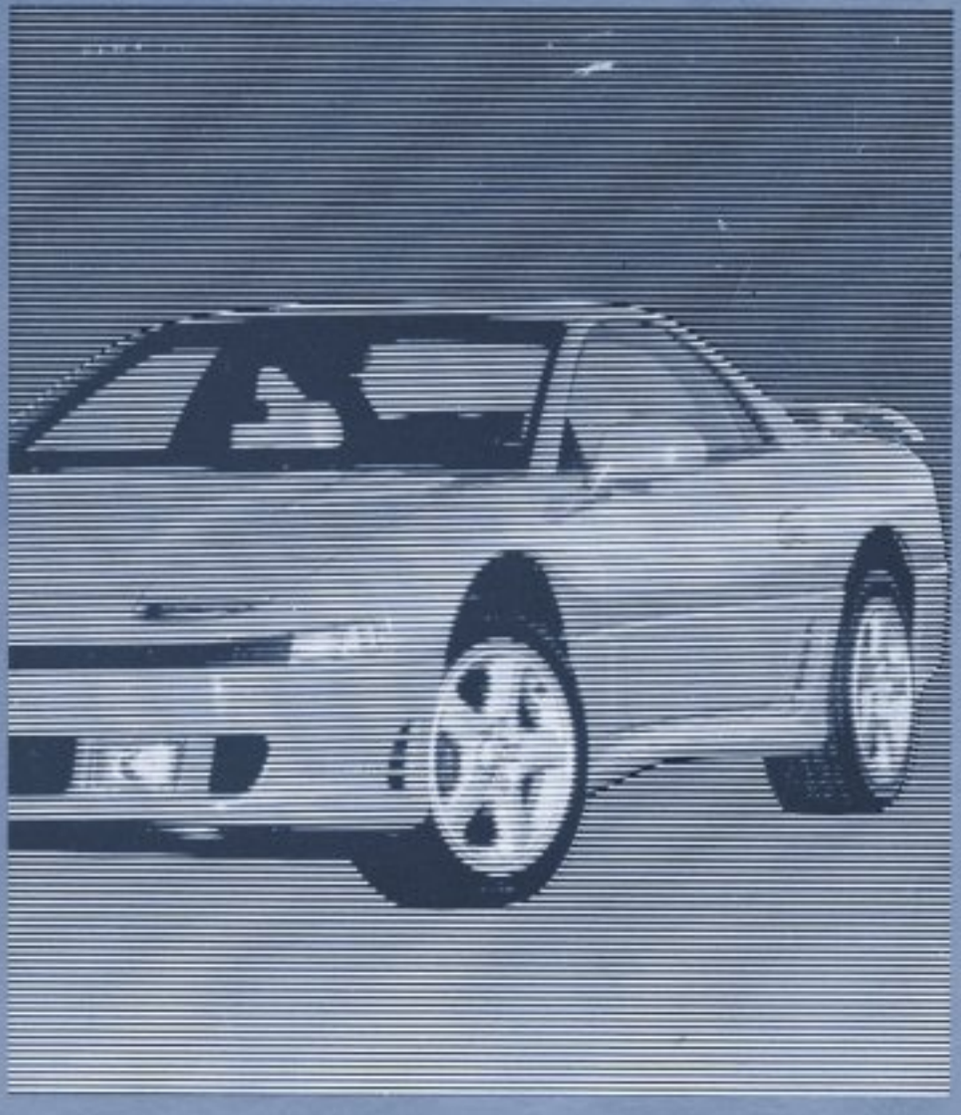
MITSUBISHI MOTORS

Service Manual

CHASSIS AND BODY



1991-1993

3000GT

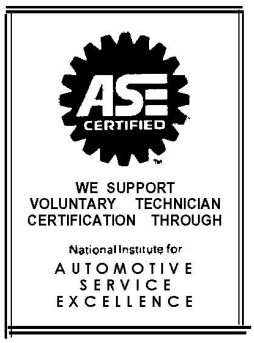
3000GT

1991-1993

Volume 1

FOREWORD

This Service Manual has been prepared with the latest service information available at the time of publication. It is subdivided into various group categories and each section contains diagnosis, disassembly, repair, and installation procedures along with complete specifications and tightening references. Use of this manual will aid in properly performing any servicing necessary to maintain or restore the high levels of performance and reliability designed into these outstanding vehicles.



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MOTOR SALES OF AMERICA Inc.

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NOTE: Electrial system information is contained in Volume 2 "Electrical" of this paired Service Manual. For overhaul procedures of engines or transmissions, refer to the separately issued Engine Service Manual or Manual/Automatic Transmission Service Manual.

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

(1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver (from rendering the SRS inoperative).

(2) If it is possible that the SRS components are subjected to heat over 93°C (200°F) in baking or in drying after painting, remove the SRS components (air bag module, SRS diagnosis unit, front impact sensors) beforehand.

(3) Service or maintenance of any SRS component or SRS-related component must'be performed only at an authorized MITSUBISHI dealer.

(4) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B – Supplemental Restraint System (SRS) and GROUP 00 – Maintenance Service, before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

Section titles with asterisks (*) in the table of contents in each group indicate operations requiring warnings.

GENERAL

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HOW TO USE THIS MANUAL

MAINTENANCE, REPAIR AND SERVICING EXPLANATIONS

This manual provides explanations, etc. concerning procedures for the inspection, maintenance, repair and servicing of the subject model. Unless otherwise specified, each service procedure covers all models. Procedures covering specific models are identified by the model codes, or similar designation (engine type, transaxle type, etc.). A description of these designations is covered in this manual under "VEHICLE IDENTIFICATION".

SERVICE ADJUSTMENT PROCEDURES

"Service Adjustment Procedures" are procedures for performing inspections and adjustments of particularly important locations with regard to the construction and for maintenance and servicing, but other inspections (for looseness, play, cracking, damage, etc.) must also be performed.

SERVICE PROCEDURES

The service steps are arranged in numerical order and attention must be paid in performing vehicle service are described in detail in SERVICE POINTS.

TROUBLESHOOTING

Troubleshootings are classified into master troubleshooting and group troubleshooting and located as follows:
The master troubleshooting is prepared when the trouble symptom relates to two or more groups and given in MASTER TROUBLESHOOTING.
The group troubleshooting guide is prepared for causes of problems related to that individual group only; a troubleshooting guide is prepared for each appropriate group.

DEFINITION OF TERMS

STANDARD VALUE

Indicates the value used as the standard for judging the quality of a part or assembly on inspection or the value to which the part or assembly is corrected and adjusted. It is given by tolerance.

LIMIT

Shows the standard for judging the quality of a part or assembly on inspection and means the maximum or minimum value within which the part or assembly must be kept functionally or in strength. It is a value established outside the range of standard value.

REFERENCE VALUE

Indicates the adjustment value prior to starting the work (presented in order to facilitate assembly and adjustment procedures, and so they can be completed in a shorter time).

CAUTION

Indicates the presentation of information particularly vital to the worker during the performance of maintenance and servicing procedures in order to avoid the possibility of injury to the worker; or damage to component parts, or a reduction of component or vehicle function or performance, etc.

INDICATION OF TIGHTENING TORQUE

The tightening torque shown in this manual is a basic value with a tolerance of ±10% except the following cases when the upper and lower limits of tightening torque are given.
(1) The tolerance for the basic value is within ±10%.
(2) Special bolts or the like are in use.
(3) Special tightening methods are used.

SPECIAL TOOL NOTE

Only MMC special tool part numbers are called out in the repair sections of this manual. Please refer to the special tool cross reference chart, which is located in the service manual at the beginning of each group, for a cross reference from the MMC special tool number to the special tool number that is available in your market.

MODEL INDICATIONS

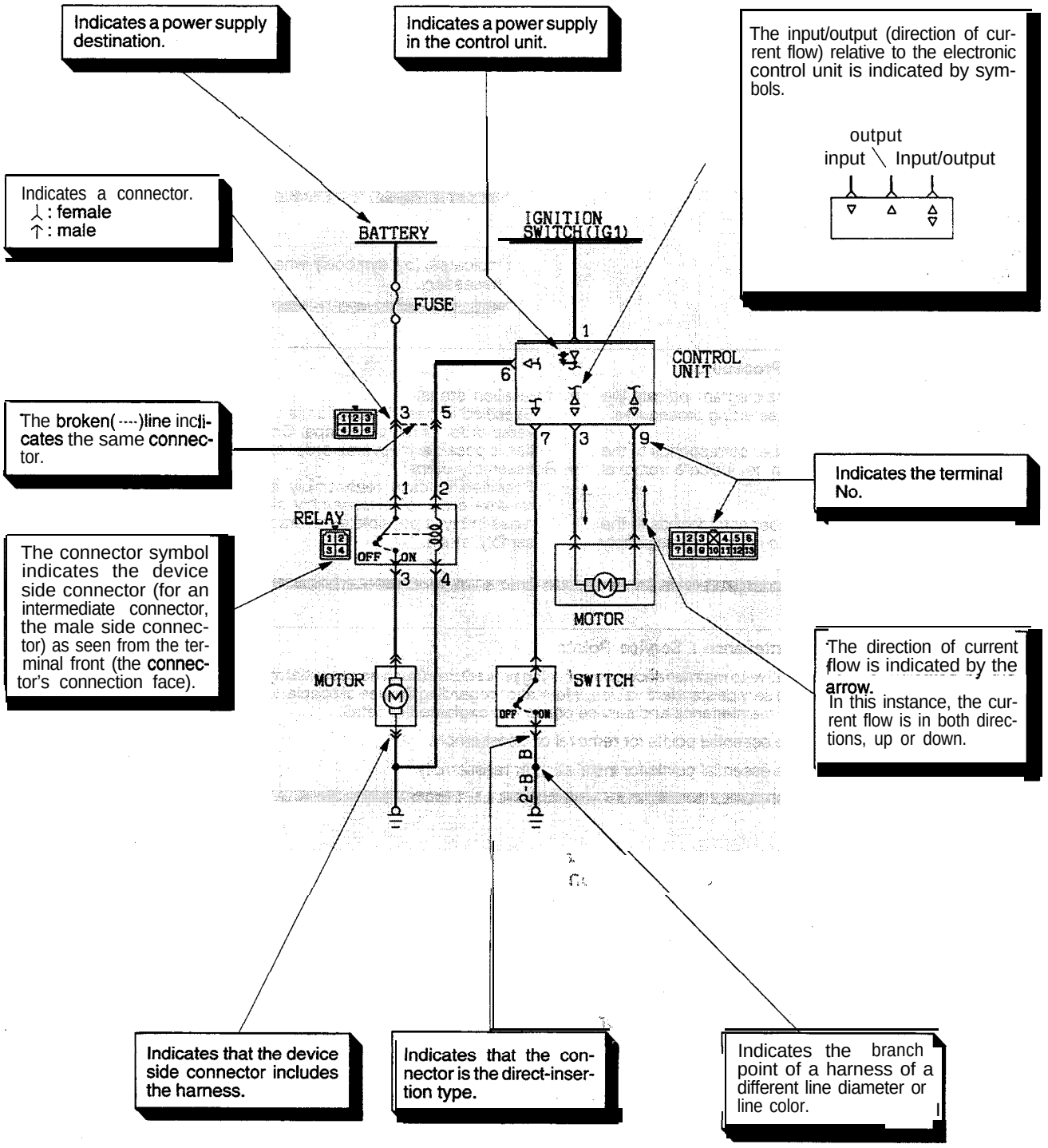
The following abbreviations are used in this manual for classification of model types.
M/T: Indicates the manual transaxle, or models equipped with the manual transaxle.
A/T: Indicates the automatic transaxle, or models equipped with the automatic transaxle.
MFI: Indicates the multiport fuel injection, or engines equipped with the multiport fuel injection.
Turbo: Indicates an engine with turbocharger, or a model equipped with such an engine.
Non-Turbo: Indicates an engine without turbocharger, or a model equipped with such an engine.
FWD: Indicates the front wheel drive vehicles.
AWD: Indicates the all wheel drive vehicles.
ABS: Indicates the anti-lock braking system or models equipped with the anti-lock braking system.
ECS: Indicates the electronic control suspension or models equipped with the electronic control suspension.
4WS: Indicates the 4-wheel steering system or models equipped with the 4-wheel steering system.

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EXPLANATION OF CIRCUIT DIAGRAMS

The symbols used in circuit diagrams are used as described below.

NOTE
For detailed information concerning the reading of circuit diagrams, refer to Volume 2 – Circuit Diagrams.



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EXPLANATION OF MANUAL CONTENTS

Indicates procedures to be performed before the work in that section is started, and procedures to be performed after the work in that section is finished.

Component Diagram

A diagram of the component parts is provided near the front of each section in order to give the reader a better understanding of the installed condition of component parts.

Indicates (by symbols) where lubrication is necessary.

Maintenance and Servicing Procedures

The numbers provided within the diagram indicate the sequence for maintenance and servicing procedures.

- Removal steps:
  The part designation number corresponds to the number in the illustration to indicate removal steps.
- Disassembly steps:
  The part designation number corresponds to the number in the illustration to indicate disassembly steps.
- Installation steps:
  Specified in case installation is impossible in reverse order of removal steps. Omitted if installation is possible in reverse order of removal steps.
- Reassembly steps:
  Specified in case reassembly is impossible in reverse order of disassembly steps. Omitted if reassembly is possible in reverse order of disassembly steps.

Classifications of Major Maintenance / Service Points

When there are major points relative to maintenance and servicing procedures (such as essential maintenance and service points, maintenance and service standard values, information regarding the use of special tools, etc.), these are arranged together as major maintenance and service points and explained in detail.

◀A▶: Indicates that there are essential points for removal or disassembly.

▶A◀: Indicates that there are essential points for installation or reassembly.

Symbols for Lubrication, Sealants and Adhesives

Information concerning the locations for lubrication and for application of sealants and adhesives is provided, by using symbols, in the diagram of component parts or on the page following the component parts page, and explained.

 : Grease
(multipurpose grease unless there is a brand or type specified)

 : Sealant or adhesive

 : Brake fluid or automatic transmission fluid

 : Engine oil, gear oil or air conditioning compressor oil

 : Adhesive tape or butyl rubber tape

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Indicates the group title.

Indicates the section title.

Indicates the group number.

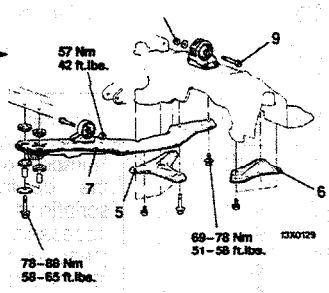
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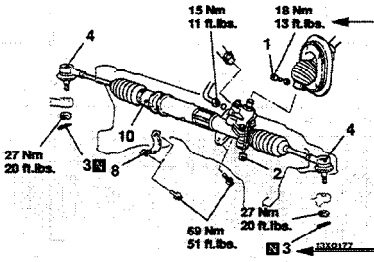
POWER STEERING GEAR BOX

110000526

REMOVAL AND INSTALLATION

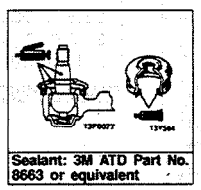
Pre-removal Operation
- Power Steering Fluid Draining (Refer to P.37A-15.)
- Stabilizer Bar Removal (Refer to GROUP 33A – Stabilizer Bar)

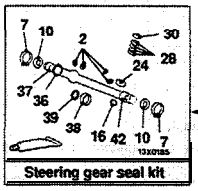




Denotes tightening torque.

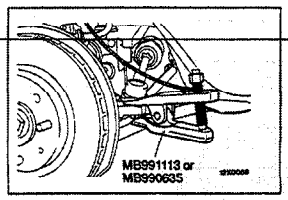
Denotes non-reusable part.





Repair kit or set parts are shown. (Only very frequently used parts are shown.)

Removal steps
1. Joint assembly and gear box connecting bolt
2. Solenoid valve connector <Vehicles with EPS>
3. Cotter pin
<A> >A< 4. Connection for tie-rod end and knuckle
5. Stay (L.H.)
6. Stay (R.H.)
7. Center member assembly
8. Clamp
<B> 9. Bolt
<C> 10. Gear box assembly

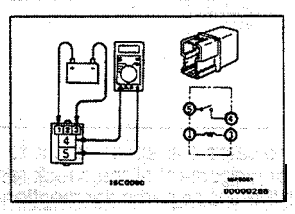


REMOVAL SERVICE POINTS

<A> TIE-ROD END DISCONNECTION

Caution
1. **Be sure to tie the cord of the special tool to the nearby part.**
2. **Loosen the nut but do not remove it.**

Operating procedures, cautions, etc. on removal, installation, disassembly and reassembly are described.



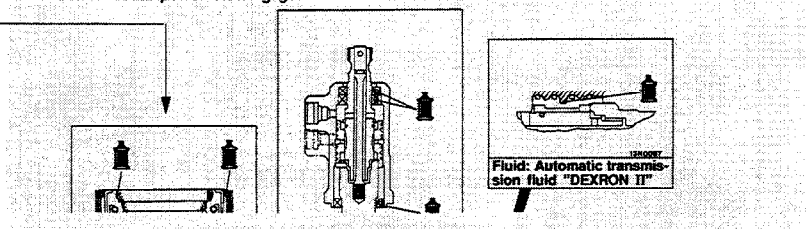
FOG LIGHT RELAY CONTINUITY CHECK

Battery voltage	Terminal			
	1	3	4	5
Power is not supplied	○	○		
Power is supplied	⊕	⊖	○	○

○—○ indicates that there is continuity between the terminals.
⊕-⊖ indicates terminals to which battery voltage is applied.

LUBRICATION AND SEALING POINTS

<Conventional power steering gear box>

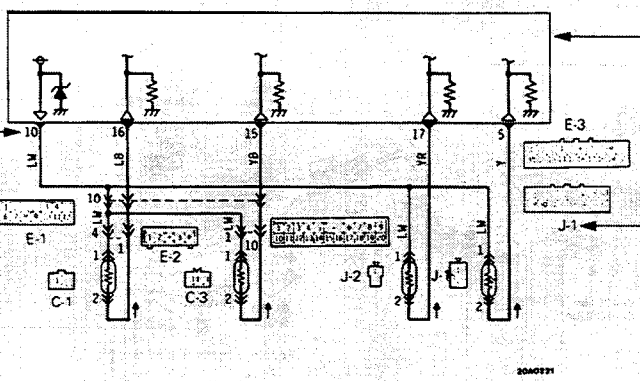


The title of the page (following the page on which the diagram of component parts is presented) indicating the locations of lubrication and sealing procedures.

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EXPLANATION OF THE TROUBLESHOOTING GUIDE

3. Checking the passenger compartment-temperature sensor, outside-air sensor, air-thermostat sensor and refrigerant-temperature sensor circuits



Indicates the circuit diagram for checking (including the interface of the air conditioning control unit).

Indicates connector's terminal number.

Indicates the connector number. Numbers are used in the operation descriptions only as necessary, and these numbers correspond to the numbers used in harness and component layout diagrams.

Provides the necessary description of circuit operation for basic understanding.

Operation description

A negative-characteristic thermistor is employed for each sensor in order to convert the ambient temperature of the sensor part to resistance.
The sensor power-supply (2.5V) of the air-conditioner control unit is applied to each sensor, and the voltages of terminals (16), (15), (17) and (5) are divided by the resistance values of each sensor, and resistance R.

Provides hints (including standards for judgement) when troubleshooting procedures are followed.

Troubleshooting hints

Diagnosis

No. 11: The passenger compartment-temperature sensor input signal is held to 25°C (77°F).
No. 12: The outside-air sensor input signal is held to 15°C (59°F).
No. 13: The air-thermostat sensor input signal is held to 4°C (39°F).

Indicates the diagnosis output code No. and the system conditions during output.

Air conditioner control unit terminal voltage

Terminal No.	Signal	Conditions	Terminal voltage
5	Outside-air sensor	Sensor part temperature 25°C (77°F) 4 kΩ	1.0–1.6V
10	Sensor power supply	At all times	2.45–2.55V
15	Refrigerant-temperature sensor	Sensor part temperature 25°C (77°F) when air conditioner is OFF 80 Ω	0.15V
16	Passenger compartment-temperature sensor	Sensor part temperature 25°C (77°F) 4 kΩ	1.0–1.6V
17	Air-thermostat sensor	Sensor part temperature 25°C (77°F) when air conditioner is OFF 4 kΩ	1.0–1.6V

Indicates the check to be made.

Indicates the terminals to be checked.

Indicates the conditions underwhich the check should be made.

Indicates the specification to be used for judgement of the check results. If there is no particular mention of conditionsin the "Conditions" column, the column Shows the specification under normal conditions.

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HOW TO USE TROUBLESHOOTING/INSPECTION SERVICE POINT

Troubleshooting of electronic control systems for which the scan tool can be used follows the basic outline described below. Furthermore, even in systems for which the scan tool cannot be used, part of these systems still follow this outline.

TROUBLESHOOTING CONTENTS

1. STANDARD FLOW OF DIAGNOSTIC TROUBLESHOOTING

The main procedures for diagnostic troubleshooting are shown.

2. SYSTEM OPERATION AND SYMPTOM VERIFICATION TESTS

If verification of the trouble symptoms is difficult, procedures for checking operation and verifying trouble symptoms are shown.

3. DIAGNOSTIC FUNCTION

The following diagnostic functions are shown.
- Method of reading diagnostic trouble codes
- Method of erasing diagnostic trouble codes
- Input inspection service points

4. INSPECTION CHART FOR DIAGNOSTIC TROUBLE CODES

5. INSPECTION PROCEDURE FOR DIAGNOSTIC TROUBLE CODES

Indicates the inspection procedures corresponding to each diagnostic trouble code. (Refer to P.OO-9 – how to use the inspection procedures.)

6. INSPECTION CHART FOR TROUBLE SYMPTOMS

If there are trouble symptoms, even though the results of inspection using the scan tool show that all diagnostic trouble codes are normal, inspection procedures for each trouble symptom will be found by means of this chart.

7. INSPECTION PROCEDURE FOR DIAGNOSTIC SYMPTOM

Indicates the inspection procedures corresponding to each trouble symptoms classified in the Inspection Chart for Trouble Symptoms. (Refer to P.00-9 – how to use the inspection procedures.)

8. SERVICE DATA REFERENCE TABLE

Inspection items and normal judgement values have been provided in this chart as reference information.

9. CHECK AT ECU TERMINALS

Terminal numbers for the ECU connectors, inspection items and standard values have been provided in this chart as reference information.

Terminal Voltage Checks

1. Connect a needle-nosed wire probe or paper clip to a voltmeter probe.
2. Insert the needle-nosed wire probe into each of the ECU connector terminals from the wire side, and measure the voltage while referring to the check chart.

NOTE
1. Measure voltage with the ECU connectors connected.
2. You may find it convenient to pull out the ECU to make it easier to reach the connector terminals.
3. Checks don't have to be carried out in the order given in the chart.

Caution
Short-circuiting the positive (+) probe between a connector terminal and ground could damage the vehicle wiring, the sensor, the ECU, or all three.
Use care to prevent this!

3. If voltage readings differ from Normal Condition values, check related sensors, actuators, and wiring, then replace or repair.
4. After repair or replacement, recheck with the voltmeter to confirm that the repair has corrected the problem.

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Terminal Resistance and Continuity Checks

1. Turn off the ignition switch.
2. Disconnect the ECU connector.
3. Measure the resistance and check for continuity between the terminals of the ECU harness-side connector while referring to the check chart.

   NOTE
   Checks don't have to be carried out in the order given in the chart.

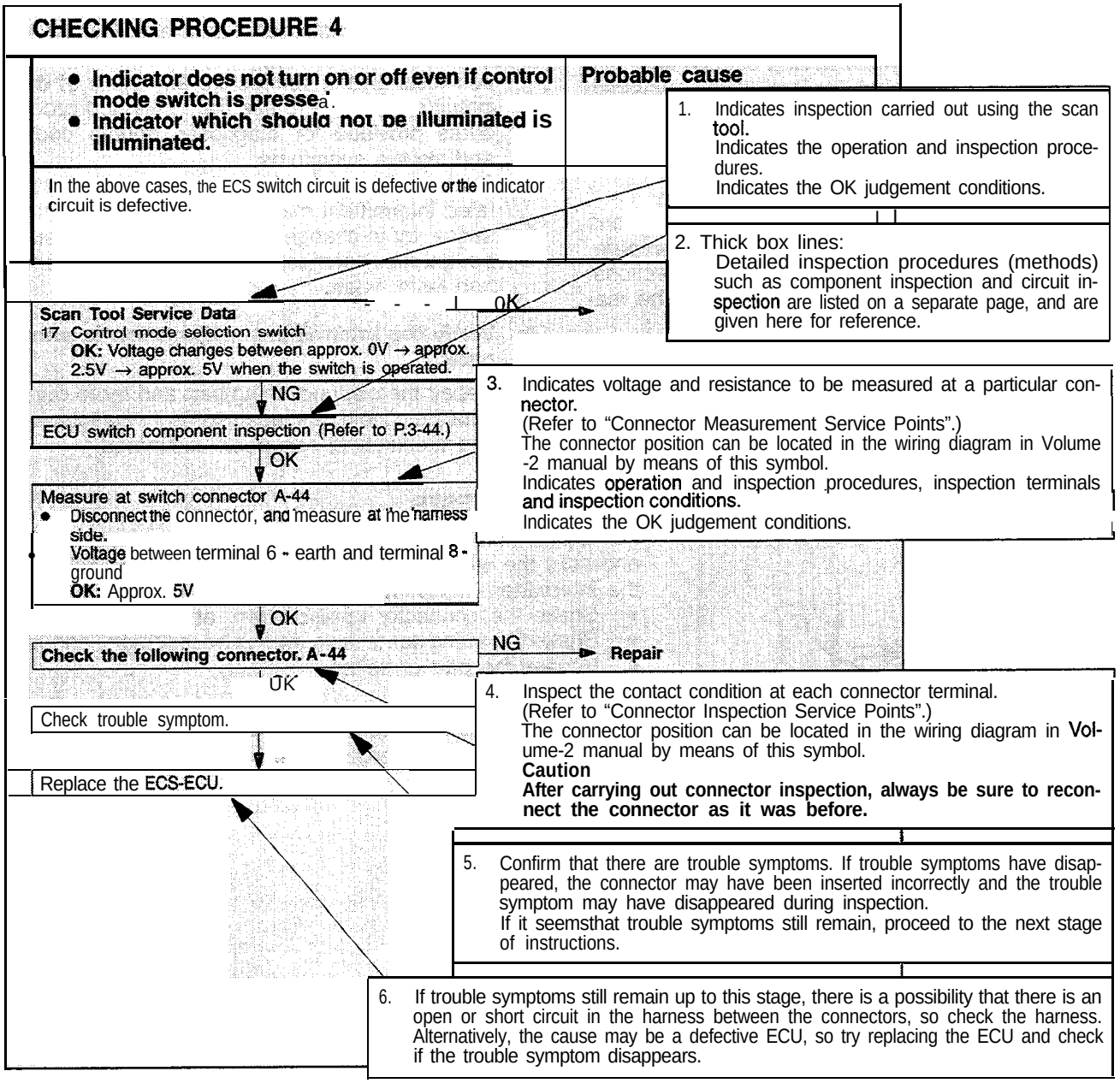
   Caution
   If resistance and continuity checks are performed on the wrong terminals, damage to the vehicle wiring, sensors, ECU, and/or ohmmeter may occur.
   Use care to prevent this!
4. If the ohmmeter shows any deviation from the Normal Condition value, check the corresponding sensor, actuator and related electrical wiring, then repair or replace.
5. After repair or replacement, recheck with the ohmmeter to confirm that the repair has corrected the problem.

10. INSPECTION PROCEDURES USING AN OSCILLOSCOPE

When there are inspection procedures using an oscilloscope, these are listed here.

HOW TO USE THE INSPECTION PROCEDURES

The causes of a high frequency of problems occurring in electronic circuitry are generally the connectors, components, the ECU and the harnesses between connectors, in that order. These inspection procedures follow this order, and they first try to discover a problem with a connector or a defective component.



HARNESS INSPECTION

Check for an open or short circuit in the harness between the terminals which were defective according to the connector measurements. Carry out this inspection while referring to Volume 2 Electrical manual. Here, "Check harness between power supply and terminal xx" also includes checking for blown fuses. For inspection service points when there is a blown fuse, refer to "Inspection Service Points for a Blown Fuse".

MEASURES TO TAKE AFTER REPLACING THE ECU

If the trouble symptoms have not disappeared even after replacing the ECU, repeat the inspection procedure from the beginning.

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HOW TO COPE WITH INTERMITTENT MALFUNCTIONS

Most intermittent malfunctions occur under certain conditions. If those conditions can be identified, the cause will be easier to find.

TO COPE WITH INTERMITTENT MALFUNCTION;

1. Ask the customer about the malfunction

Ask what it feels like, what it sounds like, etc. Then ask about driving conditions, weather, frequency of occurrence, and so on.

2. Determine the conditions from the customer's responses

Typically, almost all intermittent malfunctions occur from conditions like vibration, temperature and/or moisture change, poor connections. From the customer's replies, it should be reasoned which condition is influenced.

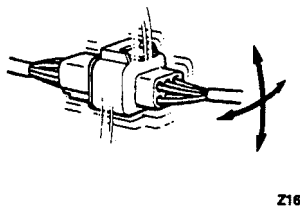
3. Use simulation test

In the cases of vibration or poor connections, use the simulation tests below to attempt to duplicate the customer's complaint. Determine the most likely circuit(s) and perform the simulation tests on the connectors and parts of that circuit(s). Be sure to use the inspection procedures provided for diagnostic trouble codes and trouble symptoms.

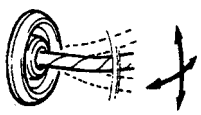
For temperature and/or moisture conditions related intermittent malfunctions, using common sense, try to change the conditions of the suspected circuit components, then use the simulation tests below.

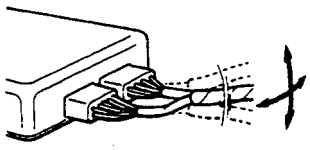
4. Verify the intermittent malfunction is eliminated

Repair the malfunctioning part and try to duplicate the condition(s) again to verify the intermittent malfunction has been eliminated.

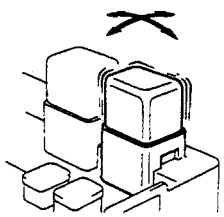


Z16S0253





Z16S0250



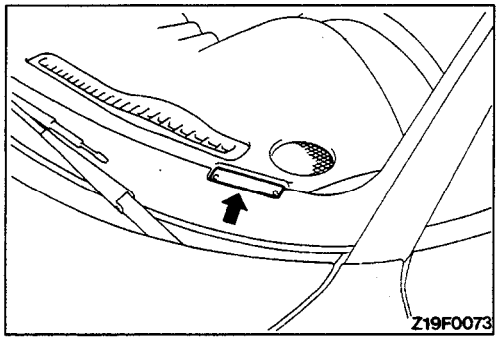
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SIMULATION TESTS

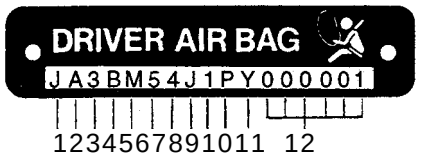
For these simulation tests, shake, then gently bend, pull, and twist the wiring of each of these examples to duplicate the intermittent malfunction.

- Shake the connector up-and-down, and right-and-left.
- Shake the wiring harness up-and-down, and right-and-left.
- Vibrate the part or sensor.

NOTE
In case of difficulty in finding the cause of the intermittent malfunction, the data recorder function in the scan tool (MUT-II) is effective.



<Up to 1993 models>



00Z0008

<From 1994 models>



0020009
00004107

VEHICLE IDENTIFICATION

VEHICLE IDENTIFICATION NUMBER LOCATION

The vehicle identification number (V.I.N.) is located on a plate attached to the left top side of the instrument panel.

VEHICLE IDENTIFICATION CODE CHART PLATE

All vehicle identification numbers contain 17 digits. The vehicle number is a code which tells country, make, vehicle type, etc.

No.	Item	Contents	
1	Country	J: Japan	
2	Make	A: Mitsubishi	
3	Vehicle type	3: Passenger Car	
4	Others	X: (1992 models)	Driver Air Bag, Passenger Manual Seat Belt
		B: (1993 models)	
		A: (From 1994 models)	Driver and Passenger Air Bag
5	Line	D: 3000GTFWD	1992 models
		E: 3000GT AWD	
		M: 3000GT FWD	1993, 1994, and from 1995 (Hatchback) models
		N: 3000GT AWD	
		V: 3000GT FWD Convertible	From 1995 (Convertible) models
		W: 3000GT AWD Convertible	
6	Price class	4: High	
		5: Sports (1994 models only), Premium	
		6: Premium (1994 models only), Special	
		7: Ultimate	
		8: Sports (1995 and 1996 models)	
7	Body	4: 3-door Hatchback	
		5: 2-door Convertible	
8	Engine	B: 3.0 dm^3 (181.4 cu.in.) <DOHC-MFI>	up to 1993 models
		C: 3.0 dm^3 (181.4 cu.in.) <DOHC-MFI-Turbo>	
		J: 3.0 dm^3 (181.4 cu.in.) <DOHC-MFI>	From 1994 models
		K: 3.0 dm^3 (181.4 cu.in.) <DOHC-MFI-Turbo>	
9	Check digits*		
10	Model year	N: 1992 Year	
		P: 1993 Year	
		R: 1994 Year	
		S: 1995 Year	
		T: 1996 Year	
11	Plant	Y: Nagoya-I Plant	
12	Serial number	000001 to 999999	

NOTE
*: Check digit means a single number or letter X used to verify the accuracy of transcription of vehicle identification number.

TSB Revision

VEHICLE IDENTIFICATION NUMBER LIST

<1 992 MODELS>

<1 993 MODELS>

VEHICLES FOR FEDERAL

V.I.N. (except sequence number)	Brand	Engine displacement	Models code
JA3BM54J□PY (1993 model) JA3XD54B□NY (1992 model)	Mitsubishi 3000GT <FWD>	3.0 dm^3 (181.4 cu.in.) [DOHC-MFI]	Z11AMNXML2M Z11AMRXML2M
JA3BM64J□PY (1993 model) JA3XD64B□NY (1992 model)			Z11AMNPML2M Z11AMRPML2M
JA3BN74K□PY (1993 model) JA3XE74C□NY (1992 model)	Mitsubishi 3000GT <AWD>	3.0 dm^3 (181.4 cu.in.) [DOHC-MFI-Turbo]	Z15AMNGFL2M Z16AMNGFL2M

VEHICLES FOR CALIFORNIA

V.I.N. (except sequence number)	Brand	Engine displacement	Models code
JA3BM54J□PY (1993 model) JA3XD54B□NY (1992 model)	Mitsubishi 3000GT <FWD>	3.0 dm^3 (181.4 cu.in.) [DOHC-MFI]	Z11AMNXML7M Z11AMRXML7M
JA3BM64J□PY (1993 model) JA3XD64B□NY (1992 model)			Z11AMNPML7M Z11AMRPML7M
JA3BN74K□PY* (1993 model) JA3XE74C□NY* (1992 model)	Mitsubishi 3000GT <AWD>	3.0 dm^3 (181.4 cu.in.) [DOHC-MFI-Turbo]	Z15AMNGFL7M Z16AMNGFL7M

NOTE
AWD marked with • can also be sold in Federal States.

<1 994 MODELS>

VEHICLES FOR FEDERAL

V.I.N. (except sequence number)	Brand	Engine displacement	Models code
JA3AM54J□RY; 0 0 0 G T	Mitsubishi 3 <FWD>	3.0 dm^3 (181.4 cu.in.) [DOHC-MFI]	Z11AMNXML2M Z11AMRXML2M
JA3AM64J□RY			Z11AMNPML2M Z11AMRPML2M
JA3AN74K□RY	Mitsubishi 3000GT <AWD>	3.0 dm^3 (181.4 cu.in.) [DOHC-MFI-Turbo]	Z16AMJGFL2M

VEHICLES FOR CALIFORNIA

V.I.N. (except sequence number)	Brand	Engine displacement	Models code
JA3AM54J□RY; 0 0 0 G T		3.0 dm^3 (181.4 cu.in.) [DOHC-MFI]	Z11AMNXML7M Z11AMRXML7M
JA3AM64J□RY			Z11AMNPML7M Z11AMRPML7M
JA3AN74K□RY	Mitsubishi 3000GT <AWD>	3.0 dm^3 (181.4 cu.in.) [DOHC-MFI-Turbo]	Z16AMJGFL7M

TSB Revision

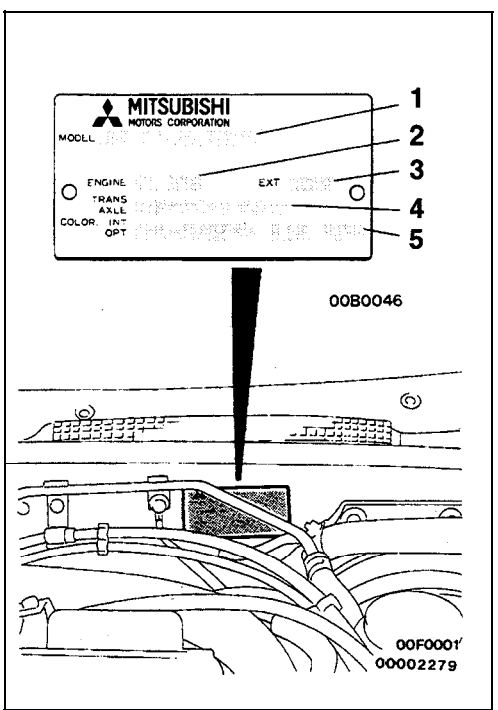
<1 995 MODELS>
cl996 MODELS>

VEHICLES FOR FEDERAL

V.I.N. (except sequence number)	Brand		Engine displacement	Models code
JA3AM54J□SY	Mitsubishi 3000GT	FWD	3.0 dm³ (181.4 cu.in.) [DOHC-MFI]	Z11AMNPML2M Z11AMRPML2M
JA3AM84J□SY				Z11AMNXML2M Z11AMRXML2M
JA3AN74K□SY		AWD	3.0 dm³ (181.4 cu.in.) [DOHC-MFI-Turbo]	Z16AMJGFL2M

VEHICLES FOR CALIFORNIA

V.I.N. (except sequence number)	Brand		Engine displacement	Models code
JA3AM54J□SY	Mitsubishi 3000GT <FWD>	Hatch-back	3.0 dm³ (181.4 cu.in.) [DOHC-MFI]	Z11AMNPML7M Z11AMRPML7M
JA3AM84J□SY				Z11AMNXML7M Z11AMRXML7M
JA3AV65J□SY		Con-vertible		Z11ABRPML7M
JA3AN74K□SY	Mitsubishi 3000GT <AWD>	Hatch-back	3.0 dm³ (181.4 cu.in.) [DOHC-MFI-Turbo]	Z16AMJGFL7M
JA3AW75K□SY		Con-vertible		Z16ABJGFL7M

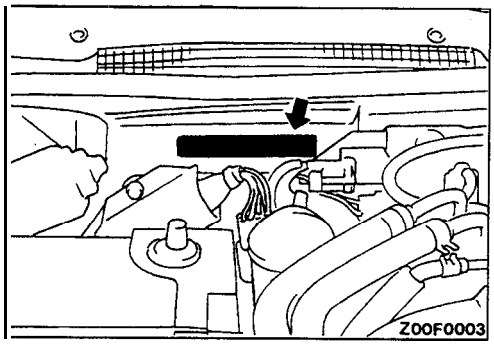


VEHICLE INFORMATION CODE PLATE

Vehicle information code plate is riveted onto the bulkhead in the engine compartment.
The place shows model code, engine model, transaxle model, and body color code.

No.	Items	Contents	
1	MODEL	Z11AM NXML2M	Z11AM: Vehicle model
			NXML2M: Model series
2	ENGINE	6G72	Engine model
3	EXT	CA6A	Exterior code
4	TRANS-AXLE	F5M33 3307	F5M33: Transaxle model
			3307: Rear differential reduction
5	COLOR, INT OPT	R25 87V 03V	R25: Body color code
			87V: Interior code
			03V: Equipment code

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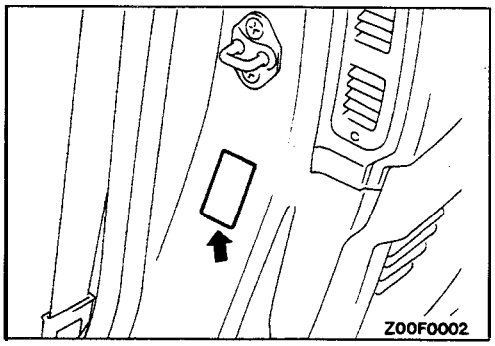
CHASSIS NUMBER

STAMPING LOCATION

The chassis number is stamped on the top center of the firewall located in the engine compartment.

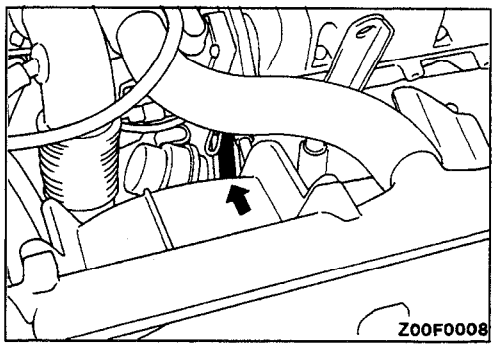
CHASSIS NUMBER CODE CHART

Chassis number code	Contents
Z1 ❑ A RY000001	Z1 CIA: Indicates 3000GT-series.
	RY000001: Refer to 10th thru 17th digits of V.I.N. plate.



VEHICLE SAFETY CERTIFICATION LABEL

1. The vehicle safety certification label is attached to the face of left door pillar.
2. This label indicates the month and year of manufacture, Gross Vehicle Weight Rating (G.V.W.R.), and Gross Axle Weight Rating (G.A.W.R.), front and rear, and Vehicle Identification Number (V.I.N.).



ENGINE MODEL STAMPING

1. The engine model number is stamped at the front side on the top edge of the cylinder block as shown in the following:

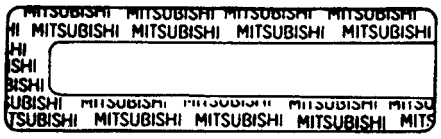
Engine model	Engine displacement
6G72	3.0 dm^3 (181.4 cu.in.)

2. The engine serial number is stamped near the engine model number.

Enaine serial number	AA0201 to YY9990

Theft protection label

For original parts



00K619

For replacement parts



00K621
00002280

THEFT PROTECTION

In order to protect against theft, a Vehicle Identification Number (VIN) is stamped in, or attached as a label to, the following major parts of the engine and transaxle, as well as main outer panels:

Engine cylinder block, Transaxle housing, Fender, Door, Quarter panel, Hood, Liftgate, Bumpers

In addition, a theft-protection label is attached to replacement parts for the body outer panel main components, and the same data are stamped into replacement parts for the engine and the transaxle.

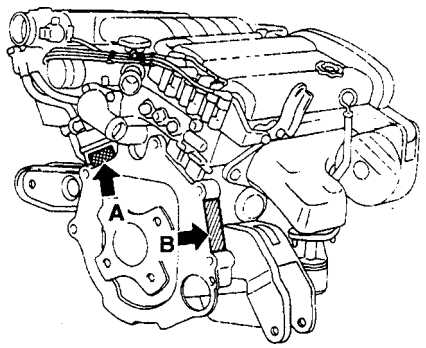
Cautions regarding panel repairs:

1. **When repainting original parts, do so after first masking the theft-protection label, and, after painting, be sure to peel off the masking tape.**
2. **The theft-protection label for replacement parts is covered by masking tape, so such parts can be painted as is. The masking tape should be removed after painting is finished.**
3. **The theft-protection label should not be removed from original parts or replacement parts.**

LOCATIONS

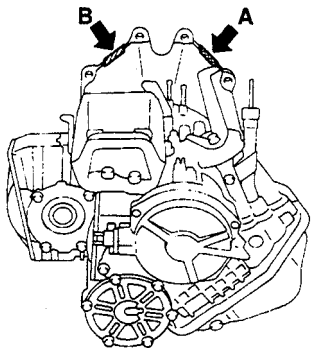
Target area (A: for original equipment parts, B: for replacement parts)

Engine



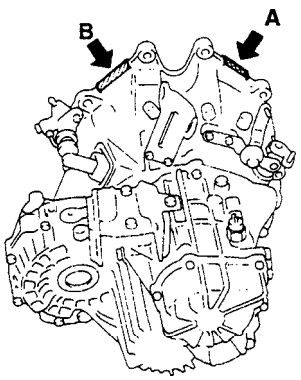
Z00F0033

Automatic transaxle



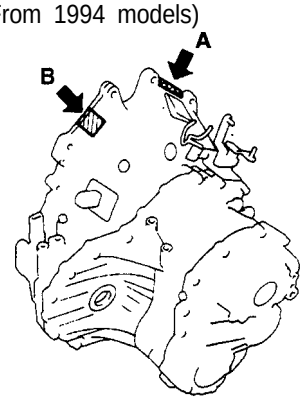
Z00F0018

Manual transaxle
<F5M33>



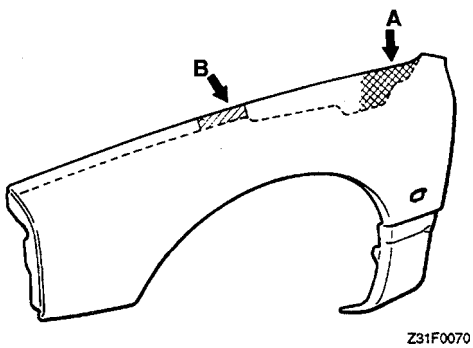
Z00F0017

Manual transaxle
<W5MG1> (Up to 1993 models)
<W6MG1> (From 1994 models)



Z00F0016

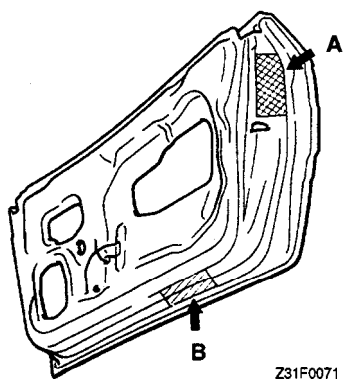
Fender



Z31F0070

The illustration indicates left hand side, outer.
Right hand side is symmetrically opposite.

Door



Z31F0071

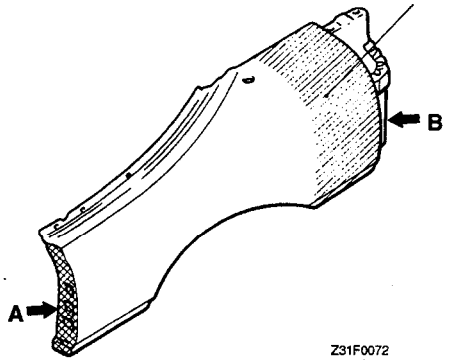
The illustration indicates right hand side, outer.
Left hand side is symmetrically opposite.

TSB Revision

Target area (A: for original equipment parts, B: for replacement parts)

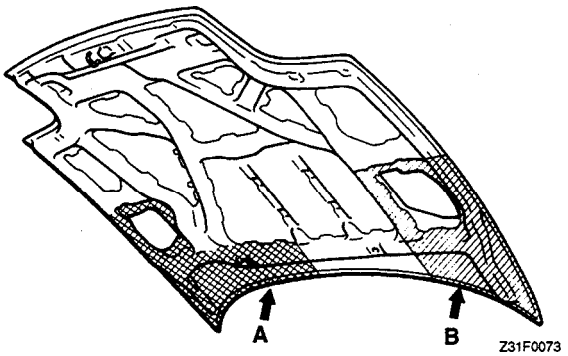
Quarter panel

The replacement part label is attached to the inner side of the part shown in the illustration.

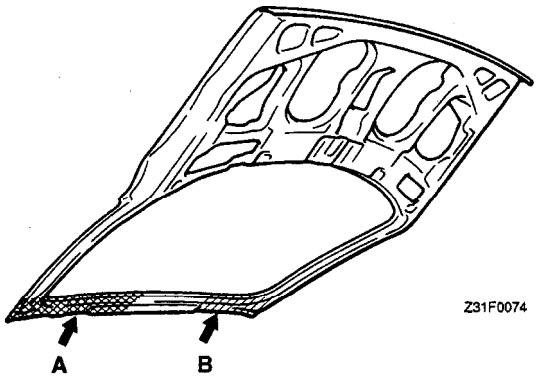


The illustration indicates left hand side, outer. Right hand side is symmetrically opposite.

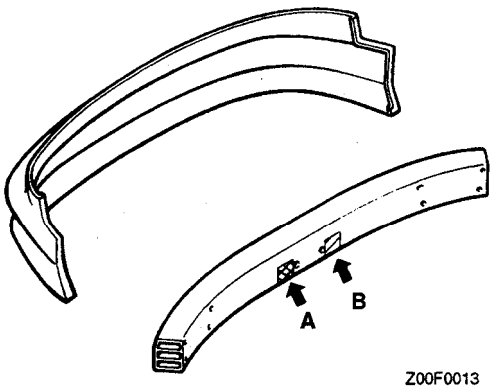
Hood



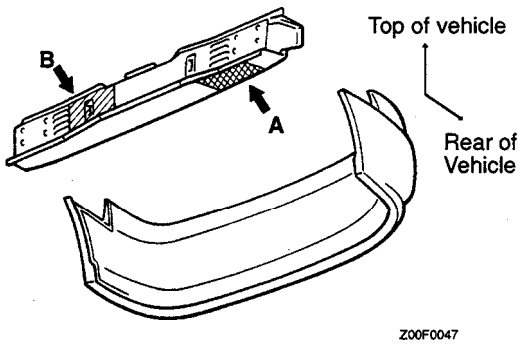
Liftgate



Front bumper



Rear bumper

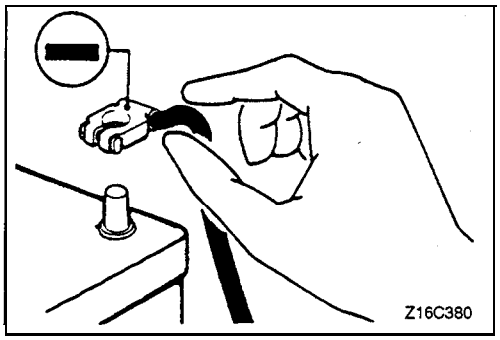


TSB Revision

PRECAUTIONS BEFORE SERVICE

SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

1. Items to follow when servicing SRS
   (1) Be sure to be read GROUP 52B – Supplemental Restraint System (SRS).
   For safe operations, please follow the directions and heed all warnings.
   (2) Always use the designated special tools and test equipment.
   (3) Wait at least 60 seconds after disconnecting the battery cable before doing any further work. The SRS system is designed to retain enough voltage to deploy the air bag even after the battery has been disconnected. Serious injury may result from unintended air bag deployment if work is done on the SRS system immediately after the battery cable is disconnected.
   (4) Never attempt to disassemble or repair the SRS components (front impact sensors, SRS diagnosis unit, air bag module and clock spring). If faulty, replace it.
   (5) Warning labels must be heeded when servicing or handling SRS components. Warning labels are located in the following locations.
   . Hood
   • Sun visor
   • Glove box
   • SRS diagnosis unit
   • Steering wheel
   • Air bag module
   • Clock spring
   • Steering gear and linkage clamp
   (6) Store components removed from the SRS in a clean and dry place.
   The air bag module should be stored on a flat surface and placed so that the pad surface is facing upward.
   Do not place anything on top of it.
   (7) Be sure to deploy the air bag before disposing of the air bag module or disposing of a vehicle equipped with an air bag. (Refer to GROUP 52B – Air Bag Module Disposal Procedures.)
   (8) Whenever you finish servicing the SRS, check the SRS warning light operation to make sure that the system functions properly.
2. Observe the following when carrying out operations on places where SRS components are installed, including operations not directly related to the SRS air bag.
   (1) When removing or installing parts do not allow any impact or shock to the SRS components.
   (2) SRS components should not be subjected to heat over 93°C (200°F), so remove the SRS components before drying or baking the vehicle after painting.
   After re-installing them, check the SRS warning light operation to make sure that the system functions properly.



SERVICING ELECTRICAL SYSTEM

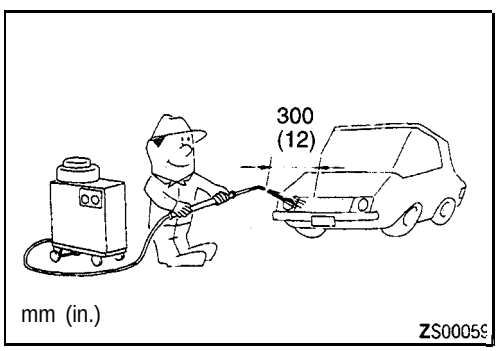
1. Note the following before proceeding with work on the electrical system.
   Note that the following must never be done:
   Unauthorized modifications of any electrical device or wiring, because such modifications might lead to a vehicle malfunction, over-capacity or short-circuit that could result in a fire in the vehicle.
2. When servicing the electrical system, disconnect the negative cable terminal from the battery.

Caution

1. Before connecting or disconnecting the negative cable, be sure to turn off the ignition switch and the lighting switch.
(If this is not done, there is the possibility of semiconductor parts being damaged.)

2. After completion of the work steps [when the battery's negative (–) terminal is connected], warm up the engine and allow it to idle for approximately ten minutes under the conditions described below, in order to stabilize the engine control conditions, and then check to be sure that the idling is satisfactory.

Engine coolant temperature: 80–95°C (176–203°F)
Lights, electric fans, accessories: OFF
Transaxle: Neutral position
(A/T models: "N" or "P")
Steering wheel: neutral (center) position



VEHICLE WASHING

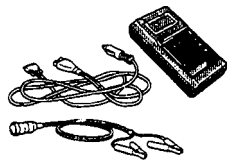
If high-pressure car-washing equipment or steam car-washing equipment is used to wash the vehicle, be sure to maintain the spray nozzle at a distance of at least 300 mm (12 in.) from any plastic parts and all opening parts (doors, luggage compartment, etc.).

APPLYING RUST PREVENTIVES, UNDERCOAT, ETC.

Heated oxygen sensors have their functional efficiency decreased if they are smeared with oil or grease. When applying rust preventives, undercoat, etc., be sure to protect the heated oxygen sensor with a protective cover or the like.

TSB Revision

Scan tool (Multi-Use Tester <MUT>)



ROM pack



00002282

SCAN TOOL (MUT) <Up to 1993 models>

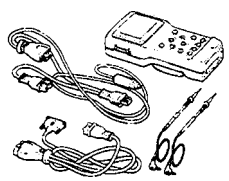
(1) To operate the scan tool, refer to the "MULTI-USE TESTER OPERATION INSTRUCTIONS".

Caution
Connection and disconnection of the scan tool should always be made with the ignition switch in the OFF position.

(2) Always use a ROM pack that is appropriate for the vehicle.

ROM Pack	Applicable Model
MB991423	1992 model
MB991466	1992.1993 model

Scan tool <MUT-II>



Z16X0606

ROM pack

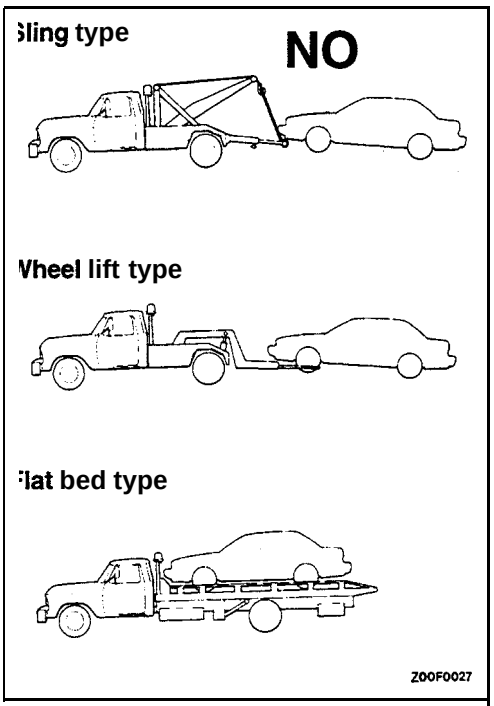


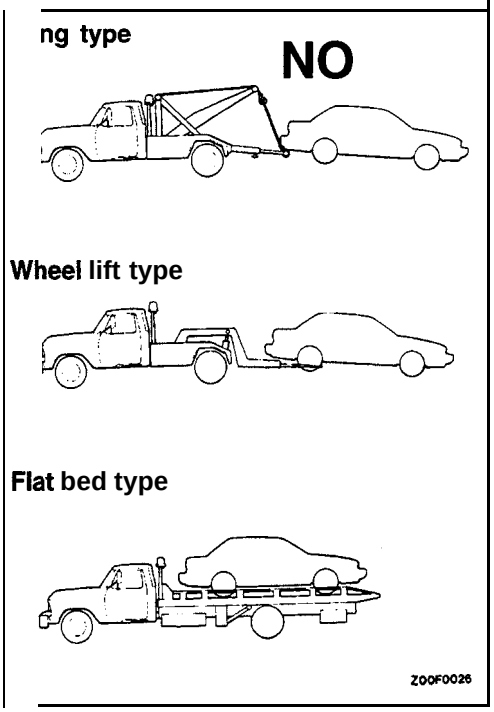
Z16X0607
00002281

SCAN TOOL (MUT-II) <From 1994 models> <All models>

To operate the scan tool, refer to the "MUT-II OPERATING INSTRUCTIONS".

Caution
Connection and disconnection of the scan tool should always be made with the ignition switch in the OFF position.





TOWING AND HOISTING

WRECKER TOWING RECOMMENDATION

<FWD>

FRONT TOWING PICKUP

Caution
This vehicle cannot be towed by a wrecker using sling-type equipment to prevent the bumper from deformation. If this vehicle is towed, use wheel lift or flat bed equipment.

The vehicle may be towed on its rear wheels for extended distances provided the parking brake is released. It is recommended that vehicles be towed using the front pickup whenever possible.

REAR TOWING PICKUP

Caution
This vehicle cannot be towed by a wrecker using sling-type equipment to prevent the bumper from deformation. If this vehicle is towed, use wheel lift or flat bed equipment.

Manual transaxle vehicles may be towed on the front wheels, provided the transaxle is in neutral and the drive-line has not been damaged. The steering wheel must be clamped in the straight-ahead position with a steering wheel clamping device designed for towing service use.

Caution
1. **Do not use steering column lock to secure front wheel position for towing.**
***2. Make sure the transaxle is in Neutral if vehicle will be with drive wheels on the ground.**

Automatic transaxle vehicle may be towed on the front wheels at speeds not to exceed 50 km/h (30 mph) for distances not to exceed 30 km (18 miles).

Caution
If these limits cannot be met, the front wheels must be placed on a tow dolly.

NOTE
***:** <From 1994 models>

TOWING WHEN KEYS ARE NOT AVAILABLE

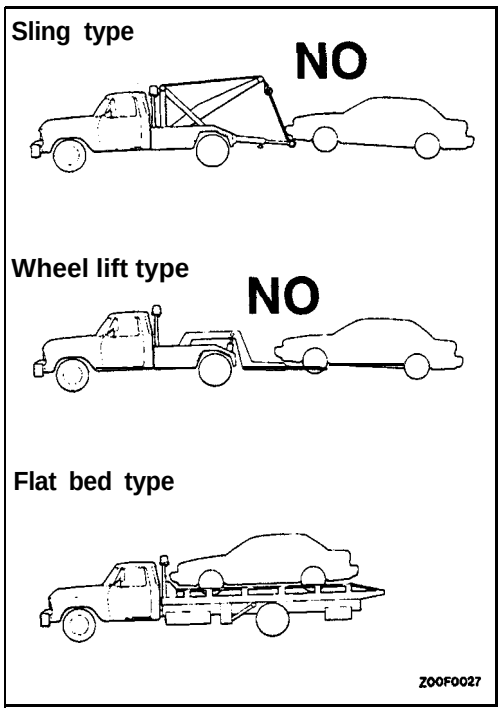
When a locked vehicle must be towed and keys are not available, the vehicle may be lifted and towed from the front, provided the parking brake is released. If not released, the rear wheels should be placed on a tow dolly.

TSB Revision

SAFETY PRECAUTIONS

The following precautions should be taken when towing the vehicle.

1. DO NOT LIFT OR TOW THE VEHICLE BY ATTACHING TO OR WRAPPING AROUND THE BUMPER.
2. Any loose or protruding parts of damaged vehicle'such as hoods, doors, fenders, trim, etc., should be secured or removed prior to moving the vehicle.
3. Operator should refrain from going under a vehicle while it is lifted by the towing equipment, unless the vehicle is adequately supported by safety stands.
4. Never allow passengers to ride in a towed vehicle.
5. State and local rules and regulations must be followed when towing a vehicle.



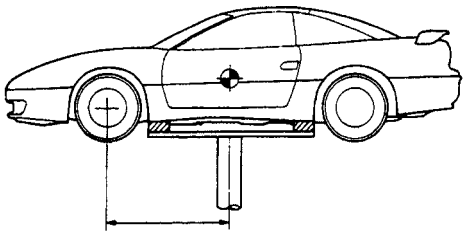
<AWD>

Caution

1. **If only the front wheels or only the rear wheels are lifted for towing, the bumper will be damaged. In addition, lifting of the rear wheels causes the oil to flow forward, and may result in heat damage to the rear bushing of the transfer, and so should never be done.**
2. **The vehicle must not be towed by placing only its front wheels or only the rear wheels on a rolling dolly, because to do so will result in deterioration of the viscous coupling and in the viscous coupling causing the vehicle to jump forward suddenly.**
3. **If this vehicle is towed, use flat bed equipment.**

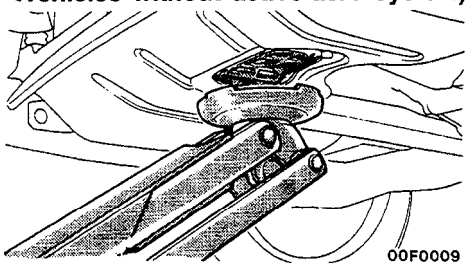
TSB Revision

Frame contact support location



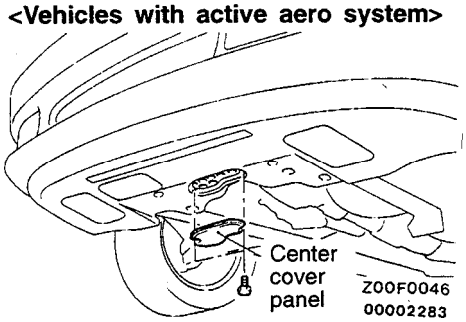
<FWD>: 1,070 mm (42.0 in.)
<AWD>: 1,130 mm (44.0 in.) Z00F003

Front
<Vehicles without active-aero system)



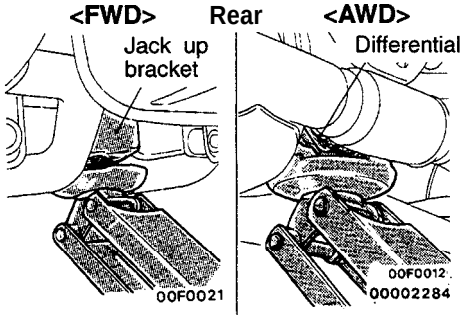
00F0009

<Vehicles with active aero system>



Z00F0046
00002283

<FWD> Rear <AWD>



00F0021
00F0012
00002284

HOISTING

POST TYPE

Special care should be taken when raising the vehicle on a frame contact type hoist. The hoist must be equipped with the proper adapters in order to support the vehicle at the proper locations.

Caution
When service procedures require removing rear suspension, fuel tank, spare tire and liftgate, place additional weight on rear end of vehicle or anchor vehicle to hoist to prevent tipping of center of gravity changes.

FLOOR JACK

The usual type of floor jack is used at the following locations.
Front: Under the mid point of No. 1 crossmember

NOTE
On vehicles with active-aero system, the front jacking point can be accessed by removing the center cover panel from the under cover. Be sure to reinstall the center cover panel after jack-up operation.

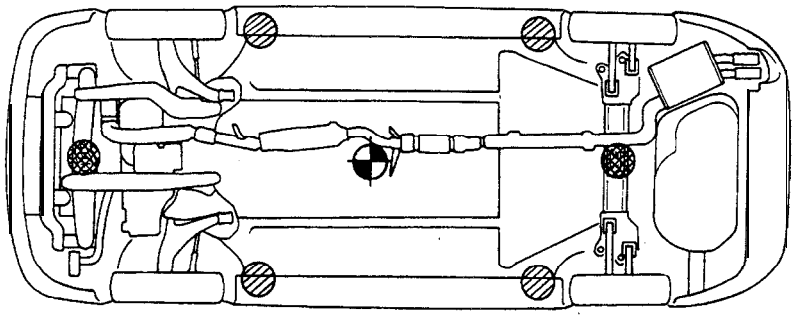
Rear:
<FWD> Under the jack up bracket of crossmember
<AWD> Under the rear differential

Caution
1. **When lifting the No. 1 crossmember, do not allow jack lifting plate to contact under cover.**
2. **In order to prevent scarring the crossmember, place a piece of cloth on the jack's contact surface (to prevent corrosion caused by damage to the coating).**
3. **A floor jack must never be used on any part of the underbody.**
4. **Do not attempt to raise one entire side of the vehicle by placing a jack midway between front and rear wheels. This practice may result in permanent damage to the body.**

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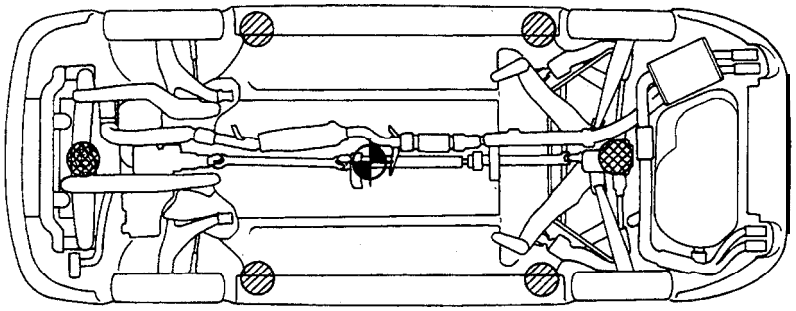
'LIFTING, JACKING SUPPORT LOCATION

<FWD>



Z00F0020

<AWD>



Z00F0019
00002285

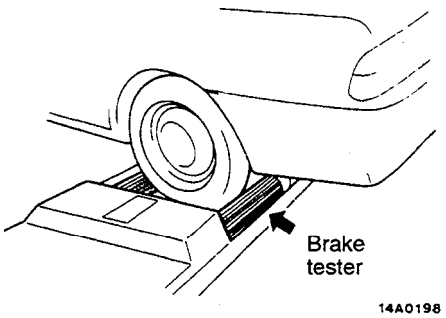
Floor jack locations Approximate center of gravity

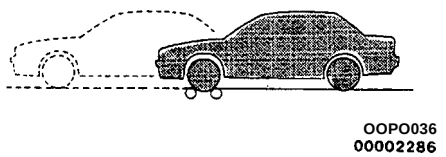
Frame contact hoist, twin post hoist or scissors jack (emergency) locations

EMERGENCY JACKING

Jack receptacles are located at the body sills to accept the scissors jack supplied with the vehicle for emergency road service. Always block opposite wheels and jack on level surface.

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SPECIAL HANDLING INSTRUCTIONS FOR AWD MODELS

BRAKE TEST

In order to stabilize the viscous coupling's dragging force, the brake test should always be conducted after the speedometer test.

FRONT WHEEL MEASUREMENTS

1. Place the front wheels on the brake tester.
2. Perform the brake test.

Caution
The rear wheels should remain on the ground.

3. If the brake dragging force exceeds the specified value, jack up the vehicle and manually rotate each wheel to check the rotation condition of each wheel.

NOTE
If the brake dragging force exceeds the specified value, the cause may be the effect of the viscous coupling's dragging force, so jack up the front wheels and check the rotation condition of the wheels in this state for no effect by the viscous coupling's dragging force.

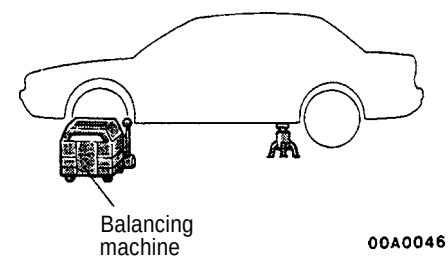
REAR WHEEL MEASUREMENTS

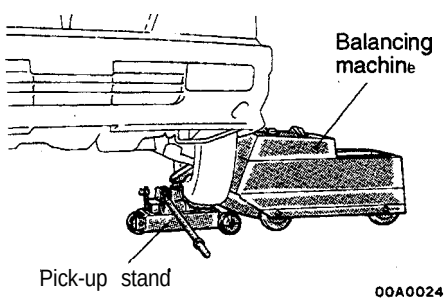
After placing the rear wheels on the brake tester, follow the same procedures as for the front wheel measurements.

WHEEL BALANCE

FRONT WHEEL MEASUREMENTS

1. Jack up the rear wheels, and place an axle stand at the designated part of the side sill.
2. Jack up the front wheels and set a pick-up stand and balancing machine in place.





Caution
1. Set so that the front and rear of the vehicle are at the same height.
2. Release the parking brake.
3. Rotate each wheel manually and check to be sure that there is no dragging.

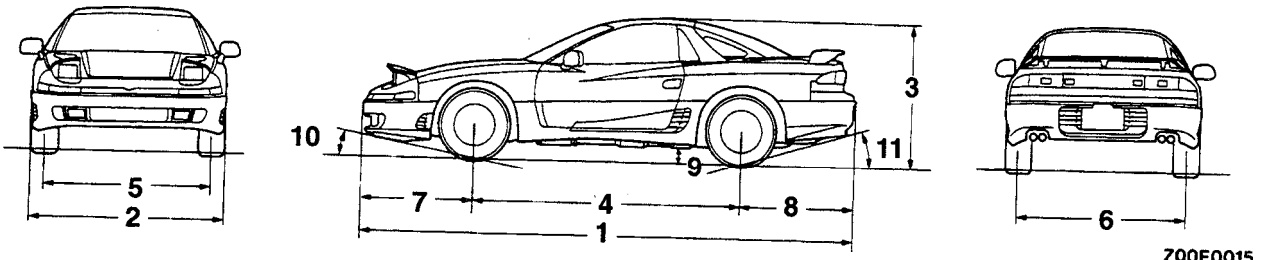
3. Use the engine to drive the tires, and then make the measurements.

Caution
1. If an error is indicated in the state of engine drive, motor drive can be used concurrently.
2. Do not operate the clutch suddenly, or increase or reduce speed suddenly during the work.

REAR WHEEL MEASUREMENTS

1. Jack up the front wheels, and place an axle stand at the designated part of the side sill.
2. Jack up the rear wheels, and then, after setting a pick-up stand and balancing machine in place, follow the same procedure as for front wheel measurements.

GENERAL DATA AND SPECIFICATIONS



Z00F0015

GENERAL SPECIFICATIONS

Items			3000GT <DOHC> (Non-Turbo)	3000GT SL <DOHC> (Non-Turbo)	3000GT VR-4 <DOHC> (Turbo)
Vehicle dimensions mm (in.)	Overall length	1	4,565 (179.7)*4 4,545 (178.9)*1, *2	4,565 (179.7)*4 4,545 (178.9)*1, *2	4,565 (179.7)*4 4,545 (178.9)*1, *2
	Overall width	2	1,840 (72.4)	1,840 (72.4)	1,840 (72.4)
	Overall height	3	1,285 (50.6)*1, *4 1,247 (49.1)*2	1,285 (50.6)*1, *4 1,247 (49.1)*2	1,285 (50.6)*1, *2 1,253 (49.3)*2
	Wheelbase	4	2,470 (97.2)	2,470 (97.2)	2,470 (97.2)
	Tread – Front	5	1,560 (61.4)	1,560 (61.4)	1,560 (61.4)
	Tread – Rear	6	1,580 (62.2)	1,580 (62.2)	1,580 (62.2)
	Overhang – Front	7	1,025 (40.4)	1,025 (40.4)	1,025 (40.4)
	Overhang – Rear	8	1,050 (41.3)	1,050 (41.3)	1,050 (41.3)
	Minimum running ground clearance	9	145 (5.7)	145 (5.7)	145 (5.7)
	Angle of approach degrees	10	12.2°	12.2°	12.2°
	Angle of departure degrees	11	16.9°	16.9°	16.9°
Vehicle weight kg (lbs.)	Curb weights <M/T>		1,450 (3,197)*4 1,455 (3,208)*1 1,460 (3,219)*2 1,475 (3,252)*7	1,520 (3,351)*1, *4 1,530 (3,373)*2 1,510 (3,329)*7	1,710 (3,770)*1 1,720 (3,792)*1, *3 1,715 (3,781)*2 1,725 (3,803)*2, *3, *4 1,700 (3,748)*7 1,870 (4,123)*8
	Curb weights <A/T>		1,490 (3,285)*4 1,495 (3,296)*1 1,500 (3,307)*2 1,515 (3,340)*7	1,560 (3,439)*1, *4 1,570 (3,461)*2 1,550 (3,417)*7 1,715 (3,781)*8	–
	Gross vehicle weight rating		1,925 (4,244) 2,025 (4,464)*6	1,925 (4,244) 2,050 (4,519)*8	2,075 (4,574) *5 2,190 (4,828)*6 2,055 (4,530)*4 2,050 (4,519)*1, *2 2,205 (4,861)*8
	Gross axle weight rating (Front)		1,100 (2,425) 1,105 (2,436)*6	1,100 (2,425) 1,090 (2,403)*8	1,130 (2,491)*5 1,165 (2,568)*6 1,120 (2,469)*4 1,110 (2,447)*1 1,105 (2,436)*2 1,145 (2,524)*8
	Gross axle weight rating (Rear)		850 (1,874) 920 (2,028)*6	850 (1,874) 960 (2,116)*8	945 (2,083) *5 1,025 (2,260)*6 935 (2,061)*4 940 (2,072)*1 945 (2,083)*2 1,060 (2,337)*8
Seating capacity			4	4	4

NOTE

*1: 1992 model
*2: 1993 model
*4: 4WS model
*5: 1995 model <Hatchback>
*6: 1995 model <Convertible>
*7: 1996 model <Hatchback>
*8: 1996 model <Convertible>

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items		3000GT <DOHC> (Non-Turbo)	3000GT SL <DOHC> (Non-Turbo)	3000GT VR-4 <DOHC> (Turbo)
Engine	Model No.	6G72-(DOHC)	6G72-(DOHC)	6G72-(DOHC)
	Piston displacement cm^3 (cu.in.)	2,972 (181.4)	2,972 (181.4)	2,972 (181.4)
Transaxle	Model No.-Type (Manual transaxle)	F5M33– 5-speed manual	F5M33– 5-speed manual	W5MG1*1 – 5-speed manual W6MG1*2 – 6-speed manual
	Model No.-Type Automatic transaxle	F4A33–4-speed automatic	F4A33–4- speed automatic	
Fuel system	Fuel supply system	Multiport fuel injection system <MFI system>	Multiport fuel injection system <MFI system>	Multiport fuel injection system <MFI system>

NOTE
*1: Up to 1993 models
'2: From 1994 models

ENGINE SPECIFICATIONS

Items	6G72 Non-Turbo	6G72 Turbo
Type	V60° DOHC Front Transverse	V60° DOHC Front Transverse
Number of cylinders	6	6
Bore mm (in.)	91.1 (3.59)	91.1 (3.59)
Stroke mm (in.)	76.0 (2.99)	76.0 (2.99)
Piston displacement cm^3 (cu.in.)	2,972 (181.4)	2,972 (181.4)
Compression ratio	10	8.0
Firing order	1-2-3-4-5-6	1-2-3-4-5-6

TRANSAXLE SPECIFICATIONS

Items		F5M33	W5MG1*1	W6MG1*2	F4A33
Type		5-speed M/T	5-speed M/T	6-speed M/T	4-speed AT
Gear ratio	1st	3.090	3.071	3.266	2.551
	2nd	1.833	1.739	1.904	1.488
	3rd	1.217	1.103	1.241	1.000
	4th	0.888	0.823	0.918	0.685
	5th	0.741	0.659	0.733	–
	6th	–	–	0.589	–
	Reverse	3.166	3.076	3.153	2.176
Final reduction ratio	Transaxle	4.153	3.972	3.869	3.958
	Transfer	–	0.814	0.958	

NOTE
*1: Up to 1993 models
*2: From 1994 models

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TIGHTENING TORQUE

Each torque value in the table is a standard value for tightening under the following conditions.

(1) Bolts, nuts and washers are all made of steel and plated with zinc.
(2) The threads and bearing surface of bolts and nuts are all in dry condition.

The values in the table are not applicable:

(1) If toothed washers are inserted.
(2) If plastic parts are fastened.
(3) If bolts are tightened to plastic or die-cast inset-ted nuts.
(4) If self-tapping screws or self-locking nuts are used.

Standard bolt and nut tightening torque

Bolt nominal diameter (mm)	Pitch (mm)	Torque Nm (ft.lbs.)		
		Head mark "4"	Head mark "7"	Head mark "8"
M5	0.8	2.5 (1.8)	4.9 (3.6)	5.9 (43)
M6	1.0	4.9 (3.6)	8.8 (6.5)	9.8 (7.2)
M8	1.25	12 (8.7)	22 (16)	25 (18)
M10	1.25	24 (17)	44 (33)	52 (38)
MI2	1.25	41 (30)	81 (60)	96 (71)
MI4	1.5	72 (53)	137 (101)	157 (116)
M16	1.5	111 (82)	206 (152)	235 (174)
M18	1.5	167 (123)	304 (224)	343 (253)
M20	1.5	226 (166)	412 (304)	481 (354)
M22	1.5	304 (224)	559 (412)	647 (477)
M24	1.5	392 (289)	735 (542)	853 (629)

Flange bolt and nut tightening torque

Bolt nominal diameter (mm)	Pitch (mm)	Torque Nm (ft.lbs.)		
		Head mark "4"	Head mark "7"	Head mark "8"
M6	1.0	4.9 (3.6)	9.8 (7.2)	12 (8.7)
M8	1.25	13 (9.4)	24 (17)	28 (20)
M10	1.25	26 (19)	49 (36)	57 (42)
M10	1.5	24 (17)	44 (33)	54 (40)
MI2	1.25	46 (34)	93 (69)	103 (76)
MI2	1.75	42 (31)	81 (60)	96 (71)

MASTER TROUBLESHOOTING

ENGINE OVERHEATS

Symptom	Probable cause	Reference page
Engine overheats	Cooling system faulty	14-3
	Incorrect ignition timing	11-9

ENGINE WILL NOT CRANK OR CRANKS SLOWLY

Symptom	Probable cause	Reference page
Engine will not crank or cranks slowly	Starting system faulty	16-19

ENGINE WILL NOT START OR HARD TO START (CRANKS OK)

Symptom	Probable cause	Reference page
Engine will not start or hard to start (Cranks OK)	No fuel supply to injector	13A-72, 200
	Injection system problems	13A-52
	Ignition system problems	16-31
	Vacuum leaks • Evaporative emission purge control valve hose • Vacuum hoses • Intake manifold • Intake manifold plenum • Throttle body • EGR valve	17-42
	Compression too low	11-14

ROUGH IDLE OR ENGINE STALLS

Symptom	Probable cause	Reference page or remedy
Rough idle or engine stalls	Vacuum leaks • Evaporative emission purge control valve hose • Vacuum hoses • Intake manifold • Intake manifold plenum • Throttle body • EGR valve	17-42
	Ignition system problems	16-31
	Idle speed set too low	Check idle speed control system
	Fuel injection system problems	13A-52
	Exhaust gas recirculation (EGR) system problems	17-66
	Engine overheats	14-3
	Compression too low	11-14

ENGINE HESITATES OR POOR ACCELERATION

Symptom	Probable cause	Reference page
Engine hesitates or poor acceleration	Ignition system problem	11-9
	Vacuum leaks • Evaporative emission purge control valve hose • Vacuum hoses • Intake manifold • Intake manifold plenum • Throttle body • EGR valve	17-42
	Air cleaner clogged	15-9
	Fuel line clogged	13F-8
	Fuel injection system problem	13A-52
	Emission control system problem • EGR system always on	17-66
	Engine overheats	14-3
	Compression too low	11-14

ENGINE DIESELING

Symptom	Probable cause	Reference page
Engine dieseling (runs after ignition switch is turned off)	Incorrect ignition timing	11-9

EXCESSIVE OIL CONSUMPTION

Symptom	Probable cause	Reference page or remedy
Excessive oil consumption	Oil leak	Repair as necessary
	Positive crankcase ventilation line clogged	17-56
	Valve stem seal worn or damaged	Repair as necessary
	Valve stem worn	Repair as necessary
	Piston ring worn or damaged	Repair as necessary

POOR FUEL MILEAGE

Symptom	Probable cause	Reference page or remedy
Poor fuel mileage	Fuel leak	Repair as necessary
	Air cleaner clogged	15-9
	Ignition system problems	16-30
	Fuel injection system problems	13A-52
	Compression too low	11-14
	Tires improperly inflated	31-3
	Clutch slips	21-3
	Brakes drag	35-6

NOISE

Symptom	Probable cause	Reference page or remedy
Noise	Loose bolts and nuts	Retighten as necessary
	Engine noise	11-6

HARD STEERING

Symptom	Probable cause	Reference page or remedy
Hard steering	Loose power steering oil pump belt	37A-9
	Low fluid level	Replenish
	Air in power steering system	37A-11
	Low tire pressure	31-3
	Excessive turning resistance of lower arm ball joint	33A-10
	Excessively tightened steering gear box rack support cover	37A-20
	Improper front wheel alignment	33A-6
	Excessive turning resistance of tie-rod ball joint	37A-7
	Sticky flow control valve	37A-30
	Bent rack in steering gear box	37A-20

POOR RETURN OF STEERING WHEEL TO CENTER

Symptom	Probable cause	Reference page
Poor return of steering wheel to center	Improper front wheel alignment	33A-6
	Improper tire pressure	31-3
	Excessive tightened rack support cover	37A-20
	Damaged front wheel bearing	26-9

POOR RIDING

Symptom	Probable cause	Reference page or remedy
Poor riding	Improper tire pressure	31-3
	Imbalanced wheels	Repair
	Improper front or rear wheel alignment	33A-6, 7 34-5, 13, 25, 36
	Malfunctioning shock absorber	
	Broken or worn stabilizer	33A-7, 12 34-13, 16, 36, 38
	Broken or worn coil spring	
	Loose suspension securing bolt(s)	Retighten
	Worn lower arm bushing	33A-10
	Worn suspension arm bushing	33A-10

ABNORMAL TIRE WEAR

Symptom	Probable cause	Reference page
Abnormal tire wear	Improper front or rear wheel alignment	33A-6 34-5, 25
	Improper tire pressure	31-3
	Imbalanced wheels	
	Loose wheel bearings	34-6
	Malfunctioning shock absorber	33A-7 34-13, 36

ROAD WANDER

Symptom	Probable cause	Reference page
Road wander	Improper front or rear wheel alignment	33A-6 34-5, 25
	Excessive play of steering wheel	37A-6
	Poor turning resistance of lower arm ball joint	33A-11
	Improper tire pressure	31-3
	Loose or worn lower arm bushing	33A-10
	Loose or worn wheel bearings	
	Loose rack support cover in steering gear box	37A-20

VEHICLE PULLS TO ONE SIDE

Symptom	Probable cause	Reference page or remedy
Vehicle pulls to one side	Improper front or rear wheel alignment	33A-6 34-5, 25
	Imbalanced or worn tires	31-3
	Uneven tire pressure	
	Excessive turning resistance of lower arm ball joint	33A-11
	Wheel bearing seizure	Replace
	Broken or worn coil spring	33A-7
	Bent front or rear axle drive shaft	26-12
	Deformed lower arm	33A-10

STEERING WHEEL SHIMMY

Symptom	Probable cause	Reference page or remedy
Steering wheel shimmy	Improper front or rear wheel alignment	33A-6 34-5, 25
	Improper tire pressure	31-3
	Imbalanced wheels	Replace
	Poor turning resistance of lower arm ball joint	33A-11
	Excessive play of steering wheel	37A-6
	Broken or weak front stabilizer	33A-12
	Worn lower arm bushing	33A-10
	Malfunctioning shock absorber	33A-7 34-13, 36
	Broken or weak coil spring	
	Wear, play, or seizure of wheel bearing	Replace
	Wear, play, or seizure of drive shaft ball joint	26-12 27-16

BOTTOMING

Symptom	Probable cause	Reference page or remedy
Bottoming	Overloaded vehicle	Correct
	Broken or weak coil spring	33A-7 34-13, 36
	Malfunctioning shock absorber	

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WHEEL BEARING TROUBLESHOOTING

Trouble	Symptom	Probable cause
Pitting	Pitting occurs because of uneven rotation of race and bearing surfaces	Excessive bearing preload Excessive load
Flaking	The surface peels because of uneven rotation of the race and bearing surfaces	End of bearing life Improper bearing assembly
Cracking	Chipping or cracking of cage or roller edges	Impact when bearing was installed (such as being hit with a hammer)
Flat spotting	When large load is applied, race and roller contact surfaces compress, forming indentations	Excessive bearing preload Excessive load Vibration when bearings are not used, such as during shipment on freight cars, transport trucks, etc.
Nicks	Instead of rolling along race surface, rollers slide, thus damaging surface	Insufficient grease Excessive bearing preload Excessive load Faulty oil seal
Smearing	Damage or wear caused by minute particles adhering to surfaces results in rough movement and such high temperatures that parts of surface melt	Excessive variation of loads on bearings Use of grease other than that specified Insuff icient grease
Rust, corrosion	Appears on various areas of the bearing	Use of grease otherthan that specified Faulty oil seal Presence of water or moisture
Wear	Wear of surface areas caused by friction	Insufficient grease Foreign matter Rust or corrosion due to moisture Use of grease other than that specified Faulty oil seal
Discoloration	Grease discoloration results from grease deterioration which causes particles of pigment contained in grease to adhere to surfaces Heat discoloration will appear as a deep brown or purple	Use of grease other than that specified Faulty oil seal Excessive bearing preload Excessive load

LUBRICATION AND MAINTENANCE

Maintenance and lubrication service recommendations have been compiled to provide maximum protection for the vehicle owner's investment against all reasonable types of driving conditions. Since these conditions vary with the individual vehicle owner's driving habits, the area in which the vehicle is operated and the type of driving to which the vehicle is subjected, it is necessary to prescribe lubrication and maintenance service on a time frequency as well as mileage interval basis.
Oils, lubricants and greases are classified and graded according to standards recommended by the Society of Automotive Engineers (SAE), the American Petroleum Institute (API) and the National Lubricating Grease Institute (NLGI).

MAINTENANCE SCHEDULES

Information for service maintenance is provided under "SCHEDULED MAINTENANCE TABLE". Three schedules are provided; one for "Required Maintenance", one for "General Maintenance" and one for "Severe Usage Service".
Item numbers in the "SCHEDULED MAINTENANCE TABLE" correspond to the item numbers in the "MAINTENANCE SERVICE" section.

SEVERE SERVICE

Vehicles operating under severe service conditions will require more frequent service.
Component service information is included in appropriate units for vehicles operating under one or more of the following conditions:

1. Trailer towing or police, taxi, or commercial type operation
2. Operation of Vehicle
   (1) Short-trip operation at freezing temperature (engine not thoroughly warmed up)
   (2) More than 50% operation in heavy city traffic during hot weather above 32°C (90°F)
   (3) Extensive idling
   (4) Driving in sandy areas
   (5) Driving in salty areas
   (6) Driving in dusty conditions

ENGINE OIL

Either of the following engine oils should be used:
(1) Engine oil displaying EOLCS certification mark
(2) Engine oil conforming to the API classification SH ECII, SH/CD ECII, SG ECII or SG/CD ECII
For further details, refer to "LUBRICANTS SELECTION" section.

Caution
Test results submitted to EPA have shown that laboratory animals develop skin cancer after prolonged contact with used engine oil. Accordingly, the potential exists for humans to develop a number of skin disorders, including cancer, from such exposure to used engine oil. Care should be taken, therefore, when changing engine oil, to minimize the amount and length of exposure time to used engine oil on your skin. Protective clothing and gloves, that cannot be penetrated by oil, should be worn. The skin should be thoroughly washed with soap and water, or use waterless hand cleaner, to remove any used engine oil. Do not use gasoline, thinners, or solvents.

GEAR LUBRICANTS

The SAE grade number also indicates the viscosity of Multi-Purpose Gear Lubricants.
The API classification system defines gear lubricants in terms of usage. Typically gear lubricants conforming to API GL-4 or GL-5 with a viscosity of SAE 75W-85W or 75W-90 are recommended for manual transaxle.

LUBRICANTS – GREASES

Semi-solid lubricants bear the NLGI designation and are further classified as grades 0, 1, 2, 3 etc. Whenever "Chassis Lubricant" is specified, Multi-Purpose Grease, NLGI grade 2, should be used.

FUEL USAGE STATEMENT

Your car must use unleaded gasoline only.
This car has a fuel tank filler tube especially designed to accept only the smaller-diameter unleaded gasoline dispensing nozzle.

Caution
Using leaded gasoline in your car will damage the catalytic converters and the oxygen sensors. It is illegal, and will void warranty coverage of the catalytic converters and the oxygen sensors.

Your car is designed to operate on premium unleaded gasoline having a minimum octane rating of 91 or 95 RON (Research Octane Number).
If premium unleaded gasoline is not available, unleaded gasoline having a octane rating of 87 or 91 RON (Research Octane Number) may be used. In this case, the performance and fuel consumption will suffer a little degradation.

MATERIALS ADDED TO FUEL

Indiscriminate use of fuel system cleaning agents should be avoided. Many of these materials intended for gum and varnish removal may contain highly active solvents or similar ingredients that can be harmful to gasket and diaphragm materials used in fuel system component parts.

Gasolines Containing Alcohol

Some gasolines sold at service stations contain alcohol, although they may not be so identified. Use of fuels containing alcohol is not recommended unless the nature of the blend can be determined as being satisfactory.

Gasohol – A mixture of 10% ethanol (grain alcohol) and 90% unleaded gasoline may be used in your car. If driveability problems are experienced as a result of using gasohol, it is recommended that the car be operated on gasoline.

Metanol – **Do not use gasolines containing methanol** (wood alcohol). Use of this type of alcohol can result in vehicle performance deterioration and damage critical parts in the fuel system components. Fuel system damage and performance problems, resulting from the use of gasolines containing methanol, may not be covered by the new car warranty.

Gasolines containing MTBE (Methyl Tertiary Butyl Ether)

Unleaded gasoline containing 15% or less MTBE may be used in your car. Fuel containing MTBE over 15% vol. may cause reduced engine performance and produce vapor lock or hard starting.

RECOMMENDED LUBRICANTS AND LUBRICANT CAPACITIES TABLE

RECOMMENDED LUBRICANTS

Items	Recommended lubricants
Engine oil	Engine oil displaying EOLCS certification mark or conforming to the API classification SH ECII, SH/CD ECII, SG ECII or SG/CD ECII (For further details, refer to "LUBRICANTS SELECTION" section)
Manual transaxle	Hypoid gear oil, SAE 75W-90 or 75W-85W conforming to API classification GL-4
Transfer	
Automatic transaxle	DIAMOND ATF SP or equivalent
Power steering	Automatic transmission fluid "DEXRON II"
Differential (rear axle)	Hypoid Gear Oil API classification GL-5 or higher Above –23°C (–10°F) SAE90, 85W-90, 80W-90 From –34°C (-30°F) to –23°C (-10°F) SAE 80W, 80W-90 Below –34°C (–30°F) SAE 75W
Brake and clutch	Conforming to DOT 3 or DOT 4
Engine coolant	DIA-QUEEN LONG-LIFE COOLANT (Part No. 0103044) or High quality ethylene-glycol antifreeze coolant
Door hinges, liftgate hinges	Engine oil

LUBRICANT CAPACITIES TABLE

Description		Metric measure	U.S. measure
Engine oil	Crankcase	4.0 dm^3	4.2 qts.
	Oil filter	0.3 dm^3	.32 qt.
	Oil cooler <Turbo>	0.3 dm^3	.32 qt.
	Total <Non-Turbo>	4.3 dm^3	4.5 qts.
	Total <Turbo>	4.6 dm^3	4.9 qts.
Cooling system (including heater and coolant reserve system)		8.0 dm^3	8.5 qts.
Manual transaxle	FWD	2.3 dm^3	2.4 qts.
	AWD	2.4 dm^3	2.5 qts.
Transfer	5M/T	0.27 dm^3	.29 qt.
	6M/T	.0.30 dm^3	.32 qt.
Automatic transaxle		7.5 dm^3	7.9 qts.
Rear axle <AWD>		1.1 dm^3	1.16 qts.
Power steering	2WS	0.9 dm^3	.95 qt.
	4WS	1.45 dm^3	1.59 qts.
Fuel tank		75 dm^3	19.8 gals.

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EOLCS certification mark



M03A015

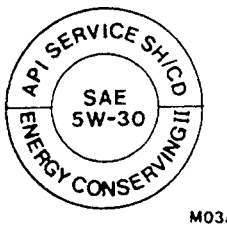
LUBRICANTS SELECTION

ENGINE OIL

Caution
Never use nondetergent or straight mineral oil.

Oil Identification Symbol

Use only engine oils displaying the EOLCS certification mark on the container.

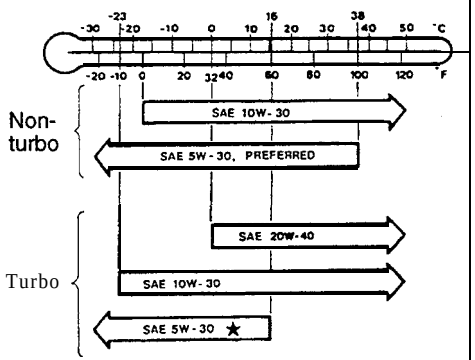


M03A014

If these oils are not available, an API classification SH ECII, SH/CD ECII, SG ECII or SG/CD ECII can be used.

Oil Viscosity

The SAE grade number indicates the viscosity of the oil. A proper SAE grade number should be selected according to ambient temperature.



003B009

NOTE
*: SAE 5W-30 may be used for operation in very cold weather areas where the lowest atmospheric temperature is below -10°F (-23°C).

REAR AXLE

Lubricant	API classification GL-5 or higher
Anticipated temperature range	Viscosity range
Above –23°C (–10°F)	SAE 90 SAE 85W-90 SAE 80W-90
–23°C to –34°C (–10°F to –30°F)	SAE 80W, SAE 80W-90
Below –34°C (-30°F)	SAE 75W

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SELECTION OF COOLANT

COOLANT

Relation between Antifreeze Concentration and Specific Gravity

Engine coolant temperature °C (°F) and specific gravity					Freezing temperature	Safe operating temperature	Engine coolant concentration (Specific volume)
10 (50)	20 (68)	30 (86)	40 (104)	50 (122)	°C (°F)	°C (°F)	%
1.054	1.050	1.046	1.042	1.036	–16 (3.2)	–11 (12.2)	30
1.063	1.058	1.054	1.049	1.044	–20 (–4)	–15 (5)	35
1.071	1.067	1.062	1.057	1.052	–25 (–13)	–20 (–4)	40
1.079	1.074	1.069	1.064	1.058	–30 (–22)	–25 (–13)	45
1.087	1.082	1.076	1.070	1.064	–36 (–32.8)	–31 (–23.8)	50
1.095	1.090	1.084	1.077	1.070	–42 (–44)	–37 (–35)	55
1.103	1.098	1.092	1.084	1.076	–50 (–58)	–45 (–49)	60

Example
The safe operating temperature is -15°C (5°F) when the measured specific gravity is 1.058 at the coolant temperature of 20°C (68°F).

Caution

1. **If the concentration of the coolant is below 30%, the anti-corrosion property will be adversely affected. In addition, if the concentration is above 60%, both the anti-freeze and engine cooling properties will decrease, affecting the engine adversely. For these reasons, be sure to maintain the concentration level within the specified range.**
2. **Do not use a mixture of different brands of anti-freeze.**

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SCHEDULED MAINTENANCE TABLE <Up to 1994 models>

SCHEDULED MAINTENANCE SERVICES FOR EMISSION CONTROL AND PROPER VEHICLE PERFORMANCE

Inspection and services should be performed any time a malfunction is observed or suspected. Retain receipts for all vehicle emission services to protect your emission warranty.

No.	Emission control system maintenance	Service to be performed		24	48	72	96	120	144	168
			Kilometers in thousands							
			Mileage in thousands	15	30	45	60	75	90	105
1	Fuel system (tank, pipe line and connection, and fuel tank filler tube cap)*	Check for leaks Every 5 years or					x			
2	Fuel hoses	Check condition Every 2 years or			×		×		×	
3	Air cleaner element	Replace at			x		x		x	
4	Evaporative emission control system (except evaporative emission canister)*	Check for leaks and clogging Every 5 years or					x			
5	Sparks plugs	Replace	except platinum plugs		x		x		x	
			platinum plugs only				x			
6	Ignition cables*	Replace Every 5 years or					x			

NOTE
*: Except for Federal

GENERAL MAINTENANCE SERVICE FOR PROPER VEHICLE PERFORMANCE

No.	General maintenance		Service to be performed		24	48	72	96	120	144	168
				Kilometers in thousands							
				Mileage in thousands	15	30	45	60	75	90	105
7	Timing belt		Replace at					×*			
8	Drive belt (for Generator)		Check condition at			×		×		×	
9	Engine oil	Non-Turbo	Change Every year or		Every 12,000 km (7,500 miles)						
		Turbo	Change Every 6 months or		Every 8,000 km (5,000 miles)						
10	Engine oil filter	Non-Turbo	Replace Every year or		×	×	×	×	×	×	×
		Turbo	Replace Every year or		Every 16,000 km (10,000 miles)						
11	Manual transmission (incl. transfer) oil		Check oil level at			×		×		×	
12	Automatic transmission fluid		Check fluid level Every year or		×	×	×	×	×	×	×
			Change fluid at			×		×		×	
13	Engine coolant		Change Every 2 years or			×		×		×	
14	Disc brake pads		Inspect for wear Every year or		×	×	×	×	×	×	×

NOTE
*: For California, this maintenance is recommended but not required.

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No.	General maintenance	Service to be performed	Kilometers in thousands	24	48	72	96	120	144	168
			Mileage in thousands	15	30	45	60	75	90	105
15	Brake hoses	Check for deterioration or leaks Every year or		×	×	×	×	×	×	×
16	'Ball joint and steering linkage seals	Inspect for grease leaks and damage Every 2 years or			x		x		x	
17	Drive shaft boots	Inspect for grease leaks and damage Every year or		x	x	x	x	x	x	x
18	Rear axle oil <AWD>	Check oil level			×		×		×	
19	SRS airbag	Inspect system		At 10 years						
20	Exhaust system (connection portion of muffler, pipings and converter heat shields)	Check and service as required Every 2 years or			x		x		x	

NOTE
SRS: Supplemental Restraint System

SCHEDULED MAINTENANCE UNDER SEVERE USAGE CONDITIONS

The maintenance items should be performed according to the following table:

No.	Maintenance Item	Service to be performed	Mileage intervals kilometers in thousands (Miles in thousands)							Severe usage conditions						
			24 (15)	48 (30)	72 (45)	96 (60)	120 (75)	144 (90)	168 (105)		A	B	C	D	E	F	G
3	Air cleaner element	Replace at	More frequently							x				x		
5	Spark plugs	Replace at	x	x	x	x	x	x	x		x		x			
9	Engine oil	Change Every 3 months or	Every 4,800 km (3,000 Miles)							x	x	x	x			x
10	Engine oil filter	Replace Every 6 months or	Every 9,600 km (6,000 Miles)							x	x	x	x			x
14	Disc brake pads	Inspect for wear	More frequently							x					x	

Severe usage conditions
A – Driving in dusty conditions
B – Trailer towing or police, taxi, or commercial type operation
C – Extensive idling
D – Short trip operation at freezing temperatures (engine not thoroughly warmed up)
E – Driving in sandy areas
F – Driving in salty areas
G – More than 50% operation in heavy city traffic during hot weather above 32°C (90°F)

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SCHEDULED MAINTENANCE TABLE <From 1995 models>

SCHEDULED MAINTENANCE SERVICES FOR EMISSION CONTROL AND PROPER VEHICLE PERFORMANCE

Inspection and services should be performed any time a malfunction is observed or suspected. Retain receipts for all vehicle emission services to protect your emission warranty.

No.	Emission control system maintenance	Service to be performed		Kilometers in thousands	24	48	72	96	120	144	168
				Mileage in thousands	15	30	45	60	75	90	105
1	Fuel system (tank, pipe line and connection, and fuel tank filler tube cap)*1	Check for leaks Every 5 years or						X			
2	Fuel hoses	Check condition Every 2 years or				X		X		X	
3	Air cleaner element	Replace at				X		X		X	
4	Evaporative emission control system (except evaporative emission canister)*1	Check for leaks and clogging Every 5 years or						X			
5	Sparks plugs	Replace	except platinum plugs			X		X		X	
			platinum plugs only					X			
6	Ignition cables*1	Replace Every 5 years or						X			

NOTE
*1: Except for Federal

GENERAL MAINTENANCE SERVICE FOR PROPER VEHICLE PERFORMANCE

No.	General maintenance		Service to be performed	Kilometers in thousands	24	48	72	96	120	144	168
				Mileage in thousands	15	30	45	60	75	90	105
7	Timing belt		Replace at					×*		At 160,000 km*2 (100,000 miles)	
8	Drive belt (for Generator, Water pump, Power steering pump)		Check condition at			X		X		X	
9	Engine oil	Non-Turbo	Change Every year or		Every 12,000 km (7,500 miles)						
		Turbo	Change Every 6 months or		Every 8,000 km (5,000 miles)						
10	Engine oil filter	Non-Turbo	Replace Every year*3 or		×	×	×	×	×	×	×
		Turbo	Replace Every year or		Every 16,000 km (10,000 miles)						
11	Manual transmission oil		Check oil level at			X		X		X	
12	Automatic transmission fluid		Check fluid level Every year or		x	x	x	x	x	x	x
			Change fluid at			×		×		×	

NOTE
*1: For California, this maintenance is recommended but not required.
*2: Not required if belt was previously changed.
*3: If the mileage is less than 12,000 km (7,500 miles) each year, the oil filter should be replaced at every oil change.

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No.	General maintenance	Service to be performed	Kilometers in thousands	24	48	72	96	120	144	168
			Mileage in thousands	15	30	45	60	75	90	105
13	Transfer oil	Check oil level			×		×		×	
14	Engine coolant	Change Every 2 years or			×		×		×	
15	Disc brake pads	Inspect for wear Every year or		x	x	x	×	×	x	x
16	Brake hoses	Check for deterioration or leaks Every year or					×××	×××		
17	Ball joint and steering linkage seals	Inspect for grease leaks and damage Every 2 years or			X		X		X	
18	Drive shaft boots	Inspect for grease leaks and damage Every year or		x	x	x	x	x	x	x
19	Rear axle oil <AWD>	inspect oil level			X		X		X	
20	SRS airbag	Inspect system		At 10 years						
21	Exhaust system (connection portion of muffler, pipings and converter heat shields)	Check and service as required Every 2 years or			X		X		X	

NOTE
SRS: Supplemental Restraint System

SCHEDULED MAINTENANCE UNDER SEVERE USAGE CONDITIONS

The maintenance items should be performed according to the following table:

No.	Maintenance Item	Service to be performed	Mileage intervals kilometers in thousands (Miles in thousands)							Severe usage conditions							
			24 (15)	48 (30)	72 (45)	96 (60)	120 (75)	144 (90)	168 (105)	A	B	C	D	E	F	G	H
3	Air cleaner element	Replace at	x	x	x	x	x	x		xx				×			
5	Spark plugs	Replace at	x	x	x	x	x	x	x		X		×				
9	Engine oil	Change Every 3 months or	Every 4,800 km (3,000 Miles)							×	×	×	×			×	
10	Engine oil filter	Replace Every 6 months or	Every 9,600 km (6,000 Miles)							×	×	×	×			×	
11	Manual transmission oil	Change at	Every 48,000 km (30,000 Miles)								×					×	×
13	Transfer oil	Change at		X		X		X			X					×	×
15	Disc brake pads	inspect for wear Every6 months or	Every 9,600 km (6,000 Miles)							×					×		

Severe usage conditions
A – Driving in dusty conditions
B – Trailer towing or police, taxi, or commercial type operation
C – Extensive idling, driving in stop and go traffic
D – Short trip operation at freezing temperatures (engine not thoroughly warmed up)
E – Driving in sandy areas
F – Driving in salty areas
G – More than 50% operation in heavy city traffic or at sustained high speeds during hot weather above 32°C (90°F)
H – Driving on off -road

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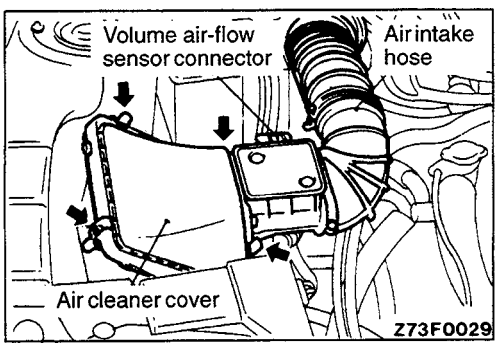
MAINTENANCE SERVICE

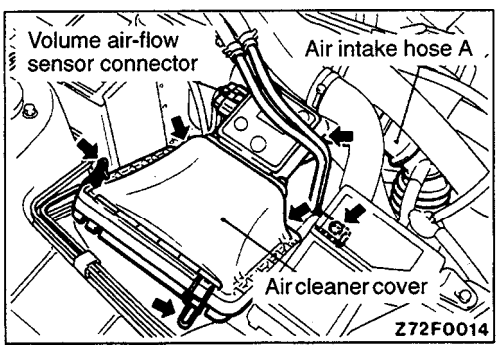
1. FUEL SYSTEM (TANK, PIPE LINE, CONNECTIONS AND FUEL TANK FILLER TUBE CAP) (Check for leak)

Check for damage or leakage in the fuel lines and connections and looseness of the fuel tank filler tube cap.

2. FUEL HOSES (Check condition)

1. Inspect the surface of fuel hoses for heat and mechanical damage. Hard and brittle rubber, cracking, checking, tears, cuts, abrasions and excessive swelling indicate deterioration of the rubber.
2. If the fabric casing of the rubber hose is exposed by cracks and abrasions in the fuel system, the hoses should be changed.





3. AIR CLEANER ELEMENT (Replace)

The air cleaner element will become dirty and loaded with dust during use, and the filtering effect will be substantially reduced. Replace it with a new one.

<Non-Turbo>

(1) Disconnect the volume air-flow sensor connector.
(2) Remove the air intake hose from the volume air-flow sensor.
(3) Unclamp the ‘air cleaner cover.
(4) Remove the air cleaner cover and volume air-flow sensor.

Cautidn
Remove the air cleaner cover with care not to give shock to the volume air-flow sensor.

(5) Take out the air cleaner element and install a new one.
(6) Be sure to close the air cleaner cover completely when clamping it.

<Turbo>

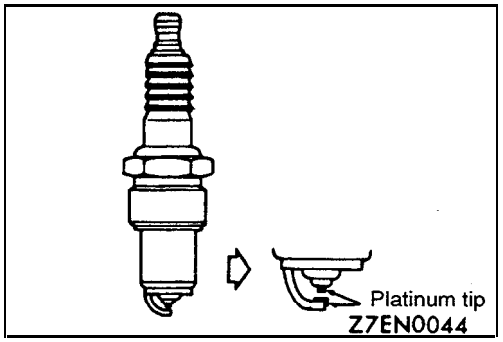
(1) Remove the clutch booster vacuum pipe mounting bolt.
(2) Disconnect the volume air-flow sensor connector.
(3) Remove air intake hose A from the volume air-flow sensor.
(4) Unclamp the air cleaner cover.
(5) Remove the air cleaner cover and volume air-flow sensor.

Caution
Remove the air cleaner cover with care not to give shock to the volume air-flow sensor.

(6) Take out the air cleaner element and install a new one.
(7) Be sure to close the air cleaner cover completely when clamping it.

4. EVAPORATIVE EMISSION CONTROL SYSTEM (Check for leaks and clogging) – except evaporative emission canister

1. If the fuel-vapor vent line is clogged or damaged, a fuel vapor mixture escapes into the atmosphere causing excessive emissions. Disconnect the line at both ends, and blow it clean with compressed air. Remove the fuel tank filler tube cap from the fuel tank filler tube and check to see if there is evidence that the packing makes improper contact to the fuel tank filler tube.
2. The fuel tank pressure control valve installed on the vapor line should be checked for correct operation.



5. SPARK PLUGS (Replace)

The spark plugs must fire properly to assure proper engine performance and emission-control.
Therefore, they should be replaced periodically with new ones.

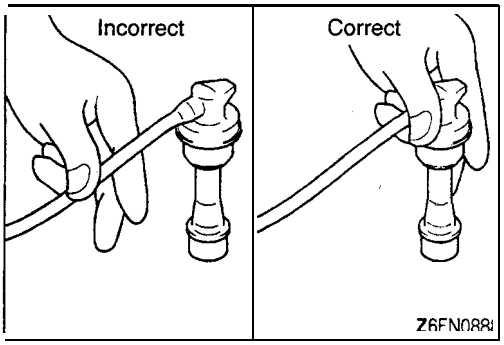
Spark plug

NGK	PFR6J-11
NIPPON DENS0	PK20PR-P11

Spark plug gap: 1.0-1.1 mm (.039–.043 in.)

NOTE
For the platinum plug, use care not to damage the platinum tip.
Do not try to adjust the plug gap.

Specified torque: 25 Nm (15 ft.lbs.)



6. IGNITION CABLES (Replace)

The ignition cables should be replaced periodically with new ones.
After replacing, make sure that the ignition cables and terminals are properly connected and full seated.

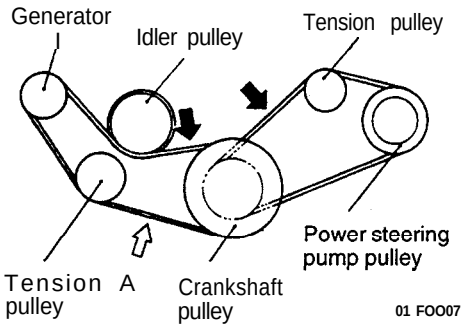
NOTE
When disconnecting an ignition cable, be sure to hold cable cap. If the cable is disconnected by pulling on the cable alone, an open circuit might result.

7. TIMING BELT (Replace)

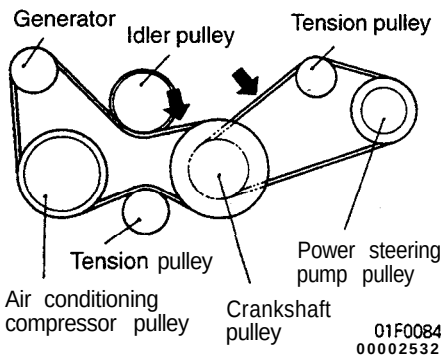
Replace the belt with a new one periodically to assure proper engine performance.
For removal and installation procedures, refer to GROUP 11 – Timing Belt.

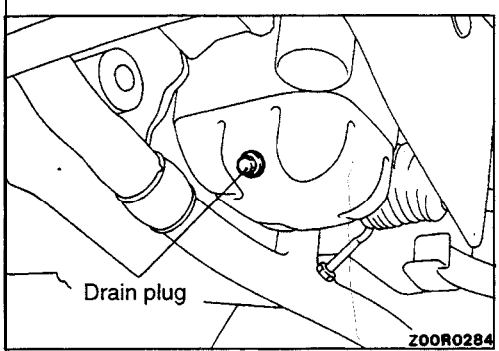
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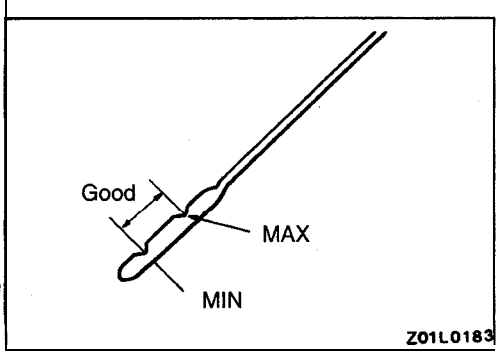
<Vehicle without air conditioning>



<Vehicle with air conditioning>







8. DRIVE BELT (For Generator, Water Pump, Power Steering Pump) (Check condition)

Check the tension of the drive belt. Inspect the drive belt for evidence of cuts and cracks, and replace it if defective.

(1) Measure the deflection with a force of 100 N (22 lbs.) applied to belt mid-point between pulleys shown in the illustration. If the standard value is not obtained, make adjustment.

(2) On vehicles without air conditioning, set a tension gauge at a position maked with arrow A in the illustration to measure the belt tension.

Standard value:
<Vehicle without air conditioning>

items		Specification
For generator	Tension N (lbs.)	350-600 (77– 132)
	Deflection mm (in.) <Reference value>	4.0–5.5 (.16–.22)
For P/S pump	Tension N (lbs.)	250–500 (55-l 10)
	Deflection mm (in.) <Reference value>	9.5–13.5 (.37–.53)

<Vehicle with air conditioning>

Items		Specification
For generator and A/C compressor	Tension N (lbs.)	350-600 (77-132)
	Deflection mm (in.) <Reference value>	4.0–5.5 (.16–.22)
For P/S pump	Tension N (lbs.)	250–500 (55–110)
	Deflection mm (in.) <Reference value>	9.5-l 3.5 (.37–.53)

9. ENGINE OIL (Change)

Always use the specified oil. (Refer to P.00-38)

Caution
Never use nondetergent or straight mineral oil.

(1) After warming up the engine, remove the oil filler cap.
(2) Remove the drain plug and drain the engine oil.
(3) Tighten the drain plug to 40 Nm (29 ft.lbs.).
(4) Pour new engine oil through the oil filler.

Caution
1. Cover the generator with shop towel before filling engine oil to make sure that even if oil is spilt, it may not drop on the generator.
2. Use an oil mug or a funnel to fill oil.

Engine oil total capacity: [including oil filter and oil cooler]

<Non-Turbo> 4.3 dm^3 (4.5 qts.)
<Turbo> 4.6 dm^3 (4.9 qts.)

(5) Check to ensure that the engine oil level is within the level range indicated on the oil dip stick.

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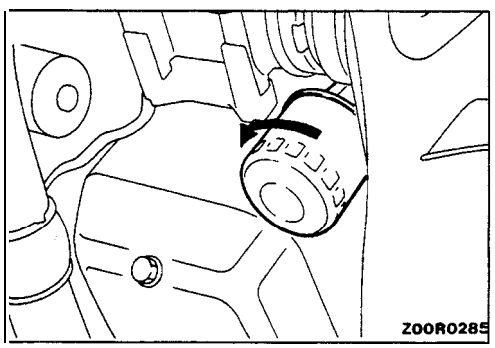
10. ENGINE OIL FILTER (Replace)

The quality of replacement filters varies considerably. Only high quality filters should be used to assure most efficient service.

ENGINE OIL FILTER SELECTION

This vehicle is equipped with a full-flow, throw-away oil filter. The same type of replacement filter is recommended as a replacement filter for this vehicle.
It is possible, particularly in cold weather, that this vehicle may develop high oil pressure for a short duration. You should be sure that any replacement filter used on this vehicle is a high-quality filter and is capable of withstanding a pressure of 256 psi (1,765 kPa) (manufacturer's specifications) to avoid filter and engine damage. Genuine oil filters are high quality filters being capable of withstanding a pressure of 256 psi and are strongly recommended for use on this vehicle.

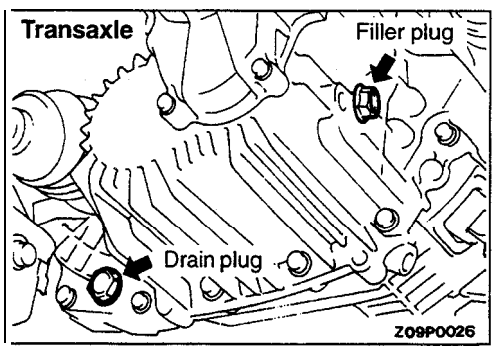
Oil Filter Part No.
MITSUBISHI Genuine Parts: MD136790 or equivalent.



Any replacement oil filter should be installed in accordance with the oil filter manufacturer's installation instructions.
(1) Remove the engine oil filter by using the oil filter wrench.
(2) Clean the oil filter mounting surface of the oil filter bracket.
(3) Coat engine oil to the O-ring of new oil filter.
(4) Screw in the oil filter by hand, and after the O-ring contacts the flange surface, tighten it another 3/4 turns with a filter wrench, etc.

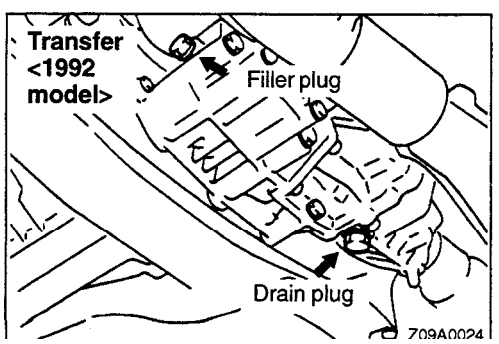
NOTE
The oil filter tightening torque is 14 Nm (11 ft.lbs.).

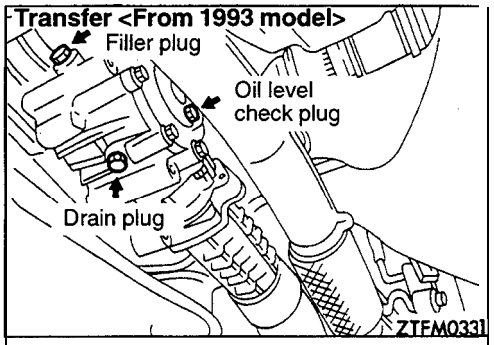
(5) Start and run engine and check for engine oil leaks.
(6) After stopping engine, check oil level and refill as necessary.

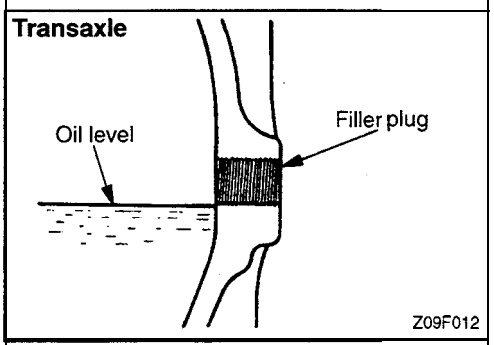


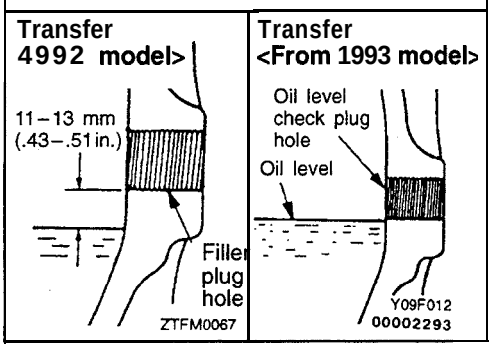
11. MANUAL TRANSMISSION OIL (Check oil level)

Inspect each component for evidence of leakage, and check the oil level by removing the filler plug. If the oil is contaminated, it is necessary to replace it with new oil.
(1) With the vehicle parked at a level place, remove the filler plug.







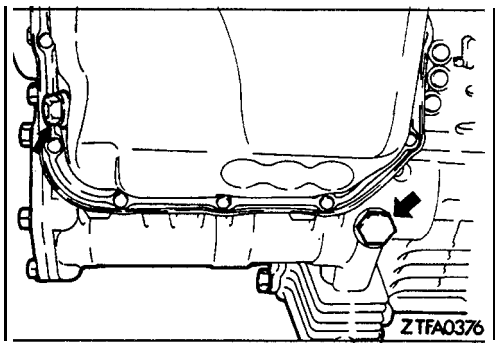


(2) Check that the transaxle oil level is at the lower portion of the filler plug hole. For AWD-vehicles, check that the transfer oil level is at the portion shown in the illustration.
(3) Check to be sure that the transmission oil is not noticeably dirty, and that it has a suitable viscosity.

12. AUTOMATIC TRANSMISSION FLUID (Check fluid level)

1. Drive until the fluid temperature reaches the usual temperature [70–80°C (160–180°F)].
2. Place vehicle on level floor.
3. Move selector lever sequentially to every position to fill torque converter and hydraulic circuit with fluid, then place lever in “N” Neutral position. This operation is necessary to be sure that fluid level check is accurate.
4. Before removing dipstick, wipe all dirt from area around dipstick. Then take out the dipstick and check the condition of the fluid.
   The transaxle should be overhauled under the following conditions.
   - If there is a “burning” odor.
   - If the fluid color has become noticeably blacker.
   - If there is a noticeably great amount of metal particles in the fluid.

5. Check to see if fluid level is in "HOT' range on dipstick. If fluid level is low, add ATF until level reaches "HOT range. Low fluid level can cause a variety of conditions because it allows pump to take in air along with fluid. Air trapped in hydraulic circuit forms bubbles which make fluid spongy. Therefore, pressures will be erratic.
   Improper filling can also raise fluid level too high. When transaxle has too much fluid, gears churn up foam and cause same conditions which occur with low fluid level, resulting in accelerated deterioration of ATF transmission fluid.
   In either case, air bubbles can cause overheating, fluid oxidation, which can interfere with normal valve, clutch, and servo operation. Foaming can also result in fluid escaping from transaxle vent where it may be mistaken for a leak.
6. Be sure to examine fluid on dipstick closely.



(Change fluid)

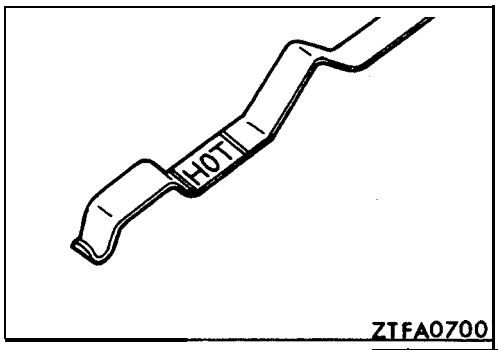
Drain the fluid and check whether there is any evidence of contamination.
Replenish with new fluid after the cause of any contamination has been corrected. .

(1) Remove drain plug at transaxle case bottom to let fluid drain.
(2) Place a drain container with large opening under the transaxle oil pan.
(3) Loosen oil pan bolts and tap pan at one corner to break it loose allowing fluid to drain, then remove oil pan.
(4) Check the oil filter for clogging and damage and replace if necessary.
(5) Clean drain plug and tighten drain plug with gasket.

Drain pulg: 30–35 Nm (22-25 ft.lbs.)

(6) Clean both gasket surfaces of transaxle case and oil pan.
(7) Install oil pan with new gasket and tighten oil pan bolts.

Oil pan bolt: 10–12 Nm (7.5-8.5 ft.lbs.)



(8) Pour 4.5 dm^3 (4.8 qts.) of specified ATF into case through dipstick hole. [Total quantity of ATF required is approx. 7.5 dm^3 (7.9 qts.). Actually however, approx. 4.5 dm^3 (4.8 qts.) of fluid can be replaced because rest of fluid remains in torque converter.]

Transmission fluid: DIAMOND ATF SP or equivalent

(9) Start engine and allow to idle for at least two minutes. Then, with parking brake on, move selector lever momentarily to each position, ending in "N" Neutral position.

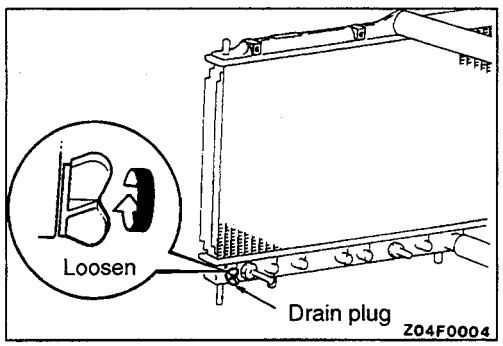
(lO)Add sufficient ATF to bring fluid level to lower mark. Recheck fluid level after transaxle is at normal operating temperature. Fluid level should be between upper and lower marks of "HOT' range. Insert dipstick fully to prevent dirt from entering transaxle.

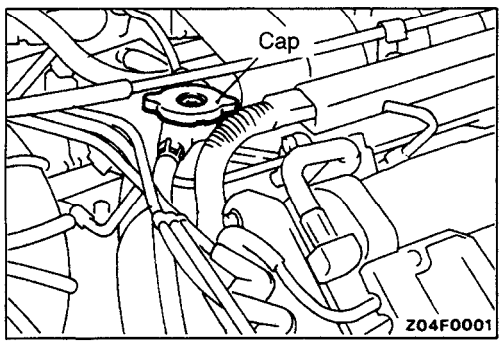
13. TRANSFER OIL (Check oil level)

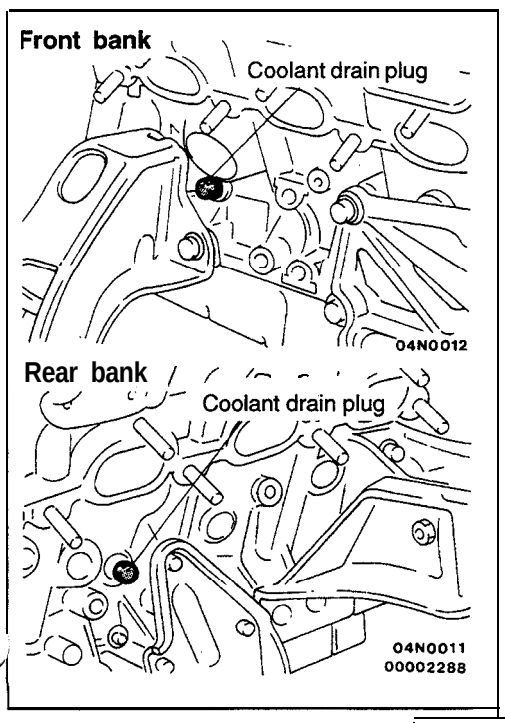
Inspect each components for evidence of leakage, and check the oil level by removing the filler plug. If the oil is contaminated, it is necessary to replace it with new oil.

14. ENGINE COOLANT (Change)

Check the cooling system parts, such as radiator, heater, and oil cooler hoses, thermostat and connections for leakage and damage.







CHANGING COOLANT

<Non-Turbo>

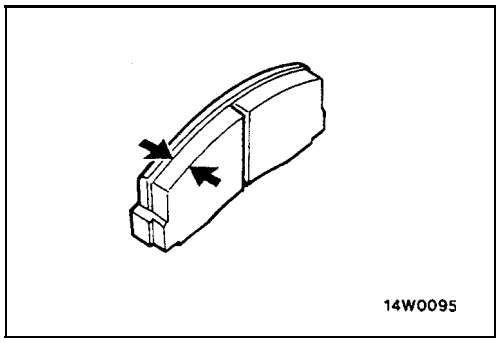
1. Remove the heat protectors (front and rear) from the exhaust manifold.
2. Loosen the radiator drain plug, remove two drain plugs from the engine block (one for each bank) and remove the radiator cap to discharge coolant.
3. Remove the reservoir tank and discharge coolant.
4. When coolant has been discharged, pour water through the filler port to flush coolant passage.
5. Coat the threads of the engine drain plugs with the specified sealant and tighten the plugs to specification.

   Specified sealant:
   3M Nut Locking Part No. 4171 or equivalent

   Tightening torque: 40 Nm (29 ft.lbs.)
6. Fit the radiator drain plug securely.
7. Mount the reserve tank.
8. Slowly pour coolant into the radiator to the brim and also into the reserve tank up to the FULL line.
9. Install the radiator cap securely.
10. Start the engine and warm up until the thermostat opens.
11. Race the engine up to around 3,000 rpm several times, then stop the engine.
12. When the engine has cooled down, remove the radiator cap and add coolant up to the brim. Add coolant to the reserve tank up to the FULL line.

<Turbo>

1. Lift up the vehicle.
2. Loosen the radiator drain plug, remove the drain plug from the rear bank of the engine and remove the radiator cap to discharge coolant.
3. Follow the same steps 3 to 12 above.



15. DISC BRAKE PADS (Inspect for wear)

Check for fluid contamination and wear. Replace complete set of pads if defective.

Caution
The pads for the right and left wheels should be replaced at the same time. Never "split" or intermix brake pad sets. All four pads must be replaced as a complete set.

Thickness of lining: Limit 2.0 mm (.08 in.)

16. BRAKE HOSES (Check for deterioration or leaks)

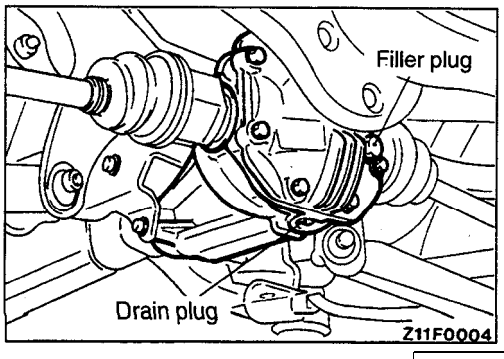
Inspection of brake hoses and tubing should be included in all brake service operations.
The hoses should be checked for:
1. Correct length, severe surface cracking, pulling, scuffing or worn spots. (If the fabric casing of the hoses is exposed by cracks or abrasion in the rubber hose cover, the hoses should be replaced. Eventual deterioration of the hose may occur with possible bursting failure.)
2. Faulty installation, casing twisting or interference with wheel, tire or chassis.

17. BALL JOINT AND STEERING LINKAGE SEALS (Inspect for grease leaks and damage)

1. These components, which are permanently lubricated at the factory, do not require periodic lubrication. Damaged seals and boots should be replaced to prevent leakage or contamination of the grease.
2. Inspect the dust cover and boots for proper sealing, leakage and damage. Replace them if defective.

18. DRIVE SHAFT BOOTS (Inspect for grease leaks and damage)

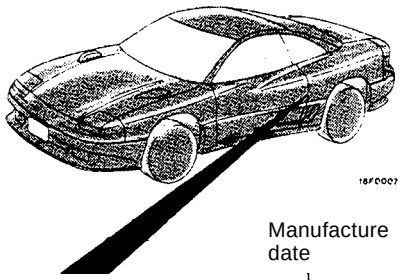
1. These components, which are permanently lubricated at the factory, do not require periodic lubrication. Damaged boots should be replaced to prevent leakage or contamination of the grease.
2. Inspect the boots for proper sealing, leakage and damage. Replace it if defective.



19. REAR AXLE OIL (LIMITED-SLIP DIFFERENTIAL) (Check oil level) – AWD

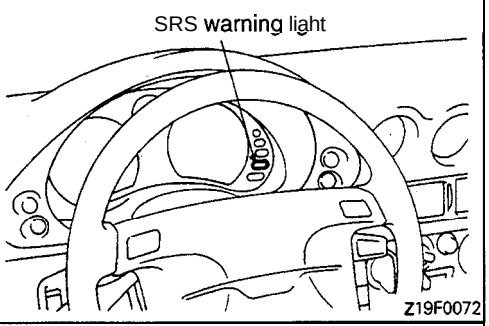
Remove the filler plug and inspect the oil level at bottom of filler hole. If the oil level is slightly below the filler hole, it is in satisfactory condition.

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20. SRS MAINTENANCE (SRS component check: damage, function, connection to wiring harness, etc.)

The SRS must be inspected by an authorized dealer 10 years after the car manufacture date shown on the certification label located on left front door latch post.



Maintenance Items

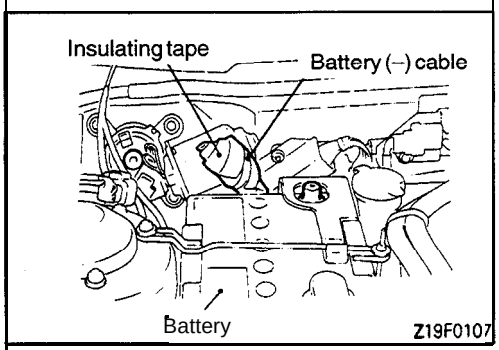
1. "SRS" WARNING LIGHT CHECK

When the ignition key is turned to "ON" or engine started, the "SRS" warning light will illuminate for about 7 seconds and then turn off.
This means that the system is functioning properly.

2. SRS COMPONENTS VISUAL CHECK

(1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

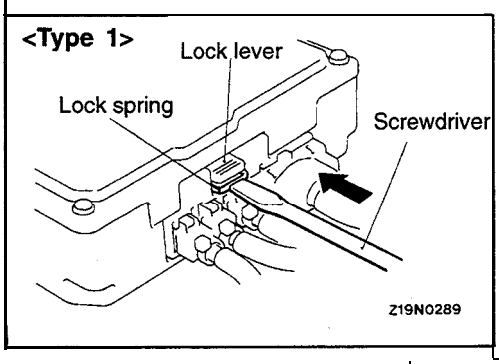
Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. The SRS system is designed to retain enough voltage to deploy the air bag even after the battery has been disconnected. Serious injury may result from unintended air bag deployment if work is done on the SRS system immediately after the battery cable is disconnected. .



(2) Remove the rear console assembly. (Refer to GROUP 52A – Floor Console.)
(3) Release the lock of SDU connector in accordance with the following procedure:

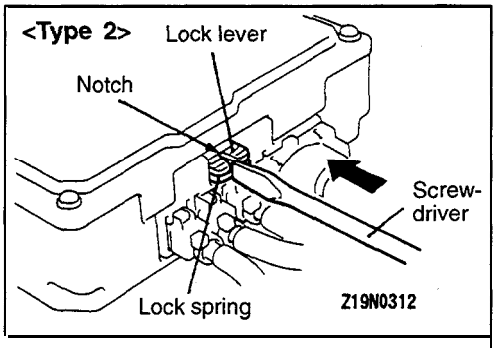
In case that there is no notch on the lock lever (Type 1)

Place a flat tip screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.



Caution
1. **Do not use excessive force to raise the lock lever.**
2. **Do not insert the screwdriver into the gap between the lock lever and the lock spring.**

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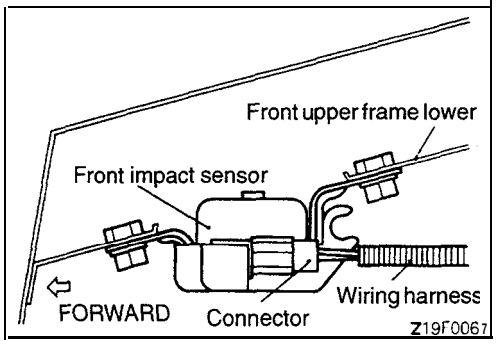


In case that there is a notch on the lock lever (Type 2)

Place a flat tip screwdriver against the lock spring (metal section) at the lock lever notch as shown in the illustration, and push the spring toward the unit.

Caution
Do not use excessive force to raise the lock lever.

(4) Disconnect the red 14-pin connector from the SDU.



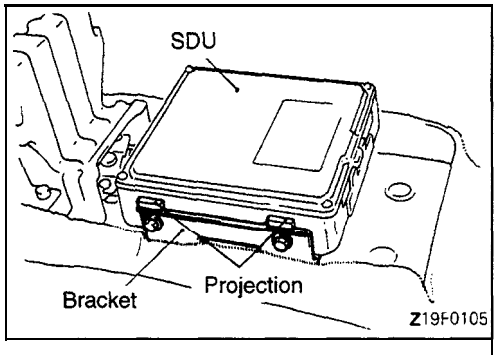
2-1 Front Impact Sensors

(1) Remove right and left front splash shield extensions. Check sensors to ensure the arrow marks face the front of the vehicle.

(2) Check front upper frame lower and sensor brackets for deformities or rust.

Caution
The SRS may not activate properly if a front impact sensor is not installed properly, which could result in serious injury or death to the vehicle's driver and passenger.

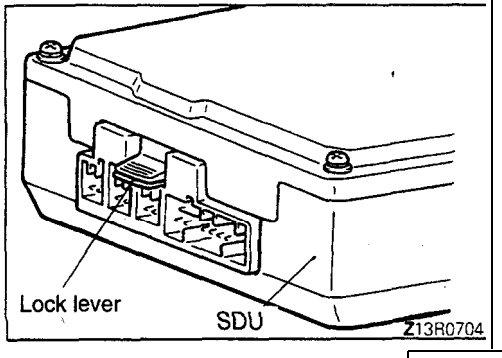
(3) Check wiring harness (for front impact sensor) for binds, connector for damage, and terminals for deformities. Replace sensor and/or wiring harness if it fails visual check. (Refer to GROUP 52B – Service Precautions and Front Impact Sensors.)



2-2 SRS Diagnosis Unit (SDU)

(1) Check SDU case and brackets for dents, cracks, deformities or rust.

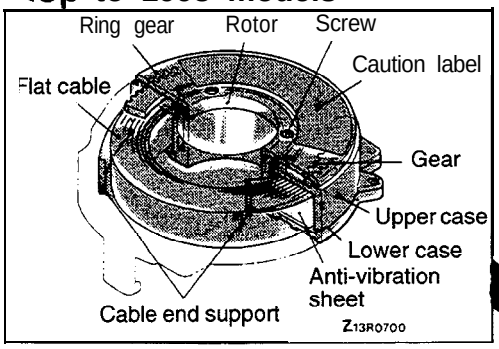
Caution
The SRS may not activate properly if SRS diagnosis unit is not installed properly, which could result in serious injury or death to the vehicle's driver and passenger.

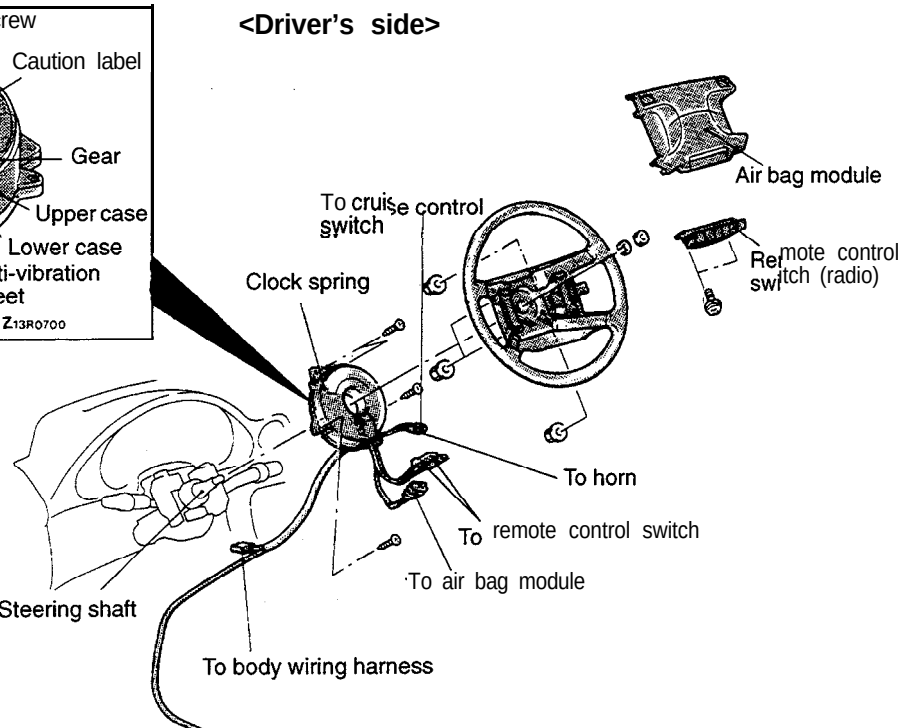


(2) Check connectors and lock lever for damage, and terminals for deformities or rust. Replace SDU if it fails visual check. [Refer to GROUP 52B – SRS Diagnosis Unit (SDU).]

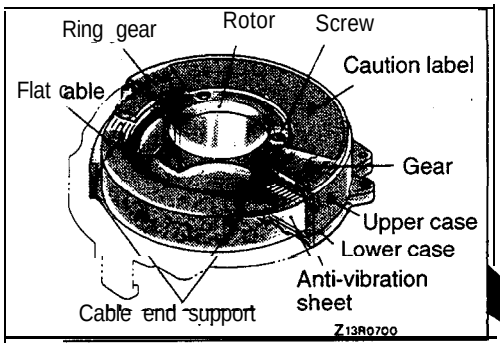
2-3 Air Bag Module, Steering Wheel and Clock Spring

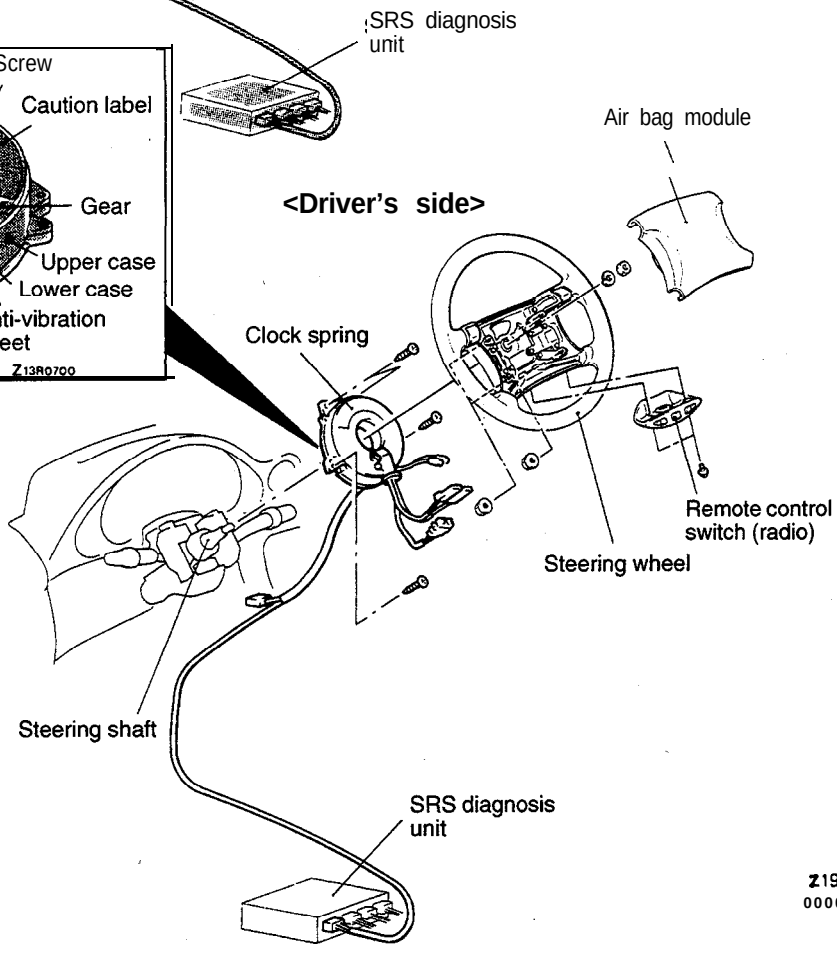
<Up to 1993 models>





<From 1994 models>

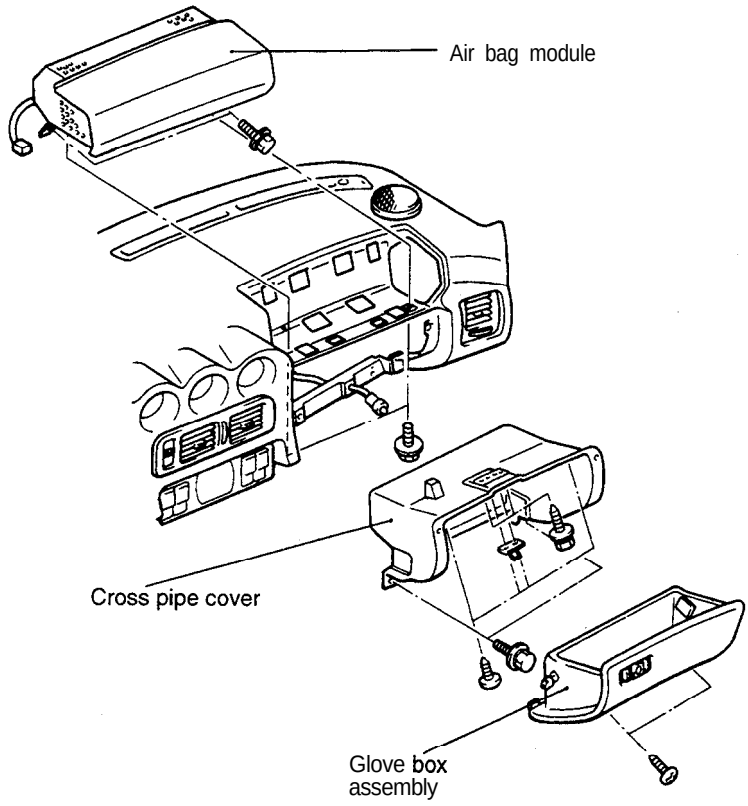




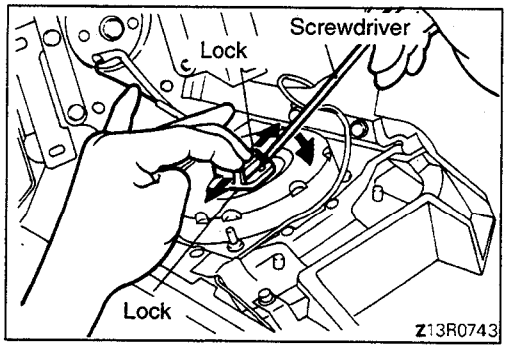
TSB Revision

<From 1994 models>

<Passenger's side>

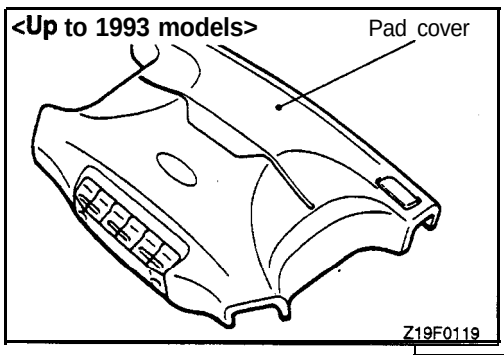


Z19F0250



(1) Remove air bag module from steering wheel. (Refer to GROUP 52B – Air Bag Module and Clock Spring.)

Caution
When disconnecting the air bag module-clock spring connector, take care not to apply excessive force to it.

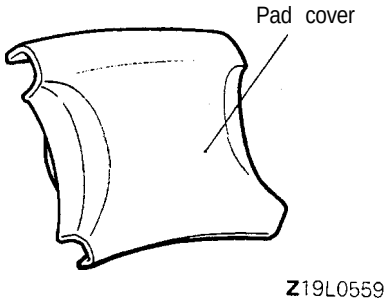


(2) Check pad cover for dents, cracks or deformities.

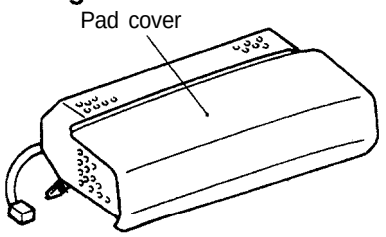
Caution
The removed air bag module should be stored in a clean, dry place with the pad cover face up.

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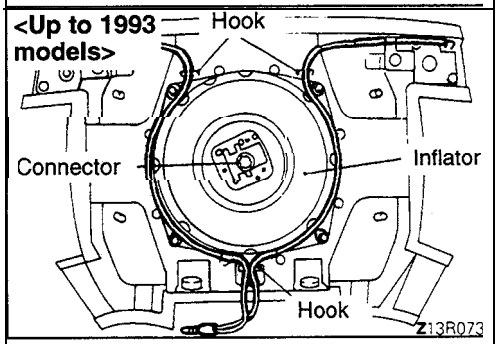
<From 1994 models>
<Driver's side>



<Passenger's side>

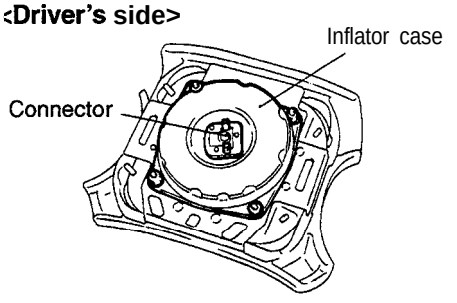


<Up to 1993 models>

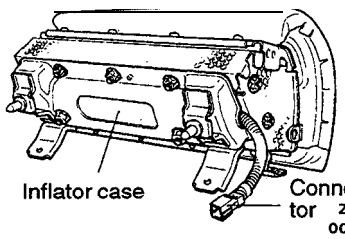


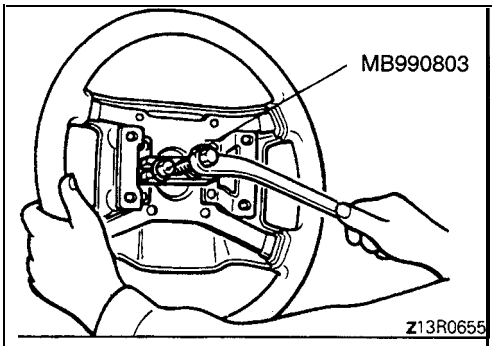
(3) Check hooks and connectors for damage, terminals deformities, and harness for binds.
(4) Check air bag inflator case for dents, cracks or deformities.
(5) Check harness (built into steering wheel) and connectors for damage, and terminals for deformities.

<From 1994 models>
<Driver's side>



<Passenger's side>

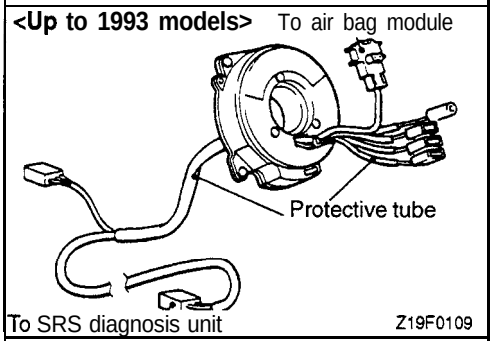




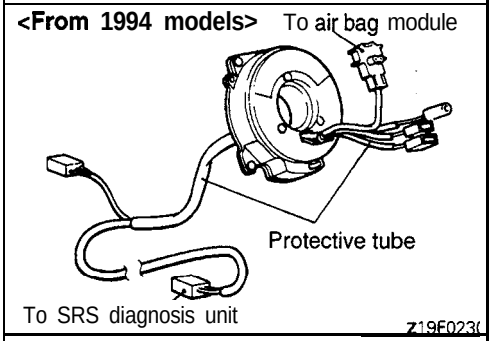
(6) Remove the steering wheel by using special tool.

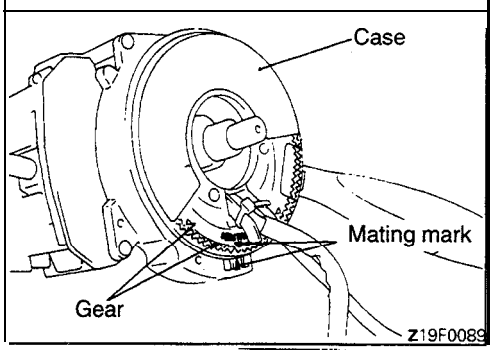
Caution
Do not hammer on the steering wheel. Doing so may damage the collapsible column mechanism.

(7) Remove the steering column covers. (Refer to GROUP 52A – Instrument Panel.)
(8) Remove the clock spring. (Refer to GROUP 52B – Air Bag Module and Clock Spring.)



(9) Check clock spring connectors and protective tube for damage, and terminals for deformities.

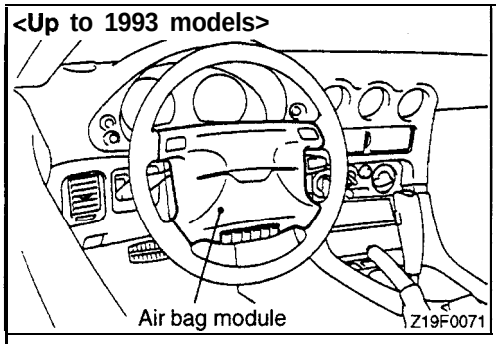




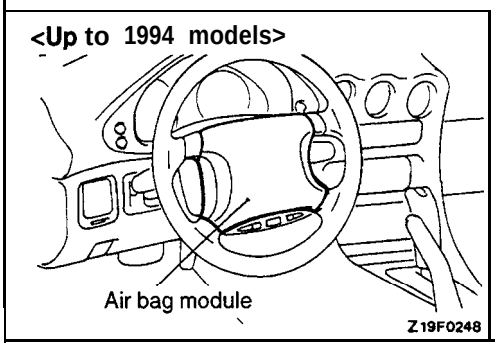
(10) Visually check the clock spring case and the gears for damage.
(11) Align the mating mark and "NEUTRAL" position indicator and, after turning the vehicle's front wheels to straight-ahead position, install the clock spring to the column switch.

Caution
If the clock spring's mating mark is not properly aligned, the steering wheel may not be completely rotational during a turn, or the flat cable within the clock spring may be severed, obstructing normal operation of the SRS and possibly leading to serious injury to the vehicle's driver and passenger.

<Up to 1993 models>



<Up to 1994 models>



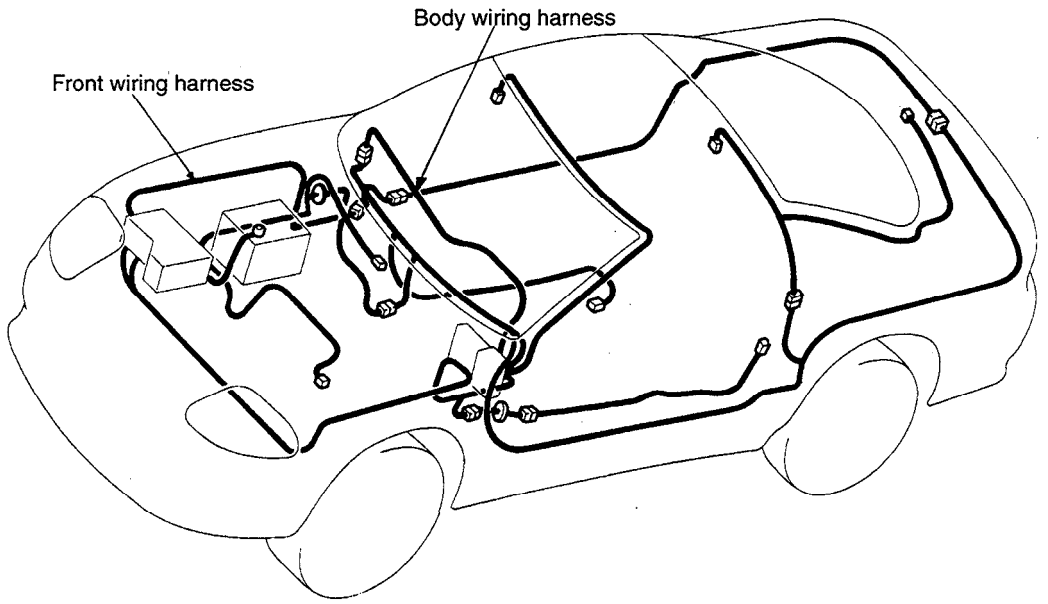
(12) Install the steering wheel, steering column covers and the air bag module.
(13) Check steering wheel for noise, binds or difficult operation.
(14) Check steering wheel for excessive free play.

REPLACE ANY VISUALLY INSPECTED PART IF IT FAILS THAT INSPECTION.

(Refer to GROUP 52B – Air Bag Module and Clock Spring.)

Caution
The SRS may not activate properly if any of the above components is not installed properly, which could result in serious injury or death to the vehicle's driver and passenger.

2-4 Front Wiring Harness and Body Wiring Harness



(1) Check connectors for poor connections.
(2) Check harnesses for binds, connectors for damage, and terminals for deformities.

REPLACE ANY CONNECTORS OR HARNESS THAT FAIL THE VISUAL INSPECTION.

(Refer to GROUP 52B – Service Precautions.)

Caution
The SRS may not activate properly if SRS harnesses or connectors are damaged or improperly connected, which could result in serious injury or death to the vehicle's driver and passenger.

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21. EXHAUST SYSTEM (CONNECTION PORTION OF MUFFLER, PIPINGS AND CONVERTER HEAT SHIELDS) (Check and service as required)

1. Check for holes and gas leaks due to damage, corrosion, etc.
2. Check the joints and connections for looseness and gas leaks.
3. Check the hanger rubber and brackets for damage.

MAIN SEALANT AND ADHESIVE TABLE

SEALANTS FOR ENGINE ACCESSORIES

Application	Recommended brand
Sealing between rocker cover and camshaft bearing cap (4G6 DOHC and 6G7 engines only)	3M ATD Part No. 8660 or equivalent
Sealing between semi-circular packing and rocker cover and between semi-circular packing and cylinder head	
Oil pressure switch	
Engine coolant temperature switch, Engine coolant temperature sensor, Thermo valve, Thermo switch, Joints, Engine coolant temperature gauge unit (large size)	3M Nut Locking Part No. 4171 or equivalent
Engine coolant temperature gauge unit (small size, MD091056 only)	3M ATD Part No. 8660 or equivalent
Oil pan (except 4G5, 4G9 engine)	MITSUBISHI GENUINE Part No. MD970389 or equivalent
Oil pan, Water pump, Thermostat case (4G9, 4G6, 6A1 engine only)	

SEALING BETWEEN GLASS AND WEATHERSTRIP

Application	Recommended brand
Sealing between tempered glass and weatherstrip	3M ATD Part No. 8513 or equivalent
Sealing between body flange and weatherstrip	3M ATD Part No. 8509 or equivalent
Sealing between laminated glass and weatherstrip	

ADHESION WITH RIBBON SEALER

Application	Recommended brand
Waterproof film for door, Fender panel, Splash shield, Mud guard, Rear combination lamp	3M ATD Part No. 8625 or equivalent

ADHESIVES FOR INTERIOR TRIM

Application	Recommended brand
Adhesion of polyvinylchloride sheet	3M Part No. EC-l 368 or equivalent
Adhesion of door weatherstrip to body	3M ATD Part No. 8001 or 3M ATD Part No. 8011 or equivalent
Sealing between grommet or packing and metal seal	3M ATD Part No. 8513 or equivalent
Adhesion of headlining and other interior trim materials	3M Part No. EC-1368 or 3M ATD Part No. 8080 or equivalent
Adhesion of fuel tank to pad	

BODY SEALANT

Application	Recommended brand
Sealing of sheet metal, drip rail, floor, body side panel, trunk, front panel and the like joints	3M ATD Part No. 8531 or 3M ATD Part No. 8646 or equivalent
Sealing of tailgate hinges	

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CHASSIS SEALANT

Application	Recommended brand
Sealing of flange surfaces and threaded portions	3M ATD Part No. 8659 or equivalent
Fuel gauge unit packing	
Sealing of flange surfaces, threaded portions, packing and dust cover • Differential carrier packing • Dust covers for ball joint and linkage • Steering gear box packing and shims • Steering gear housing rack support cover and top cover • Mating surface of knuckle arm flange	3M ATD Part No. 8663 or equivalent
Sealing between accelerator arm bracket and toeboard	Drying sealant
Sealant for drum brake shoe hold-down pin and wheel cylinder	3M ATD Part No. 8513 or equivalent

FAST BONDING ADHESIVE

Application	Recommended brand
Adhesion of all materials except polyethylene, polypropylene, fluorocarbon resin or other materials with highly absorbent surface	3M ATD Part No. 8155 or equivalent

ANAEROBIC FAST BONDING ADHESIVE

Application	Recommended brand
Fixing of bolts and screws • Tightening of drive gear to differential case • Bolts for coupling tilt steering upper column with lower column	3M Stud locking Part No. 4170 or equivalent
Fixing of bearing, fan, pulley and gear connections	
Sealing of small recess or flange surface	
Steering angle stopper bolt (jeep)	3M Nut locking Part No. 4171 or equivalent

UNDERCOAT

Application	Recommended brand
Undercoat	3M ATD Part No. 8864 or equivalent

ENGINE

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SPECIFICATIONS

GENERAL SPECIFICATIONS

Items			Non-Turbo	Turbo
Type			V-type, DOHC	V-type, DOHC
Number of cylinders			6	6
Bore mm (in.)			91.1 (3.587)	91.1 (3.587)
Stroke mm (in.)			76.0 (2.992)	76.0 (2.992)
Piston displacement cc (cu.in.)			2,972 (181.4)	2,972 (181.4)
Compression ratio			10.0	8.0
Firing order			1-2-3-4-5-6	1-2-3-4-5-6
Valve timing	Intake valve	Opens (BTDC)	16°	16°
		Closes (ABDC)	55°	55°
	Exhaust valve	Opens (BBDC)	48°	50°
		Closes (ATDC)	15°	17°

SERVICE SPECIFICATIONS

Items		Standard value	Limit
Compression pressure kPa (psi)/rpm	Non-Turbo	1,270 (185)/250–400	min. 959 (139)/250–400
	Turbo	1,080 (156)/250–400	min. 792 (115)/250–400
Compression pressure difference of all cylinder kPa (psi)		–	max. 98 (14)
Manifold vacuum mmHg (in.Hg.)		–	min. 450 (18)
Basic ignition timing at curb idle speed BTDC		5° ± 2°*1	–
		5° ± 3°*2	–
Actual ignition timing at curb idle speed BTDC		Approx. 15°	–
Curb idle speed rpm		700 ± 100	–
CO concentration %		0.5 or less	–
HC concentration ppm		100 or less	

NOTE
*1: 1992 models
*2: From 1993 models

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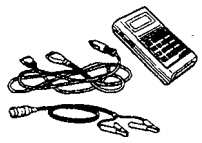
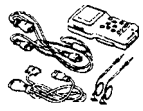
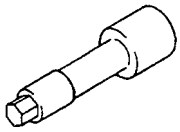
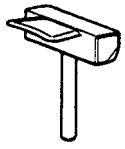
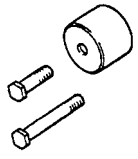
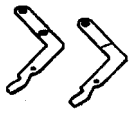
Items			Standard value	Limit
Drive belt tension N (lbs.)	For generator (Vehicle without air conditioning)	Inspection	350-600 (77-132)	
		New belt	650–850 (143-187)	
		Used belt	450-600 (99-132)	
	For generator and air conditioning compressor	Inspection	350-600 (77-132)	–
		New belt	650–850 (143-187)	
		Used belt	450-600 (99-132)	
	For power steering pump	Inspection	250–500 (55–110)	
		New belt	500-700 (110-154)	
		Used belt	350-400 (77-88)	–
Drive belt deflection mm (in.) <Reference value>	For generator (Vehicle without air conditioning)	Inspection	4.0–5.5 (.16–.22)	
		New belt	3.5-4.0 (.14–.16)	
		Used belt	4.0-5.0 (.16–.20)	
	For generator and air conditioning compressor	Inspection	4.0–5.5 (.16–.22)	
		New belt	3.5-4.0 (.14–.16)	
		Used belt	4.0-5.0 (.16–.20)	
	For power steering pump	Inspection	9.5-l 3.5 (.37–.53)	
		New belt	7.5–9.0 (.30–.35)	
		Used belt	10.5–12.5 (.41–.49)	
Timing belt	Amount of projection of auto tensioner rod mm (in.) (distance between the tensioner arm and auto tensioner body)		3.8-4.5 (.149–.177)	

SEALANTS

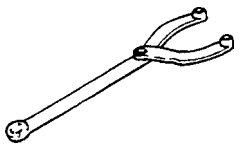
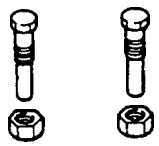
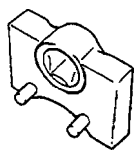
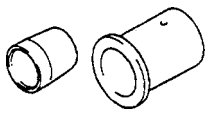
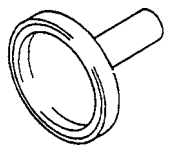
Items	Specified sealant
Oil pan	MITSUBISHI GENUINE Part No. MD970389 or equivalent
Rocker cover	3M ATD Part No. 8660 or equivalent

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SPECIAL TOOLS

Tool	Tool number and name	Supersession	Application
	MB991341 Scan tool (Multi-use tester <MUT>)	MB991 341	Up to 1993 models Idle speed check
	ROM pack (For the number, refer to GROUP 00 – Precautions before service.)	–	
 Z16X0606	MB991 502 Scan tool (MUT-II)	MB991502	All models Idle speed check
 Z16X0607	ROM pack	–	
	MD998051 Cylinder head bolt wrench	MD998051 -01	Loosening and tightening of cylinder head bolt
	MD998727 Oil pan remover	General service tool (Use a scraper and exercise care)	Removal of the oil pan
	MD998761 Camshaft oil seal installer		Installation of camshaft oil seal
	MD998782 Valve lifter set	–	Removal of rash adjuster

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Tool	Tool number and name	Supersession	Application
	MB990767 End yoke holder	MB990767-01	Supporting the sprocket and shaft pulley when attaching or detaching them Supporting the crankshaft pulley when crankshaft bolt and pulley are removed or reinstalled.
	MD998754 Crank pulley holder		
	MB990998* Crankshaft wrench		Used if the crankshaft needs to be rotated to attach the timing belt, etc. when the piston and connecting rod assembly is assembled. <SOHC> *: Use only the large nut included in MB990998, together with the crankshaft pulley bolt.
	M D998767 Tensioner pulley socket wrench		Adjustment of timing belt
	MD99871 7 Crankshaft front oil seal installer		Installation of crankshaft front oil seal
	MD99871 8 Crankshaft rear oil seal installer		Installation of crankshaft rear oil seal

TROUBLESHOOTING

Symptom	Probable cause	Remedy
Compression too low	Cylinder head gasket blown	Replace gasket
	Piston ring worn or damaged	Replace rings
	Piston or cylinder worn	Repair or replace piston and/or cylinder block
	Valve seat worn or damaged	Repair or replace valve and/or seat ring
Oil pressure drop	Engine oil level too low	Check engine oil level
	Oil pressure switch faulty	Replace oil pressure switch
	Oil filter clogged	Install new filter
	Oil pump gears or cover worn	Replace gears and/or cover
	Thin or diluted engine oil	Change engine oil to correct viscosity
	Oil relief valve stuck (opened)	Repair relief valve
	Excessive bearing clearance	Replace bearings
Oil pressure too high	Oil relief valve stuck (closed)	Repair relief valve
Noisy valves	Incorrect lash adjuster	Replace lash adjuster
	Thin or diluted engine oil (low oil pressure)	Change engine oil
	Valve stem or valve guide worn or damaged	Replace valve and/or guide
Connecting rod noise/ main bearing noise	Insufficient oil supply	Check engine oil level
	Thin or diluted engine oil	Change engine oil
	Excessive bearing clearance	Replace bearings
Timing belt noise	Incorrect belt tension	Adjust belt tension

ON-VEHICLE SERVICE

DRIVE BELTS TENSION ADJUSTMENT

(1) Check that the belts are not damaged and are properly fit into the pulley grooves.

Caution

1. When installing the V-ribbed belt, check that the V-ribs are properly fit without misalignment.
2. If creaking or slippage is observed, check the belt for wear, damage, or breakage on the pulley contact surface, check the pulley for scoring, in addition to sag inspection.
3. Check that the V-ribbed belt is not resting on the tension pulley or idler pulley flange.

(2) With belt tension gauge set to the belt midway between the pulleys as shown in the illustration, check the belt tension for standard value. Or apply a force of 98 N (22 lbs.) to the belt to check the deflection for standard value.

Standard value:

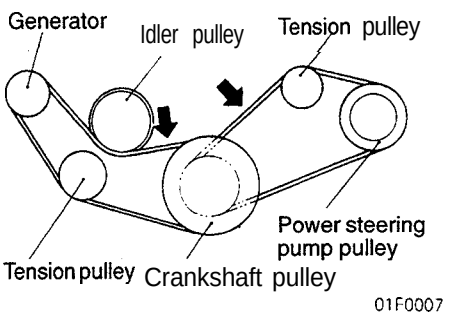
<Vehicle without air conditioning>

Items		Check value	Adjustment value – new belt	Adjustment value – used belt
For generator	Tension N (lbs.)	350-600 (77-132)	650–850 (143-187)	450-600 (99-132)
	Deflection mm (in.) <Reference value>	4.0-5.5 (.16–.22)	3.5–4.0 (.14–.16)	4.0-5.0 (.16–.20)
For power steering pump	Tension N (lbs.)	250–500 (55–110)	500-700 (110–154)	350-400 (77-88)
	Deflection mm (in) <Reference value>	9.5-13.5 (.37–.53)	7.5-9.0 (.30–.35)	10.5–12.5 (.41–.49)

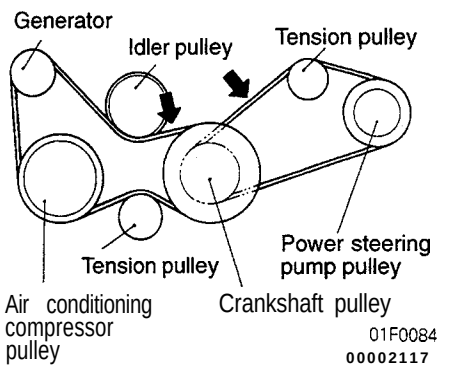
<Vehicle with air conditioning>

Items		Check value	Adjustment value – new belt	Adjustment value – used belt
For generator and A/C compressor	Tension N (lbs.)	350-600 (77-132)	650–850 (143-187)	450-600 (99-132)
	Deflection mm (in.) <Reference value>	4.0–5.5 (.16–.22)	3.5–4.0 (.14–.16)	4.0–5.0 (.16–.20)
For power steering pump	Tension N (lbs.)	250–500 (55–110)	500-700 (110–154)	350-400 (77-88)
	Deflection mm (in.) <Reference value>	9.5-13.5 (.37–.53)	7.5-9.0 (.30–.35)	10.5–12.5 (.41–.49)

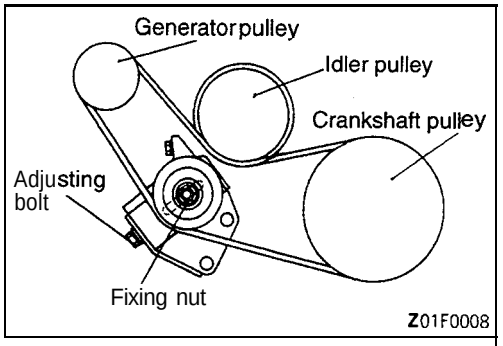
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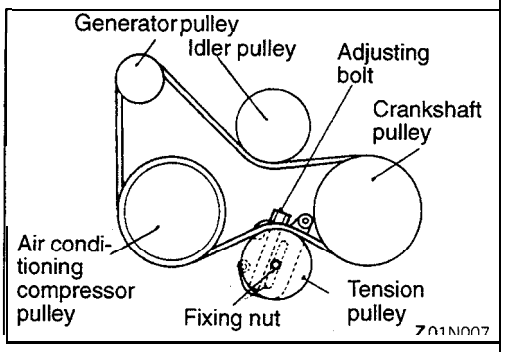


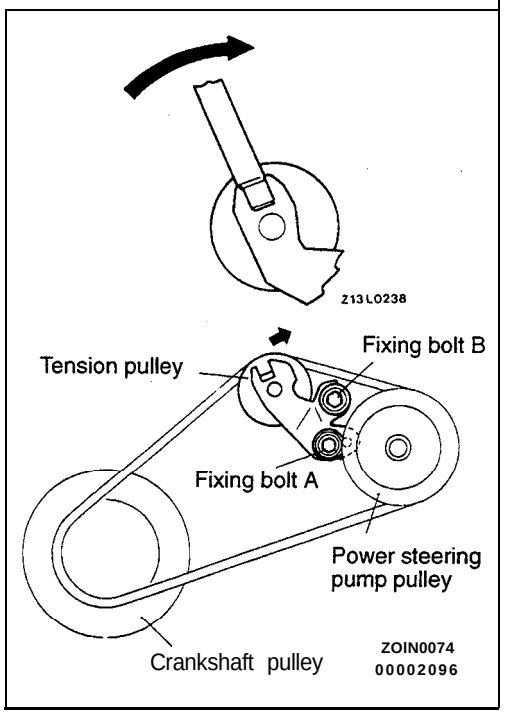
<Vehicle with air conditioner>



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GENERATOR DRIVE BELT TENSION ADJUSTMENT <Vehicle without air conditioning>

(1) Remove front under cover panel <Vehicle with active aero> (Refer to GROUP 51 – Aero Parts.).
(2) Remove under covers (front L.H., side L.H.).
(3) Loosen tension pulley fixing nut.
(4) Adjust belt deflection with adjusting bolt.
(5) Tighten fixing bolt.
(6) Run the engine one time or more.
(7) Check the belt tension. Readjust, if necessary.
(8) Install under covers.

GENERATOR AND AIR CONDITIONING COMPRESSOR DRIVE BELT DEFLECTION ADJUSTMENT <Vehicle with air conditioning>

(1) Use straight handle box wrench to loosen tension pulley fixing nut.
(2) Adjust belt deflection with adjusting bolt.
(3) Use straight handle box wrench to tighten fixing nut.
(4) Run the engine one time or more.
(5) Check the belt deflection. Readjust, if necessary.

POWER STEERING PUMP DRIVE BELT DEFLECTION ADJUSTMENT

(1) Insert an extension bar (insertion depth 12.7 mm), etc. into the opening at the end of the tension pulley bracket.
(2) Loosen the tension pulley fixing bolts in the order of B and A.
(3) Move the extension bar installed to the tension pulley in the direction of arrow to adjust the belt tension.
(4) Tighten the tension pulley fixing bolts in the order of A and B.

Tightening torque: 42 Nm (30 ft.lbs.)

(5) Give the crankshaft two turns in normal direction (clockwise) to run in the belt.
(6) Check the belt deflection. Readjust, if necessary.

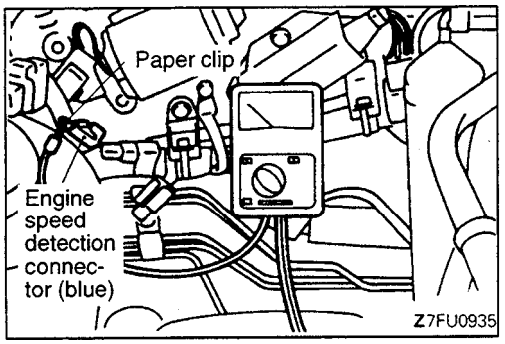
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IGNITION TIMING CHECK

4992 models>

(1) The vehicle should be prepared as follows before the inspection and adjustment.

- Engine coolant temperature: 80–95°C (176–203°F)
- Lights, electric cooling fan and accessories: OFF
- Transaxle: neutral (P for A/T)



(2) Insert a paper clip to the engine speed detection connector (blue), and connect a tachometer to the paper clip.

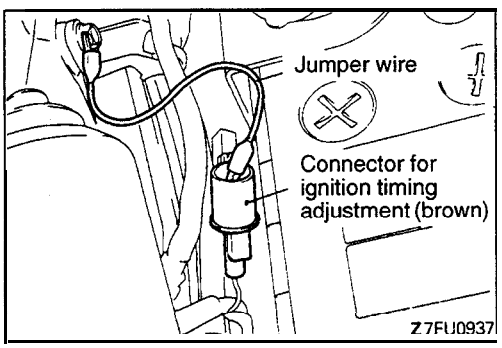
NOTE
Do not use the scan tool. If tested with the scan tool connected to the data link connector, the ignition timing will not be the basic timing but be ordinary timing.

(3) Set the timing light.
(4) Start the engine and run at idle.
(5) Check curb idle speed.

Curb idle speed: 700 ± 100 rpm

NOTE
The engine speed indicated is a third of actual speed. In other words, the reading of the tachometer times 3 is actual speed.

(6) Turn OFF the ignition switch.
(7) Remove the water-proof female connector from the ignition timing adjustment connector (brown).



(8) Using a jumper wire, ground the ignition timing adjusting terminal.

NOTE
Grounding this terminal sets the engine to the basic ignition timing.

(9) Start the engine and run at idle.
(10) Check basic ignition timing.

Basic ignition timing: 5° BTDC ± 2"

(11) If not within the standard value range, loosen the crank angle sensor mounting nut and adjust by turning the crank angle sensor. Turning it to the counterclockwise retards timing, and to the clockwise advances it.
(12) After adjustment, tighten mounting nut taking care not to move the crank angle sensor.
(13) Turn OFF the ignition switch.
(14) Disconnect the jumper wire connected at step (8).

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(15)Check to be sure that the idling ignition timing is the correct timing.

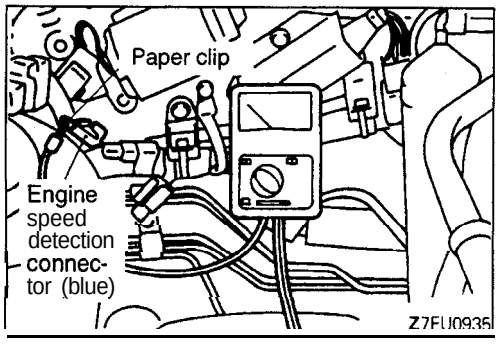
Actual ignition timing: Approx. 15° BTDC

NOTE
(1) Ignition timing is variable within about ±7°, even-under normal operation.
(2) And it is automatically further advanced by about 5 from 15" BTDC at higher altitudes.

IGNITION TIMING CHECK

<From 1993 models>

(1) The vehicle should be prepared as follows before the inspection and adjustment.
- Engine coolant temperature: 80–95°C (176–203°F)
- Lights, electric cooling fan and accessories: OFF
- Transaxle: neutral (P for A/T)



(2) Insert a paper clip to the engine speed detection connector (blue), and connect a tachometer to the paper clip.

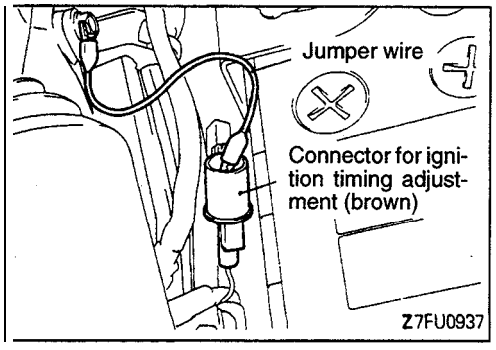
NOTE
Do not use the scan tool. If tested with the scan tool connected to the data link connector, the ignition timing will not be the basic timing but be ordinary timing.

(3) Set the timing light.
(4) Start the engine and run at idle.
(5) Check curb idle speed.

Curb idle speed: 700 ± 100 rpm

NOTE
The engine speed indicated is a third of actual speed. In other words, the reading of the tachometer times 3 is actual speed.

(6) Turn OFF the ignition switch.
(7) Disconnect the waterproof female connector from the ignition timing adjusting connector (brown).
(8) Using a jumper wire, ground the ignition timing adjusting terminal.



NOTE
Grounding this terminal sets the engine to the basic ignition timing.

(9) Start the engine and run at idle.
(10)Check basic ignition timing.

Basic ignition timing: 5°BTDC ± 3°

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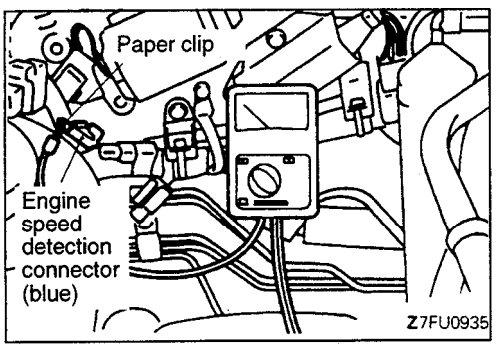
(11) If basic ignition timing is not within the standard range, check the crankshaft position sensor by reference to GROUP 13A – On-vehicle Inspection of MFI Components.
(12) Disconnect the jumper wire connected at step (8).
(13) Check to be sure that the idling ignition timing is the correct timing.

Actual ignition timing: Approx. 15° BTDC

NOTE
(1) Ignition timing is variable within about ±7°, even under normal operating.
(2) And it is automatically further advanced by about 5° from 15°BTDC at higher altitudes.

CURB IDLE SPEED CHECK

(1) The vehicle should be prepared as follows before the inspection.
- Engine coolant temperature: 80–95°C (176–203°F)
- Lights, electric cooling fan and accessories: OFF
- Transaxle: neutral (P for A/T)



(2) Connect a tachometer. (Refer to P.11-9.)
(3) Set a timing light.
(4) Using a jumper wire, ground the ignition timing adjusting terminal.
(5) Start the engine and let it idle.
(6) Check the ignition timing is the standard value; if not, adjust.

Standard value:
5° BTDC ± 2° 4992 models>
5° BTDC ± 3° <from 1993 models>

NOTE
Check the ignition timing with the scan tool not connected to the data link connector.

(7) Remove the jumper wire from the ignition timing adjusting terminal.
(8) When using the scan tool, turn OFF the ignition switch and connect the tester to the data link connector.
(9) Idle the engine for two minutes.
(10) Check the idle speed.

Curb idle speed: 700 ± 100 rpm

NOTE
(1) The idling speed is automatically regulated by the idle-speed control system.
(2) The engine speed indicated is a third of actual speed. In other words, the reading of the tachometer times 3 is actual speed.

(11) If there is a deviation from the standard value, refer to GROUP 13A – Chart Classified by Problem Symptoms, and check the MFI components.

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IDLE MIXTURE CHECK

(1) Before inspection, set the vehicle in the following condition.
- Engine coolant temperature: 80–95°C (176–203°F)
- Lights, electric cooling fan and accessories: OFF
- Transaxle: P range

(2) Make sure that the basic ignition timing is of a standard value.

Standard value:
5°BTDC ± 2° <1992 models>
5°BTDC ± 3° <from 1993 models>

(3) After turning the ignition switch OFF, set a tachometer or connect the scan tool to the data link connector.

NOTE
For tachometer setting procedure, refer to P.11-9.

(4) Start the engine and run at 2,500 rpm for approx. 2 minutes.
(5) Set the CO tester and HC tester.
(6) Check the CO concentration and HC concentration with the engine at idle.

Standard value:
CO concentration: 0.5 % or less
HC concentration: 100 ppm or less

(7) If the standard value is exceeded, check the following items.
- Diagnostic output
- Closed loop control (if closed loop control is performed normally, heated oxygen sensor output signals change within a 0–400 mV range and a 600–1,000 mV range.)
- Fuel pressure
- Injectors
- Ignition coil, spark plug cables and spark plugs
- Leaks in EGR system and EGR valve
- Evaporative emission control system
- Compression pressure

NOTE
If CO and HC concentrations exceed the respective standard values despite the fact that the results of the inspection made on all items are normal, replace the three-way catalyst.

DASHPOT CHECK AND ADJUSTMENT <Turbo and From 1994 Non Turbo M/T model for California>

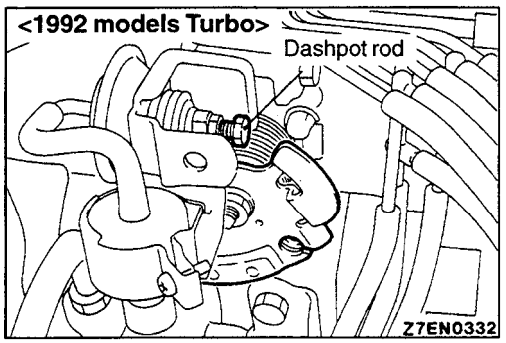
(1) Inspect the idle speed before inspection and adjustment of the dashpot.
(2) Set the vehicle in the following conditions before dashpot inspection and adjustment.
- Engine coolant temperature: 80–95°C (176–203°F)
- Lights, electrical cooling fan and accessories: OFF
- Transaxle: neutral

(3) Set the tachometer or connect the scan tool to the data link connector (white).

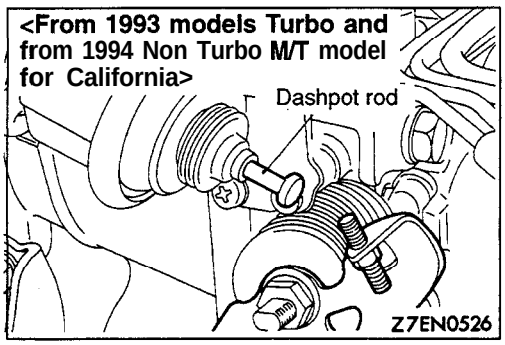
NOTE
For the tachometer setting procedure, refer to P.11-9.

(4) Start the engine.

<1992 models Turbo>



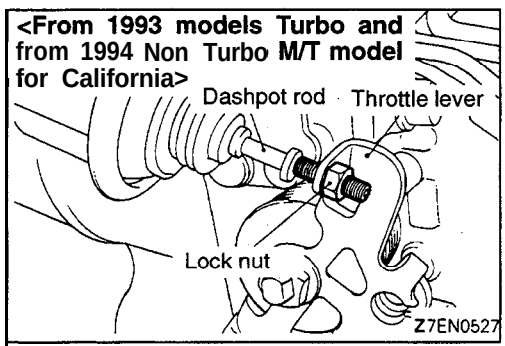
<From 1993 models Turbo and from 1994 Non Turbo M/T model for California>



(5) Open the throttle valve until the dashpot rod makes a full stroke.
(6) Close the throttle valve slowly to find a point where the throttle lever contacts the dashpot rod (a point where the dashpot starts to contract). Hold the throttle valve at this point.
(7) Check the engine speed (at which the dashpot starts to operate).

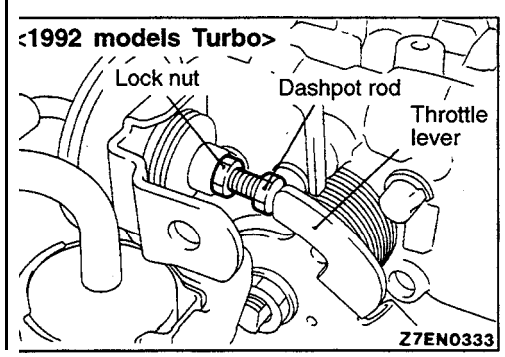
Standard value: 2,200 ± 200 rpm

<From 1993 models Turbo and from 1994 Non Turbo M/T model for California>



(8) If the engine speed is not within the specified limit, loosen the lock nut on the rod and turn the rod to make adjustment for proper dashpot starting engine speed.
(9) Release the throttle valve to make sure that the engine speed slowly drops to the idle speed.

<1992 models Turbo>

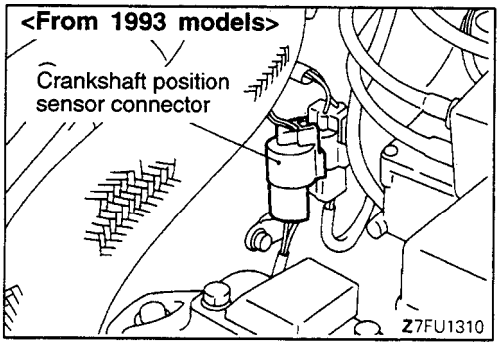


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COMPRESSION PRESSURE CHECK

(1) Prior to inspection, check to ensure that the engine oil, starter motor and battery are in proper condition. Place the vehicle in the following conditions.
- Engine coolant temperature: 80–95°C (176–203°F)
- Lights, electric cooling fan and accessories: OFF
- Transaxle: Neutral (P for A/T)

(2) Remove the spark plug cables.
(3) Remove all of the spark plugs.

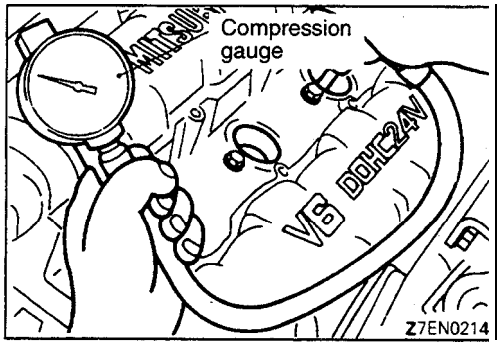


(4) Disconnect the crankshaft position sensor connector.

NOTE
By so doing the engine control module stops performing ignition and fuel injection.

(5) Cover the spark plug mounting holes with a shop towel, crank the engine, and then check for foreign substances deposited on the shop towel.

Caution
1. **When you crank the engine, keep away from the spark plug mounting holes.**
2. **If a compression measurement is performed with water, oil, fuel, etc. in the cylinder due to the cracks in the cylinders, these substances heated to a very high temperature will blow off the spark plug mounting holes and could be dangerous.**



(6) Install a compression gauge in a spark plug mounting hole.
(7) Set the throttle valve in a fully opened position, and crank the engine to measure the compression pressure.

Standard value:

<Non-Turbo>
1,270 kPa (185 psi) [250–400 rpm]

<Turbo>
1,080 kPa (156 psi) [250–400 rpm]

Limit:

<Non-Turbo>
min. 959 kPa (139 psi) [250–400 rpm]

<Turbo>
min. 792 kPa (115 psi) [250–400 rpm]

(8) Measure the compression pressure in each of the cylinders and check that the difference in compression pressure between the individual cylinders is less than the limit value.

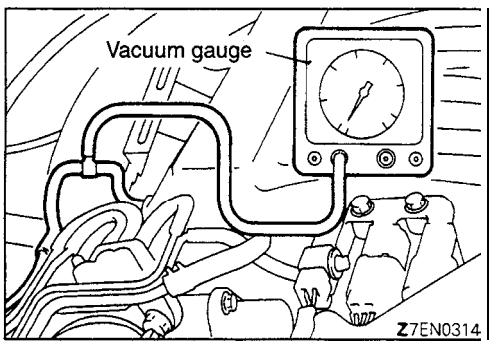
Limit: max. 98 kPa (14 psi)

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(9) If there is a cylinder in which the compression pressure or pressure difference is beyond the limit value, pour in a small amount of engine oil through the spark plug mounting hole, and repeat Steps (7) through (8).
   1) If the small amount of oil poured in causes the compression pressure to rise, then it is likely that either the piston ring, cylinder wall surface or both are worn or damaged.
   2) If the small amount of oil poured in does not cause the compression pressure to rise, then valve seizure, poor valve contact, or leakage from the gasket is suspected.

(10) Re-connect the crankshaft position sensor connector.
(11) Re-mount the spark plugs and spark plug cables.
(12) Erase the diagnostic trouble code using the scan tool or disconnect the negative (–) terminal of the battery, leave it disconnected for more than 10 seconds, and then re-connect it.

NOTE
This erases the trouble code due to the disconnection of the crankshaft position sensor connector.

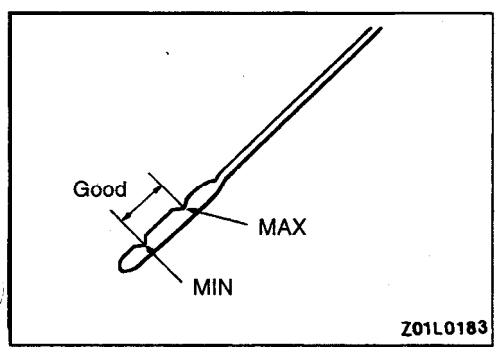


MANIFOLD VACUUM CHECK

(1) The vehicle should be repaired as follows before the inspection.
- Engine coolant temperature: 80–95°C (176–203°F)
- Lights, electric cooling fan, and accessories: OFF
- Transaxle: Neutral (P for A/T)

(2) Connect a tachometer. (Refer to P.11-9.)
(3) 1) <Non-Turbo>
   Install a three-way joint to the vacuum hose connected between the air intake plenum and the fuel pressure regulator and connect a vacuum gauge to the joint.
   2) <Turbo>
   Install a three-way joint to the vacuum hose connected between the air intake plenum and the fuel pressure solenoid valve and connect a vacuum gauge.
(4) Start the engine and check that idle speed is within the standard value range.
(5) Check the manifold vacuum.

Limit: 450 mmHg (18 in.Hg)

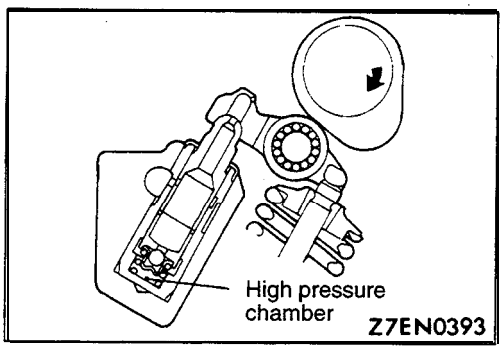


LASH ADJUSTER CHECK

NOTE
If the clanging noise due to the lash adjuster produced immediately after the engine has started or during operation persists, perform the following checks.

(1) Check the engine oil, and add or replace if necessary.

NOTE
(1) If the engine oil level is low, the air drawn in from the oil strainer will be trapped in the oil passage.



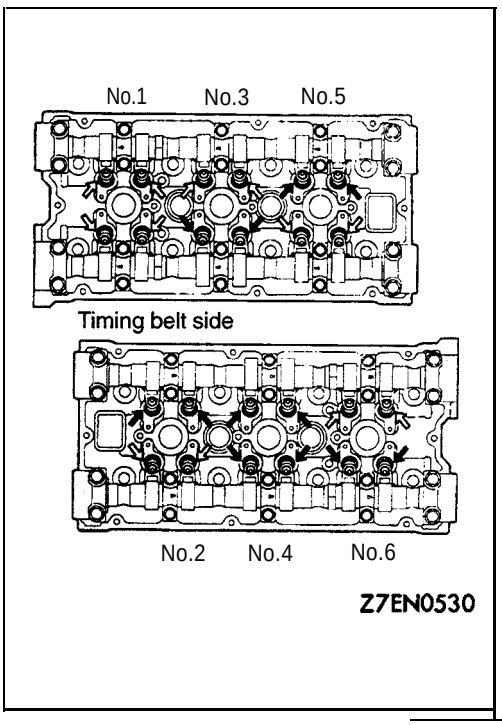
(2) If the engine oil level is higher than the specified level, agitation of the oil by the crankshaft could cause a large amount of air to enter the oil.
(3) A deteriorated oil contains a large amount of air, because the air, once trapped, is not readily separated from the oil.

If the air trapped due to these causes enters the high pressure chamber in the lash adjuster, the air in the high pressure chamber will be compressed while the valve is in the opened position. The lash adjuster will be drawn too far in, and will produce noise when the valve closes. This is the same phenomenon that occurs when the valve clearance is adjusted to an excessive dimension.
In this case, the normal condition will be restored if the air escapes from the lash adjuster.

(2) Start the engine and slowly race* it several times (less than 10 times).
If racing the engine causes the noise to die away, it means that the air has escaped from the high pressure chamber of the lash adjuster and that the lash adjuster has regained its normal functions.

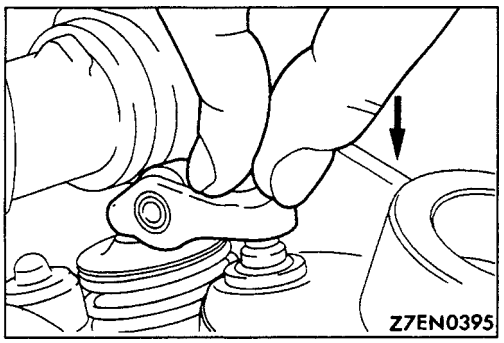
* Accelerate the engine from the idling speed to 3,000 rpm slowly (in 30 seconds) and then decelerate it to the idling speed slowly (in 30 seconds).

NOTE
(1) When the vehicle is parked on a slope for a long period, the oil in the lash adjuster will decrease. When the engine is started, the air might enter the high pressure chamber.
(2) After a long period of parking during which the oil in the oil passage goes away, it will take some time before the oil is re-supplied to the lash adjuster. Therefore, the air could enter the high pressure chamber.



(3) If any abnormal noise is not eliminated by racing, check the lash adjuster.
1) Stop the engine.
2) Set the engine so that cylinder No. 1 is positioned at the top dead center of the compression.
3) Press the rocker arm at the area indicated by the white arrow mark to check whether the rocker arm is lowered or not.
4) Slowly turn the crankshaft 360 degrees clockwise.
5) In the same procedure as Step (3), check the rocker arm at the area indicated by the black arrow mark.
6) Push down the rocker arm at a portion located right above the lash adjuster. If the rocker arm goes down readily, the lash adjuster is defective. Replace it with a new one in accordance with step (4). In addition, when replacing the lash adjuster, be sure to remove air positively from the lash adjuster before installation. Then perform inspection in accordance with steps (1) through (5) to make sure that there is no abnormality.

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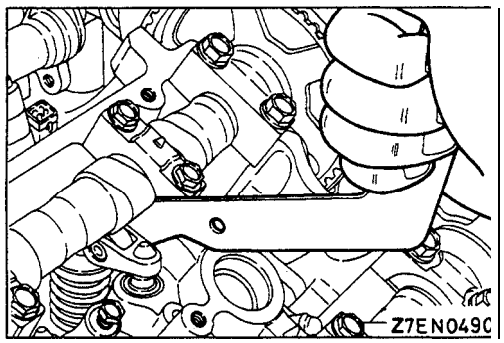


NOTE
(1) If the leak-down test is performed, the lash adjuster can be judged accurately to be defective or not.
(2) For the leak-down test procedure or the procedure for removing air from the lash adjuster, refer to the Engine Service Manual.

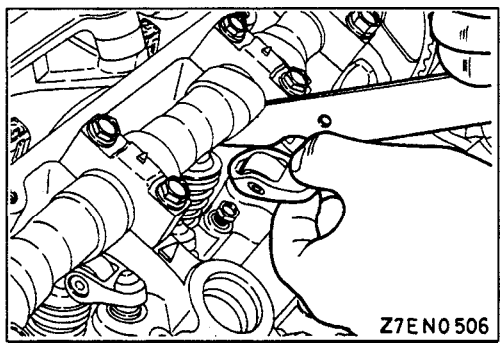
In addition, if the rocker arm is felt very stiff or cannot be pushed down when it is pushed, the lash adjuster is in the normal condition. Therefore, check for other cause of noise.

(4) Lash Adjuster Replacement Procedure

Caution
In the cylinder from which the lash adjuster is removed, the piston interferes with the valve when the valve is pushed down. Therefore, turn the crankshaft to keep the piston position down.
In addition, the rocker arm located at the valve lifted by the cam cannot be removed. Therefore, turn the crankshaft to keep the cam from lifting the valve before removal of the rocker arm.



1. Using the special tool, press the valve down and remove the roller rocker arm.



2. Pull out the lash adjuster from the cylinder head.
3. Install a new lash adjuster having air removed to the cylinder head.
4. With the valve pressed down by the special tool, install the roller rocker arm.

NOTE
When the roller rocker arm is installed, place the pivot side of the rocker arm on the lash adjuster. Then, 'push down the valve and place the slipper side of the rocker arm on the valve stem end.

LASH ADJUSTER REPLACEMENT

Refer to LASH ADJUSTER CHECK.

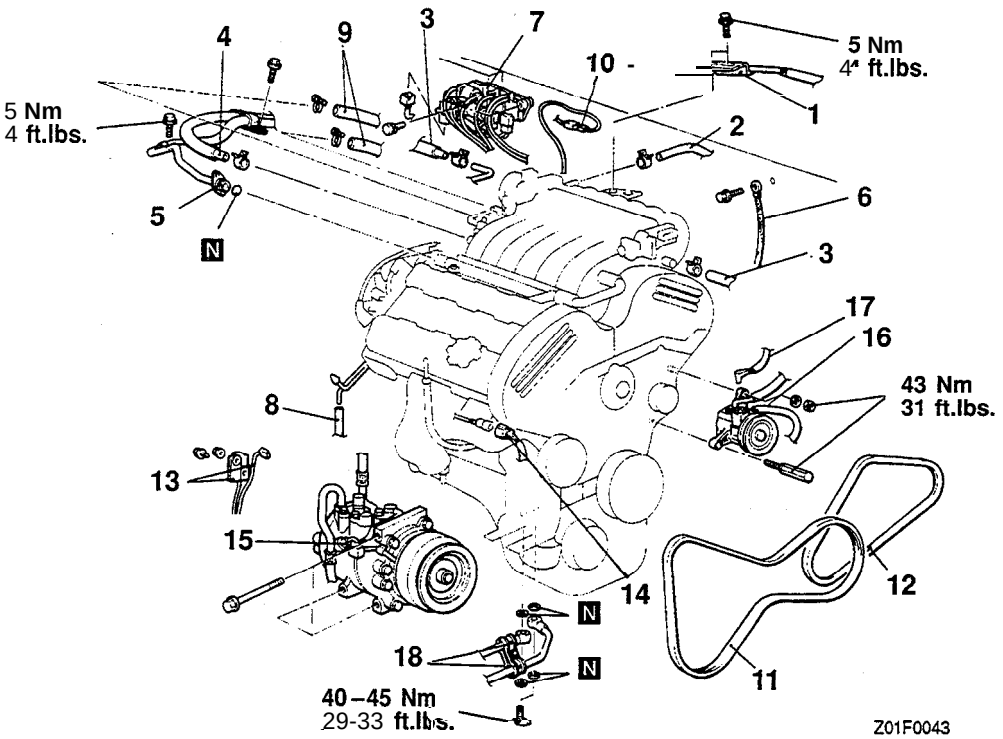
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ENGINE ASSEMBLY

REMOVAL AND INSTALLATION

Pre-removal Operation
- High Pressure Fuel Hose Release of Residual Pressure (Refer to GROUP 13A – Service Adjustment Procedures.)
- Cruise Control Pump and Link Assembly Removal (Refer to GROUP 13G – Cruise Control.)
- Hood Removal (Refer to GROUP 42 – Hood.)
- Air Hose and Air Pipe <Turbo> Removal (Refer to GROUP 15 – Charge Air Cooler.)
- Front Exhaust Pipe Removal (Refer to GROUP 15 – Exhaust Pipe and Main Muffler.)
- Transaxle Assembly Removal (M/T: Refer to GROUP 22 – Transaxle Assembly.) (A/T: Refer to GROUP 23 – Transaxle Assembly.)
- Radiator Removal (Refer to GROUP 14 – Radiator.)

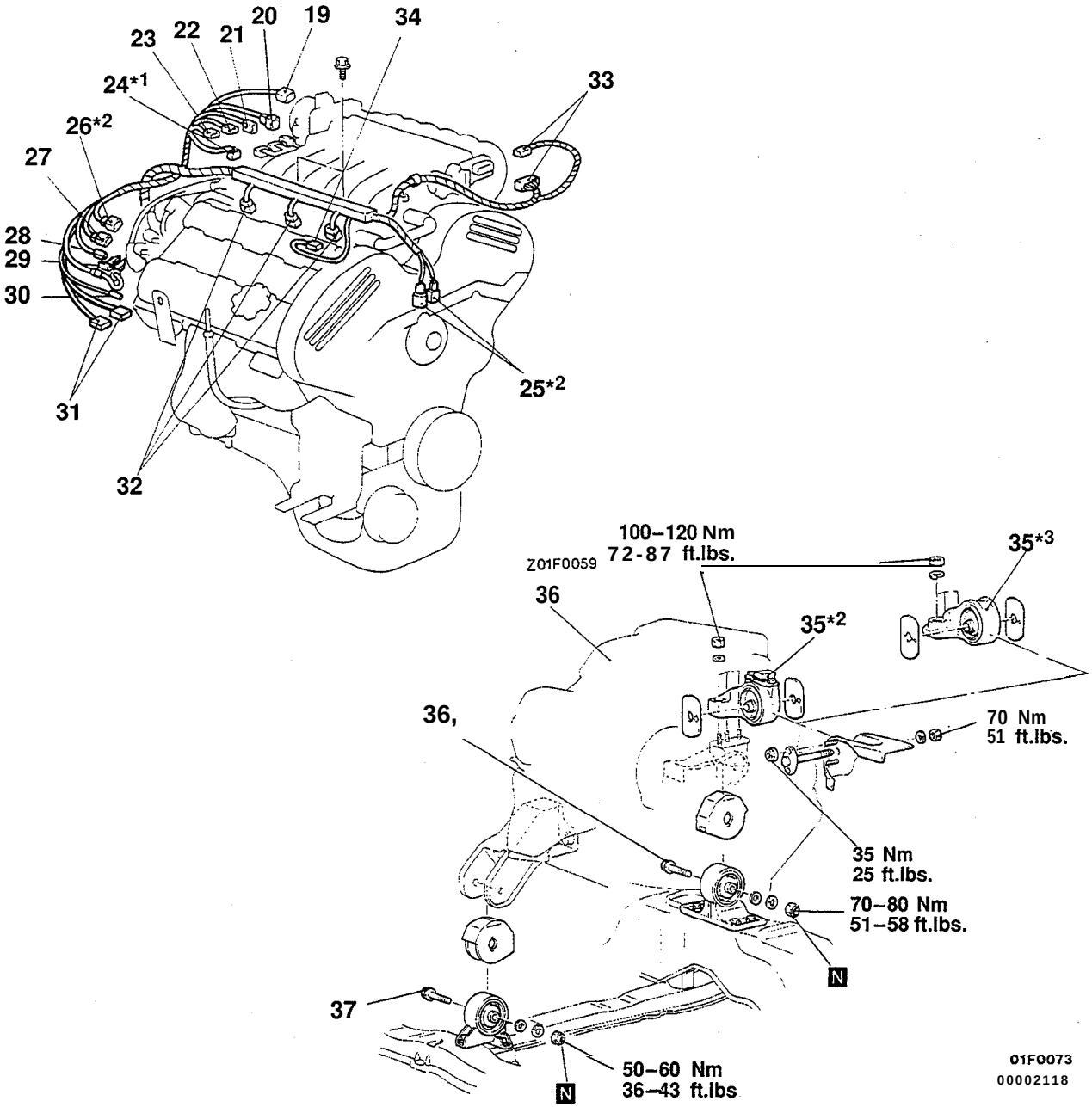
Post-installation Operation
- Radiator installation (Refer to GROUP 14 – Radiator.)
- Cruise Control Pump and Link Assembly Installation (Refer to GROUP 13G – Cruise Control.)
- Transaxle Assembly Installation (M/T: Refer to GROUP 22 – Transaxle Assembly.) (A/T: Refer to GROUP 23 – Transaxle Assembly.)
- Front Exhaust Pipe Installation (Refer to GROUP 15 – Exhaust Pipe and Main Muffler.)
- Air Hose and Air Pipe <Turbo> Installation (Refer to GROUP 14 – Charge Air Cooler.)
- Hood Installation (Refer to GROUP 42 – Hood.)
- Engine Oil Supplying (Refer to GROUP 00 – Maintenance Service.)
- Accelerator Cable Adjustment (Refer to GROUP 13F – Engine Control.)



Removal steps
1. Accelerator cable connection
2. Brake booster vacuum hose connection
3. Booster vacuum hose connection <Turbo>
4. Fuel return hose connection
5. Fuel high pressure hose connection
6. Ground cable connection
7. Solenoid valve assembly
8. Vapor hose connection
9. Heater hose connection
10. EGR temperature sensor connector <Vehicles for California>
11. Drive belt (Generator and air conditioning) (Refer to P.11-7.)
12. Drive belt (Power steering) (Refer to P.11-7.)
13. Generator harness connection
14. Heated oxygen sensor connector <Turbo>
15. Air conditioning compressor
16. Power steering oil pump
17. Oil pressure switch connector (Power steering)
18. Oil cooler pipes connection <Turbo>

◀A▶ ◀A▶

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19. Idle air control motor connector
20. TPS connector
21. Oil pressure switch and oil pressure gauge unit connector
22. Fuel injector harness connector
23. Knock sensor connector
24. Crankshaft position sensor connector*1
25. Crankshaft position sensor and camshaft position sensor connector*2
26. Engine coolant temperature switch connector (Air conditioning)*2
27. Engine coolant temperature sensor connector
28. Engine coolant temperature gauge unit connector
29. Condenser connector
30. Ignition coil connector
31. Ignition power transistor connector
32. Fuel injector connector
33. Variable induction motor connector <Non-Turbo>
34. Heated oxygen sensor connector <Turbo>
◀B▶ ▶B◀ 35. Engine mounting bracket
36. Rear roll stopper bracket and engine connection bolt
◀C▶ ▶A◀ 37. Front roll stopper bracket and engine connection bolt
38. Engine assembly

NOTE
*1 **1992 model**
*2 **1993 model**
*3 **1994 model**

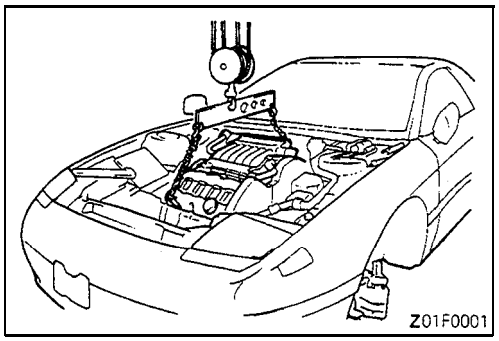
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REMOVAL SERVICE POINTS

◀A▶ AIR CONDITIONING COMPRESSOR / POWER STEERING OIL PUMP DISCONNECTION

Disconnect air conditioning compressor and power steering oil pump (with the hose).

NOTE
The removed air conditioning compressor and power steering oil pump should be fastened (by using rope, etc.) in a position that will not interfere with the removal/installation of the engine assembly.


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◀B▶ ENGINE MOUNT BRACKET REMOVAL

Before removing the engine mount bracket installation bolt, use a chain block or similar arrangement to suspend the engine assembly (to the extent that there is no looseness of the chain).

◀C▶ ENGINE ASSEMBLY REMOVAL

After checking that the cables, hoses, harness connectors, etc. are all removed, slowly raise the chain block to lift the engine assembly upward out of the engine compartment.

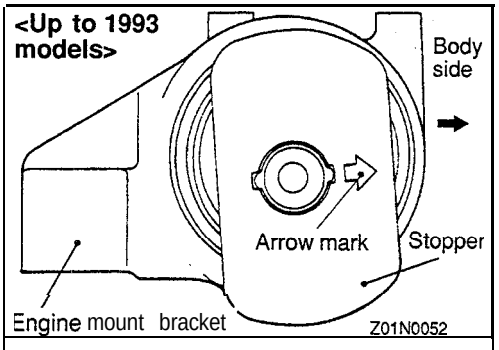
INSTALLATION SERVICE POINTS

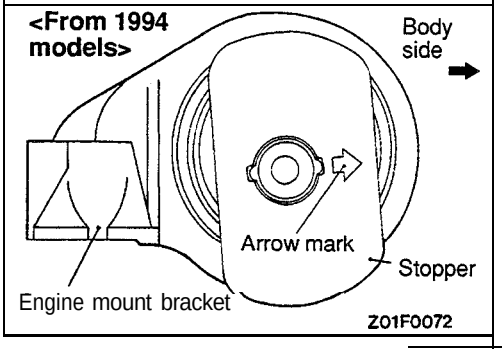
▶A◀ ENGINE ASSEMBLY INSTALLATION

When mounting the engine, check to be sure that the cables, hoses, harness connectors, etc. are all in the correct position.

▶B◀ ENGINE MOUNT BRACKET INSTALLATION

Attach the engine mounting bracket so that the arrow mark on the mounting stopper is in the direction as shown in the illustration.



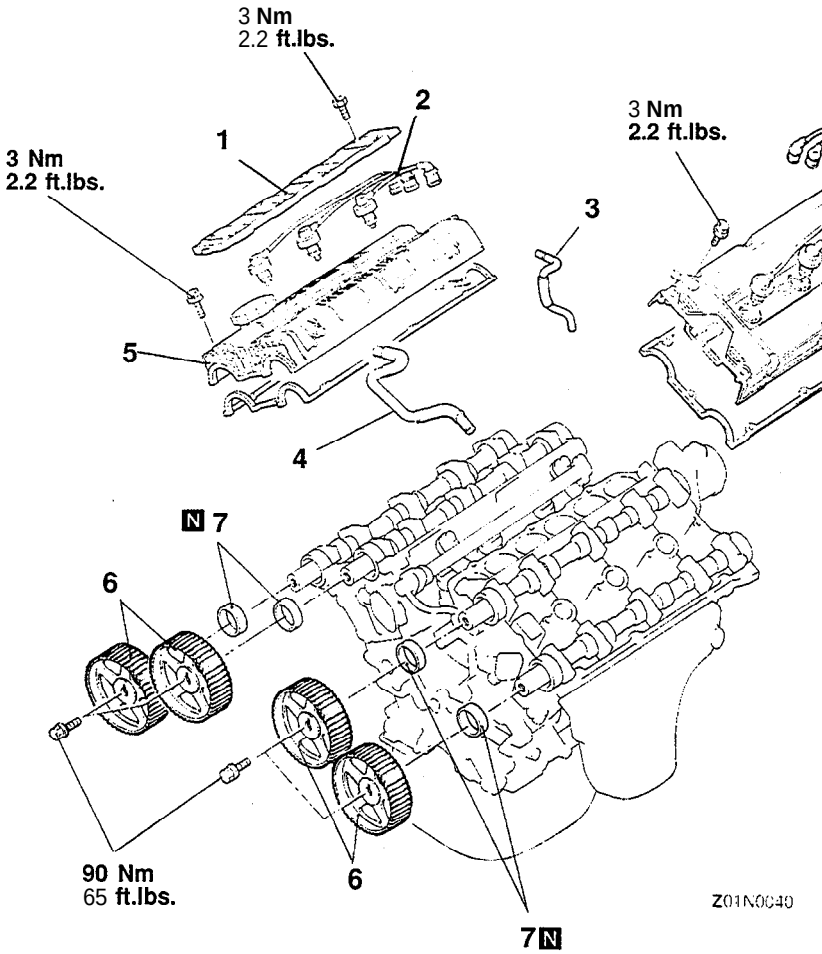


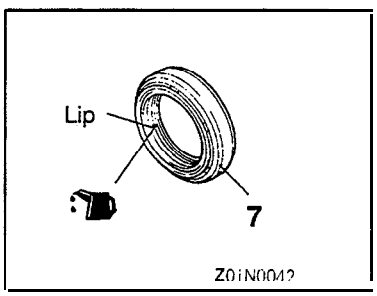
CAMSHAFT OIL SEALS

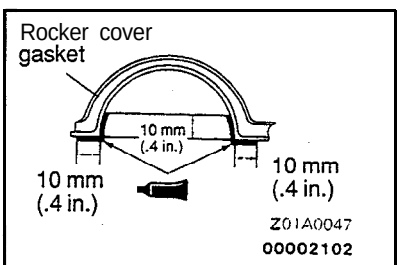
REMOVAL AND INSTALLATION

Pre-removal Operation
- Timing Belt Removal (Refer to P.11-31.)
- Intake Manifold Removal (Refer to GROUP 15 – Intake Manifold.)
- Camshaft Position Sensor Removal (Refer to GROUP 16 – Cam Position Sensor and Crankshaft Position Sensor.)

Post-installation Operation
- Camshaft Position Sensor installation (Refer to GROUP 16 – Cam Position Sensor and Crankshaft Position Sensor.)
- Intake Manifold Installation (Refer to GROUP 15 – Intake Manifold.)
- Timing Belt Installation (Refer to P.11-31.)
- Accelerator Cable Adjustment (Refer to GROUP 13F – Engine Control.)



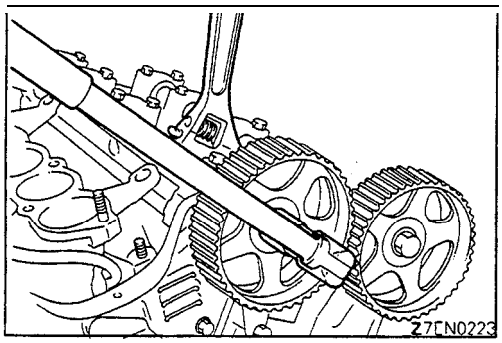




Sealant:
3M ATD Part No. 8660 or equivalent

Removal steps
1. Center cover (front bank)
2. Spark plug cables connection
3. Breather hose connection
4. PCV hose connection
▶C◀ 5. Rocker cover
◀A▶ ▶B◀ 6. Camshaft sprocket
◀B▶ ▶A◀ 7. Camshaft oil seals

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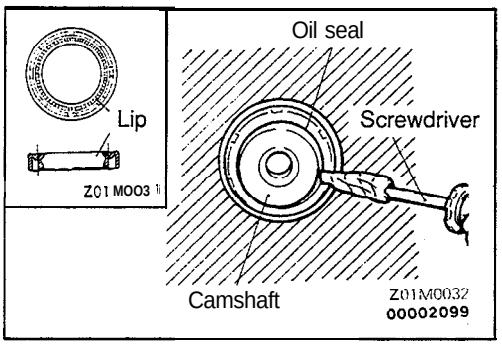


REMOVAL SERVICE POINTS

◀A▶ CAMSHAFT SPROCKET REMOVAL

Using a wrench at the hexagonal part of the camshaft (to prevent the crankshaft from turning), loosen the camshaft sprocket bolt.

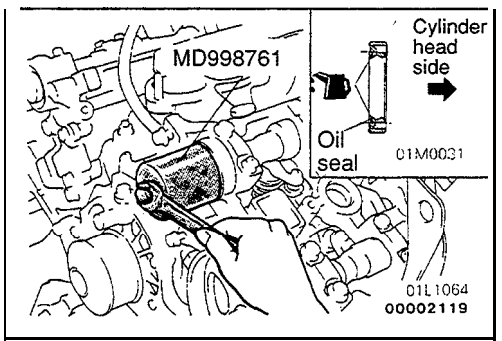
Caution
Do not hold the camshaft sprocket with a tool, or a damaged sprocket could result.



◀B▶ CAMSHAFT OIL SEAL REMOVAL

(1) Cut out a portion in the camshaft oil seal lip.
(2) Cover the tip of a screwdriver with a cloth and apply it to the cutout in the oil seal to pry off the oil seal.

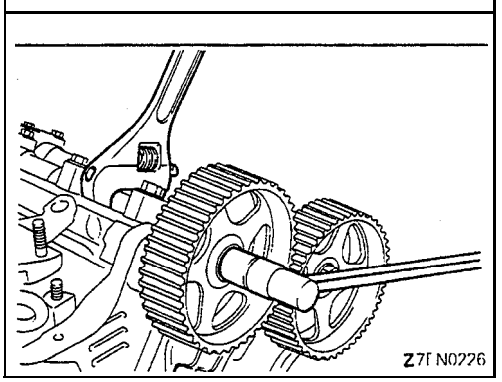
Caution
Use care not to damage the camshaft and cylinder head.



INSTALLATION SERVICE POINTS

,A(CAMSHAFT OIL SEAL INSTALLATION

(1) Apply a small amount of engine oil to the oil seal lip.
(2) Using the special tool, insert the oil seal.



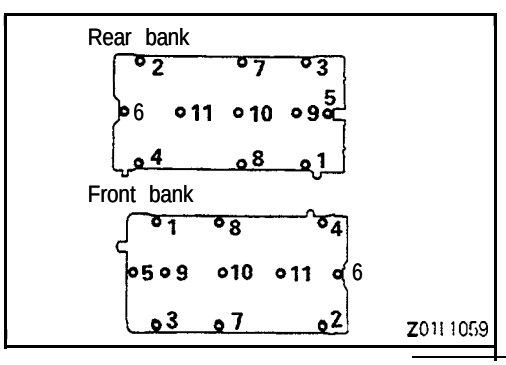
▶B◀ CAMSHAFT SPROCKET INSTALLATION

Using a wrench at the hexagonal part of the camshaft (to prevent the crankshaft from turning), tighten the camshaft sprocket bolt.

Caution
Do not hold the camshaft sprocket with a tool, or a damaged sprocket could result.

▶C◀ ROCKER COVER INSTALLATION

Tighten the rocker cover bolts in the order shown in the illustration.

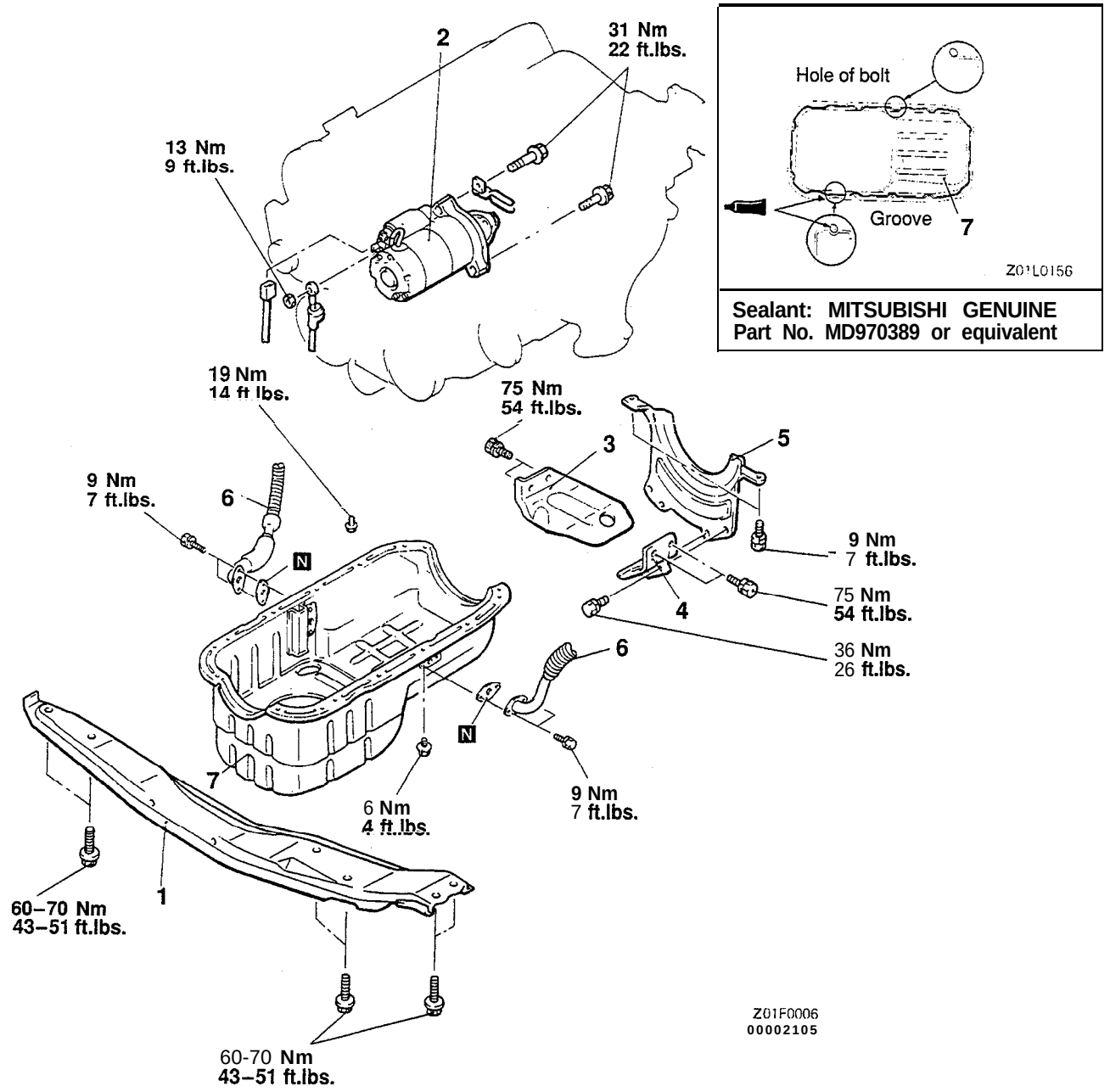


NOTE
(1) Only No. 5 bolt in the rear bank differs from other bolts in length.
Rear bank No. 5 bolt . . . . . 20 mm (.79 in.)
Except rear bank No. 5 bolt . . . . . 10 mm (.39 in.)
(2) Bolts are color-coded for the front and rear banks as follows:
Front bank . . . . . Black
Rear bank . . . . . Green
(3) When the rocker cover gasket has been replaced, tighten bolts in this order and then, retighten bolts 1 to 6 to 4 Nm (2.9 ft.lbs.).

OIL PAN AND OIL SCREEN

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Engine Oil Draining and Supplying (Refer to GROUP 00 – Maintenance Service.)
- Front Air Dam Removal and Installation <Active Aero> (Refer to GROUP 51 – Aero Parts.)
- Under Cover Removal and installation
- Front Exhaust Pipe Removal and Installation (Refer to GROUP 15 – Exhaust Pipe and Main Muffler.)
- Transfer Assembly Removal and Installation <AWD> (Refer to GROUP 22 – Transfer Assembly.)



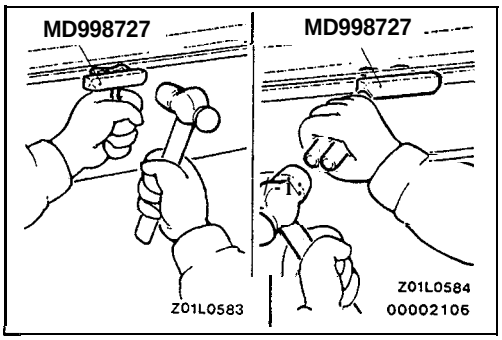
Sealant: MITSUBISHI GENUINE Part No. MD970389 or equivalent

Removal steps
1. Left member
2. Starter
3. Transaxle stay (front)
4. Transaxle stay (rear) <FWD>

◀A▶

5. Bell housing cover
6. Oil return pipes connection <Turbo>
7. Oil pan

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REMOVAL SERVICE POINT

◀A▶ OIL PAN REMOVAL

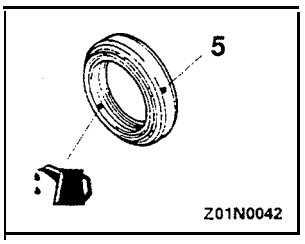
After removing the bolts, use the special tool and a brass bar to remove the oil pan from the cylinder block.

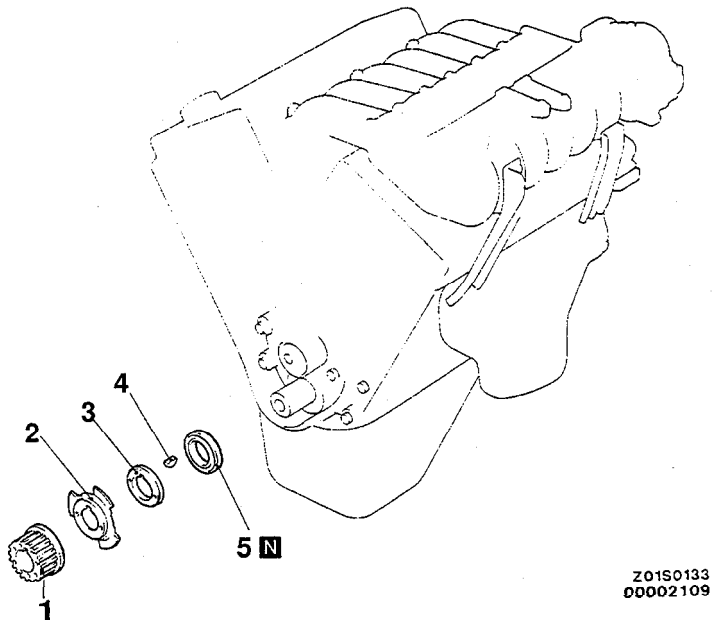
Caution
Remove the oil pan gradually since the flange of the oil pan is easy to deform.

CRANKSHAFT FRONT OIL SEAL

REMOVAL AND INSTALLATION

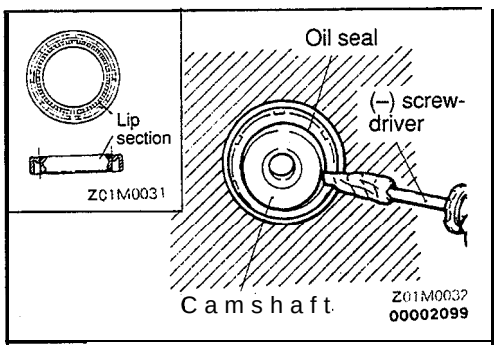
Pre-removal and Post-installation Operation
- Timing Belt Removal and Installation (Refer to P.11-31.)
- Crankshaft Position Sensor Removal and Installation (Refer to GROUP 16 – Camshaft Position Sensor and Crankshaft Position Sensor.)

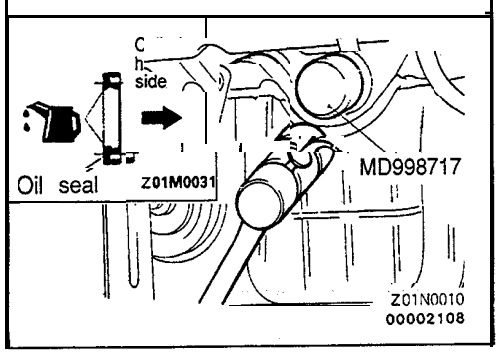




Removal steps
1. Crankshaft sprocket
2. Crankshaft sensing blade
3. Crankshaft spacer
4. Key

◀A▶ ↗ A+ 5. Crankshaft front oil seal





REMOVAL SERVICE POINT

◀A▶ CRANKSHAFT FRONT OIL SEAL REMOVAL

(1) Make a notch in the oil seal lip section with a knife, etc.
(2) Cover the end of a (–) screwdriver with a rag and insert into the notched section of the oil seal, and lever out the oil seal to remove it.

Caution
Be careful not to damage the crankshaft and the oil pump case.

INSTALLATION SERVICE POINT

▶A◀ CRANKSHAFT FRONT OIL SEAL INSTALLATION

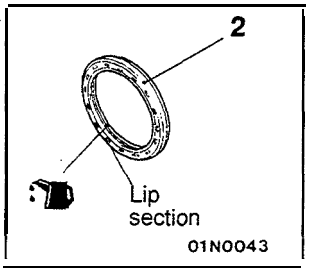
(1) Apply a small amount of engine oil to the oil seal lip and then insert.
(2) Tap the oil seal into the cylinder block.

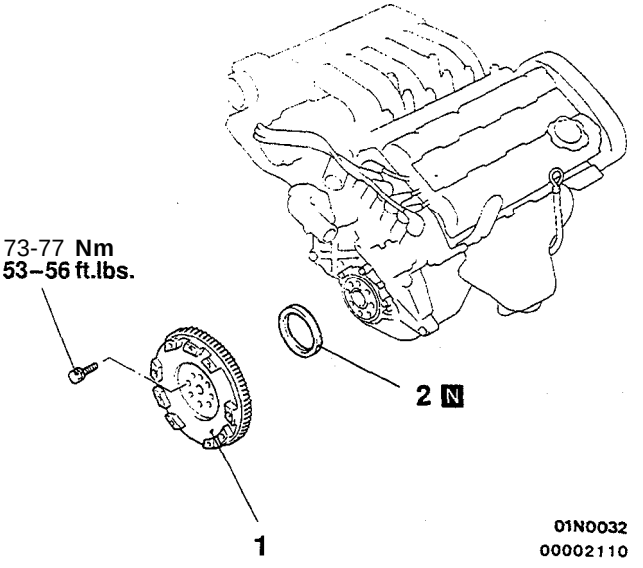
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CRANKSHAFT REAR OIL SEAL

REMOVAL AND INSTALLATION

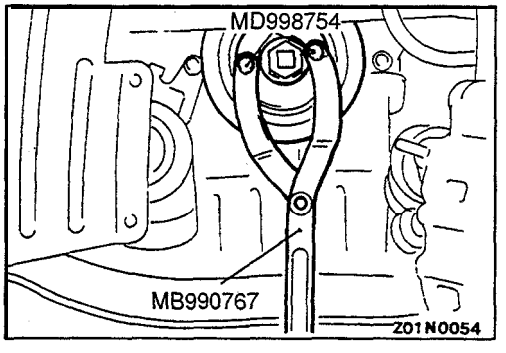
Pre-removal and Post-installation Operation
- Transaxle Assembly Removal and Installation (M/T: Refer to GROUP 22 – Transaxle Assembly.) (A/T: Refer to GROUP 23 – Transaxle Assembly.)
- Clutch Cover and Clutch Disc Removal and Installation





Removal steps

◀A▶ 1. Flywheel
◀B▶ ▶A◀ 2. Crankshaft rear oil seal

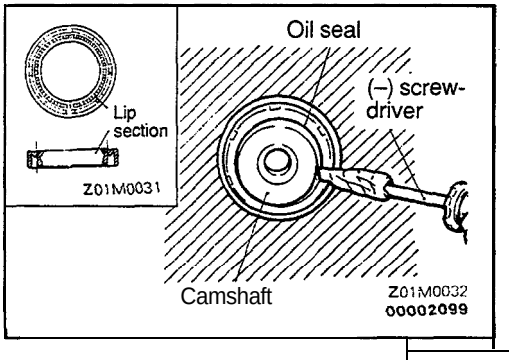


REMOVAL SERVICE POINTS

◀A▶ FLYWHEEL REMOVAL

Stop the crankshaft pulley from turning, and remove the flywheel.

Caution
Use only the specified special tools, otherwise the crankshaft pulley damper could be damaged.

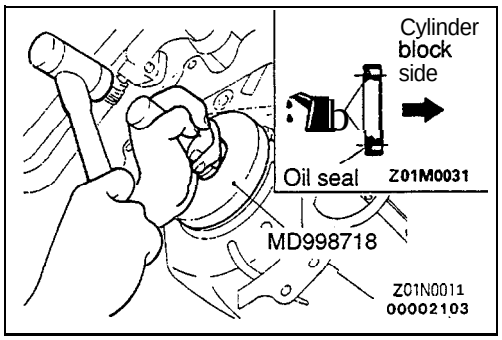


◀B▶ CRANKSHAFT REAR OIL SEAL REMOVAL

(1) Make a notch in the lip section of the oil seal with a knife, etc.
(2) Cover the end of (–) screwdriver with a rag, and insert into the notched section of the oil seal, and lever out the oil seal to remove it.

Caution
Be careful not to damage the crankshaft and the oil seal case.

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INSTALLATION SERVICE POINT

▶A◀ CRANKSHAFT REAR OIL SEAL INSTALLATION

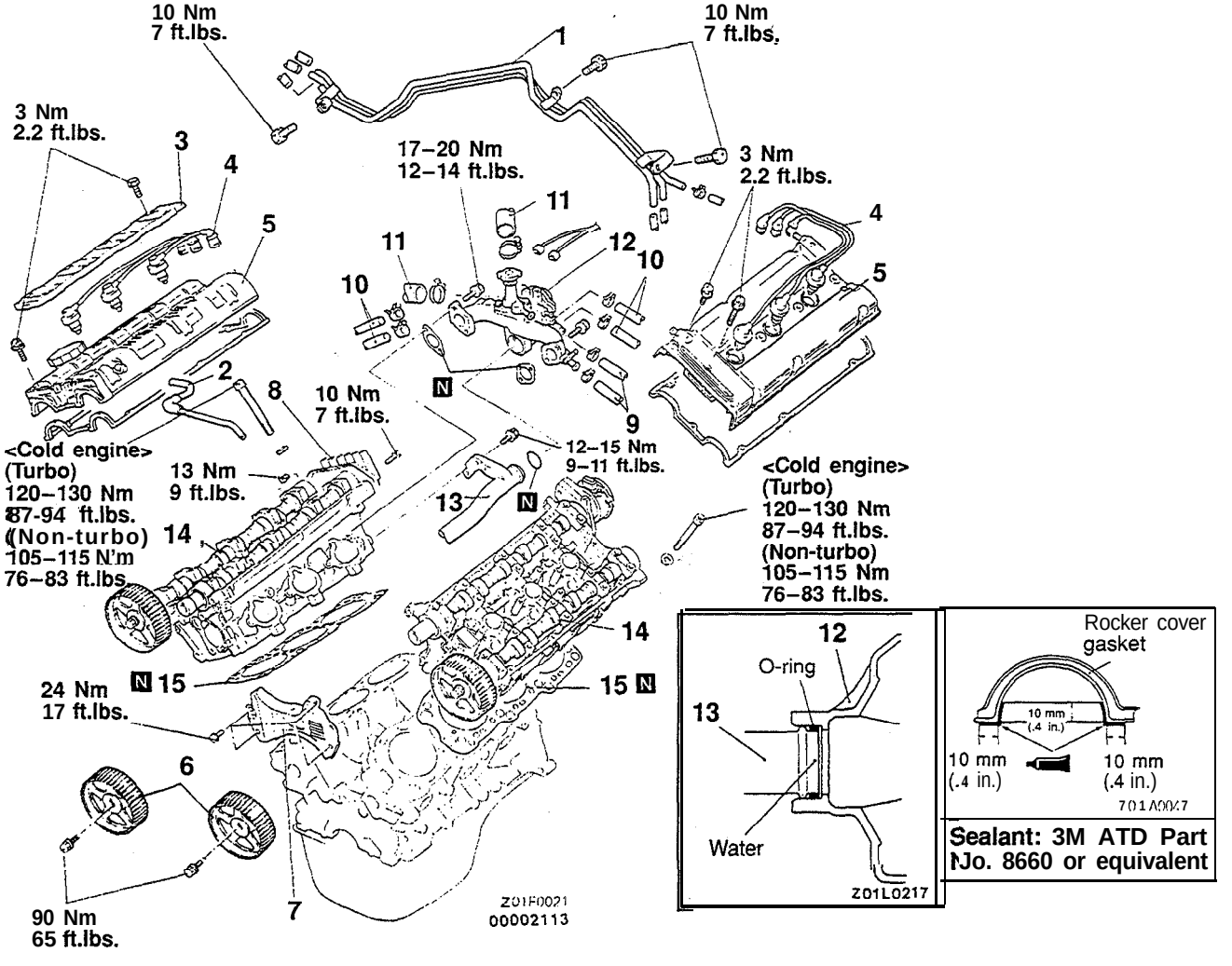
(1) Apply a small amount of engine oil to the oil seal lip and then insert.
(2) Tap the oil seal into the cylinder block.

CYLINDER HEAD GASKET

REMOVAL AND INSTALLATION

Pre-removal Operation
- Engine Coolant Draining (Refer to GROUP 00 – Maintenance Service.)
- Air Intake Manifold Removal (Refer to GROUP 15 – Air Intake Manifold.)
- Turbocharger Removal <Turbo> (Refer to GROUP 15 – Turbocharger.)
- Exhaust Manifold Removal (Refer to GROUP 15 – Exhaust Manifold.)
- Timing Belt Removal (Refer to P.11-31.)

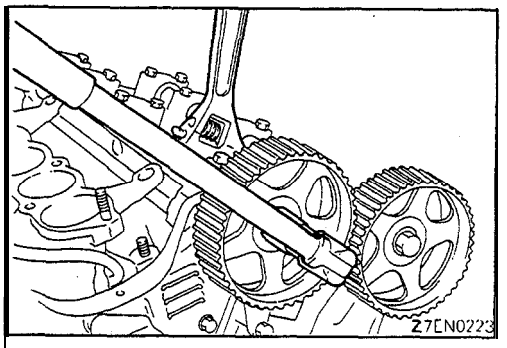
Post-installation Operation
- Timing Belt Installation (Refer to P.11-31.)
- Exhaust Manifold Installation (Refer to GROUP 15 – Exhaust Manifold.)
- Turbocharger Installation <Turbo> (Refer to GROUP 15 – Turbocharger.)
- Air Intake Manifold Installation (Refer to GROUP 15 – Air Intake Manifold.)
- Engine Coolant Supplying (Refer to GROUP 00 – Maintenance Service.)
- Accelerator Cable Adjustment (Refer to GROUP 13F – Engine Control.)
- Engine Adjustment (Refer to P.11-7.)



Removal steps

1. Pipe assembly
2. Blow-by hose
3. Center covet (Front bank)
4. Spark plug cable
- ▶D◀ 5. Rocker cover
- ◀A▶ ▶C◀ 6. Intake camshaft sprocket
7. Timing belt rear cover (Center)
8. Ignition coil
9. Heater hose connection
10. Water hoses connection <Turbo>
11. Radiator hose connection
12. Thermostat housing
13. Water inlet pipe connection (Front bank)
- ◀B▶ ▶B◀ 14. Cylinder head assembly
- ▶A◀ 15. Cylinder head gasket

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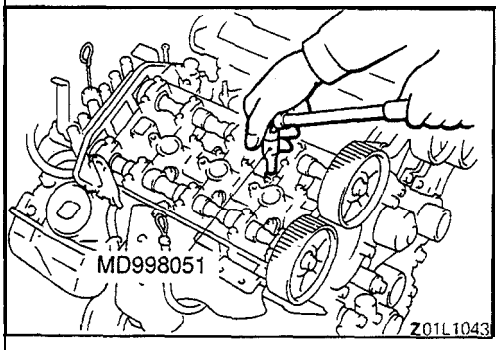
REMOVAL SERVICE POINTS

(A, INTAKE CAMSHAFT SPROCKET REMOVAL

(1) Using a wrench, hold the camshaft at its hexagon and remove the camshaft sprocket bolt.

Caution
Locking the camshaft sprocket with a tool damages the sprocket.

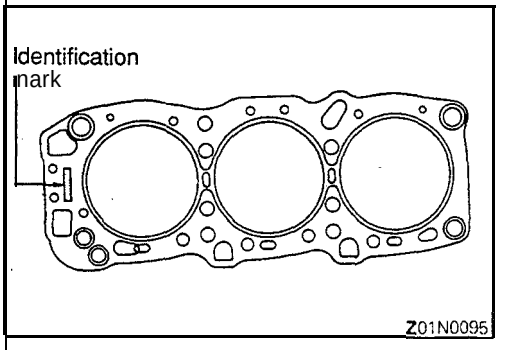
(2) Remove the camshaft sprockets.



◀B▶ CYLINDER HEAD ASSEMBLY REMOVAL

Using the special tool, remove the cylinder head assembly.

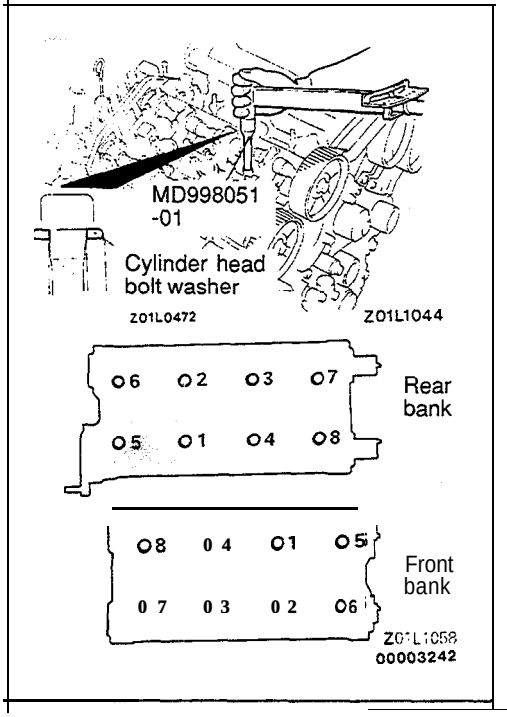
NOTE
Use of commercially available cylinder head bolt wrench is recommended.



INSTALLATION SERVICE POINTS

▶A◀ CYLINDER HEAD GASKET INSTALLATION

(1) Make sure that the gasket has the proper identification mark for the engine.
(2) Lay the cylinder head gasket on the cylinder block with the identification mark at the front top.



▶B◀ CYLINDER HEAD ASSEMBLY INSTALLATION

(1) Use a scraper to clean the gasket surface of the cylinder head assembly.

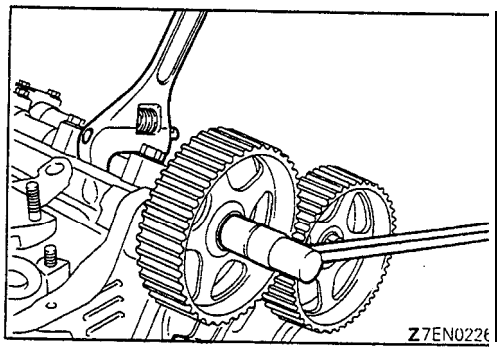
Caution
Take care that no foreign material gets into the cylinder, coolant passages or oil passages.

(2) Using the special tool and a torque wrench, tighten the bolts to the specified torque in the order shown in the illustration (in two or three cycles).

Caution
Install the head bolt washers with shear droop upward as shown in the illustration.

(3) Back off the bolts once and tighten them to the specified torque as shown in step (2). <Turbo>

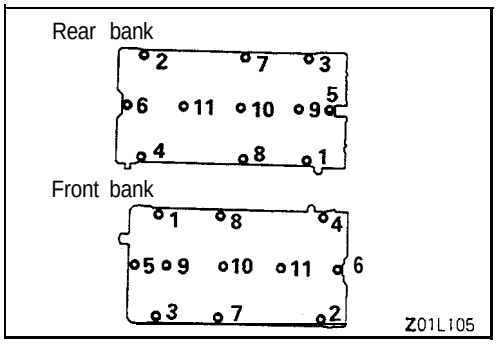
NOTE
Use of commercially available cylinder head bolt wrench is recommended.



▶C◀ INTAKE CAMSHAFT SPROCKET INSTALLATION

Using a wrench, hold the camshaft at its hexagon and tighten the bolt to specification.

Caution
Locking the camshaft sprocket with a tool damages the sprocket.



▶D◀ ROCKER COVER INSTALLATION

Tighten the rocker cover bolts in the order shown in the illustration.

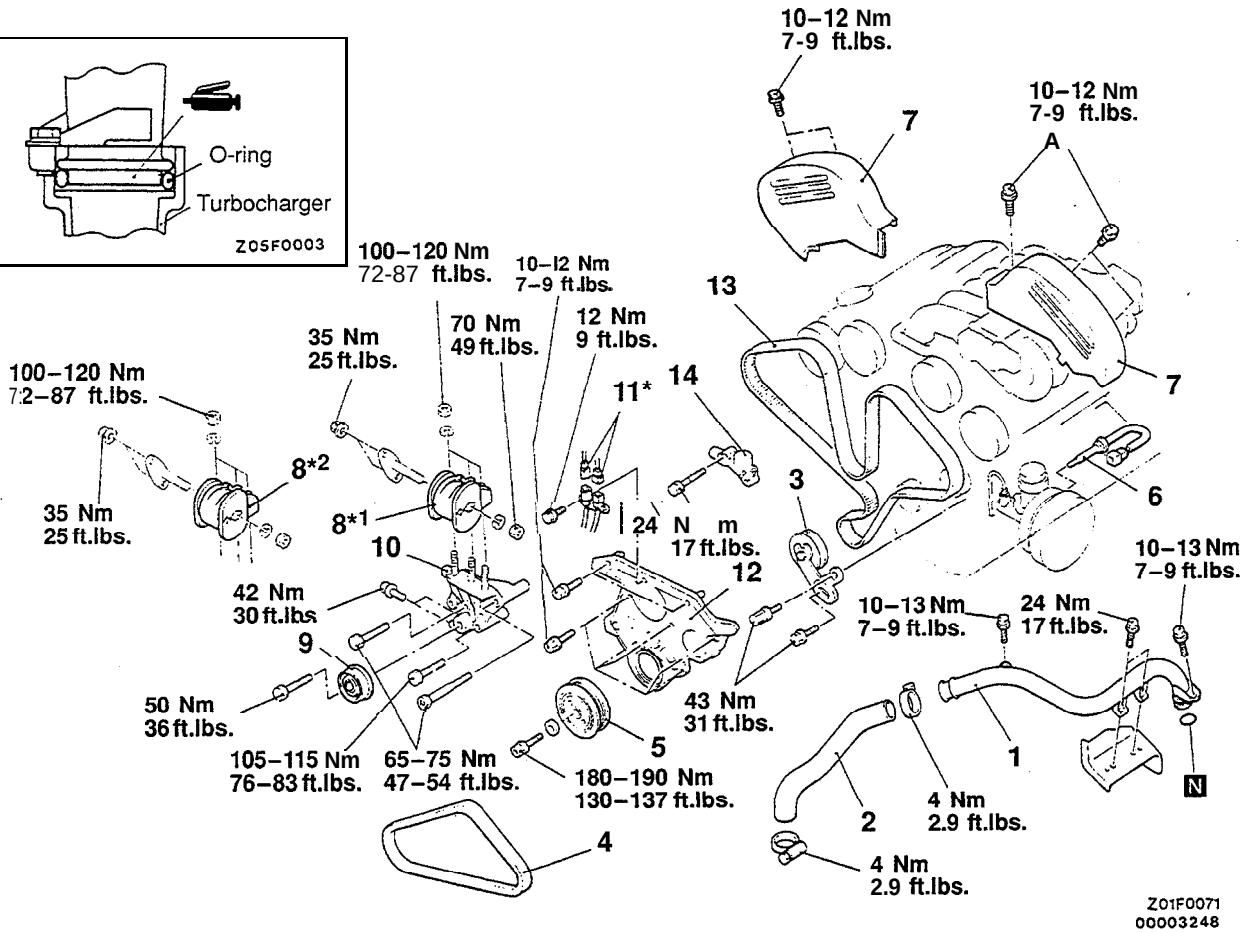
NOTE
(1) Only No. 5 bolt in the rear bank differs from other bolts in length.
Rear bank No. 5 bolt . . . . . 20 mm (.79 in.)
Except rear bank No. 5 bolt . . . . . 10 mm (.39 in.)
(2) Bolts are color-coded for the front and rear banks as follows:
Front bank . . . . . Black
Rear bank . . . . . Green
(3) When the rocker cover gasket has been replaced, tighten bolts in this order, and then retighten bolts 1 to 6 to 4 Nm (2.9 ft.lbs.).

TIMING BELT

REMOVAL AND INSTALLATION

Pre-removal Operation
- Under Cover (Front L.H., Side L.H.) Removal
- Front Under Cover Panel Removal <Vehicle with Active Aero> (Refer to GROUP 51 – Aero Parts.)
- Cruise Control Pump and Link Assembly Removal <Vehicle with Cruise Control> (Refer to GROUP 13G – Cruise Control.)
- Generator Assembly Removal (Refer to GROUP 16 – Generator.)
- Raise and Suspend the Engine to the Extent Force is not Applied to the Engine Mount

Post-installation Operation
- Generator Assembly installation (Refer to GROUP 16 – Generator.)
- Under Cover (Front L.H., Side L.H.) Installation
- Front Under Cover Panel Installation <Vehicle with Active Aero>
- Cruise Control Link Assembly Installation <Vehicle with Cruise Control> (Refer to GROUP 13G – Cruise Control.)
- Engine Adjustment (Refer to P.11-7.)



Removal steps

1. Air hose
2. Air pipe
3. Tensioner assembly
4. Drive belt (power steering) (Refer to P.11-8.)

◀A▶ ▶F◀ 5. Crankshaft pulley

6. Brake fluid level sensor
7. Timing belt upper cover
8. Engine mount bracket
9. Idler pulley (generator/air conditioning)

◀B▶ ▶E◀ 10. Engine support bracket

11. Camshaft position sensor and crankshaft position sensor connector*

▶D◀ 12. Timing belt lower cover

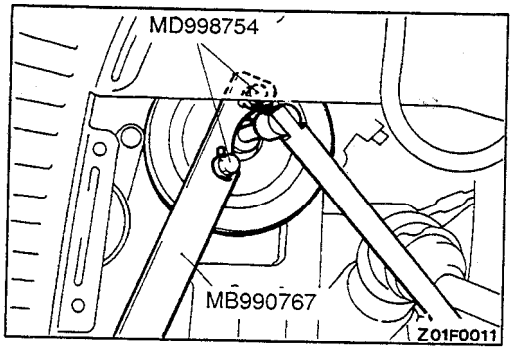
▶C◀ • Timing belt tension adjustment

◀C▶ ▶B◀ 13. Timing belt

▶A◀ 14. Auto tensioner

NOTE
* From 1993 model
*1 Up to 1993 model
*2 From 1994 model

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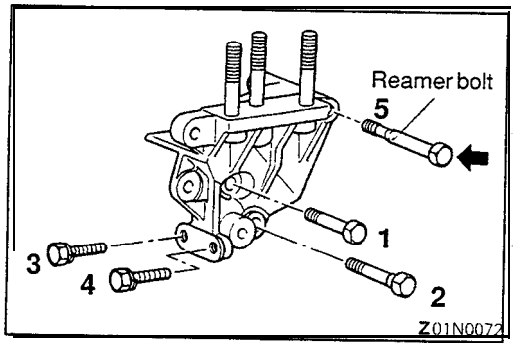


REMOVAL SERVICE POINTS

◀A▶ CRANKSHAFT PULLEY REMOVAL

Using special tools, remove the crankshaft pulley from the crankshaft.

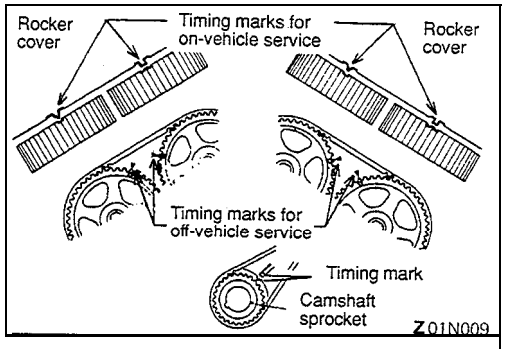
Caution
Use only the specified special tools, or a damaged pulley damper could result.



◀B▶ ENGINE SUPPORT BRACKET REMOVAL

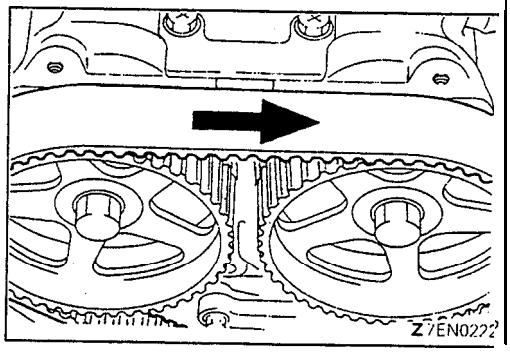
Remove the engine support bracket in the numbered sequence shown in the illustration.
Spraying lubricant, slowly remove the bolt (reamer bolt) indicated by the arrow.

Caution
Keep in mind that the reamer bolt is sometimes heat seized on the engine support bracket.



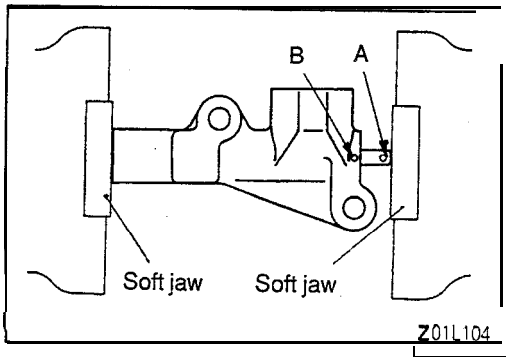
◀C▶ TIMING BELT REMOVAL

(1) Align the timing marks.



(2) Make a mark on the back of the timing belt indicating the direction of rotation so it may be reassembled in the same direction if it is to be reused.
(3) Loosen the center bolt on the tensioner pulley to remove the timing belt.

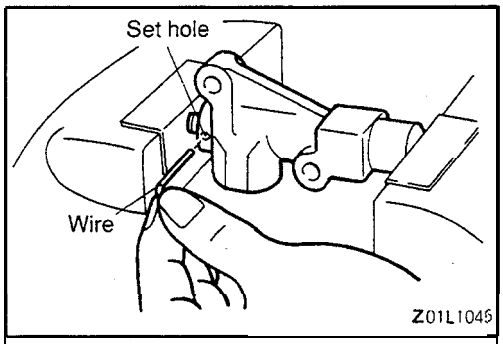
Caution
Water or oil on the belt shortens its life drastically, so the removed timing belt, sprocket, and tensioner must be free from oil and water. These parts should not be washed. Replace parts if seriously contaminated.
If there is oil or water on each part check the front case oil seals, camshaft oil seal and water pump for leaks.

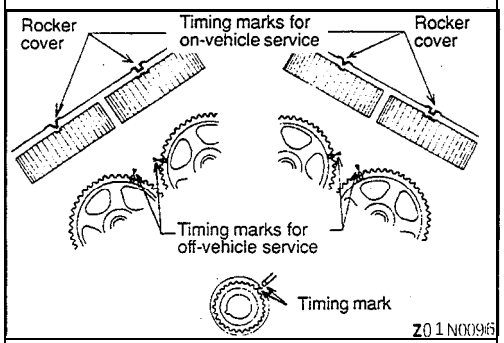


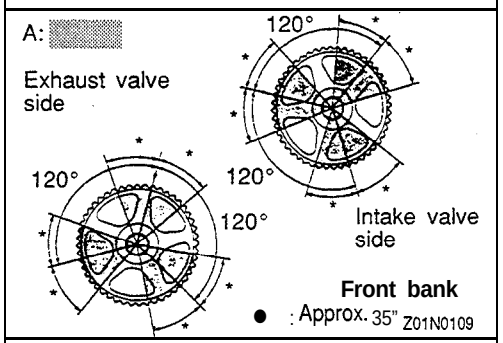
INSTALLATION SERVICE POINTS

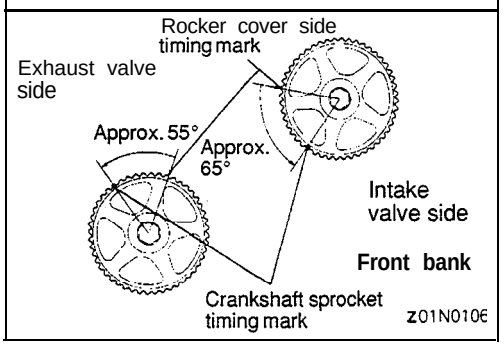
▶A◀ AUTO TENSIONER INSTALLATION

(1) If the auto tensioner rod is in its fully extended position, reset it as follows.
1) Keep the auto tensioner level and, in that position, clamp it in the vise with soft jaws.
2) Push in the rod little by little with the vise until the set hole (A) in the rod is aligned with that (B) in the cylinder.









Caution
Push in the rod slowly to prevent the push rod from being damaged.

3) Insert a wire [1.4 mm (.055 in.) in diameter] into the set holes.
4) Unclamp the auto tensioner from the vise.'

(2) Install the auto tensioner.

Caution
Leave the wire installed in the auto tensioner.

▶B◀ TIMING BELT INSTALLATION

(1) Align the timing marks on the respective sprockets. In case of the camshaft sprockets in the front bank, proceed as follows:

1) Install the crankshaft pulley. Shift the timing mark on the crankshaft sprocket by three teeth to lower the piston in No. 1 cylinder slightly from the top dead center on compression stroke.

Caution
Turning the camshaft sprocket with the piston in No. 1 cylinder located at TDC on compression stroke may cause the valves to interfere with the piston.

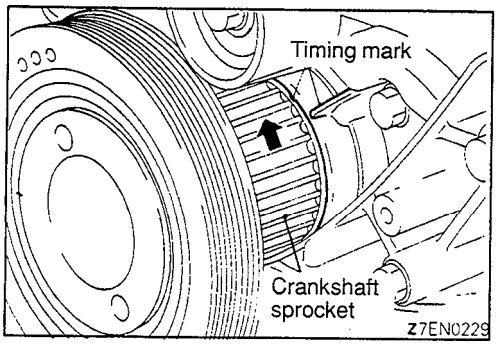
2) Make sure that the timing marks on the camshaft sprockets for intake and exhaust valves are not within the range A in the illustration at left. If the timing mark is within range A, turn the camshaft sprocket to move the timing mark to the area closest to the range A.

Caution
In range A, the cam lobe on the camshaft lifts the valve through the rocker arm and the camshaft sprocket is apt to rotate by reaction force of the valve spring. Therefore, be careful not to have the finger pinched between the sprockets.

3) Turn the camshaft sprocket for either the intake or exhaust valve to locate the timing mark as shown in the illustration at left. Then turn the other crankshaft to locate the timing mark as shown in the illustration at left.

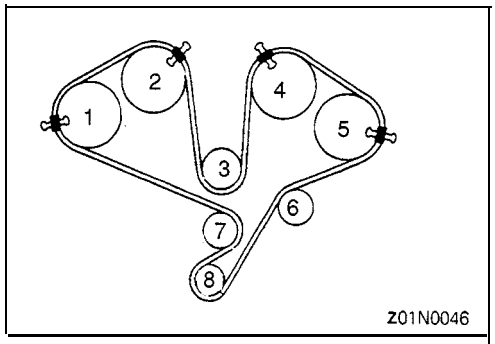
Caution
If the intake and exhaust valves of the same cylinder lift simultaneously, interference with each other may result. Therefore, turn the intake valve camshaft sprocket and the exhaust valve camshaft alternately.

4) Turn the camshaft sprocket clockwise to align the timing marks. If the camshaft sprocket has been turned excessively, turn it counterclockwise to align the timing marks.



5) Align the timing mark of the crankshaft sprocket.

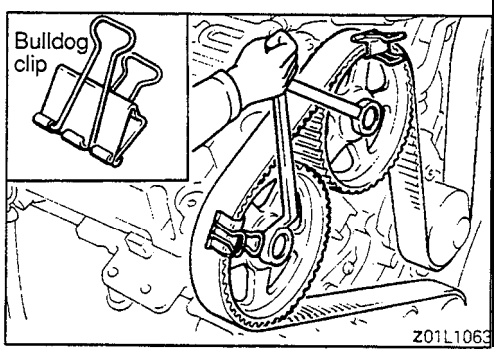
NOTE
Shift the timing mark of the crankshaft sprocket one tooth in counterclockwise direction to facilitate belt installation.



(2) Using bulldog clips, install the timing belt in the following order with care not to allow the belt to slack.
(1) Exhaust camshaft sprocket (front bank side) → (2) Intake camshaft sprocket (front bank side) → (3) Water pump pulley → (4) Intake camshaft sprocket (rear bank side) → (5) Exhaust camshaft sprocket → (6) Idler pulley → (7) Crankshaft sprocket → (8) Tensioner pulley

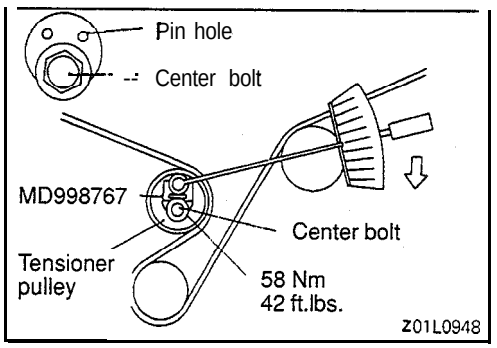
NOTE
Since the camshaft sprockets turn easily, secure them with box wrenches to install the timing belt.

Caution
1. Be careful, the camshaft is turned by the reaction of valve spring.
2. If the timing belt is reused, install it so that the arrow marks made at removal are in the direction of rotation.



(3) Turn the tensioner pulley so that its pin holes are located above the center bolt. Then, press the tensioner pulley against the timing belt and, at the same time, temporarily tighten the center bolt.
(4) Check that the timing marks on all sprockets are aligned properly.
(5) Remove the four clips.

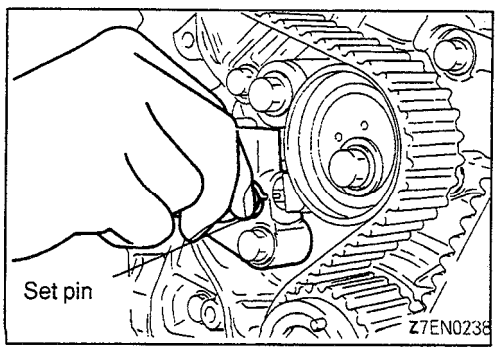
▶C◀ TIMING BELT TENSION ADJUSTMENT



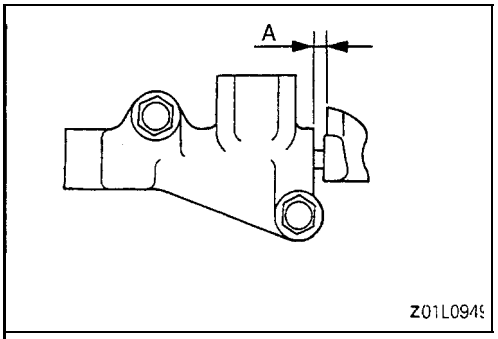
(1) Rotate the crankshaft 1/4 turn counterclockwise, then rotate it clockwise until the timing marks are aligned.
(2) Loosen the center bolt on the tensioner pulley. Using the special tool and torque wrench, apply tensioning torque to the timing belt and, at the same time, tighten the center bolt to specification.

Specified torque: 10 Nm (7 ft.lbs.)
[Timing belt tensioning torque]

Caution
When tightening the center bolt, make sure that the tensioner pulley is not rotated together.



(3) Remove the set pin from the auto tensioner. At this time, make sure that the set pin can be easily removed.
(4) Rotate the crankshaft two turns clockwise and leave it as is for five minutes or more. Then, check again that the set pin can be easily removed from, and installed to, the auto tensioner.

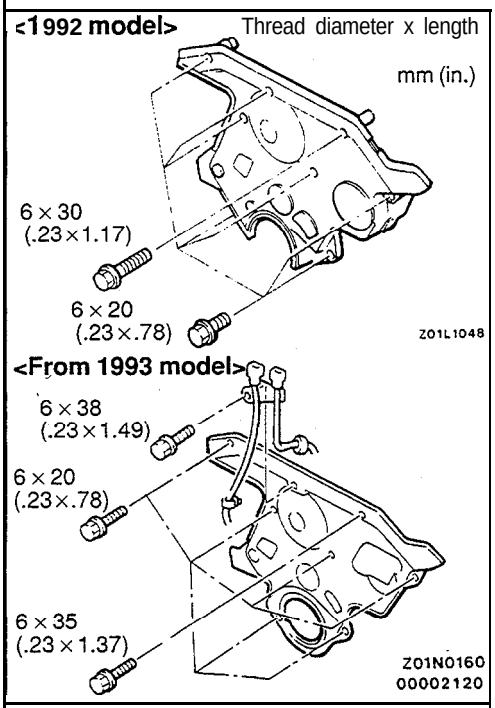


NOTE
Even if the set pin cannot be easily inserted, the auto tensioner is normal if its rod protrusion is within specification.

Standard value (A): 3.8-4.5 mm (.149–.177 in.)

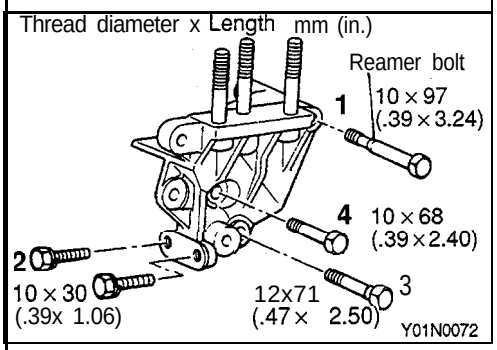
If the protrusion is out of specification, repeat steps (1) to (4).

(5) Check again that timing marks on all sprockets are aligned properly.



▶D◀ TIMING BELT LOWER COVER INSTALLATION

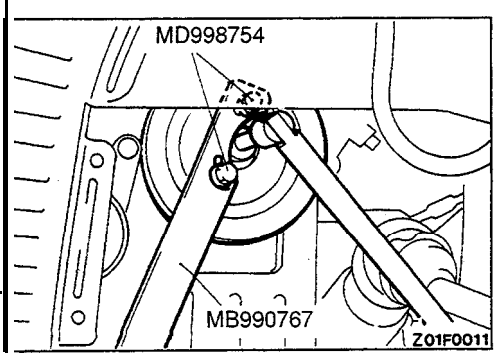
Since the mounting bolts of timing cover are different in size depending on location, insert them with care.



▶E◀ ENGINE SUPPORT BRACKET INSTALLATION

Since the mounting bolts of engine support bracket are different in size depending on location, insert them in numbered sequence.

Caution
When installing the reamer bolt, tighten it, slowly spraying lubricant on the reamer area.



▶F◀ CRANKSHAFT PULLEY INSTALLATION

Using the special tool, attach the crankshaft pulley to the crankshaft.

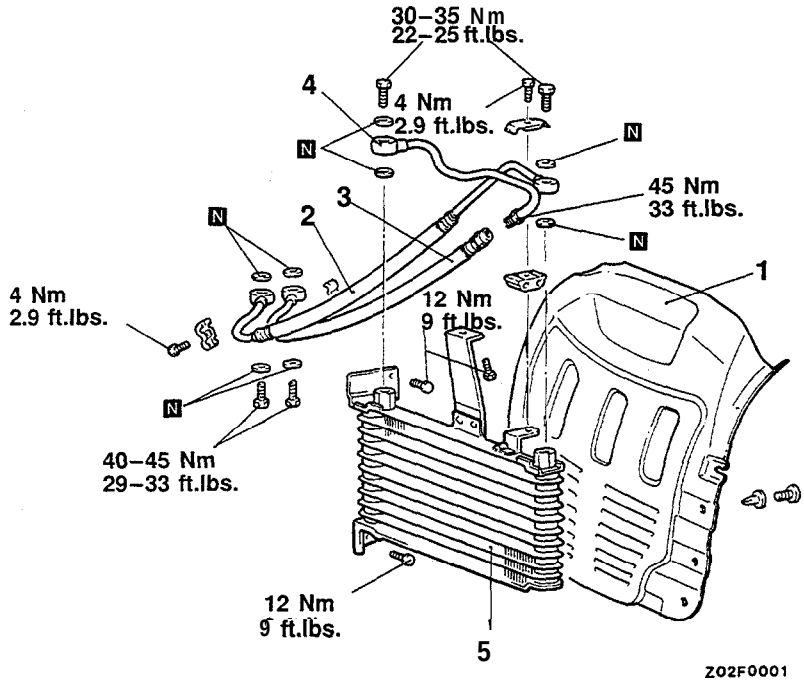
Caution
Use only the specified special tools, otherwise a damaged pulley damper could result.

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ENGINE OIL COOLER

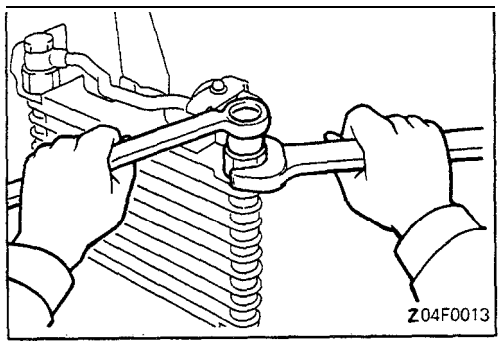
REMOVAL AND INSTALLATION

Preremoval and Post-installation Operation
- Engine Oil Draining and Supplying (Refer to GROUP 00 – Maintenance Service.)



Removal steps

1. Front splash shield extension
◀A▶ 2. Engine oil feed hose
3. Engine oil return hose
◀A▶ 4. Engine oil return tube
5. Engine oil cooler



REMOVAL SERVICE POINTS

◀A▶ ENGINE OIL FEED HOSE / ENGINE OIL RETURN TUBE REMOVAL

Caution
Be sure to hold the weld nut of the oil cooler while loosening the eye bolt.

INSPECTION

- Check the **engine** oil cooler fins for bends, breaks or plugging.
- Check the engine oil cooler hoses for cracks, damage, clogging or deterioration.
- Check the gaskets for damage or deformation.
- Check the eye bolts for clogging or deformation.

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FUEL

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TRACTION CONTROL SYSTEM 13H

NOTE
Shaded groups in the above list are not included in this manual.

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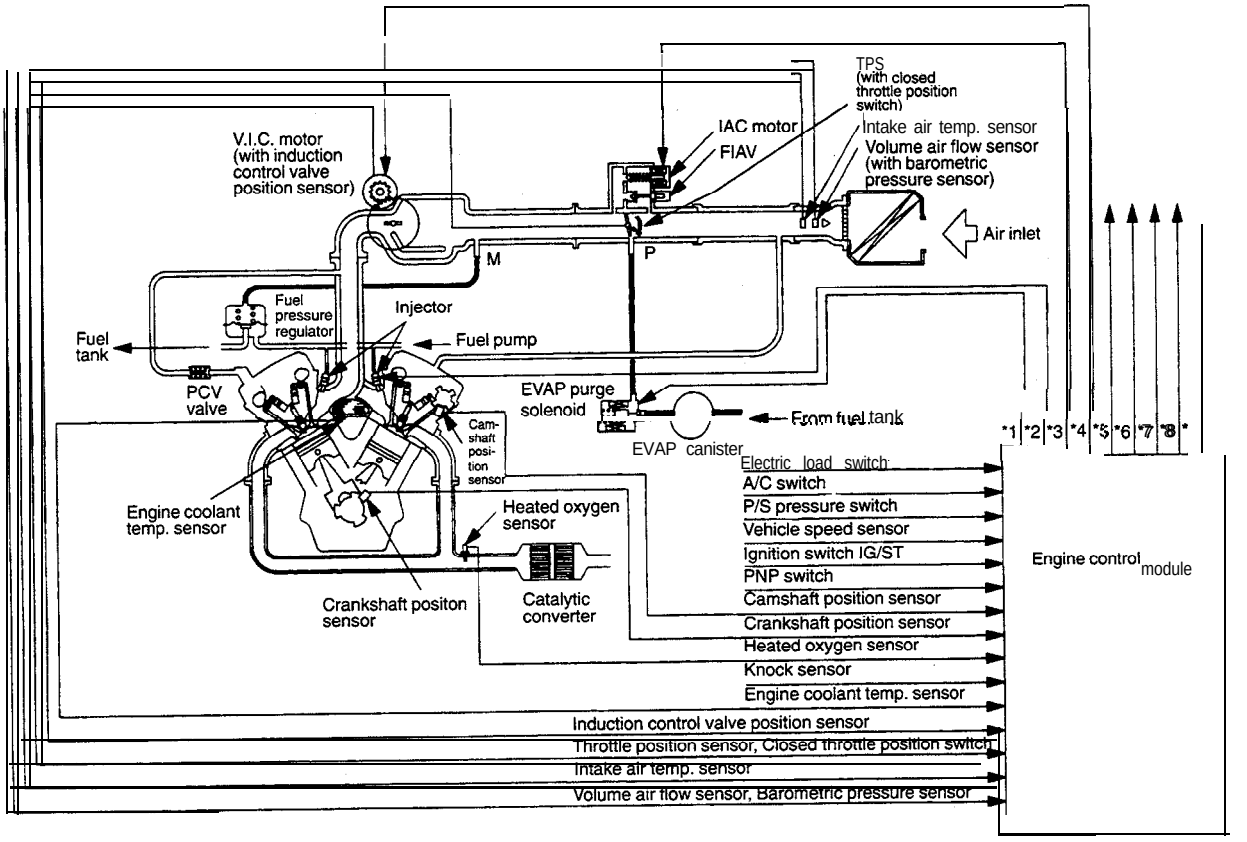
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GENERAL INFORMATION

MULTIPORT FUEL INJECTION (MFI) SYSTEM DIAGRAM

<Federal Non Turbo – Up to 1995 models>

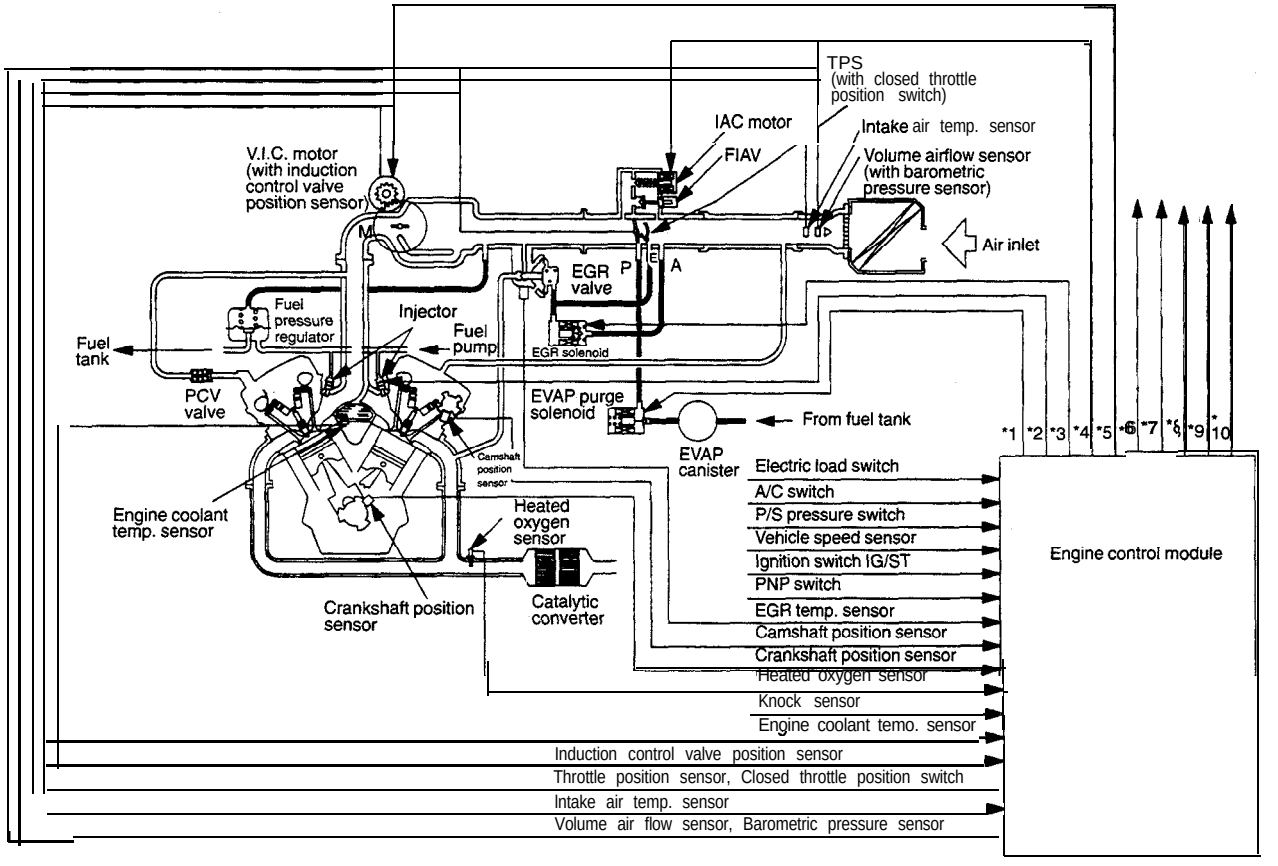


Z7FU1323

NOTE
'1: EVAP purge solenoid
'2: Injector
*3: Idle air control motor
*4: Variable induction control motor
*5: A/C compressor clutch relay
'6: Fuel pump relay
'7: Ignition coil
'8: Check engine/malfunction indicator lamp
'9: Engine/transaxle total control

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<California Non Turbo – Up to 1993 models>

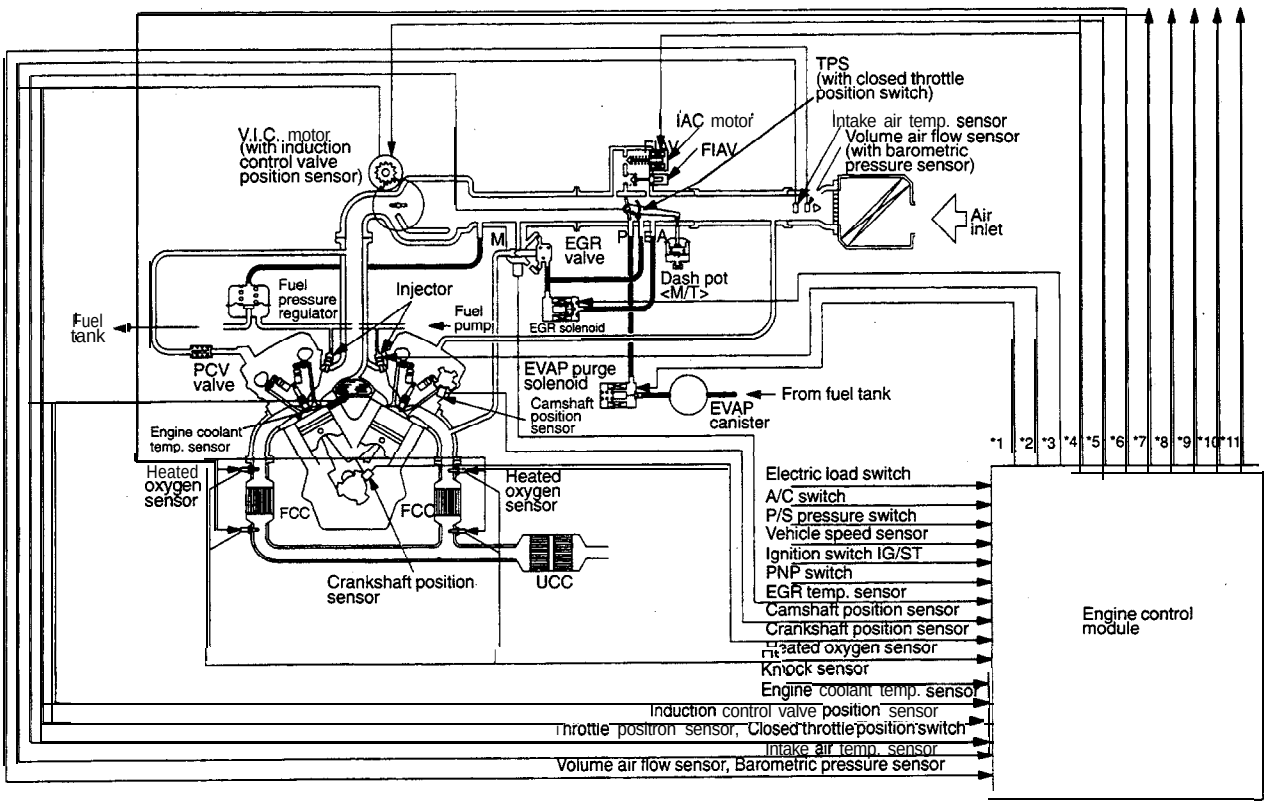


Z7FU1325

NOTE
*1: EVAP purge solenoid
*2: Injector
*3: EGR solenoid
*4: Idle air control motor
*5: Variable induction control motor
*6: A/C compressor clutch relay
*7: Fuel pump relay
*8: Ignition coil
*9: Check engine/malfunction indicator lamp
*10: Engine/transaxle total control

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<California Non Turbo – 1994 and 1995 models>

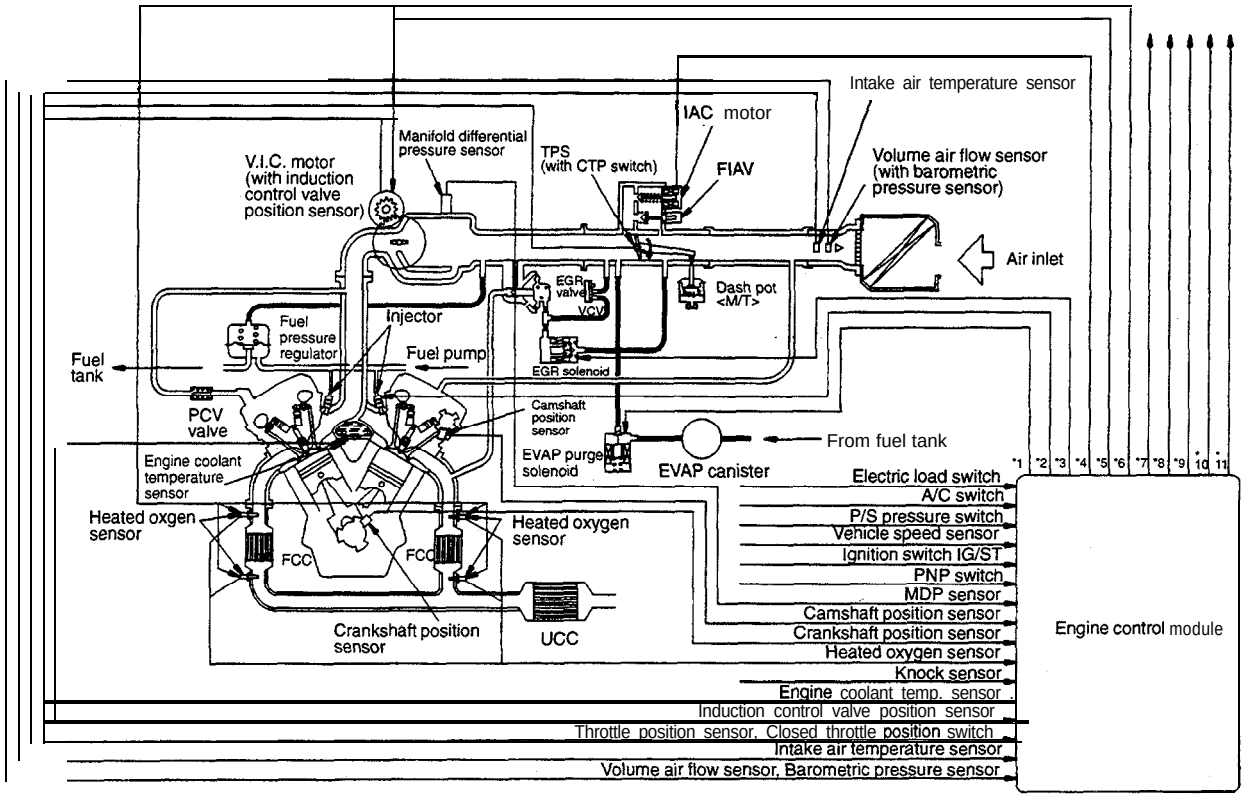


Z7FU1462

NOTE
'1: EVAP purge solenoid
'2: Injector
*3: EGR solenoid
'4: Idle air control motor
'5: Variable induction control motor
'6: Heater control
*7: A/C compressor clutch relay
*8: Fuel pump relay
*9: Ignition coil
*10: Check engine/malfunction indicator lamp
'11: Engine/transaxle total control

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<Non Turbo – From 1996 models>

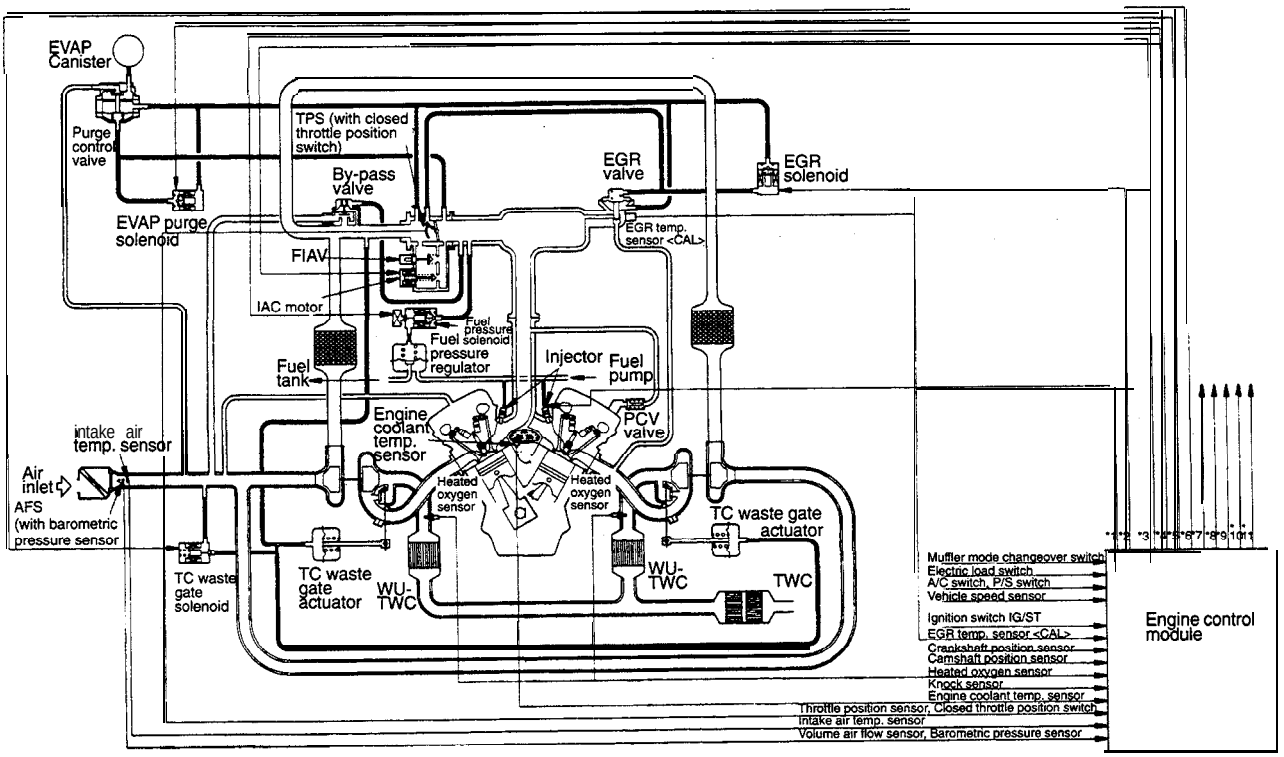


7FU1840

NOTE
- *1: EVAP purge solenoid
*2: Injector
*3: EGR solenoid
*4: Idle air control motor
*5: Variable induction control motor
*6: Heater control
*7: A/C compressor clutch relay
- *8: Fuel pump relay
*9: Ignition coil, Ignition power transistor
*10: Check engine/malfunction indicator lamp
*11: Engine/transaxle total control

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<Turbo – 1992 models>

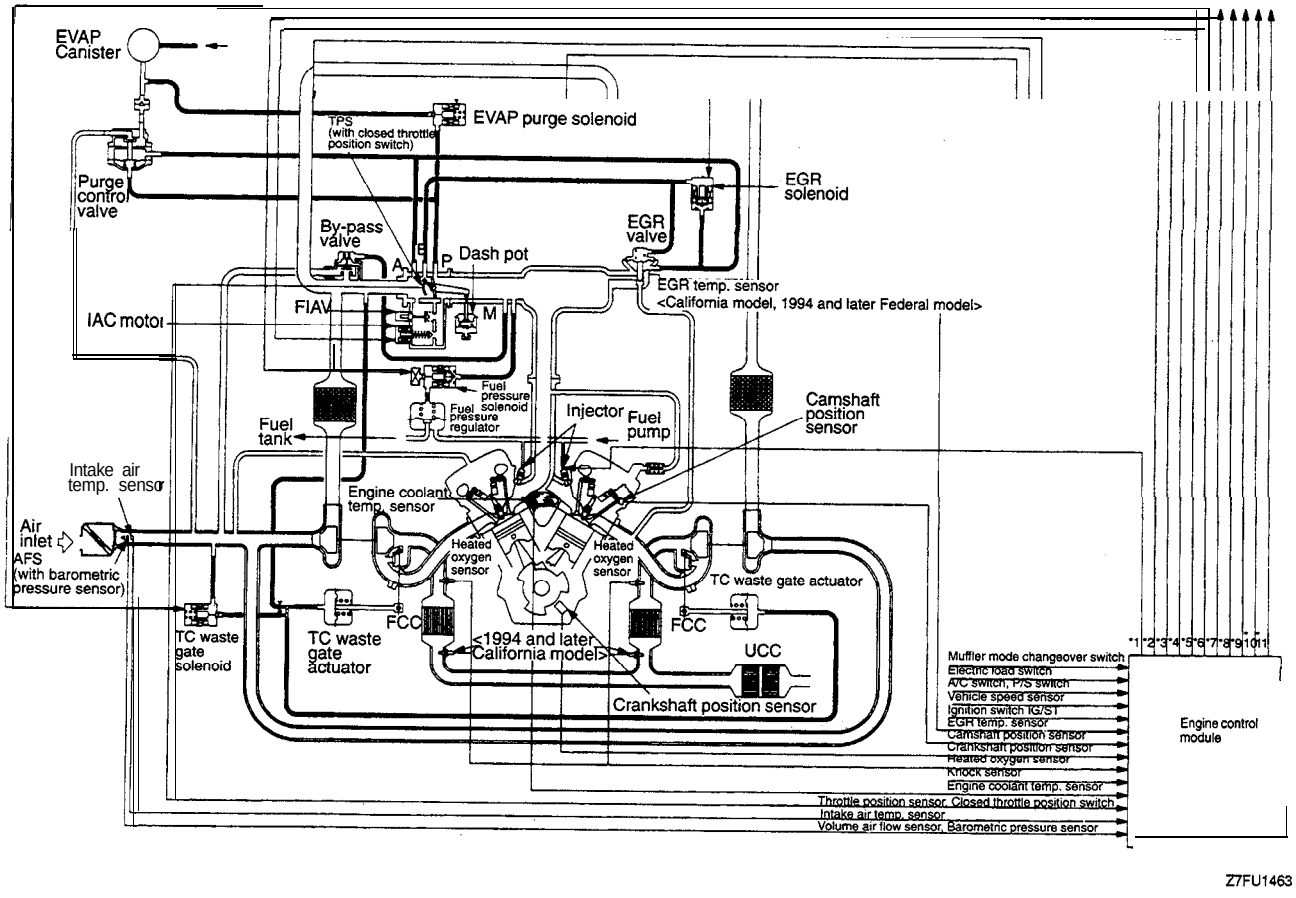


Z7FU1328

NOTE
'1: injector
'2: EGR solenoid
'3: IAC motor
'4: Fuel pressure solenoid
'5: Evaporative emission purge solenoid
'6: Turbocharger waste gate solenoid
'7: A/C compressor clutch relay
"8: Fuel pump relay
'9: Ignition coil
"10: Check engine/malfunction indicator lamp
'11: Muffler mode control

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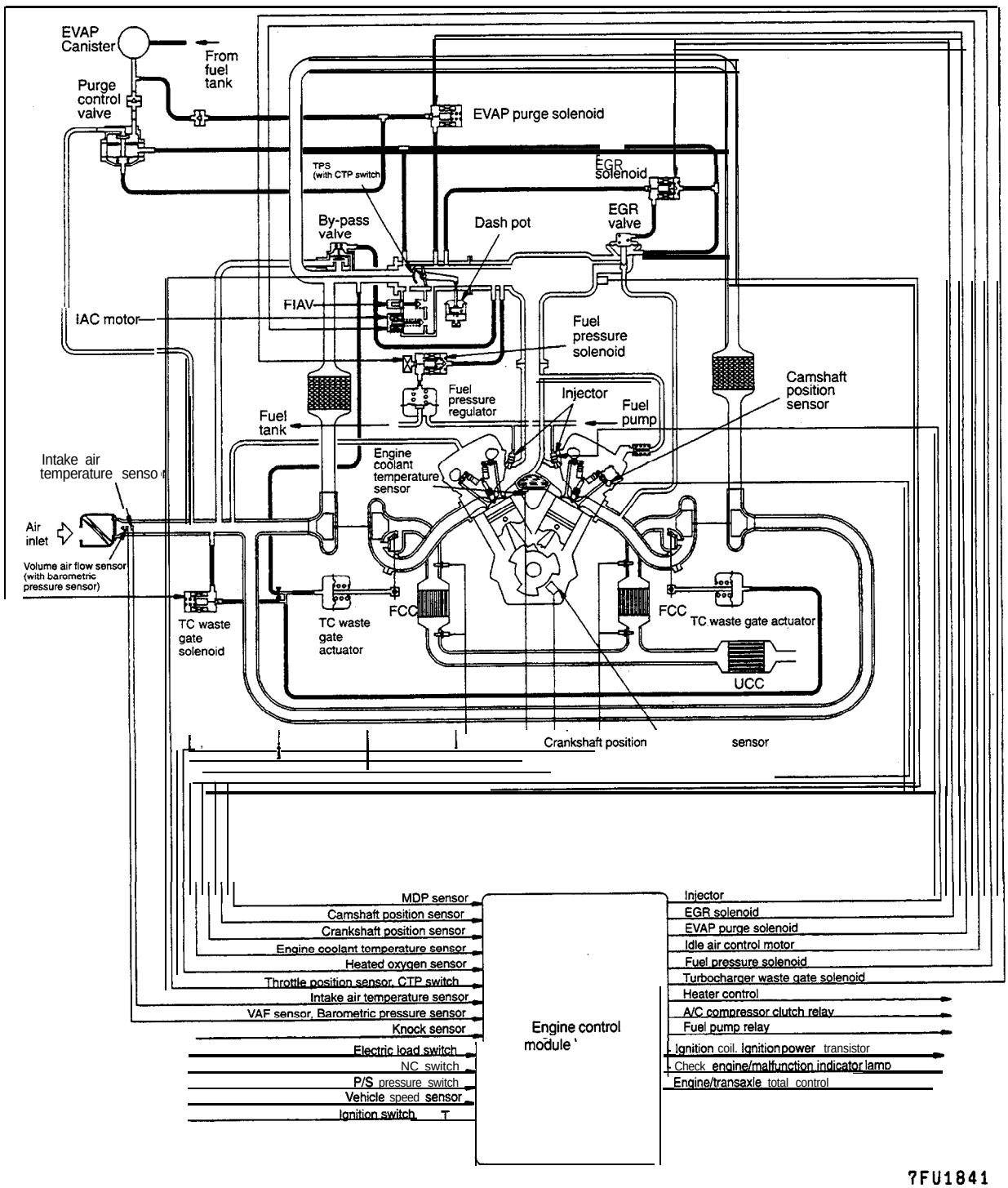
<Turbo – From 1993 Up to 1995 models>



NOTE
'1: Injector
'2: EGR solenoid
'3: Evaporative emission purge solenoid
'4: IAC motor
'5: Fuel pressure solenoid
'6: Turbocharger waste gate solenoid
"7: A/C compressor clutch relay
'8: Fuel pump relay
'9: Ignition coil
'10: Check engine/malfunction indicator lamp
*11: Muffler mode control

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<Turbo – From 1996 models>



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SPECIFICATIONS

GENERAL SPECIFICATIONS

Items		Specifications
Throttle body	Throttle bore mm (in.)	60 (2.36)
	Throttle position sensor	Variable resistor type
	Idle air control motor	Stepper motor type Stepper motor type by-pass air control system with the first idle air valve
	Closed throttle position switch	Rotary contact type
Engine control module identification model No.	Federal <Non Turbo>	E2T35676*1 E2T61375*5 E2T35690*2 E2T35694*3
	Federal <Turbo>	E2T35678*1 E2T61376*5 E2T35691*2 E2T61373*3
	California <Non Turbo>	E2T35675*1 E2T61375*5 E2T35681*2 E2T61371*3
	California <Turbo>	E2T35677*1 E2T61376*5 E2T35682*2 E2T61372*3
Sensors	Volume air flow sensor	Karman vortex type
	Barometric pressure sensor	Semiconductor type
	Intake air temperature sensor	Thermistor type
	Engine coolant temperature sensor	Thermistor type
	Heated oxygen sensor	Zirconia type
	Vehicle speed sensor <Non Turbo>	Reed switch type*6 Magnetic reluctance element type*7
	Vehicle speed sensor <Turbo>	Magnetic reluctance element type
	Knock sensor	Piezoelectric type
	Camshaft position sensor	Photo interrupter type*1 Hall element type*4
	Crankshaft position sensor	Photo interrupter type*1 Hall element type*4
	Induction control valve position sensor <Non Turbo>	Hall element type
	EGR temperature sensor <California Up to 1995, 1994 and 1995 model Federal-Turbo>	Thermistor type
	Manifold differential pressure sensor	Semiconductor type

NOTE
- *1: 1992 models
- *2: 1993 models
- *3: 1994 and 1995 models
- *4: Except 1992 models
- *5: From 1996 models
- *6: Up to 1993 models
- *7: From 1994 models

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terns		Specifications
Sensors	Power steering pressure switch	Contact switch type
Actuators	Multiport fuel injection (MFI) relay type	Contact switch type
	Injector type and number	Electromagnetic, 6
	Injector identification mark <Non Turbo>	BDH21 0*1, • 3 SDH210*2
	Injector identification mark <Turbo>	BDL360
	Variable induction control motor <Non Turbo>	Direct current motor type
	Evaporative emission purge solenoid	ON/OFF type solenoid valve*4 Duty cycle type solenoid valve*5
	EGR solenoid <California – Non Turbo, Turbo> <Federal Non Turbo – From 1996 models>	Duty cycle type solenoid valve
	Fuel pressure solenoid <Turbo>	ON/OFF type solenoid valve
	Turbocharger waste gate solenoid <Turbo>	Duty cycle type solenoid valve
Fuel pressure regulator	Regulated pressure kPa (psi) <Non Turbo>	335 (47.6)
	Regulated pressure kPa (psi) <Turbo>	300 (43.5)

NOTE
*1: Up to 1993 models
*2: From 1994 models <except 1996 and subsequent M/T models>
*3: 1996 and subsequent M/T models
*4: Up to 1995 models
*5: From 1996 models

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SERVICE SPECIFICATIONS

Items		Specifications
Basic ignition timing		5°BTDC ± 2° at curb idle*1 5°BTDC ± 3° at curb idle*2
Curb idle speed rpm		700 ± 100
Idle speed when air conditioning is on <M/T> rpm		900 in Neutral
Idle speed when air conditioning is on <A/T> rpm		650 in D range
Basic idle speed rpm		700 ± 50
Throttle position sensor adjusting voltage mV		400–1,000
Throttle position sensor resistance kΩ		3.5–6.5
Idle air control motor (stepper motor) coil resistance Ω		28–33 [at 20°C (68°F)]
Intake air temperature sensor resistance kΩ		2.7 [at 20°C (68°F)]
Engine coolant temperature sensor resistance [at 20°C (68°F)] kΩ		2.4
Engine coolant temperature sensor resistance [at 80°C (176°F)] kΩ		0.3
Fuel pressure kPa (psi)	Vacuum hose disconnection <Non Turbo>	330–350 (47–50) at curb idle
	Vacuum hose disconnection <Turbo>	295–315 (43–45) at curb idle
	Vacuum hose connection <Non Turbo>	Approx. 270 (38) at curb idle
	Vacuum hose connection <Turbo>	Approx. 235 (34) at curb idle
Injector coil resistance Ω	<Non Turbo>	13–16 [at 20°C (68°F)]
	<Turbo>	2–3 [at 20°C (68°F)]

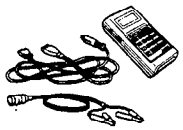
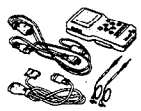
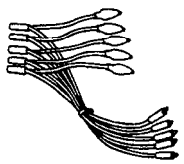
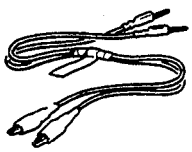
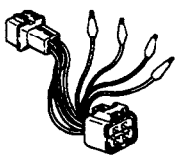
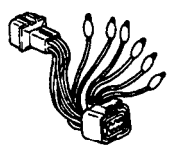
NOTE
*1: Up to 1992 models
*2: From 1993 models

SEALANT

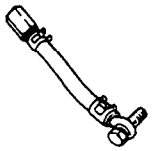
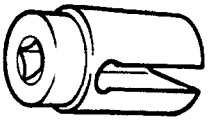
Items	Specified sealant
Engine coolant temperature sensor threaded portion	3M NUT Locking Part No. 4171 or equivalent

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SPECIAL TOOLS

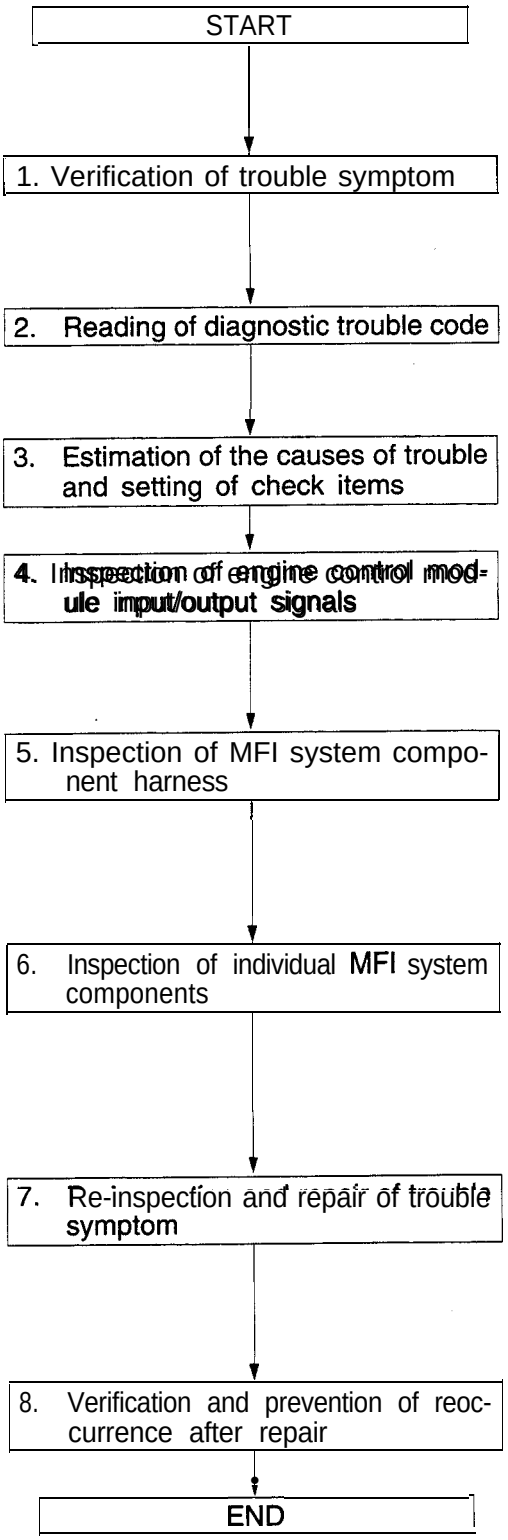
Tool	Tool number and name	Supersession	Application
	MB991341 Scan tool (Multi-use tester <MUT>)	–	<1993 models> • Reading diagnostic trouble code • MFI system inspection
	ROM pack (For the number, refer to GROUP 00 – Precautions before service)	–	
 Z16X0606	MB991502 Scan tool (MUT-II)	–	<All models> • Reading diagnostic trouble code • MFI system inspection
 Z16X0607	ROM pack	–	
	MB991348 Test harness set	–	• Adjustment of closed throttle positior switch and throttle position sensor • Inspection by oscilloscope
	MB991529 Diagnostic trouble code check harness	Tool not necessary if scan tool (MUT-II) is available.	• Checking the diagnostic trouble code • Basic idle speed adjustment
	MD998464 Test harness (4 pin, square)	MD998464-01	• Heated oxygen sensor inspection <1994 and later California model – Nor Turbo, Turbo> • Inspection by oscilloscope
	MD998463 Test harness (6 pin, square)	MD998463-01	• Idle air control motor inspection • Inspection by oscilloscope

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Tool	Tool number and name	Supersession	Application
	MD998478 Test harness (3 pin, triangle)	MD998478-01	• Inspection by oscilloscope
	MD998709 Adapter hose	MIT210196	• Measurement of fuel pressure
	MD998742 Hose adapter	MD998742-01	
	MD998773 Knock sensor wrench	–	• Removal/Installation of knock sensor

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TROUBLESHOOTING

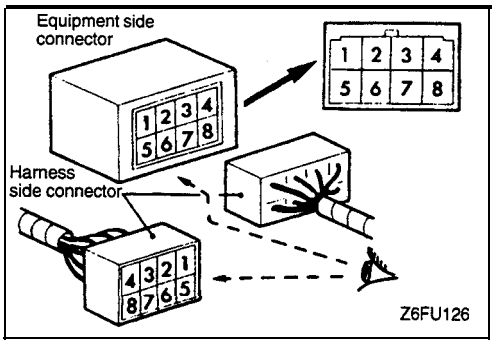


EXPLANATION OF TROUBLESHOOTING PROCEDURES

Effective troubleshooting procedures for MFI system problems are given below.

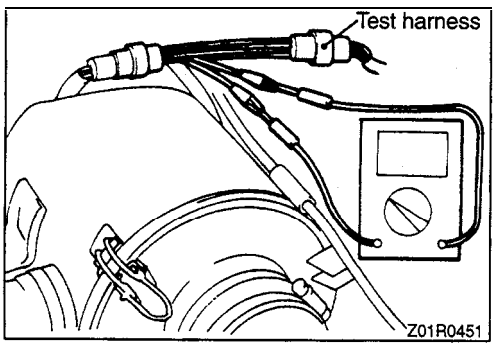
1. Verification of trouble symptom
   - Reproduce trouble symptom and verify the characteristics of the trouble and the conditions (engine condition, driving conditions, etc.) under which it is produced.
2. Reading of diagnostic trouble code
   - Read diagnostic trouble code and if a malfunction code is output, locate and correct the trouble referring to the DIAGNOSIS CHART.
3. Estimation of the causes of trouble and setting of check items
   - Referring to the Check Chart, verify the check items and checking order for the trouble symptom.
4. Inspection of engine control module input/output signals
   - Using the scan tool or oscilloscope, check the engine control module input/output signals.
   - If the signals are normal, judge the sensor input/actuator control as normal and proceed to check the input/output signals of the next check item.
5. Inspection of MFI system component harness
   - If the engine control module input/output signals are abnormal, check the MFI system component body harness and repair as necessary.
   - After repair, check the engine control module input/output signals again. If they are normal, proceed to check the input/output signals of the next check item.
6. Inspection of individual MFI system components
   - If the body harness is normal but the engine control module input/output signals are abnormal, check individual MFI system components and repair or replace as necessary.
   - After repair or replacement, check the engine control module input/output signals again. If they are normal, proceed to check the input/output signals of the next check item.
7. Re-inspection and repair of trouble symptom
   - If the harness inspection and individual component inspection results are normal but the engine control module input/output signals are abnormal, re-examine the causes of trouble referring to the troubleshooting hints and the checks and repairs included in other groups.
8. Verification and prevention of reoccurrence after repair
   - Perform tests to see if the same problems occur again and make sure that the same problems will not be repeated.
   - Remove the true causes of the trouble to prevent its reoccurrence.

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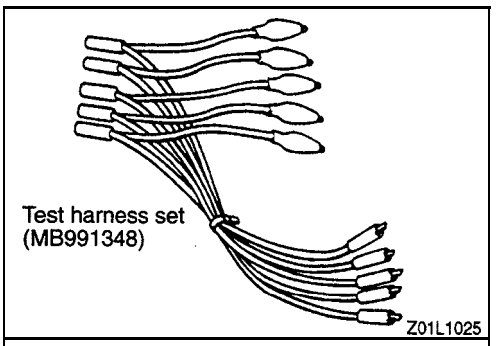


EXPLANATION AND CAUTIONS ABOUT HARNESS CHECK

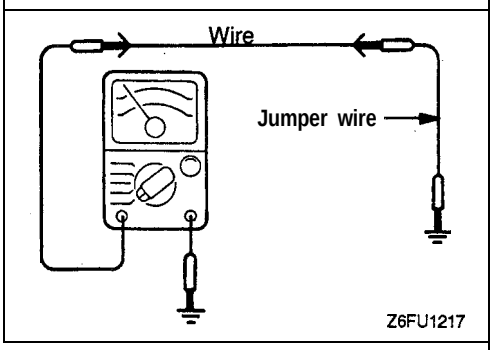
- The connector symbol shown is as viewed from the terminal end of the connector inside the vehicle.
- "B+" used as the standard value in voltage check stands for system voltage.



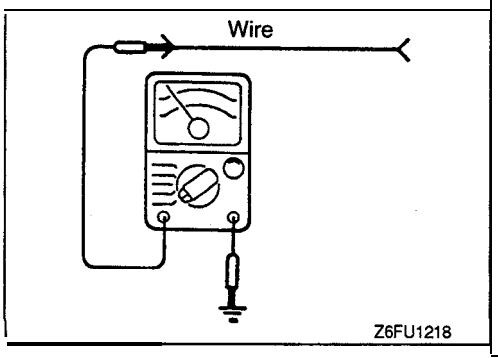
- When checking a waterproof connector for circuit continuity, be sure to use the special tool, Test Harness. Never insert the test probe from the harness side as thiscauses loss of waterproof characteristics and corrosion may result. There are various test harnesses and the appropriate one for the connector being tested should be used.



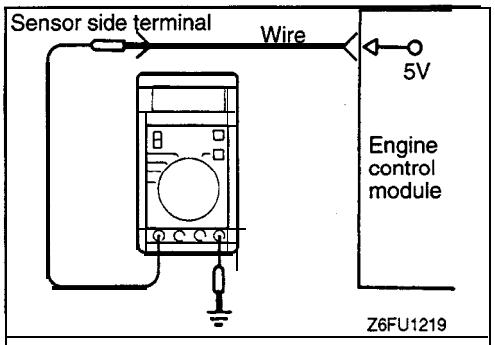
- If the appropriate test harness for the particular connector is not available, the use of the Test Harness Set (MB991348) which can be connected directly between the terminals is recommended.
- When checking the terminal voltage with the connector disconnected, do not insert the test probe if the check terminal is female.
  If the test probe is forced into the terminal, poor contact may be caused.



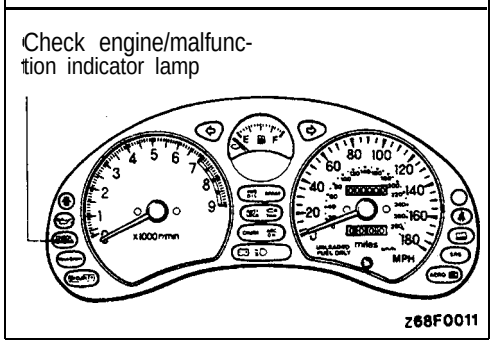
- When checking an open circuit of a wire with its ends physically separated, ground one end using a jumper wire and check the continuity between the other end and ground. Repair the wire if there is no continuity.



- When checking short-circuit to ground of a wire, open one end of the wire and check continuity between the other end and ground. If there is continuity, the wire is short-circuited to ground and requires repair.
- For checking continuity, use an analog ohmmeter (or circuit tester) as a rule.



- If the sensor impressed voltage is abnormal, check the wire for an open circuit or short-circuit to ground and repair as necessary. If the wire is normal, replace the engine control module and check again.
- To check the voltage, use a digital voltmeter (or circuit tester) as a rule.
  [However, use an analog voltmeter for checking the power transistor drive voltage.]



CHECK ENGINE/MALFUNCTION INDICATOR LAMP

Among the on-board diagnostic items, a check engine/malfunction indicator lamp comes on to notify the driver of the emission control items when an irregularity is detected. However, when an irregular signal returns to normal and the engine control module judges that it has returned to normal, the check engine/malfunction indicator lamp goes out. Moreover, when the ignition switch is turned off, the lamp goes out. Even if the ignition switch is turned on again, the lamp does not come on until the irregularity is detected. Here, immediately after the ignition switch is turned on, the check engine/malfunction indicator lamp is lit for 5 seconds to indicate that the check engine/malfunction indicator lamp operates normally.

ITEMS INDICATED BY THE CHECK ENGINE/ MALFUNCTION INDICATOR LAMP <Up to 1995 models>

Engine control module
Heated oxygen sensor
Volume air flow sensor
Intake air temoerature sensor
Throttle position sensor
Engine coolant temperature sensor
Crankshaft position sensor
Camshaft position sensor
Barometric pressure sensor
Knock sensor
Ignition timing adjustment signal
Injector
EGR system <California – Non Turbo, Turbo>
Ignition coil, ignition power transistor unit

Caution

The check engine/malfunction indicator lamp comes on when the line of the ignition timing adjustment terminal is shorted to ground. Therefore, the lamp also comes on when the ignition timing adjustment terminal is grounded to adjust the ignition timing, but this does not show any abnormality.

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ITEMS INDICATED BY THE CHECK ENGINE/MALFUNCTION INDICATOR LAMP <From 1996 models>

DTC No.	Items	DTC No.	Items
–	Engine control module (ECM) malfunction	P0301*	Cylinder 1 misfire detected
P0100	Volume air flow circuit malfunction	P0302*	Cylinder 2 misfire detected
P0105	Barometric pressure circuit malfunction	P0303*	Cylinder 3 misfire detected
P0110	Intake air temperature circuit malfunction	P0304*	Cylinder 4 misfire detected
P0115	Engine coolant temperature circuit malfunction	P0305*	Cylinder 5 misfire detected
P0120	Throttle position circuit malfunction	P0306*	Cylinder 6 misfire detected
P0125*	Excessive time to enter closed loop fuel control	P0335	Crankshaft position sensor circuit malfunction
P0130	O_2 sensor circuit malfunction (bank 1 sensor 1)	P0340	Camshaft position sensor circuit malfunction
P0135	O_2 sensor heater circuit malfunction (bank 1 sensor 1)	P0400	Exhaust gas recirculation flow malfunction
P0136	O_2 sensor circuit malfunction (bank 1 sensor 2)	P0403	Exhaust gas recirculation solenoid malfunction
P0141	O_2 sensor heater circuit malfunction (bank 1 sensor 2)	P0421	Warm up catalyst efficiency below threshold (bank 1)
P0150	O_2 sensor circuit malfunction (bank 2 sensor 1)	P0431	Warm up catalyst efficiency below threshold (bank 2)
P0155	O_2 sensor heater circuit malfunction (bank 2 sensor 1)	P0440	Evaporative emission control system malfunction
P0156	O_2 sensor circuit malfunction (bank 2 sensor 2)	P0443	Evaporative emission control system purge control valve circuit malfunction
P0161	O_2 sensor heater circuit malfunction (bank 2 sensor 2)	P0505	Idle control system malfunction
P0170	Fuel trim malfunction (bank 1)	P0510	Closed throttle position switch malfunction
P0173	Fuel trim malfunction (bank 2)	P0705	Transmission range sensor circuit malfunction (RPNDL Input) <A/T>
P0201	Injector circuit malfunction – cylinder 1	P0710	Transmission fluid temperature sensor circuit malfunction <A/T>
P0202	Injector circuit malfunction – cylinder 2	P1103	Turbocharger waste gate actuator malfunction <Turbo>
P0203	Injector circuit malfunction – cylinder 3	P1104	Turbocharger waste gate solenoid malfunction <Turbo>
P0204	Injector circuit malfunction – cylinder 4	P1105	Fuel pressure solenoid malfunction <Turbo>
P0205	Injector circuit malfunction – cylinder 5	P1400	Manifold differential pressure sonsor circuit malfunction
P0206	Injector circuit malfunction – cylinder 6	P1715	PG assembly malfunction <A/T>
P0300*	Random misfire detected	P1750	Solenoid assembly malfunction <A/T>

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NOTE
1. After the Engine Control Module (ECM) detects a malfunction, the check engine/malfunction indicator lamp illuminates when the engine is next turned on and the same malfunction is re-detected.
   However, for items marked with a "*", the check engine/malfunction indicator lamp illuminates on the first detection of the malfunction.
2. After the check engine/malfunction indicator lamp illuminates, it will be switched off under the following conditions.
   - When the ECM monitored the powertrain malfunction three times* and detected no malfunction.
     *: In this case, one time indicates from engine start to stop.
   - For misfiring or a fuel trim malfunction, when driving conditions (engine speed, engine coolant temperature, etc.) are similar to those when the malfunction was first recorded.

Caution
If the check engine/malfunction indicator lamp illuminates because of a malfunction of the ECM, transmission between the scan tool and the ECM cannot occur. In this case, the diagnostic trouble code cannot be read.

CHECK ENGINE MALFUNCTION INDICATOR LAMP INSPECTION

(1) Check that when the ignition switch is turned on, the lamp illuminates for about 5 seconds and then goes out.
(2) If the lamp does not illuminate, check for open circuit in harness, blown fuse and blown bulb.

ON-BOARD DIAGNOSTIC <Up to 1995 models>

The engine control module monitors the input/output signals (some signals at all times and the others under specified conditions) of the engine control module.
When it is noticed that an irregularity has continued for a specified time or longer from when the irregular signal is initially monitored, passing a certain number, the engine control module judges that an irregularity has occurred, memorizes the diagnostic trouble code, and outputs the signal to the diagnostic output terminal.
There are 23 diagnostic items, including the normal state, and the diagnostic results can be read out with a voltmeter or scan tool.
Moreover, since memorization of the diagnostic trouble codes is backed up directly by the battery, the diagnostic results are memorized even if the ignition key is turned off. The diagnostic trouble codes will, however, be erased when the battery terminal or the engine control module connector is disconnected.
The diagnostic trouble code can also be erased by turning on the ignition switch and sending the diagnostic trouble code erase signal from the scan tool to the engine control module.

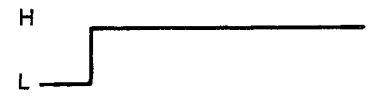
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Caution
If the sensor connector is disconnected with the ignition switch turned on, the diagnostic trouble code is memorized. In this case, send the diagnostic trouble code erase signal from the scan tool to the engine control module or disconnect the battery terminal (–) for 10 seconds or more, and the diagnostic memory will be erased.

The 23 diagnostic items are provided as follows, and if plural items are activated, they are all indicated sequentially from the smallest code number.

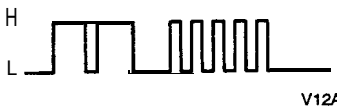
Caution
The diagnostic trouble code for the ignition timing adjustment signal is output when the line of the ignition timing adjustment terminal is shorted to ground. Therefore, the diagnostic trouble code is also output when the ignition timing adjustment terminal is grounded to adjust the ignition timing, but this does not show any abnormality.

DIAGNOSTIC CHART (FAULT TREE)

Code No.	Output signal pattern	Diagnostic item	Check item (Remedy)	Memory
	 Z12A0104	Engine control module	• Fuse • Harness and connector • Ground (Replace ECM if power + ground available)	–
11	 Y12A0104	Heated oxygen sensor <Models other than 1994 and later California model> Left bank heated oxygen sensor (front) <1994 and later California model>	• Harness and connector • Heated oxygen sensor • Fuel pressure • Injectors (Replace if defective) • Intake air leaks	Retained
12	 X12A0104	Volume air flow sensor	• Harness and connector (If harness and connector are normal, replacevolumeairflow sensor assembly.)	Retained
13	 W12A0104	Intake air temperature sensor	• Harness and connector • Intake air temperature sensor	Retained
14	 V12A0104	Throttle position sensor	• Harness and connector • Throttle position sensor • Closed throttle position switch	Retained

NOTE
Do not replace the ECM until a thorough terminal check reveals there are no short/open circuit.

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Code No.	Output signal pattern	Diagnostic item	Check item (Remedy)	Memory
21	 Z12A0107	Enginecoolanttemperaturesensor	• Harness and connector • Engine coolant temperature sensor	Retained
22	 Y12A0107	Crankshaft position sensor	• Harness and connector (If harness and connector are normal, replace crankshaft position sensor assembly.)	Retained
23	 x12.40107	Camshaft position sensor	• Harness and connector (If harness and connector are normal, replace camshaft position sensor.)	Retained
24	 W12A0107	Vchicle speed sensor	• Harness and connector • Vehicle speed sensor	Retained
25	 V12A0107	Barometric pressure sensor	• Harness and connector (If harness and connector are normal, replace barometric pressure sensor assembly.)	Retained
31	 Z12A0468	Knock sensor	• Harness and connector (If harness and connector are normal, replace knocksensor.)	Retained
36	 Z12A0105	Ignition timing adjustment signal <DOHC>	• Harness and connector	
39	 Y12A0105	Heated oxygen sensor <Federal – Turbo> Right bank heated oxygen sensor (front) <1994 and later California model>	• Harness and connector • Heated oxygen sensor • Fuel pressure • Injectors (Replace if defective) • Intake air leaks	Retained
41	 X12A0105	Injector	• Harness and connector • Injector coil resistance	Retained
43	 W12A0105	EGR <California – Non Turbo, Turbo>	• Harness and connector • EGR thermo-sensor • EGR valve • EGR solenoid • EGR valve control vacuum	Retained

NOTE
Do not replace the ECM until a thorough terminal check reveals there are no short/open circuit.

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Code No.	Output signal pattern	Diagnostic item	Check item (Remedy)	Memory
44	 V12A0105	Ignition coil, ignition powertransistor unit (No. l-4 cylinder)	• Harness and connector • Ignition coil • Ignition power transistor unit	Retained
52	 U12A0105	Ignition coil, Ignition power transistor unit (No. 2–5 cylinder)	• Harness and connector • Ignition coil • Ignition power transistor unit	Retained
53	 T12A0105	Ignition coil, Ignition power transistor unit (No. 3-6 cylinder)	• Harness and connector • Ignition coil • Ignition power transistor unit	Retained
59	 S12A0105	Left bank heated oxygen sensor (Rear) <California model from 1994>	• Harness and connector • Heated oxygen sensor • Fuel pressure • Injectors (Replace if defective) • Intake air leaks	Retained
61	 R12A0105	Acablefromtransaxlecontrolmodule, for transmission of torque reduction signal <A/T>	• Harness and connector (If harness and connector are normal, replace only transaxle control module.)	Retained
62	 Q12A0105	Induction control valve position sensor <Non Turbo>	• Harness and connector (If harness, connector and induction control valve are normal, replace air intake plenum assembly.)	Retained
69	 P12A0105	Right bank heated oxygen sensor (Rear) <California model from 1994)	• Harness and connector • Heated oxygen sensor • Fuel pressure • Injectors (Replace if defective) • Intake air leaks	Retained
	 (Continuous) U12A0104	Normal state		–

NOTE
Do not replace the ECM until a thorough terminal check reveals there are no short/open circuit.

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DIAGNOSTIC DETECTION LOGIC

Fault ID	Title	Effect	Probable causes
11	**Heated Oxygen Sensor (front) <Except 1994 and Later California model> / Left Bank Heated Oxygen Sensor (front) cl994 and Later California model>**		
Background • The oxygen sensor converts the oxygen density in the exhaust gas to a voltage and outputs it. • The engine control module checks the change of an oxygen sensor output voltage (Lean/Rich) in the air/fuel ratio closed loop control. Range of Check • 3 minutes have passed after engine was started. • Engine coolant temperature is approx. 80°C (176°F) or more. • Intake air temperature is 20–50°C (68–122°F). • Engine speed is approx. 1,900–2,200 r/min. • Vehicle is moving at constant speed on a flat, level road surface. Set Conditions The oxygen sensor output voltage does not cross specified voltage for specified seconds.	Limp-in Air/fuel ratio closed loop control is not performed.	• Oxygen sensor deteriorated. • Open or shorted oxygen sensor circuit, or loose connector. • Incorrect fuel pressure. • Injector failed. • Air intake. • Engine control module failed.

Fault ID	Title	Effect	Probable causes
12	**Volume Air Flow Sensor**		
Background • While the engine is running, the volume air flow sensor outputs a pulse signal which corresponds to the volume of air flow. • The engine control module checks whether the frequency of this signal output by the volume air flow sensor while the engine is running is at or above the set value. Range of Check Engine speed is 500 r/min or more. Set Conditions Sensor output frequency is 3 Hz or less for 4 seconds.	Limp-in (a) Uses the throttle position sensor signal and engine speed signal (crankshaft position sensor signal) for basic injector drive time and basic ignition timing from the pre-set mapping. (b) Fixes the IAC motor in the appointed position so idle air control is not performed.	• Volume air flow sensor failed. • Open or shorted volume air flow sensor circuit, or loose connector. • Engine control module failed.

Fault ID	Title	Effect	Probable causes
13	Intake Air Temperature Sensor		
Background ● The intake air temperature sensor converts the intake air temperature to a voltage and outputs it. • The engine control module checks whether the voltage is within a specified range. Range of Check • Ignition switch : ON • Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. Set Conditions • Sensor output voltage is 4.6 V or more (corresponding to an intake air temperature of –45°C(–49°F) or less) for 4 seconds. or • Sensor output voltage is 0.2 V or less (corresponding to an intake air temperature of 125°C (257°F) or more) for 4 seconds.	Limp-in Controls as if the intake air temperature is 25°C (77°F).	• Intake air temperature sensor failed. ● Open or shorted the intake air temperature sensor circuit, or loose connector. • Engine control module failed.	

Fault ID	Title	Effect	Probable causes
14	Throttle Position Sensor		
Background ● The throttle position sensor outputs a voltage which corresponds to the throttle valve opening angle. ● The engine control module checks whether the voltage is within a specified range. In addition, it checks that the voltage output does not become too large while the engine is idling. Range of Check • Ignition switch : ON • Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. Set Conditions • When the closed throttle position switch is ON, the sensor output voltage is 2 V or more for 4 seconds. or ● The sensor output voltage is 0.2 V or less for 4 seconds.	Limp-in No increase in fuel injection amount during acceleration due to the unreliable throttle position sensor signal.	● Throttle position sensor failed or maladjusted. ● Open or shorted throttle position sensor circuit, or loose connector. ● Closed throttle position switch ON malfunction. ● Closed throttle position switch signal wire shorted. ● Engine control module failed.	

Fault ID	Title	Effect	Probable causes
21	Engine Coolant Temperature Sensor		
Background • The engine coolant temperature sensor converts the engine coolant temperature to a voltage and outputs it. • The engine control module checks whether the voltage is within a specified range. In addition, it checks the engine coolant temperature (signal) does not drop while the engine is warming up. Range of Check, Set Conditions Range of check • Ignition switch : ON • Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. Set conditions • Sensor output voltage is 4.6 V or more (corresponding to an engine coolant temperature of –45°C (–49°F) or less for 4 seconds. or • Sensor output voltage is 0.1 V or less (correspondinf to an engine coolant temperature of 140°C (284°F) or more for 4 seconds. Range of check • Ignition switch : ON • Engine spped is approx. 50 r/min or more. Set conditions • Ohe sensor output voltage increases from 1.6 V or less (corresponding to an engine coolant temperature of 40°C (104°F) or more) to 1.6 V or more (correponding to an engine coolant temperature of 40°C (104°F) or less). • After this, the sensor output voltage is 1.6 V or more for 5 minutes.	Limp-in Controls as if the engine coolant temperature is 80°C (176°F).	• Engine coolant temperature sensor failed. • Open or shorted the engine coolant temperature sensor circuit, or loose connector. • Engine control module failed.

Fault ID	Title	Effect	Probable causes
22	Crankshaft Position Sensor		
Background • When the engine is running, the crankshaft position sensor outputs a pulse signal. • The engine control module checks whether the pulse signal is input while the engine is cranking. • The engine control module checks the pulse signal patterns of the crankshaft position sensor. Range of Check, Set Conditions Range of check • Ignition switch : ON • Engine is not cranking. Set conditions Regular signal patterns for cylinder discrimination from the crankshaft position sensor signal and the camshaft position sensor signal are not input 20 times in a 10 seconds period. Range of check Engine is cranking. Set conditions Sensor output voltage does not change for 4 seconds (no pulse signal input).	No limp-in	• Crankshaft position sensor failed. • Open or shorted crankshaft position sensor circuit, or loose connector. • Engine control module failed.

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Fault ID	Title	Effect	Probable causes
23	Camshaft Position Sensor		
Background • When the engine is running, the camshaft position sensor outputs a pulse signal. • The engine control module checks whether the pulse signal is input. • The engine control module checks the pulse signal patterns of the camshaft position sensor. Range of Check, Set Conditions Range of check • Ignition switch : ON • Engine speed is approx. 50 r/min or more. Set conditions Sensor output voltage does not change for 4 seconds (no pulse signal input). Range of check • Ignition switch : ON • Engine is not cranking. Set conditions Regular signal patterns for cylinder discrimination from the crankshaft position sensor signal and the camshaft position sensor signal are not input 20 times in a 10 seconds period.		Limp-in (a) Injects fuel into all cylinders simultaneously. (After the ignition switch is turned to ON, the No.1 cylinder top dead center is not detected at all.) (b) Cuts off the fuel supply 4 seconds after a problem is detected. (After the ignition switch is turned to ON, the No.1 cylinder top dead center is not detected at all.)	• Camshaft position sensor failed. • Open or shorted camshaft position sensor circuit, or loose connector. • Engine control module failed.

Fault ID	Title	Effect	Probable causes
24	Vehicle Speed Sensor		
Background • The vehicle speed sensor outputs a pulse signal while the vehicle is driven. • The engine control module checks whether the pulse signal is output. Range of Check • Ignition switch : ON • Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. • Closed throttle position switch : OFF • Engine speed is 3,000 r/min or more. • Driving under high engine load conditions. Set Conditions Sensor output voltage does not change for 4 seconds (no pulse signal input).		No limp-in	• Vehicle speed sensor failed. • Open or shorted vehicle speed sensor circuit, or loose connector. • Engine control module failed.

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Fault ID	Title	Effect	Probable causes
25	**Barometric Pressure Sensor**		
Background • The barometric pressure sensor outputs a voltage which corresponds to the barometric pressure. • The engine control module checks whether this voltage is within a specified range. Range of Check • Ignition switch : ON • Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. • Battery voltage is 8 V or more. Set Conditions • Sensor output voltage is 4.5 V or more (corresponding to a barometric pressure of 114 kPa (33.7 in. Hg) or more) for 4 seconds. or • Sensor output voltage is 0.2 V or less (corresponding to a barometric pressure of 5.33 kPa (1.57 in. Hg) or less) for 4 seconds.		Limp-in Controls as if the barometric pressure is 101 kPa (760 mmHg)(sea level).	• Barometric pressure sensor failed. • Open or shorted barometric pressure sensor circuit, or loose connector. • Engine control module failed.

Fault ID	Title	Effect	Probable causes
31	**Knock Sensor**		
Background • The knock sensor converts the vibration of the cylinder block into a voltage and outputs it. If there is a malfunction of the knock sensor, the voltage output will not change. • The engine control module checks whether the voltage changes. Range of Check • Ignition switch : ON • Excluding 60 seconds after the ignition switch is turned ON or immediately after the engine starts. • Engine speed is approx. 5,000 r/min or more. Set Conditions • The change in the knock sensor output voltage (knock sensor peak voltage at each 1/3 revolution of the crankshaft) is less than 0.06 V for 200 times in succession.		Limp-in Switches the ignition timing from ignition timing for high octane to ignition timing for Standard octane fuel.	• Knock sensor failed. • Open or shorted knock sensor circuit, or loose connector. • Engine control module failed.

Fault ID	Title	Effect	Probable causes
36	**Ignition Timing Adjusting Signal**		
Background • If there is a short circuit in the line between the engine control module and the ignition timing adjustment terminal, the line voltage will become low. • The engine control module checks whether this occurs. Range of Check Ignition switch : ON Set Conditions The ignition timing adjusting signal wire is shorted to the ground.		No limp-in	• Ignition timing adjusting signal wire circuit is shorted to the ground. • Engine control module failed.

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Fault ID	Title	Effect	Probable causes
39	**Heated oxygen sensor <Federal-Turbo> / Right Bank Heated Oxygen Sensor (front) <1994 and later California model>**	Limp-in Air/fuel ratio closed loop control is not performed.	• Oxygen sensor deteriorated. • Open or shorted oxygen sensor circuit, or loose connector. • Incorrect fuel pressure. • Injector failed. • Air intake. • Engine control module failed.
Background • The oxygen sensor converts the oxygen density in the exhaust gas to a voltage and outputs it. • The engine control module checks the change of an oxygen sensor output voltage (Lean/Rich) in the air/fuel ratio closed loop control. Range of Check • 3 minutes have passed after engine was started. • Engine coolant temperature is approx. 80°C (176°F) or more. • Intake air temperature is 20–50°C (68–122°F). • Engine speed is approx. 1,900–2,200 r/min. • Vehicle is moving at constant speed on a flat, level road surface. Set Conditions The oxygen sensor output voltage does not cross specified voltage for specified seconds.			

Fault ID	Title	Effect	Probable causes
41	**Injector**	No limp-in	• Injector failed. • Open or shorted injector circuit, or loose connector. • Engine control module failed.
Background • A surge voltage is generated when the injectors are driven and the current flowing to the injector coil is shut off. • The engine control module checks this surge voltage. Range of Check • Engine speed is approx. 50–1,000 r/min. • The throttle position sensor output voltage is 1.15 V or less. • Actuator test by scan tool is not carried out. Set Conditions Surge voltage of injector coil is not detected for 4 seconds.			

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Fault ID	Title	Effect	Probable causes
43 <California-Non Turbo, Turbo>	EGR System		
Backaround • EGR temperature sensor converts the EGR gas temperature to a voltage and outputs it. • Engine control module checks whether an output voltage of the EGR temperature sensor is within a specified range. Range of Check • Approx. 6 minutes or more have passed after engine was started. • Intake-air temperature is 0–55°C (32–131°F). • Barometric pressure is 93.3 kPa (27.6 in.Hg) or more. • Engine speed is approx. 1,900–2,100 r/min. • Vehicle is moving at constant speed on a flat, level road surface. • The above conditions continue for a continuous period of 15 seconds. Set Conditions • Sensor output voltage is approx. 3.5 V (corresponding to an EGR temperature of 70°C (158°F)) or more. • When the range of check operation. given above which accompany starting of the engine are carried out two times in succession, a problem is detected after each operation.		No limp-in	• EGR valve does not open. • EGR control vacuum is too low. • EGR solenoid failed. • EGR temperature sensor failed. • Open or shorted EGR temperature sensor circuit, or loose connector. • Engine control module failed.

Fault ID	Title	Effect	Probable causes
44, 52, 53	Ignition Coil, Ignition Power Transistor Unit (1-4, 2-5, 3-6)		
Background • Ignition power transistor unit converts ON/OFF variation of the ignition coil to the pulse signal (Ignition signal) and outputs it. • The engine control module detects whether ignition occurs or not by checking this signal while the engine is running. Range of Check • Engine speed is approx. 50–4,000 r/min. • Engine is not cranking. Set Conditions The ignition signal from the same coil is not input for 4 seconds. However, this excludes cases where no ignition signal is input from any coils.		Limp-in Cuts fuel of an ignition signal abnormal cylinder.	• Ignition coil failed • Disconnection or short circuit of the primary ignition circuit, or imperfect contact of the connector. • Ignition power transistor unit failed. • Engine control module failed.

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Fault ID	Title	Effect	Probable causes
59 <1994 and later California model>	Left Bank Heated Oxygen Sensor (rear)		
Background • The oxygen sensor converts the oxygen density in the exhaust gas to a voltage and outputs it. • The engine control module checks an output voltage of the oxygen sensor when the oxygen volume in the exhaust gas is little (Air/fuel ratio is rich.). Range of Check • Approx. 3 minutes or more have passed after engine was started. • Engine coolant temperature is approx. 80°C (176°F) or more. • Closed throttle position switch : OFF • The throttle position sensor output voltage is 4.1 V or more. • Open loop control in operation. • 20 seconds have passed after deceleration finished. Set Conditions • The heated oxygen sensor (rear) output voltage is 0.1 V or less. • The heated oxygen sensor (front) output voltage is 0.5 V or more. • The above conditions continue for a continuous period of 5 seconds.	Limp-in The air/fuel ratio feedback control (closed loop control) is performed only by using a signal of the oxygen sensor (front) which is installed on the front side of the catalytic converter.	• Oxygen sensor deteriorated. • Open or shorted oxygen sensor circuit, or loose connector. • Engine control module failed.

Fault ID	Title	Effect	Probable causes
61 <A/T>	A Cable From Transaxle Control Module for Transmission of Torque Reduction Signal		
Background • The transaxle control module inputs a torque reduction request signal (LOW) when the transaxle is shifted to the engine control module. • Since the gear shift completes within the usually specified hours, the engine control module checks whether the input hours of the torque reduction request signal (LOW) is within a specified range. Range of Check • 60 seconds or more have passed immediately after engine was started. • Engine speed is approx. 50 r/min or more. Set Conditions The voltage of the torque reduction request signal from the transmission control module is LOW for 5.5 seconds or more.	Limp-in When the transaxle is shifted, the ignition timing delay angle control (Engine-transaxle integrated contol) is not performed.	• Short circuit of torque reduction request signal wire. • Transaxle control module failed. • Engine control module failed.

Fault ID	Title	Effect	Probable causes
62 <Non Turbo>	Induction Control Valve Position Sensor		
Background • The induction control valve position sensor outputs a pulse signal according to a change of the valve opening. • The engine control module checks an actual valve position when the intake-air control valve drive motor was driven. Range of Check • 60 seconds or more have passed immediately after engine was started. • Engine speed is approx. 50 r/min or more. • Battery voltage is 10 V or more. Set Conditions • The intake-air control valve does not reach target position even after the intake-air control valve drive motor is operated several times. • When the range of check operations given above which accompany starting of the engine are carried out four times in succession, a problem is detected after each operation.		Limp-in The induction control valve is driven under condition of the valve full opening.	• Induction control valve position sensor failed. • Open or shorted induction control valve position sensor circuit, or loose connector. • Variable induction control motor failed. • Open or shorted variable induction control motor circuit, or loose connector. • Engine control module failed.

Fault ID	Title	Effect	Probable causes
69 <1994 and ater California model>	Right Bank Heated Oxygen Sensor (rear)		
Background • The oxygen sensor converts the oxygen density in the exhaust gas to a voltage and outputs it. • The engine control module checks an output voltage of the oxygen sensor when the oxygen volume in the exhaust gas is little (Air/fuel ratio is rich.). Range of Check • Approx. 3 minutes or more have passed after engine was started. • Engine coolant temperature is approx. 80°C(176°F) or more. • Closed throttle position switch : OFF • The throttle position sensor output voltage is 4.1 V or more. • Open loop control in operation. • 20 seconds have passed after deceleration finished. Set Conditions • The heated oxygen sensor (rear) output voltage is 0.1 V or less. • The heated oxygen sensor (front) output voltage is 0.5 V or more. • The above conditions continue for a continuous period of 5 seconds.		Limp-in The air/fuel ratio feedback control (closed loop control) is performed only by using a signal of the oxygen sensor (front) which is installed on the front side of the catalytic converter.	• Oxygen sensor deteriorated. • Open or shorted oxygen sensor circuit, or loose connector. • Engine control module failed.

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LIST OF FAIL-SAFE/BACK-UP FUNCTIONS

When the failure of a major sensor is detected by the on-board diagnostics, the preset control logic provides controls to assure safe operation of the vehicle.

Trouble item	Controls to be provided in the event of trouble
Volume air flow sensor	(1) Based on throttle position sensor (TPS) signal and engine speed signal (crank angle sensor signal) basic driving time of injectors and basic ignition timing is read from the preset map. (2) Idle air control motor fixed at predetermined position, and no idling speed control achieved
Intake air temperature sensor	Controls provided on the assumption that intake air temperature is 25°C (77°F)
Throttle position sensor (TPS)	No additional fuel injection provided on the basis of throttle position sensor signal at acceleration
Engine coolant temperature sensor	Controls provided on the assumption that engine coolant temperature is 80°C (176°F) (Even if the sensor signal returns to normal, this control mode is retained until the ignition switch is set to OFF.)
Camshaft position sensor	(1) Fuel injected into the cylinders in the order l-2-3-4-5-6 with irregular timing (Provided that no No.1 cylinder top dead center position has been detected since the ignition switch was placed in the ON position) (2) Fuel cut 4 seconds after a failure was detected (Provided that no No.1 cylinder top dead center position has been detected since the ignition switch was placed in the ON position)
Barometric pressure sensor	Controls provided on the assumption that barometric pressure is 101 kPa (760 mmHg) (sea level)
Knock sensor	Ignition timing is changed from that for premium gasoline to that for regular gasoline.
Ignition coil and ignition power transistor unit	Fuel cut for cylinders whose ignition signal is abnormal
Communication line with transmission control module <A/T>	No ignition timing retard control (overall engine-transmission control) achieved when transmission speeds are changed
Heated oxygen sensor (front) <All models>	No air-fuel ratio closed loop control achieved
Heated oxygen sensor (rear) cl994 and later California model>	Only signals of oxygen sensor (front) installed upstream of catalyst are used, and the air-fuel ratio feedback control (closed loop control) is not performed.

ON-BOARD DIAGNOSTICS <From 1996 models>

The engine control module monitors the input/output signals (some signals at all times and the others under specified conditions) of the engine control module.
When a malfunction has continued for a specified time or longer since the irregular signal is initially monitored, the engine control module judges that a malfunction has occurred.
After the ECM first detects a malfunction, a diagnostic trouble code is recorded when the engine is restarted and the same malfunction is re-detected.
However, for items marked with a "*", a diagnostic trouble code is recorded on the first detection of the malfunction.
There are 50 diagnostic items, and the diagnostic results can be read out with a scan tool.
Moreover, since memorization of the diagnostic trouble codes is backed up directly by the battery, the diagnostic results are memorized even if the ignition key is turned off. The diagnostic trouble codes will, however, be erased when the battery terminal or the engine control module connector is disconnected.
In addition, the diagnostic trouble code can also be erased by turning on the ignition switch to ON and sending the diagnostic trouble code erase signal from the scan tool to the engine control module.

Caution
If the sensor connector is disconnected with the ignition switch turned on, the diagnostic trouble code is memorized. In this case, send the diagnostic trouble code erase signal to the engine control module in order to erase the diagnostic memory.

The 50 diagnostic items are provided as follows, and if plural items are activated, they are all indicated sequentially from the smallest code number.

Caution
The diagnostic trouble code of the ignition timing adjustment signal is output whenever terminal for ignition timing adjustment is grounded.
Therefore, it is not a malfunction that the code is output when adjusting ignition timing.

The ECM records the diagnostic trouble code and the engine operating conditions at the time the malfunction was detected. These data are called "freeze frame" data.
This data indicates the engine operating condition from when nothing at all is detected to the initial detection of malfunction.
This data can be read by using the scan tool, and can then be used in simulation tests for troubleshooting. Data items are as follows.

Data	Unit
Engine coolant temperature	°C
Engine speed	r/min
Vehicle speed	km/h
Long-term fuel compensation (Long-term fuel trim)	%
Short-term fuel compensation (Short-term fuel trim)	%
Fuel control condition	• Open loop • Closed loop • Open loop – drive condition • Open loop – DTC set • Closed loop – O_2 (rear) failed
Calculation load value	%
Diagnostic trouble code during data recording	

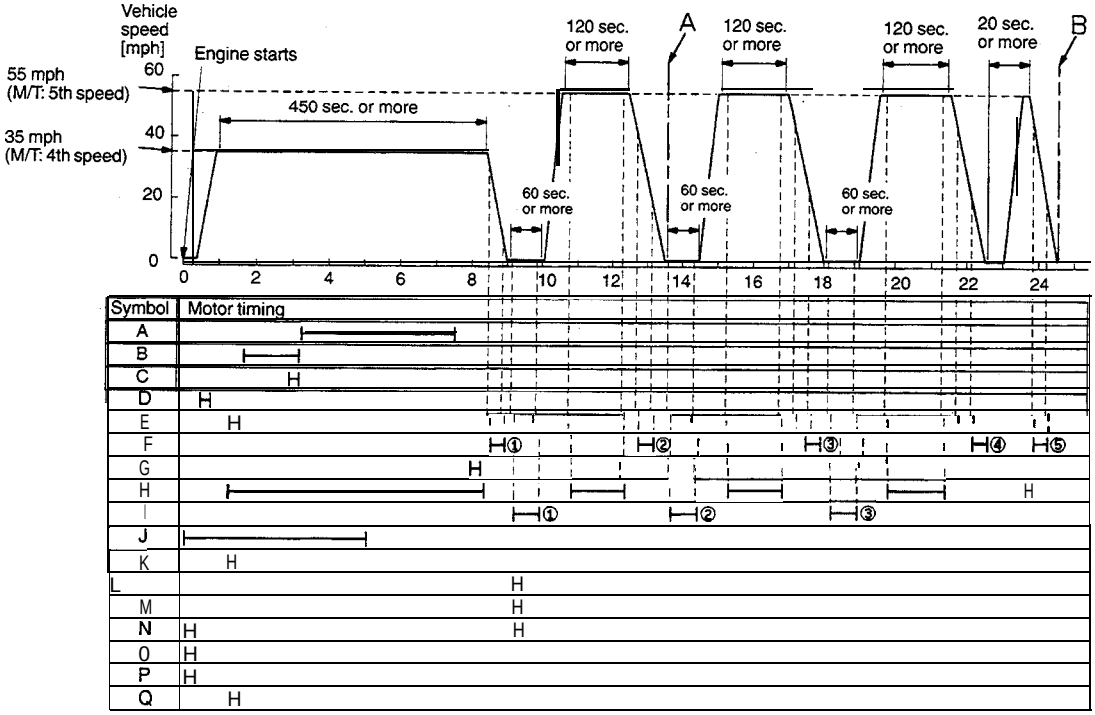
OBD-II DRIVE CYCLE

All kinds of diagnostic trouble code can be monitored by carrying out a short drive in accordance with the following drive cycle pattern. In other words, doing such a drive allows to regenerate any kind of trouble which involves illuminating the check engine/malfunction indicator lamp and to check if the repair procedure has eliminated the trouble (the check engine/malfunction indicator lamp is no more illuminated).

NOTE

1. For checking the following three systems for illumination of the check engine/malfunction indicator lamp, perform the driving up to the point B twice successively. Before beginning with the first driving, turn off the ignition switch for more than 10 seconds.
   - EGR system
   - Fuel trim
   - Evaporative emission control system
2. In case of the systems other than those three mentioned above, performing a drive up to the point A twice successively will suffice for determining if the check engine/malfunction indicator lamp illuminates or not. Before beginning with the first driving, turn off the ignition switch for more than 10 seconds.
3. Perform test drives under the following conditions:
   (1) On vehicles with automatic transmission, set selector lever in D range, overdrive switch ON, Power/Economy changeover switch in P range.
   (2) Acceleration: Keep the throttle in 1/4–3/4 opened conditions.
   (3) Deceleration: Lower the vehicle speed below 15 mph or the engine speed below 1,000 r/min (without operating brake and clutch).
   (4) During cruising: Keep the throttle opening constant.
   (5) During stopping: Keep the throttle fully closed, A/C OFF and transmission in neutral.
   (6) Coolant temperature at starting: 10°C (50°F) or more
   (7) Intake air temperature at starting: 40°C (104°F) or more
   (8) Intake air temperature during driving: 50°C (122°F) or more

Drive cycle pattern



Catalytic converter
O_2 sensor
O_2 sensor circuit (open/short)
O_2 sensor heater circuit (open/short)
Misfire
EGR system
MDP sensor
Fuel trim
Evapo. emission control system

J: ECT sensor
K: TP sensor, IAT sensor, BARO sensor
L: Idle control system
M: CTP switch
N: Injector circuit (open)
0: Solenoid valve circuit (open)
- TC waste gate, EGR, EVAP purge, Fuel pressure

P: CMP sensor, CKP sensor, VAF sensor
Q: Excessive time to enter closed loop fuel control

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DIAGNOSTIC CHART (FAULT TREE)

DTC No. <General scan tool mode>	DTC No. <Scan tool (MUT-II) mode>	Diagnostic item	Check item (Remedy)	Memory
P0100	PO100	Volume Air Flow Circuit Malfunction	• Harness and connector (If harness and connector are normal, replace volume air flow sensor assembly.)	Retained
P0105	P0105	Barometric Pressure Circuit Malfunction	• Harness and connector (If harness and connector are normal, replace volume air flow sensor assembly.)	Retained
PO110	PO110	Intake Air Temperature Circuit Malfunction	• Harness and connector • Intake air temperature sensor	Retained
PO115	PO115	Engine Coolant Temperature Circuit Malfunction	• Harness and connector • Engine coolant temperature sensor	Retained
PO120	PO120	Throttle Position Circuit Malfunction	• Harness and connector • Throttle position sensor • Closed throttle position switch	Retained
PO125		Excessive Time to Enter Closed Loop Fuel Control'	• O_2 sensor (front) • O_2 sensor harness and connector • Injector	Retained
P0130		O_2 Sensor Circuit Malfunction (Bank 1 Sensor 1)	• Harness and connector (If harness and connector are normal, replace Right bank O_2 sensor front.)	Retained
PO135	–	O_2 Sensor Heater Circuit Malfunction (Bank 1 Sensor 1)	• Harness and connector • Right bank O_2 sensor (front) heater	Retained
PO136	–	O_2 Sensor Circuit Malfunction (Bank 1 Sensor 2)	• Harness and connector • Right bank O_2 sensor (rear)	Retained
PO141		O_2 Sensor Heater Circuit Malfunction (Bank 1 Sensor 2)	• Harness and connector • Right bank O_2 sensor (rear) heater	Retained
PO150	–	O_2 Sensor Circuit Malfunction (Bank 2 Sensor 1)	• Harness and connector (If harness and connector are normal, replace Left bank O_2 sensor front.)	Retained
PO155		O_2 Sensor Heater Circuit Malfunction (Bank 2 Sensor 1)	• Harness and connector • Left bank O_2 sensor (front) heater	Retained
PO156	–	O_2 Sensor Circuit Malfunction (Bank 2 Sensor 2)	• Harness and connector • Left bank O_2 sensor (rear)	Retained
PO161		O_2 Sensor Heater Circuit Malfunction (Bank 2 Sensor 2)	• Harness and connector • Left bank O_2 sensor (rear) heater	Retained
PO170	–	Fuel Trim Malfunction (Bank 1)	• Volume air flow sensor output frequency • Injector • Fuel pressure • Intake air leaks • Engine coolant temperature sensor • Intake air temperature sensor • Barometric pressure sensor • O_2 sensor • Exhaust manifold cracked	Retained
PO173	–	Fuel Trim Malfunction (Bank 2)		

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DTC No. <General scan tool mode>	DTC No. <Scan tool (MUT-II) mode>	Diagnostic item	Check item (Remedy)	Memory
P0201	P0201	Injector Circuit Malfunction – Cylinder 1	• Harness and connector • Injector	Retained
P0202	P0202	Injector Circuit Malfunction – Cylinder 2		
P0203	P0203	Injector Circuit Malfunction – Cylinder 3		
P0204	P0204	Injector Circuit Malfunction – Cylinder 4		
P0205	P0205	Injector Circuit Malfunction – Cylinder 5		
P0206	P0206	Injector Circuit Malfunction – Cylinder 6		
P0300	–	Random Misfire Detected*	• Ignition coil • Ignition power transistor • Spark plug • Ignition circuit • Injector • O_2 sensor • Compression pressure • Timing belt • Crankshaft position sensor • Air intake • Fuel pressure • Crankshaft position sensor circuit and connector	Retained
P0301	–	Cylinder 1 Misfire Detected*		
P0302	–	Cylinder 2 Misfire Detected*		
P0303	–	Cylinder 3 Misfire Detected*		
P0304	–	Cylinder 4 Misfire Detected*		
P0305	–	Cylinder 5 Misfire Detected*		
P0306	–	Cylinder 6 Misfire Detected*		
P0325	P0325	Knock Sensor 1 Circuit Malfunction	• Harness and connector (If harness and connector are not defective, replace knock sensor.)	Retained
P0335	P0335	Crankshaft Position Sensor Circuit Malfunction	• Harness and connector ((If harness and connector are normal, replace crankshaft position sensor.)	Retained
PO340	PO340	Camshaft Position Sensor Circuit Malfunction	• Harness and connector (If harness and connector are normal, replace camshaft position sensor.)	Retained
PO400	–	Exhaust Gas Recirculation Flow Malfunction	• Harness and connector • EGR valve • EGR solenoid • EGR valve control vacuum • Manifold. differential pressure sensor	Retained
PO403	–	Exhaust Gas Recirculation Solenoid Malfunction	• Harness and connector • EGR solenoid	Retained
PO421	–	Warm Up Catalyst Efficiency Below Threshold (Bank 1)	• Exhaust manifold (Replace the catalytic converter if there is no cracks, etc.)	Retained
PO431		Warm Up Catalyst Efficiency Below Threshold (Bank 2)	• Exhaust manifold (Replace the catalytic converter if there is no cracks, etc.)	Retained
PO440	–	Evaporative Emission Control -System Malfunction	• Harness and connector • Evaporative emission purge solenoid • Purge control valve • Vacuum hoses routing	Retained
PO443	–	Evaporative Emission Control System Purge Control Valve Circuit Malfunction	• Harness and connector • Evaporative emission purge solenoid (No. 1)	Retained

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DTC No. <General scan tool mode>	DTC No. <Scan tool (MUT-II) mode>	Diagnostic item	Check item (Remedy)	Memory
PO500	PO500	Vehicle Speed Sensor Malfunction	• Harness and connector • Vehicle speed sensor	Retained
PO505	PO505	Idle Control System Malfunction	• Harness and connector • Idle air control motor	Retained
PO510	–	Closed Throttle Position Switch Malfunction	• Harness and connector • Closed throttle position switch	Retained
PO705	–	Transmission Range Sensor Circuit Malfunction (RPNDL Input)	• Harness and connector • Park/Neutral position switch	Retained
PO710		Transmission Fluid Temperature Sensor Circuit Malfunction	• Harness and connector • Transaxle oil temperature sensor	Retained
P1103		Turbocharger Waste Gate Actuator Malfunction	• Harness and connector • Turbocharger waste gate solenoid • Turbocharger waste gate actuator • Vacuum hoses routing	Retained
P1104	–	Turbocharger Waste Gate Solenoid Malfunction	• Harness and connector • Turbocharger waste gate solenoid	Retained
P1105		Fuel Pressure Solenoid Malfunction	• Harness and connector • Fuel pressure solenoid	Retained
P1300	P1300	Ignition Timing Adjustment Circuit Malfunction	• Harness and connector	Retained
P1400		Manifold Differential Pressure (MDP) Sensor Circuit Malfunction	• Harness and connector • MDP sensor	Retained
P1715		PG Assy Malfunction	• Harness and connector • Pulse generator	Retained
P1750		Solenoid Assy Malfunction	• Harness and connector • Converter clutch solenoid • Shift control solenoid • Pressure control solenoid	Retained

NOTE
1. Do not replace the engine control module (ECM) until a through terminal check reveals there are no short/open circuits.
2. After the ECM detects a malfunction, a diagnostic trouble code is recorded when the engine is next started and the same malfunction is re-detected. However, for items marked with a "*", the diagnostic trouble code is recorded on the first detection of the malfunction.
3. O_2: Heated oxygen sensor
4. Sensor 1: indicates sensors which are mounted closest to the engine.
5. Sensor 2: indicates sensors which are mounted next-closest to the engine.

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DIAGNOSTIC DETECTION LOGIC

DTC No.	Title	Probable causes
P01 00	Volume Air Flow Circuit Malfunction	
Background • While the engine is running, the volume air flow sensor outputs a pulse signal which corresponds to the volume of air flow. • The engine control module checks whether the frequency of this signal output by the volume air flow sensor while the engine is running is at or above the set value. Range of Check Engine speed is 500 r/min or more. Set Conditions Sensor output frequency is 3 Hz or less for 4 seconds.		• Volume air flow sensor failed. • Open or shorted volume air flow sensor circuit, or loose connector. • Engine control module failed.

DTC No.	Title	Probable causes
P01 05	Barometric Pressure Circuit Malfunction	
Background • The barometric pressure sensor outputs a voltage which corresponds to the barometric pressure. • The engine control module checks whether this voltage is within a specified range. Range of Check • Ignition switch: ON • Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. • Battery voltage is 8 V or more. Set Conditions • Sensor output voltage is 4.5 V or more (corresponding to a barometric pressure of 114 kPa (33.7 in.Hg) or more) for 4 seconds. or • Sensor output voltage is 0.2 V or less (corresponding to a barometric pressure of 5.33 kPa (1.57 in.Hg) or less) for 4 seconds.		• Barometric pressure sensor failed. • Open or shorted barometric pressure sensor circuit, or loose connector. • Engine control module failed.

DTC No.	Title	Probable causes
P0110	Intake Air Temperature Circuit Malfunction	
Background • The intake air temperature sensor converts the intake air temperature to a voltage and outputs it. • The engine control module checks whether the voltage is within a specified range. Range of Check • Ignition switch: ON • Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. Set Conditions • Sensor output voltage is 4.6 V or more (corresponding to an intake air temperature of –45°C (–49°F) or less) for 4 seconds. or • Sensor output voltage is 0.2 V or less (corresponding to an intake air temperature of 125°C (257°F) or more) for 4 seconds.		• Intake air temperature sensor failed. • Open or shorted the intake air temperature sensor circuit, or loose connector. • Engine control module failed.

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DTC No.	Title	Probable causes
P0115	Engine Coolant Temperature Circuit Malfunction	
Background • The engine coolant temperature sensor converts the engine coolant temperature to a voltage and outputs it. • The engine control module checks whether the voltage is within a specified range. In addition, it checks the engine coolant temperature (signal) does not drop while the engine is warming up. Range of Check, Set Conditions Range of check • Ignition switch: ON • Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. Set conditions • Sensor output voltage is 4.6 V or more (corresponding to an engine coolant temperature of –45°C (–49°F) or less for 4 seconds. or • Sensor output voltage is 0.1 V or less (corresponding to an engine coolant temperature of 140°C (284°F) or more for 4 seconds. Range of check • Ignition switch: ON • Engine speed is approx. 50 r/min or more. Set conditions • The sensor output voltage increases from 1.6 V or less (corresponding to an engine coolant temperature of 40°C (104°F) or more) to 1.6 V or more (correponding to an engine coolant temperature of 40°C (104°F) or less). • After this, the sensor output voltage is 1.6 V or more for 5 minutes. Range of check • Engine coolant temperature is 20°C (68°F) or more when the engine is started. • Intake air temperature is 20°C (68°F) or more when the engine is started. Set conditions • The engine coolant temperature takes 5 minutes or more to rise to approximately 50°C (122°F) after the engine is started.		• Engine coolant temperature sensor failed. • Open or shorted the engine coolant temperature sensor circuit, or loose connector. • Engine control module failed.

DTC No.	Title	Probable causes
P0120	Throttle Position Circuit Malfunction	
Background • The throttle position sensor outputs a voltage which corresponds to the throttle valve opening angle. • The engine control module checks whether the voltage is within a specified range. In addition, it checks that the voltage output does not become too large while the engine is idling. Range of Check • Ignition switch: ON • Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. Set Conditions • When the closed throttle position switch is ON, the sensor output voltage is 2 V or more for 4 seconds. or • The sensor output voltage is 0.2 V or less for 4 seconds. Range of Check • Ignition switch: ON • Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. • Engine speed is approx. 500–3,000 r/min or more. • During low load operations Set Conditions • The sensor output voltage is 4.6 V or more for 10 seconds.		• Throttle position sensor failed or maladjusted. • Open or shorted throttle position sensor circuit, or loose connector. • Closed throttle position switch ON malfunction. • Closed throttle position switch signal wire shorted. • Engine control module failed.

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DTC No.	Title	Probable causes
P01 25	Excessive Time to Enter Closed Loop Fuel Control	
Background • The MFI system reduces exhaust emissions by means of closed-loop fuel control. • The engine control module checks the time taken until closed-loop fuel control commences. Range of Check, Set Conditions Even though the specified length of time (approximately 30 seconds) has passed since the conditions* were met following starting of the engine, the MFI system does not enter closed-loop fuel control. *: The conditions are an engine coolant temperature of at least 80°C (176°F), an intake air temperature of 20–50°C (68–122°F), an engine speed of 1,900–2,200 r/min., etc.		• Heated oxygen sensor failed. • Injector failed. • Engine control module failed.

DTC No.	Title	Probable causes
P0130	Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 1)	
Background • When the oxygen sensor begins to deteriorate, the oxygen sensor signal response becomes poor. • The engine control module forcibly varies the air-fuel mixture to make it leaner and richer, and checks the response speed of oxygen sensor. In addition, the engine control module also checks for an open circuit in the oxygen sensor output line. Range of Check, Set Conditions The response of the oxygen sensor signal is slow when the amount of fuel injected is increased or decreased by an override during closed-loop control of the air-fuel ratio. The oxygen sensor output line is open-circuit.		• Heated Oxygen sensor deteriorated. • Open circuit in oxygen sensor output line. • Engine control module failed.

DTC No.	Title	Probable causes
P01 35	Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 1)	
Background The engine control module checks whether the heater current is within a specified range when the heater is energized. Range of Check, Set Conditions The oxygen sensor heater current is either lower than several dozen milliamperes or higherthan several amperes.		• Open or shorted oxygen sensor heater circuit. • Open circuit in oxygen sensor heater. • Engine control module failed.

DTC No.	Title	Probable causes
P01 36	Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)	
Background The engine control module checks for an open circuit in the heatd oxygen sensor output line. Range of Check, Set Conditions The heated oxygen sensor output line is open-circuit.		• Heated oxygen sensor failed. • Engine control module failed. • Open circuit in heated oxygen sensor output line.

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DTC No.	Title	Probable causes
P0141	Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 2)	
Background The engine control module checks whether the heater current is within a specified range when the heater is energized. Range of Check, Set Conditions The oxygen sensor heater current is either lower than several dozen milliamperes or higherthan several amperes.		• Open or shorted oxygen sensor heater circuit. • Open circuit in oxygen sensor heater. • Engine control module failed.

DTC No.	Title	Probable causes
P0150	Oxygen Sensor Circuit Malfunction (Bank 2 Sensor 1)	
Background • When the oxygen sensor begins to deteriorate, the oxygen sensor signal response becomes poor. • The engine control module forcibly varies the air-fuel mixture to make it leaner and richer, and checks the response speed of oxygen sensor. In addition, the engine control module also checks for an open circuit in the oxygen sensor output line. Range of Check, Set Conditions The response of the oxygen sensor signal is slow when the amount of fuel injected is increased or decreased by an override during closed-loop control of the air-fuel ratio. The oxygen sensor output line is open-circuit.		• Heated oxygen sensor deteriorated. • Open circuit in oxygen sensor output line. • Engine control module failed.

DTC No.	Title	Probable causes
P0155	Oxygen Sensor Heater Circuit Malfunction (Bank 2 Sensor 1)	
Background The engine control module checks whether the heater current is within a specified range when the heater is energized. Range of Check, Set Conditions The oxygen sensor heater current is either lower than several dozen milliamperes or higher than several amperes.		• Open or shorted oxygen sensor heater circuit. • Open circuit in oxygen sensor heater. • Engine control module failed.

DTC No.	Title	Probable causes
P0156	Oxygen Sensor Circuit Malfunction (Bank 2 Sensor 2)	
Background The engine control module checks for an open circuit in the heatd oxygen sensor output line. Range of Check, Set Conditions The heated oxygen sensor output line is open-circuit.		• Heated oxygen sensor failed. • Engine control module failed. • Open circuit in heated oxygen sensor output line.

DTC No.	Title	Probable causes
P0161	Oxygen Sensor Heater Circuit Malfunction (Bank 2 Sensor 2)	
Background The engine control module checks whether the heater current is within a specified range when the heater is energized. Range of Check, Set Conditions The oxygen sensor heater current is either lower than several dozen milliamperes or higherthan several amperes.		• Open or shorted oxygen sensor heater circuit. • Open circuit in oxygen sensor heater. • Engine control module failed.

TSB Revision

DTC No.	Title	Probable causes
P0170	Fuel Trim Malfunction (Bank 1)	
Background • If a malfunction occurs in the fuel system, the fuel compensation value bacomes too large or too small. • The engine control module checks whether the fuel compensation value is within a specified range. Range of Check, Set Conditions The fuel compensation value exceeds the specified range for 10 seconds during closed-loop control of the air-fuel ratio.		• Volume air flow sensor failed. • Injector failed. • Incorrect fuel pressure. • Air drawn in from gaps in gasket seals, etc. • Heated oxygen sensor failed. • Engine coolant temperature sensor failed. • Engine control module failed. • Intake air temperature sensor failed • Barometric pressure sensor failed.

DTC No.	Title	Probable causes
P0173	Fuel Trim Malfunction (Bank 2)	
Background • If a malfunction occurs in the fuel system, the fuel compensation value bacomes too large or too small. • The engine control module checks whether the fuel compensation value is within a specified range. Range of Check, Set Conditions The fuel compensation value exceeds the specified range for 10 seconds during closed-loop control of the air-fuel ratio.		• Volume air flow sensor failed. • Injector failed. • Incorrect fuel pressure. • Air drawn in from gaps in gasket seals, etc. • Heated oxygen sensor failed. • Engine coolant temperature sensor failed. • Engine control module failed. • Intake air temperature sensor failed • Barometric pressure sensor failed.

DTC No.	Title	Probable causes
PO201 – PO206	Injector Circuit Malfunction Cylinder-l – Cylinder-6	
Background • A surge voltage is generated when the injectors are driven and the current flowing to the injector coil is shut off. • The engine control module checks this surge voltage. Range of Check • Engine speed is approx. 50–1,000 r/min. • The throttle position sensor output voltage is 1.15 V or less. • Actuator test by scan tool is not carried out. Set Conditions Surge voltage of injector coil is not detected for 4 seconds.		• Injector failed. • Open or shorted throttle position sensor circuit, or loose connector. • Engine control module failed.

DTC No.	Title	Probable causes
PO300	Random Misfire Detected	
Background • If a misfiring occurs while the engine is running, the engine speed suddenly changes. • The engine control module checks for changes in the engine speed. Range of Check, Set Conditions • There are multiple cylinders for which the number of misfires for every 200 r/min of the engine exceeds the specified number. • There are multiple cylinders for which the number of misfires for every 1,000 r/min of the engine exceeds the specified number.		• Ignition system related part(s) failed. • Poor crankshaft position sensor signal. • Incorrect air-fuel ratio. • Low compression pressure. • Engine control module failed.

TSB Revision

DTC No.	Title	Probable causes
PO301 – PO306	Cylinder-l – Cylinder-6 Misfire Detected	
Background • If a misfiring occurs while the engine is running, the engine speed suddenly changes. • The engine control module checks for changes in the engine speed. Range of Check, Set Conditions The number of misfires for every 200 r/min of the engine exceeds the specified number (single cylinder). The number of misfires for every 1,000 r/min of the engine exceeds the specified number (single cylinder).		• Ignition system related part(s) failed. • Engine control module failed.

DTC No.	Title	Probable causes
PO325	Knock Sensor 1 Circuit Malfunction	
Background • The knock sensor converts the vibration of the cylinder block into a voltage and outputs it. If there is a malfunction of the knock sensor, the voltage output will not change. • The engine control module checks whether the voltage output changes. Range of Check • Ignition switch: ON • Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. • Engine speed is approx. 2,000 r/min or more. Set Conditions • The changes in the knock sensor output voltage (knock sensor peak voltage at each 1/2 revolution of the crankshaft) is less than 0.06 V for 200 times in succession.		• Knock sensor failed. • Open or shorted knock sensor circuit, or loose connector • Engine control module failed.

DTC No.	Title	Probable causes
PO335	Crankshaft Position Sensor Circuit Malfunction	
Background • When the engine is running, the crankshaft position sensor outputs a pulse signal. • The engine control module checks whether the pulse signal is input while the engine is cranking. Range of Check Engine is cranking. Set Conditions Sensor output voltage does not change for 4 seconds (no pulse signal input).		• Crankshaft position sensor failed. • Open or shorted crankshaft position sensor circuit, or loose connector. • Engine control module failed.

DTC No.	Title	Probable causes
PO340 /Camshaft Position Sensor Circuit Malfunction		
Background • When the engine is running, the camshaft position sensor outputs a pulse signal. • The engine control module checks whether the pulse signal is input. Range of Check • Ignition switch: ON • Engine speed is approx. 50 r/min or more. Set Conditions Sensor output voltage does not change for 4 seconds (no pulse signal input).		• Camshaft position sensor failed. • Open or shorted camshaft position sensor circuit, or loose connector. • Engine control module failed.

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DTC No.	Title	Probable causes
P0400	Exhaust Gas Recirculation Flow Malfunction	
Background • When the EGR solenoid switches from OFF to ON while the engine is running, EGR gas flows. • The engine control module checks how the EGR gas flow signal changes. Range of Check, Set Conditions The EGR gas flow signal changes little when the EGR solenoid switches from OFF to ON.		• EGR valve does not open. • EGR control vacuum is too low. • EGR solenoid failed. • Open or shorted EGR solenoid circuit, or loose connector. • Manifold differential pressure sensor failed. • Engine control module failed.

DTC No.	Title	Probable causes
P0403	Exhaust Gas Recirculation Solenoid Malfunction	
Background • The engine control module checks current flows in the EGR solenoid drive circuit when the solenoid is ON and OFF. Range of Check, Set Conditions • No surge voltage is detected even when the EGR solenoid is turned off.		• EGR solenoid failed. • Open or shorted EGR solenoid circuit, or loose connector. • Engine control module failed.

DTC No.	Title	Probable causes
P0421	Warm Up Catalyst Efficiency Below Threshold (Bank 1)	
Background • The signal from the heated oxygen sensor which follows the catalytic converter differs from that which precedes the catalytic converter. That is because the catalytic converter purifies exhaust gas. When the catalytic converter has deteriorated, the signal from the heated oxygen sensor which follows the catalytic converter becomes similar to that which precedes the catalytic converter. • The engine control module checks the outputs of the heated oxygen sensor signals. Range of Check, Set Conditions The relation between the signals from the heated oxygen sensors preceding (engine side) and following the catalytic converter meets specified condition.		• Catalytic converter deteriorated. • Engine control module failed.

DTC No.	Title	Probable causes
P0431	Warm Up Catalyst Efficiency Below Threshold (Bank 2)	
Background • The signal from the heated oxygen sensor which follows the catalytic converter differs from that which precedes the catalytic converter. That is because the catalytic converter purifies exhaust gas. When the catalytic converter has deteriorated, the signal from the heated oxygen sensor which follows the catalytic converter becomes similar to that which precedes the catalytic converter. • The engine control module checks the outputs of the heated oxygen sensor signals. Range of Check, Set Conditions The relation between the signals from the heated oxygen sensors preceding (engine side) and following the catalytic converter meets specified condition.		• Catalytic converter deteriorated. • Engine control module failed.

TSB Revision

DTC No.	Title	Probable causes
P0440	Evaporative Emission Control System Malfunction	
Background ● The evaporative emission purge solenoid opens and closes while the engine is idling. Then the fuel compensation value change according to whether the evaporative emission canister emits purge air or not. • The engine control module checks for this changes. Range of Check, Set Conditions When the evaporative emission purge solenoid opens and closes while the engine is idling the changes in the fuel compensation value is lower than the specified amounts.		• Evaporative emission purge solenoid failed. • Open or shorted evaporative emission purge solenoid circuit, or loose connector. • Purge hose connection or routing is defective. • Engine control module failed.

DTC No.	Title	Probable causes
P0443	Evaporative Emission Control System Purge Control Valve Circuit Malfunction	
Background The engine control module checks whether current flows in the evaporative emission purge solenoid drive circuit when the solenoid is driven. Range of Check, Set Conditions Even though the evaporative emission purge solenoid has switched from OFF to ON, current does not flow to the coil for 4 seconds.		• Evaporative emission purge solenoid failed. • Open or shorted evaporative emission purge solenoid circuit, or loose connector. • Engine control module failed.

DTC No.	Title	Probable causes
P0500	Vehicle Speed Sensor Malfunction	
Background • The vehicle speed sensor outputs a pulse signal while the vehicle is driven. • The engine control module checks whether the pulse signal is output. Range of Check • Ignition switch: ON • Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. • Closed throttle position switch: OFF • Engine speed is 3,000 r/min or more. • Driving under high engine load conditions. Set Conditions Sensor output voltage does not change for 4 seconds (no pulse signal input).		• Vehicle speed sensor failed. • Open or shorted vehicle speed sensor circuit, or loose connector. • Engine control module failed.

DTC No.	Title	Probable causes
P0505	Idle Control System Malfunction	
Background • If there is a malfunction of the IAC system, the actual engine speed will not be identical to the target engine speed. • The engine control module checks the difference between the actual engine speed and the target engine speed. Range of Check, Set Conditions After the engine has warmed up, the difference between the actual engine speed and the target engine speed exceeds the specified value.		• Idle air control motor failed. • Open or shorted idle air control motor circuit, or loose connector. • Engine control module failed.

DTC No.	Title	Probable causes
P0510	Closed Throttle Position Switch Malfunction	
Background • While the engine is idling without pressing the accelerator pedal, "ON" signal can be input from the closed throttle position switch to the engine control module. • The engine control module is used for checking the input signal during the engine idling. Range of Check • The vehicle is under stopping, however, the vehicle should have been driven at speed on or over 30 km/h at least one time before the vehicle is stopped. • The engine speed is approx. 800 r/min or below. Set Conditions • "OFF" signal was input from the closed throttle position switch for 2 seconds.		• Closed throttle position switch failed. • Open or shorted closed throttle position switch circuit, or loose connector. • Engine control module failed.

DTC No.	Title	Probable causes
P0705	Transmission Range Sensor Circuit Malfunction (RPNDL Input)	
Background • When a malfunction of the park/neutral position switch is detected, the transaxle control module outputs a malfunction signal to the engine control module. Range of Check, Set Conditions • The park/neutral position switch failure signal is input to the engine control module.		• Park/neutral position switch failed. • Open or shorted park/neutral position switch circuit, or loose connector. • Engine control module failed.

DTC No.	Title	Probable causes
P0710	Transmission Fluid Temperature Sensor Circuit Malfunction	
Background • When a malfunction of the fluid temperature sensor is detected, the transaxle control module outputs a malfunction signal to the engine control module. Range of Check, Set Conditions • The fluid temperature sensor failure signal is input to the engine control module.		• Oil temperature sensor failed. • Open or shorted temperature sensor circuit, or loose connector. • Engine control module failed.

DTC No.	Title	Probable causes
P1103	Turbocharger Waste Gate Actuator Malfunction	
Background • The engine control module always monitors the intake air amount to check if the engine is in overboosted condition. • When the engine control module judges that the engine is in an overboosted condition, it cuts off the fuel supply to protect the engine. Range of Check, Set Conditions • A condition where the fuel supply is to be shut off is detected.		• Turbocharger waste gate actuator failed. • Boost pressure control system failed. • Engine control module failed.

TSB Revision

DTC No.	Title	Probable causes
P1104	Turbochager Waste Gate Solenoid Malfunction	
Background The engine control module checks current flows in the turbocharger waste gate solenoid drive circuit when the solenoid is ON and OFF. Range of Check, Set Conditions No surge voltage is detected when the turbocharger waste gate solenoid is turned off.		• Turbocharger waste gate solenoid failed. • Open or shorted turbocharger waste gate solenoid circuit, or loose connector. • 'Engine control module failed.

DTC No.	Title	Probable causes
P1105	Fuel Pressure Solenoid Malfunction	
Background The engine control module checks current flows in the fuel pressure solenoid drive circuit when the solenoid is ON and OFF. Range of Check, Set Conditions No surge voltage is detected when the fuel pressure solenoid is turned off.		• Fuel pressure solenoid failed. • Open or shorted fuel pressure solenoid circuit, or loose connector. • Engine control module failed.

DTC No.	Title	Probable causes
P1300	Ignition Timing Adjusting Circuit Malfunction	
Background • If there is a short circuit in the line between the engine control module and the ignition timing adjustment terminal, the line voltage will become low. • The engine control module checks whether this occurs. Range of Check Ignition switch: ON Set Conditions The ignition timing adjusting signal wire is shorted to the ground.		• Ignition timing adjusting signal wire circuit is shorted to the ground. • Engine control module failed.

DTC No.	Title	Probable causes
P1400	Manifold Differential Pressure Sensor Circuit Malfunction	
Background • The manifold differential pressure sensor outputs a voltage which corresponds to the negative pressure in the intake manifold. • The engine control module checks whether the voltage output by the manifold differential pressure sensor is within a specified range. Range of Check, Set Conditions • After the engine has warmed up, it runs at low or medium load. • The engine coolant temperature at the time of starting the engine is 18°C (654°F) or more. • The sensor output voltage is 4.5 V or more for 4 seconds, or the sensor output voltage is 0.2 V or less for 4 seconds.		• Manifold differential pressure sensor failed. • Open or shorted manifold differential pressure sensor circuit, or loose connector • Engine control module failed.

DTC No.	Title	Probable causes
P1715	PG Assy Malfunction	
Background • The transaxle control module monitors the pulse signals of the pulse generator "A" and "B". • When the pulse generators "A" and "B" are failed, the transaxle control module inputs the pulse generator failed signal to the engine control module. Range of Check • Engine speed is approx. 500 r/min or more. • Position of selector lever: Except "P" or "N" Set Conditions The pulse generator failed signals were inputted from the transaxle control module to the engine control module.		• Pulse generator failed. • Engine control module failed.

DTC No.	Title	Probable causes
P1750	Solenoid Assy Malfunction	
Background • The transaxle control module monitors the torque converter clutch solenoid, shift control solenoid and pressure control solenoid. • When some one of these solenoids failed, the transaxle control module inputs these failed signals to the engine control module. Range of Check • Engine speed is approx. 500 r/min or more. • Position of selector lever: Except "P" or "N" Set Conditions The failed signals of the torque converter clutch solenoid, shift control solenoid or pressure control solenoid were inputted from the transaxle control module to the engine control module.		• Torque converter clutch solenoid failed. • Shift control solenoid failed. • Pressure control solenoid failed. • Engine control module failed.

LIST OF FAIL-SAFE/BACK-UP FUNCTIONS

When the failure of a major sensor is detected by the on-board diagnostics, the preset control logic provides controls to assure safe operation of the vehicle.

Trouble item	Controls to be provided in the event of trouble
Volume air flow sensor	(1) Based on throttle position sensor (TPS) signal and engine speed signal (crank angle sensor signal), basic driving time of injectors and basic ignition timing is read from the preset map. (2) Idle air control motor fixed at predetermined position, and no idling speed control achieved
Intake air temperature sensor	Controls provided on the assumption that intake air temperature is 25°C (77°F)
Throttle position sensor (TPS)	No additional fuel injection provided on the basis of throttle position sensor signal at acceleration
Engine coolant temperature sensor	Controls provided on the assumption that engine coolant temperature is 80°C (176°F) (Even if the sensor signal returns to normal, this control mode is retained until the ignition switch is set to OFF.)
Camshaft position sensor	(1) Fuel injected into the cylinders in the order I-2-3-4-5-6 with irregular timing (Provided that no No.1 cylinder top dead center position has been detected since the ignition switch was placed in the ON position) (2) Fuel cut 4 seconds after a failure was detected (Provided that no No.1 cylinder top dead center position has been detected since the ignition switch was placed in the ON position)
Barometric pressure sensor	Controls provided on the assumption that barometric pressure is 101kPa (760 mmHg) (sea level)
Knock sensor	Ignition timing is changed from that for premium gasoline to that for regular gasoline.
Ignition coil and ignition power transistor unit	Fuel cut for cylinders whose ignition signal is abnormal
Induction control valve position sensor <Non Turbo>	The induction control valve is driven to full open position.
Communication line with transmission control module <A/T>	No ignition timing retard control (overall engine-transmission control) achieved when transmission speeds are changed
Heated oxygen sensor (front)	No air-fuel ratio closed loop control achieved
Heated oxygen sensor (rear)	Only signals of oxygen sensor (front) installed upstream of catalyst are used, and the air-fuel ratio feedback control (closed loop control) is not performed.
Misfire detection	The ECM stops supplying fuel to the cylinder with the highest misfiring rate if a misfiring that could damage the catalytic converter is detected.

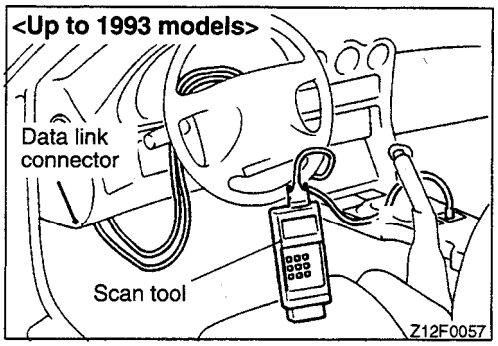
READ OUT OF DIAGNOSTIC TROUBLE CODE

Caution

(1) When battery voltage is low, no detection of failure is possible. Be sure to check the battery for voltage and other conditions before starting the test.

(2) Diagnostic item is erased if the battery or the engine control module connector is disconnected. Do not disconnect the battery before the diagnostic result is completely read.

(3) Be sure to connect or disconnect the scan tool with the ignition switch turned off. If the scan tool is disconnected with the ignition switch placed in the ON position, ABS diagnostic trouble code may be stored and ABS warning lamp turned on.

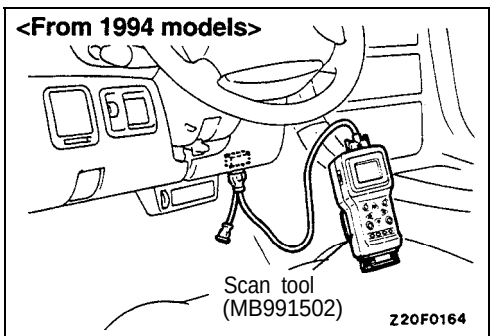


WHEN USING THE SCAN TOOL [MULTI-USE TESTER (MUT) <Up to 1993 models> or MUT-II <All models>]

(1) Connect the scan tool to the data link connector.

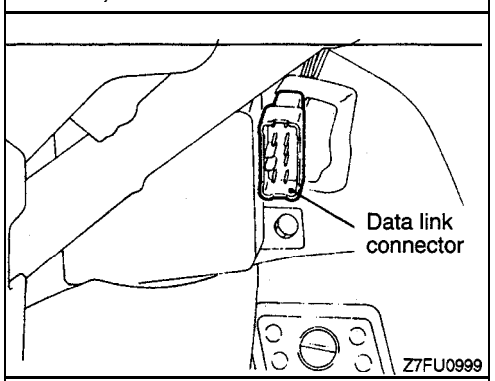
NOTE
Use adapter harness of MUT-II to connect MUT-II to 1993 and earlier models.

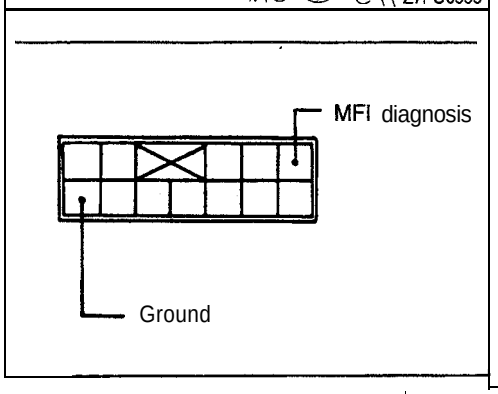
(2) Turn the ignition switch to ON.
(3) Take a reading of the diagnostic output.
(4) Repair the problem location, referring to the diagnostic chart.
(5) After turning the ignition switch once to OFF, turn it back to ON.
(6) Erase the diagnostic trouble code.
(7) Recheck to be sure that the condition is normal.

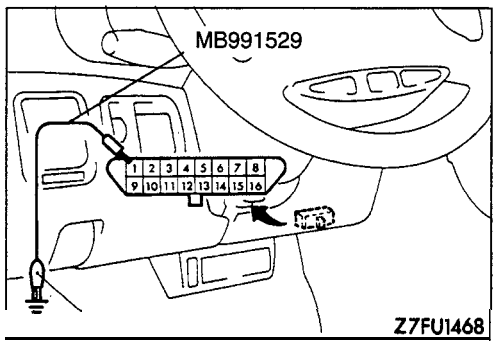


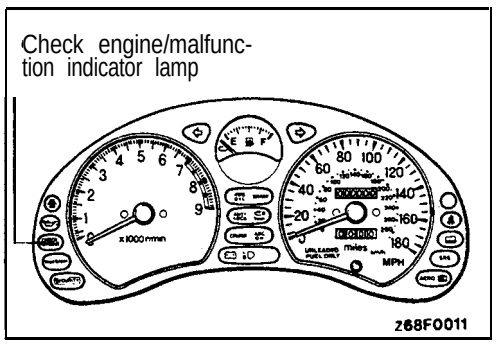
WHEN USING THE VOLTMETER <UP TO 1993 MODELS>

(1) Connect an analog voltmeter to the diagnostic output terminal (terminal 1) and ground terminal (terminal 12).
(2) Turn the ignition switch to ON.
(3) Read the diagnostic output indicated by the deflection of the voltmeter pointer.
(4) Repair the problem location, referring to the diagnostic chart.
(5) Erase the diagnostic trouble code by the following procedure.
   1) Turn the ignition switch to OFF.
   2) After removing the battery cable from the battery terminals for 10 seconds or more, reconnect the cable.
   3) Turn the ignition switch to ON and take a reading of the diagnostic output to check if a normal code is output.
   4) With the engine warmed up, idle the engine for approx. 15 minutes.







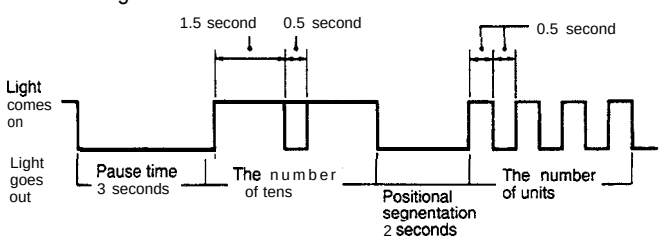


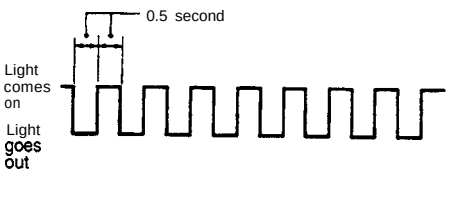
WHEN USING THE CHECK ENGINE/MALFUNCTION INDICATOR LAMP <1994 AND 1995 MODELS>

(1) Using the special tool, Diagnostic Trouble Code Check Harness, ground the diagnostic test mode control terminal (terminal 1) of the data link connector.
(2) Turn the ignition switch to ON.
(3) Read the diagnostic output by blinking of the check engine/ malfunction indicator lamp.
(4) Repair the problem location, referring to the diagnostic chart.
(5) Erase the diagnostic trouble code by the following procedure.
   1) Turn the ignition switch to OFF.
   2) After removing the battery cable from the battery terminals for 10 seconds or more, reconnect the cable.
   3) With the engine warmed up, idle the engine for approx. 15 minutes.
   4) Turn the ignition switch to ON and take a reading of the diagnostic output to check if a normal code is output.

Diagnostic result indication method when check engine/malfunction indicator lamp is used

Typical blinking, made while diagnostic trouble code is output	Blinking when condition is normal
In case of diagnostic trouble code No.24	





NOTE
Other diagnostic items are also output by lamp blinking corresponding to the same code number as when scan tool is used.

DIAGNOSIS BY DIAGNOSTIC TEST MODE II (INCREASED SENSITIVITY)

(1) Using the scan tool, changeover the diagnostic test mode of the engine control module to DIAGNOSTIC TEST MODE II (INCREASED SENSITIVITY).
(2) Road test the vehicle.
(3) Read the diagnostic trouble code in the same manner as "READ OUT OF DIAGNOSTIC TROUBLE CODE" and repair the malfunctioning part.
(4) Turn off the ignition switch once. Then turn it ON again.

NOTE
Turning OFF the ignition switch will cause the engine control module to changeover the diagnostic test module from the diagnostic test mode II to the diagnostic test mode I.

(5) Erase the diagnostic trouble code.

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CHECK CHART CLASSIFIED BY PROBLEM SYMPTOMS

items	Starting Will not start	Starting Fires up and dies Hard starting	idling stability Idling instability (rough idling)	Idling stability Incorrect idle speed	idling stability Engine stall	Reference page (13A-)
Power supply and ignition switch-IG	1 (1)					65*1, 193*2
Engine control module power around	2 (2)					71*1, 199*2
Fuel pump	3 (3)	1 (1)			1 (1)	72*1, 200*2
Volume air flow sensor					13 (11)	85*1, 212*2
Intake air temperature sensor			5			88*1, 215'2
Barometric pressure sensor			7			91*1, 217*2
Engine coolant temperature sensor		(3)	6 (5)	1 (1)	5 (5)	93*1, 219*2
Throttle position sensor						98*1, 221*2
Closed throttle position switch			3 (3)	2 (2)	4 (4)	101*1, 223*2
Camshaft position sensor	5 (5)	7 (7)			8 (7)	103*1, 225*2
Crankshaft position sensor	6 (6)	8 (8)			9 (8)	107*1, 227*2
Ignition switch-ST <M/T>	4 (4)	3 (4)				112*1, 229*2
Ignition switch-ST and Park/Neutral position switch <A/T>	4 (4)	3 (4)		7		113*1, 230*2
Vehicle speed sensor					6	117*1, 231*2
Power steering pressure switch				3		121*1, 235*2
Air conditioning switch and compressor clutch relay				4		123*1, 236*2
Knock sensor						125*1, 237*2
Electrical load switch				5		127*1, 238*2
Fan motor relay <From 1994 models>				6	11 (10)	129*1, 240*2
Induction control valve position sensor <Non Turbo>						133*1, 242*2
Heated oxygen sensor			10			137*1, 247*2
Injectors	8 (8)	2 (2)	2 (2)		3 (3)	144*1, 257*2
Idle air control motor (stepper motor type)		4 (5)	1 (1)	8 (3)	2 (2)	153*1, 263*2
Ignition coil and ignition power transistor	7 (7)				10 (9)	158*1, 264*2
Evaporative emission purge solenoid			8			162*1, 268*2
EGR solenoid <California – Non Turbo, Turbo> <Federal Non-Turbo – From 1996 models>						164*1, 269*2
Fuel pressure solenoid <Turbo>		6	9		12	166*1, 270*2
Turbocharger waste gate control solenoid <Turbo>						169*1, 271*2
Active exhaust control unit <Turbo>						173*1, 274*2
Variable induction control motor (DC motor) <Non Turbo>						174*3, 276*2
Anti-lock braking signal <Turbo>						176*1, 277*2
Engine and transaxle total control signal <A/T>						177*1, 278*2
Fuel pressure		5 (6)	4 (4)		7 (6)	180

NOTE
The numbers in the table indicates the check order for warm engine. [Numbers in ( ) are for cold engine.]

- l: Up to 1995 Federal Non Turbo models and up to 1993 models
- 2: From 1994 models except Federal Non Turbo Up to 1995 models

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Items	Driving	Driving	Driving	Driving	Driving	Driving	Stopping	Reference page (13A-)
	Hesitation Sag	Poor acceleration	Stumble	Shock	Surge	Knocking	Run-on (Dieseling)	
Power supply and ignition switch-IG								65*1, 193*2
Engine control module power ground								71", 199*2
Fuel pump	1 (1)	1 (1)						72*1, 200*2
Volume air flow sensor	12 (12)		5 (5)	5 (5)		4 (4)		85*1, 212*2
Intake air temperature sensor	8 (8)	9 (9)				2 (2)		88*1, 215*2
Barometric pressure sensor	11 (11)	11 (11)				3 (3)		91*1, 217*2
Engine coolant temperature sensor	10 (10)	10 (10)	4 (4)		3 (3)			93*1, 219*2
Throttle position sensor	9 (9)		3 (3)	4 (4)				98*1, 221*2
Closed throttle position switch								101*1, 223*2
Camshaft position sensor				2 (2)				103*1, 225*2
Crankshaft position sensor				3 (3)				107*1, 227*2
Ignition switch-ST <M/T>								112*1, 229*2
Ignition switch-ST and Park/Neutral position switch <A/T>								113*1, 230*2
Vehicle speed sensor				6				117*1, 231*2
Power steering pressure switch								121*1, 235*2
Air conditioning switch and compressor clutch relay								123*1, 236*2
Knock sensor						1 (1)		125*1, 237*2
Electrical load switch								127*1, 238*2
Fan motor relay <From 1994 models>								129*1, 240*2
Induction control valve position sensor <Non Turbo>	4 (4)	6 (6)						133*1, 242*2
Heated oxygen sensor								137*1, 247*2
Injectors	2 (2)	2 (2)	1 (1)		1 (1)		1	144*1, 257*2
Idle air control motor (stepper motor type)			9 (7)					153*1, 263*2
Ignition coil and ignition power transistor		12 (12)		1 (1)		5 (5)		158*1, 264*2
Evaporative emission purge solenoid								162*1, 268*2
EGR solenoid <California – Non Turbo, Turbo> <Federal Non-Turbo – From 1996 models>	7 (7)		6 (6)		4 (4)			164*1, 269*2
Fuel pressure solenoid <Turbo>		4 (4)						166*1, 270*2
Turbocharger waste gate control solenoid <Turbo>		5 (5)						169*1, 271*2
Active exhaust control unit <Turbo>	6 (6)	8 (8)						173*1, 274*2
Variable induction control motor (DC motor) <Non Turbo>	5 (5)	7 (7)						174*3, 276*2
Anti-lock braking signal <Turbo>				7				176*1, 277*2
Engine and transaxle total control signal <A/T>				8 (6)	5 (5)			177*1, 278*2
Fuel pressure	3 (3)	3 (3)	2 (2)		2 (2)			180

NOTE
The numbers in the table indicates the check order for warm engine. [Numbers in ( ) are for cold engine.]

*1: Up to 1995 Federal Non Turbo models and up to 1993 models
*2: From 1994 models except Federal Non Turbo Up to 1995 models

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PROBLEM SYMPTOMS TABLE (FOR YOUR INFORMATION)

Items		Symptom
Starting	Won't star-l (no initial combustion)	The starter is used to crank the engine, but there is no combustion within the cylinders, and the engine won't start.
	Fires up and dies	There is combustion within the cylinders, but then the engine soon stalls.
	Hard starting	Engine starts after cranking a while.
Idling stability	Hunting	Engine speed doesn't remain constant; changes at idle.
	Rough idle	Usually, a judgement can be based upon the movement of the tachometer pointer, and the vibration transmitted to the steering wheel, shift lever, body, etc. This is called rough idle.
	Incorrect idle speed	The engine doesn't idle at the usual correct speed.
	Engine stall (Die out)	The engine stalls when the foot is taken from the accelerator pedal, regardless of whether the vehicle is moving or not.
	Engine stall (Pass out)	The engine stalls when the accelerator pedal is depressed or while it is being used.
Driving	Hesitation, Sag	"Hesitation" is the delay in response of the vehicle speed (engine speed) that occurs when the accelerator pedal is depressed in order to accelerate from the speed at which the vehicle is now traveling, or a temporary drop in vehicle speed (engine rpm) during such acceleration. Serious hesitation is called "sag". (Refer to Fig. 1)
	Poor acceleration	Poor acceleration is inability to obtain an acceleration corresponding to the degree of throttle opening, even though acceleration is smooth, or the inability to reach maximum speed.
	Stumble	Engine rpm increase is delayed when the accelerator pedal is initially depressed for acceleration from the stopped condition. (Refer to Fig. 2)
	Shock	The feeling of a comparatively large impact or vibration when the engine is accelerated or decelerated.
	Surge	This is slight acceleration and deceleration feel usually occurred in steady, light throttle cruise. Most notable under hight loads.
	Knocking	A sharp sound like a hammer striking the cylinder walls during driving and which adversely affects driving.
Stopping	Run-on (Dieseling)	Also called dieseling, this is a continued operation of the engine after the ignition switch is turned off.

Fig. 1

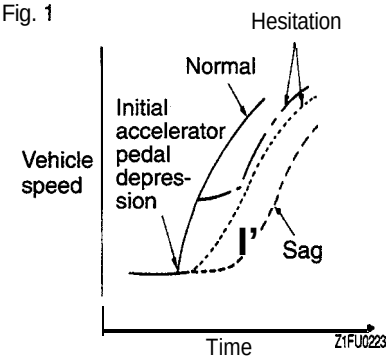
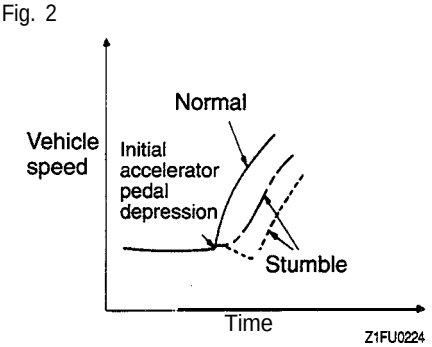


Fig. 2



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ON-VEHICLE SERVICE

BASIC IDLE SPEED ADJUSTMENT

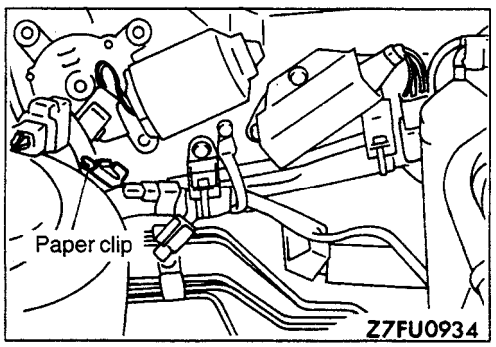
NOTE
(1) The basic Idle speed has been factory-adjusted with the engine speed adjusting screw and does not normally require adjustment.
(2) If adjustment has been disturbed, or if the idle speed is too high or it drops owing to application of air conditioning load to the engine, perform the following step to make adjustment.
(3) If the adjustment is required, first check that the ignition plug, injector, idle air control motor, and compression pressure are normal.

(1) Before starting the inspection and adjustment procedures, set the vehicle in the following conditions:
- Engine coolant temperature: 80 to 95°C (176 to 203°F)
- Lights, electric cooling fan, accessories: OFF
- Transaxle: Neutral (P range on vehicles with automatic transaxle)
- Steering wheel: Straightforward position

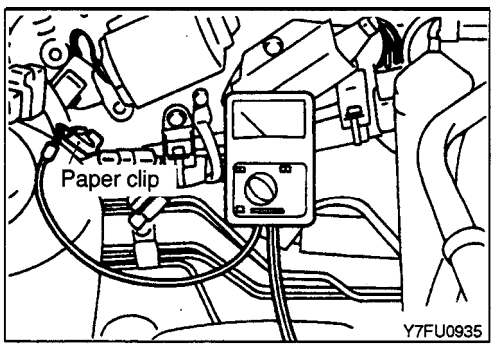
(2) Connect the scan tool to the data link connector (white).

NOTE
The connection of the scan tool grounds the diagnostic test mode control terminal.

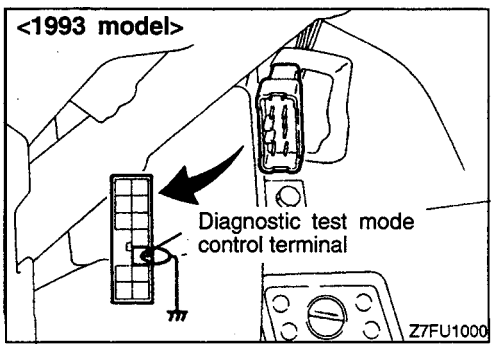
(3) If not using the scan tool, proceed as follows:
1) Insert a paper clip into the l-pin blue connector as shown in the illustration.



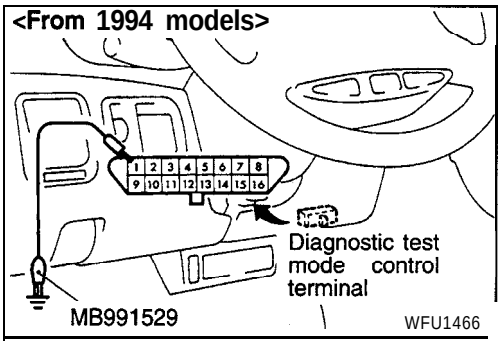
2) Connect a primary-voltage-detecting tachometer to the paper clip.



1993 model:
3) Using a jumper wire, ground the diagnostic test mode control terminal (terminal (10)) of the data link connector (white).

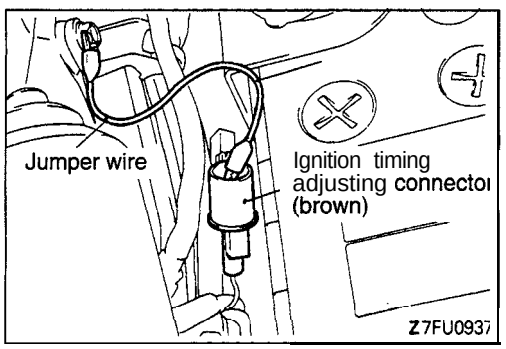


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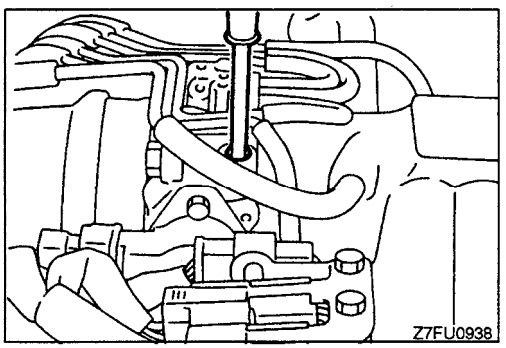


From 1994 models:

3) Use the special tool (Diagnostic Trouble Code Check Harness) to ground the diagnostic test mode control terminal (terminal (1)) of the data link connector (16-pin).



(4) Remove the waterproof female connector from the ignition timing adjusting connector (brown).
(5) Using a jumper wire, ground the ignition timing adjusting terminal.



(6) Start the engine and run at idle.
(7) Check the basic idle speed.

Basic idle speed: 700 ± 50 rpm

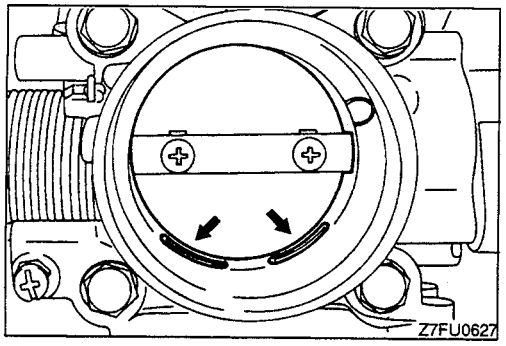
NOTE
1. The engine speed may be low by 20 to 100 rpm while the vehicle is new [distance driven approx. 500 km (300 miles) or less], but no adjustment is necessary.
2. If the engine stalls or speed is low despite a sufficient distance driven [approx. 500 km (300 miles) or more], it is probably due to deposits on the throttle valve. In this case, clean the throttle valve. (Refer to P. 13A-57.)
3. The tachometer should read 1/3 of the actual engine speed. This means that the actual engine speed is the tachometer reading multiplied by 3.

(8) If the basic idle speed is out of specification, adjust by turning the engine speed adjusting screw.

NOTE
If the idle speed is higher than the standard value even with engine speed adjusting screw fully tightened, check to see if there is evidence of the closed throttle position switch being moved. If the closed throttle position switch seems to have been moved, adjust it. If it does not seem to have been moved, there may be a leak caused by deteriorated fast idle air valve (FIAV). In such a case, replace the throttle body.

(9) Turn the ignition switch OFF.
(10) When the scan tool has not been used, remove the jumper wire from the diagnostic test mode control terminal.
(11) Remove the jumper wire from the ignition timing adjusting terminal and replace the connector back again.
(12) Start the engine again and run at idle for 10 minutes to make sure that the engine runs at proper idle speed.

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THROTTLE BODY (THROTTLE VALVE AREA) CLEANING

(1) Start the engine, warm it up until engine coolant temperature rises to 80°C (176°F), and stop the engine.
(2) Disconnect the air intake hose at the throttle body side.
(3) Put a plug in the inlet of bypass passage in the throttle body.

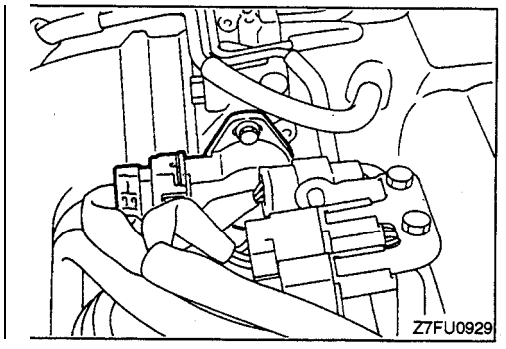
Caution
Never allow cleaning agent to flow into the bypass passage.

(4) Spray cleaning agent from the intake port of the throttle body to the valve and leave as it is for 5 minutes or so.
(5) Start the engine and race it several times. Then, run it idle for approx. one minute.

NOTE
If the engine idle speed becomes unstable (and fails in the worst case) after plugging the bypass passage, run the engine with the throttle valve slightly opened.

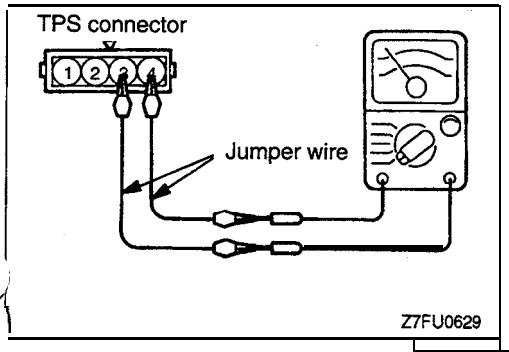
(6) If the deposit cannot be removed from the throttle valve, repeat steps (4) and (5).
(7) Disconnect the plug from the inlet of the bypass passage.
(8) Install the air intake hose.
(9) Use a scan tool to erase the diagnostic trouble code or disconnect the battery ground cable for more than 10 seconds and then connect it again.
(10) Adjust the basic idle speed (speed adjusting screw). (Refer to P. 13A-55.)

NOTE
If the engine hunts while it is idling after adjustment of the basic idle speed, disconnect the negative cable from the battery terminal for more than 10 seconds and then idle the engine again.

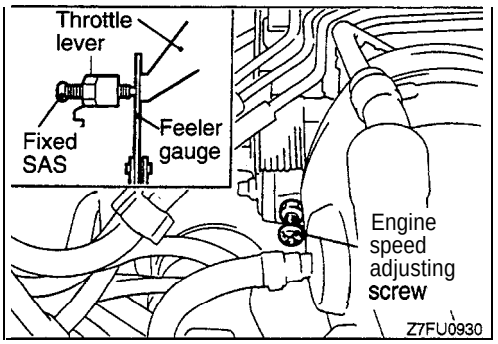


CLOSED THROTTLE POSITION SWITCH AND THROTTLE POSITION SENSOR (TPS) ADJUSTMENT

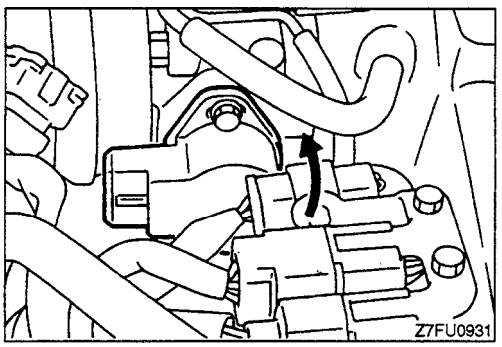
(1) Connect the MUT-II to the diagnosis tester. If the MUT-II is not used, carry out the following.
a. Disconnect the throttle position sensor connector.



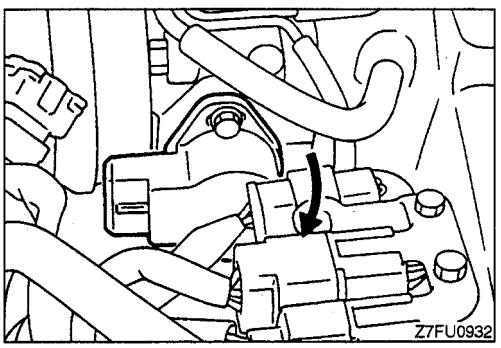
b. Using jumper wires, connect an ohmmeter across terminal (3) (closed throttle position switch) and terminal (4) (sensor ground) of the throttle position sensor.



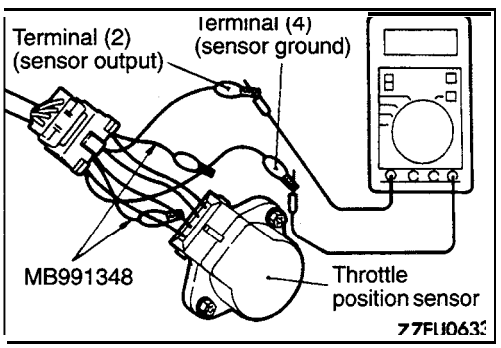
(2) Insert a 0.65-mm (.025 in.)-thick feeler gauge between the fixed SAS and throttle lever.



(3) If the MUT-II is used, turn the ignition switch to ON position. (Do not start the engine.)
(4) Loosen the throttle position sensor mounting bolts and turn the throttle position sensor body fully counterclockwise.
(5) In this condition, check that the idle switch is ON (continuity exists between terminals (3) and (4)).



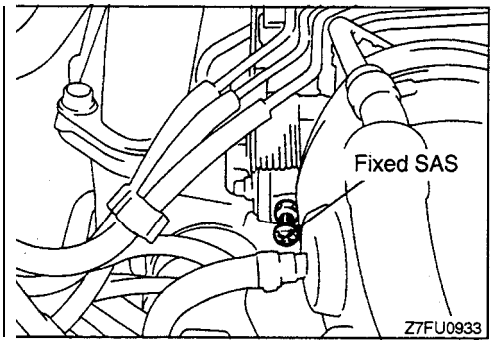
(6) Slowly turn the throttle position sensor clockwise until the idle switch is turned OFF (continuity between terminals (3) and (4) disappears). Then, tighten the throttle position sensor mounting bolt securely.



(7) If not using the scan tool, proceed as follows:
a. Disconnect the throttle position sensor connectors and connect the special tool, Test Harness Set, between the disconnected connectors.
b. Connect a digital voltmeter between the throttle position sensor terminal (2). (sensor output) and terminal (4) (sensor ground).
c. Turn the ignition switch ON (but do not start the engine).
(8) Check the throttle position sensor output voltage.

Standard value: 400–1,000 mV

(9) If the voltage is out of specification, check the throttle position sensor and associated harnesses.
(lO)Remove the feeler gauge.
(ll)Turn the ignition switch OFF.



FIXED SAS ADJUSTMENT

NOTE
(1) The fixed SAS has been factory-adjusted. Never attempt to move it.
(2) Should it be out of proper adjustment, adjust by following the procedure given below.

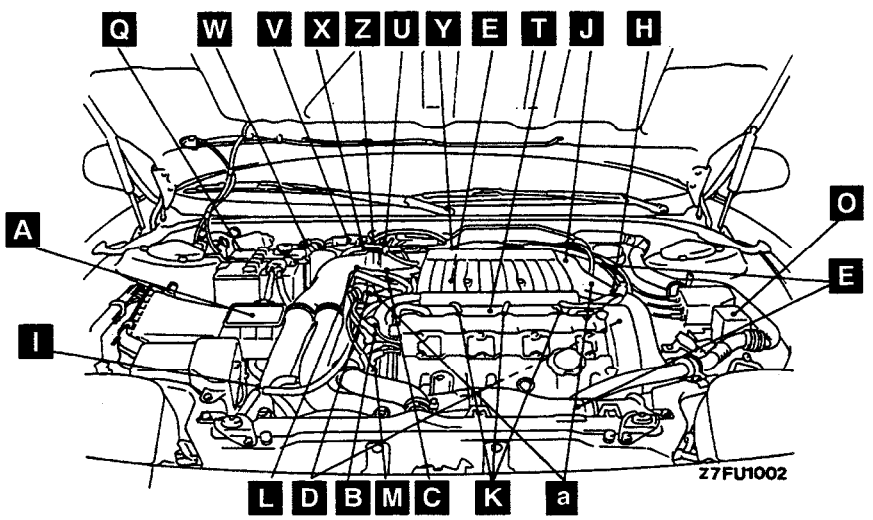
(1) Sufficiently slacken the accelerator cable.
(2) Loosen the lock nut on the fixed SAS.
(3) Sufficiently loosen the fixed SAS by turning it counterclockwise to fully close the throttle valve.
(4) Tighten the fixed SAS slowly to find a point at which it contacts the throttle lever (where the throttle valve starts opening). From that point, tighten the fixed SAS further $1\frac{1}{4}$ turns.
(5) Holding the fixed SAS to prevent it from turning, tighten the lock nut securely.
(6) Adjust the accelerator cable tension. (Refer to P.17-4.)
(7) Adjust the basic idle speed. (Refer to P.13A-55.)
(8) Adjust the closed throttle position switch and throttle position sensor (TPS). (Refer to P.13A-57.)

ON-VEHICLE INSPECTION OF MFI COMPONENTS <Up to 1995 Non Turbo Models for Federal and Up to 1993 Models>

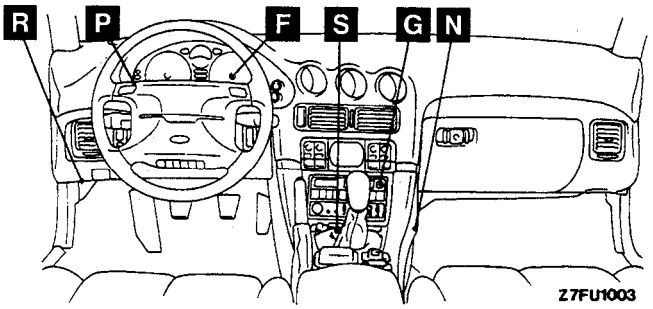
COMPONENT LOCATION

Name	Symbol	Name	Symbol
Air-conditioning relay	O	Ignition coil (ignition power transistor)	M
Air-conditioning switch	G	Ignition timing adjusting terminal	Q
Camshaft position sensor	a	Injector	K
Check engine/malfunction indicator lamp	P	Knock sensor	T
Crankshaft position sensor	D	Multiport fuel injection (MFI) relay	N
Diagnostic output terminal and diagnostic test mode control terminal	R	Park/Neutral position switch <A/T>	I
EGR solenoid <California – Non Turbo, Turbo>	Z	Power steering pressure switch	H
EGR temperature sensor <California – Non Turbo, Turbo>	Y	Resistor <Turbo>	W
Engine control module	S	Throttle position sensor (with built-in closed throttle position switch)	C
Engine coolant temperature sensor	B	Turbocharger waste gate solenoid <Turbo>	U
Evaporative emission purge solenoid	X	Variable induction control motor (DC motor) (with built-in induction control valve position sensor) <Non Turbo>	J
Fuel pressure solenoid <Turbo>	V	Vehicle speed sensor	F
Heated oxygen sensor	E	Volume air flow sensor (with built-in intake air temperature sensor and barometric pressure sensor)	A
Idle air control motor (stepper motor)	L		

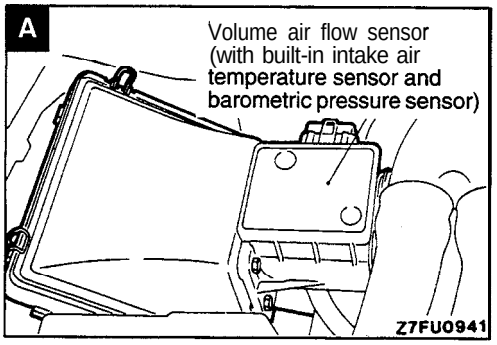
NOTE: The “Name” column is in alphabetical order.



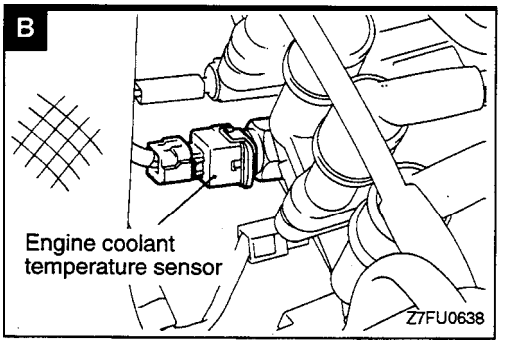
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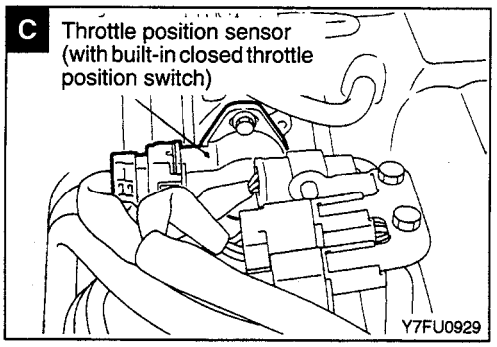
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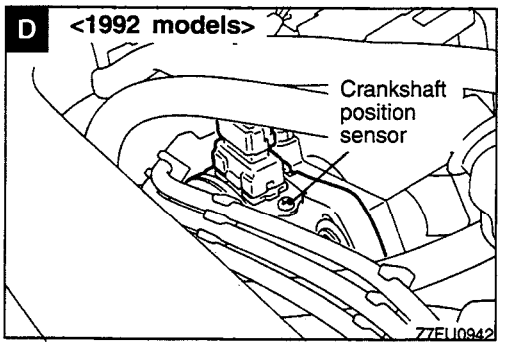
B



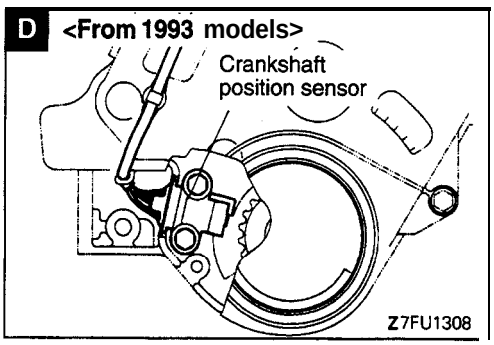
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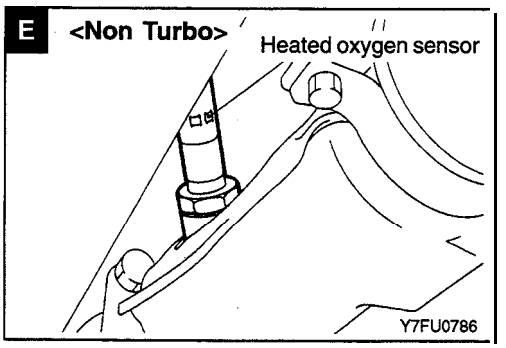
D <1992 models>



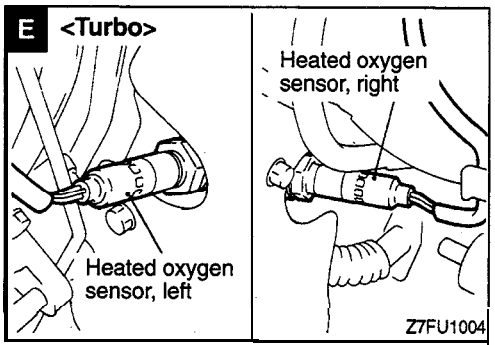
D <From 1993 models>



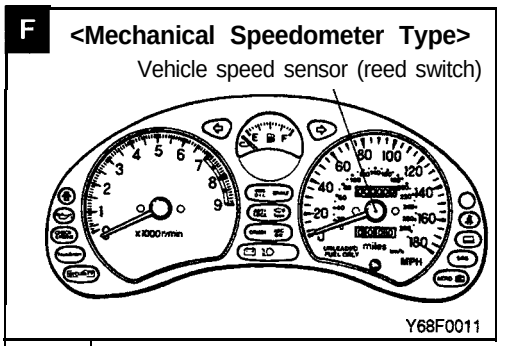
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E <Turbo>

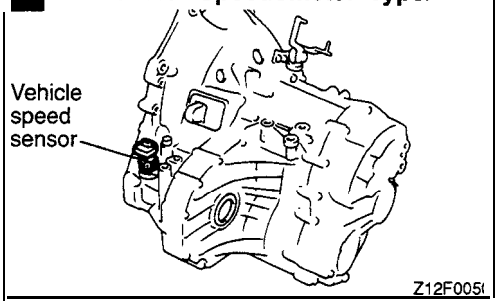


F <Mechanical Speedometer Type>

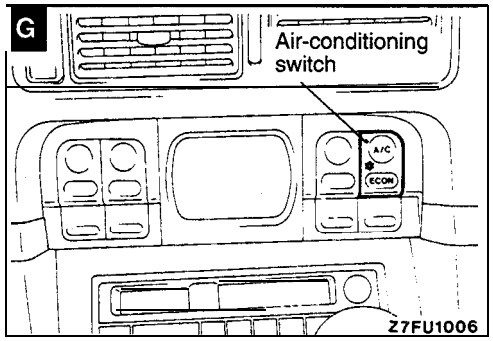


TSB Revision

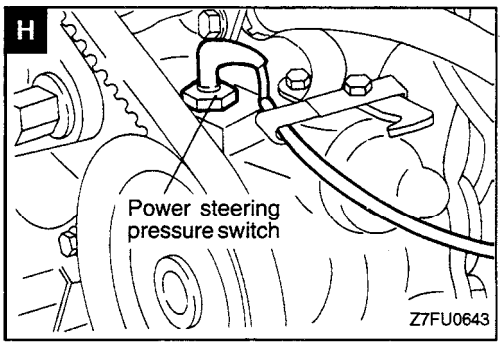
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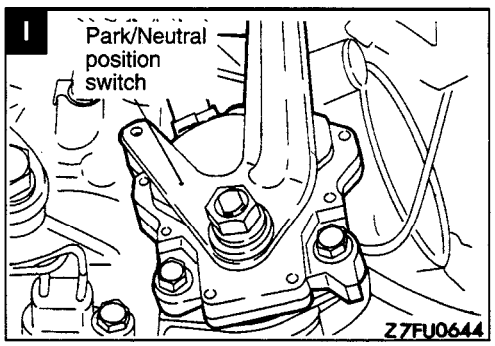
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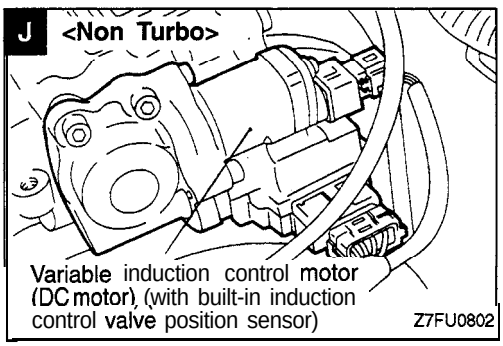
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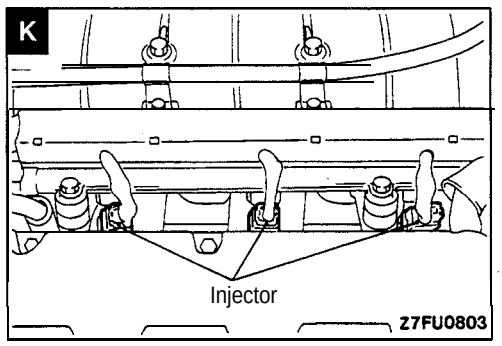
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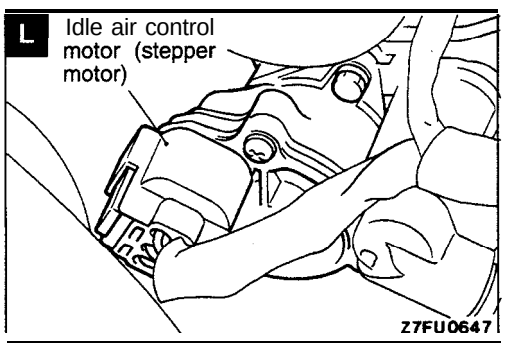
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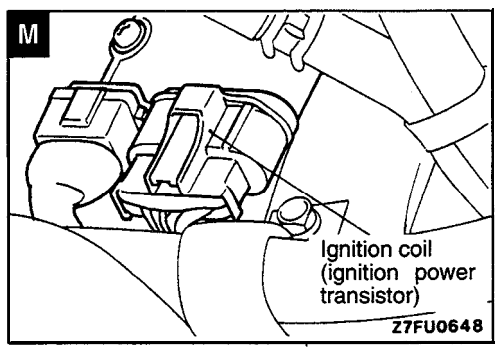
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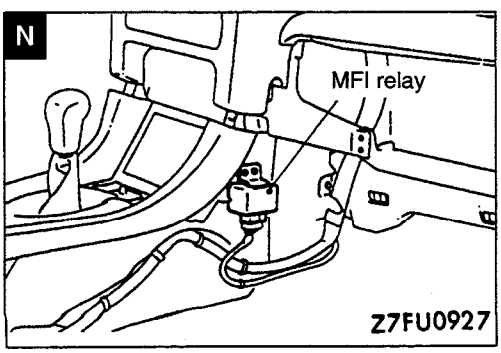
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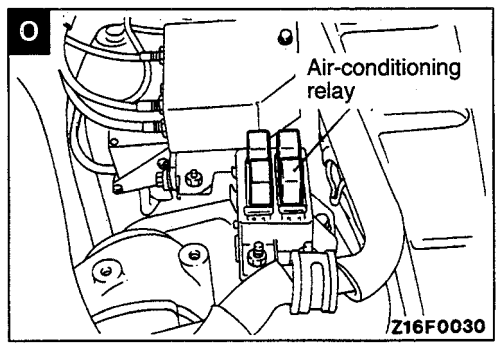
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N



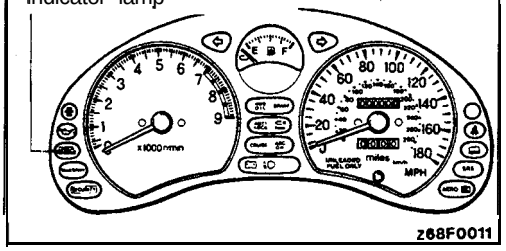
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TSB Revision

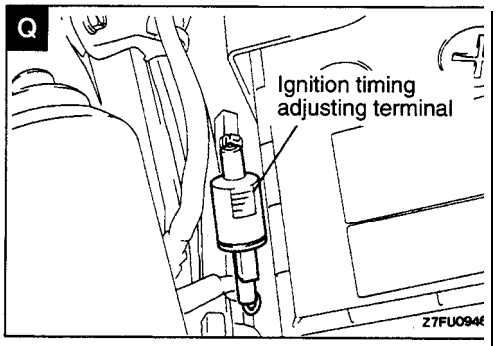
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Check engine/malfunction indicator lamp



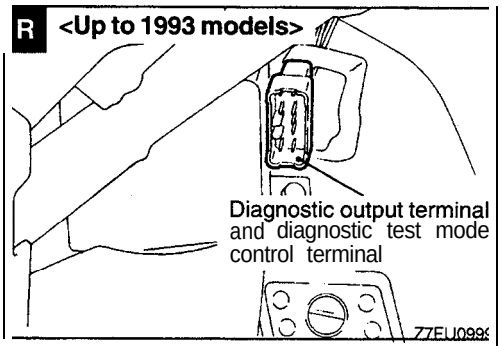
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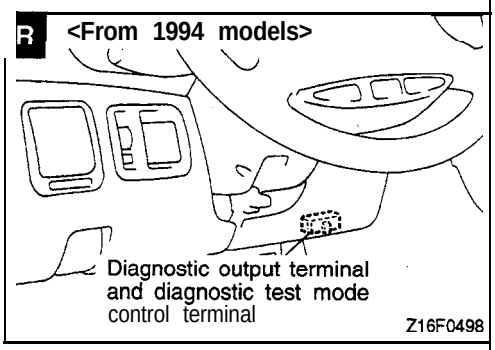
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R <Up to 1993 models>



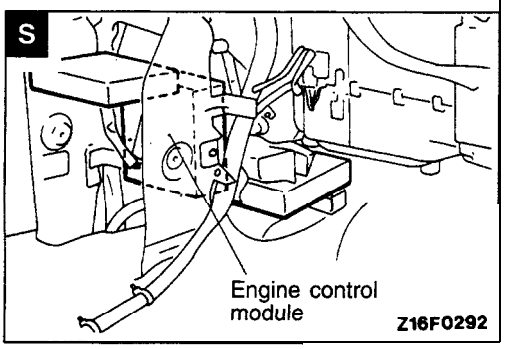
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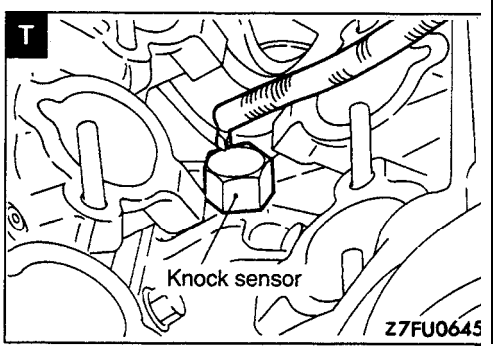
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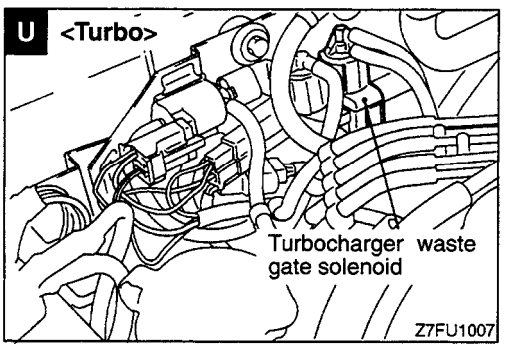
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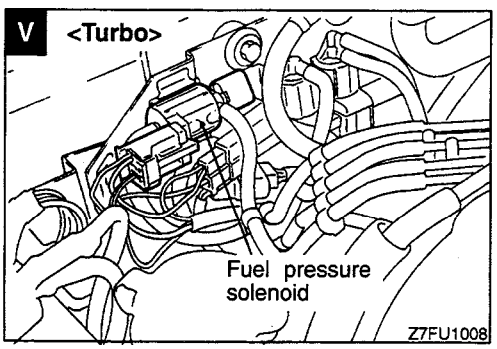
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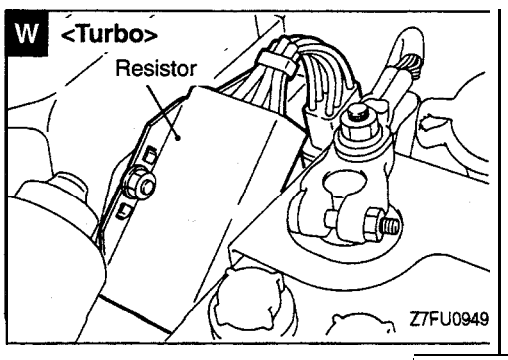
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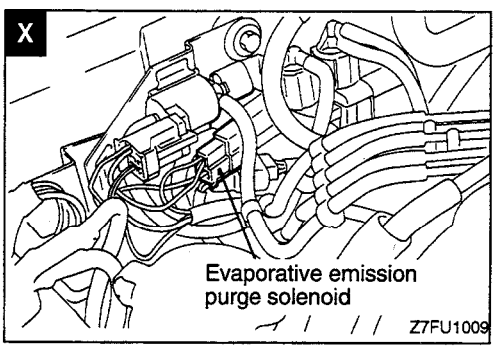
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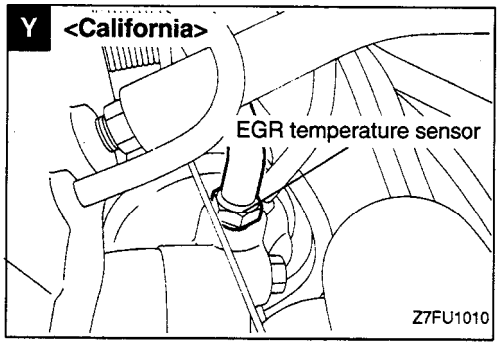
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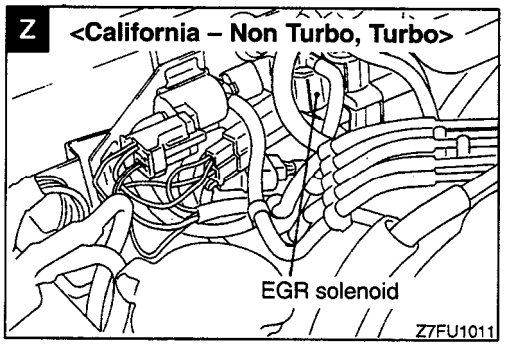
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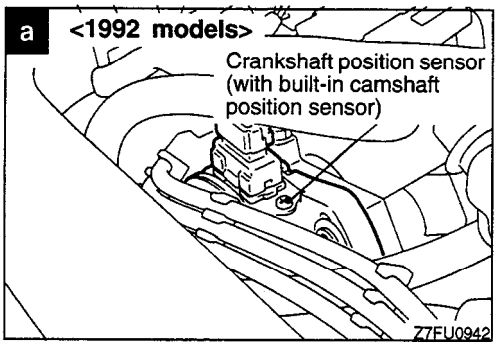


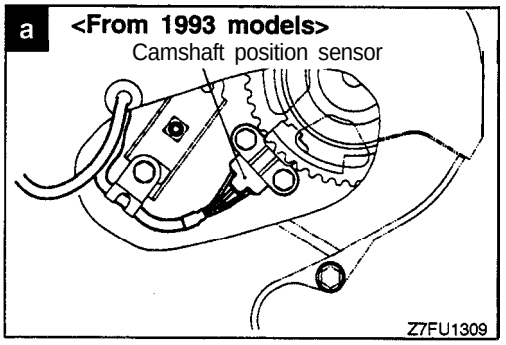
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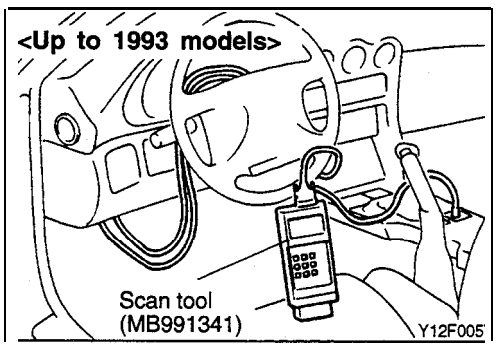
TSB Revision

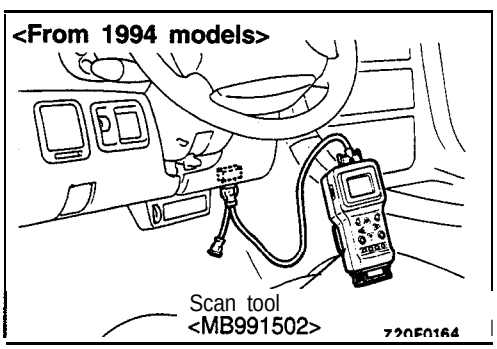










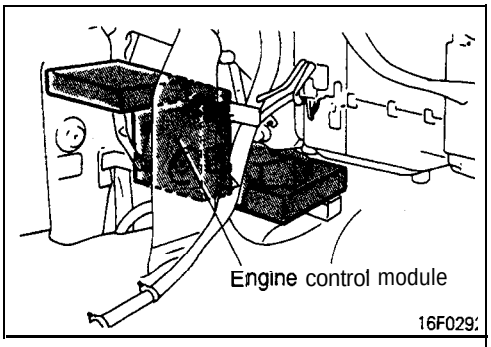


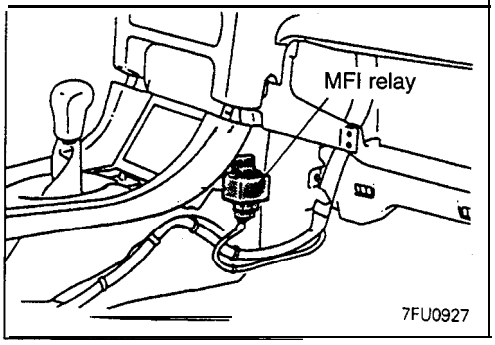
COMPONENTS INSPECTION PROCEDURE

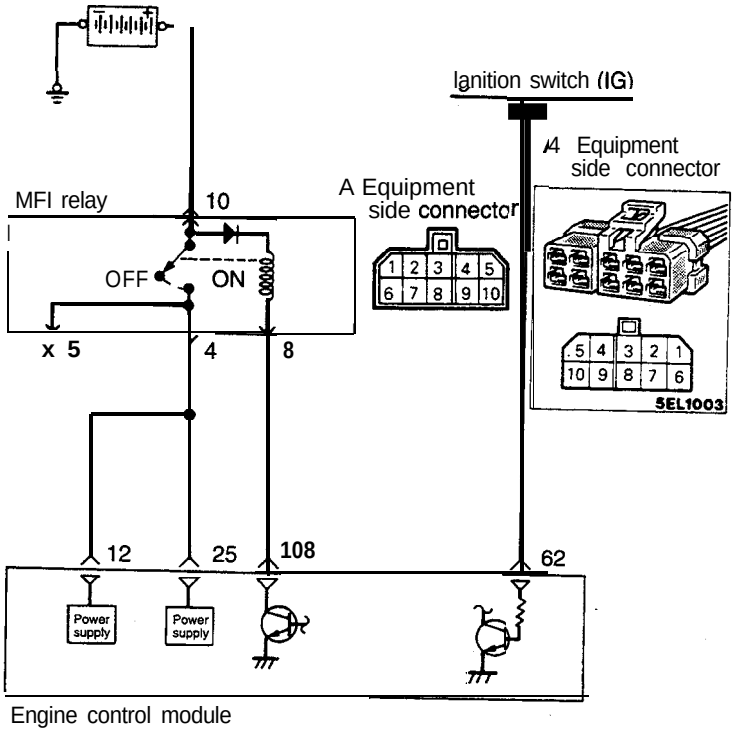
USING SCAN TOOL

(1) Check by the data reading and actuator test function. If any abnormality is found, check the body harness, components, etc. and repair as necessary.
(2) After repair, check again with the scan tool to make sure that the input and output signals are now normal.
(3) Erase the diagnostic trouble code in memory.
(4) Disconnect the scan tool.
(5) Start the engine and perform running test, etc. to make sure that the troubles have been corrected.

POWER SUPPLY (MFI relay) AND IGNITION SWITCH-IG <Up to 1993 models>

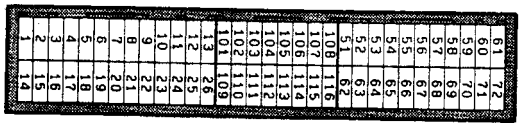






Engine control module

Engine control module connector



Z7FU0950

7FU1571

Z7FU0653

OPERATION

- While the ignition switch is on, battery power is supplied to the engine control module, the injector, the volume air flow sensor, etc.
- When the ignition switch is turned on, the battery voltage is applied from the ignition switch to the engine control module, which then turns ON the power transistor to energize the MFI relay coil. This turns ON the MFI relay switch and the power is supplied from the battery to the engine control module through the MFI relay switch.

INSPECTION

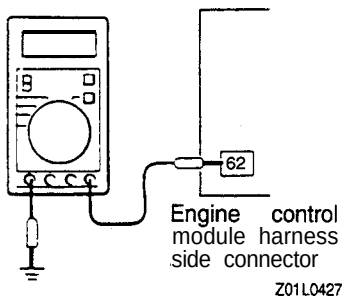
Using Scan Tool

Function	Item No.	Data display	Check condition	Standard value
Data reading	16	Engine control module power voltage	Ignition switch: ON	Battery voltage

TSB Revision

HARNESS INSPECTION

1



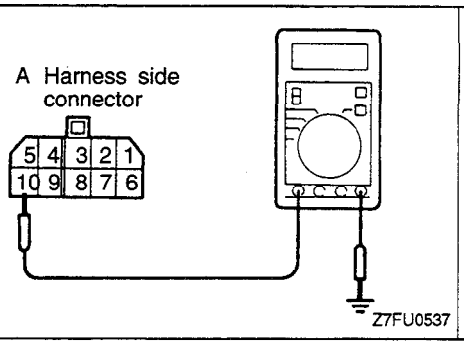
Measure the ignition switch terminal input voltage.
@ Engine control module connector: Disconnected
- Ignition switch: ON

Battery voltage

OK → 2

NG → Repair the harness. (Ignition switch – 62)

2



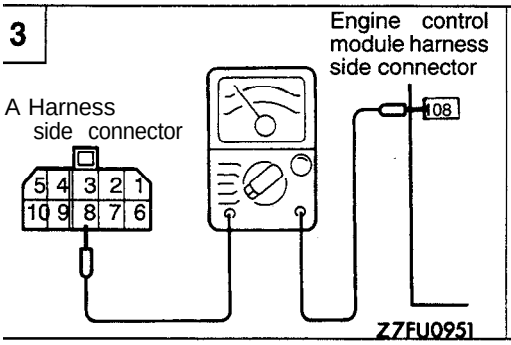
Measure the power supply voltage of the MFI relay.
- MFI relay connector: Disconnected

Battery voltage

OK → 3

NG → Repair the harness. (Battery – A10)

3

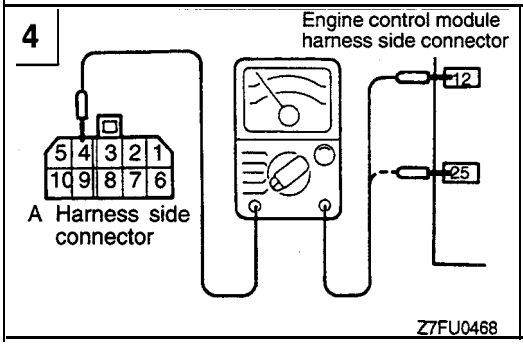


Check for an open-circuit, or a short-circuit to ground, between the engine control module and the MFI relay.
- Engine control module connector: Disconnected
- MFI relay connector: Disconnected

OK → 4

NG → Repair the harness. (A8–108)

4

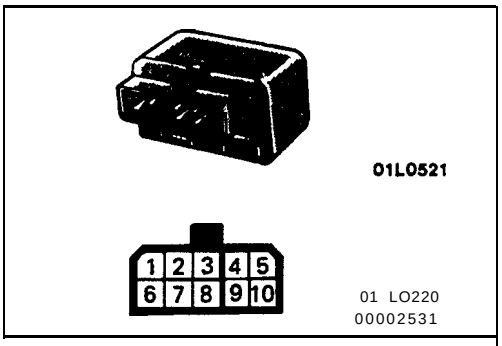


Check for an open-circuit, or a short-circuit to ground between the engine control module and the MFI relay.
- MFI relay connector: Disconnected
- Engine control module connector: Disconnected

OK → STOP

NG → Repair the harness. (A4–12, 25)

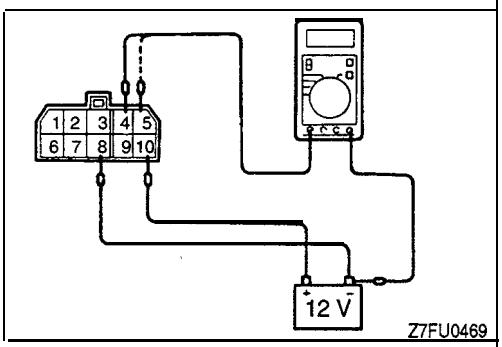
TSB Revision



MULTIPORT FUEL INJECTION (MFI) RELAY INSPECTION

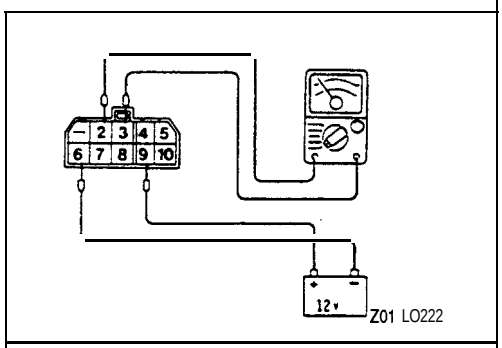
Caution
When applying battery voltage directly, make sure that it is applied to correct terminal. Otherwise, the relay could be damaged.

(1) Remove the MFI relay.



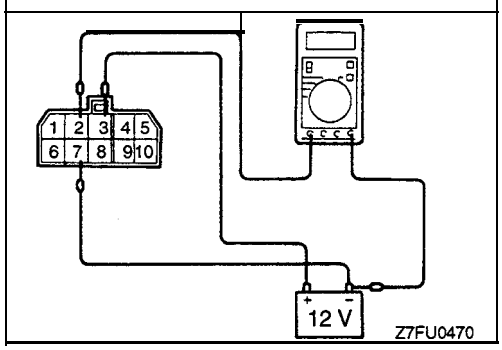
(2) Using jumper wires, connect terminal (10) of MFI relay to battery (+) terminal and terminal (8) of MFI relay to battery (–) terminal.
(3) Connecting and disconnecting the jumper wire to battery (–) terminal, measure the voltage across terminals (4) and (5) of the MFI relay.

Jumper wire	Voltage at terminal 4	Voltage at terminal 5
Connected	B+	B+
Disconnected	0 V	0 V



(4) Using jumper wires, connect terminal (9) of MFI relay to battery (+) terminal and terminal (6) of MFI relay to battery (–) terminal.
(5) Connecting and disconnecting the jumper wire to battery (–) terminal, check the continuity across terminals (2) and (3) of the MFI relay.

Jumper wire	Continuity across terminals 2 and 3
Connected	Conductive
Disconnected	Nonconductive

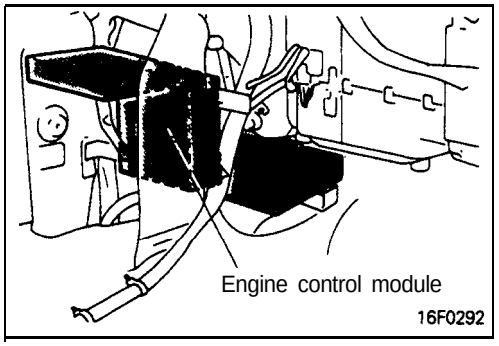


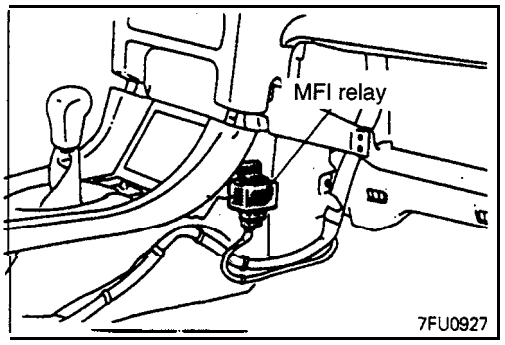
(6) Using jumper wires, connect terminal (3) of MFI relay to battery (+) terminal and terminal (7) of MFI relay to battery (–) terminal.
(7) Connecting and disconnecting the jumper wire to battery (–) terminal, measure the voltage at terminal (2) of the MFI relay.

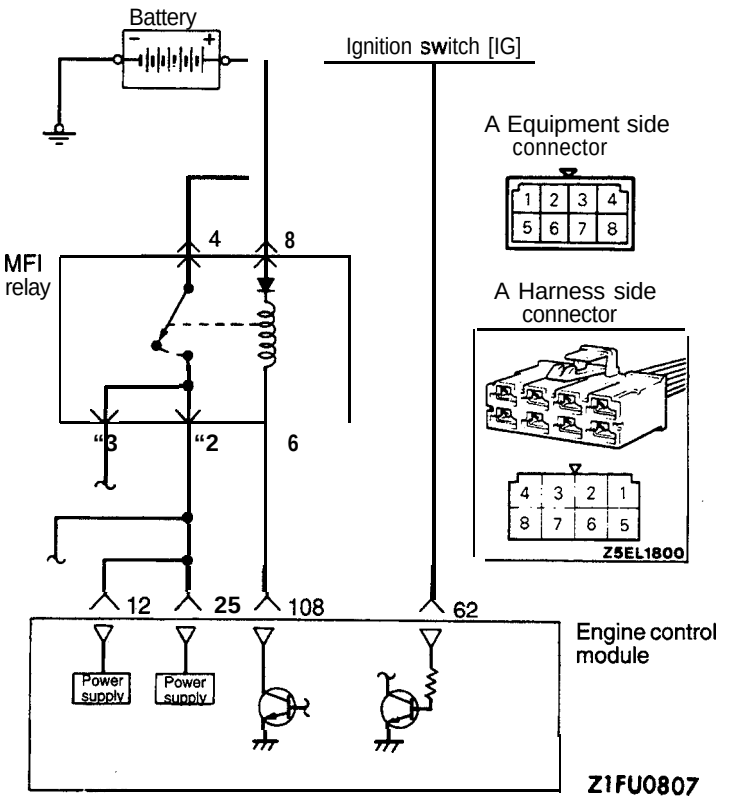
Jumper wire	Voltage at terminal 2
Connected	B+
Disconnected	0 V

(8) Replace the MFI relay if any defect is evident.

POWER SUPPLY (MFI relay) AND IGNITION SWITCH IG <From 1994 models>







OPERATION

Refer to P.13A-65.

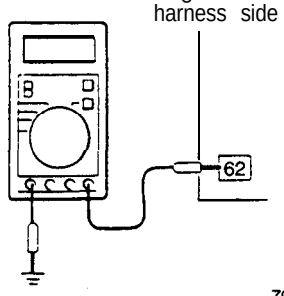
INSPECTION

Refer to P.13A-65.

TSB Revision

HARNESS INSPECTION

1

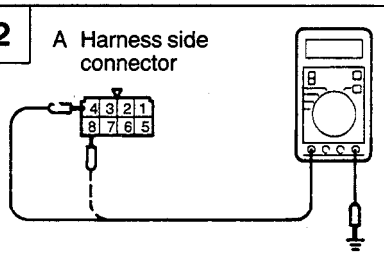


Measure the ignition switch (IG) terminal input voltage.
- Engine control module connector: Disconnected

Ignition switch OFF: O-I V
Ignition switch ON: Battery voltage

OK → 2
Repair the harness. (Ignition switch – 62) or check the ignition switch

2

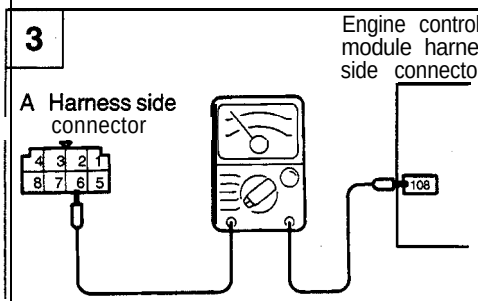


Measure the power supply voltage of the MFI relay.
- - Ignition switch: OFF
- MFI relay connector: Disconnected

Battery voltage

OK → 3
Repair the harness. (Battery – A4, A8)

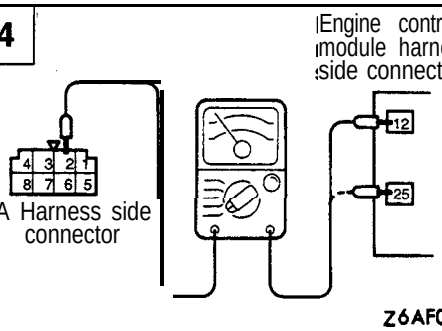
3



Check for an open-circuit, or a short-circuit to ground, between the engine control module and the MFI relay.
- Engine control module connector: Disconnected
- MFI relay connector: Disconnected

OK → 4
Repair the harness. (A6–108)

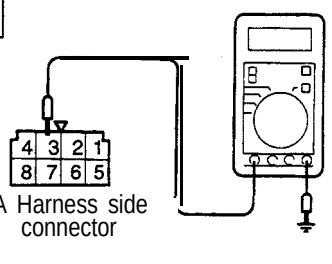
4



Check for an open-circuit, or a short-circuit to ground between the engine control module and the MFI relay.
- MFI relay connector: Disconnected
- Engine control module connector: Disconnected

OK → 5
Repair the harness. (A2–12, 25)

5

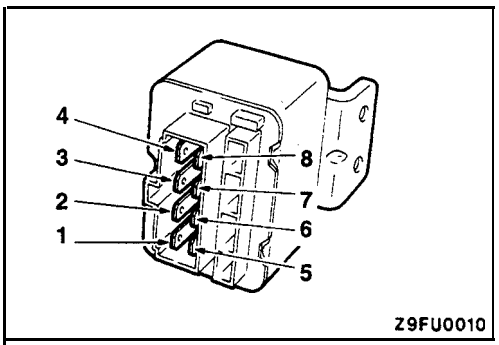


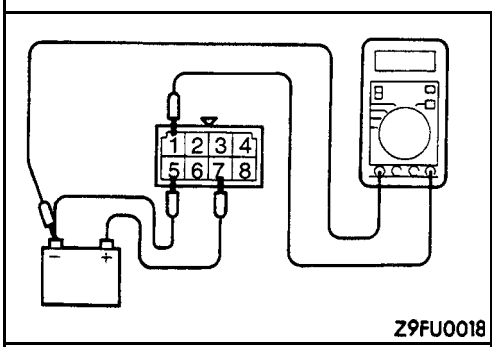
Measure power voltage to the actuator.
- MFI relay connector: Connected
- Engine control module connector: Connected

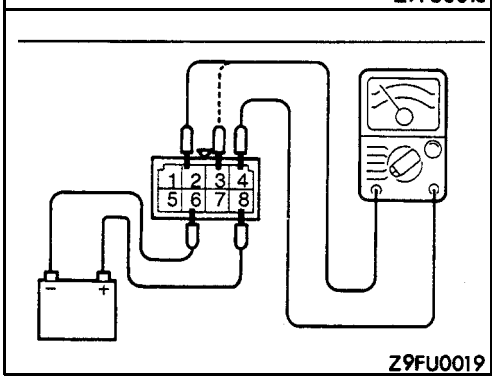
Engine cranking: 8 V or higher
Engine racing: Battery voltage

OK → STOP
Replace the MFI relay or defective engine control module

TSB Revision







MFI RELAY INSPECTION

(1) Remove the MFI relay.
(2) Check for continuity between MFI relay terminals.

Terminal No.	Continuity
5–7	Conductive (approx. 90 Ω)
6–8	Conductive (only one direction)

(3) Using jumper wires, connect terminal (7) of MFI relay to battery (+) terminal and terminal (5) of MFI relay to battery (–) terminal.

Caution
If jumper leads are not connected properly the relay will be damaged.

(4) Connecting and disconnecting the jumper wire to battery (–) terminal, measure the voltage at terminal (1) of the MFI relay.

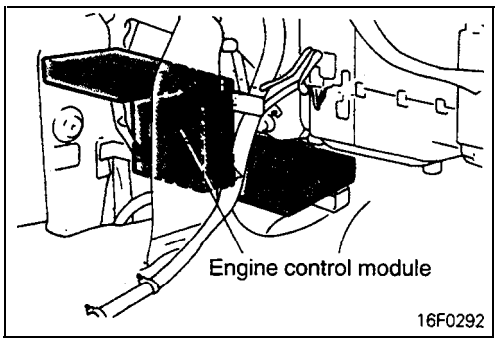
Jumper wire	Voltage
Connected	B+
Disconnected	0 V

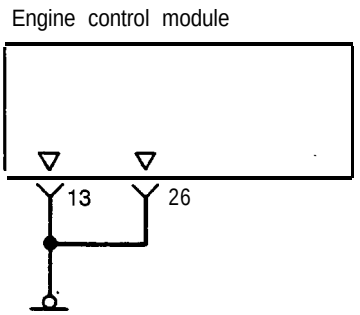
(5) Using jumper wires, connect terminal (8) of MFI relay to battery (+) terminal and terminal (6) of MFI relay to battery (–) terminal.
(6) Connecting and disconnecting the jumper wire to battery (–) terminal, check the continuity across terminals (2) and (4) (or (3) and (4)) of the MFI relay.

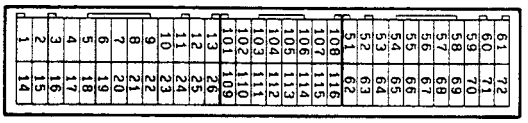
Jumper wire	Continuity across terminals 2 and 4	Continuity across terminals 3 and 4
Connected	Conductive (0 Ω)	Conductive (0 Ω)
Disconnected	Nonconductive (∞ Ω)	Nonconductive (∞ Ω)

(7) Replace the MFI relay if any defect is evident.

ENGINE CONTROL MODULE POWER GROUND







7FU0653

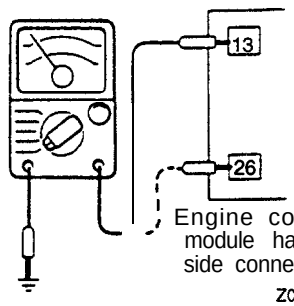
OPERATION

Grounds the engine control module

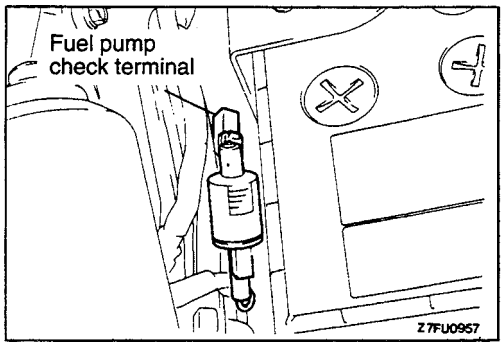
TROUBLESHOOTING HINTS

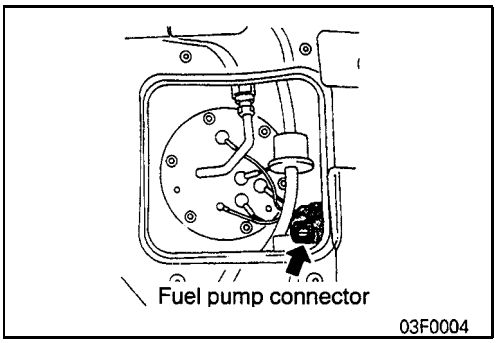
If the ground wire of the engine control module is not connected securely to ground, the module will not operate correctly.

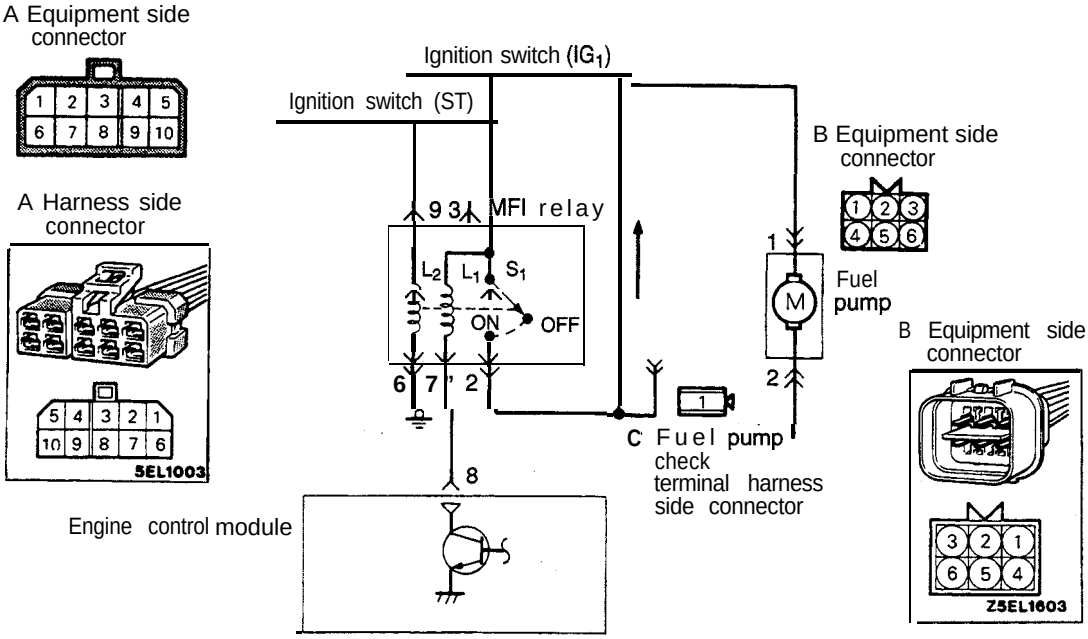
HARNESS INSPECTION

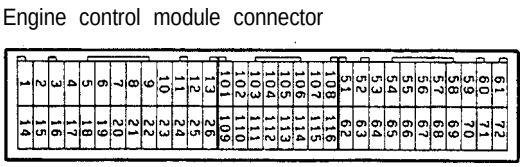
1		Check for continuity of the ground circuit. • Engine control module connector: Disconnected	OK → STOP NO → Repair the harness. (13 – Ground) (26 – Ground)

FUEL PUMP <Up to 1993 Models – Non Turbo>









OPERATION

- Drives the fuel pump during cranking and engine operation.
- When the ignition switch is set to START, current flows from the ignition switch through the MFI relay coil to ground. This turns on the MFI relay switch and drive power is supplied from the battery through the MFI relay switch to the fuel pump.
- While the engine is running, the engine control module keeps the power transistor on and energizes the MFI relay coil so that drive power is supplied to the fuel pump.

TSB Revision

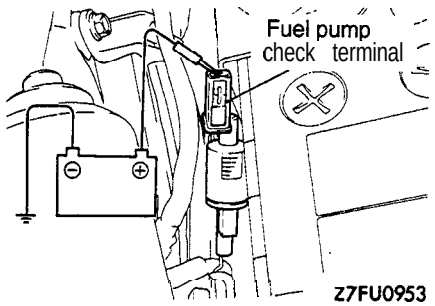
INSPECTION

Using Scan Tool

Function	Item No.	Drive	Check condition	Check content	Normal state
Actuator test	07	Fuel pump is driven to circulate fuel	• Engine cranking • Forced drive of fuel pump Check is made for above two conditions	Hold return hose with fingers to feel pulsation indicating fuel flow	Pulsation is felt
				Listen to pump operating sound near fuel tank	Operating sound is heard

HARNESS INSPECTION

1

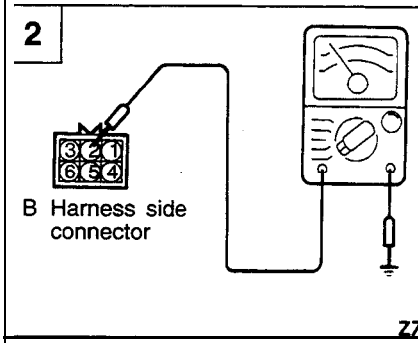


Check the fuel pump.
- Apply battery voltage to the checking terminal and operate the pump.

OK → 4

NG → 2

2

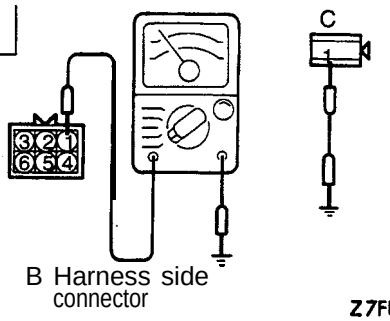


Check for continuity of the ground circuit.
- Fuel pump connector: Disconnected

OK → 3

NG → Repair the harness. (B2 – Ground)

3



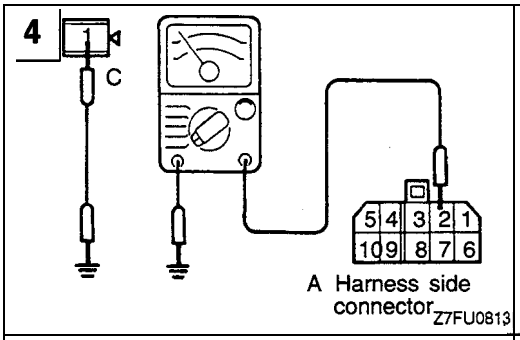
Check for continuity between the fuel pump and the checking terminal.
- Fuel pump connector: Disconnected

OK → 4

NG → Repair the harness. (B1 -CI)

TSB Revision

4

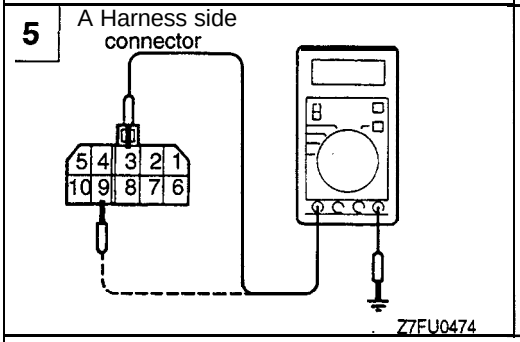


Check for continuity between the checking terminal and the MFI relay terminals.
- MFI relay connector: Disconnected
- Fuel pump connector: Disconnected

OK → 5

NG → Repair the harness. (A2–C1)

5



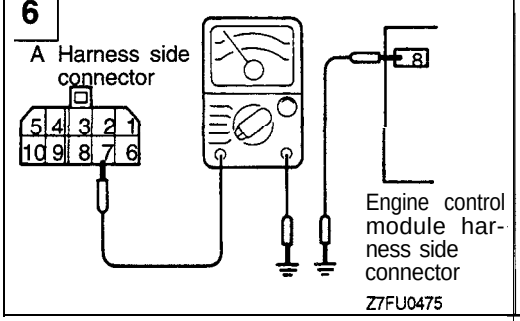
Measure the power supply voltage of the MFI relay.
- MFI relay connector: Disconnected
- Ignition switch: START (when A9 checked)
- Ignition switch: ON (when A3 checked)

8 V or more

OK → 6

NG → Repair the harness. (Ignition switch-[IG] – A3) (Ignition switch-[ST] – A9)

6

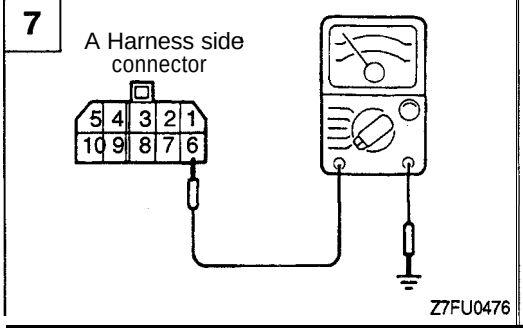


Check for an open-circuit, or a short-circuit to ground between the MFI relay and the engine control module.
- MFI relay connector: Disconnected
- Engine control module connector: Disconnected

OK → 7

NG → Repair the harness. (A7–8)

7

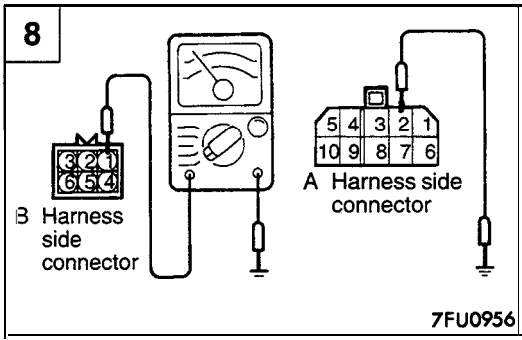


Check for continuity of the ground circuit.
- MFI relay connector: Disconnected

OK → 8

NG → Repair the harness. (A6 – Ground)

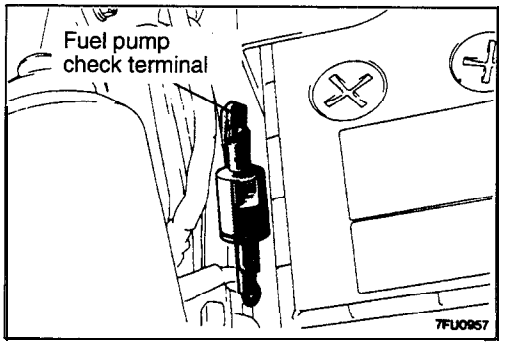
TSB Revision

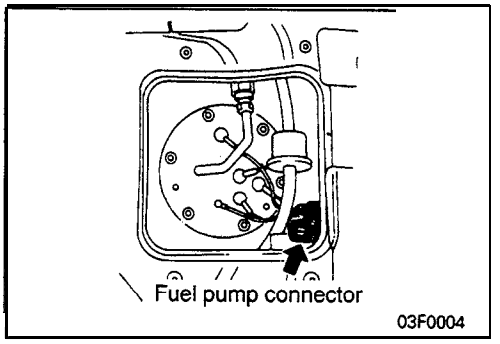
8 	Check for an open-circuit, or a short-circuit to ground between the MFI relay and the fuel pump. • MFI relay connector: Disconnected • Fuel pump connector: Disconnected	OK →	STOP
		NO →	Repair the harness. (A2–B1)

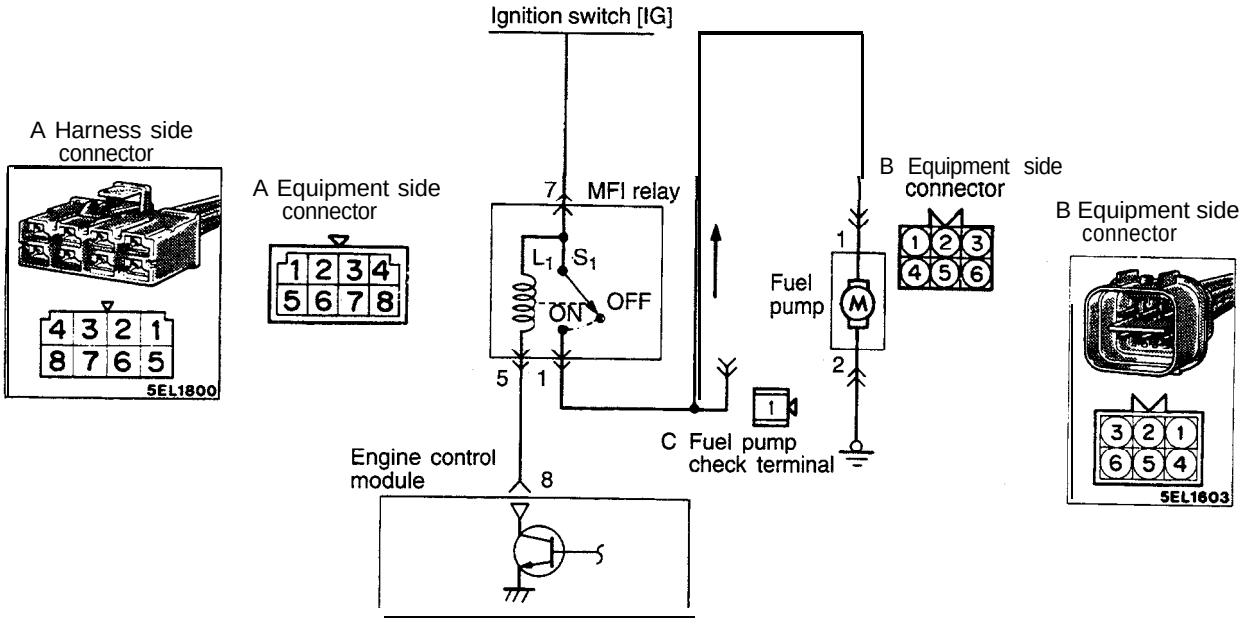
MFI RELAY INSPECTION

Refer to P.13A-67.

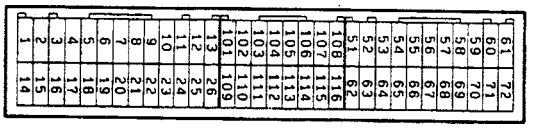
FUEL PUMP <From 1994 Model – Non Turbo>







Engine control module connector



i7FU06.53

7FU1575

OPERATION

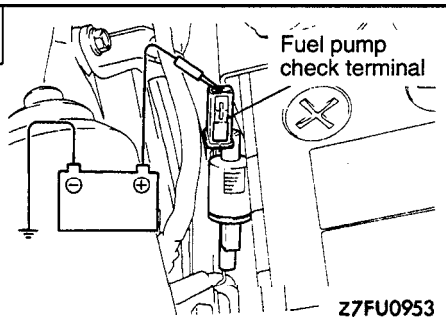
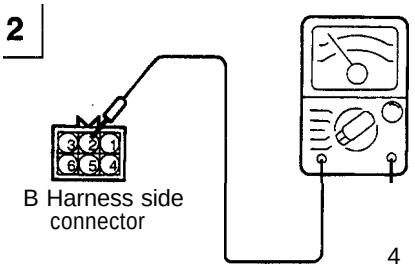
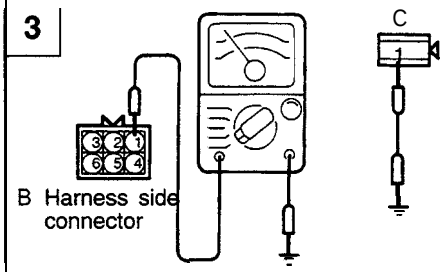
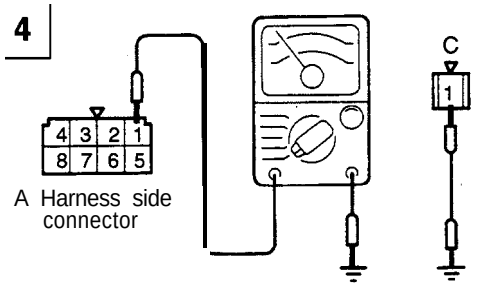
- The fuel pump is driven when the engine is cranking and while the engine is running.
- When the engine is cranking and while the engine is running, the engine control module turns the power transistor ON to the MFI relay coil. This causes the MFI relay switch to turn ON, and current is supplied from the ignition switch via the MFI relay switch to drive the fuel pump.

TSB Revision

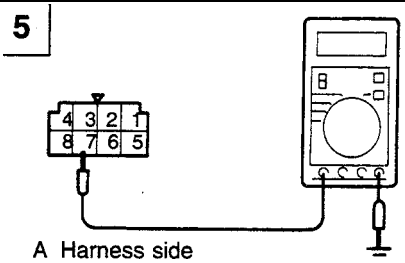
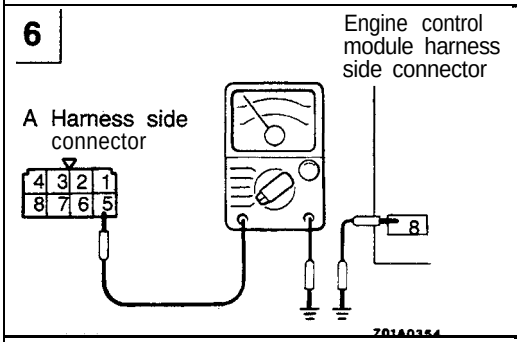
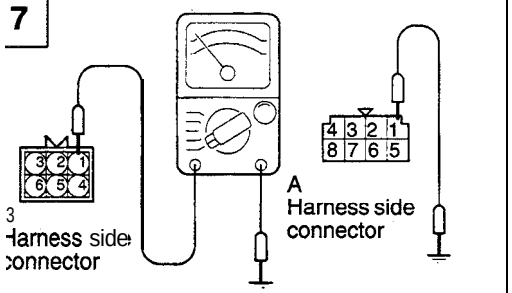
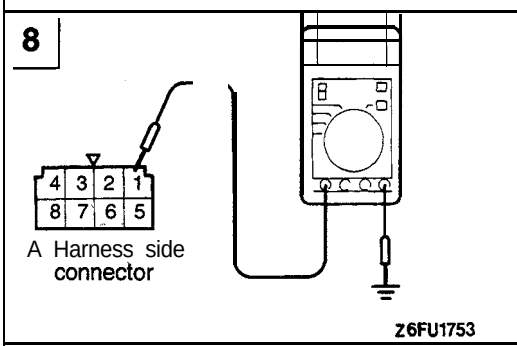
INSPECTION

Refer to P.13A-73.

HARNESS INSPECTION

1		Check the fuel pump. • Apply battery voltage to the checking terminal and operate the pump.	OK → 4 NG → 2
2		Check the ground circuit of the fuel pump. • Fuel pump connector: Disconnected	OK → 3 NG → Repair the harness. (B2 – Ground)
3		Check for continuity between the fuel pump and the checking terminal. • Connector: Disconnected	OK → 4 NG → Repair the harness. (B1 -CI)
4		Check for continuity between the fuel pump checking terminal and the MFI relay terminals. • MFI relay connector: Disconnected • Fuel pump connector: Disconnected	OK → 5 NG → Repair the harness. (AI -CI)

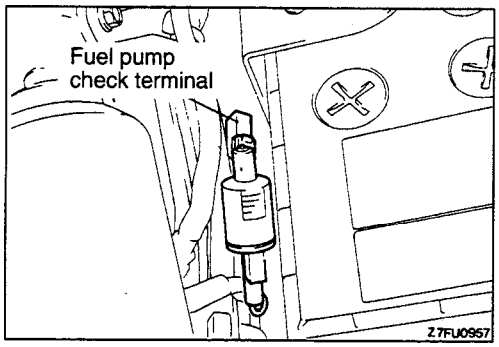
TSB Revision

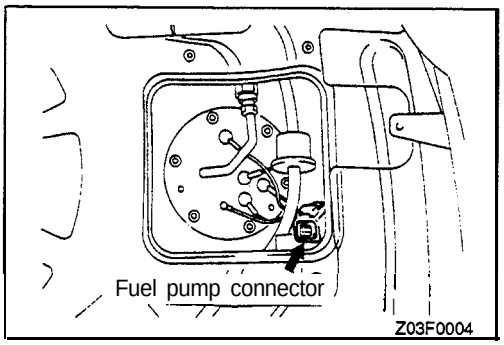
5  	Measure the power supply voltage of the MFI relay. • Control relay connector: Disconnected **Ignition switch OFF: O-l V** **Ignition switch ON: Battery voltage**	OK → 6 NO → Repair the harness. (Ignition switch – A7) or check the ignition switch.
6  	Check for an open-circuit, or a short-circuit, to ground between the MFI relay and the engine control module.- * MFI relay connector: Disconnected • Engine control module connector: Disconnected	OK → 7 NO → Repair the harness. (A5–8)
7  	Check for an open-circuit, or a short-circuit to ground, between the MFI relay (for fuel pump) and the fuel pump.' • MFI relay (for fuel pump) connector: Disconnected • Fuel pump connector: Disconnected	OK → 8 NO → Repair the harness. (Al –B1)
8  	Measure the power supply voltage of the fuel pump. • MFI relay connector: Connected • Engine control, unit connector: Connected **Engine cranking: 8 V or more** **Engine racing: Battery voltage**	OK → STOP NO → MFI relay or engine control module is defective.

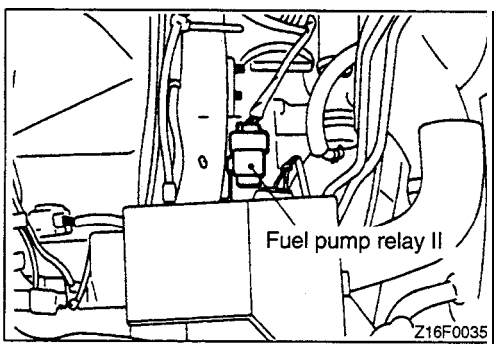
MFI RELAY INSPECTION

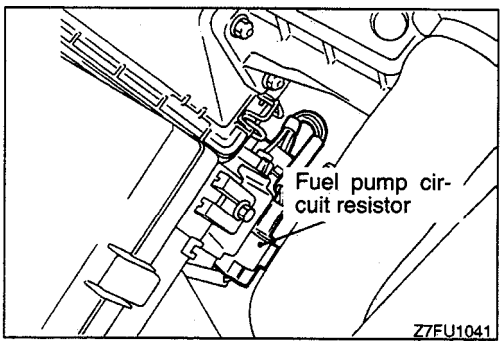
Refer to P.13A-70.

FUEL PUMP <Turbo>

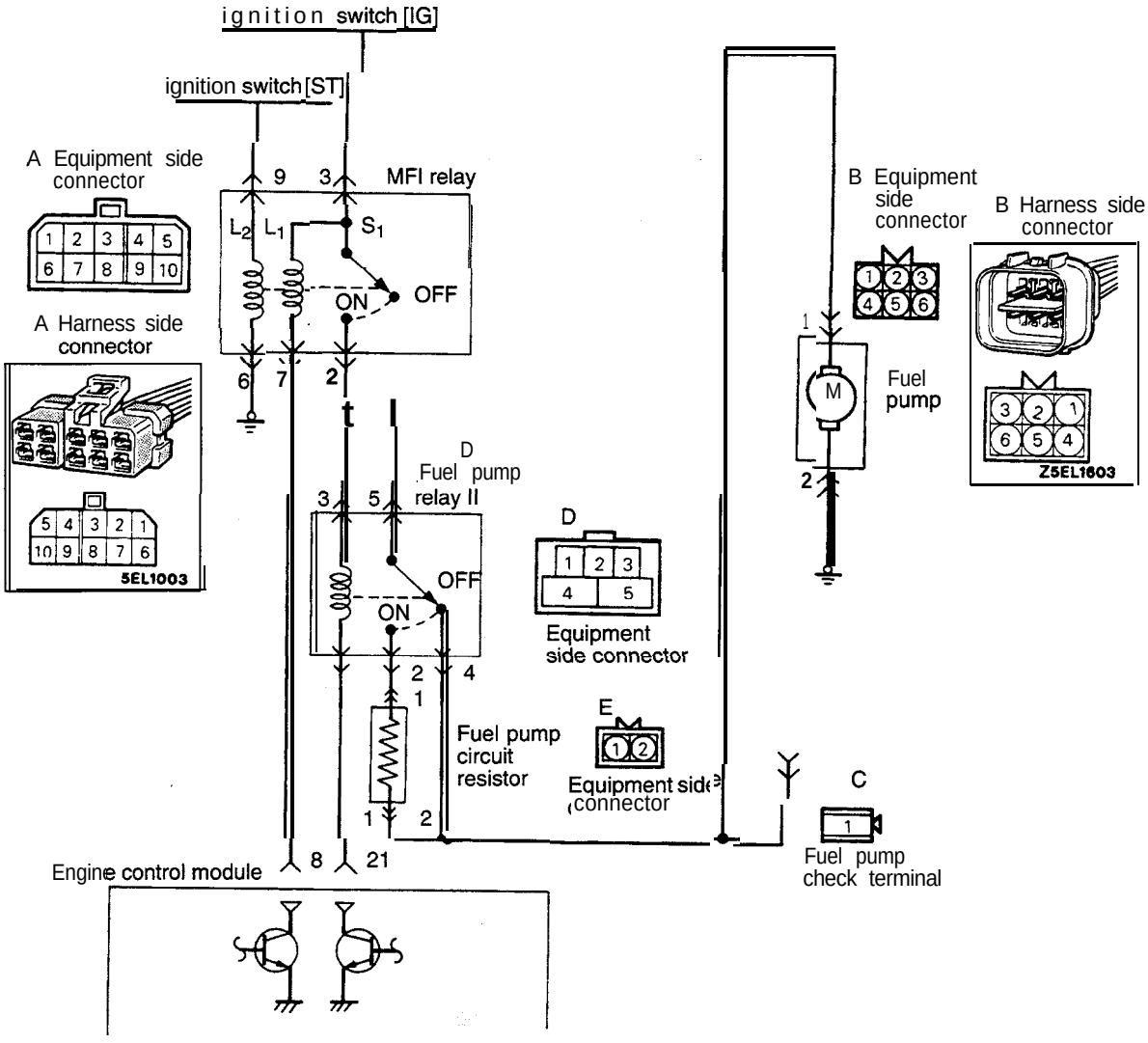






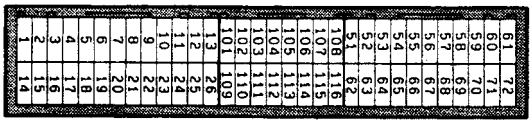


TSB Revision



Z7FU0959

Engine control module connector



7FU0653

7FU1576

TSB Revision

OPERATION

MFI Relay Operation

- Drives the fuel pump during cranking and engine operation.
- When the ignition switch is set to START, current flows from the ignition switch through the MFI relay coil to ground. This turns on the MFI relay switch and drive power is supplied from the battery through the MFI relay switch to the fuel pump.
- While the engine is running, the engine control module keeps the power transistor on and energizes the MFI relay coil so that drive power is supplied to the fuel pump.

Fuel Pump Relay II Operation

- Change the fuel pump discharge in two stages by ON-OFF operation of the relay switch for fuel pump relay II.
- If the amount of inlet air is small (the engine load is low), the engine control module turns on the power transistor to energize the coil of fuel pump relay II, sending drive power to the fuel pump through the resistor. If the amount of inlet air is large (the engine load is high), the engine control module turns off the power transistor to send drive power directly to the fuel pump without passing through the resistor.

INSPECTION

Using Scan Tool

<Fuel Pump>

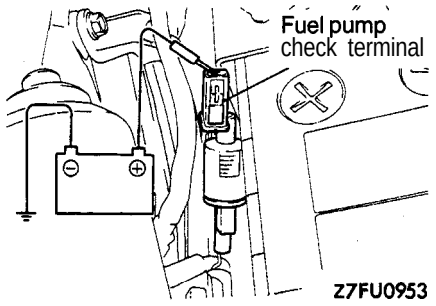
Function	Item No.	Operation	Check condition	Check item	Normal condition
Actuator test	07	Fuel pump is driven to circulate fuel	• Engine cranking • Forced drive of fuel pump Check is made for above two conditions	Hold return hose with fingers to feel pulsation indicating fuel flow	Pulsation is felt
				Listen to pump operating sound near fuel tank	Operating sound is heard

<Fuel Pump Relay II>

Function	Item No.	Operation	Check condition	Normal condition
Actuator test	13	Turn the fuel pump relay II from OFF to ON	Ignition switch: ON	Operating sound is heard.

HARNESS INSPECTION

1

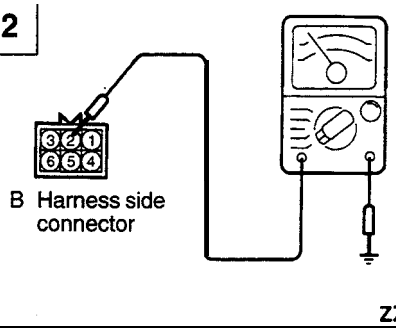


Check the fuel pump.
- Apply battery voltage to the checking terminal and operate the pump.

OK → 4

NO → 2

2



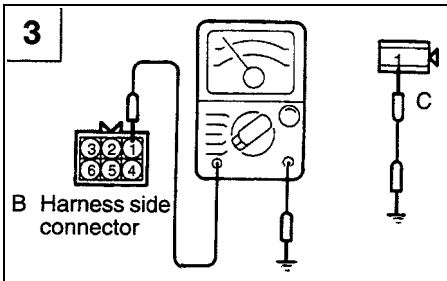
Check the ground circuit of the fuel pump.
- Fuel pump connector: Disconnected

OK → 3

NO → Repair the harness. (B2 – Ground)

TSB Revision

3

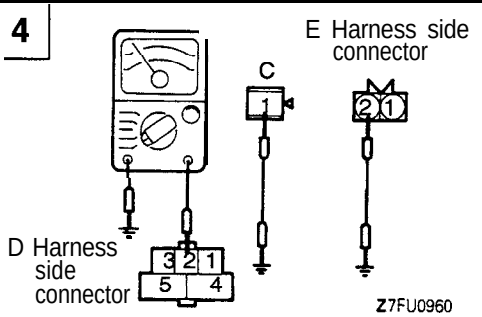


Check for continuity between the fuel pump and the checking terminal.
- Fuel pump connector: Disconnected

OK → 4

NG → Repair the harness (B1 -Cl)

4

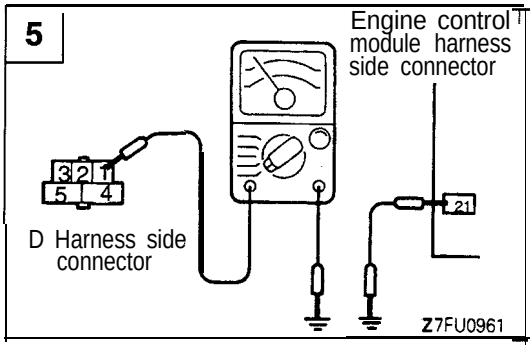


Check for continuity between the checking terminal and the fuel pump relay II, and between the resistor (for fuel pump).
- Fuel pump relay II connector: Disconnected
- Resistor (for fuel pump) connector: Disconnected
- Fuel pump connector: Disconnected

OK → 5

NG → Repair the harness. (C1–D2) (D2–E2)

5

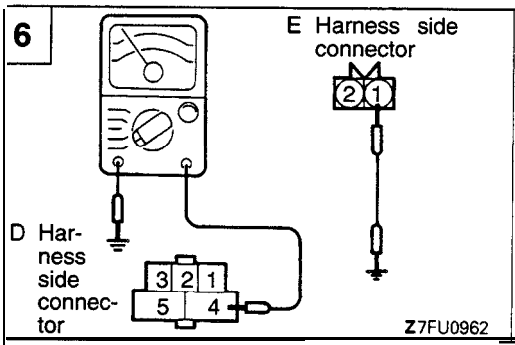


Check for an open-circuit, or a short-circuit to ground, between the fuel pump relay II and the engine control module.
- Fuel pump relay II connector: Disconnected
- Engine control module connector: Disconnected

OK → 6

NG → Repair the harness. (D1–21)

6

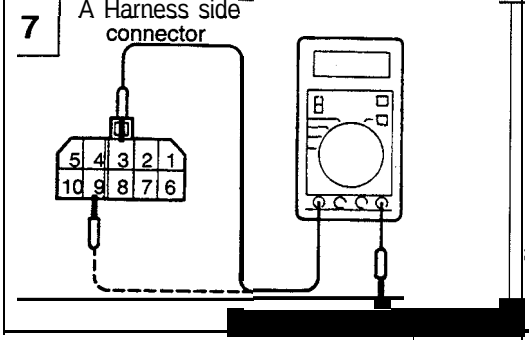


Check for continuity between the fuel pump relay II and the resistor (for fuel bump).
- Fuel pump relay II connector: Disconnected
- Resistor (for fuel pump) connector: Disconnected

OK → 7

NG → Repair the harness. (D4–E1)

7



Measure the power supply voltage of the MFI relay.
- MFI relay connector: Disconnected
- Ignition switch: START (when checking A9)
- Ignition switch: ON (when checking A3)

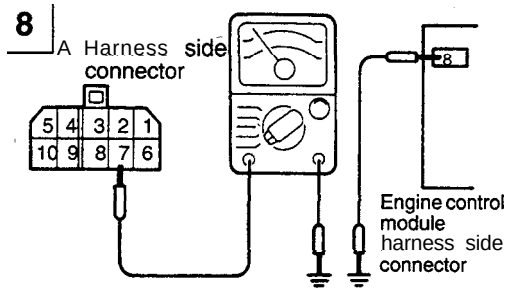
8 V or more

OK → 8

NG → Repair the harness. (Ignition switch [IG] – A3) (Ignition switch [redacted] – [redacted])

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8

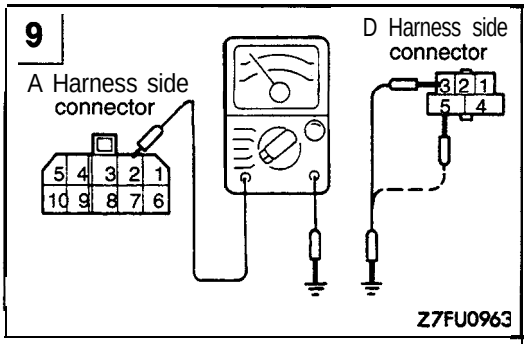


Check for an open-circuit, or a short-circuit to ground, between the MFI relay and the engine control module.-
- MFI relay connector: Disconnected
- Engine control module connector: Disconnected

OK → 9

OK → Repair the harness. (A7–8)

9

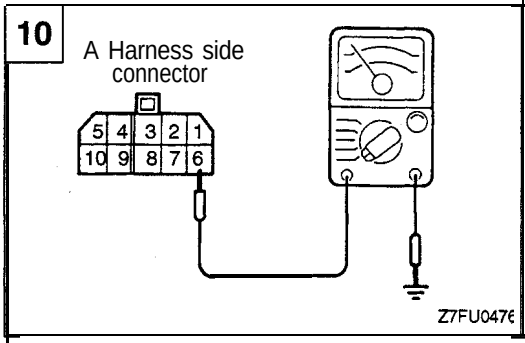


Check for continuity between the MFI relay and the fuel pump relay II.
- MFI relay connector: Disconnected
- Fuel pump relay II connector: Disconnected

OK → 10

OK → Repair the harness. (A2–D3) (A2–D5)

10

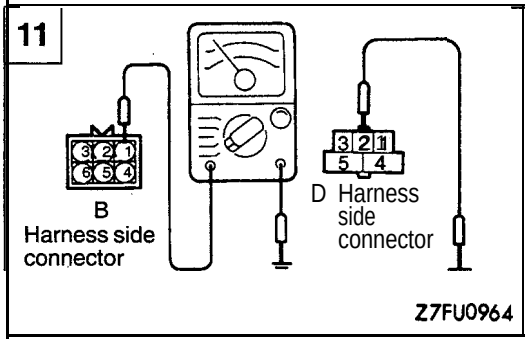


Check for continuity of the ground circuit.
- MFI relay connector: Disconnected

OK → 11

OK → Repair the harness. (A6 – Ground)

11



Check for an open-circuit, or a short-circuit to ground. between the fuel pump relay II and the fuel pump.
- Fuel pump relay II connector: Disconnected
- Fuel pump connector: Disconnected

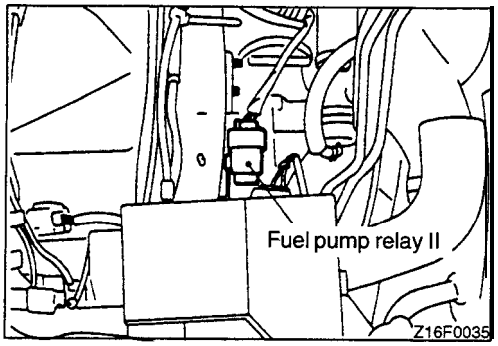
OK → STOP

OK → Repair the harness. (B1–D2)

MFI RELAY INSPECTION

Refer to P.13A-67.

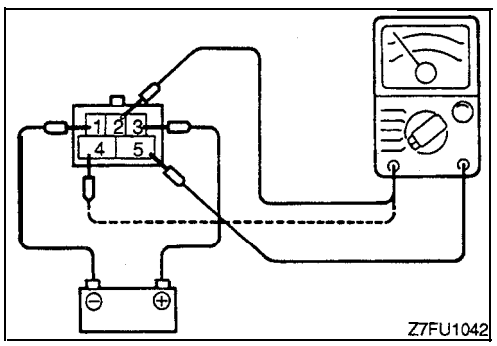
TSB Revision



FUEL PUMP RELAY II

INSPECTION

(1) Remove fuel pump relay II.

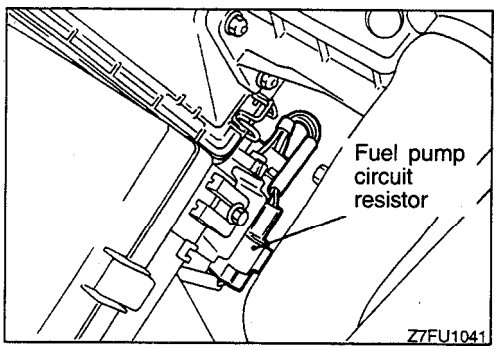


(2) Use a jumper wire to connect terminal (3) of fuel pump relay II and the positive terminal of the battery and use another jumper wire to connect terminal (1) and the negative terminal of the battery.

(3) With the jumper wire connected to and disconnected from the negative terminal of the battery, check the continuity between terminals (2) and (5) of fuel pump relay II and between terminals (4) and (5) of fuel pump relay II.

Jumper wire	Continuity between terminals 2 and 5	Continuity between terminals 4 and 5
Connected	No continuity	Continuity present
Disconnected	Continuity present	No continuity

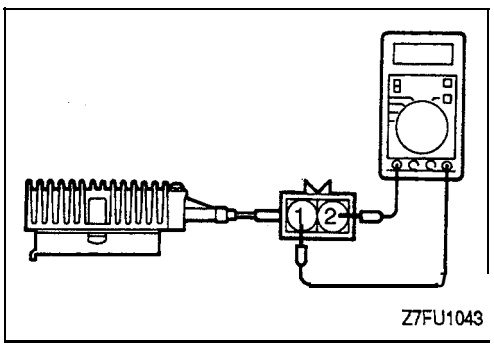
(4) Replace fuel pump relay II if it is faulty.



FUEL PUMP CIRCUIT RESISTOR

INSPECTION

(1) Disconnect the connectors for the fuel pump circuit resistor.



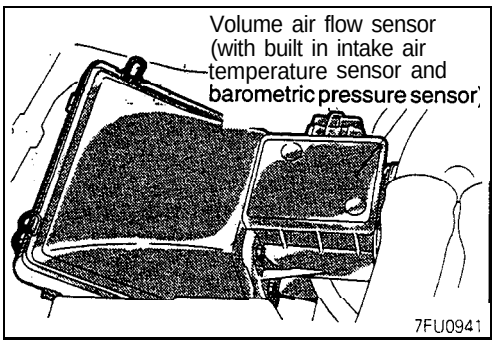
(2) Measure the resistance between the terminals.

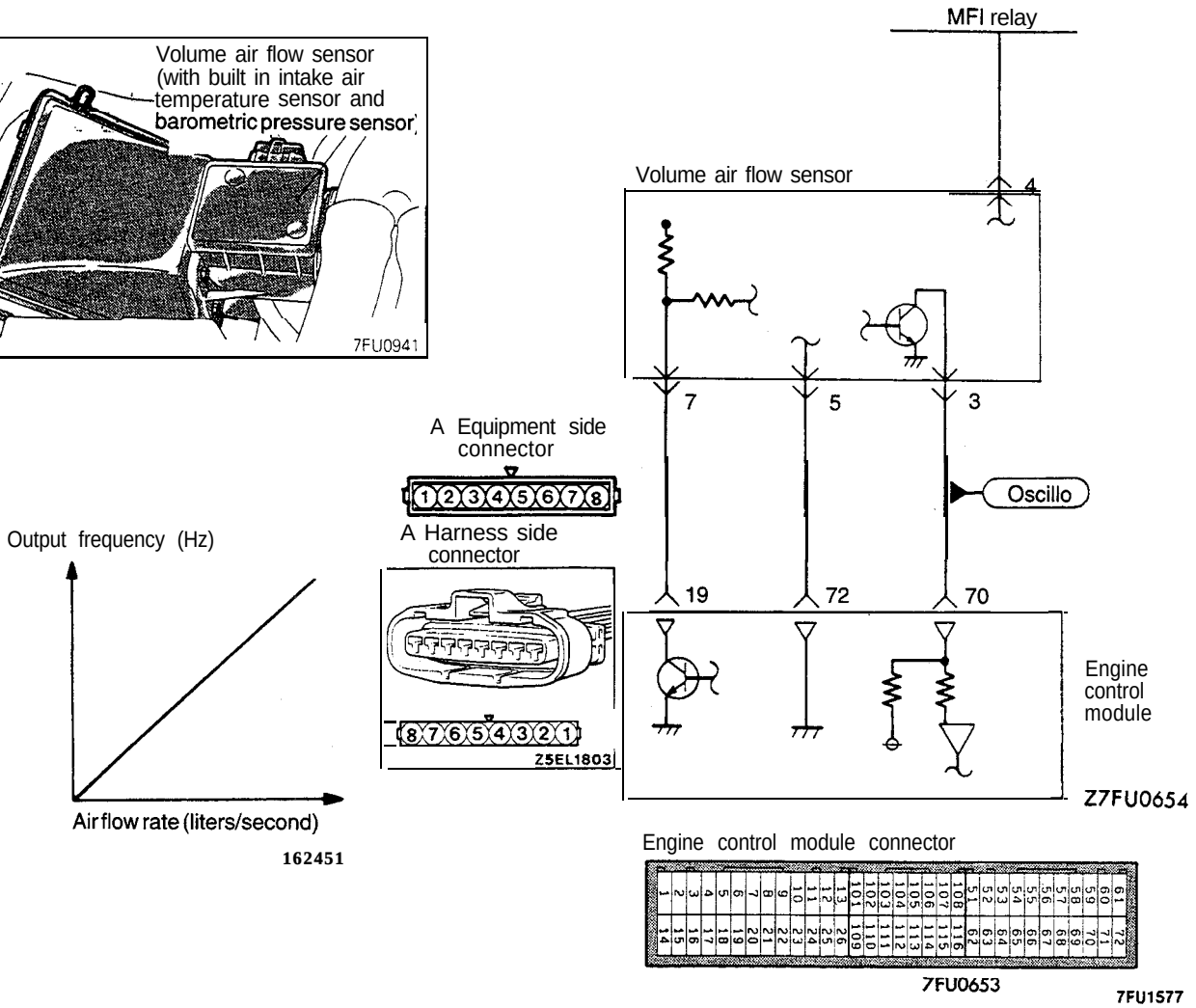
Standard value: 0.6-0.9 Ω

(3) If the resistance deviates from the standard value, replace the fuel pump circuit resistor.

TSB Revision

VOLUME AIR FLOW SENSOR





OPERATION

- The volume air flow sensor located in the air cleaner converts the engine intake air volume into a pulse signal of frequency proportional to the air volume and inputs it to the engine control module, which then computes the fuel injection rate, etc. based on the input signal.
- The volume air flow sensor power is supplied from the MFI relay to the volume air flow sensor and is grounded in the engine control module. The volume air flow sensor generates a pulse signal as it repeatedly opens and closes between the 5 V voltage supplied from the engine control module and ground.

TROUBLESHOOTING HINTS

Hint 1: If the engine stalls occasionally, crank the engine and shake the volume air flow sensor harness. If the engine stalls, poor contact of the volume air flow sensor connector is suspected.

Hint 2: If the volume air flow sensor output frequency is other than 0 when the ignition switch is turned on (but not starting the engine), faulty volume air flow sensor or engine control module is suspected.

Hint 3: If the engine can be run idle even though the volume air flow sensor output frequency is out of specification, troubles are often found in other than the volume air flow sensor itself.
[Examples]
(1) Disturbed volume air flow in the air flow sensor
(Disconnected air duct, clogged air cleaner element)
(2) Poor combustion in the cylinder
(Faulty ignition plug, ignition coil, injector, incorrect compression pressure, etc.)
(3) Air leaking into the intake manifold through gap of gasket, etc.
(4) Loose EGR valve seat

TSB Revision

INSPECTION

Using Scan Tool

<Volume Air Flow Sensor>

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	12	Sensor air volume (frequency)	• Engine coolant temperature: 80 to 95°C (176 to 203°F) • Lights and accessories: OFF • Transaxle: Neutral (P range for vehicle with A/T) • Steering wheel: Neutral	700 rpm (Idle)	22-48 Hz
				2,000 rpm	50–90 <Non turbo> 68–108 <Turbo>
				Racing	Frequency increases with racing

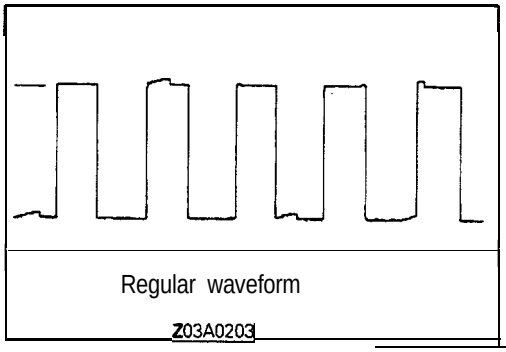
NOTE
When the vehicle is new [within initial operation of about 500 km (300 miles)], the volume air flow sensor output frequency may be about 10% higher.

<Volume Air Flow Sensor Reset Signal>

Function	Item No.	Data display	Check conditions	Engine conditions	Standard value
Data list	34	Reset signal condition	• Engine warm up	700 rpm (Idle)	ON
				2,000 rpm	OFF

<Volumetric Efficiency>

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data list	37	Volumetric efficiency	• Engine coolant temperature: 80 to 95°C (176 to 203°F) • Lights, electric cooling fan and accessory operation: OFF • Transaxle: Neutral (P range for vehicle with A/T) • Steering wheel: Neutral	700 rpm (Idle)	15–35 %
				2,000 rpm	15–35 %
				Racing	Frequency increases with racing



Regular waveform

Z03A0203

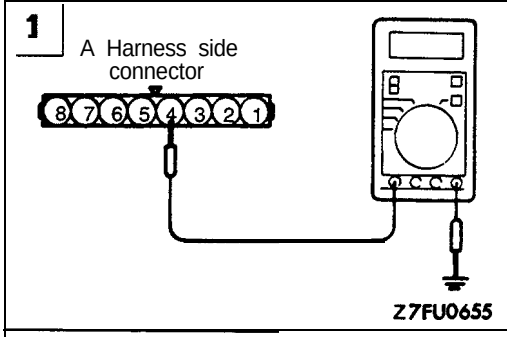
Using Oscilloscope

(1) Run the engine at idle speed.
(2) Connect the probe to the oscilloscope pick-up point as shown in the circuit diagram, and check the waveform.

TSB Revision

HARNESS INSPECTION

1



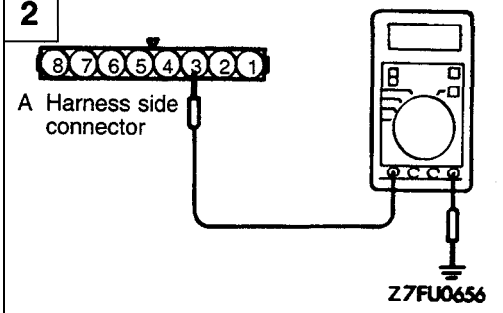
Measure the power supply voltage.
- Connector: Disconnected
- Ignition switch: ON

Battery voltage

OK → 2

NG → Repair the harness (A4 – Control relay) or check the control relay.

2



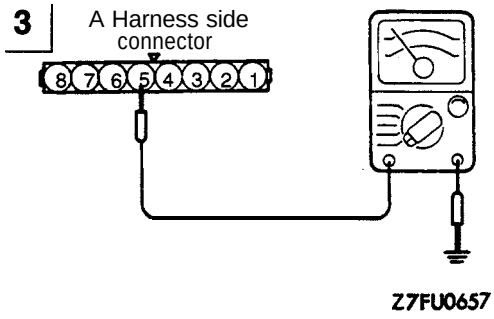
Measure the terminal voltage.
- Connector: Disconnected
- Ignition switch: ON

4.8–5.2 V

OK → 3

NG → Repair the harness. (A3–70)

3

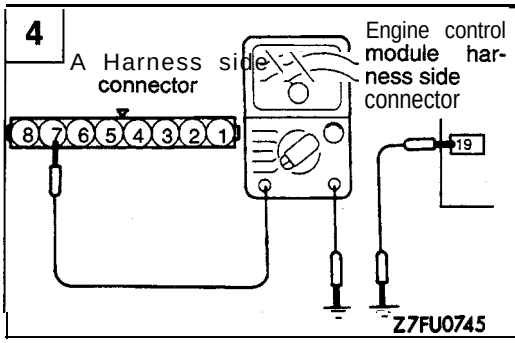


Check for continuity of the ground circuit.
- Connector: Disconnected

OK → STOP

NG → Repair the harness. (A5–72)

4



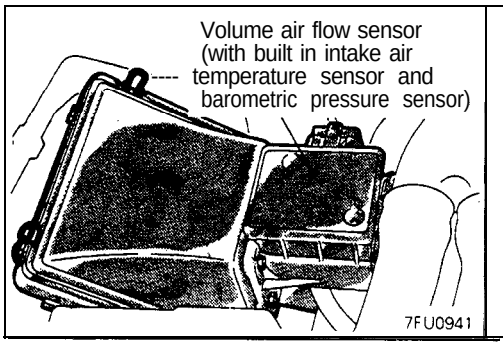
Check for continuity between the volume air flow sensor and the engine control unit.
- Volume air flow sensor connector: Disconnected
- Engine control module connector: Disconnected

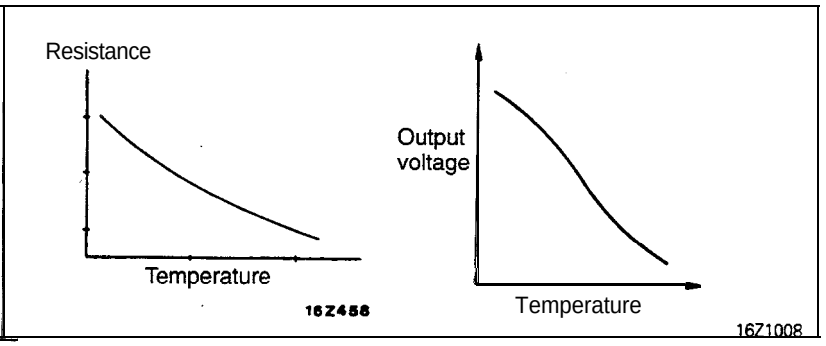
OK → STOP

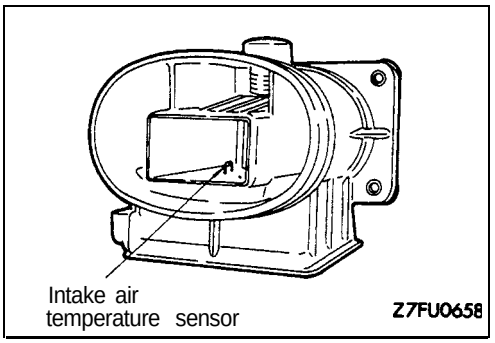
NG → Repair the harness. (A7–19)

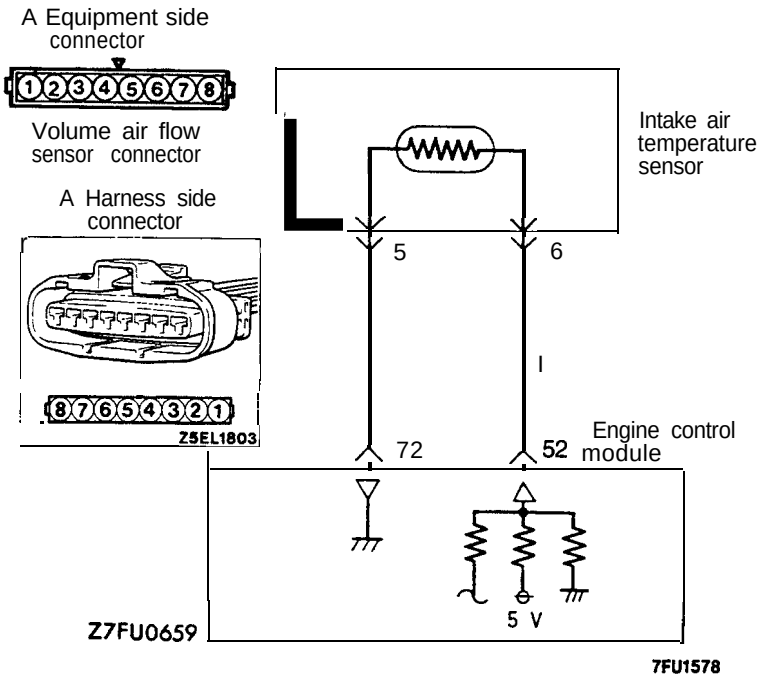
TSB Revision

INTAKE AIR TEMPERATURE SENSOR









OPERATION

- The intake air temperature sensor converts the engine intake air temperature into a voltage and inputs it to the engine control module, which then corrects the fuel injection rate, etc. based on the input signal.
- The 5 V power in the engine control module is supplied via a resistor in the module to the intake air temperature sensor. Via the sensor which is a kind of resistor, it is grounded in the engine control module. The intake air temperature sensor resistor has the characteristic of decreasing its resistance decreases as the intake air temperature rises.
- The intake air temperature sensor terminal voltage increases or decreases as the sensor resistance increases or decreases. Therefore, the intake air temperature sensor terminal voltage changes with the intake air temperature, decreasing as the temperature rises.

TROUBLESHOOTING HINTS

The intake air temperature sensor senses the intake air temperature in the air cleaner so that it may indicate a temperature different from outside temperature depending on engine operating state.

TSB Revision

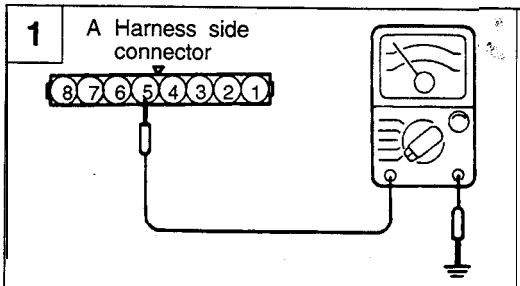
INSPECTION

Using Scan Tool

Function	Item No.	Data display	Check condition	Intake air temperature	Standard value
Data reading	13	Sensor temperature	Ignition switch: ON or engine running	At –20°C (-4°F)	-20°C
				At 0°C (32°F)	0°C
				At 20°C (68°F)	20°C
				At 40°C (104°F)	40°C
				At 80°C (176°F)	80°C

HARNESS INSPECTION

1 A Harness side connector



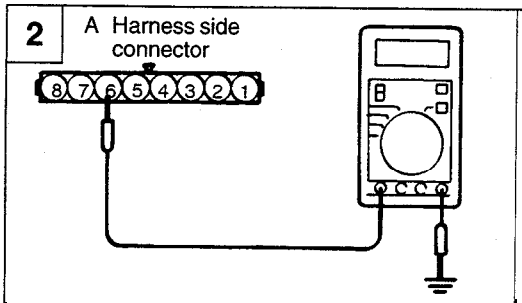
Z7FU0657

Check for continuity of the ground circuit.
- Connector: Disconnected

OK → 2

NG → Repair the harness. (A5–72)

2 A Harness side connector



Z7FU0660

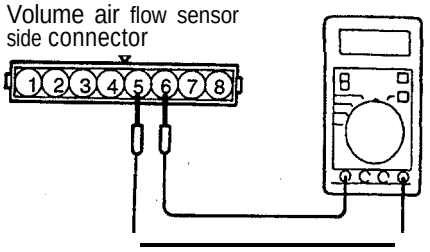
Measure the power supply voltage.
- Ignition switch: ON
- Connector: Disconnected

4.5–4.9 V

OK → STOP

NG → Repair the harness. (A6–52)

Volume air flow sensor side connector



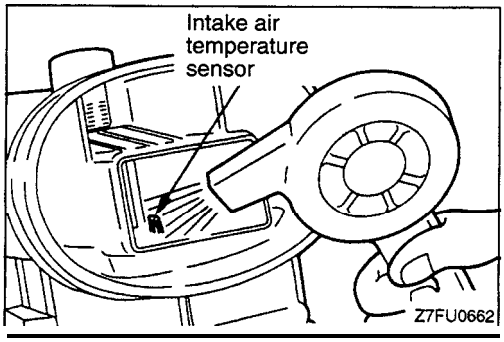
Z7FU0661

SENSOR INSPECTION

(1) Disconnect the volume air flow sensor connectors.
(2) Measure resistance between terminals (5) and (6).

Temperature [°C(°F)]	Resistance (kΩ)
0 (32)	6.0
20 (68)	2.7
80 (176)	0.4

TSB Revision

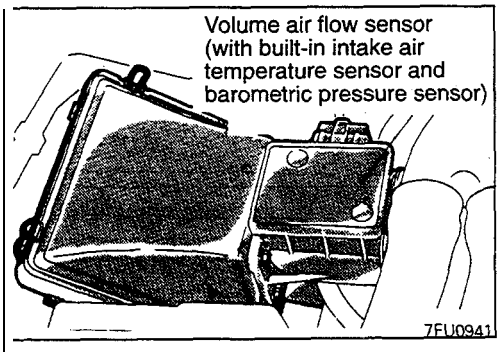


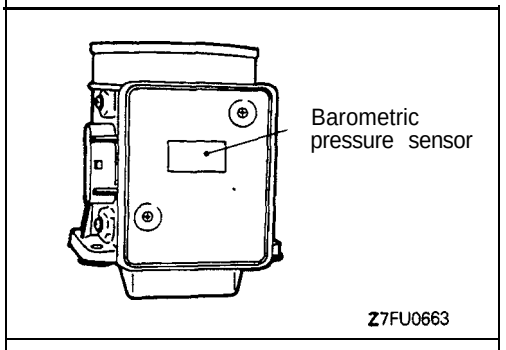
(3) Measure resistance while heating the sensor using a hair drier.

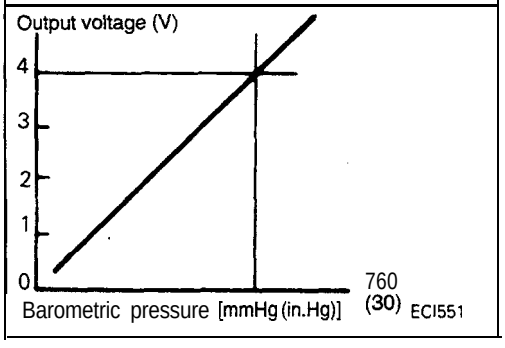
Temperature [°C (°F)]	Resistance (kΩ)
Higher	Smaller

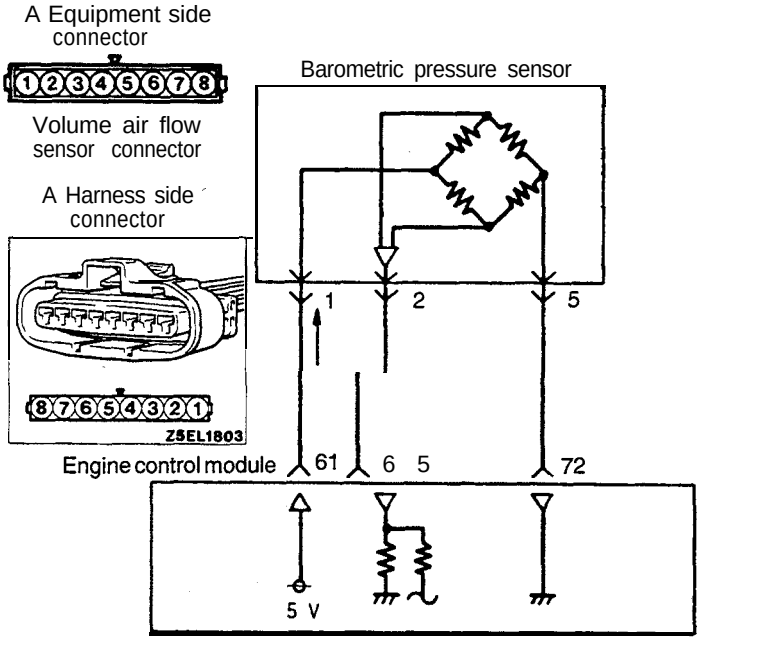
(4) If resistance does not decrease as heat increases or the resistance remains unchanged, replace the volume air flow sensor assembly.

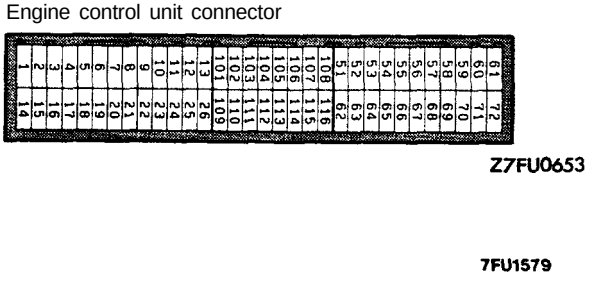
BAROMETRIC PRESSURE SENSOR











OPERATION

- The barometric pressure sensor converts the barometric pressure into a voltage and inputs it to the engine control module, which then corrects the fuel injection, rate, etc. based on the input signal.
- The 5 V power in the engine control module is supplied to the barometric pressure sensor. Through the circuit in the sensor, it is grounded in the engine control module.
- The barometric pressure sensor output voltage which is proportional to the barometric pressure (absolute pressure) is supplied to the engine control module.

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TROUBLESHOOTING HINTS

Hint 1: If the barometric pressure sensor is faulty, poor driveability is caused at high altitude, in particular.
Hint 2: If the pressure indication of the barometric pressure sensor drops significantly during high speed driving, check the air cleaner for clogging.

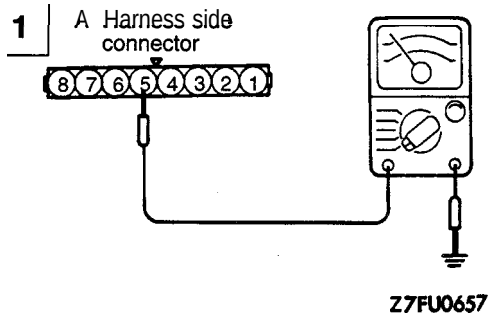
INSPECTION

Using Scan Tool

Function	Item No.	Data display	Check condition	Altitude	Standard value
Data reading	25	Sensor pressure	Ignition switch: ON	At 0 m (0 ft.)	101 kPa (760 mmHg)
				At 600 m (1,969 ft.)	95 kPa (710 mmHg)
				At 1,200 m (3,937 ft.)	88 kPa (660 mmHg)
				At 1,800 m (5,906 ft.)	81 kPa (610 mmHg)

HARNESS INSPECTION

1

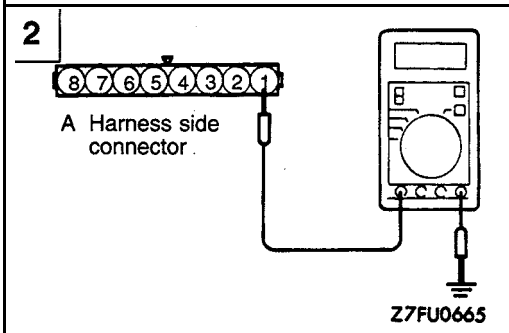


Check for continuity of the ground circuit.
- Connector: Disconnected

OK → **2**

NG → Repair the harness. (A5–72)

2



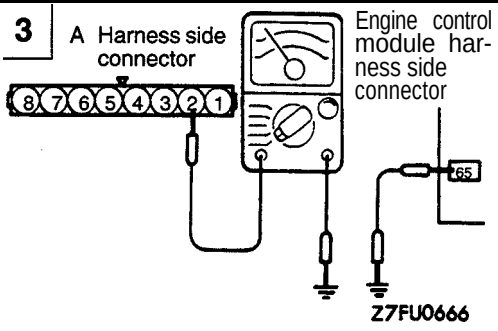
Measure the power supply voltage of the barometric pressure sensor.
- Connector: Disconnected
- Ignition switch: ON

4.8–5.2 V

OK → **3**

NG → Repair the harness. (AI -61)

3



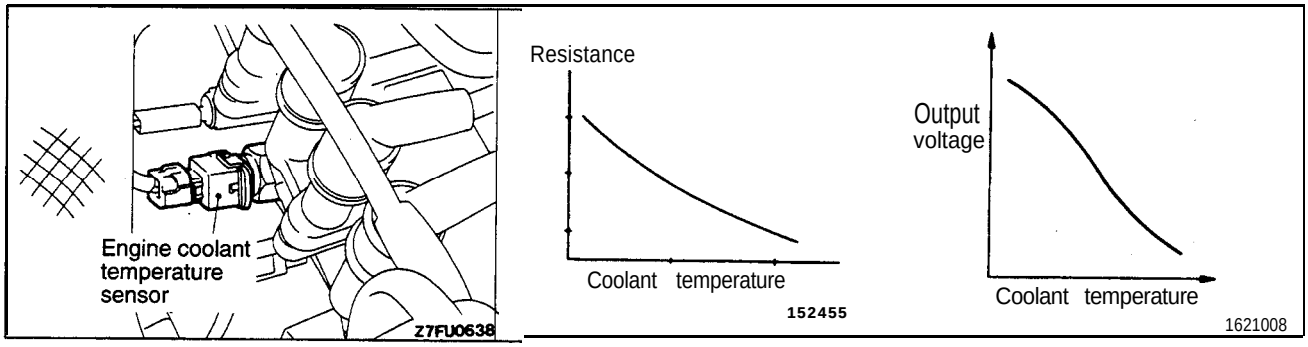
Check for an open-circuit, or a short-circuit to ground between the engine control module and the barometric pressure sensor.
- Volume air flow sensor connector: Disconnected
- Engine control module connector: Disconnected

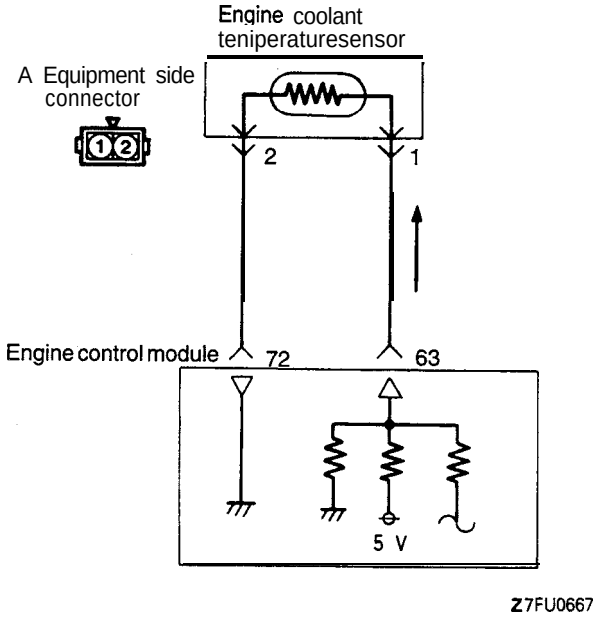
OK → STOP

NG → Repair the harness. (A2–65)

TSB Revision

ENGINE COOLANT TEMPERATURE SENSOR <Up to 1993 models>





OPERATION

- The engine coolant temperature sensor converts the engine coolant temperature into a voltage and inputs it to the engine control module, which then controls the fuel injection rate and fast idle speed when the engine is cold based on the input signal.
- The 5 V power in the engine control module is supplied via a resistor in the module to the engine coolant temperature sensor. Through the sensor which is a kind of resistor, it is grounded in the engine control module. The engine coolant temperature sensor resistor has the characteristic of decreasing its resistance decreases as the coolant temperature rises.
- The engine coolant temperature sensor terminal voltage increases or decreases as the sensor resistance increases or decreases. Therefore, the engine coolant temperature sensor terminal voltage changes with the coolant temperature, decreasing as the temperature rises.

TROUBLESHOOTING HINTS

If the fast idle speed is inadequate or the engine emits dark smoke during engine warm up operation, the engine coolant temperature sensor is often faulty.

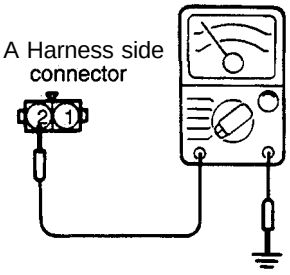
INSPECTION

Using Scan Tool

Function	Item No.	Data display	Check condition	Coolant temperature	Standard value
Data reading	21	Sensor temperature	Ignition switch: ON or engine operating	At -20°C (-4°F)	-20°C
				At 0°C (32°F)	0°C
				At 20°C (68°F)	20°C
				At 40°C (104°F)	40°C
				At 80°C (176°F)	80°C

HARNESS INSPECTION

1



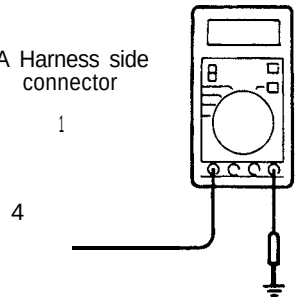
Z7FU0668

Check for continuity of the ground circuit.
- Connector: Disconnected

OK → 2

OK → Repair the harness. (A2–72)

2



Z7FU0669

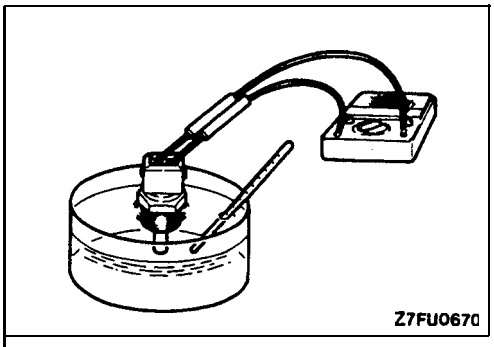
Measure the power supply voltage.
- Connector: Disconnected
- Ignition switch: ON

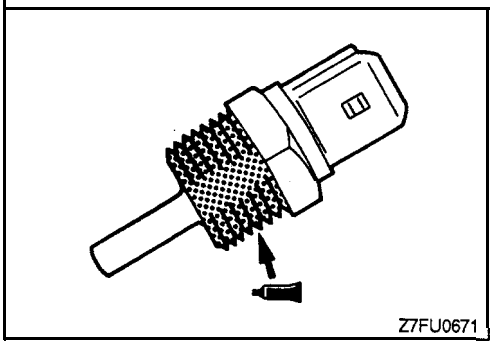
4.5-4.9 v

OK → STOP

OK → Repair the harness. (AI -63)

TSB Revision





SENSOR INSPECTION

(1) Remove engine coolant temperature sensor from the intake manifold.

(2) With temperature sensing portion of engine coolant temperature sensor immersed in hot water, check resistance.

Temperature °C(°F)	Resistance (kΩ)
0 (32)	5 . 6
20 (68)	2.4
40 (104)	1.1
80 (176)	0.3

(3) If the resistance deviates from the standard value greatly, replace the sensor.

INSTALLATION

(1) Apply sealant to threaded portion.

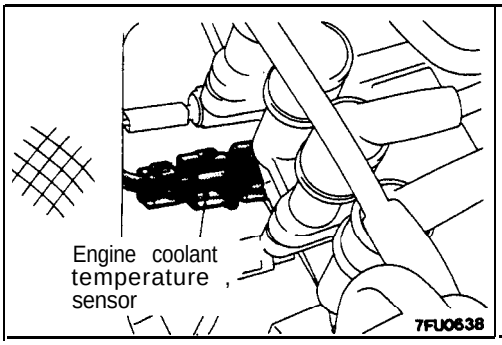
Specified sealant:
3M NUT locking Part No. 4171 or equivalent

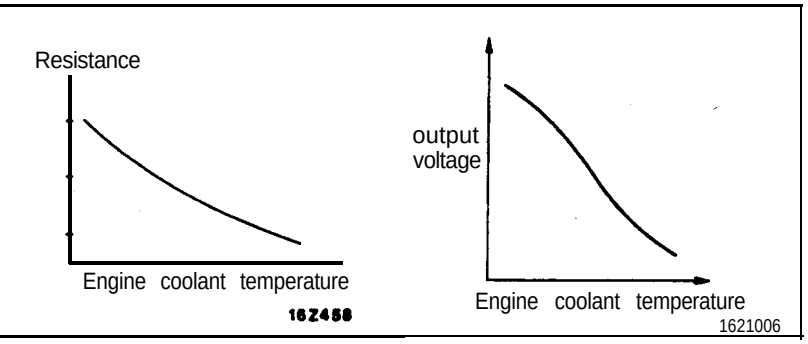
(2) Install engine coolant temperature sensor and tighten it to specified torque.

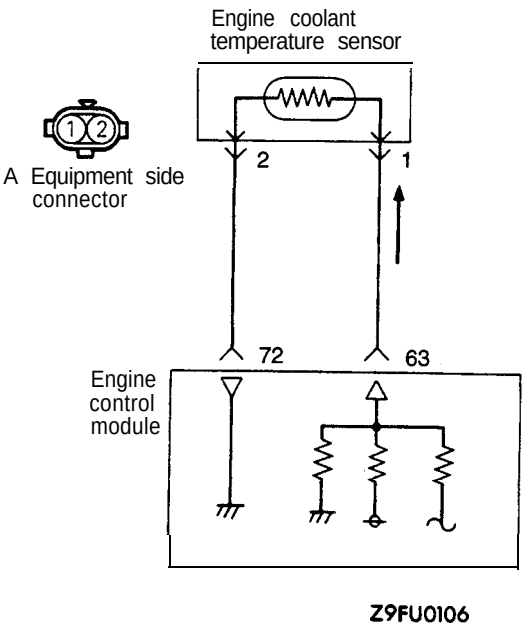
Sensor tightening torque: 30 Nm (22 ft.lbs.)

(3) Fasten harness connectors securely.

ENGINE COOLANT TEMPERATURE SENSOR <From 1994 models>







OPERATION

Refer to P.13A-93.

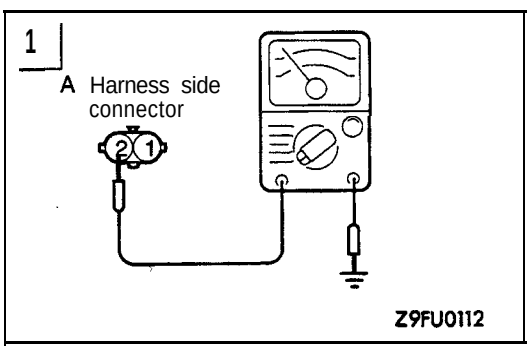
TROUBLESHOOTING HINTS

Refer to P.13A-93.

INSPECTION

Refer to P.13A-94.

HARNESS INSPECTION



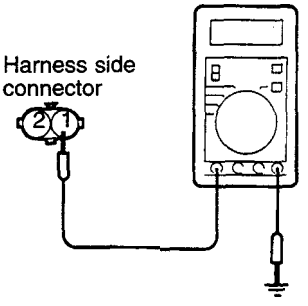
Check for continuity of the ground circuit.

- Engine coolant' temperature sensor connector: Disconnected

OK → 2

NG → Repair the harness. (A2–72)

TSB Revision

2 A Harness side connector  Z9FU0114	Measure the impressed voltage. • Engine coolant temperature sensor connector: Disconnected • Engine control module connector: Connected • Ignition switch: ON **4.5–4.9** v	OK →	STOP
		NG →	Repair the harness. (AI -63)

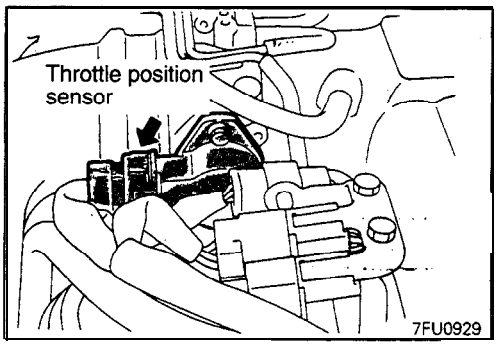
SENSOR INSPECTION

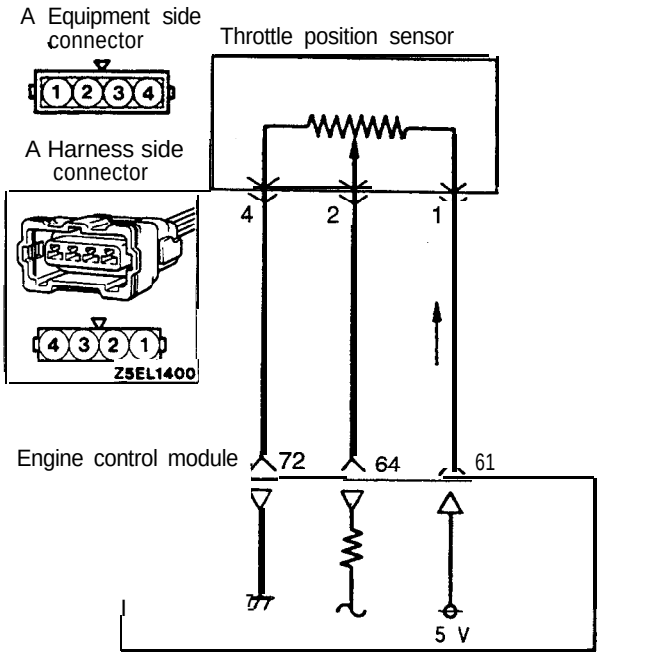
Refer to 13A-95.

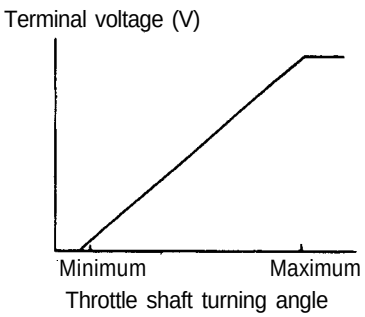
INSTALLATION

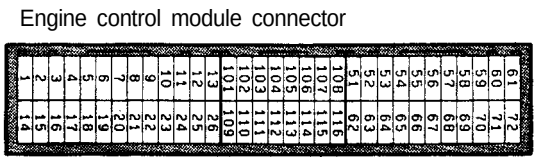
Refer to 13A-95.

THROTTLE POSITION SENSOR









OPERATION

- The throttle position sensor converts the throttle position opening into a voltage and inputs it to the engine control module, which then controls the fuel injection based on the input signal.
- The 5 V power in the engine control module is supplied to the throttle position sensor. Through the resistor in the sensor, it is grounded in the engine control module.
- As the throttle valve shaft rotates from the idle position to wide open position, the resistance between the variable resistor terminal of the throttle position sensor and the ground terminal increases. As a result, the voltage at the throttle position sensor variable resistance terminal also increases.

TROUBLESHOOTING HINTS

Hint 1: The throttle position sensor signal is more important in the control of automatic transaxle than in the engine control. Shifting shock and other troubles will be caused if this sensor is faulty.

Hint 2: If the output voltage of the throttle position sensor is out of specification, adjust the sensor and check the voltage again. If there is an evidence of disturbed fixed SAS setting, adjust the fixed SAS.

TSB Revision

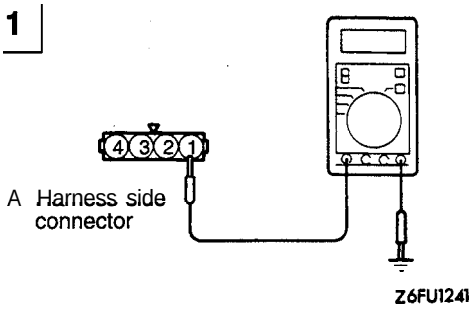
INSPECTION

Using Scan Tool

Function	Item No.	Data display	Check condition	Throttle valve	Standard value
Data reading	14	Sensor voltage	Ignition switch: left ON for 15 seconds or more	At idle position	300–1,000 mV
				Open slowly	Increases with valve opening
				Open widely	4,500–5,500 mV

HARNESS INSPECTION

1



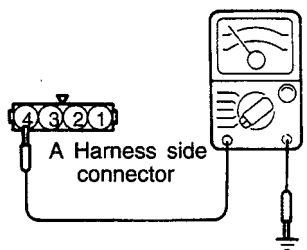
Measure the power supply voltage of the throttle position sensor.
- ● - Connector: disconnected
- Ignition switch: ON

4.8-5.2 V

OK → 2

NG → Repair the harness. (AI -61)

2

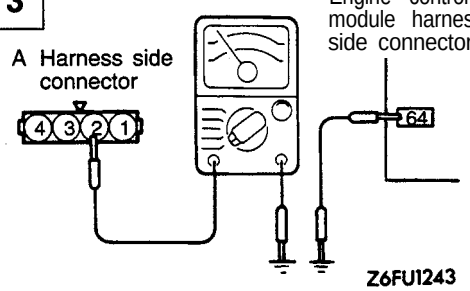


Check for continuity of the ground circuit.
- Connector: Disconnected

OK → 3

NG → Repair the harness. (A4–72)

3

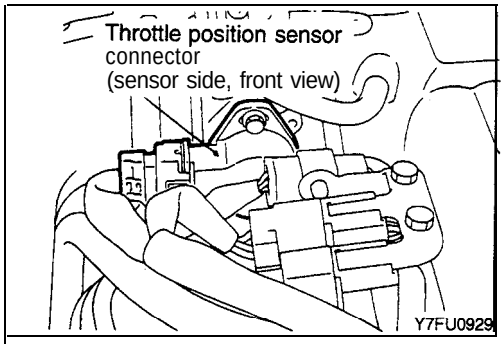


Check for an open-circuit, or a short-circuit to ground between the engine control module and the throttle position sensor.
- Throttle position sensor connector: disconnected
- Engine control module connector: Disconnected
- Connector of any control module which uses TPS output signals like ECM: Disconnected

OK → STOP

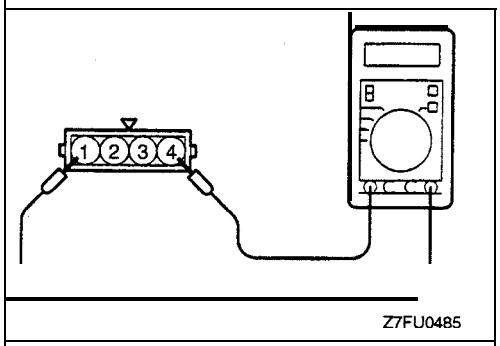
NG → Repair the harness. (A2–64)

TSB Revision



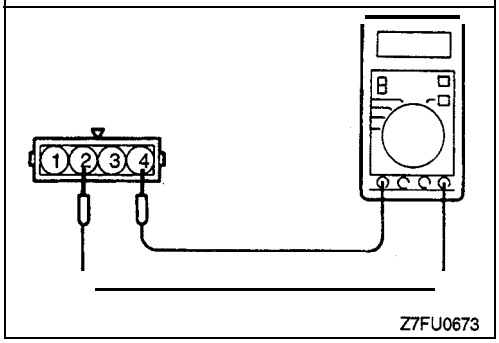
SENSOR INSPECTION

(1) Disconnect the throttle position sensor connector.



(2) Measure resistance between terminal (4) (sensor ground) and terminal **(1)** (sensor power).

Standard value: 3.5–6.5 kΩ



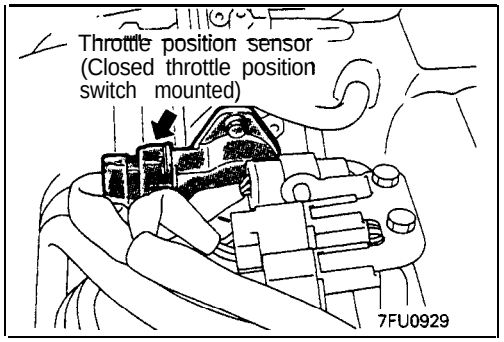
(3) Connect a pointer type ohmmeter between terminal (4) (sensor ground) and terminal (2) (sensor output).
(4) Operate the throttle valve slowly from the idle position to the full open position and check that the resistance changes smoothly in proportion with the throttle valve opening angle.
(5) If the resistance is out of specification, or fails to change smoothly, replace the throttle position sensor.

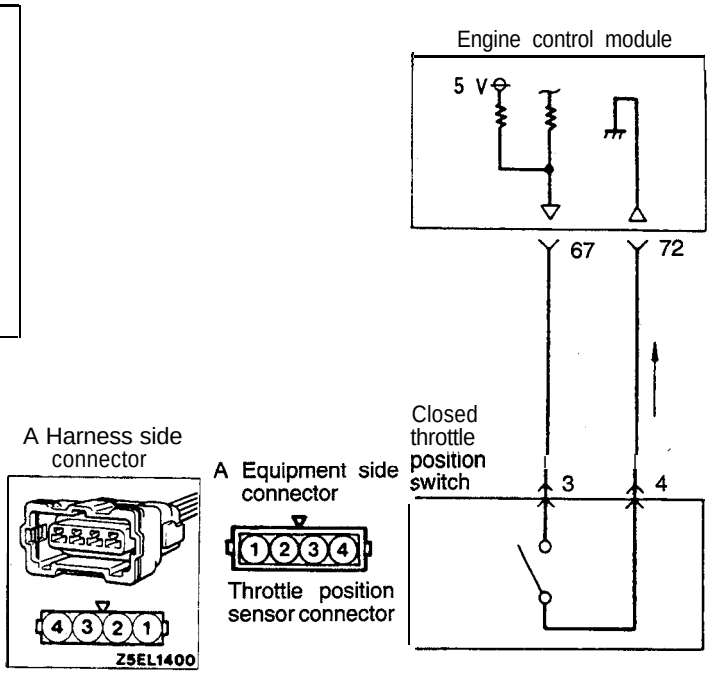
Throttle position sensor installation torque: 2.0 Nm (1.5 ft.lbs.)

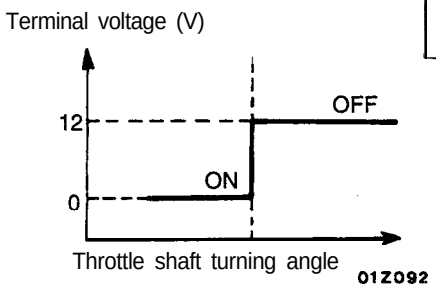
For the closed throttle position switch and throttle position sensor adjusting procedure, refer to P.13A-57.

TSB Revision

CLOSED THROTTLE POSITION SWITCH







7FU1583

OPERATION

- The closed throttle position switch senses whether the accelerator pedal is depressed or not, converts it into high/low voltage and inputs the voltage to the engine control module, which then controls the idle air control motor based on the input signal.
- The voltage in the engine control module is applied to the closed throttle position switch through a resistor. When the accelerator pedal is released, the closed throttle position switch is turned on to conduct the voltage to ground. This causes the closed throttle position switch terminal voltage to go low from high.

TROUBLESHOOTING HINTS

If the closed throttle position switch harness and individual part check results are normal but the closed throttle position switch output is abnormal, the following troubles are suspected.
(1) Poorly adjusted accelerator cable or auto-cruise control cable
(2) Poorly adjusted fixed SAS

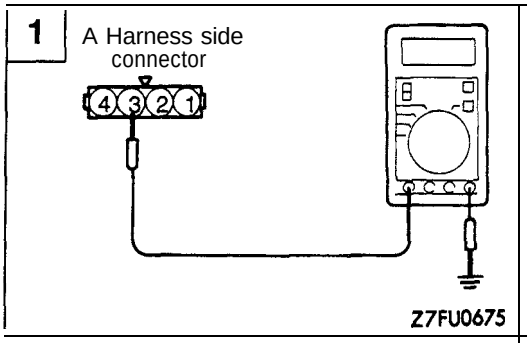
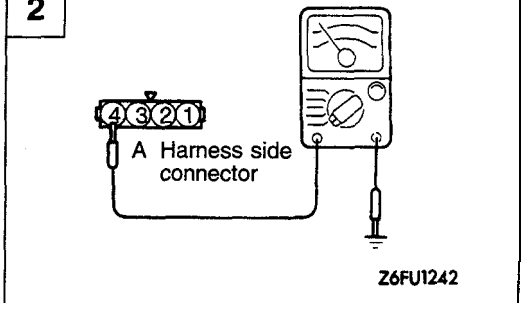
INSPECTION

Using Scan Tool

Function	Item No.	Data display	Check condition	Throttle valve	Normal indication
Data reading	26	Switch state	Ignition switch: **ON** (check by operating accelerator pedal repeatedly)	At idle position	O N
				Open a little	OFF

TSB Revision

HARNESS INSPECTION

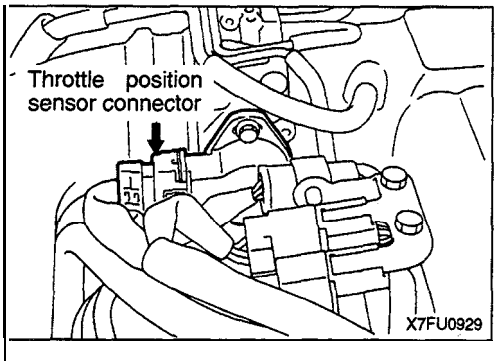
1 	Measure the power supply voltage of the closed throttle position switch. • Connector: Disconnected • Ignition switch: ON 4 **V or more**	OK → 2 3 NG → Repair the harness. (A3–67)	
2 	Check for continuity of the ground circuit. • Connector: Disconnected	OK → STOP NG → Repair the harness. (A4–72)	

SENSOR INSPECTION

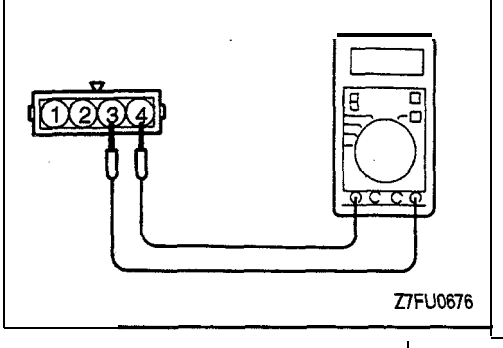
(1) With the accelerator pedal released, check to be sure that the throttle valve lever or the fixed SAS is pushed.

NOTE
If it is not pushed, adjust the fixed SAS (Refer to P.13A-59.)

(2) Disconnect the throttle position sensor connector.
(3) Check the continuity across the throttle position sensor connector terminal (4) (Sensor ground) and (3) (Closed throttle position switch).



Accelerator pedal	Continuity
Depressed	Non-conductive (∞ Ω)
Released	Conductive (0 Ω)



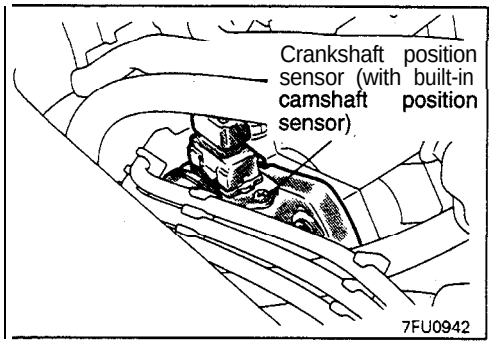
NOTE
If there is no continuity when the accelerator pedal is returned, loosen the throttle-position sensor installation screw; then, after turning all the way in the counterclockwise direction, check again.

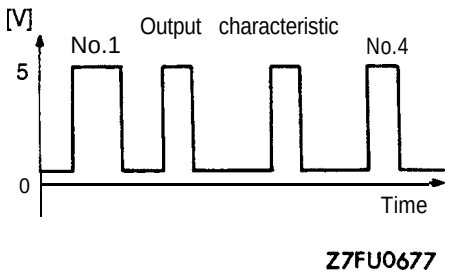
(4) Replace the throttle-position sensor (closed throttle position switch incorporated) if there is a malfunction,

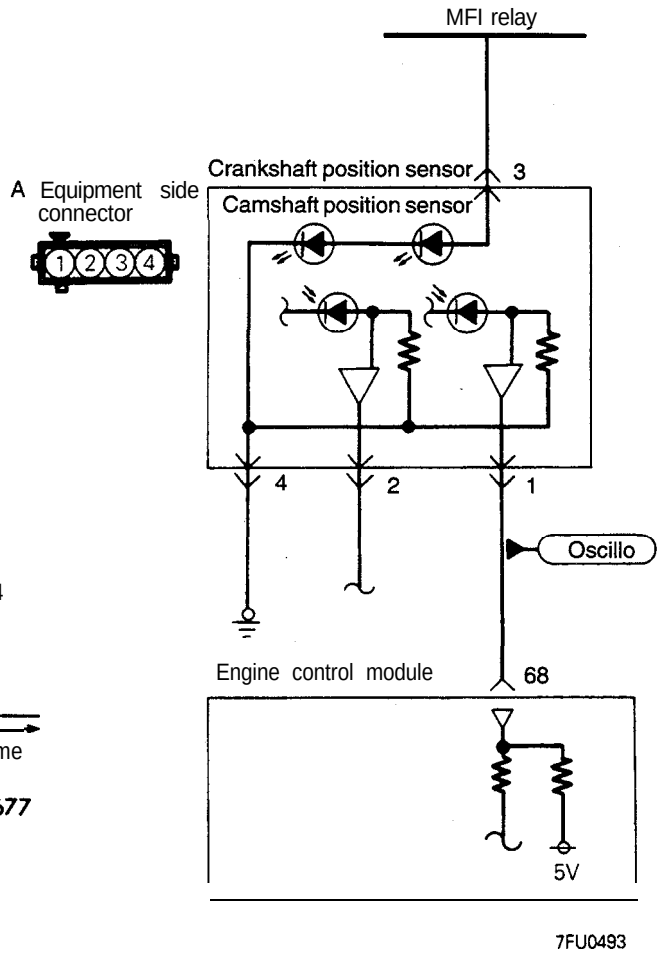
NOTE
For the closed throttle position switch and throttle position sensor adjusting procedure, refer to P.13A-57.

TSB Revision

CAMSHAFT POSITION SENSOR <1 992 models>







7FU1584

OPERATION

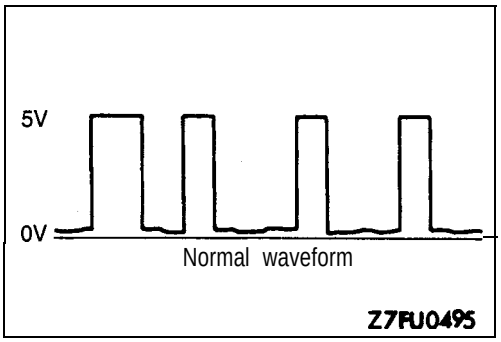
- The camshaft position sensor senses the top dead center on compression stroke of the No.1, No.3 and No.5 cylinders, converts it into a pulse signal and inputs it to the engine control module, which then controls the fuel injection sequence, etc. based on the input signal.
- Power to the camshaft position sensor is supplied from the MFI relay and is grounded to the body. The camshaft position sensor generates a pulse signal as it repeatedly connects and disconnects between 5 V voltage supplied from the engine control module and ground.

TROUBLESHOOTING HINTS

Hint 1: If the camshaft position sensor does not function correctly, correct sequential injection is not made so that the engine may stall, run irregularly at idle or fail to accelerate normally.

Hint 2: If the sensor outputs a pulse signal when the ignition switch is turned ON (with the engine not running), a faulty camshaft position sensor or engine control module is suspected.

TSB Revision



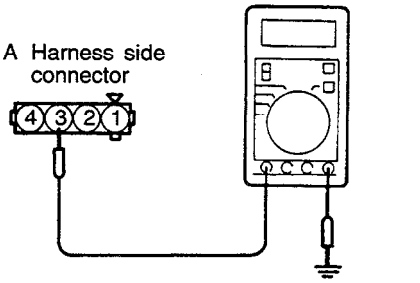
INSPECTION

Using Oscilloscope

(1) Run the engine at an idle speed.
(2) Connect the probe to the oscilloscope pick-up point as shown in the circuit diagram, and check the waveform.

HARNESS INSPECTION

1



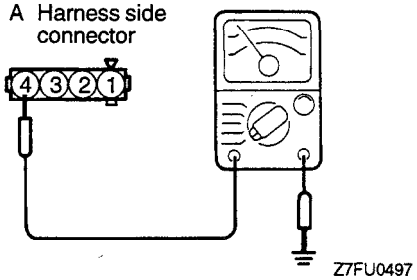
Measure the power supply voltage.
- Connector: Disconnected
- Ignition: switch ON

Battery voltage

OK → 2

NG → Repair the harness. (A3 – MFI relay)

2

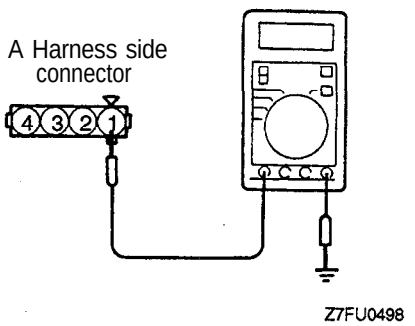


Check for continuity of the ground circuit
- Connector: Disconnected

OK → 3

NG → Repair the harness. (A4 – Ground)

3



Check the voltage of the output circuit
- Connector: Disconnected
- ignition switch: ON

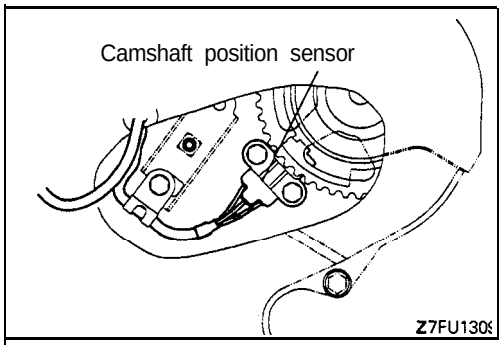
4.8–5.2 V

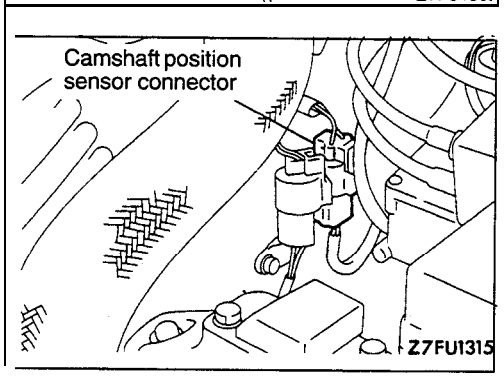
OK → STOP

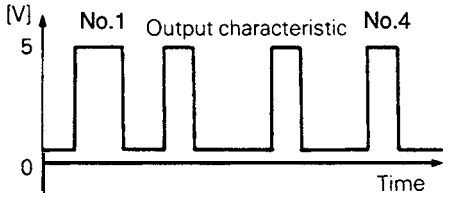
NG → Repair the harness. (A1–68)

TSB Revision

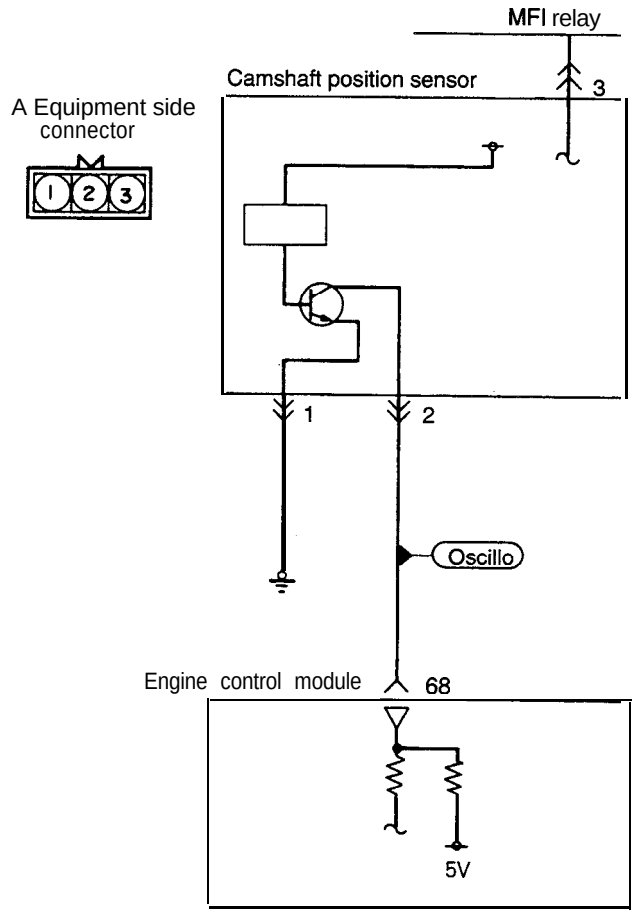
CAMSHAFT POSITION SENSOR <From 1993 models>





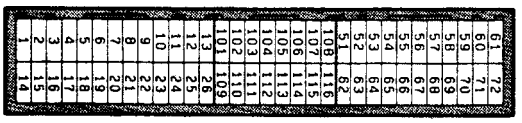


Z7FU0677



Z6AF0054

Engine control module connector



7FU1585

7FU0653

OPERATION

- The camshaft position sensor senses the top dead center on compression stroke, converts it into a pulse signal and inputs it to the engine control module, which then controls the fuel injection sequence, etc. based on the input signal.
- Power to the camshaft position sensor is supplied from the MFI relay and is grounded to the body. The camshaft position sensor generates a pulse signal as it repeatedly connects and disconnects between 5 V voltage supplied from the engine control module and ground.

TROUBLESHOOTING HINTS

Hint 1: If the camshaft position sensor does not function correctly, correct sequential injection is not made so that the engine may stall, run irregularly at idle or fail to accelerate normally.

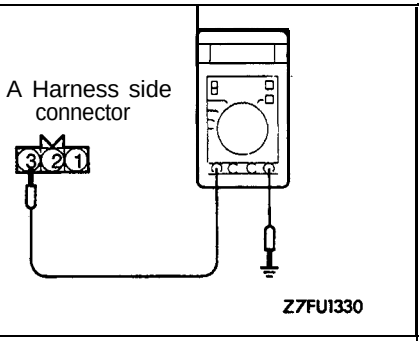
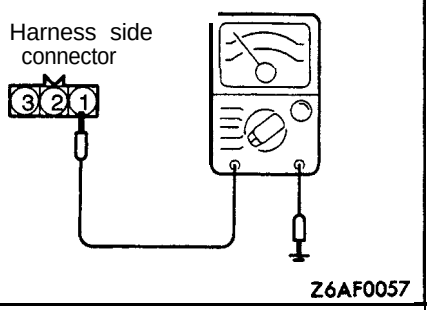
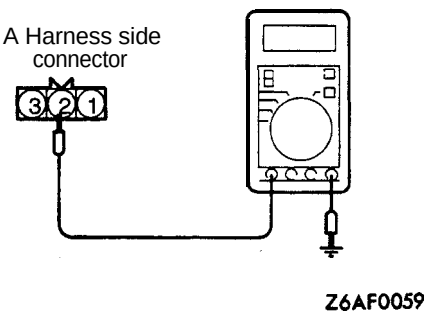
Hint 2: If the sensor outputs a pulse signal when the ignition switch is turned ON (with the engine not running), a faulty camshaft position sensor or engine control module is suspected.

INSPECTION

Refer to P.13A-104.

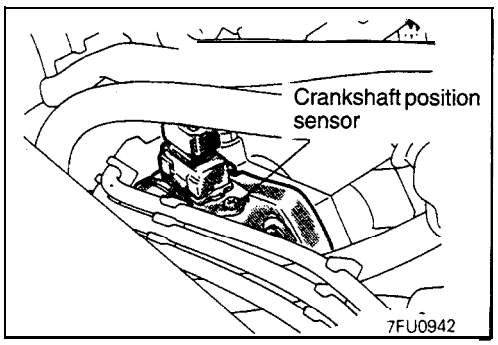
TSB Revision

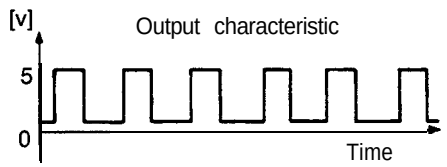
HARNESS INSPECTION

1 	Measure the power supply voltage. • Connector: Disconnected • Ignition switch: ON **Battery voltage**	OK → **2** OK → Repair the harness. (A3 – MFI relay)
2 	Check for continuity of the ground circuit. • Connector: Disconnected	OK → **3** OK → Repair the harness. (A1 – Ground)
3 	Measure the impressed voltage. • Connector: Disconnected • Ignition switch: ON **4.8–5.2** V	OK → STOP OK → Repair the harness. (A2–68)

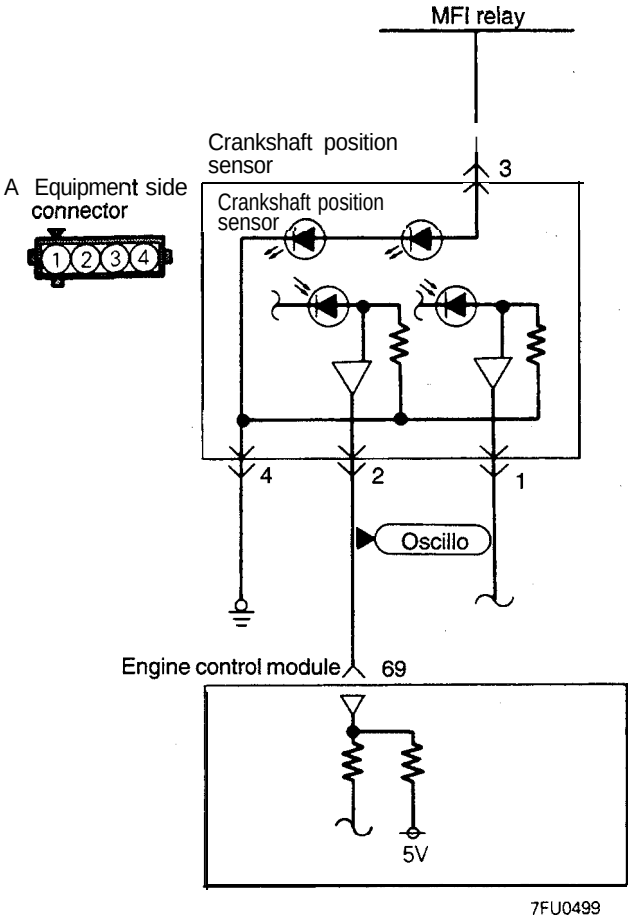
TSB Revision

CRANKSHAFT POSITION SENSOR <1 992 models>





Z7FU0682



7FU1586

OPERATION

- The crankshaft position sensor senses the crank angle (piston position) of each cylinder, converts it into a pulse signal and inputs it to the engine control module, which then controls the engine speed and controls the fuel injection timing and ignition timing based on the input signal.
- Power to the crankshaft position sensor is supplied from the MFI relay and is grounded to the body. The crankshaft position sensor generates a pulse signal as it repeatedly connects and disconnects between 5 V voltage supplied from the engine control module and ground.

TROUBLESHOOTING HINTS

Hint 1: If unexpected shocks are felt during driving or the engine stalls suddenly during idling, shake the crankshaft position sensor harness. If this causes the engine to stall, poor contact of the sensor connector is suspected.

Hint 2: If the crankshaft position sensor outputs a pulse signal when the ignition switch is turned ON (with the engine not running), a faulty crankshaft position sensor or engine control module is suspected.

Hint 3: If the tachometer reads 0 rpm when the engine that has failed to start is cranked, faulty crankshaft position sensor or broken timing belt is suspected.

Hint 4: If the tachometer reads 0 rpm when the engine that has failed to start is cranked, the primary current of the ignition coil is not turned on and off. Therefore, troubles in the ignition circuit and ignition coil or faulty ignition power transistor is suspected.

Hint 5: If the engine can be run at idle even though the crankshaft position sensor reading is out of specification, troubles are often in other than the crankshaft position sensor.
[Examples]
(1) Faulty engine coolant temperature sensor
(2) Faulty idle air control motor
(3) Poorly adjusted reference idle speed

TSB Revision

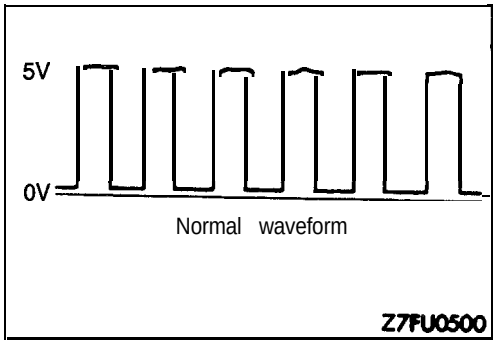
INSPECTION

Using Scan Tool

Function	Item No.	Data display	Check condition	Check content	Normal state
Data reading	22	Cranking speed	• Engine cranking • Tachometer connected (check on and off of primary current of ignition coil by tachometer)	Compare cranking speed and scan tool reading	Indicated speed to agree

NOTE
(1) The tachometer indicates a third of the actual engine speed. Therefore, 3 times the tachometer indication is the actual engine speed.
(2) When the tachometer is set to the 2-cylinder range, it indicates actual engine speed.

Function	Item No.	Data display	Check condition	Coolant temperature	Standard value
Data reading	22	Idle speed	• Engine: Running at idle • Closed throttle position switch: ON	At –20°C (–4°F)	1,300– 1,500 rpm
				At 0°C (32°F)	1,250– 1,450 rpm
				At 20°C (68°F)	1,100–1,300 rpm
				At 40°C (104°F)	950–1,150 rpm
				At 80°C (176°F)	600-800 rpm



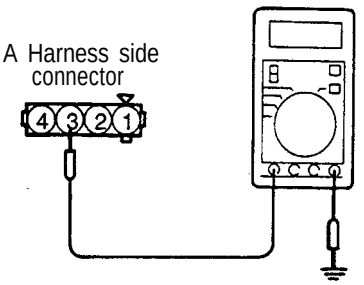
Using Oscilloscope

(1) Run the engine at idle speed.
(2) Connect the probe to the oscilloscope pick-up point as shown in the circuit diagram, and check the waveform.

TSB Revision

HARNESS INSPECTION

1



Z7FU0496

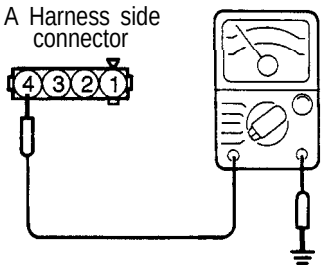
Measure the power supply voltage.
- Connector: Disconnected
- Ignition switch: ON

Battery voltage

OK → **2**

NG → Repair the harness. (A3 – MFI relay)

2



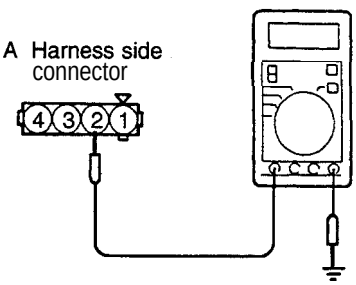
Z7FU0497

Check for continuity of the ground circuit.
- Connector Disconnected

OK → **3**

NG → Repair the harness. (A4 – Ground)

3



Y7FU0498

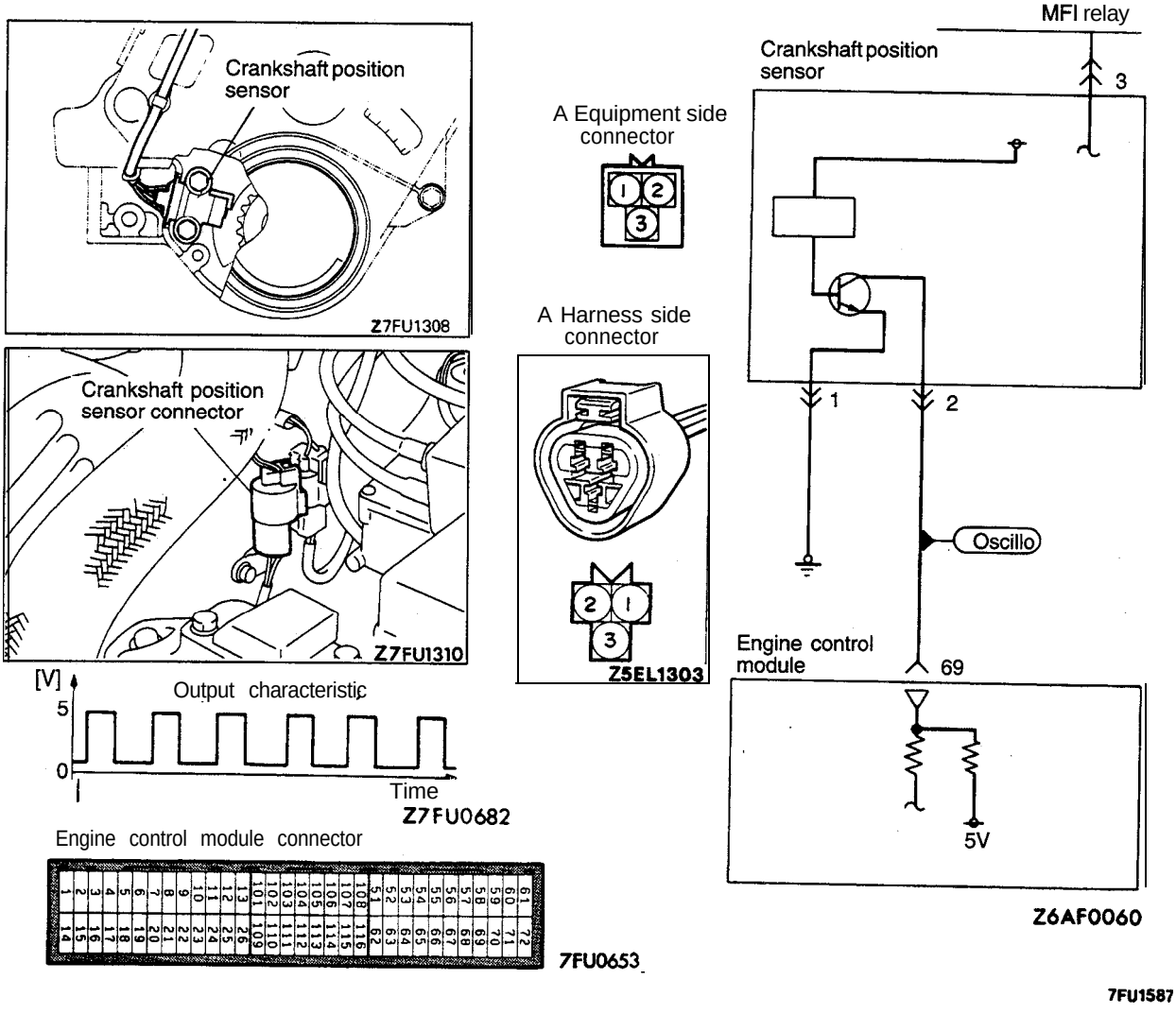
Check the voltage of the output circuit.
- Connector: Disconnected
- Ignition switch: ON

4.8–5.2 V

OK → STOP

NG → Repair the harness. (A2–69)

CRANKSHAFT POSITION SENSOR <From 1993 models>



OPERATION

Refer to P.13A-107.

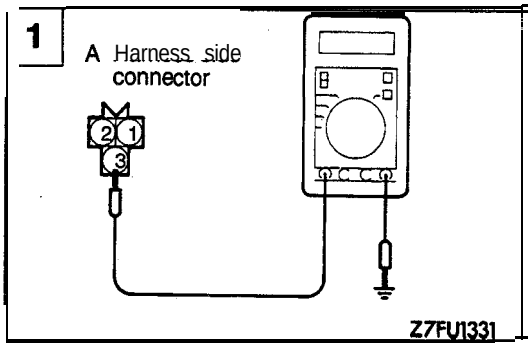
TROUBLESHOOTING HINTS

Refer to P.13A-107.

INSPECTION

Refer to P.13A-108.

HARNESS INSPECTION



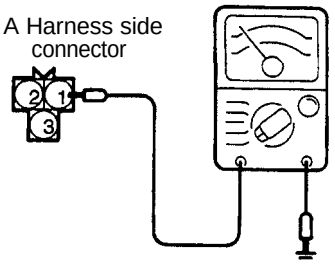
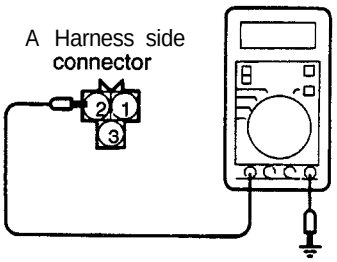
Measure the power supply voltage.
- Connector: Disconnected
- Ignition switch: ON

Battery voltage

OK → 2

NG → Repair the harness. (A3 – MFI relay)

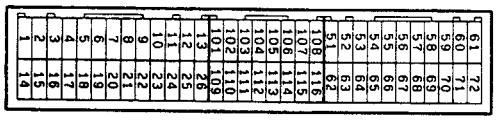
TSB Revision

2 A Harness side connector  Z6AF0062	Check for continuity of the ground circuit. • Connector: Disconnected	OK →	3
		NG →	Repair the harness. (AI – Ground)
3 A Harness side connector  Z6AF0064	Measure the impressed voltage. • Connector: Disconnected • Ignition switch: ON **4.8–5.2 V**	OK →	STOP
		NG →	Repair the harness. (A2–69)

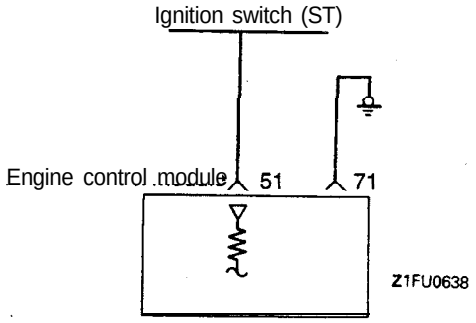
TSB Revision

IGNITION SWITCH-ST <M/T>

Engine control module connector



Z7FU0653



7FU1588

OPERATION

- The ignition switch-ST inputs a high signal to the engine control module while the engine is cranking. The engine control module provides fuel injection control, etc., at engine startup based on this signal.
- When the ignition switch is set to START, the battery voltage at cranking is applied through the ignition switch to the engine control module, which detects that the engine is cranking.

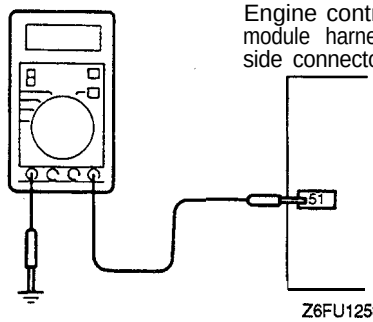
INSPECTION

Using Scan Tool

Function	Item No.	Data display	Check condition	Engine	Normal indication
Data reading	18	Switch state	ignition switch: ON	Stop	OFF
				Cranking	ON

HARNESS INSPECTION

1



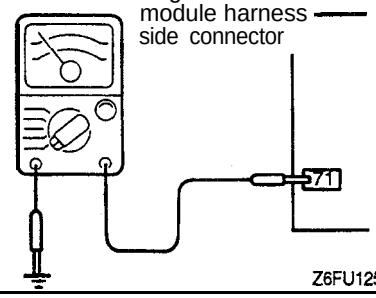
Measure the input voltage to the engine control module.
- Engine control module connector: Disconnected
- Ignition switch: START

8 **V or more**

OK → **2**

OK → Repair the harness. (51 – Ignition switch)

2



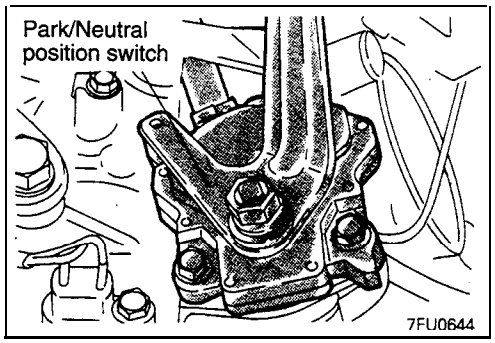
Check for continuity of the ground circuit.
- Engine control module connector: Disconnected

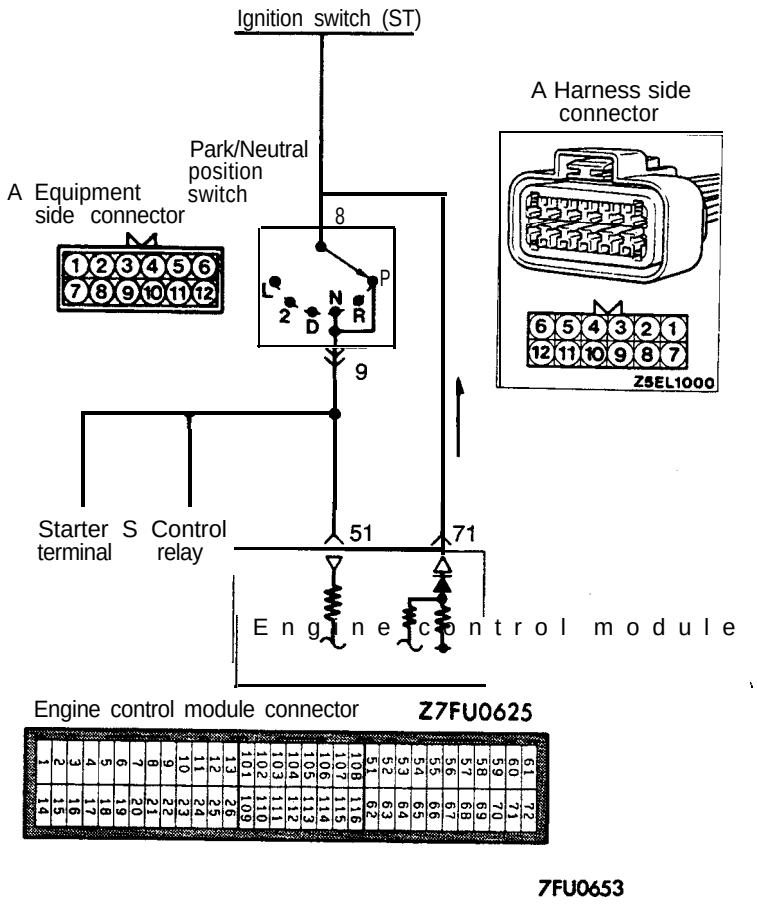
OK → STOP

OK → Repair the harness. (71 – Ground)

TSB Revision

IGNITION SWITCH-ST AND PARK/NEUTRAL POSITION SWITCH (PNP SWITCH) <A/T – 1992 models>





OPERATION

- The ignition switch-ST inputs a high signal to the engine control module while the engine is cranking. The engine control module provides fuel injection control, etc., at engine startup based on this signal.
- When the ignition switch is set to START, the battery voltage at cranking is applied through the ignition switch and park/neutral position switch to the engine control module, which detects that the engine is cranking.
  In case the selector lever is in a position other than the P/N range, the battery voltage is not applied to the engine control module.
- The park/neutral position switch converts the selector lever position (whether it is at the P/N range or at others) into high/low voltage and inputs it to the engine control module, which then controls the idle air control motor based on this signal.
- The battery voltage in the engine control module is applied through a resistor to the park/neutral position switch. When the selector lever is set to the P/N range, continuity is produced between the park/neutral position switch terminal of the engine control module and ground through the starter motor, thereby making the terminal voltage go low.

TROUBLESHOOTING HINTS

If the park/neutral position switch harness and individual part checked good but the park/neutral position switch output is abnormal, poorly adjusted control cable is suspected.

TSB Revision

INSPECTION

Using Scan Tool

IGNITION SWITCH-ST

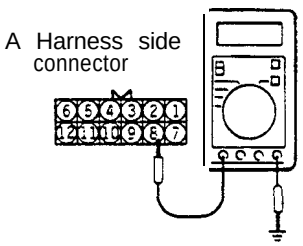
Function	Item No.	Data display	Check condition	Engine	Normal indication
Data reading	18	Switch state	Ignition switch: ON	stop	OFF
				Cranking	ON

PARK/NEUTRAL POSITION SWITCH

Function	Item No.	Data display	Check condition	Select lever position	Normal indication
Data reading	29	Shift position	Ignition switch: ON	P or N	P or N
				D, 2, L or R	D, 2, L or R

HARNESS INSPECTION

1



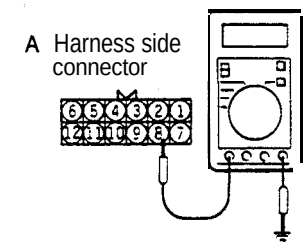
Measure the power supply voltage of the PNP switch.
- Engine control module connector: Disconnected
- PNP switch connector: Disconnected
- Ignition switch: START

Battery voltage

OK → 2

NO → Check the power supply circuit.

2



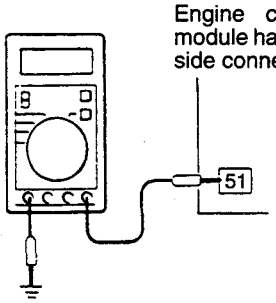
Measure the PNP switch terminal input voltage.
- Engine control module connector: Connected
- PNP switch connector: Disconnected
- Ignition switch: ON

Battery voltage

OK → 3

NO → Repair the harness. (A8–7)

3



Measure the input voltage of engine control module.
- Engine control module connector: Disconnected
- PNP switch connector: Connected
- Select lever: P range
- Ignition switch: START

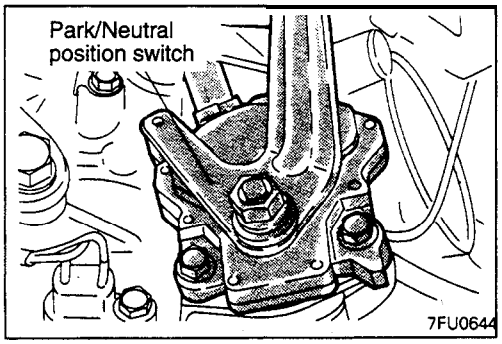
8 **V or more**

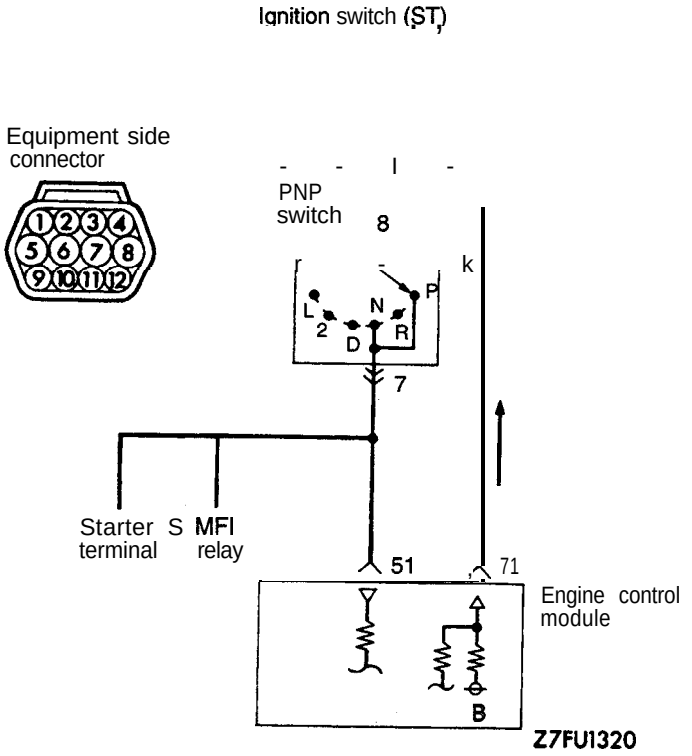
OK → A STOP

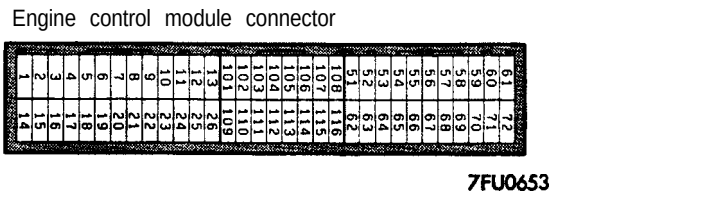
NO → Replace the engine control module

TSB Revision

IGNITION SWITCH-ST AND PARK/NEUTRAL POSITION SWITCH (PNP SWITCH) <A/T – From 1993 models>







7FU1590

OPERATION

Refer to P.13A-113.

TROUBLESHOOTING HINTS

Refer to P.13A-113.

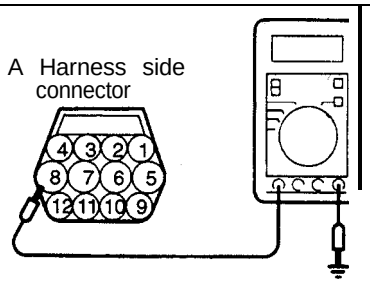
TSB Revision

INSPECTION

Refer to P.13A-114.

HARNESS INSPECTION

1



Z9FU0268

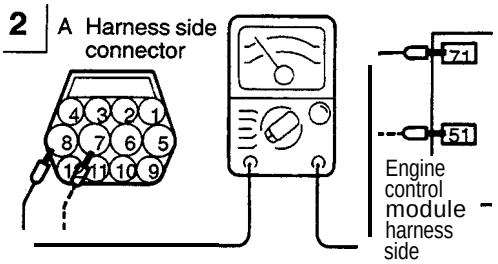
Measure the power supply voltage.
- Engine control module connector: Disconnected
- PNP switch connector: Disconnected
- Ignition switch: START

Battery voltage

OK → 2

NG → Check the power supply circuit.

2



Z9FU0269

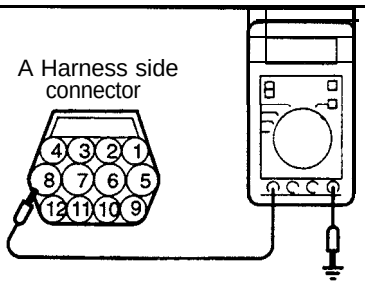
Check for continuity between the PNP switch and engine control module.
- Engine control module connector: Disconnected
- PNP switch connector: Disconnected

NOTE
Insert the probes of the circuit tester into both ends of the harness.

OK → 3

NG → Repair the harness. (A8–71) (A7–51)

3



Z9FU0268

Measure the impressed voltage to the PNP switch.
- Engine control module connector: Connected
- PNP switch connector: Disconnected
- Ignition switch: ON

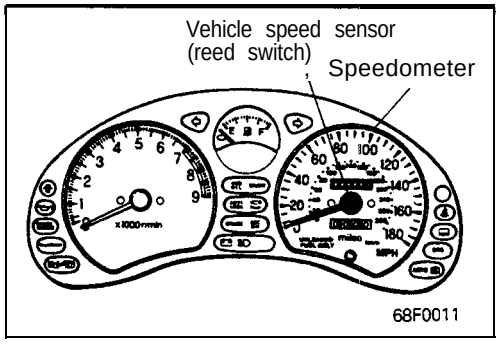
Battery voltage

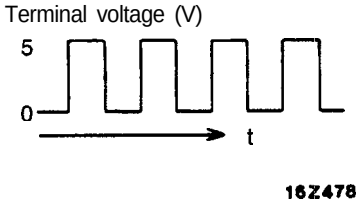
OK → STOP

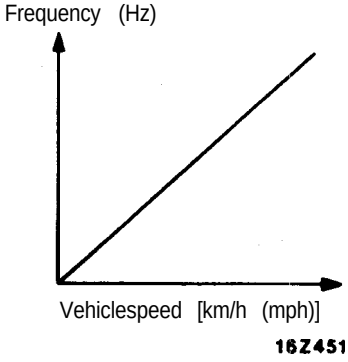
NG → Replace the engine control module.

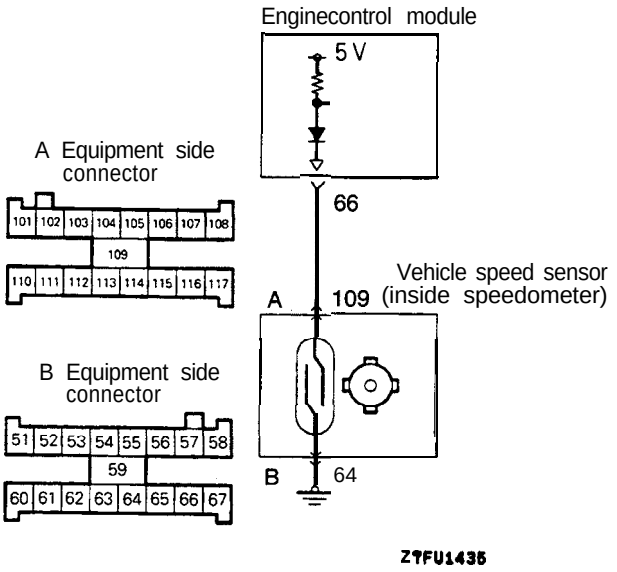
TSB Revision

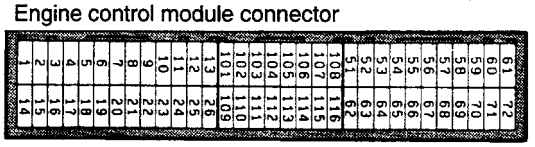
VEHICLE SPEED SENSOR (Mechanical Speedometer Type)











7FU1591

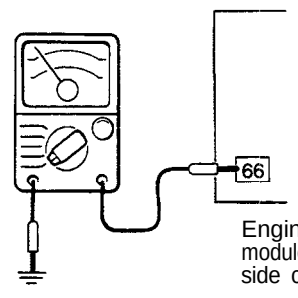
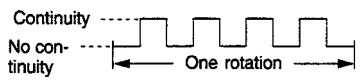
OPERATION

- The vehicle speed sensor which is located in the speedometer converts the vehicle speed into a pulse signal and inputs it to the engine control module, which then provides the idle speed control, etc. based on this signal.
- The vehicle speed sensor generates the vehicle speed signal by repeatedly opening and closing between the voltage of about 5 V applied from the engine control module and ground using a reed switch.

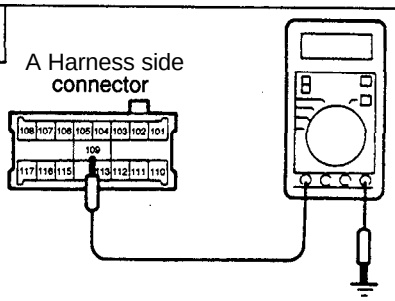
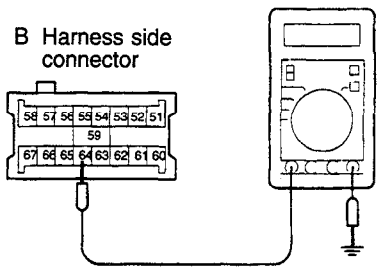
TROUBLESHOOTING HINTS

If there is an open or short circuit in the vehicle speed sensor signal circuit, the engine may stall when the vehicle is decelerated to stop.

HARNESS INSPECTION

1	 Engine control module harness side connector Z01A0508	Check the vehicle speed sensor output circuit for continuity. • Engine control module connector: Disconnected • Move the vehicle. Continuity 	OK → STOP NG → 2

TSB Revision

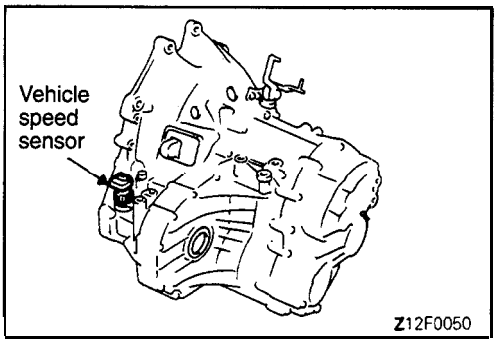
2 A Harness side connector  Z6FU1265	Measure the power supply voltage of the vehicle speed sensor. • Connector: Disconnected • Ignition switch: ON **4.5–4.9 V**	OK →	3
		NG →	Repair the harness. (A109–66)
3 B Harness side connector  Z7FU1438	Check for continuity of the ground circuit. • Connector: Disconnected	OK →	STOP
		NG →	Repair the harness. (B64 – Ground)

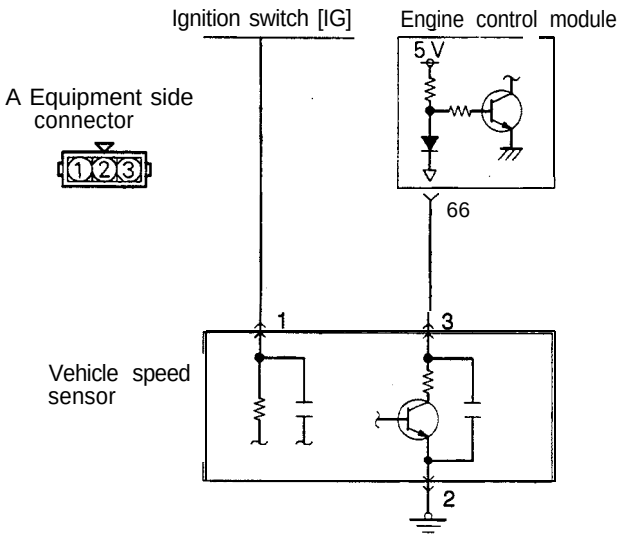
SENSOR INSPECTION

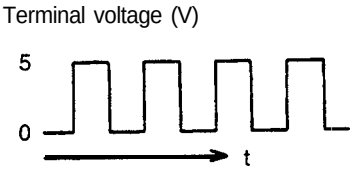
Refer to GROUP 54 – Meters and Gauges.

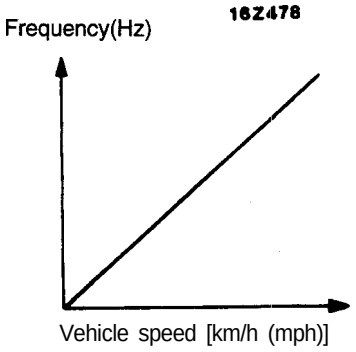
TSB Revision

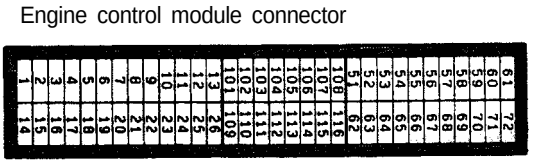
VEHICLE SPEED SENSOR (Electrical Speedometer Type)











OPERATION

- The vehicle speed sensor, mounted directly to the speedometer driven gear of the transmission, converts the vehicle speed to the pulse signal to be input to the engine control module. By this signal, the engine control module performs idle speed control servo control.
- A voltage of approx. 5V is applied from the engine control module to the vehicle speed sensor output terminal. By turning the power transistor ON and OFF, the vehicle speed sensor generates the pulse signal.

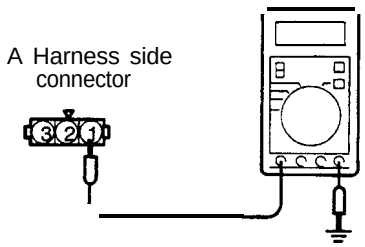
TROUBLESHOOTING HINTS

Refer to P.13A-117.

TSB Revision

HARNESS INSPECTION

1



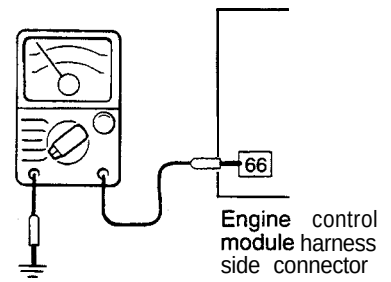
Measure the line voltage of the vehicle speed sensor.
- Connector: Disconnected
- Ignition switch: ON

Battery voltage

OK → **2**

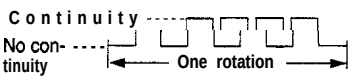
NG → Repair the harness. (A1 – Ignition switch)

2



Check the vehicle speed sensor output circuit for continuity.
- Engine control module connector: Disconnected
- Ignition switch: ON
- Move the vehicle

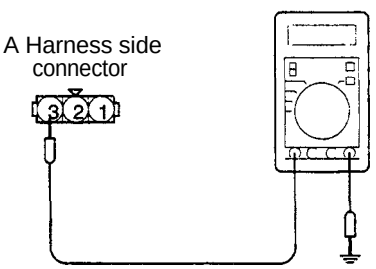
Continuity



OK → STOP

NG → **3**

3



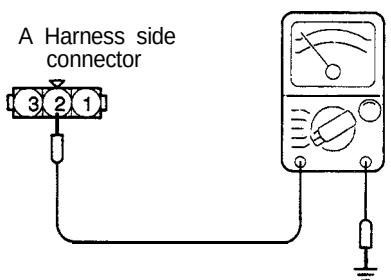
Measure the power supply voltage of the vehicle speed sensor.
- Connector: Disconnected
- Ignition switch: ON

4.5–4.9 V

OK → **4**

NG → Repair the harness. (A3–66)

4



Check for continuity of the ground circuit.
- Connector: Disconnected

OK → STOP

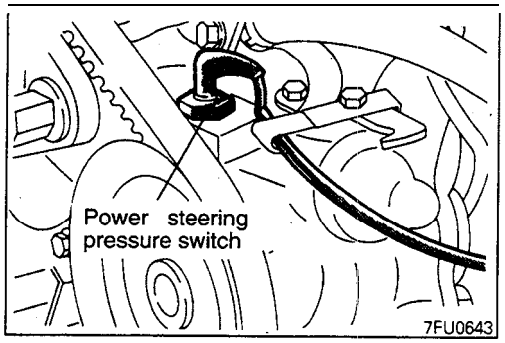
NG → Repair the harness. (A2 – Ground)

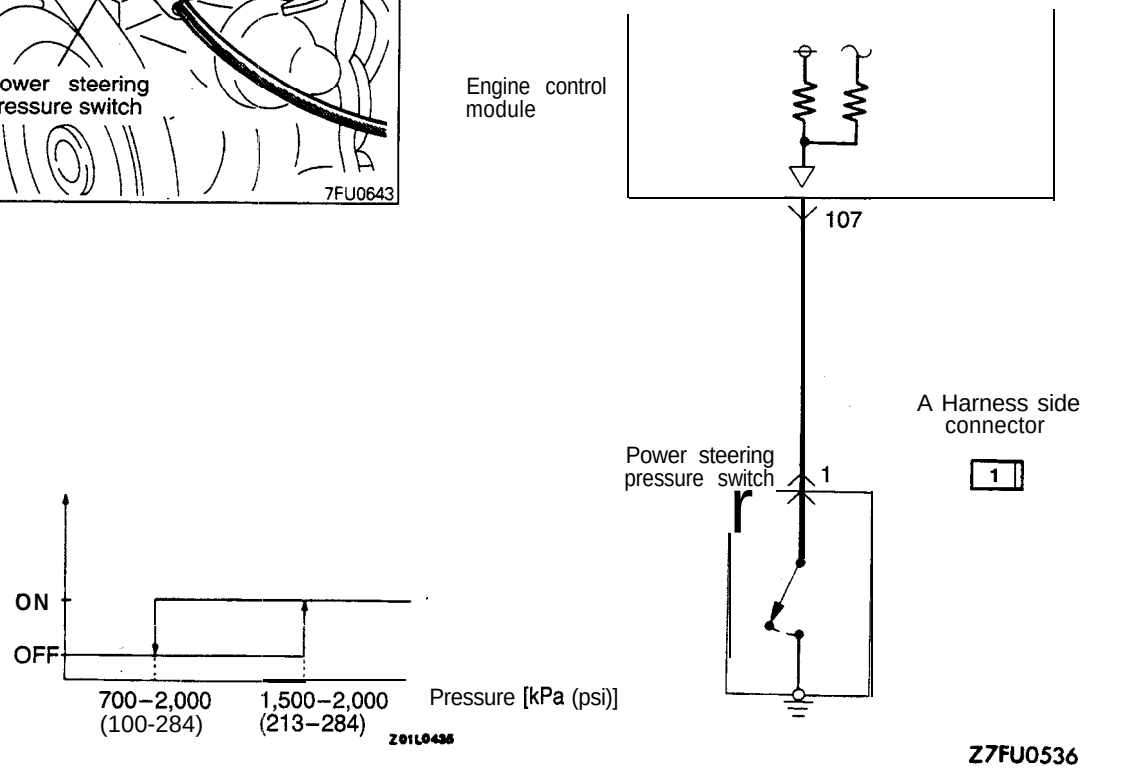
SENSOR INSPECTION

Refer to GROUP 54 – Meters and Gauges.

TSB Revision

POWER STEERING PRESSURE SWITCH





OPERATION

- The power steering pressure switch converts presence/absence of power steering load into low/high voltage and inputs it to the engine control module, which then controls the idle air control motor based on this signal.
- The battery voltage in the engine control module is applied through a resistor to the power steering pressure switch. Steering operation causes the power steering oil pressure to increase, turning the switch on. As a result, continuity is produced between the battery voltage applied and ground. This causes the power steering pressure terminal voltage to go from high to low.

INSPECTION

Using Scan Tool

Function	Item No.	Data display	Check condition	Steering wheel	Normal indication
Data reading	27	Switch state	Engine: Idling	Steering wheel neutral position (wheels straight-ahead direction)	OFF
				Steering wheel half turn	ON

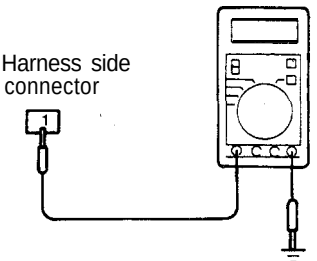
Checking Oil Pressure

Steering wheel	Oil pump delivery pressure (ref. value)
Straight forward	700–1,200 kPa (100–171 psi)
Turned	1,500–2,000 kPa (213-284 psi)

HARNESS INSPECTION

1

A Harness side connector



Z7FU0505

Measure the power supply voltage.
- Connector: Disconnected
- Ignition switch: ON

Battery voltage .

OK → STOP

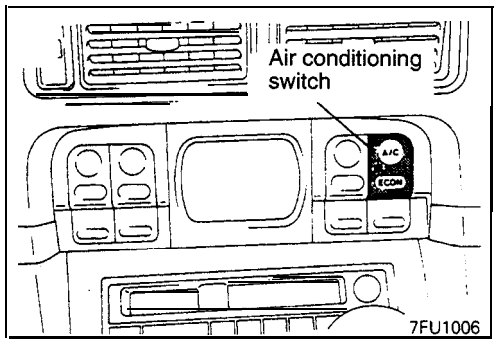
OK → Repair the harness. (AI – 107)

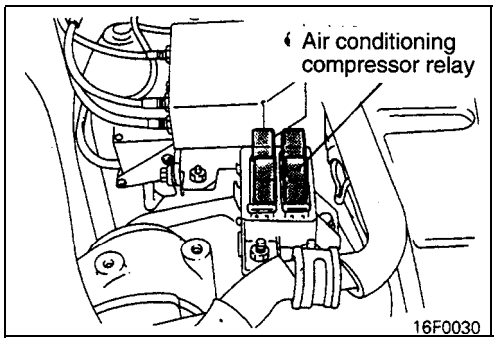
SENSOR INSPECTION

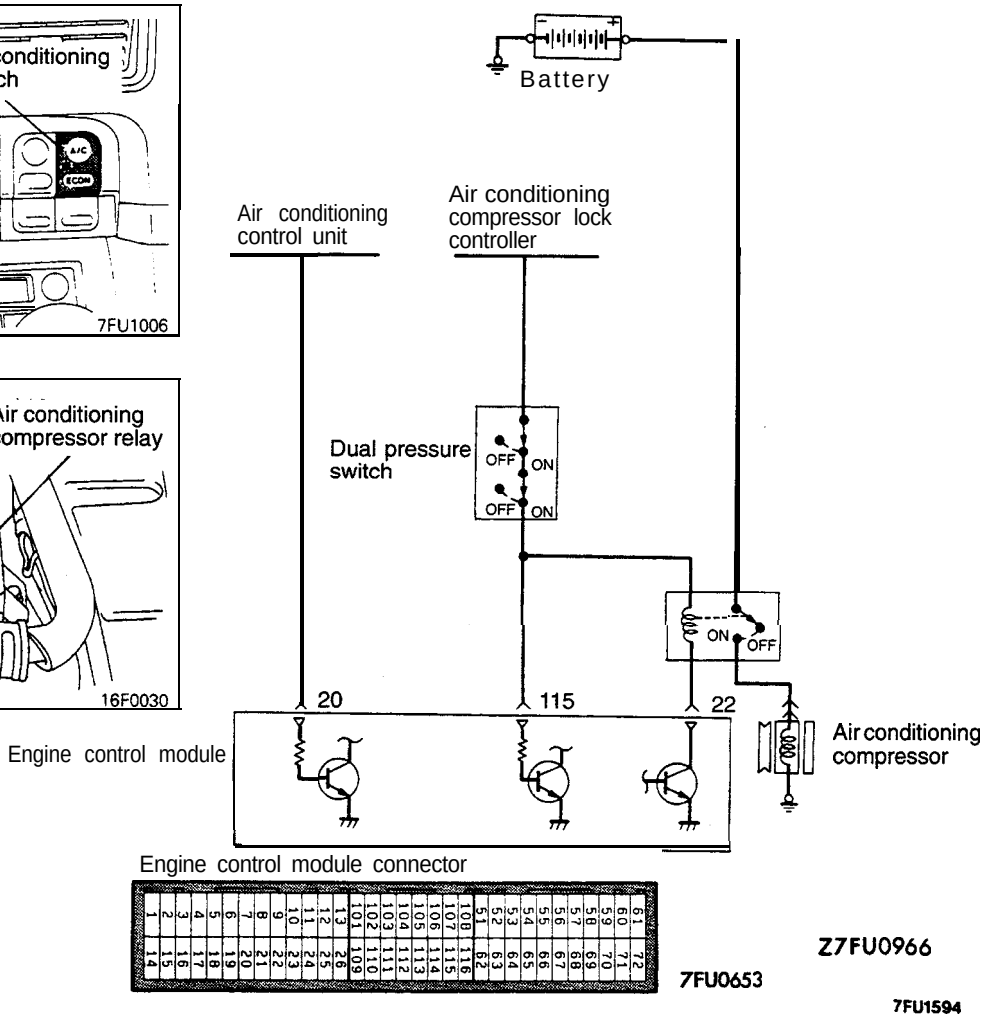
Refer to GROUP 37A – On-vehicle Service.

TSB Revision

AIR CONDITIONING SWITCH AND COMPRESSOR CLUTCH RELAY







OPERATION

- The air conditioning switch applies the battery voltage to the engine control module when the air conditioning is turned on.
- When the air conditioning ON signal is input, the engine control module drives the idle air control motor and turns ON the power transistor. As a result, the air conditioning power relay coil is energized to turn on the relay switch, which activates the air compressor magnetic clutch.

TROUBLESHOOTING HINTS

If the air compressor magnet clutch is not activated when the air conditioning switch is turned on during idling, faulty air conditioning control system is suspected.

INSPECTION

Using Scan Tool

AIR CONDITIONING SWITCH

Function	Item No.	Data display	Check condition	Air conditioning switch	Normal indication
Data reading	28	Switch state	Engine: Idling (air compressor to be running when air conditioning switch is ON)	OFF	OFF
				ON	ON

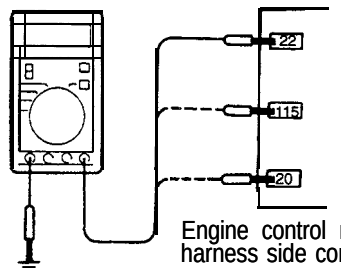
TSB Revision

AIR CONDITIONING POWER RELAY

Function	Item No.	Data display	Check condition	Air conditioning switch	Normal indication
Data reading	49	Air conditioning relay state	Engine: Idling after warm-up	OFF	OFF (compressor clutch non-activation)
				ON	ON (compressor clutch activation)

HARNESS INSPECTION

1



Engine control module harness side connector

Z7FU0695

Measure the power supply voltage of the air conditioning circuit.
- Air conditioning switch: ON
- Engine control module connector: Disconnected
- Ignition switch: ON
- Dual air conditioning switch: ON

Battery voltage

OK → STOP

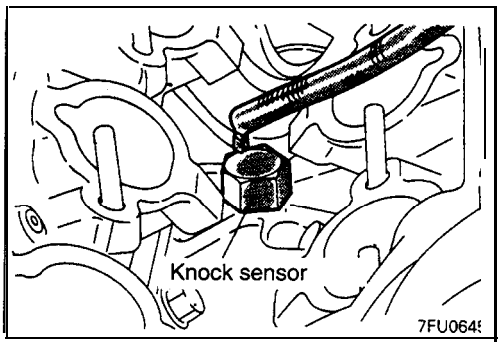
OK → Check the air conditioning circuit.

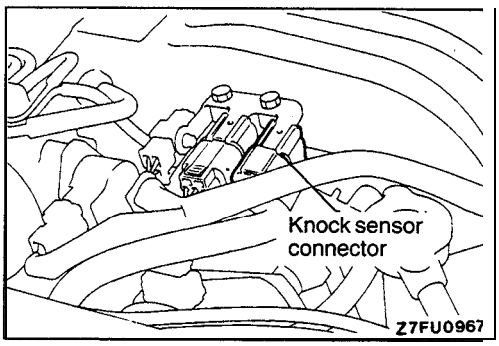
AIR CONDITIONING INSPECTION

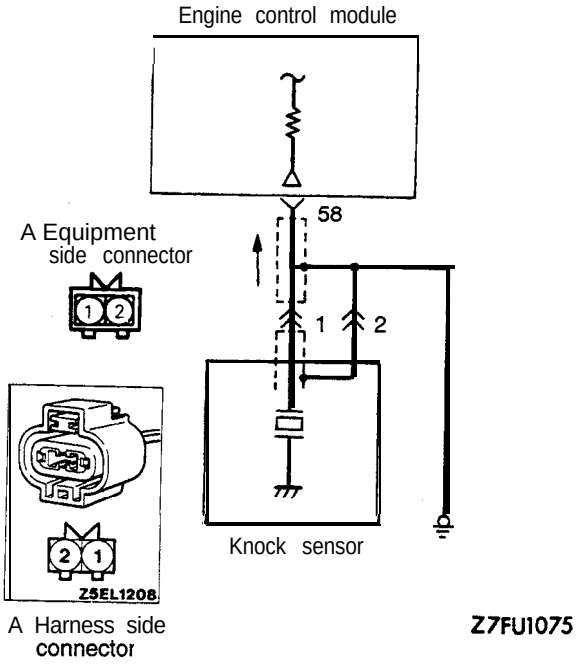
Refer to GROUP 55 – On-vehicle Service.

TSB Revision

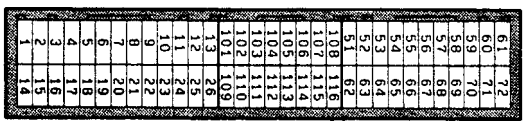
KNOCKSENSOR







Engine control module connector



7FU0653

7FU1595

OPERATION

The knock sensor generates a voltage proportional to the magnitude of cylinder block vibration due to knocking and inputs it to the engine control module. Based on this signal, the engine control module provides retard control of the ignition timing.

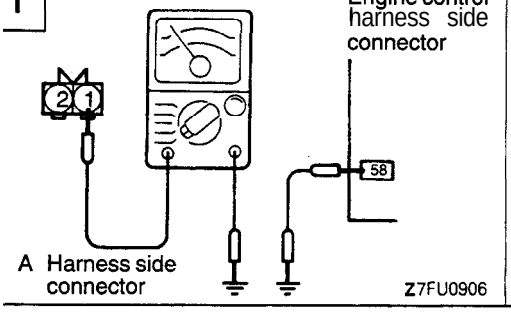
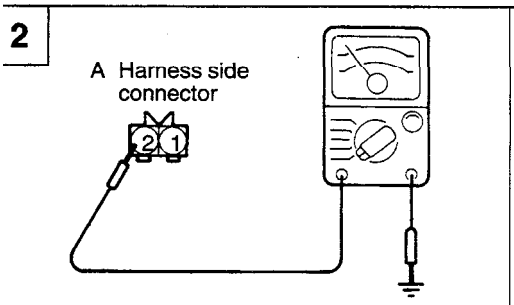
TROUBLESHOOTING HINTS

When knocking occurs while driving under high-load conditions, the following problems are suspected in addition to the knock sensor itself.

(1) Inappropriate ignition plug heat range
(2) Inappropriate gasoline
(3) Incorrectly adjusted reference ignition timing

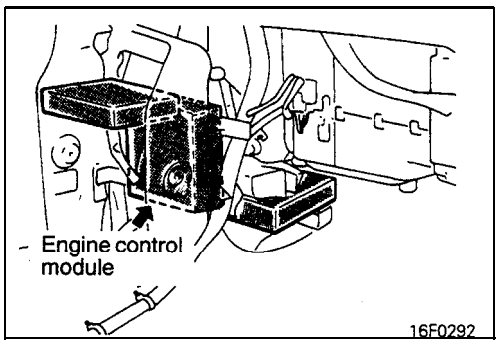
TSB Revision

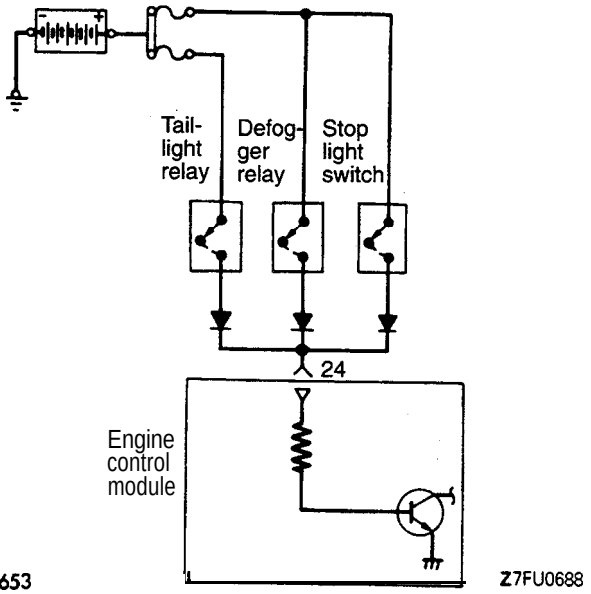
HARNESS INSPECTION

1		Check for an open-circuit or a short-circuit to ground, between the engine control module and knock sensor. • Knock sensor connector: Disconnected • Engine control module connector: Disconnected	OK → 2 NG → Repair the harness. (A1–58)
2		Check for continuity of the ground circuit. • Connector: Disconnected	OK → STOP NG → Repair the harness. (A2 – Ground)

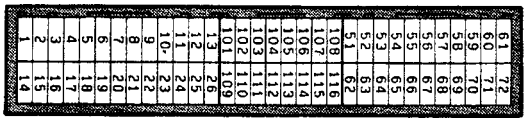
TSB Revision

ELECTRICAL LOAD SWITCH





Engine control module connector



7FU1596

OPERATION

- The electrical load switch inputs ON/OFF state of the switch of equipment that consumes much power during idling, namely, equipment with a large electrical load, to the engine control module. Based on this signal, the engine control module controls the idle air control motor.
- When the switch of equipment with a large electrical load is turned ON, the battery voltage is applied to the engine control module to indicate that the equipment switch is turned ON.

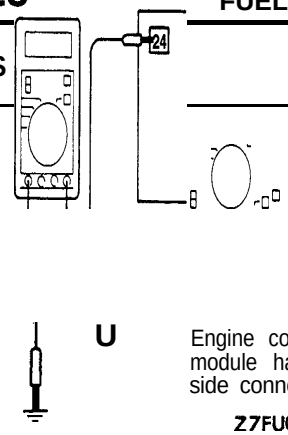
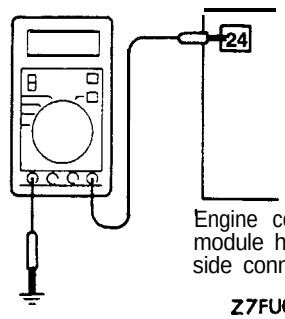
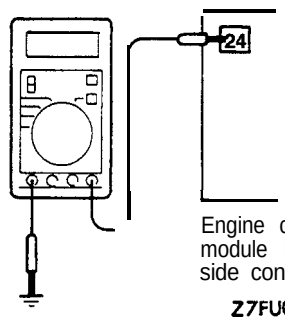
INSPECTION

Using Scan Tool

Function	Item No.	Data display	Check condition	Equipment state	Normal display
Data reading	33	Switch state	Operation of equipment: OFF	Lighting switch only: OFF → ON	OFF → ON
				Rear defogger switch only: OFF → ON	OFF → ON
				Brake pedal only: Depressed → Released	ON → OFF

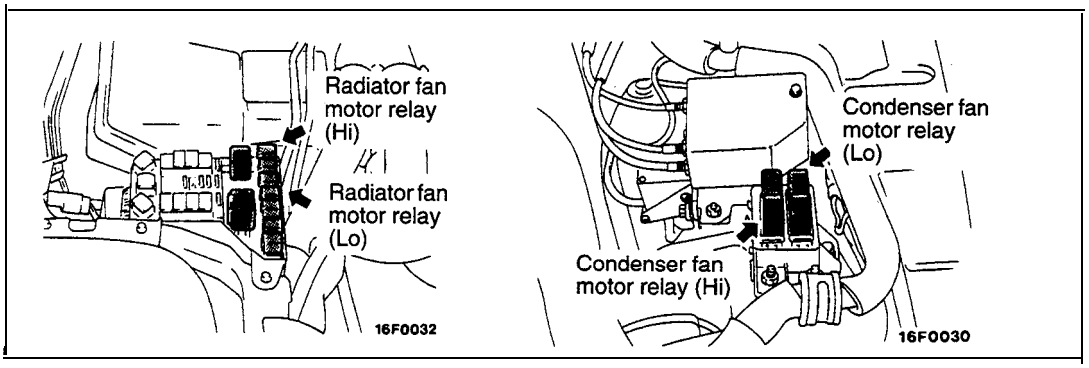
TSB Revision

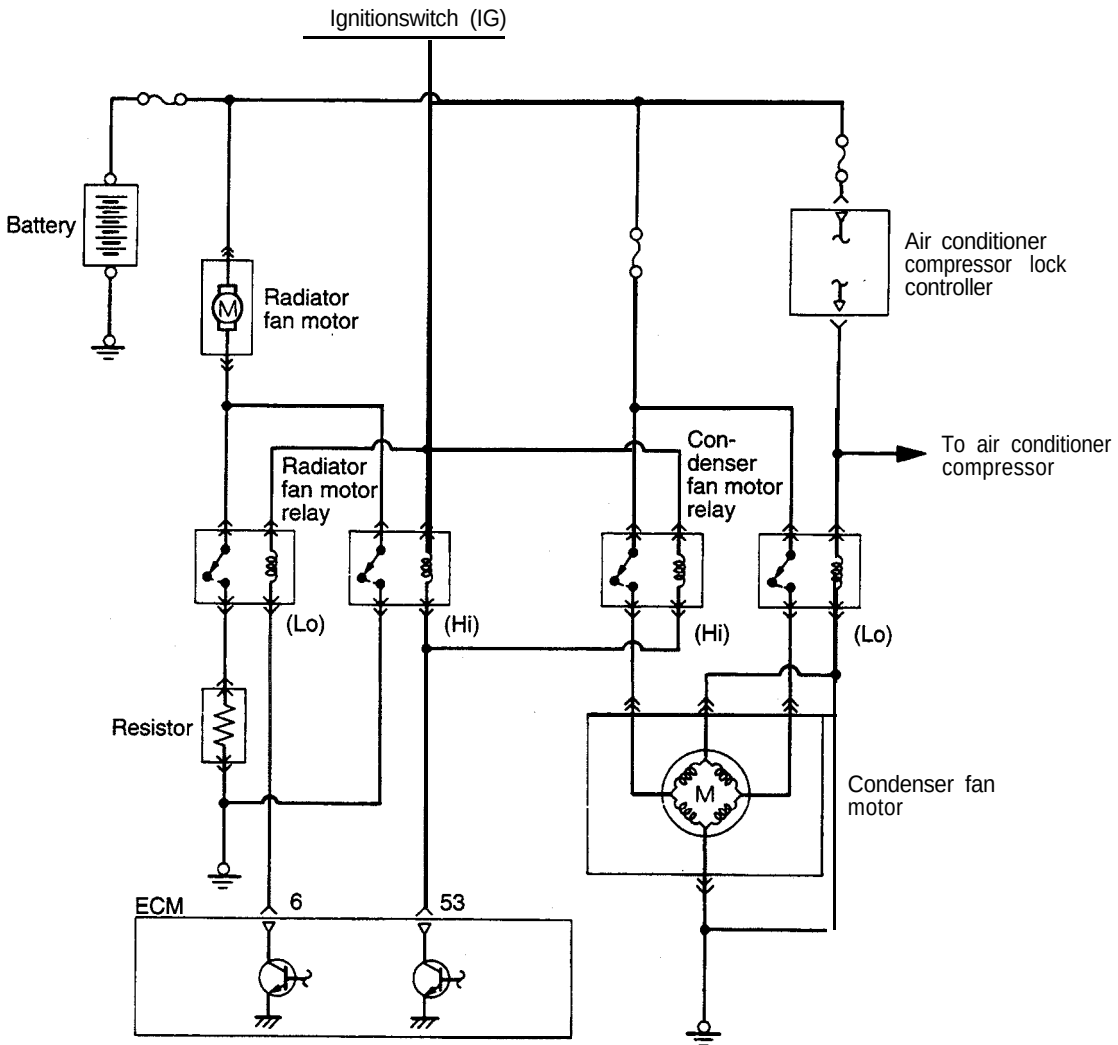
HARNESS

1	 Engine control module harness side connector Z7FU0689	Measure the input voltage of engine control module. • Engine control module connector: Disconnected • Lighting switch: ON (Tail light relay ON) **Battery voltage**	OK → 2 NG → Check circuit related to tail light relay
2	 Engine control module harness side connector Z7FU0689	Measure the input voltage of engine control module. • Engine control module connector: Disconnected • Defogger switch: ON (Defogger relay ON) **Battery voltage**	OK → 3 NG → Check circuit related to defogger relay
3	 Engine control module harness side connector Z7FU0689	Measure the input voltage of engine control module. • Engine control module connector: Disconnected • Brake pedal: Depressed (Stop light switch ON) **Battery voltage**	OK → STOP NG → Check circuit related to stoplight relay

TSB Revision

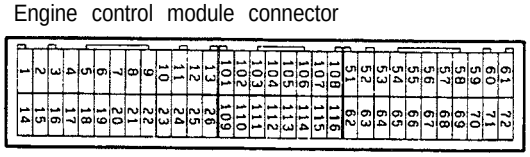
FAN MOTOR RELAY (RADIATOR, AIR CONDITIONING CONDENSER) <From 1994 models>





Z7FU1366

Engine control module connector



Z7FU0653

7FU1597

TSB Revision

OPERATION

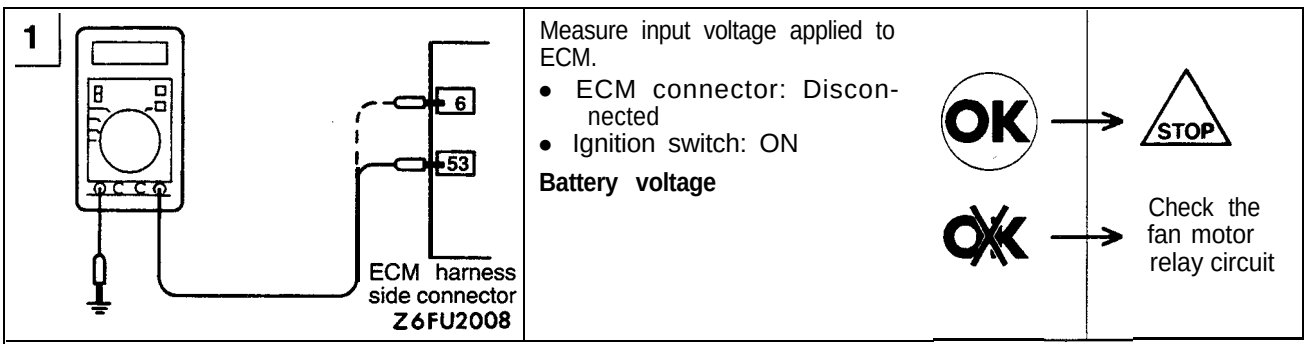
- The engine control module controls the radiator fan motor and condenser fan motor according to the engine coolant temperature and vehicle speed via the power transistors (low speed side and high speed side) in the module.
- If the engine control unit turns ON the low speed side power transistor inside the module, the radiator fan motor relay (Lo) coil operates to send driving power supply (for low speed rotation) from the battery to the radiator fan motor.
  If the air conditioner compressor lock controller outputs the air conditioner compressor driving power supply, the current flows to the condenser fan motor relay (Lo).
  The condenser fan motor relay (Lo) will operate to send driving power supply (for low speed rotation) from the battery to the condenser fan motor.
  If the engine control module turns ON the high speed side power transistor inside the unit, the radiator fan motor relay (Hi) and condenser fan motor relay (Hi) will operate to send the driving power supply (for high speed rotation) to the radiator fan motor and condenser fan motor.

INSPECTION

Using Scan Tool

Function	Item No.	Drive content	Check condition	Normal state
Actuator test	20	Radiator fan motor and condenser fan motor are driven at high speeds.	Ignition switch: ON	Radiator fan motor and condenser fan motor rotate at high speeds.
	21	Radiator fan motor and condenser fan motor are driven at low speeds.	Ignition switch: ON	Radiator fan motor and condenser fan motor rotate at low speeds.

HARNESS INSPECTION

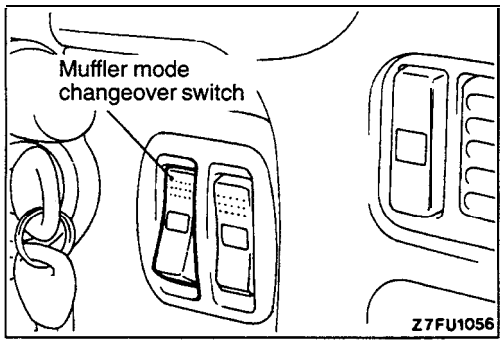


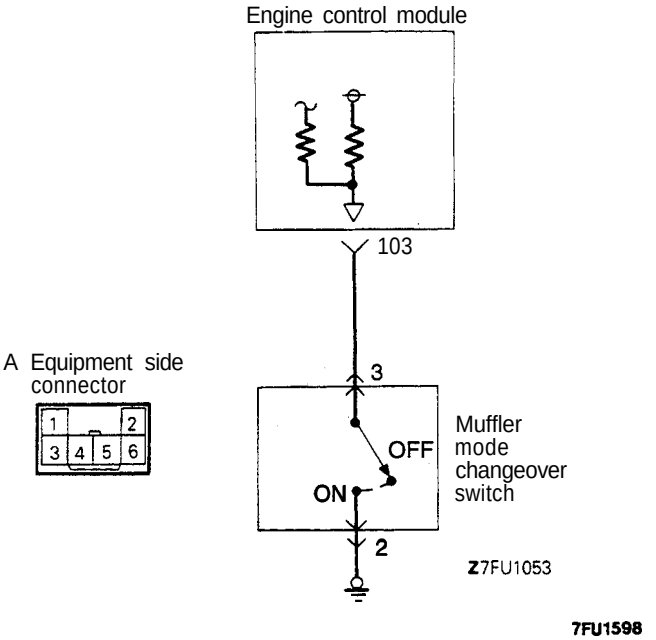
FAN MOTOR RELAY INSPECTION

Refer to Radiator Check in GROUP 14 and Power Relay Check in GROUP 55.

TSB Revision

MUFFLER MODE CHANGEOVER SWITCH <Turbo>





OPERATION

- If the operator turns the muffler mode changeover switch to ON or OFF position, this is converted to high/low voltage to be sent to the engine control module. Receiving this signal, the engine control module performs the dual mode (TOUR/SPORT mode) muffler control.
- The output terminal of the muffler mode changeover switch has battery voltage applied to it from the engine control module through the resistor inside the module. Place the muffler mode changeover switch to the ON position, and the muffler mode changeover switch circuit will be closed to short the voltage applied to output terminal to the ground. Accordingly, the output voltage of the muffler mode changeover switch changes from high to low.

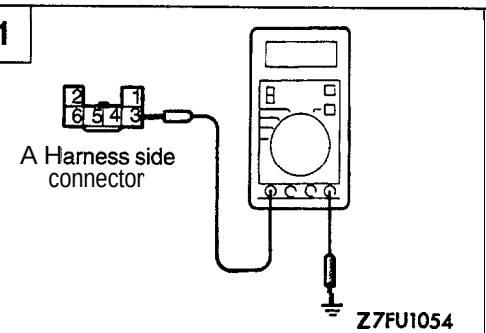
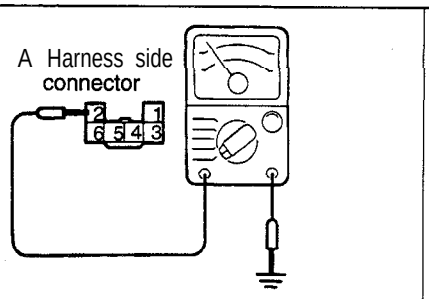
INSPECTION

Using Scan Tool

Function	Item No.	Data display	Check condition	Muffler mode changeover switch condition	Normal display
Data list	35	Switch condition	Ignition switch: ON	Turn to TOUR mode	ON
				Turn to SPORT mode	OFF

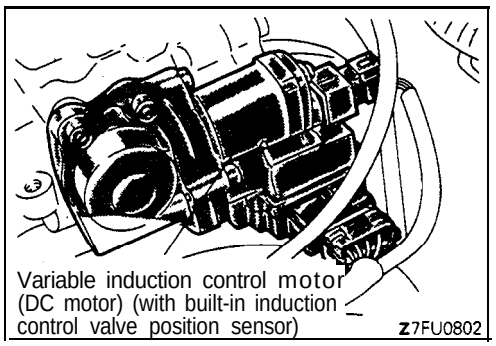
TSB Revision

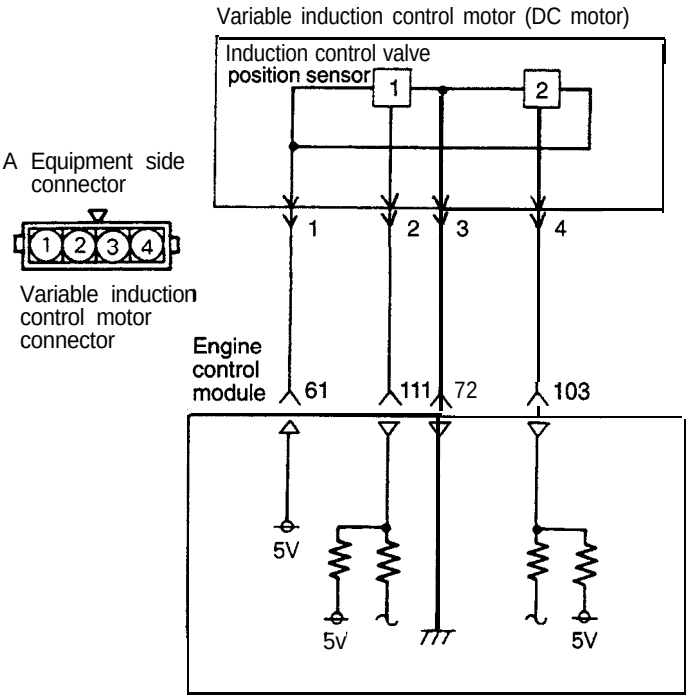
HARNESS INSPECTION

1		Measure the power supply voltage. • Connector: Disconnected • Ignition switch: ON **Battery voltage** OK → 2 NG → Repair the harness. (A3–108)	
2		Check for continuity of the ground circuit. • Connector: Disconnected OK → STOP NG → Repair the harness. (A2 – Ground)	

TSB Revision

INDUCTION CONTROL VALVE POSITION SENSOR <Non Turbo>


Variable induction control motor (DC motor) (with built-in induction control valve position sensor) Z7FU0802



Z7FU0968

7FU1599

OPERATION

- The induction control valve position sensor detects the induction control valve opening degree and converts it into a pulse signal to be input into the engine control module, which provides valve opening and closing control based on this signal.
- The induction control valve position sensor is supplied with 5V power engine control module and is grounded to the engine control module. A voltage of 5V from the engine control module is impressed to the two output terminals of the induction control valve position sensor. By opening and closing the circuit between the output terminal and ground, the induction control valve position sensor generates the pulse signal.

INSPECTION

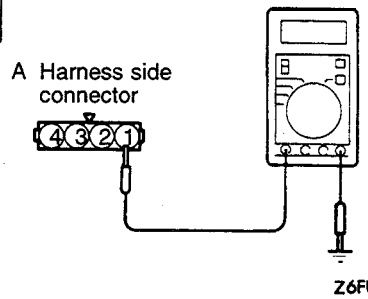
Using Scan Tool

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	62	Induction control valve position	Engine: Warm-up	700 rpm (Idling)	0 or 9 steps
				5,000 rpm or more	9 or 12 steps

TSB Revision

HARNESS INSPECTION

1



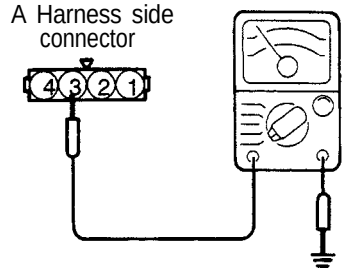
Measure the power supply voltage of the air intake control valve position sensor.
- Connector: Disconnected
- Ignition switch: ON

4.8-5.2 V

OK → 2

NG → Repair the harness. (AI -61)

2

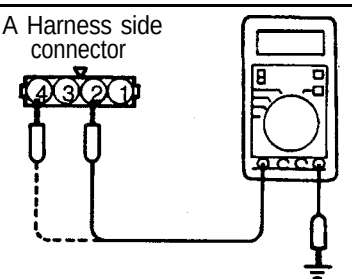


Check for continuity of the ground circuit.
- Connector: Disconnected

OK → 3

NG → Repair the harness. (A3–72)

3



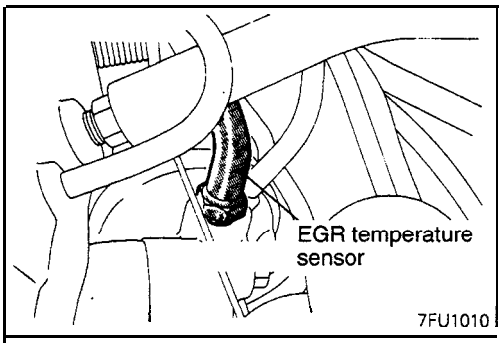
Measure the terminal voltage.
- Connector: Disconnected
- Ignition switch: ON

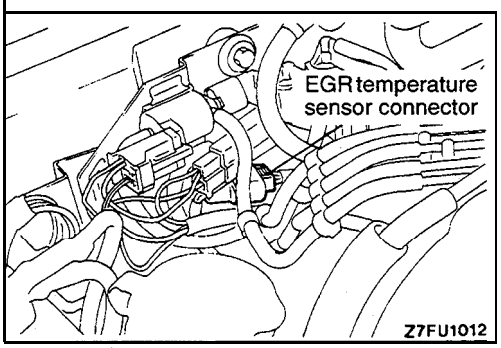
OK → STOP

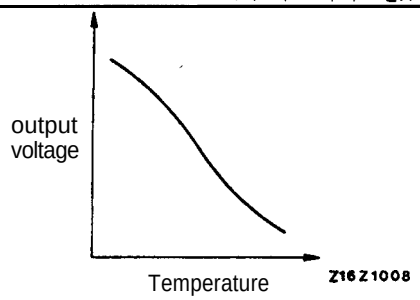
NG → Repair the harness. (A2–111) (A4–103)

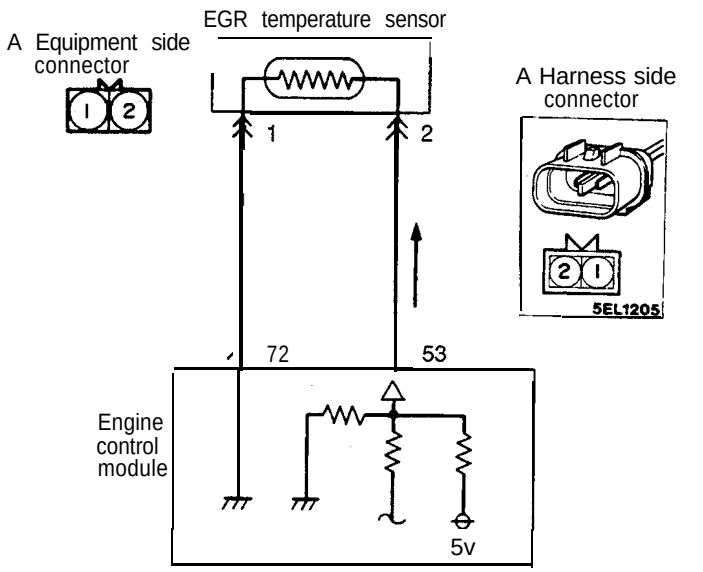
TSB Revision

EGR TEMPERATURE SENSOR <California>









7FU1600

OPERATION

- The EGR temperature sensor converts the temperature of EGR gas downstream from the EGR valve to voltage and inputs it to the engine control module. The engine control module judges the condition of the EGR by this signal. If there is abnormal condition, the check engine/malfunction indicator lamp is turned on to notify the driver.
- Five volt power supply in the engine control module is applied to the EGR temperature sensor through the resistance in the module. This power supply further passes through the EGR temperature sensor, which is a kind of resistor, and is grounded at the engine control module. The resistance of the EGR temperature sensor is characterized by a decrease in resistance with an increase of EGR temperature due to increase in quantity of EGR.
- EGR temperature sensor terminal voltage increases or decreases with EGR temperature sensor resistance. Therefore, EGR temperature sensor terminal voltage changes with EGR gas temperature. The higher the EGR gas temperature, the lower the EGR temperature sensor terminal voltage.

TSB Revision

INSPECTION

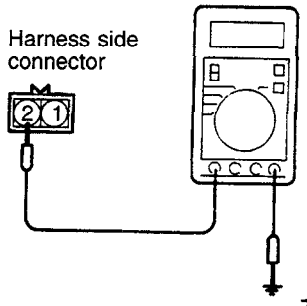
Using Scan Tool

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	43	Sensor temperature	Engine: Warmed up Engine is maintained in a constant state for 2 minutes or more Disconnect vacuum hose (green stripe) from EGR solenoid and install blind caps to removed vacuum hose end and solenoid nipple.	700 rpm (Idle)	100°C (212°F) or less
				3,500 rpm	120°C (248°F) or more

HARNESS INSPECTION

1

A Harness side connector



Z7FU1259

Measure the power supply voltage.
- Connector: Disconnected
- Ignition switch: ON

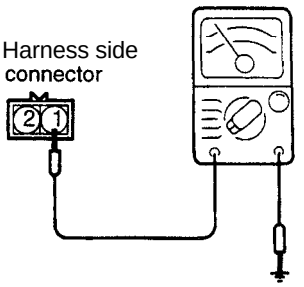
4.3–4.7 V

OK → 2

NG → Repair the harness. (A2–53)

2

A Harness side connector



Z7FU1257

Check for continuity of the ground circuit.
- Connector: Disconnected

OK → STOP

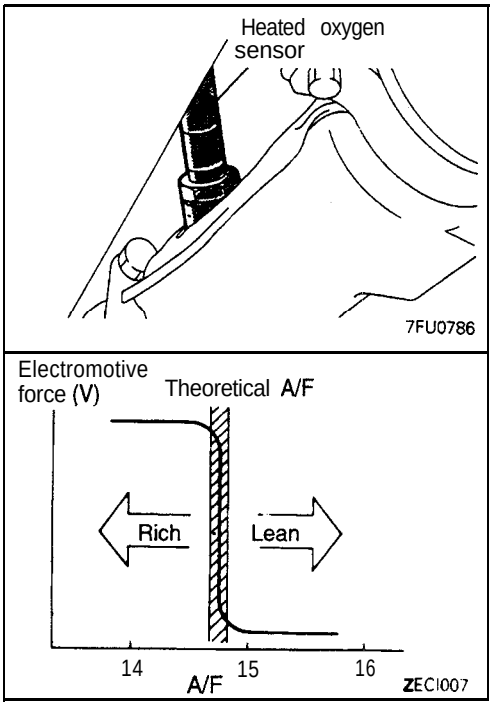
NG → Repair the harness. (A1–72)

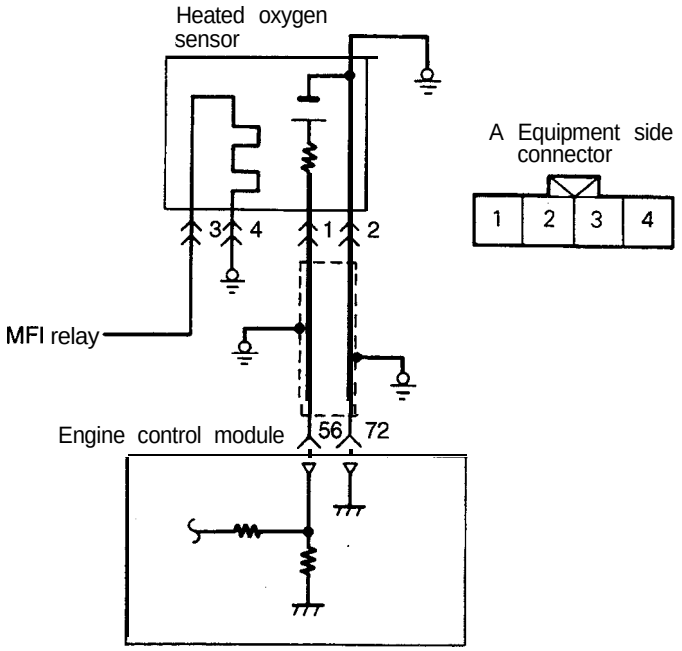
SENSOR INSPECTION

Refer to GROUP' 17 – Exhaust Gas Recirculation (EGR) System.

TSB Revision

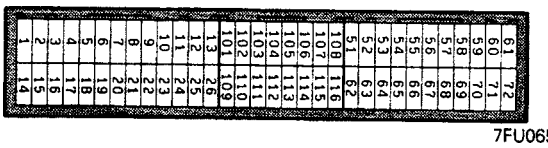
HEATED OXYGEN SENSOR <Non Turbo>





Z7FU0969

Engine control module connector



7FU1601

OPERATION

- The heated oxygen sensor senses the oxygen concentration in exhaust gas, converts it into a voltage and inputs it to the engine control module.
- The heated oxygen sensor outputs about 1 V when the air-fuel ratio is richer than the theoretical ratio and outputs about 0 V when the ratio is leaner (higher oxygen concentration in exhaust gas).
- The engine control module controls the fuel injection ratio based on this signal so that the air-fuel ratio may be kept at the theoretical ratio.
- The battery voltage is supplied to the heated oxygen sensor through the MFI relay. Therefore, the sensor element is heated by the heater so that the heated oxygen' sensor remains responsive even when the exhaust temperature is low.

TSB Revision

TROUBLESHOOTING HINTS

Hint 1: Poor cleaning of exhaust gas will result if the heated oxygen sensor fails.
Hint 2: If the heated oxygen sensor checked good but the sensor output voltage is out of specification, troubles of parts related to air-fuel ratio control system are suspected.
[Examples]
(1) Faulty injector
(2) Air leaking into the intake manifold through gasket gap, etc.
(3) Faulty volume air flow sensor, intake air temperature sensor, barometric pressure sensor, engine coolant temperature sensor

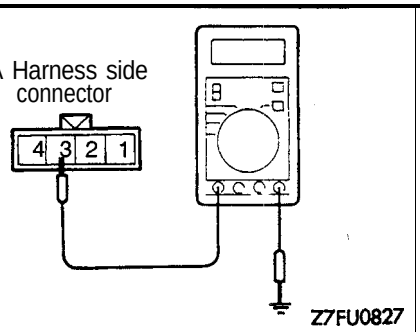
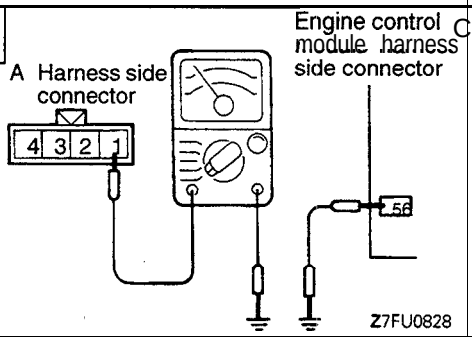
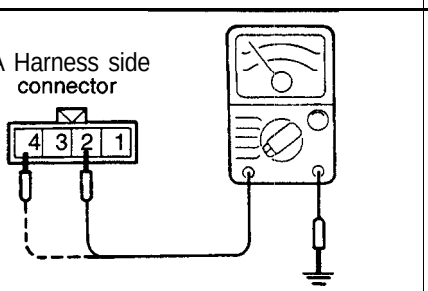
INSPECTION

Using Scan Tool

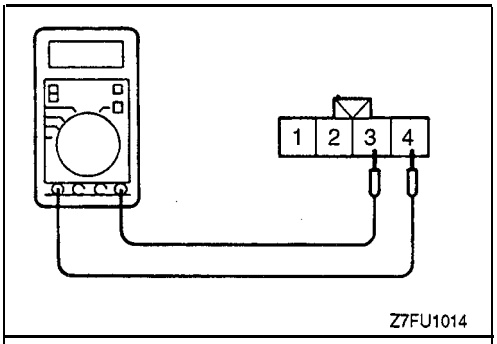
Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	11	Sensor voltage	Engine: Warm-up (make the mixture lean by engine speed reduction, and rich by racing)	When sudden deceleration from 4,000 rpm	200 mV or lower
				When engine is suddenly raced	600–1,000 mV
			Engine: Warm-up (using the heated oxygen sensor signal, check the air/fuel mixture ratio, and also check the condition of control by the engine control module)	700 rpm (Idle)	400 mV or lower ↔ 600–1,000 mV (changes)
				2,000 rpm	

TSB Revision

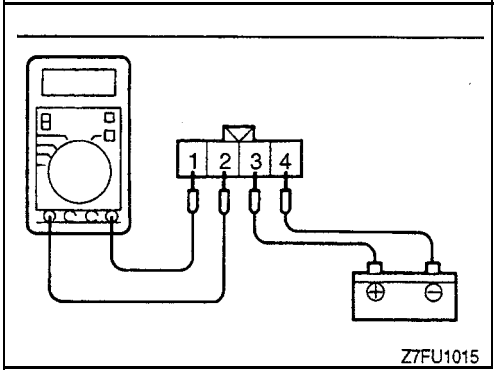
HARNESS INSPECTION

1		Measure the power supply voltage of the heated oxygen sensor. • Connector: Disconnected • Ignition switch: ON **Battery voltage**	OK → 2 NG → Repair the harness. (A3 – MFI relay)
2		Check for an open-circuit, or a short-circuit to ground between the engine control module and the heated oxygen sensor. • Heated oxygen sensor connector: Disconnected • Engine control module connector: Disconnected	OK → 3 NG → Repair the harness. (AI -56)
3		Check for continuity of the ground circuit. • Connector: Disconnected	OK → STOP NG → Repair the harness. (A2–72) (A4 – Ground)

TSB Revision



Z7FU1014



Z7FU1015

SENSOR INSPECTION

(1) Disconnect the heated oxygen sensor connector.
(2) Check that there is continuity [approx. 20 Ω at 20°C (68°F)] across terminals (3) and (4) of the heated oxygen sensor connector.
(3) If there is no continuity, replace the heated oxygen sensor.

(4) Warm up the engine until the engine coolant temperature becomes 80°C (176°F) or higher.
(5) Using jumper wires, connect terminals (3) and (4) of the heated oxygen sensor connector to battery (+) and (–) terminals respectively.

Caution
Ensure that the jumper wires are connected correctly, as wrong connections result in a broken heated oxygen sensor.

(6) Connect a digital voltmeter across terminals (1) and (2).

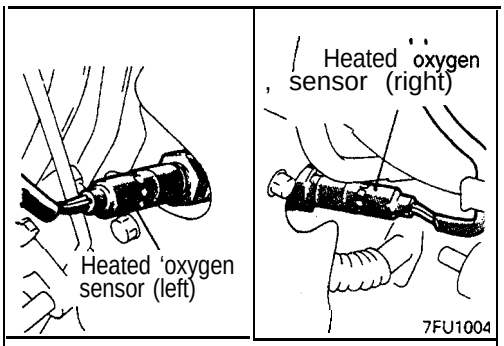
(7) Racing the engine repeatedly and measure the output voltage of the heated oxygen sensor.

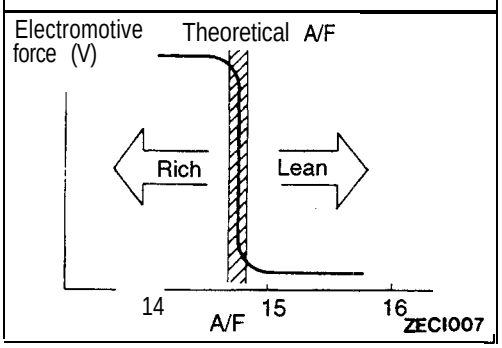
Engine	Heated oxygen sensor output voltage	Remarks
When engine is raced	0.6–1.0 V	When the air-fuel mixture becomes richer as a result of repeated racing, the heated oxygen sensor should output a voltage of 0.6–1.0 V.

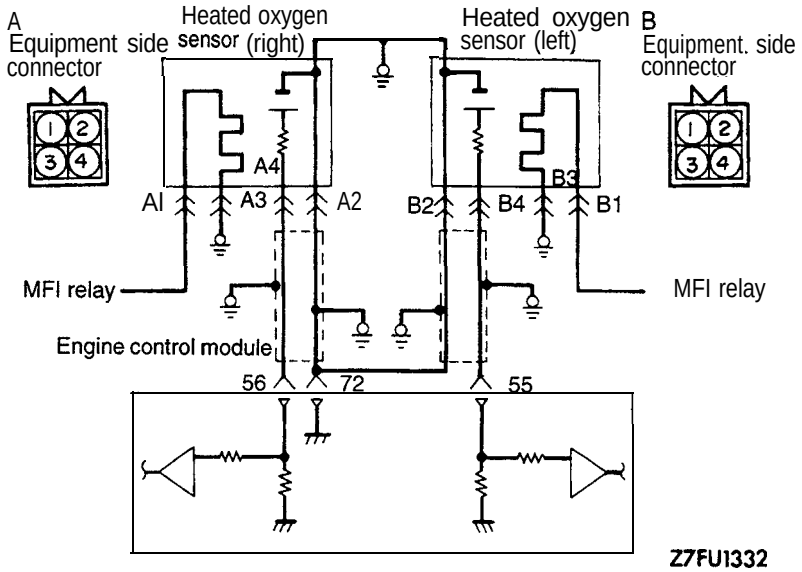
NOTE
For removal and installation of the heated oxygen sensor, refer to GROUP 15 – Exhaust Manifold.

TSB Revision

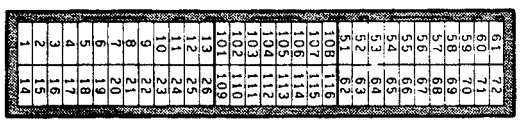
HEATED OXYGEN SENSOR <Turbo>



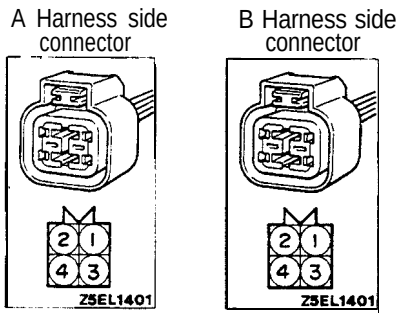




Engine control module connector



Z7FU0653



7FU1602

OPERATION

Refer to P.13A-137.

TROUBLESHOOTING

Refer to P.13A-138.

INSPECTION

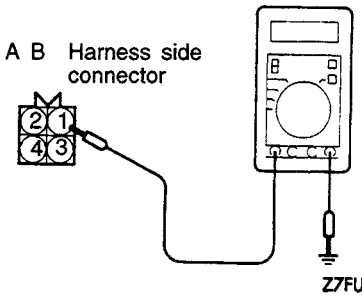
Using Scan Tool

Function	Item No.	Data display	Check condition	Engine condition	Standard value
Data reading	11 (right) 39 (left)	Sensor detection voltage	Engine: Warm-up (Make the mixture lean by engine speed reduction, and rich by racing)	When sudden deceleration from 4,000 rpm	200 mV or lower
				When engine is suddenly raced	600–1,000 mV
			Engine: Warm-up (Using the heated oxygen sensor signal, check the air/fuel mixture ratio, and also check the condition of control by the engine control module)	700 rpm (Idling)	400 mV or lower ↔ 600– 1,000 mV (changes)
				2,000 rpm 13A–163	

TSB Revision

HARNESS INSPECTION

1



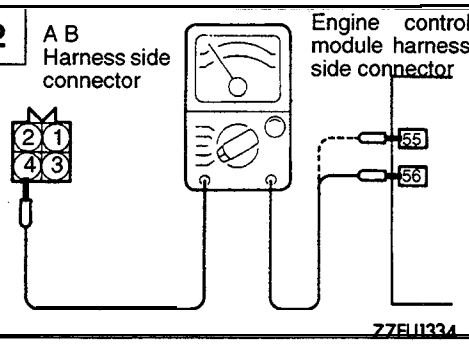
Measure the power supply voltage of the heated oxygen sensor.
- Connector: Disconnected
- Ignition switch: ON

Battery voltage

OK → 2

NG → Repair the harness. (A1,B1 – MFI relay)

2

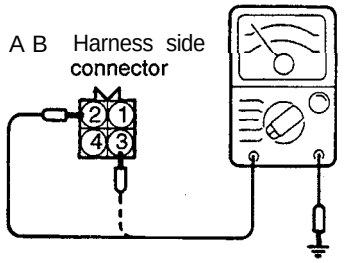


Check for an open-circuit, or a short-circuit to ground, between the engine control module and the heated oxygen sensor.
- Heated oxygen sensor connector: Disconnected
- Engine control module connector: Disconnected

OK → 3

NG → Repair the harness. (A4–56) (B4–55)

3

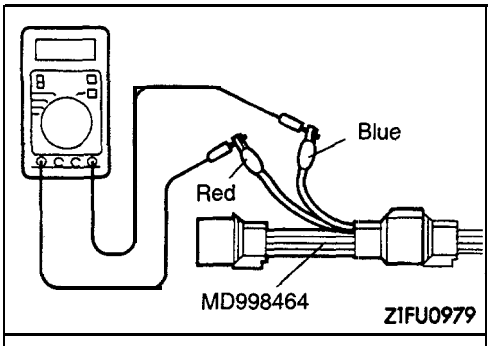


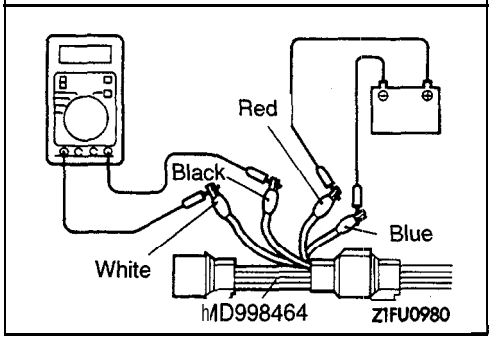
Check for continuity of the ground circuit.
- Connector: Disconnected

OK → STOP

NG → Repair the harness. (A2, B2–72) (A3, B3 – Ground)

TSB Revision





SENSOR INSPECTION

(1) Disconnect the heated oxygen sensor connector and connect the special tool, Test Harness, to the heated oxygen sensor connector.
(2) Check that there is continuity [approx. 20 Ω at 20°C (68°F)] across terminals (1) and (3) of the heated oxygen sensor connector.
(3) If there is no continuity, replace the heated oxygen sensor.

(4) Warm up the engine until the engine coolant temperature becomes 80°C (176°F) or higher.
(5) Using jumper wires, connect terminals (1) (red clip of the special tool) and (3) (blue clip) of the heated oxygen sensor connector to battery (+) and (–) terminals respectively.

Caution
Ensure that the jumper wires are connected correctly, as wrong connections result in a broken heated oxygen sensor.

(6) Connect a digital voltmeter across terminals (2) (black clip of the special tool) and (4) (white clip).
(7) Race the engine repeatedly and measure the output voltage of the heated oxygen sensor.

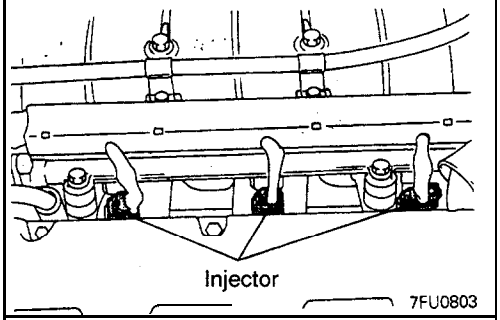
Engine	Heated oxygen sensor output voltage	Remarks
When engine is raced	0.6–1.0 V	When the air-fuel mixture becomes richer as a result of repeated racing, the heated oxygen sensor should output a voltage of 0.6–1.0 V.

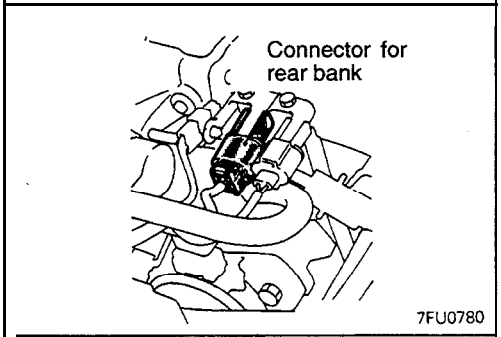
(8) If the measurements are not as specified, defective heated oxygen sensor is suspected.

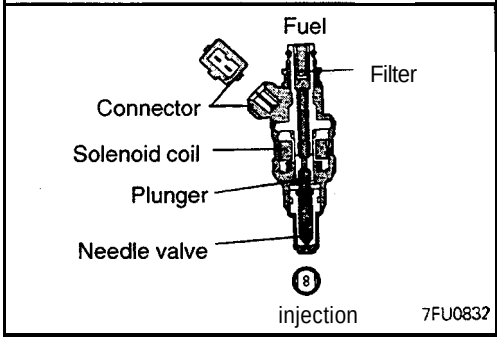
INSTALLATION

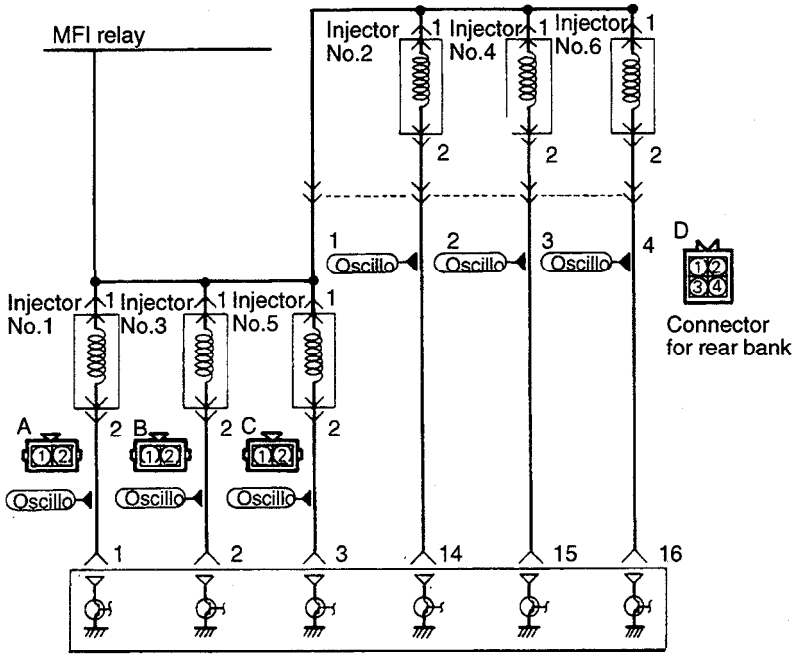
(1) For removal and installation of heated oxygen sensor, refer to GROUP 15 – Exhaust Manifold.
(2) Tighten the heated oxygen sensor to specified torque.

INJECTORS <Non Turbo>

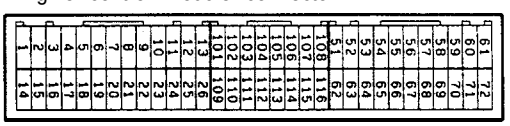








Engine control module connector



Z7FU0653 7FU1603

OPERATION

- The injector is an injection nozzle with a solenoid valve which injects fuel according to the injection signal coming from the engine control module.
- The injector has a fixed nozzle opening area and the fuel pressure against manifold inside pressure is regulated to a fixed level. Therefore, the volume of fuel injected by the injector is determined by the time during which the needle valve is open, namely, by the time during which the solenoid coil is energized.
- The battery voltage is applied through the MFI relay to this injector. When the engine control module turns on the power transistor in the module, the solenoid coil is energized to open the injector valve, which then injects fuel.

TSB Revision

TROUBLESHOOTING HINTS

Hint 1: If the engine is hard to start when hot, check fuel pressure and check the injector for leaks.
Hint 2: If the injector does not operate when the engine that is hard to start is cranked, the following as well as the injector itself may be responsible.
(1) Faulty power supply circuit to the engine control unit, faulty ground circuit
(2) Faulty MFI relay
(3) Faulty crankshaft position sensor, camshaft position sensor
Hint 3: If there is any cylinder whose idle state remains unchanged when the fuel injection of injectors is cut one after another during idling, make following checks about such cylinder.
(1) Injector and harness check
(2) Ignition plug and high tension cable check
(3) Compression pressure check
Hint 4: If the injector harness and individual part checked good but the injector drive time is out of specification, the following troubles are suspected.
(1) Poor combustion in the cylinder (faulty ignition plug, ignition coil, compression pressure, etc.)
(2) Loose EGR valve seating
(3) High engine resistance

INSPECTION

Using Scan Tool

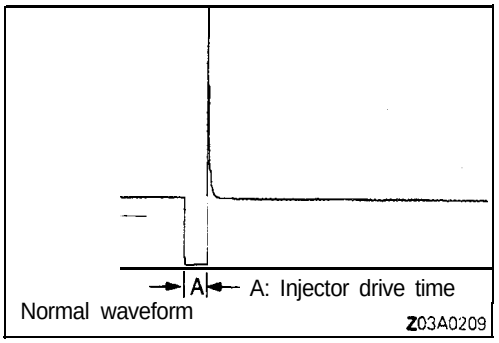
Function	Item No.	Data display	Check condition	Coolant temperature	Standard value
Data reading	41	Drive time*1	Engine: Cranking	0°C (32°F)*2	15.3–18.7 ms <Up to 1993 models> 13.8– 16.8 ms <From 1994 models>
				20°C (68°F)	41.4–50.6 ms <Up to 1993 models> 40-48.8 ms <From 1994 models>
				80°C (176°F)	9.9-12.1 ms <Up to 1993 models> 86-l 0.6 ms <From 1994 models>

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	41	Drive time*3	• Engine coolant temperature: 80 to 95°C (176 to 203°F) • Lights, electric cooling fan, accessory units: All OFF • Transaxle: Neutral (P range for vehicle with A/T) • Steering wheel: Neutral	700 rpm (Idle)	2.3-3.5 ms
				2,000 rpm	2.0-3.2 ms
				When sharp racing is made	To increase

NOTE
*1: The injector drive time refers to when the supply voltage is 11 V and the cranking speed is less than 250 rpm.
*2: When coolant temperature is lower than 0°C (32°F), injection is made by 6 cylinders simultaneously.
● 3: When the vehicle is new [within initial operation of about 500 km (300 miles)], the injector drive time may be about 10% longer.

Function	item No.	Drive content	Check condition	Normal state
Actuator test	01	No.1 injector shut off	Engine: Idling after warm-up (Shut off the injectors in sequence during idling after engine warm-up, check the idling condition)	Idle state to change further (becoming less stable or stalling)
	02	No.2 injector shut off		
	03	No.3 injector shut off		
	04	No.4 injector shut off		
	05	No.5 injector shut off		
	06	No.6 injector shut off		

TSB Revision

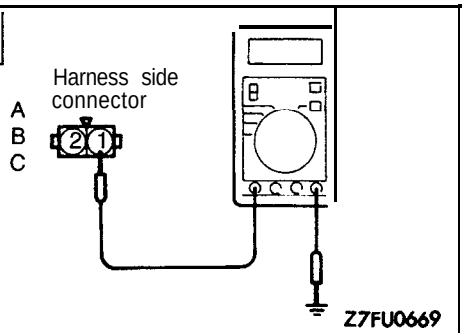


Using Oscilloscope

(1) Run the engine at idle speed.
(2) Connect the probe to the oscilloscope pick-up point as shown in the circuit diagram, and check the waveform at the drive side of each injector.

HARNESS INSPECTION

1



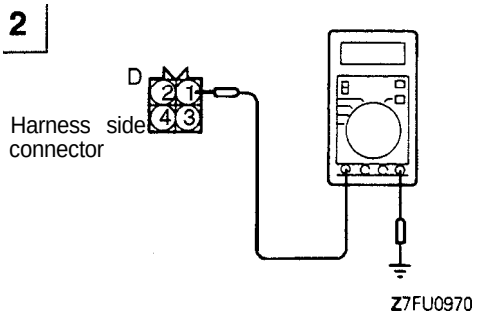
Measure the power supply voltage of the front bank injector.
- Connector: Disconnected
- Ignition switch: ON

Battery voltage

OK → 2

NG → Repair the harness. (A B CI – MFI relay)

2



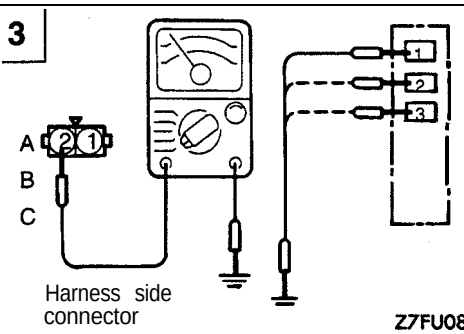
Measure the power supply voltage of the rear bank injector.
- Connector: Disconnected
- Ignition switch: ON

Battery voltage

OK → 3

NG → Repair the harness. (D1 – MFI relay)

3

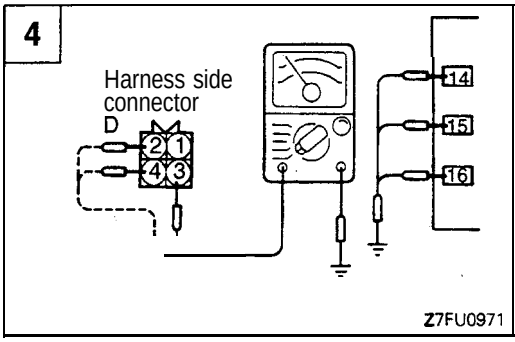


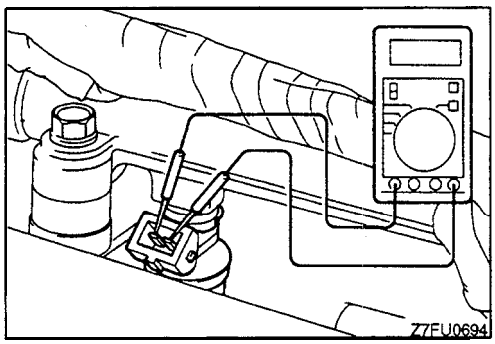
Check for an open-circuit, or a short-circuit between the front bank injector and the engine control module.
- Injector connector: Disconnected
- Engine control module connector: Disconnected

OK → 4

NG → Repair the harness. (A B C2–1 23)

TSB Revision

4 	Check for an open-circuit, or a short-circuit between the rear bank injector and the engine control module. • Connector: Disconnected • Engine control module connector: Disconnected	OK →	STOP
		NG →	Repair the harness. (D2 3 4–14 15 16)



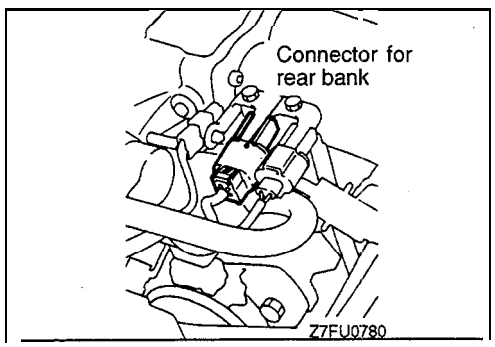
ACTUATOR INSPECTION

Measurement of Resistance between Front Bank Terminals

(1) Remove the injector connector.
(2) Measure the resistance between terminals.

Standard value: 13-16 Ω [at 20°C (68°F)]

(3) Install the injector connector.



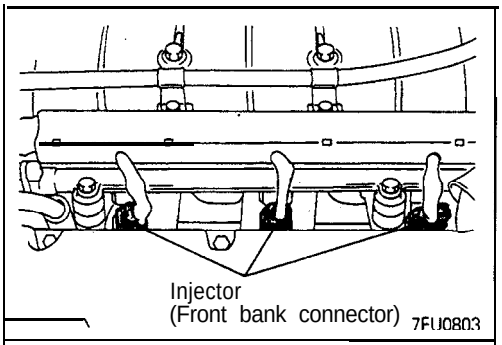
Measurement of Resistance between Rear Bank Terminals

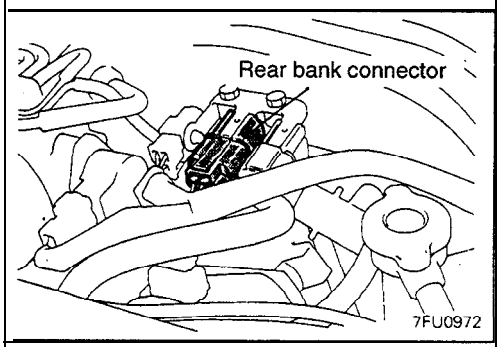
(1) Remove the injector connector.
(2) Measure the resistance between terminals.

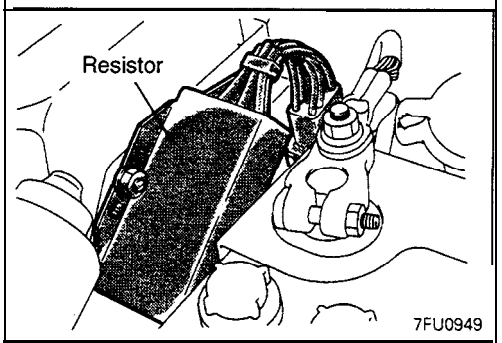
Standard value: 13-16 Ω [at 20°C (68°F)]

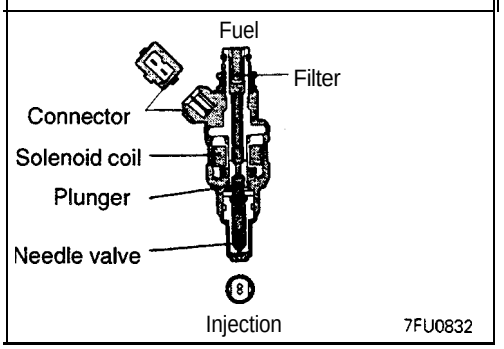
(3) Install the injector connector.

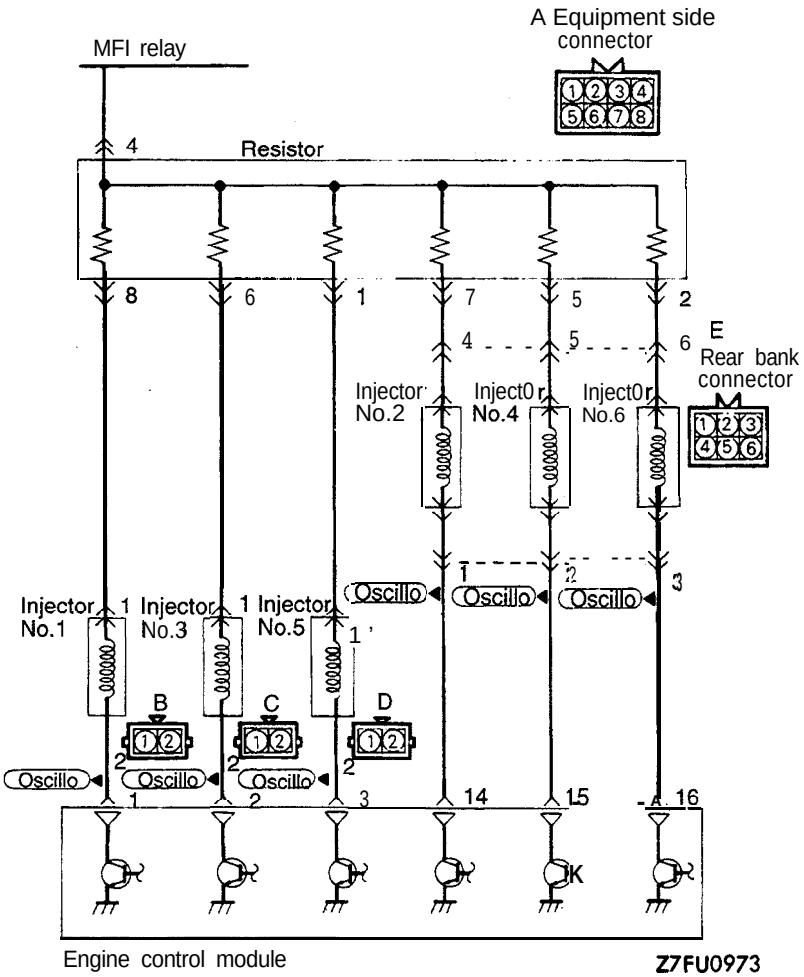
INJECTORS <Turbo>



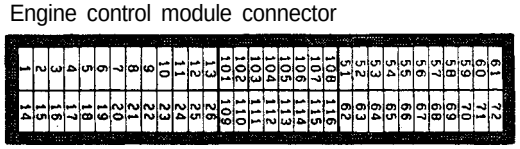








Engine control module connector



7FU0653

7FU1604

OPERATION

Refer to P.13A-144.

TROUBLESHOOTING HINTS

Refer to P.13A-145.

TSB Revision

INSPECTION

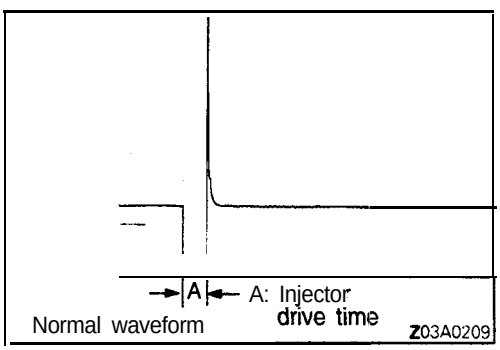
Using Scan Tool

Function	item No.	Data display	Check condition	Coolant temperature	Standard value
Data reading	41 (Rear bank) 47 (Front bank)	Drive time*1	Engine: Cranking	0°C (32°F)*2	8.1–9.9 ms
				20°C (68°F)	26.1-31.9 ms
				80°C (176°F)	6.3-7.7 ms

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	41 (Rear bank) 47 (Front bank)	Drive time*3	• Engine coolant temperature: 80 to 95°C (176 to 203°F) • Lamps, electric cooling fan, accessory units: All OFF • Transaxle: Neutral • Steering wheel: Neutral	700 rpm (Idle)	1.6-2.8 ms
				2,000 rpm	1.4-2.6 ms
				When sharp racing is made	To increase

NOTE
*1: The injector drive time refers to when the supply voltage is 11 V and the cranking speed is less than 250 rpm.
*2: When coolant temperature is lower than 0°C (32°F), injection is made by 6 cylinders simultaneously.
'3: When the vehicle is new [within initial operation of about 500 km (300 miles)], the injector drive time may be about 10% longer.

Function	Item No.	Drive content	Check condition	Normal state
Actuator test	01	No.1 injector shut off	Engine: Idling after warm-up (Shut off the injectors in sequence during idling after engine warm-up, check the idling condition)	Idle state to change further (becoming less stable or stalling)
	02	No.2 injector shut off		
	03	No.3 injector shut off		
	04	No.4 injector shut off		
	05	No.5 injector shut off		
	06	No.6 injector shut off		



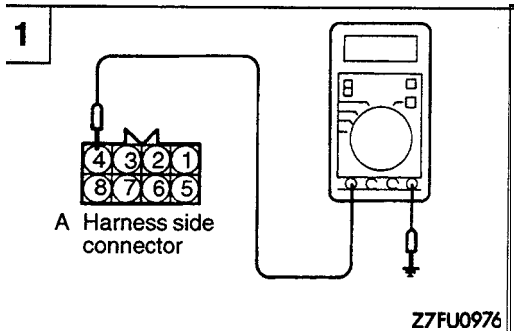
Using Oscilloscope

(1) Run the engine at idle speed.
(2) Connect the probe to the oscilloscope pick-up point as shown in the circuit diagram, and check the waveform at the drive side of each injector.

TSB Revision

HARNESS INSPECTION

1



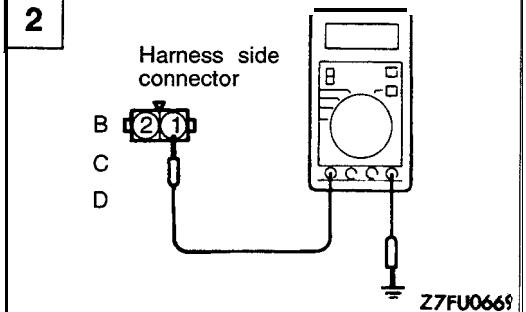
Measure the power supply voltage of the resistor.
- ● - Resistor connector: Disconnected
- Ignition switch: ON

Battery voltage

OK → **2**

NG → Repair the harness. (A4 – MFI relay)

2



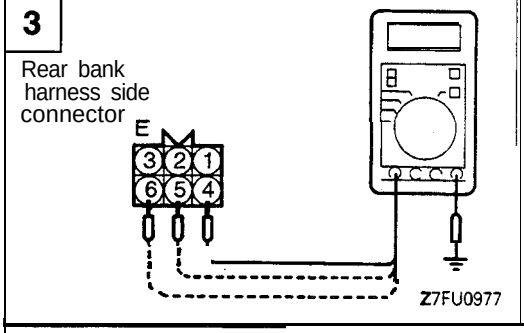
Measure the power supply voltage of the front bank injector.
- Resistor connector: Connecteu
- Injector connector: Disconnected
- Ignition switch: ON

Battery voltage

OK → **3**

NG → Repair the harness. (B C D1 – MFI relay) Check power supply Check resistor

3



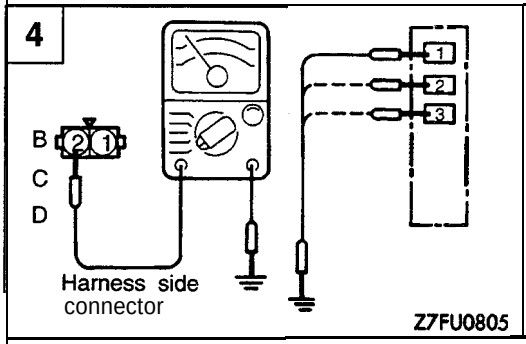
Measure the power supply voltage of the rear bank injector.
- Connector: Disconnected
- Ignition switch: ON

Battery voltage

OK → **4**

NG → Repair the harness (E4 5 6 – MFI relay) Check power supply Check resistor

4

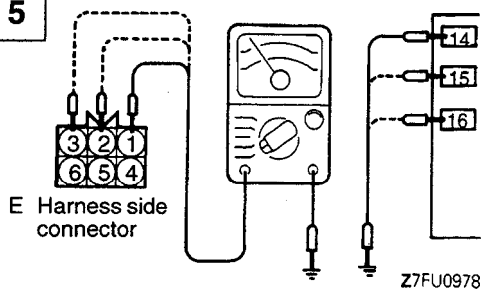


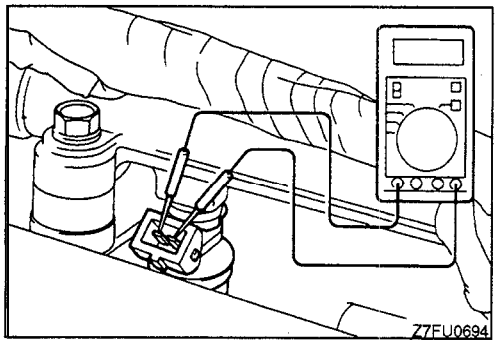
Check for an open-circuit, or a short-circuit between the front bank injector and the engine control module.
- Injector connector: Disconnected
- Engine control module connector: Disconnected

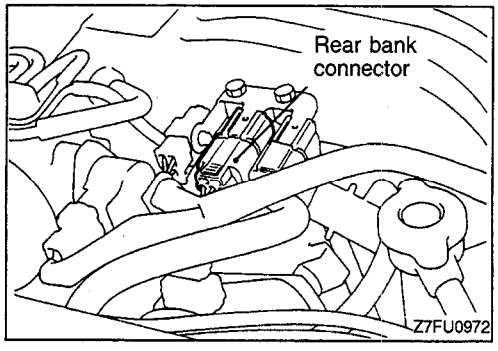
OK → **5**

NG → Repair the harness. (B C D2– 1 23)

TSB Revision

5		Check for an open-circuit, or a short-circuit between the rear bank injector and the engine control module. • Connector: Disconnected • Engine control module connector: Disconnected	OK → STOP NG → Repair the harness. (E1 2 3–14 15 16)





ACTUATOR INSPECTION

INJECTORS

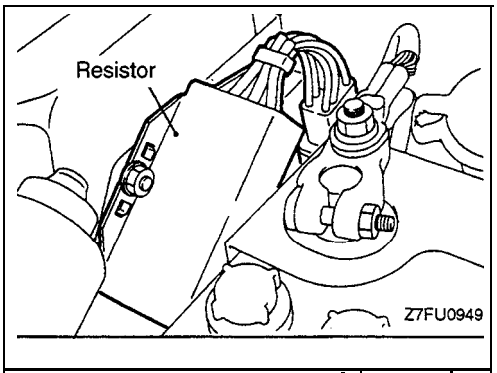
Measurement of Resistance between Front Bank Terminals

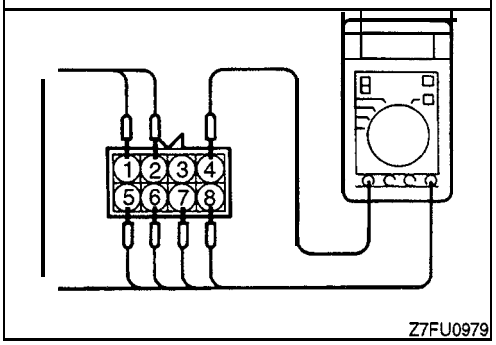
(1) Disconnect the injector connector.
(2) Measure the resistance between terminals.
Standard value: 2-3 Ω [at 20°C (68°F)]
(3) Reconnect the injector connector.

Measurement of Resistance between Rear Bank Terminals

(1) Disconnect the injector connector.
(2) Measure the resistance between terminals.
Standard value: 2-3 Ω [at 20°C (68°F)]
(3) Reconnect the injector connector.

TSB Revision





RESISTOR

Measurement of Resistance between Terminals

(1) Disconnect the resistor connector.

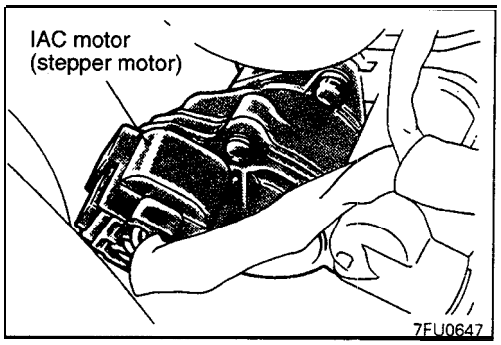
(2) Measure the resistance between terminals.

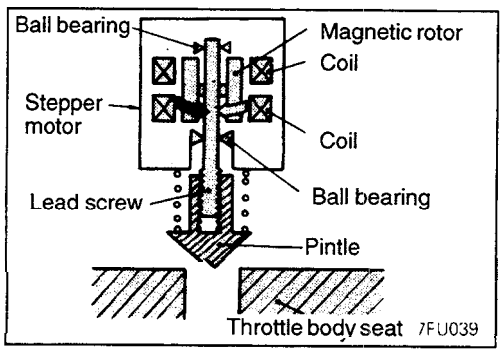
Measuring terminals	Resistance
1-4	5.5–6.5 Ω [At 20°C (68°F)]
2-4	
5-4	
6-4	
7-4	
8-4	

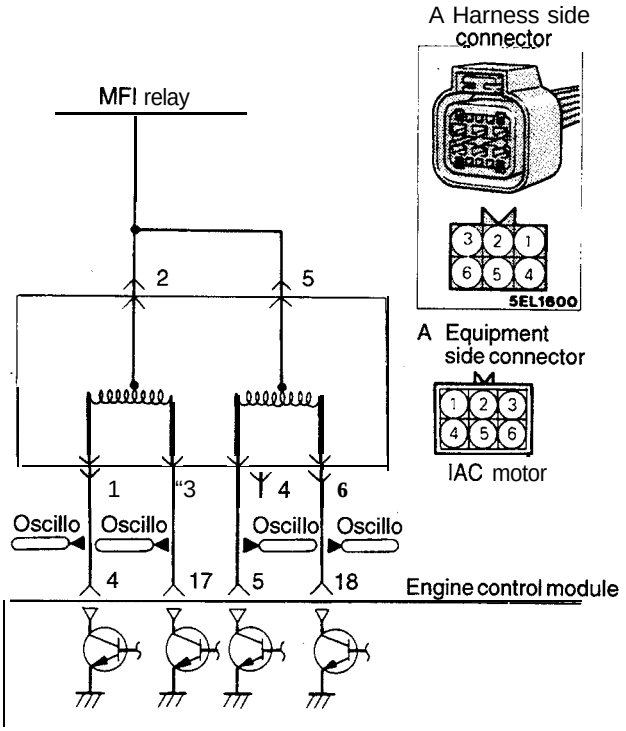
(3) If the resistance is out of specification, replace the resistor.

TSB Revision

IDLE AIR CONTROL MOTOR (STEPPER MOTOR TYPE)







OPERATION

- The intake air volume during idling is controlled by opening or closing the servo valve provided in the air path that bypasses the throttle valve.
- The servo valve is opened or closed by operating the stepper motor in the speed control servo in normal or reverse direction.
- The battery power is supplied to the stepper motor through the MFI relay. As the engine control module turns on power transistors in the module one after another, the stepper motor coil is energized and the motor rotates in normal or reverse direction.

TROUBLESHOOTING HINTS

Hint 1: If the stepper motor step increases to 100 to 120 steps or decreases to 0 step, faulty stepper motor or open circuit in the harness is suspected.

Hint 2: If the idle air control motor harness and individual part checked good but the stepper motor steps are out of specification, the following faults are suspected.

(1) Poorly adjusted reference idle speed
(2) Deposit on the throttle valve
(3) Air leaking into the intake manifold through gasket gap
(4) Loose EGR valve seat
(5) Poor combustion in the cylinder (faulty ignition plug, ignition coil, injector, low compression pressure, etc.)

TSB Revision

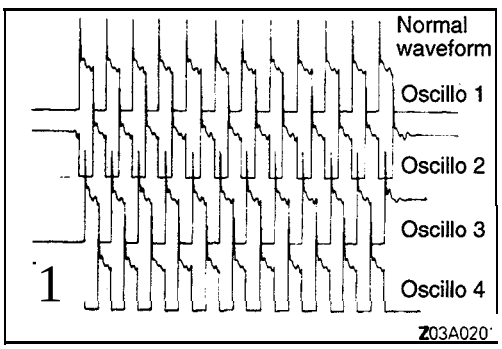
INSPECTION

Using Scan Tool

Function	Item No.	Data display	Check condition	Load state	Standard value
Data	45	Stepper motor steps	• Engine coolant temperature: 80 to 95°C (176 to 203°F) • Lights, electric cooling fan, accessory units: All OFF • Transaxle: Neutral (P range for vehicle with A/T>) • Steering wheel: Neutral • Idle position switch: ON (compressor clutch to be ON if airconditioning switch is ON) • Engine: Idling	Air conditioning switch: OFF	2–25 step
				Air conditioning switch: ON	Increase by 10–70 step
				• Air conditioning switch: ON • Selector lever: Shift to D range	Increase by 5–50 step

NOTE
When the vehicle is new [within initial operation of about 500 km (300 miles)], the stepper motor steps may be about 30 steps more than standard.

Caution
When the selector lever is shifted to the "D" range, the brakes must be used to prevent the vehicle from moving forward.



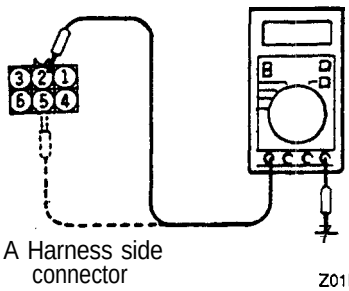
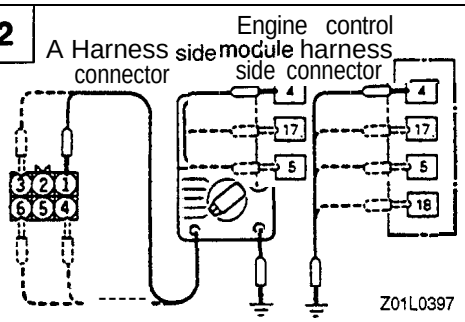
Using Oscilloscope

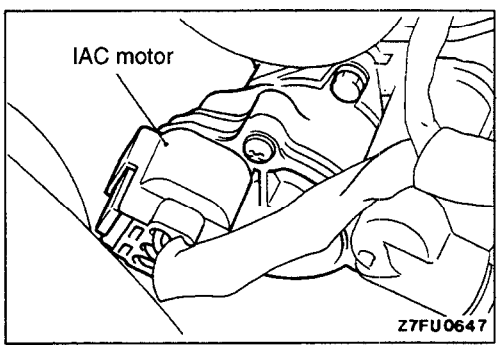
(1) Connect the probe to each oscilloscope pick-up point as shown in the circuit diagram.
(2) Start the engine.
(3) When the air conditioning switch is turned on, the idling speed increases to operate the idle speed control. Check the instantaneous waveform.

NOTE
Keep in mind that the waveform can be observed only when idle speed control is in operation.

TSB Revision

HARNESS INSPECTION

1		Measure the power supply voltage of idle air control motor. • Idle air control motor connector: Disconnected • Ignition switch: ON **Battery voltage**	OK → 2 NG → Repair the harness. (MFI relay – A2) (MFI relay – A5)
2		Check for an open-circuit, or a short-circuit to ground between the engine control module and the idle air control motor. • Engine control module connector: Disconnected • Idle air control motor connector: Disconnected	OK → STOP NG → Repair the harness. (AI -4) (A3–17) (A4–5) (A6–18)

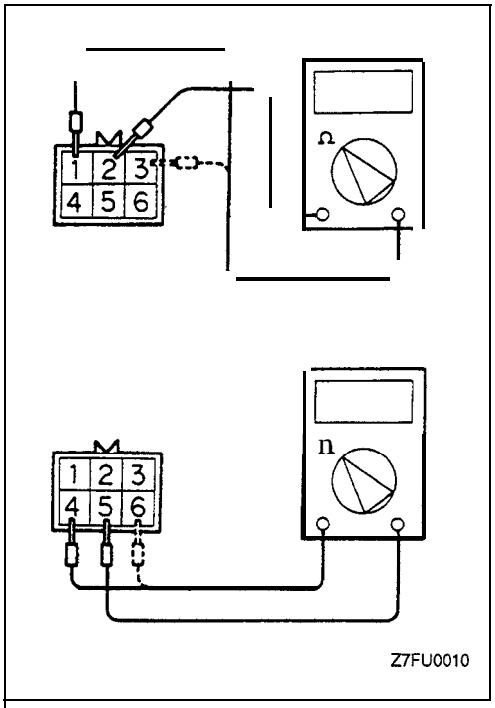


ACTUATOR INSPECTION

Checking the Operation Sound

(1) Check that the operation sound of the stepper motor can be heard after the ignition is switched ON (but without starting the motor).
(2) If the operation sound cannot be heard, check the stepper motor's activation circuit.
If the circuit is normal, it is probable that there is a malfunction of the stepper motor or of the engine control module.

TSB Revision



Checking the Coil Resistance

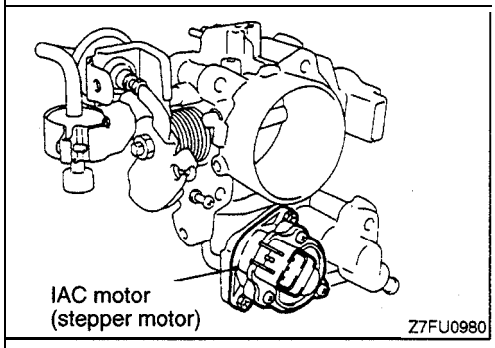
(1) Disconnect the idle air control motor connector and connect the special tool (test harness).

(2) Measure the resistance between terminal (2) (white clip of the special tool) and either terminal (1) (red clip) or terminal (3) (blue clip) of the connector at the idle air control motor side.

Standard value: 28-33 Ω at 20°C (68°F)

(3) Measure the resistance between terminal (5) (green clip of the special tool) and either terminal (6) (yellow clip) or terminal (4) (black clip) of the connector at the idle air control motor side.

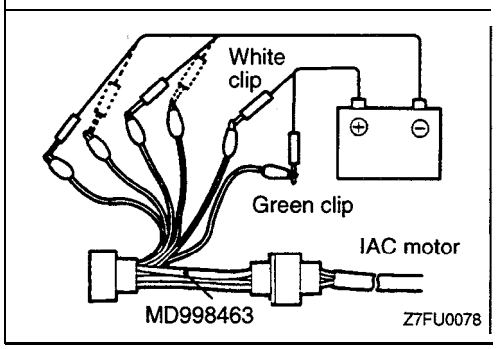
Standard value: 28-33 Ω at 20°C (68°F)



Operational Check

(1) Remove the throttle body.

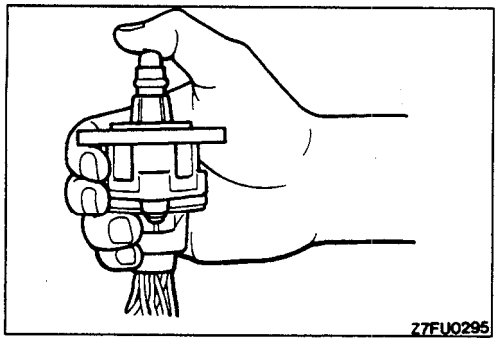
(2) Remove the stepper motor.



(3) Connect the special tool (test harness) to the idle air control motor connector.

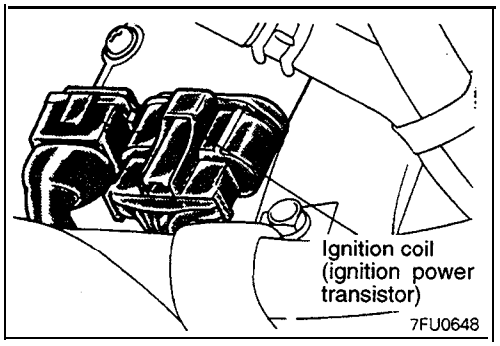
(4) Connect the positive (+) terminal of a power supply (approx. 6 V) to the white clip and the green clip.

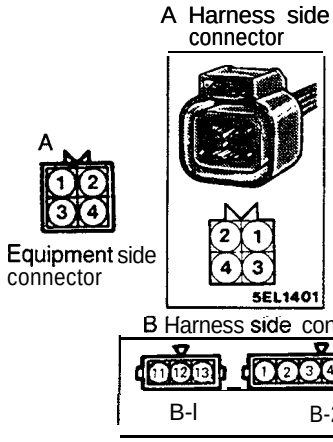
TSB Revision

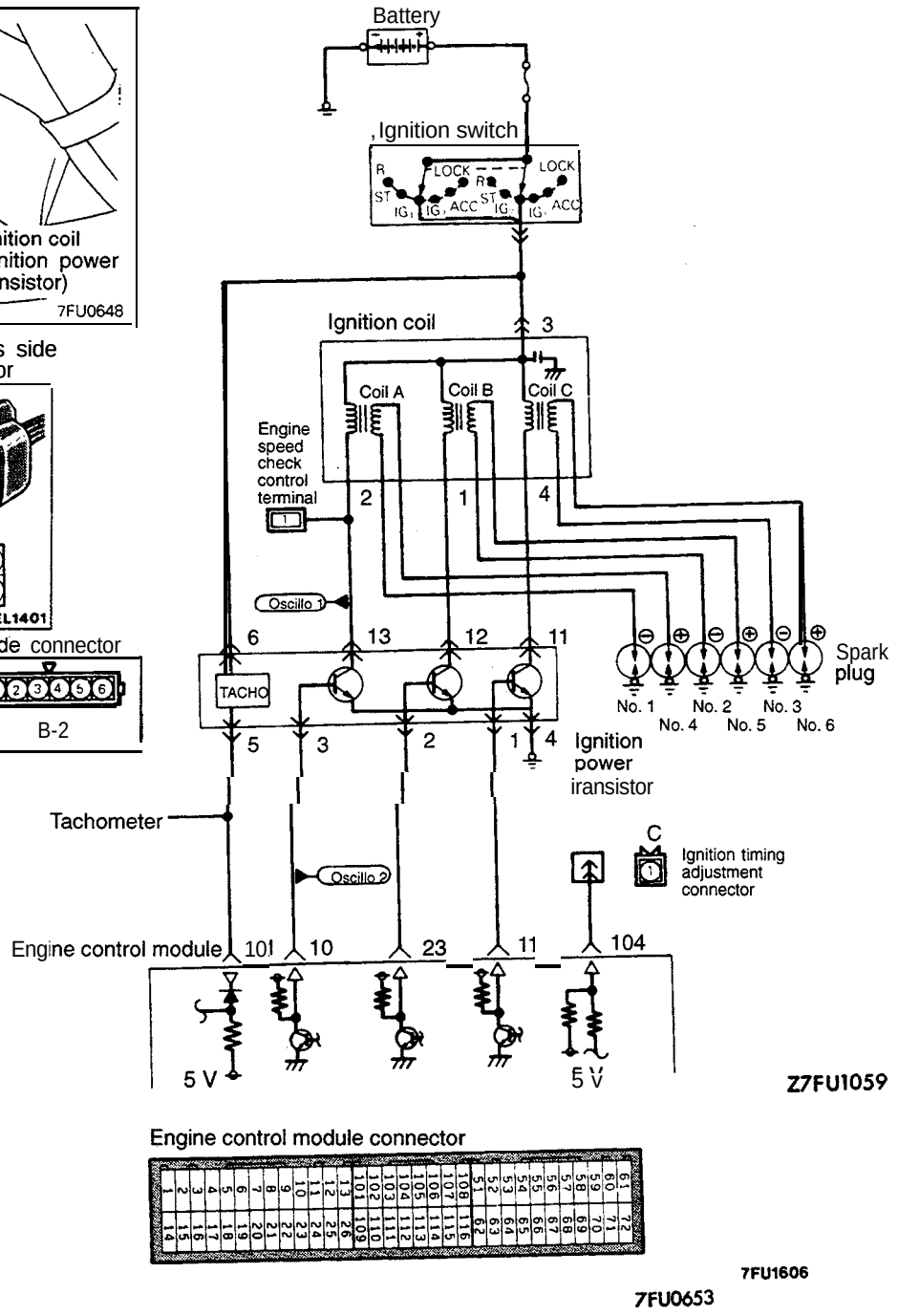


(5) With the idle air control motor as shown in the illustration, connect the negative (–) terminal of the power supply to each clip as described in the following steps, and check whether or not a vibrating feeling (a feeling of very slight vibration of the stepper motor) is generated as a result of the activation of the stepper motor.
   1) Connect the negative (–) terminal of the power supply to the red and black clip.
   2) Connect the negative (–) terminal of the power supply to the blue and black clip.
   3) Connect the negative (–) terminal of the power supply to the blue and yellow clip.
   4) Connect the negative (–) terminal of the power supply to the red and yellow clip.
   5) Connect the negative (–) terminal of the power supply to the red and black clip.
   6) Repeat the tests in sequence from (5) to (1).
(6) If, as a result of these tests, vibration is detected, the stepper motor can be considered to be normal.

IGNITION COIL AND IGNITION POWER TRANSISTOR







OPERATION

- When the ignition power transistor unit A is turned on by the signal from the engine control module, primary current flows to the ignition coil A. When the ignition power transistor unit A is turned off, the primary current is shut off and a high voltage is induced in the secondary coil A, causing the ignition plugs of No. 1 and No. 4 cylinders to spark. When the ignition power transistor unit B is turned off, the ignition plugs of No. 2 and No. 5 cylinders spark. In addition, when the ignition power transistor unit C is turned off, the ignition plugs of No. 3 and No. 6 cylinders spark.
- When the engine control module turns off the transistor. in the module, the battery voltage in the module is applied to the ignition power transistor unit to turn it on. When the engine control module turns on the transistor in the module, the ignition power transistor unit is turned off.

TSB Revision

INSPECTION

Using Scan Tool

<Spark Advance

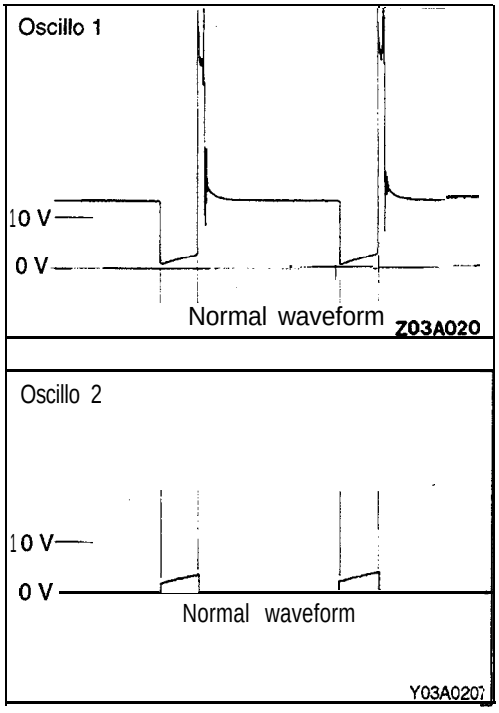
Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	44	Ignition advance	• Engine: Warming up • Timing light: Set (set timing light to check actual ignition timing)	700 rpm (Idle)	7–23°BTDC
				2,000 rpm	30–50°BTDC <Non Turbo> 23–43°BTDC <Turbo>

<Ignition Timing Adjustment Mode>

Function	Item No	Data display	Check condition	Terminal condition	Standard value
Data list	36	Continuity present or not present between ignition timing adjustment terminal and ground	• Engine: Idling	Ignition timing adjustment terminal is grounded	ON
				Ignition timing adjustment terminal is disconnected from ground	OFF

<Standard Ignition Timing>

Function	Item No.	Drive	Check condition	Normal condition
Actuator test	17	Set to ignition timing adjustment mode	• Engine: idling • Timing light: set	5°BTDC



Using Oscilloscope

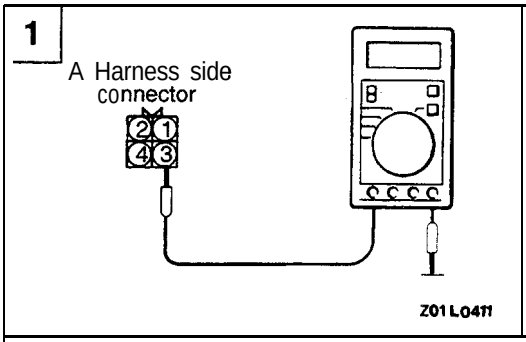
1. Primary signal of ignition coil
   (1) Run the engine at an idle speed.
   (2) Connect the probe to oscilloscope pick-up point 1 as shown in the circuit diagram, and check the primary signal of the ignition coil.

2. Control signal of ignition power transistor
   Connect the probe to oscilloscope pick-up point 2 as shown in the circuit diagram, and check the control signal of the ignition power transistor.

TSB Revision

HARNESS INSPECTION

1



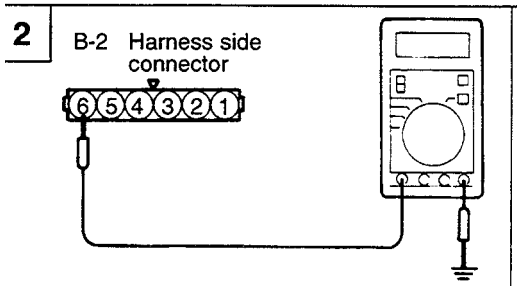
Measure the power supply voltage of the ignition coil.
- Connector: Disconnected
- Ignition switch: ON

Battery voltage

OK → **2**

NO → Repair the harness. (A3 – Ignition switch)

2



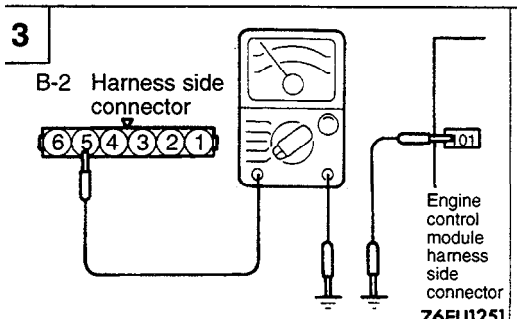
Measure the power supply voltage of the ignition coil.
- Connector: Disconnected
- Ignition switch: ON

Battery voltage

OK → **3**

NO → Repair the harness. (B6 – Ignition switch)

3

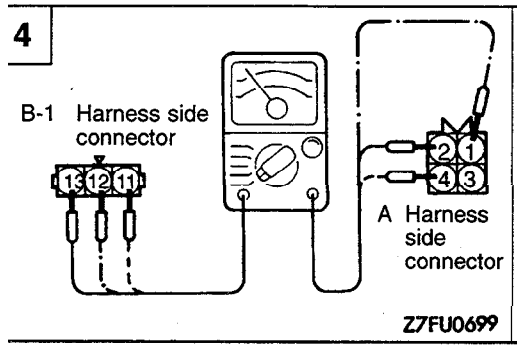


Check for an open-circuit, or a short-circuit to ground between the engine control unit and the ignition power transistor.
- Engine control module connector: Disconnected
- Ignition power transistor connector: Disconnected

OK → **4**

NO → Repair the harness. (B5–101)

4

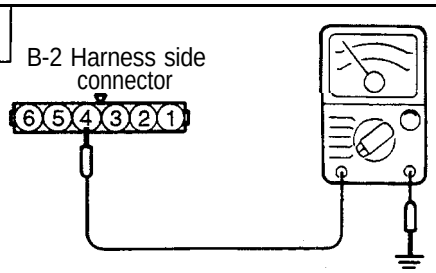
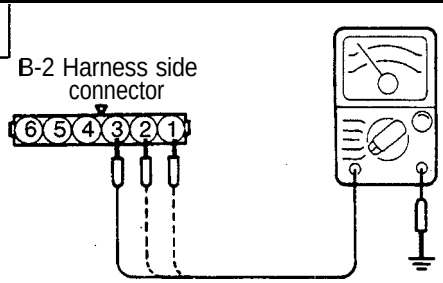
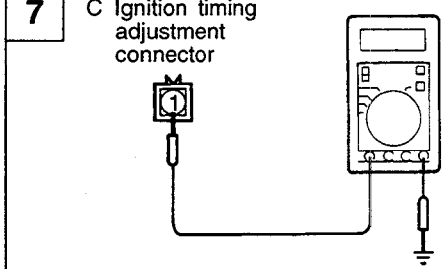


Check for an open-circuit, or a short-circuit to ground between the ignition power transistor and the ignition coil.
- Ignition coil connector: Disconnected
- Ignition power transistor connector: Disconnected

OK → **5**

NO → Repair the harness. (A2–B13) (A1–B12) (A4–B11)

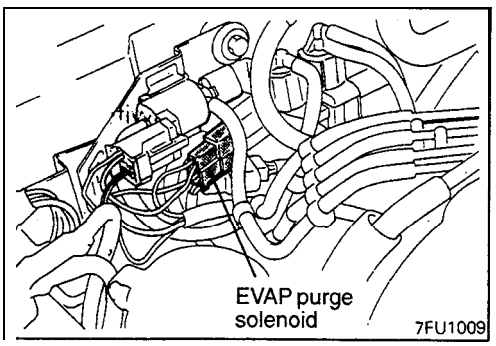
TSB Revision

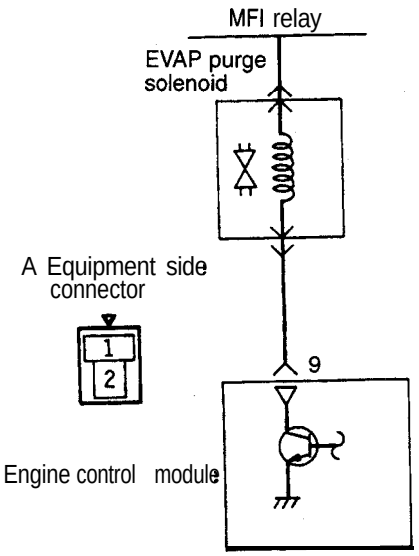
5 B-2 Harness side connector 6 5 4 3 2 1  Z7FU0700	Checkforcontinuity of the ground circuit. • Connector: Disconnected	OK →	6
		NG →	Repair the harness. (B4 – Ground)
6 B-2 Harness side connector 6 5 4 3 2 1  Z7FU0701	Measure the voltage of the control signal circuit of the ignition power transistor. • Connector: Disconnected • Ignition switch: START 0.5-4.0 **V**	OK →	7
		NG →	Repair the harness. (B3–10) (B2–23) (B1–11)
7 C Ignition timing adjustment connector 1  Z7FU1060	Measure the voltage of the ignition timing adjustment terminal. • Ignition switch: ON 4.0-5.2 V	OK →	STOP
		NG →	Repair the harness. (C1–104)

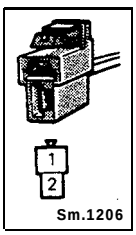
ACTUATOR INSPECTION

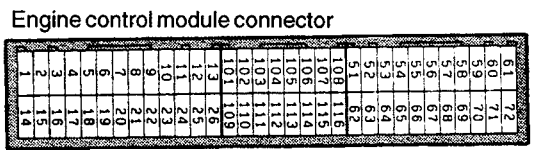
Refer to GROUP 16 – Ignition System.

EVAPORATIVE EMISSION PURGE SOLENOID









7FU1607

OPERATION

- The evaporative emission purge solenoid is an ON-OFF type one which controls introduction of purge air from the canister into the intake air plenum.
- The battery power is supplied to the evaporative emission purge solenoid through the MFI relay. When the engine control module turns ON the power transistor in the module, current flows to the coil, introducing purge air.

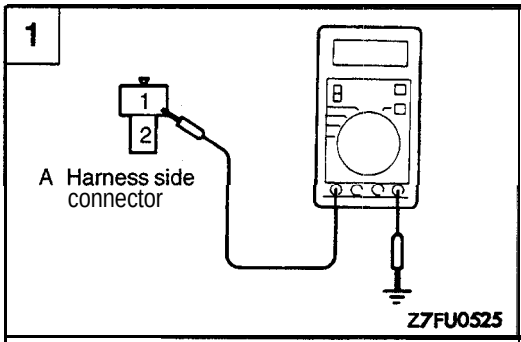
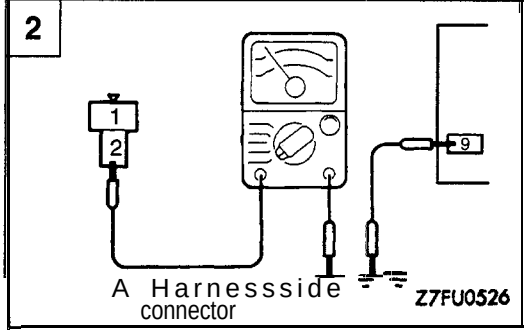
INSPECTION

Using Scan Tool

Function	Item No.	Drive content	Check condition	Normal state
Actuator test	08	Solenoid valve from OFF to ON	Ignition switch: ON	Operating sound. is heard when driven

TSB Revision

HARNESS INSPECTION

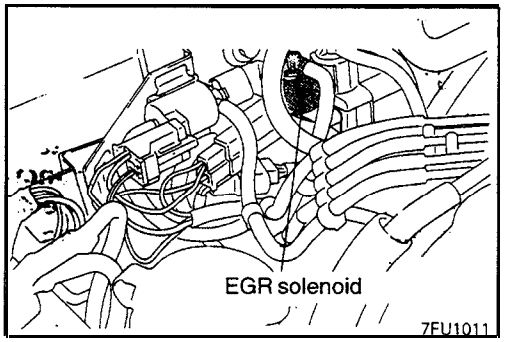
1 	Measure the power supply voltage. • Connector: Disconnected • Ignition switch: ON **Battery voltage**	OK →	2
		NG →	Repair the harness. (MFI relay - A I)
2 	Check for an open-circuit, or a short-circuit to ground between the evaporative emission purge solenoid and the engine control module. • Engine control module connector: Disconnected • Evaporative emission purge solenoid connector: Disconnected	OK →	STOP
		NG →	Repair the harness. (A2–9)

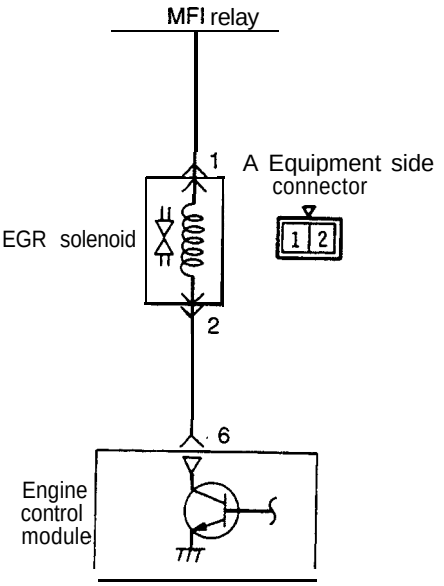
ACTUATOR INSPECTION

Refer to GROUP 17 – Evaporative Emission Control System.

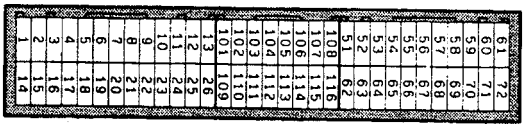
TSB Revision

EGR SOLENOID <California – Non Turbo, Turbo>





Engine control module connector



7FU1608

OPERATION

- The EGR solenoid is a duty control type solenoid valve. It makes control by leaking EGR valve operating negative pressure to the throttle body A port.
- Power supply from the battery is sent through the MFI relay to the EGR solenoid. When the engine control module turns off the power transistor inside the module, current no more flows through the coil and EGR valve operating negative pressure leaks.

TROUBLESHOOTING HINT

If the results of EGR solenoid on-vehicle and off-vehicle inspections are normal but the diagnostic trouble code for EGR system failure is displayed, check the EGR valve, vacuum hose and EGR passage for blocking.

TSB Revision

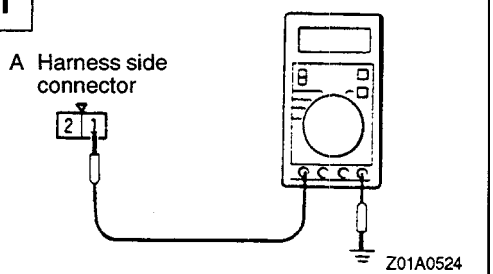
INSPECTION

Using Scan tool

Function	Item No.	Drive content	Check condition	Normal state
Actuator test	10	Change solenoid valve from OFF to ON state	Ignition switch: ON	Operating sound is heard when driven

HARNESS INSPECTION

1



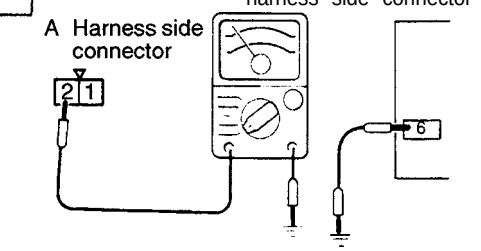
Measure the power supply voltage.
- ● - Connector: Disconnected
- ● Ignition switch: ON

Battery voltage

OK → **2**

NO → Repair the harness. (A1 – MFI relay)

2



Check for an open-circuit, or a short-circuit to ground between the EGR solenoid and the engine control module.
- ● EGR solenoid connector: Disconnected
- ● Engine control module connector: Disconnected

OK → STOP

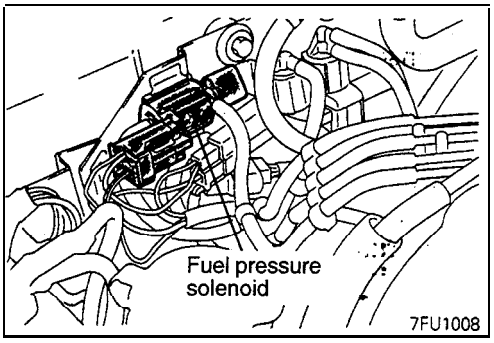
NO → Repair the harness. (A2–6)

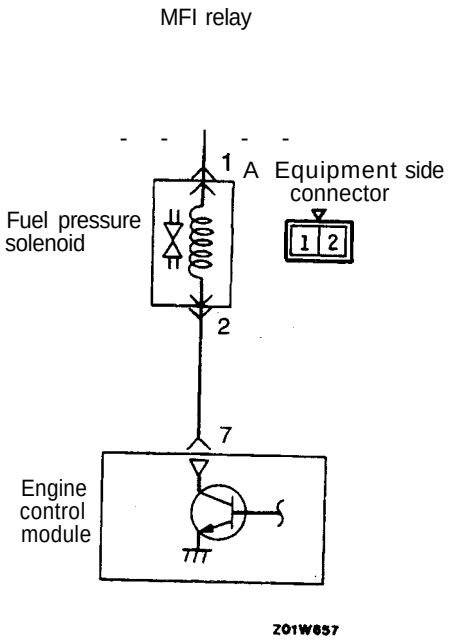
ACTUATOR INSPECTION

Refer to GROUP 17 – Exhaust Gas Recirculation (EGR) System.

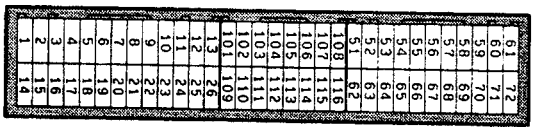
TSB Revision

FUEL PRESSURE SOLENOID <Turbo>





Engine control module connector



7FU1609

OPERATION

- The fuel pressure solenoid is an ON-OFF type solenoid valve that switches the pressure introduced to the fuel pressure regulator between either intake manifold pressure or barometric pressure.
- Battery power is supplied to this valve via the MFI relay. When the engine control module turns ON the internal power transistor, the coil is energized to allow barometric pressure to be introduced to the fuel pressure regulator.

TSB Revision

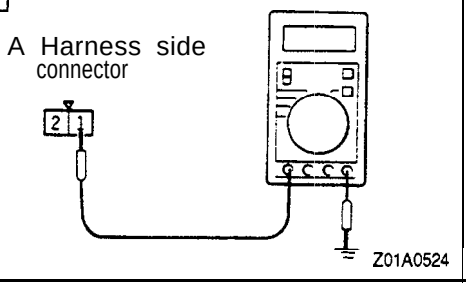
INSPECTION

Using Scan Tool

Function	Item No.	Drive content	Check condition	Normal state
Actuator test OFF	09 to	Turn solenoid valve from ON	Ignition switch: ON	Click heard when driven

HARNESS INSPECTION

1



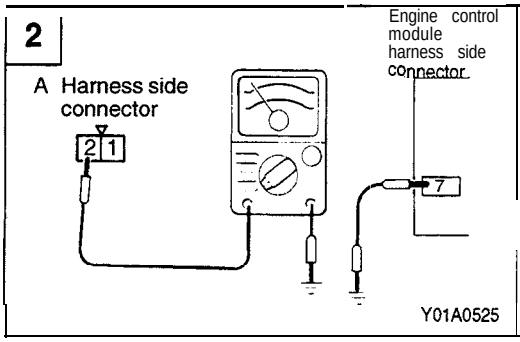
Measure the power supply voltage.
- Connector: Disconnected
- Ignition switch: ON

Battery voltage

OK → 2

NG → Repair the harness. (AI – MFI relay)

2

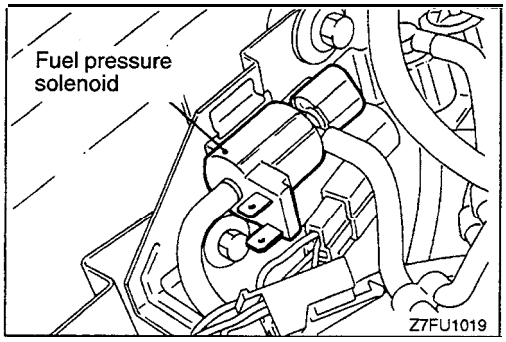


Check for an open-circuit, or a short-circuit to ground, between the fuel pressure solenoid and the engine control module.
- Engine control module connector: Disconnected
- Fuel pressure solenoid connector: Disconnected

OK → STOP

NG → Repair the harness. (A2 -7)

TSB Revision

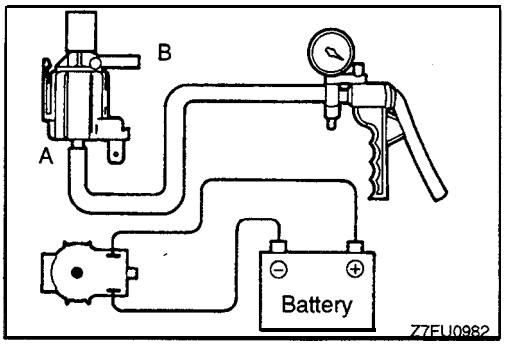


ACTUATOR INSPECTION

Operation Check

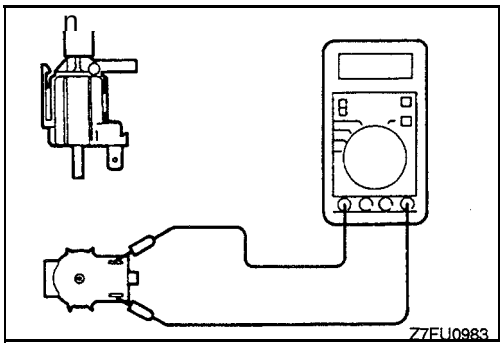
NOTE
Before disconnecting the vacuum hose, mark it to ensure reconnection at the correct position.

(1) Remove the vacuum hose (blue stripe on black) from the solenoid valve.
(2) Disconnect the harness connector.



(3) Apply a negative pressure to the nipple to which the black vacuum hose has been connected and check air-tightness with and without the battery voltage applied to the solenoid valve terminal.

Battery voltage	The other nipple of solenoid valve	Normal state
Not applied	Open	Negative pressure leaks
	Close with finger	Negative pressure is held
Applied	Open	Negative pressure is held

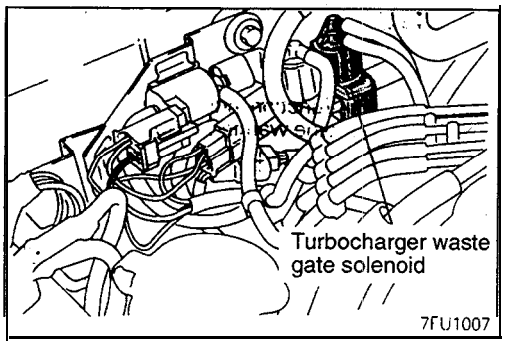


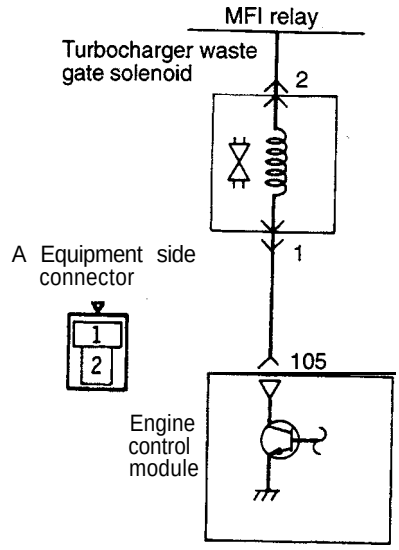
Coil Resistance Check

(1) Measure the coil resistance with a circuit tester.
Standard value: 36-46 Ω [at 20°C (68°F)]

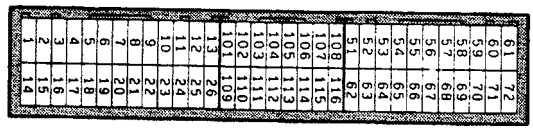
TSB Revision

TURBOCHARGER WASTE GATE SOLENOID <Turbo>





Engine control module connector



7FU1610

OPERATION

- The turbocharger waste gate solenoid is an ON-OFF type solenoid valve that controls the boost pressure that is introduced to the turbocharger waste gate actuator.
- Battery power is supplied to this valve via the MFI relay. When the engine control module turns ON the internal power transistor, the coil is energized to release part of the boost pressure applied to the turbocharger waste gate actuator.

TROUBLESHOOTING HINTS

If the turbocharger waste gate solenoid harness and the unit itself are normal, but poor acceleration or other abnormalities are experienced, the follwing problems are suspected.

(1) Faulty boost pressure control system
(2) Poor connection of intake air hose
(3) Faulty turbocharger or turbocharger waste gate actuator
(4) Clogged exhaust system

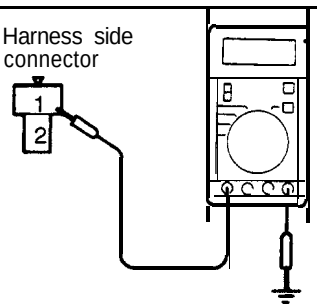
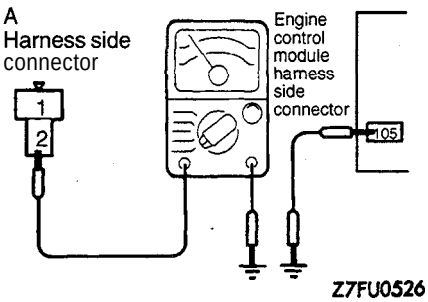
TSB Revision

INSPECTION

Using Scan Tool

Function	Item No.	Drive content	Check condition	Normal State
Actuator test	12	Turn solenoid valve from OFF to ON	Ignition switch: ON	Click heard when driven

HARNESS INSPECTION

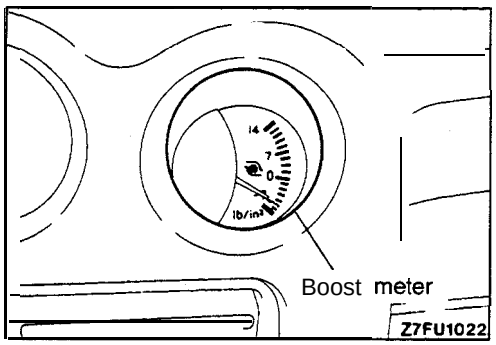
1	A Harness side connector  Z7FU0525	Measure the power supply voltage. • Connector: Disconnected • Ignition switch: ON **Battery voltage**	OK →	2
			NG →	Repair the harness. (AI – MFI relay)
2	A Harness side connector  Z7FU0526	Check for an open-circuit, or a short-circuit to ground, between the turbocharger waste gate solenoid and the engine control module. • Turbocharger waste gate solenoid connector: Disconnected • Engine control module connector: Disconnected	OK →	STOP
			NG →	Repair the Harness. (A2–105)

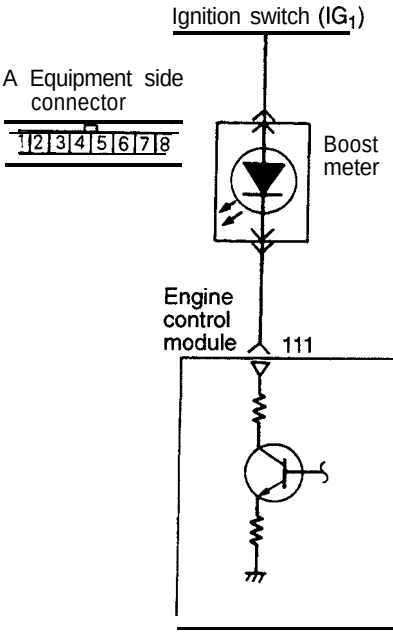
ACTUATOR INSPECTION

Refer to GROUP 15.

TSB Revision

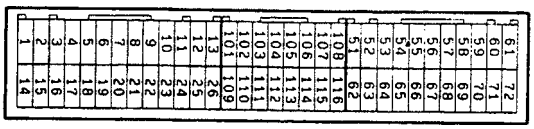
BOOST METER <Turbo>





Z7FU0985

Engine control module connector

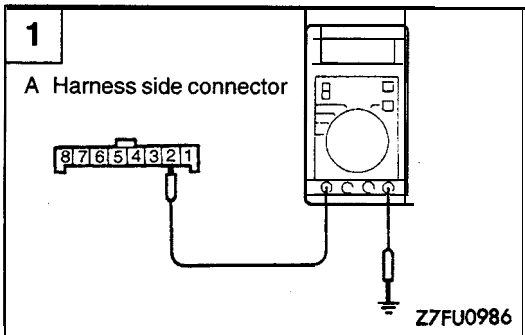
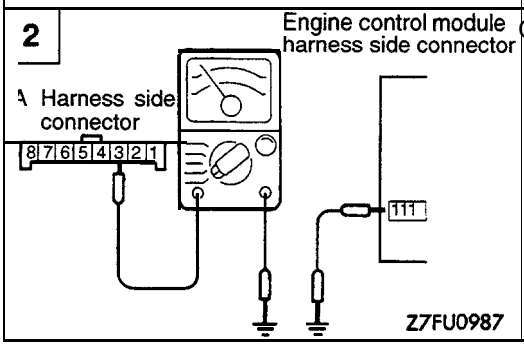


Z7FU0653

7FU1611

TSB Revision

HARNESS INSPECTION

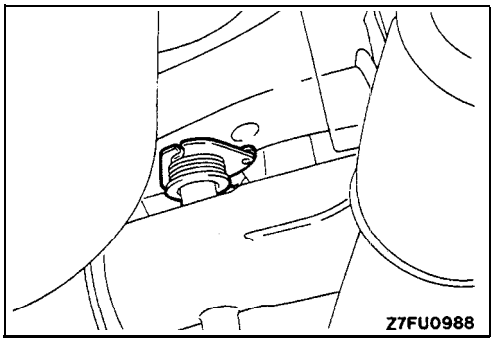
1  	Measure the power supply voltage. • Connector: Disconnected • Ignition switch: ON **Battery voltage**	OK →	2
		NG →	Repair the harness. (A2 – Ignition coil **[IG]**)
2  	Check for an open-circuit or a short-circuit to ground, between the engine control module and the boost meter. • Boost meter connector: Disconnected • Engine control module connector: Disconnected	OK →	STOP
		NG →	Repair the harness. (A3–111)

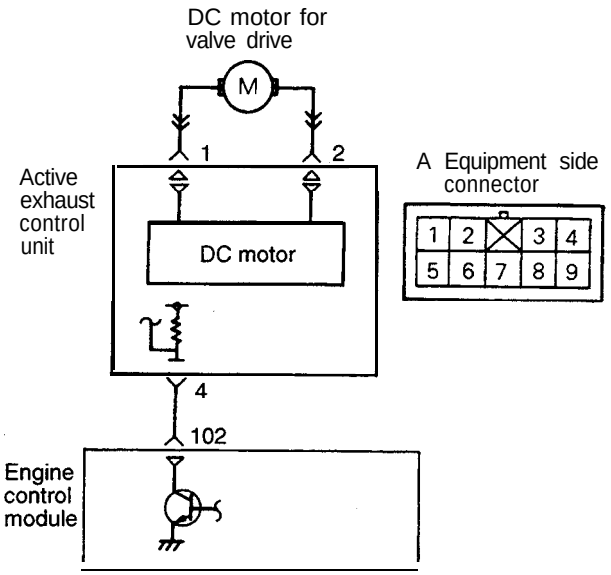
ACTUATOR INSPECTION

Refer to GROUP 54.

TSB Revision

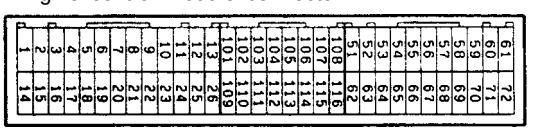
ACTIVE EXHAUST CONTROL UNIT <Turbo>





Z7FU0989

Engine control module connector



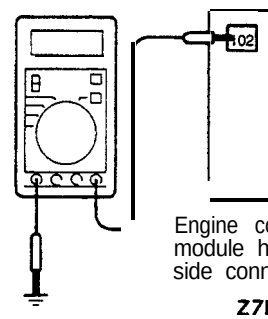
Z7FU0653

7FU1612

OPERATION

- Muffler noise is controlled1 by opening and closing the valve provided inside the main muffler.
- The valve is opened or closed by turning the DC motor in the normal or reverse direction.
- The DC motor is driven in the normal or reverse direction by changing the direction of power flow by the motor driving IC in the active exhaust control unit.
- The active exhaust control module opens and closes the valve when it receives the signal produced by the engine control unit.

HARNESS INSPECTION

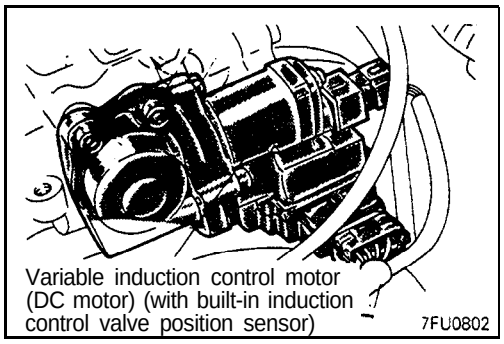
1	 Engine control module harness side connector Z7FU0689	Measure the input voltage of engine control module. • Engine control module connector: Disconnected • Ignition switch: ON **Battery voltage**	OK → STOP NG → Repair the harness (A4–102)

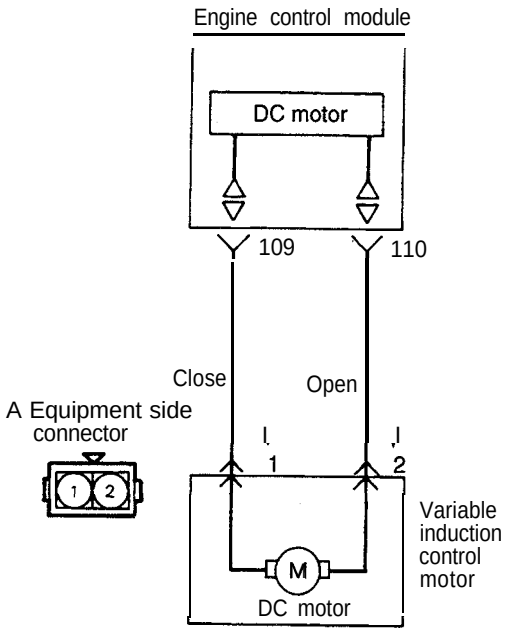
ACTUATOR INSPECTION

Refer to GROUP 15.

TSB Revision

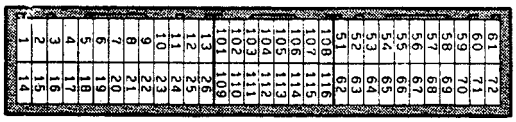
VARIABLE INDUCTION CONTROL MOTOR (DC MOTOR) <Non Turbo>


Variable induction control motor (DC motor) (with built-in induction control valve position sensor) 7FU0802



Z1FU0646

Engine control module connector



7FU0653

7FU1613

OPERATION

- As the DC motor is driven clockwise or counterclockwise by the signal from the engine control module, the variable induction valve opens or closes.
- The DC motor is driven clockwise or counterclockwise as the direction of current flow is changed by the motor drive IC in the engine control module.

INSPECTION

Using Scan Tool

<Variable Induction Control Motor>

Function	Item No.	Drive content	Check condition	Normal state
Actuator test	11	Drive the variable induction control (VIC) motor (Open and close the variable induction valve)	Ignition switch: ON	Turn the variable induction valve shaft (Variable induction valve: FULL CLOSE → FULL OPEN)

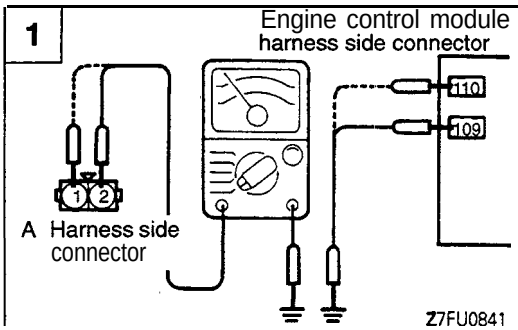
TSB Revision

<Variable Induction Control Valve Position>

Function	Item No.	Data display	Engine state	Standard value
Data list Data reading	62	Variable induction control valve position	700 rpm (idle)	0 step
			5,000 rpm or more	9 or 12* steps

NOTE
*: 1992 model only

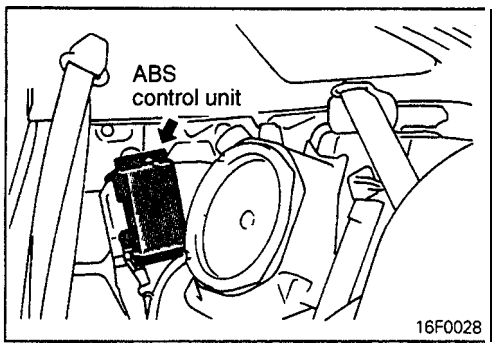
HARNESS INSPECTION

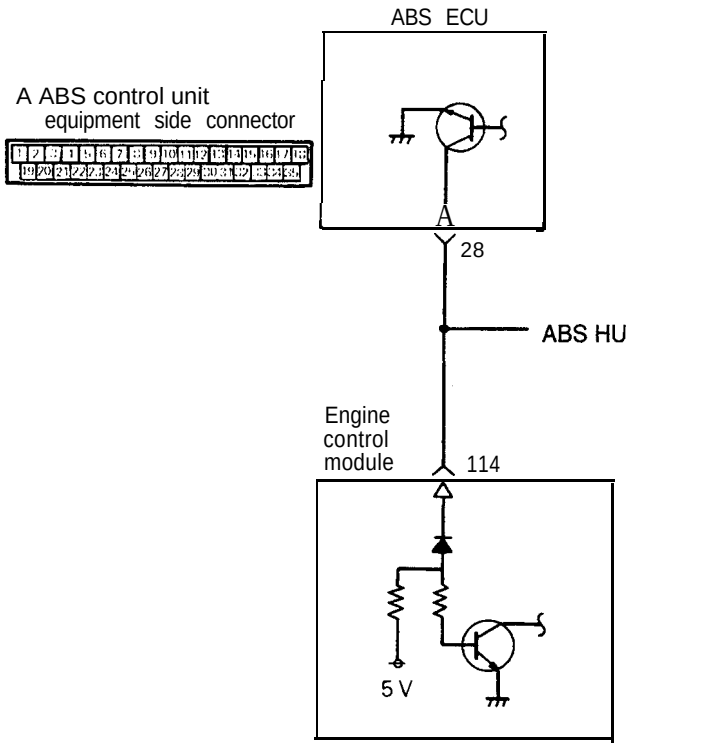
1 	Check for an open-circuit or a short-circuit to ground, between the engine control module and the variable induction control motor connector. • Variable induction control motor connector: Disconnected • Engine control module connector: Disconnected	OK → STOP NO → Repair the harness. (A1–109) (A2–110)	

ACTUATOR INSPECTION

Refer to GROUP 15.

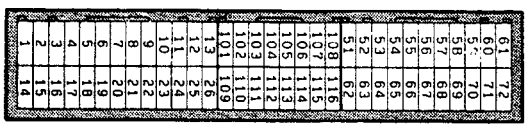
ANTI-LOCK BRAKING SIGNAL <Turbo>





Z6FU1542

Engine control module connector



7FU0653

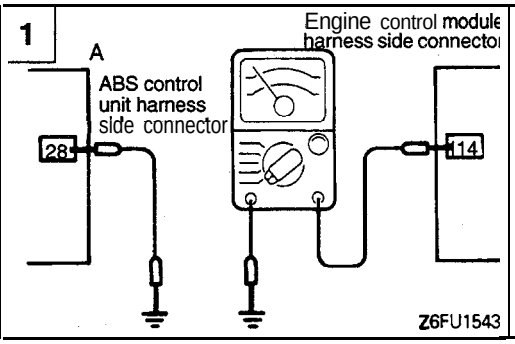
7FU1614

OPERATION

- The anti-lock braking signal is input to the engine control module from the anti-lock braking system (ABS) control module as a signal to indicate whether or not the motor relay is activated. Based on this signal, the engine control module controls the idle air control motor to secure effective anti-lock braking.
- When the motor relay is activated, the ABS control unit turns ON the power transistor, short-circuiting the terminal to ground. This causes the anti-lock braking signal to go from high to low.

HARNESS INSPECTION

1



Check for an open-circuit or a short-circuit to ground, between the ABS control unit and the engine control module.

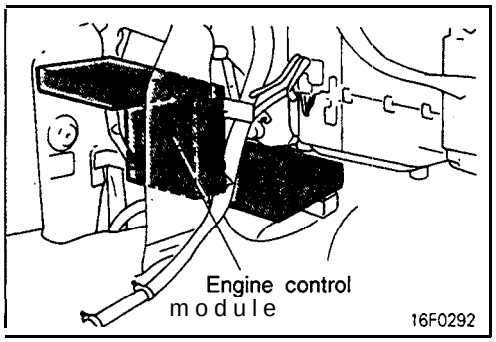
- ABS control unit connector: Disconnected
- Engine control module connector: Disconnected

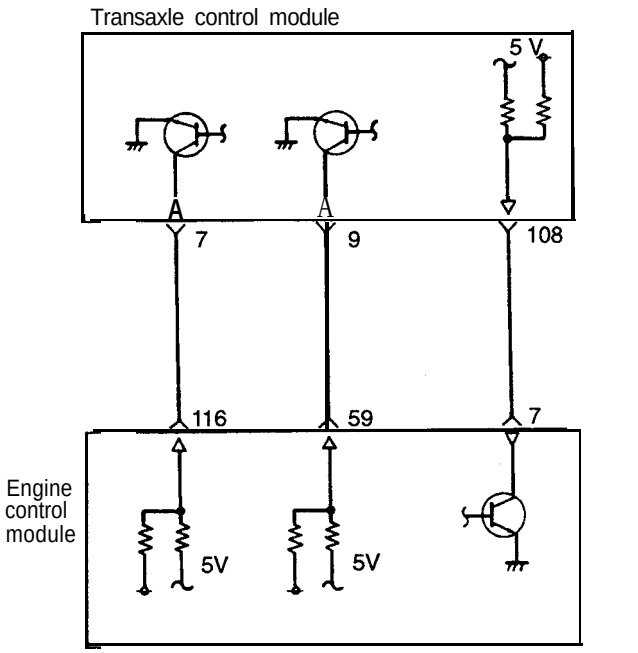
OK → STOP

OK → Repair the harness. (A28–114)

TSB Revision

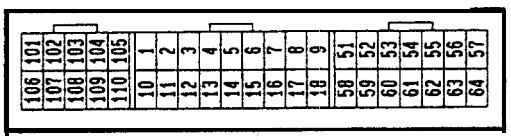
ENGINE AND TRANSAXLE TOTAL CONTROL SIGNAL <AK>





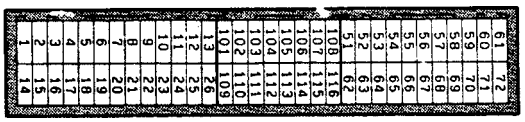
Z7FU0843

A Transaxle control module connector



Z7FU0903

Engine control module connector



7FU0653

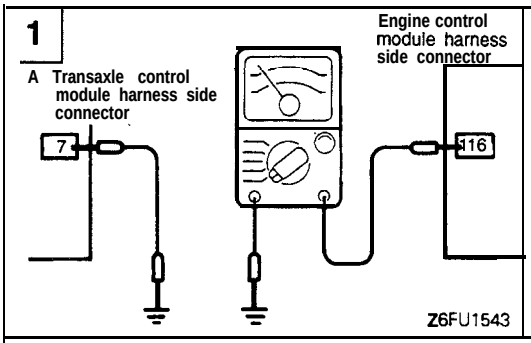
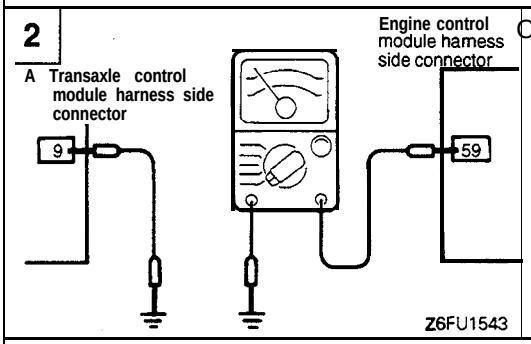
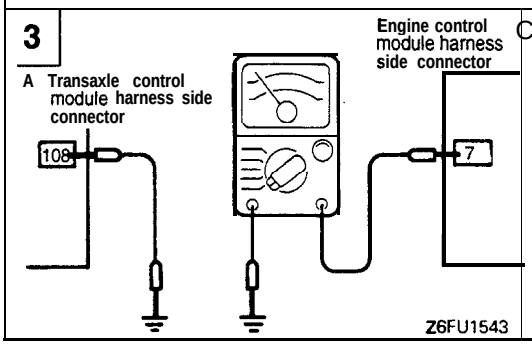
7FU1615

OPERATION

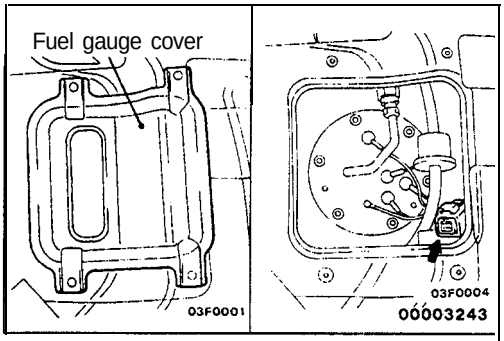
- Three communication lines are connected between the engine control module and the transaxle control module to send and receive the engine and transaxle total control signal.
- If the transistor inside the engine control module changes from OFF to ON by the command of the engine control module, the terminal having a voltage of 5 V applied to it from the transaxle control module is grounded in the engine control module.
  This will change the terminal voltage of the transaxle control module from HIGH to LOW.
  If the transistor fitted inside the engine control module changes from ON to OFF, the terminal, having applied to it a voltage of 5 V from the transaxle control module and grounded in the engine control module, is released and the terminal voltage of the transaxle control module changes from LOW to HIGH. In this way, the terminal voltage of the transaxle control module is controlled by ON/OFF operation of the transistor inside the engine control module in order to send signal.
  On the other hand, the transaxle control module also controls the terminal voltage of the engine control module by the ON/OFF operation of the transistor fitted inside the transaxle control module in order to send signal. In this way, the engine and transaxle send control signal to each other.

TSB Revision

HARNESS INSPECTION

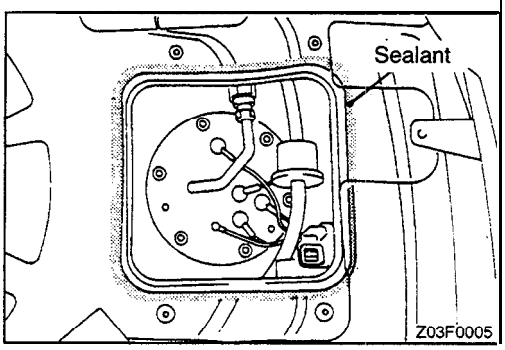
1		Check for an open-circuit, or a short-circuit to ground between the transaxle control module and the engine control module. • Transaxle control module connector: Disconnected • Engine control module connector: Disconnected	OK → 2 NG → Repair the harness. (A7–116)
2		Check for an open-circuit, or a short-circuit to ground between the transaxle control module and the engine control module. • Transaxle control module connector: Disconnected • Engine control module connector: Disconnected	OK → 3 NG → Repair the harness. (A9–59)
3		Check for an open-circuit, or a short-circuit to ground between the transaxle control module and the engine control module. • Transaxle control module connector: Disconnected • Engine control module connector: Disconnected	OK → STOP NG → Repair the 3 harness. (Al 08-7)

TSB Revision



RELEASE OF RESIDUAL PRESSURE FROM HIGH PRESSURE FUEL HOSE

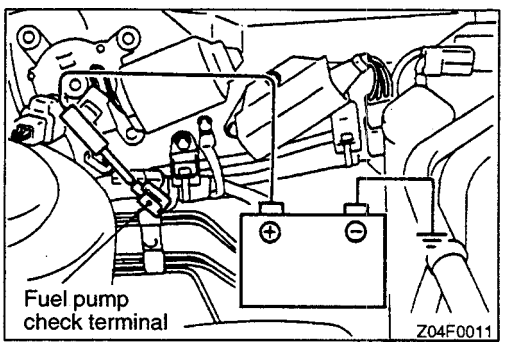
Make the following operations to release the pressure remaining in fuel pipe line so that fuel will not flow out.
(1) Remove the fuel gauge cover in the luggage compartment.
(2) Disconnect the fuel pump harness connector.
(3) Start the engine and after it stops by itself, turn the ignition switch to OFF.
(4) Connect the fuel pump harness connector.



(5) Apply the specified sealant to the rear floor pan.

Specified sealant: 3M ATD Part No.8509 or equivalent

(6) Install the fuel gauge cover.

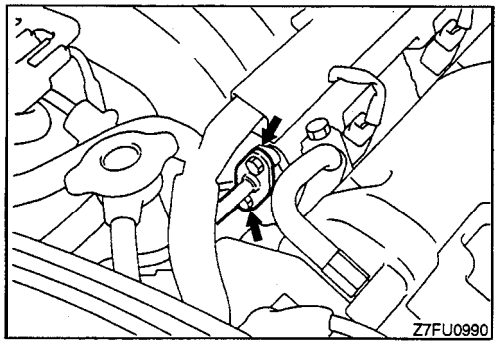


FUEL PUMP OPERATION CHECK

(1) Set the ignition switch at OFF.
(2) Check that when the battery voltage is directly applied to the fuel pump check terminal (black), the operating sound of the pump can be heard.

NOTE
Since the fuel pump is installed in the fuel tank, its operating sound cannot be readily heard. Remove the fuel tank cap and listen to the operating sound through the filter port.

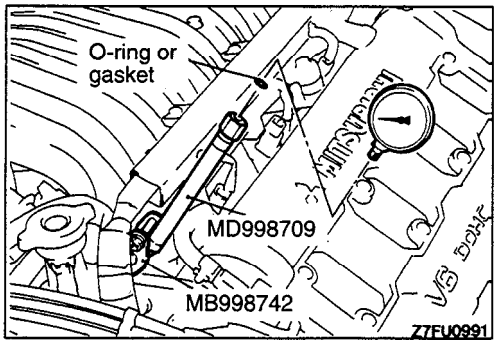
(3) Hold the high pressure fuel hose between your fingers and check that the fuel pressure can be felt.



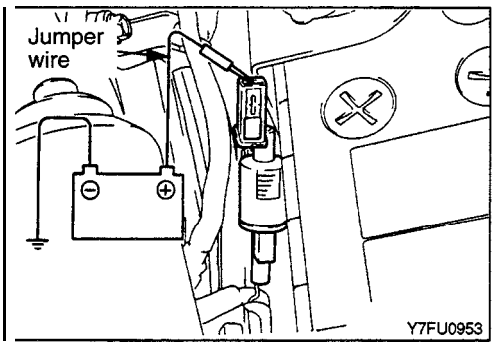
FUEL PRESSURE TEST

(1) Reduce the internal pressure of the fuel pipes and hoses.
(2) Disconnect the fuel high pressure hose at the fuel rail side.

Caution
Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.



(3) Set a fuel pressure gauge on the special tool, placing an adequate O-ring or gasket between the gauge and special tool prevent fuel leaks.
(4) Attach the special tool set in step (3) to the fuel rail between high pressure hoses.



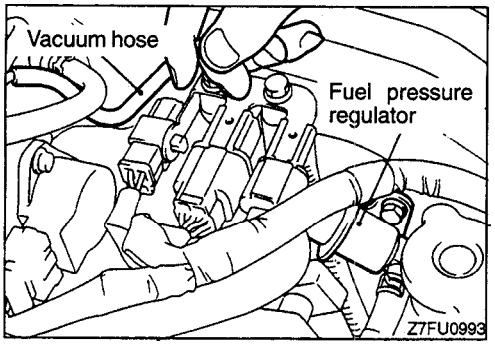
(5) Connect a jumper wire to the terminal for activation of the fuel pump and to the positive (+) terminal of the battery to activate the fuel pump. With fuel pressure applied, check to be sure that there is no fuel leakage from the fuel pressure gauge and the special tool connection part.
(6) Disconnect the jumper wire (from the terminal for activation of the fuel pump) to stop the fuel pump.
(7) Start the engine and let it idle.

(8) Measure the fuel pressure during idling.

Standard value:

<Non Turbo>Approx. 270 kPa (38 psi) at curb idle

<Turbo> Approx. 235 kPa (34 psi) at curb idle



(9) Disconnect the vacuum hose from the fuel pressure regulator, and then measure the fuel pressure while using a finger to plug the end of the hose.

Standard value:

<Non Turbo>330–350 kPa (47-50 psi) at-curb idle

<Turbo> 295-315 kPa (43-45 psi) at curb idle

(10) Check to be sure that the fuel pressure during idling does not decrease even after the engine is raced a few times.

(11) Use a finger to gently press the fuel return hose while repeatedly racing the engine, and check to be sure that there is fuel pressure in the return hose also.

NOTE
There will be no fuel pressure in the return hose if there is insufficient fuel flow.

(12) If the fuel pressure measured in steps (8) to (11) deviates from the standard value range, check for the probable cause by referring to the table below, and then make the appropriate repair.

Condition	Probable cause	Remedy
• Fuel pressure is too low. • Fuel pressure drops during racing. • No fuel pressure in fuel return hose.	Fuel filter is clogged.	Replace the fuel filter.
	Malfunction of the valve seat within the fuel pressure regulator, or fuel leakage to return side caused by spring deterioration.	Replace the fuel pressure regulator.
	Fuel pump low discharge pressure.	Replace the fuel pump
Fuel pressure is too high.	The valve within the fuel pressure regulator is sticking.	Replace the fuel pressure regulator.
	Clogging of the fuel return hose and/or the pipe	Clean or replace the hose and/or pipe.
No change of the fuel pressure when the vacuum hose is connected and when not connected.	Damaged vacuum hose or nipple clogging.	Replace the vacuum hose, or clean the nipple.
	Malfunction of the fuel pressure control system <Turbo>	Checking the fuel pressure control system <Turbo>

(13)Stop the engine and check for a change of the value indicated by the fuel pressure gauge. The condition is normal if there is no decrease of the indicated value within two minutes.
If there is a decrease of the indicated value, monitor the speed of the decrease, and, referring to the table below, determine the cause of the problem and make the appropriate repair.

Condition	Probable cause	Remedy
After the engine is stopped, the fuel pressure drops gradually.	Injector leakage.	Replace the injector.
	Leakage at the fuel pressure regulator valve seat.	Replace the fuel pressure regulator.
There is a sudden sharp drop of the fuel pressure immediately after the engine is stopped.	The check valve (within the fuel pump) is not closed.	Replace the fuel pump.

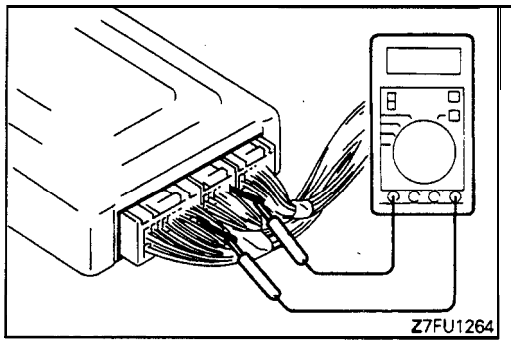
(14)Reduce the internal pressure of the fuel pipes and hoses.
(15)Disconnect the fuel pressure gauge and the special tools from the delivery pipe.

Caution
Because there will 'be some residual pressure in the fuel pipe line, use a shop towel to cover so that fuel doesn't splatter.

(16)Replace the O-ring at the end of the fuel high-pressure hose with a new one.
(17)After connecting the fuel high-pressure hose to the fuel rail, tighten the installation bolt at the specified torque.

Tightening torque: 5.0 Nm (3.6 ft.lbs.)

(18)Check to be sure that there is no fuel leakage.
1) Apply battery voltage to the terminal for activation of the fuel pump so as to activate the fuel pump.
2) With fuel pressure applied, check for leakage of the fuel line.



ENGINE CONTROL MODULE (ECM) TERMINAL VOLTAGES INSPECTION

(1) Connect a very thin wire probe (such as a paper clip) to the probe of the voltmeter.
(2) Insert the very thin probe from the wire side into contact with each of the terminals of the ECM connector and check the voltage, while referring to the check chart.

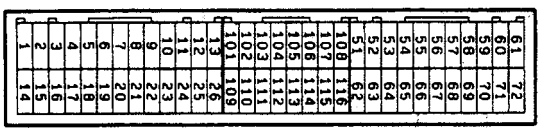
NOTE
1. Measure a voltage with the ECM connector connected.
2. Measure the voltage between each terminal and the No. 26 terminal (ground terminal).
3. Withdraw the ECM for easier access to the connector terminals.
4. The inspection need not be performed in the order of the chart.

Caution
Short-circuiting the positive (+) probe between a connector terminal and ground could cause damage to the vehicle wiring, sensors or ECM, or all of them. Use care to prevent it!

(3) If the voltmeter shows any deviation from the standard value, check the corresponding sensor, actuator and related electrical wiring, then repair or replace.
(4) After repair or replacement, recheck with the voltmeter to confirm that the problem has cleared completely.

TERMINAL VOLTAGE CHECK CHART

Engine Control Module Connector Terminal Configuration



Z7FU0653

Terminal No.	Check point	Check conditions (Engine conditions)	Standard value	Remarks
60	Back-up power supply	Ignition switch: OFF	B+	
12	Power supply	Ignition switch: ON	B+	
25				
62	Ignition switch IG	Ignition switch: ON	B+	
108	MFI relay (power supply)	Ignition switch: OFF	B+	
		Ignition switch: ON	o-3 v	
8	MFI relay (fuel pump)	Ignition switch ON	B+	
		Engine: Idle	o-3 v	
61	Sensor impressed voltage	Ignition switch: ON	4.5–5.5 v	–

Terminal No.	Check point	Check conditions (Engine conditions)		Standard value	Remarks
70	Volume air flow sensor	Engine: Idle		2.2–3.2 V	–
		Engine: 2,000 rpm			
19	Volume air flow sensor reset signal	Engine: Idle		0–1 V	–
		Engine: 3,000 rpm		6–9 V	
52	Intake air temperature sensor	Ignition switch: ON	When intake temperature is 0°C (32°F)	3.2–3.8 V	–
			When intake temperature is 20°C (68°F)	2.3–2.9 V	
			When intake temperature is 40°C (104°F)	1.5–2.1 V	
			When intake temperature is 80°C (176°F)	0.4–1.0 V	
65	Barometric pressure sensor	Ignition switch: ON	When altitude is 0 m (0 ft.)	3.7–4.3 V	–
			When altitude is 1,200 m (3,937 ft.)	3.2–3.8 V	
63	Water temperature sensor	Ignition switch: ON	When water temperature is 0°C (32°F)	3.2–3.8 V	–
			When water temperature is 20°C (68°F)	2.3–2.9 V	
			When water temperature is 40°C (104°F)	1.3–1.9 V	
			When water temperature is 80°C (176°F)	0.3–0.9 V	
64	Throttle position sensor	Ignition switch: Kept in ON state for more than 15 seconds	Idle	0.3–1.0 V	–
			Wide open throttle	4.5–5.5 V	
67	Closed throttle position switch	Ignition switch: ON	Throttle valve placed in idle position	0–1 V	–
			Throttle valve placed in slightly opened position	4 V or mere	
68	Camshaft position sensor	Engine: Cranked		0.2–3.0 V	–
		Engine: Idle			
69	Crankshaft position sensor	Engine: Cranked		0.2–3.0 V	–
		Engine: Idle			
51	Ignition switch-ST	Engine: Cranked		8 V or more	M/T
71	Park/Neutral position switch	Ignition switch: ON	Selector lever set to P or N	0–3 V	A/T
			Selector lever set to D, 2, L or R	8–14 V	

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Terminal No.	Check point	Check conditions (Engine conditions)		Standard value	Remarks
66	Vehicle speed sensor	• Ignition switch: ON • Move the vehicle slowly forward		0 ↔ 5 V (Changes repeated)	–
107	Power steering pressure switch	Engine: Idle, warm	Steering wheel placed in neutral (straight ahead) position	B+	
			Steering wheel turned half a turn	O-3 V	
115	Air conditioning switch 1	Engine: Idle	Air conditioning switch set to OFF	O-3 V	–
			Air conditioning switch set to ON (Air conditioning compressor in driven state)	B+	
20	Airconditioning switch 2	Engine: Running at idle	Air conditioning switch set to OFF	0–3 V	
			• Air conditioning switch set to ON • Indoor set temperature brought closer to atmospheric temperature	B+	
22	Air conditioning relay	• Engine: Idle • Air conditioning switch: OFF → ON (Air compressor in driven state)		B+ or 6 V or more for a moment → O-3 V as A/C clutch cycles	–
6	Fan motor relay (Lo)	Radiator fan not operating (Coolant temperature: below 90°C [194°F])		B+	1994and later Federal model
		Radiator fan operating at low speeds (Coolant temperature: 95–105°C [203–221 °F])		o-3 v	
53	Fan motor relay (Hi)	Radiator fan not operating (Coolant temperature: below 90°C [194°F])		B+	1994 and later Federal model
		Radiator fan operating at high speeds (Coolant temperature: above 105°C [221°F]		o-3 v	
24	Electric load switch	Engine: Running at idle	Lighting switch set to OFF	o-3 v	
			Lighting switch set to ON	B+	
56 55	Heated oxygen sensor	Engine: Warm, 2000 rpm (Digital voltmeter to be used for checking)		0 ↔ 0.8 V (Changes repeated)	Terminal 55 for rear bank of turbo-charged engine
1	No.1 injector	Engine: Running at idle after warmup, and accelerated abruptly by depressing accelerator pedal		Falls temporarily a little from 11-14v	–
14	No.2 injector				
2	No.3 injector				
15	No.4 injector				
3	No.5 injector				
16	No.6 injector				

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Terminal No.	Check point	Check conditions (Engine conditions)		Standard value	Remarks
4	Stepper motor coil <AI>	Engine: Warm Check immediately after hot restart		B+ ↔ 0–3 V (Changed repeated)	–
17	Stepper motor coil <A2>				
5	Stepper motor coil <B1>				
18	Stepper motor coil <B2>				
10	Ignition power transistor unit A	Engine speed: 3,000 rpm		0.3-3 v	
23	Ignition power transistor unit B				
11	Ignition power transistor unit C				
9	Evaporative emission purge solenoid	Ignition switch: ON		B+	
		Engine: Warm, 3,000 rpm		o-3 v	
7	Fuel pressure solenoid	Ignition switch: ON		B+	Turbo
		Engine: Warm, 3,000 rpm		0–3 V → B+	
105	Turbocharger waste gate solenoid	Ignition switch: ON		B+	Turbo
		Engine: Idle (when the premium gasoline is used)		O-3 V	
11	Turbo meter	Ignition switch: ON		4-13 v	Turbo
		Engine: Depress the accelerator pedal abruptly while the engine is idling		Falls temporarily from B+	
21	Fuel pump relay 2	Engine: Depress the accelerator pedal abruptly while the engine is idling		Rises temporarily from o-3 v	Turbo
101	Engine ignition signal	Engine: 3,000 rpm		0.3-3 v	
102	Valve opened or closed indication signal	Muffler mode changeover switch: ON	Engine: Idle	o-3 v	Turbo
			Engine: 4,500 rpm	B+	
103	Muffler mode changeover switch	Ignition switch: ON	Changeover switch set to ON (TOUR)	O-3 V	Turbo
			Changeover switch set to OFF (SPORT)	B+	
104	Ignition timing adjustment terminal	Ignition switch: ON	Ignition timing adjustment terminal connected to ground	O-l V	
			Ignition timing adjustment terminal disconnected from ground	4.0-5.5 V	
106	Check engine/malfunction indicator lamp	Ignition switch: OFF → ON		0–3 V → 9-13 v (Several seconds later)	–

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Terminal No.	Check point	Check conditions (Engine conditions)		Standard value	Remarks
6	EGR solenoid	Ignition switch: ON		B+	California – Non Turbo, Turbo
		Engine: Idle Suddenly depress the accelerator pedal.		Falls temporarily from B+.	
53	EGR temperature sensor	Ignition switch: ON	When sensor temperature is 50°C (122°F)	3.6–4.4 V	California
			When sensor temperature is 100°C (212°F)	2.2–3.0 V	
111	Induction control valve position sensor No. 1	Ignition switch: ON		0–1 V or 4.5–5.5 V	Non Turbo
		Engine: Slowly accelerated from idling speed to 5,000 rpm		0–1 V or 4.5–5.5 V → 1.5–4 V (for a moment)	
103	Induction control valve position sensor No. 2	Ignition switch: ON		0–1 V or 4.5–5.5 V	Non Turbo
		Engine: Slowly accelerated from idling speed to 5,000 rpm		O-l V or 4.5-5.5 v → 1.5-4 v (for a moment)	
110	Induction control valve (Opened)	Engine: Slowly accelerated from idling speed to 5,000 rpm		O-l V → 4 V or more (for a moment)	Non Turbo
109	Induction control valve (Closed)	Engine: Slowly decelerated from 5,000 rpm to idling speed			
114	Anti-lock braking signal	Engine: Idle		B+	Turbo
		• When vehicle is put in motion for the first time after the ignition switch was placed in ON position • Vehicle speed: 0 → 10km/h (0 → 0.6mph)		B+ → O-3 V (for a moment)	
116	Total control "Reduce torque" request signal 1	Engine: Idle		4.5-5.5 v	A/T
		Engine: Running at idle after warmup and changing speeds		O-l V	
59	Total control "Reduce torque" request signal 2	Engine: Idle		o-1 v	A/T
		Engine: Running at idle after warmup and changing speeds		l-5.5 V	
7	Total control "Reduce torque" execution signal	Engine: Running at idle with coolant temperature at 50°C (122°F) or lower		O-l V	A/T
		Engine: Idle, warm		1–4 V	

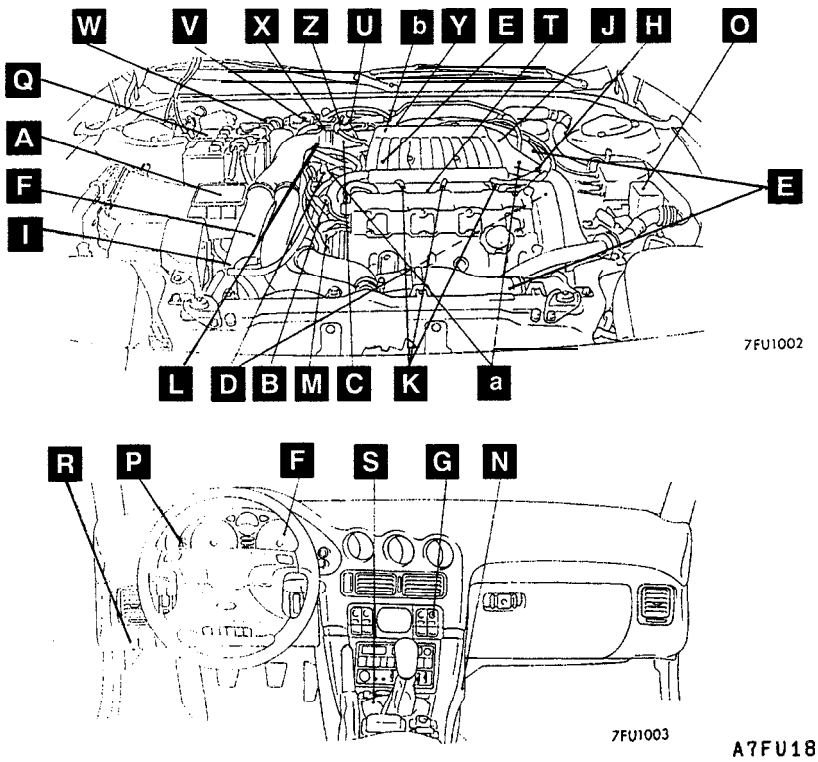
TSB Revision

ON-VEHICLE INSPECTION OF **MFI** COMPONENTS <**From** 1994 Models except Non Turbo up to 1995 Models for Federal>

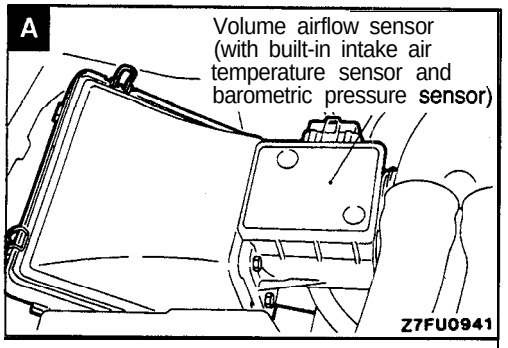
COMPONENT LOCATION

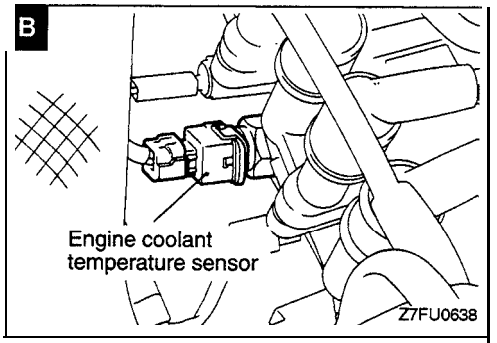
Name	Symbol	Name	Symbol
Air-conditioning relay	O	Ignition coil (ignition power transistor)	M
Air-conditioning switch	G	Ignition timing terminal	Q
Camshaft position sensor	a	Injector	K
Check engine/malfunction indicator lamp	P	Knock sensor	T
Crankshaft position sensor	D	Manifold differential pressure sensor <From 1996 models>	b
Diagnostic output terminal and diagnostic test mode control terminal	R	Multiport fuel injection (MFI) relay	N
		Park/Neutral position switch <A/T>	I
EGR solenoid <California – Non Turbo, Turbo, From 1996 Federal – Non Turbo>	Z	Power steering pressure switch	H
		Resistor <Turbo>	W
EGR temperature sensor <Up to 1995 California, Up to 1995 Federal Turbo>	Y	Throttle position sensor (with built-in closed throttle position switch)	C
Engine control module	S	Turbocharger waste gate solenoid <Turbo>	U
Engine coolant temperature sensor	B	Variable induction control motor (DC motor) (with built-in induction control valve position sensor) <Non Turbo>	J
Evaporative emission purge solenoid	X		
Fuel pressure solenoid <Turbo>	V	Vehicle speed sensor	F
Heated oxygen sensor	E	Volume air flow sensor (with built-in intake air temperature sensor and barometric pressure sensor)	A
Idle air control motor (stepper motor)	L		

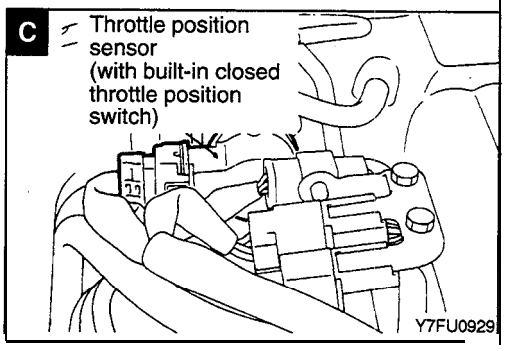
NOTE: The "Name" column is in alphabetical order

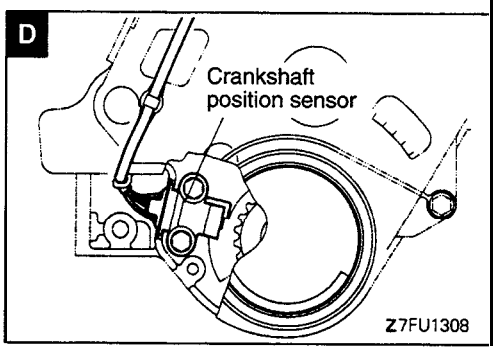


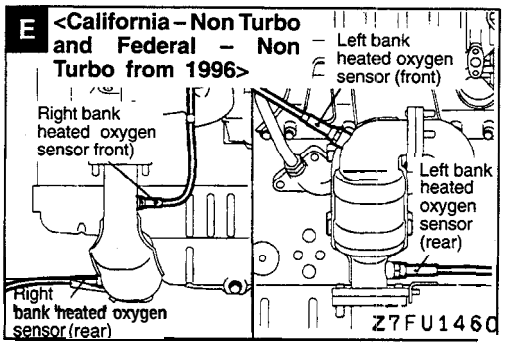
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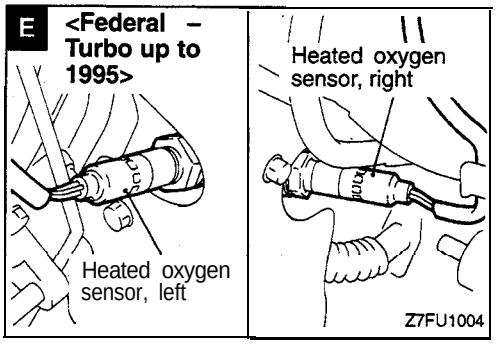
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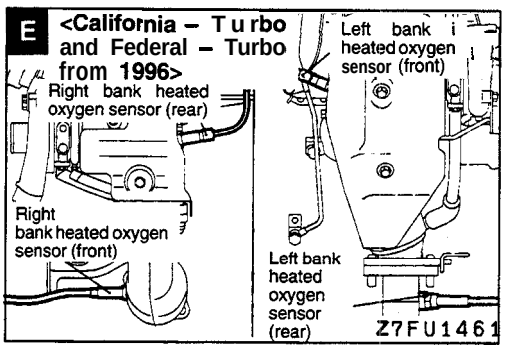
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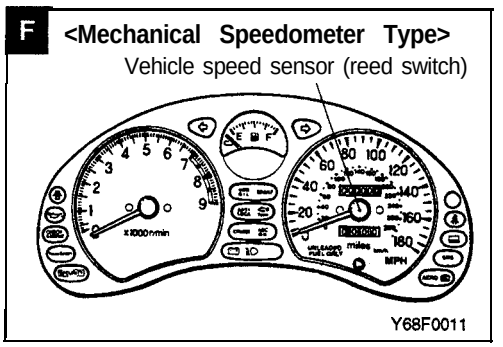
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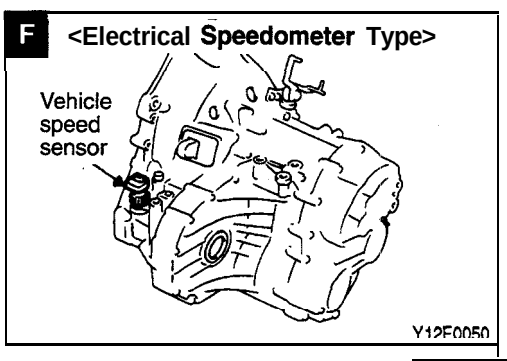
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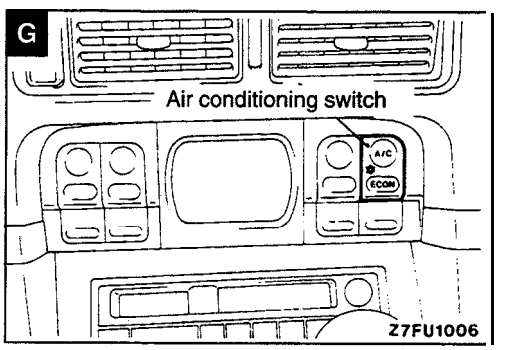
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E <Federal – Turbo up to 1995>


E <California – Turbo and Federal – Turbo from 1996>


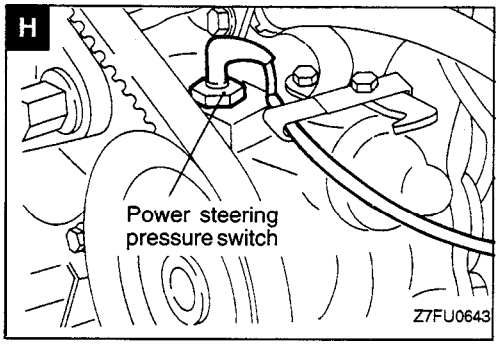
F <Mechanical Speedometer Type>


F <Electrical Speedometer Type>


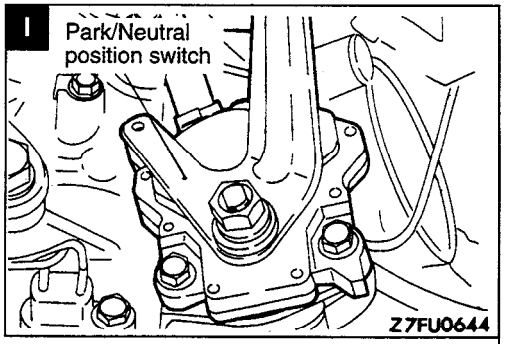
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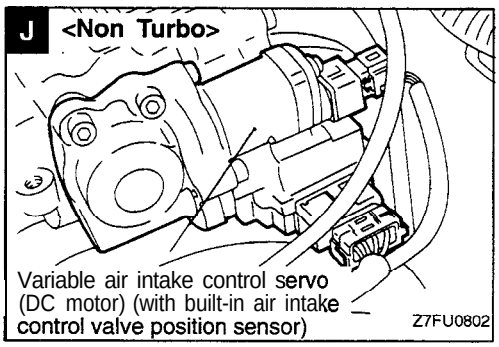
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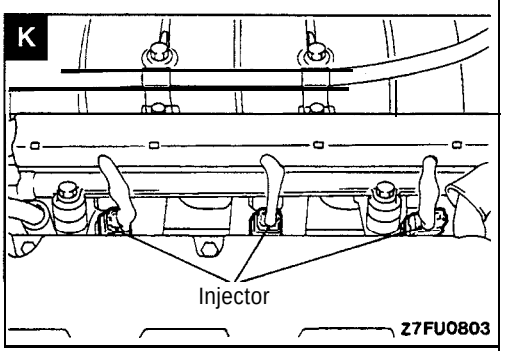
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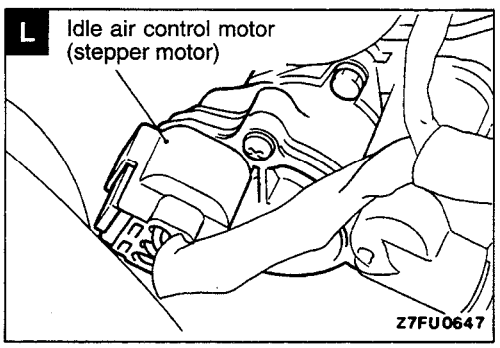
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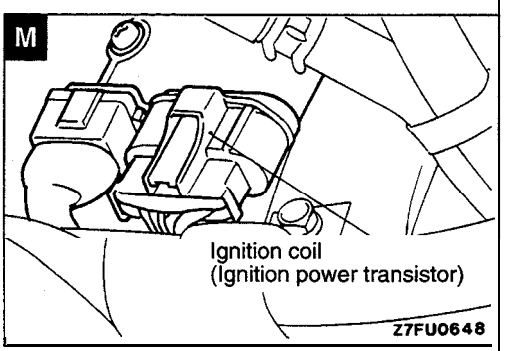
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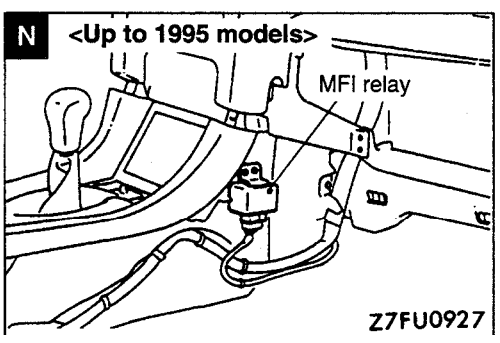
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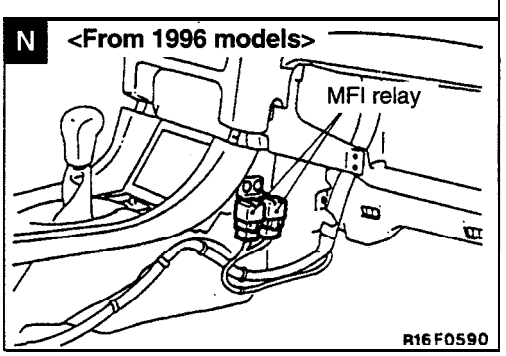
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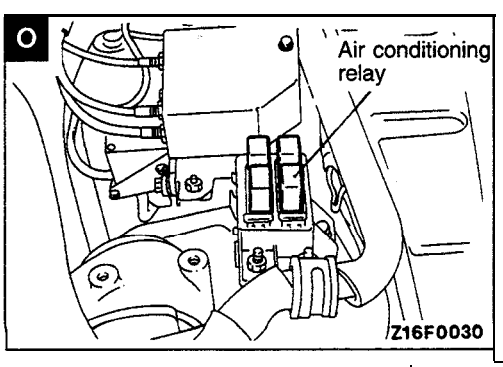
N <Up to 1995 models>



N <From 1996 models>

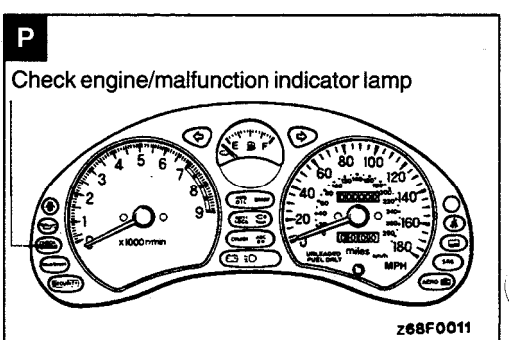


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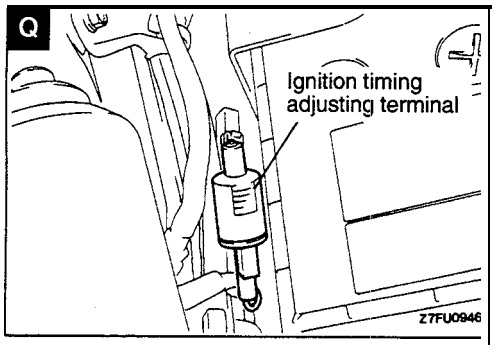
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Check engine/malfunction indicator lamp

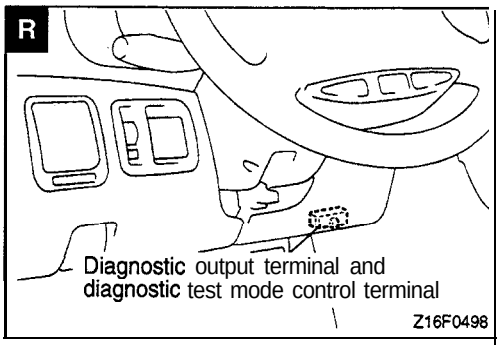


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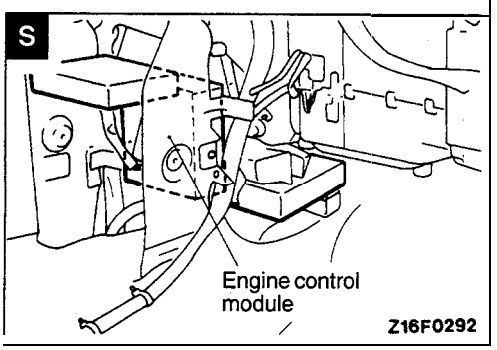
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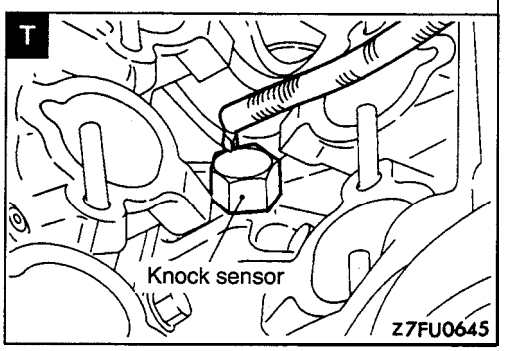
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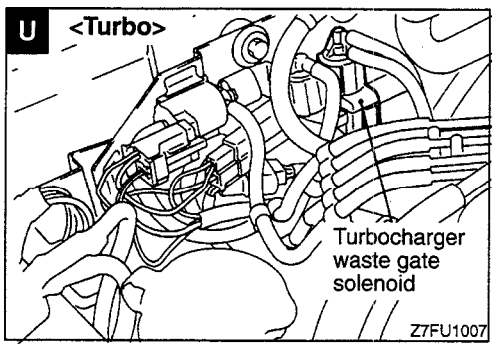
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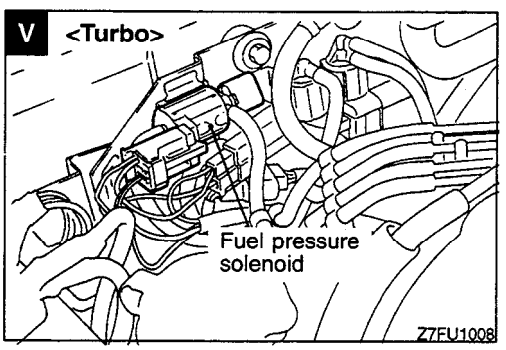
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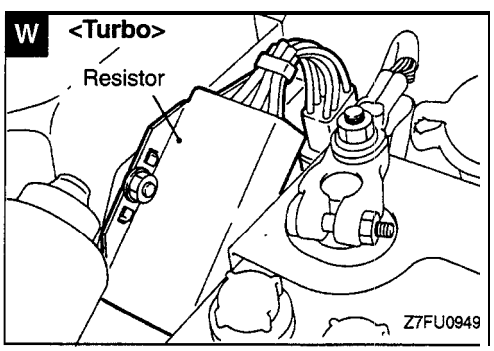
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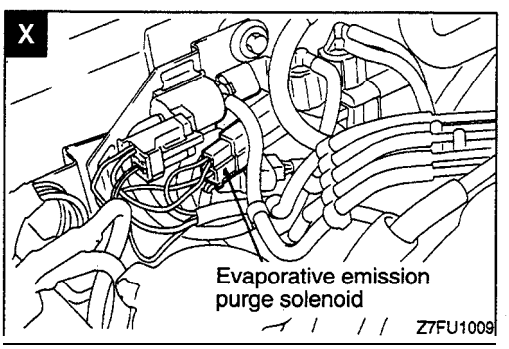
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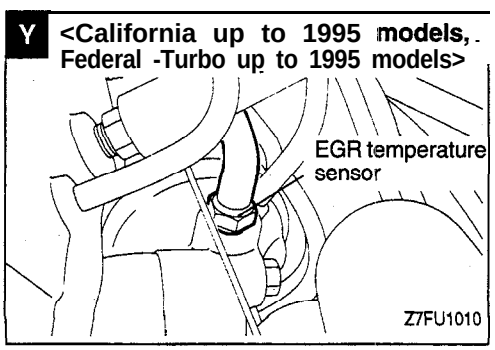
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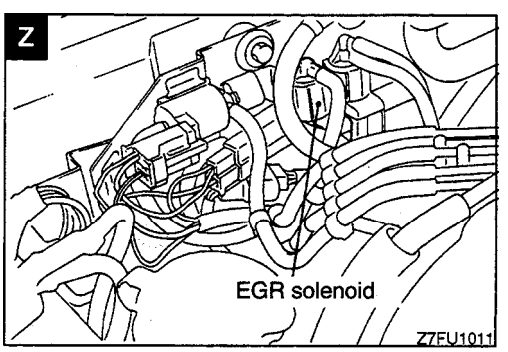
X



Y <California up to 1995 models, Federal -Turbo up to 1995 models>

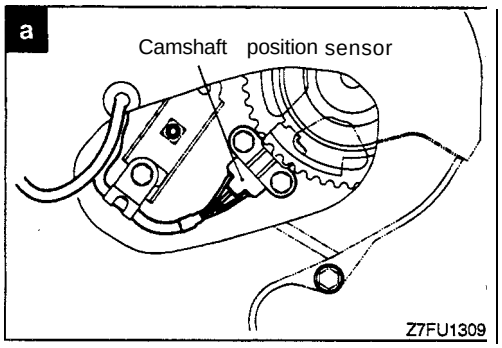


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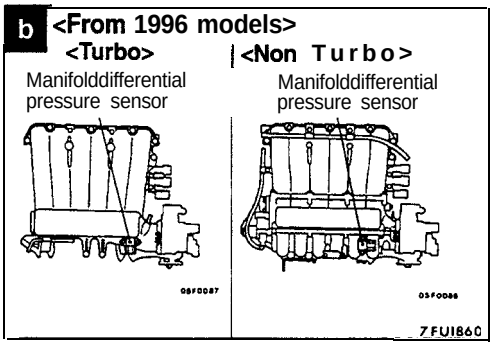


TSB Revision

a



b <From 1996 models>



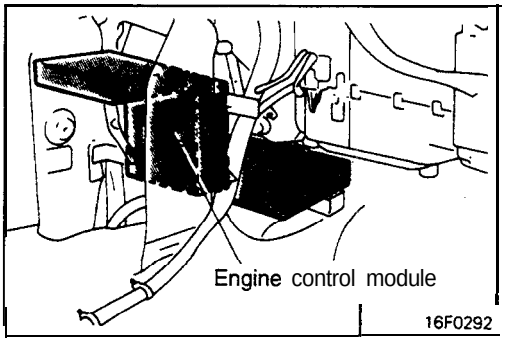
TSB Revision

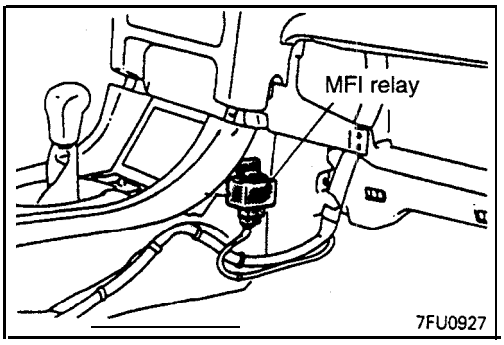
COMPONENTS INSPECTION PROCEDURE

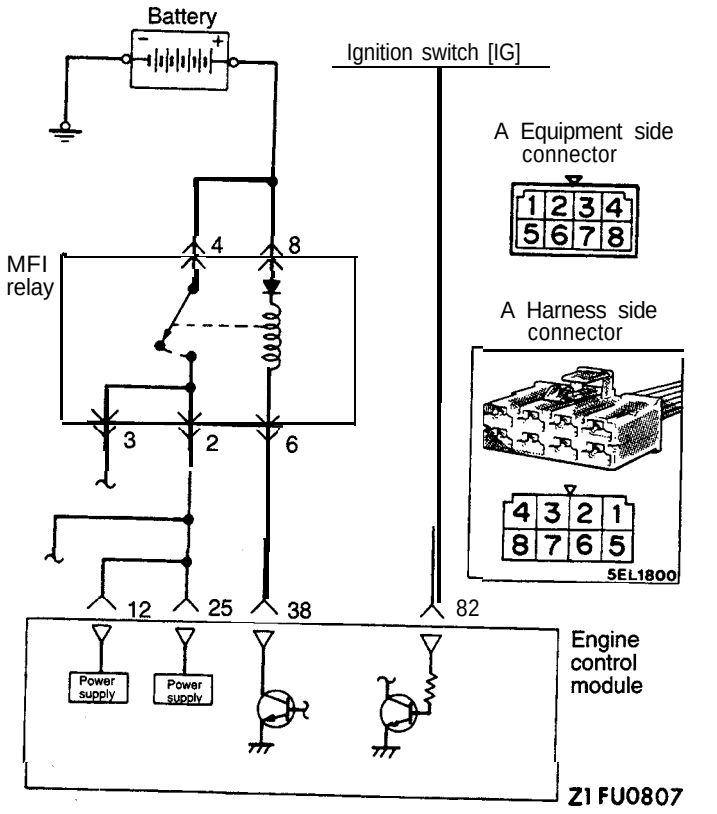
USING SCAN TOOL

Refer to P.13A-64.

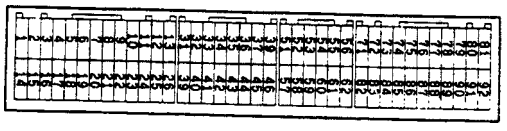
POWER SUPPLY (MFI RELAY) AND IGNITION SWITCH – IG <Up to 1995 models>







Engine control module connector



Z9FU0393 7FU1616

OPERATION

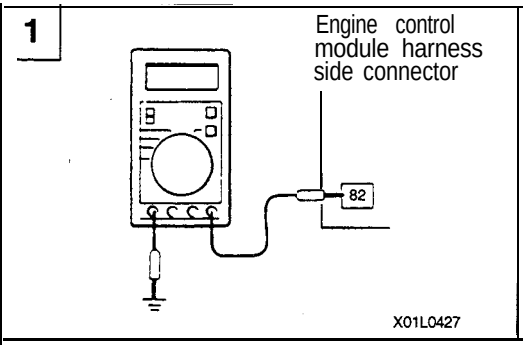
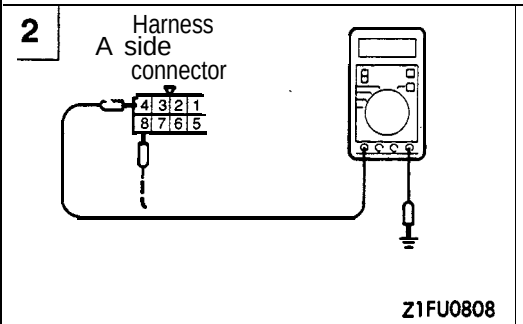
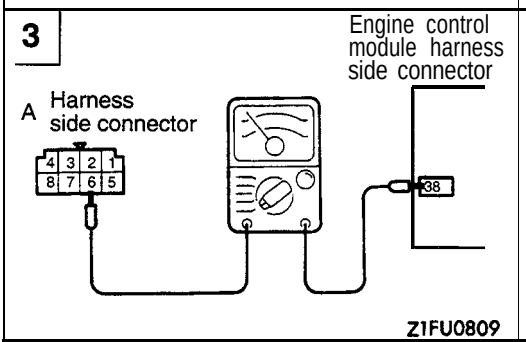
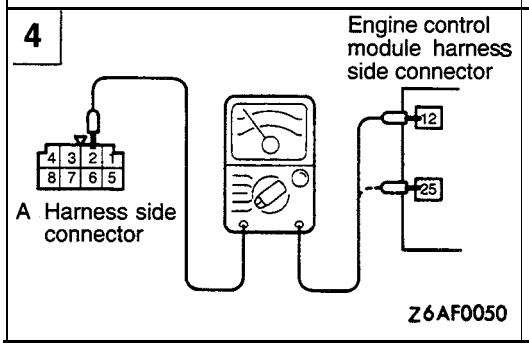
Refer to P.13A-65.

INSPECTION

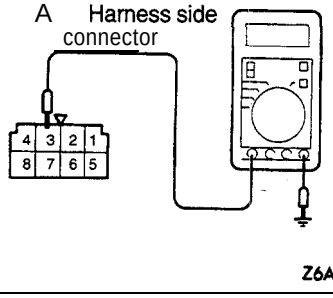
Refer to P.13A-65.

TSB Revision

HARNESS INSPECTION

1 	Measure the ignition switch (IG) terminal input voltage. • Engine control module connector: Disconnected **Ignition switch OFF: O-l V** **Ignition switch ON: Battery voltage**	OK →	2
		NG →	Repair the harness: (Ignition switch – 82) or check the ignition switch
2 	Measure the power supply voltage of the MFI relay. • Ignition switch: OFF • MFI relay connector: Disconnected **Battery voltage**	OK →	3
		NG →	Repair the harness. (Battery – A4, A8)
3 	Check for an open-circuit, or a short-circuit to ground, between the engine control module and the MFI relay. • Engine control module connector: Disconnected • MFI relay connector: Disconnected	OK →	4
		NG →	Repair the harness. (A6–38)
4 	Check for an open-circuit, or a short-circuit to earth between the engine control module and the MFI relay. • MFI relay connector: Disconnected • Engine control module connector: Disconnected	OK →	5
		NG →	Repair the harness. (A2–12, 25)

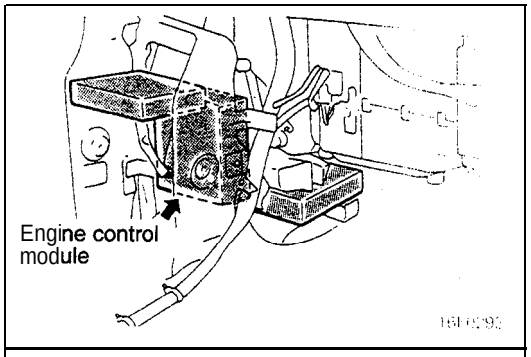
TSB Revision

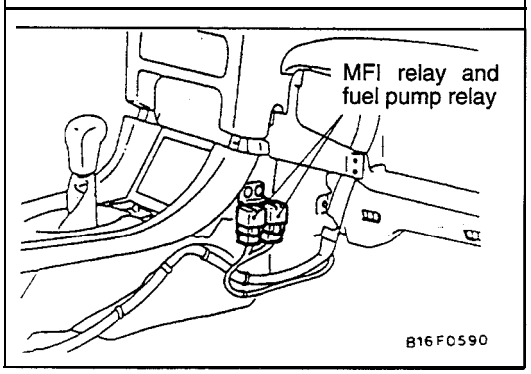
5	 Z6AF0051	Measure power voltage to the actuator. • MFI relay connector: Connected • Engine control module connector: Connected **Engine cranking: 8 V or higher** **Engine racing: Battery voltage**	OK →	STOP
			NOT OK →	Replace the MFI relay or defective engine control module

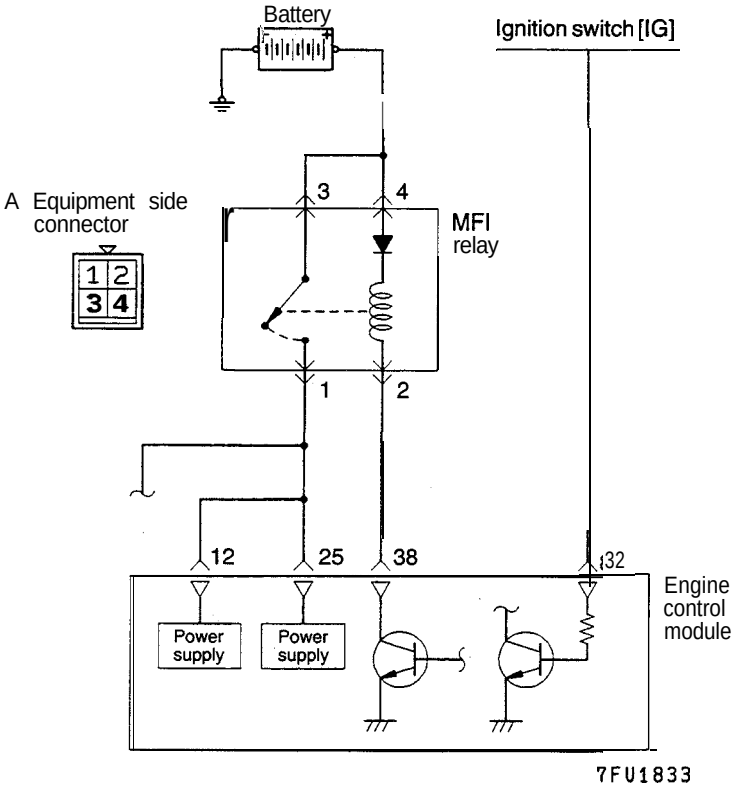
MFI RELAY INSPECTION

Refer to P.13A-70.

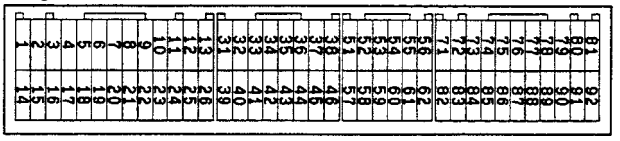
POWER SUPPLY (MFI RELAY) AND IGNITION SWITCH-IG <From 1996 models>







Engine control module connector



9FU0393

7FU1819

OPERATION

Refer to P.13A-65.

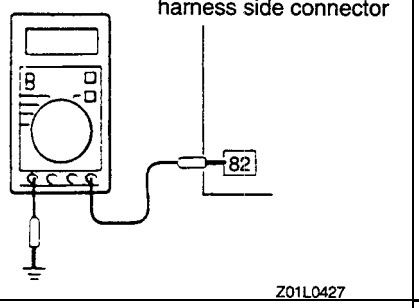
INSPECTION

Refer to P.13A-65.

TSB Revision

HARNESS INSPECTION

1

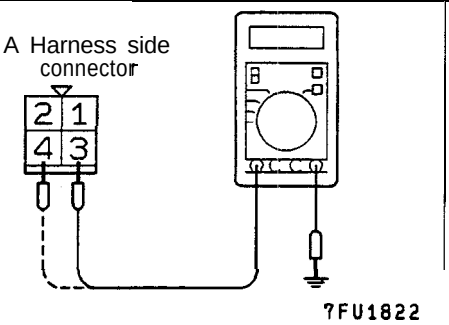


Measure the ignition switch (IG) terminal input voltage.
- Engine control module connector: Disconnected

Ignition switch OFF: 0- 1 V
Ignition switch ON: Battery voltage

OK → 2
Repair the harness. (Ignition switch – 82) or check the ignition switch

2

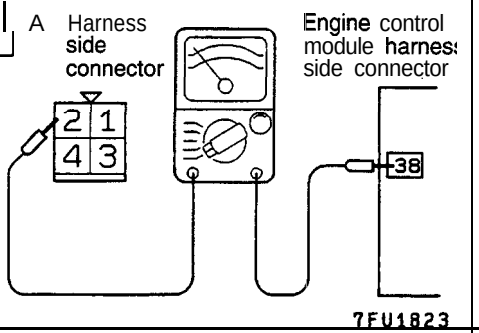


Measure the power supply voltage of the MFI relay.
- Ignition switch: OFF
- MFI relay connector: Disconnected

Battery voltage

OK → 3
Repair the harness. (Battery – A3, A4)

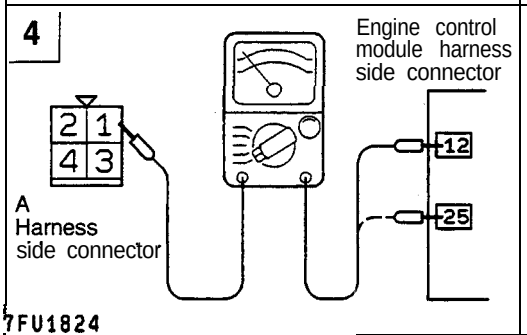
3



Check for an open-circuit, or a short-circuit to ground. between the engine control module and the MFI relay.
- Engine control module connector: Disconnected
- MFI relay connector: Disconnected

OK → 4
Repair the harness. (A2–38)

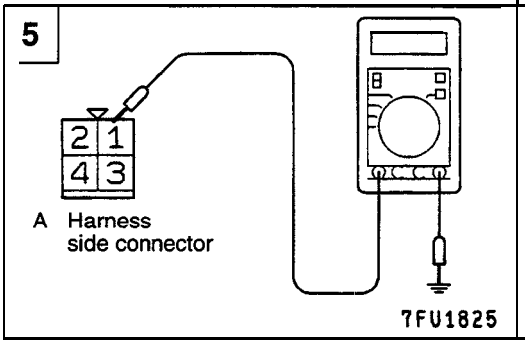
4



Check for an open-circuit, or a short-circuit to ground between the engine control module and the MFI relay.
- MFI relay connector: Disconnected
- Engine control module connector: Disconnected

OK → 5
Repair the harness. (AI –12, 25)

5

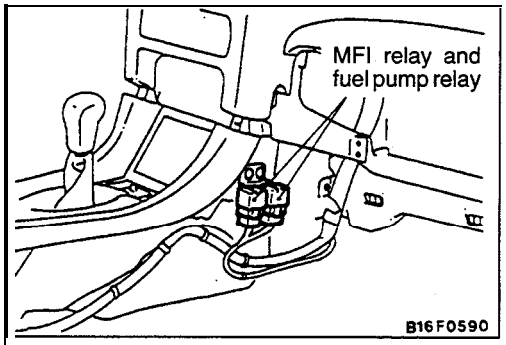


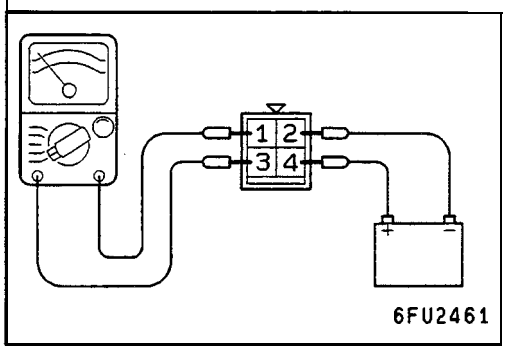
Measure power voltage to the actuator.
- MFI relay connector: Connected
- Engine control module connector: Connected

Engine cranking: 8V or higher
Engine racing: Battery voltage

OK → STOP
Replace the MFI relay or defective engine control module

TSB Revision





MULTIPORT FUEL INJECTION (MFI) RELAY AND FUEL PUMP RELAY INSPECTION

(1) Remove the relay.
(2) Check for continuity between the relay terminals.

Inspection terminals	Continuity
2–4	Continuity (approx. 70 Ω)

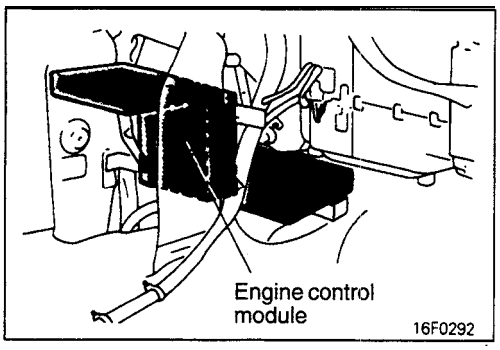
(3) Use the jumper leads to connect relay terminal 4 to the battery (+) terminal and terminal 2 to the battery (–) terminal.
(4) Check the continuity between relay terminals 1 – 3 while connecting and disconnecting the jumper lead at the battery (–) terminal.

Jumper lead	Continuity across terminals 1 - 3
Connected	Continuity (0 Ω)
Disconnected	No continuity (∞ Ω)

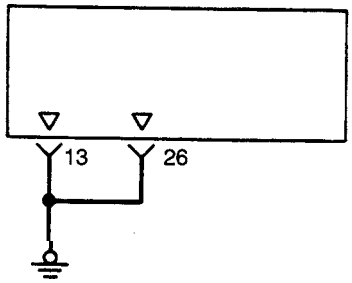
(5) If there is a defect, replace the MFI relay or fuel pump relay.

TSB Revision

ENGINE CONTROL MODULE POWER GROUND

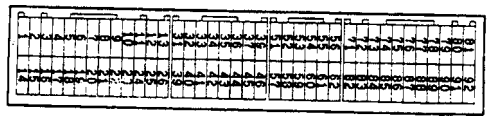


Engine control module



Z01A0191

Engine control module connector



Z9FU0393

7FU1617

OPERATION

Refer to 13A-71.

TROUBLESHOOTING HINTS

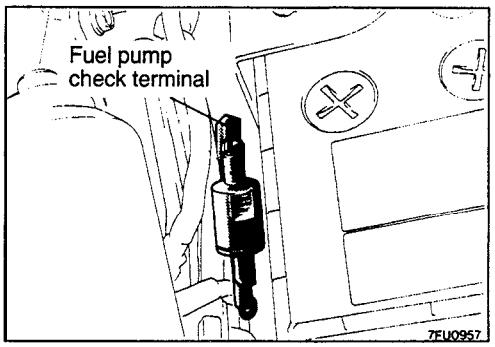
Refer to 13A-71.

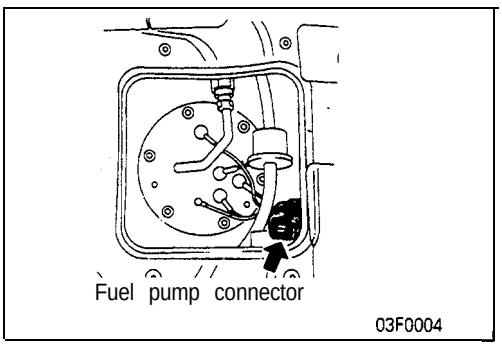
HARNESS INSPECTION

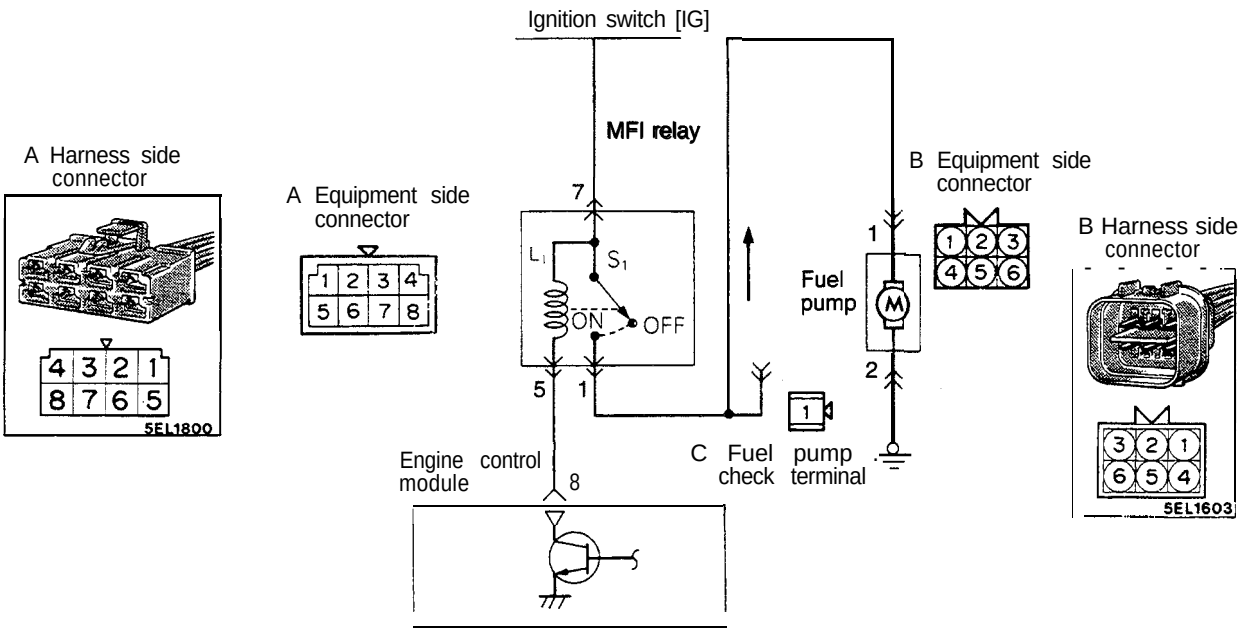
Refer to 13A-71.

TSB Revision

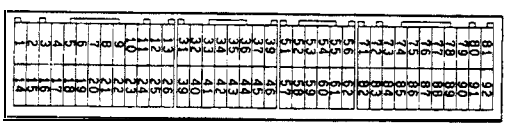
FUEL PUMP <Non Turbo – Up to 1995 models>







Engine control module connector



OPERATION

Refer to 13A-76.

INSPECTION

Refer to 13A-73.

HARNESS INSPECTION

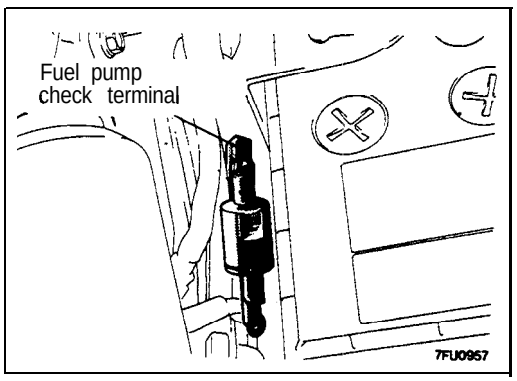
Refer to 13A-77.

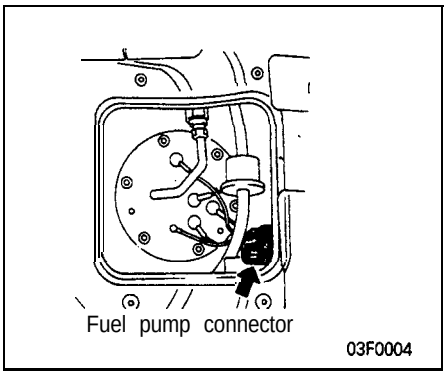
MFI RELAY INSPECTION

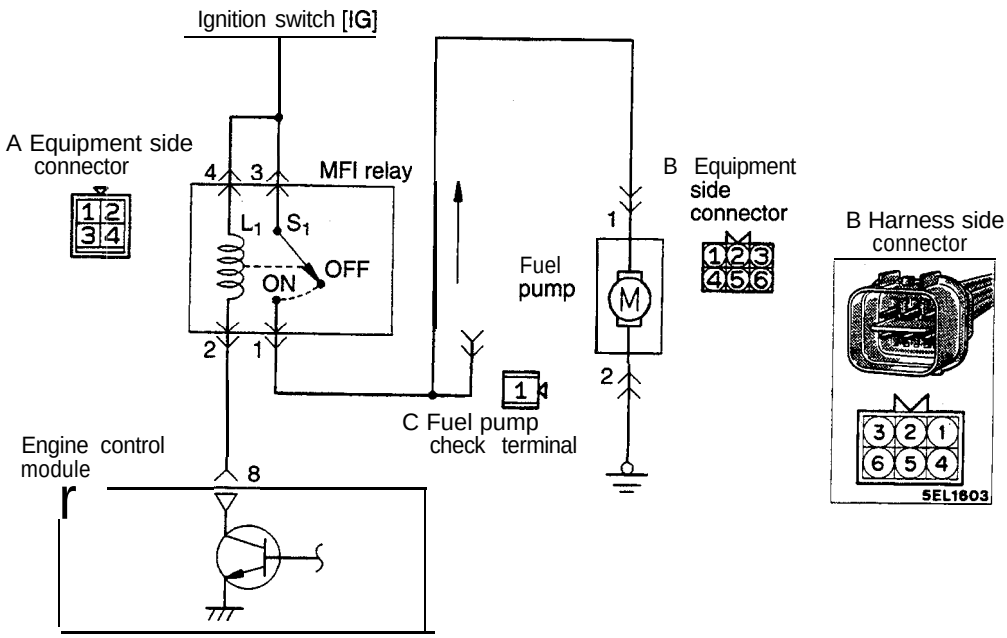
Refer to 13A-70.

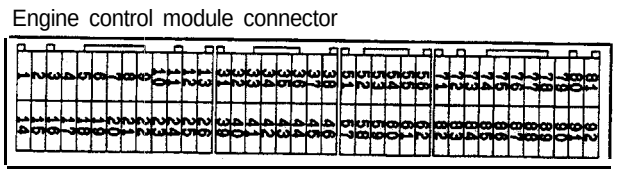
TSB Revision

FUEL PUMP <Non Turbo – From 1996 models>









7FU1821

OPERATION

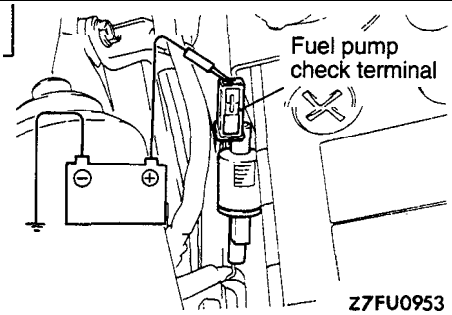
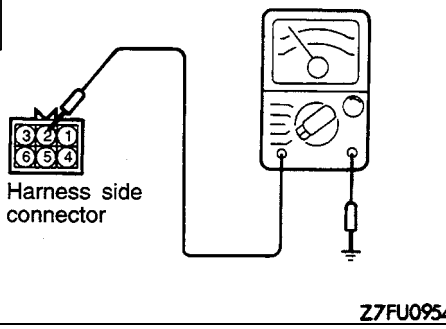
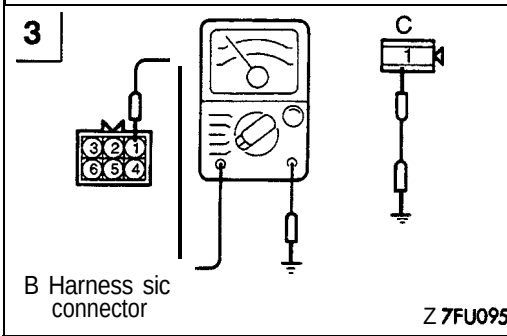
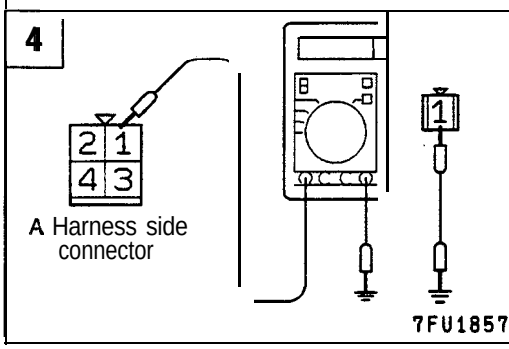
Refer to 13A-76.

INSPECTION

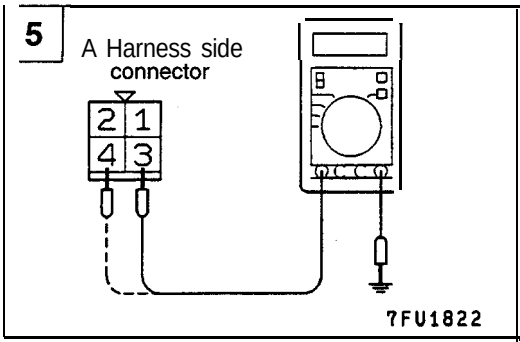
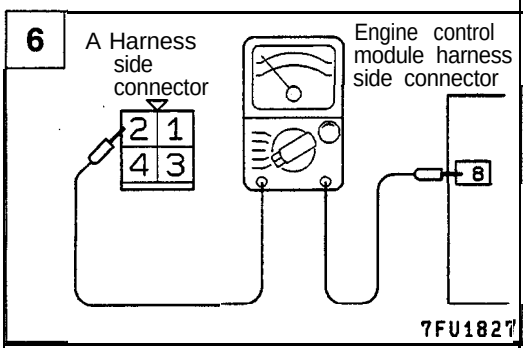
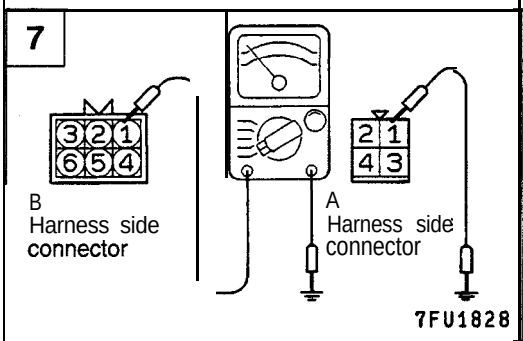
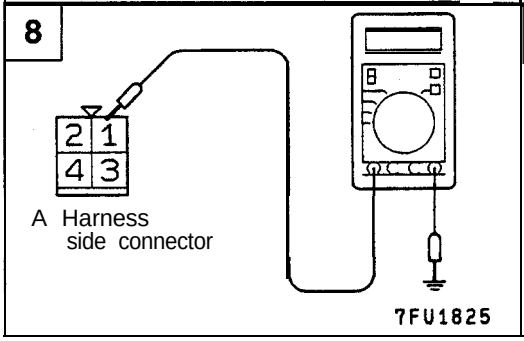
Refer to 13A-73.

TSB Revision

HARNESS INSPECTION

1		Check the fuel pump. • Apply battery voltage to the checking terminal and operate the pump.	OK → 4 NG → 2
2		Check the ground circuit of the fuel pump. • Fuel pump connector: Disconnected	OK → 3 NG → Repair the harness. (B2 – bround)
3		Check for continuity between the fuel pump and the checking terminal. • Connector: Disconnected	OK → 4 NG → Repair the harness. (B1 -Cl)
4		Check for continuity between the fuel pump checking terminal and the MFI relay terminals. • MFI relay connector: Disconnected • Fuel pump connector: Disconnected	OK → 5 NG → Repair the harness. (AI -Cl)

TSB Revision

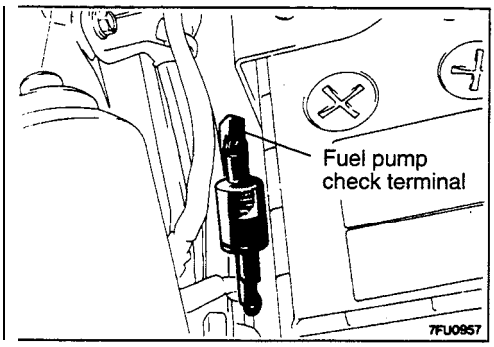
5 	Measure the power supply voltage of the MFI relay. • Control relay connector: Disconnected **Ignition switch OFF: 0- 1 V** **Ignition switch ON: Battery voltage**	OK →	**6**
		NG →	Repair the harness. (Ignition switch – A3, A4) or check the ignition switch.
6 	Check for an open-circuit, or a short-circuit to ground between the MFI relay and the engine control module. • MFI relay connector: Disconnected • Engine control module connector: Disconnected	OK →	**7**
		NG →	Repair the harness. (A2–8)
7 	Check for an open-circuit, or a short-circuit to ground, between the MFI relay (for fuel pump) and the fuel pump. • MFI relay (for fuel pump) connector: Disconnected • Fuel pump connector: Disconnected	OK →	**8**
		NG →	Repair the harness. (A1 –B1)
8 	Measure the power supply voltage of the fuel pump. • MFI relay connector: Connected • Engine control unit connector: Connected **Engine cranking: 8V or more** **Engine racing: Battery voltage**	OK →	STOP
		NG →	MFI relay or engine control module is defective.

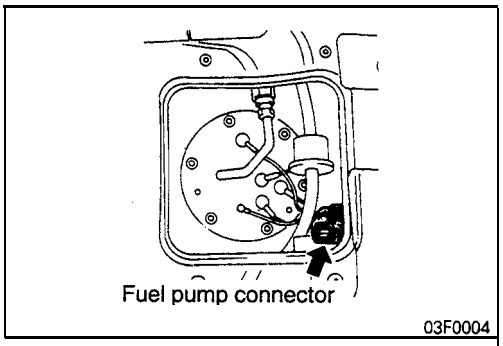
MULTIPORT FUEL INJECTION (MFI) RELAY AND FUEL PUMP RELAY INSPECTION

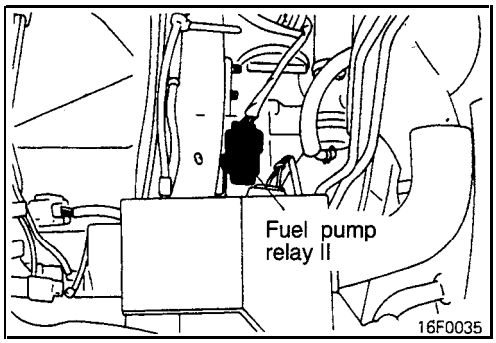
Refer to P.13A-198.

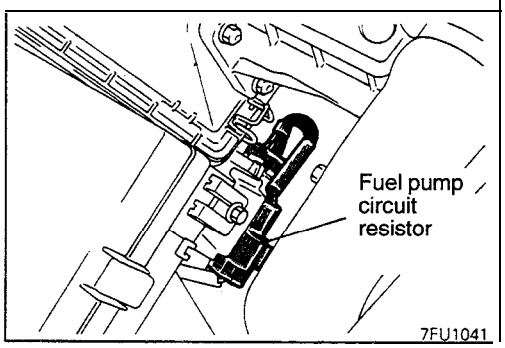
TSB Revision

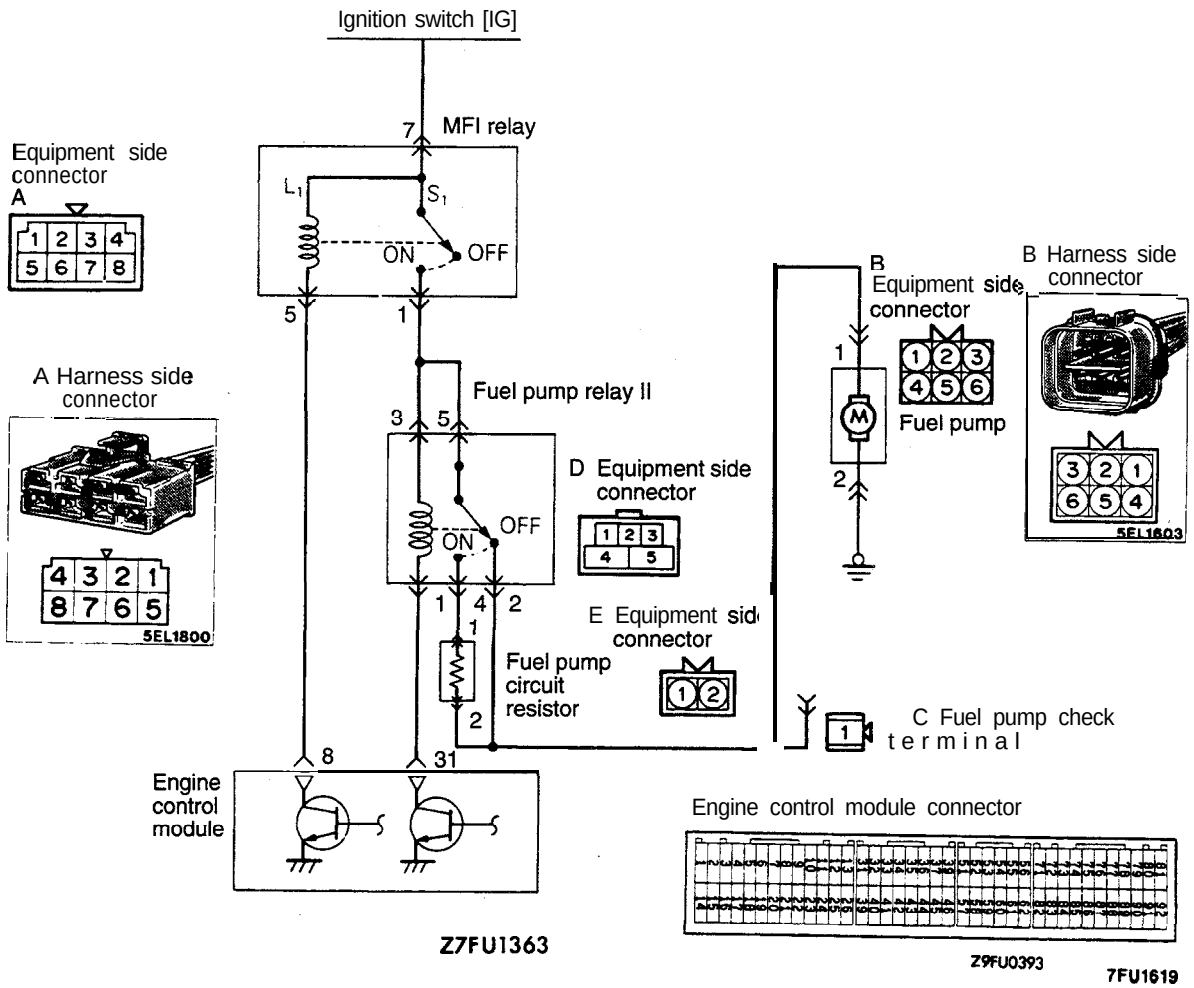
FUEL PUMP <Turbo – Up to 1995 models>











TSB Revision

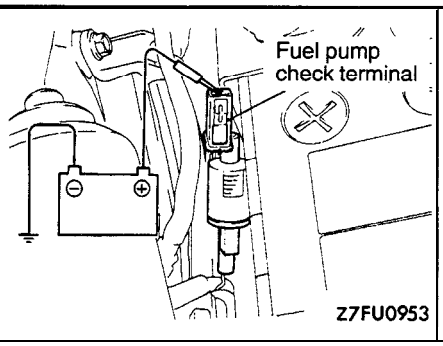
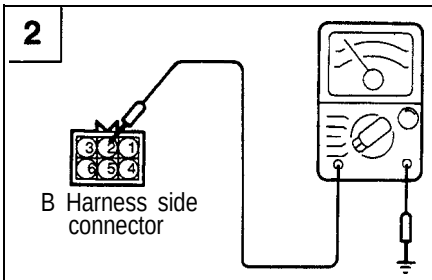
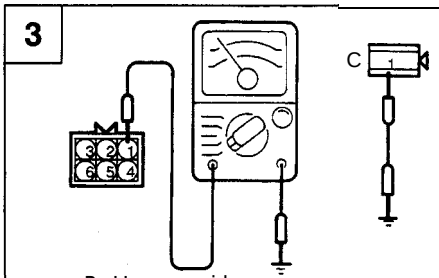
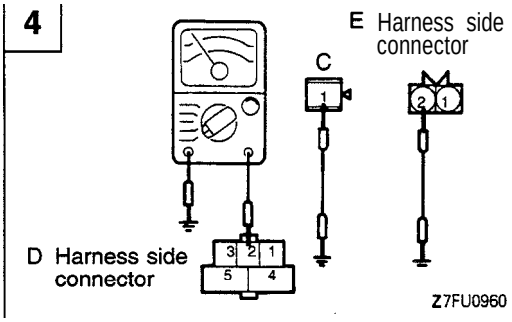
OPERATION

Refer to 13A-81.

INSPECTION

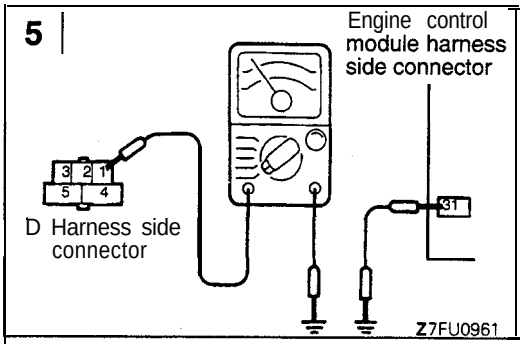
Refer to 13A-81.

HARNESS INSPECTION

1	 Z7FU0953	Check the fuel pump. • Apply battery voltage to the checking terminal and operate the pump.	OK → 4 NG → 2
2	 Z7FU0954	Check the ground circuit of the fuel pump. • Fuel pump connector: Disconnected	OK → 3 NG → Repair the harness. (B2 – Ground)
3	 Z7FU0955	Check for continuity between the fuel pump and the checking terminal. • Fuel pump connector: Disconnected	OK → 4 NG → Repair the harness. (B1 -CI)
4	 Z7FU0960	Check for continuity between the checking terminal and the fuel pump relay II, and between the resistor (for fuel pump). • Fuel pump relay II connector: Disconnected • Resistor (for fuel pump) connector: Disconnected • Fuel pump connector: Disconnected	OK → 5 NG → Repair the harness. (C1–D2) (D2–E2)

TSB Revision

5

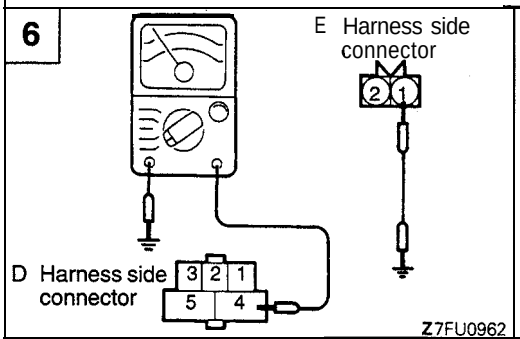


Check for an open-circuit, or a short-circuit to ground, between the fuel pump relay II and the engine control module.
- Fuel pump relay II connector: Disconnected
- Engine control module connector: Disconnected

OK → 6

NG → Repair the harness. (D1–31)

6

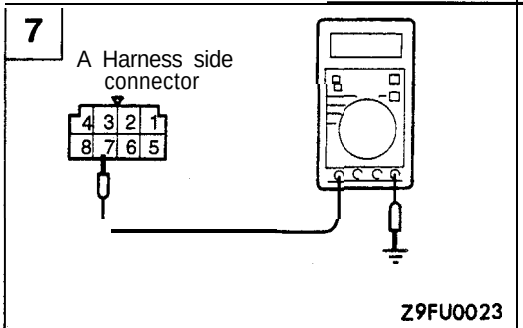


Check for continuity between the fuel pump relay II and the resistor (for fuel pump).
- Fuel pump relay II connector: Disconnected
- Resistor (for fuel pump) connector: Disconnected.

OK → 7

NG → Repair the harness. (D4–E1)

7



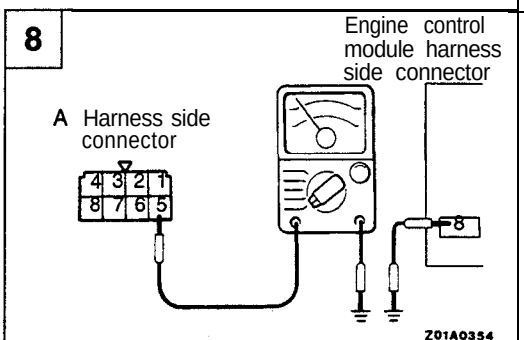
Measure the power supply voltage of the MFI relay.
- MFI relay connector: Disconnected

Ignition switch OFF: 0 V
Ignition switch ON: Battery voltage

OK → 8

NG → Repair the harness. (Ignition switch [IG] – A7)

8

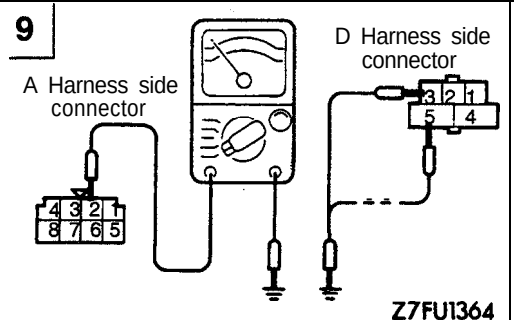


Check for an open-circuit, or a short-circuit to around, between the MFI relay and the engine control module.
- MFI relay connector: Disconnected
- Engine control module connector: Disconnected

OK → 9

NG → Repair the harness. (A5–8)

9

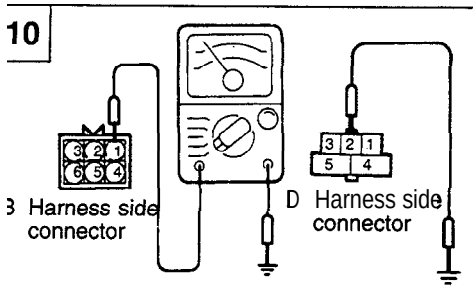


Check for continuity between the MFI relay and the fuel pump relay II.
- MFI relay connector: Disconnected
- Fuel pump relay II connector: Disconnected

OK → 10

NG → Repair the harness. (A2–D3) (A2–D5)

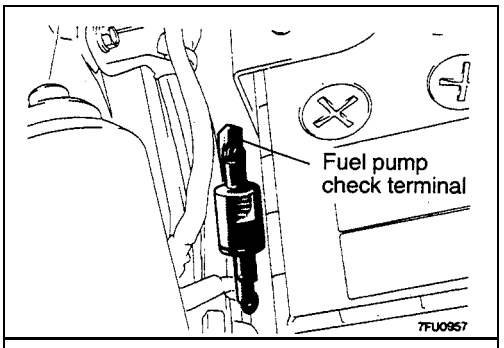
TSB Revision

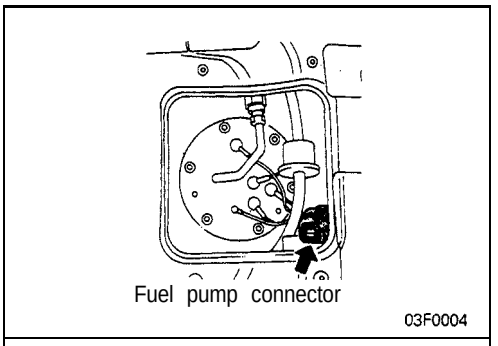
10	 Z7FU0964	Check for an open-circuit, or a short-circuit to ground, between the fuel pump relay II and the fuel pump. • Fuel pump relay II connector: Disconnected • Fuel pump connector: Disconnected	OK → STOP NG → Repair the harness. (B1–D2)

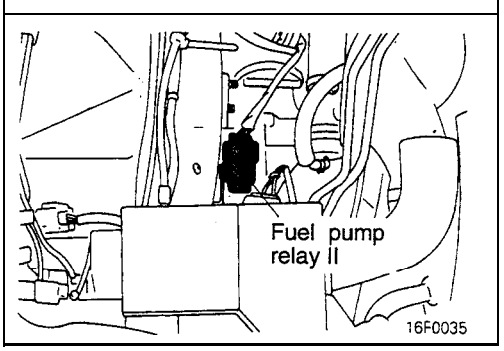
MFI RELAY INSPECTION

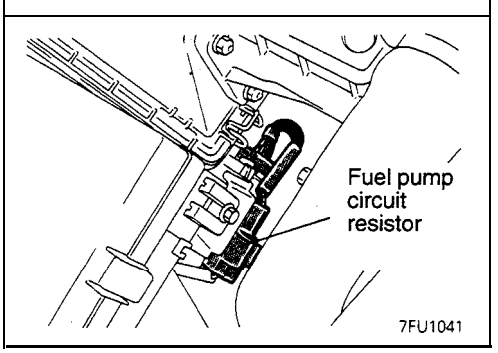
Refer to P.13A-70.

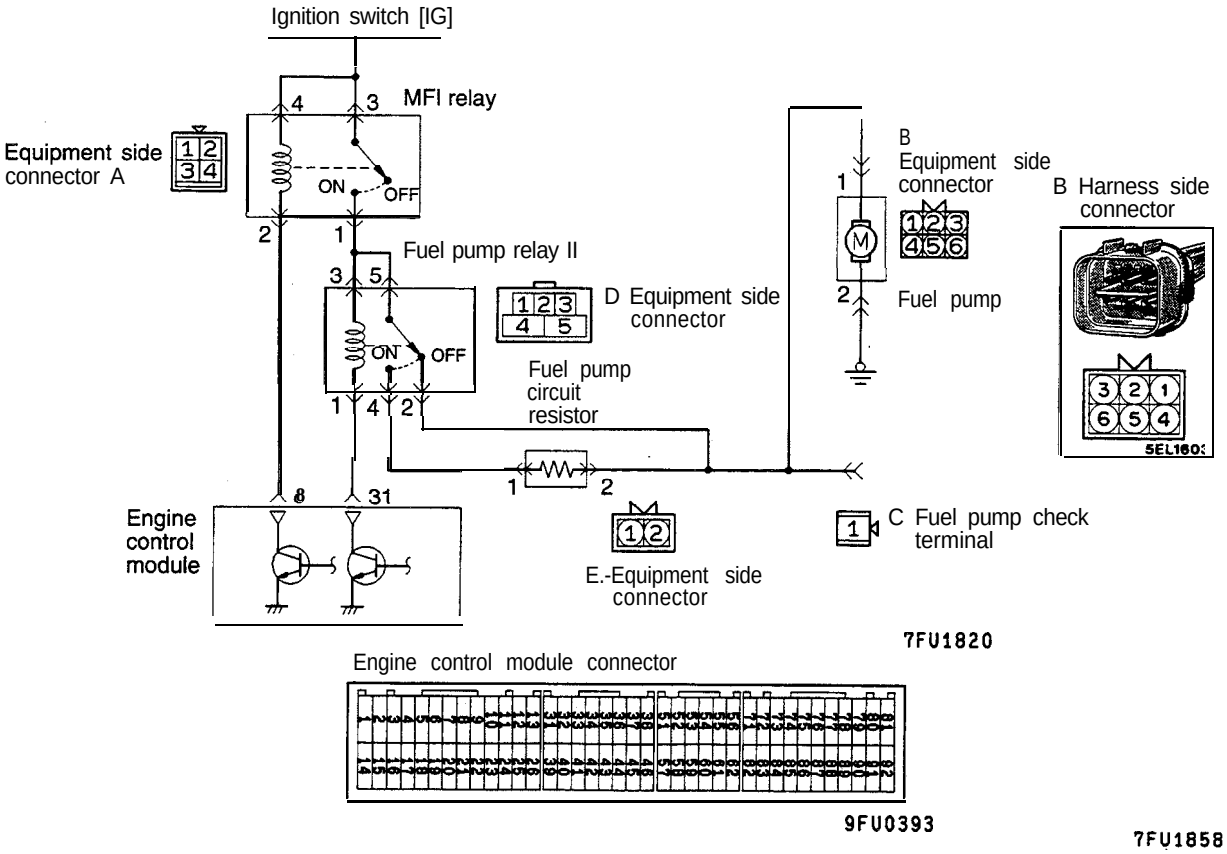
FUEL PUMP <Turbo – From 1996 models>











TSB Revision

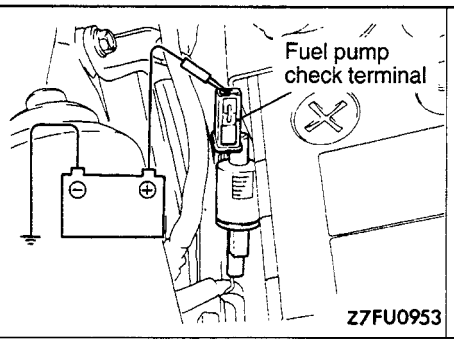
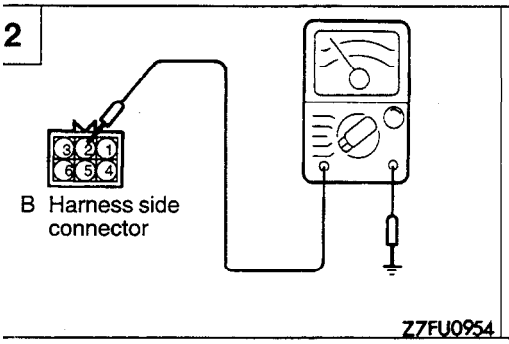
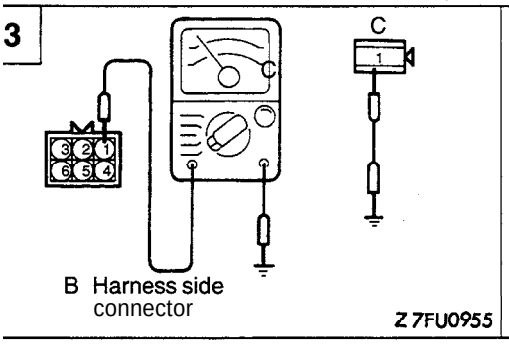
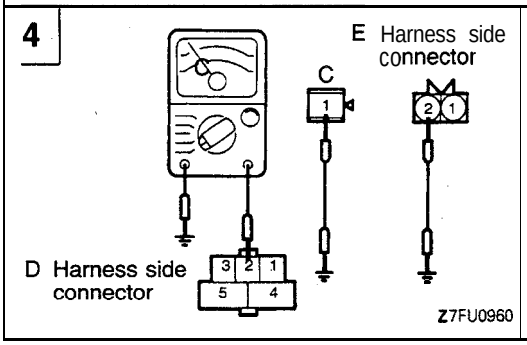
OPERATION

Refer to P.13A-81.

INSPECTION

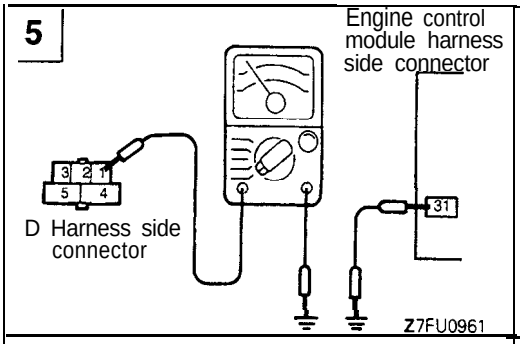
Refer to P.13A-81.

HARNESS INSPECTION

1		Check the fuel pump. • Apply battery voltage to the checking terminal and operate the pump.	OK → 4 NG → 2
2		Check the ground circuit of the fuel pump. • Fuel pump connector: Disconnected	OK → 3 NG → Repair the harness. (B2 – Ground)
3		Check for continuity between the fuel pump and the checking terminal. • Fuel pump connector: Disconnected	OK → 4 NG → Repair the harness. (B1–C1)
4		Check for continuity between the checking terminal and the fuel pump relay II, and between the resistor (for fuel pump). • Fuel pump relay II connector: Disconnected • Resistor (for fuel pump) connector: Disconnected • Fuel pump connector: Disconnected	OK → 5 NG → Repair the harness. (C1–D2) (D2–E2)

TSB Revision

5

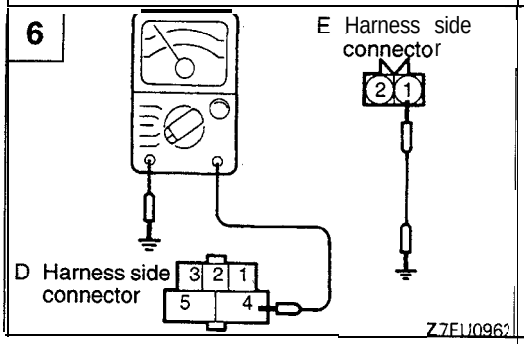


Check for an open-circuit, or a short-circuit to ground, between the fuel pump relay II and the engine control module.
- Fuel pump relay II connector: Disconnected
- Engine control module connector: Disconnected

OK → 6

NO → Repair the harness. (D1–31)

6

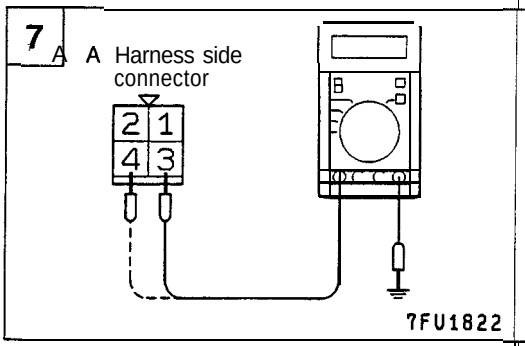


Check for continuity between the fuel pump relay II and the resistor (for fuel pump).
- Fuel pump relay II connector: Disconnected
- Resistor (for fuel pump) connector: Disconnected.

OK → 7

NO → Repair the harness. (D4–E1)

7



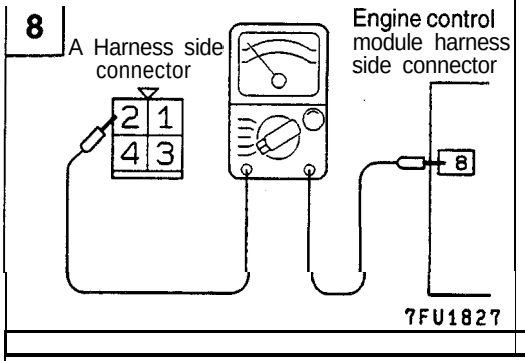
Measure the power supply voltage of the MFI relay.
- MFI relay connector: Disconnected

Ignition switch OFF: 0 V
Ignition switch ON: Battery voltage

OK → 8

NO → Repair the harness. (Ignition switch [IG] – A3, A4)

8

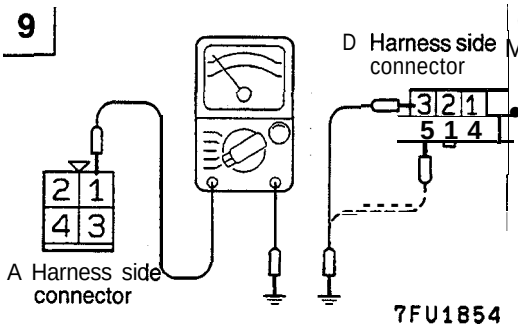


Check for an open-circuit, or a short-circuit to ground, between the MFI relay and the engine control module.
- MFI relay connector: Disconnected
- Engine control module connector: Disconnected

OK → 9

NO → Repair the harness. (A2–8)

9

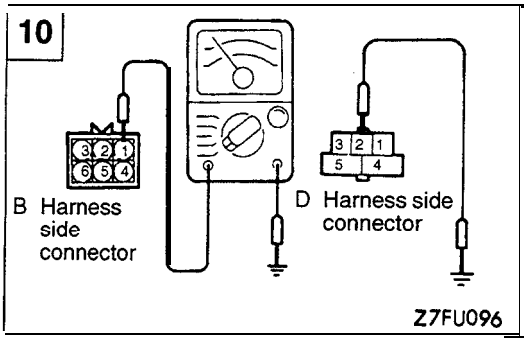


Check for continuity between the MFI relay and the fuel pump relay II.
- MFI relay connector: Disconnected
- Fuel pump relay II connector: Disconnected

OK → 10

NO → Repair the harness. (A1–D3) (A1–D5)

TSB Revision

10  	Check for an open-circuit, or a short-circuit to ground, between the fuel pump relay II and the fuel pump. • Fuel pump relay II connector: Disconnected • Fuel pump connector: Disconnected	OK → A STOP OK → Repair the harness. (B1–D2)

MULTIPORT FUEL INJECTION (MFI) RELAY AND FUEL PUMP RELAY INSPECTION

Refer to P.13A-198.

FUEL PUMP RELAY II

INSPECTION

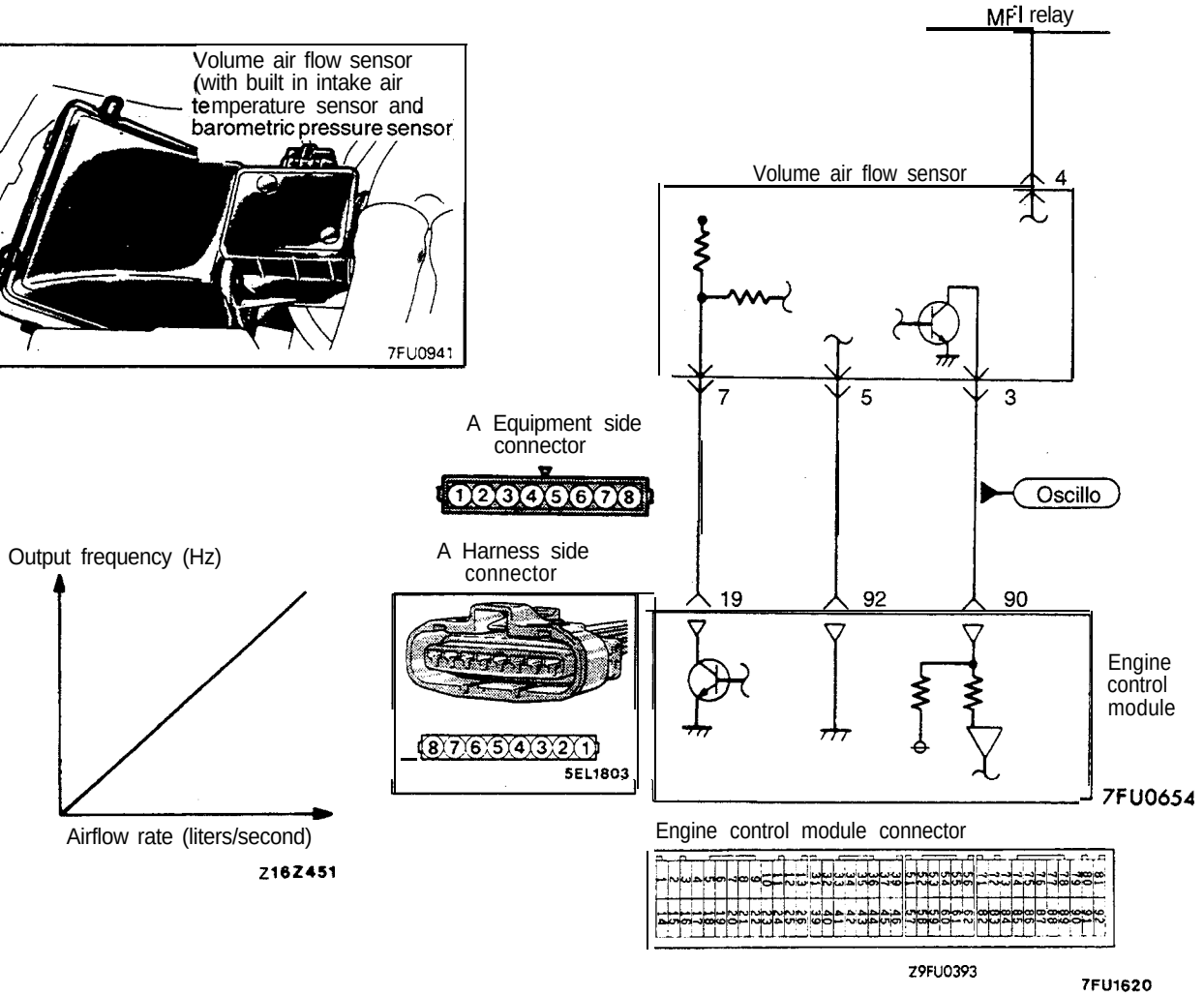
Refer to P.13A-84.

FUEL PUMP CIRCUIT RESISTOR

INSPECTION

Refer to P.13A-84.

VOLUME AIR FLOW SENSOR



OPERATION

Refer to P.13A-85.

TROUBLESHOOTING HINTS

Refer to P.13A-85.

INSPECTION

Using Scan Tool

<Volume Air Flow Sensor>

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	12	Sensor air volume (frequency)	• Engine coolant temperature: 80 to 95°C (176 to 203°F) • Lights and accessories: OFF • Transaxle: Neutral (P range for vehicle with A/T) • Steering wheel: Neutral	700 rpm (Idle)	22–48 Hz <Up to 1995 models> 24–50 Hz <Non Turbo From 1996 models> 26–52 Hz <Turbo From 1996 models>
				2,000 rpm <Up to 1995 models>	50–90 Hz <Non Turbo> 68–108 Hz <Turbo>
				2,500 rpm <From 1996 models>	71-111 Hz <Non Turbo> 93– 133 Hz <Turbo>
				Racing	Frequency increases with racing

NOTE
When the vehicle is new [within initial operation of about 500 km (300 miles)], the volume air flow sensor output frequency may be about 10% higher.

TSB Revision

Function	Item No.	Data display	Check conditions	Engine state	Standard value
Data reading <From 1996 models>	12	Sensor air volume ((Air-flow volume)	• Engine coolant temperature: 80 to 95°C (176 to 203°F) • Lights, electric cooling fan, accessories: OFF • Transaxle: Neutral (P range for A/T)	Idling	3.6-7.5 g/s <Non Turbo> 3.9-7.7 g/s <Turbo>
				2,500 rpm	10.6–16.5 g/s <Non Turbo> 13.9-19.8 g/s <Turbo>

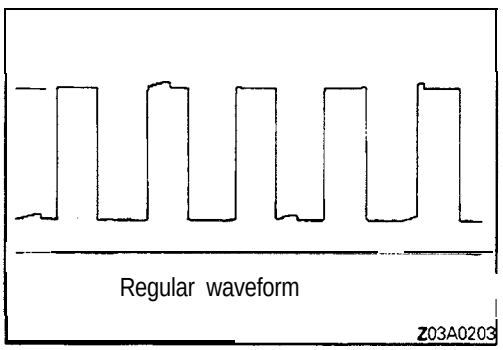
Function	Item No.	Data display	Check conditions	Engine state	Standard value
Data reading <From 1996 models>	87	Calculation load	• Engine: warm • Operation range: idling to maximum output	Engine is idling	15–35% <Non Turbo>
				2,500 rpm	10–30% <Turbo>

<Volume Air Flow Sensor Reset Signal>

Function	Data display	Check conditions	Engine conditions	Standard value
Data list	Reset signal condition	• Engine warm up	700 rpm (Idle)	ON
			2,500 rpm	OFF

<Volumetric Efficiency>

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data list	37	Volumetric efficiency	• Engine coolant temperature: 80 to 95°C (176 to 203°F) • Lights, electric cooling fan and accessory operation: OFF • Transaxle: Neutral (P range for vehicle with A/T) • Steering wheel: Neutral	700 rpm (Idle)	15–35 %
				2,500 rpm	15–35 %
				Racing	Frequency increases with racing



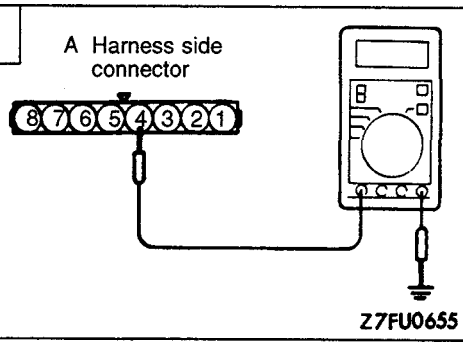
Using Oscilloscope

(1) Run the engine at idle speed.
(2) Connect the probe to the oscilloscope pick-up point as shown in the circuit diagram, and check the waveform.

TSB Revision

HARNESS INSPECTION

1



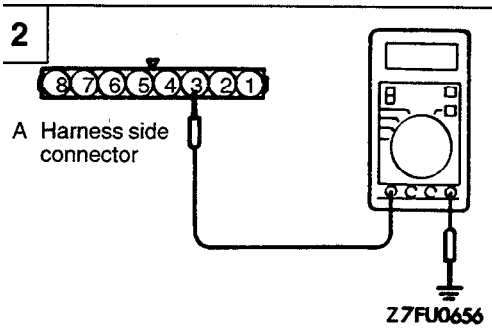
Measure the power supply voltage.
- Connector: Disconnected
- Ignition switch: ON

Battery voltage

OK → 2

NG → Repair the harness (A4 – Control relay) or check the control relay.

2



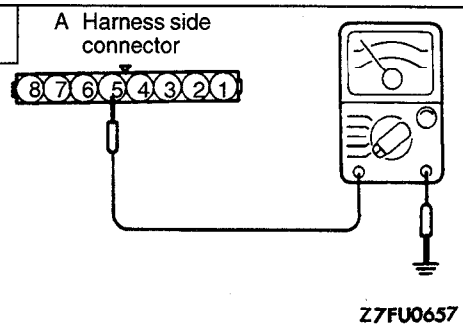
Measure the terminal voltage.
- Connector: Disconnected
- Ignition switch: ON

4.8–5.2 V

OK → 3

NG → Repair the harness (A3–90)

3

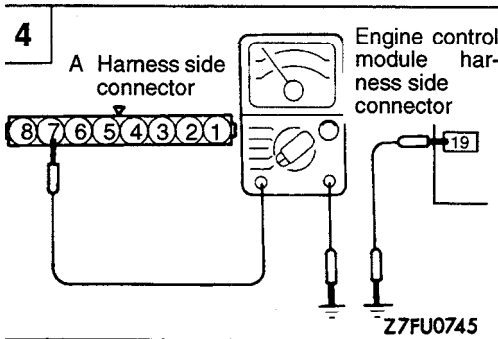


Check for continuity of the ground circuit.
- Connector: Disconnected

OK → STOP

NG → Repair the harness (A5–92)

4



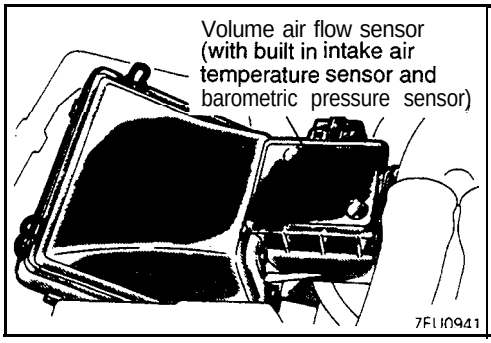
Check for continuity between the volume air flow sensor and the engine control unit.
- Volume air flow sensor connector: Disconnected
- Engine control module connector: Disconnected

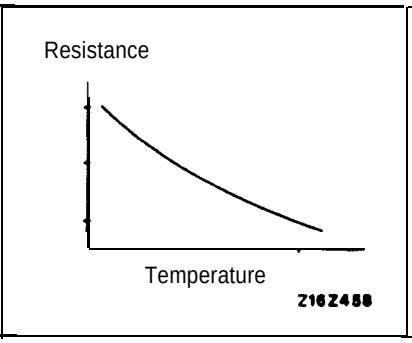
OK → STOP

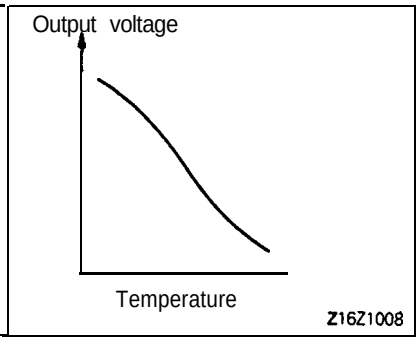
NG → Repair the harness. (A7–19)

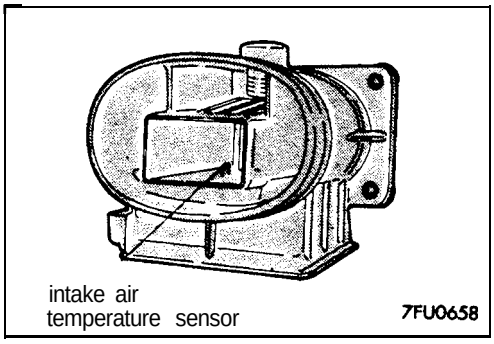
TSB Revision

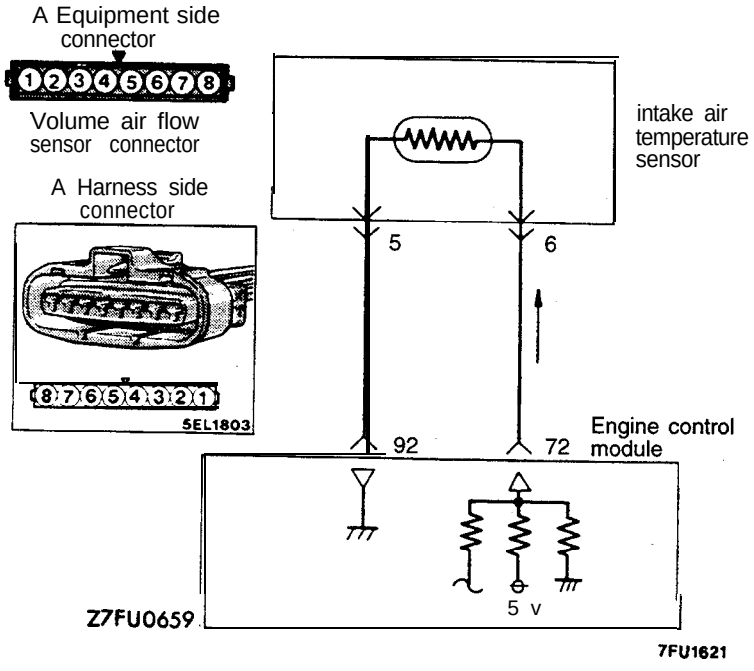
INTAKE AIR TEMPERATURE SENSOR











OPERATION

Refer to P.13A-88.

TROUBLESHOOTING HINTS

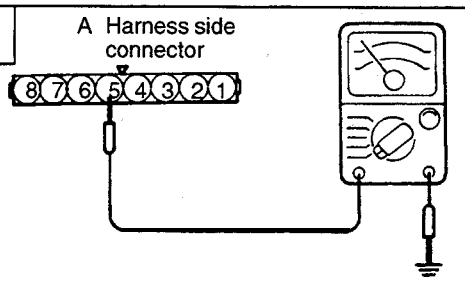
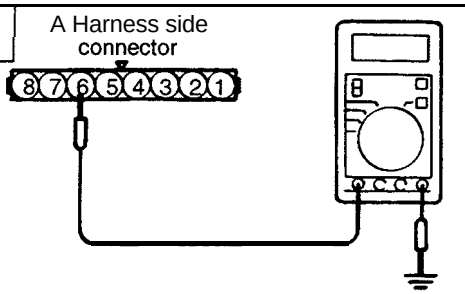
Refer to P.13A-88.

INSPECTION

Refer to P.13A-89.

TSB Revision

HARNESS INSPECTION

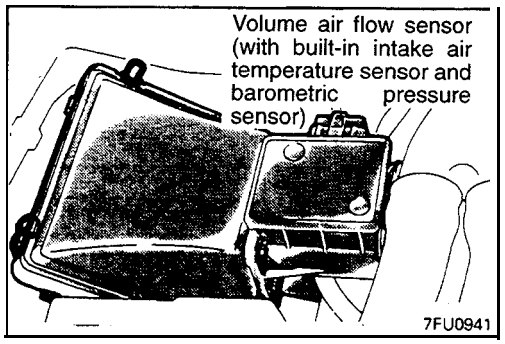
1	A Harness side connector  Z7FU0657	Check for continuity of the ground circuit. • Connector: Disconnected	OK → 2 NG → Repair the harness. (A5–92)
2	A Harness side connector  Z7FU0660	Measure the power supply voltage. • Connector: Disconnected • Ignition switch: ON 4.5-4.9 v	OK → STOP NG → Repair the harness. (A6–72)

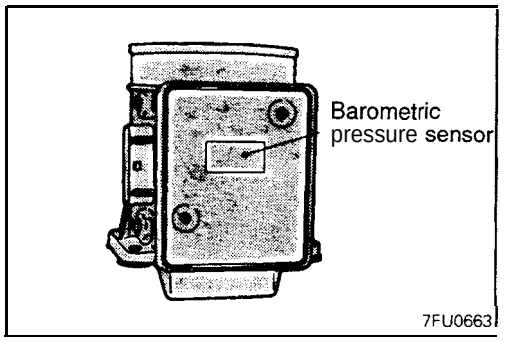
SENSOR INSPECTION

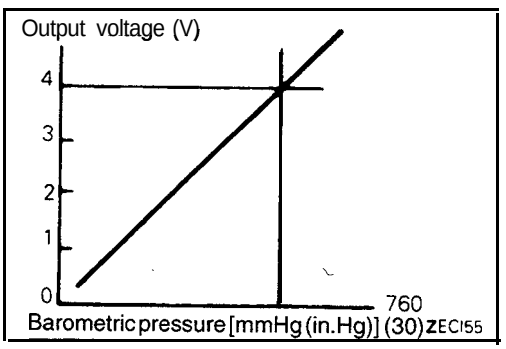
Refer to P.13A-89.

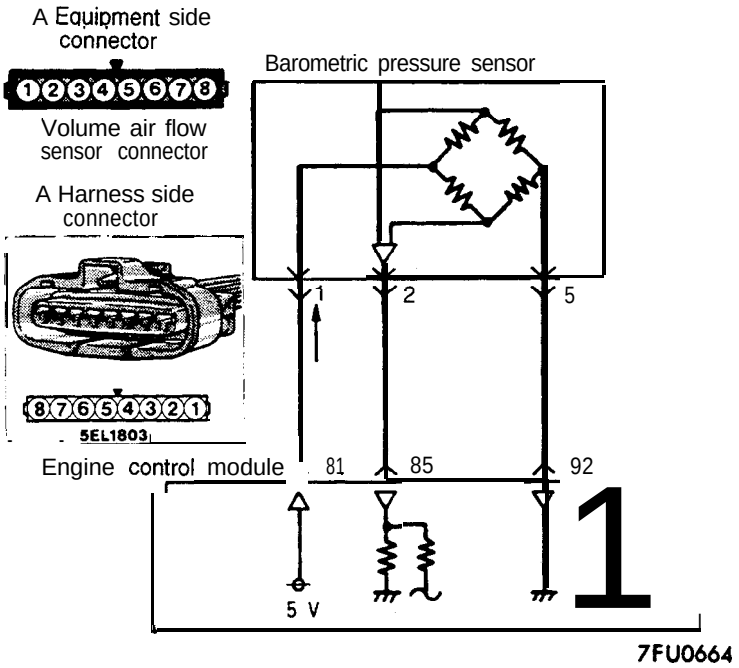
TSB Revision

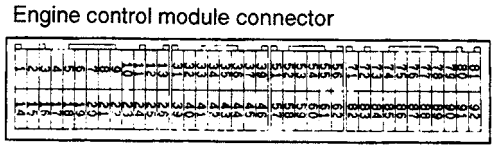
BAROMETRIC PRESSURE SENSOR











7FU1623

OPERATION

Refer to P.13A-91.

TROUBLESHOOTING HINTS

Refer to P.13A-92.

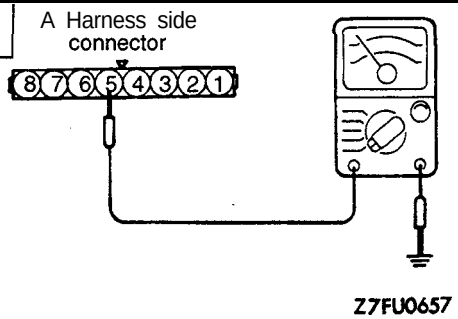
INSPECTION

Refer to P.13A-92.

TSB Revision

HARNESS INSPECTION

1

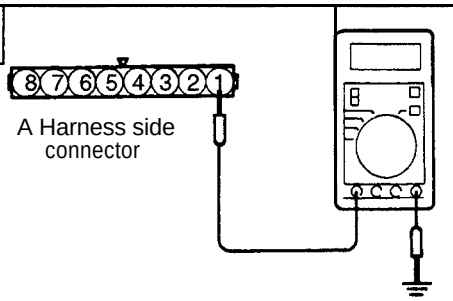


Check for continuity of the ground circuit.
- Connector: Disconnected

OK → 2

NG → Repair the harness. (A5–92)

2



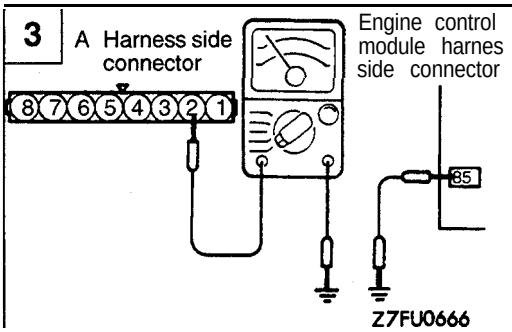
Measure the power supply voltage of the barometric pressure sensor.
- Connector: Disconnected
- Ignition switch: ON

4.8–5.2 V

OK → 3

NG → Repair the harness. (AI -81)

3



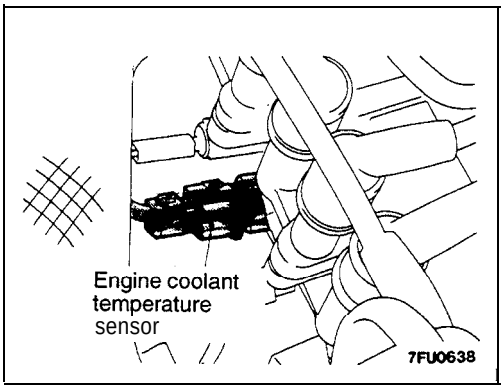
Check for an open-circuit, or a short-circuit to ground between the engine control module and the barometric pressure sensor.
- Volume air flow sensor connector: Disconnected
- Engine control module connector: Disconnected

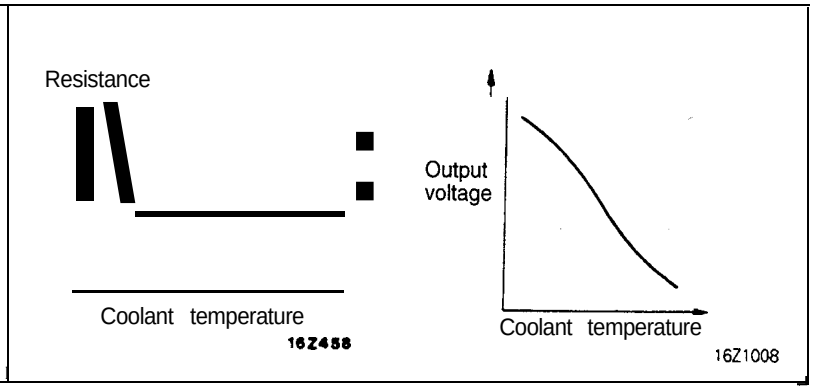
OK → STOP

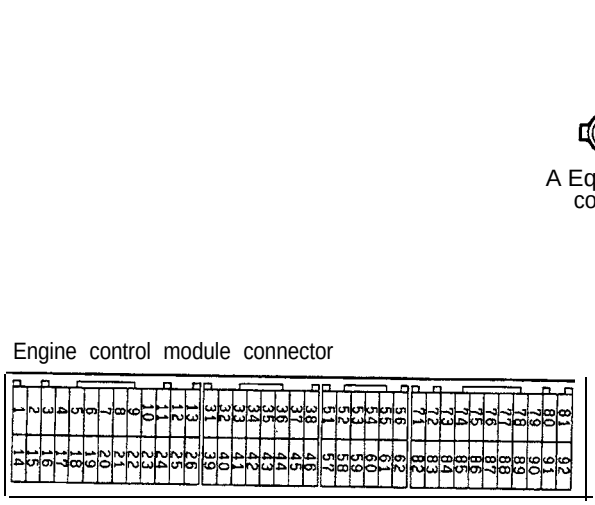
NG → Repair the harness. (A2–85)

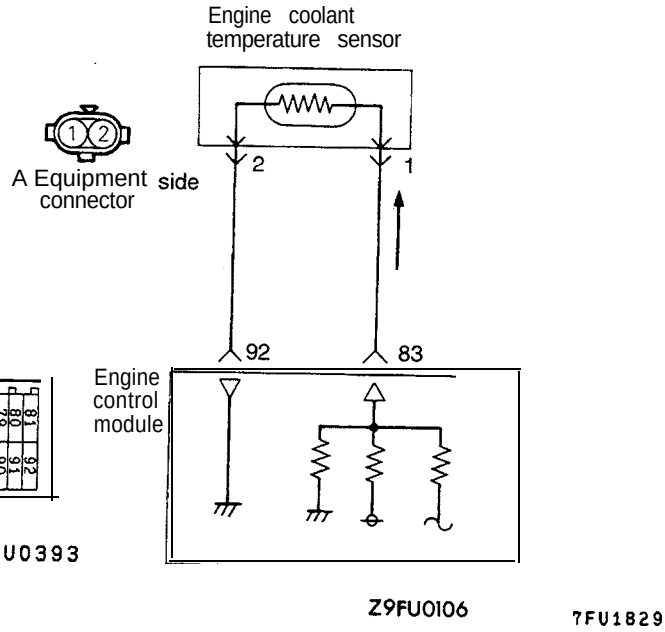
TSB Revision

ENGINE COOLANT TEMPERATURE SENSOR









OPERATION

Refer to P.13A-93.

TROUBLESHOOTING HINTS

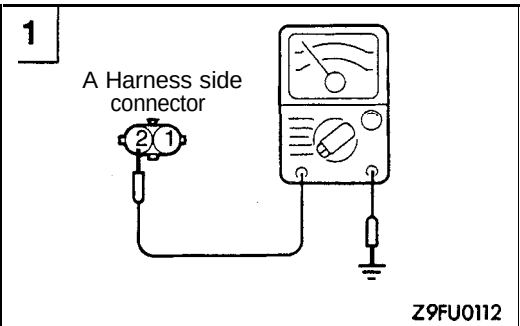
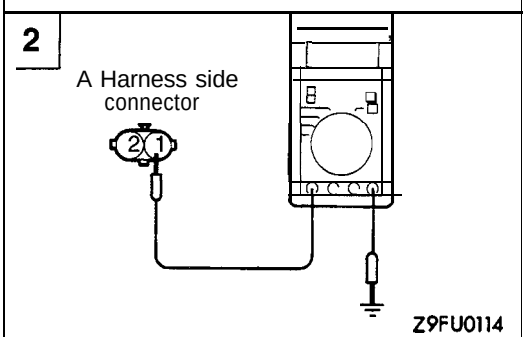
Refer to P.13A-93.

INSPECTION

Refer to P.13A-94.

TSB Revision

HARNESS INSPECTION

1  	Check for continuity of the ground circuit • Engine coolant temperature sensor connector: Disconnected	OK →	2
		NG →	Repair the harness. (A2–92)
2  	Measure the impressed voltage. • Engine coolant temperature sensor connector: Disconnected • Engine control module connector: Connected • Ignition switch: ON 4.5-4.9 v	OK →	STOP
		NG →	Repair the harness. (AI -83)

SENSOR INSPECTION

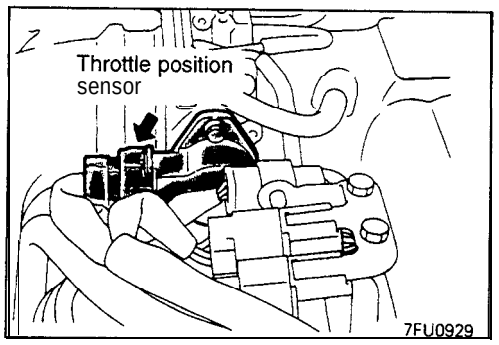
Refer to P.13A-95.

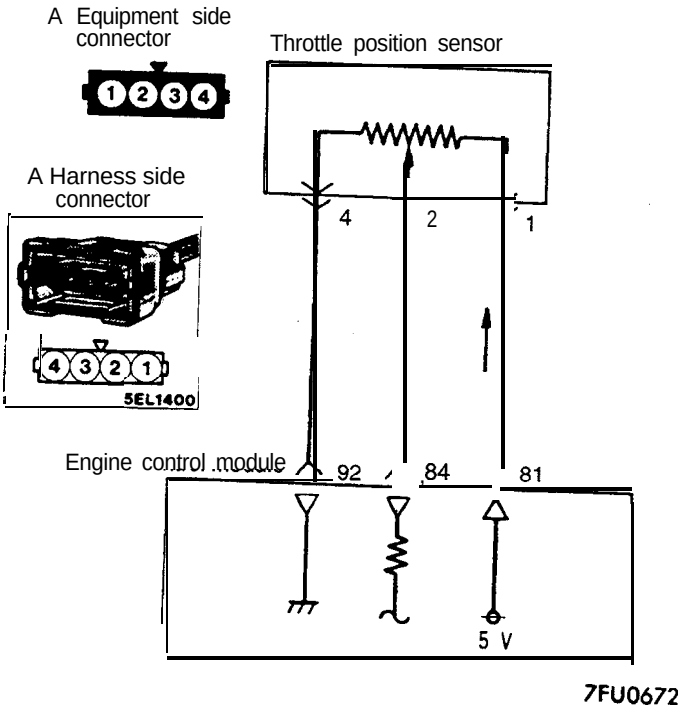
INSTALLATION

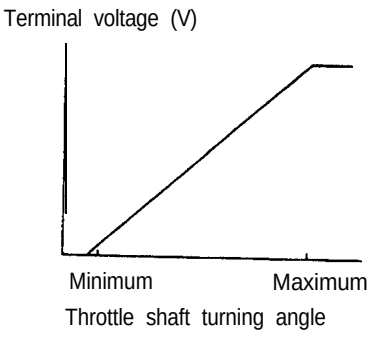
Refer to P.13A-95.

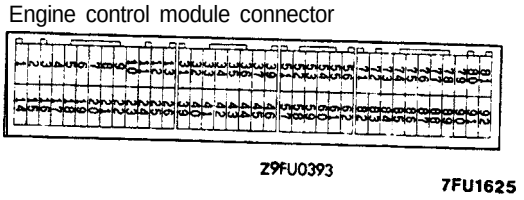
TSB Revision

THROTTLE POSITION SENSOR









OPERATION

Refer to P.13A-98.

TROUBLESHOOTING HINTS

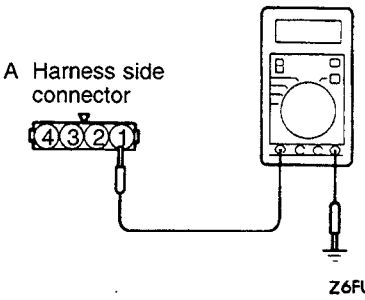
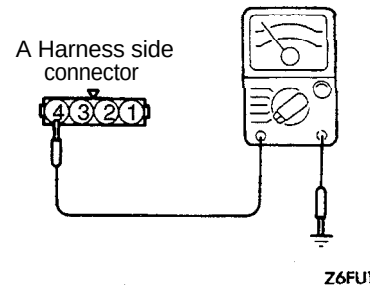
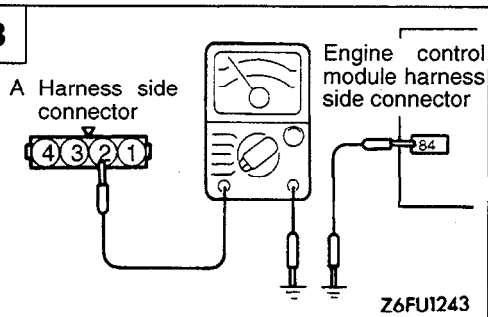
Refer to P.13A-98.

INSPECTION

Refer to P.13A-99.

TSB Revision

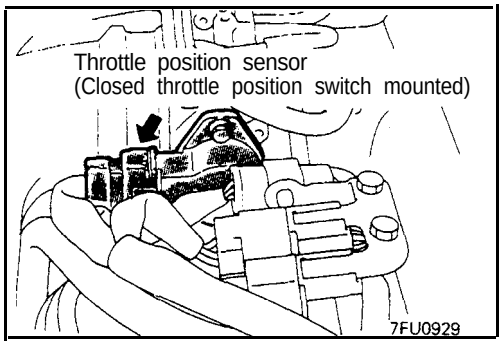
HARNESS INSPECTION

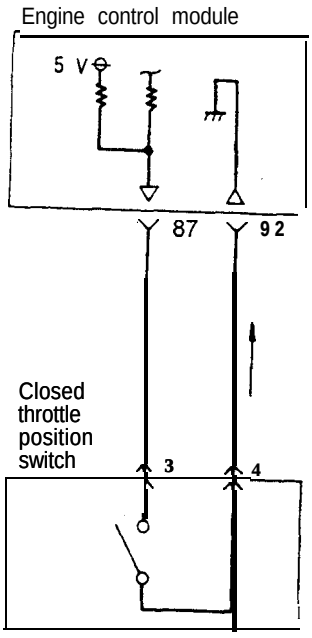
1		Measure the power supply voltage of the throttle position sensor • Connector: Disconnected • Ignition switch: ON **4.8–5.2 V**	OK → 2 NG → Repair the harness. (A1–81)
2		Check for continuity of the ground circuit. • Connector: Disconnected	OK → 3 NG → Repair the harness. (A4–92)
3		Check for an open-circuit, or a short-circuit to ground between the engine control module and the throttle position sensor. • Throttle position sensor connector: Disconnected • Engine control module connector: Disconnected • Connector of any control module which uses TPS output signals like ECM: Disconnected	OK → STOP NG → Repair the harness. (A2–84)

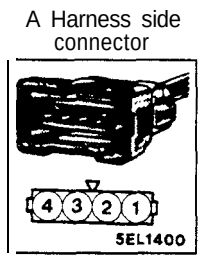
SENSOR INSPECTION

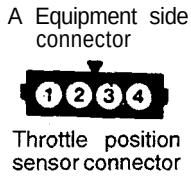
Refer to P.13A-100.

CLOSED THROTTLE POSITION SWITCH

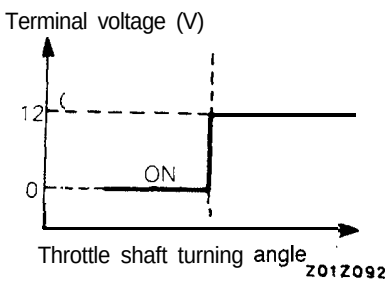








7FU0674



7FU1626

OPERATION

Refer to P.13A-101.

TROUBLESHOOTING HINTS

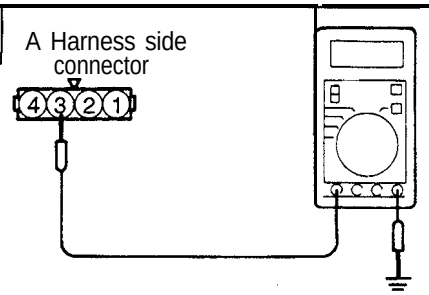
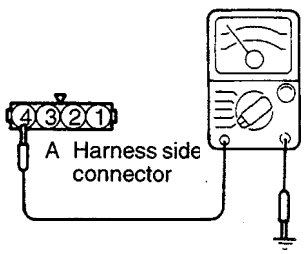
Refer to P.13A-101.

INSPECTION

Refer to P.13A-101.

TSB Revision

HARNESS INSPECTION

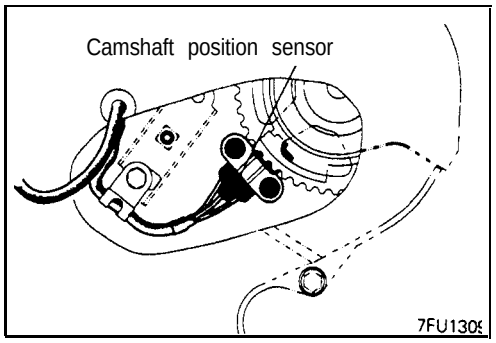
1	 Z7FU0675	Measure the power supply voltage of the closed throttle position switch. • Connector: Disconnected • Ignition switch: ON 4 V or more	OK → 2 NG → Repair the harness. (A3–87)
2	 Z6FU1242	Check for continuity of the ground circuit. • Connector: Disconnected	OK → STOP NG → Repair the harness. (A4–92)

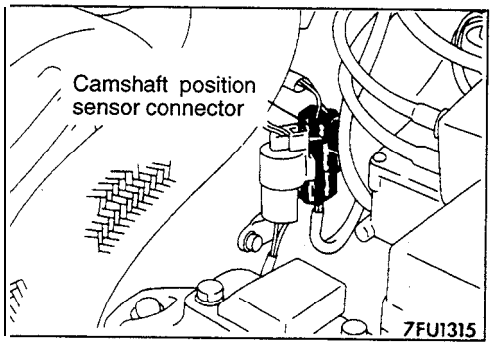
SENSOR INSPECTION

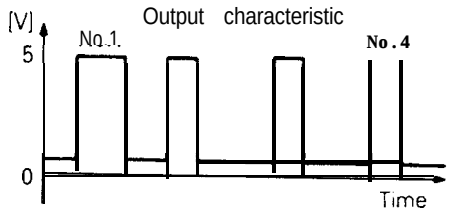
Refer to P.13A-102.

TSB Revision

CAMSHAFT POSITION SENSOR



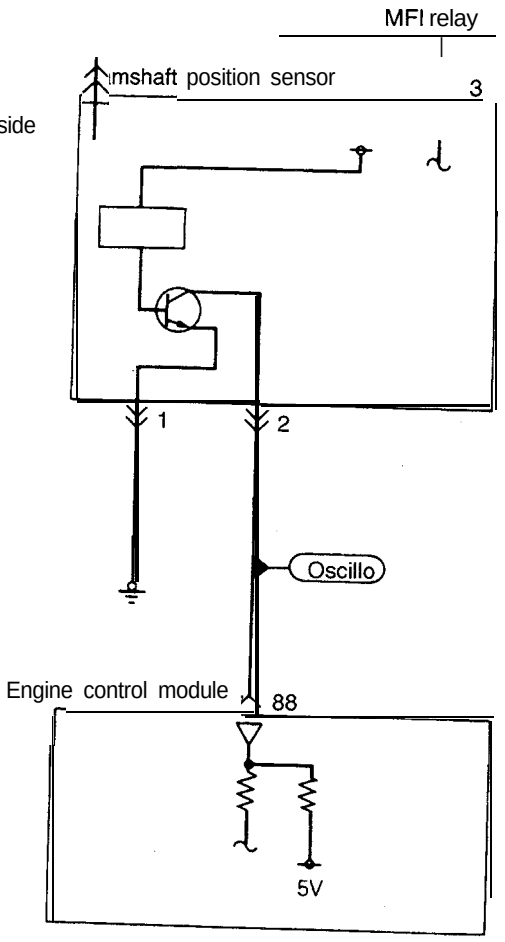




Z7FU0677

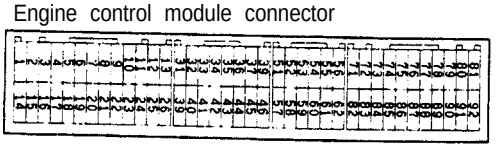
A Equipment side connector





6A F0054

Engine control module connector



Z9FU0393

7FU1627

OPERATION

Refer to P.13A-103.

TROUBLESHOOTING HINTS

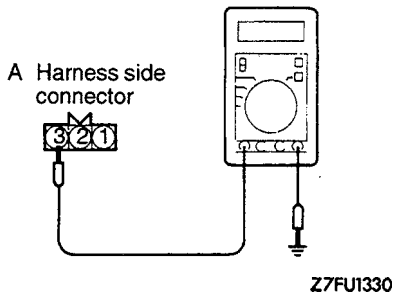
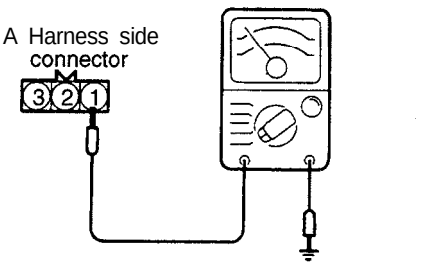
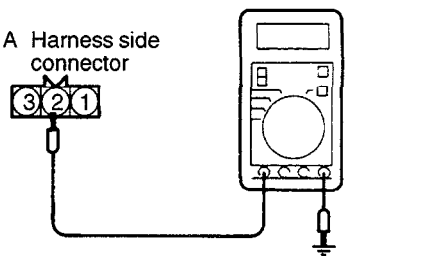
Refer to P.13A-103.

INSPECTION

Refer to P.13A-104.

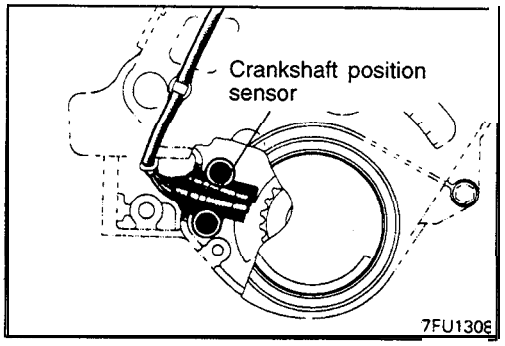
TSB Revision

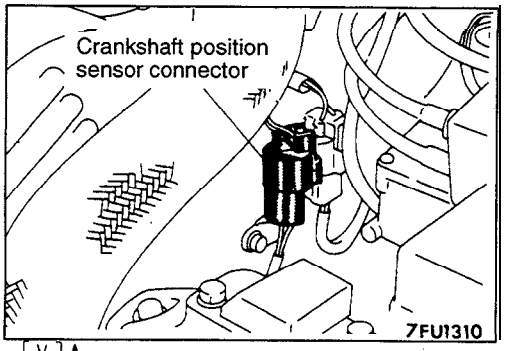
HARNESS INSPECTION

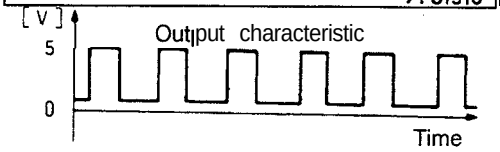
1	 Z7FU1330	Measure the power supply voltage. • Connector: Disconnected • Ignition switch: ON **Battery voltage**	OK → 2 NO → Repair the harness. (A3 – MFI relay)
2	 Z6AF0057	Check for continuity of the ground circuit. • Connector: Disconnected	OK → 3 NO → Repair the harness. (A1 – Ground)
3	 Z6AF0059	Measure the impressed voltage. • Connector: Disconnected • Ignition switch: ON **4.8–5.2 V**	OK → STOP NO → Repair the harness. (A2–88)

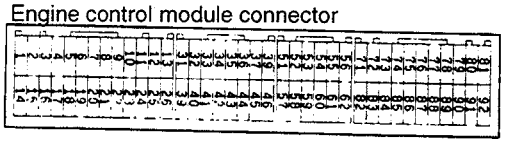
TSB Revision

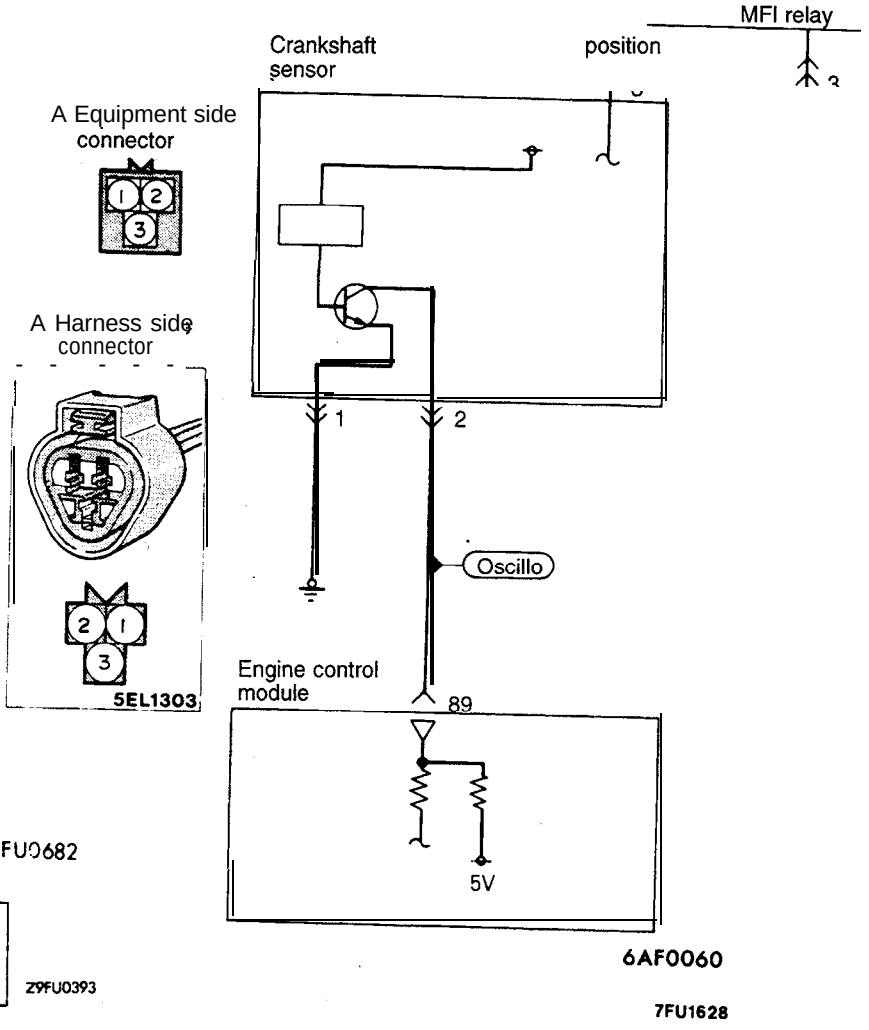
CRANKSHAFT POSITION SENSOR











OPERATION

Refer to P.13A-107.

TROUBLESHOOTING HINTS

Refer to P.13A-107.

INSPECTION

Using Scan Tool

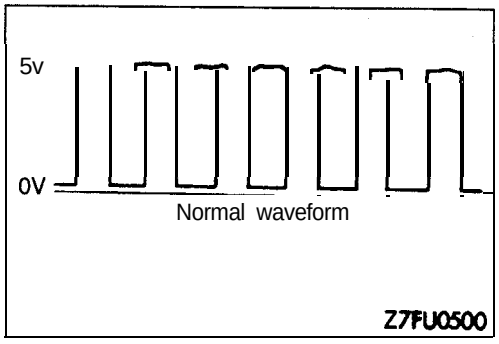
Function	Item No.	Data display	Check condition	Check content	Normal state
Data reading	22	Cranking speed	• Engine cranking • Tachometer connected (check on and off of primary current of ignition coil by tachometer)	Compare cranking speed and scan tool reading	Indicated speed to agree

NOTE
(1) The tachometer indicates a third of the actual engine speed. Therefore, 3 times the tachometer indication is the actual engine speed.
(2) When the tachometer is set to the 2-cylinder range, it indicates actual engine speed.

TSB Revision

Function	Item No.	Data display	Check condition	Coolant temperature	Standard value
Data reading	22	Idle speed	• Engine: Running at idle • Closed throttle position switch: ON	At -20°C (–4°F)	1,275– 1,475 rpm*1 1,300-l ,500 rpm*2
				At 0°C (32°F)	1,225– 1,425 rpm*1 1,300-l ,500 rpm*2
				At 20°C(68°F)	1,100–1,300 rpm*1 1,300-l ,500 rpm*2
				At 40°C(104°F)	950–1,150 rpm*1 1,050-l ,250 rpm*2
				At 80°C(176°F)	600-800 rpm

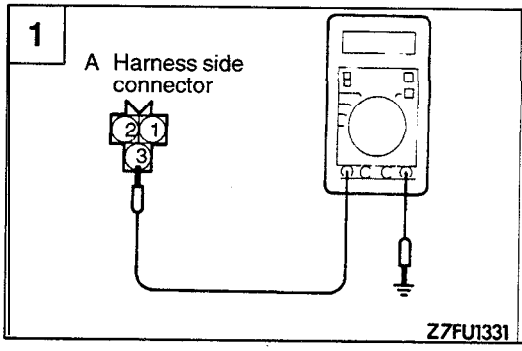
NOTE
*1: Non Turbo, Turbo Up to 1995 models
*2: Turbo From 1996 models



Using Oscilloscope

(1) Run the engine at idle speed.
(2) Connect the probe to the oscilloscope pick-up point as shown in the circuit diagram, and check the waveform.

HARNESS INSPECTION

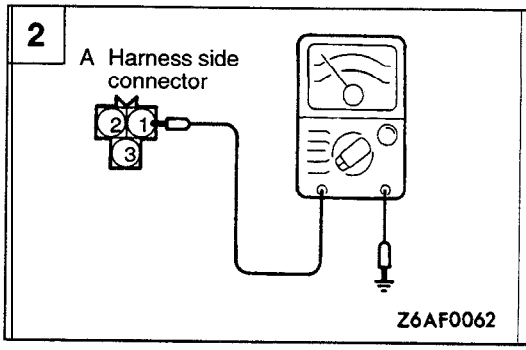


Measure the power supply voltage.
- Connector: Disconnected
- Ignition switch: ON

Battery voltage

OK → 2

NG → Repair the harness. (A3 – MFI relay)

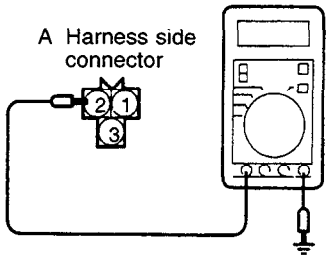


Check for continuity of the ground circuit.
- Connector. Disconnected

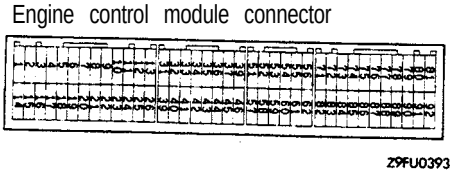
OK → 3

NG → Repair the harness. (A1 – Ground)

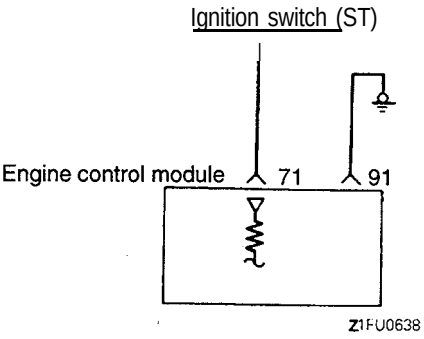
TSB Revision

3	 Z6AF0064	Measure the impressed voltage. • Connector: Disconnected • Ignition switch: ON **4.8–5.2 V**	OK → STOP NO → Repair the harness. (A2–89)

IGNITION SWITCH-ST <M/T>



Z9FU0393



Z1FU0638 7FU1629

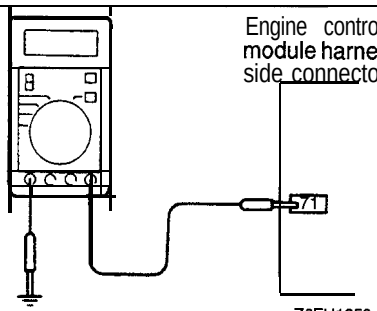
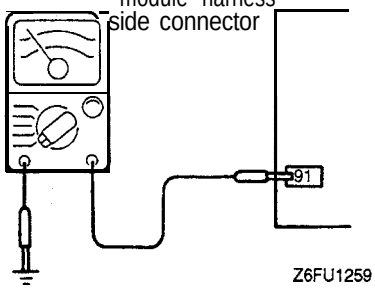
OPERATION

Refer to P.13A-112.

INSPECTION

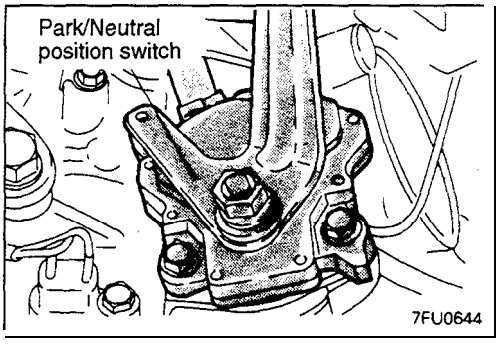
Refer to P.13A-112.

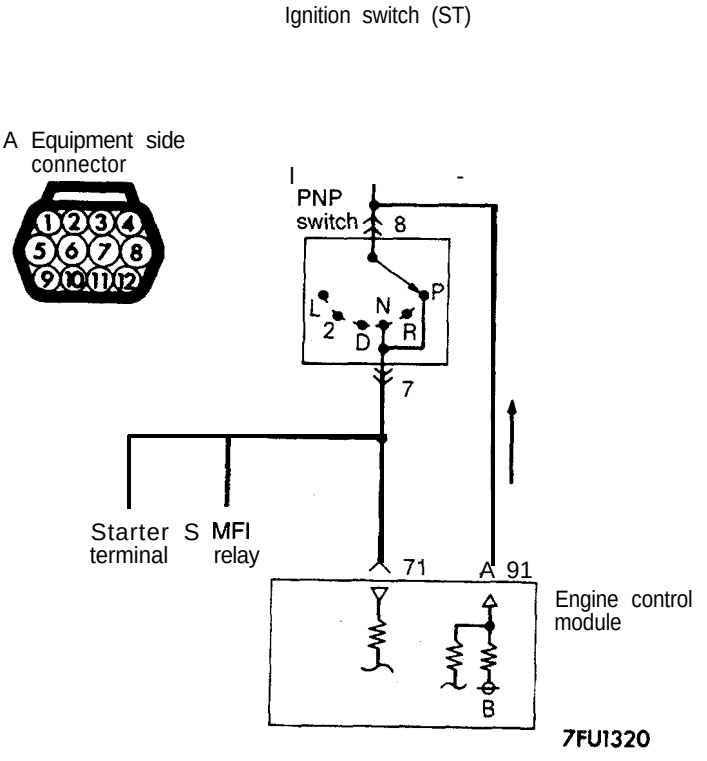
HARNESS INSPECTION

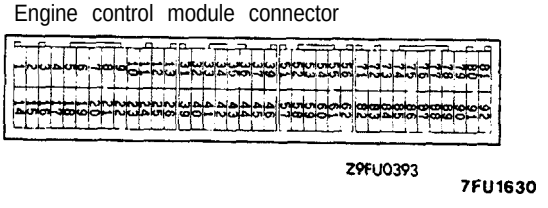
1	 Z6FU1258	Measure the input voltage to the engine control module • Engine control module connector. Disconnected • Ignition switch: START **8 V or more**	OK → 2 NO → Repair the harness. (71 – Ignition switch)
2	 Z6FU1259	Check for continuity of the ground circuit. • Engine control module connector: Disconnected	OK → STOP NO → Repair the harness. (91 – Ground)

TSB Revision

IGNITION SWITCH-ST AND PARK/NEUTRAL POSITION SWITCH (PNP SWITCH) <A/T>







OPERATION

Refer to P.13A-113.

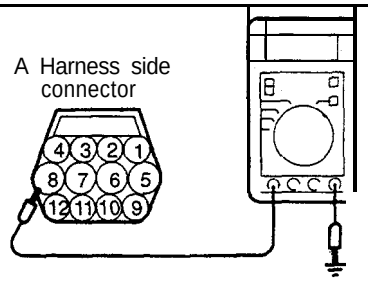
TROUBLESHOOTING HINTS

Refer to P.13A-113.

INSPECTION

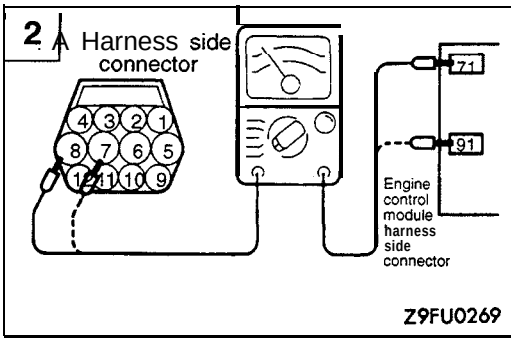
Refer to P.13A-114.

HARNESS INSPECTION

1		Measure the power supply voltage. • Engine control module connector: Disconnected • PNP switch connector: Disconnected • Ignition switch: START **Battery voltage**	OK → 2 NG → Check the power supply circuit.

TSB Revision

2



Check for continuity between the PNP switch and enaine control module.

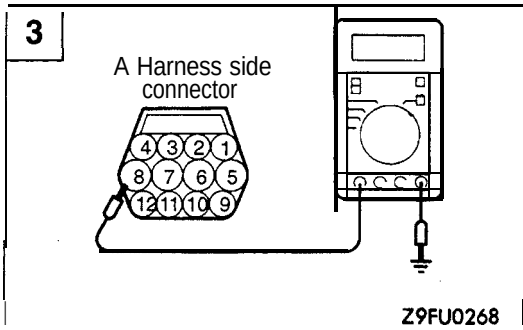
- Engine control module connector: Disconnected
- PNP switch connector: Disconnected

NOTE
Insert the probes of the circuit tester into both ends of the harness.

OK → 3

NG → Repair the harness. (A8–91) (A7–71)

3



Measure the impressed voltage to the PNP switch.

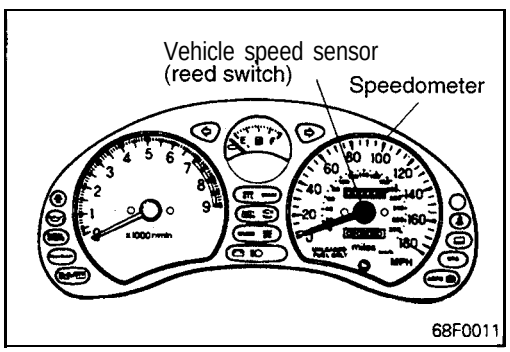
- Engine control module connector: Connected
- PNP switch connector: Disconnected
- Ignition switch: ON

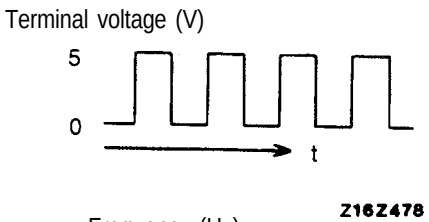
Bakery voltage

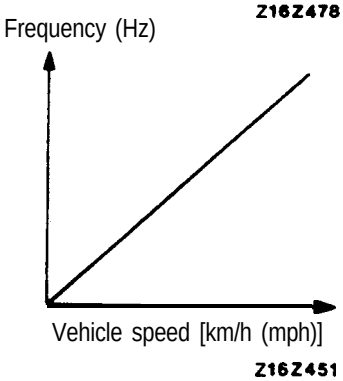
OK → STOP

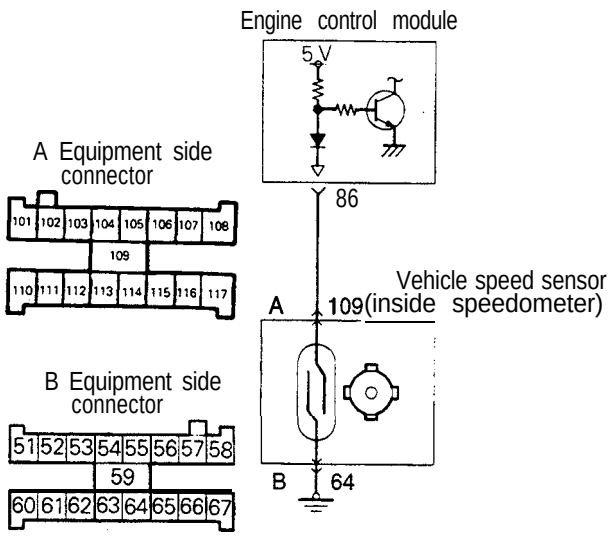
NG → Replace the engine control module.

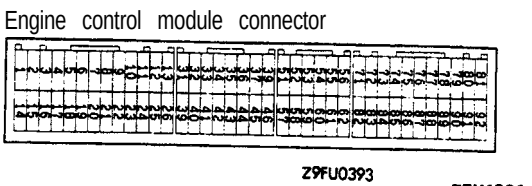
VEHICLE SPEED SENSOR (Mechanical Speedometer Type)











TSB Revision

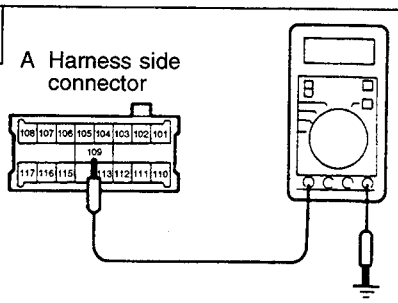
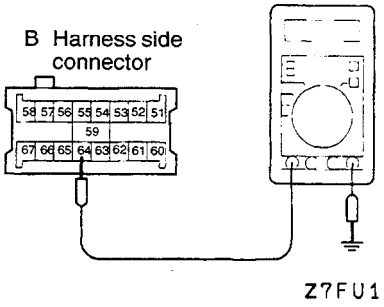
OPERATION

Refer to P.13A-117.

TROUBLESHOOTING HINTS

Refer to P.13A-117.

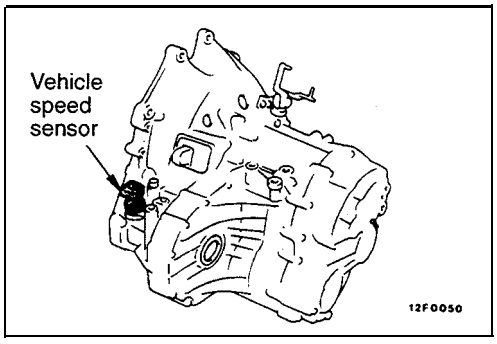
HARNESS INSPECTION

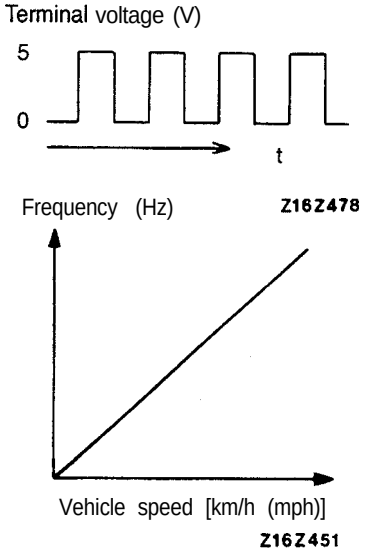
1	A Harness side connector  Z6FU1265	Measure the power supply voltage of the vehicle speed sensor. • Connector. Disconnected • Ignition switch: ON **4.5–4.9 V**	OK → 2 NG → Repair the harness. (A109–86)
2	B Harness side connector  Z7FU1438	Check for continuity of the ground circuit • Connector: Disconnected	OK → STOP NG → Repair the harness. (B64 – Ground)

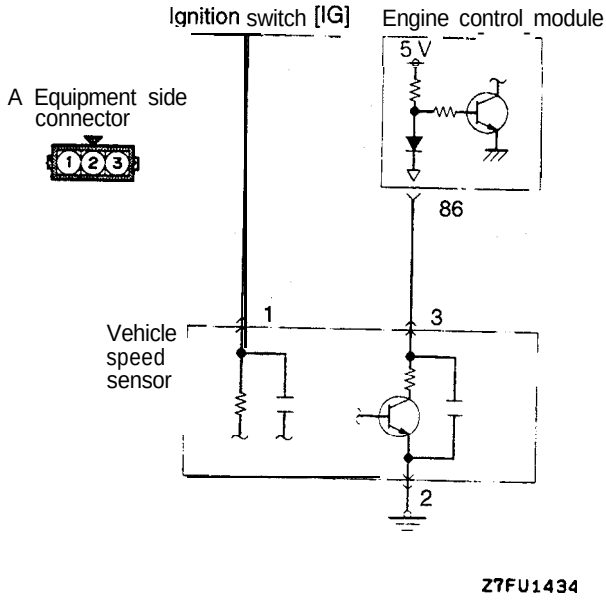
SENSOR INSPECTION

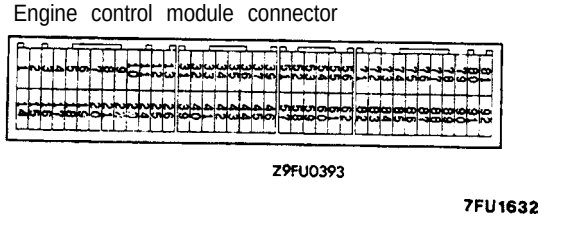
Refer to GROUP 54 – Meters and Gauges.

VEHICLE SPEED SENSOR (Electrical Speedometer Type)









OPERATION

Refer to P.13A-119.

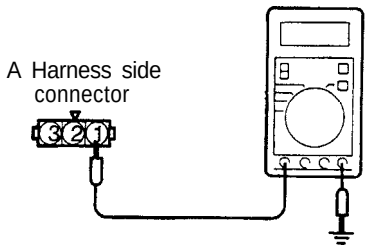
TROUBLESHOOTING HINTS

Refer to P.13A-117.

TSB Revision

HARNESS INSPECTION

1



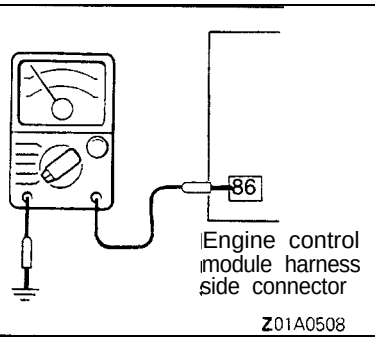
Measure line voltage applied to vehicle speed sensor.
- Connector: Disconnected
- Ignition switch: ON

Battery voltage

OK → 2

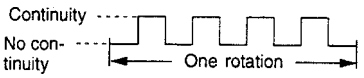
OK → Repair the harness. (AI – Ignition switch)

2



Check the vehicle speed sensor output circuit for continuity.
- Engine control module connector: Disconnected
- Ignition switch: ON
- Move the vehicle

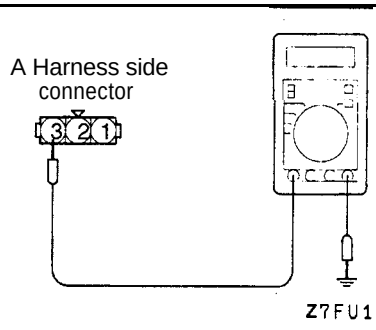
Continuity



OK → STOP

OK → 3

3



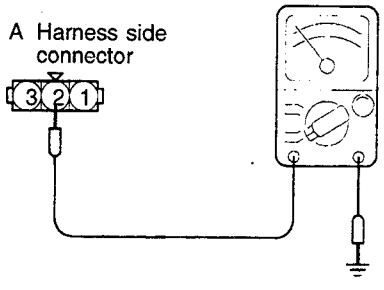
Measure the power supply voltage of the vehicle speed sensor.
- Connector: Disconnected
- Ignition switch: ON

4.5-4.9 v

OK → 4

OK → Repair the harness. (A3–86)

4



Check for continuity of the ground circuit.
- Connector: Disconnected

OK → STOP

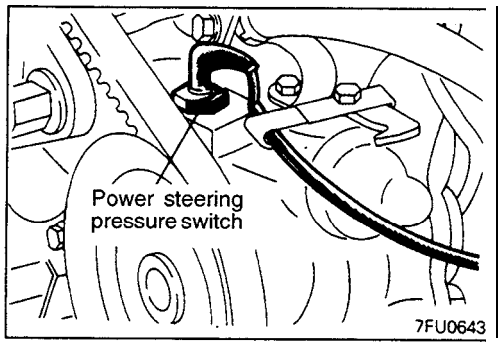
OK → Repair the harness. (A2 – Ground)

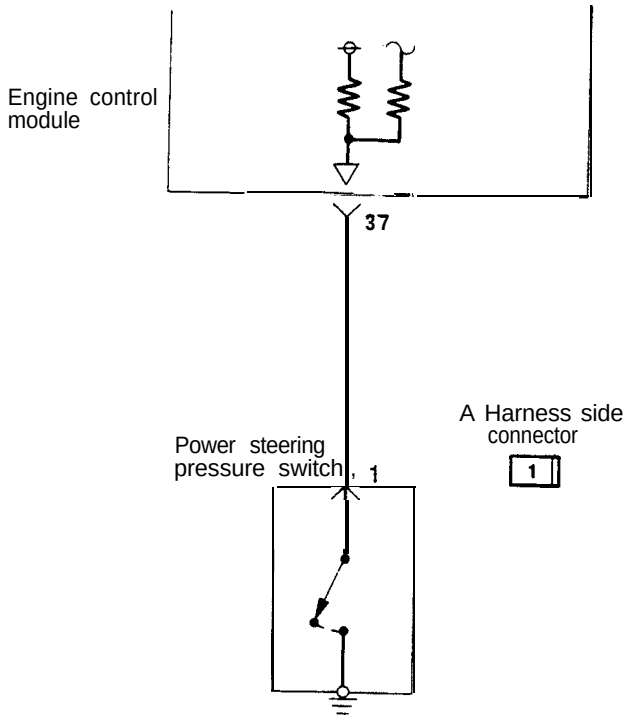
SENSOR INSPECTION

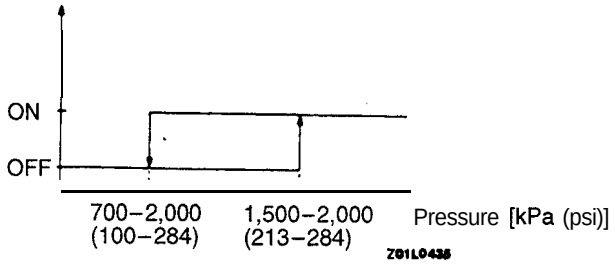
Refer to GROUP 54 – Meters and gauges.

TSB Revision

POWER STEERING PRESSURE SWITCH







Z7FU0536

7FU1633

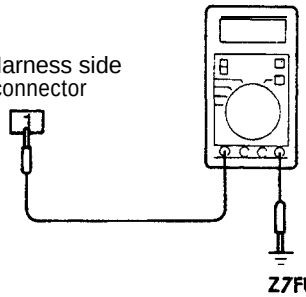
OPERATION

Refer to P.13A-121.

INSPECTION

Refer to P.13A-122.

HARNESS INSPECTION

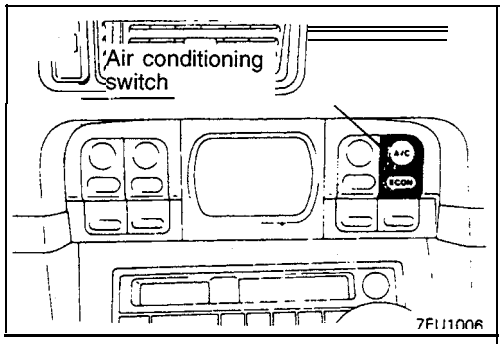
1  Z7FU0505	Measure the power supply voltage. ● Connector Disconnected • Ignition switch: ON **Battery voltage**	OK → STOP NG → Repair the harness. (AI -37)	

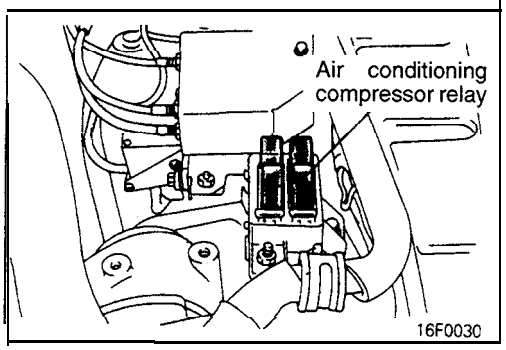
SENSOR INSPECTION

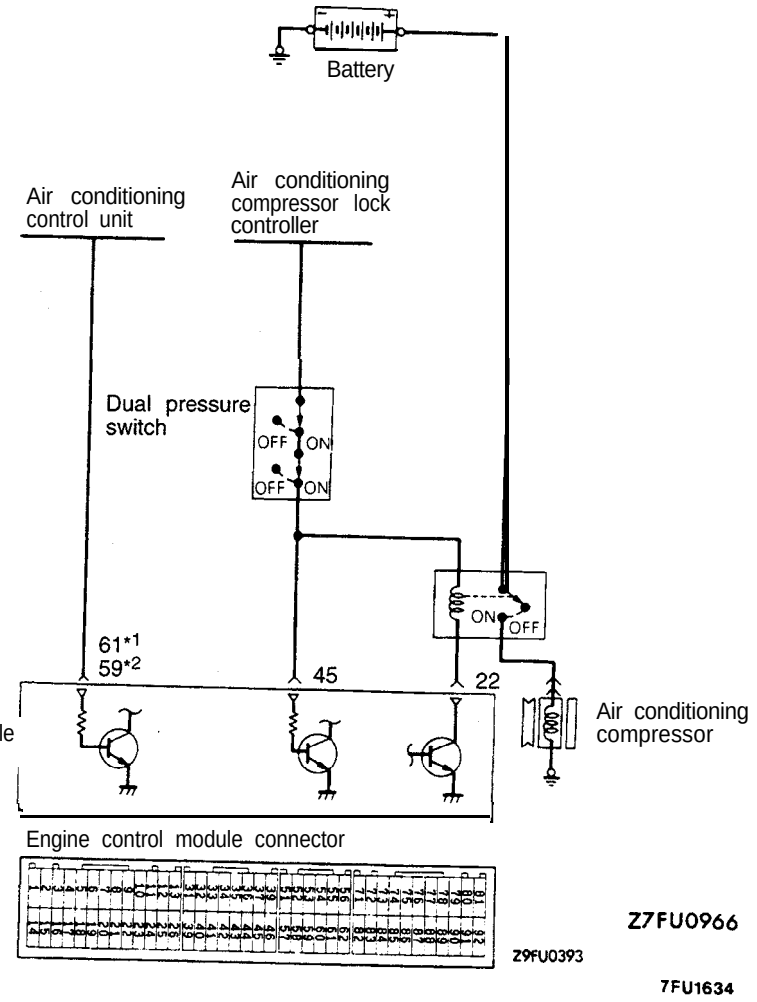
Refer to GROUP 37A – On-vehicle Service.

TSB Revision

AIR CONDITIONING SWITCH AND COMPRESSOR CLUTCH RELAY







NOTE
*1: Non Turbo
*2: Turbo

OPERATION

Refer to P.13A-123.

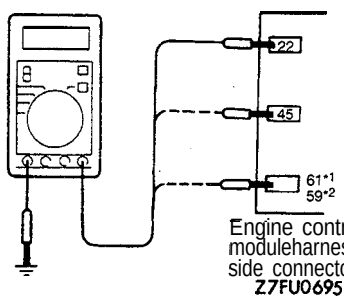
TROUBLESHOOTING HINTS

Refer to P.13A-123.

INSPECTION

Refer to P.13A-123.

HARNESS INSPECTION

1	 Engine control moduleharness side connector Z7FU0695	Measure the power supply voltage of the conditioning circuit. • Air conditioning switch: ON • Engine control module connector: Disconnected • Ignition switch: ON • Dual air conditioning switch: ON **Battery voltage**	OK NG	STOP Check the air conditioning circuit.

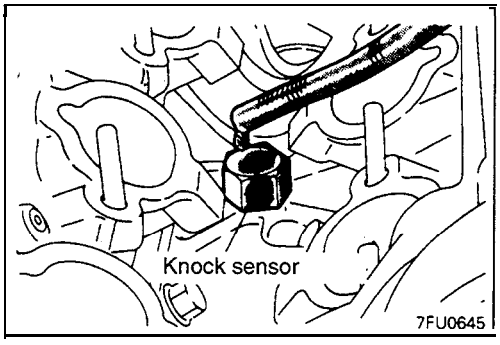
NOTE
*1: Non Turbo
*2: Turbo

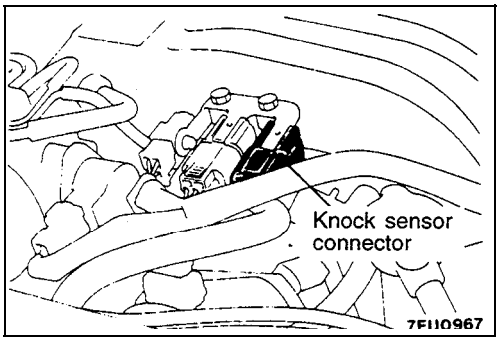
TSB Revision

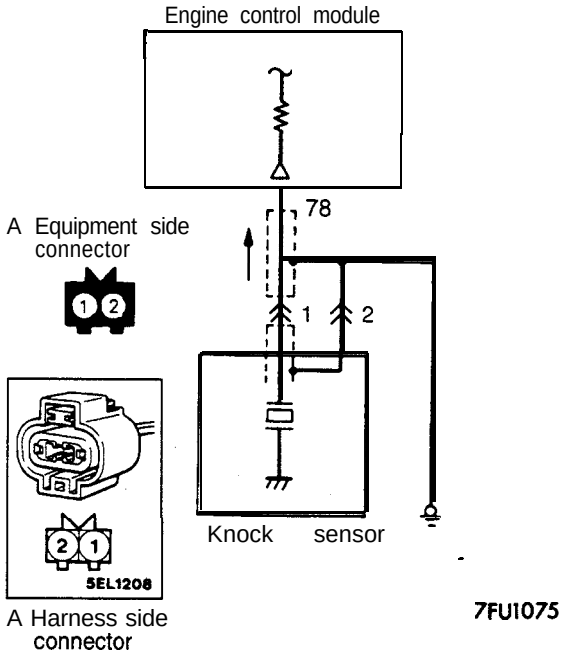
AIR CONDITIONING INSPECTION

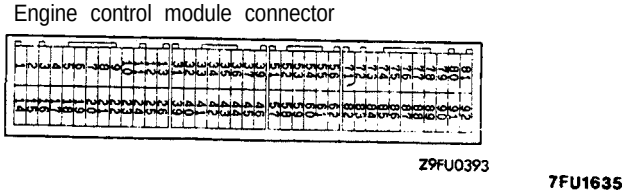
Refer to GROUP 55 – On-vehicle Service.

KNOCK SENSOR









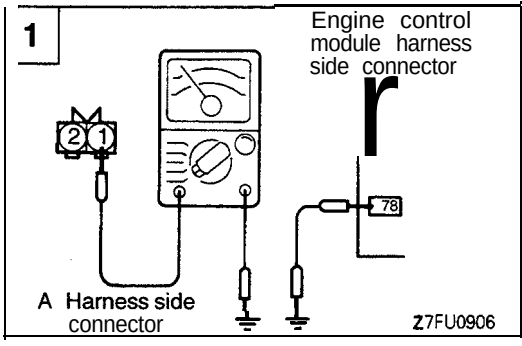
OPERATION

Refer to P.13A-125.

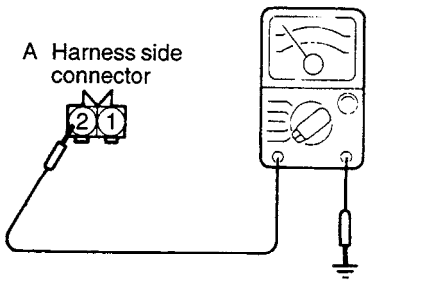
TROUBLESHOOTING HINTS

Refer to P.13A-125.

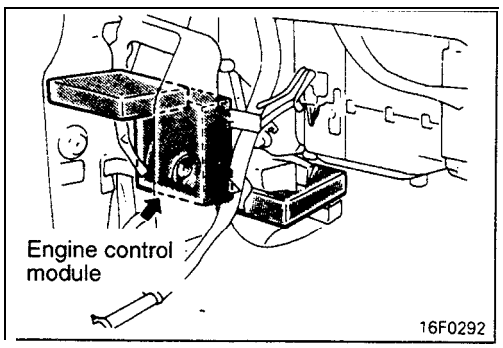
HARNESS INSPECTION

1  	Check for an open-circuit or a short-circuit to ground, between the engine control module and knock sensor. • Knock sensor connector: Disconnected • Engine control module connector: Disconnected	OK → 2 NG → Repair the harness. (AI -78)

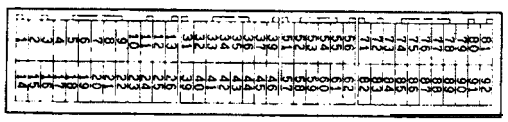
TSB Revision

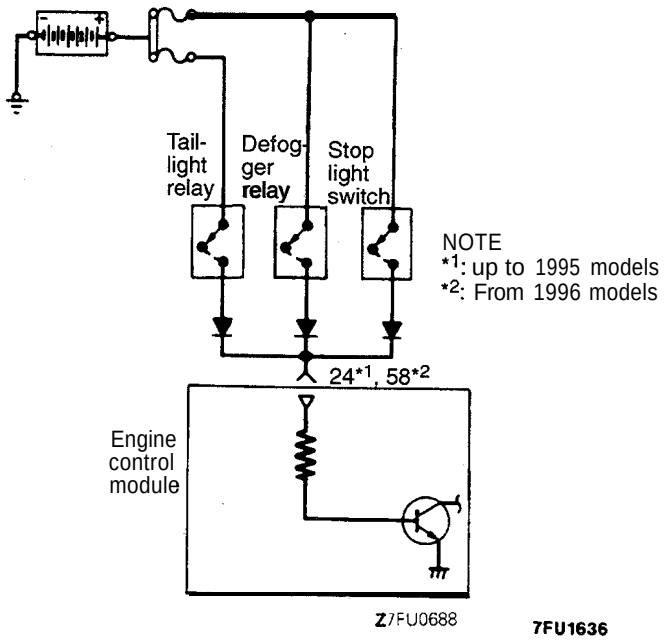
2  	Check for continuity of the ground circuit. • Connector: Disconnected	OK → STOP OK → Repair the harness. (A2 – Ground)

ELECTRICAL LOAD SWITCH



Engine control module connector





NOTE
*1: up to 1995 models
*2: From 1996 models

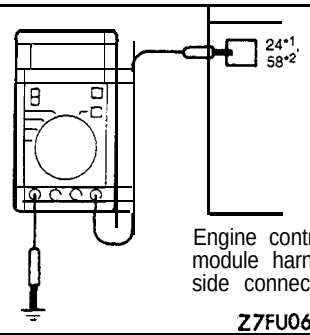
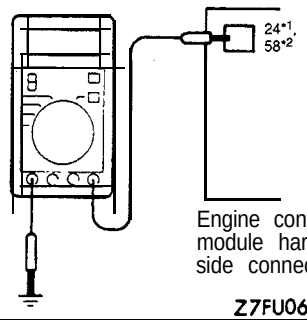
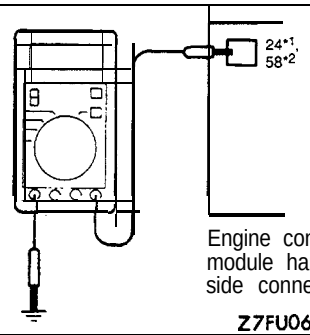
OPERATION

Refer to P.13A-127.

INSPECTION

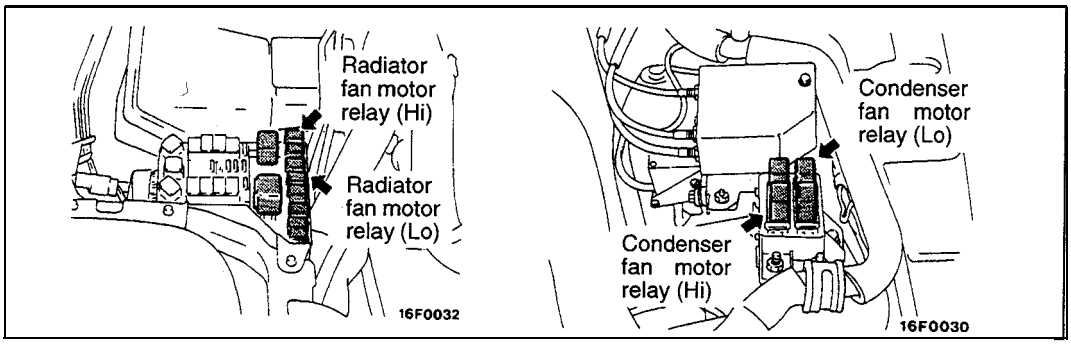
Refer to P.13A-127.

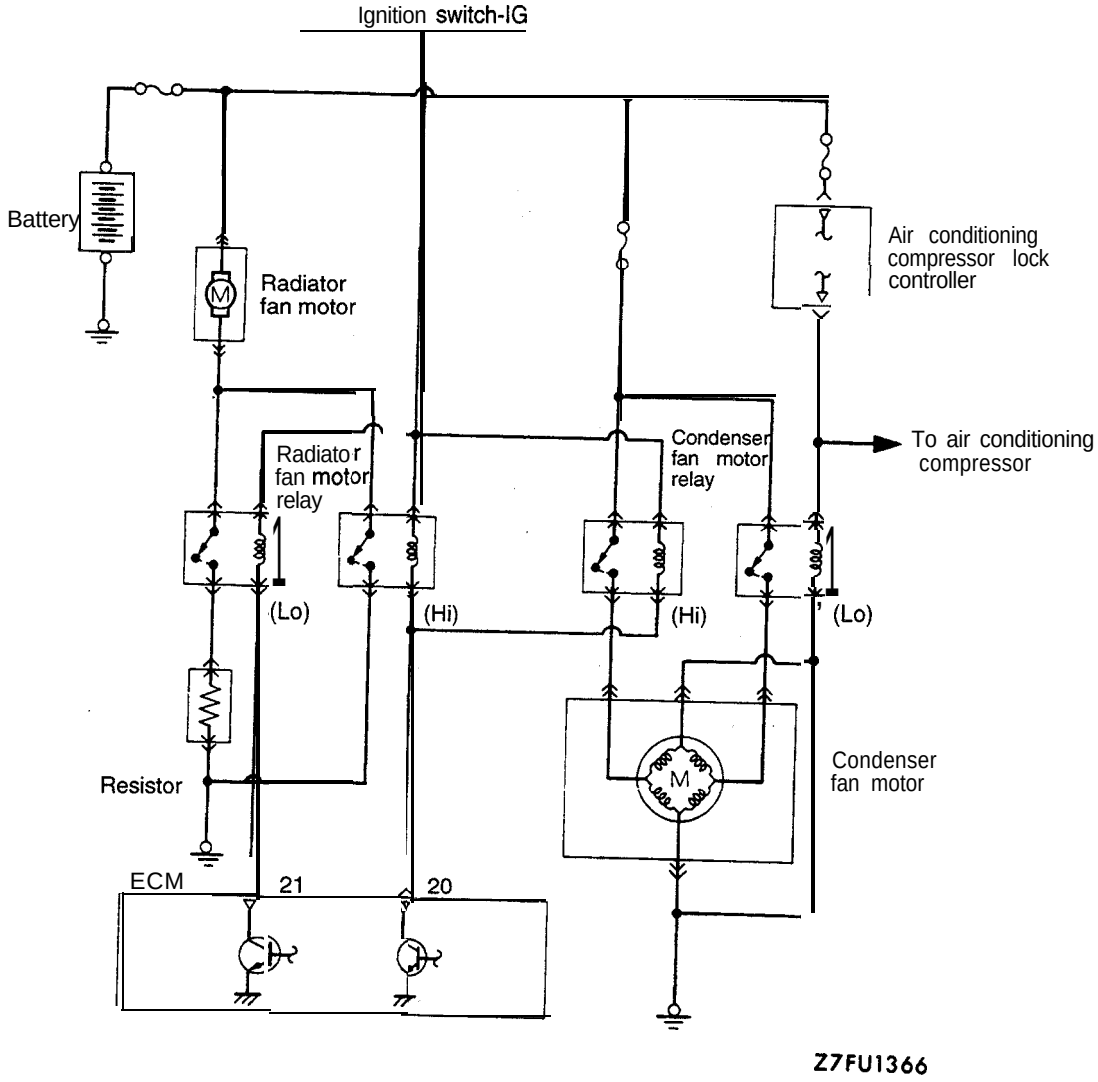
HARNESS INSPECTION

1	 Engine control module harness side connector Z7FU0689	Measure the input voltage of engine control module. • Engine control module connector: Disconnected • Lighting switch: ON (Tail light relay ON) **Battery voltage**	OK → 2 NO → Check circuit related to tail light relay
2	 Engine control module harness side connector Z7FU0689	Measure the input voltage of engine control module. • Engine control module connector: Disconnected • Defogger switch: ON (Defogger relay ON) **Battery voltage**	OK → 3 NO → Check circuit related to defogger relay
3	 Engine control module harness side connector Z7FU0689	Measure the input voltage of engine control module. • Engine control module connector: Disconnected • Brake pedal: Depressed (Stop light switch ON) **Battery voltage**	OK → STOP NO → Check circuit related to stoplight relay

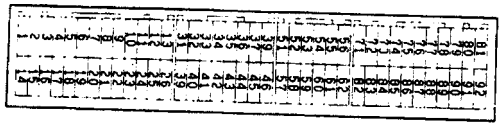
NOTE
*1: Up to 1995 models
*2: From 1996 models

FAN MOTOR RELAY (RADIATOR, AIR CONDITIONING CONDENSER)





Engine control module connector



Z9FU0393

7FU1637

TSB Revision

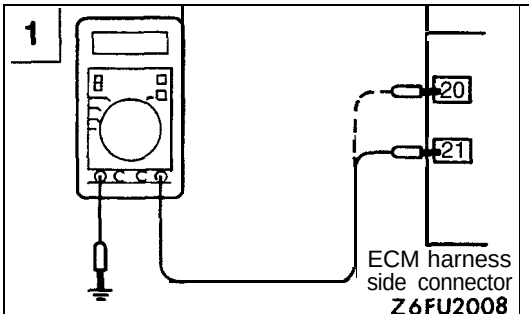
OPERATION

Refer to P.13A-130.

INSPECTION

Refer to P.13A-130.

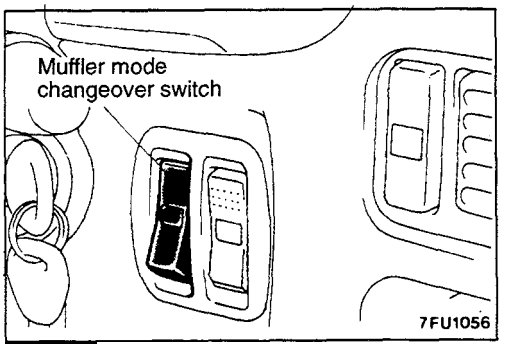
HARNESS INSPECTION

1  ECM harness side connector Z6FU2008	Measure input voltage applied to ECM. • ECM connector: Disconnected • Ignition switch: ON **Battery voltage**	OK → STOP OK → Check the fan motor relay circuit.

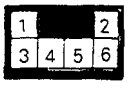
FAN MOTOR RELAY INSPECTION

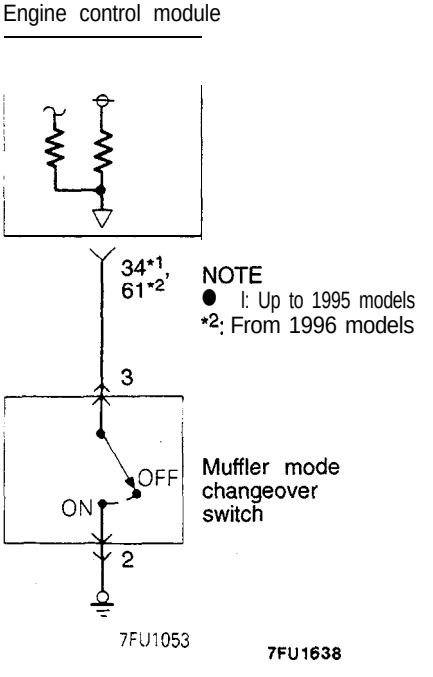
Refer to Radiator Check in GROUP 14 and Power Relay Check in GROUP 55.

MUFFLER MODE CHANGEOVER SWITCH <Turbo>



A Equipment side connector





OPERATION

Refer to P.13A-131.

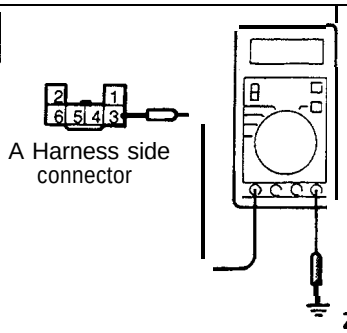
INSPECTION

Refer to P.13A-131.

TSB Revision

HARNESS INSPECTION

1



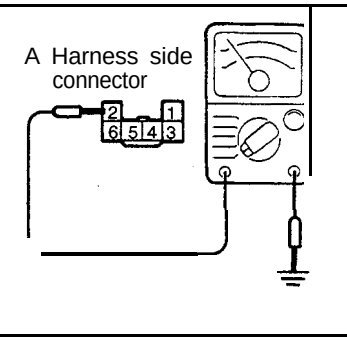
Measure the power supply voltage.
- Connector: Disconnected
- ignition switch: ON

Battery voltage

OK → 2

NG → Repair the harness. (A3–34*1, 61*2)

2



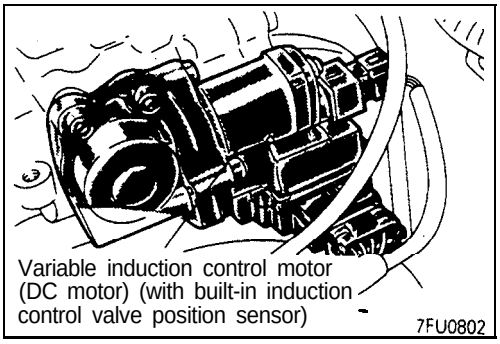
Checkforcontinuity of the ground circuit.
- Connector: Disconnected

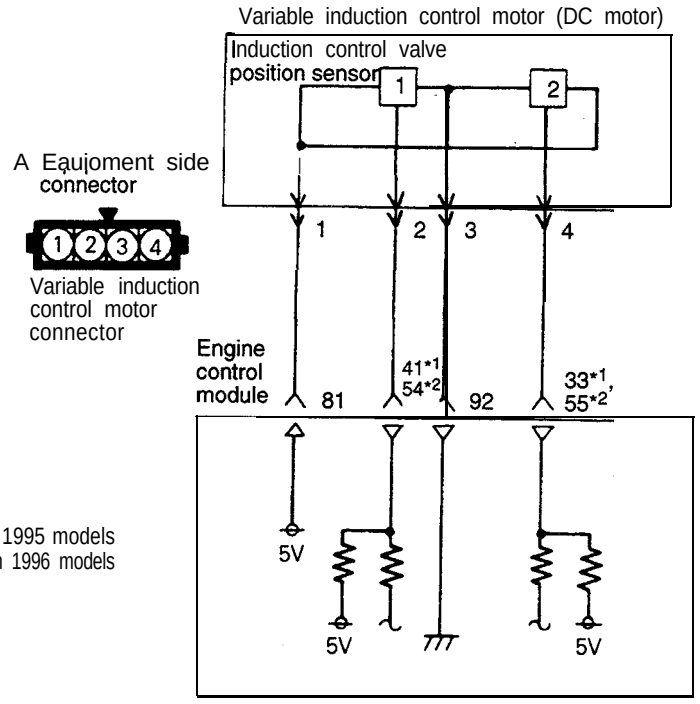
OK → STOP

NG → Repair the harness. (A2 – Ground)

NOTE
*1: Up to 1995 models
*2: From 1996 models

INDUCTION CONTROL VALVE POSITION SENSOR <Non Turbo>





NOTE
- 1: Up to 1995 models
- 2: From 1996 models

Z7FU0968
7FU1639

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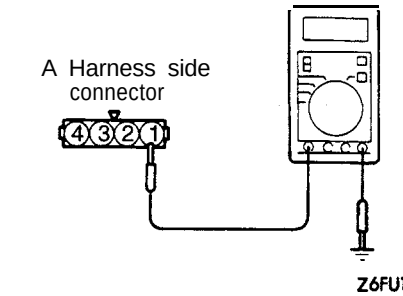
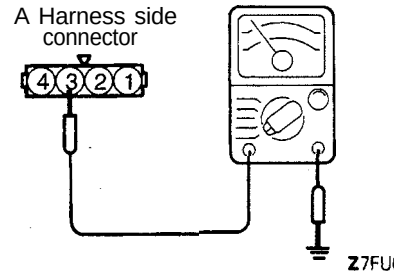
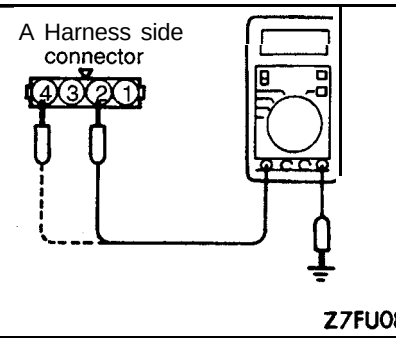
OPERATION

Refer to P.13A-133.

INSPCTION

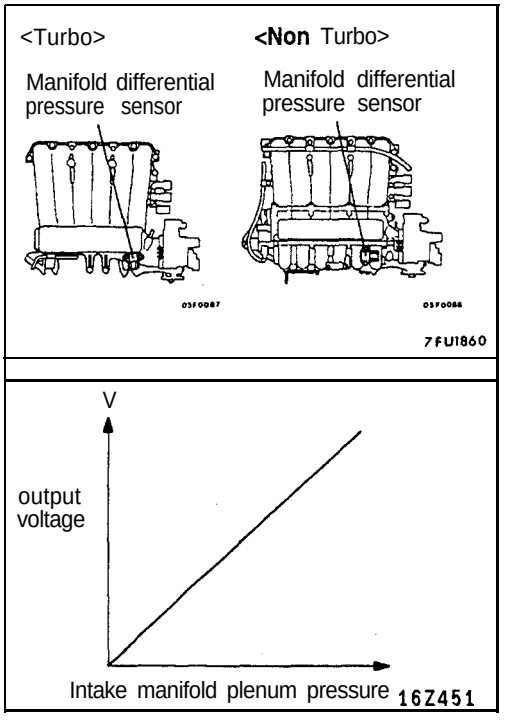
Refer to P.13A-133.

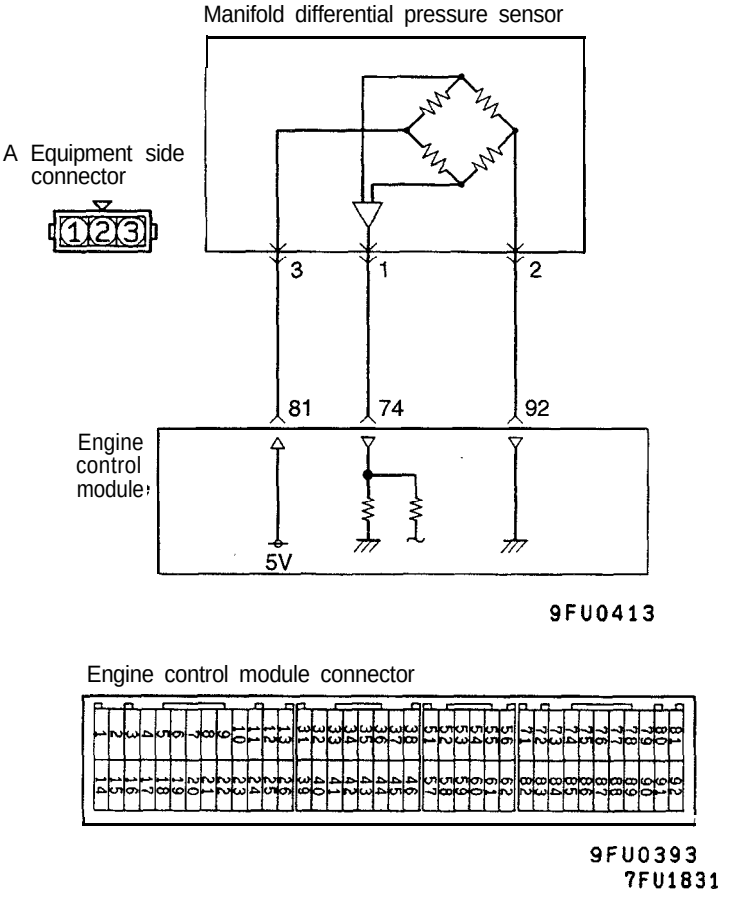
HARNESS INSPECTION

1		Measure the power supply voltage of the air intake control valve position sensor. • Connector: Disconnected • Ignition switch: ON **4.8–5.2 V**	OK → 2 NG → Repair the harness. (A1–81)
2		Check for continuity of the ground circuit. • Connector: Disconnected	OK → 3 NG → Repair the harness. (A3–92)
3		Measure the terminal voltage. • Connector: Disconnected • Ignition switch: ON	OK → STOP NG → Repair the harness. (A2–41*1, 54*2) (A4–33*1, 55*2)

NOTE
*1: Up to 1995 models
*2: From 1996 models

MANIFOLD DIFFERENTIAL PRESSURE (MDP) SENSOR





OPERATION

- Manifold differential pressure switch converts the intake manifold plenum pressure to the voltage and inputs to the engine control module. Engine control module confirms the operation of EGR system from this signal and, if there is any error in the EGR system, memorizes the diagnostic trouble code.
- 5 V of power is supplied to the manifold differential pressure sensor from the engine control module, and the sensor circuit ground is located in the engine control module.
- The manifold differential pressure sensor output voltage is proportioned to the intake manifold plenum pressure and sent to the engine control module.

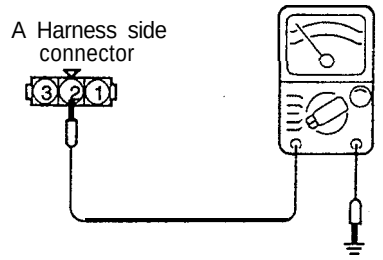
INSPECTION

Using Scan Tool

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	95	intake manifold plenum pressure	Engine: Warm-up	Idling	25.5-38.9 kPa <Non Turbo> 29.0-42.4 kPa <Turbo>

HARNESS INSPECTION

1



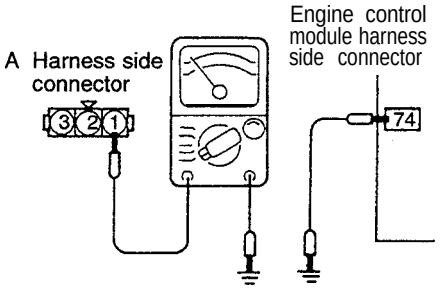
Check for continuity of the ground circuit.

- Manifold differential pressure sensor connector: Disconnected

OK → 2

NO → Repair the harness. (A2 – 92)

2



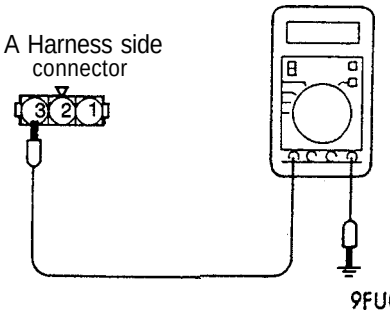
Check for open-circuit, or short-circuit to ground between the engine control module and the manifold differential pressure sensor.

- Manifold differential pressure sensor connector: Disconnected
- Engine control module connector: Disconnected

OK → 3

NO → Repair the harness. (A3 – 74)

3



Measure the impressed voltage to the manifold differential pressure sensor.

- Manifold differential pressure sensor connector: Disconnected
- Engine control module connector: Connected
- Ignition switch: ON

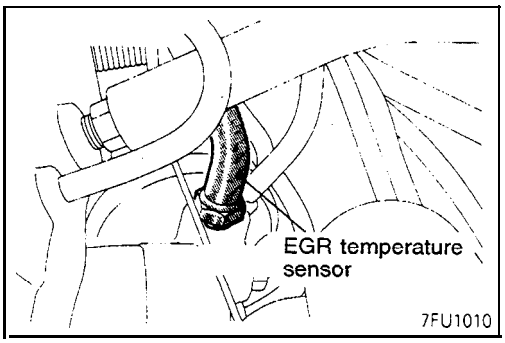
Voltage: 4.8-5.2 V

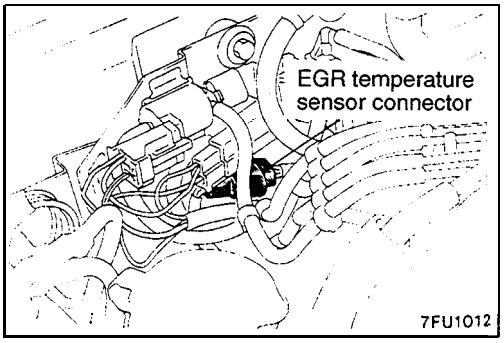
OK → STOP

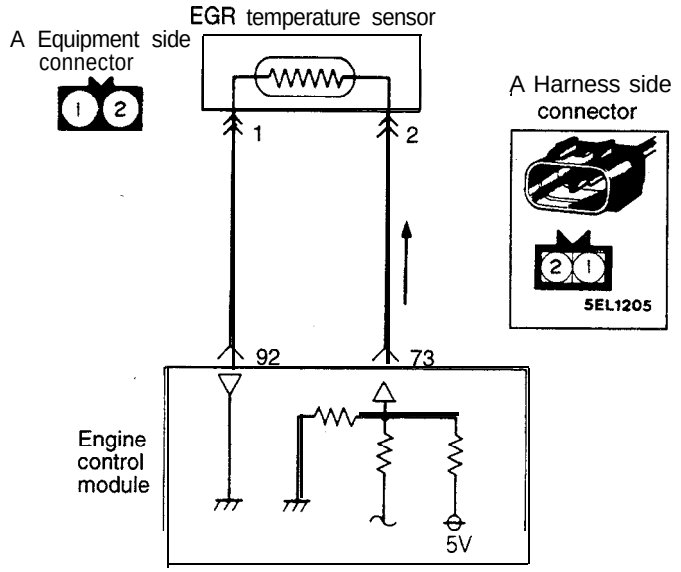
NO → Repair the engine control module.

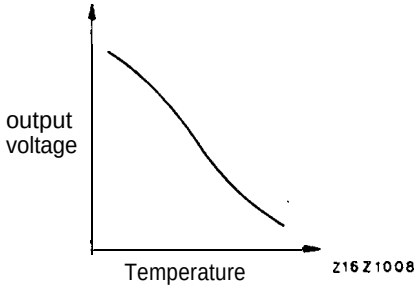
TSB Revision

EGR TEMPERATURE SENSOR <California Up to 1995 models, Federal – Turbo Up to 1995 models>









7FU1640

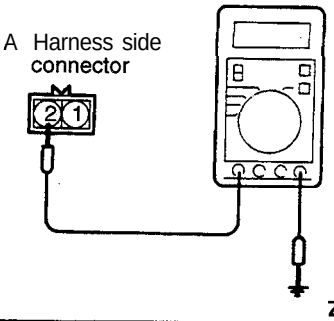
OPERATION

Refer to P.13A-135.

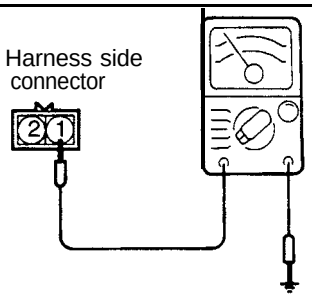
INSPECTION

Refer to P.13A-136.

HARNESS INSPECTION

1		Measure the power supply voltage. • Connector: Disconnected • Ignition switch: ON **4.3–4.7 V**	OK → 2 NG → Repair the harness. (A2–73)

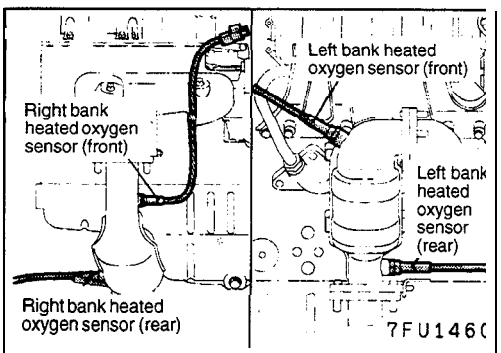
TSB Revision

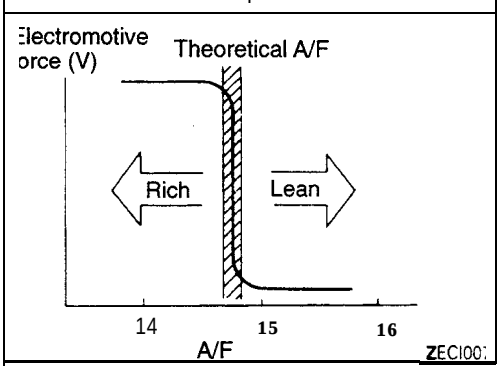
2 A Harness side connector  Z7FU1257	Check for continuity of the ground circuit. • Connector: Disconnected	OK → STOP NG → Repair the harness. (AI -92)

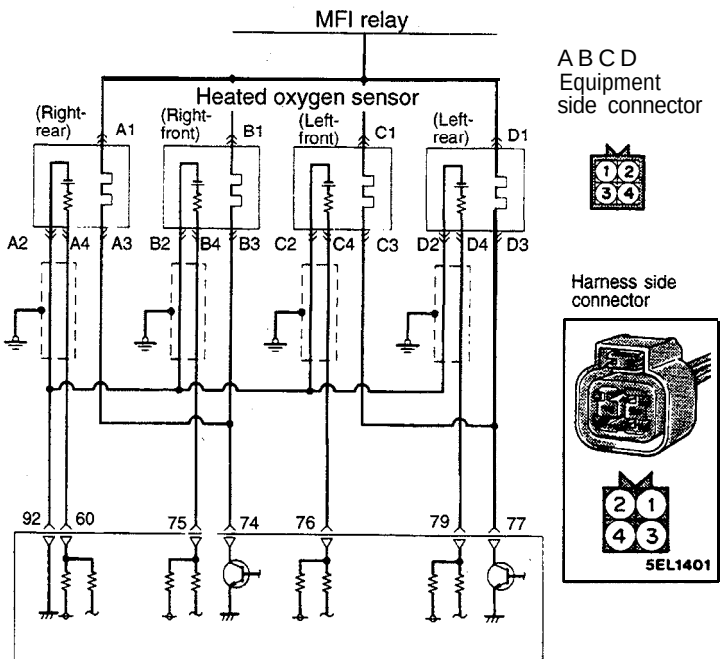
SENSOR INSPECTION

Refer to GROUP 17 – Exhaust Gas Recirculation (EGR) System.

HEATED OXYGEN SENSOR <California – Non Turbo Up to 1995 models>

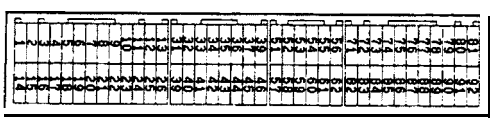






7FU1431

Engine control module connector



Z9FU0393 7FU1641

TSB Revision

OPERATION

Refer to P.13A-137.

TROUBLESHOOTING

Refer to P.13A-138.

INSPECTION

Using Scan Tool

<Heated Oxygen Sensor (front)>

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	11 39	Sensor detection voltage	Engine: Warm-up (Make the mixture lean by engine speed reduction, and rich by racing)	When sudden deceleration from 4,000 rpm	200 mV or lower
				When engine is suddenly raced	600 – 1,000 mV
			Engine: Warm-up (Using the heated oxygen sensor signal, check the air/fuel mixture ratio, and a so check the condition of control by the engine control module)	700 rpm (Idling)	400 mV or lower ↔ 600– 1,000 mV (changes)
				2,000 rpm	

<Heated Oxygen Sensor (rear)>

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	59 69	Sensor voltage	• Transaxle: 2nd gear <M/T> L range <A/T> • Drive with wide open throttle	3,500 rpm	600–1,000 mV

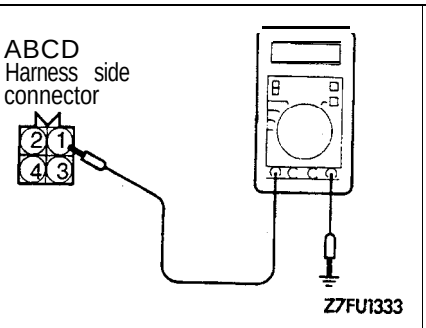
<Heated Oxygen Sensor (front, rear)>

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	48	Heater condition	Engine: Warm-up	750 rpm (Idle)	ON
				5,000 rpm	OFF

TSB Revision

HARNESS INSPECTION

1



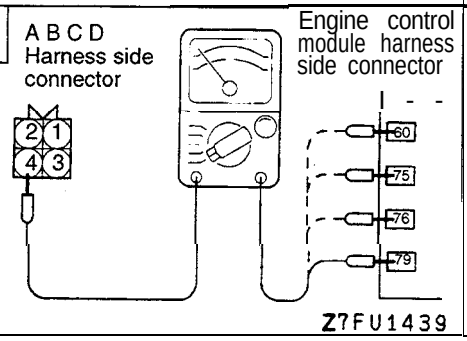
Measure the power supply voltage of the heated oxygen sensor.
- Connector: Disconnected
- Ignition switch ON

Battery voltage

OK → **2**

NG → Repair the harness. (A1, B1, C1, D1 – MFI relay)

2

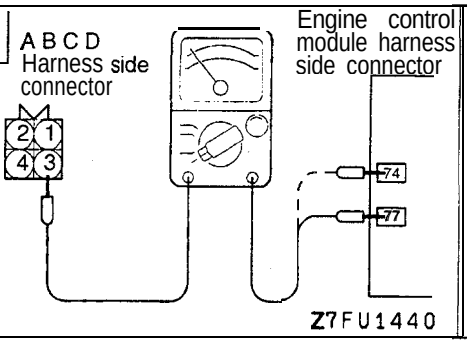


Check for an open-circuit, or a short-circuit to ground, between the engine control module and the heated oxygen sensor
- Heated oxygen sensor connector: Disconnected
- Engine control module connector: Disconnected

OK → **3**

NG → Repair the harness. (A4–60) (B4–75) (C4–76) (D4–79)

3

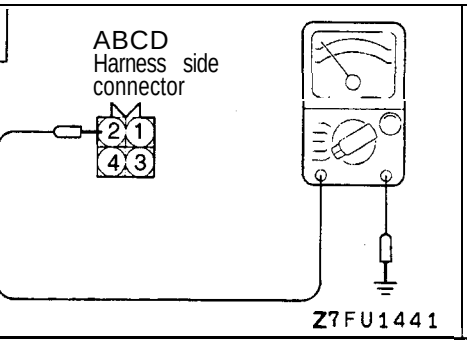


Check for an open-circuit, or a short-circuit to ground, between the engine control module and the heated oxygen sensor.
- Heated oxygen sensor connector: Disconnected
- Engine control module connector: Disconnected

OK → **4**

NG → Repair the harness. (A3, B3–74) (C3, D3–77)

4



Check for continuity of the ground circuit.
- Connector: Disconnected

OK → STOP

NG → Repair the harness. (A2, B2, C2, D2–92)

SENSOR INSPECTION

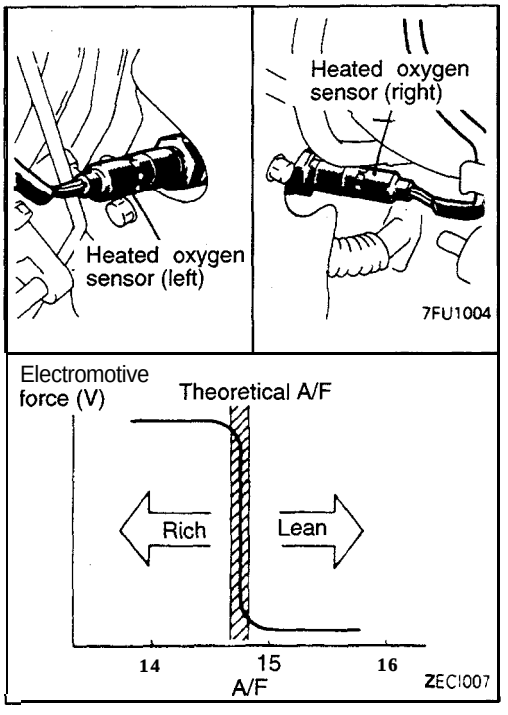
Refer to P.13A-143.

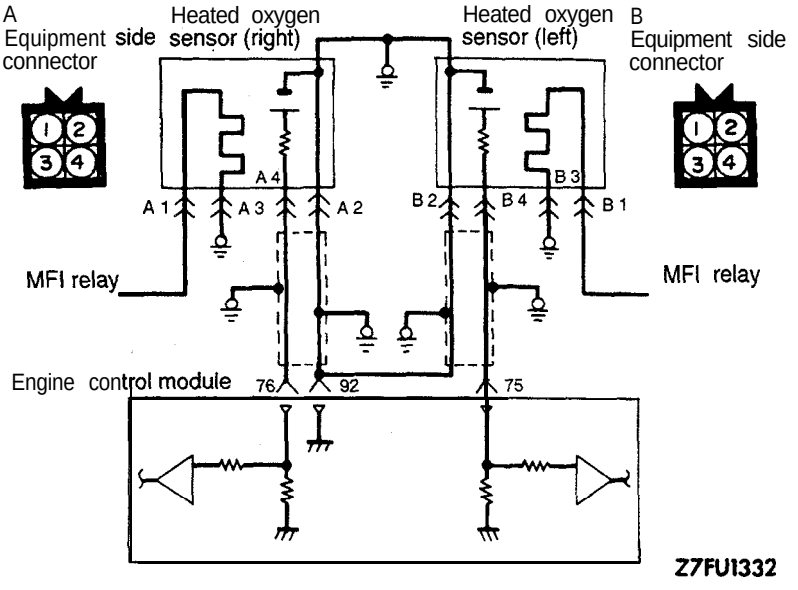
INSTALLATION

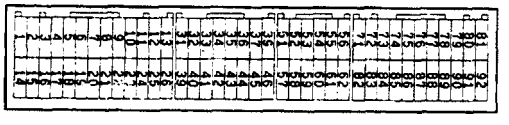
Refer to P.13A-143.

TSB Revision

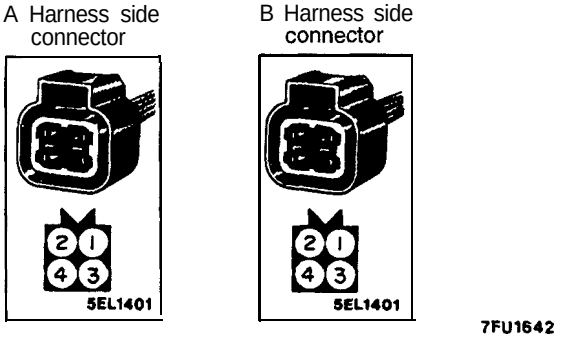
HEATED OXYGEN SENSOR <Federal – Turbo Up to 1995 models>






Engine control module connector

Z9FU0393



OPERATION

Refer to P.13A-137.

TROUBLESHOOTING

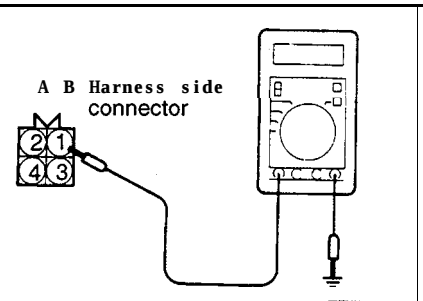
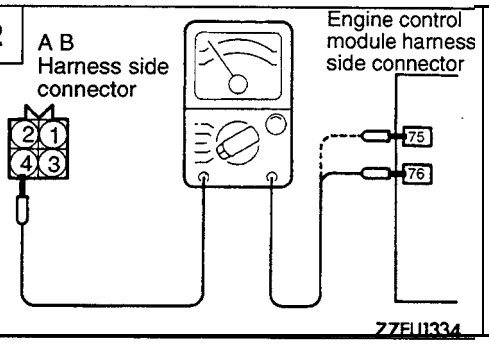
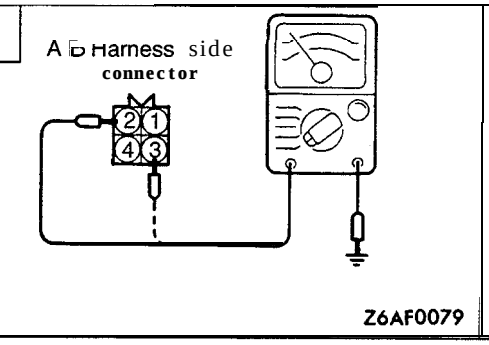
Refer to P.13A-138.

INSPECTION

Refer to P.13A-141.

TSB Revision

HARNESS INSPECTION

1		Measure the power supply voltage of the heated oxygen sensor. • Connector: Disconnected • Ignition switch: ON **Battery voltage**	OK → 2 NG → Repair the harness. (A1, B1 – MFI relay)
2		Check for an open-circuit, or a short-circuit to ground, between the enginecontrol module and the heated oxygen sensor. • Heated oxygen sensor connector: Disconnected • Engine control module connector: Disconnected	OK → 3 NG → Repair the harness. (A4–76) (B4–75)
3		Check for continuity of the ground circuit. • Connector: Disconnected	OK → STOP NG → Repair the harness. (A2, B2–92) (A3, B3 – Ground)

SENSOR INSPECTION

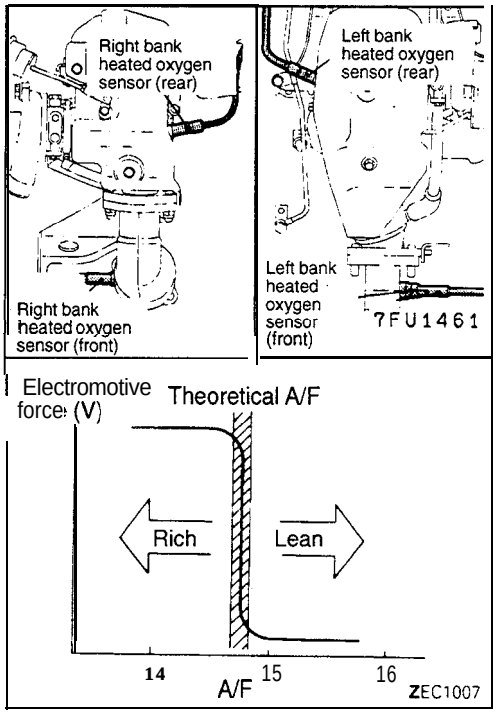
Refer to P.13A-143.

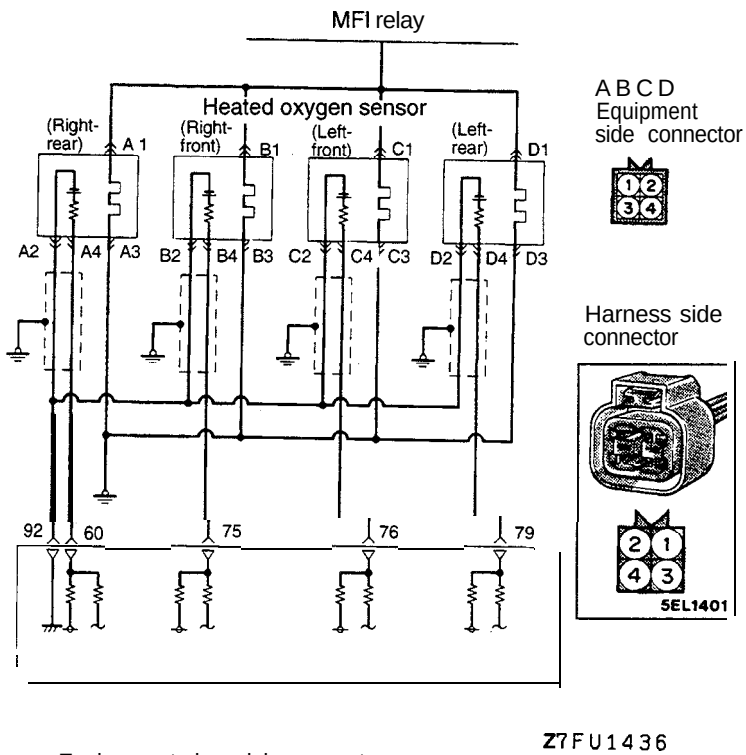
INSTALLATION

Refer to P.13A-143.

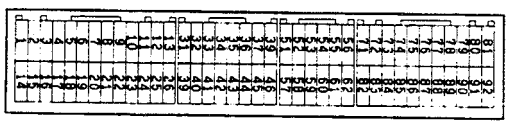
TSB Revision

HEATED OXYGEN SENSOR <California – Turbo Up to 1995 models>





Engine control module connector



Z9FU0393

7FU1643

OPERATION

Refer to P.13A-137.

TROUBLESHOOTING

Refer to P.13A-138.

INSPECTION

Using Scan Tool

<Heated Oxygen Sensor (front)>

Function	item No.	Data display	Check condition	Engine state	Standard value
Data reading	11 39	Sensor detection voltage	Engine Warm-up (Make the mixture lean by engine speed reduction, and rich by racing)	When sudden deceleration from 4,000 rpm	200 mV or lower
				When engine is suddenly raced	600–1,000 mV
			Engine Warm-up (Using the heated oxygen sensor signal, check the air/fuel mixture ratio, and also check the condition of control by the engine control module)	700 rpm (Idling)	400 mV or lower ↔ 600–1,000 mV (changes)
				2,000 rpm	

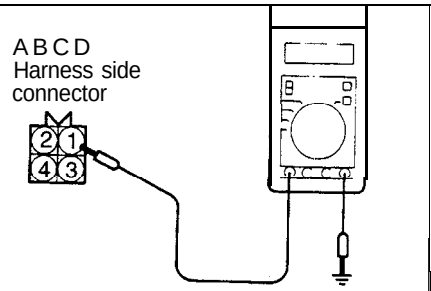
TSB Revision

<Heated Oxygen Sensor (rear)>

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	59 69	Sensor voltage	• Transaxle: 2nd gear • Drive with wide open throttle	3,500 rpm	600 – 1,000 mV

HARNESS INSPECTION

1



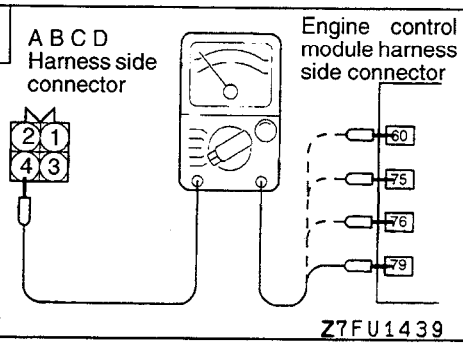
Measure the power supply voltage of the heated oxygen sensor.
- Connector: Disconnected
- Ignition switch: ON

Battery voltage

OK → 2

NG → Repair the harness. (A1, B1, C1, D1 – MFI relay)

2

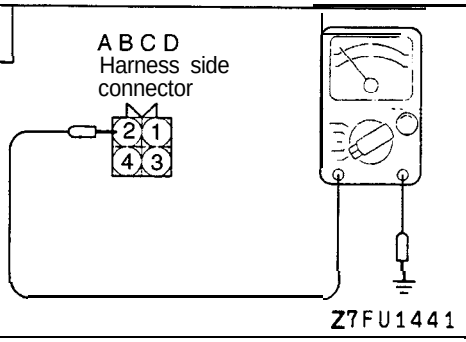


Check for an open-circuit, or a short-circuit to ground, between the engine control module and the heated oxygen sensor
- Heated oxygen sensor connector: Disconnected
- Engine control module connector: Disconnected

OK → 3

NG → Repair the harness. (A4–60) (B4–75) (C4–76) (D4–79)

3



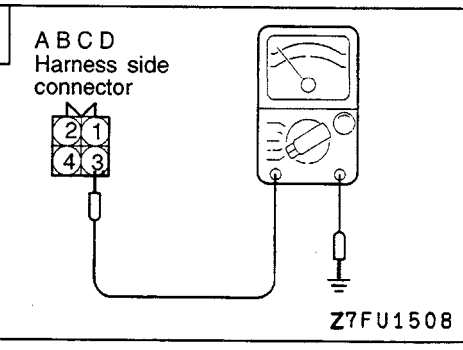
Check for continuity of the ground circuit
- Connector: Disconnected

OK → 4

3

NG → Repair the harness (A2, B2, C2, D2–92)

4



Check for continuity of the ground circuit.
- Connector: Disconnected

OK → STOP

NG → Repair the harness. (A3, B3, C3, D3 – Ground)

TSB Revision

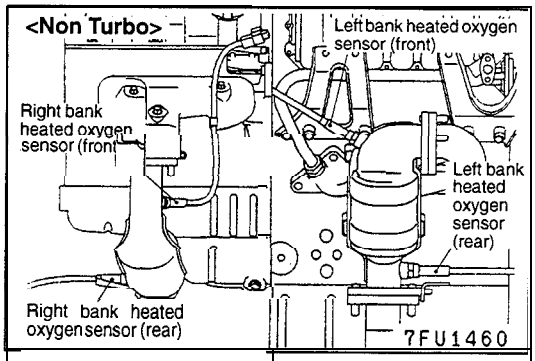
SENSOR INSPECTION

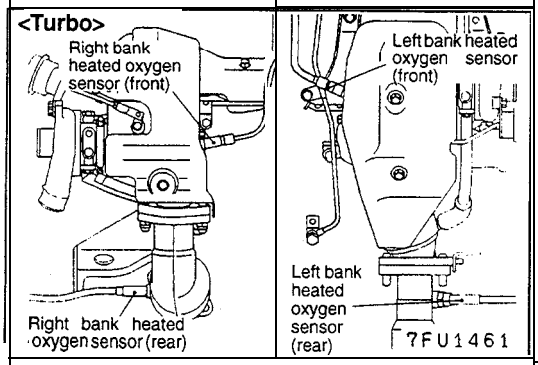
Refer to P.13A-143.

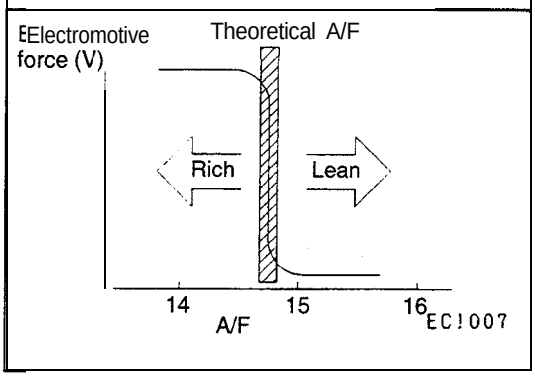
INSTALLATION

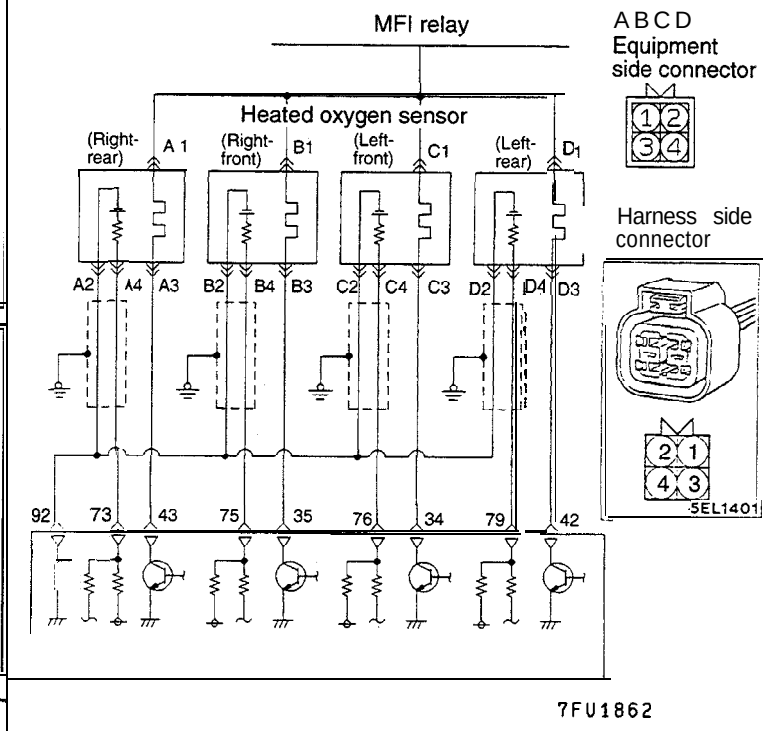
Refer to P.13A-143.

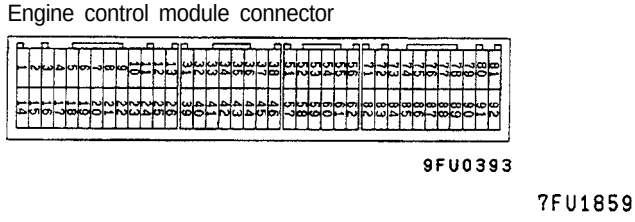
HEATED OXYGEN SENSOR <From 1996 models>











OPERATION

- The heated oxygen sensor senses the oxygen concentration in exhaust gas, converts it into a voltage and inputs it to the engine control module.
- The heated oxygen sensor outputs about **1** V when the air-fuel ratio is richer than the theoretical ratio and outputs about 0 V when the ratio is leaner (higher oxygen concentration in exhaust gas).
- The engine control module controls the fuel injection ratio based on this signal so that the air-fuel ratio may be kept at the theoretical ratio.
- The battery voltage is supplied to the heated oxygen sensor through the MFI relay. Therefore, the sensor element is heated by the heater so that the heated oxygen sensor remains responsive even when the exhaust temperature is low.

TSB Revision

TROUBLESHOOTING HINTS

Hint 1: Poor cleaning of exhaust gas will result if the heated oxygen sensor fails.
Hint 2: If the heated oxygen sensor checked good but the sensor output voltage is out of specification, troubles of parts related to air-fuel raito control system are suspected.

[Examples]
(1) Faulty injector
(2) Air leaking into the intake manifold through gasket gap, etc.
(3) Faulty volume air flow sensor, intake air temperature sensor, barometric pressure sensor, engine coolant temperature sensor

INSPECTION

Using Scan Tool

<Heated oxygen sensor (front)>

Function	item No.	Data display	Check condition	Engine state	Standard value
Data reading	11 39	Sensor detection voltage	Engine Warm-up (Make the mixture lean by engine speed reduction, and rich by racing)	When sudden deceleration from 4,000 rpm	200 mV or lower
				When engine is suddenly raced	600 – 1,000 mV
			Engine: Warm-up (Using the heated oxygen sensor signal, check the air/fuel mixture ratio, and also check the condition of control by the engine control module)	700 rpm (Idling)	400 mV or lower ↔ 600 – 1,000 mV (changes)
				2,500 rpm	

<Heated oxygen sensor (rear)>

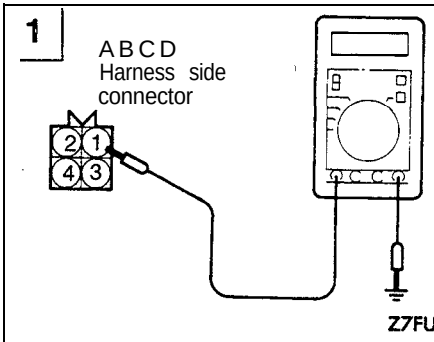
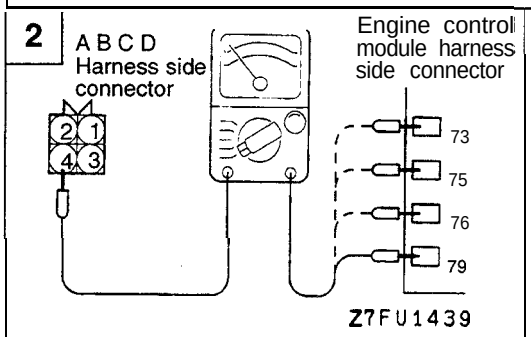
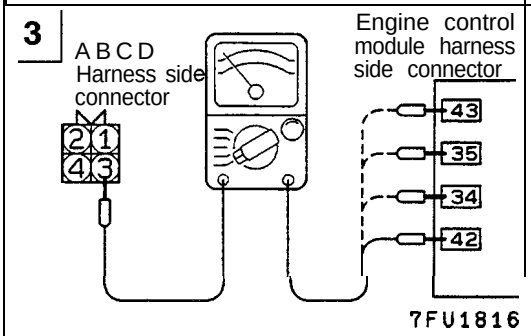
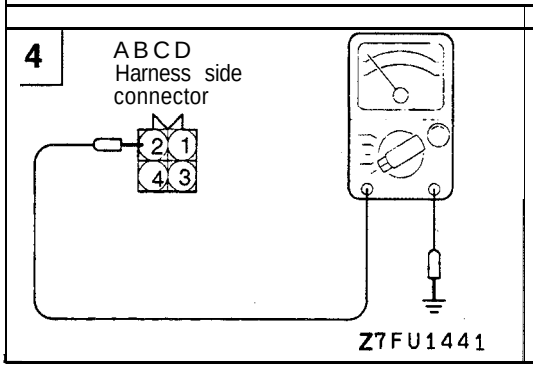
Function	Item No.	Data display	Check condition	Engine condition	Standard value
Data reading	59 69	Sensor voltage	• Transaxle: 2nd gear <M/T>, L range <A/T> • Drive with wide open throttle	3,500 rpm	600 – 1,000 mV

<Heated oxygen sensor (front, rear)>

Function	Item No.	Data display	Check condition	Engine condition	Normal indication
Data reading	48	Heater condition	Engine: Warm-up	750 rpm (Idle)	ON
				5,000 rpm	OFF

TSB Revision

HARNESS INSPECTION

1 	Measure the power supply voltage of be heated oxygen' sensor. • Connector: Disconnected • Ignition switch: ON **Battery voltage**	OK →	2
		NG →	Repair the harness. (A1, B1, C1, D I – MFI relay)
2 	Check for an open-circuit, or a short-circuit to ground, between the engine control moduleand the heated oxygen sensor • Heated oxygen sensor connector: Disconnected • Engine control module connector: Disconnected	OK →	3
		NG →	Repair the harness. (A4–73) (B4–75) (C4–76) (D4–79)
3 	Check for an open-circuit, or a short-circuit to ground, between the engine control module and the heated oxygen sensor. • Heated oxygen sensor connector: Disconnected • Engine control module connector: Disconnected	OK →	4
		NG →	Repair the harness. (A3–43) (B3–35) (C3–34) (D3–42)
4 	Check for continuity of the ground circuit. • Connector: Disconnected	OK →	STOP
		NG →	Repair the harness. (A2, B2, C2, D2–92)

SENSOR INSPECTION

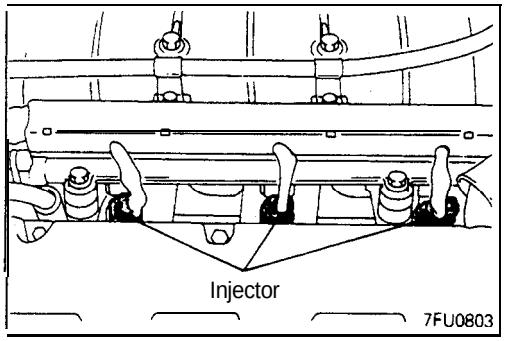
Refer to P.13A-143.

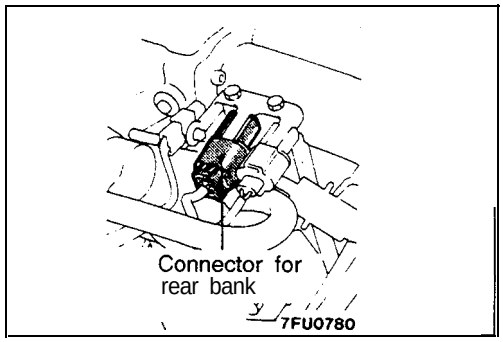
INSTALLATION

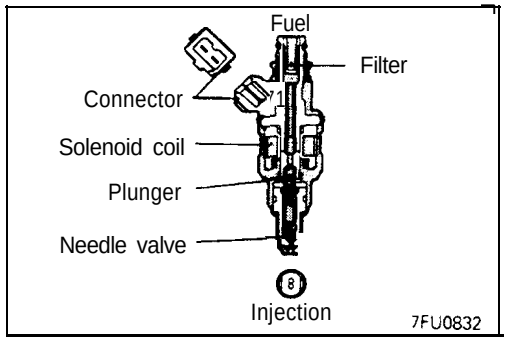
Refer to P.13A-143.

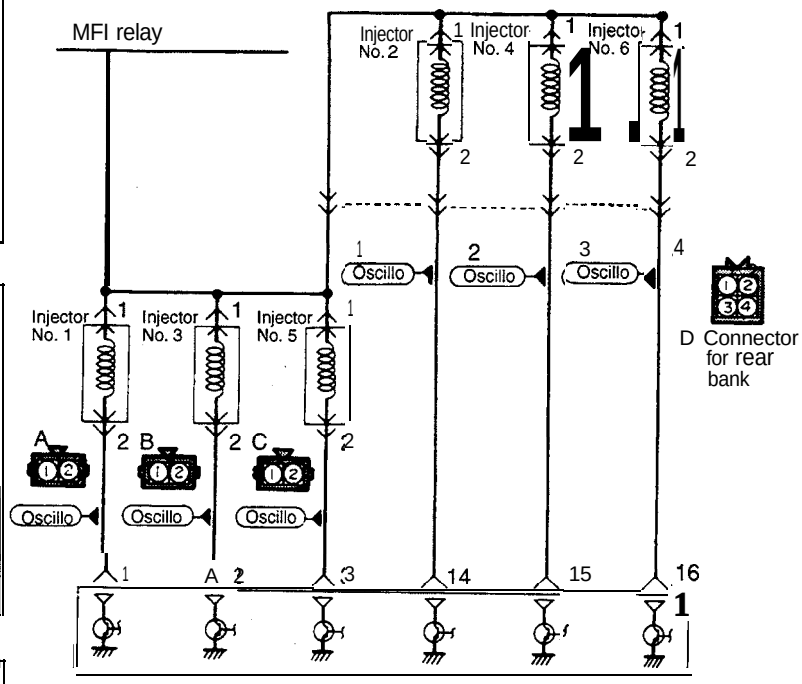
TSB Revision

INJECTORS <Non Turbo>









Z7FU0833

Engine control module connector



Z9FU0393

7FU1644

OPERATION

Refer to P.13A-144.

TROUBLESHOOTING HINTS

Refer to P.13A-145.

TSB Revision

INSPECTION

Using Scan Tool

Function	Item No.	Data display	Check condition	Coolant temperature	Standard value
Data reading	41	Drive time*1	Engine: Cranking	0°C (32°F)*2	12.9–19.3 ms
				20°C (68°F)	36.1–54.1 ms
				80°C (176°F)	8.2-i 2.4 ms

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	41	Drive time*3	• Engine coolant temperature 80 to 95°C (176 to 203°F) • Lights, electric cooling fan, accessory units: All OFF • Transaxle Neutral (P range for vehicle with A/T) • Steering wheel: Neutral	700 rpm (Idle)	2.3-3.5 ms <Up to 1995 models> 2.5-3.7 ms <From 1996 models>
				2,500 rpm	2.0-3.2 ms <Up to 1995 models> 2.2-3.4 ms <From 1996 models>
				When sharp racing is made	To increase

NOTE
*1: The injector drive time refers to when the supply voltage is 11 V and the cranking speed is less than 250 rpm.
*2: When coolant temperature is lower than 0°C (32°F), injection is made by 6 cylinders simultaneously.
*3: When the vehicle is new [within initial operation of about 500 km (300 miles)], the injector drive time may about 10% longer.
*4: From 1996 models

<Long-term fuel trim>*4

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	81	Specified range	Engine: after warming-up	Idling	–12.5–12.5%

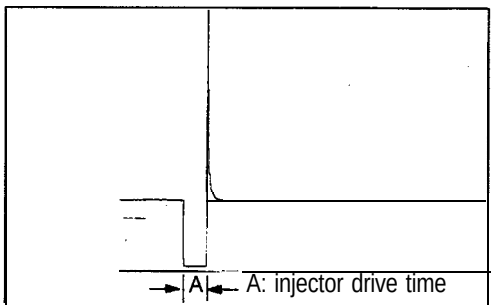
<Short-term fuel trim>*4

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	82	Specified range	Engine: afterwarming-up (during closed-loop control)	No load 2,500 rpm	–17–17%

<Fuel control condition>*4

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	86	Control condition	Engine: after warming-up	2,000 rpm	Closed loop
				Racing	Open loop

Function	Item No.	Drive content	Check condition	Normal state
Actuator test	01	No. 1 injector shut off	Engine: Idling after warm-up (Shut off the injectors in sequence during idling after engine warm-up, check the idling condition)	Idle state to change further (becoming less stable or stalling)
	02	No. 2 injector shut off		
	03	No. 3 injector shut off		
	04	No. 4 injector shut off		
	05	No. 5 injector shut off		
	06	No. 6 injector shut off		



Normal waveform Z03A0209

Using Oscilloscope

(1) Run the engine at idle speed.
(2) Connect the probe to the oscilloscope pick-up point as shown in the circuit diagram, and check the waveform at the drive side of each injector.

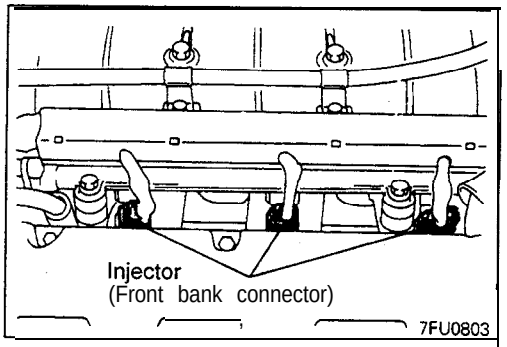
HARNESS INSPECTION

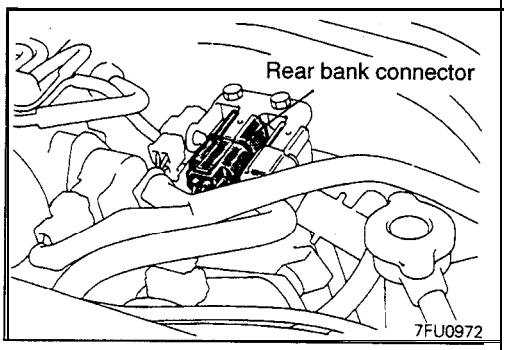
Refer to P.13A-146.

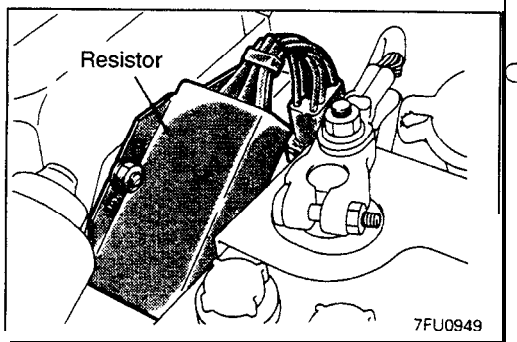
ACTUATOR INSPECTION

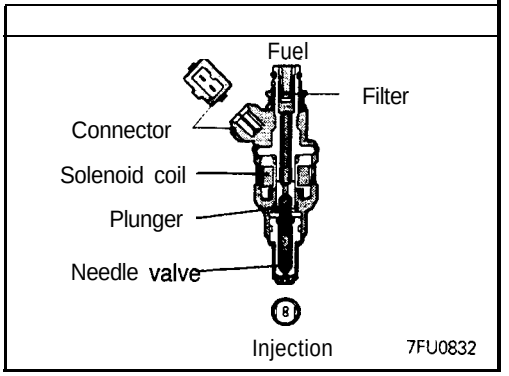
Refer to P.13A-147.

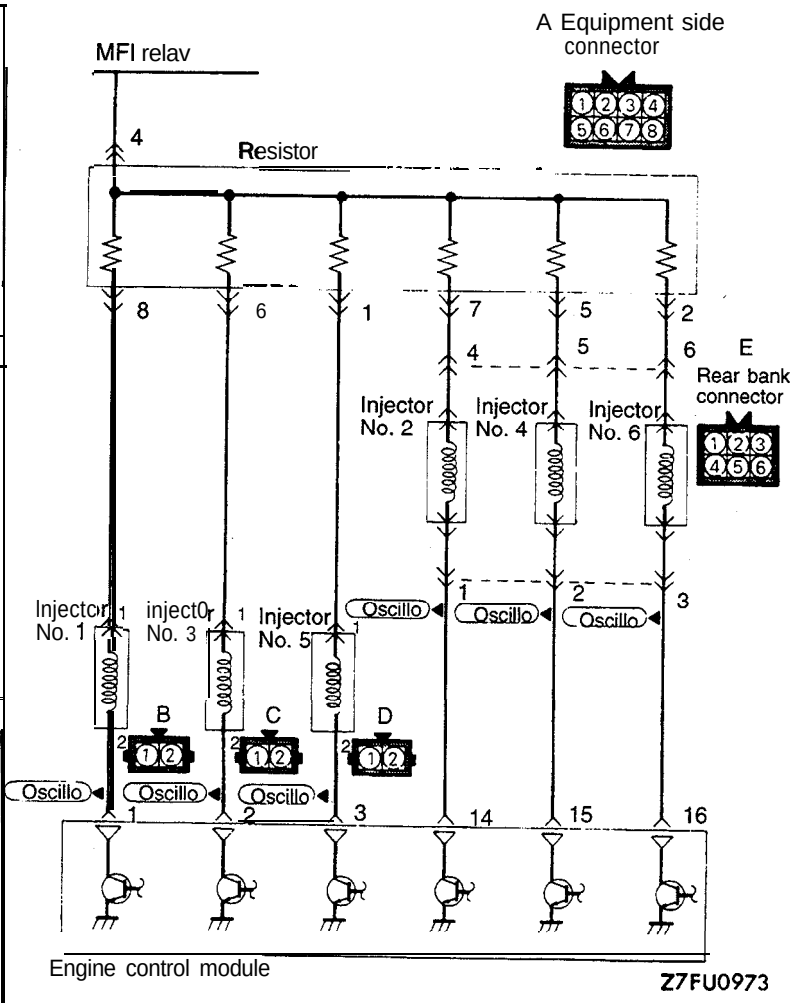
INJECTORS <Turbo>

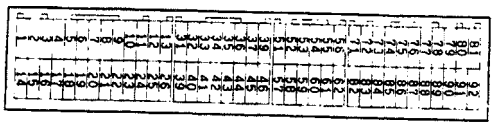












7FU1645

OPERATION

Refer to P.13A-144.

TROUBLESHOOTING HINTS

Refer to P.13A-145.

TSB Revision

INSPECTION

Using Scan Tool

Function	Item No.	Data display	Check condition	Coolant temperature	Standard value
Data reading	41 (Rear bank) 47 (Front bank)	Drive time*1	Engine: Cranking	0°C (32°F)*2	8.4-l 2.6 ms
				20°C (68°F)	23.3-34.9 ms
				80°C (176°F)	5.4-8.2 ms

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	41 (Rear bank) 47 (Front bank)	Drive time*3	• Engine coolant temperature: 80 to 95°C (176 to 203°F) • Lamps, electric cooling fan, accessory units: All OFF • Transaxle: Neutral • Steering wheel: Neutral	700 rpm (Idle)	1.6-2.8 ms <Up to 1995 models> 1.7-2.9 ms <From 1996 models>
				2,500 rpm	1.4-2.6 ms <Up to 1995 models> 1.5-2.7 ms <From 1996 models
				When sharp racing is made	To increase

NOTE
*1: The injector drive time refers to when the supply voltage is 11 V and the cranking speed is less than 250 rpm.
*2: When coolant temperature is lower than 0°C (32°F), injection is made by 6 cylinders simultaneously.
*3: When the vehicle is new within initial operation of about 500 km (300 miles)], the injector drive time may be about 10% longer.
*4: From 1996 models

<Long-term fuel trim>*4

Function	item No.	Data display	Check condition	Engine state	Standard value
Data reading	81	Specified range	Engine: after warming-up	Idling	–12.5–12.5%

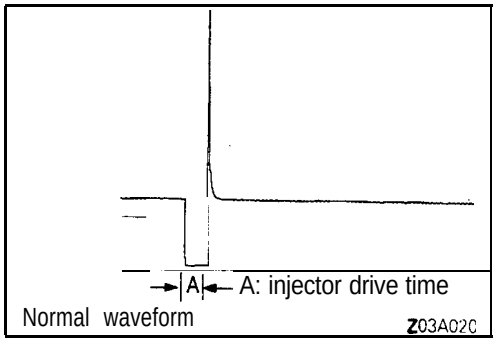
<Short-term fuel trim>*4

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	82	Specified range	Engine: afterwarming-up (during closed-loop control)	No load 2,500 rpm	–17–17%

<Fuel control condition>*4

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	86	Control condition	Engine: after warming-up	2,000 rpm	Closed loop
				Racing	Open loop

Function	Item No.	Drive content	Check condition	Normal state
Actuator test	01	No. 1 injector shut off	Engine: Idling after warm-up (Shut off the injectors in sequence during idling after engine warm-up, check the idling condition)	Idle state to change further (becoming less stable or stalling)
	02	No. 2 injector shut off		
	03	No. 3 injector shut off		
	04	No. 4 injector shut off		
	05	No. 5 injector shut off		
	06	No. 6 injector shut off		



Using Oscilloscope

(1) Run the engine at idle speed.
(2) Connect the probe to the oscilloscope pick-up point as shown in the circuit diagram, and check the waveform at the drive side of each injector.

HARNESS INSPECTION

Refer to P.13A-150.

ACTUATOR INSPECTION

INJECTORS

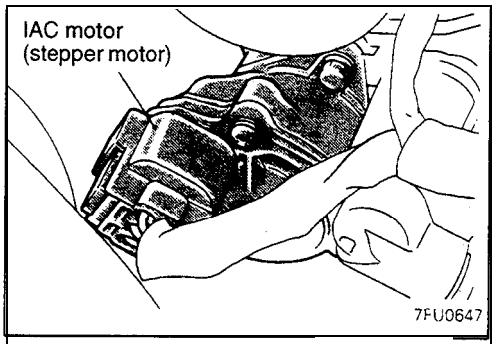
Refer to P.13A-151.

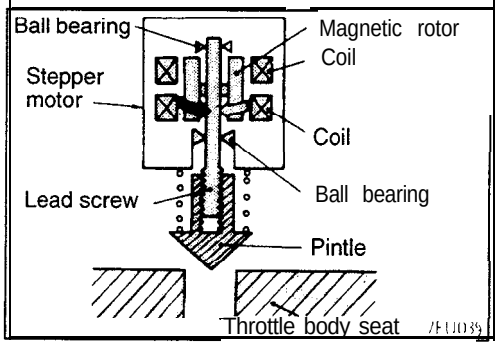
RESISTOR

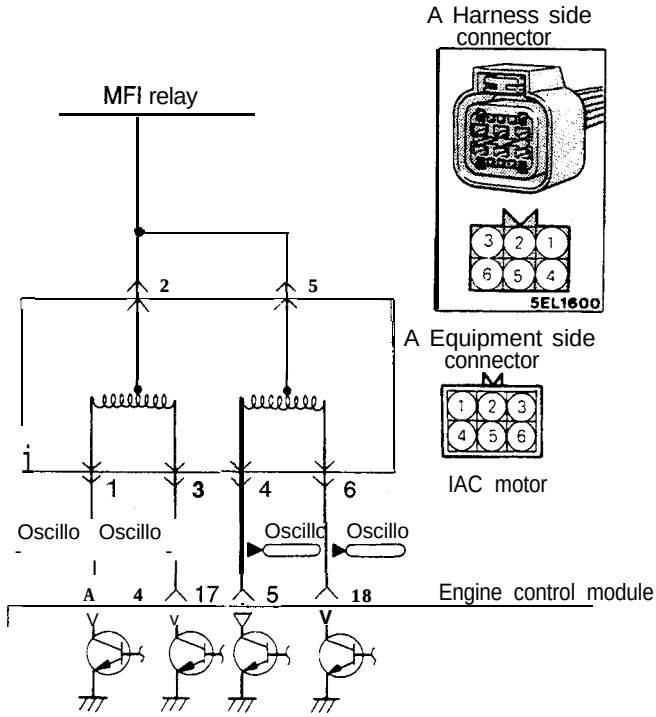
Refer to P.13A-152.

TSB Revision

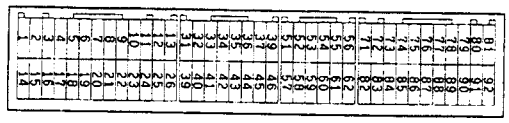
IDLE AIR CONTROL MOTOR (STEPPER MOTOR TYPE)







Engine control module connector



7FU1646

OPERATION

Refer to P.13A-153.

TROUBLESHOOTING HINTS

Refer to P.13A-153.

INSPECTION

Refer to P.13A-154.

HARNESS INSPECTION

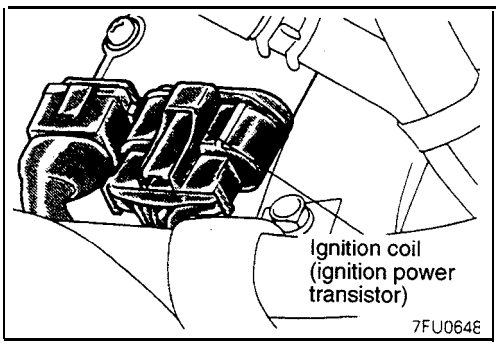
Refer to P.13A-155.

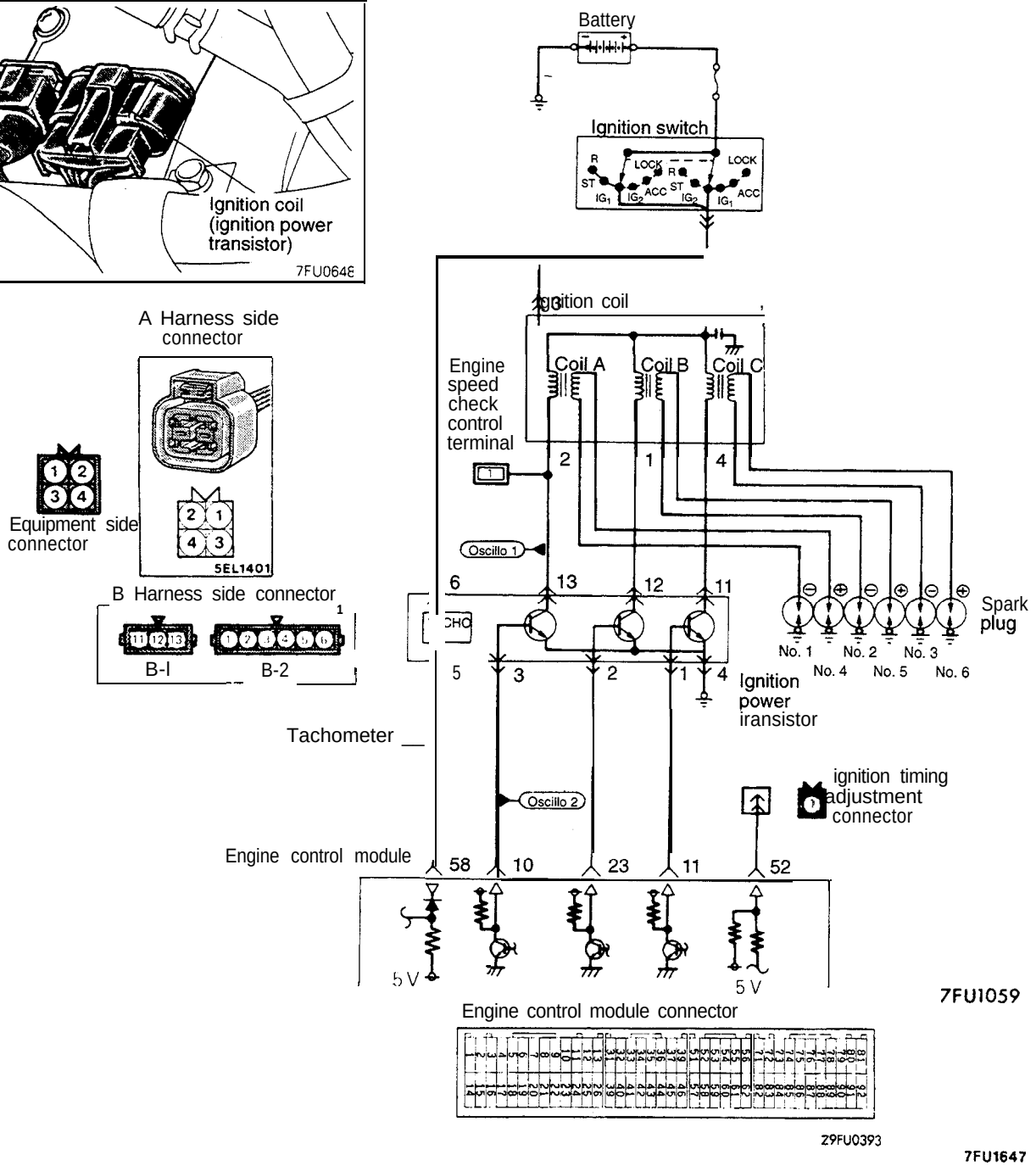
ACTUATOR INSPECTION

Refer to P.13A-155.

TSB Revision

IGNITION COIL AND IGNITION POWER TRANSISTOR





OPERATION

Refer to P.13A-158.

TSB Revision

INSPECTION

Using Scan Tool

<Spark Advance>

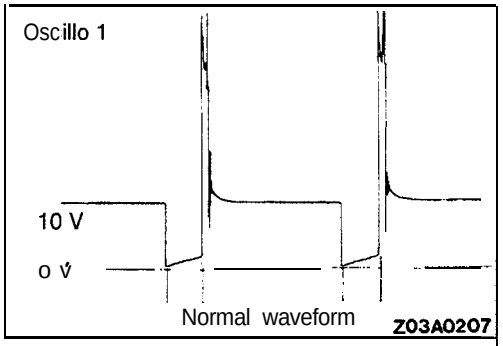
Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	44	Ignition advance	• Engine: Warming up • Timing light: Set (set timing light to check actual ignition timing)	700 rpm (Idle)	7-23" BTDC
				2,000 rpm <Up to 1995 models>	30–50° BTDC <Non Turbo> 23-43" BTDC <Turbo>
				2,500 rpm <From 1996 models>	32–52° BTDC <Non Turbo> 25-45" BTDC <Turbo>

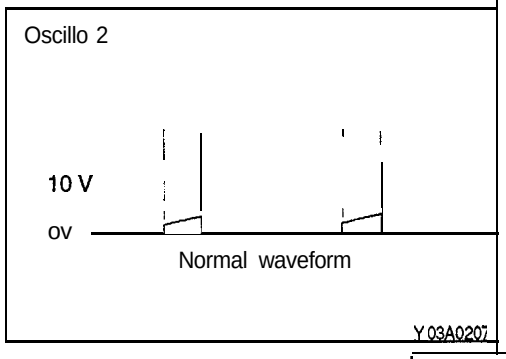
<Ignition Timing Adjustment Mode>

Function	Item No.	Data display	Check condition	Terminal condition	Standard value
Data list	36	Continuity present or not present between ignition timing adjustment terminal and ground	• Engine: Idling	Ignition timing adjustment terminal is grounded	ON
				Ignition timing adjustment terminal is disconnected from ground	OFF

<Standard Ignition Timing>

Function	Item No.	Drive	Check condition	Normal condition
Actuator test	17	Set to ignition timing adjustment mode	• Engine: idling • Timing light: set	5" BTDC





Using Oscilloscope

1. Primary signal of ignition coil
   (1) Run the engine at an idle speed.
   (2) Connect the probe to oscilloscope pick-up point 1 as shown in the circuit diagram, and check the primary signal of the ignition coil.

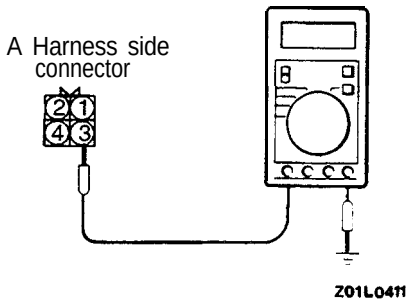
2. Control signal of ignition power transistor

   Connect the probe to oscilloscope pick-up point 2 as shown in the circuit diagram, and check the control signal of the ignition power transistor.

TSB Revision

HARNESS INSPECTION

1



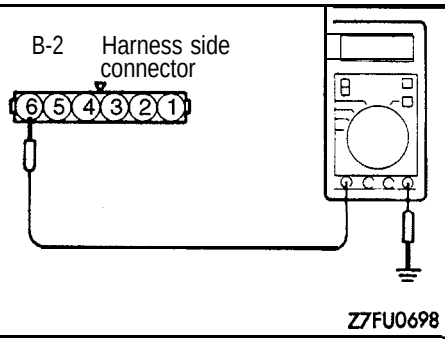
Measure the power supply voltage of the ignition coil.
- Connector: Disconnected
- Ignition switch: ON

Battery voltage

OK → **2**

NG → Repair the harness. (A3 – Ignition switch)

2



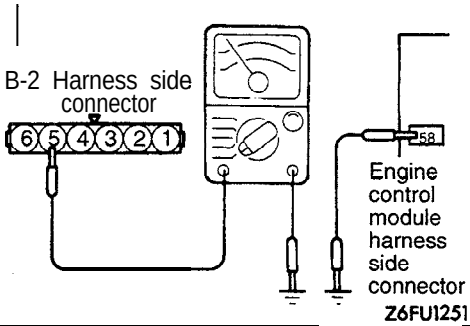
Measure the power supply voltage of the ignition coil.
- Connector: Disconnected
- Ignition switch: ON

Battery voltage

OK → **3**

NG → Repair the harness. (B6 – Ignition switch)

3

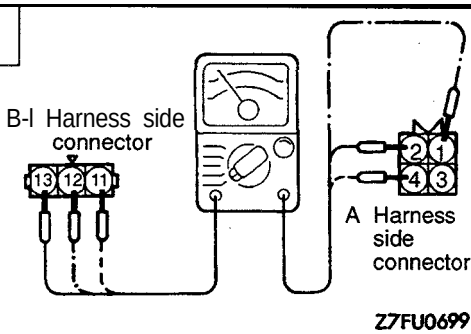


Check for an open-circuit, or a short-circuit to ground between the engine control unit and the ignition power transistor.
- Engine control module connector: Disconnected
- Ignition power transistor connector: Disconnected

OK → **4**

NG → Repair the harness. (B5–58)

4

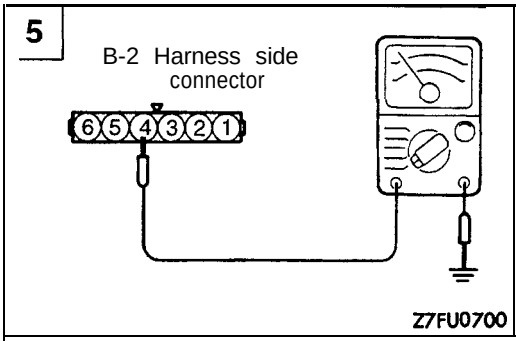
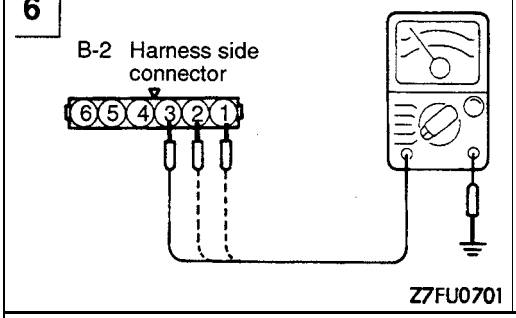
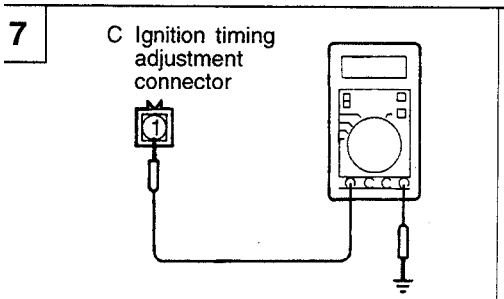


Check for an open-circuit, or a short-circuit to ground between the ignition power transistor and the ignition coil.
- Ignition coil connector: Disconnected
- Ignition power transistor connector: Disconnected

OK → **5**

NG → Repair the harness. (A2–B13) (A1–B12) (A4–B11)

TSB Revision

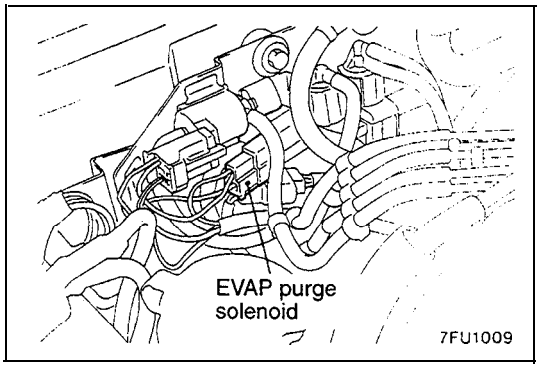
5 	Check for continuity of the ground circuit. • Connector: Disconnected	OK →	6
		NG →	Repair the harness. (B4 – Ground)
6 	Measure the voltage of the control signal circuit of the ignition power transistor. • Connector: Disconnected • Ignition switch: START 0.5-4.0 v	OK →	7
		NG →	Repair the harness. (B3–10) (B2–23) (B1–11)
7 	Measure the voltage of the ignition timing adjustment terminal. • Ignition switch: ON **4.0–5.2 V**	OK →	STOP
		NG →	Repair the harness. (C1–52)

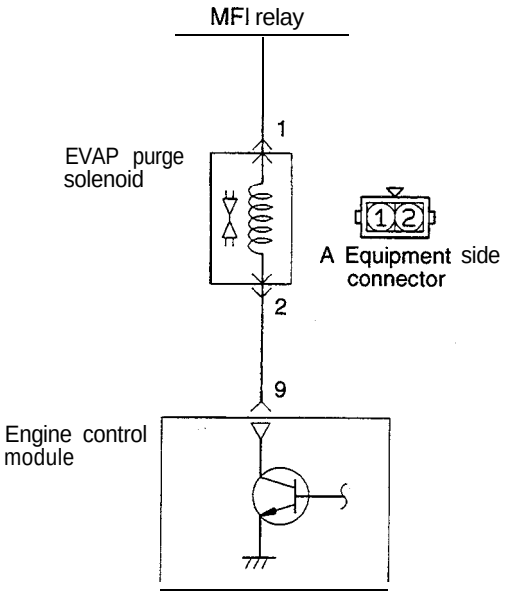
ACTUATOR INSPECTION

Refer to GROUP 16 – ignition System.

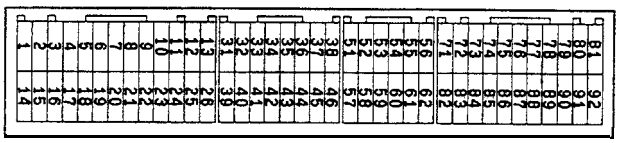
TSB Revision

EVAPORATIVE EMISSION PURGE SOLENOID





Engine control module connector



7FU1850

OPERATION

Refer to P.13A-162.

INSPECTION

Refer to P.13A-162.

HARNESS INSPECTION

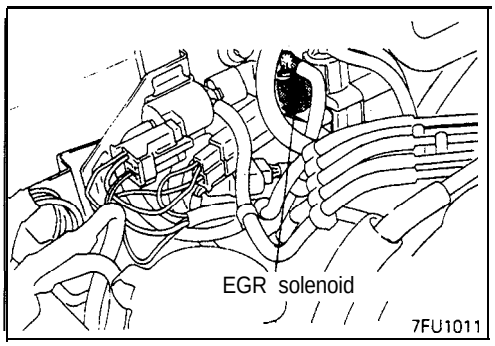
Refer to P.13A-163.

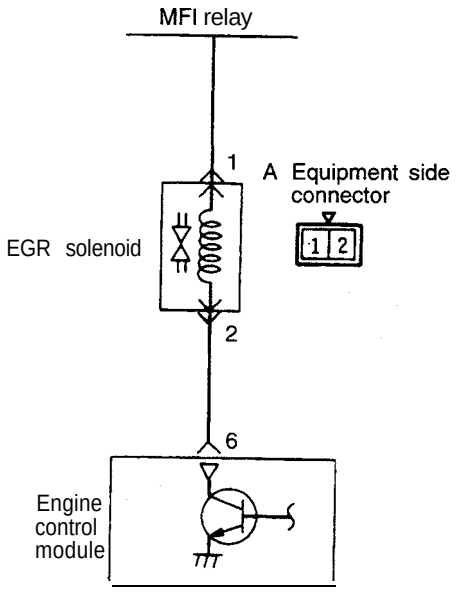
ACTUATOR INSPECTION

Refer to GROUP 17 – Evaporative Emission Control System.

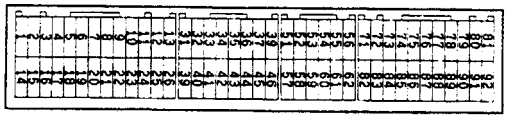
TSB Revision

EGR SOLENOID





Engine control module connector



OPERATION

Refer to P.13A-164.

TROUBLESHOOTING HINT

Refer to P.13A-164.

INSPECTION

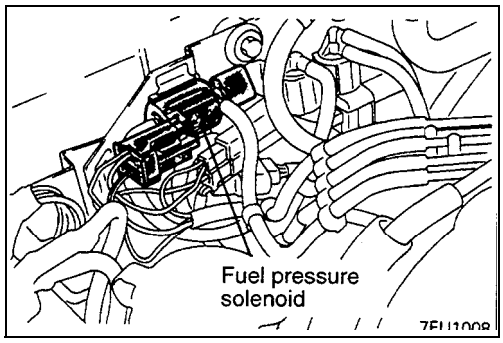
Refer to P.13A-165.

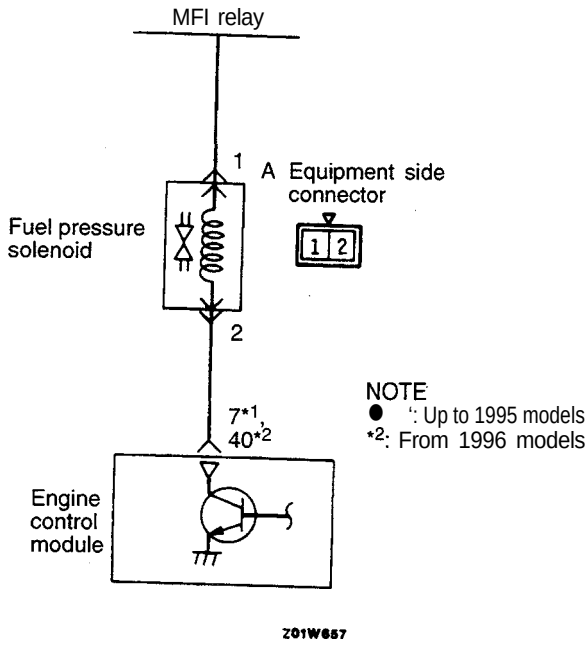
HARNESS INSPECTION

Refer to P.13A-165.

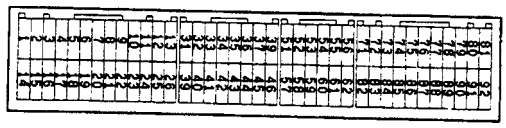
TSB Revision

FUEL PRESSURE SOLENOID <Turbo>





Engine control module connector



Z9FU0393

7FU1650

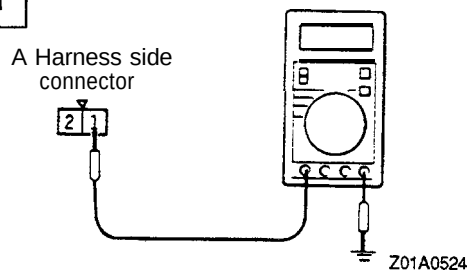
OPERATION

Refer to P.13A-166.

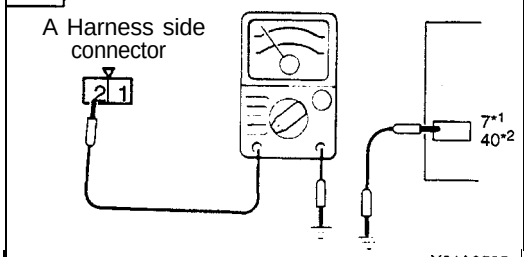
INSPECTION

Refer to P.13A-167.

HARNESS INSPECTION

1  	Measure the power supply voltage • Connector: Disconnected • Ignition switch: ON **Battery voltage** OK → 2 NG → Repair the harness. (AI – MFI relay)

TSB Revision

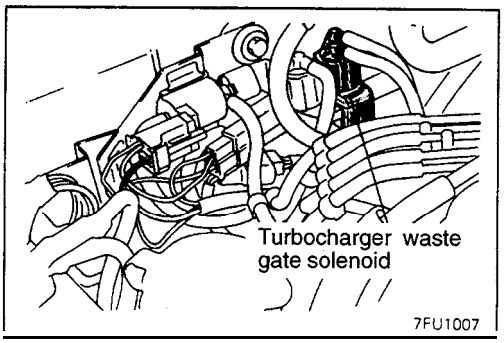
2	Engine control module harness side connector A Harness side connector  Y01A0525	Check for an open-circuit, or a short-circuit to ground, between the fuel pressure solenoid and the engine control module. • Engine control module connector: Disconnected • Fuel pressure solenoid connector: Disconnected	OK → A STOP NG → Repair the harness. (A2–7*1, 40*2)

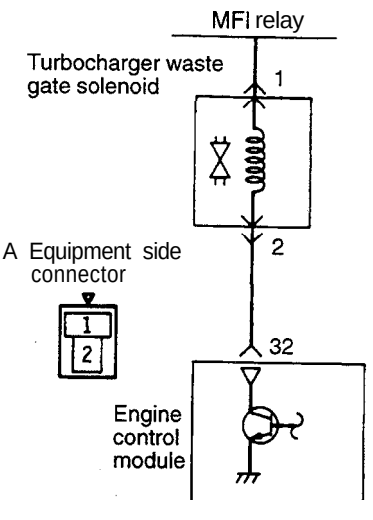
NOTE
*1: Up to 1995 models
*2: From 1996 models

ACTUATOR INSPECTION

Refer to P.13A-168.

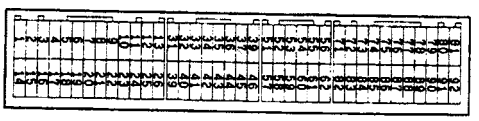
TURBOCHARGER WASTE GATE SOLENOID <Turbo>





Z01A0324

Engine control module connector



Z9FU0393

7FU1651

TSB Revision

OPERATION

Refer to P.13A-169.

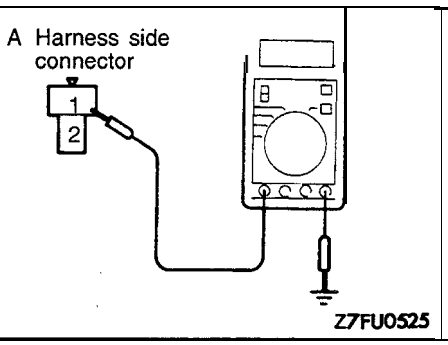
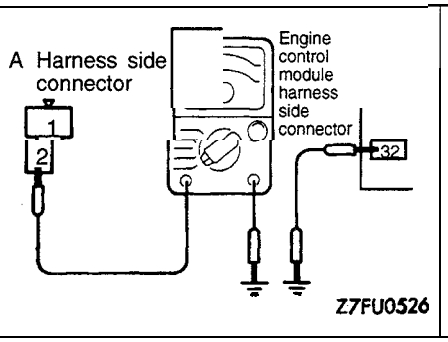
TROUBLESHOOTING HINTS

Refer to P.13A-169.

INSPECTION

Refer to P.13A-170.

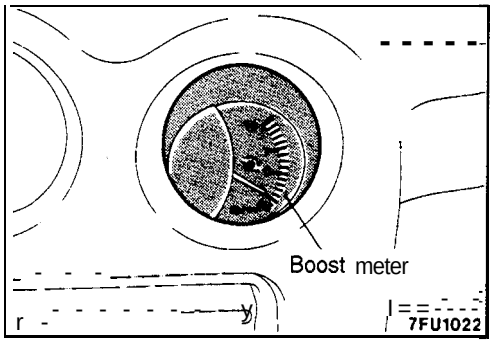
HARNESS INSPECTION

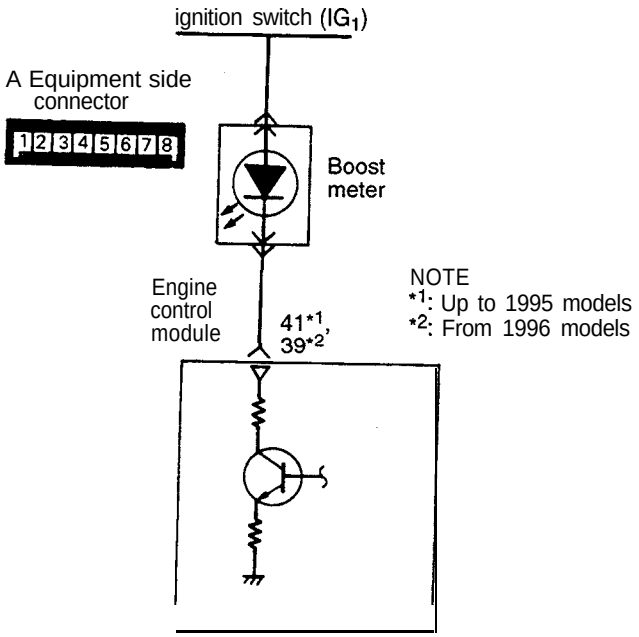
1		Measure the power supply voltage. • Connector: Disconnected • Ignition switch: ON **Battery voltage**	OK → 2 NG → Repair the harness. (A1 – MFI relay)
2		Check for an open-circuit, or a short-circuit to ground, between the turbocharger waste gate solenoid and the engine control module. • Turbocharger waste gate solenoid connector: Disconnected • Engine control module connector: Disconnected	OK → A STOP NG → Repair the harness. (A2–32)

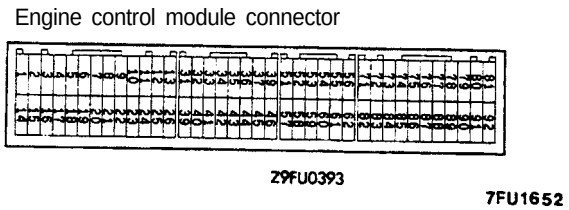
ACTUATOR INSPECTION

Refer to GROUP 15.

BOOST METER <Turbo>



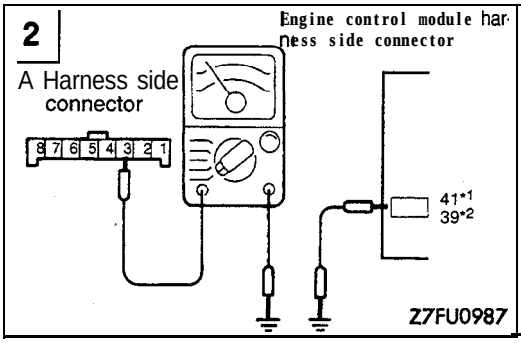




HARNESS INSPECTION

1 A Harness side connector 8 7 6 5 4 3 2 1 Z7FU0986	Measure the power supply voltage. • Connector: Disconnected • Ignition switch: ON **Battery voltage**	OK → 2 NO → Repair the harness. (A2 – Ignition coil [IG])

TSB Revision

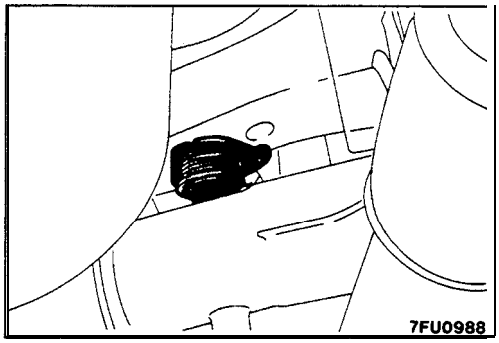
2  	Check for an open-circuit or a short-circuit to ground, between the engine control module and the boost meter. • Boost meter connector: Disconnected • Engine control module connector: Disconnected	OK →	STOP
		OK →	Repair the harness. (A3–41*1, 39*2)

NOTE
*1: Up to 1995 models
*2: From 1996 models

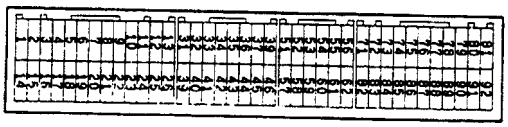
ACTUATOR INSPECTION

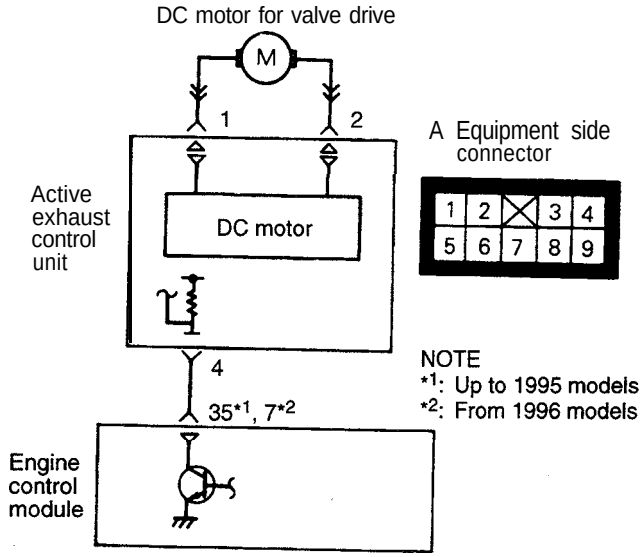
Refer to GROUP 54.

ACTIVE EXHAUST CONTROL UNIT <Turbo>



Engine control module connector





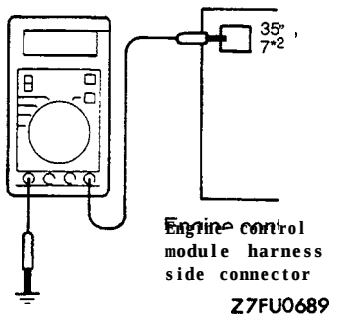
7FU1653

TSB Revision

OPERATION

Refer to P.13A-173.

HARNESS INSPECTION

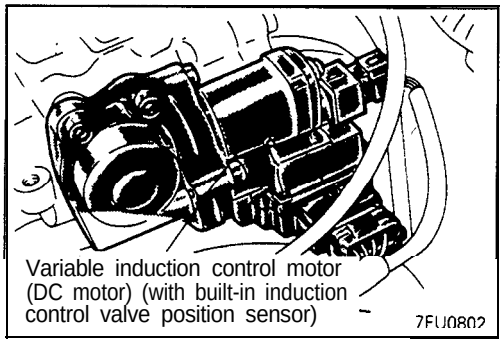
1		Measure the input voltage of engine control module. ● Engine control module connector: Disconnected ● Ignition switch: ON **Battery voltage**	@ - 	- A Repair the harness. (A4–35*1, 7*2)

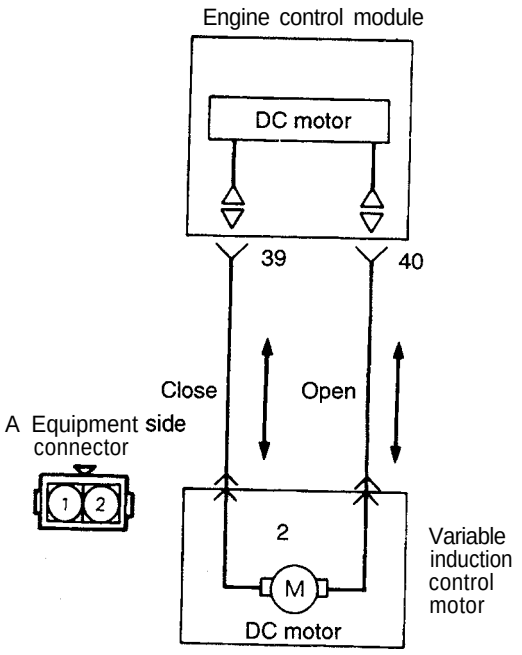
NOTE
*1: Up to 1995 models
*2: From 1996 models

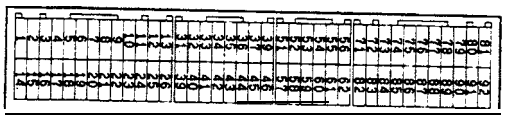
ACTUATOR INSPECTION

Refer to GROUP 15.

VARIABLE INDUCTION CONTROL MOTOR (DC MOTOR) <Non Turbo>







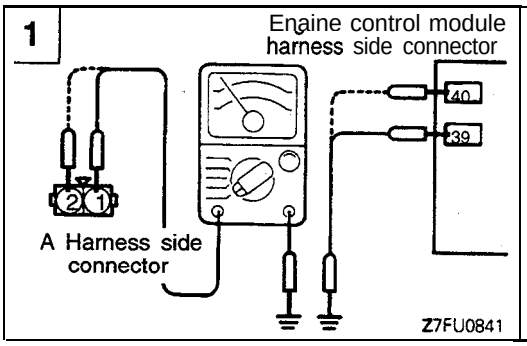
OPERATION

Refer to P.13A-174.

INSPECTION

Refer to P.13A-174.

HARNESS INSPECTION



Check for an open-circuit or a short-circuit to ground, between the engine control module and the variable induction control motor connector.

- Variable induction control motor connector: Disconnected
- Engine control module connector: Disconnected

OK → STOP

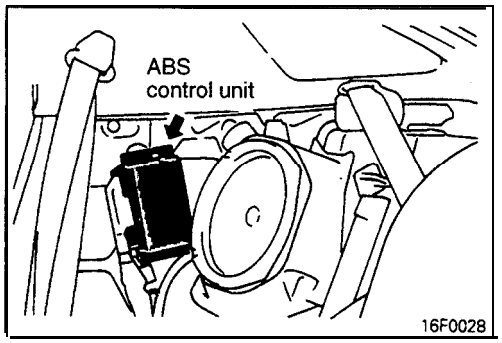
NG → Repair the harness. (A1–39) (A2–40)

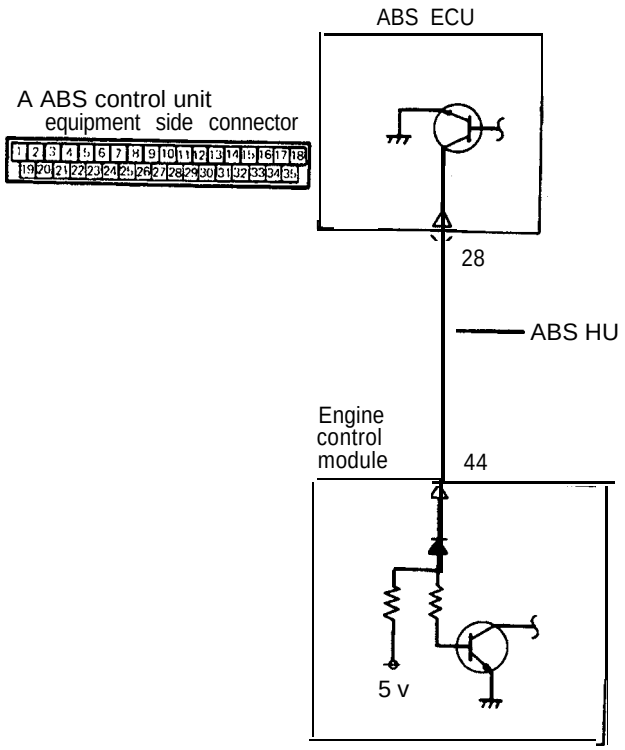
ACTUATOR INSPECTION

Refer to GROUP **15.**

TSB Revision

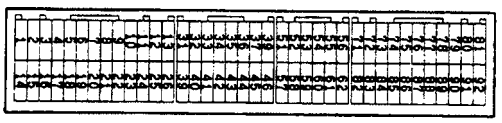
ANTI-LOCK BRAKING SIGNAL <Turbo>





Z6FU1542

Engine control module connector



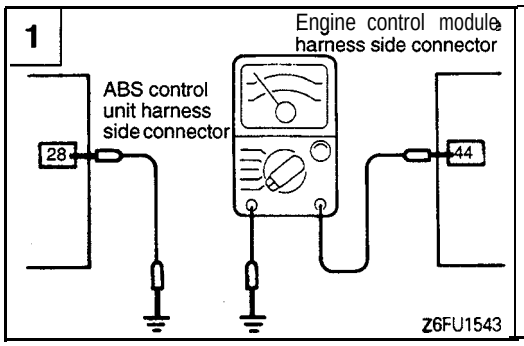
Z9FU0393

7FU1655

OPERATION

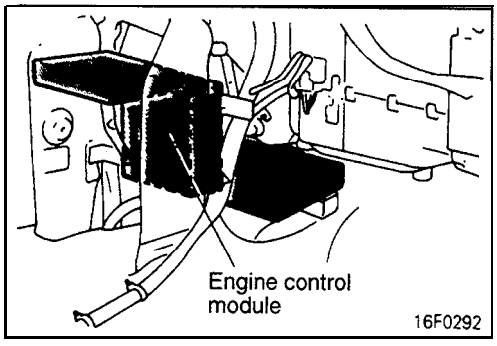
Refer to P.13A-176.

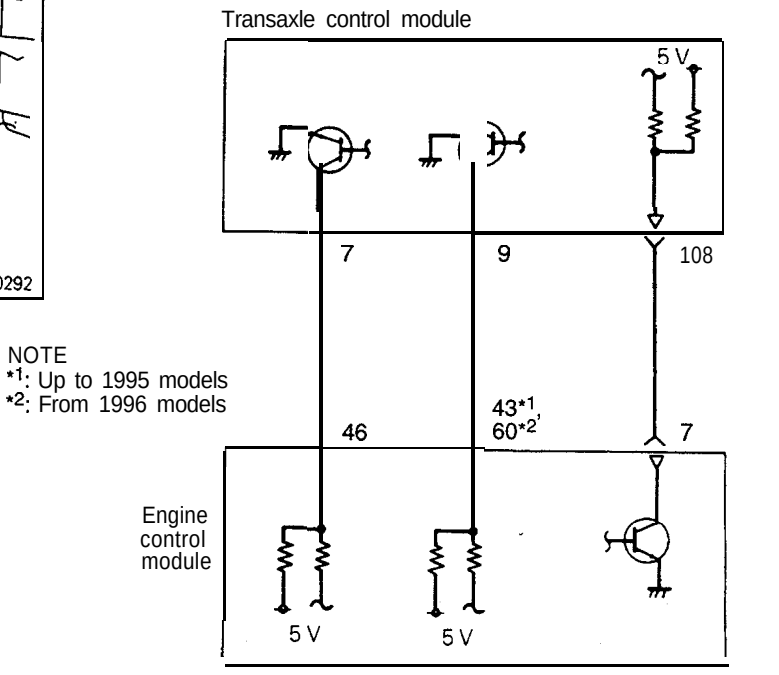
HARNESS INSPECTION

1  Z6FU1543	Check for an open-circuit or a short-circuit to ground, between the ABS control unit and the engine control module. • ABS control unit connector: Disconnected • Engine control module connector: Disconnected	@ - - A OK → Repair the harness. (A28–44)

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ENGINE AND TRANSAXLE TOTAL CONTROL SIGNAL <A/T>

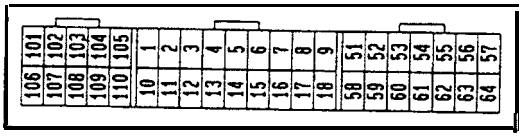




NOTE
*1: Up to 1995 models
*2: From 1996 models

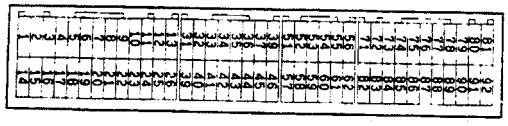
Z7FU0843

A Transaxle control module connector



Z7FU0903

Engine control module connector



Z9FU0393

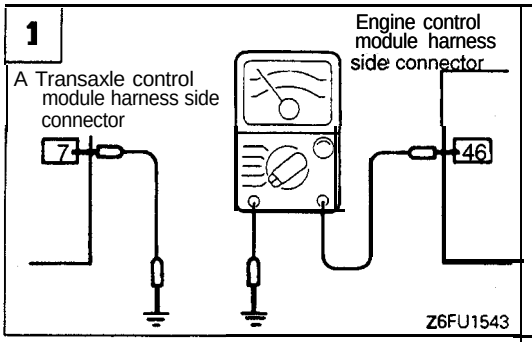
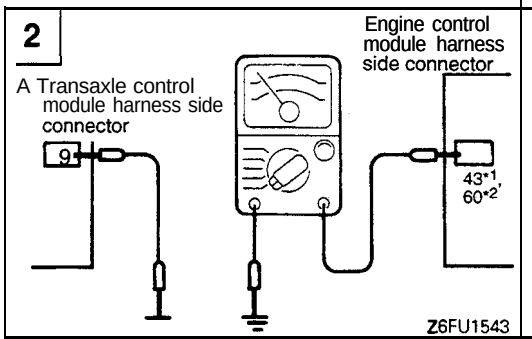
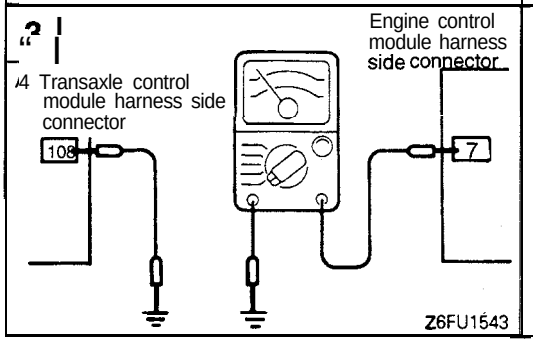
7FU1656

OPERATION

Refer to P.13A-177

TSB Revision

HARNESS INSPECTION

1  	Check for an open-circuit, or a short-circuit to ground between the transaxle control module and the engine control module. • Transaxle control module connector: Disconnected • Engine control module connector: Disconnected	OK → 2 NG → Repair the harness. (A7–46)
2  	Check for an open-circuit, or a short-circuit to ground between the transaxle control module and the engine control module. • Transaxle control module connector: Disconnected • Engine control module connector: Disconnected	OK → 3 NG → Repair the harness. (A9–43*1, 60*2)
3  	Check for an open-circuit, or a short-circuit to ground between the transaxle control module and the engine control module. • Transaxle control module connector: Disconnected • Engine control module connector: Disconnected	OK → STOP NG → Repair the harness. (AI 08-7)

NOTE
*1: Up to 1995 models
● 2: From 1996 models

RELEASE OF RESIDUAL PRESSURE FROM HIGH PRESSURE FUEL HOSE

Refer to P.13A-179.

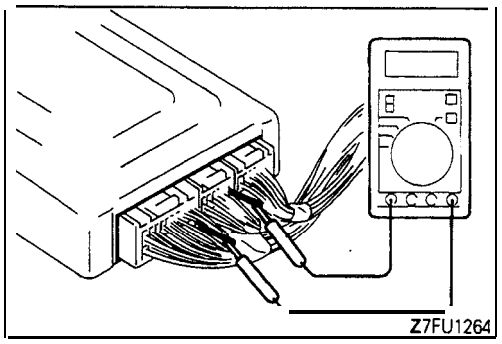
FUEL PUMP OPERATION CHECK

Refer to P.13A-179.

FUEL PRESSURE TEST

Refer to P.13A-180.

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ENGINE CONTROL MODULE (ECM) TERMINAL VOLTAGE INSPECTION

(1) Connect a very thin wire probe (such as a paper clip) to the probe of the voltmeter.
(2) Insert the very thin probe from the wire side into contact with each of the terminals of the ECM connector and check the voltage, while referring to the check chart.

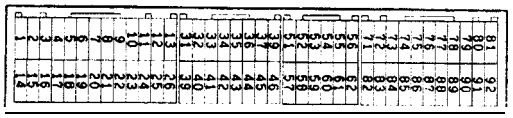
NOTE
1. Measure a voltage with the ECM connector connected.
2. Measure the voltage between each terminal and the No. 26 terminal (ground terminal).
3. Withdraw the ECM for easier access to the connector terminals.
4. The inspection need not be performed in the order of the chart.

Caution
Short-circuiting the positive (+) probe between a connector terminal and ground could cause damage to the vehicle wiring, sensors or ECM, or all of them. Use care to prevent it!

(3) If the voltmeter shows any deviation from the standard value, check the corresponding sensor, actuator and related electrical wiring, then repair or replace.
(4) After repair or replacement, recheck with the voltmeter to confirm that the problem has cleared completely.

TERMINAL VOLTAGE CHECK CHART

Engine Control Module Connector Terminal Configuration



Z9FU0393

Terminal No.	Check point	Check conditions (Engine conditions)	Standard value	Remarks
80	Back-up power supply	Ignition switch: OFF	B+	–
12	power supply	Ignition switch: ON	B+	–
25				
82	Ignition switch: IG	Ignition switch: ON	B+	–
38	MFI relay (power supply)	Ignition switch: OFF	B+	–
		Ignition switch: ON	0–3 V	
8	MFI relay (fuel pump)	Ignition switch: ON	B+	–
		Engine: Idle	0–3 V	
81	Sensor impressed voltage	Ignition switch: ON	4.5–5.5 V	–

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Terminal No.	Check point	Check conditions (Engine conditions)		Standard value	Remarks
90	Volume air flow sensor	Engine: Idle		2.2-3.2 V	–
		Engine: 2,000 rpm			
19	Volume air flow sensor reset signal	Engine: Idle		o-1 v	–
		Engine: 3,000 rpm		6-9 V	
72	Intake air temperature sensor	ignition switch: ON	When intake temperature is 0°C (32°F)	3.2-3.8 V	–
			When intake temperature is 20°C (68°F)	2.3-2.9 V	
			When intake temperature is 40°C (104°F)	1.5-2.1 V	–
			When intake temperature is 80°C (176°F)	0- 10 V	
85	Barometric pressure sensor	Ignition switch: ON	When altitude is 0 m (0 ft.)	3.7-4.3 V	–
			When altitude is 1,200 m (3,937 ft.)	3.2-3.8 V	
83	Water temperature sensor	Ignition switch: ON	When water temperature is 0°C (32°F)	3.2-3.8 V	–
			When water temperature is 20°C (68°F)	2.3-2.9 V	
			When water temperature is 40°C (104°F)	1.3–1.9 V	–
			When water temperature is 80°C (176°F)	0.3-0.9 V	
84	Throttle position sensor	Ignition-switch: Kept in ON state for more than 15 seconds	Idle	0.3–1.0 v	–
			Wide open throttle	4.5-5.5 v	
87	Closed throttle position switch	Ignition switch: ON	Throttle valve placed in idle position	O-l V	–
			Throttle valve placed in slightly opened position	4 V or more	
88	Camshaft position sensor	Engine: Cranked		0.2-3.0 V	–
		Engine: Idle			
89	Crankshaft position sensor	Engine: Cranked		0.2-3.0 V	–
		Engine: Idle			
71	Ignition Switch – ST	Engine: Cranked		8 V or more	M/T
91	Park/Neutral position switch	Ignition switch: ON	Selector lever set to P or N	o-3 v	A/T
			Selector lever set to D, 2, L or R	8-14 V	

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Terminal No.	Check point	Check conditions (Engine conditions)		Standard value	Remarks
86	Vehicle speed sensor	• Ignition switch: ON • Move the vehicle slowly forward		0 ↔ 5 V (Changes repeated)	–
37	Power steering pressure switch	Engine: Idle, warm	Steering wheel placed in neutral (straight ahead) position	B+	
			Steering wheel turned half a turn	O-3 V	
45	Air conditioning switch 1	Engine: Idle	Air conditioning switch set to OFF	O-3 V	
			Air conditioning switch set to ON (Air conditioning compressor in driven state)	B+	
59 <Turbo, Non-Turbo up to 1995 models> 61 <Non-Turbo From 1996 models>	Air conditioning switch 2	Engine: Idle	Air conditioning switch set to OFF	O-3 V	
			• Air conditioning switch set to ON • Indoor set temperature brought closer to atmospheric temperature	B+	
22	Air conditioning relay	• Engine: Idle • Air conditioning switch: OFF → ON (Air compressor in driven state)		B+ or 6 V or more for a moment → O-3 V	–
21	Fan motor relay (Lo)	Radiator fan not operating [Coolant temperature: below 90°C (194°F)]		B+	–
		Radiator fan operating at low speeds [Coolant temperature: 95–105°C (203-221 "F)]		o-3 v	
20	Fan motor relay (Hi)	Radiator fan not operating [Coolant temperature: below 90°C (194°F)]		B+	
		Radiator fan operating at high speeds [Coolant temperature: above 105°C (221 °F)]		o-3 v	
24 <Up to 1995 models> 58 <From 1996 models>	Electric load switch	Engine: Running at idle	Lighting switch set to OFF	o-3 v	
			Lighting switch set to ON	B+	
75 76	Heated oxygen sensor(front)	Engine: Warm, 2,000 rpm (Check using a digital type voltmeter.)		0 ↔ 0.8 V (Changes repeatedly)	–

TSB Revision

Terminal No.	Check point	Check conditions (Engine conditions)	Standard value	Remarks
60 <Up to 1995 models> 73, 79 <From 1996 models>	Heated oxygen sensor (rear)	• Transaxle: 2nd gear <M/T>, L range <A/T> • Drive with wide open throttle • Engine 3,500 rpm or more	0.6–1.0 V	<California, Federal - from 1996 models>
1	No. 1 injector	Engine: Running at idle after warmup, and accelerated abruptly by depressing accelerator pedal	Falls temporarily a little from 11-14 V.	–
14	No. 2 injector			
2	No. 3 injector			
15	No. 4 injector			
3	No. 5 injector			
16	No. 6 injector			
4	Stepper motor coil <A1>	Engine: Warm Check immediately after hot restart.	B+ ↔ 0–3 V (Changed repeated)	–
17	Stepper motor coil <A2>			
5	Stepper motor coil <B1>			
18	Stepper motor coil <B2>			
10	Ignition power transistor unit A	Engine speed: 3,000 rpm	0.3-3 v	–
23	Ignition power transistor unit B			
11	Ignition power transistor unit C			
9	Evaporative emission purge solenoid	Ignition switch: ON	B+	
		Engine: Warm, 3,000 rpm	o-3 v	
7 cup to 1995 models> 40 <From 1996 models>	Fuel pressure solenoid	Ignition switch: ON	B+	Turbo
		Engine: From cranking to idling (within approx. 2 minutes)	O-3 V → B+	
32	Turbocharger waste gate solenoid	Ignition switch: ON	B+	Turbo
		Engine: Idle (when the premium gasoline is used)	O-3 V	
41 <Up to 1995 models> 39 <From 1996 models>	Turbo meter	Ignition switch: ON	4-13 v	Turbo
		Engine: Depress the accelerator pedal abruptly while the engine is idling	Falls temporarily from B+	

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Terminal No.	Check point	Check conditions (Engine conditions)		Standard value	Remarks
31	Fuel pump relay 2	Engine: Depress the accelerator pedal abruptly while the engine is idling		Rises temporarily from 0–3 V	Turbo
58 <Up to 1995 models> 51 <From 1996 models>	Engine ignition signal	Engine: 3,000 rpm		0.3–3 V	–
35 <Up to 1995 models> 7 <From 1996 models>	Valve opened or closed indication signal	Muffler mode change-over switch: ON	Engine: Idle	0–3 V	Turbo
			Engine: 4,500 rpm	B+	
34 <Up to 1995 models> 61 <From 1996 models>	Muffler mode change-over switch	Ignition switch: ON	Changeover switch set to ON (TOUR)	O-3 V	Turbo
			Changeover switch set to OFF (SPORT)	B+	
52	Ignition timing adjustment terminal	Ignition switch: ON	Ignition timing adjustment terminal connected to ground	O-l V	–
			Ignition timing adjustment terminal disconnected from ground	4.0-5.5 V	
36	Check engine/malfunction indicator lamp	Ignition switch: OFF → ON		0–3 V → 9-13 v (Several seconds later)	–
6	EGR solenoid	Ignition switch: ON		B+	<up to 1995: California – Non Turbo, Turbo> <From 1996: All models>
		Engine: Idle Suddenly depress the accelerator pedal		Falls temporarily from B+.	
73 <Up to 1995 models>	EGR temperature sensor	Ignition switch: ON	When sensor temperature is 50°C (122°F)	3.6-4.4 V	California, Federal – Turbo
			When sensor temperature is 100°C (212°F)	2.2-3.0 V	
74, 77 <Up to 1995 models> 34, 35, 42, 43 <From 1996 models>	Oxygen sensor heater	Engine: Idle, warm		o-3 v	<Up to 1995: California – Non Turbo> <From 1996: All models>
		Engine: 5,000 rpm		B+	

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Terminal No.	Check point	Check conditions (Engine conditions)	Standard value	Remarks
41 <Up to 1995 models> 54 <From 1996 models>	Induction control valve position sensor No. 1	Ignition switch: ON	O-l V or 4.5-5.5 v	Non Turbo
		Engine: Slowly accelerated from idling speed to 5,000 rpm	O-l V or 4.5-5.5 v → 1.5–4 v (for a moment)	
33 <Up to 1995 models> 55 <From 1996 models>	Induction control valve position sensor No. 2	Ignition switch: ON	O-l V or 4.5-5.5 v	Non-Turbo
		Engine: Slowly accelerated from idling speed to 5,000 rpm	O-l V or 4.5-5.5 v → 1.5-4 v (for a moment)	
40	Induction control valve (Opened)	Engine: Slowly accelerated from idling speed to 5,000 rpm	O-l V → 4 V or more (for a moment)	Non Turbo
39	Induction control valve (Closed)	Engine: Slowly decelerated from 5,000 rpm to idling speed		
44	Anti-lock braking signal	Engine: Idle	B+	Turbo
		• When vehicle is put in motion for the first time after the ignition switch was placed in ON position • Vehicle speed: 0 → 10 km/h (0 → 0.6 mph)	B+ → O-3 V (for a moment)	
46	Total control "Reduce torque" request signal 1	Engine: Idle	4.5-5.5 v	A/T
		Engine: Running at idle after warmup and changing speeds	O-l V	
43 <Up to 1995 models> 60 <From 1996 models>	Total control "Reduce torque" request signal 2	Engine: Idle	o-1 v	A/T
		Engine: Running at idle after warmup and changing speeds	l-5.5 V	
7	Total control "Reduce torque" execution signal	Engine: Running at idle with coolant temperature at 50°C (122°F) or lower	O-l V	A/T
		Engine: idle, warm	1–4 V	
74	Manifold differential pressure senosr	Engine: Idle	0.8-2.4 V	A/T
		• Engine: Idle • Suddenly depress the accelerator pedal.	Voltage rises temporarily from 0.8-2.4 V	

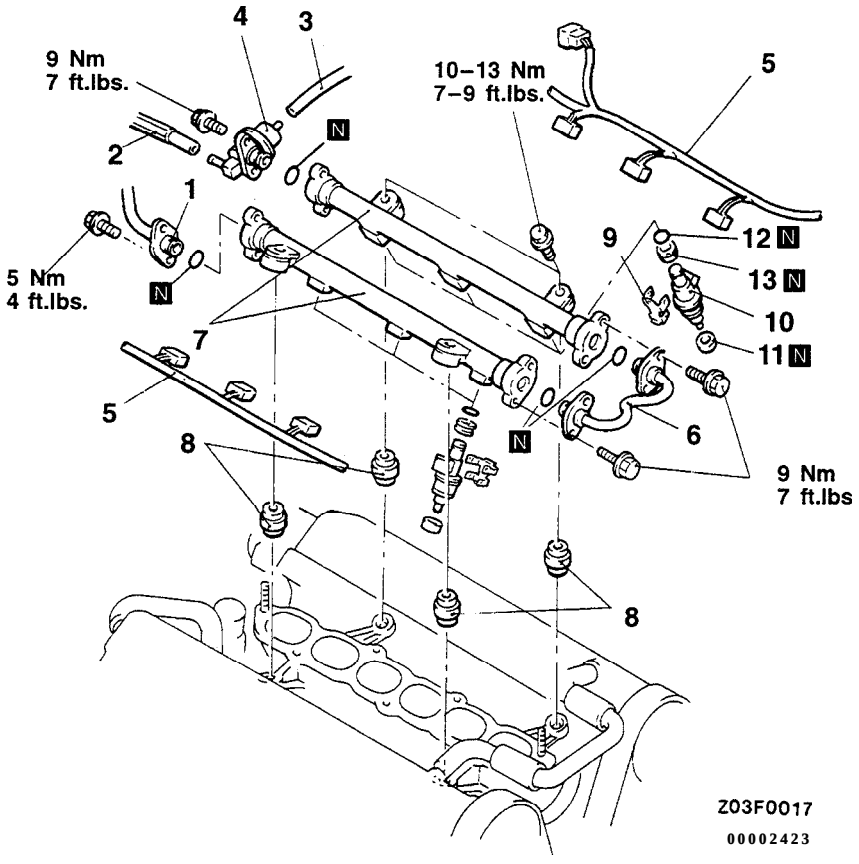
TSB Revision

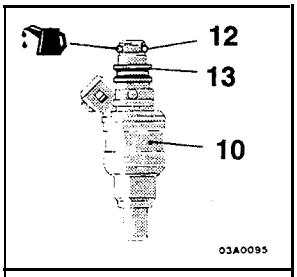
INJECTOR

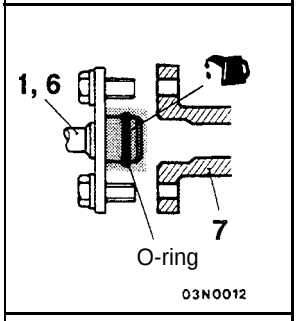
REMOVAL AND INSTALLATION

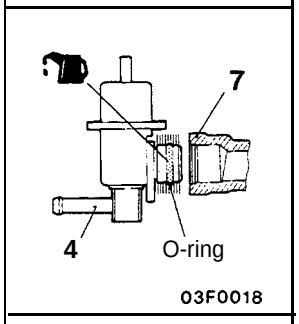
Pre-removal Operation
- Coolant Draining (Refer to GROUP 00 – Maintenance Service.)
- Intake Manifold Plenum Removal (Refer to GROUP 15 – Intake Manifold Plenum.)
- Residual Pressure from High Pressure Hose Release (Refer to P.13A-179.)

Post-installation Operation
- Coolant Supplying (Refer to GROUP 00 – Maintenance Service.)
- Intake Manifold Plenum Installation (Refer to GROUP 15 – Intake Manifold Plenum.)
- Fuel Leakage Checking









Engine oil

Removal steps

◀A▶ ▶C◀ 1. High pressure fuel hose connection
2. Fuel return hose connection
3. Vacuum hose connection
▶B◀ 4. Fuel pressure regulator
5. Control harness connection
▶C◀ 6. Fuel pipe
7. Fuel rail
8. insulator
9. Injector support
▶A◀ 10. Injector
11. Insulator
12. O-ring
13. Grommet

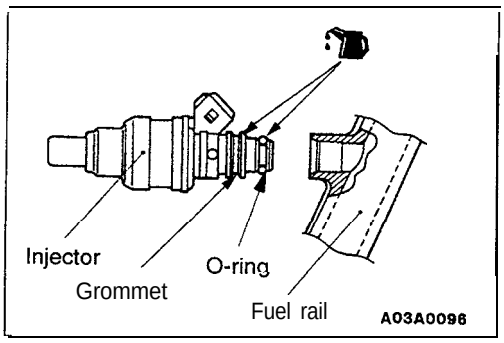
TSB Revision

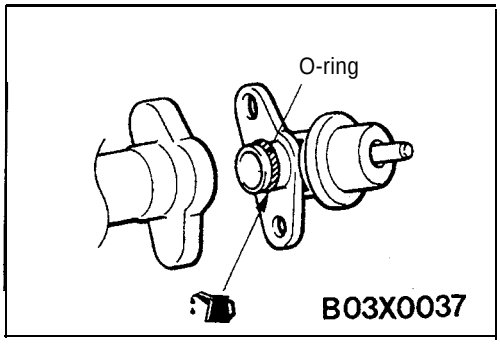
REMOVAL SERVICE POINT

(A, HIGH PRESSURE FUEL HOSE DISCONNECTION

Bleed the residual pressure within the fuel pipe line so as to prevent the flow of fuel.

Caution
Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.





INSTALLATION SERVICE POINTS

▶A◀ INJECTOR INSTALLATION

(1) Apply a small amount of new engine oil to the O-ring.

Caution
Do not let the engine oil get into the fuel rail.

(2) While turning the injector to the left and right, install it to the fuel rail.
(3) Check to be sure that the injector turns smoothly. If it does not turn smoothly, the O-ring may be trapped, remove the injector and then reinsert it into the fuel rail and check again.

▶B◀ FUEL PRESSURE REGULATOR INSTALLATION

(1) Apply a small amount of new engine oil to a new O-ring and insert it to the fuel rail carefully.

Caution
Do not let the engine oil get into the fuel rail.

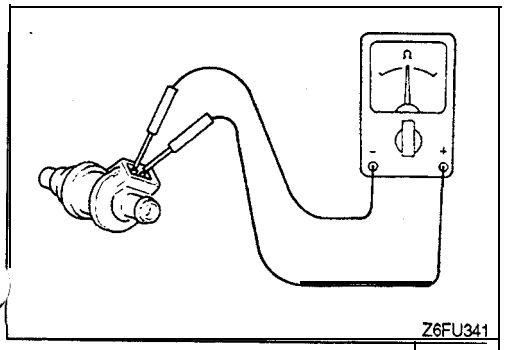
(2) If the fuel pressure regulator does not move smoothly, the O-ring may be folded. Then, remove the regulator to check the O-ring for damage.
(3) Tighten the regulator to the specified torque.

Tightening torque: 9 Nm (7 ft.lbs.)

▶C◀ FUEL PIPE / HIGH PRESSURE FUEL HOSE CONNECTION

Apply a small amount of new engine oil to the fuel pipe and high pressure fuel hose union, and then insert, being careful not to damage the O-ring.

Caution
Do not let the engine oil get into the fuel rail.



INSPECTION

INJECTORS CHECK

(1) Measure resistance between terminals of injector using a circuit tester.

Standard value:

13-16 Ω [at 20°C (68°F)] <Non Turbo>
2-3 Ω [at 20°C (68°F)] <Turbo>

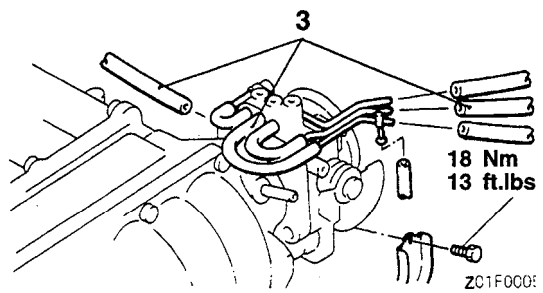
(2) If the resistance is out of specification, replace the injector.

THROTTLE BODY

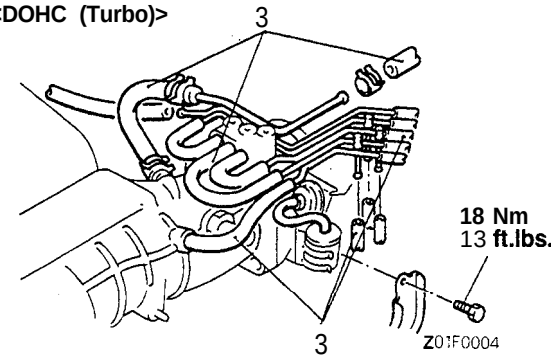
REMOVAL AND INSTALLATION

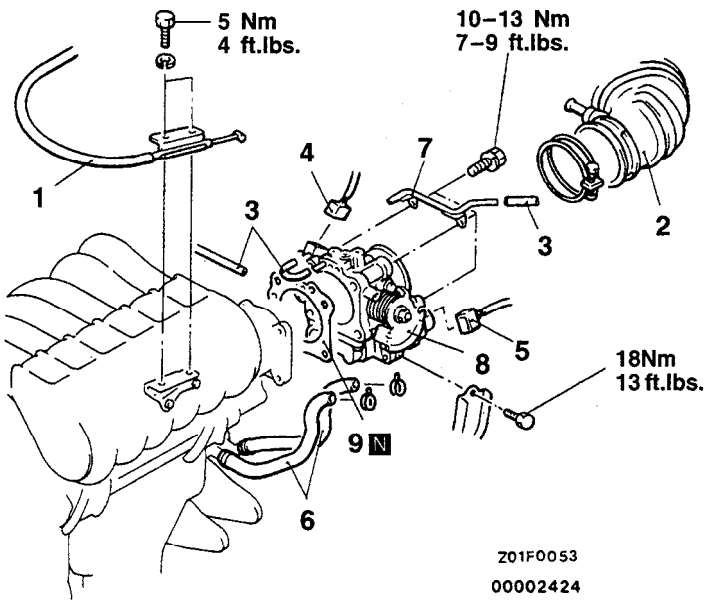
Pre-removal and Post-installation Operation
- Engine Coolant Draining and Supplying (Refer to GROUP 00 – Maintenance Service.)

<DOHC (Non Turbo) – California>



<DOHC (Turbo)>



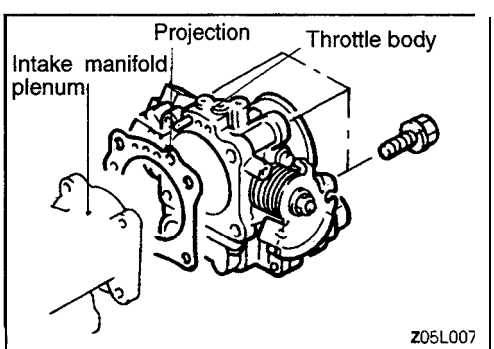


Removal steps

▶B◀ • Accelerator cable adjustment
1. Accelerator cable connection
2. Air intake hose connection
3. Vacuum nose connection
4. TPS connector connection
5. ISC motor connector connection
6. Water hose connection
7. Vacuum pipe assembly
8. Throttle body

▶A◀ 9. Gasket

NOTE
The layout of vacuum hoses (No. 3) of the construction drawing is for the DOHC (Non Turbo) – Federal.



INSTALLATION SERVICE POINTS

▶A◀ GASKET' INSTALLATION

Install the gasket so that the projection is where shown in the illustration.

Caution
Poor idling etc. may result if the gasket is installed incorrectly.

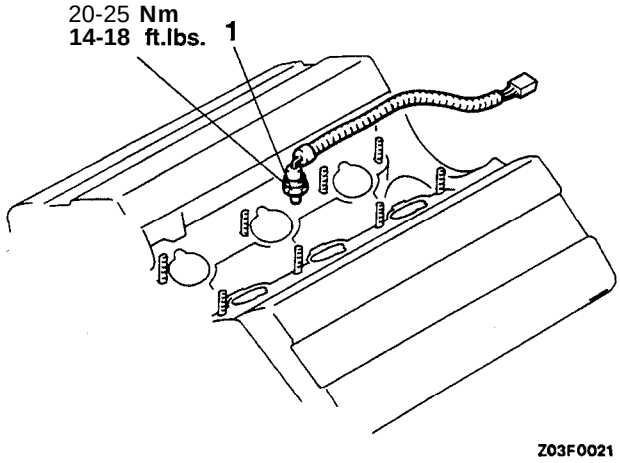
▶B◀ ACCELERATOR CABLE ADJUSTMENT

For information concerning adjustment of the accelerator cable, refer to GROUP 17 – Engine Control System.

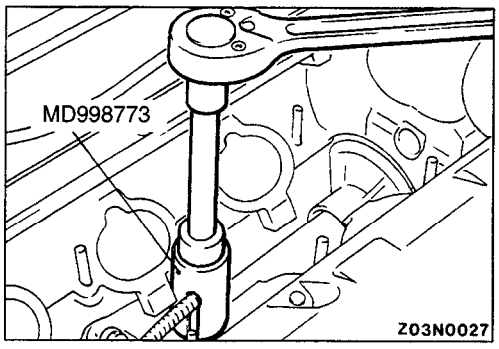
KNOCK SENSOR

R EMOVAL AND INSTALLATION

Pre-remov and Post-installation Operation
- Intake Manifold Plenum Release and Installation (Refer to GROUP 15 – Intake Manifold Plenum.)
- Intake Manifold Removal and Installation (Refer to GROUP 15 – Intake Manifold.)



◀A▶ ▶A◀ 1. Knock sensor



REMOVAL SERVICE POINT

◀A▶ KNOCK SENSOR REMOVAL

Remove the knock sensor with special tool.

INSTALLATION SERVICE POINT

▶A◀ KNOCK SENSOR INSTALLATION

When the knock sensor is installed, be sure to tighten it precisely to the specified torque as its installation affects the engine control.

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NOTES

FUEL SUPPLY

CONTENTS

FUEL FILTER 10

FUEL LINE AND VAPOR LINE 8

FUEL PUMP AND FUEL GAUGE UNIT ASSEMBLY AND FUEL TANK PRESSURE CONTROL VALVE 6

FUEL TANK 3

SPECIFICATIONS 2

General Specifications 2

Sealant 2

TROUBLESHOOTING 2

Fuel Tank and Fuel Line 2

SPECIFICATIONS

GENERAL SPECIFICATIONS

Items		Specifications
Fuel	Tank capacity dm^3 (gal.)	75 (19.8)
	Return system	Equipped
	Filter	High pressure type

SEALANT

Items	Specified sealant
Fuel tank hole cover	3M ATD Part No. 8509 or equivalent

TROUBLESHOOTING

FUEL TANK AND FUEL LINE

Symptom	Probable cause	Remedy
Engine malfunctions due to insufficient fuel supply	Bent or kinked fuel pipe or hose	Repair or replace
	Clogged fuel pipe or hose	Clean or replace
	Clogged fuel filter or in-tank fuel filter	Replace
	Water in fuel filter	Replace the fuel filter or clean the fuel tank and fuel line
	Dirty or rusted fuel tank interior	Clean or replace
	Malfunctioning fuel pump (Clogged filter in the pump)	Replace
Evaporative emission control system malfunctions (When tank cap is removed, pressure releasing noise is heard)	Mispiping of vapor line	Correct
	Disconnected vapor line piping joint	Correct
	Folded, bent, cracked or clogged vapor line	Replace
	Faulty fuel tank filler tube cap	Replace
	Malfunctioning fuel tank pressure control valve	Replace

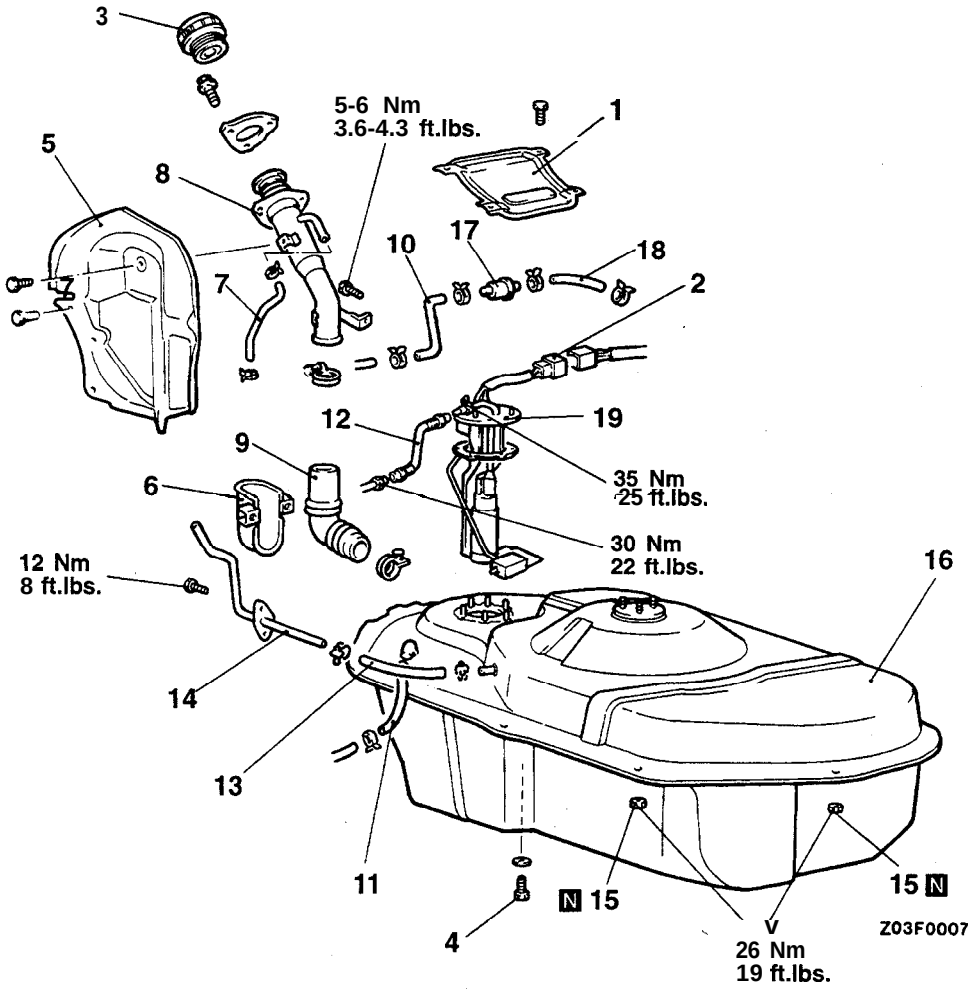
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FUEL TANK

REMOVAL AND INSTALLATION

Pre-removal Operation
- Fuel Draining
- Residual Pressure from High Pressure Hose Release (Refer to GROUP 13A – On-Vehicle Inspection of MFI Components.)

Post-installation Operation
- Fuel Supplying
- Fuel Leakage Checking



Removal steps

▶F◀ 1. Fuel gauge cover
2. Fuel pump and fuel gauge unit assembly connector
3. Fuel tank cap
4. Drain plug
5. Splash shield
6. Fuel tank filler tube protector
▶B◀ 7. Vapor hose
8. Fuel tank filler tube
9. Fuel filler hose
▶B◀ 10. Vapor hose
▶E◀ 11. Return hose
◀A▶ ▶D◀ 12. High pressure fuel hose
▶B◀ 13. Vapor hose
14. Leveling pipe
15. Self-locking nut
16. Fuel tank
▶C◀ 17. Fuel tank pressure control valve
▶B◀ 18. Vapor hose
▶A◀ 19. Fuel pump and fuel gauge unit assembly

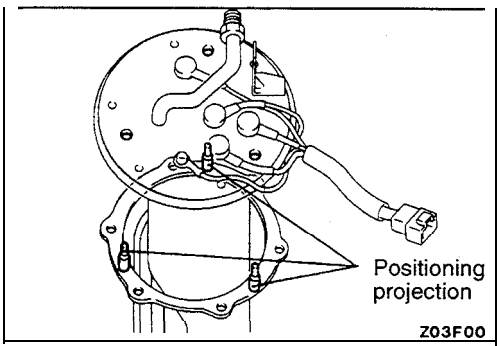
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REMOVAL SERVICE POINT

(A, HIGH PRESSURE FUEL HOSE DISCONNECTION

Disconnect the hose from body main pipe first and then from fuel pump.

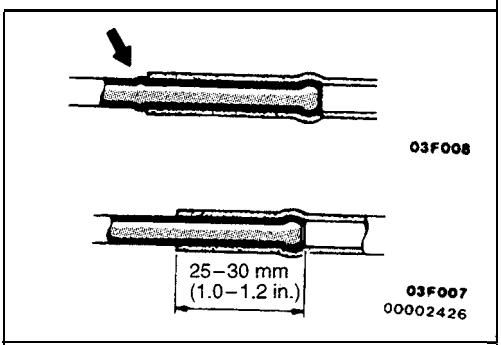
Caution
Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.



INSTALLATION SERVICE POINTS

▶A◀ FUEL PUMP AND FUEL GAUGE UNIT ASSEMBLY INSTALLATION

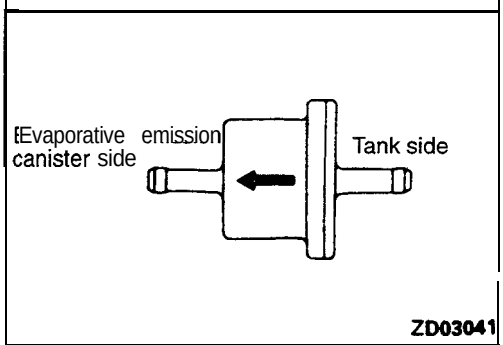
Align the three positioning projections of the packing with the holes in the fuel pump and fuel gauge unit assembly.



▶B◀ VAPOR HOSE CONNECTION

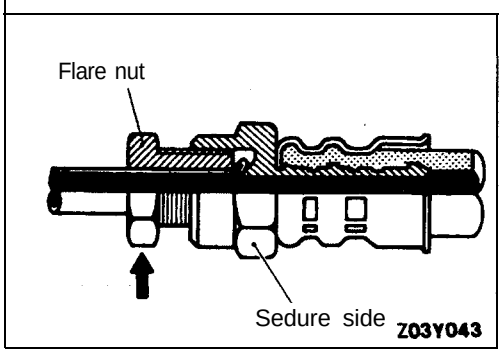
(1) If the pipe has a stepped part, connect the vapor hose to the pipe securely, up to the stepped part, as shown in the illustration.
(2) If the pipe does not have a stepped part, connect the vapor hose to the pipe securely, so that it is the standard value.

Standard value: 25–30 mm (1.0–1.2 in.)



▶C◀ FUEL TANK PRESSURE CONTROL VALVE INSTALLATION

Install so that the fuel tank pressure control valve is facing in the direction shown in the illustration.

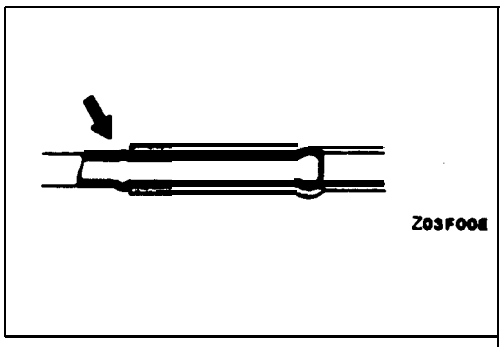


▶D◀ HIGH PRESSURE FUEL HOSE CONNECTION

Temporarily tighten the flare nut by hand, and then tighten it to the specified torque, being careful that the high pressure fuel hose does not become twisted.

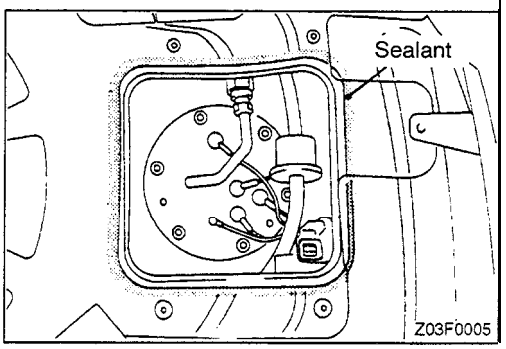
Caution
When tightening flare nut, be careful not to bend or twist line to prevent fuel pump from damage.

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▶E◀ RETURN HOSE CONNECTION

Connect the return hose to the pipe securely, up to the stepped part, as shown in the illustration.



▶F◀ FUEL GAUGE COVER INSTALLATION

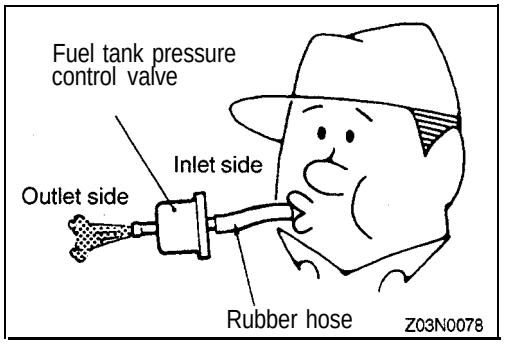
Before installing the fuel gauge cover, apply the specified sealant to the rear floor pan.

Specified sealant: 3M ATD Part No. 8509 or equivalent

INSPECTION

- Check the hoses and the pipes for crack or damage.
- Check the fuel tank filler tube cap for malfunction.
- Check the fuel tank for deformation, corrosion or crack.
- Check the fuel tank for dust or foreign material.

NOTE
If the inside of the fuel tank is to be cleaned, use any one of the following:
(1) Kerosene
(2) Trichloroethylene
(3) A neutral emulsion type detergent



FUEL TANK PRESSURE CONTROL VALVE REPLACEMENT

Connect a clean rubber hose to the fuel tank pressure control valve and check for operation.

Inspection procedure	Normal condition
Lightly blow from the inlet (fuel tank) side	Air passes through after a slight resistance
Lightly blow from the outlet (canister) side	Air passes through

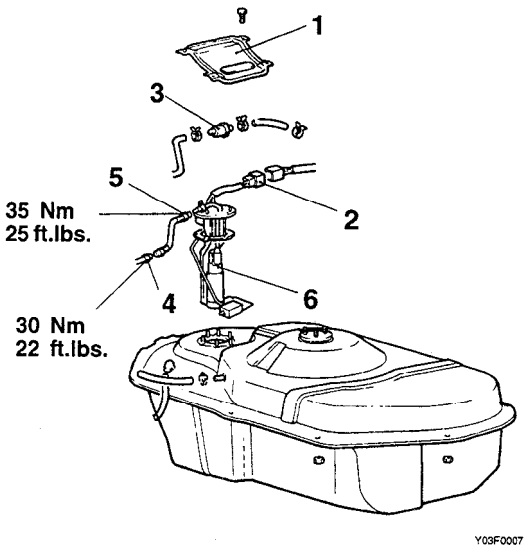
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FUEL PUMP AND FUEL GAUGE UNIT ASSEMBLY AND FUEL TANK PRESSURE CONTROL VALVE

REMOVAL AND INSTALLATION

Pre-removal Operation
- Fuel Draining
- Residual Pressure from High Pressure Hose Release (Refer to GROUP 13A – On-Vehicle Inspection of MFI Components.)

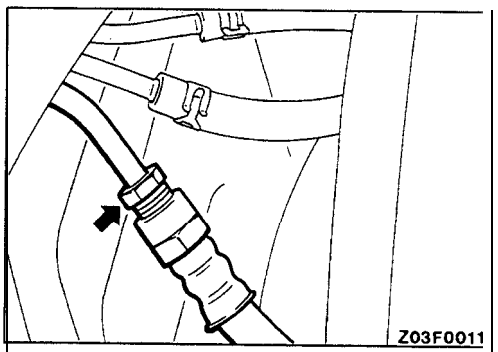
Post-installation Operation
- Fuel Supplying
- Fuel Leakage Checking

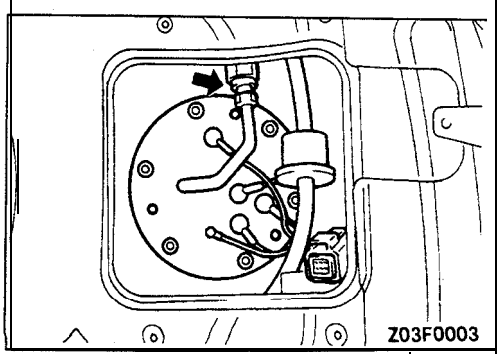


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Removal steps

▶D◀ 1. Fuel gauge cover
2. Fuel pump and fuel gauge unit assembly connector
▶C◀ 3. Fuel tank pressure control valve
◀A▶ ▶B◀ 4. High pressure fuel hose connection (body side)
◀B▶ ▶B◀ 5. High pressure fuel hose connection (fuel pump side)
▶A◀ 6. Fuel pump and fuel gauge unit assembly


Z03F0011


Z03F0003

REMOVAL SERVICE POINTS

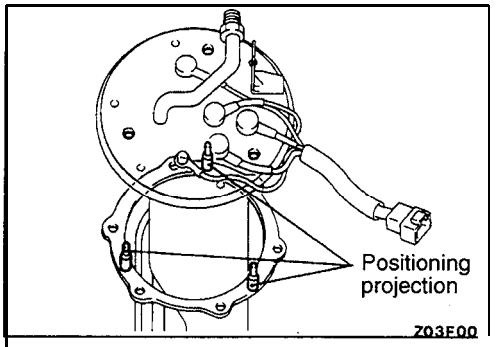
◀A▶ HIGH PRESSURE FUEL HOSE DISCONNECTION (BODY SIDE)

Caution
Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.

◀B▶ HIGH PRESSURE FUEL HOSE DISCONNECTION (FUEL PUMP SIDE)

NOTE
Hold the pump side nut with a wrench while turning the nut on the hose side.

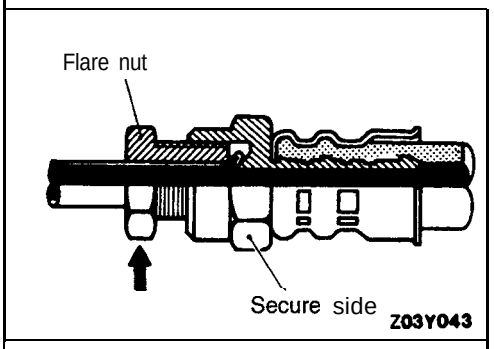
TSB Revision



INSTALLATION SERVICE POINTS

▶A◀ FUEL PUMP AND FUEL GAUGE UNIT ASSEMBLY INSTALLATION

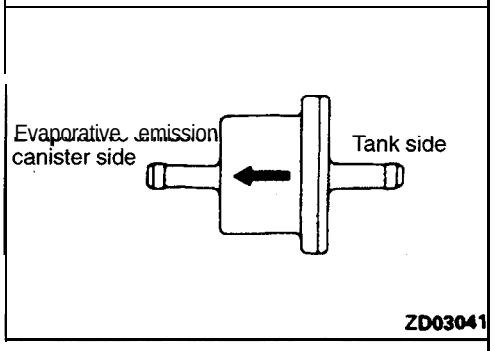
Align the three positioning projections of the packing with the holes in the fuel pump and fuel gauge unit assembly.



▶B◀ HIGH PRESSURE FUEL HOSE CONNECTION

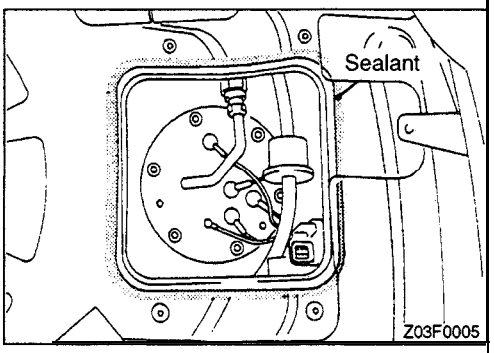
Temporarily tighten the flare nut by hand, and then tighten it to the specified torque, being careful that the high pressure fuel hose does not become twisted.

Caution
When tightening flare nut, be careful not to bend or twist line to prevent fuel pump from damage.



▶C◀ FUEL TANK PRESSURE CONTROL VALVE INSTALLATION

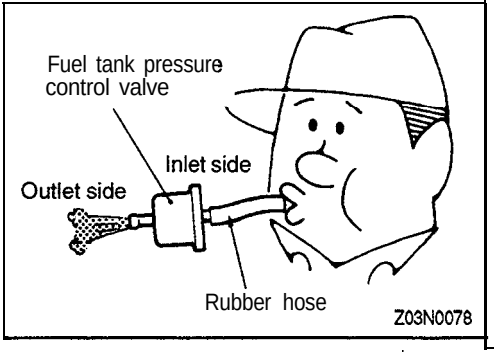
Install so that the fuel tank pressure control valve is facing in the direction shown in the illustration.



▶D◀ FUEL GAUGE COVER INSTALLATION

Before installing the fuel gauge cover, apply the specified sealant to the rear floor pan.

Specified sealant: 3M ATD Part No. 8509 or equivalent



FUEL TANK PRESSURE CONTROL VALVE REPLACEMENT

Connect a clean rubber hose to the overfill limiter and check for operation.

Inspection procedure	Normal condition
Lightly blow from the inlet (fuel tank) side	Air passes through after a slight resistance
Lightly blow from the outlet (canister) side	Air passes through

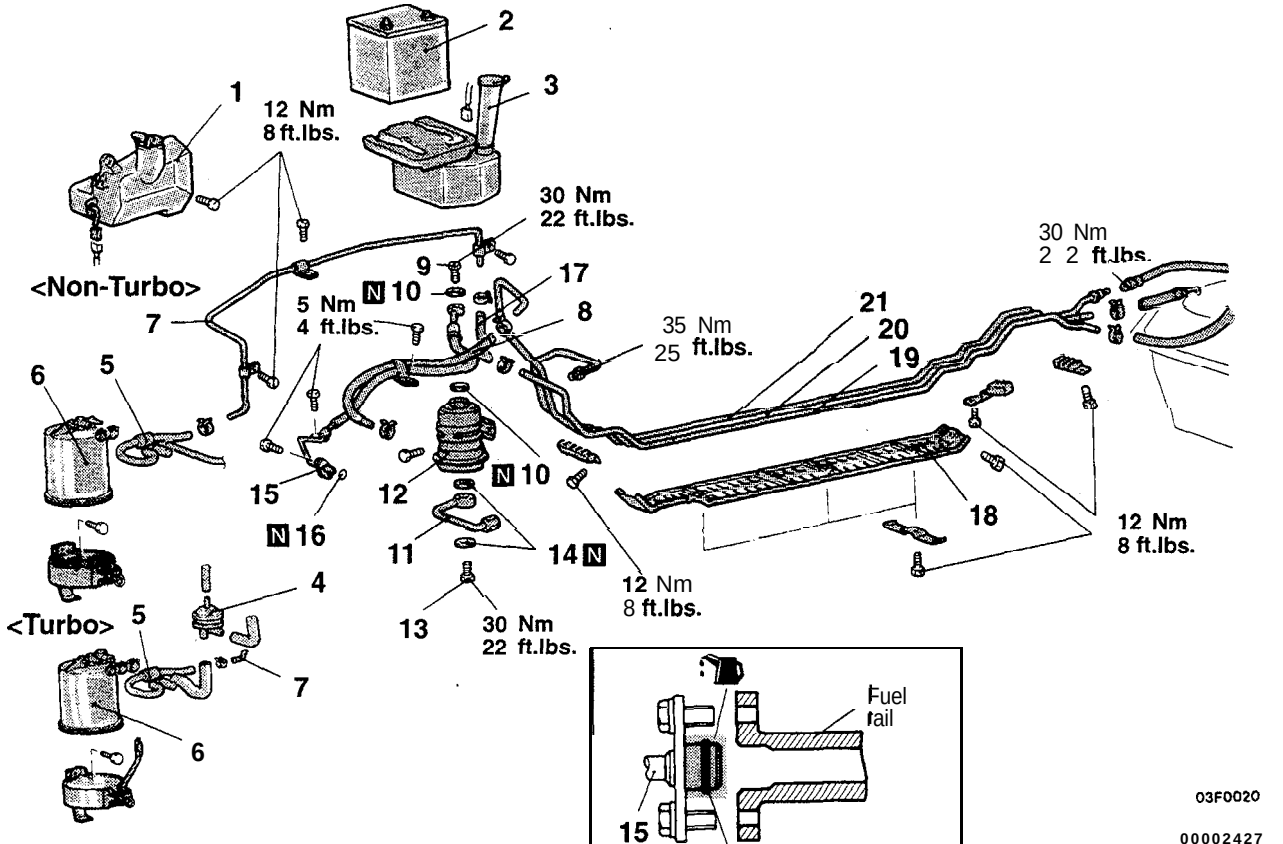
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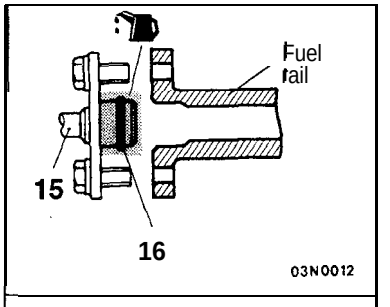
FUEL LINE AND VAPOR LINE

REMOVAL AND INSTALLATION

Pre-removal Operation
- Residual Pressure from High Pressure Hose Release (Refer to GROUP 13A – On-Vehicle Inspection of MFI Components.)
- Air Cleaner and Air Intake Hose Removal (Refer to GROUP 15 – Air Cleaner.)

Post-installation Operation
- Air Cleaner and Air Intake Hose Installation (Refer to GROUP 15 – Air Cleaner.)
- Fuel Leakage Checking



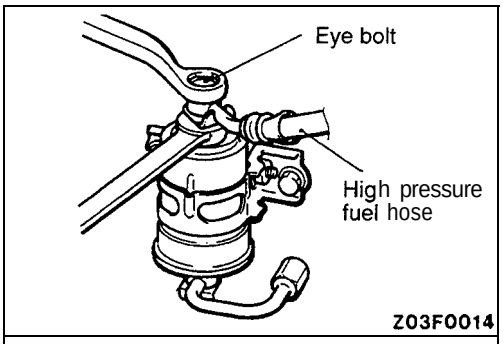


Engine oil

Removal steps

1. Reserve tank
2. Battery
3. Battery tray with washer tank assembly
4. Purge control valve
▶A◀ 5. Fuel vapor hose
6. Evaporative emission canister
7. Vapor pipe assembly
▶A◀ 8. Fuel return hose
◀A▶ 9. Eye bolt
10. Gasket
11. High pressure fuel pipe
▶C◀ 12. Fuel filter
◀A▶ 13. Eye bolt
14. Gasket
▶B◀ 15. High pressure fuel hose
16. O-ring
▶A◀ 17. Fuel vapor hose
18. Stone protector
19. Fuel vapor pipe
20. Fuel return pipe
21. Fuel main pipe

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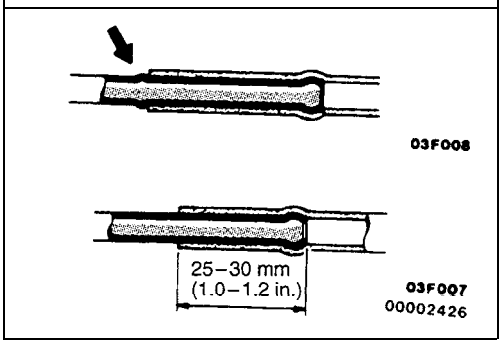


REMOVAL SERVICE POINTS

(A, EYE BOLT REMOVAL

Remove the eye bolt while holding the fuel filter nut securely.

Caution
Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.



INSTALLATION SERVICE POINTS

▶A◀ FUEL VAPOR HOSE / FUEL RETURN HOSE INSTALLATION

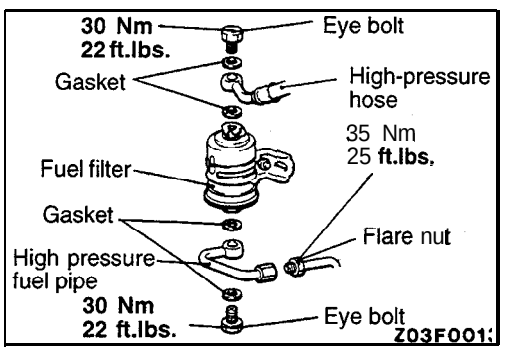
(1) If the fuel pipe has a stepped part, connect the fuel hose to the pipe securely, up to the stepped part, as shown in the illustration.
(2) If the fuel pipe does not have a stepped part, connect the fuel hose to the pipe securely, so that it is the standard value.

Standard value: 25–30 mm (1.0–1.2 in.)

▶B◀ HIGH PRESSURE FUEL HOSE INSTALLATION

Apply small amount of new engine oil to the hose union. Insert the hose, being careful not to damage the O-ring, and tighten securely.

Caution
Because there is high pressure applied between the fuel pump and the injection mixer, be especially sure that there is no fuel leakage in this area.



▶C◀ FUEL FILTER INSTALLATION

(1) When installing the fuel filter, first temporarily install the filter to the filter bracket; then insert the main pipe at the connector part of the high pressure fuel pipe, and manually screw in the main pipe's flare nut.
(2) Holding the fuel filter nut, tighten the fuel main pipe's flare nut and eye bolt at the specified torque. Then tighten the filter to the bracket.

INSPECTION

- Check the hoses and pipes for cracks, bend, deformation and clogging.
- Check the evaporative emission canister for clogging.
- Check the fuel filter for clogging and damage.

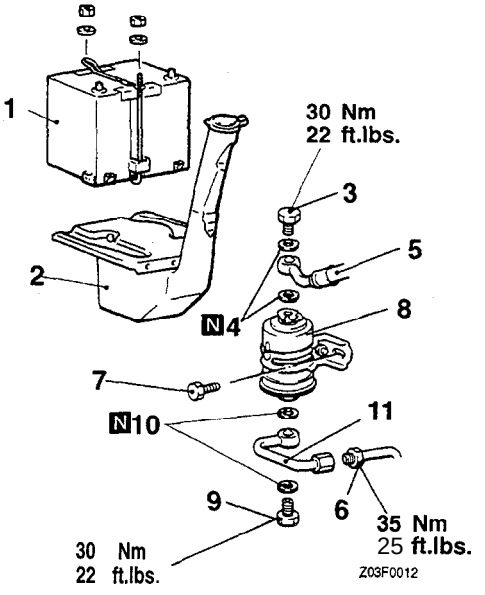
TSB Revision

FUEL FILTER

REMOVAL AND INSTALLATION

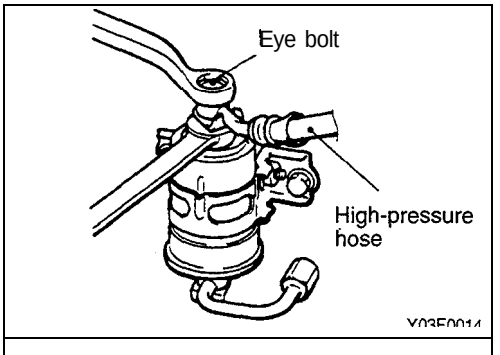
Pre-removal Operation
- Residual Pressure from High Pressure Hose Removal (Refer to GROUP 13A – On-Vehicle Inspection of MFI Components.)

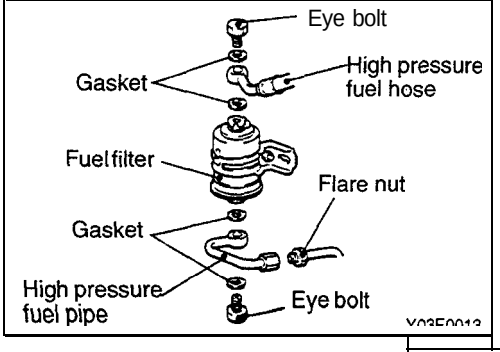
Post-installation Operation
- Fuel Leakage Checking



Removal steps

1. Battery
2. Battery tray with washer tank assembly
◀A▶ 3. Eye bolt
4. Gasket
5. High pressure fuel hose
6. Fuel main pipe connection
7. Mounting bolt
▶A◀ 8. Fuel filter
◀A▶ 9. Eye bolt
10. Gasket
11. High pressure fuel pipe





REMOVAL SERVICE POINT

◀A▶ EYE BOLT REMOVAL

Remove the eye bolt while holding the fuel filter nut securely.

Caution
Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.

INSTALLATION SERVICE POINT

▶A◀ FUEL FILTER INSTALLATION

(1) When installing the fuel filter, first temporarily install the filter to the filter bracket; then insert the main pipe at the connector part of the high pressure fuel pipe, and manually screw in the main pipe's flare nut.
(2) Holding the fuel filter nut, tighten the fuel main pipe's flare nut and eye bolt at the specified torque. Then tighten the filter to the bracket.

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ENGINE COOLING

CONTENTS

ENGINE COOLANT TEMPERATURE GAUGE UNIT, ENGINE COOLANT TEMPERATURE SENSOR AND AIR CONDITIONING ENGINE COOLANT TEMPERATURE SWITCH . . . .*.....*. 13

ON-VEHICLE SERVICE 4
- Cap Pressure Test 4
- Engine Coolant Concentration Test 4
- Engine Coolant Leak Check 4
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WATER PUMP, WATER PIPE AND WATER HOSE . . . ..*.....*.....*..... 11

SPECIFICATIONS

GENERAL SPECIFICATIONS

Items		Specifications
Cooling method		Water-cooled, pressurized, forced circulation with electrical fan
Radiator	Type	Pressurized corrugated fin type
Radiator fan motor	Type	Direct current ferrite type
Water pump	Type	Centrifugal impeller type
Thermostat	Type	Wax type with jiggle valve
	Identification mark	76.5 (Stamped on flange)

SERVICE SPECIFICATIONS

Items			Standard value	Limit
Range of coolant antifreeze concentration %			30-60	–
Thermostat	Valve opening temperature °C(°F)		76.5 (170)	–
	Full-opening temperature °C(°F)		90 (194) or more	–
Opening pressure of cap high pressure valve kPa (psi)			75–105 (11-15)	65 (9.2)
Thermo sensor (on radiator) operating temperature <up to 1993 models>	For radiator fan	OFF → ON °C (°F)	81-89 (178-192)	–
		ON → OFF °C (°F)	77 (171) or less	
	For condenser fan – Vehicles with air conditioning	OFF → ON °C (°F)	91 - 99 (196–210)	–
		ON → OFF °C (°F)	87 (189) or less	

LUBRICANT

Item	Specified lubricant	Quantity
Engine coolant lit. (qts.)	High quality ethylene glycol antifreeze coolant	8.0 (8.5)

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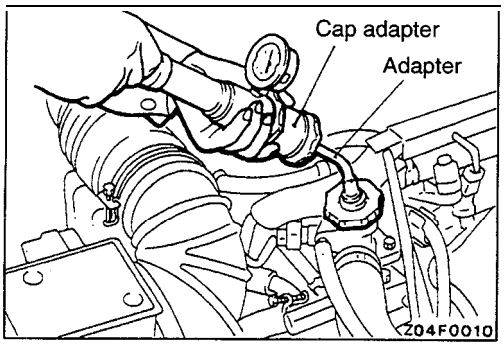
SEALANT

Items	Specified sealants
Engine coolant temperature gauge unit	3M Nut Locking Part No. 4171
Engine coolant temperature sensor (Engine control)	
Engine coolant temperature sensor (Air conditioning) <Up to 1993 models>	

TROUBLESHOOTING

Symptom	Probable cause		Remedy
Overheat	Insufficient engine coolant		Replenish
	Too high an anti-freeze concentration		Correct anti-freeze concentration
	Damaged or blocked (insufficiently ventilated) radiator fins		Correct
	Faulty thermostat operation		Replace
	Faulty water pump operation		
	Water passage clogged with slime or rust deposit or foreign substance		Clean
Overheat	Inoperative electric cooling fan	Faulty coolant temperature sensor <Up to 1993 models>	Replace
		Engine coolant temperature sensor <From 1994 models>	
		Faulty electrical motor	
		Faulty radiator fan relay	
	Water leaks	Damaged radiator core joint	Replace
		Corroded or cracked hoses (radiator hose, heater hose, etc.)	
		Faulty cap valve or setting of spring	
		Cracked thermostat housing	
		Loose water pump mounting bolt or leaking gasket	Correct or replace
		Loose bolt or leaking gasket in water outlet fitting	
		Loose bolt or leaking gasket in water inlet fitting	
		Loose thermostat housing bolts or leaking from gasket	Retorque bolts or replace gasket
	Faulty automatic transaxle oil cooler operation	Blocked or collapsed hose and pipe	Replace
		Loose hose and pipe connection	Correct
No rise in temperature	Faulty thermostat		Replace

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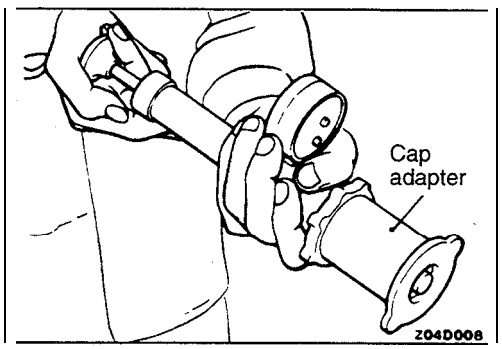


ON-VEHICLE SERVICE

ENGINE COOLANT LEAK CHECK

1. Loosen cap.
2. Confirm that the engine coolant level is up to the filler neck.
3. Install an adapter and cap adapter to the water outlet fitting and apply 160 kPa (23 psi) pressure. Hold pressure for two minutes, while checking for leakage from the radiator, hose or connections.

   Caution
   Be sure to completely clean away any moisture from the places checked.
   When the tester is removed, be careful not to spill any engine coolant from it.
   Be careful, when installing and removing the tester and when testing, not to deform the water outlet fitting.
4. If there is leakage, repair or replace the appropriate part.



CAP PRESSURE TEST

1. Use a cap adapter to attach the cap to the tester.
2. Increase the pressure until the indicator of the gauge stops moving.

   Limit: 65 kPa (9.2 psi)
   Standard value: 75–105 kPa (11-15 psi)
3. Replace the cap if the reading does not remain at or above the limit.

   NOTE
   Be sure that the cap is clean before testing, since rust or other foreign material on the cap seal will cause an improper indication.

ENGINE COOLANT REPLACEMENT

Refer to GROUP 00 – Maintenance Service.

ENGINE COOLANT CONCENTRATION TEST

Refer to GROUP 00 – Selection of Coolant.

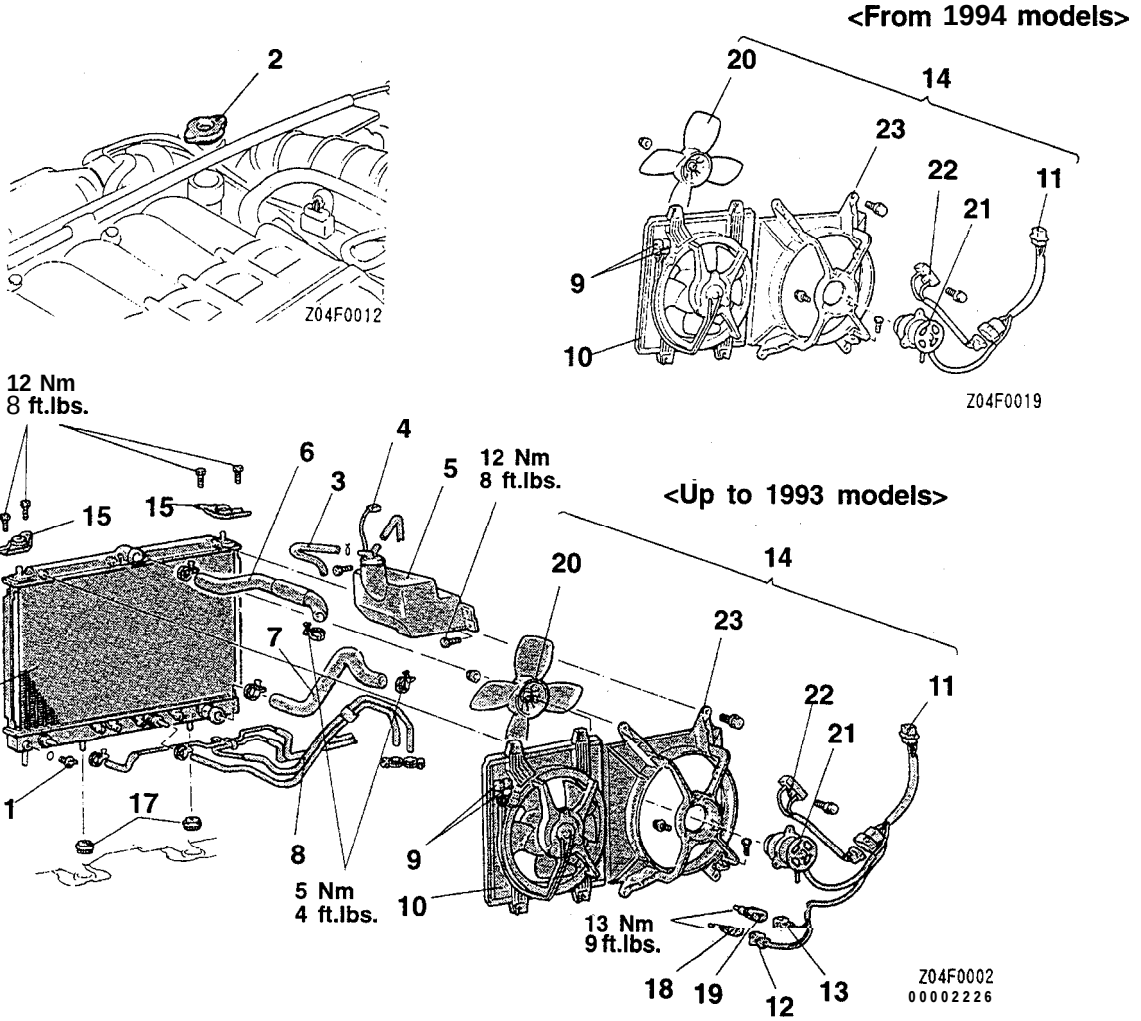
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RADIATOR

REMOVAL AND INSTALLATION

Pre-removal Operation
- Engine Coolant Draining
  (Refer to GROUP 00 – Maintenance Service.)

Post-installation Operation
- Engine Coolant Refilling
  (Refer to GROUP 00 – Maintenance Service.)
- Checking Automatic Transaxle Fluid Level and Refilling If Necessary



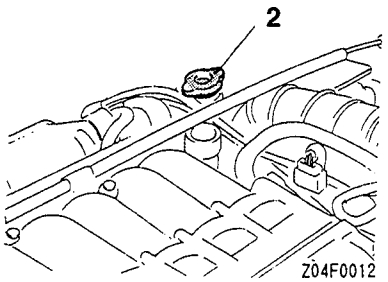
Radiator removal steps

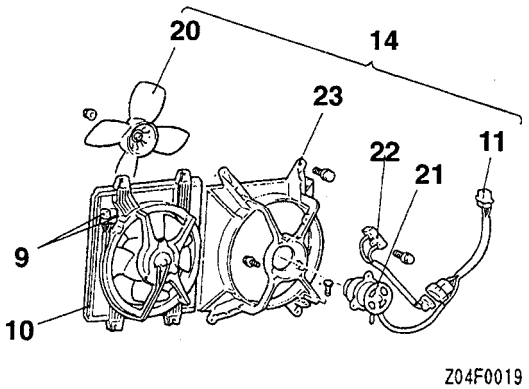
1. Drain plug
2. Cap
3. Overflow tube
4. Water level sensor connector
5. Reserve tank
6. Radiator upper hose
7. Radiator lower hose
◀A▶ 8. Automatic transaxle oil cooler hoses <Vehicles with A/T>
9. Condenser fan motor connector. <Vehicles with air conditioning>
10. Condenser fan motor assembly <Vehicles with air conditioning>
▶A◀ 11. Radiator fan motor connector*
12. Thermo sensor connection* (For radiator fan)
13. Thermo sensor connection* (For condenser fan) <Vehicles with air conditioning>
14. Radiator fan motor assembly
15. Upper insulator
16. Radiator assembly
17. Lower insulator
18. Thermo sensor (For radiator fan)*
19. Thermo sensor (For condenser fan)* <Vehicles with air conditioning>
20. Fan
21. Radiator fan motor
22. Resistor
23. Shroud

NOTE
● : Up to 1993 models

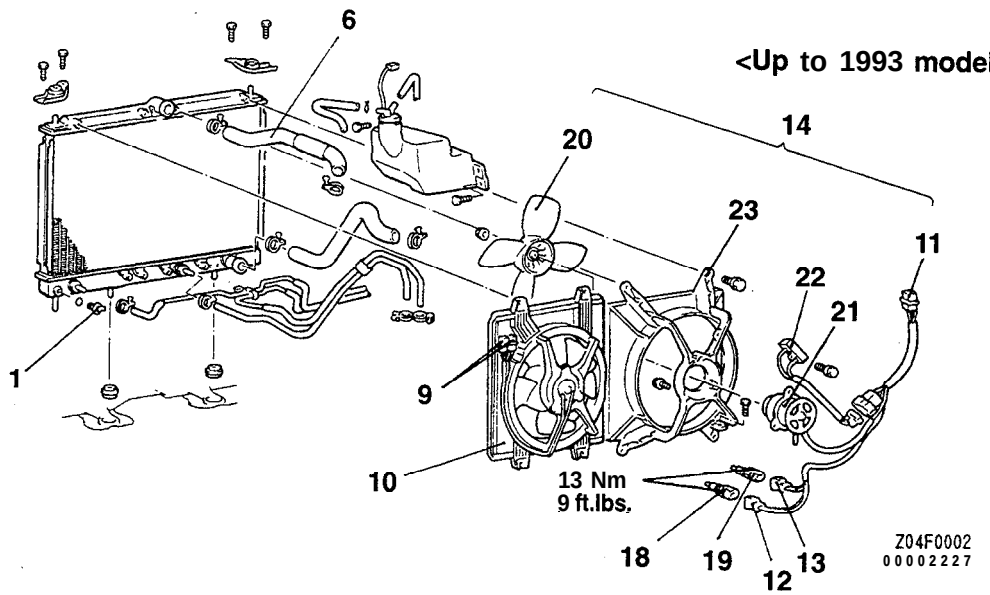
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<From 1994 models>





<Up to 1993 models>



Radiator fan motor assembly removal steps

1. Drain plug
2. Cap
6. Radiator upper hose
9. Condenser fan motor connector <Vehicles with air conditioning>
10. Condenser fan motor assembly <Vehicles with air conditioning>
▶A◀ 11. Radiator fan motor connector
12. Thermo sensor connection* (For radiator fan)
13. Thermo sensor connection* (For condenser fan) <Vehicles with air conditioning>
14. Radiator fan motor assembly
20. Fan
21. Radiator fan motor
22. Resistor
23. Shroud

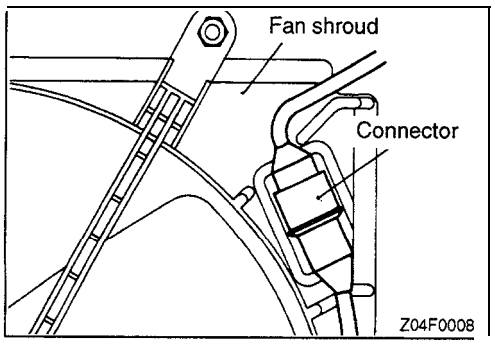
NOTE
*: Up to 1993 models

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REMOVAL SERVICE POINT

◀A▶ AUTOMATIC TRANSAXLE OIL COOLER HOSES DISCONNECTION

Use a plug or otherwise cover the hose and nipple part of the radiator so that dust, dirt, foreign materials, etc. do not enter after the hose has been disconnected from the radiator.



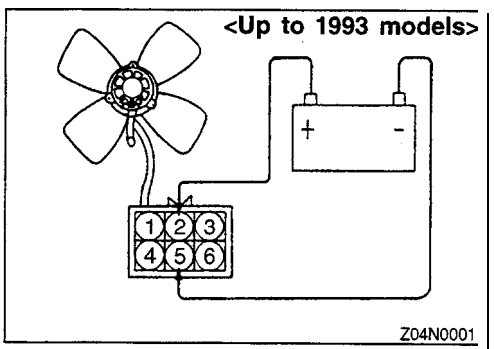
INSTALLATION SERVICE POINT

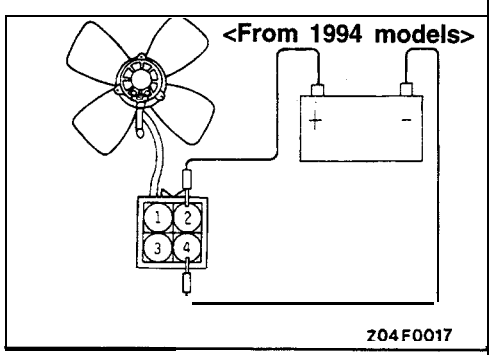
▶A◀ RADIATOR FAN MOTOR CONNECTOR CONNECTION

Connect the radiator fan motor connector to the body harness. Then, insert into the shroud hole and fix securely.

INSPECTION

- Check for foreign material between radiator fins.
- Check the radiator fins for bent, or damage.
- Check the radiator for corrosion, damage, rust or scale.
- Check the radiator hoses for cracks, damage or deterioration.
- Check the reserve tank for damage.
- Check the automatic transaxle oil cooler hoses for cracking, damage or deterioration.



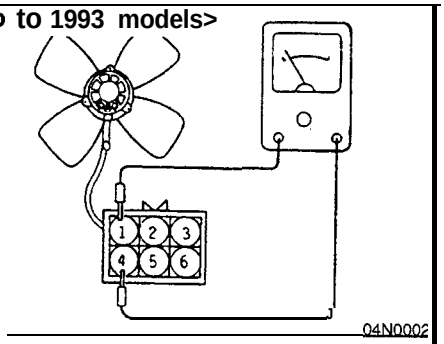


RADIATOR FAN MOTOR CHECK

(1) Check to be sure that the radiator fan rotates when battery voltage is applied between terminals (as shown in the figure).
(2) Check to see that abnormal noises are not produced, while motor is turning.

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<Up to 1993 models>

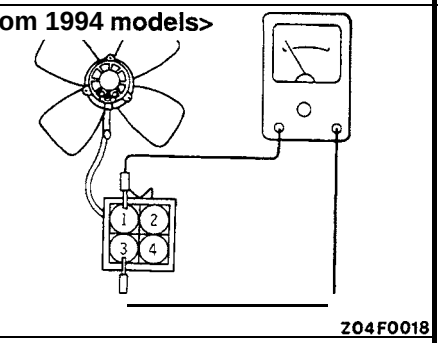


RESISTOR CHECK

(1) Measure the resistance between connector terminals (1) and (4) of the radiator fan motor.
(2) The resistor is normal if the resistance is within the following range.

Resistance: 0.29-0.35 Ω

<From 1994 models>



RESISTOR CHECK

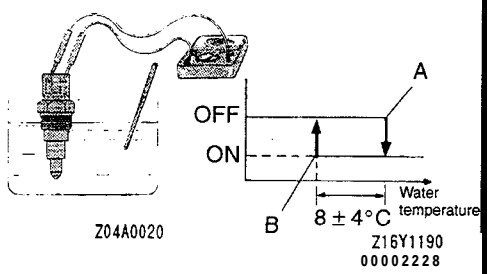
(1) Measure the resistance between connector terminals (1) and (3) of the radiator fan motor.
(2) The resistor is normal if the resistance is within the following range.

Resistance: 0.29-0.35 Ω

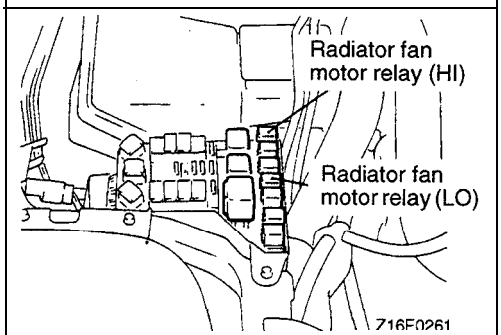
THERM0 SENSOR CHECK <Up to 1993 models>

(1) Immerse the water temperature switch in hot water as shown.
(2) Change the water temperature and check continuity with a circuit tester. If it is as specified below, the switch is functioning correctly.

<Up to 1993 models>

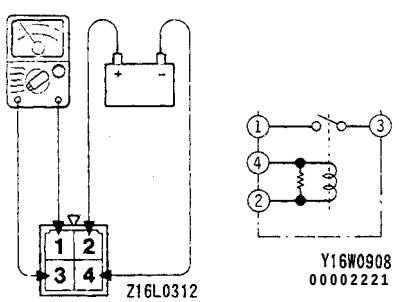


Item	For condenser fan	For radiator fan
With continuity (temperature of point A)	91–99°C (196–210°F)	81–89°C (178–192°F)
Without continuity (temperature of point B)	87°C (189°F) or less	77°C (171 °F) or less



RADIATOR FAN MOTOR RELAY CHECK

(1) Remove radiator fan motor relay from the relay box located at the right side in the engine compartment.



(2) Check for continuity between the terminals when the battery power-supply is applied to terminal (2), and terminal (4) is grounded.

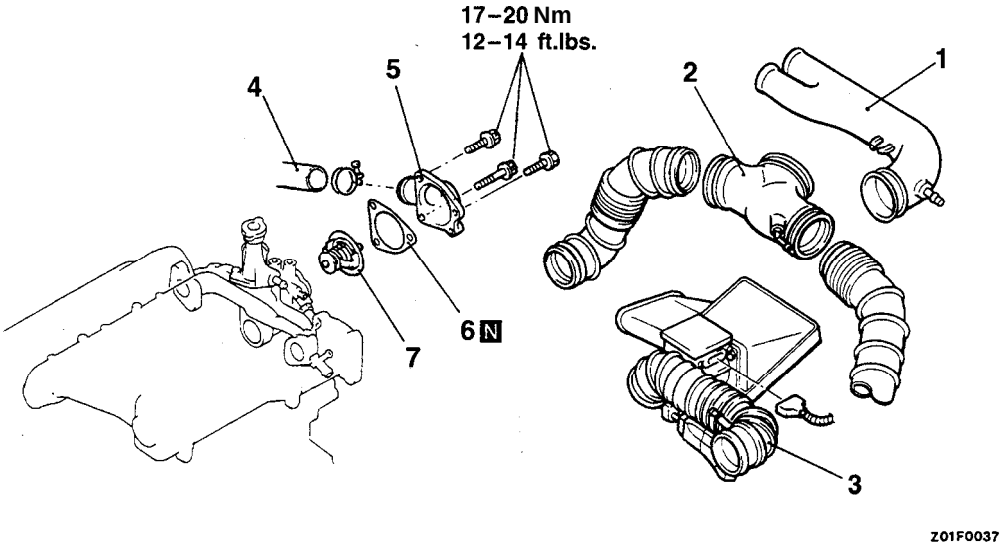
When current flows	Between terminals l-3	Continuity
When no current flows	Between terminals l-3	No continuity
	Between terminals 2-4	Continuity

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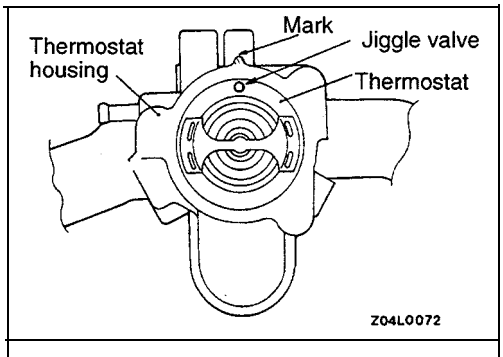
THERMOSTAT

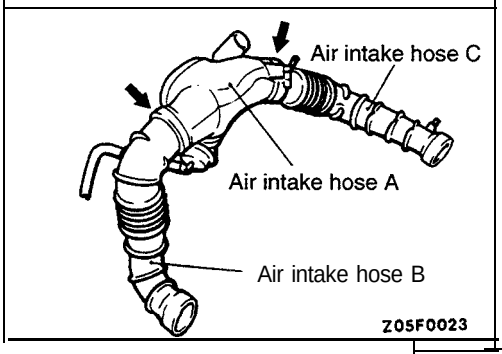
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Engine Coolant Draining and Supplying (Refer to GROUP 00 – Maintenance Service.)



Removal steps
1. Air hose A <Turbo>
▶B◀ 2. Air intake hose A <Turbo>
3. Air intake hose <Non-Turbo>
4. Radiator lower hose connection
5. Water inlet fitting
6. Gasket
▶A◀ 7. Thermostat





INSTALLATION SERVICE POINTS

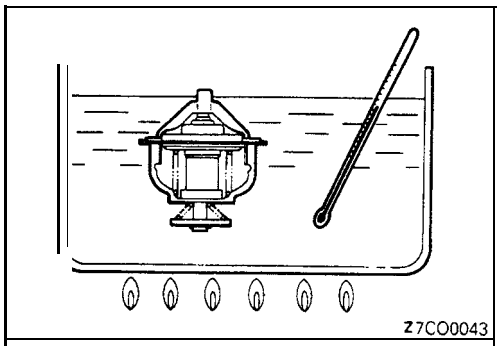
▶A◀ THERMOSTAT INSTALLATION

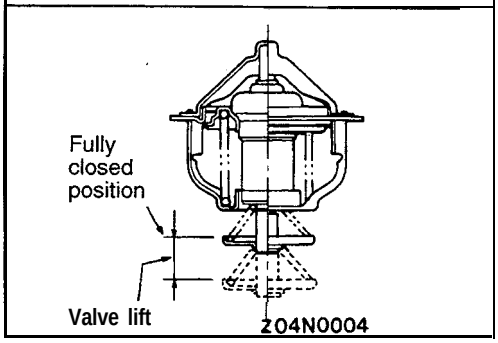
Install the thermostat with its jiggle valve lined up with the mark on the thermostat housing.

▶B◀ AIR INTAKE HOSE A INSTALLATION

Assemble the air intake hose A with its notches (arrow-marked) lined up with the A marks on the air intake hoses B and C. Insert the hoses into the air intake hose A until they are bottomed.

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INSPECTION

- Check that valve closes tightly at room temperature.
- Check for defects or damage.
- Check for rust or encrustation on valve. Remove if any.
- Immerse thermostat in container of water. Stir to raise water temperature and check that thermostat opening valve temperature and the temperature with valve fully open [valve lift-over 8 mm (.31 in.)] are at the standard value.

Standard value:

Opening valve temperature 76.5°C (170°F)

Full-open temperature 90°C (194°F)

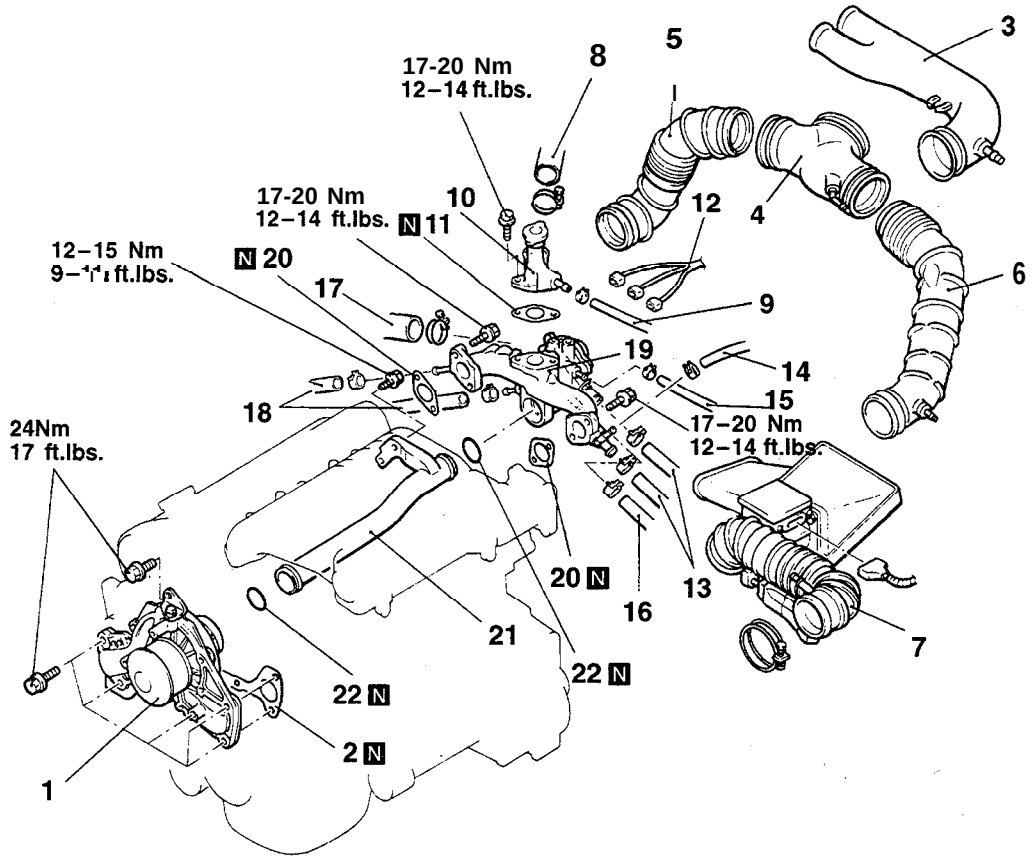
NOTE
Measure valve height when fully closed. Calculate lift by measuring the height when fully open.

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WATER PUMP, WATER PIPE AND WATER HOSE

REMOVAL AND INSTALLATION

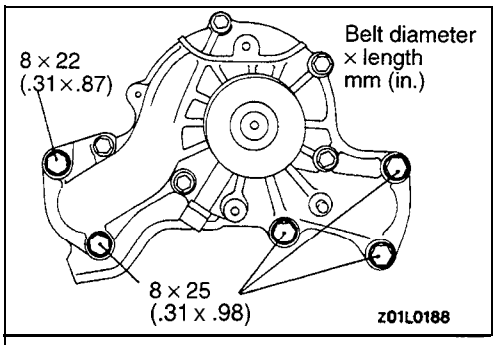
Pre-removal and Post-installation Operation
- Engine Coolant Draining and Supplying (Refer to GROUP 00 – Maintenance Service.)
- Ignition Power Transistor Unit and Ignition Coil Removal and Installation (Refer to GROUP 16 – Engine Electrical.)
- Timing Belt Removal and Installation (Refer to GROUP 11 – Timing Belt.)



Removal steps
1. Water pump
2. Gasket
3. Air hose A <Turbo>
4. Air intake hose A <Turbo>
5. Air intake hose B <Turbo>
6. Air intake hose C <Turbo>
7. Air intake hose <Non-Turbo>
8. Radiator upper hose connection
9. Water hose connection <Turbo>
10. Water outlet fitting
11. Gasket
12. Harness connection
13. Heater hose connection
14. Water hose A connection
15. Water hose connection
16. Water hose connection <Turbo>
17. Radiator lower hose connection
18. Water hose connection <Turbo>
19. Thermostat housing
20. Gasket
21. Inlet water pipe
22. O-ring

Installation steps
2. Gasket
▶A◀ 1. Water pump
▶B◀ 22. O-ring
▶B◀ 21. Inlet water pipe
20. Gasket
19. Thermostat housing
18. Water hose connection <Turbo>
17. Radiator lower hose connection
16. Water hose connection <Turbo>
15. Water hose connection
14. Water hose A connection
13. Heater hose connection
12. Harness connection
11. Gasket
10. Water outlet fitting
9. Water hose connection <Turbo>
8. Radiator upper hose connection
7. Air intake hose <Non-Turbo>
▶C◀ 6. Air intake hose C <Turbo>
▶C◀ 5. Air intake hose B <Turbo>
▶C◀ 4. Air intake hose A <Turbo>
3. Air hose A <Turbo>

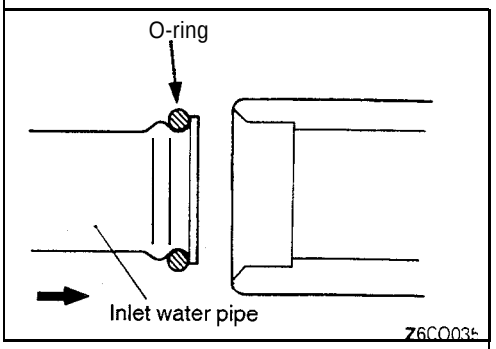
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INSTALLATION SERVICE POINTS

▶A◀ WATER PUMP INSTALLATION

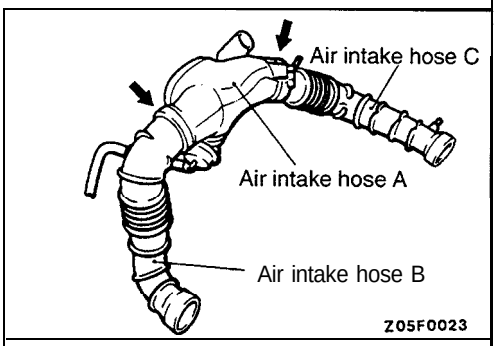
(1) Clean both gasket surfaces of water pump body and cylinder block.
(2) Install new water pump gasket and water pump assembly and tighten the bolts.
(3) Water pump installation bolt size are different and caution must be paid to ensure that they are properly installed.



▶B◀ O-RING / INLET WATER PIPE INSTALLATION

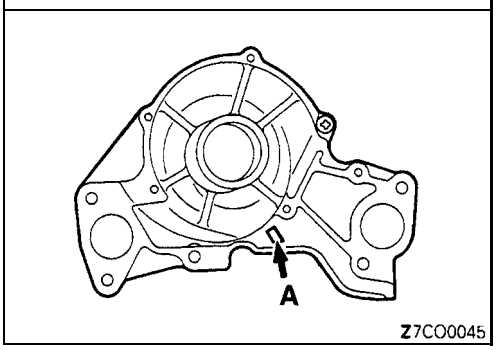
Replace the O-rings at both ends of the water inlet pipe with new ones and apply water to the outside of O-rings to help smooth insertion of the pipe into the water pump, thermostat housing.

Caution
Care must be taken not to permit engine oil or other greases to adhere to the O-ring.



▶C◀ AIR INTAKE HOSE C / AIR INTAKE HOSE B / AIR INTAKE HOSE A INSTALLATION

Assemble the air intake hose A with its notches (arrow-marked) lined up with the A marks on the air intake hoses B and C. Insert the hoses into the air intake hose A until they are bottomed.
Insert the air intake hoses B and C on the turbocharger side until they are bottomed.



INSPECTION

WATER PUMP CHECK

If any of the following irregularities are observed, replace the water pump as an assembly.
(1) Damage or crack on the water pump body
(2) Water leakage. With improper sealing, a water leakage mark may be observed around hole (A).

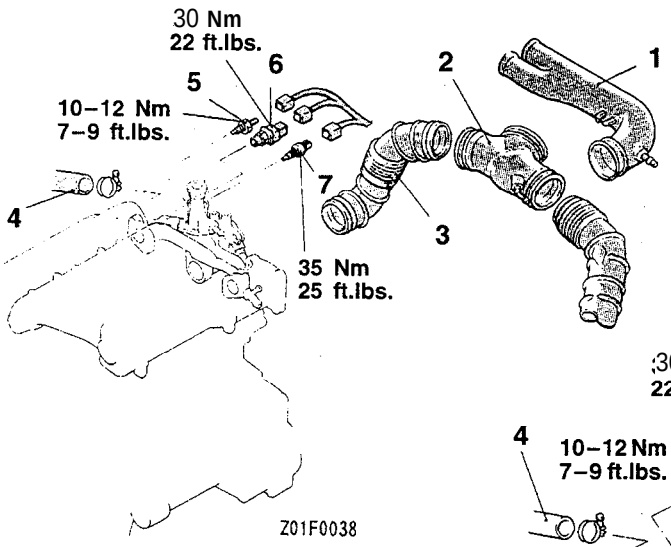
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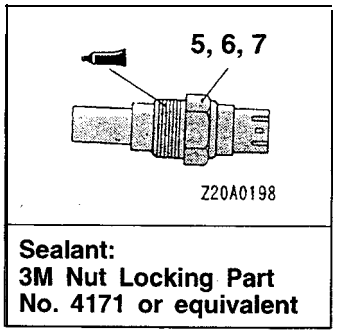
ENGINE COOLANT TEMPERATURE GAUGE UNIT, ENGINE COOLANT TEMPERATURE SENSOR AND AIR CONDITIONING ENGINE COOLANT TEMPERATURE SWITCH

REMOVAL AND INSTALLATION

Pre-removal and Post-installation operation
- Engine Coolant Draining and Supplying (Refer to GROUP 00 – Maintenance Service.)

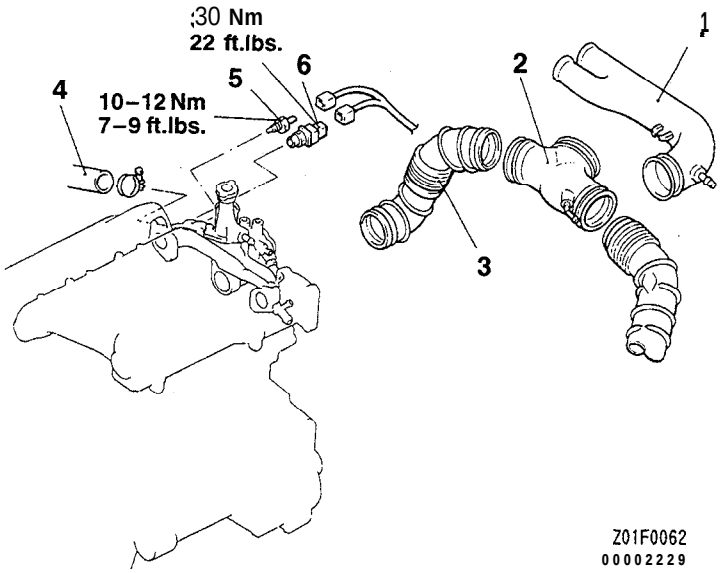
<Up to 1993 models>





Sealant:
3M Nut Locking Part No. 4171 or equivalent

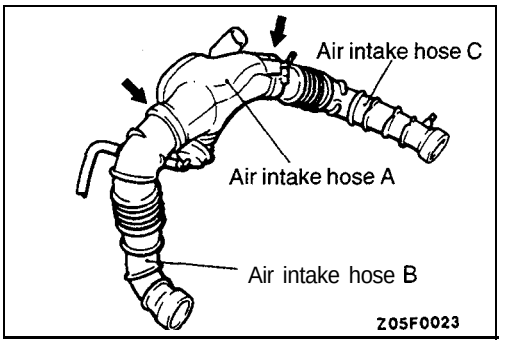
<From 1994 models>



Removal steps

1. Air hose A <Turbo>
▶A◀ 2. Air intake hose A <Turbo>
▶A◀ 3. Air intake hose B <Turbo>
4. Radiator upper hose connection
5. Engine coolant temperature gauge unit
6. Engine coolant temperature sensor (Engine control)
7. Air conditioning engine coolant temperature switch <Up to 1993 models>

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INSTALLATION SERVICE POINTS

▶A◀ AIR INTAKE HOSE B / AIR INTAKE HOSE A INSTALLATION

Assemble the air intake hose A with its notches (arrow-marked) lined up with the A marks on the air intake hoses B and C.
Insert the hoses into the air intake hose A until they are bottomed.
insert the air intake hose B on the turbocharger side until they are bottomed.

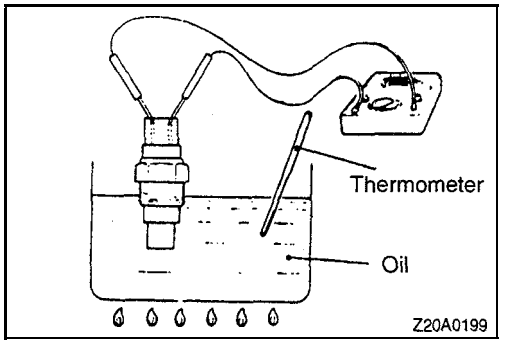
INSPECTION

ENGINE COOLANT TEMPERATURE GAUGE UNIT

Refer to GROUP 54 – Meters and Gauges.

ENGINE COOLANT TEMPERATURE SENSOR (Engine control)

Refer to GROUP 13A – MFI System Inspection.



AIR CONDITIONING ENGINE COOLANT TEMPERATURE SWITCH <Up to 1993 models>

(1) Immerse the A/C engine coolant temperature switch in oil and then heat (by using a gas stove flame or similar method) so as to increase the oil temperature.
(2) Check to be sure that the A/C engine coolant temperature switch is switched OFF when the oil temperature reaches the standard value.

Standard value: 112–118°C (234–244°F)

Caution
The oil used above should be engine oil and should be stirred well while being heated; do not heat more than necessary.

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INTAKE AND EXHAUST

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- Intake Manifold Vacuum Check ..... Refer to Group 11
- Turbocharger Bypass Valve Check 8
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- Variable Induction Control System Check 5

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SPECIFICATIONS

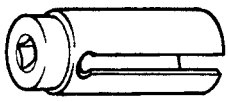
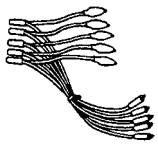
GENERAL SPECIFICATIONS

Items		Specifications
Air cleaner	Element	Unwoven cloth type
Exhaust system	Front exhaust pipe	Dual type
	Muffler	Expansron resonance type
	Coupling	Flat coupling, insertion type
	Suspension system	Rubber hangers
Turbocharger	Type	Exhaust gas turbine type
	Identification No.	TD04-09BS-6
	Supercharging pressure control	Turbocharger waste gate actuator and solenoid valve
Charge air cooler	Type	Air cooled type

SERVICE SPECIFICATIONS

Items		Standard value	Limit
Intake manifolds	Distortion of cylinder head contacting surface mm (in.)	Less than 0.15 (.0059)	0.2 (.008)
Turbocharger waste gate solenoid terminal resistance [at 20°C (68" F)] Ω		36-44	
Turbocharger	Supercharging pressure kPa (psi)	Approx. 69 (10)	–

SPECIAL TOOL

Tool	Tool number and name	Supersession	Application
	MD998770 Oxygen sensor wrench		Removal/Installation of heated oxygen sensor <Turbo>
	MB991 348 Test harness set		Inspection of variable induction control system

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TROUBLESHOOTING

Symptom	Probable cause	Remedy
Exhaust gas leakage	Loose joints	Retighten
	Broken pipe or muffler	Repair or replace
Abnormal noise	Broken separator in muffler	Replace
	Broken rubber hangers	Replace
	Interference of pipe or muffler with vehicle body	Correct
	Broken pipe or muffler	Repair or replace

TROUBLESHOOTING (ACTIVE EXHAUST SYSTEM) <Up to 1994 models>

TROUBLESHOOTING PROCEDURE

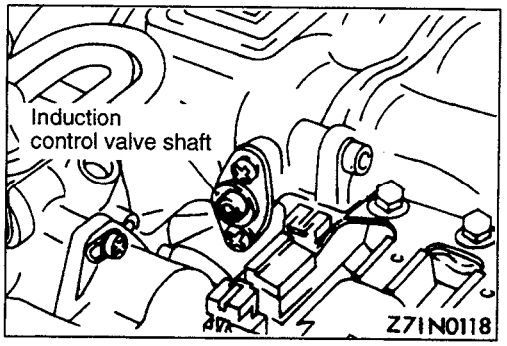
(1) Make sure that the valve operating cable is not dislocated.
(2) Make sure that the connectors of each component are positively connected and that no fuse has blown.
(3) Have an overall understanding of the substance and procedure of checking by reference to the Troubleshooting Quick-Reference Table and perform check in the proper sequence.
(4) Check each component with its connectors disconnected.

TROUBLESHOOTING QUICK-REFERENCE TABLE

If no abnormality is found in all parts by the check performed in the following sequence, the problem is probably caused by faulty active exhaust control unit and therefore the active exhaust control unit is replaced.

Sequence	Part to be checked	Checking procedure	Normal condition	Probable cause	Remedy
1	Valve	Operate valve manually.	Operates freely.	Valve sticking	Replace main muffler.
2	Active exhaust switch	Refer to P.15-40.		Faulty switch	Replace switch.
3	Power window relay	Check continuity between terminals (1) and (3) of relay.	Continuity present	Faulty power window relay	Replace power window relay.
		With battery voltage applied between terminals (1) and (3) of relay, check continuity between terminals (4) and (5) of relay.			
4	Actuator assembly	Check continuity between terminals in SPORT mode.	No continuity present between terminals (2) and (5).	Faulty actuator assembly	Replace actuator assembly.
			Continuity present between terminals (5) and (6).		
		Check continuity between terminals while idling in TOUR mode.	Continuity present between terminals (2) and (5).		
			No continuity present between terminals (5) and (6).		
		Apply battery voltage between terminals (1) and (3).	Motor operates.		
			Motor turns in reverse direction when polarity is reversed.		
5	Cable	Operate active exhaust switch (while idling).	Actuator operates and valve operates as well.	Broken or maladjusted cable	Replace or adjust cable.

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ON-VEHICLE SERVICE

VARIABLE INDUCTION CONTROL SYSTEM CHECK (Non Turbo)

cl 992 models>

SYSTEM CHECK

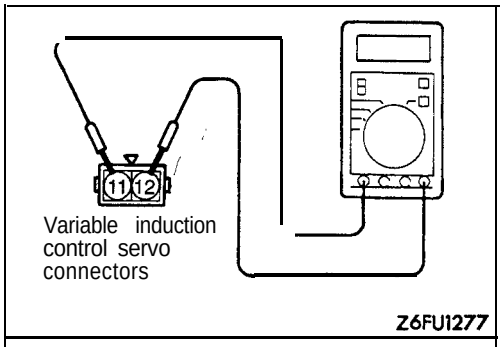
(1) Warm up the engine.
(2) Connect the tachometer. (Refer to GROUP 11 – Engine Adjustment.)
(3) Make sure that when the engine speed is increased from the idle speed to 5,000 rpm, the induction control valve shaft turns.

VARIABLE INDUCTION CONTROL MOTOR CHECK

(1) Disconnect the variable induction control motor connectors.
(2) Check the variable induction control motor coil for continuity.

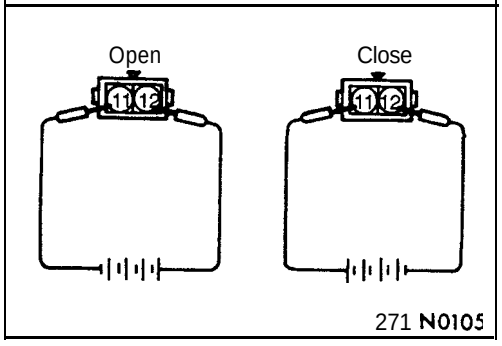
Standard value

Measured terminal	Continuity
Between terminals (11) and (12)	Present [5–35 Ω: 20°C (68°F)]

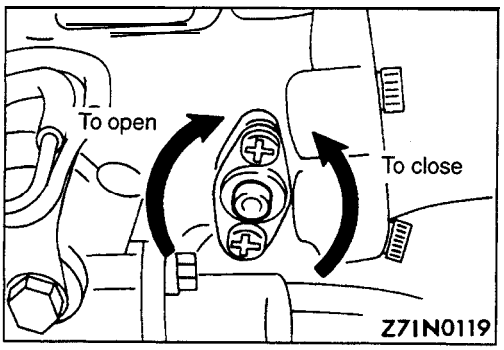


(3) Make sure that when DC 6V is applied to terminals (11) and (12) of the variable induction control motor connector, the induction control valve shaft turns smoothly.

Caution
Be sure to apply a voltage of not higher than DC 6V to the variable induction control motor connector terminals since application of high voltage may lock the servo gears.



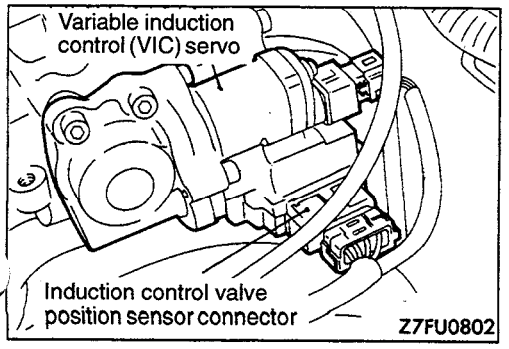
(4) If deviation from the standard value occurs or the variable induction control valve shaft does not turn smoothly, replace the intake manifold plenum assembly.



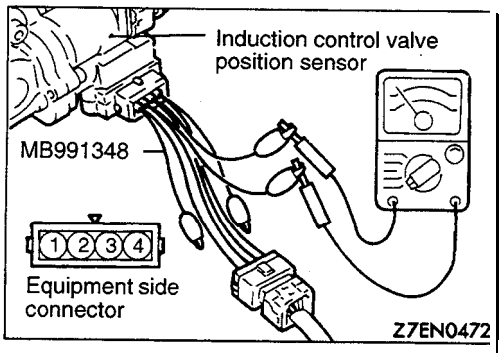
<From 1993 models>

SYSTEM CHECK

(1) Disconnect the induction control valve position sensor connector.
(2) Connect the special tool (test harness set) between the disconnected connectors. (All terminals should be connected.)
(3) Connect a circuit tester between terminal (2) and terminal (3) of the induction control valve position sensor and measure the voltage. In addition, measure the voltage between terminal (3) and terminal (4) in the same way.



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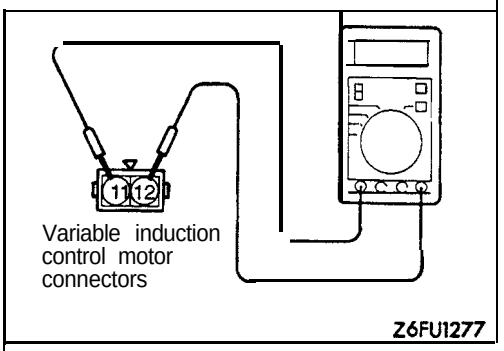
Standard value

Engine condition	Voltage [V]
Idle	O-l or 4.5–5.5
Engine speed gradually Increases to 5,000 rpm	1.5–4.0 (momentarily)
5,000 rpm	O-l or 4.5-5.5

(4) If the voltages are outside the standard values, inspect the induction control valve position sensor, variable induction control motor and the related harnesses.

VARIABLE INDUCTION CONTROL MOTOR CHECK

(1) Disconnect the variable induction control motor connectors.
(2) Disconnect the air intake hose from the throttle body.
(3) Check the variable induction control motor coil for continuity.

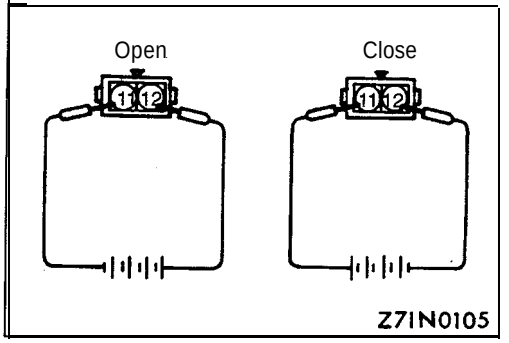


Standard value

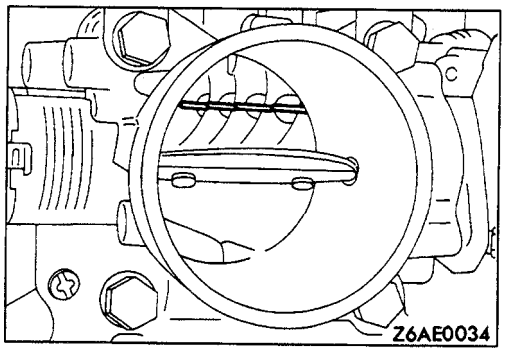
Measured terminal	Continuity
Between terminals (11) and (12)	Present [5–35 Ω: 20°C (68°F)]

(4) Make sure that when DC 6V is applied to terminals (11) and (12) of the variable induction control motor connector, the induction control valve opens and closes smoothly.

Caution
Be sure to apply a voltage of not higher than DC 6V to the variable induction control motor connector terminals since application of high voltage may lock the servo gears.



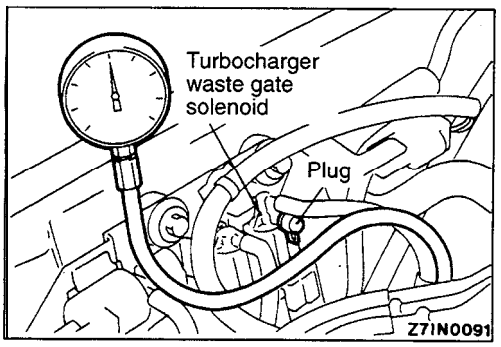
(5) If outside the standard value, or if the variable induction valve does not open and close smoothly, replace the intake manifold plenum assembly.



TURBOCHARGER SUPERCHARGING PRESSURE CHECK (Turbo)

Caution
Perform running inspection with two passengers in the vehicle and where full throttle acceleration can be safely made.
The pressure gauge reading is taken by a front seat passenger.

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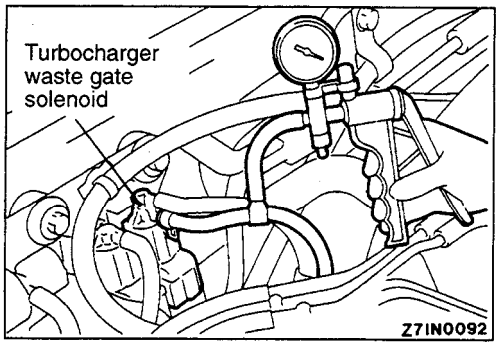
(1) Disconnect the hose (black) from the turbocharger waste gate solenoid, and connect the pressure gauge to the hose. Plug the nipple of the solenoid valve from which the hose (black) has been disconnected.
(2) Drive the vehicle with full throttle and accelerate the engine to a speed of more than 3,500 rpm at 2nd gear. Measure the supercharging pressure when the pointer is stabilized.

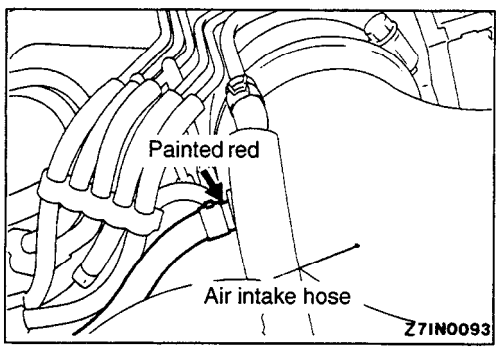
Standard value: 20-60 kPa (2.9-8.7 psi)

Caution
If the supercharging pressure deviates from the standard value, check the following items for possible causes.

When pressure is high:
Turbocharger waste gate actuator malfunction

When pressure is low:
Turbocharger waste gate actuator malfunction
Supercharging pressure leaks
Faulty turbocharger





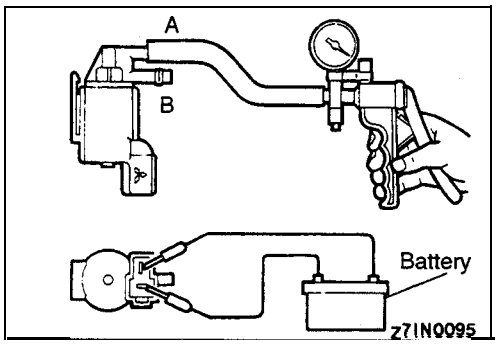
INTAKE CHARGE PRESSURE CONTROL SYSTEM CHECK (Turbo)

(1) After the diagnostic trouble code of MFI system is completely read, turn off the ignition switch.
(2) Disconnect the hose (black) from the turbocharger waste gate solenoid and connect a three-way joint between the hose and the solenoid.
(3) Connect a hand vacuum pump to the three-way joint.
(4) Disconnect the hose (with its end painted red) from the turbocharger wastegate actuator control boost nipple and plug the nipple.
(5) Applying a negative pressure with the hand vacuum pump, check tightness both when the hose end (with its end painted red) is closed and when it is open.

Engine state	Hose (with its end painted red)	Normal state
stop (Ignition switch: ON)	Opened	Negative pressure leaks.
	Closed by finger	Negative pressure is maintained.
Idling (after warm-up)	Closed by finger	Negative pressure leaks.

NOTE
If this check indicates an abnormal condition, the turbocharger waste gate actuator, turbocharger waste gate solenoid or hose is broken.

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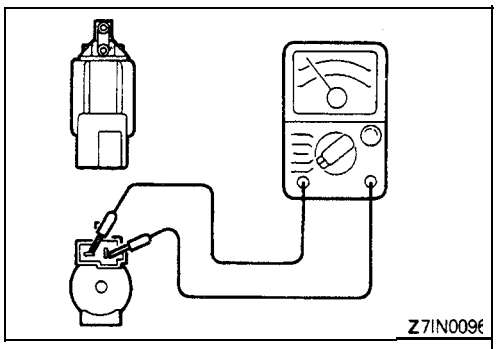


TURBOCHARGER WASTE GATE SOLENOID CHECK (Turbo)

OPERATION CHECK

(1) Connect a hand vacuum pump to the solenoid valve nipple (A) (see the illustration to the left).
(2) Using a jumper wire, connect between the solenoid valve terminal and battery terminal.
(3) Connecting and disconnecting the jumper wire at the battery negative terminal to apply a negative pressure, check tightness.

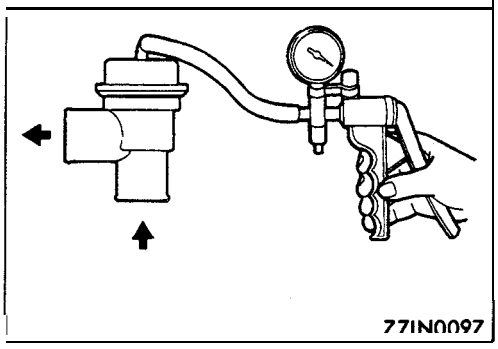
Jumper wire	(B) nipple condition	Normal condition
Connected	Open	Negative pressure leaks.
	Close	Negative pressure is held.
Disconnected	Open	Negative pressure is held.



COIL RESISTANCE CHECK

Measure resistance between solenoid valve terminals.

Standard value: 36-44 Ω [at 20°C (68°F)]



TURBOCHARGER BYPASS VALVE CHECK (Turbo)

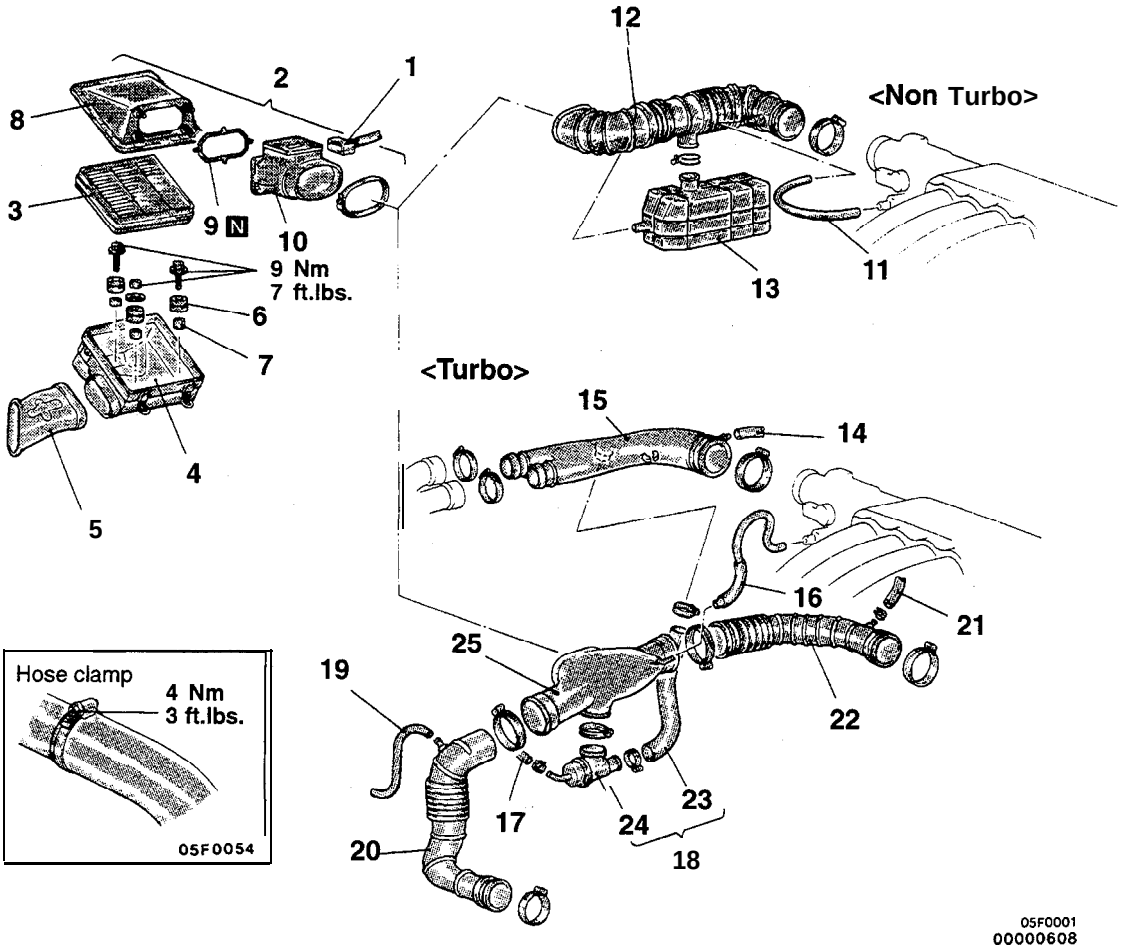
(1) Remove the turbocharger bypass valve.
(2) Connect the hand vacuum pump to the nipple of the turbocharger bypass valve.
(3) Apply a negative pressure of approx. 400 mmHg (16 in.Hg), and check operation of the valve. Also check that air tightness is maintained.

Negative pressure	Valve operation
About 400 mmHg (16 in.Hg)	It starts opening

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AIR CLEANER

REMOVAL AND INSTALLATION



Air cleaner removal steps

1. Volume airflow sensor connector
2. Air cleaner cover and volume airflow sensor assembly
3. Air cleaner element
4. Air cleaner body
5. Air duct
6. Insulator
7. Collar
8. Air cleaner cover
9. Volume air flow sensor gasket
10. Volume air flow sensor assembly

Air intake hose removal steps

<Non-Turbo>

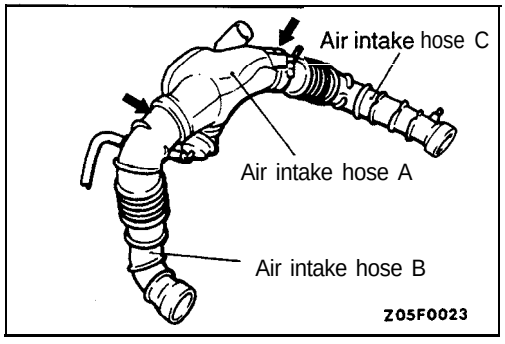
11. Breather hose
12. Air intake hose
13. Resonator

Air intake hose removal steps

<Turbo>

14. Boost hose connection
15. Air hose A
16. Breather hose
17. Vacuum hose connection
▶A◀ 18. Air intake hose A, turbocharger bypass valve and air by-pass hose
19. Purge hose connection
▶A◀ 20. Air intake hose B
21. Boost hose connection
▶A◀ 22. Air intake hose C
23. Air by-pass hose
24. Turbocharger bypass valve
25. Air intake hose A

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INSTALLATION SERVICE POINTS

▶A◀ AIR INTAKE HOSE C / AIR INTAKE HOSE B / AIR INTAKE HOSE A, TURBOCHARGER BY-PASS VALVE AND AIR BY-PASS HOSE INSTALLATION

Engaging the notch with the A mark at points indicated by the arrows, insert air intake hoses B and C until seated. Insert the turbocharger end of air intake hoses B and C completely.

INSPECTION

- Check the air cleaner body, cover or packing for deformation, corrosion or damage.
- Check the air duct for damage.
- Check the air cleaner element for clogging, contamination or damage.
  If element is slightly clogged, remove dust by blowing air from inside of element.

VOLUME AIR FLOW SENSOR CHECK

For inspection of volume airflow sensor, refer to GROUP 13A – Volume Air Flow Sensor Check.

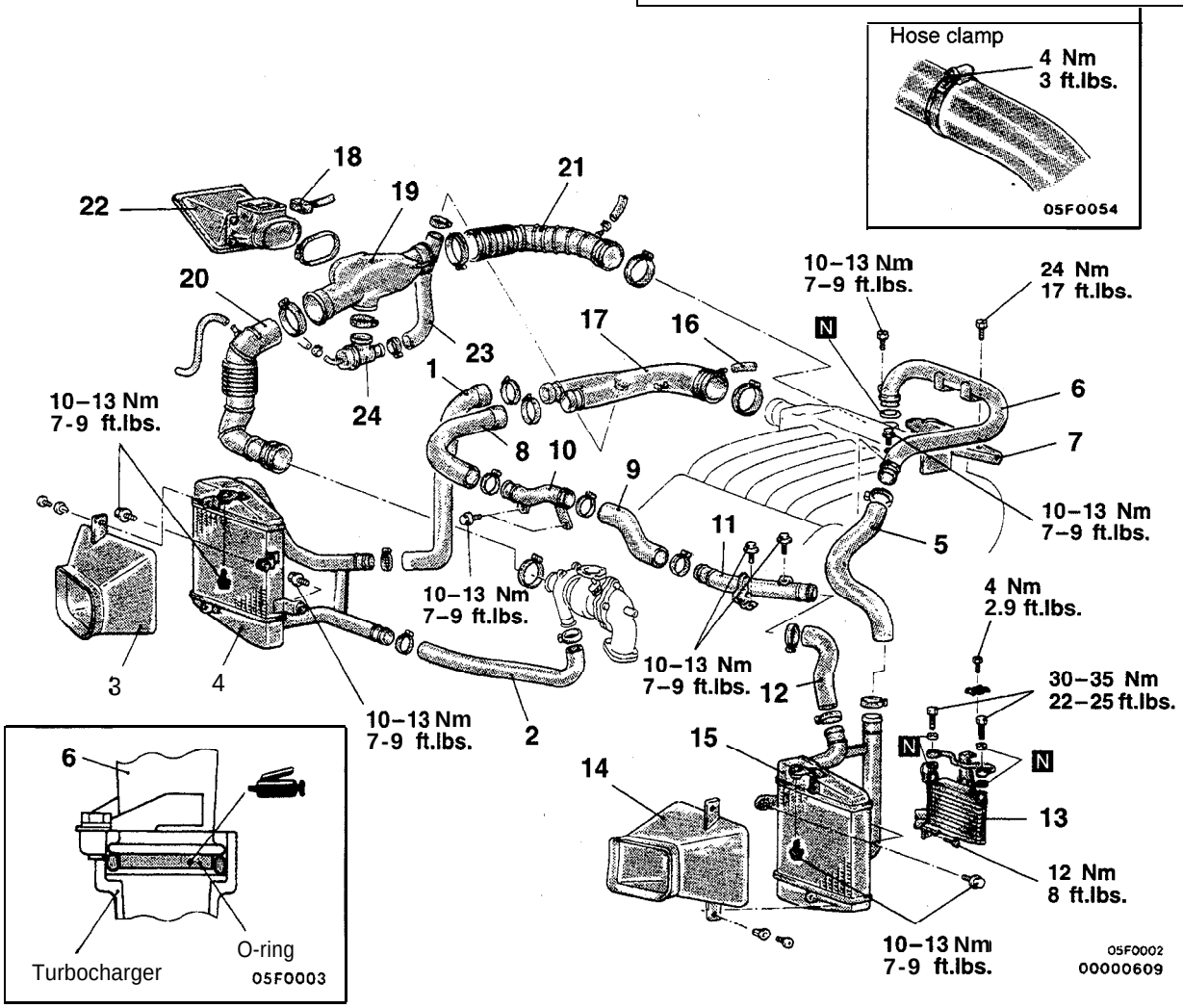
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CHARGE AIR COOLER

REMOVAL AND INSTALLATION

Pre-removal Operation
- Front Bumper Removal
  (Refer to GROUP 51 – Front Bumper.)

Post-installation Operation
- Engine Oil Supplying
  (When equipped with charge air cooler left)
  (Refer to GROUP 00 – Maintenance Service.)
- Front Bumper Installation
  (Refer to GROUP 51 – Front Bumper.)



Charge air cooler right removal steps

▶C◀ 1. Air hose C
▶C◀ 2. Air hose D
3. Charge air cooler duct (RH)
▶C◀ 4. Charge air cooler right

Charge air cooler left removal steps

▶B◀ 5. Air hose G
6. Air pipe A
7. Heat protector F
▶B◀ 8. Air hose B
▶B◀ 9. Air hose E
10. Air pipe B
11. Air pipe C
▶B◀ 12. Air hose F
◀A▶ 13. Engine oil cooler
14. Charge air cooler duct (LH)
▶B◀ 15. Charge air cooler left

Air intake hose removal steps

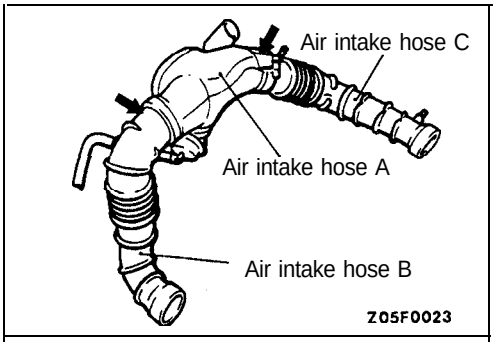
16. Boost hose connection
17. Air hose A
18. Volume air flow sensor connector
▶A◀ 19. Air intake hose A
▶A◀ 20. Air intake hose B
▶A◀ 21. Air intake hose C
22. Air cleaner
23. Air by-pass hose
24. Turbocharger bypass valve

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REMOVAL SERVICE POINT

◀A▶ ENGINE OIL COOLER REMOVAL

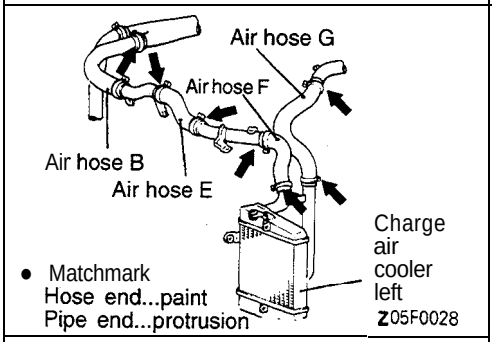
Disconnect the hose from the engine oil cooler and remove the engine oil cooler only.



INSTALLATION SERVICE POINTS

▶A◀ AIR INTAKE HOSE C / AIR INTAKE HOSE B / AIR INTAKE HOSE A INSTALLATION

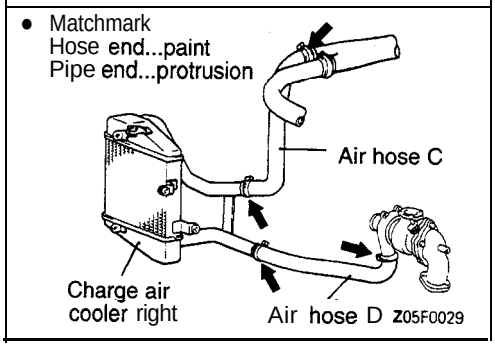
Engaging the notch with the A mark at points indicated by the arrows, insert air intake hoses B and C until seated. Insert the turbocharger end of air intake hoses B and C completely.



▶B◀ CHARGE AIR COOLER LEFT / AIR HOSE F / AIR HOSE E / AIR HOSE B / AIR HOSE G INSTALLATION

Aligning the marks at the points indicated by the arrows, insert securely into the stepped portion of the pipe or until seated.

Caution
Be careful not to allow any foreign matter to get into the hoses, pipes, or the charge air cooler itself.



▶C◀ CHARGE AIR COOLER RIGHT / AIR HOSE D / AIR HOSE C INSTALLATION

Aligning the marks at the points indicated by arrows, insert securely into the stepped portion of the pipe.

Caution
Be careful not to allow any foreign matter to get into the hoses, pipes, or the charge air cooler itself.

INSPECTION

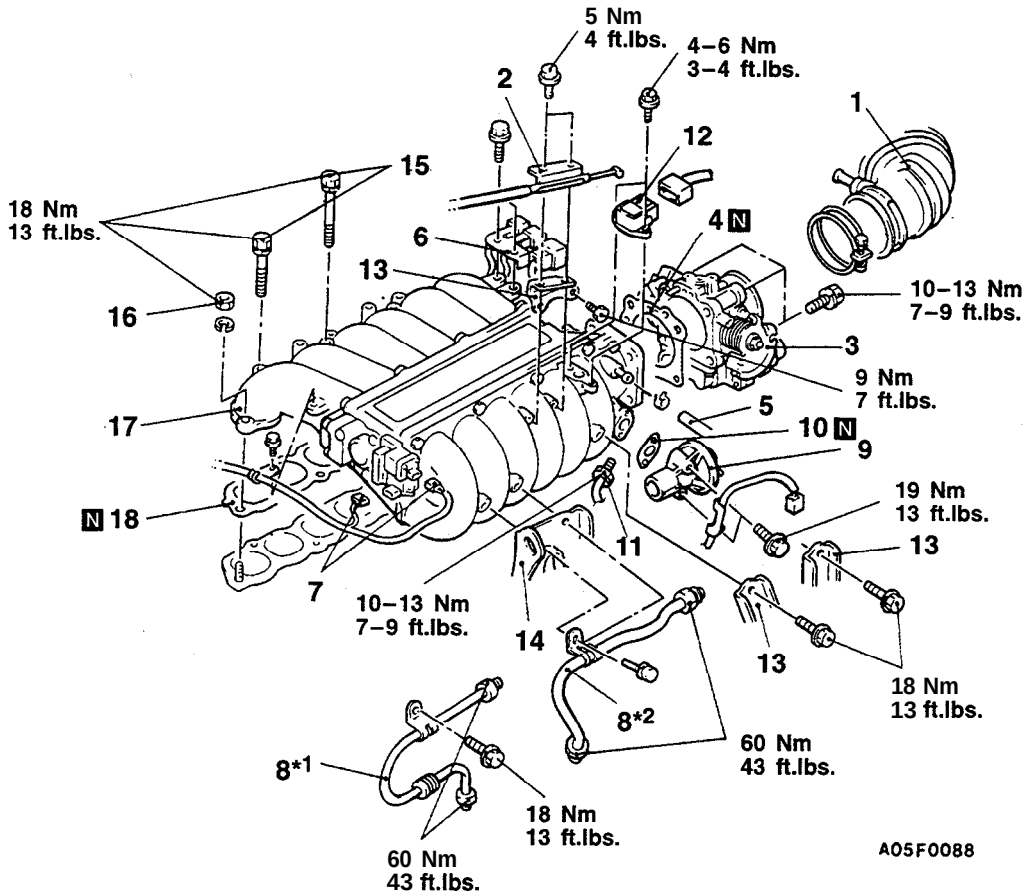
- Check the charge air cooler fins for bending, damage, or foreign matter.
- Check the charge air cooler hoses for cracking, damage, or wear.

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INTAKE MANIFOLD PLENUM <Non Turbo>

REMOVAL AND INSTALLATION

Post-installation operation
- Accelerator Cable Adjustment
  (Refer to GROUP 13F – Engine Control.)



Removal steps

1. Air intake hose connection
2. Accelerator cable connection
◀A▶ 3. Throttle body assembly
▶A◀ 4. Throttle body gasket
5. Brake booster vacuum hose connection
6. Harness connectors
7. VIC motor connection
8. EGR pipe <Up to 1995 model for California and from 1996 model>
9. EGR valve <Up to 19.95 model for California and from 1996 model>
10. EGR valve gasket
    <Up to 1995 model for California and from 1996 model>
11. EGR temperature sensor
    <Up to 1995 model for California>
12. Manifold differential pressure sensor <From 1996 model>
13. Accelerator cable bracket
14. Intake manifold plenum stay connection
15. Intake manifold plenum installation bolts
16. Intake manifold plenum installation nuts
17. Intake manifold plenum
18. Intake manifold plenum gasket

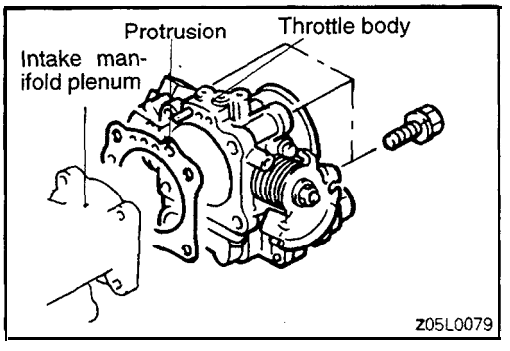
NOTE
*1 Up to 1993 model
*2 From 1994 model

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REMOVAL SERVICE POINT

(A, THROTTLE BODY ASSEMBLY REMOVAL

Leaving the water hoses and vacuum hoses in their installed positions, remove from the intake manifold plenum.



INSTALLATION SERVICE POINT

▶A◀ THROTTLE BODY GASKET INSTALLATION

Install with the gasket protrusion positioned as shown.

Caution
If installed in an incorrect direction, idling failure or other problems may occur.

INSPECTION

Cheek the following points; replace the part if a problem is found.

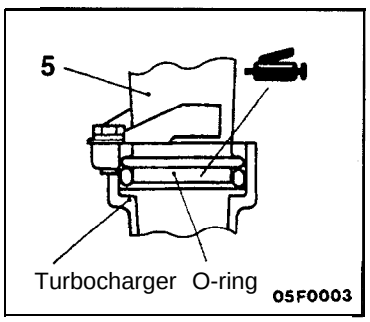
INTAKE MANIFOLD PLENUM CHECK

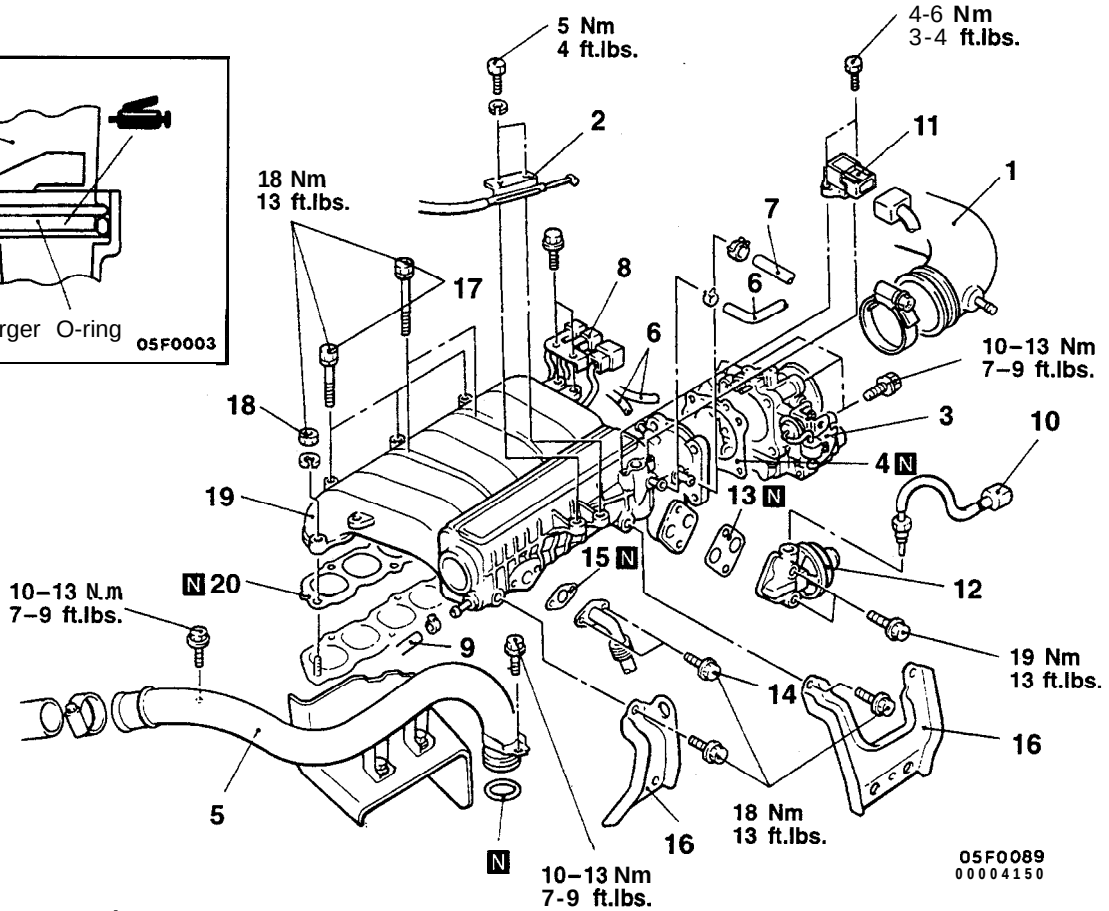
(1) Check intake manifold plenum for defect or cracks. Replace if defective or cracked.
(2) Check load (negative pressure) of drain port. Clean if required.

INTAKE MANIFOLD PLENUM <Turbo>

REMOVAL AND INSTALLATION

Post-installation Operation
- Accelerator Cable Adjustment
  (Refer to GROUP 13F – Engine Control.)





Removal steps

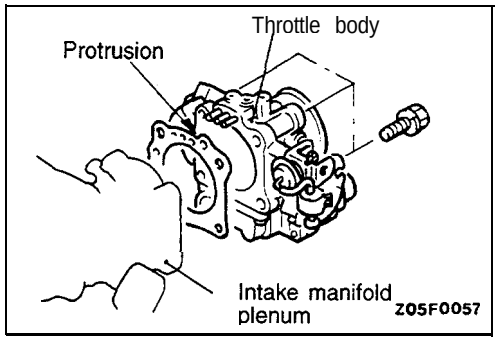
1. Air hose A connection
2. Accelerator cable connection
◀A▶ 3. Throttle body assembly
▶A◀ 4. Throttle body gasket
5. Air pipe A
6. Vacuum hose connection
7. Brake booster vacuum hose connection
8. Harness connector
9. Clutch booster vacuum hose connection
10. EGR temperature sensor <Up to 1995 model for California>
11. Manifold differential pressure sensor <From 1996 model>
12. EGR valve <Up to 1995 model for California and from 1996 model>
13. EGR valve gasket <Up to 1995 model for California and from 1996 model>
14. EGR pipe installation bolts <Up to 1995 model for California and from 1996 model>
15. EGR pipe gasket <Up to 1995 model for California and from 1996 model>
16. intake manifold plenum stay connection
17. Intake manifold plenum installation bolts
18. Intake manifold plenum installation nuts
19. Intake manifold plenum
20. Intake manifold plenum gasket

REMOVAL SERVICE POINT

◀A▶ THROTTLE BODY ASSEMBLY REMOVAL

Leaving the water hoses and vacuum hoses in their installed positions remove from the intake manifold plenum.

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INSTALLATION SERVICE POINT

▶A◀ THROTTLE BODY GASKET INSTALLATION

Install with the gasket protrusion positioned as shown.

Caution
If installed in an incorrect direction, idling failure or other problems may occur.

INSPECTION

Check the following points; replace the part if a problem is found.

INTAKE MANIFOLD PLENUM CHECK

(1) Check intake manifold plenum for defect or cracks. Replace if defective or cracked.
(2) Check load (negative pressure) of drain port. Clean if required.

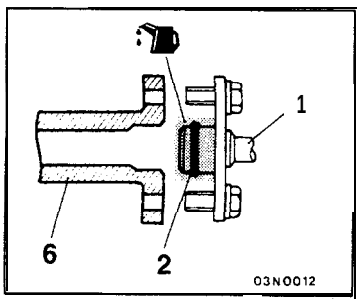
TSB Revision

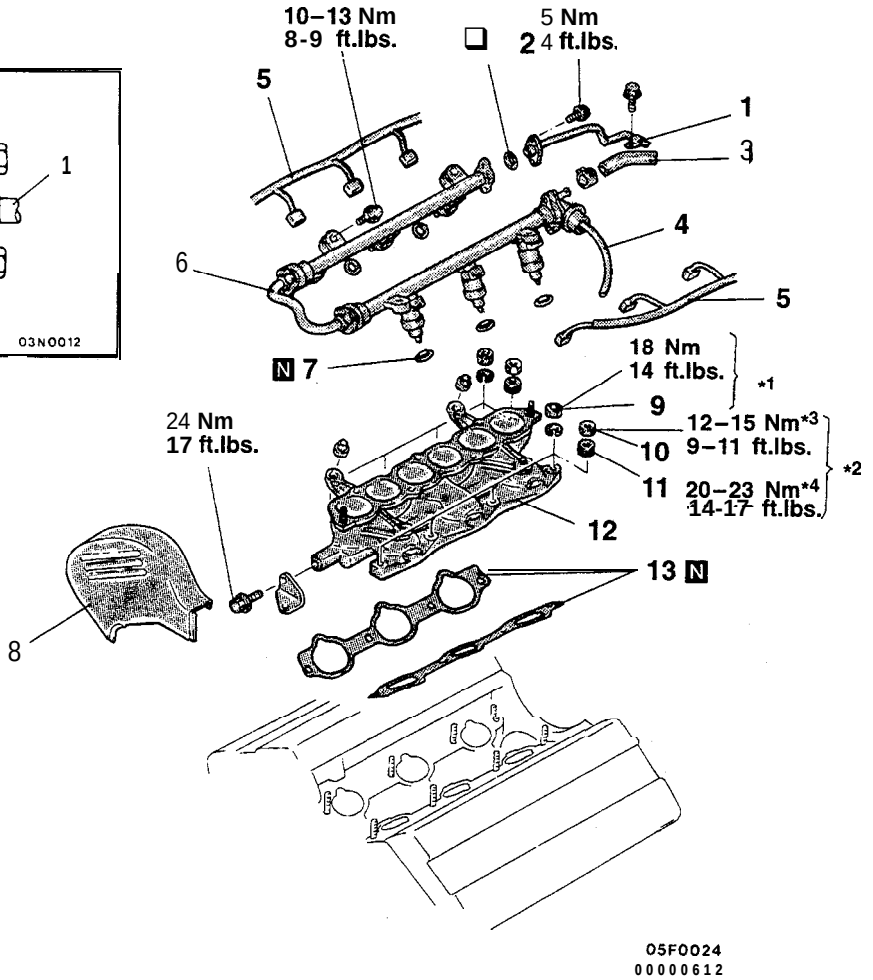
INTAKE MANIFOLD

REMOVAL AND INSTALLATION

Pre-removal Operation
- Residual Pressure Release (Refer to GROUP 13A – On-vehicle Service.)
- Engine Coolant Draining (Refer to GROUP 00 – Maintenance Service.)
- Intake Manifold Plenum Removal (Refer to P.15-13, 15.)

Post-installation Operation
- Intake Manifold Plenum Installation (Refer to P.15-13, 15.)
- Engine Coolant Filling' (Refer to GROUP 00 – Maintenance Service.)
- Accelerator Cable Adjustment (Refer to GROUP 13F – Engine Control.)
- Fuel Leakage Checking





Removal steps

1. High-pressure fuel hose connection
2. O-ring
3. Fuel return hose connection
4. Vacuum hoses connection
5. Injector connector
6. Fuel rail (with injectors)
7. Insulators
8. Timing belt upper cover

▶C◀ 9. Intake manifold mounting nut*1

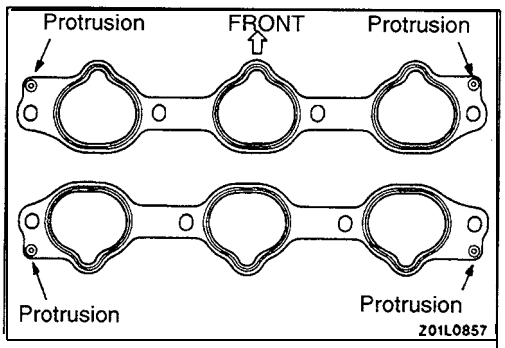
▶B◀ 10. Intake manifold mounting nut*2

11. Cone disc spring*2
12. Intake manifold

▶A◀ 13. Intake manifold gasket

NOTE
*1: <1992 non turbo model>
*2: <1992 turbo model and from 1993 model>
*3: <1992 turbo model and up to November, 1993 models>
*4: <From December, 1993 models>

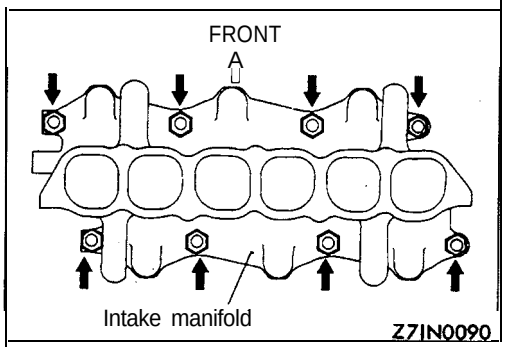
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INSTALLATION SERVICE POINTS

▶A◀ INTAKE MANIFOLD GASKET INSTALLATION

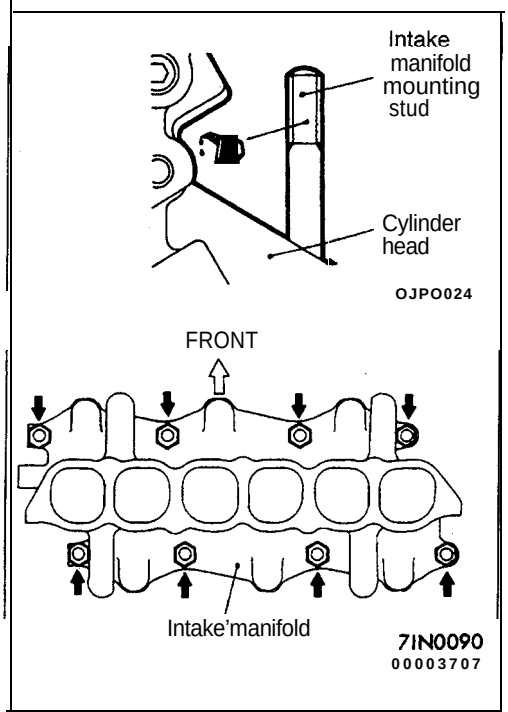
Install with gasket protrusions in the position illustrated.

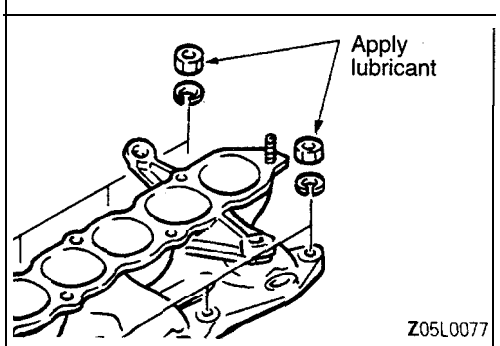


▶B◀ INTAKE MANIFOLD MOUNTING NUT INSTALLATION

<1992 turbo, model and up to November, 1993 models>
Tighten the intake manifold mounting nuts one bank after the other by the following procedure.
(1) Tighten the nuts in the front bank to 3 to 5 Nm (2.2 to 3.6 ft.lbs.).
(2) Tighten the nuts in the rear bank to 12 to 15 Nm (9 to 11 ft.lbs.).
(3) Tighten the nuts in the front bank to 12 to 15 Nm (9 to 11 ft.lbs.).
(4) Repeat steps (2) and (3) one more time respectively.

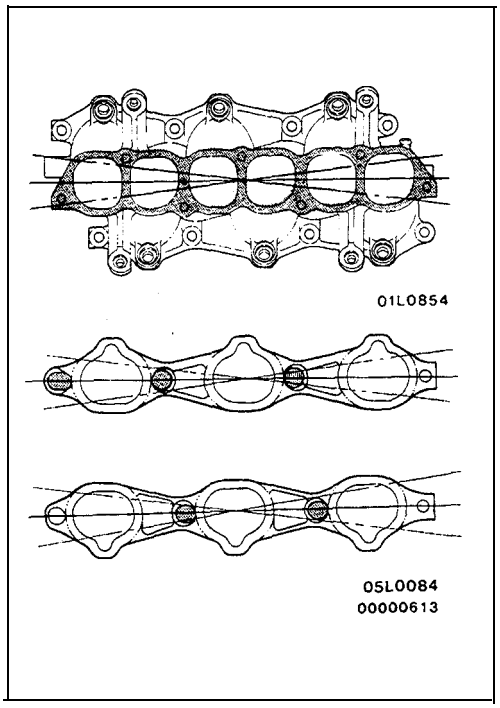
<From December, 1993 models>
(1) Apply engine oil to the intake monifold mounting stud.
(2) Tighten the intake manifold mounting nuts one bank after the other by the following procedure.
  (1) Tighten the nuts in the front bank to 5 to 8 Nm (4 to 6 ft.lbs.).
  (2) Tighten the nuts in the rear bank to 20 to 23 Nm (14 to 17 ft.lbs.).
  (3) Tighten the nuts in the front bank to 20 to 23 Nm (14 to 17 ft.lbs.).
  (4) Repeat Steps (2) and (3) one more time respectively.





▶C◀ INTAKE MANIFOLD MOUNTING NUT INSTALLATION 4992 non turbo model>

Apply lubricant sparingly to the intake manifold mounting nuts.



INSPECTION

Check the following points; replace the part if a problem is found.

INTAKE MANIFOLD CHECK

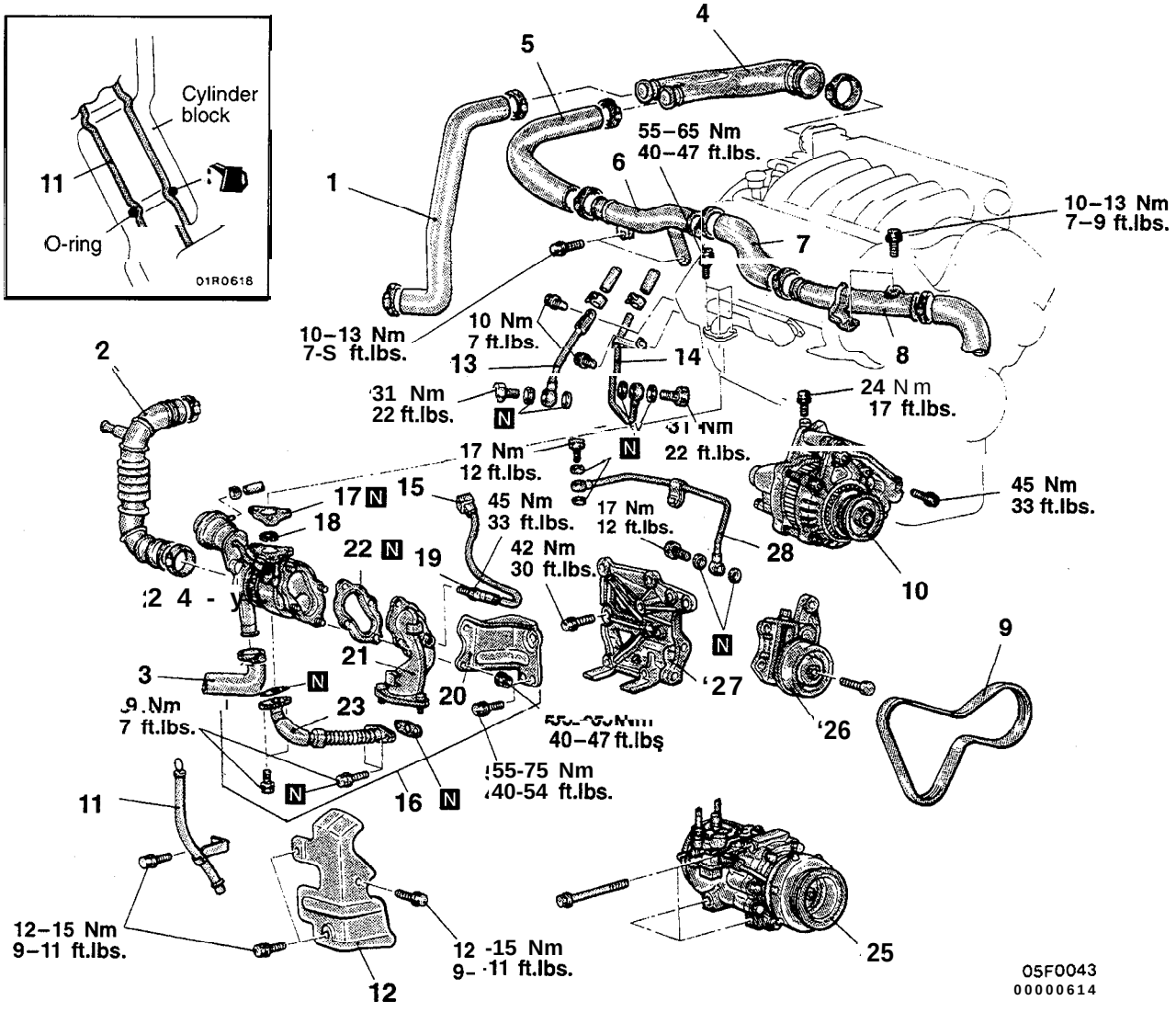
(1) Check for damage or cracking of any part.
(2) Clogging of the negative pressure (vacuum) outlet port, or clogging of the gas passages.
(3) Check deflection of installation surface with straight edge and thickness gauge.

Standard value: 0.15 mm (.0059 in.) or less
Limit: 0.2 mm (.008 in.)

TURBOCHARGER (FRONT)

REMOVAL AND INSTALLATION

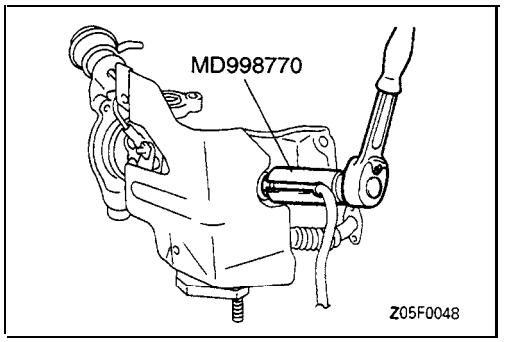
Pre-removal and Post-installation Operation
- Radiator Removal and Installation (Refer to GROUP 14 – Radiator.)
- Transmission Stay (Right) Removal and Installation
- Front Exhaust Pipe Removal and Installation (Refer to P.15-33, 35, 37.)



Removal steps

- ▶D◀ 1. Air hose C
- ▶E◀ 2. Air intake hose B
- ▶D◀ 3. Air hose D
- 4. Air hose A
- ▶C◀ 5. Air hose B
- 6. Air pipe B
- ▶C◀ 7. Air hose E
- 8. Air pipe C
- 9. Drive belt (Refer to GROUP 11 – Service Adjustment Procedures.)
- 10. Generator assembly (Refer to GROUP 16 – Generator.)
- 11. Engine oil level gauge guide
- 12. Heat protector B
- 13. Water pipe A
- 14. Water pipe B
- 15. Heated oxygen sensor connection
- 16. Turbocharger & fitting assembly
- 17. Gasket
- 18. Ring
- ◀A▶ ▶B◀ 19. Heated oxygen sensor
- 20. Turbocharger stay
- 21. Exhaust fitting
- 22. Gasket
- 23. Oil return pipe
- ▶A◀ 24. Turbocharger assembly
- ◀B▶ 25. Air conditioning compressor
- 26. Tension pulley bracket
- 27. Air conditioning compressor bracket
- 28. Oil pipe

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REMOVAL SERVICE POINTS

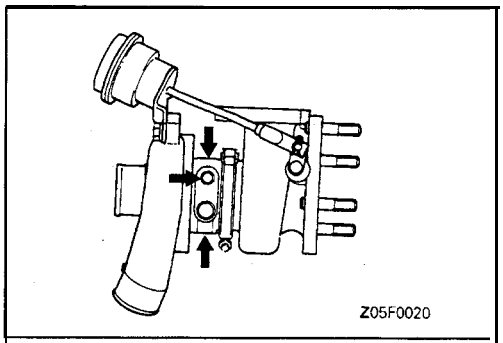
◀A▶ HEATED OXYGEN SENSOR REMOVAL

Disconnect the connector of the heated oxygen sensor, and install the special tool to the heated oxygen sensor.

◀B▶ AIR CONDITIONING COMPRESSOR DISCONNECTION

Disconnect air conditioning compressor with hoses from the bracket.

NOTE
The removed air conditioning compressor should be fastened (by using rope, etc.) in a position that will not interfere with the removal/installation of the turbocharger assembly.

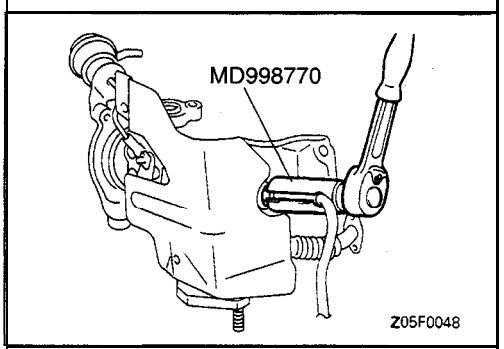


INSTALLATION SERVICE POINTS

▶A◀ TURBOCHARGER ASSEMBLY INSTALLATION

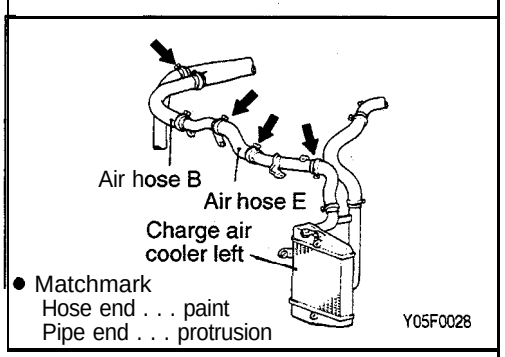
Clean the alignment surfaces shown in the illustration. Supply clean engine oil through the oil pipe installation hole of the turbocharger assembly.

Caution
When cleaning, care must be taken so that a piece of the gasket does not enter the oil passage hole.



▶B◀ HEATED OXYGEN SENSOR INSTALLATION

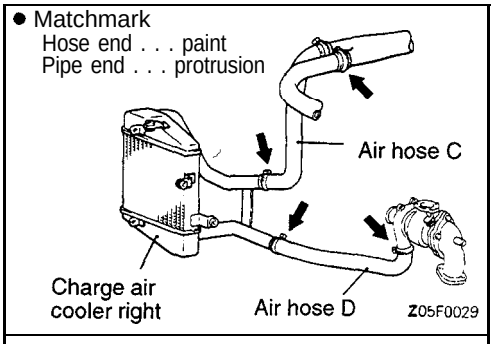
Use the special tool to install the heated oxygen sensor.



▶C◀ AIR HOSE E / AIR HOSE B INSTALLATION

Aligning the marks at the points indicated by the arrows, insert securely into the stepped portion of the pipe or until seated.

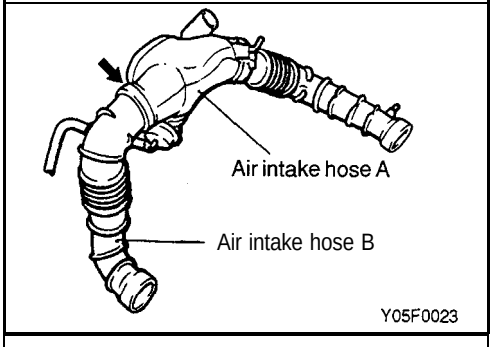
Caution
Be careful not to allow any foreign matter to get into the hoses or pipes.



▶D◀ AIR HOSE D / AIR HOSE C INSTALLATION

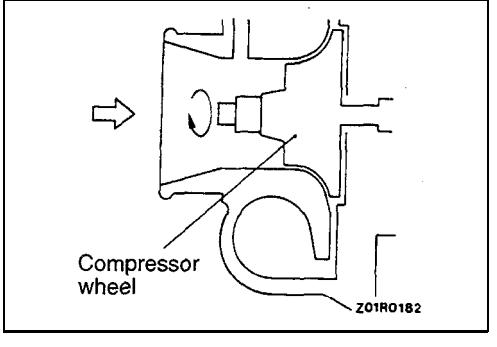
Aligning the marks at the points indicated by the arrows, insert securely into the stepped portion of the pipe.

Caution
Be careful not to allow any foreign matter to get into the hoses or pipes.



▶E◀ AIR INTAKE HOSE B INSTALLATION

Engaging the notches with A marks at the points indicated by the arrows, insert until seated.
Insert the turbocharger end of air intake hose B completely.



INSPECTION

TURBOCHARGER ASSEMBLYCHECK

- Visually check the turbine wheel and the compressor wheel for cracking or other damage.
- Check whether the turbine wheel and the compressor wheel can be easily turned by hand.
- Check for oil leakage from the turbocharger assembly.
- Check whether or not the turbocharger waste gate valve remains open. If any problem is found, replace the part after disassembly.

OIL PIPE AND OIL-RETURN PIPE CHECK

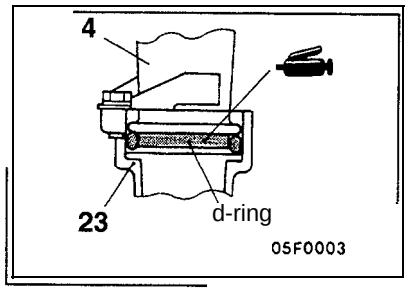
Check the oil pipe and oil-return pipe for clogging, bending, or other damage.
If there is clogging, clean it.

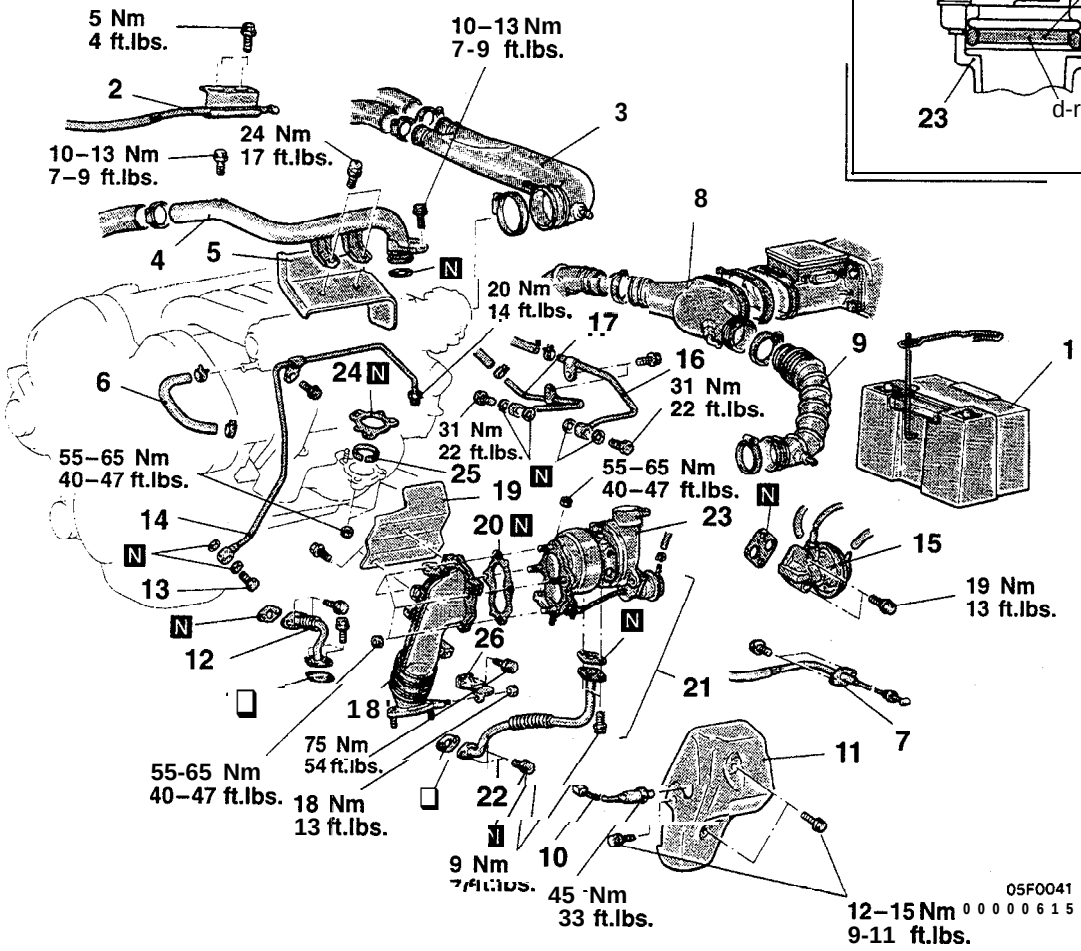
TURBOCHARGER (REAR)

REMOVAL AND INSTALLATION

Pre-removal Operation
- Engine Coolant Draining (Refer to GROUP 00 – Maintenance Service.)
- Front Exhaust Pipe Removal (Refer to P.15-33, 35, 37.)

Post-installation Operation
- Front Exhaust Pipe Installation (Refer to P.15-33, 35. 37.)
- Engine Coolant Refilling (Refer to GROUP 00 – Maintenance Service.)
- Accelerator Cable Adjustment (Refer to GROUP 13F – Engine Control.)

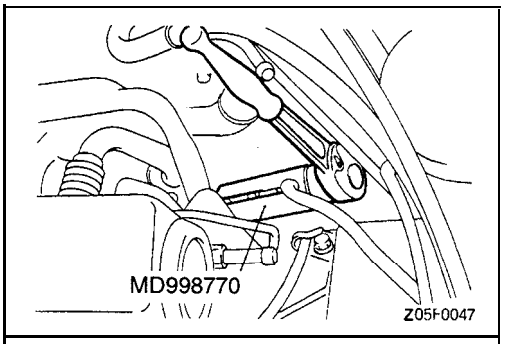




Removal steps

1. Battery
2. Accelerator cable connection (engine side)
3. ▶E◀ Air hose A
4. ▶E◀ Air pipe A
5. Heat protector F
6. Clutch booster vacuum hose
7. Accelerator cable connection (pedal side)
8. ▶D◀ Air intake hose A
9. ▶D◀ Air intake hose C
10. ◀A▶ ▶C◀ Heated oxygen sensor
11. Heat protector D
12. EGR pipe
13. Eye bolt
14. ▶B◀ Oil Pipe
15. EGR valve
16. Water pipe A
17. Water pipe B
18. Exhaust fitting
19. Heat protector E
20. Gasket
21. Turbocharger & return pipe assembly
22. Oil return pipe
23. ▶A◀ Turbocharger assembly
24. Gasket
25. Ring
26. Exhaust fitting stay

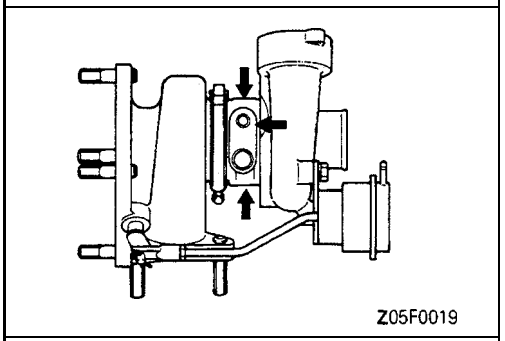
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REMOVAL SERVICE POINT

◀A▶ HEATED OXYGEN SENSOR REMOVAL

Disconnect the connector of the heated oxygen sensor, and install the special tool to the heated oxygen sensor.



INSTALLATION SERVICE POINTS

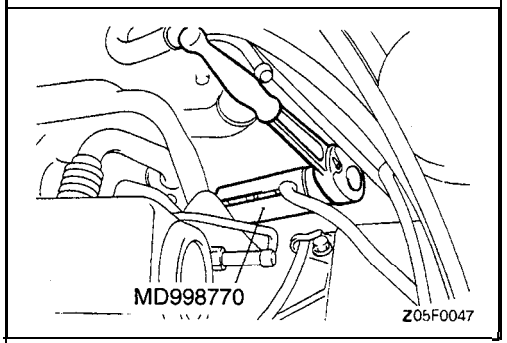
▶A◀ TURBOCHARGER ASSEMBLY INSTALLATION

Clean the alignment surfaces shown in the Illustration.

Caution
When cleaning, care must be taken so that a piece of the gasket does not enter the oil passage hole.

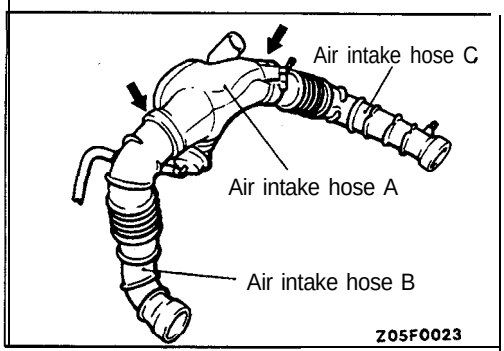
▶B◀ OIL PIPE INSTALLATION

Supply clean engine oil through the oil pipe installation hole of the turbocharger assembly.



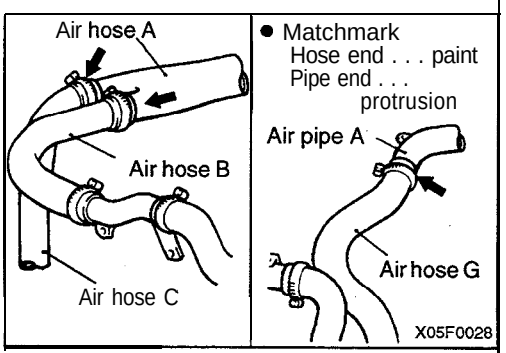
▶C◀ HEATED OXYGEN SENSOR INSTALLATION

Use the special tool to install the heated oxygen sensor.



▶D◀ AIR INTAKE HOSE C / AIR INTAKE HOSE A INSTALLATION

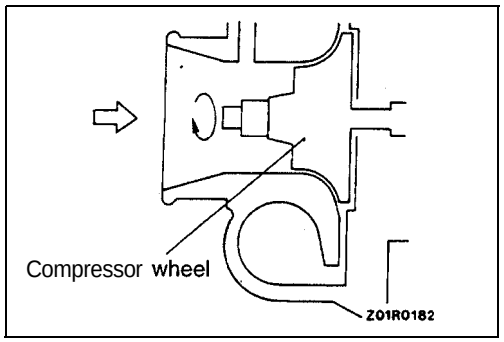
Engaging the notches with A marks at the points indicated by the arrows insert until seated.
Insert the turbocharger end of air intake hose C completely.



▶E◀ AIR PIPE A / AIR HOSE A INSTALLATION

Aligning the marks at the points indicated by the arrows, insert securely into the stepped portion of the pipe.

Caution
Be careful not to allow any foreign matter to get into the hoses or pipes.



INSPECTION

TURBOCHARGER ASSEMBLY CHECK

- Visually check the turbine wheel and the compressor wheel for cracking or other damage.
- Check whether the turbine wheel and the compressor wheel can be easily turned by hand.
- Check for oil leakage from the turbocharger assembly.
- Check whether or not the turbocharger waste gate valve remains open. If any problem is found, replace the part after disassembly.

OIL PIPE AND OIL-RETURN PIPE CHECK

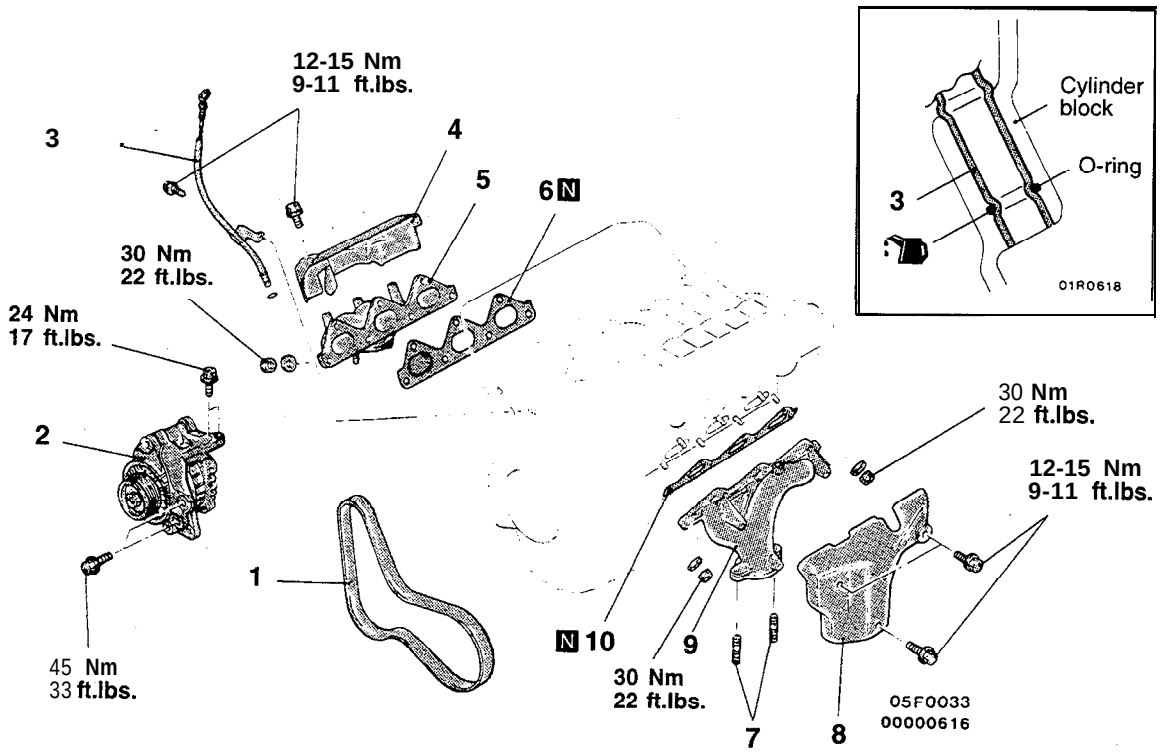
Check the oil pipe and oil-return pipe for clogging, bending, or other damage.
If there is clogging, clean it.

EXHAUST MANIFOLD <Non Turbo>

REMOVAL AND INSTALLATION

<Vehicles for Federal>

Pre-removal and Post-installation Operation
- Front Exhaust Pipe Removal and Installation (Refer to P.15-30, 31.)
- Condenser Fan Motor Assembly Removal and Installation <Vehicles with Air Conditioning> (Refer to GROUP 14 – Radiator.)



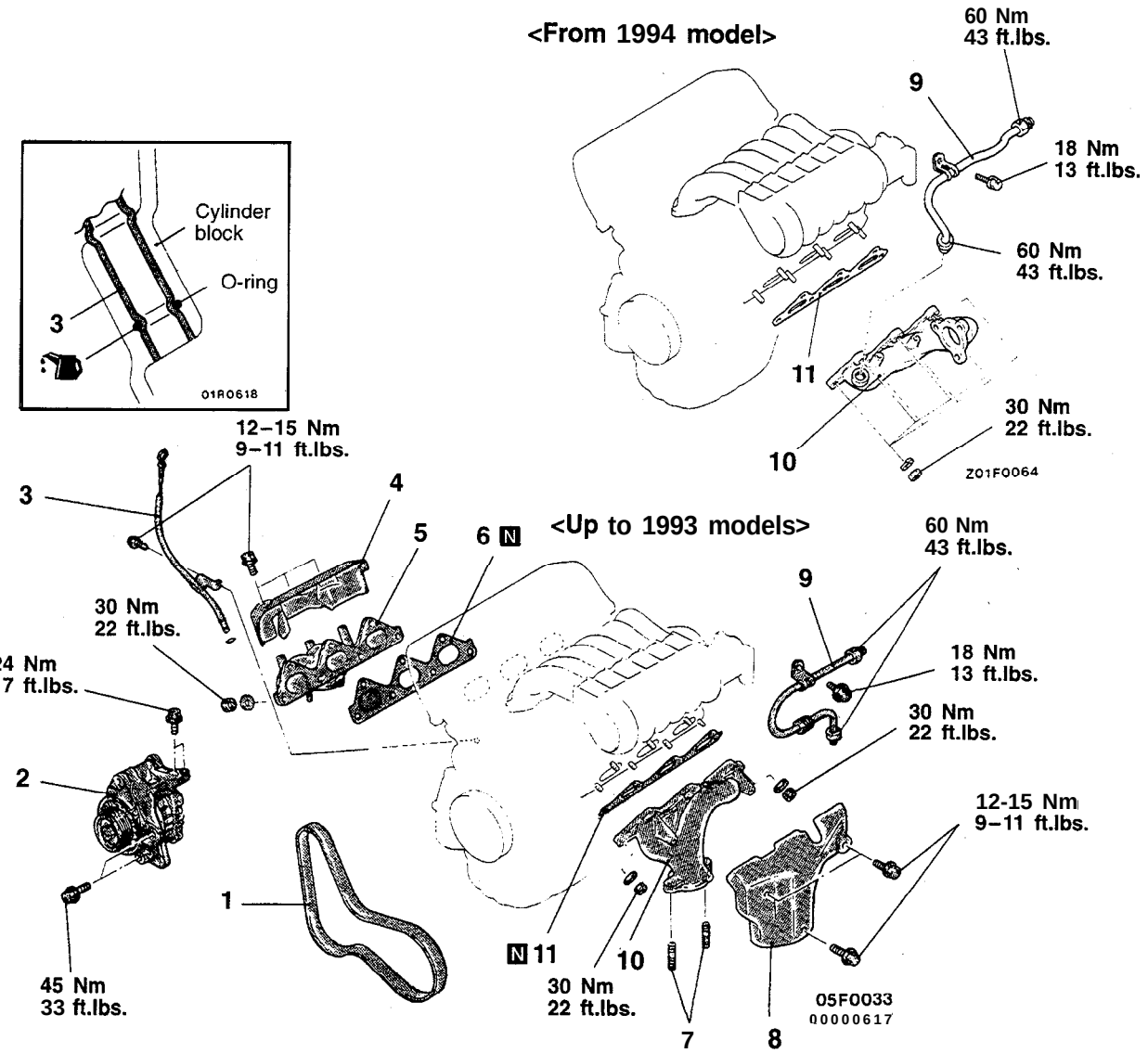
Exhaust manifold removal steps (front)
1. Drive belt (Generator) (Refer to GROUP 11 – Service Adjustment Procedures.)
2. Generator assembly
3. Oil level gauge guide
4. Heat protector
5. Exhaust manifold (front)
6. Gasket

Exhaust manifold removal steps (rear)
7. Stud
8. Heat protector
9. Exhaust manifold (rear)
10. Gasket

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<Vehicles for California>

Pre-removal and Post-installation Operation
- Catalytic Converter Removal and Installation <Front or Rear> (Refer to P.15-30, 31.)
- Condenser Fan Motor Assembly Removal and Installation <Vehicles with Air Conditioning> (Refer to GROUP 14 – Radiator.)



Exhaust manifold removal steps (front)
1. Drive belt (Generator) (Refer to GROUP 11 – Service Adjustment Procedures.)
2. Generator assembly
3. Oil level gauge guide
4. Heat protector
5. Exhaust manifold (front)
6. Gasket

Exhaust manifold removal steps (rear)
7. Stud
8. Heat protector
9. EGR pipe
10. Exhaust manifold (rear)
11. Gasket

INSPECTION

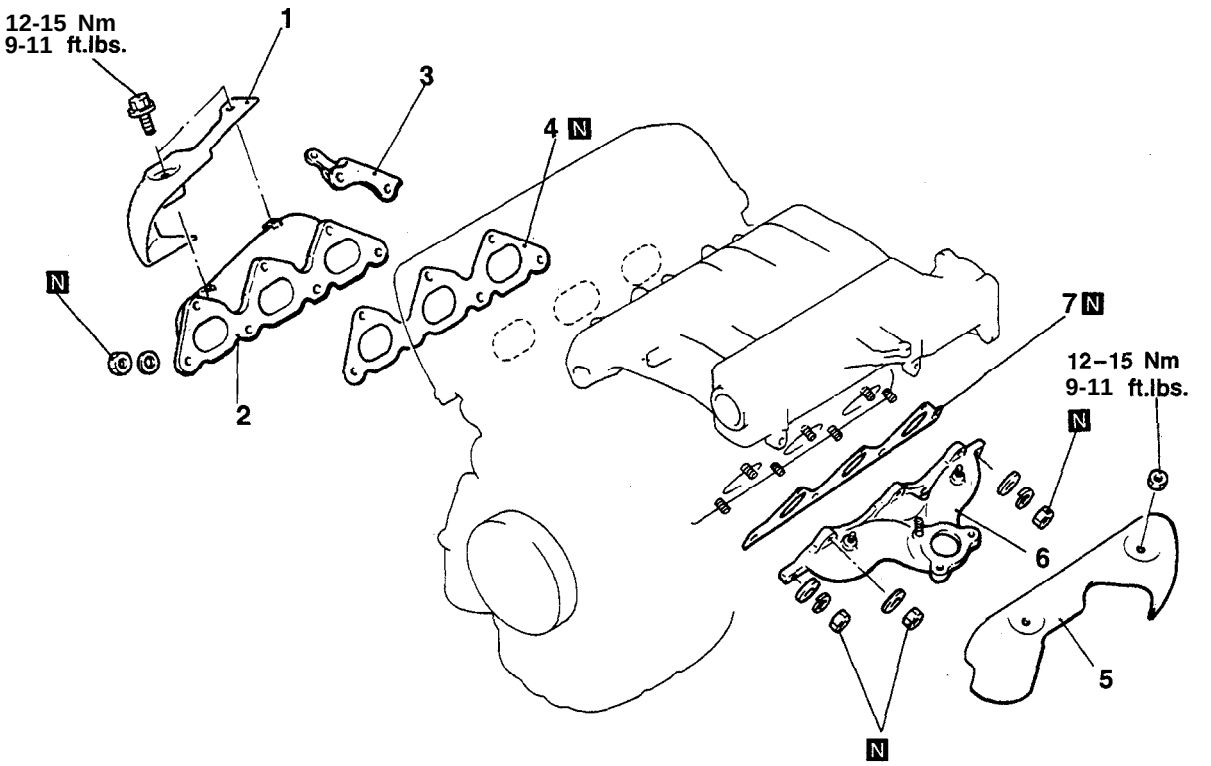
Check the following points; replace the part if a problem is found.
- Check for damage of cracking of any part.

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EXHAUST MANIFOLD <Turbo>

REMOVAL AND INSTALLATION

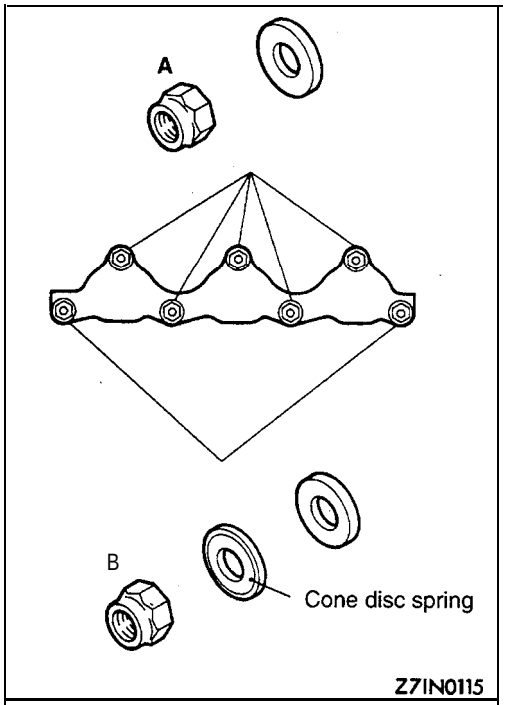
Pre-removal and Post-installation Operation
- Turbocharger Assembly Removal and Installation (Refer to P.15-20, 23.)



Exhaust manifold removal steps (front)
1. Heat protector
▶C◀ 2. Exhaust manifold (front)
▶B◀ 3. Exhaust manifold stay
4. Gasket

Exhaust manifold removal steps (rear)
5. Heat protector
▶A◀ 6. Exhaust manifold (rear)
7. Gasket

TSB Revision

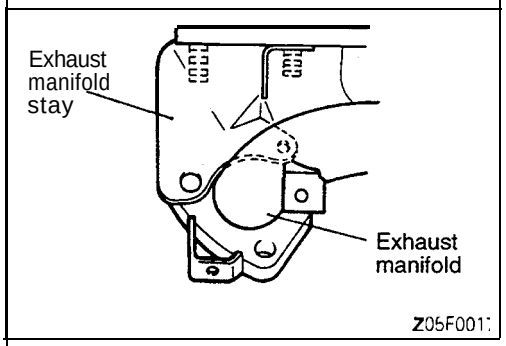


INSTALLATION SERVICE POINTS

▶A◀ EXHAUST MANIFOLD INSTALLATION (REAR)

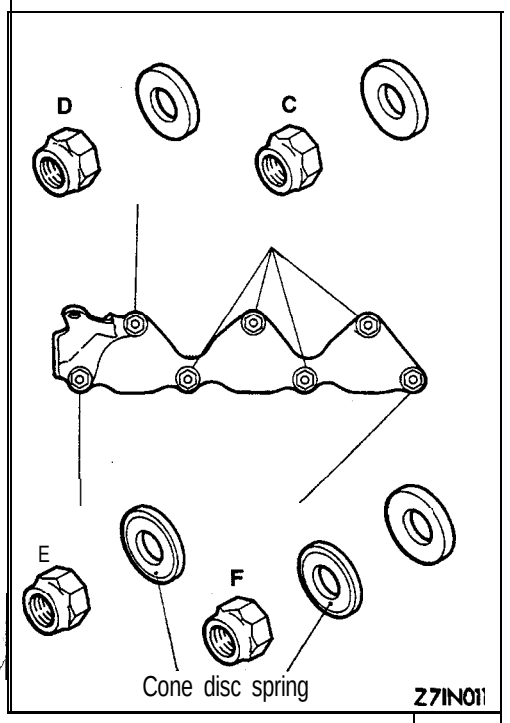
Tighten the nuts in the following order.
(1) Tighten five nuts (A) to 30 Nm (22 ftlbs.).
(2) Tighten nuts (B) to 47-53 Nm (34-38 ftlbs.).
(3) Back off nuts (B) until torque value of 10 Nm (7 ft.lbs.) is achieved.
(4) Tighten nuts (B) to 29-31 Nm (21-22 ft.lbs.).

NOTE
1. Fit the cone disc spring with the grooved side facing the nut.
2. Install the nut, cone disc spring and washer in the order shown in the illustration.



▶B◀ EXHAUST MANIFOLD STAY INSTALLATION

With the exhaust manifold stay resting on the exhaust manifold, fit it along with the exhaust manifold over the studs.



▶C◀ EXHAUST MANIFOLD INSTALLATION (FRONT)

Tighten the nuts in the following order.
(1) Tighten four nuts (C) to 30 Nm (22 ftlbs.).
(2) Temporarily tighten the turbocharger to the exhaust manifold.
(3) Tighten nut (D) to 30 Nm (22 ftlbs.).
(4) Tighten nuts (E) and (F) to 47-53 Nm (34-38 ft.lbs.).
(5) Back off nuts (E) and (F) until torque value of 10 Nm (7 ft.lbs.) is achieved.
(6) Tighten nuts (E) and (F) to 29-31 Nm (21-22 ft.lbs.).

NOTE
1. Fit the cone disc spring with the grooved side facing the nut.
2. Install the nut, cone disc spring and washer in the order shown in the illustration.

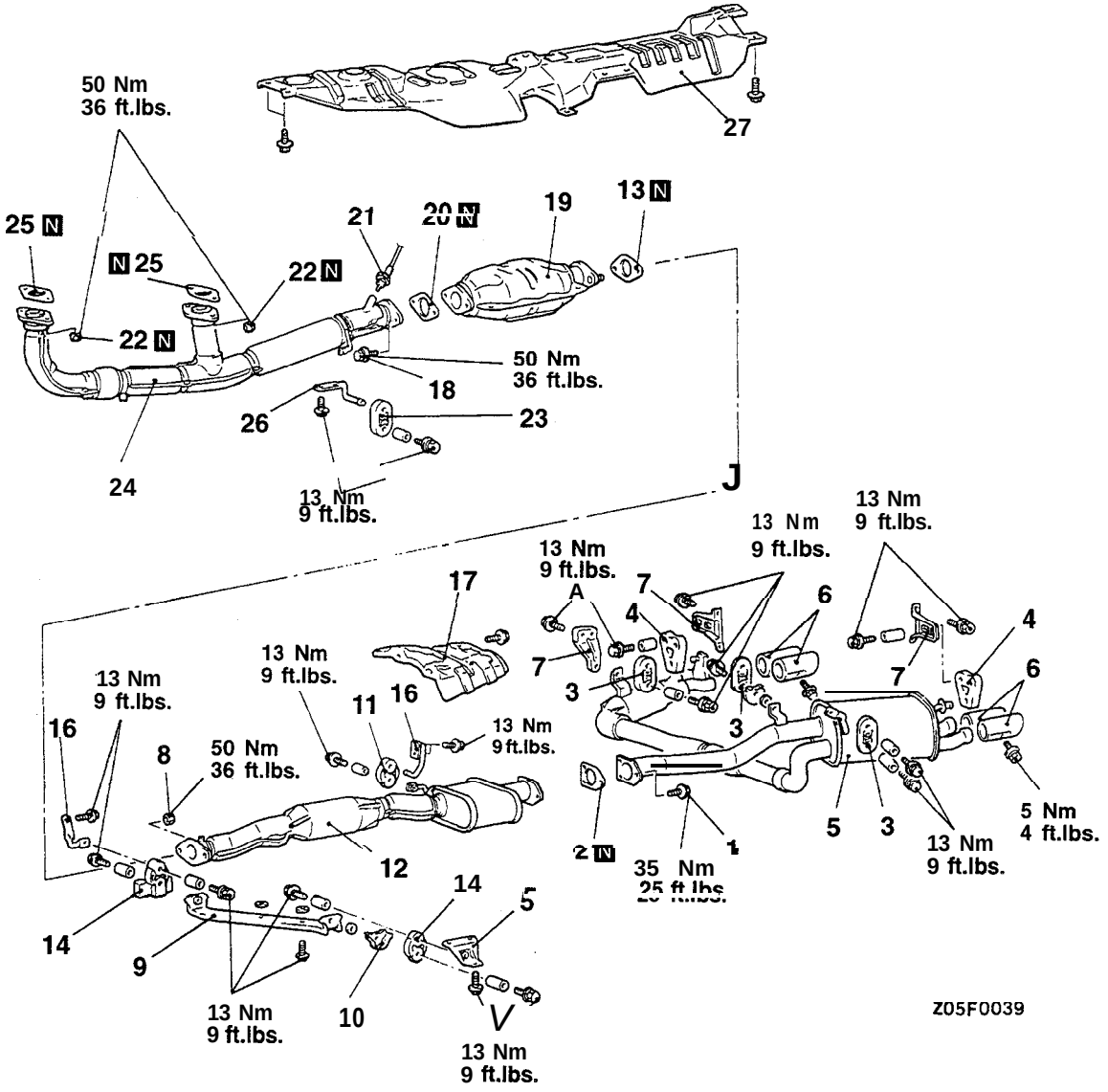
INSPECTION

Check the following points; replace the part if a problem is found.
- Check for damage of cracking of any part.

EXHAUST PIPE, MAIN MUFFLER AND CATALYTIC CONVERTER <Non Turbo>

REMOVAL AND INSTALLATION

<VEHICLE FOR FEDERAL, CALIFORNIA – Up to 1993 models>



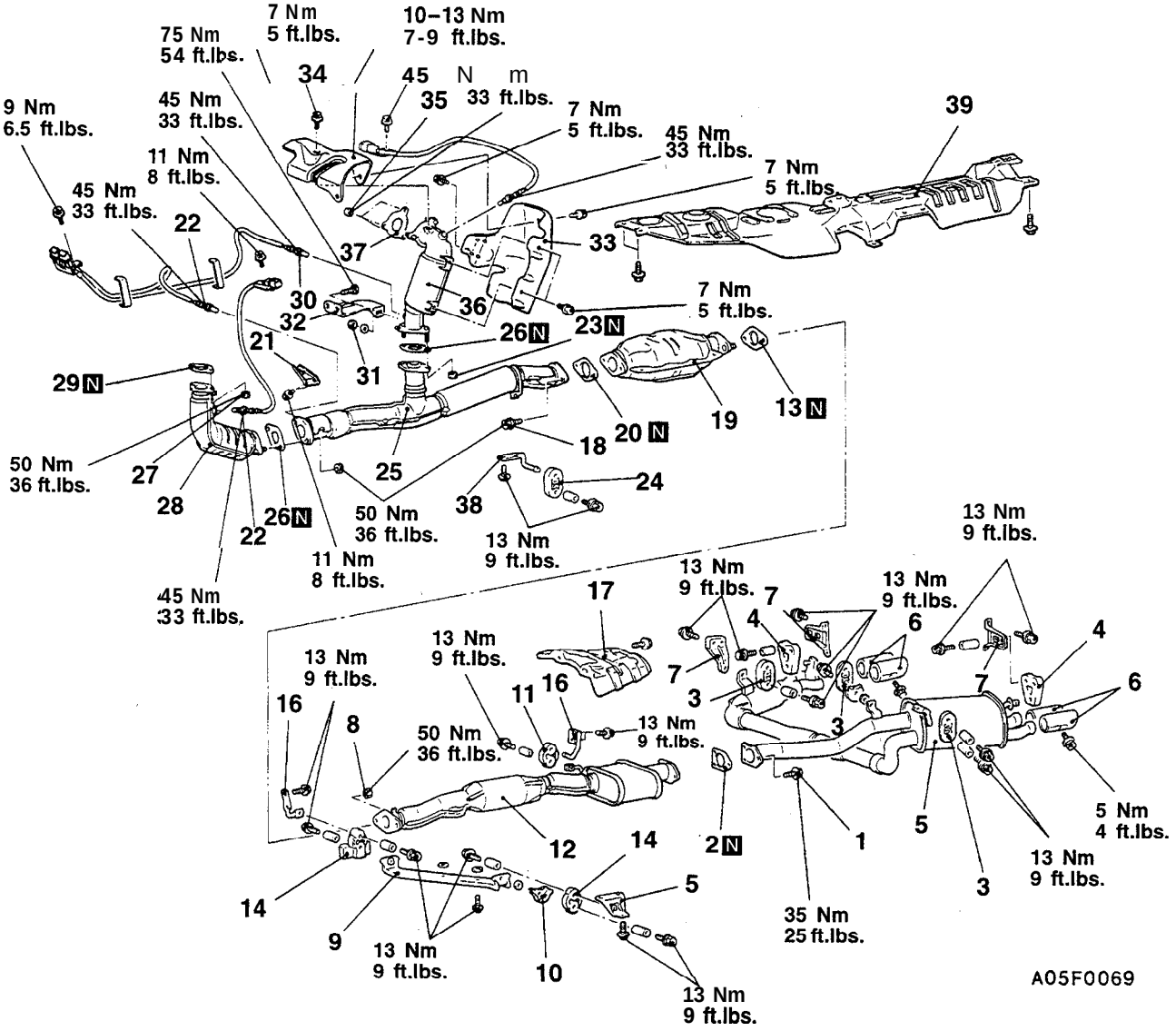
Removal steps

1. Main muffler and center exhaust pipe
2. Gasket
3. Rubber hanaers
4. Rubber hanger
5. Main muffle;
6. Mouldings
7. Hanger brackets
8. Catalytic converter and center exhaust pipe installation bolts
9. Hanger bracket
10. Protector
11. Rubber hangers
12. Center exhaust pipe
13. Gasket
14. Rubber hangers
15. Hanger bracket
16. Hanger brackets
17. Rear floor heat protector
18. Catalytic converter and front exhaust pipe installation bolts
19. Catalytic converter
20. Gasket
21. Heated oxygen sensor connection
22. Self-locking nuts
23. Rubber hanger
24. Front exhaust pipe
25. Gasket
26. Hanger bracket
27. Front floor heat protector

◀A▶ ◀A▶ ◀A▶

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<VEHICLE FOR CALIFORNIA – From 1994 models>

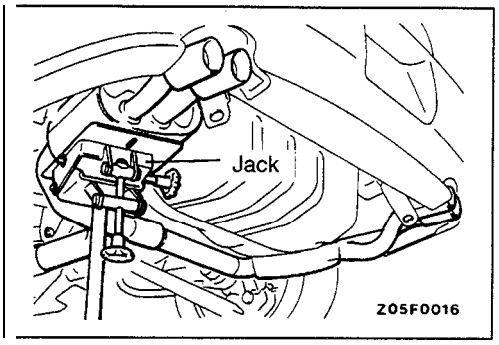


Removal steps

1. Main muffler and center exhaust pipe installation bolts
2. Gasket
3. Rubber hangers
4. Rubber hanger
5. Main muffler
6. Mouldings
7. Hanger brackets
8. Catalytic converter and center exhaust pipe installation bolts
9. Hanger bracket
10. Protector
11. Rubber hanger
12. Center exhaust pipe
13. Gasket
14. Rubber hangers
15. Hanger bracket
16. Hanger brackets
17. Rear floor heat protector
18. Catalytic converter and front exhaust pipe installation bolts
19. Catalytic converter
20. Gasket
21. Oxygen sensor protector
22. Heated oxygen sensor connection
23. Self-locking nuts
24. Rubber hanger
25. Front exhaust pipe
26. Gasket
27. Self-locking nuts
28. Catalytic converter (front)
29. Gasket
30. Heated oxygen sensor connection
31. Catalytic converter (rear) and exhaust fitting stay installation nut
32. Exhaust fitting stay
33. Heat protector A
34. Heat protector B
35. Exhaust manifold (rear) and catalytic converter (rear) installation nut
36. Catalytic converter (rear)
37. Gasket
38. Hanger bracket
39. Front floor heat protector

◀A▶ ◀A▶ ◀A▶

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REMOVAL SERVICE POINTS

◀A▶ RUBBER HANGER / MAIN MUFFLER REMOVAL

Support with a transmission jack, etc.

INSPECTION

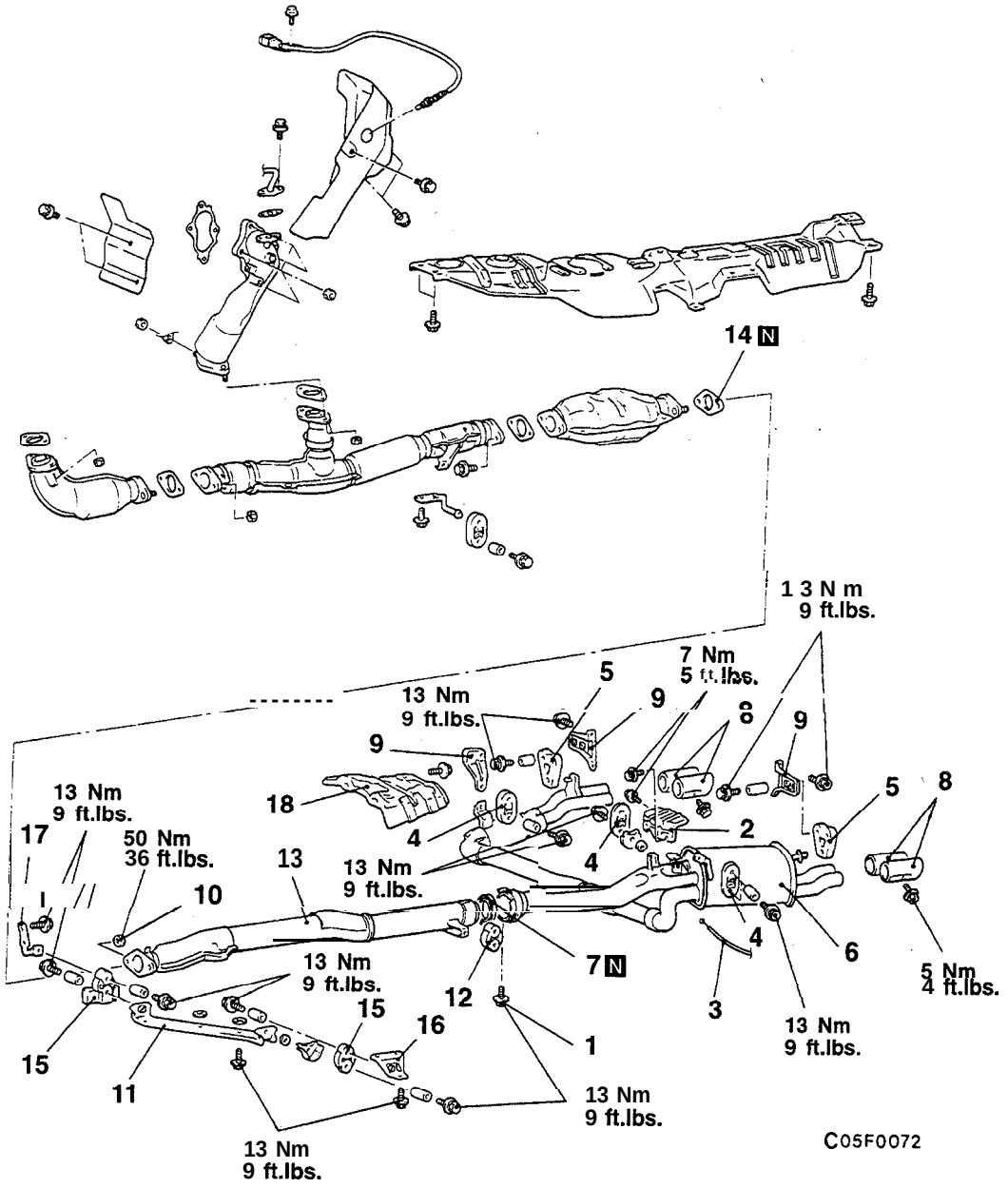
- Check the mufflers and pipes for corrosion or damage.
- Check the rubber hangers for deterioration or damage.
- Check for gas leakage from mufflers and pipes.

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EXHAUST PIPE, MAIN MUFFLER AND CATALYTIC CONVERTER <Turbo>

REMOVAL AND INSTALLATION

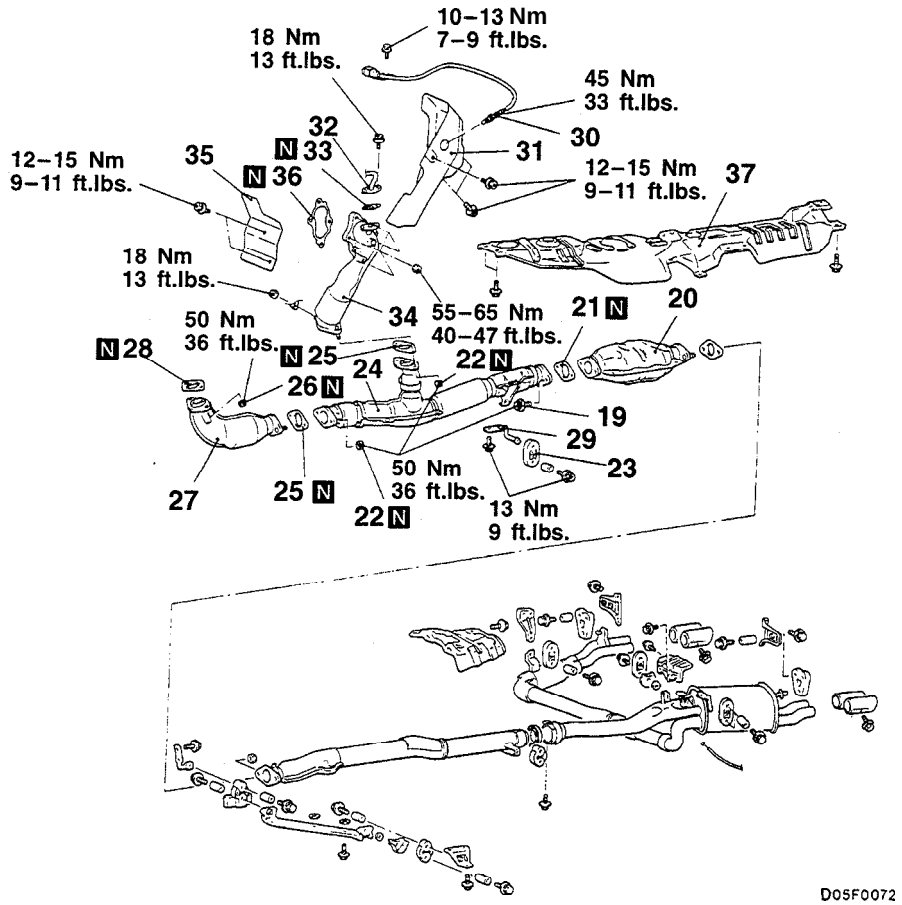
<Up to 1993 models>



Removal steps

1. Main muffler and center exhaust pipe installation bolts
2. Protector
▶B◀ 3. Cable assembly connection
◀A▶ 4. Rubber hangers
◀A▶ 5. Rubber hangers
◀A▶ 6. Main muffler
7. Gasket
8. Mouldings
9. Hanger brackets
10. Catalytic converter and center exhaust pipe installation nuts
11. Hanger bracket
12. Rubber hangers
13. Center exhaust pipe
14. Gasket
15. Rubber hangers
16. Hanger brackets
17. Hanger bracket
18. Rear floor heat protector

TSB Revision

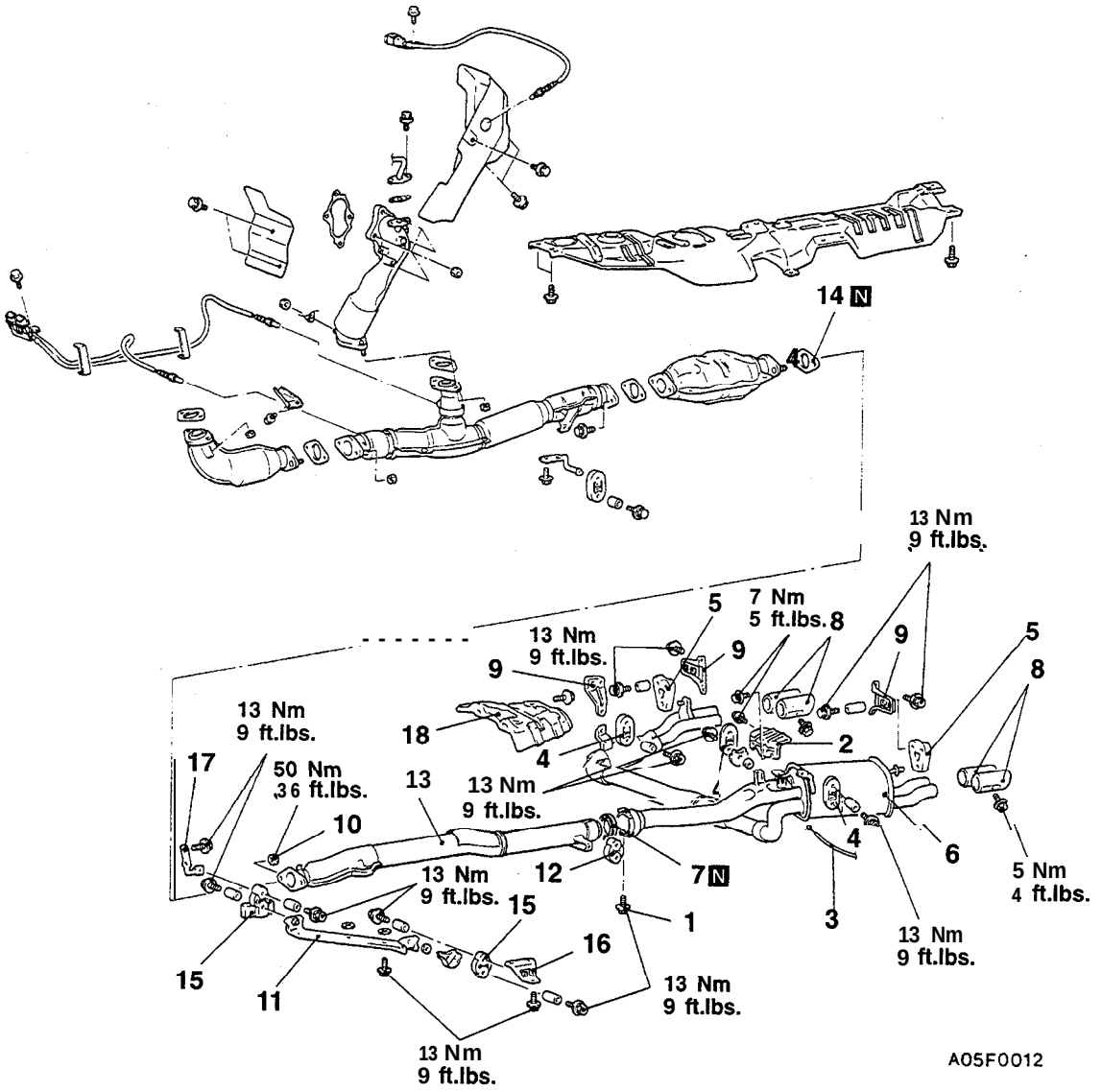


19. Catalytic converter and front exhaust pipe installation bolts
20. Catalytic converter
21. Gasket
22. Self-locking nuts
23. Rubber hanger
24. Front exhaust pipe
25. Gaskets
26. Self-locking nuts
27. Right bank warm up three-way catalytic converter
28. Gasket
29. Hanger bracket
◀B▶ ▶A◀ 30. Heated oxygen sensor connection
31. Heat protector D
32. EGR pipe connection
33. Gasket
34. Left bank warm up three-way catalytic converter
35. Heat protector E
36. Gasket
37. Front floor heat protector

TSB Revision

cl 994 models>

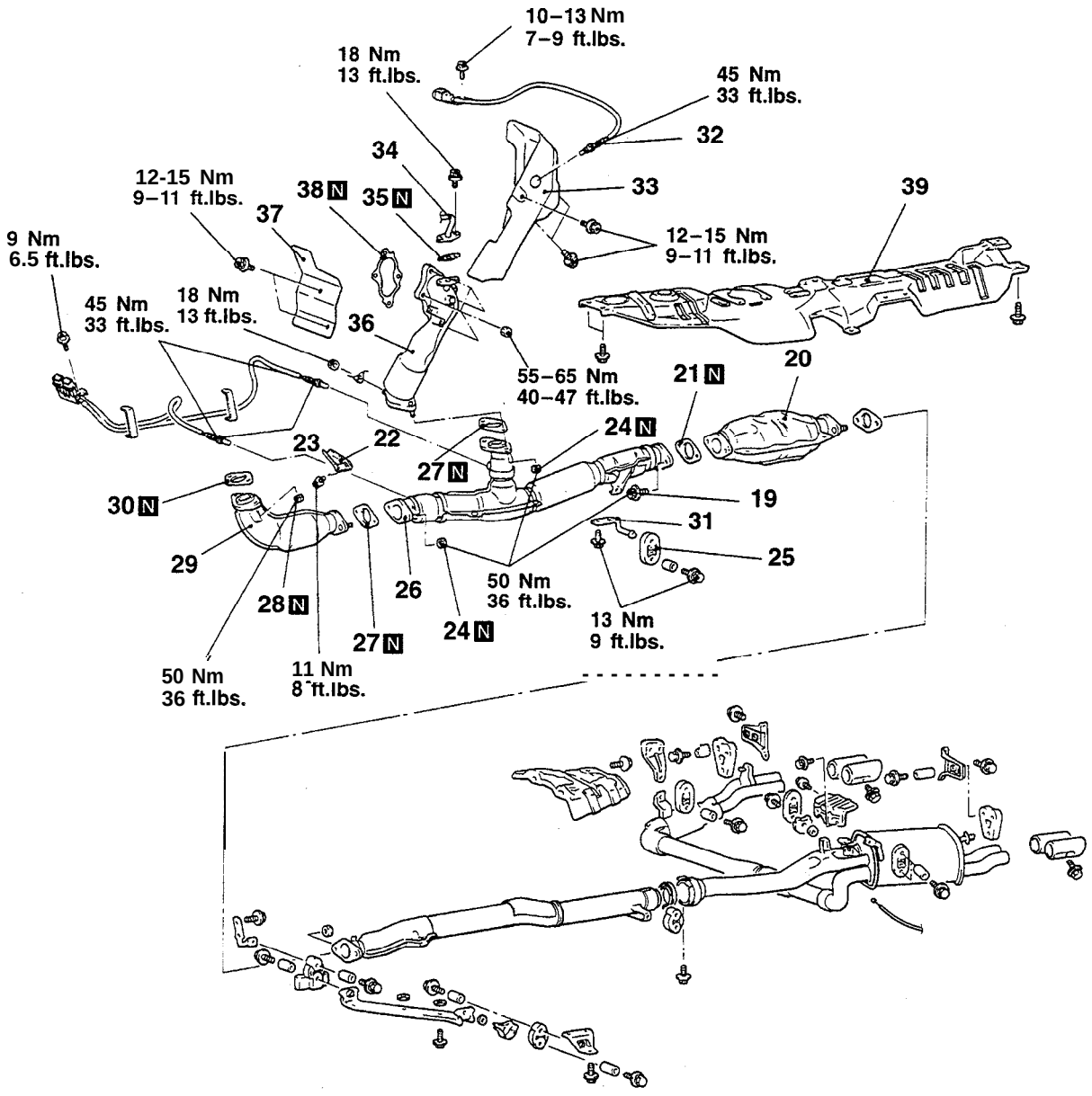
Pre-removal and Post-installation Operation
- Air Conditioning Low-Pressure Hose and Liquid Pipe B Clamp Removal and Installation (Refer to GROUP 55 – Refrigerant Line.)
- Brake Booster VacuumTube Clamp Removal and Installation (Refer to GROUP 35 -Master Cylinder and Brake Booster.)
- Clutch Booster Vacuum Pipe Removal and Installation (Refer to GROUP 21 – Clutch Control.)
- Drive Shaft (Left Side), Inner Shaft Assembly Removal and Installation (Refer to GROUP 26 – Drive Shaft.)



Removal steps

1. Main muffler and center exhaust pipe installation bolts
2. Protector
▶B◀ 3. Cable assembly connection
◀A▶ 4. Rubber hangers
◀A▶ 5. Rubber hangers
◀A▶ 6. Main muffler
7. Gasket
8. Mouldings
9. Hanger brackets
10. Catalytic converter and center exhaust pipe installation nuts
11. Hanger bracket
12. Rubber hangers
13. Center exhaust pipe
14. Gasket
15. Rubber hangers
16. Hanger brackets
17. Hanger bracket
18. Rear floor heat protector

TSB Revision



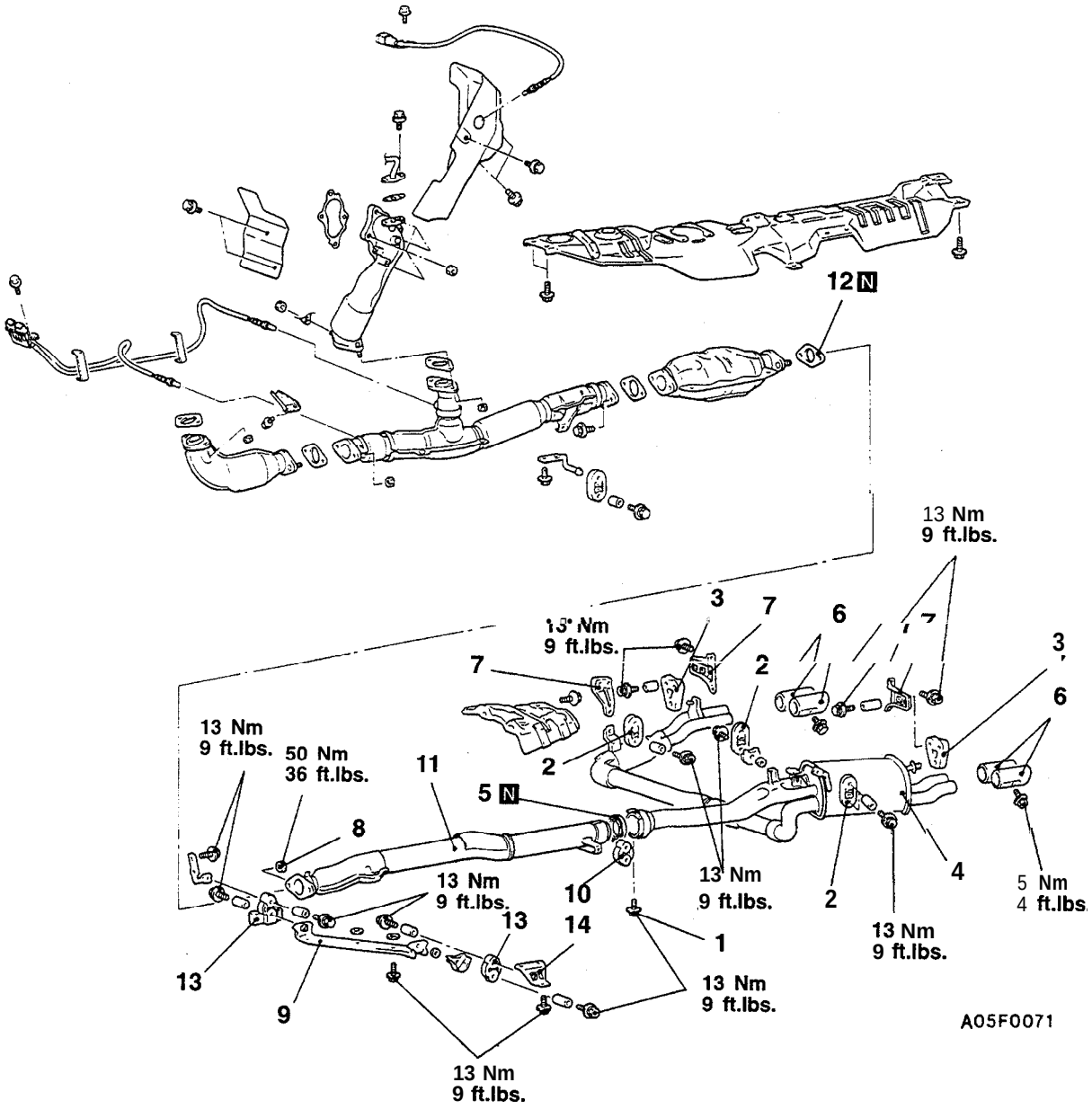
B05F0012

19. Catalytic converter and front exhaust pipe installation bolts
20. Catalytic converter
21. Gasket
22. Oxygen sensor protector
23. Heated oxygen sensor connection
24. Self-locking nuts
25. Rubber hanger
26. Front exhaust pipe
27. Gaskets
28. Self-locking nuts
29. Right bank warm up three-way catalytic converter
30. Gasket
31. Hanger bracket
◀B▶ ▶A◀ 32. Heated oxygen sensor connection
33. Heat protector D
34. EGR pipe connection
35. Gasket
36. Left bank warm up three-way catalytic converter
37. Heat protector E
38. Gasket
39. Front floor heat protector

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<From 1995 models>

Preremoval and Post-installation Operation
- Air Conditioning Low-Pressure Hose and Liquid Pipe B Clamp Removal and installation (Refer to GROUP 55 – Refrigerant Line.)
- Brake Booster VacuumTube Clamp Removal and Installation (Refer to GROUP 35 -Master Cylinder and Brake Booster.)
- Clutch Booster Vacuum Pipe Removal and Installation (Refer to GROUP 21 – Clutch Control.)
- Drive Shaft (Left Side), Inner Shaft Assembly Removal and Installation (Refer to GROUP 26 – Drive Shaft.)

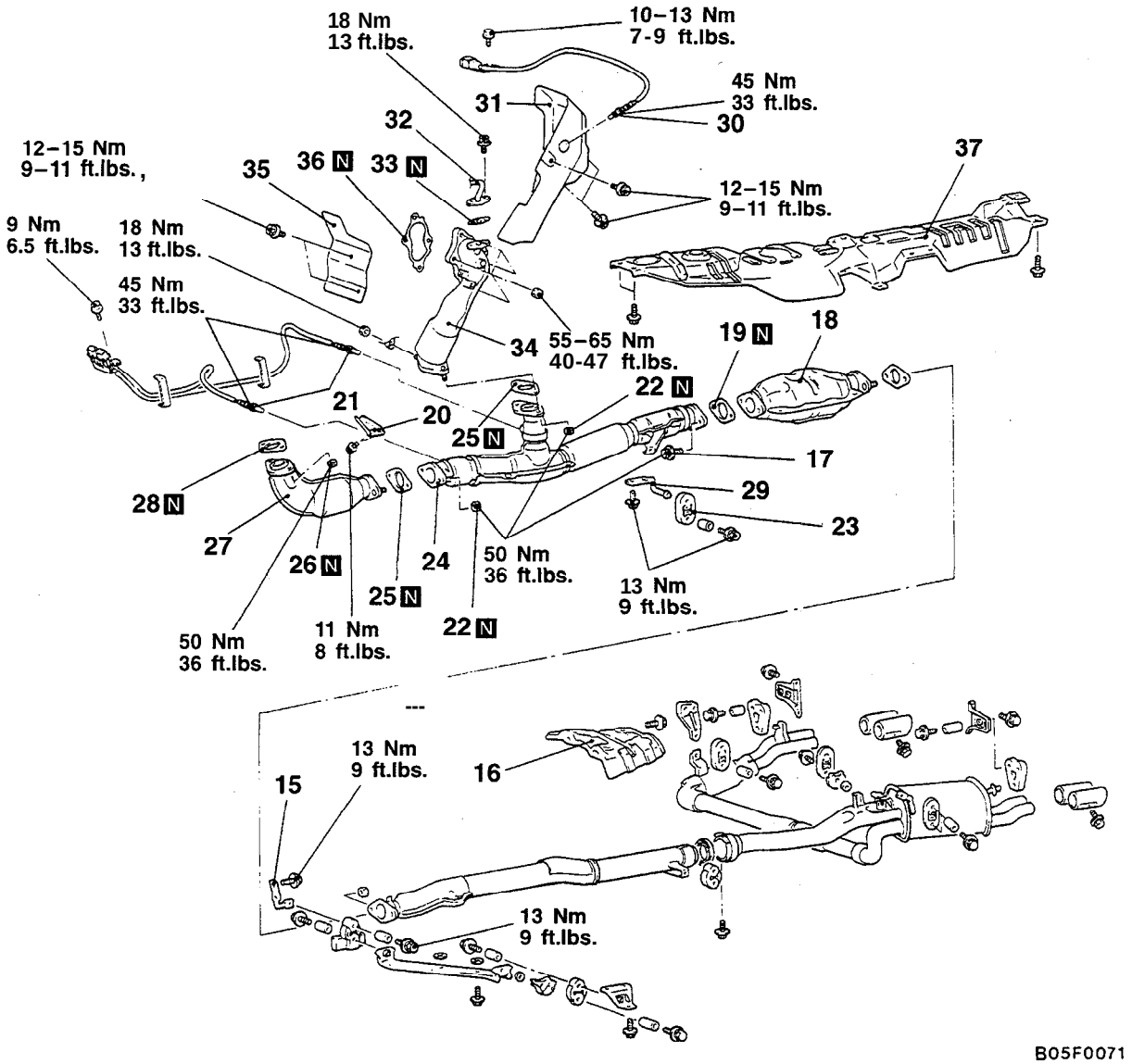


Removal steps

1. Main muffler and center exhaust pipe installation bolts
2. Rubber hangers
3. Rubber hangers
4. Main muffler
5. Gasket
6. Hanger fittings
7. Hanger brackets
8. Catalytic converter and center exhaust pipe installation nuts
9. Hanger bracket
10. Rubber hangers
11. Center exhaust pipe
12. Gasket
13. Rubber hangers
14. Hanger brackets

◀A▶ ◀A▶ ◀A▶

TSB Revision

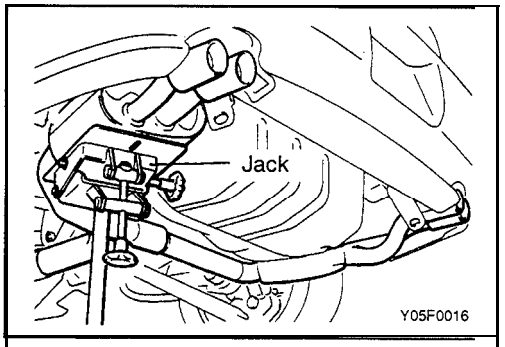


15. Hanger bracket
16. Rear floor heat protector
17. Catalytic converter and front exhaust pipe installation bolts
18. Catalytic converter
19. Gasket
20. Oxygen sensor protector
21. Heated oxygen sensor connection
22. Self-locking nuts
23. Rubber hanger
24. Front exhaust pipe
25. Gaskets
26. Self-locking nuts
27. Right bank warm up three-way catalytic converter
28. Gasket
29. Hanger bracket

◀B▶ ↗ ● 30. Heated oxygen sensor connection

31. Heat protector D
32. EGR pipe connection
33. Gasket
34. Left bank warm up three-way catalytic converter
35. Heat protector E
36. Gasket
37. Front floor heat protector

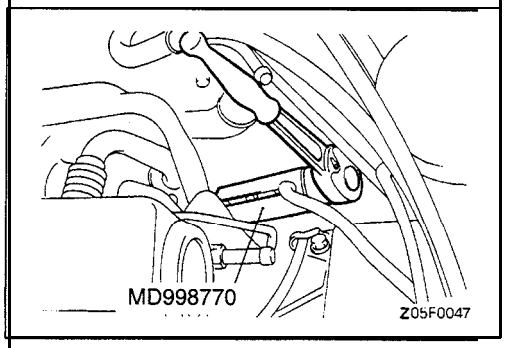
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REMOVAL SERVICE POINTS

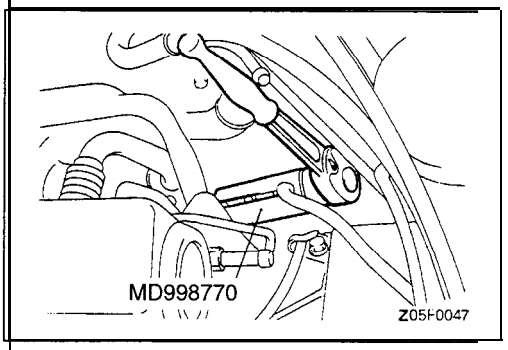
◀A▶ RUBBER HANGER / MAIN MUFFLER REMOVAL

Support with a transmission jack, etc.



◀B▶ HEATED OXYGEN SENSOR REMOVAL

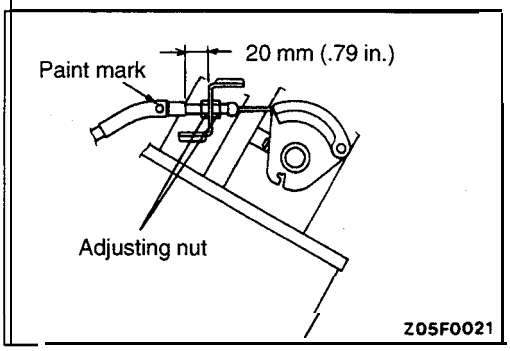
Disconnect the connector of the heated oxygen sensor, and install the special tool to the heated oxygen.



INSTALLATION SERVICE POINTS

▶A◀ HEATED OXYGEN SENSOR INSTALLATION

Use the special tool to install the heated oxygen sensor.



▶B◀ CABLE ASSEMBLY INSTALLATION

Install with the paint mark facing up and adjust the adjusting nut to obtain the illustrated dimension.

INSPECTION

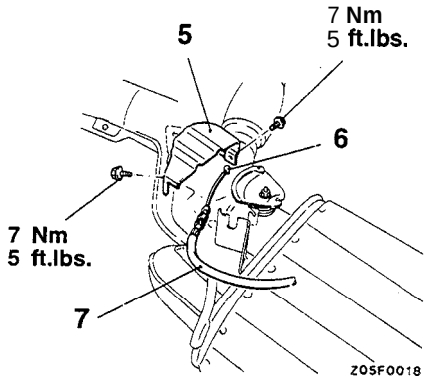
- Check the mufflers and pipes for corrosion or damage.
- Check the rubber hangers for deterioration or damage.
- Check for gas leakage from mufflers and pipes.
- Check if the main muffler active exhaust system valve can be moved smoothly by hand.

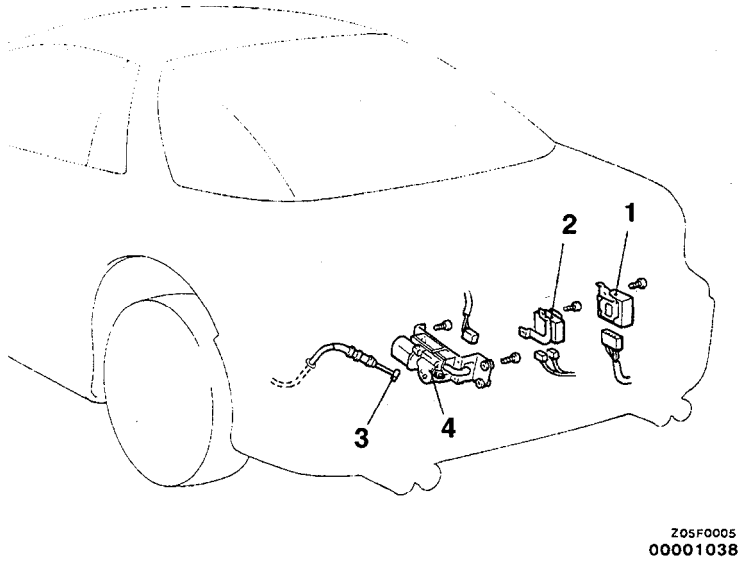
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ACTIVE EXHAUST SYSTEM <Up to 1994 models>

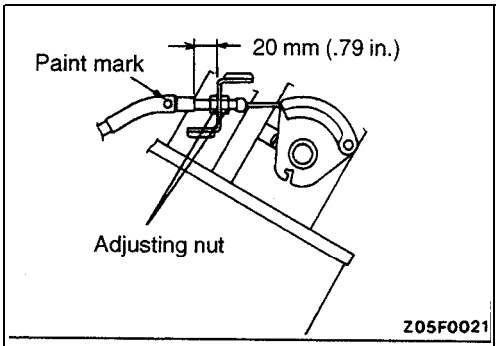
REMOVAL AND INSTALLATION

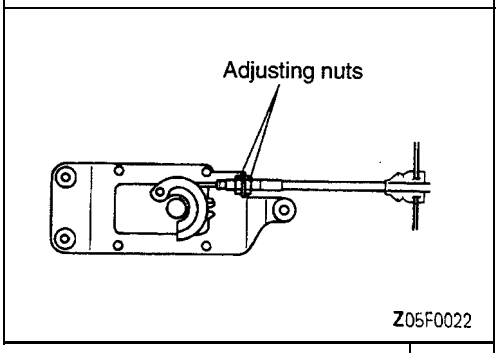
Pre-removal and Post-installation Operation
- Rear Side Trim (LH) Removal and installation (Refer to GROUP 52A – Trims.)





Removal steps
1. Active exhaust system control module
▶B◀ 2. Cable connection (Actuator side)
3. Actuator
4. Protector
▶A◀ 5. Cable connection (Muffler side)
6. Cable





INSTALLATION SERVICE POINTS

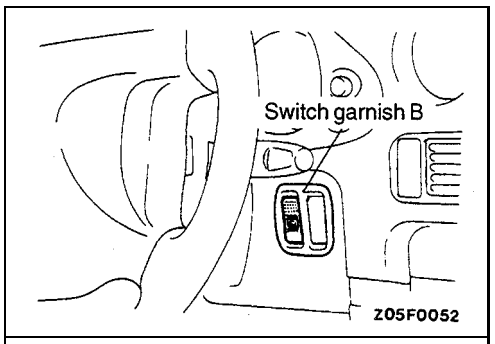
▶A◀ CABLE INSTALLATION (Muffler Side)

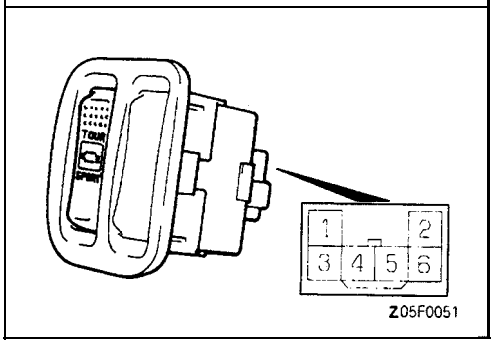
Install with the paint mark facing up and adjust the adjusting nut to obtain the illustrated dimension.

▶B◀ CABLE INSTALLATION (Actuator Side)

After adjusting the cable on the muffler side, adjust the adjusting nuts for an inner cable play of 0 to 1 mm (0 to .04 in.).

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INSPECTION

ACTIVE EXHAUST SWITCH CHECK

(1) Remove switch garnish B from the knee protector.

(2) Operate the switch and check the continuity between the terminals.

Switch position	Terminal No.					
	2	3	5	6	1	4
TOUR	0	n		○		
SPORT						

NOTES

ENGINE AND EMISSION CONTROL

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CONTINUED ON NEXT PAGE

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

(1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the 'SRS' inoperative).

(2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.

(3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B – Supplemental Restraint System (SRS) and GROUP 00 -Maintenance Service, before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE
The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning light, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

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Accelerator Cable and Accelerator Pedal 3

ENGINE CONTROL SYSTEM

SPECIFICATIONS

SERVICE SPECIFICATIONS

Items		Standard value
Accelerator cable play mm (in.)	M/T	1–2 (.04–.08)
	A/T	3-5 (.12–.20)

TROUBLESHOOTING

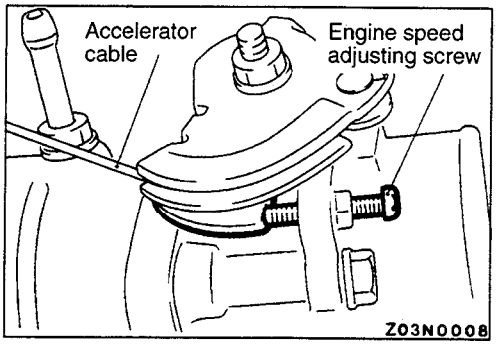
ACCELERATOR CABLE AND ACCELERATOR PEDAL

Symptom	Probable cause	Remedy
Throttle valve will not fully open or close	Misadjusted accelerator cable	Adjust
	Misadjusted automatic speed-control cable	Adjust
	Broken return spring	Replace
	Throttle lever malfunction	Replace
Accelerator pedal operation not smooth (over acceleration)	Accelerator pedal wrongly tightened	Repair
	Misinstalled accelerator cable	Repair
	Accelerator cable requires lubrication	Lubricate or replace

ON-VEHICLE SERVICE

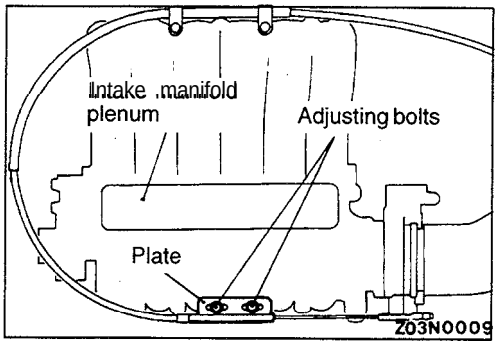
ACCELERATOR CABLE CHECK AND ADJUSTMENT

For models equipped with the cruise control system, refer to P.17-31.

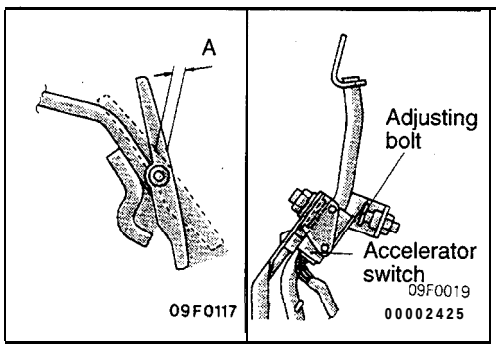


(1) Check the accelerator cable for sharp bends.
(2) Check to ensure that the throttle lever is in contact with the engine speed adjusting screw.
(3) Check to ensure that the inner cable play is within the standard limits.

Standard value:
<M/T> l-2 mm (.04–.08 in.)
<A/T> 3-5 mm (.12–.20 in.)



(4) If the play is out of the standard limits, loosen the adjusting bolts, slide the plate so that the inner cable play will fall within the standard limits, and then retighten the adjusting bolts.



ACCELERATOR SWITCH CHECK AND ADJUSTMENT (1992 models)

Make sure that when the accelerator pedal is free, there is continuity between the terminals of the accelerator switch and that when the pedal is pressed until the indicated pedal stroke A reaches the standard value, there is no continuity between the terminals of the switch.

Standard value:

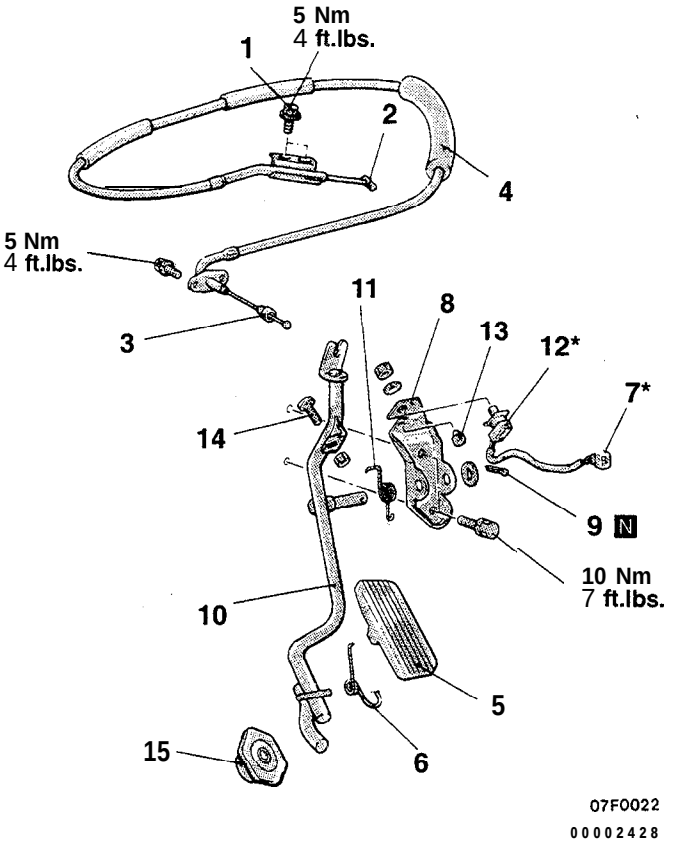
Accelerator switch switching point
2-6 mm (.08–.24 in.)

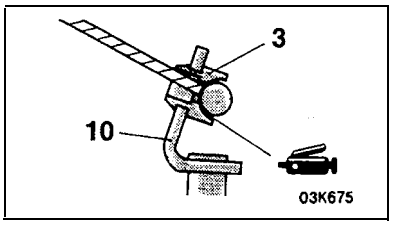
If stroke A is out of specification, adjust with adjusting bolt.

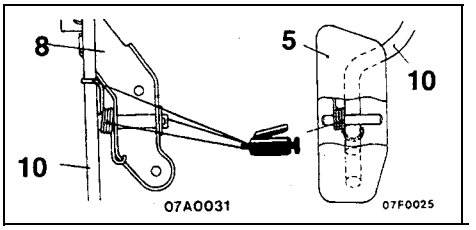
ENGINE CONTROL

REMOVAL AND INSTALLATION

Post-installation Operation
- Accelerator Cable Adiustment (Refer to P.17-4.)
- Accelerator Switch Adjustment <A/T> (Refer to P.17-4.)







Removal steps
1. Adjusting bolt
2. Throttle body side inner cable connection
3. Bushing
4. Accelerator cable
5. Accelerator pedal
6. Spring
7. Accelerator switch connector connection <A/T>*
8. Accelerator arm bracket
9. Split pin
10. Accelerator arm
11. Return spring
12. Accelerator switch <A/T>*
13. Accelerator arm stopper
14. Bolt <A/T>
15. Stopper

NOTE
* Equipped on 1992 models only

INSPECTION

- Check the inner and outer cable for damage.
- Check the cable for smooth movement.
- Check the accelerator arm for bending.
- Check the return spring for deterioration.
- Check the connection of bushing to end metal fitting.
- Check the accelerator pedal switch for correct ON-OFF switching. <A/T>

TSB Revision

CRUISE CONTROL SYSTEM

SPECIFICATIONS

GENERAL SPECIFICATIONS

Items			Specifications
Main switch	Rated load A		1.2
	Voltage drop V		0.1 or less
Auto-cruise control switch	Rated load mA	SET	3
		RESUME	6
		CANCEL	10
Stop light switch (for cruise control)	Rated load A		0.1–0.9
	Voltage drop (at rated load) V		0.15 or less
Clutch pedal position switch	Rated load A		0.1–1.5
	Voltage drop (at rated load) V		0.15 or less
Auto-cruise control unit	Range of speed control km/h(mph)		40–145 (25–90)*1 , 40–200 (25–124)*2
Vacuum pump	Type		Diaphragm type
	Rated load A		3.0 or less
Control valve, release valve	Rated load A		0.4 or less
Actuator	Drive system		Vacuum type
	Stroke mm (in.)		38–42 (1.5–1.7)

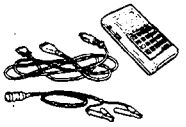
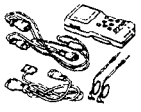
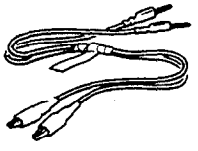
NOTE
*1: Vehicles built up to April 1991.
*2: Vehicles built from May 1991.

SERVICE SPECIFICATIONS

Items		Standard value
Accelerator cable play mm (in.)	M/T	0–1 (0–.04)
	A/T	2–3 (.08–.12)
Throttle cable mm (in.)		1–2 (.04–.08)
Cruise control cable mm (in.)		1–2 (.04–.08)
Resistance between terminals for control valve and relief valve in vacuum pump Ω		50–60

TSB Revision

SPECIAL TOOLS

Tool	Tool number and name	Supersession	Application
	MB991341 Scan tool (Multi-use tester <MUT>)	MB991341C	Up to 1993 models Checking of the diagnostic output
	ROM pack (For the number, refer to GROUP 00 – Precautions Before Service.)		Up to 1993 models Checking of the diagnostic output
 Z16X0606	MB991502 Scan tool (MUT-II)	MB991502	All models Checking of the diagnostic trouble code
 Z16X0607	ROM pack		All models Checking of the diagnostic trouble code
	MB991529 Diagnostic trouble code check harness	MB991529	From 1994 models Inspection of cruise control system using a voltmeter

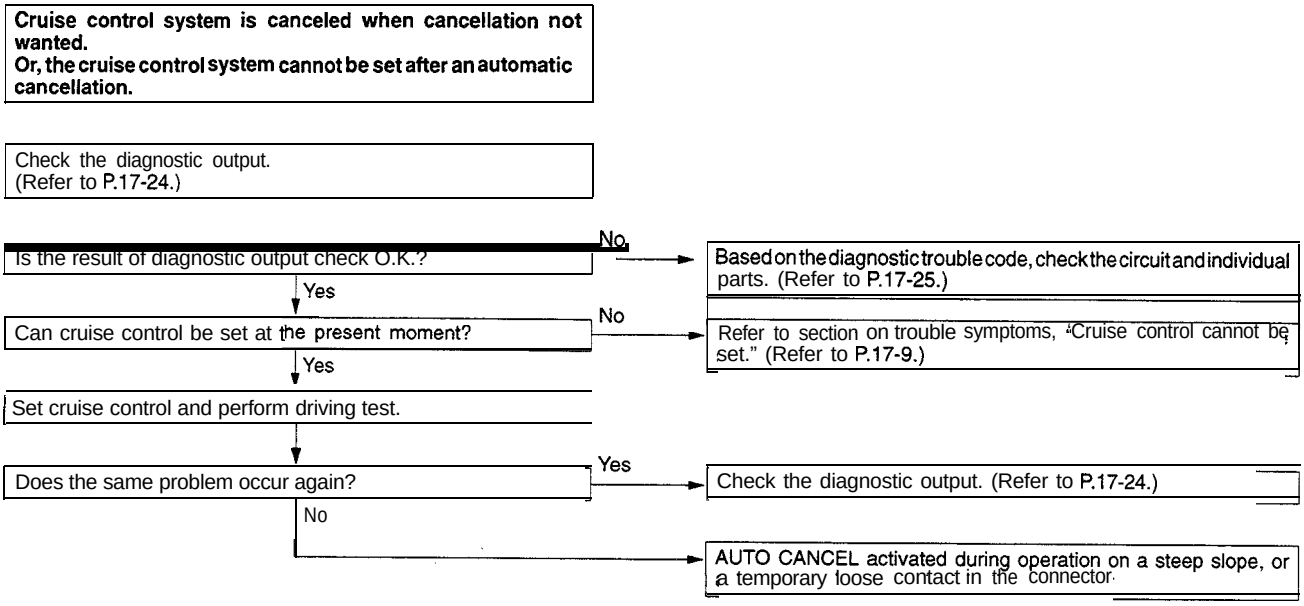
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TROUBLESHOOTING

PRELIMINARY INSPECTION

Check the following points and repair defective points, if any, before troubleshooting.
(1) Check that the vacuum pump assembly, link assembly, actuator and all cables and vacuum hoses are properly installed and that the cables and vacuum hoses are correctly routed.
(2) Check that the link assembly and all cables move smoothly.
(3) Check each of the cables for excessive play or tension.

TROUBLESHOOTING QUICK REFERENCE CHART



TSB Revision

Cruise control system can not be set.

Check input. (Refer to P.17-26.)

Is the result of input check O.K.?

Yes → Check vacuum pump assembly circuit. (Refer to P.17-17.)

No

NOTE
This chart contains troubleshooting procedures to perform when a problem cannot be detected by on-board diagnostic.

NOTE
If the results of checks on the vacuum pump assembly circuit and actuator parts (refer to P.17-37.) indicate that they are good, replace the control unit.

Result of check	Probable cause	Remedy	Reference page
None of the codes appear even if input operations are performed.	Open circuit in control unit power supply circuit.	Replace main switch or repair harness.	P.17-12
	Open circuit in control switch circuit	Replace control switch or repair harness.	P.17-13
	Defective control unit	Replace control unit.	–
Even when SET switch is set to OFF, code No. 21 does not go away.	SET switch ON malfunction	Replace the control switch.	P.17-13
Even when RESUME switch is set to OFF, code No. 22 does not go away.	RESUME switch ON malfunction	Replace control switch	P.17-13
Even when CANCEL switch is set to OFF, code No. 27 does not go away.	CANCEL switch ON malfunction	Replace control switch.	P.17-13
Even when brake pedal is depressed, code No. 23 is not displayed.	Defective stop light switch circuit	Replace stop light switch or repair harness.	P.17-19
Even when brake pedal is released, code No. 23 does not go away.			
Even when clutch pedal is released, code No. 26 does not go away. <M/T>	Defective clutch pedal position switch circuit	Replace clutch pedal position switch or repair harness.	P.17-19
Even when select lever is placed in any position other than "N" and "P", code No. 26 does not go away. <A/T>	Defective park/neutral position switch circuit	Replace park/neutral position switch or repair harness.	P.17-20
Code No. 25 is not displayed even when vehicle speed is less than about 40 km/h (25 mph).	Defective vehicle speed sensor circuit	Check and repair vehicle speed sensor circuit.	P. 17-23
Even when vehicle speed is increased to more than about 40 km/h (25 mph), code No. 25 does not go away. Code No. 24 is not displayed, either.			

TSB Revision

Trouble symptom	Probable cause	Check chart No.	Remedy
• The set vehicle speed varies greatly upward or downward. • "Hunting" (repeated alternating acceleration and deceleration) occurs after setting is made.	Malfunction of the vehicle speed sensor circuit	No.4	Repair the vehicle speed sensor system, or replace the part.
	Malfunction Of the speedometer cable or speedometer drive gear <Up to 1993 models (Non turbo)>		
	Vacuum pump assembly circuit poor contact	No.5	Repair the actuator system, or replace the part.
	Malfunction of the vacuum pump assembly (including air leaks from negative pressure passage)		
	Malfunction of the ECU	–	Replace the ECU.
The cruise control system is not canceled when the brake pedal is depressed.	Brake switch (for cruise control) malfunction (short-circuit)	No.6	Repair the harness or replace the stop light switch.
	Vacuum pump assembly drive circuit short-circuit	No.5	Repair the harness or replace the vacuum pump assembly.
	Malfunction of the ECU	–	Replace the ECU.
The cruise control system is not canceled when the clutch pedal is depressed. <M/T> (It is canceled, however, when the brake pedal is depressed.)	Damaged or disconnected wiring of clutch switch input circuit	If the input check code No. 26 indicates a malfunction. No.7	Repair the harness, or repair or replace the clutch switch.
	Clutch switch improper installation (won't switch ON)		
	Malfunction of the ECU	–	Replace the ECU.
The cruise control system is not canceled when the shift lever is moved to the "N" position. – <A/T> (It is canceled, however, when the brake pedal is depressed.)	Damaged or disconnected wiring of park/neutral position switch input circuit.	If the input check code No. 26 indicates a malfunction. No.8	Repair the harness, or repair or replace the park/neutral position switch.
	Improper adjustment of park/neutral position switch		
	Malfunction of the ECU	–	Replace the ECU.
Cannot decelerate by using the SET switch.	Temporary damaged or disconnected wiring of control switch input circuit	No.2	Repair the harness or replace the control switch.
	Vacuum pump assembly circuit poor contact	No.5	Repair the harness or replace the vacuum pump assembly.
	Malfunction of the vacuum pump assembly		
	Malfunction of the ECU	–	Replace the ECU.

NOTE
ECU: Electronic control unit

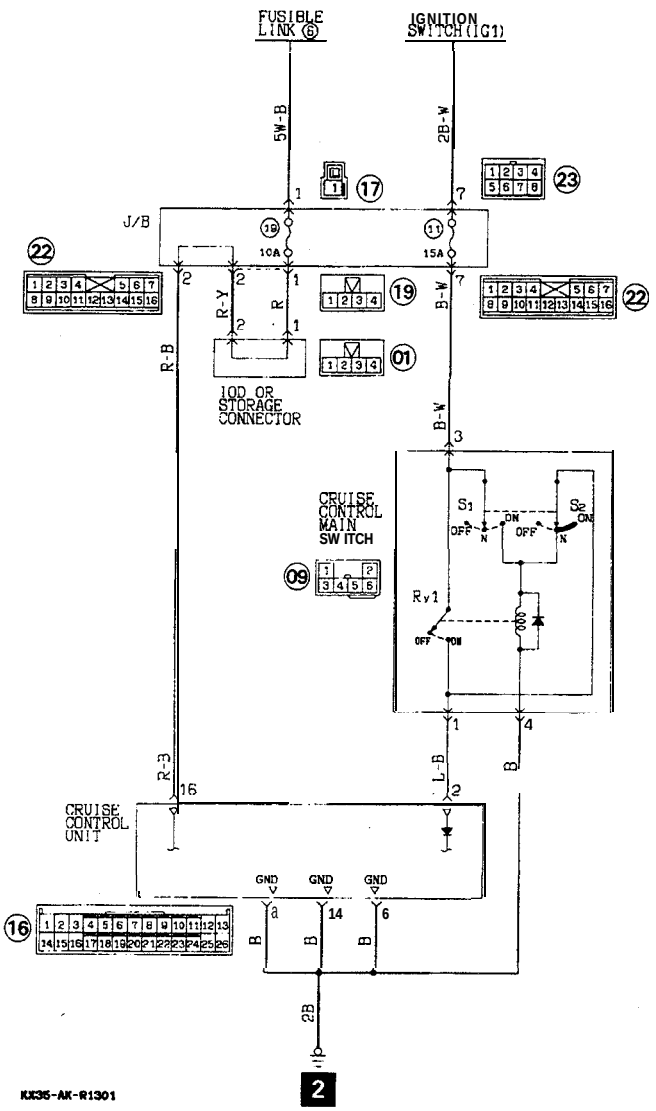
TSB Revision

Trouble symptom	Probable cause	Check chart No.	Remedy
Cannot accelerate or resume speed by using the RESUME switch.	Open or shot-t circuit in RESUME switch circuit in control switch	No. 2	Replace the control switch.
	Vacuum pump assembly circuit poor contact	No.5	Repair the harness or replace the vacuum pump assembly.
	Malfunction of the vacuum pump assembly (including air leaks from negative pressure passage)		
	Malfunction of the ECU	–	Replace the ECU.
Even when CANCEL switch is set to ON, cruise control is not canceled (Cruise control, however, is canceled when brake pedal is depressed.)	Open or short circuit in CANCEL switch circuit in control switch	If the input check code No. 27 indicates a malfunction. No.2	Replace the control switch
	Malfunction of the ECU	–	Replace the ECU
The cruise control system can be set while traveling at a vehicle speed of less than 40 km/h (25 mph), or there is no automatic cancellation at that speed.	Malfunction of the vehicle-speed sensor circuit	No.4	Repair the vehicle speed sensor system, or replace the part.
	Malfunction of the speedometer cable or the speedometer drive gear <Up to 1993 models (Non turbo)>		
	Malfunction of the ECU	–	Replace the ECU.
The cruise control indicator light in the combination meter does not illuminate. (But cruise control system is normal)	Damaged or disconnected bulb of indicator light	No.3	Repair the harness or replace the light bulb.
	Harness damaged or disconnected		
	Malfunction of the ECU	–	Replace the ECU.
Cruise control ON indicator light does not come on. (However, cruise control is functional.)	Burned-out indicator light bulb	No.3	Repair the harness or replace the main switch.
	Open or short circuit in harness		
Malfunction of control function by ON/OFF switching of ELC 4 A/T accelerator switch. (Non-operation of damper clutch, 2nd gear hold, etc.)	Malfunction of circuit related to accelerator switch OFF function	No. 10	Repair the harness or replace the part.
	Malfunction of the ECU		
Overdrive is not canceled during fixed speed driving <A/T>	Malfunction of circuit related to overdrive cancellation, or malfunction of ECU	No. 11	Repair the harness or replace the part.
No shift to overdrive during manual driving. <A/T>			

TSB Revision

CHECK CHART

1	**inspection of control unit power supply circuit**



DESCRIPTION OF OPERATION

The power is supplied through the ignition switch (IG_1) and cruise control main switch to the control unit.

1. When the cruise control main switch is set to ON with the ignition switch at ON, the current from switch S_1 flows through relay Ry_1 in the switch. Accordingly, the contact of relay Ry_1 is closed and the power is supplied to the control uhit.
2. When the main switch is released, it automatically returns to the neutral position. Since the current from switch S_2 flows to relay Ry_1, the contact of relay Ry_1 remains closed.
3. When the main switch is set to OFF, current to relay Ry_1 is interrupted. This opens the contact of relay Ry_1 to stop the power supply to the control unit. When the switch is released, it automatically returns to the neutral position, but relay Ry_1 stays in the OFF state.
4. When the ignition switch is set to OFF while relay Ry_1 in the main switch is ON, relay Ry_1 is forced to the OFF state just 'like when the main switch is set to OFF. Even if the ignition switch is set to ON again, relay Ry_1 stays in the OFF state until the main switch is set to ON.

NOTE
The numbers beside each connector correspond to those in the section (P.17-28) "HARNESS AND COMPONENTS LAYOUT'.

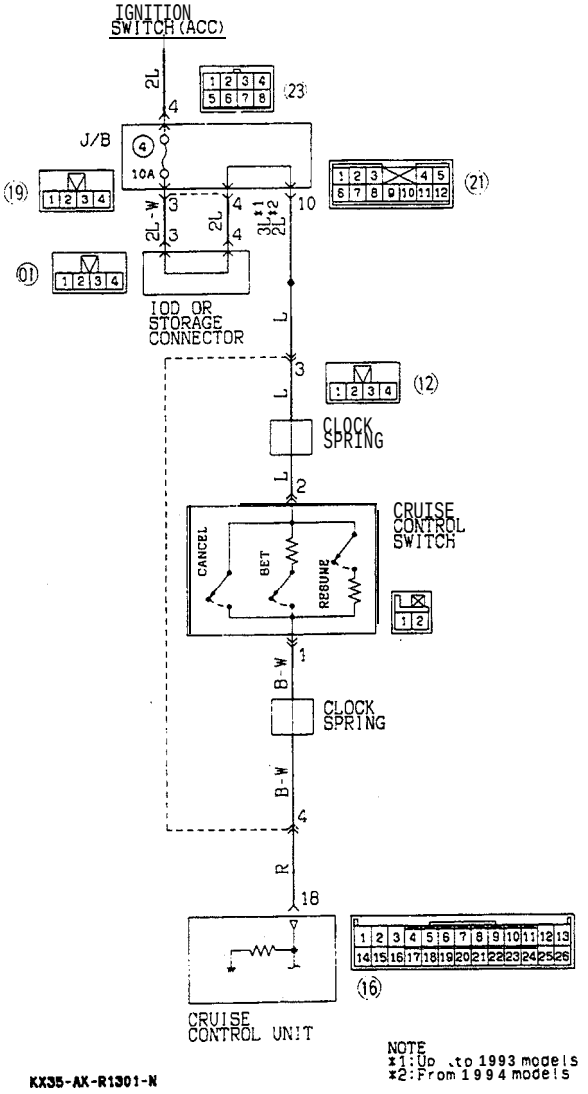
TSB Revision

TROUBLESHOOTING HINTS

ECU terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
2	Control unit power supply	Main switch ON and neutral position thereafter	Battery positive voltage
		Main switch OFF and neutral position thereafter	0 V
8, 14	Control unit ground	At all times	o v
16	Control unit back up power supply	At all times	Battery positive voltage

2 Inspection of control switch circuit



TSB Revision

DESCRIPTION OF OPERATION

The control switch is a switch in which the SET, RESUME and CANCEL switches are integrated. Therefore, different resistance values are used for the individual switches to change the outputs (voltages) to the control unit. Current flows through fuse No. 4 of J/B and through the control switch to the control unit.

1. SET switch

When the cruise control switch is ON, if the SET switch is set to ON while vehicle speed is within a range from about 40 to 145 km/h (25 to 90 mph)*1, 40 to 200 km/h (25 to 124 mph)*2, the vehicle starts cruising at the speed. If the SET switch is kept at ON during cruise operation, the vehicle coasts, and starts cruising at the speed reached when the SET switch is set to OFF.

2. RESUME switch

Even if cruise operation is canceled, the vehicle resumes cruising at the speed set before the cancellation. Both when the main switch is set to OFF and when the vehicle speed is reduced to less than 40 km/h (25 mph), the vehicle will not resume cruising at the previously set speed even if the RESUME switch is set to ON. If the RESUME switch is kept at ON during cruise operation, the engine accelerates, and the vehicle starts cruising at the speed reached when the RESUME switch was set to OFF. (However, when the vehicle speed is raised to more than 145 km/h (90 mph)*1, 200 km/h (124 mph)*2, the vehicle cruises at approximately 145 km/h (90 mph)*1, 200 km/h (124 mph)*2.

3. CANCEL switch

When the CANCEL switch is set to ON during cruise operation, the cancel signal is input to the control unit which internally interrupts the power supply to the vacuum pump assembly for cancellation of cruise operation.

NOTE
*1: Vehicles built up to April 1991.
*2: Vehicles built from May 1991.

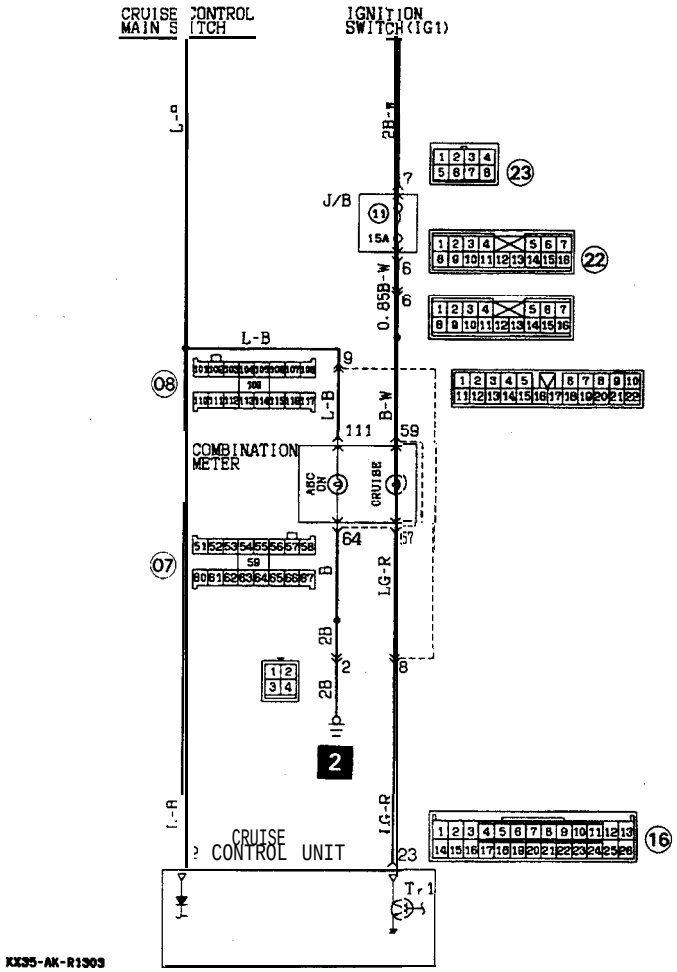
TROUBLESHOOTING HINTS

Diagnosis No. 15 (Automatically canceled)

ECU terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
18	Control switch	When all switches are OFF	o v
		When SET switch is ON	3 v
		When RESUME switch is ON	6V
		When CANCEL switch is ON	Battery positive voltage

3 Inspection of indicator light circuit



DESCRIPTION OF OPERATION

1. Cruise control ON (ASC ON) indicator light

Located in the combination meter, it lights as soon as the main switch is set to ON.

2. Cruise control (CRUISE) indicator light

During cruise control operation, transistor Tr_1 in the control unit is kept in the ON state to keep the indicator light on.

TROUBLESHOOTING HINTS

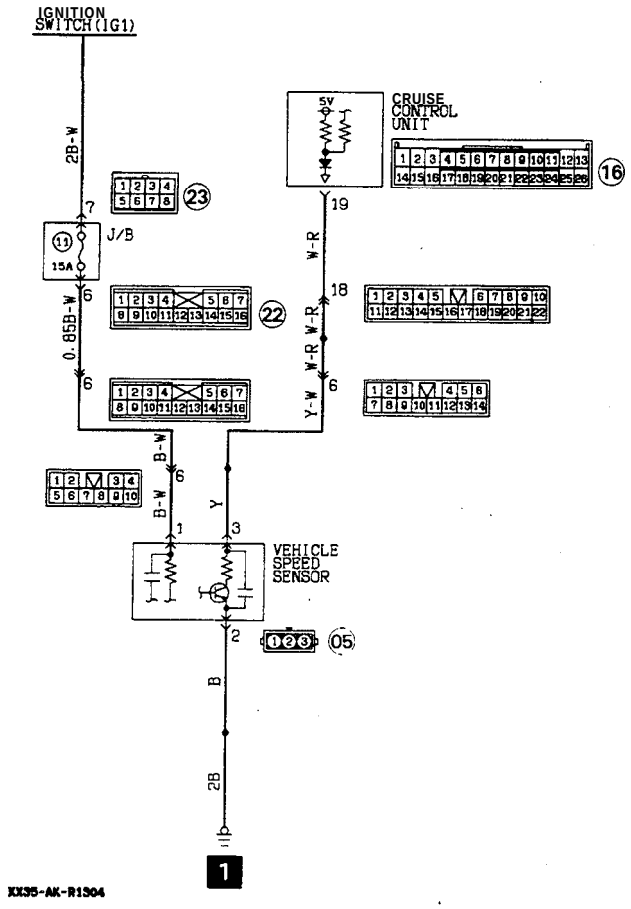
ECU terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
23	Cruise control (CRUISE) indicator light	When cruise control is active	o v
		When cruise control is inactive	Battery positive voltage

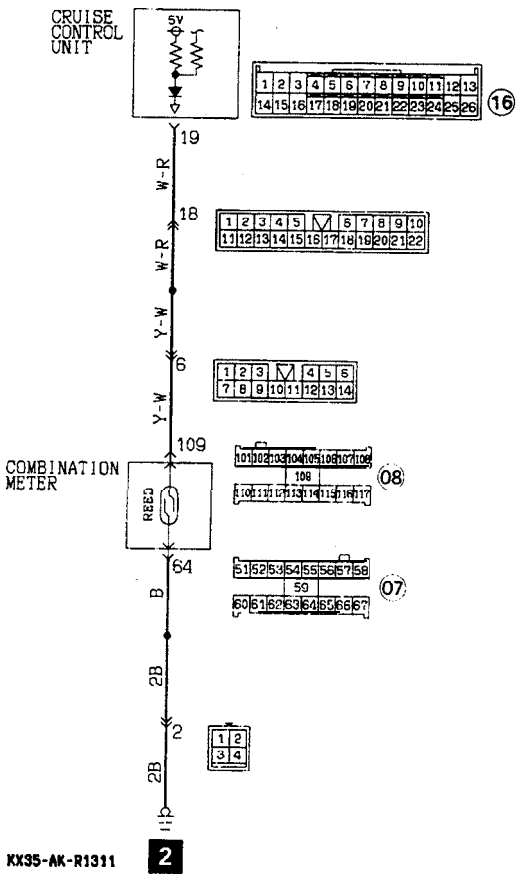
TSB Revision

4 Inspection of vehicle speed sensor circuit

<Up to 1993 models (TURBO) and From 1994 models>



<Up to 1993 models (NON-TURBO)>



DESCRIPTION OF OPERATION

<Up to 1993 models (TURBO) and From 1994 models>

The vehicle speed sensor, mounted in the transmission, delivers pulse signals proportional to the rotational speed of the transmission output gear (vehicle speed) to the control unit. (Four pulse signals generated per rotation of the output gear) Since the vehicle speed sensor is of the electronic type, the power is supplied through the ignition switch (IG_1).

<Up to 1993 models (NON-TURBO)>

The vehicle speed sensor is a reed switch type and is mounted in the speedometer. It sends pulse signals proportional to the rotational speed of the transmission output gear (vehicle speed) to the control unit. (Four pulse signals generated per rotation of the output gear)

TROUBLESHOOTING HINTS

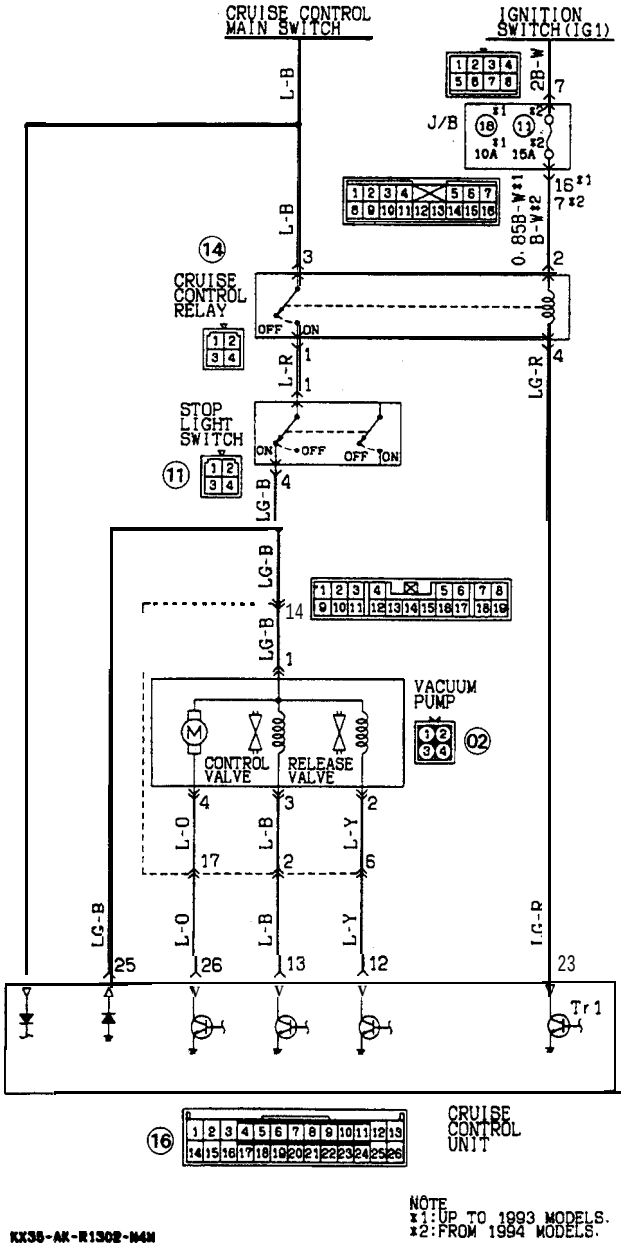
Diagnosis No. 12 (Automatically canceled)

ECU terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
19	Vehicle speed sensor	Slowly drive forward with SELECT lever at "D" or "1 st Speed"	0 to 0.6 V ↔ 2 V or more (Flashing)

TSB Revision

5 Inspection of vacuum pump assembly drive circuit



TSB Revision

DESCRIPTION OF OPERATION

The input signal from the control switch causes transistor Tr_1 to be ON. Accordingly, the cruise control relay is placed in the ON state to supply power to the vacuum pump assembly.
The vacuum pump assembly consists of a diaphragm type negative pressure pump that is driven by a DC motor, and two solenoid valves (control valve and relief valve) and is controlled by the control unit as shown in the following table. When the brake pedal is depressed during cruise control operation, the power supply to the vacuum pump assembly is cut off.

Cruise control operation	DC motor (ON: Current flows) (OFF: No current flows)	Solenoid valve ON: open OFF: closed	
		Control valve	Relief valve
Acceleration	ON	ON	ON
Hold	OFF	ON	ON
Deceleration	OFF	OFF	ON
Release	OFF	OFF	OFF

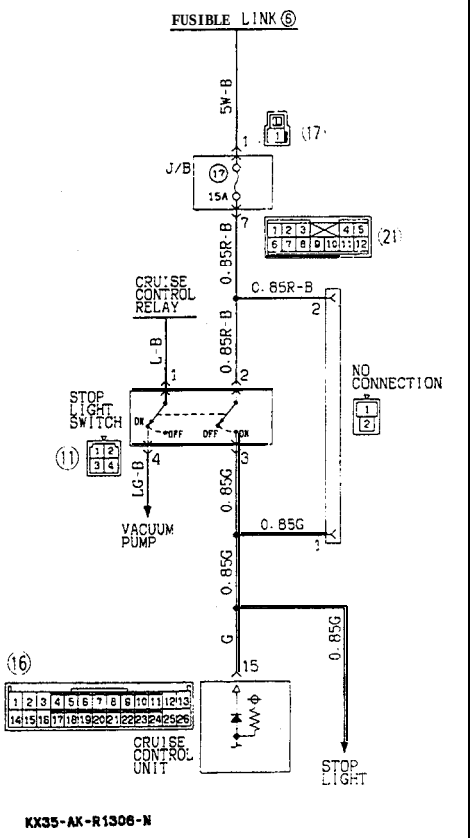
TROUBLESHOOTING HINTS

Diagnosis No. 11 (Automatically canceled)

ECU terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
12	Relief valve drive signal	When relief valve is ON	0 V
		When relief valve is OFF	Battery positive voltage
13	Control valve drive signal	When control valve is ON	0 V
		When control valve is OFF	Battery positive voltage
26	DC motor drive signal	When DC motor is running	0 V
		When DC motor is stationary	Battery positive voltage
25	Surge absorption circuit terminal	When main switch is ON	Battery positive voltage

TSB Revision



6 Inspection of stop light switch circuit

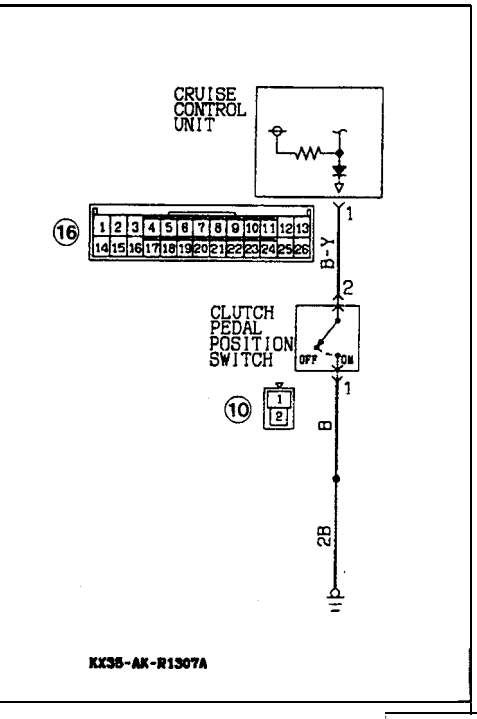
DESCRIPTION OF OPERATION

When the brake pedal is depressed during vehicle speed control, the cruise control (NC) contact of the stop light switch is opened to interrupt the power supply to the vacuum pump assembly for cancellation of vehicle speed control. (Refer to P.17-17.) At the same time, the stoplight (NO) contact is closed. As a result, a cancel signal is input to the control unit which internally interrupts the vacuum pump assembly drive circuit.

TROUBLESHOOTING HINTS

ECU terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
15	Stop light switch	When brake pedal is depressed	Battery positive voltage
		When brake pedal is not depressed	0 V



7 Inspection of clutch pedal position switch circuit <M/T>

DESCRIPTION OF OPERATION

When the clutch pedal is depressed during vehicle speed control, the contact of the clutch pedal position switch is closed. As a result, a cancel signal is input to the control unit which internally interrupts the power supply to the vacuum pump assembly drive circuit for cancellation of vehicle speed control.

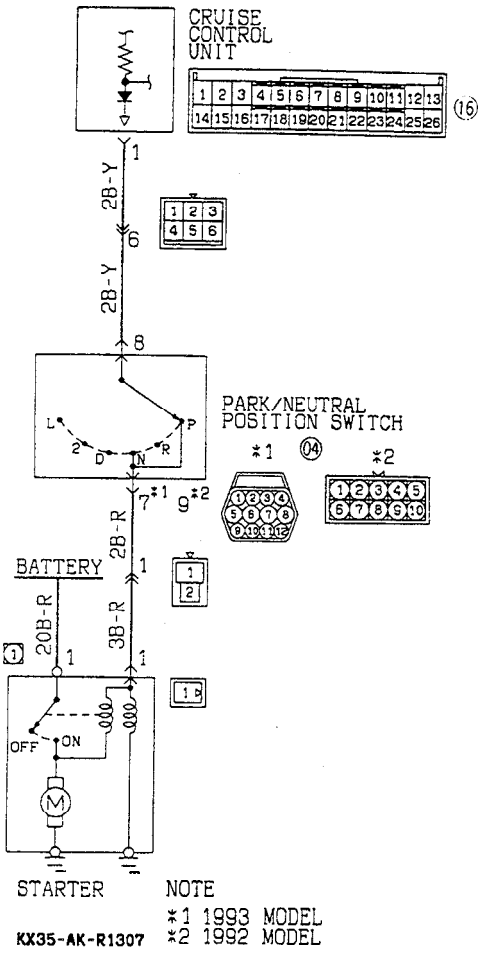
TROUBLESHOOTING HINTS

ECU terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
1	Clutch pedal position switch	When clutch pedal is depressed	0 V
		When clutch pedal is not depressed	Battery positive voltage

TSB Revision

8 Inspection of park/neutral position switch circuit <A/T>



DESCRIPTION OF OPERATION

The park/neutral position switch is interlocked with the starter switch. When the gear selector lever is placed in the "N" position during vehicle speed control, a cancel signal is input to the control unit which internally interrupts the power supply to the vacuum pump assembly drive circuit for cancellation of vehicle speed.

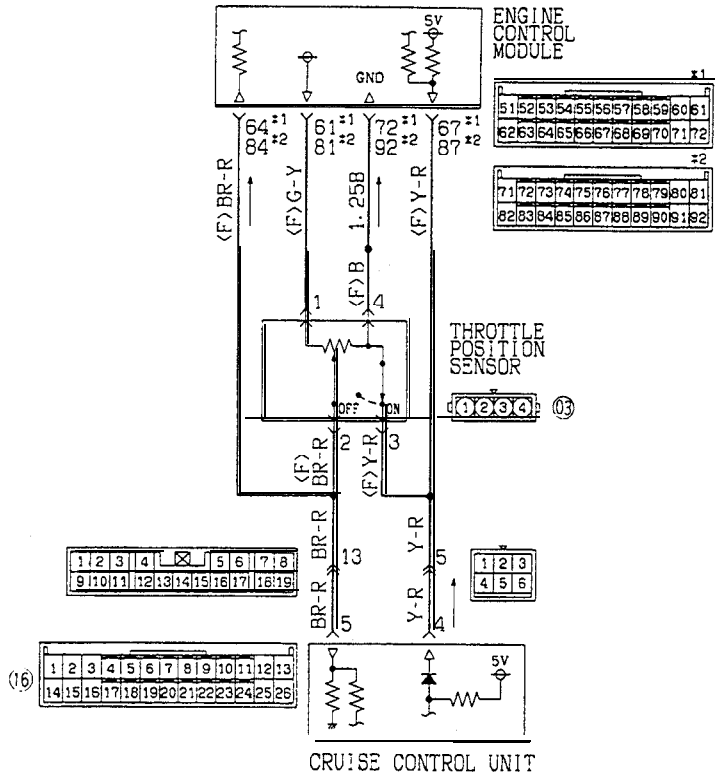
TROUBLESHOOTING HINTS

ECU terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
1	Park/neutral position switch	Park/neutral position switch in "N" or "P" position	0 V
		Park/neutral position switch in "D", "2", "L" or "R" position	Battery positive voltage

TSB Revision

9 Inspection of throttle position sensor circuit



NOTE
*1: UP TO 1993 MODELS AND 1994, 1995 MODELS (NON TURBO – FEDERAL)
● 2: 1994, 1995 MODELS (TURBO, NON TURBO – CALIFORNIA) AND 1996 MODELS

KX35-AK-R1301-N4M

DESCRIPTION OF OPERATION

The throttle position sensor (with built-in closed throttle position switch) is used for engine control as well as cruise control.
The throttle position sensor sends data to the control unit, regarding the opening of the accelerator. The closed throttle position switch inputs the data to the control unit on whether or not the accelerator pedal is operated.

TROUBLESHOOTING HINTS

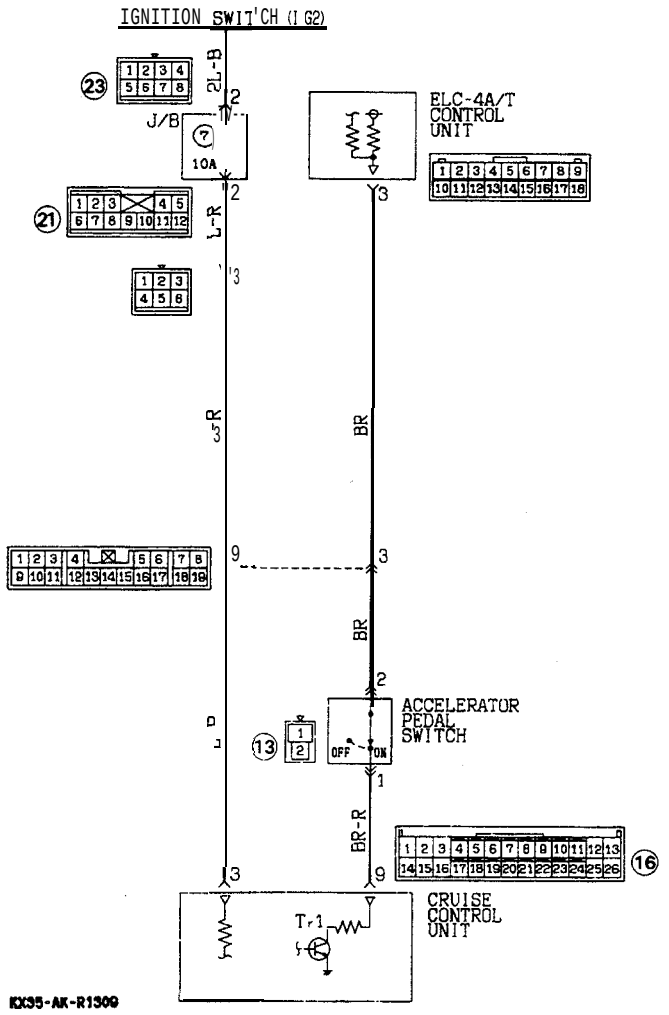
Diagnosis No. 17 (Not automatically canceled)

ECU terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
4	Closed throttle position switch	When accelerator pedal is depressed	o v
		When accelerator pedal is not depressed	4.5-5.5 v
5	Throttle position sensor	During idle	0.48 -0.72 V
		When fully opened	4.0-5.5 v

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10 Inspection of circuit associated with accelerator pedal switch OFF function <A/T> (1992 models)



DESCRIPTION OF OPERATION

The accelerator pedal switch is used to detect the operating state of the accelerator pedal. It is one of the sensors of the ELC-4A/T automatic transmission. Since the accelerator pedal is not operated during vehicle speed control, the cruise control unit forces transistor Tr_1 into the OFF state, creating the same state as when the accelerator pedal switch is placed in the OFF state.

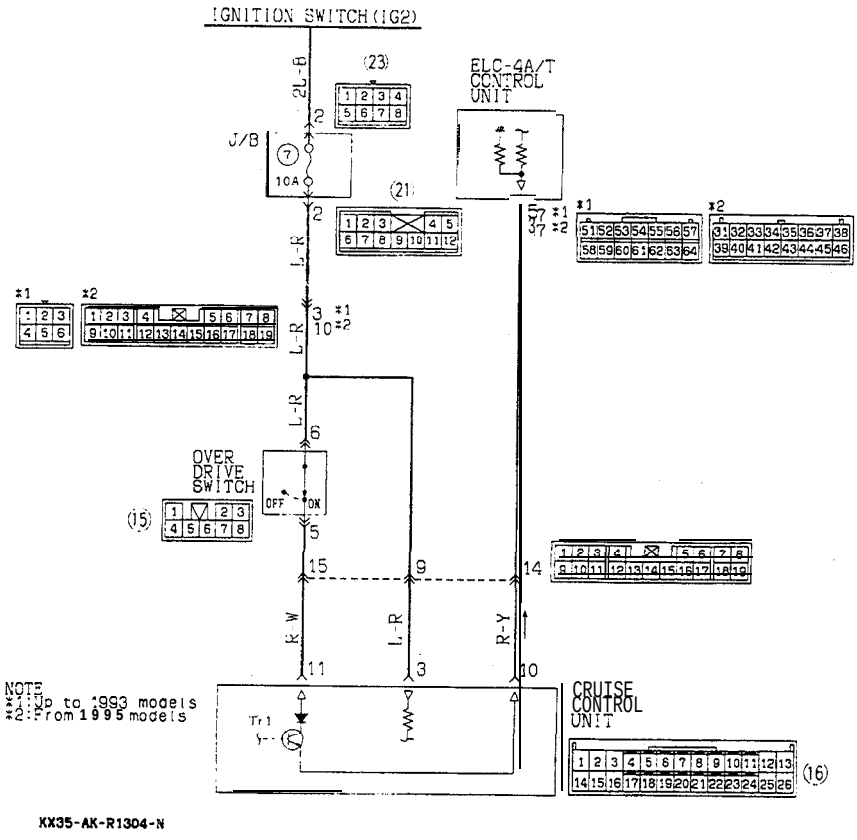
TROUBLESHOOTING HINTS

ECU terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
3	Accelerator pedal switch control power supply	When ignition switch is placed at ON	Battery positive voltage
9	Accelerator pedal switch	When accelerator pedal is depressed	0 V
		When accelerator pedal is not depressed (Cruising)	Battery positive voltage
		When accelerator pedal is not depressed (Idling)	0 V

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11 Inspection of circuits associated with overdrive cancel <A/T>



DESCRIPTION OF OPERATION

On a vehicle with cruise control, the OD switch ON signal is input through the cruise control unit to the ELC-4A/T control unit.
When the vehicle speed control is in the overdrive mode, if the actual vehicle speed falls more than about 7 km/h (4 mph) below the set vehicle speed or the RESUME switch is turned ON, the cruise control unit forces transistor Tr_1 into the OFF state. This cancels the overdrive mode because no OD switch ON signal is input to the ELC-4A/T control unit.

TROUBLESHOOTING HINTS

ECU terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
3	OD signal control power supply	When ignition switch is ON	Battery positive voltage
10	ELC-4A/T control unit	When overdrive mode is active	Battery positive voltage
		When overdrive mode is inactive	0 V
11	OD switch	When OD switch is ON	Battery positive voltage
		When OD switch is OFF	1 ov

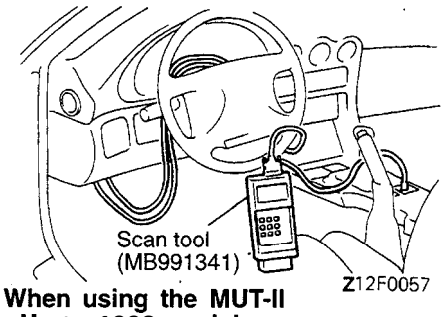
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ON-BOARD DIAGNOSTIC CHECKING

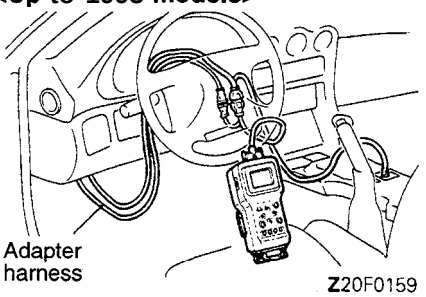
On-board diagnostic checking is performed when there has been an automatic cancellation, without cancel switch operation.

NOTE
Even when the ignition key is placed in the OFF position, all diagnostic trouble codes are stored and retained, until the battery cable is disconnected, to make sure that the problems encountered in the past can be checked.

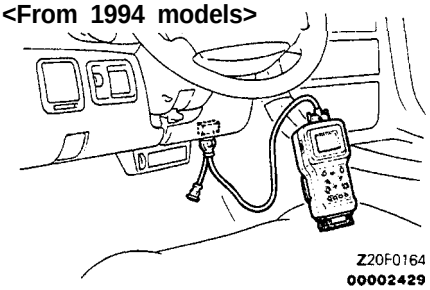
When using the MUT



When using the MUT-II <Up to 1993 models>



<From 1994 models>

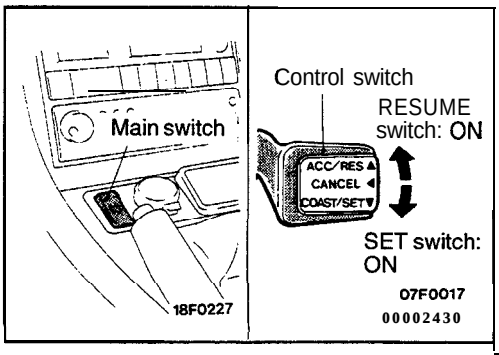


WHEN USING THE SCAN TOOL [MULTI-USE TESTER (MUT) <Up to 1993 models> OR MUT-II <All models>]

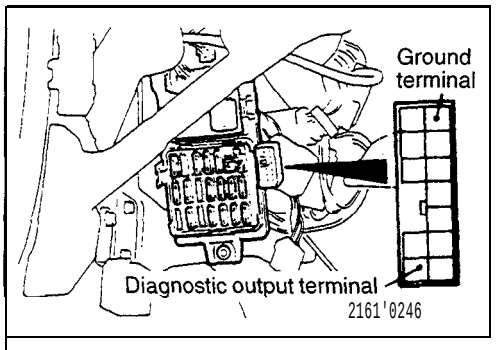
(1) Connect the scan tool to the data-link connector to read out the diagnostic trouble codes
When connecting the scan tool to a vehicle up to 1993 models, use the adapter harness supplied together.

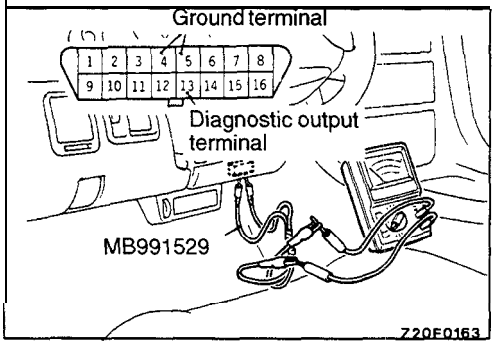
Caution
Turn off the ignition switch beforehand whenever the scan tool is connected or disconnected.

(2) Refer to the diagnostic chart and repair the defective point.



(3) Clear the diagnostic trouble codes by the following procedure.
1) Place the ignition switch in the ON position.
2) With the SET switch in the ON state, set the main switch to ON. In less than 1.0 second thereafter, set the RESUME switch to ON.
3) With the SET switch in the ON state again, keep the stop light switch in the ON state for more than 5 seconds.
4) Temporarily place the main switch in the OFF position to let the control unit escape from the input check mode. Then place the main switch in the ON position again.
5) Check the diagnostic trouble code to verify that a normal code is output.





WHEN USING THE VOLTMETER
<Up to 1993 models>

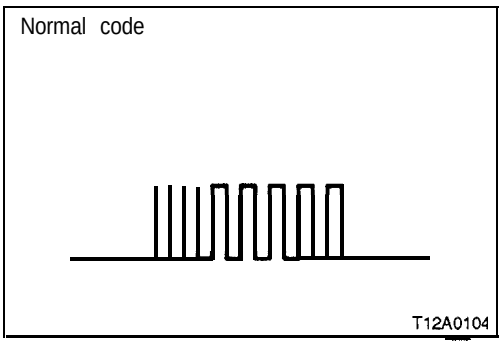
(1) Connect an analog voltmeter across the diagnostic output terminal and ground terminal of the data link connector.
(2) Place the ignition switch in the ON position.
(3) Read the diagnostic trouble code on the basis of the deflection of the pointer of the voltmeter.
(4) Refer to the diagnostic chart and repair the defective point.
(5) Clear the diagnostic trouble codes in the same way as when a scan tool is used.

<From 1994 models>

Connect a voltmeter to the diagnostic output terminal and the ground terminal of the data-link connector using the special tool. Observe the voltmeter pointer deflection to read out the diagnostic trouble codes.

DIAGNOSIS DISPLAY PATTERNS AND CODES

Code No.	Display patterns (output codes) (Use with voltmeter)	Probable cause	Check chart No.
11	 The same pattern repeatedly displayed	Vacuum pump assembly drive output system out of order	5
12		Vehicle speed signal system out of order	4
15		Control switch out of order (When SET or RESUME switch is kept in ON state continuously for more than 60 seconds)	2
16		Control unit out of order	
17*	 00002434	Throttle position sensor or closed throttle position switch out of order	9



NOTE
1. When two or more problems occur simultaneously, the three latest code numbers are displayed in the order of lowest code number first.
2. Even if the problem represented by the code number marked * occurs during cruise control operation, the cruise control mode will not be canceled.
3. When the system is normal, the diagnostic trouble code is displayed as described below.
   1) If a scan tool is used:
      "No abnormality" will be displayed.
   2) If a voltmeter is used:
      Continuous ON/OFF signals will be displayed at 0.5 second intervals. (Refer to the illustration at the left.)

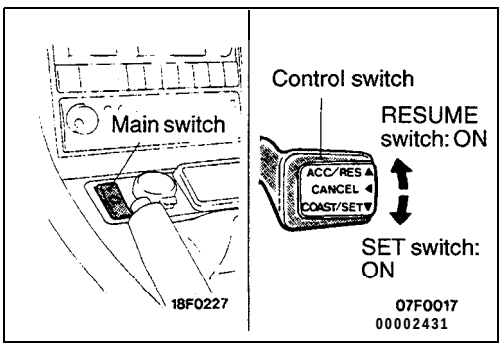
INPUT CHECKING

Input checks should be made when the cruise control system cannot be set and when it is necessary to check (when a malfunction related to the cruise control system occurs) whether or not the input signals are normal.

NOTE
1. If inspection of on-board diagnostic is necessary, confirm diagnostic trouble code first and conduct input check.
2. Input check can be conducted by set operations. On-board diagnostic terminal outputs display patterns.
3. Display codes are displayed only if the circuit is normal according to the conditions shown in the table on the next page.

Perform checks using the following procedures.
(1) Connect a scan tool or a voltmeter to the data link connector.

NOTE
Connect a voltmeter using the same procedure as for inspection of diagnostic output.



(2) Calling up a code
   1) Set the ignition switch to ON.
   2) With the SET switch in the ON state, set the main switch to ON. In less than 1.0 second thereafter, set the RESUME switch to ON. Then the input check results can be displayed.

(3) Reading a code'
   1) Perform the individual input operations according to the input check table and read the codes.

      NOTE
      1. When two or more input operations are performed simultaneously, all the associated code numbers are output in ascending order.
      2. If no code is output by performing any of the input operations, the control unit power supply circuit or SET and RESUME switches are probably defective.
         Check the check tables 1 and 2 (P.17-12, 13).

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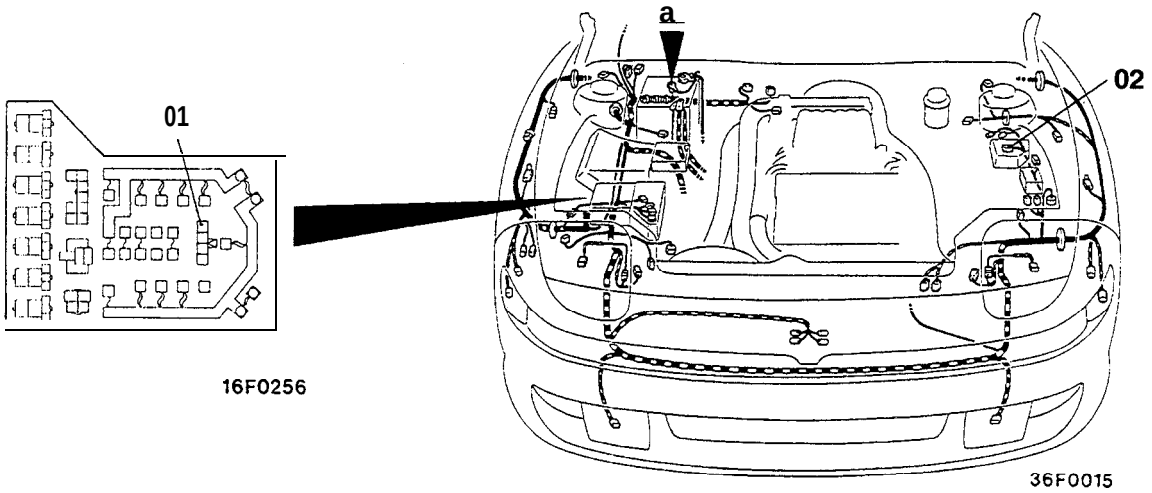
INPUT CHECK TABLE

Code No.	Display patterns (output codes) (use with voltmeter)	Input operation		Check results
21		SET switch ON		SET switch circuit normal
22		RESUME switch ON		RESUME switch normal
23		Stop light switch ON (brake pedal depressed)		Stop light switch circuit normal
24		Vehicle speed more than approx. 40 km/h (25 mph)		Vehicle speed sensor circuit normal if code Nos. 24 and 25 are displayed
25		Vehicle speed less than approx. 40 km/h (25 mph)		
26		M/T	Clutch pedal position switch ON (clutch pedal depressed)	Clutch pedal position switch circuit normal
		A/T	Park/neutral position switch ON (SELECT lever placed in "N" position)	Park/neutral position switch circuit normal
27		CANCEL switch ON		CANCEL switch circuit normal
28		TPS output voltage 1.5 V or more (Accelerator pedal depressed more than half the way)		Throttle position sensor circuit normal
29	 00002432	Closed throttle position switch OFF (Accelerator pedal depressed)		Closed throttle position switch circuit normal

2) Set main switch to OFF.

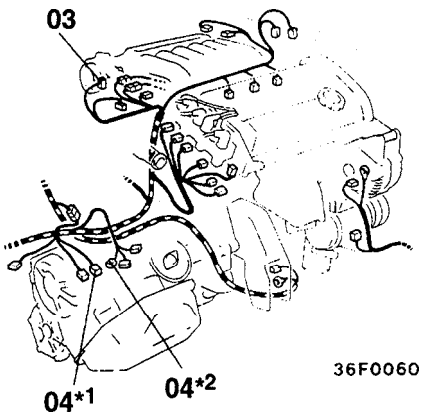
HARNESS AND COMPONENT LAYOUT

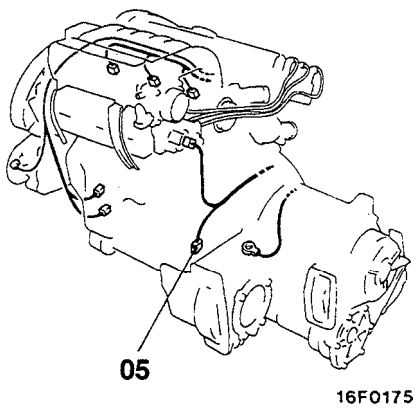
ENGINE COMPARTMENT



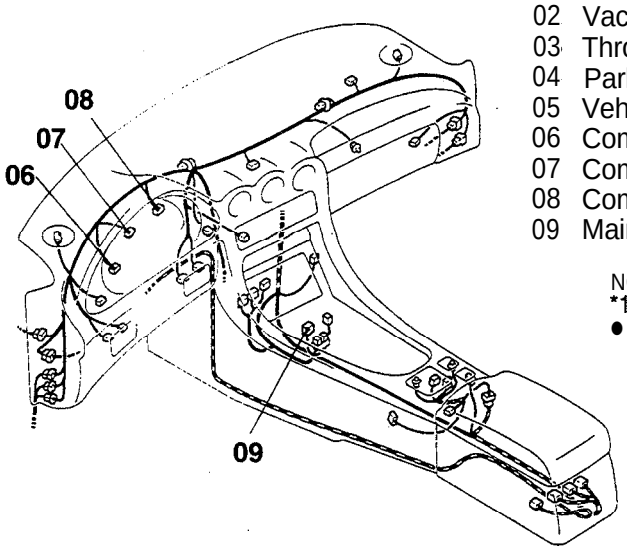
Engine front view

Engine rear view





INSTRUMENT PANEL AND FLOOR CONSOLE

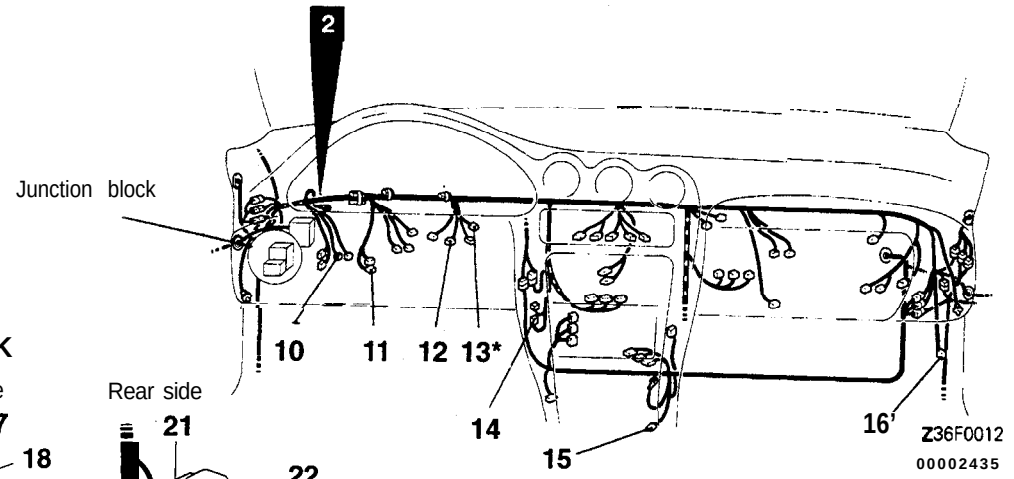


01 Jumper connector
02 Vacuum pump
03 Throttle position sensor
04 Park/neutral position switch <A/T>
05 Vehicle speed sensor
06 Combination meter
07 Combination meter
08 Combination meter
09 Main switch

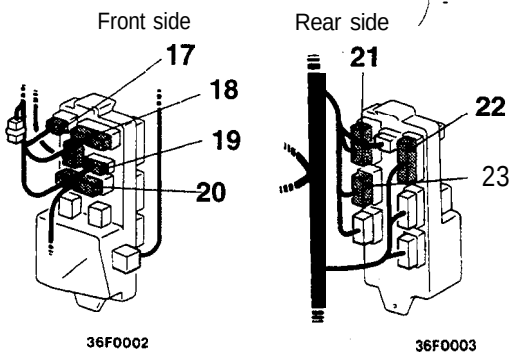
NOTE
*1 1992 model
● 2 From 1993 model

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DASH PANEL



JUNCTION BLOCK

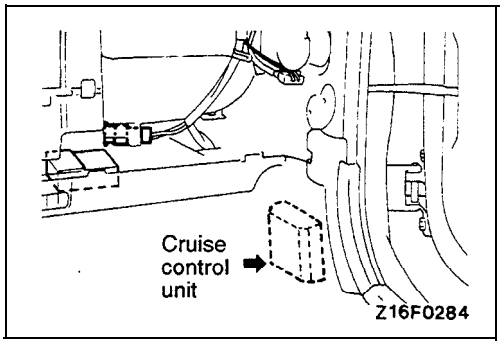


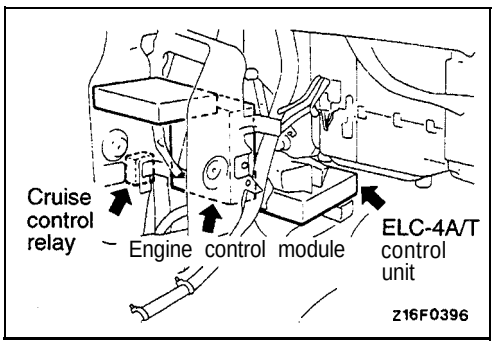
10. Clutch pedal position switch <M/T>
11. Stop light switch
12. Clock spring
13. Accelerator pedal switch <A/T>*
14. Cruise control relay
15. Over drive switch <A/T>
16. Cruise control unit
17. Front wiring harness and junction block combination
18. Front wiring harness and junction block combination
19. Front wiring harness and junction block combination
20. Adapter wiring harness and junction block combination
21. Body wiring harness (LH) and junction block combination
22. Body wiring harness (LH) and junction block combination
23. Body wiring harness (LH) and junction block combination

NOTE
● : Equipped on 1992 models only.

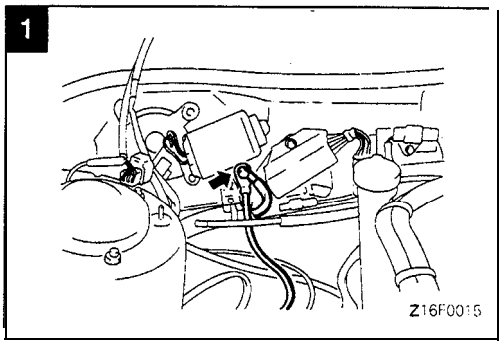
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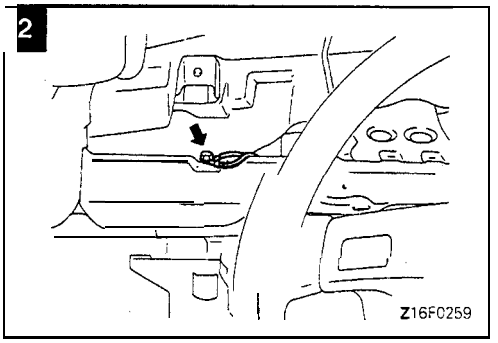
LOCATION OF CONTROL UNIT AND RELAY





GROUND POINT

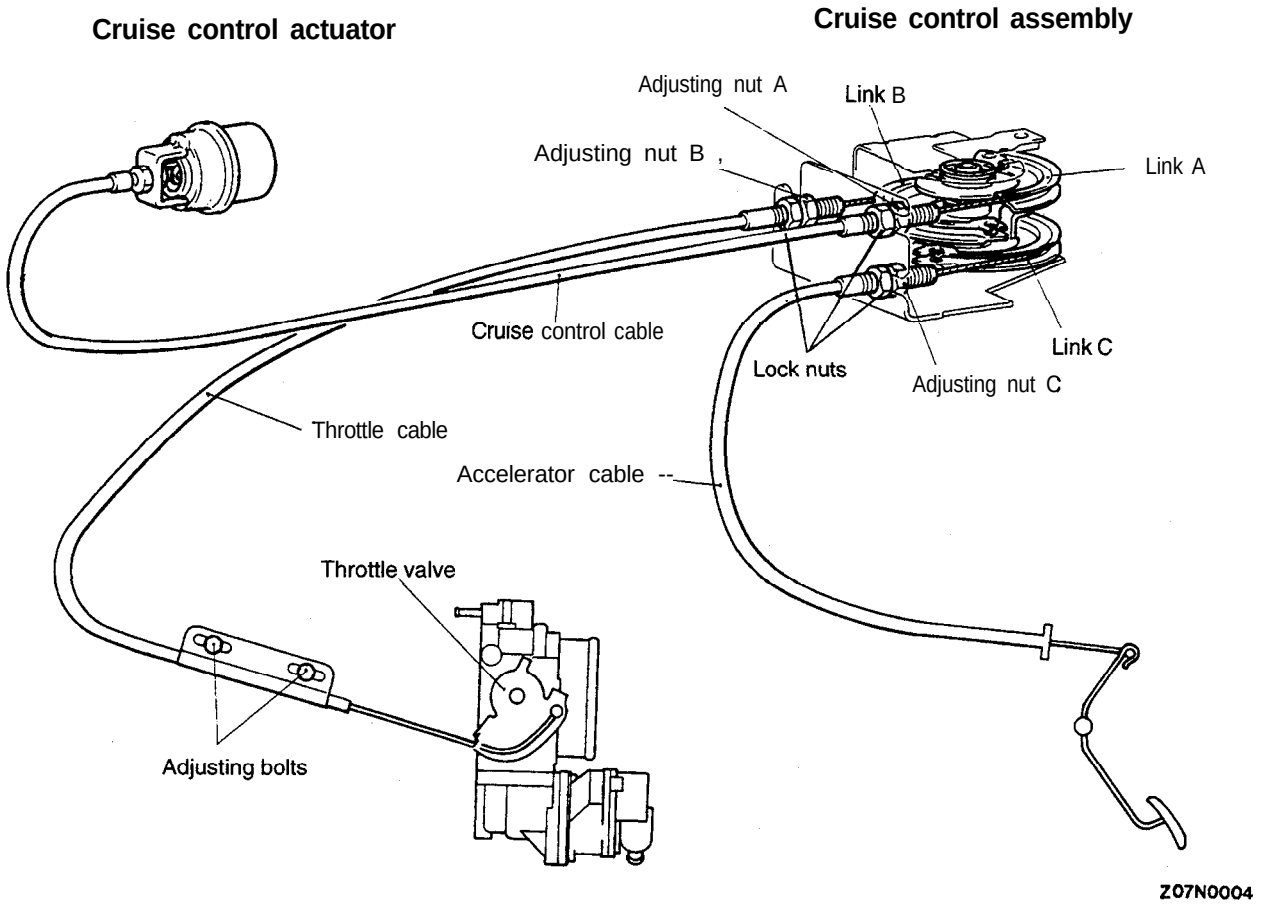




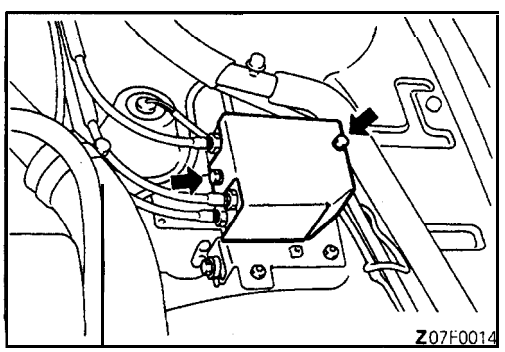
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ON-VEHICLE SERVICE

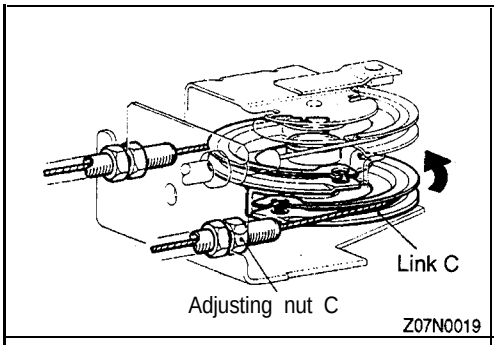
CRUISE CONTROL CABLES CHECK AND ADJUSTMENT

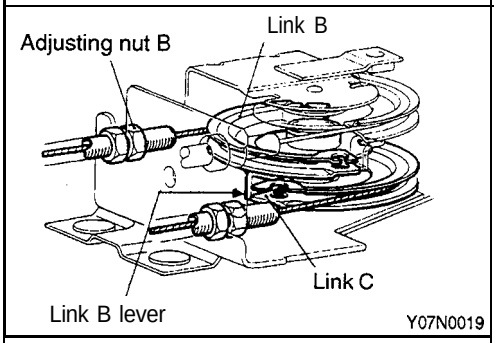


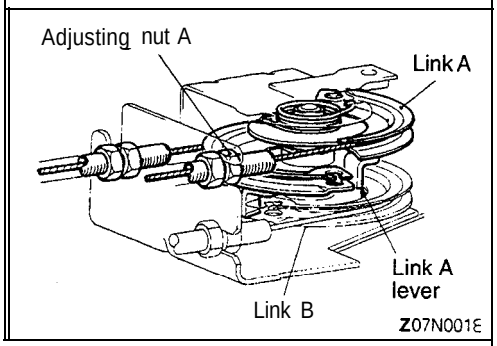
(1) Set the air conditioning, lights and other switches to OFF for inspection at no load.
(2) Let the engine warm up until it runs at idle.
(3) Check that the idle speed is within the specified range.
(4) Stop the engine and set the ignition switch to OFF.
(5) Check that the accelerator cable, cruise control cable and throttle cable are routed without sharp bends.
(6) Depress the accelerator pedal to check that the throttle lever moves smoothly from the fully-closed to fully-opened position.
(7) Check the free travel state of the inner cables of the accelerator cable, cruise control cable and throttle cable.
(8) If the inner cables are too loose or have no free travel at all, check using the following procedure.
  1) Remove the link protector.
  2) Loosen the adjusting and lock nuts of the throttle lever and intermediate links A, B and C to place the throttle lever and intermediate links A, B and C in the free state.

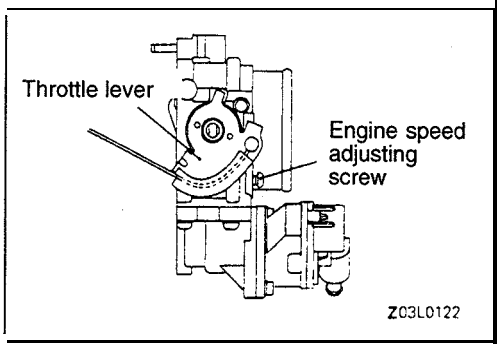


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3) Set the ignition switch to ON (do not start the engine).
4) Rotate intermediate link C in the direction shown until it is blocked by the stopper, turn down adjusting nut C in the direction that the free travel of the inner cable is reduced, and back off adjusting nut C the specified number of turns just before intermediate link C begins to move.

Amount adjusting nut C is to be backed off:

<M/T> About 1/2 turn [inner cable free travel O-l mm (0–.04 in.)]

<A/T> About two turns [inner cable free travel 2-3 mm (.08–.12 in.)]

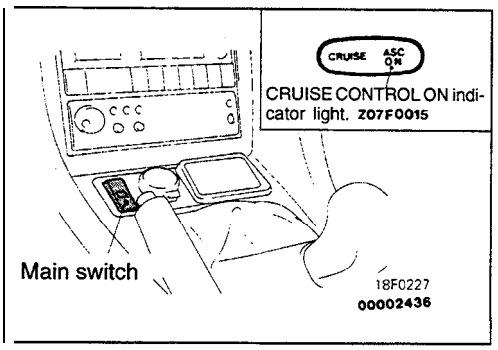
5) Secure the accelerator cable with the lock nut.
6) Turn down adjusting nut B in the direction that the free travel of the inner cable of the throttle cable is reduced.
At the position where the lever of intermediate link B is brought into contact with intermediate link C, back off adjusting nut B the specified number of turns.

Amount adjusting nut B is to be backed off:
About one turn [inner cable free travel l-2 mm (.04–.08 in.)]

7) Secure the throttle cable with the lock nut.
8) Secure the adjusting bolt of the intake manifold plenum.
9) Turn down adjusting nut A in the direction that the free travel of the inner cable of the cruise control cable is reduced. At the position where the lever of intermediate link A is brought into contact with intermediate link B, back off adjusting nut A the specified number of turns.

Amount adjusting nut A is to be backed off:
About one turn [inner cable free travel l-2 mm (.04–.08 in.)]

10) Secure the cruise control cable with the lock nut.
11) After adjustment, check to see that the end of the engine speed adjusting screw is in contact with the stopper of the throttle lever.

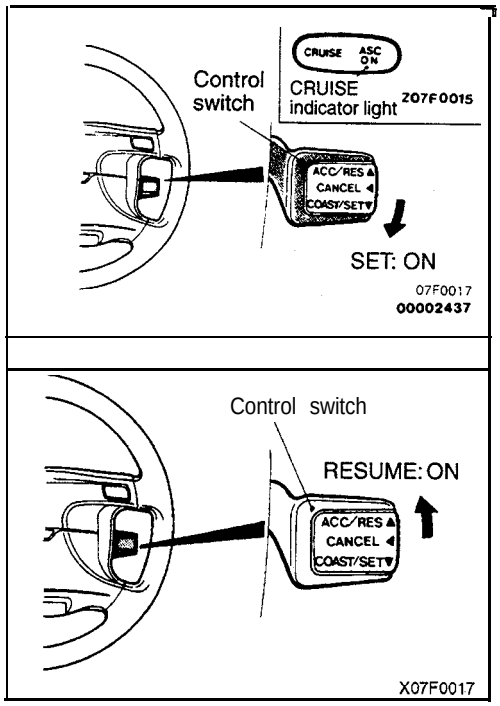


CRUISE CONTROL SYSTEM CHECK

CRUISE CONTROL MAIN SWITCH CHECK

(1) Turn the ignition key to ON.
(2) Check to be sure that the CRUISE CONTROL ON indicator light within the combination meter illuminates when the main switch is switched ON.

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CRUISE CONTROL SETTING CHECK

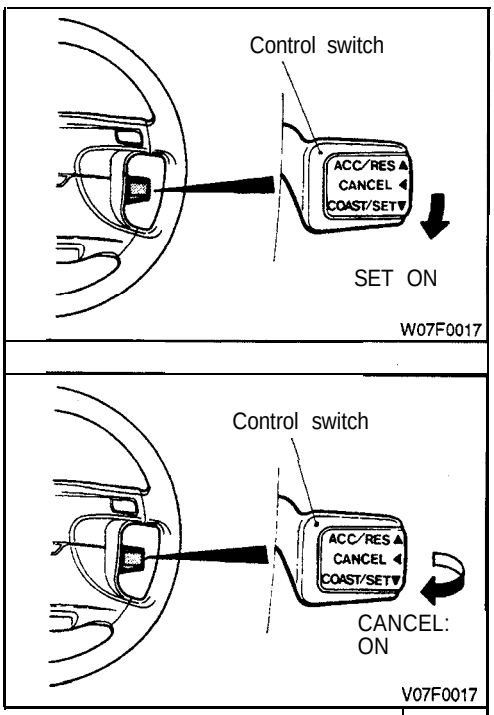
(1) Switch ON the main switch.
(2) Drive at the desired speed within the range of approximately 40-145 km/h (25-90 mph)*1, 40-200 km/h (25-124 mph)*2.
(3) Operate the control switch downward. (SET switch: ON)
(4) Check to be sure that the speed is the desired constant speed when the switch is released, and also check to be sure that the CRUISE indicator light (within the combination meter) illuminates.

NOTE
(1) If the vehicle speed decreases to approximately 15 km/h (9 mph) below the set speed, because of climbing a hill for example, the cruise control will be cancelled.
(2) *1: Vehicles built up to April 1991
(3) *2: Vehicles built from May 1991

SPEED-INCREASE SETTING CHECK

(1) Set to the desired speed.
(2) Operate the control switch upward. (RESUME switch: ON)
(3) Check to be sure that acceleration continues while the switch is held, and that when it is released the constant speed at the time when it was released becomes the driving speed.

NOTE
Even if, during acceleration, the vehicle speed reaches or exceeds the high limit, acceleration will continue, however, when the switch is released, the set speed ("memorized speed") will become the high limit of the vehicle speed.



SPEED REDUCTION SETTING CHECK

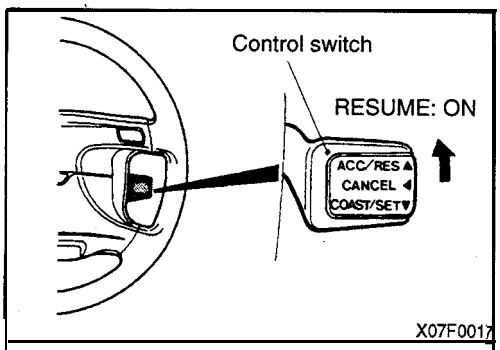
(1) Set to the desired speed.
(2) Operate the control switch downward. (SET switch: ON)
(3) Check to be sure that deceleration continues while the switch is held, and that when it is released the constant speed at the time when it was released becomes the driving speed.

NOTE
When the vehicle speed reaches the low limit [approximately 40 km/h (25 mph)] during deceleration, the cruise control will be cancelled.

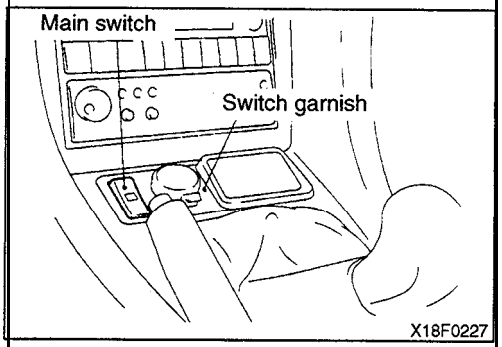
CRUISE CONTROL CANCELLATION AND SET SPEED RESUME CHECK

(1) Set cruise control.
(2) In the cruising condition of the cruise control mode, check that when any of the following operations are performed, the normal drive mode is restored and the vehicle coasts smoothly.
1) Move the control switch toward you. (CANCEL switch: ON)
2) Depress the brake pedal.
3) Depress the clutch pedal. <M/T>
4) Place the gear selector lever in the N range. <A/T>

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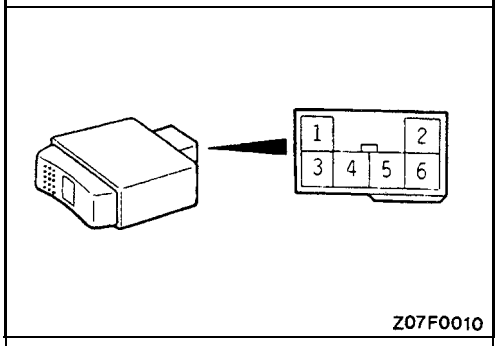
(3) With the vehicle at a speed of more than about 40 km/h (25 mph), check that when the control switch is moved upward (RESUME switch: ON), the vehicle resumes cruising at the speed held before cancellation of the cruise control mode.
(4) In the cruise control mode, check that when the main switch is set to OFF, the normal drive mode is restored and the vehicle coasts smoothly.



INDIVIDUAL PARTS CHECK

CRUISE CONTROL MAIN SWITCH CHECK

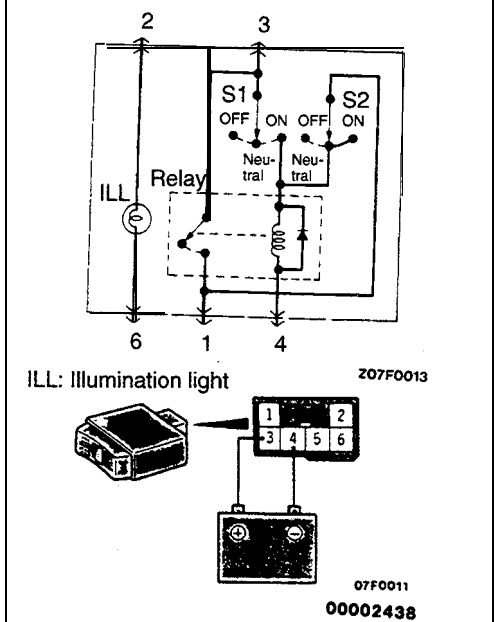
(1) Remove the main switch together with the switch garnish.
(2) Remove the main switch from the switch garnish.



(3) Operate the main switch and check for continuity across the individual terminals.

Switch state	Terminal No.					
	6	ILL	2	3	4	1
Press OFF.	○	—(ILL)—	○			
Neutral position	○	—(ILL)—	○		○	○
Press ON.	○	—(ILL)—	○	○	○	○

NOTE
ILL: Illumination light

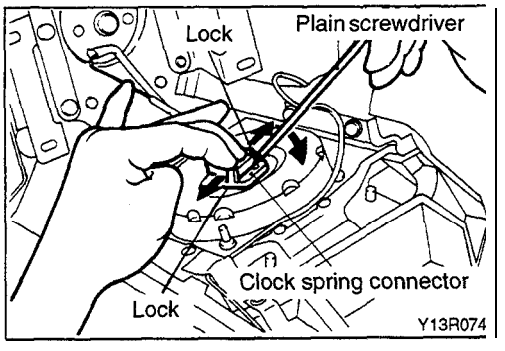


(4) Connect a positive lead from the battery to terminal (3) and a negative lead from the battery to terminal (4) and check that battery voltage is available across terminal (1) and the ground during the period the ON side of the main switch is pressed and during the period before the OFF side is pressed thereafter.
Check that when the OFF side of the main switch is pressed thereafter, the battery voltage available across terminal (1) and the ground is reduced to 0 V.

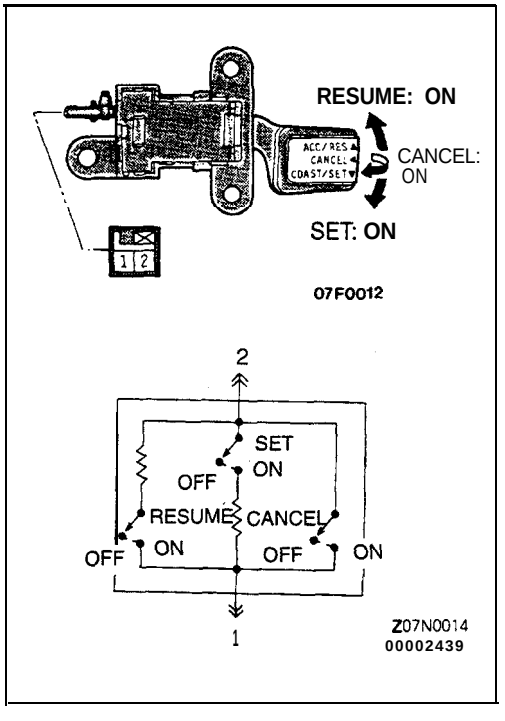
CRUISE CONTROL SWITCH CHECK

(1) Remove the air bag module using the following procedure.
1) Remove the negative terminal of the battery and wait for more than 60 seconds.

Caution
The capacitor in the SRS diagnosis unit retains enough voltage to deploy the air bag for a given period even after disconnection of the battery. If an operation is performed during that given period, unintended deployment of the air bag could result and cause serious injury.



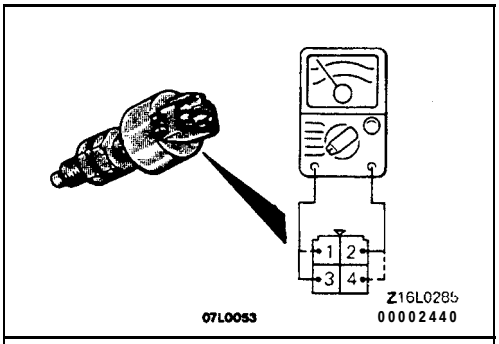
2) Remove the air bag module. To remove the clock spring connector (squib connector) from the air bag module, force the lock outward and pry it with a plain screwdriver as shown at left so that no undue force will be exerted on the connector when it is removed.
3) The removed air bag module should be stored in a clean, dry, flat place with the pad side up.



(2) Disconnect the connector of the control switch and operate the control switch to measure the resistance between the individual terminals.
If the readings are as shown below, the control switch may be considered good.

Switch operation	Resistance between terminals
When switch is not operated	No continuity
When switch is operated toward you (CANCEL switch: ON)	Approx. 0 Ω
When switch is operated upward (RESUME switch: ON)	Approx. 820 Ω
When switch is operated downward (SET switch: ON)	Approx. 2,700 Ω

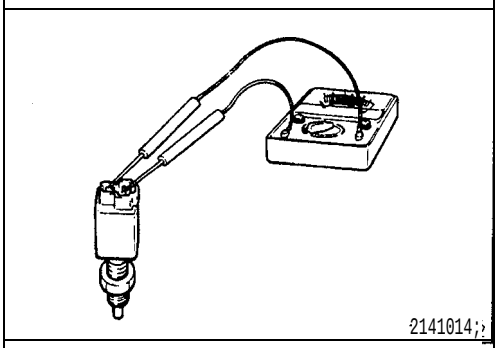
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STOP LIGHT SWITCH/BRAKE SWITCH CHECK

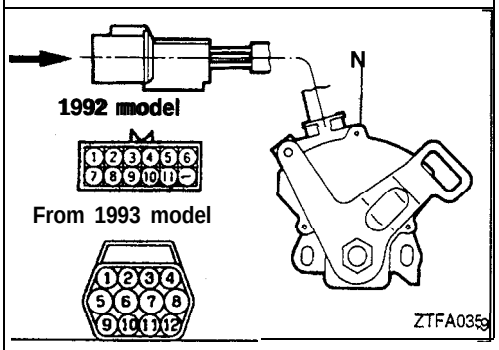
(1) Disconnect the connector.
(2) Check for continuity between the terminals of the switch.

Measurement conditions	For brake switch terminal		For stop light switch terminal	
	1	4	2	3
When brake pedal depressed.			○	○
When brake pedal not depressed.	b--+--l			



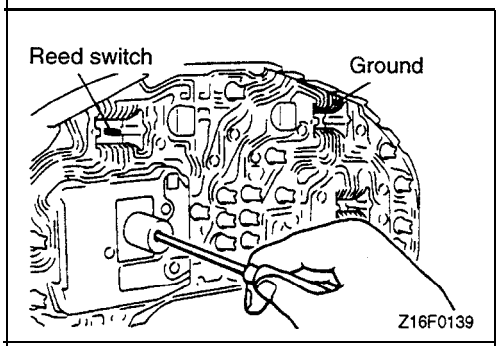
CLUTCH PEDAL POSITION SWITCH CHECK <M/T>

(1) Disconnect the connector.
(2) Check that there is continuity between the terminals when the clutch pedal is depressed, and that there is no continuity when the pedal is released.



PARK/NEUTRAL POSITION SWITCH ("N" POSITION) CHECK <A/T>

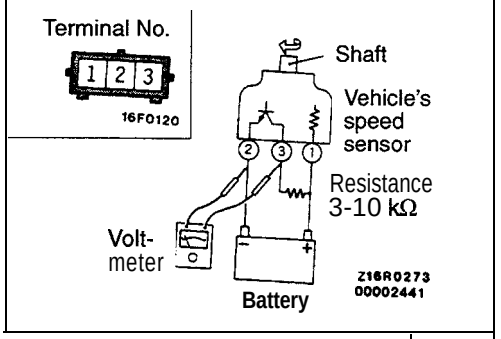
(1) Disconnect the connector.
(2) On 1992 models, check to be sure that there is continuity between connector terminals (8) and (9) when the shift lever is moved to the "N" range.
(3) From 1993 models, check to be sure that there is continuity between connector terminal (8) and (7) when the shift lever is moved to the "N" range.



VEHICLE SPEED SENSOR CHECK

<Up to 1993 models (Non Turbo)>

Use circuit tester to check circuit repeats off/on between terminals when speedometer shaft turned several times.



<Up to 1993 models (Turbo) and From 1994 models>

(1) Remove the vehicle's speed sensor and connect as shown in the illustration, using a 3-10 kS2 resistance.
(2) Use a voltmeter to check for voltage at terminals (2) and (3) when the pulse generator shaft is turning. (One revolution is four pulses.)

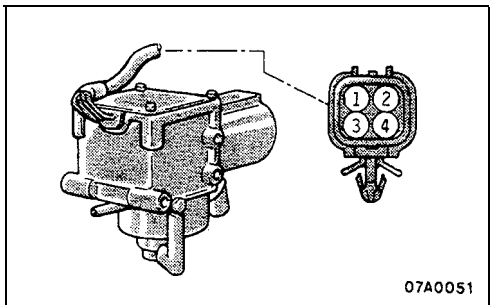
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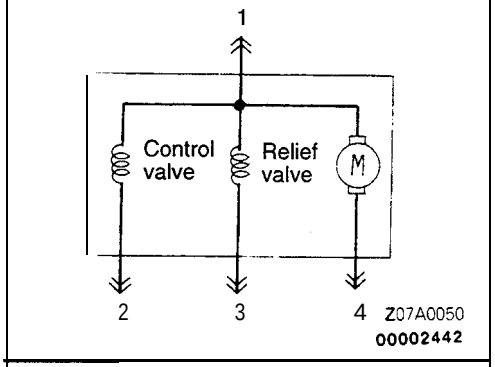
THROTTLE POSITION SENSOR INSPECTION

For inspection, refer to GROUP 13A – On-Vehicle Inspection of MFI Components.

CLOSED THROTTLE POSITION SWITCH INSPECTION

For inspection, refer to GROUP 13A – On-Vehicle Inspection of MFI Components.





VACUUM PUMP INSPECTION

Inspection of Solenoid Valves (Control and Relief Valves)

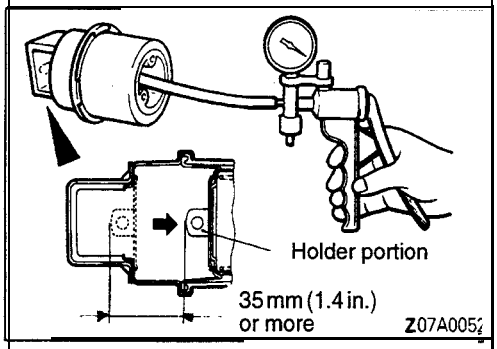
(1) Disconnect the connector of the vacuum pump assembly.
(2) Measure the resistance values across terminals (1) and (2) and across terminals (1) and (3).

Standard value: 50–60 Ω

(3) Check that when the battery voltage is applied across terminals (1) and (2) and across terminals (1) and (3), the operating sounds of the solenoid valves are heard.
(4) If the solenoid valves are defective, replace the vacuum pump assembly.

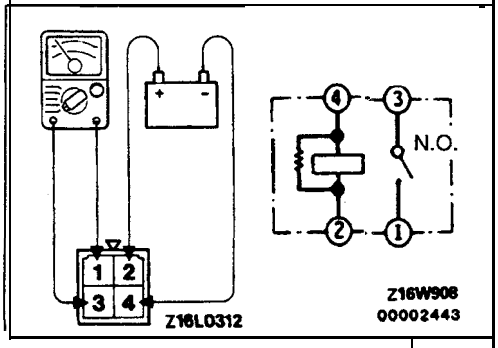
Inspection of Motor

(1) Disconnect the connector of the vacuum pump assembly.
(2) Check that when the battery voltage is applied across terminals (1) and (4), the motor operates.



ACTUATOR INSPECTION

(1) Remove the actuator.
(2) Using a vacuum pump, apply a negative pressure to the actuator to check that the holder portion moves more than 35 mm (1.4 in.). Retain the negative pressure in that state to check that the holder portion does not change its position.
(3) After the actuator has been mounted, check and adjust the cruise control cable. (Refer to P.17-31.)



CRUISE CONTROL RELAY INSPECTION

(1) Remove the cruise control relay.
(2) Apply battery power to terminal (2) and connect terminal (4) to the ground. Check for continuity across the terminals.

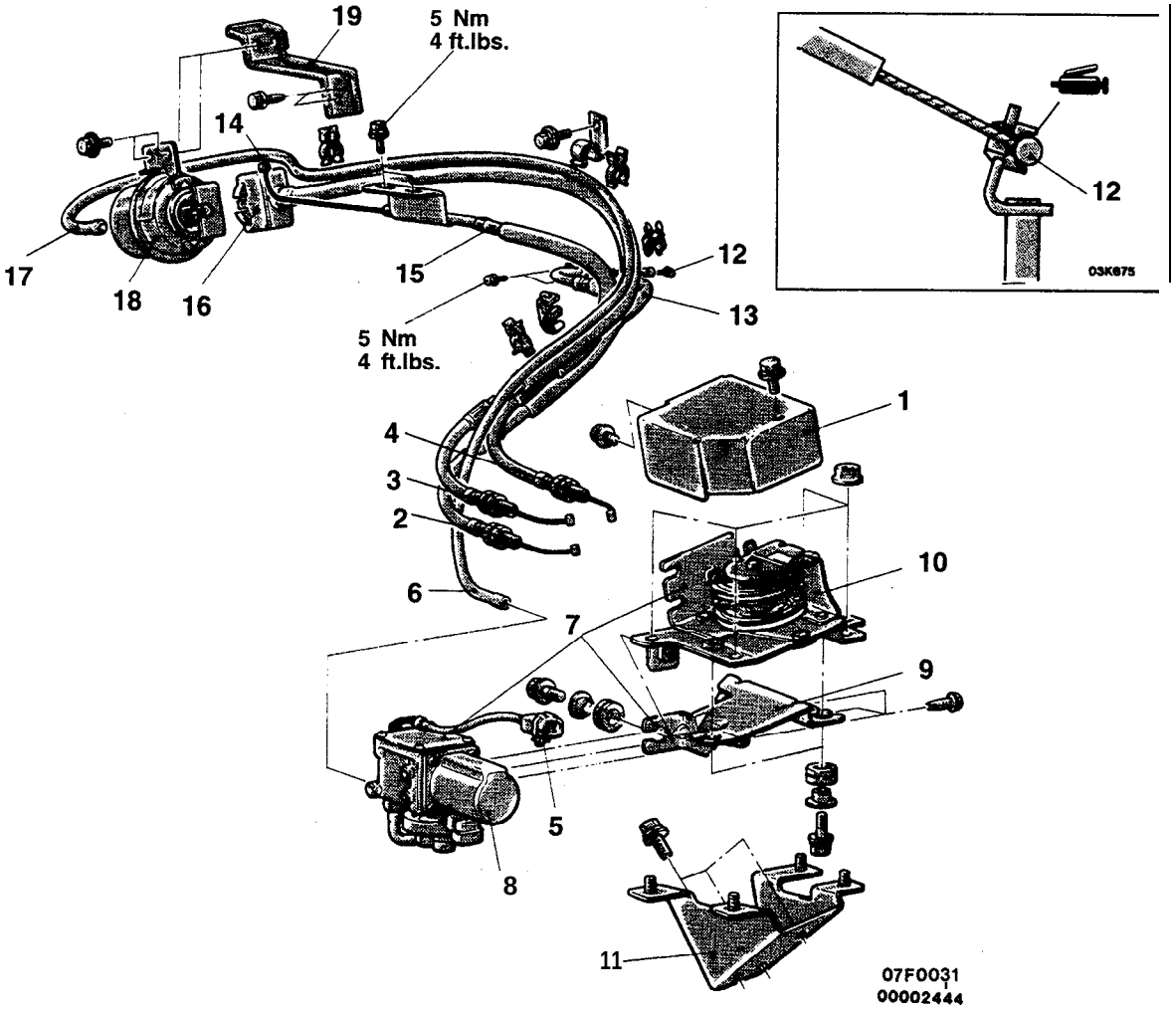
When power is supplied	Across terminals 1-3	Continuity
When no power is supplied	Across terminals 1–3	No continuity
	Across terminals 2-4	Continuity

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CRUISE CONTROL SYSTEM

REMOVAL AND INSTALLATION

Post-installation Operation
- Cruise Control Cables Adjustment (Refer to R.17-31.)

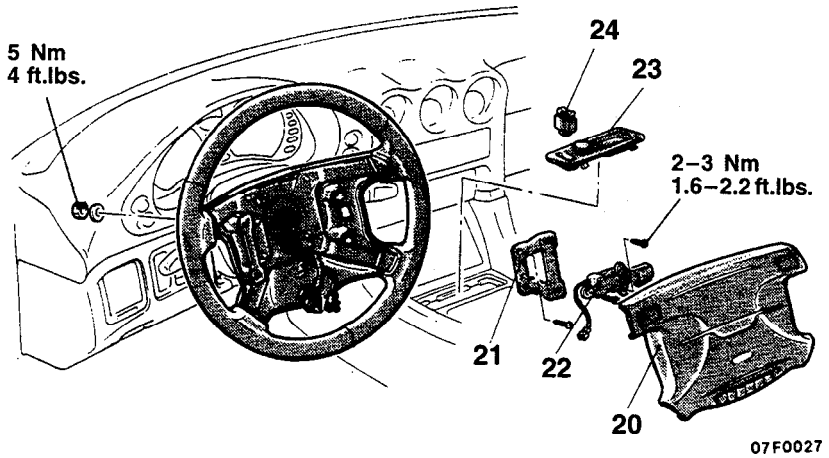


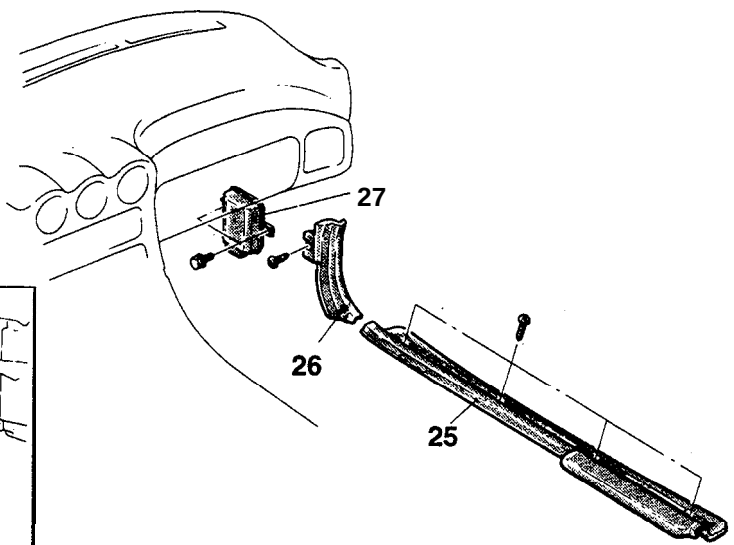
Actuator removal steps

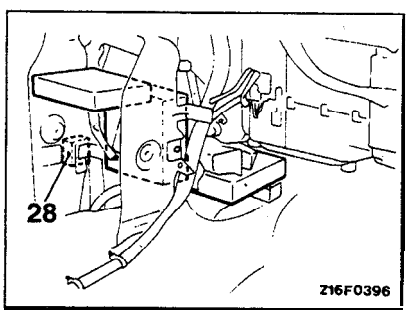
1. Link protector
2. Accelerator cable and link assembly connection
3. Cruise control cable and link assembly connection
4. Throttle cable and link assembly connection
5. Vacuum pump connector
6. ▶A◀ Vacuum hose and vacuum pump connection
7. Link assembly and vacuum pump
8. Vacuum pump
9. Pump bracket
10. Link assembly
11. Link bracket
12. Accelerator cable and accelerator pedal connection
13. Accelerator cable
14. Throttle cable and throttle body connection
15. Throttle cable
16. Actuator and actuator bracket
17. Cruise control cable and actuator connection
18. Actuator
19. Actuator bracket

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CAUTION: SRS
Before removal of air bag module, refer to GROUP 52B – Service Precautions and Air Bag Module and Clock Spring.







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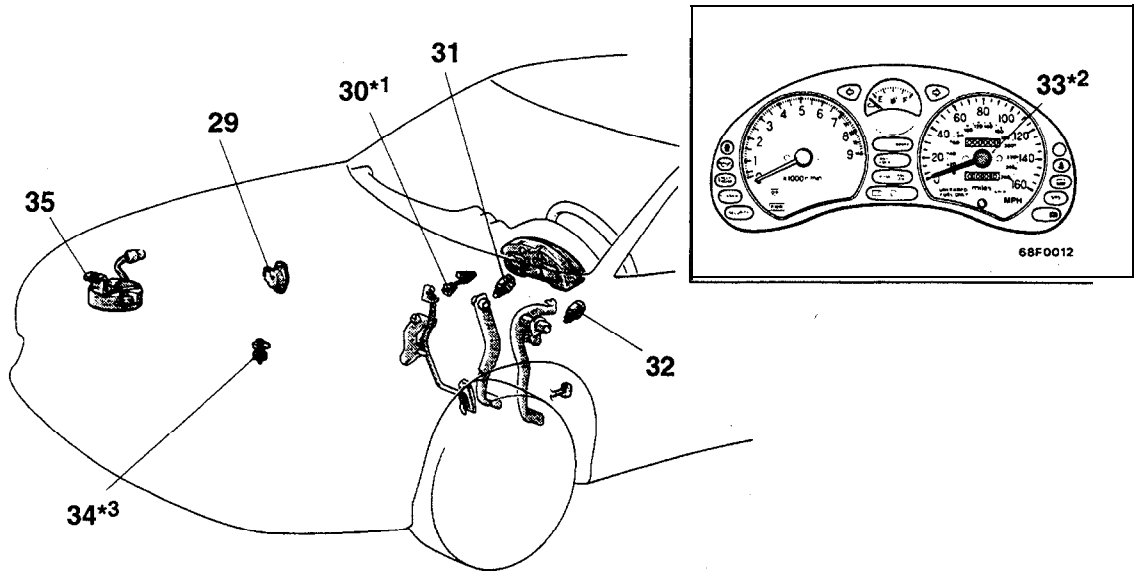
Control switches removal steps

20. Air bag module
    (Refer to GROUP 52B – Air Bag Module and Clock Spring.)
21. Air bag module bracket
22. Cruise control switch
23. Switch garnish
24. Main switch

Control unit and relay removal steps

25. Scuff plate (R.H.)
26. Cowl side trim (R.H.)
27. Cruise control unit
28. Cruise control relay

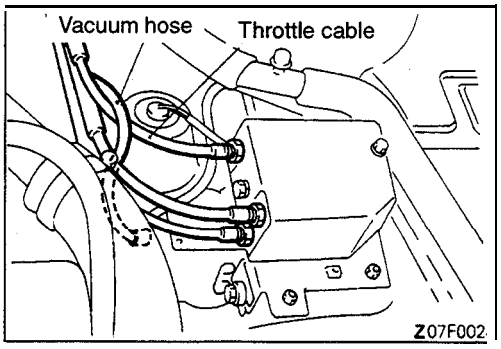
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Sensors and switches removal steps

29. Throttle position sensor
30. Accelerator pedal switch*1
31. Stop light switch
32. Clutch pedal position switch <M/T>
33. Vehicle speed sensor <Non turbo>*2 (Refer to GROUP 54 – Meters and Gauges.)
34. Vehicle speed sensor*3 (Refer to GROUP 54 – Meters and Gauges.)
35. Park/neutral position switch <A/T>

NOTE
*1: Equipped on 1992 models only
*2: Up to 1993 models
*3: Up to 1993 models (Turbo) and From 1994 models



INSTALLATION SERVICE POINT

▶A◀ VACUUM HOSE TO VACUUM PUMP CONNECTION

Route the vacuum hose over the throttle cable and connect the hose to the vacuum pump so as to prevent the slackened hose from interfering with other parts.

INSPECTION

- Check the inner and outer cable for damage.
- Check the cable for smooth movement.
- Check the link protector for damage.

INSPECTION OF INDIVIDUAL PARTS

Refer to On-vehicle Service – individual Parts Inspection (P.17-34).

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EMISSION CONTROL SYSTEM

SPECIFICATIONS

GENERAL SPECIFICATIONS

Items		Specifications
Positive crankcase ventilation system		Closed type with positive crankcase ventilation valve
Evaporative emission control system		Evaporative emission canister storage type
Evaporative emission <EVAP> canister		Charcoal type
Evaporative emission <EVAP> purge solenoid <Up to 1995 models>		ON/OFF solenoid valve
Evaporative emission <EVAP> purge solenoid <From 1996 models>		Duty cycle type
Exhaust gas recirculation system	EGR valve <California – Non Turbo, Turbo>	Vacuum-activated diaphragm type
	EGR temperature sensor <California, Federal – Turbo from 1994 model>	Thermistor type
	EGR solenoid <California – Non Turbo, Turbo>	Duty cycle type solenoid valve
Catalytic converter		Monolith type
Location <California – Non Turbo up to 1993 model, Federal – Non turbo UP to 1995 model>		Under floor
Location <Turbo, California – Non Turbo from 1994 model, Federal – Non Turbo from 1996 model>		Right bank, Left bank and underfloor

SERVICE SPECIFICATIONS

Items	Specifications
Evaporative emission purge solenoid coil resistance Ω	36-44 [at 20°C (68°F)]
EGR temperature sensor resistance <Up to 1995 model> kΩ	60-83 [at 50°C (122°F)] 11-14 [at 100°C (212°F)]
EGR solenoid coil resistance Ω	36-44 [at 20°C (68°F)]

TROUBLESHOOTING

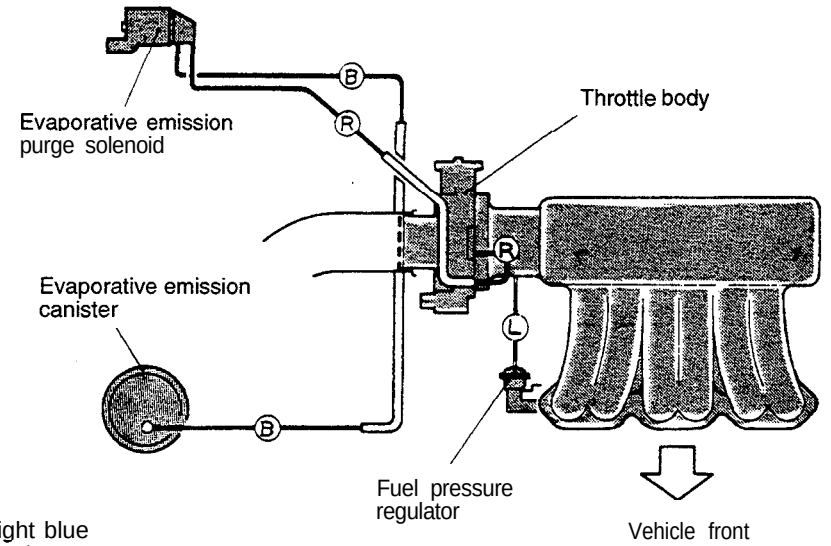
Symptom	Probable cause	Remedy
Engine will not start or hard to start	Vacuum hose disconnected or damaged	Repair or replace
	The EGR valve is not closed	Repair or replace
	Malfunction of the evaporative emission purge solenoid	Repair or replace
Rough idle or engine stalls	The EGR valve is not closed	Repair or replace
	Vacuum hose disconnected or damaged	Repair or replace
	Malfunction of the positive crankcase ventilation valve	Replace
	Malfunction of the purge control system	Check the system; if there is a problem, check its component parts
Engine hesitates or poor acceleration	Malfunction of the exhaust gas recirculation	Check the system; if there is a problem, check its component parts
Excessive oil consumption	Positive crankcase ventilation line clogged	Check positive crankcase ventilation system
Poor fuel mileage	Malfunction of the exhaust gas recirculation system	Check the system; if there is a problem, check its component parts

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VACUUM HOSES

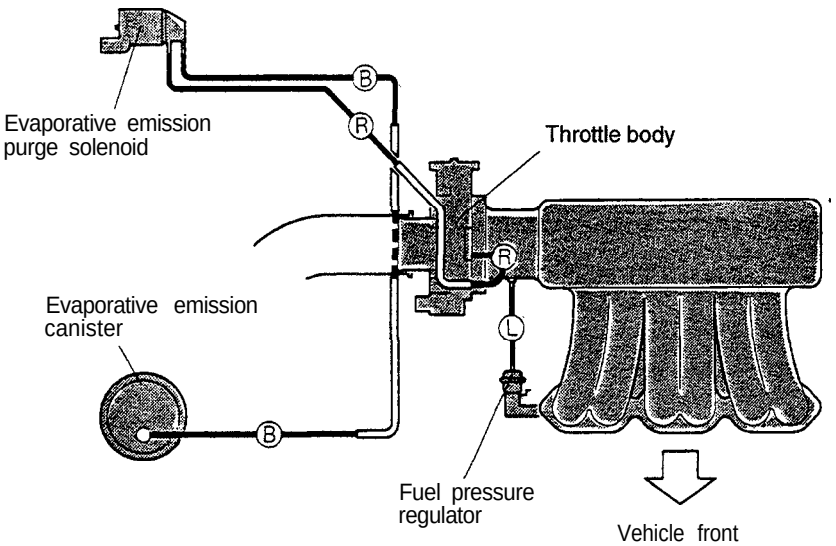
VACUUM HOSES ROUTING

<Federal Non Turbo – 1992 models>



L: Light blue
R: Red
B: Black

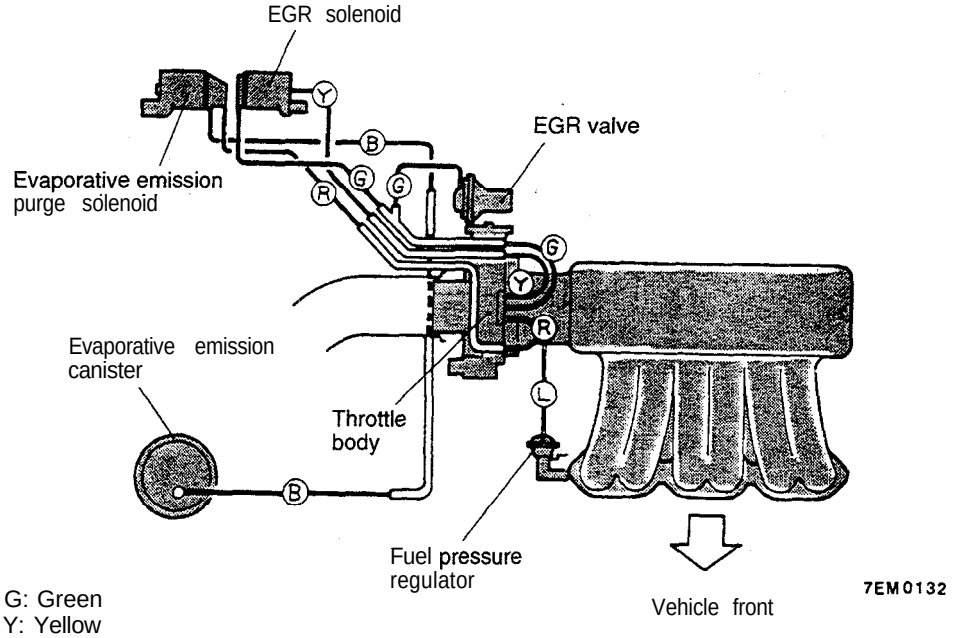
<Federal Non Turbo – From 1993 up to 1995 models>



L: Light blue
R: Red
B: Black

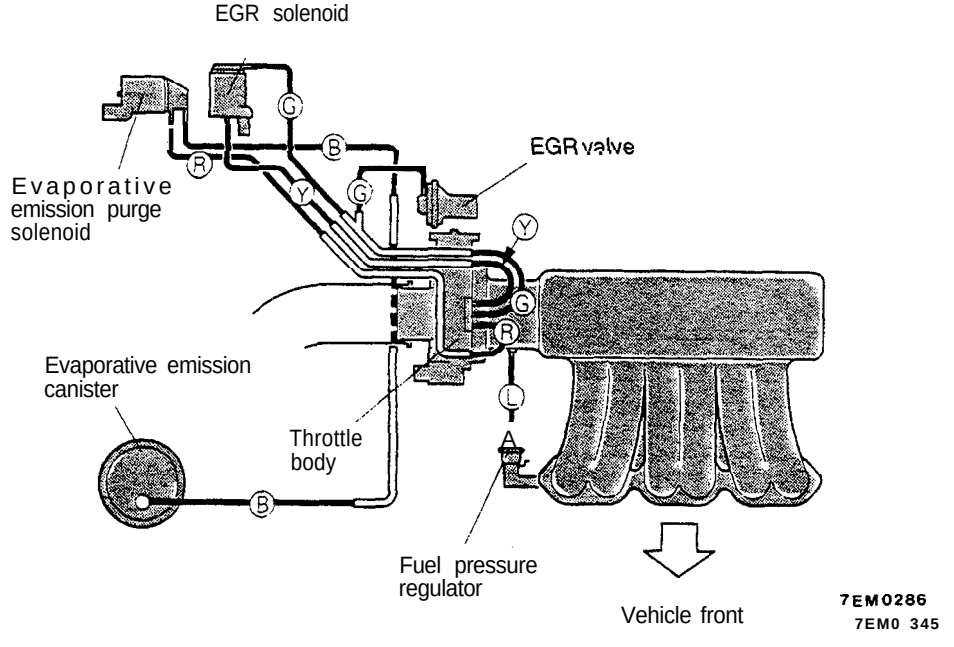
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<California Non Turbo – 1992 models>



G: Green
Y: Yellow
L: Light blue
R: Red
B: Black

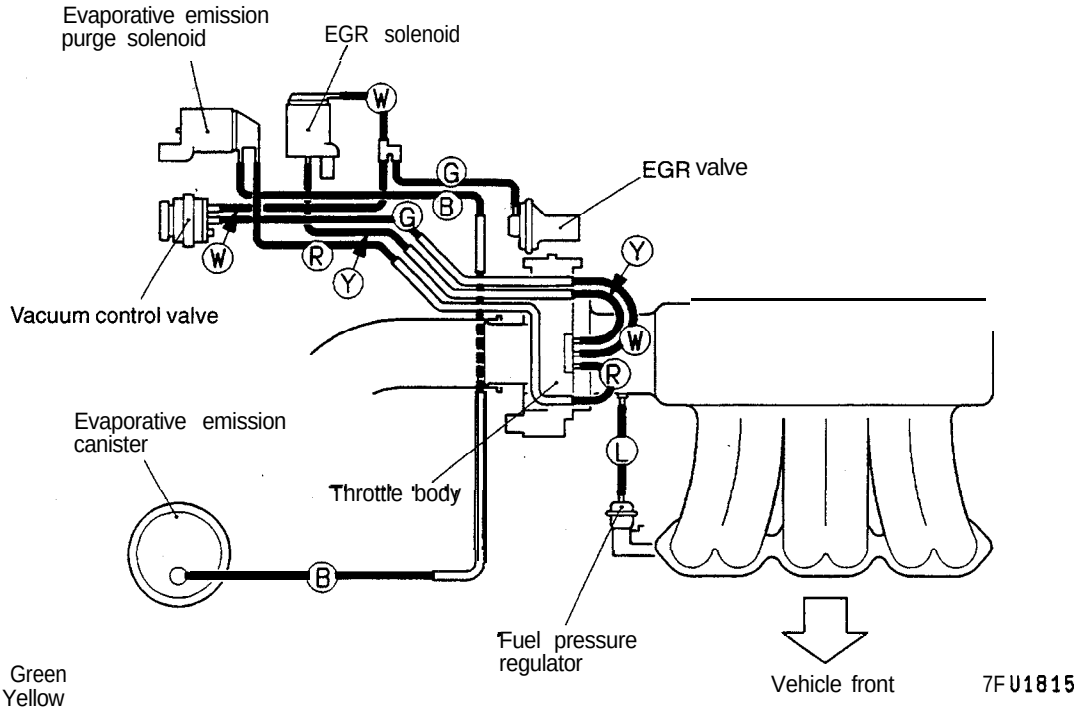
<California Non Turbo – From 1993 up to 1995 models>



G: Green
Y: Yellow
L: Light blue
R: Red
B: Black

TSB Revision

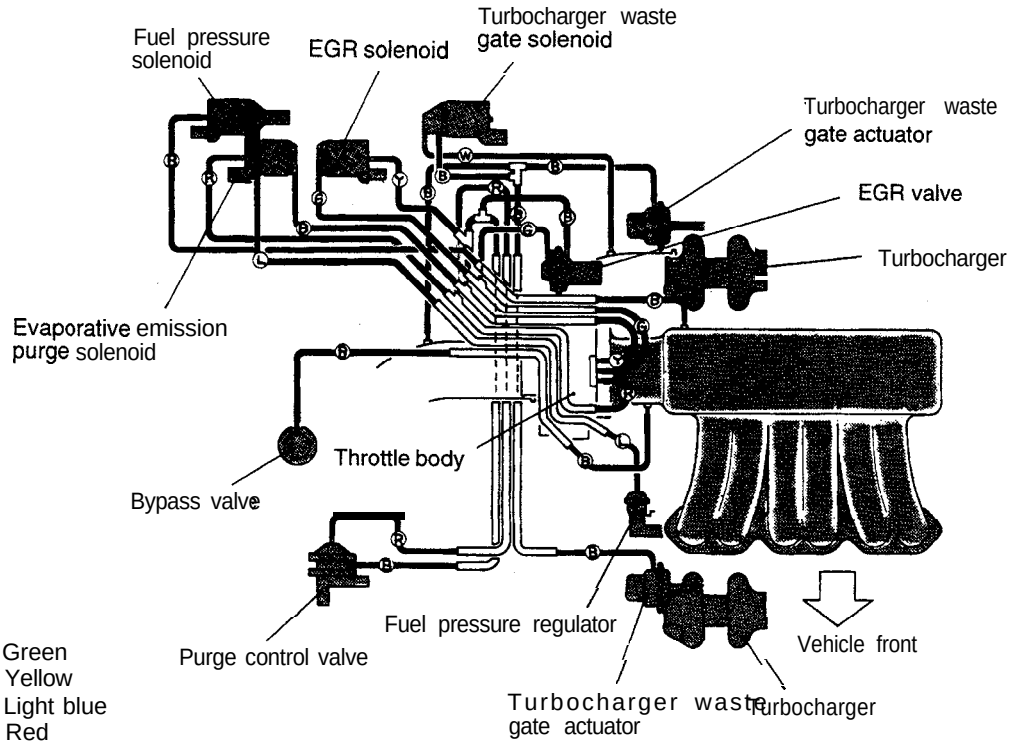
<Non Turbo – From 1996 models>



G: Green
Y: Yellow
L: Light blue
R: Red
B: Black
W: White

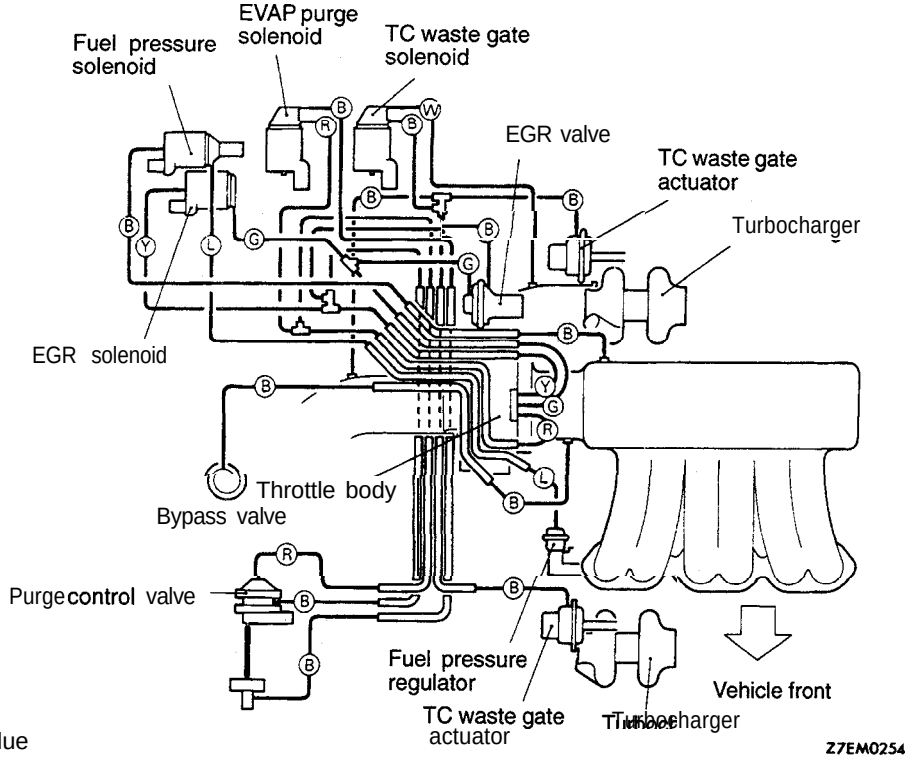
TSB Revision

<Turbo – 1992 models>



G Green
Y: Yellow
L: Light blue
R: Red
B: Black
W: White

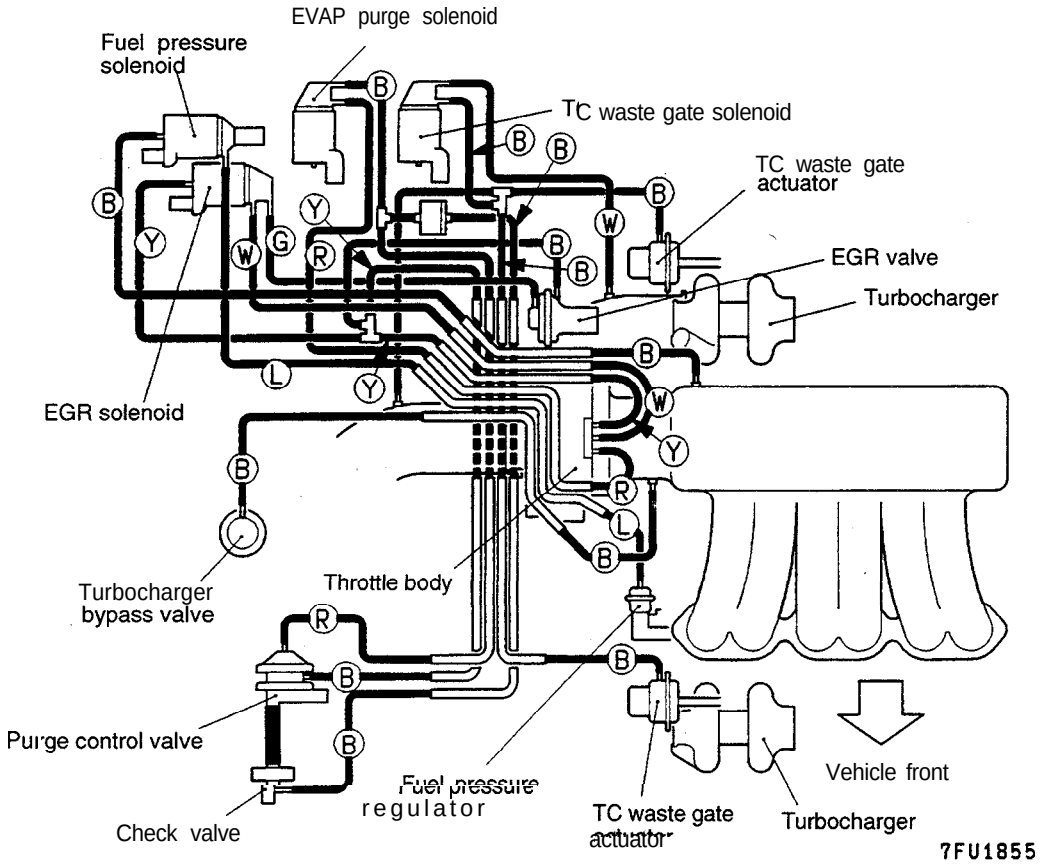
<Turbo – From 1993 up to 1995 models>



G: Green
Y: Yellow
L: Light blue
R Red
B: Black
W: White

TSB Revision

<Turbo – From 1996 models>

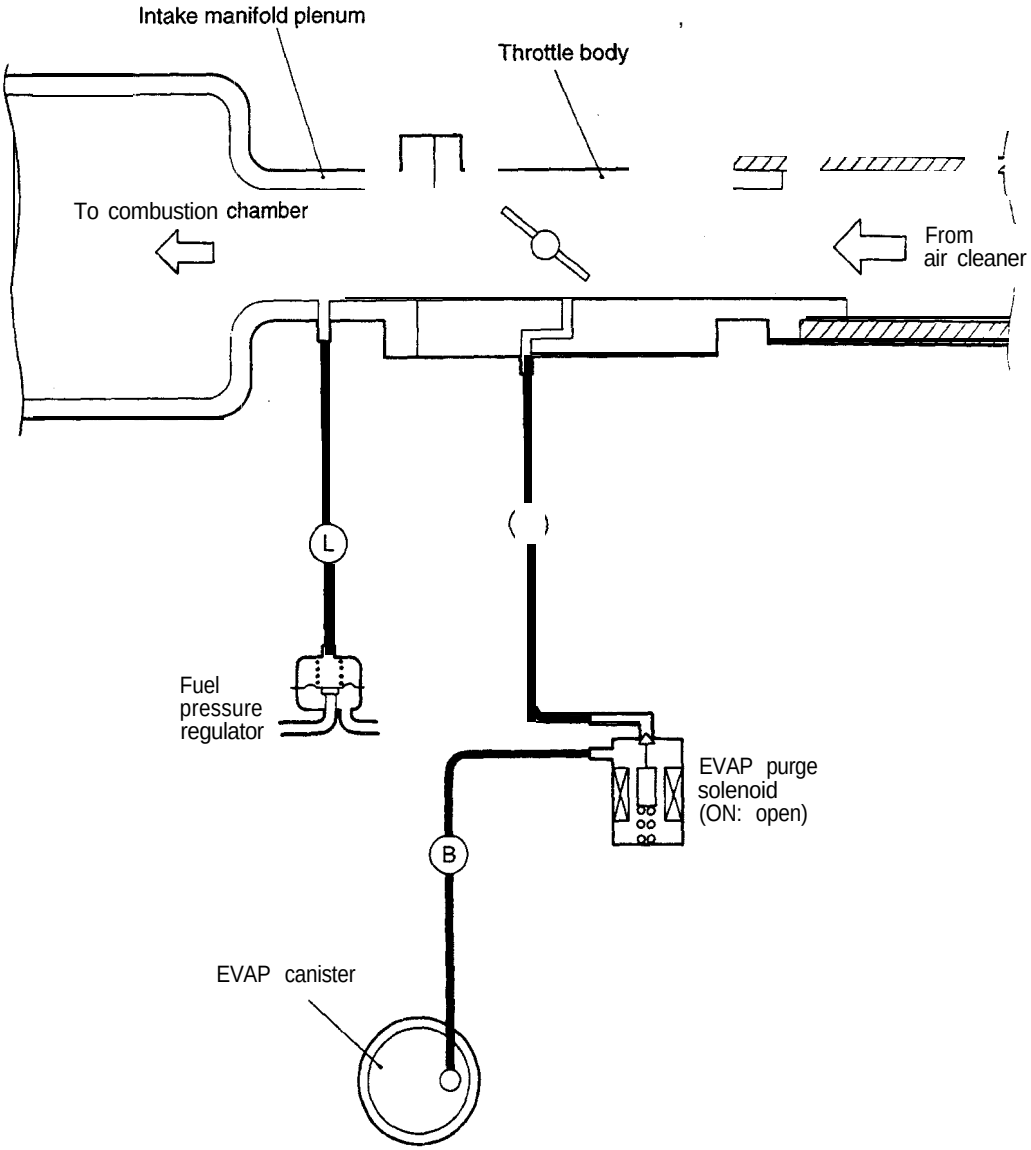


G: Green
Y: Yellow
L: Light blue
R: Red
B: Black
W: White

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VACUUM CIRCUIT DIAGRAM

<Federal Non Turbo – 1992 models>

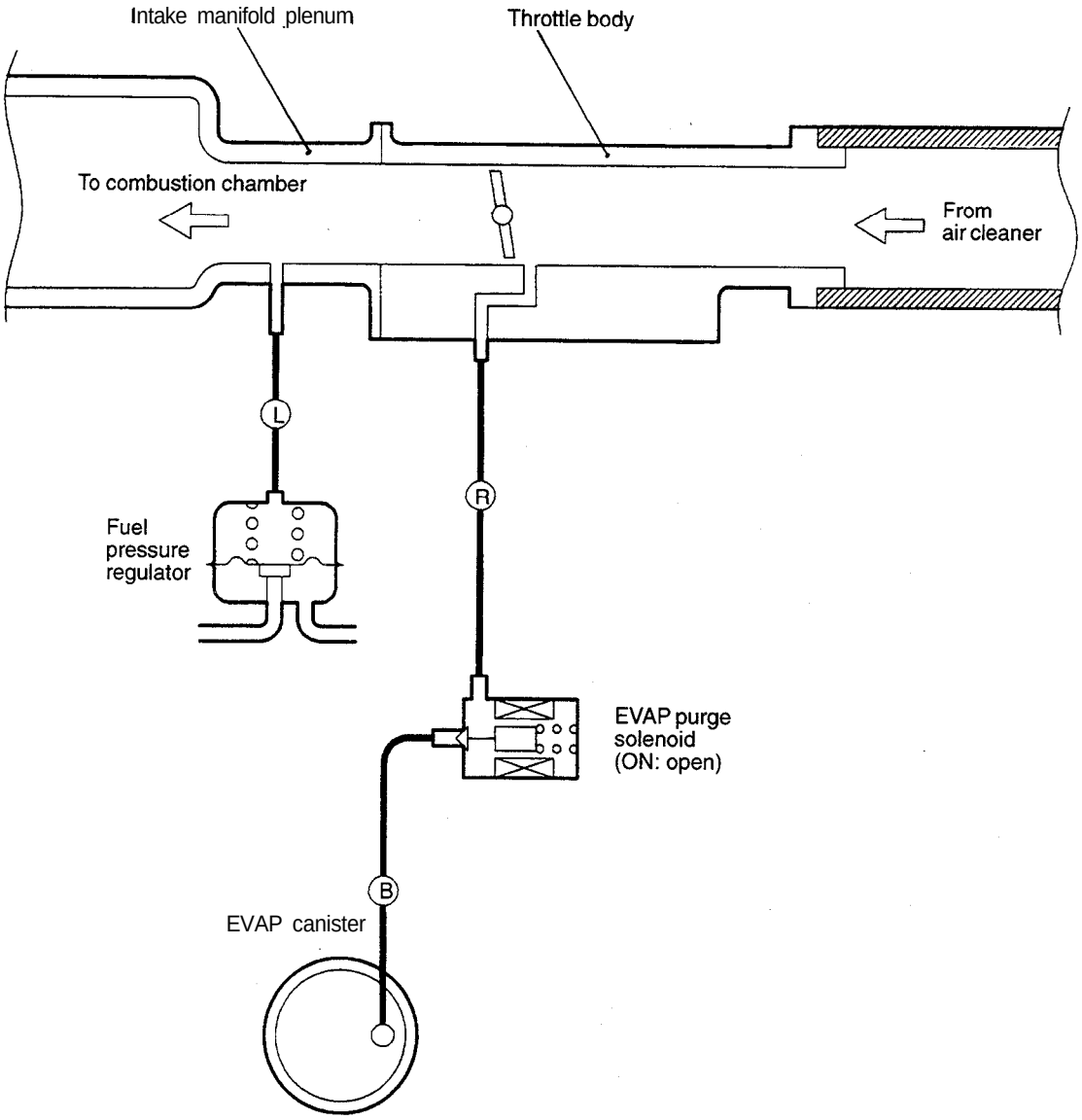


B: Black
L: Light blue
R: Red

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<Federal Non Turbo – From 1993 up to 1995 models>

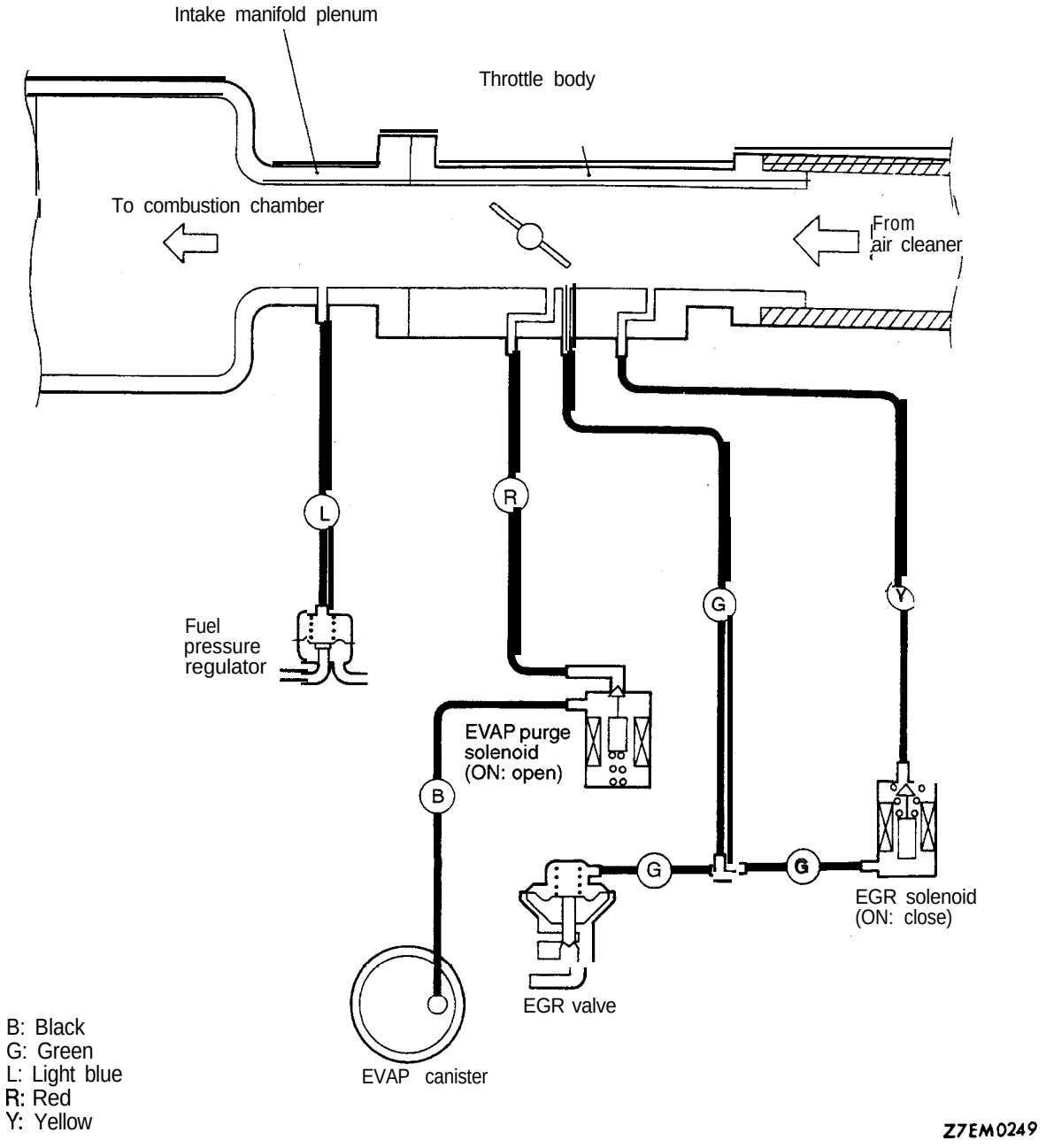


B: Black
L: Light blue
R: Red

Z7EM0287

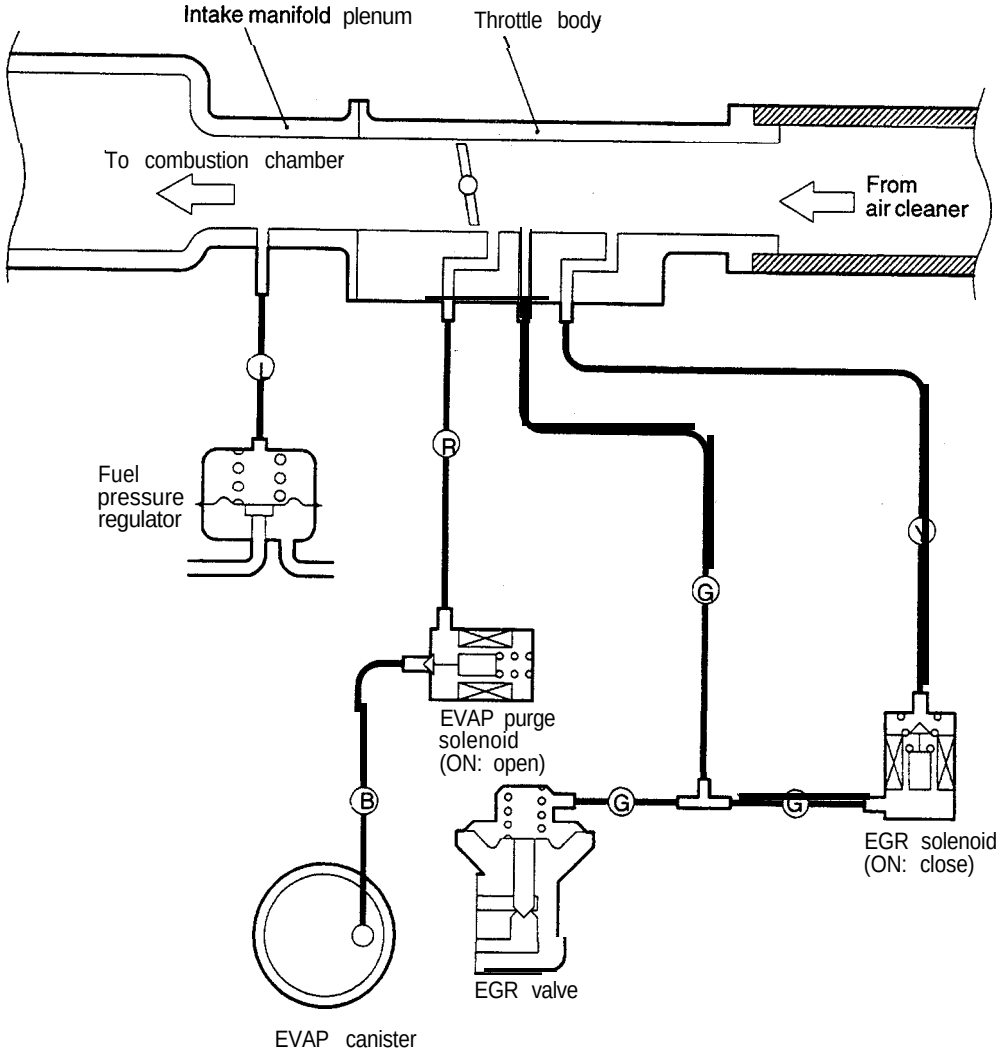
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<California Non Turbo – 1992 models>



TSB Revision

<California Non Turbo – From 1993 up to 1995 models>

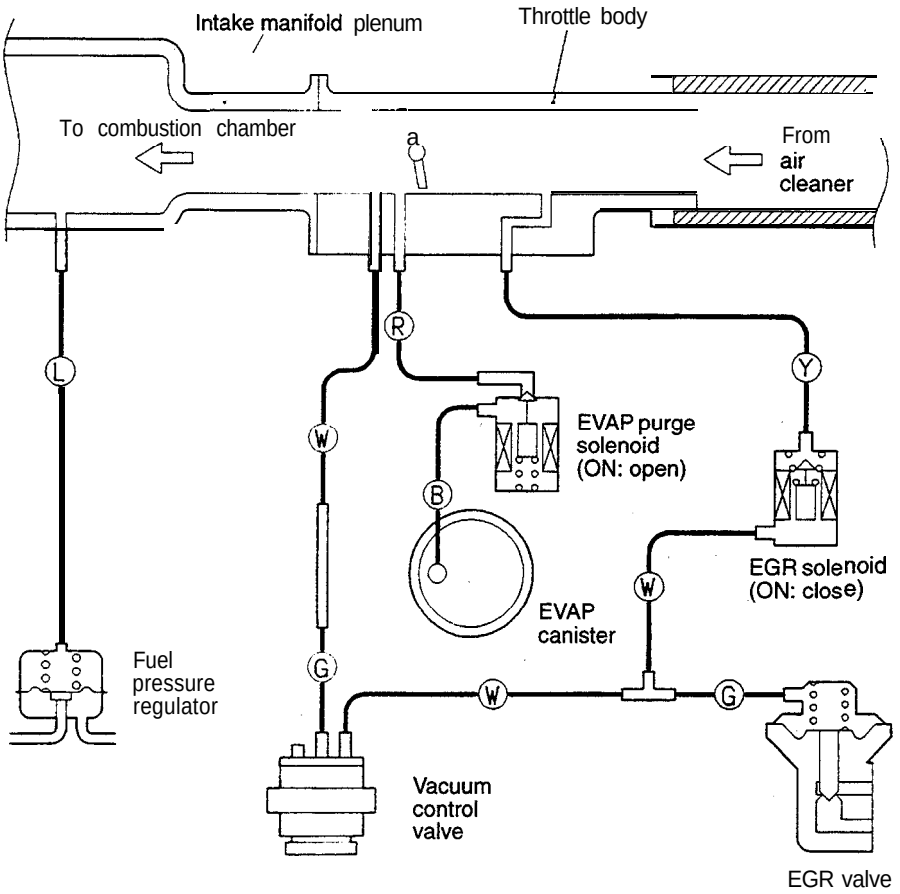


B: Black
G: Green
L: Light blue
R: Red
Y: Yellow

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TSB Revision

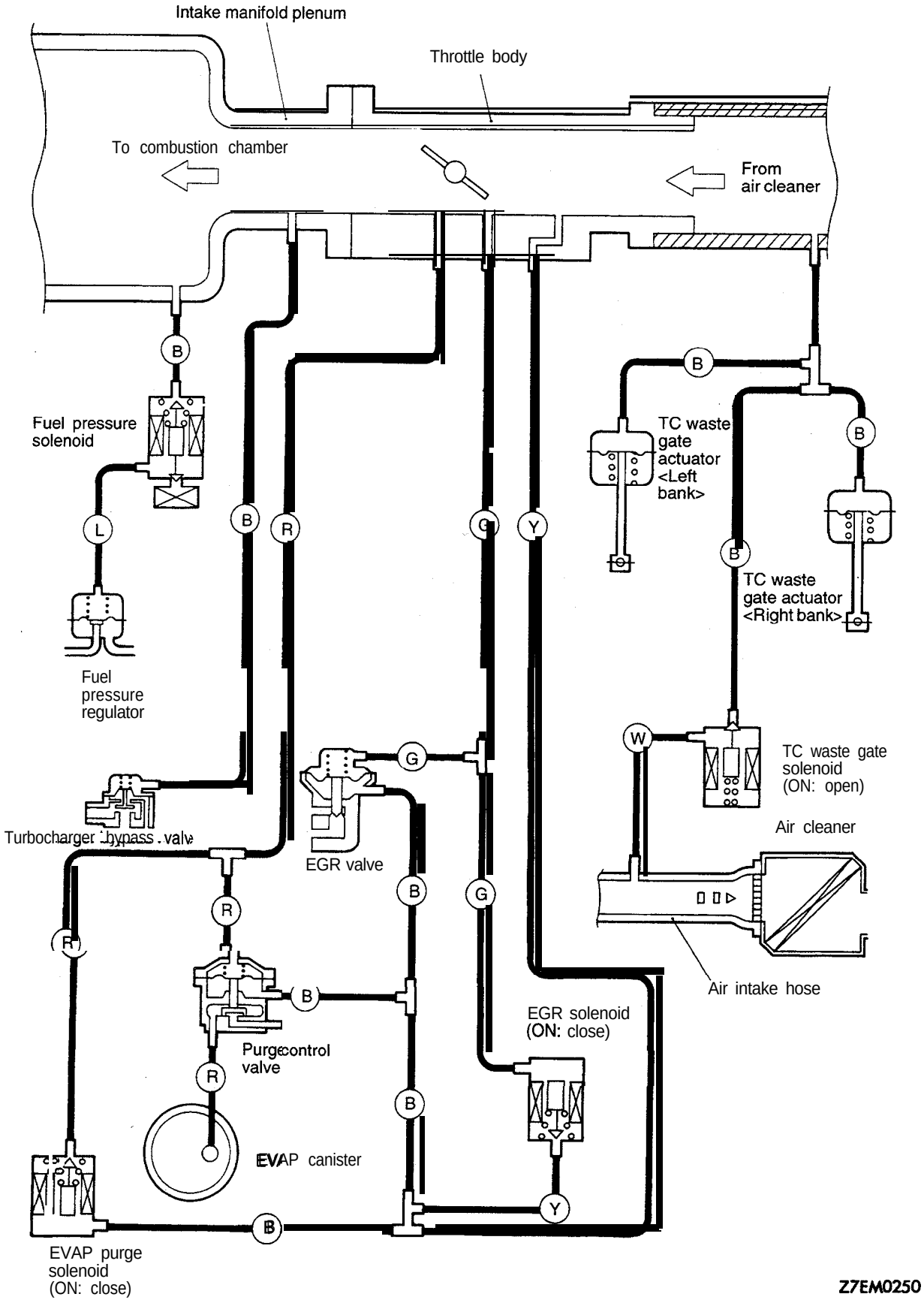
<Non Turbo – From 1996 models>



G: Green
Y: Yellow
L: Light blue
R: Red
B: Black
W: White

TSB Revision

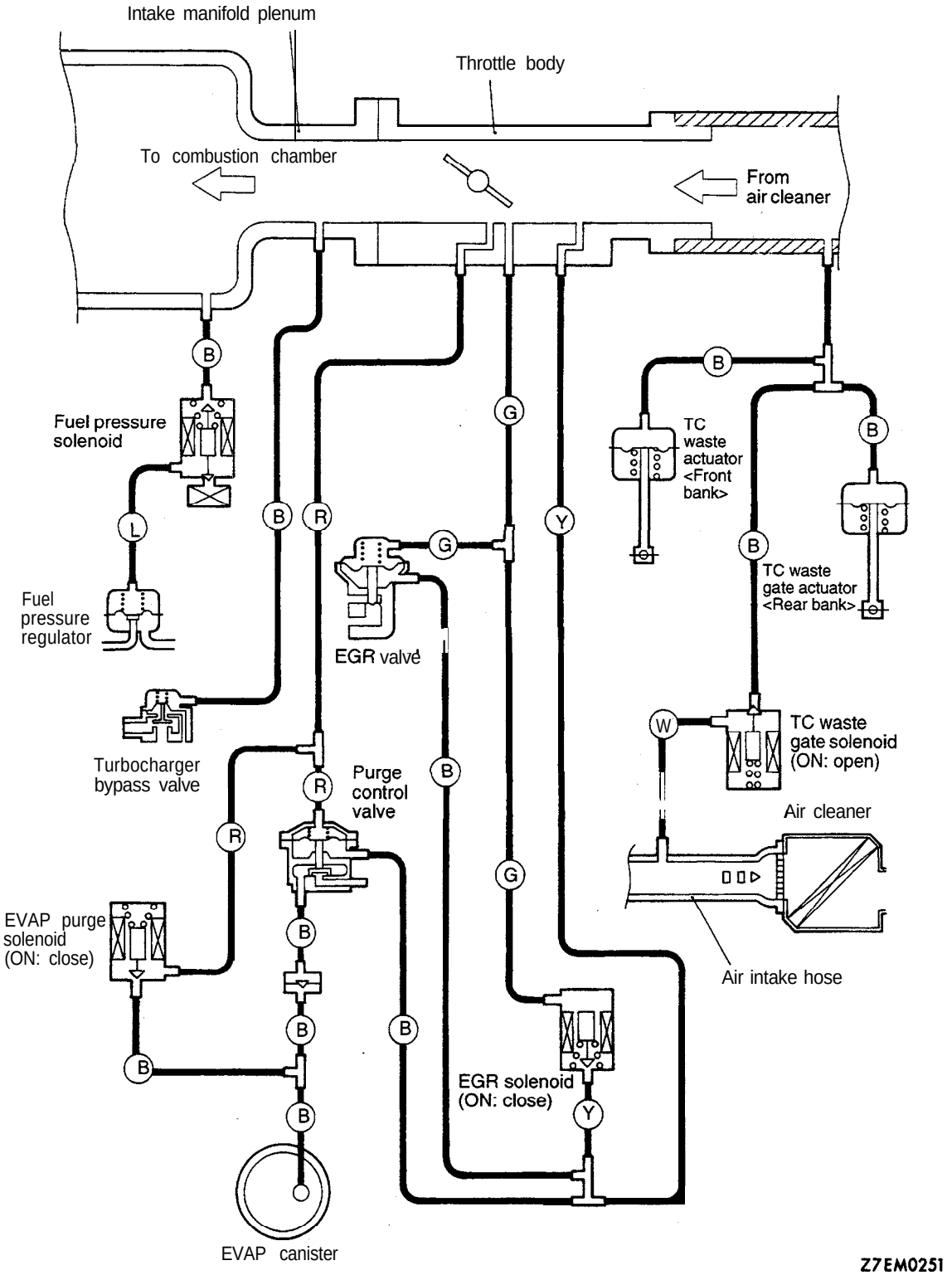
<Turbo – 1992 models>



Z7EM0250

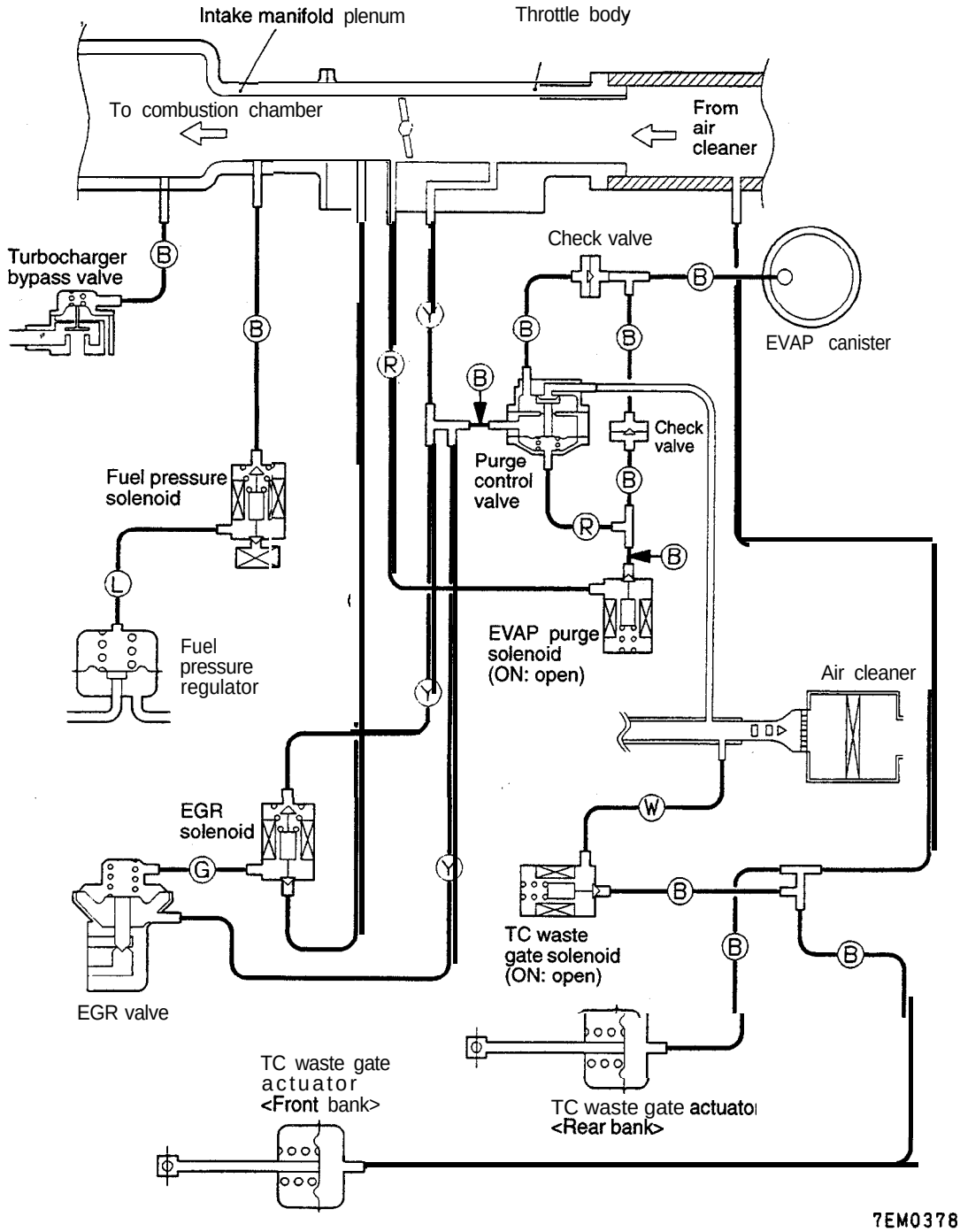
TSB Revision

<Turbo – From 1993 up to 1995 models>



TSB Revision

<Turbo – From 1996 models>



G: Green
Y: Yellow
L: Light blue
R: Red
B: Black
W: White

TSB Revision

INSPECTION

(1) Referring to the VACUUM HOSES ROUTING, confirm that the vacuum hoses are properly connected.
(2) Check the hoses for irregularities (disconnection, looseness, etc.) and confirm that there is no breakage or damage.

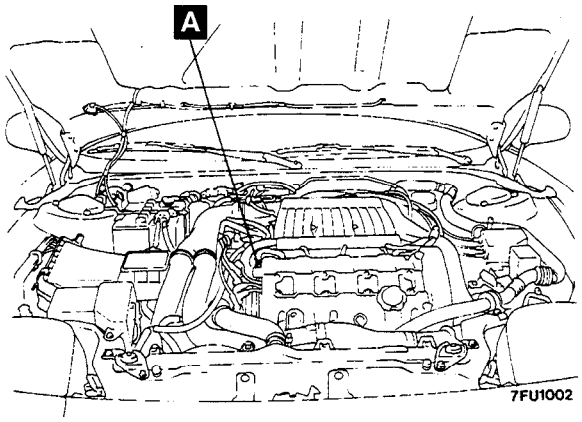
INSTALLATION

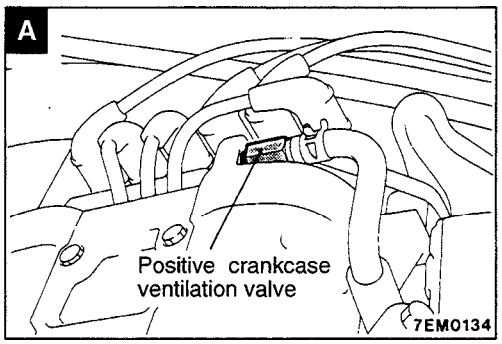
(1) When connecting a hose, firmly press it onto the nipple.
(2) Referring to the VACUUM HOSES ROUTING, connect the hoses correctly.

POSITIVE CRANKCASE VENTILATION SYSTEM

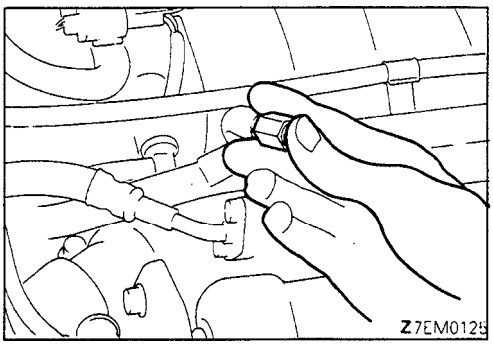
COMPONENT LOCATION

Name	Symbol
Positive crankcase ventilation valve	A





7EM0340



CRANKCASE VENTILATION SYSTEM INSPECTION

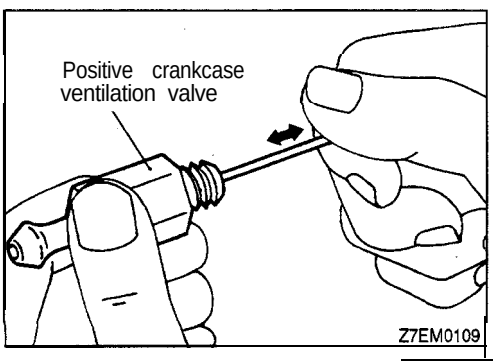
(1) After disconnecting the ventilation hose from the positive crankcase ventilation valve, disconnect the positive crankcase ventilation valve from the rocker cover, and reconnect the positive crankcase ventilation valve to the ventilation hose.
(2) Idle engine, put finger on the opening end of the positive crankcase ventilation valve, and check that the negative pressure of the intake manifold is felt with finger.

NOTE
At this time, the plunger in the positive crankcase ventilation valve moves back and forth.

(3) If negative pressure is not felt, clean or replace the positive crankcase ventilation valve.

POSITIVE CRANKCASE VENTILATION VALVE

INSPECTION



(1) Remove the positive crankcase ventilation valve.
(2) Insert a thin stick into the positive crankcase ventilation valve from the threaded side to check that the plunger moves.
(3) If the plunger does not move, the positive crankcase ventilation valve is clogged. Clean it or replace.

INSTALLATION

Install the positive crankcase ventilation valve and tighten to specified torque.

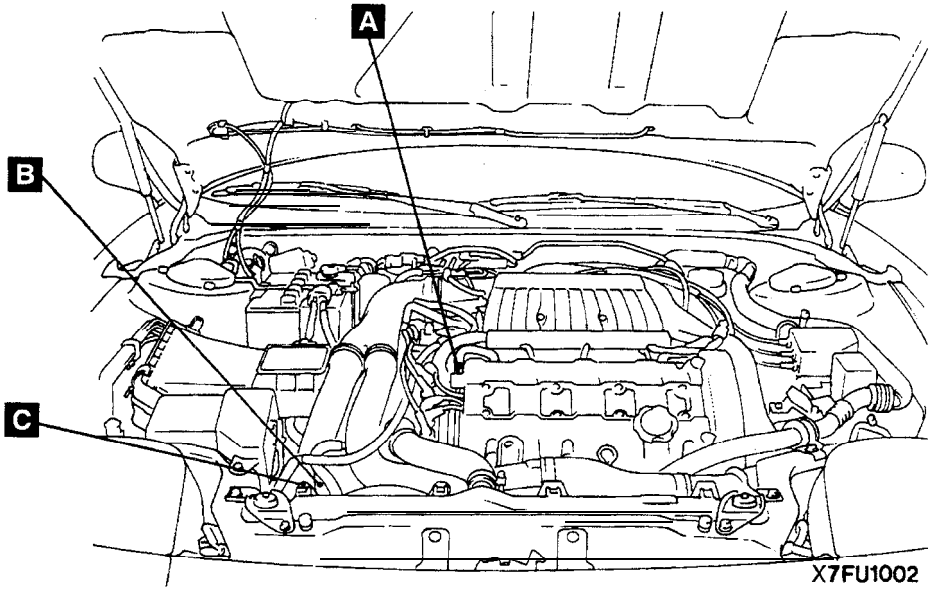
Specified tightening torque: 10 Nm (7.2 ft.lbs.)

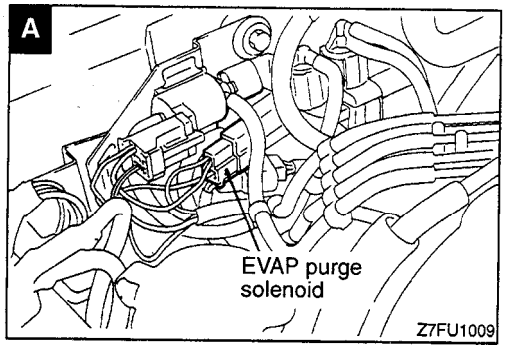
TSB Revision

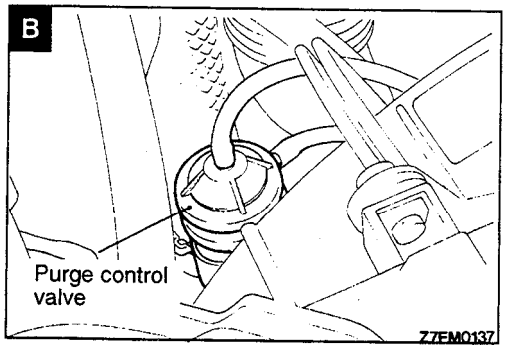
EVAPORATIVE EMISSION CONTROL SYSTEM

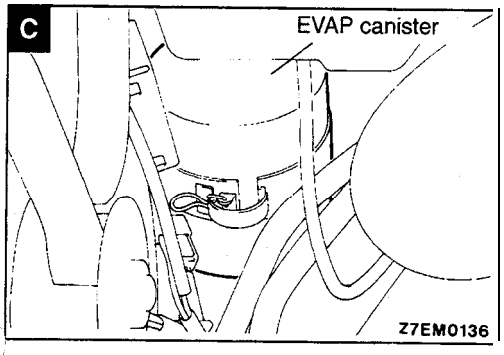
COMPONENT LOCATION

Name	Symbol	Name	Symbol
Evaporative emission (EVAP) canister	C	Purge control valve <Turbo>	B
Evaporative emission (EVAP) purge solenoid	A		





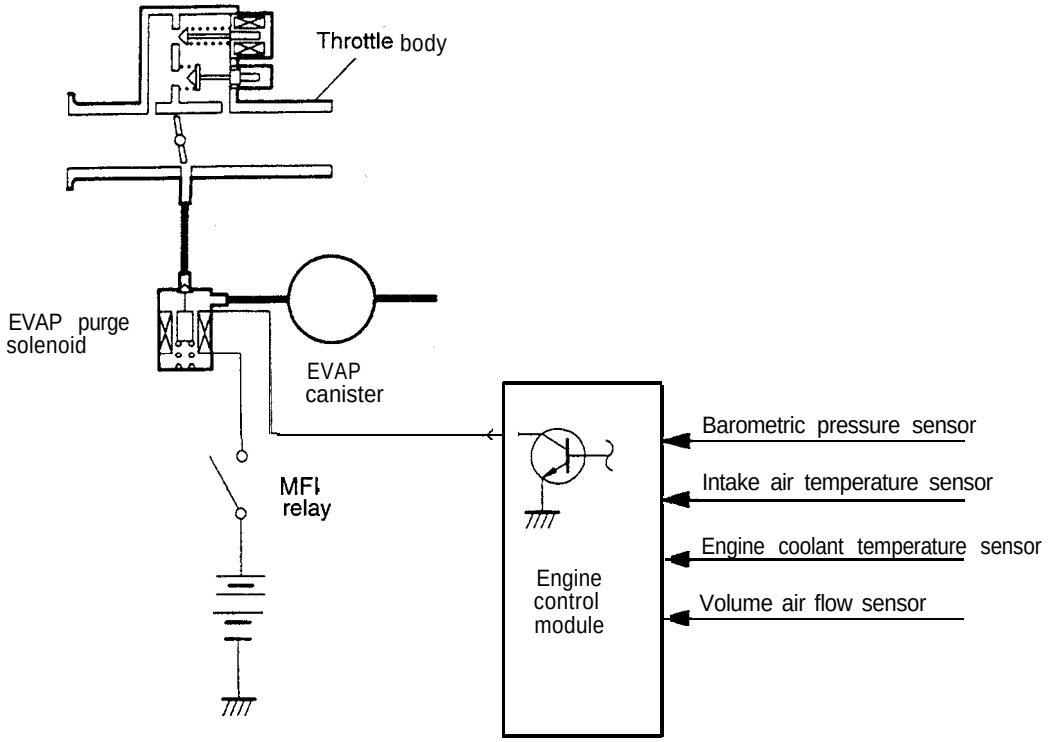




TSB Revision

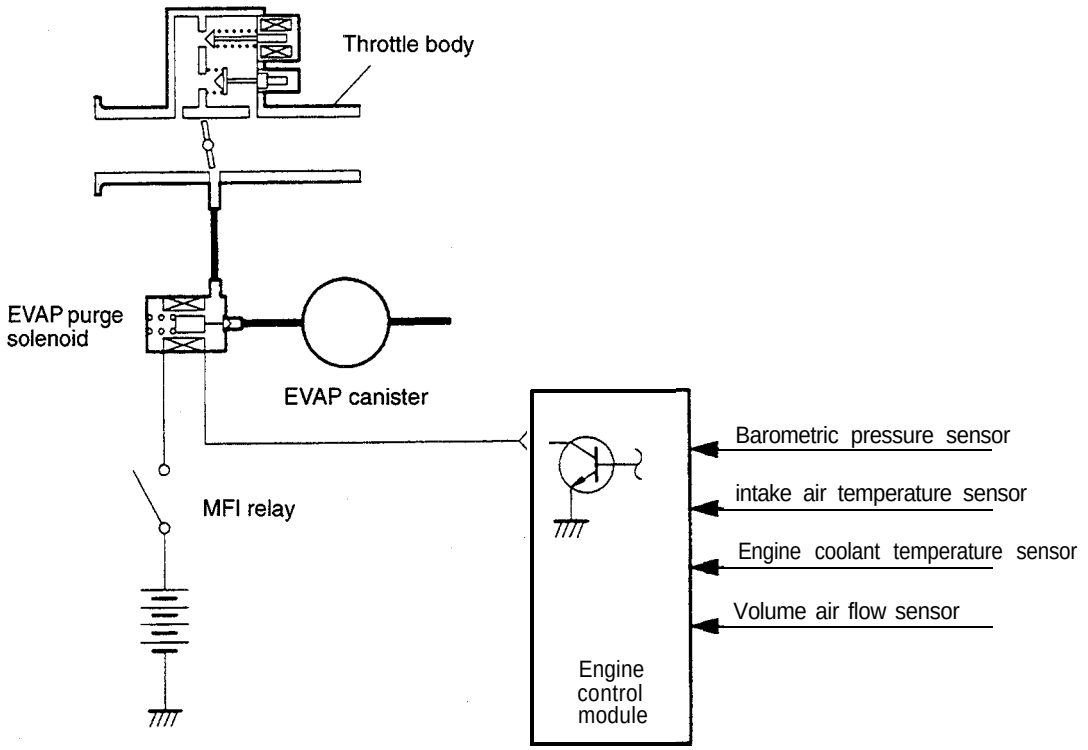
PURGE CONTROL SYSTEM INSPECTION

<Non Turbo – 1992 models>



Z7EM0289

<Non Turbo – From 1993 up to 1995 models>

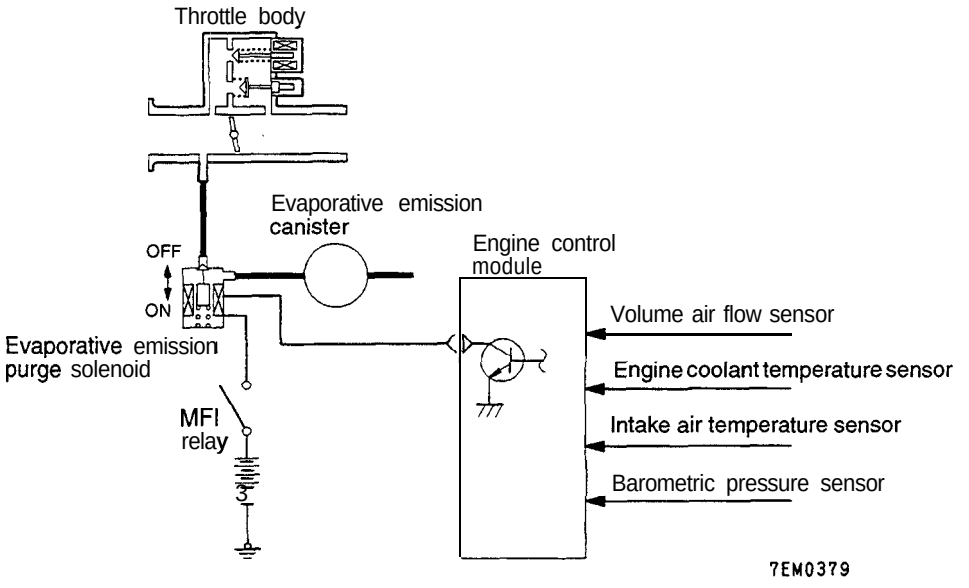


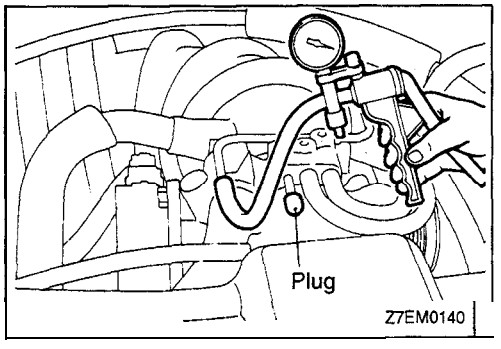
Z7EM0290

7EM0354

TSB Revision

<Non Turbo – From 1996 models>





(1) Disconnect the vacuum hose (red stripes) from the throttle body and connect it to a hand vacuum pump.
(2) Plug the nipple from which the vacuum hose is disconnected.
(3) Under the engine conditions shown below, check by applying vacuum from a hand vacuum pump.

When engine is cold – engine coolant temperature: 60°C (140°F) or less

Engine'operating condition	Applying vacuum	Result
Idling	375 mmHg (14.8 in.Hg)	Vacuum is maintained
3,000 rpm		

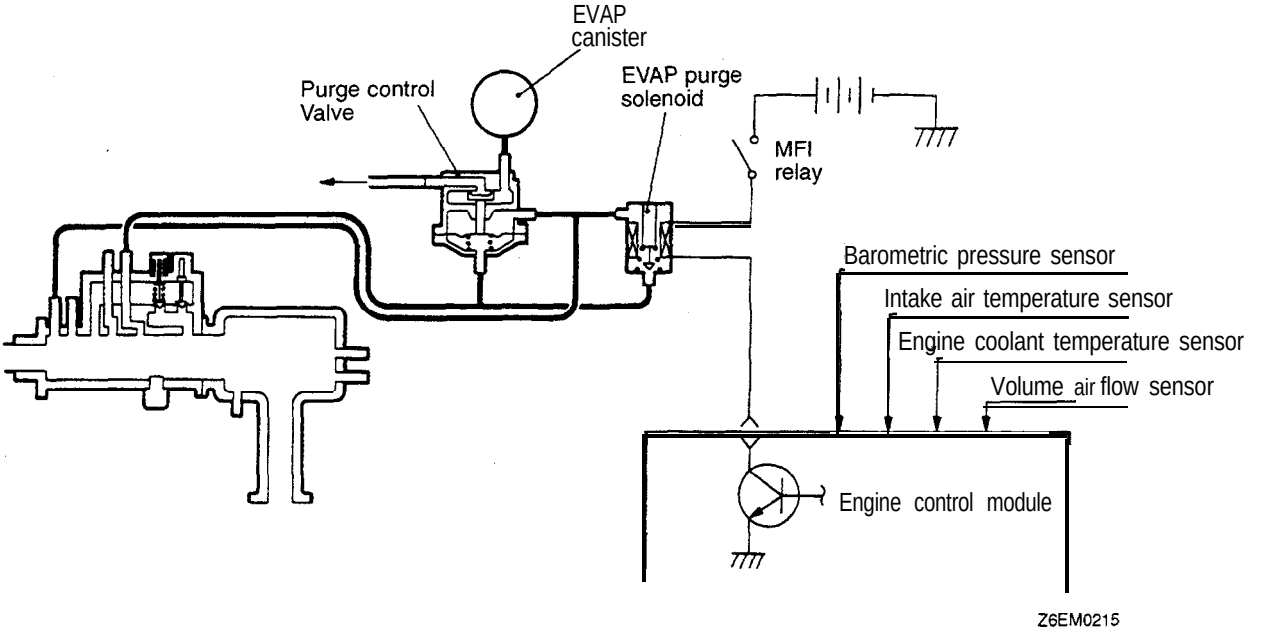
When engine is hot – engine coolant temperature: 70°C (158°F) or higher

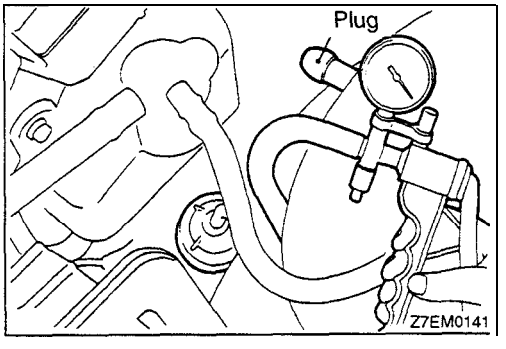
Engine operating condition	Applying vacuum	Result
Idling	375 mmHg (14.8 in.Hg)	Vacuum is maintained
3,000 rpm within three minutes after starting engine	Try applying vacuum	Vacuum leaks
3,000 rpm after three minutes have elapsed after starting engine	375 mmHg (14.8 in.Hg)	Vacuum will be maintained momentarily, after which it will leak*.

NOTE
*1 The vacuum will leak continuously if the altitude is 2,200 m (7,200 ft.) or higher, or the intake air temperature is 50°C (122°F) or higher.

TSB Revision

PURGE CONTROL SYSTEM INSPECTION <Turbo – 1992 models>





(1) Disconnect the purge air hose from the air intake hose, and plug the air intake hose. Then, connect the hand vacuum pump to the purge air hose.
(2) Under the engine conditions shown below, check by applying vacuum from a hand vacuum pump.

When engine is cold – engine coolant temperature: 60°C (140°F) or less

Engine operating condition	Applying vacuum	Result 1
Idling	375 mmHg (14.8 in.Hg)	Vacuum is maintained
3.000 rpm		

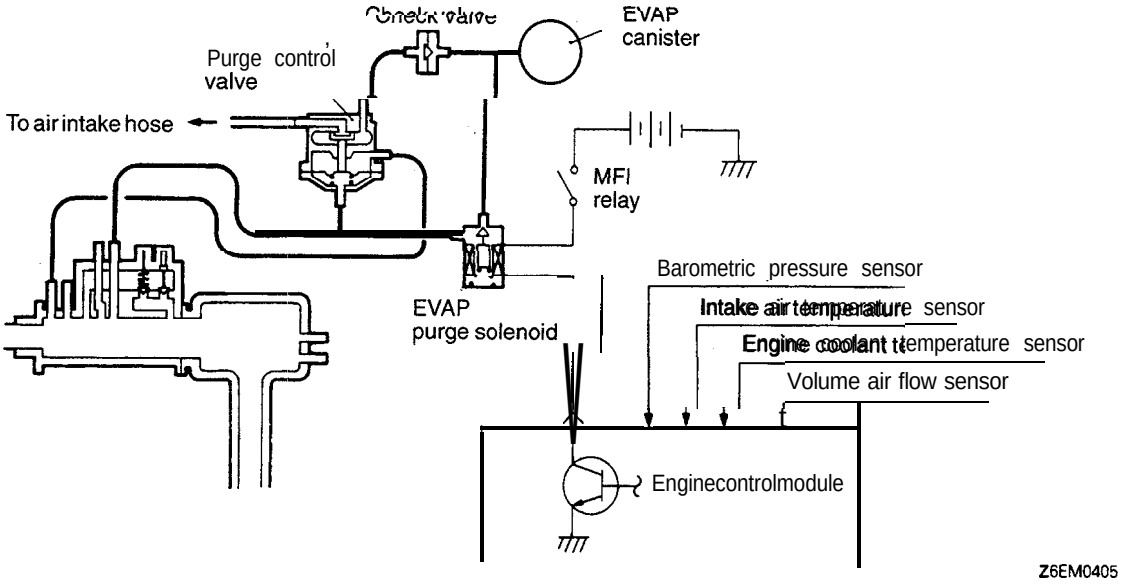
When engine is hot – engine coolant temperature: 70°C (158°F) or higher

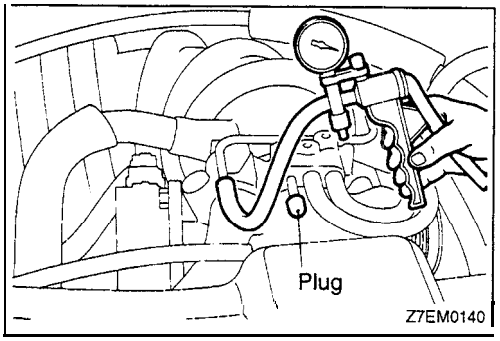
Engine operating condition	Applying vacuum	Result
Idling	375 mmHg (14.8 in.Hg)	Vacuum is maintained
3,000 rpm within three minutes after starting engine	Try applying vacuum	Vacuum leaks
3,000 rpm after three minutes have elapsed after starting engine	375 mmHg (14.8 in.Hg)	Vacuum will be maintained momentarily, after which it will leak*.

NOTE
*: The vacuum will leak continuously if the altitude is 2,200 m (7,200 ft.) or higher, or the intake air temperature is 50°C (122°F) or higher.

TSB Revision

PURGE CONTROL SYSTEM INSPECTION <Turbo – From 1993 up to 1995 models>





(1) Disconnect the vacuum hose (red stripes) from the throttle body and connect it to a hand vacuum pump.
(2) Plug the nipple from which the vacuum hose is disconnected.
(3) Under the engine conditions shown below, check by applying vacuum from a hand vacuum pump.

When engine is cold – engine coolant temperature: 60°C (140°F) or less

Engine operating condition	Applying vacuum	Result
3,000 rpm	375 mmHg (14.8 in.Hg)	Vacuum is maintained

When engine is hot – engine coolant temperature: 70°C (158°F) or higher

Engine operating condition	Applying vacuum	Result
3,000 rpm within three minutes after starting engine	Try applying vacuum	Vacuum leaks
3,000 rpm after three minutes have elapsed after starting engine	375 mmHg (14.8 in.Hg)	Vacuum will be maintained momentarily, after which it will leak*.

NOTE
*: The vacuum will leakcontinuously if the altitude is 2,200 m (7,200 ft.) or higher, or the intake air temperature is 50°C (122°F) or higher.

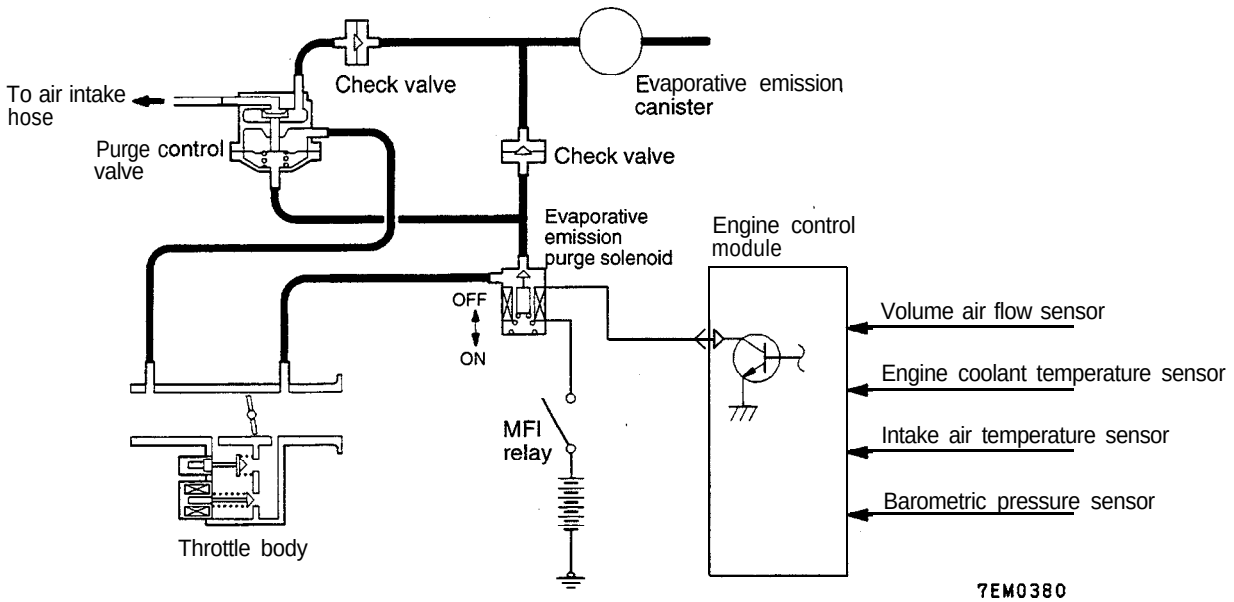
TSB Revision

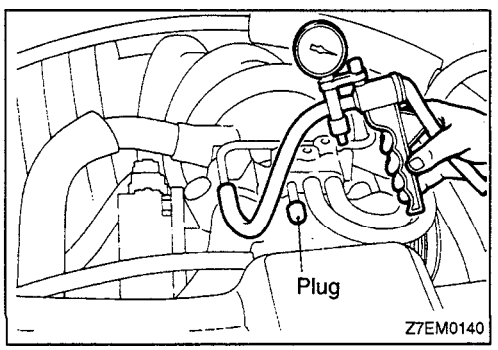
(4) Connect the vacuum hose (red stripes) removed in (1) above to P nipple of the throttle body as before.
(5) Disconnect the purge air hose from the air intake hose, and plug the air intake hose. Then, connect the hand vacuum pump to the purge air hose.
(6) Under the engine conditions shown below, check by applying vacuum from a hand vacuum pump.

When engine is hot – engine coolant temperature: 70°C (158°F) or higher

Applying vacuum	Engine operating condition	Result
375 mmHg (14.8 in.Hg.)	Idling	Vacuum is maintained
	Sudden racing	Vacuum leaks

PURGE CONTROL SYSTEM INSPECTION <Turbo – From 1996 models>





(1) Disconnect the vacuum hose (red stripes) from the throttle body and connect it to a hand vacuum pump.
(2) Plug the nipple from which the vacuum hose is disconnected.
(3) Under the engine conditions shown below, check by applying vacuum from a hand vacuum pump.

TSB Revision

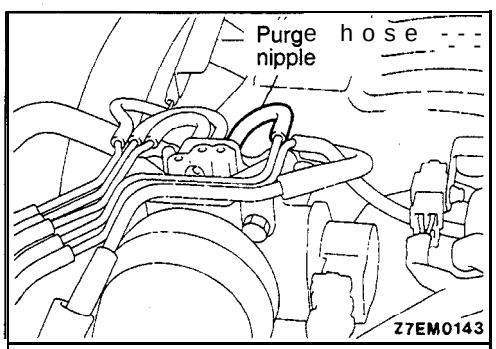
When engine is cold – engine coolant temperature: 60°C (140°F) or less

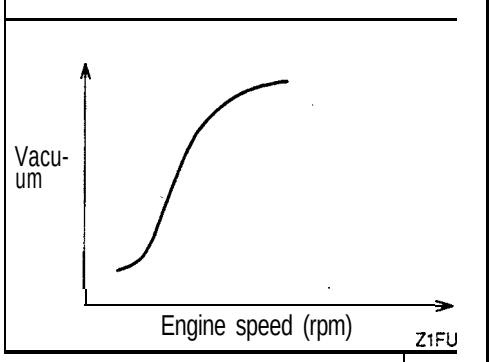
Engine operating condition	Applying vacuum	Result
3,000 rpm	375 mmHg (14.8 in.Hg)	Vacuum is maintained

When engine is hot – engine coolant temperature: 70°C (158°F) or higher

Engine operating condition	Applying vacuum	Result
3,000 rpm within three minutes after starting engine	Try applying vacuum	Vacuum leaks

(4) Connect the vacuum hose (red stripes) removed in (1) above to P nipple of the throttle body as before.
(5) Disconnect the purge air hose from the air intake hose, and plug the air intake hose. Then, connect the hand vacuum pump to the purge air hose.
(6) Apply vacuum in hot engine [coolant temperature: 70°C (158°F) or higher], and check to see that vacuum leak is caused when performing a sudden racing.





PURGE PORT VACUUM CHECK

Check Condition

Engine coolant temperature: 80–95°C (176–205°F)

(1) Disconnect the vacuum hose from the throttle body purge hose nipple and connect a hand vacuum pump to the nipple.

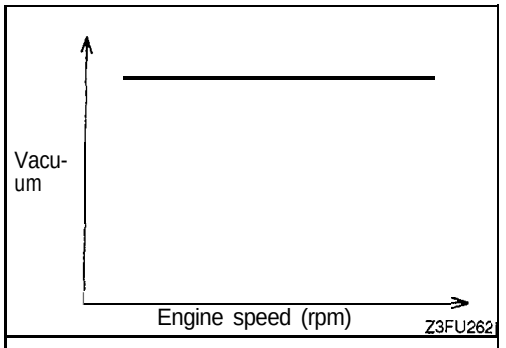
(2) Start the engine and check to see that, after raising the engine speed by racing the engine.

<Non Turbo up to 1995 models, Turbo – From 1993 up to 1995 models>

Vacuum raises proportionately with the rise in engine speed.

NOTE
If there is a problem with the change in vacuum, it is possible that the throttle body purge port may be clogged and require cleaning.

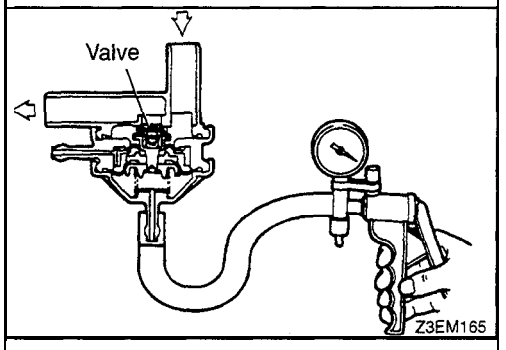
TSB Revision

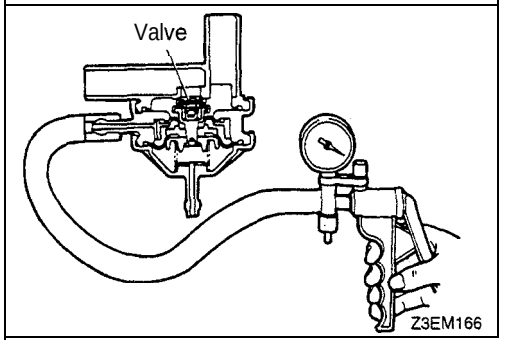


<Non Turbo – From 1996 models, Turbo – 1992 and from 1996 models>

Vacuum is kept constant regardless of the increased engine speed.

NOTE
If there is no vacuum created, it is possible that the throttle body purge port may be clogged and require cleaning.





PURGE CONTROL VALVE <Turbo>

INSPECTION

(1) Remove the purge control valve.

of the purge control valve.

mmHg in.Hg.)

airtightness.

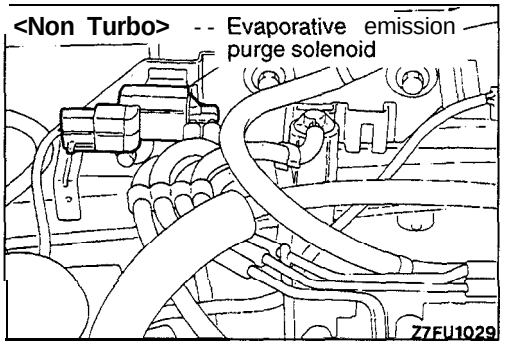
(4) Blow in air lightly from the canister side nipple and check conditions as follows.

Hand vacuum pump vacuum	Normal condition
0 mmHg (0 in.Hg.) (No vacuum is applied)	Air does not blow through
200 mmHg (8.0 in.Hg.) or more	Air blow through

(5) Connect a hand vacuum pump to the positive pressure nipple of the purge control valve.

mmHg in.Hg.)

airtightness.

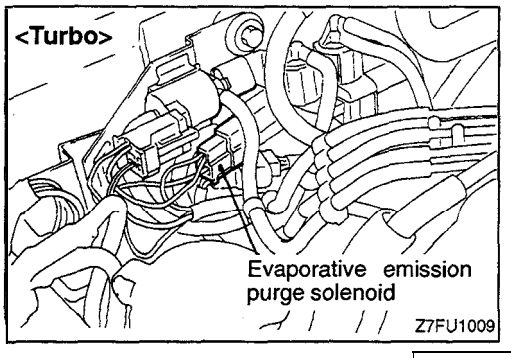


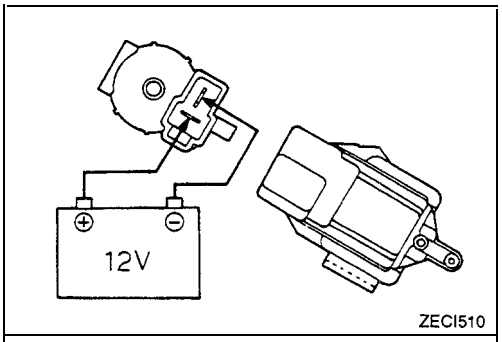
INSPECTION

NOTE
When disconnecting the vacuum hose, make an identification mark on it so that it can be reconnected to the original position.

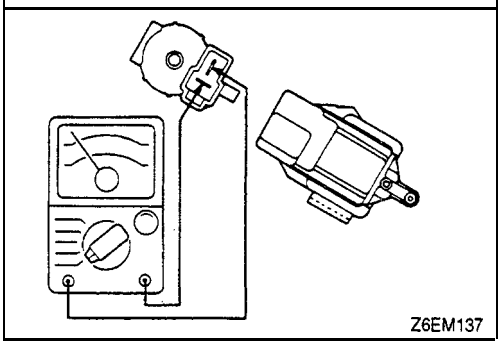
(1) Disconnect the vacuum hoses (non stripe and red stripe hose) from the solenoid.
(2) Disconnect the harness connector from solenoid.

the red-striped vacuum hose was connected.





ZECI510


Z6EM137

(4) Apply a vacuum and check for air tightness when voltage applied directly to the evaporative emission purge solenoid and when the voltage is discontinued.

Battery voltage		Result
Non-Turbo, Turbo – From 1993 models	When applied	Vacuum leaks
	When discontinued	Vacuum is maintained
Turbo – 1992 models	When applied	Vacuum is maintained
	When discontinued	Vacuum leaks

(5) Measure the resistance between the terminals of the solenoid.

Standard value: 36–44 Ω [at 20°C (68°F)]

VOLUME AIR FLOW SENSOR, ENGINE COOLANT TEMPERATURE SENSOR AND INTAKE AIR TEMPERATURE SENSOR

To inspect these parts, refer to GROUP 13A – MFI System Components.

AIR CONDITIONING SWITCH

To inspect the air conditioning switch, refer to GROUP 55 – Air Conditioning Switch.

FUEL TANK PRESSURE CONTROL VALVE

To inspect the fuel tank pressure control valve, refer to GROUP 13F – Fuel Tank.

EVAPORATIVE EMISSION CANISTER

To inspect the evaporative emission canister, refer to GROUP 13F – Fuel Line and Vapor Line.

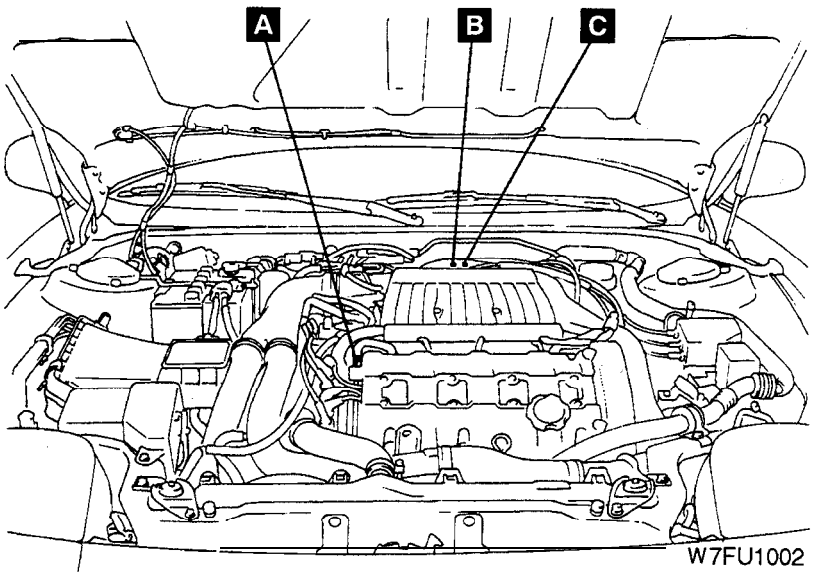
FUEL TANK FILLER TUBE CAP INSPECTION

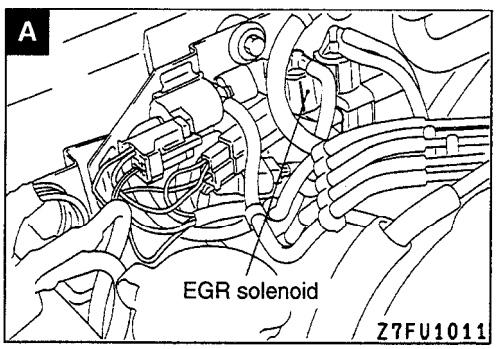
Check the gasket of the fuel tank filler tube cap, and the fuel tank filler cap itself, for damage or deformation; replace the cap if necessary.

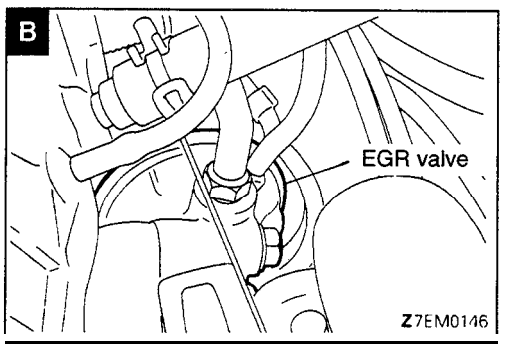
EXHAUST GAS RECIRCULATION (EGR) SYSTEM

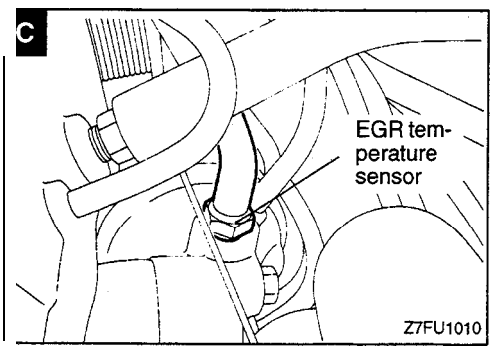
COMPONENT LOCATION

Name	Symbol	Name	Symbol
EGR valve <California – Non Turbo, Turbo, Federal – Non Turbo from 1996 model>	B	EGR solenoid <California – Non Turbo, Turbo, Federal – Non Turbo from 1996 model>	A
EGR temperature sensor <California – up to 1995, Federal -Turbo 1994 and 1995 model>	C	–	

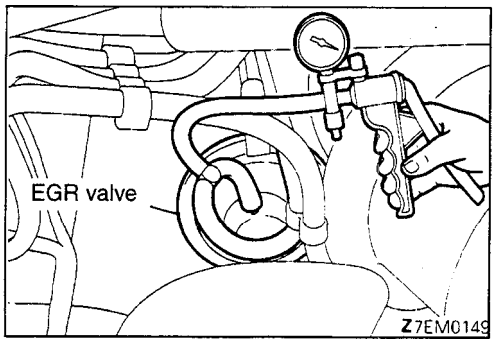


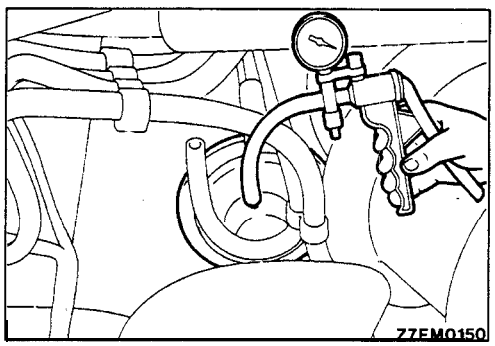






TSB Revision





EGR SYSTEM INSPECTION <California – Non Turbo, Turbo, Federal – Non Turbo from 1996 model>

(1) Disconnect the vacuum hose (green stripe) from the EGR valve, and connect a hand vacuum pump through the three-way terminal.
(2) Regarding cold condition [coolant temperature: 20°C (68°F) or less] and warm condition [coolant temperature: 70°C (158°F) or more] of the engine, check the following two points:

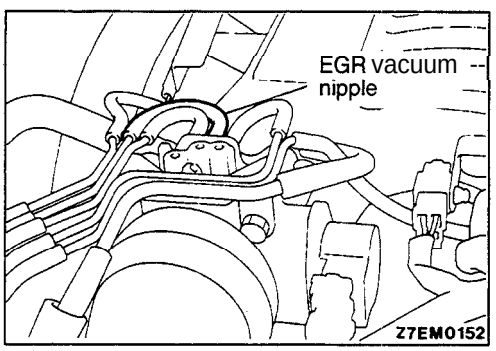
<Cold condition of engine>

Engine operation	Normal state
Race the engine by rapidly press in the accelerator pedal.	The negative pressure does not vary. (Atmospheric pressure)

<Warm condition of engine>

Engine operation	Normal state
Race the engine by rapidly press in the accelerator pedal.	The negative pressure rises to 100 mmHg (3.9 in.Hg) or more.

(3) Disconnect the three-way terminal, and connect the hand vacuum pump to the EGR valve.
(4) When a negative pressure of 230 mmHg (9.1 in.Hg.) is applied during idling, check that the engine stops or idles unstably.

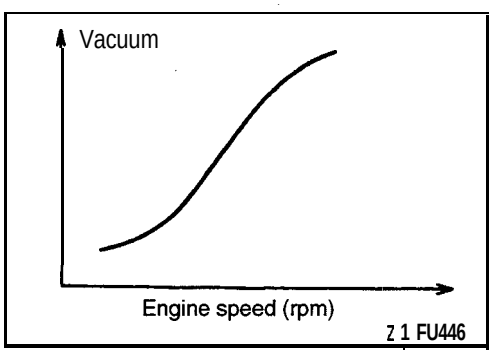


EGR VALVE CONTROL VACUUM CHECK <California – Non Turbo, Turbo, Federal – Non Turbo from 1996 model>

Check Condition

Engine coolant temperature: 80–95°C (176–203°F)

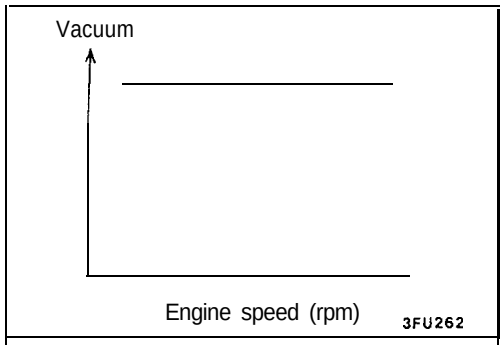
(1) Disconnect the vacuum hose from the throttle body EGR vacuum nipple and connect a hand vacuum pump to the nipple.



(2) Start the engine and check to see that, after raising the engine speed by racing the engine.

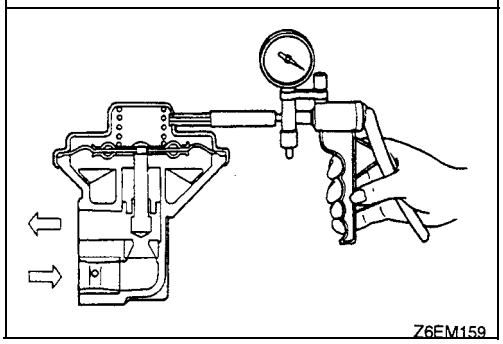
<Up to 1995 models>
Vacuum raises proportionately with the rise in engine speed.

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<From 1996 models>
Vacuum remains fairly constant.

NOTE
If there is a problem with the change in vacuum, it is possible that the throttle body port may be clogged and require cleaning.



EGR VALVE <California – Non Turbo, Turbo, Federal – Non Turbo from 1996 models>

INSPECTION

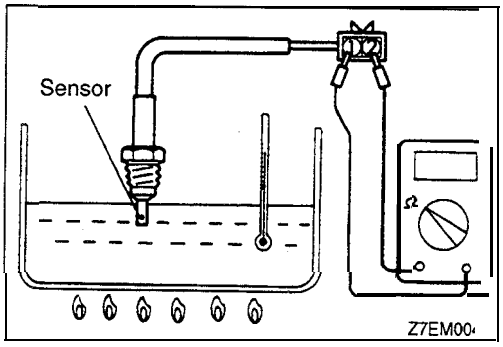
(1) Remove the EGR valve and check it for sticking, deposit of carbon, etc.
If such condition exists, clean with adequate solvent to ensure tight valve seat contact.
(2) Connect a hand vacuum pump to the EGR valve.
(3) Apply a vacuum of 500 mmHg (19.8 in.Hg.) and check air-tightness.
(4) Blow in air from one passage of the EGR to check condition as follows.

Applying vacuum	Result
45 mmHg (1.8 in.Hg.) or less	Air does not blow through
230 mmHg (9.1 in.Hg.) or more	Air blows through

INSTALLATION

Install a new gasket and EGR valve, tighten bolts to specified torque.

Specified tightening torque: 22 Nm (16 ft.lbs.)



EGR TEMPERATURE SENSOR <California up to 1995 models, Federal – Turbo 1994 and 1995 model>

INSPECTION

(1) Remove the EGR temperature sensor.
(2) Place the EGR temperature sensor in water, and then measure the resistance value between terminals 1 and 2 while increasing the water's temperature.
Replace the EGR temperature sensor if there is a significant deviation from the standard value.

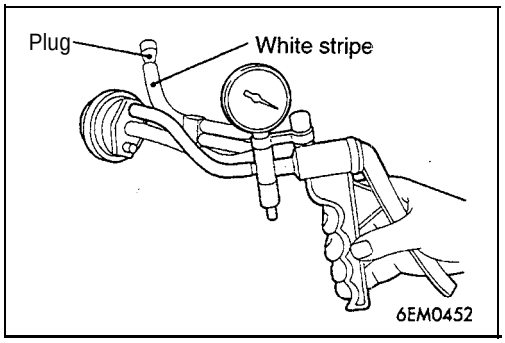
Temperature °C (°F)	Resistance kΩ
50 (122)	60-83
100 (212)	11-14

INSTALLATION

Install the EGR temperature sensor tighten to specified torque.

Specified tightening torque: 11 Nm (8 ft.lbs.)

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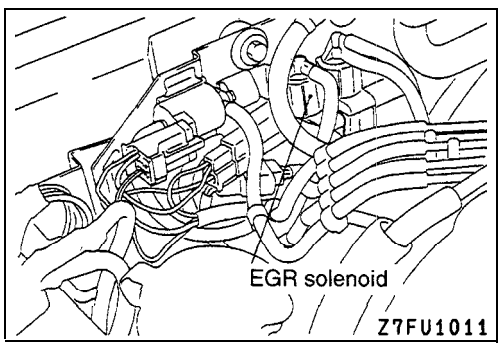


VACUUM CONTROL VALVE <Non Turbo>

INSPECTION

(1) Disconnect the vacuum hose (white stripe) from the vacuum control valve and connect the hand vacuum pump to the vacuum control valve.
(2) Put the blind plug to the removed vacuum hose.
(3) Start the engine and run at idle.
(4) Check the vacuum condition.

Engine condition	Normal vacuum condition
Idling	Approx. 170 mmHg (6.7 in.Hg)



EGR SOLENOID <California – Non Turbo, Turbo – Up to 1995 models, Federal – Non Turbo From 1996 models>

INSPECTION

NOTE
When disconnecting the vacuum hose, make an identification mark on it so that it can be reconnected to the original position.

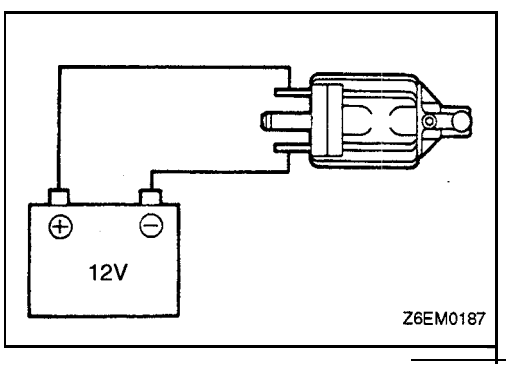
(1) **<Up to 1995 models>**
Disconnect the vacuum hose (yellow and green stripe) from the solenoid.

<From 1996 models>
Disconnect the vacuum hose (yellow and white stripe) from the solenoid.

(2) Disconnect the harness connector.

(3) **<Up to 1995 models>**
Connect a hand vacuum pump to the nipple to which the green-striped vacuum hose was connected.

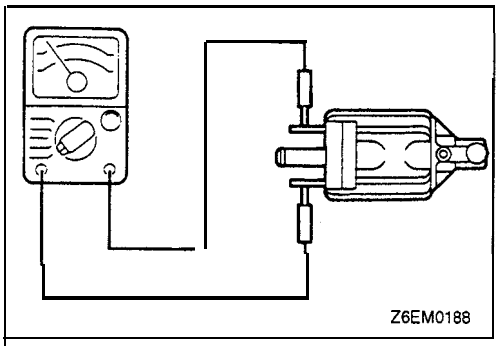
<From 1996 models>
Connect a hand vacuum pump to the nipple to which the white-striped vacuum hose was connected.



(4) Apply a vacuum and check for air-tightness when voltage applied directly to the EGR solenoid and when the voltage is discontinued.

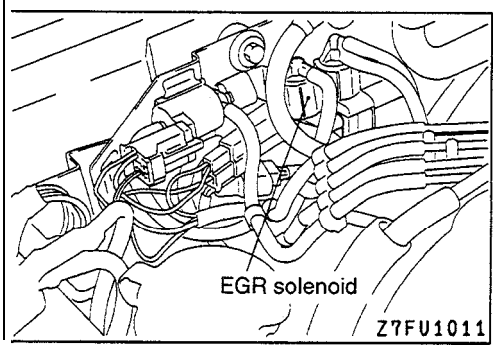
Battery voltage	Result
When applied	Vacuum is maintained
When discontinued	Vacuum leaks

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(5) Measure the resistance between the terminals of the solenoid.

Standard value: 36–44 Ω [at 20°C (68°F)]

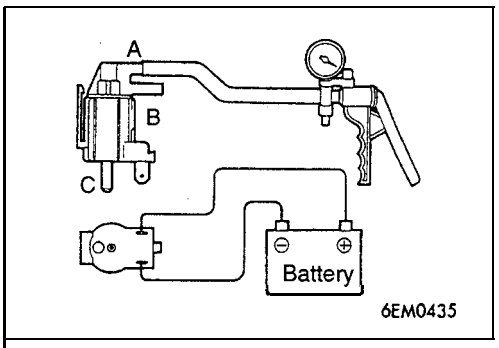


EGR SOLENOID <Turbo>

INSPECTION

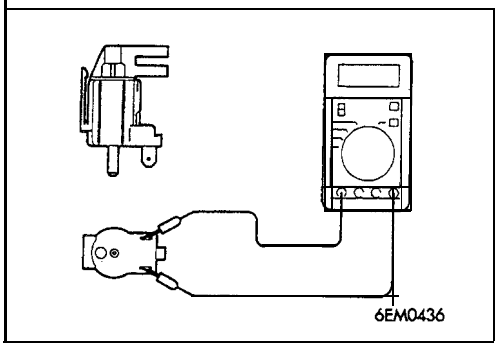
NOTE
When disconnecting the vacuum hose, place an identification mark on it for proper re-connection.

(1) Disconnect the vacuum hose (yellow stripe, green stripe, white stripe) from the solenoid valve.
(2) Disconnect the harness connector.



(3) Connect a hand vacuum pump to the nipple to which the white-striped vacuum hose was connected.
(4) Check air tightness by applying a vacuum with voltage applied directly from the battery to the EGR control solenoid valve and without applying voltage.

Battery voltage	B Nipple condition	Normal condition
Not applied	Open	Vacuum maintained
Applied	Open	Vacuum leaks
	Closed	Vacuum maintained



(5) Measure the resistance between the solenoid valve terminals.

Standard value: 36–44 Ω [at 20°C (68°F)]

MIXTURE CONTROL (MFI) SYSTEM

- To inspect the mixture control (MFI) system, refer to GROUP 13A – On-vehicle Service.
- For detailed information concerning the illumination pattern of the check engine/malfunction indicator lamp and other aspects of the on-board diagnostic, refer to GROUP 13A – On-board Diagnostic.

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CATALYTIC CONVERTER

REMOVAL AND INSTALLATION

Refer to GROUP 15 – Exhaust Pipe, Main Muffler and Catalytic Converter.

INSPECTION

Inspect for damage, cracking or deterioration. Replace if faulty.

Caution

1. **Operation of any type, including idling, should be avoided if engine misfiring occurs. Under this condition the exhaust system will operate at abnormally high temperature, which may cause damage to the catalyst or underbody parts of the vehicle.**
2. **Alteration or deterioration of ignition or fuel system, or any type of operating condition which results in engine misfiring must be corrected to avoid overheating the catalytic converters.**
3. **Proper maintenance and tune up according to manufacturer's specifications should be made to correct the conditions as soon as possible.**

NOTES

CLUTCH

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CLUTCH PEDAL 8

CLUTCH RELEASE CYLINDER 16

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- Sealant 3
- Service Specifications 2

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SPECIFICATIONS

GENERAL SPECIFICATIONS

Items		FWD	AWD
Clutch operating method		Hydraulic type	Hydraulic type
Clutch disc	Type	Single dry disc type	Single dry disc type
	Facing diameter O.D. x I.D. mm (in.)	225 x 150 (8.86 x 5.91)	250 x 160 (9.84 x 6.30)
Clutch cover assembly	Type	Diaphragm spring strap drive type	Diaphragm spring strap drive type
	Setting load N (lbs.)	6,300 (1,386)	9,220 (2,072)
Clutch release cylinder	I.D. mm (in.)	19.05 (3/4)	17.46 (11/16)
Clutch master cylinder	I.D. mm (in.)	15.87 (5/8)	15.87 (5/8)
Clutch booster	Type	–	Vacuum type
	Effective dia. of power cylinder mm (in.)	–	101 (4.0)
	Boosting ratio [Clutch pedal depressing force]	–	1.7 [at 110 N (24 lbs.)]

SERVICE SPECIFICATIONS

Items		Standard value	Limit
Clutch pedal height mm (in.)	FWD	177–182 (6.97–7.17)	–
	AWD	183–188 (7.20–7.40)	–
Clutch pedal stroke mm (in.)		160 (6.29)	–
Amount of clutch pedal return from full pedal stroke position to where operating sound of interlock switch is produced mm (in.)		10–15 (.394–.591)	–
Clutch pedal free play mm (in.)	FWD	6–13 (.24–.51)	–
	AWD	12–20 (.49–.79)	–
Distance between the clutch pedal and the firewall when the clutch is disengaged mm (in.)		55 (2.2) or more	–
Booster push rod to master cylinder piston clearance mm (in.) <AWD>		0.21–0.46 (.0082–.0181)	–
Vacuum hose insertion distance mm (in.) <AWD>		20–25 (1.0)	–
Facing rivet sink mm (in.)		–	0.3 (.012)
Diaphragm spring end height difference mm (in.)		–	0.5 (.020)

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LUBRICANTS

Items	Specified lubricants
Contact surface of release bearing and fulcrum of clutch release fork	MITSUBISHI genuine grease Part No. 0101011 or equivalent
Inner surface of clutch release bearing	
Inner surface of clutch disc spline	
Contact portion of release fork to release cylinder push rod	
Clutch fluid	Conforming to DOT3 or DOT4
Inner surface of clutch release cylinder and outer circumference of piston and cup	
Inner surface of clutch master cylinder and outer circumference of piston assembly	

SEALANT

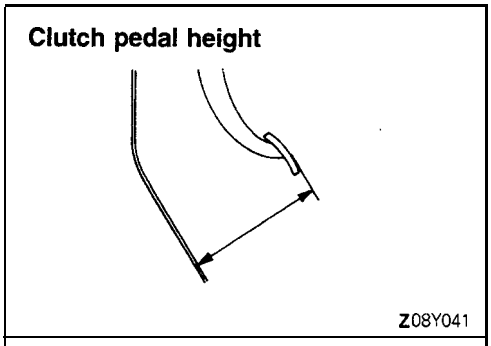
Items	Specified sealant
Thread part fitting	3M ATD Part No. 8663 or equivalent

TROUBLESHOOTING

Symptom	Probable cause	Remedy
Clutch slips	Clutch pedal play too small	Adjust
	Excessive wear of clutch disc facing	Replace
	Hardened clutch disc facing or oil on facing	Replace
	Clutch release fork not operating smoothly	Repair or replace
	Settled or damaged diaphragm spring	Replace
	Clogged hydraulic system	Repair or replace
	Poorly adjusted clutch booster push rod <AWD>	Adjust
Gear shifting failure	Clutch pedal play too large	Adjust
	Large clutch disc distortion or runout	Replace
	Worn clutch cover assembly	Replace
	Worn or corroded clutch disc splines	Replace
	Separated clutch disc facing	Replace
	Worn clutch release bearing	Replace
	Damaged pressure plate or flywheel	Replace
	Leaky or clogged hydraulic system or air trapped in hydraulic system	Repair or replace
	Poorly adjusted clutch booster push rod <AWD>	Adjust

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Symptom	Probable cause	Remedy
Noisy clutch	Clutch pedal play too small	Adjust
	Incorrectly installed clutch cover assembly	Repair or replace
	Excessive wear of clutch disc facing	Replace
	Clutch release fork not operating smoothly	Repair or replace
	Worn clutch release bearing	Replace
	Settled or damaged torsion spring	Replace
	Damaged pilot bushing	Replace
	Poorly lubricated bearing sleeve sliding surface	Repair
Heavy clutch pedal	Poorly lubricated clutch pedal	Repair
	Poorly lubricated clutch disc splines	Repair
	Clutch release fork not operating smoothly	Repair or replace
	Poorly lubricated bearing sleeve sliding surface	Repair
	Defective clutch booster <AWD>	Replace
	Leaky or clogged vacuum system <AWD>	Repair
Clutch vibrates	Worn or damaged clutch disc facing	Replace
	Oil on clutch disc facing	Replace
	Uneven diaphragm spring height	Repair or replace
	Settled or damaged torsion spring	Replace
	Damaged pressure plate or flywheel	Replace
	Loose or damaged mounts	Tighten or replace



ON-VEHICLE SERVICE

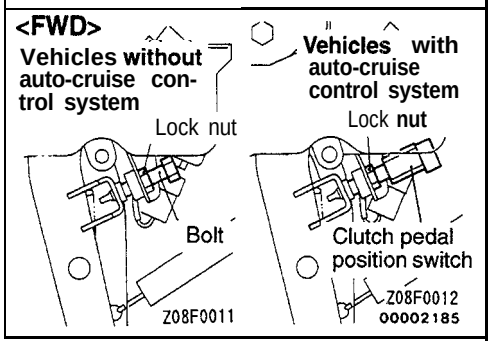
CLUTCH PEDAL CHECK AND ADJUSTMENT

1. Take off the carpet at under the clutch pedal. Measure the clutch pedal height (from the face of the pedal pad to the firewall).

Standard value:

<FWD> 177–182 mm (6.97–7.17 in.)

<AWD> 183–188 mm (7.20–7.40 in.)

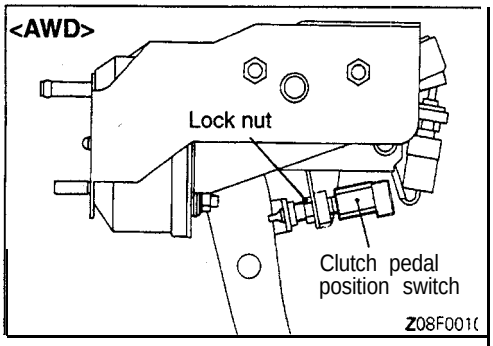


If the clutch pedal height is not within the standard value range, adjust as follows:

For vehicles without auto-cruise control system, turn and adjust the bolt so that the pedal height is the standard value, and then secure by tightening the lock nut to the specified torque.

Vehicles with auto-cruise control system, disconnect the clutch pedal position switch connector and turn the switch for standard clutch pedal height. Tighten the lock nut to the specified torque.

Specified torque: 13 Nm (9 ft.lbs.)

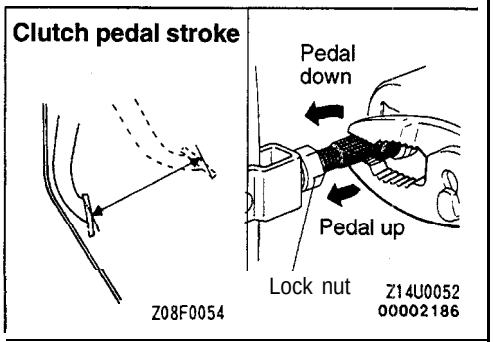


NOTE

When the pedal height is lower than the standard value, loosen the bolt or clutch pedal position switch, and then turn the push rod to make the adjustment. After making the adjustment, tighten the bolt or clutch pedal position switch to reach the pedal stopper, and then lock with the lock nut.

2. Measure the clutch pedal stroke.

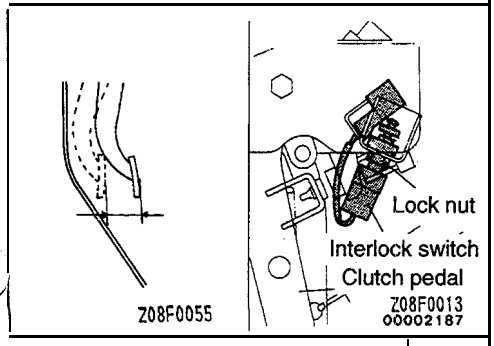
Standard value: 160 mm (6.29 in.) or more



If the clutch pedal stroke deviates from the standard value, turn the push rod to adjust the stroke.

3. Return the clutch pedal gradually from its full-stroke position to measure amount of the return made by the pedal until, the interlock switch makes an operating sound.

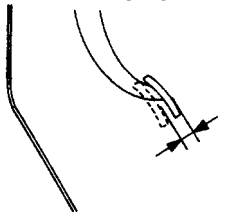
Standard value: 10–15 mm (.394–.591 in.)



If the amount of pedal return deviates from the standard value, adjust it by loosening the lock nut and turning the interlock switch.

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Clutch pedal clevis pin play and clutch pedal free play



Z08Y043

4. Measure the clutch pedal clevis pin play.

Clutch pedal clevis pin play

Standard value: 1–3 mm (.04–.12 in.)

If the clutch pedal clevis pin play is outside the standard value, adjust with the push rod.

Caution
Do not push in the master cylinder push rod at this time.

5. Measure pedal play. In the case of AWD vehicles, depress the pedal 2 or 3 times to eliminate booster negative pressure with the engine stopped and then push the pedal with a finger to measure the play.

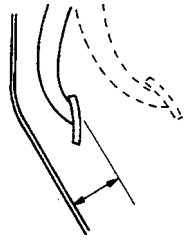
Clutch pedal play

Standard value:

<FWD> 6–13 mm (.24–.51 in.)

<AWD> 12–20 mm (.49–.79 in.)

Distance between the clutch pedal and the firewall when the clutch is disengaged



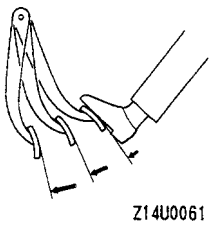
Z08N0010

6. Measure the clearance to the toe board (or pedal stopper) when the clutch disengages. In the case of AWD vehicles, measure with the engine running.

Clearance to toe board when clutch disengages:
Standard value: 55 mm (2.2 in.) or more

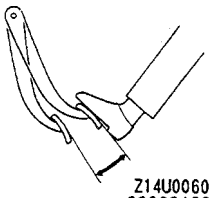
7. If the play and/or clearance is out of specification, bleed the hydraulic system or check the master cylinder, release cylinder or clutch proper.
8. Return the carpet to the original position.

Good



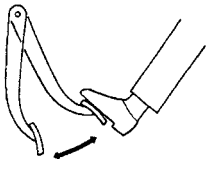
Z14U0061

No good



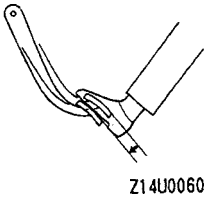
Z14U0060
00002188

When engine is stopped



Z14U0059

When engine is started



Z14U0060
00002189

CLUTCH BOOSTER OPERATING CHECK <AWD>

For simple checking of clutch booster operation, carry out the following tests.

(1) Run the engine for one or two minutes, and then stop it.

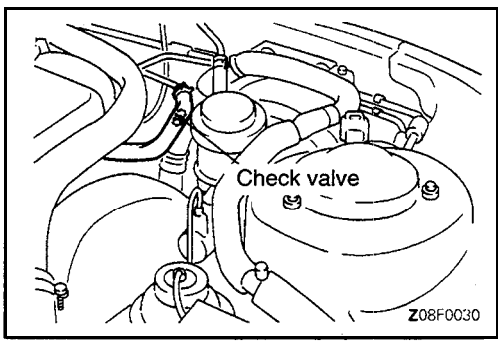
(2) Step on the clutch pedal several times with normal pressure.
If the pedal depressed fully the first time but gradually becomes higher when depressed succeeding times, the booster is operating properly.
If the pedal height remains unchanged, the booster is faulty.

(3) With the engine stopped, step on the clutch pedal several times with the same foot pressure to make sure that the pedal height will not change.
Then step on the clutch pedal and start the engine.
If the pedal moves downward slightly, the booster is in good condition. If there is no change, the booster is faulty.

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(4) With the engine running, step on the clutch pedal and then stop the engine.
Hold the pedal depressed for 30 seconds. If the pedal height does not change, the booster is in good condition. If the pedal rises, the booster is faulty.

If the above three tests are okay, the booster performance can be determined as good.
If one of the above three tests is not okay at last, the check valve, vacuum hose, or booster will be faulty.

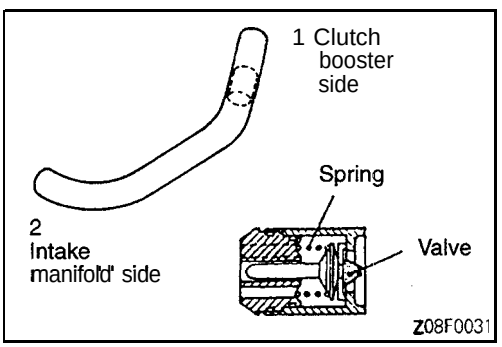


CHECK VALVE OPERATION CHECK <AWD>

When checking the check valve, keep the check valve fit in the vacuum hose.

1. Remove the vacuum hose.

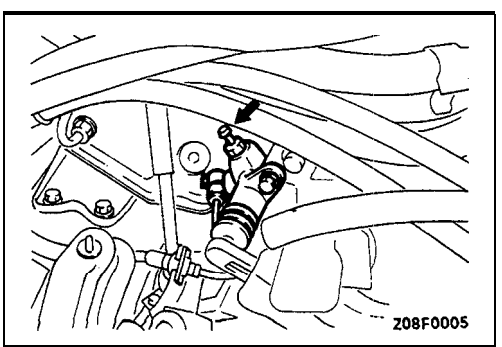
Caution
The check valve is press-fit inside the vacuum hose and do not remove the check valve from the vacuum hose.



2. Check the operation of the check valve by using a vacuum pump.

Vacuum pump connection	Accept/reject criteria
Connection at the clutch booster side (1)	A negative pressure (vacuum) is created and held.
Connection at the intake manifold side (2)	A negative pressure (vacuum) is not created.

Caution
If the check valve is defective, replace it as an assembly unit together with the vacuum hose.



BLEEDING

Whenever the clutch tube, the clutch hose, and/or the clutch master cylinder have been removed, or if the clutch pedal is spongy, bleed the system.

Specified fluid: Conforming to DOT3 or DOT4

Caution
Use the specified fluid. Avoid using a mixture of the specified fluid and other fluid.

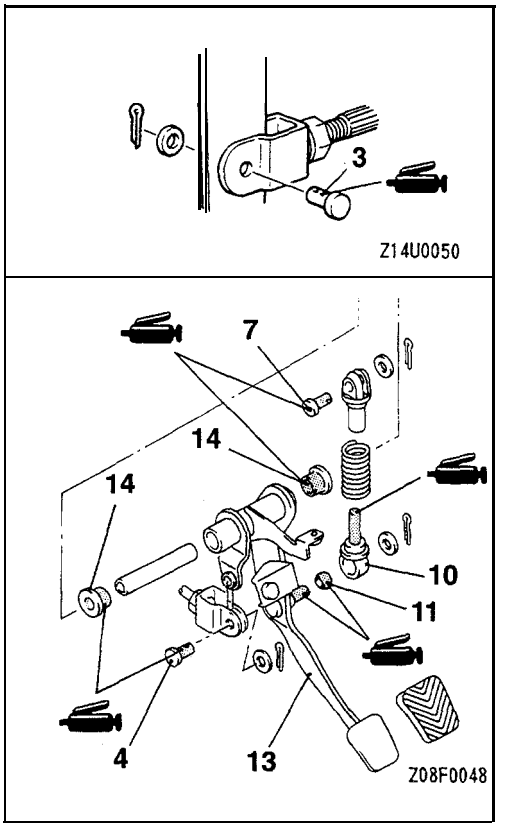
· **TSB Revision**

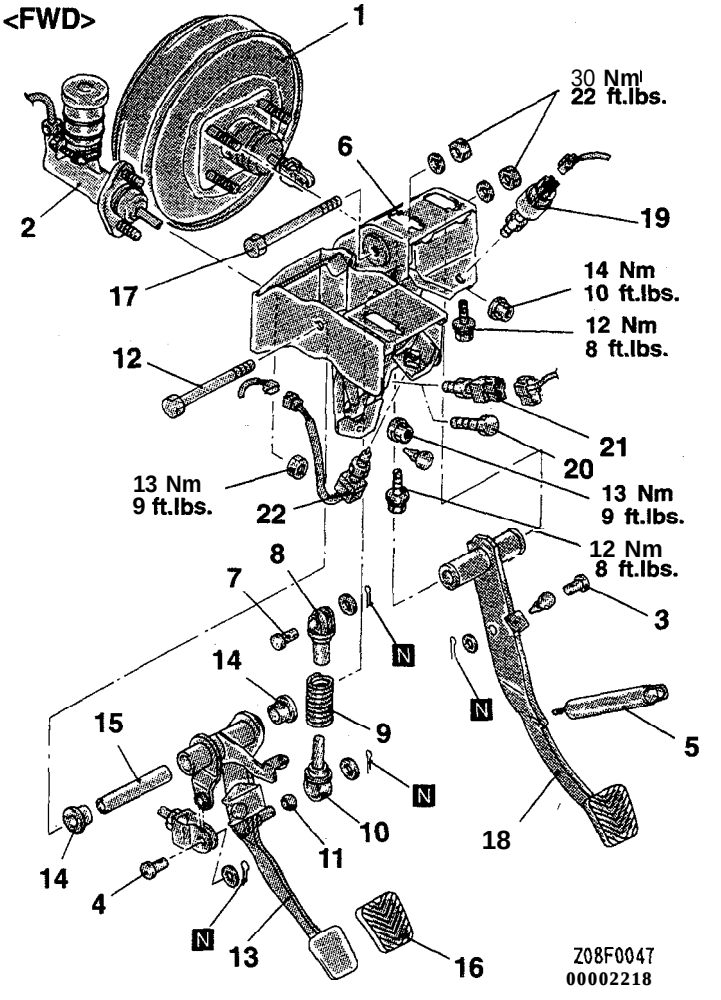
CLUTCH PEDAL

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Steering Column Assembly Removal and Installation (Refer to GROUP 37A – Steering Wheel and Shaft.)

Adjustment
- Clutch Pedal Adjustment (Refer to P.21-5.)

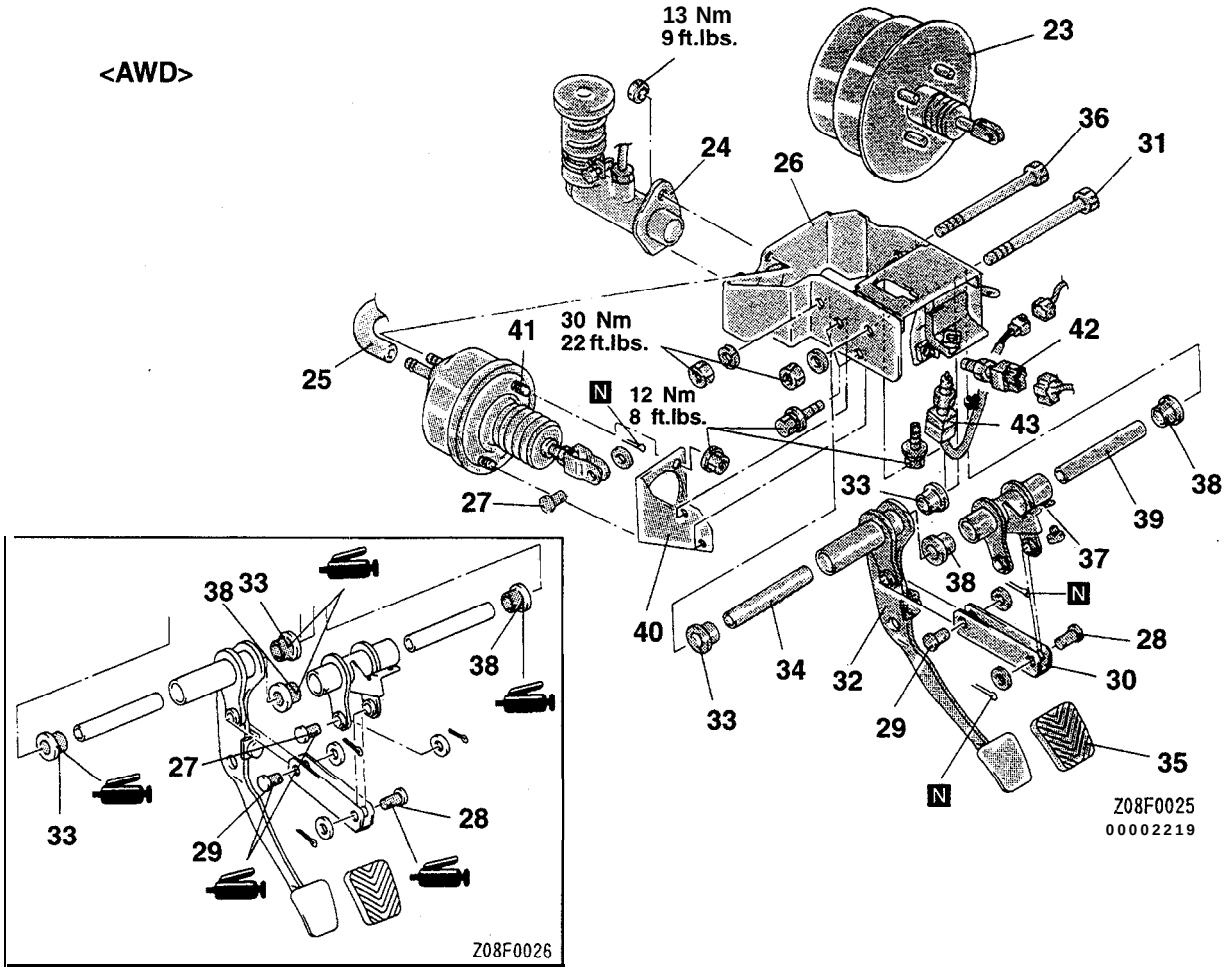




Removal steps

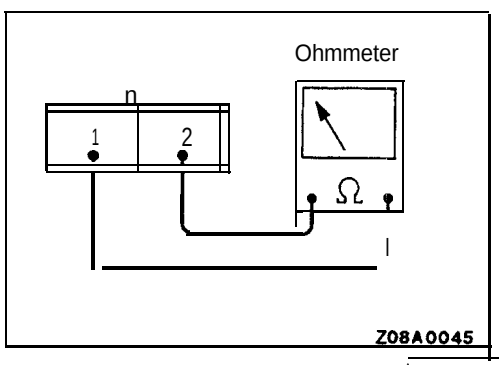
1. Brake booster connection
- Brake pedal adjustment (Refer to GROUP 35 – Service Adjustment Procedures.)
2. Clutch master cylinder connection
3. Clevis pin
4. Clevis pin
5. Return spring
6. Pedal support bracket
7. Clevis pin
8. Rod A
9. Turn over spring
10. Rod B
11. Bush
12. Clutch pedal shaft
13. Clutch pedal
14. Bushing
15. Spacer
16. Clutch pedal pad
17. Brake pedal shaft
18. Brake pedal
19. Stop light switch
20. Bolt <Vehicles without auto-cruise control system>
21. Clutch pedal position switch <Vehicles with' auto-cruise control system>
22. Interlock switch

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Removal steps

23. Brake booster (Refer to GROUP 35 – Brake Booster.)
24. Clutch master cylinder connection
25. Vacuum hose connection
26. Pedal support bracket
27. Clevis pin
28. Clevis pin
29. Clevis pin
30. Yoke
31. Clutch pedal shaft
32. Clutch pedal
33. Bushing
34. Spacer
35. Clutch pedal pad
36. Bolt
37. Lever assembly
38. Bushing
39. Spacer
40. Support bracket
41. Clutch booster
42. Clutch pedal position switch
43. Interlock switch



INSPECTION

- Check the pedal shaft and bushing for wear.
- Check the clutch pedal for bend or torsion.
- Check the turn over spring for damage or deterioration. <FWD>
- Check the pedal pad for damage or wear.

INTERLOCK SWITCH CHECK

(1) Disconnect the connector.
(2) Check to be sure that there is continuity between connector terminals 1 and 2.

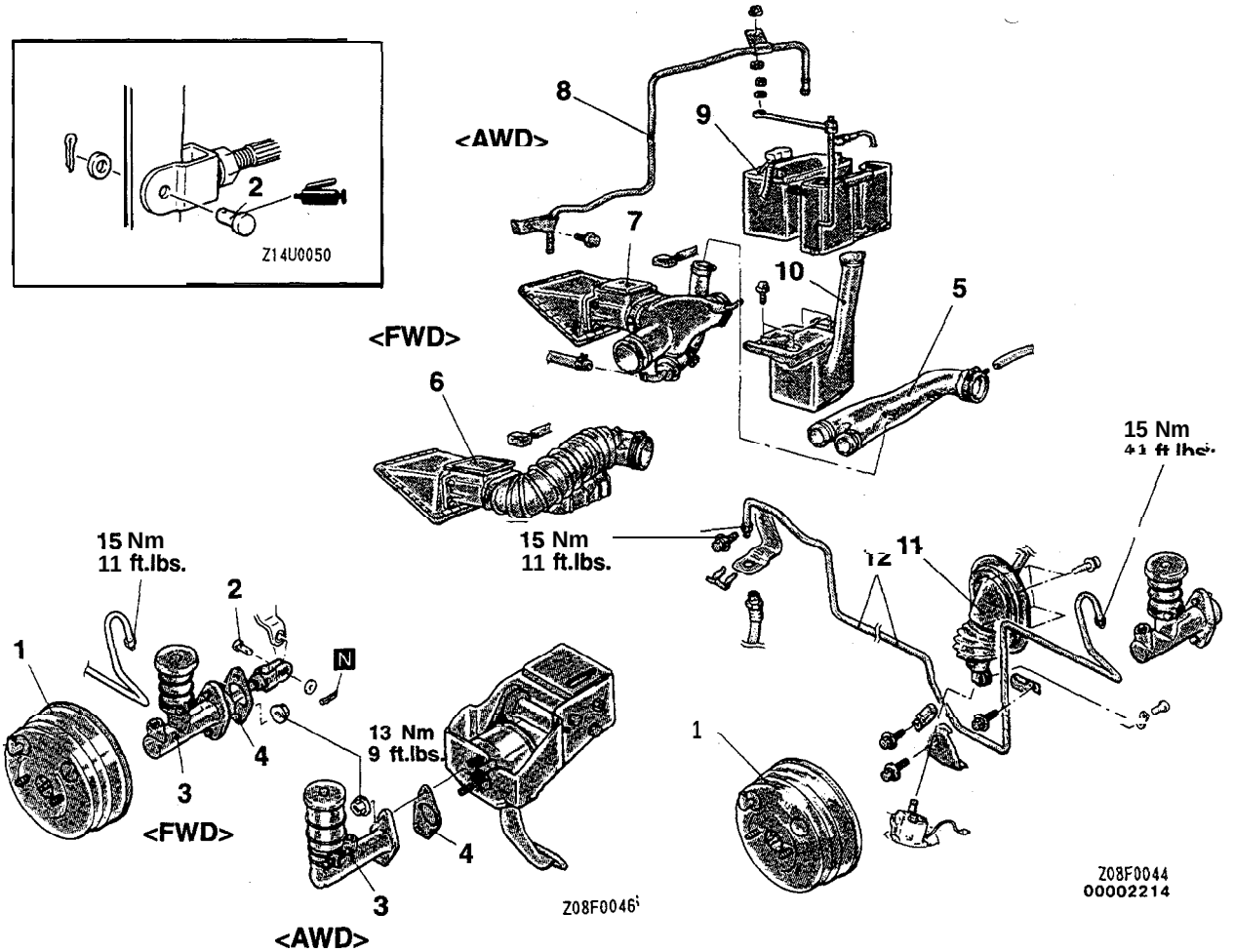
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CLUTCH CONTROL

REMOVAL AND INSTALLATION

Pre-removal Operation
- Draining of the Clutch Fluid

Post-installation Operation
- Clutch Fluid Supplying
- Clutch Line Bleeding (Refer to P.21-7.)
- Clutch Pedal Adjustment (Refer to P.21-5.)



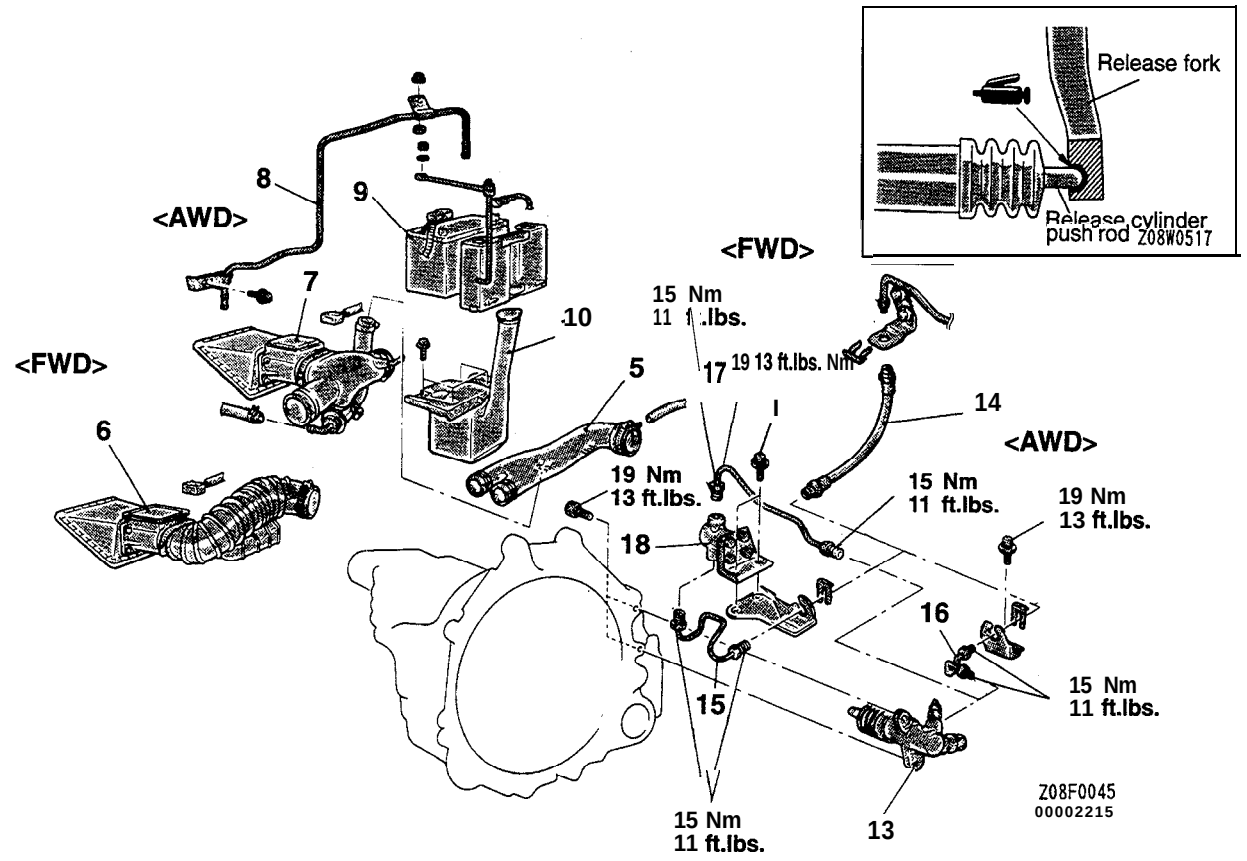
Clutch master cylinder removal steps

1. Brake booster (Refer to GROUP 35 – Brake Booster.)
2. Clevis pin <FWD>
3. Clutch master cylinder
▶F◀ • Piston adjustment to push rod clearance <AWD>
4. Sealer

Clutch tube removal steps

1. Brake booster (Refer to GROUP 35 – Brake Booster.)
▶E◀ 5. Air hose A <AWD>
6. Air cleaner cover, air intake hose <FWD>
▶D◀ 7. Air cleaner cover, air intake hose A <AWD>
▶C◀ 8. Vacuum pipe <AWD>
9. Battery
10. Battery seat, washer tank
11. Steering column assembly (Refer to GROUP 37A – Steering Wheel and Shaft.)
◀A▶ ▶A◀ 12. Clutch tube

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Clutch release cylinder removal steps

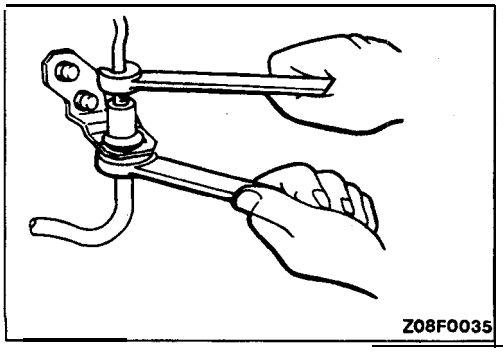
- ▶E◀ 5. Air hose A <AWD>
- 6. Air cleaner cover, air intake hose <FWD>
- ▶D◀ 7. Air cleaner cover, air intake hose A <AWD>
- ▶C◀ 8. Vacuum pipe <AWD>
- 9. Battery
- 10. Battery seat, washer tank
- ◀B▶ ▶B◀ 13. Clutch release cylinder

Clutch hose removal steps

- ▶E◀ 5. Air hose A <AWD>
- 6. Air cleaner cover, air intake hose <FWD>
- ▶D◀ 7. Air cleaner cover, air intake hose A <AWD>
- ▶C◀ 8. Vacuum pipe <AWD>
- 9. Battery
- 10. Battery seat, washer tank
- ◀C▶ ▶A◀ 14. Clutch hose

Clutch tube A, tube B, tube C, damper removal steps

- ▶E◀ 5. Air hose A <AWD>
- 6. Air cleaner, air intake hose <FWD>
- ▶D◀ 7. Air cleaner cover, air intake hose A <AWD>
- ▶C◀ 8. Vacuum pipe <AWD>
- 9. Battery
- 10. Battery seat, washer tank
- ◀D▶ ▶A◀ 15. Clutch tube A <FWD>
- ◀D▶ ▶A◀ 16. Clutch tube B <AWD>
- 17. Clutch tube C <FWD>
- 18. Clutch damper <FWD>



REMOVAL SERVICE POINTS

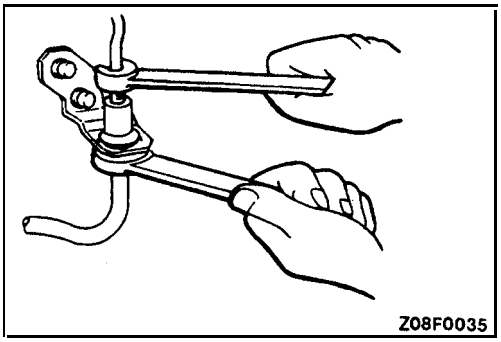
◀A▶ CLUTCH TUBE REMOVAL (CLUTCH HOSE SIDE)

While holding the clutch hose side nut, loosen the clutch tube flare nut.

◀B▶ CLUTCH RELEASE CYLINDER REMOVAL

On AWD-vehicles, use a flat type short box wrench to remove the clutch release cylinder mounting bolts.

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◀C▶ CLUTCH HOSE REMOVAL

To disconnect clutch hose from the clutch tube, proceed as follows:
(1) Secure the nut on the clutch hose and loosen the flare nut on the clutch tube.
(2) Remove the clip from the clutch hose to remove clutch hose from bracket.

◀D▶ CLUTCH TUBE A <FWD> (CLUTCH HOSE SIDE) / CLUTCH TUBE B <AWD> (CLUTCH HOSE SIDE) REMOVAL

While holding the clutch hose side nut, loosen the clutch tube flare nut.

INSTALLATION SERVICE POINTS

▶A◀ CLUTCH TUBE B <AWD> / CLUTCH TUBE A <FWD> / CLUTCH HOSE / CLUTCH TUBE INSTALLATION

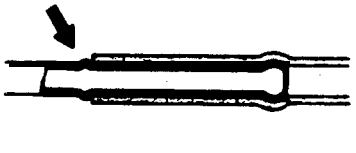
Be careful that the clutch hose does not become twisted.

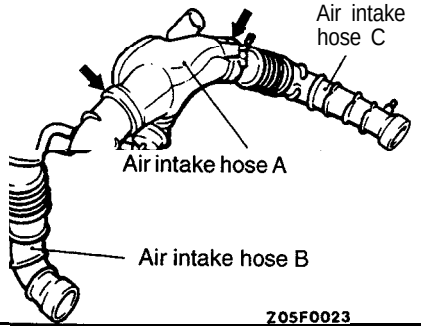
▶B◀ CLUTCH RELEASE CYLINDER INSTALLATION

On AWD-vehicles, use a flat type short box wrench to tighten the clutch release cylinder mounting bolts.

▶C◀ VACUUM PIPE <AWD> INSTALLATION

If the vacuum pipe has a stepped part, connect the vacuum hose to the pipe securely, up to the stepped part, as shown in the illustration.

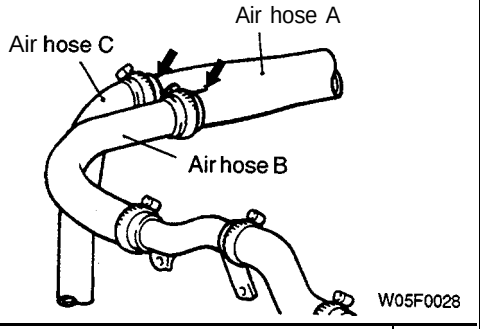

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▶D◀ AIR CLEANER COVER, AIR INTAKE HOSE A INSTALLATION

Align slots indicated by arrows in air intake hose A with A markings on air intake hoses B and C; then, insert hoses B and C all the way into air intake hose A.
Insert air intake hoses B and C all the way up to the roots on the turbocharger end.

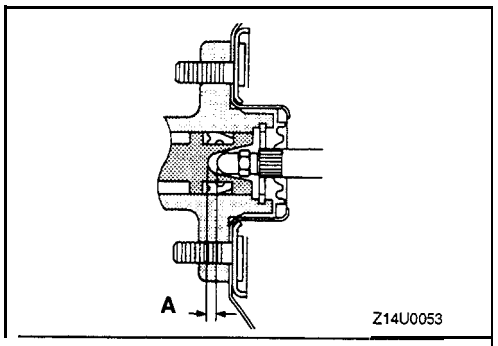


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▶E◀ AIR HOSE A INSTALLATION

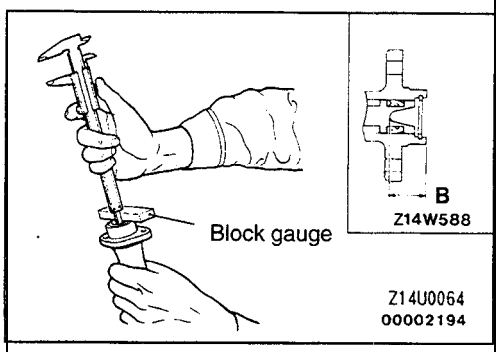
Connect the air hoses ensuring that alignment marks are aligned with projections.
Insert air hoses B and C into pipe all the way to its step.

Caution
Be careful not to allow any foreign matter to get into the hoses, pipes, or the intercooler itself.



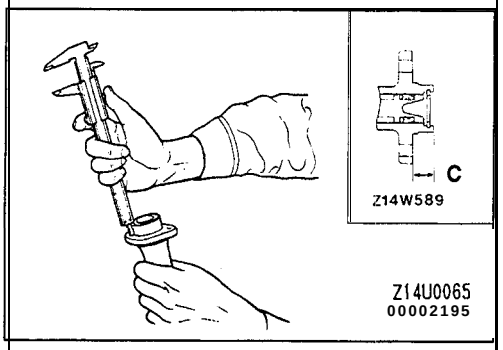
▶F◀ CLEARANCE BETWEEN CLUTCH BOOSTER PUSH ROD AND PISTON ADJUSTMENT<AWD>

Adjust the clearance (A) between the clutch booster push rod and piston as follows:

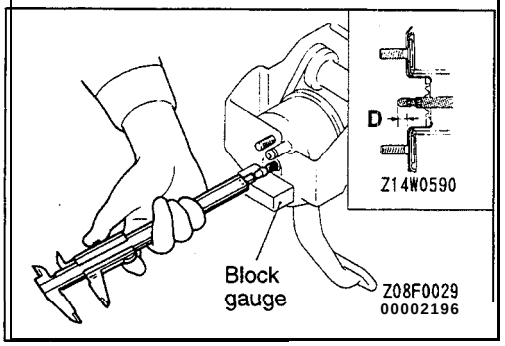


(1) Measure the dimension (B) between the master cylinder end face and piston.

NOTE
To obtain (B), first take measurement with a square placed on the master cylinder end face. Then, subtract the thickness of the square to arrive at (B).



(2) Obtain the dimension (C) between the clutch booster mounting surface on the master cylinder and the end face.



(3) Measure the dimension (D) between the master cylinder mounting surface on clutch booster and the push rod end.

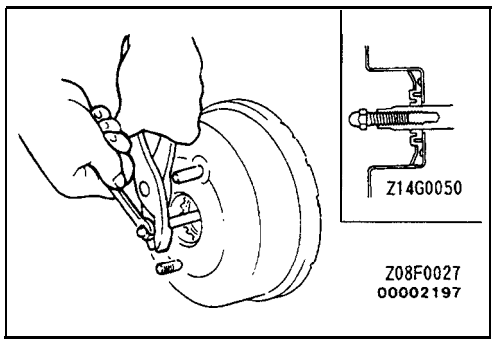
NOTE
To obtain (D), first take measurement with a square placed on the clutch booster. Then, subtract the thickness of the square to arrive at (D).

(4) Using the measured values obtained in (1) through (3), obtain the clearance (A) between the clutch booster push rod and piston.

Standard value: [A (A = B – C – D)]
0.21–0.46 mm (.0082–.0181 in.)
[Atmospheric pressure]

[When the clutch booster negative pressure of 66.7 kPa (9.7 psi) is applied, the clearance (A) becomes 0.1 to 0.3 mm (.0039 to .0118 in.).]

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(5) If the clearance is not within the standard value range, adjust by changing the push rod length by turning the adjustable end of the push rod.

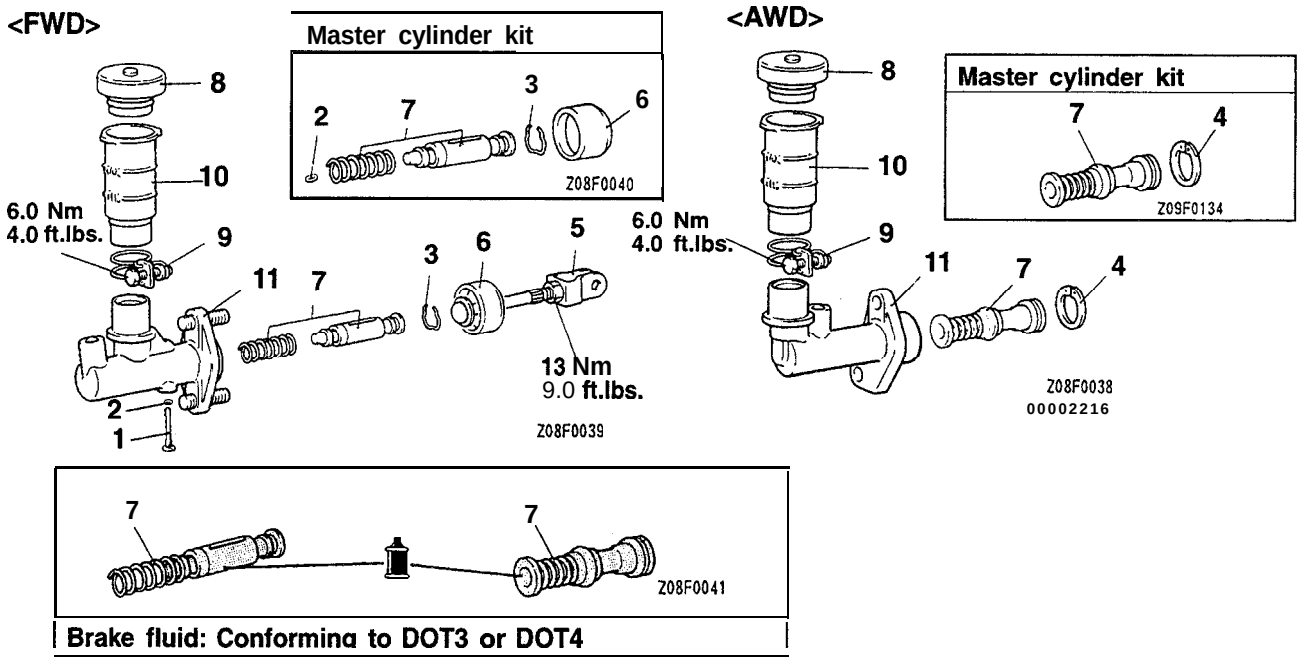
Caution
Insufficient clearance may cause the slippage or seizure of the clutch.

INSPECTION

- Check the clutch hose or tube for cracks or clogging.

CLUTCH MASTER CYLINDER

DISASSEMBLY AND REASSEMBLY

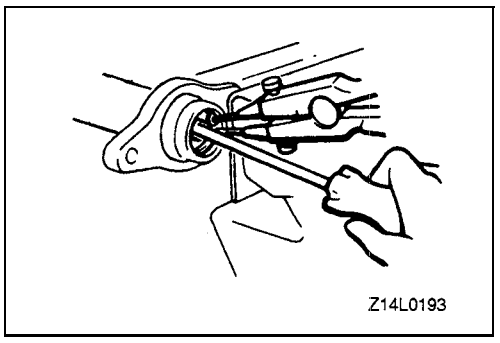


Brake fluid: Conforming to DOT3 or DOT4

Disassembly steps

1. Piston stop bolt <FWD>
2. Gasket <FWD>
◀A▶ 3. Piston stop ring <FWD>
◀A▶ 4. Snap ring <AWD>
▶A◀ 5. Push rod <FWD>
6. Boot <FWD>
◀B▶ 7. Piston assembly
8. Reservoir cap
9. Reservoir band
10. Reservoir
11. Master cylinder body

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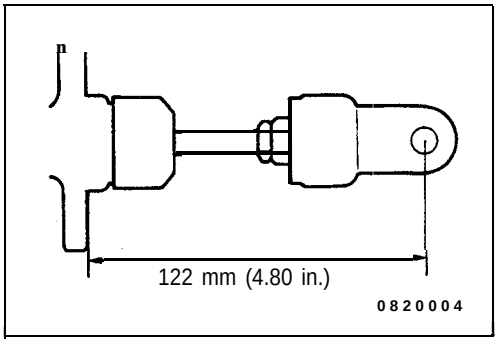
◀A▶ PISTON STOP RING <FWD> / SNAP RING <AWD> DISASSEMBLY

Remove the piston stop ring or snap ring, while depressing the piston.

◀B▶ PISTON ASSEMBLY REMOVAL

Caution

1. Do not damage the master cylinder body and piston assembly.
2. Do not disassemble piston assembly.



REASSEMBLY SERVICE POINT

▶A◀ PUSH ROD INSTALLATION

NOTE
Set the push rod length to the dimension shown in the illustration before installation. This can facilitate the clutch pedal adjustment.

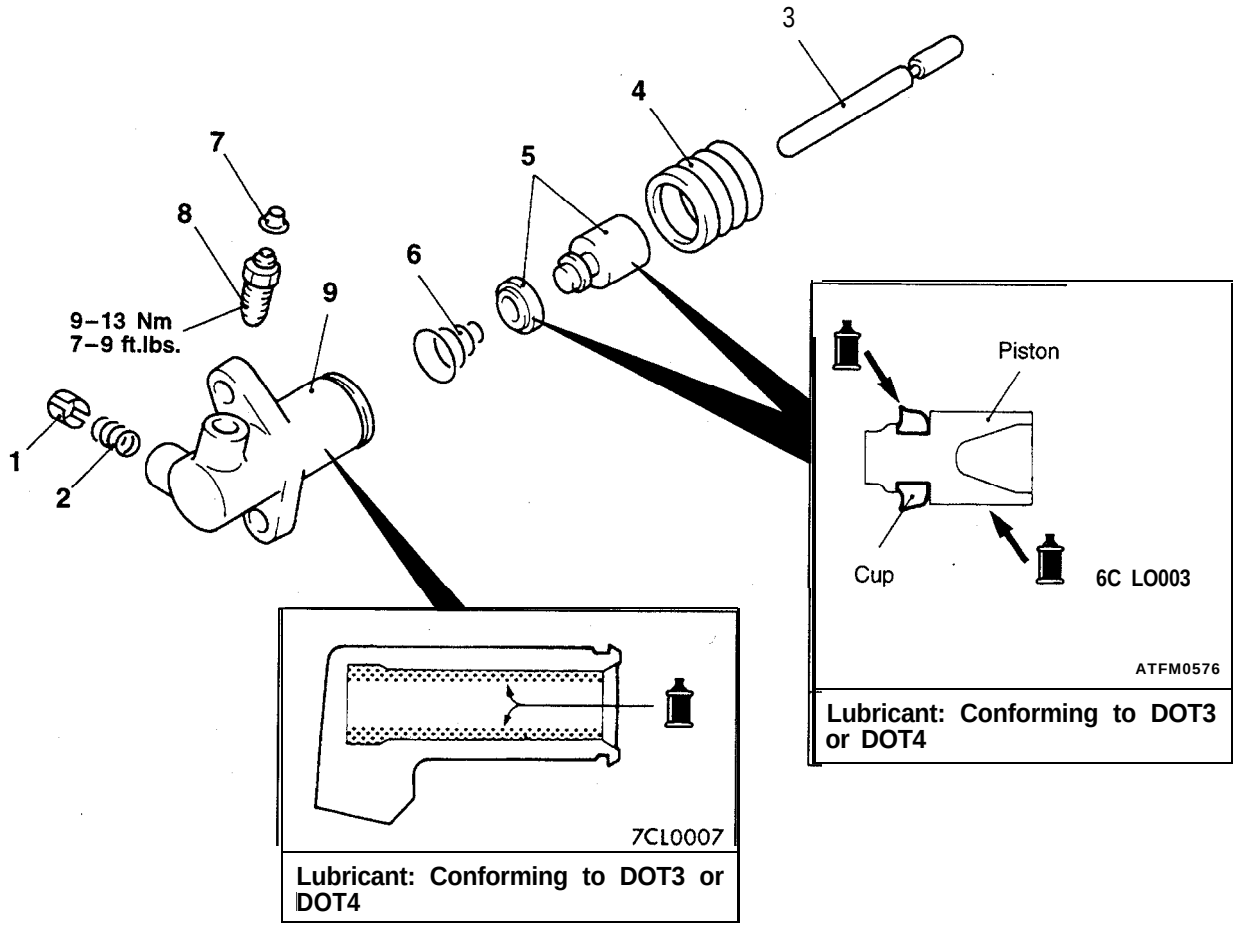
INSPECTION

- Check the inside cylinder body for rust or scars. Check the piston cup for wear or deformation.
-
- Check the clutch tube connection part for clogging.

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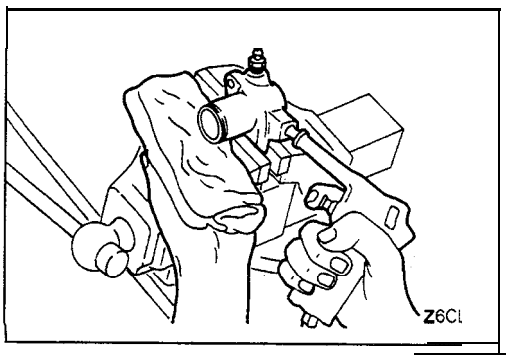
CLUTCH RELEASE CYLINDER

DISASSEMBLY AND REASSEMBLY



Disassembly steps

1. Valve plate
2. Spring
3. Push rod
4. Boots
◀A▶ ▶A◀ 5. Piston and cup
6. Conical spring
7.
8. Bleeder plug
9. Release cylinder



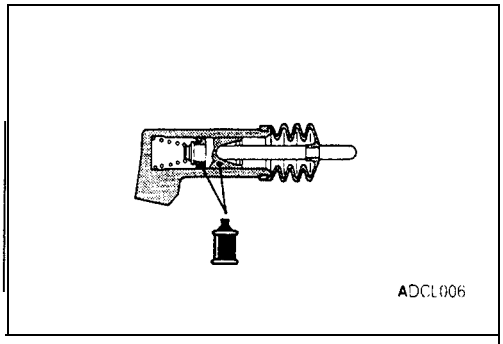
DISASSEMBLY SERVICE POINT

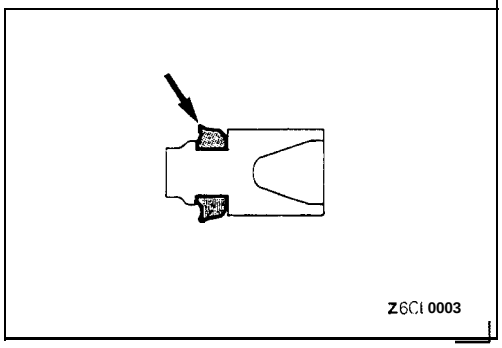
◀A▶ PISTON AND CUP DISASSEMBLY

(1) Remove the corrosion from the piston-removal port of the release cylinder.
(2) Remove the piston from the release cylinder using compressed air.

Caution
1. Cover with rags to prevent the piston from popping out.
2. Apply compressed air slowly to prevent brake fluid from splashing.

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REASSEMBLY SERVICE POINT

▶A◀ FLUID APPLICATION TO PISTON AND CUP

Apply specified brake fluid to the release cylinder inside and outer surface of the piston and piston cup and push the piston cup assembly in the cylinder.

Specified brake fluid: Conforming to DOT3 or DOT4

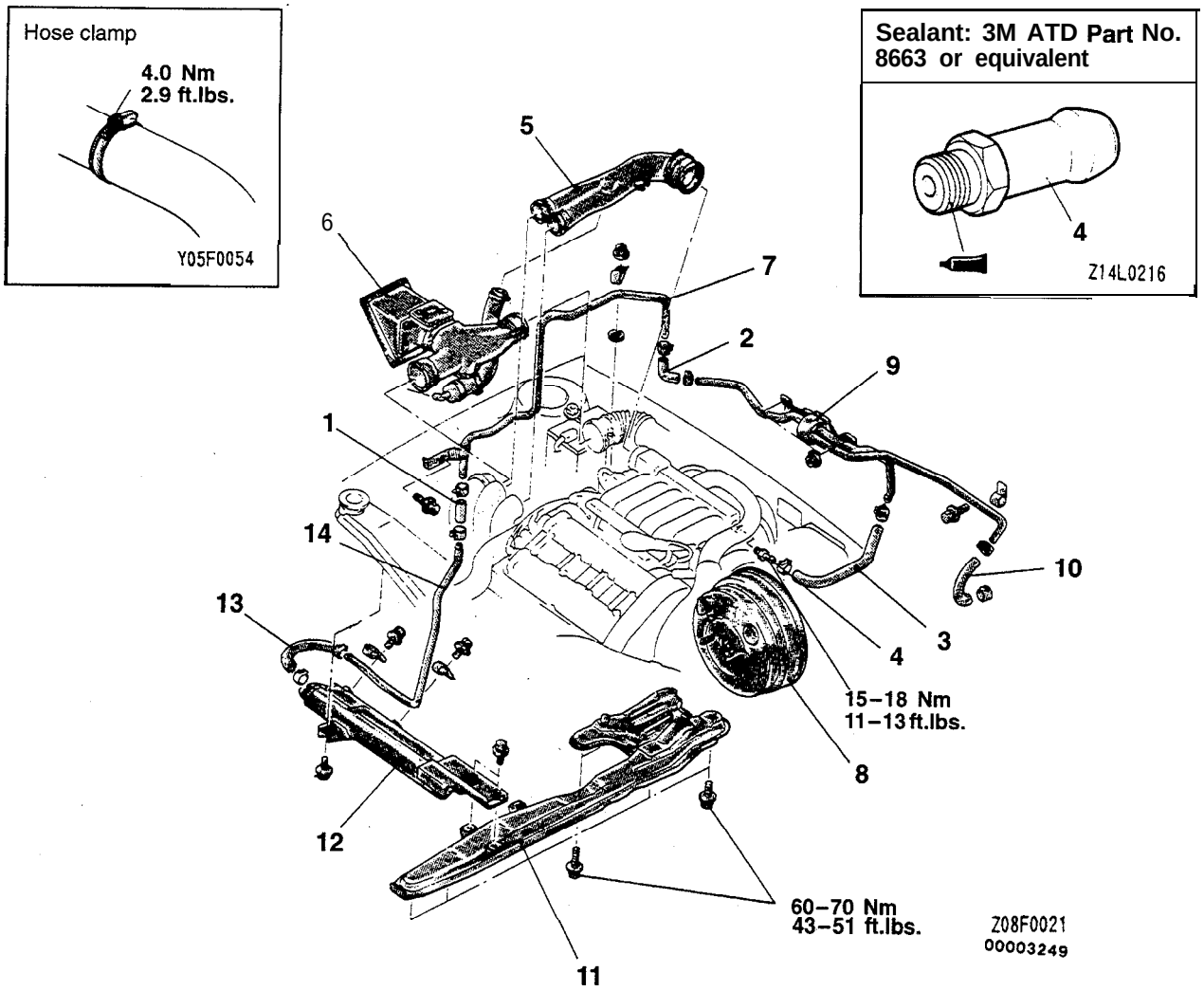
INSPECTION

(1) Check the inner surface of the release cylinder for scratches or irregular wear.
(2) Replace if the piston cup outer circumference is scratched or shows signs of fatigue, or if there is excessive wear of the lip where indicated in the figure.

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CLUTCH VACUUM LINE, VACUUM TANK <AWD>

REMOVAL AND INSTALLATION



▶A◀ 1. Vacuum hose A
▶A◀ 2. Vacuum 'hose B
◀A▶ ▶A◀ 3. Vacuum hose C with check valve
4. Fitting

Vacuum pipe A removal steps

▶C◀ 5. Air hose A
▶B◀ **6.** Air cleaner cover, air intake hose A
7. Vacuum pipe A

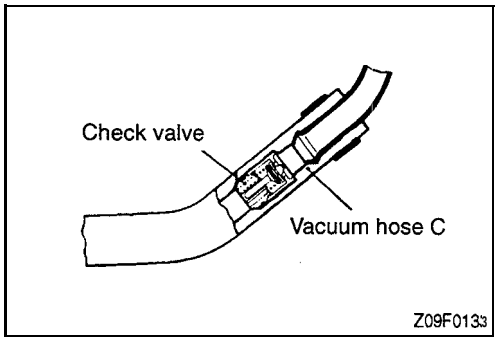
Vacuum pipe B, vacuum hose D removal steps

8. Brake booster (Refer to GROUP 35 – Brake Booster.)
9. Vacuum pipe B
▶A◀ 10. Vacuum hose D

Vacuum tank assembly, vacuum hose E, vacuum pipe C removal steps

11. Right member (Refer to GROUP 32 – Right Member, Left Member and Crossmember.)
12. Vacuum tank assembly
▶A◀ 13. Vacuum hose E
14. Vacuum pipe C

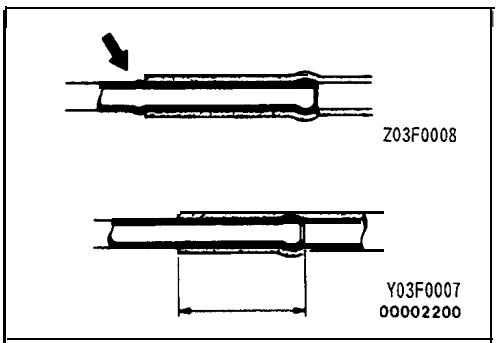
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REMOVAL SERVICE POINT

◀A▶ VACUUM HOSE C WITH CHECK VALVE REMOVAL

NOTE
Since the check valve is fit to the vacuum hose C, replace the check valve as an assembly unit together with the vacuum hose C if the check valve is defective.

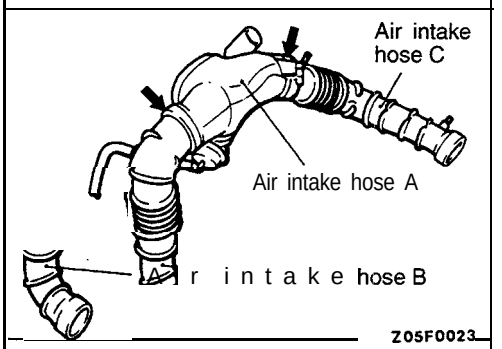


INSTALLATION SERVICE POINTS

▶A◀ VACUUM HOSE E / VACUUM HOSE D / VACUUM HOSE C WITH CHECK VALVE / VACUUM HOSE B / VACUUM HOSE A INSTALLATION

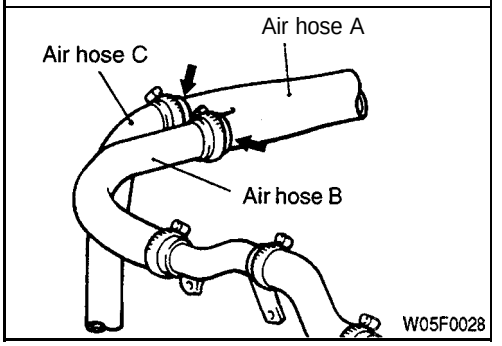
If a hose is connected to a pipe with a stepped part, insert the hose up to the stepped part.
If it is connected to a pipe without any stepped part, insert the hose until the insertion amount reaches the standard value.

Standard value: 20–25 mm (.8–1.0 in.)



▶B◀ AIR CLEANER COVER, AIR INTAKE HOSE A INSTALLATION

Align slots indicated by arrows in air intake hose A with A markings on air intake hoses B and C; then, insert hoses B and C all the way into air intake hose A.
Insert air intake hoses B and C all the way up to the roots on the turbocharger end.



▶C◀ AIR HOSE A INSTALLATION

Connect the air hoses ensuring that alignment marks are aligned with projections.
Insert air hoses B and C into pipe all the way to its step.

Caution
Be careful not to allow any foreign matter to get into the hoses, pipes, or the intercooler itself.

INSPECTION

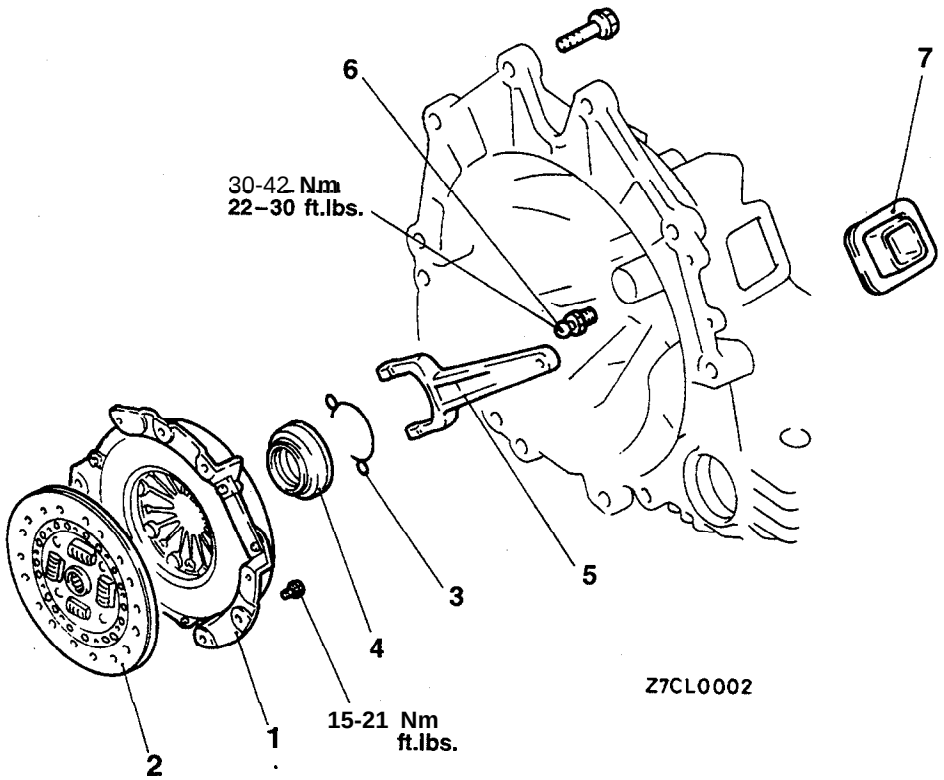
- Check the hose and pipes for cracks, bend, deformation and clogging.
- Check the vacuum tank for deformation or crack.

CLUTCH COVER AND DISC

REMOVAL AND INSTALLATION

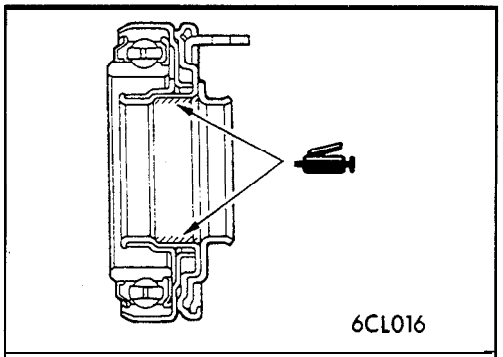
Pre-removal Operation
- Transaxle Assembly Removal
  (Refer to GROUP 22 – Transaxle Assembly.)

Post-installation Operation
- Transaxle Assembly Installation
  (Refer to GROUP 22 – Transaxle Assembly.)

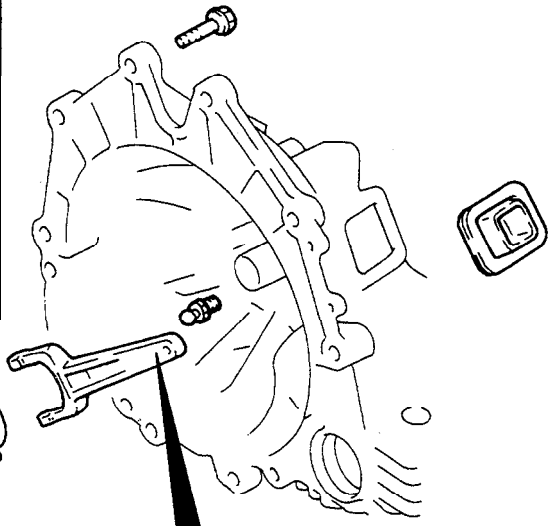


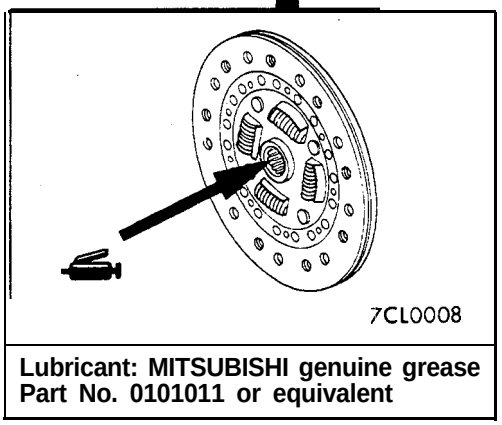
◀A▶ ▶C◀
◀A▶ ▶C◀ 3. Return clip
▶B◀ 4. Clutch release bearing
▶A◀ 5. Release fork
6. Fulcrum
7. Release fork boot

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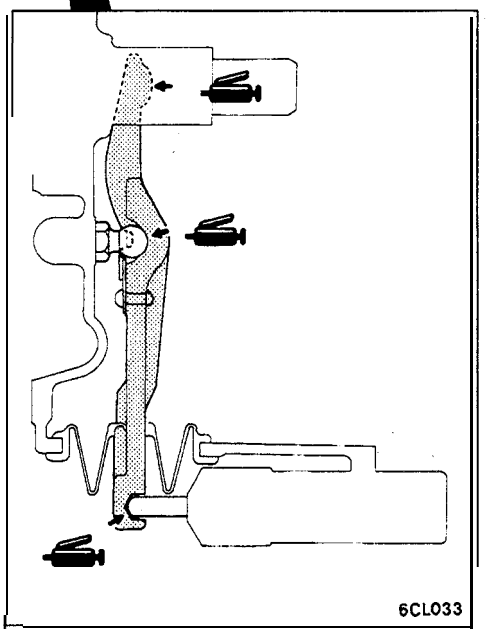


Lubricant: MITSUBISHI genuine grease Part No. 0101011 or equivalent



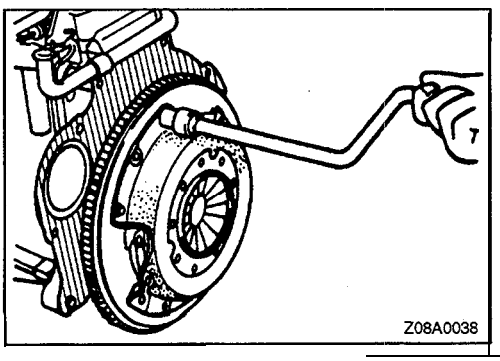


Lubricant: MITSUBISHI genuine grease Part No. 0101011 or equivalent



Lubricant: MITSUBISHI genuine grease Part No. 0101011 or eauivalent

ATFM0857



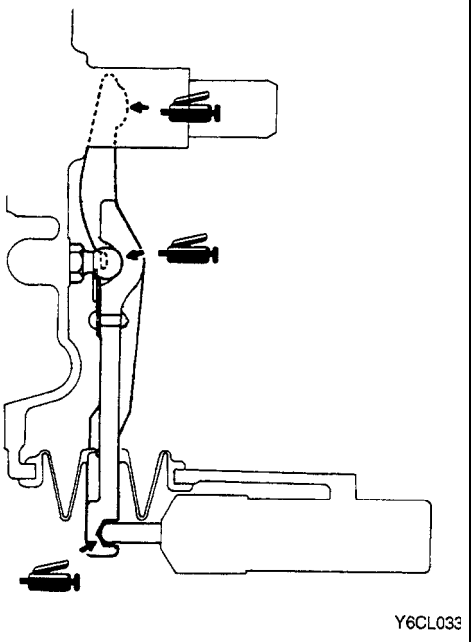
REMOVAL SERVICE POINT

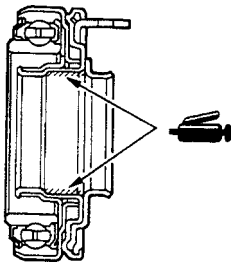
◀A▶ CLUTCH COVER ASSEMBLY / CLUTCH DISC REMOVAL

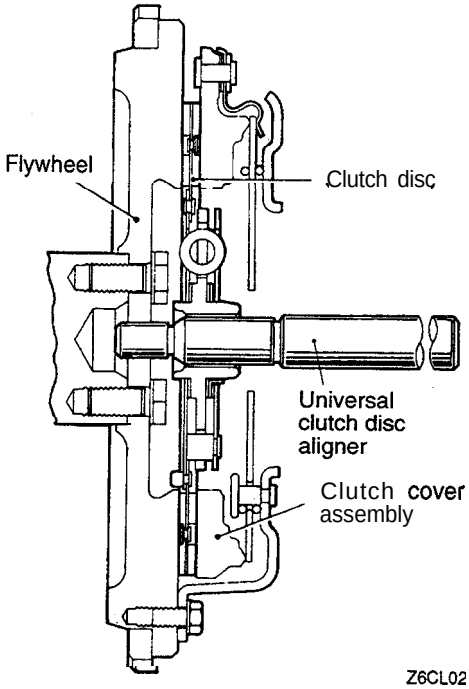
Diagonally loosen bolts which attach clutch cover to flywheel. Back off bolts in succession, one or two turns at a time, to avoid bending cover flange.

Caution
DO NOT clean clutch disc or release bearing with cleaning solvent.

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Y6CL033


Y6CL016



Z6CL02

INSTALLATION SERVICE POINTS

▶A◀ GREASE APPLICATION TO RELEASE FORK

(1) Apply a coating of the specified grease to the point of contact with the fulcrum and the point of contact with the release bearing.

Specified grease:
MITSUBISHI genuine grease Part No. 0101011 or equivalent

Caution
When installing the clutch, apply grease to each part, but be careful not to apply excessive grease; excessive grease will cause clutch slippage and shudder.

(2) Apply a coating of the specified grease to the end of the release cylinder's push rod and to the push rod hole in the release fork.

Specified grease:
MITSUBISHI genuine grease Part No. 0101011 or equivalent

▶B◀ GREASE APPLICATION TO CLUTCH RELEASE BEARING (FWD)

Pack the inner surface of the clutch release bearing and the groove with the specified grease.

Specified grease:
MITSUBISHI genuine grease Part No. 0101011 or equivalent

▶C◀ GREASE APPLICATION TO CLUTCH DISC / CLUTCH COVER ASSEMBLY

(1) Apply a coating of the specified grease to the clutch disc spline, and then use a brush to rub it in.

Specified grease:
MITSUBISHI genuine grease Part No. 0101011 or equivalent

(2) Using the universal clutch disc aligner, position the clutch disc to the flywheel.
(3) install the clutch cover assembly. Tighten the bolts a little at a time, working in a diagonal sequence, finally tightening them to the specified torque.

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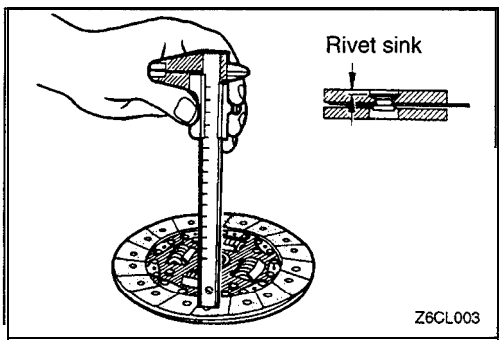
INSPECTION

CLUTCH COVER ASSEMBLY CHECK

- Check the diaphragm spring end for wear and uneven height.
- Replace if wear is evident or height difference exceeds the limit.

  Limit: 0.5 mm (.020 in.)

- Check the pressure plate surface for wear, cracks and color change.
- Check the strap plate rivets for looseness and replace the clutch cover assembly if loose.

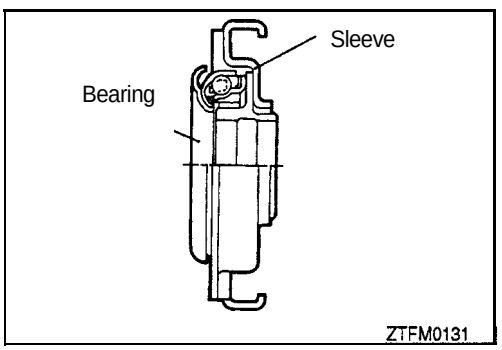


CLUTCH DISC CHECK

- Check the facing for loose rivets, uneven contact, deterioration due to seizure, adhesion of oil or grease and replace the clutch disc if defective.
- Measure the rivet sink and replace the clutch disc if it is out of specification.

  Limit: 0.3 mm (.012 in.)

- Check for torsion spring play and damage and if defective, replace the clutch disc.
- Combine the clutch disc with the input shaft and check sliding condition and check for play in the rotating direction. If it does not slide smoothly, check after cleaning and reassembling. If the play is excessive, replace the clutch disc and/or the input shaft.



CLUTCH RELEASE BEARING CHECK

Caution

1. The release bearing is packed with grease, so don't use cleaning oil, etc. to clean it.

2. Do not disassemble the bearing and sleeve of the clutch release bearing. If disassembled, replace. (AWD only)

- Check for bearing heat damage, other damage, abnormal noise and/or improper rotation. Also check whether or not there is wear at the point of contact with the diaphragm spring.
- If there is abnormal wear at the point of contact with the release fork, replace the bearing.

RELEASE FORK CHECK

If there is abnormal wear at the point of contact with the bearing, replace the release fork.

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NOTES

MANUAL TRANSAXLE

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WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

(1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).

(2) Service or maintenance of any SRS component or SK-related component must be performed only at an authorized MITSUBISHI dealer.

(3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B -Supplemental Restraint System (SRS) and GROUP 00 -Maintenance Service, before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning light, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

MANUAL TRANSAXLE <FWD>

SPECIFICATIONS

GENERAL SPECIFICATIONS

Items		1992 model	Up to 1994 model	From 1995 model
Model		F5M33-2-SNZR	F5M33-2-SNQR	F5M33-2-SUQR
Applicable engine		6G72-DOHC MPI	6G72-DOHC MPI	6G72-DOHC MPI
Type		5-speed transaxle floor shift	5-speed transaxle floor shift	5-speed transaxle floor shift
Gear ratio	1st	3.090	3.090	3.090
	2nd	1.833	1.833	1.833
	3rd	1.217	1.217	1.217
	4th	0.888	0.888	0.888
	5th	0.741	0.741	0.741
	Reverse	3.166	3.166	3.166
Final reduction ratio		4.153	4.153	4.153
Speedometer gear ratio (driven/drive)		28/36	28/36	28/36
Oil quantity dm^3 (qts.)		2.0 (2.1)	2.0 (2.1)	2.0 (2.1)

LUBRICANTS

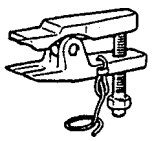
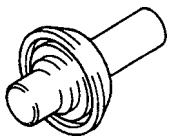
Items	Specified lubricant	Quantity dm^3 (qts)
Manual transmission oil	Hypoid gear oil, SAE 75W-90 or 75W-85W conforming to API classification GL-4	2.0 (2.1)
Drive shaft oil seal lip		As required

SEALANTS AND ADHESIVES

Items	Specified sealants and adhesives
Transaxle case – clutch housing mating surfaces	Mitsubishi genuine part No. 997740 or equivalent
Transaxle case – rear cover mating surfaces	
Differential drive gear bolts	3M STUD Locking part No. 4170 or equivalent
Bearing retainer screw (flush head screw)	
Reverse brake cone mounting screw bolts	
Air breather	3M ATD part No. 8001 or equivalent

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SPECIAL TOOLS

Tool	Tool number and name	Supersession	Application
	MB991113 Steering linkage puller	MB991113-01	• Disconnection of the coupling- of the knuckle and lower arm ball joint • Disconnection of the coupling of the knuckle and tie-rod end ball joint
	MD998325 Differential oil seal installer	MD998325-01	Installation of differential oil seal

TROUBLESHOOTING

Symptom	Probable cause	Remedy
Vibration, noise	a. Loose or damaged transaxle and engine mounts	a. Tighten or replace mounts
	b. Inadequate shaft end play	b. Correct end play
	c. Worn of damaged gears	c. Replace gears
	d. Use of inadequate grade of oil	d. Replace with specified oil
	e. Low oil level	e. Replenish
	f. Inadequate engine idle speed	f. Adjust idle speed
Oil leakage	a. Broken or damaged, oil seal or O-ring	a. Replace oil seal or O-ring
Hard shift	a. Faulty control cable	a. Replace control cable
	b. Poor contact or wear of synchronizer ring and gear cone	b. Correct or replace
	c. Weakened synchronizer spring	c. Replace synchronizer spring
	d. Use of inadequate grade of oil	d. Replace with specified oil
Jumps out of gear	a. Worn gear shift fork or broken poppet spring	a. Replace shift fork or poppet spring
	b. Synchronizer hub to sleeve spline clearance too large	b. Replace synchronizer hub and Sleeve

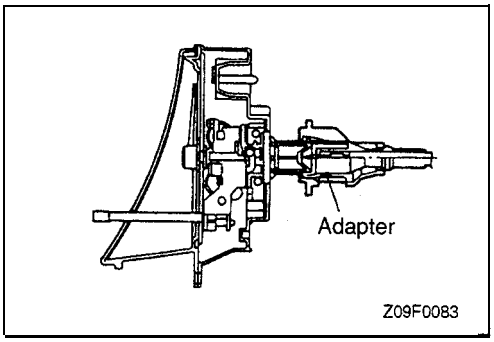
ON-VEHICLE SERVICE

TRANSMISSION OIL LEVEL CHECK

Refer to GROUP 00 – Maintenance Service.

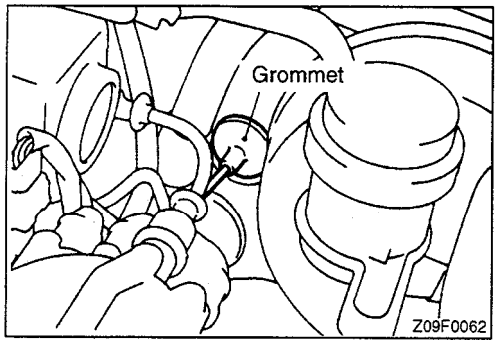
TRANSMISSION OIL REPLACEMENT

Refer to GROUP 00 – Maintenance Service.



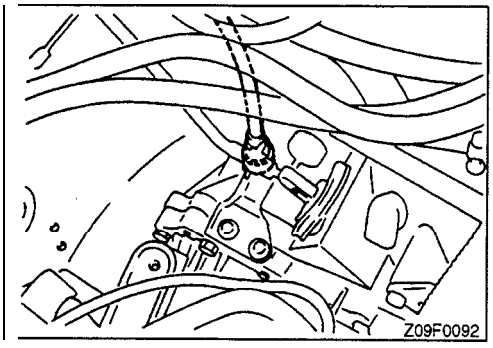
SPEEDOMETER CABLE REPLACEMENT <Up to 1993 models>

1. Correctly insert the adapter into the instrument panel, and fasten the new speedometer cable.



2. Install the grommet so that, as shown in the illustration, the cable attachment part and the projecting part are horizontal.

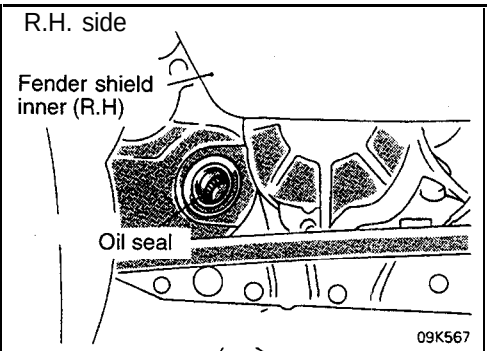
Caution
The cable arrangement should be made so that the radius of cable bends is 150 mm (5.9 in.) or more.

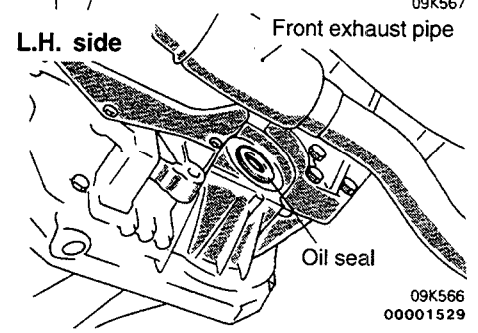


3. At the transaxle end of the soeedometer cable, the key joint should be inserted into the transaxle, and the nut should be securely tightened.

Caution
If the cable is not correctly and securely connected, it may cause incorrect indication by the speedometer, or abnormal noise. Be sure to connect it correctly.

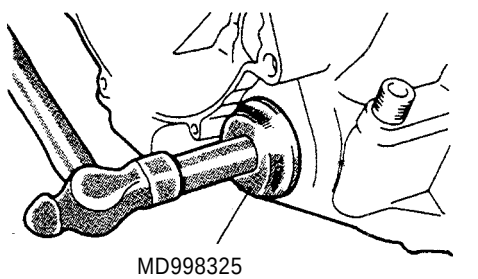
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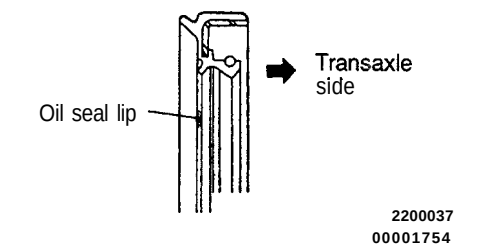
DRIVE SHAFT OIL SEALS REPLACEMENT

(1) Disconnect the drive shaft from the transaxle.
(Refer to GROUP 26 – Drive Shaft.)
(2) Using a flat-tip (–) screwdriver, remove the oil seal.



(3) Using the special tool, tap the drive shaft oil seal into the transaxle.
The drive shaft oil seal must be installed in the direction shown.
(4) Apply a coating of the transmission oil to the lip of the oil seal.

Transmission oil:
Hypoid gear oil, SAE 75W-90 or 75W-85W conforming to API classification GL-4

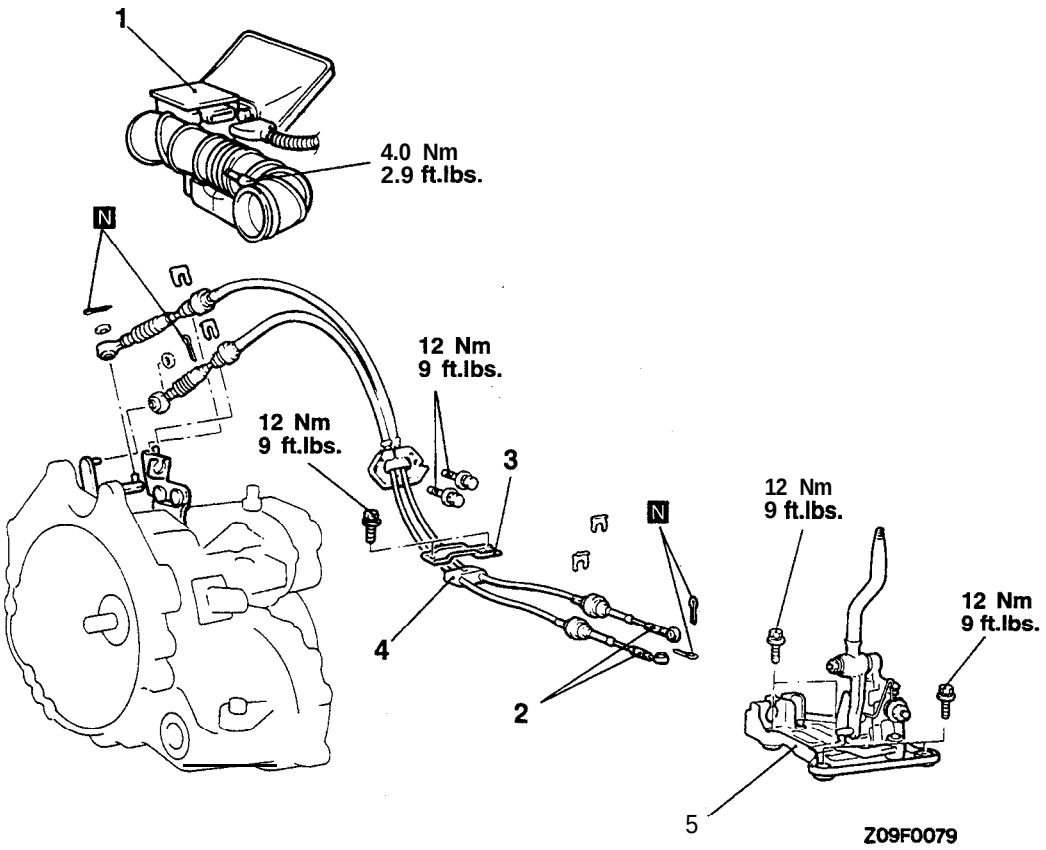


TRANSAXLE CONTROL

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Front Console Assembly Removal and Installation (Refer to GROUP 52A – Floor Console.)

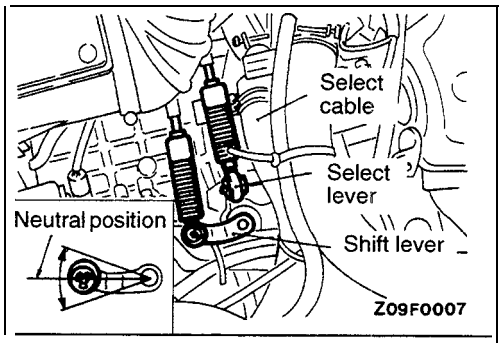
CAUTION: SRS
When removing and installing the front console assembly, don't allow any impact or shock to the SRS diagnosis unit.

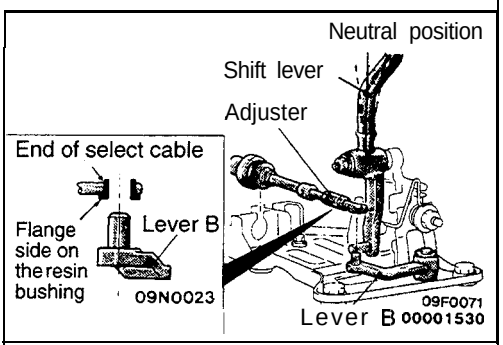


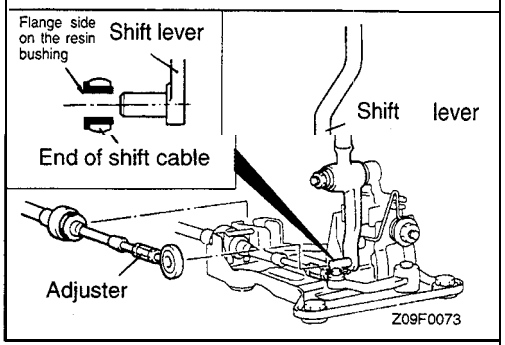
Transaxle control cable assembly removal steps
1. Air cleaner, Air intake hose
▶A◀ 2. Transaxle control cable assembly connection (Shift lever assembly side)
3. Retainer
4. Transaxle control cable assembly

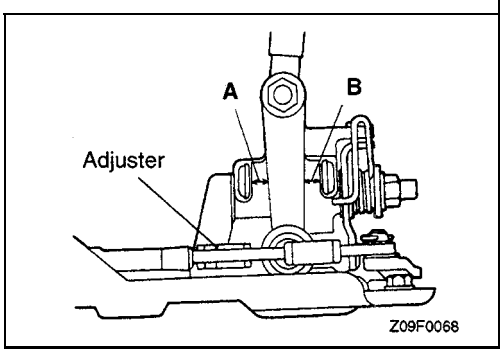
Shift lever assembly removal steps
1. Air cleaner, Air intake hose
▶A◀ 2. Transaxle control 'cable assembly connection (Shift lever assembly side)
5. Shift lever assembly

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INSTALLATION SERVICE POINTS

▶A◀ TRANSAXLE CONTROL CABLE ASSEMBLY CONNECTION (SHIFT LEVER ASSEMBLY SIDE)

(1) Move the transaxle shift lever to the neutral position.

NOTE
The select lever will be set to the neutral position when the transaxle shift lever is moved to the neutral position.

(2) With the shift lever on the passenger compartment side in the neutral position, turn adjuster on select cable so that select cable end is positioned as shown with reference to lever B of shift lever.
(3) Install the select cable so that the flange side of the plastic bushing at the end of select cable is on the end face side of lever B.

(4) Turn adjuster on shift cable so that shift cable end is positioned as shown with reference to shift lever on the passenger compartment side.
(5) Install the shift cable so that the flange side of the plastic bushing at the end of shift cable is on the split pin side.

(6) Connect the shift cable, then turn adjuster on shift cable so that dimension A equals dimension B.
(7) Move the shift lever to each position and check that the shifting is smooth.

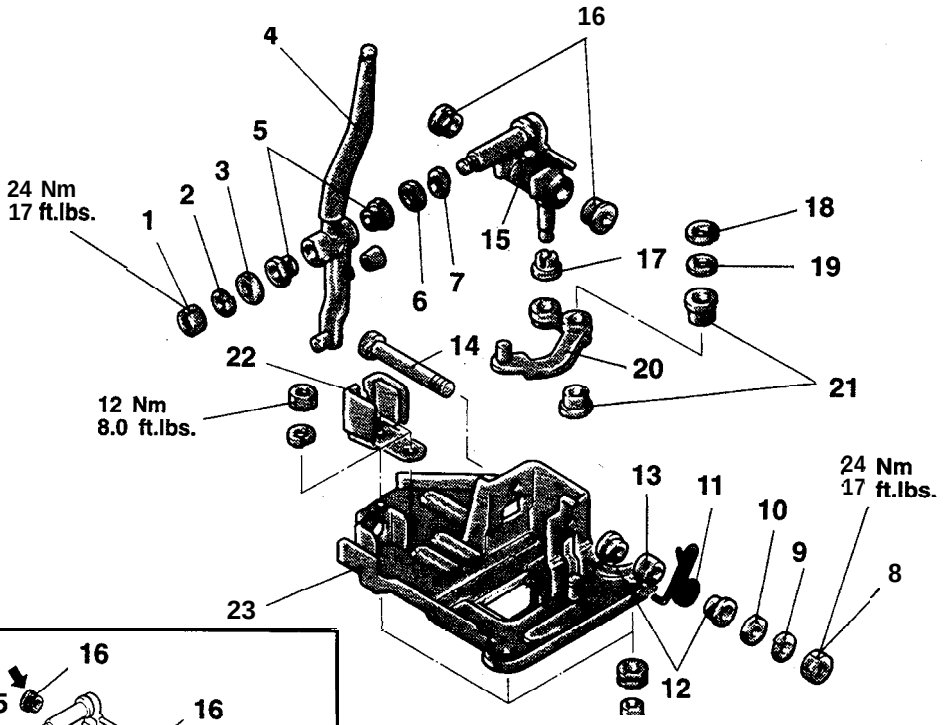
INSPECTION

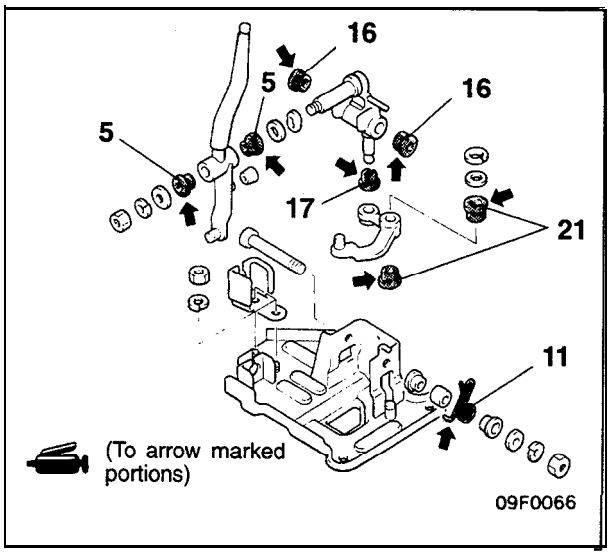
- Check the transaxle control cable assembly for function and for damage.
- Check the boot for damage.
- Check each bushing for wear or abrasion, sticking, impeded action, and damage.

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SHIFT LEVER ASSEMBLY

DISASSEMBLY AND REASSEMBLY





Disassembly steps

1. Nut
2. Spring washer
3. Plain washer
4. Shift lever
5. Bushing
6. Plain washer
7. Wave washer
8. Nut
9. Spring washer
10. Plain washer
11. Return spring
12. Bushing
13. Pipe
14. Bolt
15. Lever (A)
16. Bushing
17. Bushing
18. Snap ring
19. Washer
20. Lever(B)
21. Bushing
22. Cable bracket
23. Bracket assembly

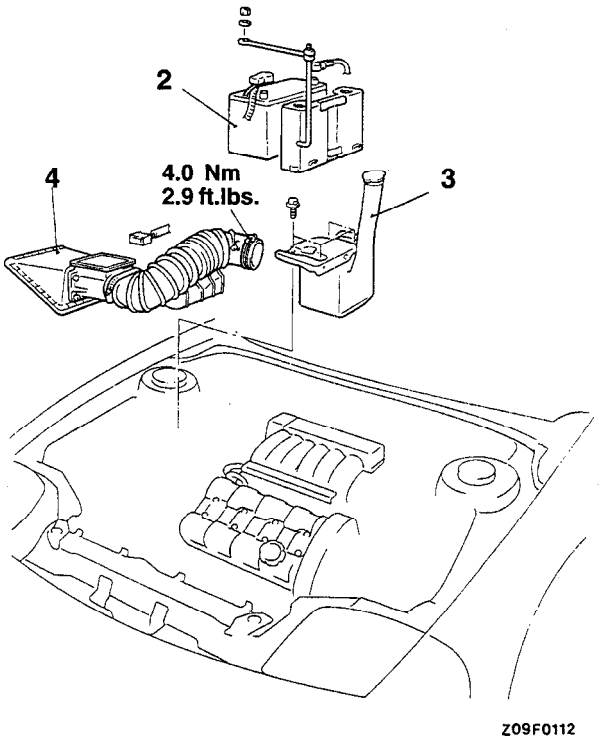
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TRANSAXLE ASSEMBLY

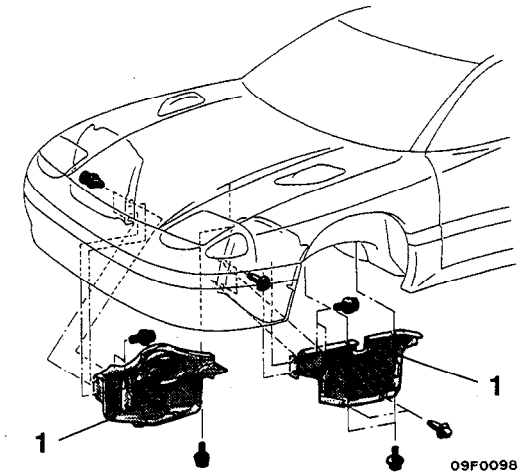
REMOVAL AND INSTALLATION

Pre-removal Operation
- Transmission Oil Draining (Refer to p.22-4.)
- Front Under Cover Removal (Refer to GROUP 51 – Front Bumper.)

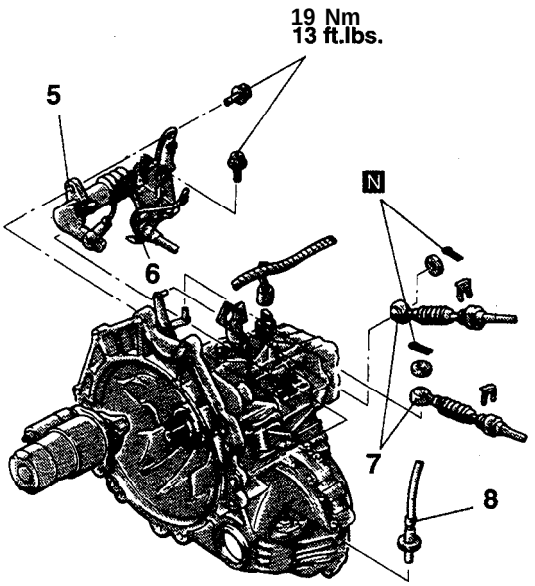
Post-installation Operation
- Front Under Cover Installation (Refer to GROUP 51 – Front Bumper.)
- Transmission Oil Supplying (Refer to P.22-4.)
- Engine Coolant Filling (Refer to GROUP 14 – Service Adjustment Procedures.)
- Shift Lever at Each Position Checking Operation
- Meters and Gauges Checking Operation



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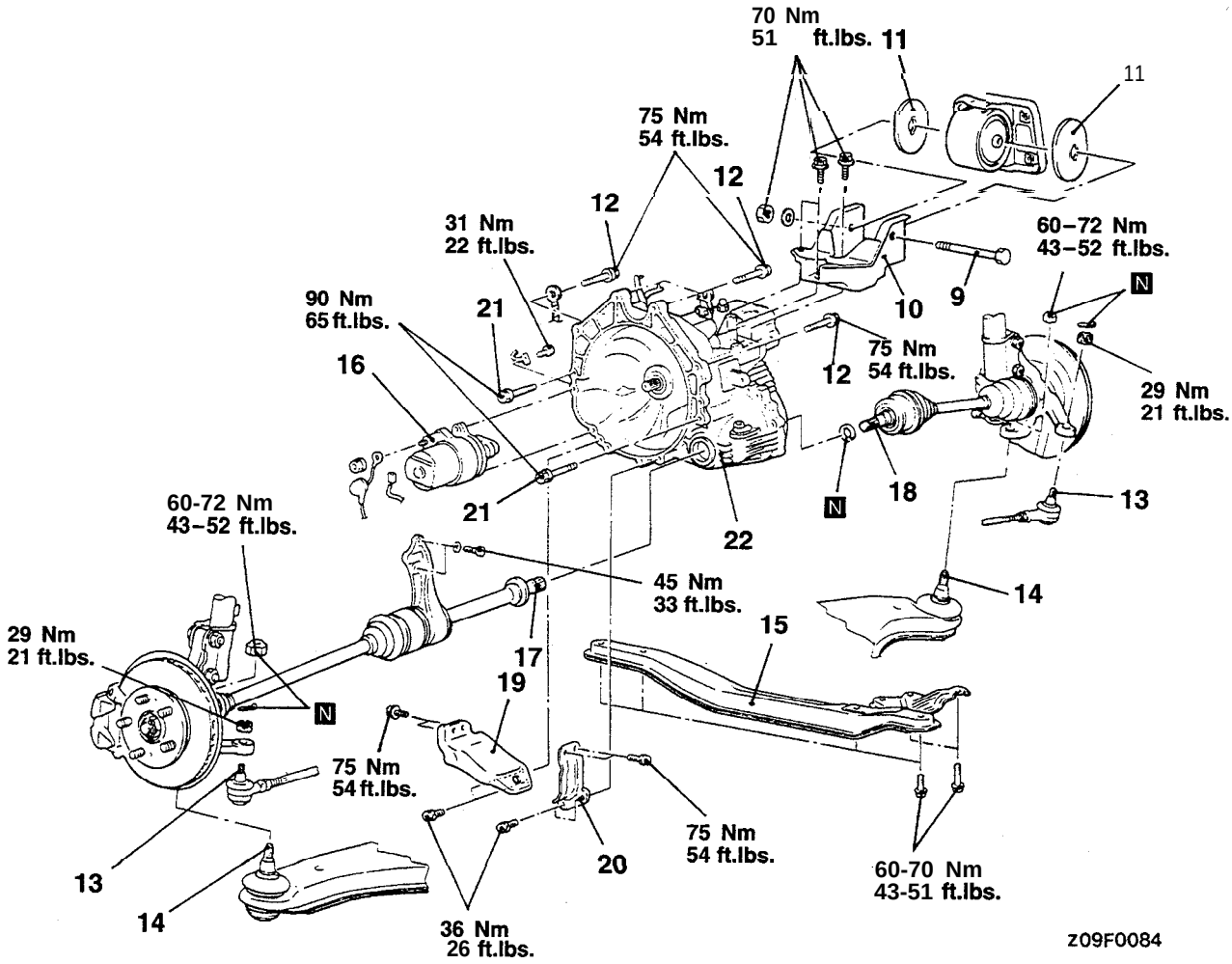
Removal steps

1. Side under cover
2. Battery
3. Battery seat, washer tank
4. Air cleaner cover, air intake hose
5. Clutch release cylinder connection

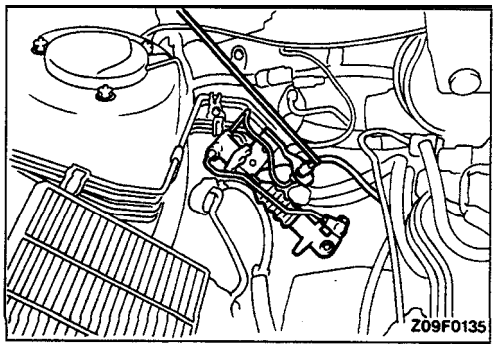
◀A▶

6. Clutch tube bracket and clutch damper assembly connection
7. Transaxle control cable connection
8. Speedometer cable <Up to 1993 models> or speedometer connector <From 1994 models> connection

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◀B▶ 9. Transaxle mount connection
10. Transaxle mount bracket
▶B◀ 11. Mounting stopper
12. Transaxle assembly upper part coupling bolt
◀C▶ 13. Tie rod end connection
◀D▶ 14. Lower arm ball joint connection
15. Right member
16. Starter
◀E▶ 17. Drive shaft (Left side), Inner shaft assembly
◀F▶ ▶A◀ 18. Drive shaft (Right side)
19. Transaxle stay (Front bank side)
20. Transaxle stay (Rear bank side)
◀G▶ 21. Transaxle assembly lower part coupling bolt
◀G▶ 22. Transaxle assembly



REMOVAL SERVICE POINTS

◀A▶ CLUTCH TUBE BRACKET AND CLUTCH DAMPER ASSEMBLY DISCONNECTION

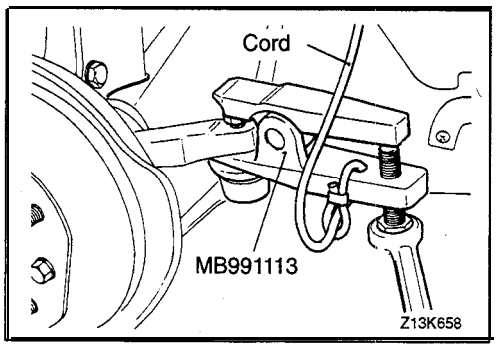
Remove the clutch release cylinder and clutch oil line bracket installation bolt, and then secure at the body side without disconnecting the oil line coupling.

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◀B▶ TRANSAXLE MOUNT DISCONNECTION

Raise transaxle assembly with a jack up to a level where mount bracket no longer receives its weight and remove transaxle mount insulator bolt.

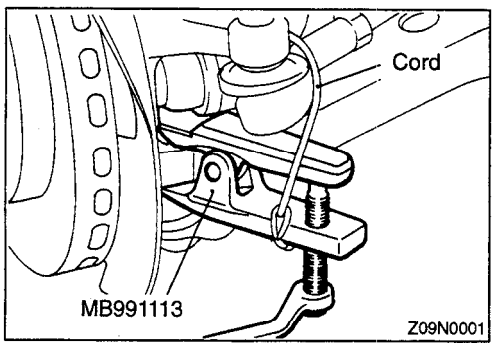
Caution
Support the transaxle assembly with the jack so that no localized force is applied to the assembly.



◀C▶ TIE ROD END DISCONNECTION

Using the special tool, disconnect the tie rod end from the knuckle.

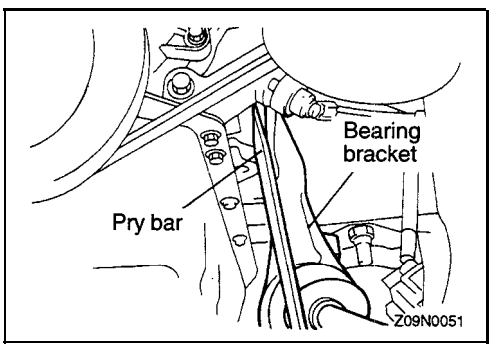
Caution
1. **Be sure to tie the cord of the special tool to the nearby part.**
2. **Loosen the nut but do not remove it.**



◀D▶ LOWER ARM BALL JOINT DISCONNECTION

Using the special tool, disconnect the lower arm ball joint from the knuckle.

Caution
1. **Be sure to tie the cord of the special tool to the nearby part.**
2. **Loosen the nut but do not remove it.**

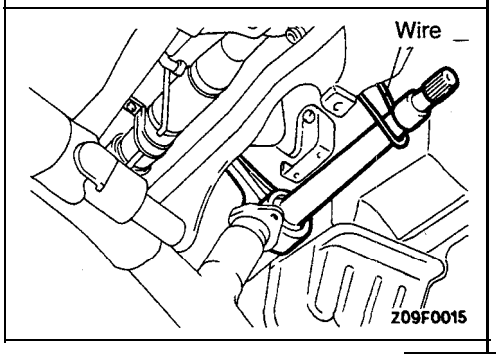


◀E▶ DRIVE SHAFT (LEFT SIDE), INNER SHAFT ASSEMBLY REMOVAL

(1) Remove the bearing bracket mounting bolts and insert the pry bar between the bearing bracket and the cylinder block.

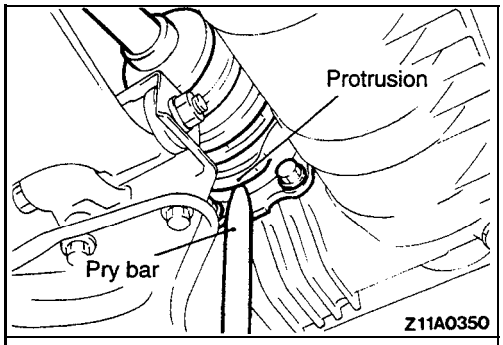
(2) Remove drive shaft (left side) and inner shaft assembly from transaxle assembly.

NOTE
Remove drive shaft and inner shaft assembly as an assembly together with hub, knuckle, and other parts.



(3) Suspend the removed drive shaft (left side) and inner shaft assembly with wire or something similar to prevent it from sharply bending or turning at each joint.

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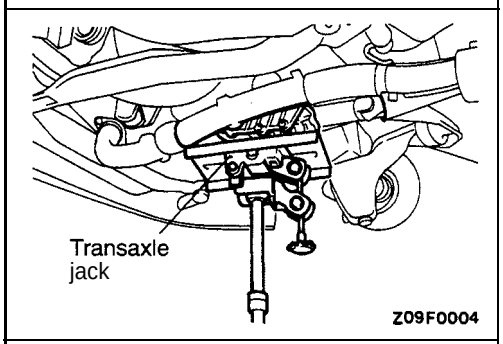


◀F▶ DRIVE SHAFT (RIGHT SIDE) REMOVAL

(1) To remove drive shaft (right side) from transaxle assembly, apply pry bar to the protrusion.

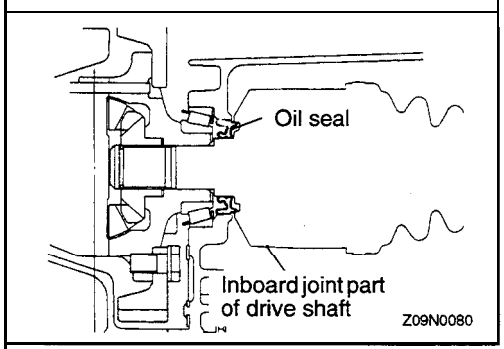
NOTE
Remove drive shaft (right side) as an assembly together with hub, knuckle, and other parts.

(2) Suspend the removed drive shaft (right side) with wire or something similar to prevent it from sharply bending or turning at each joint.



◀G▶ TRANSAXLE ASSEMBLY LOWER PART COUPLING BOLT / TRANSAXLE ASSEMBLY REMOVAL

Support transaxle assembly with a transaxle jack and remove transaxle assembly lower part coupling bolt; then, lower transaxle assembly.

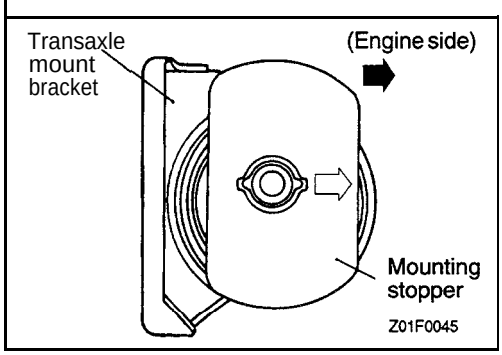


INSTALLATION SERVICE POINTS

▶A◀ DRIVE SHAFT (RIGHT SIDE) INSTALLATION

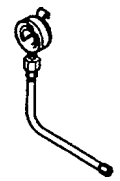
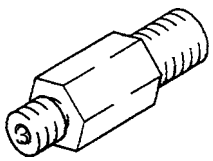
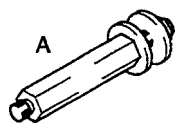
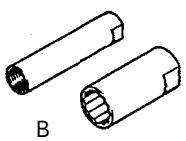
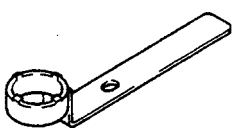
Provisionally install the drive shaft (right side) so that the inboard joint part of the drive shaft (right side) is straight, and not bent relative to the transaxle.

Caution
Care must be taken to ensure that the oil seal lip part of the transaxle is not damaged by the serrated part of the drive shaft (right side).

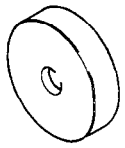
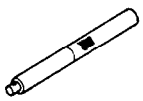
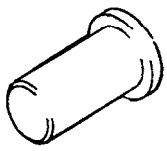
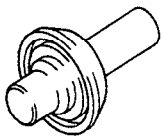
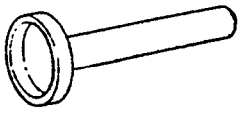
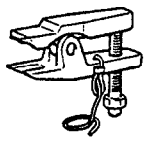
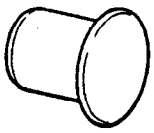


▶B◀ MOUNTING STOPPER INSTALLATION

Install mounting stopper in the direction shown.

Tool	Tool number and name	Supersession	Application
	MD998330 Oil pressure gauge (30 kg/cm^2) MD999563 Oil pressure gauge (10 kg/cm^2)	MD998330-01	Measuring oil pressure
	MD998332 Adapter	MD998332-01	Connection of the oil pressure gauge
 	A: MD99891 5 Kickdown servo wrench adapter B: MD99891 6 Kickdown servo adjust wrench set	MD99891 6-01 MD99891 6-1-01 MD99891 6-2-01 MD99891 6-3-01	Adjustment of kickdown servo
	MD99891 8 Kickdown servo wrench		Adjustment of kickdown servo

SPECIAL TOOLS

Tool	Tool number and name	Supersession	Application
	MB990930 Installer adjuster		Installation of input shaft rear seal cap
	MB990938 Installer bar	MB990938-01	Use with MB990930
	MD998304 Oil seal installer	MD998304-01	Installation of transfer extension housing oil seal
	MD998325 Differential oil seal installer	MD998325-01	Installation of differential oil seal
	MD998803 Differential oil seal installer		Installation of differential oil seal
	MD998812 Installer cap		Use with installer adapter
	MD998824 Installer adapter (50)		Installation of transfer case oil seal
	MB991113 Steering linkage puller	MB991113-01	• Disconnection of the coupling of the knuckle and lower arm ball joint • Disconnection of the coupling of the knuckle and tie-rod end ball joint
	MB991193 Plug		Prevention of transfer oil discharge and foreign object entry

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ON-VEHICLE SERVICE

TRANSMISSION OIL LEVEL CHECK

Refer to GROUP 00 – Maintenance Service.

TRANSMISSION OIL REPLACEMENT

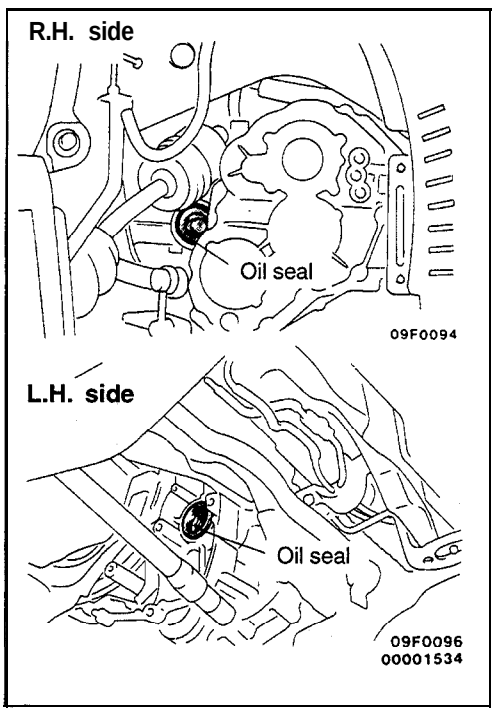
Refer to GROUP 00 – Maintenance Service.

TRANSFER OIL LEVEL CHECK

Refer to GROUP 00 – Maintenance Service.

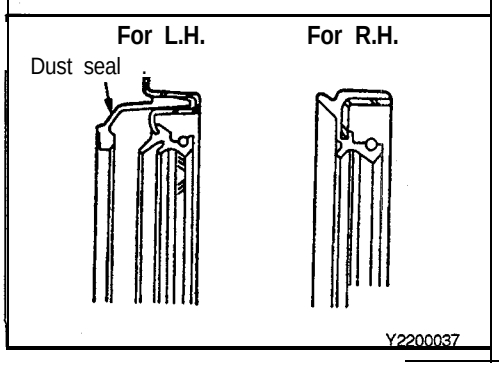
TRANSFER OIL REPLACEMENT

Refer to GROUP 00 – Maintenance Service.



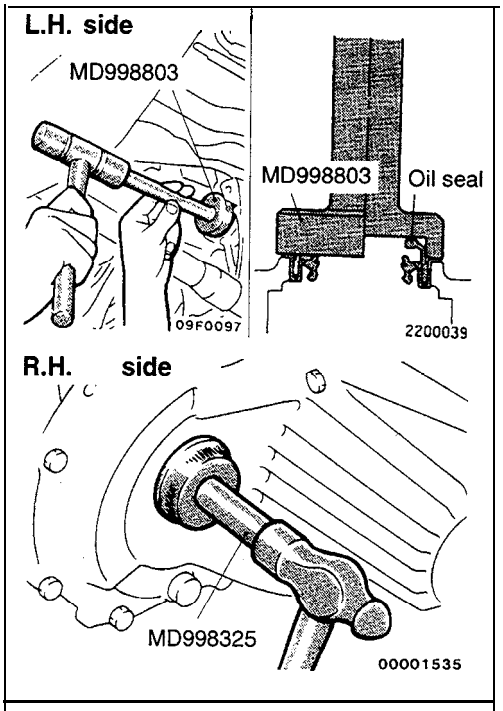
DRIVE SHAFT OIL SEALS REPLACEMENT

(1) Disconnect the drive shaft from the transaxle. (Refer to GROUP 26 – Drive Shaft.)
(2) Remove the transfer assembly.
(3) Using a flat-tip (–) screwdriver, remove the oil seal.



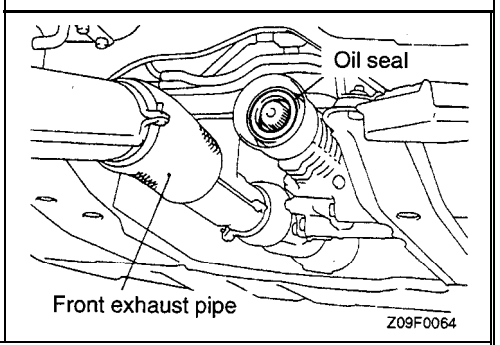
(4) Install the oil seals using the following procedure:
Using the special tool, tap the oil seal into the transaxle. Note that there are two types of oil seals, one for R.H. and the other for L.H., and the shape of each type is different, as shown.

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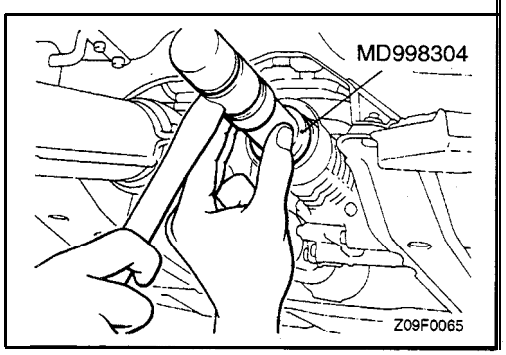
(5) Drive shaft oil seal must be installed in the direction shown.
(6) Apply a coating of the transmission oil to the lip of the oil seal.

Transmission oil:
Hypoid gear oil, SAE 75W-90 or 75W-85W conforming to API classification GL-4



TRANSFER OIL SEAL REPLACEMENT

(1) Pull out the propeller shaft from the transfer. (Refer to GROUP 25 – Propeller Shaft.)
(2) Using a flat-tip (–) screwdriver, remove the oil seal.



(3) Using the special tool, tap the drive shaft oil seal into the transfer.
(4) Apply a coating of the transmission oil to the lip of the oil seal.

Transmission oil:
Hypoid gear oil, SAE 75W-90 or 75W-85W conforming to API classification GL-4

SHIFT LEVER ASSEMBLY

Refer to P.22-8.

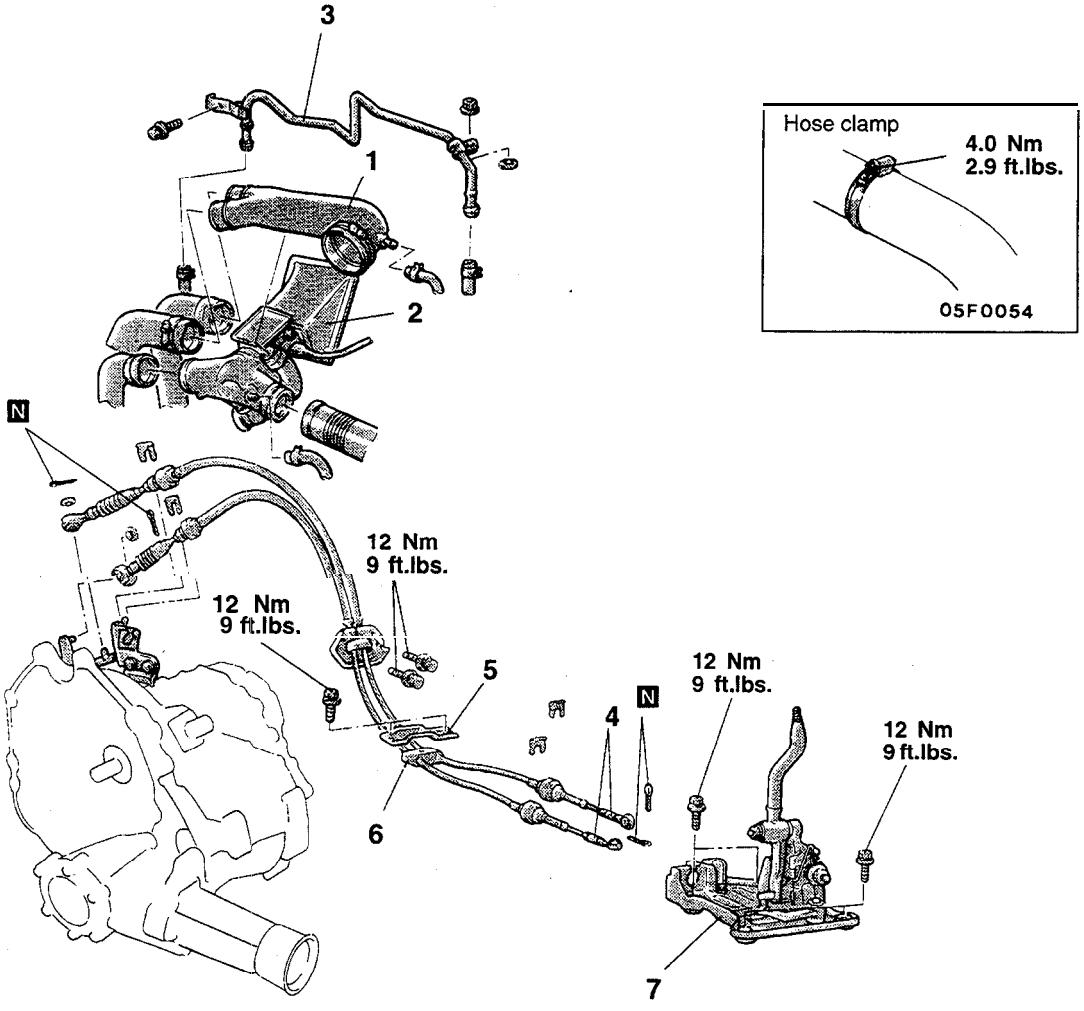
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TRANSAXLE CONTROL

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Front Console Assembly Removal and Installation (Refer to GROUP 52A – Floor Console.)

CAUTION: SRS
When removing and installing the front console assembly, don't allow any impact or shock to the SRS diagnosis unit.



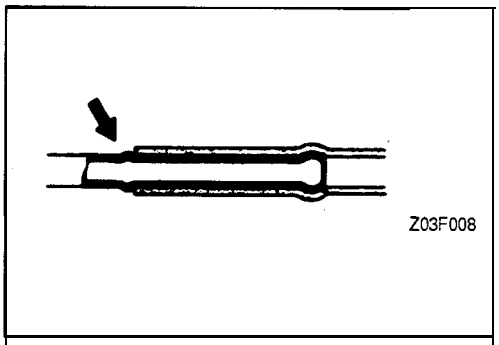
Transaxle control cable assembly removal steps

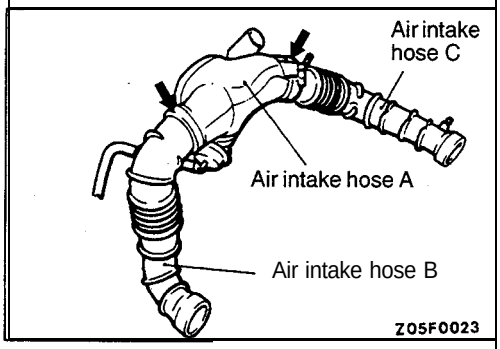
▶D◀ **1. Air hose A**
▶C◀ 2. Air cleaner cover, Air intake hose A
▶B◀ 3. Vacuum pipe
▶A◀ 4. Transaxle control cable assembly connection (Shift lever assembly side)
5. Retainer
6. Transaxle control cable assembly

Shift lever assembly removal steps

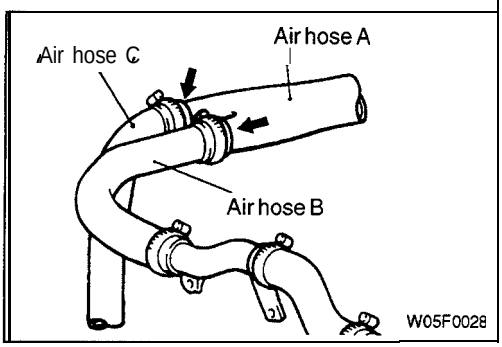
▶D◀ **1. Air hose A**
▶C◀ 2. Air cleaner cover, Air intake hose A
▶B◀ 3. Vacuum pipe
▶A◀ 4. Transaxle control cable assembly connection (Shift lever assembly side)
7. Shift lever assembly

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Z03F008



Z05F0023



W05F0028

INSTALLATION SERVICE POINTS

▶A◀ TRANSAXLE CONTROL CABLE ASSEMBLY CONNECTION (SHIFT LEVER ASSEMBLY SIDE)

Refer to P.22-7.

▶B◀ VACUUM PIPE INSTALLATION

If the vacuum pipe has a stepped part, connect the vacuum hose to the pipe securely, up to the stepped part, as shown in the figure.

▶C◀ AIR CLEANER COVER, AIR INTAKE HOSE A CONNECTION

Align slots indicated by arrows in air intake hose A with △ markings on air intake hoses B and C; then, insert hoses B and C all the way into air intake hose A.

▶D◀ AIR HOSE A CONNECTION

Connect the hoses ensuring that paint marks are aligned with projections. Insert air hoses B and C into air hose A all the way, or up to the step in hose A.

Caution
Be careful not to allow any foreign matter to get into the hoses, pipes, or the intercooler itself.

INSPECTION

- Check the transaxle control cable assembly for function and for damage.
- Check the boot for damage.
- Check each bushing for wear or abrasion, sticking, impeded action, and damage.

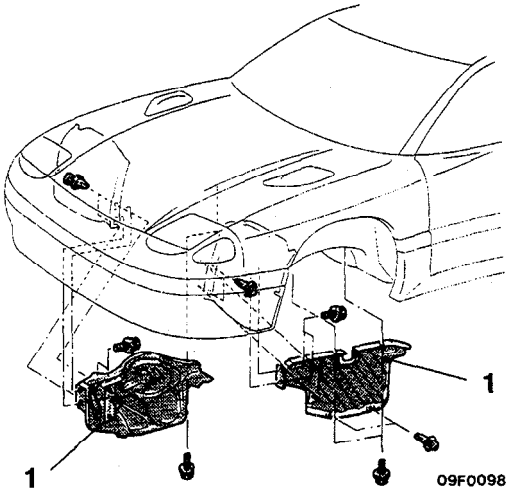
TSB Revision

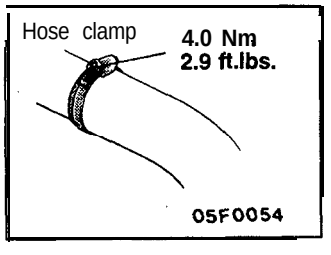
TRANSAXLE ASSEMBLY

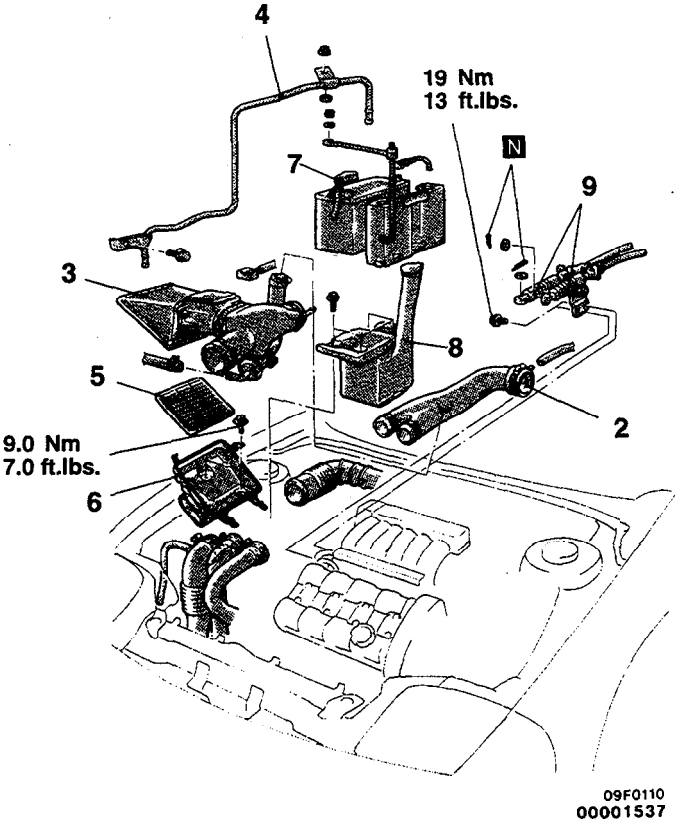
REMOVAL AND INSTALLATION

Pre-removal Operation
- Transmission Oil Draining (Refer to P.22-15.)
- Transfer Assembly Removal (Refer to P.22-22.)

Post-installation Operation
- Transfer Assembly installation (Refer to P.22-22.)
- Transmission Oil Supplying (Refer to P.22-15.)
- Shift Lever at Each Position Checking Operation
- Meters and Gauges Checking the Operation



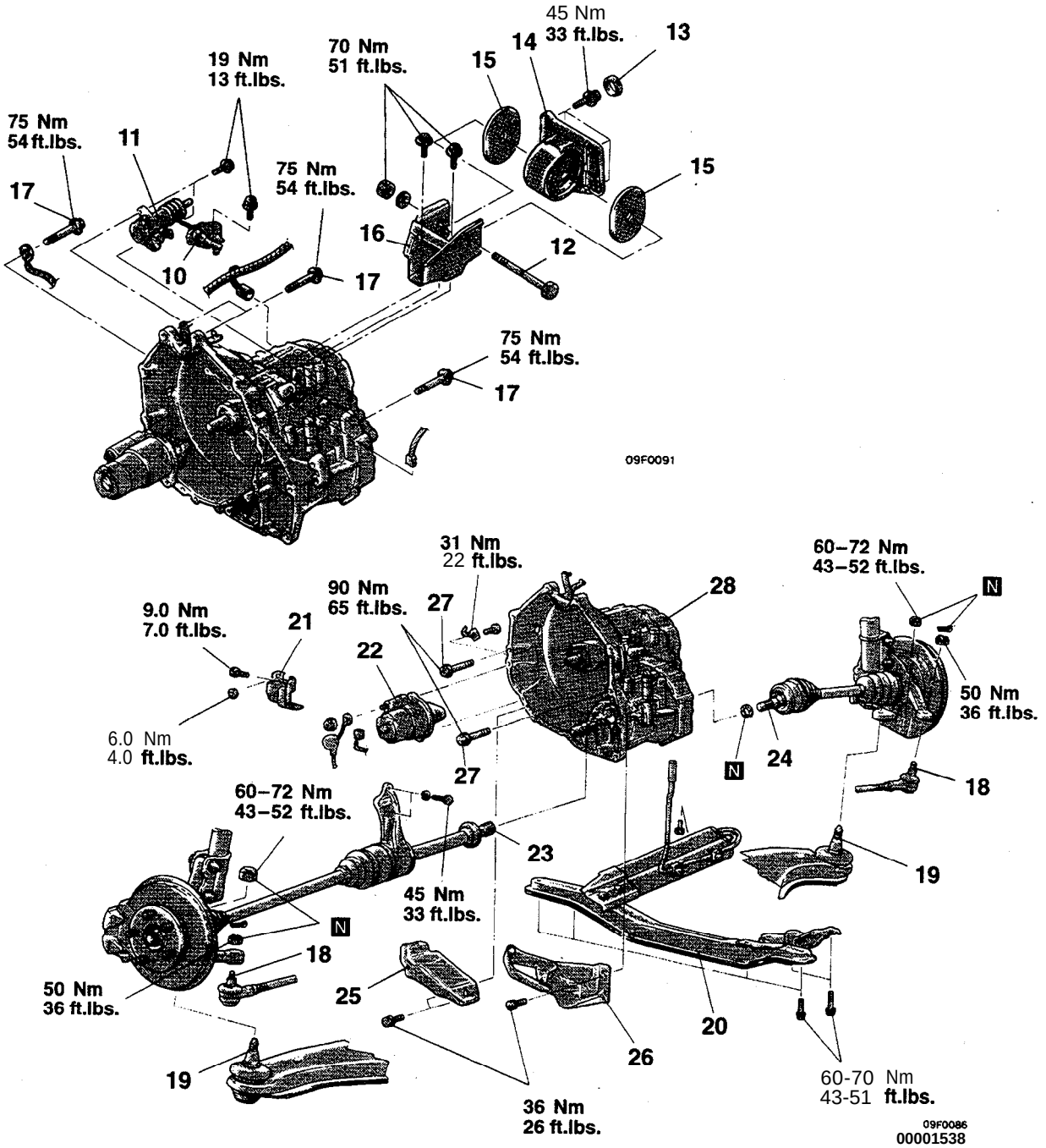




Removal steps

1. Side under cover
▶D◀ **2.** Air hose A
▶C◀ 3. Air cleaner cover, Air intake hose A
▶B◀ 4. Vacuum pipe
5. Air cleaner element
6. Air cleaner body
7. Battery
8. Battery seat, Washer tank
9. Transaxle control cable connection

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10. Clutch tube bracket connection
◀A▶ 11. Clutch release cylinder connection
◀A▶ 12. Transaxle mount connection
13. Plug
14. Transaxle mount bracket (Body side)
▶A◀ 15. Mounting stopper
16. Transaxle mount bracket (Transaxle side)
17. Transaxle assembly lower part coupling bolt
◀B▶ 18. Tie rod end connection
◀B▶ 19. Lower arm ball joint connection
20. Right member
21. Starter cover
22. Starter
◀C▶ 23. Drive shaft (Left side), Inner shaft assembly
◀C▶ ▶A◀ 24. Drive shaft (Right side)
25. Transaxle stay connection (Front bank side)
26. Transaxle stay connection (Rear bank side)
◀C▶ 27. Transaxle assembly lower part coupling bolt
◀C▶ 28. Transaxle assembly

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REMOVAL SERVICE POINTS

◀A▶ CLUTCH RELEASE CYLINDER / TRANSAXLE MOUNT CONNECTION

Refer to P.22-10.

◀B▶ TIE ROD END / LOWER ARM BALL JOINT CONNECTION

Refer to P.22-11.

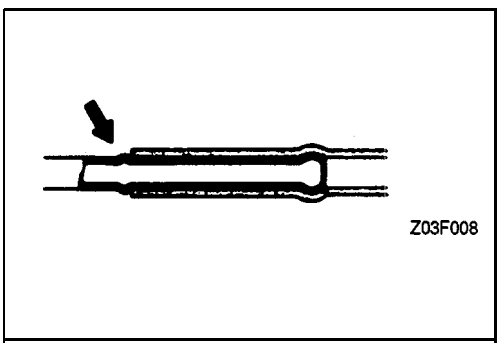
◀C▶ DRIVE SHAFT (LEFT SIDE), INNER SHAFT ASSEMBLY / DRIVE SHAFT (RIGHT SIDE) / TRANSAXLE ASSEMBLY LOWER COUPLING BOLT / TRANSAXLE ASSEMBLY REMOVAL

Refer to P.22-11.

INSTALLATION SERVICE POINTS

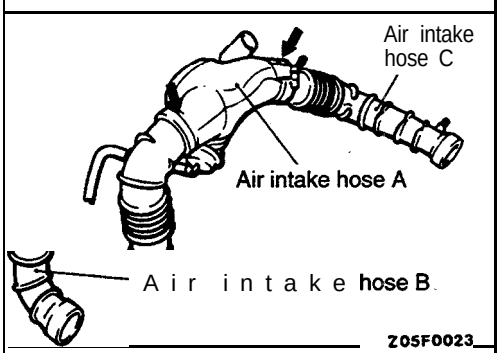
▶A◀ DRIVE SHAFT (RIGHT SIDE) / MOUNTING STOPPER INSTALLATION

Refer to P.22-12.



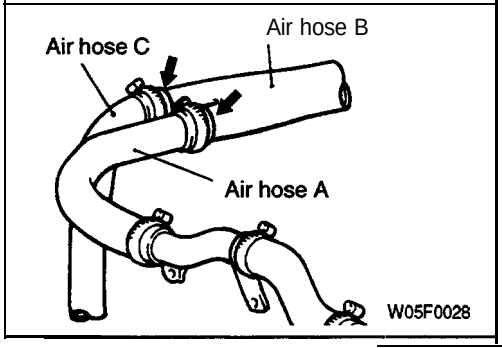
▶B◀ VACUUM PIPE INSTALLATION

If the vacuum pipe has a stepped part, connect the vacuum hose to the pipe securely, up to the stepped part, as shown in the figure.



▶C◀ AIR CLEANER COVER, AIR INTAKE HOSE A INSTALLATION

Align slots indicated by arrows in air intake hose A with A markings on air intake hoses B and C; then, insert hoses B and C all the way into air intake hose A.
Insert air intake hoses B and C all the way up to the roots on the turbocharger end.



▶D◀ AIR HOSE A INSTALLATION

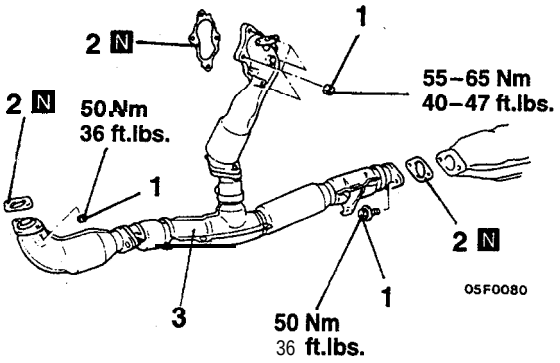
Connect the air hoses ensuring that alignment marks are aligned with projections.
Insert air hoses B and C into pipe all the way to its step.

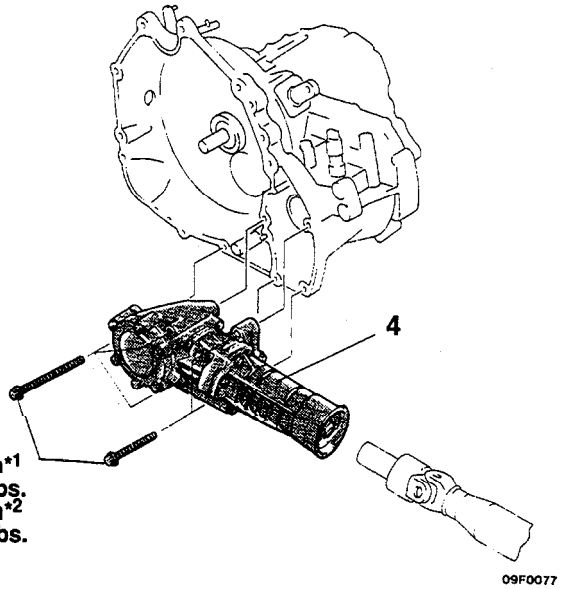
Caution
Be careful not to allow any foreign matter to get into the hoses, pipes, or the intercooler itself.

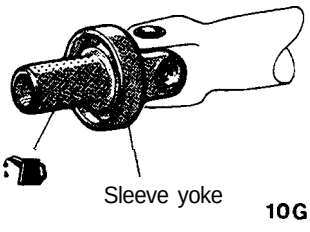
TRANSFER ASSEMBLY

REMOVAL AND INSTALLATION

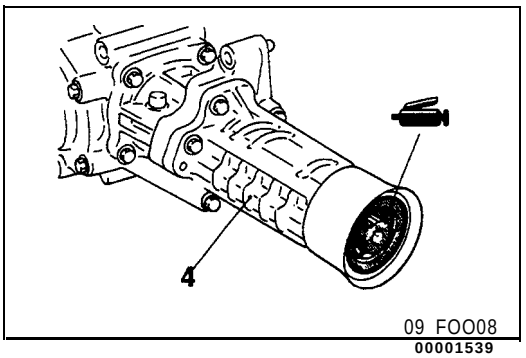
Pre-removal and Post-installation Operation
- Transfer Oil Draining and Supplying (Refer to P.22-15.)
- Active Front Venturi Skirt Removal and Installation (Refer to GROUP 51 – Front Bumper.)





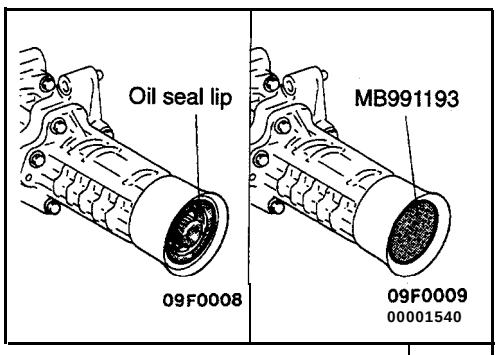


Gear oil: Hypoid gear oil, SAE 75W-90 or 75W-85W conforming to API classification GL-4



Removal steps
1. Bolts and nuts
2. Gaskets
3. Warm up catalytic converter and front exhaust pipe
◀A▶ 4. Transfer assembly

NOTE
- l: Up to 1993 models
- 2: From 1994 models

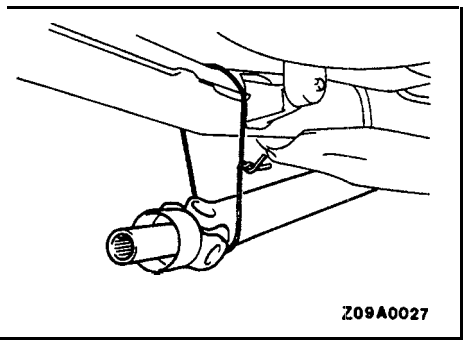


REMOVAL SERVICE POINT

◀A▶ TRANSFER ASSEMBLY REMOVAL

Caution
1. Be cautious to avoid damaging the transfer oil seal lip.
2. Cover the transfer opening with the special tool to prevent transaxle oil discharge and the entry of foreign objects.

TSB Revision

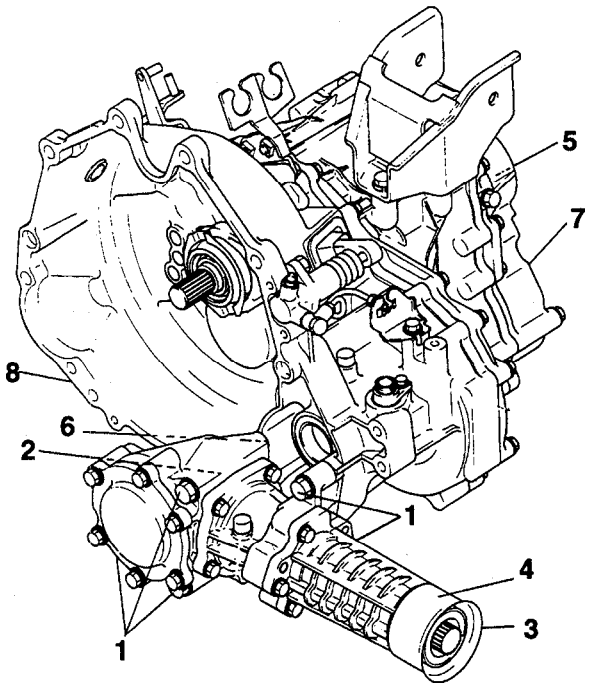


3. The propeller shaft should be suspended so that it is not sharply bent.

TRANSAXLE ASSEMBLY

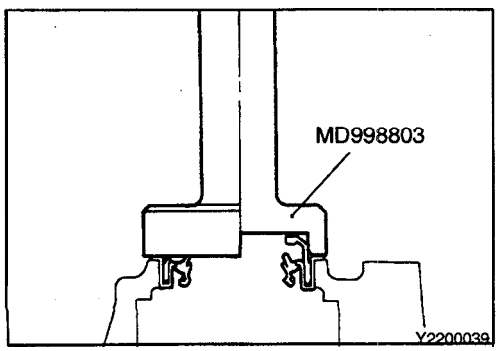
The transaxle cannot be disassembled.
If any parts other than describes below are defective, replace the transaxle assembly.

REPLACEMENT PART



ZTFM0157

1. Transfer mounting bolts
▶F◀ 2. Transfer case oil seal
▶E◀ 3. Transfer extension housing oil seal
4. Transfer oil seal guide
▶D◀ 5. Input shaft rear seal cap
▶C◀ 6. Center shaft oil seal
▶B◀ 7. Drive shaft oil seal
▶A◀ 8. Drive shaft oil seal

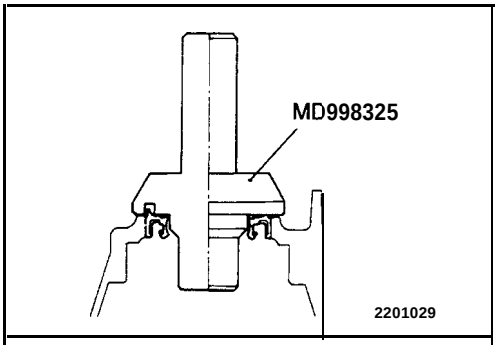


INSTALLATION SERVICE POINTS

▶A◀ DRIVE SHAFT OIL SEAL INSTALLATION

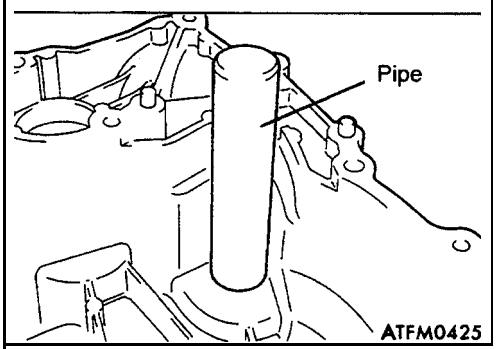
Using the special tool, install the drive shaft oil seal.

TSB Revision



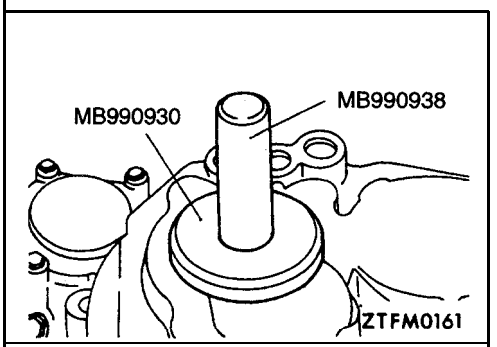
▶B◀ DRIVE SHAFT OIL SEAL INSTALLATION

Using the special tool, install the drive shaft oil seal.



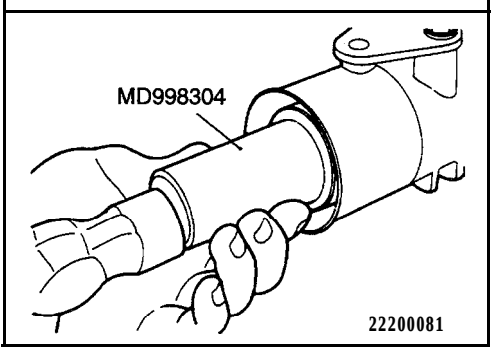
▶C◀ CENTER SHAFT OIL SEAL INSTALLATION

Using a pipe shown in the illustration, drive the oil seal until it is flush with the case. Do not drive the oil seal more than necessary.



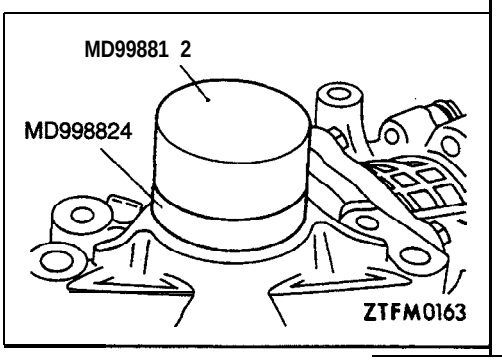
▶D◀ INPUT SHAFT REAR SEAL CAP INSTALLATION

Using the special tool, install the input shaft rear seal cap.



▶E◀ TRANSFER EXTENSION HOUSING OIL SEAL INSTALLATION

Using the special tool, install the transfer extension housing oil seal.



▶F◀ TRANSFER CASE OIL SEAL INSTALLATION

Using the special tool, install the transfer case oil seal.

AUTOMATIC TRANSAXLE

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- Shift Lock Mechanism Check 52
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WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

(1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injuryordeathtoservicepersonnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).

(2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.

(3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B -Supplemental Restraint System (SRS) and GROUP 00 -Maintenance Service, before beginning any service or maintenance of any component of the SRS or any SRS-related component.

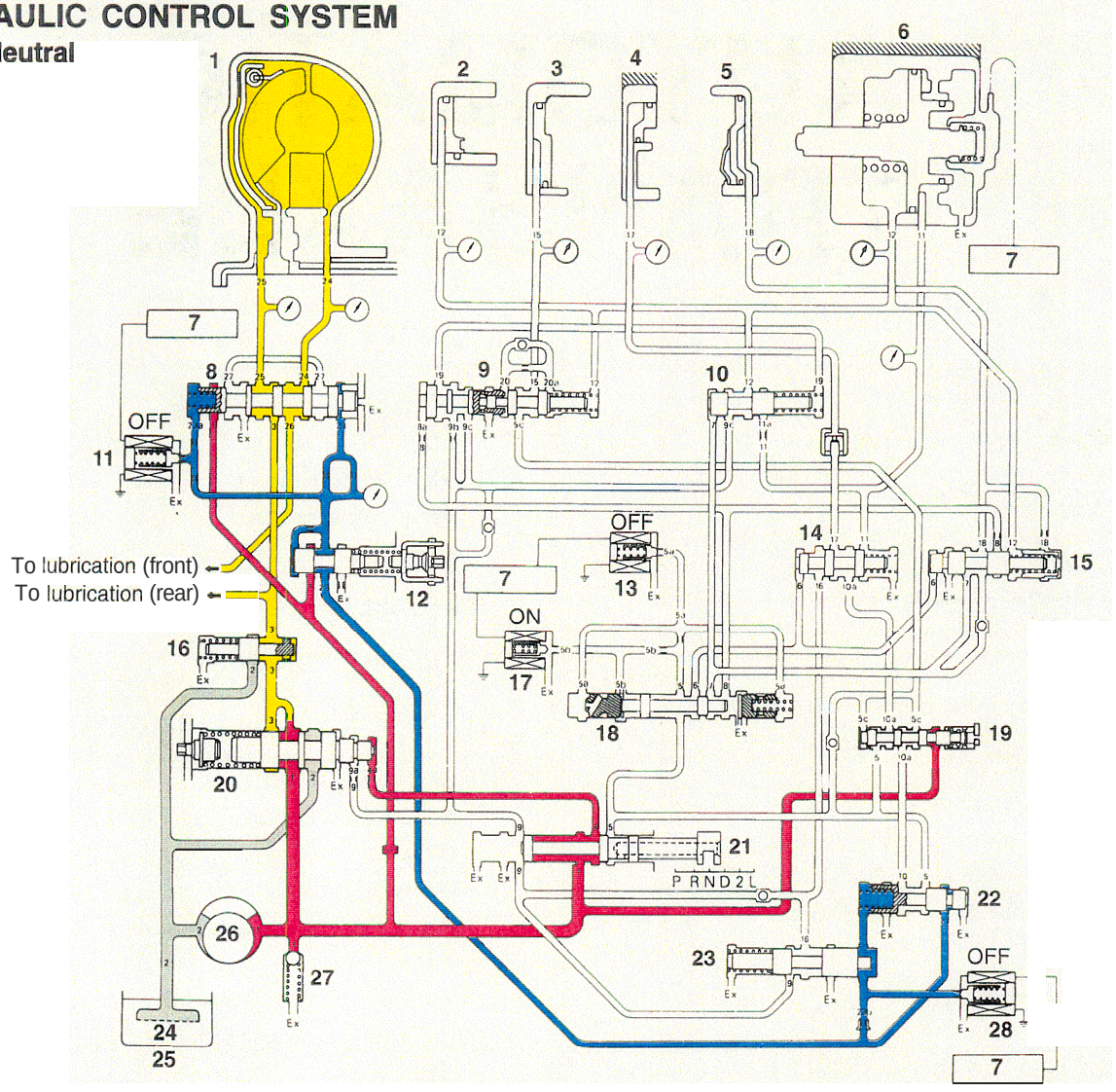
NOTE

The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning light, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

GENERAL INFORMATION

HYDRAULIC CONTROL SYSTEM

Neutral



Line pressure

Oil pump suction pressure

Torque converter clutch pressure

Torque converter and lubrication pressure

Modulated line pressure

Torque converter clutch solenoid pressure

Reducing pressure

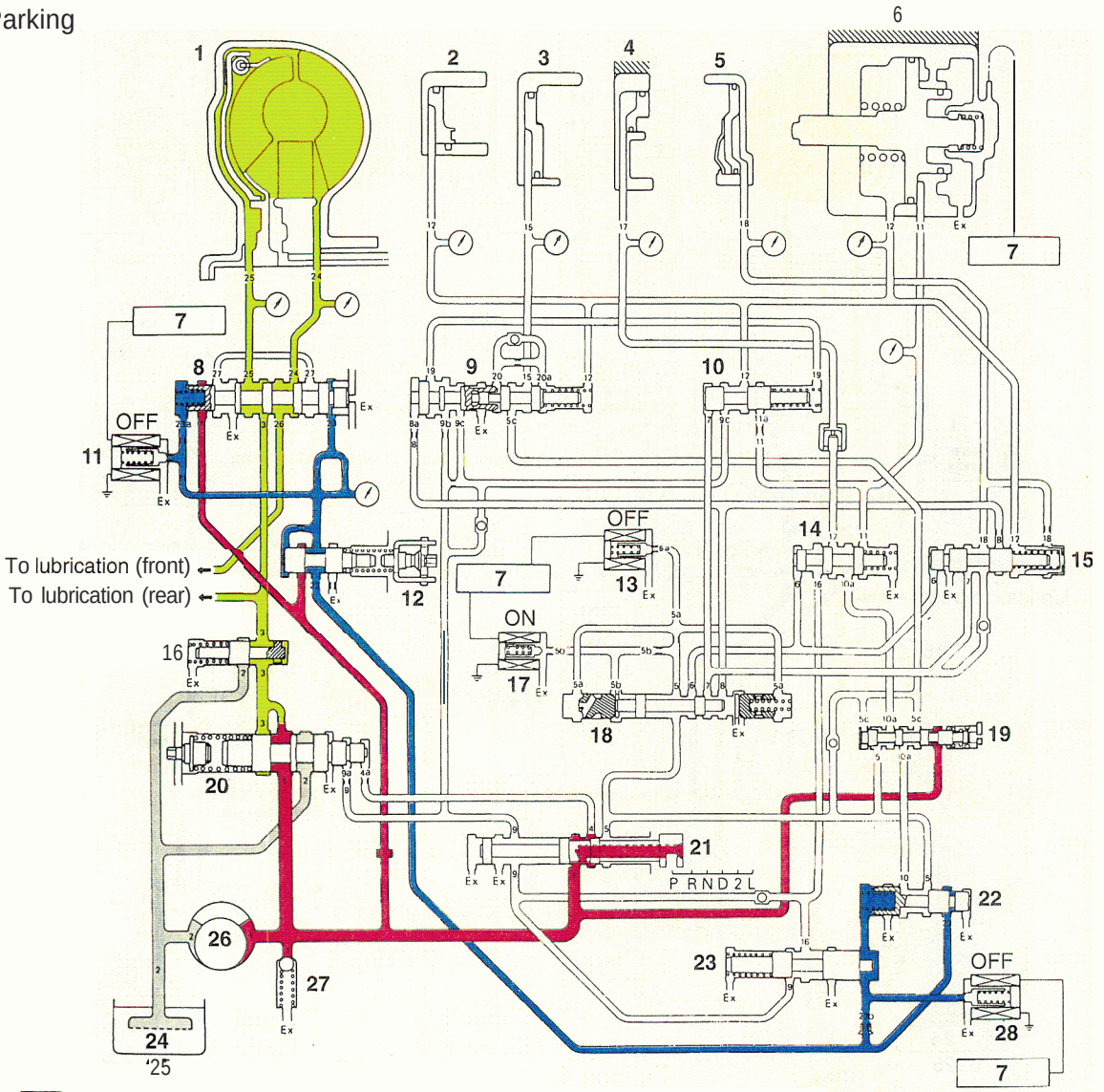
Pressure control solenoid valve pressure

TFA0070

1. Torque converter
2. Front clutch
3. Rear clutch
4. Low-reverse brake
5. End clutch
6. Kickdown servo
7. Transaxle control module
8. Torque converter clutch valve
9. Rear clutch exhaust valve
10. 2-3/4-3 shift valve
11. Torque converter clutch solenoid
12. Reducing valve
13. Shift control solenoid valve "A"
14. I-2 shift valve
15. End clutch valve
16. Torque converter control valve
17. Shift control solenoid valve "B"
18. Shift control valve
19. N-D control valve
20. Regulator valve
21. Manual valve
22. Pressure control vaive
23. N-R control valve
24. Oil filter
25. Oil pan
26. Oil pump
27. Line relief valve
28. Pressure control solenoid valve

TSB Revision

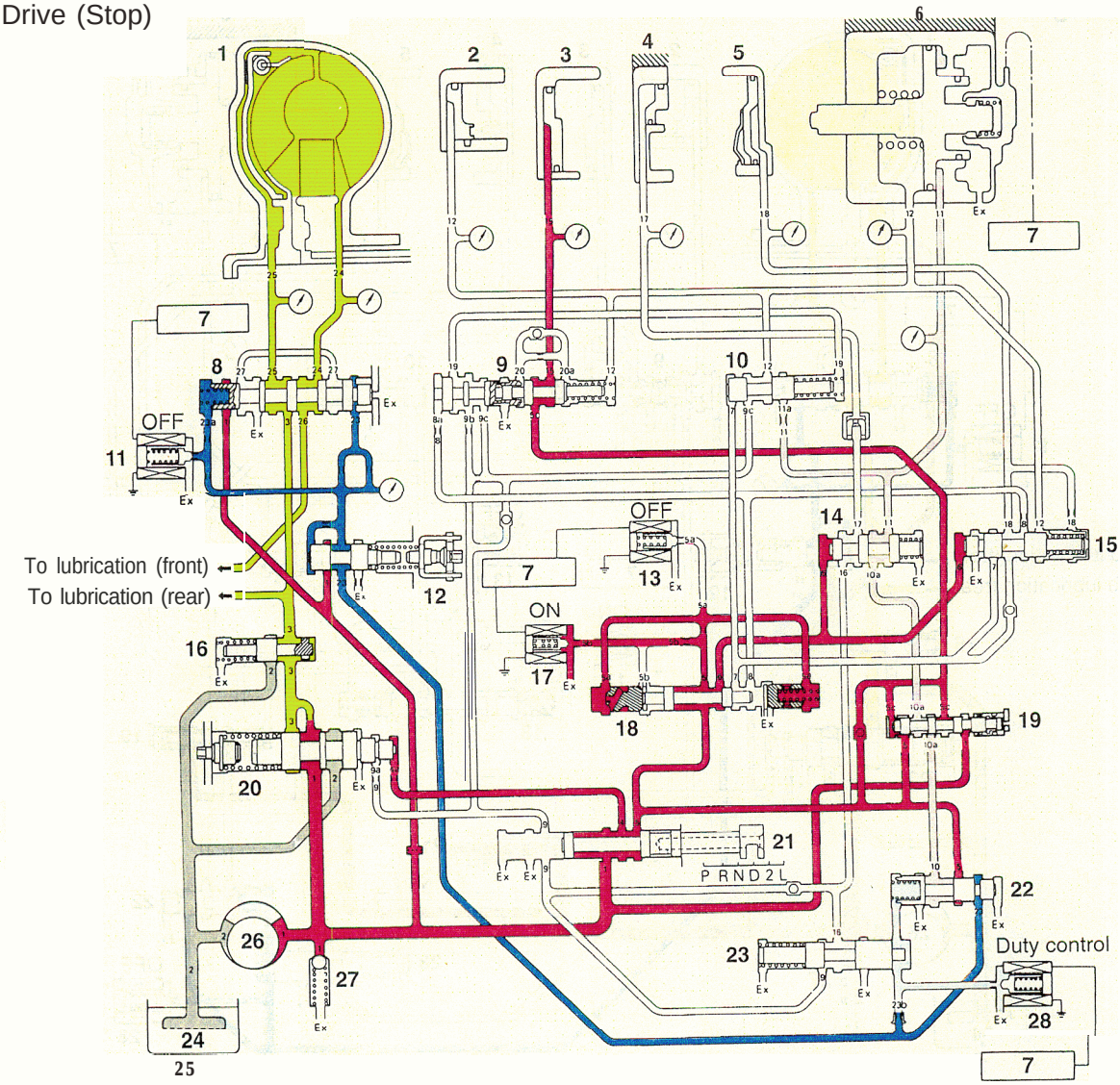
Parking



1. Torque converter
2. Front clutch
3. Rear clutch
4. Low-reverse brake
5. End clutch
6. Kickdown servo
7. Transaxle control module
8. Torque converter clutch valve
9. Rear clutch exhaust valve
10. 2-3/4-3 shift valve
11. Torque converter clutch solenoid
12. Reducing valve
13. Shift control solenoid valve "A"
14. 1-2 shift valve
15. End clutch valve
16. Torque converter control valve
17. Shift control solenoid valve "B"
18. Shift control valve
19. N-D control valve
20. Regulator valve
21. Manual valve
22. Pressure control valve
23. N-R control valve
24. Oil filter
25. Oil pan
26. Oil pump
27. Line relief valve
28. Pressure control solenoid valve

TSB Revision

Drive (Stop)



Line pressure

Oil pump suction pressure

Torque converter clutch pressure

Torque converter and lubrication pressure

Modulated line pressure

Torque converter clutch solenoid pressure

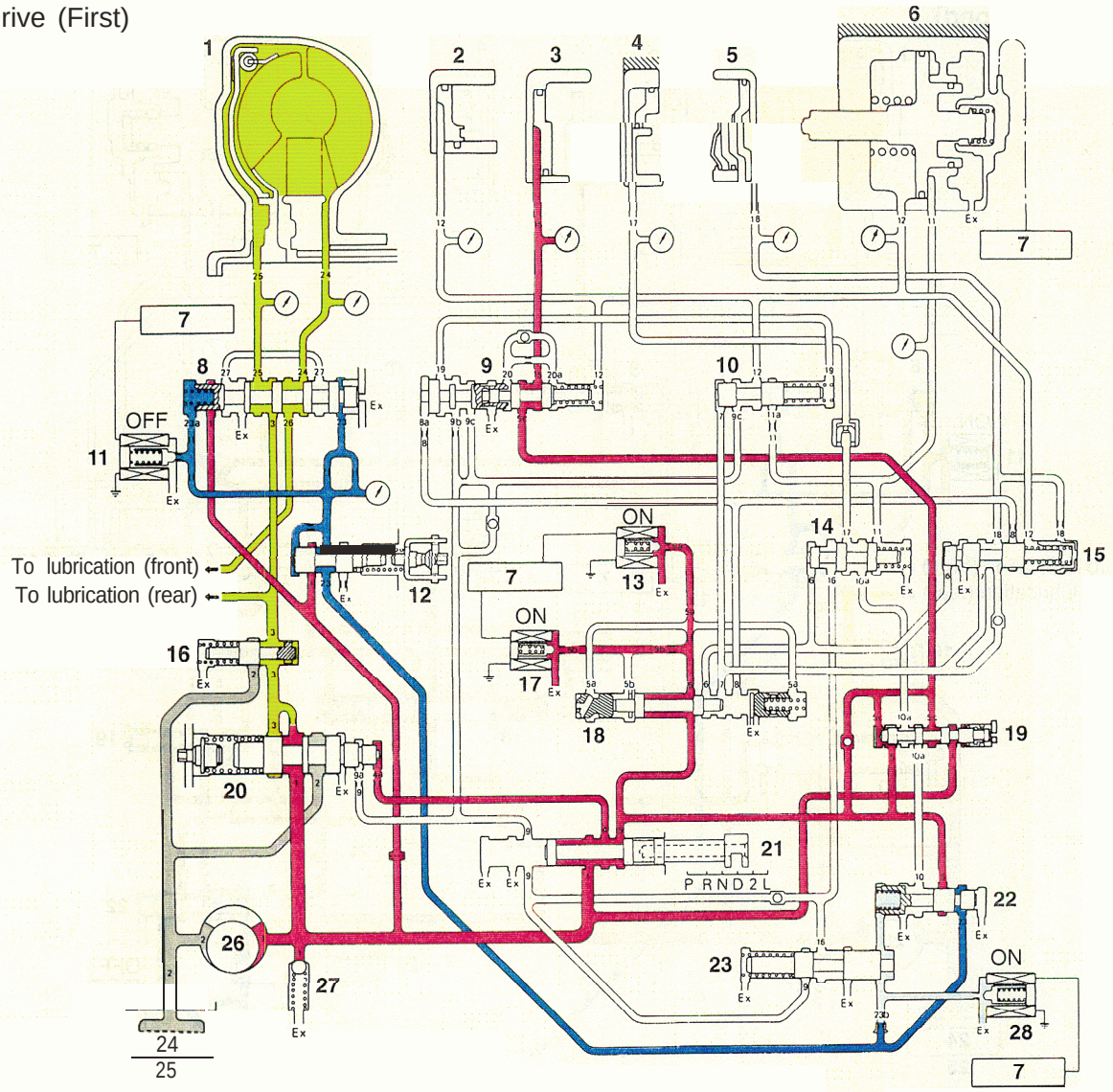
Reducing pressure

Pressure control solenoid valve pressure

1. Torque converter
2. Front clutch
3. Rear clutch
4. Low-reverse brake
5. End clutch
6. Kickdown servo
7. Transaxle control module
8. Torque converter clutch valve
9. Rear clutch exhaust valve
10. 2-3/4-3 shift valve
11. Torque converter clutch solenoid
12. Reducing valve
13. Shift control solenoid valve "A"
14. I-2 shift valve
15. End clutch valve
16. Torque converter control valve
17. Shift control solenoid valve "B"
18. Shift control valve
19. N-D control valve
20. Regulator valve
21. Manual valve
22. Pressure control valve
23. N-R control valve
24. Oil filter
25. Oil pan
26. Oil pump
27. Line relief valve
28. Pressure control solenoid valve

TSB Revision

Drive (First)



Line pressure

Oil pump suction pressure

Torque converter clutch pressure

Torque converter and lubrication pressure

Modulated line pressure

Tbrque converter clutch solenoid pressure

Reducing pressure

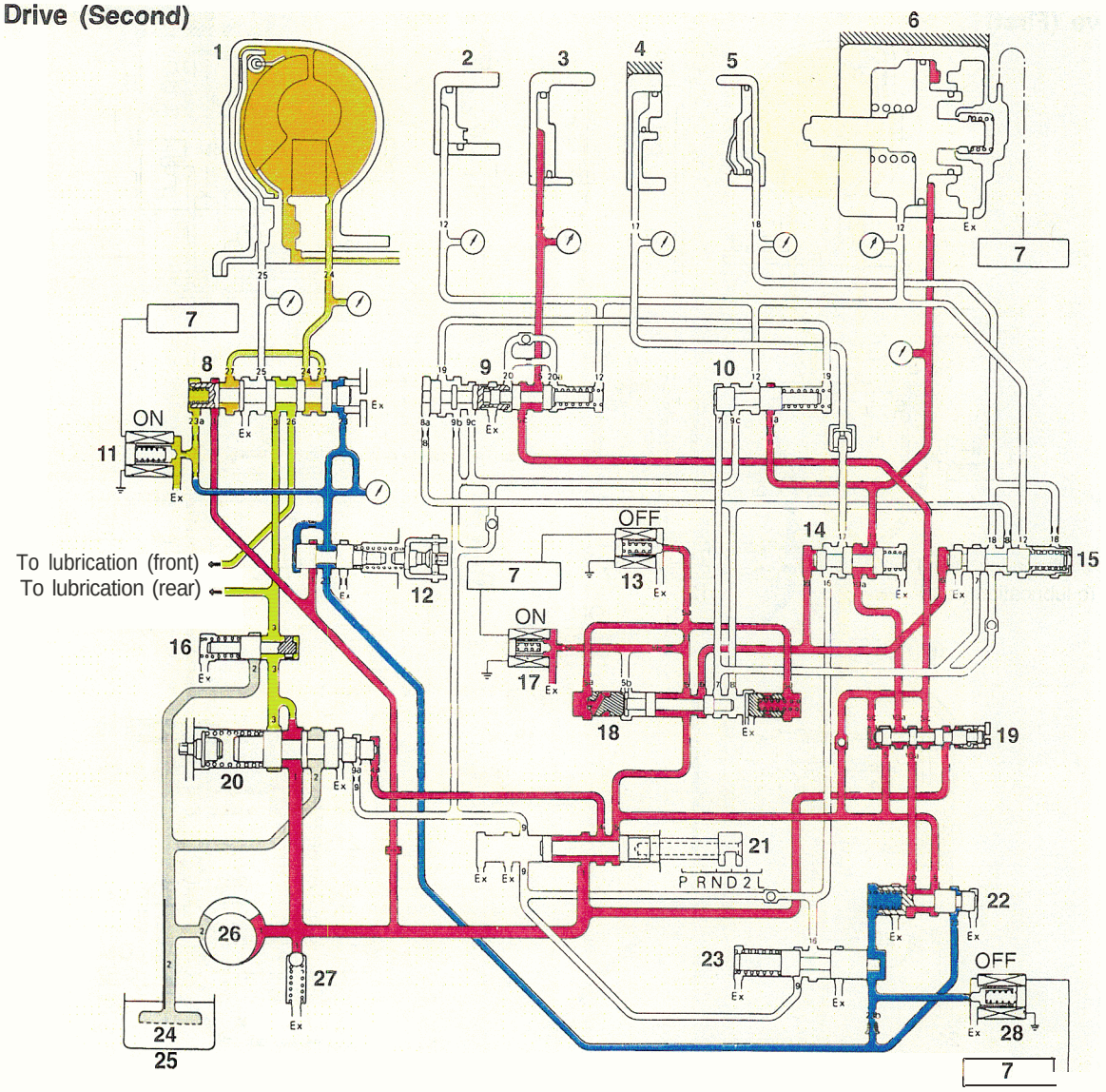
Pressure control solenoid valve pressure

TFA0072

1. Torque converter
2. Front clutch
3. Rear clutch
4. Low-reverse brake
5. End clutch
6. Kickdown servo
7. Transaxle control module
8. Torque converter clutch valve
9. Rear clutch exhaust valve
10. 2-3/4-3 shift valve
11. Torque converter clutch solenoid
12. Reducing valve
13. Shift control solenoid valve "A"
14. 1-2 shift valve
15. End clutch valve
16. Torque converter control valve
17. Shift control solenoid valve "B"
18. Shift control valve
19. N-D control valve
20. Regulator valve
21. Manual valve
22. Pressure control valve
23. N-R control valve
24. Oil filter
25. Oil pan
26. Oil pump
27. Line relief valve
28. Pressure control solenoid valve

TSB Revision

Drive (Second)



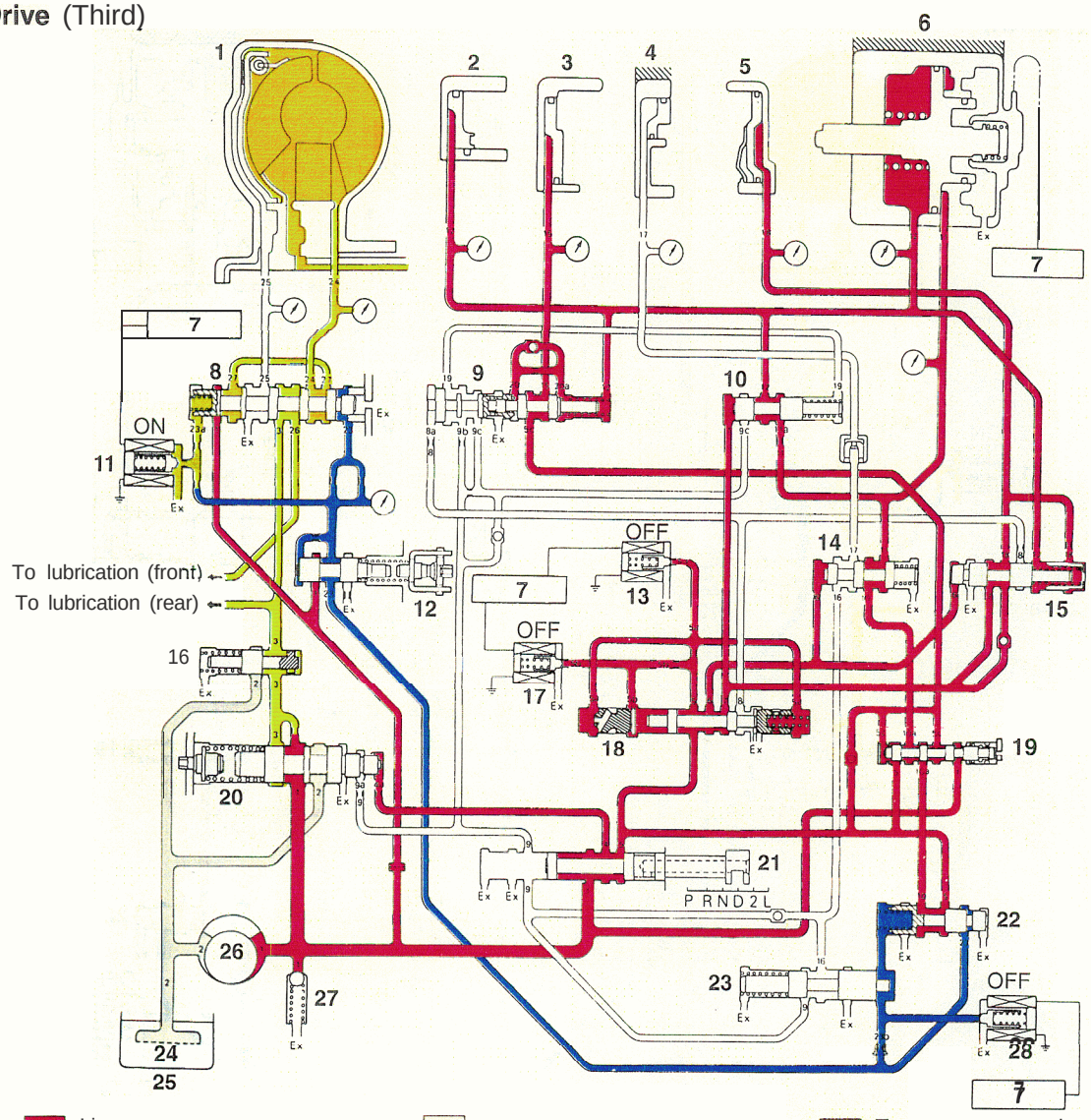
Line pressure
Oil pump suction pressure
Torque converter clutch pressure
Torque converter and lubrication pressure
Modulated line pressure
Torque, converter clutch solenoid pressure
Reducing pressure
Pressure control solenoid valve pressure

TFA0073

1. Torque converter
2. Front clutch
3. Rear clutch
4. Low-reverse brake
5. End clutch
6. Kickdown servo
7. Transaxle control module
8. Torque converter clutch valve
9. Rear clutch exhaust valve
10. 2-3/4-3 shift valve
11. Torque converter clutch solenoid
12. Reducing valve
13. Shift control solenoid valve "A"
14. I-2 shift valve
15. End clutch valve
16. Torque converter control valve
17. Shift control solenoid valve "B"
18. Shift control valve
19. N-D control valve
20. Regulator valve
21. Manual valve
22. Pressure control valve
23. N-R control valve
24. Oil filter
25. Oil pan
26. Oil pump
27. Line relief vaive
28. Pressure control solenoid valve

TSB Revision

Drive (Third)



Line pressure

Oil pump suction pressure

Torque converter clutch pressure

Torque converter and lubrication pressure

Modulated line pressure

Torque converter clutch solenoid pressure

Reducing pressure

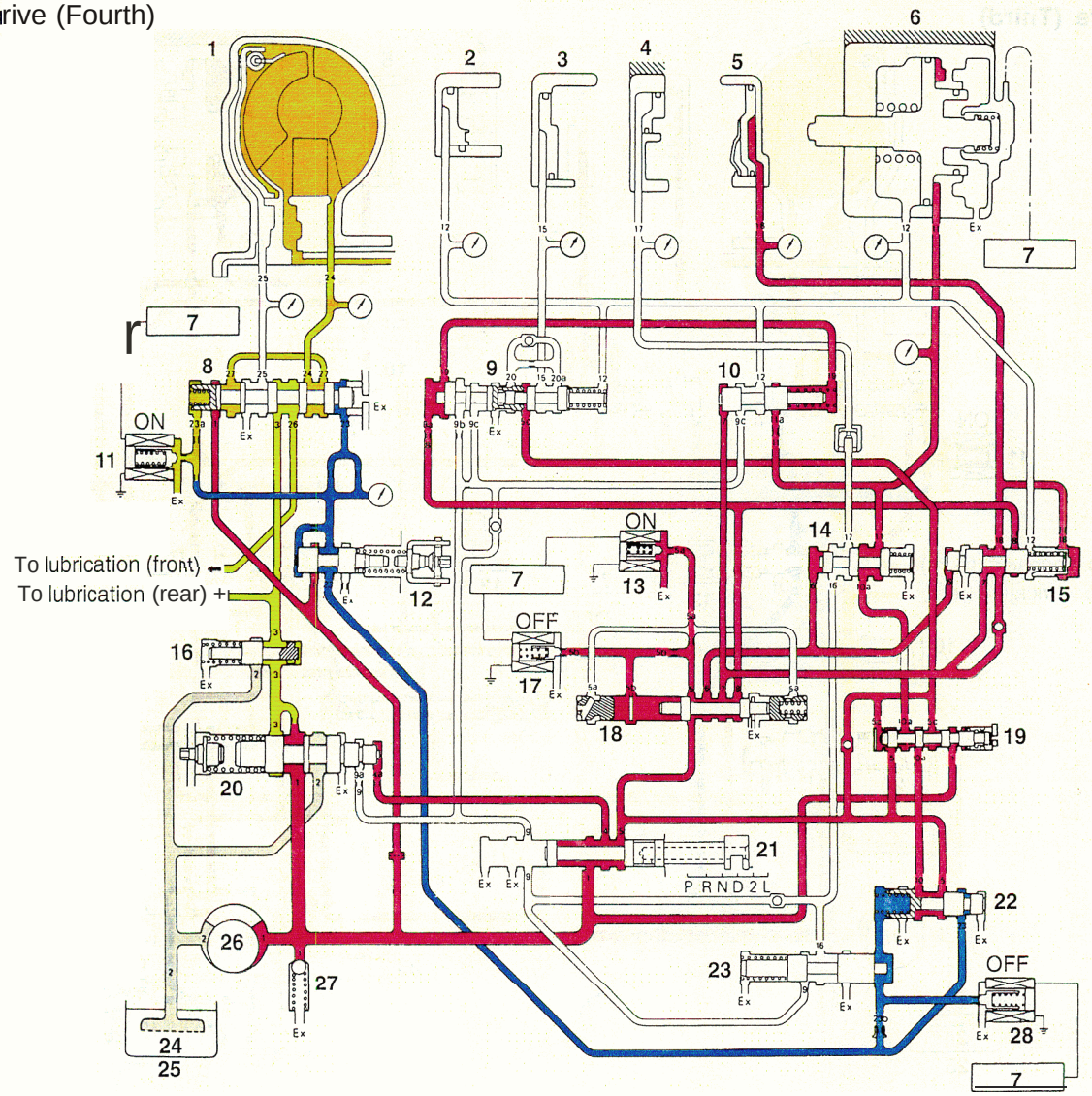
Pressure control solenoid valve pressure

TFA0074

1. Torque converter
2. Front clutch
3. Rear clutch
4. Low-reverse brake
5. End clutch
6. Kickdown servo
7. Transaxle control module
8. Torque converter clutch valve
9. Rear clutch exhaust valve
10. 2-3/4-3 shift valve
11. Torque converter clutch solenoid
12. Reducing valve
13. Shift control solenoid valve "A"
14. I-2 shift valve
15. End clutch valve
16. Torque converter control valve
17. Shift control solenoid valve "B"
18. Shift control valve
19. N-D control valve
20. Regulator valve
21. Manual valve
22. Pressure control valve
23. N-R control valve
24. Oil filter
25. Oil pan
26. Oil pump
27. Line relief valve
28. Pressure control solenoid valve

TSB Revision

Drive (Fourth)



Line pressure

Oil pump suction pressure

Torque converter clutch pressure

Torque converter and lubrication pressure

Modulated line pressure

Torque converter clutch solenoid pressure

Reducing pressure

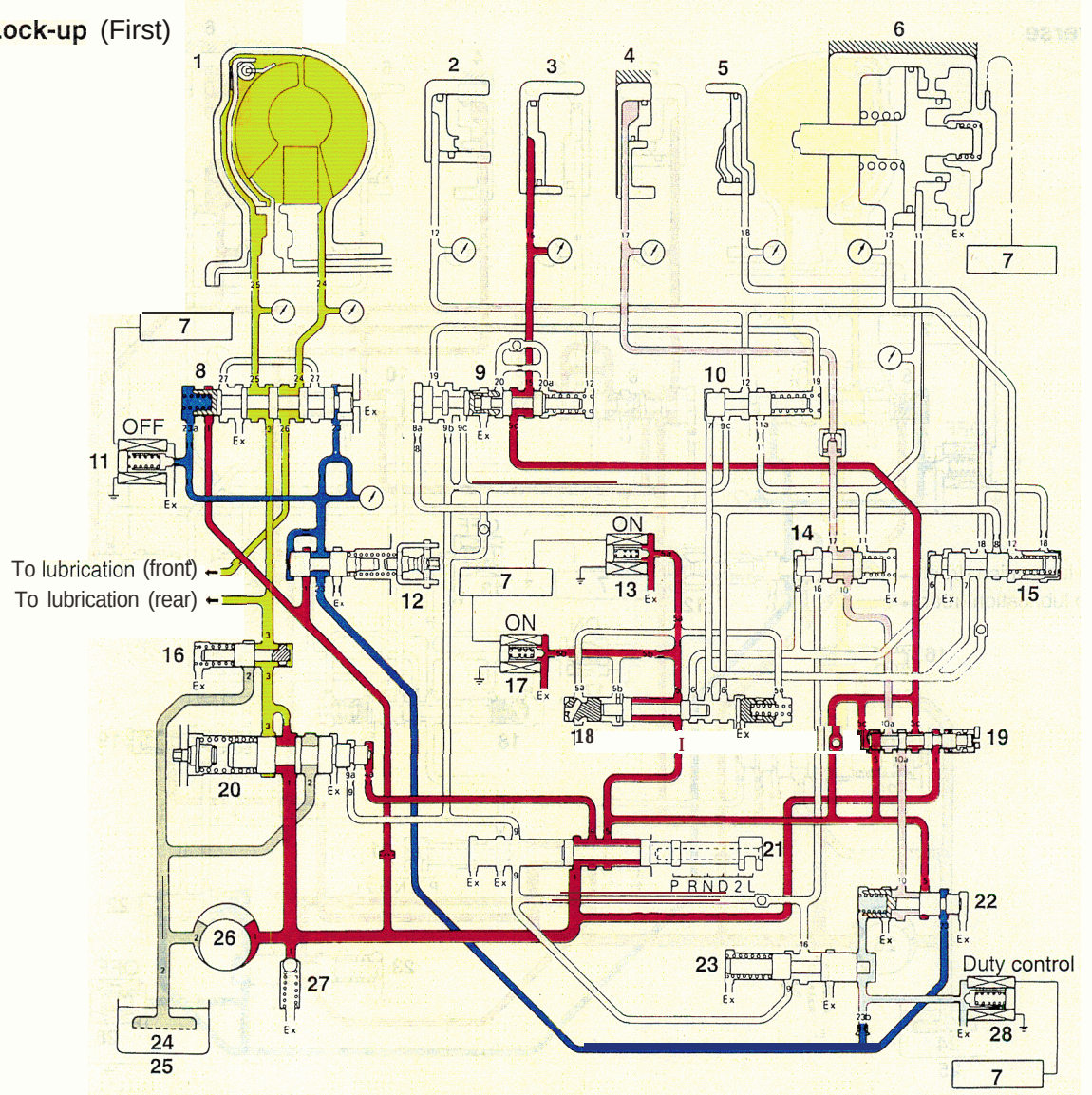
Pressure control solenoid valve pressure

TFA0075

1. Torque converter
2. Front clutch
3. Rear clutch
4. Low-reverse brake
5. End clutch
6. Kickdown servo
7. Transaxle control module
8. Torque converter clutch valve
9. Rear clutch exhaust valve
10. 2-3/4-3 shift valve
11. Torque converter clutch solenoid
12. Reducing valve
13. Shift control solenoid valve "A"
14. 1-2 shift valve
15. End clutch valve
16. Torque converter control valve
17. Shift control solenoid valve "B"
18. Shift control valve
19. N-D control valve
20. Regulator valve
21. Manual valve
22. Pressure control valve
23. N-R control valve
24. Oil filter
25. Oil pan
26. Oil pump
27. Line relief valve
28. Pressure control solenoid valve

TSB Revision

Lock-up (First)



Line pressure

Torque converter and lubrication pressure

Reducing pressure

Oil pump suction pressure

Modulated line pressure

Pressure control solenoid valve pressure

To rque converter clutch pressure

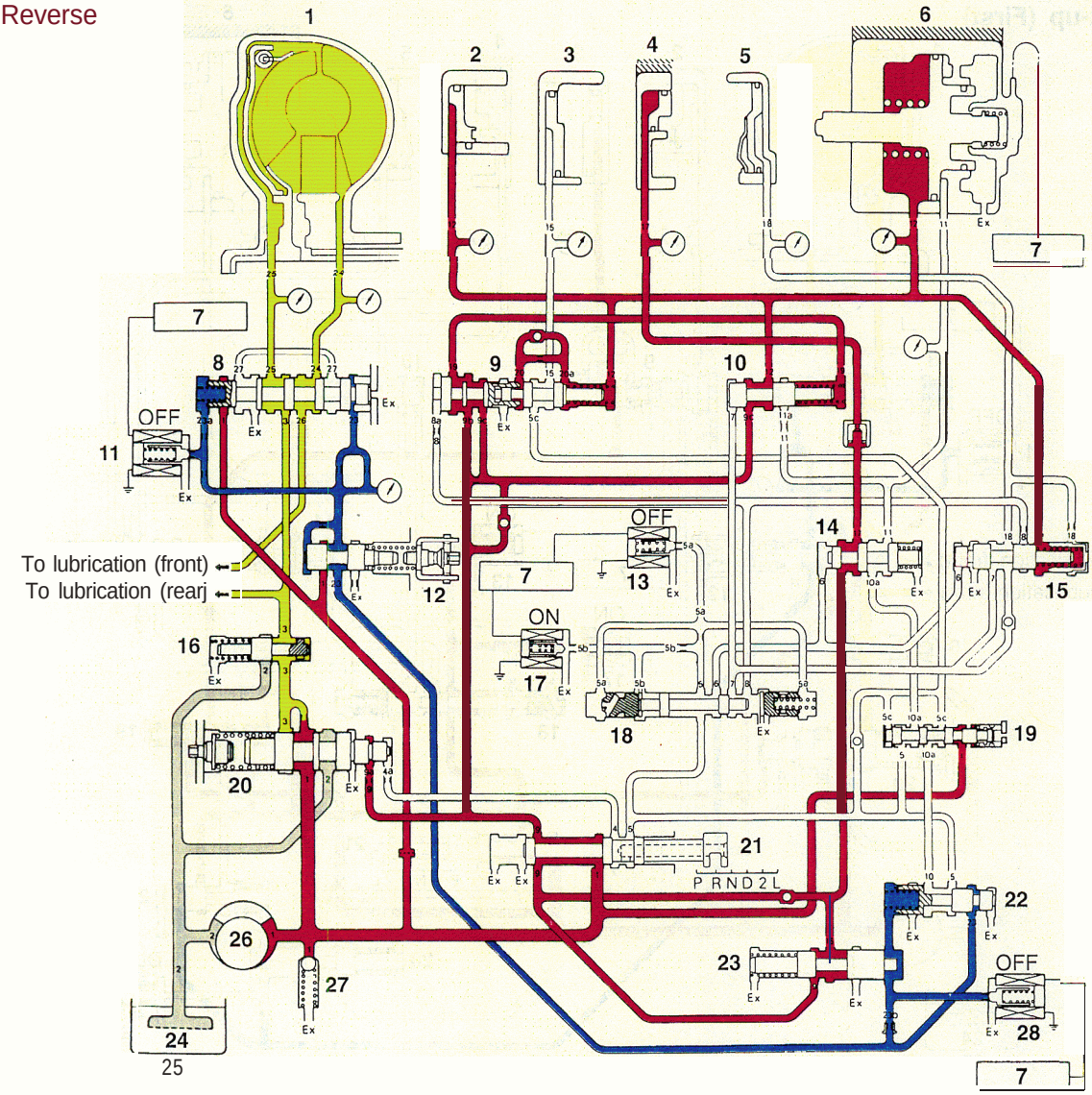
To rque converter clutch solenoid pressure

TFA0076

1. Torque converter
2. Front clutch
3. Rear clutch
4. Low-reverse brake
5. End clutch
6. Kickdown servo
7. Transaxle control module
8. Torque convertor clutch valve
9. Rear clutch exhaust valve
10. 2-3/4-3 shift valve
11. Torque converter clutch solenoid
12. Reducing valve
13. Shift control solenoid valve "A"
14. I-2 shift valve
15. End clutch valve
16. Torque converter control valve
17. Shift control solenoid valve "B"
18. Shift control valve
19. N-D control valve
20. Regulator valve
21. Manual valve
22. Pressure control valve
23. N-R control valve
24. Oil filter
25. Oil pan
26. Oil pump
27. Line relief valve
28. Pressure control solenoid valve

TSB Revision

Reverse



- Line pressure
- Oil pump suction pressure
- Torque converter clutch pressure
- Torque converter and lubrication pressure
- Modulated line pressure
- Torque converter clutch solenoid pressure
- Reducing pressure
- Pressure control solenoid valve pressure

TFA0077

1. Torque converter
2. Front clutch
3. Rear clutch
4. Low-reverse brake
5. End clutch
6. Kickdown servo
7. Transaxle control module
8. Torque converter clutch valve
9. Rear clutch exhaust valve
10. 2-3/4-3 shift valve
11. Torque converter clutch solenoid
12. Reducing valve
13. Shift control solenoid valve “A”
14. I-2 shift valve
15. End clutch valve
16. Torque converter control valve
17. Shift control solenoid valve “B”
18. Shift control valve
19. N-D control valve
20. Regulator valve
21. Manual valve
22. Pressure control valve
23. N-R control valve
24. Oil filter
25. Oil pan
26. Oil pump
27. Line relief valve
28. Pressure control solenoid valve

TSB Revision

SPECIFICATIONS

GENERAL SPECIFICATIONS

Items		Specifications
Model		F4A33-1-MNP2 <1 992 model> F4A33-1-MNP8 <1993 model> F4A33-1-MNQ2 <1 994 model> F4A33-1-MNQ7 <From 1995 models>
Type		Electronically controlled 4-speed full-automatic
Torque converter	Type	3 element with torque converter clutch
	Engine stall speed	2,200–3,200 rpm
	Stall torque ratio	1.80
Gear ratio	First	2.551
	Second	1.488
	Third	1.000
	Fourth	0.685
	Reverse	2.176
Final gear ratio		3.958
Speedometer gear ratio (Drive/Driven)		36/29

SERVICE SPECIFICATIONS

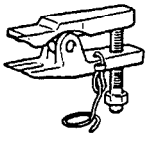
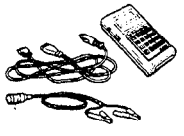
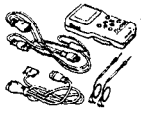
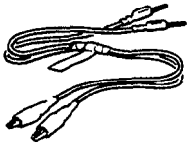
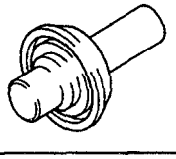
Items		Specifications
Resistance of torque converter clutch solenoid valve coil [at 20°C (68°F)] <Up to 1993 model> Ω		Approx. 3
Resistance of torque converter clutch solenoid valve coil [at 20°C (68°F)] <From 1995 model> Ω		Approx. 13
Line pressure	Line pressure kPa (psi)	870-890 (124-127)
	Oil pressure change for each turn of adjustment screw kPa (psi)	38 (5)
Reducing pressure (when the scan tool is not used)	Reducing pressure kPa (psi)	425 ± 10 (60 ± 1)
	Oil pressure change for each turn of adjustment screw kPa (psi)	45 (6)
Reducing pressure (when the scan tool is used)	Reducing pressure kPa (psi)	275 (39)
	Oil pressure change for each turn of adjustment screw kPa (psi)	22 (3)
Accelerator pedal stroke (accelerator pedal switch ON to OFF) <1992 model> mm (in.)		2-6 (.079–.24)
Sleeve and selector lever assembly end play mm (in.)		15.2–15.9 (.598–.625)

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LUBRICANTS

Items	Specified lubricants	Quantity
Transmission fluid dm^3 (qts.)	DIAMOND ATF SP or equivalent	7.5 (7.9)
Drive shaft oil seal lip		As required

SPECIAL TOOLS

Tool	Tool number and name	Supersession	Application
	MB991113 Steering linkage puller	MB991113-01	• Disconnection of the coupling of the knuckle and lower arm ball joint • Disconnection of thecoupling of the knuckle and tie-rod end ball joint
	MB991341 Scan tool [Multi-use tester (MUT)]	MB991341C	Up to 1993 models Checking of the diagnostic trouble code
	ROM pack (For the number, refer to GROUP 00 – Precaution before Service.)		
 Z16X0606	MB991502 Scan tool (MUT-II)	MB991502	All models Checking of the diagnostic trouble code
 Z16X0607	ROM pack		
	MB991529 Diagnostic trouble code check harness	MB991529	From 1994 models Reading out diagnostic trouble codes using a voltmeter
	MD998325 Differential oil seal installer	MD998325-01	Installation of differential oil seal

TSB Revision

MANUAL TRANSAXLE <AWD>

SPECIFICATIONS

GENERAL SPECIFICATIONS

Items		Up to 1993 model	From 1994 model
Model		W5MG1-0-FNBR	W6MG1-0-FNBR
Applicable engine		6G72-DOHC (Turbo)	6G72-DOHC (Turbo)
Type		5-speed transaxle floor shift	6-speed transaxle floor shift
Sear ratio	1st	3.071	3.266
	2nd	1.739	1.904
	3rd	1.103	1.241
	4th	0.823	0.918
	5th	0.659	0.733
	6th		0.589
	Reverse	3.076	3.153
Reduction ratio	Primary	1.375	1.222
	Front differential	2.888	3.166
	Transfer	0.814	0.958
Speedometer gear ratio (driven/drive)		27/36	28/36
Oil quantity dm^3 (qts.)	Transaxle	2.4 (2.5)	2.4 (2.5)
	Transfer	0.27 (.29)	0.6 (.63)

LUBRICANTS

Items	Specified lubricants	Quantity dm^3 (qts.)
Transmission oil	Hypoid gear oil, SAE 75W-90 or 76W-85W conforming to API classification GL-4	2.4 (2.5)
Transfer oil		0.27 (.29) <W5MG1>
		0.6 (.63) <W6MG1>
Drive shaft oil seal lip		As required
Transfer oil seal lip		

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TROUBLESHOOTING

Based upon use of the troubleshooting guide, the probable location of the problem should be estimated.

↓

Checks should be made of fluid levels and the condition of the ATF, as well as the condition of the manual control cables; adjustments should then be made if found to be necessary.

↓

If a presumption has been made that there is an abnormalconditionsomewhere in the electronic-control system, check the fault code, in order to determine the probable location of the problem, by using a multi-use tester or voltmeter.

↓

When the abnormal system is discovered, check each element (sensors, etc.) one by one, and make repairs as necessary.

↓

When the abnormal condition is presumed to be in the hydraulic-pressure-control system, check by making an oil-pressure test.

↓

When the result of the oil-pressure test does not satisfy the specified pressure, check each system at places related to the valve body, check the hydraulic-pressure oassaaes for leakaae. etc.

↓

If the problem is unusually dirty ATF, abnormal noises, oil leakage, or slippage of the clutch or brakes, or an abnormalcondition of the transaxle itself, disassemble and repair the transaxle.

Functional malfunctions of the ELC-4A/T can lead to other problems, such as those described below:
(1) Improper maintenance and/or adjustments
(2) Malfunctions of the electronic control functions
(3) Malfunctions of mechanical functions
(4) Malfunctions of hydraulic control functions
(5) Malfunctions of engine performance
etc.

In order to properly determine ("Troubleshoot") the source of these malfunctions, it is first essential to methodically question the user concerning the details of the problem, such as the condition of the problem, the situation at the time the problem occurred, and any other relevant information, all in as much detail as possible. The user should also be asked whether or not the problem has occurred more than once, and under what conditions.
Subsequently, certain tests should be conducted in a certain order, as described at the left.

TROUBLESHOOTING GUIDE

Iterns			Driving impossible or abnormal (before start-off)			
			Starter motor won't function	Forward/ backward movement impossible	Forward movement impossible	Backward movement impossible
Engine	1	Abnormal idling rpm				
	2	Performancemalfunction				
Transaxle (power train)	3	Improper adjustmentof manual linkage	×	⊗	⊗	⊗
	4	Malfunction of torque convertor		×	×	×
	5	Operation malfunction of oil pump		×	×	×
	6	Malfunction of one-way clutch			×	
	,	Damagedor worn gear or other rotating pan, or improper adjustment of the preload				
	8	Malfunction of parking mechanism				
	9	Cracked drive plate or loose bolt		×		
	10	Worn inside diameter of front clutch retainer				×
Hydraulic-pressure system (including friction elements)	11	Low fluid level		⊗	⊗	⊗
	12	Line pressure too low (seal damaged, leakage, looseness, etc.)		⊗	⊗	⊗
	13	Malfunction of valve body (sticking valve, working cavity, adjustment, etc.)		⊗	⊗	⊗
	14	Malfunction of front clutch or piston				×
	15	Malfunction of rear clutch or piston			⊗	
	16	Malfunction of kickdown band or piston				
	17	Improper adiustment of kickdown servo				
	18	Malfunction of low-reverse brake or piston				×
	19	O-ringof low-reverse brake circuit between valve body and case notinstalled				X
	20	Malfunction of end clutch or piston (check ball hole, other)				
Electronic-control system	21	Malfunction of park/neutral position switch, damaged or disconnected wiring, or improper adjustment	×			
	22	Malfunction of TPS, or improper adjustment				
	23	Pulse generator (A) damaged or disconnected wiring, or short-circuit				
	24	Pulse generator(B) damaged or disconnected wiring, or short-circuit				
	25	Malfunction of kickdown servo switch				
	26	SCSV-A or B damaged or disconnected wiring, or short-circuit or sticking (valve open)				
	27	Malfunction of ignition signal system				
	28	incorrectly grounded ground strap				
	29	PCSV damaged or disconnected wiring, or short-circuit				
	30	PCSV damaged or disconnected wiring (valve open)		⊗	⊗	⊗
	31	TCC solenoid damaged or disconnecting wiring (valve open)				
	32	TCC solenoid short-circuit or sticking (valve open)				
	33	Malfunction of overdrive control switch				
	34	Malfunction of oil-temoerature sensor				
	35	Malfunction of leadswitch				
	36	Poor contact of ignition switch	X			
	37	Malfunction of transaxle control module				

NOTE: ⊗ Indicates items of priority inspection.
Abbrevilations: TPS = Throttle position sensor
SCSV = Shirt control solenoid valve
PSCV = Pressure control valve
TCC solenoid = Torque converter clutch solenoid
OD = Overdrive

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–	Driving impossible or abnormal (before start-off)							
	Engine stalls when N → D or R	Clutch slips at D (stall rpm too high)	Clutch slips at R (stall rpm too high)	Stall rpm too low	Vehicle moves at P or N	Engine starts, or vehicle moves, between N-R or N-D	Parking doesn't hold	Abnormal vibration-shock when shift to D-2-L-R
1	⊗							×
2	×			×				
3		⊗	⊗		⊗	⊗	⊗	⊗
4	×	×	×	×				
5		×	×					
6		×						
7								
8					×		×	
9								
10			×					
11		×	×					
12		⊗	⊗					
13	×	×	×		×	×		×
14			×					×
15		×			×			×
16								×
17								×
18			×					×
19			×					
20								
21						×		×
22								×
23								
24								
25								
26								
27								×
28								×
29								
30		×	×					
31		×						
32	⊗							
33								
34								
35								
36								
37								×

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–	Transaxle malfunction of shift-shock (after start-off)						
–	Won't shift from 2nd to 3rd	Won't shift to 4th	Overdrive control switch doesn't function	Doesn't shift according to shift pattern (shifting is possible)	Improper start-off (starts off from 2nd etc.)	Excessive creeping or idling vibration	Excessive vibration-shock when shift 1-2 or 3-4
1						×	
2					×		×
3		×					
4					×		
5							
6							
7							
8							
9							
10	×	×					
11							
12							
13	×	×		×	×		×
14	×						
15							
16							×
17							×
18							
19							
20		⊗					×
21	×	×					
22				⊗			×
23							×
24				×			
25							×
26							
27							
28							
29							
30							
31							
32							
33		×	×				
34							
35							
36							
37	×	×	×	×	×	×	×

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–	Transaxle malfunction of shift-shock (after start-off)					
–	Excessive vibration-shock when shift 2-3 or 4-3	Excessive vibration-shock during upshift	Excessive vibration-shock during D-2 downshift	Sudden engine rpm increase during upshift	Sudden engine rpm increase during 3-2 shift, excessive vibration	Excessive vibration-shock only when cold
1						
2	×	×	×			×
3						
4						
5				×	×	
6						
7						
8						
9						
10				×	×	
11				×	×	
12				⊗	⊗	
13	×	×	×	×	×	×
14	×	×		×		
15						
16			×	×	×	
17			×	×	×	
18						
19						
20				×		
21						
22	×	⊗	×	⊗	×	
23	×	×	×	×	×	
24						
25			×	×	×	
26						
27						
28						
29						
30				×	×	
31						
32						
33						
34						
35						
36						
37	×	×	×	×	×	

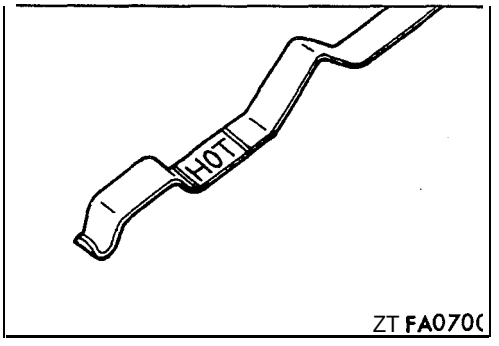
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–	Transaxle malfunction of shift-shock (after start-off)			Abnormal noise, others			
–	Excessive vibration-shock (other than already described)	Torque converter clutch won't function	Abnormal vibration in high-load region in low gear (approx. 1 Hz)	Abnormal noise from converter housing together with engine rpm	Mechanical noise (clatter noise) from converter housing	Abnormal noise inside transaxle case	3rd gear is held
1							
2	×		×				
3							
4		×	×				
5				×			
6							
7						×	
8							
9					×		
10							
11							
12	×						
13	×	×	×				
14							
15							
16							
17	×						
18							
19							
20							
21							×
22	×	×	×				
23	×	×	×				
24		×	×				×
25							
26							×
27		×					
28							×
29	×						×
30							
31		×					
32			×				×
33							
34	×	×	×				
35							×
36							×
37	×	×	×	×			×

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DIAGNOSIS AND TEST

FLUID LEVEL AND CONDITION



1. Drive until the fluid temperature reaches the usual temperature [70–80°C (158–176°F)].
2. Place vehicle on level floor.
3. Move selector lever sequentially to every position to fill torque converter and hydraulic circuit with fluid, then place lever in "N" Neutral position. This operation is necessary to be sure that fluid level check is accurate.
4. Before removing dipstick, wipe all dirt from area around dipstick. Then take out the dipstick and check the condition of the fluid.
   The transaxle should be overhauled under the following conditions.
   - If there is a "burning" odor.
   - If the fluid color has become noticeably blacker.
   - If there is a noticeably great amount of metal particles in the fluid.
5. Check to see if fluid level is in "HOT" range on dipstick. If fluid level is low, add automatic transmission fluid until level reaches "HOT" range.
   Low fluid level can cause a variety of conditions because it allows pump to take in air along with fluid. Air trapped in hydraulic circuit forms bubbles which make fluid spongy. Therefore, pressures will be erratic.
   Improper filling can also raise fluid level too high. When transaxle has too much fluid, gears churn up foam and cause same conditions which occur with low fluid level, resulting in accelerated deterioration of automatic transmission fluid.
   In either case, air bubbles can cause overheating, fluid oxidation, which can interfere with normal valve, clutch, and servo operation. Foaming can also result in fluid escaping from transaxle vent where it may be mistaken for a leak.
6. Be sure to examine fluid on dipstick closely.

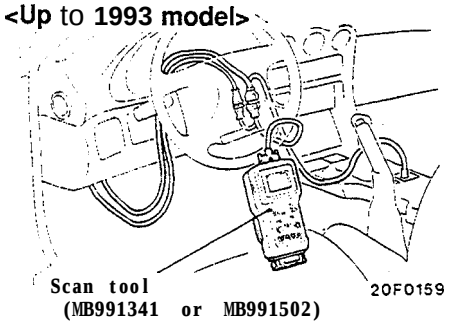
CONTROL CABLE

Whether control cable is properly adjusted can be confirmed by checking whether park/neutral position switch is performing well.

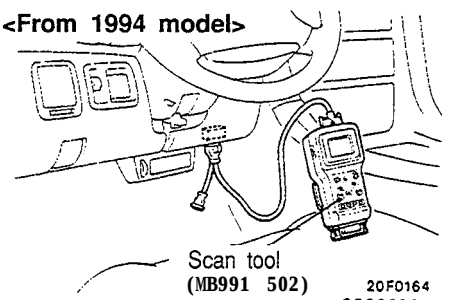
1. Apply parking brakes and service brakes securely.
2. Place selector lever to "R" range.
3. Set ignition key to "ST" position.
4. Slowly move the selector lever upward until it clicks as it fits in notch of "P" range. If starter motor operates when lever makes a click, "P" position is correct.
5. Then slowly move selector lever to "N" range by the same procedure as in foregoing paragraph. If starter motor operates when selector lever fits in "N", "N" position is correct.
6. Also check to be sure the vehicle doesn't begin to move and the lever doesn't stop between P-R-N-D.
7. The control cable is properly adjusted if, as described above, the starter motor starts at both the "P" range and the "N" range.

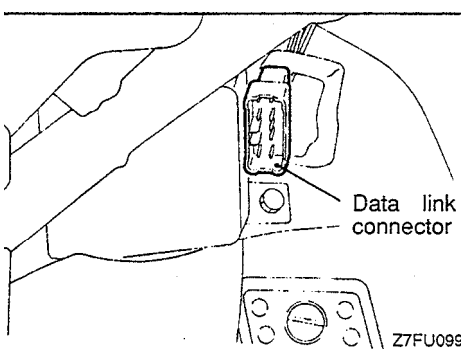
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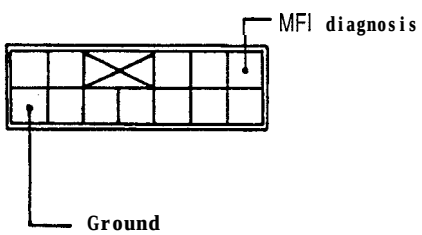
<Up to 1993 model>

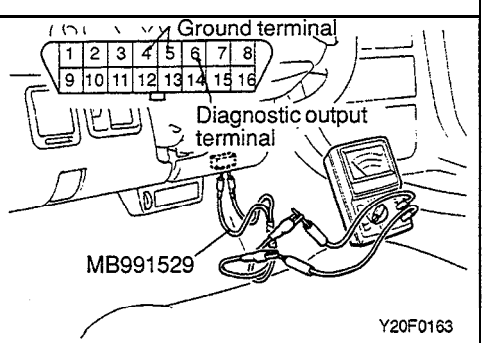


<From 1994 model>









DIAGNOSIS FUNCTION

METHOD OF READING THE DIAGNOSTIC TROUBLE CODES

When using the scan tool [Multi-use tester (MUT) <1993 model> or MUT-II <All models>]

Caution
Connection and disconnection of the scan tool should always be made with the ignition switch in the OFF position.

(1) Connect the scan tool to the data link connector.

NOTE
When connecting MUT-II to a vehicle up to. 1993 model, use the adapter harness supplied together.

(2) Take a reading of the diagnostic output.
(3) Repair the problem location, referring to the diagnostic chart.
(4) After turning the ignition switch once to OFF, turn it back to ON.

When using a voltmeter cl993 model>

(1) Connect an analog voltmeter to the diagnostic output terminal (No. 6 terminal) and the ground terminal (No. 12 terminal) of the data link connector (white).
(2) Obtain the diagnostic output by observing the voltmeter pointer deflection.
(3) Repair the problem location, referring to the diagnostic chart.

When using a Voltmeter <From 1994 model>

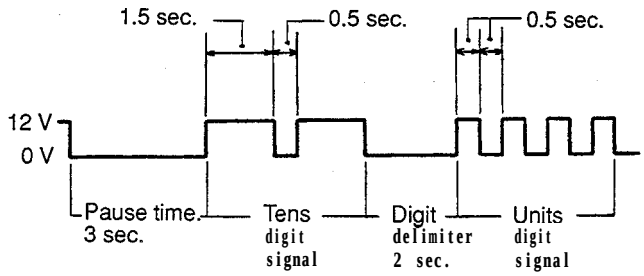
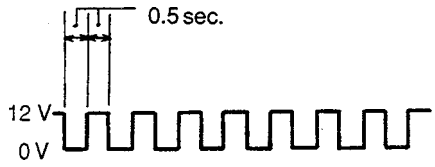
(1) Connect an analog voltmeter to the diagnostic output terminal (No. 6 terminal) and the ground terminal (No. 4 or 5 terminal) of the data link connector.

Caution
Be sure to use the special tool (diagnostic trouble code check harness) to connect the voltmeter to the -ground terminal (No. 4 or 5 terminal).

(2) Obtain the diagnostic output by observing the voltmeter pointer deflection.
(3) Repair the problem location, referring to’ the diagnostic chart.

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Diagnostic result indication by voltmeter

Example of diagnostic trouble code output voltage waveform	Waveform when normal
Waveform for diagnostic trouble code No. 24  Z14N0173	 Z14N0174

NOTE
Other diagnostic items are also indicated by the voltage waveforms corresponding to the code numbers obtainea when the scan tool is used.

METHOD OF ERASE THE DIAGNOSTIC TROUBLE CODES

When using the scan tool [Multi-use tester (MUT) <Up to 1993 model> or MUT-II <All models>]

(1) Turn the ignition switch to OFF and then back to ON again.
(2) Erase the diagnostic trouble codes.
(3) Check to be sure that no diagnostic trouble codes exist.

When using the voltmeter

(1) Turn the ignition switch to the OFF.
(2) After disconnecting the battery cable from the battery (–) terminal for 10 seconds or more, reconnect the cable.
(3) Turn the ignition switch to the ON, and read the diagnostic trouble codes to check that a normal code is output.

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FAULT CODE' DESCRIPTION

Code No.	Item	Remedial Action
11	Excessively large throttle position sensor output	• Check throttle position sensor connector. • Check throttle position sensor on bench. • Adjust throttle position sensor. • Check accelerator switch (whether code number 24 is being output). <1992 models only>
12	Excessively small throttle position sensor output	
13	Defective or improperly adjusted throttle position sensor	
14	Improperly adjusted throttle position sensor	
15	• Open-circuited low-oil-temperature sensor <1992 model> • Open-circuited oil temperature sensor <From 1993 model>	• Check oil temperature sensor connector. • Check oil temperature sensor on bench.
16	• Short-circuited high-oil-temperature sensor <1992 model only> • Short-circuited oil-temperature sensor <From 1996 model>	
17	Open-circuited high-oil-temperature sensor or short-circuited low-oil-temperature sensor <1992 model only>	
21	Open-circuited kickdown servo switch	• Check kickdown servo switch connector. • Check kickdown servo switch on bench.
22	Short-circuited kickdown servo switch	
23	Open-circuited ignition pulse pickup cable	• Check ignition pulse signal line.
24	Open-circuited or improperly adjusted accelerator switch <1992 model only>	• Check accelerator switch connector. • Check accelerator switch on bench. • Adjust accelerator switch.
31	Open-circuited pulse generator A	• Check pulse generator A or B on bench. • Check vehicle-speed reed switch (chattering).
32	Open-circuited pulse generator B	
36	Short-circuited Park/neutral position switch	• Check Park/neutral position switch connector • Check Park/neutral position switch on bench
37	Open-circuited Park/neutral position switch	
41	Open-circuited shift control solenoid valve A	• Check solenoid valve connector. • Check shift control solenoid valve A on bench
42	Short-circuited shift control solenoid valve A	
43	Open-circuited shift control solenoid valve B	• Check solenoid valve connector. • Check shift control solenoid valve B on bench.
44	Short-circuited shift control solenoid valve B	
45	Open-circuited pressure control solenoid valve	• Check solenoid valve connector. • Check pressure control solenoid valve on bench.
46	Short-circuited pressure control solenoid valve	
47	Open-circuited torque converter clutch solenoid	• Check solenoid valve connector. • Check torque converter clutch solenoid on bench
48	Short-circuited torque converter clutch solenoid	
49	Defective torque converter clutch system	• Check torque converter clutch hydraulic circuit • Check torque converter clutch solenoid on bench • Replace control unit.

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Code No.	Item	Remedial Action
51	1 st gear incorrect ratio	• Check connectors of pulse generators A and B. • Check pulse generators A and B on bench. • Rear clutch slipping
52	2nd gear incorrect ratio	• Check connectors of pulse generators A and B. • Check pulse generators A and B on bench. • Rear clutch slipping • Kickdown brake slipping
53	3rd gear incorrect ratio	• Check connectors of pulse generators A and B. • Check pulse generators A and B on bench. • Front clutch slipping • Rear clutch slipping
54	4th gear incorrect ratio	• Check connectors of pulse generators A and B. • Check pulse generators A and B on bench. • End clutch slipping • Kickdown brake slipping
59	Occurence of abnormal vibration <From 1994 model>	• Check connector of pulse generator A. • Check pulse generator A proper. • Replace automatic transmission fluid.
61	Short-circuited torque reduction request signal line or open-circuited torque reduction execution signal line	• Check torque reduction request signal line. • Check torque reduction execution signal line.
62	Open-circuited torque reduction request signal line	• Check torque reduction request signal line.
63	Short-circuited torque reduction execution signal line	• Check torque reduction execution signal line.

FAIL-SAFE CODE DESCRIPTION

Code No.	Item	Fail-safe	Related Self-Diagnosis
81	Open-circuited pulse generator A	Fixed at 3rd (D) or 2nd (2, L)	31
82	Open-circuited pulse generator B	Fixed at 3rd (D) or 2nd (2, L)	32
83	Open- or short-circuited shift control solenoid valve A	Fixed at 3rd	41, 42
84	Open- or short-circuited shift control solenoid valve B	Fixed at 3rd	43, 44
85	Open- or short-circuited pressure control solenoid valve	Fixed at 3rd (D) or 2nd (2,L)	45, 46
86	Incorrect gear ratio	Fixed at 3rd (D) or 2nd (2, L)	51, 52 53, 54

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INSPECTION OF CONTROL SYSTEM

Check the control system by using the scan tool and following the procedure given below.

CONTROL SYSTEM INSPECTION TABLE

Check Item	Condition	Criteria	Possible Cause of Trouble (or Remedy)
Throttle position sensor (TPS) • Data list • Item No. 11	Accelerator pedal fully released	0.4–1.0 v	• TPS is improperly adjusted if voltage is high when accelerator pedal is fully depressed or released. • TPS or circuit harness is defective if there is no change. • TPS or accelerator pedal cable is defective if change is not smooth.
	Accelerator pedal slowly depressed	Varies with throttle opening degree	
	Accelerator pedal fully depressed	4.5–5.0 v	
Oil temperature sensor • Data list • Item No. 15	Cold engine (before start)	Equivalent to outside temperature	• Defective oil temperature sensor or circuit harness
	Engine warming up	Gradually increases	
	After engine warming up	80–110°C	
Kickdown servo switch • Data list • Item No. 21	L range, idle	ON	• Improperly adjusted kickdown servo • Defective kickdown servo switch or circuit harness • Defective kickdown servo
	D range, 1st or 3rd speed	ON	
	D range, 2nd or 4th speed	OFF	
Ignition signal line • Data list • Item No. 23	N range, idle	650-900 rpm	• Defective ignition system • Defective ignition signal pickup circuit harness
	N range, 2,500 rpm (tachometer reading)	2,400–2,600 rpm	
Accelerator pedal switch <1992 model only> • Data list • Item No. 24	Accelerator pedal fully released	ON	• Improperly adjusted accelerator pedal switch • Defective accelerator pedal switch or circuit harness
	Accelerator pedal slightly depressed	OFF	
Closed throttle position switch • Data list • Item No. 25	Accelerator pedal fully released	ON	• Improperly adjusted TPS • Defective TPS or circuit harness
	Accelerator pedal slightly depressed	OFF	
Air conditioning compressor clutch relay signal • Data list • Item No. 26	D range, air conditioning idle-up	ON	• Defective air-conditioning compressor clutch relay ON signal detection circuit harness
	D range, air conditioning idle OFF	OFF	
Transaxle gear position • Data list • Item No. 27	D range, idle	C	• Defective TCM • Defective accelerator pedal switch circuit • Defective park/neutral position switch circuit • Defective TPS circuit
	L range, idle	1ST	
	2 range, 2nd speed	2ND	
	D range, O/D OFF, 3rd speed	3RD	
	D range, O/D, 4th speed	4TH	

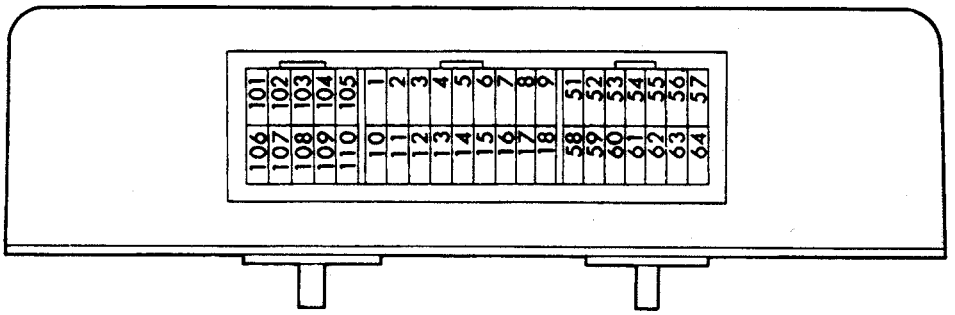
Check Item	Condition	Criteria	Possible Cause of Trouble (or Remedy)
Pulse generator A • Data list • Item No. 31	D range, stop	0 rpm	• Defective pulse generator A or circuit harness • Defective pulse generator A shielded wire • External noise interference
	D range, 3rd speed, driven at 50 km/h (31 mph)	1,600–2,000 rpm	
	D range, 4th speed, driven at 50 km/h (31 mph)	1,100–1,400 rpm	
Pulse generator B • Data list • Item No. 32	D range, stop	0 rpm	• Defective pulse generator B or circuit harness • Defective pulse generator B shielded wire • External noise interference
	D range, 3rd speed, driven at 50 km/h (31 mph)	1,600–2,000 rpm	
	D range, 4th speed, driven at 50 km/h (31 mph)	1,600–2,000 rpm	
Overdrive switch • Data list • Item No. 35	Overdrive switch in ON position	OD	• Defective overdrive switch or circuit harness
	Overdrive switch in OFF position	OD-OFF	
Power/economy select switch • Data list • Item No. 36	Power pattern selected (including economy pattern control with low oil temperature)	Power	• Defective power/economy select switch or circuit harness
	Economy pattern selected	Economy	
Park/neutral position switch • Data list • Item No. 37	Shifted to P range	P	• Improperly adjusted park/neutral position switch • Defective park/neutral position switch or circuit harness • Defective manual control cable • If selector lever does not move, check shift lock mechanism.
	Shifted to R range	R	
	Shifted to N range	N	
	Shifted to D range	D	
	Shifted to 2 range	2	
	Shifted to L range	L	
Vehicle-speed reed switch • Data list • Item No. 38	Vehicle stationary	0 km/h (0 mph)	• Vehicle-speed reed switch is defective if a high-speed signal is output where vehicle is stationary. • Otherwise, vehicle-speed reed switch or circuit harness is defective.
	Driven at 30 km/h (19 mph)	30 km/h (19 mph)	
	Driven at 50 km/h (31 mph)	50 km/h (31 mph)	
PCSV duty • Data list • Item No. 45	D range, idle	50–70%	• Duty should become 100% when accelerator pedal is depressed even a little from D range idle conditions. • Defective TCM • Defective TPS circuit • Defective accelerator pedal switch circuit
	D range, 1st speed	100%	
	D range, gear being shifted	Depends on conditions	
Torque converter clutch slip • Data list • Item No. 47	D range, 3rd speed, 1,500 rpm (tachometer reading)	100–300 rpm	• Defective torque converter clutch • Defective ignition signal line or pulse generator B circuit • Incorrect transmission fluid pressure • Defective TCC solenoid
	D range, 3rd speed, 3,500 rpm (tachometer reading)	0 rpm	
TCC solenoid duty • Data list • Item No. 49	D range, 3rd speed, 1,500 rpm (tachometer reading)	0%	• Defective TCM • Defective TPS circuit • Defective pulse generator B circuit
	D range, 3rd speed, 3,500 rpm (tachometer reading)	Depends on leads	

TSB Revision

TRANSAXLE CONTROL MODULE

The connector has 42 pins to accommodate the increased number of sensor inputs. Here are the pin assignments.

cl 992 models>

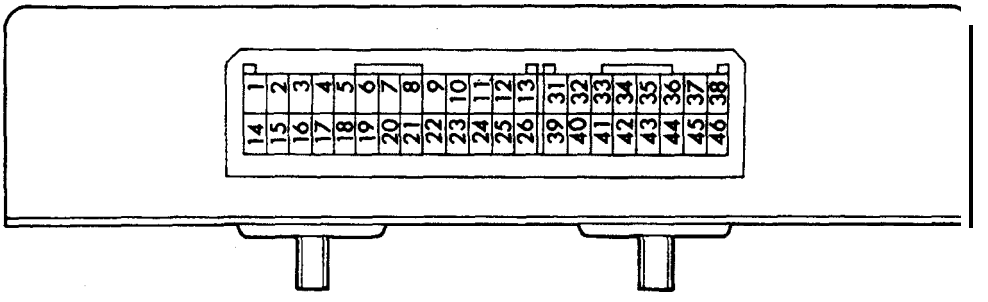


ZTFA0360

101. Torque converter clutch solenoid
102. Shift control solenoid valve A
103. –
104. Power source
105. Ground
106. Pressure control solenoid valve
107. Shift control solenoid valve B
108. Engine communication signal
109. Power source
110. Ground
1. Ground
2. –
3. Accelerator switch
4. –
5. On-board diagnostic output
6. Air conditioning compressor clutch relay signal
7. Engine communication signal
8. Diagnostic test mode control terminal
9. Engine communication signal
10. Power source (backup)
11. Kickdown servo switch
12. Closed throttle position switch
13. –
14. Oil temperature sensor (Low temperature side)
15. Oil temperature sensor (High temperature side)
16. Throttle position sensor
17. Sensor ground
18. Vehicle-speed reed switch
51. Park/neutral position switch (P)
52. Park/neutral position switch (R)
53. Park/neutral position switch (N)
54. Park/neutral position switch (D)
55. Park/neutral position switch (2)
56. Park/neutral position switch (L)
57. Overdrive switch
58. Pulse generator B
59. Pulse generator B
60. Pulse generator A
61. Pulse generator A
62. Ground
63. Ignition pulse
64. Power mode signal

TSB Revision

<From 1993 models>



ZTFA0744

1. Torque converter clutch solenoid
2. Shift control solenoid valve A (SCSV-A)
3. –
4. Engine communication signal
5. –
6. –
7. Kickdown servo switch
8. Air conditioning relay signal
9. On-board diagnostic output terminal
10. Pulse generator B (PG-B) output
11. Diagnostic test mode control terminal
12. Power source
13. Ground
14. Pressure control solenoid valve (PCSV)
15. Shift control solenoid valve B (SCSV-B)
16. –
17. Engine communication signal
18. Engine communication signal
19. –
20. Closed throttle position switch
21. Throttle position sensor (TPS)
22.
23. Oil temperature sensor
24. Sensor ground
25. Power source
26. Ground
31. Park/neutral position switch (P)
32. Park/neutral position switch (R)
33. Park/neutral position switch (N)
34. Park/neutral position switch (D)
35. Park/neutral position switch (2)
36. Park/neutral position switch (L)
37. Overdrive switch
38. Power mode signal
39. Power source (backup)
40. Vehicle-speed reed switch
41. Pulse generator B (PG-B)
42. Pulse generator B (PG-B)
43. Pulse generator A (PG-A)
44. Pulse generator B (PG-A)
45. Ground
46. Ignition pulse

ELEMENT IN USE AT EACH POSITION OF SELECTOR LEVER

Selector. lever position	Overdrive control switch	Shifting gear	Gear ratio	Engine start	Parking mechanism	Clutch				Brake	
						Cl	C2	C3	owc	B1	B2
P		Neutral	–	Possible	•						
R		Reverse	2.176	–		•					•
⁑		Neutral	–	Possible							
D	ON	1st	2.551	–			•		•		
		2nd	1.488	–			•			•	
		3rd	1.000	–		•	•	•			
		OD	0.685	–				•			
D	OFF	1st	2.551	–			•		•		
		2nd	1.488	–			•			•	
		3rd	1.000	–		•	•	•			
2	–	1st	2.551	–			•		•		
		2nd	1.488	–			•			•	
L	–	1st	2.551	–			•				•

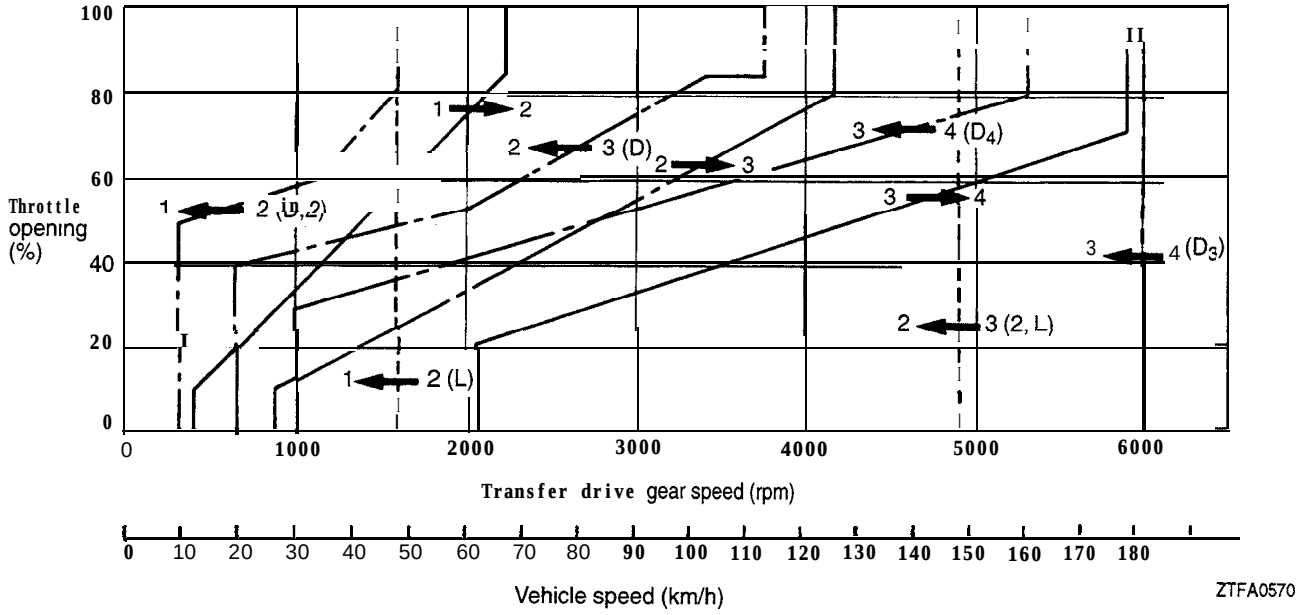
NOTE
Cl . . Front clutch
C2 . . Rear clutch
C3 . . . End clutch
B1 . . . . Kickdown brake
B2 . . . . Low reverse brake
OWC . One way clutch

SHIFT PATTERNS

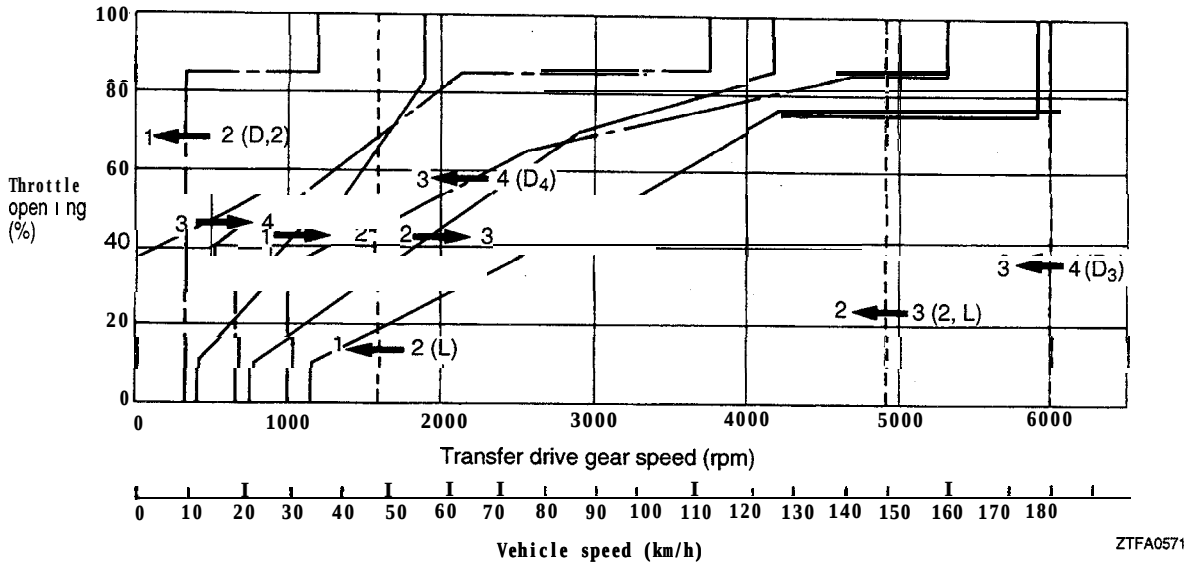
Two shift patterns are prestored in the control unit of this transaxle. One is the power pattern (for more powerful performance), and the other is the economy pattern (for improved fuel consumption and quieter operation). The driver can select and switch to the desired pattern by using the power/economy select switch on the center console. The solid lines shown in these shift patterns indicate up-shifts, and the broken lines indicate down-shifts. The reason why there is a difference between the shift points for up-shifts and for down-shifts is so that up-shifts and down-shifts will not occur frequently when driving at a speed in the vicinity of the shift point.
When the vehicle is stopped, there is a shift to 2nd gear in order to obtain a suitable “creeping”, but when the accelerator pedal is then depressed the vehicle starts off in 1st gear.

cl 992 model>

P range



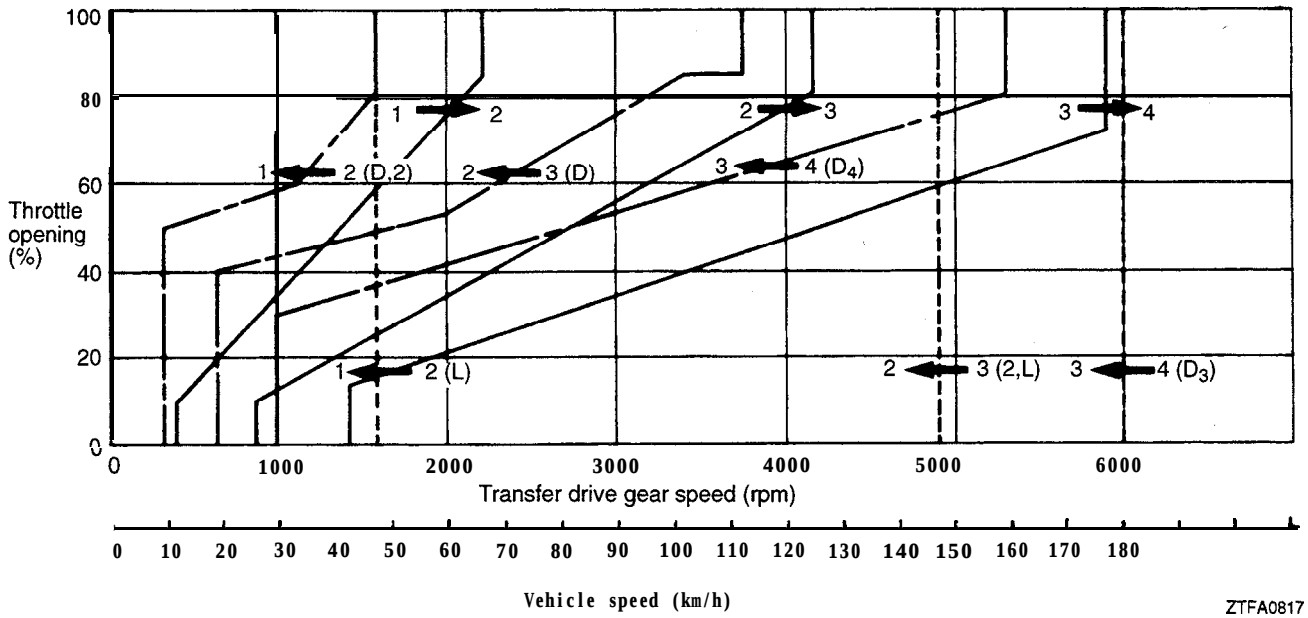
E range



TSB Revision

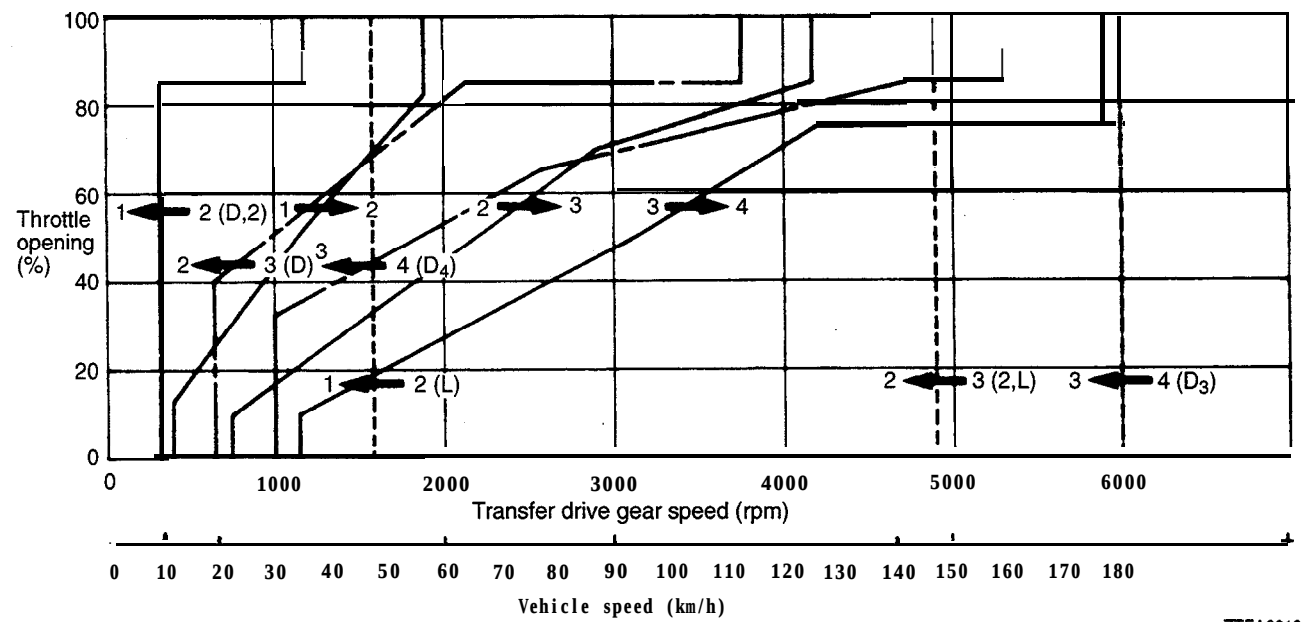
<From 1993 models>

P range



ZTFA0817

E range



ZTFA0818

TSB Revision

INSPECTION OF ELECTRONIC CONTROL SYSTEM COMPONENTS

1. Wiring

→ Based on the wiring diagram check whether the continuity and grounding of each harness is OK.

→ No continuity

→ Improperconnectionof connector, damaged or disconnected harness, or incorrect wiring connection.

→ Reconnecttheconnector; repair or replace the harness.

Based on the wiring diagram check whether the continuity and grounding of each harness is OK.

→ Continuity

→ Normal

2. Oil-temperature sensor <1992 model>

→ Vary the thermo-sensitive part from low temperature to high temperature and check the resistance between the terminals 1 and 2 or 2 and 3.

→ No continuity (resistance: ∞)

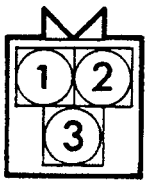
→ Damaged or disconnected wiring

→ Replace the oil-temperature sensor

Vary the thermo-sensitive part from low temperature to high temperature and check the resistance between the terminals 1 and 2 or 2 and 3.

→ Changes of the resistance continuous and smooth.

→ Normal



Z1750447

1: Low temperature side
2: Ground
3: High temperature side

3. Oil-temperature sensor <From 1993 model>

→ Vary the thermo-sensitive part from low temperature to high temperature and check the resistance between the terminals 1 and 2.

→ No continuity (resistance: ∞)

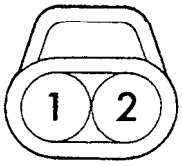
→ Damaged or disconnected wiring

→ Replace the oil-temperature sensor

Vary the thermo-sensitive part from low temperature to high temperature and check the resistance between the terminals 1 and 2.

→ Changes of the resistance continuous and smooth.

→ Normal



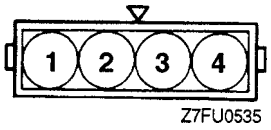
ZTFA0821

1: Oil temperature sensor
2: Ground

TSB Revision

4. Throttle-position sensor (TPS)

TPS terminal



1. Ground
2. Closed throttle position switch
3. output
4. Power

Check the resistance between terminals 1 and 4 of the TPS.

- Resistance: high or infinite → Damaged or disconnected wiring → Replace the TPS.
- 3.5–6.5 kΩ/20°C (68°F)

Check the resistance between terminals 4 and 2 with the engine idling after throttle-valve opening warm-up.

- Resistance: more or less than 0.4 kΩ/20°C (68°F) → Improper adjustment → Readjust the TPS installation.
- 1
- Resistance: approx. 0.4 kΩ/20°C (68°F)

Check for changes of the resistance between terminals 4 and 2 when the throttle valve is operated from the idling position to the fully open position.

- Changes of the resistance are not continuous. → Poor contact → Replace the TPS.
- Changes of the resistance continuous and smooth.
- Normal

TSB Revision

5. Pulse generator A or B

Check the resistance between terminals 1 and 2 or 3 and 4.

Resistance: too low or too high → Short-circuit, or damaged or disconnected wiring → Replace the pulse generator,

215–275 Ω/20°C (68°F)

Normal

Pulse generator terminals

1-2: pulse generator A
3-4: pulse generator B



Z1750338

6. Pulse generator A or B (checking by an oscilloscope)

Connect the pulse generator and body harness, and connect an oscilloscope. Check with the chassis on a dynamo or with the front wheels raised.

With the selector lever at the "L" position and the engine running at 1,000 rpm, check the voltage waveform between terminals 1 and 2.

Very low voltage → Incorrect installation of the pulse generator, or malfunction of the pulse generator.

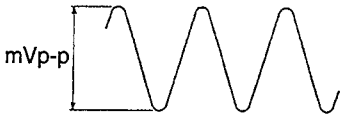
Correct the installation condition, or replace the pulse generator.

Noise in the waveform → Improper grounding of the pulse generator circuits shielded wiring.

Replace the pulse generator.

Oscilloscope waveform

mVp-p



1,000 mVp-p or higher

TFA1328

With the selector lever at the "L" position and the engine running at 1,000 rpm, check the voltage waveform between terminals 3 and 4.

Very low voltage → Incorrect installation of the pulse generator, or malfunction of the pulse generator.

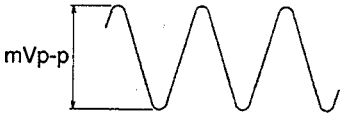
Correct the installation condition, or replace the pulse generator.

Noise in the waveform → Improper grounding of the pulse generator circuits shielded wiring.

Replace the pulse generator.

500 mVp-p or higher

mVp-p



TFA1328

Normal

TSB Revision

7. Pressure-control solenoid valve (PCSV)

- t h e solenoid valve connector and the transaxle case.
  - Resistance: too low or too high → Short-circuit, or damaged or disconnected wiring → Replace the PCSV.
  - 2.9 ±0.3Ω/20°C (68°F)
    - Connect 12 V between the transaxle case and terminal 1; switch ON and OFF and check for operation noise.
      - No operation noise. (stroke: 0.3 mm (.012 in.) or less) → Foreign material caught between the valve and guide → Replace the PCSV.
      - Noise exists.
        - Normal

Solenoid valve connector terminals



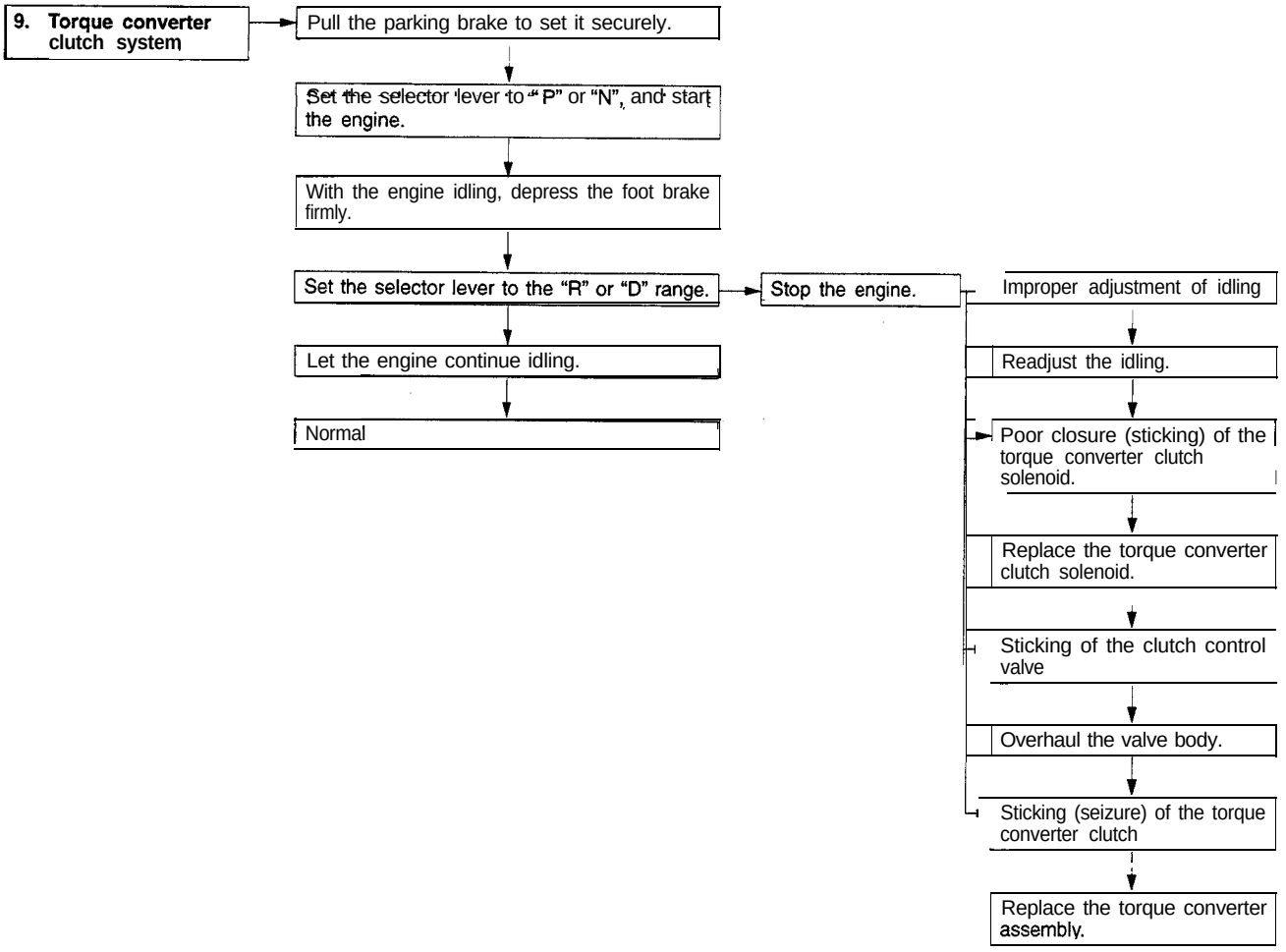
Z1750338

1: PCS"
2: TCC solenoid
3: SCSV-A
4: SCSV-B

8. Shift-control solenoid valve (SCSV) A or B

- Check the resistance between terminal 3 or 4 of the solenoid valve connector and the transaxle case.
  - Resistance: too low or too high → Short-circuit, or damaged or disconnected wiring → Replace the SCSV.
  - 22.3 ±1.5Ω/20°C (68°F)
    - Connect 12V between the transaxle case and terminal 3 or 4; switch ON and OFF and check for operation noise of the solenoid valve, and check the valve stroke.
      - No operation noise. (stroke: 0.25 mm (.010 in.) or less) → Residue accumulated in valve and core. → Replace the SCSV.
      - Noise exists.
        - Normal

1



TSB Revision

10. Torque converter clutch solenoid (TCC solenoid)

Solenoid valve connector terminals



1: PCS"
2: TCC solenoid
3: SCSV-A
4: SCSV-B

Z1750338

Check the resistance between terminal 2 of the solenoid valve connector and the transmission case.

- Resistance: too low or too high → Short-circuit, or damaged or disconnected wiring. → Replace the TCC solenoid.

Standard value: 3 Ω/20°C (68°F) <1992,1993 models> 13 Ω/20°C (68°F) <From 1994 models>

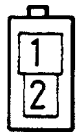
Connect 12 V between the transmission case and terminal 2; switch ON and OFF and check for operation noise.

- No operation noise. Check for sticking. (Valve stroke: in.) or less) → Foreign terminal caught between the valve and guide → Replace the TCC solenoid.

***Sticking is usually at the release side.**

- Noise exists.
- Normal

11. Accelerator switch <1992 model only>



Z171096

With the accelerator pedal not depressed, check the resistance between terminals 1 and 2.

- No continuity (resistance: ∞) → Check the installation of the accelerator switch; adjust if necessary. → Problem not solved. → Replace the accelerator switch.
- Continuity exists (resistance: 0)

With the accelerator pedal depressed slightly (about 5%), check the resistance between terminals 1 and 2.

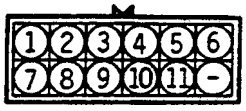
- Continuity exists (resistance: 0) → Problem not solved. → Replace the accelerator switch.
- No continuity (resistance: ∞)

1

- Normal

TSB Revision

12. Park/neutral position switch <1992 models



Z1750339

In the "P" range, check for continuity between terminals 3 and 4, and terminals 8 and 9.

↓

Continuity exists

↓

In the "R" range, check for continuity between terminals 4 and 7, and terminals 10 and 11.

↓

Continuity exists

↓

In the "N" range, check for continuity between terminals 2 and 4. and terminals 8 and 9.

↓

Continuity exists

→ No continuity → Poor contact, or damaged or disconnected wiring.

↓

Replace the park/ neutral position switch.

↓

In the "D" range, check for continuity between terminals 4 and 6.

↓

Continuity exists

↓

In the "2" range, check for continuity between terminals 1 and 4.

↓

Continuity exists

↓

In the "L" range, check for continuity between terminals 4 and 5.

↓

Continuity exists

1

Normal

TSB Revision

13. Park/neutral position switch <From 1993 model>



ZTFA0802

In the "P" range, check for continuity between terminals 3 and 4, and terminals 7 and 8.

↓

Continuity exists

↓

In the "R" range, check for continuity between teninals 2 and 3, and terminals 5 and 6.

↓

Continuitv exists

↓

In the "R" range, check for continuity between terminals 2 and 3. and terminals 5 and 6.

↓

Continuity exists

↓

In the "D" range, check for continuity between terminals 3 and 10.

1

Continuity exists

↓

In the "2" range, check for continuity between terminals 3 and 11

↓

Continuity exists

↓

In the "L" range, check for continuity between terminals 3 and 9.

↓

Continuity exists

↓

Normal

No continuity → Poor contact, or damaged or disconnected wiring.

↓

Replace the park/neutral position switch.

TSB Revision

14. Kickdown (K/D) servo switch

Check for continuity between the kickdown servo switch terminal and the transaxle case.

→ No continuity → Poor contact, or damaged or disconnected wiring → Replace the K/D servo switch.

Continuity exists

<1992 model>



ZTFA0389

Start the engine, set to the "D" range, and let the engine idle: check for continuity between the kickdown servo switch terminal and the transaxle case.
NOTE: Be sure the brakes are applied during this check.

→ Continuity exists → Poor contact (sticking) → Replace the K/D servo switch.

<From 1993 model>



ZTFA0809

No continuity

Normal

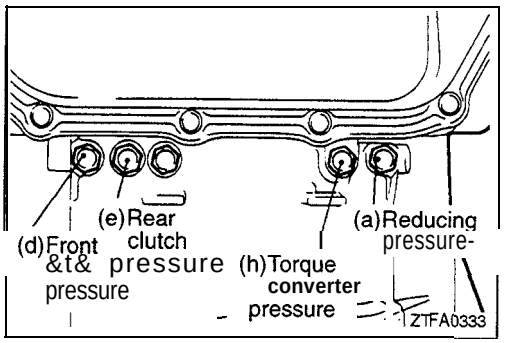
15. Transaxle control module (TCM)

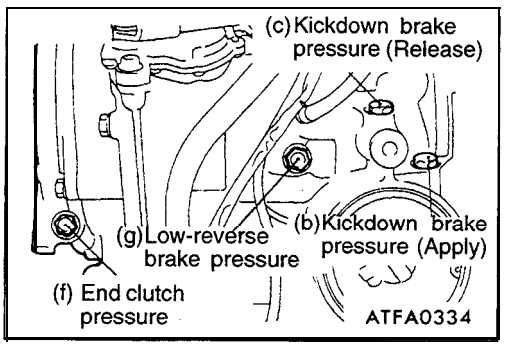
Disconnect the harness (both A and B connectors) from the vehicle's TCM. Then connect, via an intermediate harness for checking, a new TCM to this harness and make a road test.

→ The problem does not occur. → Malfunction of the original TCM → Install a new TCM.

Consider the original TCM to be normal, and again check the sensors, wiring, etc.

Same problem (as before TCM exchange) occurs.





HYDRAULIC PRESSURE TESTS

1. Completely warm up the transaxle.
2. Raise the vehicle by using a jack so that the front wheels can be rotated.
3. Connect an engine tachometer and place it in a position where it's easy to see.
4. Attach the special oil-pressure gauge (MD998330 or MD999563) and the adaptor (MD998332) to each oil-pressure outlet port.
   When the reverse position pressure is to be tested, the 3,000 kPa (400 psi) type of gauge should be used.
5. Measure the hydraulic pressure under various conditions, and check to be sure that the measured results are within the standard value range shown in the "Standard oil pressure table" below.
   If the oil pressure is not within the specified range, check and repair as described in the section "Remedial action to take for inadequate hydraulic pressure" on the next page.

STANDARD HYDRAULIC PRESSURE TABLE

No.	Conditions			Standard oil pressure kPa (psi)							
	Select lever position	Engine speed rpm	Gear position	(a) Reducing pressure	(b) K/D brake pressure (application)	(c) K/D brake pressure (release)	(d) Front clutch pressure	(e) Rear clutch pressure	(f) End clutch pressure	(g) Low-reverse brake pressure	(h) Torque converter pressure
1	N	Idling	Neutral	360–480 (51–68)	–						★
2	D	Idling	2nd	360–480 (51–68)	100–210 (14–30)	–		730–830 (104–118)	–		★
3	D (SW-ON)	Approx 2,500	4th	360–480 (51–68)	830–900 (118–128)	–			830–900 (118–128)	–	450–650 (64–92)
4	D (SW-OFF)	Approx 2,500	3rd	360–480 (51–68)	830–900 (118–128)	830–900 (118–128)	830–900 (118–128)	830–900 (118–128)	830–900 (118–128)	–	450–650 (64–92)
5	2	Approx 2,500	2nd	360–480 (51–68)	830–900 (118–128)	–		830–900 (118–128)	–		450–650 (64–92)
6	L	Approx 1,000	1st	360–480 (51–68)	–			830–900 (118–128)	–	300–450 (43–64)	★
7	R	Approx 2,500	Reverse	360–480 (51–68)	–	1,640–2,240 (233–319)	1,640–2,240 (233–319)	–		1,640–2,240 (233–319)	450–650 (64–92)
		1,000x	verse	(51–68)0	–	1,000 (142) or more	1,000 (142) or more	–		1,000 (142) or more	450–650 (64–92)

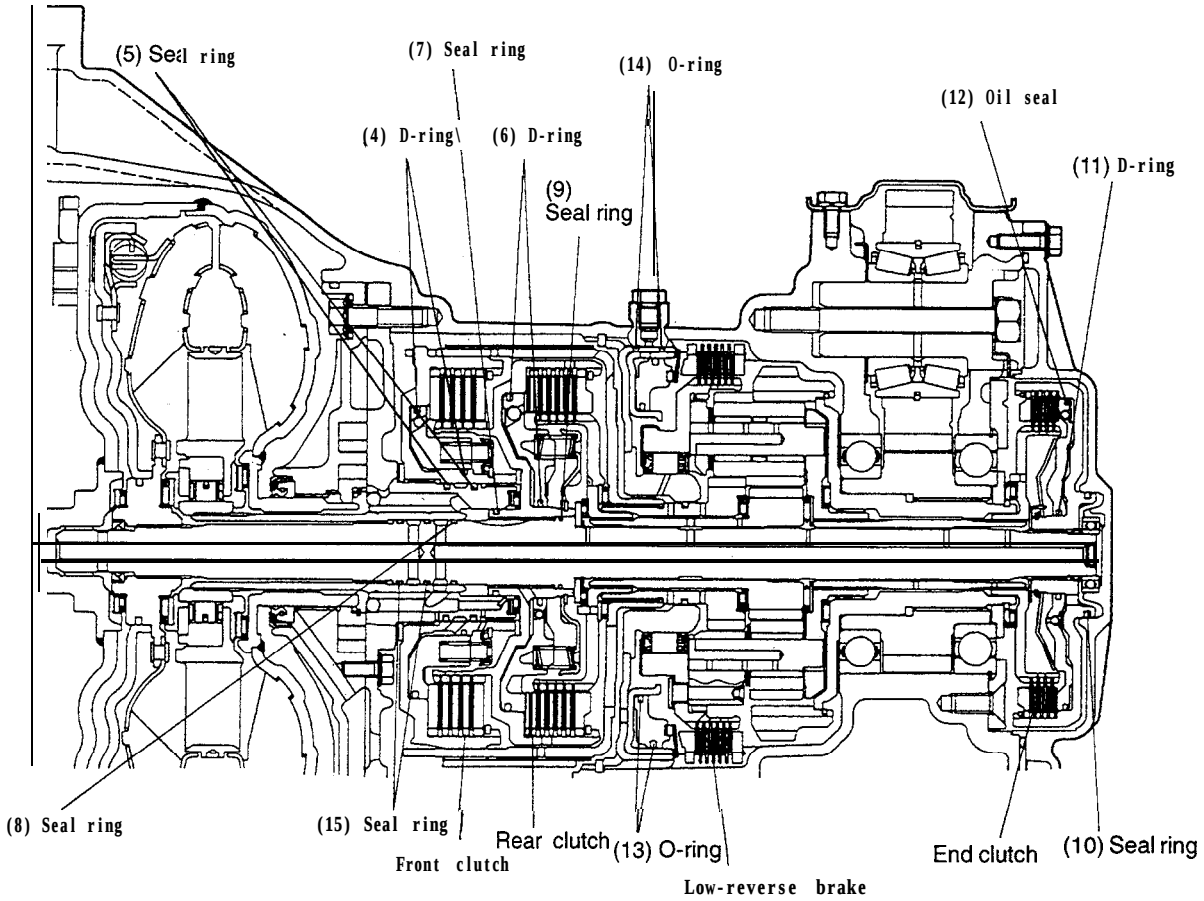
NOTE
(1) –: Indicates pressure is below 10 kPa (1.4 psi).
(2) SW-ON: OD switch in ON position.
(3) SW-OFF: OD switch in OFF position.
(4) ★: Pressure is not standard.

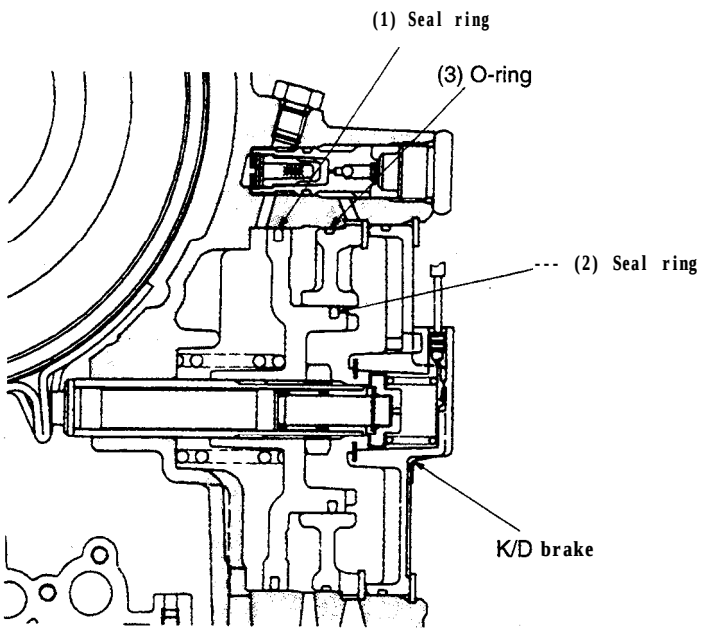
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REMEDIAL ACTION TO TAKE FOR INADEQUATE HYDRAULIC PRESSURE

Symptom	Possible cause	Remedy
1. All line pressures are low (or high). NOTE: Line pressures are (b), (c), (d), (e), (f) and (g) shown on the Standard Oil Pressure Table on the preceding page.	Plugged oil filter	Visually check oil filter and replace it if plugged.
	Improperly adjusted regulator valve line pressure	Measure line pressure (b) (K/D brake pressure) and readjust line pressure if it is out of specifications. Or, replace valve body assembly.
	Defective valve body assembly	Replace valve body assembly.
	Valve body left loose	Torque valve body clamp bolt and mounting bolt to specification.
	Improper oil pump delivery pressure	Check oil pump gear side clearance and replace oil pump assembly as necessary.
2. Improper reducing pressure	Plugged reducing pressure circuit filter (L-shaped)	Disassemble valve body assembly to check filter and replace filter if it is plugged.
	Improperly adjusted reducing pressure	Measure reducing pressure (a) and readjust as necessary.
	Defective valve body assembly	Replace valve body assembly.
3. Improper K/D brake pressure (application)	Defective seal ring (1) and D-ring (2) of K/D servo piston and seal ring (3) of sleeve	Disassemble K/D servo and check seal ring and D-ring for damage. Replace seal ring or D-ring if damaged or scratched.
	Defective valve body assembly	Replace valve body assembly.
4. Improper K/D brake pressure (release)	Defective seal ring (1) and D-ring (2) of K/D servo piston and seal ring (3) of sleeve	Disassemble K/D servo and check seal ring and D-ring for damage. Replace seal ring or D-ring if damaged or scratched.
	Defective valve body assembly	Replace valve body assembly.
5. Improper front clutch pressure	Defective seal ring (1) and D-ring (2) of K/D servo piston and seal ring (3) of sleeve	Disassemble K/D servo and check seal ring and D-ring for damage. Replace seal ring or D-ring if damaged or scratched.
	Defective valve body assembly	Replace valve body assembly.
	Worn front clutch piston and retainer or defective D-ring (4) or seal ring (5)	Disassemble transaxle and check front clutch piston and retainer for wear and D-ring and seal ring for damage. Replace piston, retainer, D-ring, or seal ring as necessary.
6. Improper rear clutch pressure	Defective D-ring (6) of piston, seal ring (7) of retainer, and seal ring (8) and D-ring (9) of input shaft	Disassemble rear clutch and check input shaft D-ring, center support seal ring, and piston D-ring; replace if damaged or scratched.
	Defective valve body assembly	Replace valve body assembly.
7. Improper end clutch pressure	Defective seal ring (IO), D-ring (11) and oil seal (12) of end clutch	Disassemble the end clutch and check piston oil seal, D-ring, and center support seal ring; replace if damage or scratches are evident.
	Defective valve body assembly	Replace valve body assembly.
3. Improper low-reverse brake pressure	Damaged O-ring between valve body and transmission	Remove valve body assembly and check O-ring on top of upper valve body; replace if damage or scratches are evident.
	Defective valve body assembly	Replace valve body assembly.
	Defective D-ring (13) of piston or O-ring (14) of center support.	Disassemble transaxle and check D-ring and O-ring; replace if damage or scratches are evident
9. Improper torque converter pressure	Sticking torque converter clutch solenoid (TCC solenoid) or torque converter clutch control valve	Check torque converter clutch system and TCC solenoid for operation.
	Plugged or leaky oil cooler and pipings	Repair or replace cooler or pipings.
	Damaged seal ring (15) of input shaft	Disassemble transaxle and check seal ring; replace if it is damaaed.
	Defective torque converter	Replace torque converter.

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CONVERTER STALL TEST

Stall test consist of determining maximum engine speed obtained at full throttle in "D" and "R" positions. This test checks torque converter stator overrunning clutch operation, and holding ability of transaxle clutches and low-reverse brake.

Caution
During this test, make sure that no one stand in front of or behind vehicle.

1. Check transmission fluid level. Fluid should be at normal operating temperature [70–80°C (158–176°F)]. Engine coolant should also be at normal operating temperature [80–90°C (176–194°F)].
2. Apply chocks to both rear wheels.
3. Attach engine tachometer.
4. Apply parking and service brakes fully.
5. Start engine.
6. With selector lever in "D" position, depress accelerator pedal fully to read engine maximum rpm. Do not hold throttle wide open any longer than is necessary to obtain maximum engine rpm reading, and never longer than 5 seconds at a time. If more than one stall test is required, operate engine at approximately 1,000 rpm in neutral for 2 minutes to cool transmission fluid between tests.

   Stall speed: 2,200–3,200 rpm
7. Place selector lever to "R" position and perform stall test by the same procedure as in foregoing item.

Stall Speed Above Specification in "D"

If stall speed is higher than specification, rear clutch or overrunning clutch of transaxle is slipping. In this case, perform hydraulic test to locate cause of slippage.

Stall Speed Above Specification in "R"

If stall speed is higher than specification, front clutch of transaxle or low-reverse brake is slipping. In this case, perform hydraulic test to locate cause of slippage.

Stall Speed Below Specification in "D" and "R"

If stall speed is lower than specification, insufficient engine output or faulty torque converter is suspected. Check for engine misfiring, ignition timing, valve clearance, etc. If these are good, torque converter is faulty.

TRANSAXLE CONTROL

Symptom	Probable cause	Remedy
Selector lever operation is stiff	Incorrect adjustment of sleeve	Adjust
	Incorrect adjustment of control cable	Adjust
	Excessive wear of detent plate	Replace
	Worn contact surfaces of pushbutton and sleeve	Replace
Starter motor does not operate with the selector lever in the "N" or "P" position	Malfunction in park/neutral position switch	Replace
	Incorrect adjustment of control cable	Adjust
	Malfunction of starter relay	Replace
Will not shift to 4-speed	Malfunction of OD switch	Replace

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A/T SAFETY-LOCK SYSTEM TROUBLESHOOTING

Symptom	Probable cause	Remedy	Ref. page
Selector lever can be selected into R from P without depressing brake pedal with ignition key in a position other than LOCK.	Damaged lock cam B	Check and replace lock cam B.	23-59
	Improperly adjusted shift lock cable, broken inner cable, loose or off connections	Check, adjust or replace the shift lock cable.	23-57
	Broken or sagging outer cable (shift lock cable) return spring	Check and replace shift lock cable.	23-56
Selector lever cannot be selected into R from P by depressing brake pedal with ignition key in position other than LOCK.	Defective selector lever assembly	Check and replace selector lever assembly.	23-55
	Sticking shift lock cable, key interlock cable, and transaxle control cable.	Check and replace shift lock cable, key interlock cable, and transaxle control cable.	23-55
	Foreign matter wedged in lock cams A and B	Check and adjust lock cams A and B.	23-59
	Improperly adjusted shift lock cable, elongated inner cable	Check, adjust, and replace shift lock cable.	23-56
	Sticking slide lever and cam lever inside key cylinder	Check and adjust slide lever and cam lever.	23-56
Selector lever can be selected into R from P when brake pedal is depressed even though the ignition key is in the LOCK position.	Damaged lock cam A	Check and replace lock cam A.	23-59
	Broken or disconnected key interlock cable	Check and replace key interlock cable.	23-56
	Damaged slide lever and cam lever inside key cylinder	Check and replace slide lever and cam lever.	23-56
Selector lever operation from P to R is not smooth.	Improperly adjusted key interlock cable	Check and adjust key interlock cable.	23-58
	Improperly adjusted shift lock cable, elongated inner cable	Check, adjust, and replace shift lock cable.	23-56
	Binding lock cams A and B (in rotation)	Check rotating parts of lock cams A and B.	23-59
	Defective selector lever assembly	Check and replace selector lever assembly.	23-55
	Binding slide lever inside key cylinder	Check slide lever and cam lever.	23-56

Symptom	Probable cause	Remedy	Ref. page
Selector lever cannot be shifted from R to P.	Defective selector lever assembly	Check and replace selector lever assembly.	23-55
	Improperly adjusted transaxle control cable	Adjust transaxle control cable.	23-57
Ignition key cannot be turned to LOCK position with selector lever in P.	Foreign matter wedged in lock cams A and B	Check and replace lock cams A and B.	23-59
	Improperly adjusted key interlock cable, sticking inner cable	Check, adjust, and replace key interlock cable.	23-56
	Binding slide lever inside key cylinder	Check slide lever.	23-56
Ignition key can be turned to LOCK position even with selector lever in position other than P.	Damaged lock cam A	Check and replace lock cam A.	23-59
	Loose key cylinder cover	Check and retighten cover.	23-56
	Broken key interlock cable, loose connections, elongated inner cable	Check and replace key interlock cable.	23-56
	Damaged cam lever inside key cylinder	Check and replace cam lever.	23-56
Buzzer does not sound even when selector lever is placed in R position.	Defective buzzer	Check and replace buzzer.	23-56
	Open-circuited buzzer circuit harness	Check or correct harness.	–
	Defective park/neutral position switch	Check and replace park/neutral position switch.	–
	Improperly adjusted transaxle control cable	Adjust transaxle control cable.	23-55

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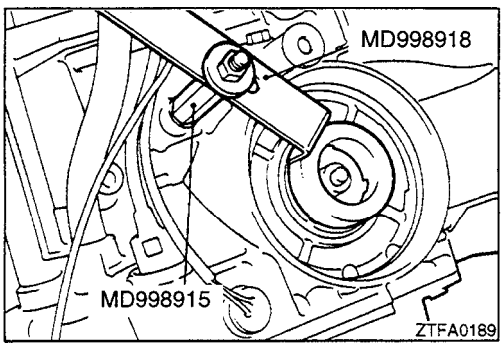
ON-VEHICLE SERVICE

TRANSMISSION FLUID LEVEL CHECK

Refer to GROUP 00 – Maintenance Service.

TRANSMISSION FLUID REPLACEMENT

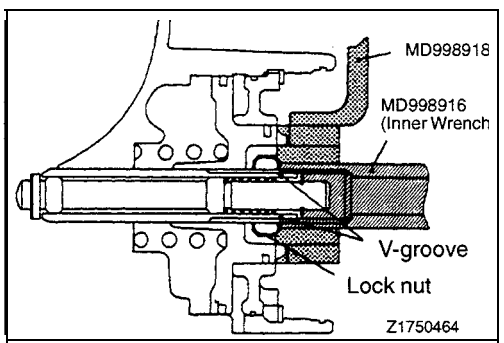
Refer to GROUP 00 – Maintenance Service.



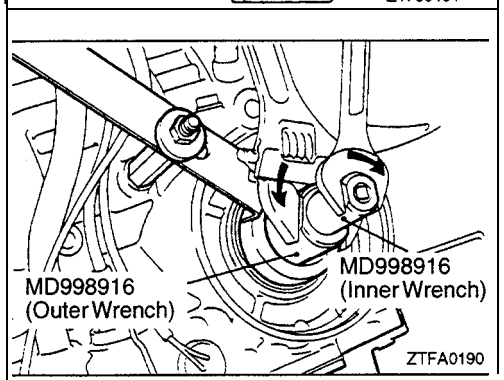
KICKDOWN SERVO ADJUSTMENT

(1) Remove dust, dirt, and other contaminants completely from kickdown (K/D) servo cover and surrounding areas.
(2) Snap off the snap ring and remove K/D servo switch.
(3) Fit claw of special tool into cutout in piston to prevent piston from turning and use adapter to fix the piston into position.

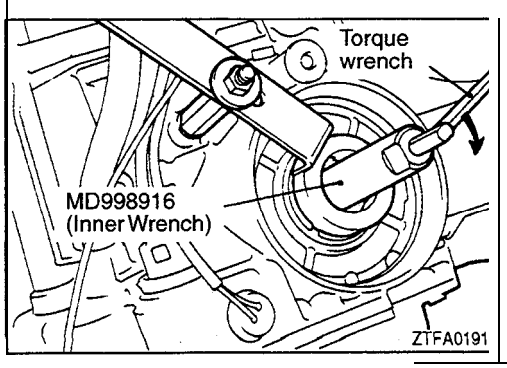
Caution
1. Do not push piston with the special tool.
2. Secure adapter only hand-tight to L/R brake pressure take-up port and do not apply excessive torque.



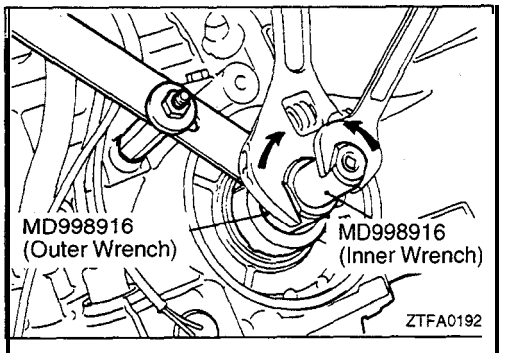
(4) Loosen lock nut to immediately before V-groove in adjust rod (see illustration on left) and tighten special tool (Inner Wrench) until it contacts lock nut.



(5) Fit special tool (Outer Wrench) over the lock nut. Turn Outer Wrench counterclockwise and turn inner cylinder clockwise to lock the lock nut and special tool (Inner Wrench).

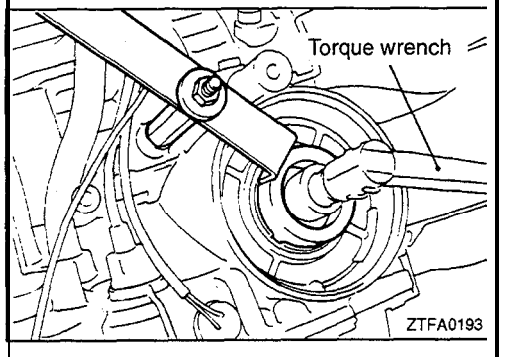


(6) Fit torque wrench to special tool (Inner Wrench) and repeat tightening and loosening cycle two times with a torque of 10 Nm (7.2 ft.lbs.). Then, torque-to 5 Nm (3.6 ft.lbs.). Next, back off special tool (Inner Wrench) 2 to $2^1/_4$ turns.



(7) Fit special tool (Outer Wrench) to lock nut.
Turn Outer Wrench clockwise and Inner Wrench counterclockwise to unlock the lock nut from special tool (Inner Wrench).

Caution
Be sure to apply even torque to the two special tools when unlocking.



(8) Tighten lock nut by hand until it contacts piston. Then, using torque wrench, tighten to specification.

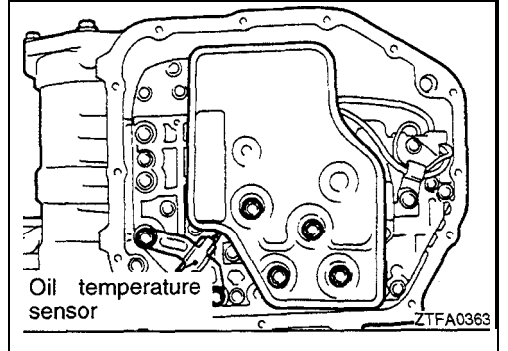
Lock nut: 29 Nm (21 ft.lbs.)

Caution
Use of socket wrench or torque wrench could result in lock nut being turned with adjust rod.

(9) Remove the special tool to secure the piston and torque plug to specification at L/R brake pressure take-up port.

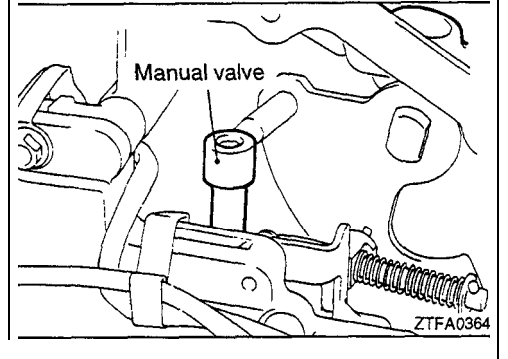
LINE PRESSURE ADJUSTMENT

(1) Discharge ATF.
(2) Remove oil pan.
(3) Remove oil filter.
(4) Remove oil temperature sensor.



(5) Press solenoid valve harness grommet catch to push in grommet; then, remove valve body assembly.

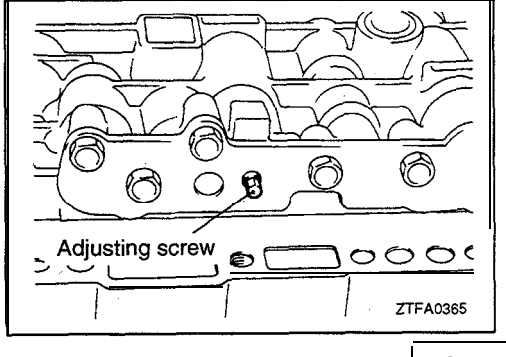
Caution
Do not let manual valve fall.

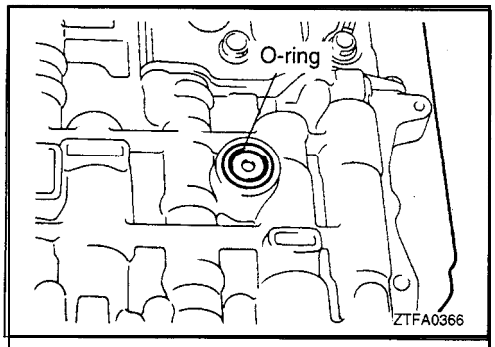


(6) Turn adjusting screw of regulator valve to obtain the specified line pressure (K/D brake pressure).

Standard value: 870-890 kPa (124-127 psi)

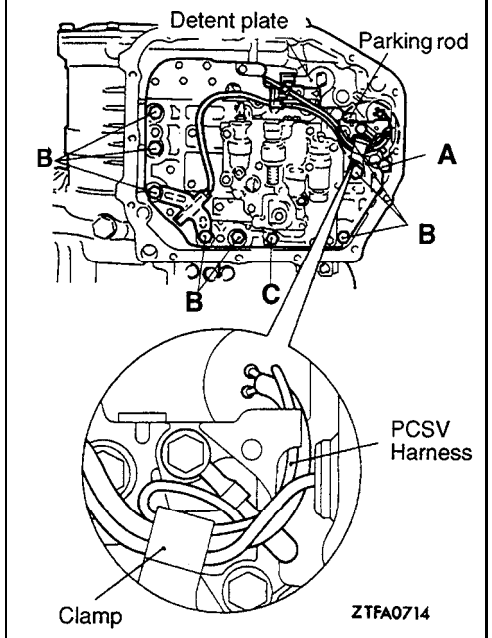
Oil pressure change for each turn of adjustment screw: 38 kPa (5.4 psi)





(7) Check that an O-ring is fitted at the location shown on top of valve body.
(8) Replace O-ring of solenoid valve intermediate grommet with a new one and then fit the O-ring into case.

4992 model>

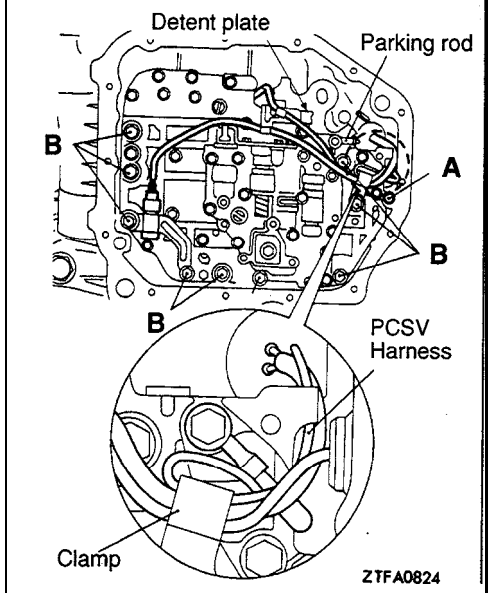


(9) Install valve body and oil temperature sensor.
Bolt A = Length 18 mm (.71 in.)
Bolt B = Length 25 mm (.98 in.)
Bolt C = Length 40 mm (1.57 in.)

Caution
Secure solenoid valve and oil temperature sensor harness at locations shown. Especially the pressure control solenoid valve (PCSV) harness must be routed and clamped as shown in the illustration since it is separated from other harnesses. Failure to secure the harness results in its contact with the detent plate or parking rod.

(10) Install oil filter.
(11) Install new oil pan gasket and oil pan.
(12) Add the specified amount of ATF.
(13) Carry out hydraulic test. Readjust as necessary.

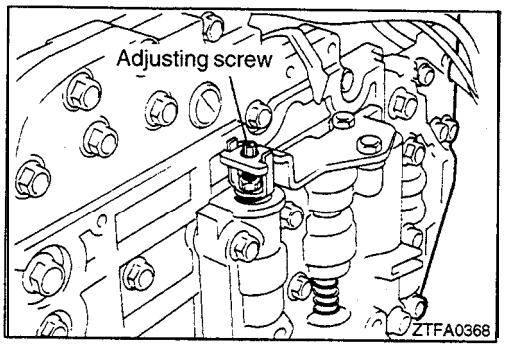
<From 1993 model>



REDUCING PRESSURE ADJUSTMENT

When scan tool is not used

(1) Following the same steps as those in line pressure adjustment, remove parts up to oil filter.
There is no need to remove valve body.



(2) Turn adjusting screw of lower valve body to obtain the specified reducing pressure. Turn it counterclockwise to increase the pressure.

Standard value: 425 ± 10 kPa (60 ± 1 psi)

Oil pressure change for each turn of adjusting screw: 45 kPa (6 psi)

(3) In the same way as in line pressure adjustment, install oil filter and oil pan.
(4) Perform hydraulic test.
Adjust as necessary.

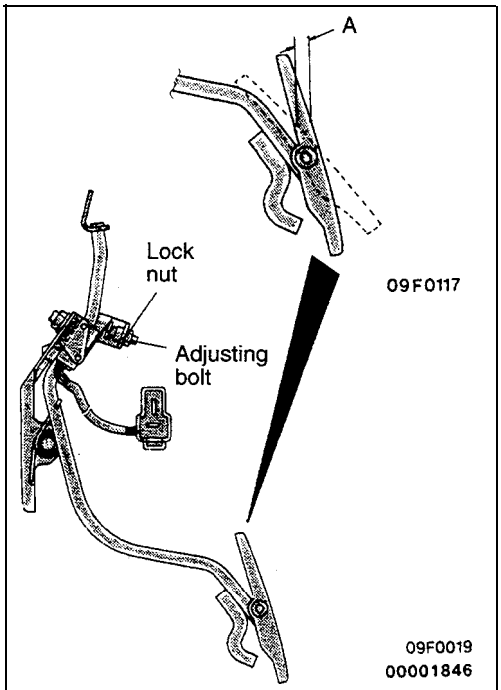
When scan tool is used

(1) Use scan tool to measure the K/D brake apply pressure when the pressure control solenoid valve is force-driven at 50% duty. If the K/D brake apply pressure is not within the specified limit, make readjustment by using the reducing pressure adjustment screw.

Standard value: 275 kPa (39 psi)
Oil pressure change for each turn of adjusting screw: 22 kPa (3 psi)

(2) After adjustment has been made, check that the reducing pressure is in the range 360-480 kPa (51-68 psi).

Caution
This adjustment should be made with oil temperature 70–80°C (158–176°F).
The adjustment made with high oil temperature could result in improper adjustment due to a line pressure drop at idle.

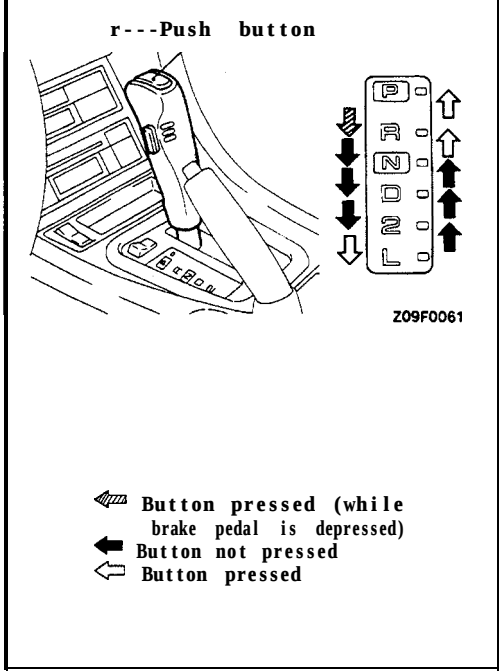


ACCELERATOR SWITCH CHECK AND ADJUSTMENT (1992 model)

Check that current flows between terminals of accelerator switch when accelerator pedal is in free state and that no current flows when the pedal is depressed and the specified stroke A is obtained.

Standard value: 2-6 mm (.079–.24 in.)

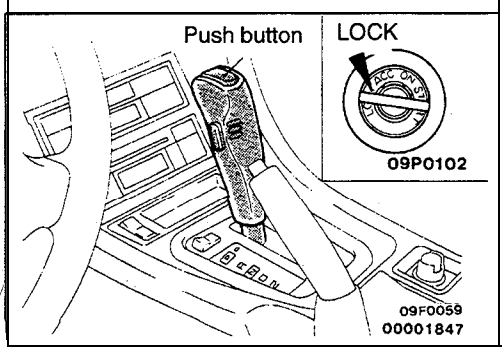
If stroke A is out of specification, adjust with adjusting bolt.



SELECTOR LEVER OPERATION CHECK

1. Shift selector lever to each range and check that lever moves smoothly and clicks into position. Check that position indicator is correct.
2. Check to be sure the selector lever can be shifted to each position (by button operation as shown in the illustration).
3. Start the engine and check if the vehicle moves forward when the selector lever is shifted from N to D, and moves backward when shifted to R.
4. When the shift lever malfunctions, adjust control cable and selector lever sleeve. Check for worn shift lever assembly sliding parts.

NOTE
To move the selector lever from the "P" position to any other position, first turn the ignition key to any position other than "LOCK" and depress the brake pedal.

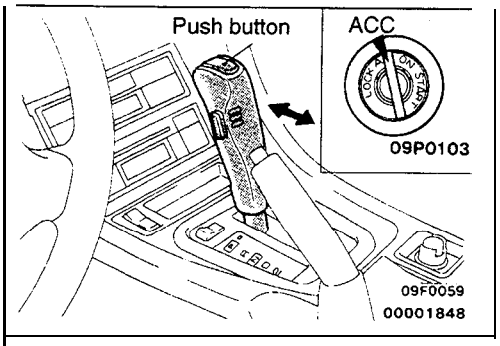


KEY INTERLOCK MECHANISM CHECK

Completely stop the vehicle and switch OFF the engine before making the check

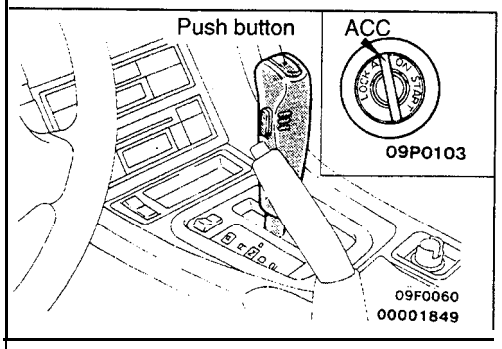
1. Check to be sure that, under the following conditions, the selector lever cannot be moved from the "P" position to any other position.
   Also check, at the same time, that the button cannot be pressed.

   Ignition key position: "LOCK" or removed
   Brake pedal: Depressed

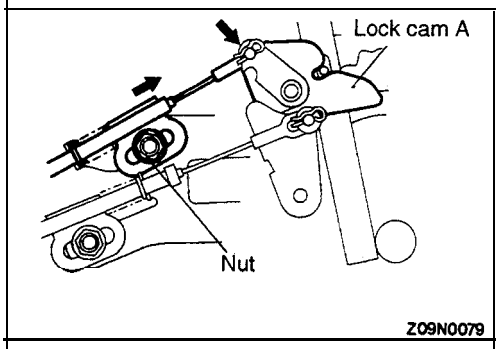


2. Check to be sure that, under the following conditions, the selector lever can be moved from the "P" position to any other position.
   Press the button a few times and check to be sure that the selector lever moves smoothly.

   Ignition key position: "ACC"
   Brake pedal: Depressed
   Button: Pressed



3. Check to be sure that, at all positions of the selector lever (other than "P"), the ignition key cannot be turned to the "LOCK" position.
   Check to be sure that the ignition key smoothly turns to the "LOCK" position when the selector lever is then set to the "P" position and the button is released.
4. If above are not checked okay, adjust key interlock cable mechanism as follows.
   (1) Remove front console assembly.
   (2) Place selector lever into "P" position.
   (3) Turn ignition key to the "LOCK" position.

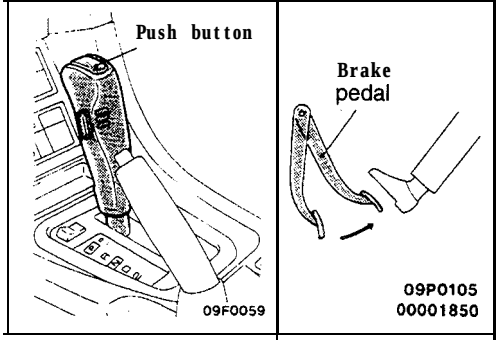


   (4) Loosen nut that secures key interlock cable.
   (5) Lightly pressing lock cam A in the direction of arrow, lightly push key interlock cable to take up slack and tighten nut to secure key interlock cable.
   (6) Reinstall front console assembly.

SHIFT LOCK MECHANISM CHECK

1. Check to be sure that, under the following conditions, the selector lever cannot be moved from the "P" position to any other position.

   Ignition key position: "ACC"
   Brake pedal: Not depressed
   Button: Pressed

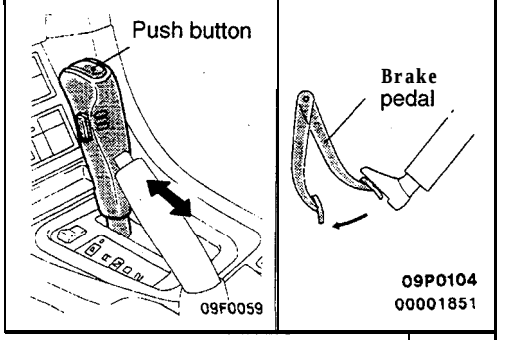


2. Check to be sure that, under the following conditions, the selector lever can be moved smoothly from 'the "P" position to any other position.

   Ignition key position: "ACC"
   Brake pedal: Depressed
   Button: Pressed

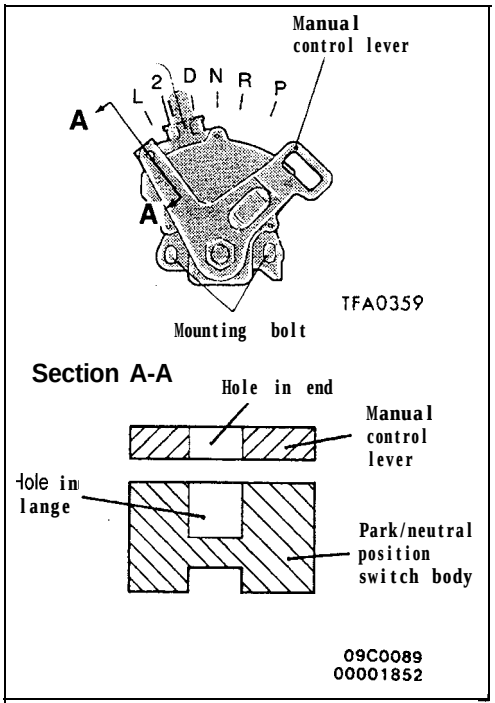
3. Check to be sure that, under the following conditions, the selector lever can be moved smoothly from the "R" position to the "P" position.

   Ignition key position: "ACC"
   Brake pedal: Released
   Button: Pressed



4. If a malfunction is discovered when following the above checking procedures, either adjust or check the shift lock cable mechanism.

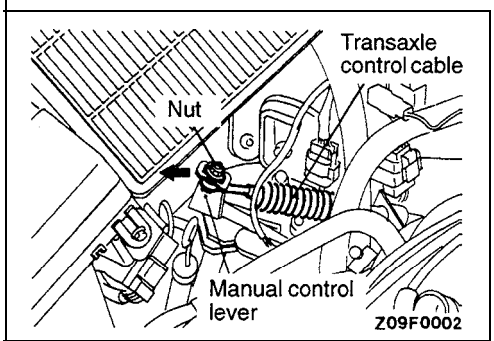
TSB Revision



PARK/NEUTRAL POSITION SWITCH AND CONTROL CABLE ADJUSTMENT

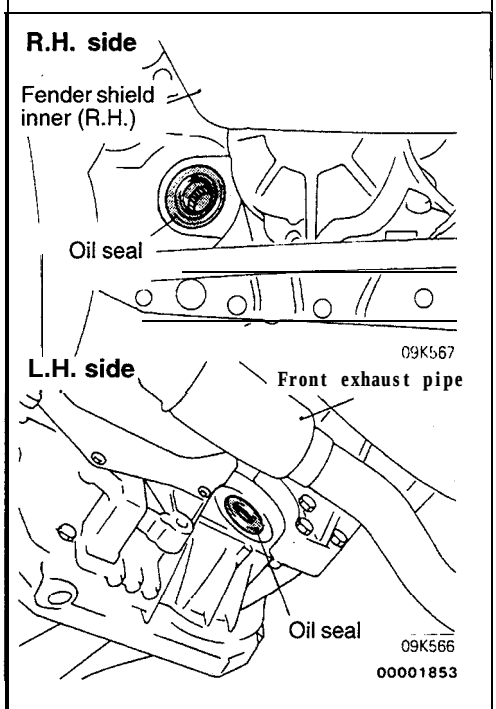
1. Place selector lever in "N" (Neutral) position.
2. Loosen transaxle control cable to manual control coupling adjusting nut to set cable and lever free.
3. Place manual control lever in "N" (Neutral) position.
4. For adjustment, loosen the park/neutral position switch body mounting bolt, and turn park/neutral position switch body so that the end (section A-A in illustration on left) of manual control lever is aligned with the hole in park/neutral position switch body flange.
5. Tighten the mounting bolts of the park/neutral position switch body to the specified torque. Be careful at this time that the position of the switch body is not changed.

   Specified torque: 10–12 Nm (7-9 ft.lbs.)



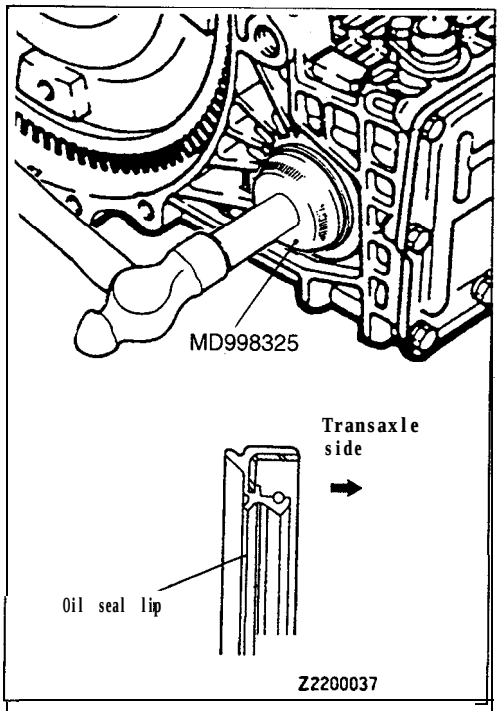
6. Lightly pull the transaxle control cable in the arrow direction, and tighten the adjusting nut to the specified torque.

   Specified torque: 13 Nm (9 ft.lbs.)
7. Check that the selector lever is in "N" position.
8. Check that it securely operates and functions on the transaxle side in the range which corresponds to each position of the selector lever.



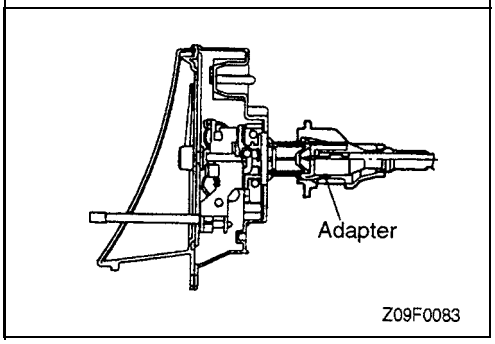
DRIVE SHAFT OIL SEALS REPLACEMENT

(1) Disconnect the drive shaft from the transaxle. (Refer to GROUP 26 – Drive Shaft.)
(2) Using a flat-tip (–) screwdriver, remove the oil seal.



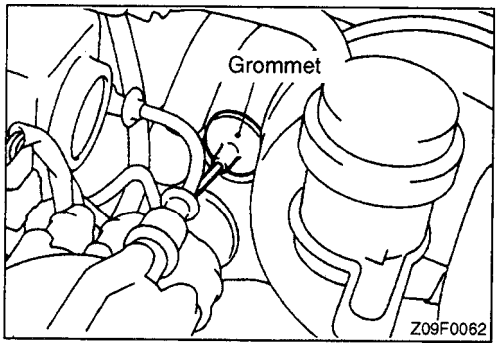
(3) Using the special tool, tap the drive shaft oil seal into the transaxle.
Note in illustration the direction of installation of drive shaft oil seal.
(4) Apply a coating of the transmission fluid to the lip of the oil seal.

Transmission fluid: DIA QUEEN ATF SP or equivalent



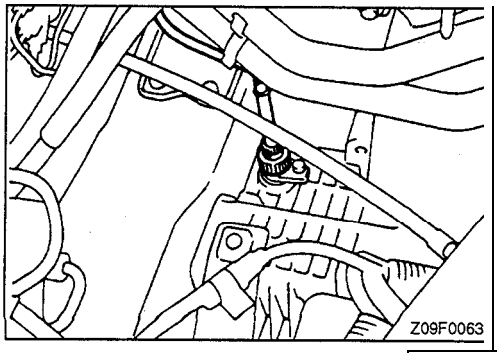
SPEEDOMETER CABLE REPLACEMENT <Up to 1993 models>

1. Correctly insert the adapter into the instrument panel, and fasten the new speedometer cable.



2. Install the grommet so that, as shown in the illustration, the cable attachment part and the projecting part are horizontal.

Caution
The cable arrangement should be made so that the radius of cable bends is 150 mm (5.9 in.) or more.



3. At the transaxle end of the speedometer cable, the key joint should be inserted into the transaxle, and the nut should be securely tightened.

Caution
If the cable is not correctly and securely connected, it may cause incorrect indication by the speedometer, or abnormal noise. Be sure to connect it correctly.

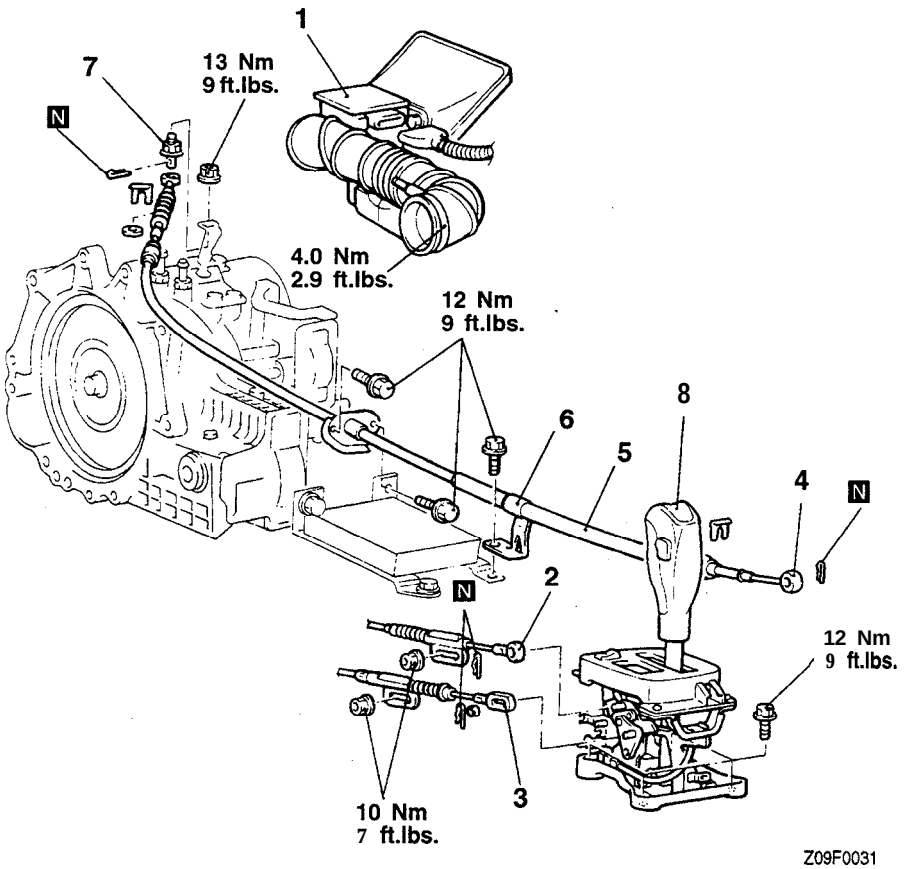
TSB Revision

TRANSAXLE CONTROL

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Front Console Assembly Removal and Installation (Refer to GROUP 52A – Floor Console.)

CAUTION: SRS
When removing and installing the front console assembly, don't allow any impact or shock to the SRS diagnosis unit.



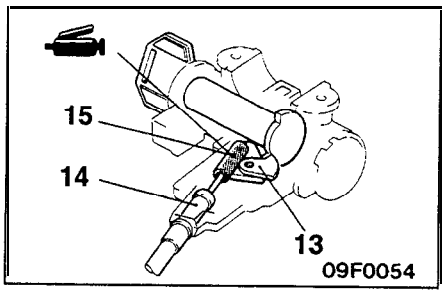
Transaxle control cable removal steps

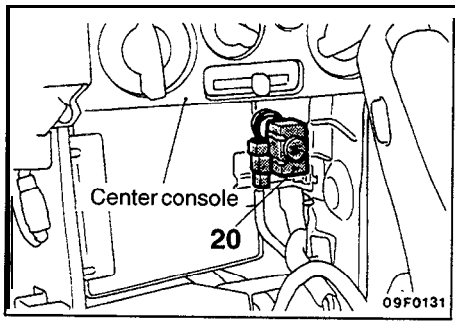
1. Air cleaner cover, Air intake hose
▶C◀ 4. Transaxle control cable assembly connection (Select lever assembly side)
5. Transaxle control cable assembly
6. Clamp
7. Adjuster

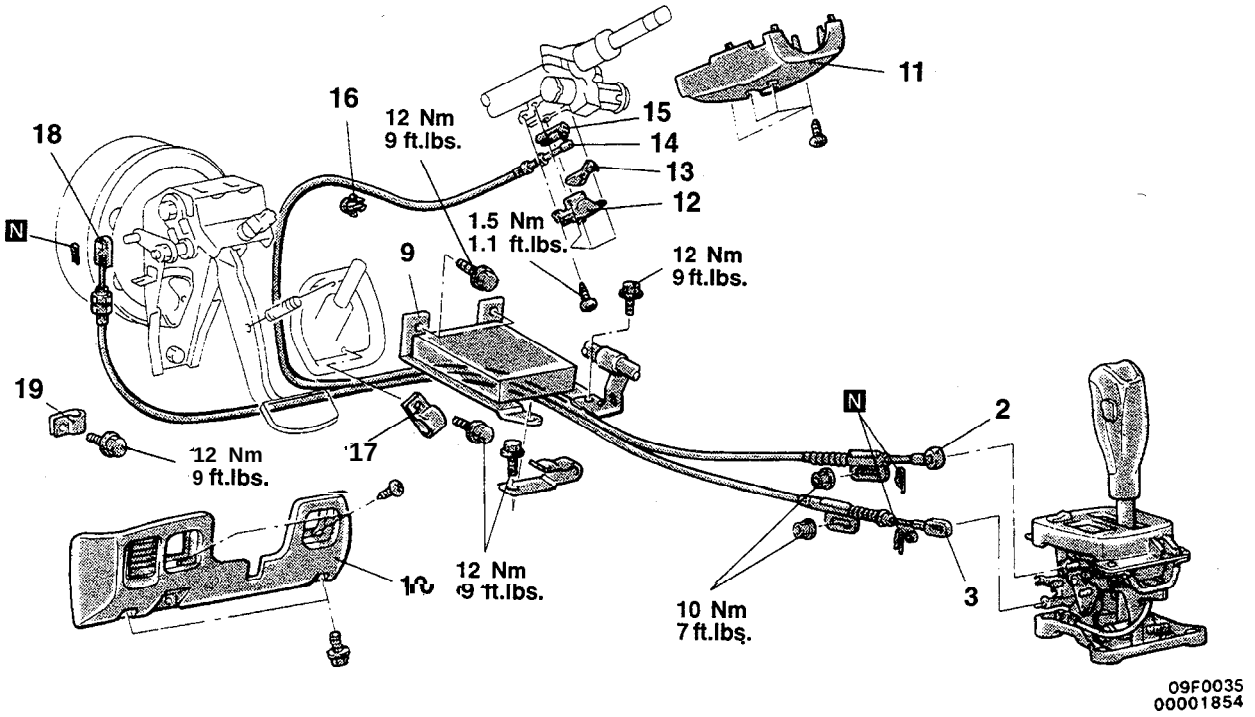
Selector lever assembly removal steps

1. Air cleaner cover, Air intake hose
▶E◀ 2. Key-interlock cable connection (Selector lever assembly side)
▶D◀ 3. Shift-lock cable connection (Selector lever assembly side)
▶C◀ 4. Transaxle control cable connection (Selector lever assembly side)
8. Selector lever assembly

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Key-interlock cable removal steps

- ▶E◀ 2. Key-interlock cable connection (Selector lever assembly side)
- 9. Transaxle control module connection
- 10. Knee protector (Refer to GROUP 52A – Instrument Panel.)
- 11. Column cover lower
- 12. Cover
- ▶B◀ 13. Cam lever
- ▶B◀ 14. Key-interlock cable
- ▶B◀ 15. Slide lever
- 16. Cable guide
- 17. Clamp

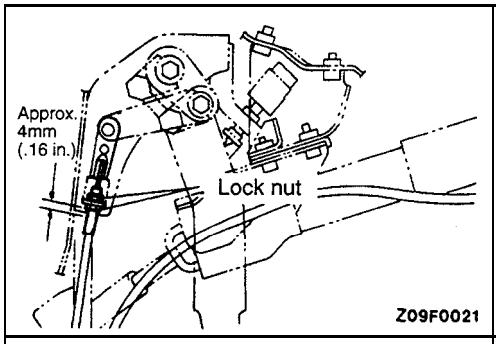
Shift-lock cable removal steps

- ▶D◀ 3. Shift-lock cable connection (Selector lever assembly side)
- 9. Transaxle control module connection
- ▶A◀ 18. Shift-lock cable
- 19. Clamp

Reverse (R) position alarm buzzer removal

- 20. Reverse (R) position alarm buzzer

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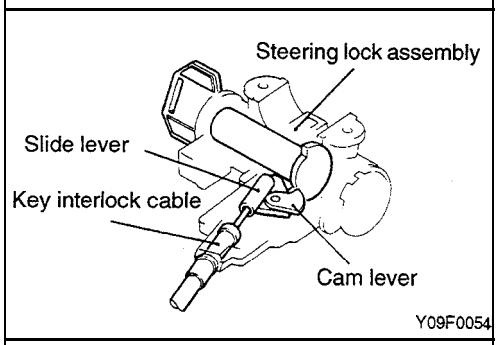


INSTALLATION SERVICE POINTS

▶A◀ SHIFT LOCK CABLE CONNECTION (BRAKE PEDAL SIDE)

Connect the shift lock cable so that its threads measure about 4 mm (.16 in.).

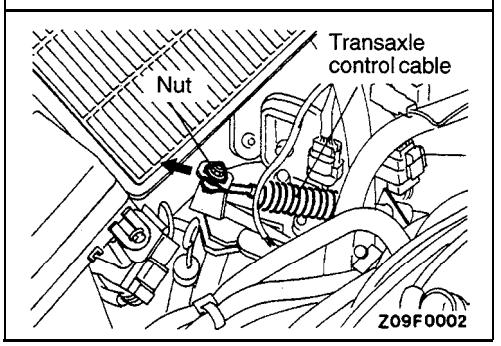
Caution
Do not change the routing of shift lock cable to the selector lever assembly.



▶B◀ SLIDE LEVER / KEY INTERLOCK CABLE (STEERING LOCK ASSEMBLY SIDE) / CAM LEVER INSTALLATION

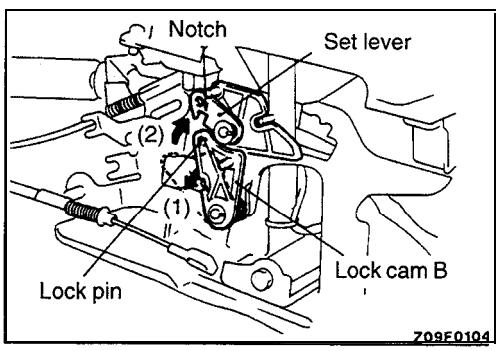
(1) Place the ignition key at the "LOCK" position or keep it removed.
(2) Install the slide lever, key interlock cable, and cam lever to the steering lock assembly as shown.

Caution
Do not change the routing of key interlock cable to the selector lever assembly.



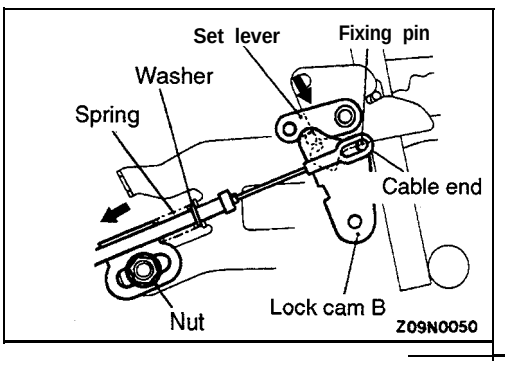
▶C◀ TRANSAXLE CONTROL CABLE CONNECTION (SELECTOR LEVER ASSEMBLY SIDE)

Connect the transaxle control cable, then make the following adjustment.
(1) Place the selector lever in "N" position.
(2) Loosen the nut and slightly pull the transaxle control cable in the direction of the arrow; then, tighten the nut.



▶D◀ SHIFT LOCK CABLE CONNECTION (SELECTOR LEVER ASSEMBLY SIDE)

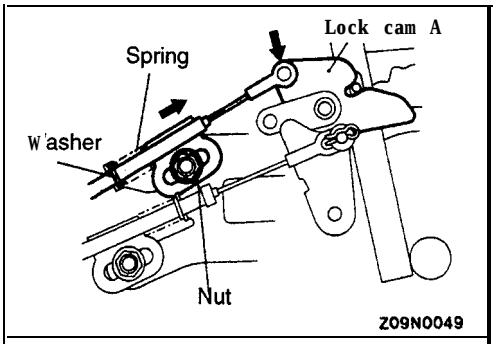
(1) Place the selector lever in "P" position.
(2) Disconnect the key interlock cable from the selector lever assembly side.
(3) Turn the lock cam B counterclockwise (arrow (1)) to move the set lever upward (arrow (2)).
(4) Fit the cutout in set lever to the lock pin of lock cam B.



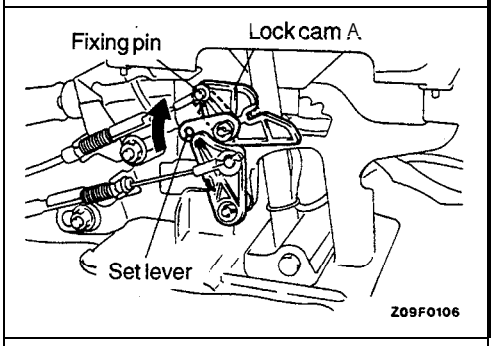
(5) Connect the shift lock cable to lock cam B and temporarily tighten the nut.
At this time, install the spring and washer, which have been fitted to the shift lock cable, as shown.
(6) Pressing the set lever to prevent lock cam B from moving, lightly pull the shift lock cable to take up slack and tighten the nut to secure the shift lock cable into position.

NOTE
Make sure that the shift lock cable end is in contact with the fixing pin of lock cam B as shown, then install the washer and snap pin.

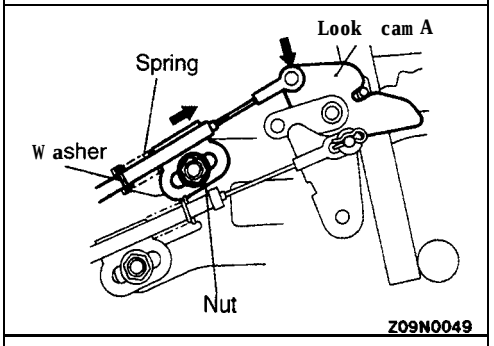
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(7) Connect the key interlock cable to lock cam A and temporarily tighten the nut.
At this time, install the spring and washer, which have been fitted to the key interlock cable, as shown.
(8) Lightly pressing lock cam A in the direction of arrow, lightly push the key interlock cable to take up slack and tighten the nut to secure the key interlock cable in position.

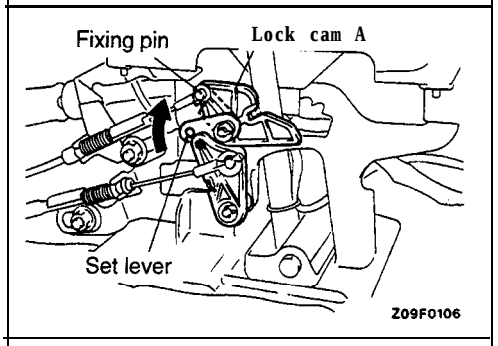


(9) Turn the set lever and fit it onto the fixing pin on lock cam A, then install the snap pin.
(10) After the key interlock cable has been connected, check the shift lock and key interlock mechanism. (Refer to P.23-51, 52.)

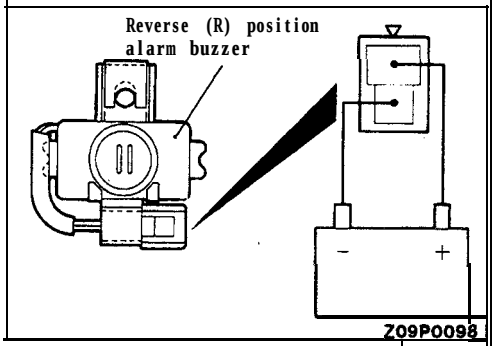


▶E◀ KEY INTERLOCK CABLE CONNECTION (SELECTOR LEVER ASSEMBLY SIDE)

(1) Place the selector lever into "P" position.
(2) Connect the key interlock cable to lock cam A and temporarily tighten the nut.
At this time, install the spring and washer, which have been fitted to the key interlock cable, as shown.
(3) Lightly pressing lock cam A in the direction of arrow, lightly push the key interlock cable to take up slack and tighten the nut to secure the key interlock cable in position.



(4) Turn the set lever and fit it onto the fixing pin on lock cam A, then install the snap pin.
(5) After the key interlock cable has been connected, check the key interlock mechanism. (Refer to P.23-51.)



INSPECTION

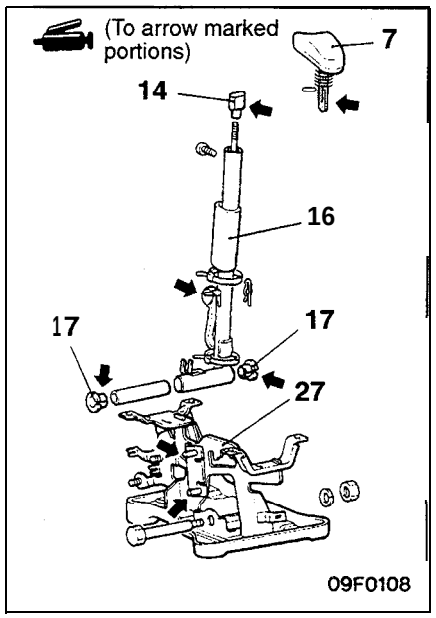
- Check the control cable for function and for damage.
- Check the outer cable (key interlock cable, shift lock cable) for damage and spring for breakage and tension.
- Check the inner cable (key interlock cable, shift lock cable) for extension.

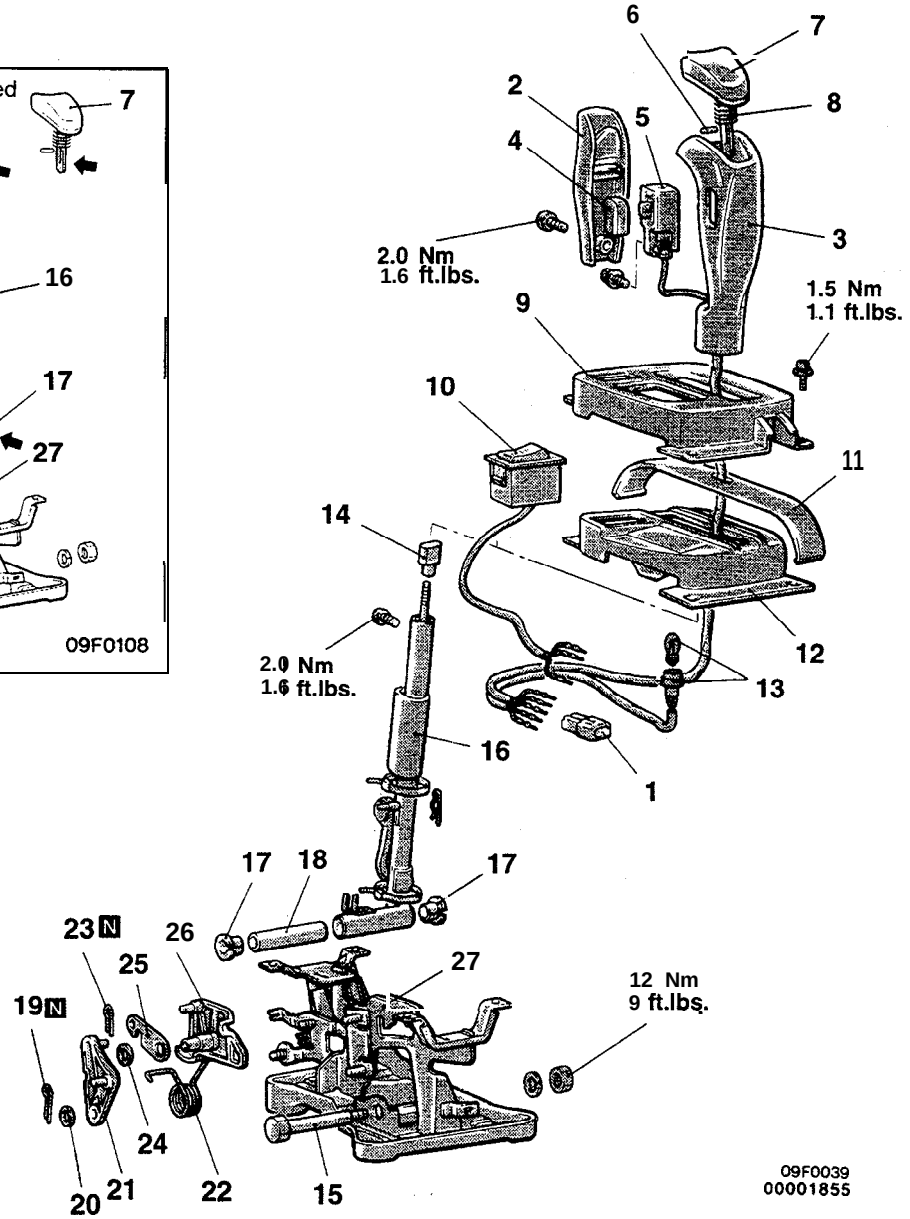
REVERSE (R) POSITION ALARM BUZZER CHECK

Check that the buzzer sounds when battery voltage is applied across terminals.

SELECTOR LEVER ASSEMBLY

DISASSEMBLY AND REASSEMBLY

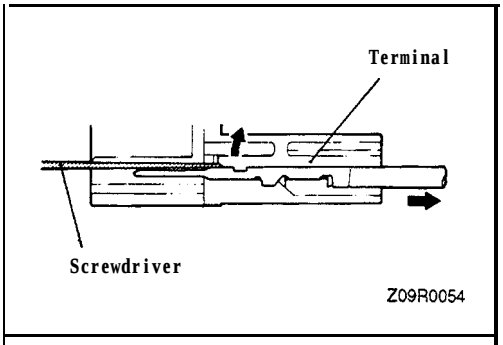




Disassembly steps

◀A▶ 1. Overdrive control switch, position light and Power (PWR)/Economy (ECO)/Hold (HOLD) changeover switch connector
2. Cover
3. Selector knob
◀B▶ 4. Overdrive control switch button
◀B▶ 5. Overdrive control switch
6. Pin
7. Pushbutton
8. Spring
9. Indicator panel
10. Power (PWR)/Economy (ECO)/Hold (HOLD) changeover switch connector
11. Slider
12. Indicator panel lower
13. Socket assembly
▶A◀ 14. Sleeve
15. Bolt
16. Lever assembly
17. Bushing
18. Pipe
19. Cotter pin
20. Washer
21. Lock cam B
22. Spring
23. Cotter pin
24. Washer
25. Set lever
26. Lock cam A
27. Bracket assembly

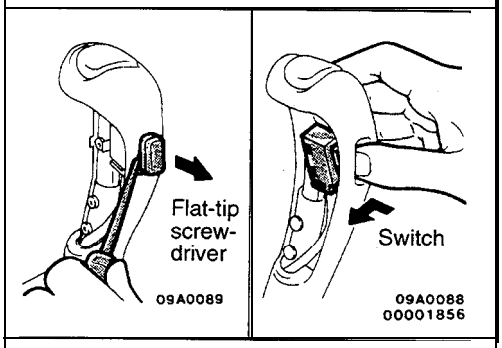
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DISASSEMBLY SERVICE POINTS

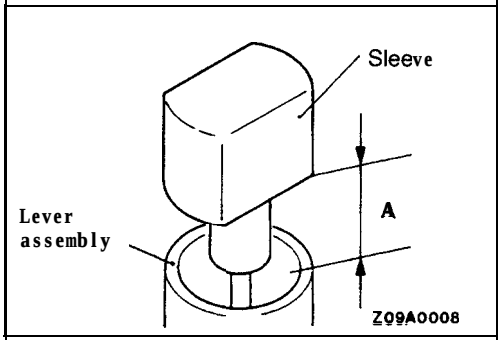
◀A▶ OVERDRIVE CONTROL SWITCH CONNECTOR REMOVAL

Disconnect the overdrive control switch connector and then remove the terminal from the overdrive control switch connector.



◀B▶ OVERDRIVE CONTROL SWITCH BUTTON / OVERDRIVE CONTROL SWITCH REMOVAL

(1) Using the flat-tip screwdriver, remove the overdrive control switch button.
(2) Remove the overdrive control switch mounting screw.
(3) Pressing the switch, remove the overdrive control switch.

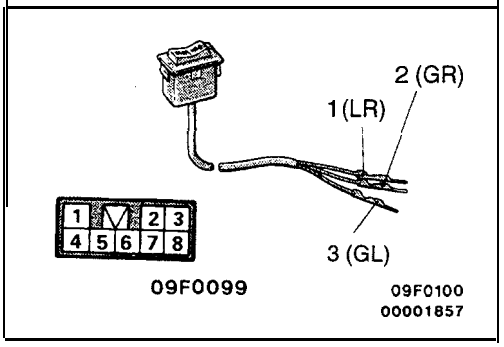


REASSEMBLY SERVICE POINT

,A(SLEEVE INSTALLATION

Place the selector lever in the "N" position, and then turn the sleeve so that the clearance between the sleeve and the lever assembly end is within the standard value.

Standard value (A): 15.2–15.9 mm (.598–.625 in.)



INSPECTION

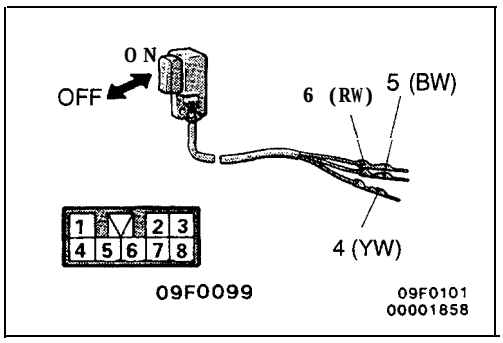
- Check the detent plate for wear.
- Check the bushing for wear or damage.
- Check the spring for damage or deterioration.

POWER (PWR)/ECONOMY (ECO)/HOLD (HOLD) SWITCH CHECK

Check for continuity between terminals when the switch is OFF and when ON.

Switch position	Terminal No.		
	1	2	3
ON (PWR)	○	○	
OFF (ECO)			
ON (HOLD)		○	○

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OVERDRIVE CONTROL SWITCH CHECK

Check for continuity between terminals when the switch is OFF and when ON.

Switch position	Terminal No.		
	4	5	6
ON (Overdrive activation)		○	○
OFF (Overdrive non-activation)	0		0

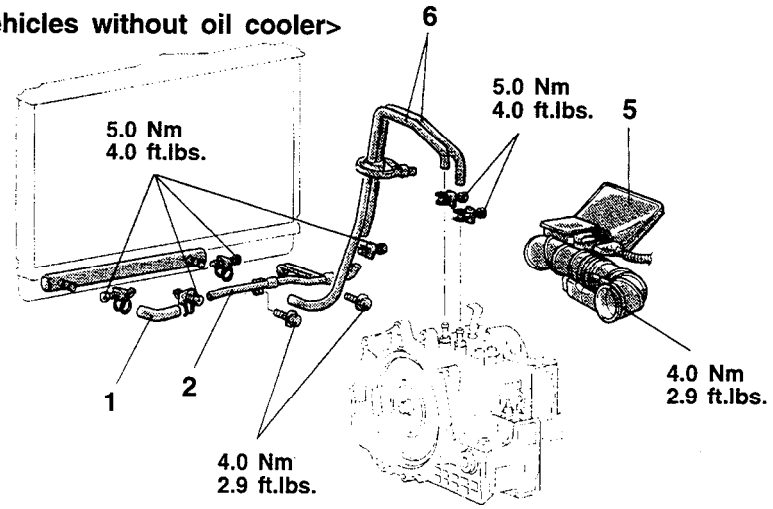
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TRANSAXLE OIL COOLER, HOSES, TUBES

REMOVAL AND INSTALLATION

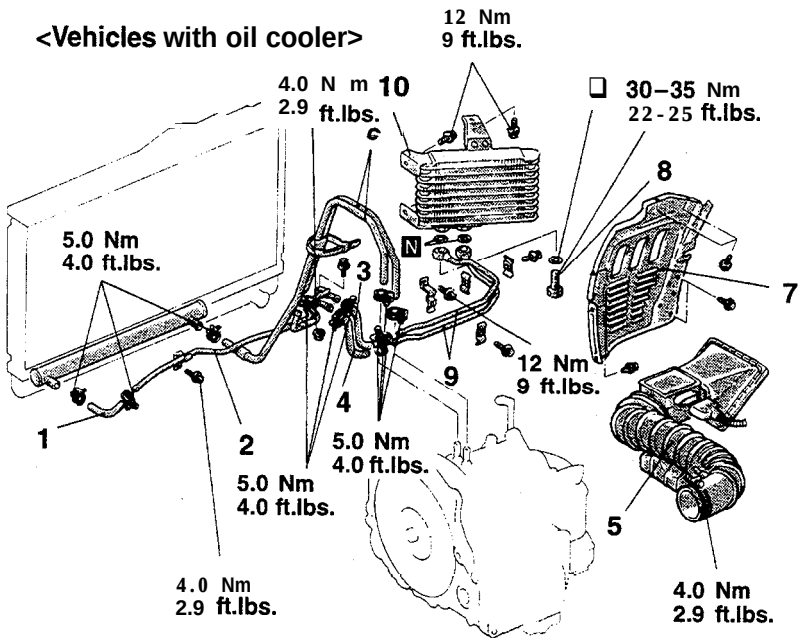
Pre-removal and Post-installation Operation
- Automatic Transmission Fluid Drainage and Filling (Refer to GROUP 00 – Maintenance Service.)
- Front Under Cover Removal and Installation (Refer to GROUP 51 – Front Bumper.)

<Vehicles without oil cooler>



09F0038

<Vehicles with oil cooler>



09F0116
00001859

◀A▶ 1. Hose
◀A▶ 2. Tube assembly
◀A▶ 3. Feed hose
◀A▶ 4. Return hose

Hose assembly removal steps

5. Air cleaner cover, Air intake hose
◀B▶ 6. Hose assembly

Tube assembly removal steps

7. Front splash shield extension (right side)
◀C▶ ▶A◀ 8. Eye bolt
9. Tube assembly

Transaxle oil cooler removal steps

7. Front splash shield extension (right side)
◀C▶ ▶A◀ 8. Eye bolt
10. Transaxle oil cooler

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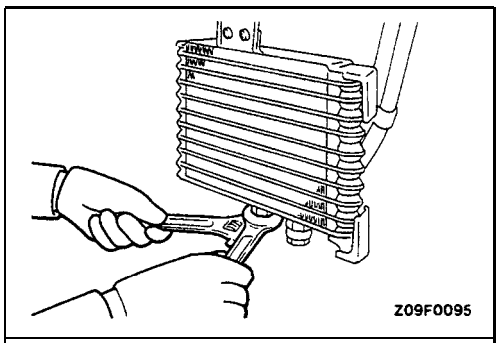
REMOVAL SERVICE POINTS

◀A▶ HOSE / TUBE ASSEMBLY / FEED HOSE / RETURN HOSE REMOVAL

Caution
Be careful not to spill the transmission fluid when removing components.

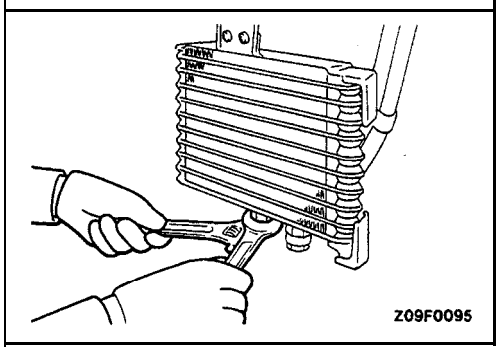
◀B▶ HOSE ASSEMBLY REMOVAL

Caution
1. When removing the hose assembly; be careful not to allow the transmission fluid to spill.
2. After removing the hose assembly, plug so that foreign materials cannot enter the transaxle.



◀C▶ EYE BOLT REMOVAL

(1) Wipe the connection threads and tightly contacting surfaces clean of dust and dirt.
(2) Secure the oil cooler connector with a spanner to prevent excessive force from being applied to it, then loosen the eye bolt.



INSTALLATION SERVICE POINT

▶A◀ EYE BOLT INSTALLATION

(1) Wipe the connection threads and tightly contacting surfaces clean of dust and dirt.
(2) Secure the oil cooler connector with a spanner to prevent excessive force from being applied to it, then tighten the eye bolt.

INSPECTION

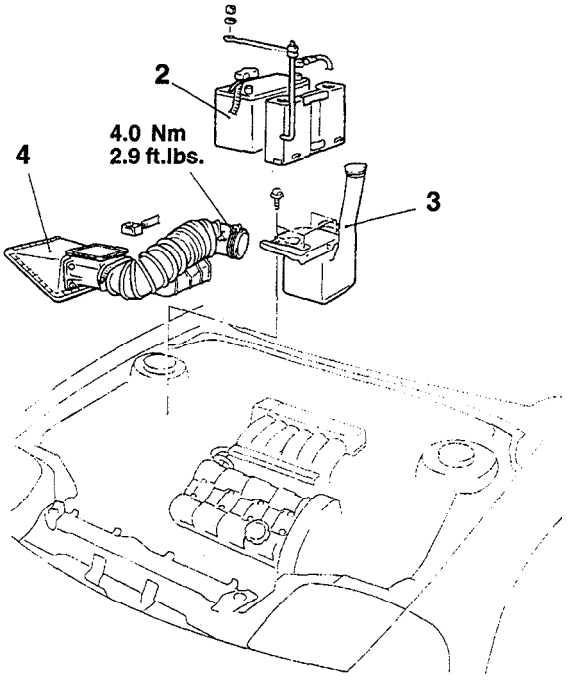
- Check the hose for crack, damage and clog.
- Check for rusted or clogged radiator oil cooler.
- Check oil cooler fins for bend, damage, and clogged foreign matter.

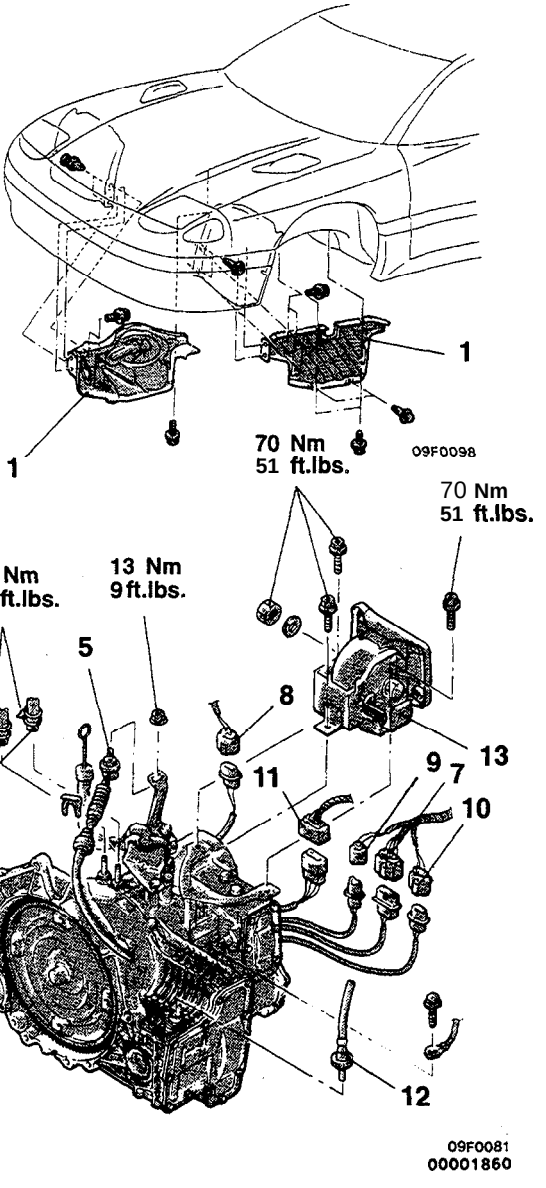
TRANSAXLE ASSEMBLY

REMOVAL AND INSTALLATION

Pre-removal Operation
- Place Selector Lever in "N" Position and Stop the Engine.
- Transaxle Fluid Draining (Refer to GROUP 00 – Maintenance Service.)
- Front Under Cover Removal (Refer to GROUP 51 – Front Bumper.)

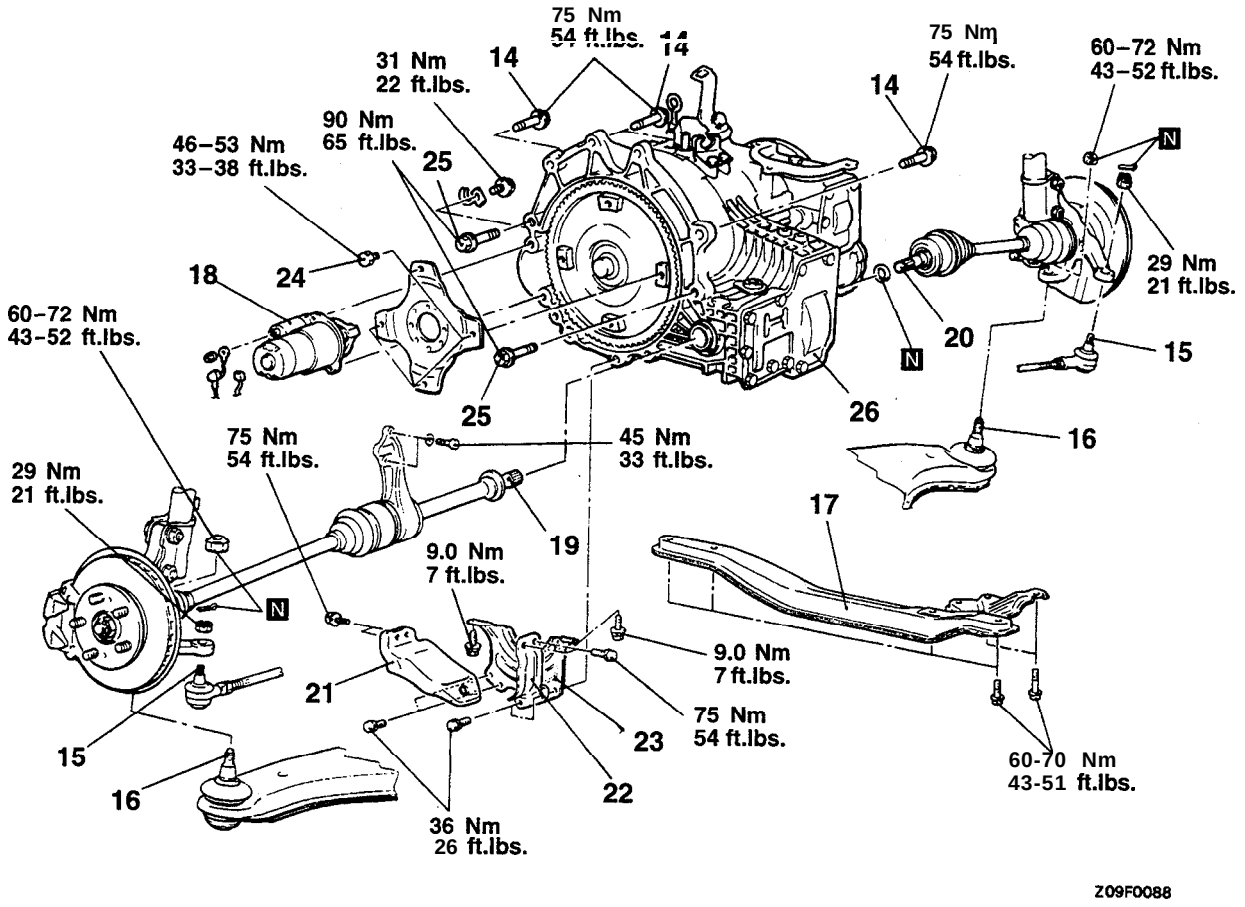
Post-installation Operation
- Front Under Cover Installation (Refer to GROUP 51 – Front Bumper.)
- Transaxle Fluid Supplying (Refer to GROUP 00 – Maintenance Service.)
- Selector Lever Operation Check
- Speedometer Operation Check





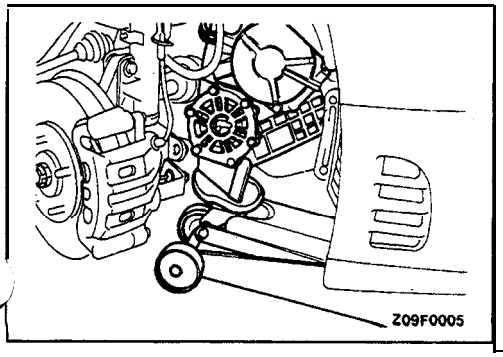
Removal steps
1. Side under cover
2. Battery
3. Battery seat, Washer tank
4. Air cleaner cover, Air intake hose
▶C◀ 5. Transaxle control cable connection
6. Oil cooler hose connection
7. Park/neutral position switch connector
8. Kickdown servo switch connector
9. Pulse generator connector
10. Oil temperature sensor connector
11. Shift control solenoid valve connector
12. Speedometer cable <Up to 1993 models> or speedometer connector <From 1994 models> connection
13. Transaxle mount bracket connection

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14. Transaxle assembly upper part coupling bolt
◀B▶ 15. Tie rod end connection
◀B▶ 16. Lower arm ball joint connection
17. Right member
18. Starter
◀C▶ 19. Drive shaft (left side), Inner shaft assembly
◀C▶ ▶B◀ 20. Drive shaft (right side)
21. Transaxle stay (front bank side)
22. Transaxle stay (rear bank side)
23. Bell housing cover
◀D▶ 24. Special bolts
◀D▶ 25. Transaxle assembly lower part coupling bolt
◀D▶ ▶A◀ 26. Transaxle assembly



Z09F0005

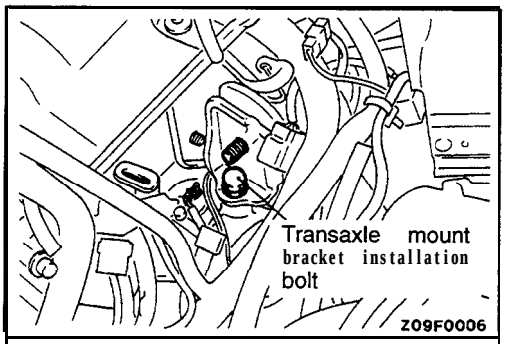
REMOVAL SERVICE POINTS

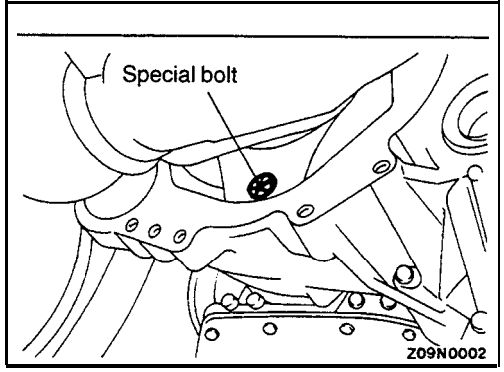
◀A▶ TRANSAXLE MOUNT BRACKET DISCONNECTION

(1) Raise the transaxle assembly with a jack up to a level where no weight is applied to the mount bracket.

Caution
When raising the transaxle assembly, make sure it is supported over a wide area and no local force is being applied.

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(2) Remove the nut and move the bolt so that a spanner can be applied to the transaxle mount bracket mounting bolt; then, remove the transaxle mount bracket mounting bolt.

◀B▶ TIE ROD END / LOWER ARM BALL JOINT DISCONNECTION

Refer to GROUP 22 – Manual Transaxle.

◀C▶ DRIVE SHAFT (LEFT SIDE) AND INNER SHAFT ASSEMBLY / DRIVE SHAFT (RIGHT SIDE) REMOVAL

Refer to GROUP 22 – Manual Transaxle.

◀D▶ SPECIAL BOLTS / TRANSAXLE ASSEMBLY LOWER PART COUPLING BOLT / TRANSAXLE ASSEMBLY REMOVAL

(1) Support the transaxle assembly with the transaxle jack.
(2) Rotating the crankshaft, remove the special bolts at four places.
(3) After removing the special bolts, push the torque converter toward transaxle so that it does not remain on the engine side.
(4) Remove coupling bolt at the bottom of transaxle assembly and lower the transaxle assembly.

INSTALLATION SERVICE POINTS

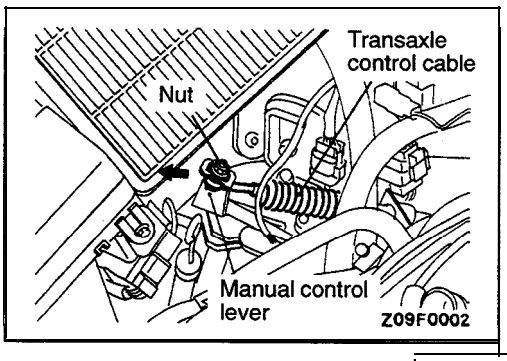
▶A◀ TRANSAXLE ASSEMBLY INSTALLATION

Attach the torque converter on the transaxle side and mount the transaxle assembly on the engine.

Caution
If the torque converter is mounted first on the engine, the oil seal on the transaxle side may be damaged. Therefore, be sure to first assemble the torque converter on the transaxle side.

▶B◀ DRIVE SHAFT INSTALLATION (RIGHT SIDE)

Refer to GROUP 22 – Manual Transaxle.



▶C◀ TRANSAXLE CONTROL CABLE CONNECTION

(1) Connect the transaxle control cable to the manual control lever and tighten the nut temporarily.
(2) Loosen the nut, pull the transaxle control cable lightly in the arrow direction and retighten the nut.

PROPELLER SHAFT

CONTENTS

PROPELLER SHAFT **3**

SPECIAL TOOL **3**

SPECIFICATIONS **2**

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General Specifications 2

Lubricants.. 2

Service Specifications 2

TROUBLESHOOTING **3**

SPECIFICATIONS

GENERAL SPECIFICATIONS

PROPELLER SHAFT

Items		Specifications
Type		4 joint propeller shaft
Length x O.D. mm (in.) <Up to 1993 models>	Front	673.5 x 65 (26.52 x 2.56)
	Center	662.5 x 65 (26.08 x 2.56)
	Rear	555.5 x 75 (21.87 x 2.95)
Length x O.D. mm (in.) <From 1994 models>	Front	698.5 x 65 (27.50 x 2.56)
	Center	662.5 x 65 (26.08 x 2.56)
	Rear	555.5 x 65 (21.87 x 2.56)

UNIVERSAL JOINT

Items		Specifications
Type	No. 1 (front)	Cross type
	No. 2 (center front)	Cross type
	No. 3 (center rear) [Lobro joint]	Constant velocity type
	No. 4 (rear)	Cross type
Lubrication		Pre-packed type
Size mm (in.)	Cross type joint journal O.D.	16 (.63)
	Constant velocity joint O.D.	99.73 (3.93)

NOTE
Propeller shaft length indicates the length between the center points of each joint.

SERVICE SPECIFICATIONS

Items		Limit
Propeller shaft runout (Dial indicator reading) mm (in.)	Front	0.6 (.024) or less
	Center	0.6 (.024) or less
	Rear	0.6 (.024) or less

LUBRICANTS

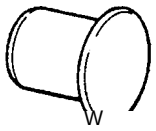
Items		Specified lubricant	Quantity
Sleeve yoke surface		Hypoid Gear Oil/API classification GL-4, SAE 75W-90 or 75W-85W	As required
Lobro joint assembly	Outer and inner races ball grooves	Repair kit grease	As required
	Lobro joint assembly inner part	Repair kit grease	45-55 g (1.59–1.94 oz.)

ADHESIVE

Item	Specified adhesive
Lobro joint rubber packing	3M ATD Part No. 8155 or equivalent

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SPECIAL TOOL

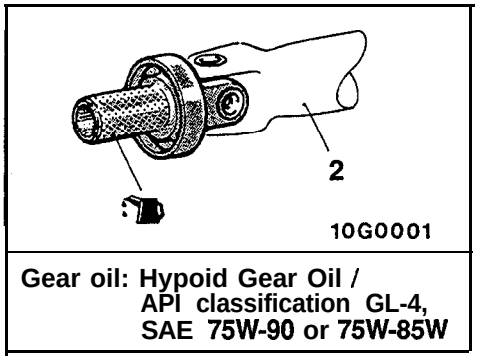
Tool	Tool number and name	Supersession	Application
	MB991193 Plug	General service tool	Prevention of entry of foreign objects into the transaxle and transfer

TROUBLESHOOTING

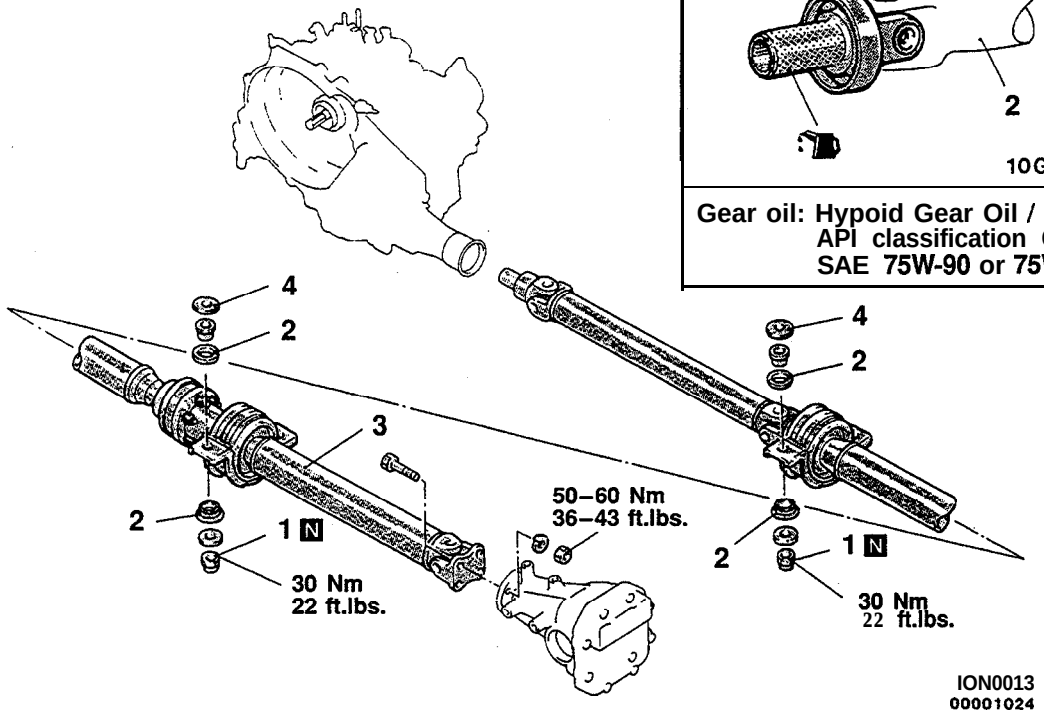
Symptom	Probable cause	Remedy
Noise at start	Worn journal bearing	Replace
	Worn sleeve yoke spline	Replace
	Loose propeller shaft installation	Retighten
Noise and vibration at high speed	Unbalanced propeller shaft	Replace
	Worn journal bearing	Replace

PROPELLER SHAFT

REMOVAL AND INSTALLATION



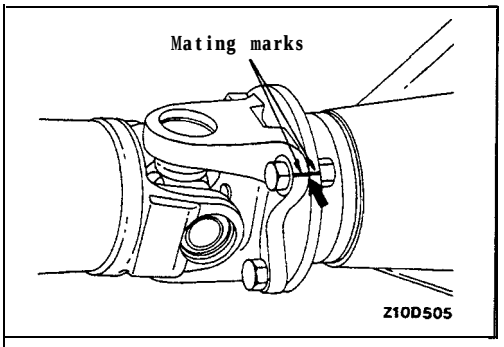
Gear oil: Hypoid Gear Oil / API classification GL-4, SAE 75W-90 or 75W-85W



Removal steps

1. Self-locking nut
▶B◀ 2. Insulator
◀A▶ ▶A◀ 3. Propeller shaft
◀B▶ 4. Spacer

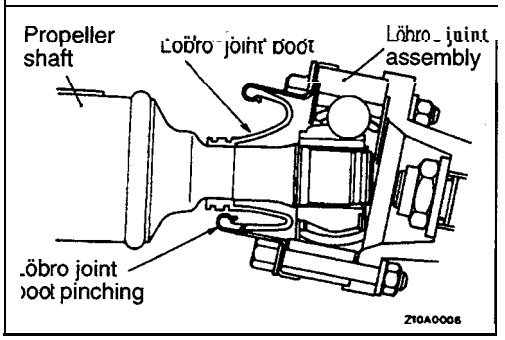
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REMOVAL SERVICE POINTS

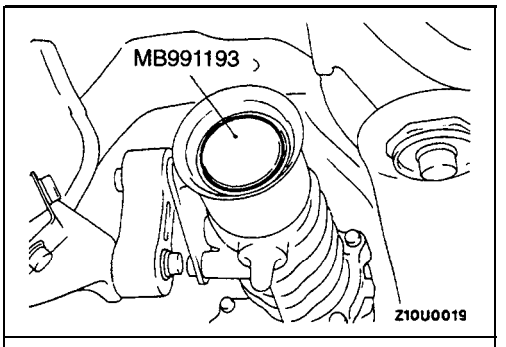
◀A▶ PROPELLER SHAFT REMOVAL

(1) Make mating marks on the differential companion flange and flange yoke.



Caution
Remove the propeller shaft in a straight and level manner so as to ensure that the boot is not damaged through pinching.

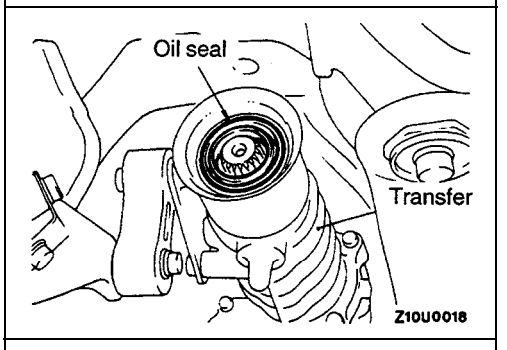
NOTE
Damage to the boot can be avoided, and the work will be easier, if a piece of cloth or similar material is inserted in the boot.



(2) Use the special tool provided as a cover to prevent the entry of foreign objects into the transfer.

◀B▶ SPACER REMOVAL

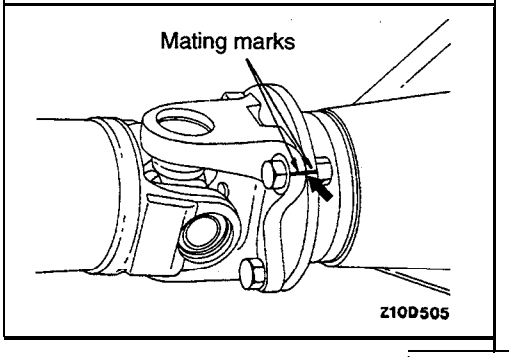
The number of spacers necessary may differ from one location to another (front, rear, right, left). Record the number of spacers used to ensure correct installation.



INSTALLATION SERVICE POINTS

▶A◀ PROPELLER SHAFT INSTALLATION

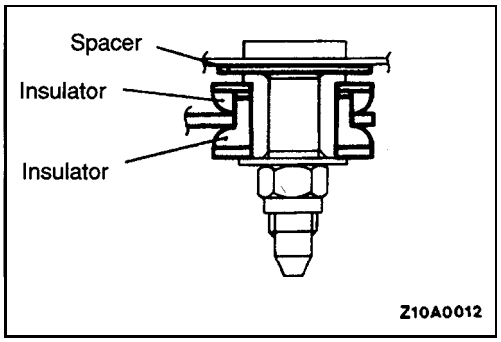
(1) **Caution**
Be cautious to avoid damage to the oil seal lip of the transfer.



(2) Install the propeller shaft to the companion flange with the mating marks properly aligned.

Caution
Tighten installation bolts after removing oil and grease from threads to prevent them from loosening due to lubrication.

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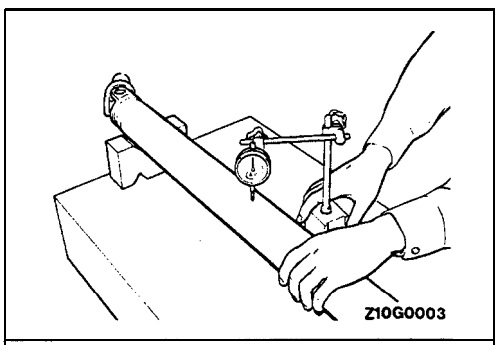
▶B◀ INSULATOR INSTALLATION

Install spacers and insulators as indicated in the illustration.

Caution
When installing the center bearing, assemble the same spacers as removed from it (or new spacers of equal thickness).

INSPECTION

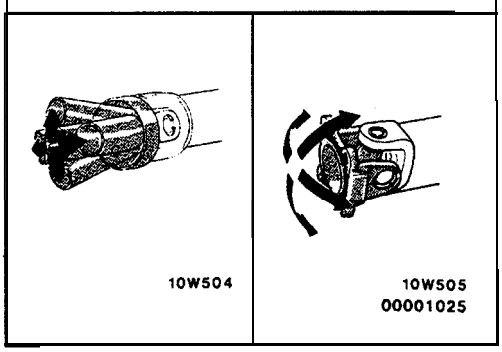
- Check the sleeve yoke, center yoke and flange yoke for wear, damage or cracks.
- Check the propeller shaft yokes for wear, damage or cracks.
- Check the propeller shaft for bends, twisting or damage.



- Measure the propeller shaft runout with a dial indicator.

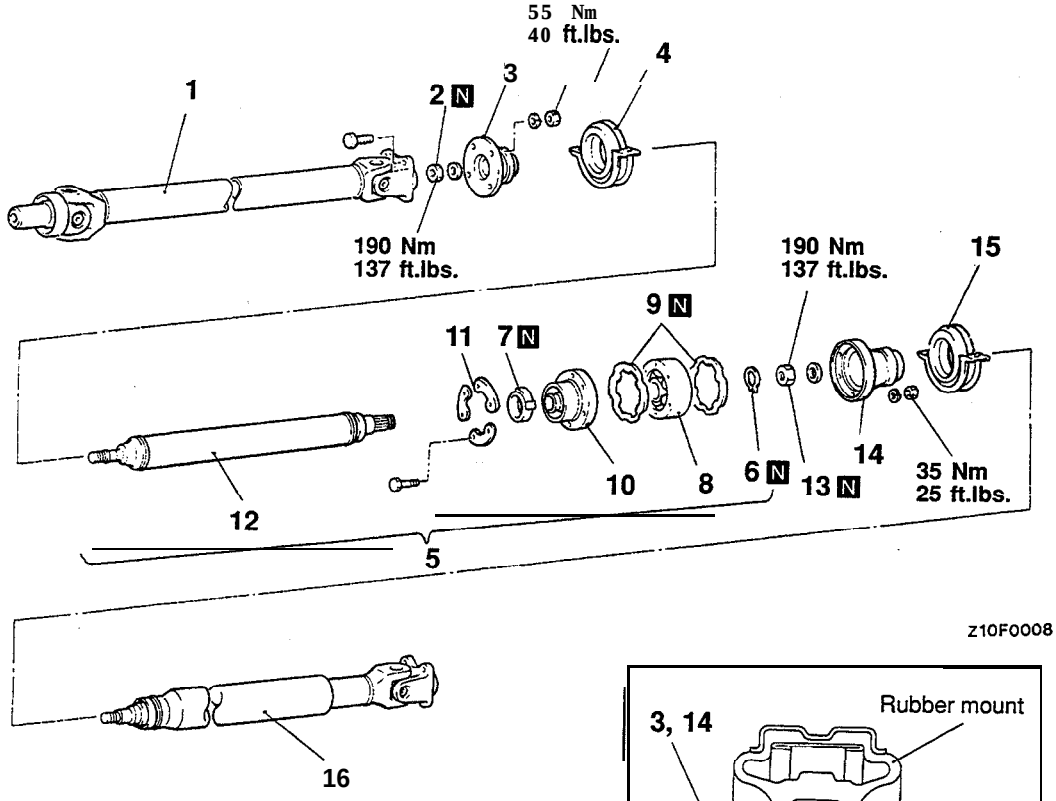
  Limit:
  Front propeller shaft 0.6 mm (.024 in.) or less
  Center propeller shaft 0.6 mm (.024 in.) or less
  Rear propeller shaft 0.6 mm (.024 in.) or less

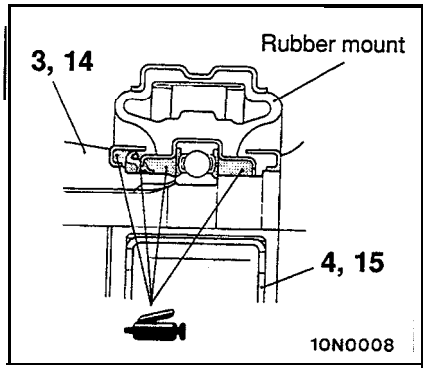
  NOTE
  Set the V-blocks as much as possible to the end of the shaft. Measure deflection at the center of the shaft.



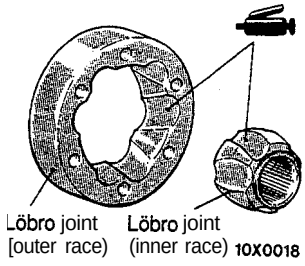
- Check the universal joints for smooth operation in all directions.
- Check the center bearing for smooth movement.
- Check the center bearing mounting rubber for damage or deterioration.

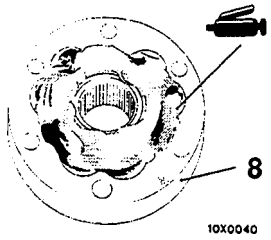
DISASSEMBLY AND REASSEMBLY



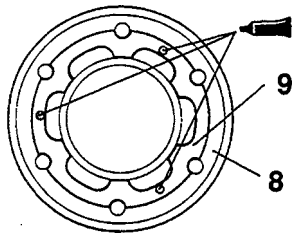


Löbro joint assembly





Grease: Repair kit grease [45–55g (1.59–1 .94 oz.)]

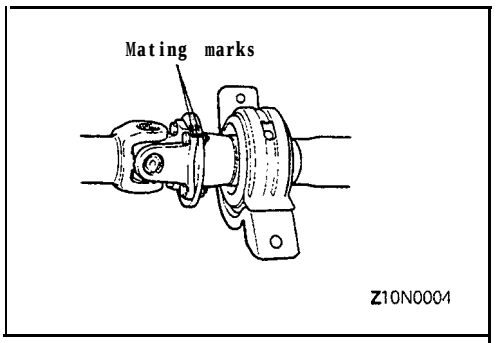


Adhesive: 3M ATD Part No. 8155 or equivalent

Disassembly steps

◀A▶ 1. Front propeller shaft assembly
▶F◀ 2. Self-locking nut
◀B▶ ▶F◀ 3. Companion flange
◀C▶ ▶F◀ 4. Center bearing assembly
◀D▶ ▶E◀ 5. Center propeller shaft assembly
6. Snap ring
▶D◀ 7. Boot band
◀E▶ ▶C◀ 8. Löbro joint assembly
9. Rubber packing
◀F▶ ▶B◀ 10. Lobro joint boot
11. Washer
12. Center propeller shaft
▶A◀ 13. Self-locking nut
◀G▶ ▶A◀ 14. Companion flange
◀H▶ ▶A◀ 15. Center bearing assembly
16. Rear propeller shaft

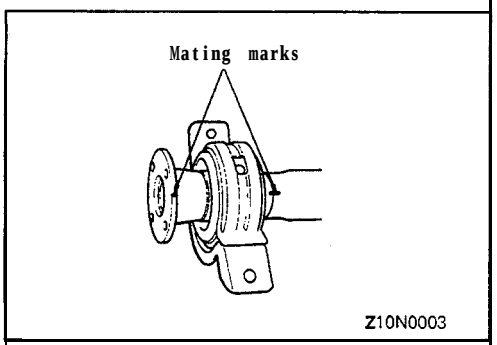
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DISASSEMBLY SERVICE POINTS

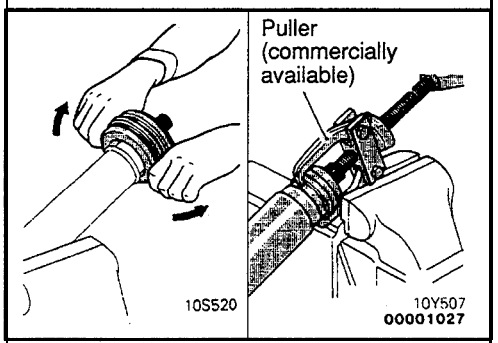
◀A▶ FRONT PROPELLER SHAFT ASSEMBLY REMOVAL

Put mating marks on the front propeller shaft flange yoke and the companion flange before removing the front propeller shaft assembly.



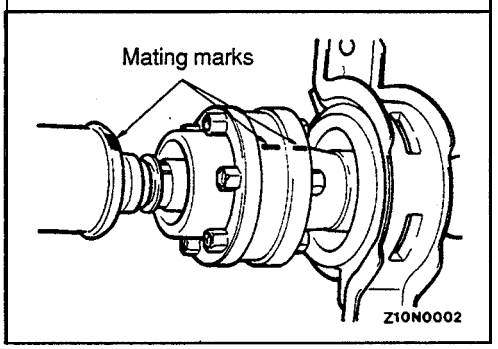
◀B▶ COMPANION FLANGE REMOVAL

Put mating marks on the companion flange and the center propeller shaft before removing the companion flange.



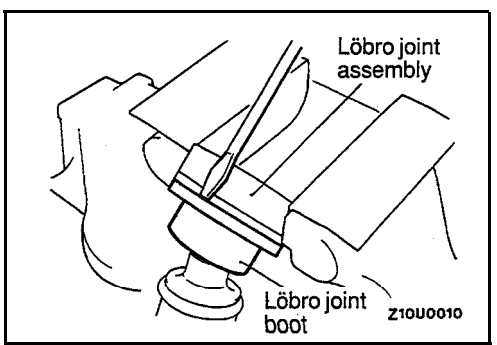
◀C▶ CENTER BEARING ASSEMBLY REMOVAL

First remove the center bearing bracket and then remove the center bearing using a puller (commercially available).



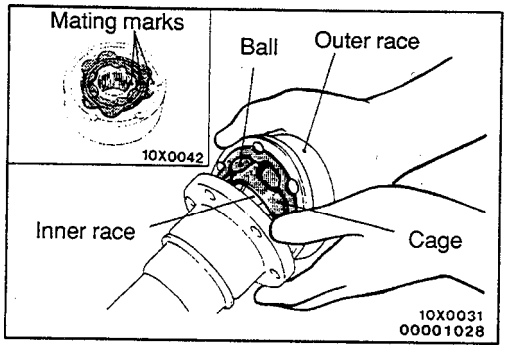
◀D▶ CENTER PROPELLER SHAFT ASSEMBLY REMOVAL

Put mating marks on the center propeller shaft, the Lobro joint assembly and the companion flange before removing the center propeller shaft assembly.



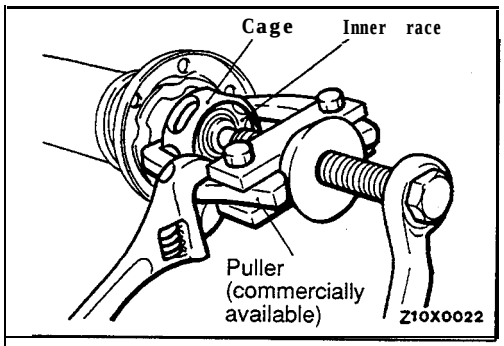
◀E▶ LÖBRO JOINT ASSEMBLY REMOVAL

(1) Remove the Lobro joint boot from the Lobro joint assembly.



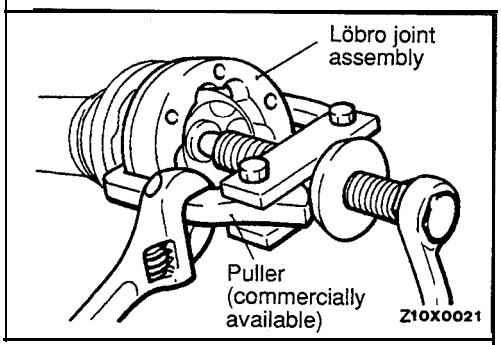
(2) Put mating marks on the outer race, cage and inner race with a scriber before removing the outer race and balls.

Caution
Note the positions of balls so that they can be reinstalled in their original positions.

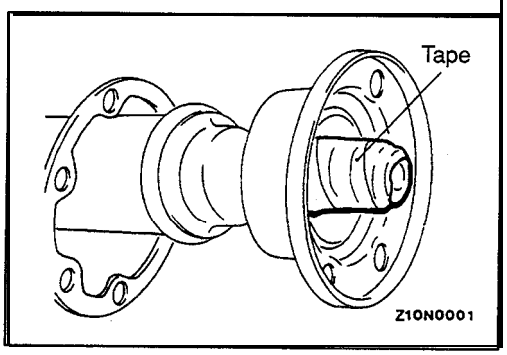


(3) Remove the inner race with cage from the center propeller shaft by using a puller (commercially available).

NOTE
When changing the grease on the Lobro joint assembly, wipe off the grease and clean the outer and inner races, cage and balls.

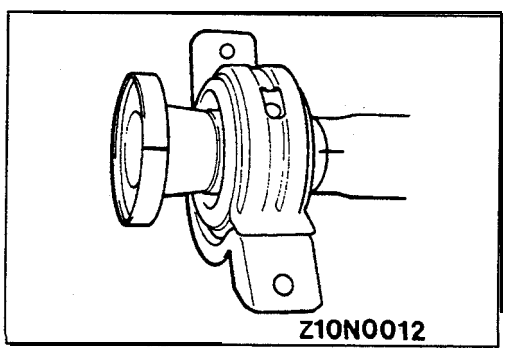


(4) If the outer race cannot be removed, remove the complete Lobro joint assembly from the center propeller shaft by using a puller (commercially available).



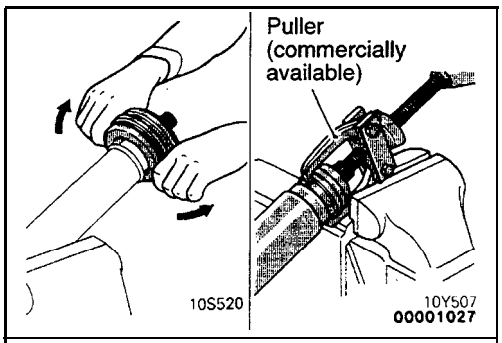
◀F▶ LÖBRO JOINT BOOT REMOVAL

Tape the serration of the center propeller shaft and then remove the Lobro joint boot.



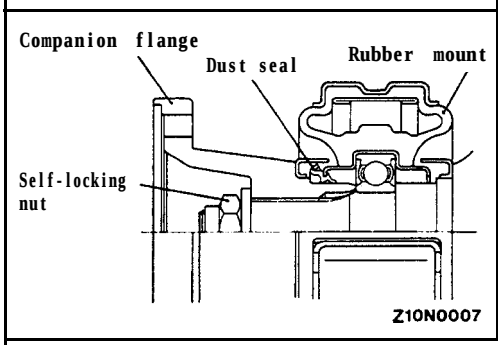
◀G▶ COMPANION FLANGE REMOVAL

Put mating marks on the companion flange and the rear propeller shaft before removing the companion flange.



◀H▶ CENTER BEARING ASSEMBLY REMOVAL

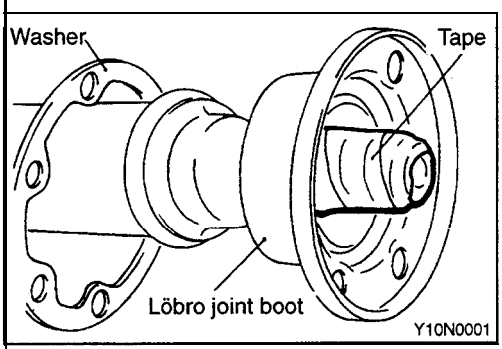
First remove the center bearing bracket and then remove the center bearing using a puller (commercially available).



REASSEMBLY SERVICE POINTS

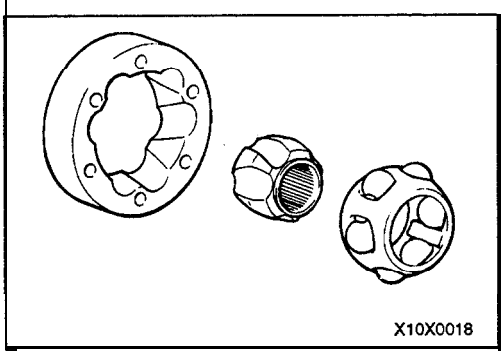
▶A◀ CENTER BEARING ASSEMBLY / COMPANION FLANGE / SELF-LOCKING NUT INSTALLATION

(1) Install the bearing in the rubber mount groove of the center bearing bracket.
(2) Install the center bearing assembly to the rear propeller shaft with its dust seal facing the companion flange side.
(3) Install, lining up the mating marks on the companion flange and the rear propeller shaft.
(4) While tightening the self-locking nut, install the center bearing assembly with the companion flange.



▶B◀ LÖBRO JOINT BOOT INSTALLATION

Tape the serration of the center propeller shaft and then install the Lobro joint boot.

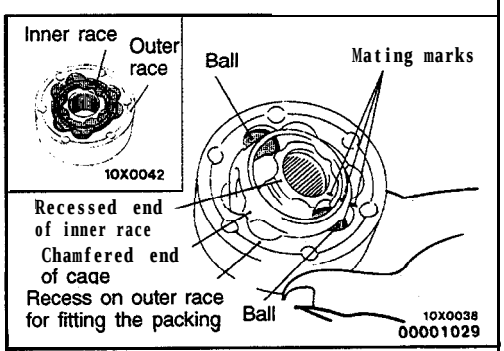


▶C◀ LÖBRO JOINT ASSEMBLY INSTALLATION

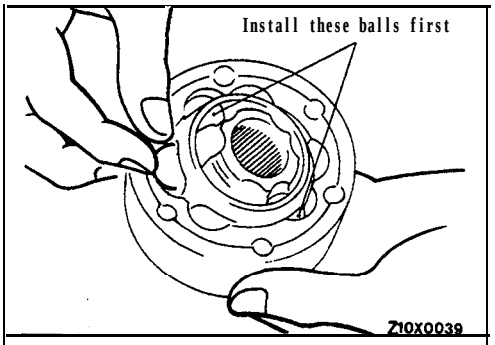
Assemble the Lobro joint as follows:
(1) Apply a thin coat of the specified grease to the ball grooves of the inner and outer races.

Specified grease: Repair kit grease

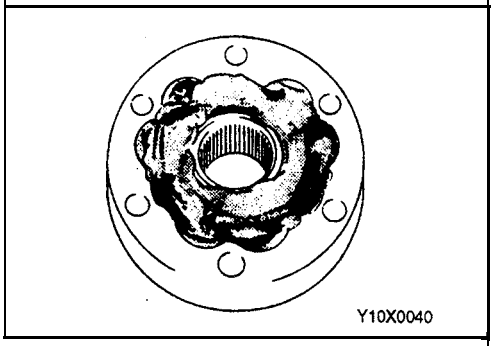
(2) Put the cage on the inner race with the mating marks aligned and install two balls, one in a groove and the other in the groove opposite to that groove.
Both balls should be placed in the grooves where they were before disassembly.
(3) Assemble the inner race and cage in the outer race with their mating marks aligned.



NOTE
Make sure that the recessed end (where snap ring will be fitted) of the inner race, the recessed end (where packing will be fitted) of the outer race, and the chamfered end of the cage are all on the same side. Also ensure that the relative positions of the inner and outer races are as shown in the illustration.

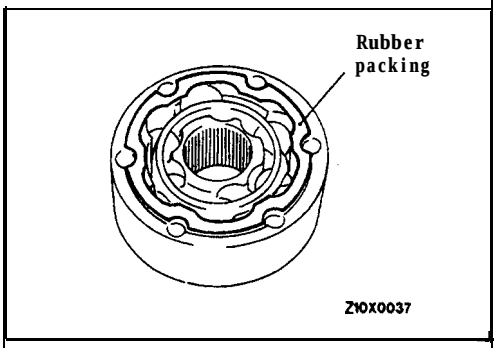


(4) Install the remaining balls in their original positions.
(5) Check that the outer race rotates on the inner race smoothly.



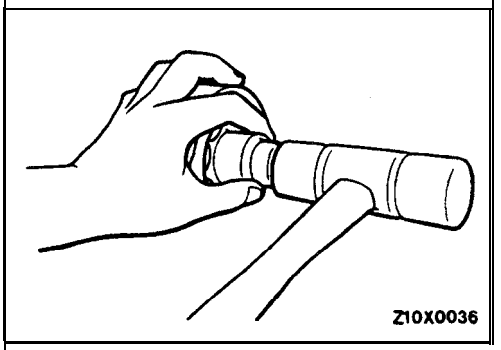
(6) Apply specified grease to the Lobro joint assembly.

Specified grease:
Repair kit grease [45–55 g (1.59–1.94 oz.)]

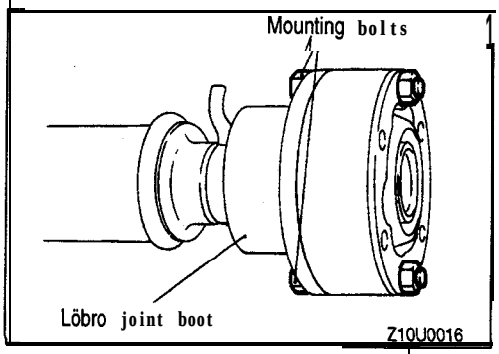


(7) Apply quick fix adhesive at three locations illustrated to prevent displacement of the rubber packing and fix it to the Lobro joint assembly temporarily.

Specified adhesive:
3M ATD Part No. 8155 or equivalent

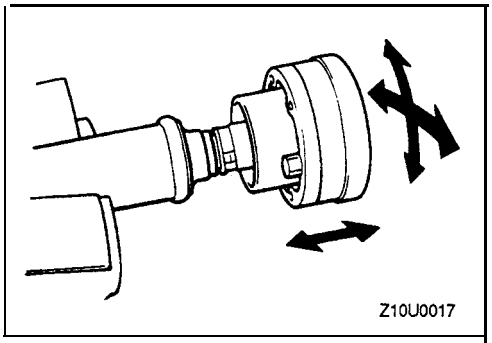


(8) Lining up the mating marks on the Lobro joint assembly and the center propeller shaft and applying the socket to the inner race of the Lobro joint assembly, install the Lobro joint assembly to the center propeller shaft.

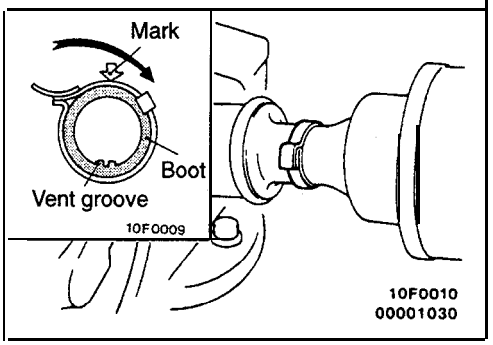


(9) Using the center propeller shaft bolt, align the bolt holes of the Lobro joint boot and the Lobro joint assembly and install the Lobro joint boot to the Lobro joint assembly.

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(10)Check that the Lobro joint assembly moves smoothly.

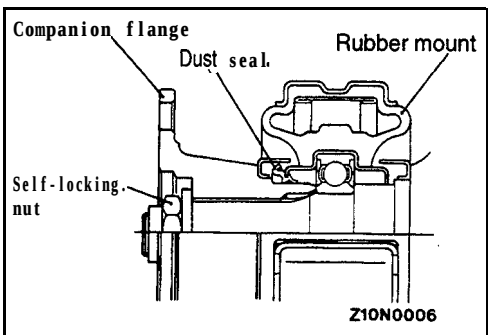


▶D◀ BOOT BAND INSTALLATION

Caution
Clamp the boot band by folding down the lever at a position nearly opposite to the vent groove provided in the Löbro-joint boot (at arrow marked position on boot). Be sure to remove grease, if present, from around the vent groove. Grease obstructs the ventilation air passage.

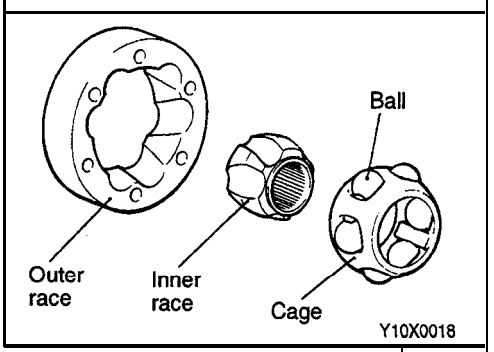
▶E◀ CENTER PROPELLER SHAFT ASSEMBLY INSTALLATION

Install, lining up the mating marks on the center propeller shaft, the Lobro joint assembly and the companion flange.



▶F◀ CENTER BEARING ASSEMBLY / COMPANION FLANGE / SELF-LOCKING NUT INSTALLATION

(1) Install the bearing in the rubber mount groove of the center bearing bracket.
(2) Install the center bearing assembly to the center propeller shaft with its dust seal facing the companion flange side.
(3) Install, lining up the mating marks on the companion flange and the center propeller shaft.
(4) While tightening the self-locking nut, install the center bearing assembly with the companion flange.



INSPECTION

- Check the propeller shaft splines for wear or damage.
- Check the ball grooves in inner or outer race for uneven wear, damage or rust.
- Check ball surface for rust, wear or other damage.
- Check the cage for rust or damage.

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NOTES

FRONT AXLE

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SPECIFICATIONS

GENERAL SPECIFICATIONS

WHEEL BEARING

Items	FWD	AWD
Type	Double-row angular-contact ball bearing	Unit ball bearing
O.D. x I.D. mm (in.)	84 x 45 (3.31 x 1.77)	

DRIVE SHAFT

Items		FWD	AWD
Joint type	Outer	B.J.	B.J.
	Inner	T.J.	T.J.
Length mm (in.)	L.H. shaft	417 (16.4)	419 (16.5)
	R.H. shaft	405 (15.9) or 393 (15.5)*	391(15.4)

NOTE
*: <A/T>

SERVICE SPECIFICATIONS

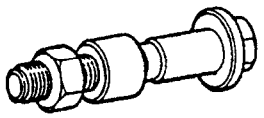
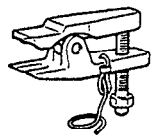
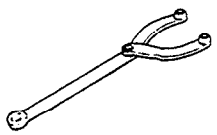
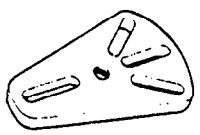
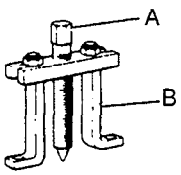
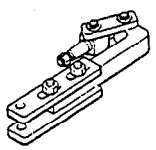
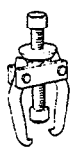
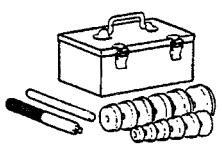
Items		Standard value	Limit
Setting of T.J. boot length mm (in.)	L.H.	85 ± 3 (3.35 ± .12)	
	R.H.	85 ± 3 (3.35 ± .12)	
Hub end play mm (in.)		–	0.05 (.002)
Wheel bearing starting torque (Hub starting torque) Nm (in.lbs.)		–	1.8 (16)

LUBRICANTS

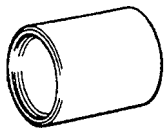
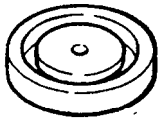
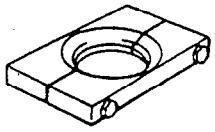
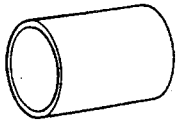
Items	Specified lubricants	Quantity
T.J. boot grease	Repair kit grease	160 g (5.64 oz.)
B.J. boot grease <1992 models>	Repair kit grease	<FWD> 145 g (5.11 oz.)
		<AWD> 135 g (4.76 oz.)
Dust seal inner	Multipurpose grease	14–20 g (.49–.71 oz.)
Dust seal outer		8–12 g (.28–.42 oz.)

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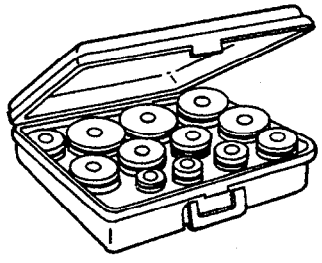
SPECIAL TOOLS

Tool	Tool number and name	Supersession	Application
	MB990998 Front hub remover and installer	MB990998-01	Removal or press-in the front hub <FWD> Measurement of front hub unit bearing rotation starting torque <AWD> Provisional holding of the wheel bearing Measurement of front wheel bearing <FWD>
	MB991113 Steering linkage puller	MB991113-01	Removal of the lower arm ball joint and tie rod
	MB990767 End yoke holder	MB990767-01	Fixing the hub
	MB991354 Puller body	General service tool	Removal of drive shaft (Use conjunction with MB991354, MB990242, MB990244)
	MB990241 Axle shaft puller A: MB990244 Puller shaft B: MB990242 Puller bar	MB990241-01 or General service tool	
	MB990326 Preload socket	General service tool	Measurement of the wheel bearing starting torque Measurement of the lower arm ball joint starting torque Measurement of the stabilizer link rotation starting torque
	MB991056 or MB991355 Knuckle arm bridge	MB991056-01	Removal of the hub <FWD>
	MB990810 Side bearing puller	General service tool	Removal of the wheel bearing inner race <FWD>
	MB990925 Bearing and oil seal installer set	MB990925-01 or General service tool	Removal of wheel bearing <FWD> (Use in conjunction with MB991355 or MB991056) Press-out of the center bearing Press-fitting of the center bearing Press-fitting of the dust seal outer (Use in conjunction with MB990890)

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Tool	Tool number and name	Supersession	Application
	MB990890 Rear suspension bushing base	MB990890-01	Press-fitting of the dust seal Press-fitting of the wheel bearing, oil-seal (drive shaft side)
	MB990883 Fate&suspension	MB990883-01	
	MB990947 Lower arm bushing arbor	MB990947-01	Press-fitting of the oil seal (hub side)
	MB990955 Oil seal installer	MB990955-01	
	MB991248 or MD998801 Inner shaft remover		Press-out of the inner shaft and press-fitting seal plate
	MB991172 Adapter		Press-fitting of the inner shaft

MB990925-01

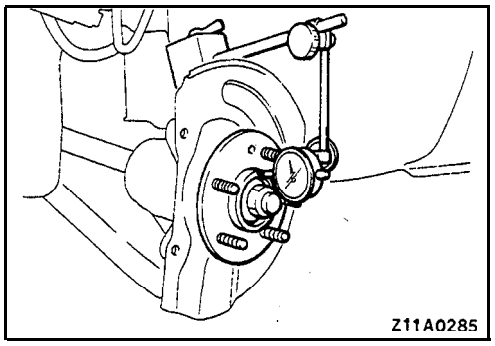


Tool number	Installer disc O.D. mm (in.)
MB990926-01	39.0 (1.54)
MB990927-01	45.0 (1.77)
MB990928-01	49.5 (1.95)
MB990929-01	51.0 (2.01)
MB990930-01	54.0 (2.13)
MB990931-01	57.0 (2.24)
MB990932-01	61.0 (2.40)
MB990933-01	63.5 (2.50)
MB990934-01	67.5 (2.66)
MB990935-01	71.5 (2.81)
MB990936-01	75.5 (2.97)
MB990937-01	79.0 (3.11)

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TROUBLESHOOTING

Symptom	Probable cause	Remedy
Vehicle pulls to one side	Seizure of drive shaft ball joint	Replace
	Abnormal wear, play or seizure of wheel bearing	Replace
	Malfunction of front suspension or steering	Adjust or replace
Vibration	Bend, damage or abnormal wear of drive shaft	Replace
	Play in drive shaft and hub serration	Replace
	Abnormal wear, play or seizure of wheel bearing	Replace
Shimmy	Improper wheel alignment	Adjust or replace
	Malfunction of front suspension or steering	Adjust or replace
Excessive noise	Broken boot, grease leakage	Replace, repack grease
	Bend, damage or abnormal wear of drive shaft	Replace
	Play of drive shaft and hub serration	Replace
	Abnormal wear, play or seizure of center bearing	Replace
	Abnormal wear, play or seizure of wheel bearing,	Replace
	Loose wheel nut	Retighten
	Malfunction of front suspension and steering	Adjust or replace



ON-VEHICLE SERVICE

HUB END PLAY CHECK

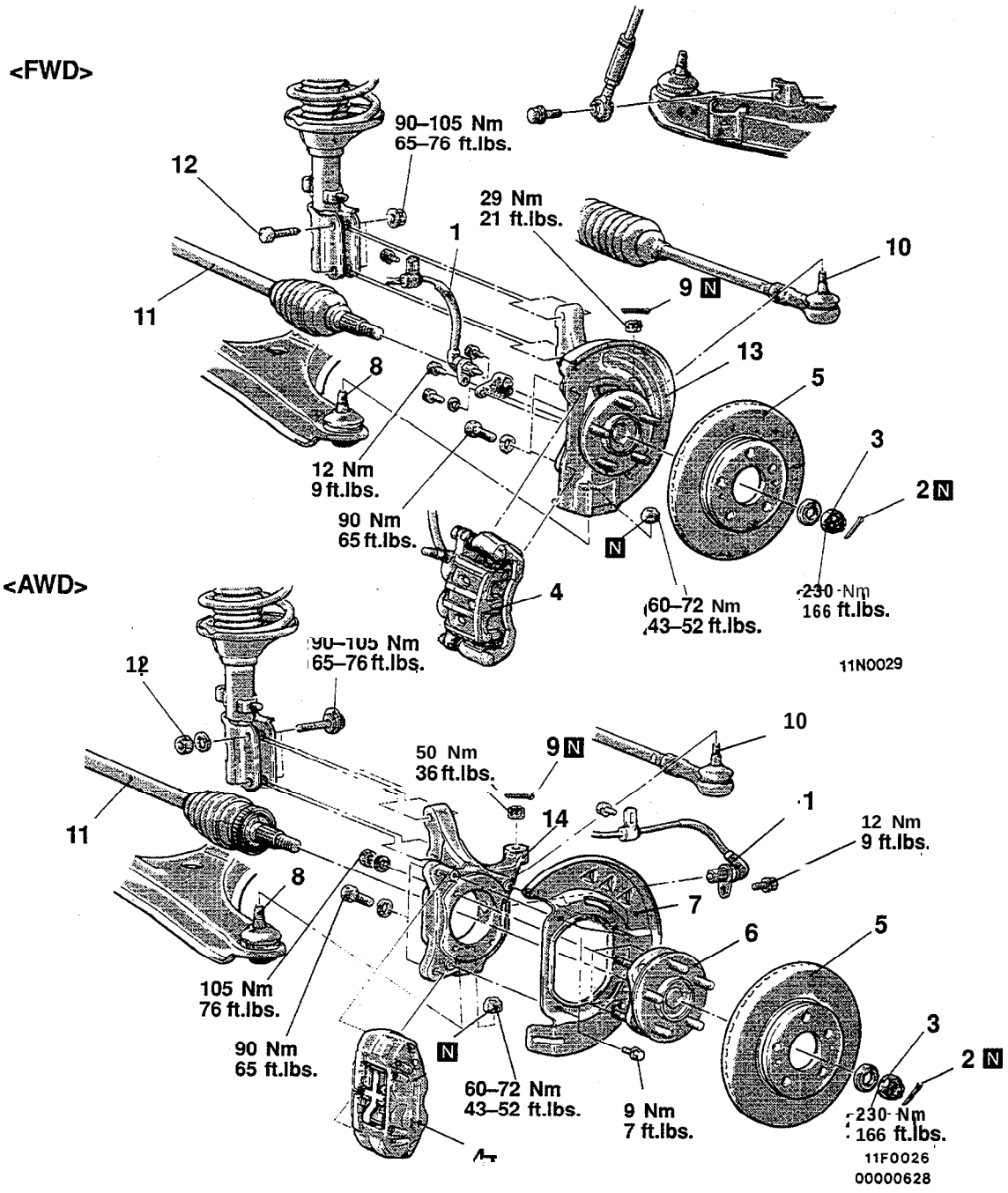
1. Jack up. the vehicle and remove the front wheels.
2. Remove the disc brake caliper and suspend it with a wire. (Refer to GROUP 35 – On-vehicle Service.)
3. Attach a dial indicator as shown in the illustration, and then measure the axial play while moving the hub back and forth.

   Limit: 0.05 mm (.002 in.)
4. If axial play exceeds the limit, disassemble and check parts.

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HUB AND KNUCKLE

REMOVAL AND INSTALLATION

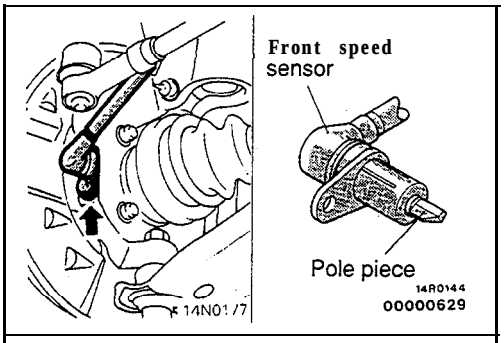


Removal steps

◀A▶ 1. Front speed sensor connection <Vehicles with ABS*>
▶A◀ 2. Cotter pin
◀B▶ ▶A◀ 3. Drive shaft nut
◀C▶ 4. Caliper assembly
5. Brake disc
6. Front hub unit bearing
7. Dust shield
◀D▶ 8. Lower arm ball joint connection
9. Cotter pin
◀E▶ 10. Tie rod end connection
◀F▶ 11. Drive shaft
12. Front strut mounting bolt
13. Hub and knuckle
◀G▶ 14. Hub

NOTE
*: Anti-lock braking system

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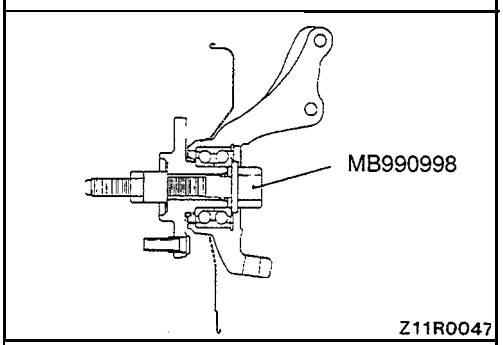


REMOVAL SERVICE POINTS

◀A▶ FRONT SPEED SENSOR DISCONNECTION

Remove the mounting bolts which hold the speed sensor bracket to the knuckle, and then remove the speed sensor.

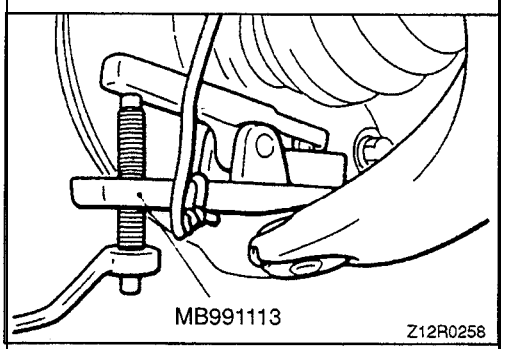
Caution
Be careful when handling the pole piece at the tip of the speed sensor and the toothed edge of the rotor so as not to damage them by striking against other parts.



◀B▶ DRIVE SHAFT NUT REMOVAL

Loosen the drive shaft nut while the vehicle is on the floor with the brakes applied.

Caution
Do not apply vehicle load to the wheel bearing loosing the drive shaft nut. If, however, vehicle load must be applied to the bearing in moving the vehicle, temporarily secure the wheel bearing by using the special tools, MB990998, etc.



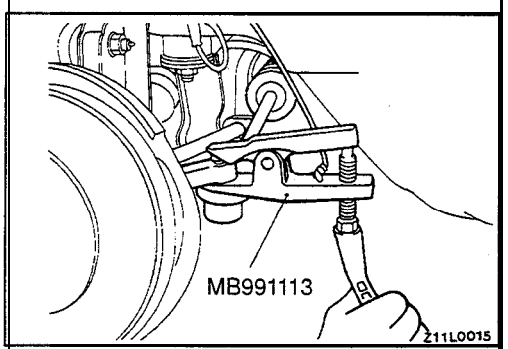
◀C▶ CALIPER ASSEMBLY REMOVAL

Remove the caliper assembly and suspend it with wires.

◀D▶ LOWER ARM BALL JOINT DISCONNECTION

Using the special tool, disconnect the lower arm ball joint from the knuckle.

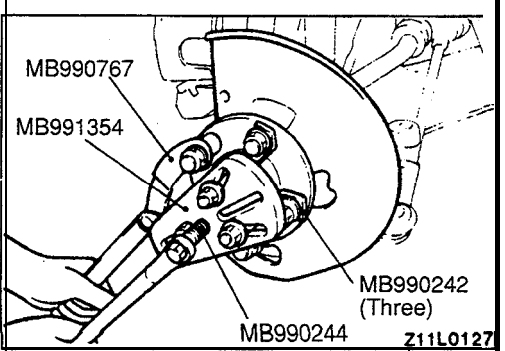
Caution
1. **Be sure to tie the cord of the special tool to the nearby part.**
2. **Loosen. the nut but do not remove it.**



◀E▶ TIE ROD END DISCONNECTION

Using the special tool, disconnect the tie rod end from the knuckle.

Caution
1. **Be sure to tie the cord of the special tool to the nearby part.**
2. **Loosen the nut but do not remove it.**

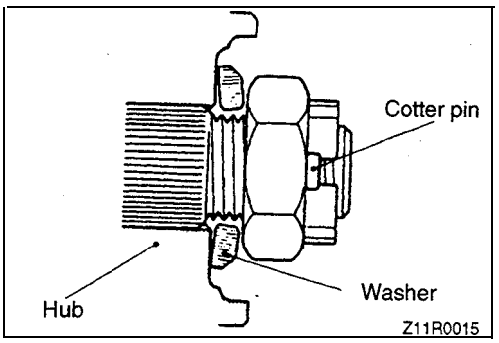


◀F▶ DRIVE SHAFT REMOVAL

Use the special tool to push out the drive shaft from the front hub.

◀G▶ HUB REMOVAL

In the case of AWD-vehicles with ABS, take care not to damage the rotor for ABS installed to the B.J. outer race when removing the hub.



INSTALLATION SERVICE POINT

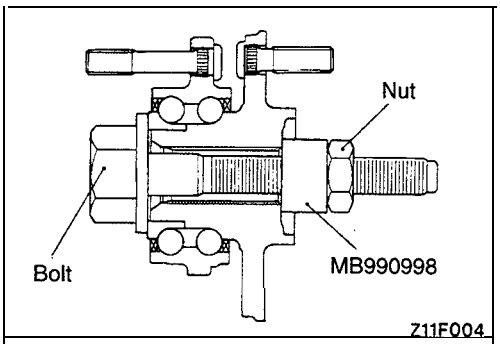
▶A◀ DRIVE SHAFT NUT / COTTER PIN INSTALLATION

(1) Be sure to install the washer and wheel bearing nut in the specified direction.
(2) After installing the wheel, lower the vehicle to the ground and finally tighten the wheel bearing nut.
(3) If the position of the cotter pin holes does not match, tighten the nut up to 260 Nm (188 ft.lbs.) in maximum.
(4) Install the cotter pin in the first matching holes and bend it securely.

INSPECTION

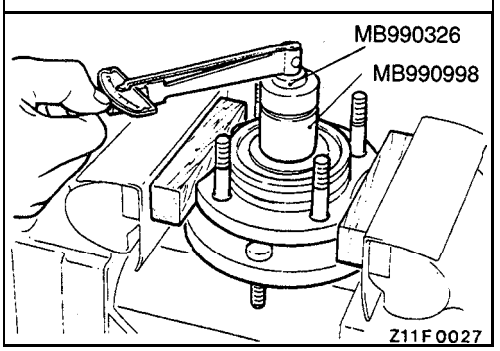
- Check the hub for cracks and spline for wear.
- Check the oil seal for damage.
- Check the knuckle for cracks.
- Check for defective bearing.

NOTE
If the meshing of the wheel bearing outer race and the knuckle, or of the wheel bearing inner race and the hub, is loose, replace the bearing or damaged parts.



MEASUREMENT OF FRONT HUB UNIT BEARING ROTATION STARTING TORQUE

(1) Set the special tool to the front hub unit bearing.
(2) Holding the special tool (bolt), tighten its nut to 200 to **260** Nm (145 to 188 ft.lbs.).
(3) Turn the hub to cause grease to distribute evenly over the bearing.

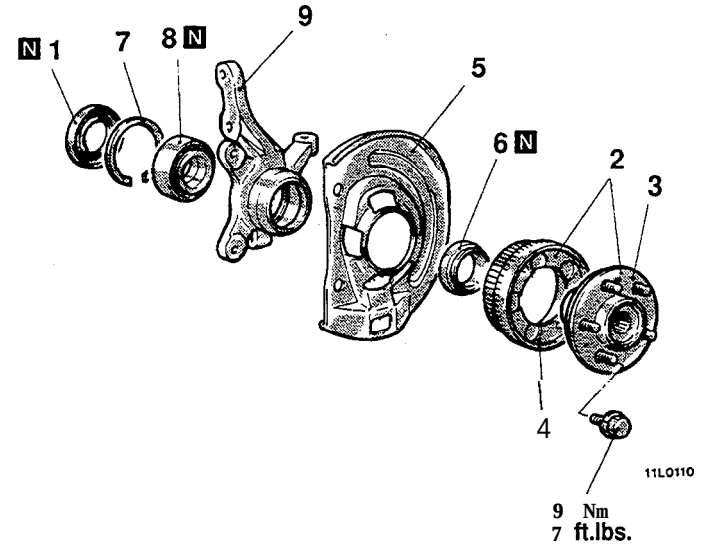


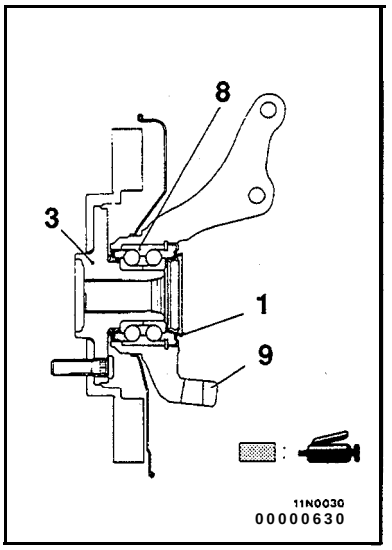
(4) Measure the rotation starting torque of the hub.

Limit: 1.8 Nm (16 in.lbs.) or less

(5) The starting torque must be within the limit and, in addition, the bearing must not feel rough when rotated.

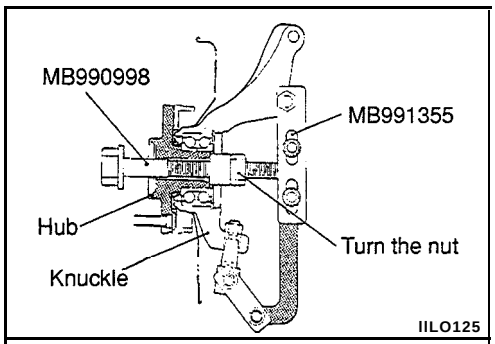
DISASSEMBLY AND REASSEMBLY <FWD>

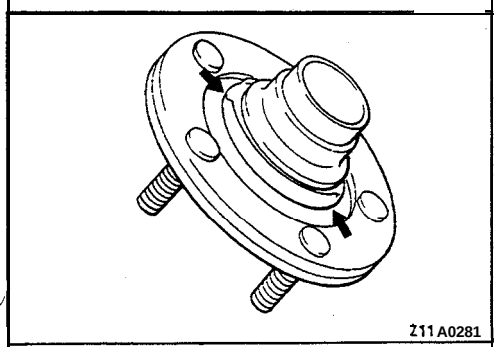




Disassembly steps

- ▶D◀ 1. Oil seal (drive shaft side)
- ◀A▶ 2. Hub and rotor
- ▶C◀ • Adjustment of wheel bearing starting torque
- 3. Hub
- 4. Rotor <Vehicles with ABS>
- 5. Dust shield
- ▶B◀ 6. Oil seal (hub side)
- 7. Snap ring
- ◀B▶ ▶A◀ 8. Wheel bearing
- 9. Knuckle





DISASSEMBLY SERVICE POINTS

◀A▶ HUB AND ROTOR REMOVAL

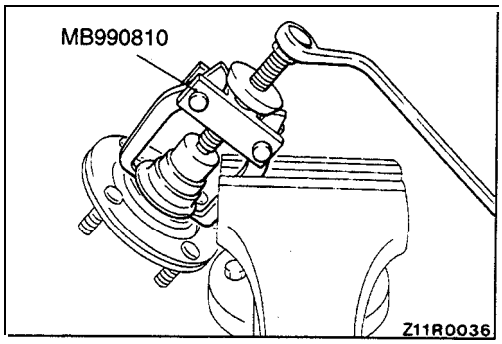
(1) Attach the special tools to the knuckle and front hub.
(2) Secure the knuckle in a vise.
(3) Tighten the nut of the special tool and remove the hub and rotor from the knuckle.

Caution
1. Be sure to use the special tools.
2. If the hub and knuckle are disassembled by striking them with a hammer, the bearing will be damaged.

◀B▶ WHEEL BEARING REMOVAL

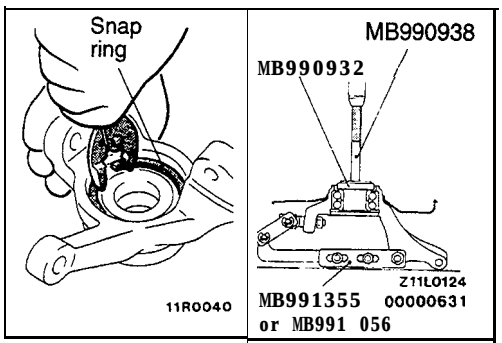
(1) Crush the oil seal in two places to that the tabs of the special tool will be caught on the wheel bearing inner race.

TSB Revision



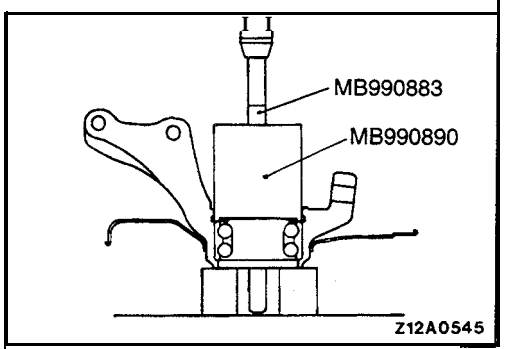
(2) Remove the wheel bearing inner race from the hub by using the special tool:

Caution
Be careful that the hub will not fall down as the wheel bearing inner race (outer side) is removed from the hub.



(3) Remove the snap ring from the knuckle.
(4) Remove the bearing by using the special tools.

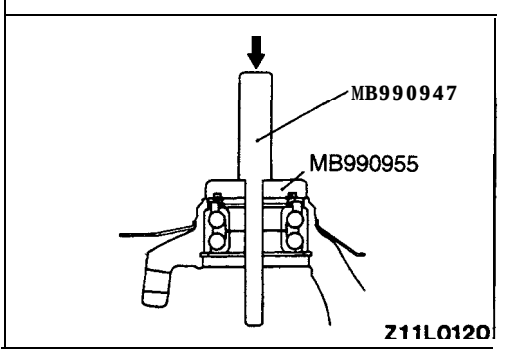
NOTE
Removal is easier if the outer side inner race removed from the hub is placed on the bearing and the wheel bearing is then removed.



REASSEMBLY SERVICE POINTS

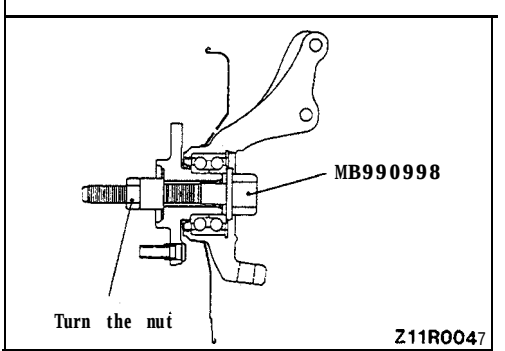
▶A◀ WHEEL BEARING INSTALLATION

(1) Fill the wheel bearing with multipurpose grease.
(2) Apply a thin coating of multipurpose grease to the knuckle and bearing contact surfaces.
(3) With the wheel bearing inner race removed, press-in the bearing by using the special tools.
(4) Install the wheel bearing inner race to the wheel bearing.



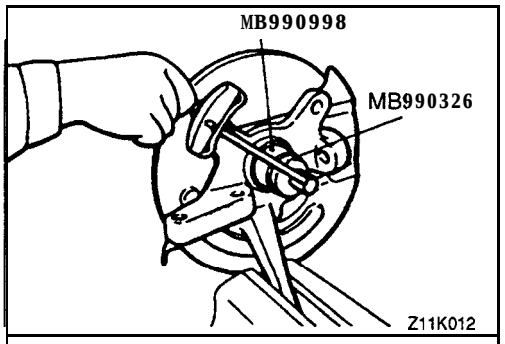
▶B◀ OIL SEAL (HUB SIDE) INSTALLATION

(1) Drive the oil seal (hub side) into the knuckle by using the special tools until it is flush with the knuckle end surface.
(2) Apply multipurpose grease to the lip of the oil seal and to the surfaces of the oil seal which contact the hub.



▶C◀ WHEEL BEARING STARTING TORQUE ADJUSTMENT

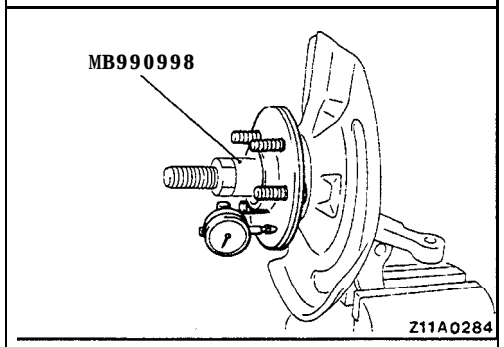
(1) Use the special tool to mount the hub assembly onto the knuckle.
(2) Tighten the nut of the special tool to 200-260 Nm (145–188 ft.lbs.).
(3) Rotate the hub assembly in order to seat the bearing.



(4) Measure the wheel bearing starting torque (hub starting torque) by using the special tools.

Limit: 1.8 Nm (16 in.lbs.) or less

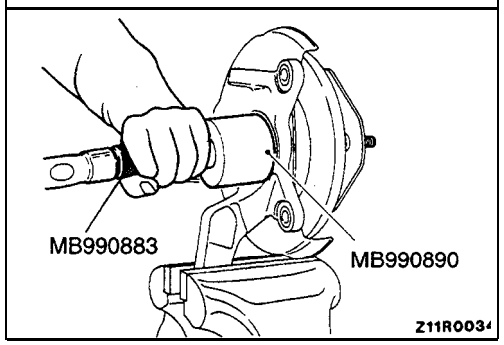
NOTE
The starting torque must be within the limit and, in addition, the bearing must not feel rough when rotated.



(5) Measure to determine whether the end play of the hub is within the specified limit or not.

Limit: 0.05 mm (.002 in.)

(6) If the starting torque and hub end play are not within the limit range while the nut is tightened to 200-260 Nm (145-188 ft.lbs.), the bearing, hub and/or knuckle have probably not been installed correctly. Repeat the disassembly and assembly procedure.



▶D◀ OIL SEAL (DRIVE SHAFT SIDE) INSTALLATION

Drive the oil seal (drive shaft side) into the knuckle until it contacts the snap ring.
Apply multipurpose grease to the lip of the oil seal.

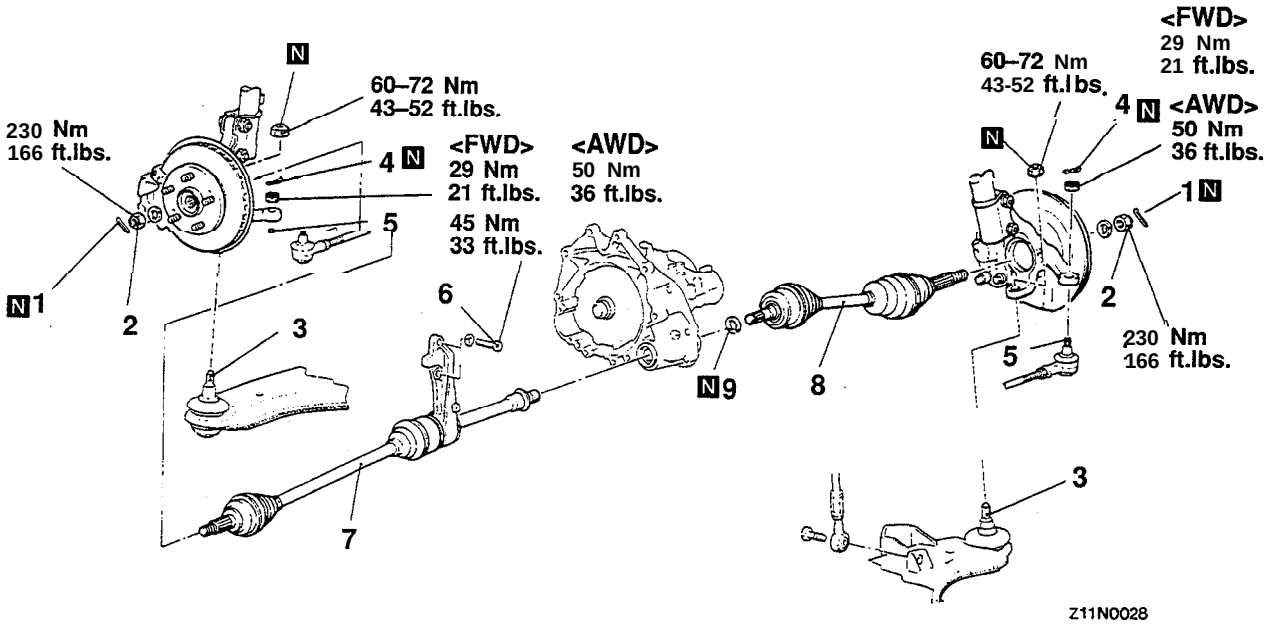
INSPECTION

- Check the hub and brake disc mounting surfaces for galling and contamination.
- Check the knuckle inner surface for galling and cracks.
- Check for defective bearing.

DRIVE SHAFT

REMOVAL AND INSTALLATION

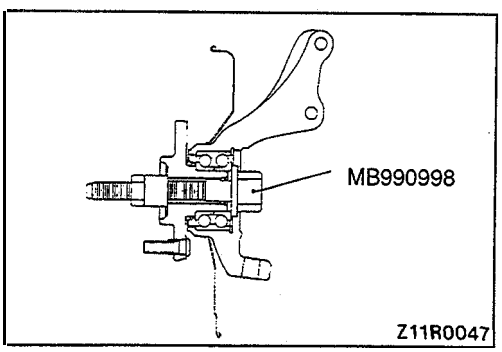
Pre-removal and Post-installation Operation
- Under Cover Removal and Installation



Removal steps

1. Cotter pin
◀A▶ ▶A◀ 2. Drive shaft nut
◀B▶ 3. Lower arm ball joint connection
4. Cotter pin
◀C▶ 5. Tie rod end connection
6. Center bearing bracket installation bolt
◀D▶ 7. Drive shaft and inner shaft assembly (L.H.)
◀D▶ 8. Drive shaft (R.H.)
9. Circlip

Caution
In the case of AWD-vehicles with ABS, take care not to damage the rotor for ABS installed to the B.J. outer race.



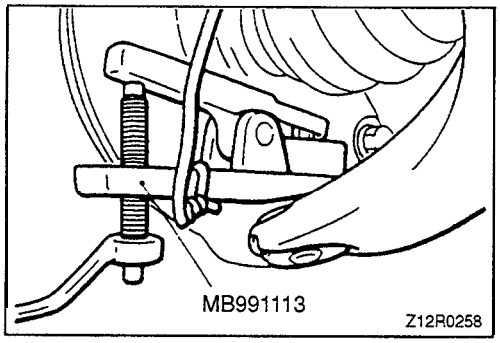
REMOVAL SERVICE POINTS

◀A▶ DRIVE SHAFT NUT REMOVAL

Loosen the drive shaft nut while the vehicle is on the floor with the brakes applied.

Caution
Do not apply vehicle load to the wheel bearing loosing the drive shaft nut. If, however, vehicle load must be applied to the bearing in moving the vehicle, temporarily secure the wheel bearing by using the special tools, MB990998, etc.

TSB Revision



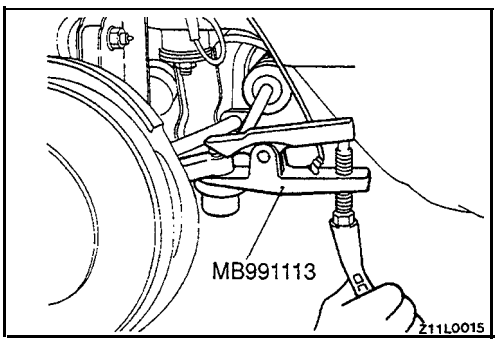
◀B▶ LOWER ARM BALL JOINT DISCONNECTION

Using the special tool, disconnect the lower arm ball joint from the knuckle.

Caution

1. Be sure to tie the cord of the special tool to the nearby part.

2. Loosen the nut but do not remove it.



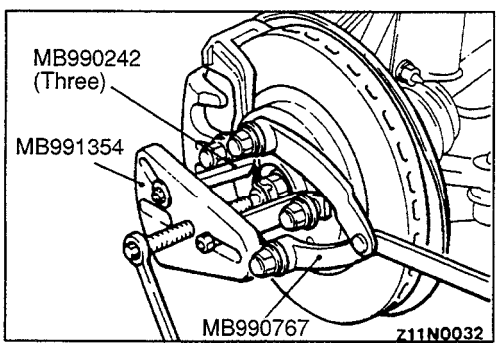
◀C▶ TIE ROD END DISCONNECTION

Using the special tool, disconnect the tie rod end from the knuckle.

Caution

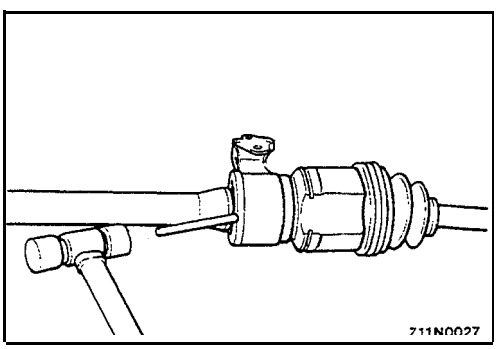
1. Be sure to tie the cord of the special tool to the nearby part.

2. Loosen the nut but do not remove it.

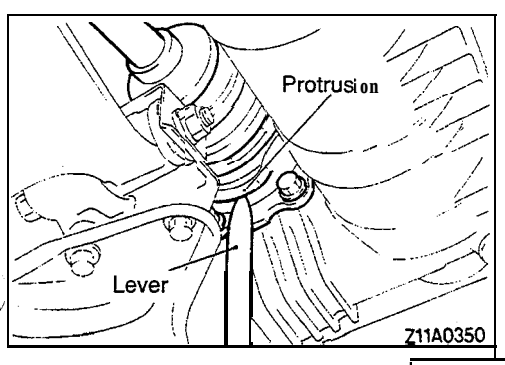


◀D▶ DRIVE SHAFT AND INNER SHAFT ASSEMBLY (L.H.) / DRIVE SHAFT (R.H.) REMOVAL

(1) Using the special tool, push out the drive shaft and inner shaft assembly (L.H.) or the drive shaft (R.H.) from the hub.



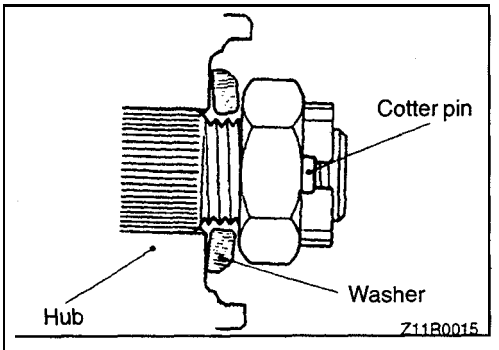
(2) If the inner shaft is hard to remove from the transaxle, strike the center bearing bracket lightly with a plastic hammer.

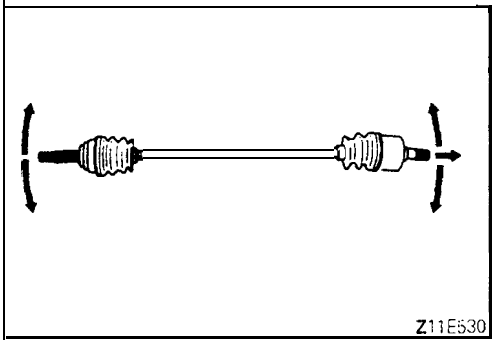


(3) To remove the drive shaft (R.H.) from the transaxle, pry off the shaft using a lever against' the protrusion of the drive shaft.

Caution

Pulling the drive shaft can cause damage to the T.J. Be sure to use a lever.





INSTALLATION SERVICE POINT

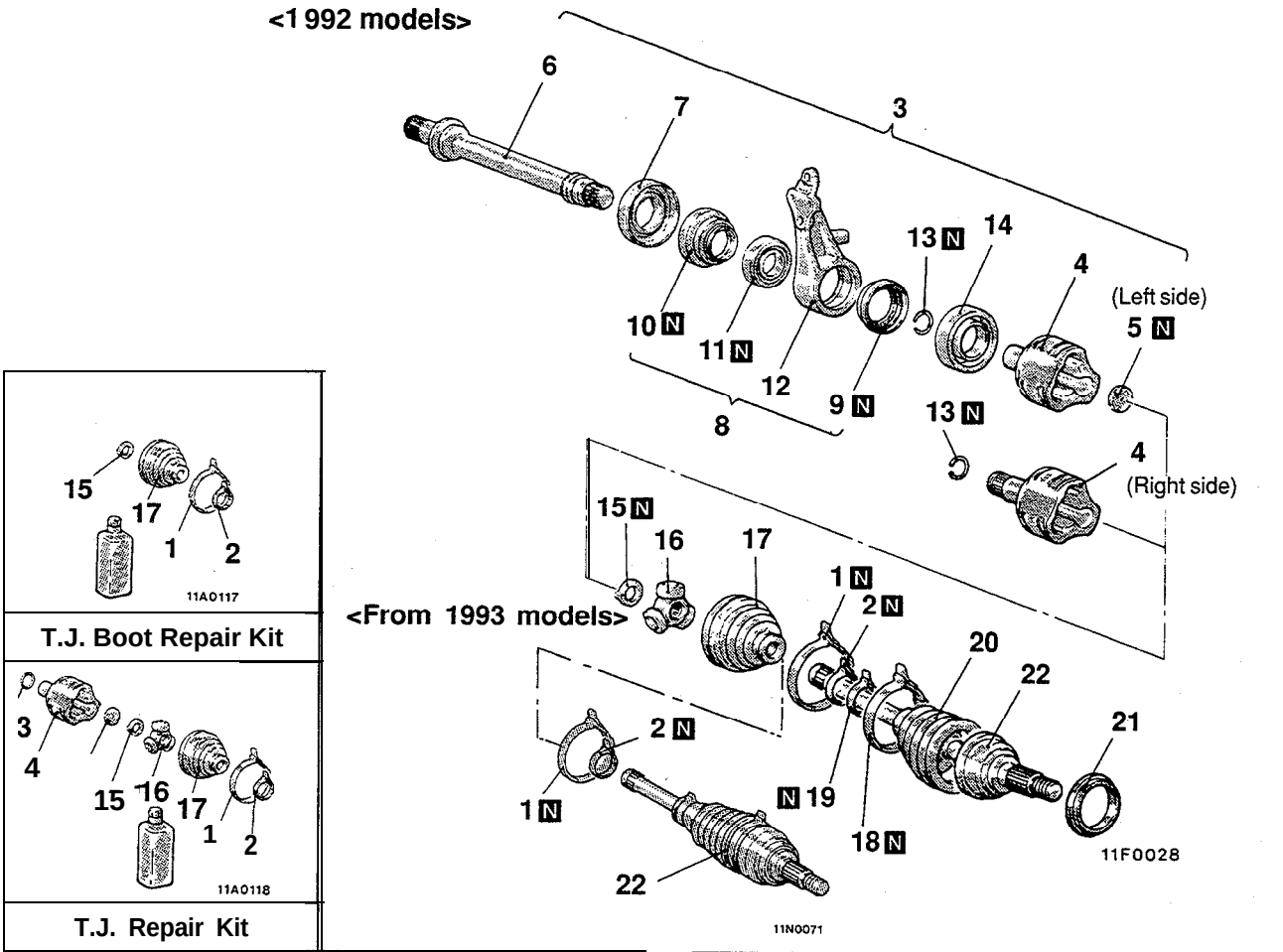
▶A◀ DRIVE SHAFT NUT INSTALLATION

(1) Be sure to install the washer and wheel bearing nut in the specified direction.
(2) After installing the wheel, lower the vehicle to the ground and finally tighten the wheel bearing nut.
(3) If the position of the cotter pin holes does not match, tighten the nut up to 260 Nm (188 ft.lbs.) in maximum.
(4) Install the cotter pin in the first matching holes and bend it securely.

INSPECTION

- Check the drive shaft boot for damage or deterioration.
- Check the ball joints for wear or operating condition.
- Check the spline part for wear or damage.

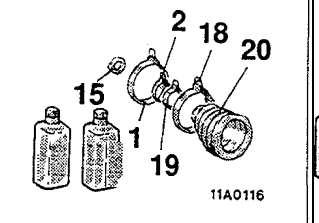
DISASSEMBLY AND REASSEMBLY



T.J. Boot Repair Kit

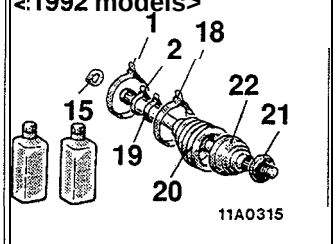
T.J. Repair Kit

<:1992 models>

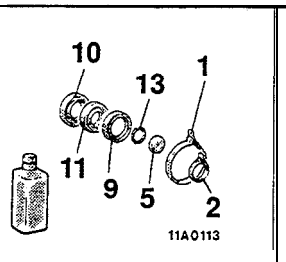


B.J. Boot Repair Kit

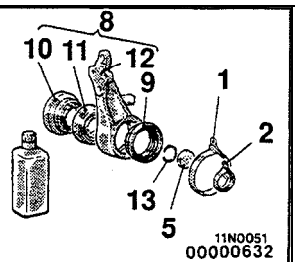
<:1992 models>



B.J. Repair Kit



Bearing Dust Seal Repair Kit



Bracket Assembly Repair Kit

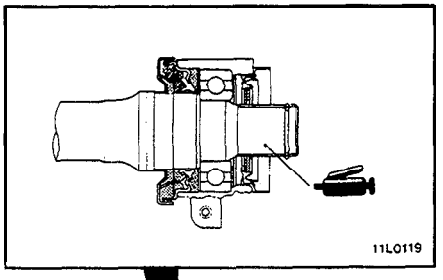
Disassembly steps

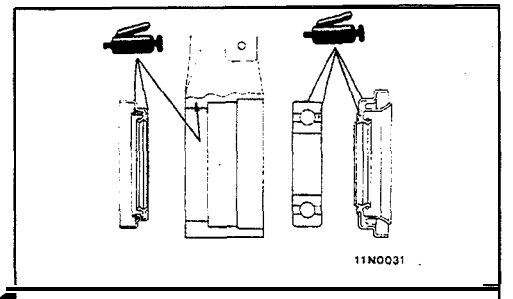
- ▶G◀ 1. T.J. boot band (large)
- ▶G◀ 2. T.J. boot band (small)
- ▶F◀ 3. T.J. case and inner shaft assembly
- 4. T.J. case
- 5. Seal plate
- ◀A▶ ▶E◀ 6. Inner shaft
- 7. Dust shield
- 8. Bracket assembly
- ▶D◀ 9. Dust seal outer
- ▶D◀ 10. Dust seal inner
- ◀B▶ ▶C◀ 11: Center bearing
- 12. Center bearing bracket
- 13. Circlip
- 14. Dust shield
- 15. Snap ring
- ▶B◀ **16.** Spider assembly
- ◀C▶ ▶A◀ **17.** T.J. boot
- 18. B.J. boot band (large) cl 992 models>
- 19. B.J. boot band (small) <1 992 models>
- ◀C▶ ▶A◀ 20. B.J. boot <1992 models>
- 21. Dust shield <1992 models>
- ◀D▶ 22. B.J. assembly

Caution
in the case of AWD-vehicles with ABS, take care not to damage the rotor installed to the B.J. outer race.

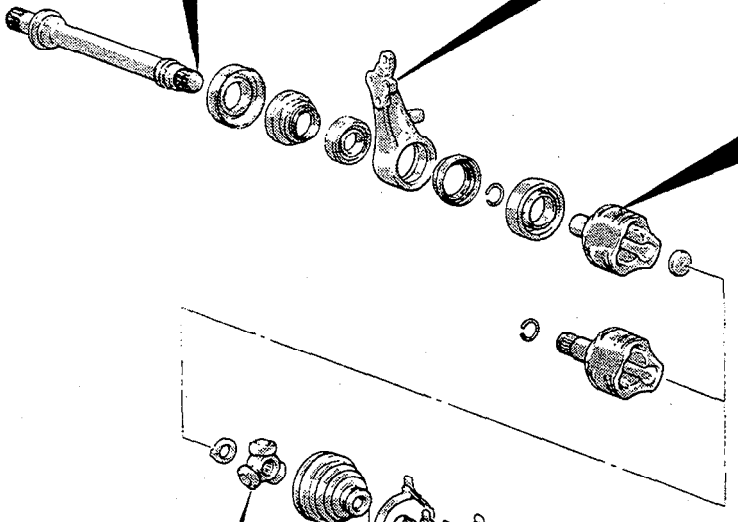
TSB Revision

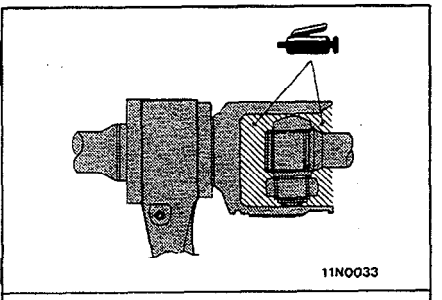
Lubrication Points





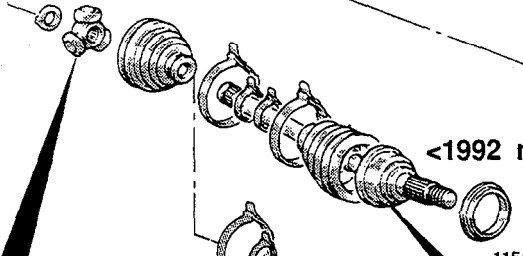
Grease: Multipurpose grease
Dustseal inner 14–20 g (.49–.711 oz.)
Dust seal outer 8–12 g (.28–.42 oz.)

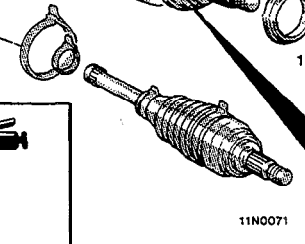




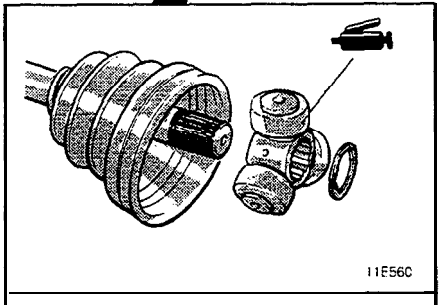
Grease: Repair kit grease
160 g (5.64 oz.)
Caution
The grease in the repair kit should be divided in half for use, respectively, at the joint and inside the boot.
Special grease is used to lubricate the joint. Do not mix old and new grease or different types of grease.

<1992 models>



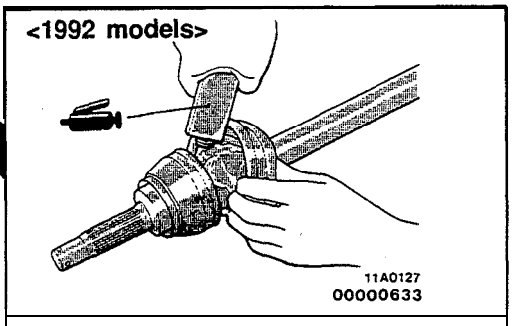


<From 1993 models,



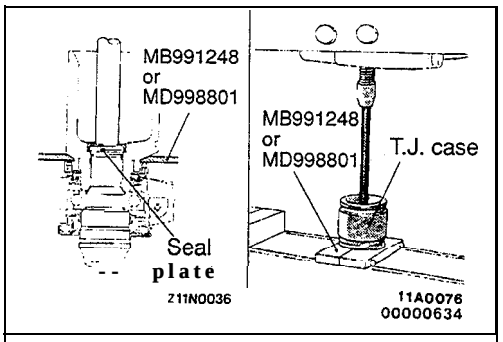
Grease: Repair kit grease

<1992 models>



Grease: Repair kit grease
<FWD> 145 g (5.11 oz.)
<AWD> 135 g (4.76 oz.)
Caution
The grease in the repair kit should be divided in half for use, respectively, at the joint and inside the boot.
Special grease is used to lubricate the joint. Do not mix old and new grease or different types of grease.

TSB Revision

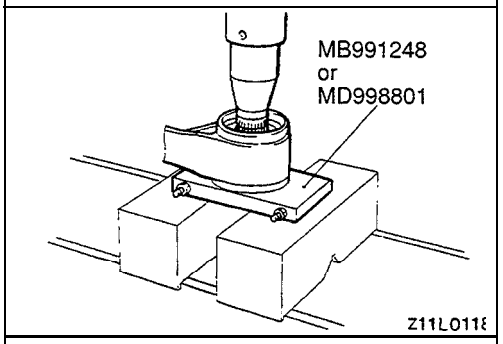


DISASSEMBLY SERVICE POINTS

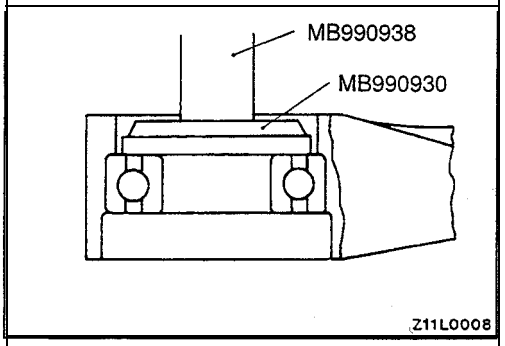
◀A▶ INNER SHAFT REMOVAL

(1) Using the special tool, remove the inner shaft assembly, together with the seal plate, from the T.J. case.

NOTE
Press the tool directly against the seal plate. The tool under pressure will puncture and deform the seal plate, and push out the inner shaft underneath.

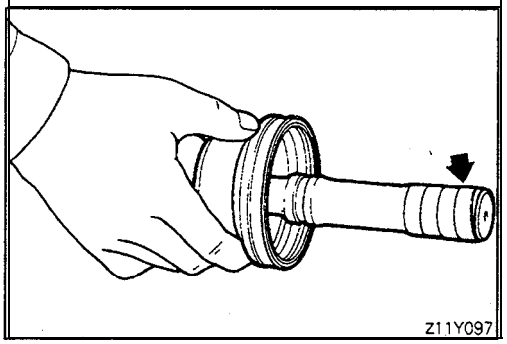


(2) Use the special tool to remove the inner shaft from the center bearing bracket.



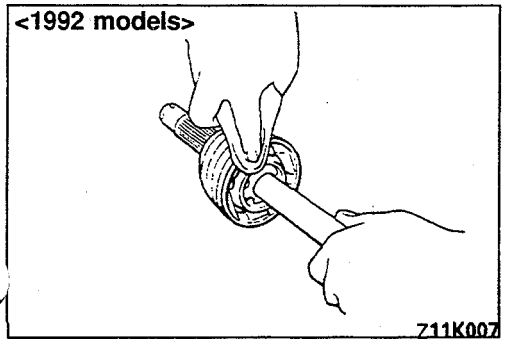
◀B▶ CENTER BEARING REMOVAL

Use the special tools to remove the center bearing from the center bearing bracket.



◀C▶ T.J. BOOT / B.J. BOOT <1992 models> REMOVAL

(1) Wrap vinyl tape around the spline on the T.J. side of the drive shaft so that the T.J. and B.J. boots are not damaged when they are removed.
(2) Withdraw the T.J. and B.J. boots from the drive shaft.



◀D▶ GREASE FROM B.J. ASSEMBLY <1992 models> REMOVAL

Wipe off grease from the B.J. assembly.

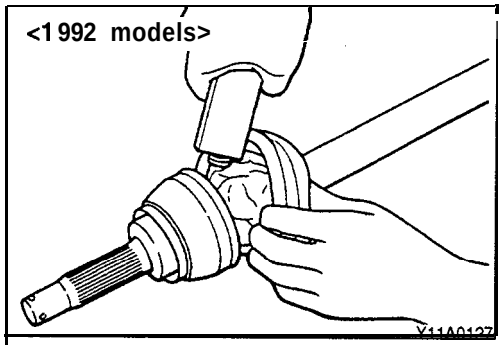
Caution
B.J. assembly cannot be disassembled.

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REASSEMBLY SERVICE POINTS

▶A◀ B.J. BOOT cl992 models> / T.J. BOOT INSTALLATION

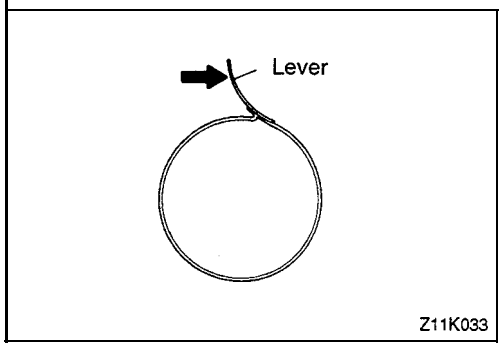
(1) Wrap vinyl tape around the splines on the drive shaft, and then install the R.J. boots and T.J. boots, in that order.



(2) Fill the inside of the B.J. and B.J. boot with the specified grease.

Specified grease:
Repair kit grease
<FWD> 145 g (5.11 oz.)
<AWD> 135 g (4.76 oz.)

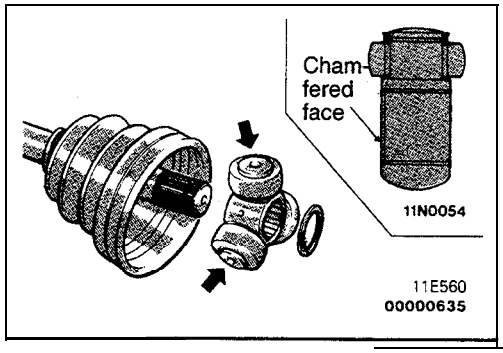
Caution
1. The grease in the repair kit should be divided in half for use, respectively, at the joint and inside the boot.
2. Special grease is used to lubricate the joint. Do not mix old and new grease or different types of grease.



(3) Secure the boot bands.

Boot band		FWD	AWD
B.J. boot band <1992 models>	Large	20–22#BJ104	20–75#BJ100L
	Small	20–15#BJ104	20–72#BJ100
T.J. boot band	Large	20–131#BJ100	20–131#BJ100
	Small	20–72#BJ100	20–72#BJ100

Caution
1. The boot bands should be tightened with the drive shaft at a 0° joint angle.
2. The B.J. boot band and T.J. boot band are identified by the identification number stamped on the lever. Take good care to install the correct one.



▶B◀ SPIDER ASSEMBLY INSTALLATION

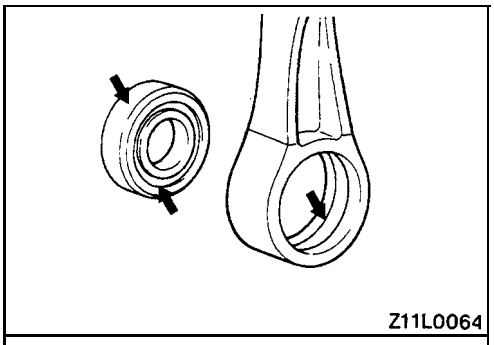
(1) Pack specified grease amply between the spider shaft and rollers of the spider assembly.

Specified grease: Repair kit grease

Caution
Special grease is used to lubricate the joint. Do not mix old and new grease or different types of grease.

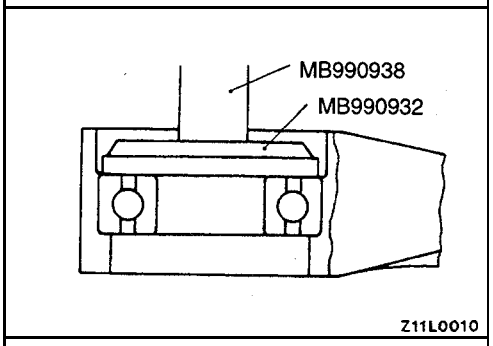
(2) To install the spider assembly to the shaft, insert the shaft from the chamfered end of the spider.

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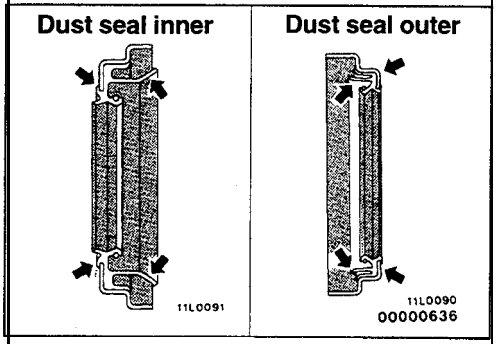
▶C◀ CENTER BEARING INSTALLATION

(1) Apply multipurpose grease to the center bearing and inside the center bearing bracket.



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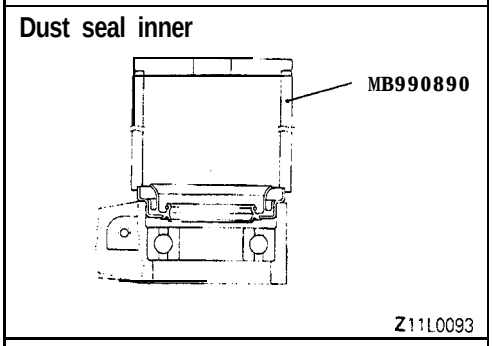
(2) Use the special tools to press-fit the center bearing into the center bearing bracket.



▶D◀ DUST SEALS INSTALLATION

(1) Apply multipurpose grease to the rear surfaces of all dust seals.

Dust seal inner: 14-20 g (.49–.71 oz.)
Dust seal outer: 8-12 g (.28–.42 oz.)



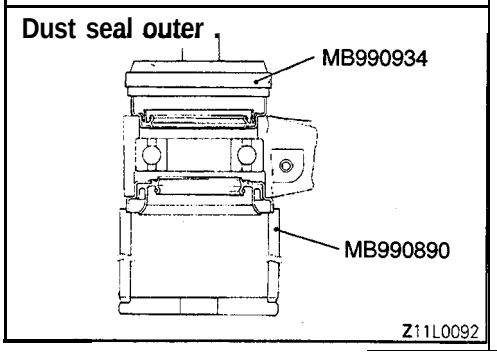
Z11L0093

(2) Press the oil seal into the center bearing bracket using the special tool.

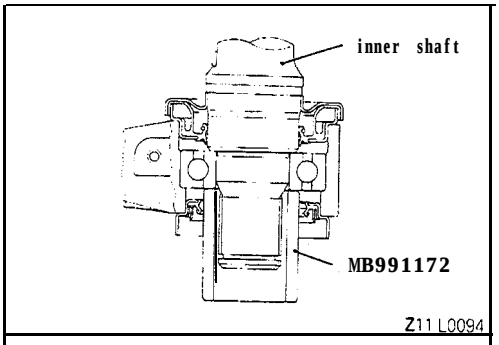
Caution
Take care not to damage the rubber part on the periphery of the dust seal.

(3) Apply multipurpose grease to the lip of each dust seal.

NOTE
When applying grease, make sure that it does not adhere to anything outside the lip.

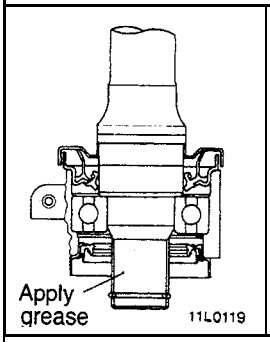


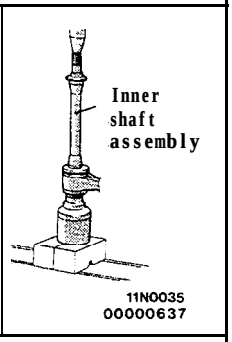
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▶E◀ INNER SHAFT INSTALLATION

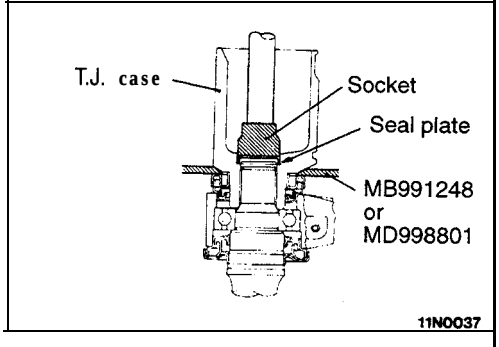
Use the special tool to hold the inner race of the center bearing and force the inner shaft into place.



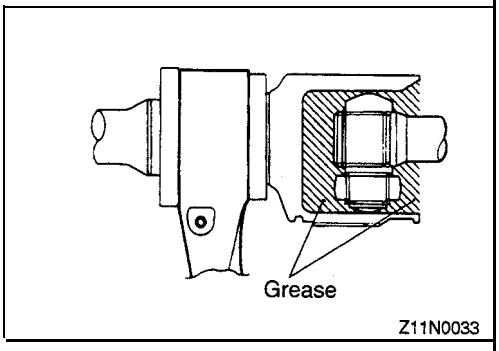


▶F◀ T.J. CASE AND INNER SHAFT ASSEMBLY INSTALLATION

(1) Apply multipurpose grease to the inner shaft spline, then press fit it into the T.J. case.



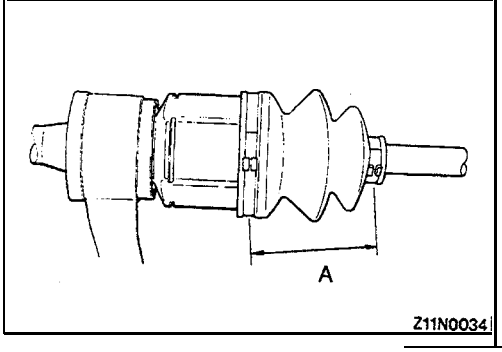
(2) Using the special tool, press the seal plate into the T.J. case.



(3) Fill the specified grease furnished in the repair kit to the T.J. case.

Specified grease:
Repair kit grease 160 g (5.64 oz.)

Caution
1. **The grease in the repair kit should be divided in half for use, respectively, at the joint and inside the boot.**
2. **The drive shaft joint uses special grease. Do not mix old and new or different types of grease.**



▶G◀ T.J. BOOT BANDS INSTALLATION

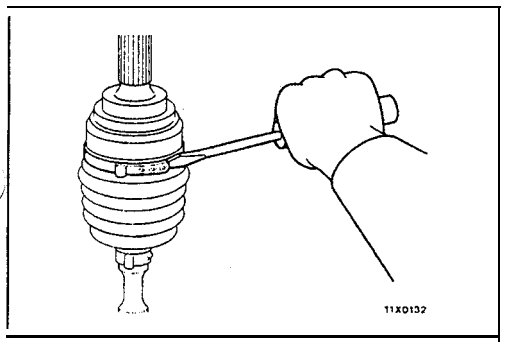
Set the T.J. boot bands at the specified distance in order to adjust the amount of air inside the T.J. boot, and then tighten the T.J boot band securely.

Standard value (A): 85 ± 3 mm (3.35 ± .12 in.)

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INSPECTION

- Check the drive shaft for damage, bending or corrosion.
- Check the inner shaft for damage, bending or corrosion.
- Check the drive shaft splines for wear or damage.
- Check the inner shaft splines for wear or damage.
- Check for entry of water and/or foreign material into B.J.
- Check the spider assembly for roller rotation, wear or corrosion.
- Check the groove inside T.J. case for wear of corrosion.
- Check the boots for deterioration, damage or cracking.
- Check the center bearing for seizure, discoloration or roughness of rolling surface.
- Check the dust cover for damage or deterioration.

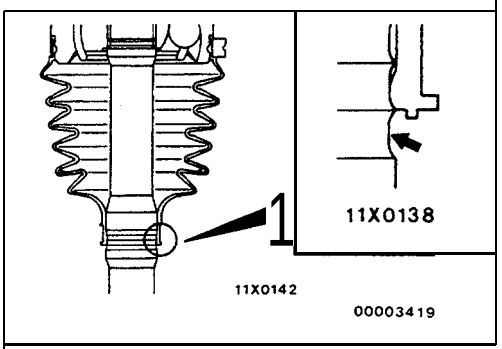


B.J. BOOT (RESIN BOOT) REPLACEMENT

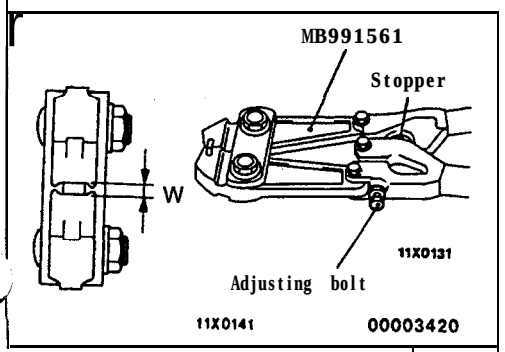
(1) Remove the large and small boot bands.

NOTE
Do not reuse the boot bands.

(2) Remove the B.J. boot.



(3) Install the small diameter end of the B.J. boot by so locating it as to expose only one of the grooves provided on the shaft.



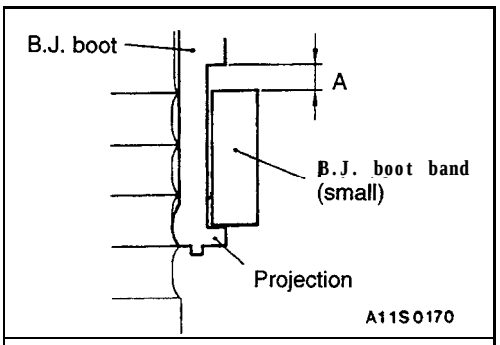
(4) Turn the adjusting bolt of the special tool to obtain a standard value of the opening width (W).

Standard value (W): 2.9 mm (.114 in.)

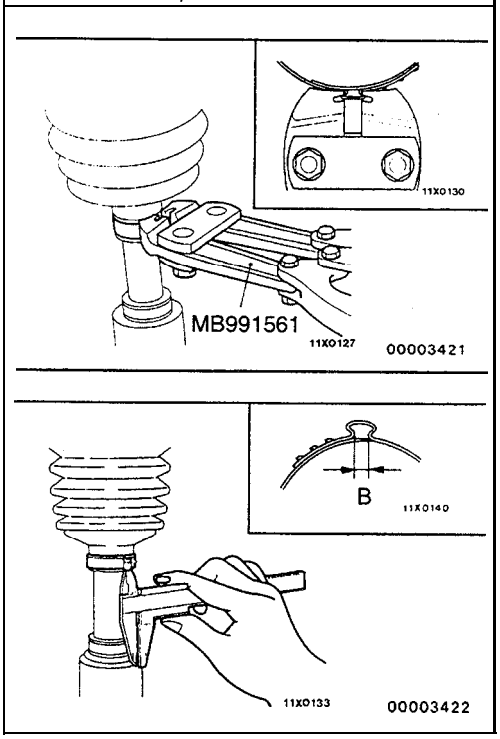
<When width is above 2.9 mm (.114 in.)>
Tighten the adjusting bolt.

<When width is below 2.9 mm (.114 in.)>
Loosen the adjusting bolt.

NOTE
(1) One complete turn of the adjusting bolt will change the width by approx. 0.7 mm (.028 in.).
(2) Do not give more than one turn to the adjusting bolt.



(5) Install the boot band (small) against the projection at the boot end to provide clearance A as shown in the illustration.



(6) Using the special tool, crimp the boot band.

Caution

1. With the drive shaft secured vertically, pinch positively the portion to be crimped of the band between the tips of the special tool.

2. Be sure to compress the boot band until the special tool handle comes in contact with the stopper.

(7) Make sure that the amount of boot band crimping (B) is of the standard value.

Standard value (B): 2.4 – 2.8 mm (.094 – .110 in.)

<When amount of crimping is above 2.8 mm (.110 in.)>

Readjust W given in (4) above to the value calculated by the following formula, and repeat work described in (6).

W = 5.5 mm (.217 in.) – B

[Example: When B = 2.9 mm (.114 in.), W = 2.6 mm (.102 in.)]

<When amount of crimping is below 2.4 mm (.094 in.)>

Remove the boot band, readjust W given in (4) to the value calculated by the following formula and repeat work described in (5) and (6) by using a new boot band.

W = 5.5 mm (.217 in.) – B

[Example: When B = 2.3 **mm (.091 in.), W = 3.2 mm (.126 in.)]**

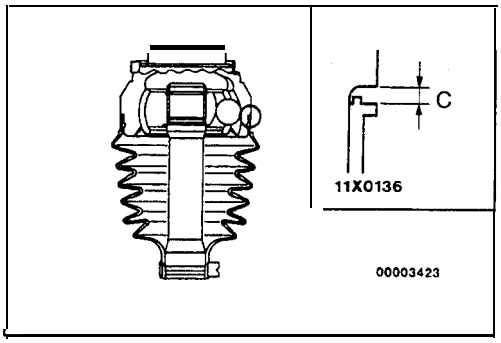
(8) Make sure that the boot band does not protrude from the band mounting area. If the band protruds, replace it with a new band and repeat work described in (5) through (7).

(9) Pack the boot with specified amount of grease to specification.

Specified grease: Grease in repair kit

Amount applied: 155 g (5.47 oz.)

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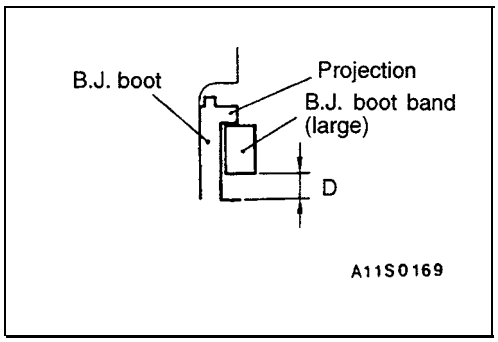


(10) Install the boot with a clearance of standard value (C) provided between the large diameter end of the boot and the shoulder of B.J. housing.

Standard value (C): 0.1 – 1.55 mm (.004 – .061 in.)

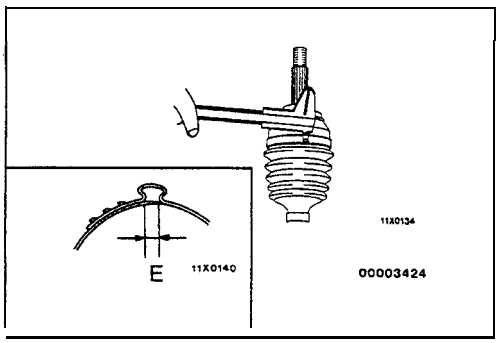
(11) Adjust the width of opening in the special tool (W) to standard value in the same manner as described in (4).

Standard value (W): 3.2 mm (.126 in.)



(12) Install the boot band (large) against the projection at the boot end to provide clearance D as shown in the illustration.

(13) Crimp the boot band (large) with the special tool in the same manner as described in (6) above.



(14) Make sure that the amount of boot band crimping is within the range of standard value (E).

Standard value (E): 2.4-2.8 mm (.094 – .110 in.)

<When amount of crimping is above 2.8 mm (.110 in.)>

Readjust W given in (11) to a value obtained by the following formula and repeat work described in (13) above.

W = 5.8 mm (.228 in.) – E

[Example: When E = 2.9 mm (.114 in.), W = 2.9 mm (.114 in.)]

<When amount of crimping is below 2.4 mm (.094 in.)>

Remove the boot band, readjust W given in (11) to a value calculated by the following formula and repeat work described in (12) and (13) by using a new boot band.

W = 5.8 mm (.228 in.) – E

[Example: When E = 2.3 mm (.091 in.), W = 3.5 mm (.138 in.)]

(15) Make sure that the boot band does not protrude from its mounting area. If the band protrudes, replace it with a new -band and repeat work described in (12) through (14).

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NOTES

REAR AXLE

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REAR AXLE <FWD>

SPECIFICATIONS

GENERAL SPECIFICATIONS

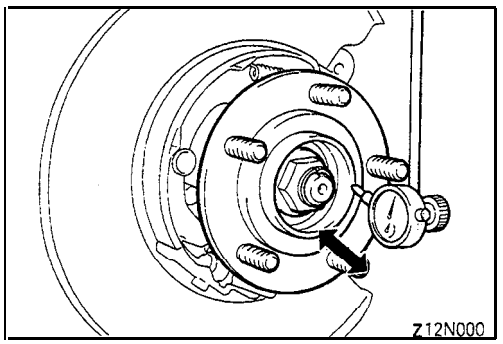
Item		Specification
Wheel bearing	Type	Unit ball bearing

SERVICE SPECIFICATIONS

Items	Limit
Wheel bearing end play mm (in.)	0.05 (.002) or less
Rear hub rotary-sliding resistance N (lbs.)	31 (7) or less

TROUBLESHOOTING

Symptom	Probable cause	Remedy
Abnormal sound	Loose wheel nuts	Tighten
	Damaged or worn wheel bearings	Replace
	Bent or distorted brake discs	Replace



ON-VEHICLE SERVICE

WHEEL BEARING END PLAY CHECK

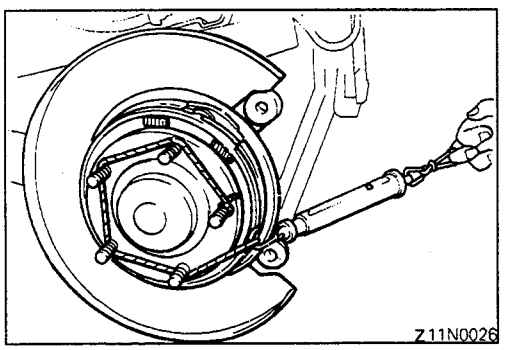
1. Inspect the play of the bearings while the vehicle is jacked up and resting on floor jack.
2. Remove the hub cap and then release the parking brake.
3. Remove the caliper assembly and the brake disc.
4. Check the bearing's end play.
   Place a dial gauge against the hub surface; then move the hub in the axial direction and check whether or not there is end play.

   Limit: 0.05 mm (.002 in.) or less

   NOTE
   If the limit value is exceeded, the lock nut should be tightened to the specified torque and check the end play again.
5. Replace the rear hub bearing unit if an adjustment cannot be made to within the limit.

REAR HUB ROTARY-SLIDING RESISTANCE CHECK

1. Inspect the play of the bearings while the vehicle is jacked up and resting on floor jack.
2. Release the parking brake.
3. Remove the caliper assembly and the brake disc.



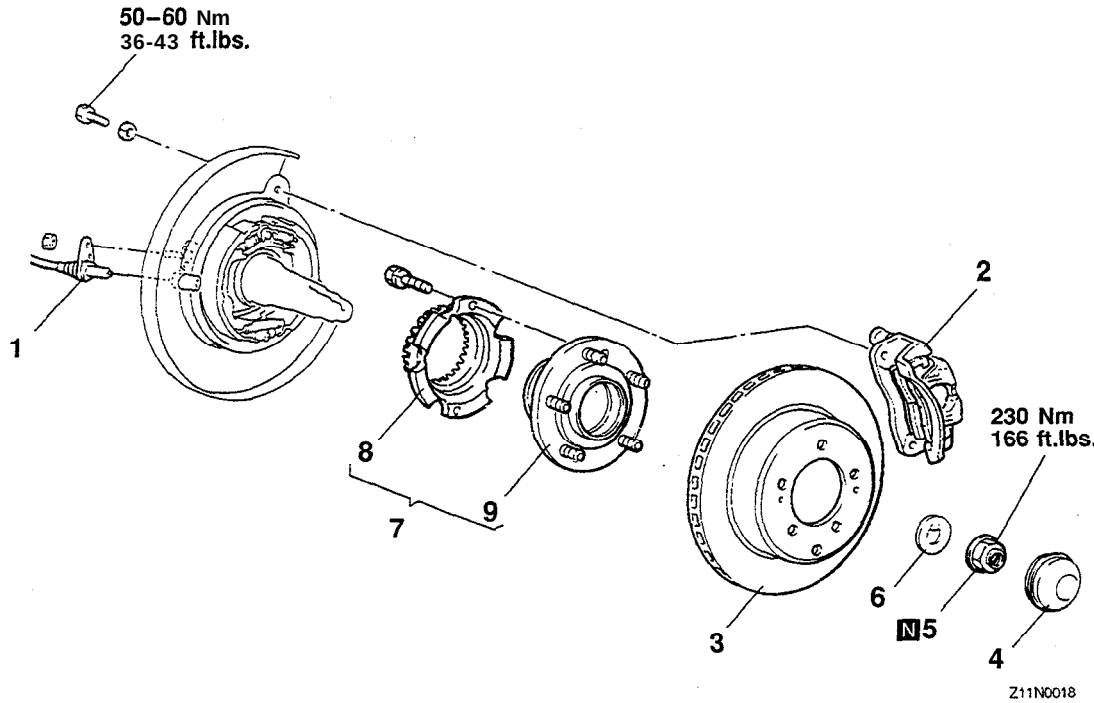
4. After turning the hub a few times to seat the bearing, attach a spring balance to the hub bolt, and, pulling at a 90° angle from the hub bolt, measure to determine whether or not the rotary-sliding resistance of the rear hub is the limit value.

   Limit: 31 N (7 lbs.) or less

   NOTE
   If the limit value is exceeded, loosen the nut and then tighten it to the specified torque, and check the rear hub rotary-sliding resistance again.
5. Replace the rear hub unit bearing if an adjustment cannot be made to within the limit.

REAR AXLE HUB

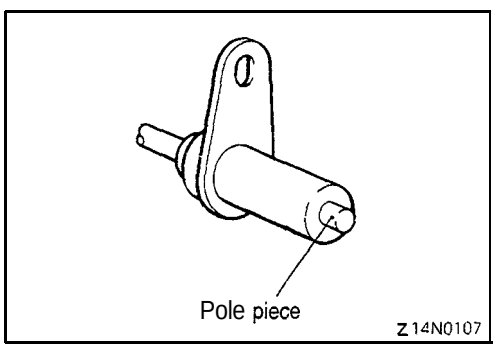
REMOVAL AND INSTALLATION



Removal steps

- ● ∂ 1. Rear speed sensor <Vehicles with ABS>
- ◀B▶ 2. Caliper assembly
- 3. Brake disc
- 4. Hub cap
- ▶A◀ 5. Wheel bearing nut
- 6. Tongued washer
- 7. Rear hub assembly
- ◀C▶ 8. Rear rotor <Vehicles with ABS>
- 9. Rear hub unit bearing

Caution
Rear hub unit bearing cannot be disassembled.



REMOVAL SERVICE POINTS

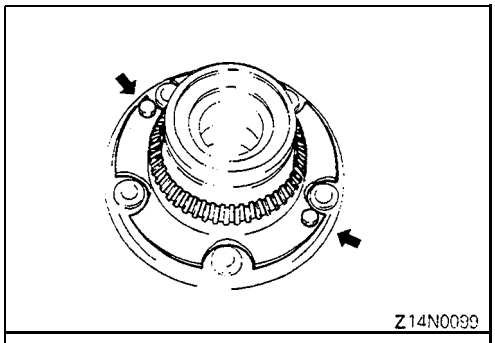
◀A▶ REAR SPEED SENSOR REMOVAL <VEHICLES WITH ABS>

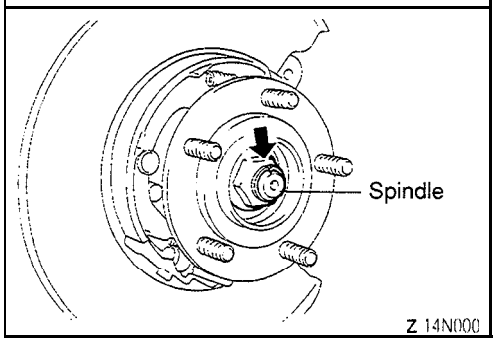
Caution
Be careful when handling the pole piece at the tip of the speed sensor and the toothed edge of the rotor so as not to damage them by striking against other parts.

◀B▶ CALIPER ASSEMBLY REMOVAL

Remove the caliper assembly and suspend it with a piece of wire.

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◀C▶ REAR ROTOR REMOVAL <VEHICLES WITH ABS>

Caution
Care must be taken not to scratch or scar the rotor's toothed surface, and not to drop it.
If the rotor's toothed surface is chipped or the rotor is deformed, it might not be able to accurately sense the wheel rotation speed and the system as a result might not perform normally.

INSTALLATION SERVICE POINT

▶A◀ WHEEL BEARING NUT INSTALLATION

After tightening the wheel bearing nut, align with the spindle's indentation and crimp.

REAR AXLE <AWD>

SPECIFICATIONS

GENERAL SPECIFICATIONS

AXLE SHAFT

Items			Specifications
Type			Semi-floating type
Shaft dimensions mm (in.)	Outer bearing portion dia.		35 (1.38)
	Inner bearing portion dia.		28 (1.10)
	Center portion dia.		34.5 (1.36)
	Overall length		245.4 (9.7)
Bearing	O.D. × I.D. mm (in.)	Outer	72 × 35 (2.83 × 1.38)
		Inner	58 × 28 (2.28 × 1.10)

DRIVE SHAFT

items		Specifications
Joint type	Outer	B.J.
	Inner	T.J.
Length (joint to joint) x diameter mm (in.)		395x28 (15.6 × 1.10)

N O T E
B.J.: Bit-field Joint
T.J.: Tripod Joint

DIFFERENTIAL

items			Specifications
Reduction gear type			Hypoid gear
Reduction ratio			<Up to 1993 models> 3.545
			<From 1994 models> 3.307
Differential gear type and configuration	Side gear		Straight bevel gear x 2*
	Pinion gear		Straight bevel gear x 4
Number of teeth	Drive gear		<Up to 1993 models> 39
			<From 1994 models> 43
	Drive pinion		<Up to 1993 models> 11
			<From 1994 models> 13
	Side gear		16
	Pinion gear		10
Bearing	O.D. x I.D. mm (in.)	Side	82.500 x 45.242 (3.25 x 1.78)
		Front	68.263 x 30.163 (2.69 x 1 .19)
		Rear	76.200 x 36.513 (3.00 x 1 .44)

NOTE
● : Denotes the gear (L.H.) which is in a single body with the viscous coupling.

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SERVICE SPECIFICATIONS

Items			Standard value	Limit
Setting of T.J. boot length mm (in.)			85 ± 3 (3.35 ± .12)	–
Final drive gear backlash mm (in.)			0.11–0.16 (.004–.006)	–
Differential gear backlash (Limited slip differential) mm (in.)			0.03-0.09 (.0012–.0035)	–
Drive pinion rotation torque Nm (in.lbs.)	With oil seal	New part (with rust-prevention oil)	0.5–0.7 (4-6)	–
		New part/reusable part (gear oil application)	0.35–0.45 (3-4)	–
	Without oil seal	New part (with rust-prevention oil)	0.3-0.5 (3-4)	–
		New part/reusable part (gear oil application)	0.15–0.25 (l-2)	–
Rear wheel bearing rotation torque N (lbs.)			-	12 (2.6)
Rear axle total backlash mm (in.)				5 (.2)
Drive gear runout mm (in.)			–	0.05 (.002)
Rear wheel bearing end play mm (in.)			-	0.8 (.031)

LUBRICANTS

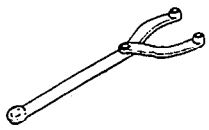
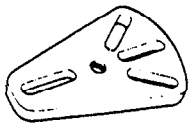
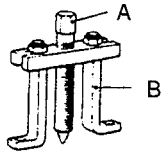
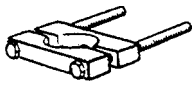
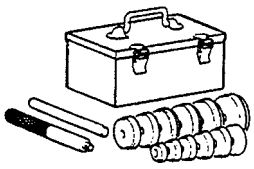
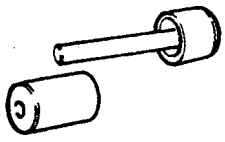
Items	Specified lubricants	Quantity
Rear axle gear oil	Hypoid Gear Oil API classification GL-5 or higher Above -23°C (–10°F) SAE 90, 85W-90, 80W-90 From -34°C (–30°F) to -23°C (-10°F) SAE 80W, 80W-90 Below –34°C (–30° F) SAE 75W	1.1 lit. (1.2 qts.)
B.J. boot grease	Repair kit grease	125 g (4.41 oz.)
T.J. boot grease		135 g (4.76 oz.)

SEALANTS AND ADHESIVES

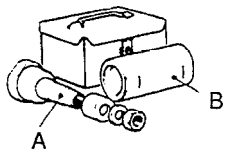
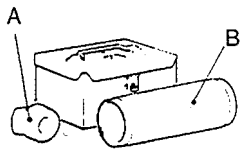
Items	Specified sealants and adhesives
Drive gear threaded hole	3M Stud Locking Part No. 4170 or equivalent
Vent plug	3M ATD Part No. 8663 or equivalent
Differential cover	

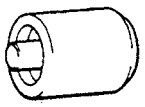
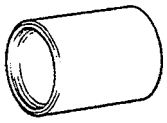
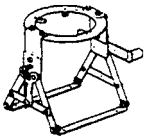
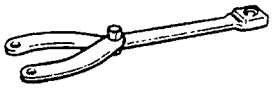
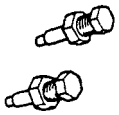
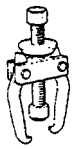
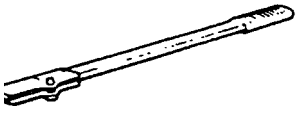
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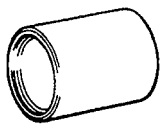
SPECIAL TOOLS

Tool	Tool number and name	Supersession	Application
	MB990767 End yoke holder	MB990767-01	Holding of hub
	MB991354 Puller body	General service tool	Removal of the axle shaft
	MB990241 Axle shaft puller A: MB990244 Puller shaft B: MB990242 Puller bar	MB990241-01 or General service tool	
	MB990211 Sliding hammer and adapter	MB990211-01	
	MB990560 Bearing remover	General service tool	Removal of the axle shaft dust shield, outer bearing and rear rotor Press-in the outer wheel bearing and rear rotor
	MB990925 Bearing and oil seal installer set	MB990925 or General service tool	Removal of axle shaft inner bearing Installation of axle shaft inner bearing Installation of drive pinion rear bearing outer race Installation of drive pinion front bearing outer race Installation of differential side oil seal (Use in conjunction with MB991 380) Removal of drive pinion front bearing and drive pinion rear bearing outer race Adjustment of differential final gear tooth contact
	MB990641 Lower arm bushing installer and remover A		Press-fitting of axle housing oil seal

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Tool	Tool number and name	Supersession	Application
	MB990901 Drive pinion setting gauge set A: MB990903 Drive pinion gauge assembly B: MB990552 Cylinder gauge	MB990901 -01 MIT21 5838	Drive pinion height adjustment (Use in conjunction with MB991 366)
	MB991 378 Drive pinion setting gauge set A: MB991 366 Head B: MB991 365 Cylinder gauge	MB991366-01	
	MB990802 Bearing installer	MB990802-01	Pressing of drive pinion rear bearing inner race Pressing of side bearing inner race
	MB990326 Preload socket	General service tool	Measurement of the drive pinion preload
	MB990728 Bearing installer	MB990802-01	Press-fitting of the side bearing inner race
	MB991 380 Oil seal installer	MB991 380-01	Press-fitting of differential oil seal
	MB991294 Side gear holding tool		Inspection of differential gear backlash
6	MB990799 Ball joint dust shield installer	MB990799-01	Press-fitting the axle shaft dust shield

Tool	Tool number and name	Supersession	Application
	MB991153 Bushing remover & installer arbor		Driving-out and press-fitting of differential support bushing and differential support member bushing
	MB990831 Bushing remover & installer ring		
	MB990847 Bushing remover & installer base		
	MB990909 Working base	General service tool	Disassembly and reassembly of differential carrier assembly (Use in conjunction with adapter MB991 116)
	MB991116 Working base adapter	General service tool	
	MB991 367 Special spanner	MB991367-01	Removal and installation of side bearing nut
	MB991 385 Pin		
	MB99081 0 Bearing puller	P-334	Removal of companion flange
		MB990339-01 MB990811 -01 MIT44801 MIT303173	Removal of the side bearing inner race and drive pinion rear bearing inner race
	MB990850 End yoke holder	MB990767-01	Removal and installation of companion flange

Tool	Tool number and name	Supersession	Application
	MB990339 Taper roller bearing puller	General service tool	Removal of drive pinion rear bearing inner race
	MB990648 Bearing remover	General service tool	
	MB990890 Rear suspension bushing base	MB990890-01	Press-fitting of drive gear (for 4WS)

TROUBLESHOOTING

AXLE SHAFT

Symptom	Probable cause	Remedy
Noise while wheels are rotating	Brake drag	Replace
	Bent axle shaft	
	Worn or scarred axle shaft bearing	
Grease leakage	Worn or damaged oil seal	
	Malfunction of bearing seal	

DRIVE SHAFT

Symptom	Probable cause	Remedy
Noise	Wear, play or seizure of ball joint	Replace
	Excessive drive shaft spline looseness	

DIFFERENTIAL (LIMITED SLIP DIFFERENTIAL)

Symptom	Probable cause	Remedy
Abnormal noise during driving or gear changing*1	Excessive final drive gear backlash	Adjust
	Insufficient drive pinion preload	
	Excessive differential gear backlash	Adjust or replace
	Worn spline of a side gear	Replace
	Loose companion flange self-locking nut	Retighten or replace
Abnormal noise when cornering	Damaged differential gears	Replace
	Damaged pinion shaft	
	Insufficient gear oil quantity	Replenish
Gear noise*2	Improper final drive gear tooth contact adjustment	Adjust or replace
	Incorrect final drive gear backlash	Adjust
	Improper drive pinion preload adjustment	
	Damaged, broken, and/or seized tooth surfaces of the drive gear and drive pinion	Replace
	Damaged, broken, and/or seized drive pinion bearings	
	Damaged, broken, and/or seized side bearings	
	Damaged differential case	
	Inferior gear oil	
	Insuff icient gear oil quantity	Replenish

N O T E
(1) *1: In addition to a malfunction of the differential carrier components, abnormal noise can also be caused by the universal joint of the propeller shaft, the axle shafts, the wheel bearings, etc. Before disassembling any parts, take all possibilities into consideration and confirm the source of the noise.
(2) *2: Noise from the engine, muffler vibration, transaxle, propeller shaft, wheel bearings, tires, body, etc., is easily mistaken as being caused by malfunctions in the differential carrier components. Be extremely careful and attentive when performing the driving test, etc.
Test methods to confirm the source of the abnormal noise include: coasting, acceleration, constant speed driving, raising the rear wheels on a jack, etc. Use the method most appropriate to the circumstances.

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Symptom	Probable cause	Remedy
Gear oil leakage	Worn or damaged front oil seal, or an improperly installed oil seal	Replace
	Damaged gasket	
	Loose companion flange self-locking nut	Retighten or replace
	Loose filler or drain plug	Retighten or apply adhesive
	Clogged or damaged vent plug	Clean or replace
Seizure*1	Insufficient final drive gear backlash	Adjust
	Excessive drive pinion preload	
	Excessive side bearing preload	
	Insufficient differential gear backlash	
	Excessive clutch plate preload	
	Inferior gear oil	Replace
	Insufficient gear oil quantity	Replenish
Breakdown*2	Incorrect final drive gear backlash	Adjust
	Insufficient drive pinion preload	
	Insufficient side bearing preload	
	Excessive differential gear backlash	
	Loose drive gear clamping bolts	Retighten
The limited slip differential does not function (on snow, mud, ice, etc.)	The limited slip device is damaged	Disassemble, check the functioning and replace the damaged parts

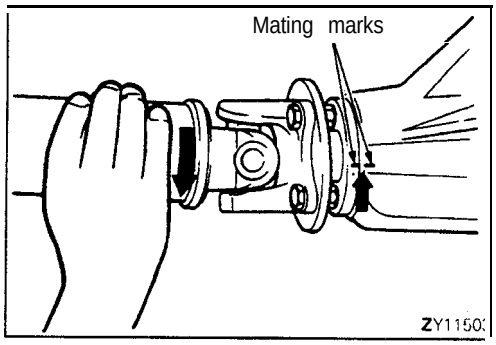
NOTE
(1) ● *1: In the event of seizure, disassemble and replace the parts involved, and also be sure to check all components for any irregularities and repair or replace as necessary.
(2) ● *2: In addition to disassembling and replacing the failed parts, be sure to check all components for irregularities and repair or replace as necessary.

ON-VEHICLE SERVICE

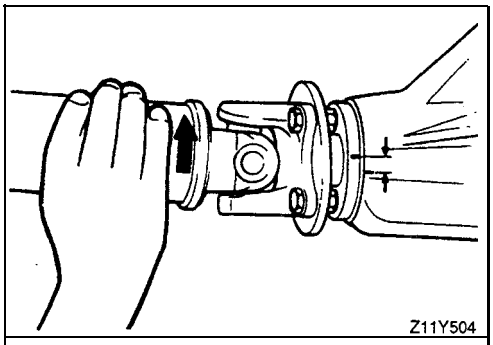
REAR AXLE TOTAL BACKLASH CHECK

If the vehicle vibrates and produces a booming sound due to an imbalance of the driving system, measure the rear axle total backlash by the following procedures to see if the differential carrier assembly required removal.

(1) Place the gearshift lever in the neutral position, apply the parking brake and jack up the vehicle.



(2) Manually turn the propeller shaft clockwise as far as it will go and make mating marks on the companion flange dust shield and the differential carrier.



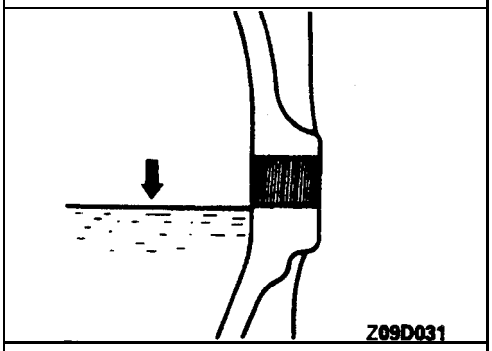
(3) Manually turn the propeller shaft counterclockwise as far as it will go and measure the movement of the mating marks.

Limit: 5 mm (.2 in.)

(4) If the backlash exceeds the limit, remove the differential carrier assembly and adjust the backlash. (Refer to P.27-27.)

GEAR OIL LEVEL CHECK

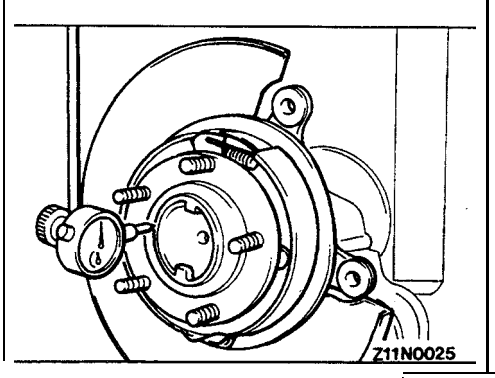
1. Remove the filler plug, and check the oil level.
2. The oil level is sufficient if it reaches the filler plug hole.



Specified gear oil:
Hypoid Gear Oil API classification GL-5 or higher
[1.1 liter (1.2 qts.)]

NOTE
Above –23°C (-10°F): SAE 90, 85W-90, 80W-90
From -34°C (-30°F) to -23°C (-10°F): SAE 80W, 80W-90
Below -34°C (-30°F): SAE 75W

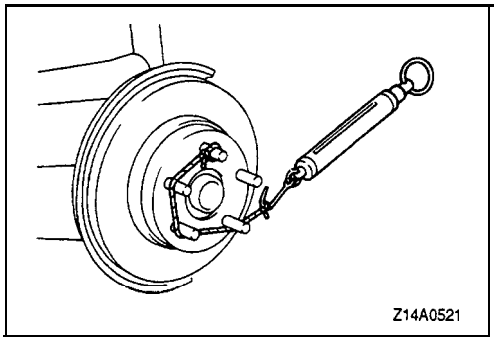
REAR WHEEL BEARING END PLAY CHECK



1. Support the vehicle on axle stands positioned at the specified locations and remove the rear wheel.
2. Separate the parking brake cable from the rear brake.
3. Remove the caliper assembly and brake disc.
4. Place a dial gauge as shown in the illustration, and then measure the play when the axle shaft is moved in the axial direction.

Limit: 0.8 mm (.031 in.)

5. If the play exceeds the limit, check the tightening torque of the companion flange of the axle shaft; if it is correct, replace the wheel bearing.

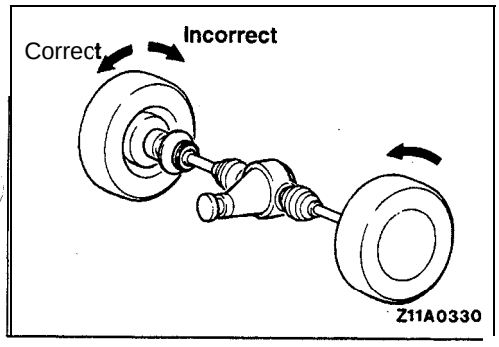


REAR WHEEL BEARING ROTARY-SLIDING RESISTANCE CHECK

1. Remove the drive shaft from the companion flange.
2. Remove the brake pad or caliper assembly.
3. Attach a spring balance to the hub bolt, then, pulling the balance at a right angle to the hub bolt, measure the rotary-sliding resistance to see whether it is within the limit value.

   Limit: 12 N (2.6 lbs.)

4. If the rotary-sliding resistance exceeds the limit value, check the tightening torque of the axle shaft companion flange. If it is normal, replace the bearing.



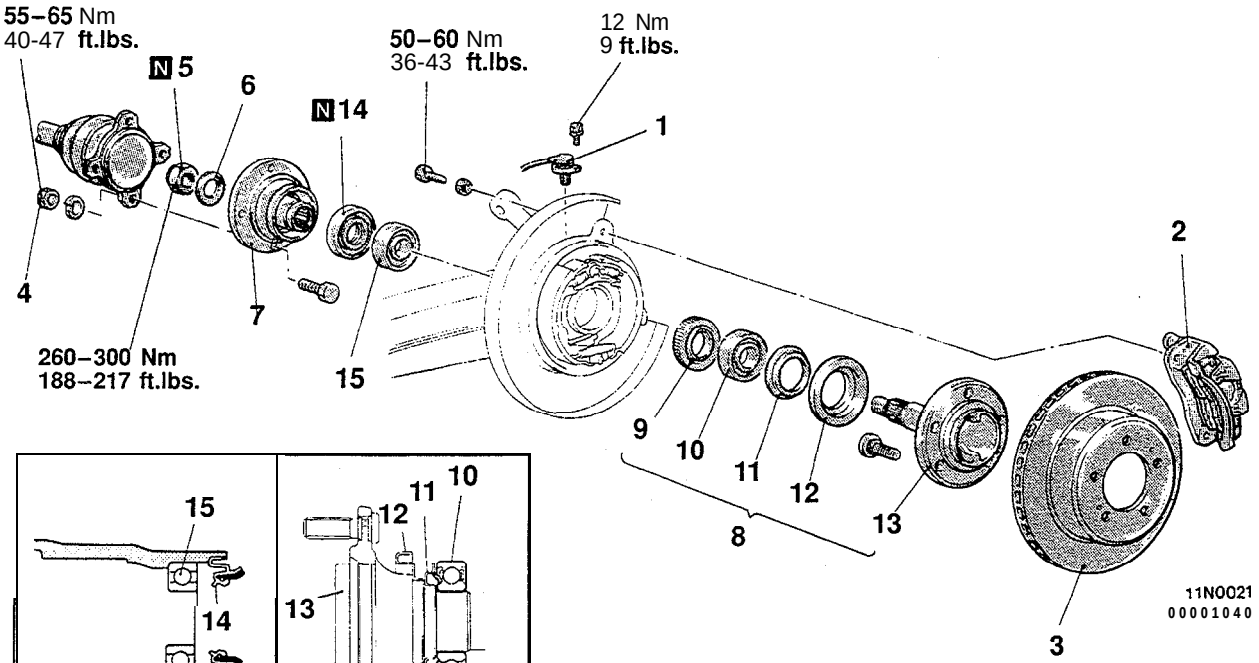
LIMITED-SLIP DIFFERENTIAL CHECK

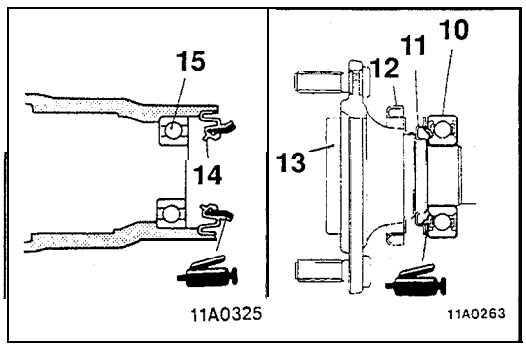
1. Block the front wheels and move the shift lever to neutral.
2. Completely release the parking brake.
3. Jack up the rear wheels and place a rigid rack at the specified part of the side sill.
4. Disconnect the coupling of the differential and propeller shaft.
5. When one wheel is slowly rotated, check whether or not the wheel on the other side turns in the same direction.
6. If it turns in the opposite direction, replace the viscous unit.

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AXLE SHAFT

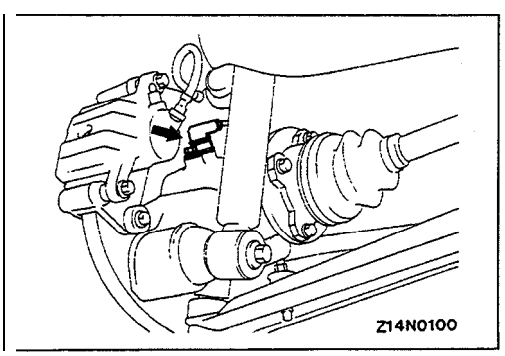
REMOVAL AND INSTALLATION





Removal steps

◀A▶ 1. Rear speed sensor <Vehicles with ABS>
◀B▶ 2. Brake caliper assembly
3. Brake disc
4. Drive shaft mounting nut
◀C▶ ▶G◀ 5. Self-locking nut
6. Washer
7. Companion flange
◀D▶ 8. Axle shaft assembly
◀E▶ ▶F◀ 9. Rear rotor <Vehicles with ABS>
◀F▶ ▶E◀ 10. Outer bearing
◀F▶ ▶D◀ 11. Dust shield
▶C◀ 12. Dust shield
13. Axle shaft
◀G▶ ▶B◀ 14. Oil seal
◀G▶ ▶A◀ 15. Inner bearing



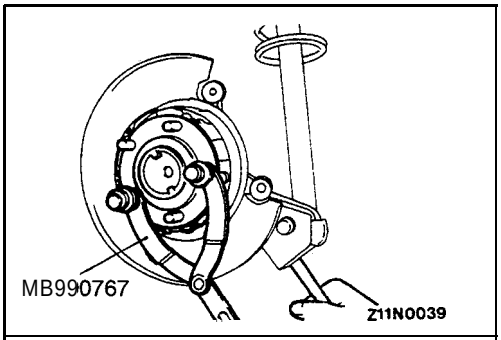
REMOVAL SERVICE POINTS

◀A▶ REAR SPEED SENSOR REMOVAL <VEHICLES WITH ABS>

Caution
Be cautious to ensure that the tip of the pole piece does not come in contact with other parts when removing the speed sensor.

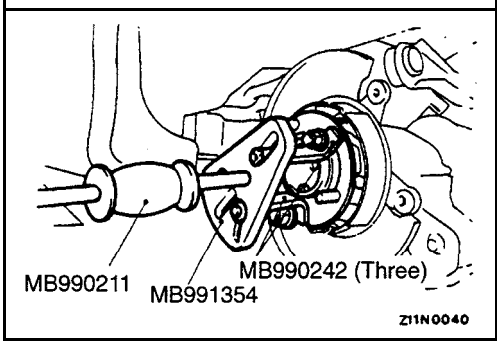
◀B▶ BRAKE CALIPER ASSEMBLY REMOVAL

Remove the brake caliper assembly and suspend it with a piece of wire.



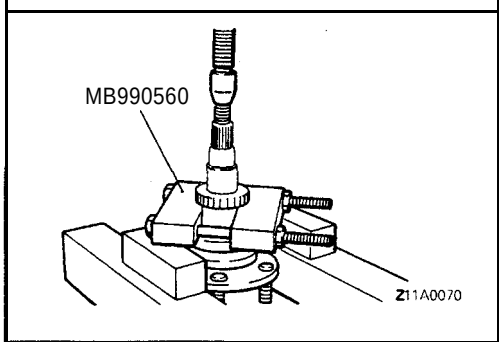
◀C▶ SELF-LOCKING NUT REMOVAL

With the special tool, secure the axle shaft and remove the companion flange self-locking nut.



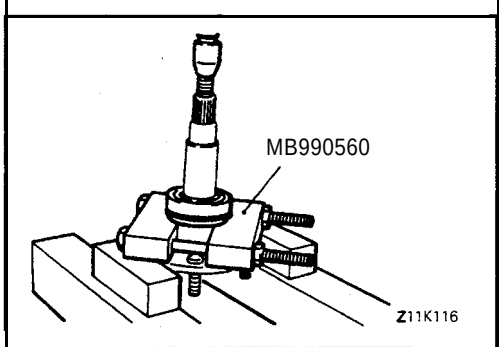
◀D▶ AXLE SHAFT ASSEMBLY REMOVAL

With the special tool, remove the axle shaft from the axle housing.



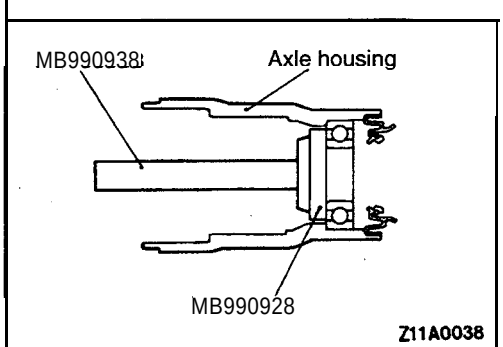
◀E▶ REAR ROTOR REMOVAL <VEHICLES WITH ABS>

Using the special tool, remove the rear rotor from the axle shaft.



◀F▶ OUTER BEARING / DUST SHIELD REMOVAL

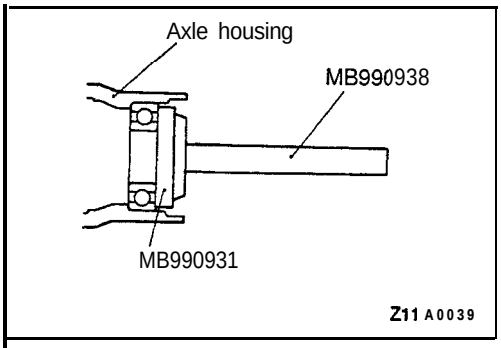
Using the special tool, remove the outer bearing and dust shield concurrently from the axle shaft.



◀G▶ OIL SEAL / INNER BEARING REMOVAL

With the special tool, remove the inner bearing and oil seal from the axle housing.

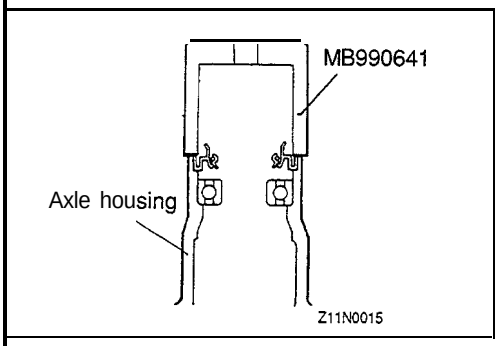
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INSTALLATION SERVICE POINTS

▶A◀ INNER BEARING INSTALLATION

With the special tool, press fit the inner bearing onto the axle housing.

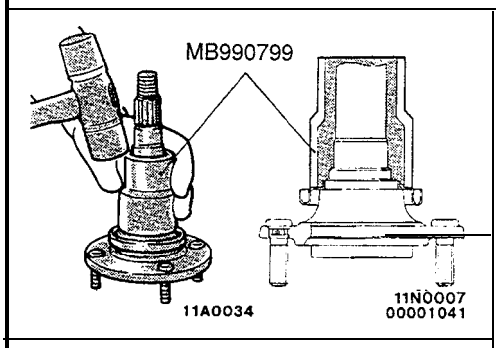


▶B◀ OIL SEAL INSTALLATION

(1) With the special tool, press the oil seal onto the axle housing with the depression in the oil seal facing upward, and until it contacts the shoulder on the inside of the axle housing.

NOTE
When tapping the oil seal in, use a plastic hammer to lightly tap the top and circumference of the special tool, press fitting gradually and evenly.

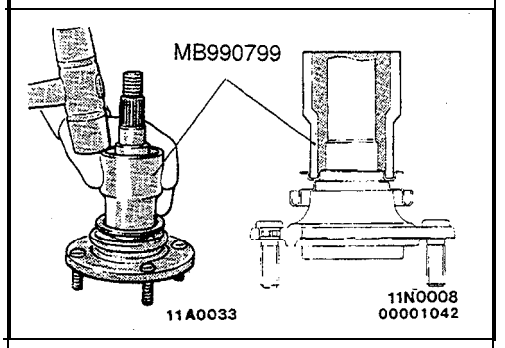
(2) Apply multipurpose grease to the oil seal lip.



▶C◀ DUST SHIELD INSTALLATION

Orienting the dust shield as shown in the illustration, and using the special tool, press fit the dust shield until it contacts the axle shaft shoulder.

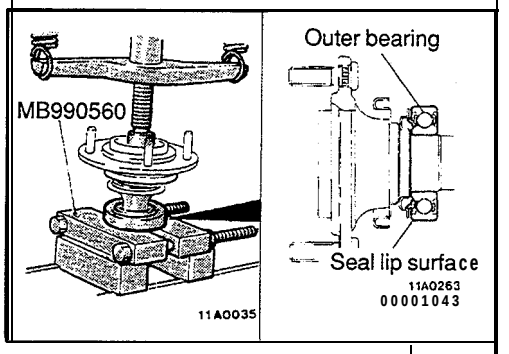
NOTE
When tapping the oil seal in, use a plastic hammer to lightly tap the top and circumference of the special tool, press fitting gradually and evenly.



▶D◀ DUST SHIELD INSTALLATION

With the special tool, install the dust shield so that the depression is facing upward.

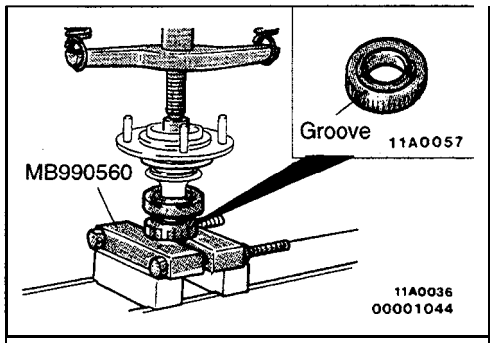
NOTE
When tapping the oil seal in, use a plastic hammer to lightly tap the top and circumference of the special tool, press fitting gradually and evenly.



▶E◀ OUTER BEARING INSTALLATION

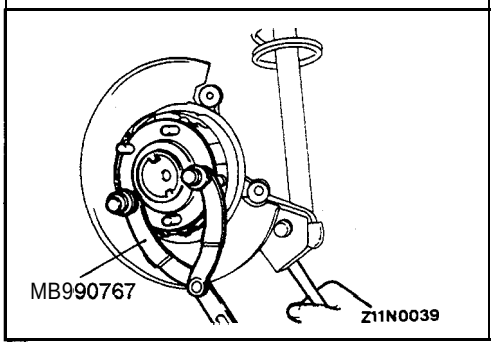
(1) Apply multipurpose grease around the entire circumference of the inner side of the outer bearing seal lip.

(2) Using the special tool, press fit the outer bearing to the axle shaft so that the bearing seal lip surface is facing towards the axle shaft flange.



▶F◀ REAR ROTOR INSTALLATION <VEHICLES WITH ABS>

Using the special tool, press fit the rear rotor to the axle shaft with the rear rotor groove surface toward the axle shaft flange.



▶G◀ SELF-LOCKING NUT INSTALLATION

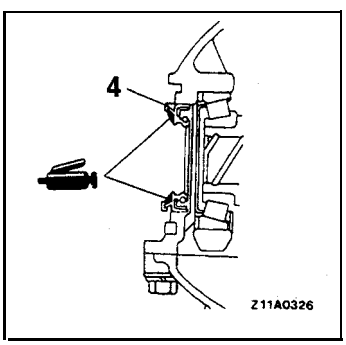
With the special tool, secure the axle shaft and tighten the companion flange self-locking nut.

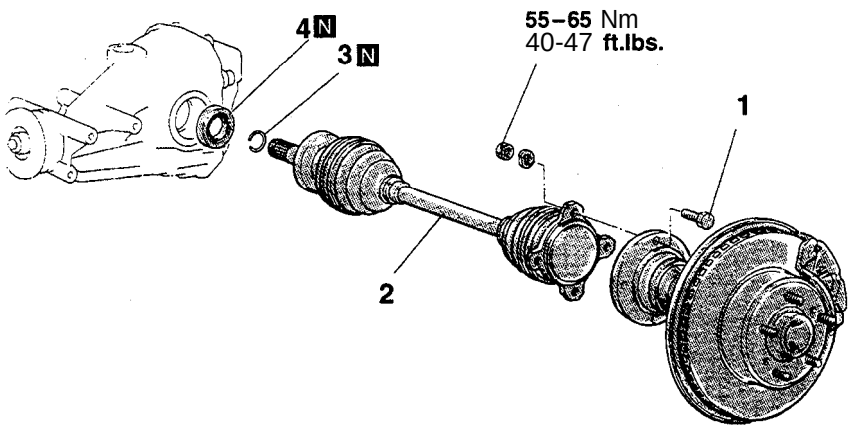
INSPECTION

- Check the companion flange for wear or damage.
- Check the dust shield for deformation or damage.
- Check the wheel bearings for burning or discoloration.
- Check the wheel bearing for unsmooth rotation.
- Check the axle shaft for cracking, wear or damage.
- Check oil seal for cracking or damage.

DRIVE SHAFT

REMOVAL AND INSTALLATION

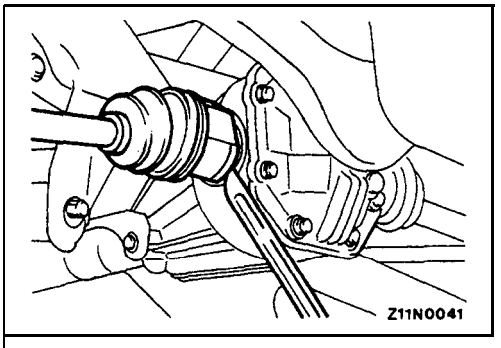




Removal steps

1. Bolt
◀A▶ ▶B◀ 2. Drive shaft
3. Circlip
▶A◀ 4. Oil seal

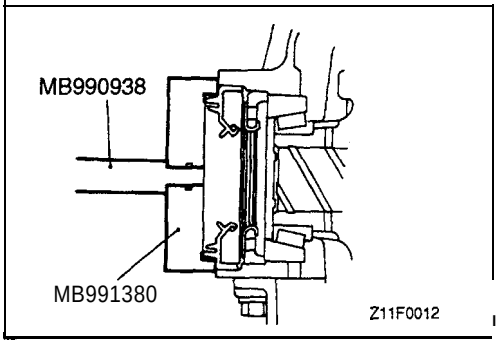
TSB Revision



REMOVAL SERVICE POINT

◀A▶ DRIVE SHAFT REMOVAL

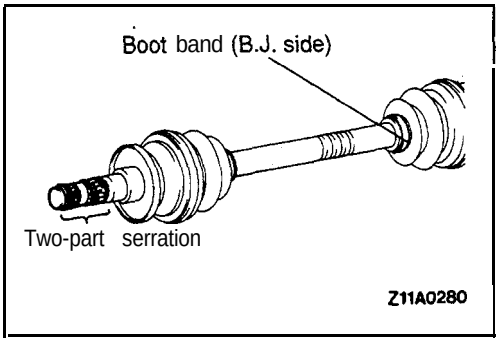
Using a tire lever, etc. remove the drive shaft from the differential carrier.



INSTALLATION SERVICE POINTS

▶A◀ OIL SEAL INSTALLATION

(1) If the oil seal is to be replaced because of damage, drive it in by using the special tool.
(2) Apply the specified grease to the oil seal lip.



▶B◀ DRIVE SHAFT INSTALLATION

Caution

1. **Be cautious to ensure that the differential carrier oil seal is not damaged by the drive shaft spline.**
2. **The right drive shaft for models equipped with the LSD having a VCU has a two-part serration. Be very careful to install each one on the correct side.**

NOTE
The left and right drive shafts can also be distinguished from each other by the identification color of boot band (B.J. side).

Item	Drive shaft (LH)	Drive shaft (RH)
Boot band (B.J. side) identification color	White	Blue

Caution

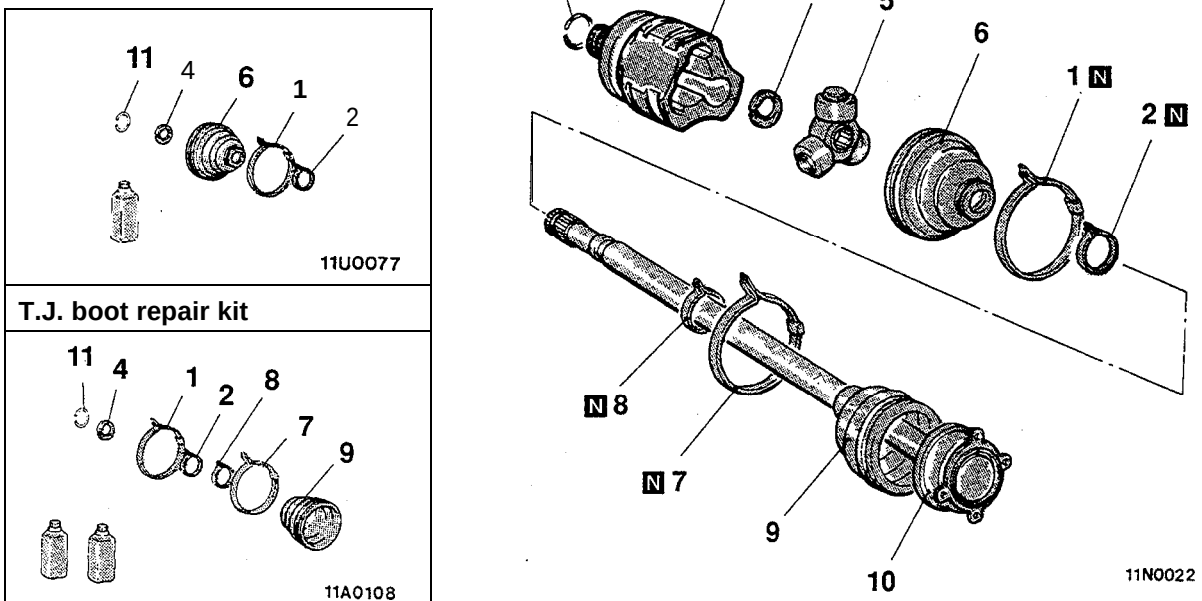
Be sure to thoroughly remove any oil or grease, etc. from the threaded part of the bolt and nut used for installation to the companion flange, because any oil, grease, etc. on these parts might cause later loosening even though tightening is at the specified torque.

INSPECTION

- Check the drive shaft boots for damage or deterioration.
- Check the ball joints for excessive play or check operation.
- Check the drive shaft spline for wear or damage.

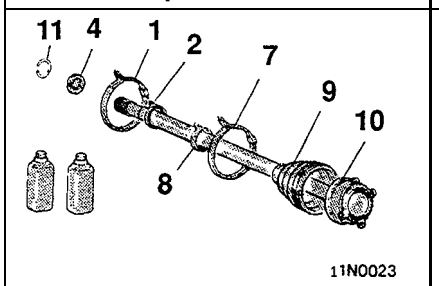
TSB Revision

DISASSEMBLY AND REASSEMBLY

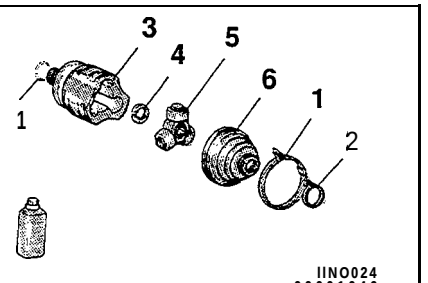


T.J. boot repair kit

B.J. boot repair kit



B.J. repair kit



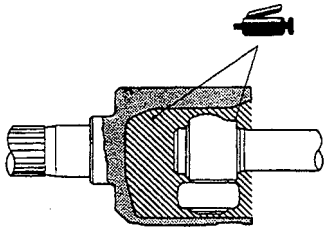
T.J. repair kit

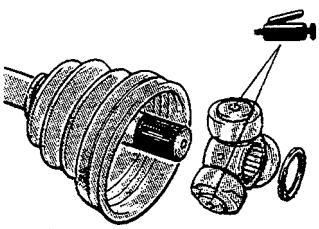
Disassembly steps

- ▶C◀ 1. T.J. boot band (large)
- ▶C◀ 2. T.J. boot band (small)
- 3. T.J. case
- 4. Snap ring
- ◀A▶ ◀A▶ ▶B◀ 5. Spider assembly
- ◀B▶ ▶A◀ 6. T.J. boot
- ▶A◀ 7. B.J. boot band (large)
- ▶A◀ 8. B.J. boot band (small)
- ◀B▶ ▶A◀ 9. B.J. boot
- ◀C▶ 10. B.J. assembly
- 11. Circlip

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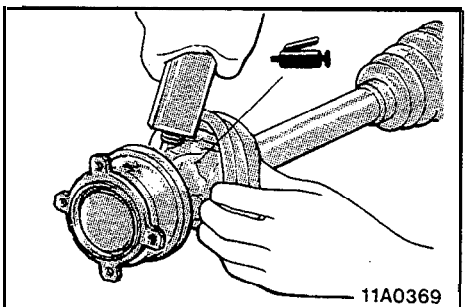
Lubrication Points





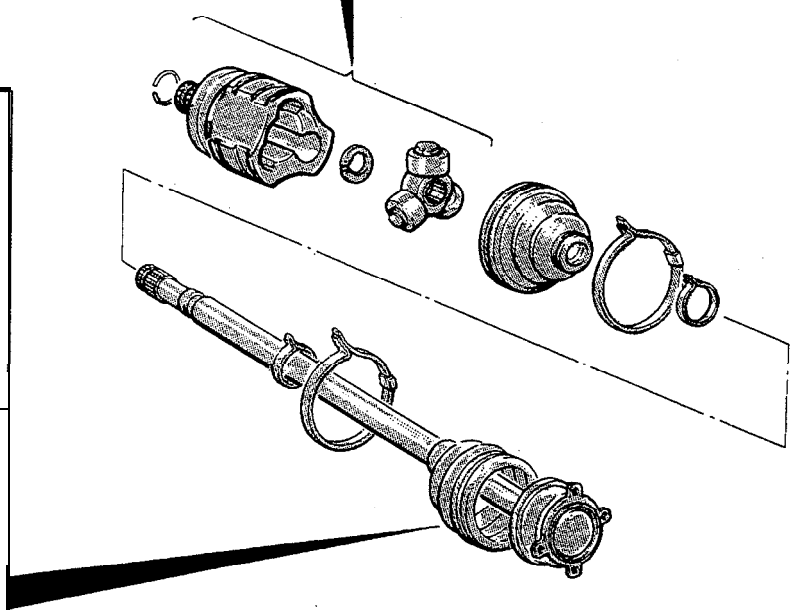
Grease: Repair kit grease
Quantity to use: 135 g (4.76 oz.)

Caution
Apply all of the grease from the repair kit to the joint and boot, a half to each as a rule.
Special grease is used for the joint. Do not mix old grease with new or mix different types.



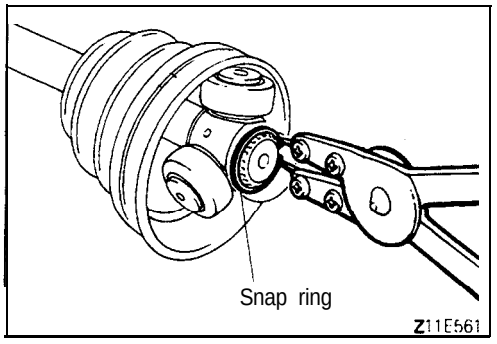
Grease: Repair kit grease
Quantity to use: 125 g (4.41 oz.)

Caution
Apply all of the grease from the repair kit to the joint and boot, a half to each as a rule.
Special grease is used for the joint. Do not mix old grease with new or mix different types.



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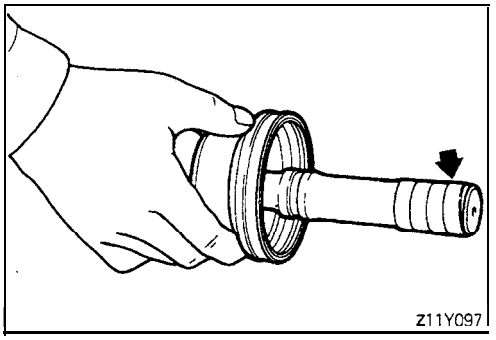


DISASSEMBLY SERVICE POINTS

◀A▶ SNAP RING / SPIDER ASSEMBLY REMOVAL

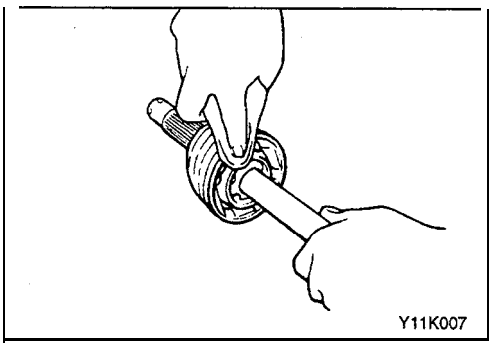
(1) Remove the snap ring from the drive shaft with the snap ring pliers.
(2) Take out the spider assembly from the drive shaft.
(3) Clean the spider assembly.

Caution
1. Do not disassemble the spider assembly.
2. If the T.J. of the drive shaft assembly is bent, the joint may be damaged. Use care in handling the drive shaft.
3. The drive shaft joint use special grease. Do not add another type of grease.



◀B▶ T.J. BOOT / B.J. BOOT REMOVAL

(1) Wrap vinyl tape around the spline part on the T.J. side of the drive shaft so that the T.J. and B.J. boots are not damaged when they are removed.
(2) Withdraw the T.J. and B.J. boots from the drive shaft.



◀C▶ GREASE FROM B.J. REMOVAL

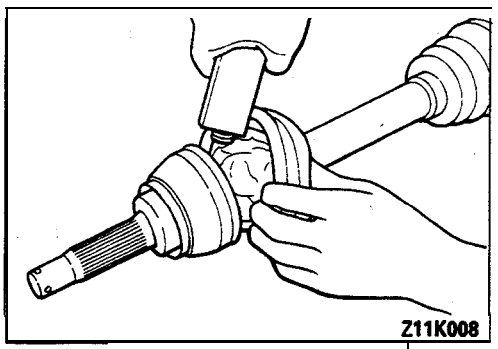
Wipe out the grease from the B.J.

Caution
Do not disassemble the B.J.

REASSEMBLY SERVICE POINTS

▶A◀ B.J. BOOT / B.J. BOOT BAND (SMALL) / B.J. BOOT BAND (LARGE) / T.J. BOOT , INSTALLATION

(1) Wrap vinyl tape around the drive shaft spline.
(2) Insert the drive shaft in B.J. boot, boot bands, T.J. boot in that sequence.

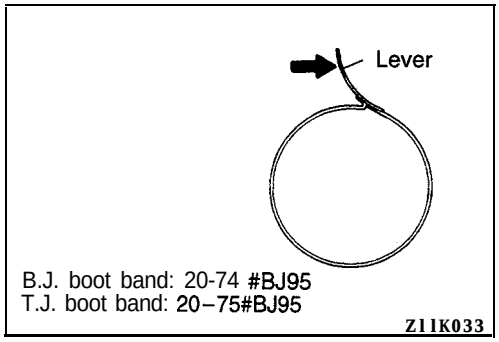


(3) Fill the inside of the B.J. and B.J. boot with the specified grease.

Specified grease: Repair kit grease 125 g (4.41 oz.)

Caution
The grease in the repair kit should be divided in half for use, respectively, at the joint and inside the boot. A special type of grease is used on the joint. Be cautious to ensure that not other grease is allowed to come in contact with the joint.

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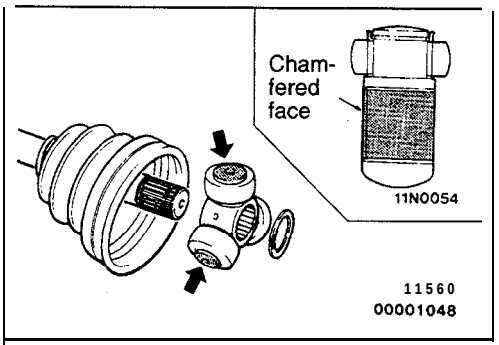


(4) Secure the boot bands.

Caution

1. The boot bands should be tightened with the drive shaft at a 0° joint angle.

2. The B.J. boot band and T.J. boot band are identified by the identification number stamped on the lever. Install correct ones at correct positions.

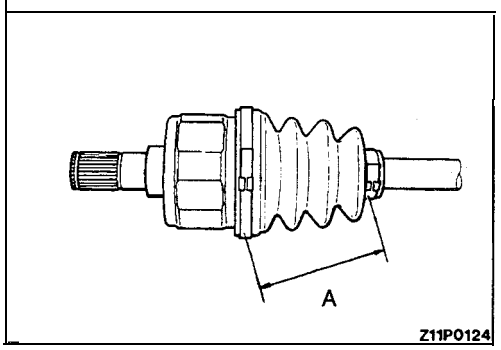


▶B◀ SPIDER ASSEMBLY INSTALLATION

(1) Apply the specified grease furnished in the repair kit to the spider assembly.

Specified grease: Repair kit grease

(2) Install the spider assembly with the chamfered spline end first.



▶C◀ T.J. BOOT BANDS INSTALLATION

Set the T.J. boot bands at the specified distance in order to adjust the amount of air inside the T.J. boot, and then tighten the T.J. boot band securely.

Standard value (A): 85 ± 3 mm (3.35 ± .12 in.)

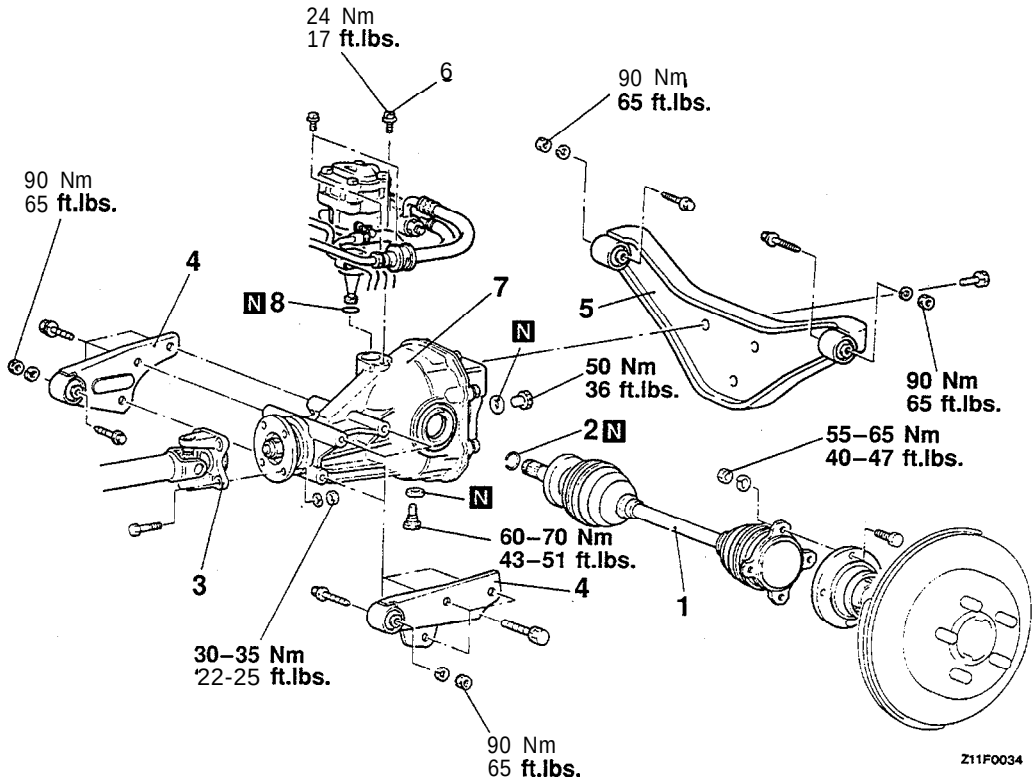
INSPECTION

- Check the drive shaft for damage, bending or corrosion.
- Check the drive shaft spline part for wear or damage.
- Check for entry of water and/or foreign material into B.J.
- Check the spider assembly for roller rotation, wear or corrosion.
- Check the groove inside T.J. case for wear or corrosion.
- Check the boots for deterioration, damage or cracking.

DIFFERENTIAL CARRIER

REMOVAL AND INSTALLATION

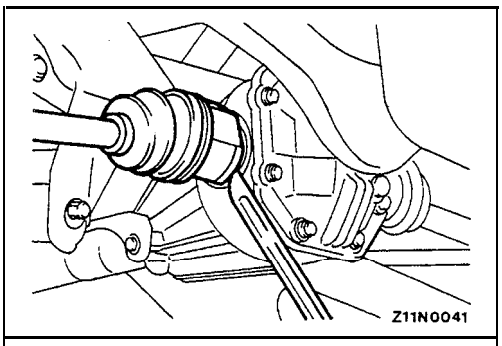
Pre-removal and Post-installation Operation
- Differential Gear Oil Draining and Filling (Refer to Group 00 – Maintenance Service.)
- Main Muffler Removal and Installation (Refer to Group 15 – Exhaust Pipe and Muffler.)



Removal steps

◀A▶ 1. Drive shaft
2. Circlip
◀B▶ ▶B◀ 3. Propeller shaft connection
4. Differential support assembly
5. Differential support member assembly
6. Rear wheel oil pump installation bolt
◀C▶ ▶A◀ 7. Differential carrier
8. O-ring

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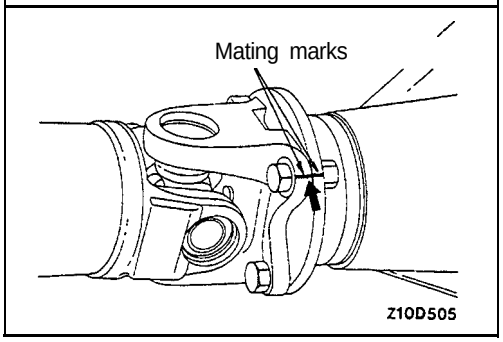


REMOVAL SERVICE POINTS

◀A▶ DRIVE SHAFT REMOVAL

With a tire lever, etc., remove the drive shaft from the differential carrier.

NOTE
Be cautious to ensure that the differential carrier oil seal is not damaged by the drive shaft spline.



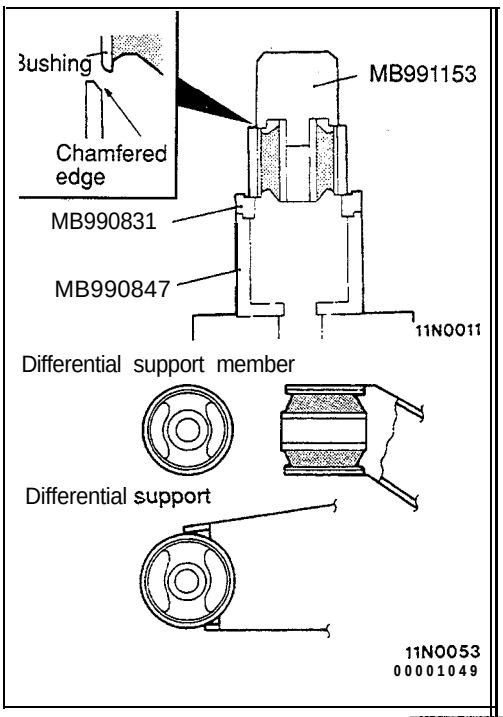
◀B▶ PROPELLER SHAFT DISCONNECTION

(1) Make mating marks on the differential companion flange and the propeller shaft flange yoke for reference during reassembly.
(2) Remove the differential carrier and propeller shaft connection.
(3) Support the propeller shaft with wire.

◀C▶ DIFFERENTIAL CARRIER REMOVAL

Holding the bottom of the differential carrier and removing the rear wheel oil pump through the mounting hole, remove the differential carrier.

Caution
1. Use care not to damage the rear wheel oil pump gears.
2. Use care not to allow dirt or foreign matter to fall into the differential carrier.



DIFFERENTIAL SUPPORT BUSHING AND DIFFERENTIAL SUPPORT MEMBER BUSHING REPLACEMENT

Install or remove the bushing using the special tool. Install the bushing with its hollow portion facing in the direction shown.

Caution
Install the bushing with the differential support and differential support member chamfered end first and install until the bushing outer case end face is flush with the support and support member.

INSTALLATION SERVICE POINTS

▶A◀ DIFFERENTIAL CARRIER INSTALLATION

Install the rear wheel oil pump by inserting it through the mounting hole and install the differential carrier securely.

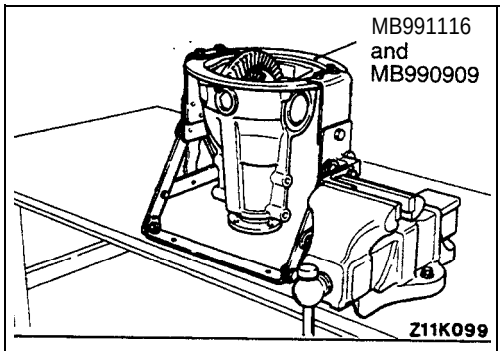
Caution
Use care not to damage the rear wheel oil pump gears.

▶B◀ PROPELLER SHAFT CONNECTION

Align the mating marks on the flange yoke and the companion flange to install the propeller shaft.

BEFORE DISASSEMBLY CHECK

Hold the special tools in a vice, and attach the differential carrier to the working base.

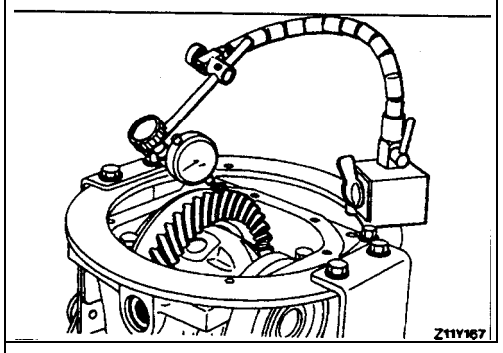


FINAL DRIVE GEAR BACKLASH CHECK

With the drive pinion locked in place, measure the final drive gear backlash with a dial indicator on the drive gear.

NOTE
Measure at four points or more on the circumference of the drive gear.

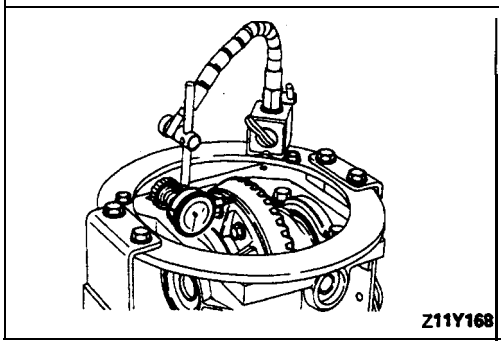
Standard value: 0.11–0.16 mm (.004–.006 in.)



DRIVE GEAR RUNOUT CHECK

Measure the drive gear runout at the shoulder on the reverse side of the drive gear.

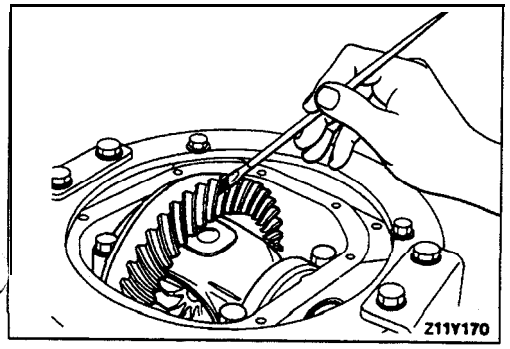
Limit: 0.05 mm (.002 in.)

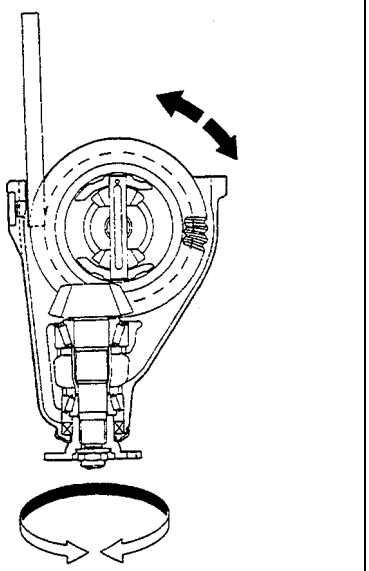


FINAL DRIVE GEAR TOOTH CONTACT CHECK

Check the final drive gear tooth contact by following the steps below.

(1) Apply a thin, uniform coat of machine blue to both surfaces of the drive gear teeth.

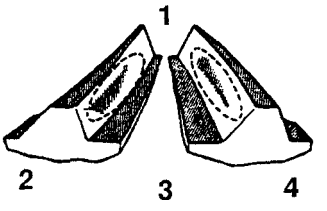
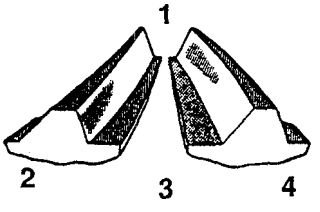
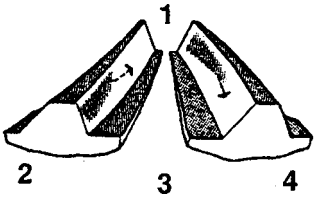
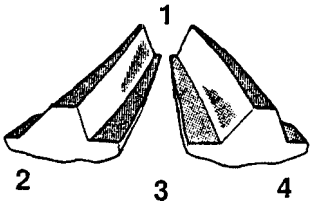
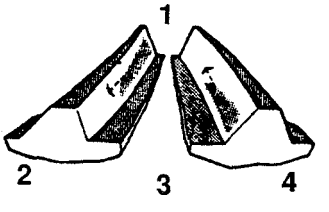




(2) Insert a brass rod between the differential carrier and the differential case, and then rotate the companion flange by hand (once in the normal direction, and then once in the reverse direction) while applying a load to the drive gear, so that the revolution torque [approximately 2.5–3.0 Nm (28-33 in.lbs.)] is applied to the drive pinion.

Caution
If the drive gear is rotated too much, the tooth contact pattern will become unclear and difficult to check.

(3) Check the tooth contact condition of the drive gear and drive pinion.

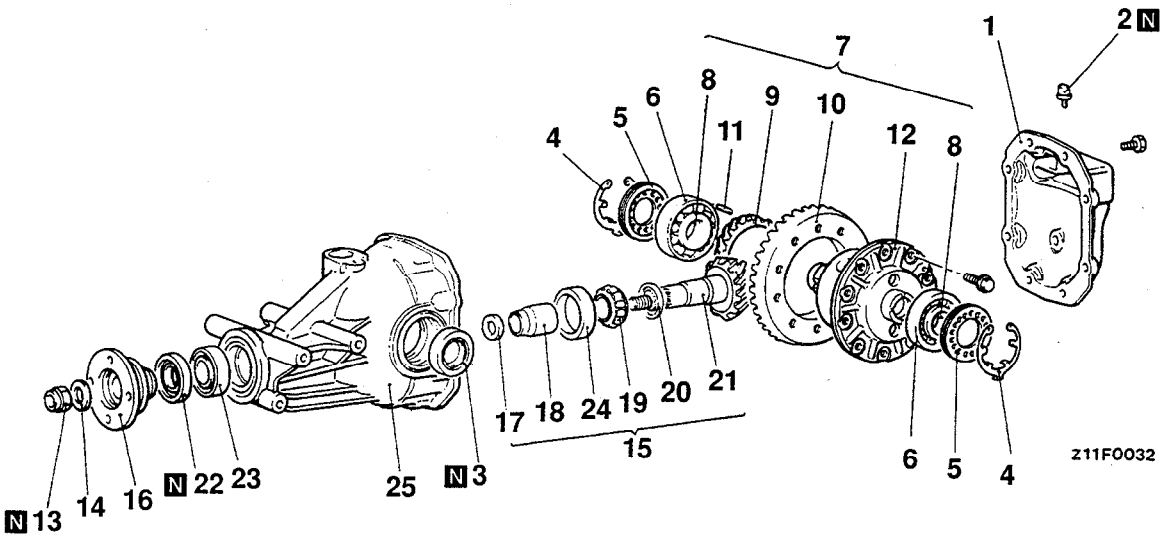
Standard tooth contact pattern 1 Narrow tooth side 2 Drive-side tooth surface (the side applying power during forward movement) 3 Wide tooth side 4 Coast-side tooth surface (the side applying power during reverse movement)	
Problem	Solution
Tooth contact pattern resulting from excessive pinion height  The drive pinion is positioned too far from the center of the drive gear.	 Increase the thickness of the pinion height adjusting shim, and position the drive pinion closer to the center of the drive gear. Also, for backlash adjustment, position the drive gear farther from the drive pinion.
Tooth contact pattern resulting from insufficient pinion height  The drive pinion is positioned too close to the center of the drive gear.	 Decrease the thickness of the pinion height adjusting shim, and position the drive pinion farther from the center of the drive gear. Also, for backlash adjustment, position the drive gear closer to the drive pinion.

NOTE
(1) Tooth contact pattern is a method for judging the result of the adjustment of drive pinion height and final drive gear backlash. The adjustment of drive pinion height and final drive gear backlash should be repeated until tooth contact patterns bear a similarity to the standard tooth contact pattern.
(2) When adjustment is not able to obtain a correct pattern, it may be judged that the drive gear and drive pinion have exceed their usage limits and both gears should be replaced as a set.

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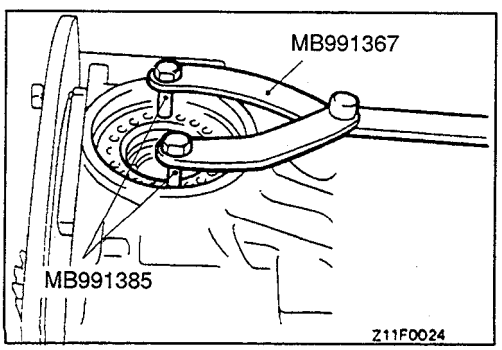
DISASSEMBLY

Inspection Before Disassembly
- Final Drive Gear Backlash (Refer to P.27-27.)
- Drive Gear Runout (Refer to P.27-27.)
- Final Drive Gear Tooth Contact (Refer to P.27-27.)



Disassembly steps

1. Differential cover assembly
2. Vent plug
3. Oil seal
4. Snap ring
◀A▶ 5. Side bearing nut
◀B▶ 6. Side bearing outer race
7. Differential case assembly
◀C▶ 8. Side bearing inner race
◀C▶ 9. Drive gear (for 4WS)
◀D▶ 10. Drive gear
11. Spring pin (for 4WS)
12. LSD case (Refer to P.27-40.)
◀E▶ 13. Self-locking nut
14. Washer
◀F▶ 15. Drive pinion assembly
16. Companion flange
17. Drive pinion front shim (for preload adjustment)
18. Drive pinion spacer
◀G▶ 19. Drive pinion rear bearing inner race
20. Drive pinion rear shim (for pinion height adjustment)
21. Drive pinion
◀H▶ 22. Oil seal
◀H▶ 23. Drive pinion front bearing
◀I▶ 24. Drive pinion rear bearing outer race
25. Differential carrier

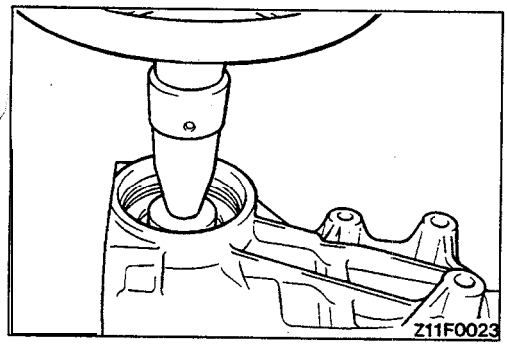


DISASSEMBLY SERVICE POINTS

◀A▶ SIDE BEARING NUT REMOVAL

Using the special tool, remove the side bearing nut.

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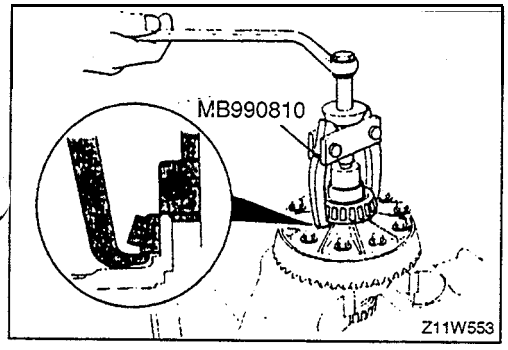


◀B▶ SIDE BEARING OUTER RACE REMOVAL

(1) Using a press, push the differential case until it is pressed against the carrier.
(2) Remove the differential case from the press. Insert two spacers in diagonally opposed positions between the side bearing outer race to be removed and the inner race. Using the press again, remove the outer race.

Caution
Use care not to drop the side bearing outer race.

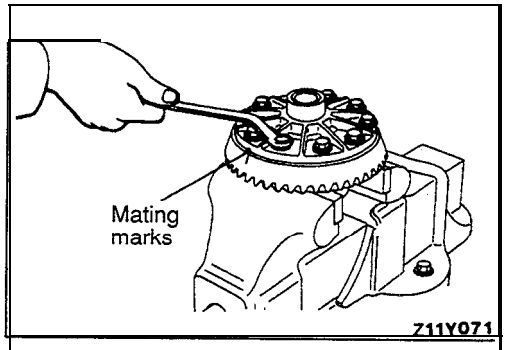
NOTE
(1) Identify the right-and left-hand side bearing outer races for correct reassembly.
(2) Use a spacer, approx. 30 mm (1.18 in.) long, 10 mm (.39 in.) wide and 1 to 2 mm (.04 to .08 in.) high, made of copper sheet or the like to prevent damage to the bearing.



◀C▶ SIDE BEARING INNER RACES / DRIVE GEAR (FOR 4WS) REMOVAL

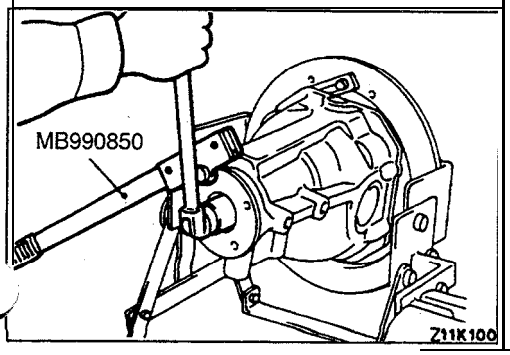
Pull out the side bearing inner races by using the special tools.

NOTE
(1) For 4WS, remove the side bearing inner race together with the rear wheel oil pump drive gear.
(2) Hook the pawl of the special tool to the side bearing inner race using the two notches on the differential case.



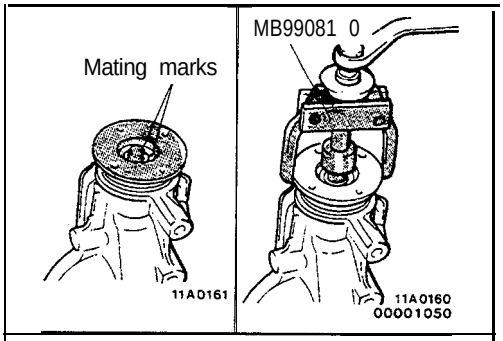
◀D▶ DRIVE GEAR REMOVAL

(1) Make the mating marks to the differential case and the drive gear.
(2) Loosen the drive gear attaching bolts in diagonal sequence to remove the drive gear.



◀E▶ SELF-LOCKING NUT REMOVAL

Use the special tools to hold the companion flange and remove the companion flange self-locking nut.

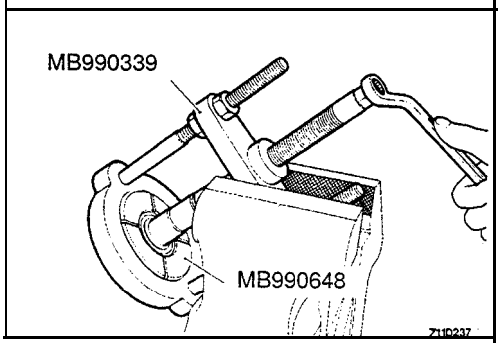


◀F▶ DRIVE PINION ASSEMBLY REMOVAL

(1) Make the mating marks to the drive pinion and companion flange.

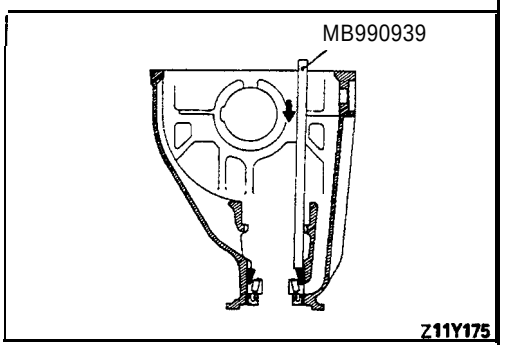
NOTE
Mating marks should not be made to the contact surfaces of companion flange and propeller shaft.

(2) Drive out the drive pinion together with the drive pinion spacer and drive pinion front shims.



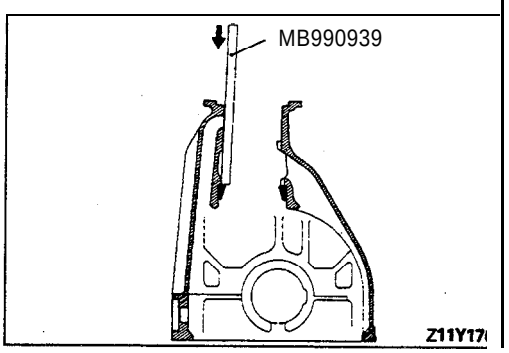
◀G▶ DRIVE PINION REAR BEARING INNER RACE REMOVAL

Pull out the drive pinion rear bearing inner race by using the special tools.



◀H▶ OIL SEAL / DRIVE PINION FRONT BEARING REMOVAL

Using the special tool, drive out the drive pinion front bearing from the gear carrier.



◀I▶ DRIVE PINION REAR BEARING OUTER RACE REMOVAL

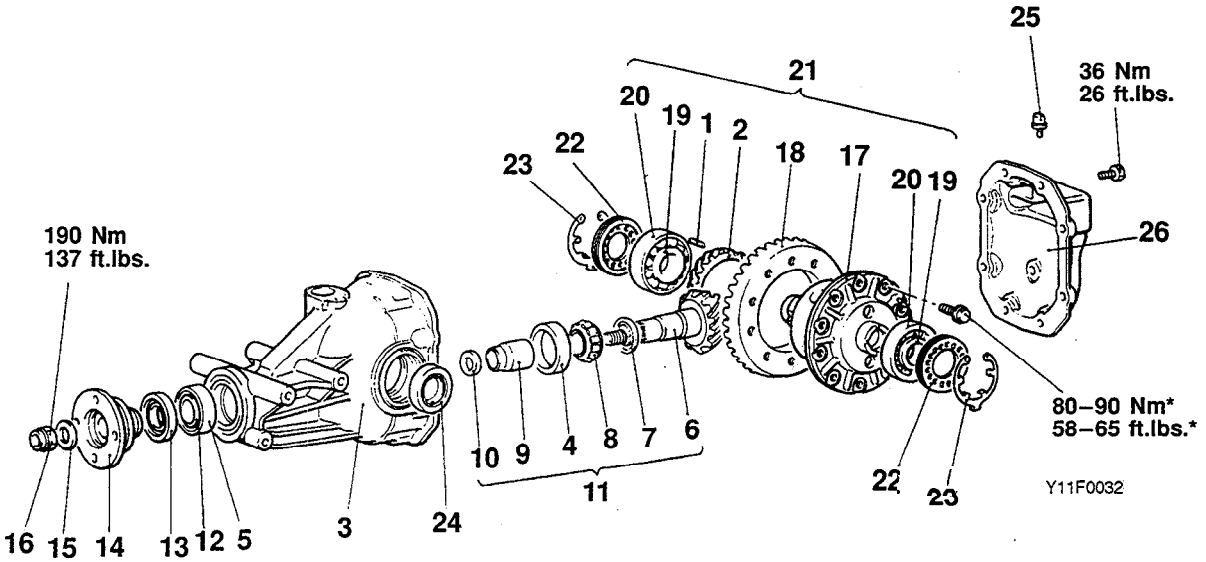
Using the special tool, drive out the drive pinion rear bearing outer race from the gear carrier.

INSPECTION

- Check the companion flange for wear or damage.
- Check the oil seal for wear or deterioration.
- Check the bearings for wear or discoloration.
- Check the gear carrier for cracks.
- Check the drive pinion and drive gear for wear or cracks.
- Check the side gears, pinion gears and pinion shaft for wear or damage.
- Check the side gear spline for wear or damage.

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REASSEMBLY



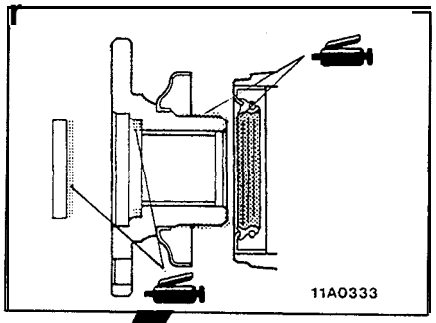
Reassembly steps

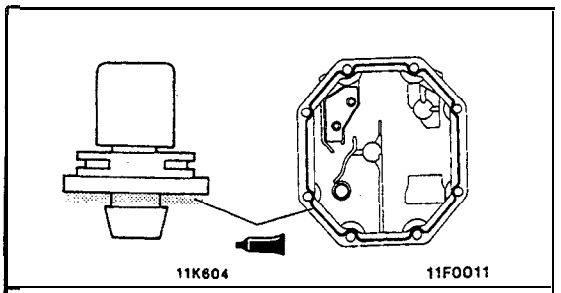
- ▶A◀ 1. Spring pin (for 4WS)
- ▶B◀ 2. Drive gear (for 4WS)
- 3. Differential carrier
- ▶C◀ 4. Drive pinion rear bearing outer race
- ▶C◀ 5. Drive pinion front bearing outer race
- ↗ • Drive pinion height adjustment
- 6. Drive pinion
- 7. Drive pinion rear shim (for drive pinion height adjustment)
- 8. Drive pinion rear bearing inner race
- 9. Drive pinion spacer
- ▶E◀ • Drive pinion preload adjustment
- 10 Drive pinion front shim
- 11. Drive pinion assembly
- 12. Drive pinion front bearing inner race
- 13. Oil seal
- 14. Companion flange
- 15. Washer
- 16. Self-locking nut
- 17. LSD case (Refer to P.27-40.)
- ▶F◀ 18. Drive gear
- ▶G◀ 19. Side bearing inner race
- 20. Side bearing outer race
- ▶H◀ • Final drive gear backlash adjustment
- 21. Differential case assembly
- 22. Side bearing nut
- 23. Snap ring
- ▶I◀ 24. Oil seal
- 25. Vent plug
- 26. Differential cover assembly

NOTE
*: Tightening torque with oil applied.

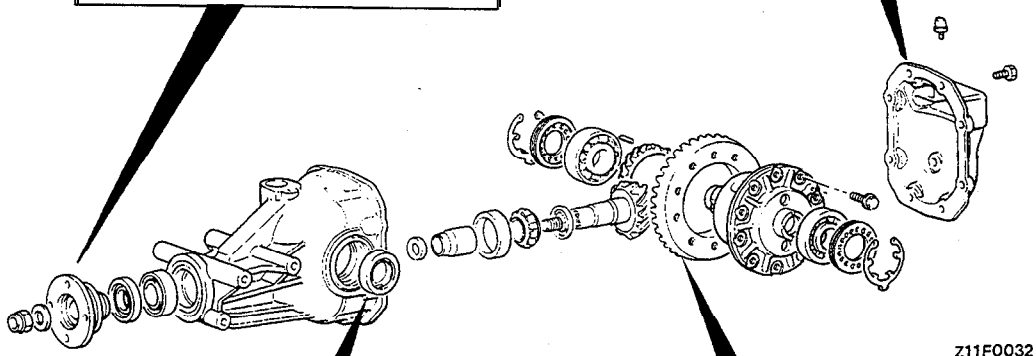
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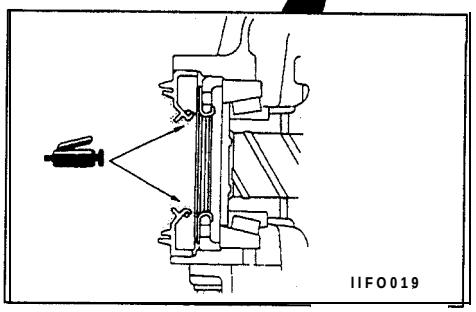
Lubrication, Sealing and Adhesion Points

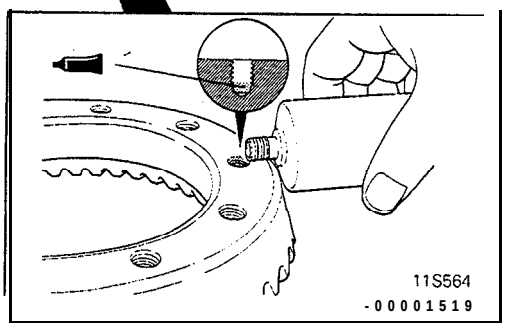




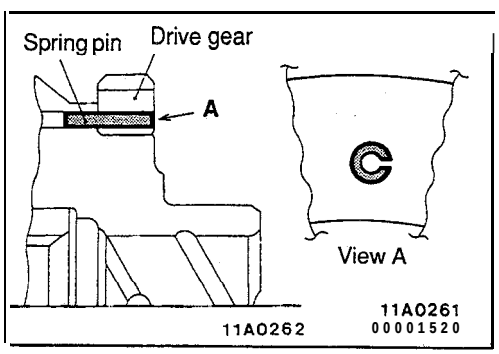
Sealant: 3M ATD Part No. 8663 or equivalent







Adhesive: 3M Stud Locking Part No. 4170 or equivalent

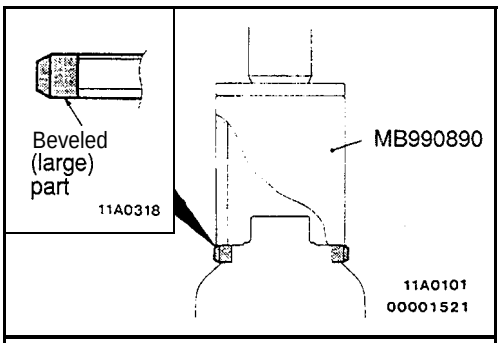


REASSEMBLY SERVICE POINTS

▶A◀ SPRING PIN INSTALLATION (FOR 4WS)

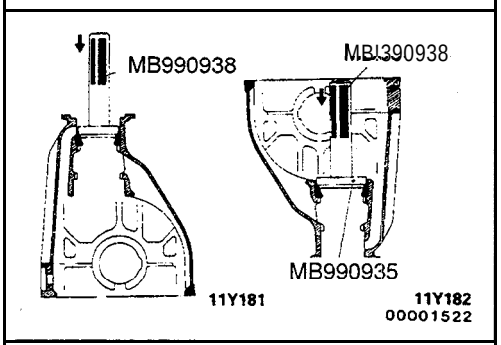
Tap the spring pin into the differential case to the position shown in the illustration before press fitting the rear wheel oil pump drive gear. The notch on the spring pin should be in the position shown in the illustration.

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▶B◀ DRIVE GEAR PRESS-IN (FOR 4WS)

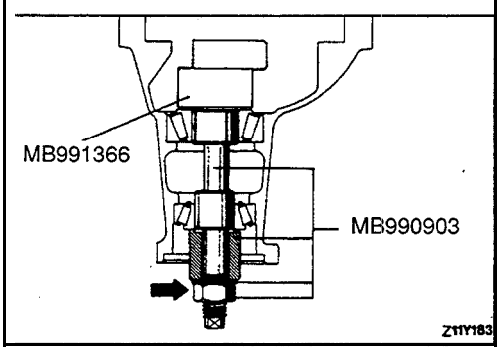
(1) With the beveled (large) part of the rear wheel oil pump drive gear at the inner side, press in the drive gear (by using the special tool) until the drive gear contacts the end surface of the differential case.
(2) Check to ensure that the drive gear and the spring pin are flush.



▶C◀ DRIVE PINION REAR BEARING OUTER RACE / DRIVE PINION FRONT BEARING OUTER RACE INSTALLATION

Press-fit the drive pinion rear and front bearing outer races into the gear carrier by using the special tools.

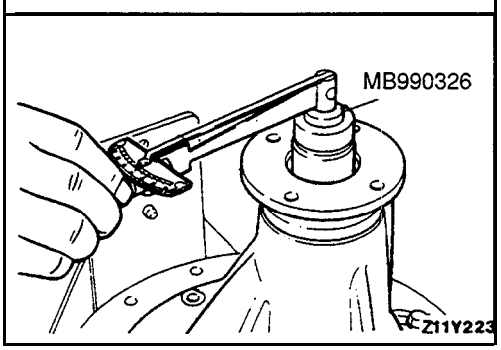
Caution
Be careful not to press in the outer race at an angle.



▶D◀ DRIVE PINION HEIGHT ADJUSTMENT

Adjust the drive pinion height by the following procedures:
(1) Install special tools and drive pinion front and rear bearing inner races on the gear carrier in the sequence shown in the illustration.

NOTE
Apply a thin coat of multipurpose grease to the mating face of the washer of the special tool.



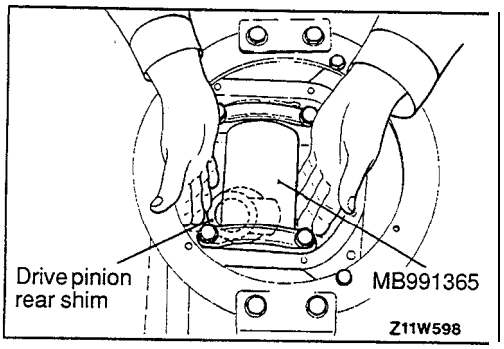
(2) Tighten the special tool until the standard value of drive pinion rotation torque is obtained.
(3) Measure the drive pinion rotation torque (without the oil seal).

Standard value

Bearing classification	Bearing lubrication	Rotation torque Nm (in.lbs.)
New	None (with rust-prevention oil)	0.3–0.5 (3–4)
New/reused	Gear oil application	0.15–0.25 (1–2)

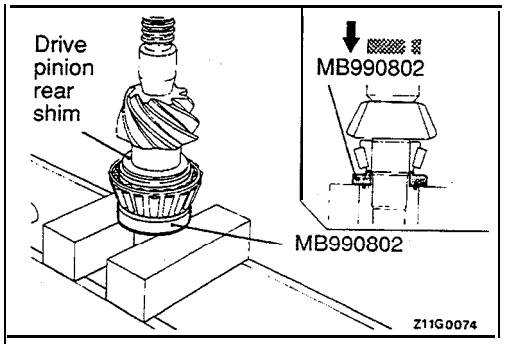
NOTE
(1) Gradually tighten the nut of the special tool while checking the drive pinion rotation torque.
(2) Because the special tool cannot be turned one turn, turn it several times within the range that it can be turned; then, after fitting to the bearing, measure the rotation torque.

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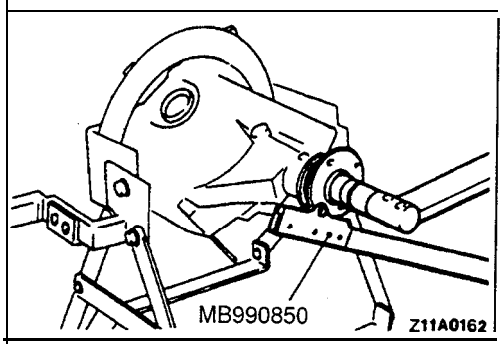


(4) Position the special tool in the side bearing seat of the gear carrier, and then select a drive pinion rear shim of a thickness which corresponds to the gap between the special tools.

NOTE
Clean the side bearing seat thoroughly.
When selecting the drive pinion rear shims, keep the number of shims to a minimum.



(5) Fit the selected drive pinion rear shim(s) to the drive pinion, and press-fit the drive pinion rear bearing inner race by using the special tool.



▶E◀ DRIVE PINION PRELOAD ADJUSTMENT

Adjust the drive pinion rotation torque by using the following procedures:

(1) Fit the drive pinion front shim(s) between the drive pinion spacer and the drive pinion front bearing inner race.

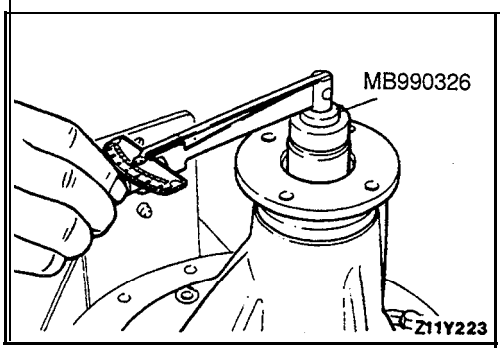
(2) Tighten the companion flange to the specified torque by using the special tools.

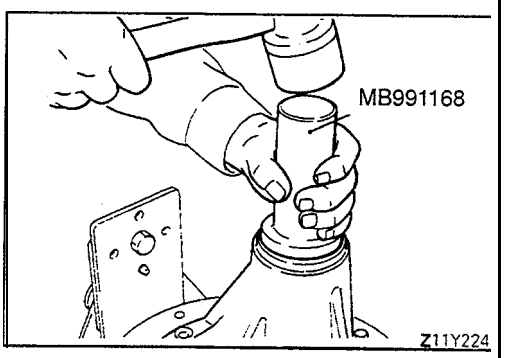
NOTE
Do not install the oil seal.

(3) Measure the drive pinion rotation torque (without the oil seal) by using the special tools.

Standard value

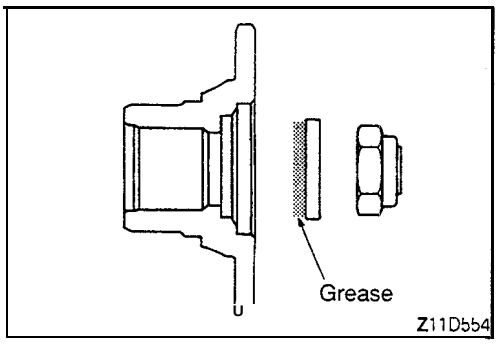
Bearing classification	Bearing lubrication	Rotation torque Nm (in.lbs.)
New	None (with rust-prevention oil)	0.3-0.5 (3-4)
New/reused	Gear oil application	0.15–0.25 (1–2)



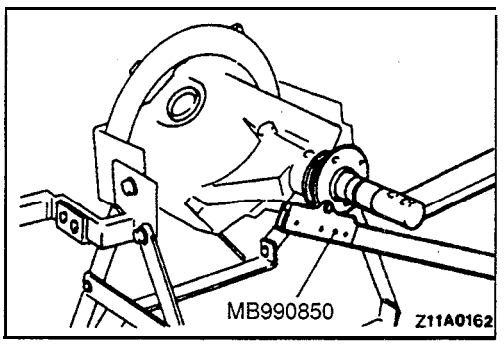


(4) If the drive pinion rotation torque is not within the range of the standard value, adjust the rotation torque by replacing the drive pinion front shim(s) or the drive pinion spacer.

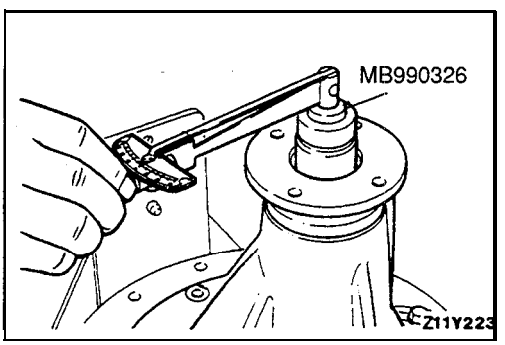
NOTE
When selecting the drive pinion front shims, if the number of shims is large, reduce the number of shims to a minimum by selecting the drive pinion spacers.



(5) Remove the companion flange and drive pinion once again.
Drive the oil seal into the gear carrier front lip by using the special tool.
Apply multipurpose grease to the oil seal lip.
(6) Apply a thin coat of multipurpose grease to the companion flange contacting surface of the washer before installing drive pinion assembly.



(7) Install the drive pinion assembly and companion flange with mating marks properly aligned, and tighten the companion flange self-locking nut to the specified torque by using the special tools.

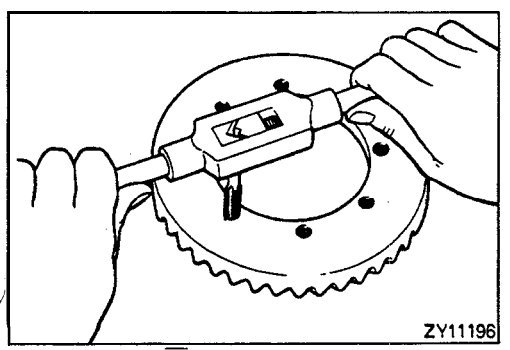


(6) Measure the drive pinion rotation torque (with oil seal) to verify that the drive pinion rotation torque complies with the standard value.

Standard value

Bearing classification	Bearing lubrication	Rotation torque Nm (in.lbs.)
New	None (with rust-prevention oil)	0.5–0.7 (4-6)
New/reused	Gear oil application	0.35-0.45 (3–4)

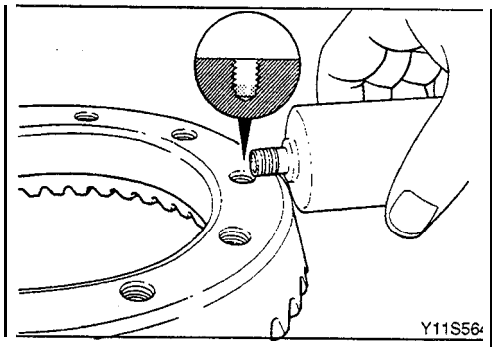
If there is a deviation from the standard value, check whether or not there is incorrect tightening torque of the companion flange tightening self-locking nut, or incorrect fitting of the oil seal.



▶F◀ DRIVE GEAR INSTALLATION

(1) Clean the drive gear attaching bolts.
(2) Use an Ml 0 x 1.25 tap to remove the adhesive adhering to the threaded holes of the drive gear, and then clean the threaded holes by applying compressed air.

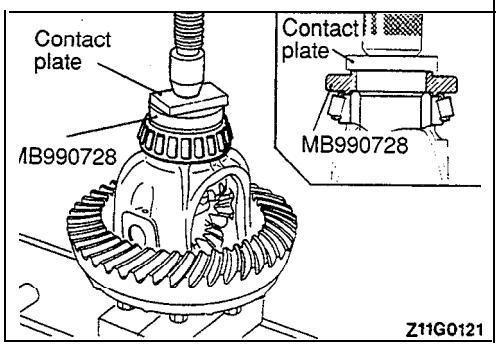
TSB Revision



(3) Apply multipurpose adhesive to the threaded holes of the drive gear.

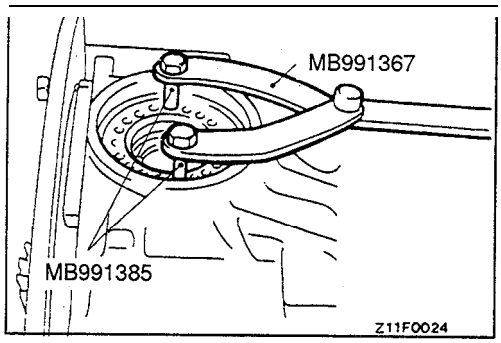
Specified adhesive:
3M Stud Locking Part No. 4170 or equivalent

(4) Install the drive gear onto the differential case with the mating marks properly aligned. Tighten the bolts to the specified torque in a diagonal sequence.



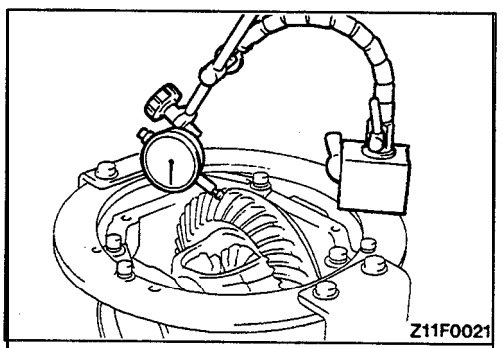
▶G◀ SIDE BEARING INNER RACE PRESS-FITTING

Press-fit the side bearing inner races to the differential case by using the special tool.



▶H◀ FINAL DRIVE GEAR BACKLASH ADJUSTMENT

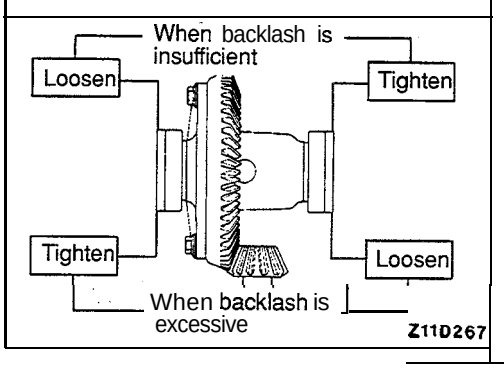
(1) Using the special tool, temporarily tighten the side bearing nut until it is in the state just before preloading of the side bearing.



(2) Measure the final drive gear backlash.

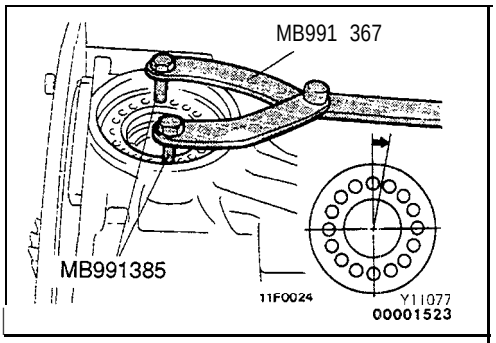
Standard value: 0.11–0.16 mm (.004–.006 in.)

NOTE
Measure at four or more points around the drive gear circumference.

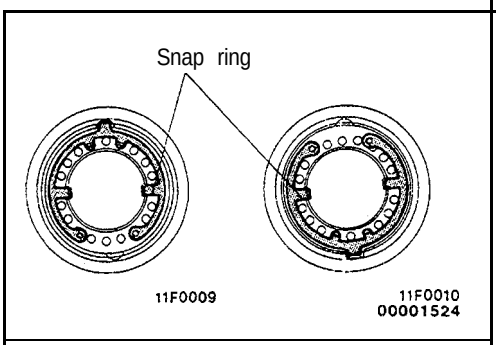


(3) Using the special tool (MB991 367 and MB991 385), adjust the backlash to standard value by moving the side bearing nut as shown.

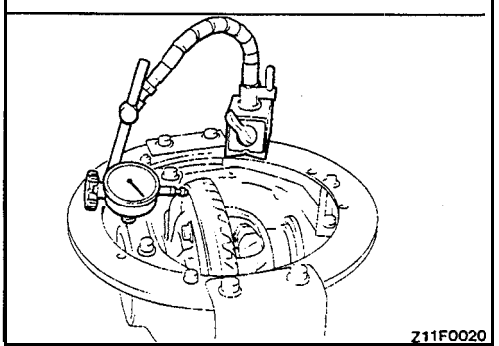
NOTE
First turn the side bearing nut for loosening, and then turn (by the same amount) the side bearing nut for tightening.



(4) Using the special tool, to apply the preload, turn down both right and left side bearing nuts on half the distance between centers of two neighboring holes.



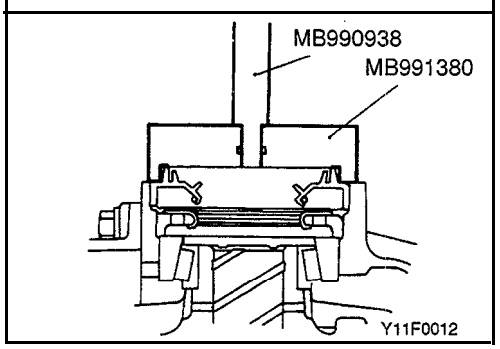
(5) Fit the snap ring at either position shown to lock the side bearing nut.
(6) Check the drive gear and drive pinion for tooth contact. If poor contact is evident, make adjustment. (Refer to P-27-29.)



(7) Measure the drive gear runout at the shoulder on the reverse side of the drive gear.

Limit: 0.05 mm (.002 in.)

(8) If the drive gear runout exceeds the limit, reinstall by changing the phase of the drive gear and differential case, and remeasure.

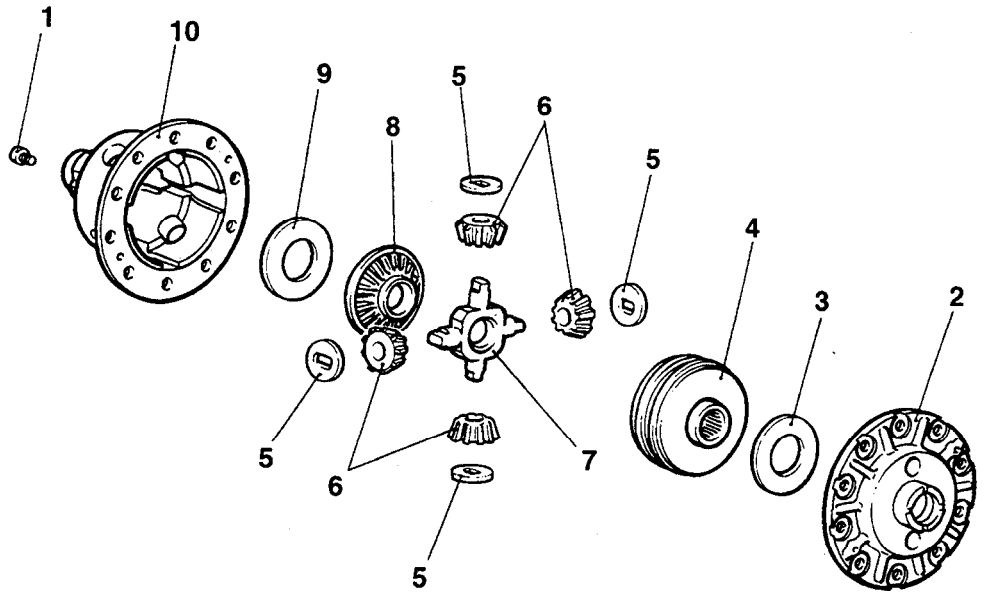


▶I◀ OIL SEAL INSTALLATION

(1) Using the special tool, install the oil seal flush with the gear carrier end face.
(2) Apply a thin coat of Multi-purpose grease to the oil seal lip.

LSD CASE ASSEMBLY

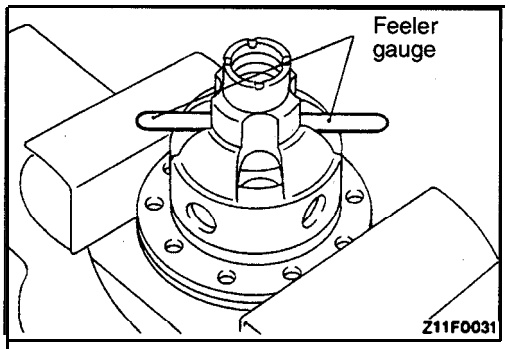
DISASSEMBLY AND REASSEMBLY



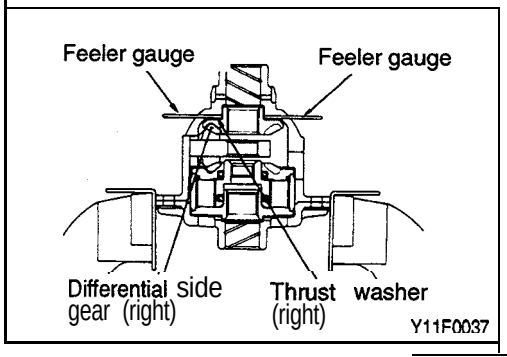
Z11F0033

Disassembly steps

1. Screw
▶A◀ 2. Differential case A
◀A▶ ▶C◀ 3. Thrust washer (L.H.)
4. Viscous unit
▶B◀ 5. Pinion mate washer
▶B◀ 6. Differential pinion mate
7. Differential pinion shaft
8. Differential side gear (R.H.)
◀A▶ 9. Thrust washer (R.H.)
▶A◀ 10. Differential case B



Z11F0031



Y11F0037

BEFORE DISASSEMBLY CHECK

DIFFERENTIAL GEAR BACKLASH CHECKING

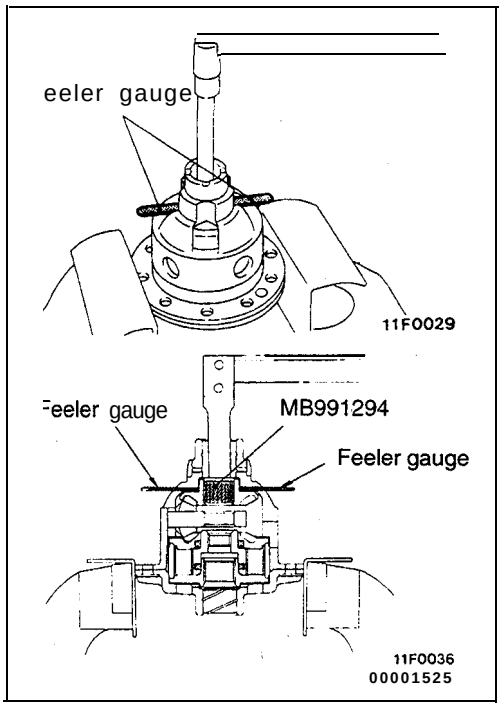
(1) Secure the differential case assembly in a vise so that the differential side gear (right) is facing upward.

Caution
When securing the vise, be sure not to hold the differential case assembly too tightly.

(2) Insert a 0.03 mm (.0012 in.) feeler gauge at two places (diagonally) between differential case B and the thrust washer (right).

Caution
Do not insert a feeler gauge in the oil groove of differential case B.

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(3) Insert the special tool at the spline part of differential case B (right) and check to be sure the side gear (right) rotates.
(4) Then insert a 0.09 mm (.0035 in.) feeler gauge to replace a 0.03 mm (.0012 in.) gauge.
(5) insert the special tool at the spline part of the differential side gear (right) and check to be sure the side gear (right) does not rotate.

Differential gear backlash
Standard value (clearance in thrust direction of side gear): 0.03-0.09 mm (.0012–.0035 in.)

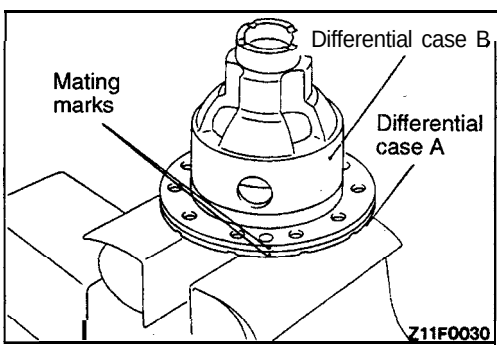
NOTE
if the clearance in the thrust direction of the side gear is within the standard value range, the backlash of the differential gear is normal.

(6) If the clearance in the thrust direction of the side gear is not within the standard value range, remove differential case A and make the adjustment by adjusting the thickness of the thrust washer (left).

DISASSEMBLY SERVICE POINTS

◀A▶ THRUST WASHER (LEFT) / THRUST WASHER (RIGHT) REMOVAL

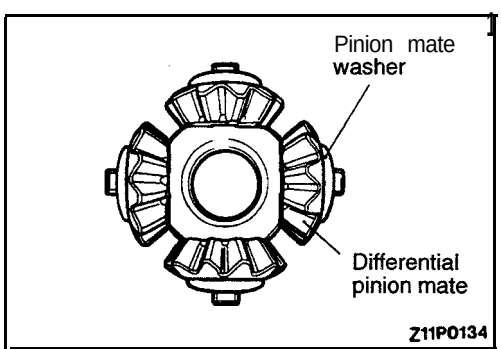
The thrust washers (left and right) are of different thickness, and so should be discriminated in some way for reference. during installation.



REASSEMBLY SERVICE POINTS

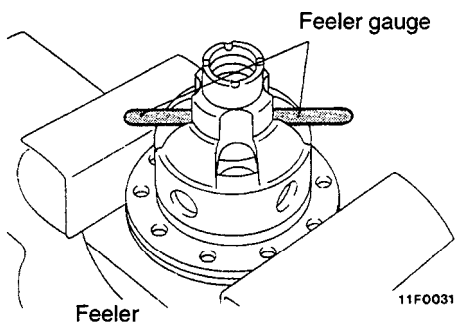
▶A◀ DIFFERENTIAL CASE B / DIFFERENTIAL CASE A INSTALLATION

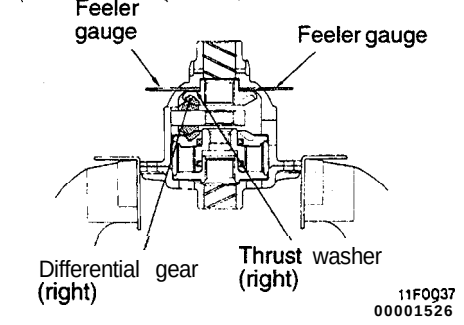
Align the mating marks of differential cases B and A, and assemble the cases.

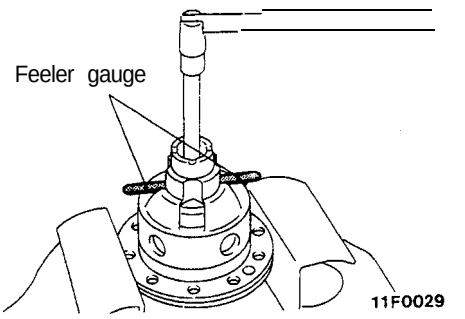


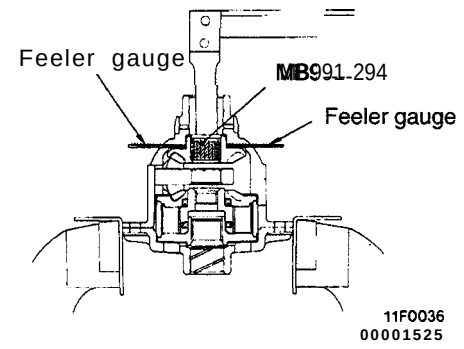
▶B◀ DIFFERENTIAL PINION MATE / PINION MATE WASHER INSTALLATION

With the washer in the position shown in the illustration, install to the differential pinion shaft, and then install to differential case B.









▶C◀ THRUST WASHER (LEFT) SELECTION

If the differential side gear and pinion mate gear have been replaced, select the thrust washer (left) by following the steps below.

(1) Wash the differential side gear and pinion mate gear in unleaded gasoline to remove all oil, grease, etc.
(2) Install the previously used thrust washers (being careful the left and right ones are used at the correct side), together with the gears, viscous unit, pinion mate washer and pinion shaft, to differential cases A and B, and then, using screws, secure them temporarily.
(3) Secure the differential case assembly in a vise so that the differential side gear (right) is facing upward.

Caution
When securing in the vise, be sure not to hold the differential case assembly too tightly.

(4) Insert a 0.03 mm (.0012 in.) feeler gauge at two places (diagonally) between differential case B and the thrust washer (right).

Caution
Do not insert a feeler gauge in the oil groove of differential cace B.

(5) Insert the special tool at the spline part of differential side gear (right) and check to be sure the side gear (right) rotates.
(6) Then insert a 0.09 mm (.0035 in.) feeler gauge to replace a 0.03 mm (.0012 in.) gauge.
(7) Insert the special tool at the spline part of the differential side gear (right) and check to be sure the side gear (right) does not rotate.

Differential gear backlash
Standard value (clearance in thrust direction of side gear): 0.03-0.09 mm (.0012–.0035 in.)

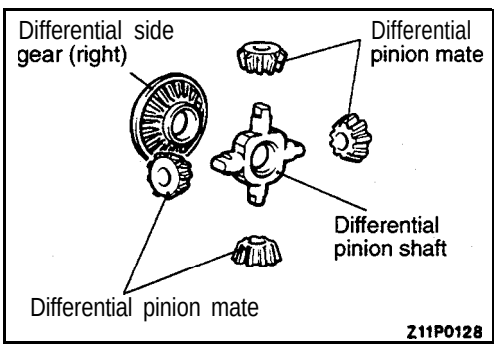
NOTE
If the clearance in the thrust direction of the side gear is within the standard value range, the backlash of the differential side gear is normal.

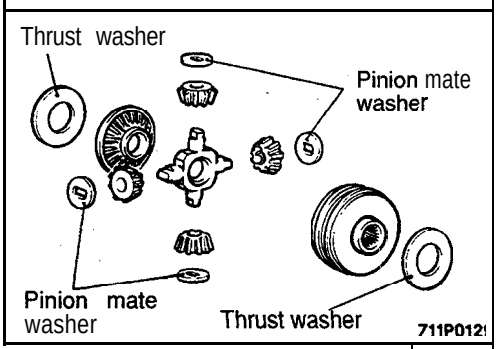
(8) If the clearance in the thrust direction of the side gear is not within the standard value range, remove differential case A and make the adjustment by adjusting the thickness of the thrust washer (left).

Thrust washer (left)	
Part No.	Thickness mm (in.)
MB837461	0.8 (.031)
	0.9 (.035)
	1 .0 (.039)
	1.1 (.043)
	1.15 (.045)
	1.2 (.047)
	1.25 (.049)
	1.3 (.051)
	1.35 (.053)
	1.4 (.055)
	1.5 (.059)

Thrust washer (right) (reference)	
Part No.	Thickness mm (in.)
M B837522	0.8 (.031)

NOTE
Select one thrust washer (left) from the eleven types in the kit.



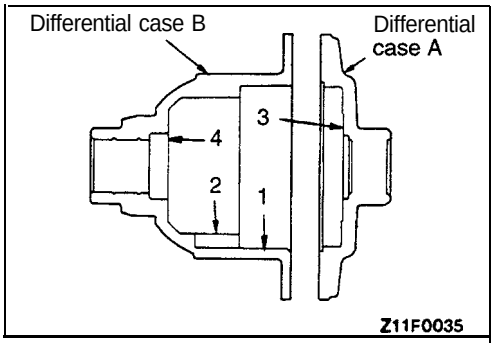


INSPECTION

(1) Check the gears and differential pinion shaft for unusual wear or damage.
(2) Check the spline part of the differential side gear (right) for stepped wear or damage.

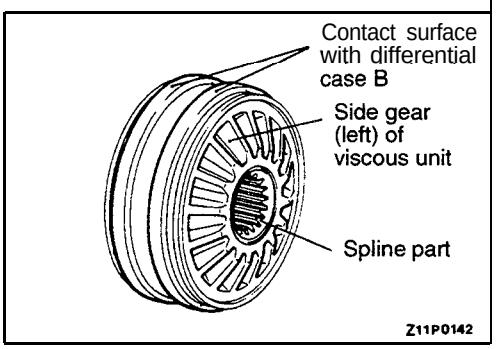
(3) Check the thrust washer and pinion mate washer for unusual wear of contact surfaces, heat damage or other damage.

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(4) Check differential cases A and B for unusual wear of contact surfaces, heat damage or other damage.

1: Contact surface with the viscous unit
2: Contact surface with the pinion mate washer
3 and 4: Contact surfaces with thrust washer



(5) Check the spline part of the viscous unit for stepped wear or damage, and check the contact surface with differential case B.
(6) Check the side gear (left) of the viscous unit for unusual wear or damage.

WHEEL AND TIRE

CONTENTS

ON-VEHICLE SERVICE 4
- Tire Inflation Pressure Check 4
- Tire Wear Check 4
- Wheel Runout Check 4

SPECIFICATIONS 2
- General Specifications 2
- Service Specifications 2

TROUBLESHOOTING 3
- Bald Spots
- Cracked Treads
- Feathered Edge
- Rapid Wear at Center
- Rapid Wear at Shoulders
- Scalloped Wear
- Wear on One Side

WHEEL AND TIRE 4

SPECIFICATIONS

GENERAL SPECIFICATIONS

Items		Hatchback		Convertible
		DOHC-N/A	DOHC-T/C	
Wheel (except spare wheel)	Type	Aluminum type	Aluminum type	Aluminum type
	Size	16 × 8J*1, 16 × 8JJ*2	17 × 8.5J, 18 × 8.5J*3	17 × 8.5J
	Amount of wheel offset mm (in.)	46 (1.8)	46 (1.8)	46 (1.8)
	Pitch circle diameter (P.C.D.) mm (in.)	114.3 (4.50)	114.3 (4.50)	114.3 (4.50)
Tire (except spare tire)	Size	225/55R16 93V	245/45ZR17, 245/40ZR18*3	245/45ZR17
Spare wheel	Type	Polycast steel type	Aluminum type	Aluminum type
	Size	16 x 4T	16 × 4T*1, 17 x 4T*2	17 x 4-r
	Amount of wheel offset mm (in.)	14 (.55)	14 (.55)*1 14 ± 1.0 (.55 ± .04)*2	14 ± 1.0 (.55 ± .04)
	Pitch circle diameter (P.C.D.). mm (in.)	114.3 (4.50)	114.3 (4.50)	114.3 (4.50)
Spare tire	Size	T125/90D16	T125/90D16*1, T135/80D17*2	T135/80D17

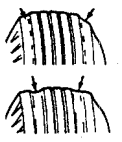
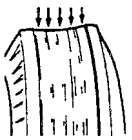
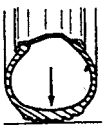
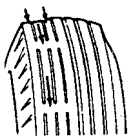
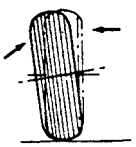
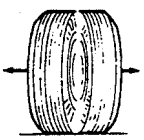
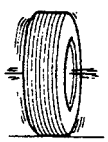
NOTE
● l: Up to 1993 models
*2: From 1994 models
*3: From 1995 models <Option>

SERVICE SPECIFICATIONS

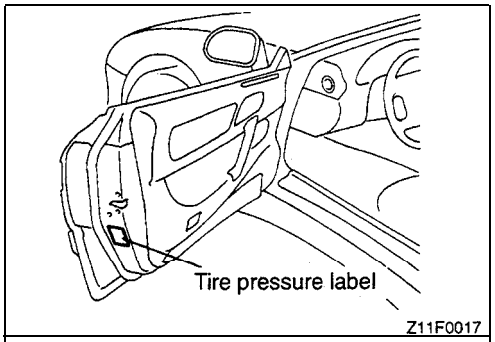
Items		Limit
Wheel runout mm (in.)	Radial	1.0 or less (.04 or less)
	Lateral	1.0 or less (.04 or less)
Tread depth of tire mm (in.)		1.6 (.06)

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TROUBLESHOOTING

Symptom		Probable cause		Remedy
Rapid wear at shoulders	 11X0109	Under-inflation or lack of rotation	 11X0116	Adjust the tire pressure.
Rapid wear at center	 11X0110	Over-inflation or lack of rotation	 11X0117	
Cracked treads	 11X0111	Under-inflation		Adjust the tire pressure.
Wear on one side	 11X0112	Excessive camber	 11X0118	Inspect the camber.
Feathered edge	 11X0113	Incorrect toe-in	 11X0119	Adjust the toe-in.
Bald spots	 11X0114	Unbalanced wheel	 11X0120	Adjust the unbalanced wheels.
Scalloped wear	 11X0115	Lack of rotation of tires or worn or out-of-alignment suspension		Rotate the tires. Inspect the front suspension alignment.

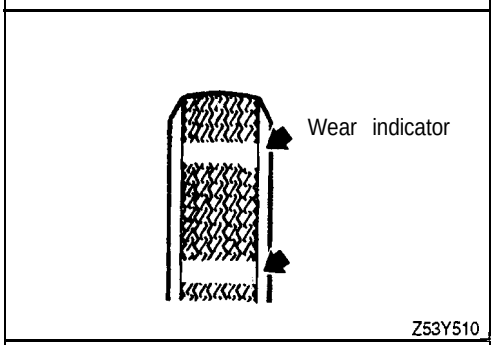
TSB Revision



ON-VEHICLE SERVICE

TIRE INFLATION PRESSURE CHECK

Check the inflation pressure of the tires. If it is not within the standard value, make the necessary adjustment.



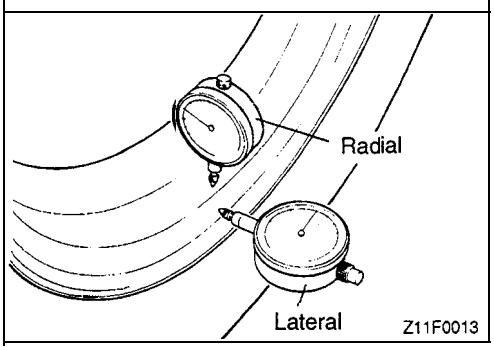
TIRE WEAR CHECK

Measure the tread depth of tires.

Limit: 1.6 mm (.06 in.)

If the remaining tread depth is less than the limit, replace the tire.

NOTE
When the tread depth of tire is reduced to 1.6 mm (.06 in.) or less, wear indicator will appear.



WHEEL RUNOUT CHECK

Jack up the vehicle so that the wheels are clear of the floor. While slowly turning the wheel, measure wheel runout with a dial indicator.

Limit:
Radial 1.0 mm or less (.04 in. or less)
Lateral 1.0 mm or less (.04 in. or less)

If wheel runout exceeds the limit, replace the wheel.

WHEEL AND TIRE

SERVICE POINTS OF INSTALLATION

Tighten the wheel nut to the specified torque.

Tightening torque: 120–140 Nm (87–101 ft.lbs.)

POWER PLANT MOUNT

CONTENTS

ENGINE MOUNTING 3

ENGINE ROLL STOPPER 6

RIGHT MEMBER, LEFT MEMBER AND CROSSMEMBER* 8

SPECIAL TOOLS 2

SPECIFICATIONS 2

Service Specifications 2

TRANSAXLE MOUNTING 5

TROUBLESHOOTING 2

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

(1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injuryordeath to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).

(2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.

(3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B -Supplemental Restraint System (SRS) and GROUP 00- Maintenance Service, before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

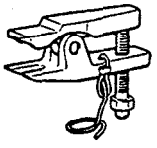
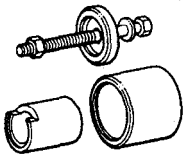
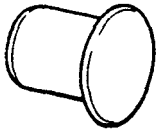
The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning light, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk **(*)**.

SPECIFICATIONS

SERVICE SPECIFICATIONS

Items		Standard value
No. 1 crossmember	Bushing (B) projection mm (in.)	7.5–10.5 (.30–.41)
Crossmember	Bushing (A) projection mm (in.)	7.2-10.2 (.28–.40)
	Bushing (B) projection mm (in.)	6.5-9.5 (.26–.37)

SPECIAL TOOLS

Tool	Tool number and name	Supersession	Application
	MB991113 Steering linkage puller	MB991113-01	Removal of the lower arm ball joint and tie rod
	MB991045 Bushing remover and installer	Tool not available	Removal and installation of the crossmember bushing
	MB991193 Plug	General service tool	Prevention of transfer oil discharge and foreign object entry

TROUBLESHOOTING

Symptom	Probable cause	Remedy
Excessive engine wobble or vibration (with engine in normal condition)	Cracked rubber parts of insulator	Replace
	Insufficiently tightened parts	Retighten
Abnormal noise	Insuff iciently tightened parts	Retighten

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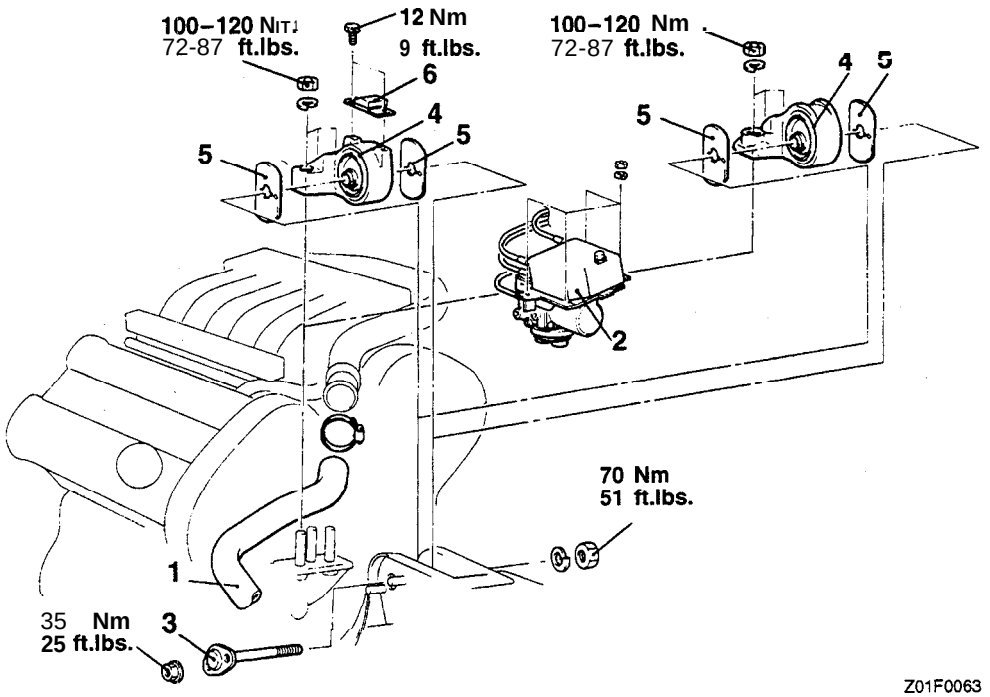
ENGINE MOUNTING

REMOVAL AND INSTALLATION

Pre-removal Operation
- Raise and Suspend the Engine to the Extent Force is not Applied to the Engine Mount

Post-installation Operation
- Lower the Engine.

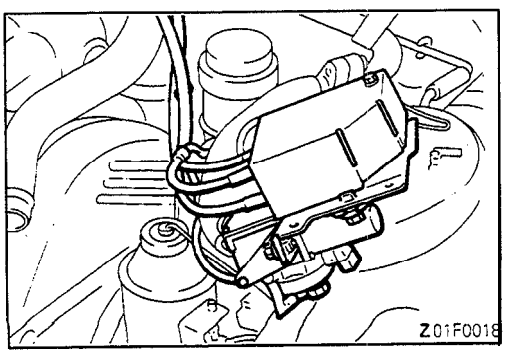
<Up to 1993 models> <From 1994 models>



Removal steps

◀A▶
1. Air hose G connection <Turbo>
2. Cruise control pump and link assembly <Vehicles with Cruise Control>
3. Engine mount bracket and body connection bolt
4. Engine mount bracket

▶A◀
5. Mounting stopper
6. Dynamic damper <Up to 1993 models>

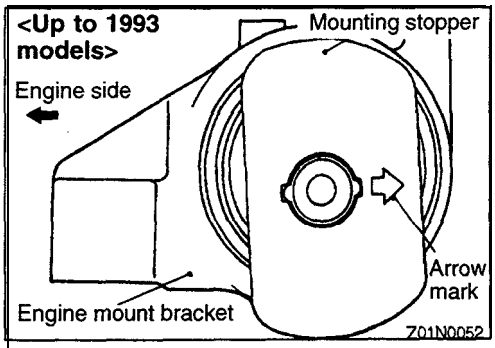


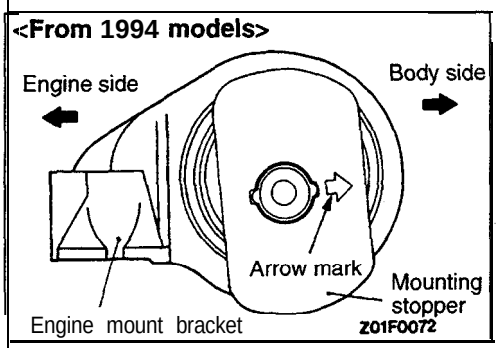
REMOVAL SERVICE POINT

◀A▶ CRUISE CONTROL PUMP AND LINK ASSEMBLY REMOVAL

Remove the actuator mounting nuts and place the actuator where it will not interfere with the work.

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INSTALLATION SERVICE POINT

▶A◀ MOUNTING STOPPER INSTALLATION

Attach the engine mounting bracket so that the arrow mark on the mounting stopper is in the direction as shown in the illustration.

INSPECTION

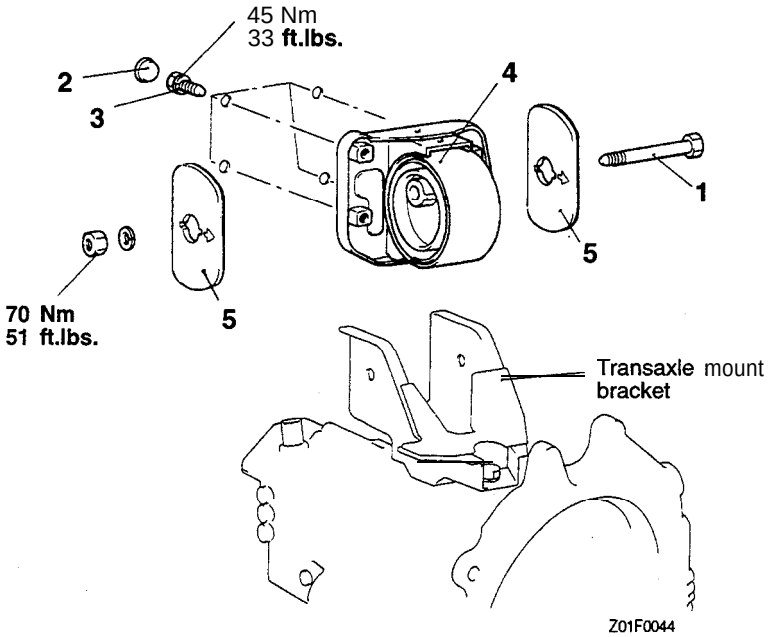
- Check each insulator for cracks or damage.
- Check each bracket for deformation or damage.

TRANSAXLE MOUNTING

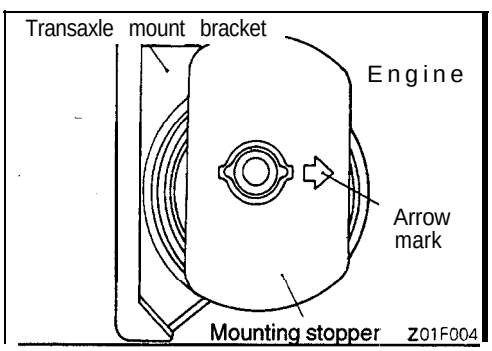
REMOVAL AND INSTALLATION

Pre-removal Operation
- Raise and Suspend the Transaxle to the Extent Force is not Applied to the Transaxle Mount
- Air Cleaner Removal
  (Refer to GROUP 15 – Air Cleaner.)

Post-installation Operation
- Lower the Transaxle.
- Air Cleaner Installation
  (Refer to GROUP 15 – Air Cleaner.)



Removal steps
1. Transaxle mount bracket and transaxle connection bolt
2. Cap
3. Transaxle mount bracket installation bolt
4. Transaxle mount bracket
▶A◀ 5. Mounting stopper



INSTALLATION SERVICE POINT

▶A◀ MOUNTING STOPPER INSTALLATION

Attach the transaxle mounting bracket so that the arrow mark on the mounting stopper is in the direction as shown in the illustration.

INSPECTION

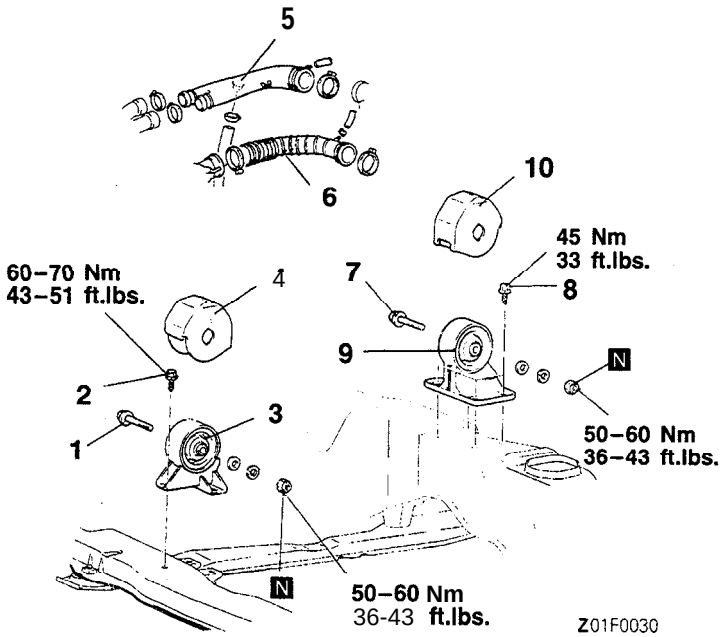
- Check each insulator for cracks or damage.
- Check each bracket for deformation or damage.

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ENGINE ROLL STOPPER

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Condenser Fan Motor Assembly Removal and Installation <Turbo> (Refer to GROUP 55 – Condenser and Condenser Fan Motor.)
- Left Bank Warm Up Three-Way Catalytic Converter Removal and Installation <Turbo> (Refer to GROUP 15 – Turbocharger <Rear>.)

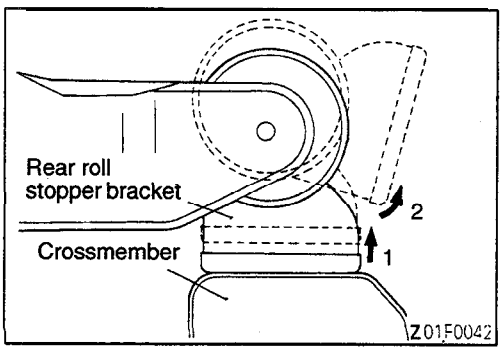


Front stopper bracket removal steps

1. Front roil stopper bracket and engine connection bolt
2. Front roll stopper bracket installation bolt
3. Front roll stopper bracket
4. Heat protector <Turbo>

Rear roll stopper bracket removal steps

5. Air hose A <Turbo>
6. Air intake hose C <Turbo>
▶B◀ 7. Rear roll stopper bracket and engine connection bolt
8. Rear roll stopper bracket installation bolt
◀A▶ ▶A◀ 9. Rear roll stopper bracket
10. Heat protector <Turbo>

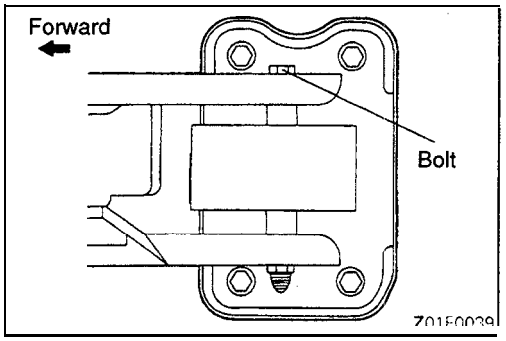


REMOVAL SERVICE POINT

◀A▶ REAR ROLL STOPPER BRACKET REMOVAL

(1) Slightly raise the rear roll stopper bracket.
(2) Turn the rear roll stopper bracket in the direction shown in the illustration and lift upward to remove.

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INSTALLATION SERVICE POINTS

▶A◀ REAR ROLL STOPPER BRACKET INSTALLATION

Install the rear roll stopper bracket as shown in the illustration.

▶B◀ **REAR** ROLL STOPPER BRACKET AND ENGINE CONNECTION BOLT INSTALLATION

Install the bolt as shown in the illustration.

INSPECTION

- Check each insulator for cracks or damage.
- Check each bracket for deformation or damage.

RIGHT MEMBER, LEFT MEMBER AND CROSSMEMBER

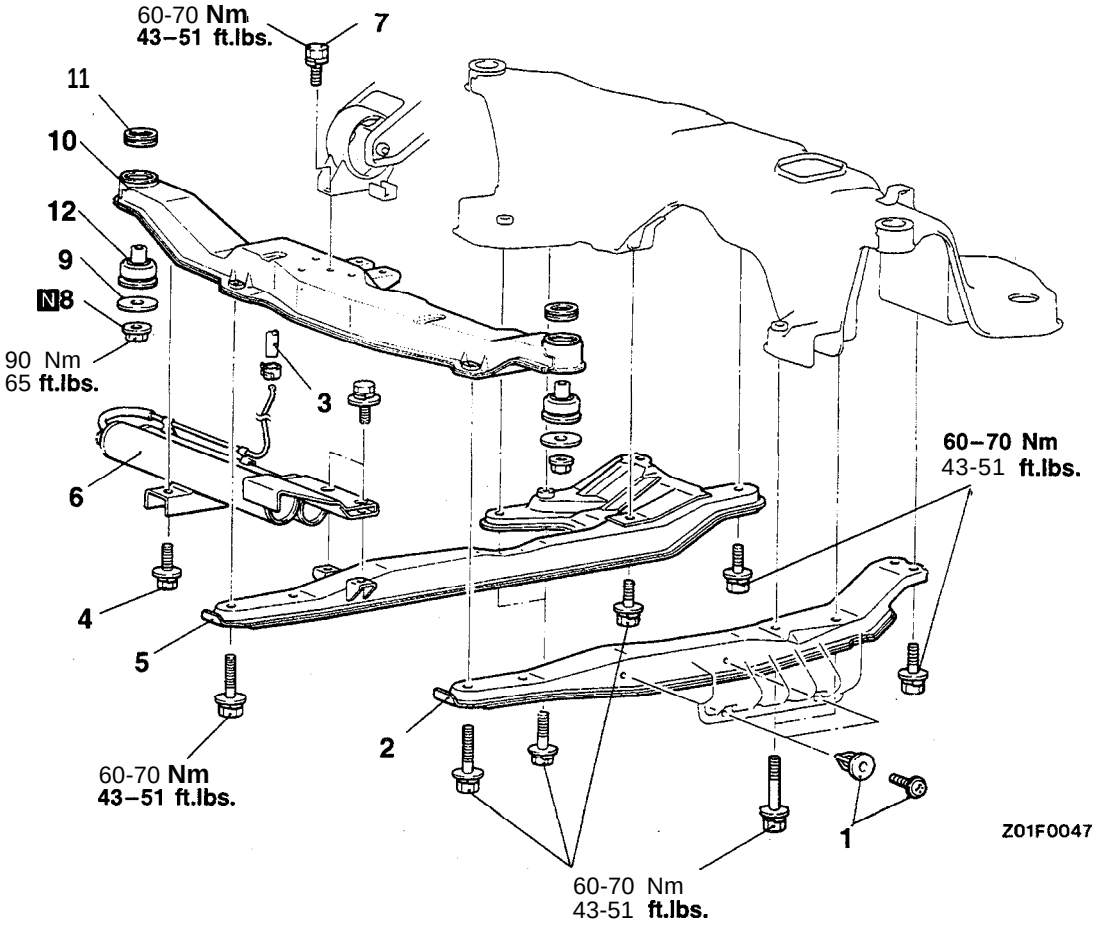
REMOVAL AND INSTALLATION

Pre-removal Operation
- Under Cover Removal
  (Refer to GROUP 51 – Front Bumper.)

CAUTION: SRS
Before removal of steering gear box, refer to GROUP 52B – SRS, center front wheels and remove ignition key. Failure to do so may damage SRS clock spring and render SRS system inoperative, risking serious driver injury.

Post-installation Operation
- Under Cover Installation
  (Refer to GROUP 51 – Front Bumper.)
- Power-steering Fluid Air Bleeding
  (Refer to GROUP 37A – Service Adjustment Procedures.)
- Front Wheel Alignment Adjustment
  (Refer to GROUP 33A – Service Adjustment Procedures.)
- Transfer Oil Supplying <AWD>
  (Refer to GROUP 00 – Maintenance Service.)

No. 1 crossmember, Left member, Right member

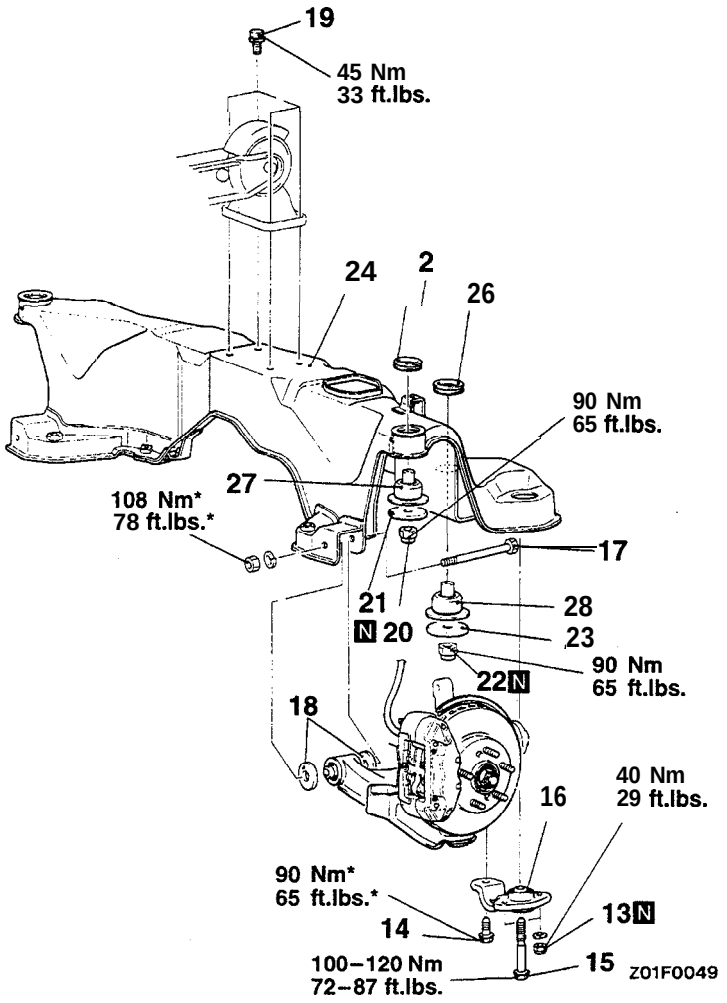


No. 1 crossmember, left member, right member removal steps

1. Cover installation screw
2. Left member
3. Clutch vacuum hose connection <Turbo>
4. Vacuum tank installation bolt <Turbo>
5. Right member
6. Vacuum tank <Turbo>
7. Front roll stopper installation bolt
8. No. 1 crossmember installation nut
9. Lower plate
10. No. 1 crossmember
11. Stopper(B)
12. Bushing (B)

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Crossmember



Crossmember removal steps

- Front exhaust pipe (Refer to GROUP 15 – Exhaust Pipe, Main Muffler and Catalytic Convener.)
- Transfer <AWD> (Refer to GROUP 22 – Transfer.)
- Stabilizer bar (Refer to GROUP 33A – Stabilizer Bar.)
- Steering gear box (Refer to GROUP 37A – Power Steering Gear Box.)

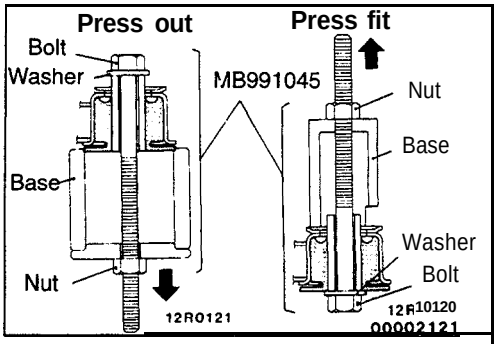
13. Self-locking nut
14. Clamp installation bolt (short)
15. Clamp installation bolt (long)
16. Clamp
17. Lower arm mounting bolt
18. Stopper
19. Rear roll stopper bracket mounting bolt
20. Self-locking nut
21. Lower plate
22. Self-locking nut
23. Lower plate
24. Crossmember
25. Stopper B
26. Stopper A
27. Bushing B
28. Bushing A

Caution
***: Indicates parts which should be temporarily tightened, and then fully tightened with the vehicle on the ground in the unladen condition.**

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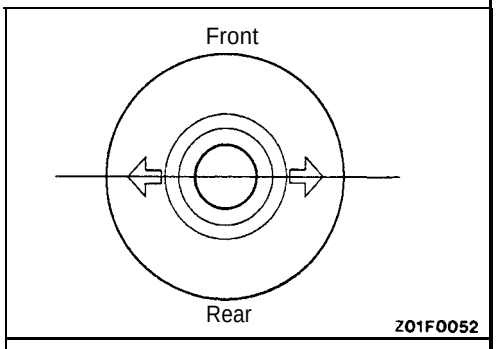
INSPECTION

- Check the crossmember for cracks or deformation.
- Check the bushings for cracks or deterioration.
- Check the right member for cracks or deformation.
- Check the left member for cracks or deformation.



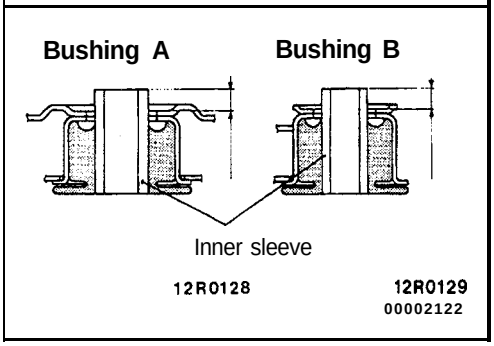
BUSHING A AND B REPLACEMENT

Use the special tool to remove and press in bushings A and B.



Press in bushings A and B so that the arrows on their bottom surfaces may be directed in the crosswise direction (except those on No. 1 crossmember of FWD vehicles).

Caution
Shifting of the arrow in the direction of rotation shall be within ±5° of the crosswise direction.



Press in bushings A and B so that the projecting amount of the inner sleeve agrees with the standard value.

Standard value:
No. 1 crossmember
Bushing B 7.5–10.5 mm (.30–.41 in.)
Crossmember
Bushing A 7.2–10.2 mm (.28–.40 in.)
Bushing B 6.5-9.5 mm (.26–.37 in.)

Caution
When pressing in, apply a solution of soap and water to the sliding part of the bushings, and then press them in without stopping one after the other.
If there is a pause during the pressing operation, the frictional resistance will prevent installation.

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FRONT SUSPENSION

CONTENTS

FRONT SUSPENSION 33A

ELECTRONIC CONTROL SUSPENSION (ECS)* 33B

ELECTRONIC CONTROL SUSPENSION (ACTIVE PREVIEW ECS) . . . 33C

NOTE
(1) Shaded groups in the above list are not included in this manual.
(2) *: Up to 1995 models

NOTES

FRONT SUSPENSION

CONTENTS

LOWER ARM 10

ON-VEHICLE SERVICE 6
- Front Wheel Alignment 6
- Wheel Bearing Adjustment 6

SPECIAL TOOLS 4

SPECIFICATIONS 2
- General Specifications 2
- Service Specifications 3

STABILIZER BAR 12

STRUT ASSEMBLY 7

TROUBLESHOOTING 5

SPECIFICATIONS

GENERAL SPECIFICATIONS

SUSPENSION SYSTEM

Items	Specification
Suspension type	McPherson strut with coil spring and compression rod type

COIL SPRING (Hatchback)

<Up to 1993 models>

Items	FWD	AWD
Wire dia. x O.D. x free length mm (in.)	M/T: 14.8 x 170 x 322.5 (.58x 6.69 x 12.70)	15.7x170x301.5 (.62 x 6.69 x 11.87)
	A/T, M/T*: 15.0 x 170 x 331.0 (.59 x 6.69 x 13.03)	
Coil spring identification color	M/T: Orange x 1	Blue x 1
	A/T: Orange x 2	
Spring constant N/mm (lbs./in.)	30 (168)	39 (218)

<From 1994 models>

Items	FWD	AWD
Wire dia. x O.D. x free length mm (in.)	M/T: 14.4 x 170 x 322.7 (.56x 6.69 x 12.4)	15.2 x 170 x 301.6 (.60 x 6.69 x 11.87)
	NT, M/T*: 14.5 x 170 x 329.3 (.57 x 6.69 x 12.96)	
Coil spring identification color	M/T: Green x 1	Brown x 1
	A/T: Green x 2	
Spring constant N/mm (lbs./in.)	29 (162)	38 (212)

COIL SPRING (Convertible)

Items	FWD	AWD
Wire dia. x O.D. x free length mm (in.)	14.7 x 170 x 338.0 (.58x 6.69 x 13.31)	15.4 x 170 x 308.5 (.61 x 6.69 x 12.15)
Coil spring identification color	Orange x 1	Gray x 1
Spring constant N/mm (lbs./in.)	30 (168)	39 (218)

NOTE
*: Option

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SHOCK ABSORBER

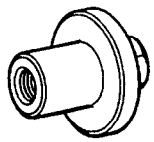
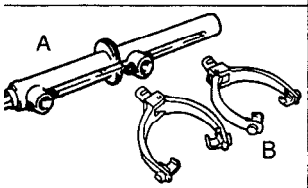
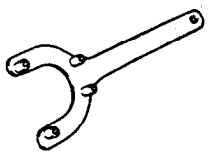
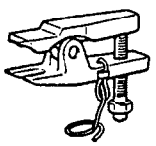
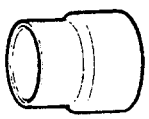
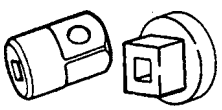
Items		Vehicles without ECS	Vehicles with ECS (up to 1995 models)
Type		Hydraulic, cylindrical double acting type	Hydraulic, cylindrical double acting type
Maximum length mm (in.)		485 (19.09)	485 (19.09)
Compressed length mm (in.)		335 (13.19)	335 (13.19)
Stroke mm (in.)		150 (5.91)	150 (5.91)
Damping force [at 0.3 m/sec. (0.984 ft./sec.)]	Expansion	1,080 (238)	Hard: 2,530 (558) Medium: 1,580 (348) Soft: 620 (137)
	Contraction	540 (119)	Hard: 1 ,190 (262) Medium: 1,120 (247) Soft: 970 (214)

SERVICE SPECIFICATIONS

Items		Standard value
Camber		0" ± 30
Caster		3°55' ± 30
Toe-in mm (in.)		0 ± 3 (0 ± .12)
Lower arm ball joint breakaway torque Nm (in.lbs.)		10–22 (86-191)
Stabilizer link ball joint breakaway torque Nm (in.lbs.)		1.7-3.2 (15-28)
Steering angle	Inner wheel	33°45
	Cuter wheel	28°21'

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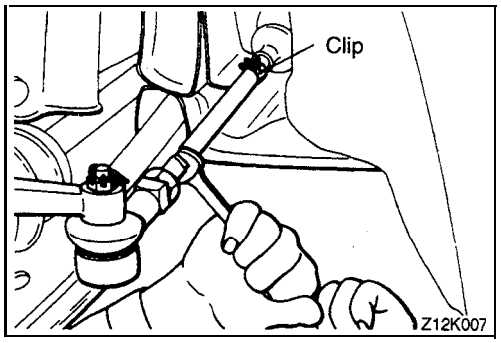
SPECIAL TOOLS

Tool	Tool number and name	Supersession	Application
	MB991004 Wheel alignment gauge attachment	MB991004-01 or General service tool	Measurement of the wheel alignment
	A: MB991 237 Spring compressor body B: MB991 238 Arm set	MIT62220	Compression of the front coil spring
	MB991176 Spring seat holder	MIT62220	Disassembly/assembly of the strut assembly
	MB991113 Steering linkage puller	MB991113-01	Removal of the lower arm ball joint and tie rod
	MB990799 Ball joint remover and installer	MB990799-01	Installation of the dust shield
	MB990326 Preload socket	General service tool	Measurement of the ball joint and stabilizer link ball joint starting torque

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TROUBLESHOOTING

Symptom	Probable cause	Remedy
Steering wheel is heavy, vibrates or pulls to one side	Suspension malfunction	Adjust or replace
	Ball joint	
	Coil spring	
	Wheel alignment	
	Unbalanced or worn tires	
Excessive vehicle rolling	Broken or deteriorated stabilizer	Replace
	Shock absorber malfunction	
Poor riding	Improper tire inflation pressure	Adjust
	Broken or deteriorated coil spring	Replace
	Shock absorber malfunction	
Inclination of vehicle	Broken or deteriorated coil spring	Replace
Noise	Lack of lubrication	Lubricate
	Looseness and wear of each part	Retighten or replace
	Broken coil spring	Replace
	Shock absorber malfunction	



ON-VEHICLE SERVICE

FRONT WHEEL ALIGNMENT

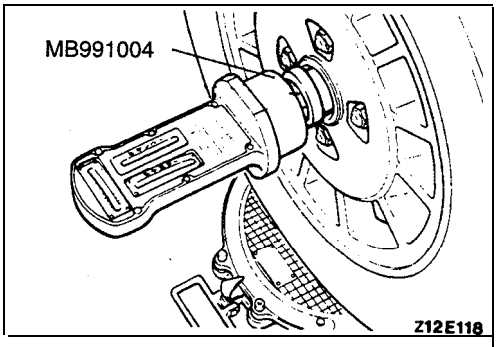
TOE-IN

Standard value: 0 ± 3 mm (0 ± .12 in.)

1. Adjust the toe-in by undoing the clips and turning the left and right tie rod turnbuckles by the same amount (in opposite directions).
2. After making the adjustments, use a turning radius gauge to confirm that the steering wheel turning angle is within the standard value range. (Refer to GROUP 37A – On-vehicle Service.)

Standard value:

inner wheel	**33°45'**
Outer wheel	**28°21'**



CAMBER AND CASTER

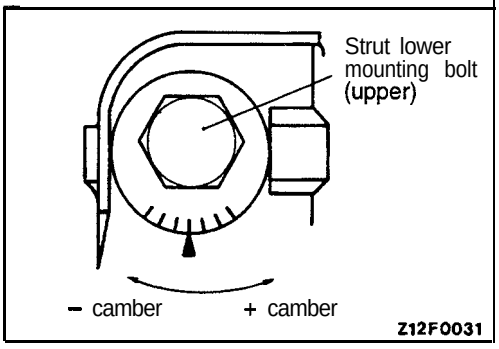
Standard value:

Camber	**0° ± 30'**
Caster	**3°55'** ± 30'

Install the special tool by tightening it to the same torque as that applied to the drive shaft nut.
To adjust camber, turn the strut lower mounting bolt (upper). One graduation is equivalent to about 20' in camber. Caster has been factory-adjusted to the standard value and requires no adjustment.

Caution

1. One camber graduation changes toe by about 0.5 mm (.02 in.). Be sure to adjust toe after camber has been adjusted.
2. The difference in camber between right and left should be within 0°30'.



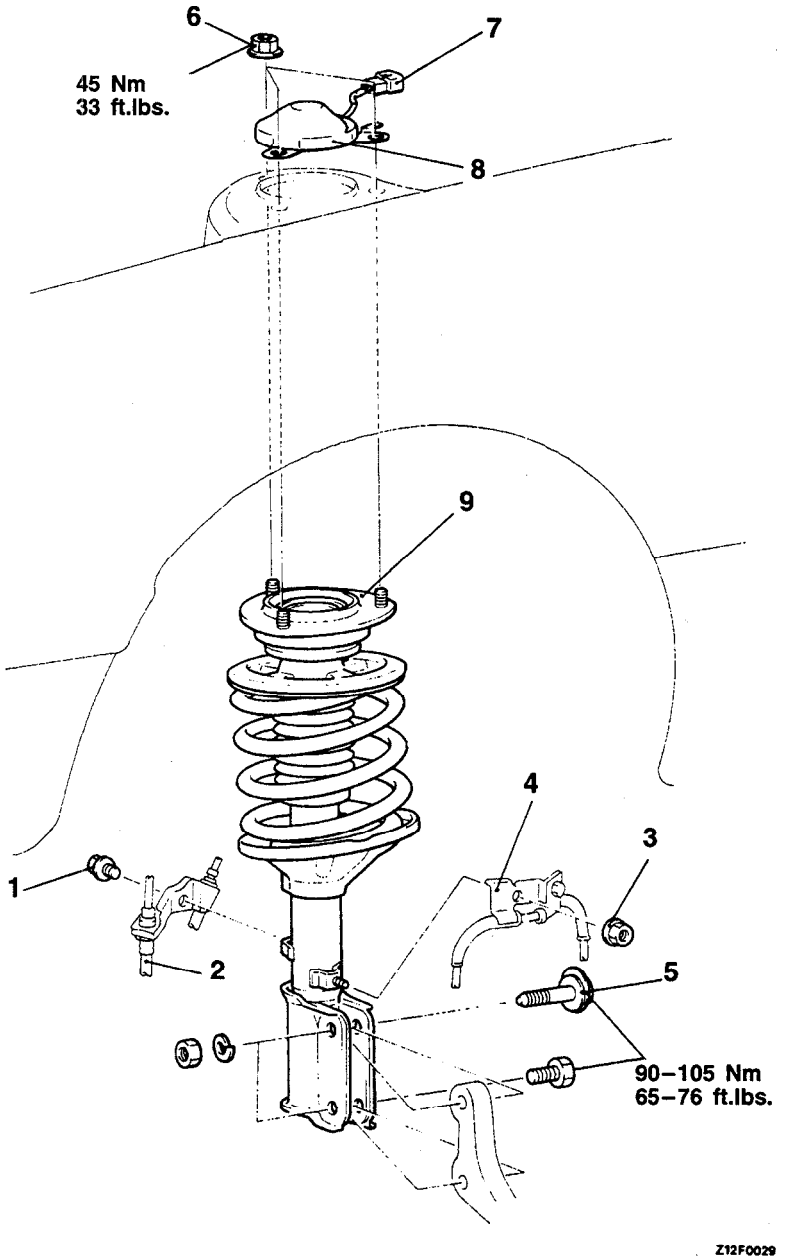
WHEEL BEARING ADJUSTMENT

Bearing preload is preset to the specified value by design and therefore can not be adjusted.

STRUT ASSEMBLY

REMOVAL AND INSTALLATION

Post-installation Operation
- Wheel Alignment Adjustment (Refer to P.33A-6.)

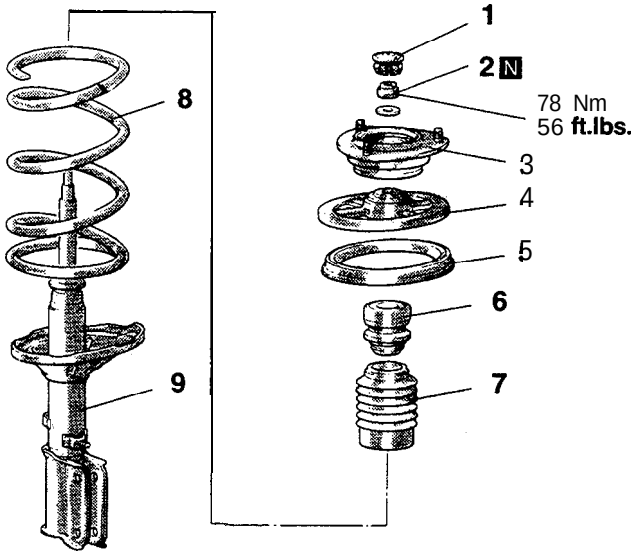


Removal steps

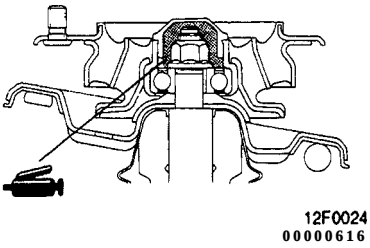
1. Brake hose tube clamp mounting bolt
2. Brake hose tube clamp
3. Front speed sensor clamp mounting nut <ABS>
4. Front speed sensor clamp <ABS>
5. Strut lower mounting bolt
6. Strut upper mounting bolt
7. ECS connector <EC&-
8. Cap <ECS> or dust cover
9. Strut assembly

TSB Revision

DISASSEMBLY AND REASSEMBLY



12F0030

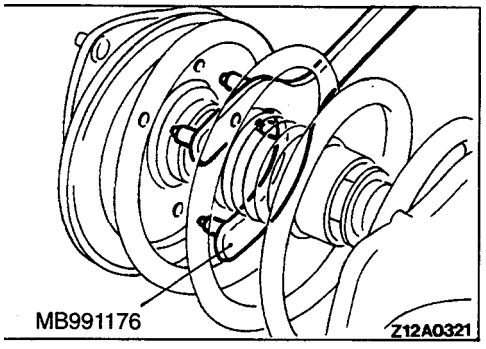


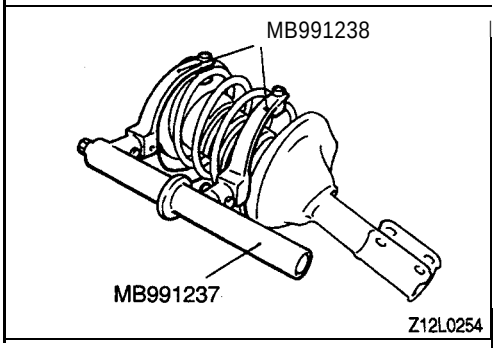
12F0024
00000616

Caution
When applying the grease, take care that grease does not adhere to the insulator's rubber part.

Disassembly steps

1. Dust shield
◀A▶ ▶B◀ 2. Self-locking nut
3. Strut insulator assembly
▶A◀ 4. Spring upper seat assembly'
5. Upper spring pad
6. Bump rubber
7. Dust shield
8. Front coil spring
9. Strut assembly





DISASSEMBLY SERVICE POINT

◀A▶ SELF-LOCKING NUT REMOVAL

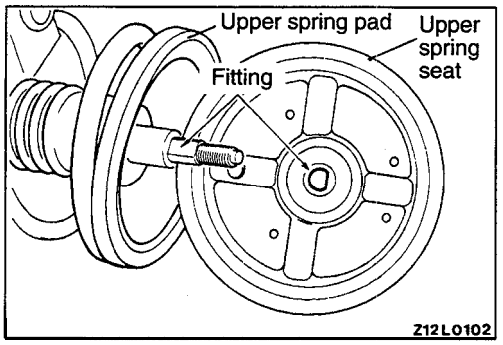
(1) Holding the spring upper seat with the special tool, loosen the self-locking nut.

Caution
The self-locking nut should be loosened only not removed.

(2) Using the special tools, compress the coil spring, and then remove the self-locking nut.

Caution
(1) Install the special tools evenly, and so that the maximum length will be attained within the installation range.
(2) Do not use an air tool to tighten the bolt of the special tool and to remove the self-locking nut.

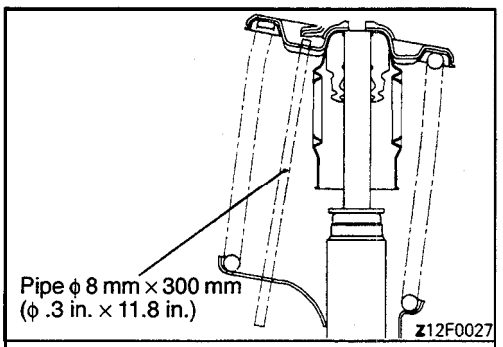
TSB Revision



REASSEMBLY SERVICE POINTS

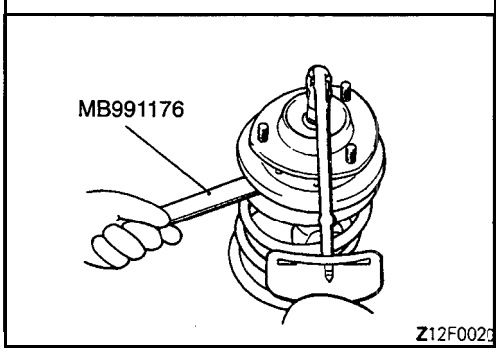
▶A◀ SPRING UPPER SEAT ASSEMBLY INSTALLATION

(1) Assemble the spring upper seat to the piston rod, fitting the notch in the rod to the shaped hole in spring seat.



(2) Using a pipe, line up the holes in the strut assembly spring lower seat with the hole in the spring upper seat.

NOTE
The job is easily accomplished with a pipe [ϕ 8 mm x 300 mm (ϕ .3 in. x 11.8 in.)].



▶B◀ SELF-LOCKING NUT INSTALLATION

(1) With the coil spring held compressed by the special tools (MB991 237 and MB991 238), provisionally tighten the self-locking nut.

Caution
Do not use an air tool to tighten the bolt of the special tool.

(2) Correctly align both ends of the coil spring with the grooves in the spring seat, and then loosen the special tools (MB991237 and MB991238).

(3) Using the special tool, tighten the strut insulator at the specified torque.

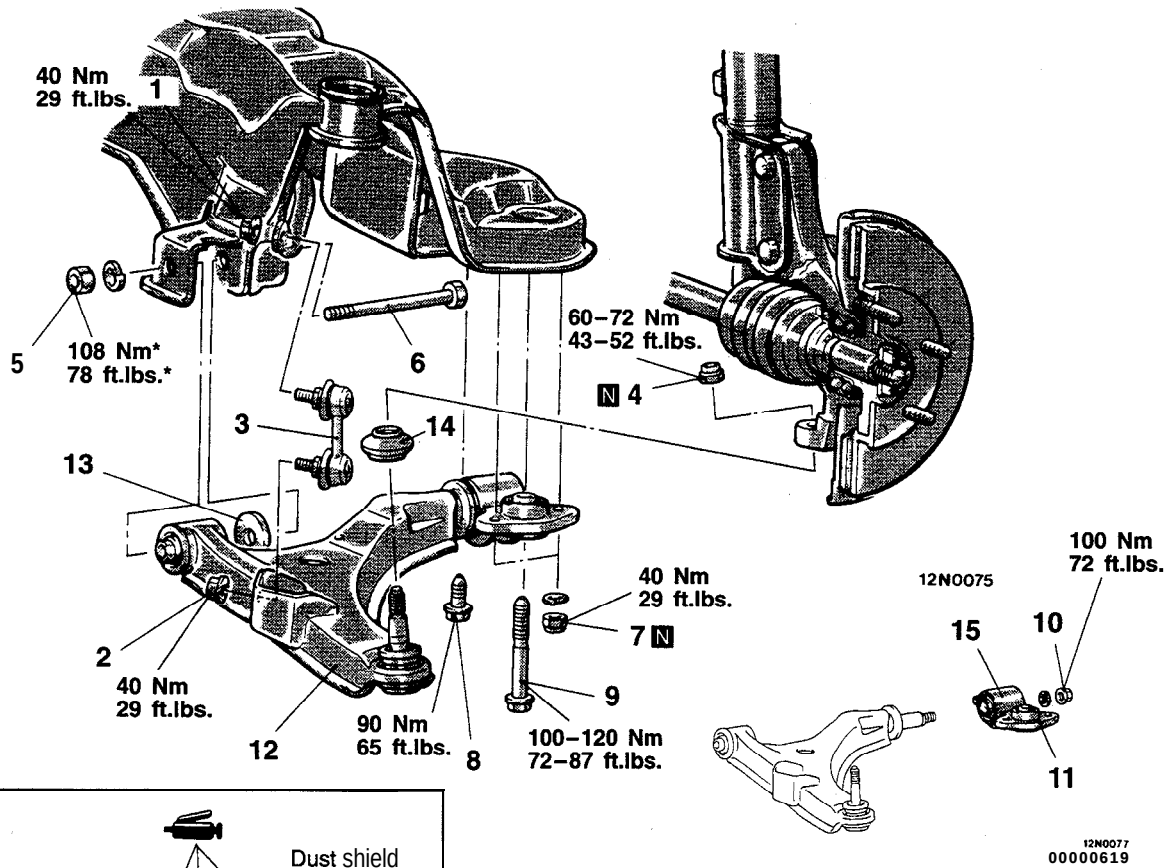
Caution
Do not use an air tool.

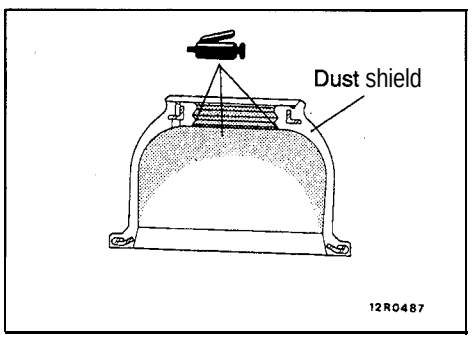
TSB Revision

LOWER ARM

REMOVAL AND INSTALLATION

Post-installation Operation
- Wheel Alignment- Adjustment (Refer to P.33A-6.)



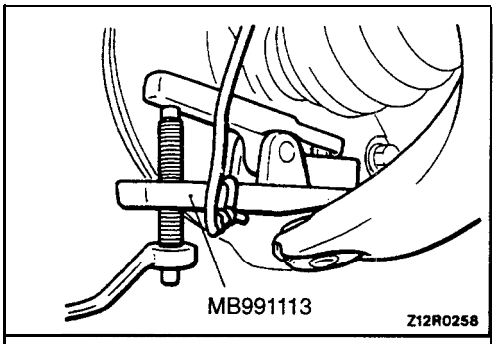


Removal steps

1. Stabilizer link mounting nut (stabilizer bar side)
2. Stabilizer link mounting nut (lower arm side)
3. Stabilizer link
◀A▶ 4. Self-locking nut connecting lower arm ball joint to knuckle
5. Lower arm mounting nut
6. Lower arm mounting bolt
7. Clamp mounting self-locking nut
8. Clamp mounting bolt (small)
9. Clamp mounting bolt (large)
▶A◀ 10. Lower arm clamp mounting self-locking nut
11. Lower arm mounting clamp
12. Lower arm
13. Stopper
14. Dust shield
15. Rod bushing

NOTE
*: Indicates parts which should be temporarily tightened, and then fully tightened with the vehicle on the ground in the unladen condition.

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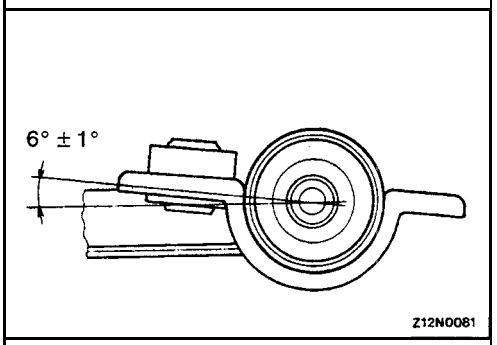
REMOVAL SERVICE POINT

◀A▶ LOWER ARM BALL JOINT REMOVAL

Using the special tool, disconnect the knuckle from the lower arm ball joint.

Caution

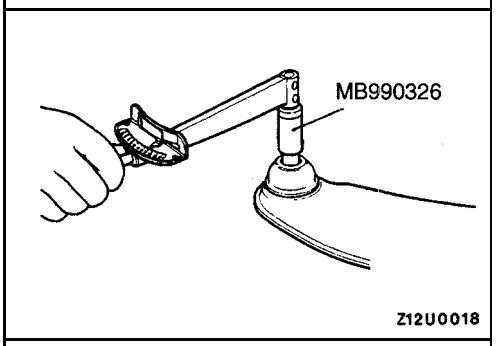
1. **Be sure to tie the cord of the special tool to a nearby part,**
2. **Loosen the nut but do not remove it.**



INSTALLATION SERVICE POINT

▶A◀ LOWER ARM CLAMP MOUNTING SELF-LOCKING NUT INSTALLATION

Place the lower arm bushing bracket so that its mounting surface tilts 6° ± 1° with respect to the bottom surface of the lower arm; then, mount the self-locking nut.



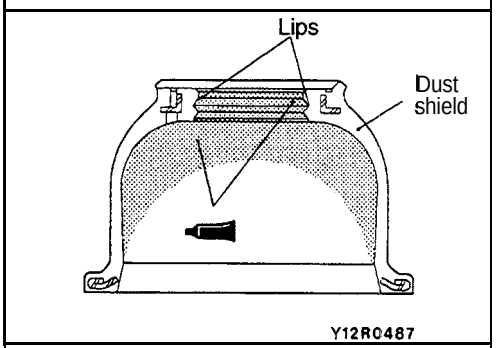
INSPECTION

- Check the bushing for wear and deterioration.
- Check the lower arm for bend or breakage.
- Check the clamp for deterioration or damage.
- Check the ball joint dust shield for cracks.
- Check all bolts for condition and straightness.

CHECKING BALL JOINT FOR BREAKAWAY TORQUE

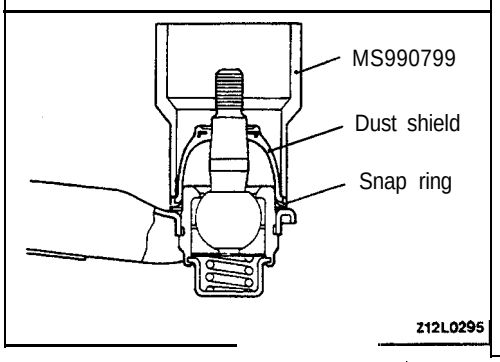
Using the special tool, measure the ball joint breakaway torque.

Standard value: 10–22 Nm (86-191 in.lbs.)



BALL JOINT DUST SHIELD REPLACEMENT

(1) Remove the dust shield.
(2) Apply multipurpose grease to the lip and inside of the dust shield.

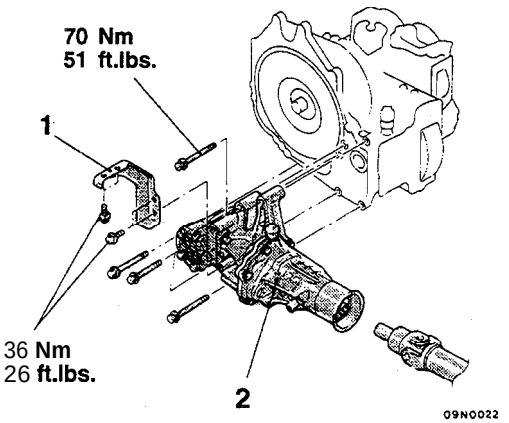


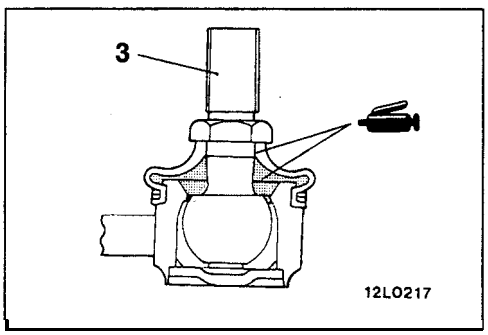
(3) Drive in the dust shield with special tool until it is fully seated.

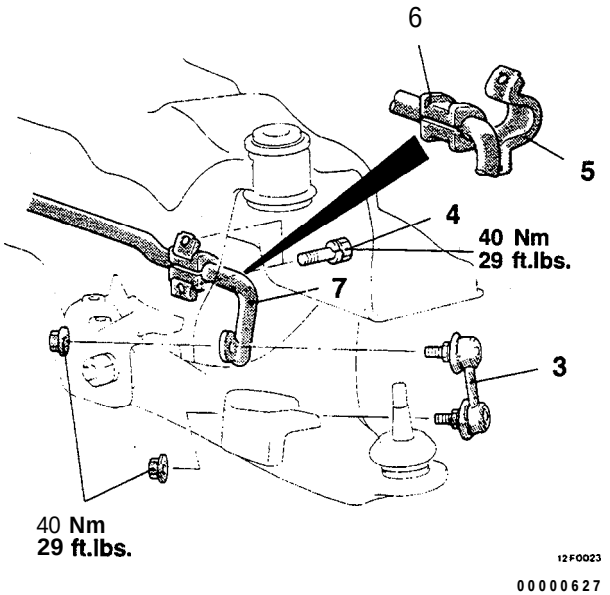
STABILIZER BAR

REMOVAL AND INSTALLATION

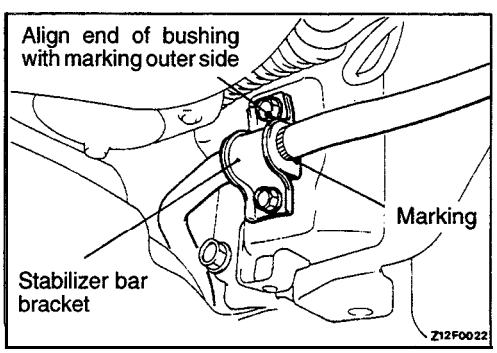
Pre-removal and Post-installation Operation
- Front Exhaust Pipe Removal and installation (Refer to GROUP 15 – Exhaust Pipe and Main Muffler.)
- Under Cover Removal and Installation
- Left Member and Right Member Removal and Installation (Refer to GROUP 32 – Right Member, Left Member and Crossmember.)







Removal steps
1. Transmission stay B <AWD vehicles with automatic transaxle>
2. Transfer (AWD) (Refer to GROUP 22 – Transfer.)
3. Stabilizer link
4. Stabilizer bar bracket mounting bolt
▶A◀ 5. Stabilizer bar bracket
6. Bushing
7. Stabilizer bar



INSTALLATION SERVICE POINT

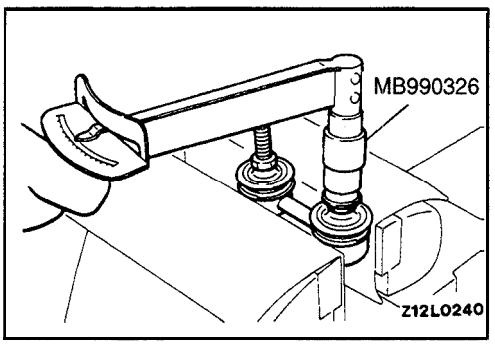
▶A◀ STABILIZER BAR BRACKET POSITIONING

(1) Align the bushing (LH) with the stabilizer bar marking end and temporarily tighten the stabilizer bar bracket (LH).
(2) In this condition, mount the stabilizer bar bracket (RH) and temporarily tighten it.
(3) Temporarily fix the both ends of the stabilizer bar to the link and tighten the stabilizer bar bracket mounting bolts to specification.

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INSPECTION

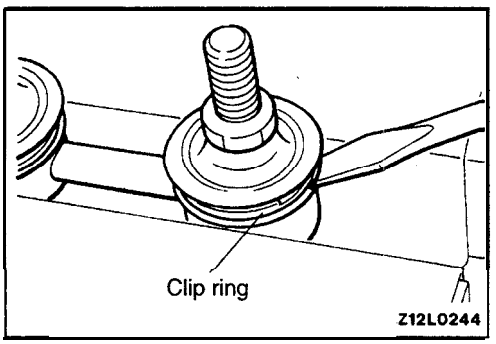
- Check the bushing for wear and deterioration.
- Check the stabilizer bar for deterioration or damage.
- Check the stabilizer link ball joint dust cover for cracks.
- Check all bolts for condition and straightness.



CHECKING STABILIZER LINK BALL JOINT BREAKAWAY TORQUE

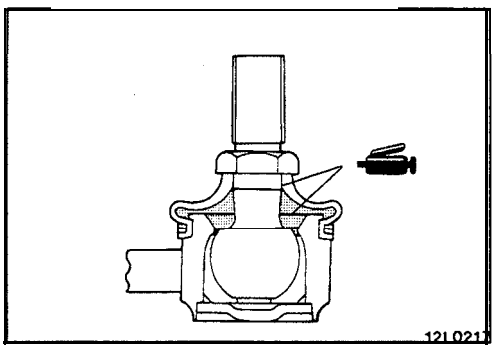
Install the nut to each stud. Then use the special tool to measure the ball joint breakaway. torque.

Standard value: 1.7-3.2 Nm (15-28 in.lbs.)

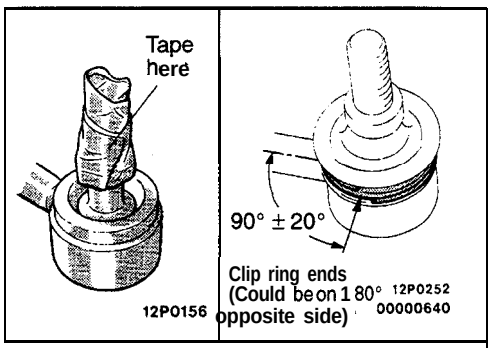


BALL JOINT DUST SHIELD REPLACEMENT

(1) Remove the clip ring and the dust shield.



(2) Apply multipurpose grease to the lip and inside of the dust shield.



(3) Use vinyl tape to tape the stabilizer link where shown in the illustration, and then install the dust shield to the stabilizer link.
(4) Secure the dust shield by the clip link.
At this time, make sure that the clip ring ends are located at a point 90° ± 20° with reference to the link axis.

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NOTES

ELECTRONIC CONTROL SUSPENSION (ECS)

CONTENTS

DAMPING FORCE CHANGEOVER ACTUATOR 19

ECS CONTROL UNIT 20

ECS INDICATOR LIGHT 19

ECS SWITCH 18

G SENSOR 18

POSITION DETECTION SWITCH 19

SERVICE ADJUSTMENT PROCEDURES.. . . 11

On-Vehicle Inspection 11

SPECIAL TOOLS 4

SPECIFICATIONS 2

General Specifications 2

Service Specifications 4

STEERING ANGULAR VELOCITY SENSOR* 18

STOP LIGHT SWITCH 19

THROTTLE POSITION SENSOR 19

TROUBLESHOOTING 5

VEHICLE SPEED, SENSOR 18

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

(1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).

(2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.

(3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B -Supplemental Restraint System (SRS) and GROUP 00 -Maintenance Service, before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning light, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

SPECIFICATIONS

GENERAL SPECIFICATIONS

FRONT SUSPENSION

item	Specification
Suspension system	McPherson strut type

COIL SPRING (Hatchback)

<Up to 1993 models>

Items	FWD – M/T	FWD – A/T	AWD
Wire dia. × center dia. × free length mm (in.)	14.8 × 170 × 322.5 (.58 x 6.69 x 12.70)	15.0 × 170 × 331.0 (.59 x 6.69 x 13.03)	15.7 × 170 × 301.5 (.62 x 6.69 x 11.87)
Coil spring identification color	Orange × 1	Orange × 2	Blue × 1
Spring constant N/mm (lbs./in.)	30 (168)	30 (168)	39 (218)

<From 1994 models>

Items	FWD – M/T	FWD – A/T	AWD
Wire dia. x center dia. x free length mm (in.)	14.4 x 170 x 322.7 (.57 x 6.69 x 12.70)	14.5 x 170 x 329.3 (.57 x 6.69 x 12.96)	15.2 x 170 x 301.6 (.60 x 6.69 x 11.87)
Coil spring identification color	Green x 1	Green x 2	Brown x 1
Spring constant N/mm (lbs./in.)	29 (162)	29 (162)	38 (212)

COIL SPRING (Convertible)

Items	FWD	AWD
Wire dia. x O.D. x free length mm (in.)	14.7 x 170 x 338.0 (.58 x 6.69 ×13.31)	15.4 x 170 x 308.5 (.61 x 6.69 x 12.15)
Coil spring identification color	Orange x 1	Gray x 1
Spring constant N/mm (lbs./in.)	30 (168)	39 (218)

SHOCK ABSORBER

Items			Specifications
Type			Hydraulic, cylindrical double-acting type
Max. length mm (in.)			485 (19.1)
Min. length mm (in.)			335 (13.2)
Stroke mm (in.)			150 (5.9)
Damping force at 0.3 m/sec. (.9 ft.)/sec. N (lbs.)	Expansion	Hard	2,530 (558)
		Medium	1,580 (348)
		Soft	620 (137)
	Contraction	Hard	1,190 (262)
		Medium	1,120 (247)
		Soft	970 (214)

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STABILIZER BAR

Items	FWD	AWD
Mounting method	Pillow ball type	Pillow ball type
Outside dia. mm (in.)	22 (.86)	23 (.91)

REAR SUSPENSION

Items	FWD	AWD
Suspension system	Multi-link type	Double-wishbone type

COIL SPRING (Hatchback)

<Up to 1993 models>

Items	FWD	AWD
Wire dia. x center dia. x free length mm (in.)	12.2 x 105 x 350.0 (.48 x 4.13 x 13.78)	12.2 x 105 x 379.3 (.48 x 4.13 x 14.93)
Coil spring identification color	Orange x 1	Blue x 2
Spring constant N/mm (lbs./in.)	35 (196)	28 (157)

<From 1994 models>

Items	FWD	AWD
Wire dia. x center dia. x free length mm (in.)	11.6 x 105 x 350.0 (.46 x 4.13 x 13.78)	11.5x105x379.3 (.45 x 4.13 x 14.93)
Coil spring identification color	Green x 1	Brown x 1
Spring constant N/mm (lbs./in.)	34 (190)	28 (157)

COIL SPRING (Convertible)

Items	FWD	AWD
Wire dia. x center dia. x free length mm (in.)	12.0 x 105 x 366.5 (.47 x 4.13 x 14.43)	11.8 x 105 x 395.2 (.46 x 4.13 x 15.56)
Coil spring identification color	Blue x 1	Gray x 1
Spring constant N/mm (lbs./in.)	35 (196)	28 (157)

SHOCK ABSORBER

Items			FWD	AWD
Type			Hydraulic, cylindrical double-acting type	
Max. length mm (in.)			515 (20.3)	610 (24.0)
Min. length mm (in.)			356 (14.0)	407 (16.0)
Stroke mm (in.)			159 (6.3)	203 (8.0)
Damping force at 0.3 m/sec. (.9 ft.)/sec. N (lbs.)	Expansion	Hard	1,710 (377)	1,710 (377)
		Medium	1,160 (256)	1,160 (256)
		soft	560 (123)	560 (123)
	Contraction	Hard	1,010 (223)	1,010 (223)
		Medium	880 (194)	880 (194)
670		Soft(1	670 (148)	48)

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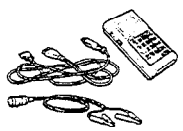
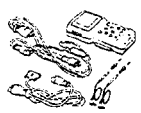
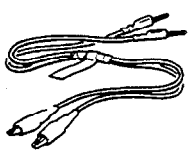
STABILIZER BAR

Items	FWD	AWD
Mounting method	Pillow ball type	Pillow ball type
Outside dia. mm (in.)	10 (.37)	22 (.86)

SERVICE SPECIFICATIONS

Items		Front suspension	Rear suspension – FWD	Rear suspension- AWD
Standard value	Camber	0" ± 30'	0" ± 30'	–0°10' ± 30'
	Caster	3°55' ± 30'	–	
	Toe-in mm (in.)	0 ± 3 (0 ± .12)	.5 ± 2.5 (.02 ± .1)	.5 ± 2.5 (.02 ± .1)

SPECIAL TOOLS

Tool	Tool number and name	Supersession	Application
	MB991341 Scan tool (multi-use tester <MUT>)	MB991341C	Up to 1993 models Inspection of electronic control suspension system • Reading and erasing diagnostic trouble codes • Reading service data • Actuator test
	ROM pack [For the number, refer to Group 00 – Precautions Before Service.]		
 Z16X0606	MB991502 Scan tool (MUT-II)	MB991502	All models Inspection of electronic control suspension system • Reading and erasing diagnostic trouble codes • Reading service data • Actuator test
 Z16X0607	ROM pack		
	MB991529 Diagnostic trouble code check harness	MB991529	From 1994 models Electronic control system inspection using a voltmeter

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TROUBLESHOOTING

QUICK REFERENCE CHART FOR TROUBLESHOOTING

Symptoms	Associated components	Pages to refer to
When diagnostic trouble code No. 11 is output. *1	G sensor *1	P.33B-6
	ECS control unit	
When diagnostic trouble code No. 21 is output. *2	Steering angular velocity sensor *2	P.33B-6
	ECS control unit	
When diagnostic trouble code No. 24 is output. *3	Vehicles speed sensor *3	P.33B-7
	ECS control unit	
When diagnostic trouble code Nos. 61 through 64 are output.	Position detection switch	P.33B-8
	Damping force changeover actuator	
	ECS control unit	
ECS indicator light does not switch when ECS switch is operated.	ECS switch	P.33B-9
	ECS indicator light	
	ECS control unit	
Anti-roll control only stops. *2	Steering angular velocity sensor *2	P.33B-6
	ECS control unit	
Anti-dive control only stops.	Stop light switch	P.33B-9
	ECS control unit	
Anti-squat control only stops. *4	Throttle position sensor *4	P.33B-10
	ECS control unit	

TROUBLESHOOTING HINTS

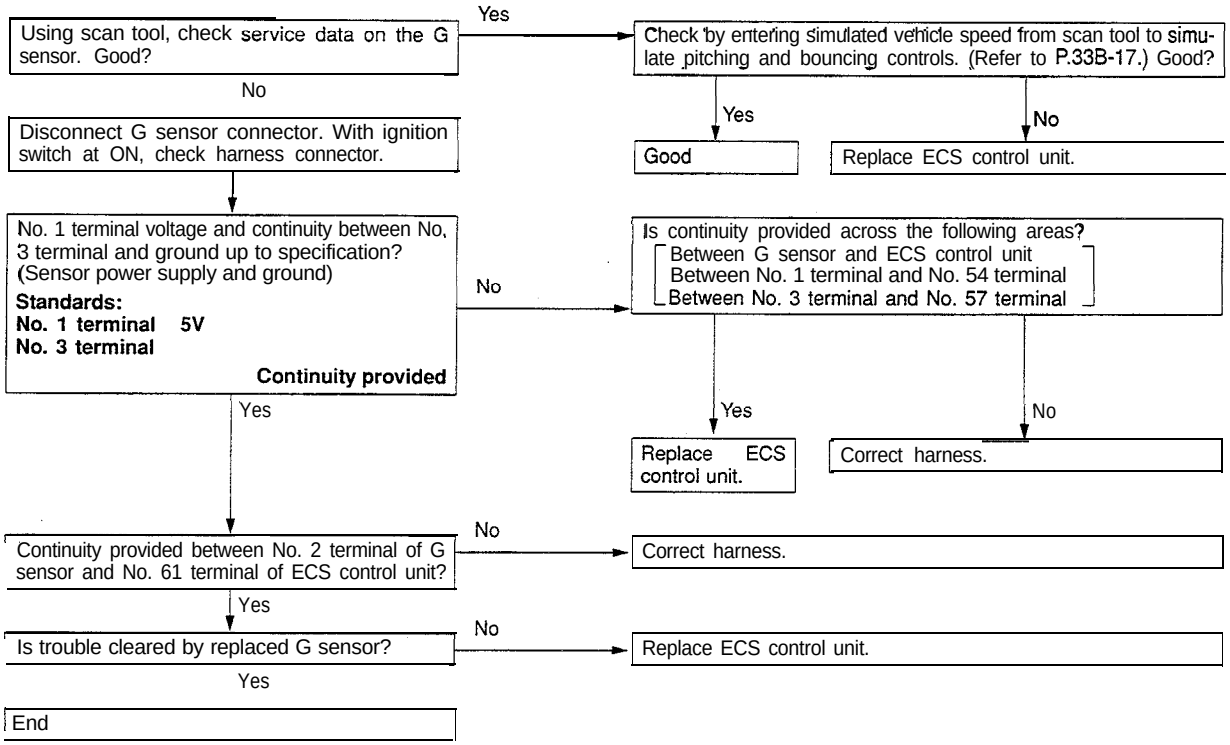
*1. The G sensor is a sensor associated with ride control (detecting pitching, bouncing and rough road). If it fails, therefore, ride control stops.

*2. A self diagnostic decision on the steering angular velocity sensor is made by the ECS control unit which internally detects the voltages of the two sensor output lines connected to the ECS control unit to detect an open circuit in the signal line. When the signal line is short-circuited or when the power line is open-circuited, however, it cannot be detected. In a situation where anti-roll control only stops, if diagnostic trouble code No. 21 is not on display, a short-circuited sensor output line or open-circuited sensor power line is suspected.

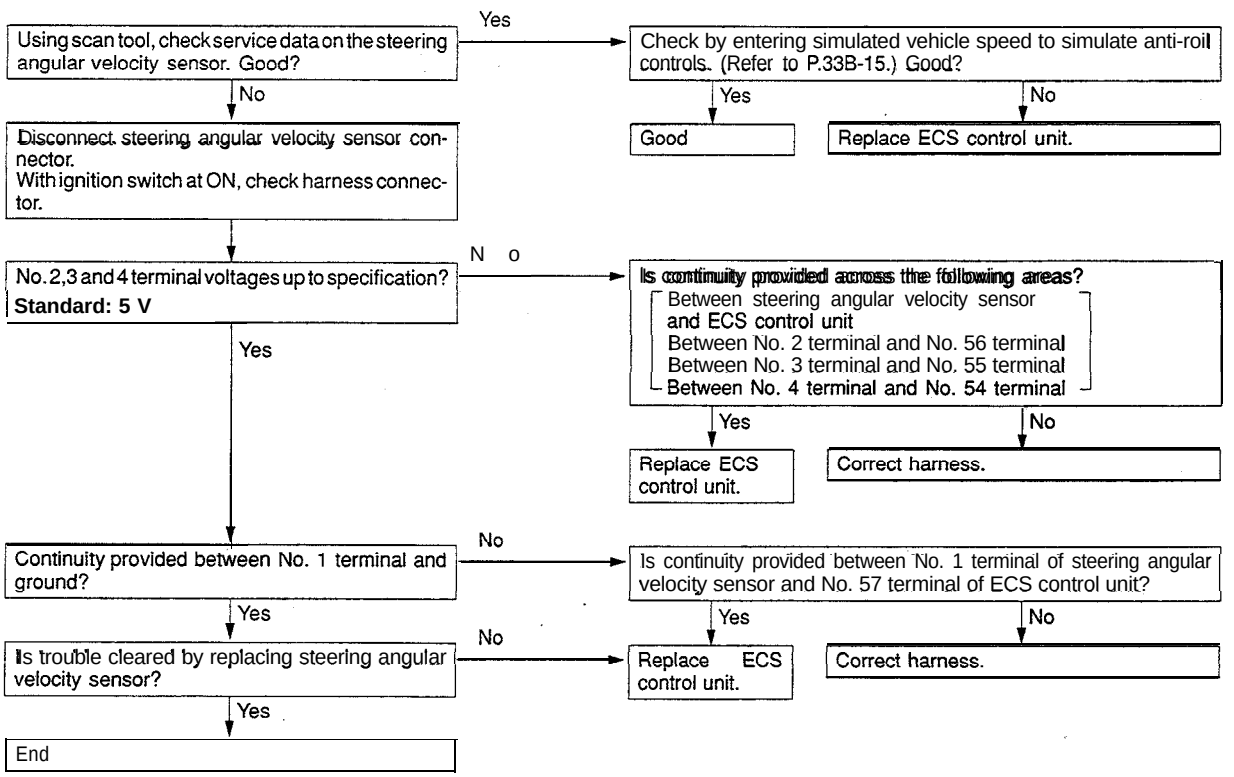
*3. The vehicle speed sensor is a sensor associated with attitude controls (anti-dive, anti-squat) and steering stability controls (anti-roll, high speed sensitive controls). If all these controls stop, therefore, trouble in the sensor is suspected. The vehicle speed sensor is also in use for operation of the speedometer and for the other electronics controlled systems for the engine, automatic transaxle, etc.

*4. The sensor associated with anti-squat control is the throttle position sensor. The sensor is also used for control of the engine and automatic transaxle. If the sensor fails, therefore, the check engine/malfunction indicator lamp in the combination meter will light, and engine diagnostic trouble code No. 14 will be output. In a situation where anti-squat control only stops, therefore, if the check engine/malfunction indicator lamp does not light, defective wiring is suspected between the ECS control unit and throttle position sensor.

1 When diagnostic trouble code No. 11 is output



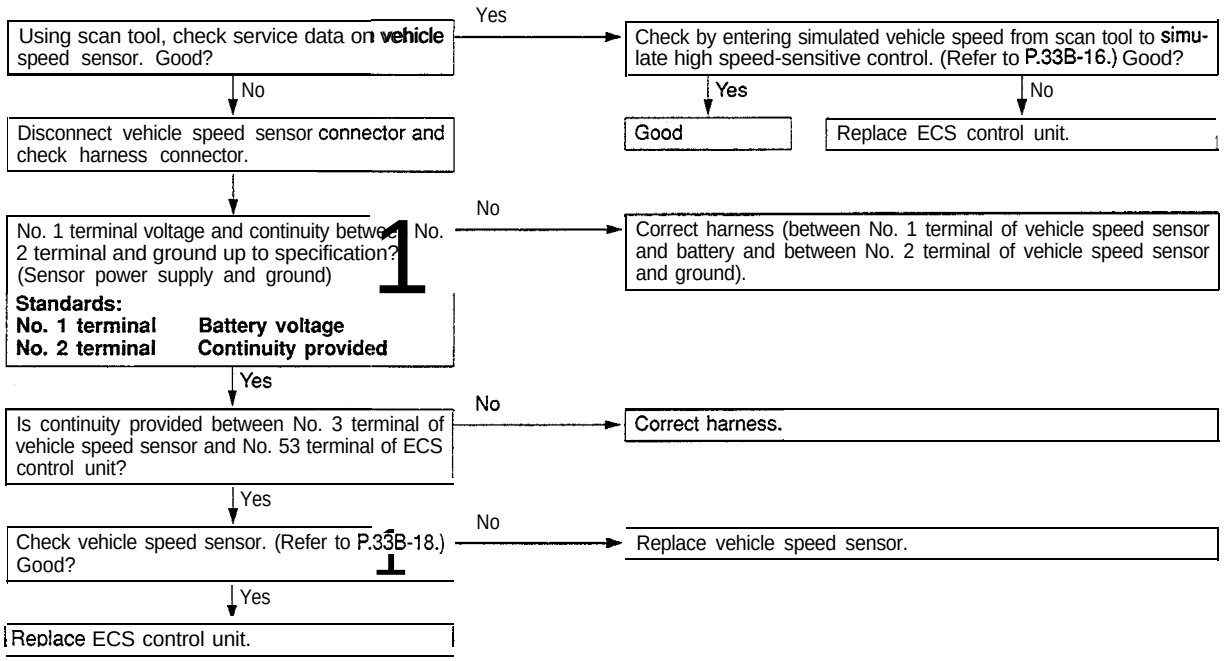
2 When diagnostic trouble code No. 21 is output, or when anti-roll control only stops.



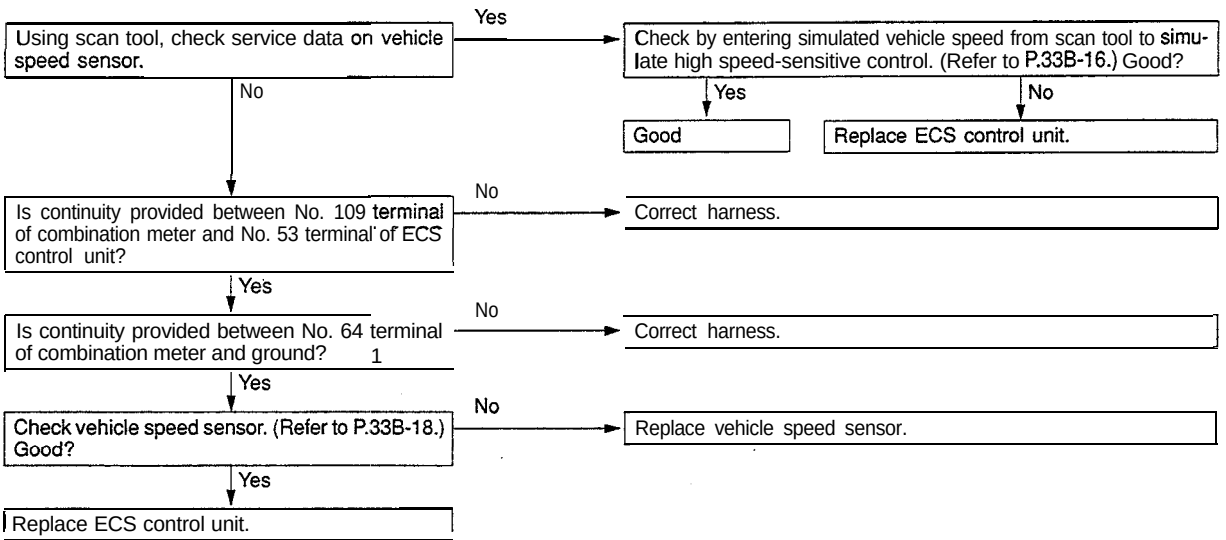
TSB Revision

3 When diagnostic trouble code No. 24 is output

<Turbo>



<Non-Turbo>



TSB Revision

4 When diagnostic trouble code Nos. 61, 62, 63 and 64 are output.

Using scan tool, check actuator. (Refer to P.33B-15.) Good?
- Yes → Good
- No → Remove cap at top of shock absorber associated with diagnostic trouble code No., disconnect connector directly connected to shock absorber, and check harness connector with ignition switch at ON.

No. 1 and 3 terminal voltages up to specification?
Standard: 5 V
- No → Is continuity provided across the following areas of shock absorber associated with diagnostic trouble code No.?

Shock absorber terminal	ECS control unit terminal
FR No. 1	**No. 7**
FR No. 3	**No. 6**
FL No. 1	No. 10
FL No. 3	No. 9
RR No. 1	No. 13
RR No. 3	**No. 12**
RL No. 1	No. 16
RL No. 3	**No. 15**

  - Yes → Check the shock absorber which corresponds to the displayed diagnosis code No. for the continuity between terminal No. 1 and the body ground and terminal No. 3 and the body ground.
    - No → Replace ECS control unit.
    - Yes → Correct harness.
  - No → Correct harness.
- Yes

Is continuity provided between No. 2 and 4 terminals and ground?
- No → Correct harness (between No. 2 and 4 terminals of shock absorber and ground).
- Yes

While measuring No. 5 terminal voltage, force-drive actuator by scan tool. Is terminal voltage up to specification?
Standard: 9 V during forced drive of actuator (for approx. 1 sec.) 0 V except during forced drive
- No → Is continuity provided across the following areas of shock absorber associated with diagnostic trouble code No.?

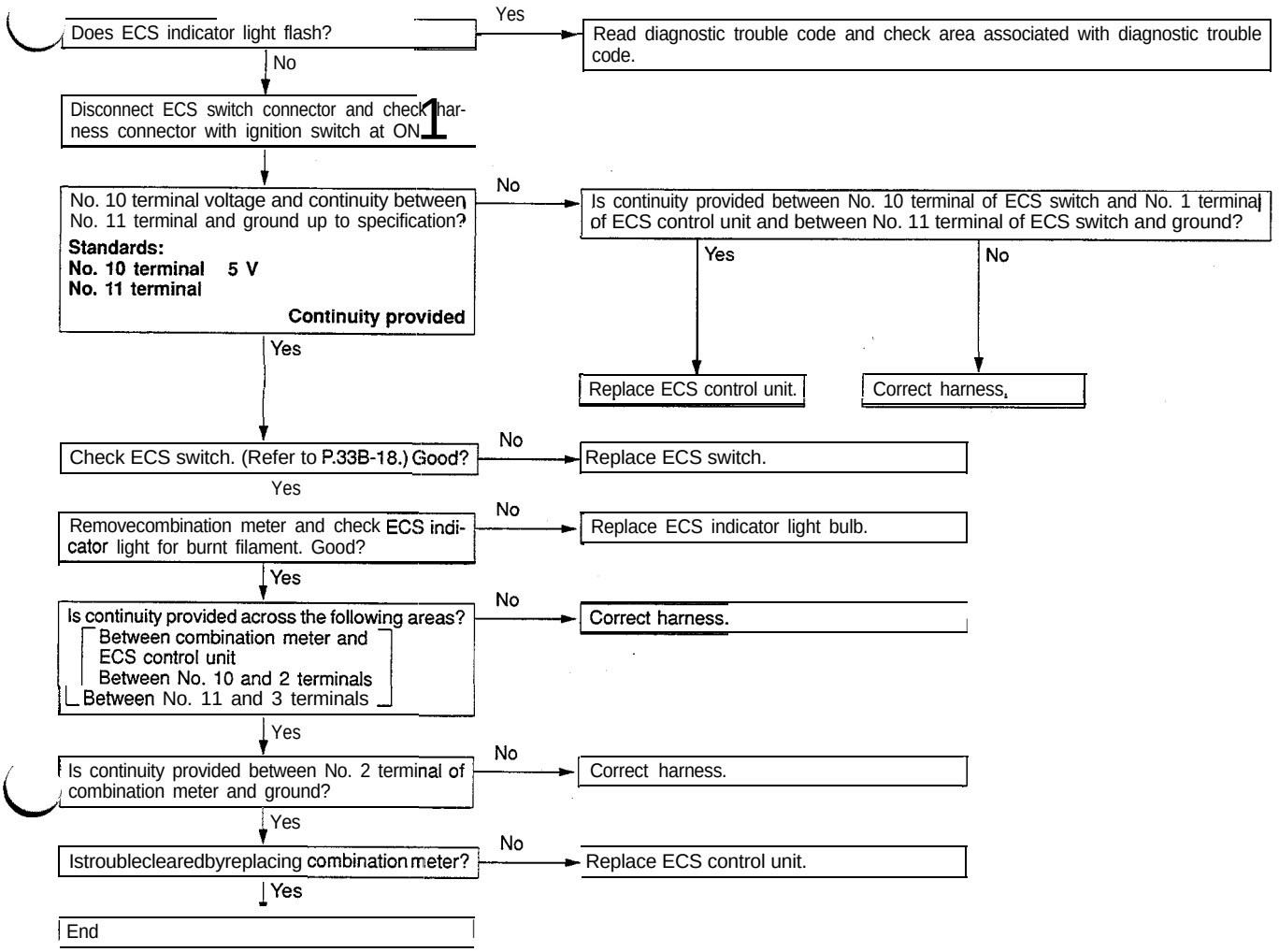
Shock absorber terminal	ECS control unit terminal
FR No. 5	No. 5
FL No. 5	No. 8
RR No. 5	No. 11
RL No. 5	No. 14

  - Yes → Check the shock absorber which corresponds to the displayed diagnosis code No. for the continuity between terminal No. 5 and the body ground.
    - No → Replace ECS control unit.
    - Yes → Correct harness.
  - No → **Correct** harness.
- Yes

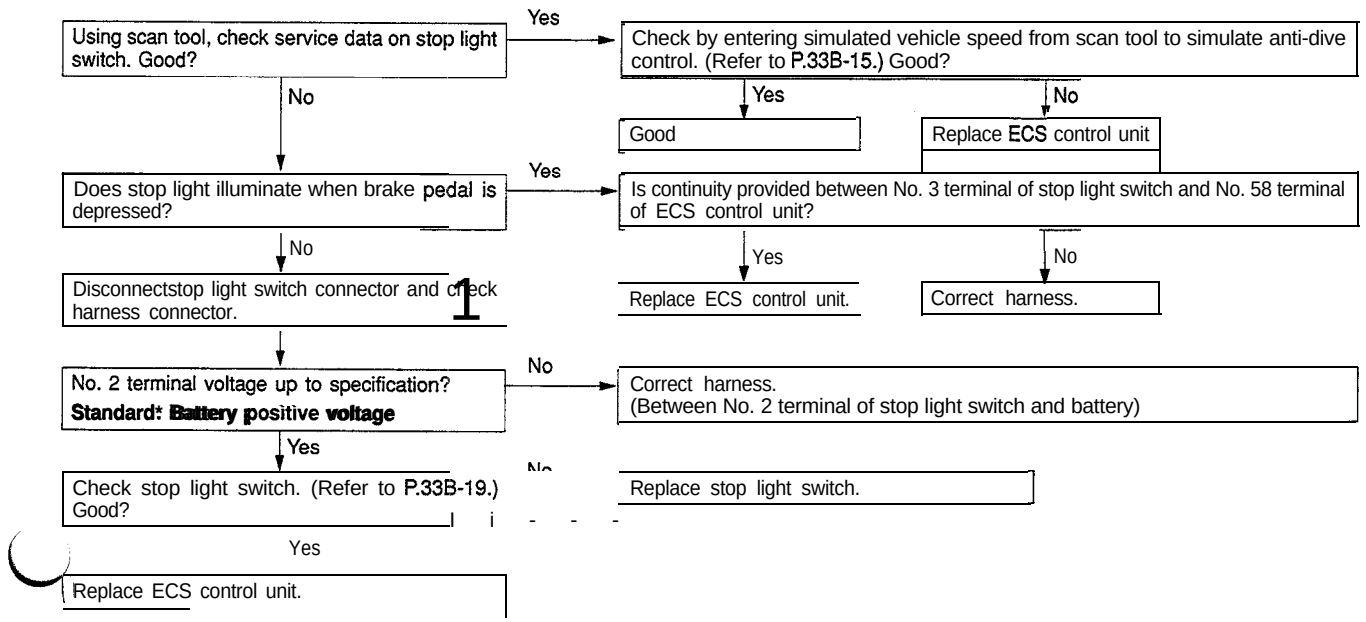
Is trouble corrected by replacing shock absorber (including damping force changeover actuator and position detection switch) associated with diagnostic trouble code No.?
- No → Replace ECS control unit.
- Yes → End

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5 ECS indicator light does not switch when ECS switch is operated.

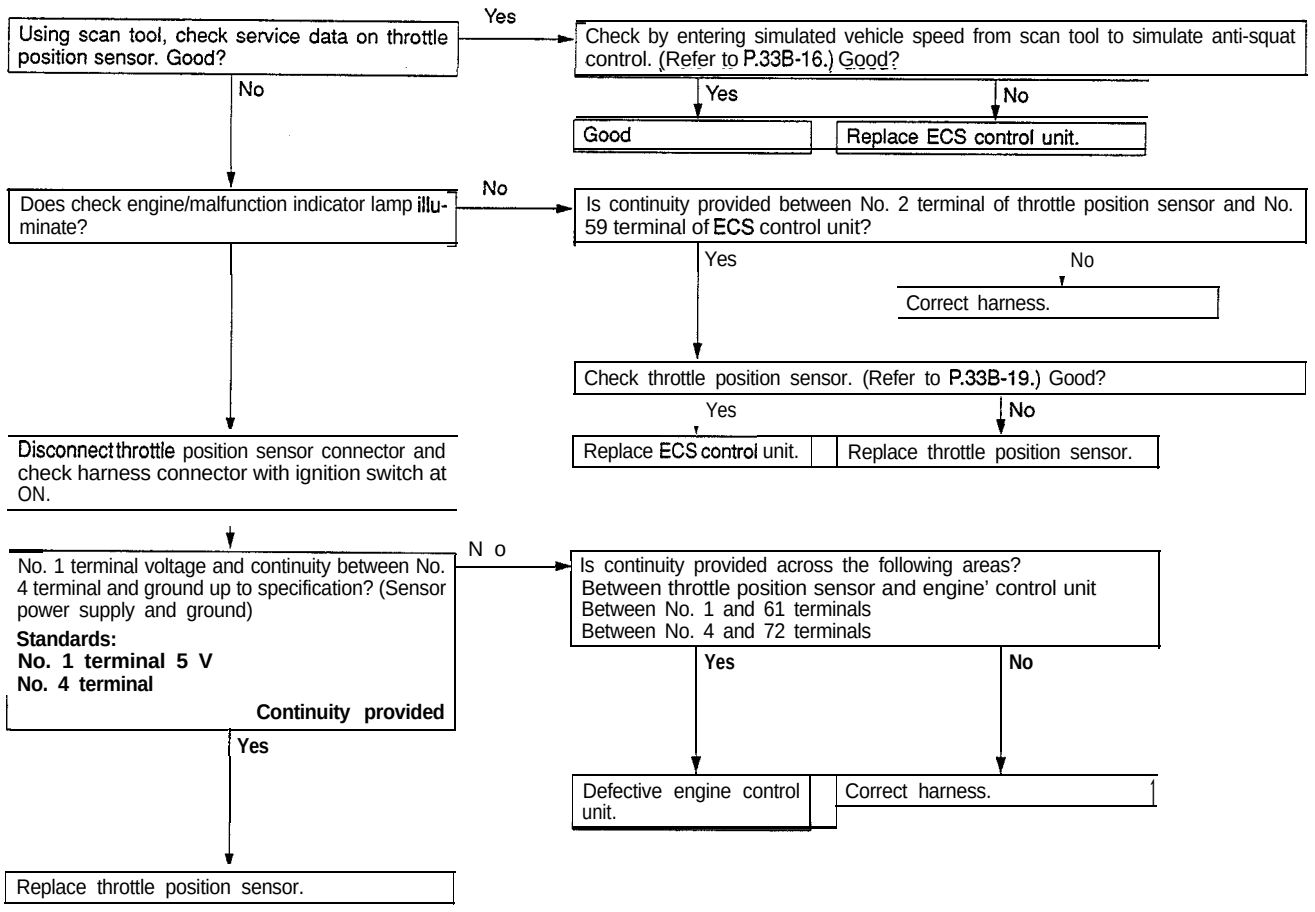


6 Anti-dive control only stops.

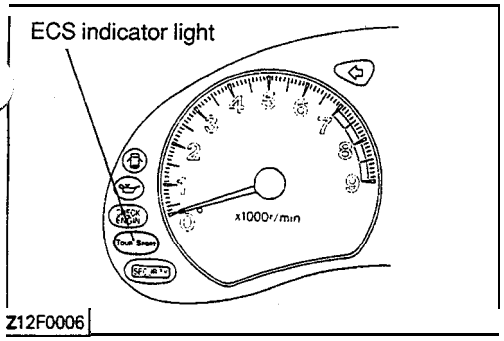


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7 Anti-squat control only stops.



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SERVICE ADJUSTMENT PROCEDURES

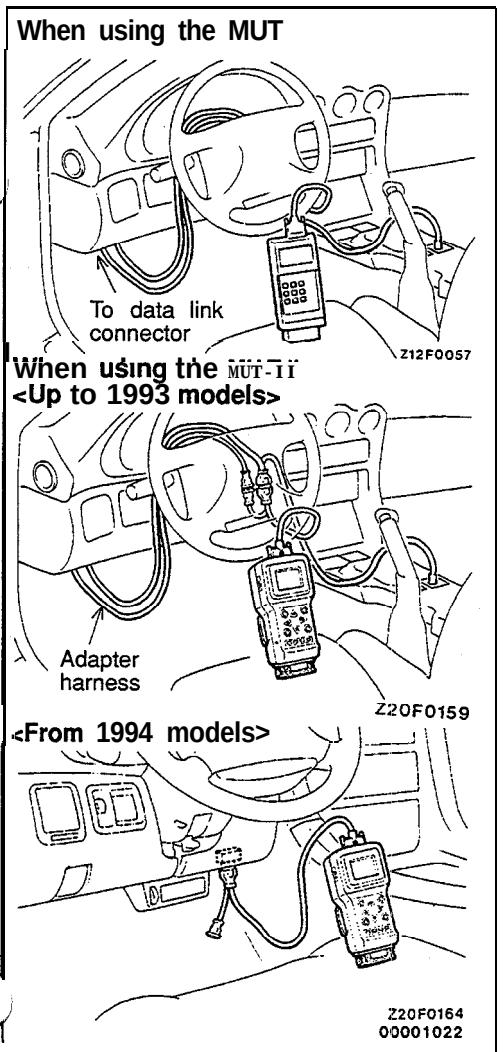
ON-VEHICLE INSPECTION

1. WARNING INDICATION BY ECS INDICATOR LIGHT

If a problem associated with the following items occurs, the ECS indicator light (Tour Sport) in the combination light flashes at intervals of 0.5 sec. At the same time, the diagnostic trouble code associated with the problem is output to the data link connector.

Warning Indication Items

- G sensor
- Steering angular velocity sensor
- Vehicle speed sensor
- Damping force changeover actuator (including position detection switch)



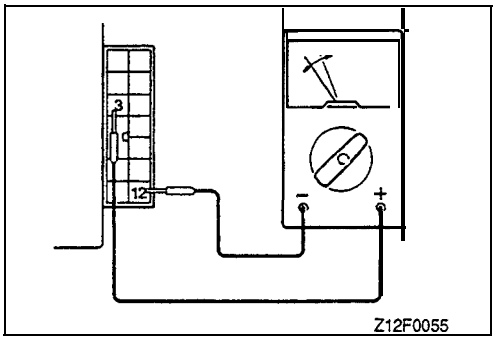
2. ON-BOARD DIAGNOSTIC OUTPUT CHECK

When using the scan tool [multi-use tester (MUT) <Up to 1993 models> or MUT-II <all models>]

(1) Connect scan tool to the data link connector.
When connecting the scan tool (MUT-II) to a vehicle up to 1993 model, use the adapter harness supplied together with the scan tool.

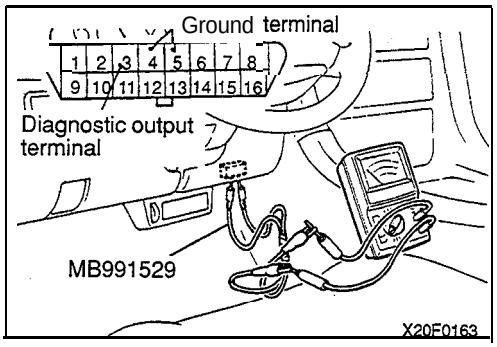
Caution
Turn off the ignition switch beforehand whenever the scan tool is connected or disconnected.

(2) Check the diagnostic trouble code.
(3) After the defective portion has been repaired, erase the diagnostic trouble code. (If the defective portion is not completely repaired, it may be impossible to erase the diagnostic trouble code by the scan tool.)
(4) Perform on-board diagnostic output check again and check that the diagnostic trouble code is good.



When using the voltmeter <Up to 1993 models>

(1) Set the ignition switch to OFF.
(2) Connect the positive (+) terminal of the voltmeter to the No. 3 terminal of the data link connector beside the junction block and connect the negative (–) terminal of the voltmeter to the No. 12 terminal.
(3) Set the ignition switch to ON.
(4) Read the diagnostic trouble code on the basis of the deflection of the pointer of the voltmeter.
(5) Based on the diagnostic trouble code, repair the associated defective portion.
(6) Set the ignition switch to OFF.
(7) Disconnect the battery cables from the battery terminals and reconnect them more than 10 seconds thereafter.
(8) Set the ignition switch to ON, perform on-board diagnostic check again, and check that the diagnostic trouble code is good.



<From 1994 models>

Connect a voltmeter to the diagnostic output terminal and ground terminal of the data link connector using the special tool. Observe the pointer deflection to read out the diagnostic trouble code.

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Fail Safe and Diagnosis List

output Code No.	Output Code indication Pattern	Diagnostic Item	Fail Safe
0		[Good]	[Good]
11		G sensor defective*	• Ride controls (pinching and bouncing control, bad road detection control) stop.
21		Steering angular velocity sensor open-circuited*	• Anti-roll control stops.
24		Vehicle speed sensor open-circuited*	• Steering stability controls (anti-roil, high speed sensitive controls) and attitude controls (anti-dive, anti-squat) stop. • Shock absorber damping force fixed at MEDIUM
61		F.R. damping force changeover actuator defective	• All ECS controls stop. • Normal shock absorber damping force fixed at HARD.
62		F. L. damping force changeover actuator defective	
63		R. R. damping force changeover actuator defective	
64		R.L. damping force changeover actuator defective	

NOTE
(1) Control stop, warning indication and fixed damping force return to normal when the ignition switch is set to OFF.
When any of the problems marked * occurs, if no subsequent problem occurs (for example, when the problem is transient), normal operation will be restored even if the ignition switch is not set to OFF.
(2) Even if control stop, warning indication and fixed damping force return to normal as described above, the diagnostic trouble code is stored in the memory in the ECS control unit.
(3) The diagnostic trouble code can be force-cleared by use of the scan tool or by stopping the power supply to the ECS control unit. In addition, it is automatically cleared if the ON/OFF control of the ignition switch is repeated 60 times after the diagnostic trouble code has been output, provided that no new diagnostic trouble code is output during the period.

On-board Diagnostic Determination Conditions

Code No.	What is Defective	On-board Diagnostic Determination Conditions
11	G sensor defective	When sensor input of 0.5 or less or 4.5 V or more lasts for more than 10 seconds.
21	Steering angular velocity sensor open-circuited	Open circuit detected on the basis of difference in voltage level of sensor signal.
24	Vehicle speed sensor defective	When throttle opening of 30% (1.5 V) or more lasts for more than 60 seconds with the ignition switch at ON and if there is no input from the vehicle speed sensor during the period, it is regarded as a problem.
61-64	Damping force changeover actuator defective	If no damping force changeover is made in a second afteractuatordrive signal has been output (position detection switch output pattern does not change to that of target damping force), it is regarded as a problem.

3. SERVICE DATA OUTPUT CHECK'

Using the scan tool, check the service data.

Service Data Inspection List

Item No.	Check Point	Check Condition	Soundness Determination Value
11	G sensor	Vehicle in stationary condition	2.0–3.0 V
		Shake vehicle up and down	Indicated value increases or decreases from 2.5 V
14	Throttle position sensor	Throttle fully closed	300–1,000 mV
		(Slowly depress accelerator pedal.)	Smoothly increases.
		Throttle fully opened	4,500–5,500 mV
21	Steering angular velocity sensor	Slowly turn steering wheel counterclockwise and check if ST1 and ST2 change as shown at right column.	ST1 ON ON OFF OFF ST2 ON OFF OFF ON
		Slowly turn steering wheel clockwise and check if ST1 and ST2 change as shown at right column.	ST1 ON OFF OFF ON ST2 ON ON OFF OFF
24	Vehicle speed sensor	Check by actually operating vehicle.	Speedometer indication and scan tool indication coincide.
26	Stop light switch	Depress brake pedal.	ON
		Do not depress brake pedal.	OFF
61	F.R. actuator	Tour mode with vehicle stationary	SOFT
		Sport mode with vehicle stationary	HARD
62	F.L. actuator	Tour mode with vehicle stationary	SOFT
		Sport mode with vehicle stationary	HARD
63	R.R. actuator	Tour mode with vehicle stationary	SOFT
		Sport mode with vehicle stationary	HARD
64	R.L. actuator	Tour mode with vehicle stationary	SOFT
		Sport mode with vehicle stationary	HARD

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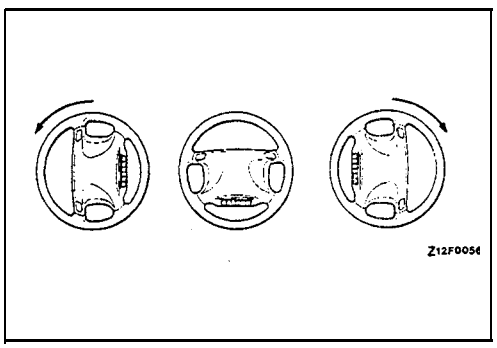
4. ACTUATOR CHECK

(1) Using the scan tool, force-drive the actuator and fix the damping force changeover.
(2) Check service data (Item No. 61 through 64) to verify that the actuator has been force-driven.

NOTE
- All of the four actuators in the shock absorbers are simultaneously changed over by forced drive.
- The damping force changed over and fixed by forced drive is cleared by the following three conditions.
  1. Ignition switch OFF
  2. Vehicle speed 3 km/h (1.9 mph) or more
  3. Scan tool disconnected

Actuator Check List

Item No.	Check Point	Check Condition	Scan Tool Service Data Item No. 61-64 Indicated
01	Damping force SOFT	Vehicle in stationary condition	SOFT
03	Damping force MEDIUM		MEDIUM
04	Damping force HARD		HARD



5. CONTROL FUNCTION SIMULATION CHECK 110004356

Using the scan tool, check all control functions during operation with the vehicle in stationary condition.

5-1. Anti-Roll Control Function Check

(1) Raise the front wheels on a jack and have them supported by rigid racks.
(2) Place the steering wheel in straight ahead position.
(3) Select the Tour mode by the ECS switch.
(4) Enter a simulated vehicle speed of 100 km/h (62 mph) from the scan tool.
(5) Using the scan tool, check the indications of service data items No. 61 through 64.

Scan tool indication: SOFT

(6) Turn the steering wheel clockwise or counterclockwise from the straight ahead position.
(7) Using the scan tool, check that the indications of service data items No. 61 through 64 change over.

Steering turning speed	Scan tool indication
Approx. 0.3 seconds for 90° rotation	MEDIUM
Approx. 0.2 seconds for 90° rotation	HARD

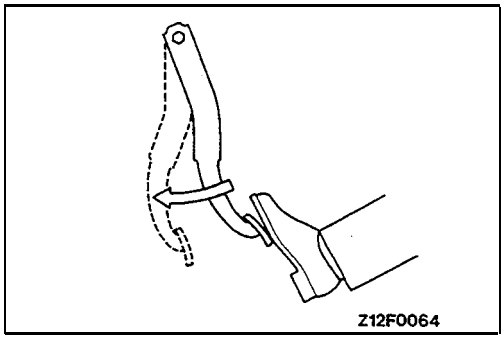
(8) Check that the original damping force indication (SOFT) is restored a second later.

5-2. Anti-Dive Control Function Check

(1) Select the Tour mode by the ECS switch.
(2) Enter a simulated vehicle speed of 100 km/h (62 mph) from the scan tool.
(3) Using the scan tool, check the indications of service data items No. 61 through 64.

Scan tool indication: SOFT

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(4) Depress the brake pedal and simultaneously change the entered simulated vehicle speed by the scan tool. (Change the speed in 0.4 seconds after depressing the brake pedal.)
(5) Using the scan tool, check that the indications of service data items No. 61 through 64 change over.

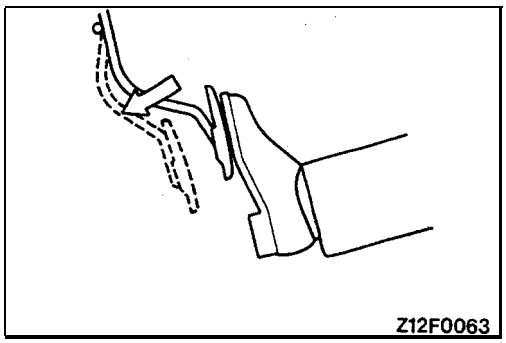
Changing entered simulated vehicle speed	Scan tool indication
100 km/h (62 mph) to 80 km/h (50 mph)	HARD

(6) Check that the original damping force indication (SOFT) is restored a second later.

5-3. Anti-Squat Control Function Check

(1) Select the Tour mode by the ECS switch.
(2) Enter a simulated vehicle speed of 30 km/h (19 mph) from the scan tool.
(3) Using the scan tool, check the indications of service data items No. 61 through 64.

Scan tool indication: SOFT



(4) Check that when the accelerator pedal is operated, the indications of service data items No. 61 through 64 on the scan tool change as shown in the following table.
(5) With the simulated vehicle speed at 60 km/h (37 mph) and 90 km/h (56 mph), similarly operate the accelerator pedal and check that the scan tool indications change over.

Entered simulated vehicle speed	Accelerator operating condition	
km/h (mph)	Quickly depress	A second later with pedal deoressed
30 (19)	HARD	MEDIUM
60 (37)	MEDIUM	MEDIUM
90 (56)	SOFT	MEDIUM

(6) Check that when the accelerator pedal is released, the original damping force (SOFT) is restored in less than a second.

5-4. High Speed Sensitive Control Function Check

(1) Select the Tour mode by the ECS switch.
(2) Check that when the entered simulated vehicle speed is changed by the scan tool, the indications of service data items No. 61 through 64 change.
(If the simulated vehicle speed is continuously changed by the fixed function keys of the scan tool, however, the indications of service data items No. 61 through 64 do not change during the period the fixed function key is pressed.)

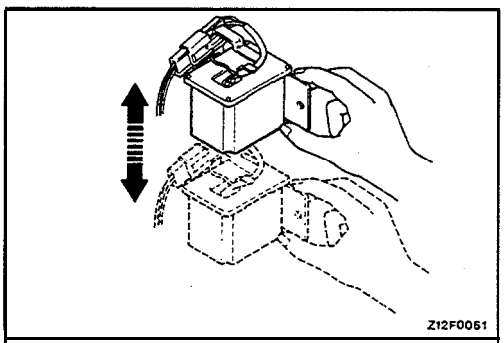
Changing entered simulated vehicle speed	Scan tool indication
Acceleration 129 km/h (80 mph) to 130 km/h (81 mph)	SOFT → MEDIUM
Deceleration 120 km/h (75 mph) to 119 km/h (74 mph)	MEDIUM → SOFT

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5-5. Pitching and Bouncing Control Function Check

(1) Select the Tour mode by the ECS switch.
(2) Using the scan tool, check the indications of service data items No. 61 through 64.

Scan tool indication: SOFT


Z12F0061

(3) Remove the G sensor, slowly shake it up and down through a space of about 5 cm (1.9 in.) with the connector connected, and check that the indications of service data items No. 61 through 64 change.

G sensor status	Scan tool indication
Shake up and down at a speed of a round trip in a second.	HARD

(4) Check that when the G sensor is held stationary, the original damping force indication (SOFT) is restored.

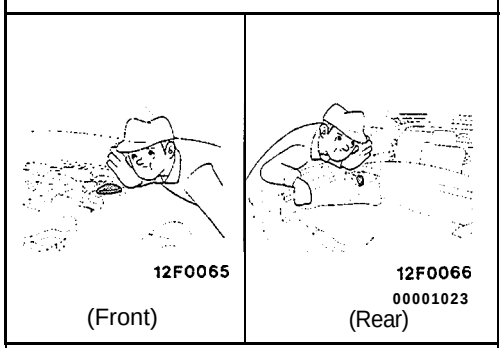
6. ACTUATOR OPERATION CHECK

6-1. Actuator Operating Sound Check

(1) Set the ignition switch to ON.
(2) Bring your ear near the top of the shock absorber.

NOTE
In the case of the rear shock absorbers, remove the trim cover at the top of the shock absorber before bringing your ear near the shock absorber.

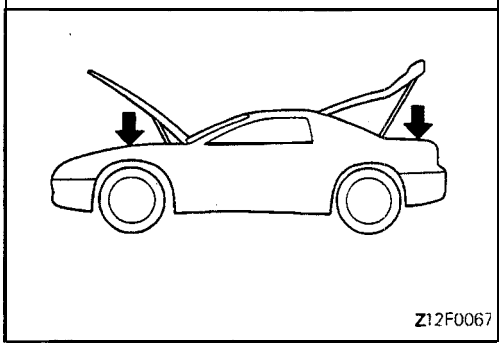
(3) Check that the operating sound of the actuator in the shock absorber can be heard each time the control modes are changed by pressing the ECS switch.

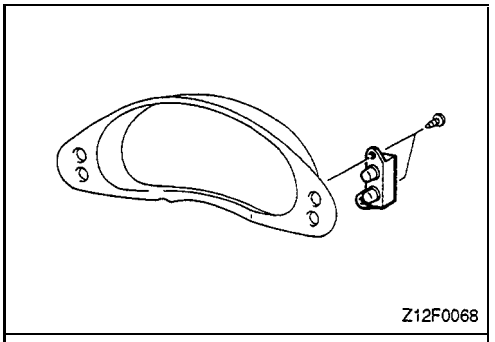

12F0065
(Front)

12F0066
00001023
(Rear)

6-2. Damping Force Check

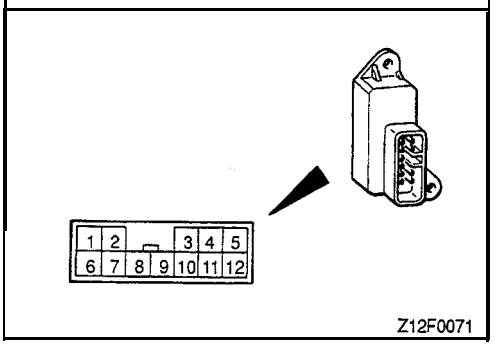
(1) Set the ignition switch to ON.
(ECS indicator Tour ON, damping force SOFT)
(2) Check the damping force SOFT state by shaking the top mounting points of the front shock absorbers or the top of the rear end panels of the rear shock absorbers up and down.
(3) Press the ECS switch to change the control mode to sport.
(ECS indicator Sport ON, damping force HARD).
(4) Shake the vehicle up and down to check that the damping force is harder than in the SOFT state.


Z12F0067


Z12F0068

ECS SWITCH

To mount or remove the ECS switch, refer to GROUP 54 – Meters and Gauges. Remove the meter bezel before mounting or removing the ECS switch.

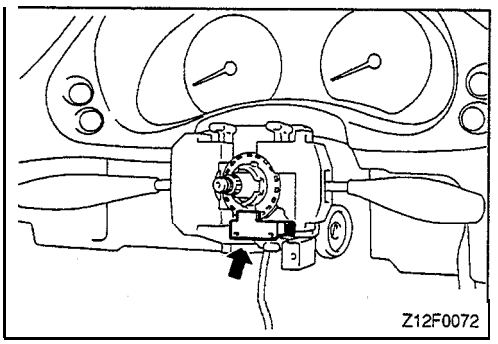


Z12F0071

INSPECTION

Operate the switch to check for continuity between the individual terminals.

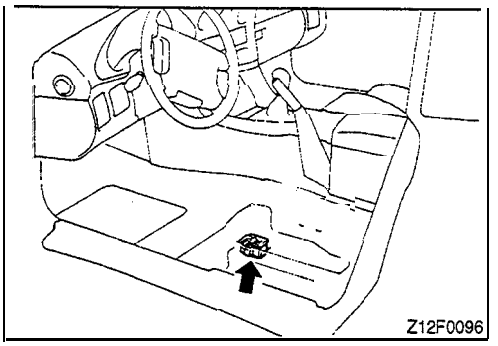
Switch position		Terminal No.			
		3	4	10	11
ECS switch	ON	0——	——0	0——	——0
	OFF	0——	——0		


Z12F0072

STEERING ANGULAR VELOCITY SENSOR

To mount or remove the steering angular velocity sensor, refer to GROUP 54 – Column Switch. Remove the Steering wheel and clock spring before mounting or removing the sensor.

CAUTION: SRS
Before removal of air bag module, refer to GROUP 52B – Service Precautions and Air Bag Module and Clock Spring.


Z12F0096

G SENSOR

To mount or remove the G sensor, refer to GROUP 52A – Front Seat. Remove the front seat (L.H.) before removing or mounting the sensor.

VEHICLE SPEED SENSOR

To mount or remove the vehicle speed sensor, refer to GROUP 54 – Meters and Gauges.

INSPECTION

Refer to GROUP 54 – Meters and Gauges.

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THROTTLE POSITION SENSOR

INSPECTION AND ADJUSTMENT

Refer to GROUP 13A – Fuel System.

STOP LIGHT SWITCH

To remove or mount the stoplight switch, refer to GROUP 35 – Brake Pedal.

INSPECTION

Refer to GROUP 35 – Brake Pedal.

POSITION DETECTION SWITCH and DAMPING FORCE CHANGEOVER ACTUATOR

To remove or mount the position detection switch and damping force changeover actuator, refer to GROUP 33A – Strut Assembly and GROUP 34 – Shock Absorber Assembly.

Caution

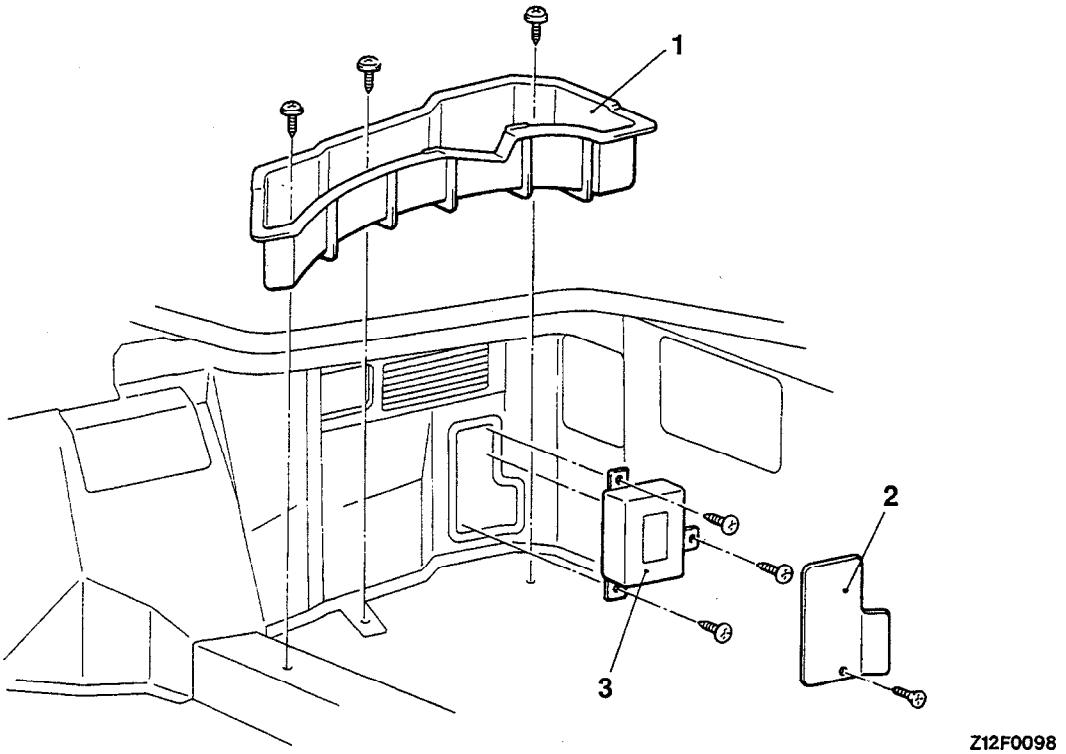
The position detection switch and damping force changeover actuator are built into the shock absorber assemblies of front and rear suspensions. Since they are of the non-disassembly type, remove or mount them in the form of a strut assembly or shock absorber assembly.

ECS INDICATOR LIGHT

To remove or mount the ECS indicator lights, refer to GROUP 54 – Meters and Gauges.

ECS CONTROL UNIT

REMOVAL AND INSTALLATION



Z12F0098

Removal steps

1. Cargo floor box (R.H.)
2. Lid
3. ECS control unit

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REAR SUSPENSION

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REAR SUSPENSION <FWD>

SPECIFICATIONS

GENERAL SPECIFICATIONS

SUSPENSION SYSTEM

Item	Specification
Suspension system	Multi-link

COIL SPRING (Hatchback)

<Up to 1993 models>

Items	Vehicles without ECS	Vehicles with ECS
Wire dia. x O.D. x free length mm (in.)	12 × 95 × 350 (.47 x 3.74 x 13.78)	12.2 × 105 × 350 (.48x 4.13 x 13.78)
Coil spring identification color	Pink x 1	Orange x 1
Spring constant N/mm (lbs./in.)	35 (196)	35 (196)

<From 1994 models>

Items	Vehicles without ECS	Vehicles with ECS
Wire dia. x O.D. x free length mm (in.)	11.3 × 95 × 350 (.44 x 3.74 x 13.78)	11.6 × 105 × 350 (.46x 4.13 x 13.78)
Coil spring identification color	Pink x 2	Green x 1
Spring constant N/mm (lbs./in.)	34 (190)	34 (190)

COIL SPRING (Convertible)

<1995 model>

Items	Specifications
Wire dia. x O.D. x free length mm (in.)	12.0 x 105 x 366.5 (.47 x4.13 x 14.43)
Coil spring identification color	Blue x 1
Spring constant N/mm (lbs./in.)	35 (196)

cl 996 model>

Items	Specifications
Wire dia. x O.D. x free' length mm (in.)	11.7 x 95 x 366.5 (.46 x 3.74 x 14.43)
Coil spring identification color	Blue x 2
Spring constant N/mm (lbs./in.)	34 (190)

SHOCK ABSORBER

Items		Vehicles without ECS	Vehicles with ECS
Type		Hydraulic cylindrical double-acting type	Hydraulic cylindrical double-acting type
Max. length mm (in.)		515 (20.2)	515 (20.2)
Min. length mm (in.)		356 (14.0)	356 (14.0)
Stroke mm (in.)		159 (6.3)	159 (6.3)
Damping force [at 0.3 m/sec. (.9 ft./sec.)] N (lbs.)	Expansion	1,000 (220)	Hard: 1,710 (377) Medium: 1 ,160 (256) Soft: 560 (123)
	Contraction	550 (121)	Hard: 1 ,010 (223) Medium: 880 (194) Soft: 670 (148)

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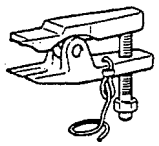
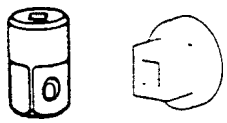
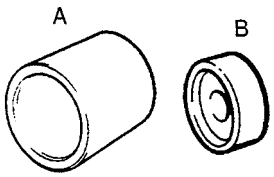
WHEEL BEARING

Item	Specification
Type	Unit ball bearing

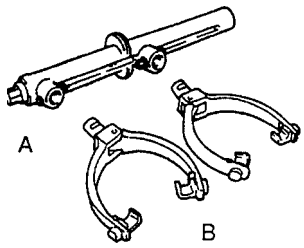
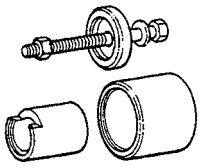
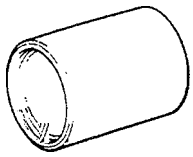
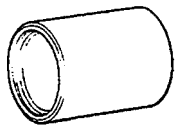
SERVICE SPECIFICATIONS

Items	Standard value	Limit
Toe-in (Left-right difference) mm (in.)	0.5 ± 2.5 (.01± .09)	–
Camber	0" ± 30'	
Stabilizer link ball joint breakaway torque Nm (in.lbs.)	1.7-3.2 (15–28)	–
Ball joint rotation breakaway torque Nm (in.lbs.)	2-9 (17-78)	–
Stabilizer link protrusion mm (in.)	5-7 (.197–.276)	–
Crossmember bushing projection mm (in.)	8.5-9.5 (.33–.37)	–
Wheel bearing end play mm (in.)		0.05 (.002) or less
Rear hub rotary-sliding resistance N (lbs.)		31 (7) or less

SPECIAL TOOLS

Tool	Tool number and name	Supersession	Application
	MB991113 Steering linkage puller	MB991 113-01	Removal of the ball joint
	MB990326 Preload socket	General service tool	Measurement of the ball joint break away torque
	MB990800 Ball joint remover and installer	MB990800-01	Installation of the dust cover
	MB991 071 Bushing remover and installer A: MB991 073 Base B: MB991 072 Arbor		Removal and installation of bushing from/to upper arm, lower arm, and assist link

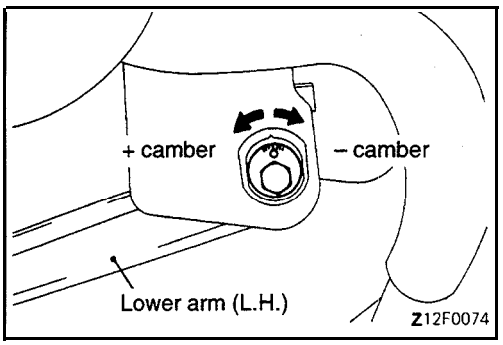
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Tool	Tool number and name	Supersession	Application
	A: MB991 237 Spring compressor body B: MB991 239 Arm set	MIT62220	Compression of the coil spring
	MB991 045 Bushing remover and installer		Removal and installation of the crossmember bushing
	MB990880 Arbor	MB991 005-01	Removal and installation of trailing arm bushing
	MB990847 Base	MB991389-01	

TROUBLESHOOTING

Symptom	Probable cause	Remedy
Squeaks or other abnormal noise	Loose rear suspension installation bolts and nuts	Retighten
	Malfunction of shock absorber	Replace
	Worn bushings	
	Upper arms and/or lower arms and/or assist link deformed or damaged	
	Trailing arms deformed or damaged	
	Crossmember deformed or damaged	
Poor ride	Excessive tire inflation pressure	Adjust the pressure
	Malfunction of shock absorber	Replace
	Weak or broken springs	
	Stabilizer bar and/or stabilizer link deformed or damaged	
Body tilting	Weak or deteriorated bushings	Replace
	Weak or broken springs	
	Upper arms and/or lower arms and/or assist link deformed or damaged	
	Trailing arms deformed or damaged	
	Crossmember deformed or damaged	

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ON-VEHICLE SERVICE

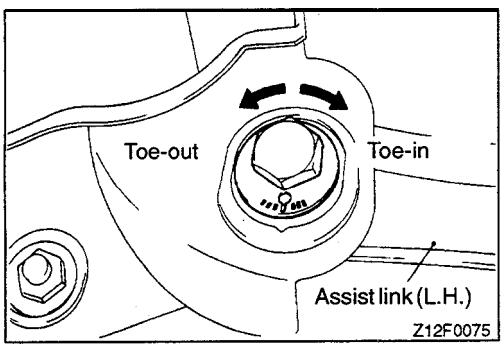
REAR WHEEL ALIGNMENT CHECK

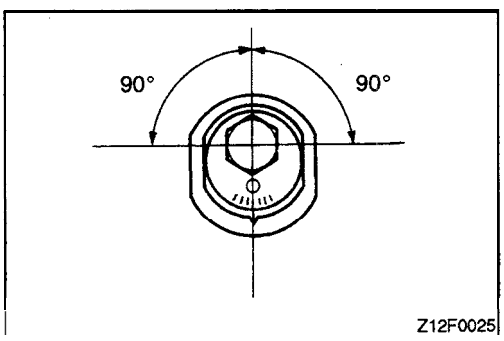
CAMBER

Standard value: 0° ± 30'

To adjust camber, turn the lower arm mounting bolt (crossmember side).

NOTE
(1) Make the adjustment with the assist link mounting bolt (crossmember side) loosened.
(2) The difference between the right and left wheels should be 30' or less.
(3) Left wheel: Clockwise ((–) camber)
Right wheel: Clockwise ((+) camber)
One graduation changes camber by about 15'.





TOE-IN

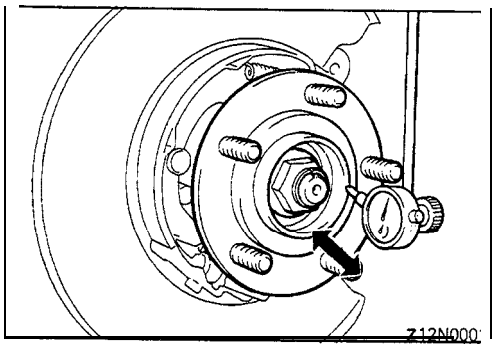
Standard value: 0.5 ± 2.5 mm (.01 ± .09 in.)

To adjust toe, turn the assist link mounting bolts (on crossmember side) on both sides the same amount.

NOTE
(1) The difference between right and left wheels should be 3 mm (.12 in.) or less.
(2) Left wheel: Clockwise (toe-in)
Right wheel: Clockwise (toe-out)
One graduation changes toe by about 4.8 mm (.19 in.) <equivalent to toe angle 27' on one side>.

Caution
1. **Adjust the eccentric bolt within 90° from the central position.**
2. **Adjust camber and toe, in that order, and, if camber is adjusted, be sure to adjust toe also.**

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WHEEL BEARING END PLAY CHECK

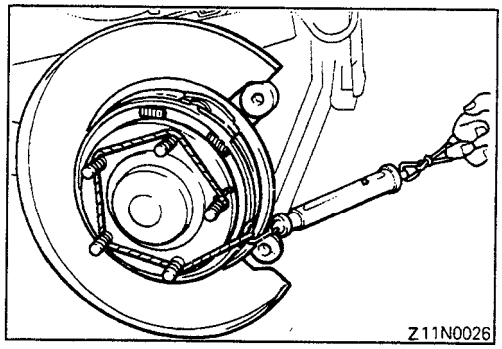
1. Inspect the play of the bearings while the vehicle is jacked up and resting on floor jack.
2. Remove the hub cap and then release the parking brake.
3. Remove the caliper assembly and the brake disc.
4. Check the bearing's end play.
   Place a dial gauge against the hub surface; then move the hub in the axial direction and check whether or not there is end play.

   Limit: 0.05 mm (.002 in.) or less

   NOTE
   If the limit value is exceeded, the lock nut should be tightened to the specified torque and check the end play again.
5. Replace the rear hub bearing unit if an adjustment cannot be made to within the limit.

REAR HUB ROTARY-SLIDING RESISTANCE CHECK

1. inspect the play of the bearings while the vehicle is jacked up and resting on floor jack.
2. Release the parking brake.
3. Remove the caliper assembly and the brake disc.



4. After turning the hub a few times to seat the bearing, attach a spring balance to the hub bolt, and, pulling at a 90" angle from the hub bolt, measure to determine whether or not the rotary-sliding resistance of the rear hub is the limit value.

   Limit: 31 N (7 lbs.) or less

   NOTE
   If the limit value is exceeded, the lock nut should be tightened to the specified torque and check the end play again.
5. Replace the rear hub unit bearing if an adjustment cannot be made to within the limit.

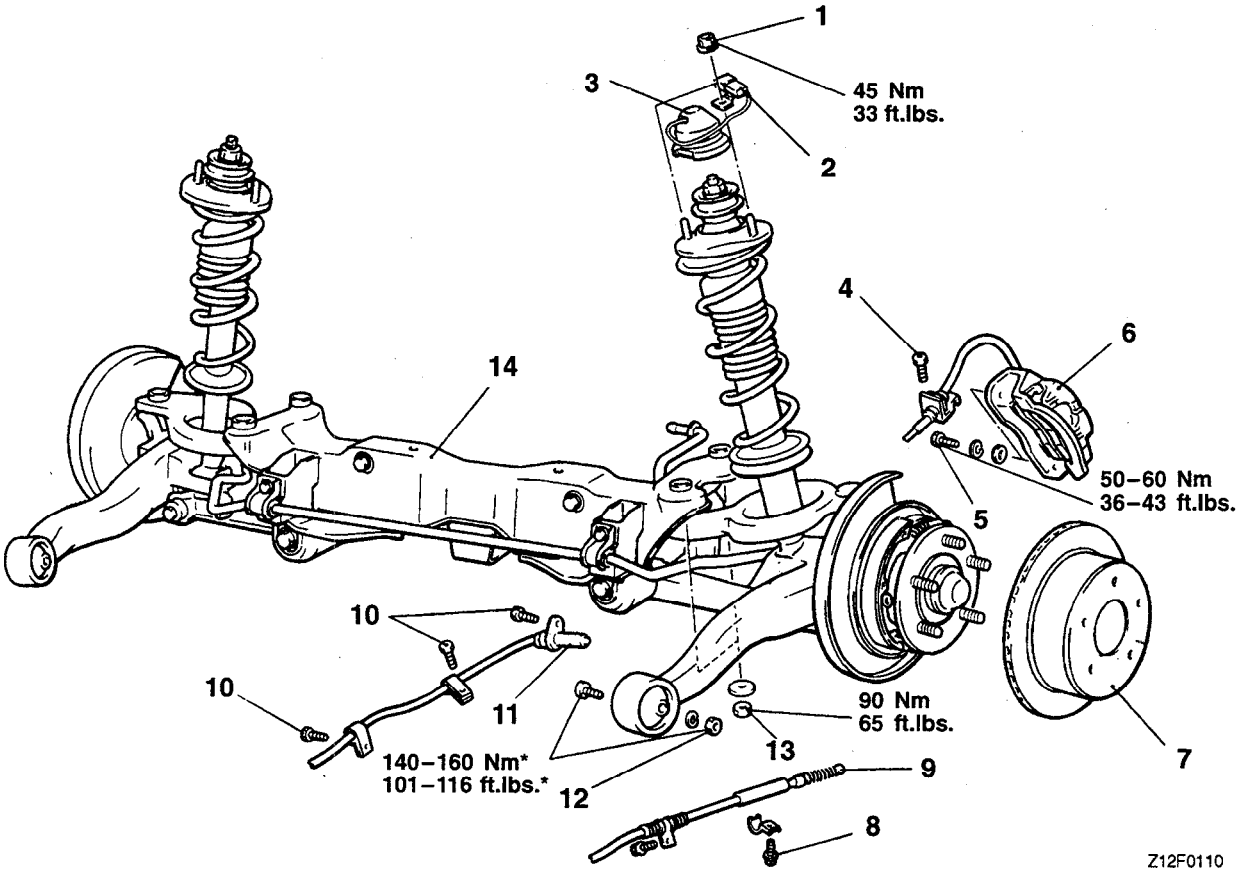
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REAR SUSPENSION ASSEMBLY

REMOVAL AND INSTALLATION

Pre-removal Operation
- Absorber Lid Removal from Rear Side Trim (Refer to GROUP 52A – Trims.)
- Main Muffler Removal (Refer to GROUP 15 – Exhaust Pipe and Main Muffler.)

Post-installation Operation
- Main Muffler Installation (Refer to GROUP 15 – Exhaust Pipe and Main Muffler.)
- Wheel Alignment Check (Refer to P.34-5.)
- Parking Brake Lever Stroke Check (Refer to GROUP 36 – On-vehicle Service.)
- Absorber Lid to Rear Side Trim Installation (Refer to GROUP 52A – Trims.)



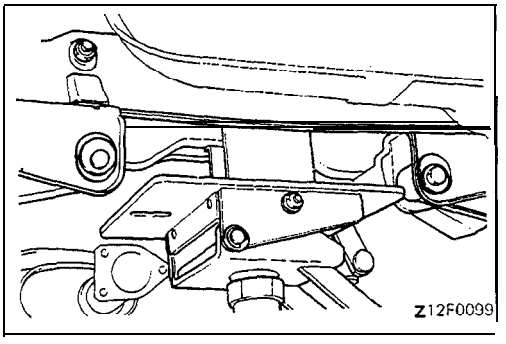
Removal steps

1. Shock absorber mounting nuts (upper)
2. ECS connector <ECS>
3. Cap
4. Brake tube clamp bolt
5. Brake caliper mounting bolt
6. Brake caliper assembly
7. Brake disc
8. Parking brake cable clamp bolt
9. Parking brake cable end (Refer to GROUP 36 – Parking Brake.)
10. Rear speed sensor clamp bolt <ABS>
11. ABS speed sensor <ABS>
12. Trailing arm mounting bolt and nut
13. Crossmember mounting nut
14. Rear suspension assembly

◀A▶ ◀A▶

NOTE
*: indicates parts which should be temporarily tightened, and then fully tightened with the vehicle on the ground in the unladen condition.

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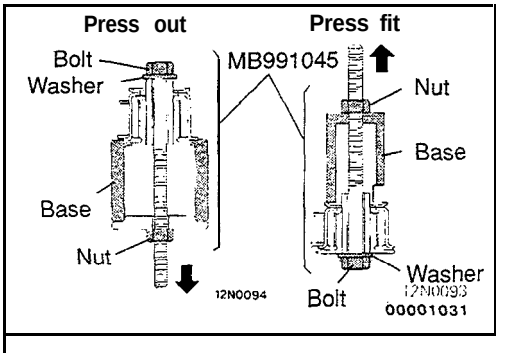
REMOVAL SERVICE POINT

◀A▶ CROSSMEMBER MOUNTING NUT / REAR SUSPENSION ASSEMBLY REMOVAL

Support the crossmember with a transmission jack, then remove the crossmember mounting nut and rear suspension assembly.

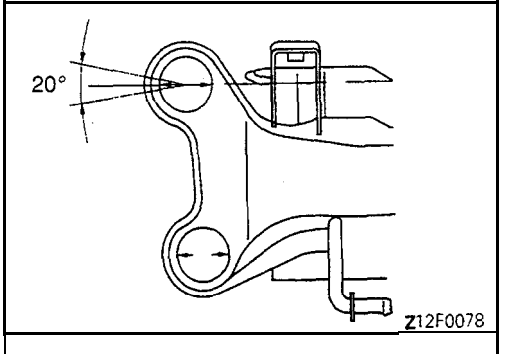
INSPECTION

- Check the crossmember for cracks or deformation.
- Check the bushings for cracks or deterioration.

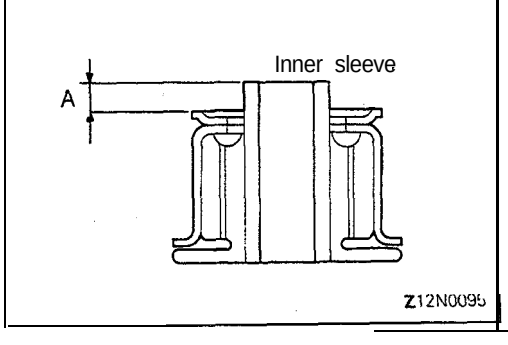


CROSSMEMBER BUSHING REPLACEMENT

(1) Using the special tool, remove and press-fit the bushing.



(2) When press-fitting the bushing, apply soapsuds to it and position the arrows as shown.



(3) Make sure that the protrusion (dimension A) of the inner sleeve is up to specification.

Standard value (A) : 8.5–9.5 mm (.33–.37 in.)

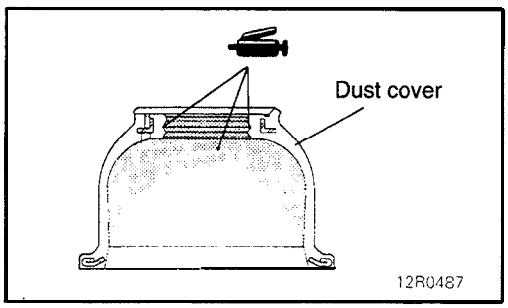
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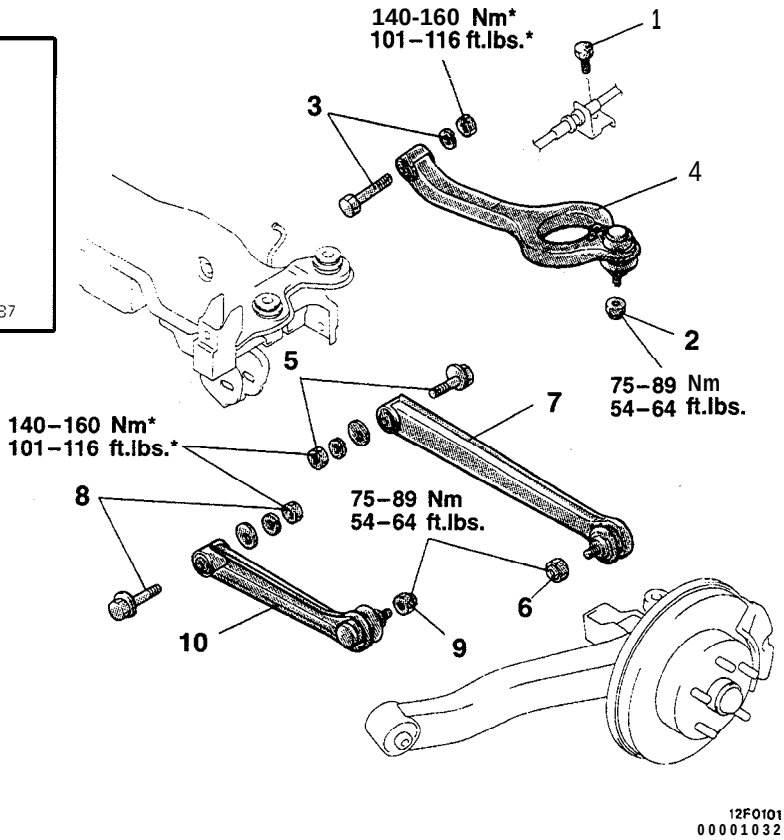
UPPER ARM, LOWER ARM AND ASSIST LINK

REMOVAL AND INSTALLATION

Pre-removal Operation
- Shock Absorber Removal (Refer to P.34-13.)

Post-installation Operation
- Wheel Alignment Check (Refer to P.34-5.)
- Shock Absorber Installation (Refer to P.34-13.)





Upper arm removal steps

1. Brake tube clamp bolt
◀A▶ 2. Self-locking nut
3. Upper arm mounting bolt and nut
4. Upper arm

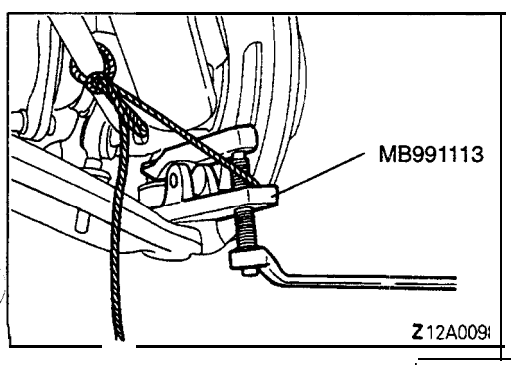
Lower arm removal steps

5. Lower arm mounting bolt and nut
◀A▶ 6. Self-locking nut
7. Lower arm

Assist link removal steps

8. Assist link mounting bolt and nut
◀A▶ 9. Self-locking nut
10. Assist link

NOTE
* Indicates parts which should be temporarily tightened, and then fully tightened with the vehicle on the ground in the unladen condition.



REMOVAL SERVICE POINT

◀A▶ SELF-LOCKING NUT REMOVAL

Using the special tool, disconnect the knuckle from the upper arm, lower arm, and assist link.

Caution

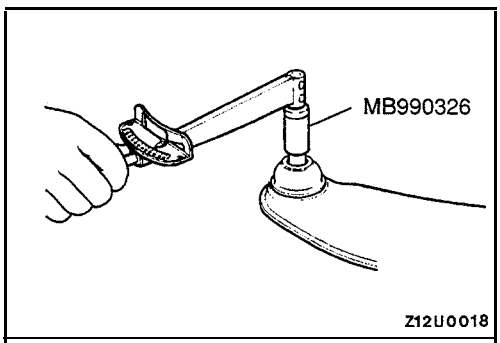
1. Be sure to tie the cord of the special tool to a nearby part.

2. Loosen the nut but do not remove it.

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INSPECTION

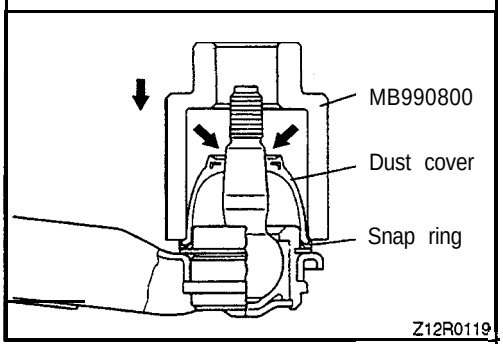
- Check the bushing for wear and deterioration.
- Check the upper, lower arm or assist link for bend or breakage.
- Check the ball joint dust cover for cracks.
- Check all bolts for condition and straightness.



BALL JOINT BREAKAWAY TORQUE CHECKING

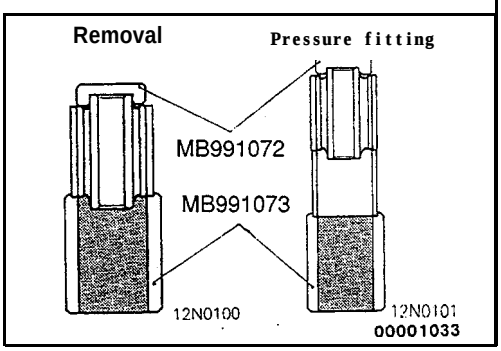
Using the special tool, measure the ball joint breakaway torque.

Standard value: 2-9 Nm (17-78 in.lbs.)



BALL JOINT DUST COVER REPLACEMENT

(1) Remove the dust cover.
(2) Apply multipurpose grease to the lip and inside of the dust cover.
(3) Drive in the dust cover with special tool until it is fully seated.



LOWER ARM, UPPER ARM, ASSIST LINK BUSHING REPLACEMENT

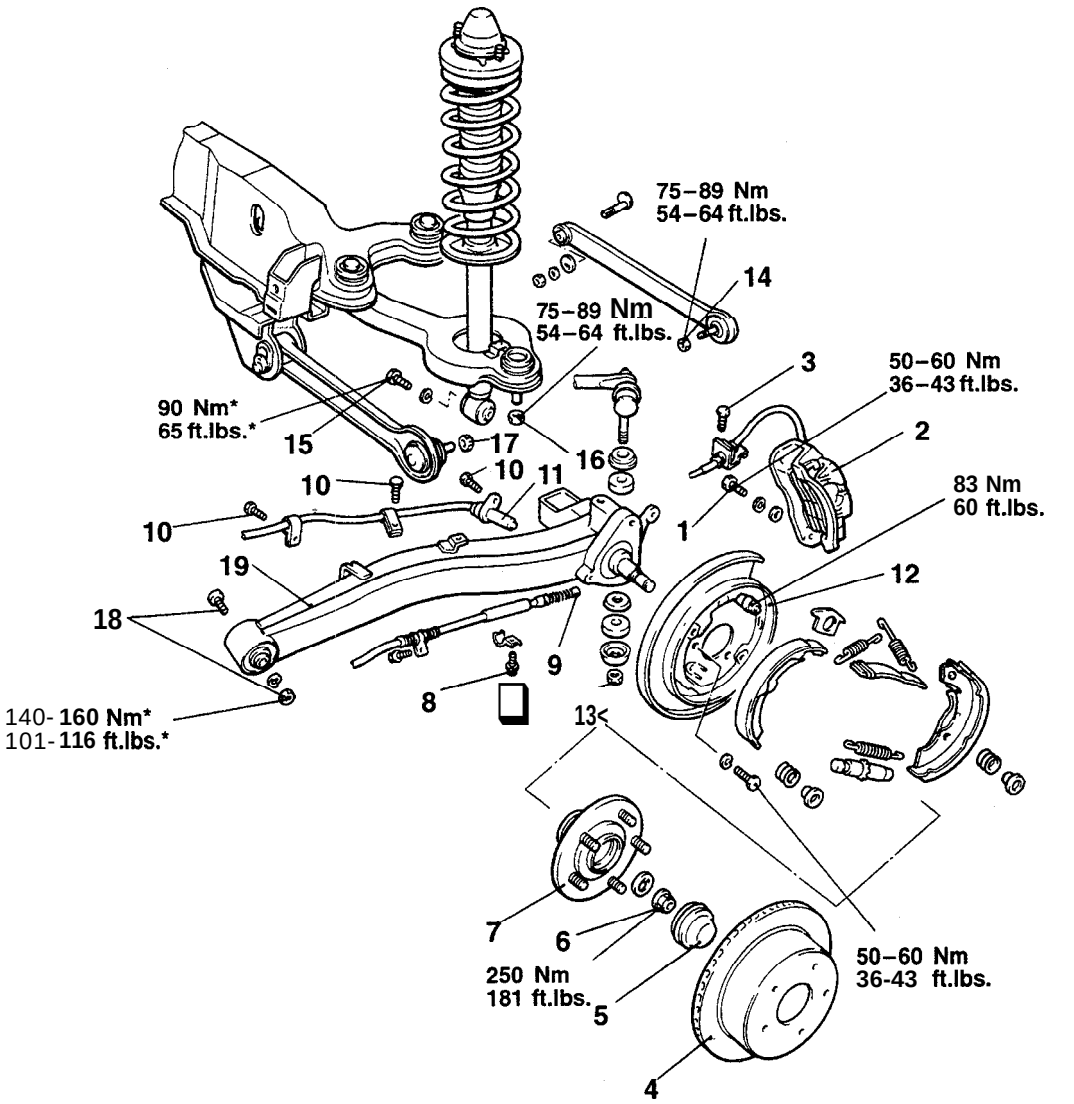
Use the special tool to remove and press-fit the bushing.

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TRAILING ARM

REMOVAL AND INSTALLATION

Post-installation Operation
- Wheel Alignment Check (Refer to P.34-5.)
- Parking Brake Lever Stroke Check (Refer to GROUP 36 – On-vehicle Service.)
- Rear Brake Disc Run-out Check (Refer to GROUP 35 – On-vehicle Service.)



Removal steps

1. Brake caliper mounting bolt
2. Brake caliper
3. Brake tube clamp bolt
4. Rear brake disc
5. Hub cap
6. Wheel bearing nut
◀A▶ 7. Rear hub assembly
8. Parking brake cable clamp bolt
9. Parking brake cable end (Refer to GROUP 36 – Parking Brake.)
10. Rear speed sensor clamp bolt <ABS>
11. ABS speed sensor <ABS>
12. Backing plate
▶A◀ 13. Stabilizer link mounting nut
◀B▶ 14. Self-locking nut
15. Shock absorber mounting bolt (upper)
◀B▶ 16. Self-locking nut
◀B▶ 17. Self-locking nut
18. Trailing arm mounting bolt and nut
19. Trailing arm assembly

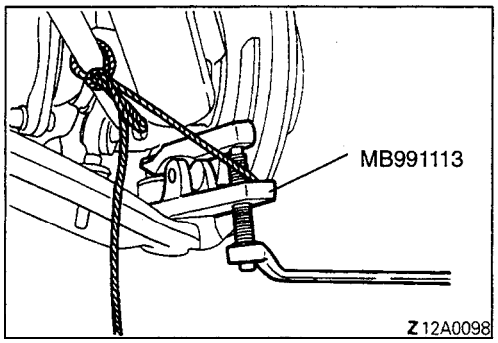
NOTE
*: Indicates parts which should be temporarily tightened, and then fully tightened with the vehicle on the ground in the unladen condition.

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REMOVAL SERVICE POINTS

◀A▶ REAR HUB ASSEMBLY REMOVAL

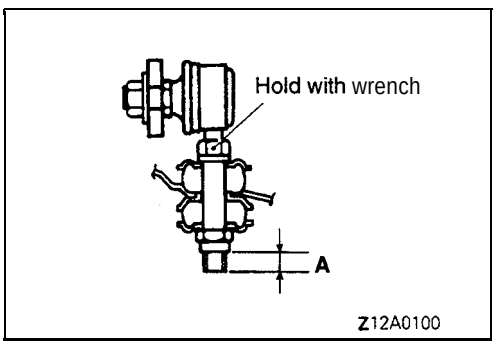
Caution
Replace the rear hub assembly with a new one if the bearing inner race is left on the spindle when removing the rear hub assembly.
If the removed rear hub assembly is reinstalled with the inner race attached on the spindle, it can be caused that the oil seal lip is pushed in the reverse direction, resulting in oil leaks or loose mounting.



◀B▶ SELF-LOCKING NUT REMOVAL

Using the special tool, remove the knuckle from the lower arm, upper arm, and assist link.

Caution
1. **Be sure to tie the cord of the special tool to a nearby part.**
2. **Loosen the nut but do not remove it.**



INSTALLATION SERVICE POINT

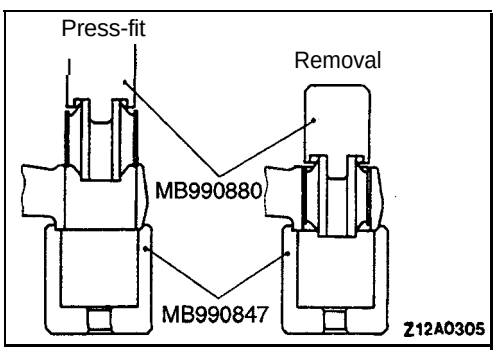
▶A◀ STABILIZER LINK MOUNTING NUT INSTALLATION

Holding the stabilizer link with a wrench, tighten the self-locking nut so that the protrusion of the stabilizer link (dimension A indicated in illustration) is within the standard value.

Standard value (A) : 5–7 mm (.197–.276 in.)

INSPECTION

- Check trailing arm for cracks and deformation.
- Check bushing for cracks, deterioration and wear.



TRAILING ARM BUSHING REPLACEMENT

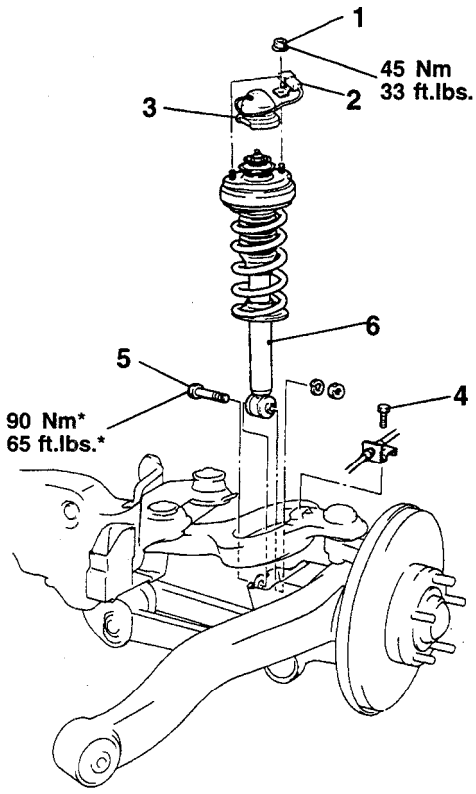
Use the special tool to remove and press-fit the bushing.

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SHOCK ABSORBER ASSEMBLY

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Rear Side Trim Absorber Lid Removal and Installation (Refer to GROUP 52A – Trims.)



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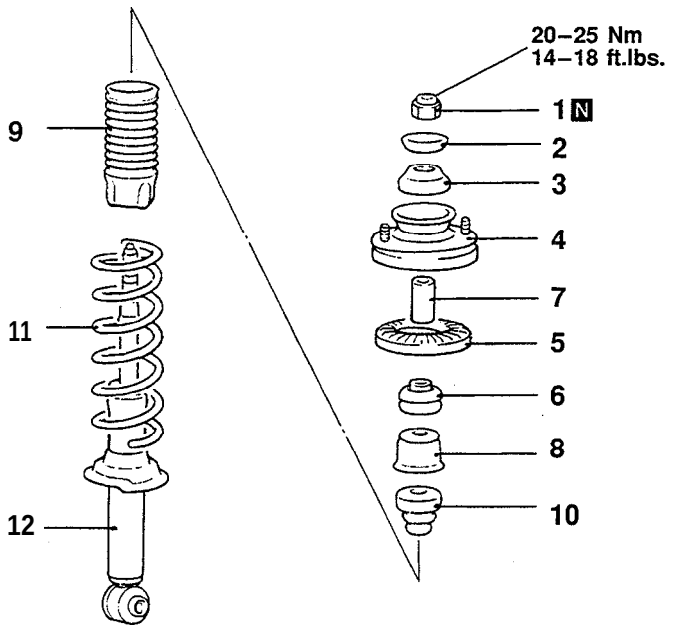
Removal steps

1. Shock absorber upper mounting nut
2. ECS connector <ECS>
3. Cap
4. Brake tube clamp bolt
5. Shock absorber lower mounting bolt
6. Shock absorber

NOTE
*: Indicates parts which should be temporarily tightened, and then fully tightened with the vehicle on the ground in the unladen condition.

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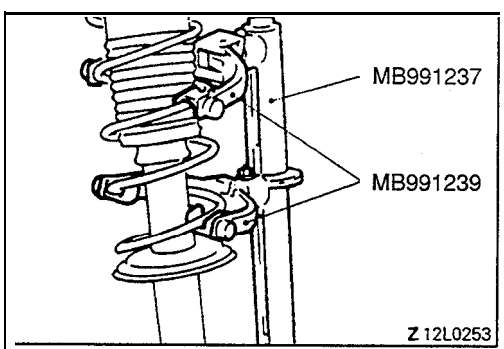
DISASSEMBLY AND REASSEMBLY



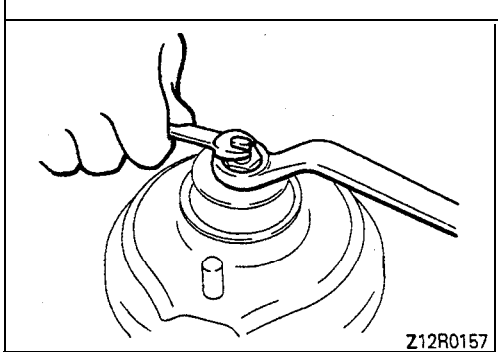
Z12A0328

Disassembly steps

◀A▶ ▶B◀ 1. Piston rod tightening nut
2. Washer
3. Upper bushing (A)
▶B◀ 4. Bracket assembly
5. Upper spring pad
6. Upper bushing (B)
7. Collar
8. Cup assembly
9. Dust cover
10. Bump rubber
▶A◀ 11. Coil spring
12. Shock absorber



Z12L0253



Z12R0157

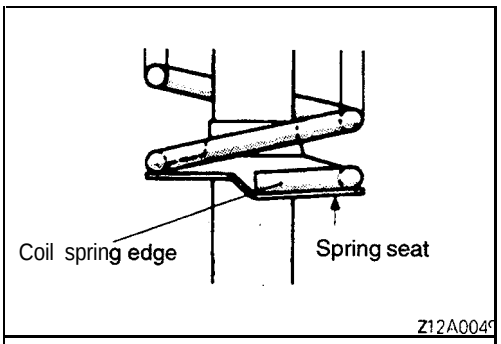
DISASSEMBLY SERVICE POINT

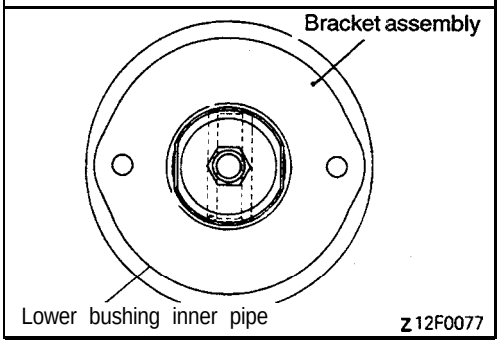
◀A▶ PISTON ROD TIGHTENING NUT REMOVAL

(1) Before removing the piston rod tightening nut, compress the coil spring using the special tool.

(2) While holding the piston rod, remove the piston rod tightening nut.

TSB Revision





REASSEMBLY SERVICE POINTS

▶A◀ COIL SPRING INSTALLATION

(1) Use the special tool (MB991237 and MB991239) to compress the coil spring and insert it in the shock absorber.
(2) Align the edge of the coil spring to the position of the shock absorber spring seat as shown.

▶B◀ BRACKET ASSEMBLY / PISTON ROD TIGHTENING NUT INSTALLATION

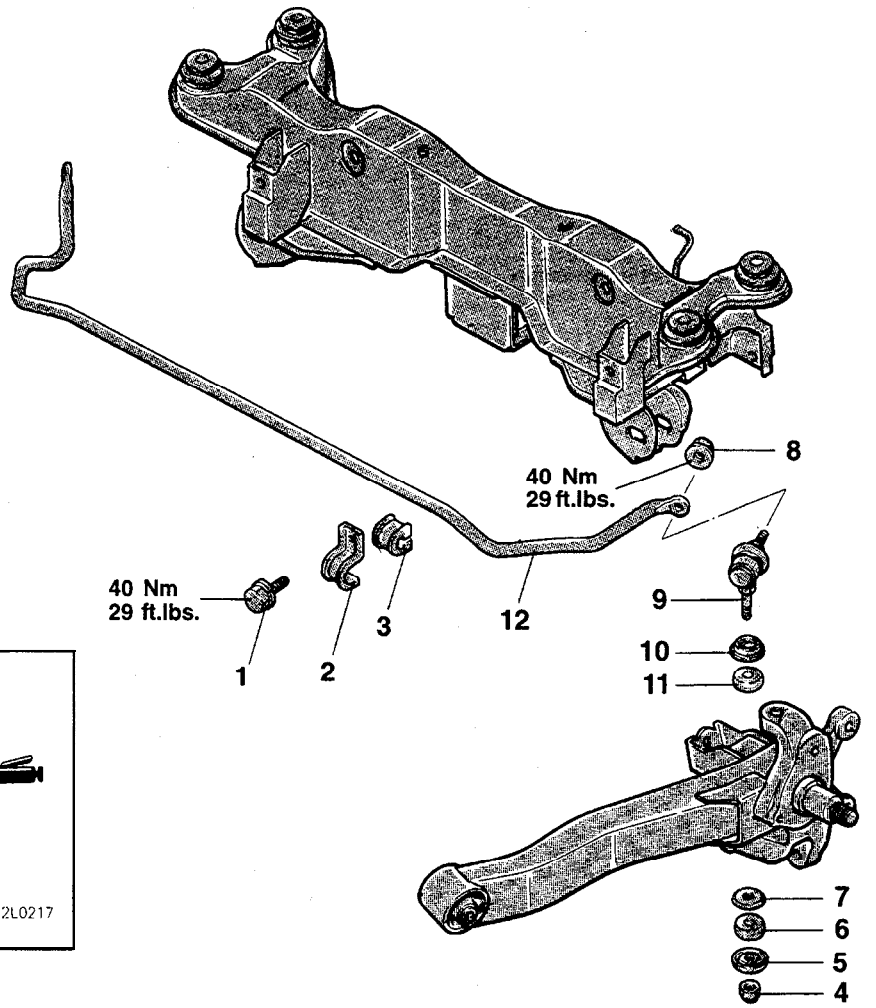
(1) With the position of the bracket assembly as shown in the figure, tighten the tightening nut to the specified torque.
(2) Install the coil spring so that the lower edge fits into the spring seat groove and the upper edge fits into the spring pad groove, then remove the special tool (MB991237 and MB991 239).

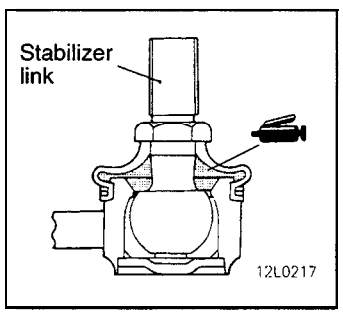
INSPECTION

- Check the rubber parts for damage.
- Check the coil springs for crack, damage or deterioration.

STABILIZER BAR

REMOVAL AND INSTALLATION

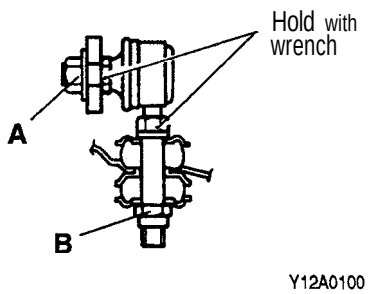




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Removal steps

1. Stabilizer bracket mountina bolt
▶B◀ 2. Stabilizer bar bracket
3. Bushing
▶A◀ 4. Self-locking nut
5. Joint cup (A)
6. Stabilizer rubber
7. Joint cup (B)
▶A◀ 8. Self-locking nut
▶A◀ 9. Stabilizer link
10. Joint cup (A)
11. Stabilizer rubber
12. Stabilizer bar



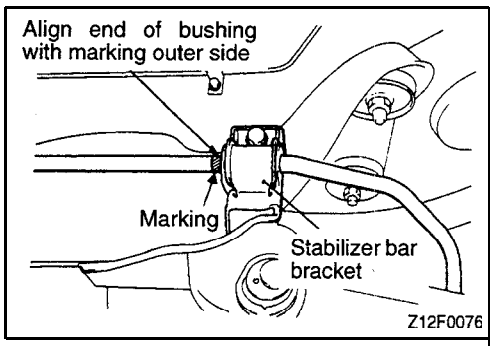
INSTALLATION SERVICE POINTS

▶A◀ STABILIZER LINK / SELF-LOCKING NUT / SELF-LOCKING NUT INSTALLATION

(1) Hold the stabilizer link ball studs with a wrench and install the self-locking nut (A).
(2) Holding the stabilizer link with a wrench, tighten the self-locking nut (B) so that the protrusion of the stabilizer link is within the standard value.

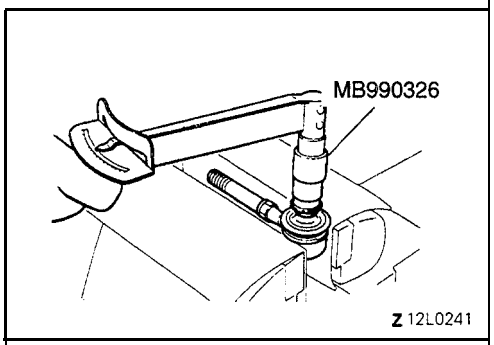
Standard value: 5-7 mm (.197–.276 in.)

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▶B◀ STABILIZER BAR BRACKET INSTALLATION

(1) Align the bushing (L.H.) with the stabilizer bar marking end and temporarily tighten the stabilizer bar bracket (L.H.).
(2) In this condition, mount the stabilizer bar bracket (R.H.) and temporarily tighten it.
(3) Temporarily fix the both ends of the stabilizer bar to the link and tighten the stabilizer bar bracket mounting bolts to specification.



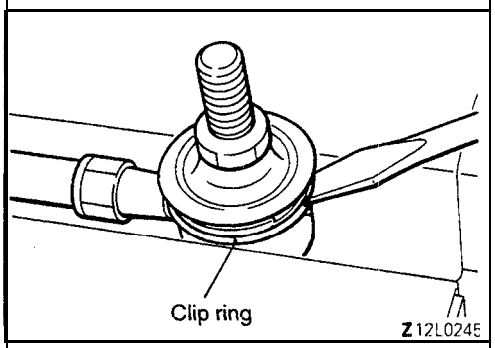
INSPECTION

- Check the bushing for wear and deterioration.
- Check the stabilizer bar for deterioration or damage.
- Check the stabilizer link ball joint dust cover for cracks.
- Check all bolts for condition and straightness.

STABILIZER LINK BALL JOINT BREAKAWAY TORQUE CHECKING

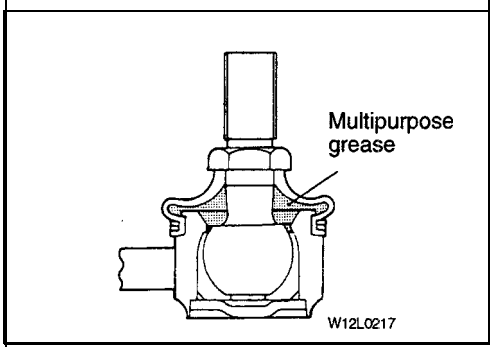
Using the special tool, measure the ball joint breakaway torque.

Standard value: 1.7-3.2 Nm (15-28 in.lbs.)

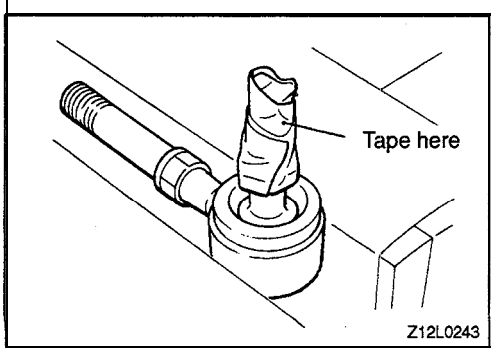


BALL JOINT DUST COVER REPLACEMENT

(1) Remove the clip ring and the dust cover.



(2) Apply multipurpose grease to the lip and inside of the dust cover.

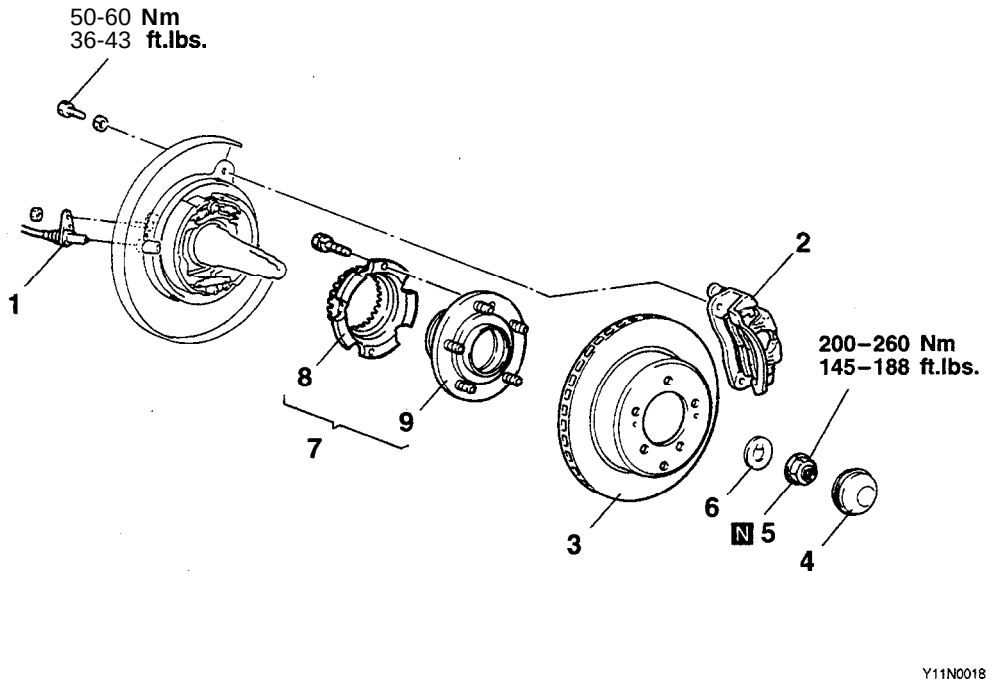


(3) Use vinyl tape to tape the stabilizer link where shown in the illustration, and then install the dust cover to the stabilizer link.
(4) Secure the dust cover by the clip ring.

TSB Revision

REAR AXLE HUB

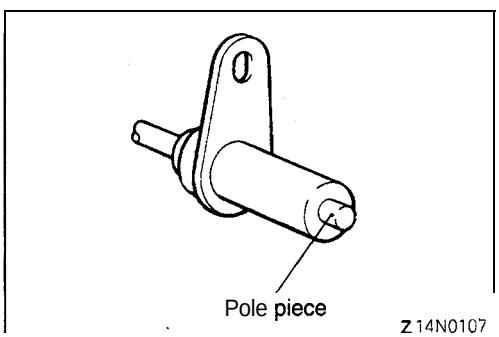
REMOVAL AND INSTALLATION



Removal steps

◀A▶ 1. Rear speed sensor <ABS>
◀B▶ 2. Caliper assembly
3. Brake disc
4. Hub cap
▶A◀ 5. Wheel bearing nut
6. Tongued washer
◀C▶ 7. Rear hub assembly
◀D▶ 8. Rear rotor <ABS>
9. Rear hub unit bearing

Caution
Rear hub unit bearing cannot be disassembled.



REMOVAL SERVICE POINTS

◀A▶ REAR SPEED SENSOR REMOVAL <ABS>

Caution
Be careful when handling the pole piece at the tip of the speed sensor and the toothed edge of the rotor so as not to damage them by striking against other parts.

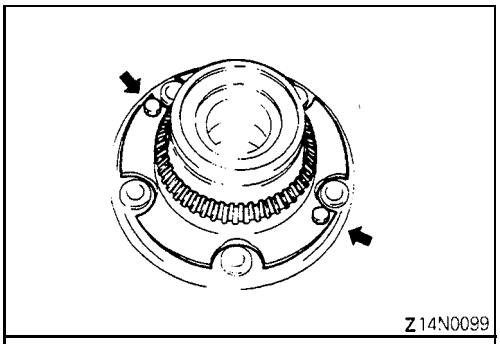
◀B▶ CALIPER ASSEMBLY REMOVAL

Remove the caliper assembly and suspend it with a piece of wire.

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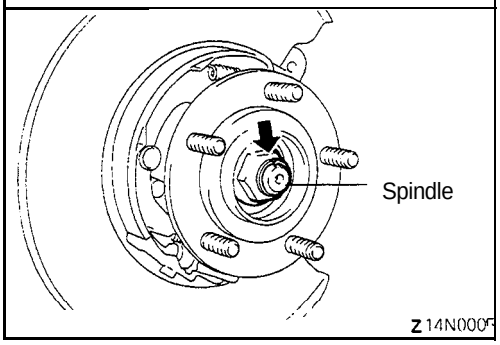
◀C▶ REAR HUB ASSEMBLY REMOVAL

Caution
Replace the rear hub assembly with a new one if the bearing inner race is left on the spindle when removing the rear hub assembly.
If the removed rear hub assembly is reinstalled with the inner race attached on the spindle, it can be caused that the oil seal lip is pushed in the reverse direction, resulting in oil leaks or loose mounting.


Z14N0099

◀D▶ REAR ROTOR REMOVAL <ABS>

Caution
Care must be taken not to scratch or scar the rotor's toothed surface, and not to drop it.
If the rotor's toothed surface **is chipped or the rotor is deformed, it might not be able to accurately sense the wheel rotation speed and the system as a result might not perform normally.**



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INSTALLATION SERVICE POINT

▶A◀ WHEEL BEARING NUT INSTALLATION

After tightening the wheel bearing nut, align with the spindle's indentation and crimp.

REAR SUSPENSION <AWD>

SPECIFICATIONS

GENERAL SPECIFICATIONS

SUSPENSION SYSTEM

Item	Specification
Suspension system	Double wishbone suspension type

COIL SPRING (Hatchback)

<Up to 1993 models>

Items	Specifications
Wire dia. x O.D. x free length mm (in.)	12.2 x 105 x 379.3 (.48x 4.13 x 14.93)
Coil spring identification color	Blue x 2
Spring constant N/mm (lbs./in.)	28.0 (157)

<1994 and 1995 models>

items	Specifications
Wire dia. x O.D. x free length mm (in.)	11.5x 105 x 379.3 (.45 x 4.13 x 14.93)
Coil spring identification color	Light brown x 2
Spring constant N/mm (lbs./in.)	28.0 (157)

cl 996 models>

Items	Specifications
Wire dia. x O.D. x free length mm (in.)	11 .1 x 95 x 372 (.44 x 3.74 x 14.65)
Coil spring identification color	Light blue x 1
Spring constant N/mm (lbs./in.)	28.0 (157)

COIL SPRING (Convertible)

<1 995 model>

Items	Specifications
Wire dia. x O.D. x free length mm (in.)	11.8 x 105 x 395.2 (.46x4.13x 15.56)
Coil spring identification color	Gray x 1
Spring constant N/mm (lbs./in.)	28.0 (157)

cl 996 model>

Items	Specifications
Wire dia. x O.D. x free length mm (in.)	11.5 x 95 x 395.2 (.45 x 3.74 x 15.56)
Coil spring identification color	Gray x 2
Spring constant N/mm (lbs./in.)	28.0 (157)

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SHOCK ABSORBER

<Up to 1995 models>

Items		Specifications
Type		Hydraulic, cylindrical, double-acting type
Max. length mm (in.)		610 (24.0)
Min. length mm (in.)		407 (16.0)
Stroke mm (in.)		203 (8.0)
Damping force [at 0.3 m/sec. (0.9 ft./sec.)] N (lbs.)	Expansion	Hard: 1,710 (377) Medium: 1 ,160 (256) Soft: 560 (123)
	Contraction	Hard: 1 ,010 (223) Medium: 880 (194) Soft: 670 (148)

cl 996 models>

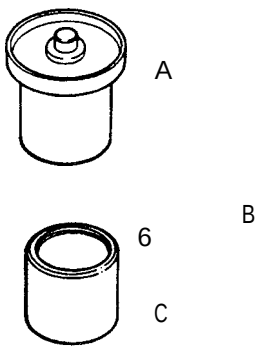
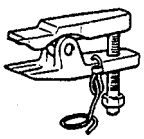
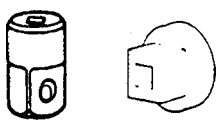
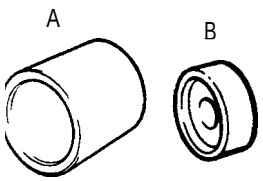
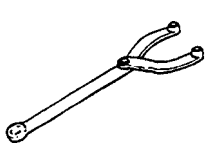
Items		Specifications
Type		Hydraulic, cylindrical, double-acting type
Max. length mm (in.)		610 (24.0)
Min. length mm (in.)		407 (16.0)
Stroke mm (in.)		203 (8.0)
Damping force [at 0.3 m/sec. (0.9 ft./sec.)] N (lbs.)	Expansion	1,400 (309)
	Contraction	500 (110)

SERVICE SPECIFICATIONS

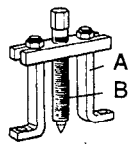
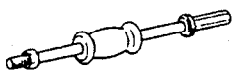
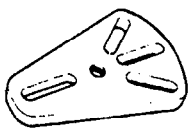
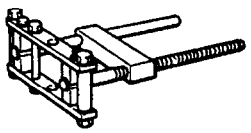
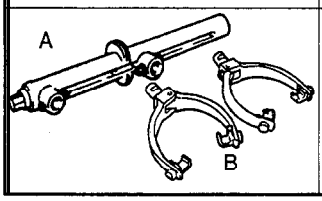
Items		Standard value
Toe-in mm (in.)		0.5 ± 2.5 (.01± .09)
Camber		–0°10' ± 30
Protruding length of stabilizer bar mounting bolt mm (in.)		5-7 (.197–.276)
Lower arm ball joint breakaway torque Nm (in.lbs.)		2.0-9.0 (17-78)
Stabilizer link ball joint break away torque Nm (in.lbs.)		1.7-3.2 (15-28)
Crossmember support bushing projection mm (in.)	Upper part	15.5 (.59)
	Lower part	2.1-3.7 (.08–.15)
Differential support bushing projection mm (in.)		6.7-7.3 (.26–.29)

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SPECIAL TOOLS

Tool	Tool numberand name	Supersession	Application
	A: MB991 387 Arbor B: MB991 388 Base C: MB990890 Base		Removal and installation of the crossmember bushing
	MB990958 Arbor	MB990958-01	Removal and installation of crossmember bushings
	MB991113 Steering linkage puller	MB991113-01	Disconnection of the ball joint
	MB990326 Preload socket	General service tool	Measurement of the ball joint break away torque
	MB990800 Ball joint remover and installer		Installation of the dust cover
	MB991 071 Bushing remover and installer A: MB991 073 Base B: MB991 072 Arbor		Removal and installation of bushing from/to upper arm, lower arm, and assist link
	MB990767 End yoke holder	MB990767-01	To stop axle shaft turning

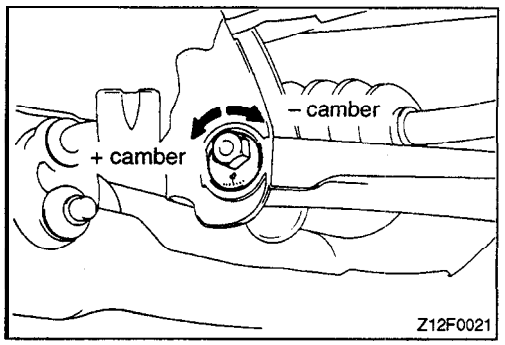
TSB Revision

Tool	Tool number and name	Supersession	Application
	MB990241 Axle shaft puller A: MB990242 Puller bar B: MB990244 Puller shaft	General service tool	For removal of the axle shaft
	MB990211 Sliding hammer	MB990211-01	
	MB991354 Puller body	MB990241-01	
	MB991254 Rod remover and installer		Replacement of trailing arm connecting rod
	A: MB991237 Spring compressor body B: MB991239 Arm set	MIT62220	Compression of the coil spring

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TROUBLESHOOTING

Symptom	Probable cause	Remedy
Squeaks or other abnormal noise	Loose rear suspension installation bolts and nuts	Retighten
	Malfunction of shock absorber	Replace
	Worn bushings	
	Upper arms and/or lower arms deformed or damaged	
	Trailing arms deformed or damaged	
	Crossmember deformed or damaged	
Poor ride	Excessive tire inflation pressure	Adjust the pressure
	Malfunction of shock absorber	Replace
	Weak or broken springs	
	Stabilizer bar and/or stabilizer link deformed or damaged	
Body tilting	Weak or deteriorated bushings	Replace
	Weak or broken springs	
	Upper arms and/or lower arms deformed or damaged	
	Trailing arms deformed or damaged	
	Crossmember deformed or damaged	



ON-VEHICLE SERVICE

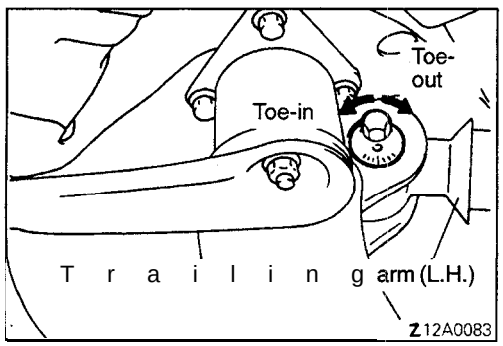
REAR WHEEL ALIGNMENT CHECK

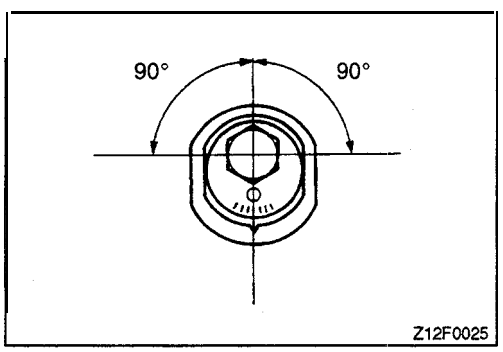
CAMBER

Standard value: –0°10' ± 30'

To adjust camber, turn the lower arm mounting bolt on the crossmember side.

NOTE
Left wheel: Clockwise ((–) camber)
Right wheel: Clockwise ((+) camber)
The difference between the right and left wheels should be 30' or less.
One graduation changes camber by about 12'.





TOE-IN

Standard value: 0.5 ± 2.5 mm (.01 ± .09 in.)

To adjust toe, turn the trailing arm mounting bolts on the crossmember side on both sides the same amount.

NOTE
Left wheel: Clockwise (toe-out)
Right wheel: Clockwise (toe-in)
The difference between right and left wheels should be 3 mm (.12 in.) or less.
One graduation changes toe by about 2 mm (.08 in.).

Caution

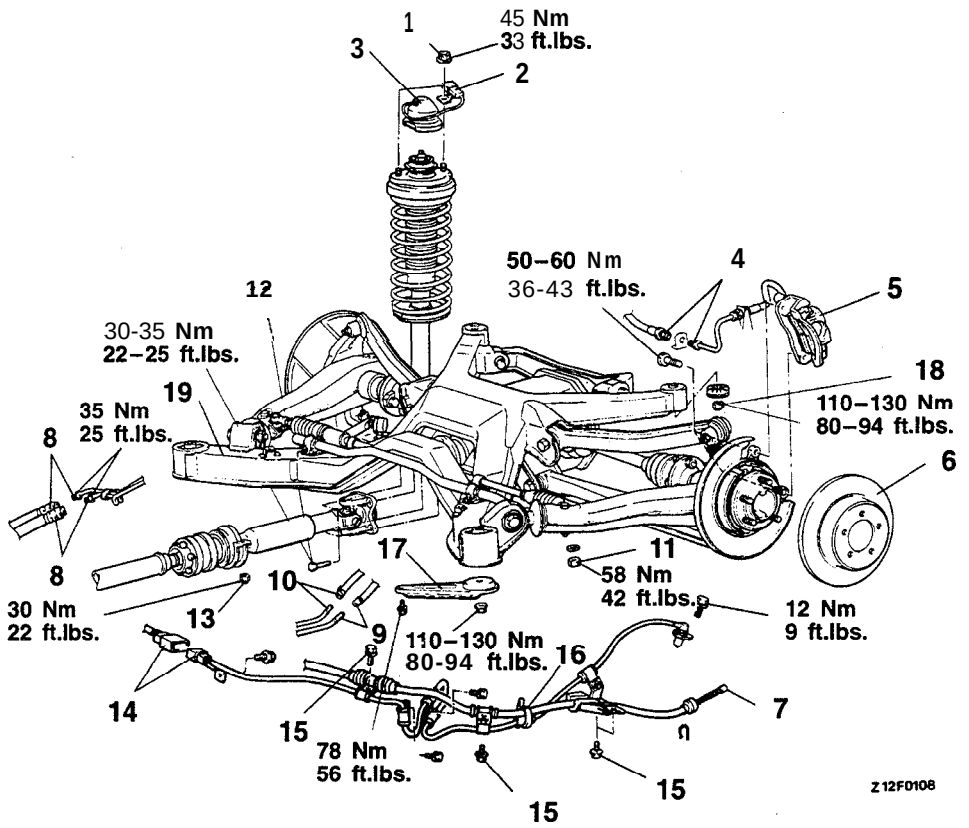
1. **Adjust the eccentric cam bolt within 90° from the central position.**
2. **Adjust camber and toe, in that order, and, if camber is adjusted, be sure to adjust toe also.**
3. **Make the adjustments with the 4WS tie rod end disconnected from the trailing arm.**
4. **On vehicles without 4WS, disconnect the assist links from the trailing arms before adjustment.**

REAR SUSPENSION ASSEMBLY

REMOVAL AND INSTALLATION

Pre-removal Operation
- Rear Side Trim Absorber Lid Removal (Refer to GROUP 52A – Trims.)
- Center Exhaust Pipe and Main Muffler Removal (Refer to GROUP 15 – Exhaust Pipe and Main Muffler.)

Post-installation Operation
- Center Exhaust Pipe and Main Muffler Installation (Refer to GROUP 15 – Exhaust Pipe and Main Muffler.)
- Rear Side Trim Absorber Lid Installation (Refer to GROUP 52A – Trims.)
- Power Steering System Refilling and Bleeding (Refer to GROUP 37A – On-vehicle Service.)
- Wheel Alignment Checking (Refer to P.34-25.)
- 4WS System Bleeding and Operation Inspection (Refer to GROUP 37B – On-vehicle Service.)
- Parking Brake Lever Stroke Checking (Refer to GROUP 36 – On-vehicle Service.)

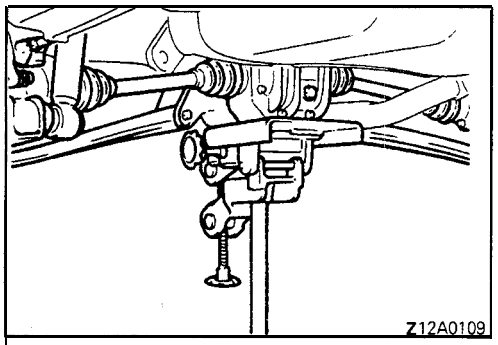


Removal steps

1. Shock absorber mounting nuts (upper)*
2. ECS connector <ECS>*
3. Cap*
4. Brake tube to brake hose connection* (Refer to GROUP 35 – Brake Line.)
5. Brake caliper*
6. Brake disc*
7. Parking brake cable end* (Refer to GROUP 36 – Parking Brake.)
8. Pressure tube assembly to pipe assembly connection <4WS> ◀A▶
9. Feed pipe assembly to suction hose connection <4WS> ◀A▶
10. Return pipe assembly to rubber hose connection <4WS> ◀A▶
11. Power cylinder tie rod coupling nut <4WS>* or assist link coupling nut <except 4WS>*
12. Differential carrier to propeller shaft coupling bolt and nut
13. Center bearing mounting nut
14. Harness connector <ABS>*
15. Parking brake cable and ABS sensor fixing bolt <ABS>*
16. Cable band*
17. Crossmember bracket*
18. Crossmember mounting nut (on differential side)*
19. Rear suspension assembly

NOTE
Parts marked with * are symmetrical.

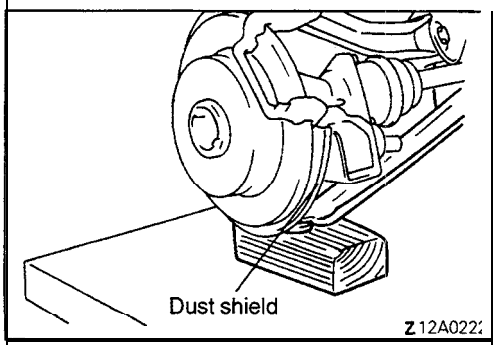
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REMOVAL SERVICE POINTS

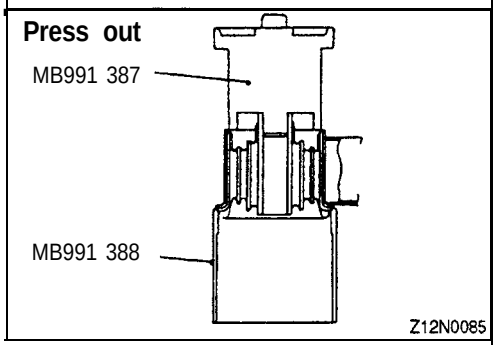
◀A▶ CROSSMEMBER BRACKET / CROSSMEMBER MOUNTING NUT (ON DIFFERENTIAL SIDE) / REAR SUSPENSION ASSEMBLY REMOVAL

(1) Before removing the crossmember bracket, support the differential case with the transmission jack.
(2) Remove the crossmember mounting bolt and nut.



NOTE
Lowering the rear suspension assembly down from the transmission jack requires three persons, as the rear suspension assembly is very heavy. (Assign one person to the differential and one each to the left and right lower arm.)

(3) Apply a wood block to the ball joint of the lower arm to prevent the dust shield from being deformed.

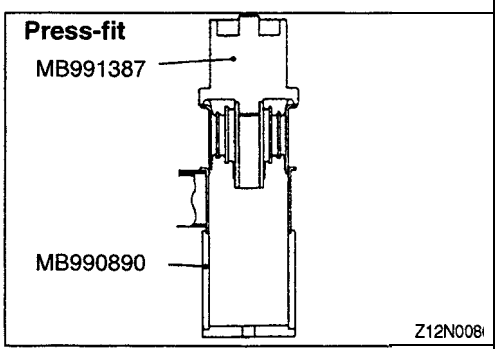


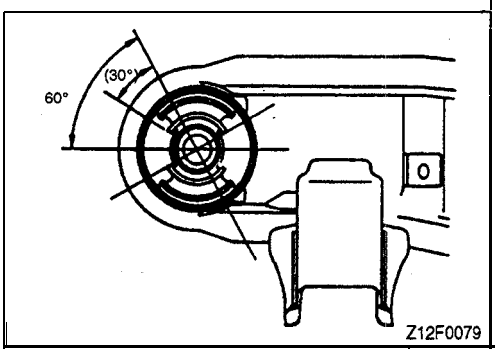
INSPECTION

- Check the crossmember for cracks or deformation.
- Check the bushings for cracks or deterioration.

CROSSMEMBER SUPPORT BUSHING (FRONT) REPLACEMENT

(1) Using the special tool, remove and press-fit the crossmember support bushing.

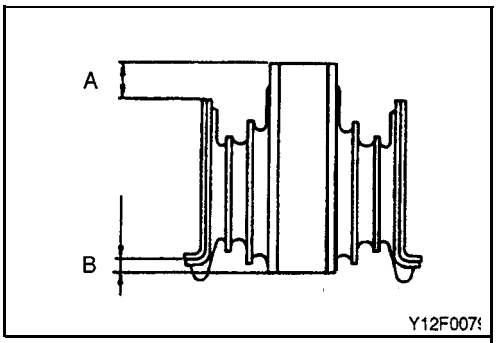




(2) When press-fitting the bushing, make sure that the hollow portions are positioned as shown.

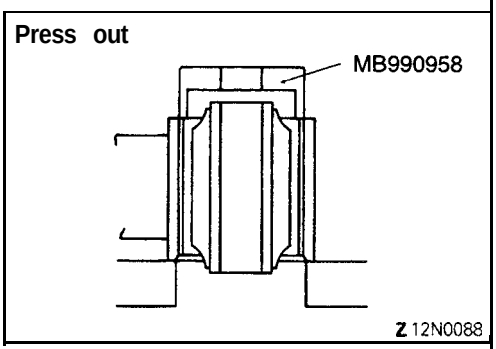
NOTE
Ensure that the shift in rotating direction is within ±5°.

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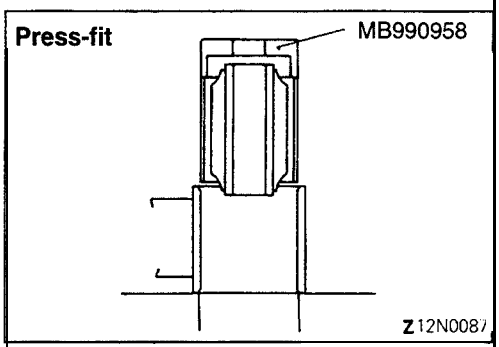
(3) Make sure that the protrusion of the inner sleeve (dimension A and B) are up to specifications.

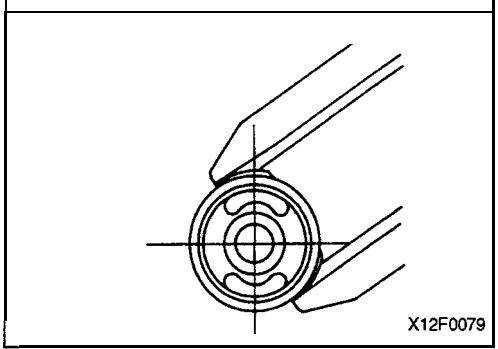
Standard value
Dimension A: 15.5 mm (.59 in.)
Dimension B: 2.1-3.7 mm (.08–.15 in.)



CROSSMEMBER BUSHING (REAR) REPLACEMENT

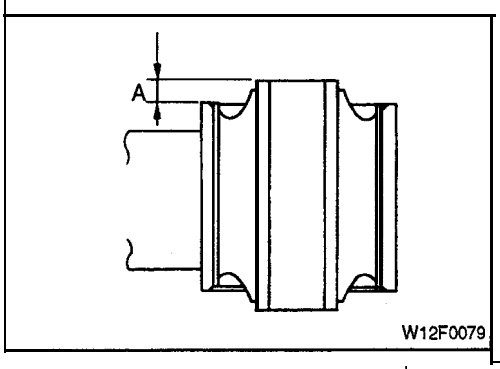
(1) Using the special tool, remove and press-fit the bushing.





(2) When press-fitting, position the bushing as shown.

NOTE
Ensure that the shift in rotating direction is within ±5°.



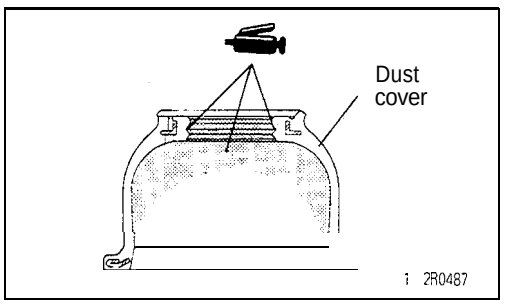
(3) Make sure that the protrusion of the inner sleeve (dimension A) is up to specification.

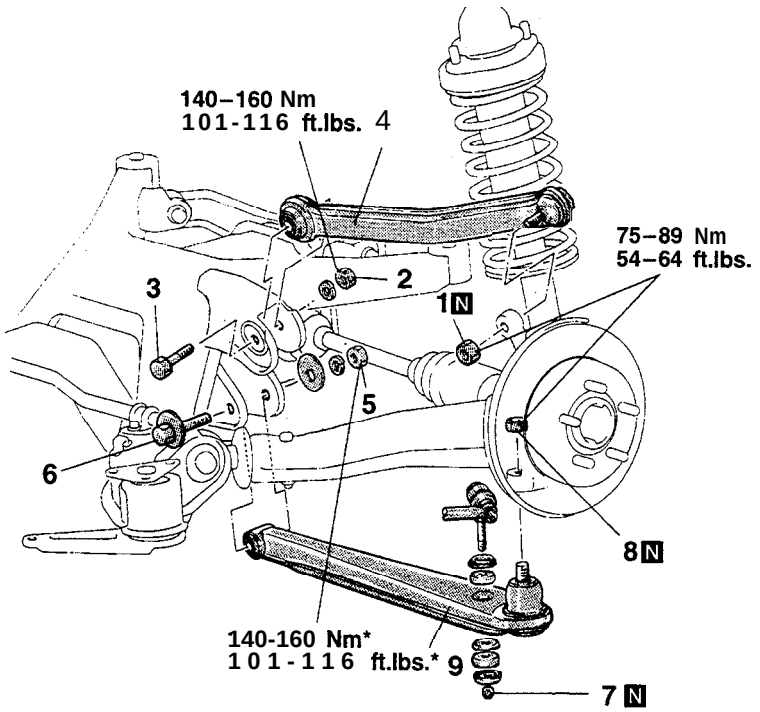
Standard value (A) : 6.7-7.3 mm (.26–.29 in.)

UPPER AND LOWER ARM

REMOVAL AND INSTALLATION

Post-installation Operation
- Wheel Alignment Check (Refer to P.34-25.)





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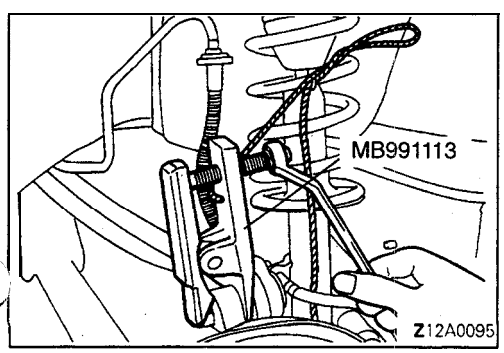
Upper arm removal steps

◀A▶
1. Self-locking nut
2. Upper arm mounting nut
3. Upper arm mounting bolt
4. Upper arm

Lower arm removal steps

5. Lower arm mounting nut
6. Lower arm mounting bolt
▶A◀ 7. Stabilizer link to lower arm coupling nut
◀B▶ 8. Self-locking nut
9. Lower arm

NOTE
*: Indicates parts which should be temporarily tightened, and then fully tightened with the vehicle on the ground in the unladen condition.



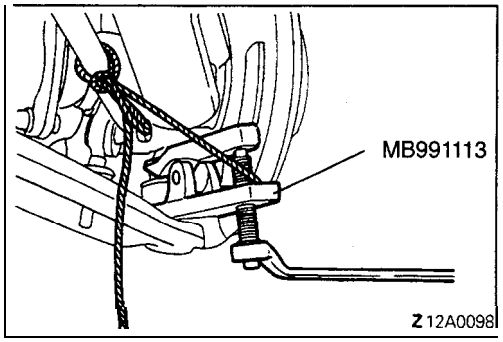
REMOVAL SERVICE POINTS

(A, SELF-LOCKING NUT REMOVAL

Using the special tool, disconnect the upper arm ball joint from the knuckle.

Caution
1. **Be sure to tie the cord of the special tool to a nearby part.**
2. **Loosen the nut but do not remove it.**

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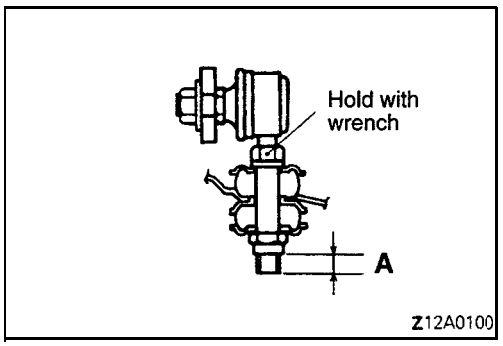
◀B▶ SELF-LOCKING NUT REMOVAL

Lower down the lower arm on the crossmember side. Then, install the special tool and disconnect the lower arm ball joint from the knuckle.

Caution

1. Be sure to tie the cord of the special tool to a nearby part.

2. Loosen the nut but do not remove it.



INSTALLATION SERVICE POINT

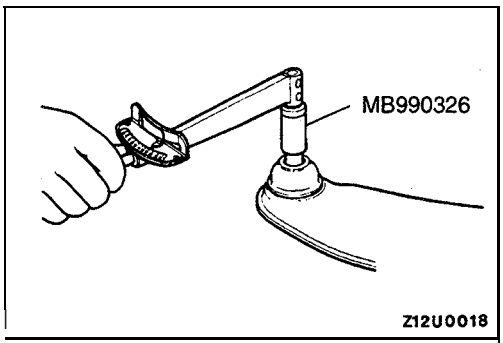
▶A◀ STABILIZER LINK TO LOWER ARM COUPLING NUT INSTALLATION

Holding the stabilizer link with a wrench, tighten the self-locking nut so that the protrusion of the stabilizer link (dimension A indicated in illustration) is within the standard value.

Standard value (A) : 5-7 mm (.197–.276 in.)

INSPECTION

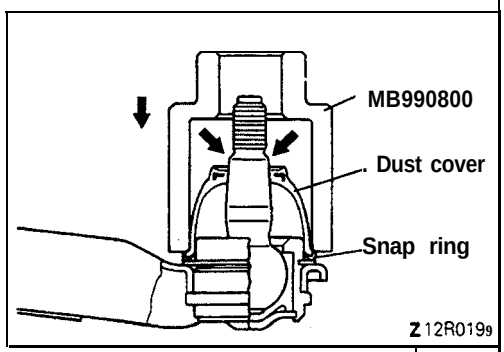
- Check the bushing for wear and deterioration.
- Check the upper arm or lower arm for bend or breakage.
- Check the ball joint dust cover for cracks.
- Check all bolts for condition and straightness.



BALL JOINT BREAKAWAY TORQUE CHECKING

Using the special tool, measure the ball joint breakaway torque.

Standard value: 2-9 Nm (17-78 in.lbs.)

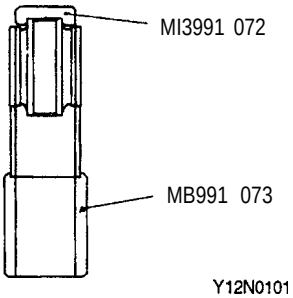


BALL JOINT DUST COVER REPLACEMENT

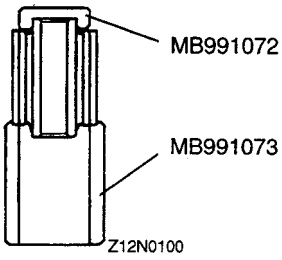
(1) Remove the dust cover.
(2) Apply multipurpose grease to the lip and inside of the dust cover.
(3) Drive in the dust cover with special tool until it is fully seated.

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Removal

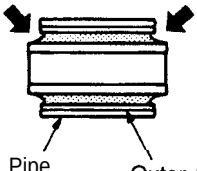


Press-fit



LOWER ARM BUSHING REPLACEMENT

(1) Use the special tool to remove and press-fit the bushing.

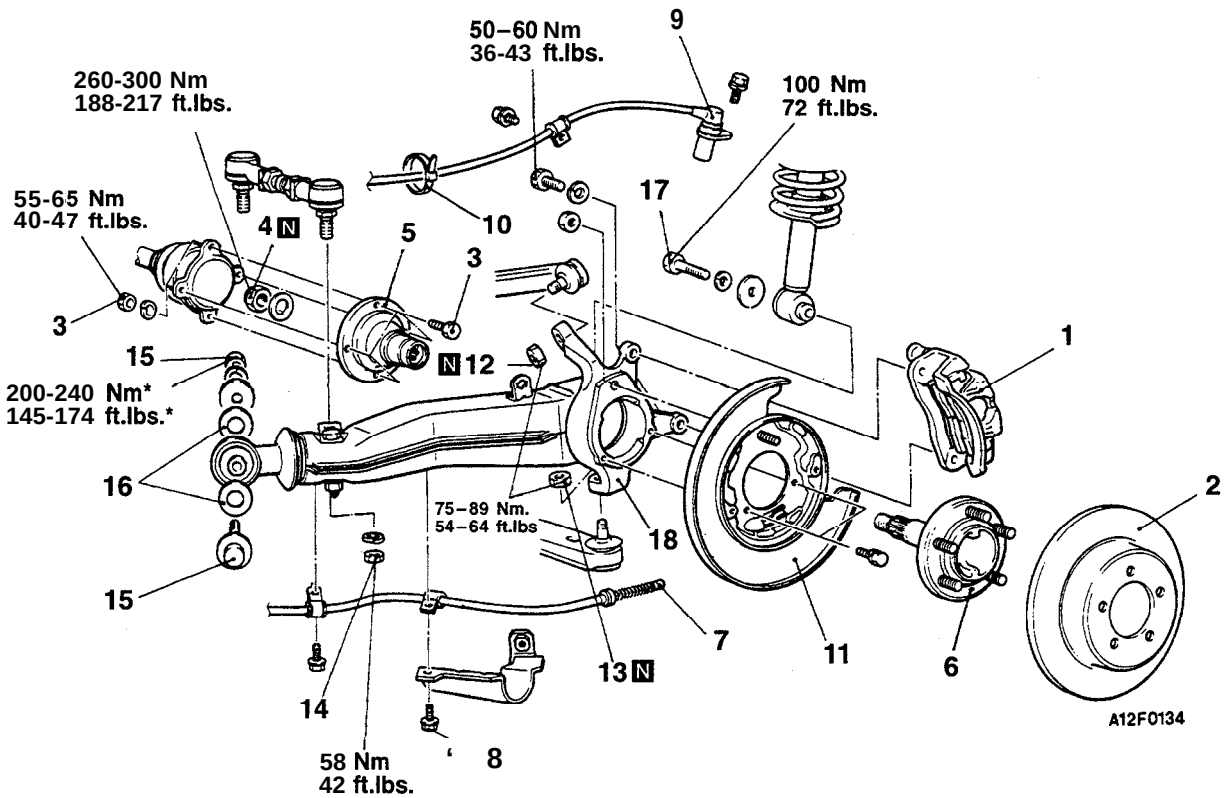


(2) Press-fit the lower arm bushing until the bushing outer pipe edge flush with the lower arm pipe edge.

TRAILING ARM

REMOVAL AND INSTALLATION

Post-installation Operation
- Wheel Alignment Check (Refer to P.34-25.)
- Parking Brake Lever Stroke Check (Refer to GROUP 36 – On-vehicle Service.)
- Rear Brake Disc Run-out Check (Refer to GROUP 35 – On-vehicle Service.)



Removal steps

1. Rear brake caliper assembly
2. Rear brake disc
3. Drive shaft to companion flange mounting bolt and nut

◀A▶ 4. Self-locking nut

5. Companion flange

◀B▶ 6. Rear axle shaft

7. Parking brake cable end
8. Parking brake cable clamp bolt
9. Rear speed sensor <ABS>
10. Rear speed sensor cable and parking brake cable bands <ABS>
11. Dust shield

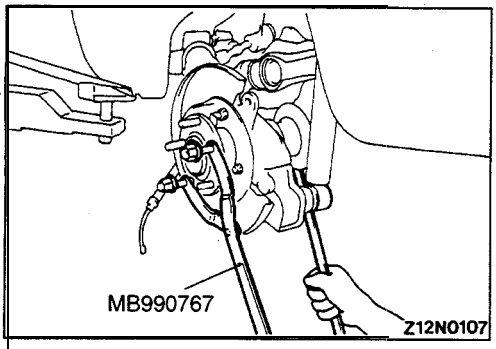
◀C▶ 12. Self-locking nut (upper arm)

◀C▶ 13. Self-locking nut (lower arm)

14. Assist link or tie rod end mounting nut
15. Trailing arm ‘mounting bolt and nut
16. Stopper (18 in.-wheel equipped vehicles)
17. Rear shock absorber mounting bolt
18. Trailing arm

NOTE
N: Indicates parts which should be temporarily tightened, and then fully tightened with the vehicle on the ground in the unladen condition.

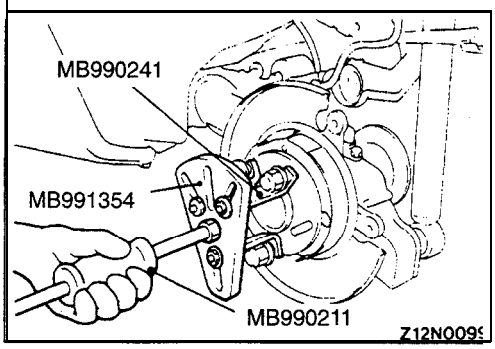
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REMOVAL SERVICE POINTS

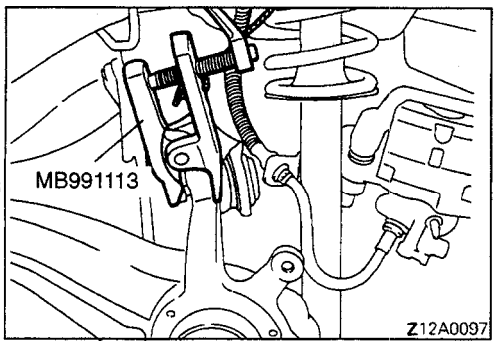
◀A▶ SELF-LOCKING NUT REMOVAL

With the special tool, secure the rear **axle** shaft, then remove the self-locking nut.



◀B▶ REAR AXLE SHAFT REMOVAL

With the special tool, remove the rear axle shaft.

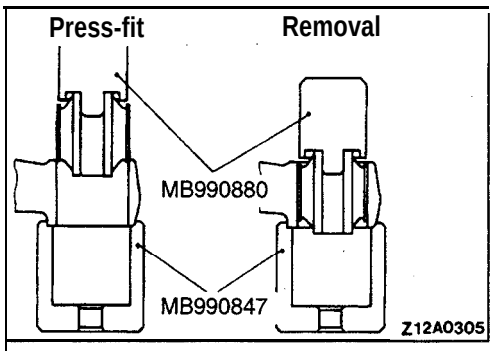


◀C▶ SELF-LOCKING NUT (UPPER ARM) / SELF-LOCKING NUT (LOWER ARM) REMOVAL

Using the special tool, disconnect the ball joint from the knuckle.

Caution

1. **Be sure to tie the cord of the special tool to a nearby part.**
2. **Loosen the nut but do not remove it.**

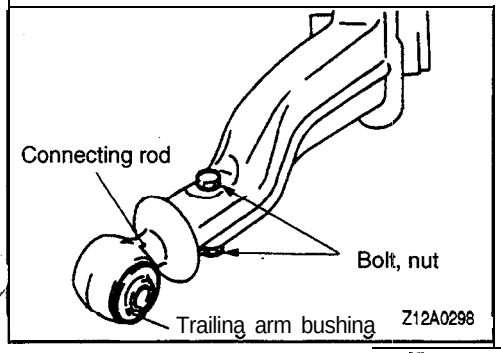


INSPECTION

- Check trailing arm for cracks and deformation.
- Check bushing for cracks, deterioration and wear.

TRAILING ARM BUSHING REPLACEMENT

Use the special tool to remove and press-fit the bushing.

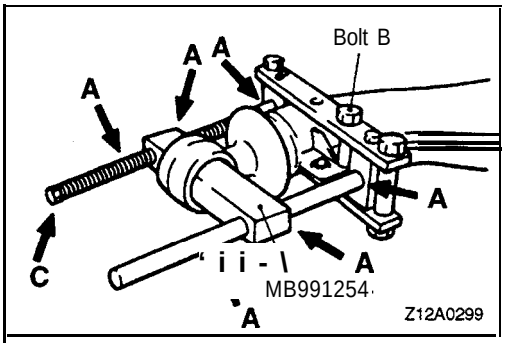


CONNECTING ROD REPLACEMENT

Replace the connecting rod using the following procedure:

(1) Remove the trailing arm bushing.
(2) Remove the bolt and nut.

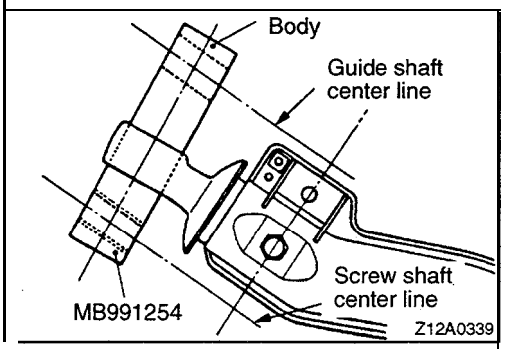
TSB Revision



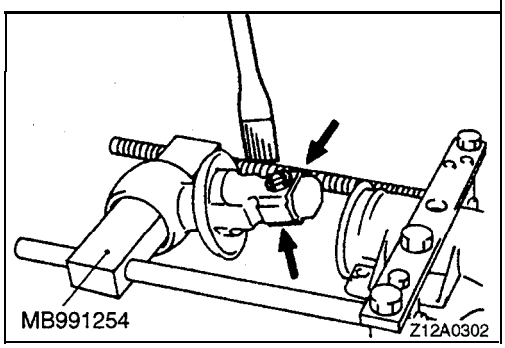
(3) Set the special tool onto the trailing arm as shown in the illustration.

NOTE
(1) Apply lubricant to the sliding portion of the special tool (at the arrow marked "A" in the illustration).
(2) Install bolt B to the trailing arm, at the point shown in the figure.

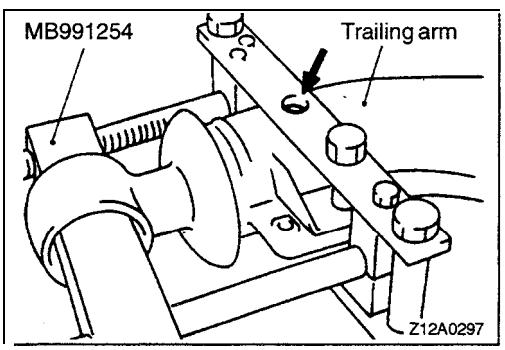
(4) Use a spanner, etc., to turn the portion marked "C" in the illustration to remove the connecting rod.



(5) Installation of the body (special tool) should be performed with the screw shaft and guide shaft center lines oriented as shown in the illustration.



(6) Apply soapy water to the rubber portion of the connecting rod.
(7) Reverse the removal procedures to press-fit.



(8) Remove the special tool after aligning the holes in the special tool and trailing arm.
(9) Tighten the bolts and nuts to the specified torque.

Tightening torque : 98 Nm (71 ft.lbs.)

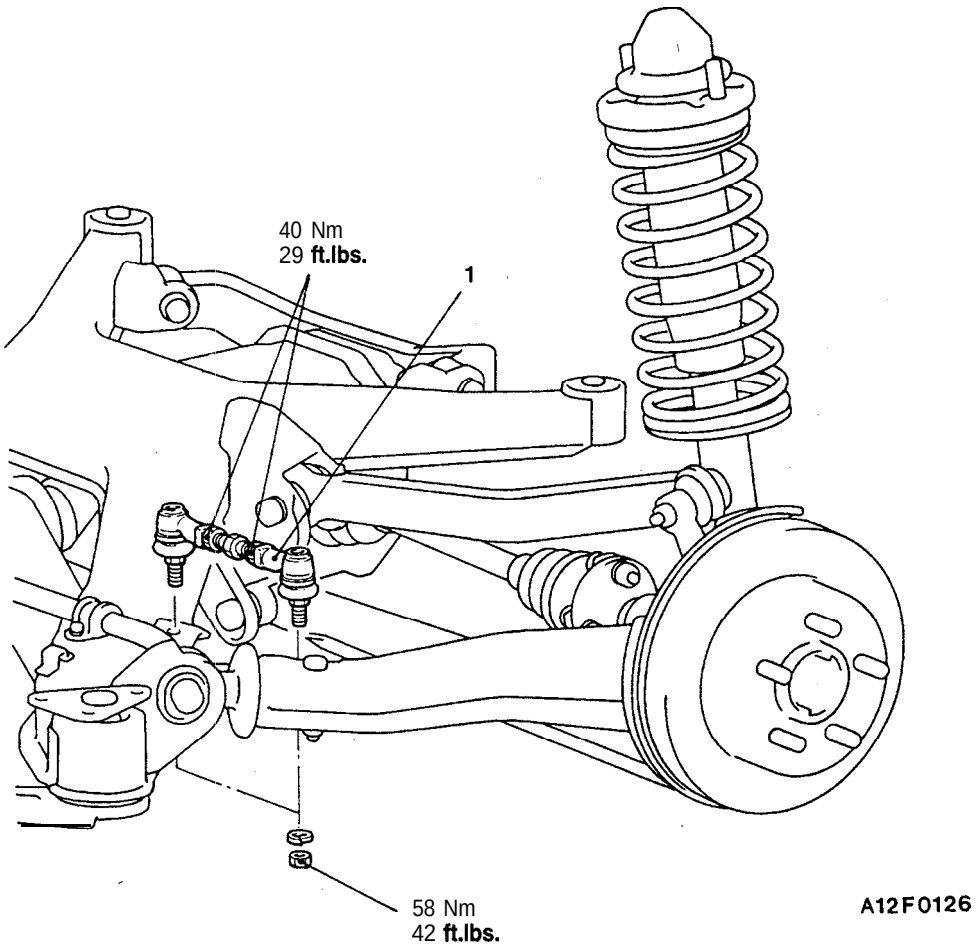
(10) Press-fit the trailing arm bushing. (Refer to P.34-33.)

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ASSIST LINK <Up to 1994 models>

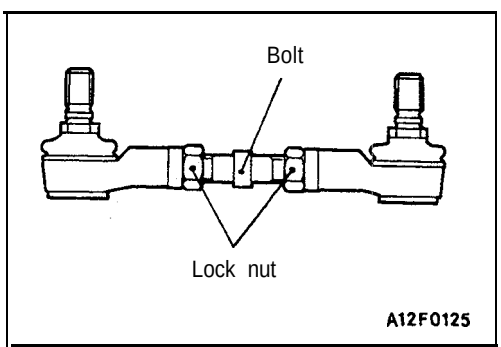
REMOVAL AND INSTALLATION

Post-installation Operation
- Wheel Alignment Check (Refer to P.34-25.)



▶A◀ 1. Assist link

NOTE
L.H. side shown.



INSTALLATION SERVICE POINT

▶A◀ ASSIST LINK INSTALLATION

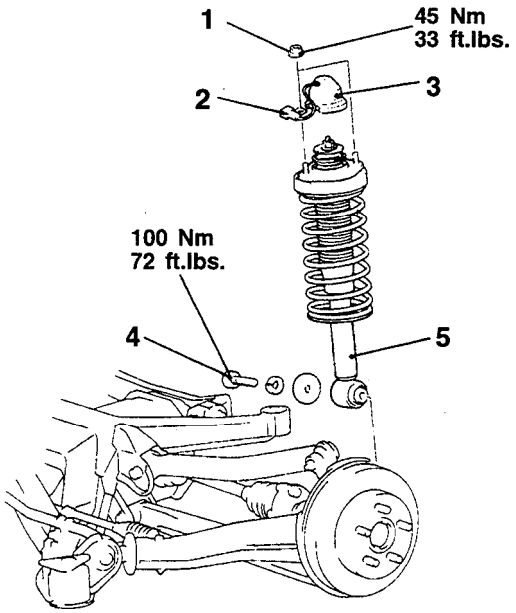
If the ball studs of the assist link does not align with their mounting holes, loosen the lock nuts and turn the adjusting bolt to adjust the length of the assist link.

TSB Revision

SHOCK ABSORBER ASSEMBLY

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Rear Side Trim Absorber Lid Removal and Installation (Refer to GROUP 52A – Trims.)



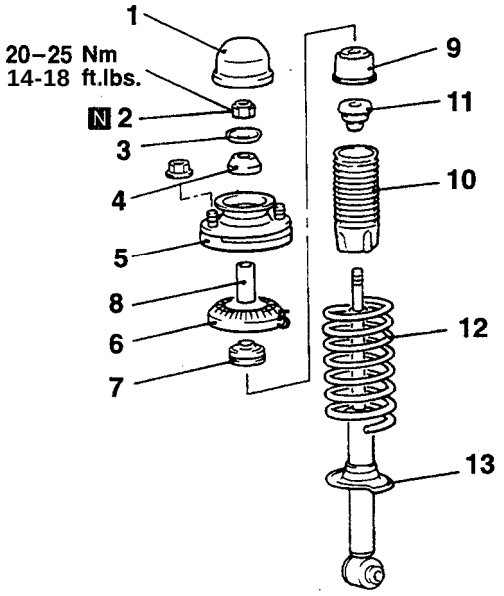
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Removal steps

1. Shock absorber upper mounting nut
2. ECS connector <EC&-
3. Cap
4. Shock absorber lower mounting bolt
5. Shock absorber assembly

TSB Revision

DISASSEMBLY AND REASSEMBLY



Z12A0360

Disassembly steps

1. Cap
2. Piston rod tightening nut (Refer to P.34-14.)
3. Washer
4. Upper bushing (A)
5. Bracket assembly (Refer to P.34-15.)
6. Spring pad
7. Upper bushing (B)
8. Collar
9. Cup assembly
10. Dust cover
11. Bump rubber
12. Coil spring (Refer to P.34-15.)
13. Shock absorber

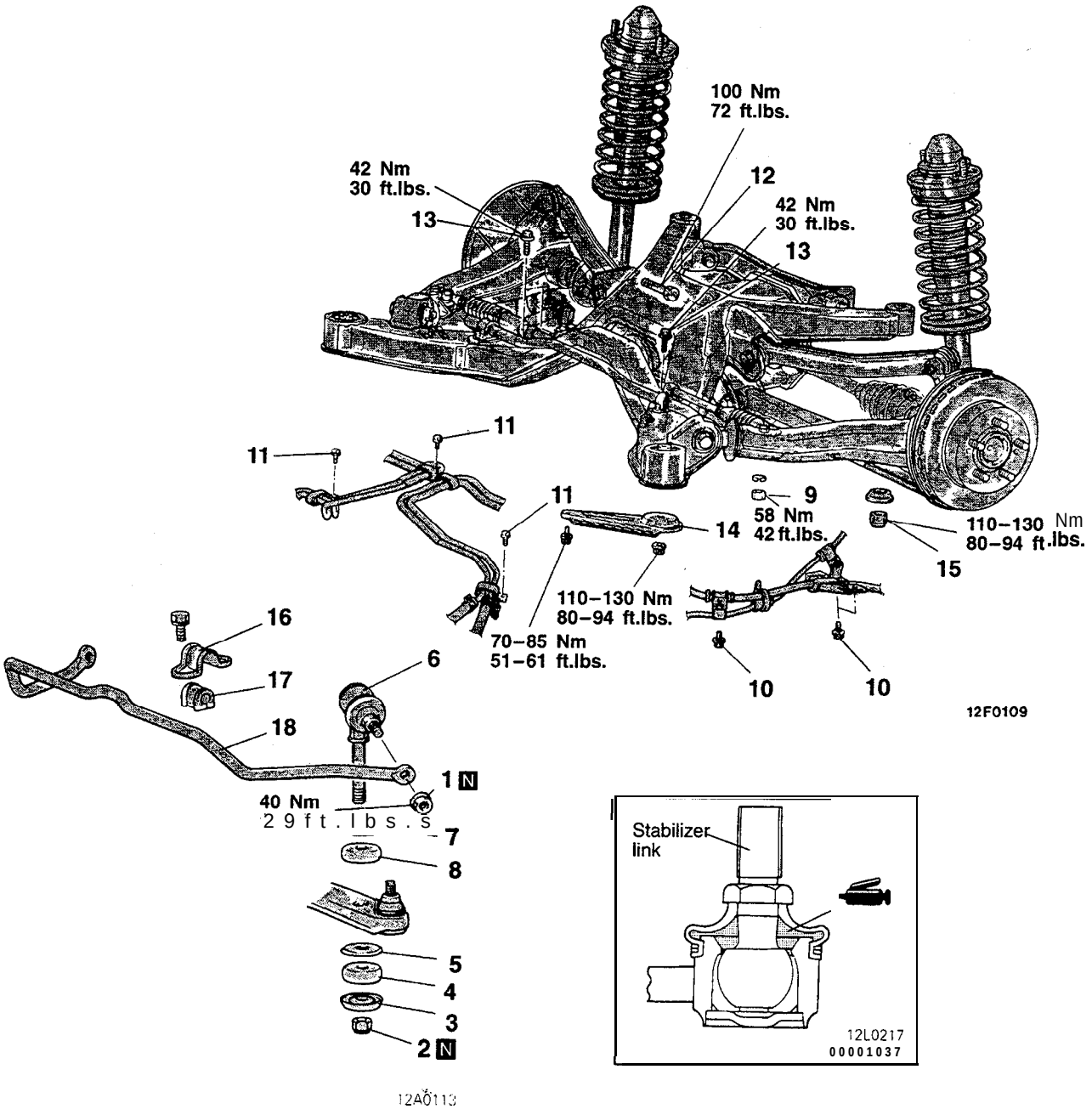
INSPECTION

- Check the rubber parts for damage.
- Check the coil springs for crack, damage or deterioration.

TSB Revision

STABILIZER BAR

REMOVAL AND INSTALLATION

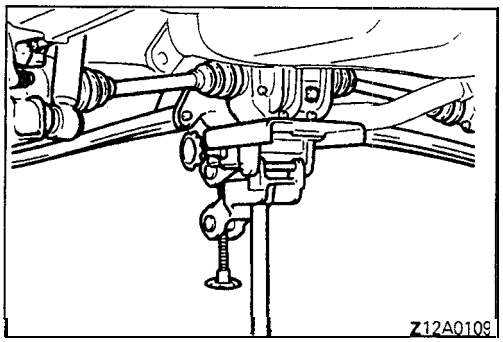


Removal steps

- ▶A◀ 1. Self-locking nut*
- ▶A◀ 2. Self-locking nut*
- 3. Joint cup A*
- 4. Stabilizer rubber*
- 5. Joint cup B*
- ▶A◀ 6. Stabilizer link
- 7. Joint cup A*
- 8. Stabilizer rubber*
- 9. Tie rod end mounting nut*
- 10. Parking brake cable bracket mounting bolt*
- 11. 4WS piping fixing bolt <4WS>
- 12. Rear shock absorber mounting bolt
- 13. Power cylinder mounting bolt <4WS>
- ◀A▶ 14. Crossmember bracket*
- ◀A▶ 15. Crossmember mounting nut*
- 16. Stabilizer bracket*
- 17. Bushing*
- ◀B▶ 18. Stabilizer bar

NOTE
Parts marked with * are symmetrical.

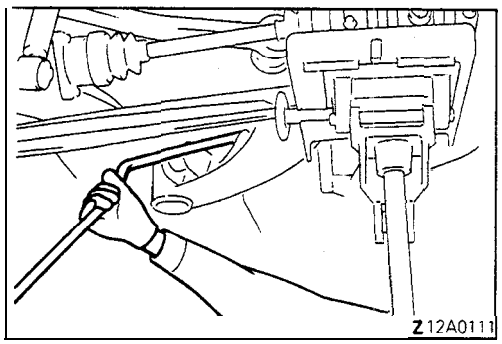
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REMOVAL SERVICE POINTS

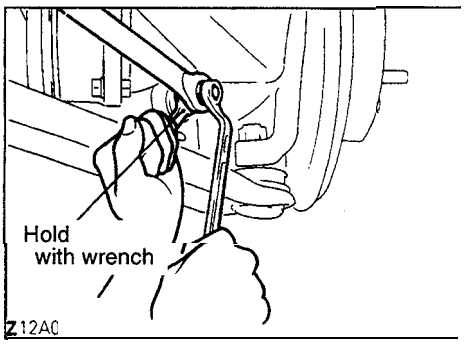
◀A▶ CROSSMEMBER BRACKET / CROSSMEMBER MOUNTING NUT REMOVAL

(1) Support the rear suspension assembly with the transmission jack.
(2) Remove the crossmember bracket and crossmember mounting nut.



◀B▶ STABILIZER BAR REMOVAL

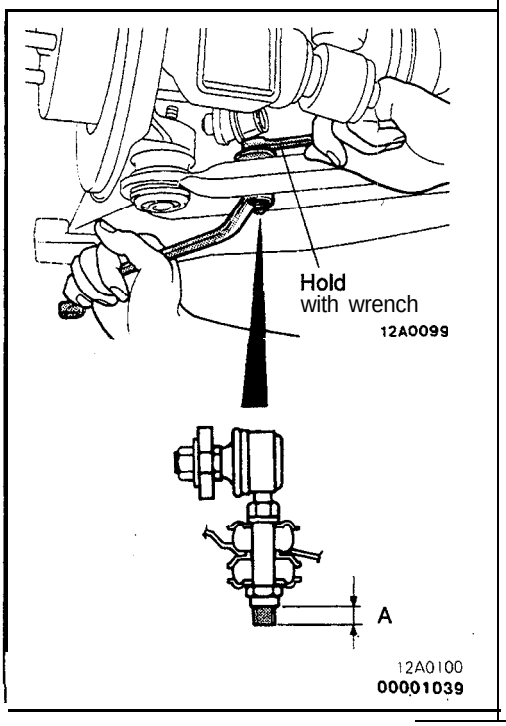
(1) Lower the transmission jack a little to obtain a gap between the rear suspension and body.
(2) Remove the stabilizer bar.



INSTALLATION SERVICE POINTS

▶A◀ STABILIZER LINK / SELF-LOCKING NUT / SELF-LOCKING NUT INSTALLATION

(1) Secure the stabilizer link ball stud with a wrench and mount the self-locking nut.

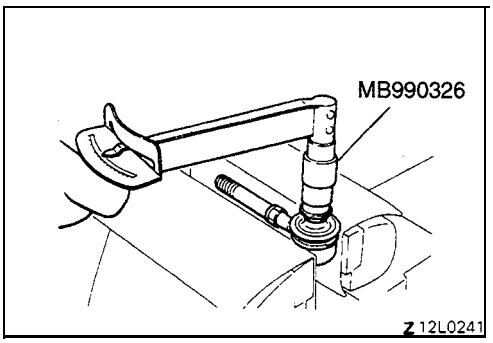


(2) Hold the stabilizer link with a wrench so that its protrusion on the lower arm side (dimension A) is up to specification, then mount the self-locking nut.

Standard value (A) : 5-7 mm (.197–.276 in.)

INSPECTION

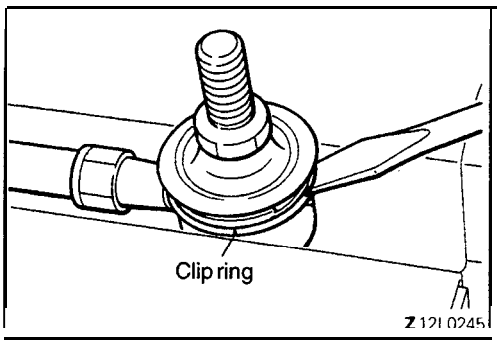
- Check the bushing for wear and deterioration.
- Check the stabilizer bar for deterioration or damage.
- Check the stabilizer link ball joint dust cover for cracks.
- Check all bolts for condition and straightness.



STABILIZER LINK BALL JOINT BREAKAWAY TORQUE CHECKING

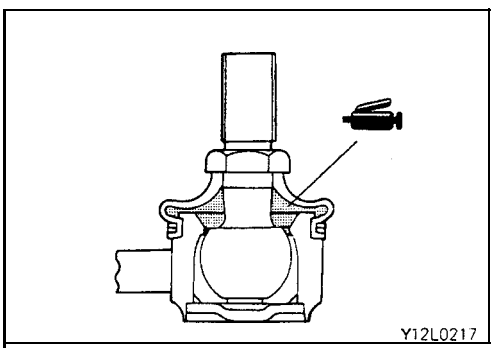
Using the special tool, measure the ball joint breakaway torque.

Standard value: 1.7-3.2 Nm (15-28 in.lbs.)

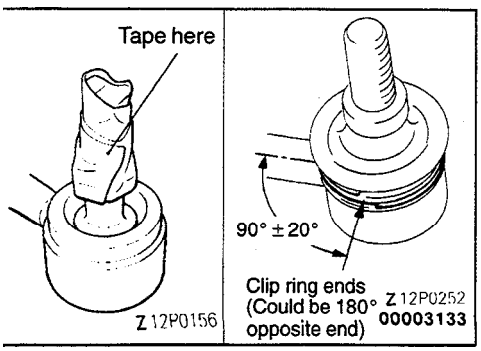


BALL JOINT DUST COVER REPLACEMENT

(1) Remove the clip ring and the dust cover.



(2) Apply multipurpose grease to the lip and inside of the dust cover.



(3) Wind tape around the threads of the stabilizer link stud and install the dust cover.
(4) Secure the dust cover with the clip ring.
At this time, make sure that the clip ring ends are located at a point 90° ± 20° with reference to the link axis.

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WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

(1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).

(2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.

(3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B -Supplemental Restraint System (SRS) and GROUP 00 -Maintenance Service, before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning light, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with **SRS** service or maintenance) are indicated in the table of contents by an asterisk (*).

SPECIFICATIONS

GENERAL SPECIFICATIONS

MASTER CYLINDER

Items	FWD without ABS	FWD with ABS	AWD
Type	Tandem type (with level sensor)	Tandem type (with level sensor)	Tandem type (with level sensor)
I.D. mm (in.)	25.4 (1) or 26.9 (1 1/16)	26.9 (1 1/16)	26.9 (1 1/16)

BRAKE BOOSTER

Items	FWD without ABS	FWD with ABS	AWD
Type	Vacuum type, tandem	Vacuum type, tandem	Vacuum type, tandem
Effective dia. of power cylinder mm (in.)	180 (7.0) + 205 (8.0) or 203 (8.0) + 230 (9.0)	203 (8.0) + 230 (9.0)	203 (8.0) + 230 (9.0)
Boosting ratio [Brake pedal depressing force]	6.0 [at 247 N (54 lbs.)]	7.0 [at 261 N (58 lbs.)]	7.0 [at 261 N (58 lbs.)]

PROPORTIONING VALVE

Items	Convertible	Hatchback
Split point MPa (psi)	4.95-5.45 (704-775)	3.75-4.25 (533-604)
Decompression ratio	0.43	0.96

FRONT BRAKES

Items	FWD	AWD <Up to 1993 models>	AWD <From 1994 models>
Type	Floating caliper, 2-piston, ventilated disc (M-R57W)	Rigid caliper, 4-piston, ventilated disc (M-R66Z)	Rigid caliper, 4-piston, ventilated disc (M-R76Z)
Disc effective dia. mm (in.)	227 (9.0)	249 (9.8)	271 (10.7)
Disc thickness mm (in.)	24 (.94)	30 (1.18)	30 (1.18)
Pad thickness mm (in.)	16 (.63)	15 (.59)	15 (.59)
Wheel cylinder I.D. mm (in.)	42.8 (1 11/16) × 2	40.4 (1 19/32) × 2 + 42.8 (1 11/16) × 2	40.4 (1 19/32) × 2 + 42.8 (1 11/16) × 2
Clearance adiustment	Automatic	Automatic	Automatic

REAR BRAKES

Items	FWD	AWD <Up to 1993 models>	AWD <From 1994 models>
Type	Floating caliper, 1 -piston, ventilated disc (M-R45V)	Floating caliper, 1 -piston, ventilated disc (M-R58V)	Rigid caliper, 2-piston, ventilated disc (M-R68X)
Disc effective dia. mm (in.)	228 (9.0)	237 (9.4)	250 (9.8)
Disc thickness mm (in.)	18 (.71)	20 (.79)	20 (.79)
Pad thickness mm (in.)	15.5 (.61)	15.5 (.61)	15 (.60)
Wheel cylinder I.D. mm (in.)	34.9 (1 3/8)	38.1 (1 1/2)	38.1 (1 1/2)
Clearance adiustment	Automatic	Automatic	Automatic

WHEEL SPEED SENSOR <ABS>

Items		Specifications
Rotor teeth	Front wheel side	47
	Rear wheel side	47
Speed sensor		Magnet coil type

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SERVICE SPECIFICATIONS

Items			Standard value	Limit
Brake pedal height mm (in.)			177–182 (7.0–7.2)	–
Brake pedal free play mm (in.)			3–8 (.1–.3)	–
Brake pedal to floorboard clearance mm (in.)			80 (3.1) or more	–
Pad thickness mm (in.)			10.0 (.39)	2.0 (.08)
Front disc thickness mm (in.)		FWD	24.0 (.94)	22.4 (.88)
		AWD	30.0 (1.18)	28.4 (1.12)
Rear disc thickness mm.(in.)		FWD	18.0 (.71)	16.4 (.65)
		AWD	20.0 (.79)	18.4 (.72)
Proportioning valve pressure MPa (psi)	Split point	Convertible	4.95–5.45 (704–775)	–
		Hatchback	3.75–4.25 (533–604)	–
	Output pressure [input pressure]	Convertible	6.72–7.52 (956–1,070)	–
		Hatchback	5.82–6.62 (828–942)	–
Booster push rod to master cylinder piston clearance mm (in.)	7 + 8 inch brake booster		0.55–0.75 (.022–.030)	–
	8 + 9 inch brake booster		0.65–0.85 (.026–.033)	–
Disc brake drag force (tangential force of wheel mounting bolts) N (lbs.)			70 (15.4) or less	–
Speed sensor's internal resistance <ABS> kΩ		Front	0.8–1.2	–
		Rear <FWD>	0.6–0.8	–
		Rear <AWD>	0.8–1.2	–
Solenoid valve (HU) resistance Ω <Up to 1995 models>			1.0–1.3	–
Hydraulic unit solenoid valve internal resistance Ω		IN	8.5–9.5	–
		OUT	4.45–4.95	–
G-sensor output voltage V		In laden, stationary vehicle	2.3–2.7	–
		With front mark downward	3.3–3.7	–
Rear speed sensor pole piece-to-rotor tooth surface clearance <AWD> mm (in.)			28.15–28.45 (1.11–1.12)	–
Clearance between the speed pole piece and the toothed rotor <FWD> mm (in.)		Front	0.3–0.9 (.012–.035)	–
		Rear	0.2–0.7 (.008–.028)	–
Left/right proportioning valve output pressure difference MPa (psi)			–	0.4 (57)
Front disc run-out mm (in.)		FWD	–	0.07 (.0028) or less
		AWD	–	0.1 (.004) or less

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Items		Standard value	Limit
Rear brake lining thickness mm (in.)		2.8 (.11)	1.0 (.04)
Rear drum inside diameter mm (in.)		168.0 (6.6)	169.0 (6.7)
Front hub end play mm (in.)			0.05 (.002)
Rear disc run-out mm (in.)			0.08 (.0031) or less
Rear hub end play mm (in.)	FWD		0.05 (.002)
	AWD		0.8 (.031)

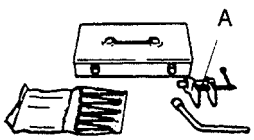
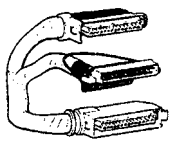
LUBRICANTS

Items	Specified lubricant
Brake fluid	Conforming to DOT3 or DOT4
Inside of shim A and shim B, or inside of inner shim A, inner shim B, and outer shim	Brake grease SAE J310, NLGI No. 1
Guide pin and lock pin sliding part Piston boot inner surface Pin boot inner surface	Repair kit grease

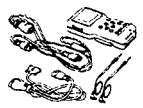
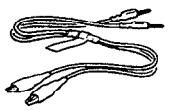
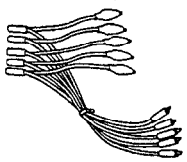
SEALANTS

Items	Specified sealant
Thread part fitting	3M ATD Part No. 8663 or equivalent

SPECIAL TOOLS

Tool	Tool number and name	Supersession	Application
	MB990964 Brake tool set A: MB990520 Disc brake piston expander	General service tool	Compressing disc brake piston
	MB991 356 ABS check harness	MB991 356	For checking of ABS
	MB991 341 Scan tool (Multi-Use Tester <MUT>)	MB991341C	Up to 1993 models For checking of ABS

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Tool	Tool number and name	Supersession	Application
	ROM pack (For the number, refer to GROUP 00 – Precautions Before Service.)		Up to 1993 models For checking of ABS
 Z16X0606	MB991502 Scan tool (MUT-II)	MB991502	All models For checking of ABS
 Z16X0607	ROM pack		
	MB991529 Diagnostic trouble code check harness	Tool not necessary if scan tool (MUT-II) is available.	1996 models For checking of ABS
	MB991348 Test harness set		For checking of G-sensor

TROUBLESHOOTING

Symptom	Probable cause	Remedy
Vehicle pulls to one side when brakes are applied	Grease or oil on pad or lining surface	Replace
	Inadequate contact of pad	Correct
	Auto adjuster malfunction	Adjust
Insufficient braking power	Low or deteriorated brake fluid	Add or refill
	Air in brake system	Bleed air from system
	Overheated brake rotor due to dragging of pad	Correct
	Grease or oil on pad surface	Replace
	Inadequate contact of pad	Correct
	Brake booster malfunction	Correct
	Auto adjuster malfunction	Adjust
	Clogged brake line	Correct
	Proportioning valve malfunction	Replace

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Symptom	Probable cause	Remedy
Increased pedal stroke (Reduced pedal to floorboard clearance)	Air in brake system	Bleed air from system
	Worn pad	Replace
	Broken vacuum hose	Replace
	Brake fluid leaks	Correct
	Excessive push rod to master cylinder clearance	Adjust
	Faulty master cylinder	Replace
Brake drag	Worn brake pedal return spring	Replace
	Incorrect push rod to master cylinder clearance	Adjust
	Defective master cylinder piston return spring	Replace
	Clogged master cylinder return port	Correct
Insufficient parking brake function	Worn brake pad	Replace
	Excessive parking brake lever stroke	Adjust the parking brake lever stroke or check the parking brake cable routing
	Grease or oil on pad surface	Replace
	Parking brake cable sticking	Replace
	Stuck caliper piston	Replace
Scraping or grinding noise when brakes are applied	Worn brake pad	Replace
	Caliper to wheel interference	Correct or replace
	Cracked brake disc	Correct or replace
Squealing, groaning or chattering noise when brakes are applied	Disc brakes – missing or damaged brake pad anti-squeak shim	Replace
	Brake discs and pads worn or scored	Correct or replace
	Improper lining parts	Correct or replace
	Disc brakes – burred or rusted calipers	Clean or deburr
	Dirty, greased, contaminated or glazed pad	Clean or replace
	Incorrect adjustment of brake pedal or booster push-rod	Adjust

Symptom	Probable cause	Remedy
Squealing noise when brakes are not applied	Disc brakes – rusted, stuck	Lubricate or replace
	Loose or extra brake parts	Retighten
	Improper positioning of pads in caliper	Correct
	Improper installation of support mounting to caliper body	Correct
	Poor return of brake booster or master cylinder	Replace
	Incorrect adjustment of brake pedal or booster push-rod setting	Adjust
Groaning, clicking or rattling noise when brakes are not applied	Stones or foreign material trapped inside wheel covers	Remove stones, etc.
	Loose wheel nuts	Retighten
	Disc brakes -failure of anti-rattle shim	Replace
	Disc brakes – loose installation bolt	Retighten
	Incorrect adjustment of brake pedal or booster push-rod setting.	Adjust

ANTI-LOCK BRAKING SYSTEM TROUBLESHOOTING

<Up to 1995 models>

PARTICULAR PHENOMENA OF THE ANTI-LOCK BRAKING SYSTEM

Models equipped with the anti-lock braking system (ABS) may exhibit one or more of the following phenomena from time to time, but none of these are abnormal.'

(1) A pulsing feeling in the brake pedal, or vibration of the body or the steering wheel, when the anti-lock braking system is activated by sudden braking or by braking on a slippery road surface. Actually, this phenomenon is an indication that the anti-lock braking system is functioning normally.

(2) When the vehicle speed reaches approximately 6 km/h (4 mph) after the engine is started and the vehicle starts off (for the first time), a whining motor noise may be heard from the engine compartment if the vehicle is traveling in a quiet place, but this noise is simply the result of a self-check being made of the anti-lock braking system operation.

TROUBLESHOOTING METHODS

Problems related to the anti-lock braking system (ABS) can be classified into two general categories: problems in the electrical system and those in the hydraulic system.

For problems in the electrical system, the on-board diagnostic is built into the electronic control unit (ECU) causing the ABS warning light to illuminate as a warning to the driver. In this instance, checks can be made by using the multi-use tester and oscilloscope.

Problems in the hydraulic system (poor, braking, etc.) can be located in the same way as for ordinary brakes. There is, however, the necessity to check to determine whether the problem is related to ordinary brake components or to the components related to the ABS. To make this check, use the scan tool.

HOW TO USE THE TROUBLESHOOTING FLOW CHART

(1) Using the flow chart, check the ABS warning light light-up sequence. Read the diagnosis codes and check the condition of braking operation.

(2) Following the check chart listed in the remedy column, perform the checks. There are [Explanation] and [Hint] in each check chart. Refer to them when troubleshooting.

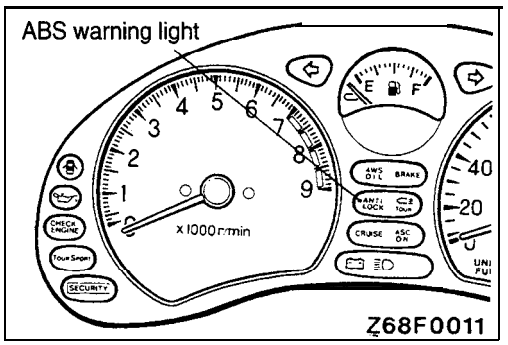
NOTE
ECU: Electronic control unit
HU: Hydraulic unit

TROUBLESHOOTING (ABS-FWD)

Confirm condition in the following way and diagnosis accordingly.

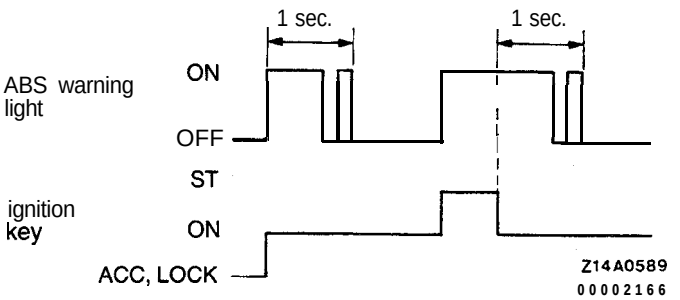
Does the ABS warning light illuminate as described below up to the time the engine starts?

(1) When the ignition key is turned to the "ON" position, the ABS ECU causes the ABS warning light to flash twice in about one second (during which the valve relay self check is made) and then causes it to go out.



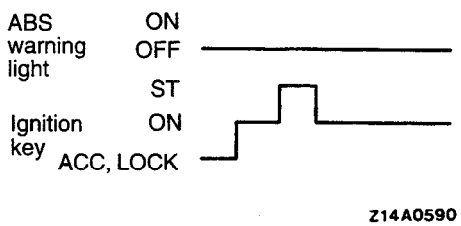
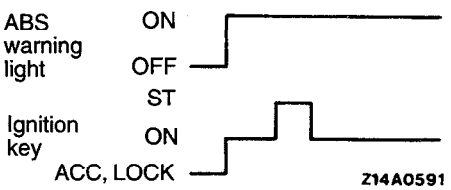
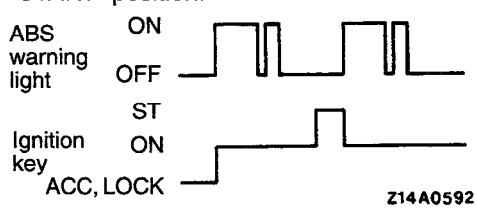
(2) With the ignition key in the "START" position, power to the ABS ECU is interrupted and the ABS warning light remains lit because the valve relay is OFF.

(3) When the ignition key is returned from the "START' position to the "ON" position, the ABS warning light flashes twice in about one second (during which the valve relay self check is made again) and then goes out.

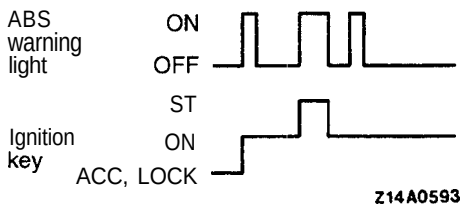


Yes → CONTINUED ON NEXT PAGE

No

No.	Trouble condition	Major causes	Remedy
1	ABS warning light does not light up at all. 	• ABS warning light bulb is burnt out. • Open in ABS warning light electrical circuit (check for blown fuse)	Check, using flow chart A (Refer to P.35-12.)
2	When the ignition key is turned to the "ON" position, it remains lighted. 	• Fail safe is functioning due to ECU on-board diagnostic. • Short in ECU warning light drive circuit • Malfunction of ECU	Check, using flow chart B (Refer to P.35-15.)
3	Does not illuminate when ignition key is in "START" position. 	• Malfunction of valve relay • Break in harness between ABS warning light and HU • Break in harness between HU and body ground	Check, using flow chart C (Refer to P.35-18.)

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No.	Trouble condition	Major causes	Remedy
4	After the ignition key is turned to the "ON" position, it blinks once and then illuminates when it is turned to the "START' position. When the key is returned to the "ON" position, the light blinks again. (Blinking with the ignition key in the "ON" position is synchronized with operation noise of the valve relay.) 	• Break in harness for ECU warning light drive circuit • Malfunction of ECU	Check, using flow chart D (Refer to P.35-19.)

CONTINUED FROM PREVIOUS PAGE

Does the ABS warning light illuminate when starting to drive the car?

Yes → Trouble with the motor relay, solenoid valve [due to self test at start-up or malfunction of wheel speed sensor]

No

Is there one-sided braking, insufficient braking force or malfunction of ABS operation?

No → CONTINUED ON NEXT PAGE

Yes

Trouble condition	Major causes	Remedy
One-sided braking Insuff icient braking force	• Hydraulic line in HU is clogged. • Mechanical lock of HU solenoid valve	Check HU operation and, if necessary, replace HU. If HU is normal, check structural parts for normal braking.
Decline in ABS function	• Hydraulic line in HU is clogged. • Malfunction in HU solenoid valve operation	
ABS sometimes functions even when there is no sudden braking. (ABS operation vibration is transmitted.)	• Insufficient wheel speed sensor output voltage (sensor malfunction, too large a gap between sensor rotor, missing rotor teeth). • Malfunction of ABS ECU	Check wheel speed sensor (Refer to P.35-75.) and, if necessary, replace sensor, adjust gap or replace rotor. If tests indicate that there are no mechanical or electrical failures, replace the ECU.

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CONTINUED FROM PREVIOUS PAGE

After a test drive*, use on-board diagnostic to check (Refer to P.35-20.).

NOTE
* Drive at 19 mph or higher for more than 30 seconds.

No diagnostic trouble codes output and normal codes are displayed?

No No on-board diagnostic output

No Diagnostic trouble codes are output

Check and repair the harness between the ABS ECU serial/on-board diagnostic output terminals and the diagnosis check connector.

Yes

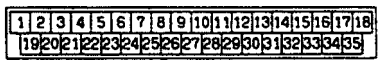
There was trouble in the past.
NOTE
Store diagnostic trouble codes in the memory.

Referring to the trouble code check chart E-1–E-6, make the diagnostic trouble code reoccur to discover the main cause of intermittent or other trouble.

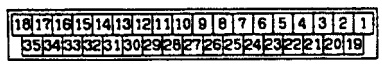
If trouble does not reappear, watch vehicle movements until it reappears. (Refer to P.35-11.)

All ABS functions are normal. (Nor are there stored memory of past diagnostic trouble code.)

Connector terminal No. layout for troubleshooting



Terminal No. layout shown on the special tool connector



00002535

Caution

1. **When carrying out inspection of the ABS-ECU terminal voltage and resistance, the special tool (MB991356) should be used.**
2. **Because the ABS-ECU connector terminal No. layout for troubleshooting is different from the terminal No. layout shown on the special tool connector, when using the special tool for inspecting, take the readings from the special tool terminal Nos.**

Example

ABS-ECU connector terminal No. for troubleshooting	Terminal No. shown on the special tool connector
18	1

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METHOD OF CLEARING DIAGNOSTIC TROUBLE CODE MEMORY

Caution

- **When servicing is finished, clear the diagnostic trouble code memory.**

Trouble codes cannot be cleared from memory when the ABS ECU system is in fail safe. Proceed to diagnosis and repair.

(1) Clear memory using scan tool.
(No. 7 "DIAG. ERASE" in the actuator test is selected to erase the diagnostic trouble code.)
(2) After clearing, recheck the diagnostic trouble codes, and check that memory is cleared.

ACTUATOR TEST FUNCTION

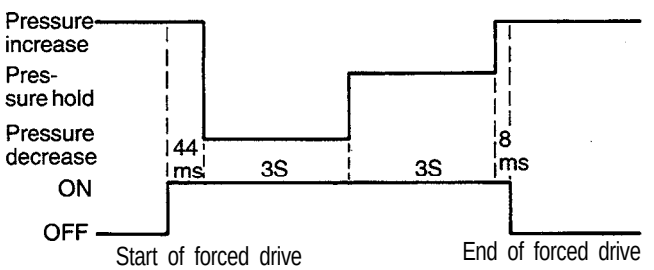
The actuator can be forcibly driven in the following way by using the scan tool.

NOTE

- The actuator test cannot be carried out when the ABS ECU System is in fail safe.
- When using forced drive using the scan tool, the vehicle must be stopped.
- During forced drive using the scan tool, forced drive operation is stopped when any wheel speed reaches 10 km/h (6 mph).

Actuator test specifications

No.	Scan tool display	Drive solenoid valve and motor	Drive pattern
01	FR VALVE A	Not used	
02	FL VALVE A		
03	REAR VALVE A		
04	FR VALVE M	Solenoid valve and pump motor for each HU corresponding channel. <Manual pattern>	Solenoid valve / Pump motor
05	FL VALVE M		
06	REAR VALVE M		



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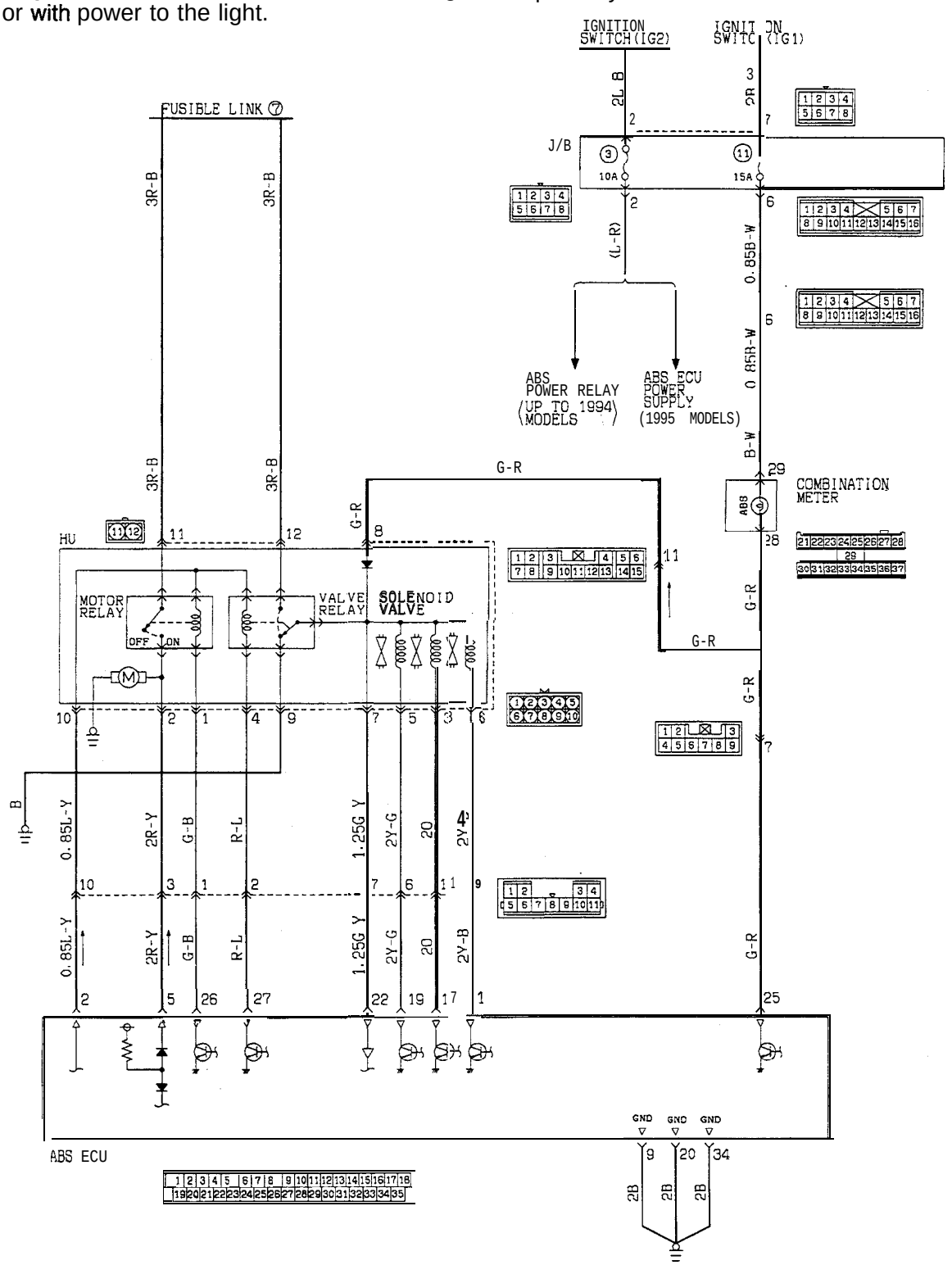
A ABS warning light does not light at all.

[Explanation]

When it does not light up at all, there is a strong possibility that there is trouble with ABS warning light or with power to the light.

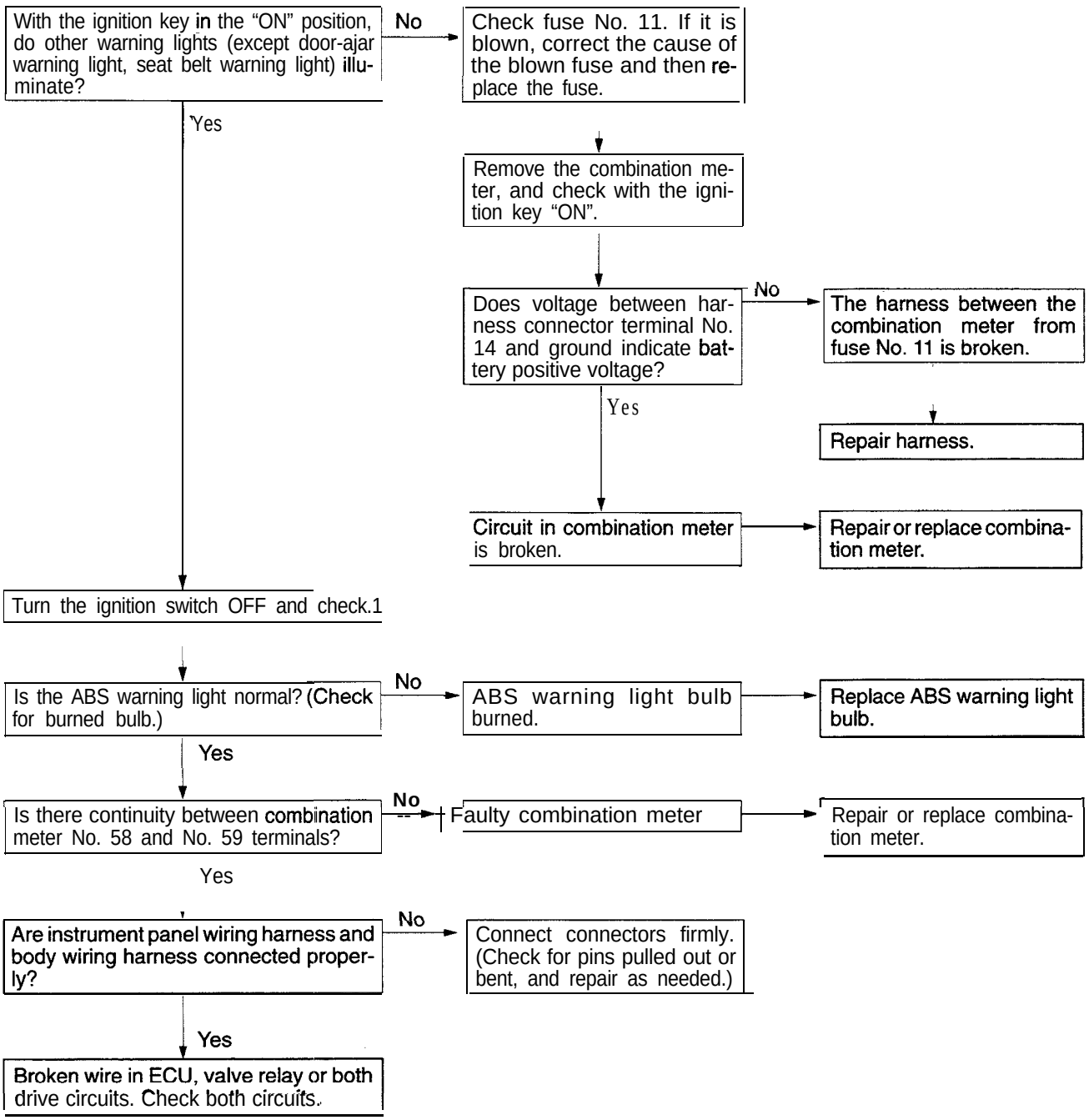
[Hint]

If other warning lights do not light up either, fuse is probably blown.

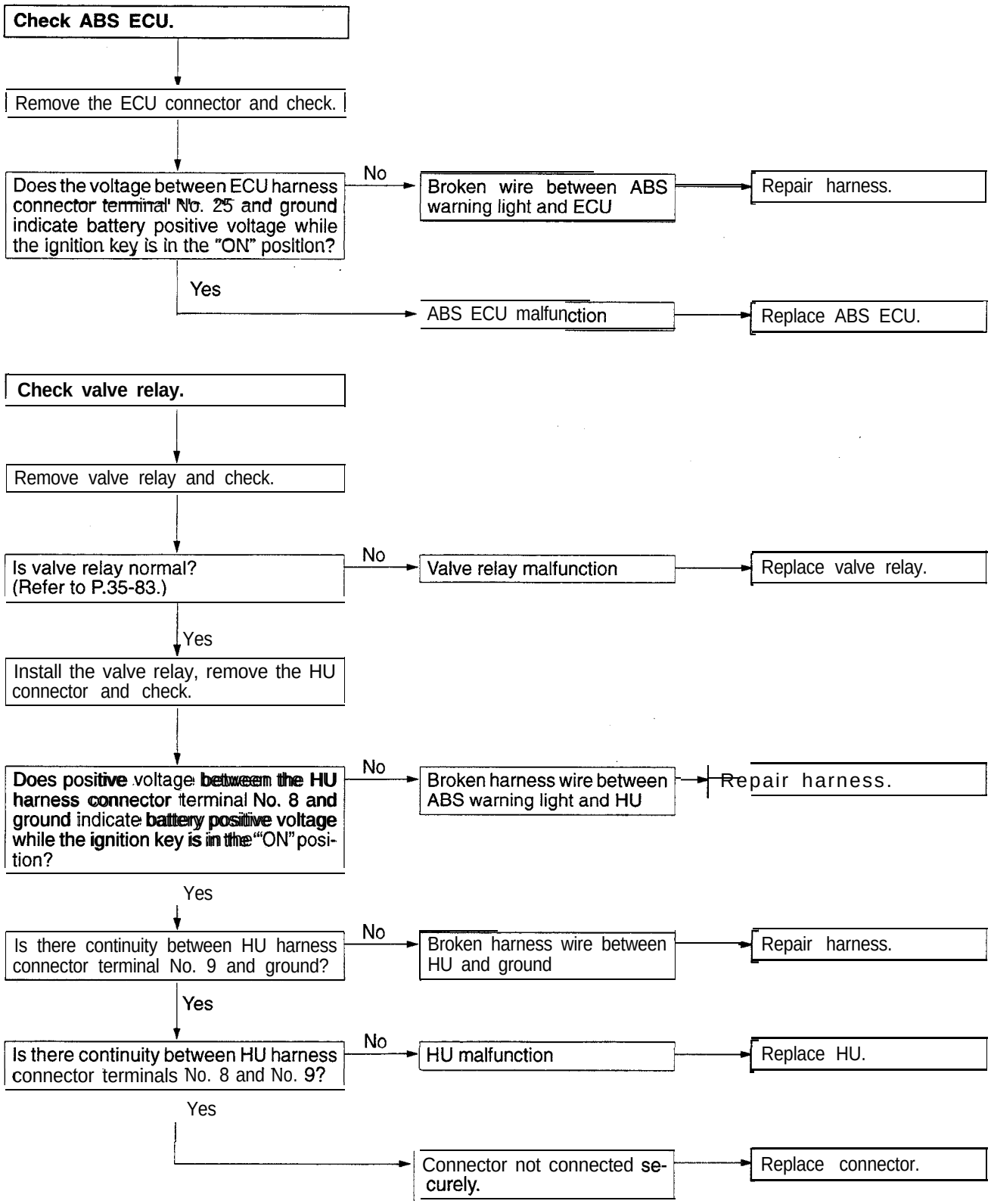


KX35-AK-R3521-N

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B ABS warning light stays on when the ignition key is in the "ON" position.

[Explanation]

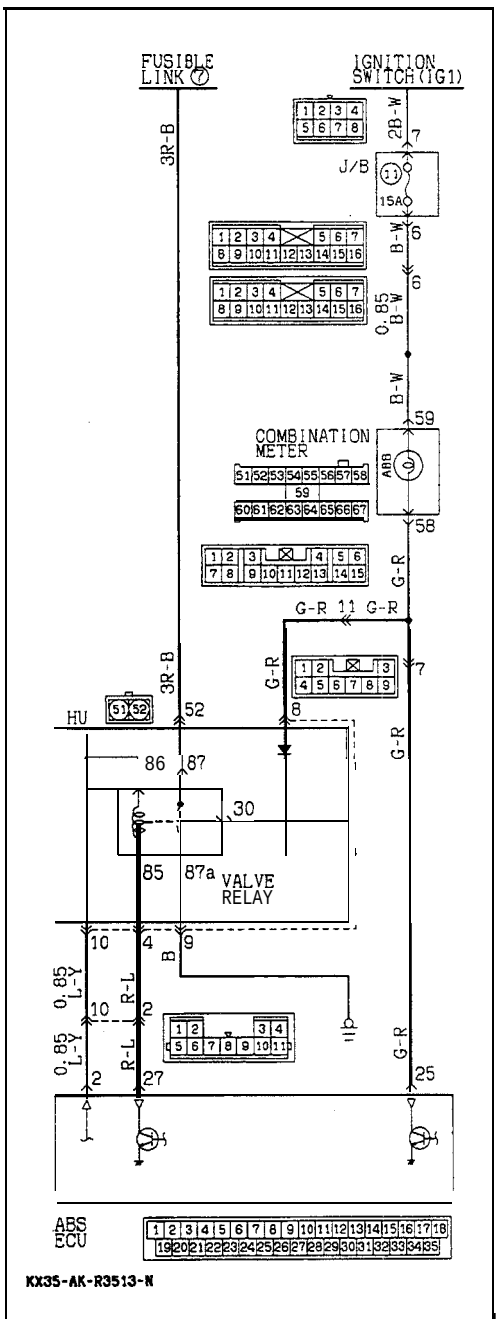
This is the symptom when the ABS ECU does not power up due to broken ECU power circuit, etc., when the fail safe function operates and isolates the system or when the warning light drive circuit is short circuited.

[Hint]

Check the on-board diagnostic output and if there is no output voltage or if the scan tool and ABS ECU cannot communicate, there is a good possibility that power is not flowing to the ECU.

Caution

- **If the diagnostic trouble code is output, the system can be in the fail safe mode. In such a case, erase the diagnostic trouble code and then restart the engine to check if the system is currently in a fault condition.**



Is there on-board diagnostic output? (Is there communication with scan tool?)
- No → On vehicles produced up to Oct. 1994, refer to P.35-16. On vehicles produced from Nov. 1994, refer to P.35-17.
- Yes ↓

Does diagnostic trouble code output display normal codes?
- No → Check, using the diagnostic trouble code check chart (Refer to P.35-21.).
- Yes ↓

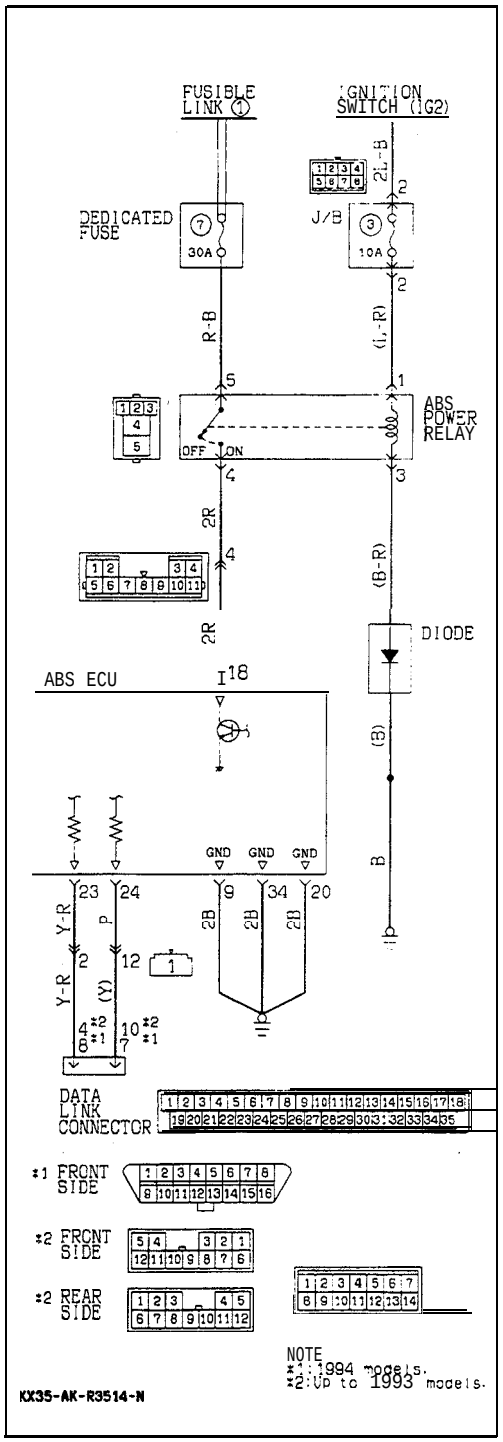
Does the ABS warning light remain illuminated even with the ECU connector disconnected?
- No → Short in ECU transistor → Replace ECU.
- Yes ↓

Does the ABS warning light remain illuminated even with the HU connector disconnected?
- No → Short in HU harness or sticking of valve relay contact → Replace HU or replace valve relay.
- Yes ↓

Short-circuit in harness between HU or ECU and ABS warning light
- No → Repair harness or replace combination meter.

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<Models produced up to Oct. 1994>



CONTINUED FROM PREVIOUS PAGE

Can other electronic control systems communicate with scan tool?
- No → Scan tool related malfunction. Repair and recheck.
- Yes ↓

Is fuse No. 3 normal?
- No → Correct cause of blown fuse and replace fuse.
- Yes ↓

Is power relay normal? (Refer to P.35-82.)
- No → Power relay malfunction → Replace power relay.
- Yes ↓

Disconnect ECU connector and check harness connector

With the ignition key in the "ON" position, does voltage between ECU connector terminal No. 18 and ground indicate the battery positive voltage?
- No → Harness wire between power relay and ECU is broken → Repair harness.
- Yes ↓

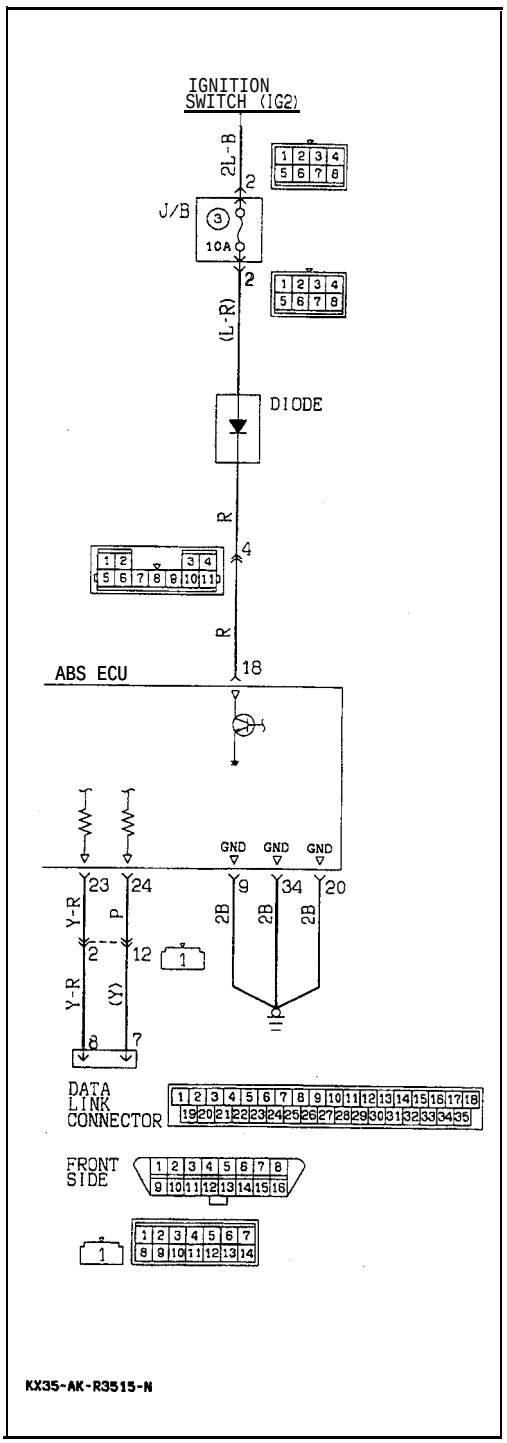
Is there continuity between body harness terminals No. 9 and No. 34, and ground?
- No → ECU ground line broken → Repair harness.
- Yes ↓

Is there continuity between body harness connector terminals No. 23 and No. 24, and diagnosis inspection terminals No. 4 & No. 10 or No. 7 & No. 8?
- No → Harness wire between diagnosis inspection terminal and ABS ECU is broken → Repair harness.
- Yes ↓

Malfunction of ABS ECU → Replace ABS ECU.

TSB Revision

<Models produced from Nov. 1994>



CONTINUED FROM PREVIOUS PAGE

Can other electronic control systems communicate with scan tool?
- No → Scan tool related malfunction. Repair and recheck.
- Yes ↓

Is fuse No. 3 normal?
- No → Correct cause of blown fuse and replace fuse.
- Yes ↓

Disconnect ECU connector and check harness connector

With the ignition key in the "ON" position, does voltage between ECU connector terminal No. 18 and ground indicate the battery positive voltage?
- No → Harness wire between multi-purpose fuse No. 3 and ECU is broken → Repair harness.
- Yes ↓

Is there continuity between body harness terminals No. 9 and No. 34, and ground?
- No → ECU ground line broken → Repair harness.
- Yes ↓

Is there continuity between body harness connector terminals No. 23 and No 24, and diagnosis inspection terminals No. 7 & No. 8?
- No → Harness wire between diagnosis inspection terminal and ABS ECU is broken. → Repair harness.
- Yes ↓

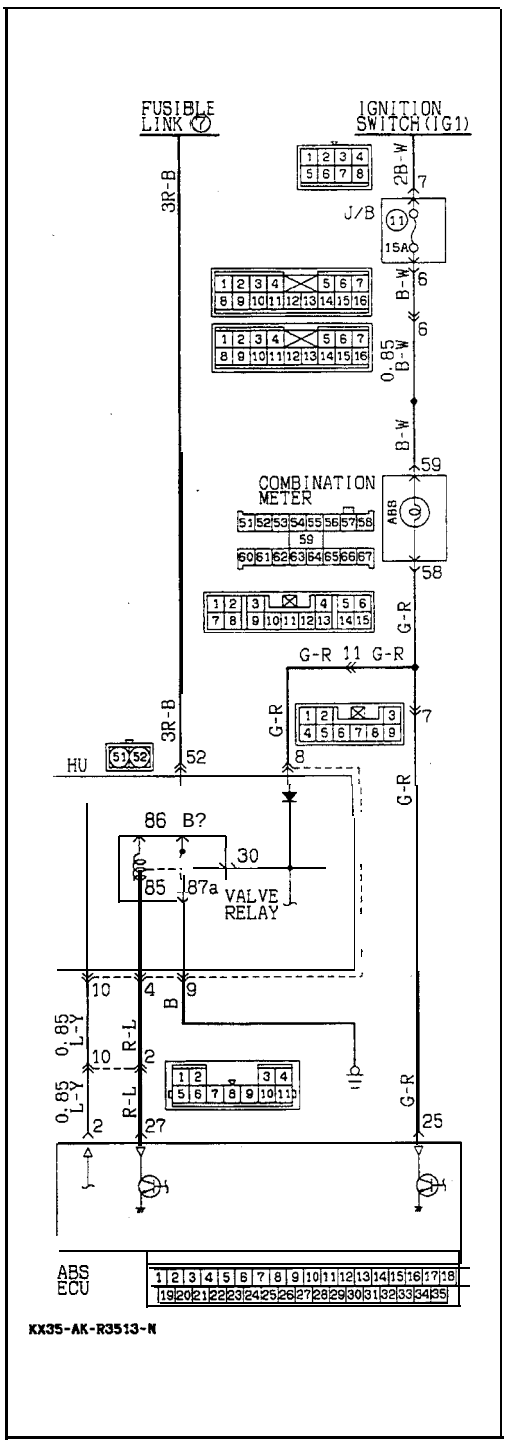
Malfunction of ABS ECU → Replace ABS ECU.

TSB Revision

C ABS warning light does not illuminate when the ignition key is in the "START" position.

[Explanation]

The ABS ECU uses the IG_2 power source which is turned off in the "START" position. The ABS warning light uses the IG_1 power source which is not turned off **even** in the "START" position. Consequently, in the "START" position power is off and the ECU turns the valve relay OFF. If the warning light does not illuminate at this time, there is trouble in the warning light circuit on the valve relay side.



Remove the No. 3 fuse from the junction box to turn off power to the ABS-ECU. Disconnect the hydraulic unit connector (A-64) and the ABS valve relay connector (A-65). Inspect the harness side of both connectors for damage to the terminal pins. Repair terminal pins as needed.

↓

With the ignition key in the "ON" position, does voltage between body connector terminal No. 8 and ground indicate the battery positive voltage?

- No → Harness wire between HU and warning light is broken.
- Yes ↓

Is there continuity between body connector terminal No. 9 and ground?

- No → Broken line between HU and body ground
- Yes ↓

Is there continuity between HU connector terminal No. 8 and terminal No. 9? *

- No → Valve relay malfunction or break in HU harness wire
- Yes ↓

Remove the valve relay. Is there continuity between terminal No. 87a and No. 30?

- No → Valve relay malfunction → Replace valve relay.
- Yes ↓

HU harness malfunction → Replace HU.

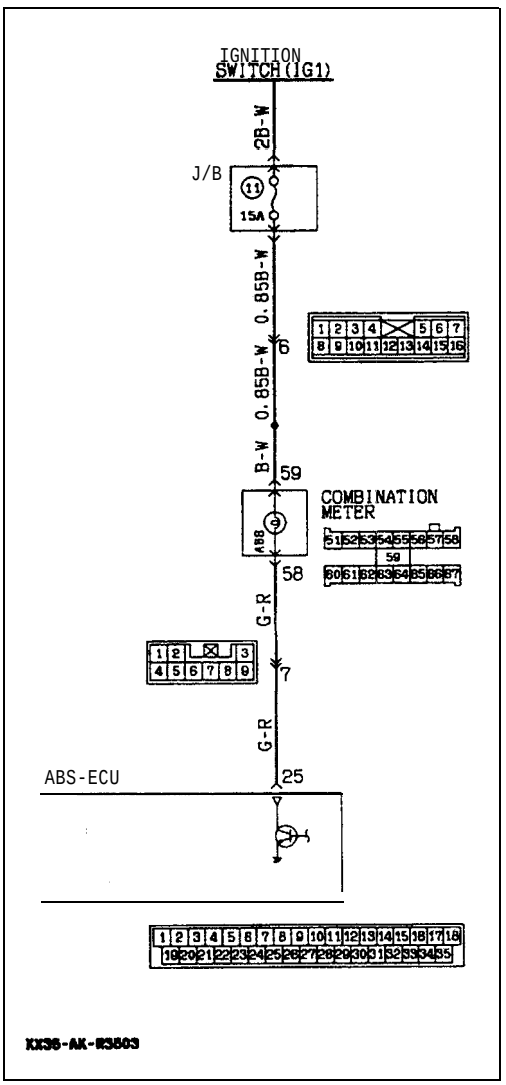
NOTE
When performing the check marked *, note polarity of the diode (refer to the circuit diagram).

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D **ABS warning light blinks once after the ignition key is turned to the "ON" position. It illuminates in the "START" position and blinks once again when turned to the "ON" position.**

[Explanation]

When power flows, the ABS ECU turns on the warning light for approximately 1 sec. while it performs a valve relay test. If there is a break in the harness between the ECU and the warning light, the light illuminates only when the valve relay is off in the valve relay test, etc.



Disconnect the hydraulic unit connector (A-64) and the ABS-ECU connector (E-12).
Inspect the harness' side of both connectors for damage to individual terminal pins.
Repair terminal pins as needed.

↓

In the ignition key "ON" position, does voltage between terminal No. 25 and ground indicate battery positive voltage?

No → Harness wire between ABS warning light and ECU is broken.

↓

Repair harness.

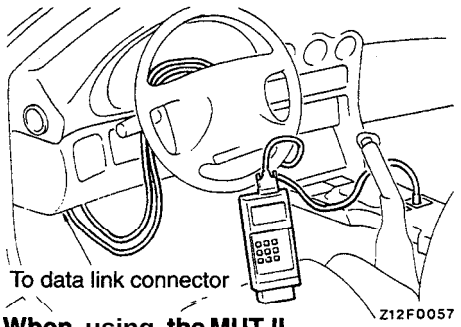
Yes ↓

[Malfunction of ABS ECU

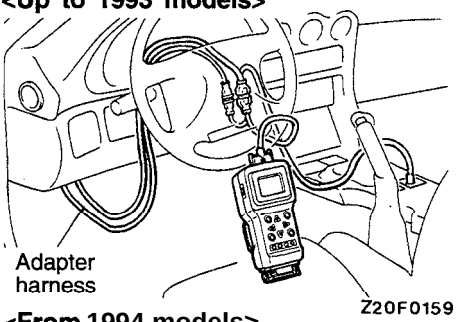
Replace ABS ECU.

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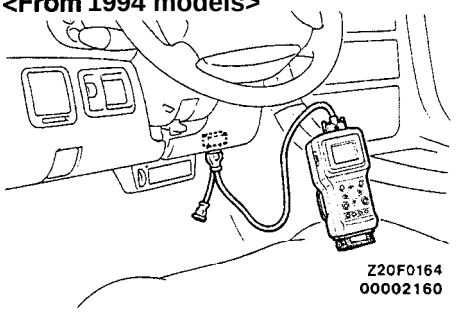
When using the MUT



When using the MUT-II <Up to 1993 models>



<From 1994 models>



CHECK USING ON-BOARD DIAGNOSTIC

When using the scan tool [Multi-use tester (MUT) <Up to 1993 models> or MUT-II <All models>]

(1) With the ignition switch OFF, connect the scan tool. When connecting the scan tool (MUT-II) to a 1993 model vehicle, use the adapter harness supplied together.

Caution
Turn off the ignition switch beforehand whenever the scan tool is connected or disconnected.

Turn the ignition ON and select the ABS system. (The ABS warning light lights up, it goes into the scan tool mode. **In the scan tool mode, ABS does not function.)** If it does not go into the scan tool mode, check the ECU power circuit and the harness between the ECU and diagnostic output terminals.

(2) Read the on-board diagnostic output codes from the ECU memory.

(3) Clear the diagnostic trouble codes once from memory. (Refer to P.35-11.)
If the memory cannot be cleared, the ECU is currently detecting the trouble and the ABS ECU is in fail safe. If it can be cleared, the trouble is either temporary or appears only when driving.

(4) When the diagnostic trouble codes cannot be cleared, or when the ABS ECU goes into fail safe during another test drive and diagnostic trouble codes are output, check according to diagnostic trouble code check charts (E-I -E-6).

DIAGNOSTIC TROUBLE CODE CHART

Diagnostic trouble code	Scan tool display letters	Check chart name or remedy	Reference page	Diagnostic trouble code	Scan tool display letters	Check chart name or remedy	Reference page
11	FL SNSR. OPEN	E-1	P.35-21	41	FL SOL. VALVE	E-4	P.35-24
12	FR SNSR. OPEN			42	FR SOL. VALVE		
13	RL SNSR. OPEN			43	REAR SOL. V.		
14	RR SNSR. OPEN			51	VALVE RELAY	E-5	P.35-25
15	VEH. SPD. SNSR.	E-2	P.35-21	52	MOTOR RELAY	E-6	P.35-26
22	STOP LAMP SW	E-3	P.35-23	55	CONT. UNIT	ECU replacement	–

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E-I When the following diagnostic trouble codes are displayed "11 FL SNSR. OPEN" "12 FR SNSR. OPEN" "13 RL SNSR. OPEN" "14 RR SNSR. OPEN"

[Explanation]

The ABS ECU detects breaks in the wheel speed sensor wire. This trouble code is output if the wheel speed sensor signal is not input (or short circuited) or if its output is low when starting to drive or while driving.

[Hint]

In addition to a broken wire/short circuit in the wheel speed sensor, also check whether the sensor gap is too large, sensor harness wire is broken, or sensor harness and body connector are not properly connected.

E-2 When diagnostic trouble code "15 VEH. SPD. SNSR." is displayed

[Explanation]

This trouble code is output when there is an abnormality (other than broken wire or short circuit) in any of the wheel speed sensor output signals while driving.

[Hint]

The following can be considered as the cause of the wheel speed sensor output abnormality.

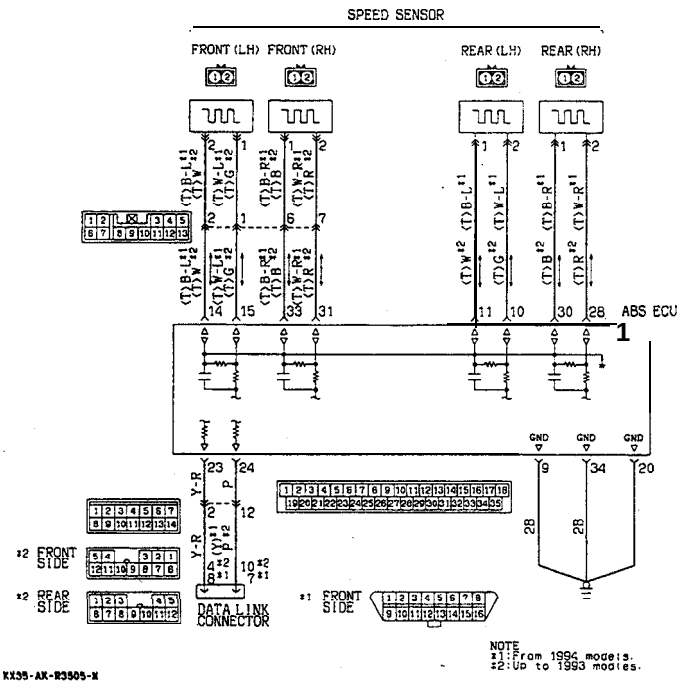
- Distortion of rotor, teeth missing
- Low frequency noise interference when sensor harness wire is broken
- Noise interference in sensor signal
- Sensor output signal is below the standard value or amplitude modulation is over the standard value. Using an oscilloscope to measure the wave shape of the wheel speed sensor output signal is very effective.
- Broken sensor harness
- Poor connection of connector

NOTE

(1) If contact is poor, check the sensor cable by bending and lightly stretching it.

(2) Except for the case where a fault condition exists in the system, but the inspection results are normal; if an abnormality cannot be found in the sensor circuit displayed as abnormal, erase the diagnostic trouble code and turn the ignition switch to OFF once, and then test-drive* again.
If the same diagnostic trouble code is output, replace the ABS ECU. If the trouble does not occur anymore, the problem is likely to be with the ABS ECU.
(If the trouble is in the speed sensor circuit, but is difficult to recreate, it will recur even after the ABS ECU has been replaced.)

(3) *: Drive at 19 mph or higher for more than 30 seconds.



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Check flow connected with wheel speed sensor

NOTE
When checking with an oscilloscope, first measure voltage variations in the wheel speed sensor output. (Refer to P.35-75.)

Is the resistance value of the wheel speed sensor part normal?
Standard value:
Front 0.8–1.2 kΩ
Rear 0.6–0.8 kΩ

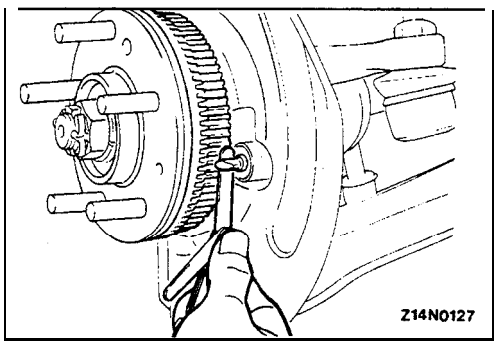
No → Malfunction of wheel speed sensor → Replace wheel speed sensor

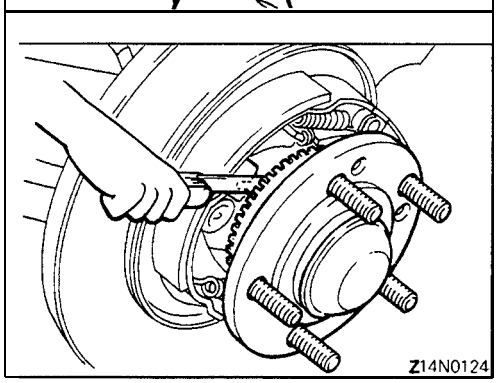
Yes ↓

Is the resistance value with the ECU connector normal?
Standard value:
Front 0.8–1.2 kΩ
Rear 0.6-0.8 kΩ

No → Harness wire for wheel speed sensor circuit is broken → Repair harness.

Yes





Is the standard value for the gap between the wheel speed sensor and rotor within the range?
Standard value:
Front 0.3-0.9 mm (.012–.035 in.)
Rear 0.2-0.7 mm (.008–.028 in.)

No → Adjust the gap between the wheel speed sensor and rotor.

Yes ↓

Is the wheel speed sensor rotor normal, with no missing or damaged teeth?

No → Replace rotor that has missing or damaged teeth.

Yes ↓

Check the output of each wheel speed sensor with an oscilloscope, including the waveform. (Refer to measurement of wheel speed sensor output voltage variations on P.35-75.)
Is the output voltage for each wheel speed sensor over the standard value and is the waveform normal?

No → Recheck if below the standard value or if the sensor has a poor waveform. Replace sensor or rotor.

Yes ↓

If the above checks are normal, there is a malfunction of ABS ECU when this diagnostic trouble code re-occurs often.

→ Replace the ABS ECU and check that the trouble code does not reoccur.

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E-3 When diagnostic trouble code "22 STOP LAMP SW" is displayed

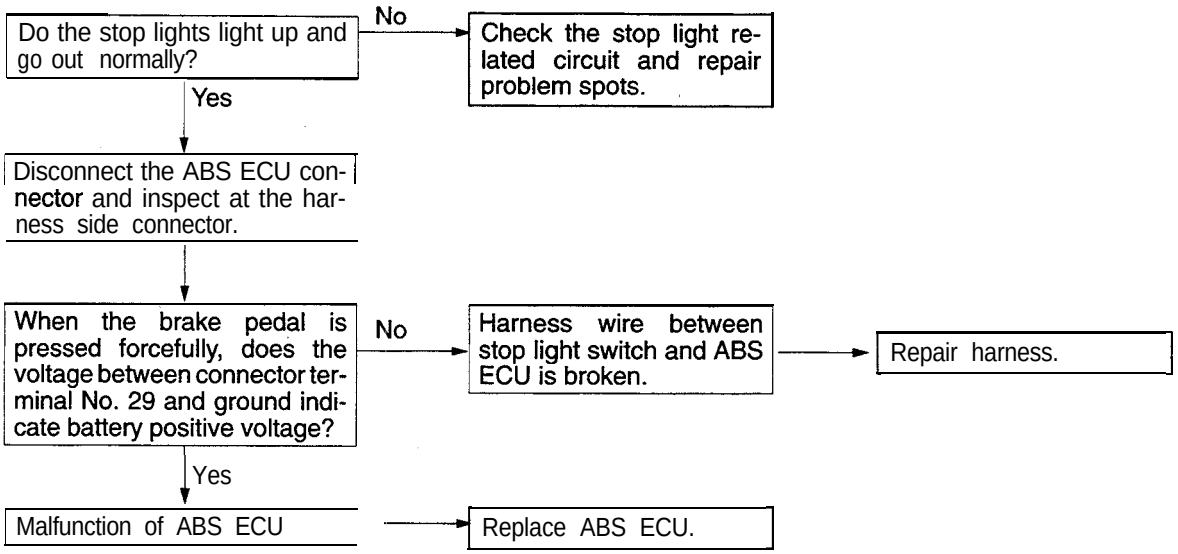
[Explanation]

The ABS ECU outputs this diagnostic trouble code in the following cases.

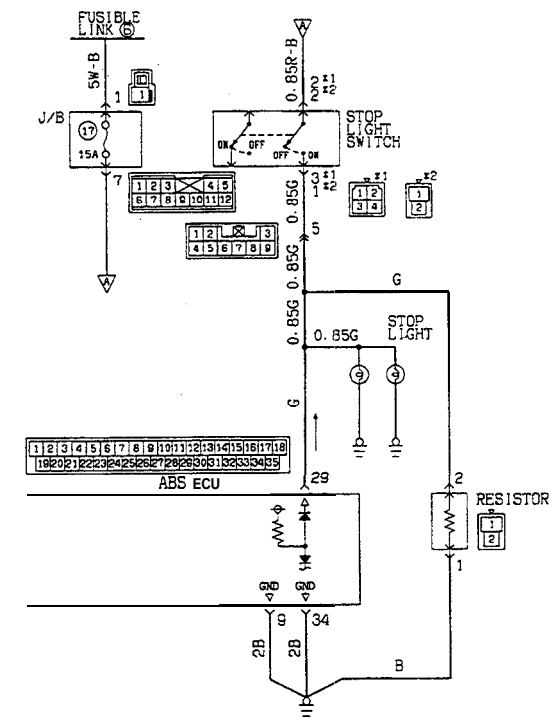
- Stop light switch may remain on for more than 15 minutes without ABS operation.
- The harness wire for the stop light switch may be open.

[Hint]

If the stop light operates normal, the harness for the stop light switch input circuit is broken or there is a malfunction in the ABS ECU.



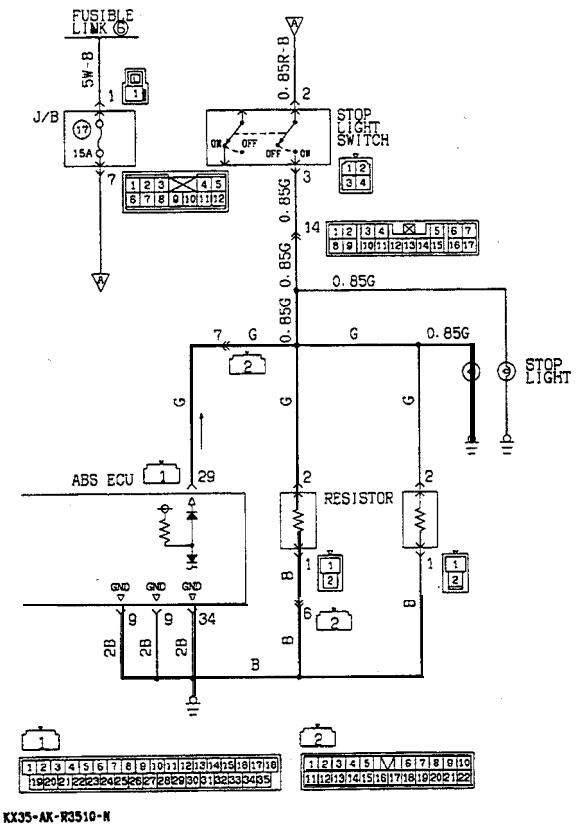
<Hatchback>



NOTE
*1: VEHICLES WITH AUTO-CRUISE CONTROL SYSTEM
*2: VEHICLES WITHOUT AUTO-CRUISE CONTROL SYSTEM

KX35-AK-R3508-N

<Conventible>



KX35-AK-R3510-N

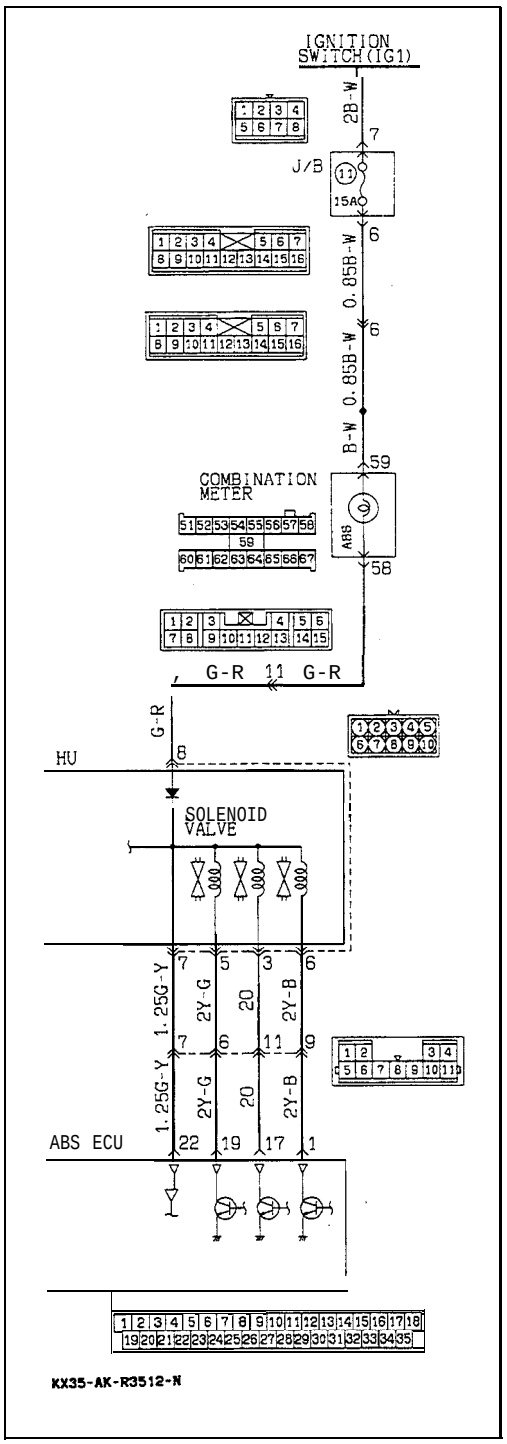
00002529

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E-4 **When diagnostic trouble codes "41 FL SOL. VALVE", "42 FR SOL. VALVE" or "43 REAR SOL. V." are displayed.**

[Explanation]

The ABS ECU normally monitors the solenoid valve drive circuit.
If no current flows in the solenoid even if the ECU turns the solenoid ON or if it continues to flow even when turned OFF, the ECU determines the solenoid coil wire is broken/short-circuited or the harness is broken/short-circuited, and then these diagnostic trouble codes are output.



Remove HU 10P connector and check with the HU side connector.

↓

Is the resistance value for the solenoid valve within the range of the standard values?
Standard value: 1.0–1.3 Ω

No → Replace HU.

Yes ↓

Connect HU 10P connector, disconnect ECU connector and check.

↓

Is the solenoid valve resistance value within the range of the standard values when measured at the ECU connector?
Standard value: 1.0–1.3Ω

No → The harness wire for the solenoid valve circuit whose resistance value is outside the range of the standard value is broken or short circuited.

→ Repair ABS harness.

Yes ↓

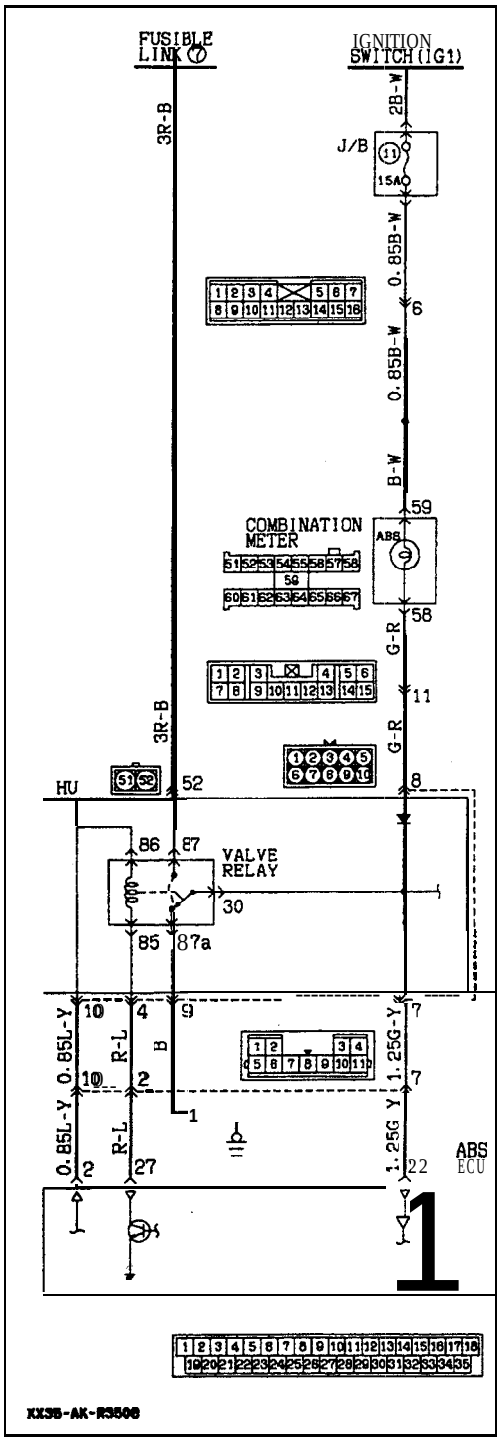
Malfunction of ABS ECU → Replace ABS ECU.

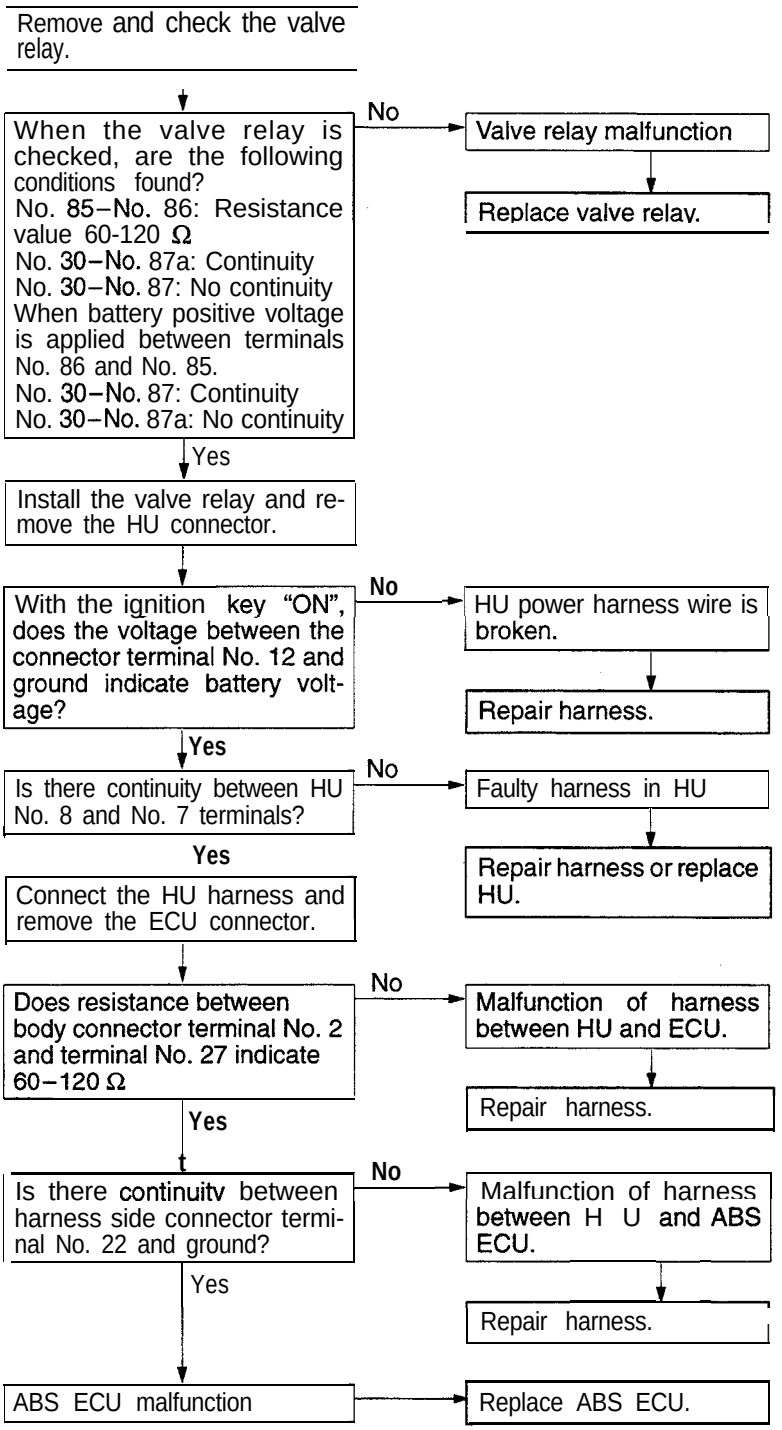
TSB Revision

E-5 When diagnostic trouble code "51 VALVE RELAY" is displayed

[Explanation]

When the ignition switch is turned ON, the ABS ECU switches the valve relay OFF and ON for an initial check, compares the voltage of the signal to the valve relay and valve power monitor line voltage to check whether the valve relay operation is normal. In addition, normally it monitors whether or not there is power in the valve power monitor line since the valve relay is normally ON. Then, if the supply of power to the valve power monitor line is interrupted, this diagnostic trouble code will be output.





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E-6 When diagnostic trouble code "52 MOTOR RELAY" is displayed

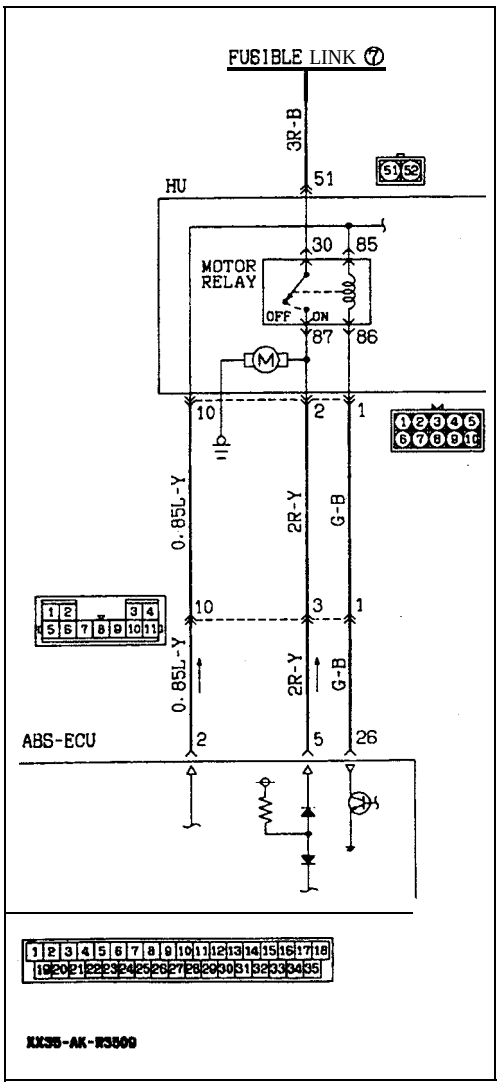
[Explanation]

The ABS ECU outputs this diagnostic trouble code for the motor relay and motor in the following cases.

- When the motor relay does not function
- When there is trouble with the motor itself and it does not revolve
- When the motor ground line is disconnected and the motor does not revolve
- When the motor continues to revolve

[Hint]

If there is motor operation noise during scan tool forced drive mode, there is a broken or short circuited motor monitor wire.



Does the motor make a noise during scan tool forced drive mode?
- Yes → Broken wire or short circuit in motor monitor line → Repair the harness between HU and ECU.
- No → Remove the motor relay.

Remove the motor relay and check resistance values.
No. 85–No. 86: Resistance value 72-88 Ω
No. 30–No. 87: No continuity
Battery positive voltage is applied between terminals No. 85 and No. 86.
No. 30–No. 87: Continuitv
- No → Motor relay malfunction → Replace motor relay.
- Yes → Is pump motor ground connected normally?
  - No → Connect ground wire.
  - Yes → Install motor relay and remove HU connector.

Does voltage between body connector terminal 11 and ground indicate battery positive voltage?
- No → Broken wire in pump motor power circuit → Repair harness.
- Yes → Is resistance between HU connector terminals No. 10 and No. 1: 72–88 Ω?
  - No → Harness in HU faulty → Repair harness or replace HU.
  - Yes → Connect the HU connector and remove the ECU connector

Is resistance between body connector terminal No. 2 and No. 26: 72-88 Ω?
- No → Malfunction of harness between HU and ECU → Repair harness.
- Yes → Is resistance between body connector terminal No. 5 and ground 0.1–0.3 Ω?
  - No → Malfunction of harness between HU and ECU → Repair harness.
  - Yes → ABS ECU malfunction → Replace ABS ECU.

TSB Revision

TROUBLESHOOTING (ABS-AWD)

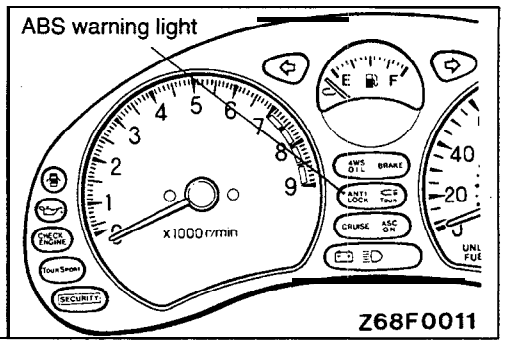
Confirm condition in the following way and diagnosis accordingly.

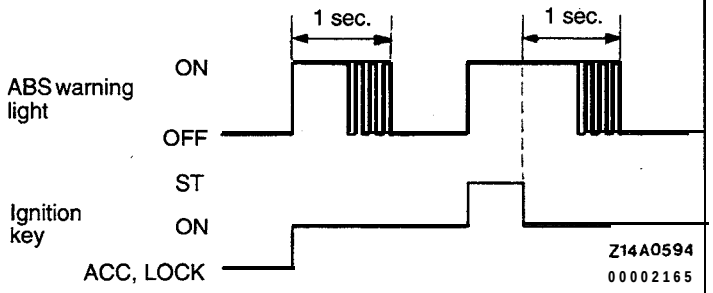
Does the ABS warning light illuminate as described below up to the time the engine starts?

(1) When the ignition key is turned to the "ON" position, the ABS ECU causes the ABS warning light to flash four times in about one second (during which the valve relay self check is made) and then causes it to go out.

(2) With the ignition key in the "START" position, power to the ABS ECU is interrupted and the ABS warning light remains lit because the valve relay is OFF.

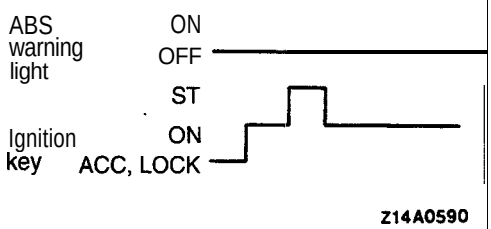
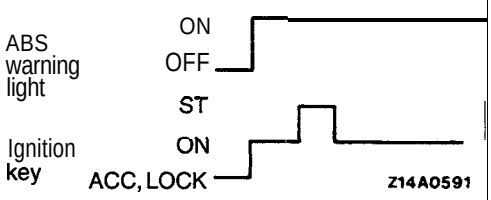
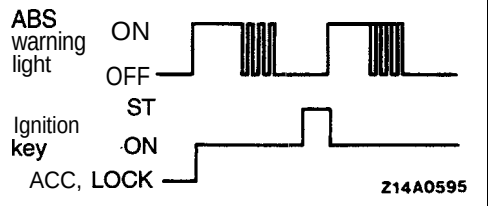
(3) When the ignition key is returned from the "START" position to the "ON" position, the ABS warning light flashes four times in about one second (during which the valve relay self check is made again) and then goes out.



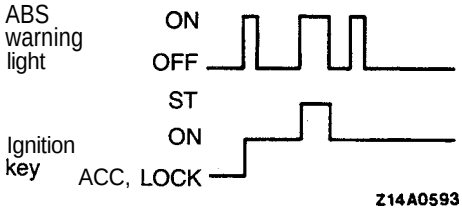


Yes → CONTINUED ON NEXT PAGE

No

No.	Trouble condition	Major causes	Remedy
1	ABS warning light does not light up at all. 	• ABS warning light bulb is burnt out. • Open in ABS warning light electrical circuit (check for blown fuse)	Check, using flow chart A (Refer to P.35-31.)
2	When the ignition key is turned to the "ON" position, it remains lighted. 	• Fail safe is functioning due to ECU self diagnosis. • Short in ECU warning light drive circuit • Malfunction of ECU	Check, using flow chat-l B (Refer to P.35-34.)
3	Does not illuminate when ignition key is in "START' position. 	• Malfunction of valve relay • Break in harness between ABS warning light and HU • Break in harness between HU and body ground	Check, using flow chart C (Refer to P.35-37.)

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No.	Trouble condition	Major causes	Remedy
4	After the ignition key is turned to the "ON" position, it blinks once and then illuminates when it is turned to the "START' position. When the key is returned to the "ON" position, the light blinks again. (Blinking with the ignition key in the "ON" position is synchronized with operation noise of the valve relay.) ABS warning light: ON / OFF Ignition key: ST / ON / ACC, LOCK  Z14A0593	• Break in harness for ECU warning light drive circuit • Malfunction of ECU	Check, using flow chart D (Refer to P.35-38.)

CONTINUED FROM PREVIOUS PAGE

Does the ABS warning light illuminate when starting to drive the car?

Yes → Trouble with the motor relay, solenoid valve [due to self test at start-up or malfunction of wheel speed sensor]

No

Is there one-sided braking, insufficient braking force or malfunction of ABS operation?

No → CONTINUED ON NEXT PAGE

Yes

Trouble condition	Major causes	Remedy
One-sided braking Insuff icient braking force	• Hydraulic line in HU is clogged. • Mechanical lock of HU solenoid valve	Check HU operation and, if necessary, replace HU. If HU is normal, check structural parts for normal braking.
Decline in ABS function	• Hydraulic line in HU is clogged. • Malfunction in HU solenoid valve operation	
ABS sometimes functions even when there is no sudden braking. (ABS operation vibration is transmitted.)	• Insufficient wheel speed sensor output voltage (sensor malfunction, too large a gap between sensor rotor, missing rotor teeth) • Malfunction of ABS ECU	Check wheel speed sensor (Refer to P.35-60.) and, if necessary, replace sensor, adjust gap or replace rotor. If tests indicate that there are no mechanical or electrical failures, replace the ECU.

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CONTINUED FROM PREVIOUS PAGE

After a test drive, use on-board diagnostic to check (Refer to P.35-39.).

No diagnostic trouble codes output and normal codes are displayed?

No — No on-board diagnostic output → Check and repair the harness between the ABS ECU serial/ on-board diagnostic output terminals and the diagnosis check connector.

No — Diagnostic trouble codes are output

Yes

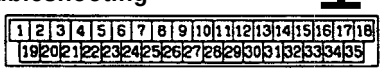
There was trouble in the past.
NOTE
Store diagnostic trouble codes in the memory.

→ Referring to the diagnostic trouble code check chart E-I-E-7, make the diagnostic trouble code reoccur to discover the main cause of intermittent or other trouble.

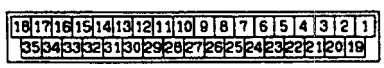
→ If trouble does not reappear, watch vehicle movements until it reappears. (Refer to P.35-30.)

All ABS functions are normal. (Nor are there stored memory of past diagnostic trouble code.)

Connector terminal No. layout for troubleshooting



Terminal No. layout shown on the special tool connector



00002535

Caution

1. **When carrying out inspection of the ABS-ECU terminal voltage and resistance, the special tool (MB991356) should be used.**
2. **Because the ABS-ECU connector terminal No. layout for troubleshooting is different from the terminal No. layout shown on the special tool connector, when using the special tool for inspecting, take the readings from the special tool terminal Nos.**

Example

ABS-ECU connector terminal No. for troubleshooting	Terminal No. shown on the special tool connector
18	1

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METHOD OF CLEARING DIAGNOSTIC TROUBLE CODE MEMORY

Caution

- **When servicing is finished, clear the diagnostic trouble code memory**

Diagnostic trouble codes cannot be cleared from memory when the ABS-ECU system is in fail safe mode. Proceed to diagnosis and repair.

(1) Clear memory using scan tool.
(No. 7 "DIAG. ERASE" in the actuator test is selected to erase the diagnostic trouble code.)
(2) After clearing, recheck the diagnostic trouble codes, and check that memory is cleared.

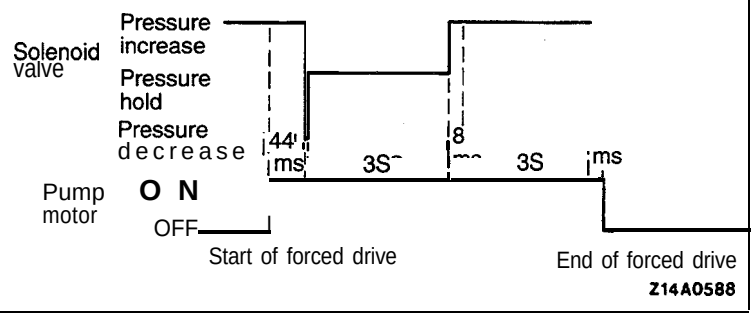
ACTUATOR TEST FUNCTION

The actuator can be forcibly driven in the following way by using the scan tool.

NOTE

- The actuator test cannot be carried out when the ABS ECU system is in fail safe mode.
- When using forced drive using the scan tool, the vehicle must be stopped.
- During forced drive using the scan tool, forced drive operation is stopped when any wheel speed reaches 10 km/h (6 mph).

Actuator test specifications

No.	Scan tool display	Drive solenoid valve and motor	Drive pattern
01	FR VALVE A	Not used	
02	FL VALVE A		
04	FR VALVE M	Solenoid valve and pump motor for each HU corresponding channel. <Manual pattern>	
05	FL VALVE M		

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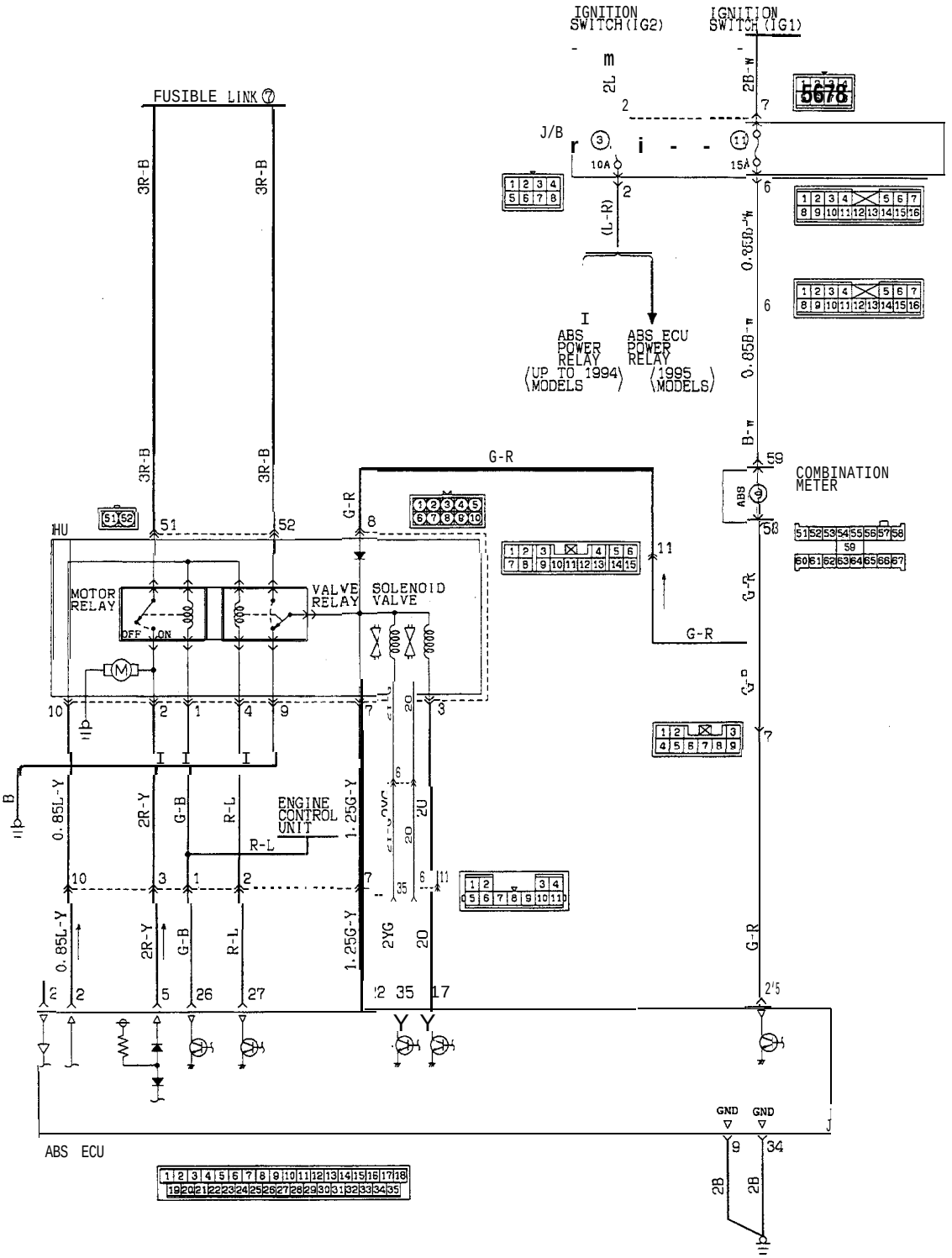
A ABS warning light does not light at all.

[Explanation]

When it does not light up at all, there is a strong possibility that there is trouble with ABS warning light or with power to the light.

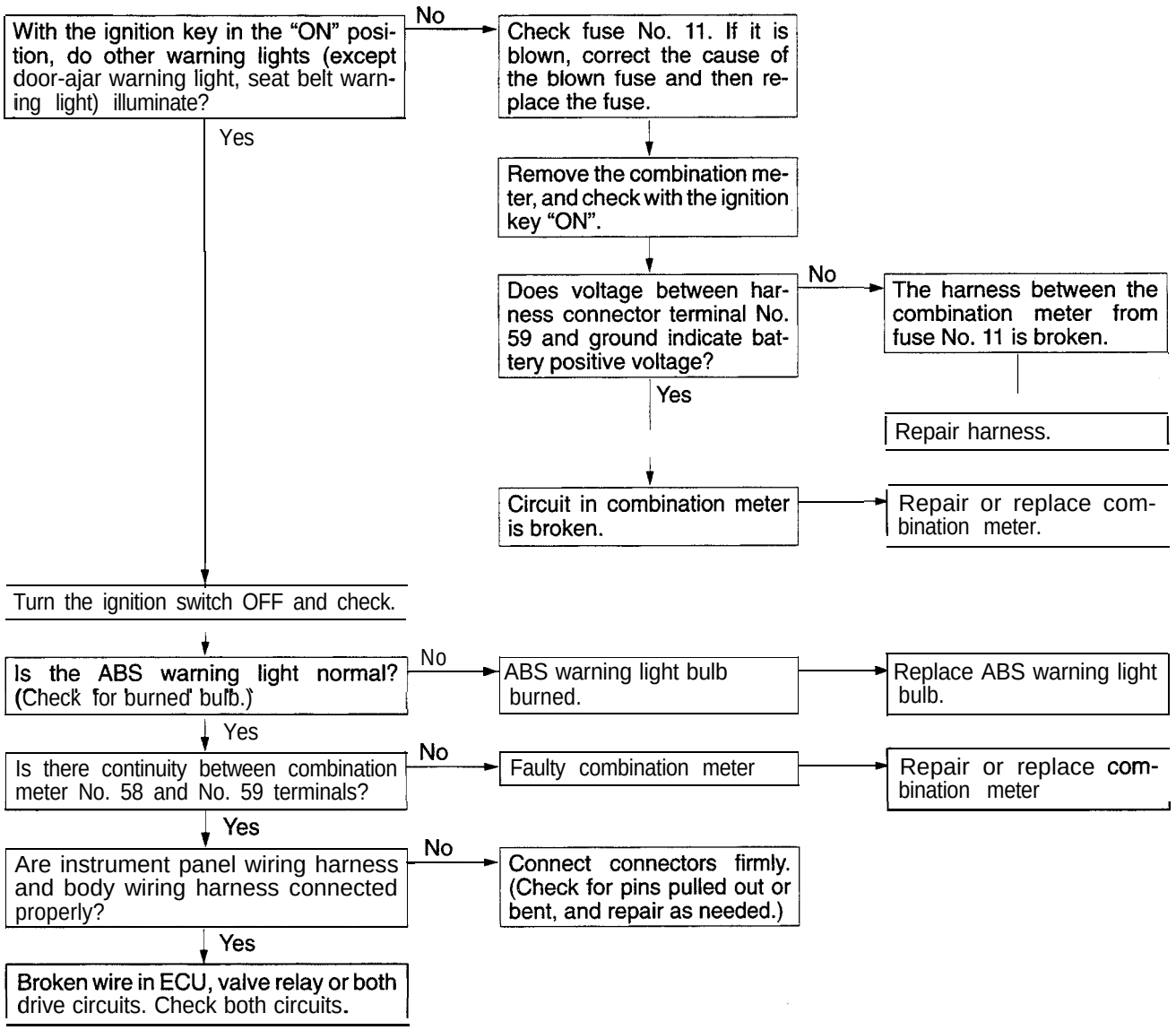
[Hint]

If other. warning lights do not light up either, fuse is probably blown.



KX35-AK-R3501-N

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Check ABS ECU.

↓

Remove the ECU connector and check.

↓

Does the voltage between ECU harness connector terminal No. 25 and ground indicate battery positive voltage while the ianition kev is in the "ON" oosition?

No → Broken wire between ABS warning light and ECU → Repair harness.

Yes → ABS ECU malfunction → Replace ABS ECU.

Check valve relav.

↓

Remove valve relay and check.

↓

Is valve relay normal? (Refer to P.35-83.)

No → Valve relay malfunction → Replace valve relay.

Yes ↓

Install the valve relay, remove the HU connector and check.

↓

Does voltage between the HU harness connector terminal No. 8 and ground indicate battery positive voltage while the ignition key is in the "ON" position?

No → Broken harness wire between ABS warning light and HU → Repair harness.

Yes ↓

Is there continuity between HU harness connector terminal No. 9 and ground?

No → Broken harness wire between HU and ground → Repair harness.

Yes ↓

Is there continuity between HU harness connector terminals No. 8 and No. 9?

No → HU malfunction- Replace HU.

Yes → Connector not connected securely. → Replace connector.

TSB Revision

B ABS warning light stays on when the ignition key is in the "ON" position.

[Explanation]

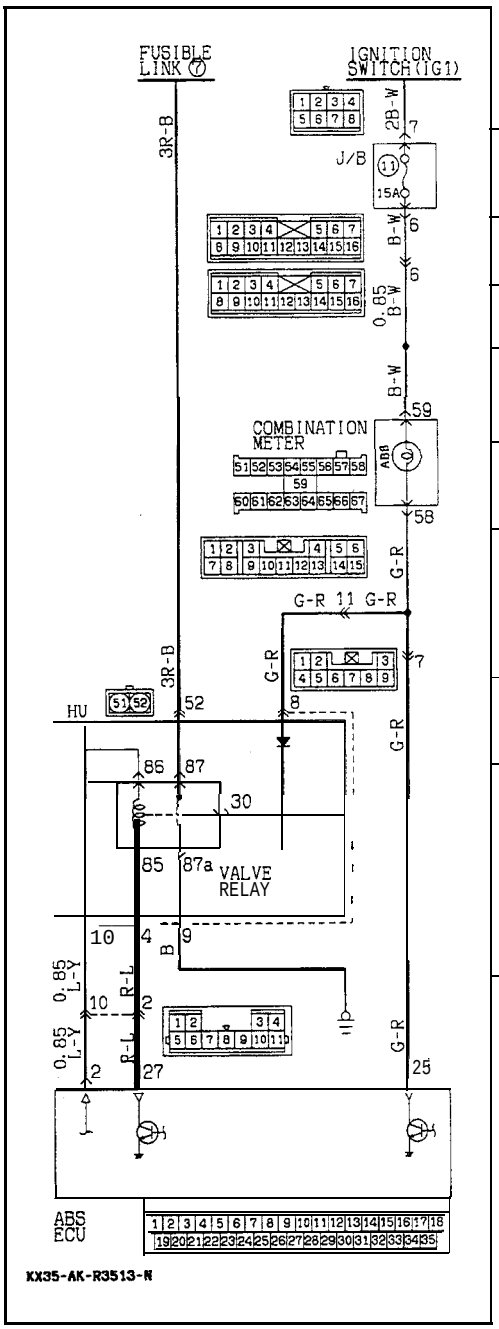
This is the symptom when the ABS ECU does not power up due to broken ECU power circuit, etc., when the fail safe function operates and isolates the system or when the warning light drive circuit is short circuited.

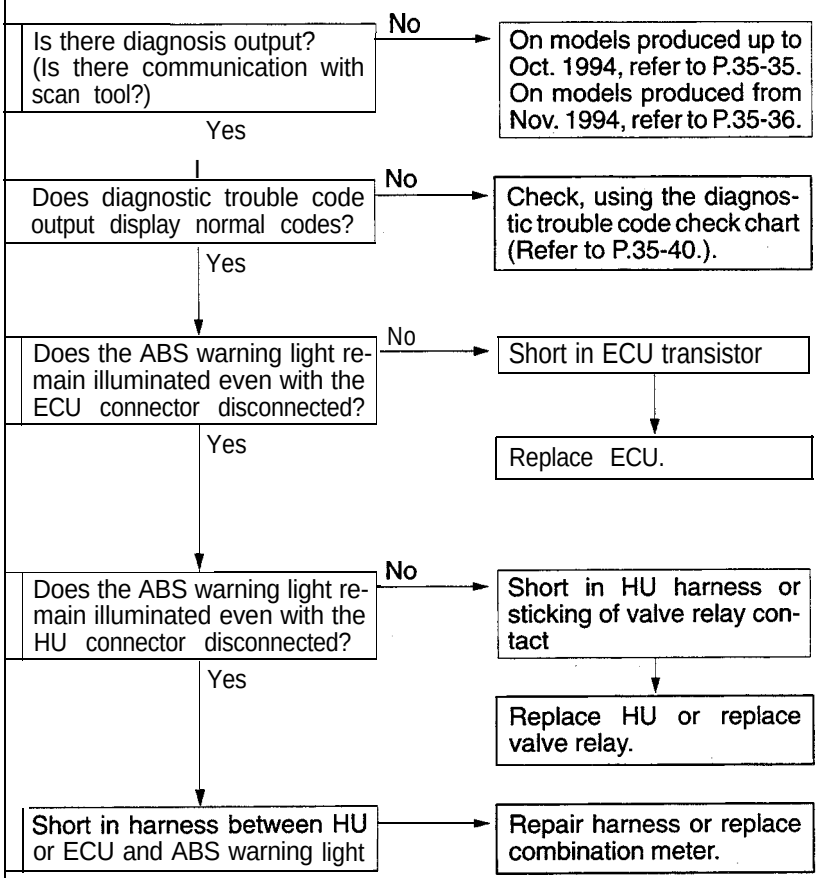
[Hint]

Check the on-board diagnostic output and if there is no output voltage or if the scan tool and ABS ECU cannot communicate, there is a good possibility that power is not flowing to the ECU.

Caution

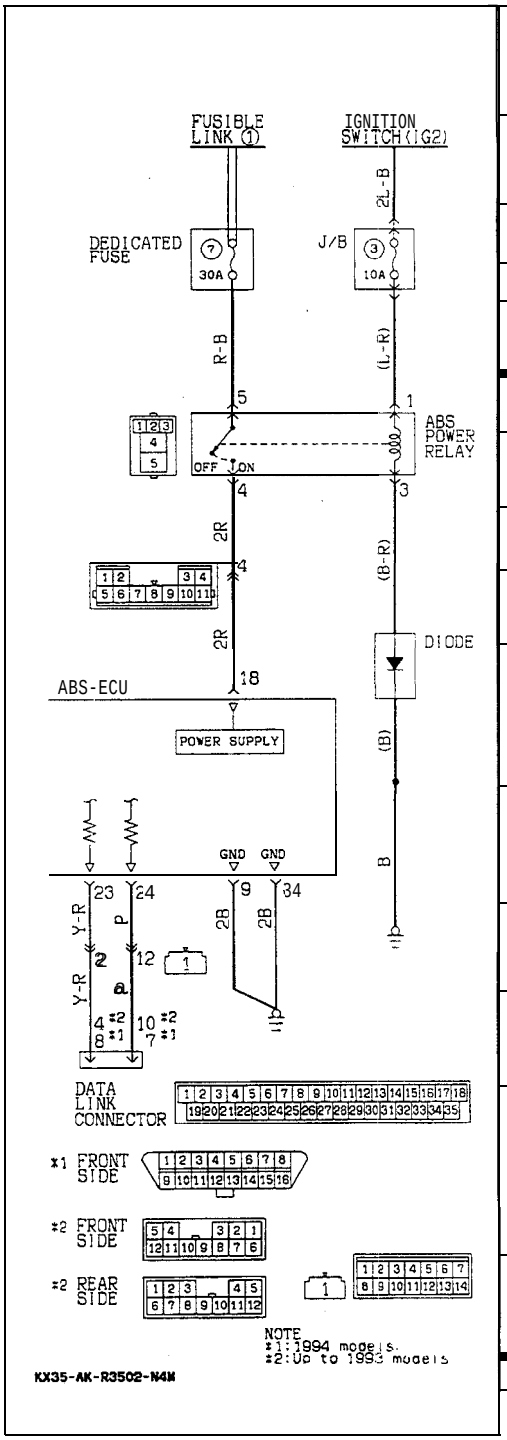
- **If the diagnostic trouble code is output, the system can be in the fail safe mode. In such a case, erase the diagnostic trouble code and then restart the engine to check if the system is currently in a fault condition.**





TSB Revision

<Models produced up to Oct. 1994>



CONTINUED FROM PREVIOUS PAGE

Can other electronic control systems communicate with scan tool?
- No → Scan tool related malfunction. Repair and recheck.
- Yes ↓

is fuse No. 3 normal?
- No → Correct cause of blown fuse and replace fuse.
- Yes ↓

Is power relay normal? (Refer to P.35-65.)
- No → Power relay malfunction → Replace power relay.
- Yes ↓

Disconnect ECU connector and check harness connector

With the ignition key in the "ON" position, does voltage between ECU connector terminal No. 18 and ground indicate the battery positive voltage?
- No → Harness wire between power relay and ECU is broken → Repair harness.
- Yes ↓

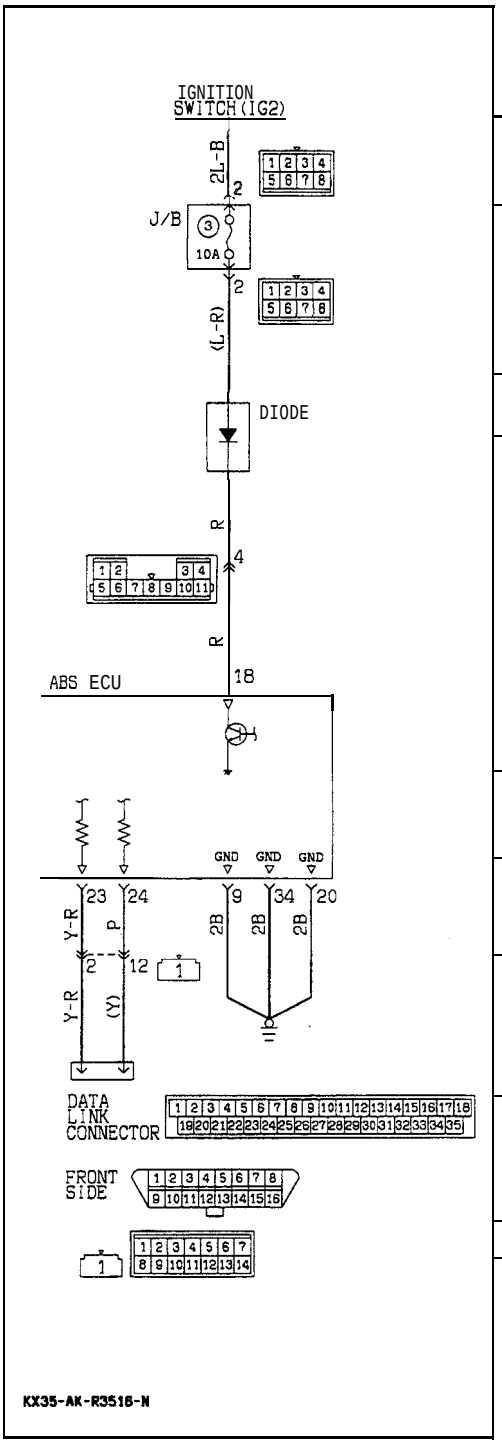
Is there continuity between body harness terminals No. 9 and No. 34, and ground?
- No → ECU ground line broken → Repair harness.
- Yes ↓

Is there continuity between body harness connector terminals No. 23 and No. 24, and diagnosis inspection terminals No. 4 & No. 10 or No. 7 & No. 8?
- No → Harness wire between diagnosis inspection terminal and ABS ECU is broken. → Repair harness.
- Yes ↓

Malfunction of ABS ECU → Replace ABS ECU.

TSB Revision

<Models produced from Nov. 1994>



CONTINUED FROM PREVIOUS PAGE

Can other electronic control systems communicate with scan tool?
- No → Scan tool related malfunction. Repair and recheck.
- Yes ↓

Is fuse No. 3 normal?
- No → Correct cause of blown fuse and replace fuse.
- Yes ↓

Disconnect ECU connector and check harness connector

With the ignition key in the "ON" position, does voltage between ECU connector terminal No. 18 and ground indicate the battery positive voltage?
- No → Harness wire between multi-purpose fuse No. 3 and ECU is broken → Repair harness.
- Yes ↓

Is there continuity between body harness terminals No. 9 and No. 34, and ground?
- No → ECU ground line broken → Repair harness.
- Yes ↓

Is there continuity between body harness connector terminals No. 23 and No. 24, and diagnosis inspection terminals No. 7 & No. 8?
- No → Harness wire between diagnosis inspection terminal and ABS ECU is broken. → Repair harness.
- Yes ↓

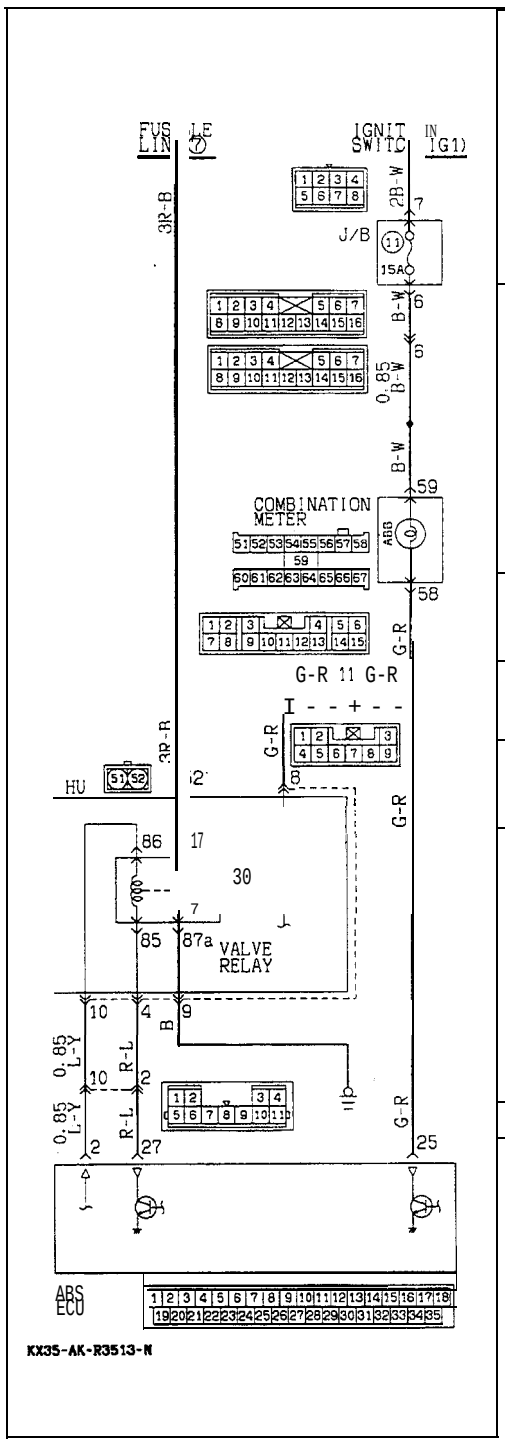
Malfunction of ABS ECU → Replace ABS ECU.

TSB Revision

C ABS warning light does not illuminate when the ignition key is in the "START" position.

[Explanation]

The ABS ECU uses the IG_2 power source which is turned off in the "START" position. The ABS warning light uses the IG_1 power source which is not turned off even in the "START" position. Consequently, in the "START" position, power is off and the ECU turns the valve relay OFF. If the warning light does not illuminate at this time, there is trouble in the warning light circuit on the valve relay side.



Remove the No. 3 fuse from the junction box to turn off power to the ABS-ECU. Disconnect the hydraulic unit connector (A-64) and the ABS valve relay connector (A-65). Inspect the harness side of both connectors for damage to the terminal pins. Repair terminal pins as needed.

With the ignition key in the "ON" position, does voltage between body connector terminal No. 8 and ground indicate the battery positive voltage?
- No → Harness wire between HU and warning light is broken.
- Yes ↓

Is there continuity between body connector terminal No. 9 and ground?
- No → Broken line between HU and body ground
- Yes ↓

Is there continuity between HU connector terminal No. 8 and terminal No. 9? *
- No → Valve relay malfunction or break in HU harness wire
- Yes ↓

Remove the valve relay. Is there continuity between terminal No. 87a and No. 30?
- No → Valve relay malfunction → Replace valve relay.
- Yes ↓

HU harness malfunction → Replace HU.

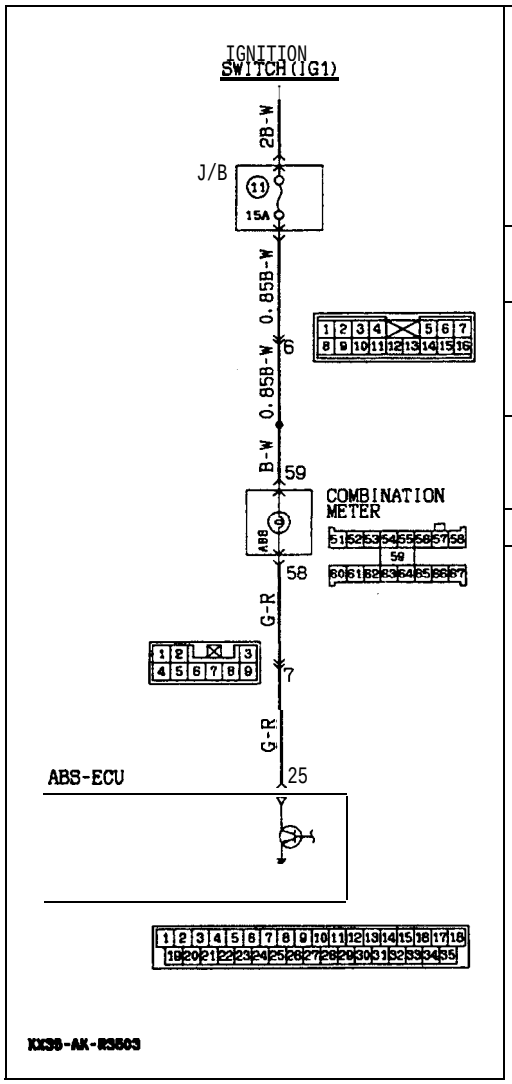
NOTE
When performing the check marked *, note polarity of the diode (refer to the circuit diagram).

TSB Revision

D **ABS warning light blinks once after the ignition key is turned to the "ON" position. It illuminates in the "START" position and blinks once again when turned to the "ON" position.**

[Explanation]

When power flows, the ABS ECU turns on the warning light for approximately 1 sec. while it performs a valve relay test. If there is a break in the harness between the ECU and the warning light, the light illuminates only when the valve relay is off in the valve relay test, etc.



Disconnect the hydraulic unit connector (A-64) and the ABS-ECU connector (E-l 2).
Inspect the harness side of both connectors for damage to individual terminal pins.
Repair terminal pins as needed.

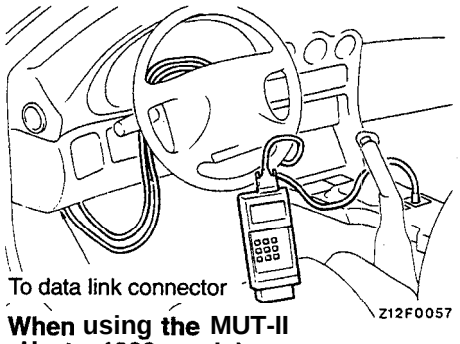
In the ignition key "ON" position, does voltage between terminal No. 25 and ground indicate battery positive voltage?

No → Harness wire between ABS warning light and ECU is broken. → Repair harness.

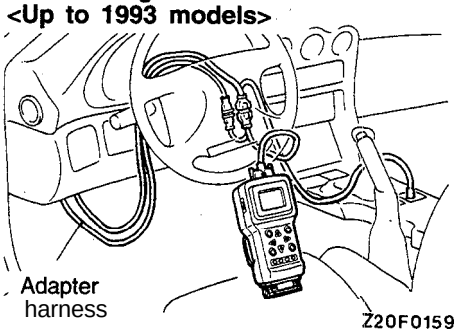
Yes → Malfunction of ABS ECU → Replace ABS ECU.

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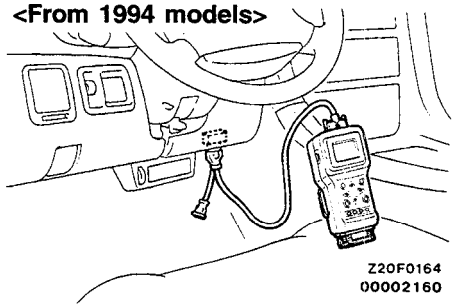
When using the MUT



When using the MUT-II <Up to 1993 models>



<From 1994 models>



CHECK USING ON-BOARD DIAGNOSTIC

When using the scan tool [Multi-use tester (MUT) <Up to 1993 models> or MUT-II <All models>

(1) With the ignition switch OFF, connect the scan tool. When connecting the scan tool (MUT-II) to a 1993 model vehicle, use the adapter harness supplied together.

Caution
Turn off the ignition switch beforehand whenever the scan tool is connected or disconnected.

Turn the ignition ON and select the ABS system. (The ABS warning light lights up, it goes into the scan tool mode. **In the scan tool mode, ABS does not function.)** If it does not go into the scan tool mode, check the ECU power circuit and the harness between the ECU and diagnostic output terminals.

(2) Read the on-board diagnostic output codes from the ECU memory.

(3) Clear the diagnostic trouble codes once from memory. (Refer to P.35-12.)
If the memory cannot be cleared, the ECU is currently detecting the trouble and the ABS ECU is in fail safe. If it can be cleared, the trouble is either temporary or appears only when driving.

(4) When the diagnostic trouble codes cannot be cleared, or when the ABS ECU goes into fail safe during another test drive and diagnostic trouble codes are output, check according to diagnostic trouble code check charts (E-l – E-6).

DIAGNOSTIC TROUBLE CODE CHART

Diagnostic trouble code	Scan tool display letters	Check chart name or remedy	Reference page	Diagnostic trouble code	Scan tool display letters	Check chart name or remedy	Reference page
11	FL SNSR. OPEN	E-1	P.35-40	41	FL SOL. VALVE	E-5	P.35-45
12	FR SNSR. OPEN			42	FR SOL. VALVE		
13	RL SNSR. OPEN			43	VALVE DRIFT		
14	RR SNSR. OPEN			51	VALVE RELAY	E-6	P.35-46
15	VEH. SPD. SNSR.	E-2	P.35-40	52	MOTOR RELAY	E-7	P.35-47
21	G SNSR.	E-3	P.35-42	55	CONT. UNIT	ECU replacement	–
22	STOP LAMP SW	E-4	P.35-43				

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E-I When the following diagnostic trouble codes are displayed "11 FL SNSR. OPEN" "12 FR SNSR. OPEN" "13 RL SNSR. OPEN" "14 RR SNSR. OPEN"

[Explanation]

The ABS ECU detects breaks in the wheel speed sensor wire. This diagnostic trouble code is output if the wheel speed sensor signal is not input (or short circuited) or if its output is low when starting to drive or while driving.

[Hint]

In addition to a broken wire/short circuit in the wheel speed sensor, also check whether the sensor gap is too large, sensor harness wire is broken, or sensor harness and body connector are not properly connected.

E-2 When diagnostic trouble code "15 VEH. SPD. SNSR." is displayed

[Explanation]

This diagnostic trouble code is output when there is an abnormality (other than broken wire or short circuit) in any of the wheel speed sensor output signals while driving.

[Hint]

The following can be considered as the cause of the wheel speed sensor output abnormality.

- Distortion of rotor, teeth missing
- Low frequency noise interference when sensor harness wire is broken
- Noise interference in sensor signal
- Sensor output signal is below the standard value or amplitude modulation is over the standard value. Using an oscilloscope to measure the wave shape of the wheel speed sensor output signal is very effective.
- Broken sensor harness
- Poor connection of connector

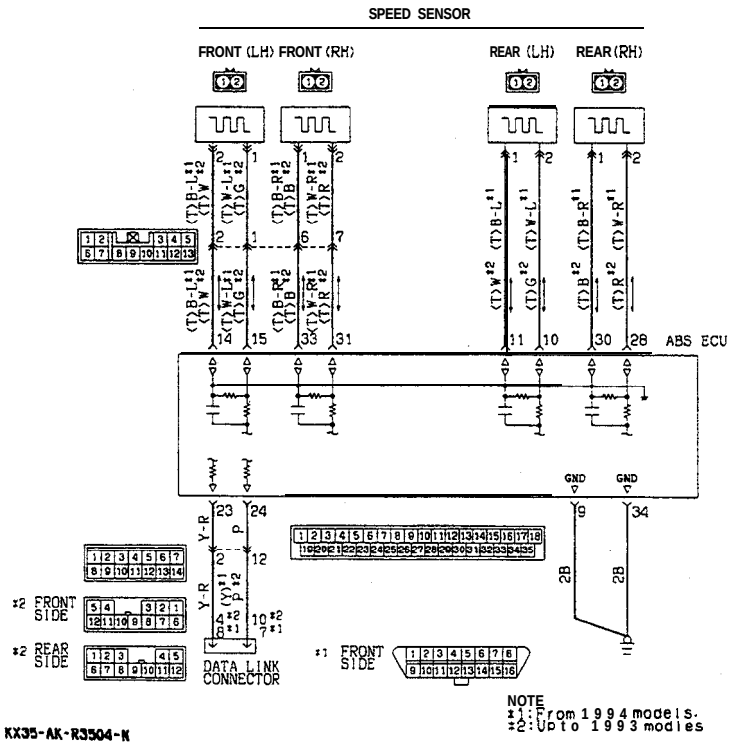
NOTE

(1) If contact is poor, check the sensor cable by bending and lightly stretching it.

(2) Except for the case where a fault condition exists in the system, but the inspection results are normal; if an abnormality cannot be found in the sensor circuit displayed as abnormal, erase the diagnostic trouble code and turn the ignition switch to OFF once, and then test-drive again.

If the same diagnostic trouble code is output, replace the ABS ECU. If the trouble does not occur anymore, the problem is likely to be with the ABS ECU.

(If the trouble is in the speed sensor circuit, but is difficult to recreate, it will recur even after the ABS ECU has been replaced.)



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Check flow connected with wheel speed sensor

NOTE
Check speed sensor harness and connector connection and then observe with oscilloscope. (Refer to P.35-75.)

Is the resistance value of the wheel speed sensor part normal?
Standard value: 0.8-1.2 kΩ

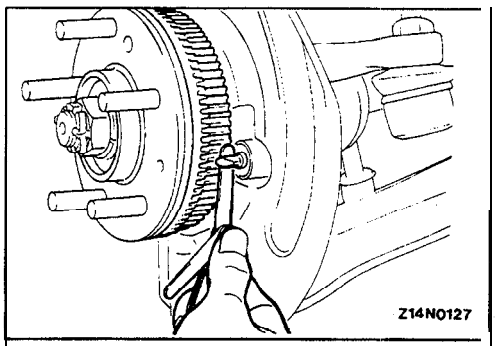
No → Malfunction of wheel speed sensor → Replace wheel speed sensor

Yes

Is the resistance value at the ECU connector normal?
Standard value: 0.8-1.2 kΩ

No → Harness wire for wheel speed sensor circuit is broken → Repair harness.

Yes



Is the front wheel speed sensor-to-rotor clearance normal?
Standard value:
0.3-0.9 mm (.012–.035 in.)

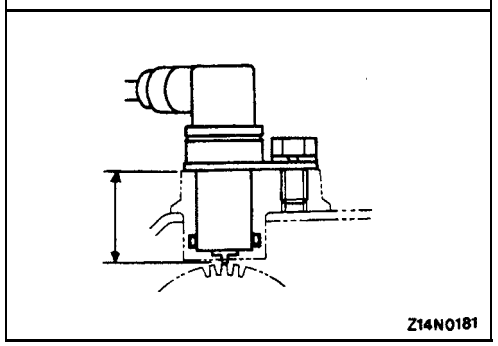
No → Adjust the gap between the wheel speed sensor and rotor.

Yes

Are there any abnormalities such as a loose rear speed sensor mounting bolt?

No → Retighten or correct abnormalities.

Yes



Is the rear speed sensor mounting surface-to-rotor tooth flank (all around) distance normal?
Standard value:
28.15-28.45 mm (1.11-1.12 in.)

No → Replace rear axle shaft or rotor (refer to GROUP 27 – Axle Shaft.)

Yes

Is the wheel speed sensor rotor normal, with no missing or damaged teeth?

No → Replace rotor that has missing or damaged teeth.

Yes

Check the output of each wheel speed sensor with an oscilloscope, including the waveform. (Refer to P.35-75.)
Is the output voltage for each wheel speed sensor over the standard value and is the waveform normal?

No → Recheck if below the standard value or if the sensor has a poor waveform. Replace sensor or rotor.

Yes

If the above checks are normal, there is a malfunction of ABS ECU when this diagnostic trouble code reoccurs often.

→ Replace the ABS ECU and check that the diagnostic trouble code does not reoccur.

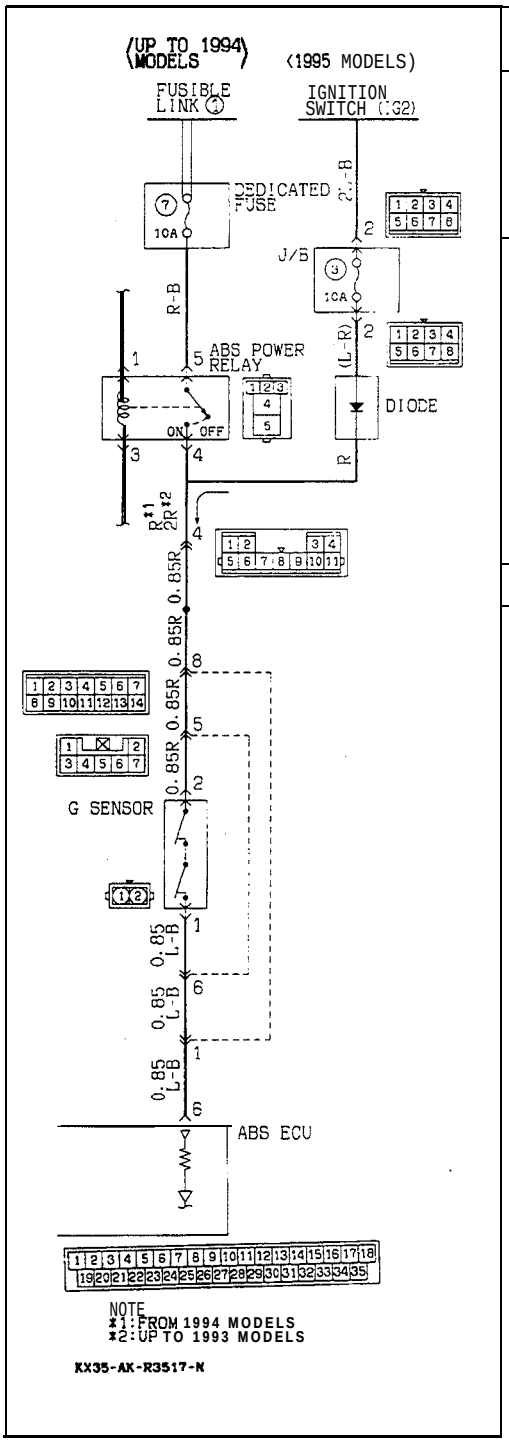
TSB Revision

E-3 When diagnostic trouble code "21 G SNSR." is displayed

[Explanation]

The ABS-ECU outputs this diagnostic trouble code in the following cases.

- G sensor OFF trouble (It is judged that the G sensor continues to be OFF for more than approximately 13 seconds except when the vehicle is stopped or when there is stop light switch input.)
- When there is a broken wire or short circuit in the harness for the G sensor system.



Is G sensor normal? (Refer to P.35-117.) — No → Replace G sensor.

Yes ↓

Remove the ABS-ECU connector and check at the harness connector.

With the ignition key "ON", does the voltage between terminal No. 6 and ground indicate battery positive voltage? — No → The harness between the G sensor and the ABS ECU is broken. → Repair harness.

Yes ↓

ABS-ECU malfunction → Replace ABS-ECU.

TSB Revision

E-4 When diagnostic trouble code "22 STOP LAMP SW" is displayed

[Explanation]

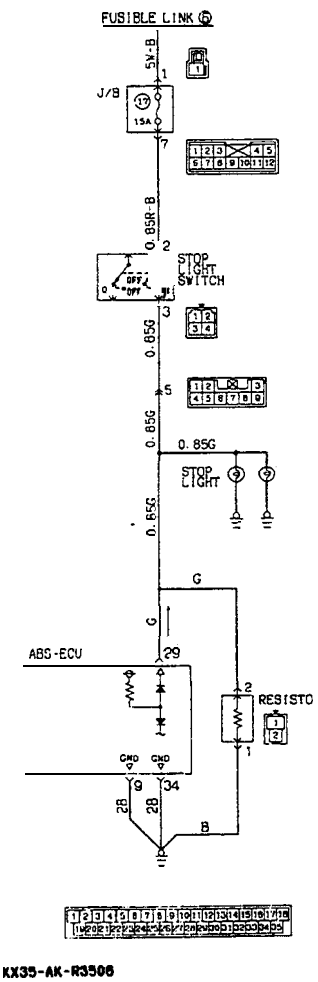
The ABS-ECU outputs this diagnostic trouble code in the following cases.

- Stop light switch remains on for more than 15 minutes while the ABS is not functioning.
- The harness wire for the stop light switch may be open.

[Hint]

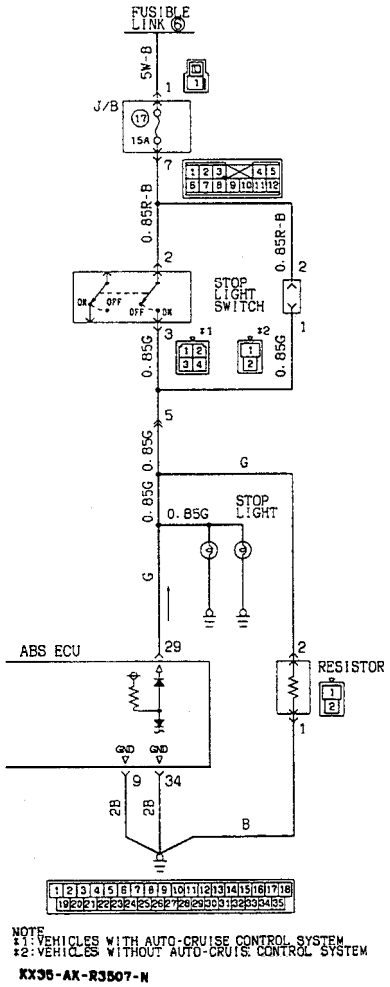
If the stop light operates normal, the harness for the stop light switch input circuit is broken or there is a malfunction in the ABS-ECU.

<Up to 1994 models>



KX35-AK-R3506

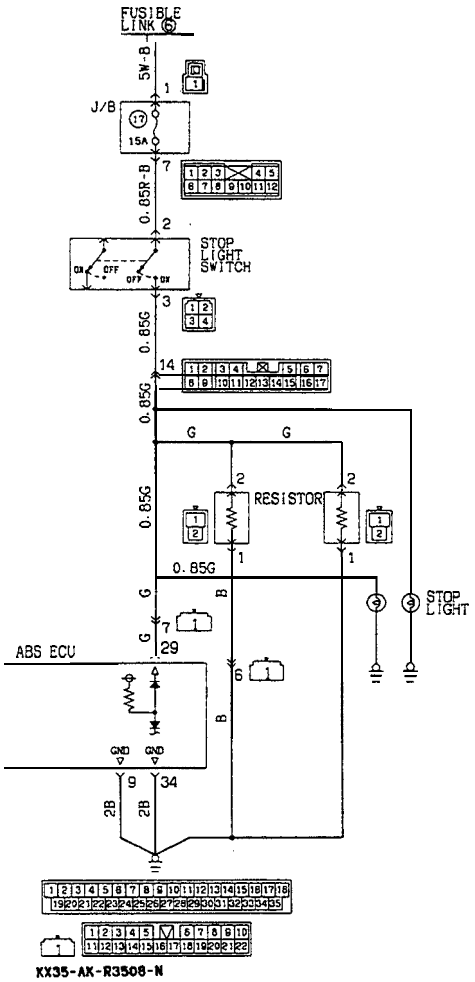
<1995 models> Hatchback



NOTE
*1: VEHICLES WITH AUTO-CRUISE CONTROL SYSTEM
*2: VEHICLES WITHOUT AUTO-CRUISE CONTROL SYSTEM

KX35-AK-R3507-N

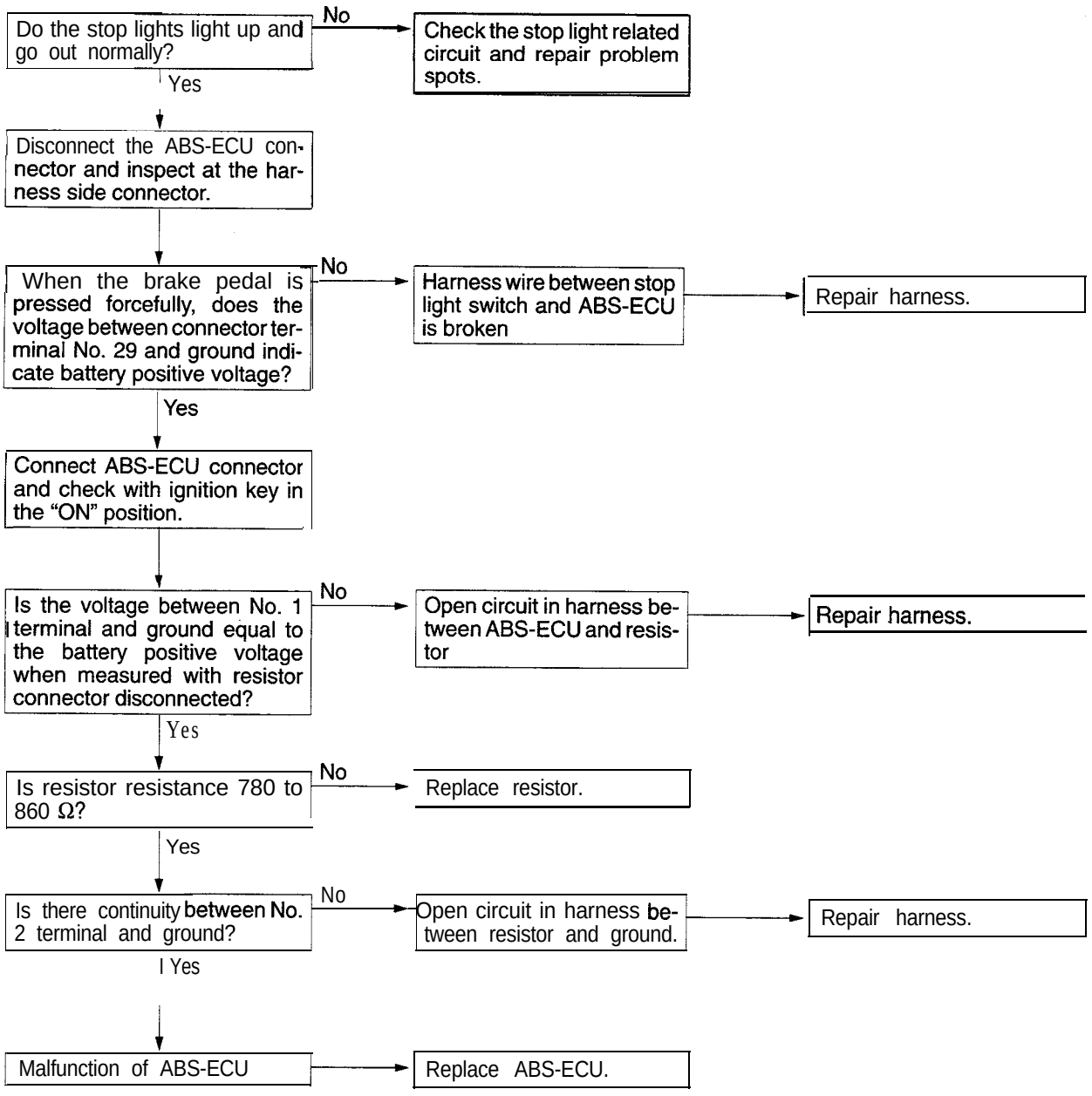
<1995 models> Convertible



KX35-AK-R3508-N

00002538

TSB Revision

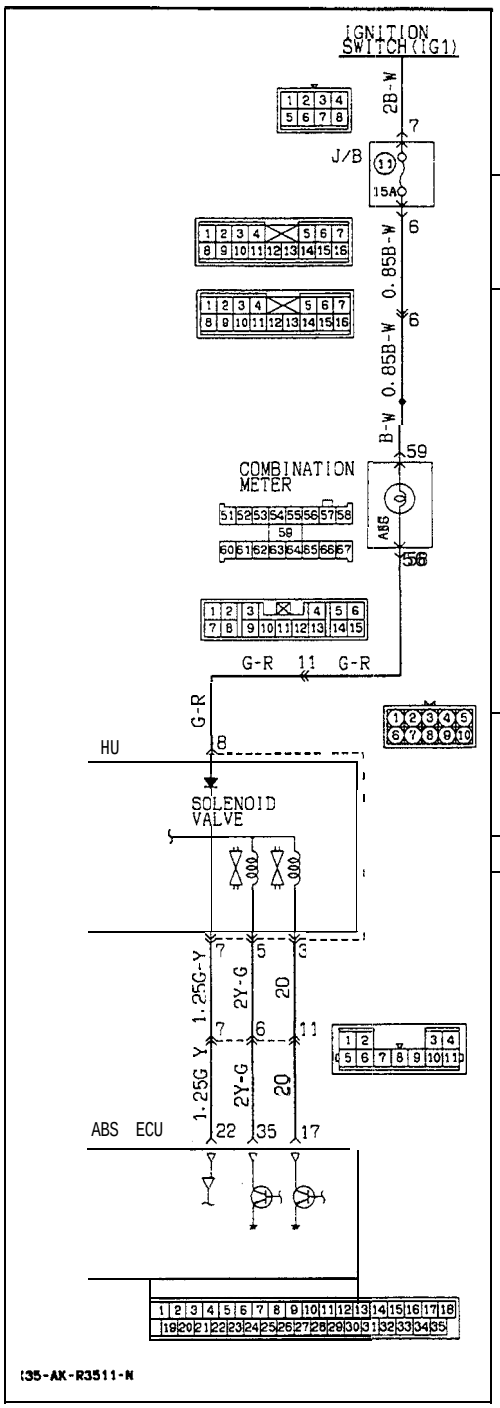


TSB Revision

E-5 When diagnostic trouble codes "41 FL SOL. VALVE", "42 FR SOL. VALVE" or "43 VALVE DRIFT" are displayed.

[Explanation]

The ABS-ECU normally monitors the solenoid valve drive circuit.
If no current flows in the solenoid even if the ECU turns the solenoid ON or if it continues to flow even when turned OFF, the ECU determines the solenoid coil wire is broken/short-circuited or the harness is broken/short-circuited, and then these diagnostic trouble codes are output. ABS-ECU controls the solenoid valve current and if the current value of the solenoid valves differs from each other in the same mode, solenoid valve drift error is produced and the ABS-ECU goes into the failsafe mode.



Remove HU 10P connector and check with the HU side connector.

In the resistance value for the solenoid valve within the range of the standard values?
Standard value: 1.0-1.3 Ω
No → Replace HU.
Yes

Connect HU 10P connector, disconnect ECU connector and check.

Is the solenoid valve resistance value within the range of the standard values when measured at the ECU connector?
Standard value: 1.0-1.3 Ω
No → The harness wire for the solenoid valve circuit whose resistance value is outside the range of the standard value is broken or short circuited.
→ Repair harness.
Yes

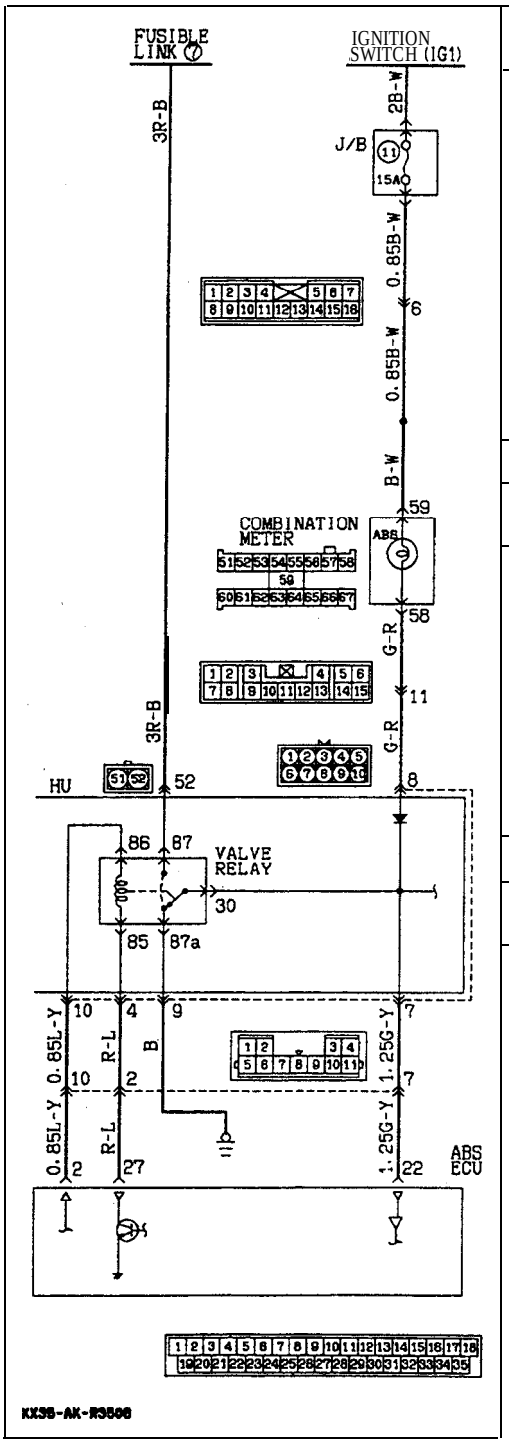
Malfunction of ABS-ECU → Replace ABS-ECU.

TSB Revision

E-6 When diagnostic trouble code "51 VALVE RELAY" is displayed

[Explanation]

When the ignition switch is turned ON, the ABS ECU switches the valve relay OFF and ON for an initial check, compares the voltage of the signal to the valve relay and valve power monitor line voltage to check whether the valve relay operation is normal. In addition, normally it monitors whether or not there is power in the valve power monitor line since the valve relay is normally ON. If the supply of power to the valve power monitor line is interrupted, this diagnostic trouble code will be output.



Remove and check the valve relay.

↓

When the valve relay is checked, are the following conditions found?
No. 85–No. 86: Resistance value 60–120 Ω
No. 30–No. 87a: Continuity
No. 30–No. 87: No continuity
When battery voltage is applied between terminals No. 86 and No. 85.
No. 30–No. 87: Continuity
No. 30–No. 87a: No continuity

No → Valve relay malfunction → Replace valve relay.

Yes ↓

Install the valve relay and remove the HU connector.

↓

With the ignition key "ON", does the voltage between the connector terminal No. 52 and ground indicate battery positive voltage?

No → HU power harness wire is broken. → Repair harness.

Yes ↓

Is there continuity between HU No. 8 and No. 7 terminals?

No → Faulty harness in HU → Repair harness or replace HU.

Yes ↓

Connect the HU harness and remove the ECU connector.

↓

Does resistance between body connector terminal No. 2 and terminal No. 27 indicate 60–120 Ω

No → Malfunction of harness between HU and ECU → Repair harness.

Yes ↓

Is there continuity between harness side connector terminal No. 22 and ground?

No → Malfunction of harness between HU and ABS ECU → Repair harness.

Yes ↓

ABS ECU malfunction → Replace ABS ECU.

TSB Revision

E-7 When diagnostic trouble code "52 MOTOR RELAY" is displayed

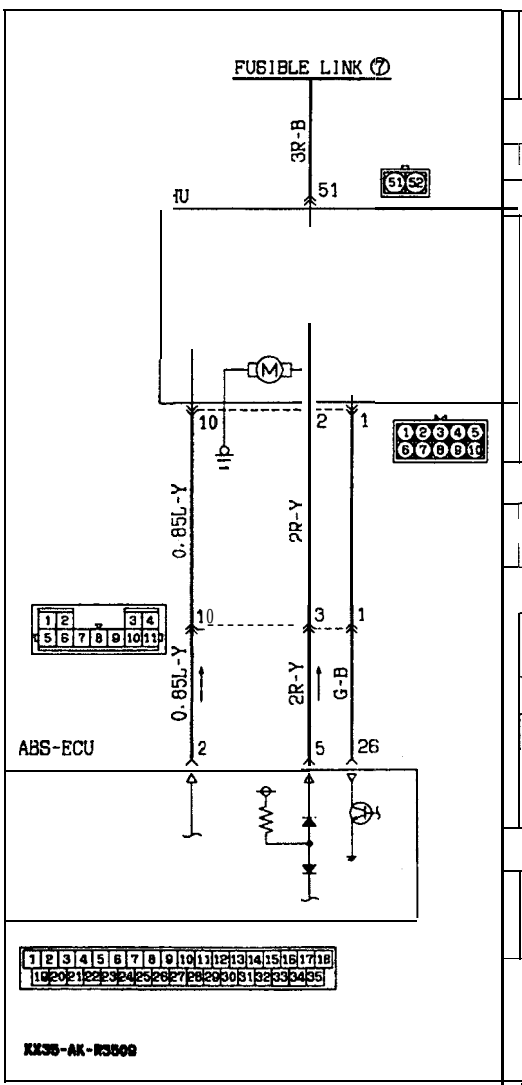
[Explanation]

The ABS ECU outputs this diagnostic trouble code for the motor relay and motor in the following cases.

- When the motor relay does not function
- When there is trouble with the motor itself and it does not revolve
- When the motor ground is disconnected and the motor does not revolve
- When the motor continues to revolve

[Hint]

If there is motor operation noise during scan tool forced drive mode; there is a broken or short circuited motor monitor wire.



Does the motor make a noise during scan tool forced drive mode?
- Yes → Broken wire or short circuit in motor monitor line → Repair the harness between HU and ECU.
- No → Remove the motor relay.

Remove the motor relay and check resistance values.'
No. 85–No. 86: Resistance value 72-88 Ω
No. 30–No. 87: No continuity
Battery voltage is applied between terminals No. 85 and No. 86.
No. 38–No. 87: Continuity
- No → Motor relay malfunction → Replace motor relay.
- Yes

Is pump motor ground connected normally?
- No → Connect ground wire.
- Yes → Install motor relay and remove HU connector.

Does voltage between body connector terminal 11 and ground indicate battery positive voltaae?
- No → Broken wire in pump motor power circuit → Repair harness.
- Yes

Is resistance between HU connector terminals No. 1 and No. 10 72-88 Ω?
- No → Harness in HU faulty → Repair harness or replace HU.
- Yes → Connect the HU connector and remove the ECU connector

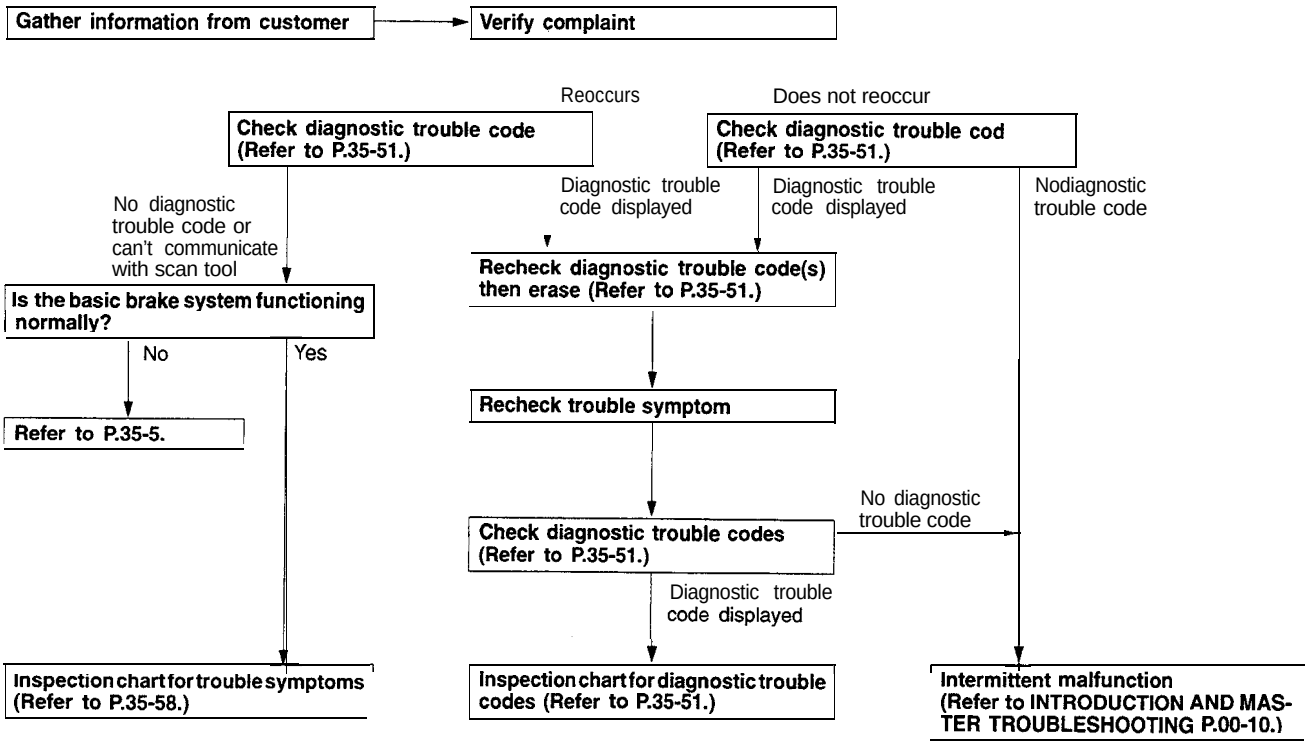
Is resistance between body connector terminal No. 2 and No. 26 72-88 Ω?
- No → Malfunction of harness between HU and ECU → Repair harness.
- Yes

Is resistance between body connector terminal No. 5 and around 0.1–0.3 Ω?
- No → Malfunction of harness between HU and ECU → Repair harness.
- Yes → ABS ECU malfunction → Replace ABS ECU.

TSB Revision

<From 1996 models>

DIAGNOSTIC TROUBLESHOOTING FLOW



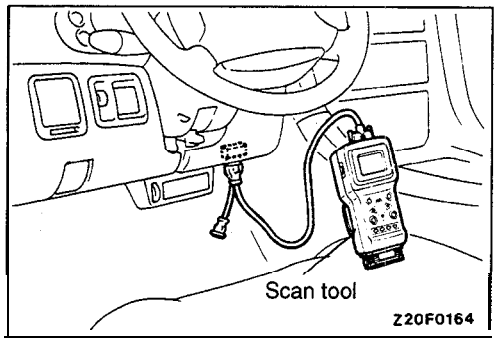
NOTES WITH REGARD TO DIAGNOSIS

The condition listed in the following table are considered normal.

Condition	Explanation of condition
System check sound	When starting the engine, a thudding sound can sometimes be heard coming from inside the engine compartment, but this is because the system operation check is being performed. This is considered normal.
ABS operation sound	1. Sound of the motor inside the ABS hydraulic unit (HU) operating (whine) 2. Sound is generated along with vibration of the brake pedal (scraping) 3. When ABS operates, sound is generated from the vehicle chassis due to repeated brake application and release. (Thump: suspension; squeak: tires)
ABS operation (Long braking distance)	For road surfaces such as snow-covered roads and gravel roads, the braking distance for vehicles with ABS can sometimes be longer than that for other vehicles. Accordingly, advise the customer to drive safely on such roads by lowering the vehicle speed and not being overconfident.

Diagnosis detection condition can vary depending on the diagnostic trouble code.
When checking to see if the trouble symptom reoccurs after the diagnostic trouble code has been erased, check the memorize timing column in the inspection chart for diagnostic trouble codes (refer to P.35-51) and the memorize conditions recorded in the "Comments" column of the inspection procedure chart for diagnostic trouble codes in order to carry out testing under driving conditions which satisfy each of the given conditions.

TSB Revision



DIAGNOSTIC FUNCTION

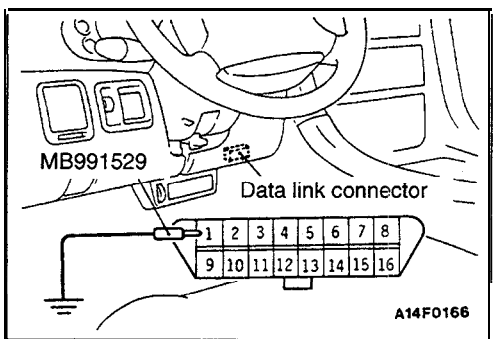
DIAGNOSTIC TROUBLE CODES CHECK

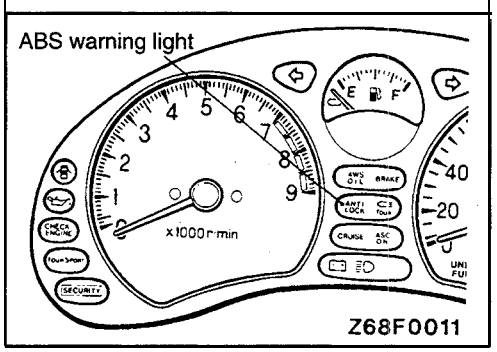
With the Scan Tool

Connect the scan tool to the data link connector, then check diagnostic trouble codes.

Caution
Always turn the ignition switch to connect or disconnect the scan tool.

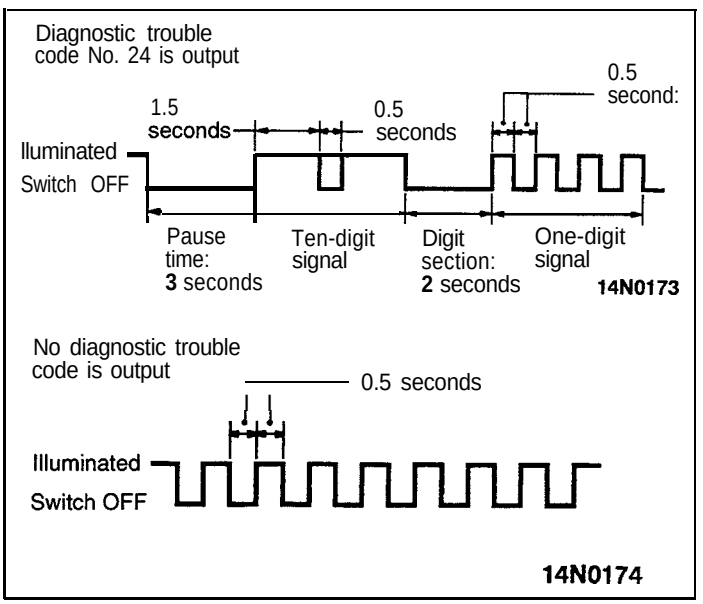
NOTE
Diagnostic trouble code No. 16 can be output when the ABS system fails because of a battery surge.





With the ABS Warning Light

(1) Use the special tool (diagnostic trouble code check harness) to ground the terminal (1) of the data link connector.
(2) Take a reading of the diagnostic trouble code from the flashing of the ABS warning light.



NOTE
(1) Other diagnostic trouble codes also are output as the same code numbers as when using the scan tool.
(2) Diagnostic trouble code No. 16 can be output when the ABS system fails because of a battery surge.

TSB Revision

ERASING DIAGNOSTIC TROUBLE CODES

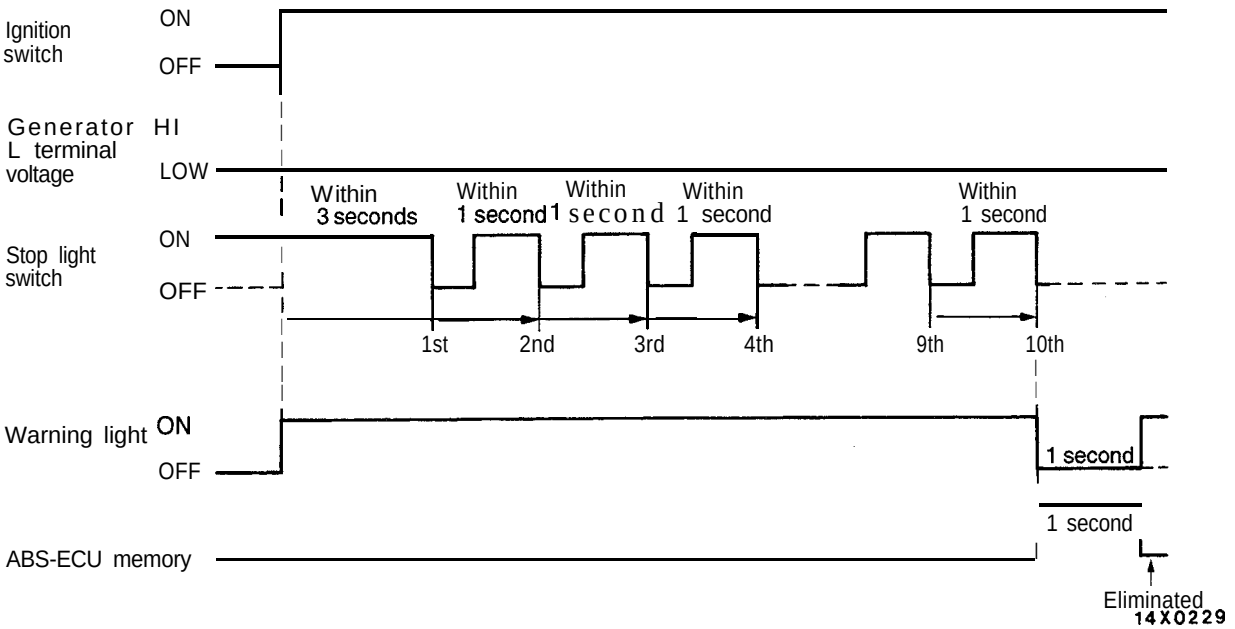
With the Scan Tool

Connect the scan tool to the data link connector (16-pin), then erase the diagnostic trouble codes.

With the ABS Warning Light

When the ignition switch is turned on while the stop light switch is on, the stop light switch will operate 10 times in succession according to the timing given below.

Caution
The memory cannot be erased under the following conditions.
(1) When the stop light switch is not turned on and off according to the table below.
(2) When the generator L terminal voltage increased (HI state).



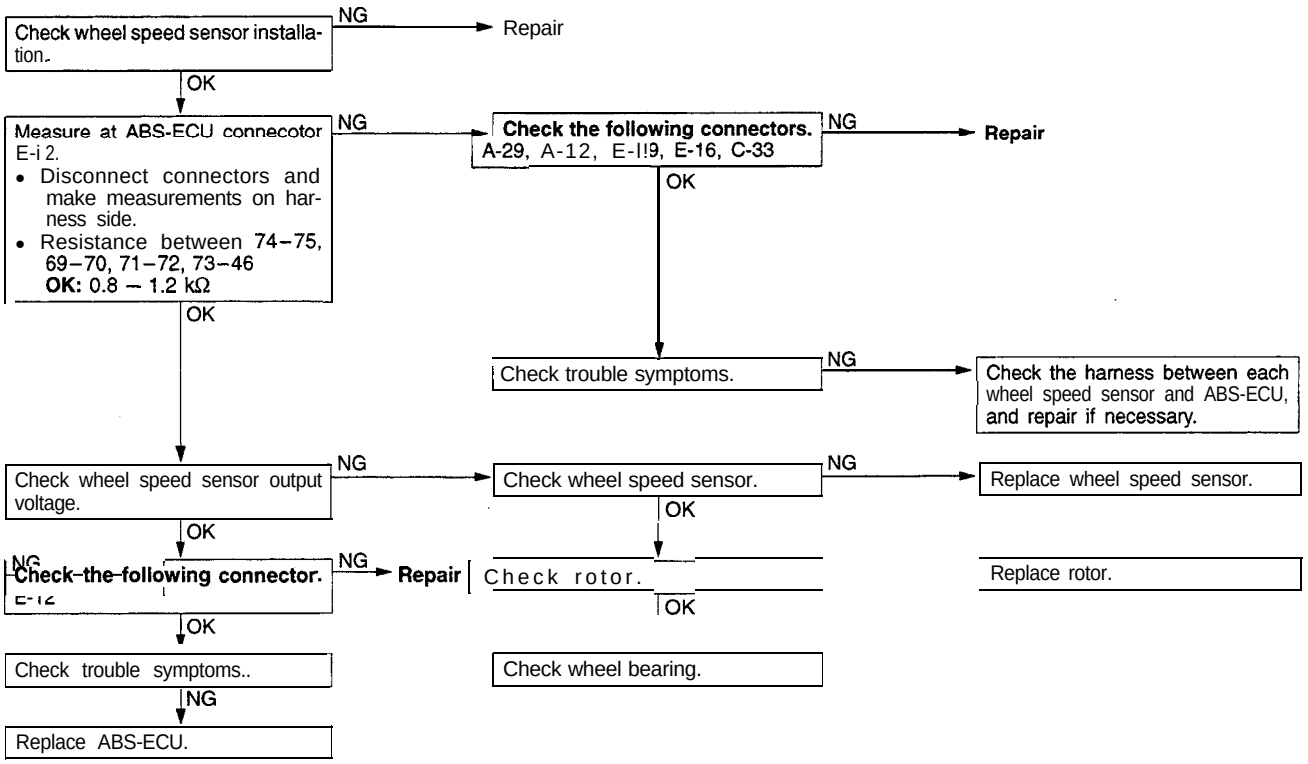
INSPECTION CHART FOR DIAGNOSTIC TROUBLE CODES

Code No.	Diagnostic Item	Reference Page
11	F.R. wheel speed sensor system (open-circuited)	35-52
12	F.L. wheel speed sensor system (open-circuited)	35-52
13	R.R. wheel speed sensor system (open-circuited)	35-52
14	R.L. wheel speed sensor system (open-circuited)	35-52
15	Wheel speed sensor system (output signal abnormal)	35-52
16	ABS-ECU power supply system (voltage abnormally low or high)	35-53
21	F.R. wheel speed sensor system (shorted)	35-53
22	F.L. wheel speed sensor system (shorted)	35-53
23	R.R. wheel speed sensor system (shorted)	35-53
24	R.L. wheel speed sensor system (shorted)	35-53
26	G-sensor system (open- or short-circuited or signal provided abnormally)	35-54
38	Stop light switch system (open-circuited or ON trouble)	35-54
41	F.R. solenoid valve IN system	35-55
42	F.L. solenoid valve IN system	35-55
43	R.R. solenoid valve IN system	35-55
44	R.L. solenoid valve IN system	35-55
45	F.R. solenoid valve OUT system	35-55
46	F.L. solenoid valve OUT system	35-55
47	R.R. solenoid valve OUT system	35-55
48	R.L. solenoid valve OUT system	35-55
51	ABS valve relay system	35-56
53	HU pump motor or ABS motor relay system	35-57
63	ABS-ECU system	ABS-ECU replacement

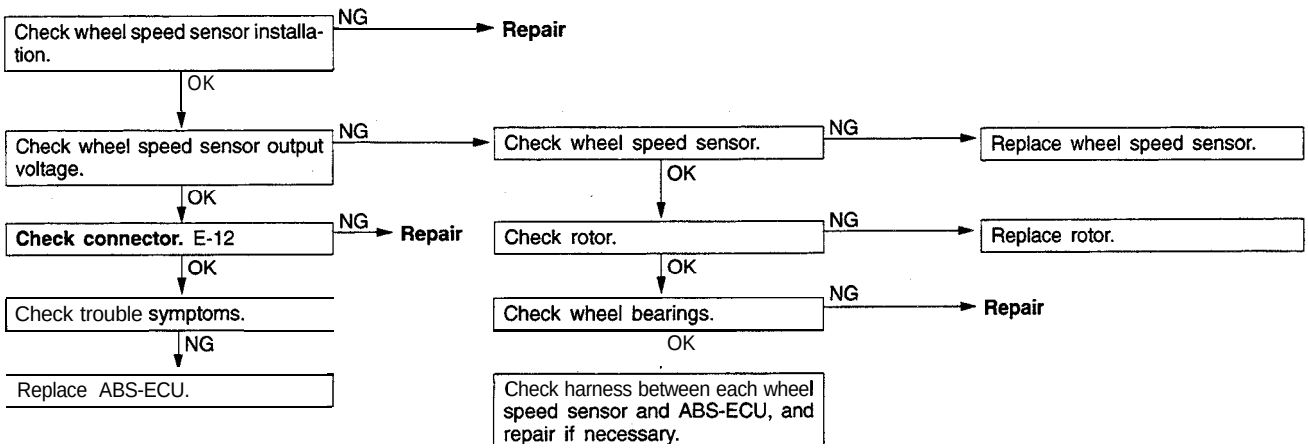
TSB Revision

INSPECTION PROCEDURE FOR DIAGNOSTIC TROUBLE CODES

Code Nos. 11, 12, 13, 14 Wheel speed sensor system (open-circuited)	Probable cause
Output is provided when signal is not input due to breakage of the (+) or (–) wire of one or more of the four wheel speed sensors.	• Wheel speed sensor defective • Harness and connector defective • ABS-ECU defective



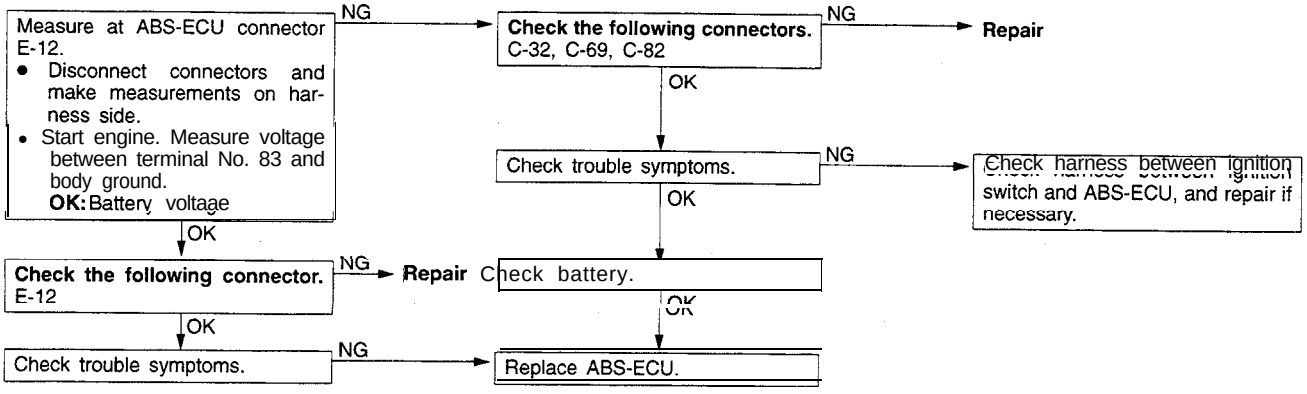
Code No. 15 Wheel speed sensor system (output signal abnormal)	Probable cause
Output is provided when output signal produced by any of wheel speed sensors is abnormal (excluding short- and open-circuits). (Improper number of rotor teeth or the like)	• Wheel speed sensor installation defective • Wheel speed sensor defective • Harness and connector defective • Rotor defective • Wheel bearing defective • ABS-ECU defective



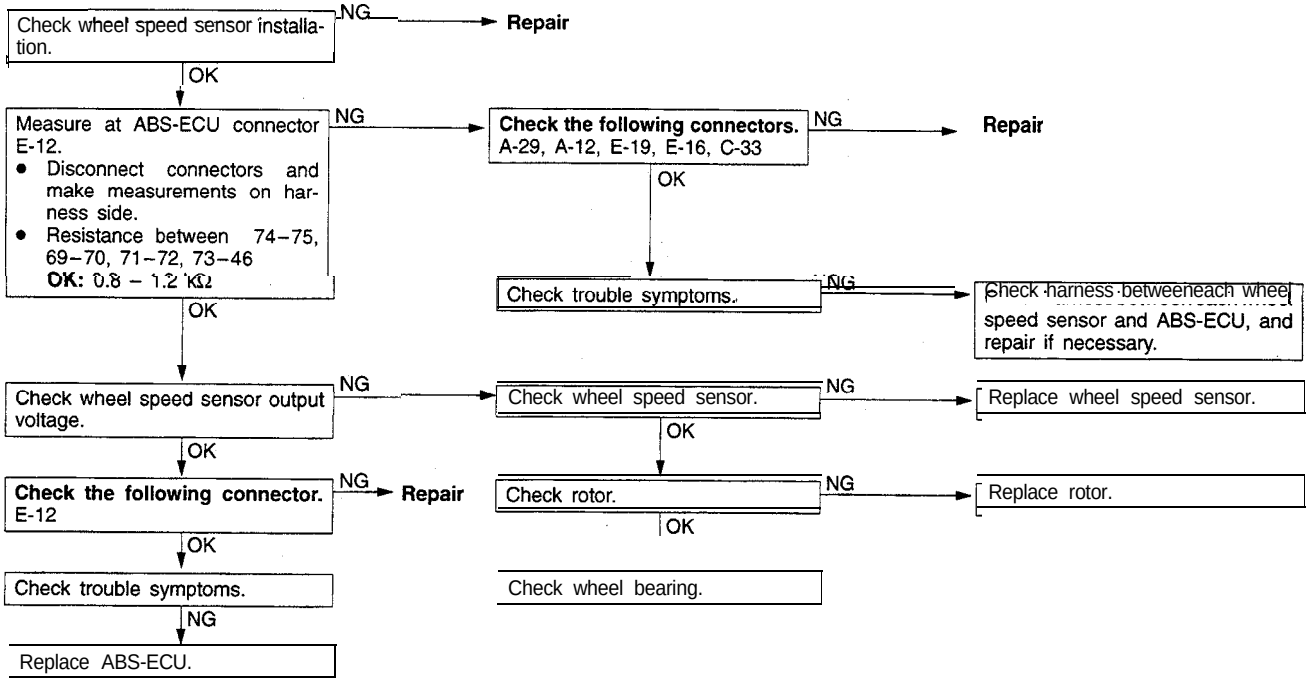
TSB Revision

Code No. 16 ABS-ECU power supply system (voltage abnormally low or high)	Probable cause
Output is provided when ABS-ECU power supply voltage drops below or rises above the normal value. Output is not provided if power supply voltage returns to normal voltage.	• Harness and connector defective • ABS-ECU defective

Caution
If battery voltage drops or rises while making this check, this code is output as an existing trouble, making it impossible to perform correct trouble diagnosis. Before carrying out the following check, be sure to check the battery for conditions and charge it if necessary.

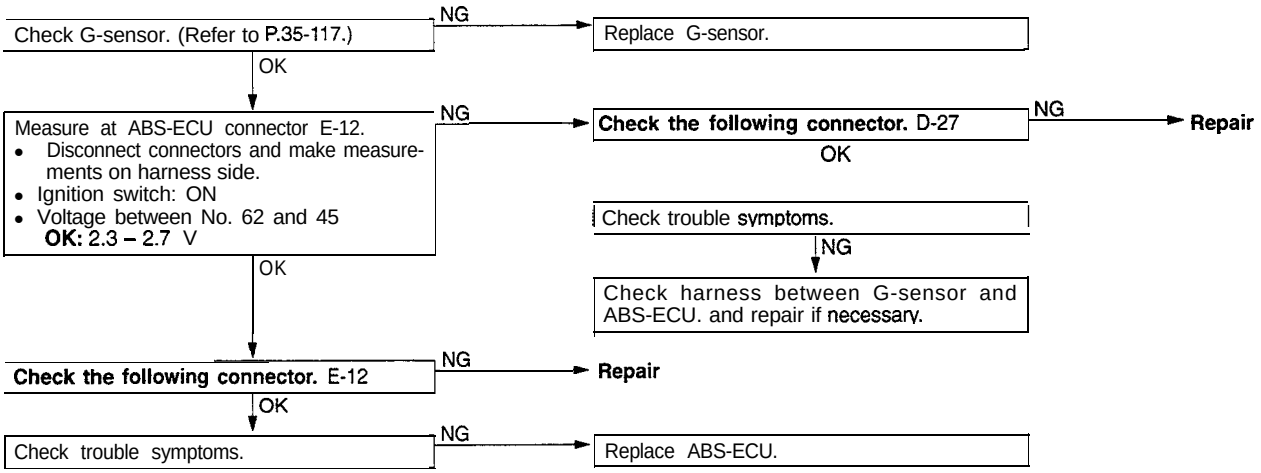


Code Nos. 21, 22, 23 and 24 Wheel speed sensor system (shorted)	Probable cause
Output is provided in the following case. • Open circuit is not found but no input is received by one or more of the four wheel speed sensors at a vehicle speed of 10 km/h (6 mph) or more.	• Wheel speed sensor defective • Harness and connectors defective • Rotor defective • Excessive clearance between sensor and rotor • ABS-ECU defective • Wheel bearing defective

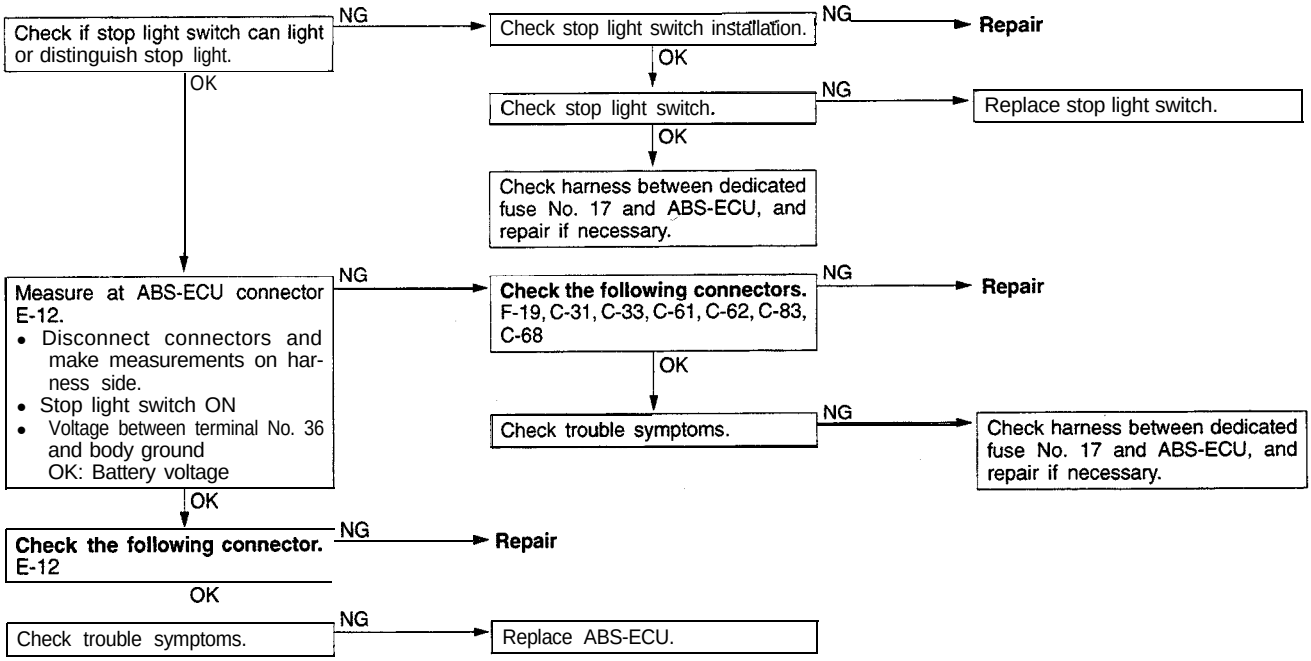


TSB Revision

Code No. 26 G-sensor system (open-, short-circuited or signal abnormal)	Probable cause
Output is provided in the following cases. • G-sensor output drops below 0.5V or rises above 4.5V • G-sensor svstem harness is broken or shorted	• G-sensor defective • Harness and connector defective • ABS-ECU defective

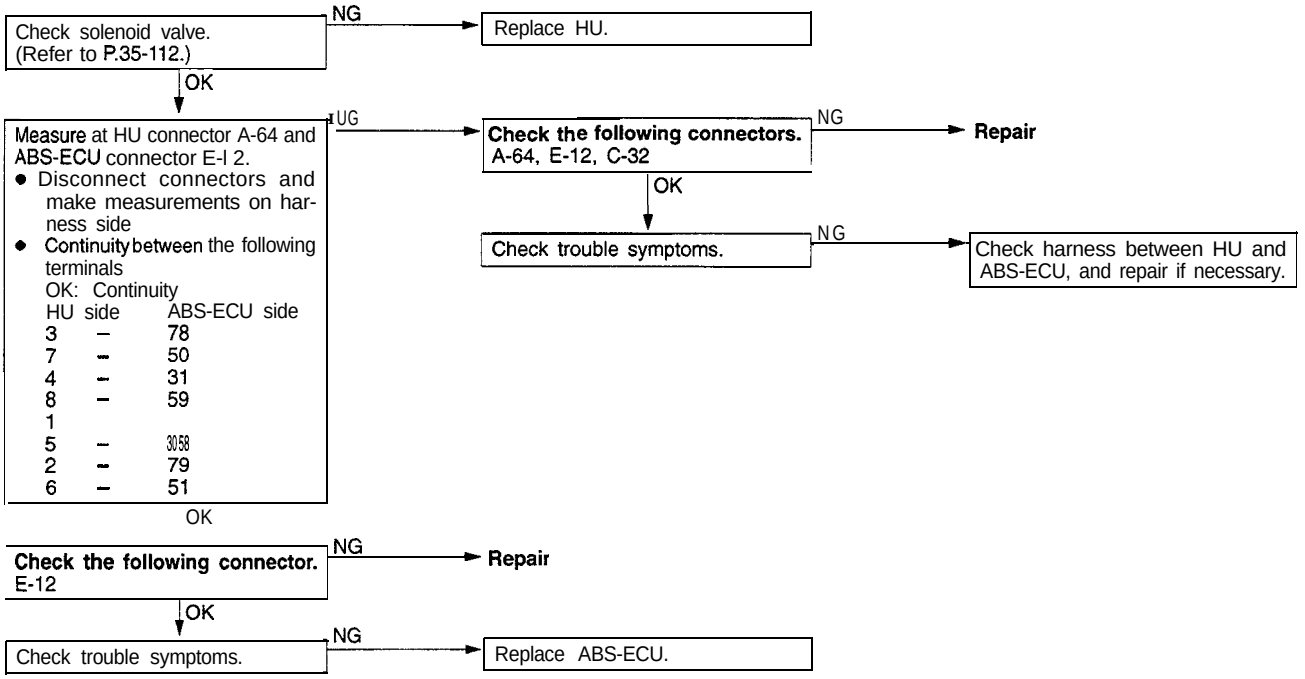


Code No. 38 Stop light switch system (open-circuited or ON trouble)	Probable cause
Output is provided in the following cases. • Stop light switch is in trouble and remains in ON state for more than 15 minutes. • Stop light switch system harness is broken and no signal is input to ABS-ECU.	• Stop light switch defective • Harness and connector defective • ABS-ECU defective



TSB Revision

Code Nos. 41, 42, 43, 44, 45, 46, 47 and 48 Solenoid valve systems	Probable cause
ABS-ECU monitors solenoid valve drive circuit at all times. When solenoid is not energized with solenoid valve turned ON by ABS-ECU or when it is kept energized with solenoid valve turned OFF by ABS-ECU, solenoid coil is judged to be open- or short-circuited or harness is judged to be broken or shorted and output is provided.	• HU defective • Harness, connector defective * ABS-ECU defective



TSB Revision

Code No. 51 ABS valve relay system	Probable cause
ABS-ECU monitors solenoid valve drive circuit at all times. When 5 or more solenoids are not energized with solenoid valve turned ON by ABS-ECU or when 5 or more solenoids are kept energized with solenoid valve turned OFF by ABS-ECU, ABS valve is judged to be in trouble and output is provided.	• ABS valve relay defective • Harness, connector defective • HU defective • ABS-ECU defective

Check ABS valve relay. (Refer to P.35-83.)
NG → Replace ABS valve relay.
OK ↓

Measure at ABS valve relay connector A-80.
- Disconnect connectors and make measurements on harness side.
- Voltage between terminal No. 5 and body ground

OK: Battery voltage

NG → Check harness between ABS valve relay and main fusible link No. 7, and repair if necessary.
OK ↓

Measure at ABS-ECU connector E-12.
- Disconnect connectors and make measurements on harness side.
- Resistance between 82-47

OK: 60 – 120 Ω

NG → **Check the following connectors.** c-94, A-80
NG → **Repair**
OK ↓
Check trouble symptoms.
NG → Check harness between ABS valve relay and ABS-ECU, and repair if necessary.
OK ↓

Check solenoid valve. (Refer to P.35-112.)
NG → Replace HU.
OK ↓

Measure at HU connector A-64 and ABS-ECU connector E-12.
- Disconnect connectors and make measurements on harness side.
- Continuity between the following terminals

OK: Continuity provided

HU side		ABS-ECU side
3	–	78
7	–	50
4	–	31
8	–	59
1	–	30
5	–	58
2	–	79
6	–	51

NG → **Check the following connectors.** A-64, E-12, C-32
NG → **Repair**
OK ↓
Check trouble symptoms.
NG → Check harness between HU and ABS-ECU, and repair if necessary.
OK ↓

Measure at HU connector A-65 and ABS valve relay connector A-80.
- Disconnect connectors and make measurements on harness side.
- Continuitybetween thefollowing terminals

OK: Continuity provided

HU side		ABS valve relay side
1	2 -	4

NG → **Check the following connectors.** A-65, A-80
NG → **Repair**
OK ↓
Check trouble symptoms.
NG → Check harness between HU and ABS valve relay, and repair if necessary.
OK ↓

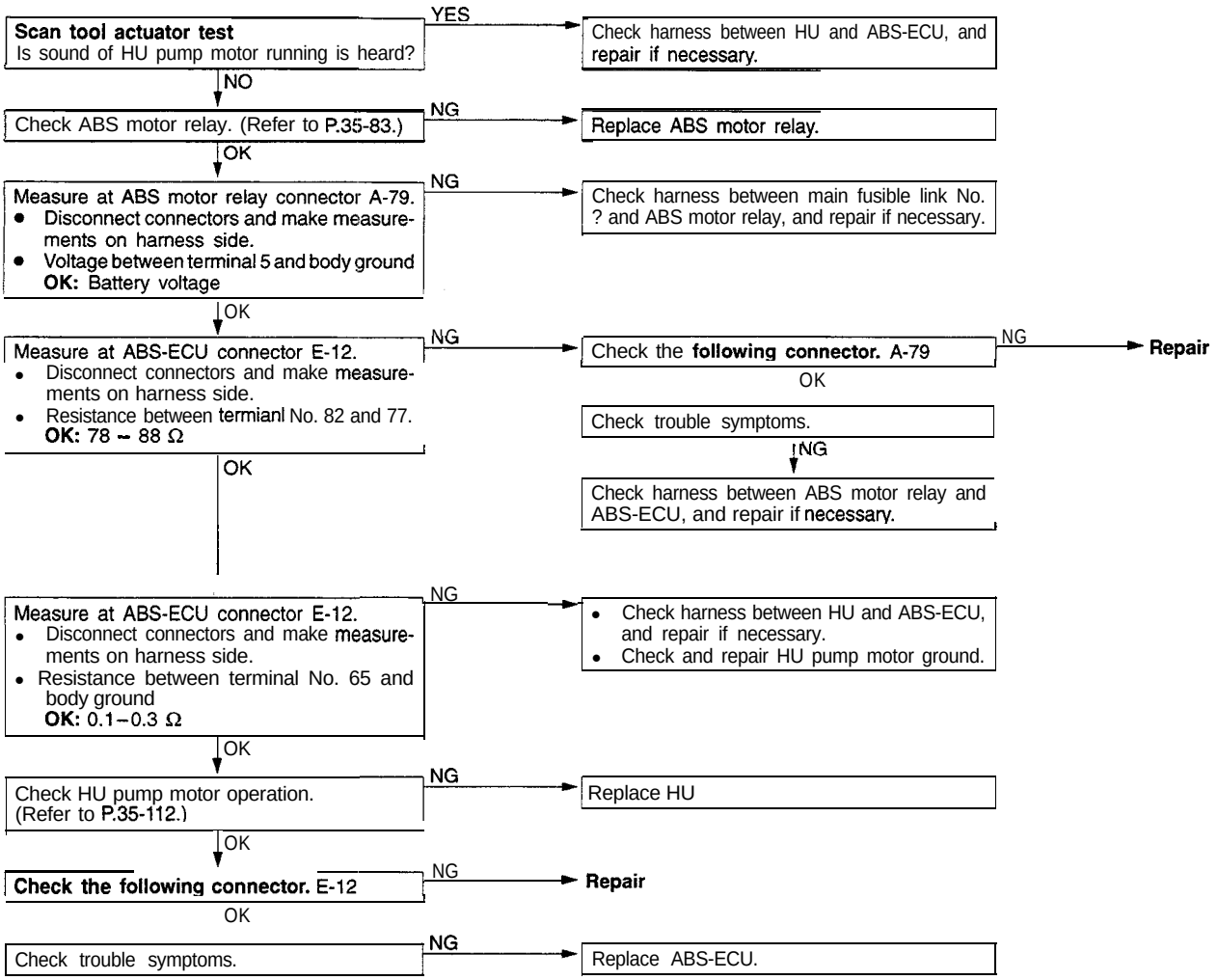
Check the following connector. E-12
NG → **Repair**
OK ↓

Check trouble symptoms.
NG → Replace ABS-ECU.

TSB Revision

Code No. 53 HU pump motor or ABS motor relay system	Probable cause
Output is provided in the following cases. • No signal is received by motor monitor line with ABS motor relay turned ON. (HU pump motor does not run.) • Signal is received by motor monitor line for 5 seconds or more with ABS motor relay turned OFF. (HU pump motor continues to run.) • ABS motor relay does not operate.	• ABS motor relay defective. • Harness, connector defective • HU defective • ABS-ECU defective

Caution
Driving HU pump motor for actuator test discharges the battery. After the test, therefore, start the engine and keep it running for a while.



TSB Revision

INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble Symptom	Check Procedure No.	Reference Page
No communication is possible between scan tool and any of control systems.	1	35-58
No communication is possible between scan tool and ABS-ECU.	2	35-59
ABS warning light is not lighted with the ignition key turned ON (stationary engine).	3	35-60
ABS warning light does not go out after turning ON of the ignition switch.	4	35-60
Brakes operate abnormally.	5	35-61

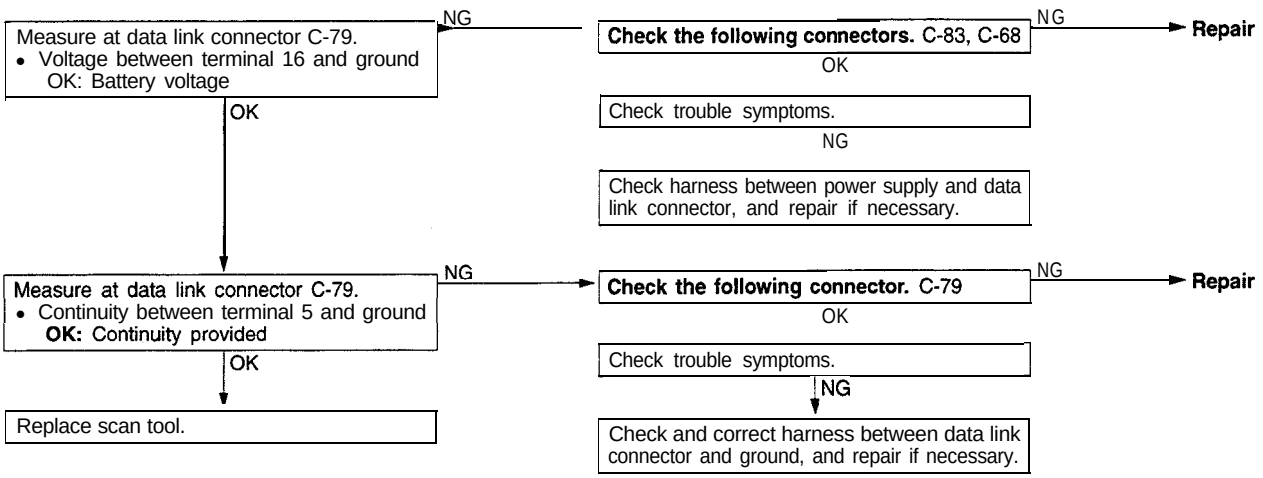
Caution

1. **Under certain driving conditions such as going on a low μ road surface, high speed turning and passing over projection, ABS may operate even if no sudden brake is applied. When making diagnosis by questioning the user, therefore, be sure to check if the trouble occurred under such driving conditions.**
2. **When ABS is in operation, changes are caused in a feeling of the brake pedal (pedal vibration and inapplicable brake pedal). This is due to intermittent changes of fluid pressure inside the brake line in order to prevent the wheels from locking. There is nothing abnormal.**

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

Inspection Procedure 1

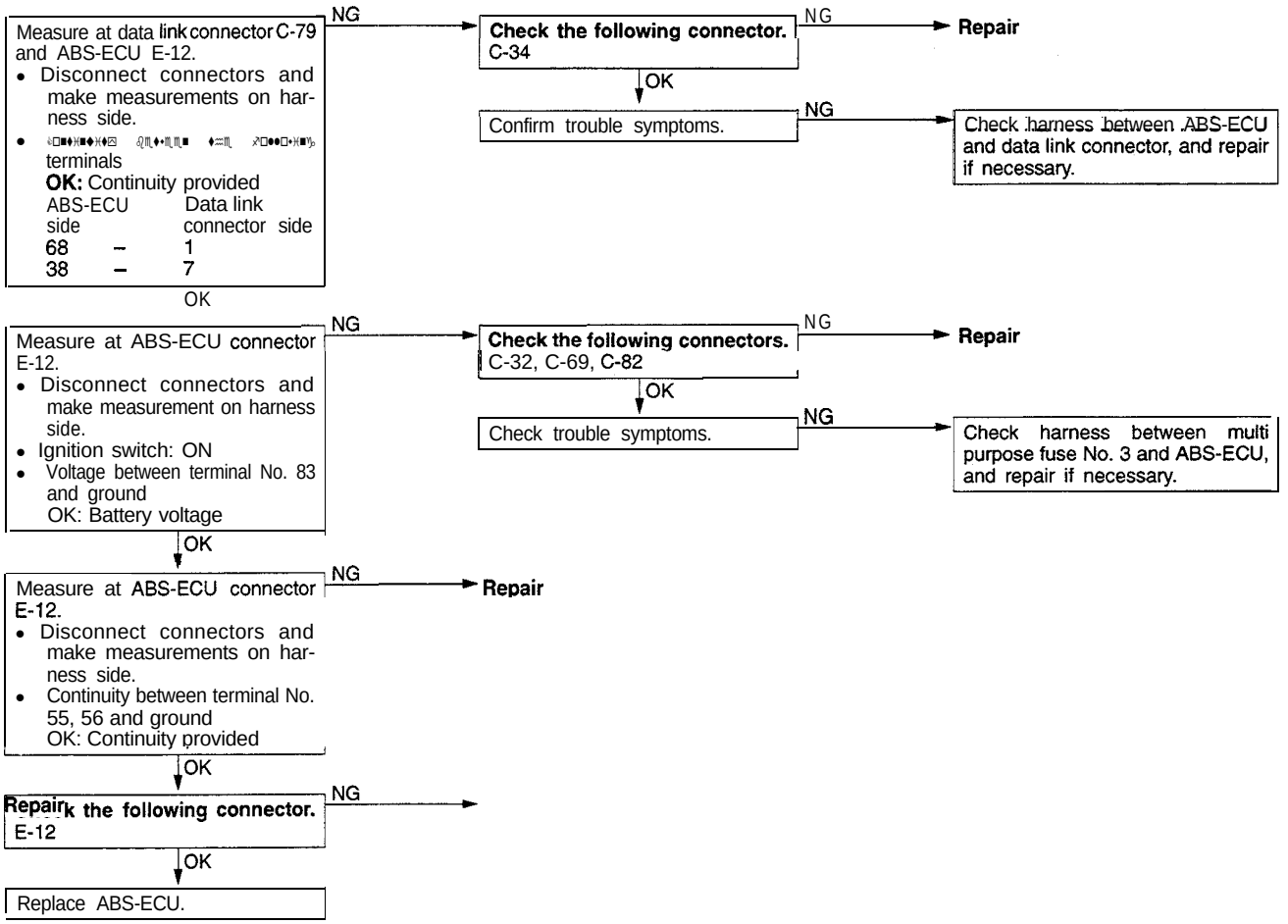
No communication is possible between scan tool and any of control systems.	**Probable cause**
The power circuit and ground circuit of data link connector are probably defective.	• Data link connector defective • Harness defective



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Inspection Procedure 2

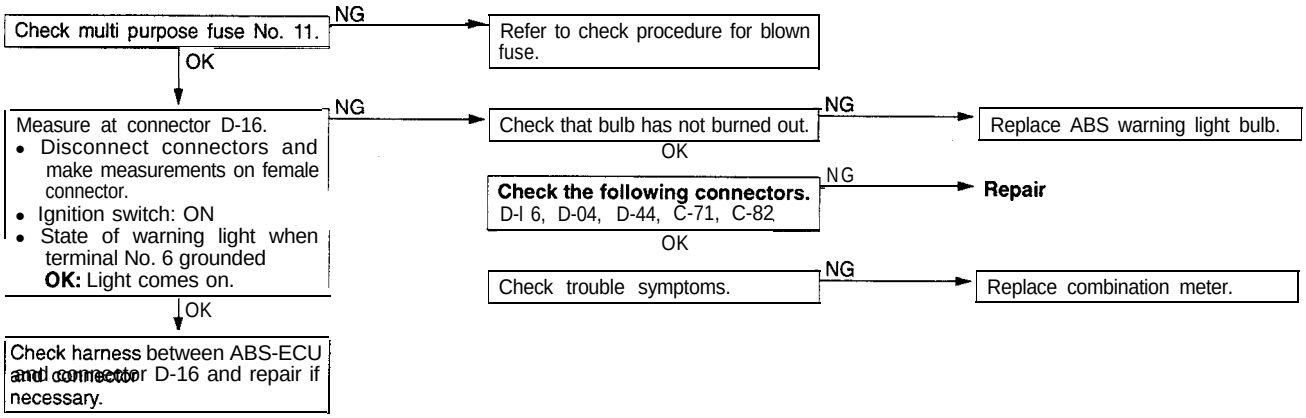
No communication is possible between scan tool and ABS-ECU.	Probable cause
ABS-ECU power supply circuit or diagnosis output circuit is probably open-circuited.	• Fuse blown • Harness, connector defective • ABS-ECU defective



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Inspection Procedure 3

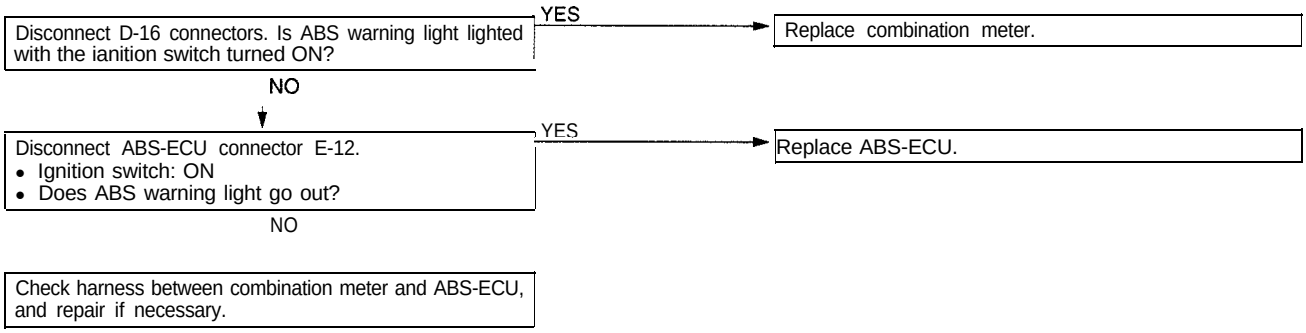
ABS warning light is not lighted with the ignition key turned ON (stationary engine).	Probable cause
Probably light power supply circuit is open-circuited, light bulb has burned out or circuit between warning light and ABS-ECU is open-circuited.	• Fuse blown • ABS warning light bulb burned out. • Harness, connector defective



Inspection procedure 4

ABS warning light does not go out after turning ON of the ignition switch.	Probable cause
ABS warning light lighting circuit is probably short-circuited.	• Combination meter defective • ABS-ECU defective • Harness defective (shorted)

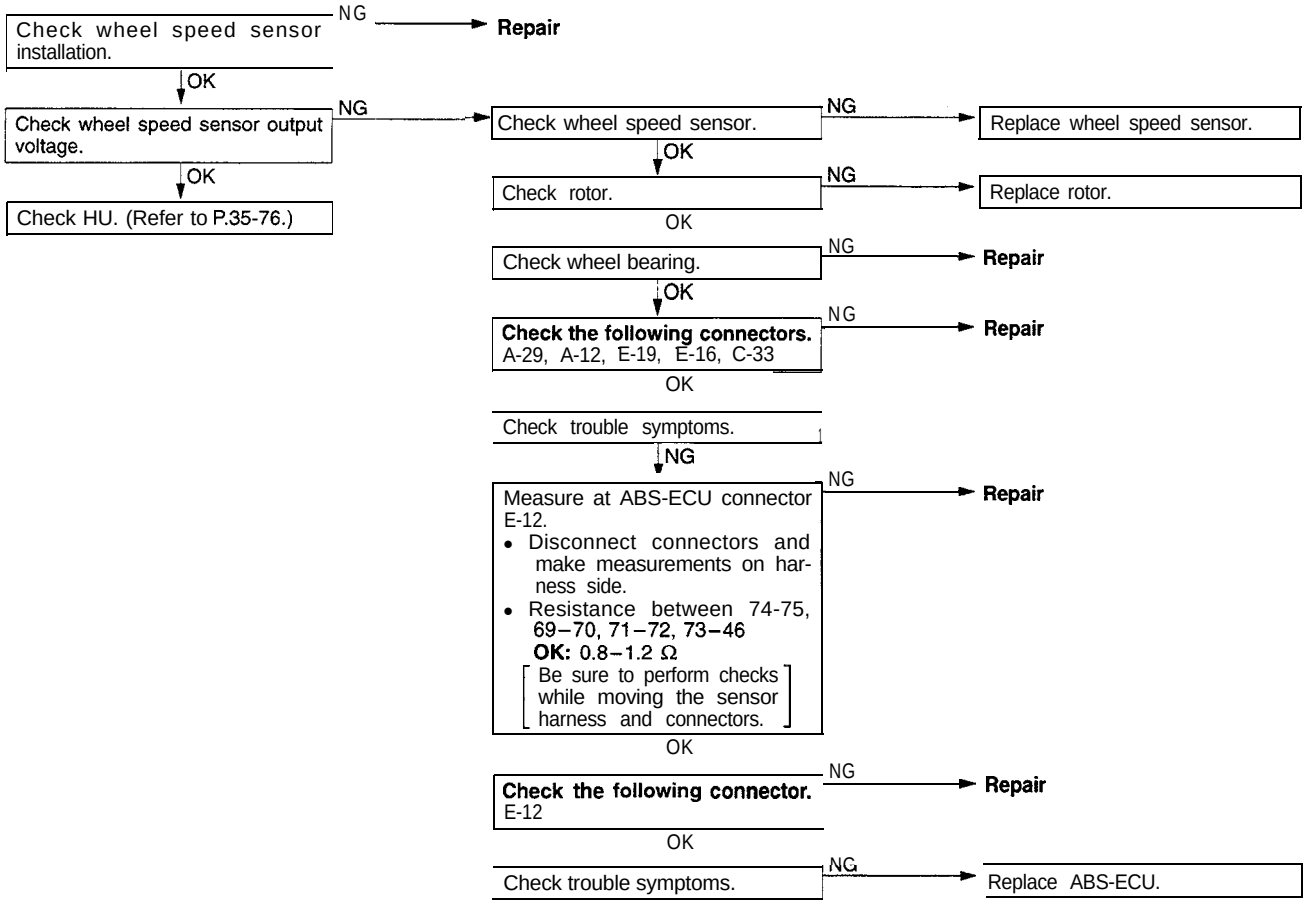
NOTE
This trouble symptom is limited to the case where communication with scan tool is possible (ABS-ECU power supply is normal) and diagnostic code is normal code.



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inspection Procedure 5

Brakes operate abnormally,.	Probable cause
Troubles are hard to be judged since they differ according to the driving conditions and the state of road surface, when the diagnostic trouble code is normal code, perform the following check.	• Wheel speed sensor installation defective • Harness, connector defective • Wheel speed sensor defective • Rotor defective • Wheel speed sensor having foreign matter deposited on it. • Wheel bearing defective • HU defective • ABS-ECU defective



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SERVICE DATA CHART

Of all ECU input data, the following items can be read by the scan tool.

Item No.	Check Item	Checking Condition	Criterion for normality
11	F.R. sensor	Perform actual running.	Agreement of speedometer reading with scan tool display
12	F.L. sensor		
13	R.R. sensor		
14	R.L. sensor		
16	ABS-ECU power supply voltage	IG power supply voltage	Battery voltage
17	G-sensor output voltage	Vehicle is stationary.	2.3–2.7 V
		Perform actual running.	Displayed value rises above or drops below 2.5 V.
38	Stop light switch	When brake pedal is depressed.	ON
		When brake pedal is released.	OFF

ACTUATOR TEST CHART

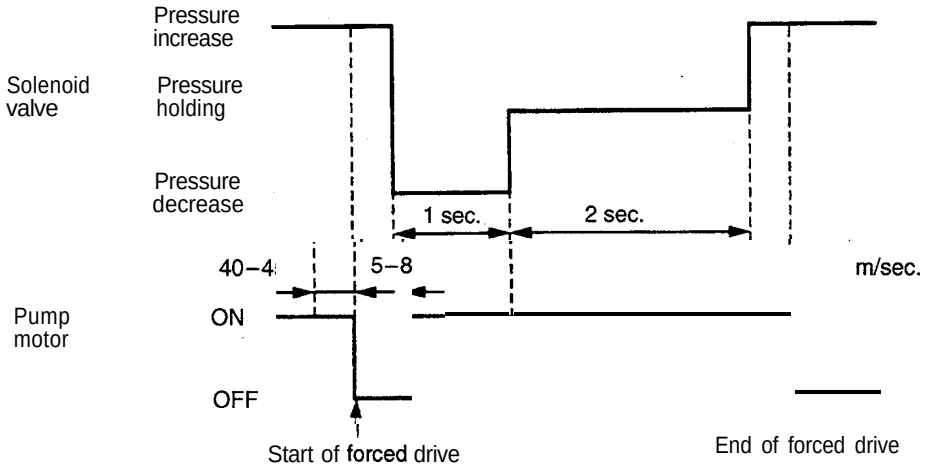
The following actuators can be force-driven by use of the scan tool.

NOTE
(1) Actuator test cannot be made when ABS-ECU is not functioning.
(2) Actuator test can be carried out only when the vehicle is not running. If the vehicle speed reaches 10 km/h (6 mph) while the actuator is force-driven, force driving is discontinued.

ACTUATOR TEST SPECIFICATIONS

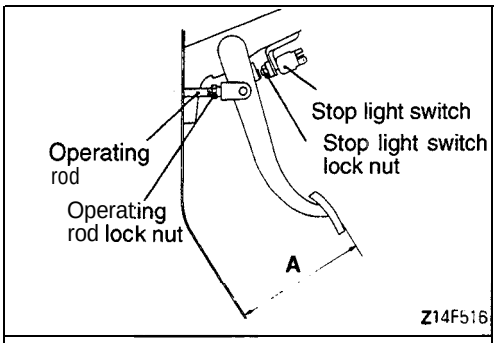
Item No.	Check Item	Detail of Drive
01	F.R. wheel solenoid valve + motor	Solenoid valve and pump motor in corresponding channel of HU (simple check mode)
02	F.L. wheel solenoid valve + motor	
03	R.R. wheel solenoid valve + motor	
04	R.L. wheel solenoid valve + motor	

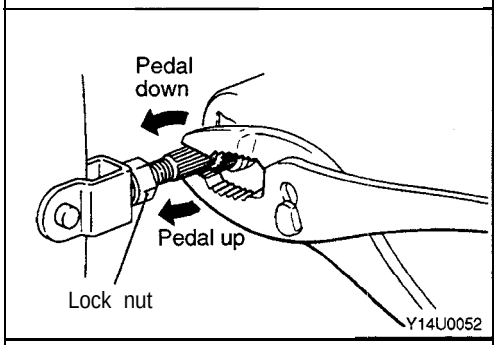
Drive Pattern

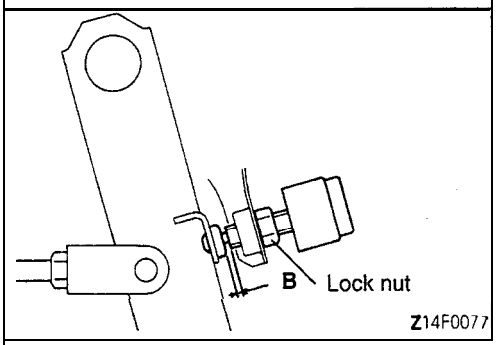


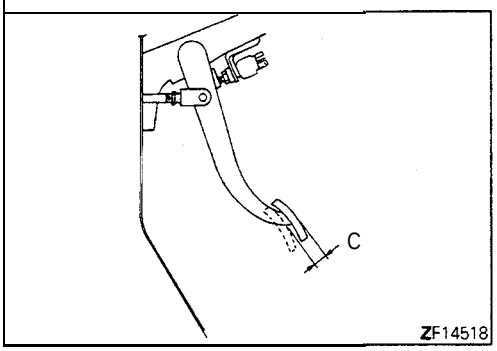
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ON-VEHICLE SERVICE

BRAKE PEDAL CHECK AND ADJUSTMENT

BRAKE PEDAL HEIGHT

1. Turn off the carpet etc. at under the brake pedal.
2. Measure the brake pedal height as illustrated. If the brake pedal height is not within the standard value, adjust as follows.

   Standard value (A): 177-182 mm (7.0-7.2 in.)

   (1) Disconnect the stop light switch connector, loosen the lock nut, and move the stop light switch to a position where it does not contact the brake pedal arm.
   (2) Adjust the brake pedal height by turning the operating rod with pliers (with the operating rod lock nut loosened), until the correct brake pedal height is obtained.
   (3) Screw in the stop light switch until it contacts the brake pedal stopper (just before the brake pedal is caused to move). Back off the stop light switch 1/2 to 1 turn and secure by tightening the lock nut.
   (4) Connect the connector of the stop light switch.
   (5) Check to be sure that the stop light is not illuminated with the brake pedal released.

   Reference value (B): 0.5–1.0 mm (.02–.04 in.)

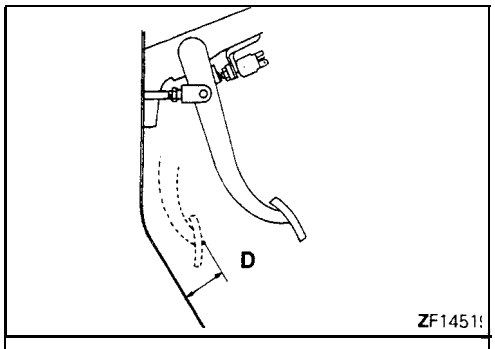
   (6) On vehicles with automatic transaxle, check the shift-lock mechanism. (Refer to GROUP 23 – Transaxle Control.)
3. Return the carpet etc. to the original position.

BRAKE PEDAL FREE PLAY

1. With the engine stopped, press the brake pedal two or three times. After eliminating the vacuum in the power brake booster, press the pedal down by hand, and confirm that the amount of movement before feeling resistance is met (the free play) is within the standard value range.

   Standard value (C): 3-8 mm (.1–.3 in.)

2. If the free play is less than the standard value, confirm that the clearance between the stop light switch and brake pedal is within the standard value.
   If the free play exceeds the standard value, it is probably due to excessive play between the clevis pin and brake pedal arm. Check for excessive clearance and replace faulty parts as required.



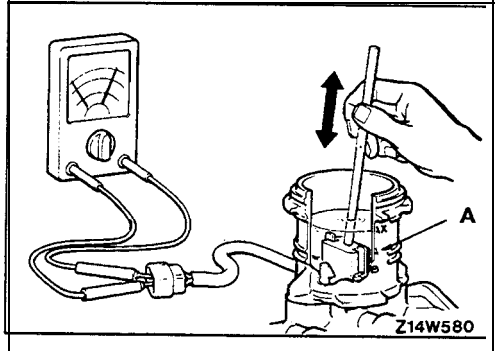
CLEARANCE BETWEEN BRAKE PEDAL AND FLOOR BOARD

1. Turn off the carpet etc. at under the brake pedal.
2. Start the engine, depress the brake pedal with approximately 500 N (110 lbs.) of force, and measure the clearance between the brake pedal and the floorboard.

   Standard value (D): 80 mm (3.1 in.) or more
3. If the clearance is less than the standard value, check for air trapped in the brake line **and** for brake fluid leaks. If necessary, check the brake system mechanism (excessive shoe clearance due to faulty auto adjuster) and repair faulty parts as required.
4. Return the carpet etc. to the original position.

BRAKE FLUID LEVEL SENSOR CHECK

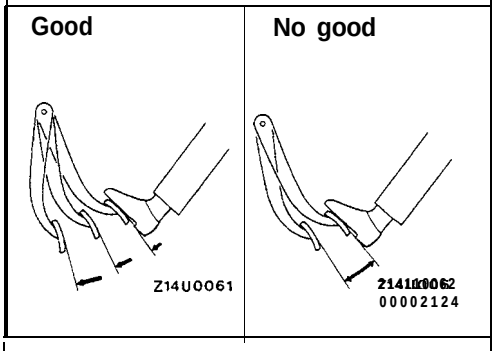
1. Connect a circuit tester to the brake fluid level sensor.
2. Move the float from top to bottom and check for continuity.
3. The brake fluid level sensor is in good condition if there is no continuity when the float surface is above “A”, and if there is continuity when the float surface is below “A”.

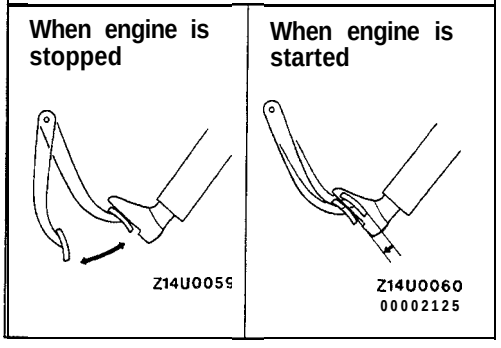


BRAKE BOOSTER OPERATING CHECK

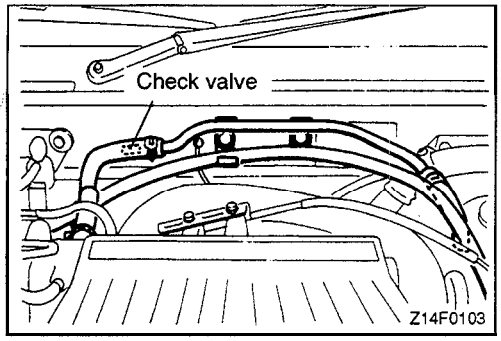
For simple checking of brake booster operation, carry out the following tests.

1. Run the engine for one or two minutes, and then turn the engine off.
2. Step on the brake pedal several times with normal pressure.
   If the pedal depresses fully the first time but gradually becomes higher when depressed succeeding times, the booster is operating properly.
   If the pedal height remains unchanged, the booster is faulty.
3. With the engine stopped, step on the brake pedal several times with the same pressure to make sure that the pedal height will not change.
   Then step on the brake pedal and start the engine. If the pedal moves downward slightly, the booster is in good condition. If there is no change, the booster is faulty.
4. With the engine running, step on the brake pedal and then stop the engine.
   Hold the pedal depressed for 30 seconds. If the pedal height does not change, the booster is in good condition. If the pedal rises, the booster is defective.





Brake booster performance is satisfactory if it passes all three operating tests.
If the brake booster does not pass all three tests, there may be a fault in the check valve, vacuum hose or in the booster itself.



CHECK VALVE OPERATION CHECK

When checking the check valve, keep the check valve fit in the vacuum hose.

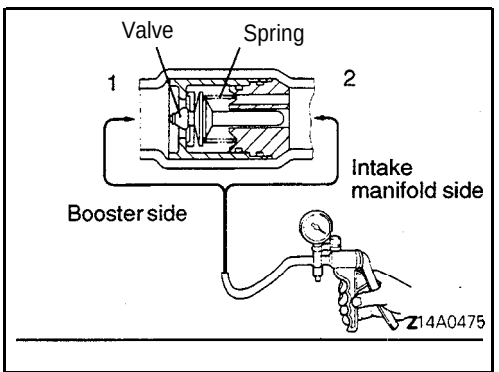
1. Remove the vacuum hose.

Caution
The check valve is press-fit inside the vacuum hose and do not remove the check valve from the vacuum hose.

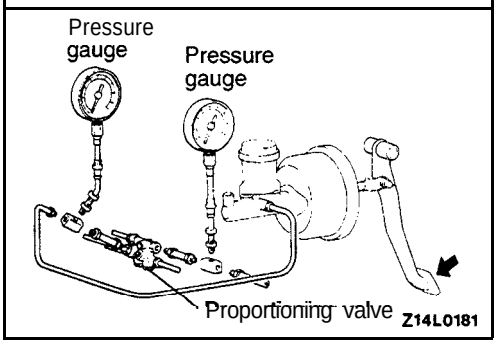
2. Check the operation of the check valve by using a vacuum pump.

Vacuum pump connection	Accept/reject criteria
Connection at the brake booster side (1)	A negative pressure (vacuum) is created and held.
Connection at the intake manifold side (2)	A negative pressure (vacuum) is not created.

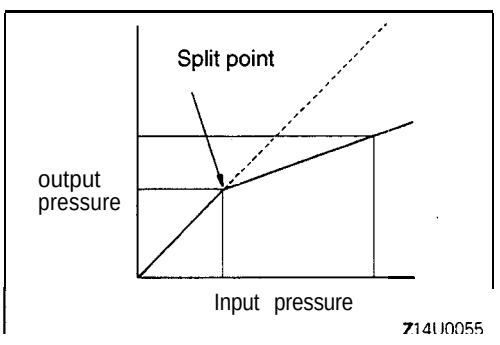
Caution
If the check valve is defective, replace it as an assembly unit together with the vacuum hose.



PROPORTIONING VALVE FUNCTION TEST



1. Connect two pressure gauges, one each to the input side and output side of the proportioning valve, as shown.
2. Air bleed the brake line and the pressure gauge.
3. While gradually depressing the brake pedal, make the following measurements and check to be sure that the measured values are within the allowable range.



(1) Output pressure begins to drop relative to input pressure (split point).

Standard value:
Convertible 4.95–5.45 MPa (704-775 psi)
Hatchback 3.75-4.25 MPa (533-604 psi)

(2) Output fluid pressure when input fluid pressure is 10 MPa (1,422 psi)

Standard value:
Convertible 6.72-7.52 MPa (956–1,070 psi)
Hatchback 5.82-6.62 MPa (828-842 psi)

(3) Output pressure difference between left and right brake lines

Limit: 0.4 MPa (57 psi)

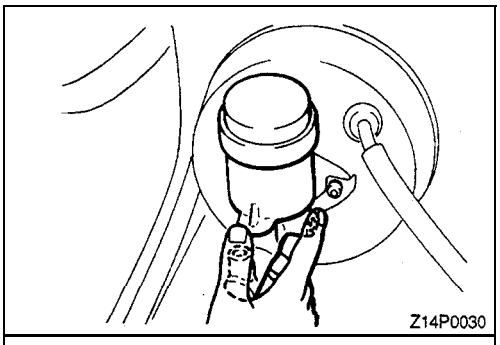
4. If the measured pressures are not within allowable ranges, replace the proportioning valve.

BLEEDING

Caution

Use the specified brake fluid. Don't use a mixture of the specified brake fluid and another non-specified fluid.

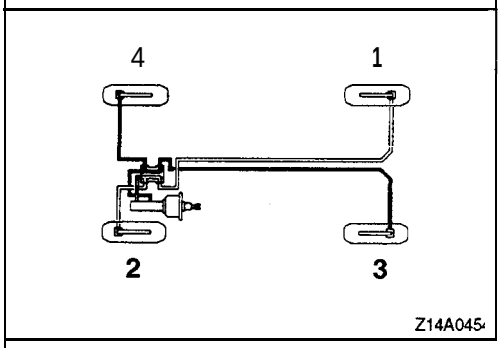
Specified brake fluid: Conforming to DOT3 or DOT 4



BLEEDING THE MASTER CYLINDER

If the master cylinder is empty of brake fluid, bleed the cylinder as follows.

(1) Fill the reserve tank with brake fluid.
(2) Depress and hold the brake pedal.
(3) Let your fellow worker plug the master cylinder outlet with finger.
(4) Keeping the condition (3), release the brake pedal.
(5) Repeat steps (2) to (4) three to four times while filling the master cylinder with brake fluid.

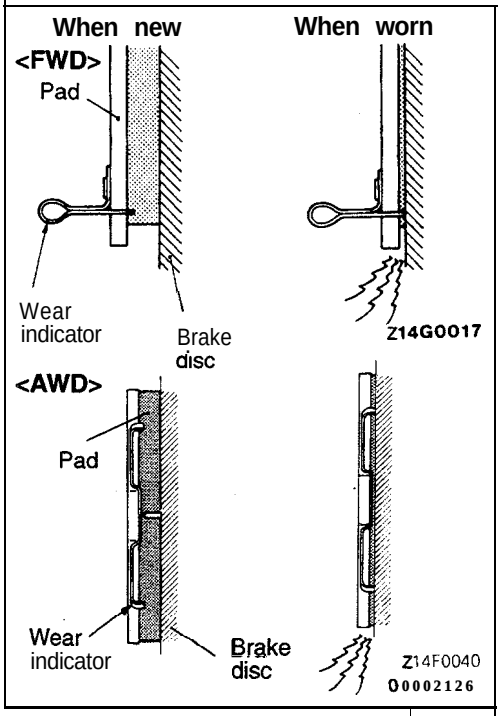


BLEEDING THE BRAKE LINE

Start the engine and bleed the air in the sequence shown in the figure.

Caution

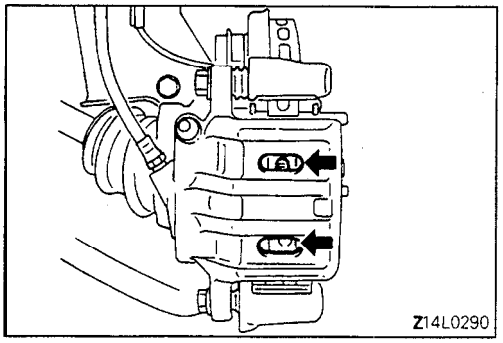
For vehicles with ABS, be sure to filter/strain the brake fluid being added to the master cylinder reservoir tank. Debris may damage the HU.



FRONT DISC BRAKE PAD CHECK AND REPLACEMENT

NOTE

The brake pads have wear indicators that contact the brake disc when the brake pad thickness becomes 2 mm (.079 in.). The wear indicators emit a squealing sound to warn the driver to have the pads replaced and to have the brake system checked.

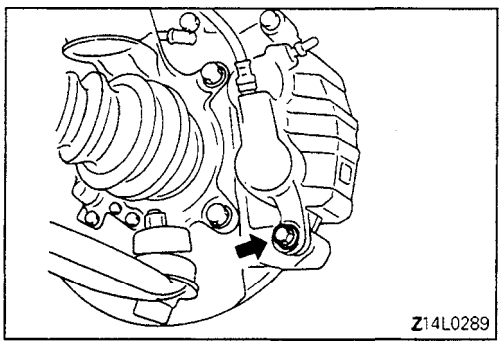


<FWD>

1. Visually check the brake pad thickness through the inspection hole in the caliper body.

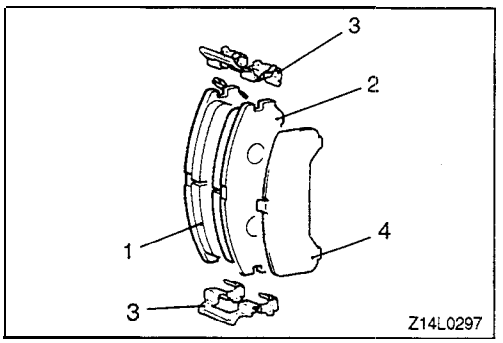
   Standard value: 10.0 mm (.39 in.)
   Limit: 2.0 mm (.08 in.)

   Caution
   1. **Replace the pad if worn beyond the limit. At this time, replace the pads on right and left wheels as a set.**
   2. **If there is a large difference in thickness between the pads on the right and left wheels, check the sliding portions of the caliper.**

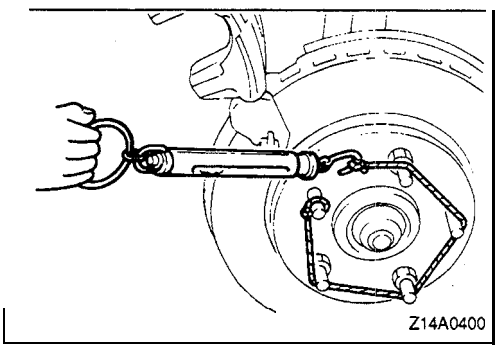


2. Remove the guide pin, lift caliper assembly, slide the assembly toward the inside of the wheel well until separated from the lock pin. Support it with a wire, etc.

   Caution
   The guide pin has been coated with special grease. Do not wipe off the special grease on the lock pin, and do not contaminate the lock pin.

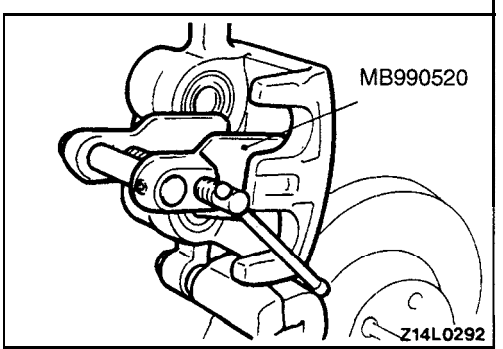


3. Remove the following parts from the caliper support.
   (1) Pad and wear indicator assembly
   (2) Pad assembly
   (3) Clip
   (4) Outer shim

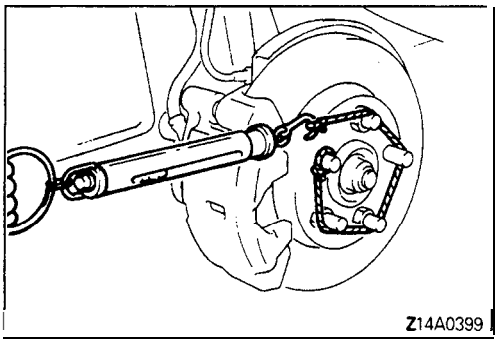


Using the following method, measure the drag force of the disc brake after installation of the brake assembly.

4. With the brake assembly removed, use a spring scale to measure the rotary sliding resistance of the hub in the forward direction.
5. Install the pad clips to the caliper support in position.



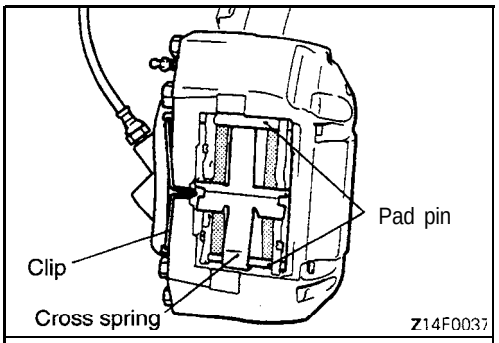
6. Clean the piston and, using the special tool, push the piston into the cylinder (caliper).
7. With care not to allow the piston boot to be wedged, lower the caliper assembly and fit the lock pin.
8. Start the engine, depress the brake pedal firmly two to three times and stop the engine.
9. Give the brake disc ten turns in the forward direction.



10. Using a spring scale, measure the rotary sliding resistance of the hub in the forward direction.
11. Obtain the drag force of the disc brake (the difference between the values measured in 10 and 4).

    Standard value: 70 N (15.4 lbs.) or less

12. If the drag force of the brake exceeds the standard value, disassemble the piston and check for dirty or corroded piston sliding surface and deteriorated piston seal.

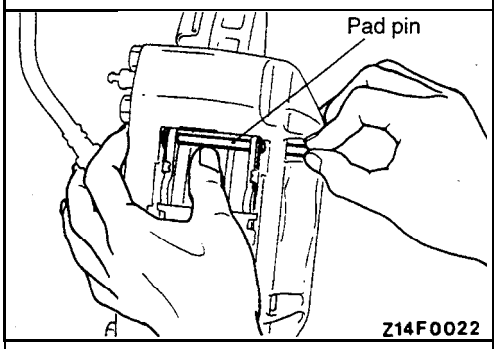


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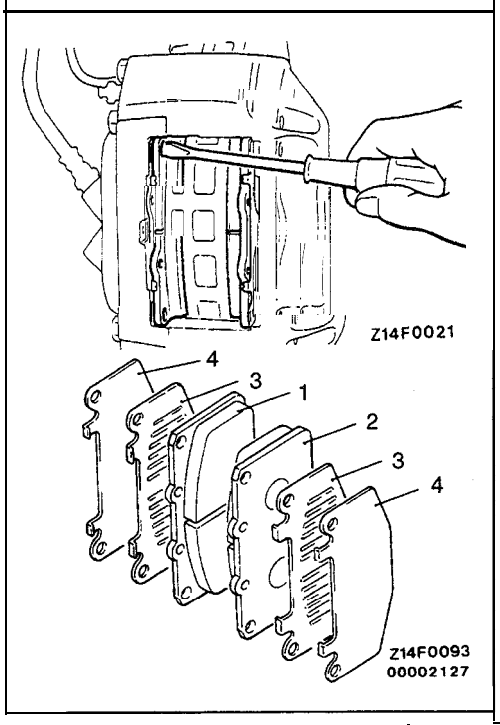
1. Visually check the brake pad thickness. Through the opening in the caliper body.

   Standard value: 10.0 mm (.39 in.)
   Limit: 2.0 mm (.08 in.)

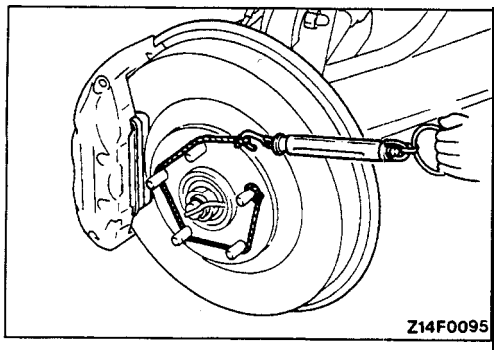
   Caution
   1. **Replace the pad if worn beyond the limit. At this time, replace the pads on right and left wheels as a set.**
   2. **If there is a large difference in thickness between the pads on the right and left wheels, check the sliding portions of the caliper.**



2. Remove the clip and, holding the cross spring with hand, remove the pad pins.

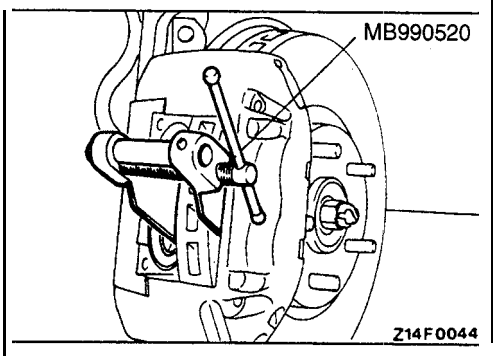


3. Using a screwdriver, remove the pads and shims.
   (1) Inner pad (with wear indicator)
   (2) Outer pad
   (3) Shim B
   (4) Shim A

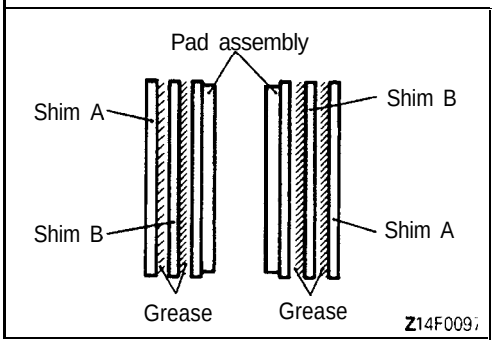


Using the following method, measure the drag force of the disc brake after installation of the brake assembly.

4. With the brake assembly removed, use a spring scale to measure the rotary sliding resistance of the hub in the forward direction.



5. Clean the piston and then using the special tool, push the piston into the cylinder (caliper).

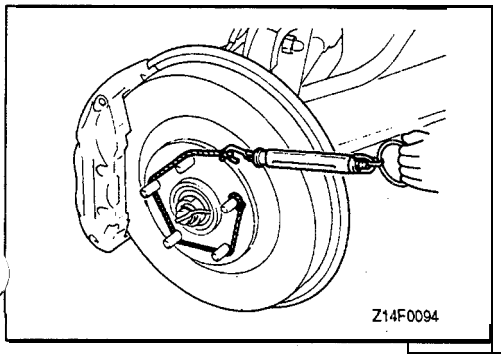


6. Apply repair kit grease to both sides of the inner shims.

Specified grease:
Brake grease SAE 5310, NLGI No. 1

Caution
1. **Make sure that the friction surfaces of pads and brake discs are free of grease and other contaminants.**
2. **The grease should never squeeze out from around the shim.**

7. Start the engine, depress the brake pedal firmly two to three times and stop the engine.
8. Give the brake disc ten turns in the forward direction.

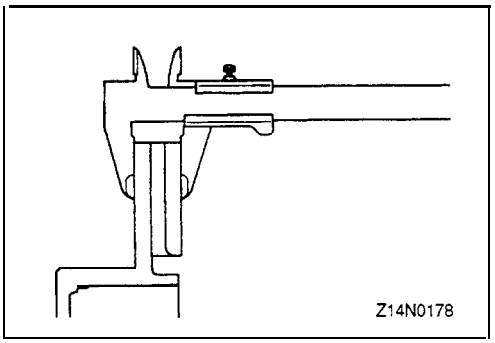


9. Using a spring scale, measure the rotary sliding resistance of the hub in the forward direction.
10. Obtain the drag force of the disc brake (the difference between the values measured in 9 and 4).

Standard value: 70 N (15.4 lbs.) or less

11. If the drag force of the brake exceeds the standard value, disassemble the piston and check for dirty or corroded piston sliding surface and deteriorated piston seal.

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FRONT BRAKE DISC THICKNESS CHECK

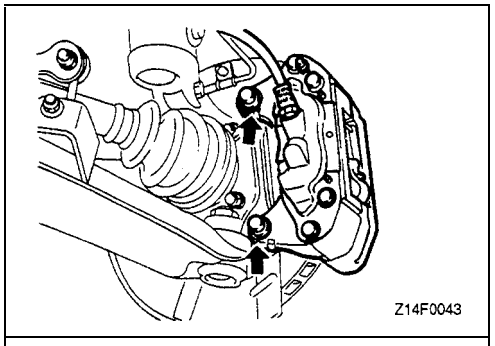
1. Using a micrometer, measure disc thickness at eight positions, approximately 45° apart and 10 mm (.39 in.) in from the outer edge of the disc.

   Standard value:
   <FWD> 24.0 mm (.94 in.)
   <AWD> 30.0 mm (1.18 in.)

   Limit:
   <FWD> 22.4 mm (.88 in.)
   <AWD> 28.4 mm (1.12 in.)

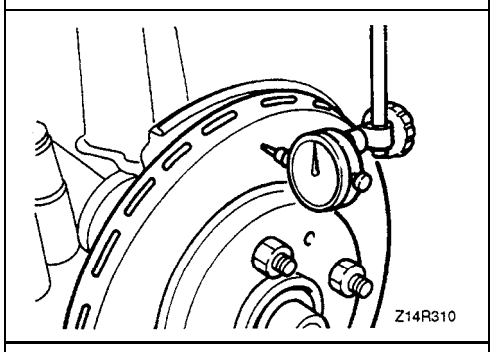
   Thickness variation (At least 8 positions)
   The difference between any thickness measurement should not be more than .015 mm (.0006 in.).

2. If the disc is beyond the limits for thickness, remove it and install a new one.
   If thickness variation exceeds the specification, replace the disc or turn rotor on the car type brake lathe ("MAD, DL1-8700PF" or equivalent). Be sure to follow the exact brake lathe manufacturer instructions.



FRONT BRAKE DISC RUN-OUT CHECK

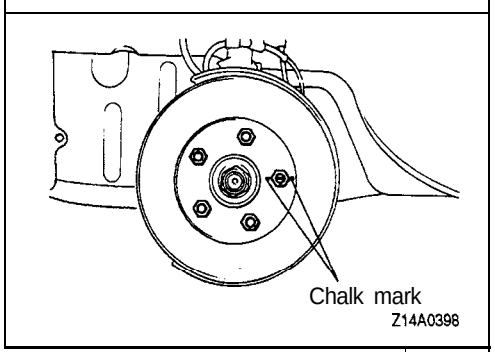
1. Remove the front brake assembly; and support it with a wire, etc.
2. Inspect the disc surface for grooves, cracks and rust. Clean the disc thoroughly and remove all rust.



3. Place a dial gauge approximately 5 mm (.2 in.) from the outer circumference of the brake disc, and measure the run-out of the disc.

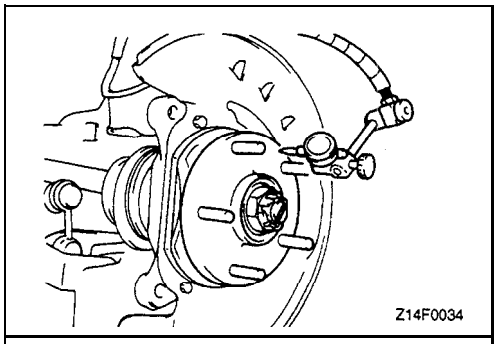
   Limit:
   <FWD> 0.07 mm (.0028 in.) or less
   <AWD> 0.10 mm (.004 in.) or less

   NOTE
   Secure the disc to the hub with wheel nuts.



FRONT BRAKE DISC RUN-OUT CORRECTION

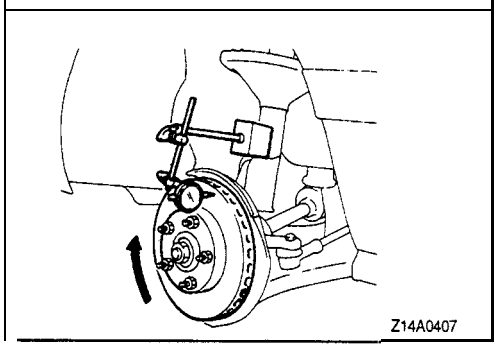
1. If the run-out of the brake disc is equivalent to or exceeds the limit specification, change the phase of the disc and hub, and then measure the run-out again.
   (1) Before removing the brake disc, chalk both sides of the wheel stud on the side at which run-out is greatest.



(2) Remove the brake disc, and then place a dial gauge as shown in the illustration; then move the hub in the axial direction and measure the play.

Limit: 0.05 mm (.002 in.)

If the play is equivalent to or exceeds the limit, replace the front hub unit bearing.



(3) If the play does not exceed the limit specification, and then check the run-out of the brake disc once again.
Mount the brake disc on the position dislocated from the chalk mark.

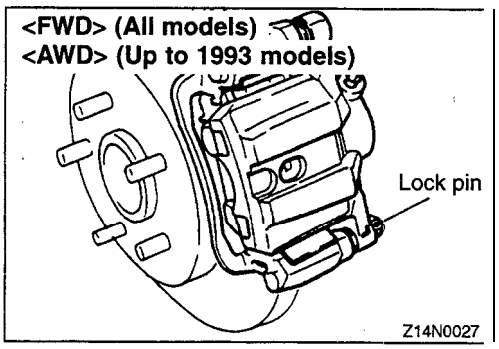
2. If the run-out cannot be corrected by changing the phase of the brake disc, replace the disc or turn rotor on the car type brake lathe ("MAD, DL-8700PF" or equivalent). Be sure to follow the exact brake lathe manufacturer instructions. Rotors turned on the vehicle will often have a lower run-out than a new brake disc.

REAR DISC BRAKE PAD CHECK AND REPLACEMENT

1. Check brake pad thickness through caliper body check port.

Standard value: 10.0 mm (.39 in.)
Limit: 2.0 mm (.08 in.)

Caution
1. When the limit is exceeded, the brake pads on both the left and right wheels must be replaced as a set.
2. If there is a large difference in thickness between the pads on the right and left wheels, check the sliding portions of the caliper.

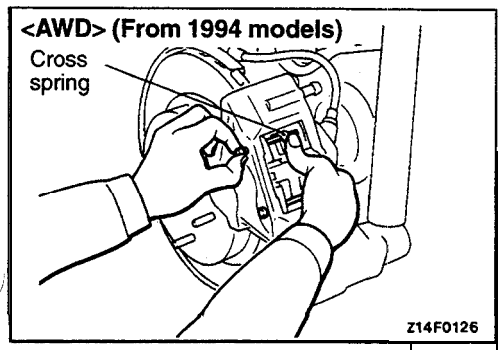


2. Loosen the parking brake cable (from the vehicle interior), and disconnect the parking brake end installed on the rear brake assembly.

<FWD (All models), AWD (Up to 1993 models)>

3. Remove lock pin. Lift caliper assembly, slide the assembly toward the inside of the wheel well until separated from the lock pin. Support it with wires.

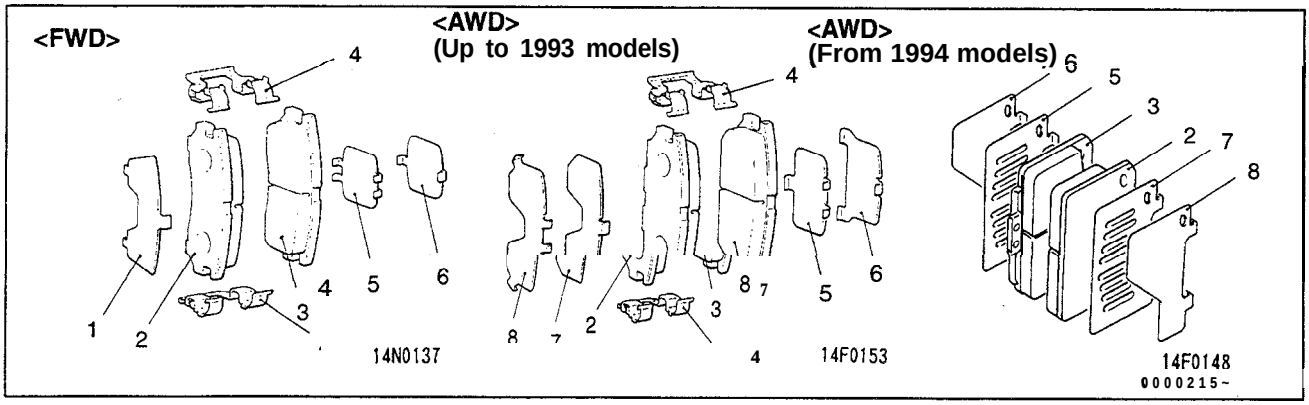
Caution
Do not wipe off special grease on lock pin or do not make it ditty.

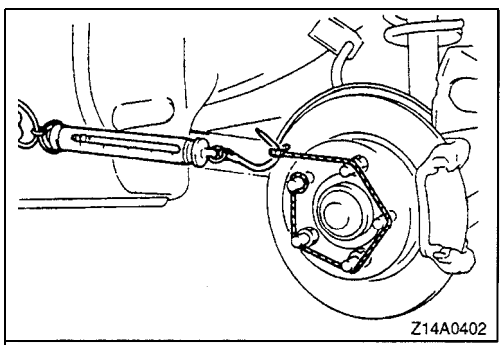


<AWD (From 1994 models)>

3. Remove the clip and pull out the pad pin while holding the cross spring by hand.

4. Remove the following parts from caliper support,
   (1) Outer shim
   (2) Pad assembly
   (3) Pad & wear indicator assembly
   (4) Clip
   (5) Inner shim A
   (6) Inner shim B
   (7) Outer shim A
   (8) Outer shim B





Using the following method, measure the drag force of the disc brake after installation of the brake assembly.

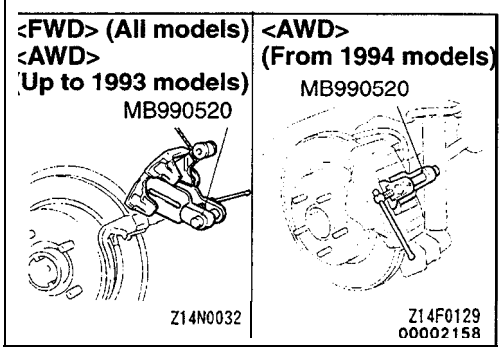
5. With the brake assembly removed, use a spring scale to measure the rotary sliding resistance of the hub in the forward direction.
   Disengage the drive shaft and companion flange.

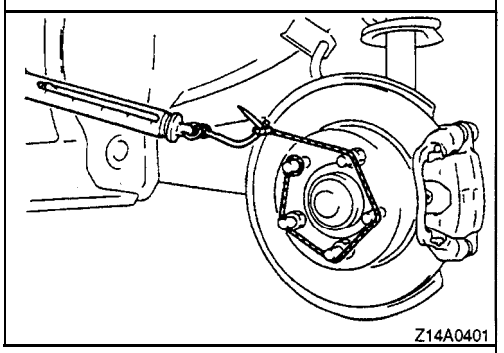
   NOTE
   Secure the disc to the hub with wheel nuts.

6. Securely attach the pad clip to the caliper support.

   Caution
   Do not deposit grease or other dirt on pad or brake disc friction surfaces.

7. Clean the piston and then using the special tool, push the piston into the cylinder (caliper).
8. <FWD (All models), AWD (Up to 1993 models)>
   With care not to allow the piston boot to be wedged, lower the caliper assembly and fit the lock pin.
9. Start the engine, depress the brake pedal firmly two to three times and stop the engine.
10. Give the brake disc ten turns in the forward direction.



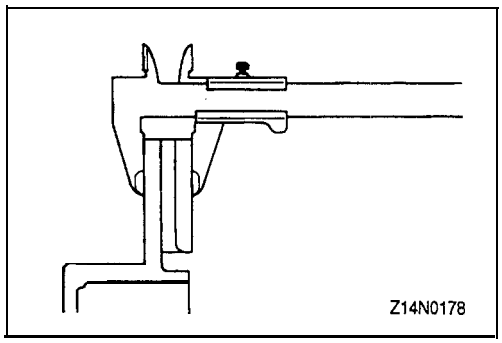


11. Using a spring scale, measure the rotary sliding resistance of the hub in the forward direction.
12. Obtain the drag force of the disc brake (the difference between the values measured in 11 and 5).

    Standard value: 70 N (15.4 lbs.) or less

13. If the drag force of the brake exceeds the standard value, disassemble the piston and check for dirty or corroded piston sliding surface and deteriorated piston seal.

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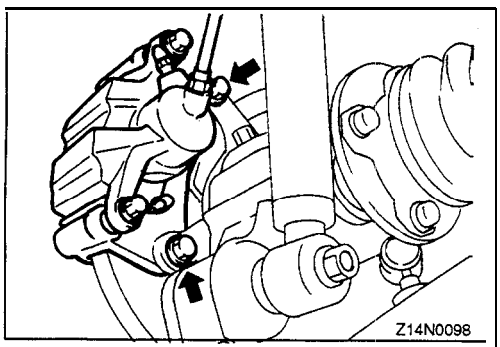
REAR BRAKE DISC THICKNESS CHECK

1. Remove dirt and rust from brake disc surface.
2. Measure disc thickness at 4 locations or more.

Standard value:
<FWD> 18.0 mm (.71 in.)
<AWD> 20.0 mm (.79 in.)

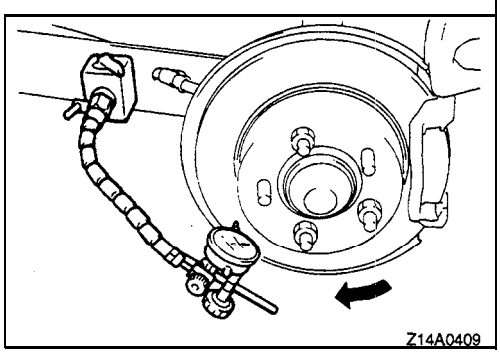
Limit:
<FWD> 16.4 mm (.65 in.)
<AWD> 18.4 mm (.72 in.)

Replace the discs and pad assembly for both sides left and right of the vehicle if they are worn beyond the specified limit.



REAR BRAKE DISC RUN-OUT CHECK

1. Remove the rear brake assembly, and support it by a wire, etc.



2. Place a dial gauge approximately 5 mm (.2 in.) from the outer circumference of the brake disc, and measure the run-out of the disc.

Limit: 0.08 mm (.0031 in.) or less

NOTE
Tighten nuts to secure the disc to the hub.

REAR BRAKE DISC RUN-OUT CORRECTION

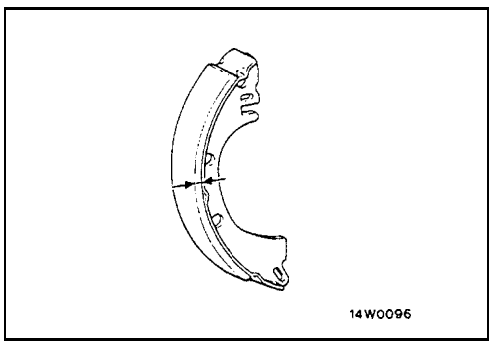
1. If the run-out of the brake disc is equivalent to or exceeds the limit specification, change the phase of the disc and hub, and then measure the run-out again.

N O T E
The procedures for checking and changing the rear disc phase are the same as those for the front brake discs. Note, however, that the axial play (limit) in the hub differs. (Refer to P.35-56.)

Limit: <FWD> 0.05 mm (.002 in.)
<AWD> 0.8 mm (.031 in.)

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2. If the problem cannot be corrected by changing the phase of the brake disc, replace the disc or turn rotor using an on the car type brake lathe. Be sure to follow the exact brake lathe manufacturer instructions. Rotors turned on the vehicle will often have a lower run-out than a new brake disc.



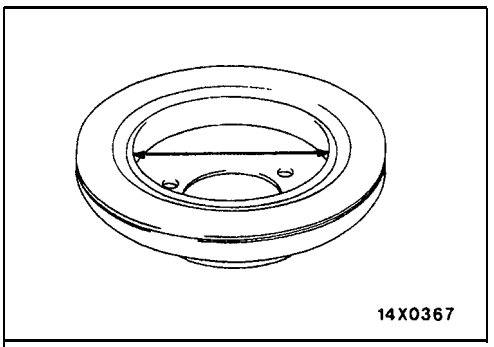
BRAKE LINING THICKNESS CHECK

1. Remove the rear brake assembly, and support it by a wire, etc.
2. Remove the brake disc.
3. Measure the wear of the brake lining at the place worn the most.

   Standard value: 2.8 mm (.11 in.)
   Limit: 1.0 mm (.04 in.)

   Replace the shoe and lining assembly if any location of the brake lining thickness is less than the limit.

   Caution
   Whenever the shoe and lining assembly is replaced, replace both RH and LH assemblies as a set to prevent car from pulling to one side when braking.

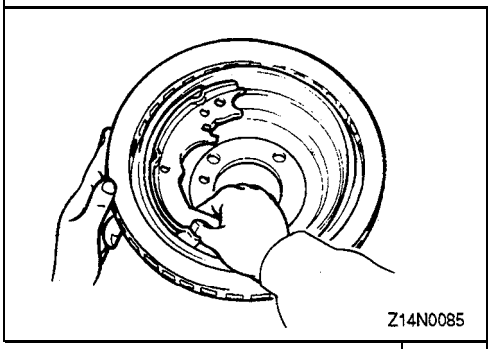


BRAKE DRUM INSIDE DIAMETER CHECK

1. Remove the rear brake assembly, and support it by a wire, etc.
2. Remove the brake disc.
3. Measure the inside diameter of the hub and drum at two or more locations.

   Standard value: 168.0 mm (6.6 in.)
   Limit: 169.0 mm (6.7 in.)

   Replace brake drums and shoe and lining assemblies when wear exceeds the limit value or is badly out of balance.

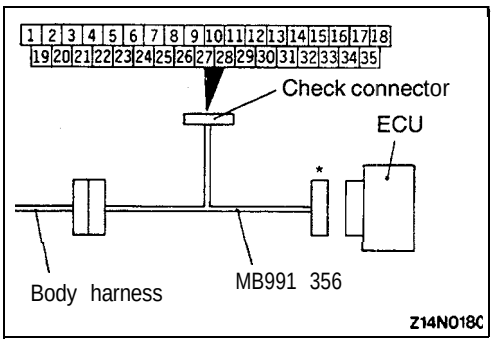


BRAKE LINING AND BRAKE DRUM CONNECTION CHECK

1. Remove the rear brake assembly, and support it by a wire, etc.
2. Remove the brake disc.
3. Remove the shoe and lining assembly.
4. Chalk inner surface of brake disc and rub with shoe and lining assembly.

5. Replace shoe and lining assembly or brake disc if very irregular contact area is observed.

NOTE
Clean off chalk after check.



WHEEL SPEED SENSOR OUTPUT VOLTAGE MEASUREMENT

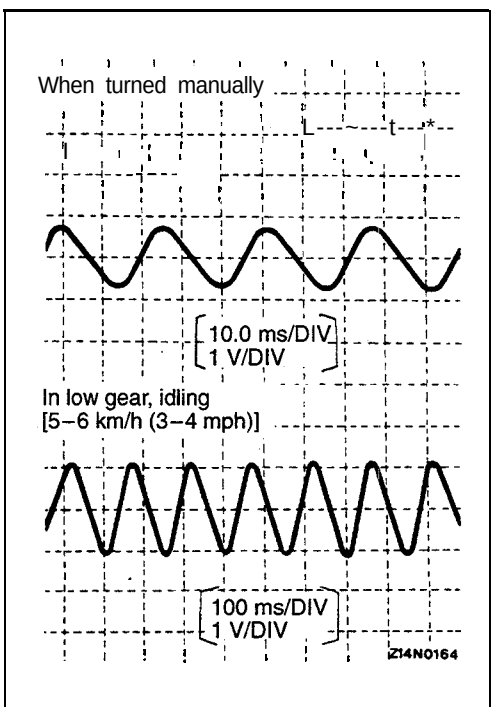
1. Lift up the vehicle and release the parking brake.
2. Disconnect the ECU harness connector and measure with the adapter harness (MB991356) connected to the harness side connector.

Caution
1. Never insert a probe, etc. into the connector as it may result in poor contact later.
2. Do not connect the connector (Special Tool) marked with "*" except when recording the waveform on a driving test. In such a case, connect the connector to the ECU.

Terminal No. (same for AWD and FWD)			
FL	RR	FR	RL
4	24	21	8
5	26	23	9

3. Manually turning the wheel to be measured by 1/2 to 1 turn/second, measure the output voltage with a circuit tester or oscilloscope.
   Output voltage:
   When measured with circuit tester: 70 mV or more
   When measured with oscilloscope (max. voltage): 100 mV or more
   Probable causes of low output voltage
   - Speed sensor pole piece-to-rotor clearance too large
   - Faulty speed sensor
4. Then, in order to observe the output state of the wheel speed sensors, shift into low gear (AWD vehicle) and drive the wheels, observe the output voltage waveform of each wheel speed sensor with an oscilloscope.
   In the case of the FWD vehicle, observe the waveform with an oscilloscope; for the front wheels, shift into low gear and drive the wheels; for the rear wheels, turn the wheels manually at a constant speed.

   NOTE
   1. Waveform may also be observed by actually driving the vehicle.
   2. The output voltage is low when the wheel speed is low and similarly it will be higher as the wheel speed increases.

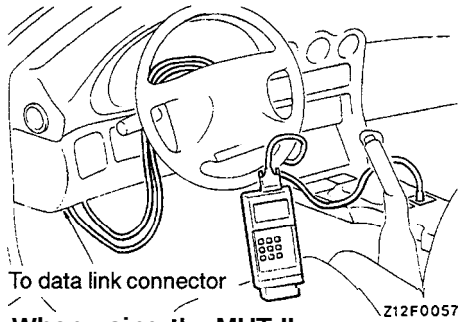


POINTS IN WAVEFORM MEASUREMENT

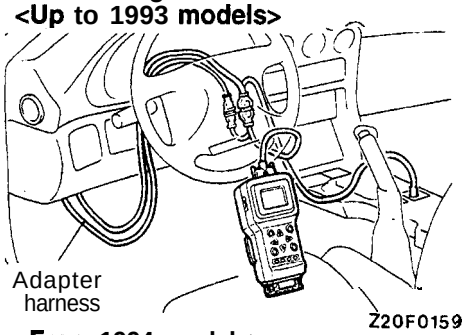
Symptom	Probable causes	Remedy
Too small or zero waveform amplitude	Faulty wheel speed sensor	Replace sensor
	Incorrect pole piece-to-rotor clearance	Adjust clearance
Waveform amplitude fluctuates excessively (this is no problem if the minimum amplitude is 100 mV or more)	Axle hub eccentric or with large runout	Replace hub
Noisy or disturbed waveform	Open circuit in sensor	Replace sensor
	Open circuit in harness	Correct harness
	Incorrectly mounted wheel speed sensor	Mount correctly
	Rotor with missing or damaged teeth	Replace rotor

NOTE
The wheel speed sensor cable moves following motion of the front or rear suspension. Therefore, it is likely that it has an open circuit only when driving on rough roads and it functions normally on ordinary roads. It is, therefore, recommended to observe sensor output voltage waveform also under special conditions, such as rough road driving.

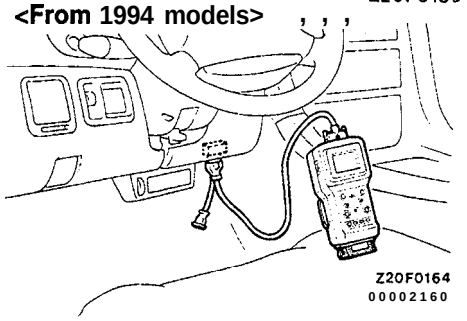
When using the MUT



When using the MUT-II <Up to 1993 models>



<From 1994 models>



HYDRAULIC UNIT (HU) CHECK

<Up to 1995 models>

INSPECTION BY FEEL

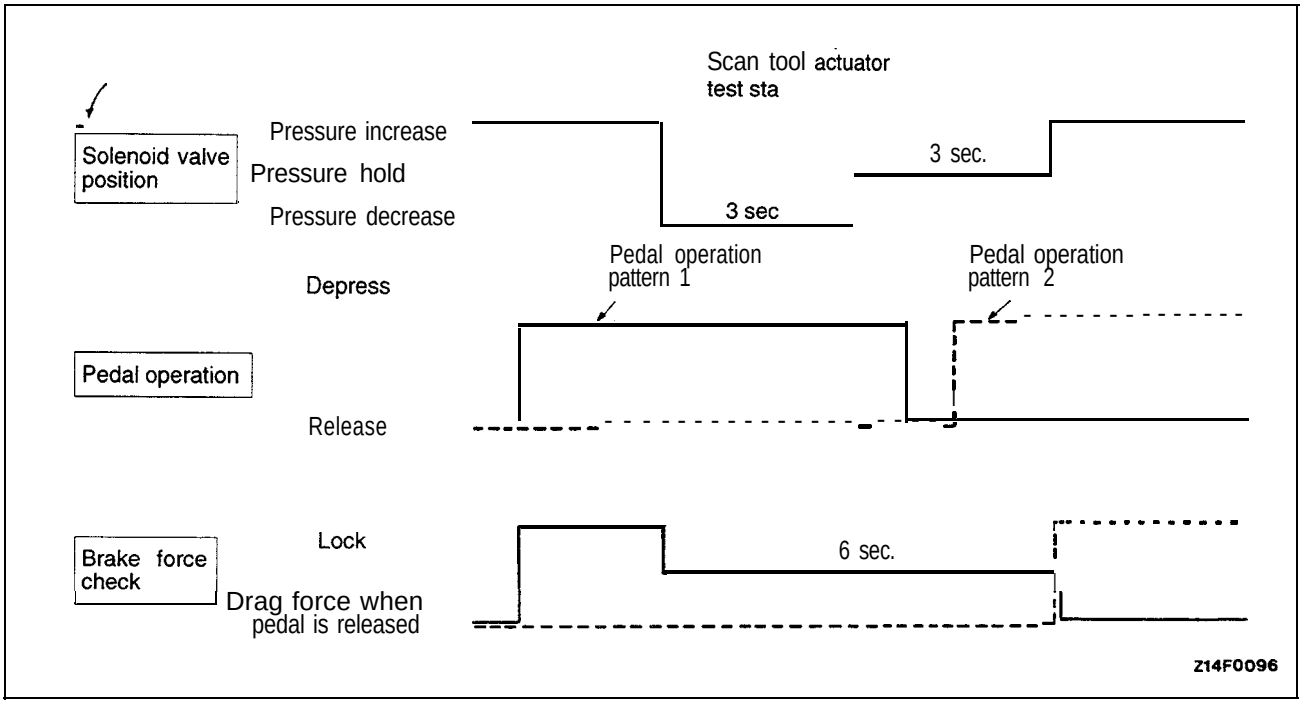
When using the scan tool [Multi-use tester (MUT) <Up to 1993 models> or MUT-II <All models>]

(1) Jack up the vehicle and support the vehicle with rigid racks placed at the specified jack-up points.
(2) Release the parking brake and determine the drag force (drag torque) of each wheel by feel.
(3) Set the scan tool as illustrated.
When connecting the scan tool (MUT-II) to a 1993 model vehicle, use the adapter harness supplied together.

Caution
Turn off the ignition switch beforehand whenever the scan tool is connected or disconnected.

(4) After confirming that the shift lever or selector lever is in the neutral position, start the engine.
The ABS warning light lights up, it goes into the scan tool mode. In the scan tool mode, ABS does not function.
(5) Operate the scan tool to force the actuator to operate (item No. 04, 05, 06).
(6) Turning the wheel manually, check the change of the braking force when the brake pedal is depressed.
The change should be as shown in the following illustration.

NOTE
While the ABS is in the fail safe mode, the scan tool actuator test cannot be made.



(7) If any abnormality is found in the check, take corrective action according to the following "Judgement in Inspection by Feel" table.

Judgement in Inspection by Feel

No.	Scan tool display	Operation	Normal condition	Abnormal condition	Probable cause	Remedy
04	FR VALVE M	(1) Depress brake pedal to lock wheel. (2) Using the scan tool, select the wheel to be checked and force the actuator to operate. (3) Turn the selected wheel manually to check the change of brake force.	Brake force released for 6 seconds after locking.	Wheel does not lock when brake pedal is depressed.	Clogged brake line other than HU	Check and clean brake line
35	FL VALVE M				Clogged hydraulic circuit in HU	Replace HU assembly
06*	Rear VALVE M*			Brake force is not released	Incorrect HU brake tube connection	Connect correctly
					HU solenoid valve not functioning correctly	Replace HU assembly

NOTE
*: FWD

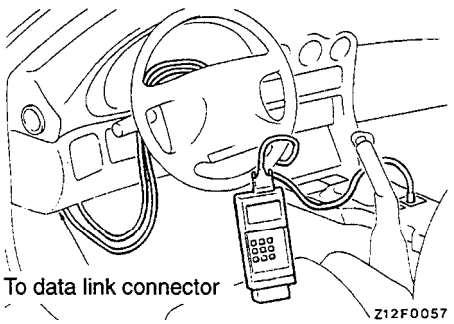
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INSPECTION BY USING BRAKE FORCE TESTER

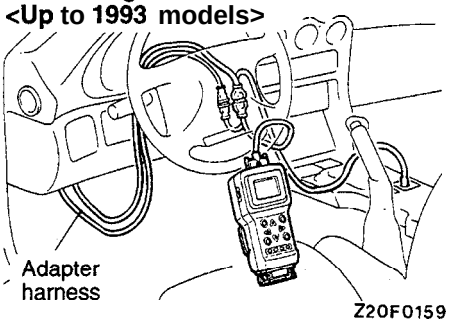
When using the scan tool [Multi-use tester (MUT) <Up to 1993 models> or MUT-II <All models>]

NOTE
(1) The brake force tester roller and tire must be dry during the test.
(2) When testing the front brakes, apply the parking brake and when testing the rear brakes, apply chocks to the front wheels to lock them.

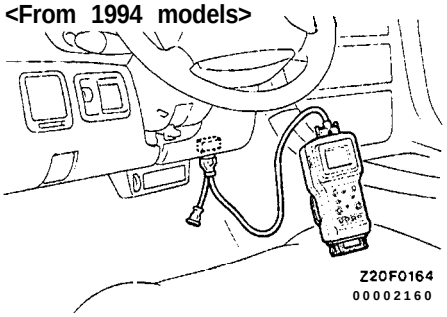
When using the MUT



When using the MUT-II <Up to 1993 models>



<From 1994 models>



00002160

(1) Place the front or rear wheels on the brake force tester roller.
(2) Set the scan tool as illustrated.
When connecting the scan tool (MUT-II) to a 1993 model vehicle, use the adapter harness supplied together.

Caution
Turn off the ignition switch beforehand whenever the scan tool is connected or disconnected.

(3) After confirming that the shift lever or selector lever is in the neutral position, start the engine.
(The ABS warning light lights up, it goes into the scan tool mode. In the scan tool mode, ABS does not function.)
(4) Operate the brake force tester roller.
(5) Depress the brake pedal until the brake force tester indicates the following value and keep the brake force at this level during the test.

Front wheels: 1,000 N (220 lbs.)
Rear wheels: 650 N (143 lbs.)

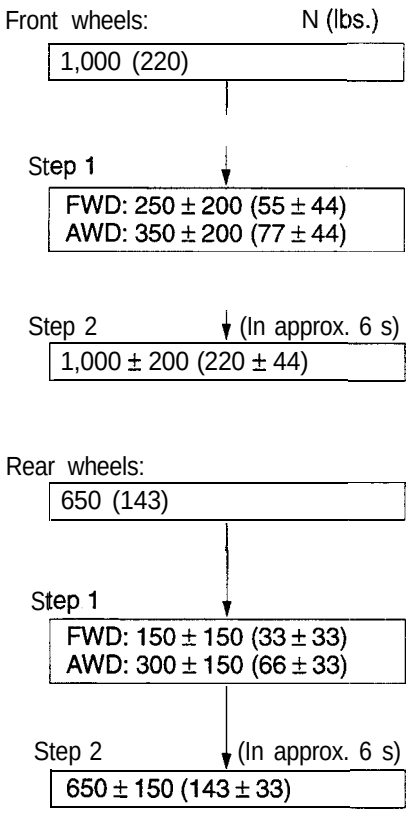
(6) Allow the brake tester indication to stabilize before operating the scan tool to perform actuator test (Item No. 01, 02, 03). Then, read change of tester indication.
Referring to the following "Judgement in Inspection by Using Brake Force Tester" table, judge and take corrective action if necessary.

NOTE
While the ABS is in the fail safe mode, the scan tool actuator test cannot be made.

Judgement in Inspection by Using Brake Force Tester

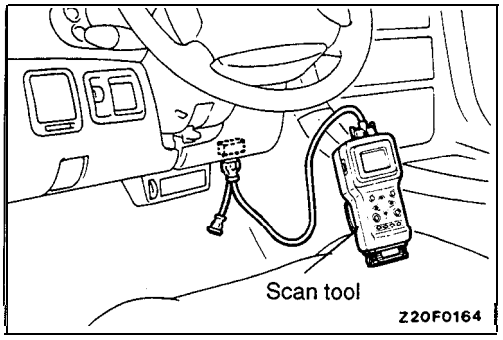
No.	Scan tool display	Operation	Normal condition	Abnormal condition	Probable cause	Remedy
04	FR VALVE M	After brake force tester indication has stabilized, operate scan tool to force the actuator to operate and check the change in brake force.	(1) Brake force changes as shown in Table 1 after actuator is forced to drive with a scan tool.	Brake force in Step 1 shows very little or almost no decrease.	Incorrect HU brake tube connection	Connect correctly
					Faulty HU	Replace HU assmbly
05	FL VALVE M			Brake force decreases in Step 1 but in Step 2, it shows very little or almost no increase.	Clogged brake line other than HU	Check and clean brake line
					Faulty HU	Replace HU assmbly
06	REAR VALVE M		2) Immediately after checking Step 2 value (in approx. 3 s), increasing brake pedal depression force does not increase brake force.	Increasing brake pedal depression force increases brake force.	Fluid leaking in HU (poor sealing)	Replace HU assembly

Table 1: Change in brake force



NOTE
(1) During forced drive using the scan tool, forced drive operation is stopped when any wheel speed reaches 10 km/h (6 mph).
(2) Failure to keep the brake pedal depression force constant can result in misjudgement.
Even if the judgement has resulted in NG, it might be that the depression force was not kept constant. Therefore, repeat the same check again as necessary.
(3) The probable causes given above all assume that all the other brake parts are normal.

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<From 1996 models>

Caution
Turn the ignition switch off before connecting or disconnecting the scan tool.

1. Jack up the vehicle and support the vehicle with rigid racks placed at the specified jack-up points or place the wheels which are checked on the rollers of the braking force tester.

   Caution
   1. The roller of the braking force tester and the tire should be dry during testing.
   2. When testing the front brakes, apply the parking brake, and when testing the rear brakes, stop the front wheels by chocking them.

2. Release the parking brake, and feel the drag force (drag torque) on each road wheel.
   When using the braking force tester, take a reading of the brake drag force.
3. Turn the ignition key to the OFF position and set the scan tool as shown in the diagram.
4. After checking that the shift lever <M/T> or the selector lever <A/T> is in neutral, start the engine.

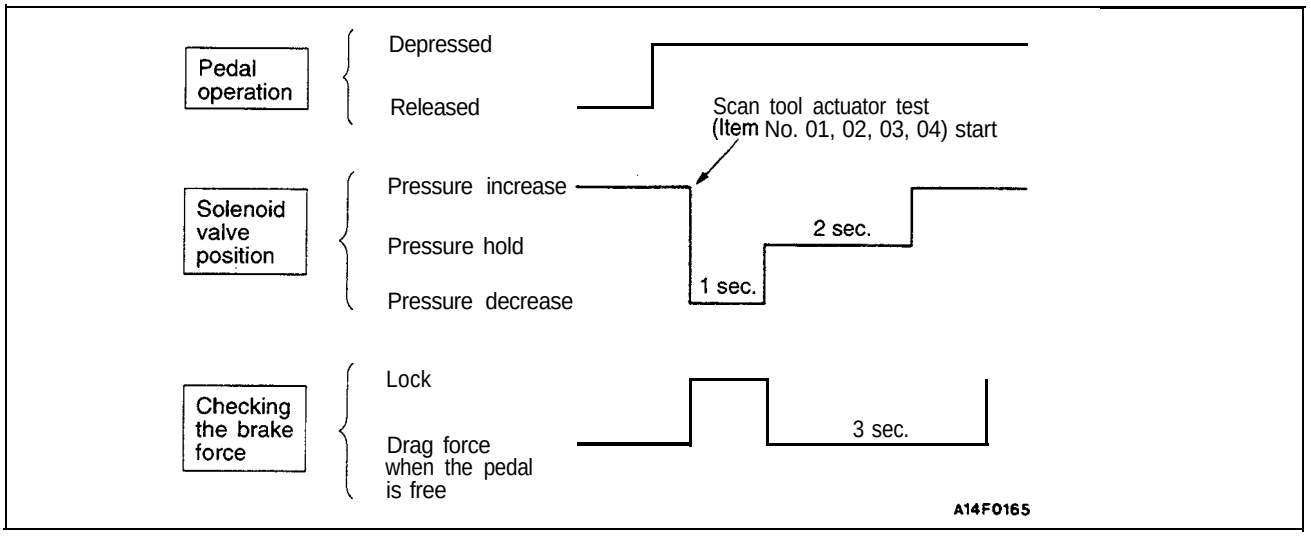
   NOTE
   1. At this time, the ABS system will switch to the scan tool mode and the ABS warning light will illuminate.
   2. When the ABS has been interrupted by the fail-safe function, the scan tool actuator testing cannot be used.

5. Use the scan tool to force-drive the actuator.
6. Turn the wheel by hand and check the change in braking force when the brake pedal is depressed.
   When using the braking force tester, depress the brake pedal until the braking force is at the following values, and check to be sure that the braking force changes to the brake drag force inspected in step 2 when the actuator is force-driven.

Front wheel	882-l ,078 N (194-238 lbs.)
Rear wheel	539-735 N (119-162 lbs.)

The result should be as shown in the following diagram.

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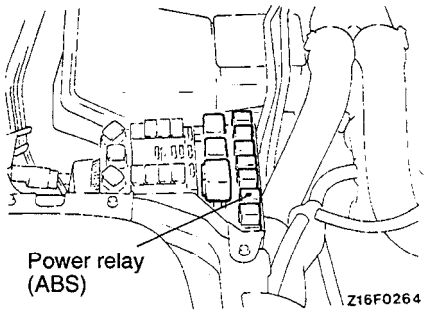
7. If the result of inspection is abnormal, correct according to the "Diagnosis Table."

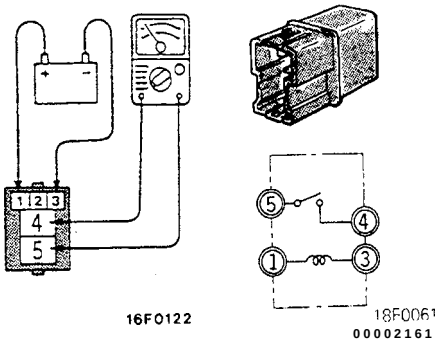
Diagnosis Table

No.	Scan tool display	Operation	Normal condition	Abnormal condition	Probable cause	Remedy
01	FR VALVE M	(1) Depress brake pedal to lock wheel. (2) Using the scan tool, select the wheel to be checked and force the actuator to operate. (3) Turn the selected wheel manually to check the change of brake force.	Brake force released for 2 seconds after locking.	Wheel does not lock when brake pedal is depressed.	Clogged brake line otherthan HU	Check and clean brake line
02	FL VALVE M				Clogged hydraulic circuit in HU	Replace HU assembly
03	RR VALVE M			Brake force is not released.	Incorrect HU brake tube connection	Connect correctly
04	RL VALVE M				HU solenoid valve not functioning correctly	Replace HU assembly

8. After inspection, disconnect the scan tool immediately after turning the ignition switch to OFF.

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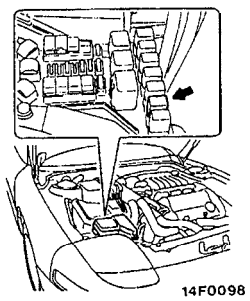
POWER RELAY CHECK

<up to Oct. 1994>

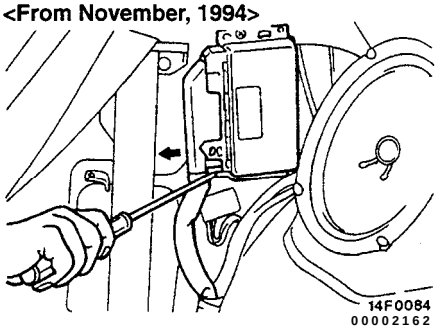
1. Remove the relay box cover in the engine compartment and remove the power relay.
2. Apply the battery voltage to the terminal (1) and check for continuity between the following terminals when the terminal (3) is short-circuited to ground.

When energized	Between terminals 4 and 5	Continuity
When de-energized	Between terminals 4 and 5	Nocontinuity
	Between terminals 1 and 3	Continuity

<Up to October, 1994>



<From November, 1994>



REMEDY FOR A DISCHARGED BATTERY

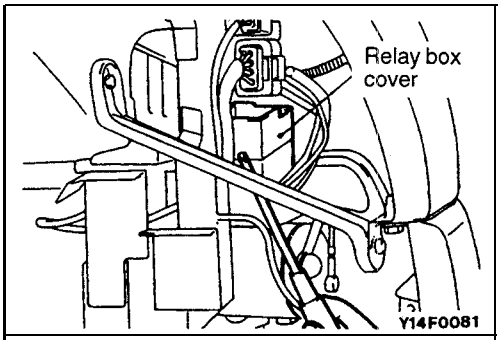
If the engine is jump-started, because of a completely discharged battery, the vehicle may suffer misfiring and fail to start if an attempt is made to start without allowing the batterty to recover sufficientry. This is because the ABS consumes a great deal of current for its self check. In such a case, allow the battery to sufficiently charge or deactivate ABS in the following manner.

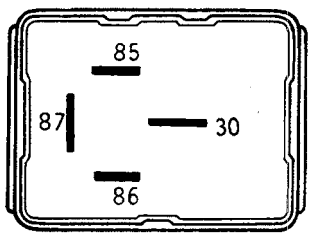
<Up to October, 1994>

Remove the ABS power relay in the engine compartment to disable the ABS. Removing the ABS causes the ABS warning light to light. After the battery is charged sufficiently, install the power relay and restart the engine to check that the ABS warning light goes out.

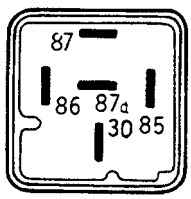
<From November, 1994>

Disconnect the ABS-ECU connector. (Refer to P.35-119.) Removing the ABS causes the ABS warning light to light. After the battery is charged sufficiently, connect the ABS-ECU connector and restart the engine to check that the ABS warning light goes out.

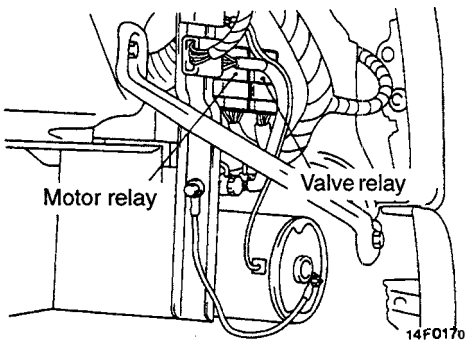


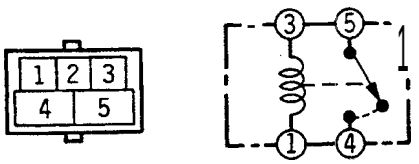


Z16R0670



Y16R0670





14N0235
00003725

VALVE RELAY AND MOTOR RELAY CHECK <ABS>

<Up to 1995 models>

1. Remove the splash shield (FR) and remove the relay box cover by inserting a screwdriver between the hydraulic unit and cover to pry off the lock.
2. Remove the relays. The one closest to you (larger one) is the motor relay and the one farthest from you (smaller one) is the valve relay.

3. Check continuity of the relays both when they are energized and de-energized.

Motor Relay

When de-energized	Between terminals (85) and (86)	30-60 Ω
	Between terminals (30) and (87)	No continuity (∞ Ω)
When energized between terminals (85) and (86)	Between terminals (30) and (87)	Continuity (approx. 0 Ω)

Valve Relay

When de-energized	Between terminals (85) and (86)	60-120 Ω
	Between terminals (30) and (87a)	Continuity (approx. 0 Ω)
	Between terminals (30) and (87)	No continuity (∞ Ω)
When energized between terminals (85) and (86)	Between terminals (30) and (87a)	No continuity (∞ Ω)
	Between terminals (30) and (87)	Continuity (approx. 0 Ω)

<From 1996 models>

Remove the splash shield (FR) and remove the relays.

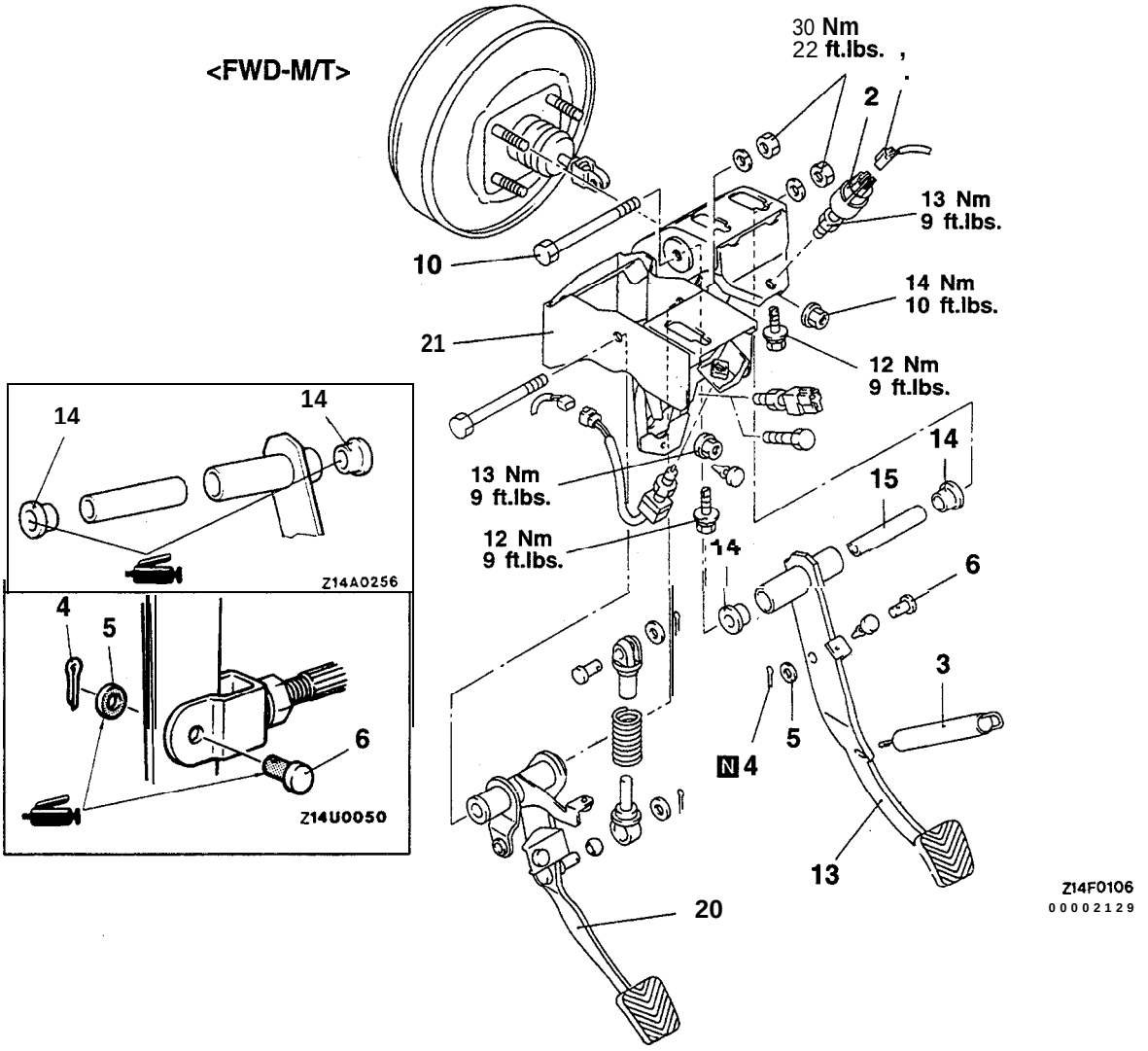
Battery voltage	Terminal No.			
	1	3	4	5
Continuity no voltage	0	0		
Continuity with voltage	⊕	0	0	0

BRAKE PEDAL

REMOVAL AND INSTALLATION

Pre-removal Operation
- Steering Column Assembly Removal
  (Refer to GROUP 37A – Steering Wheel and Shaft.)

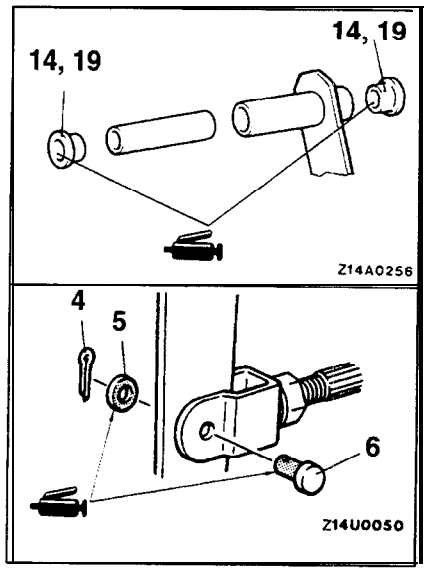
Post-installation Operation
- Steering Column Assembly Installation
  (Refer to GROUP 37A – Steering Wheel and Shaft.)
- Clutch Pedal Adjustment
  (Refer to GROUP 21 – Clutch Pedal.)
- Brake Pedal Adjustment (Refer to P.35-63.)

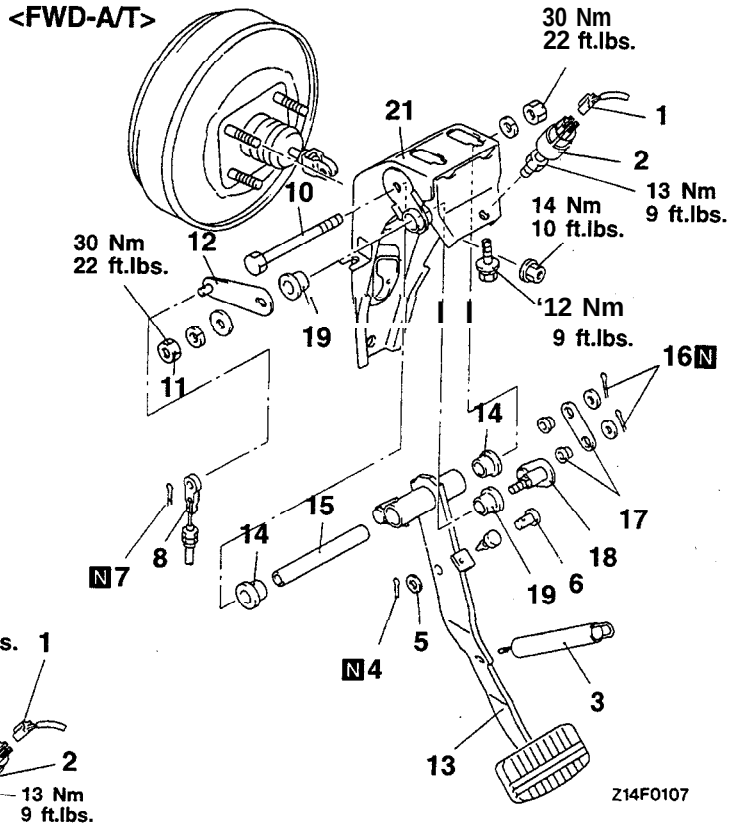


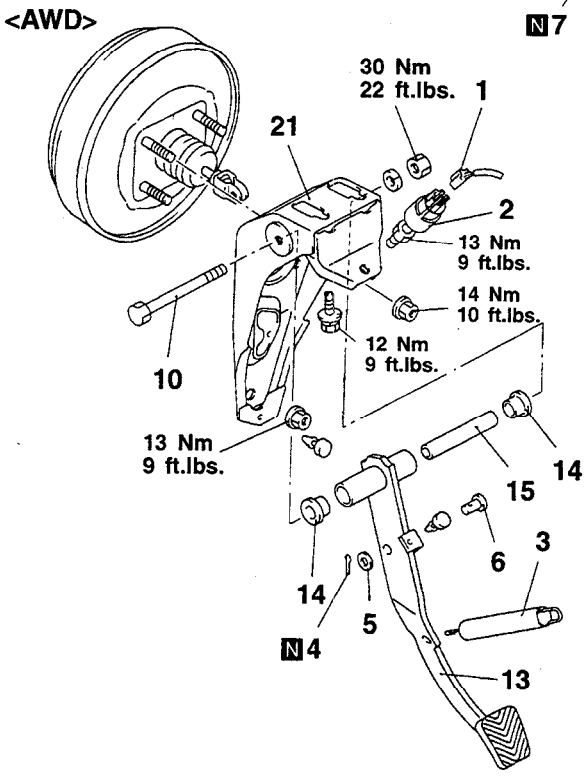
Stop light switch removal steps
1. Stop light switch connector
2. Stop light switch

Brake pedal removal steps
▶A◀ 3. Return spring
4. Cotter pin
5. Washer
6. Clevis pin
9. Brake pedal assembly
   (parts from step 10 to step 21)
10. Brake pedal shaft bolt
13. Brake pedal
14. Bushing
15. Spacer
20. Clutch pedal (Refer to GROUP 21 – Clutch Pedal.)
21. Brake pedal suppon member

TSB Revision







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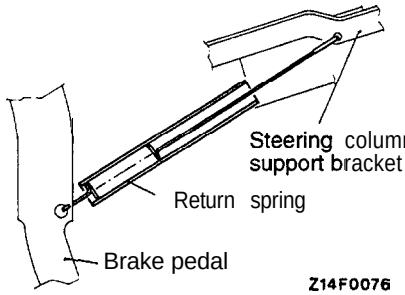
Stop light switch removal steps

1. Stop light switch connector
2. Stop light switch

Brake pedal removal steps

▶A◀ 3. Return spring
4. Cotter pin
5. Washer
6. Clevis pin
7. Cotter pin
8. Shift lock cable connection
9. Brake pedal assembly (parts from step 10 to step 21)
10. Brake pedal shaft bolt
11. Lever assembly installation nut
12. Lever assembly
13. Brake assembly
14. Bushing
15. Spacer ,
16. Cotter pin
17. Link assembly
18. Lever assembly
19. Bushing
21. Brake pedal support member

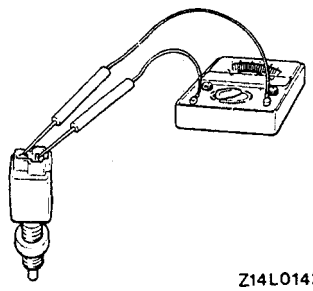
TSB Revision

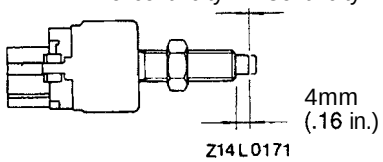


INSTALLATION SERVICE POINT

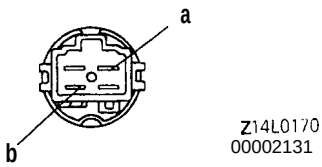
▶A◀ RETURN SPRING INSTALLATION

Install the return spring with the shorter hook on the brake pedal.





<Vehicles with cruise control>



INSPECTION

- Check the bushing for wear.
- Check the brake pedal for bend or twisting.
- Check the brake pedal return spring for damage.

STOP LIGHT SWITCH CHECK

(1) Connect a circuit tester to the stop light switch.
(2) The stop light switch is in good condition if there is no continuity when the plunger is pushed in to a depth of within 4 mm (.16 in.) from the outer case edge surface, and if there is continuity when it is released.
For vehicles with the cruise control system, the check for continuity should be made at connectors “a” and “b” of the stop light switch.

TSB Revision

MASTER CYLINDER AND BRAKE BOOSTER

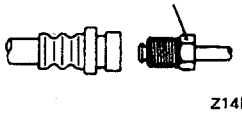
REMOVAL AND INSTALLATION

Pre-removal Operation
- Draining Brake Fluid

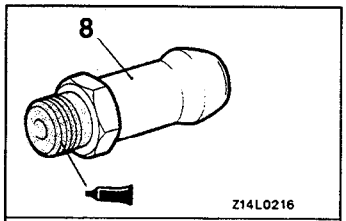
Post-installation Operation
- Brake Fluid Supplying
- Bleeding (Refer to P.35-66.)
- Brake Pedal Adjustment (Refer to P.35-63.)

Brake tube flare nut

15 Nm
11 ft.lbs.

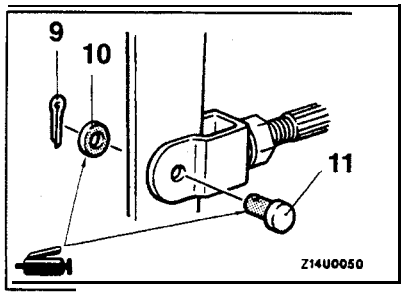


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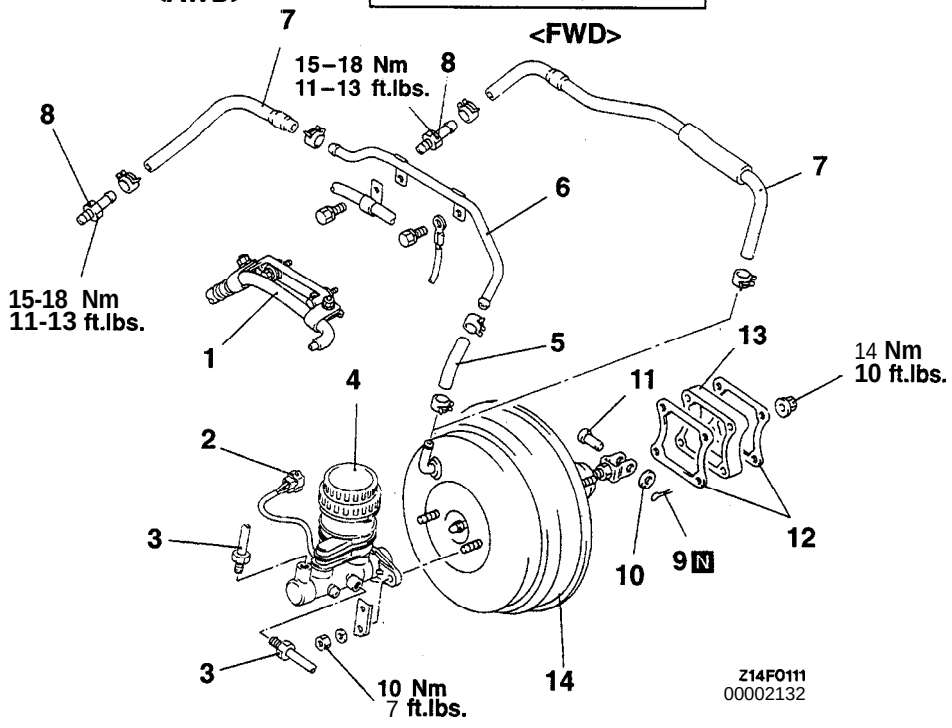


Z14L0216

Sealant: 3M ATD Part No. 8663 or equivalent



Z14U0050



Z14F0111
00002132

Master cylinder removal steps

◀A▶
1. Low-pressure hose
2. Brake fluid level sensor connector
3. Brake tube connection
4. Master cylinder

▶B◀ • Clearance between brake booster push rod and primary piston adjustment

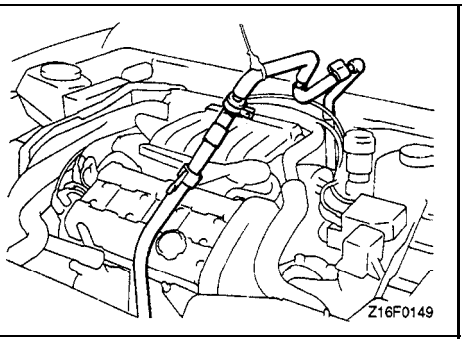
Brake booster removal steps

4. Master cylinder
5. Vacuum hose
6. Vacuum tube

▶A◀ 7. Vacuum hose with check valve

8. Fitting
9. Cotter pin
10. Washer
11. Clevis pin
12. Sealer
13. Spacer
14. Brake booster

TSB Revision

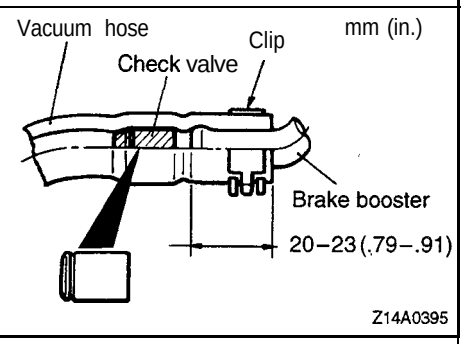


REMOVAL SERVICE POINT

◀A▶ MOVING LOW-PRESSURE HOSE

Remove the nuts and bolts securing low-pressure hose shown in the illustration, and using a wire, suspend the hose from the hood to a position where it does not hamper the removal and installation of the brake booster.

Caution
Move the hose slowly with care not 'to bend it.



INSTALLATION SERVICE POINTS

▶A◀ VACUUM HOSE WITH CHECK VALVE INSTALLATION

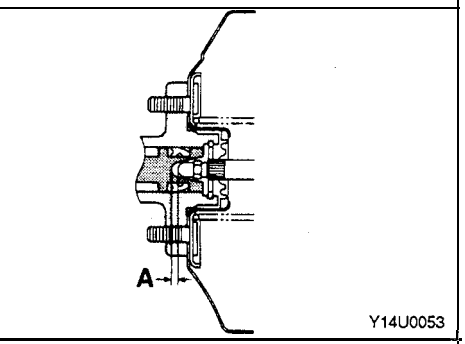
(1) In the case of AWD, install the vacuum hose to the brake booster nipple as shown in the figure. Secure the hose with the hose clip.

Caution
The check valve and the pipe part of the brake booster must not contact each other.

(2) Install the other end of the vacuum hose fully onto its port on the engine. Secure the hose using the hose clip.

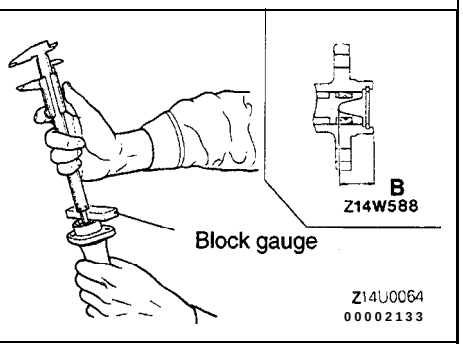
▶B◀ CLEARANCE BETWEEN BRAKE BOOSTER PUSH ROD AND PRIMARY PISTON ADJUSTMENT

Adjust the clearance (A) between the brake booster push rod and primary piston as follows:

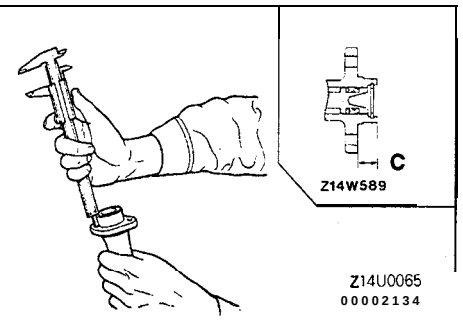


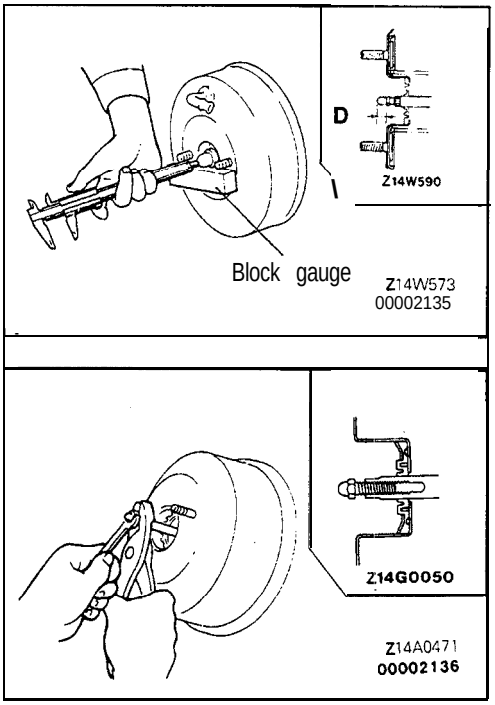
(1) Measure the dimension (B) between the master cylinder end face and piston.

NOTE
To obtain (B), first take measurement with a square placed on the master cylinder end face. Then, subtract the thickness of the square to arrive at (B).



(2) Obtain the dimension (C) between the brake booster mounting surface on the master cylinder and the end face.





(3) Measure the dimension (D) between the master cylinder mounting surface on brake booster and the push rod end.

NOTE
To obtain (D), first take measurement with a square placed on the brake booster. Then, subtract the thickness of the square to arrive at (D).

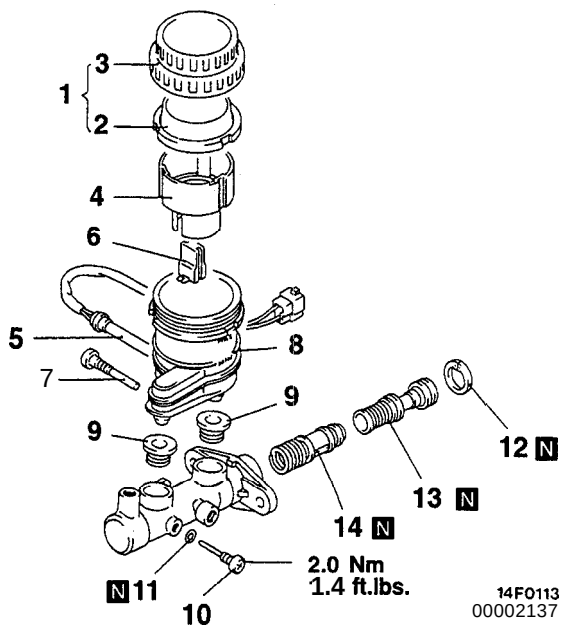
(4) Using the measured values obtained in (1) through (3), obtain the clearance (A) between the brake booster push rod and primary piston.

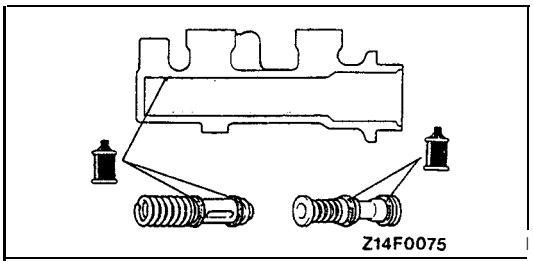
Standard value: A (A = B – C – D)
7 + 8 inch brake booster
0.55–0.75 mm (.022–.030 in.)
8 + 9 inch brake booster
0.65–0.85 mm (.026–.033 in.)

(5) If the clearance is not within the standard value range, turn the push rod screw to achieve desired length.

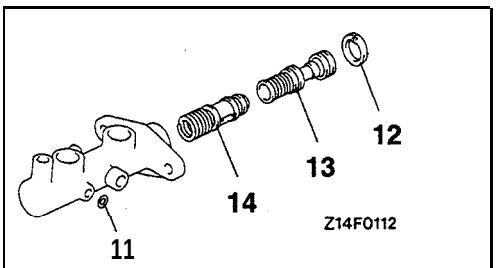
Caution
Improper clearance may cause excessive brake drag.

DISASSEMBLY AND REASSEMBLY





Brake fluid: Conforming to DOT3 or DOT4



Brake master cylinder kit

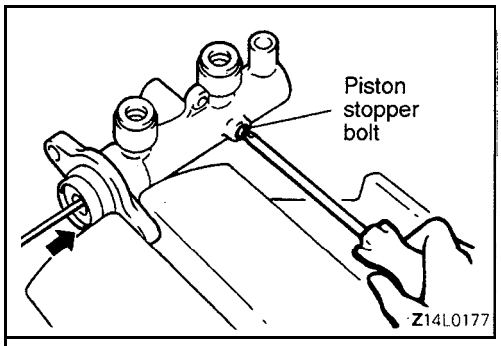
Disassembly steps

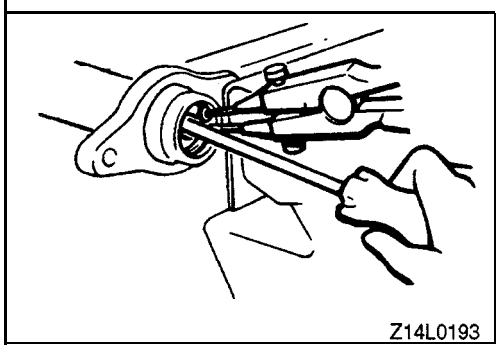
1. Reservoir cap assembly
2. Diaphragm
3. Reservoir cap
4. Filter <Vehicles with ABS>
5. Brake fluid level sensor
6. Float
7. Reservoir stopper bolt
8. Reservoir
9. Reservoir seal

◀A▶ 10. Piston stopper bolt
11. Gasket
◀B▶ 12. Piston stopper ring
13. Primary piston assembly
◀C▶ 14. Secondary piston assembly
15. Master cylinder body

Caution
Do not disassemble the primary and secondary piston assemblies.

TSB Revision





DISASSEMBLY SERVICE POINTS

◀A▶ PISTON STOPPER BOLT DISASSEMBLY

Remove the piston stopper bolt, while depressing the piston.

◀B▶ PISTON STOPPER RING DISASSEMBLY

Remove the piston stopper ring, while depressing the piston.

◀C▶ SECONDARY PISTON ASSEMBLY DISASSEMBLY

NOTE
If it is hard to remove the secondary piston from the cylinder, gradually apply compressed air from the outlet port on the secondary end of the master cylinder.

INSPECTION

- Check the inner surface of master cylinder body for corrosion or pitting.
- Check the primary and secondary pistons for corrosion, scoring, wear or damage.
- Check the diaphragm for cracks and wear.

BRAKE LINE

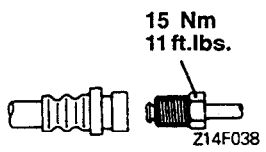
REMOVAL AND INSTALLATION

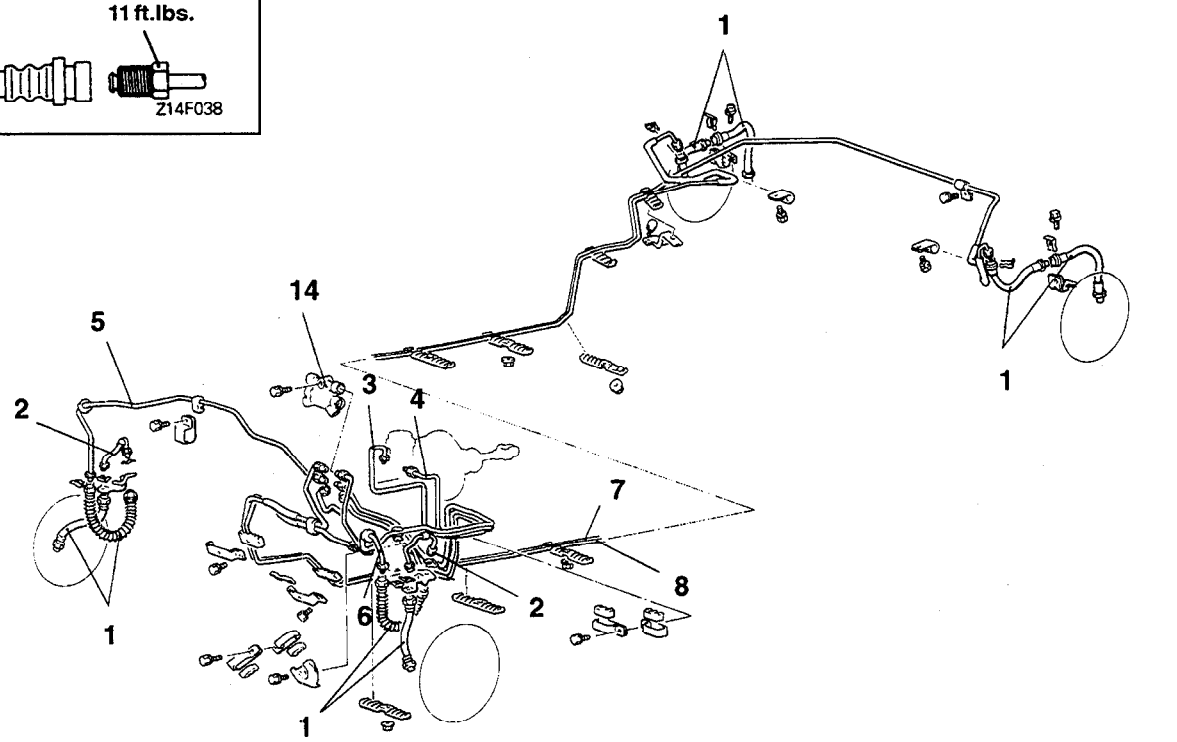
<Vehicles without ABS>

Pre-removal Operation
- Brake Fluid Draining

Post-installation Operation
- Brake Fluid Supplying
- Bleeding (Refer to P.35-66.)

Flared brake line nuts





Z14F0109
00002138

1. Brake hose
2. Brake tube (strut)
3. Brake tube (A)
4. Brake tube (B)
5. Brake tube (front, R.H.)
6. Brake tube (front, L.H.)
7. Brake tube (main, R.H.)
8. Brake tube (main, L.H.)
14. Proportioning valve

Caution
Do not disassemble the proportioning valve because its performance depends on the set load of the spring.

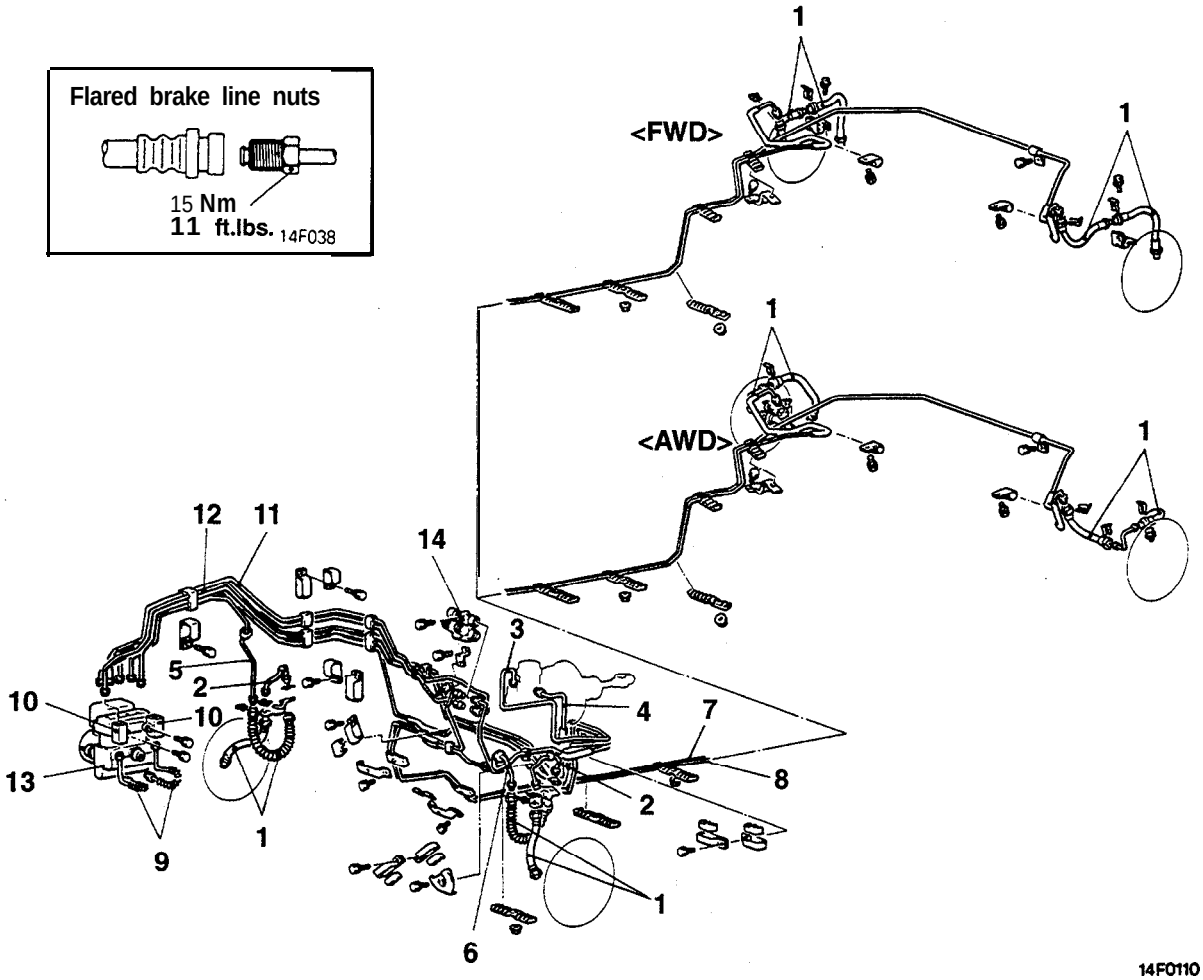
TSB Revision

<Vehicles with ABS>

Pre-removal Operation
- Brake Fluid Draining

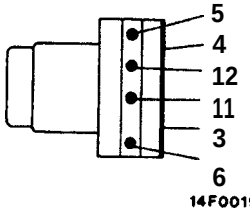
Post-installation Operation
- Brake Fluid Supplying
- Bleeding (Refer to P.35-66.)

Flared brake line nuts

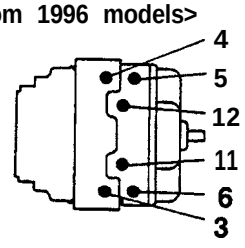


Connecting part of hydraulic unit

<Up to 1995 models>



<From 1996 models>



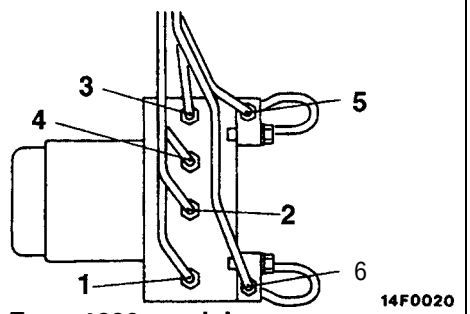
1. Brake hose
2. Brake tube (strut)
3. Brake tube (A)
4. Brake tube (B)
5. Brake tube (front, R.H.)
6. Brake tube (front, L.H.)
7. Brake tube (main, R.H.)
8. Brake tube (main, L.H.)
9. Brake tube <Up to 1995 models>
10. 2-way connector <Up to 1995 models>
11. Brake tube (rear, R.H.)
12. Brake tube (rear, L.H.)

▶A◀ 13. Hydraulic unit (HU)

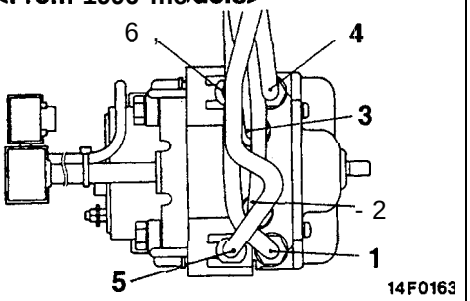
14. Proportioning valve

TSB Revision

<Up to 1995 models>



<From 1996 models>



INSTALLATION SERVICE POINT

▶A◀ TUBE TO HYDRAULIC UNIT CONNECTION

Connect the tubes to the HU as shown in the illustration.

<Up to 1995 models>
1. HU – front brake (L.H.)
2. HU – rear brake (R.H.)
3. HU – front brake (R.H.)
4. HU – rear brake (L.H.)
5. Master cylinder – HU (for left front and right rear)
6. Master cylinder – HU (for right front and left rear)

<From 1996 models>
1. HU – front brake (L.H.)
2. HU – rear brake (R.H.)
3. H U – rear brake (L.H.)
4. HU – front brake (R.H.)
5. Master cylinder – HU (for left front and right rear)
6. Master cylinder – HU (for right front and left rear)

INSPECTION

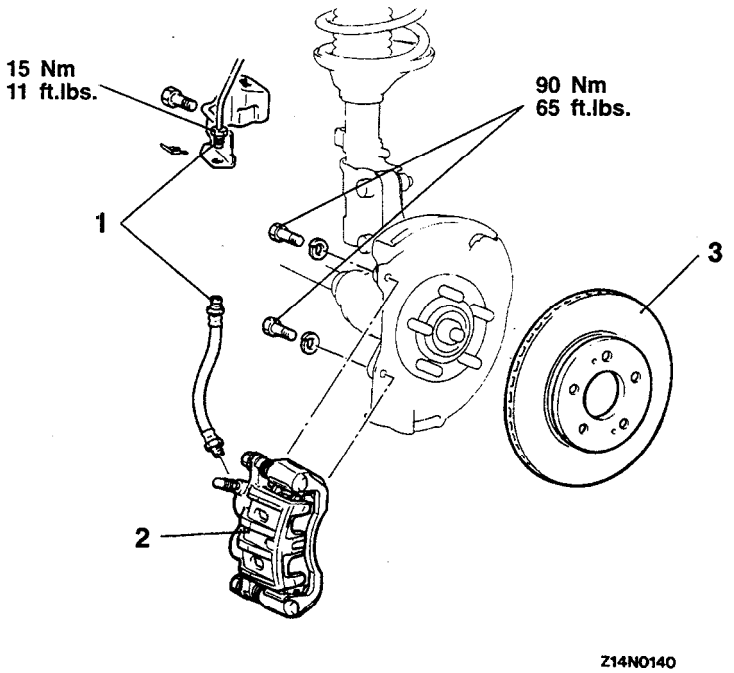
- Check the brake tubes for cracks, crimps and corrosion.
- Check the brake hoses for cracks, damage and leakage.
- Check the flared brake line nuts for damage and leakage.

FRONT DISC BRAKE

REMOVAL AND INSTALLATION

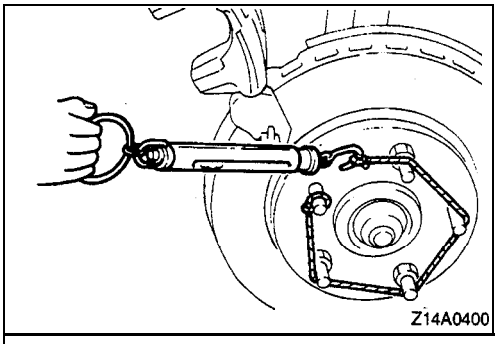
Pre-removal Operation
- Brake Fluid Draining

Post-installation Operation
- Brake Fluid Supplying
- Bleeding (Refer to P.35-66.)



Removal steps
1. Connection for brake hose and the brake tube
▶A◀ 2. Front brake assembly
3. Brake disc

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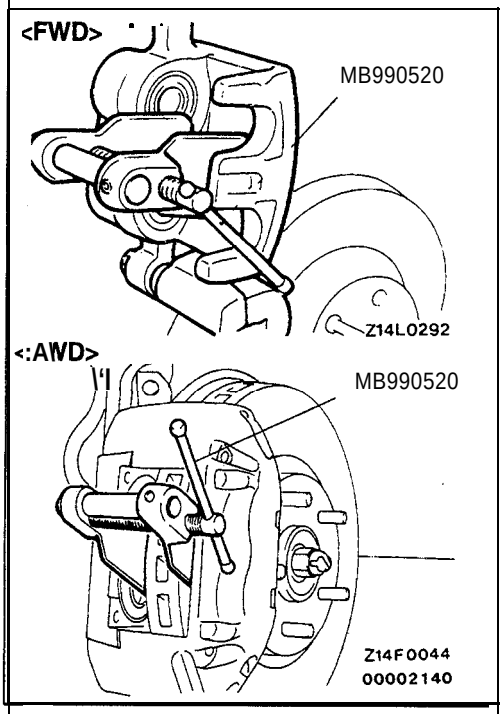
INSTALLATION SERVICE POINT

▶A◀ FRONT BRAKE ASSEMBLY INSTALLATION

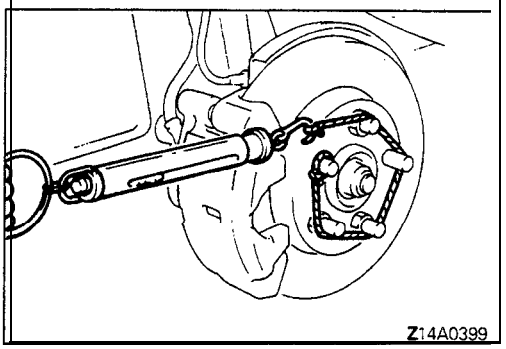
Using the following method, measure the drag force of the disc brake after installation of the brake assembly.

(1) With the brake assembly removed, use a spring scale to measure the rotary sliding resistance of the hub in the forward direction.

NOTE
Secure the disc to the hub with wheel nuts.



(2) After installing the caliper support to the knuckle, expand the piston by use of the special tool, and then install the caliper body.



(3) Start the engine, depress the brake pedal firmly two to three times and stop the engine.
(4) Turn the brake disc ten times in the forward direction.
(5) Using a spring scale, measure the rotary sliding resistance of the hub in the forward direction.
(6) Obtain the **drag** force of the disc brake (the difference between the values measured in 5 and 1).

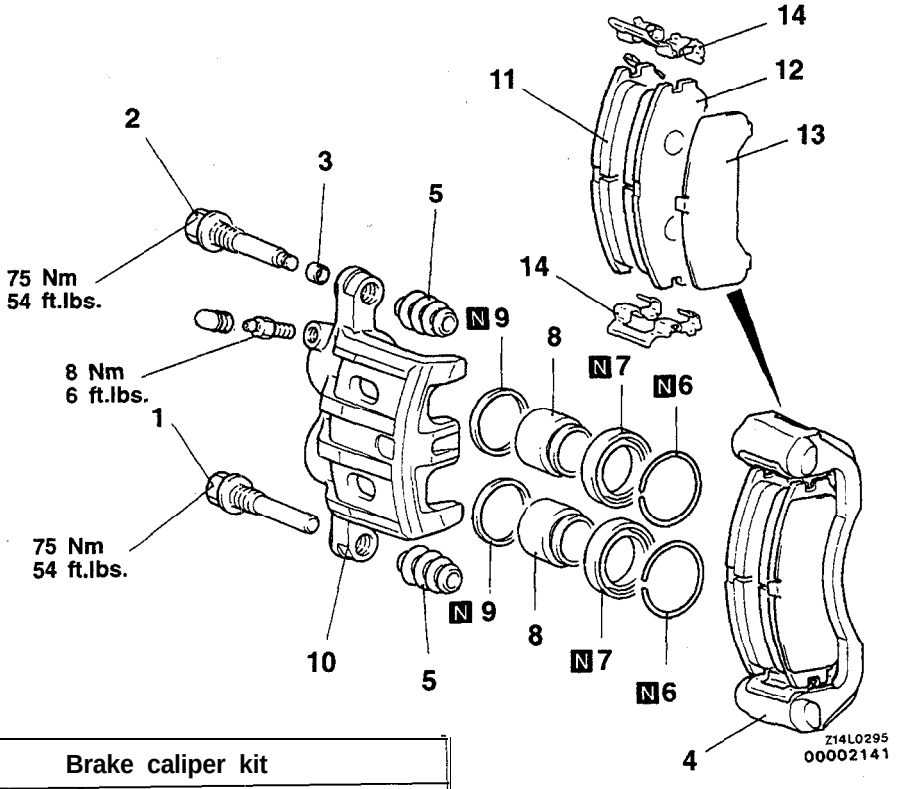
Standard value: 70 N (15.4 lbs.) or less

(7) If the drag force of the brake exceeds the standard value, disassemble the piston and check for dirty or corroded piston sliding surface and deteriorated piston seal.

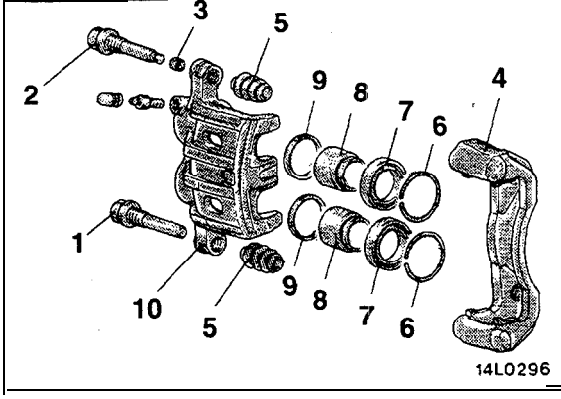
INSPECTION

- Check disc for wear. (Refer to P.35-70.)
- Check disc for runout. (Refer to P.35-70, 71.)
- Check disc for damage.

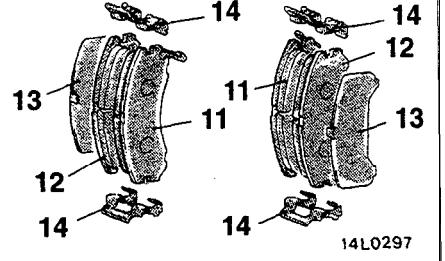
DISASSEMBLY AND REASSEMBLY <FWD>



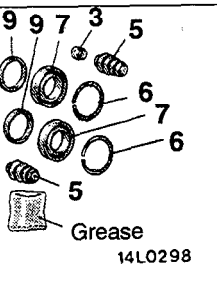
Brake caliper kit



Pad kit



Seal and boot kit



Caliper assembly disassembly steps

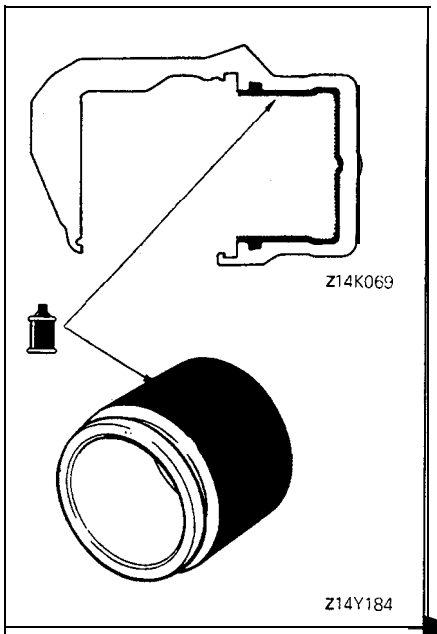
- ▶A◀ ▶A◀ 1. Guide pin 2. Lock pin
- 3. Bushing
- 4. Caliper support (pad, clip, shim)
- 5. Pin boot
- ◀A▶ ◀A▶ 6. Boot ring 7. & 8. Piston Piston boot
- ◀B▶ 9. Piston seal
- 10. Caliper body

Pad assembly disassembly steps

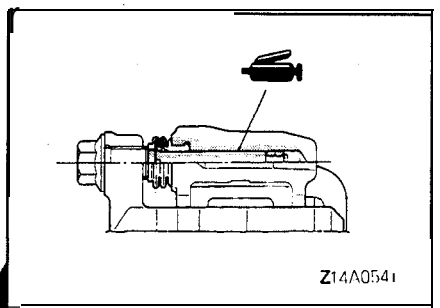
- ▶A◀ 1. Guide pin
- ▶A◀ 2. Lock pin
- 3. Bushing
- 4. Caliper support (pad, clip, shim)
- 11. Pad & wear indicator
- 12. Pad assembly
- 13. Outer shim
- 14. Clip

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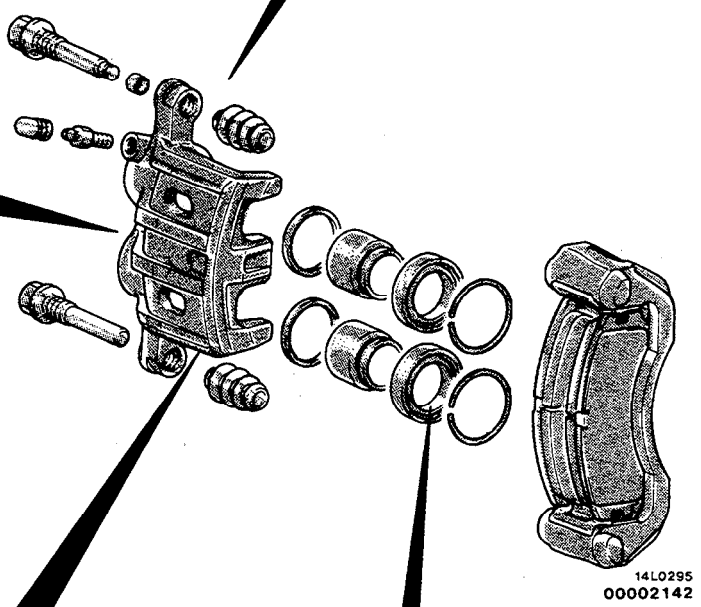
Lubrication points

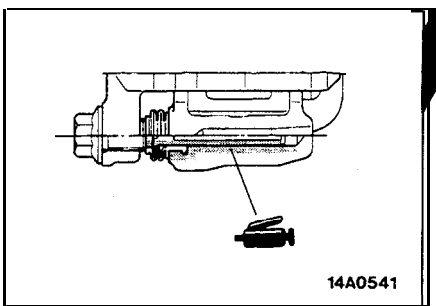


Brake fluid:
Conforming to DOT3 or DOT4

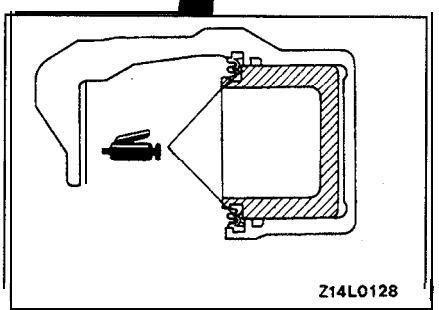


Grease:
Repair kit grease (orange)



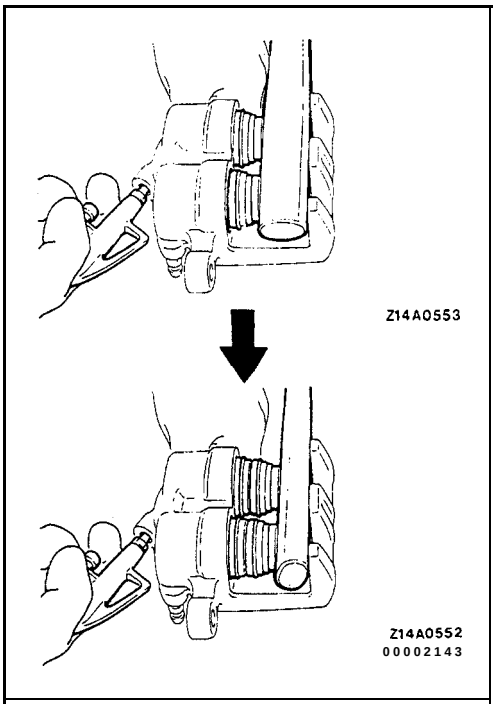


Grease:
Repair kit grease (orange)



Grease:
Repair kit grease (orange)

TSB Revision



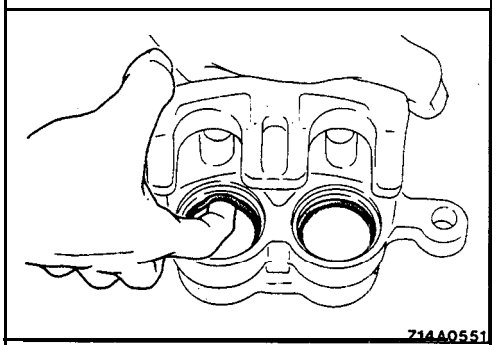
DISASSEMBLY SERVICE POINTS

When disassembling the front disc brakes, disassemble both sides (left and right) as a set.

◀A▶ PISTON BOOT / PISTON REMOVAL

Send compressed air from the port to which brake hose is installed and remove the pistons and piston boots.

Caution
Send the air gradually, and using the handle of a plastic hammer etc., keep the protrusions of the two pistons even.
If one of the two pistons is removed, the other one cannot be removed.



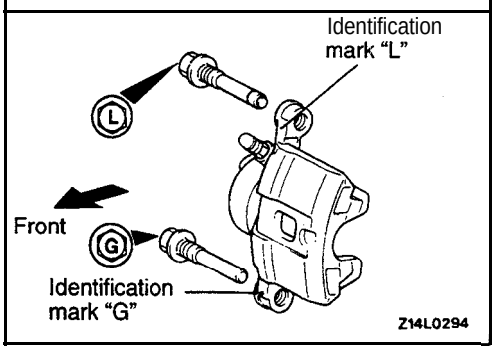
◀B▶ PISTON SEAL REMOVAL

(1) Remove piston seal with finger tip.

Caution
Do not damage the cylinder inner surface.

(2) Clean piston surface and inner cylinder with trichloroethylene, alcohol or specified brake fluid.

Specified brake fluid:
Conforming to DOT3 or DOT4



REASSEMBLY SERVICE POINT

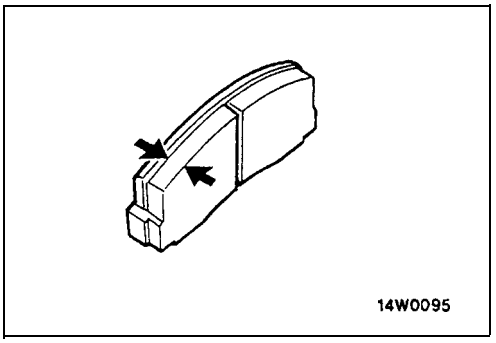
▶A◀ LOCK PIN / GUIDE PIN INSTALLATION

Install the guide pin and lock pin mating the head markings on the guide and lock pins with the identification markings on the caliper body.

INSPECTION

- Check cylinder for wear, damage or rust.
- Check piston surface for wear, damage or rust.
- Check caliper body or sleeve for wear.
- Check pad for damage or adhesion of grease, check backing metal for damage.

TSB Revision



PAD WEAR CHECK

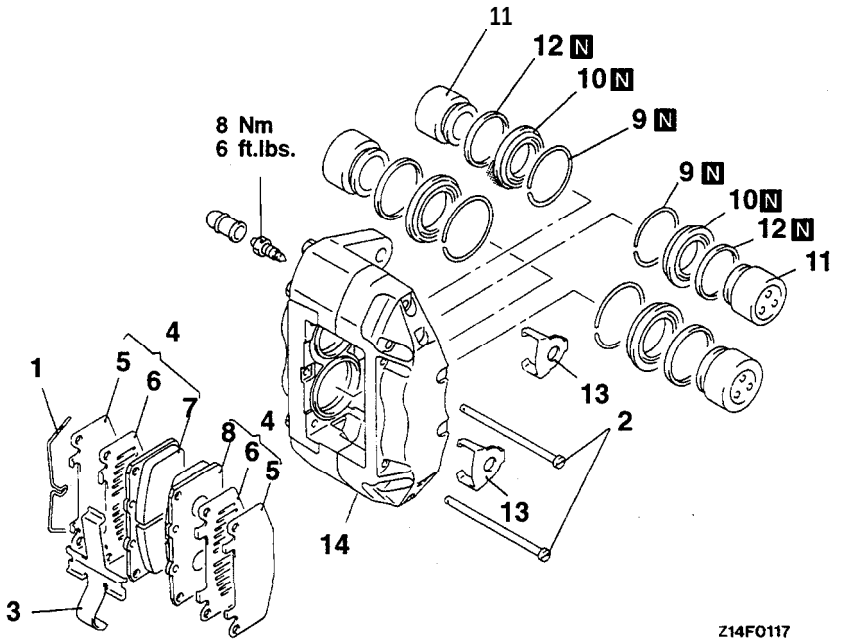
Measure thickness at the thinnest and worn area of the pad. Replace pad assembly when pad thickness is less than the limit value.

Standard value: 10.0 mm (.39 in.)
Limit value: 2.0 mm (.08 in.)

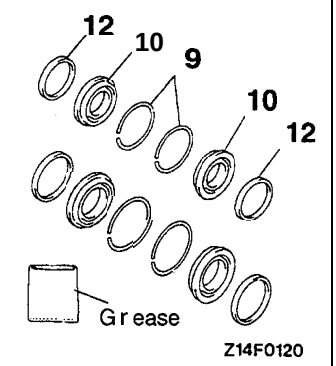
Caution
1. **When the limit is exceeded, the brake pads on both the left and right wheels must be replaced as a set.**
2. **If there is a large difference in thickness between the pads on the right and left wheels, check the sliding portions of the caliper.**

TSB Revision

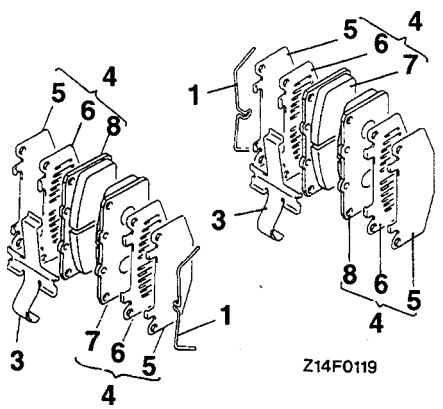
DISASSEMBLY AND REASSEMBLY <AWD>



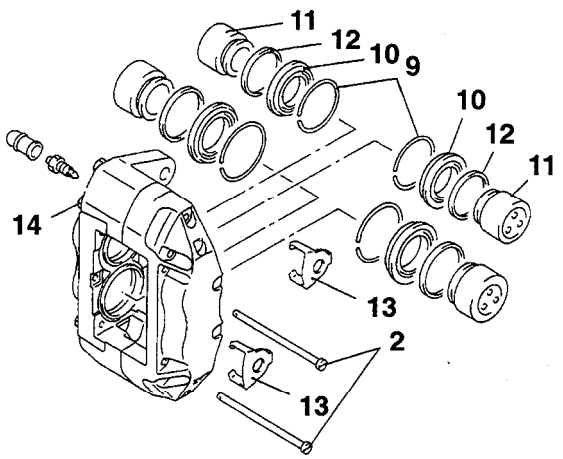
Seal and boot kit



Pad kit



Brake caliper kit

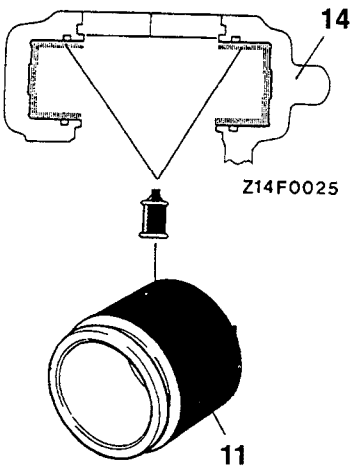


Disassembly steps

1. Clip
◀A▶ 2. Pad pin
3. Cross spring
◀B▶ 4. Pad assembly
5. Shim A
6. Shim B
7. inner pad (with wear indicator)
8. Outer pad
9. Retaining ring
10. Piston boot
◀C▶ 12.
◀D▶ 11. Piston Piston seal
13. Washer
14. Caliper body

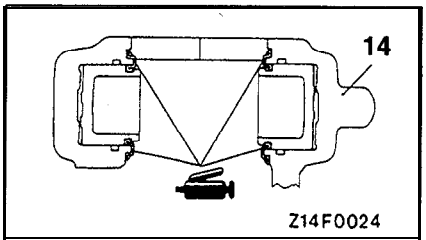
TSB Revision

Lubrication points

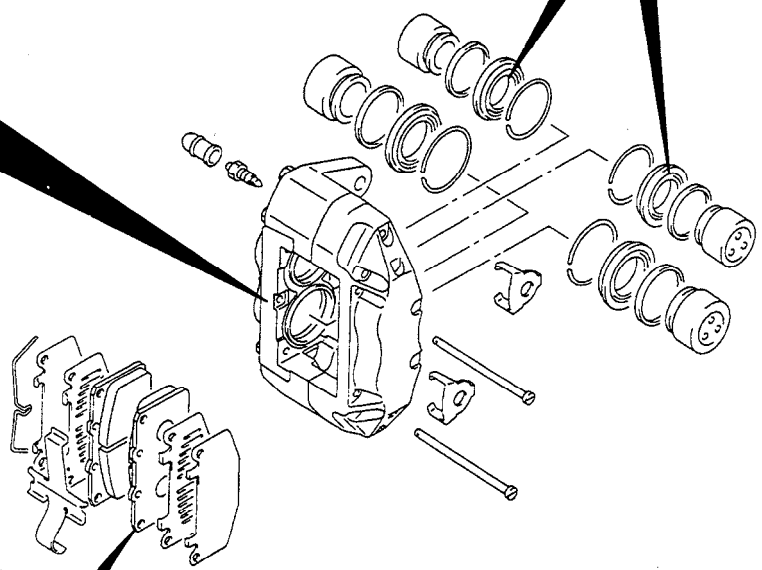


Caution
The piston seal contained in the seal and boot kit is coated with special grease.
Do not wipe off the grease.

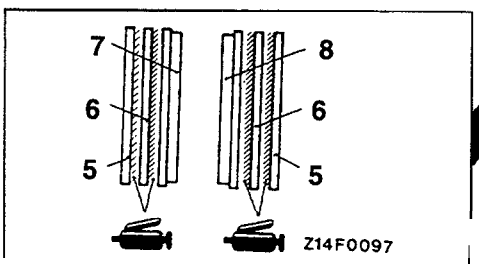
Brake fluid:
Conforming to DOT3 or DOT4



Grease:
Repair kit grease (orange)

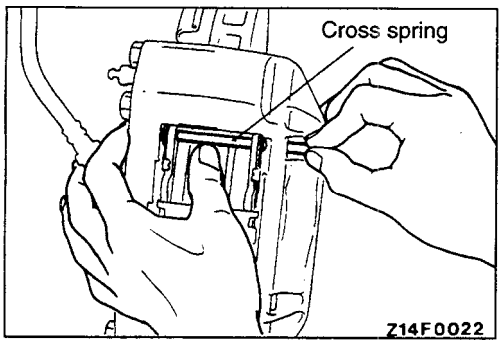


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00002145



Grease:
Brake grease SAE J310, NLGI No. 1

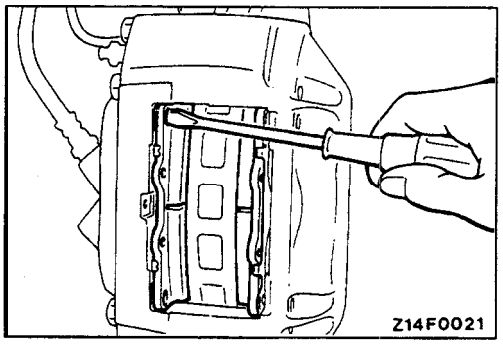
TSB Revision



DISASSEMBLY SERVICE POINTS

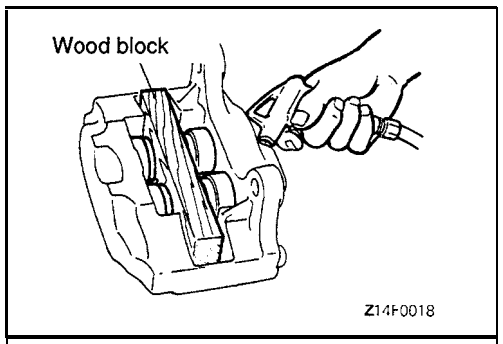
◀A▶ PAD PIN REMOVAL

Holding the cross spring with hand, remove the pad pin.



◀B▶ PAD ASSEMBLY REMOVAL

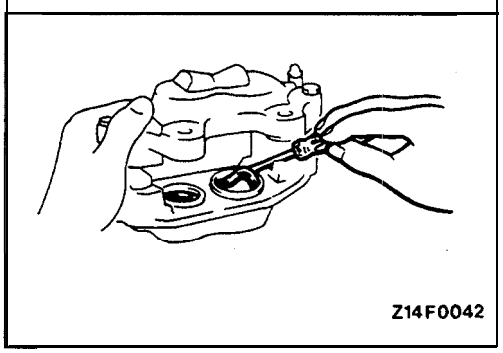
Using a screwdriver, remove the pad assembly.



◀C▶ PISTONS REMOVAL

Install a wood block as shown and send compressed air through the port, to which brake hose is attached, to remove the pistons.
At this time, make sure that the four pistons come out evenly.

Caution
1. Be careful not to get your fingers to be pinched.
2. Be careful not to let the brake fluid splash.



◀D▶ PISTON SEAL REMOVAL

(1) Remove the piston seal.

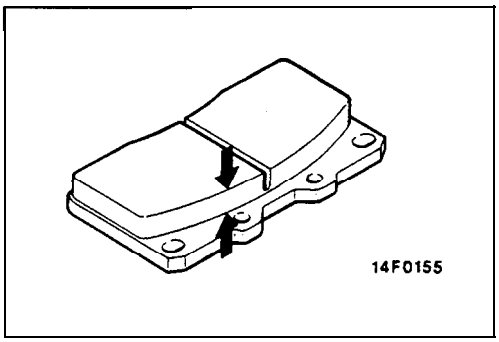
Caution
Do not damage the cylinder inner surface.

(2) Clean the piston surfaces and cylinder inner surfaces with trichloroethylene, alcohol, or the specified brake fluid.

Specified brake fluid:
Conforming to DOT3 or DOT4

INSPECTION

- Check cylinder for wear, damage or rust.
- Check piston surface for wear, damage or rust.
- Check caliper body or sleeve for wear.
- Check pad for damage or adhesion of grease, check backing metal for damage.



PAD WEAR CHECK

Measure the thickness at the thinnest and worn area of the pad. Replace pad assembly when pad thickness is less than the limit value.

Standard value: 10.0 mm (.39 in.)
Limit: 2.0 mm (.08 in.)

Caution
1. When the limit is exceeded, the brake pads on both the left and right wheels must be replaced as a set.
2. If there is a large difference in thickness between the pads on the right and left wheels, check the sliding portions of the caliper.

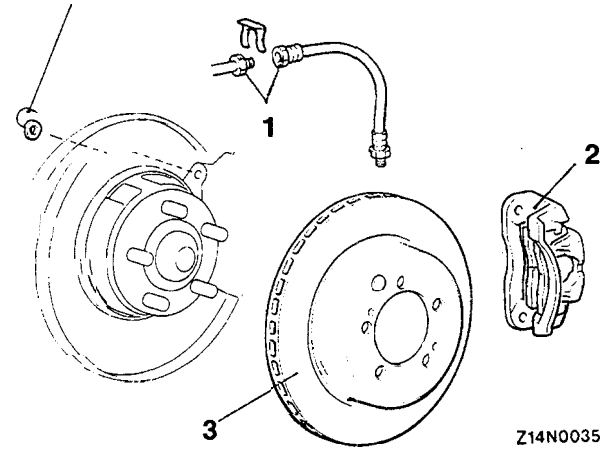
REAR DISC BRAKE

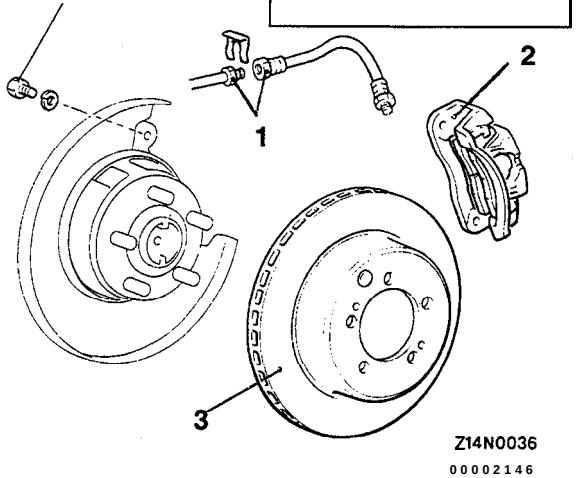
REMOVAL AND INSTALLATION

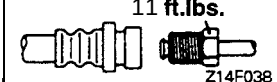
Pre-removal Operation
- Brake Fluid Draining

Post-installation Operation
- Brake Fluid Filling
- Brake Line Bleeding (Refer to P.35-66.)

Flared brake line nuts
15 Nm
11 ft.lbs.







00002146

Removal steps
1. Brake hose
▶A◀ 2. Rear brake assembly
3. Brake disc

INSTALLATION SERVICE POINT

▶A◀ REAR BRAKE ASSEMBLY INSTALLATION

Install the rear brake assembly using the same procedure as that for the front brake assembly. (Refer to P.35-94.)

INSPECTION

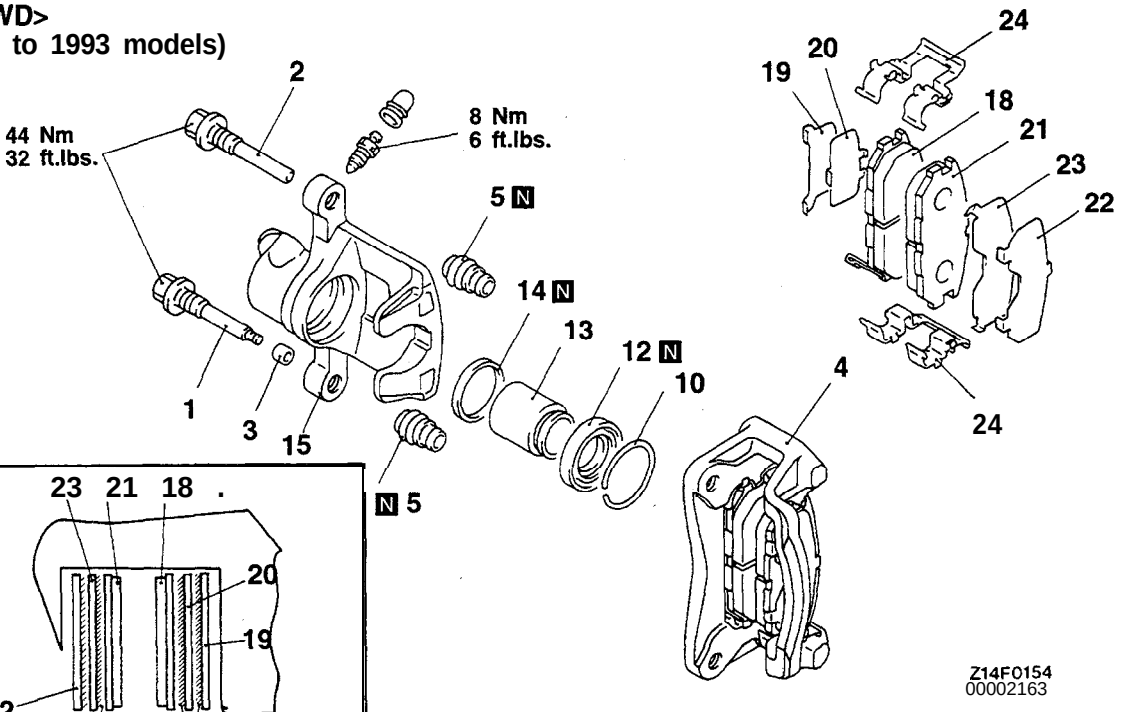
INSPECTING THE BRAKE DISC

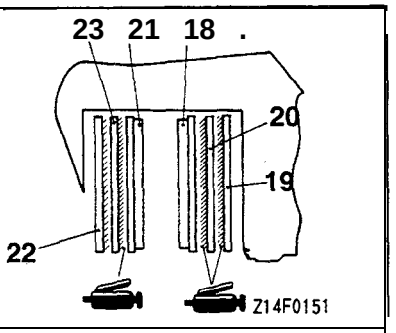
- Check disc for wear. (Refer to P.35-73.)
- Check disc for runout. (Refer to P.35-73.)
- Check disc for damage.

TSB Revision

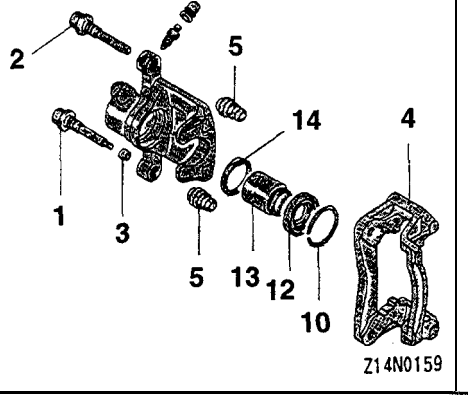
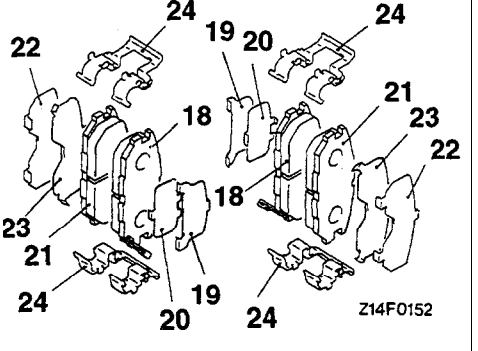
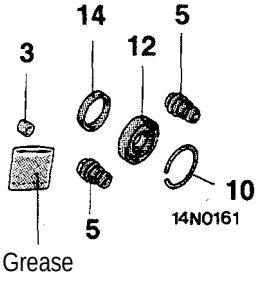
DISASSEMBLY AND REASSEMBLY

<AWD>
(Up to 1993 models)





Grease: Brake grease SAE J310, NLGI No. 1

Brake caliper kit	Pad kit	Seal and boot kit
		

Caliper assembly disassembly steps

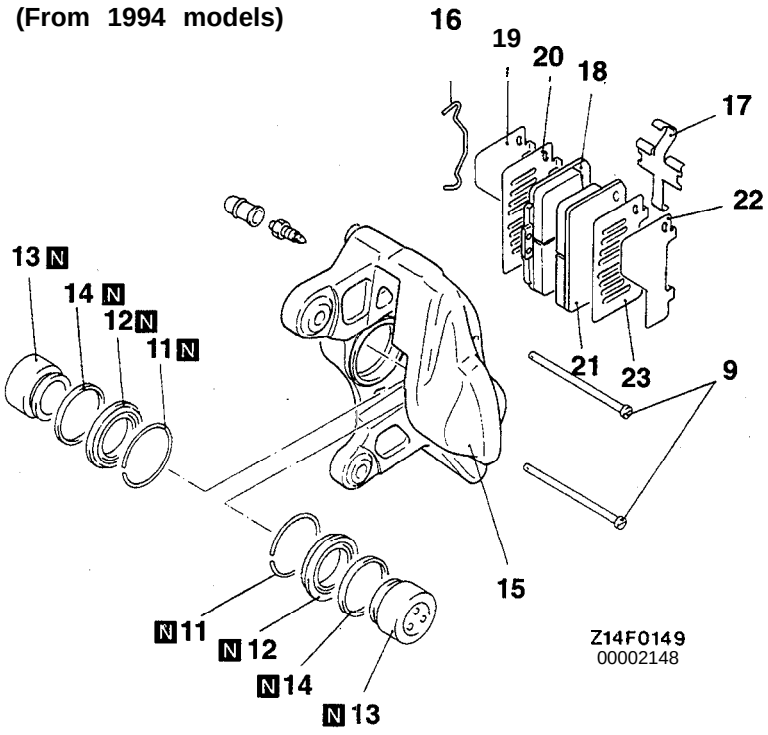
- ▶A◀ 1. Lock pin
- ▶A◀ 2. Guide pin
- 3. Bushing
- 4. Caliper support (pad, clip, shim)
- 10. Boot (pad, clip, Ring
- 12. Piston boot Pin boot
- ◀A▶ 13. Piston
- ◀A▶ 14. Piston seal
- ◀B▶ 15. Caliper body

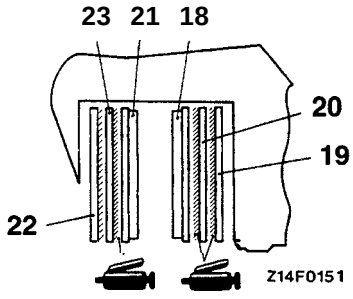
Pad assembly disassembly steps

- ▶A◀ 1. Lock pin
- ▶A◀ 2. Guide pin
- 3. Bushing
- 4. Caliper support (pad, clip, shim)
- 18. Pad and wear indicator assembly
- 19. Inner shim B
- 20. Inner shim A
- 21. Pad assembly
- 22. Outer shim B
- 23. Outer shim A
- **24.** Clip

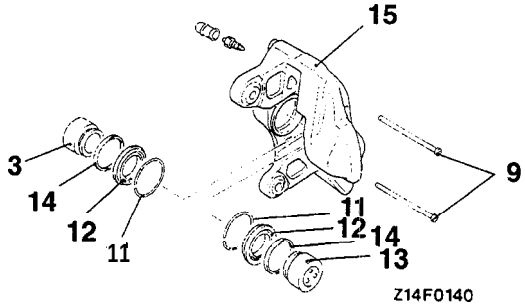
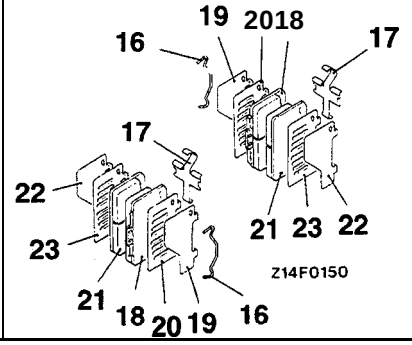
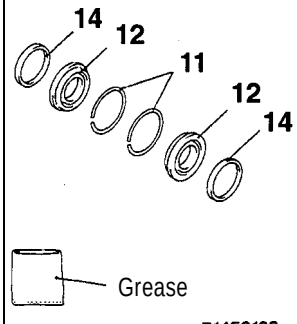
TSB Revision

(From 1994 models)





Grease:
Brake grease SAE 5310, NLGI No. 1

Brake caliper kit	Pad kit	Seal and boot kit
		

Caliper assembly disassembly steps

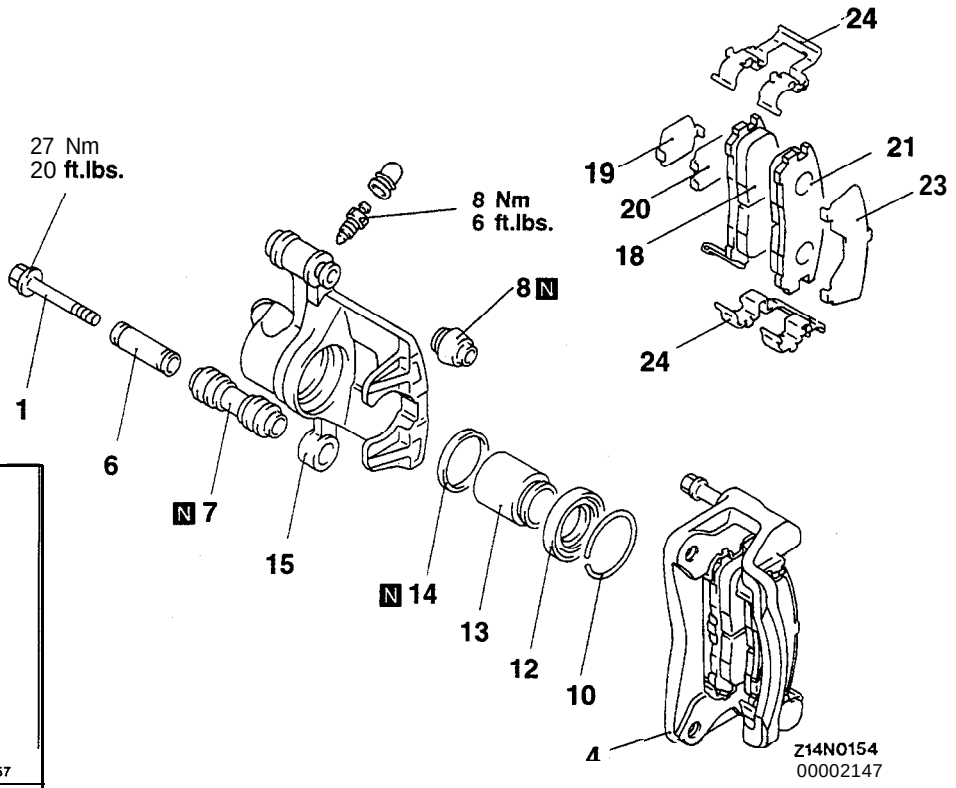
9. Pad pin
11. Retaining ring
◀A▶ ◀A▶ ◀B▶ 12. Piston boot
13. Piston
14. Piston seal
15. Caliper body

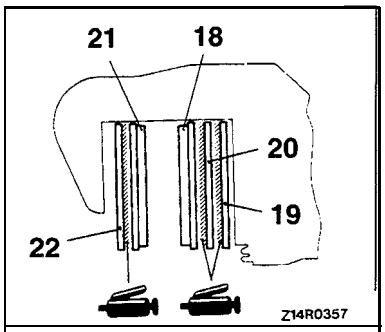
Pad assembly disassembly steps

9. Pad pin
16. Clip
17. Cross spring
18. Pad and wear indicator assembly
19. Inner shim B
20. Inner shim A
21. Pad assembly
22. Outer shim B
23. Outer shim A

TSB Revision

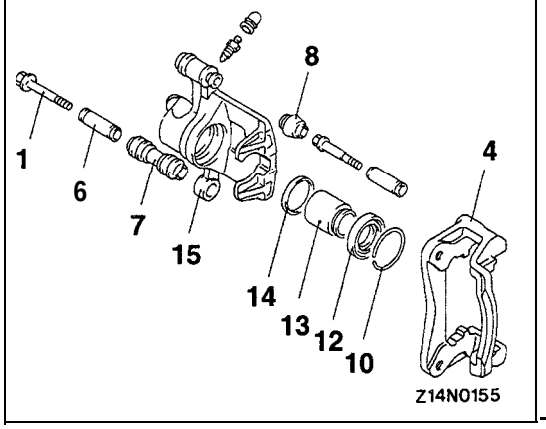
<FWD>



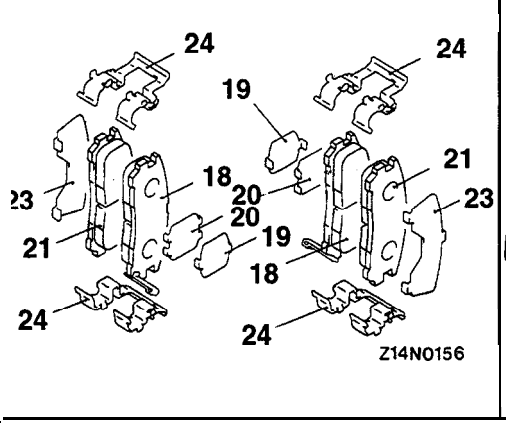


Grease:
Brake grease SAE 5310, NLGI No. 1

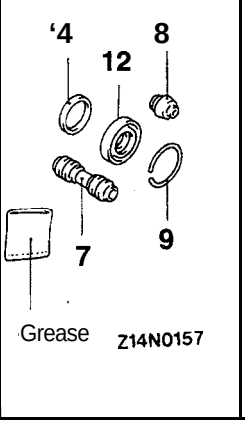
Brake caliper kit



Pad kit



Seal and boot kit



Caliper disassembly steps

1. Lock pin
4. Caliper support (pad, clip, shim)
6. Sleeve
7. Lock pin boot
8. Guide pin boot
10. Boot ring
12. Piston boot
13. 14. Piston Piston seal
15. Caliper body

Pad assembly disassembly steps

1. Lock pin
4. Caliper support (pad, clip, shim)
18. Pad and wear indicator assembly
19. Inner shim B
20. Inner shim A
21. Pad assembly
23. Outer shim
24. Clip

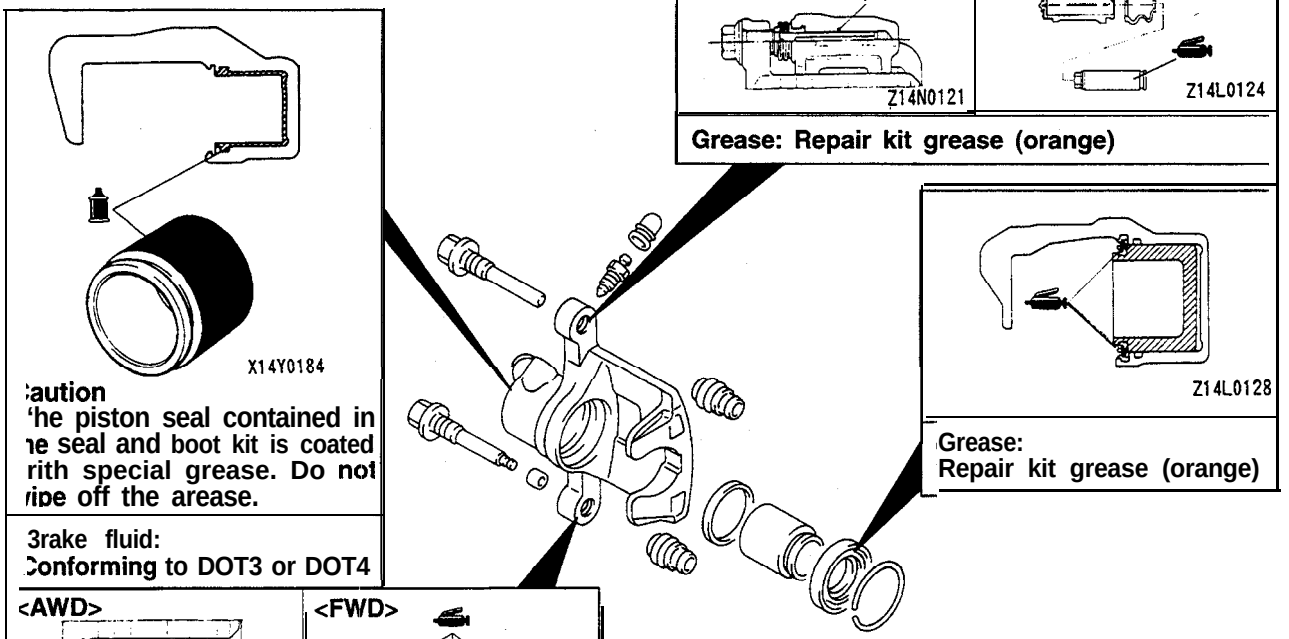
◀A▶
◀B▶

TSB Revision

Lubrication Points

<AWD> (Up to 1993 models)

<FWD>



Caution
The piston seal contained in the seal and boot kit is coated with special grease. Do not wipe off the arease.

Brake fluid:
Conforming to DOT3 or DOT4

<FWD>

Grease: Repair kit grease (orange)

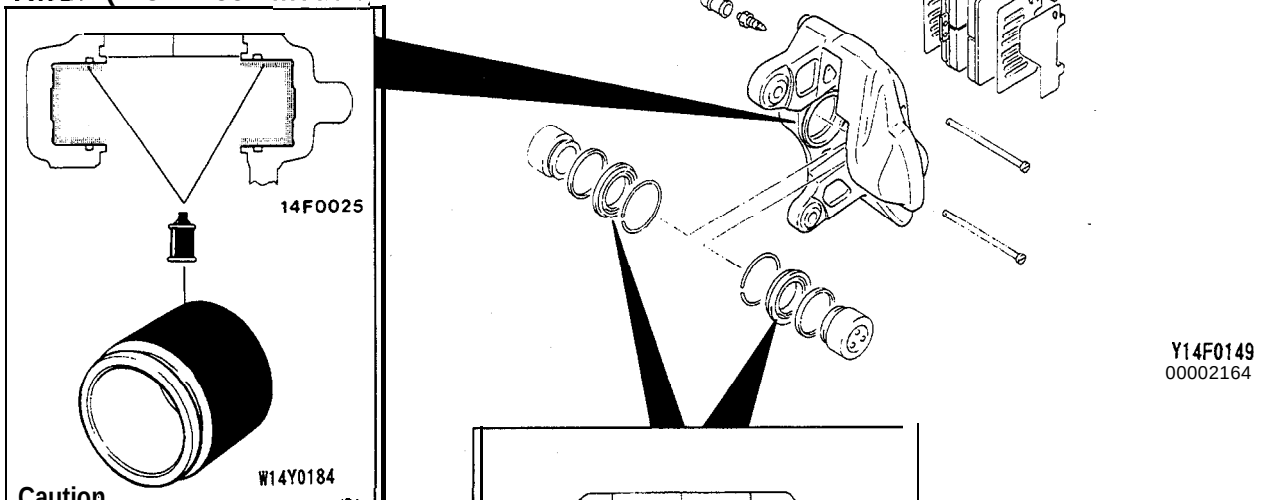
Grease:
Repair kit grease (orange)

<AWD>

<FWD>

Grease: Repair kit grease (orange)

AWD> (From 1994 models

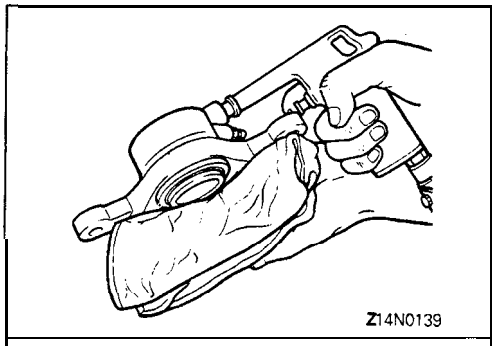


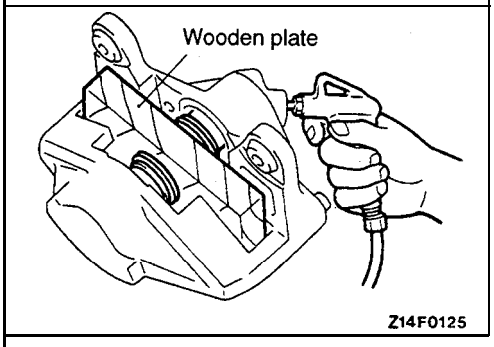
Caution
The piston seal contained in the seal and boot kit is coated with special grease. Do not wipe off the grease.

Brake fluid:
Conforming to DOT3 or DOT4

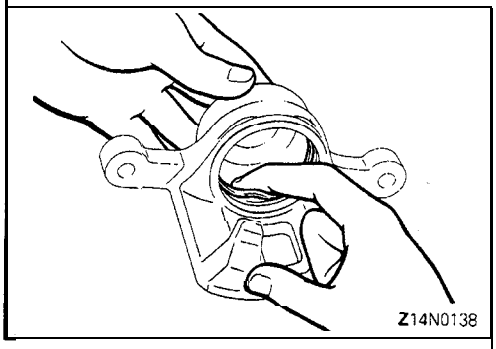
Grease: Repair kit grease (orange)

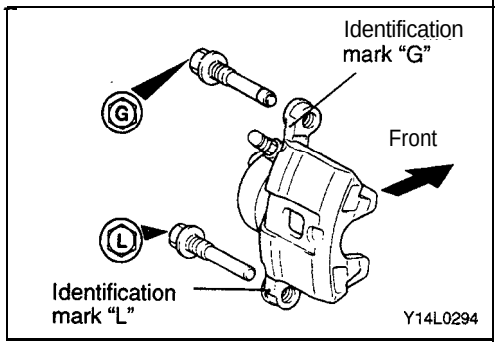
TSB Revision


Z14N0139



Z14F0125


Z14N0138



Y14L0294

DISASSEMBLY SERVICE POINTS

◀A▶ PISTON BOOT / PISTON REMOVAL

<AWD> (Up to 1993 models)
<FWD>

Protect caliper body with cloth. Blow compressed air through brake hose to remove piston boot and piston.

Caution
Blow compressed air gently.

<AWD> (From 1994 models)

Insert a piece of wooden plate as shown and blow compressed air through the brake hose connecting hole to remove the pistons.
Adjust the compressed air pressure as necessary so that both pistons are forced out evenly.

Caution
1. Be careful not to pinch your fingers.
2. Be careful not to splash the brake fluid.

◀B▶ PISTON SEAL REMOVAL

(1) Remove piston seal with finger tip.

Caution
Do not damage the cylinder inner surface.

(2) Clean piston surface and inner cylinder with trichloroethylene, alcohol or specified brake fluid.

Specified brake fluid:
Conforming to DOT3 or DOT4

REASSEMBLY SERVICE POINTS

▶A◀ GUIDE PIN / LOCK PIN INSTALLATION

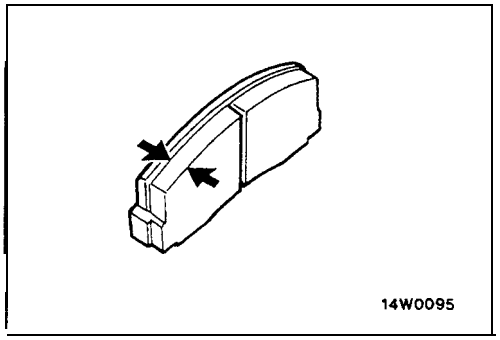
<AWD> (Up to 1993 models)

Install the guide pin and lock pin mating the head markings on the guide and lock pins with the identification markings on the caliper body.

INSPECTION

- Check cylinder for wear, damage or rust.
- Check piston surface for wear, damage or rust.
- Check caliper body or sleeve for wear.
- Check pad for damage or adhesion of grease, check backing metal for damage.
- Check wear indicator for damage.

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PAD WEAR CHECK

Measure the thickness at the thinnest worn area of the pad. Replace pad assembly when pad thickness is less than the limit value.

Standard value: 10.0 mm (.39 in.)
Limit: 2.0 mm (.08 in.)

Caution
1. **When the limit is exceeded, the brake pads on both the left and right wheels must be replaced as a set.**
2. **If there is a large difference in thickness between the pads on the right and left wheels, check the sliding portions of the caliper.**

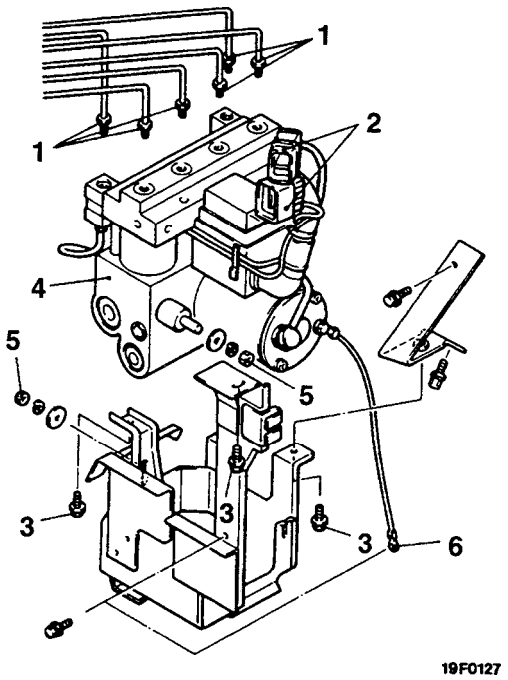
HYDRAULIC UNIT (HU), RELAY <ABS>

REMOVAL AND INSTALLATION

Pre-removal Operation
- Splash Shield Removal (Refer to Group 42 – Fender.)
- Brake Fluid Draining
- Relay Box Removal
- Air Duct Removal

Post-installation Operation
- Splash Shield Installation (Refer to Group 42 – Fender.)
- Air Duct installation
- Relay Box Installation
- Brake Fluid Filling
- Bake Line Bleeding (Refer to P.35-66.)

<Up to 1995 models>

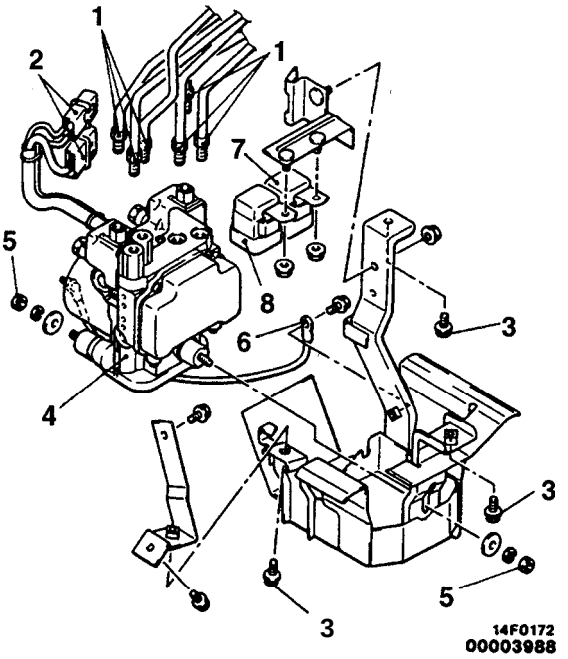


Flared brake line nuts



15 Nm
11 ft.lbs. 14F038

<From 1996 models>



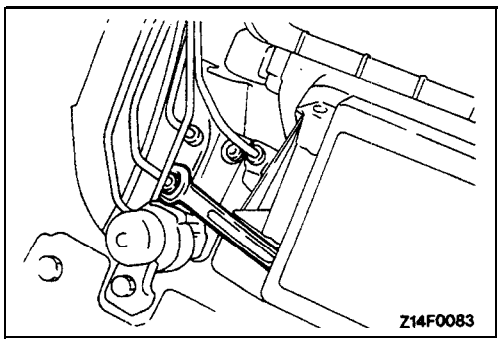
Hydraulic unit removal steps

◀A▶ ▶B◀ 1. Brake tube
2. Harness connector
3. Bracket nut
◀B▶ 4. Hydraulic unit (HU) (with bracket)
5. Hydraulic unit (HU) bolt
▶A◀ 6. Grounding wire

Relay removal steps

7. ABS valve relay
8. ABS motor relay

TSB Revision



REMOVAL SERVICE POINTS

◀A▶ BRAKE TUBE REMOVAL

Pull. up the relay box with harness attached and inserting a hand under the relay box, remove the brake tube using the flare nut wrench.

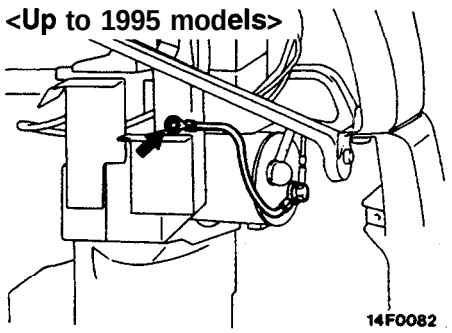
◀B▶ HYDRAULIC UNIT (HU) REMOVAL

Remove the hydraulic unit together with the bracket from the wheel house.

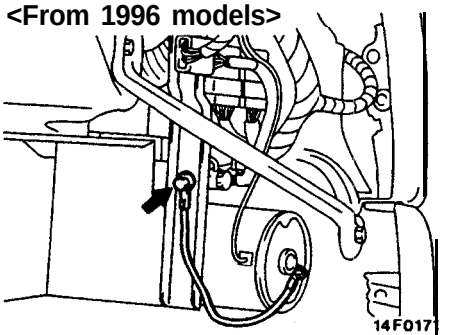
Caution

1. The HU is heavy. Use care when removing it.
2. The HU cannot be disassembled. Never loosen its nuts or bolts.
3. Do not drop or shock the HU.
4. Do not turn the HU upside down or lay it on its side.

<Up to 1995 models>



<From 1996 models>

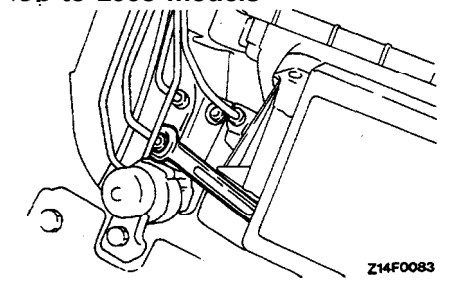


INSTALLATION SERVICE POINTS

▶A◀ GROUNDING WIRE CONNECTION

Connect the grounding wire at the point shown in the illustration.

<Up to 1995 models>



▶B◀ BRAKE TUBE INSTALLATION

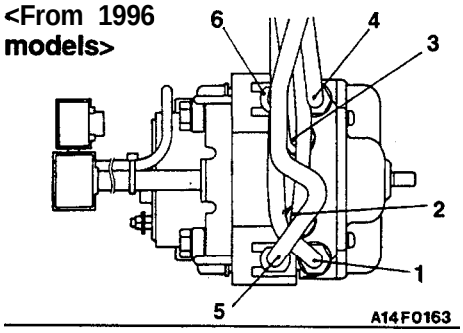
<Up to 1995 models>

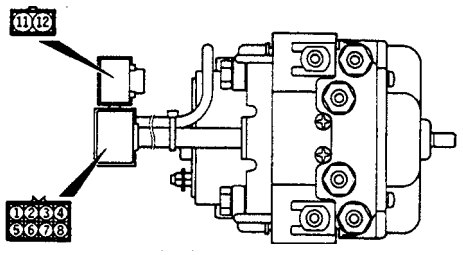
Pull up the relay box with harness attached and inserting a hand under the relay box, install the brake line using flare nut wrench.

Connect the line and hose to the hydraulic unit correctly. (Refer to P-35-93.)

TSB Revision

<From 1996 models>





<From 1996 models>

Connect the tubes to the HU as shown in the illustration.
1. HU – front brake (L.H.)
2. HU – rear brake (R.H.)
3. HU – rear brake (L.H.)
4. HU – front brake (R.H.)
5. Master cylinder – HU (for left front and right rear)
6. Master cylinder – HU (for right front and left rear)

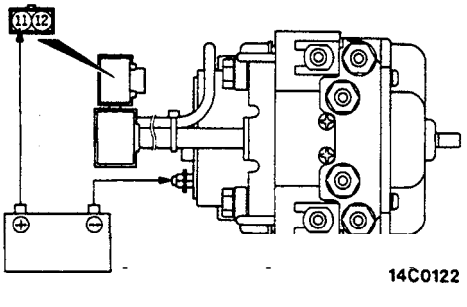
INSPECTION

SOLENOID VALVE CHECK <From 1996 models>

Measure resistance between terminals of each of the following solenoid valves.

Standard value:

Solenoid valve	Measured terminal	Resistance between terminals
Front IN (right side)	1 – 12	8.5 – 9.5 Ω
Front OUT (right side)	5 – 12	4.45 – 4.95 Ω
Front IN (left side)	2 - 12	8.5 – 9.5 Ω
Front OUT (left side)	6 - 12	4.45 – 4.95 Ω
Rear IN (right side)	3 - 12	8.5 – 9.5 Ω
Rear OUT (right side)	7 - 12	4.45 – 4.95 Ω
Rear IN (left side)	4 - 12	8.5 – 9.5 Ω
Rear OUT (left side)	8 - 12	4.45 – 4.95 Ω



HYDRAULIC UNIT PUMP MOTOR CHECK

With the battery connected, confirm operating sound of the hydraulic unit pump motor.

Caution
Do not apply battery voltage for more than 1 second.

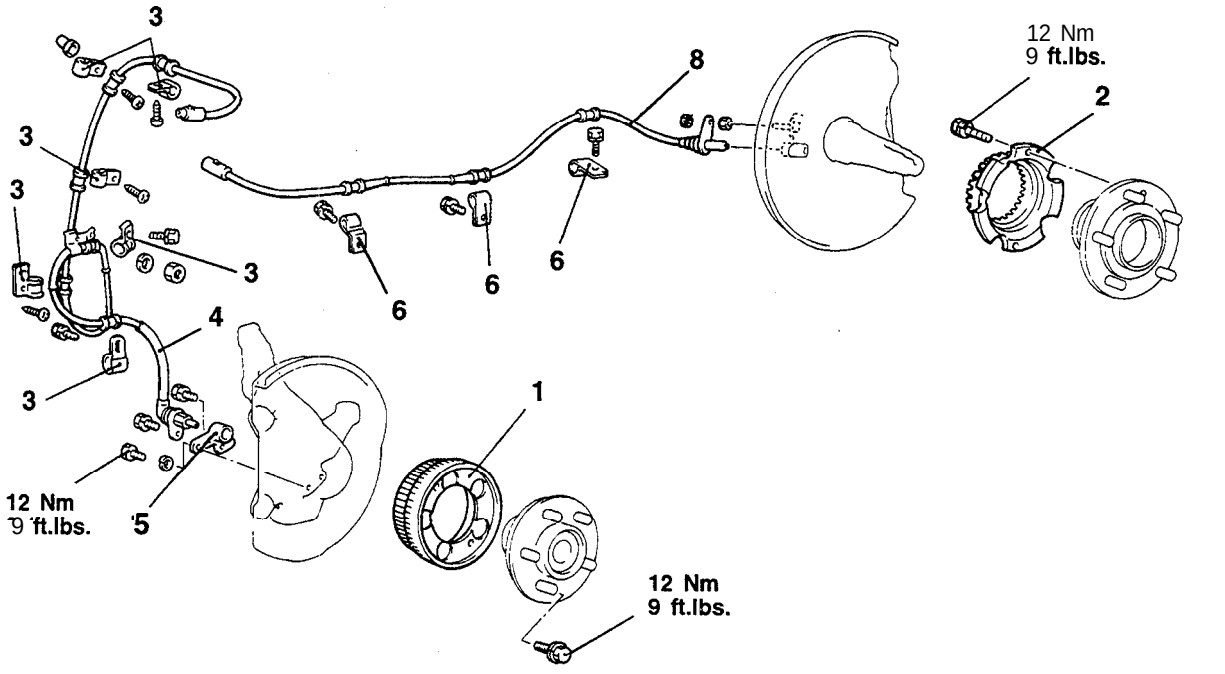
WHEEL SPEED SENSOR <ABS>

REMOVAL AND INSTALLATION

Pre-removal Operation
- Splash Shield Removal (Refer to Group 42 – Fender.)

Post-installation Operation
- Splash Shield Installation (Front Only) (Refer to Group 42 – Fender.)
- ABS Inspection (Refer to P.35-7.)

<FWD>



Z14F0078

◀A▶ 1. Front rotor
◀A▶ 2. Rear rotor

Front speed sensor removal steps
3. Clip
◀B▶ ▶C◀ 4. Front speed sensor
▶B◀ 5. Front speed sensor bracket

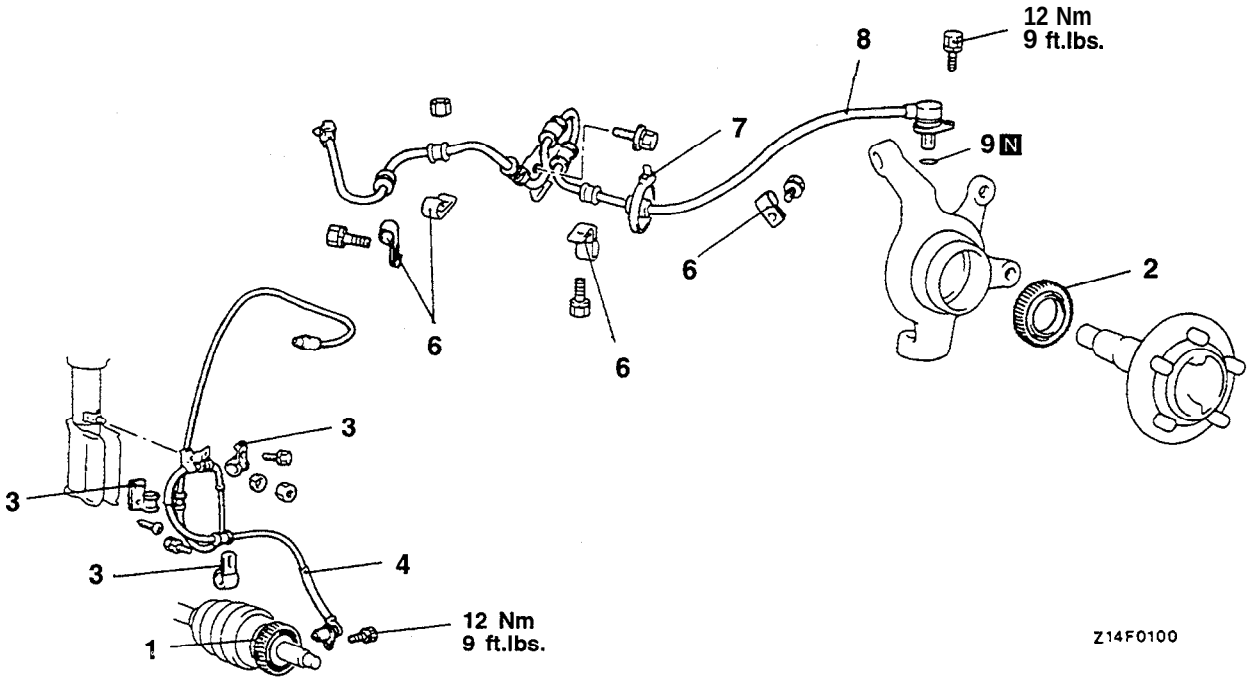
Rear speed sensor removal steps
6. Clip
◀B▶ ▶A◀ **8.** Rear speed sensor

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Pre-removal Operation
- Splash Shield Removal (Front Only) (Refer to Group 42 – Fender.)

Post-installation Operation
- Splash Shield Installation (Front Only) (Refer to Group 42 – Fender.)
- ABS Inspection (Refer to P.35-7.)

<AWD>



◀A▶ 1. Front rotor
◀A▶ 2. Rear rotor

Front speed sensor removal steps
3. Clip
◀B▶ ▶C◀ 4. Front speed sensor

Rear speed sensor removal steps
6. Clip
7. Cable band
◀B▶ ▶A◀ 8. Rear speed sensor
9. O-ring

REMOVAL SERVICE POINTS

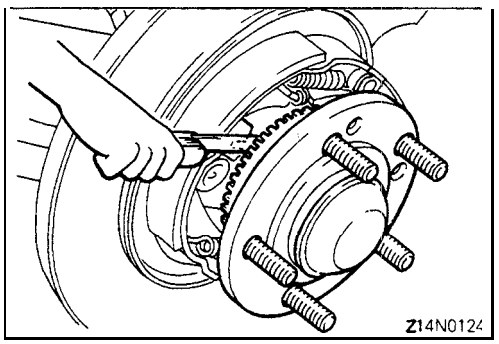
◀A▶ FRONT ROTOR / REAR ROTOR REMOVAL

Caution
Do not damage rotor teeth and never drop the rotor. If the rotor has missing teeth or is deformed, accurate wheel speed detection cannot be expected and the system may fail to function normally.
Use particular care in handling the front rotor of an AWD vehicle as it cannot be disassembled.

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◀B▶ FRONT SPEED SENSOR / 'REAR SPEED SENSOR REMOVAL

Caution
When removing the speed sensor from the knuckle, be careful not to strike the tip of the pole piece against the rotor teeth or any other parts.



INSTALLATION SERVICE POINTS

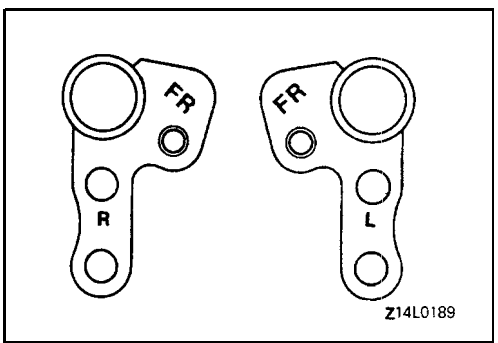
▶A◀ REAR SPEED SENSOR INSTALLATION <FWD>

Insert a feeler gauge between the speed sensor pole piece and the rotor tooth surface and tighten the speed sensor to specified torque where the clearance is as specified all around.

Standard value: 0.2-0.7 mm (.008–.028 in.)

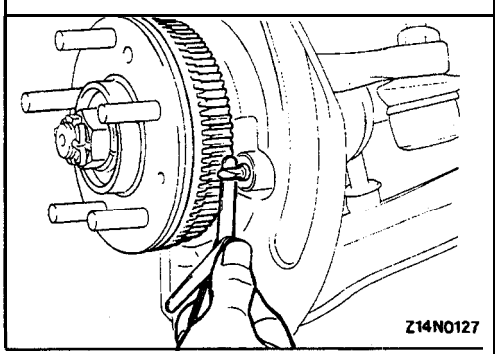
NOTE
The rear speed sensor pole piece-to-rotor tooth surface clearance is not adjustable in the case of AWD vehicles. In this case, measure the sensor mounting surface-to-rotor tooth surface clearance.

Standard value: 28.15-28.45 mm (1.11-1.12 in.)



▶B◀ FRONT SPEED SENSOR BRACKET INSTALLATION

NOTE
(1) The right and left speed sensor brackets differ in shape. Install correctly referring to the identification symbols.
FR: For front speed sensor
R: For right wheel
L: For left wheel
(2) After installation of the speed sensor to the bracket, check that the letters "FR" are visible.

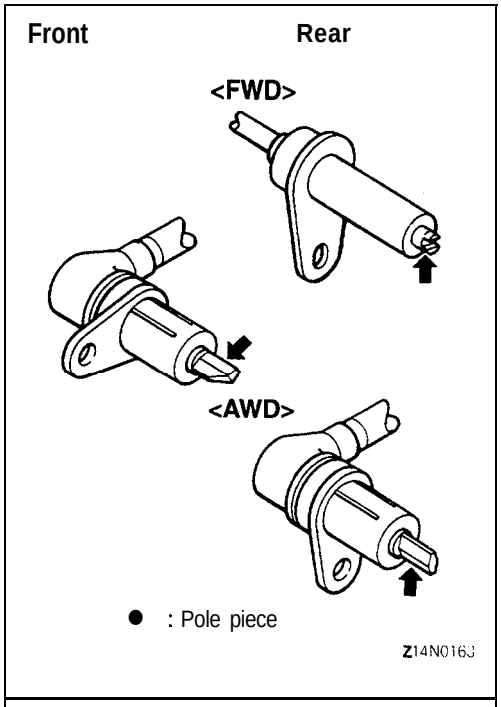


▶C◀ FRONT SPEED SENSOR INSTALLATION

Caution
Handle the speed sensor carefully so as not to strike the tip of the pole piece or the rotor teeth against any metal parts and damage them.

Insert a feeler gauge between the speed sensor pole piece and rotor tooth surface and tighten the speed sensor to specified torque where the clearance is as specified all around.

Standard value: 0.3–0.9 mm (.012–.035 in.)

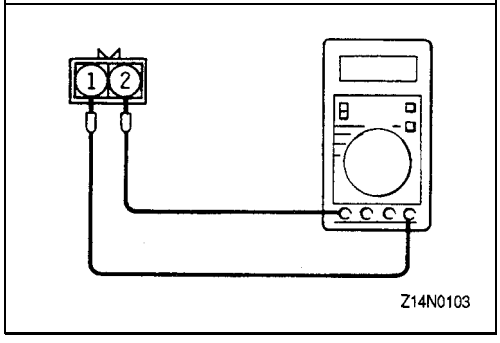


INSPECTION

SPEED SENSOR CHECK

(1) Check the tip of the speed sensor pole piece for deposits of metal or other foreign matter and clean the pole piece as necessary.
Also check the pole piece for damage and replace if damaged.

Caution
The speed sensor pole piece is magnetized by a built-in magnet inside the sensor, so it tends to attract metal. If the pole piece is damaged, accurate wheel speed detection may not be expected.



(2) Measure resistance between speed sensor terminals.

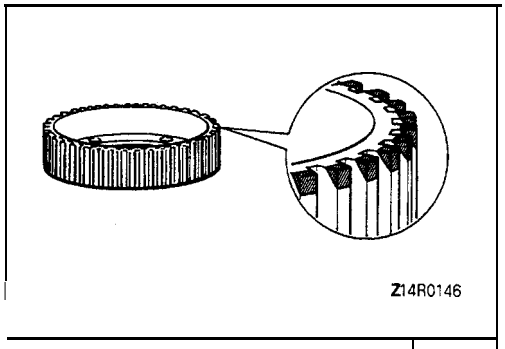
Standard value:

<FWD>	**Front 0.8-1.2 kΩ**
	Rear 0.6-0.8 kΩ
<AWD>	**0.8-1.2 kΩ**

If the internal resistance of the speed sensor is out of specification, replace with a new one.

(3) Check the speed sensor cable for open circuit and replace if faulty.

NOTE
Remove the cable clamp from the body and, while flexing the cable near the clamp, check for temporary open circuit. Also check connector connection and terminal insertion.



ROTOR CHECK

Check the rotor for missing or worn teeth and replace if faulty.

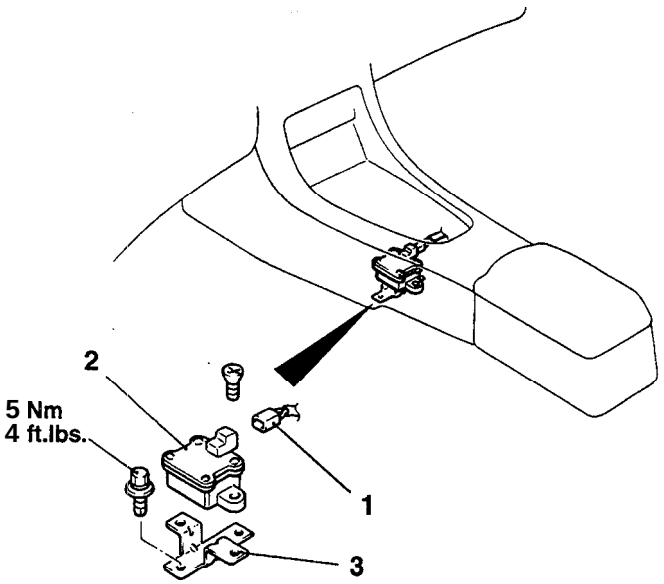
TSB Revision

G SENSOR <AWD-ABS>

REMOVAL AND INSTALLATION

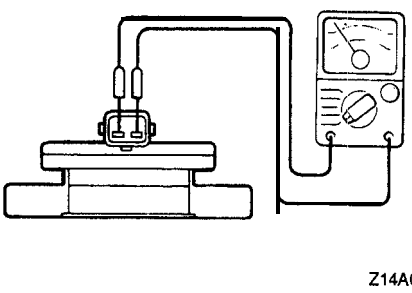
Pre-removal and Post-installation Operation
- Front and Rear Console Assemblies Removal and Installation (Refer to GROUP 52A – Console Box.)

CAUTION: SRS
When installing or removing the instrument panel, don't allow any impact or shock to the SRS diagnosis unit.

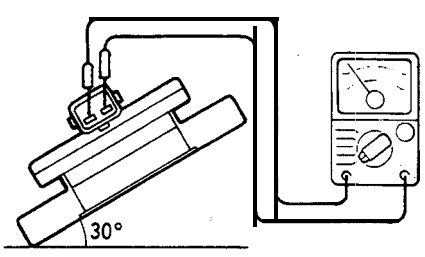


Z14F0115

Removal steps
1. G sensor connector
2. G sensor
3. G sensor bracket



Z14A0194



Z14A0195

INSPECTION

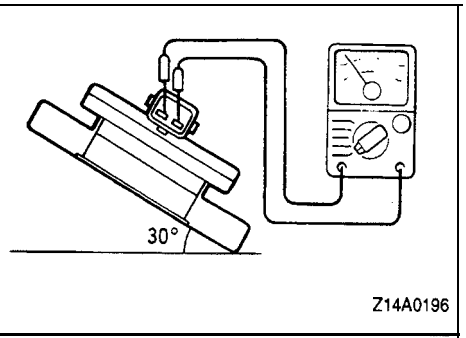
G SENSOR CHECK

<Up to 1995 models>

(1) Lay the G sensor on a level surface and check for continuity between its terminals.

(2) Incline the G sensor toward the vehicle front gradually and check that continuity is lost at an angle of 30° or more.

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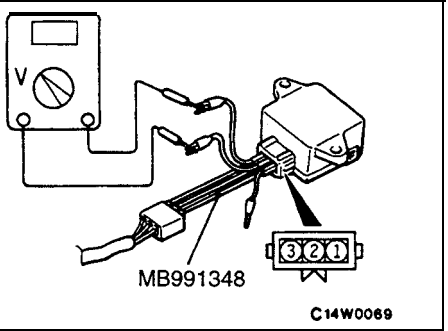
Z14A0196

(3) Incline the G sensor toward the vehicle rear gradually and check that continuity is lost at an angle of 30” or more.

<From 1996 models>

(1) Disconnect G-sensor connector and connect special tool between terminals of the disconnected connector.
(2) With the ignition switch turned ON, read output voltage between terminals No. 2 and No. 3.

Standard value: 2.3-2.7 V

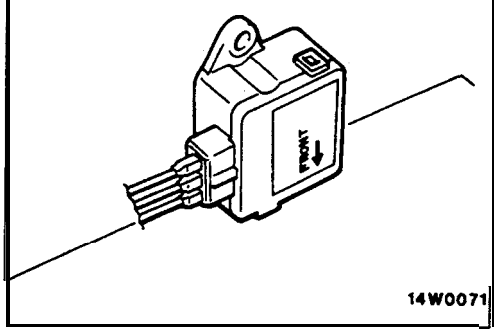


C14W0069

(3) With the special tool connected, fix the connector in such a manner as to direct the front mark on the G-sensor mounting surface downward and read output voltage between terminals No. 2 and No. 3.

Standard value: 3.3-3.7 V

(4) If the output deviates from the standard value, make sure that nothing is wrong with the power supply wire and ground wire and then replace G-sensor.


14W0071

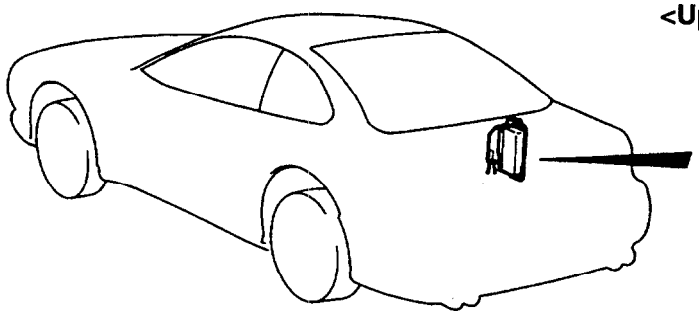
TSB Revision

ELECTRONIC CONTROL UNIT (ABS-ECU) <ABS>

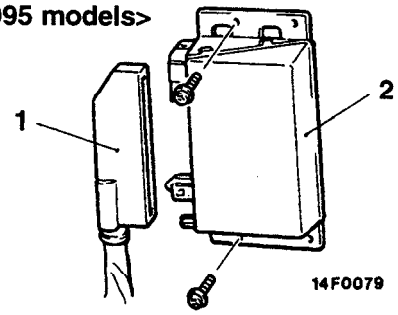
REMOVAL AND INSTALLATION

Pre-removal Operation
- Rear Seat Cushion Removal
- Rear Seatback (RH) Removal
- Quarter Trim Removal

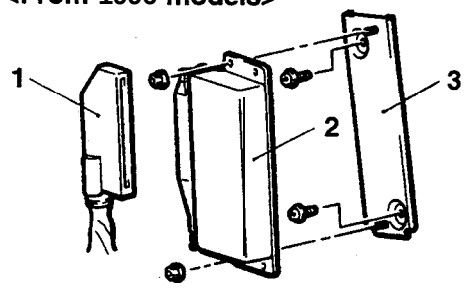
Post-installation Operation
- Quarter Trim Installation
- Rear Seatback (RH) installation
- Rear Seat Cushion Installation
- ABS Inspection (Refer to P.35-7.)



<Up to 1995 models>

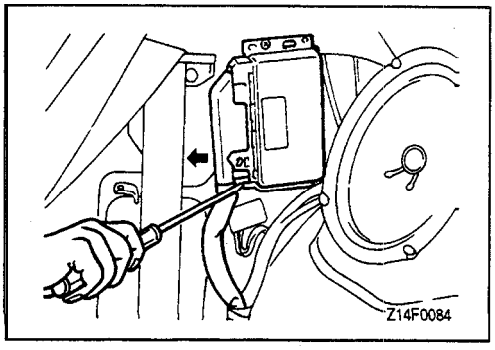


<From 1996 models>



Removal steps

◀A▶ 1. Control unit connector connection
2. Electronic control unit
3. ABS-ECU bracket



REMOVAL SERVICE POINT

◀A▶ CONTROL UNIT CONNECTOR REMOVAL

Insert a screwdriver into the lock section as illustrated and pull out the connector from below.

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NOTES

PARKING BRAKES

CONTENTS

ON-VEHICLE SERVICE 4
- Lining Running-in 5
- Parking Brake Lever Stroke Check 4
- Parking Brake Switch Check 4

PARKING BRAKE 8

PARKING BRAKE LEVER AND PARKING BRAKE CABLE* 5

SPECIAL TOOLS 3

SPECIFICATIONS 2
- General Specifications 2
- Lubricants.. 2
- Service Specifications 2

TROUBLESHOOTING 3

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

(1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).

(2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.

(3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B – Supplemental Restraint System (SRS) and GROUP 00 -Maintenance service, before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning light, air bag module, clock spring, and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

SPECIFICATIONS

GENERAL SPECIFICATIONS

items		Specifications
Parking brakes	Type	Mechanical brake acting on rear wheels
	Brake lever type	Lever type
	Cable arrangement	V-type

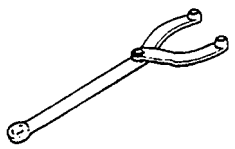
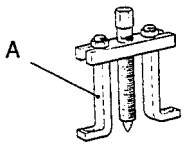
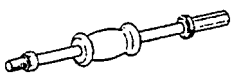
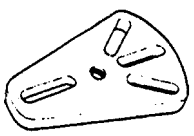
SERVICE SPECIFICATIONS

Items	Standard value	Limit
Parking brake lever stroke	3–5 notches	–
Brake lining thickness mm (in.)	2.8 (.110)	1.0 (.039)
Brake drum I.D. mm (in.)	168.0 (6.6)	169.0 (6.7)
Clearance between the speed sensor pole piece and the rotor tooth mm (in.)	0.2–0.7 (.008–.028)	–

LUBRICANTS

Items	Specified lubricant
Rear brake shoe and backing plate contact surfaces	Brake grease SAE J310, NLGI No. 1
Contact surface between shoe & lining assembly's strut and adjuster	
Contact surface between shoe & lining assembly and shoe-adjustment bolt and shoe-support piece	

SPECIAL TOOLS

Tool	Tool number and name	Supersession	Application
	MB990767 End yoke holder	MB990767-01	Removal of the rear axle shaft assembly
	MB990241 Axle shaft puller A: MB990244 Puller bar	General service tool	
	MB990211 Sliding hammer	MB990211 -01	
	MB991 354 Puller body	General service tool	

TROUBLESHOOTING

Symptom	Probable cause	Remedy
Brake drag	Incomplete release of parking brake	Correct
	Incorrect parking brake adjustment	Adjust
Insuff icient parking brake function	Worn brake pad	Replace
	Excessive parking brake lever stroke	Adjust the parking brake lever stroke or check the parking brake cable routing
	Grease or oil on pad surface	Replace
	Parking brake cable sticking	Replace

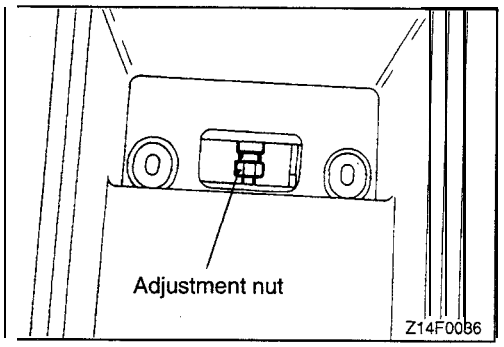
ON-VEHICLE SERVICE

PARKING BRAKE LEVER STROKE CHECK

1. Pull the parking brake lever with a force of approx. 200 N (45 lbs.), and count the number of notches.

   Caution
   The 200 N (45 lbs.) force of the parking brake lever must be strictly observed.

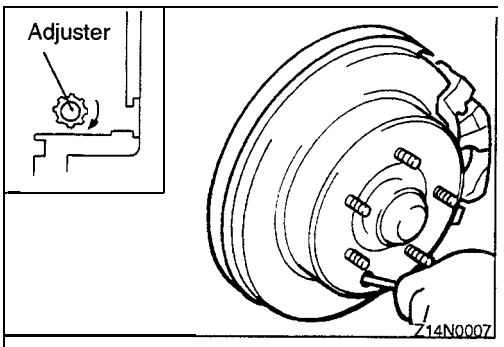
   Standard value: 3-5 notches

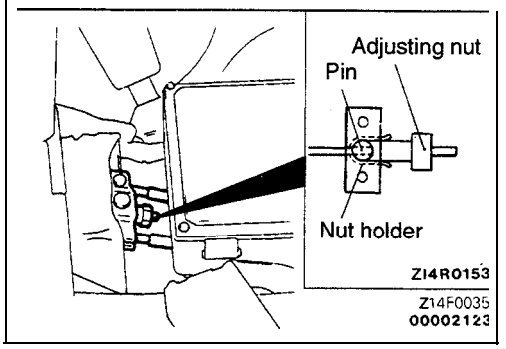


2. If the parking brake lever stroke is not the standard value, adjust as described below.
   (1) Remove the cup holder and plug and loosen the adjustment nut to the cable end so that the cable becomes free.
   (2) Repeat depressing the brake pedal until the pedal stroke becomes stable.

   NOTE
   When the brake pedal is repeatedly depressed, shoe clearance is adjusted properly.

   (3) Disengage the drive shaft and companion flange.
   (4) Remove the adjusting hole plug. Using a screwdriver, turn the adjuster in the direction of the arrow (to expand the shoe) until brake is lightly applied [where the disc cannot be turned with both hands: approx. 2.7 Nm (23 in.lbs.)]. Then, turn the adjuster five notches in the direction opposite the arrow.
   (Reference: Shoe clearance on one side 0.19 mm [.0075 in.])





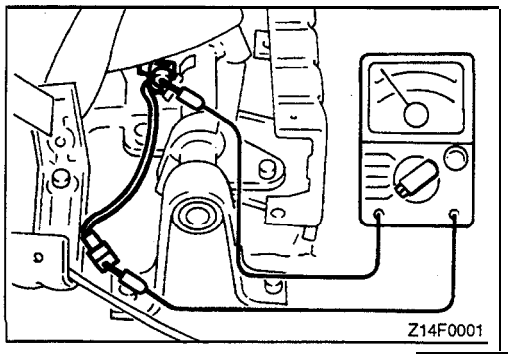
   (5) Turn the adjusting nut to obtain specified parking brake lever stroke. After the adjustment, check that there is no play between the adjusting nut and pin.

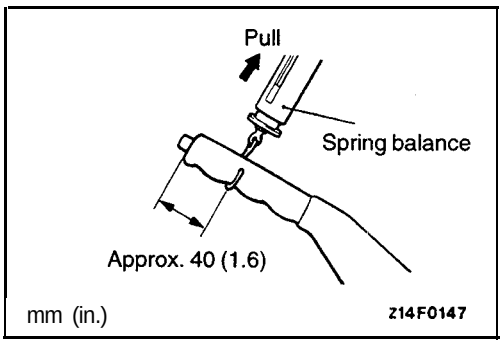
   Caution
   Do not adjust parking brake lever stroke too tight, less than the standard value, or brake drag could result.

   (6) After the parking brake lever stroke has been adjusted, jack up the rear part of the vehicle. Loosen the parking brake and turn the rear wheel to check that the parking brake does not drag.

PARKING BRAKE SWITCH CHECK

1. Disconnect the connector of the parking brake switch, and connect an ohmmeter to the parking brake switch and the switch installation bolt.
2. The parking brake switch is good if there is continuity when the parking brake lever is pulled and there is no continuity when it is returned.





LINING RUNNING-IN

Carry out running-in by the following procedure when replacing the parking brake linings or the rear brake disc rotors, or when brake performance is insufficient.

1. Adjust the parking brake stroke to the specified value.
2. Hook a spring balance onto the center of the parking brake lever grip and pull it with a force of 98-147 N (22-32 lbs.) in a direction perpendicular to the handle.
3. Drive the vehicle at a constant speed of 35–50 km/h (22-31 mph) for 100 m (328 ft.).
4. Release the parking brake and let the brakes cool for 5– 10 minutes.
5. Repeat the procedure in steps (2) to (4) 4-5 times.

Caution
Carry out running-in in a place with good visibility, and pay careful attention to safety.

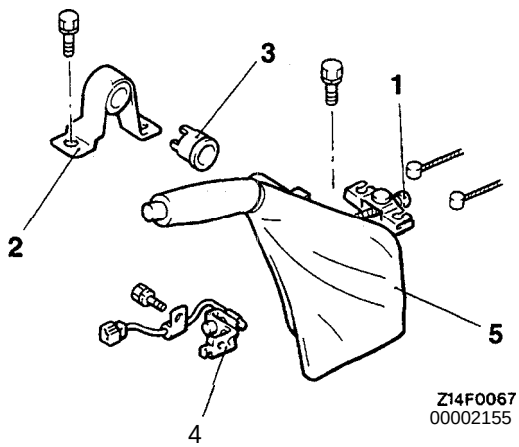
PARKING BRAKE LEVER AND PARKING BRAKE CABLE

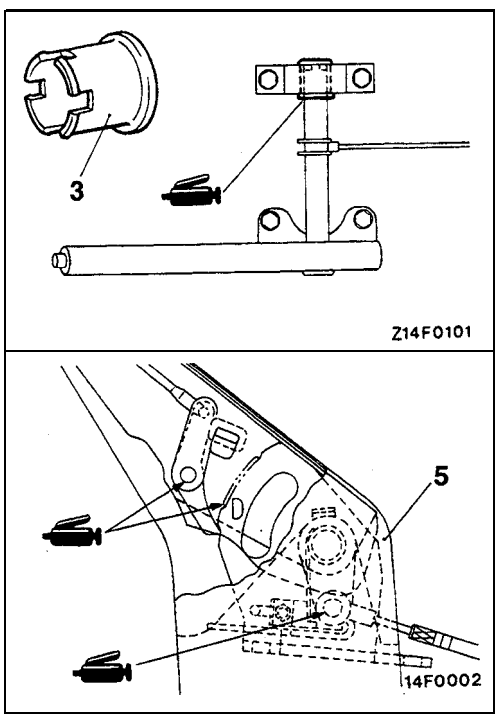
REMOVAL AND INSTALLATION

Pre-removal Operation
- Front and Rear Console Removal (Refer to GROUP 52A – Console Box.)

CAUTION: SRS
When installing or removing the floor console, don't allow any impact or shock to the SRS diagnosis unit.

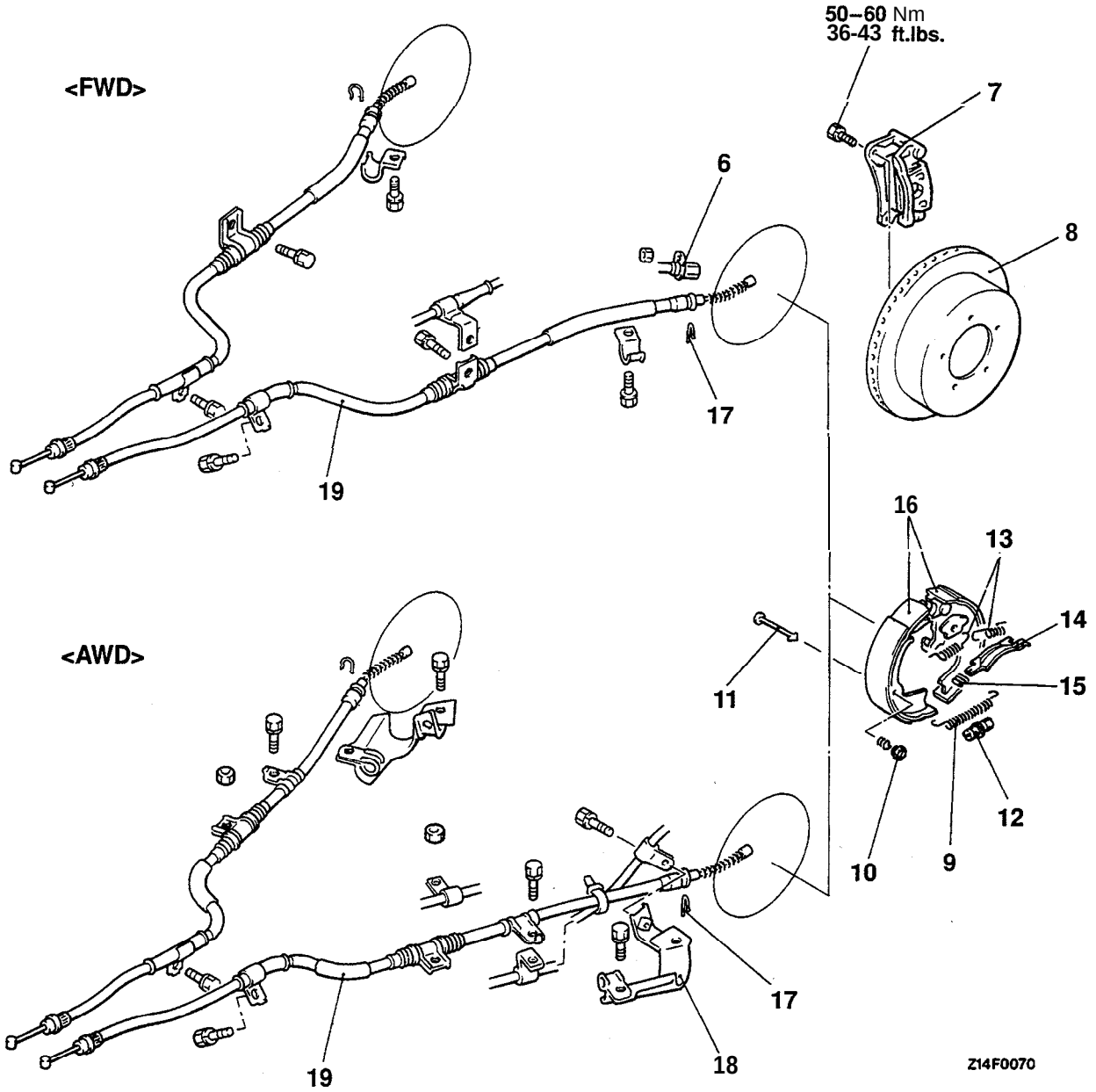
Post-installation Operation
- Parking Brake Lever Stroke Adjustment (Refer to P.36-4.)
- Front and Rear Console Installation (Refer to GROUP 52A – Console Box.)





Parking brake lever removal steps
1. Cable adjuster
2. Parking brake stay
3. Bushing
4. Parking brake switch
5. Parking brake lever

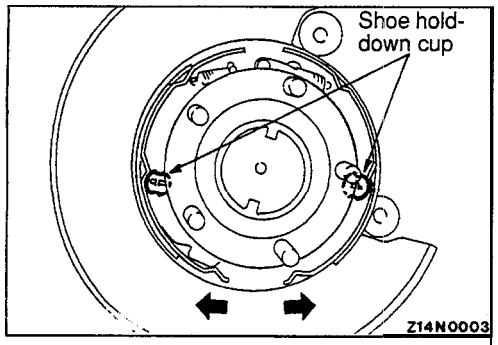
TSB Revision



Parking brake cable removal steps

1. Cable adjuster
6. Rear speed sensor
   (Refer to GROUP 35–Speed Sensor.)
7. Rear brake assembly
8. Rear brake disc
9. Adjusting wheel spring
◀A▶ 10. Shoe hold-down cup
11. Shoe hold-down pin
▶B◀ 12. Adjuster
▶A◀ 13. Shoe-to-anchor spring
14. Strut
15. Strut return spring
16. Shoe & lining assembly
17. Clip
18. Parking cable protector
19. Parking brake cable

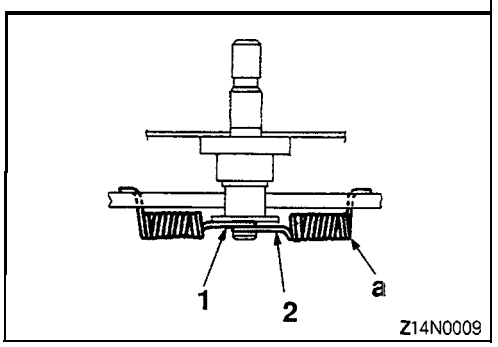
TSB Revision



REMOVAL SERVICE POINT

◀A▶ SHOE HOLD DOWN CUP REMOVAL

Expand the shoe & lining assembly and remove the shoe hold down cup.



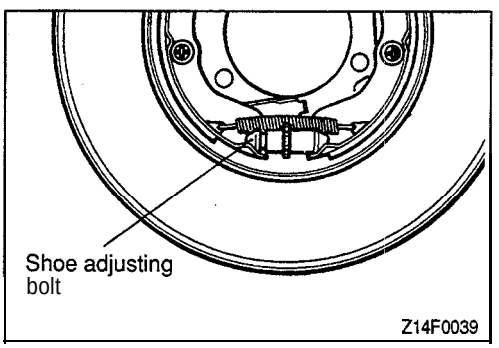
INSTALLATION SERVICE POINTS

▶A◀ SHOE TO ANCHOR SPRINGS INSTALLATION

The shoe-to-anchor spring must be installed in the sequence shown in the illustration.

Caution
Each shoe-to-anchor spring has a unique spring load and the spring "a" is painted to prevent erroneous installation.

NOTE
The figure shows the left wheel; for the right wheel, the position in symmetrical.



▶B◀ ADJUSTER INSTALLATION

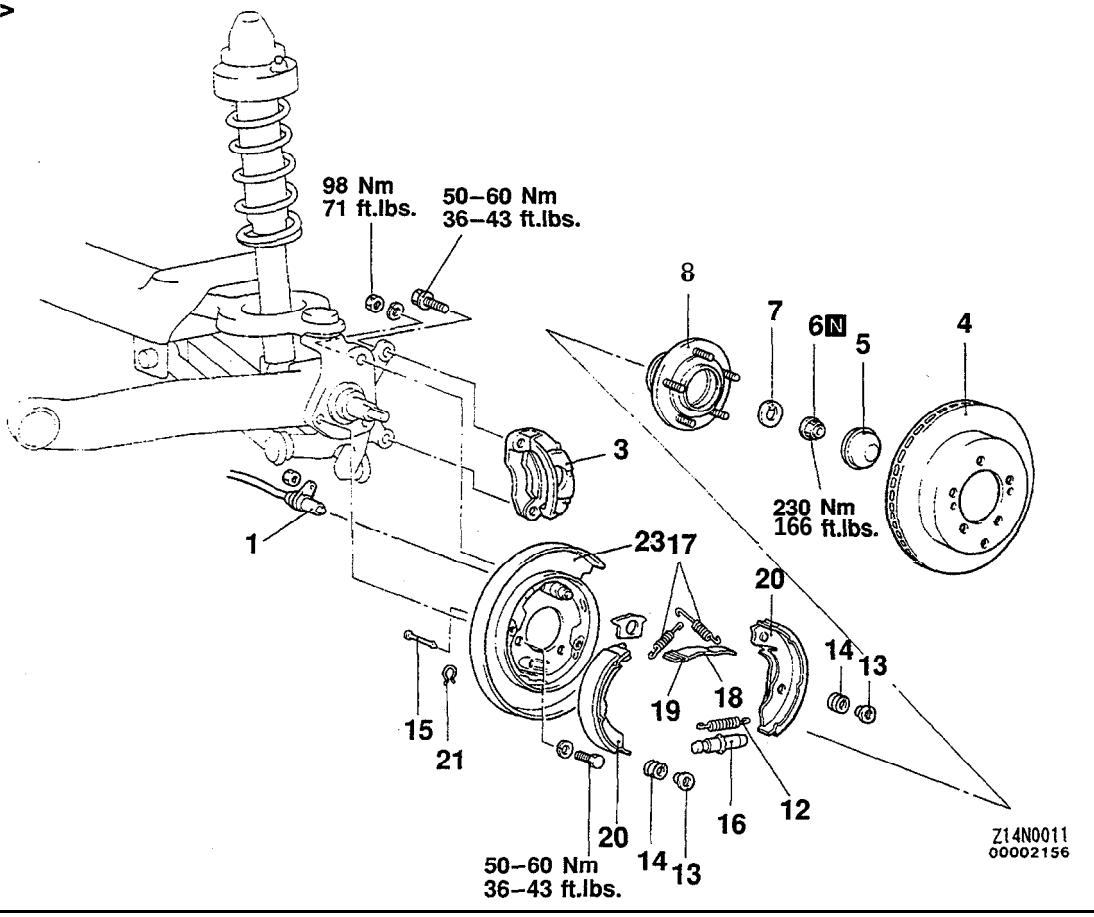
Install the adjuster facing the left adjusting bolt to the vehicle front and right adjusting bolt to the vehicle rear.

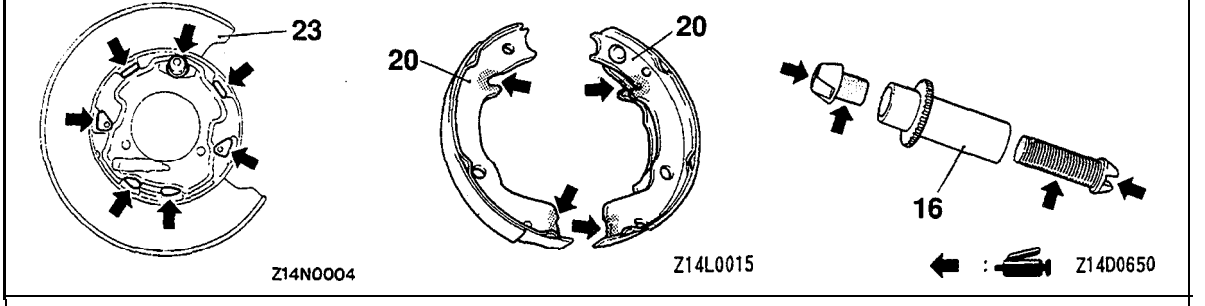
PARKING BRAKE

REMOVAL AND INSTALLATION

Post-installation Operation
- Parking Brake Lever Stroke Adjustment (Refer to P.36-4.)

<FWD>





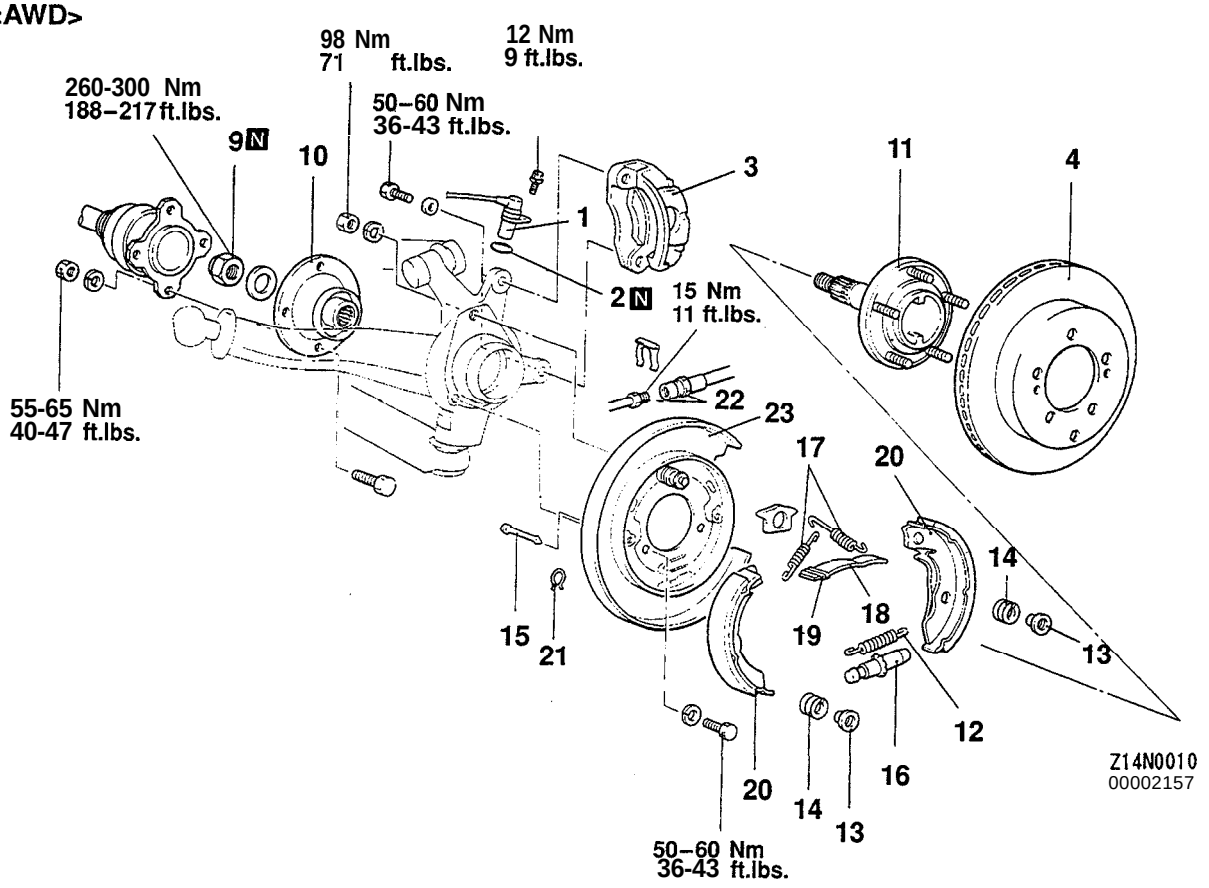
Grease: Brake grease SAE J310, NLGI No. 1

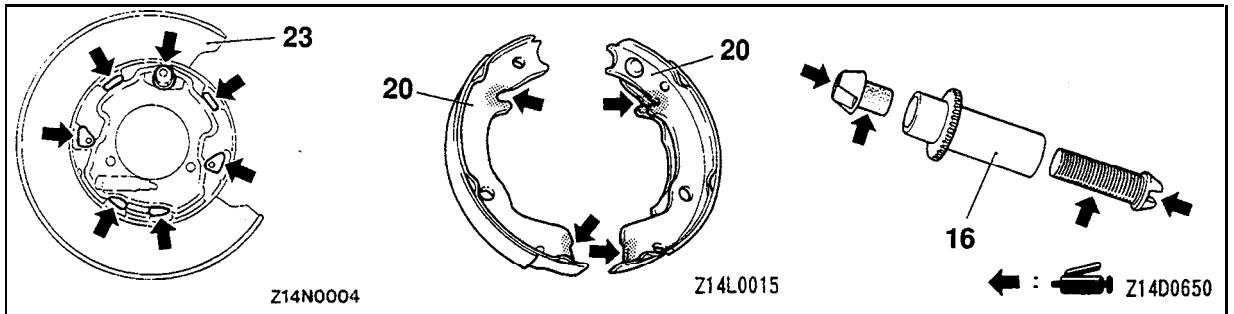
Removal steps

◀A▶ ▶E◀ 1. Rear speed sensor
3. Rear brake assembly
4. Rear brake disc
5. Hub cap
▶D◀ 6. Flange nut
7. Washer
8. Rear hub unit bearing
12. Adjusting wheel spring
13. Shoe hold-down cup
14. Shoe hold-down spring
15. Shoe hold-down pin
▶B◀ 16. Adjuster
▶A◀ 17. Shoe-to-anchor spring
18. Strut
19. Strut return spring
20. Shoe & lining assembly
21. Clip
23. Backing plate

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<AWD>





Grease: Brake grease SAE J310, NLGI No. 1

Removal steps

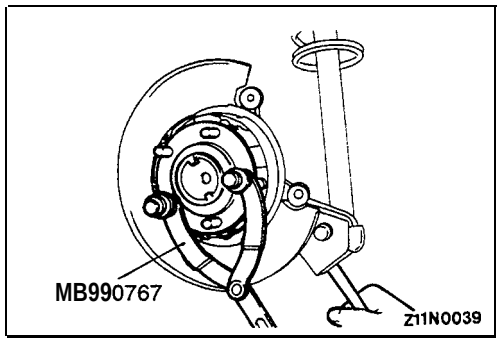
◀A▶ 1. Bearingspeed sensor
2. Rear brake assembly
3. Rear brake disc:
◀B▶ ▶C◀ 9. Self-locking nut 10. Compacking flange
◀C▶ 11. Rear axle shaft
12. Adjusting wheel spring
13. Shoe hold-down cup
14. Shoe hold-down spring
▶B◀ 16. Adjuster hold-down pin
▶A◀ 17. Shoe-to-anchor spring
18. Strut
19. Strut return spring
20. Shoe & lining assembly
21. Clip
22. Brake tube connection
23. Backing plate

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REMOVAL SERVICE POINTS

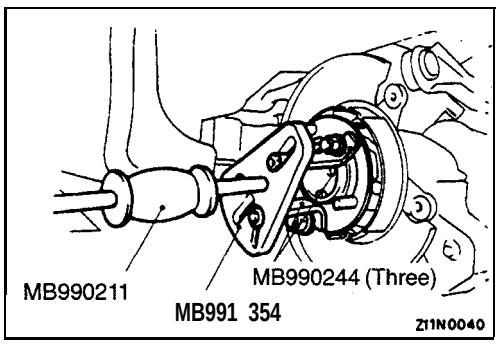
◀A▶ REAR SPEED SENSOR REMOVAL

Caution
When removing the speed sensor from the knuckle, use care not to hit the pole piece at its tip against the rotor teeth or other parts.



◀B▶ SELF-LOCKING NUT REMOVAL

With the special tool, secure the axle shaft and remove the companion flange self-locking nut.



◀C▶ AXLE SHAFT ASSEMBLY REMOVAL

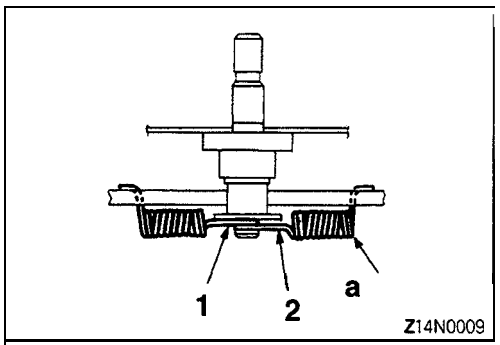
With the special tool, remove the axle shaft from the trailing arm.

INSTALLATION SERVICE POINTS

▶A◀ SHOE-TO-ANCHOR SPRING INSTALLATION

The shoe-to-anchor spring must be installed in the sequence shown in the illustration.

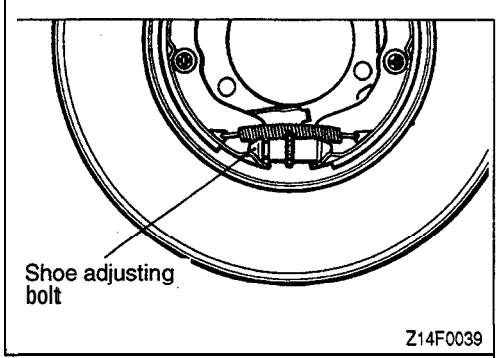
Caution
Each shoe-to-anchor spring has a unique spring load and the spring "a" is painted to prevent erroneous installation.

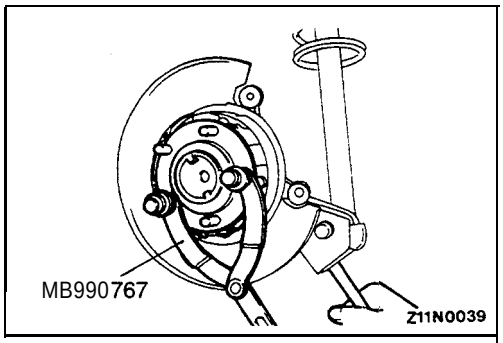


NOTE
The figure shows the left wheel; for the right wheel, the position in symmetrical.

▶B◀ ADJUSTER INSTALLATION

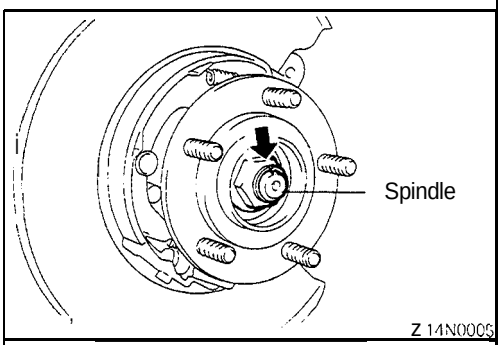
Install the adjuster facing the left adjusting bolt to the vehicle front and right adjusting bolt to the vehicle rear.





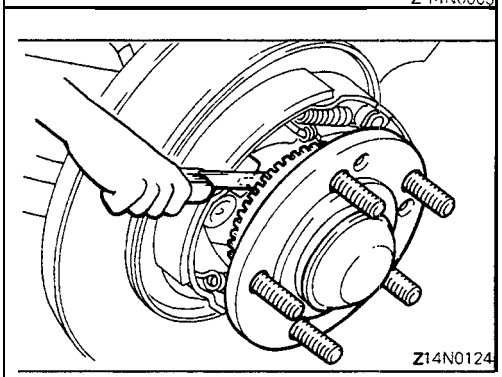
▶C◀ SELF-LOCKING NUT INSTALLATION

With the special tool, secure the axle shaft and tighten the companion flange self-locking nut.



▶D◀ FLANGE NUT INSTALLATION

After tightening the flange nut, align with the spindle's indentation and crimp.



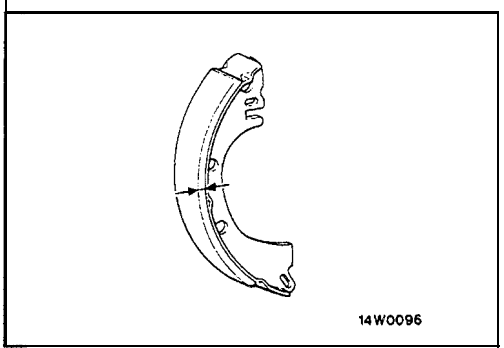
▶E◀ REAR SPEED SENSOR INSTALLATION

Insert a filler gauge between the speed sensor pole piece and rotor teeth and tighten the speed sensor at such position where the gap is as specified below over the entire circumference.

Standard value: 0.2–0.7 mm (.008–.028 in.)

INSPECTION

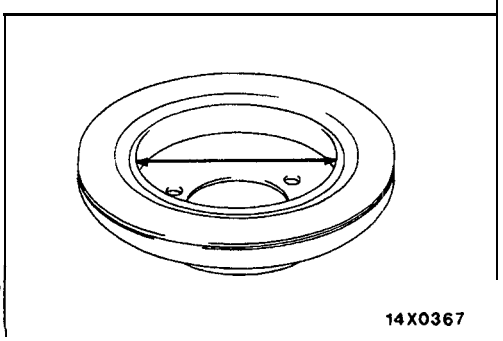
CHECKING FOR UNUSUAL WEAR OF THE BRAKE LINING AND BRAKE DRUM



(1) Measure the thickness of the brake lining at several places.

Standard value: 2.8 mm (.110 in.)
Limit: 1.0 mm (.039 in.)

Caution
Replace the brake shoes if the thickness of the brake lining is the limit value or less.



(2) Measure the brake disc drum inner diameter at two or more places.

Standard value: 168.0 mm (6.6 in.)
Limit: 169.0 mm (6.7 in.)

Caution
Replace if the brake disc drum inner diameter is the limit value or more.

NOTES

STEERING

CONTENTS

STEERING 37A

4-WHEEL STEERING SYSTEM (4WS) 37B

CWHEEL STEERING SYSTEM (ACTIVE 4WS) 37C

NOTE
Shaded groups in the above list are not included in this manual.

NOTES

STEERING

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- Fluid Level Check 10
- Fluid Replacement 10
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- Oil Pump Pressure Test 12
- Stationary Steering Effort Check 9
- Steering Angle Check 6
- Steering Wheel Centering 7
- Steering Wheel Free Play Check 6
- Steering Wheel Return to Center Check 9
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POWER STEERING GEAR BOX* 18

POWER STEERING HOSES 33

POWER STEERING OIL PUMP 29

SPECIAL TOOLS 4

SPECIFICATIONS 2
- General Specifications 2
- Lubricants 3
- Sealant 3
- Service Specifications 2

STEERING WHEEL AND SHAFT* 14

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

(1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injuryordeathtoservicepersonnel (from inadvertentfiringoftheair bag) or to the driver and passenger (from rendering the SRS inoperative).

(2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.

(3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B – Supplemental Restraint System (SRS) and GROUP 00 -Maintenance Service, before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning light, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

SPECIFICATIONS

GENERAL SPECIFICATIONS

Items		Specifications
Steering wheel	Steering wheel O.D. mm (in.)	390 (15.4)*1, 386 (15.2)*2
Gear box	Steering gear type	Rack and pinion
Power steering oil pump	Oil pump type	Vane type
	Displacement cm^3/rev. (cu.in./rev.)	9.6 (.59)
	Relief set pressure MPa (psi)	8 (1,138)

NOTE
*1: Up to 1993 models
*2: From 1994 models

SERVICE SPECIFICATIONS

Items			Standard value	Limit
Steering wheel free play (with engine stopped) mm (in.)			11 (.43)	–
Steering angle	FWD, AWD*1	Inner wheel	33°45' ± 2"	
		Outer wheel	28°21'	
	AWD*2	Inner wheel	31°45' ± 2"	–
		Outer wheel	27°10	
Tie rod end ball joint starting torque Nm (in.lbs.)		FWD	0.5–3.0 (4-26)	
		AWD	1 .O-3.0 (9-26)	
Stationary steering effort N (lbs.)			35 (8) or less	
Drive belt deflection mm (in.)	When belt tension is inspected		9.5–13.5 (.37–.53)	
	When belt tension is readjusted		10.5–12.5 (.41–.49)	
	When new belt is installed		7.5-9.0 (.30–.35)	
Oil pump pressure MPa (psi)	Pressure gauge valve closed		7.5-8.2 (1,067–1,166)	
	Pressure gauge valve opened		0.8–1.0 (114– 142)	–
Oil pressure switch operating pressure MPa (psi)	Oil pressure switch contacts closed (continuity)		1.5-2.0 (213-284)	–
	Oil pressure switch contacts opened (no continuity)		0.7–1.2 (100-171)	
Total pinion torque Nm (in.lbs.)			0.6-1.3 (5-11)	
Tie-rod joint swing resistance N (lbs.)			8-18 (1.8-4.0)	
Tie-rod joint swing torque Nm (in.lbs.)			2-5 (17-43)	–
Steering wheel free play (when hydraulic operation) mm (in.)				30 (1.2)
Variation of tie rod end ball joint shaft direction mm (in.)				1.5 (.059)
Oil pump pressure MPa (psi)	Pressure gauge valve opened			1.5 (213)
Space between vane and rotor mm (in.)				0.06 (.0024)

NOTE
*1: Up to 1993 models
*2: From 1994 models

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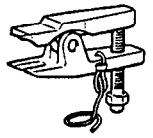
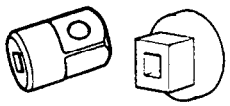
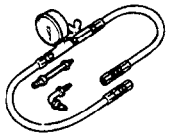
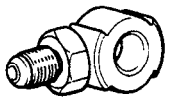
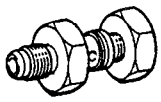
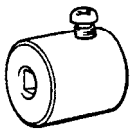
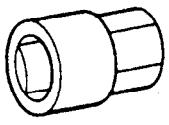
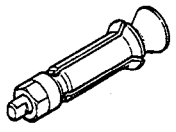
LUBRICANTS

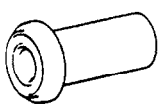
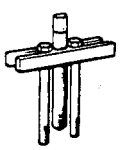
Items		Specified lubricant	Quantity
Gear box	Bearing	Automatic transmission fluid "DEXRON II"	As required
	O-ring		
	Oil seal		
	Special tool (MB991213)		
	Pinion and valve assembly seal ring part		
	Bellows	Silicone grease	As required
Oil pump	Power steering fluid	Automatic transmission fluid "DEXRON II"	0.9 dm^3 (.95 qt.)
	Flow control valve	Automatic transmission fluid "DEXRON II"	As required
	Friction surface of rotor, vane, cam ring and pump cover		
	O-ring		

SEALANT

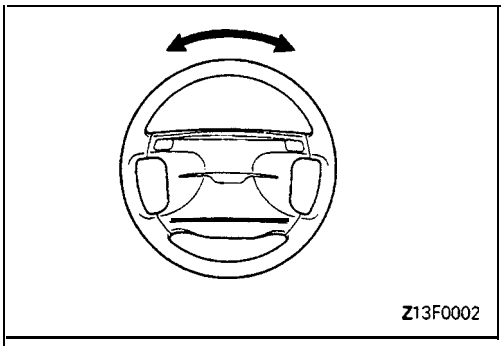
Items		Specified sealant
Power steering gear box	End plug screw	3M ATD Part No. 8663 or equivalent
	Power steering rack support cover screw	
	Dust cover	

SPECIAL TOOLS

Tool	Tool number and name	Supersession	Application
	MB991113 Steering linkage puller	MB991113-01	Disconnection of tie-rod end
	MB990326 Preload socket	General service tool	Measurement of the ball joint starting torque
	MB990662 Power steering oil pressure gauge	MB990662-01	Measurement of oil pressure
	MB990993 Power steering oil pressure gauge adapter (pump side)	MB990993-01	
	MB990994 Power steering oil pressure gauge adapter (hose side)	MB990994-01	
	MB991006 Preload socket	MB991006-01	Measurement of the total pinion torque
	MB991204 Torque wrench socket	General service tool	Removal and installation of the rack support cover
	MB990925 Bearing and oil seal installer set	MB990925-01 or General service tool	Installation of oil seal and bearing For details of the installers, refer to GROUP 26 – Special Tools.
	MB991120 Needle bearing puller	Tool not available	Removal of rack housing needle bearing

Tool	Tool number and name	Supersession	Application
	MB991199 Oil seal installer	General service tool	To press in the oil seal for the rack
	MB991197 Bar (long type)	General service tool	To press in the oil seal for the rack
	MB991 202 Oil seal and bearing installer	General service tool	Press-fitting of rack housing bearing
	MB991213 Rack installer	General service tool	Rack installation
	MB991203 Oil seal and bearing installer	Tool not available	Installation of valve housing oil seal and bearing
	MB990941 Torque tube bearing installer	MB990941-01	Installation of valve housing oil seal
	MB990803 Steering wheel puller	General service tool	Removal of steering wheel

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ON-VEHICLE SERVICE

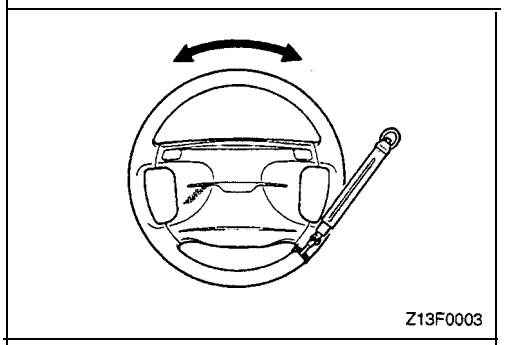
STEERING WHEEL FREE PLAY CHECK

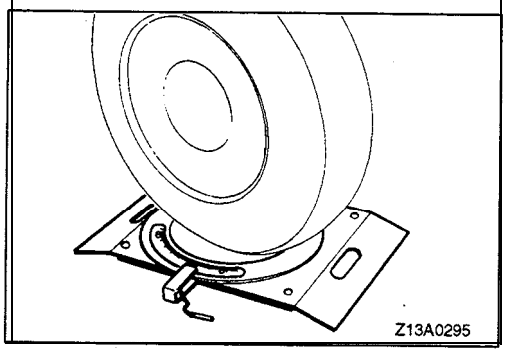
1. With engine running (hydraulic operation), set front wheels straight ahead.
2. Measure the play on steering wheel circumference before wheels start to move when slightly moving steering wheel in both directions.

   Limit: 30 mm (1.2 in.)
3. When the play exceeds the limit, check for play on steering shaft connection and steering linkage. Correct or replace.
4. If the free play still exceeds the limit value set steering wheel straight ahead with engine stopped. Load 5 N (1 lb.) towards steering wheel circumference and check play.

   Standard values (steering wheel play with engine stopped): 11 mm (.43 in.)

   If the play exceeds the standard value, remove steering gear box and check total pinion torque.


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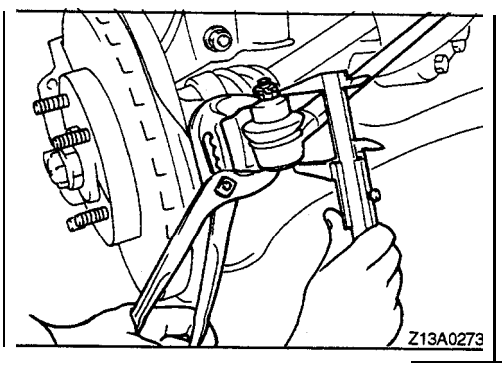
STEERING ANGLE CHECK

1. Set front wheels on turning radius gauge and measure steering angle.

   Standard values:

   <FWD, AWD (Up to 1993 models)>
   Inner wheel 33°45' ± 2"
   Outer wheel 28°21'

   <AWD (From 1994 models)>
   Inner wheel 31°45' ± 2"
   Outer wheel 27°10'
2. When not within the standard value, it is probably a toe problem. Adjust toe (refer to GROUP 33A – Service Adjustment Procedures) and recheck.


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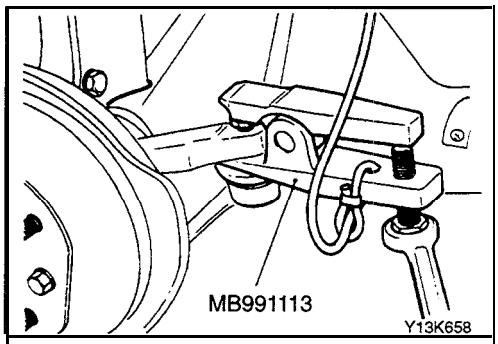
TIE ROD END BALL JOINT VARIATION CHECK (SHAFT DIRECTION)

1. Hold the ball joint with pliers.
2. Set a caliper gauge as illustrated and measure the displacement with the ball stud compressed.

   Limit: 1.5 mm (.059 in.)

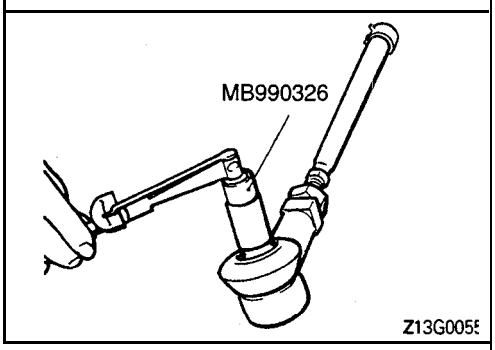
3. If the measured displacement exceeds the limit, replace the tie-rod end.

Caution
Even if the variation is within the limit, check ball joint starting torque.



TIE ROD END BALL JOINT STARTING TORQUE CHECK

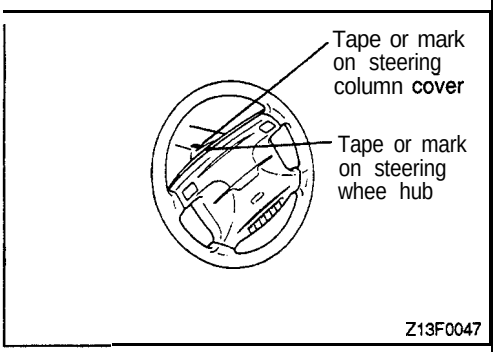
1. Disconnect tie rod and knuckle with special tool.



2. Move ball joint stud several times and install nut on stud. Using the special tool, measure ball joint starting torque.

Standard value:
<FWD> 0.5–3.0 Nm (4-26 in.lbs.)
<AWD> 1.0-3.0 Nm (9-26 in.lbs.)

3. When starting torque exceeds the standard value, replace tie rod end.
4. When the starting torque is under the standard value, check for play or ratcheting in ball joint. If none of these, it is still serviceable.

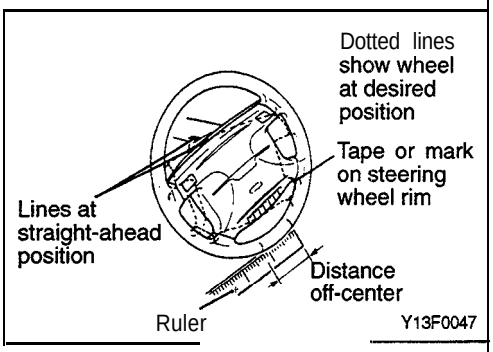


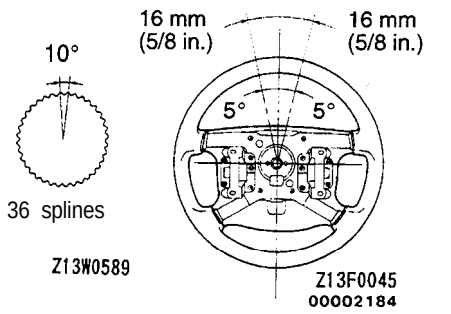
STEERING WHEEL CENTERING

SIMPLIFIED STEERING WHEEL CENTERING

Determining Steering Wheel's Off Center

1. For the road test, take along chalk or tape and a ruler.
2. Drive straight ahead on an uncambered level surface.
3. When the vehicle's wheels are pointing straight ahead, mark the steering wheel hub and column cover with a chalk or tape line.
4. Stop the vehicle and line up the marks on the hub and column cover.
5. Place a tape strip or mark on the steering wheel rim.
6. Hold a ruler next to the rim as shown in the illustration, and then steer the steering wheel until it is in the desired centered position.
7. Record the distance the strip or mark on the rim has moved.
   This is how far the steering wheel is off center. If it is more than 16 mm (5/8 in.) off center, it can be centered by indexing it ten degrees towards the center.





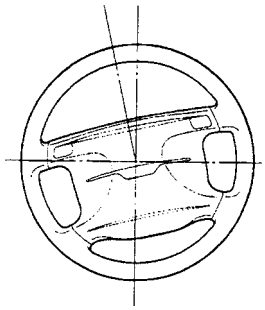
Indexing Steering Wheel to Center It

The steering wheel shaft has 36 splines, a lowing the steering wheel to be indexed in ten-degree increments.

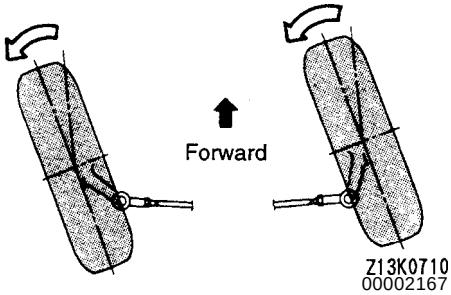
1. Remove the steering wheel.
2. Without disturbing the position of the steering wheel shaft, re-install the wheel as near on-center as possible.

PRECISION STEERING WHEEL CENTERING

In general, the tie rods are adjusted to steer the front wheels in the same direction that the steering wheel is off center. If the steering wheel is off center to the left, center it by adjusting the tie rods to make the front wheels steer toward the left, and vice versa.



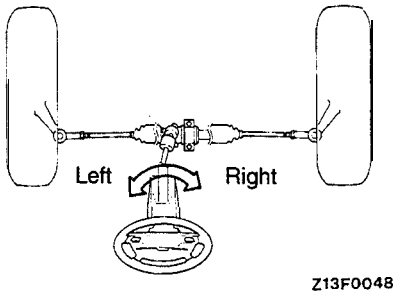
Steering wheel off center left

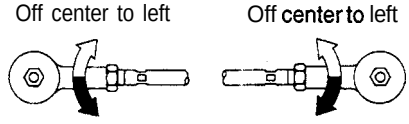


1. Mark the tie rods and tie rod ends with chalk before loosening the lock nuts.
2. Hold the tie rod with a wrench and loosen the lock nut.
3. Hold the tie rod end with a wrench and turn the tie rod the desired number of turns.

   For 2° or 6 mm (.25 in.) at the steering wheel rim 1/5 turn of tie rods

4. Tighten the lock nut to specified torque, taking care not to turn the tie rod.

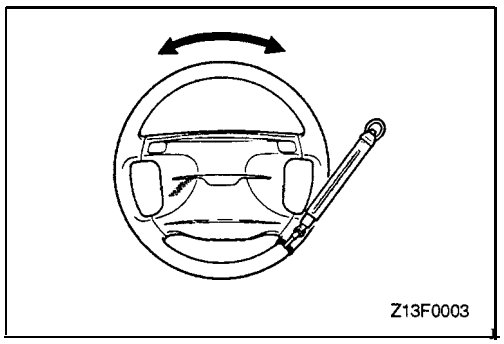




Turn both tie rods in the same direction.

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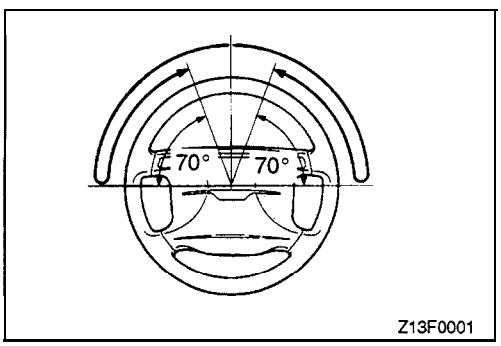
STATIONARY STEERING EFFORT CHECK

1. With the vehicle stopped on a flat, paved surface, turn the steering wheel to the straight ahead position.
2. Start the engine and set it to 1,000 ± 100 rpm.

Caution
After checking the engine speed, there must be a return to the standard idling speed.

3. Attach a spring balance to the outer circumference of the steering wheel and measure the steering force required to turn the steering wheel from the straight ahead position to the left and right (within a range of 1.5 turns). Also check to be sure that there is no significant fluctuation of the required steering force.

Standard value:
Steering effort 35 N (8 lbs.) or less
Fluctuation allowance 6 N (1.3 lbs.) or less



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STEERING WHEEL RETURN TO CENTER CHECK

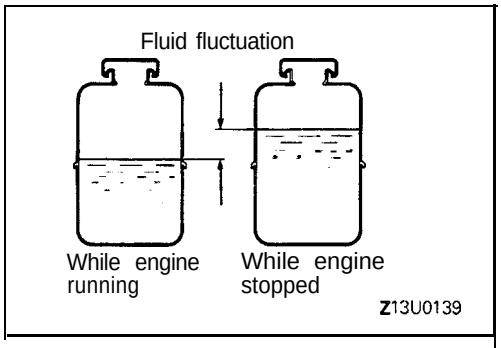
To make this test, conduct a road test and check as follows.

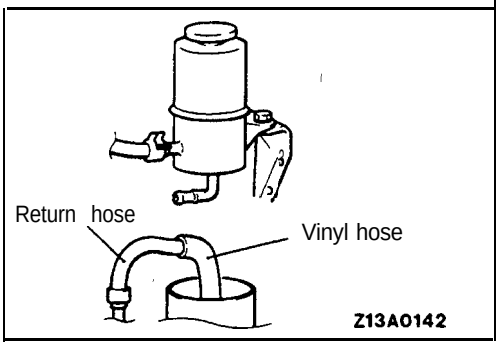
1. Make both gradual and sudden turns and check the steering "feeling" to be sure that there is no difference in the steering force required and the wheel return between left and right turns.
2. At a speed of 35 km/h (22 mph), turn the steering wheel 90°, and release the steering wheel after 1 or 2 seconds. If the steering wheel then returns 70° or more, the return can be judged to the satisfactory.

NOTE
There will be a momentary feeling of "heaviness" when the wheel is turned quickly, but this is not abnormal. (This is because the oil pump discharge amount is especially apt to be insufficient during idling.)

DRIVE BELT TENSION CHECK

Refer to GROUP 11 – On-vehicle Service.





FLUID LEVEL CHECK

1. Park the vehicle on a flat, level surface, start the engine, and then turn the steering wheel several times to raise the temperature of the fluid to approximately 50–60°C (122–140°F).
2. With the engine running, turn the wheel all the way to the left and right several times.
3. Check the fluid in the oil reservoir for foaming or milkiness. Check the difference of the fluid level when the engine is stopped, and while it is running. If the fluid level changes considerably, air bleeding should be done.

FLUID REPLACEMENT

1. Raise the front wheels on a jack, and then support them with rigid racks.
2. Disconnect the return hose connection.
3. Connect a vinyl hose to the return hose, and drain the oil into a container.
4. Disconnect the high-tension cable, and then while operating the starting motor intermittently, turn the steering wheel all the way to the left and right several times to drain all of the fluid.

Caution
Be careful not to position the high-tension cable near the carburetor or the delivery pipe.

5. Connect the return hoses securely, and then secure it with the clip.
6. Fill the oil reservoir with the specified fluid up to the lower position of the filter, and then bleed the air.

Specified fluid:
Automatic transmission fluid "DEXRON II"

BLEEDING

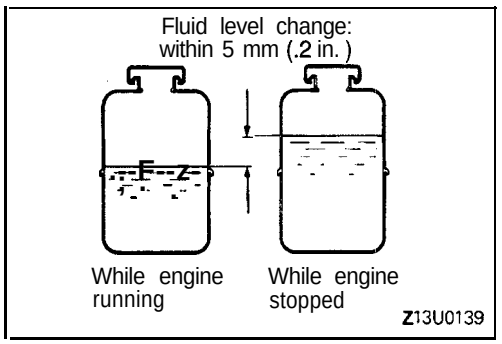
1. Jack up the front wheels and support them by using a floor stand.
2. Manually turn the oil pump pulley a few times.
3. Turn the steering wheel all the way to the left and to the right several times.
4. Disconnect the high-tension cable, and then, while operating the starting motor intermittently, turn the steering wheel all the way to the left and right several times (for 15 to 20 seconds).

Caution

1. During air bleeding, replenish the fluid supply so that the level never falls below the lower position of the filter.

2. If air bleeding is done while engine is running, the air will be broken up and absorbed into the fluid; be sure to do the bleeding only while cranking.

5. Connect the ignition cable, and then start the engine (idling).
6. Turn the steering wheel to the left and right until there are no air bubbles in the oil reservoir.
7. Confirm that the fluid is not milky, and that the level is up to the specified position on the level gauge.
8. Confirm that there is very little change in the fluid level when the steering wheel is turned left and right.



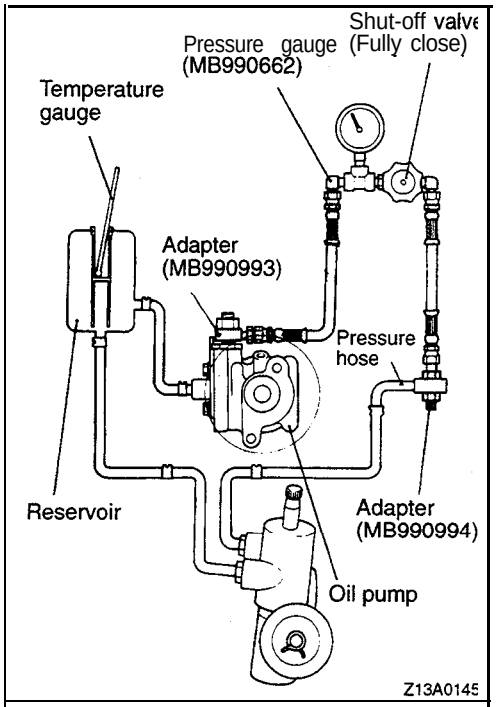
9. Check whether or not the change in the fluid level is within 5 mm (.2 in.) when the engine is stopped and when it is running.

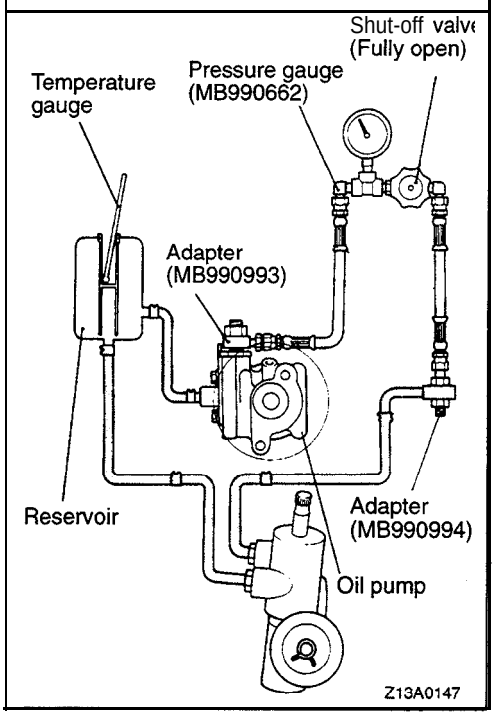
Caution

1. If the change of the fluid level is 5 mm (.2 in.) or more, the air has not been completely bled from the system, and thus must be bled completely.

2. If the fluid level rises suddenly after the engine is stopped, the air has not been completely bled.

3. If air bleeding is not complete, there will be abnormal noises from the pump and the flow-control valve, and this condition could cause a lessening of the life of the pump, etc.





OIL PUMP PRESSURE TEST

CHECKING THE OIL PUMP RELIEF PRESSURE

1. Disconnect the pressure hose from the oil pump, and then connect the special tools.
2. Bleed the air, and then turn the steering wheel several times while the vehicle is not moving so that the temperature of the fluid rises to approximately 50–60°C (122–140°F).
3. Start the engine and idle it at 1,000 ±100 rpm.
4. Fully close the shut-off valve of the pressure gauge and measure the oil pump relief pressure to confirm that it is within the standard value range.

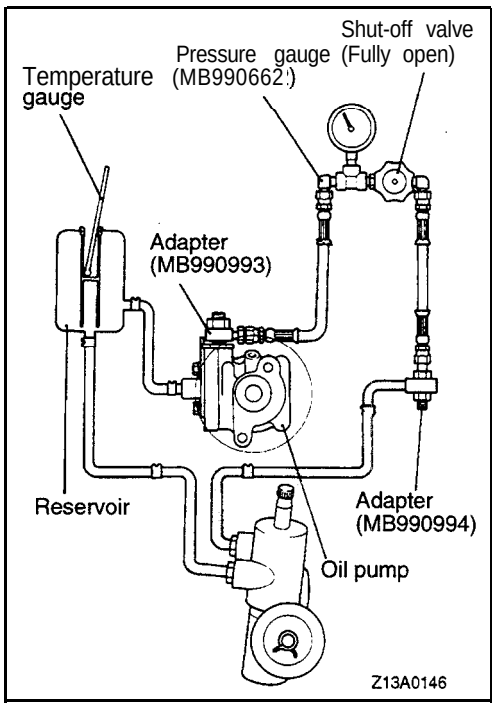
   Standard value: 7.5-8.2 MPa (1,067–1,166 psi)

   Caution
   Pressure gauge shut off valve must not remain closed for more than 10 seconds.
5. If it is not within the standard value, overhaul the oil pump.
6. Remove the special tools, and then tighten the pressure hose to the specified torque.
7. Bleed the system.

CHECKING THE PRESSURE UNDER NO-LOAD CONDITIONS

1. Disconnect the pressure hose from the oil pump, and then connect the special tool.
2. Bleed the air, and then turn the steering wheel several times while the vehicle is not moving so that the temperature of the fluid rises to approximately 50–60°C (122–140°F).
3. Start the engine and idle it at 1,000 ± 100 rpm.
4. Check whether or not the hydraulic pressure is the standard value when no-load conditions are created by fully opening the shut-off valve of the pressure gauge.

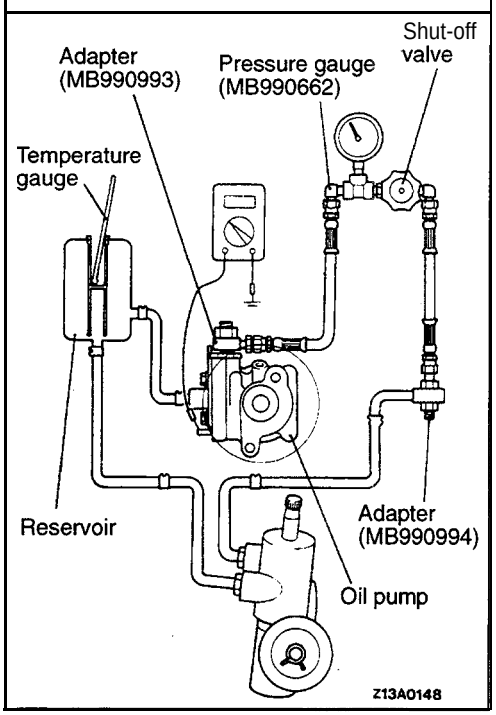
   Standard value: 0.8-1.0 MPa (114-142 psi)
   Limit: 1.5 MPa (213 psi)
5. If it is not within the standard value, the probable cause is a malfunction of the oil line or steering gear box, so check these parts and repair as necessary.
6. Remove the special tools, and then tighten the pressure hose to the specified torque.
7. Bleed the system.



CHECKING THE STEERING GEAR RETENTION HYDRAULIC PRESSURE

1. Disconnect the pressure hose from the oil pump, and then connect the special tools.
2. Bleed the air, and then turn the steering wheel several times while the vehicle is not moving so that the temperature of the fluid rises to approximately 50–60°C (122–140°F).
3. Start the engine and idle it at 1,000 ±100 rpm.
4. Fully open the shut-off valve of the pressure gauge.
5. Turn the steering wheel all the way to the left or right; then check whether or not the retention hydraulic pressure is the standard value.

   Standard value: 7.5-8.2 MPa (1,067–1,166 psi)
6. When not within the standard value, overhaul the steering gear box.
   Remeasure fluid pressure.
7. Remove the special tools, and then tighten the pressure hose to the specified torque.
8. Bleed the system.



OIL PRESSURE SWITCH CHECK

1. Disconnect the pressure hose from the oil pump, and then connect the special tools.
2. Bleed the air, and then turn the steering wheel several times while the vehicle is not moving so that the temperature of the fluid rises to approximately 50–60°C (122–140°F).
3. The engine should be idling.
4. Disconnect the connector for the oil pressure switch, and place an ohmmeter in position.
5. Gradually close the shut-off valve of the pressure gauge and increase the hydraulic pressure then check whether or not the hydraulic pressure that activates the switch is the standard value.

   Standard value: 1.5-2.0 MPa (213-284 psi)
6. Gradually open the shut-off valve and reduce the hydraulic pressure; then check whether the hydraulic pressure that deactivates the switch is the standard value.

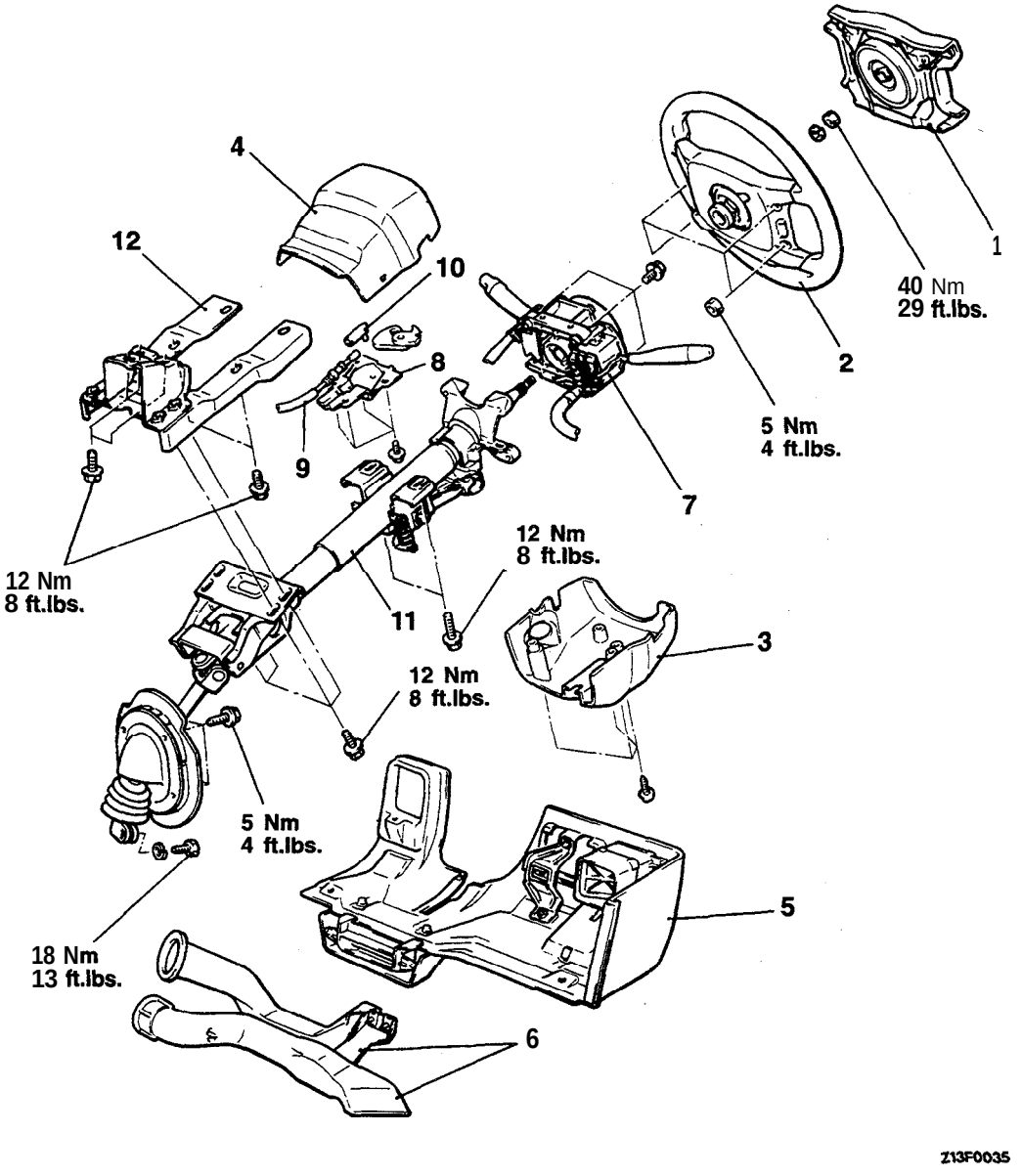
   Standard value: 0.7-1.2 MPa (100–171 psi)
7. Remove the special tools, and then tighten the pressure hose to the specified torque.
8. Bleed the system.

STEERING WHEEL AND SHAFT

REMOVAL AND INSTALLATION

Post-installation Operation
- Checking Steering Wheel Position with Wheels Straight Ahead

CAUTION: SRS
Before removal of air bag module, refer to GROUP 52B – Service Precautions and Air Bag Module and Clock Spring.

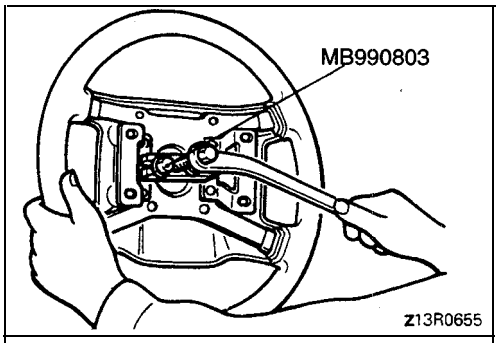


Removal steps

1. Air bag module (Refer to GROUP 52B – Air Bag Module and Clock Spring.)
◀A▶ ▶A◀ 2. Steering wheel
3. Lower column cover
4. Upper column cover
5. Knee protector (Refer to GROUP 52A – Instrument Panel.)
6. Lap cooler duct and foot shower duct
7. Column switch assembly
8. Cover* (Refer to GROUP 23 – Transaxle Control.)
9. Key interlock cable* (Refer to GROUP 23 – Transaxle Control.)
10. Slide lever* (Refer to GROUP 23 – Transaxle Control.)
11. Steering column assembly
12. Column support assembly

NOTE
● : <Automatic transaxle vehicles>

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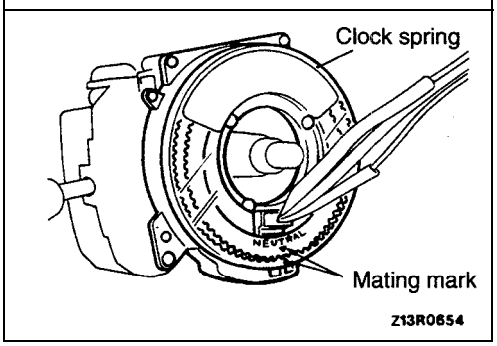


REMOVAL SERVICE POINT

(A, STEERING WHEEL REMOVAL

Remove the steering wheel by using the special tool.

Caution
Do not hammer on the steering wheel to remove it; doing so may damage the collapsible mechanism.



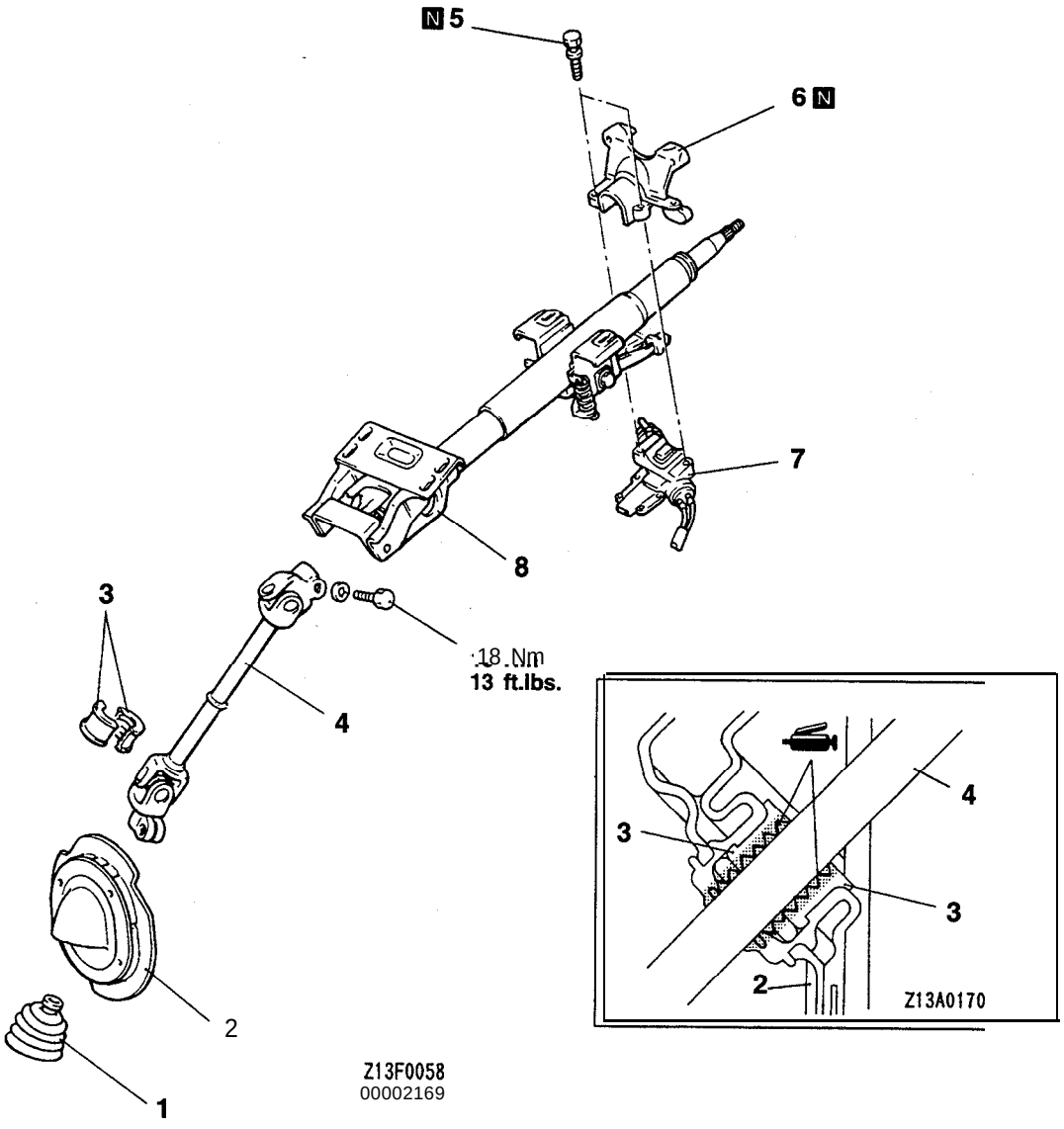
INSTALLATION SERVICE POINT

,A(STEERING WHEEL INSTALLATION

Line up the “NEUTRAL” mark of the clock spring with the mating mark before installing the steering wheel.

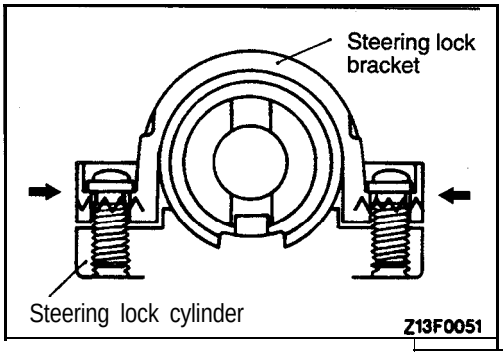
Caution
If the clock spring’s mating mark is not properly aligned, the steering wheel may not be completely rotational during a turn, or the flat cable within the clock spring may be severed, obstructing normal operation of the SRS and possibly leading to serious injury to the vehicle’s driver.

DISASSEMBLY AND REASSEMBLY



Disassembly steps

1. Boot
2. Cover assembly
▶B◀ 3. Bearing
4. Joint assembly
▶A◀ 5. Special bolts
◀A▶ ▶A◀ 6. Steering lock bracket
◀A▶ ▶A◀ 7. Steering lock cylinder
8. Steering column assembly



DISASSEMBLY SERVICE POINT

◀A▶ STEERING LOCK BRACKET / STEERING LOCK CYLINDER REMOVAL

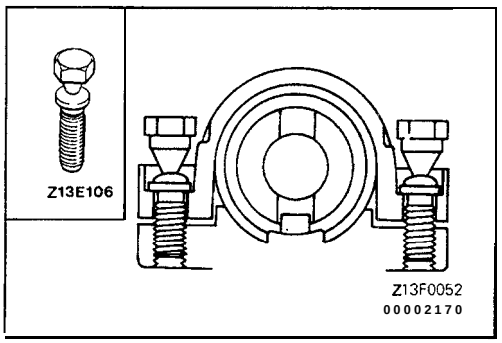
If it is necessary to remove the steering lock cylinder, use a hacksaw to cut the special bolts at the steering lock bracket side.

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REASSEMBLY SERVICE POINTS

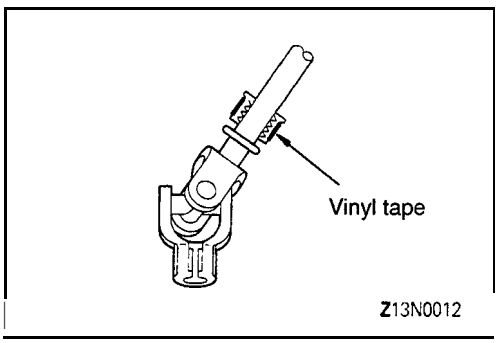
▶A◀ STEERING LOCK CYLINDER / STEERING LOCK BRACKET / SPECIAL BOLT INSTALLATION

(1) When installing the steering lock cylinder and steering lock bracket to the column tube, temporarily install the steering lock in alignment with the column boss.



(2) After checking that the lock works properly, tighten the special bolts until the head twists off.

Caution
The steering lock bracket and bolts must be replaced with new ones when the steering lock cylinder is installed.



▶B◀ BEARING INSTALLATION

(1) Fill the inside of the bearing with multipurpose grease.
(2) Install the bearings to the shaft on the joint assembly.
(3) Wrap vinyl tape approximately one and one-half times around the concave circumferences of the bearings, and then press fit the bearings into the cover assembly.

INSPECTION

- Check the steering shaft for play and round movement.
- Check the joints for play, damage, or rough movement.
- Check the joint bearing for wear and damage.
- Check the dust shield for damage.

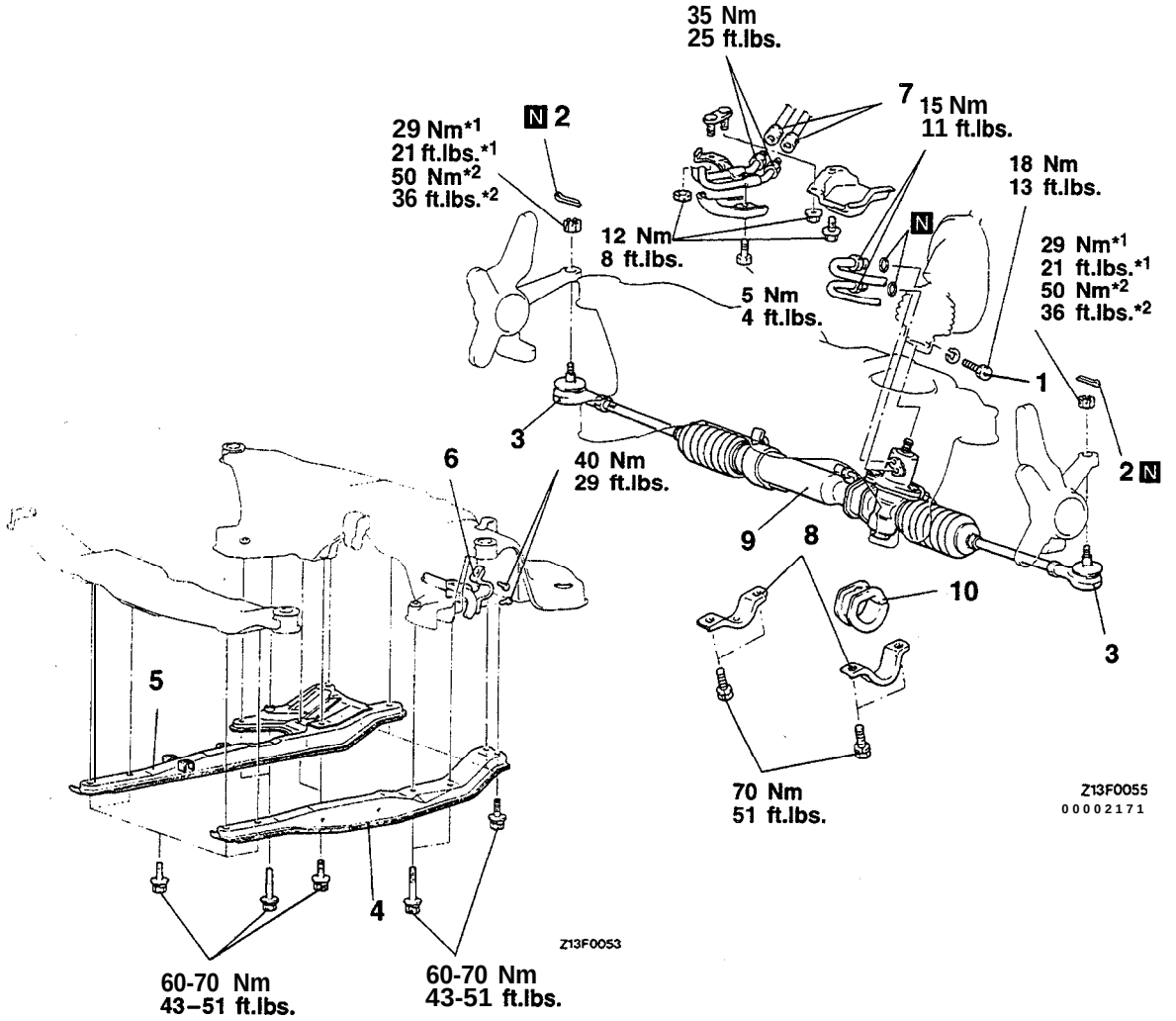
POWER STEERING GEAR BOX

REMOVAL AND INSTALLATION

Pre-removal Operation
- Power Steering Fluid Draining (Refer to P.37A-10.)
- Front Exhaust Pipe Removal (Refer to GROUP 15 – Exhaust Pipe and Main Muffler.)
- Transfer Assembly Removal (Refer to GROUP 22 – Transfer.)

CAUTION: SRS
Before removal of steering gearbox, refer to GROUP 52B – SRS, center front wheels and remove ignition key. Failure to do so may damage SRS clock spring and render SRS system inoperative, risking serious driver injury.

Post-installation Operation
- Transfer Assembly installation (Refer to GROUP 22 – Transfer.)
- Front Exhaust Pipe Installation (Refer to GROUP 15 – Exhaust Pipe and Main Muffler.)
- Power Steering Fluid Supplying (Refer to P.37A-10.)
- Power Steering Fluid Line Bleeding (Refer to P.37A-11.)
- Steering Wheel Position with Wheels Straight Ahead Checking
- Front Wheel Alignment Adjustment (Refer to GROUP 33A – On-vehicle Service.)

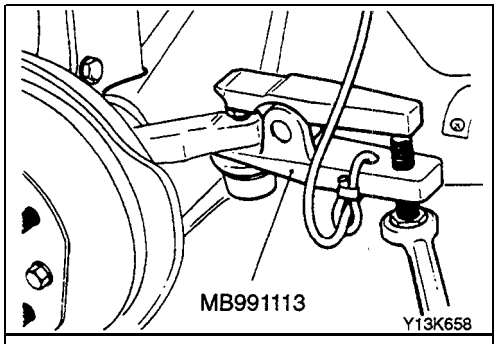


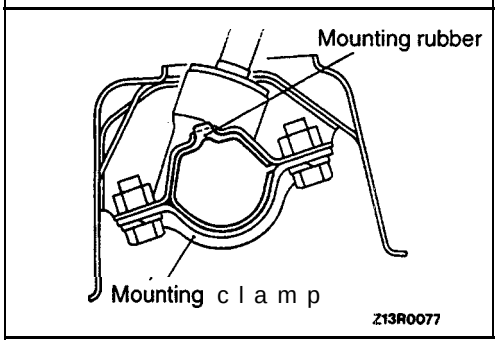
Removal steps

1. Joint assembly and gear box connecting bolt
2. Cotter pin
◀A▶ 3. Tie-rod end and knuckle connecting nut
4. Left member
5. Right member
6. Stabilizer bar bracket
7. Connection of steering gear box with 4WS oil line
8. Clamp
◀B▶ ▶A◀ 9. Gear box assembly
▶A◀ 10. Mounting rubber

NOTE
*1: FWD
*2: AWD

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REMOVAL SERVICE POINTS

◀A▶ TIE-ROD END DISCONNECTION

Using the special tool, disconnect the tie rod from the knuckle.

◀B▶ GEAR BOX ASSEMBLY REMOVAL

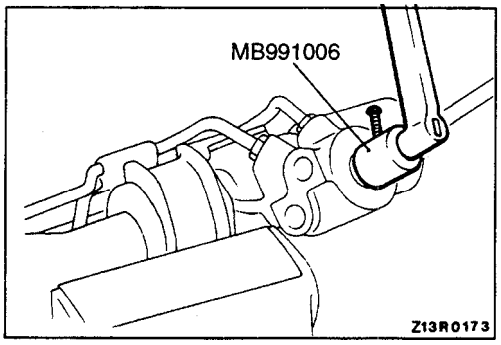
(1) Move the rack completely to the right and then remove the gear box from the crossmember.
(2) While tilting the gear box downward, remove it to the left.

Caution
When removing the gear box, pull it out carefully and slowly to avoid damaging the boots.

INSTALLATION SERVICE POINTS

▶A◀ MOUNTING RUBBER / GEAR BOX ASSEMBLY INSTALLATION

When installing the mounting rubber, align the projection of the mounting rubber with the indentation in the crossmember to install the gear box.



INSPECTION

GEAR BOX FOR TOTAL PINION TORQUE

Using the special tools, rotate the pinion gear at the rate of one rotation in approximately 4 to 6 seconds to check the total pinion torque.

Standard value: 0.6-1.3 Nm (5-11 in.lbs.)

NOTE
Measure the pinion torque through the whole stroke of the rack.

If the measured value is not within the standard range, first adjust the rack support cover, and then check the total pinion starting torque again.
If the total pinion starting torque cannot be adjusted to within the standard range by adjusting the rack support cover, check the rack support cover, rack support spring, rack support and replace any parts necessary.

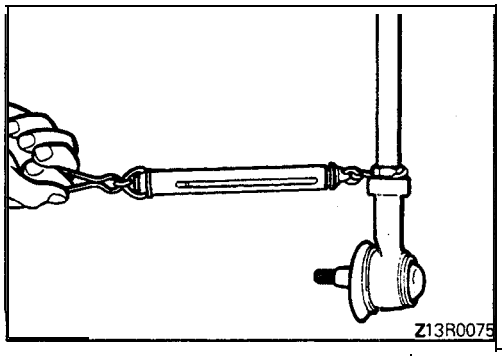
CHECK THE TIE ROD FOR SWING RESISTANCE

(1) Give 10 hard swings to the tie rod.
(2) Measure the tie rod swing resistance with a spring balance.

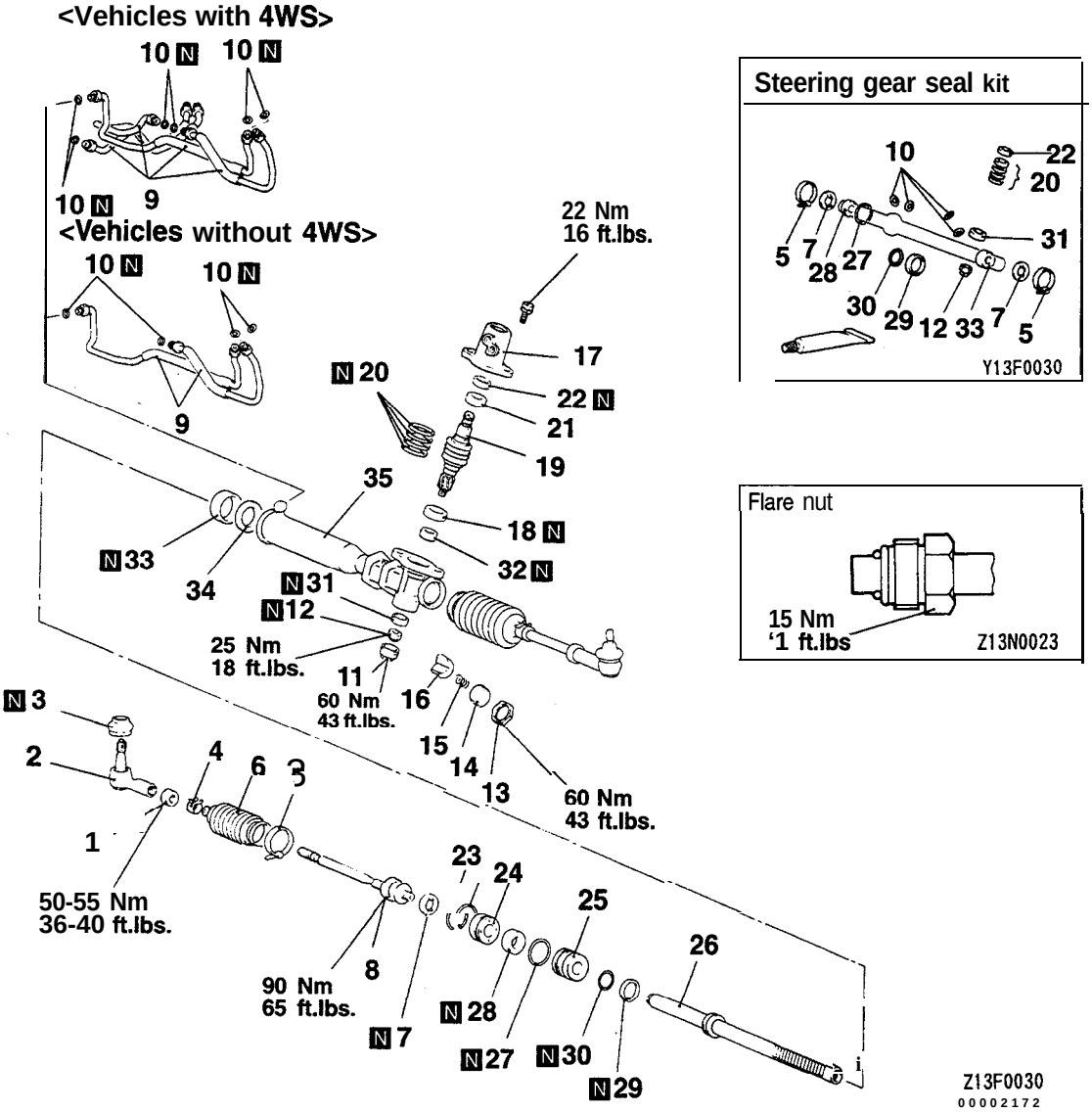
Standard value:
8-18 N (1.8–4.0 lbs.) [2–5 Nm (17-43 in.lbs.)]

(3) If the measured value exceeds the standard value, replace tie rod assembly.

NOTE
Even if the measured value is below the standard value, the tie rod which swings smoothly without excessive play may be used.



DISASSEMBLY AND REASSEMBLY

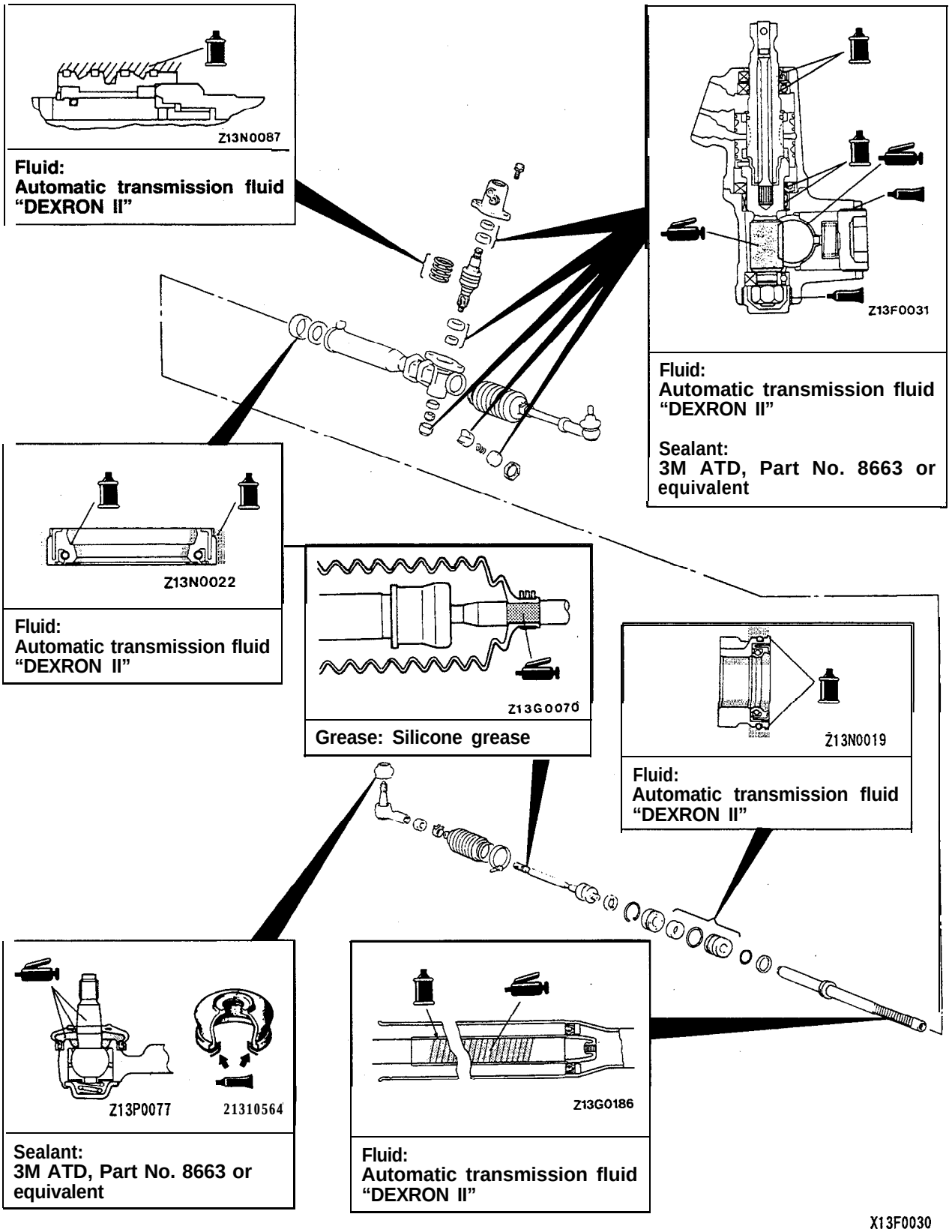


Disassembly steps

1. Tie rod end locking nuts
▶P◀ **2. Tie** rod ends
◀A▶ ▶O◀ 3. Dust shield
4. Bellows clips
◀B▶ 5. Bellows bands
6. Bellows
◀C▶ 7. Tab washers
▶N◀ **8.** Tie rods
9. Feed tubes
10. O-rings
▶M◀ • Total pinion torque adjustment
◀D▶ ▶L◀ 11. End plug
12. Self-locking nut
13. Locking nut
◀E▶ 14. Rack support cover
15. Rack support spring
16. Rack support
17. Valve housing
◀F▶ ▶K◀ **18.** Oil seal
19. Pinion and valve assembly
▶J◀ 20. Seal rings
◀G▶ ▶I◀ 21. Ball bearing
◀G▶ ▶H◀ **22.** Oil seal
◀H▶ ▶G◀ 23. **Circlip**
24. Rack stopper
▶F◀ **25.** Rack bushing
◀I▶ ▶E◀ **26.** Rack
▶D◀ **27.** O-ring
◀J▶ ▶D◀ **28.** Oil seal
29. Seal rings
30. O-ring
◀K▶ ▶C◀ **31. Ball bearing**
◀L▶ ▶B◀ **32.** Needle roller bearing
◀M▶ ▶A◀ **33.** Oil seal
◀M▶ ▶A◀ 34. Back-up washer
35. Rack housing

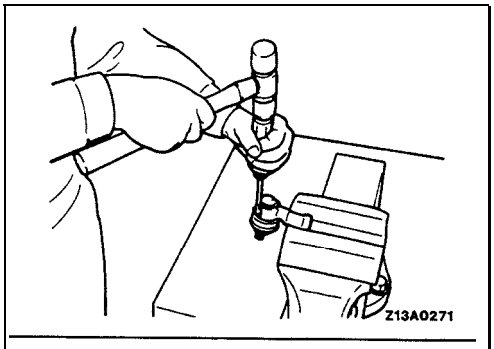
TSB Revision

LUBRICATION AND SEALING POINTS



X13F0030
00002173

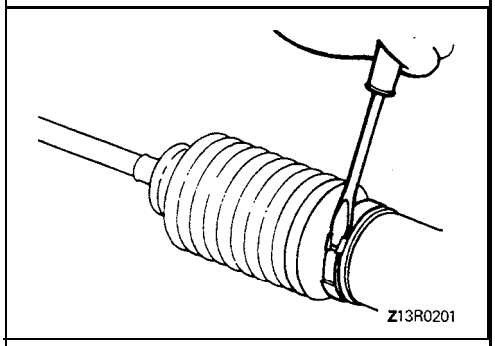
TSB Revision



DISASSEMBLY SERVICE POINTS

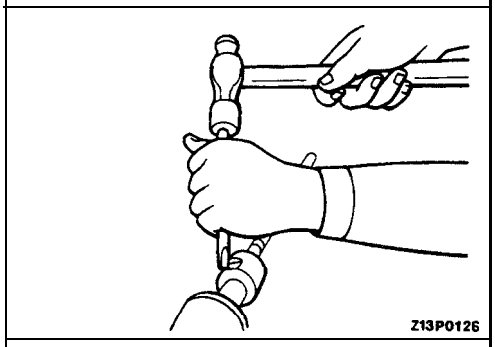
◀A▶ DUST SHIELD REMOVAL

Remove the dust shield from the tie rod end.



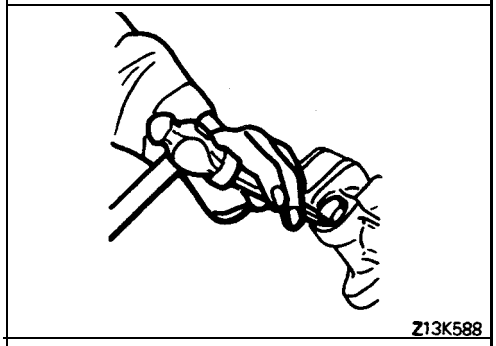
◀B▶ BELLOWS BANDS REMOVAL

Using a screwdriver or similar tool, loosen and then remove the boot retaining band.



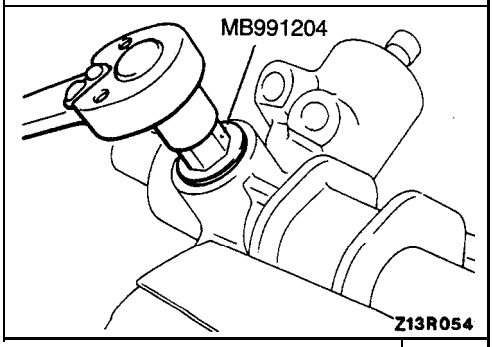
◀C▶ TAB WASHER REMOVAL

Unstake the tab washer which fixes the tie rod and rack with a chisel.



◀D▶ END PLUG REMOVAL

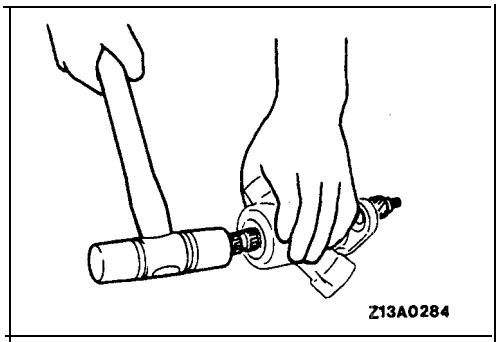
Disconnect end plug caulking and remove end plug.



◀E▶ RACK SUPPORT COVER REMOVAL

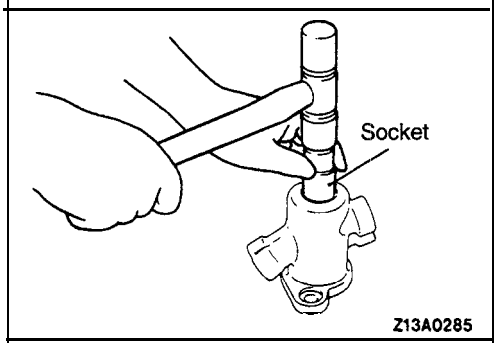
Using the special tool, remove the rack support cover from the gear box.

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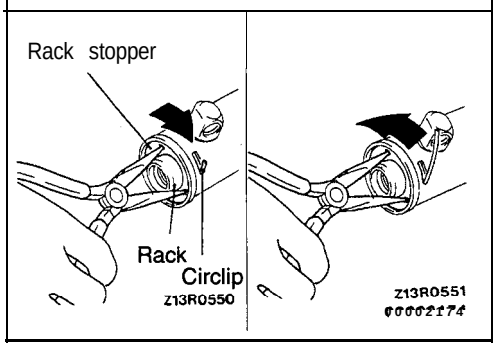
◀F▶ OIL SEAL REMOVAL

Using a plastic hammer, gently tap the pinion to remove it.



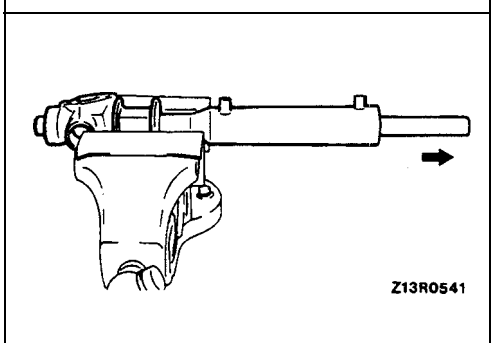
◀G▶ BALL BEARING / OIL SEAL REMOVAL

Using a socket, remove the oil seal and the ball bearing from the valve housing simultaneously.



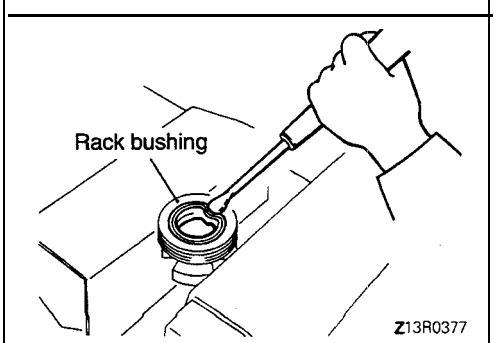
◀H▶ CIRCLIP REMOVAL

(1) Turn the rack stopper clockwise until the end of the circlip comes out of the slot in the rack housing.
(2) Turn the rack stopper anticlockwise to remove the circlip.



◀I▶ RACK REMOVAL

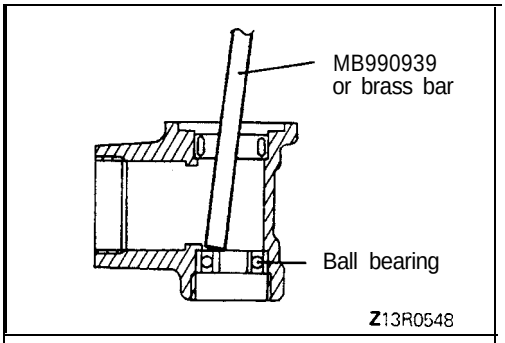
Pull out the rack slowly.
At this time also take out the rack stopper and the rack bushing simultaneously.



◀J▶ OIL SEAL REMOVAL

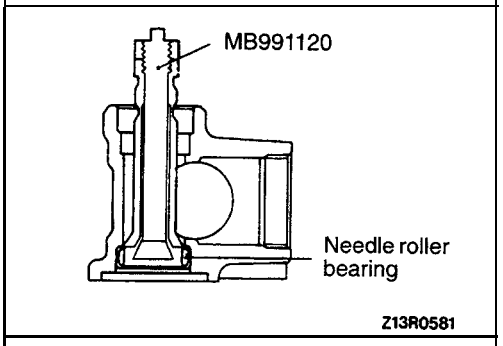
Partially bend oil seal and remove from rack bushing.

Caution
Do not damage oil seal press fitting surface.



◀K▶ BALL BEARING REMOVAL

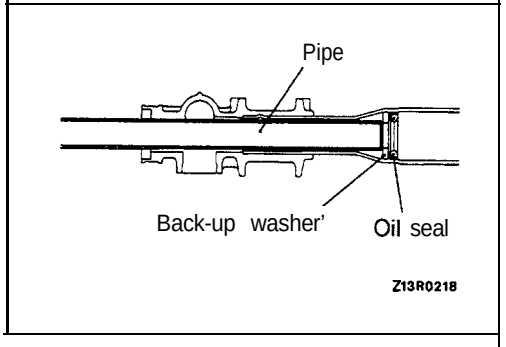
Use a brass bar to remove the ball bearing from the gear housing.



◀L▶ NEEDLE ROLLER BEARING REMOVAL

Use the special tool to remove the needle roller bearing from the rack housing.

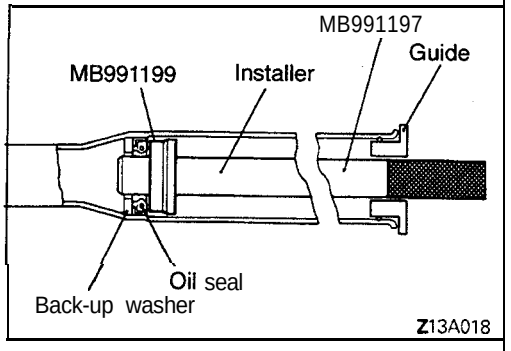
Caution
Do not open special tool excessively to prevent damaging housing interior.



◀M▶ OIL SEAL / BACK-UP WASHER REMOVAL

Use a piece of pipe or similar tool to remove the back-up washer and oil seal from the gear housing.

Caution
Be careful not to damage the inner surface of the rack cylinder of the gear housing.



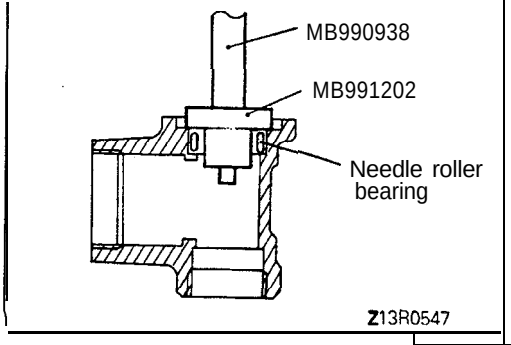
REASSEMBLY SERVICE POINTS

▶A◀ BACK-UP WASHER / OIL SEAL INSTALLATION

(1) Apply a coating of the specified fluid to the outside of the oil seal.

Specified fluid:
Automatic transmission fluid "DEXRON II"

(2) Using the special, tool, press the back-up washer and the oil seal into the rack housing to the specified position (where the upper surface of the press-in guide coincides with the stepped part of the press-in tool).



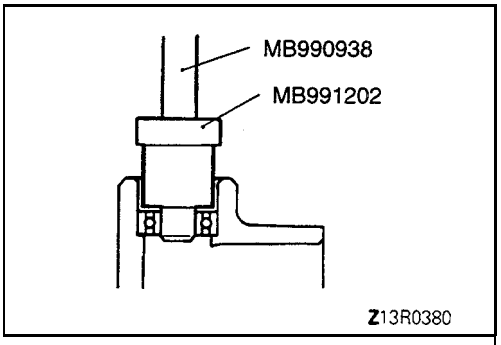
▶B◀ NEEDLE ROLLER BEARING INSTALLATION

(1) Apply specified fluid to housing, bearing and oil seal press fitting surface.

Specified fluid:
Automatic transmission fluid "DEXRON II"

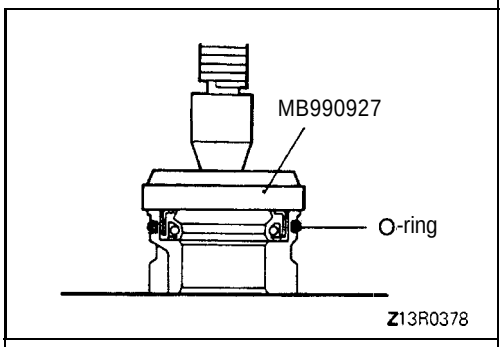
(2) Using the special tools, press fit needle roller bearing.

Caution
Press fit straight as valve housing is aluminium.



▶C◀ BALL BEARING INSTALLATION

Use the special tools to press fit ball bearing.

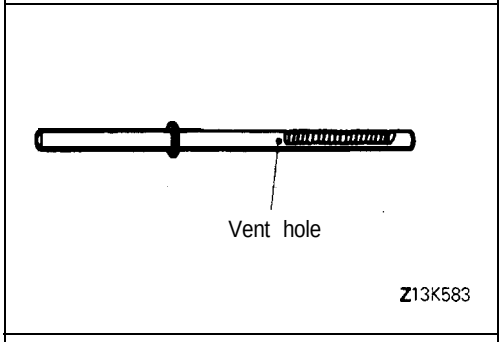


▶D◀ OIL SEAL / O-RING INSTALLATION

(1) Apply 'a coating of the specified fluid to the outside of the oil seal and O-ring.

Specified fluid:
Automatic transmission fluid "DEXRON II"

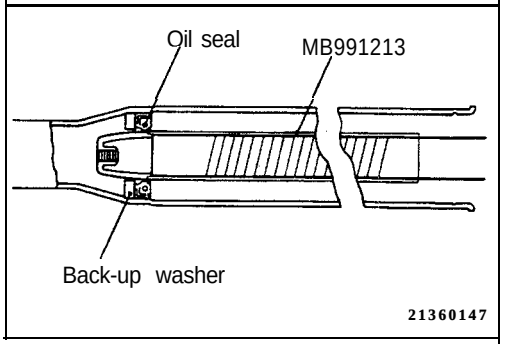
(2) Using the special tool, press fit oil seal until it touches rack bush end.



▶E◀ RACK INSTALLATION

(1) Apply a coating of multipurpose grease to the rack teeth face.

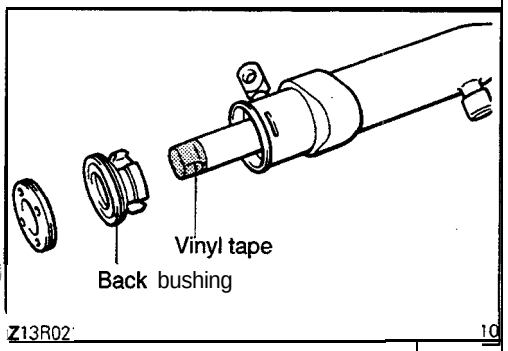
Caution
Do not close the vent hole in the rack with grease.



(2) Cover rack serrations with special tool.
(3) Apply specified fluid on special tool.

Specified fluid:
Automatic transmission fluid "DEXRON II"

(4) Match oil seal center with rack to prevent retainer spring from slipping and slowly insert rack from power cylinder side.

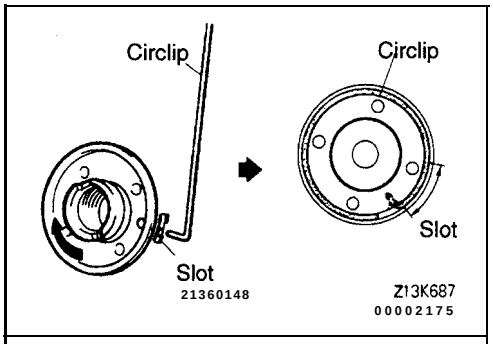


▶F◀ RACK BUSHING INSTALLATION

Wrap the rack end with vinyl tape, apply a coating of the specified fluid, and then install the rack bushing and rack stopper.

Specified fluid:
Automatic transmission fluid "DEXRON II"

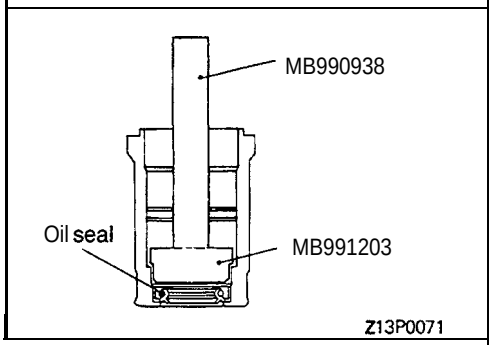
Caution
Do not allow oil seal retainer spring to slip out.



▶G◀ CIRCLIP INSTALLATION

Insert circlip to rack stopper hole through cylinder hole. Turn rack stopper clockwise and insert circlip firmly.

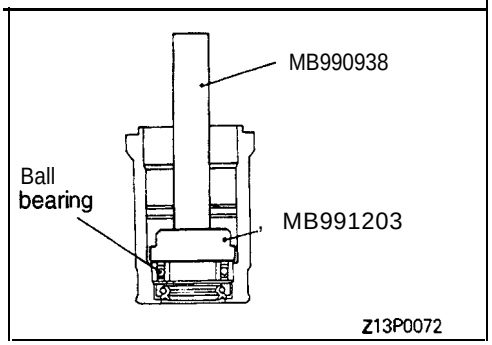
Caution
Insert circlip to rack stopper hole while turning rack stopper clockwise.



▶H◀ OIL SEAL INSTALLATION

Apply a coating of the specified fluid to the outside of the oil seal. Using the special tools, press the oil seal into the valve housing.

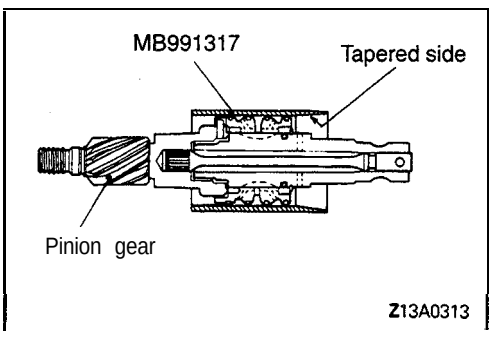
Specified fluid:
Automatic transmission fluid "DEXRON II"



▶I◀ BALL BEARING INSTALLATION

Apply a coating of the specified fluid to the outside of the ball bearing. Using the special tools, press the ball bearing into the valve housing.

Specified fluid:
Automatic transmission fluid "DEXRON II"

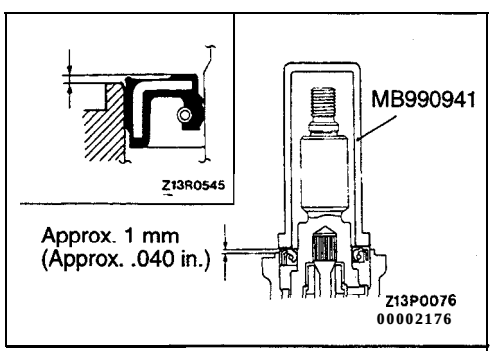


▶J◀ SEAL RING INSTALLATION

(1) Kneed the seal ring to soften it.
(2) Apply the specified fluid to the seal ring, and install to the rack groove.

Specified fluid:
Automatic transmission fluid "DEXRON II"

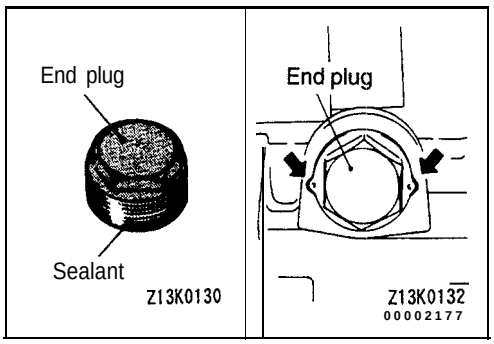
(3) Insert the tapered side of the special tool from the pinion gear side, and compress the seal ring.



▶K◀ OIL SEAL INSTALLATION

Using the special tool, press the oil seal into the valve housing.

Caution
In order to eliminate a seal malfunction at the valve housing alignment surface, the upper surface of the oil seal should project outward approximately 1 mm (.040 in.) from the housing edge surface.

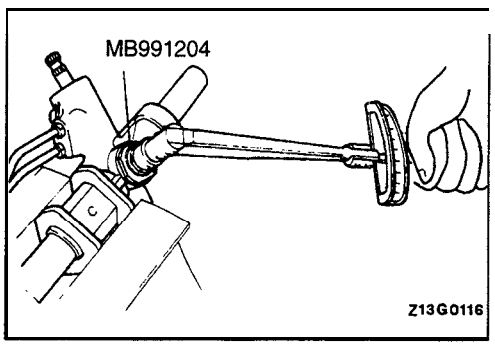


▶L◀ END PLUG INSTALLATION

(1) Apply the semi-drying sealant to the threaded part of the end plug.

Specified sealant:
3M ATD Part No. 8663 or equivalent

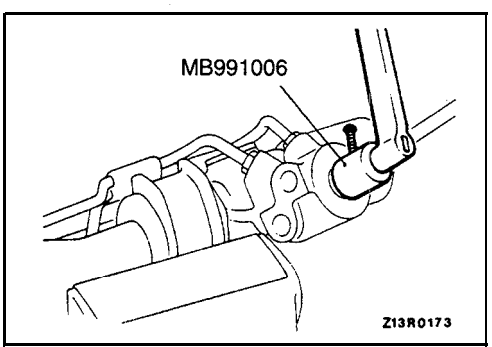
(2) Secure the threaded portion of the end plug at two places by using a punch.



▶M◀ TOTAL PINION TORQUE ADJUSTMENT

(1) Position rack at its center. With special tool, tighten rack support cover to 15 Nm (11 ft.lbs.).
(2) In neutral position, rotate pinion shaft clockwise one turn/4 – 6 seconds with special tool. Return rack support cover 30° – 60° and adjust torque to the standard value.

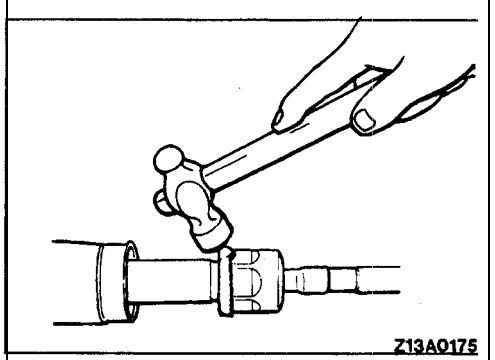
Standard value: 0.6–1.3 Nm (5–11 in.lbs.)



Caution
1. When adjusting, set the standard value at its highest value.
2. Assure no ratcheting or catching when operating rack towards the shaft direction.

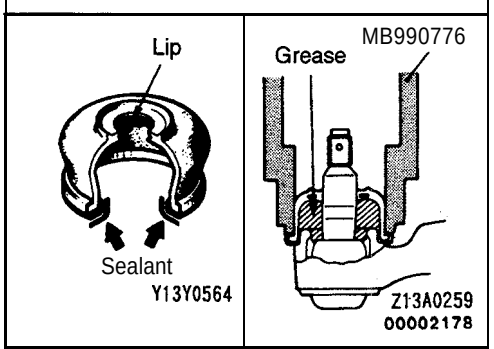
NOTE
When it cannot be adjusted within the specified return angle, check rack support cover components or replace.

(3) After adjusting, lock rack support cover with lock nut.



▶N◀ TIE ROD INSTALLATION

After installing tie rod to rack, fold tab washer end (2 locations) to tie rod notch.



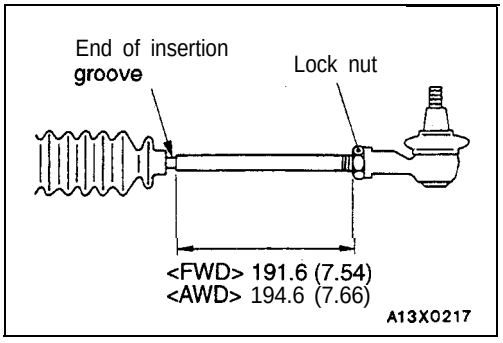
▶O◀ DUST SHIELD INSTALLATION

(1) Pack dust shield interior and lip with multipurpose grease.
(2) Apply semi-drying sealant to dust shield.

Specified sealant:
3M ATD Part No. 8663 or equivalent

(3) Using the special tool, press dust shield to tie rod end.

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▶P◀ TIE ROD END INSTALLATION

Screw in tie rod end to have its right and left length as illustrated. Lock with lock nut.

INSPECTION

RACK CHECK

- Check the rack tooth surfaces for damage or wear.
- Check the oil seal contact surfaces for uneven wear.
- Check the rack for bends.

PINION AND VALVE ASSEMBLY CHECK

- Check the pinion gear tooth surfaces for damage or wear.
- Check for worn or defective seal ring.

BEARING CHECK

- Check for roughness or abnormal noise during bearing operation.
- Check the bearing for play.
- Check the needle roller bearings for roller slip-off.

OTHERS CHECK

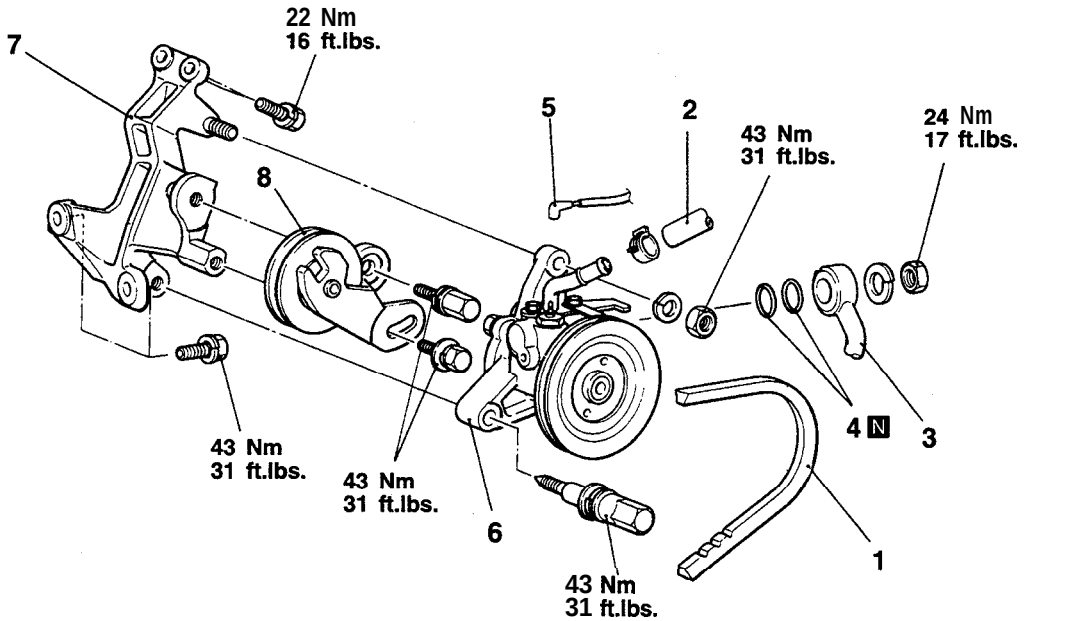
- Check the cylinder inner surface of the rack housing for damage.
- Check the boots for damage, cracking or deterioration.
- Check the rack support for uneven wear or dents.
- Check the rack bushing for uneven wear or damage.

POWER STEERING OIL PUMP

REMOVAL AND INSTALLATION

Pre-removal Operation
- Power Steering Fluid Draining

Pre-installation Operation
- Power Steering Fluid Supplying
- Drive Belt Tension Adjusting (Refer to P.37A-9.)
- Power Steering Fluid Line Bleeding (Refer to P.37A-11.)
- Oil Pump Pressure Checking (Refer to P.37A-12.)

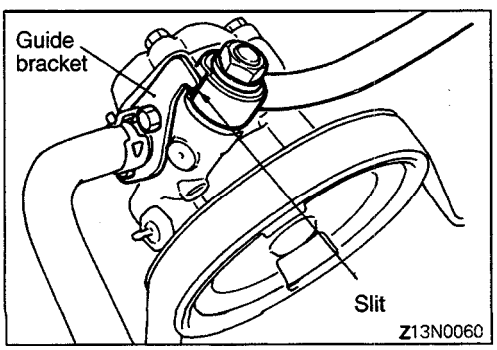


Removal steps

1. Drive belt
2. Suction hose
▶A◀ 3. Pressure hose
4. O-ring
5. Pressure switch connector
6. Oil pump
7. Oil pump bracket
8. Tensioner pulley

INSPECTION

- Check the drive belt for cracks.
- Check the pulley assembly for uneven rotation.



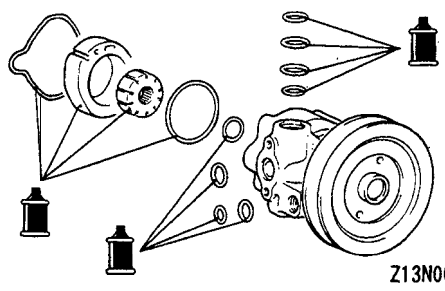
INSTALLATION SERVICE POINT

▶A◀ PRESSURE HOSE INSTALLATION

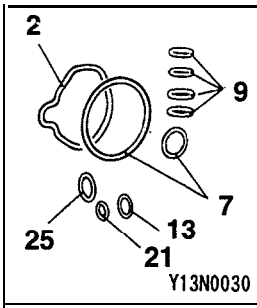
Connect the pressure hose so that its slit part contacts the oil pump's guide bracket.

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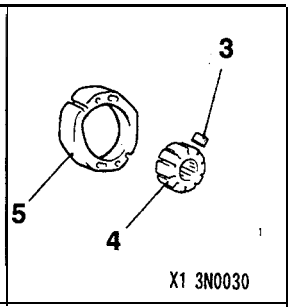
DISASSEMBLY AND REASSEMBLY



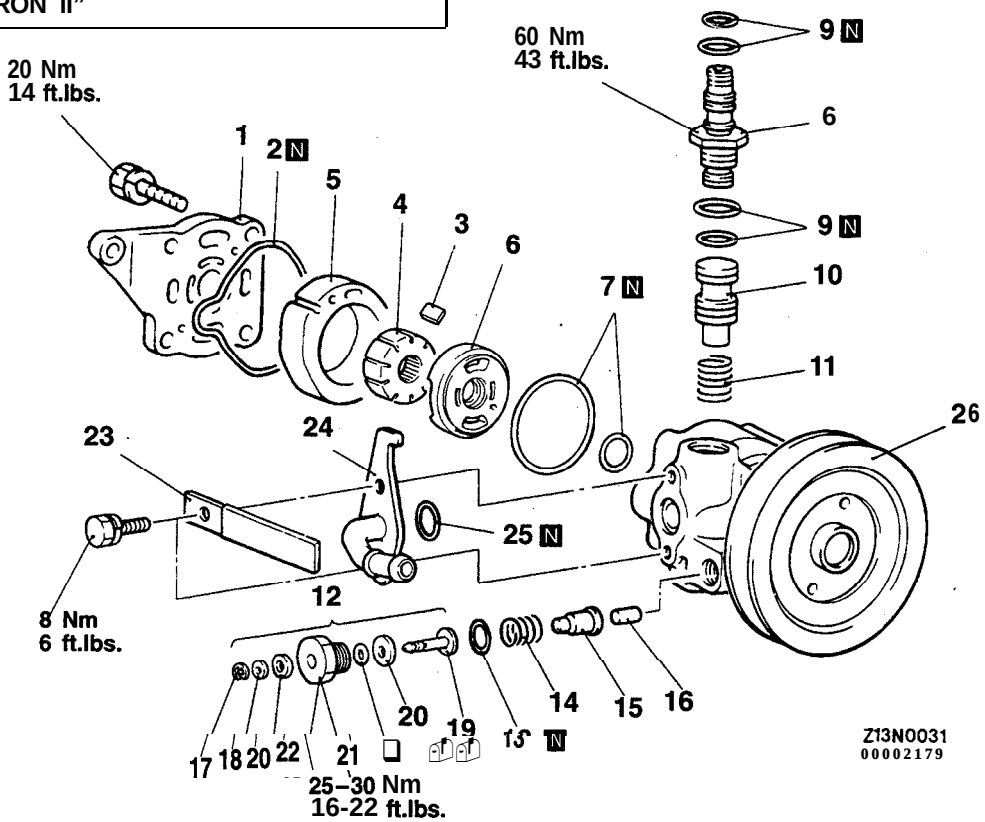
Fluid:
Automatic transmission fluid "DEXRON II"



Oil pump seal kit



Oil pump cartridge k/t

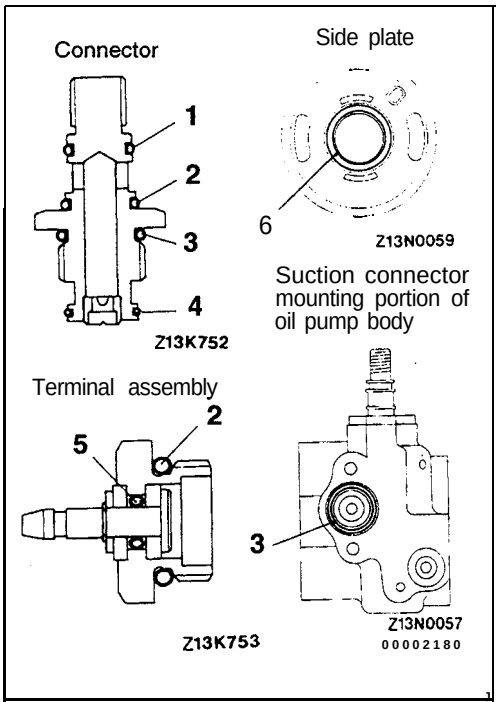


Disassembly steps

- 2. O-ring cover
- ▶E◀ 3. Vanes
- 4. Rotor
- ▶D◀ 5. Cam ring
- ▶C◀ 6. Side plate
- ▶A◀ 7. O-ring
- 8. Connector
- ▶A◀ 9. O-ring
- 10. Flow control valve
- 11. Flow control spring
- 12. Terminal assembly
- ▶A◀ 13. O-ring
- ▶B◀ 14. Spring
- 15. Plunger
- 16. Piston rod
- 17. Snap ring
- 18. Terminal
- 19. Washer
- 20. insulator
- ▶A◀ 21. O-ring
- 22. Plug
- 23. Clip
- 24. Suction connector
- ▶A◀ 25. O-ring
- 26. Oil pump body and pulley assembly

Caution
Do not disassemble the flow control valve.

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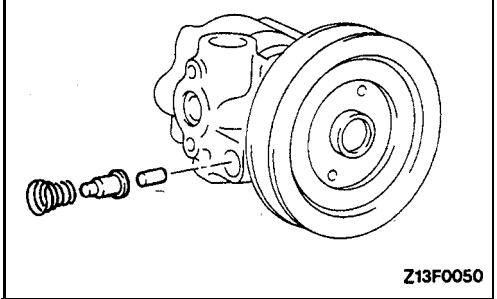


REASSEMBLY SERVICE POINTS

▶A◀ O-RINGS INSTALLATION

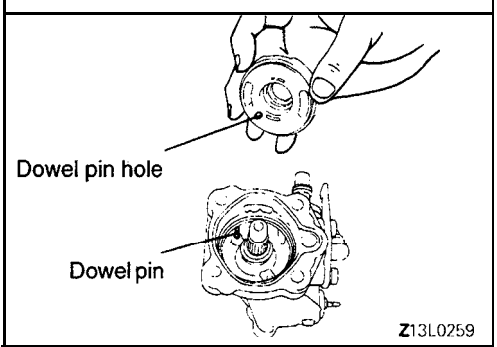
Apply specified fluid on O-rings to install.

No.	I.D. x Width mm (in.)	
1	11 x 1.9	(.433 x .075)
2	13x 1.9	(.512x .075)
3	17.8 x 2.4	(.701 x .094)
4	13.5 x 1.5	(.531 x .059)
5	3.8 x 1.9	(.150 x .075)
6	16.8 x 2.4	(.661 x .094)



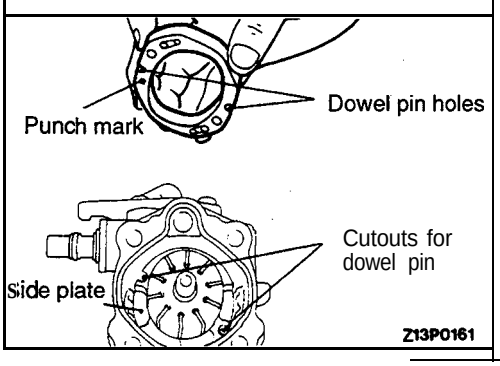
▶B◀ SPRING INSTALLATION

Fit the spring to the oil pump body with the larger-diameter end at the terminal assembly side.



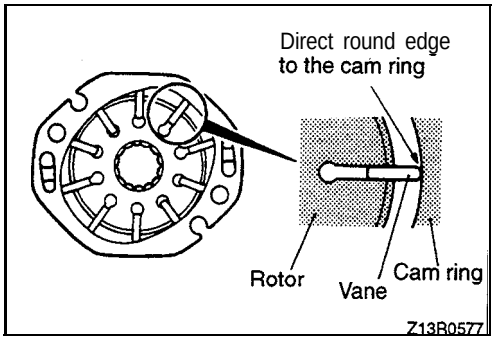
▶C◀ SIDE PLATE INSTALLATION

Line up the dowel pin hole of the side plate with the dowel pin of the pump body when installing the side plate.



▶D◀ CAM RING INSTALLATION

Install the cam ring with the punch mark facing the side plate.

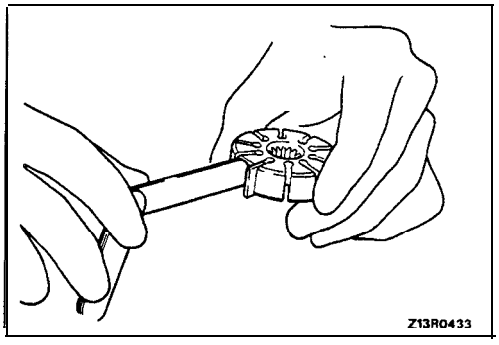


▶E◀ VANES INSTALLATION

Install the vanes on the rotor, paying close attention to the installation direction.

INSPECTION

- Check the flow control spring for wear.
- Check the shaft of the pulley for play and round movement.
- Check the groove of rotor vane for “stepped” wear.
- Check the contact surface of cam ring and vanes for “stepped” wear.
- Check the vanes for breakage.



CHECK OF GAP BETWEEN VANE AND ROTOR GROOVE

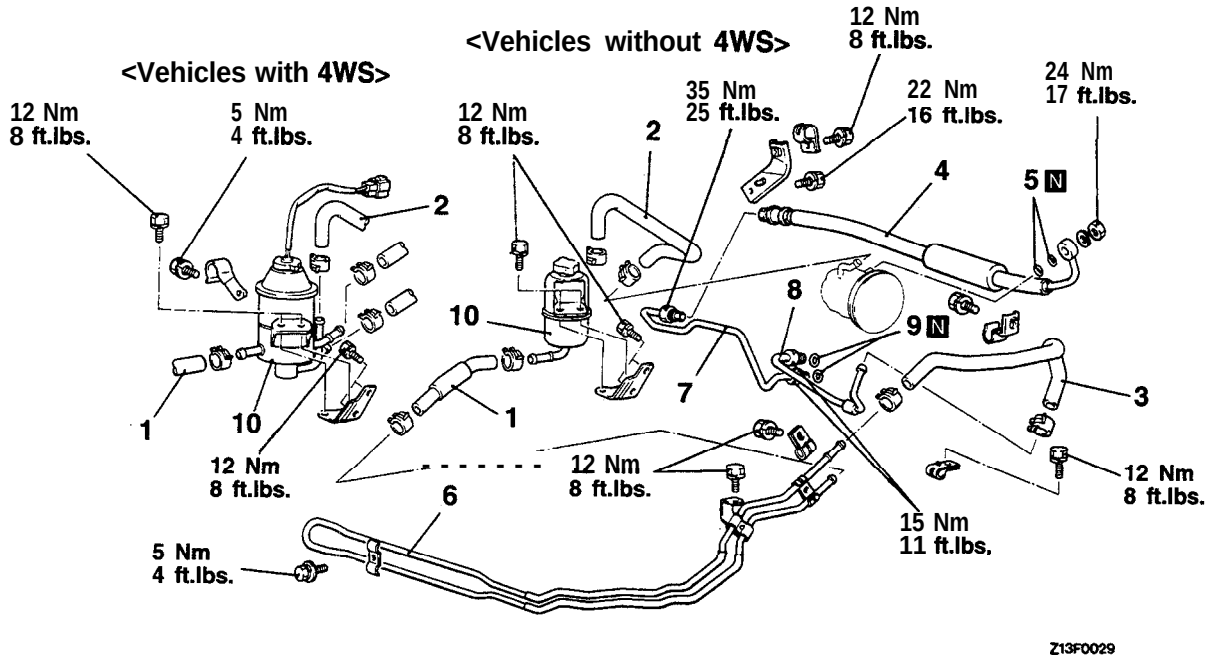
Install vane to rotor groove as illustrated. Measure the gap between vane and rotor groove with thickness gauge.

Limit: 0.06 mm (.0024 in.)

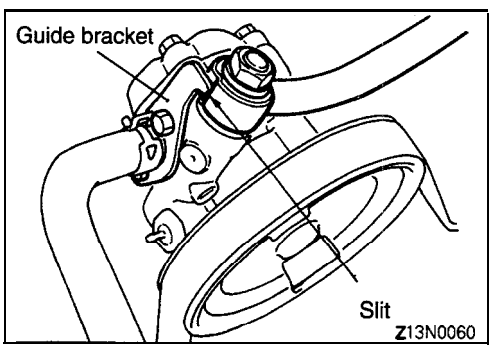
POWER STEERING HOSES

REMOVAL AND INSTALLATION

Pm-removal and Post-installation Operation
- Power Steering Fluid Draining, Supplying, and Bleeding (Refer to P.37A-10,11.)



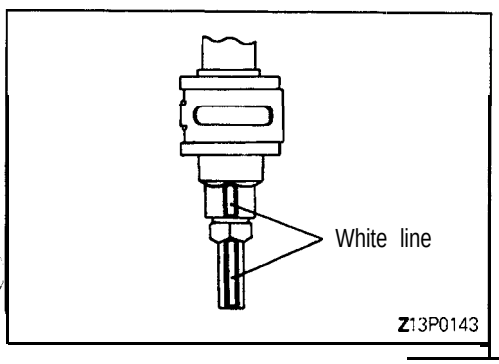
Removal steps
1. Return hose
2. Suction hose
3. Return hose
4. Pressure hose
5. O-ring
6. Cooler tube
7. Pressure tube
8. Return tube
9. O-ring
10. Oil reservoir



INSTALLATION SERVICE POINT

▶A◀ PRESSURE HOSE INSTALLATION

(1) Connect the pressure hose so that its slit part contacts the oil pump's guide bracket.



(2) When the pressure hose is installed, align the white line on the pressure hose with the white line on the pressure tube so that together they form a straight line.

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NOTES

4-WHEEL STEERING SYSTEM (4WS)

CONTENTS

CONTROL VALVE 9

ON-VEHICLE SERVICE 4

- Ball Joint Rotation Starting Torque Check 5
- Bleeding 4
- Function Check 5
- Rear Oil Pump Discharge Flow Volume Check 5

POWER CYLINDER 6

REAR OIL LINE 10

REAR OIL PUMP 11

SPECIAL TOOLS 2

SPECIFICATIONS 2

- General Specifications 2
- Lubricants 2
- Service Specifications 2

TROUBLESHOOTING 3

SPECIFICATIONS

GENERAL SPECIFICATIONS

Items		Specifications
Power steering gear box	Type	Rack and pinion
Oil pump	Type	Vane type
	Displacement cm^3/rev. (cu.in./rev.)	9.6 (0.59)
	Relief set pressure MPa (psi)	8 (1,138)
Rear oil pump	Type	Vane type
	Displacement cm^3/rev. (cu.in./rev.)	3.3 (0.20)
	Relief set pressure MPa (psi)	4 (569)
Power cylinder	Type	Hydraulic double action type
	Stroke mm (in.)	20.2 (.8) [one side 10.1 (.39)]

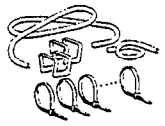
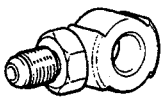
SERVICE SPECIFICATIONS

Items	Standard value
Rear oil pump displacement [at speedometer reading of 31 mph (50 km/h) for 30 seconds] dm^3 (qts.)	Approx. 1 .0 (1.06)
Power cylinder ball joint rotation starting torque Nm (in.lbs.)	**0.5 (4)** or less
Power cylinder tie rod swing torque N (lbs.) [Nm (in.lbs.)]	9–55 **(2-12)** [0.5–3.0 (4–26)]
Power cylinder slide resistance N (lbs.)	**67** (15) or less

LUBRICANTS

Items	Specified lubricant	Quantity
Power steering fluid	Automatic Transmission fluid "DEXRON II"	1.45 dm^3 (1.53 qts.)
Dust cover	Silicone grease	As required

SPECIAL TOOLS

Tool	Tool number and name	Supersession	Application
	MB991230 Air bleeder set		Air bleed
	MB990993 Power steering oil pressure gauge adapter	MB990993-01	Measurement of fluid flow volume

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TROUBLESHOOTING

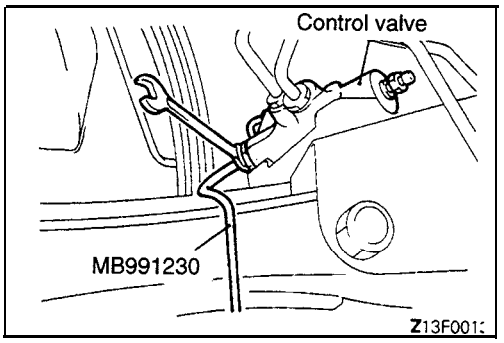
Before inspecting, check the following items:
- Ensure that the suspension has not been modified
- 'Tire and wheel size, specifications, air pressure, balance and amount of wear
- Steering wheel type
- Wheel alignment
- Oil pump drive belt tension
- Power steering fluid level, and air in the system
- Engine idle speed and even idle
- Oil leakage

Malfunction symptom	Malfunctioning system	Inspection item
4WS does not operate	Power cylinder	Tie rod swing torque
		Power cylinder slide resistance
	Rear oil pump	Flow volume check
	Control valve	
Poor steering feeling Feeling of friction in steering Poor steering return	Steering gears and linkage	Rack cracks or deformation
Steering wheel efforts excessive	Control valve	Oil leakage from control valve joint
	Power cylinder	Oil leakage from piston rod
	Oil line	Pressure hose breakage
	Oil reservoir	Oil reservoir deformation or oil leakage
Rear wheels cannot be steered Poor rear wheels return Hydraulic pressure for rear wheel is constantly high	Control valve	Stuck control valve spool
	Power cylinder	Stuck power cylinder
	Rear oil pump	Relief valve remains open
Long rear wheel steering delay Poor steering response Poor steering return	Power cylinder	Excessive power or cylinder friction
		Looseness in power cylinder tie rod ball joint
		Ball joint dust cover cracks
Poor rear wheel steering response Poor rear wheel steering range	Control valve	Oil leakage from control valve spool
	Power cylinder	Oil leakage from power cylinder
	Rear oil pump	Extreme oil pump internal wear
Poorsteerability (extreme tire wear)	Power cylinder	Tie rod length improperly adjusted after toe-in adjustment

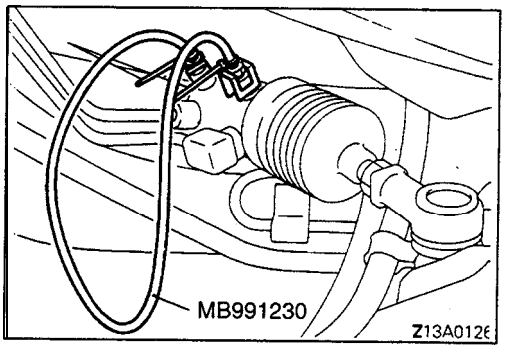
ON-VEHICLE SERVICE

BLEEDING

(1) Bleed air from power steering system. (Refer to GROUP 37A – On-vehicle Service.)
(2) Lift up the vehicle.
(3) Start the engine and let it idle.



(4) Loosen the bleeder screw on the left side of the control valve and set the special tool to the bleeder screw.
(5) Turn the steering wheel all the way to the left, immediately returning it half way back.
At this time confirm that air is discharged with the fluid.
(6) Repeat step (5) two or three times to make sure that there is no more air in the system. Tighten the bleeder screw and remove the special tool.
(7) Repeat steps (4) through (6) for the right side bleeder screw, turning the steering wheel to the right this time.



(8) Loosen the power cylinder bleeder screw and set the special tool to the bleeder screw.

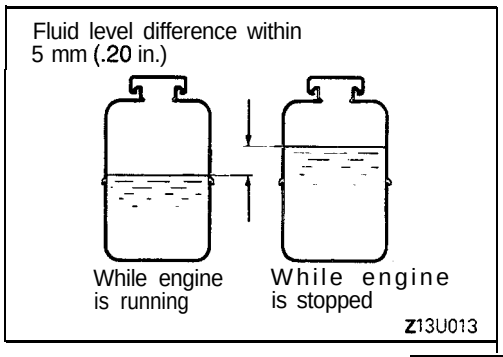
Caution
Loosen the bleeder screw about 30 to 45 degrees, and secure it with the special tool (rotation prevention metal fixtures) so as not to be loosened more.

(9) Start the engine and keep the front wheels in a straight ahead position. Increase the engine speed once to a speedometer reading of 70-80 km/h (43-50 mph) to operate the oil pump for the rear wheels.

Caution
Pay particular attention to all four wheels that rotate.

NOTE
When the engine speed is increased, the fluid circulates through the oil pump but it does not circulate through the tube (special tool).

(IO) With a 30-40 km/h (19-25 mph) speedometer reading maintained, turn the steering wheel all the way clockwise and counterclockwise to ensure that pressure rises, causing air to circulates through the tube (special tool) and to be discharged from the reserve tank.
(11) Repeat step (10) several times to make sure that there is no more air in the system. Tighten the bleeder screw and remove the special tool.



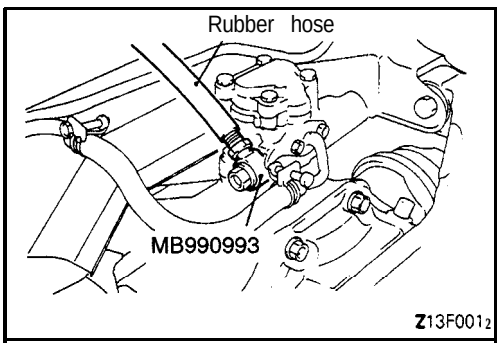
(12) Ensure that the difference in the fluid levels when the engine is running and when it is stopped are within 5 mm (.20 in.).
If the difference exceeds 5 mm (.20 in.), there is still air in the system and it must be bled again.

Caution
If air has not been completely bled from the system, the pump will make a humming sound or an unusual noise will come from the flow control valve; this also contributes to shortened pump life.

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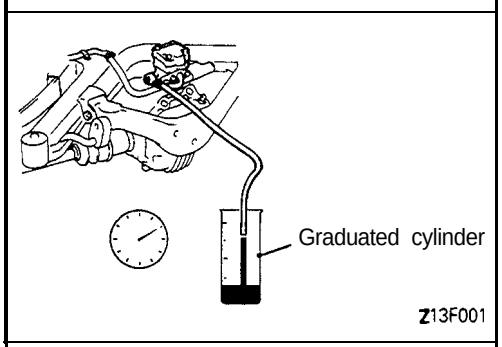
FUNCTION CHECK

(1) Raise the vehicle so that all four wheels may turn freely.
(2) Start the engine, running the vehicle at an indicated speed of about 80 km/h (50 mph).
(3) Turn the steering wheel all the way to left and right and turn it swiftly, checking to ensure that the rear wheels steer to the same directions as the front wheels.



REAR OIL PUMP DISCHARGE FLOW VOLUME CHECK

(1) Disconnect the pressure hose from the rear oil pump and install the special tool with a rubber hose.
(2) Place the other end of the rubber hose in a container which permits measurement of flow rate (2-dm^3 graduated cylinder).

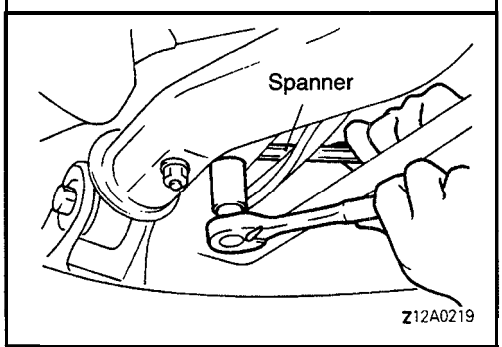


(3) Start the engine. Increase speed slowly, then hold the indicated speed of 50 km/h (31 mph), measuring discharge flow volume for 30 seconds.

Caution
While performing this work, continuously add fluid into the oil reservoir.

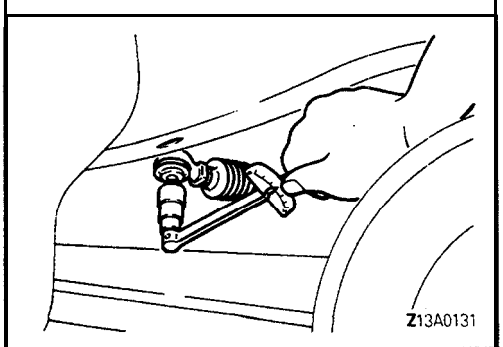
Standard value: Approximately 1.0 dm^3 (1.06 qts.)

(4) If the discharge flow volume is extremely high or low, the rear oil pump should be replaced.



BALL JOINT ROTATION STARTING TORQUE CHECK

(1) Holding the power cylinder tie rod with a spanner, disconnect the tie rod and trailing arm.



(2) After swinging the ball joint stud several times, install the stud nut, then measure the ball joint rotation starting torque with the special tool.

Standard value: 0.5 Nm (4 in.lbs.) or less

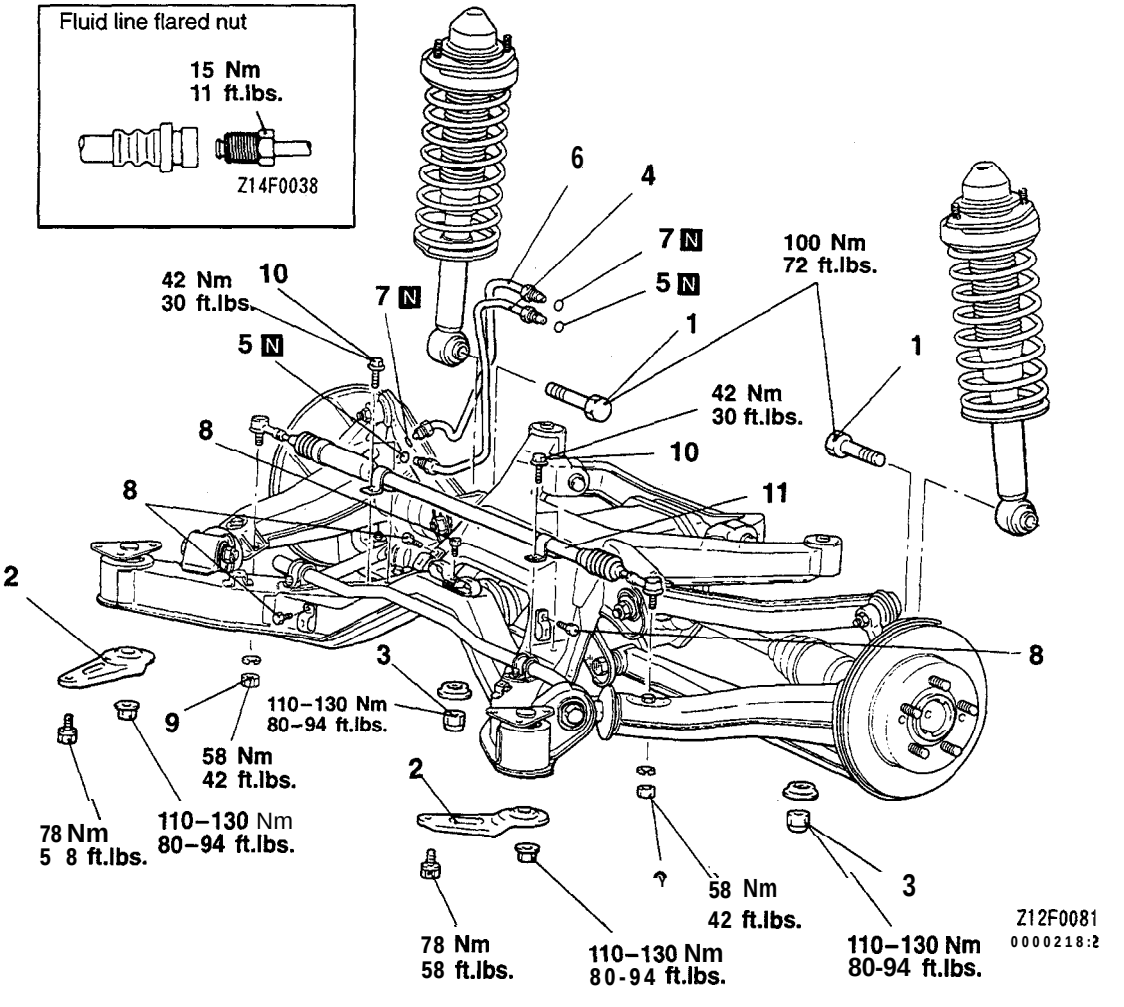
(3) If the rotation starting torque exceeds the standard value, replace the tie rod end.
(4) If the rotation starting torque is less than the standard value, check that the ball joint is not loose and operates smoothly. If not, it may be reused.

POWER CYLINDER

REMOVAL AND INSTALLATION

Pre-removal Operation
- Cleaning of Pipings with Steam
- Power Steering Fluid Draining (Refer to GROUP 37A – On-vehicle Service.)
- Main Muffler Assembly Removal (Refer to GROUP 15 – Exhaust Pipe and Muffler.)

Post-installation Operation
- Main Muffler Assembly Installation (Refer to GROUP 15 – Exhaust Pipe and Muffler.)
- Power Steering System Refilling and Bleeding (Refer to GROUP 37A – On-vehicle Service.)
- 4WS System Bleeding (Refer to P.37B-4.)
- 4WS System Operation Checking (Refer to P.37B-5.)
- Wheel Alignment Checking (Refer to GROUP 34 – On-vehicle Service.)



Removal steps

1. Rear shock absorber lower mounting bolt
2. Crossmember bracket
3. Crossmember mounting nut (on differential side)

◀A▶

4. Pressure tube (RL)
5. O-ring
6. Pressure tube (RR)
7. O-ring
8. Oil line clamp bolt

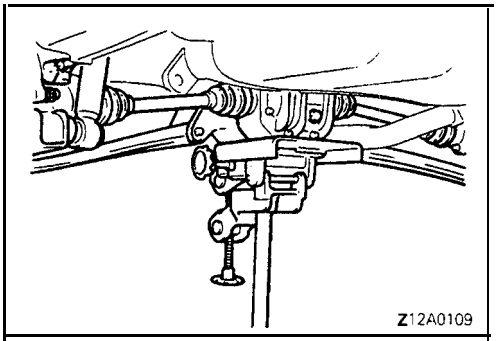
◀B▶

9. Tie rod end nut

▶A◀ 10. Power cylinder installation bolt

▶A◀ 11. Power cylinder

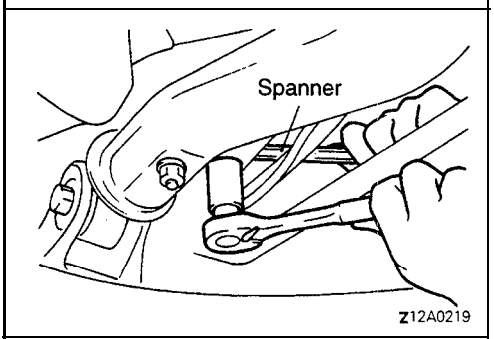
TSB Revision


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REMOVAL SERVICE POINTS

(A, CROSSMEMBER MOUNTING NUT REMOVAL

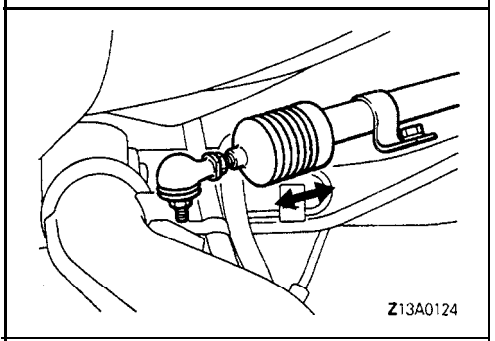
(1) Before removing the self-locking nuts, support the differential case with a transaxle jack.
(2) Remove the self-locking nuts.



Z12A0219

◀B▶ TIE ROD END NUT REMOVAL

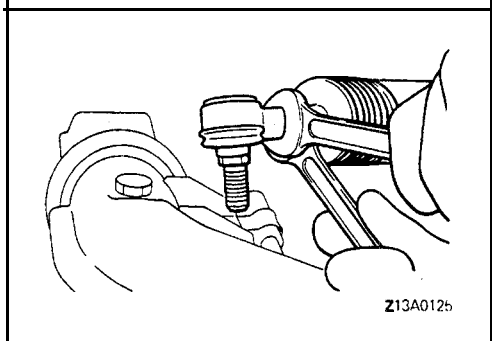
Secure the power cylinder on the tie rod side with a spanner and remove the power cylinder mounting nut.


Z13A0124

INSTALLATION SERVICE POINTS

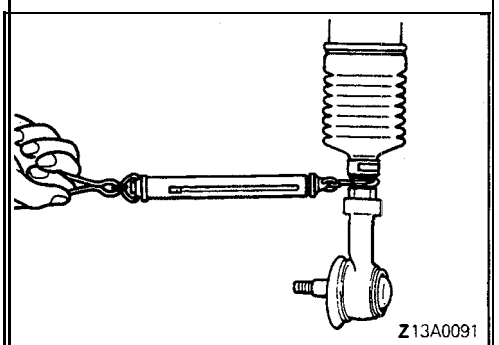
▶A◀ POWER CYLINDER / POWER CYLINDER INSTALLATION BOLTS INSTALLATION

(1) Secure the power cylinder to the crossmember.
(2) Move the power cylinder piston rod over its full stroke to determine its neutral position.
(3) Align tie rod ends and the installation holes at trailing arm.


Z13A0125

(4) When the tie rod ends and the installation holes at the trailing arm do not meet, loosen the tie rod end securing nut, then adjust the length. The dust cover fastener clip should be removed for this.
(5) The difference between the lengths of the left and right tie rods should be less than 1 mm (.039 in.).

NOTE
The threads of the tie rod ends may be used as a guide for this.


Z13A0091

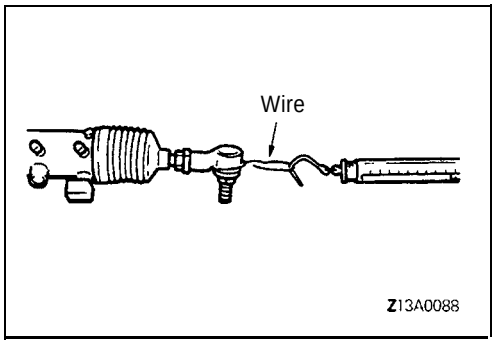
INSPECTION

TIE ROD SWING TORQUE INSPECTION

(1) Swing the tie rod ten times, hard.
(2) Point the tie rod end down, then attach a spring balance as shown in the illustration to measure swing resistance (swing torque).

Standard value: 9-55 N (2-12 lbs.)
[0.5–3 Nm (4-26 in.lbs.)]

(3) If the swing resistance exceeds the standard value, replace the tie rod.
(4) If the swing resistance is less than the standard value, the ball joint may be reused as long as it is not loose and operates smoothly.



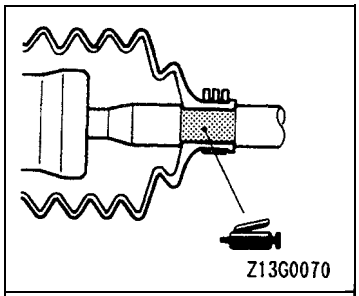
POWER CYLINDER SLIDE RESISTANCE CHECK

(1) Place the piston in a neutral position.
(2) Wrap a wire around the tie rod end, then measure slide resistance with a spring balance as shown in the illustration.

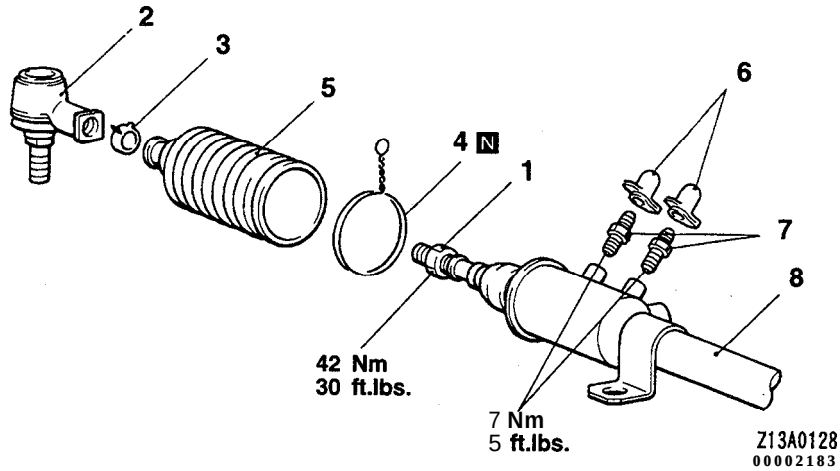
Standard value: 67 N (15 lbs.) or less

(3) If the slide resistance exceeds the standard value, replace the power cylinder.
(4) If the slide resistance is less than the standard value, the power cylinder may be reused as long as it is not loose and slides smoothly.

DISASSEMBLY AND REASSEMBLY

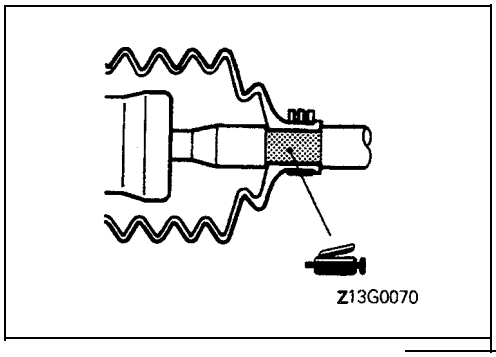


Grease: Silicone grease



Disassembly steps

1. Nut
▶B◀ 2. Tie rod end assembly
3. Clip
4. Wire
▶A◀ 5. Dust cover
6. Bleeder caps
7. Bleeder screws
8. Cylinder assembly

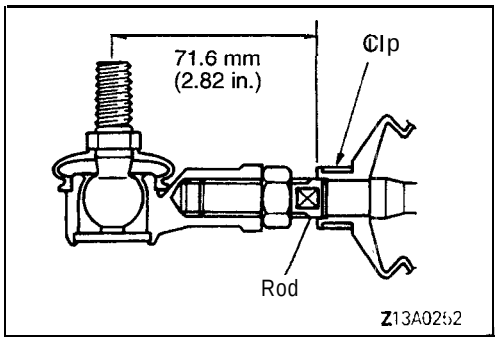


REASSEMBLY SERVICE POINTS

▶A◀ DUST COVER INSTALLATION

Apply the specified grease to the place indicated in the illustration, then install the dust cover to the cylinder assembly.

Specified grease: Silicone grease



▶B◀ TIE ROD END ASSEMBLY INSTALLATION

Temporarily attach the tie rod end assembly to the cylinder assembly at the place of dimension as illustrated.

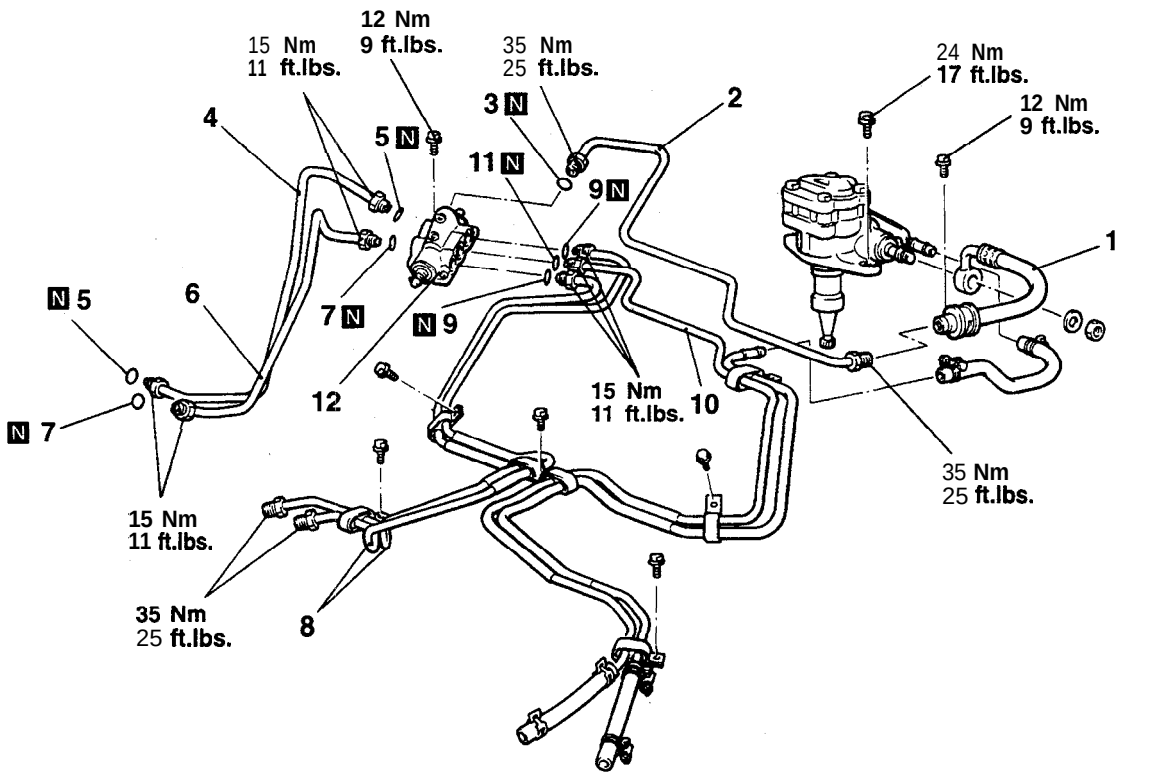
NOTE
To adjust the assembly dimensions of the tie rod end assembly, remove the dust cover clip and rotate the rod.

CONTROL VALVE

REMOVAL AND INSTALLATION

Pre-removal Operation
- Cleaning of Pipings with Steam
- Power Steering Fluid Draining (Refer to GROUP 37A – On-vehicle Service.)
- Rear Suspension Assembly Removal (Refer to GROUP 34 – Rear Suspension Assembly.)

Post-installation Operation
- Rear Suspension Assembly Installation (Refer to GROUP 34 – Rear Suspension Assembly.)
- Power Steering System Refilling and Bleeding (Refer to GROUP 37A – On-vehicle Service.)
- 4WS System Bleeding (Refer to P.37B-4.)
- 4WS System Operation Checking (Refer to P.37B-5.)



Removal steps
1. Pressure hose
2. Pressure tube
3. O-ring
4. Pressure tube (RR)
5. O-ring
6. Pressure tube (RL)
7. O-ring
8. Pressure tube (FL, FR)
9. O-ring
10. 11. O-ring Return pipe
12. Control valve

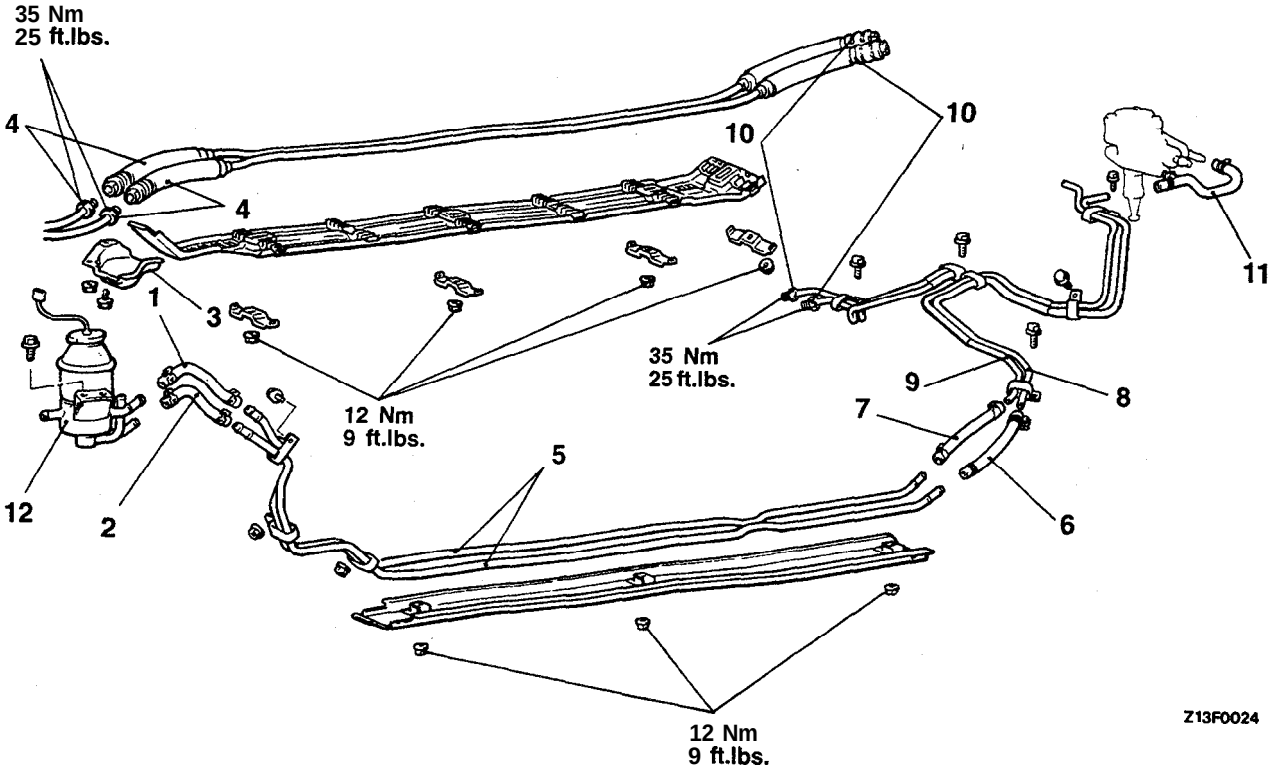
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REAR OIL LINE

REMOVAL AND INSTALLATION

Pre-removal Operation
- Cleaning of Pipings with Steam
- Power Steering Fluid Draining (Refer to GROUP 37A – On-vehicle Service.)

Post-installation Operation
- Power Steering System Refilling and Bleeding (Refer to GROUP 37A – On-vehicle Service.)
- 4WS System Bleeding (Refer to P.37B-4.)
- 4WS System Operation Checking (Refer to P.37B-5.)



Removal steps
1. Return hose
2. Suction hose
3. Protector
4. Pipe assembly to pressure tube connection
5. Pipe assembly
6. Suction hose
7. Rubber hose
8. Feed pipe assembly
9. Return pipe assembly
10. Pressure tube assembly to pipe assembly connection
11. Suction hose
12. Reserve tank

INSPECTION

- Check tubes and pipes for cracking, damage or corrosion.
- Check hoses for cracking, damage, leakage or fluid seepage.
- Check flare nuts for damage.

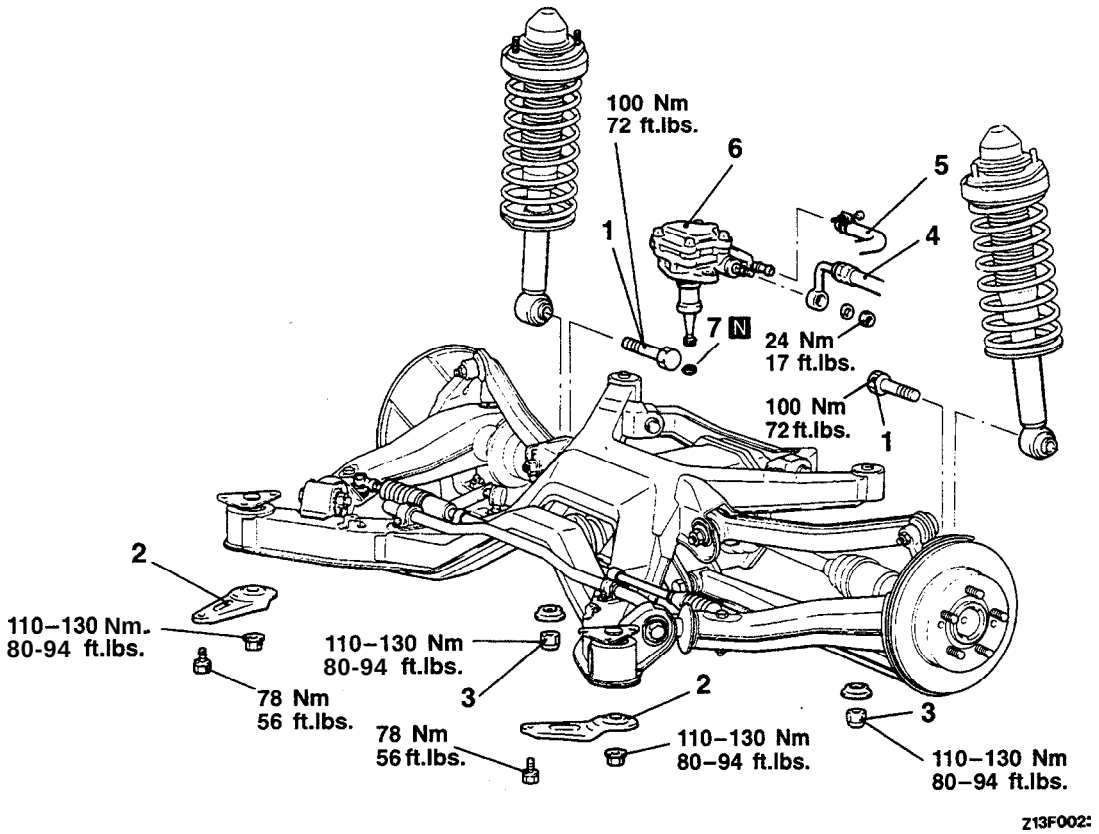
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REAR OIL PUMP

REMOVAL AND INSTALLATION

Pre-removal Operation
- Power Steering Fluid Draining (Refer to GROUP 37A – On-vehicle Service.)
- Main Muffler Assembly Removal (Refer to GROUP 15 – Exhaust Pipe and Muffler.)

Post-installation Operation
- Main Muffler Assembly Installation (Refer to GROUP 15 – Exhaust Pipe and Muffler.)
- Power Steering System Refilling and Bleeding (Refer to GROUP 37A – On-vehicle Service.)
- 4WS System Bleeding (Refer to P.37B-4.)
- 4WS System Operation Checking (Refer to P.37B-5.)

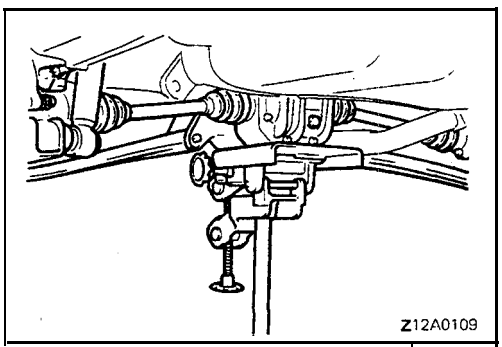


Removal steps

1. Rear shock absorber lower mounting bolt
2. Crossmember bracket
3. Crossmember mounting nut (on differential side)
4. Pressure hose
5. Suction hose
6. Rear-wheel oil pump
7. O-ring

◀A▶ ◀A▶

N O T E
Do not disassemble the rear-wheel oil pump.



REMOVAL SERVICE POINT

(A, CROSSMEMBER BRACKET / CROSSMEMBER MOUNTING NUT (ON DIFFERENTIAL SIDE) REMOVAL

(1) Support the differential case with the transmission jack, then remove the crossmember bracket and crossmember mounting nut (on the differential side).
(2) Slightly lower the crossmember.

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NOTES

BODY

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WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

(1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).

(2) Service or maintenance of any SRS component or SF&related component must be performed only at an authorized MITSUBISHI dealer.

(3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B – Supplemental Restraint System (SRS) and GROUP 00 -Maintenance Service, before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning light, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

SPECIFICATIONS

GENERAL SPECIFICATIONS

HOOD, DOOR, LIFTGATE

Items		Specifications
Hood	Type	Rear hinged, front opening type (with gas damper)
Door	Construction	Front-hinged, sashless
	Regulator system	Wire type
	Locking system	Pin-fork type
Liftgate	Type	Inner-hinged, with gas damper

GLASS

Items		Specifications
Glass installation method	Windshield glass	Adhesive type
	Quarter window glass	Adhesive type
	Liftgate window glass	Adhesive type
Glass thickness mm (in.)	Windshield glass	5.3 (.21)
	Liftgate window glass	3.5 (.14)
	Door glass	5.0 (.20)
	Quarter window glass	3.5 (.14)

POWER WINDOW

Power window motor

Items		Specifications
Type		Permanent magnet type (Built-in circuit breaker)
Revolutions under no load rpm		75 or more
Revolutions under load rpm	At 1 Nm (.72 ft.lbs.)	45–75
	At 2 Nm (1.45 ft.lbs.)	50–80
Bound current A		34 or less
Direction of rotation		Clockwise and counter-clockwise

Power window main switch

Items		Specifications
Type		Automatic reset type
Rated load current A	Lock switch	10
	Power window switch	10

Power window sub switch

Items	Specifications
Type	Automatic reset type
Rated load current A	10

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Power window relay

Items	Specifications
Maximum contact current A	20
Rated coil current A	Max. 0.2
Voltage drop between terminals V (At 12 V and the rated load current)	0.2 or less

CENTRAL DOOR LOCKING SYSTEM

Items		Specifications
Door lock power relay	Range of voltage used V	8-16
	Rated load current (at 13.5 V) A	10
	Rated coil current A	0.2 or less
	Voltage drop between terminals V	0.2 or less
Door lock actuator	Bound current (at 12 V) A	2.5–4.5
	Operating voltage range V	9–15
	*Tripping time (at 12 V) second	5–30

NOTE
*: Tripping time is the time consumed until current reaches 0.5 A after power connection.

SERVICE SPECIFICATIONS

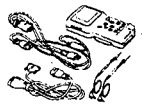
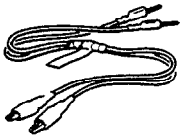
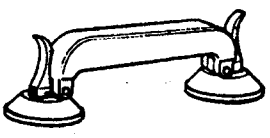
Items			Standard value
Play of door inside handle mm (in.)	A (play)		7 (.28)
	B (OPEN)		46 ± 9 (1.81 ± .35)
	C (FULL)		69 (2.72)
Clearance of window glass to weatherstrip holder mm (in.)	Adjustment of glass inclination amount	Front pillar	11.7 ± 1.0 (.46 ± .04)
		Roof	11.8 ± 1.0 (.46 ± .04)
		Quarter pillar	20.5 ± 1.0 (.80 ± .04)
	Adjustment of glass longitudinal inclination	Front pillar	7.0 ± 1.0 (.28 ± .04)
		Roof	7.7 ± 1.0 (.30 ± .04)
		Quarter pillar	12.0 ± 1.0 (.47 ± .04)
Roof lid sliding resistance N (lbs.)			147 (33) or less
Sunroof motor clutch slippage force N (lbs.)			39-49 (8.7-11)

SEALANTS AND ADHESIVES

Items	Specified sealant	Remarks
Front fender panel	3M ATD Part No. 8625 or equivalent	Ribbon sealer
Splash shield		
Waterproof film		

Items	Specified sealant	Remarks
Windshield	3M SUPER FAST URETHAN 8609 or eauivalent and 3M SUPER FAST URETHAN PRIMER 8608 or equivalent	–
Quarter window glass		
Liftgate glass		

SPECIAL TOOLS

Tool	Tool number and name	Supersession	Application
	MB990834 Door adjusting wrench	MB990834-01	Adjustment of door fit
	MB990449 Window moulding remover		Removal of window moulding
	MB991 341 Scan tool (Multi-use tester <MUT>)	MB991341C	<Up to 1993 models> Checking the power-windows system and the central door-locking system (ETACS input check)
	ROM pack (For the number, refer to GROUP 00 – Precautions Before Service.)		
 Z16X0606	MB991502 Scan tool (MUT-II)	MB991502	<All models> Checking the power-window system and the central door-locking system (ETACS input check)
 Z16X0607	ROM pack		
	MB991529 Diagnostic trouble code check harness	MB991529	<From 1994 models> Checking the power-window system and the central door-locking system by using a voltmeter
	MB990480 Window glass holder	General service tool	Removal and installation of window glass

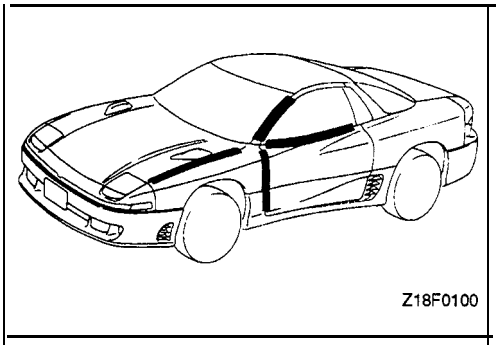
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TROUBLESHOOTING

HOOD, LIFTGATE, GLASS AND DOORS

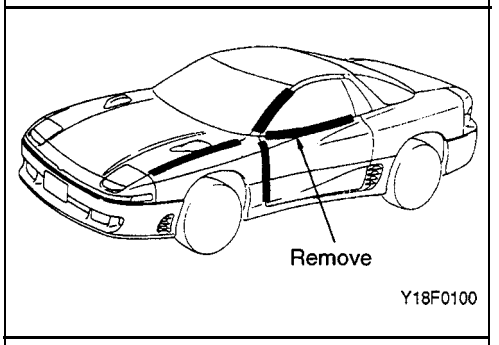
Symptom		Probable cause	Remedy
Hood/ Liftgate	Improper closure	Striker and latch not properly aligned	Adjust the alignment
	Difficult locking and unlocking	Striker and latch not properly aligned	Adjust the alignment
	Uneven body clearance	Incorrectly installed hood or liftgate	Adjust the installation of hood, deck lid or liftgate
	Uneven height	Incorrect hood bumper height	Adjust the hood bumper, deck lid bumper or liftgate bumper height
Window glass	Water leak through windshield	Defective seal	Fill sealant
		Defective body flange	Correct
	Water leak through door window glass	Incorrect window glass installation	Adjust position
		Gap at upper window glass	Adjust position
	Water leak through liftgate window	Defective seal	Fill sealant
		Defective body flange	Correct
Doors	Door window malfunction	Incorrect window glass installation	Adjust position
		Damaged or faulty regulator	Correct or replace
	Water leak through door edge	Cracked or faulty weatherstrip	Replace
	Water leak from door center	Drain hole clogged	Remove foreign objects
		Inadequate waterproof film contact or damage	Correct or replace
	Door hard to open	Incorrect latch or striker adjustment	Adjust
	Door does not open or close completely	Incorrect door installation	Adjust position
		Defective door check strap	Correct or replace
		Door check strap and hinge required grease	Apply grease
	Uneven gap between body	Incorrect door installation	Adjust position
	Wind noise around door	Weatherstrip not holding firmly	Adjust fit of door
		Improperly installed weatherstrip or setting of weatherstrip	Repair or replace
		Improperly closed door	Adjust
		Improperly fit door	Adjust
		Improper clearance between door glass and door weatherstrip holder	Adjust
		Deformed door	Repair or replace

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Z18F0100

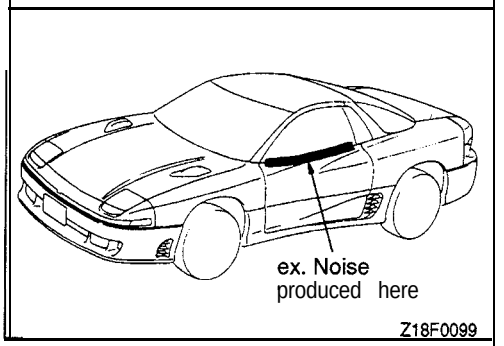
HOW TO LOCATE WIND NOISES

(1) Attach cloth tape to every place which might conceivably be the source of wind noise, such as panel seams, projections, moulding seams, glass and body seams, etc.
(2) Then make a road test in order to determine that the places not covered by tape are not sources of wind noise.



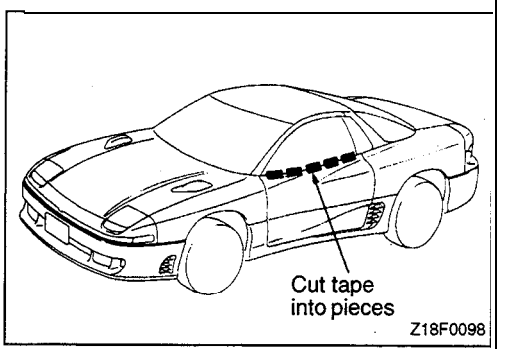
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(3) Then remove the strips of tape one by one, making a road test after each is removed, until a wind noise source is discovered.



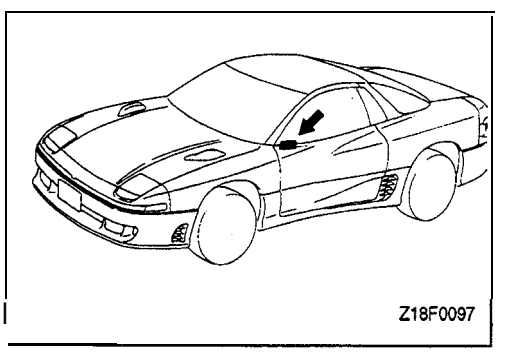
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(4) When such a place is found, cover it again and continue with the procedure so as to determine if there are any other noise sources.
(5) If no others are found, the last remaining tape is the only source.



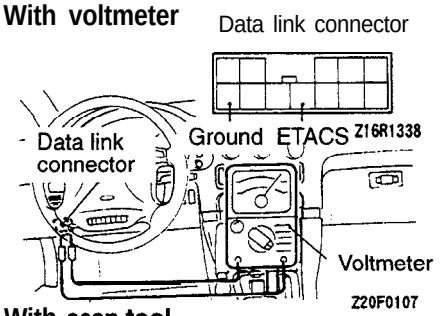
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(6) Cut the remaining piece of tape into smaller pieces, attach it again as it was before, and then remove the pieces one by one in the same way so as to narrow down the source.

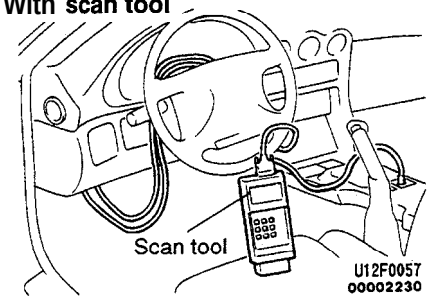

Z18F0097

(7) Check to confirm that wind noise occurs when the last remaining tape is removed, and that noise does not occur when it is re-attached.
(8) When the source(s) of the wind noise is finally located, attach butyl tape, body sealer or similar material to obstruct this source as much as possible.

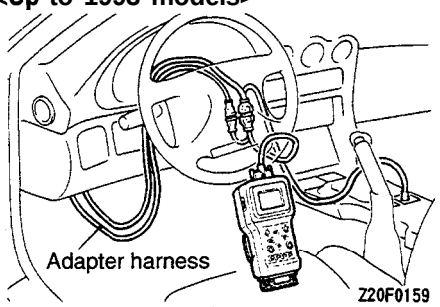
With voltmeter



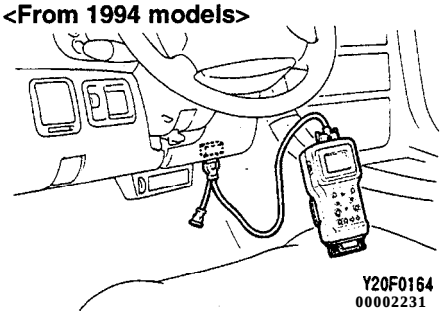
With scan tool

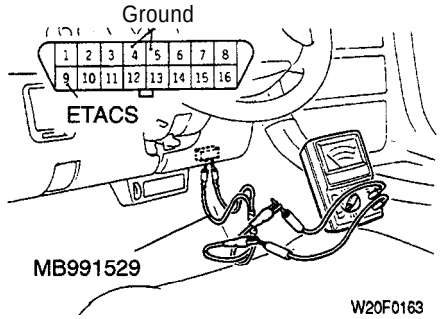


When using the MUT-II
<Up to 1993 models>



<From 1994 models>





POWER WINDOW AND CENTRAL DOOR LOCKING SYSTEM

INPUT SIGNAL

<Up to 1993 models>

When using the scan tool (MUT) or voltmeter

Using the scan tool or voltmeter, check whether or not the input signals from each switch are being input to the ETACS unit.

(1) Connect the scan tool to the data link connector located at the right side of the junction block or connect the voltmeter between the ETACS terminal and the ground terminal.

(2) Check if the buzzer of the scan tool sounds or the needle of the voltmeter moves when each switch is operated. If the buzzer sounds or the needle moves, the input signals are being input to the ETACS unit, so that switch can be considered to be functioning normally. If not, the switch or switch input circuit is faulty. Check the switch and the switch input circuit.

<All models>

When using the scan tool (MUT-II)

(1) Connect the scan tool to the data link connector. On 1993 and earlier models, use the adapter harness contained in the scan tool to connect the scan tool.

Caution
Be sure to place the ignition switch in the OFF position before connecting or disconnecting the scan tool.

(2) Perform ON/OFF operation of each switch. If the buzzer of the scan tool sounds once, the ECU input signal sent from the corresponding switch circuit system is normal.

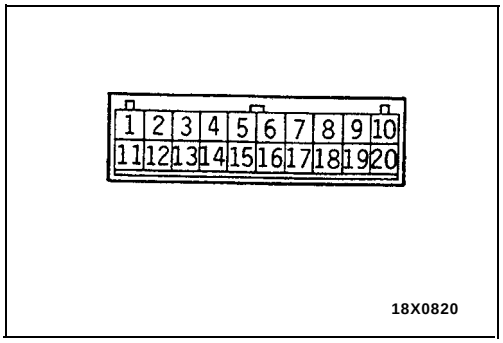
<From 1994 models>

When using the voltmeter

(1) Use the special tool to connect a voltmeter to the ETACS terminal and ground terminal of the data link connector.

(2) Perform ON/OFF operation of each switch. If the pointer of the voltmeter moves once, the ECU input signal sent from the corresponding switch circuit system is normal.

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KEYLESS CONTROL UNIT INSPECTION

Disconnect the amplifier and inspect the connector on the wire harness side as shown in the chart below.

Terminal No.	Signal	Conditions		Terminal voltage
1	Key reminder switch (vehicles with theft alarm)	ON (Key removed)		Battery positive voltage
		OFF (Key installed)		o v
2	Door switch	All doors close (Door switch: OFF)		Battery positive voltage
		One of doors open (Door switch: ON)		o v
6	Door lock actuator (L.H.)	LOCK		5 V
		UNLOCK		0 V
9	Keyless entry control unit power source	Ignition switch (ACC or ON)		Battery positive voltage
		Ignition switch (OFF)		0 V
10	Keyless entry control unit power source	Always		Battery positive voltage
11	Dome light	All doors close (door switch: OFF)	To operate	0 V
			Not to operate	Battery positive voltage
12	Door lock output	To operate		o v
		Not to operate		Battery positive voltage
13	Door unlock output	To operate		o v
		Not to operate		Battery positive voltage
14	Drivers door unlock output	To operate		0 V
		Not to operate		Battery positive voltage
15	ETACS-ECU <Vehicle with theft-alarm system>	Transmitter switch: ON		0 V
		Transmitter switch: OFF		5 V
20	Ground	Always		0 V

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ELECTRICALLY OPERATED SLIDING SUNROOF

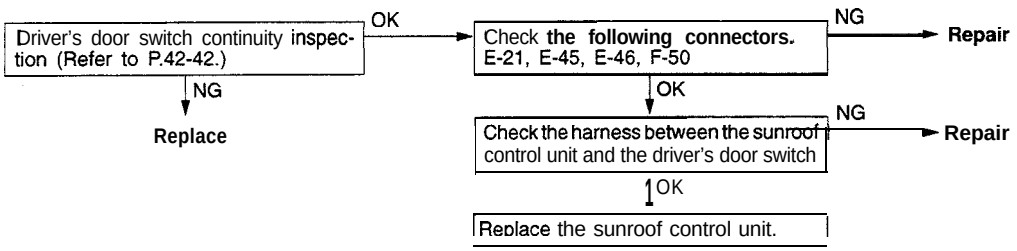
INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptom	Inspection procedure
Sunroof does not operate within 30 seconds after driver's door is opened.	1
Sunroof does not operate at all.	2

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

Inspection Procedure 1

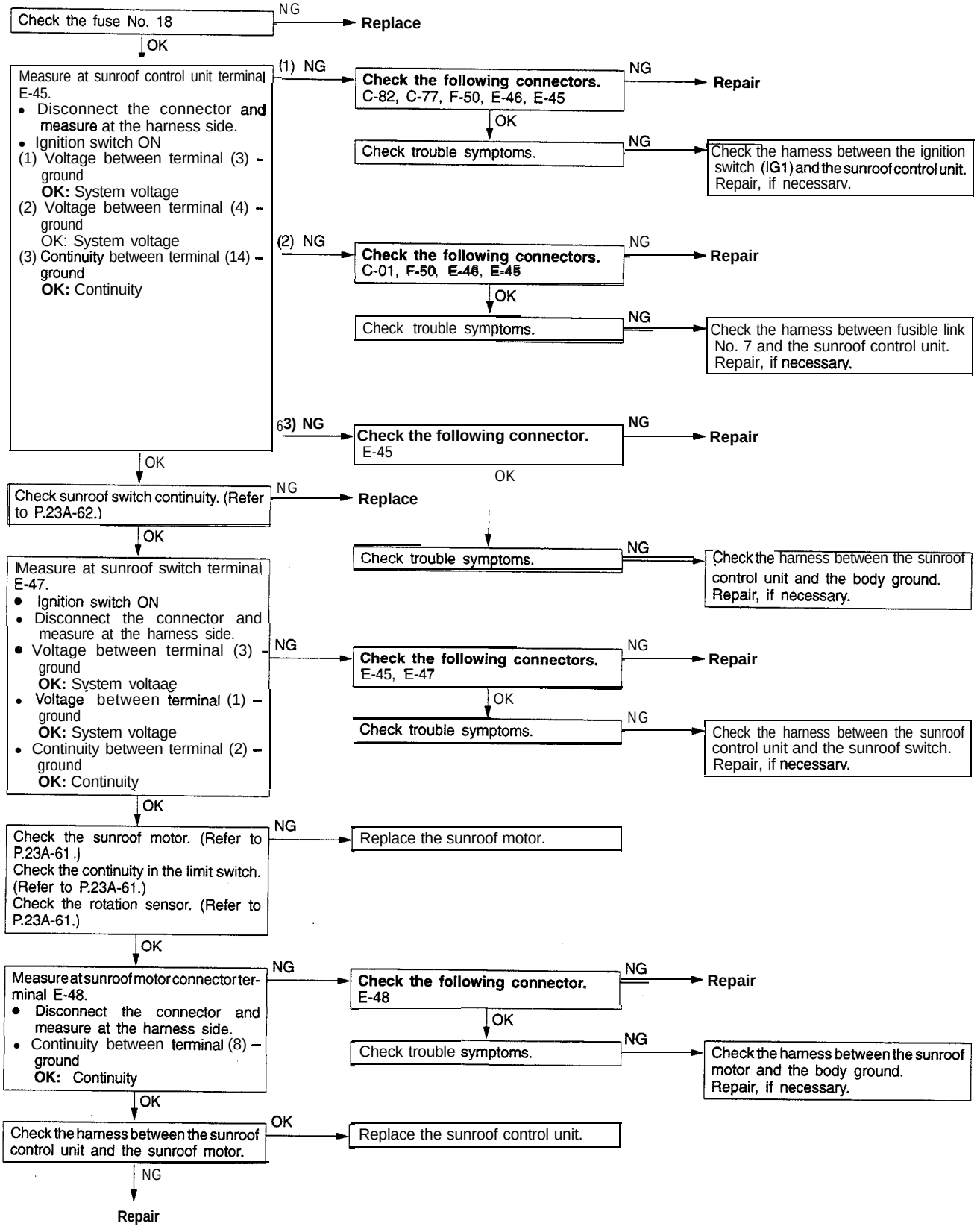
Sunroof does not operate within 30 seconds after driver's door is opened.	**Procedure cause**
After the driver's door is opened within 30 seconds after the ignition switch is turned off, the sunroof can still be operated for a further 30 seconds. If it is impossible, the driver's door switch or the sunroof control unit may be defective.	• Malfunction of door switch (driver's side) • Malfunction of sunroof control unit • Malfunction of wiring harness or connector



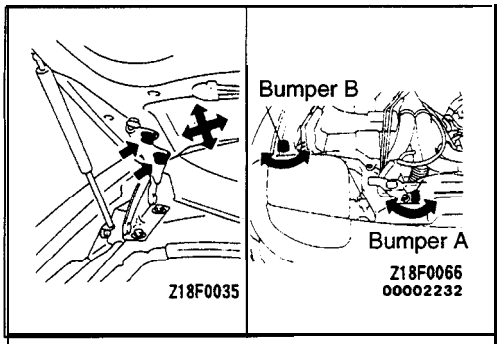
Inspection Procedure 2

Sunroof does not operate at all.	**Procedure cause**
One of the following items may be defective. Sunroof switch Sunroof motor Sunroof control unit Power supply circuit (including the fuse)	• Malfunction of sunroof switch • Malfunction of sunroof motor • Malfunction of sunroof control unit • Malfunction of wiring harness or connector

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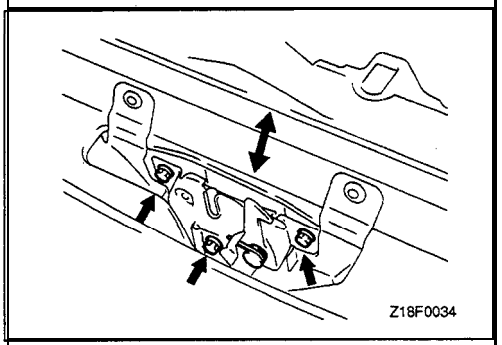
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ON-VEHICLE SERVICE

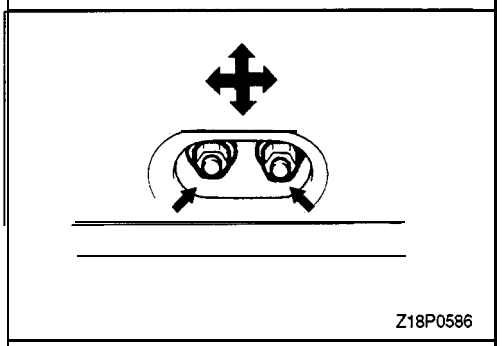
HOOD ADJUSTMENT

1. Loosen the hood mounting bolts, and then adjust the hood by moving it so that the clearance is equal on all sides.
2. Turn the bumpers A and B, adjust the height of the hood.

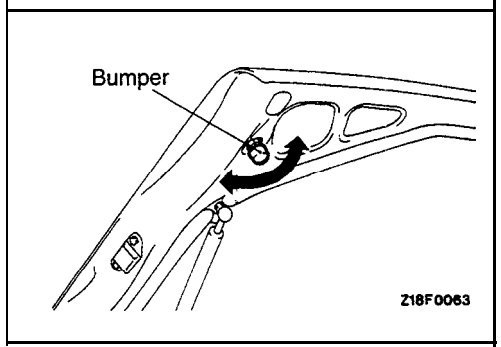


3. Loosen the hood latch mounting bolts, and move the hood latch to adjust the attachment between the hood latch and hood striker.

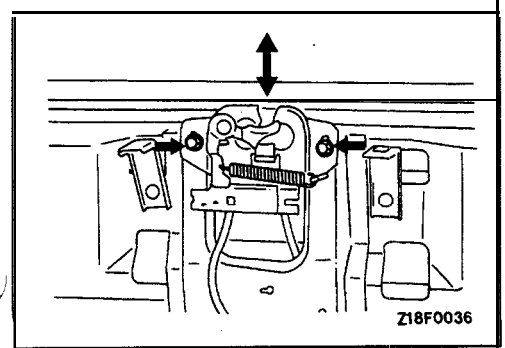
LIFTGATE ADJUSTMENT



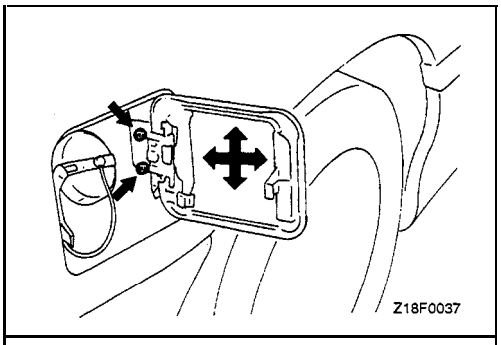
1. Loosen the liftgate hinges mounting bolts, and then adjust the liftgate by moving it so that the clearance is equal on all sides.



2. Turn the bumper to adjust the liftgate height.

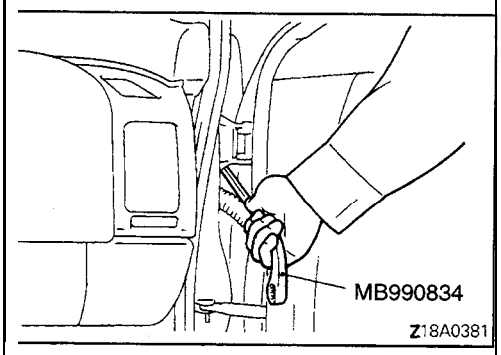


3. Loosen the liftgate latch mounting bolts, and move the liftgate latch to adjust the attachment between the liftgate latch and liftgate striker.



FUEL FILLER DOOR ADJUSTMENT

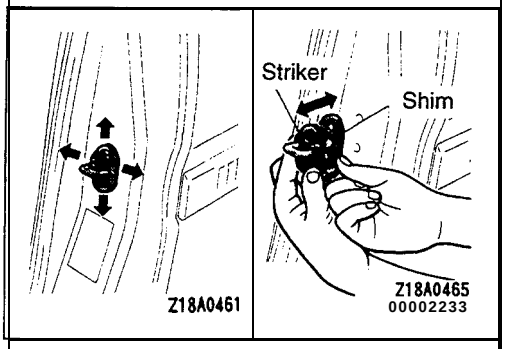
Loosen the fuel filler door mounting screw and adjust the fuel filler door so that the clearance around the fuel filler door is even without any height differences.

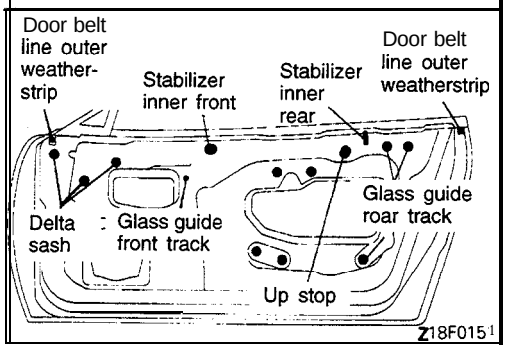


DOOR ADJUSTMENT

1. Use the special tool to loosen the hinge mounting bolts on the body side, and then adjust the clearance around the door so that it is uniform on all sides.
2. If the door is not flush with the body, remove the spring pin from the door check, use the special tool to loosen the bolts for mounting the door hinges to the door. Move the door to adjust the door position along the body surface.

   Caution
   Attach protection tape to the fender edges where the hinge is installed.
3. If the door does not open freely, adjust the engagement of the striker with the door latch by means of the striker mounting shim and move the striker up and down or from side to side.

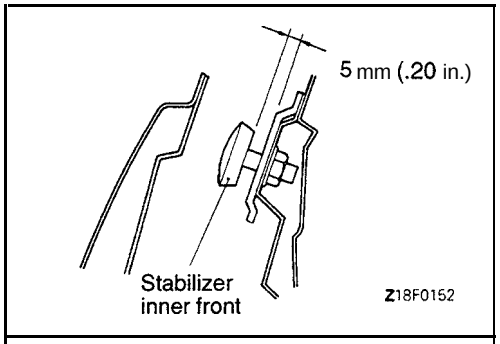




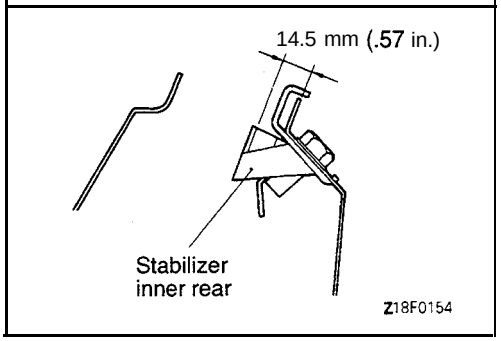
DOOR WINDOW GLASS ADJUSTMENT (When removing and installing the door window glass)

1. Remove the door trim and waterproof film. (Refer to P.42-42.)
2. Remove the front pillar trim.
3. Remove the drip line weatherstrip.
4. Loosen the bolts and nuts of the following parts.
   - Glass guide front track
   - Glass guide rear track
   - Delta sash
   - Stabilizer inner front
   - Stabilizer inner rear
   - up stop
   - Door belt line outer weatherstrip

   NOTE
   Move the window glass down to the lowest position before removing the delta sash bolt.



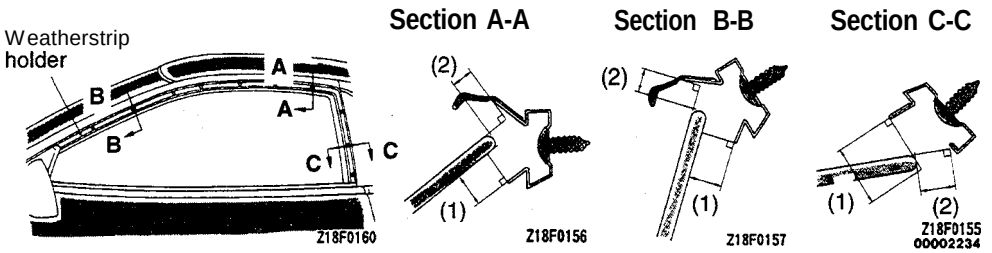
5. Remove the stabilizer inner front and adjust the adjusting bolt for the dimension shown here.

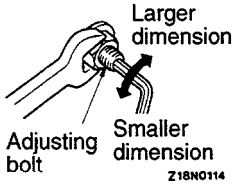
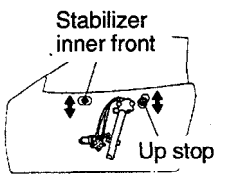


6. Adjust the adjusting bolt for the stabilizer inner rear dimension shown here.
7. Raise door window glass. Push glass against the outer stabilizer of the door belt line outer weatherstrip and insert cloth or the like between the door inner panel and glass.

8. Adjust glass to have standard clearance between the weatherstrip holder and window glass.

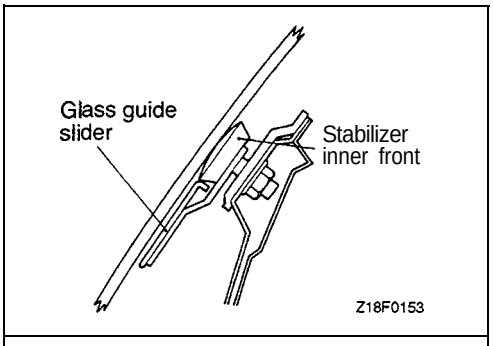
Caution
Measure the clearance, specified in section A-A, B-B and C-C, at the corresponding weatherstrip holder screws as shown in the illustration.



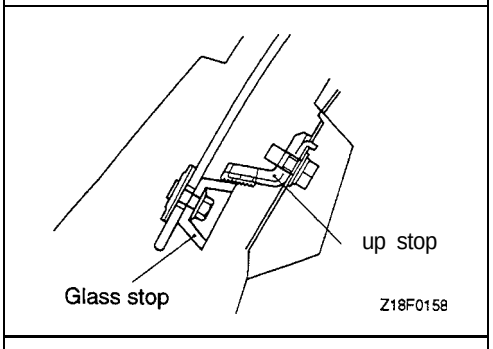
Adjustment		Adjustment procedures		Standard value mm (in.)	
1	Adjustment of inward tilt of glass	Adjust by turning the adjusting bolts of the glass guide front track and glass guide rear track. **Caution** **Turn the two adjusting bolts of the glass guide rear track same amount.**		Section A-A	(1): 11.7 ± 1.0 (.46 ± .04)
				Section B-B	(1): 11.8 ± 1.0 (.46 ± .04)
				Section C-C	(1): 20.5 ± 1.0 (.80 ± .04)
2	Adjustment of forward or backward tilt of glass	Move the stabilizer inner front and up stop up and down to adjust the forward or rearward tilt of glass when glass is fully closed. **Caution** **Do not turn the stabilizer inner front adjusting bolt.**		Section A-A	**(2): 7.0 ± 1.0 (.28 ± .04)**
				Section B-B	**(2): 7.7 ± 1.0 (.30 ± .04)**
				Section C-C	**(2): 12.0 ± 1.0 (.47 ± .04)**

NOTE
Adjust both inward tilt and forward or backward tilt of glass at the same time.

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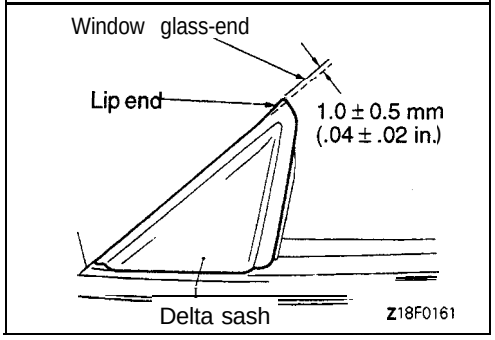


9. Force the stabilizer inner front onto the glass guide slider of the window glass assembly and tighten in position.



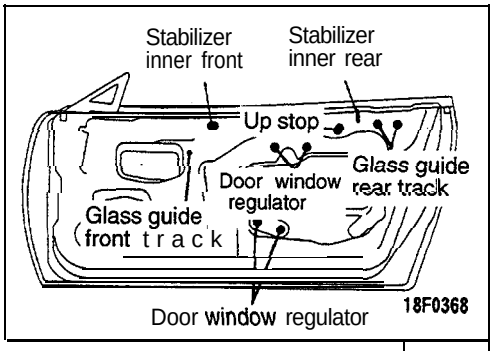
10. Force the up stop onto the glass stop of the window glass assembly and tighten in position.
11. Tighten the glass guide front and rear tracks.

Caution
Do not turn the adjusting bolts of guide tracks.



12. Adjust the delta sash. so that the window glass end and the delta sash lip end are positioned as illustrated and tighten in position.

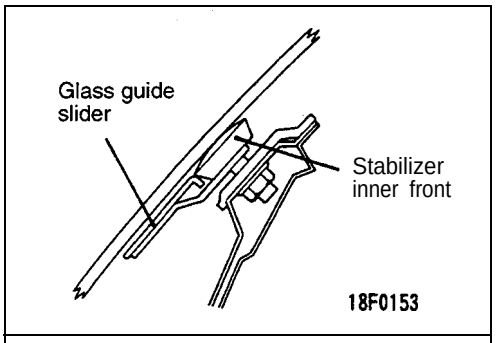
13. Install the drip line weatherstrip.
14. Install the front pillar trim.
15. Install the door trim and the waterproof film. (Refer to P.42-42.)
16. Open and close the door and move up and down the window glass to check fitting of the door.



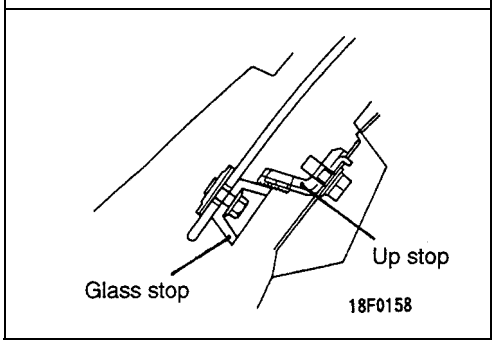
(When not removing and installing the door window glass)

1. Remove the door trim and waterproof film. (Refer to P.42-42.)
2. Loosen the bolts and nuts of the following parts.
   - Glass guide front track
   - Glass guide rear track
   - Door window regulator
   - Stabilizer inner front
   - Stabilizer inner rear
   - up stop
3. Lift the window glass up to its highest position.

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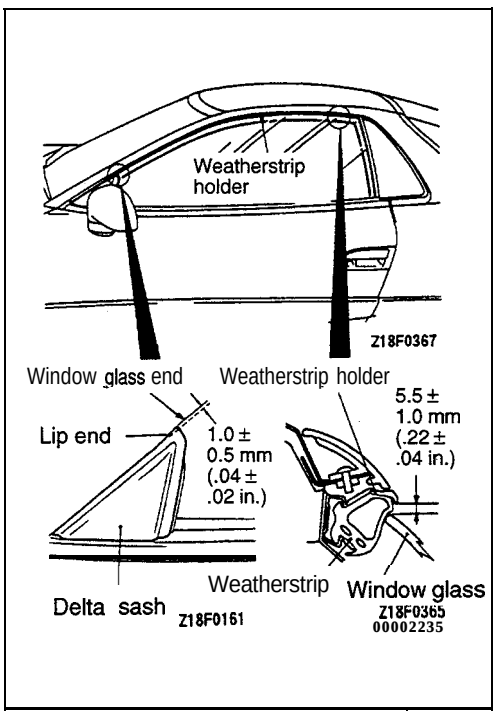


4. Tighten the stabilizer inner front so that it presses against the glass guide slider of the window glass assembly.



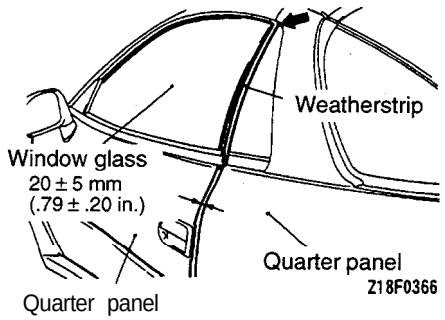
5. Tighten the up stop so that it presses against the glass stop of the window glass assembly.

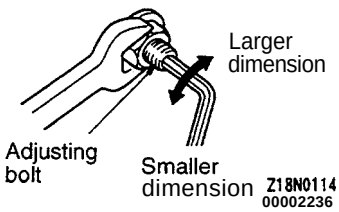
6. Tighten the stabilizer inner rear so that it presses against the window glass assembly.



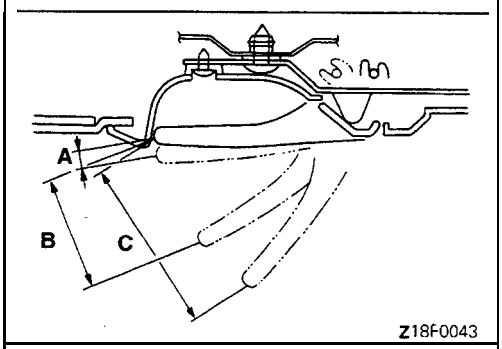
7. Check that the clearance between the weatherstrip holder and the top edge of the window glass is as shown in the illustration when the top edge of the window glass is touching the weatherstrip.
8. Check that the relative position of the window glass end the lip end of the delta sash is as shown in the illustration.
9. If the clearance or the position is not at the standard values, repeat the procedures in steps 4 and 5.

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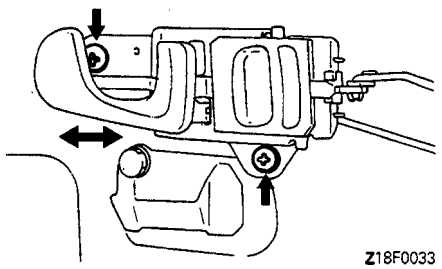
10. Turn the adjusting bolts of the glass guide rear track and the glass guide front track to adjust so that the corner of the window glass touches the, weatherstrip when the door is opened by the amount shown in the illustration.
11. Install the door trim and the waterproof film. (Refer to P.42-42.)
12. Open and close the door and move up and down the window glass to check fitting of the door.



DOOR INSIDE HANDLE PLAY CHECK

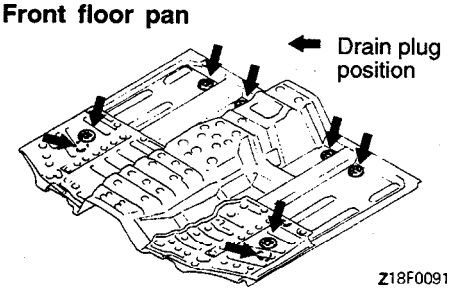
1. Check that the door inside handle play is as specified.

Standard value
A (play): 7 mm (.28 in.)
B (OPEN): 46 ± 9 mm (1.81 ± .35 in.)
C (FULL): 69 mm (2.72 in.)



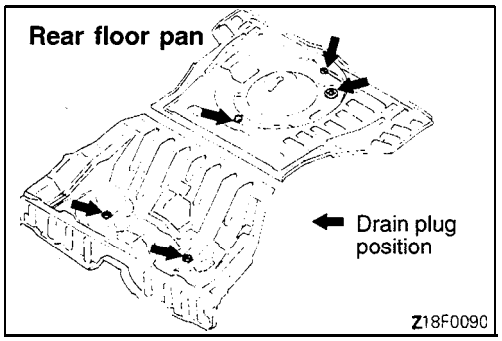
2. If out of specifications, adjust as described below.
   1) Remove the door trim. (Refer to P.42-42.)
   2) Loosen the screw attaching the inside handle and slide the inside handle back and forth to adjust the inside handle play.

Front floor pan



FLOOR PAN CHECK

A common result of body leaks is a soaked floor mat pad or carpet, and it's not unusual to find that the water is getting in through the floor pan to some other low point in the body. It is possible however, for water to enter higher up and run downward to soak the mat.
Since a soaked mat should be removed for drying, it's a good way to start your check. Of course, mat removal means you'll have to take off door sill plates and pull out seats or seat cushion. But, this gives you a clear field for action so you can check body seam sealing and the plugs in the floor pan.

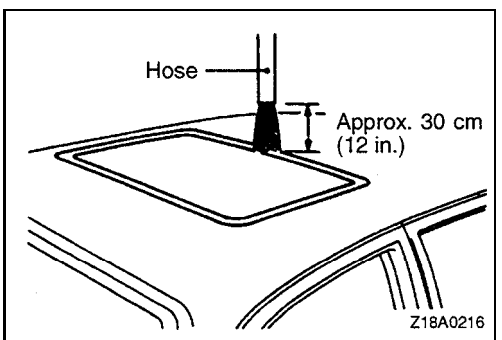


It's usually not practical to water test for floor pan or wheelhousing leaks unless a special underbody water spray arrangement is available. As an alternate, the best way to locate these leak points is to look for rusty seam edges or other traces of leaks after the mats and cushions are removed. Traces of mud are an indication that the water is coming in from below.

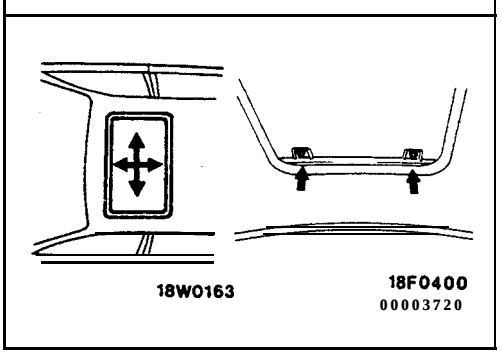
SUNROOF LEAKAGE INSPECTION

Check if there are any leaks in the sunroof by the following procedure.

(1) Fully close the roof lid.
(2) Adjust the water pressure so that water comes out of the hose to a height of approximately 50 cm (20 in.) when the hose is held vertically facing upwards.



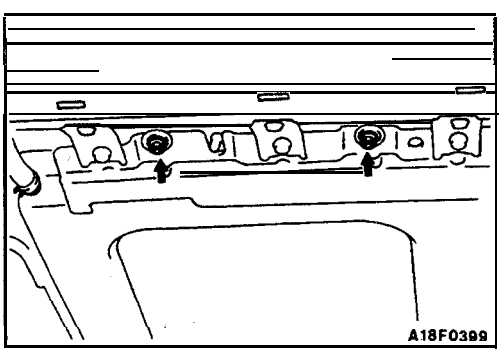
(3) Hold the end of the hose about 30 cm (12 in.) above the roof and let the water run onto the weatherstrip for 5 minutes or more.
(4) While doing this, check if any water leaks through into the passenger compartment from around the roof lid.



SUNROOF FIT ADJUSTMENT

LONGITUDINAL AND LATERAL ADJUSTMENTS

1. Remove the roof lid trim.
2. Fully close the roof lid.
3. Loosen the four roof lid assembly mounting nuts to adjust the roof lid assembly forward and back or to the left and right.



VERTICAL ADJUSTMENT

1. Remove the headlining.
2. Fully close the roof lid.
3. Loosen four adjuster nuts and adjust so that the roof lid is flush with the roof panel.

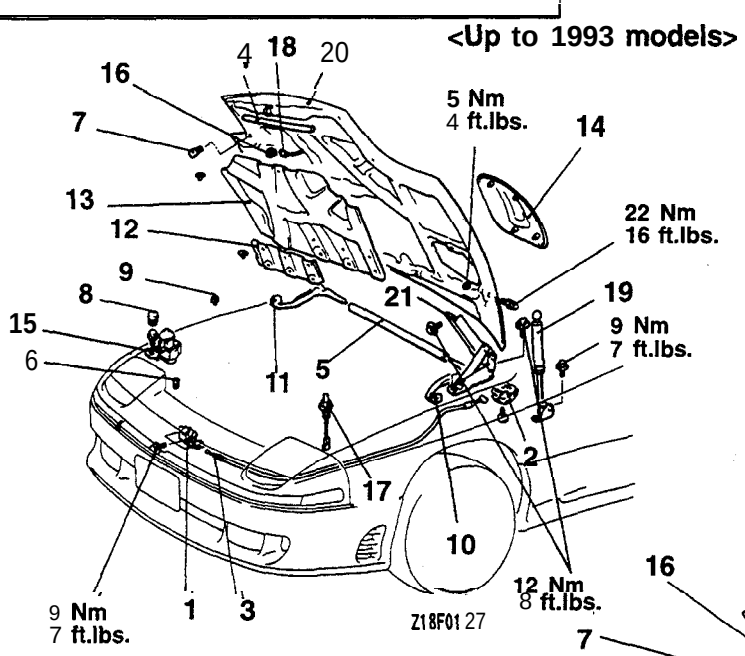
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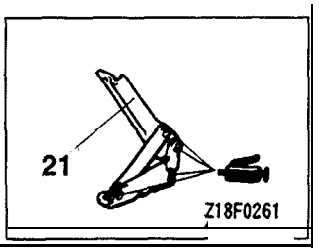
ENGINE HOOD

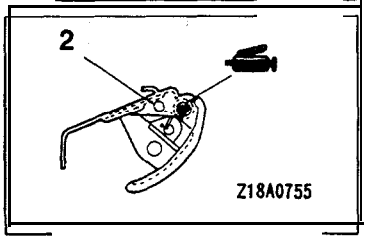
REMOVAL AND INSTALLATION

Adjustment
- Hood Adjustment (Refer to P.42-11.)

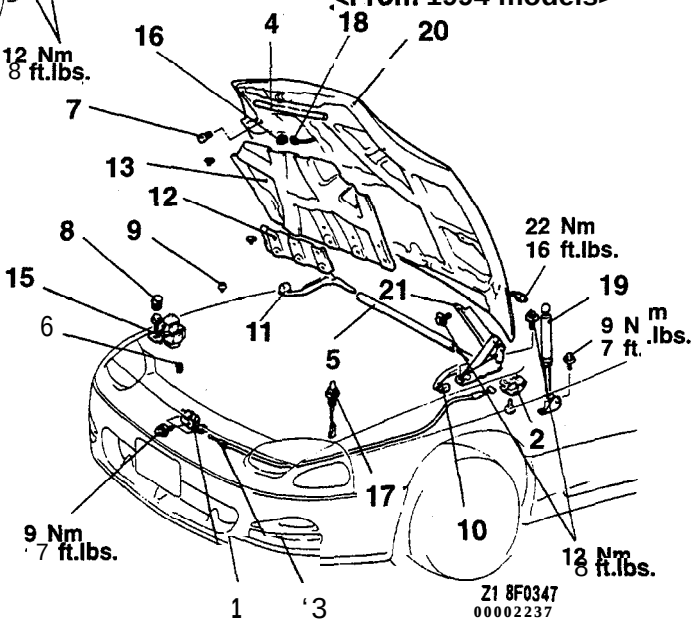
<Up to 1993 models>

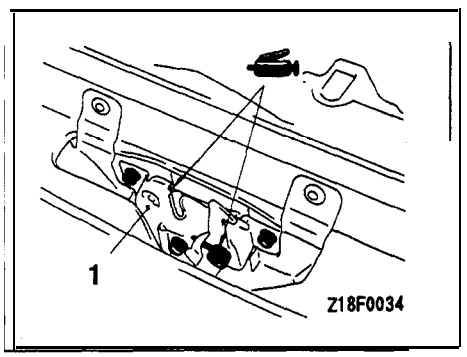






<From 1994 models>





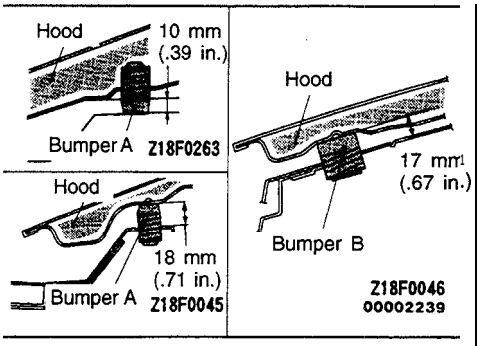
1. Hood latch
2. Hood lock release handle
3. Hood lock release cable
4. Hood weatherstrip (Front)
5. Hood weatherstrip (Rear)
6. ▶A◀ Bumper A (Body side)
7. ▶A◀ Bumper A (Hood side)
8. ▶A◀ Bumper B
9. Bumper
10. Hood side weatherstrip (LH)
11. Hood side weatherstrip (RH)
12. Heat protector panel
13. Heat protector
14. Hood garnish assembly
15. Hood switch (Vehicles with theft-alarm system)
16. Engine room inspection light
17. Inspection light switch

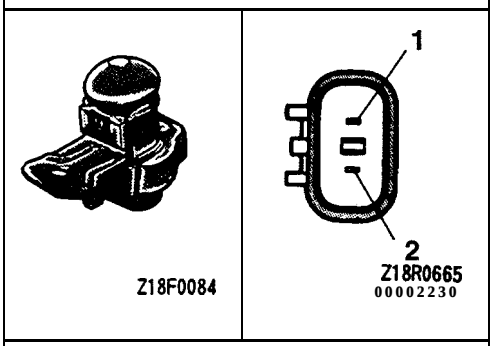
Hood hinge removal steps
- Washer tube (Refer to GROUP 51 – Windshield Wiper and Washer.)

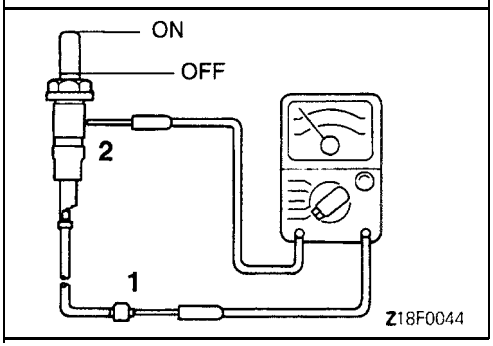
18. Inspection light wiring harness
19. Hood gas spring
20. Hood
21. Hood hinge

Caution
1. **Never try to disassemble the hood gas spring or burn it.**
2. **Always bore a hole in the gas spring to release the interior gas before the spring is discarded.**

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INSTALLATION SERVICE POINTS

▶A◀ BUMPER B, A INSTALLATION

Install the bumpers as illustrated.

INSPECTION

HOOD SWITCH CHECK

Check the continuity between the terminals.

Switch position	Terminal No.	
	1	2
Lid switch unpressed	0 ——	—○
Lid switch depressed		

LIGHT SWITCH CHECK

Turn the switch ON/OFF and check continuity between terminals (between the connector terminal and the switch body).

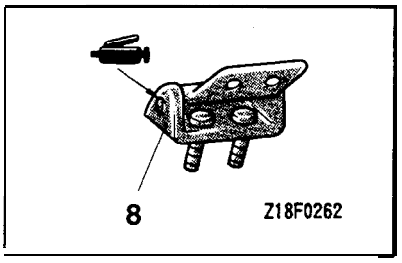
Switch position	1 (Connector terminal)	2 (Switch body)
ON	○	—○
OFF		

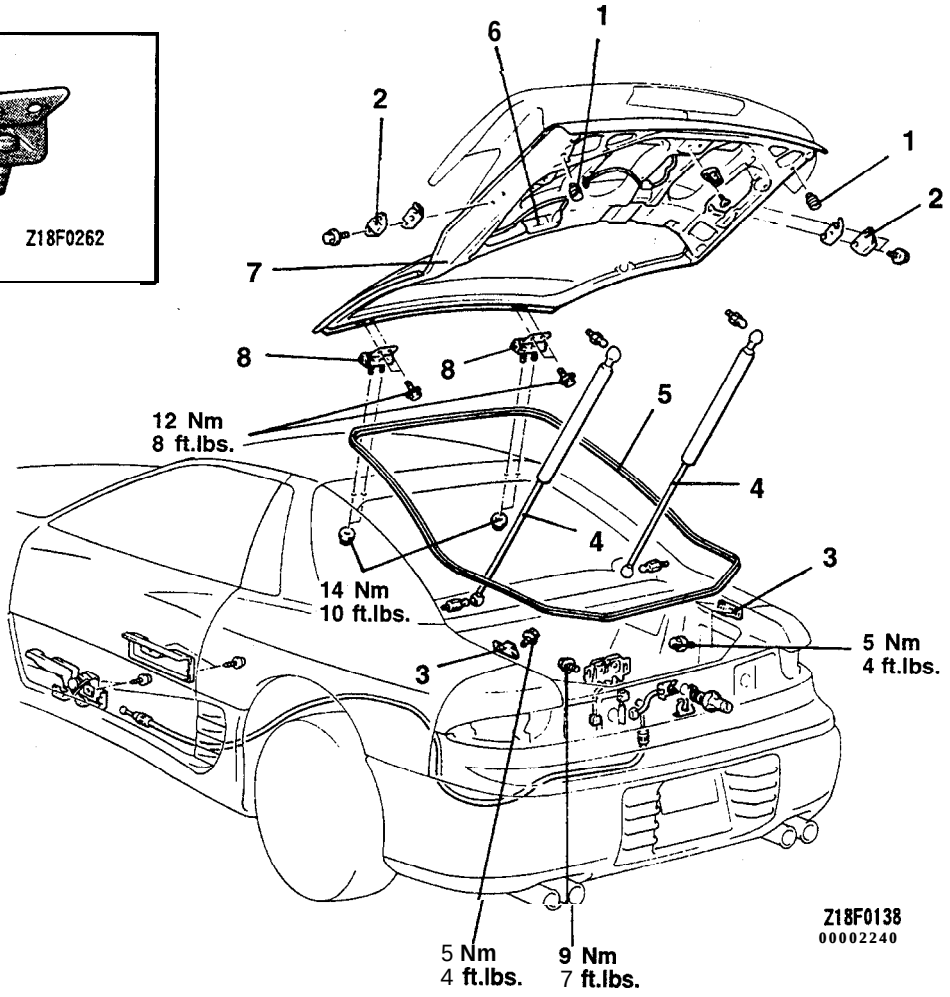
TSB Revision

LIFTGATE

REMOVAL AND INSTALLATION

Adjustment
- Liftgate Adjustment (Refer to P.42-11.)





▶A◀ 1. Bumper
2. Liftgate damper (upper)
3. Liftgate damper (lower)

Liftgate gas spring and liftgate opening weatherstrip removal steps
- Liftgate trim (Refer to GROUP 52A – Trims.)
- Rear side trim (Refer to GROUP 52A – Trims.)

4. Liftgate gas spring
5. Liftgate opening weatherstrip

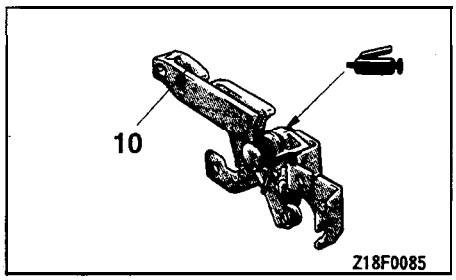
Liftgate and liftgate hinge removal steps
- Washer tube (Refer to GROUP 51 – Windshield Wiper and Washer.)
- Liftgate trim (Refer to GROUP 52A – Trims.)
- Liftgate side trim (LH) (Refer to GROUP 52A – Trims.)
- Rear side trim (Refer to GROUP 52A – Trims.)

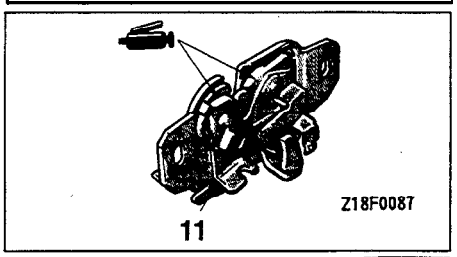
4. Liftgate gas spring
6. Connection for liftgate wiring harness
7. Liftgate
- Headlining (Refer to GROUP 52A – Headlining.)

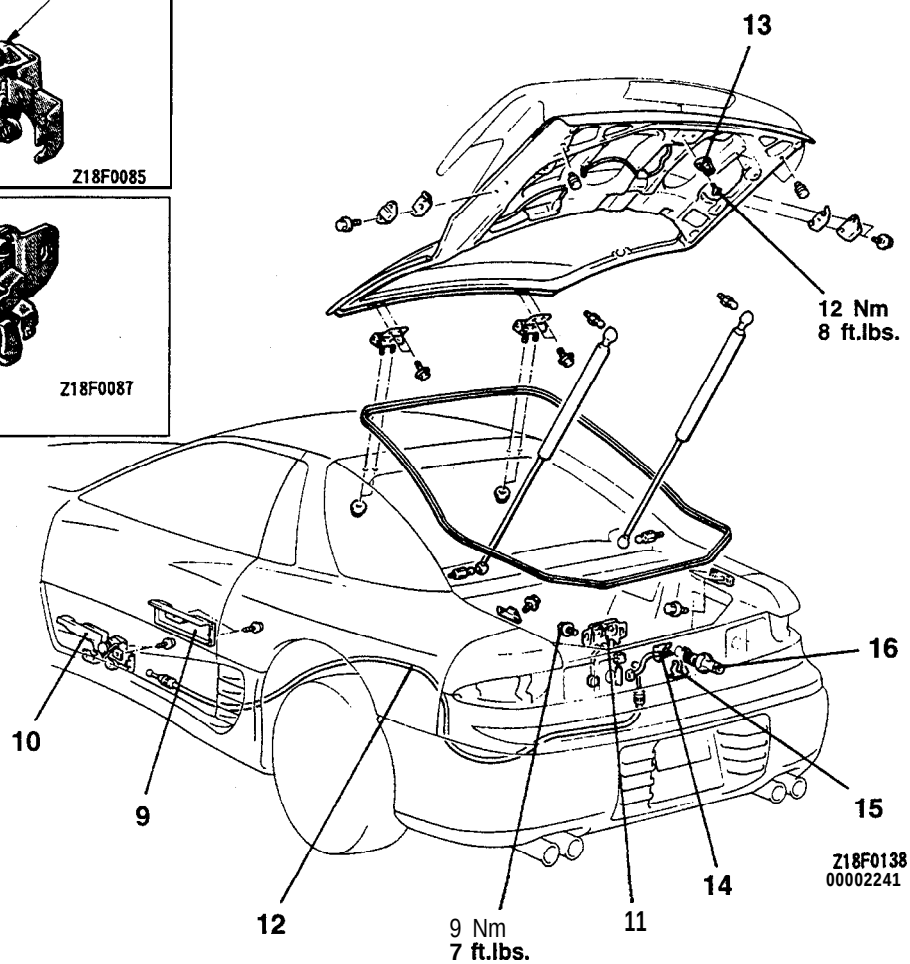
8. Liftgate hinge

Caution
1. **Never try to disassemble the liftgate gas spring or burn it.**
2. **Always bore a hole in the gas spring to release the interior gas before the spring is discarded.**

TSB Revision







Liftgate lock release cable and handle removal steps

- Scuff plate (driver's side) (Refer to GROUP 52A – Trims.)

9. Release handle cover
10. Liftgate lock release handle
    - Quarter trim (Refer to GROUP 52A – Trims.)
    - Rear side trim (Refer to GROUP 52A – Trims.)
    - Rear end trim (Refer to GROUP 52A – Trims.)
11. Liftgate latch
12. Liftgate lock release cable

Liftgate latch removal steps

- Rear end trim (Refer to GROUP 52A – Trims.)

11. Liftgate latch

Liftgate striker removal steps

- Liftgate trim (Refer to GROUP 52A – Trims.)

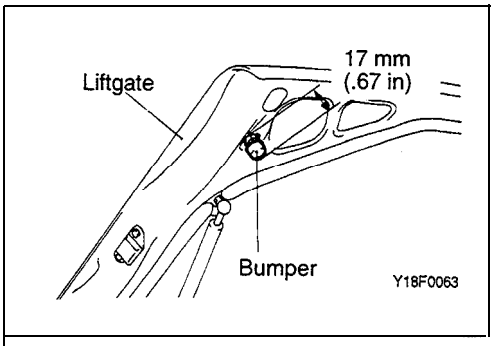
13. Liftgate striker

Liftgate lock cylinder removal steps

- Rear end trim (Refer to GROUP 52A – Trims.)
- Rear combination light (Refer to GROUP 51 – Garnishes and Mouldings.)
- Rear panel garnish (Refer to GROUP 51 – Garnishes and Mouldings.)

14. Liftgate lock cylinder switch
15. Retainer
16. Liftgate lock cylinder

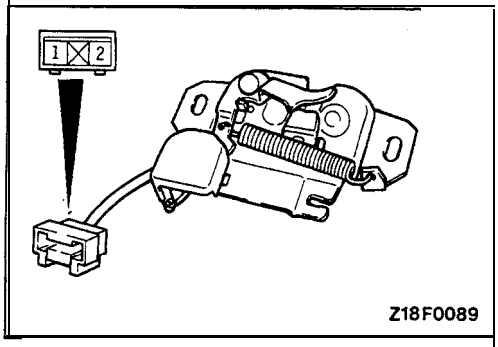
TSB Revision



INSTALLATION SERVICE POINT

▶A◀ BUMPER INSTALLATION

Install the bumper so that the amount of projection from the liftgate is as shown in the illustration.

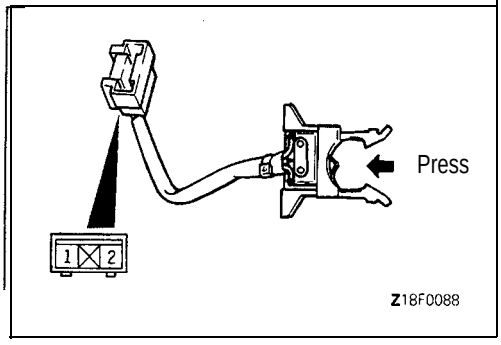


INSPECTION

LIFTGATE LATCH SWITCH CHECK

(1) Unlock the liftgate latch.
(2) Check the continuity between the terminals.

Switch position	Terminal No.	
	1	2
Liftgate latch locked		
Liftgate latch unlocked	0	0



LIFTGATE LOCK CYLINDER SWITCH CHECK

Check the continuity between the terminals.

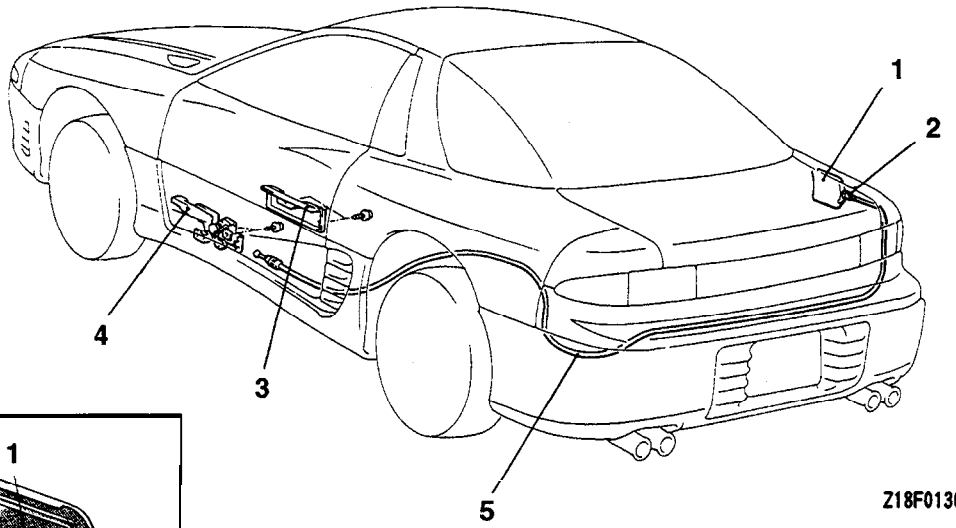
Switch position	Terminal No.	
	1	2
When switch is pressed		
When switch is not pressed	∩	0

FUEL TANK FILLER DOOR

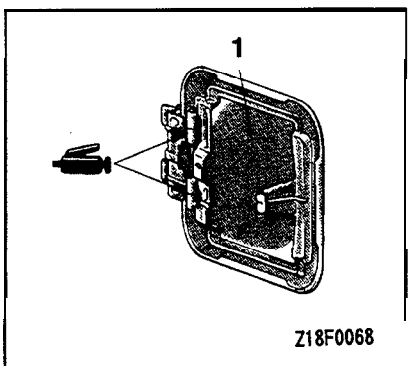
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Rear Side Trim,. Quarter Trim and Scuff Plate Removal and Installation (Refer to GROUP 52A – Trims.)

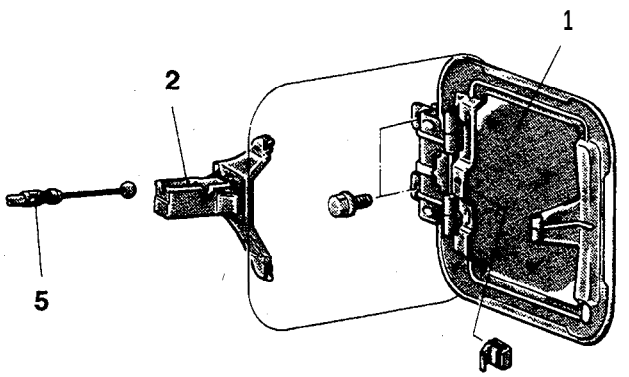
Adjustment
- Fuel Filler Door Adjustment (Refer to P.42-12.)



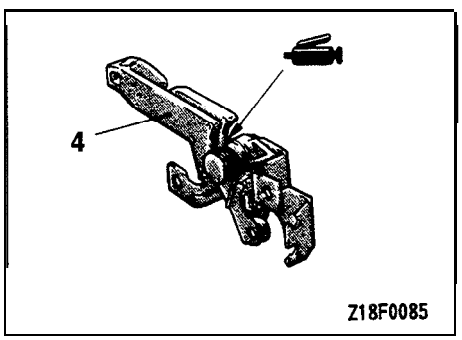
Z18F0130



Z18F0068



Z18F0069
00002242



Z18F0085

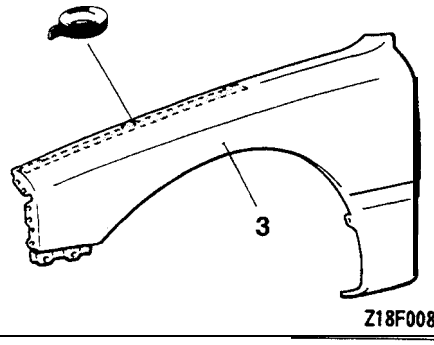
Removal steps
1. Fuel filler door
2. Fuel filler door hook
3. Release handle cover
4. Fuel filler door lock release handle
5. Fuel filler door lock release cable

TSB Revision

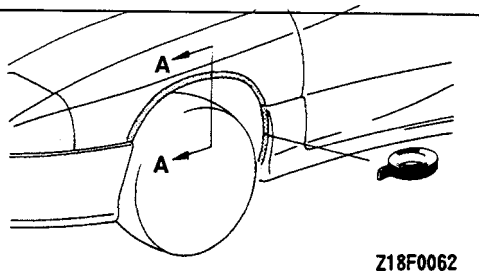
FENDER

REMOVAL AND INSTALLATION

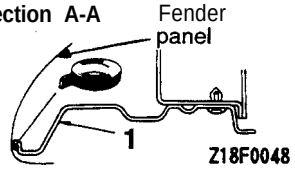
CAUTION: SRS
When removing and installing the front fender panel, do not allow any impact or shock to the front impact sensor.



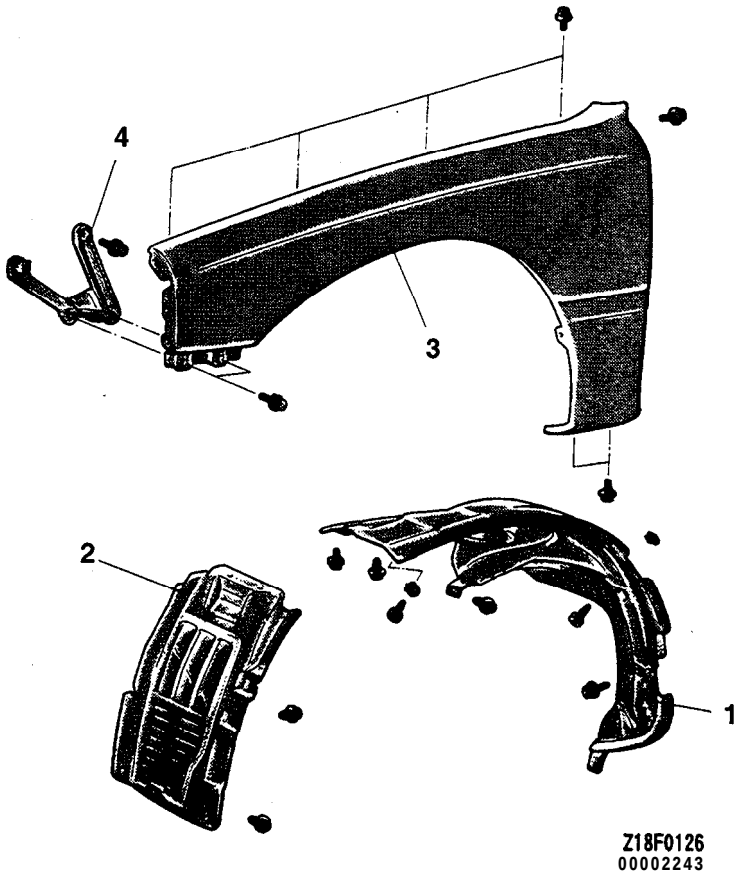
Sealant:
3M ATD Part No. 8625 or equivalent



Section A-A



Sealant:
3M ATD Part No. 8625 or equivalent



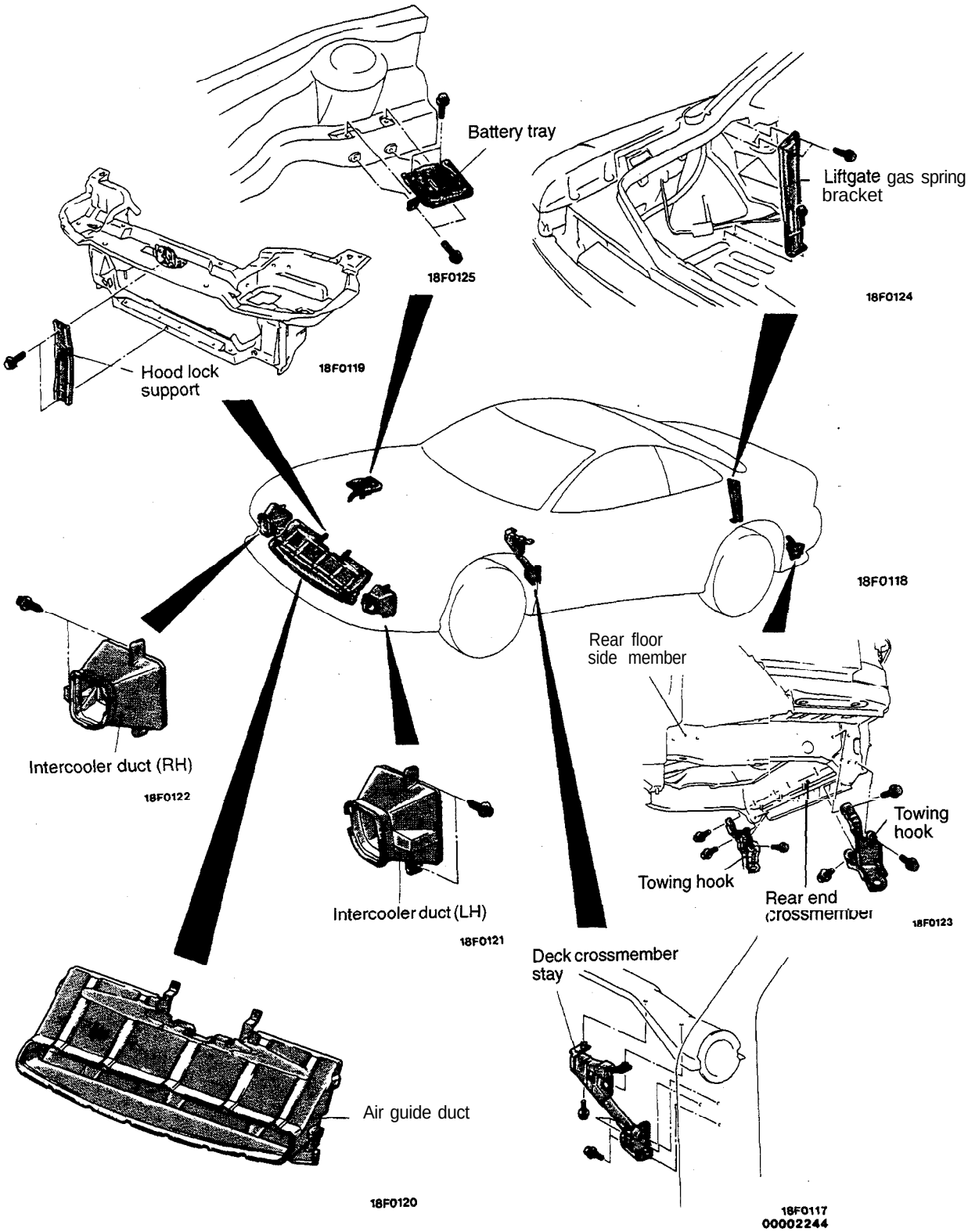
Removal steps

1. Front splash shield
   - Side airdam
     (Refer to GROUP 51 – Aero Parts.)
2. Front splash shield
   - Front bumper
     (Refer to GROUP 51 – Front Bumper.)
3. Front fender panel
4. Front fender bracket

TSB Revision

LOOSE PANEL

REMOVAL AND INSTALLATION



TSB Revision

WINDOW GLASS

GENERAL

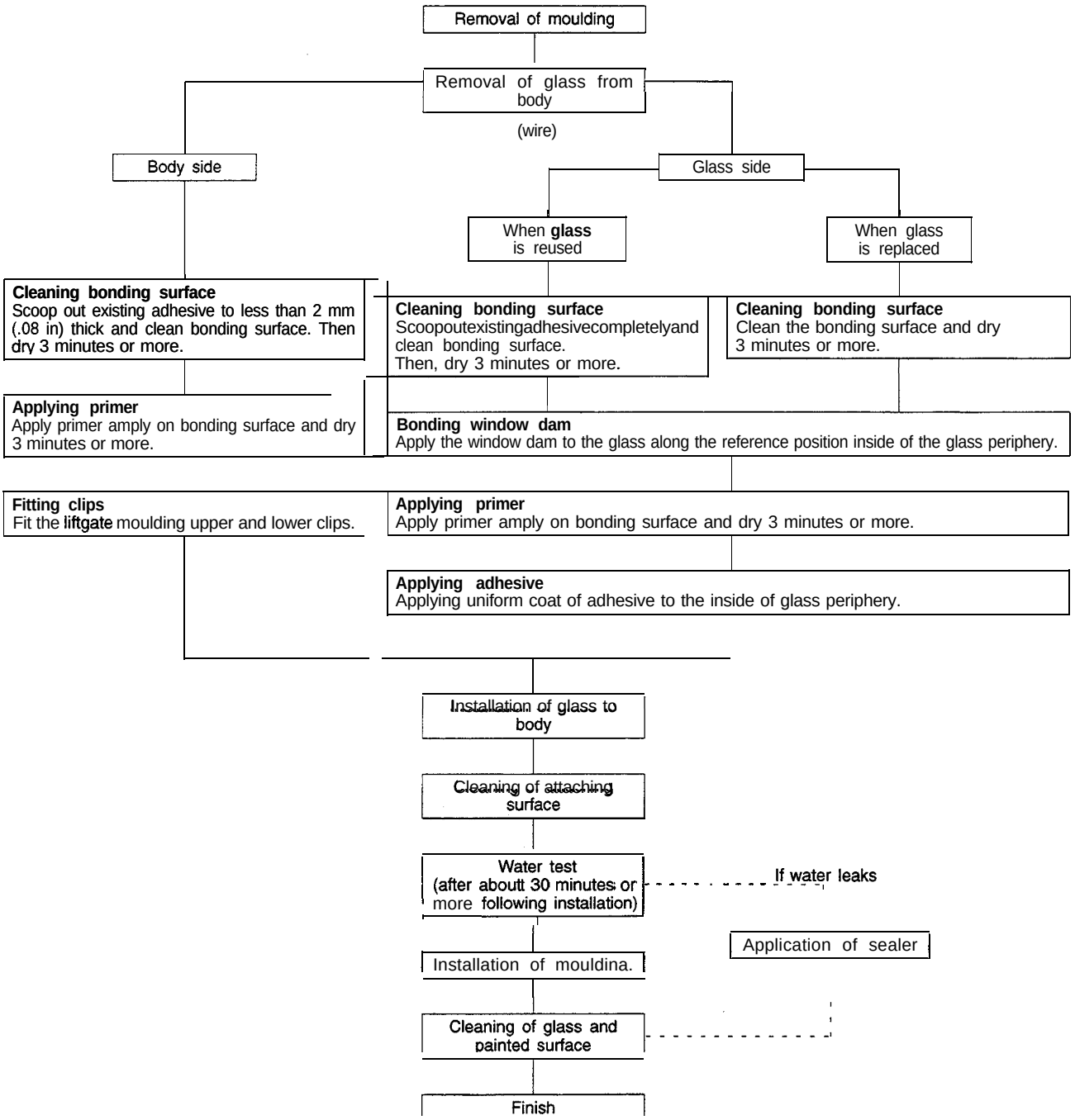
For bonding of the windshield and liftgate glass, a single-liquid urethane adhesive is used.

ADHESIVE AND RESERVE ITEMS

Adhesive and Reserve Items		Applications	Quantity
Adhesive	3M SUPER FAST URETHAN 8609		One cartridge
	3M SUPER FAST URETHAN PRIMER 8608		As required
Reserve items	Wire (dia. x length)	for cutting adhesive	Five pieces of wire **0.6** mm x 1 m (.02 in. x 3.3 ft.)
	Adhesive gun	for adhesive application	One
	3M ATD Part No. 8906	for cleaning jointing surfaces	As required
	Wiping rags		As required
	Sealer	for prevention of water leaks and gathering after adhesive application	As required
	Glass holder	–	Two
	Windshield moulding (Service Part)		One
	Window dam (Service Part)		As required

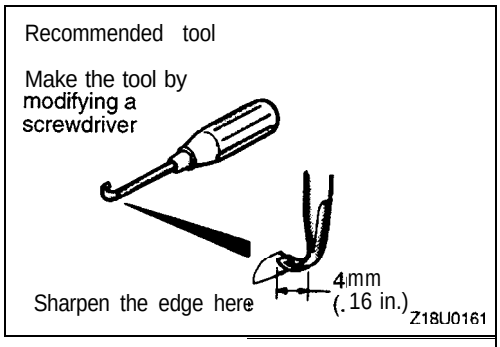
TSB Revision

WINDSHIELD AND LIFTGATE GLASS INSTALLATION PROCEDURE

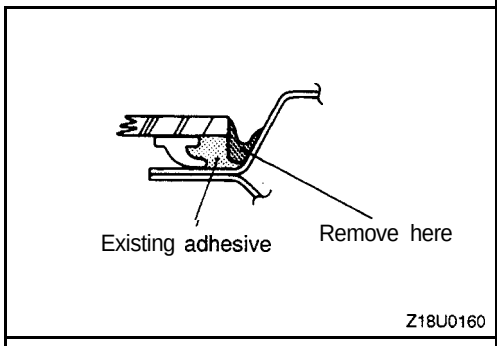


TSB Revision

MOULDING REPLACEMENT (BONDING TYPE)

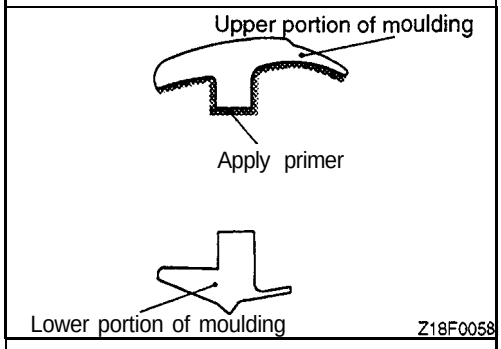


1. Remove the mouldings.
2. To cut the existing adhesive, make a tool such as the one shown.



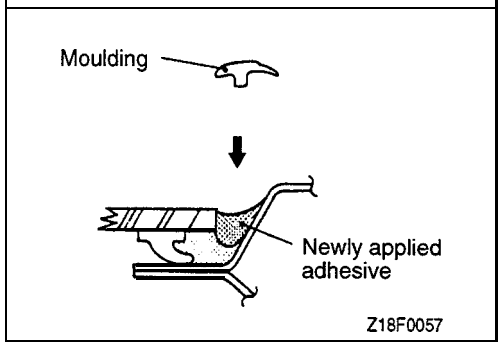
3. Using the tool, scoop out the existing adhesive.

Caution
1. Do not remove existing adhesive more than necessary.
Be careful not to damage the coated surface.
2. If the coated surface is damaged, apply paint.



4. Cut off the lower portion of a new moulding and install the moulding temporarily to check that it is seated securely.
5. Apply primer to the moulding.

Caution
Never touch the primer coated surface.



6. Apply adhesive to the illustrated area and install the moulding before it hardens.

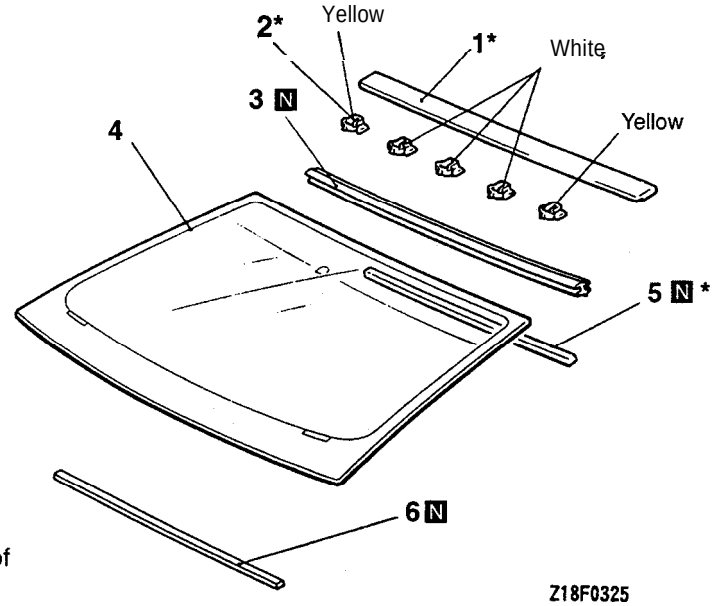
7. Scrape away excessive sealant forced out during installation of the moulding from the glass or body and wipe the surfaces clean with 3M ATD Part No. 8906 or equivalent.
8. After the work, leave the vehicle as it is until the adhesive hardens.

TSB Revision

WINDSHIELD

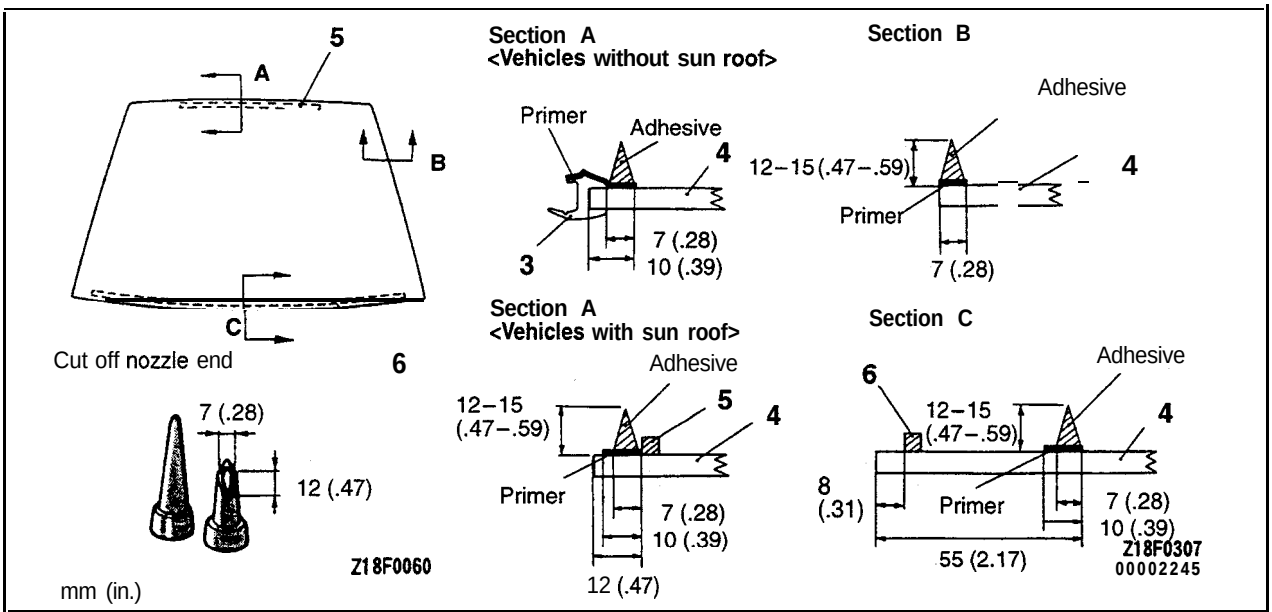
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Deck Garnish Removal and Installation (Refer to GROUP 51 – Garnishes and Mouldings.)
- Roof Drip Moulding Removal and Installation (Refer to GROUP 51 – Garnishes and Mouldings.)
- Headlining Removal and Installation (Refer to GROUP 52A – Headlining.)
- Front Pillar Trim Removal and Installation (Refer to GROUP 52A – Trims.)



NOTE
* Vehicles with sun roof

Z18F0325



mm (in.)

Adhesive: 3M SUPER FAST URETHAN 8609 or equivalent
Primer: 3M SUPER FAST URETHAN PRIMER 8608 or equivalent

Removal steps

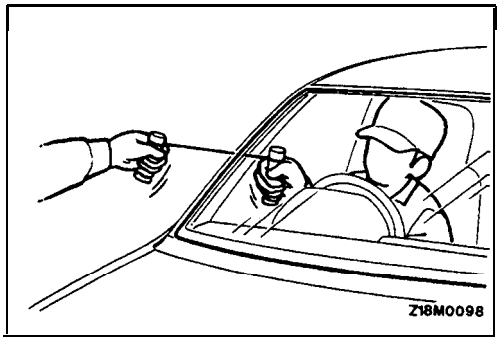
<Vehicles without sun roof>

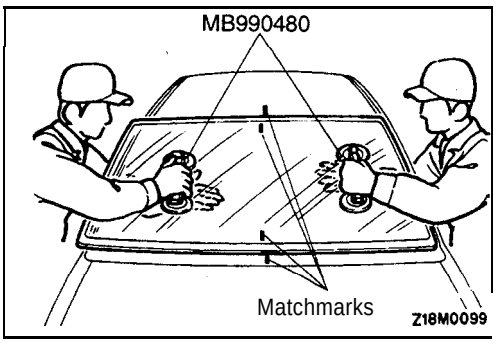
▶A◀ 3. Windshield moulding
◀A▶ ▶A◀ 4. Windshield glass
6. Window spacer (lower)

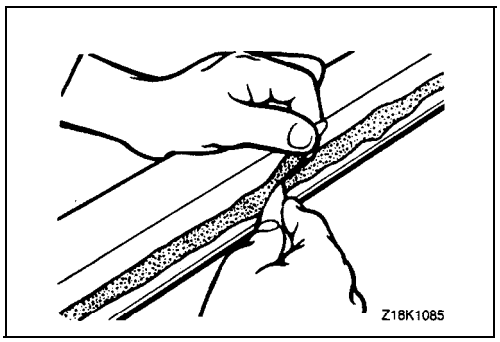
<Vehicles with sun roof>

1. Windshield moulding
2. Moulding clip
◀A▶ ▶A◀ 4. Windshield glass
▶A◀ 5. Window spacer (upper)
▶A◀ 6. Window spacer (lower)

TSB Revision







REMOVAL SERVICE POINT

◀A▶ WINDSHIELD GLASS REMOVAL

Remove windshield using the following procedure.

(1) For protection of the body (coated surface), apply cloth tape to all around the body where the glass is installed.
(2) Using a drill of sharp bit, drill a hole through the adhesive fixing the windshield glass.
(3) Run a wire through the hole from inside of the compartment.
(4) Pull the wire alternately from inside and outside of the compartment to cut off the adhesive.

Caution
Be careful to prevent contact of the wire with the windshield glass edge.

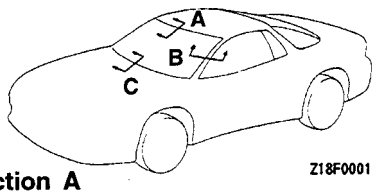
(5) Put matchmarks on the body and the glass.
(6) Using the special tool, remove the windshield glass.

(7) Using a sharp knife, scoop out existing adhesive from the body flange to 2 mm (.08 in.) or less thickness all around the window opening.
(8) Finish smooth the flange surfaces.

Caution
1. Do not remove the adhesive more than necessary.
2. Be careful not to damage the coated surface of the body with the knife. If it is damaged, apply retouch paint of anti-corrosive.

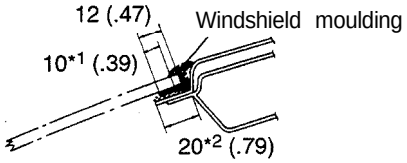
(9) If the glass is reused, scoop out existing adhesive and fragments of the window dam completely from the glass and degrease with 3M ATD Part No. 8906 or equivalent.
(lO)Degrease the body same way.

Caution
After degreasing, allow three minutes or more to dry well before next work. Do not touch the degreased surface.



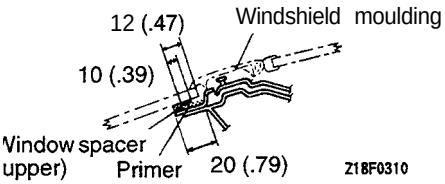
Z18F0001

Section A
<Vehicles without sun roof>



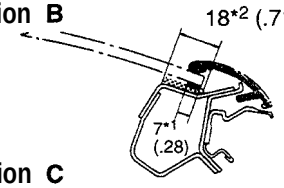
Z18F0055

<Vehicles with sun roof>

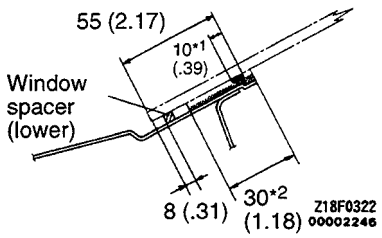


Z18F0310

Section B



Section C
Z18F0054



Z18F0322
00002246

mm (in.)

*1: Glass surface
● 2: Body surface

INSTALLATION SERVICE POINTS

▶A◀ WINDOW SPACER (LOWER) / WINDOW SPACER (UPPER) / WINDSHIELD GLASS / WINDSHIELD MOULDING INSTALLATION

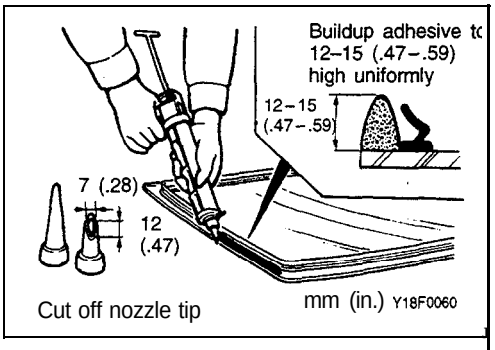
(1) <On vehicles without sun roof>
Install the windshield moulding to the windshield.
<On vehicles with sun roof>
Affix the window spacer (upper) to the specified area of the windshield.
(2) Affix the window spacer (lower) to the specified area of the windshield.
(3) When replacing glass, fit a new glass once to the body and put matchmarks on the body and glass.
(4) Apply a uniform coat of primer to the illustrated areas of the body and glass making sure it is applied without breaks or thin spots.

Adhesive:
3M SUPER FAST URETHAN PRIMER 8608 or equivalent

Caution
1. The primer is used to strengthen bonding power. Make sure that it covers the surfaces completely. Note that the primer if applied to thick can cause loss of bonding power.
2. Never touch the primer coated surface.

(5) Allow 3 to 30 minutes to dry the primer.

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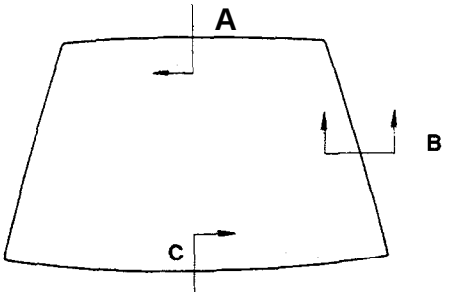


(6) Within 30 minutes of primer application, apply the adhesive all around the windshield glass uniformly.

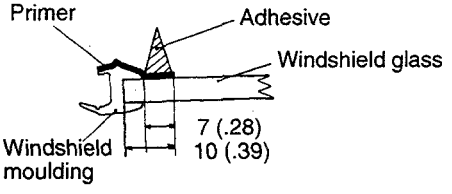
Adhesive:
3M SUPER FAST URETHAN 8609 or equivalent

NOTE
Cutting the nozzle tip of the sealant gun to a V-shape will help application.

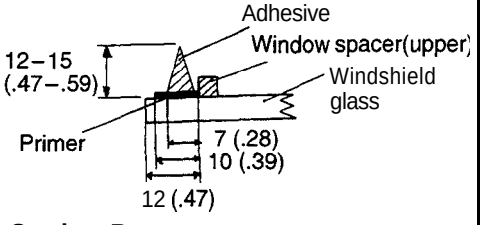
(7) Install the windshield moulding.



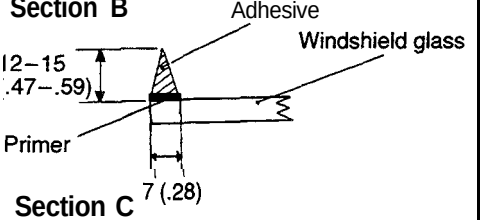
Section A
<Vehicles without sun roof>



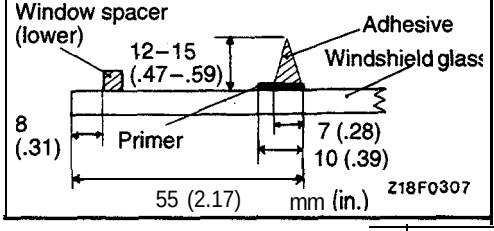
<Vehicles with sun roof>



Section B



Section C



(8) After application of the adhesive, line up the match-marks on the glass and body and force the glass lightly and evenly onto the body for complete fitting.
(9) Remove adhesive from around and on the glass and body surfaces using a spatula and wipe the surfaces clean.
(lO) After the work (installation of the glass), allow to stand until the adhesive hardens.

Caution
If an infrared lamp or other means are used for quicker hardening, keep the surface temperature 60°C (140°F) or lower.

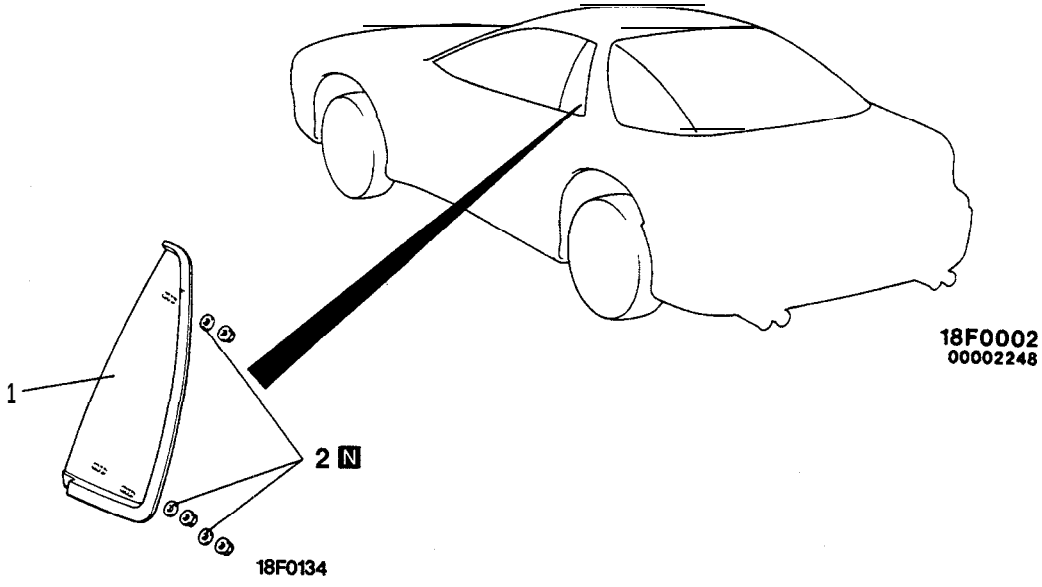
(11) After about 30 minutes or more following bonding of the windshield glass to the body, check for water leaks.

Caution
1. If the vehicle is to be moved, do so gently.
2. When checking for water leaks, do not apply water with the hose end squeezed.

CENTER PILLAR GLASS

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Quarter Upper Trim Removal and Installation (Refer to GROUP 52A – Trims.)
- Center Pillar Garnish Removal and Installation (Refer to GROUP 51 – Garnishes and Mouldings.)



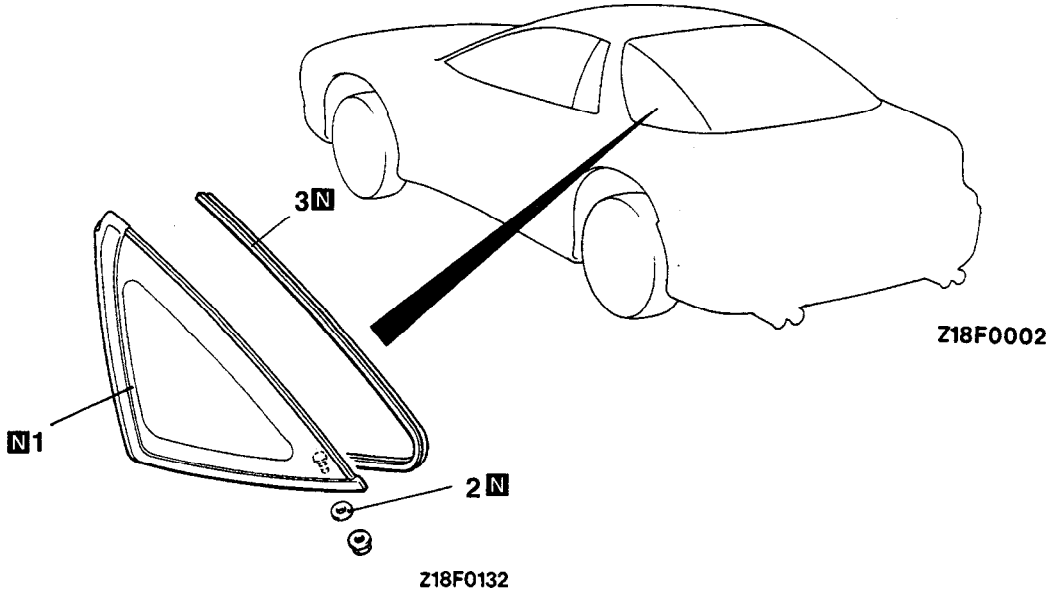
1. Center pillar glass
2. Packing

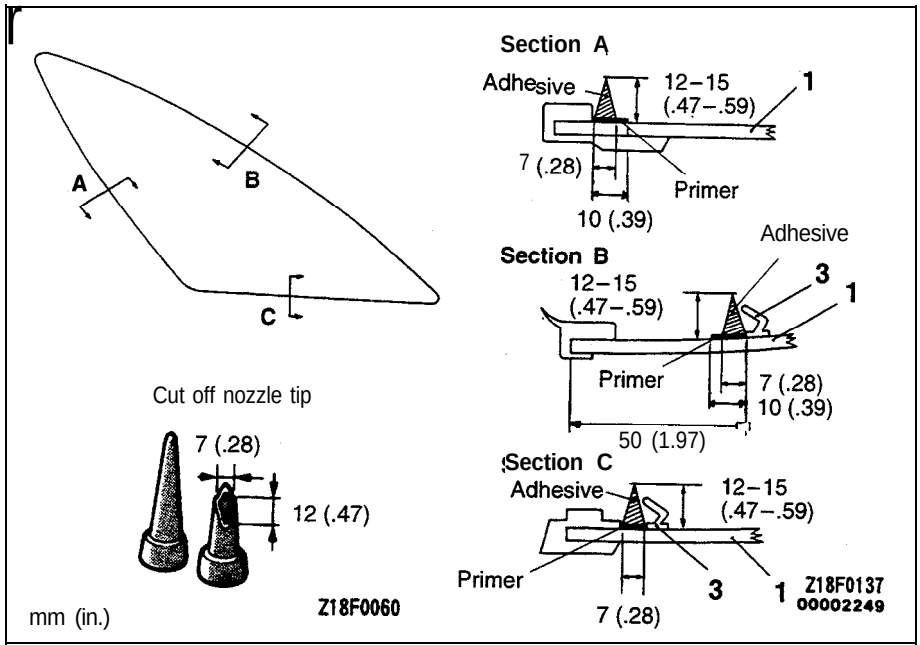
TSB Revision

QUARTER WINDOW GLASS

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Quarter Upper Trim Removal and installation (Refer to GROUP 52A – Trims.)
- Center Pillar Garnish Removal and Installation (Refer to GROUP 51 – Garnishes and Mouldings.)



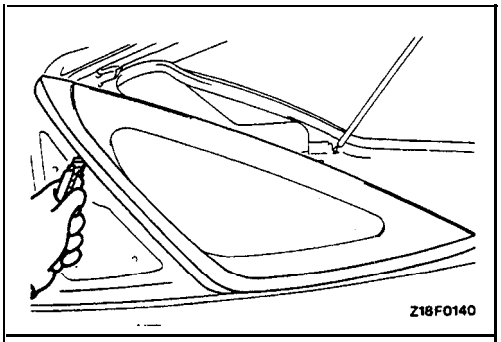


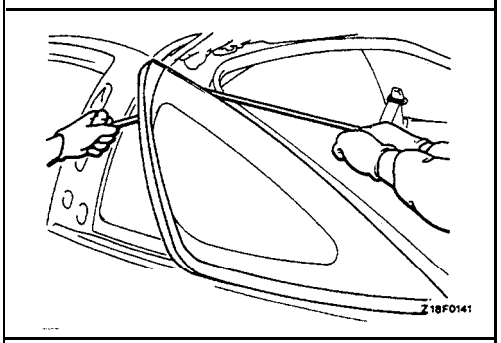
▲Adhesive: 3M SUPER FAST URETHAN 8609 or equivalent
▲Primer: 3M SUPER FAST URETHAN PRIMER 8608 or equivalent

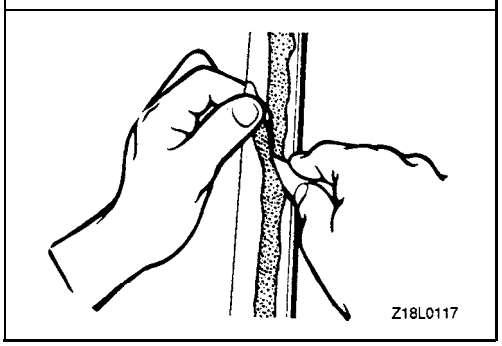
Removal steps

◀A▶ ▶A◀ 1. Quarter window moulding and glass
2. Packing
3. Window dam

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REMOVAL SERVICE POINT

◀A▶ QUARTER WINDOW MOULDING AND GLASS REMOVAL

(1) For protection of the body (coated surface), apply cloth tape to all around the body where the glass is installed.
(2) Using a cutter knife, cut off the quarter window moulding along its edge.

(3) Run a wire between the glass and the body at the upper portion of the quarter window and pull it back and forth along the glass to cut through the adhesive.
When doing so, pay attention to the bolt.

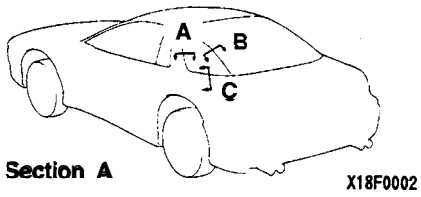
Caution
Hold the window glass with the glass holders to prevent it from falling when the adhesive is cut through.

(4) Using a sharp knife, scoop out existing adhesive from the body flange to 2 mm (.08 in.) or less thickness all around the window opening.
(5) Finish smooth the flange surface.

Caution
1. Do not remove the adhesive more than necessary.
2. Be careful not to damage the coated surface of the body with the knife. If it is damaged, apply retouch paint or anti-corrosive.

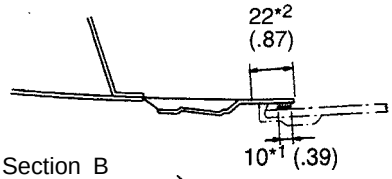
(6) Degrease using 3M ATD Part No. 8906 or equivalent.

Caution
After degreasing, allow three minutes or more to dry well before next work. Do not touch the degreased surface.

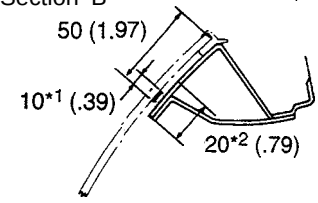


Section A

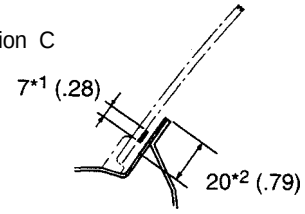
X18F0002



Section B



Section C



Z18F0143
00002250

- 1: Glass surface
- 2: Body surface

mm (in.)

INSTALLATION SERVICE POINT

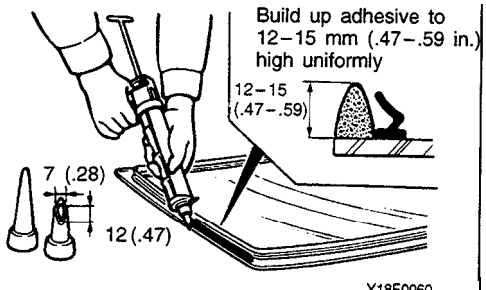
▶A◀ QUARTER WINDOW MOULDING AND GLASS INSTALLATION

(1) Apply a uniform coat of primer to the illustrated areas of the body and glass making sure it is applied without breaks or thin spots.

Caution

1. **The primer is used to strengthen bonding power. Make sure that it covers the surfaces completely. Note that the primer if applied to thick can cause loss of bonding power.**
2. **Never touch the primer** coated **surface.**

(2) Allow 3 to 30 minutes to dry the primer.



Y18F0060

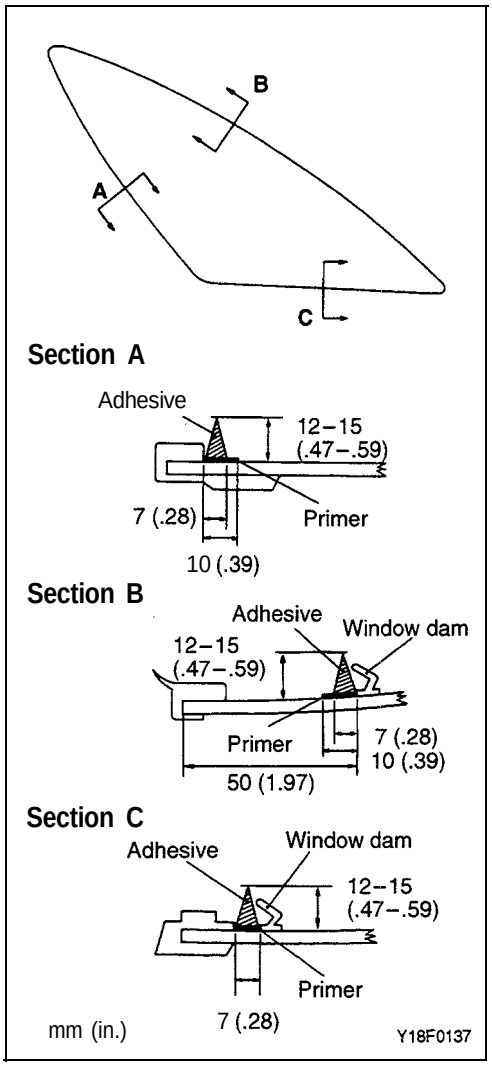
Cut off nozzle tip mm (in.)

(3) Within 30 minutes of primer application, apply the adhesive all around the windshield glass uniformly.

Adhesive:
3M SUPER FAST URETHAN 8609 or equivalent

NOTE
Cutting the nozzle tip of the sealant gun to a V-shape will help application.

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(4) After application of the adhesive, line up the matchmarks on the glass and body and force the glass lightly and evenly onto the body for complete fitting.

(5) Remove adhesive from around and on the glass and body surfaces using a spatula and wipe the surfaces clean.

(6) After the work (installation of the glass), allow to stand until the adhesive hardens.

Caution
If an infrared lamp or other means are used for quicker hardening, keep the surface temperature 60°C (140°F) or lower.

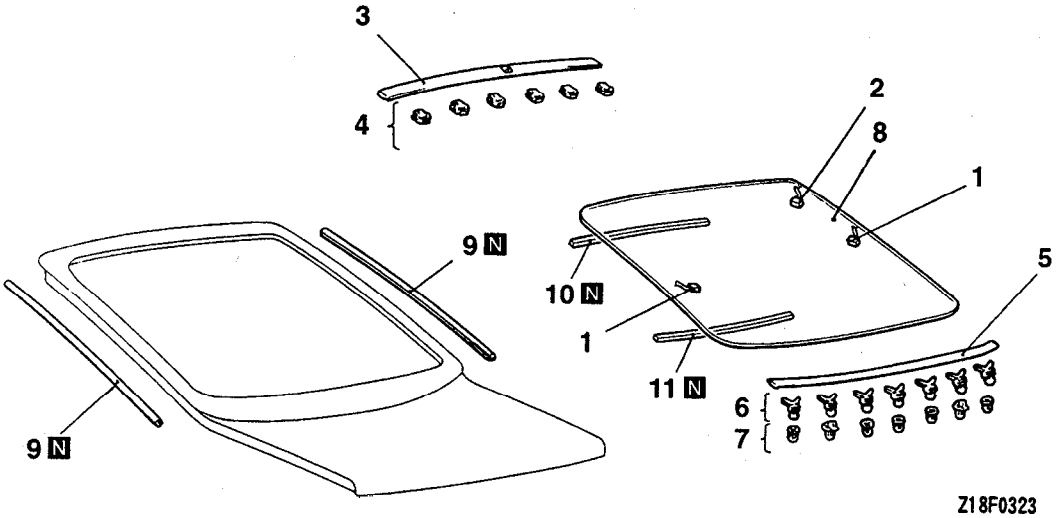
(7) After about 30 minutes or more following bonding of the windshield glass to the body, check for water leaks.

Caution
1. If the vehicle is to be moved, do so gently.
2. When checking for water leaks, do not squeeze the hose end.

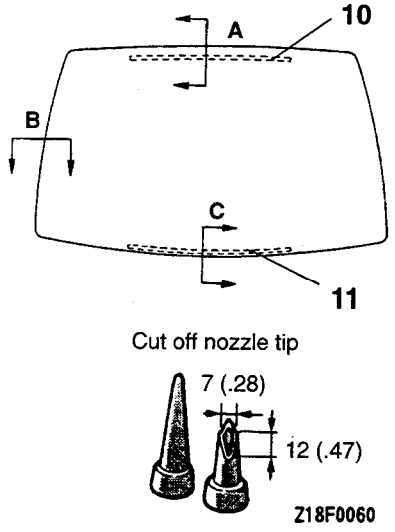
LIFTGATE GLASS

REMOVAL AND INSTALLATION

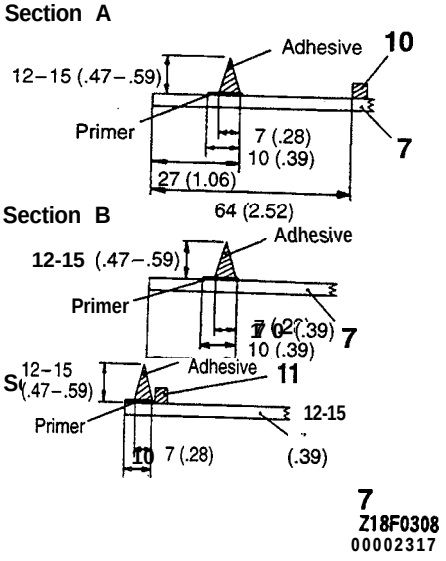
Pre-removal and Post-installation Operation
- Rear Wiper Arm Removal and installation (Refer to GROUP 51 -Windshield Wiper and Washer.)
- Liftgate Upper Trim Removal **and** Installation (Refer to GROUP 52A – Trims.)
- Liftgate Trim Removal and Installation (Refer to GROUP 52A – Trims.)
- Liftgate Side Trim Removal and Installation (Refer to GROUP 52A – Trims.)



Z18F0323



Z18F0060



Z18F0308
00002317

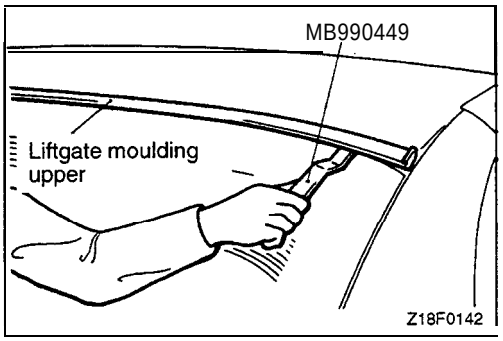
mm (in.)

Adhesive: 3M SUPER FAST URETHAN 8609 or equivalent
Primer: 3M SUPER FAST URETHAN PRIMER 8608 or equivalent

Removal steps

1. Defogger connector
2. Glass antenna connection
◀A▶ 3. Liftgate moulding upper
4. Liftgate moulding upper clip
◀A▶ 5. Liftgate moulding lower
6. Liftgate moulding lower clip
7. Clip grommet
◀B▶ ▶A◀ 8. Lift gate glass
9. Liftgate moulding side
10. Window spacer (upper)
11. Window spacer (lower)

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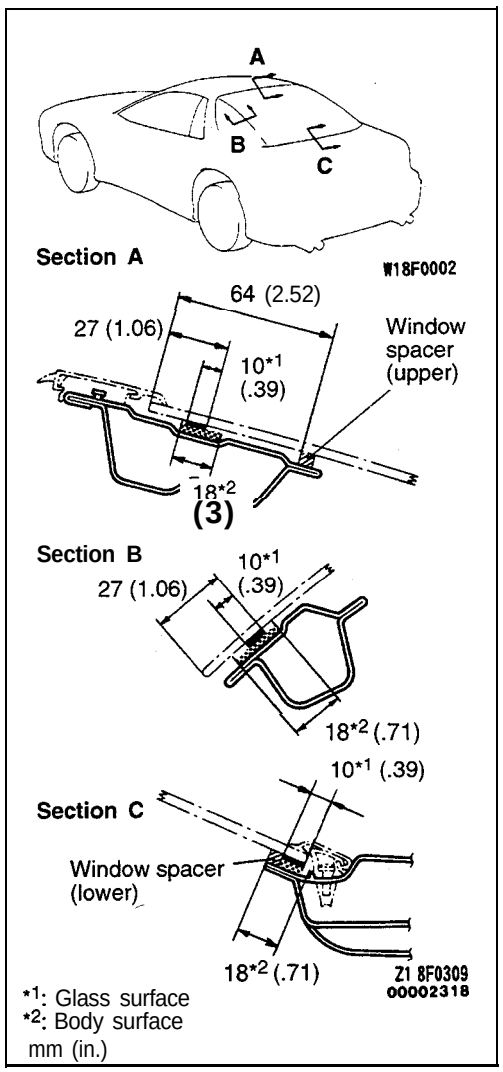
REMOVAL SERVICE POINTS

◀A▶ LIFTGATE MOULDING UPPER / LIFTGATE MOULDING LOWER REMOVAL

Using the special tool, pry up the clipped portions to remove the liftgate moulding upper and lower.

◀B▶ LIFTGATE GLASS REMOVAL

Remove the same way as the windshield glass. (Refer to P.42-30.)



INSTALLATION SERVICE POINT

▶A◀ LIFTGATE GLASS INSTALLATION

(1) Affix the window spacer to the specified area of the liftgate glass.
(2) To replace the liftgate glass with a new one, fit the new liftgate glass to the body and put match marks to the body and the liftgate glass.
(3) Apply a uniform coat of primer to the illustrated areas of the body and glass making sure it is applied without breaks or thin spots.

Adhesive:
3M SUPER FAST URETHAN PRIMER 8608 or equivalent

Caution
1. **The primer is used to strengthen bonding power. Make sure that it covers the surfaces completely. Note that the primer if applied to thick can cause loss of' bonding power.**
2. **Never touch the primer coated surface.**

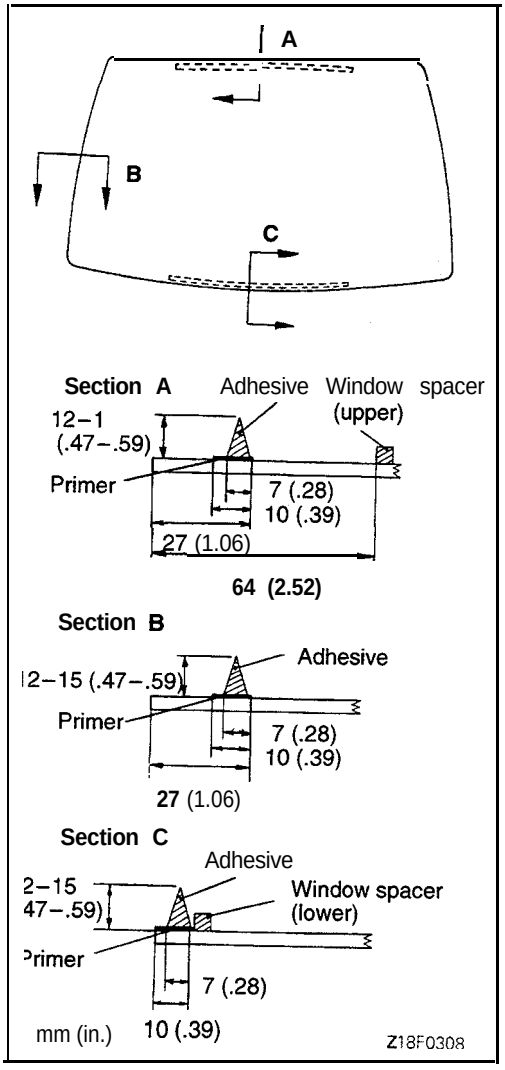
(4) Allow 3 to 30 minutes to dry the primer.

(5) Within 30 minutes of primer application, apply the adhesive all around the liftgate glass uniformly.

Adhesive:
3M SUPER FAST URETHAN 8609 or equivalent

NOTE
Cutting the nozzle tip of the sealant gun to a V-shape will help application.

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(6) After application of the adhesive, line up the matchmarks on the glass and liftgate and force the glass lightly and evenly for complete fitting.
(7) Remove adhesive from around and on the glass and body surfaces using a spatula and wipe the surfaces clean.
(8) After the work (installation of the glass), allow to stand until the adhesive hardens.

Caution
If an infrared lamp or other means are used for quicker hardening, keep the surface temperature 60°C (140°F) or lower.

(9) After about 30 minutes or more following bonding of the liftgate glass to the tail gate, check for water leaks.

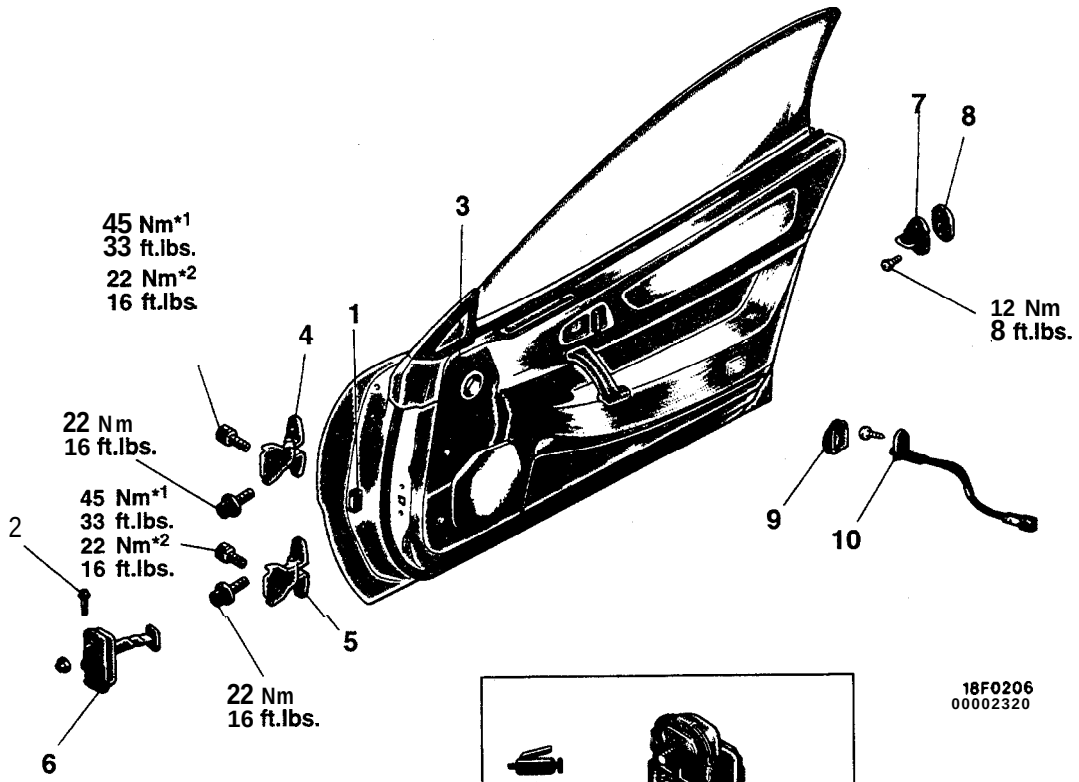
Caution
1. If the vehicle is to be moved, do so gently.
2. When the checking for water leaks, do not squeeze the hose end.

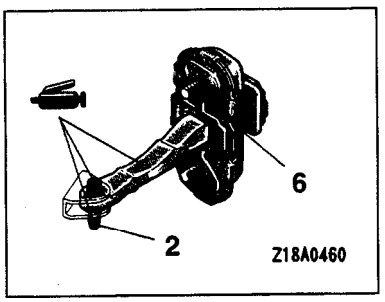
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DOOR ASSEMBLY

REMOVAL AND INSTALLATION

Adjustment
- Door Adjustment (Refer to P.42-12.)





NOTE
*1: Up to 1994 models
*2: From 1995 models

Door assembly removal steps
1. Connection for door wiring harness connector
2. Spring pin
3. Door assembly
4. Upper hinge
5. Lower hinge

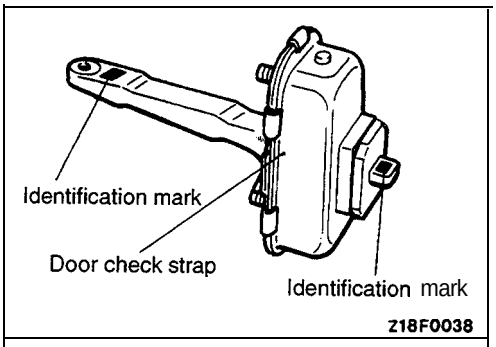
Door check strap removal steps
- Door trim (Refer to P.42-42.)
- Waterproof film (Refer to P.42-42.)

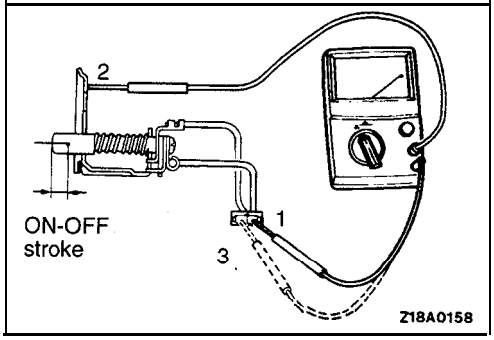
2. Spring pin
▶A◀ 6. Door check strap

Striker removal steps
7. Striker
8. Striker shim

Door switch removal steps
9. Door switch cap
10. Door switch

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INSTALLATION SERVICE POINT

▶A◀ DOOR CHECK STRAP INSTALLATION

Install the door check strap with the identification mark facing up.

Position	Identification mark	
Door (L.H.)	WL	L
Door (R.H.)	WR	R

INSPECTION

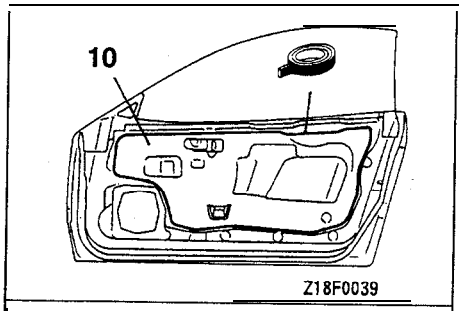
DOOR SWITCH CHECK

Operate the switch, and check the continuity between the terminals.

Switch position		Terminal No.		
		1	2	3
Switch	Open (ON)	0	A	0
	Depressed (OFF)			

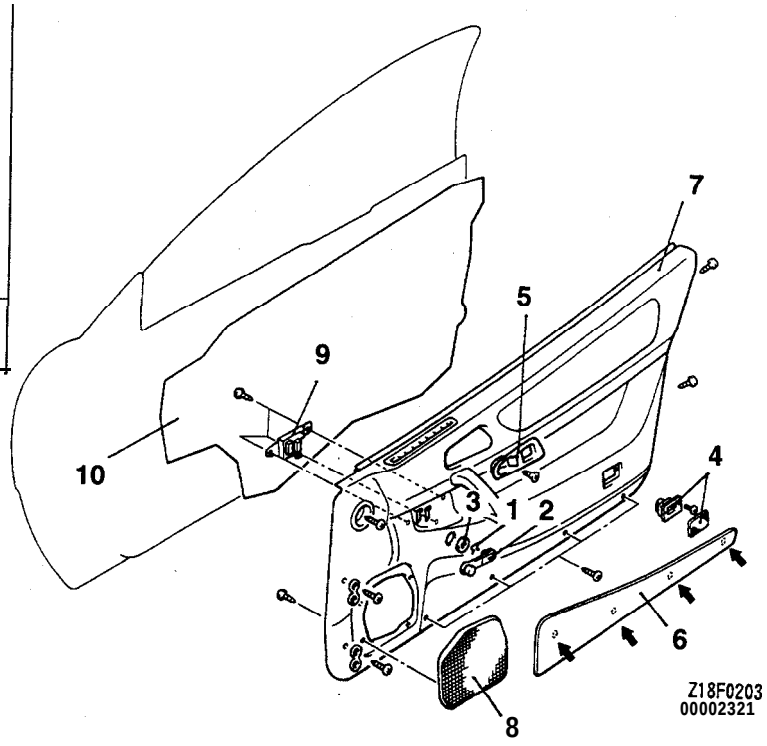
DOOR TRIM AND WATERPROOF FILM

REMOVAL AND INSTALLATION



Sealant:
3M ATD Part No. 8625 or equivalent

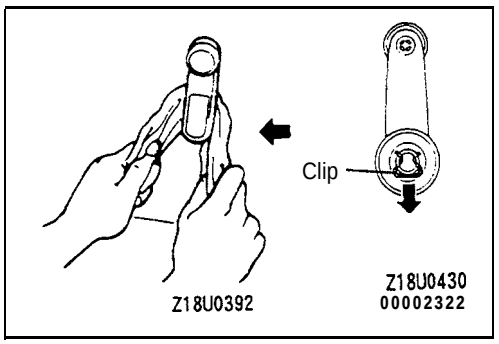
NOTE
⬅: Clip locations



Removal steps

◀A▶
1. Clip
2. Door window regulator handle
3. Escutcheon
4. Door light
5. Inside handle cover
6. Door trim carpet
7. Door trim
8. Speaker garnish
9. Power window switch
10. Waterproof film

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REMOVAL SERVICE POINT

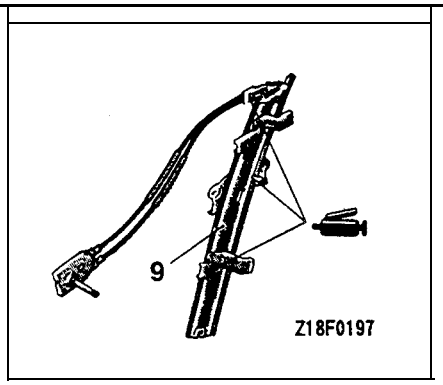
◀A▶ CLIP REMOVAL

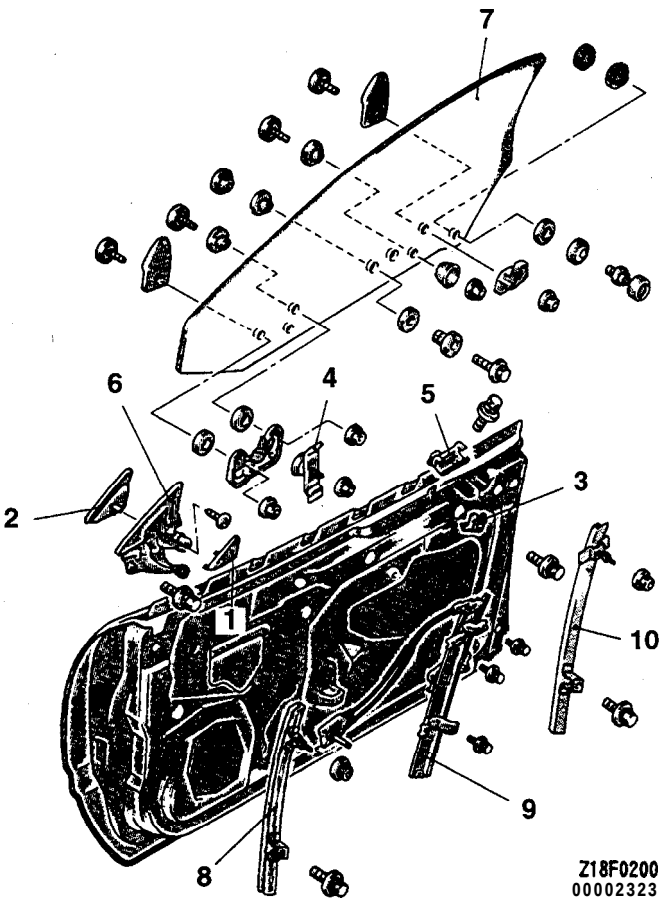
Use a shop towel to remove the clip; and remove door window regulator handle.

DOOR GLASS AND REGULATOR

REMOVAL AND INSTALLATION

Adjustment
- Door Window Glass Adjustment (Refer to P.42-12.)





Removal steps

- Door trim (Refer to P.42-42.)
- Waterproof film (Refer to P.42-42.)

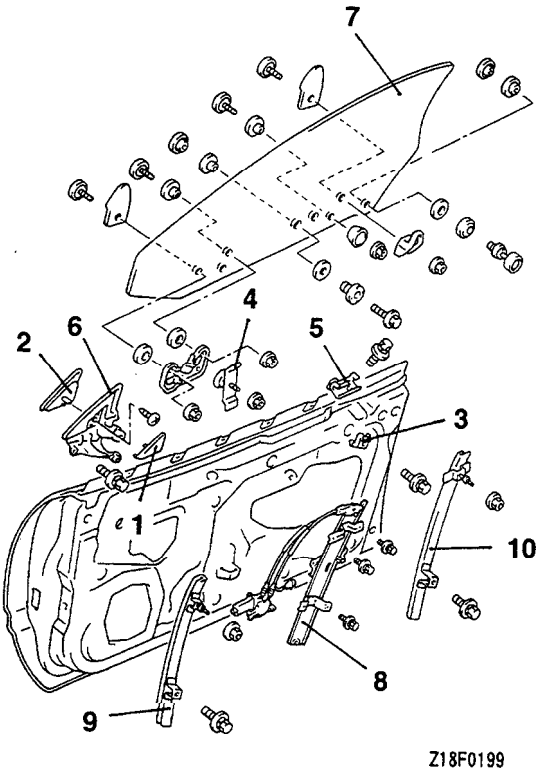
1. Delta cover inner
2. Delta cover outer
   - Door belt line outer weatherstrip (Refer to P.42-63.)
3. up stop
4. Stabilizer inner front
5. Stabilizer inner rear
6. Delta sash
7. Door window glass
8. Door glass guide track front
9. Door window regulator assembly
10. Door glass guide track rear

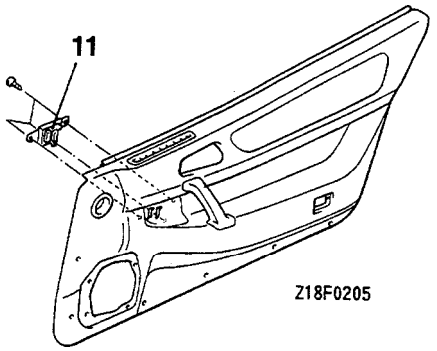
TSB Revision

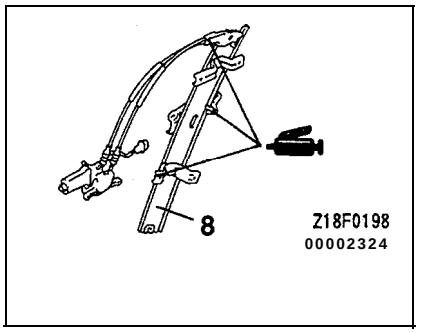
POWER WINDOW

REMOVAL AND INSTALLATION

Adjustment
- Door Window Glass Adjustment (Refer to P.42-12.)







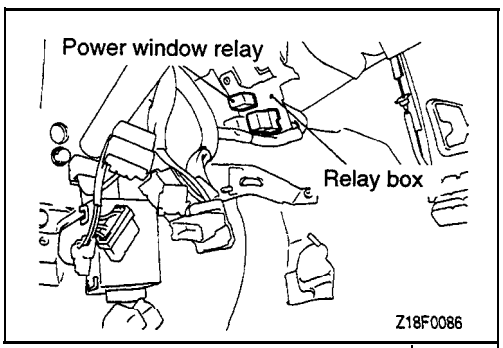
Door window regulator assembly removal steps
- Door trim (Refer to P.42-42.)
- Waterproof film (Refer to P.42-42.)

1. Delta cover inner
2. Delta cover outer
- Door belt line outerweatherstrip (Refer to P.42-63.)

3. up stop
4. Stabilizer inner front
5. Stabilizer inner rear
6. Delta sash
7. Door window glass
8. Door window regulator assembly
9. Door glass guide track front
10. Door glass guide track rear

Power window switch assembly removal steps
- Door trim (Refer to P.42-42.)

11. Power window switch assembly

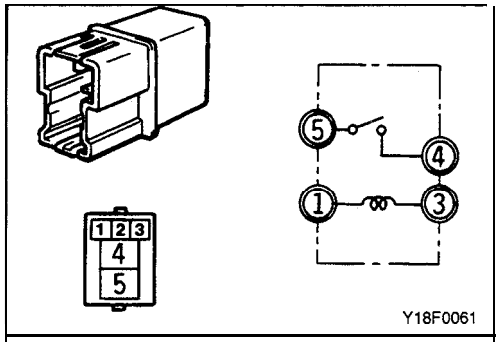


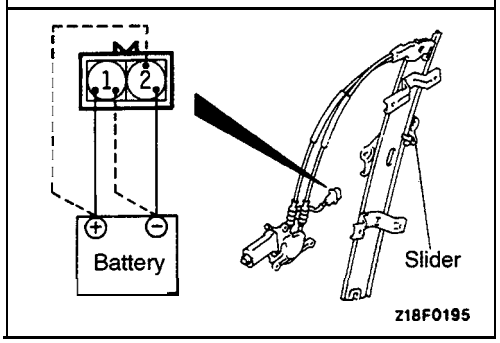
INSPECTION

POWER WINDOW RELAY CHECK

(1) Remove the knee protector assembly. (Refer to GROUP 52A – Instrument Panel.)
(2) Remove the power window relay from indoor relay box.

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(3) Apply battery voltage to terminal 1, and check for continuity when terminal 3 is grounded.

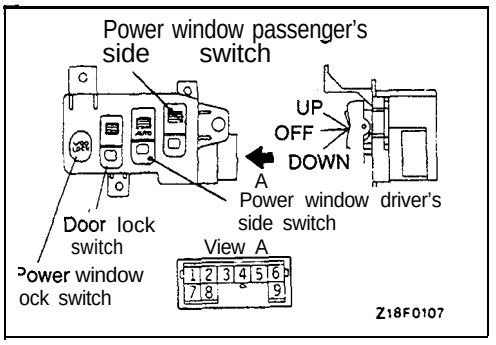
Battery voltage	Terminal No.			
	1	3	4	5
Continuity no voltage	0	0		
Continuity with voltage			0	0

POWER WINDOW MOTOR CHECK

(1) Connect the battery directly to the motor terminal and check that the slider moves smoothly.
(2) Connect the battery in reverse polarity and check that the slider moves in opposite direction.

CIRCUIT BREAKER CHECK (INCORPORATED IN THE POWER WINDOW MOTOR)

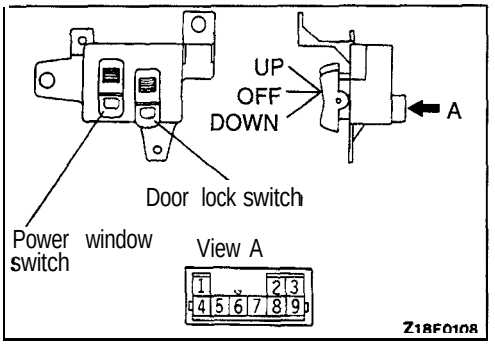
(1) Press the UP switch to fully close the window glass, and continue to press the switch for 10 seconds.
(2) At the moment that the UP switch is released, press the DOWN switch. The circuit breaker can be considered good if at this time the door window glass begins to open within 60 seconds.



POWER WINDOW MAIN SWITCH CHECK

Check for continuity in accordance to the following connection table.

Switch position			Terminal No.							
			Driver's side switch				Passenger's side switch			
			1	2	6	9	1	3	4	6
Power window switch	Power window lock switch (unlock)	UP	○	○			○	○	○	○
		OFF		○	○	○		○	○	○
		DOWN	○	○	○	○	○	○	○	○
	Power window lock switch (lock)	UP	○	○	○	○	○		○	
		OFF		○	○	○		○	○	
		DOWN	○	○	○	○	○	○		



POWER WINDOW SUB SWITCH CHECK

Check for continuity in accordance with the following connection table.

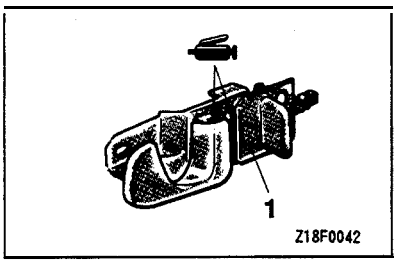
Switch position	Terminal No.				
	3	5	7	8	9
UP	○			○	
		○			○
OFF		○	○		
	○			○	
DOWN	○				○
		○	○		

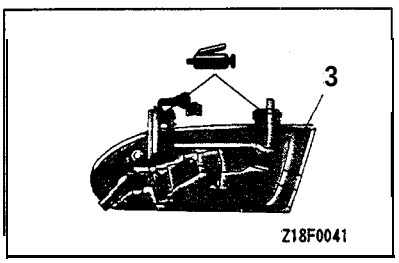
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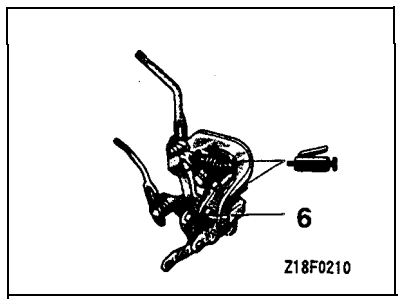
DOOR HANDLE AND LATCH

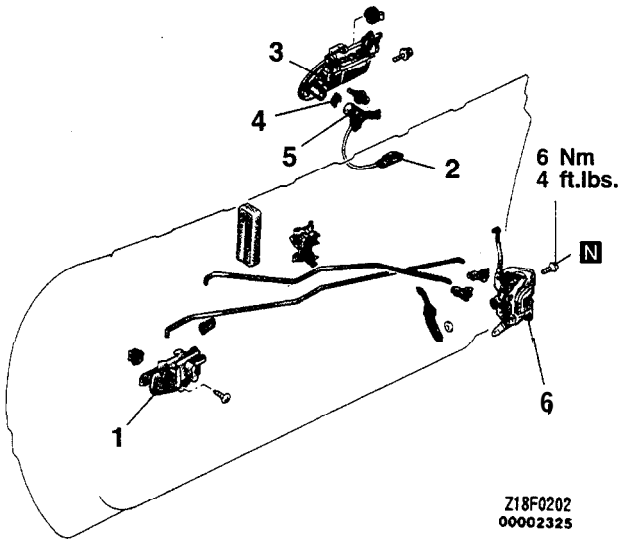
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Door Trim and Waterproof Film Removal and Installation (Refer to P.42-42.)







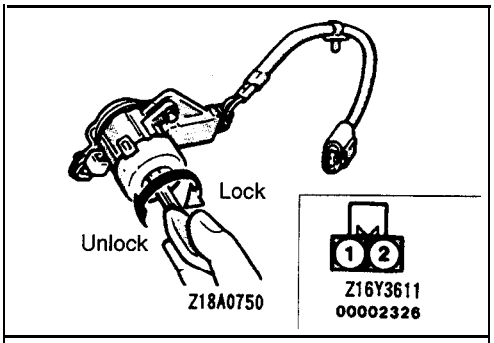


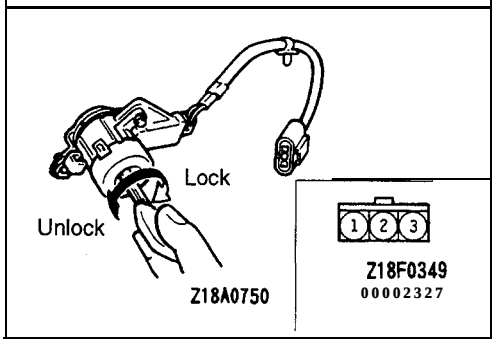
Door inside handle removal
- Door inside handle play check (Refer to P.42-16.)

1. Door inside handle

Door outside handle and latch removal steps
2. Door key cylinder unlock switch connector
   (Vehicles with central door locking or theft-alarm system)
3. Door outside handle
4. Ring
5. Door lock key cylinder
6. Door latch assembly

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INSPECTION

DOOR KEY CYLINDER UNLOCK SWITCH CHECK

<Up to 1993 models>

The key cylinder unlock switch is normal if there is not continuity between terminals 1 and 2 when the key is turned approx. 20° clockwise or counterclockwise from the neutral position, and there is continuity when it is turned further.

<From 1994 models>

Insert the key and turn it to the LOCK or UNLOCK position to check for continuity as follows:

<Vehicles with central door locking system> or <Vehicles with central door locking system and theft-alarm system>

Switch position			Terminal No.		
			1	2	3
Door key cylinder unlock switch	L.H. side	LOCK		0 —	— 0
		Neutral			
		UNLOCK	0 —	— 0	
	R.H. side	LOCK	0 —	— 0	
		Neutral			
		UNLOCK		○ —	— ○

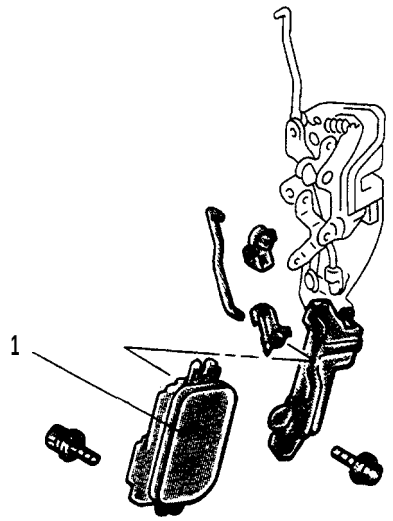
<Vehicles with theft-alarm system only>

Switch position		Terminal No.		
		1	2	3
Door key cylinder unlock switch (L.H. side and R.H. side)	LOCK		○ —	— ○
	Neutral			
	UNLOCK		○ —	— ○

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CENTRAL DOOR LOCKING SYSTEM

REMOVAL AND INSTALLATION

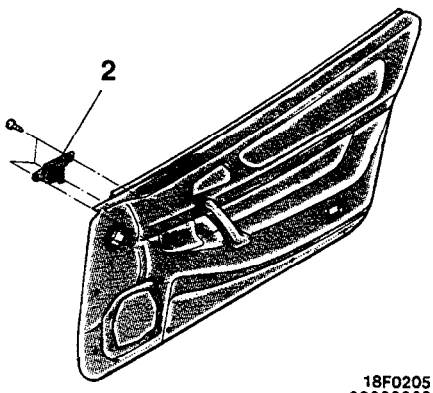


18F0196

Door lock actuator removal

- Door trim and waterproof film (Refer to P.42-42.)
- Door latch assembly (Refer to P.42-47.)

1. Door lock actuator

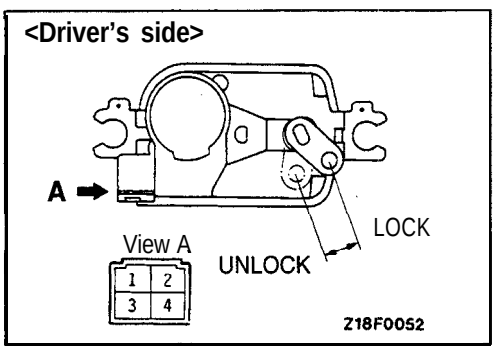


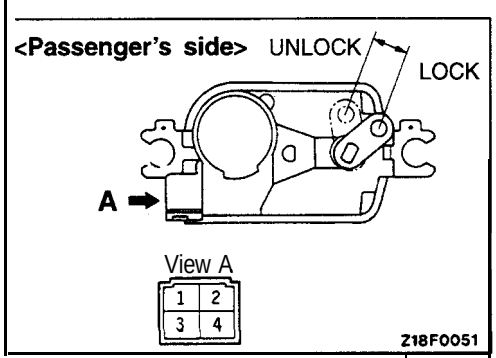
18F0205
00002328

Door lock switch removal

- Door trim (Refer to P.42-42.)

2. Door lock switch





INSPECTION

DOOR LOCK ACTUATOR

(1) Place the rod in the LOCK position, apply the battery power to the terminal [(3) for driver's side or (1) for passenger's side] and check to see that when the terminal [(1) for driver's side or (3) for passenger's side] is grounded, the rod moves to the UNLOCK position.

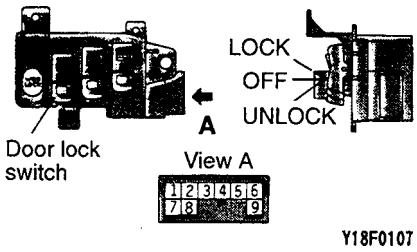
(2) Then place the rod in the UNLOCK position, apply the battery power to the terminal [(1) for driver's side or (3) for passenger's side], and check to see that when the terminal [(3) for driver's side or (1) for passenger's side] is grounded, the rod moves to the LOCK position.

(3) Check to ensure that when the rod is placed in the UNLOCK position, there is a continuity between the terminals (2) and **(4)**, and that when the rod is placed in the LOCK position, there is no continuity.

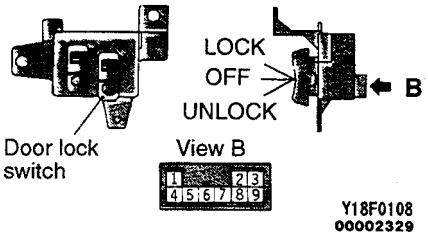
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<Vehicles with power window>

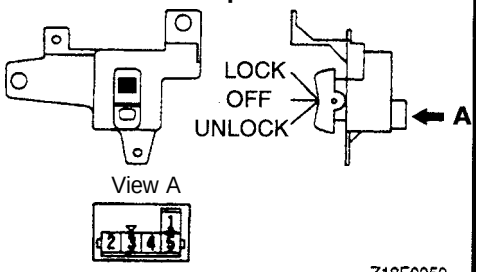
Power window main switch side

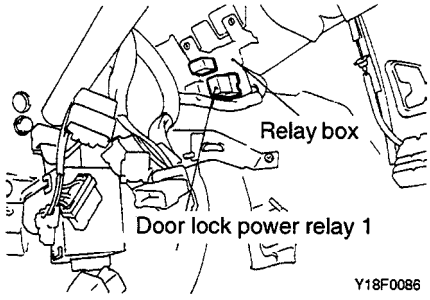


Power window sub switch side



<Vehicles without power window>





DOOR LOCK SWITCH CHECK

Check for continuity in accordance to the following connection table.

<Vehicles with power window>

Power window main switch side

Switch position	Terminal No.		
	7	6	5
LOCK	○	○	
OFF			
UNLOCK		○	○

Power window sub switch side

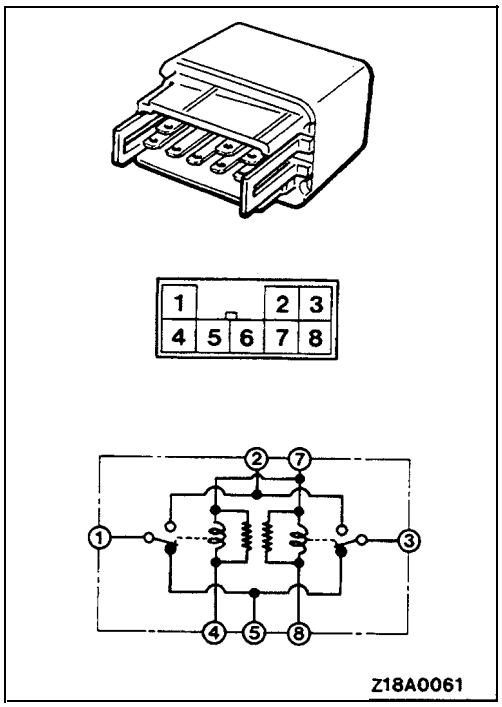
Switch position	Terminal No.		
	4	6	1
LOCK	○	○	
OFF			
UNLOCK		○	○

<Vehicles without power window>

Switch position	Terminal No.		
	3	2	5
LOCK	○	○	
OFF			
UNLOCK		0	0

DOOR LOCK POWER RELAY CHECK

(1) Remove the knee protector assembly. (Refer to GROUP 52A – Instrument Panel.)
(2) Remove the door lock power relay 1 from indoor relay box.
(3) Remove the door lock power relay 2. (Refer to P.42-52.)



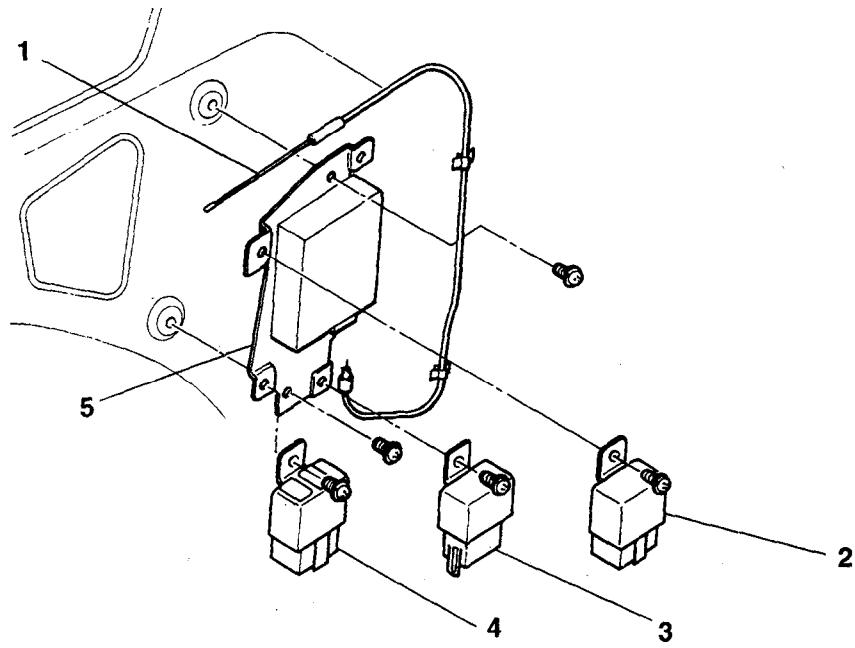
(4) Check for continuity between terminals under the conditions described below.

Battery voltage	Terminal No.						
	1	2	3	4	5	7	8
Continuity no voltage	○		○		○		
				○		○	○
Continuity with voltage	○	○		⊖		⊕	
		○	○			⊕	⊖

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KEYLESS ENTRY SYSTEM <From 1993 model>

REMOVAL AND INSTALLATION



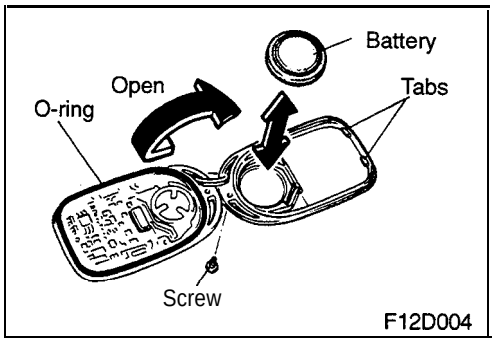
Z18F0317

Removal steps

- Quarter trim (L.H.) (Refer to GROUP 52A – Trims.)

1. Antenna
2. Light automatic shut-off unit
3. Rear intermittent wiper relay
4. Door lock power relay 2
5. Receiver assembly

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INSPECTION

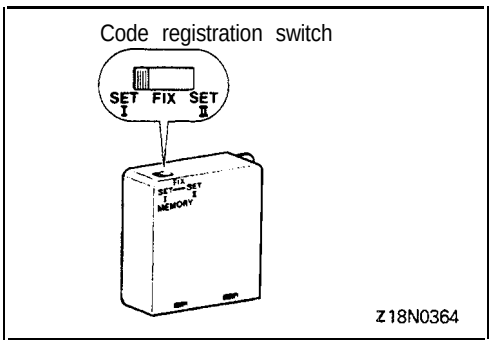
BATTERY REPLACEMENT

(1) Remove the mounting screw and take the battery out of the transmitter.
(2) Install a new battery with its positive side down.

Replacement battery: Coin type battery CR2032

(3) Insert the tabs first. Then, being careful not to shift the O-ring, assemble the transmitter.
(4) Make sure that the keyless entry system operates properly.

NOTE
(1) When the transmitter is opened, be careful not to allow water, dust, etc. to stick to the inside of the transmitter. In addition, do not touch the precision electronic device.
(2) If the O-ring is shifted while assembling the transmitter, water, dust, etc. may enter the transmitter, resulting in transmitter troubles.

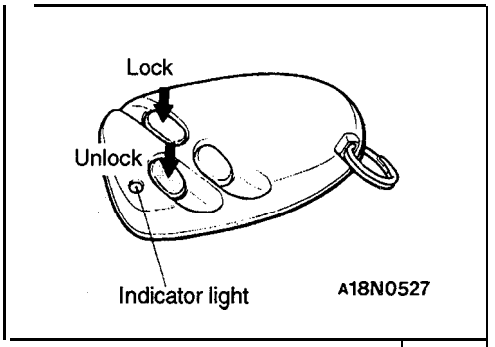


SECRET CODE REGISTERING METHOD

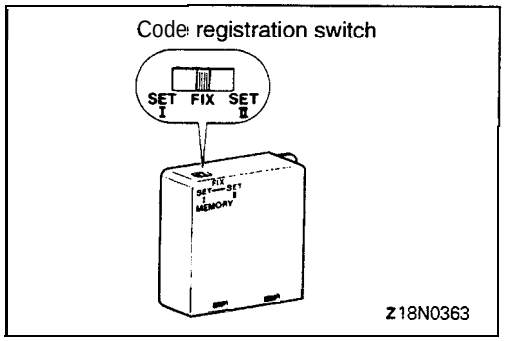
<Up to 1995 models>

The transmitter has each individual secret code stored in memory. When, therefore, the transmitter or receiver is replaced or the trouble is presumed to be caused by the faulty registration of the secret code, it is necessary to register the secret code on EEPROM inside the receiver.
Since two different secret code at the most can be placed in the storage space of EEPROM, the old code will no longer be usable if the undermentioned registration operation is repeated twice. Meanwhile, before registering the code, it should be confirmed that an ordinary door lock function can be performed by key operation.

(1) Place the code registration switch to the SET I position (registration mode).



(2) Press the LOCK or UNLOCK switch of the transmitter.

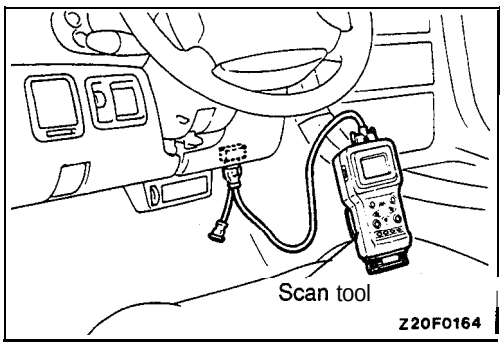


(3) Set the code registration switch of the receiver to the FIX position (operation mode).
(4) Confirm that the keyless entry system operates normally. The registration is completed if the system operates normally. If not, repeat the steps (1) through (3).

NOTE
(1) In case there are two transmitters, register the code on the SET II side in the same manner as the SET I side. In addition, even if there is only one transmitter, register the code on SET I and SET II to prevent malfunction.
(2) Make sure that after a code has been registered, the registration switch is set to the FIX position positively.

<From 1996 models>

Since the transmitter is memorized by each individual code, it is necessary to register a code on EEPROM in the receiver if the transmitter or receiver is replaced, or cause of the trouble is presumed to be due to faulty registration of the code. Since two different codes at the most can be memorized in the memory space of EEPROM, the old code will become unable to be used if the following registration operation is repeated twice. Meanwhile, register a code after confirming that an ordinary door lock function can be worked through key operation.



(1) Connect the scan tool to the data link connector.

NOTE
This grounds the data link connector No. 1 and gets ready for a code registration.

Caution
Turn the ignition switch to OFF before connecting or disconnecting the scan tool.

(2) Close all doors.
(3) Turn the ignition switch to ACC and return it to OFF.

NOTE
This locks and unlocks the door once, and then a code can be registered.

(4) After pressing any switch on the transmitter once, press it two more times within 10 seconds to register the same code for SET I and SET II.
(5) After registration is completed, the door will be locked and unlocked once.

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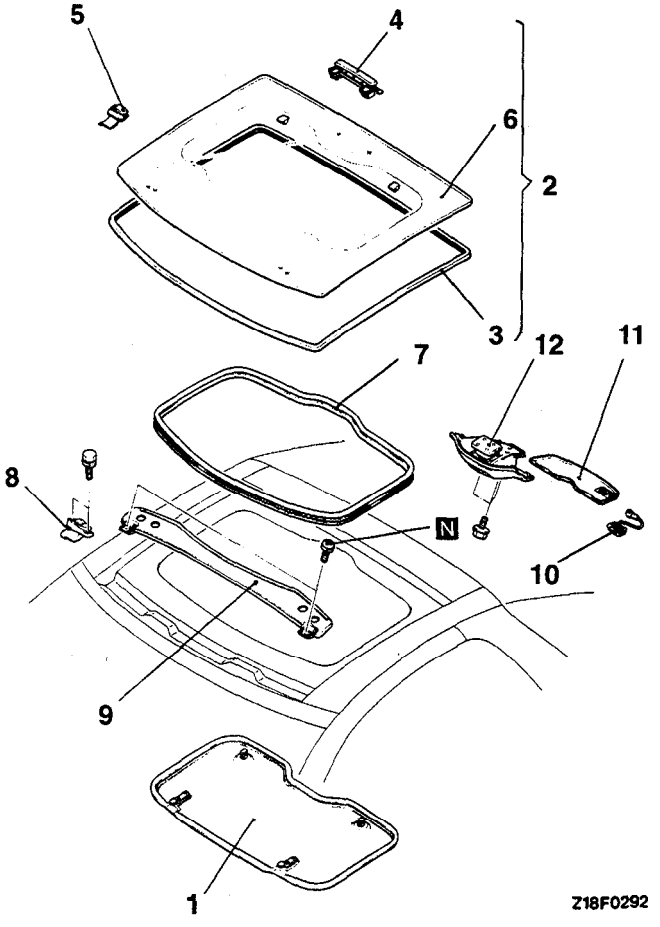
NOTE
If there are two transmitters, one registration procedure is the same as the other one. In addition, the second registration shall be done within a minute after the first one was completed.

(6) After the second registration is completed, the door will be locked and unlocked once.
(7) Registration mode finishes under the following conditions.
- Registration of two transmitter codes are completed.
- One minute has passed since the registration mode setting.
- Scan tool is disconnected. (ground released.)
- Ignition switch is turned ON.
- Any of the doors are opened.

SUNROOF <Removable type>

REMOVAL AND INSTALLATION

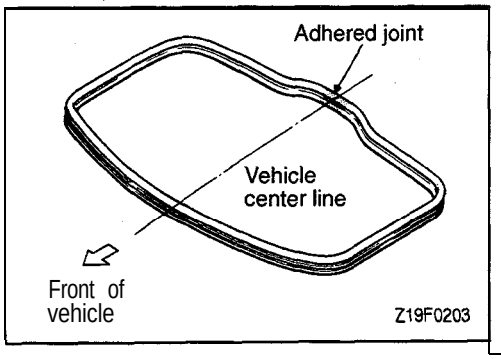
Post-installation Operation
- Sunroof Leakage Inspection (Refer to p.42-17.)



Z18F0292

Roof lid glass removal steps
1. Sunroof trim assembly
2. Roof lid glass assembly
3. Weatherstrip
4. Slide lock latch assembly
5. Roof lid male hinge
6. Roof lid glass
▶A◀ 7. Roof inner weatherstrip
8. Roof lid female hinge
9. Deflector

Roof lid regulator assembly removal steps
1. Sunroof trim assembly
2. Roof lid glass assembly
10. Interior temperature sensor
11. Regulator cover
12. Roof lid regulator assembly



INSTALLATION SERVICE POINT

▶A◀ ROOF INNER WEATHERSTRIP INSTALLATION

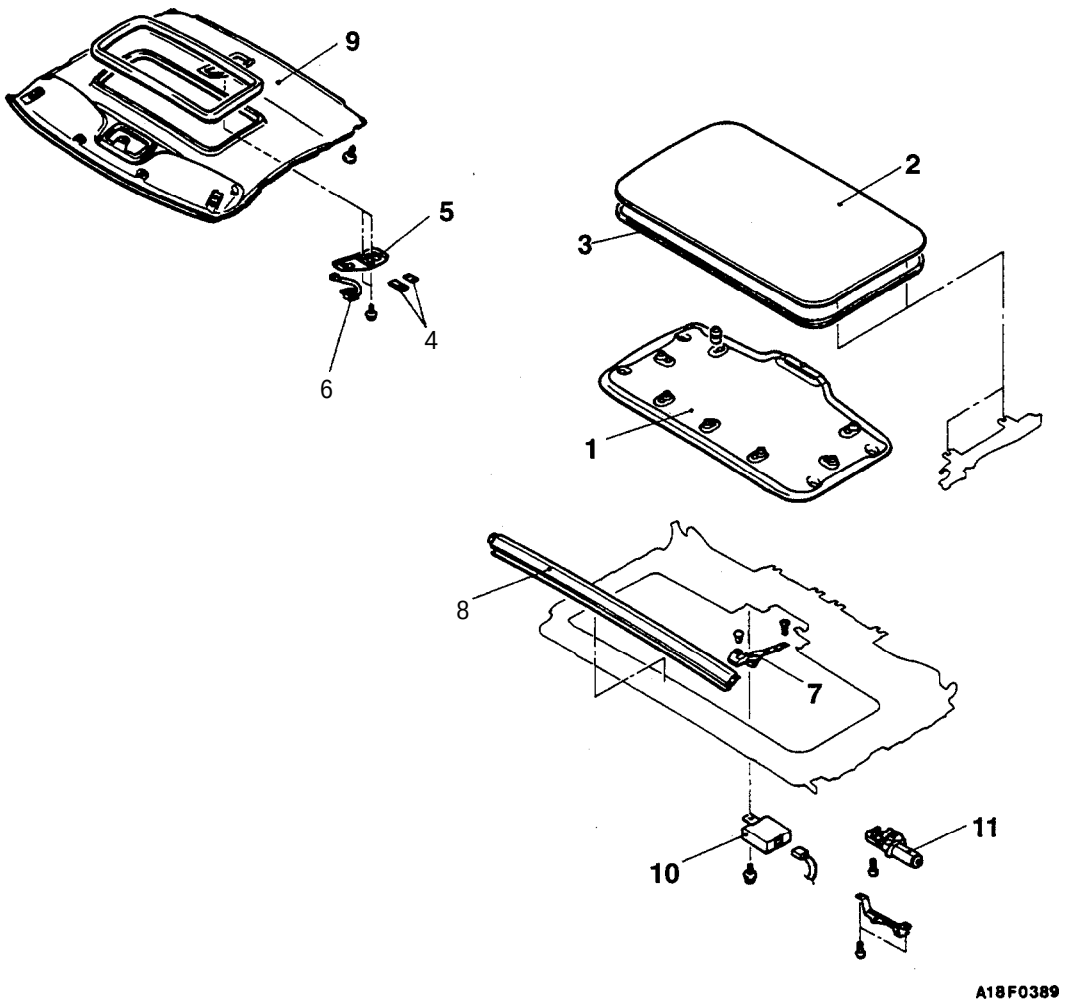
Install the roof weatherstrip with its adhered joint located on the center line of the vehicle (toward the rear of the vehicle).

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SUNROOF <Electrically operated sliding type>

REMOVAL AND INSTALLATION

Post-installation Operation
- Sunroof Leakage Inspection (Refer to p.42-17.)
- Sunroof Fit Adjustment (Refer to p.42-17.)



Roof lid removal steps

◀A▶ 1. Roof lid trim
◀A▶ 2. Roof lid
3. Roof lid weatherstrip

Sunroof switch removal steps

4. Cover
5. Sunroof switch panel assembly
6. Sunroof switch

Deflector assembly removal steps

- Roof lid fully opened

7. Link assembly
8. Deflector assembly

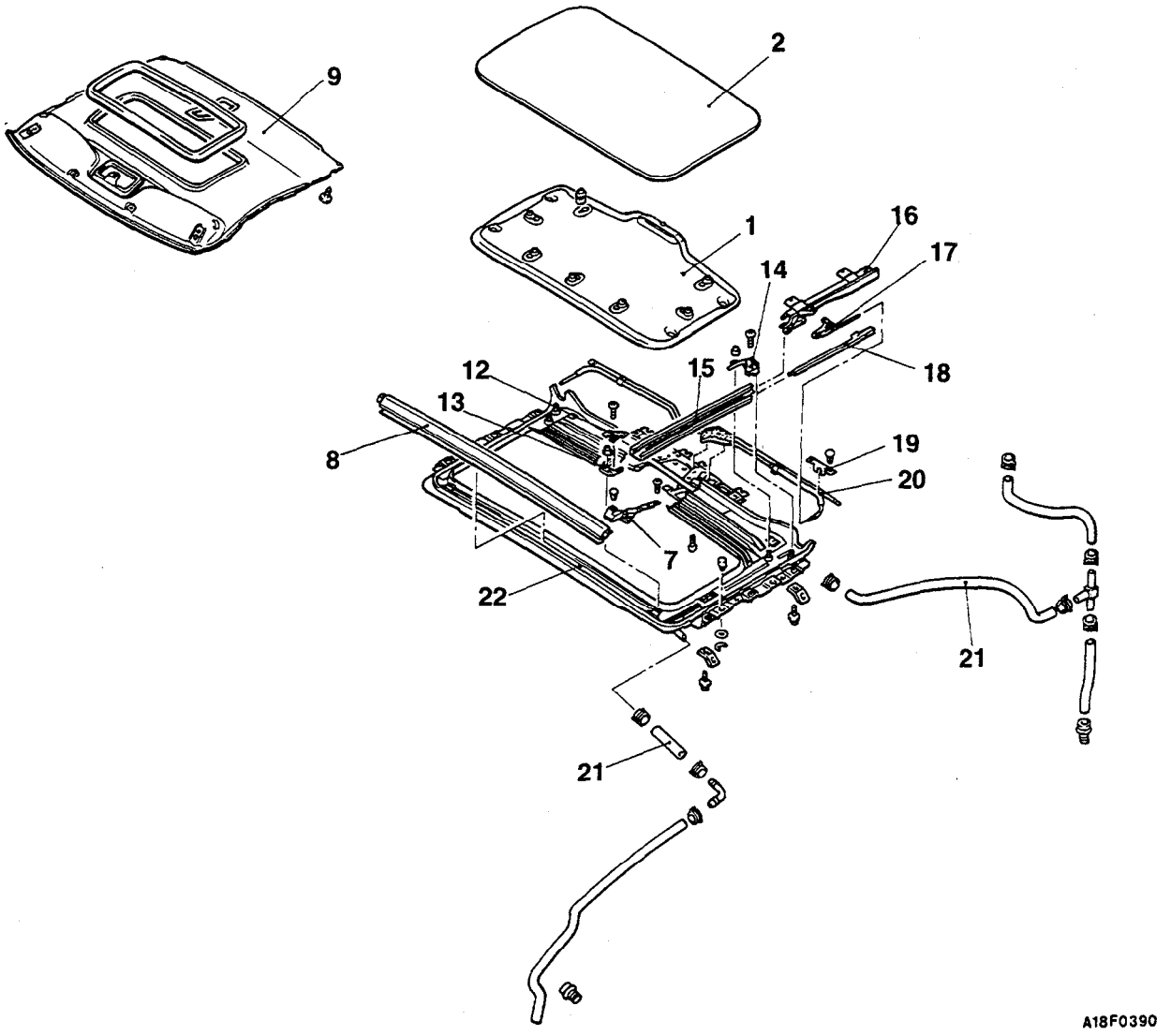
Slide & tilt ECU removal steps

9. Headlining
10. Slide & tilt ECU

Sunroof motor removal steps

9. Headlining
▶B◀ 11. Sunroof motor

TSB **Revision**



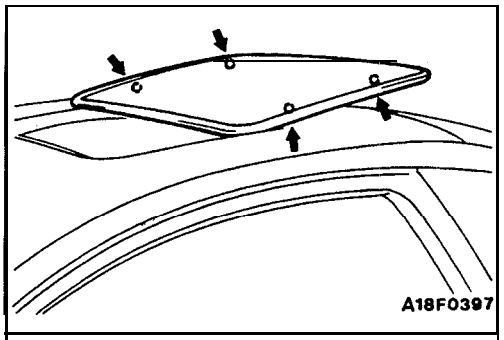
Lifter-slider assembly/drive unit assembly removal steps

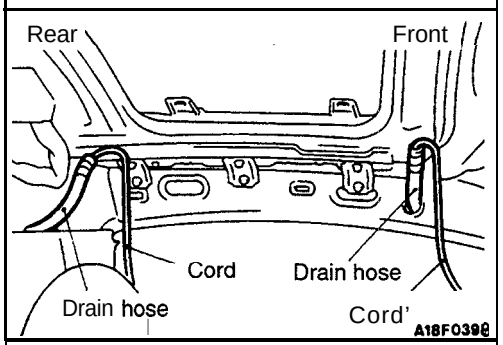
12. Front corner panel
13. Front holder
14. Rear holder
15. Slide rail
16. Lifter assembly
17. Slider assembly
18. Rear timing
19. Tube cover
20. Drive unit assembly

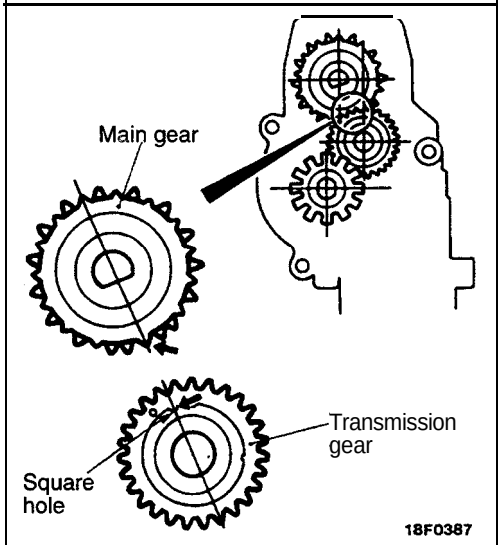
Frame assembly removal steps

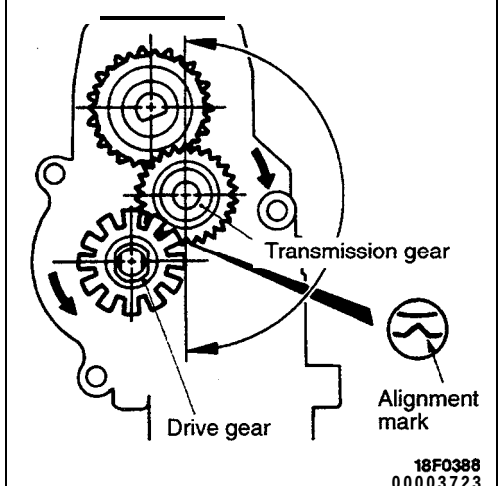
◀A▶ ◀A▶ 1. Roof lid trim
2. Roof lid
7. Link assembly
8. Deflector assembly
9. Headlining
◀B▶ ▶A◀ 21. Drain hose
22. Frame assembly

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REMOVAL SERVICE POINTS

◀A▶ ROOF LID TRIM/ROOF LID REMOVAL

(1) Fully slide-open the sunroof and bring it in the tilted position.
(2) Remove the roof lid trim.
(3) Remove the roof lid mounting nuts, then lift off the roof lid.

◀B▶ DRAIN HOSE REMOVAL

Tie a cord to the end of the drain hose, and wind tape around the tie until it is smooth. Then pull the drain hose out from the passenger compartment.

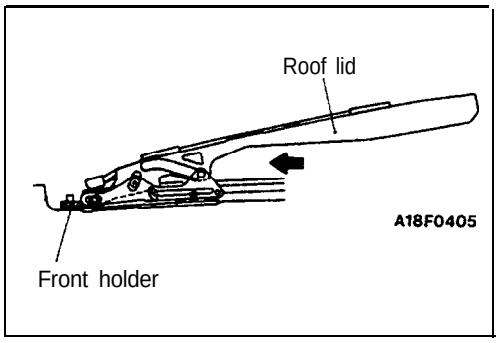
INSTALLATION SERVICE POINTS

▶A◀ DRAIN HOSE INSTALLATION

(1) Tie the cord which has been used for removal again to the end of the drain hose, and wind tape around the tie until it is smooth.
(2) Pull at the cord to install the drain hose.

▶B◀ SUNROOF MOTOR INSTALLATION

(1) Remove the cover.
(2) Align the main gear tooth with the square hole in the transmission gear as shown in the illustration.
(3) While keeping the gear position attained in Step (2), turn the drive gear in the direction given by the arrow to rotate the transmission gear 180°.
Then, check to ensure that the alignment mark on the transmission gear is on the vertical line.

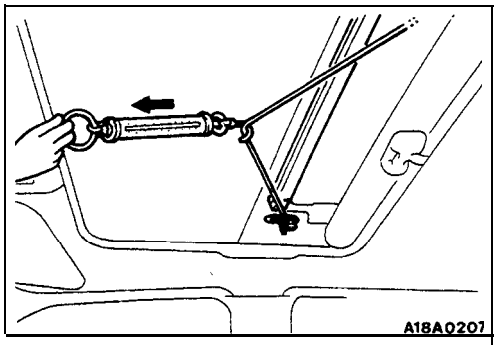


(4) Press the roof lid against the front holder while keeping it in the tilted-up position.
(5) Install the sunroof motor.

INSPECTION

SLIDING RESISTANCE OF ROOF LID CHECK

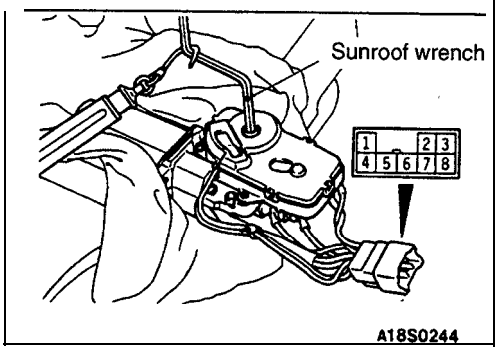
(1) Remove the roof lid trim.
(2) Loosen the roof lid front mounting nuts and tie a rope to them.
(3) Fully close the roof lid and then remove the sunroof motor.



(4) Use a spring balance to measure the sliding resistance of the roof lid.

Standard value: 147 N (33 lbs.) or less

(5) If the sliding resistance of the roof lid is higher than the standard value, check the following.
Lifter-slider assembly installation, warping or jamming by foreign materials
Drive cable connection
Tilt of roof lid



SLIDING FORCE OF SUNROOF MOTOR'S CLUTCH CHECK

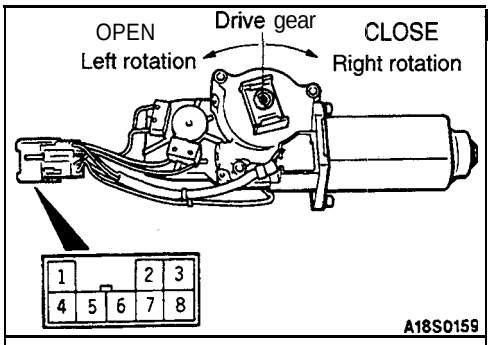
1. Insert the sunroof wrench of the on-board tools into the hexagonal hole in the motor drive shaft, and hook a spring balance as shown in the illustration.
2. Apply battery voltage between terminals (1) and (2) of the sunroof motor connector to operate the motor.
3. Measure the load on the spring balance at the point where the rotation torque of the motor matches the spring force of the spring balance.

Standard value: 39-49 N (8.7–11 lbs.)

Caution
1. The spring balance should be kept a right angle to the sunroof wrench.
2. If a wrench other than that in the on-board tools is used, the value for the clutch sliding force will be different, so only the on-board tool should be used.

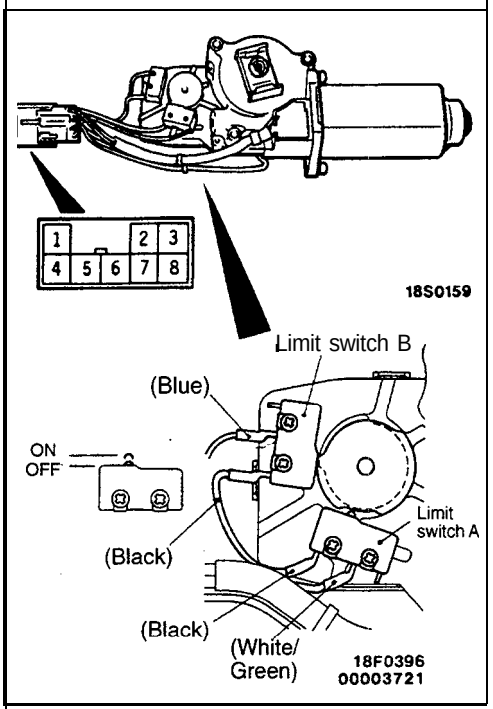
4. If the clutch sliding force is outside the standard value, replace the sunroof motor.

TSB Revision



SUNROOF MOTOR CHECK

Battery connection terminal		Drive gear rotation direction
1	2	
⊖	⊕	Right
⊕	⊖	Left

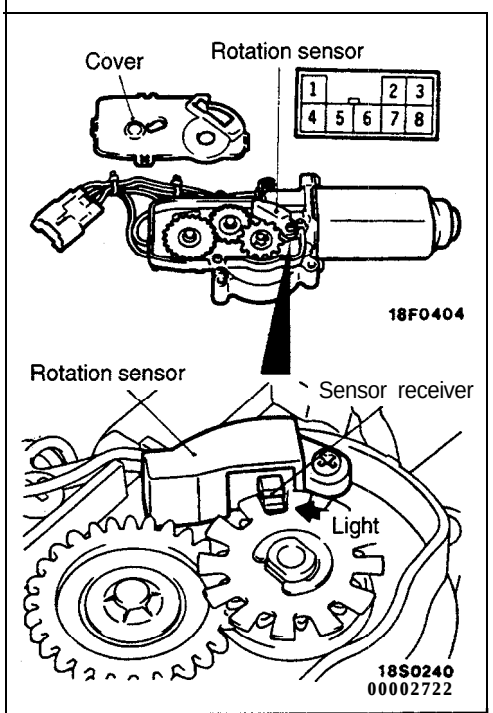


LIMIT SWITCH CONTINUITY CHECK

1. Remove the limit switches from the sunroof motor, and then check the operation of the limit switches.

Switch position		Terminal No.		
		5	6	8
Limit switch A	ON	⊖	⊖	
	OFF			
Limit switch B	ON	⊖		⊖
	OFF			

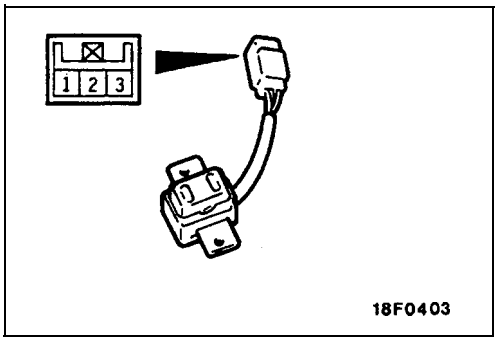
2. Check the identification colors. Then install the limit switches as shown in the illustration.



ROTATION SENSOR CHECK

1. When connecting an ohmmeter negative probe to terminal (3) and the positive probe to terminal (8), there should be continuity. When the probes are reversed, there should be no continuity.
2. Remove the cover, and then check that there is no continuity when connecting the negative probe to terminal (7) and the positive probe to terminal (8). Also check that there is continuity when the probes are connected to the same terminals and light is shined onto the sensor receiver.

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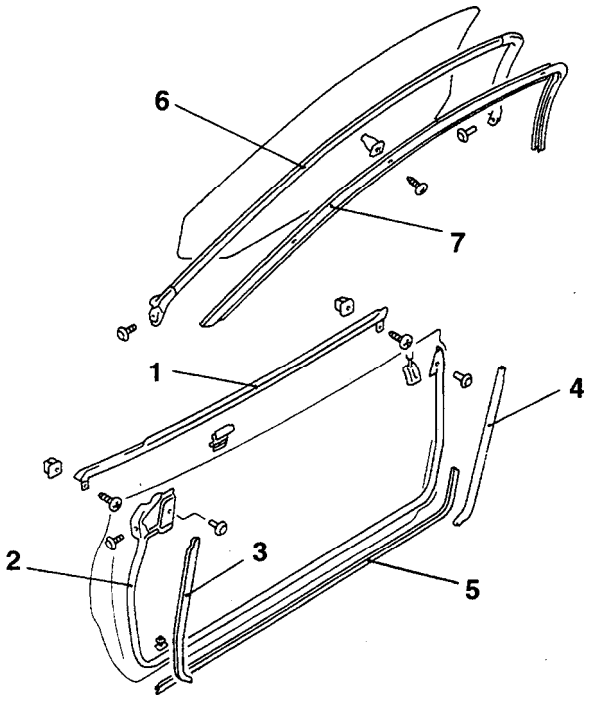
SUNROOF SWITCH CONTINUITY CHECK

Switch position	Terminal No.		
	1	2	3
Open	○——	——○	
OFF			
Close		○——	——○

TSB Revision

DRIP LINE WEATHERSTRIP

REMOVAL AND INSTALLATION



Z18F0219

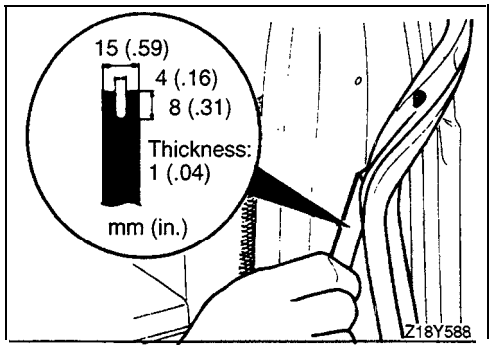
Removal steps

- Delta cover inner (Refer to P.42-43, 44.)
- Delta cover outer (Refer to P.42-43, 44.)
- Door trim (Refer to P.42-42.)

1. Door belt line outer weatherstrip
◀A▶ ▶A◀ 2. Door outer opening weatherstrip
3. Door inner opening weatherstrip front
4. Door inner opening weatherstrip rear
5. Door opening weatherstrip lower

Drip line weatherstrip removal steps

6. Drip line weatherstrip
7. Door weatherstrip holder



REMOVAL SERVICE POINT

(A, DOOR OUTER OPENING WEATHERSTRIP REMOVAL

Place a tool as shown in the illustration to remove the door opening weatherstrip.

INSTALLATION SERVICE POINT

▶A◀ DOOR OUTER OPENING WEATHERSTRIP INSTALLATION

The clip color identifies the left and right weatherstrips, so be sure to use the colors so as to install correctly.

Identification color	Applicable side
White	Left door
Orange	Right door

TSB Revision

NOTES

EXTERIOR

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SPECIFICATIONS

GENERAL SPECIFICATIONS

WINDSHIELD WIPER MOTOR

Items		Specifications
Type		Ferrite-magnet type
Speed control system		Third brush system
Braking system		Dynamic brake system
rpm at load of 1 Nm (0.72 ft.lbs.)	Low speed	48 ± 4
	High speed	70 ± 7
Nominal torque Nm (ft.lbs.)		24 (17)

REAR WIPER MOTOR

Items	Specifications
Type	Ferrite-magnet type
Braking system	Dynamic braking system
rpm at load of 0.6 Nm (0.43 ft.lbs.)	38 ± 5

WINDSHIELD WIPER BLADE

Items		Specifications
Wiping angle	Driver's side	89°
	Passenger's side	91°
Wiper blade length mm (in.)	Driver's side	525 (20.7)
	Passenger's side	500 (19.7)

REAR WIPER BLADE

Items	Specifications
Wiping angle	87" ± 1.5"
Wiper blade length mm (in.)	550 (21.7)

WINDOW WASHER MOTOR AND PUMP

Items		Specifications
Motor type		Direct current ferrite magnet type
Pump type		Centrifugal type
Power consumption A		3.8 or less
Time of continuous use sec.	With washer fluid	Max. 60
	Empty operation	Max. 20
Nozzle jet pressure kPa (psi)		120 (17) or more
Tank capacity dm^3 (qts.)		2.0 (2.1) or more

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REAR WINDOW WASHER MOTOR AND PUMP

items		Specifications
Motor type		Direct current ferrite magnet type
Pump type		Centrifugal type
Power consumption A		3.8 or less
Time of continuous use sec.	With washer fluid	Max. 60
	Empty operation	Max. 20
Nozzle jet pressure kPa (psi)		120 (17) or more
Tank capacity dm^3 (qts.)		1.2 (1.3) or more

WIPER AND WASHER SWITCH

Items		Specifications
Rated load A	Wiper switch (LO, HI)	4
	Wiper switch (INT)	0.22 ± 0.05
	Washer switch	Max. 4
Voltage drop (at 12V and the rated load) V	Wiper switch	0.2 or less
	Washer switch	0.5 or less

REAR WIPER AND WASHER SWITCH

Items		Specifications
Rated load A	Wiper switch	5
	Washer switch	5
Voltage drop V		0.1 or less

INTERMITTENT WIPER RELAY

Items		Specifications
Front (incorporated in column switch)	Intermittent interval (min.-max.) sec. [Variable-interval intermittent wiper]	Approx. 3-12
	Delay time in washer moving sec.	0.6
Rear	Intermittent interval sec.	8 ± 2

DOOR MIRROR

Items		Specifications
Printed heater lines	Working voltage V	10–15
	Operating current A	3.5 or less
	Resistance Ω	7.7– 10.2

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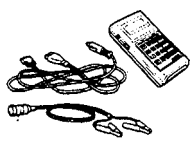
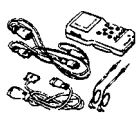
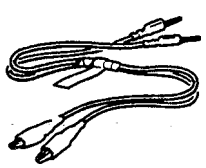
SERVICE SPECIFICATIONS

Items	Standard value
Front wiper blade park position (A) mm (in.)	15–20 (.6–.8)

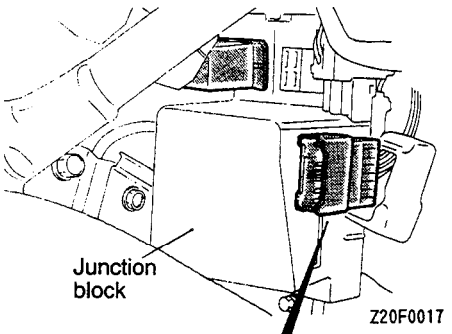
ADHESIVES

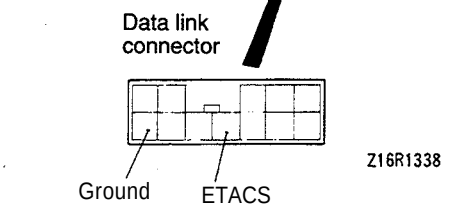
Items	Specified adhesive
Side protect moulding	3M ATD Part No. 8609 SUPER FAST URETHAN or equivalent and 3M ATD Part No. 6382 or equivalent
Side air dam	
Side garnish, Cushion	3M ATD Part No. 6382 or equivalent

SPECIAL TOOLS

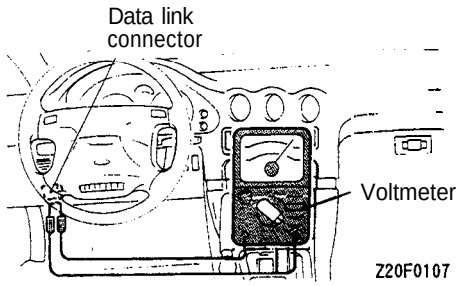
Tool	Tool numberand name	Supersession	Application
	MB990449 Window moulding remover	General service tool	Removal of liftgate moulding, upper and liftgate moulding, lower
	MB991 341 Scan tool (Multi-use tester <MUT>)	MB991341C	<Up to 1993 models> Windshield wiper and washer system (ETACS input check) and active aero system inspection
	ROM pack (For the number, refer to GROUP 00 – Precautions Before Service.)		
 Z16X0606	MB991 502 Scan tool (MUT-II)	MB991 502	<All models> Windshield wiper and washer system (ETACS input check) and active aero system inspection
 Z16X0607	ROM pack		
	MB991 529 Diagnostic trouble code check harness	MB991 529	<From 1994 models> Windshield wiper and washer system inspection by using a voltmeter

TSB Revision

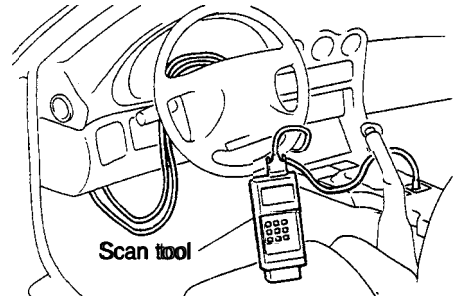




With voltmeter



With scan tool



TROUBLESHOOTING

INPUT SIGNAL <WINDSHIELD WIPER AND WASHER>

<Up to 1993 models>

When using the scan tool [Multi-Use-Tester (MUT)] or a voltmeter

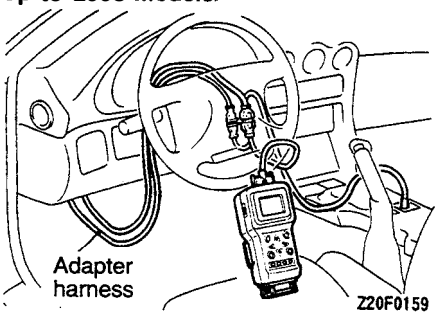
Check whether or not the input signals from each switch are being input to the ETACS unit.

(1) Connect the scan tool to the data link connector or connect the voltmeter between the ETACS terminal and the ground terminal.

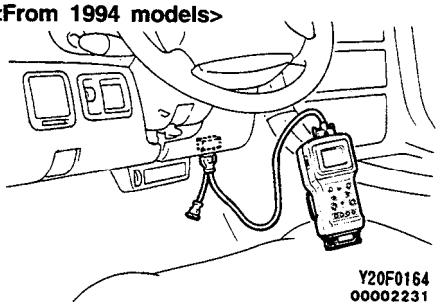
(2) Check if the buzzer of the scan tool sounds or the needle of the voltmeter moves when each switch is operated. If the buzzer sounds or the needle moves, the input signals are being input to the ETACS unit, so that switch can be considered to be functioning normally. If not, the switch or switch input circuit is faulty. Check the switch and the switch input circuit.

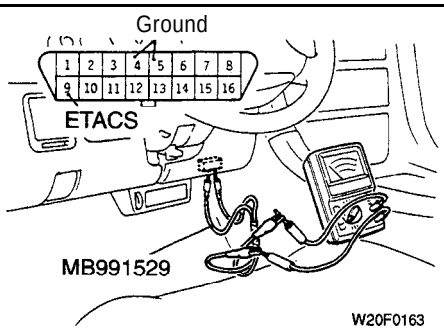
TSB Revision

When using the MUT-II
<Up to 1993 models>



<From 1994 models>





<All models>

When using the scan tool (MUT-II)

(1) Connect the scan tool to the data link connector.
(2) When connecting the scan tool (MUT-II) to a vehicle up to 1993 model, use the adapter harness supplied together with the scan tool.

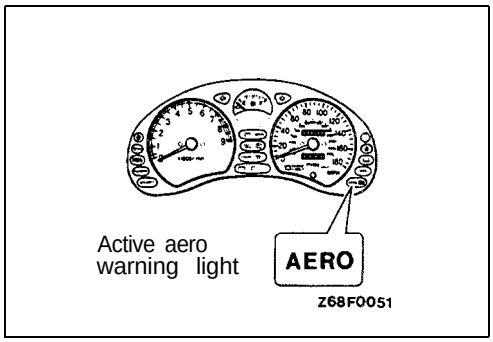
Caution
Turn off the ignition switch beforehand whenever the scan tool is connected or disconnected.

(3) The ECU input signal of individual circuit systems is normal, if the scan tool buzzer sounds once when the respective switches are operated (turned ON/OFF).

<From 1994 models>

When using the voltmeter

(1) Connect a voltmeter to the ETACS and ground terminals of the data link connector using the special tool.
(2) The ECU input signal of individual circuit systems is normal, if the voltmeter pointer deflects once when the respective switches are operated (turned ON/OFF).



ON-VEHICLE SERVICE

ACTIVE AERO SYSTEM CHECK

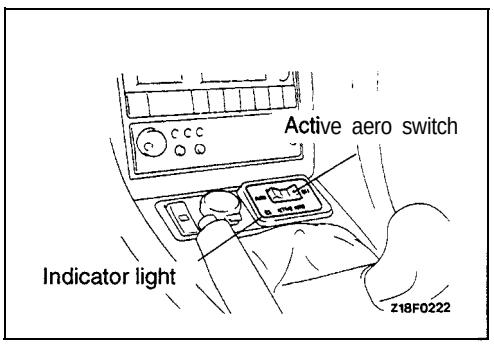
1. INSPECTION BY WARNING LIGHT

Turn the ignition switch from “OFF” to “ON” to see if the warning light is lit for approx. three seconds and then goes out. If not, replace the control unit.

NOTE

(1) The active aero control unit has a self-check function which is designed as follows: Turn the ignition switch from “OFF” to “ON”. If the unit is in normal condition, the warning light is lit for approx. three seconds and then goes out.

(2) If the front venturi skirt does not return to the standard condition properly in normal use, the warning light comes on.



2. INSPECTION BY ACTIVE AERO SWITCH AT AUTO 2

(1) With the vehicle stopped, insert the key in the ignition key cylinder.

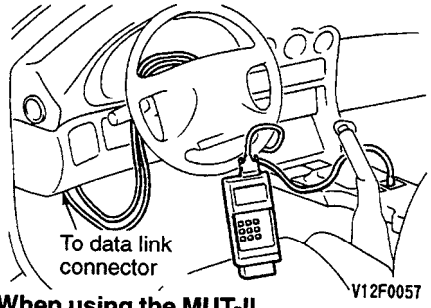
(2) Set the active aero switch to AUTO 2 to make sure that the active aero system is placed in the operative condition and the indicator light comes on. Then turn off the active aero switch to confirm that the system returns to the standard condition and the indicator light goes out.

(3) If there is abnormality, check the following parts.

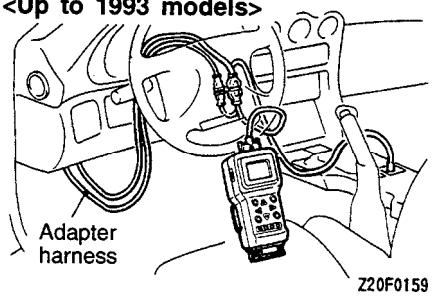
- Active aero switch
- Lighting monitor switch
- Air dam link assembly and rear spoiler
- Wiring harness

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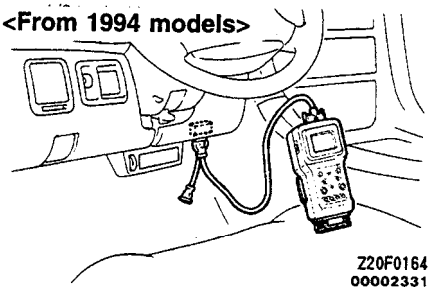
When using the MUT



When using the MUT-II <Up to 1993 models>



<From 1994 models>



3. INSPECTION WITH SCAN TOOL

When using the scan tool [multi-use tester (MUT) cup to 1993 models> or MUT-II <all models>]

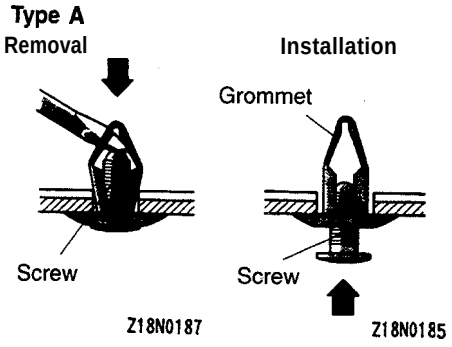
Using pseudo vehicle speed input function of the scan tool, inspection can be made by means of vehicle speed.

(1) Set the scan tool to the data link connector.
When connecting the scan tool (MUT-II) to a vehicle up to 1993 model, use the adapter harness supplied together with the scan tool.

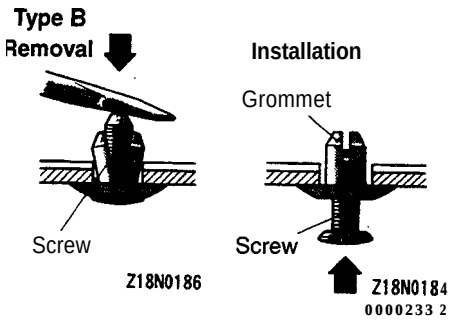
Caution
Turn off the ignition switch beforehand whenever the scan tool is connected or disconnected.

(2) Turn the ignition switch to "ACC" or "ON".
(3) Place the active aero switch to AUTO 1.
(4) Using the scan tool, increase the vehicle speed to approx. 80 km/h (50 mph) or more to make sure that the active aero system is placed to the operative condition.
Then decrease the vehicle speed to approx. 50 km/h (30 mph) or less to confirm that the system returns to the standard condition.

Type A



Type B



FRONT BUMPER

REMOVAL AND INSTALLATION OF CLIP WITH SCREW

Normally, remove the clip with a Phillips screwdriver. If, however, there is enough space to insert a screwdriver or the like behind the clip, use the following procedure for ease of work.

1. Removal

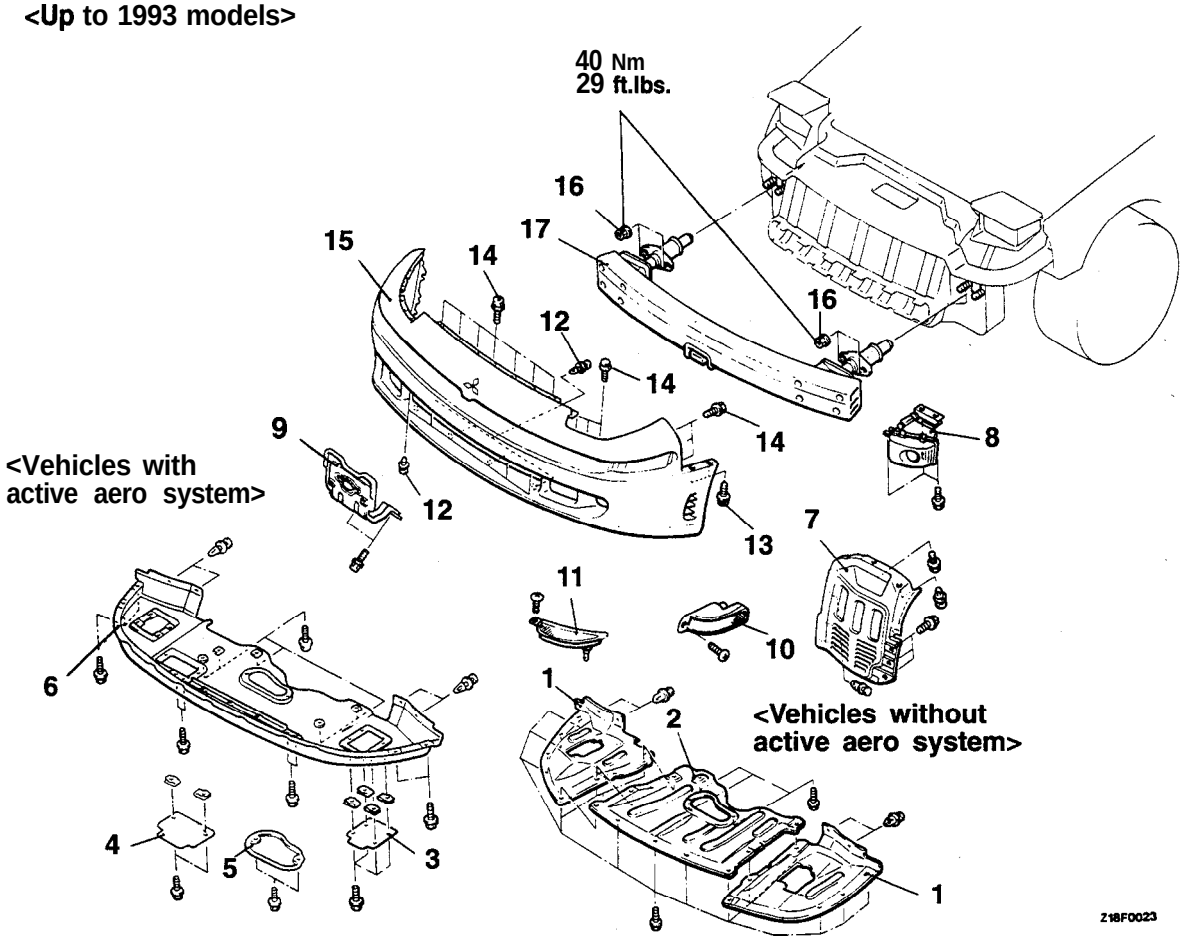
Using a screwdriver or the like, press the screw from the inside of the bumper to remove the clip.

2. Installation

With the grommet inserted in the hole, press the screw in.

REMOVAL AND INSTALLATION

<Up to 1993 models>



Removal steps

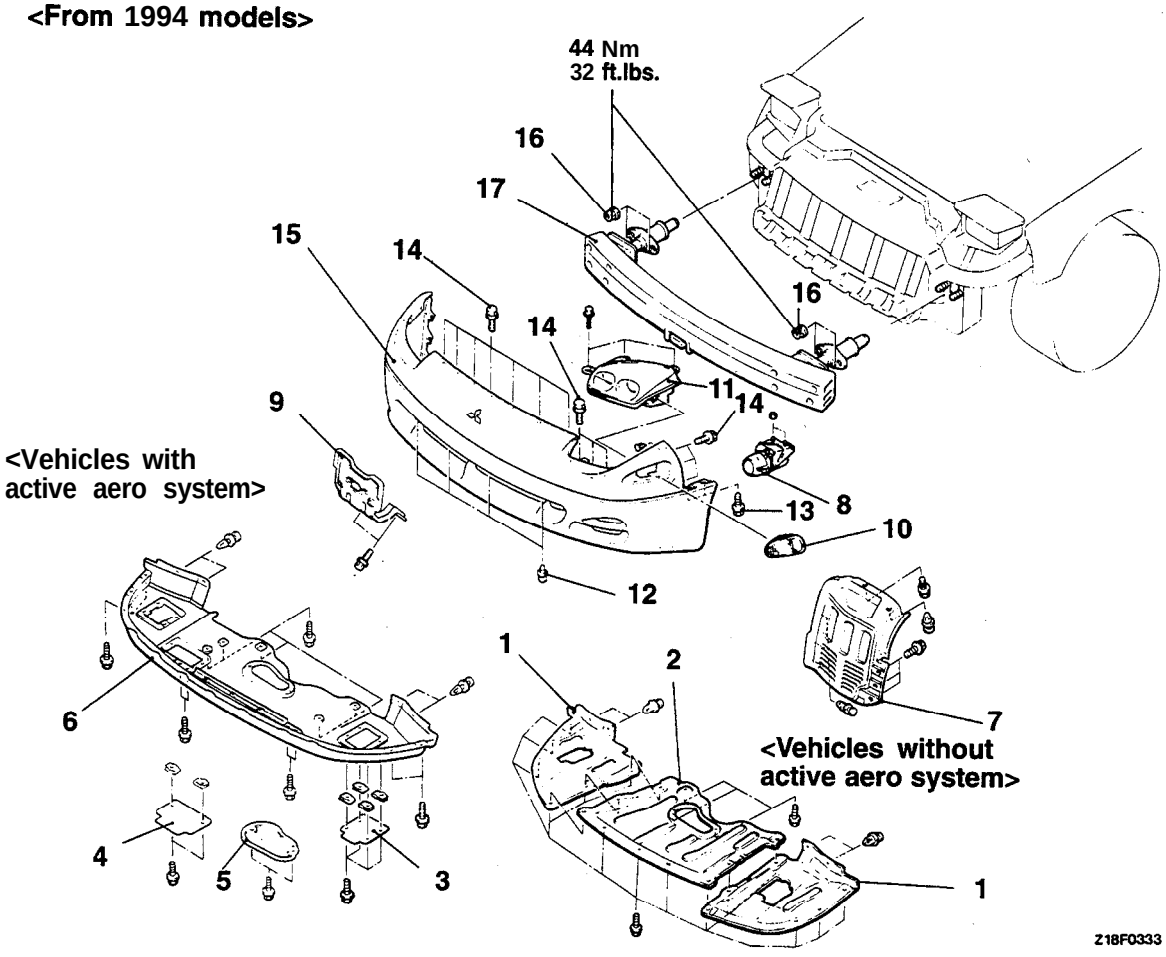
1. Front under cover side panel (Vehicles without active aero system)
2. Front under cover center panel (Vehicles without active aero system)
3. Side cover panel (Vehicles with active aero system)
4. Front cover panel (Vehicles with active aero system)
5. Center cover panel (Vehicles with active aero system)

▶A◀ 6. Front under cover panel (Vehicles with active aero system)

7. Front splash shield extension
8. Fog light
9. License plate bracket
10. Front combination light
11. Optical horn lens
12. Clips with screw
13. Tapping screws
14. Bolts
15. Bumper face assembly
16. Nuts
17. Bumper reinforcement assembly

TSB Revision

<From 1994 models>



Removal steps

1. Front under cover side panel (Vehicles without active aero system)
2. Front under cover center panel (Vehicles without active aero system)
3. Side cover panel (Vehicles with active aero system)
4. Front cover panel (Vehicles with active aero system)
5. Center cover panel (Vehicles with active aero system)

▶A◀ 6. Front under cover panel (Vehicles with active aero system)

7. Front splash shield extension
8. Fog light
9. License plate bracket
10. Front combination light
11. Headlight
12. Clips with screw
13. Tapping screws
14. Bolts
15. Bumper face assembly
16. Nuts
17. Bumper reinforcement assembly

INSTALLATION SERVICE POINT

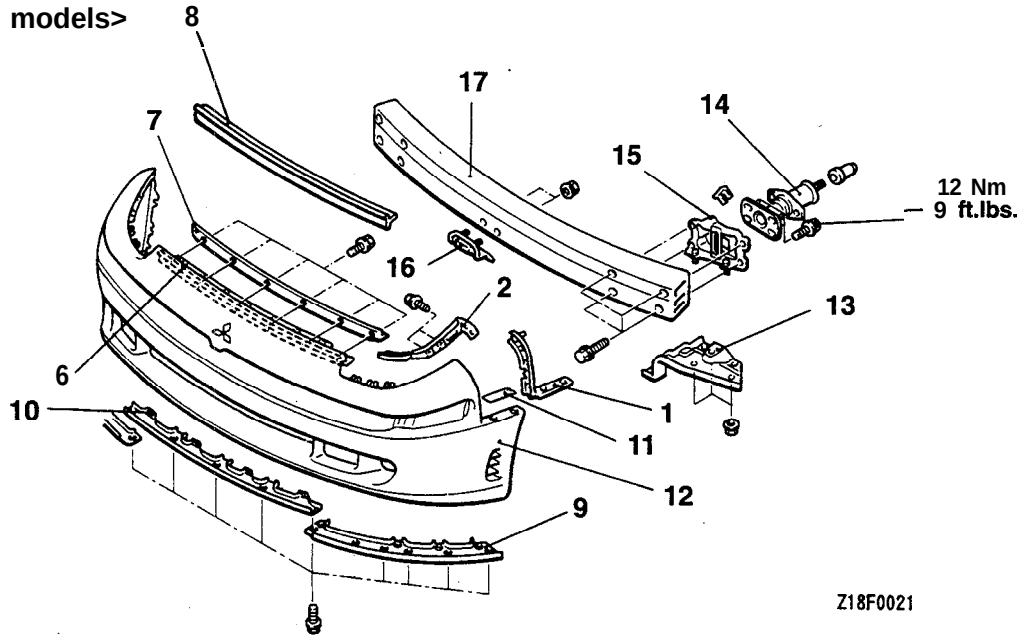
▶A◀ FRONT UNDER COVER PANEL INSTALLATION

Install the air dam link assembly in the operative condition for ease of front under cover panel.

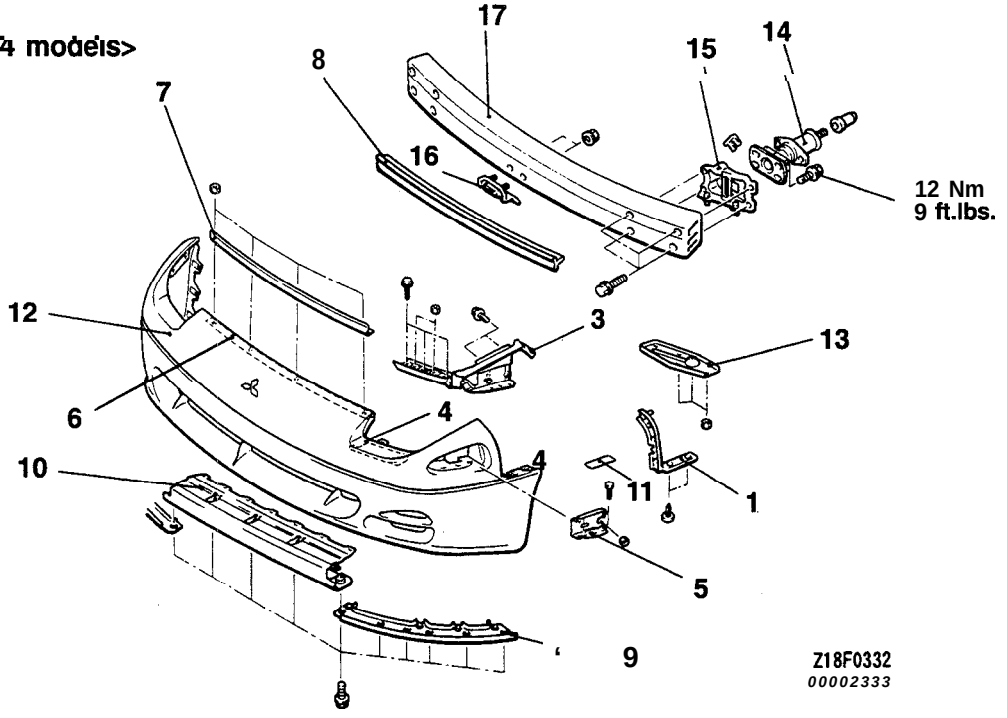
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DISASSEMBLY AND REASSEMBLY

<Up to 1993 models>



<From 1994 models>



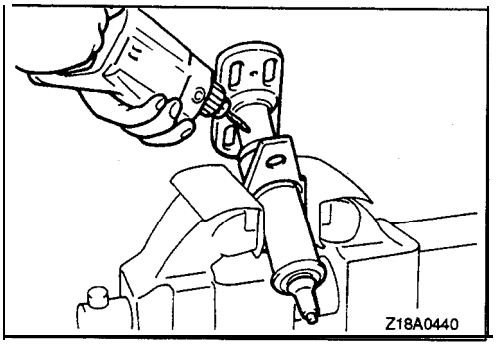
Bumper face disassembly steps

1. Bumper face side plate
2. Bumper face comer plate <Up to 1993 models>
3. Bumper face outer corner plate <From 1994 models>
4. Bumper face inner corner plate <From 1994 models>
5. C corner plate <From 1994 models>
6. Bumper face upper front plate
7. Bumper face upper center plate
8. Bumper face protector
9. Side lower plate
10. Center lower plate
11. Pad
12. Bumper face

Bumper reinforcement disassembly steps

13. Fog light bracket
◀A▶ ▶A◀ 14. Bumper absorber
15. Bumper reinforcement stay
16. License plate bracket support
17. Bumper reinforcement

TSB Revision

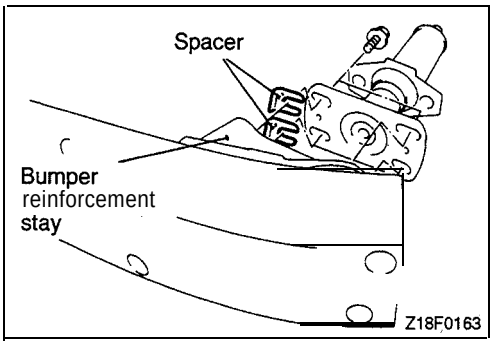


DISASSEMBLY SERVICE POINT

◀A▶ BUMPER ABSORBER REMOVAL

Caution

1. **Do not attempt to repair a bumper absorber that has been compressed in an accident; replace it with a new one.**
2. **Before discarding the bumper absorber, drill a 3 mm (.13 in.) diameter hole to discharge the gas contained in the unit. Be sure to wear safety goggles while performing this operation as the gas is not harmful but chips may be ejected with it.**
3. **If the bumper absorber is to be discarded, do not burn it.**

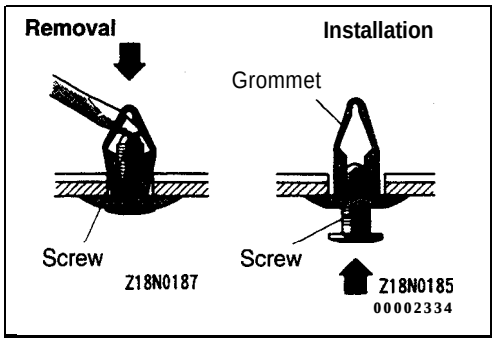


REASSEMBLY SERVICE POINT

▶A◀ BUMPER ABSORBER INSTALLATION

If the squareness between the bumper reinforcement stay and the bumper absorber is improper, adjust it by putting a spacer between them.

TSB Revision



REAR BUMPER

REMOVAL AND INSTALLATION OF CLIP WITH SCREW

Normally, remove the clip with a Phillips screwdriver. If, however, there is enough space to insert a screwdriver or the like behind the clip, use the following procedure for ease of work.

1. Removal

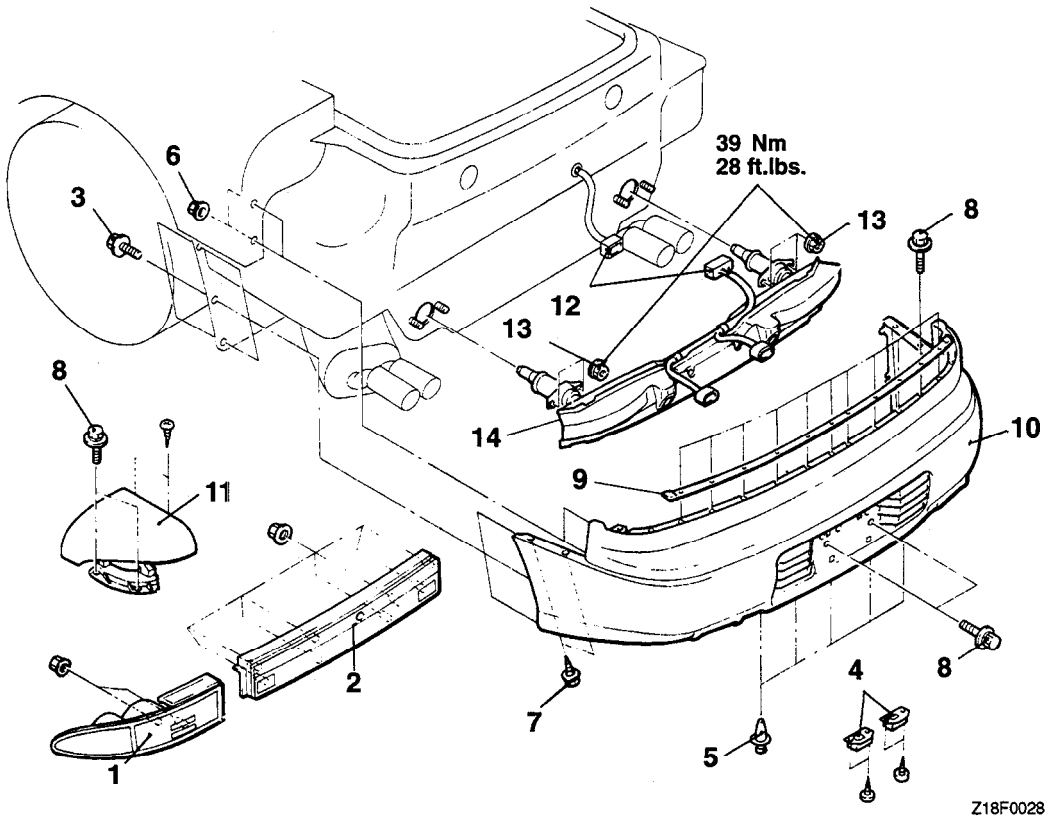
Using a screwdriver or the like, press the screw from the inside of the bumper to remove the clip.

2. Installation

With the grommet inserted in the hole, press the screw in.

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Rear End Trim and Rear Side Trim Removal and Installation (Refer to GROUP 52A – Trims.)
- ECS Control Unit Removal and Installation (Refer to GROUP 33B – ECS Control Unit.)

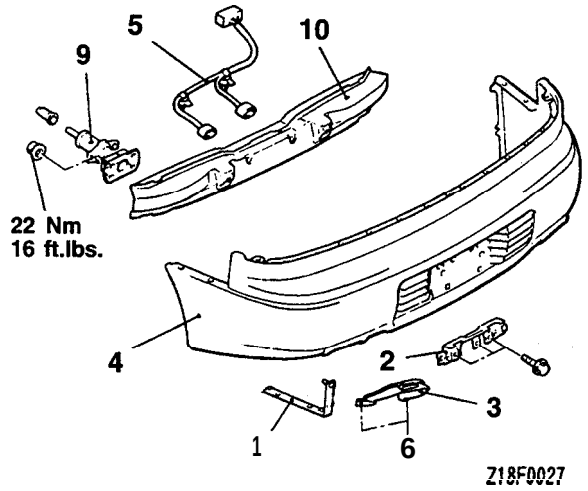


Removal steps
1. Rear combination light
2. Rear panel garnish
3. Bolts
4. License plate light
5. Clips with screw
6. Nuts
7. Tapping screws
8. Bolts
9. Bumper face upper plate
10. Bumper face assembly
11. Rear bumper upper extension
12. Rear bumper harness connector
13. Nuts
14. Bumper reinforcement assembly

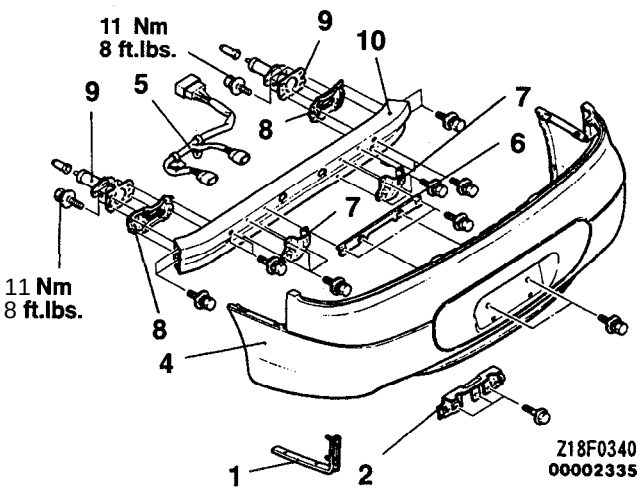
TSB Revision

DISASSEMBLY AND REASSEMBLY

<Up to 1993 models>



<From 1994 models>



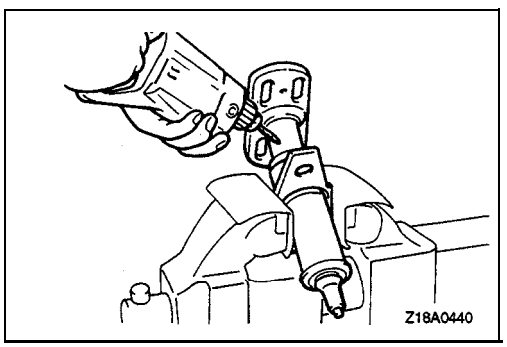
Bumper face assembly disassembly steps

1. Bumper face side plate
2. License plate light bracket
3. Bumper muffler plate
4. Bumper face .

Bumper reinforcement assembly disassembly steps

5. Rear bumper harness
6. Bumper reinforcement bracket
7. Bumper reinforcement extension
8. Bumper reinforcement stay
9. Bumper absorber
10. Bumper reinforcement

◀A▶



DISASSEMBLY SERVICE POINT

◀A▶ BUMPER ABSORBER REMOVAL

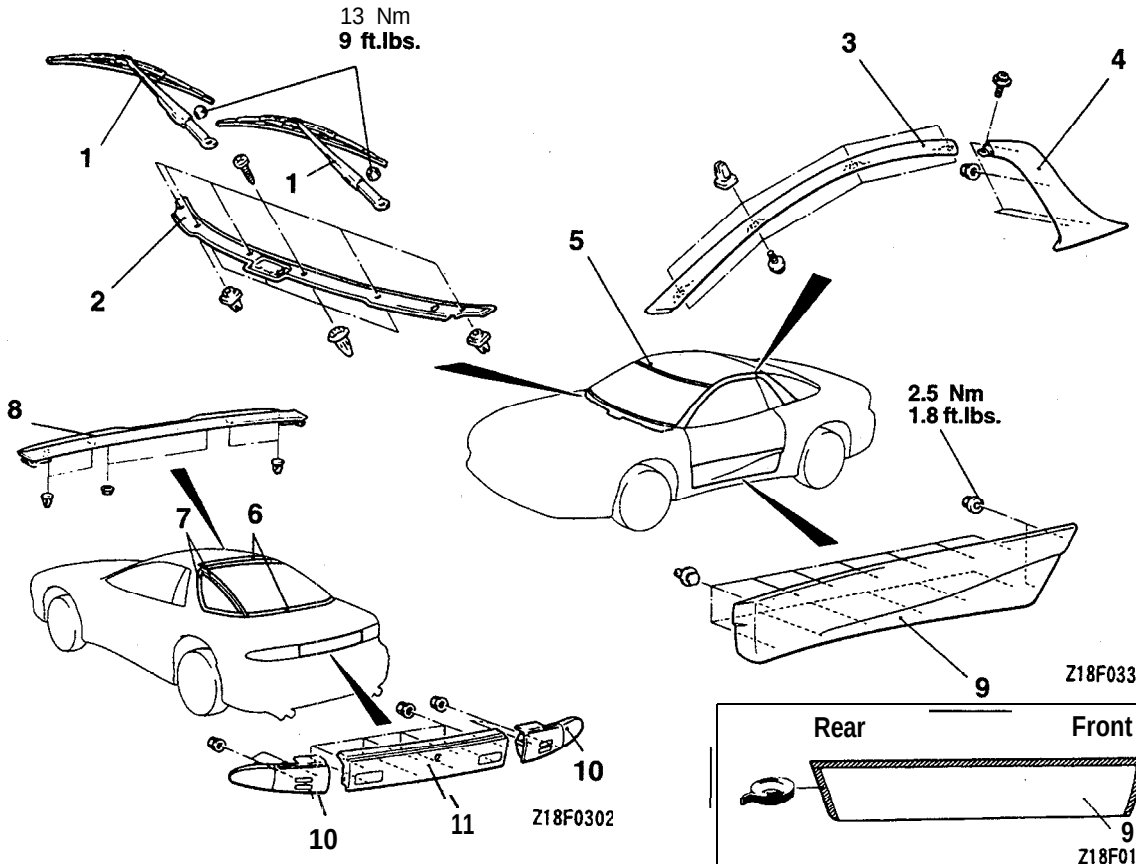
Caution

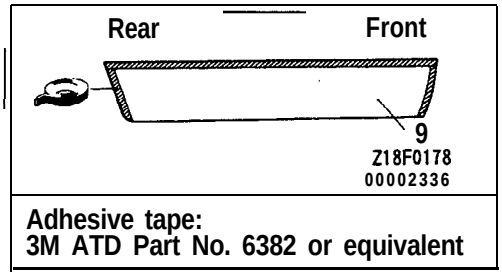
1. **Do not attempt to repair a bumper absorber that has been compressed in an accident; replace it with a new one.**
2. **Before discarding the bumper absorber, drill a 3 mm (.13 in.) diameter hole to discharge the gas contained in the unit. Be sure to wear safety goggles while performing this operation as the gas is not harmful but chips may be ejected with it.**
3. **If the bumper absorber is to be discarded, do not burn it.**

TSB Revision

GARNISHES AND MOULDINGS

REMOVAL AND INSTALLATION





Adhesive tape:
3M ATD Part No. 6382 or equivalent

Front deck garnish removal steps

1. Wiper arm assembly
2. Front deck garnish

Drip moulding and center pillar garnish removal steps <Hatchback>

- Drip line weatherstrip (Refer to GROUP 42 – Drip Line Weatherstrip.)
- Door weatherstrip holder (Refer to GROUP 42 – Drip Line Weatherstrip.)

3. Drip moulding
- Quarter upper trim (Refer to GROUP 52A – Trims.)

4. Center pillar garnish

Windshield moulding removal steps <Hatchback>

3. Drip moulding
5. Windshield moulding (Refer to GROUP 42 – Windshield.)

Liftgate moulding removal <Hatchback>

6. Liftgate moulding (Refer to GROUP 42 – Liftgate Glass.)

Quarter window moulding and glass removal steps <Hatchback>

4. Center pillar garnish
7. Quarter window moulding and glass (Refer to GROUP 42 – Quarter Window Glass.)

Rear roof extension removal steps (with sunroof) <Hatchback>

- Headlining (Refer to GROUP 52A – Headlining)

8. Rear roof extension

Side garnish removal <Hatchback>

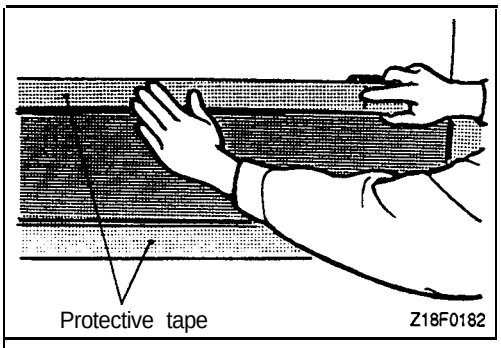
◀A▶ ▶A◀ 9. Side garnish

Rear panel garnish removal steps

- Rear end trim (Refer to GROUP 52A – Trims.)
- Rear side trim (Refer to GROUP 52A – Trims.)

10. Rear combination light
11. Rear panel garnish

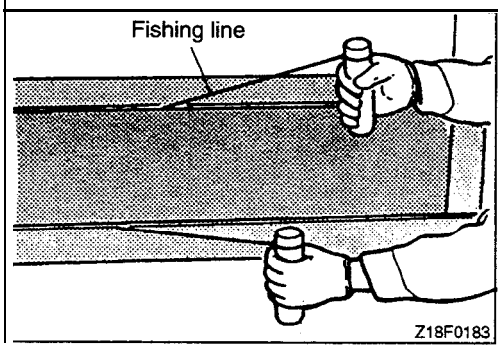
TSB Revision



REMOVAL SERVICE POINT

◀A▶ SIDE GARNISH REMOVAL

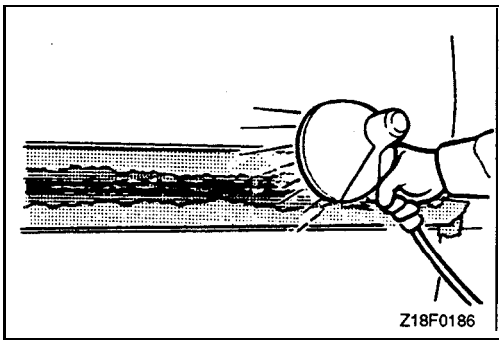
(1) Remove the side garnish mounting nuts.
(2) Affix protective tape to the periphery of the side garnish.



(3) Insert a fishing line [φ0.8 mm (.03 in.)] between the body and the side garnish and grip each end of the fishing line. Cut through adhesive material by pulling wire in a sawing motion and remove the side garnish.

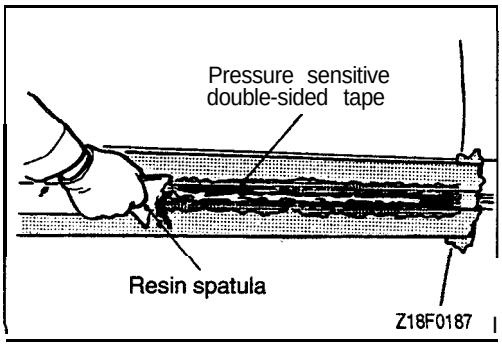
(4) When the side garnish is fastened with a clip or bolt, pull the side garnish toward you to remove the clip or the bolt.

Caution
1. To reuse the side garnish, remove it by pulling the fishing line along the body so as not to damage the edges of the side garnish.
2. If it is hard to cut through adhesive material, heat it to approx. 40°C (104°F).



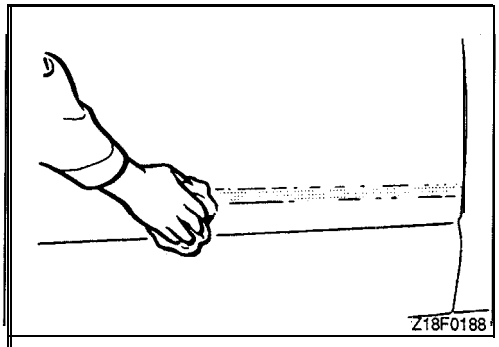
(5) Use an infrared lamp or the like to heat the pressure sensitive double-sided tape remaining on the body to 40 to 60°C (104 to 140°F) for 5 to 10 minutes.

Caution
Do not overheat the tape until its surface dries to turn white.



(6) Use a resin spatula to scrape off the pressure sensitive adhesive double coated tape.

TSB Revision



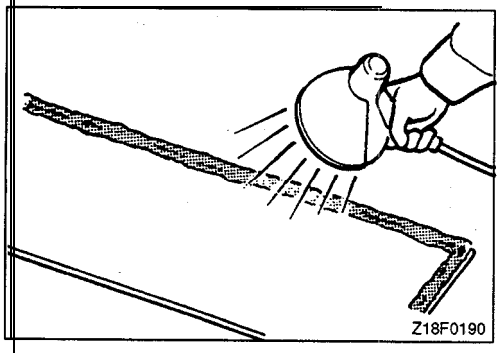
(7) Wipe off application surface of body with clean cloth dampened with degreaser (3M ATD Part No. 8906 or equivalent).

NOTE
After wiping surface, leave surface as it is to volatilize degreaser.

INSTALLATION SERVICE POINT

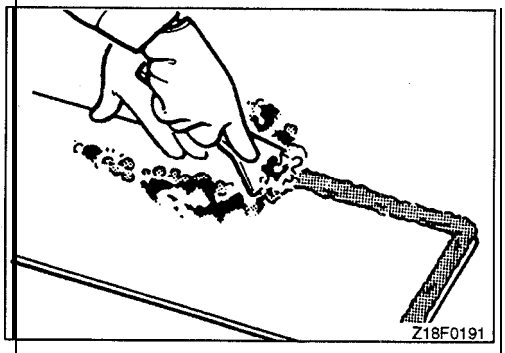
▶A◀ SIDE GARNISH INSTALLATION

Adhesion of Pressure Sensitive Double-sided Tape to Side Garnish (For Reuse)

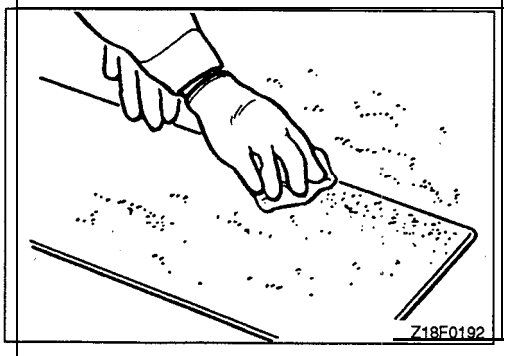


(1) Use an infrared lamp or the like to heat the pressure sensitive double-sided tape to 40 to 60°C (104 to 140°F) for 5 to 10 minutes.

Caution
Do not overheat the tape until its surface dries to turn white.

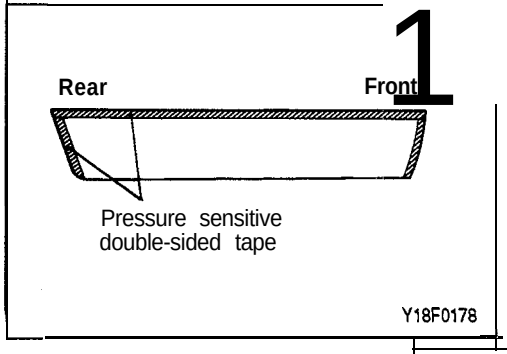


(2) Using a resin spatula or gasket scraper, scrape off the pressure sensitive double-sided tape.
(3) If the pressure sensitive double-sided tape remains on the side garnish, repeat steps (1) and (2).



(4) Use cloth moistened with degreaser (3M ATD Part No. 8906 or equivalent) to wipe the side garnish clean.
(5) Scrape old adhesive slightly.

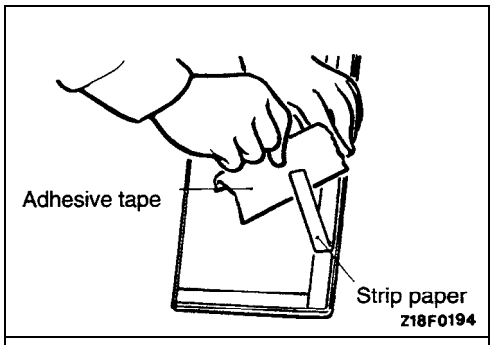
Caution
Do not scrape off all old adhesive.



(6) Affix specified pressure sensitive double-sided tape to the side garnish.

Specified adhesive tape:
3M ATD Part No. 6382 or equivalent

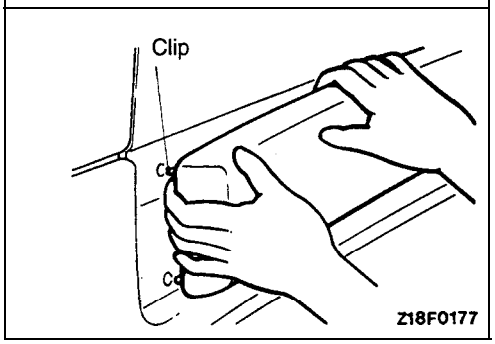
TSB Revision



Side Garnish Installation

(1) Remove strip paper from the pressure sensitive double-sided tape.

NOTE
Affix adhesive tape to the end of strip paper for ease of strip paper removal.



(2) With its clips and bolts aligned with the respective holes in the body, install the side garnish to the body.

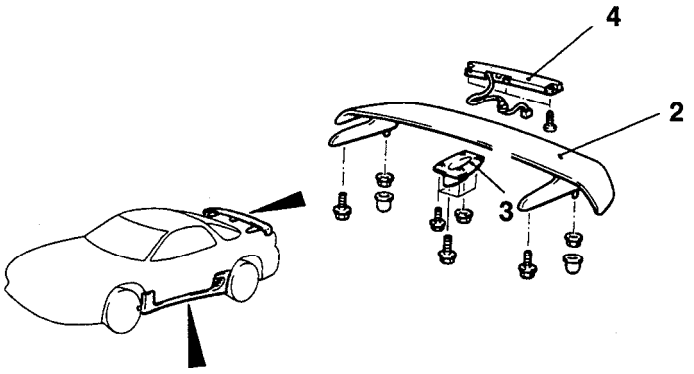
NOTE
If it is hard to affix the pressure sensitive double-sided tape in winter, heat the application surface of the body and the adhesive surface of the side garnish before affixing the tape.
Body . . . . . 40–60°C (104–140°F)
Side garnish.. . . . . 20–30°C (68–86°F)

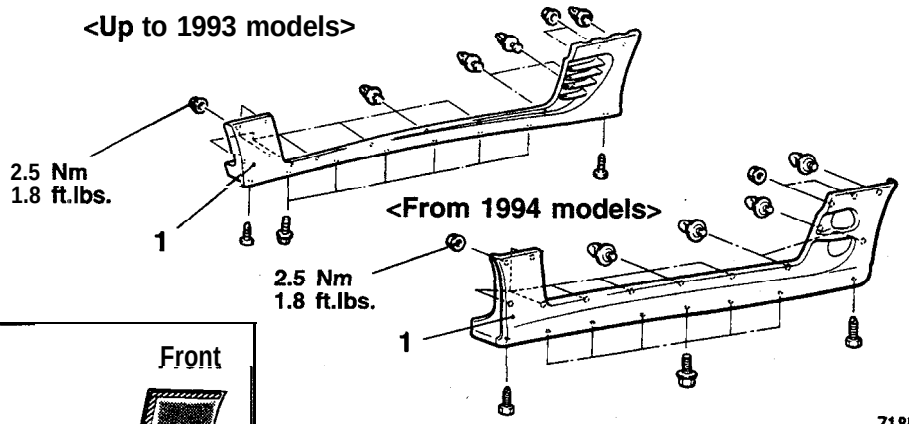
(3) Apply pressure fully to the side garnish.

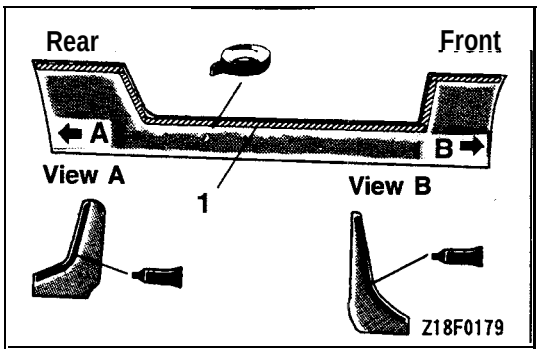
AERO PARTS

REMOVAL AND INSTALLATION

<Vehicles without active aero system>







▨ Adhesive tape:
3M ATD Part No. 8382 or equivalent
■ Adhesive:
3M ATD Part No. 8609 SUPER FAST URETHAN or equivalent

Side air dam removal steps

- Front splash shield (Refer to GROUP 42 – Fender.)
- Quarter trim (Refer to GROUP 52A – Trims.)

◀A▶ ▶B◀ 1. Side air dam

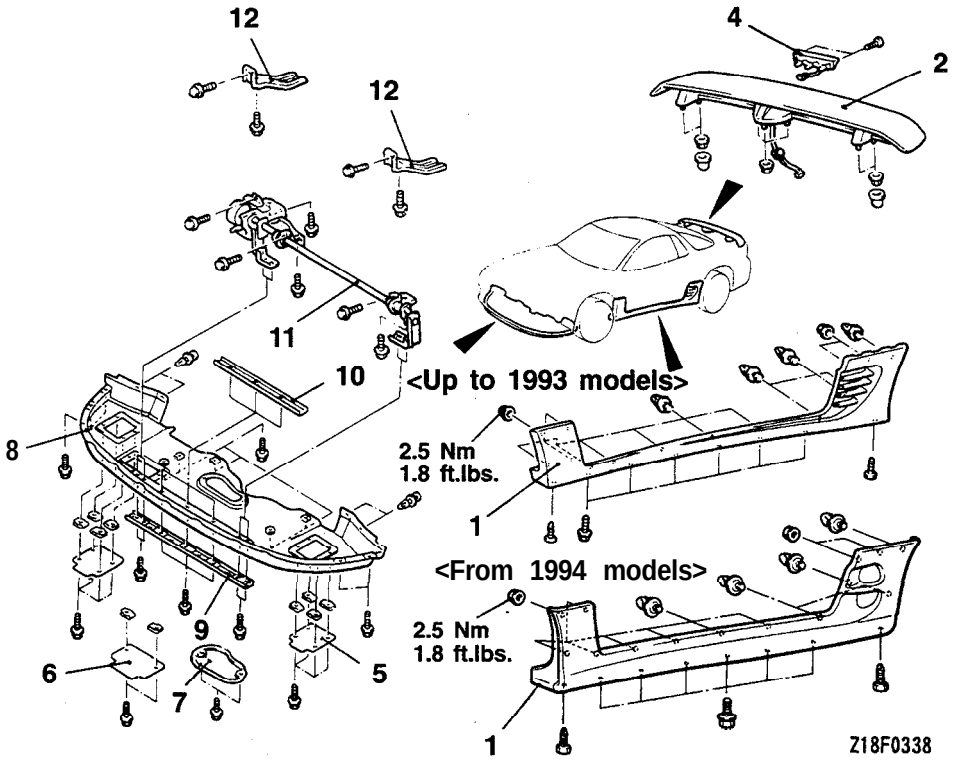
Rear spoiler removal steps

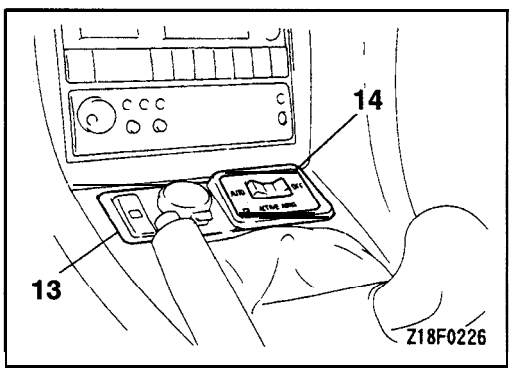
- Liftgate lower trim (Refer to GROUP 52A – Trims.)

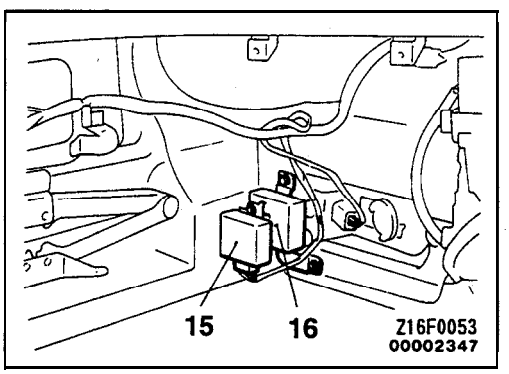
2. Rear spoiler assembly
3. Center stay
4. High mounted stop light

TSB Revision

<Vehicles with active aero system>







Side air dam removal steps

- Front splash shield
  (Refer to GROUP 42 – Fender.)

◀A▶ ▶B◀ 1. Side air dam

Rear spoiler removal steps

- Liftgate lower trim
  (Refer to GROUP 52A – Trims.)

2. Rear spoiler assembly
4. High mounted stop light

Front under cover panel, air dam link assembly removal steps

5. Side cover panel (L.H.)
6. Front cover panel
7. Center cover panel
8. Front under cover panel
9. Lower plate
10. Upper plate

▶A◀ 11. Air dam link assembly

12. Under cover bracket

Active aero switch removal steps

13. Switch garnish C
14. Active aero switch

Active aero control unit removal steps

- Rear side trim (L.H.)
  (Refer to GROUP 52A – Trims.)

15. Active exhaust control unit
    <Up to 1994 models>
16. Active aero control unit

TSB Revision

REMOVAL SERVICE POINT

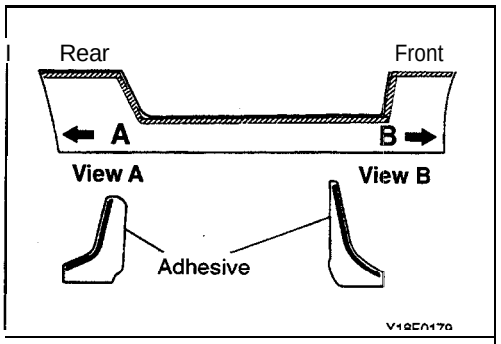
◀A▶ SIDE AIR DAM REMOVAL

Remove the side air dam by the same procedure as the side garnish. (Refer to P.51-15.)

INSTALLATION SERVICE POINTS

▶A◀ AIR DAM LINK ASSEMBLY INSTALLATION

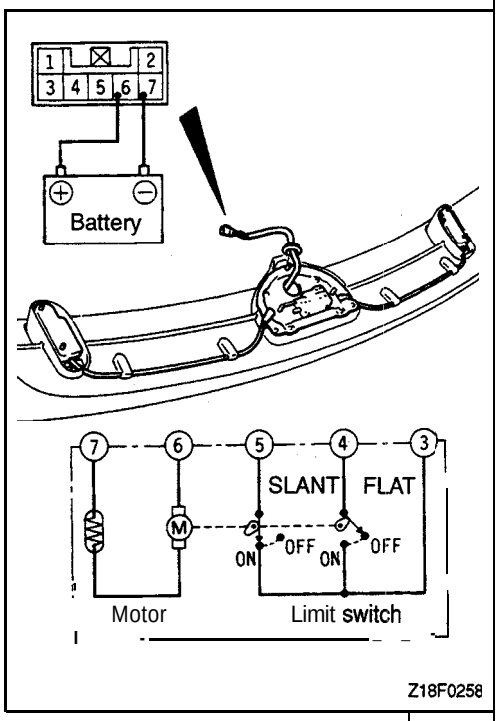
Install the air dam link assembly in the operative condition for ease of front under cover panel.



▶B◀ SIDE AIR DAM INSTALLATION

Install the side air dam by the same procedure as the side garnish (refer to P.51-15), provided that specified adhesive is used.

Specified adhesive:
3M ATD Part No. 8609 SUPER FAST URETHAN or equivalent



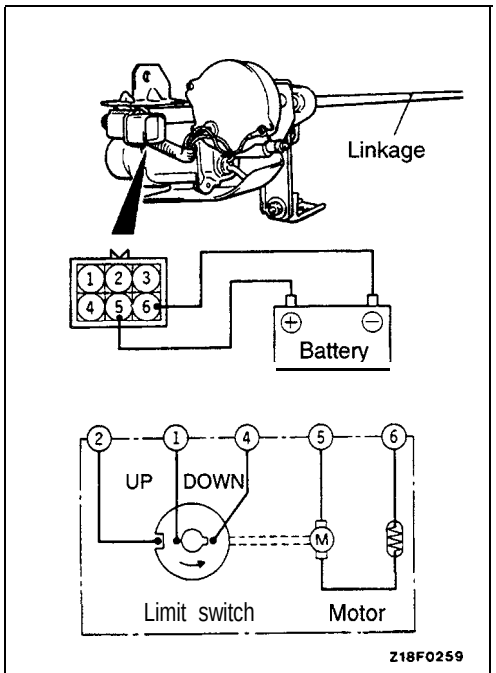
INSPECTION

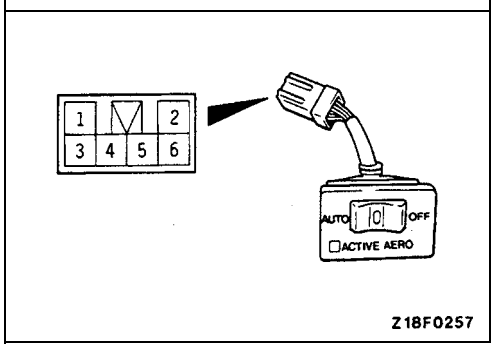
1. REAR SPOILER MOTOR AND LIMIT SWITCH CHECK

(1) Connect the battery as shown in the illustration to make sure that the motor and spoiler operate freely. Then connect the battery with the reversed polarity to make sure that the motor and spoiler operate freely.
(2) While performing the inspection described in (1) above, check the limit switch for continuity.

Spoiler position	Terminal No.		
	3	4	5
FLAT (standard position)	○		○
During operation	0	0	
	0		0
SLANT (operative position)	0	0	

TSB Revision





2. AIR DAM LINK ASSEMBLY MOTOR AND LIMIT SWITCH CHECK

(1) Connect the battery as shown in the illustration to make sure that the motor and the linkage operate freely.
(2) While performing the inspection described in (1) above, check the limit switch for continuity.

Linkage position	Terminal No.		
		2	4
UP (standard position)	○		○
During operation		○	○
	○		○
DOWN (operative position)		○	○

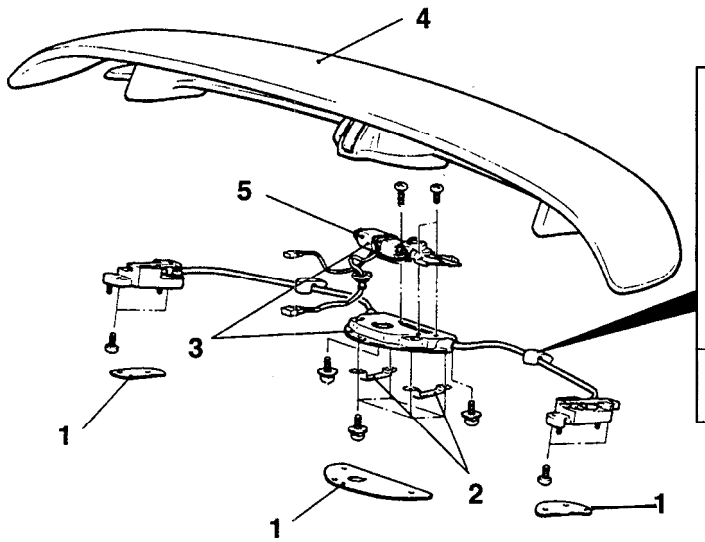
3. ACTIVE AERO SWITCH CHECK

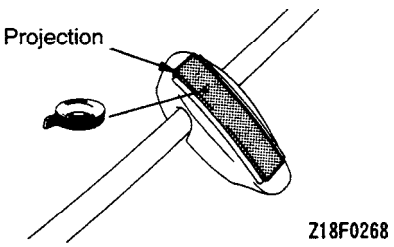
Operate the switch to check the continuity between the terminals.

Switch position	Terminal No.					
	5	1	2	4	6	3
OFF	ILL	○	○			IND
			○		○	
AUTO 1		○	○		○	
AUTO 2 (Automatic reset type)				○	○	

TSB Revision

DISASSEMBLY AND REASSEMBLY <REAR SPOILER ASSEMBLY>



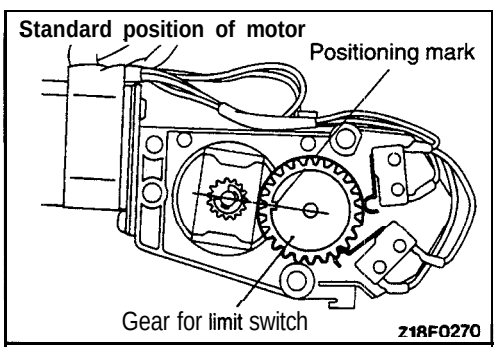


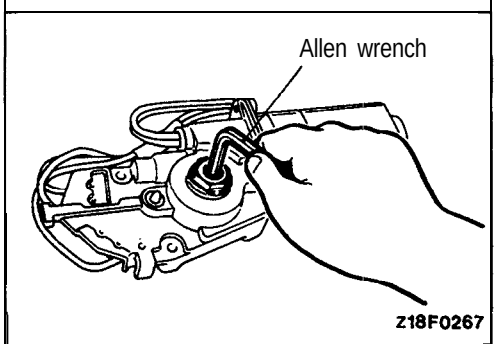
Adhesive tape:
3M ATD Part No. 6382 or equivalent

Z18F0272
00002338

Disassembly steps

1. Spacer
2. Bracket
▶B◀ 3. Motor and cable assembly
4. Rear spoiler
▶A◀ 5. Motor





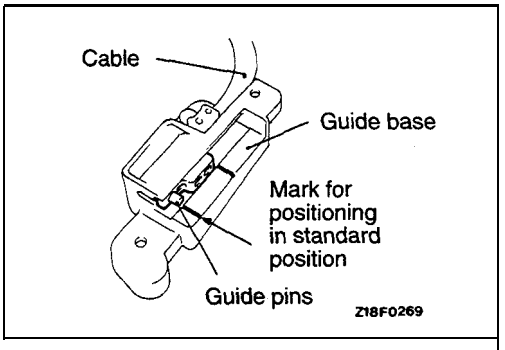
REASSEMBLY SERVICE POINTS

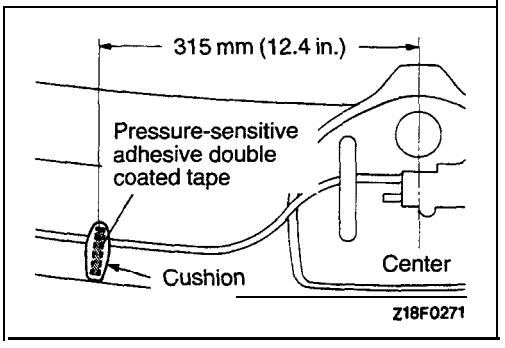
▶A◀ MOTOR INSTALLATION

(1) Make sure that the motor is in the standard position as shown in the illustration.

(2) If the motor is not in the standard position, use Allen wrench to turn the gear for the limit switch until the motor is in the standard position.

TSB Revision





(3) Align the center of the guide pin with the positioning mark of the guide base to set the cable in the standard position.
(4) Install the motor to the cable assembly.

NOTE
When the motor is installed to the cable assembly, the drive gear of the motor may not engage with the cable. In such a case, they can be engaged with each other by tightening the motor mounting screw.

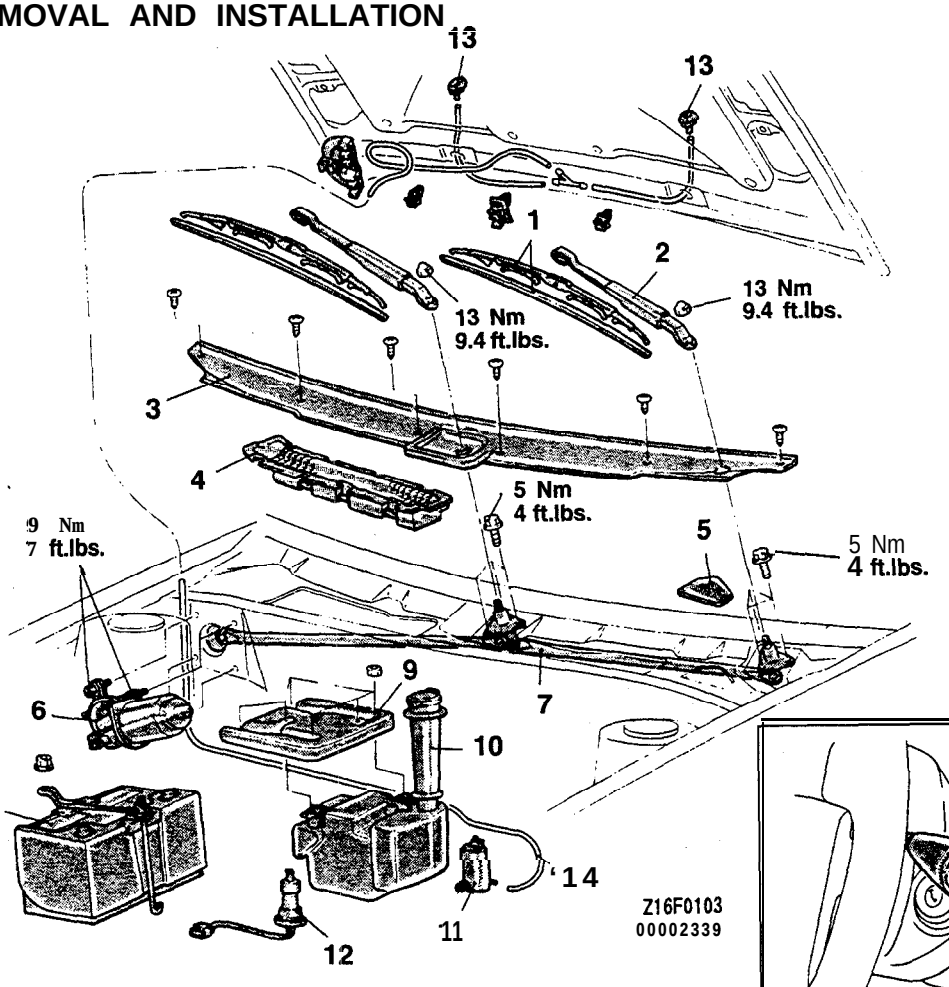
▶B◀ MOTOR AND CABLE ASSEMBLY INSTALLATION

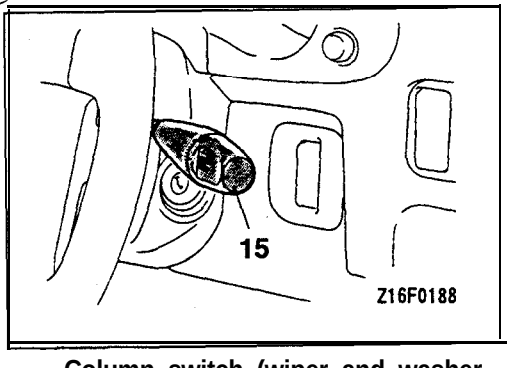
Affix pressure-sensitive adhesive double coated tape to the projection of each cushion and install the cushion in the position shown in the illustration.

Specified adhesive tape:
3M ATD Part No. 6382 or equivalent

WINDSHIELD WIPER AND WASHER

REMOVAL AND INSTALLATION





Linkage removal steps

1. Wiper blade
▶A◀ 2. Wiper arm
3. Front deck garnish
4. Air inlet garnish (RH)
5. Hole cover
◀A▶ 6. Wiper motor
7. Linkage

Wiper motor removal steps

1. Wiper blade
▶A◀ 2. Wiper arm
5. Hole cover
◀A▶ 6. Wiper motor

Column switch (wiper and washer switch) removal

15. Column switch (Refer to GROUP 54 – Column Switch.)

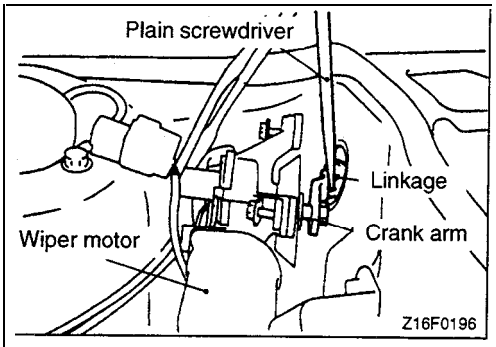
Washer tank removal steps

8. Battery
9. Battery tray
10. Washer tank
11. Washer motor
12. Washer fluid level sensor

Washer tube removal steps

8. Battery
9. Battery tray
13. Washer nozzle
14. Washer tube

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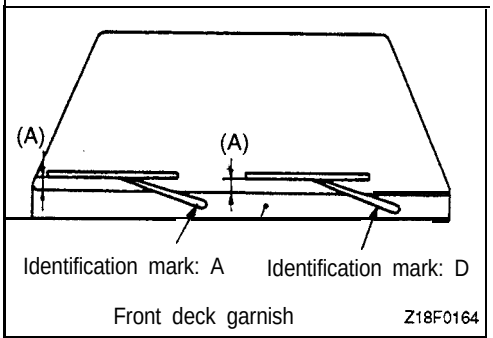


REMOVAL SERVICE POINT

◀A▶ WIPER MOTOR REMOVAL

(1) Remove the wiper motor mounting bolts.
(2) Using a plain screwdriver, detach the crank arm of the wiper motor from the linkage to remove the wiper motor.

Caution
Do not remove the crank arm from the wiper motor except when necessary, as the auto stop angle has been preset. When the crank arm is to be removed, make **a mark on both of them before removal.**

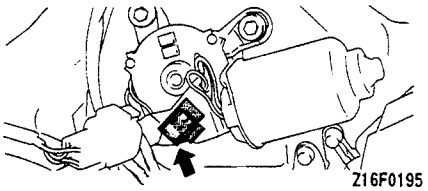


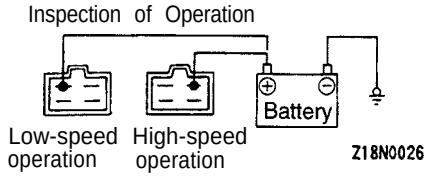
INSTALLATION SERVICE POINT

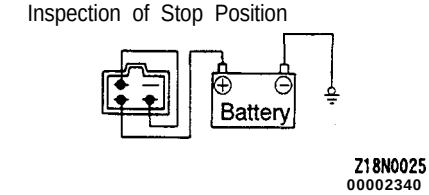
▶A◀ WIPER ARM INSTALLATION

(1) The wiper arms, right and left, are different in shape. Check the identification symbol.
(2) After the wiper blades have been set, install them in such a way that the ends of the wiper blades will stop at the specified positions (standard values).

Standard value (A): 15–20 mm (.6–.8 in.)







INSPECTION

WIPER MOTOR CHECK

Inspect the wiper motor mounted on the vehicle with its connector disconnected.

Wiper Motor Operation at LOW and HIGH Speeds Check

Connect the battery to the wiper motor as shown, and check its operation at LOW and HIGH speeds.

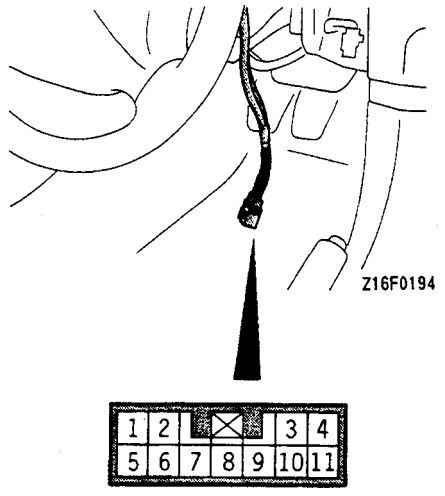
Wiper Motor STOP Position Check

(1) Operate the wiper motor at LOW speed and intermediately disconnect the battery to let the wiper motor stop.
(2) Connect the terminals as well as the battery, as shown, and check that the wiper motor stops at the automatically-stopped position following LOW-speed operation.

COLUMN SWITCH CHECK

(1) Remove the knee protector.
(Refer to GROUP 52A – Instrument Panel.)
(2) Remove the column cover.
(3) Remove the column switch right coupling connector (11 terminals).

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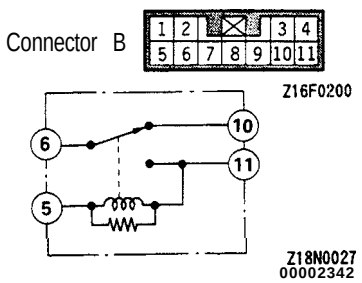


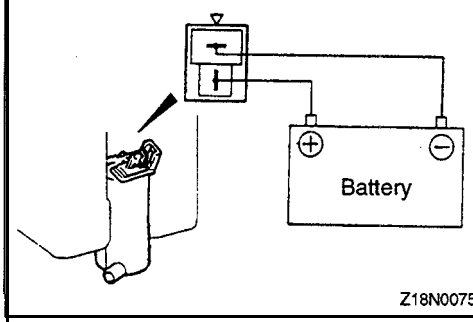
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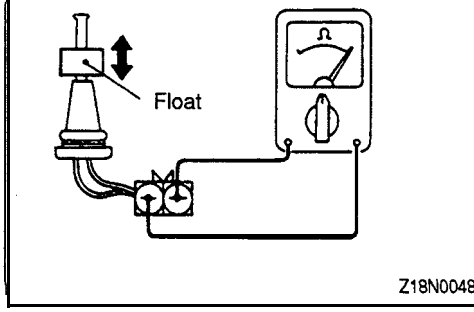
Wiper and Washer Switch Check

Operate the switch to check for continuity between the terminals.

Switch position		Terminal No.							
		3	4	5	6	7	8	9	10
Wiper switch	OFF				0				○
	INT	0						0	
					0				
	LO			○	○				
	HI			○		○			
Variable intermittent wiper control switch			○					○	
Washer switch				○			○		

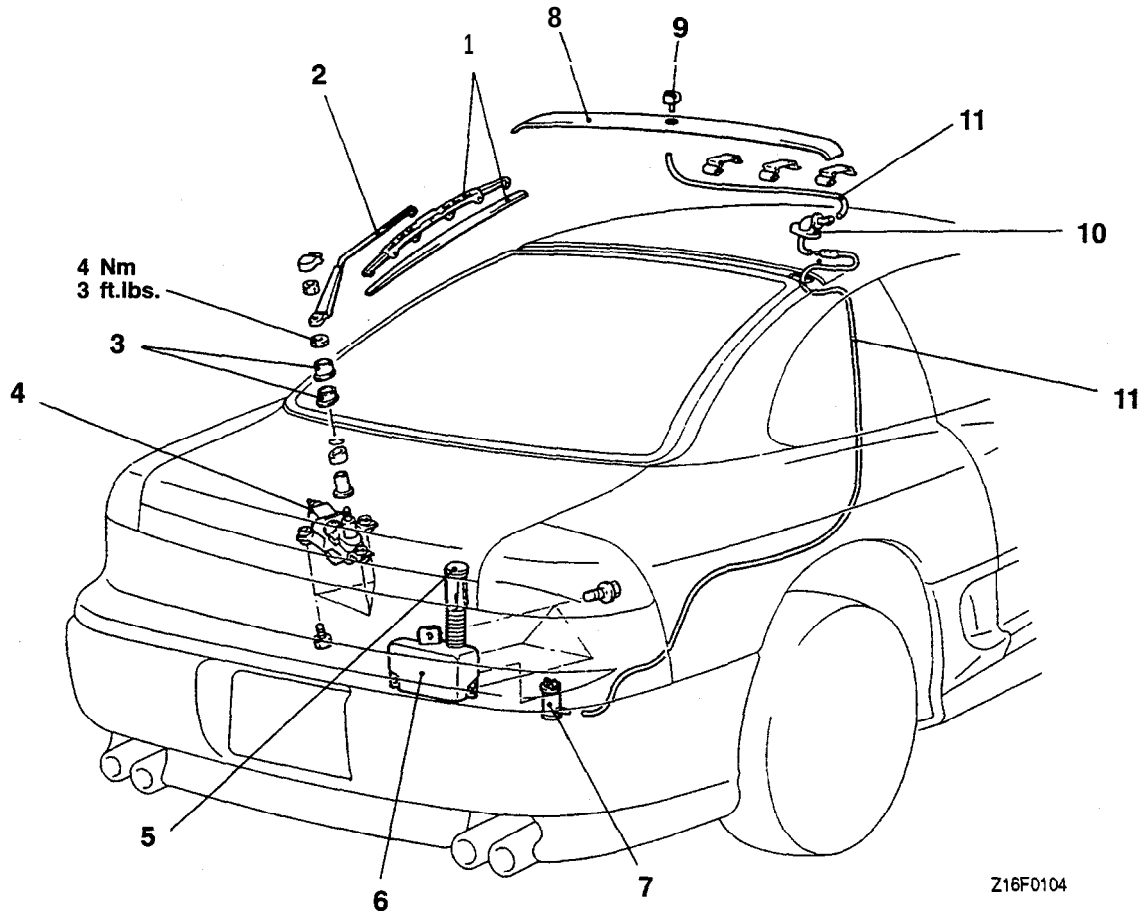






REAR WIPER AND WASHER

REMOVAL AND INSTALLATION



Wiper motor removal steps

1. Wiper blade
2. ▶A◀ Wiper arm
3. Spacer
- Liftgate lower trim (Refer to GROUP 52A – Trims.)
4. Wiper motor

Washer tank removal steps

- Rear end trim (Refer to GROUP 52A – Trims.)
5. Cap
6. Washer tank
7. Washer motor

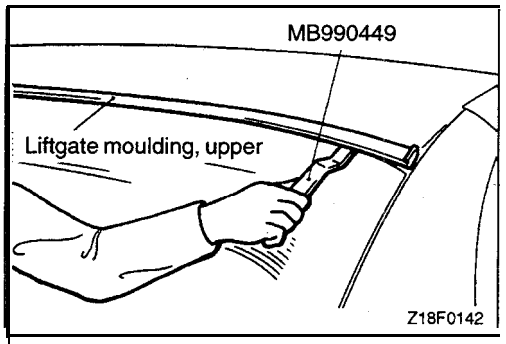
Washer tube removal steps

- Front pillartrim (RH) (Refer to GROUP 52A – Trims.)
- Quarter trim (RH) (Refer to GROUP 52A – Trims.)
- Quarter upper trim (RH) (Refer to GROUP 52A – Trims.)
- Rear roof rail trim (Refer to GROUP 52A – Trims.)
- Rear side trim (RH) (Refer to GROUP 52A – Trims.)

◀A▶

8. Liftgate upper moulding
9. Washer nozzle
10. Tube and grommet assembly
11. Washer tube

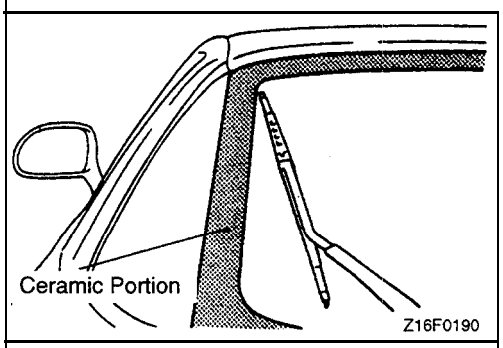
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REMOVAL SERVICE POINT

(A, LIFTGATE UPPER MOULDING REMOVAL

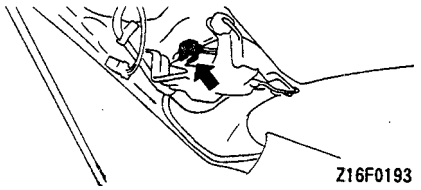
Using a special tool, pry the clip portion to remove the upper liftgate moulding.



INSTALLATION SERVICE POINT

▶A◀ WIPER ARM INSTALLATION

After assembling the wiper blade to the wiper arm, install the wiper arm with its tip positioned along the ceramic part,



INSPECTION

WIPER MOTOR CHECK

Check the wiper motor with it mounted on the vehicle and with its harness connector disconnected.

Wiper Motor Operation

Connect a battery to the wiper motor, as shown, to check the operation of the wiper motor.

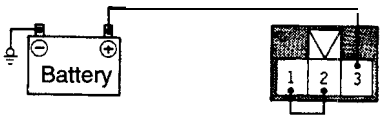
inspection of operation

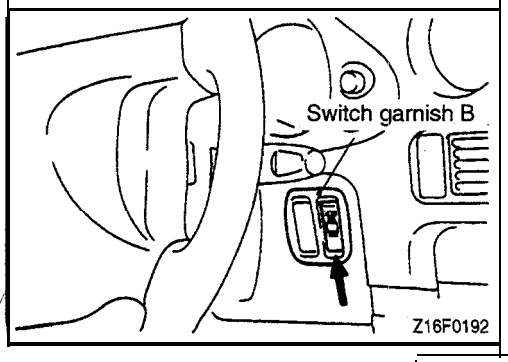


Wiper Motor Stop Position

(1) Operate the wiper motor by the procedure described above and intermediately disconnect the battery to let the wiper motor stop.
(2) Reconnect the battery **as** shown and check that the wiper motor stops at the automatically-stopped position after operation.

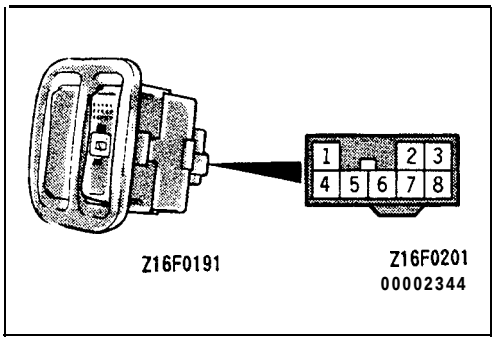
Inspection of stop position





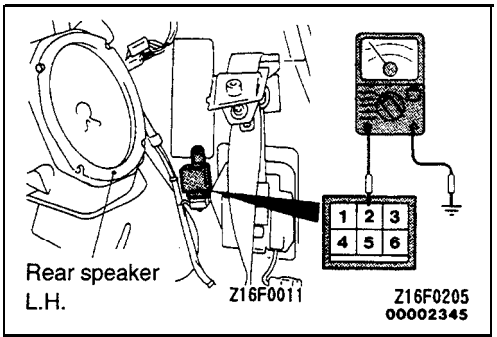
WIPER WASHER SWITCH CHECK

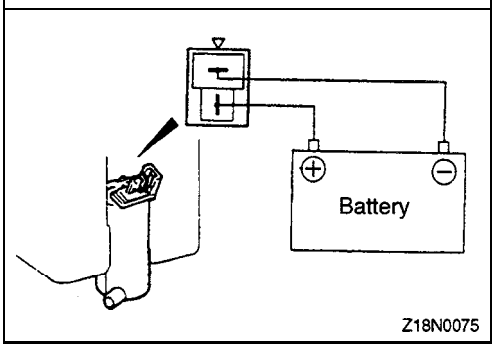
(1) Remove switch garnish B from the knee protector.



(2) Operate the switch to check for continuity between the terminals.

Switch position		Terminal No.							
		2	4	5	6	7	8	1	3
Wiper switch	OFF		○—○					ILL	
	INT		○—○			○—○			
	ON			○—○					
Washer switch	OFF								
	ON	○—		——	—○				





INTERMITTENT WIPER RELAY CHECK

(1) Remove the quarter trim. (Refer to GROUP 52A – Trims.)
(2) With the intermittent wiper relay connected to the wiring harness connector, let the wiper operate intermittently and check the voltage at terminal (2).

Condition	Standard
When wiper is stationary	o v
When wiper is in operation	System voltage

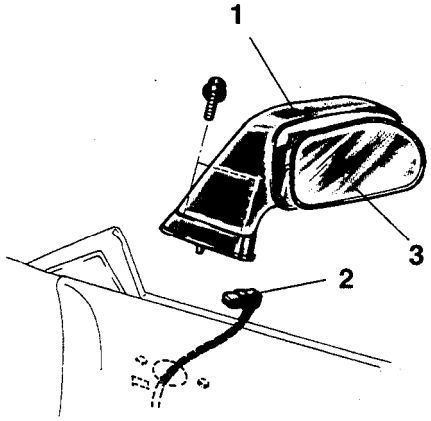
WASHER MOTOR CHECK

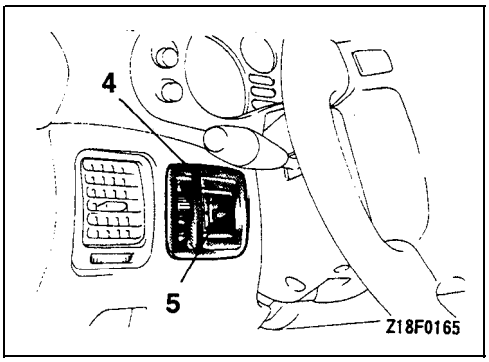
(1) When the washer motor is inspected, make sure that it is mounted on the washer tank and that the washer tank is filled with water.
(2) Connect the battery as shown to check whether water is pumped out.

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DOOR MIRROR

REMOVAL AND INSTALLATION





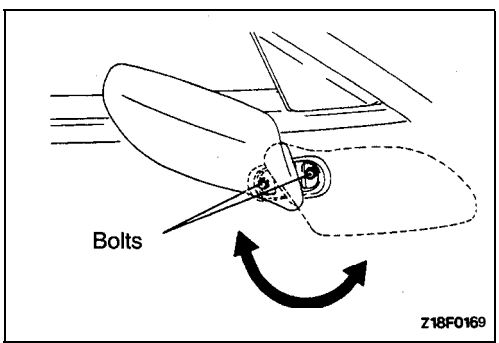
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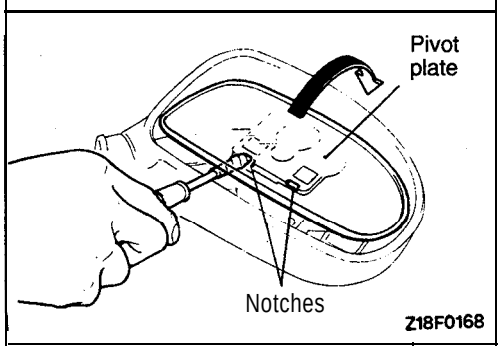
Door mirror removal steps

◀A▶ 1. Door mirror
2. Harness connector
◀B▶ 3. Mirror

Electric remote controlled mirror switch removal steps

4. Instrument panel switch
5. Electric remote controlled mirror switch





REMOVAL SERVICE POINTS

◀A▶ DOOR MIRROR REMOVAL

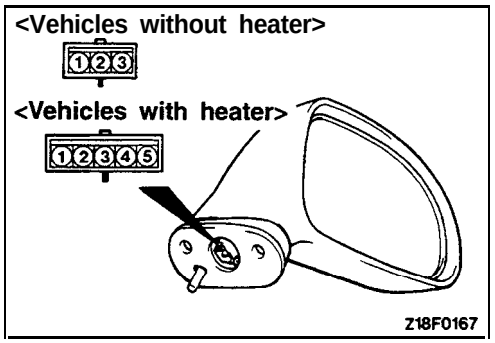
Tilt the door mirror backward and forward to remove the attaching bolts.

◀B▶ MIRROR REMOVAL

Tilt the mirror upward and fit a screwdriver blade covered with protective tape in the notch between the mirror and the pivot plate to pry up the mirror.

Caution
Do not fit the screwdriver blade between the pivot plate and actuator assembly.

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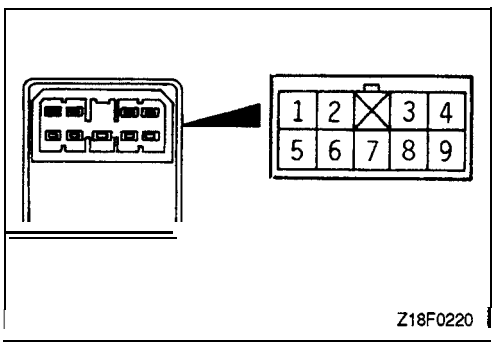


I N S P E C T I O N

DOOR MIRROR CHECK

(1) Check to be sure that the mirror moves as described in the table when each terminal is connected to the battery.
(2) Check to see that there is continuity between terminals 1 and 5.

Direction	Terminal No.				
	2 (1)*	3 (2)*	4 (3)*	1	5
UP	⊖		⊕		
DOWN	⊕		⊖		
RIGHT	⊖		⊕		
LEFT	⊕		⊖		



ELECTRIC REMOTE CONTROLLED MIRROR SWITCH CHECK

Operate switches and check for continuity between terminals.

Direction	Left side					Right side				
	Terminal No.									
	3	4	6	7	8	2	4	6	7	9
UP		○			○	○		○		
			○	○						
DOWN		○			○	○		○		
			○	○						
LEFT		○					○			○
	○		○					○		
RIGHT	○						○			○
			○	○				○	○	

TSB Revision

INTERIOR

CONTENTS

INTERIOR 52A

SUPPLEMENTAL RESTRAINT SYSTEM (SRS) 52B

NOTES

INTERIOR

CONTENTS

FLOOR CONSOLE* 10
FRONT SEAT* 17
HEADLINING 16
INSTRUMENT PANEL* 5
REAR SEAT 25
SEAT BELT* 26
SPECIAL TOOLS 2
SPECIFICATIONS 2
TRIMS 11
TROUBLESHOOTING 3

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

(1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).

(2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.

(3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B -Supplemental Restraint System (SRS) and GROUP 00 – Maintenance Service, before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

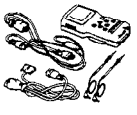
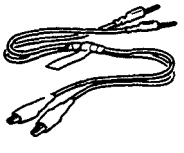
The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning light, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

SPECIFICATIONS

ADHESIVES

Item		Specified adhesive
Front seat	Lower rail and nut housing mounting bolts	3M Stud Locking Part No.41 70 or equivalent

SPECIAL TOOLS

Tool	Tool number and name	Supersession	Application
	MB991341 Scan tool (Multi-use tester <MUT>)	MB991341C	<Up to 1993 models> Checking the seat belt warning light and buzzer system
	ROM pack (For the number, refer to GROUP 00 – Precautions Before Service.)		
 Z16X0606	MB991502 Scan tool (MUT-II)	MB991502	<All models> Checking the seat belt warning light and buzzer system
 Z16X0607	ROM pack		
	MB991 529 Diagnostic trouble code check harness	MB991 529	<From 1994 models> Electronic control system inspection by using a voltmeter

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TROUBLESHOOTING

INPUT SIGNAL <POWER SEAT, TENSION-REDUCER TYPE SEAT BELT AND BUZZER>

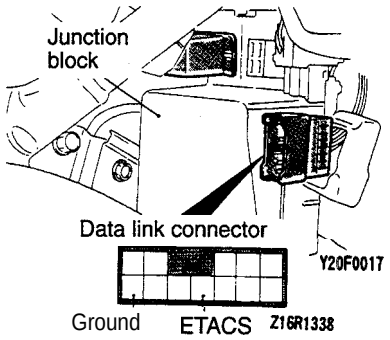
<Up to 1993 models>

When the scan tool [Multi-use tester (MUT)] or a voltmeter is used

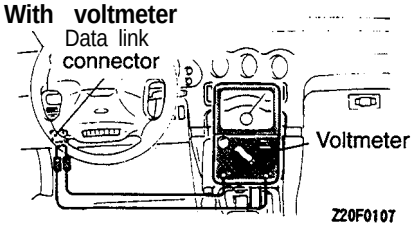
Using the scan tool or voltmeter, check whether or not the input signals from each switch are being input to the ETACS unit.

(1) Connect the scan tool to the data link connector or connect the voltmeter between the ETACS terminal and the ground terminal.

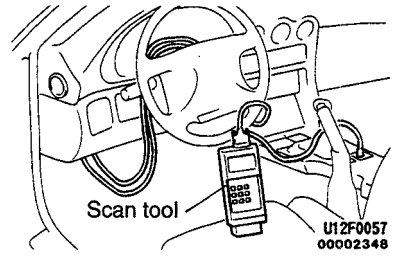
(2) Check if the buzzer of the scan tool sounds or the needle of the voltmeter moves when each switch is operated. if the buzzer sounds or the needle moves, the input signals are being input to the ETACS unit, so that switch can be considered to be functioning normally. If not, the switch or switch input circuit is faulty. Check the switch and the switch input circuit.



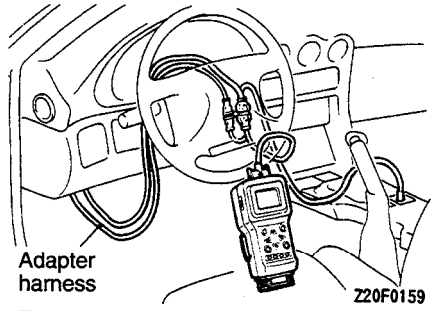
With voltmeter



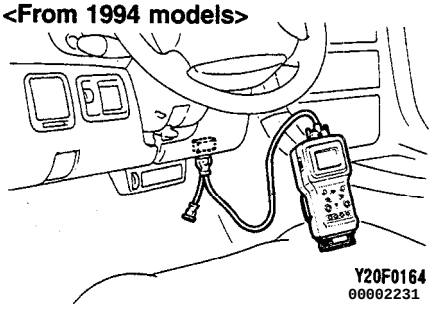
With scan tool



When using the MUT-II
<Up to 1993 models>



<From 1994 models>



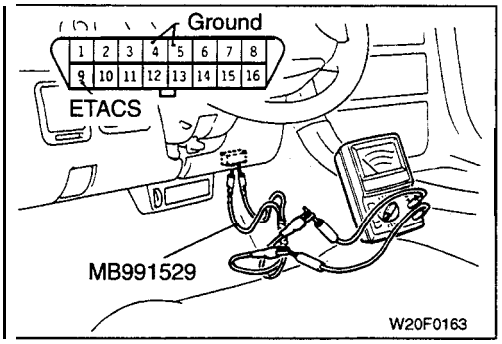
<All models>

When the scan tool (MUT-II) is used.

(1) Connect the scan tool to the data link connector to read out the diagnostic trouble codes.
When connecting the scan tool to a vehicle up to 1993 model, use the adapter harness supplied together.

Caution
Make certain that the ignition switch is at OFF when the scan tool is connected or disconnected.

(2) If the buzzer of the scan tool sounds once when each switch is operated (turned ON/OFF), the circuit system of the switch sends the input signal to the ECU normally.



<From 1994 models>

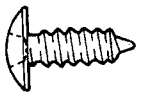
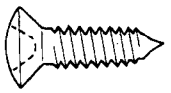
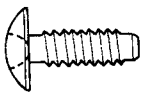
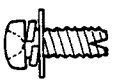
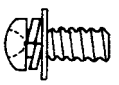
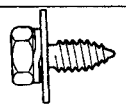
When a voltmeter is used:

Connect a voltmeter to the ETACS terminal and the ground terminal of the data link connector using the special tool. Observe the voltmeter pointer deflection to read out the diagnostic trouble codes.

TSB Revision

INSTRUMENT PANEL

For installation of the instrument panel, the bolts and screws described below are used. They are indicated by symbols in the illustration.

Name	Symbol	Size mm (in.) (D × L)	Color	Shape
Tapping screw	A	5 × 16 (.20 × .63)	–	
	B	5 × 30 (.20 × 1.2)	–	
	C	4 × 12 (.16 × .47)	Black	
	D	5 × 16 (.20 × .63)	Black	
	E	4x16(.16x.63))	–	
Washer assembled screw	F	5 × 16 (.20 × .63)	–	
	G	4x12(.16x.47)		
Washer assembled bolt	H	6 × 16 (.24 × .63)	–	
	I	6 x 16 (.24 × .63)		
	J	6 x 20 (.24 x .79)		
	K	6 x 20 (.24 x .79)	Black	
	L	6 x 25 (.24 x .98)	Black	Z19N0001

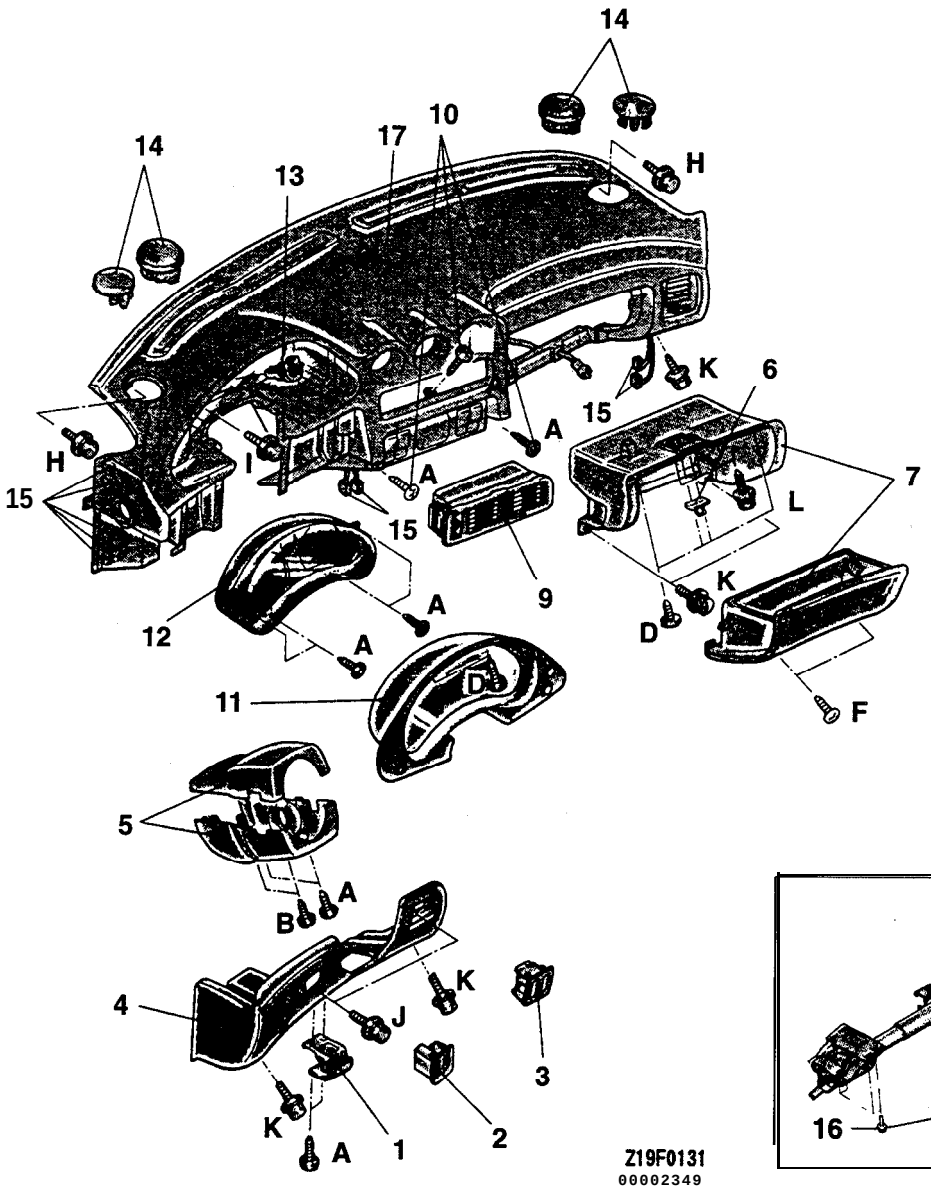
NOTE
D = Thread diameter
L = Effective thread length

REMOVAL AND INSTALLATION

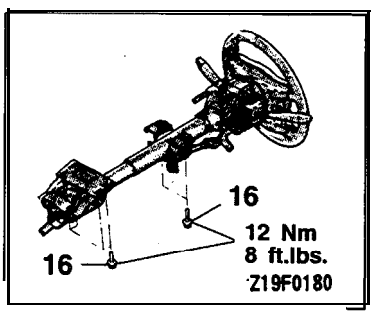
<Up to 1993 models>

Pre-removal and Post-installation Operation
- Floor Console Removal and Installation (Refer to P.52A-10.)

CAUTION: SRS
When removing and installing the floor console assembly, don't allow any impact or shock to the SRS diagnosis unit.



Z19F0131
00002349



Removal steps

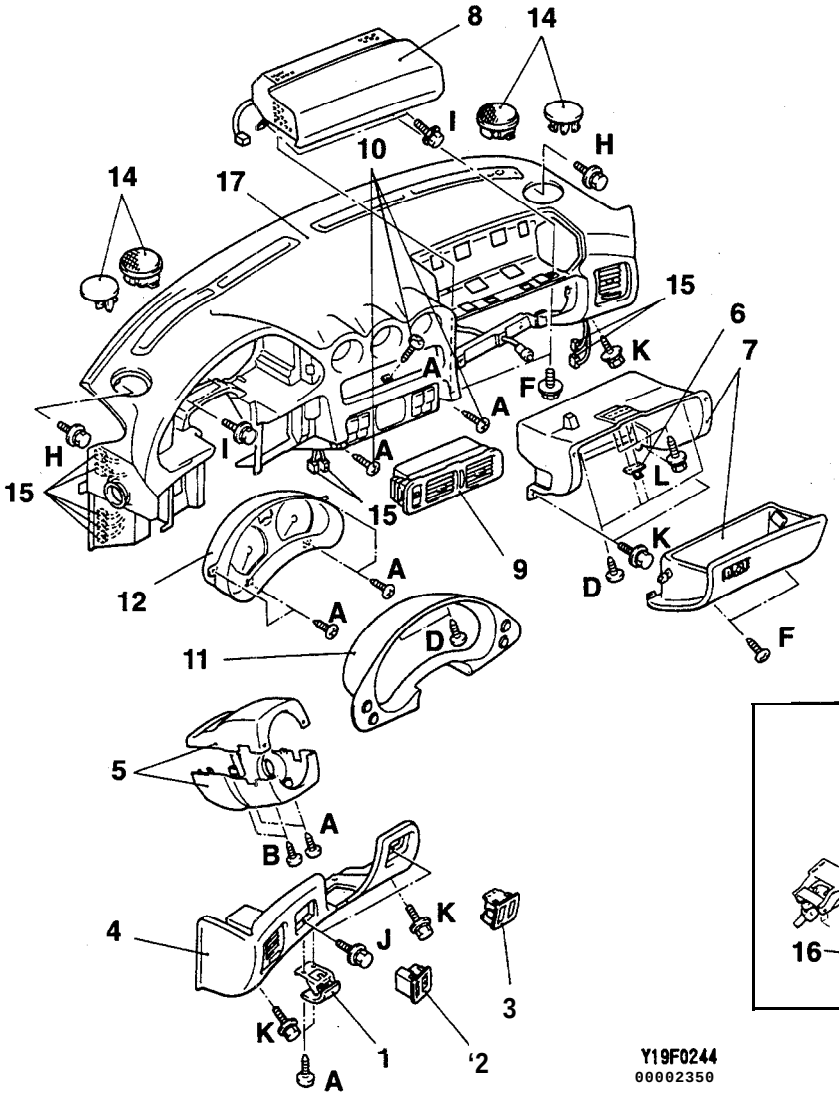
1. Hood lock release handle
2. Rheostat
3. Switch garnish B
4. Knee protector assembly
◀A▶ 5. Column cover
6. Glove box striker
7. Glove box and cross pipe cover
◀B▶ 9. Center air outlet assembly
10. Heater control assembly installation screws
◀C▶ 11. Meter bezel
12. Combination meter
13. Speedometer cable adapter (Mechanical type speedometer)
14. Speaker or plug
15. Harness connector
16. Steering shaft mounting bolts
17. Instrument panel assembly

TSB Revision

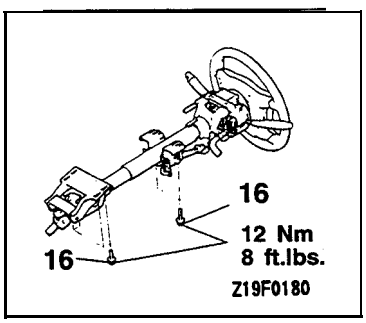
<From 1994 models>

Pre-removal and Post-installation Operation
- Floor Console Removal and Installation (Refer to P.52A-10.)

CAUTION: SRS
(1) When removing and installing the floor console assembly, don't allow any impact or shock to the SRS diagnosis unit.
(2) For the passenger side air bag module removal/installation, always observe the service procedures of GROUP 52B – Air Bag Module and Clock Spring.



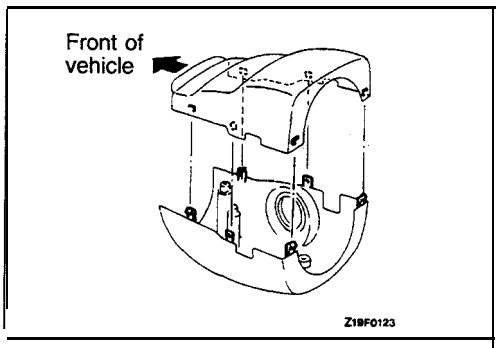
Y19F0244
00002350



Removal steps

1. Hood lock release handle
2. Rheostat
3. Switch garnish B
4. Knee protector assembly
◀A▶ 5. Column cover
6. Glove box striker
7. Glove box and cross pipe cover
8. Passenger seat air bag module '(Refer to GROUP 52B – Air Bag Module and Clock Spring.)
◀B▶ 9. Center air outlet assembly
10. Heater control assembly installation screws
11. Meter bezel
12. Combination meter
14. Speaker or plug
15. Harness connector
16. Steering shaft mounting bolts
17. Instrument panel assembly

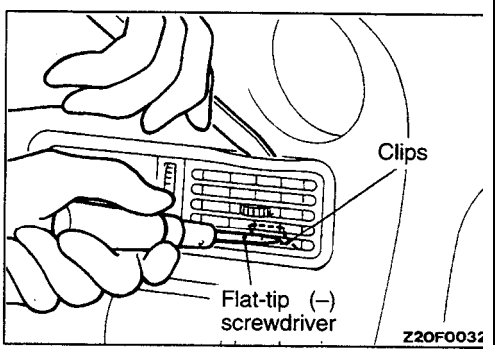
TSB Revision



REMOVAL SERVICE POINTS

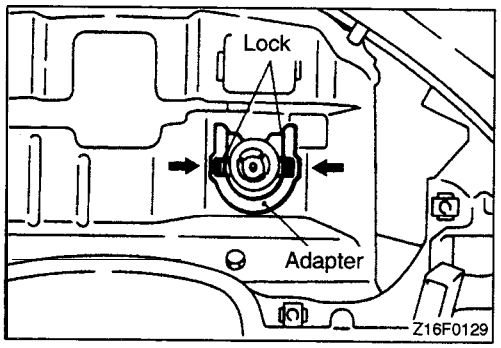
◀A▶ COLUMN COVER REMOVAL

Remove the screws and remove the column cover while being careful not to break the claws.



◀B▶ CENTER AIR OUTLET ASSEMBLY REMOVAL

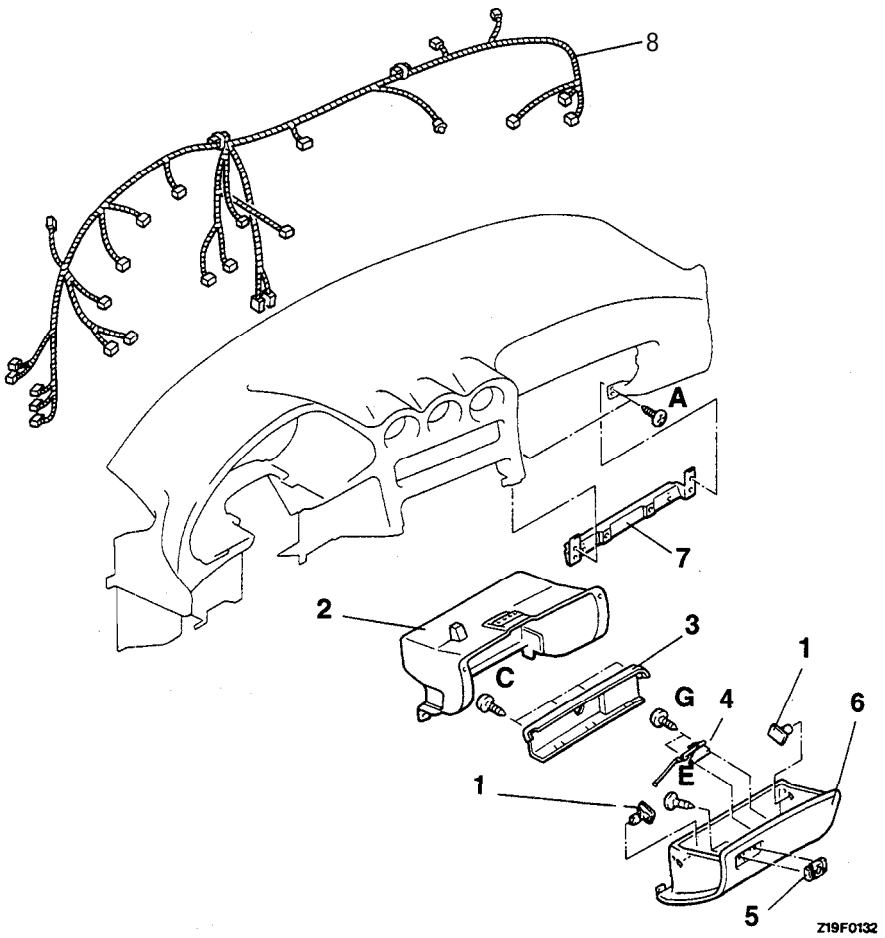
Disengaging the clips of the center air outlet assembly with a fiat tip (–) screwdriver, remove the center air outlet assembly with the trim stick.



◀C▶ SPEEDOMETER 'CABLE ADAPTER (MECHANICAL TYPE SPEEDOMETER) REMOVAL

(1) Disconnect the speedometer cable at the transaxle end of the cable.
(2) Remove the adapter locks from the instrument panel.
(3) Pull the speedometer cable slightly toward the passenger compartment and remove the adapter.

DISASSEMBLY AND REASSEMBLY



Glove box disassembly steps

1. Glove box stopper
2. Cross pipe cover
3. Glove box cover
4. Ratchet assembly
5. Lock cylinder assembly
6. Glove box

Instrument panel disassembly steps

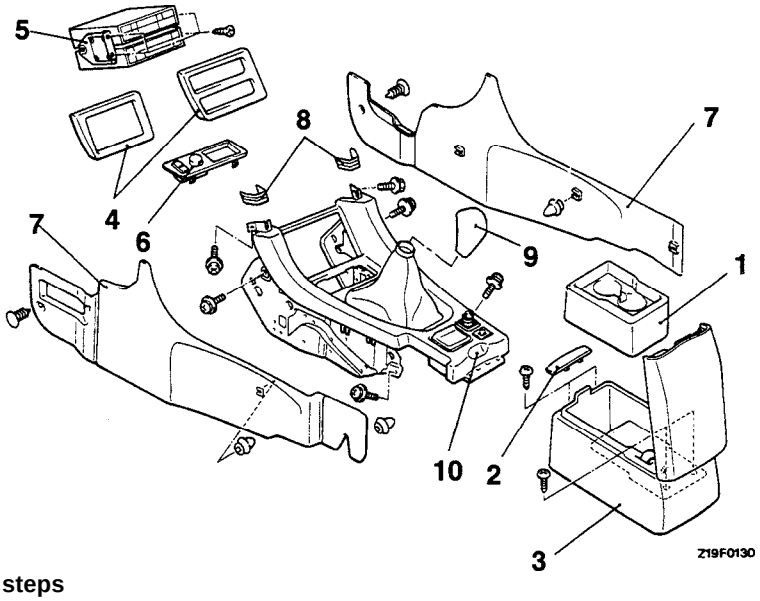
7. Glove box lower frame
   (Refer to GROUP 55 – Ventilators.)
   - Side air outlet (Refer to GROUP 55 – Ventilators.)
   - Photo sensor (Refer to GROUP 55 – Ventilators.)
   - Defroster garnish (Refer to GROUP 55 – Ventilators.)
   - Heater ducts (Refer to GROUP 55 – Ventilators.)
   - Combination gauge
     (Refer to GROUP 54 – Meters and Gauges.)
8. Instrument panel wiring harness

TSB Revision

FLOOR CONSOLE

REMOVAL AND INSTALLATION

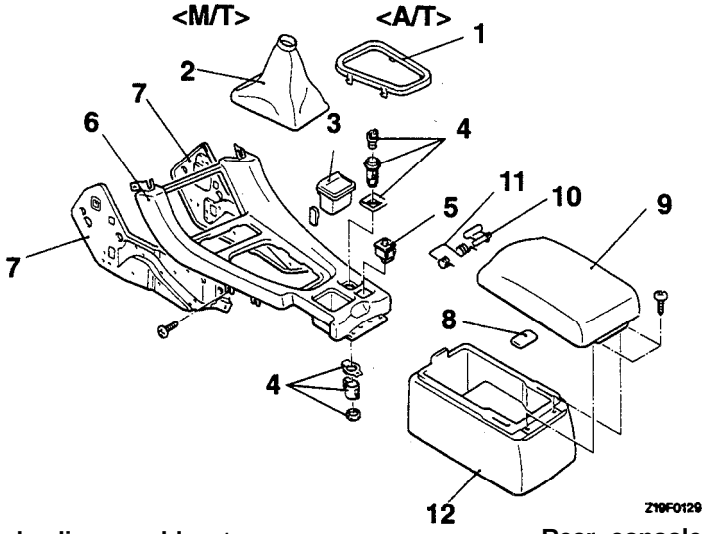
CAUTION: SRS
When removing and installing the floor console assembly, don't allow any impact or shock to the SRS diagnosis unit.



Removal steps

1. Cup holder
2. Console plug
3. Rear console assembly
4. Radio panel
5. Radio
6. Switch garnish C
7. Console side cover
8. Front console garnish
9. Manual transaxle shift lever knob
10. Front console assembly

DISASSEMBLY AND REASSEMBLY



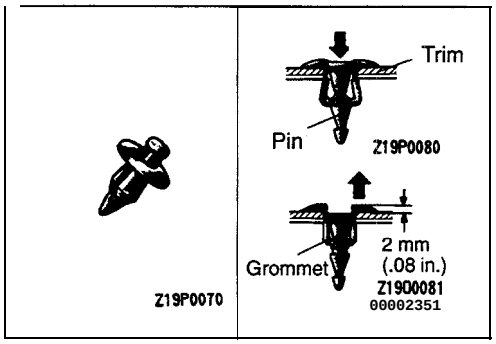
Front console disassembly steps

1. A/T garnish <A/T>
2. M/T shift lever cover <M/T>
3. Ashtray
4. Cigarette lighter
5. Power seat switch
6. Front console
7. Front console bracket

Rear console disassembly steps

8. Plug
9. Console lid
10. Lock lever
11. Spring
12. Rear console

TSB Revision



TRIMS

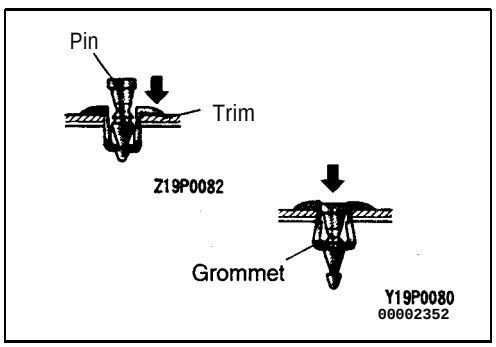
TRIM CLIP REMOVAL/INSTALLATION PROCEDURES

The type of clip shown in the illustration, which is used for the installation of instrument panel, should be removed and installed by the following procedures described below.

REMOVAL

(1) Use a cross-tip (+) screwdriver to push inward the pin (at the center of the trim clip) to a depth of about 2 mm (.08 in.).
(2) Pull the trim clip outward to remove it.

Caution
Do not push the pin inward more than necessary because it may damage the grommet, or the pin may fall in, if pushed too far.

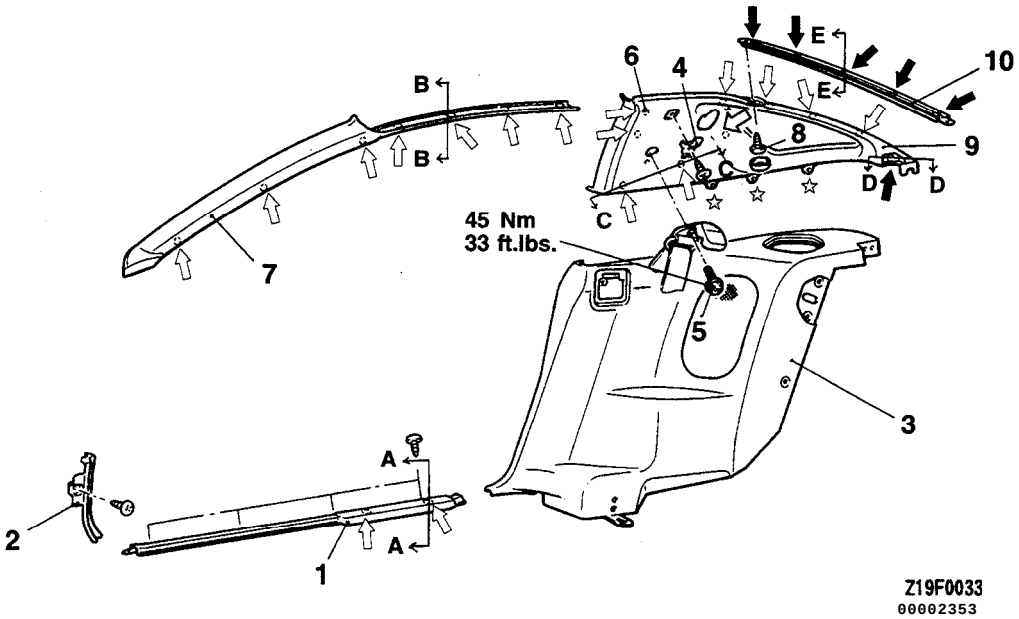


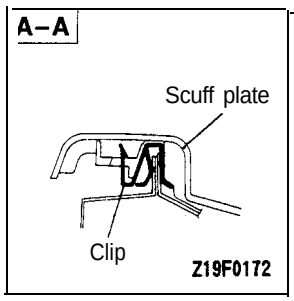
INSTALLATION

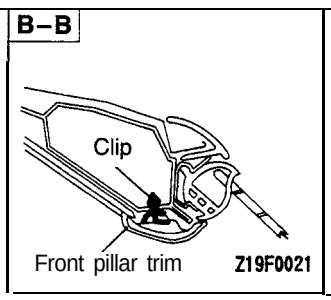
(1) With the pin pulled out, insert the trim clip into the hole in the trim.
(2) Push the pin inward until the pin's head is flush with the grommet.
(3) Check whether the trim is secure.

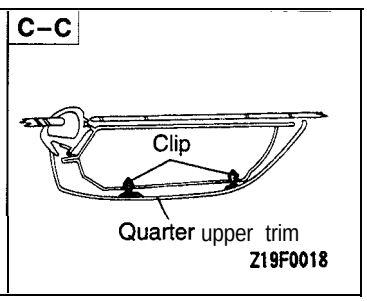
REMOVAL AND INSTALLATION

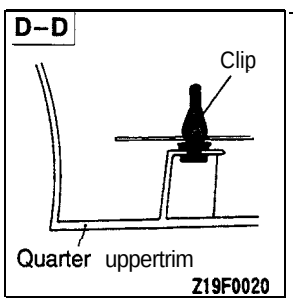
<Interior>

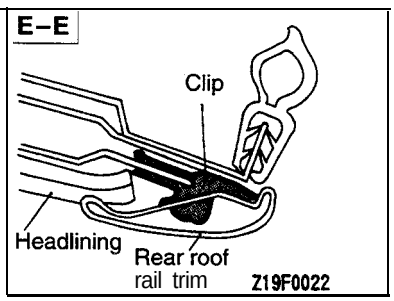












NOTE
(1) ⇦: Location of metallic clip
(2) ⬅: Location of resin clip
(3) ☆ indicates trim clip.
(Refer to P.52A-11.)
(4) For door trim, refer to GROUP 42 – Door Trim and Waterproof Film.

Cowl side trim removal steps

1. Scuff plate
2. Cowl side trim

Front pillar trim removal steps

4. Hanger bracket
5. Sash guide cover mounting bolt
6. Clip
7. Front pillar trim

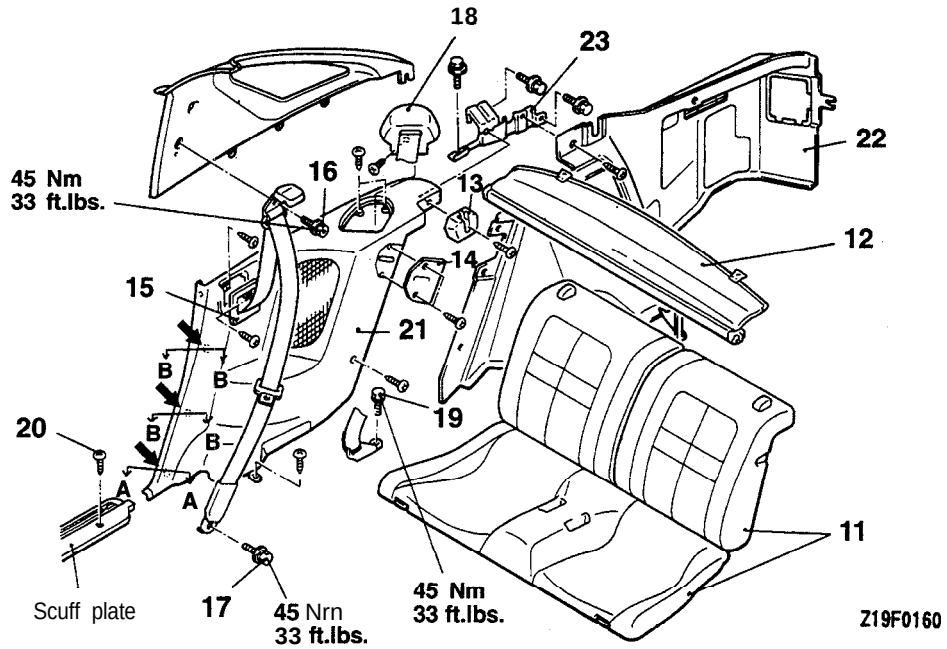
Quarter upper trim removal steps

3. Quarter trim (Refer to P.52A-13.)
4. Coat hanger
8. Screw
9. Quarter upper trim

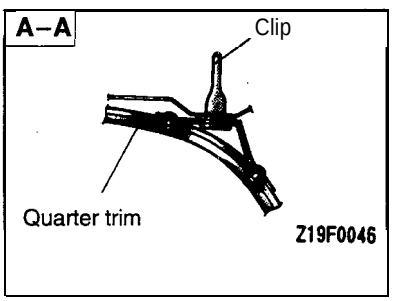
Rear roof rail trim removal steps

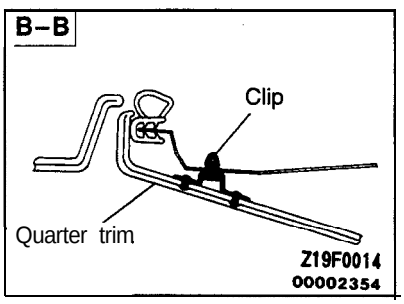
8. Screw
10. Rear roof rail trim

TSB Revision



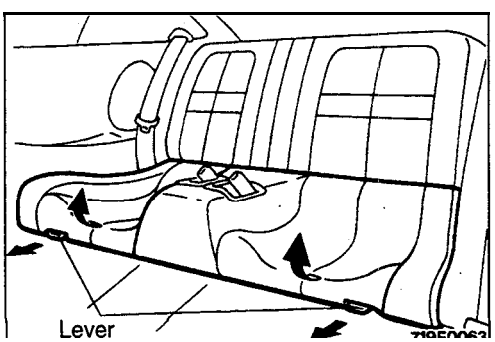
NOTE
⬅: Location of resin clip





Quarter trim removal steps

◀A▶ ▶A◀ 11. Rear seat
12. Shelf cover assembly
13. Shelf catcher
14. Cover
15. Garnish
16. Sash guide cover mounting bolt
17. Front seat belt anchor plate mounting bolt
18. Retractor cover
19. Rear seat belt anchor plate mounting bolt
20. Screw
21. Quarter trim
22. Rear side trim (Refer to P.52A-14.)
23. Quarter trim bracket

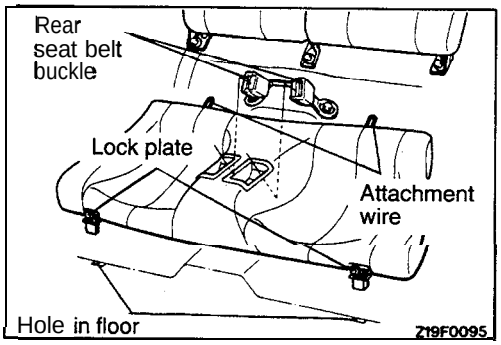


REMOVAL SERVICE POINT

◀A▶ REAR SEAT REMOVAL

With the lever pulled forward, raise the seat cushion to remove it.

TSB Revision



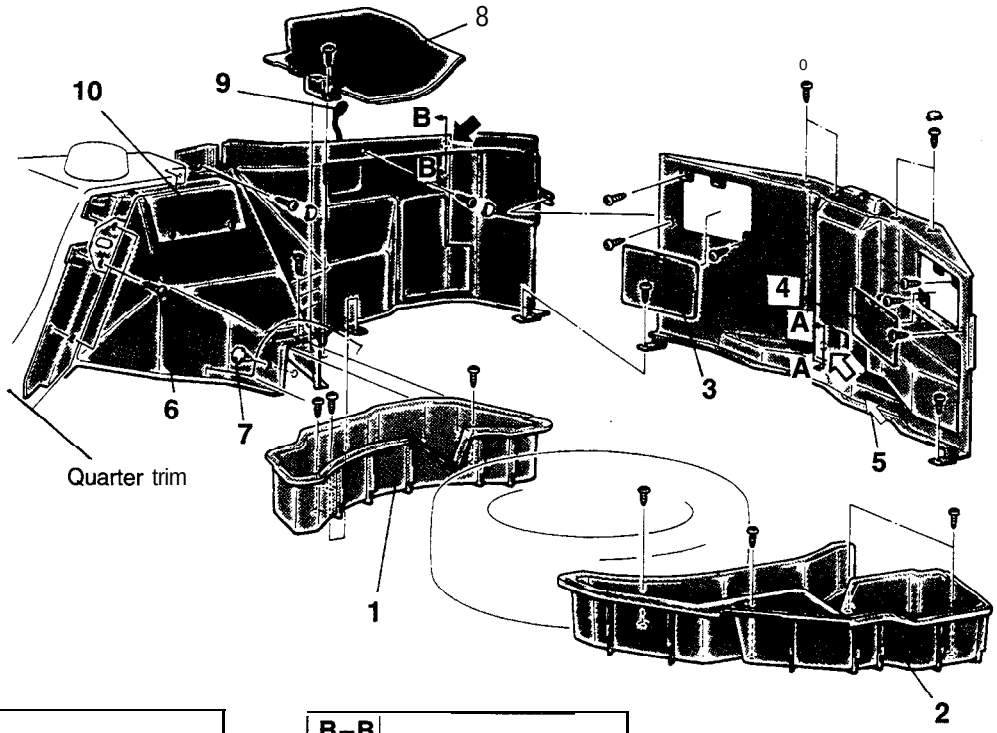
INSTALLATION SERVICE POINT

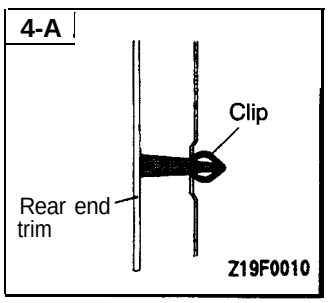
▶A◀ REAR SEAT INSTALLATION

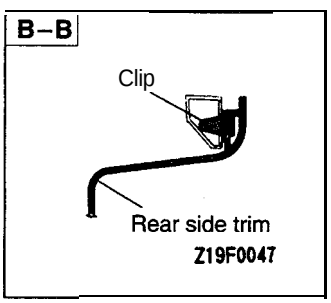
(1) Fit the seat cushion attachment wire under the seat-back positively.
(2) Pass the rear seat belt buckles through the seat cushion.
(3) Insert the lock plate of seat cushion in the hole provided in the floor positively.

REMOVAL AND INSTALLATION

<Luggage compartment>







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00002355

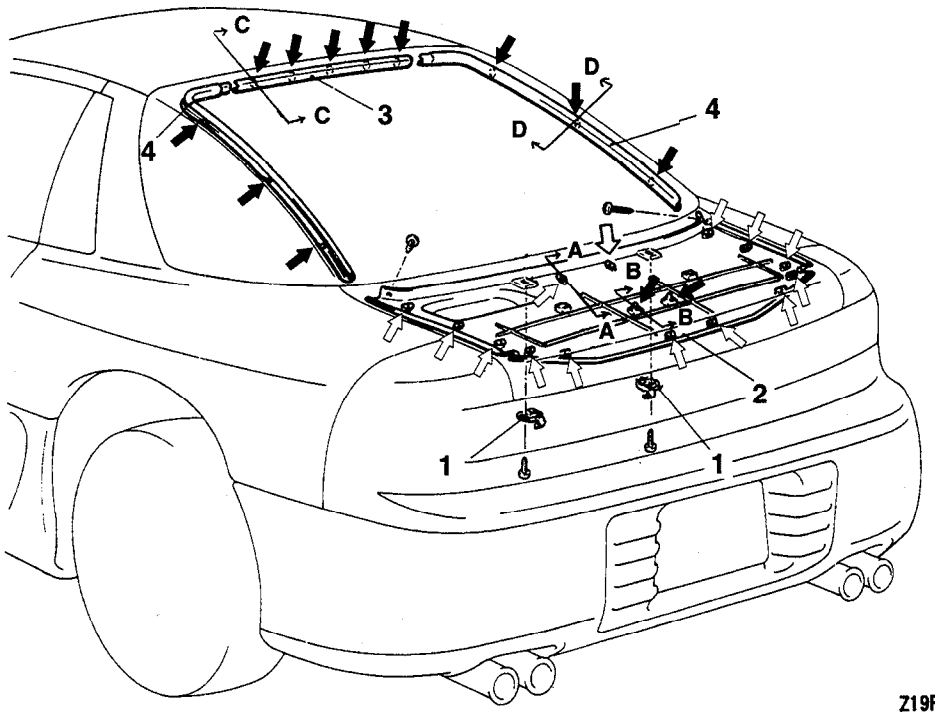
NOTE
(1) ⇦: Location of metallic clip
(2) ⬅: Location of resin clip

Rear side trim, rear end trim removal steps

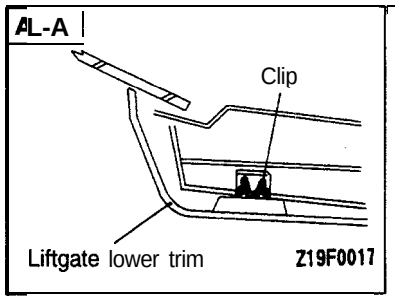
1. Luggage compartment floor box (R.H.)
2. Luggage compartment floor box (L.H.)
3. Lid (R.H.)
4. Lid (L.H.)
5. Rear end trim
6. Screws
7. Floor mat mounting clip
8. High floor center board
9. Luggage compartment light connector connection
10. Rear side trim

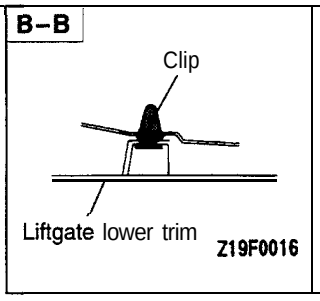
TSB Revision

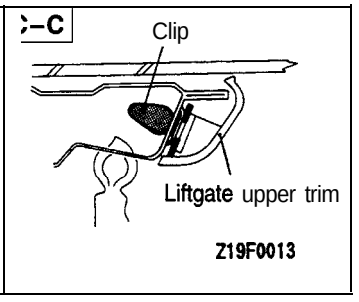
<Liftgate>

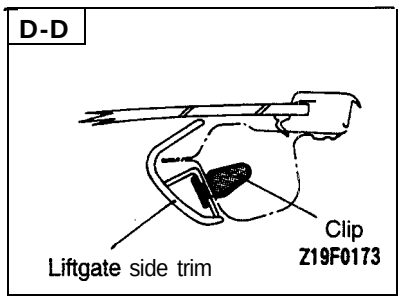


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00002356









NOTE
(1)⇦: Location of metallic clip
(2)⬅: Location of resin clip

Liftgate trim removal steps

1. Shelf hook
2. Liftgate lower trim
3. Liftgate upper trim
4. Liftgate side trim

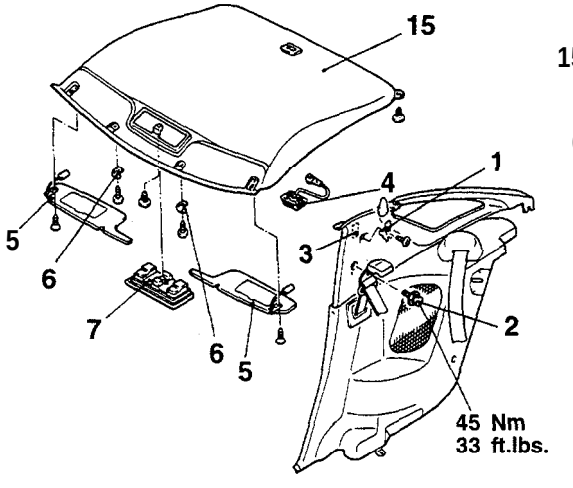
TSB Revision

HEADLINING

REMOVAL AND INSTALLATION

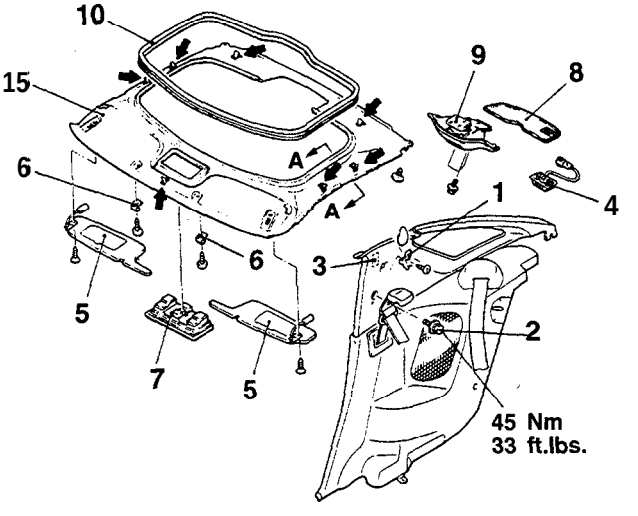
Pre-removal and Post-installation Operation
- Sunroof Lid Glass Assembly and Sunroof Trim Assembly Removal and Installation (Refer to GROUP 42 – Sunroof.)
- Rear Roof Rail Trim Removal and Installation (Refer to P.52A-12.)
- Front Pillar Trim Removal and Installation (Refer to P.52A-12.)

<Vehicles without sunroof>



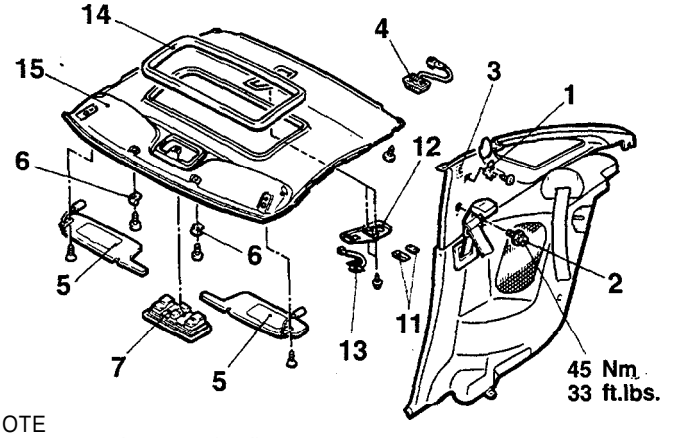
IQF0162

<Vehicles with removable sunroof>

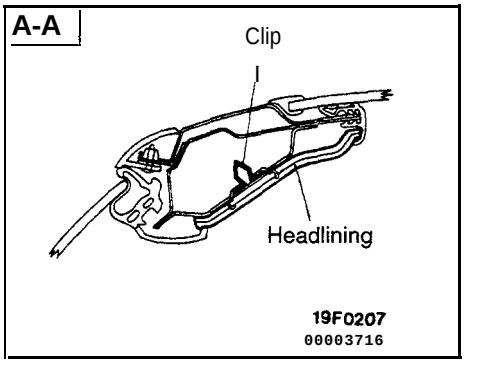


19F0202

<Vehicles with electrically operated sliding sunroof>



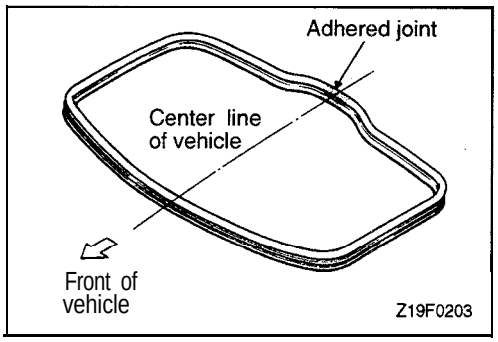
19F0283



NOTE
◀ : Location of resin clip

Removal steps
1. Hanger bracket
2. Sash guide cover mounting bolt
3. Clip
4. Interior temperature sensor
5. Sunvisor assembly
6. Sunvisor holder
7. Room light assembly
8. Regulator cover <Vehicle with removable sunroof>
9. Sunroof regulator <Vehicle with removable sunroof>
▶A◀ 10. Sunroof inner weatherstrip <Vehicle with removable sunroof>
11. Cover <Vehicles with electrically operated sliding sunroof>
12. Sunroof switch panel assembly <Vehicles with electrically operated sliding sunroof>
13. Sunroof switch <Vehicles with electrically operated sliding sunroof>
14. Headlining trim <Vehicles with electrically operated sliding sunroof>
15. Headlining

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INSTALLATION SERVICE POINT

▶A◀ SUNROOF INNER WEATHERSTRIP INSTALLATION

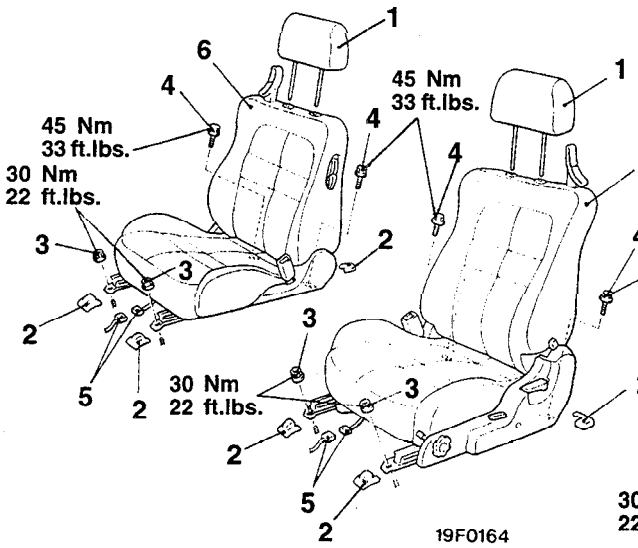
Install the sunroof inner weatherstrip with its adhered joint located toward the rear of the vehicle and on its center line.

FRONT SEAT

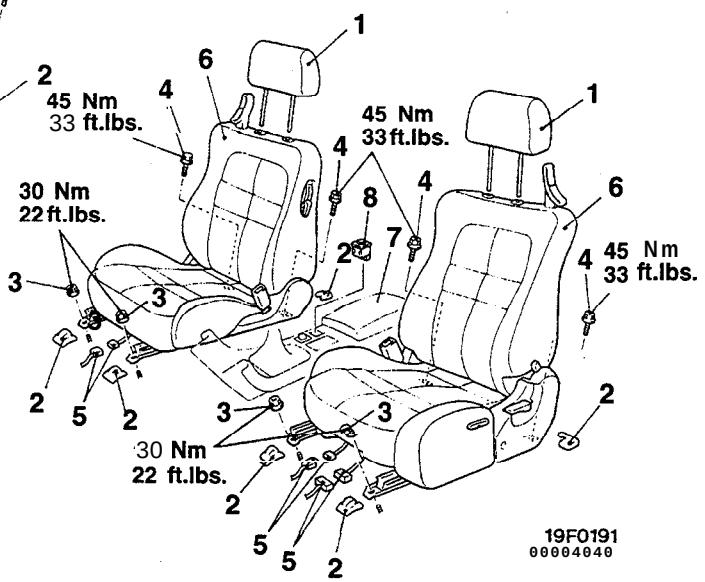
REMOVAL AND INSTALLATION

CAUTION: SRS
When removing and installing the floor console assembly, don't allow any impact or shock to the SRS diagnosis unit.

<Standard type>



<Sporty type>



1. Head restraint

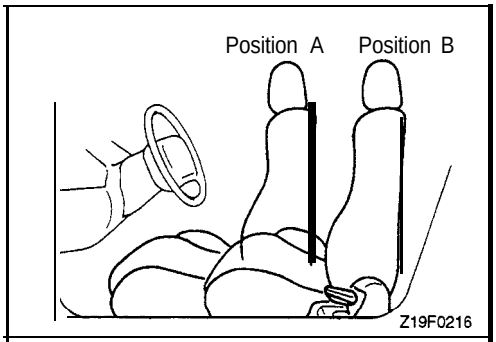
Front seat removal steps

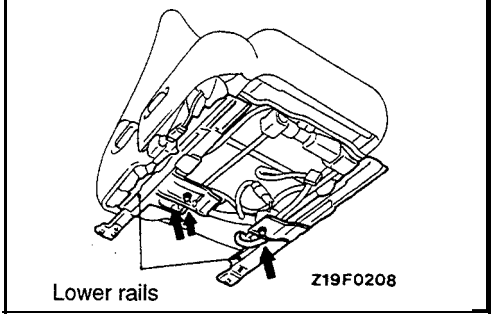
▶B◀ 2. Seat anchor covers
3. Seat mounting nut
4. Seat mounting bolt
5. Harness connector
▶A◀ 6. Front seat assembly

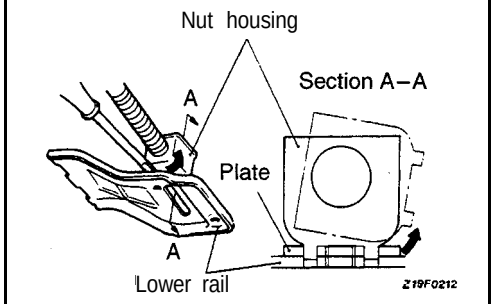
Power seat switch removal steps

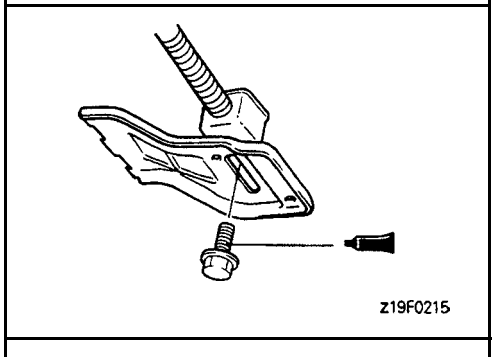
7. Front console assembly (Refer to P.52A-10.)
8. Power seat switch A

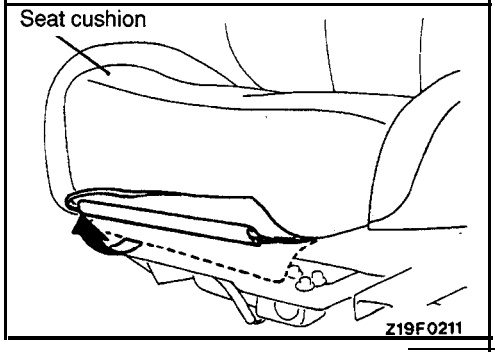
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FRONT SEAT ASSEMBLY REMOVAL AND INSTALLATION POINTS WHEN THERE IS A MALFUNCTION IN THE POWER SEAT SLIDE MECHANISM

If removal of the seat mounting nut and bolt is impossible when there is a malfunction in the slide motor or the slide switch and the seat cannot slide, remove and install the front seat assembly by the following procedure.
In addition, two removed and installation procedures are established depending on the seat positions.

- Position A shown in the illustration – Refer to procedure 1.
- Position B shown in the illustration – Refer to procedure 2.

1. Procedure for removal and installation of seat stopped at forward position

(1) Working from behind the seat, remove the bolt from under the seat cushion as illustrated.

(2) Insert a flat tip screwdriver between the plate and the nut housing, pry the pawl of the nut housing from the hole of the plate and rotate the housing.
(3) Slide the seat and remove the seat mounting nuts and bolts.

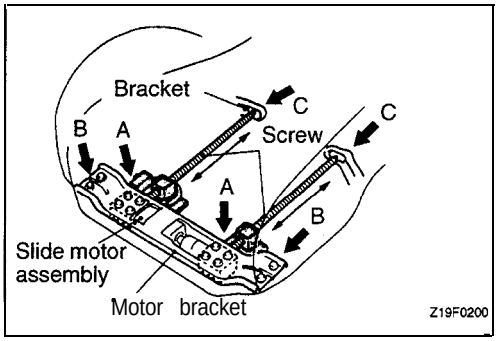
(4) When the power seat adjuster assembly is reused, apply specified adhesive to the mounting bolts before, tightening them.

Specified adhesive:
3M stud locking 4171 or equivalent.

Caution
Be sure that the right and left nut housing are in alignment.

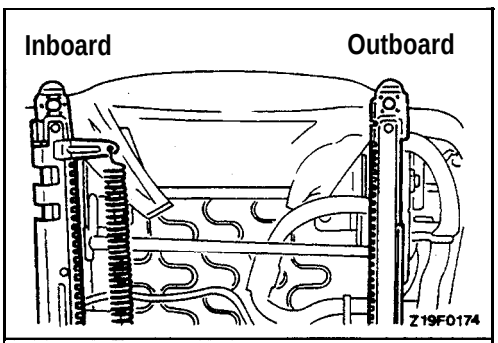
2. Procedure for removal and installation of seat stopped at rearward position

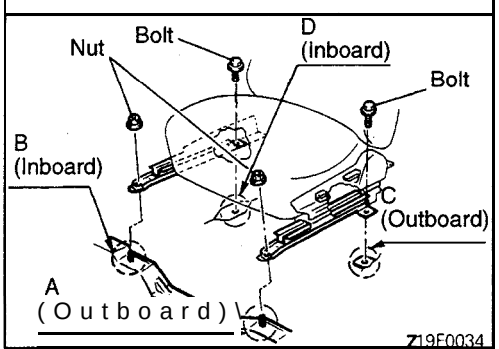
(1) Take off the seat cover from the front end of the seat cushion.

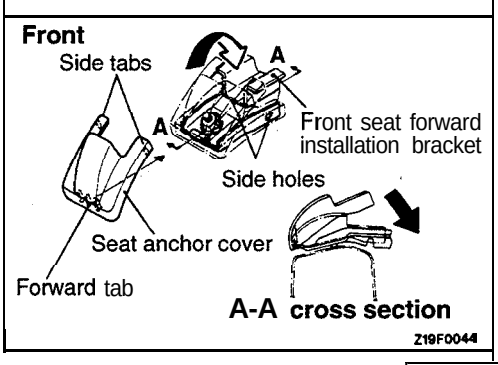


(2) Remove the slide motor mounting bolts (eight bolts at A in the illustration).
Slightly pull the slide motor assembly forward to disconnect the screws from the respective brackets at C in the illustration.
Removing only bolts at A in the illustration may not allow the slide motor to be pulled out, depending on the seat position. In that case, further remove the motor bracket mounting nuts (four nuts at B in the illustration).
(3) Slide the seat and remove the seat mounting nuts and bolts.

NOTE
If the seat does not move for enough to remove the seat mounting nuts and bolts, slide the seat forward **as** much as possible and remove the seat in accordance with procedure 1.







INSTALLATION SERVICE POINTS

▶A◀ FRONT SEAT ASSEMBLY INSTALLATION

(1) Locate the lower rails correctly so that the front side seat mounting holes may be positioned at the same relative positions on both R.H. and L.H. sides.
(Except power seat)

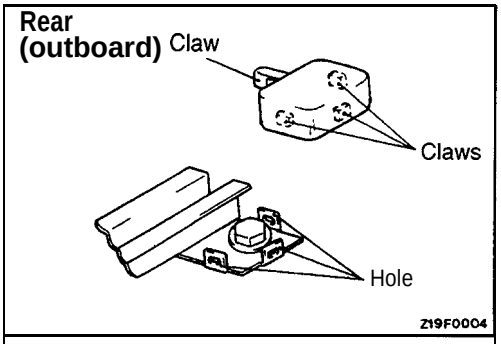
Caution
Note that when the slide is pulled, the inboard slide rail is unlocked, causing the slide rail to be pulled back by spring force.

(2) After checking that the seat adjuster is locked at both sides, provisionally tighten (in the A, B, C and D sequence) the seat installation nuts and the seat installation bolts; then fully tighten at the specified torque.

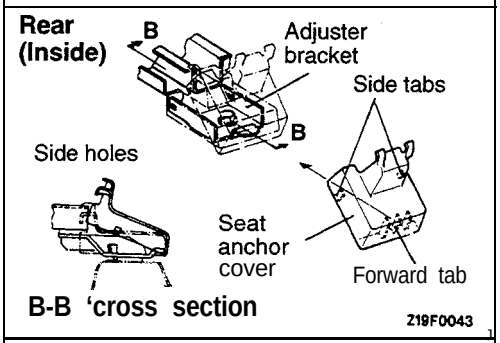
▶B◀ SEAT ANCHOR COVERS INSTALLATION

(1) Install the forward tab of the front seat anchor cover to the front seat forward mounting bracket positively.
Then rotate the cover in the direction of arrow to install the side tabs in the side holes of the bracket.

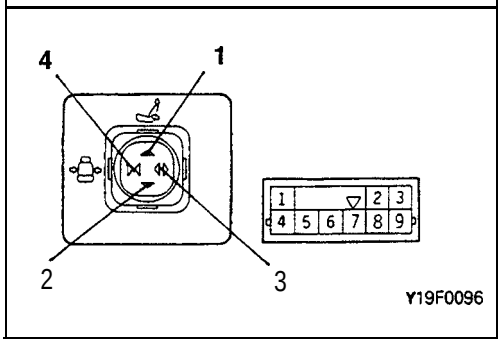
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(2) Insert the rear side seat anchor cover (outer side) to the front seat rearward installation bracket, and then attach each tab of the seat anchor cover to the hole of the bracket.



(3) Insert the rear tab of the rear seat anchor cover in the front seat rear mounting bracket positively. Then rotate the cover in the direction of arrow to install the side tabs in the side holes of the bracket.



INSPECTION

POWER SEAT SWITCH A CHECK

Operate the power seat switch A to check for continuity.

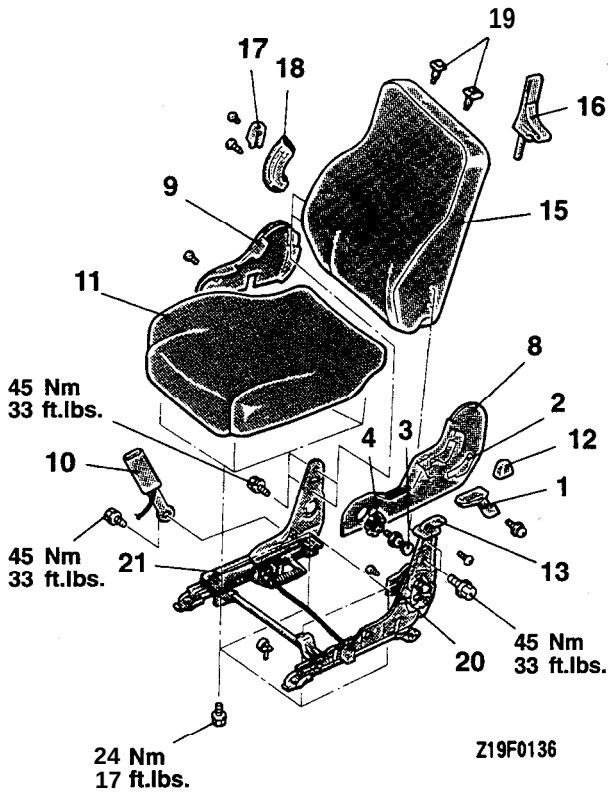
Lumbar support					Side support				
Switch position	Terminal No.				Switch position	Terminal No.			
	2	3	5	7		1	2	7	a
PUSH (1)	0	○	0	○	SPREAD (3)	0	0	0	○
OFF	0	n	0		OFF	0	n		0
RELEASE (2)	0	0	0	0	CLOSE (4)	0	0	0	0

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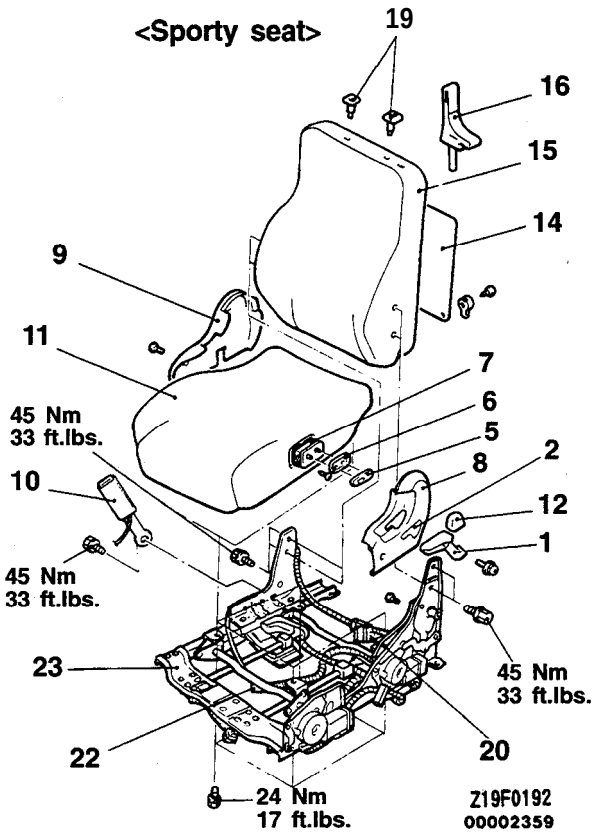
DISASSEMBLY AND REASSEMBLY

DRIVER SEAT

<Standard seat>



<Sporty seat>

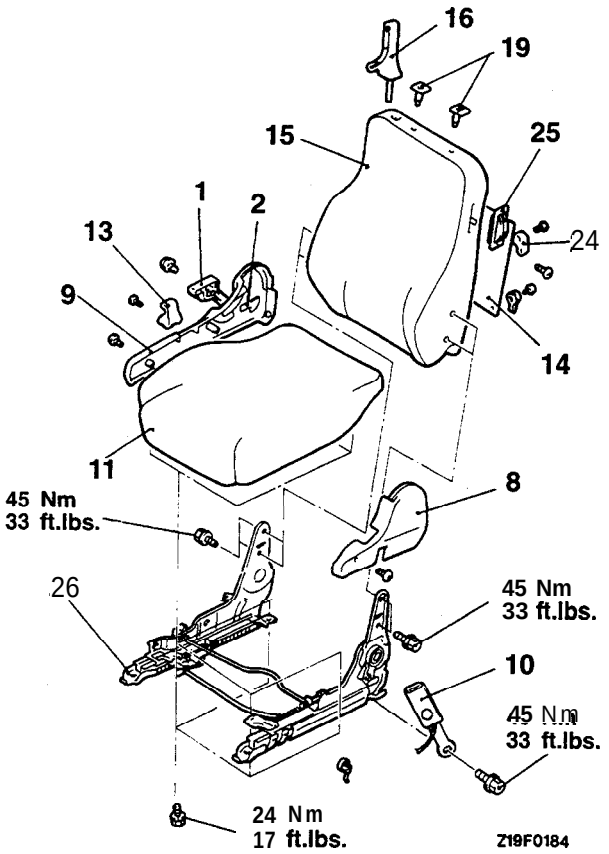


Removal steps

1. Reclining adjuster knob
2. Plug
3. Cap (Standard seat)
4. Height adjuster lever (Standard seat)
5. Power seat adjuster lever (Sporty seat)
6. Garnish (Sporty seat)
7. Power seat switch B (Sporty seat)
6. Side shield cover (L.H.)
9. Side shield cover (R.H.)
▶A◀ 10. Inner seat belt
11. Seat cushion assembly
12. Memory reclining knob
13. Sliding adjuster knob
14. Seat back panel (Sporty seat)
15. Seat back assembly
16. Seat belt guide
17. Lumbar support knob (Standard seat)
18. Lumbar support garnish (Standard seat)
19. Head restraint guide
20. Reclining adjuster lower cover
21. Height adjuster (Standard seat)
22. Power seat harness (Sporty seat)
23. Power seat adjuster (Sporty seat)

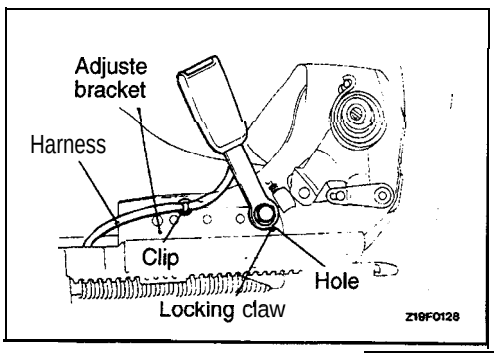
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FRONT PASSENGER SEAT



Removal steps

1. Reclining adjuster knob
2. Plug
6. Side shield cover (L.H.)
9. Side shield cover (R.H.)
▶A◀ 10. Inner seat belt
11. Seat cushion assembly
13. Sliding adjuster knob
14. Seat back panel
15. Seat back assembly
16. Seat belt guide
19. Head restraint guide
24. Walk-in knob
25. Walk-in knob garnish
26. Slide adjuster

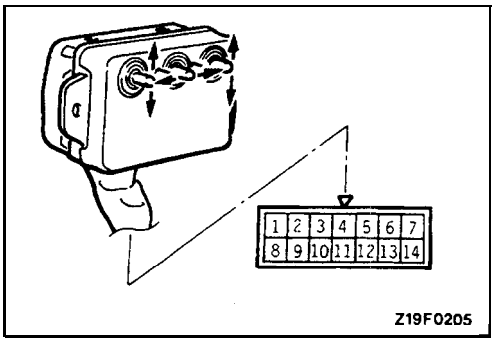


REASSEMBLY SERVICE POINT

▶A◀ INNER SEAT BELT INSTALLATION

(1) Route the seat belt switch connector harness on the adjuster bracket.
(2) Use clips to secure the harness to the adjuster bracket.
(3) Fit the locking claw of the inner seat belt positively in the locking hole provided in the seat bracket.

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INSPECTION

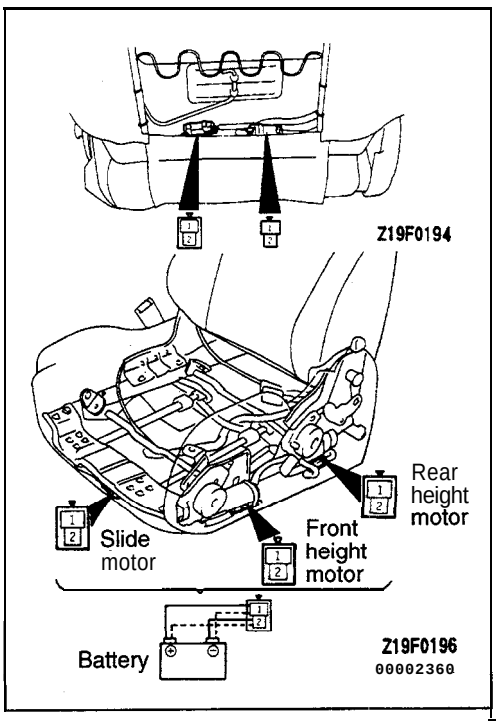
POWER SEAT SWITCH B CHECK

Operate the power seat switch to check for continuity.

Switch position		Terminal No.													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Slide switch	Forward		○	○											○
Slide switch	Backward	○			○										○
Front height switch	Up									○	○				○
	Down								○		○				○
Rear height switch	Up						○						○		○
	Down					○		○							
All switches	OFF												○		○

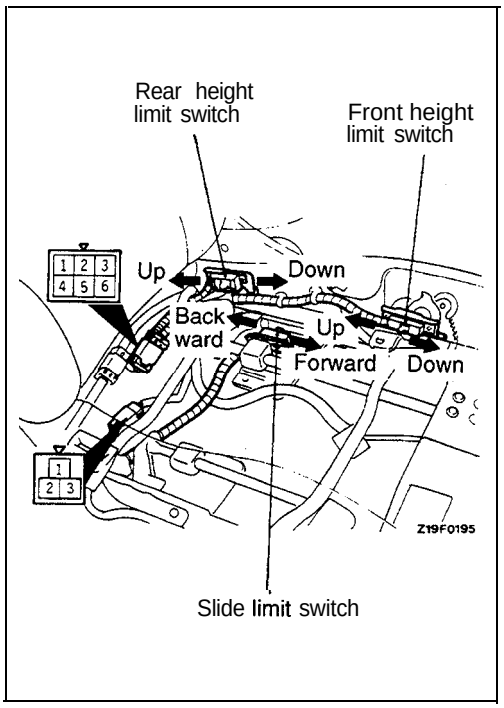
ALL POWER SEAT MOTORS CHECK

(1) Disconnect each motor at the connector. To disconnect the lumbar support and side support motors, remove the seatback panel in advance.
(2) Connect the terminals of each motor directly with the battery and check to see that the motor turns freely and each adjusting mechanism operates in the directions shown in the table below.
(3) If there is any abnormality, replace the power seat adjuster assembly or seatback assembly.



Name of motor	Direction of operation	Terminal No. 1	Terminal No. 2	Stop position
Lumbar support	Push	(–)	(+)	Stops within the range of operation
	Release	(+)	(–)	
Side support	Close	(–)	(+)	
	Spread	(+)	(–)	
Front height, Rear height	Up	(+)	(–)	Stops when limit switch is turned off
	Down	(–)	(+)	
Slide	Forward	(+)	(–)	
	Backward	(–)	(+)	

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LIMIT SWITCH CHECK

(1) Disconnect each limit switch at the connector and connect a circuit tester between the terminals.
(2) Operate each switch to check for continuity between the terminals.
(3) If there is any abnormality, replace the power seat adjuster assembly.

<Slide limit switch>

Switch position	Terminal No.		
	1	2	3
Forward	○		○
Backward	○	○	
Middle (ON)	○	○	○

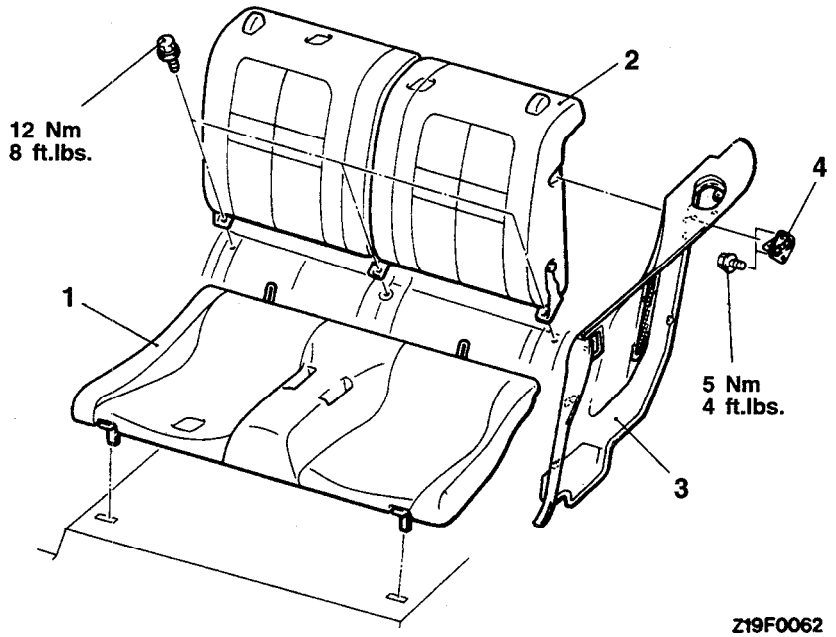
<Front and rear height limit switch>

Switch position	Front height			Rear height		
	Terminal No.					
	1	2	3	4	5	6
Up	○		○	○		○
Down	○	○		○	○	
Middle (ON)	○	○	○	○	○	○

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REAR SEAT

REMOVAL AND INSTALLATION

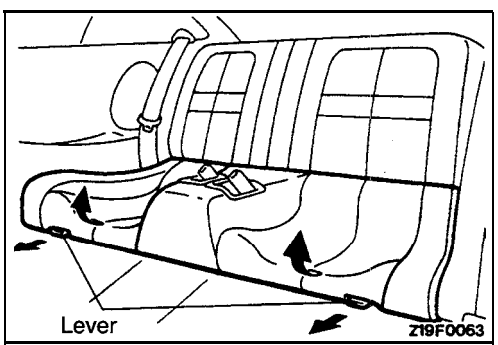


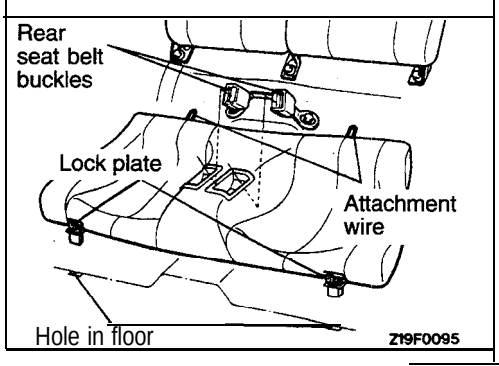
Rear seat removal steps

◀A▶ ▶A◀ 1. Rear seat cushion
2. Rear seat back

Striker removal steps

3. Quarter trim (Refer to P.52A-13.)
4. Striker





REMOVAL SERVICE POINT

◀A▶ REAR SEAT CUSHION REMOVAL

With the lever pulled, raise the seat cushion, and remove the seat cushion.

INSTALLATION SERVICE POINT

▶A◀ REAR SEAT CUSHION INSTALLATION

(1) Fit the attachment wire of the seat cushion under the seatback positively.
(2) Pass the rear seat belt buckle through the seat cushion.
(3) Insert the lock plate of the seat cushion in the respective holes provided in the floor.

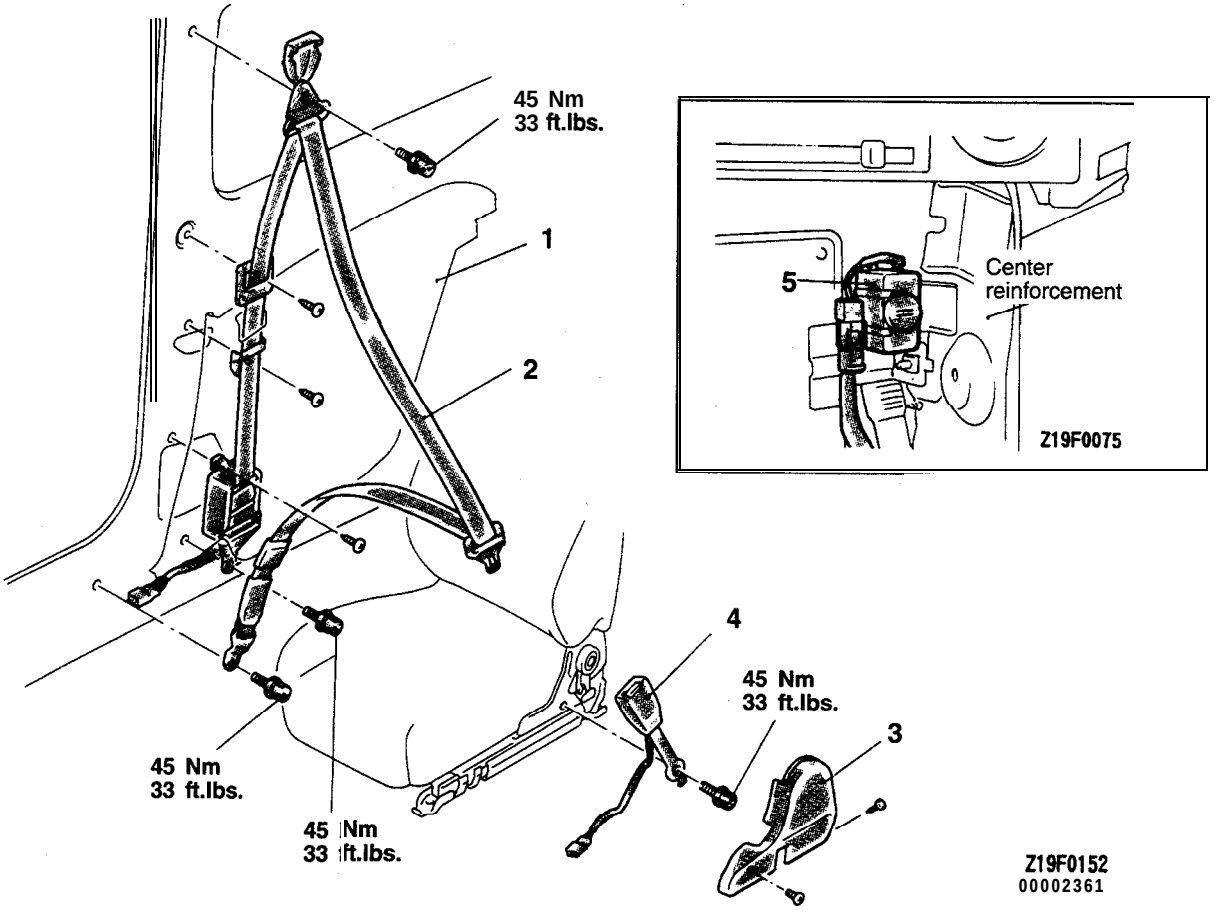
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SEAT BELT

REMOVAL AND INSTALLATION

<Front Seat Belt>

CAUTION: SRS
When removing and installing the floor console assembly, don't allow any impact or shock to the SRS diagnosis unit.



Outer seat belt removal steps
1. Quarter trim (Refer to P.52A-13.)
▶C◀ 2. Outer seat belt

Inner seat belt removal steps
- Floor console assembly (Refer to P.52A-10.)

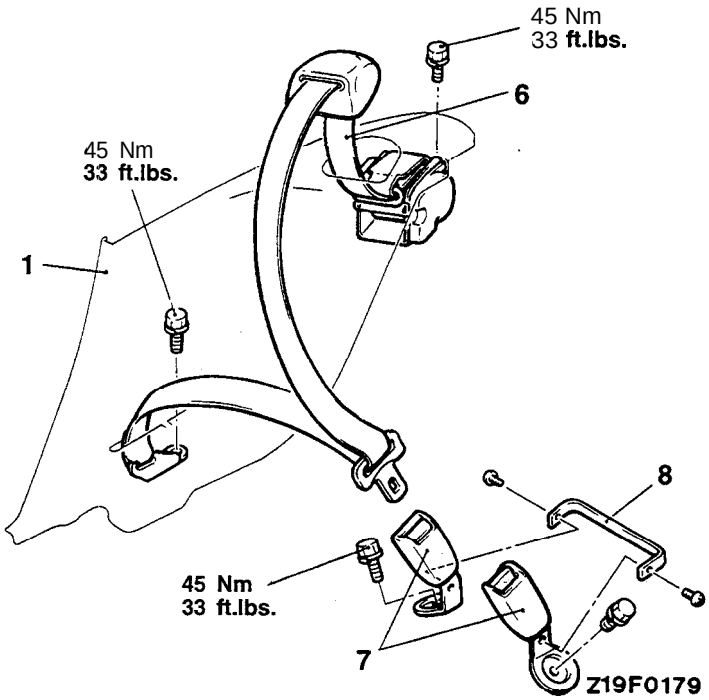
3. Shield cover
▶B◀ 4. Inner seat belt

Buzzer removal steps
- Floor console assembly (Refer to P.52A-10.)

5. Buzzer

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<Rear Seat Belt>



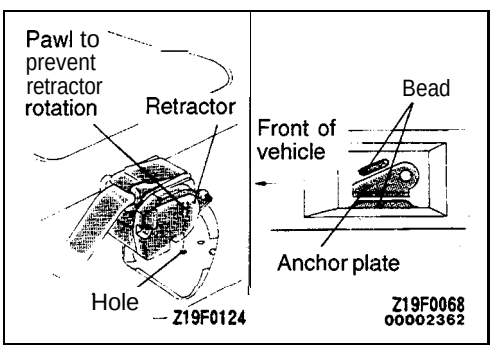
Outer seat belt removal steps

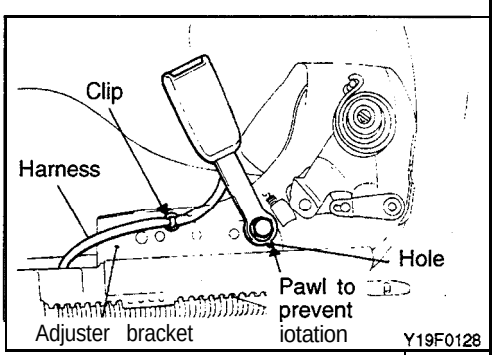
1. Quarter trim (Refer to P.52A-13.)
▶A◀ 6. Outer seat belt

Inner seat belt removal steps

- Rear seat cushion (Refer to P.52A-25.)

7. Inner seat belt
8. Inner seat belt bracket





INSTALLATION SERVICE POINTS

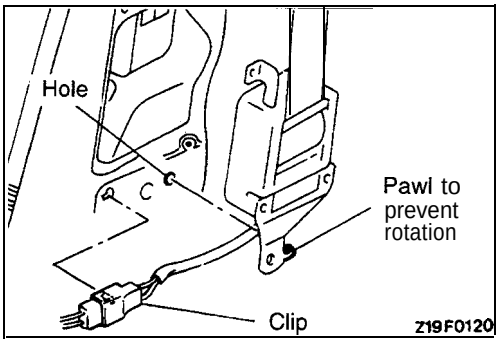
▶A◀ OUTER SEAT BELT INSTALLATION

(1) Positively insert the pawl to prevent the retractor from rotating in the hole provided on the body.
(2) Install the anchor plate along the bead of the body.

▶B◀ INNER SEAT BELT INSTALLATION

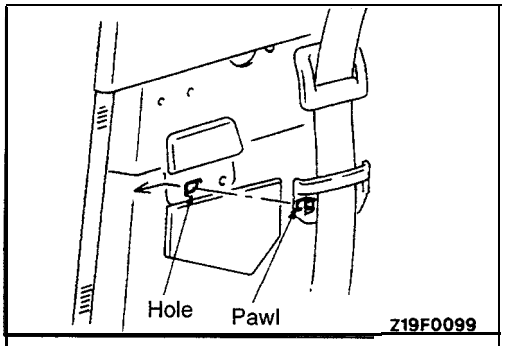
(1) Route the seat belt switch connector harness on the adjuster bracket.
(2) Use clips to secure the harness to the adjuster bracket.
(3) Fit the locking claw of the inner seat belt positively in the locking hole provided in the seat bracket.

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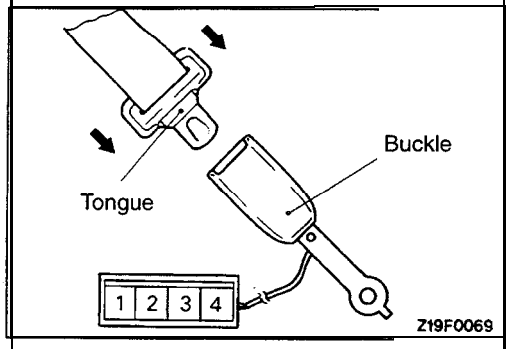


▶C◀ OUTER SEAT BELT INSTALLATION

(1) Positively insert the pawl to prevent the retractor from rotating in the hole provided on the body.
(2) After connecting the seat belt harness with the body harness, insert the clip on the connector into the hole on the body panel.



(3) Insert the pawl of the belt guide in the hole provided on the body.
(4) Install the final anchor of the front seat belt with the belt twisted 180" at the section between the sash guide and the final anchor so that the tip of the tongue is directed toward the front of the vehicle.

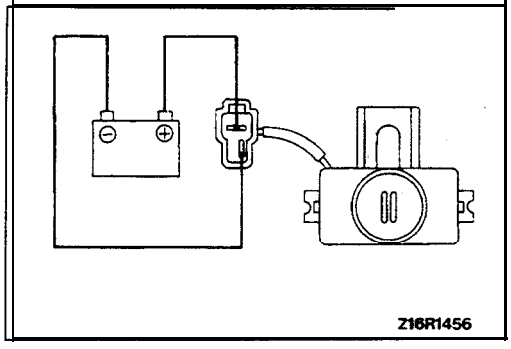


INSPECTION

BUCKLE SWITCH CHECK

(1) Disconnect the buckle switch connector.
(2) Check the continuity between the terminals.

Items	Terminal No.			
	1	2	3	4
Buckle unlock			0	0
Buckle lock	0	0		



BUZZER CHECK

Check that buzzer sounds when battery voltage is applied to the buzzer terminal.

SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

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CAUTION

- **Carefully read and observe the information in the SERVICE PRECAUTIONS (P.52B-18) prior to any service.**
- **For information concerning troubleshooting or maintenance, always observe the procedures in the Troubleshooting (P.52B-23) or the SRS Maintenance (GROUP 00 – Maintenance Service) sections, respectively.**
- **If any SRS components are removed or replaced in connection with any service procedures, be sure to follow the procedures in the COMPONENT SERVICE section (P.52B-68) for the components involved.**
- **If you have any questions about the SRS, please contact your local distributor.**

GENERAL INFORMATION

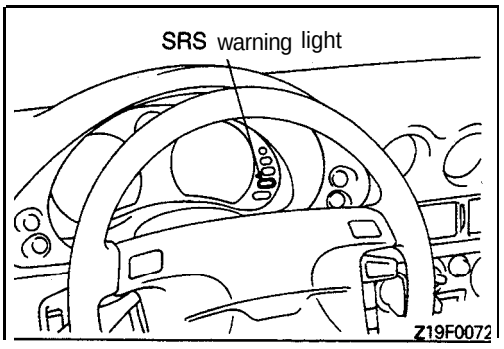
INTRODUCTION

On vehicles up to 1993 model, the Supplemental Restraint System (SRS) is adopted for the driver's side, and on vehicles from 1994 model, it is adopted both for driver's and passenger's side.

SRS is designed to supplement the front seat belts to help reduce the risk or severity of injury to the front seat occupants by activating and deploying two air bags during certain frontal collisions.

The SRS consists of: left front and right front impact sensors (located on the right and left front upper frame lowers); air bag modules for the driver (located in the center of the steering wheel) and for the front seat passenger (located above the glove box). Each module contains a folded air bag and an inflator unit. The SRS also contains: an SRS Diagnosis Unit with safing impact sensor (located under the floor console assembly); and SRS warning light to indicate the operational status of the SRS (located on the instrument panel); clock spring (mounted behind the steering wheel); and wiring. The SRS is designed so that the air bag will deploy when the safing sensor, plus either or both of the left front and right front impact sensors simultaneously activate while the ignition switch is in the ON position. These sensors are designed to activated in frontal or near-frontal impacts of moderate to server force.

Only authorized service personnel should work on or around SRS components. Those personnel should read this manual carefully before starting any work. Extreme care must be used when servicing the SRS to avoid injury to service personnel (by inadvertent deployment of the air bags) or vehicle occupant (by rendering the SRS inoperative).



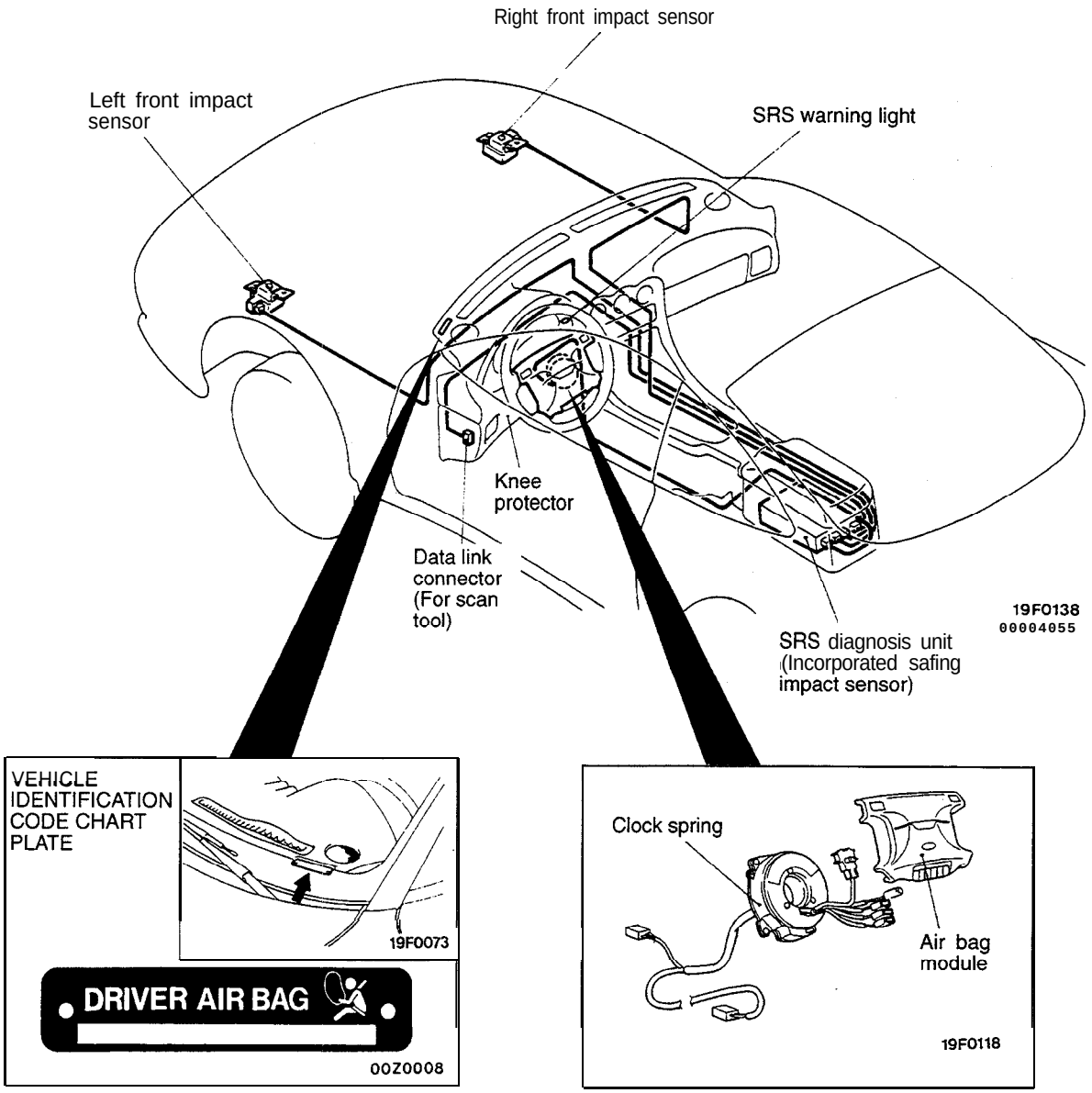
ON-BOARD DIAGNOSTIC/SRS WARNING LIGHT FUNCTION

The diagnosis unit monitors the SRS system and stores data concerning any detected faults in the system. When the ignition key is in "ON" or "START" position, the SRS warning light should illuminate for about 7 seconds and then turn off. That indicates that the SRS system is in operational order. If the SRS warning light does any of the following, immediate inspection by an authorized dealer is needed.

(1) The SRS warning light does not illuminate as described above.
(2) The SRS warning light stays on for more than 7 seconds.
(3) The SRS warning light illuminates while driving.

If a vehicle's SRS warning light is in any of these three conditions when brought in for inspection, the SRS system must be inspected, diagnosed and serviced in accordance with this manual.

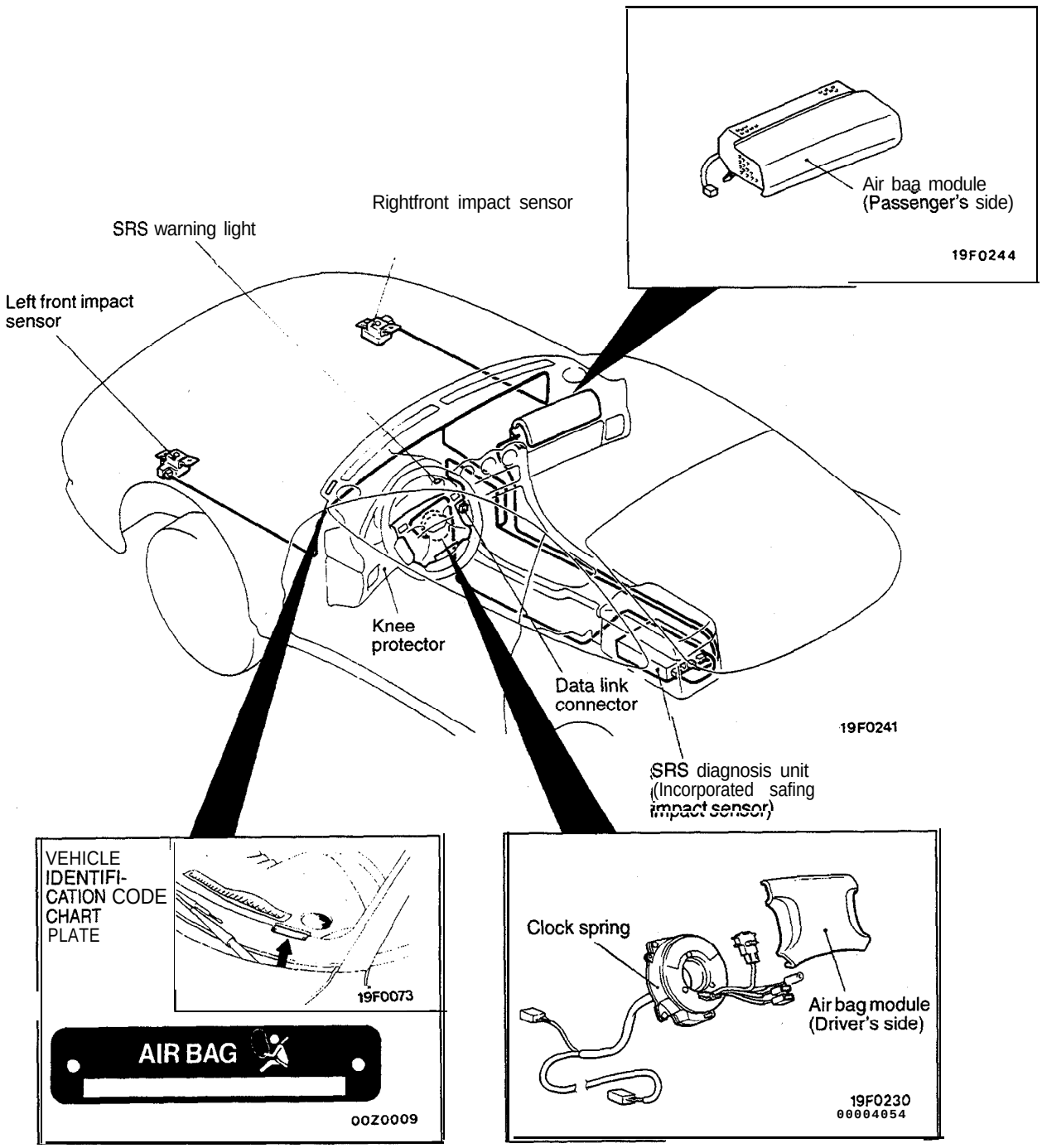
CONSTRUCTION DIAGRAM (Up to 1993 models)



NOTE
This construction diagram displays the general view of the SRS components.
For details, refer to "Schematic" (P.52B-7), "Configuration Diagrams" (P.52B-9) and "Circuit Diagram" (P.52B-13).

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(From 1994 models)



NOTE
This construction diagram displays the general view of the SRS components.
For details, refer to "Schematic" (P.52B-8), "Configuration Diagrams" (P.52B-9) and "Circuit Diagram"(P.52B-15).

TSB Revision

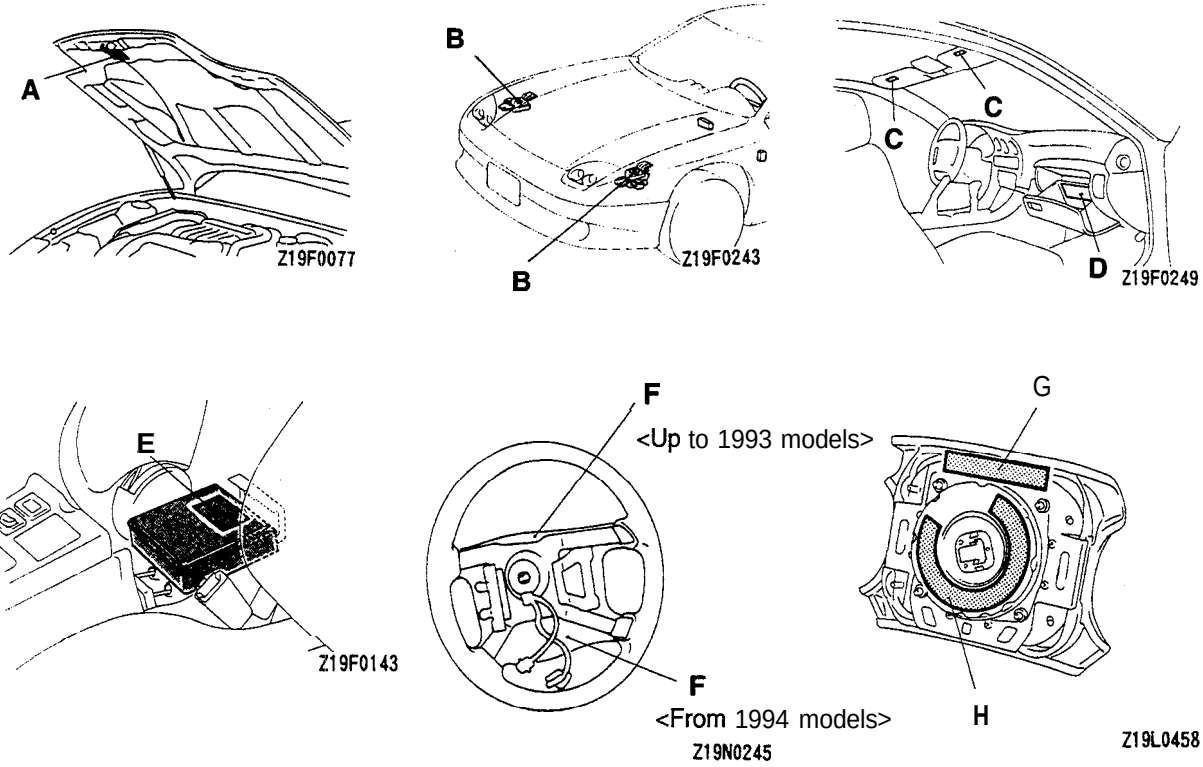
WARNING/CAUTION LABELS

A number of caution labels relating to the SRS are found in the vehicle, as shown in the following illustration. Follow label instructions when servicing SRS.

If labels are dirty or damaged, replace them with new ones.

NOTE

Shown here are the contents of the caution labels attached to a vehicle from 1994 model. On caution labels attached to 1992 and 1993 model vehicles, slightly different expressions are used in places.

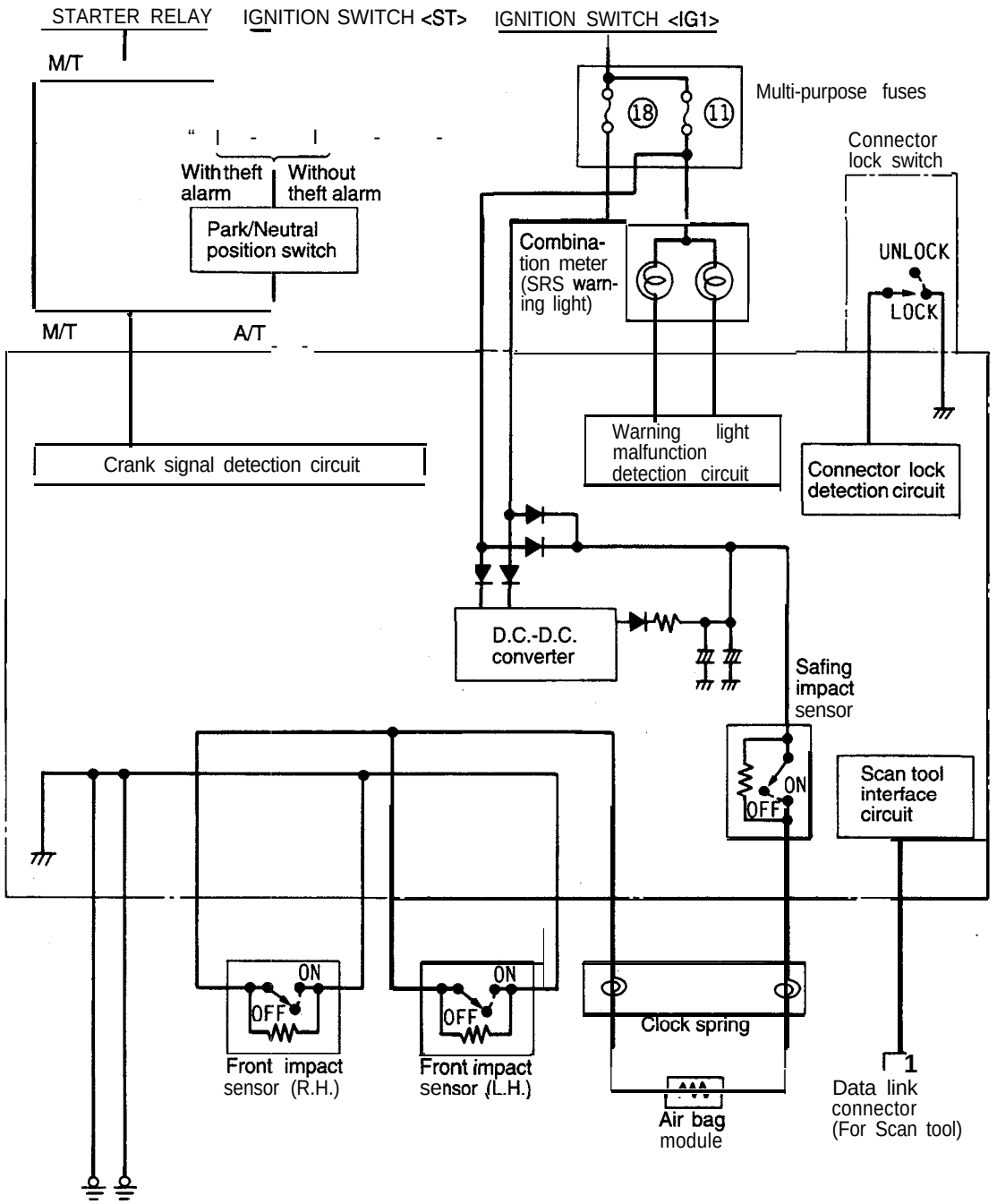


Contents of the labels

A	WARNING This vehicle has an air bag system. Refer to service manual before servicing or disassembling underhood components. Read "SRS" section of manual for important instructions. Improper service procedures can result in the air bag firing or becoming inoperative, leading to injury.
B	CAUTION: SRS Read service manual. Do not drop. Do not tamper or disassemble.
C	This vehicle has air bags for front occupants as a supplemental restraint system (SRS). You must always wear your seatbelt, even with an air bag: • Air bags are not designed to inflate in rollovers or in rear, side or low-speed frontal crashes. • Air bags inflate powerfully and in moment. If you're too close to an inflating air bag. It could seriously injure you. Seatbelts help keep you in position for air bag inflation in a crash. • An inflating air bag can seriously injure small children. A child in a rear-facing child restraint can be badly injured by an inflating air bag so never use a rear-facing child restraint in the front seat of this vehicle: a rear-facing child restraint should be used only in the rear seat. Use a forward-facing child restraint with the front passenger seat as far back as possible, or in the rear seat. • Before driving read label inside the glove box: if the "SRS light comes on while you are driving or does not come on when you first start the vehicle, see your dealer for service. See your owner's manual for more information.
D	Air bag system information This vehicle has an air bag which will supplement the seatbelt in certain frontal collisions. The air bag is not a substitute for the seatbelt in any type of collision. The driver and all other occupants should wear seatbelts at all times. WARNING! If the "SRS" warning light does not illuminate for several seconds when the ignition key is turned to "ON" or engine is started, or if the warning light stays on while driving, take the vehicle to your nearest authorized dealer immediately. Also, if the vehicle's front end is damaged or if the air bag has deployed, take the vehicle for service immediately. The air bag system must be inspected by an authorized dealer ten years after the vehicle manufacture date shown on certification label located on left front door-latch post or door frame. Read "SRS" section of your owner's manual before driving, for important information, about operation, and service of the air bag system. When you are going to discard your gas generator or vehicle, please see your dealer.
E	CAUTION: SRS diagnosis unit This unit cannot be repaired. If defective, remove and replace entire unit per service manual instructions. Do not disassemble or tamper. See service manual for handling and storage instructions. Do no drop: keep dry. Failure to follow instructions could render air bag inoperative and result in driver injury.
F	CAUTION: SRS Before replacing steering wheel, read service manual, center front wheels and align SRS clock spring neutral marks. Failure to do so may render SRS system inoperative, risking serious driver injury.
G	WARNING: SRS This air bag module cannot be repaired. Do not disassemble. Do not tamper. Do not perform diagnosis. Do not touch with electrical test equipment or probes. Refer to service manual for further instructions, and for special handling, storage and disposal procedures. Tampering or mishandling can result in injury.
H	Danger Poison. Keep out of the reach of children. Contains sodium azide and potassium nitrate contents are poisonous and extremely flammable. Contact with acid, water, or heavy metals may produce harmful and irritating gases or explosive compounds. Do not dismantle, incinerate, bring into contact with electricity or store at temperatures exceeding (93.3%) 200°F. First aid: If contents are swallowed induce vomiting. For eye contact flush eye with water for 15 minutes. If gases from acid or water contact are inhaled, seek fresh air. In every case, get prompt medical attention. For additional information, see material safety data sheet (MSDS) for this product.
I	CAUTION: SRS clock spring This is not a repairable part. Do not disassemble. Do not tamper. if defective, remove and replace entire unit per service manual instructions. Before replacement, read service manual, center front wheels and align neutral marks. Failure to follow instructions may render SRS system inoperative, risking serious driver injury.
J	CAUTION: SRS Before removal of steering gearbox, read service manual, center front wheels and remove ignition key. Failure to do so may damage SRS clock spring and render SRS system inoperative, risking serious driver injury.
K	WARNING: SRS This air bag module cannot be repaired. Do not disassemble. Do not tamper. Do not perform diagnosis. Do not touch with electrical test equipment or probes. Refer to service manual for further instructions, and for special handling. Storage and disposal procedures. Tampering or mishandling can result in injury. DANGER POISON Keep out of the reach of children. Contains sodium azide and potassium nitrate contents are poisonous and extremely flammable. Contact with acid, water or heavy metals may produce harmful and irritating gases or explosive compounds. Do not dismantle. Incinerate, bring into contact with electricity or store at temperatures exceeding 93°C (200°F). FIRST AID: If contents are swallowed induce vomiting. For eye contact flush eye with water for 15 minutes. If gases from acid or water contact are inhaled, fresh air. In every case, get prompt medical attention.

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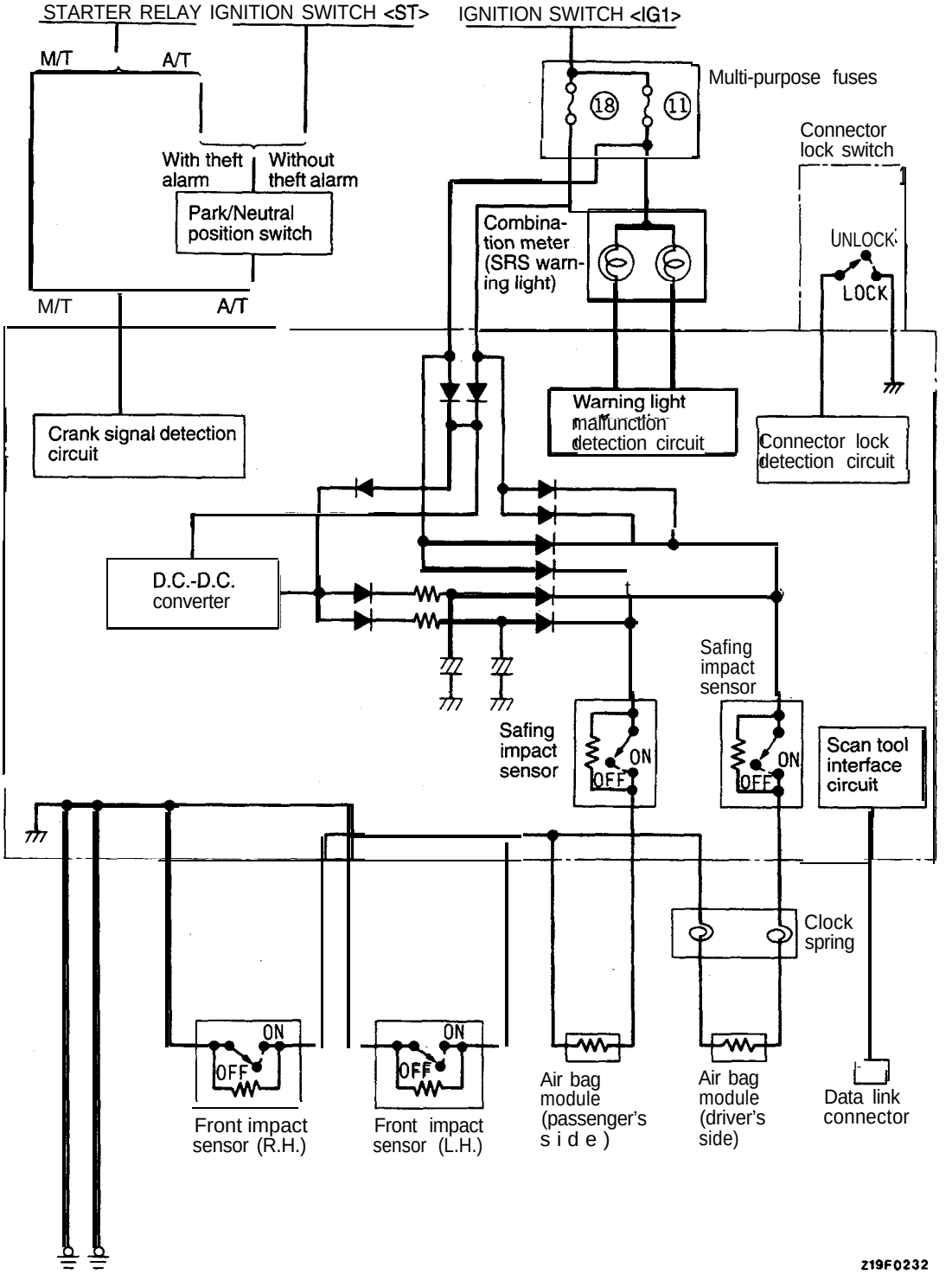
SCHEMATIC
(Up to 1993 models)



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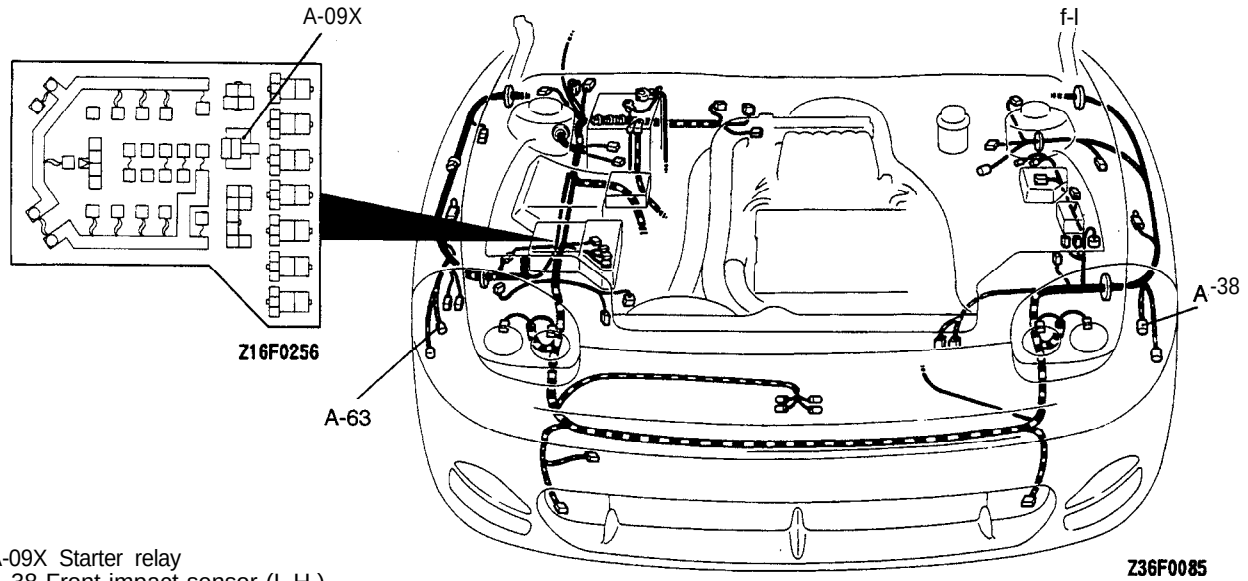
(From 1994 models)



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CONFIGURATION DIAGRAMS

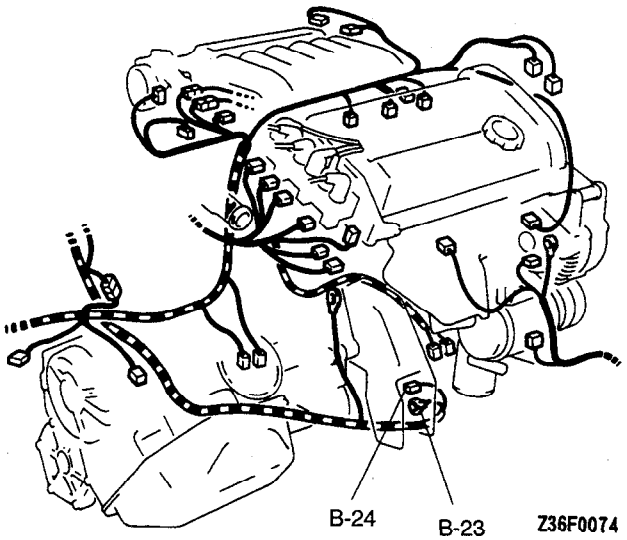
A. Engine compartment



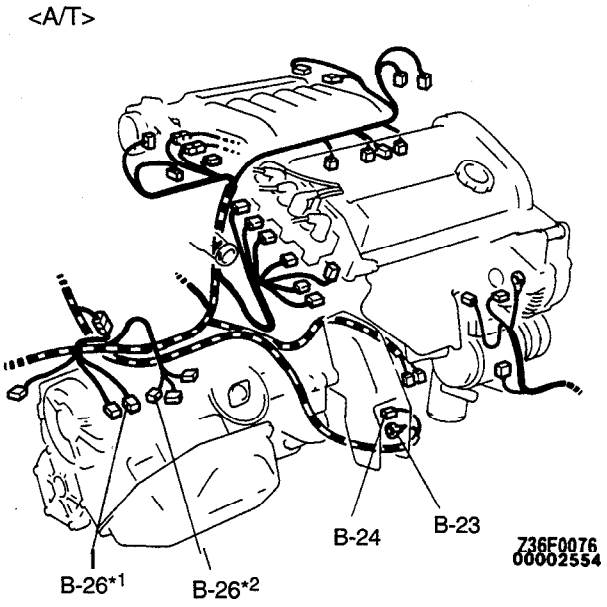
A-09X Starter relay
A-38 Front impact sensor (L.H.)
A-63 Front impact sensor (R.H.)

B. Engine and transaxle (Front view)

<M/T>



<A/T>

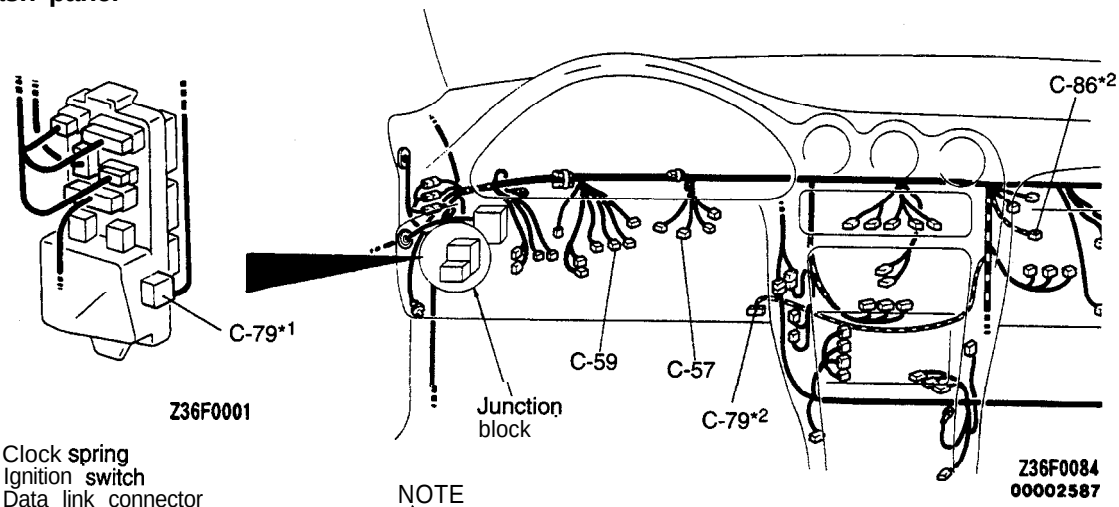


B-23 Starter motor
B-24 Starter motor
B-26 Park/neutral position switch

NOTE
*1 1992 model
*2 From1 993 model

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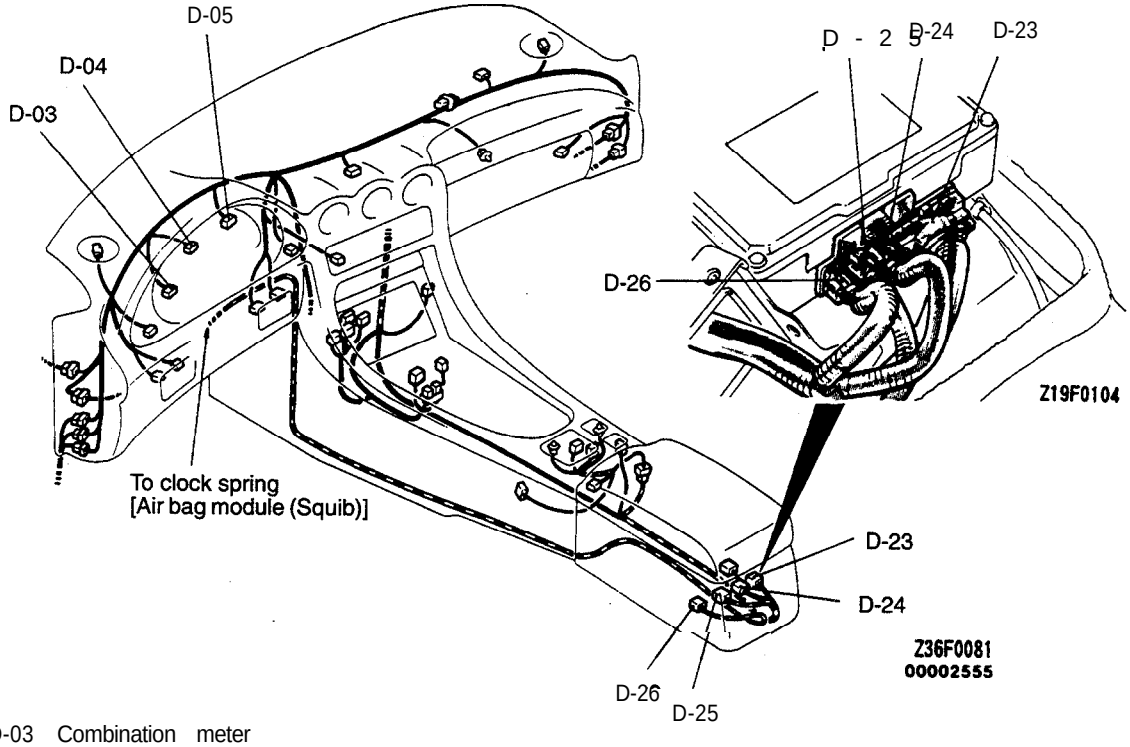
C. Dash panel



c-57 Clock spring
c-59 Ignition switch
c-79 Data link connector (For scan tool)
C-86 Passenger's air bag module

NOTE
*1 Up to 1993 models
*2 From 1994 models

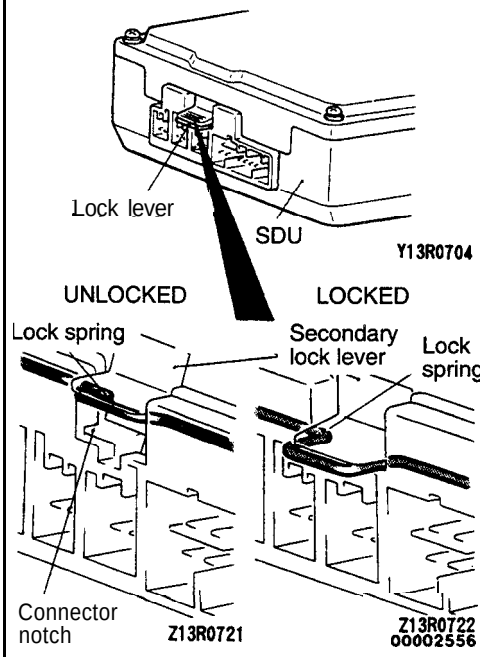
D. Instrument panel and floor console

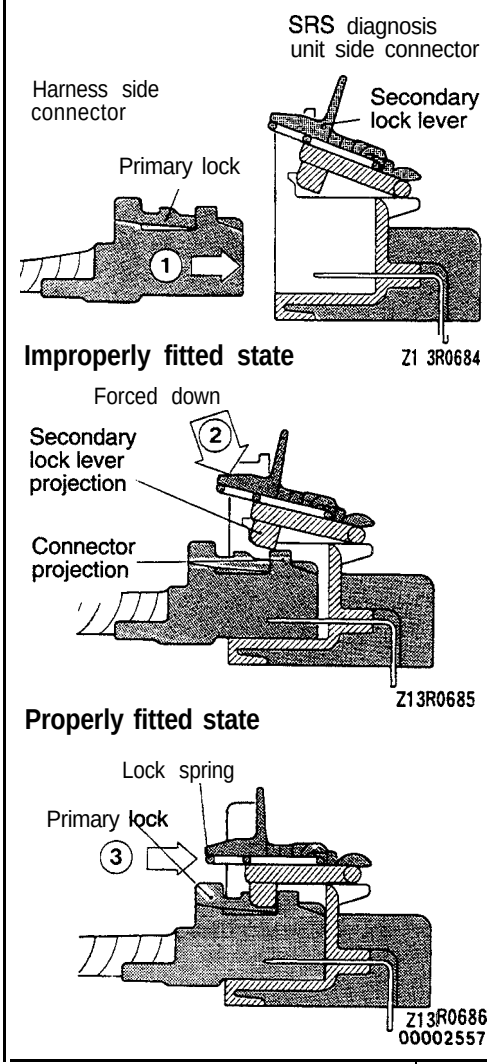


D-03 Combination meter (For SRS warning light)
D-04 Combination meter (For SRS warning light)
D-05 Combination meter (For SRS warning light)
D-23 14-pin red connector to body wiring harness
D-24 2-pin blue connector to right front impact sensor (Up to 1993 models) or 2-pin green connector to passenger's air bag module (squib) <From 1994 models>
D-25* 2-pin yellow connector to left front impact sensor <Up to 1993 models> or no connection <From 1994 models>
D-26' P-pin red connector to clock spring

NOTE
● : Connector to SRS Diagnosis Unit

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CONNECTOR CONSTRUCTION

The connector of the SRS diagnosis unit has a double lock mechanism, fit verification mechanism and connector shorting mechanism.

DOUBLE LOCK MECHANISM

The mechanism is composed of two mechanisms: each connector of the SRS diagnosis unit is locked to the connector of the harness, then these connectors (of the four harnesses) are locked with the secondary lock lever mounted on the connector of the SRS diagnosis unit side.
The secondary lock lever locking is done as the lock spring fits in the notch of the connector.
The operating principle is described below.

When Connectors Are To Be Fitted

(1) The SRS diagnosis unit and harness side connectors are connected. (Primary lock)
(2) The secondary lock lever mounted to the SRS diagnosis unit side connector, is pressed down until a click is heard indicating that the connectors have been locked. (Secondary lock)
If the harness and SRS diagnosis unit connectors do not properly fit, the secondary lock lever side projection and the harness side connector projection interfere with each other, making it impossible to lock the connectors.

When Connectors Are Unlocked

(1) Release the lock of SDU connector in accordance with the following procedure:

In case that there is no notch on the lock lever (Type 1)

Place a flat tip screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.

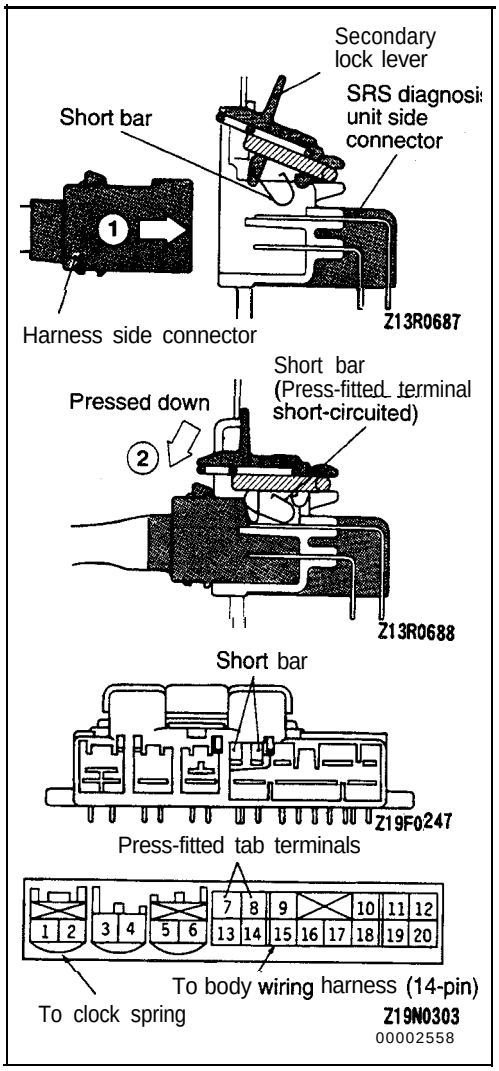
Caution
1. **Do not use excessive force to raise the lock lever.**
2. **Do not insert the screwdriver into the gap between the lock lever and the lock spring.**

In case that there is a notch on the lock lever (Type 2)

Place a flat tip screwdriver against the lock spring (metal section) at the lock lever notch as shown in the illustration, and push the spring toward the unit.

Caution
Do not use excessive force to raise the lock lever.

(2) Press the primary lock of each of the harness side connectors and remove the harness side connector.



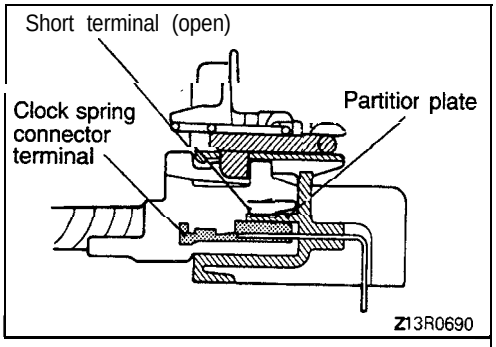
FIT VERIFICATION MECHANISM

The mechanism is used to electrically check the engagement of the connector between the SRS diagnosis unit and the body wiring harness. The operating principle is described below.

(1) Securely connect the SRS diagnosis unit and harness side connectors and press the secondary lock lever down to lock the connectors.
(2) At this time, the short bar provided on the rear surface of the secondary lock lever produces a short circuit across terminals No. (7) and (8) of the SRS diagnosis unit. The SRS diagnosis unit supplies monitoring current to the circuit to electrically verify that the connectors have been locked.

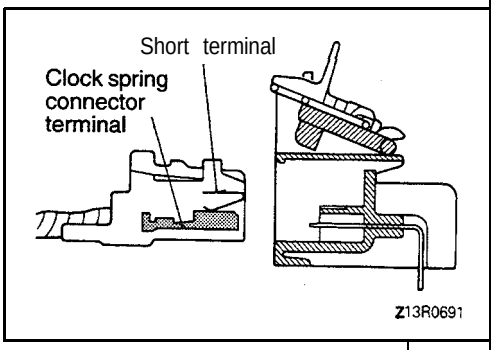
CONNECTOR SHORTING MECHANISM

The mechanism is designed for prevention of accidental ignition of the inflator when the clock spring connector (for the squib circuit) is removed from the SRS diagnosis unit. The operating principle is described below.



When Connectors Are Fitted

When the SRS diagnosis unit and clock spring connectors are coupled, the circuit between the short terminals and clock spring connector terminals is kept in the OFF state by the partition plate provided in the connector of the SRS diagnosis unit.

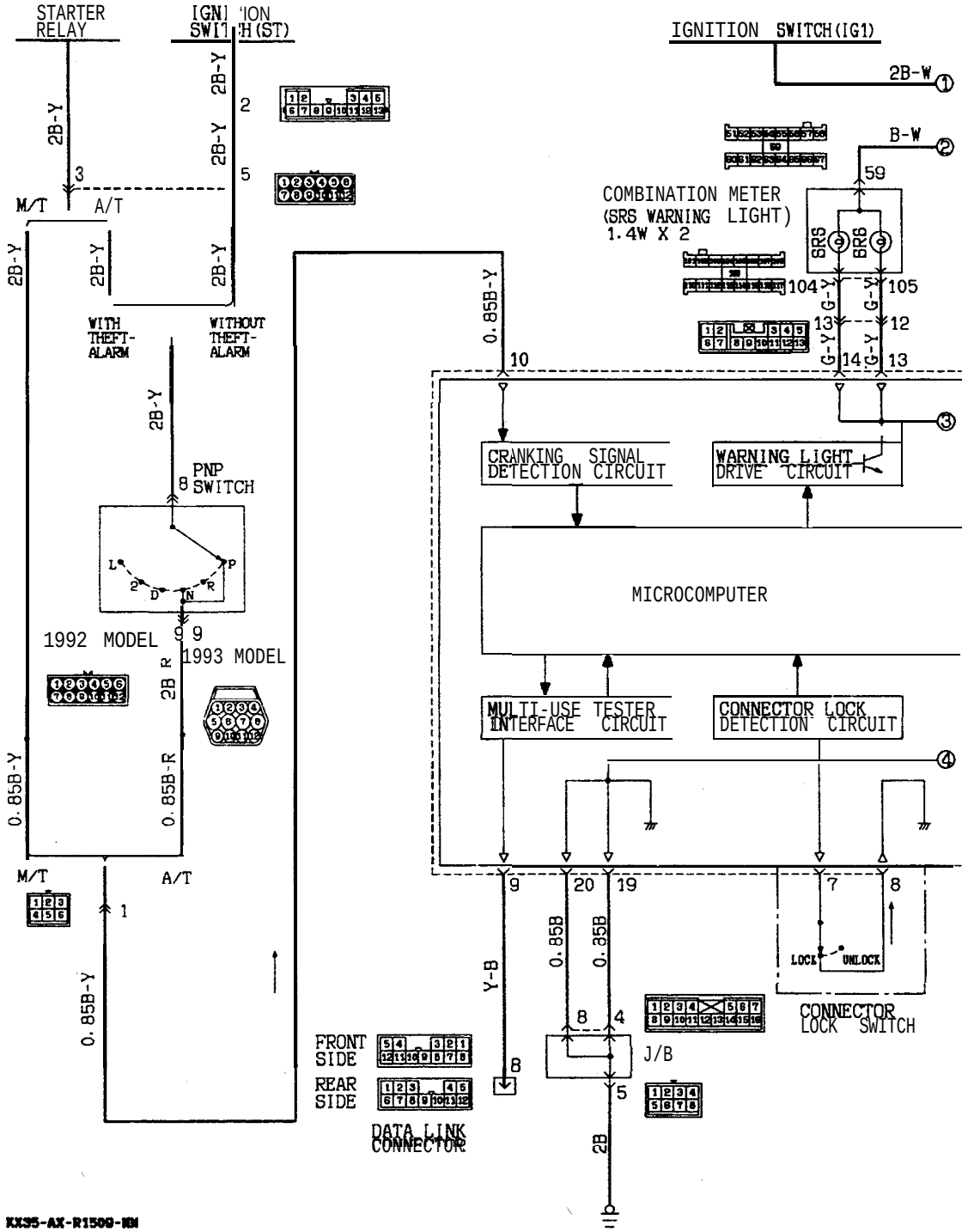


When Connectors Are Disconnected

When the clock spring connectors are disconnected from the SRS diagnosis unit, the partition plate between the short terminals and clock spring connector terminals is removed. As a result, a short circuit is formed between the two poles of the clock spring connector terminals to prevent generation of a potential difference (current) between the squib terminals.

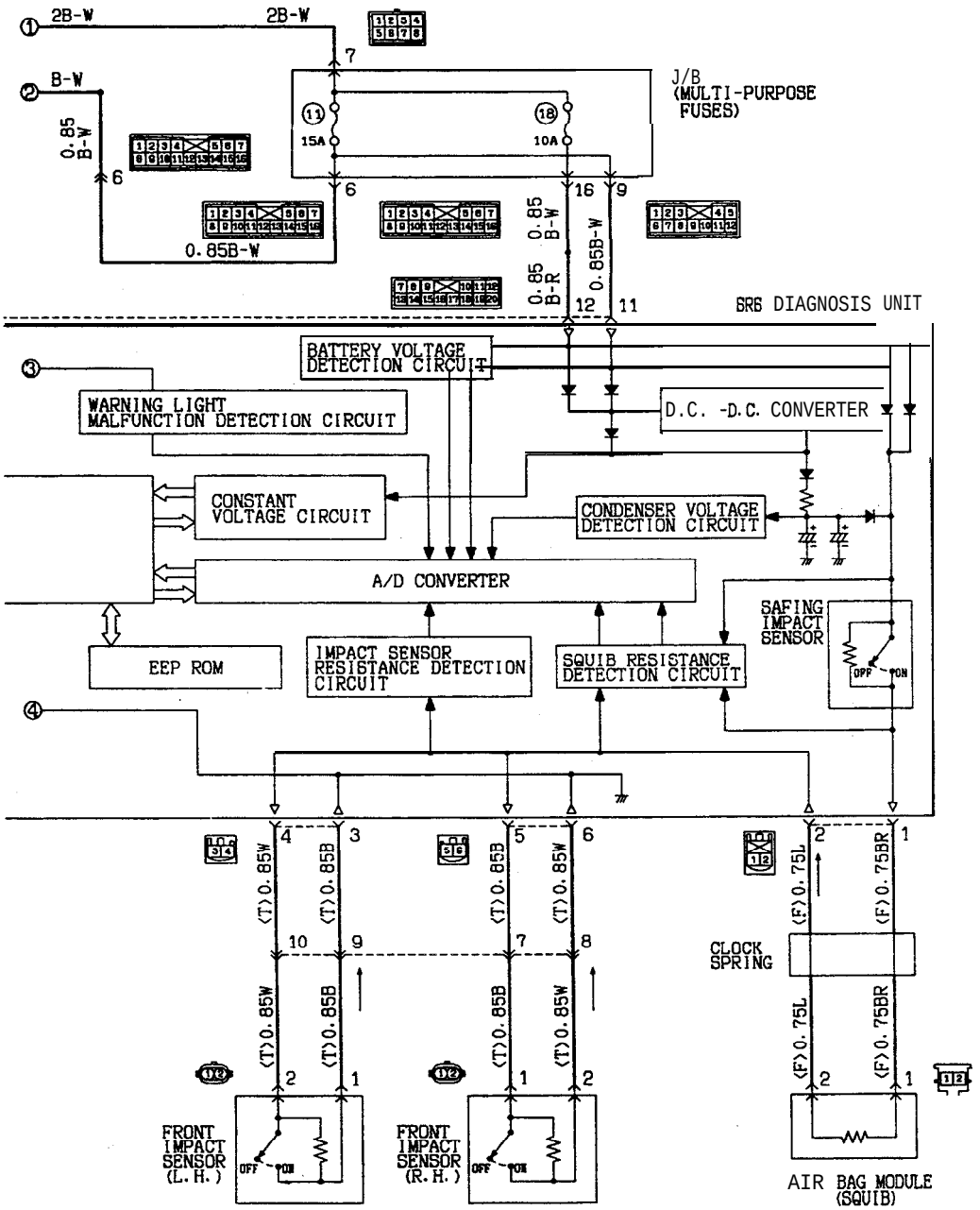
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CIRCUIT DIAGRAM
(Up to 1993 models)



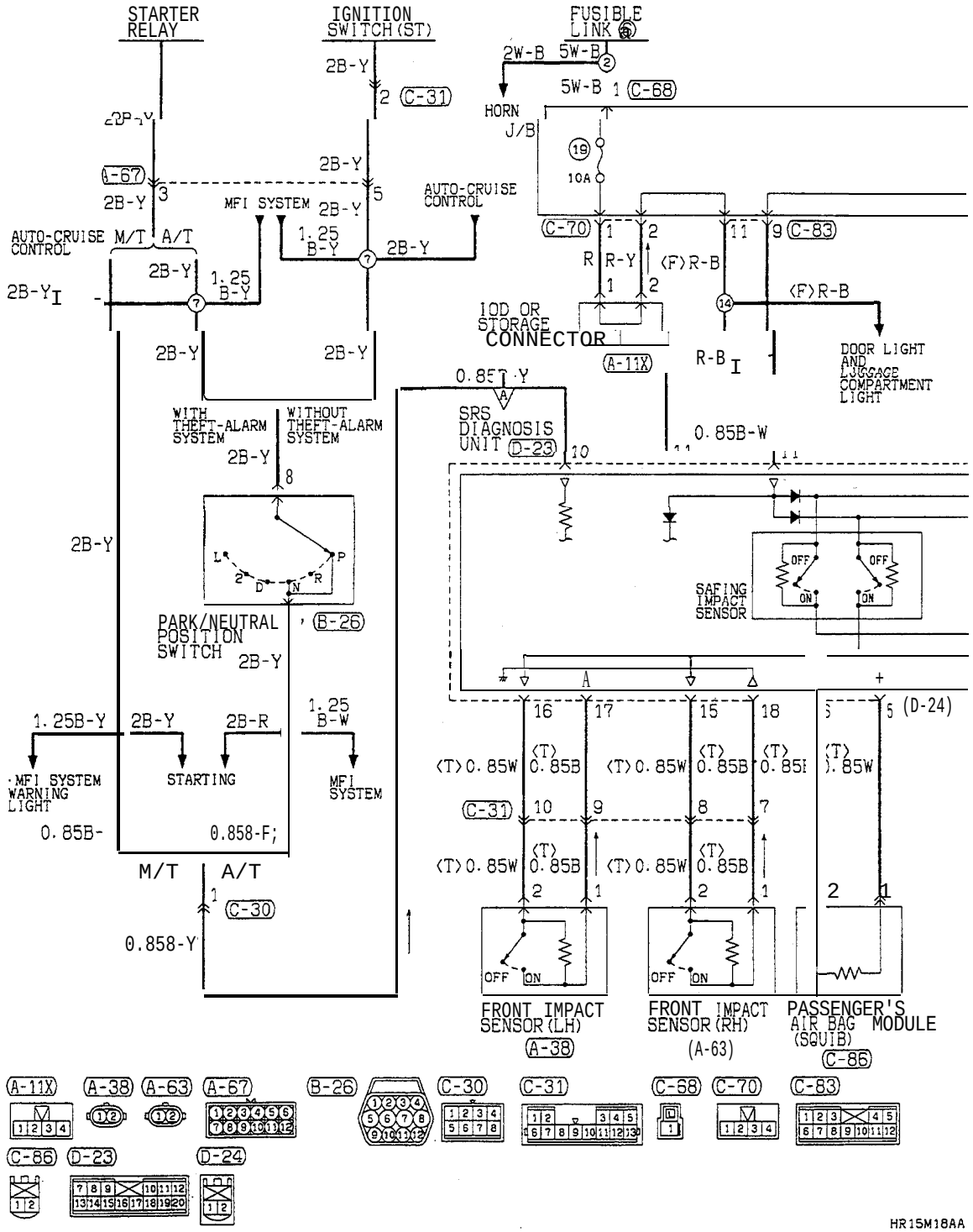
CAUTION

1. **Do not repair, spline or modify SRS wiring (except for specific repairs to the body wiring harness shown on page 52B-18; replace wiring if necessary, after reading and following all precautions and procedures in this manual.**
2. **Do not use an analogue ohmmeter to check SRS wiring or components; use only special tools and digital multi-meter shown on page 52B-22.**



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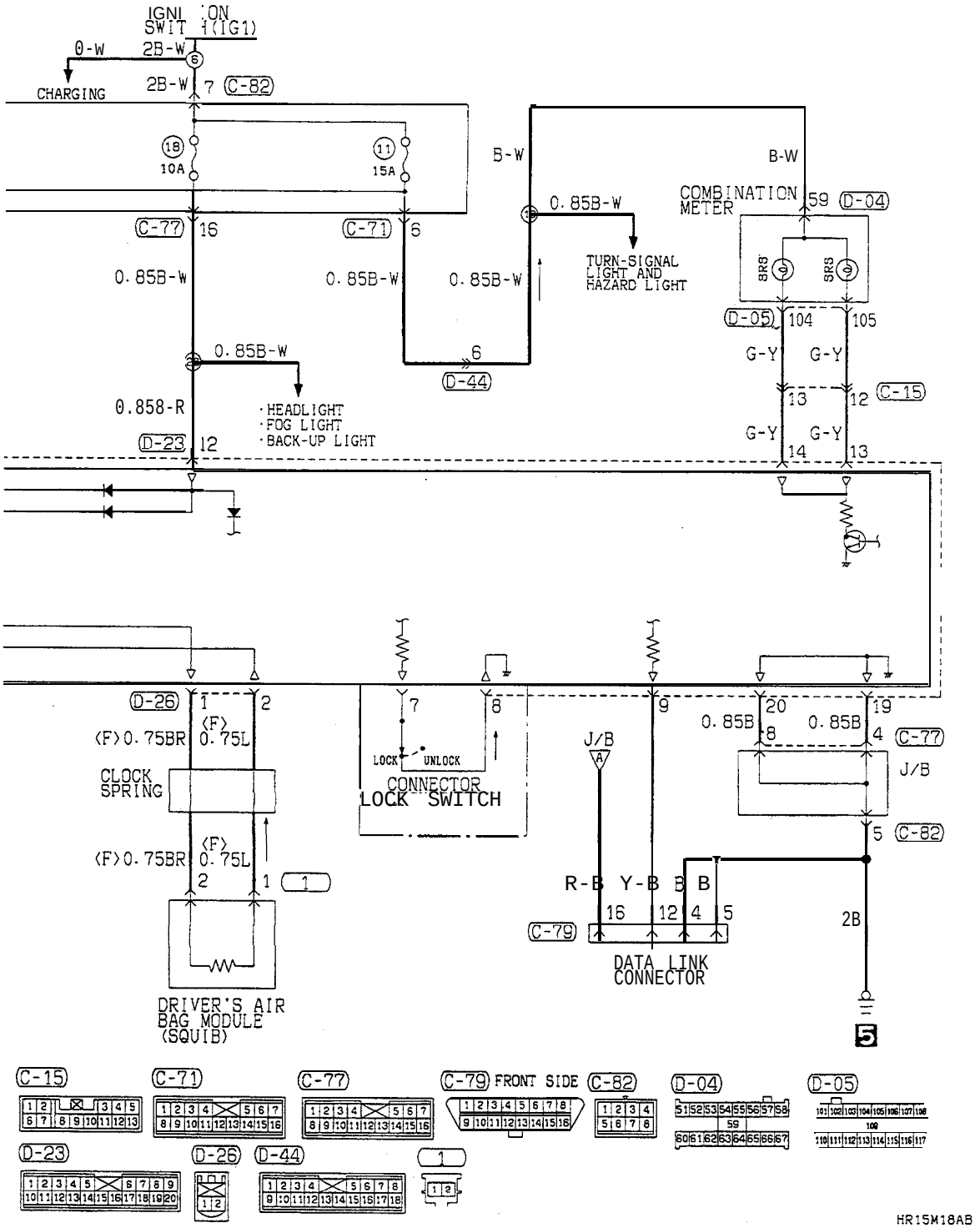
(From 1994 models)



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CAUTION

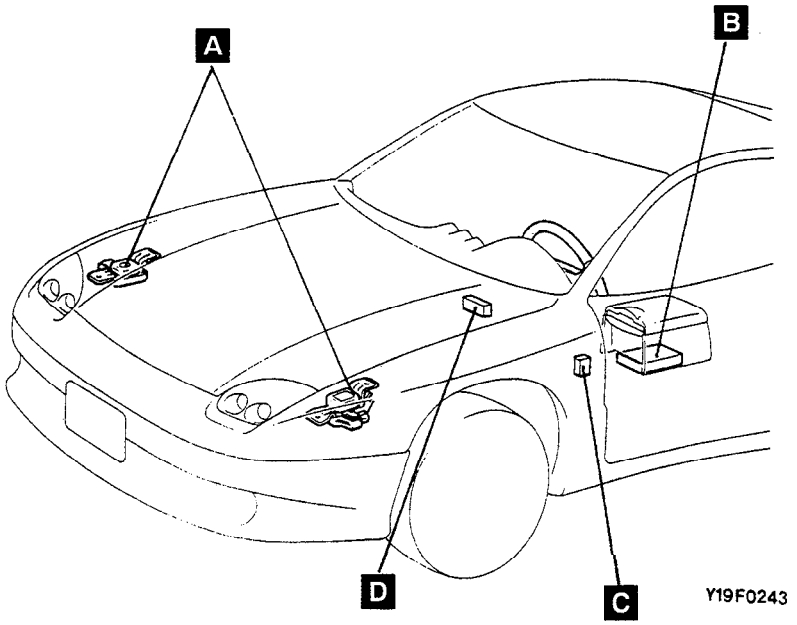
1. **Do not repair, spline or modify SRS wiring (except for specific repairs to the body wiring harness shown on page 52B-20; replace wiring if necessary, after reading and following all precautions and procedures in this manual.**
2. **Do not use an analogue ohmmeter to check SRS wiring or components; use only special tools and digital multi-meter shown on page 52B-22.**

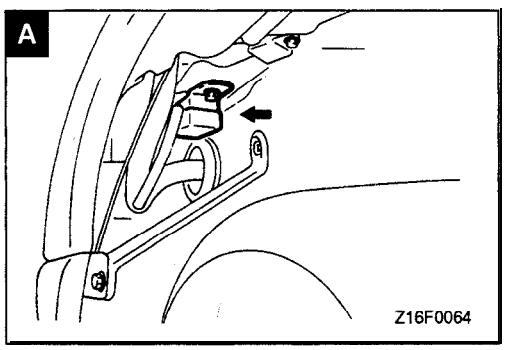


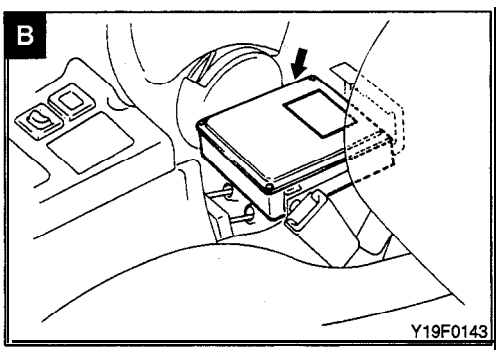
TSB Revision

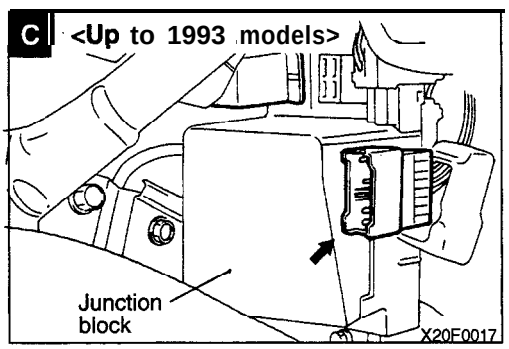
COMPONENT LOCATION

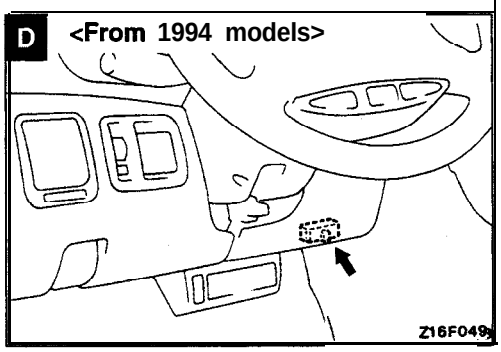
Name	Symbol	Name	Symbol
Data link connector <From 1994 models>	D	Front impact sensor	A
Data link connector <Up to 1993 models>	C	SRS diagnosis unit	B











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SERVICE PRECAUTIONS

1. In order to avoid injury to yourself or others from accidental deployment of the air bag during SRS servicing, read and carefully follow all the precautions and procedures described in this manual.
2. Do not use any electrical test equipment on or near SRS components, except those specified on P.52B-22.
   Never use an analog ohmmeter.

3. Never Attempt to Repair the Following Components:

- Front Impact Sensors
- SRS Diagnosis Unit (SDU)
- Clock Spring
- Air Bag Module

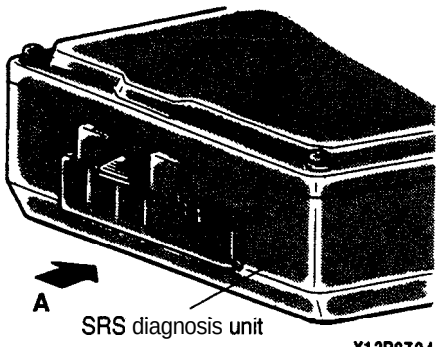
If any of those components are diagnosed as faulty, they should only be replaced, in accordance with the COMPONENT SERVICE procedures in this manual, starting at page [52B-68].

4. Do not attempt to repair the wiring harness connectors of the SRS. If any of the connectors is diagnosed as fault, replace the wiring harness. If the wires are diagnosed as faulty, replace or repair the wiring harness according to the following table.

(Up to 1993 models)

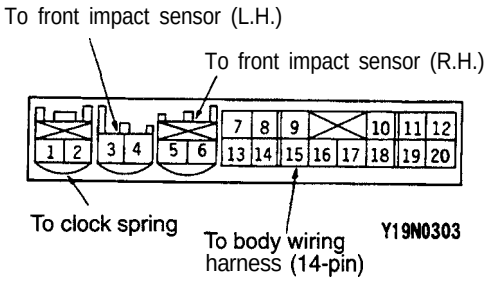
SDU Terminal No.	Harness Connector (No. of Terminals, Color)	Destination of Harness	Corrective Action
1	2 pins, red	Clock spring	Replace clock spring.
2			
3	2 pins, yellow	Body wiring harness → Front wiring harness → Front impact sensor (LH)	Replace with sensor cable.*
4			
5	2 pins, blue	Body wiring harness → Front wiring harness → Front impact sensor (RH)	
6			
7	14 pins, red	Body wiring harness	–
8			
9		Body wiring harness → Diagnosis check pin	Correct or replace control wiring, instrument panel wiring harness or body wiring harness.
10		Body wiring harness → Control wiring harness → Ignition switch (ST)	
11		Body wiring harness → Multi-purpose fuse No. 11	
12		Body wiring harness → Multi-purpose fuse No. 18	
13		Body wiring harness → Instrument panel wiring harness → SRS warning light	
14			
15 to 18		–	–
19		Body wiring harness → Junction block → Body wiring harness → Ground	Correct or replace body wiring harness.
20			

NOTE
(1) The sensor cable marked with • is available as service part.
(2) The sensor cable used as a replacement part is routed along the body wiring harness.

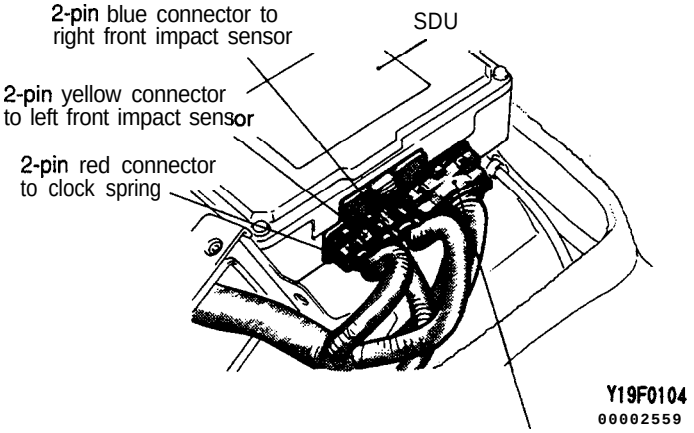


X13R0704

View A



Y19N0303



Y19F0104
00002559

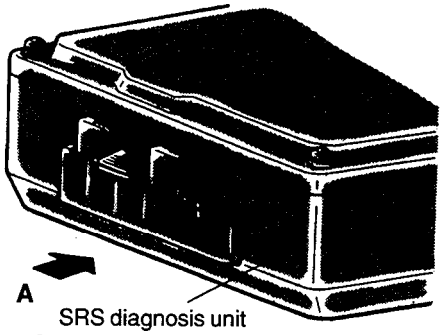
TSB Revision

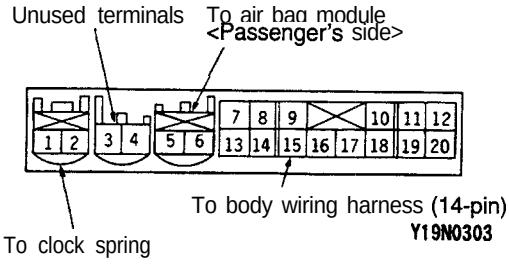
(From 1994 models)

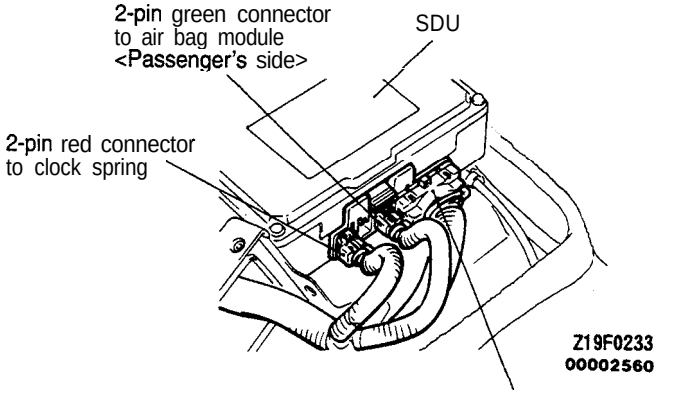
SDU Terminal No.	Harness Connector (No. of Terminals, Color)	Destination of Harness	Corrective Action
1	2 pins, red	Clock spring	Replace clock spring.
2			
3	No connection	–	–
4			
5	2 pins, green	Body wiring harness → Air bag module (passenger's side)	Correct or replace body wiring harness
6			
7	14 pins, red	Body wiring harness	–
8			
9		Body wiring harness → Diagnosis check pin	Correct or replace control wiring, instrument panel wiring harness or body wiring harness.
10		Body wiring harness → Control wiring harness → Ignition switch (ST)	
11		Body wiring harness → Multi-purpose fuse No. 11	
12		Body wiring harness → Multi-purpose fuse No. 18	
13		Body wiring harness → Instrument panel wiring harness → SRS warning light	
14			
15		Body wiring harness → Front wiring harness → Front impact sensor (R.H.) – positive (+) terminal	Replace the sensor cable*
16		Body wiring harness → Front wiring harness → Front impact sensor (L.H.) – positive (+) terminal	
17		Body wiring harness → Front wiring harness → Front impact sensor (L.H.) – negative (–) terminal	
18		Body wiring harness → Front wiring harness → Front impact sensor (R.H.) – negative (–) terminal	
19		Body wiring harness → Junction block → Body wiring harness → Ground	Correct or replace body wiring harness.
20			

NOTE
(1) The sensor cable marked with * is available as service part.
(2) The sensor cable used as a replacement part is routed along the body wiring harness.

TSB Revision







5. After disconnecting the battery cable, wait 60 seconds or more before proceeding with the following work. The SRS system is designed to retain enough voltage to deploy the air bag for a short time even after the battery has been disconnected, so serious injury may result from unintended air bag deployment if work is done on the SRS system immediately after the battery cables are disconnected.
6. SRS components should not be subjected to heat over 93°C (200°F), so remove the front impact sensors, SRS diagnosis unit and air bag module and clock spring before drying or baking the vehicle after painting.
7. Whenever you finish servicing the SRS, check the SRS warning light operation to make sure that the system functions properly. (Refer to P.52B-2).
8. Make certain that the ignition switch is at OFF when the scan tool is connected or disconnected.

NOTE
SERIOUS INJURY CAN RESULT FROM UNINTENDED AIR BAG DEPLOYMENT, SO USE ONLY THE PROCEDURES AND EQUIPMENT SPECIFIED **IN** THIS MANUAL.

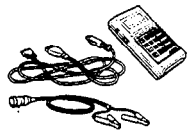
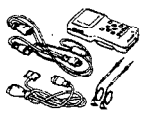
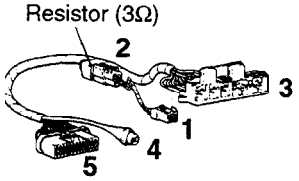
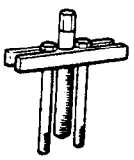
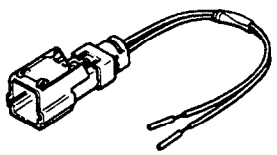
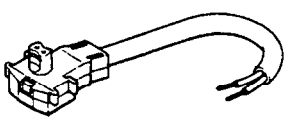
SPECIFICATIONS

SERVICE SPECIFICATION

Items	Standard value
Front impact sensor resistance Ω	**2,000 ± 40**
Clock spring resistance Ω	less than **0.4**

TSB Revision

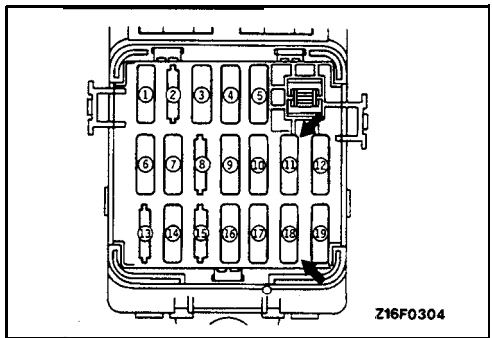
SPECIAL TOOLS

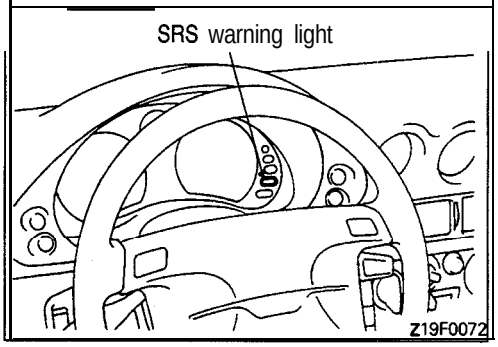
Tool	Tool number and name	Supersession	Application
	MB991341 Scan tool (Multi use tester <MUT>)	MB991341C	Up to 1993 models • Reading diagnostic trouble codes • Erasing diagnostic trouble code • Reading trouble period • Reading erase times
	ROM pack (For the number, refer to GROUP 00 – Precautions Before Service.)		
 Z16X0606	MB991502 Scan tool (MUT-II)	MB991502	All models • Reading diagnostic trouble code • Erasing diagnostic trouble code • Reading trouble period • Reading erase times
 Z16X0607	ROM pack		
Resistor (3Ω) 	MB991349*1 or MB991530*2 SRS Check Harness NOTE *1 Up to 1993 model *2 From 1994 model		• Checking the SRS electrical circuitry with a digital multi-meter NOTE SRS check harness is used on various Diagnostic Tests. For details, refer to DIAGNOSTIC SEQUENCE (P.52B-24–P.52B-63)
	MB990803 Steering wheel puller	General service tool	Removal of steering wheel
	MB686560 SRS air bag adapter harness A	General service tool	Deployment of air bag module inside the vehicle
	MR203491 or MB628919 SRS air bag adapter harness B	General service tool	Deployment of air bag module outside the vehicle

TSB Revision

TEST EQUIPMENT

Tool	Name	Use
 Z13R0746	Digital multi-meter (Use a multi-meter for which the Maximum test current is 2 mA or less at the minimum range of resistance measurement.)	Checking the SRS electrical circuitry with SRS Check Harness


Z16F0304



Z19F0072

TROUBLESHOOTING

SRS DIAGNOSTIC PROCEDURES – INITIAL STEPS

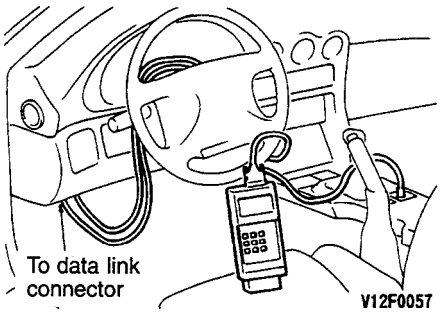
FOLLOW THESE STEPS WHEN BEGINNING ANY SRS SERVICE:

1. Check the SRS fuses (multi-purpose fuses No. 11 and No. 18).
   If either is loose, tighten it; if damaged or blown, replace it.

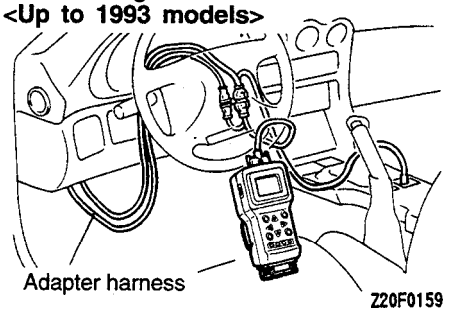
2. After performing step 1, turn the ignition key to the "ON" position. Does "SRS" warning light illuminate for about 7 seconds and then turn OFF? If yes, SRS system is functioning properly.
   If no, continue with following steps.

   NOTE
   1. From 1993 model, the SRS warning light illuminates also when the battery voltage drops. In that case, the SRS warning light goes out if the battery voltage returns to the normal level.
   2. On 1992 model, if the vehicle has a discharged battery or battery power supply (multi-purpose fuses No. 11 or No. 18) is disconnected with the ignition key in the "ON" position, the SRS warning light will continue to illuminate even after the battery is recharged or the fuses are replaced in their original positions. In this case, the SRS warning light can be extinguished by turning the ignition switch ON and OFF 10 times.

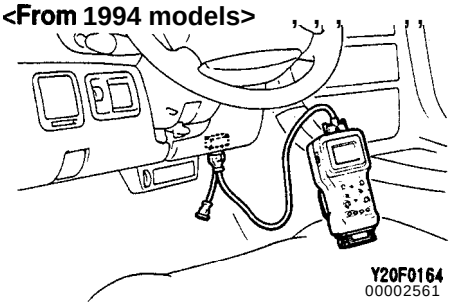
When using the MUT



When using the MUT-II <Up to 1993 models>



<From 1994 models>



3. Turn the ignition key to the "LOCK" position.
4. Connect the scan tool (MUT or MUT-II).
   When connecting the scan tool (MUT-II) to a vehicle up to 1993 model, use the adapter harness supplied together.

   Caution
   Make certain that the ignition switch is at OFF when the scan tool is connected or disconnected.
5. Start the SRS diagnosis by conducting TEST 1 (SRS warning light does not extinguish) or TEST 2 (SRS warning light does not illuminate) which begins on next page.

DIAGNOSTIC SEQUENCE

TEST 1 SRS WARNING LIGHT DOES NOT EXTINGUISH

(1) Read (and write down) all of the displayed diagnostic trouble codes and service data (fault duration and how many time memories are erased) using the scan tool.

NOTE
(1) Maximum stored period: 9999 minutes (approximately 7 days)
(2) Maximum number of times to be stored: **250**
(3) If the scan tool displays "CAN'T COMM.", check the scan tool and vehicle side self-check data link connector for poor connections (Refer to P.52B-27.) and perfom TEST 3.

(2) Erase the diagnostic trouble codes following the 'scan tool messages.
(3) Start engine.
Does "SRS" warning light illuminate for about 7 seconds, turn OFF and then remain extinguished for at least 45 seconds?
If yes, SRS system is functioning properly now.
If no, check the diagnostic trouble codes written down at step (4) above, refer to ON-BOARD DIAGNOSTIC **QUICK REFERENCE CHART** (P.52B-25) and perform service indicated there.

TSB Revision

TEST 2 SRS WARNING LIGHT DOES NOT ILLUMINATE

(1) Read (and write down) all of the displayed diagnostic trouble codes and service data (fault duration and how many time memories are erased) using the scan tool.

NOTE
(1) Maximum stored period: 9999 minutes (approximately 7 days)
(2) Maximum number of times to be stored: 250

(2) Check diagnostic trouble codes against ON-BOARD DIAGNOSTIC QUICK REFERENCE CHART and perform service indicated there.

(3) If the scan tool displays "CAN'T COMM.", check the scan tool and vehicle side self-check data link connector for poor connections (Refer to P.52B-24.) and perform TEST 4.

ON-BOARD DIAGNOSTIC QUICK REFERENCE CHART

Fault No.	Explanation	Service
	Normal. The SRS is in good order.	
11	The circuits for the front impact sensor are shorted to each other. Or the negative harness between the air bag module and the SDU is shorted to ground or the positive harness between the front impact sensor and the SDU is shorted to ground.	Perform TEST 5
12	Right or left impact sensor circuit is open or the wire from the sensor to the SDU is open-circuit.	
13	Right and left impact sensor circuits are open or the wires from the sensors to the SDU are open-circuit.	
21	The circuits for the driver's air bag module (squib) are shorted to each other or the circuit is grounded.	Perform TEST 6
22	The driver's seat air bag module (squib) circuit is open or the wire from the driver's air bag module to the SDU (clock spring) is open-circuit. Or the harness connector make a poor contact or the positive harness between the driver's air bag module and the SDU is shorted to ground.	
24	The circuits for the passenger's air bag module (squib) are shorted to each other or the circuit is grounded.	Perform TEST 7
25	The passenger's air bag module (squib) circuit is open or the wire from the passenger's air bag module to the SDU (clock spring) is open-circuit. Or the harness connector make a poor contact or the positive harness between the passenger's air bag module and the SDU is shorted to ground.	
31	The capacitor (integrated in the SDU) terminal voltage is higher than the specified value for 5 seconds.	If the battery voltage is normal, replace SDU. (Refer to P.52B-71.) If the battery is run down, turn the ignition key to the "LOCK" position, disconnect the negative battery cable and wrap the terminal with tape for insulation. Then, charge the battery.
32*1	The capacitor (integrated in the SDU) terminal voltage is lower than the specified value for 5 seconds. Or the battery runs short.	
33*2	The circuit for the cranking signal is shorted to some power supply circuits. It takes at least 45 seconds that the SDU detects this fault.	Perform TEST 8

TSB Revision

Fault No.	Explanation	Service
34*2	The lock switch (short bar) of the SDU double lock connector is open.	Perform TEST 9
41 *1,*2	The multi-purpose fuse (No. 18) is blown or the wire from the fuse to the SDU is open-circuit or its resistance value is increased, or the battery runs short. It takes at least 5 seconds that the SDU detects this fault.	If the battery is run down, turn the ignition key to the "LOCK" position, disconnect the negative battery cable and wrap the terminal with tape for insulation. Then, charge the battery.
42*1, *2	The multi-purpose fuse (No. 11) is blown or the wire from the fuse to the SDU is open-circuit or its resistance value is increased, or the battery runs short. It takes at least 5 seconds that the SDU detects this fault.	If the battery is run down, turn the ignition key to the "LOCK" position, disconnect the negative battery cable and wrap the terminal with tape for insulation. Then, charge the battery.
43*2	The SRS warning light circuits are open or the wire from the light to the SDU is grounded. It takes at least 5 seconds with the light OFF that the SDU detects this fault.	When SRS warning light does not extinguish: Perform TEST 12 When SRS warning light does not illuminate: Perform TEST 13
44	The SRS warning light drive transistor (integrated in the SDU) is open-circuit.	Replace the SDU. (Refer to P.52B-71.)
45	The EEP ROM or A/D converter (integrated in the SDU) is defective.	

NOTE – IMPORTANT

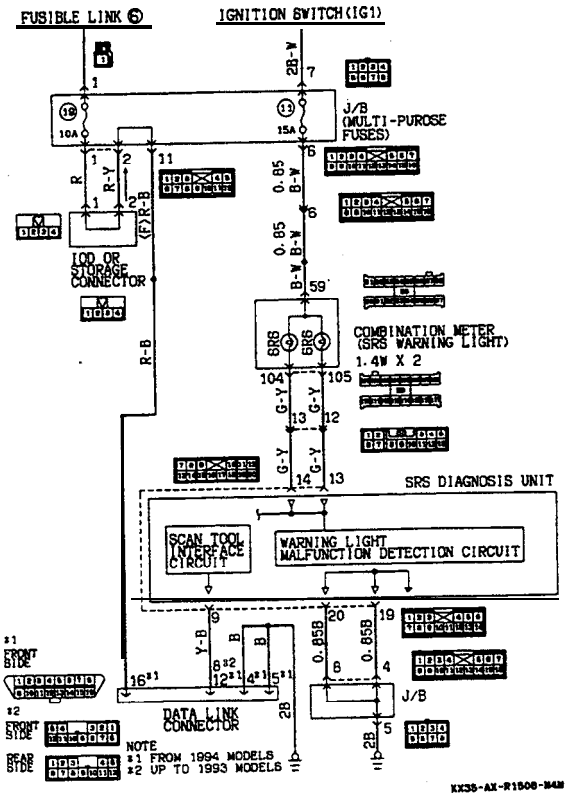
(1) After repairing the SRS, reconnect the battery cable, erase the diagnostic trouble code memory from the scan tool and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)

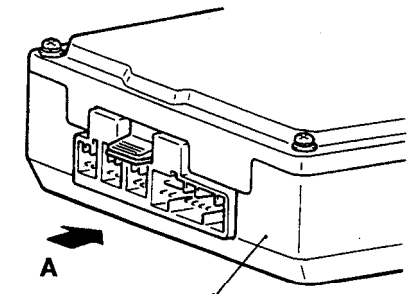
(2) SDU = SRS Diagnosis Unit

(3) *1: If the vehicle has a discharged battery it will store the fault code 32. When this diagnostic trouble code is displayed, check the battery.

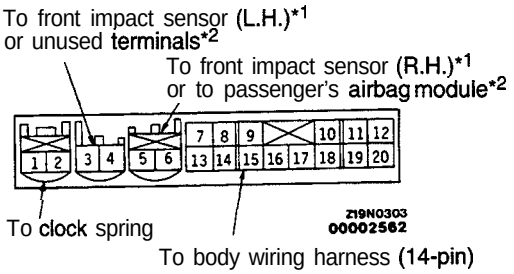
(4) *2: Upon recovery from the fault identified with the code No. marked with *2, the SRS warning light goes out and the function returns to the normal condition. (From 1993 model)

TEST 3 NO COMMUNICATION BETWEEN SCAN TOOL AND SDU (SRS warning light does not extinguish)



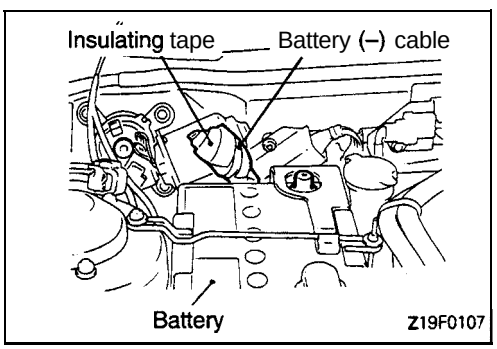


View A



NOTE
- *1 Up to 1993 models

*2 From 1994 models

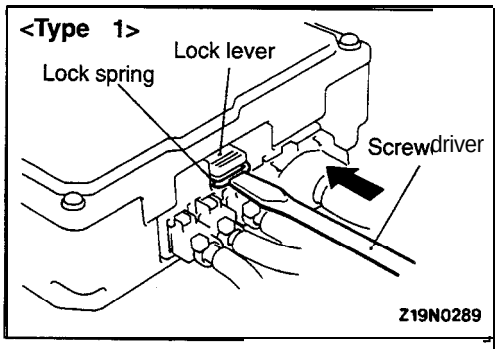


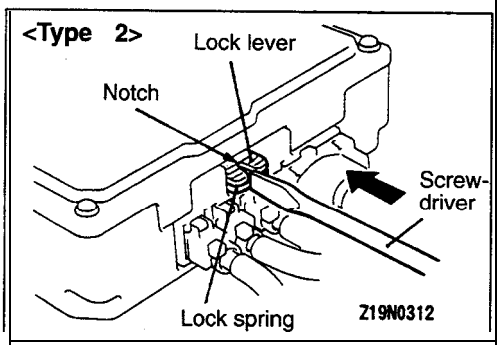
(1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. The SRS system is designed to retain enough voltage to deploy the air bag even after the battery has been disconnected. Serious injury may result from unintended air bag deployment if work is done on the SRS system immediately after the battery cable is disconnected.

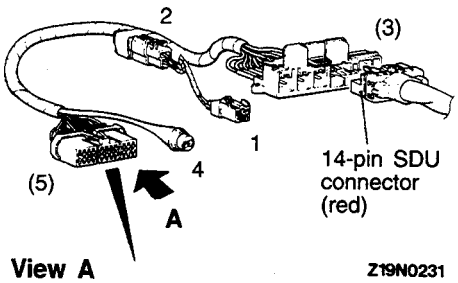
(2) Remove the rear console assembly. (Refer to GROUP 52A – Floor Console.)

TSB Revision



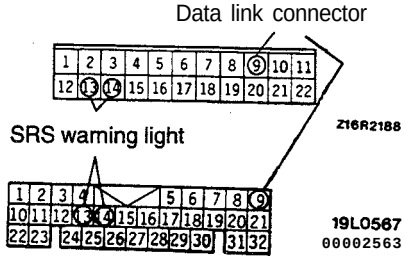


MB991349 (Up to 1993 models)
MB991530 (From 1994 models)
SRS Check Harness



View A

SRS Check Harness connector (5)



(3) Release the lock of SDU connector in accordance with the following procedure:

In case that there is no notch on the lock lever (Type 1)

Place a flat tip screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.

Caution
1. Do not use excessive force to raise the lock lever.
2. Do not insert the screwdriver into the gap between the lock lever and the lock spring.

In case that there is a notch on the lock lever (Type 2)

Place a flat tip screwdriver against the'lock spring (metal section) at the lock lever notch as shown in the illustration, and push the spring toward the unit.

Caution
Do not use excessive force to raise the lock lever.

(4) Disconnect the red 14-pin connector from the SDU.

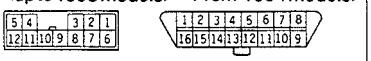
(5) Connect the now disconnected red harness-side SDU connector (14-pin) to the connector (3) of the SRS Check Harness.

(6) Check according to the flow chart on the next page, using the specified digital multi-meter.

Is there continuity between the No. 8 terminal (vehicles up to 1993 model) or No.12 terminal (vehicles from 1994 model) of the data link connector and the No. 9 terminal of the SRS Check Harness Connector (5)?

Data link connector

<up to 1993 models> <From 1994 models>



19F0280

No → Body wiring harness damaged or disconnected between the SDU and the data link connector → Repair or replace the body wiring harness. (Refer to P.52B-18, 20.)

Yes

Is there continuity between the No. 13 or No. 14 terminal of SRC Check Harness connector (5) and around?

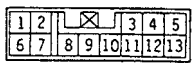
No → Malfunction of the SDU. → Replace the SDU. (Refer to P.52B-71.)

Yes

Disconnect the connector between the body wiring harness and instrument panel wiring harness.

Yes

Check for continuity between the grounal and terminal No. 12 or No. 13 of the body wiring harness's connector which is connected to the instrument panel wiring harness.



19F0281

No → The harness between SDU and instrument panel wiring harness is short-circuited. → Repair or replace the body wiring harness at the location of the short circuit (Refer to P.52B-18, 20.)

Yes → The instrument panel wiring harness between SRS warning lamp and body wiring harness is short-circuited. → * Repair or replace the instrument panel wiring harness at the location of the short-circuit.

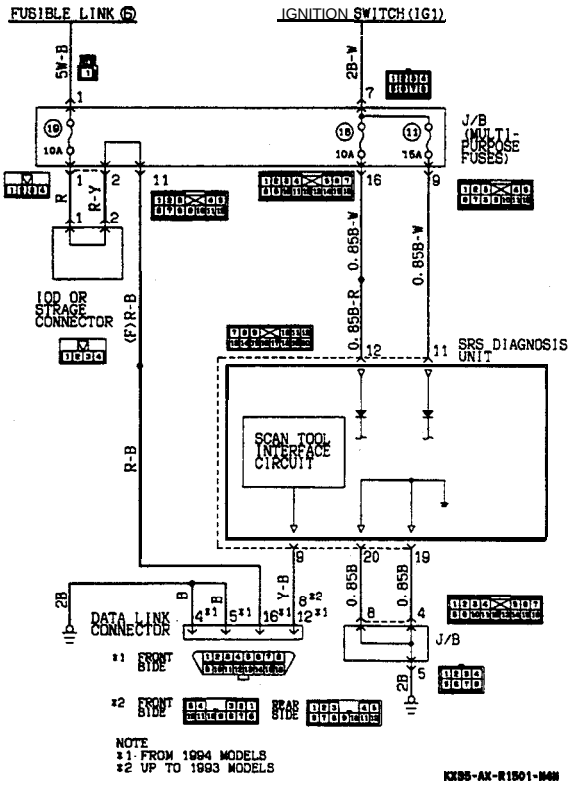
NOTE – IMPORTANT

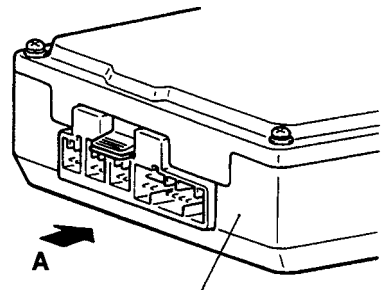
(1) After repairing the SRS, reconnect the battery cable, erase the diagnostic trouble code memory from the scan tool and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)

(2) SDU = SRS Diagnosis Unit

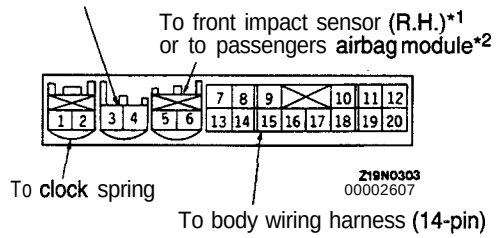
TSB Revision

TEST 4 NO COMMUNICATION BETWEEN SCAN TOOL AND SDU (SRS warning light does not illuminate)

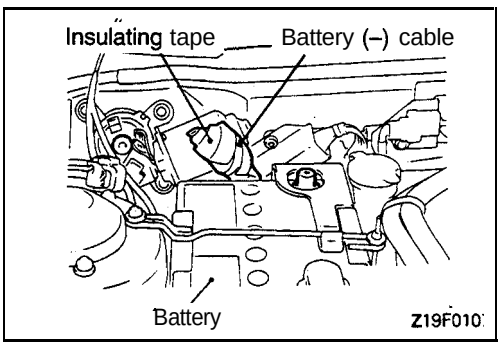




View A Z13R0704



NOTE
*1 Up to 1993 models
*2 From 1994 models



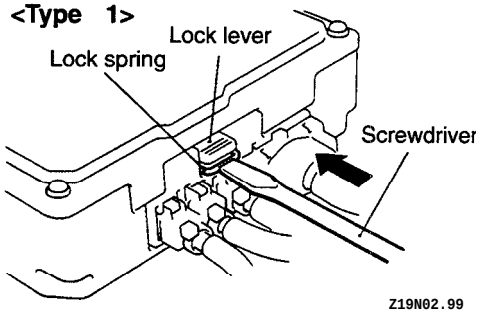
(1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. The SRS system is designed to retain enough voltage to deploy the air bag even after the battery has been disconnected. Serious injury may result from unintended air bag deployment if work is done on the SRS system immediately after the battery cable is disconnected.

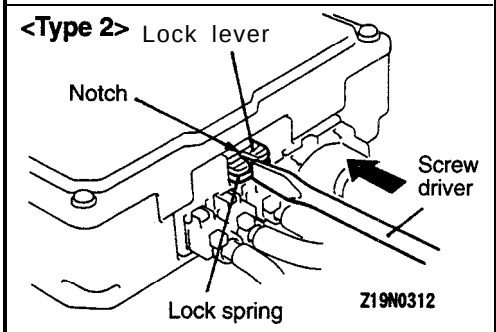
(2) Remove the rear console assembly. (Refer to GROUP 52A – Floor Console.)

TSB Revision

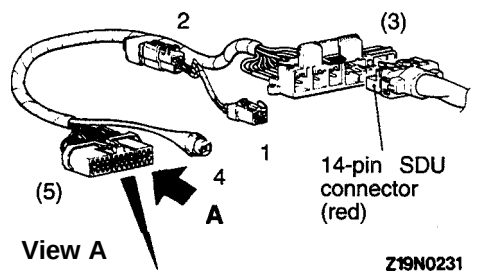
<Type 1>



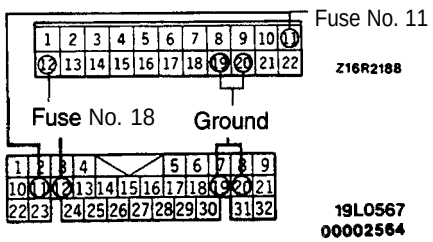
<Type 2>



MB991349 (Up to 1993 models)
MB991530 (From 1994 models)
SRS Check Harness



SRS Check Harness Connector (5)



(3) Release the lock of SDU connector in accordance with the following procedure:

In case that there is no notch on the lock lever (Type 1)

Place a flat tip screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.

Caution
1. **Do not use excessive force to raise the lock lever.**
2. **Do not insert the screwdriver into the gap between the lock lever and the lock spring.**

In case that there is a notch on the. lock lever (Type 2)

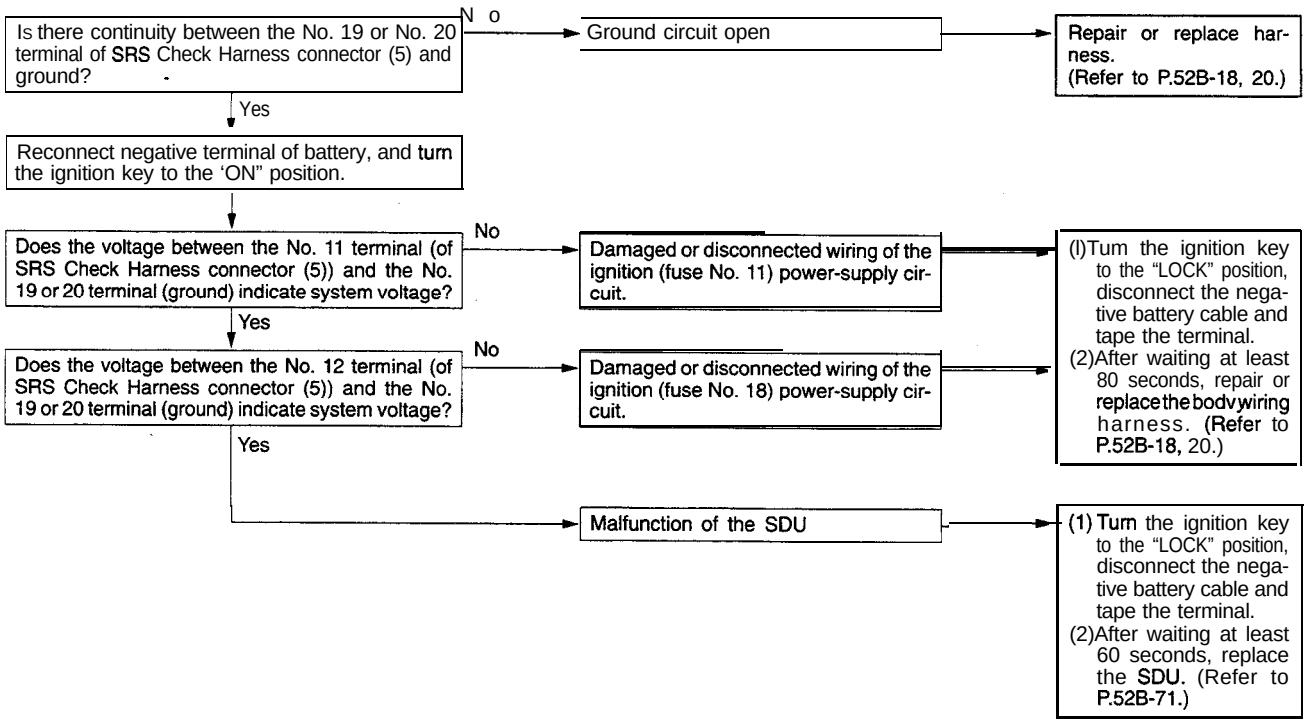
Place a flat tip screwdriver against the lock spring (metal section) at the lock lever notch as shown in the illustration, and push the spring toward the unit.

Caution
Do not use excessive force to raise the lock lever.

(4) Disconnect the red 14-pin connector from the SDU.

(5) Connect the now disconnected red harness-side SDU connector (14-pin) to the connector (3) of the SRS Check Harness.

(6) Check according to the flow chart on the next page using the specified digital multi-meter.



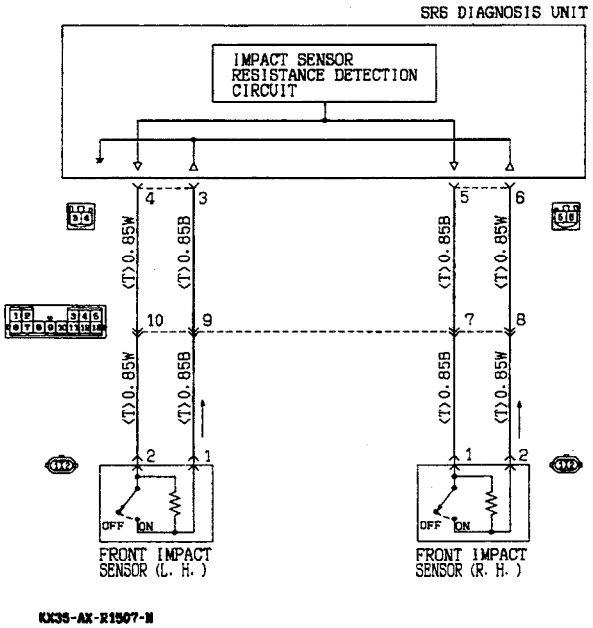
NOTE – IMPORTANT

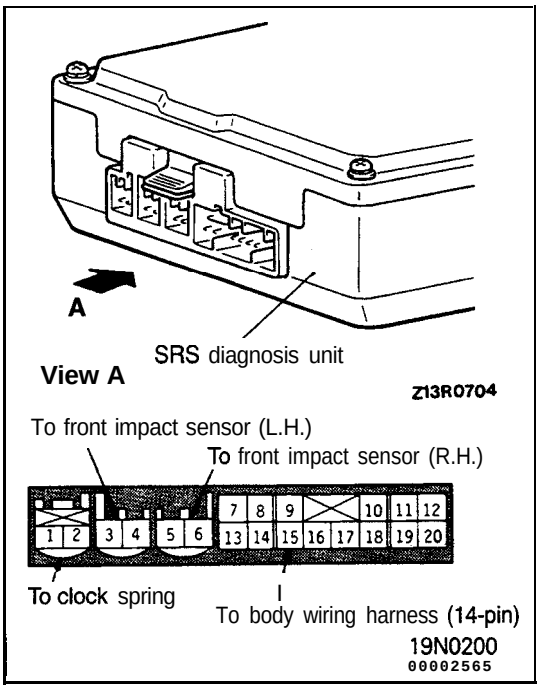
(1) After repairing the SRS, reconnect the battery cable, erase the diagnostic trouble code memory from the scan tool and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)

(2) SDU = SRS Diagnosis Unit

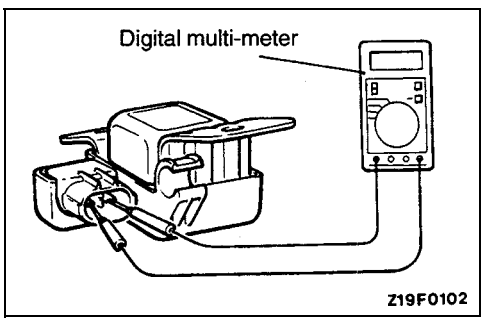
TSB Revision

TEST 5 **WHEN DIAGNOSTIC TROUBLE CODE No. 11, No. 12 OR No. 13 IS DISPLAYED (Up to 1993 models)**





Front impact sensor resistance check

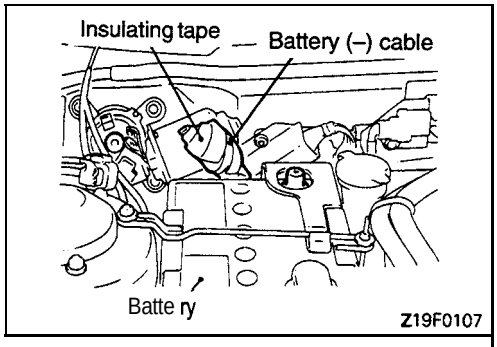


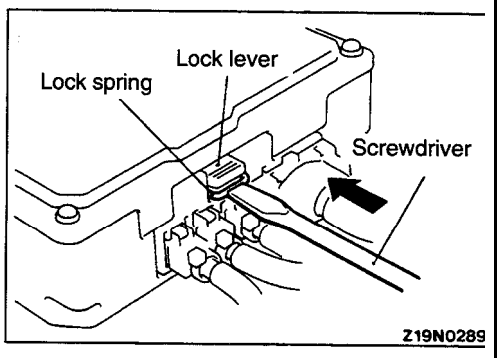
NOTE
If combined front impact sensor and air bag module (squib) failure modes simultaneously occur in two places, the preconditions for the respective detection circuits will go out of order. For this reason, both diagnostic trouble codes may not be stored but only one of them may be indicated.
Their relationships are shown in the following table.

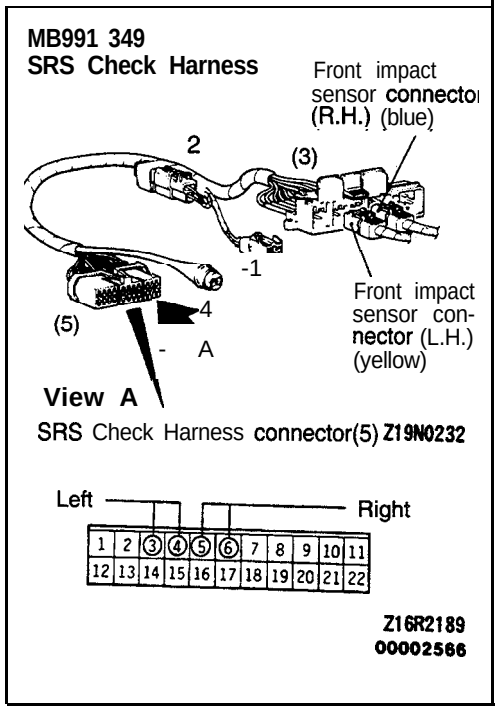
Failure modes		Front impact sensor short-circuited	Front impact sensor open-circuited (one side)	Front impact sensor open-circuited (both side)
Air bag module (Squib)	Short-circuited	11 or 21	12 or 21	13 or 21
	Open-circuited	11 or 22	12 or 22	13 or 22

The numbers in the boxes are diagnostic trouble codes numbers. (Refer to P.52B-25.)

TSB Revision







(1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. The SRS system is designed to retain enough voltage to deploy the air bag even after the battery has been disconnected. Serious injury may result from unintended air bag deployment if work is done on the SRS system immediately after the battery cable is disconnected.

(2) Remove the rear console assembly. (Refer to GROUP 52A – Floor Console.)

(3) Apply a flat tip screwdriver to the lock spring (metallic portion) of the SDU connector lock lever as illustrated and push it horizontally toward the back of the unit.

Caution
1. Do not push up the lock lever (green) by force.
2. Never insert a screwdriver between the lock lever (green) and the lock spring (metallic portion).

(4) Disconnect each connector other than 14-pin connector from the SRS diagnosis unit while pressing down the lock of each connector. (Refer to P.52B-11.)

(5) Locate the blue and yellow connectors for the wiring leading to the front impact sensors, which were connected to the now-disconnected harness-side connector of the SDU. Connect those blue and yellow connectors to connector (3) of the SRS Check Harness.

(6) Check according to the flow chart on the next page, using the specified digital multi-meter and scan tool.

Is the resistance between the No. 3 terminal of SRS Check Harness connector (5) and the No. 4 terminal normal?
Standard value: 2,000 ± 40Ω

No → Is the resistance between the terminals of the left front impact sensor normal? (Refer to P.52B-33.)
Standard value: 2,000 ± 40Ω

No → Replace the left front impact sensor. (Refer to P.52B-68.)

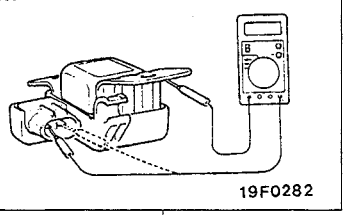
Yes → Front wiring harness is grounded or open.

→ Replace the sensor cables. (Refer to P.52B-18.)

Yes

For terminals No. 3 and No. 4 of the SRS check harness connector (5), is there continuity between each of them and the body ground?

Yes → Is there continuity between left front impact sensor terminal and sensor bracket?



Yes → Replace the left front impact sensor. (Refer to P.52B-68.)

No → Short-circuit of the harness between left front impact sensor and SRS diagnosis unit.

→ Replace harness.

No

Is the resistance between the No. 5 terminal of SRS Check Harness connector (5) and the No. 6 terminal normal?
Standard value: 2,000 ± 40Ω

No → Is the resistance between the terminals of the right front impact sensor normal? (Refer to P.52B-33.)
Standard value: 2,000 ± 40Ω

No → Replace the right front impact sensor. (Refer to P.52B-68.)

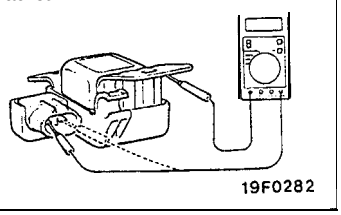
Yes → Front wiring harness is grounded or open.

→ Replace the sensor cables. (Refer to P.52B-18.)

Yes

For terminals No. 5 and No. 6 of the SRS check harness connector (5), is there continuity between each of them and the body ground?

Yes → Is there continuity between right front impact sensor terminal and sensor bracket?



Yes → Replace the right front impact sensor. (Refer to P.52B-68.)

No

No → Short-circuit of the harness between right front impact sensor and SRS diagnosis unit.

Yes → Replace harness.

No

CONTINUED ON NEXT PAGE

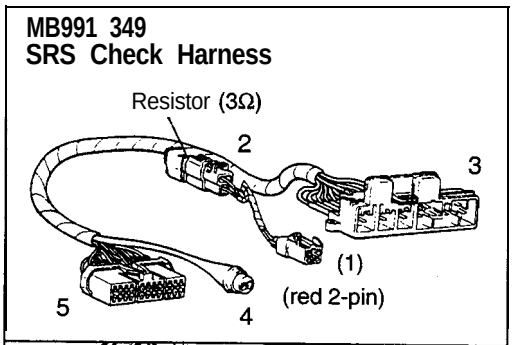
NOTE – IMPORTANT

(1) After repairing the SRS, reconnect the battery cable, erase the diagnostic trouble code memory from the scan tool and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)

(2) SDU = SRS Diagnosis Unit

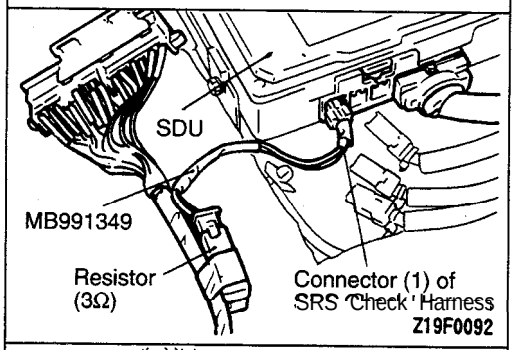
TSB Revision

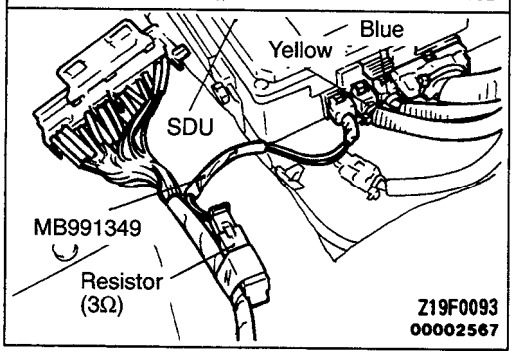
CONTINUED FROM PREVIOUS PAGE



(1) Connect the red 2-pin connector (1) of the SRS Chec Harness to the SDU in place of the now-disconnecte clock spring-SDU connector.

NOTE
A 3-ohm resistor that corresponds to the resistance c the air bag module (squib) and the wiring resistance i connected between the terminals of the connector (1 of the SRS Check Harness.





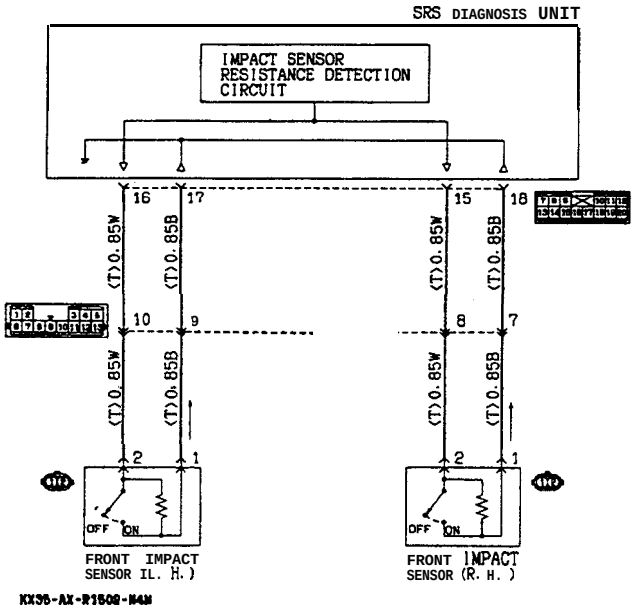
(2) Reconnect blue and yellow connectors, for the wiring lead ing to the front impact sensors, to the SDU and doubl lock them. (Refer to P.52B-11.)

NOTE
If double locking cannot be made, the connector is incor rectly or incompletely inserted; re-check to insert the con nector correctly and securely.

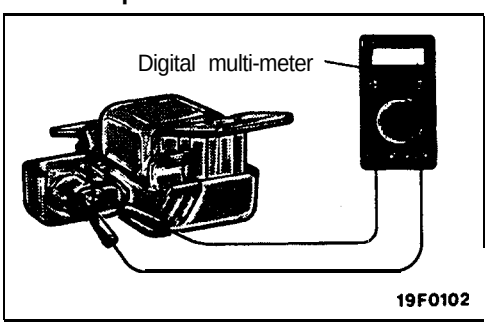
CONTINUED ON 52B-45
(TEST 6)

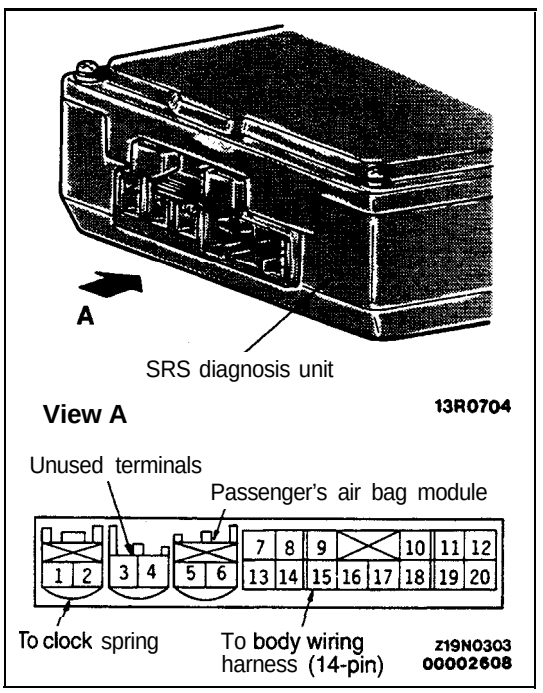
NOTE – IMPORTANT
(1) After repairing the SRS, reconnect the battery cable, erase the diagnostic trouble code memory from the scan tool and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)
(2) SDU = SRS Diagnosis Unit

TEST 5 **WHEN DIAGNOSTIC TROUBLE CODE No. 11, No. 12 OR No. 13 IS DISPLAYED (From 1994 models)**



Front impact sensor resistance check



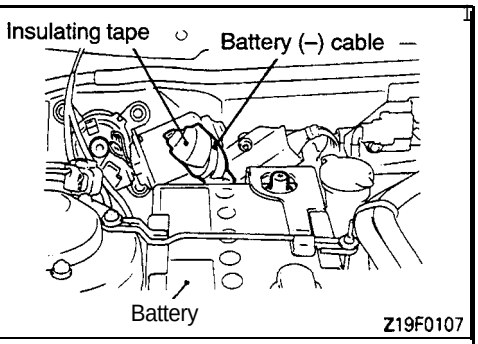


NOTE
If combined front impact sensor and air bag module (squib) failure modes simultaneously occur in two places, the preconditions for the respective detection circuits will go out of order. For this reason, both diagnostic trouble codes may not be stored but only one of them may be indicated.
Their relationships are shown in the following table.

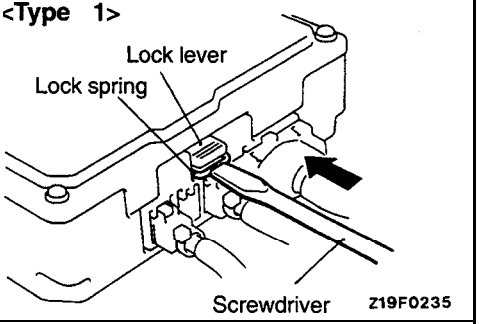
Failure modes		Front impact sensor short-circuited	Front impact sensor open-circuited (one side)	Front impact sensor open-circuited (both side)
Driver's air bag module (Squib)	Short-circuited	11 or 21	12 or 21	13 or 21
	Open-circuited	11 or 22	12 or 22	13 or 22
Passenger's air bag module (Squib)	Short-circuited	11 or 24	12 or 24	13 or 24
	Open-circuited	11 or 25	12 or 25	13 or 25

The numbers in the boxes are diagnostic trouble codes numbers. (Refer to P.52B-25.)

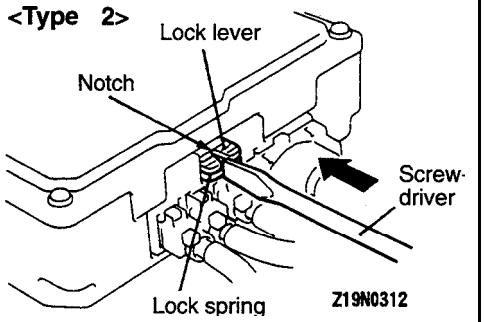
TSB Revision



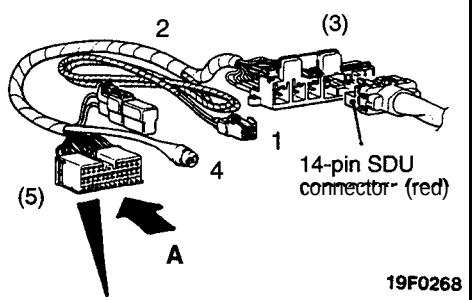
<Type 1>



<Type 2>

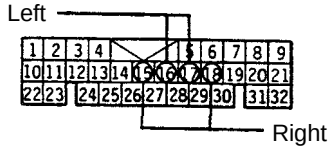


MB991 530
SRS Check Harness



View A

SRS Check Harness connector (5)



(1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. The SRS system is designed to retain enough voltage to deploy the air bag even after the battery has been disconnected. Serious injury may result from unintended air bag deployment if work is done on the SRS system immediately after the battery cable is disconnected.

(2) Remove the rear console assembly. (Refer to GROUP 52A – Floor Console.)

(3) Release the lock of SDU connector in accordance with the following procedure:

In case that there is no notch on the lock lever (Type 1)

Place a flat tip screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.

Caution
1. **Do not use excessive force to raise the lock lever.**
2. **Do not insert the screwdriver into the gap between the lock lever and the lock spring.**

In case that there is a notch on the lock lever (Type 2)

Place a flat tip screwdriver against the lock spring (metal section) at the lock lever notch as shown in the illustration, and push the spring toward the unit.

Caution
Do not use excessive force to raise the lock lever.

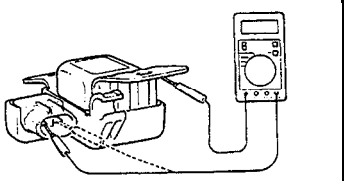
(4) Disconnect red 14-pin connector from the SRS diagnosis unit. (Refer to P.52B-11.)

(5) Connect the now disconnected red harness-side SDU connector (14-pin) to the connector (3) of the SRS Check Harness.

(6) Check according to the flow chart on the next page, using the digital multi-meter.

Is the resistance between the No. 16 terminal of SRS Check Harness connector (5) and the No. 17 terminal normal?
Standard value: 2,000 ± 40Ω
No → Is the resistance between the terminals of the left front impact sensor normal? (Refer to P.52B-37.)
Standard value: 2,000 ± 40Ω
No → Replace the left front impact sensor. (Refer to P.52B-68.)
Yes → Front wiring harness is grounded or open.
Yes → Replace the sensor cables. (Refer to P.52B-20.)

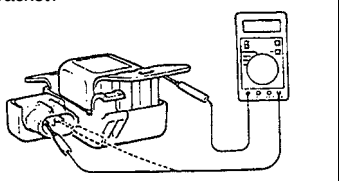
For terminals No. 16 and No. 17 of the SRS check harness connector (5), is there continuity between each of them and the body ground?
Yes → Ils there continuity between left front impact sensor terminal and sensor bracket?
Yes → Replace the left front impact sensor. (Refer to P.52B-68.)



No → Short-circuitof the harness between left front impact sensor and SRS diagnosis unit.
Replace harness.

Is the resistance between the No. 15 terminal of SRS Check Harness connector (5) and the No. 18 terminal normal?
Standard value: 2,000 ± 40Ω
No → Is the resistance between the terminals of the right front impact sensor normal? (Refer to P.52B-37.)
Standard value: 2,000 ± 40Ω
No → Replace the right front impact sensor. (Refer to P.52B-68.)
Yes → Front wiring harness is grounded or open.
Yes → Replace the sensor cables. (Refer to P.52B-20.)

For terminals No. 15 and No. 18 of the SRS check harness connector (5), is there continuity between each of them and the body ground?
Yes → Is there continuity between right front impact sensor terminal and sensor bracket?
Yes → Replace the right front impact sensor. (Refer to P.23B-68.)



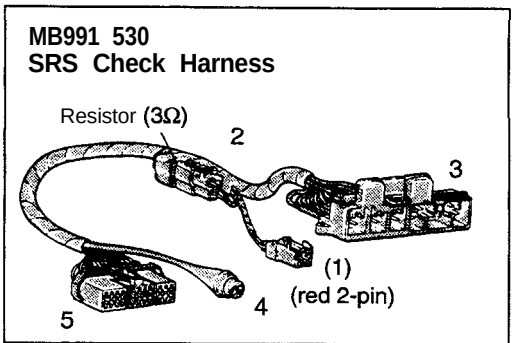
No → Short-circuit of the harness between right front impact sensor and SRS diagnosis unit.
Yes → Replace harness.

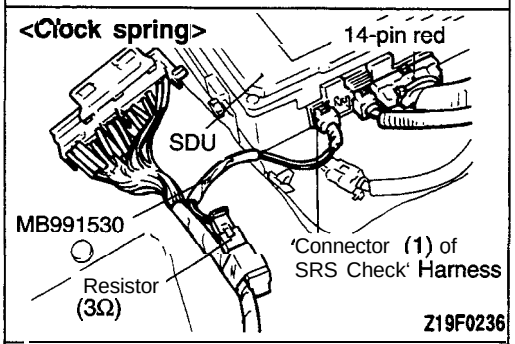
CONTINUED ON NEXT PAGE

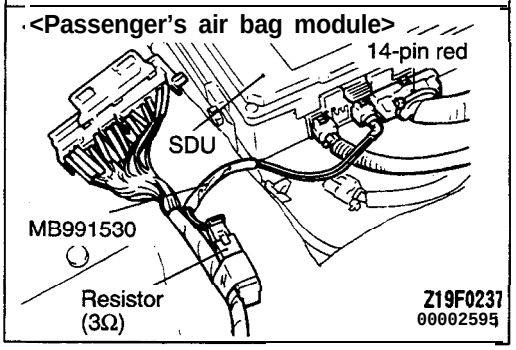
NOTE – IMPORTANT
(1) After repairing the SRS, reconnect the battery cable, erase the diagnostic trouble code memory from the scan tool and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)
(2) SDU = SRS Diagnosis Unit

TSB Revision

CONTINUED FROM PREVIOUS PAGE







(1) Connect the red 2-pin connector (1) of the SRS Check Harness to the SDU in place of the clock spring-SDU connector passenger's air bag module-SDU.

NOTE
A 3-ohm resistor that corresponds to the resistance of the air bag module (squib) and the wiring resistance is connected between the terminals of the connector (1) of the SRS Check Harness.

(2) Reconnect 14-pin red connectors, for the wiring leading to the front impact sensors, to the SDU and double lock them. (Refer to P.52B-11.)

NOTE
If double locking cannot be made, the connector is incorrectly or incompletely inserted; recheck to insert the connector correctly and securely.

Clock spring

CONTINUED ON 52B-45 (TEST 6)

Passenger's air bag module

CONTINUED ON 52B-51 (TEST 7)

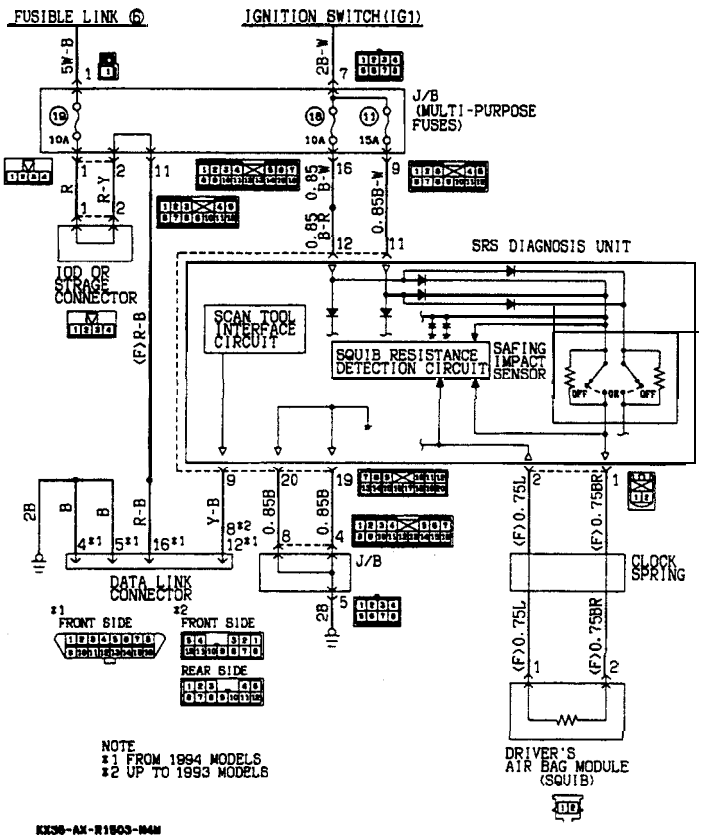
NOTE – IMPORTANT
(1) After repairing the SRS, reconnect the battery cable, erase the diagnostic trouble code memory from the scan tool and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)
(2) SDU = SRS Diagnosis Unit

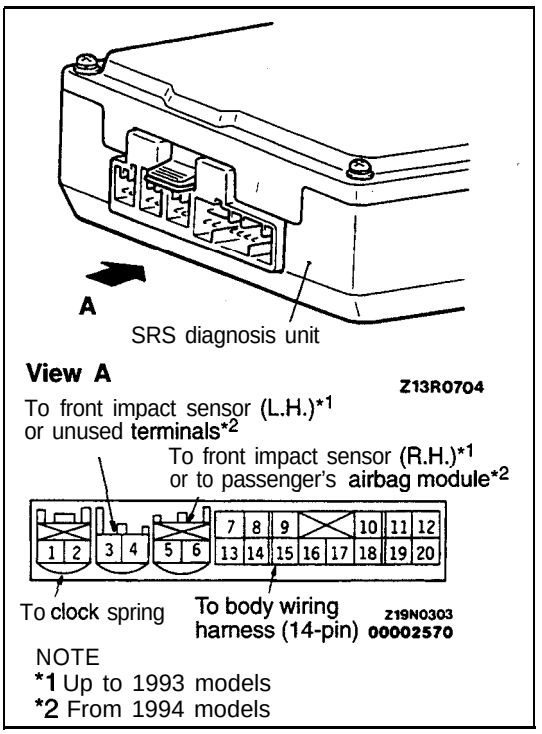
TSB Revision

TEST 6 WHEN DIAGNOSTIC TROUBLE CODE No. 21 OR No. 22 IS DISPLAYED

Caution

Never attempt to measure the circuit resistance of the driver's air bag module (squib) even if you are using the specified tester. If the circuit resistance is measured with a tester, accidental driver's air bag deployment will result in serious personal injury.





Have the other diagnostic trouble code test(s) been finished?

No → Perform the other diagnostic trouble code test(s) prior to this test.

Yes

NOTE

If combined front impact sensor and driver's air bag module (squib) failure modes simultaneously occur in two places, the preconditions for the respective detection circuits will go out of order. For this reason, both diagnostic trouble codes may not be stored but only one of them may be indicated.

Their relationships are shown in the following table.

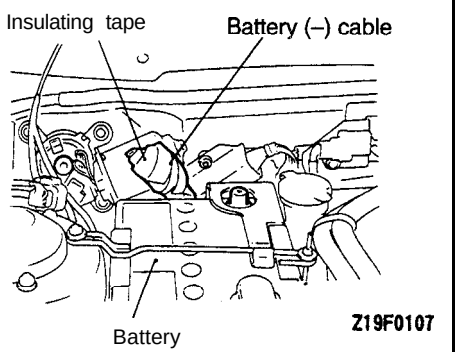
Perform TEST 5 if it does not become proper even through TEST 6 is executed.

Failure modes		Front impact sensor short-circuited	Front impact sensor open-circuited (one side)	Front impact sensor open-circuited (both side)
Driver's air bag module (Squib)	Short-circuited	11 or21	12 or 21	13 or 21
	Open-circuited	11 or22	12 or 22	13 or 22

The numbers in the boxes are diagnostic trouble codes numbers. (Refer to P.52B-25.)

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(1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

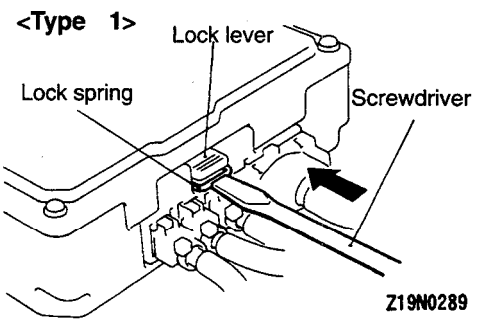
Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. The SRS system is designed to retain enough voltage to deploy the air bag even after the battery has been disconnected. Serious injury may result from unintended air bag deployment if work is done on the SRS system immediately after the battery cable is disconnected.

(2) Remove the rear console assembly.
(Refer to GROUP 52A – Floor Console.)

(3) Release the lock of SDU connector in accordance with the following procedure:

In case that there is no notch on the lock lever (Type 1)

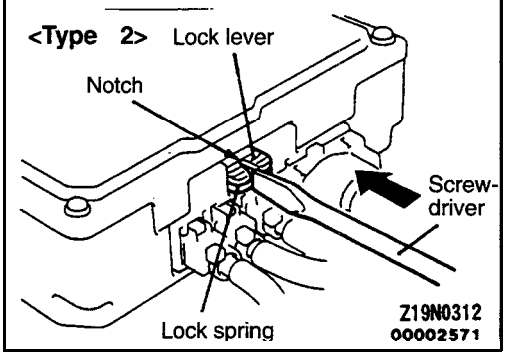
Place a flat tip screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.



Caution
1. **Do not use excessive force to raise the lock lever.**
2. **Do not insert the screwdriver into the gap between the lock lever and the lock spring.**

In case that there is a notch on the lock lever (Type 2)

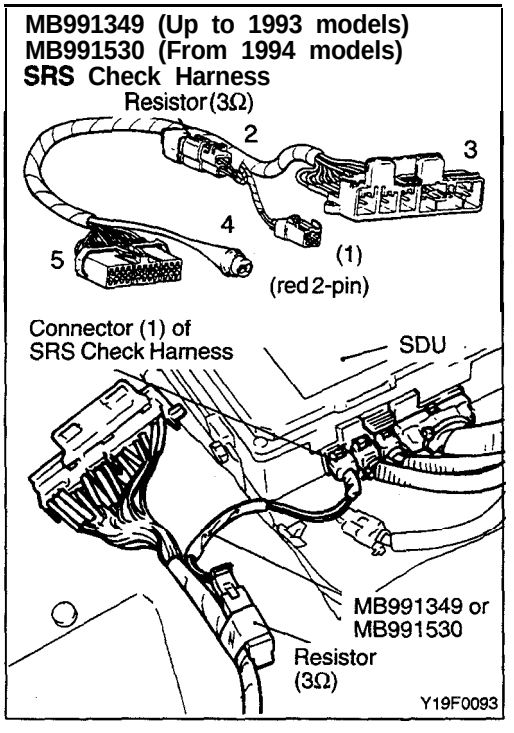
Place a flat tip screwdriver against the lock spring (metal section) at the lock lever notch as shown in the illustration, and push the spring toward the unit.



Caution
Do not use excessive force to raise the lock lever.

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(1) Disconnect the red 2-pin connector from the SDU while pressing down the lock of the connector.
(Refer to P.52B-11.)

(2) Connect the red connector (1) of the SRS Check Harness to the SDU instead of the now-disconnected harness-side connector of the SDU, which were connected to the driver's air bag module (squib) through the clock spring.

NOTE
A 3-ohm resistor that corresponds to the resistance of the driver's air bag module (squib) and the wiring resistance is connected between the terminals of the connector (1) of the SRS Check Harness.

(3) Make the double locking.

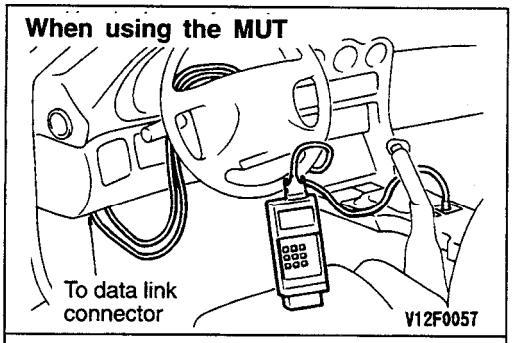
NOTE
If double locking cannot be made, the connector is incorrectly or incompletely inserted; recheck to insert the connector correctly and securely.

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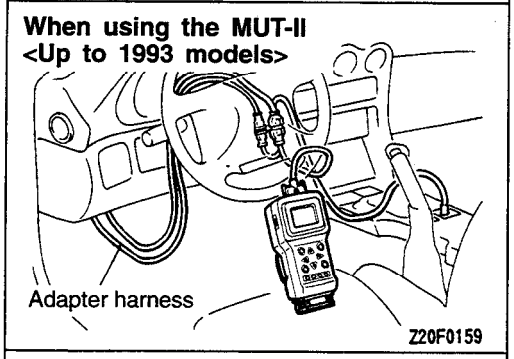
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CONTINUED FROM P.52B-36, 40

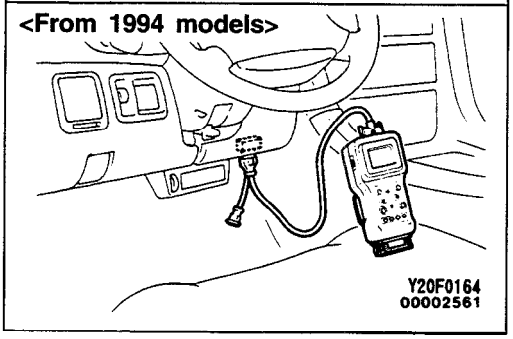
When using the MUT



When using the MUT-II <Up to 1993 models>



<From 1994 models>



(1) Reconnect negative terminal of battery.
(2) Use the scan tool (when connecting the scan tool (MUT-II to a vehicle up to 1993 model, use the adapter harness supplied together).

Caution
Before connecting or disconnecting the scan tool make sure that the ignition switch is placed at tht OFF position.

(3) Turn the ignition key to the "ON" position, erase the diagnostic trouble code memory (Refer to TEST 1.)
(4) Return the ignition key from the "ON" to the "LOCK position and then back to the "ON" position.

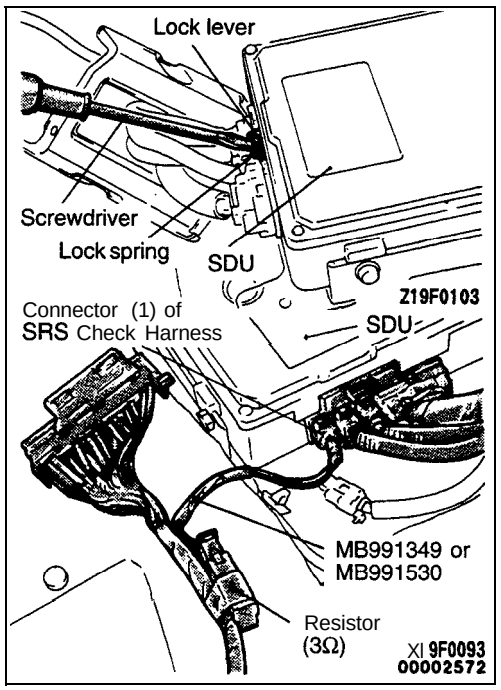
Is the SRS warning light operation normal? → No → Malfunction of the SDU. → Replace the SDU (Refer to P.52B-71.)

Yes

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(1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. The SRS system is designed to retain enough voltage to deploy the air bag even after the battery has been disconnected. Serious injury may result from unintended air bag deployment if work is done on the SRS system immediately after the battery cable is disconnected.

(2) Apply a flat tip screwdriver to the lock spring (metallic portion) of the SDU connector lock lever as illustrated and push it horizontally toward the back of the unit.

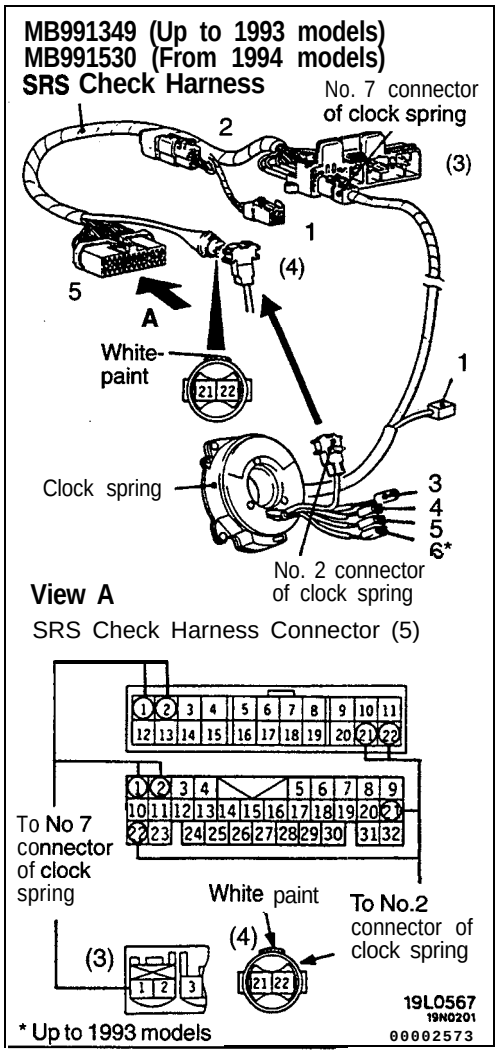
Caution
1. **Do not push up the lock lever (green) by force.**
2. **Never insert a screwdriver between the lock lever (green) and the lock spring (metallic portion).**

(3) Disconnect the red 2-pin connector of the SRS Check Harness from the SDU.

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1



(1) Remove the driver's air bag module. (Refer to P.52B-74.)
(2) Join the No. 2 and No. 7 connectors of the clock spring to SRS Check Harness connector (4) and SRS Check Harness connector (3) respectively.

NOTE
When joining SRS Check Harness connector (4), aligr its white paint with the hollow portion of the No. 2 connector of the clock spring.

(3) Is the resistance between terminal 1 and terminal 21 of SRS Check Harness connector (5), and between terminal 2 and terminal 22 of SRS Check Harness connector (5) normal?

Standard value: less than 0.4 Ω

Yes

No

Malfunction of the clock spring. → Replace the clock spring. (Refer to P.52B-74.)

Malfunction of the air bag module. → Replace the air bag module. (Refer to P.52B-74.)

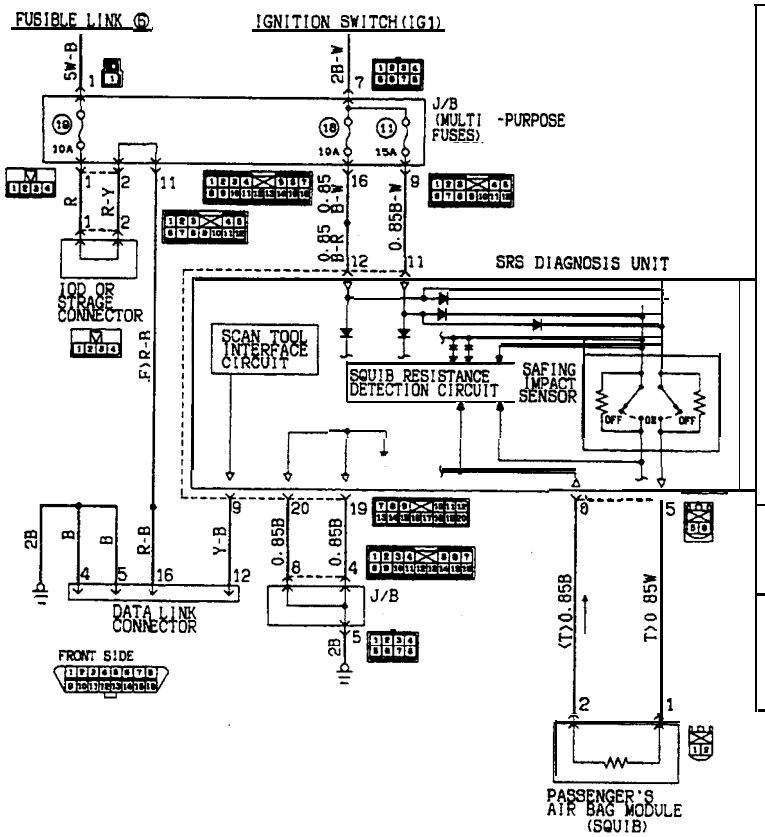
Caution
Never attempt to measure the circuit resistance of the air bag module (squib) even if you are using the specified tester. If the circuit resistance is measured with a tester, accidental air bag deployment will result in serious personal injury.

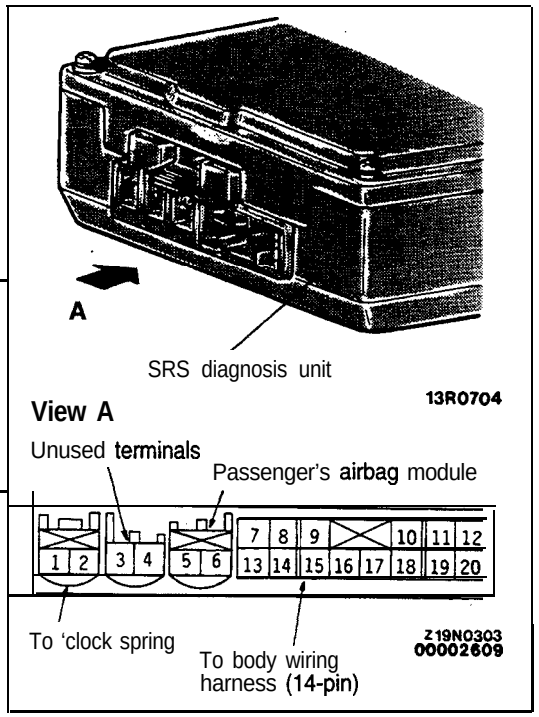
NOTE – IMPORTANT
(1) After repairing the SRS, reconnect the battery cable, erase the diagnostic trouble code memory from the scan tool and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)
(2) SDU = SRS Diagnosis Unit

TSB Revision

TEST 7 WHEN DIAGNOSTIC TROUBLE CODE No. 24 OR No. 25 IS DISPLAYED (From 1994 models)

Caution
Never attempt to measure the circuit resistance of the passenger's air bag module (squib) even if you are using the specified tester. If the circuit resistance is measured with a tester, accidental passenger's air bag deployment will result in serious personal injury.





KX36-AX-R1504-H4N

TSB Revision

Have the other diagnostic trouble code test(s) been finished?

No → Perform the other diagnostic trouble code test(s) prior to this test.

Yes

NOTE

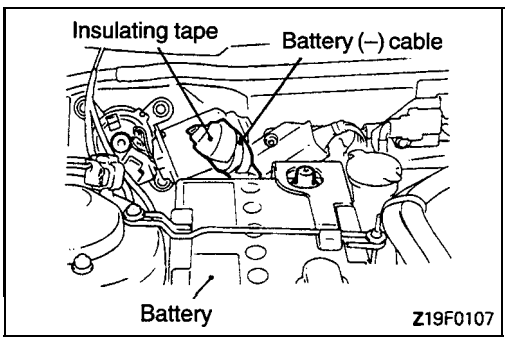
If combined front impact sensor and passenger's air bag module (squib) failure modes simultaneously occur in two places, the preconditions for the respective detection circuits will go out of order. For this reason, both diagnostic trouble codes may not be stored but only one of them may be indicated.
Their relationships are shown in the following table.
Perform TEST 5 if it does not become proper even through TEST 7 is executed.

Failure modes		Front impact sensor short-circuited	Front impact sensor open-circuited (one side)	Front impact sensor open-circuited (both side)
Passenger's air bag module (Squib)	Short-circuited	11 or 24	12 or 24	13 or 24
	Open-circuited	11 or 25	12 or 25	13 or 25

The numbers in the boxes are diagnostic trouble codes numbers. (Refer to P.52B-25.)

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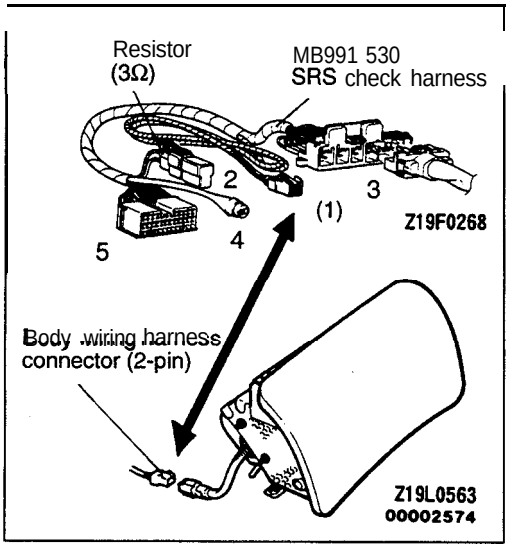
(1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. The SRS system is designed to retain enough voltage to deploy the air bag even after the battery has been disconnected. Serious injury may result from unintended air bag deployment if work is done on the SRS system immediately after the battery cable is disconnected.

(2) Disconnect the passenger's air bag module connector from the body wiring harness connector.

(3) Connect the SRS check harness connector (1) to the body wiring harness connector.

NOTE
A 3-ohm resistor that corresponds to the resistance of the passenger's air bag module (squib) and the wiring resistance is connected between the terminals of the connector (1) of the SRS Check Harness.

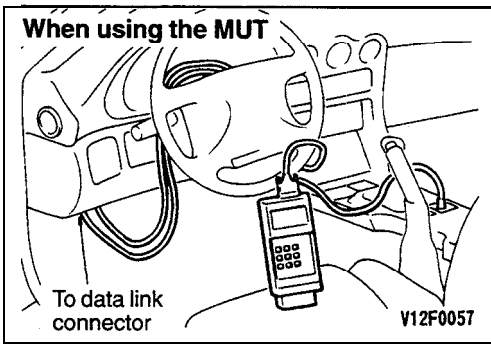


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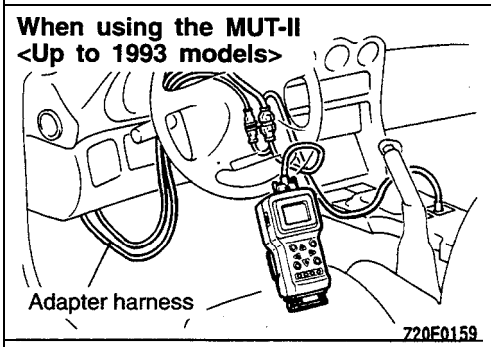
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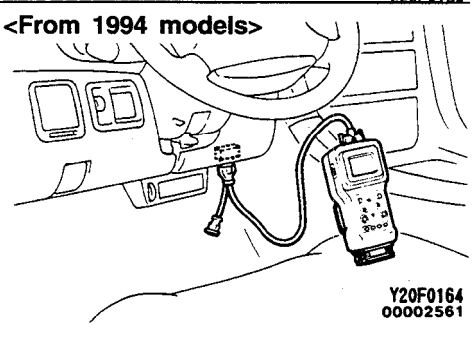
When using the MUT



When using the MUT-II <Up to 1993 models>



<From 1994 models>



(1) Reconnect negative terminal of battery.
(2) Use the scan tool (when connecting the scan tool (MUT-II) to a vehicle up to 1993 model, use the adapter harness supplied together).

Caution
Before connecting or disconnecting the scan tool make sure that the ignition switch is placed at the OFF position.

(3) Turn the ignition key to the "ON" position, erase the diagnostic trouble code memory. (Refer to TEST 1.)
(4) Return the ignition key from the "ON" to the "LOCK position and then back to the "ON" position.

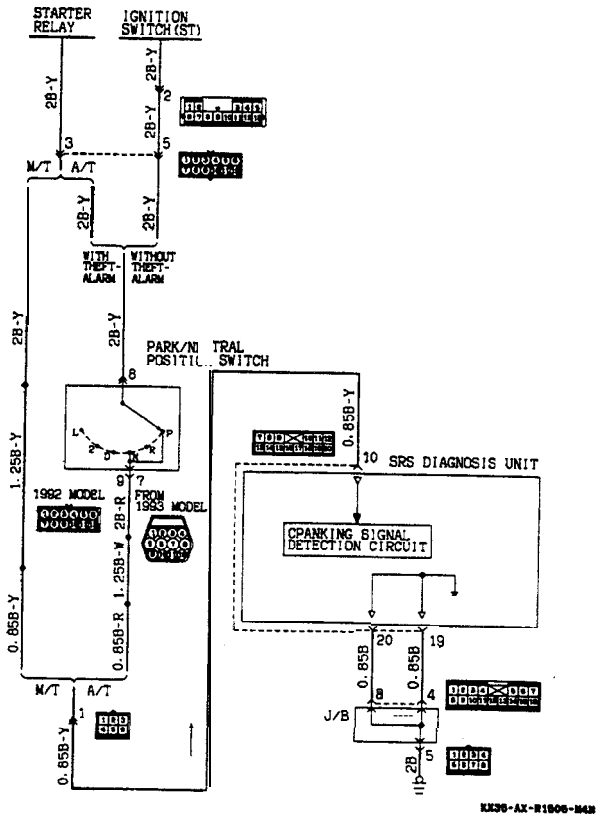
Is the SRS warning light operation normal?
- No → Defective SDU or harness between SDU and passenger's air bag module → • Repair or replace harness (Refer to P.52B-20.) • Replace SDU
- Yes → Defective passenger's air bag module → Replace passenger's air bag module (Refer to P.52B-75.)

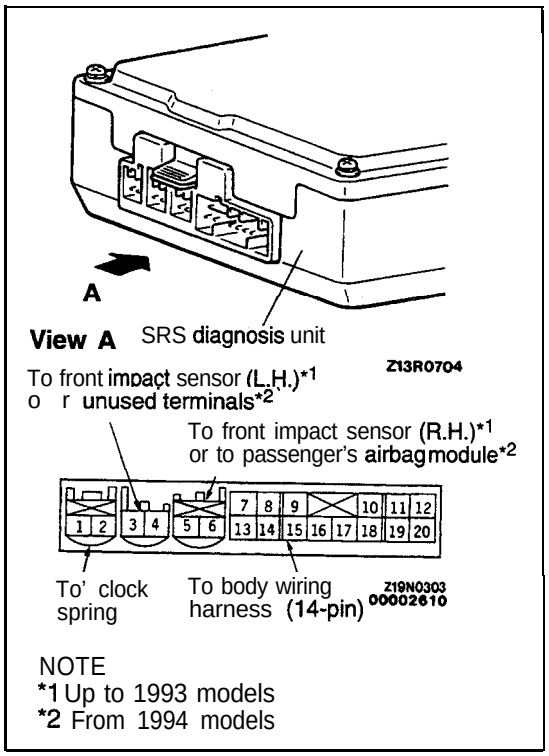
Caution
Never attempt to measure the circuit resistance of the air bag module (squib) even if you are using the specified tester. If the circuit resistance is measured with a tester, accidental air bag deployment will result in serious personal injury.

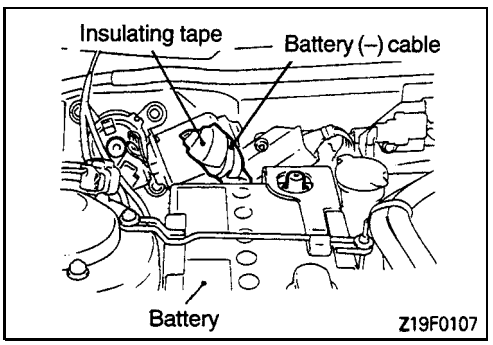
NOTE – IMPORTANT
(1) After repairing the SRS, reconnect the battery cable, erase the diagnostic trouble code memory from the scan tool and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)
(2) SDU = SRS Diagnosis Unit

TSB Revision

TEST 8 WHEN DIAGNOSTIC TROUBLE CODE No. 33 IS DISPLAYED







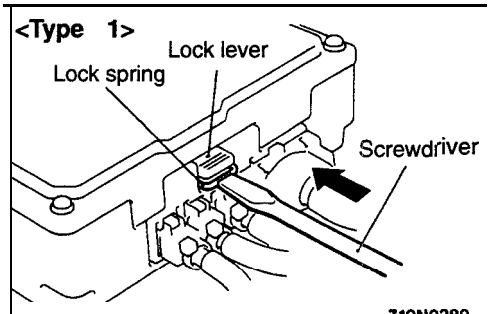
(1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. The SRS system is designed to retain enough voltage to deploy the air bag even after the battery has been disconnected. Serious injury may result from unintended air bag deployment if work is done on the SRS system immediately after the battery cable is disconnected.

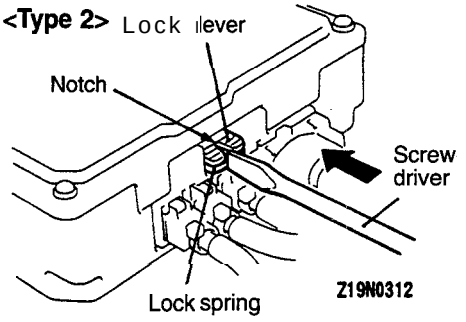
(2) Remove the rear console assembly. (Refer to GROUP 52A – Floor Console.)

TSB Revision

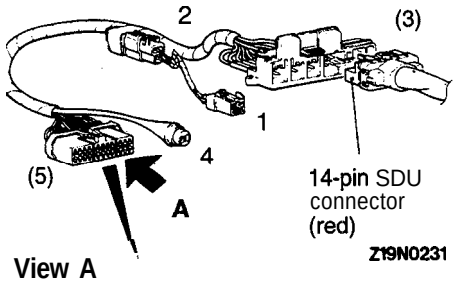
<Type 1>



<Type 2>

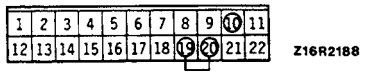


MB991349 (Up to 1993 models)
MB991530 (From 1994 models)
SRS Check Harness

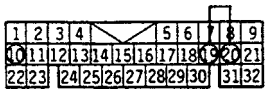


View A

SRS Check Harness connector (5)



Ground



(3) Release the lock of SDU connector in accordance with the following procedure:

In case that there is no notch on the lock lever (Type 1)

Place a flat tip screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.

Caution
1. **Do not use excessive force to raise the lock lever.**
2. **Do not insert the screwdriver into the gap between the lock lever and the lock spring.**

In case that there is a notch on the lock lever (Type 2)

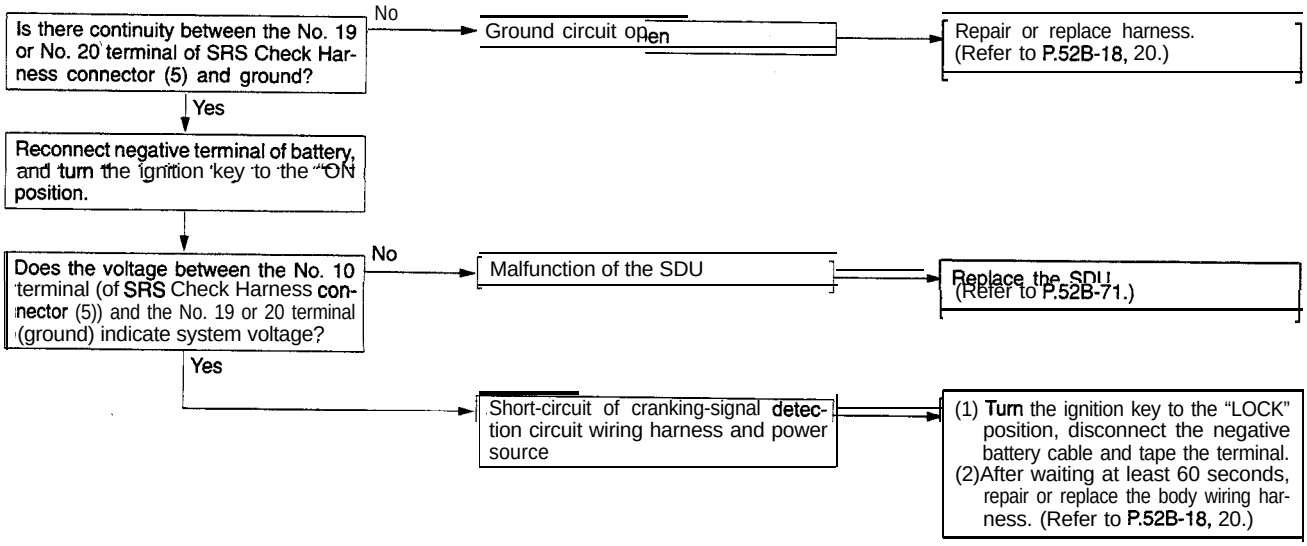
Place a flat tip screwdriver against the lock spring (metal section) at the lock lever notch as shown in the illustration, and push the spring toward the unit.

Caution
Do not use excessive force to raise the lock lever.

(4) Disconnect the red **14-pin** connector from the SDU.

(5) Connect the now disconnected red harness-side SDU connector **(14-pin)** to the connector (3) of the SRS Check Harness. .

(6) Check according to the flow chart on the next page, using the specified digital multi-meter.



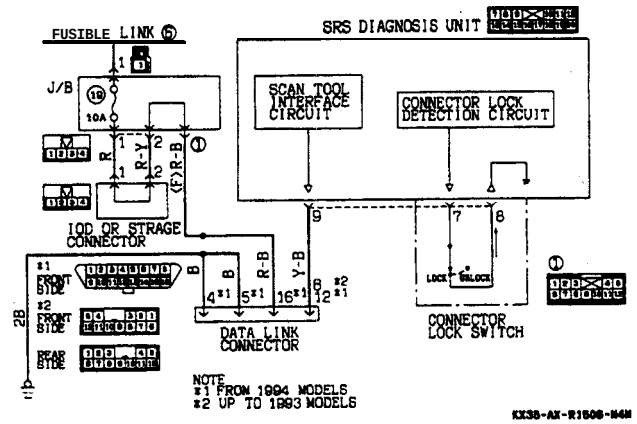
NOTE – IMPORTANT

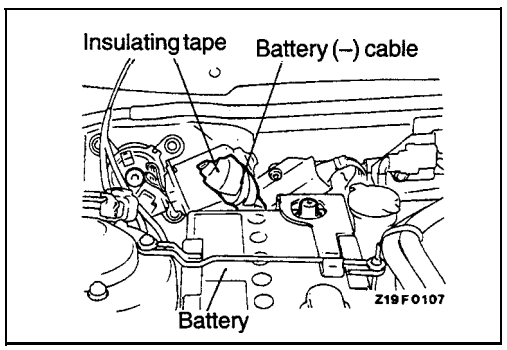
(1) If more than 45 seconds of cranking is required to start up the engine, the diagnostic trouble code will be stored in memory, but if there is no problem, the diagnostic trouble code will be cleared and the SRS will return to normal.

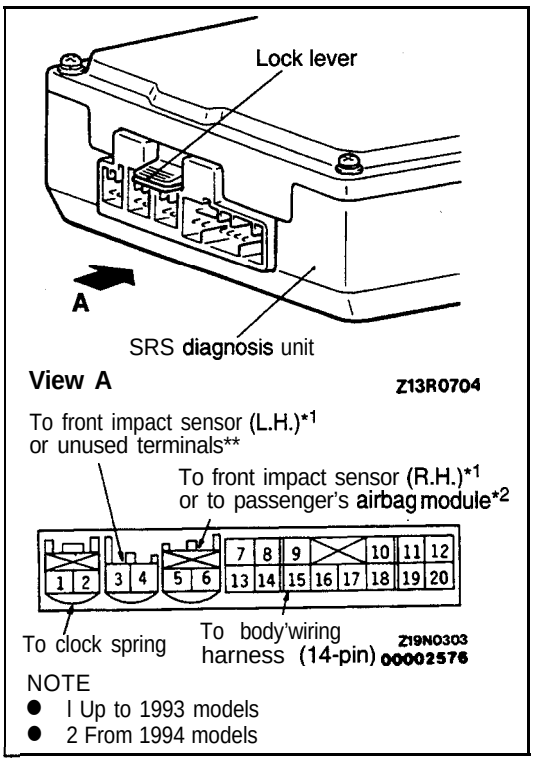
(2) After repairing the SRS, reconnect the battery cable, erase the diagnostic trouble code memory from the scan tool (1992 model) and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)

(3) SDU = SRS Diagnosis Unit

TEST 9 WHEN DIAGNOSTIC TROUBLE CODE No. 34 IS DISPLAYED



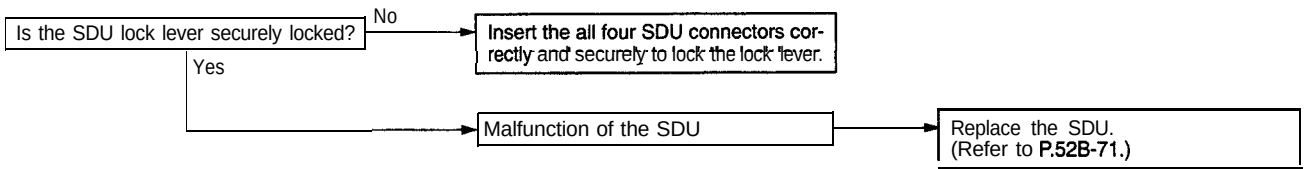




(1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. The SRS system is designed to retain enough voltage to deploy the air bag even after the battery has been disconnected. Serious injury may result from unintended air bag deployment if work is done on the SRS system immediately after the battery cable is disconnected.

(2) Remove the floor console. (Refer to GROUP 52A – Floor Console.)



NOTE – IMPORTANT

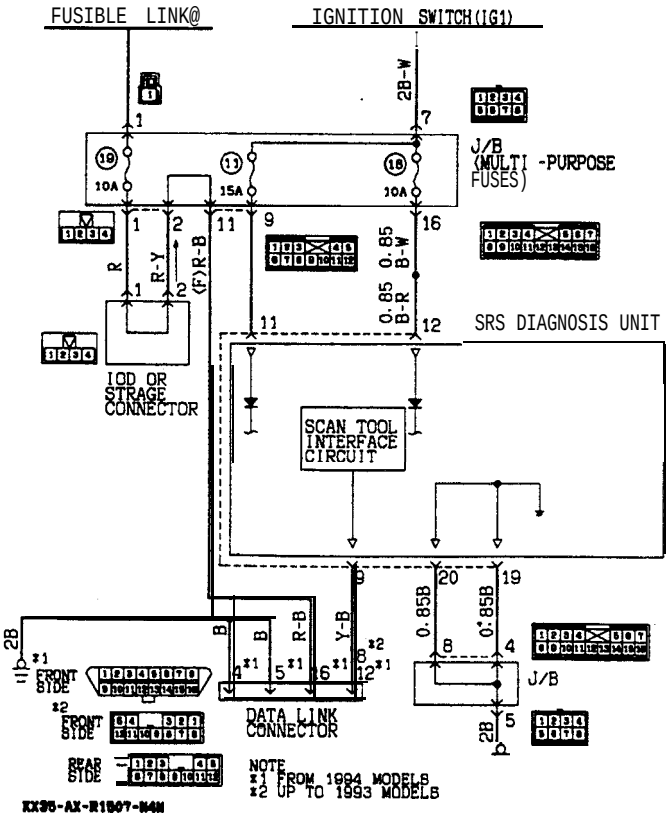
(1) After repairing the SRS, reconnect the battery cable, erase the diagnostic trouble code memory from the scan tool (1992 model) and check the SRS warning light operation to verify the system functions properly. (Refer to Test 1.)

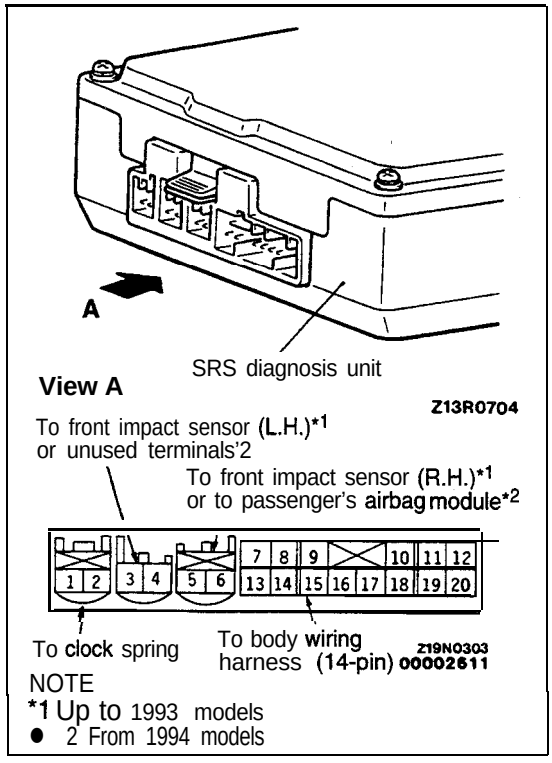
(2) SDU = SRS Diagnosis Unit

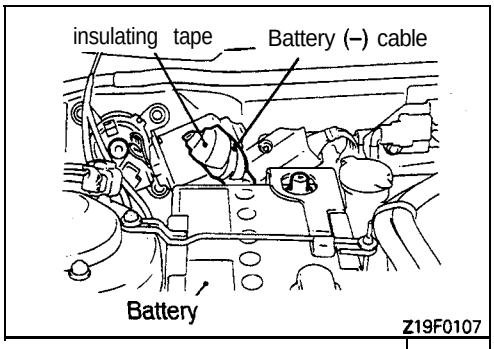
TSB Revision

TEST 10 WHEN DIAGNOSTIC TROUBLE CODE No. 41 IS DISPLAYED

TEST 11 WHEN DIAGNOSTIC TROUBLE CODE No. 42 IS DISPLAYED







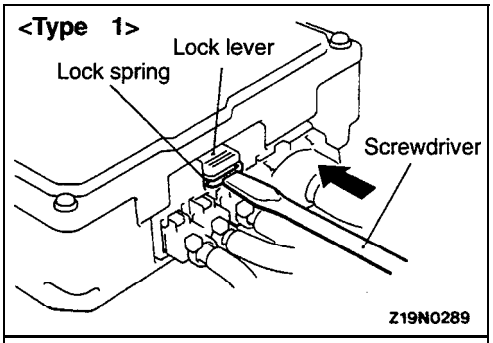
(1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. The SRS system is designed to retain enough voltage to deploy the air bag even after the battery has been disconnected. Serious injury may result from unintended air bag deployment if work is done on the SRS system immediately after the battery cable is disconnected.

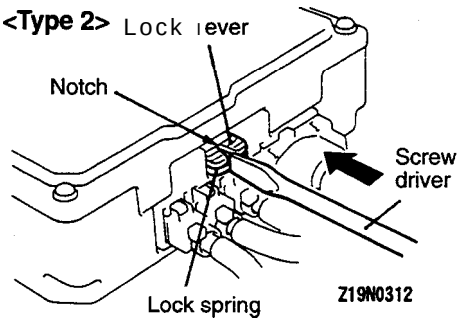
(2) Remove the rear console assembly. (Refer to GROUP 52A – Floor Console.)

TSB Revision

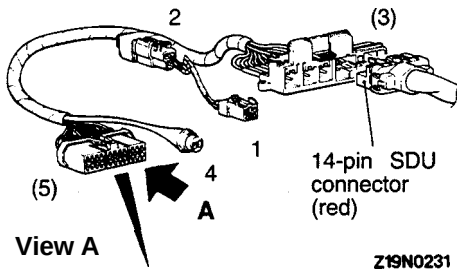
<Type 1>



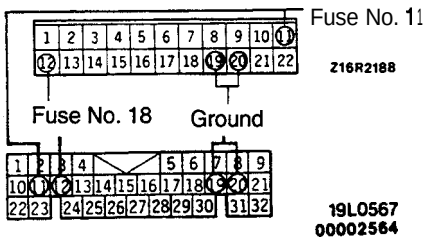
<Type 2> Lock lever



MB991349 (Up to 1993 models)
MB991 530 (From 1994 models)
SRS Check Harness



SRS Check Harness Connector (5)



(3) Release the lock of SDU connector in accordance with the following procedure:

In case that there is no notch on the lock lever (Type 1)

Place a flat tip screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.

Caution
1. **Do not use excessive force to raise the lock lever.**
2. **Do not insert the screwdriver into the gap between the lock lever and the lock spring.**

In case that there is a notch on the lock lever (Type 2)

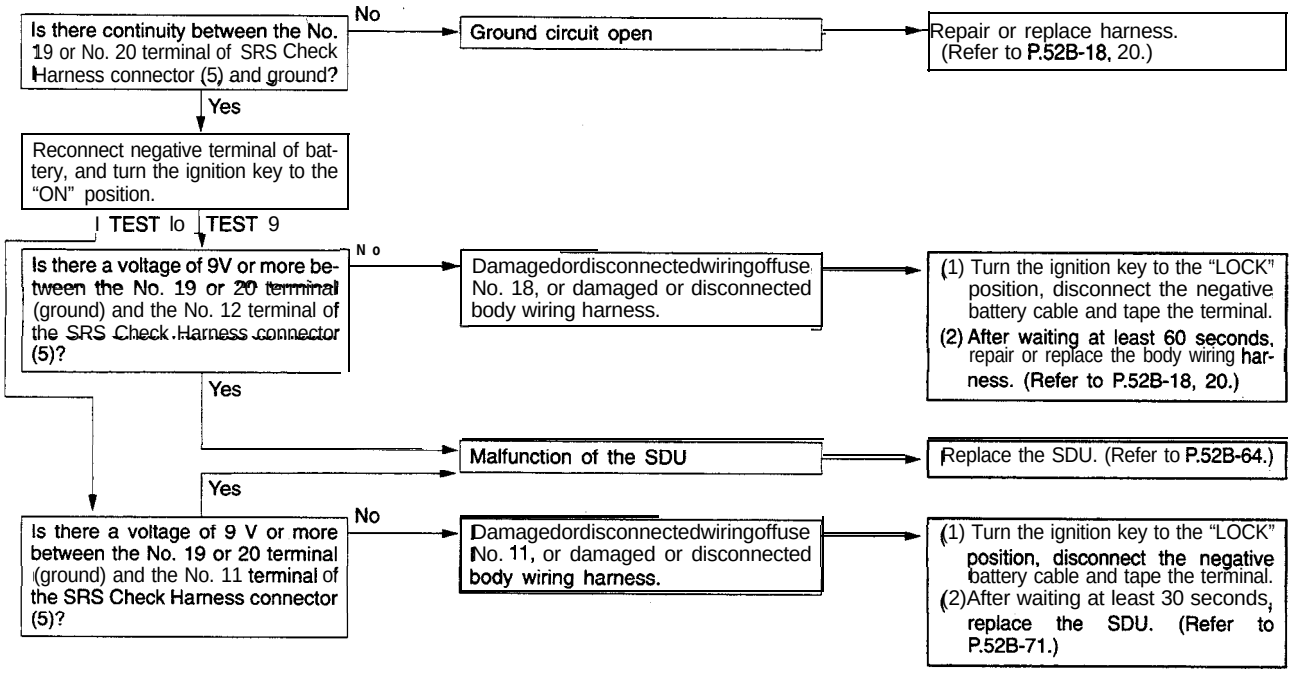
Place a flat tip screwdriver against the lock spring (metal section) at the lock lever notch as shown in the illustration, and push the spring toward the unit.

Caution
Do not use excessive force to raise the lock lever.

(4) Disconnect the red 14-pin connector from the SDU.

(5) Connect the now disconnected red harness-side SDU connector (14-pin) to the connector (3) of the SRS Check Harness.

(6) Check according to the flow chart on the next page, using the specified digital multi-meter.



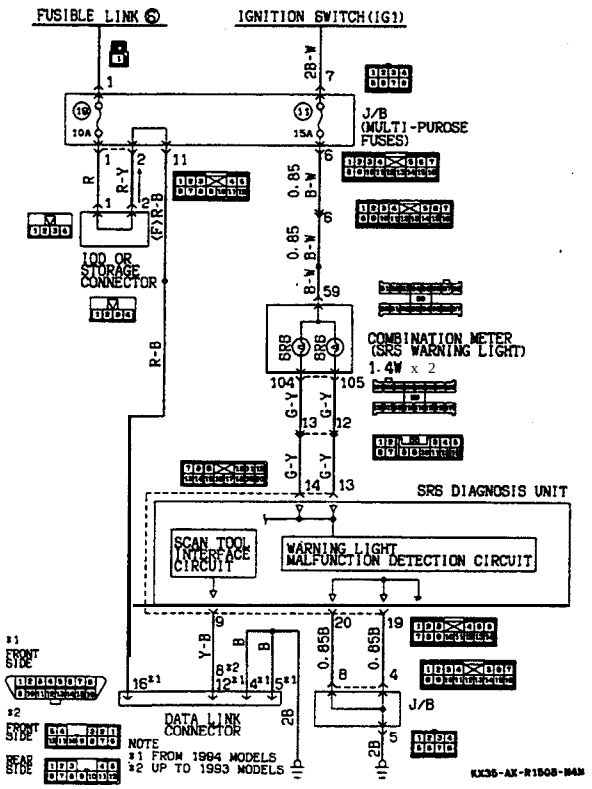
NOTE – IMPORTANT

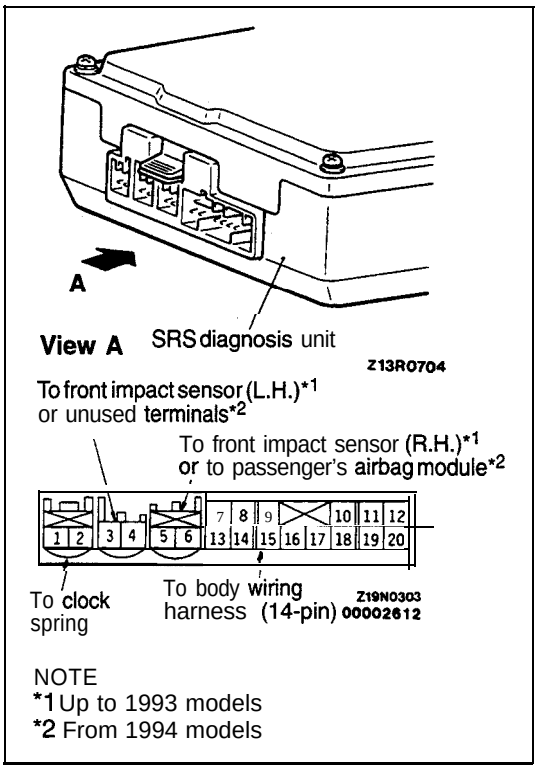
(1) After repairing the SRS, reconnect the battery cable, erase the diagnostic trouble code memory from the scan tool (1992 model) and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)

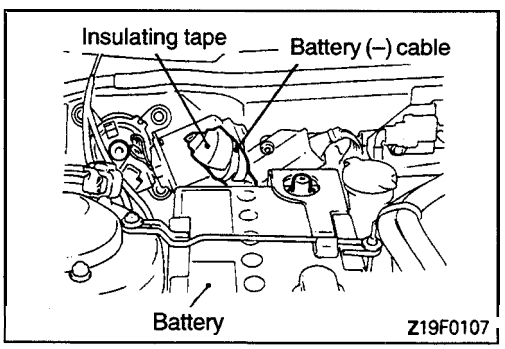
(2) SDU = SRS Diagnosis Unit

TSB Revision

TEST 12 WHEN DIAGNOSTIC TROUBLE CODE No. 43 IS DISPLAYED





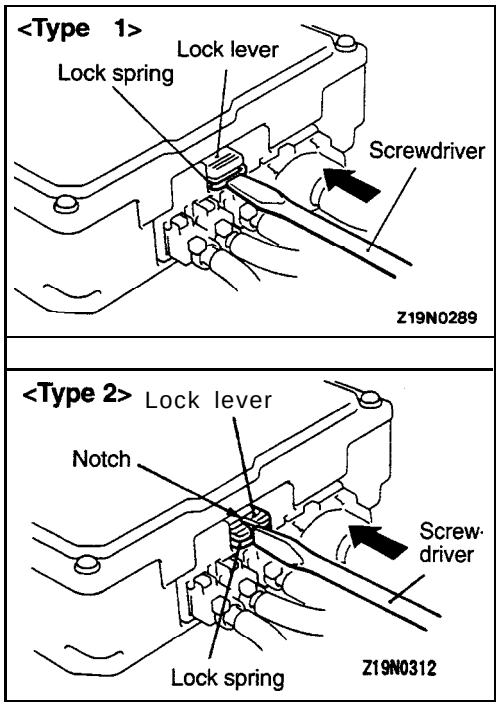


(1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. The SRS system is designed to retain enough voltage to deploy the air bag even after the battery has been disconnected. Serious injury may result from unintended air bag deployment if work is done on the SRS system immediately after the battery cable is disconnected.

(2) Remove the rear console assembly. (Refer to GROUP 52A – Floor Console.)

TSB Revision



(3) Release the lock of SDU connector in accordance with the following procedure:

In case that there is no notch on the lock lever (Type 1)

Place a flat tip screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.

Caution
1. **Do not use excessive force to raise the lock lever.**
2. **Do not insert the screwdriver into the gap between the lock lever and the lock spring.**

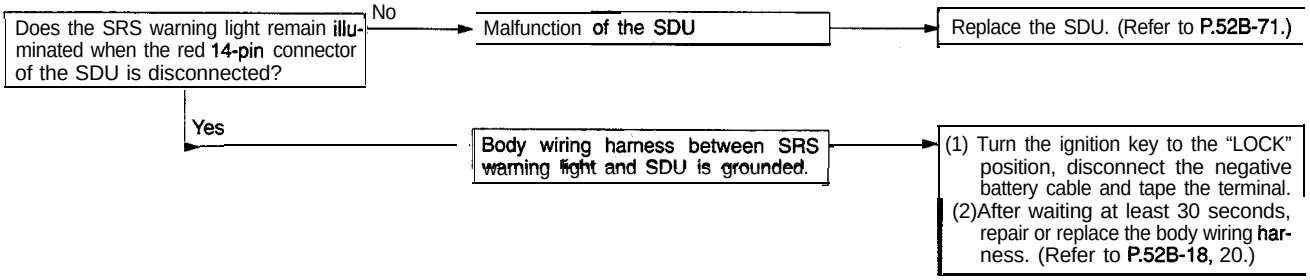
In case that there is a notch on the lock lever (Type 2)

Place a flat tip screwdriver against the lock spring (metal section) at the lock lever notch as shown in the illustration, and push the spring toward the unit.

Caution
Do not use excessive force to raise the lock lever.

(4) Disconnect the red 14-pin connector from the SDU.

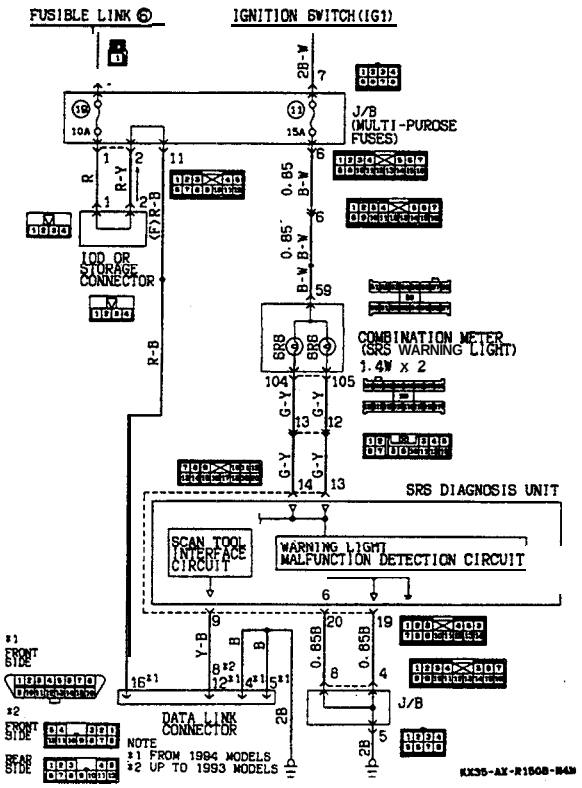
(5) Reconnect negative terminal of battery, and turn the ignition key to the "ON" position.
(6) Check according to the flow chart below.

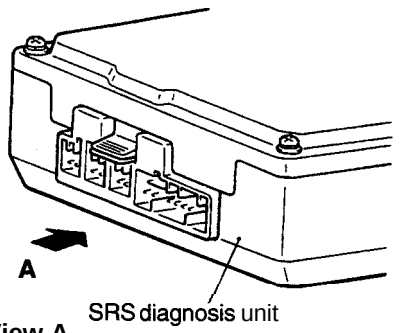


NOTE – IMPORTANT
(1) After repairing the SRS, reconnect the battery cable, erase the diagnostic trouble code memory from the scan tool (1992 model) and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)
(2) SDU = SRS Diagnosis Unit

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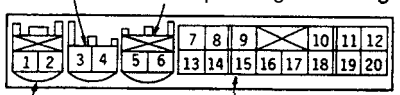
TEST 13 **WHEN DIAGNOSTIC TROUBLE CODE No. 43 IS DISPLAYED (SRS warning light does not illuminate)**





To front impact sensor (L.H.)*1 or unused terminals*2

To front impact sensor (R.H.)*1 or to passenger's airbag module*2

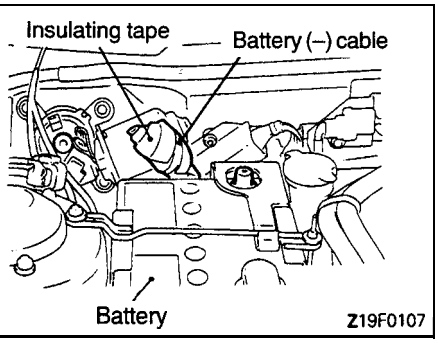


To clock spring

To body wiring harness (14-pin)

Z19N0303 00002612

NOTE
*1 Up to 1993 models
*2 From 1994 models



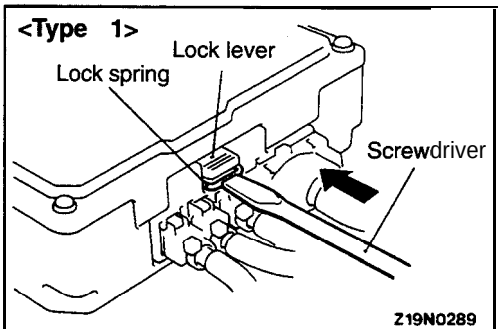
(1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. The SRS system is designed to retain enough voltage to deploy the air bag even after the battery has been disconnected. Serious injury may result from unintended air bag deployment if work is done on the SRS system immediately after the battery cable is disconnected.

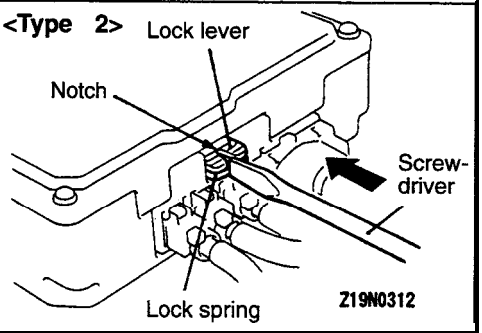
(2) Remove the rear console assembly. (Refer to GROUP 52A – Floor Console.)

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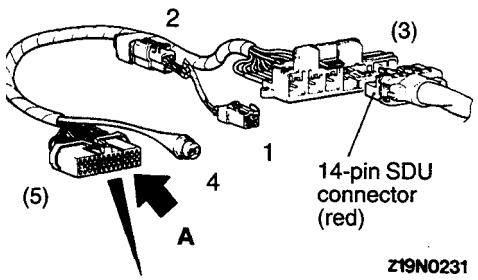
<Type 1>



<Type 2>

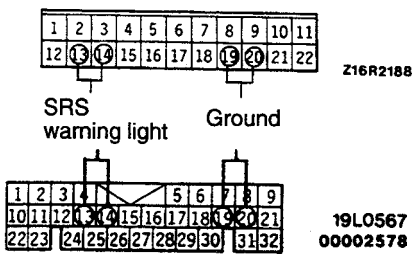


MB991349 (Up to 1993 models)
MB991530 (From 1994 models)
SRS Check Harness



View A

SRS Check Harness connector (5)



(3) Release the lock of SDU connector in accordance with the following procedure:

In case that there is no notch on the lock lever (Type 1)

Place a flat tip screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.

Caution
1. Do not use excessive force to raise the lock lever.
2. Do not insert the screwdriver into the gap between the lock lever and the lock spring.

In case that there is a notch on the lock lever (Type 2)

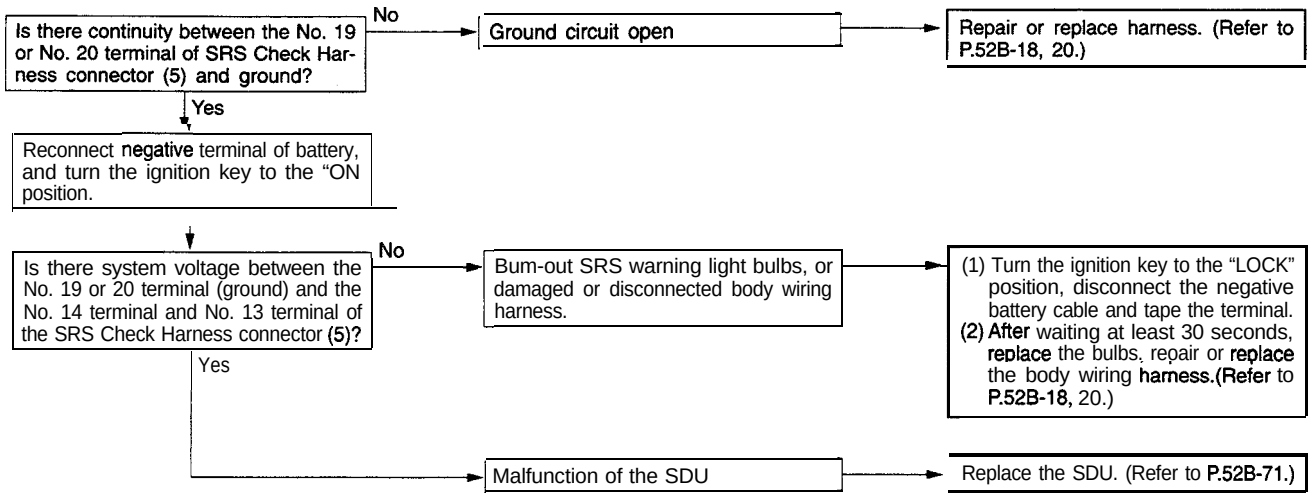
Place a flat tip screwdriver against the lock spring (metal section) at the lock lever notch as shown in the illustration, and push the spring toward the unit.

Caution
Do not use excessive force to raise the lock lever.

(4) Disconnect the red 14-pin connector from the SDU.

(5) Connect the now disconnected red harness-side SDU connector (14-pin) to the connector (3) of the SRS Check Harness.

(6) Check according to the flow chart on the next page, using the specified digital multi-meter.



NOTE – IMPORTANT

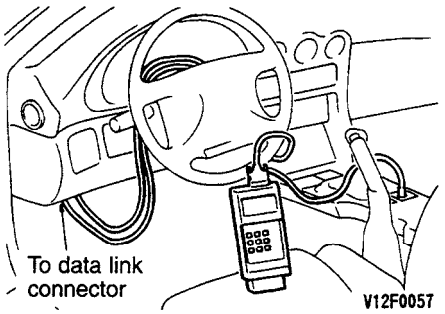
(1) After repairing the SRS, reconnect the battery cable, and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)

(2) SDU = SRS Diagnosis Unit

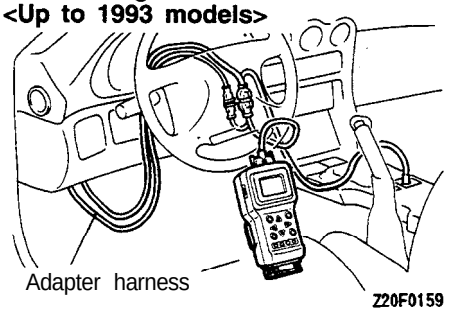
MAINTENANCE

The SRS must be inspected by an authorized dealer 10 years after the car manufacture date. (Refer to GROUP 00 – Maintenance Service.)

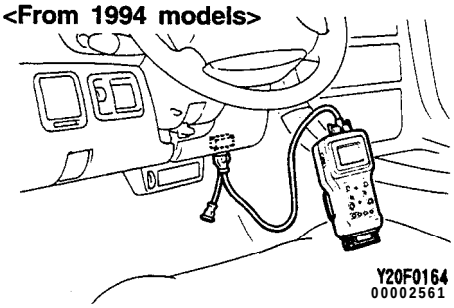
When using the MUT



When using the MUT-II
<Up to 1993 models>



<From 1994 models>



POST-COLLISION DIAGNOSIS

To inspect and service the SRS after a collision (whether or not the air bags has deployed), perform the following steps.

1. SRS Diagnosis Unit Memory Check

(1) Connect the scan tool to the data link connector. When connecting the scan tool to a vehicle up to 1993 model, use the adapter harness supplied together.

Caution
Make certain that the ignition switch is at OFF when the scan tool is connected or disconnected.

(2) Read (and write down) all displayed diagnostic trouble codes. (Refer to P.52B-25.)

NOTE
If the battery power supply has been disconnected or disrupted by the collision, the scan tool cannot communicate with the SRS diagnosis unit. Inspect and, if necessary, repair the body wiring harness before proceeding further.

(3) Read the service data (fault duration and how many times memories are erased) using the scan tool.

NOTE
- Maximum stored period: 9999 minutes (approximately 7 days)
- Maximum number of times to be stored: 250

(4) Erase the diagnostic trouble codes and after waiting 45 seconds or more read (and write down) all displayed diagnostic trouble codes. (Refer to P.52B-25.)

2. Repair Procedure

2-1. When air bag deploys from collision

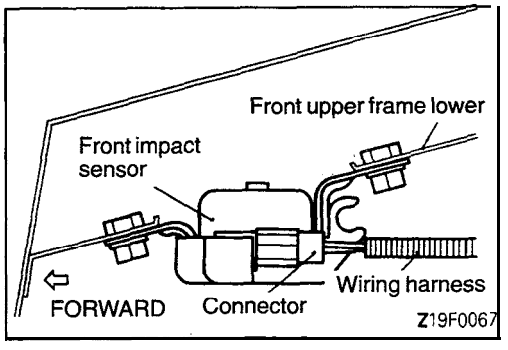
(1) Replace the following parts with new ones.
- Front impact sensors (Refer to P.52B-68.)
- SRS diagnosis unit (Refer to P.52B-71.)
- Air bag module (Refer to P.52B-74.)

(2) Check the following parts and replace if there are any malfunctions.
- Clock spring (Refer to P.52B-74.)
- Steering wheel, steering column and intermediate joint
  1) Check wiring harness (built into steering wheel) and connectors for damage, and terminals for deformities.

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2) Install air bag module to check fit or alignment with steering wheel.
3) Check steering wheel for noise, binding or difficult operation, or excessive free play.

(3) Check harnesses for binding, connectors for damage, poor connections, and terminals for deformities. (Refer to P.52B-18.)

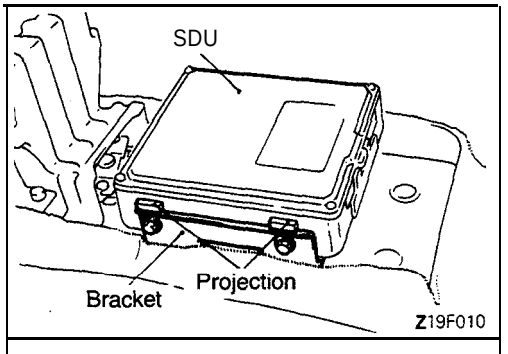


2-2. When air bag does not deploy in low-speed collision

Check the SRS components.
If the SRS components are showing any visible damage such as dents, cracks, or deformation, replace them with new ones. Concerning parts removed for inspection, replacement with new parts and cautionary points for working, refer to appropriate COMPONENT SERVICE, P.52B-68.

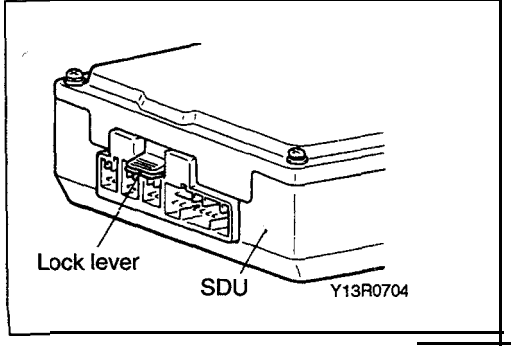
Front Impact Sensors

(1) Check front upper frame lower for deformities or rust.
(2) Check front impact sensor for dents, cracks, deformities or rust.
(3) Check sensor harnesses for binds, connectors for damage, and terminals for deformities.

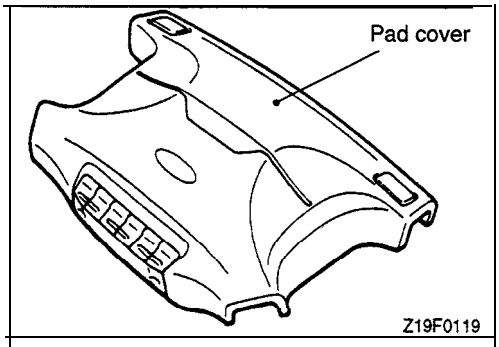


SRS Diagnosis Unit (SDU)

(1) Check SDU case and brackets for dents, cracks or deformities.



(2) Check connectors and lock lever for damage, and terminals for deformities.

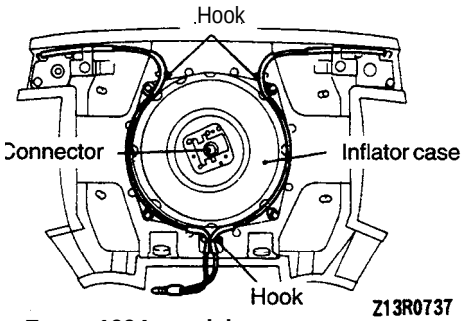


Air Bag Module

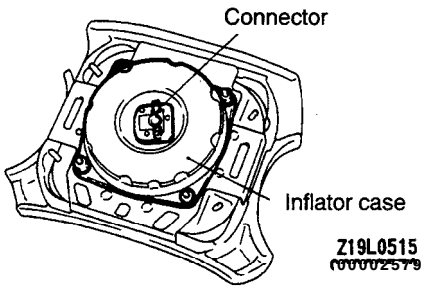
<Driver's side>

(1) Check pad cover for dents, cracks or deformities.

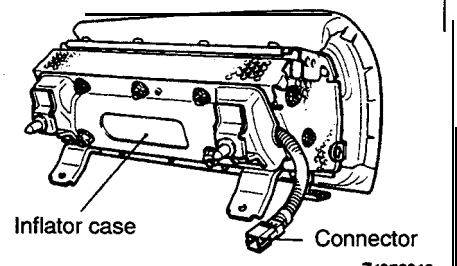
<Up to 1993 models>



<From 1994 models>

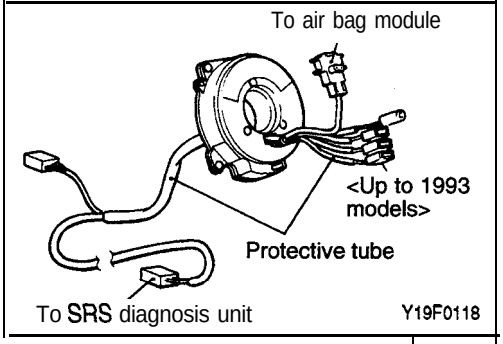


(2) Check for hooks and connectors damage, deformed terminal, and binding harness.
(3) Check air bag inflator case for dents, cracks or deformities.
(4) Install air bag module to steering wheel to check fit or alignment with the wheel.



<Passenger's side>

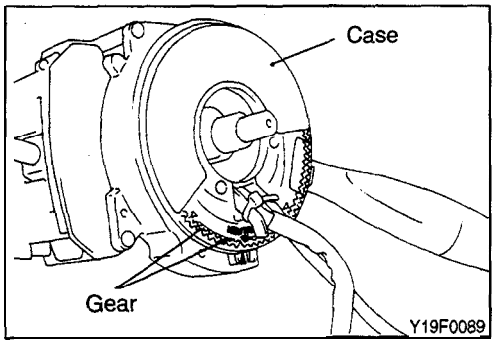
(1) Check module cover for dents, cracks or deformities.
(2) Check connectors for damage, terminals deformities and for binds.
(3) Check air bag inflator case for dents, cracks or deformities.



Clock Spring

(1) Check clock spring connectors and protective tube for damage, and terminals for deformities.

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(2) Visually check the case and the gears for damage.

Steering Wheel, Steering Column and Intermediate Joint

(1) Check wiring harness (built into steering wheel) and connectors for damage, and terminals for deformities.
(2) Install air bag module to check fit or alignment with steering wheel.
(3) Check steering wheel for noise, binding or difficult operation, or excessive free play.

Harness Connector (Body and Front wiring harness)

Check for binding harnesses, connectors for damage, poor connections, and deformed terminals.
(Refer to P.52B-18.)

COMPONENT SERVICE

If the SRS components are to be removed or replaced as a result of maintenance, troubleshooting, etc., follow each procedure (P.52B-68–P.52B-81).

Caution

1. SRS components should not be subjected to heat over 93°C (200°F), so remove the front impact sensors, SRS diagnosis unit, air bag modules and clock spring before drying or baking the 'vehicle after painting. Recheck SRS system operability after re-installing them.
2. If the SRS components are removed for the purpose of inspection, sheet metal repair, painting, etc., they should be stored in a clean, dry place until they are reinstalled.

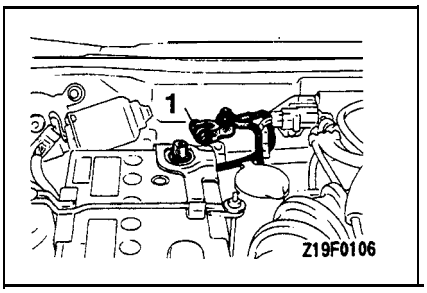
FRONT IMPACT SENSORS

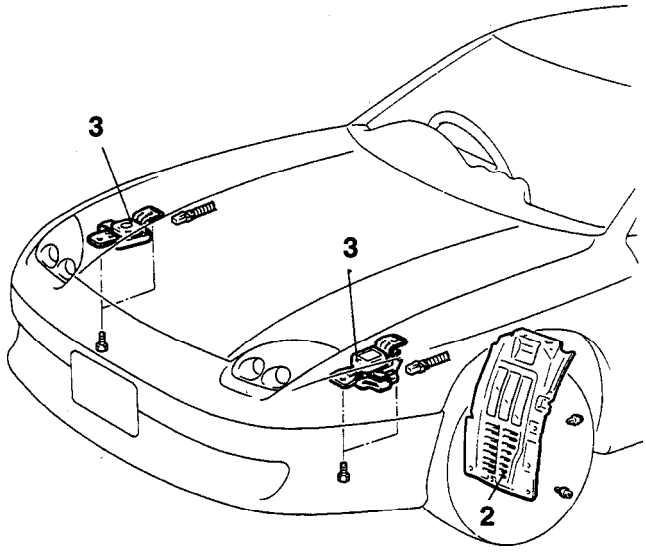
Caution

1. **Never repair or disassemble a front impact sensor. If faulty, replace it.**
2. **Handle the front impact sensors very carefully, taking care not to drop them or otherwise subject them to impact. If a sensor is seen to be dented, cracked, deformed or rusted, replace it with a new one.**
3. **Replace sensors with new ones after the air bag has deployed.**

REMOVAL AND INSTALLATION

Pre-removal Operation
- Turn the ignition key to the "LOCK" position



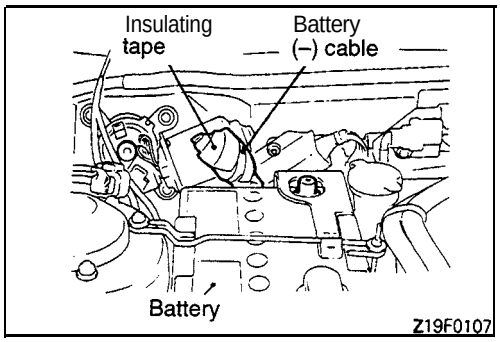


Z19F0242
00002580

Removal steps

◀A▶ ▶C◀ • Post-installation inspection
1. Negative (–) battery cable connection
2. Front splash shield extension
▶B◀ 3. Front impact sensor
▶A◀ • Pre-installation inspection

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REMOVAL SERVICE POINT

◀A▶ NEGATIVE (–) BATTERY CABLE DISCONNECTION

Turn the ignition key to the "LOCK" position, disconnect the negative battery cable from the battery and tape the terminal.

Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. The SRS system is designed to retain enough voltage to deploy the air bag even after the battery has been disconnected. Serious injury may result from unintended air bag deployment if work is done on the SRS system immediately after the battery cable is disconnected.

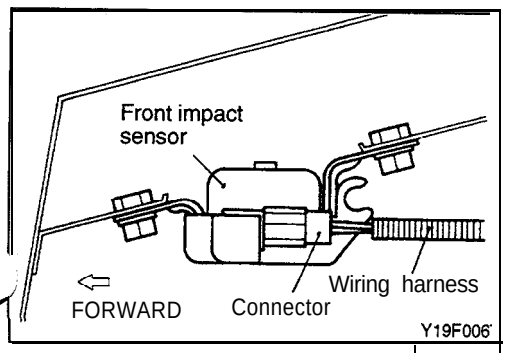
INSTALLATION SERVICE POINTS

▶A◀ PRE-INSTALLATION INSPECTION

(1) Before any front impact sensor is installed in the vehicle, it must be visually inspected. If a dent, crack or other deformation, or rust, is detected, discard the sensor and replace it with a new one that passes the visual inspection.
(2) Before any front impact sensor is installed in the vehicle, the resistance between its terminals must be confirmed to be within the standard value.

Standard value: 2,000 ± 40 Ω

Use the digital multi meter. If the resistance is not within that standard value range, discard it and replace it with a new one that has the standard value.

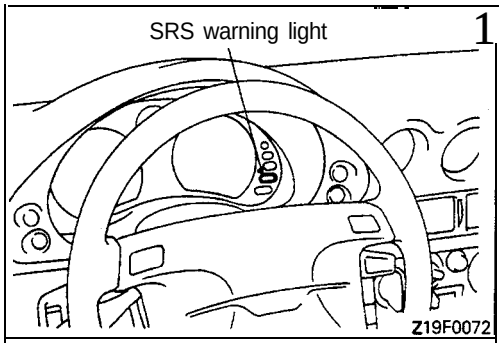


▶B◀ FRONT IMPACT SENSOR INSTALLATION

(1) Bend the wiring harness slightly (to the extent that there is no slack), and clip securely by using the clip of the front impact sensor.
(2) Install the front impact sensor so that there is close adherence of the upper surface of the front impact sensor and the installation surface of the upper frame (lower).

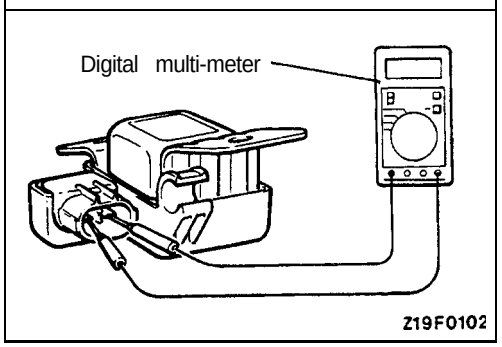
Caution
The SRS may not activate properly if a front impact sensor is not installed properly, which could result in the SRS system not operating properly during a collision.

TSB Revision



▶C◀ POST-INSTALLATION INSPECTION

Reconnect the negative battery terminal. Turn the ignition switch to "ON". Does the "SRS" warning light illuminate for about 7 seconds, turn OFF and then remain OFF for at least 45 seconds? If yes, SRS system is functioning properly. If no, consult page 52B-23.



INSPECTION

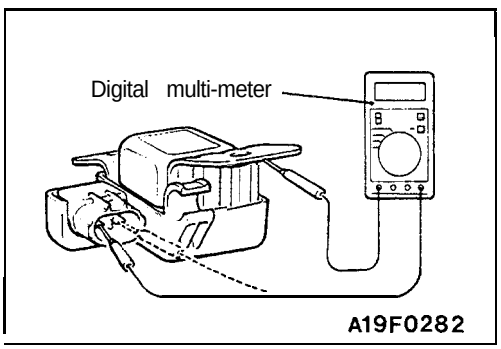
(1) Check upper frame and sensor brackets for deformities or rust.
(2) Check sensor harness for binds, connectors for damage, and terminals for deformities.
(3) Check for dents, cracks or deformation of the front impact sensor.

Caution
If a dent, crack, deformation or rust is detected, replace with a new sensor.

(4) Remove the front impact sensor.
(5) Measure the resistance between terminals and check whether it is within the standard value.

Standard value: 2,000 ± 40 Ω

Caution
Always replace the sensor with a new one if the resistance is not within the standard value.



(6) Check the continuity between the terminal and the bracket. If there is continuity, the insulation of the sensor is faulty. Replace the sensor with a new one.

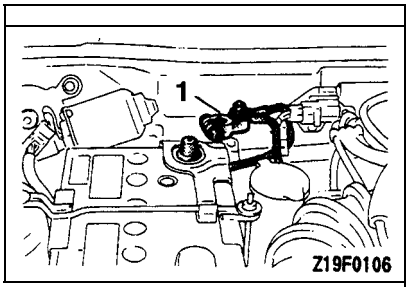
SRS DIAGNOSIS UNIT (SDU)

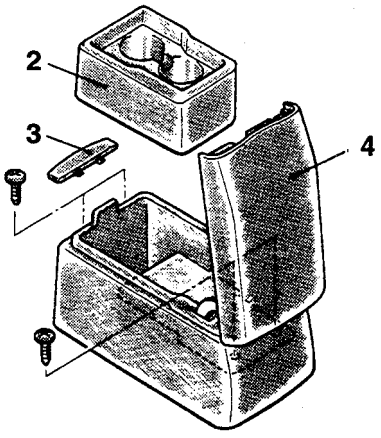
Caution

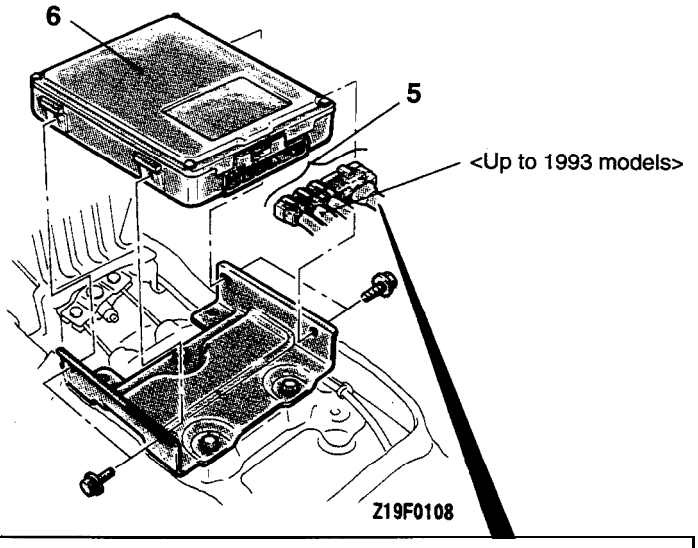
1. **Never attempt to disassemble or repair the SRS diagnosis unit. If faulty, replace it.**
2. **Do not drop or subject the SRS diagnosis unit to impact or vibration.**
   If dents, cracking, deformation, or rust are discovered on the SRS diagnosis unit, replace it with a new SRS diagnosis unit. Discard the old one.
3. **After deployment of the air bags, replace the SRS diagnosis unit with a new one.**
4. **Never use an ohmmeter on or near the SRS diagnosis unit, and use only the special test equipment described on P.52B-23.**

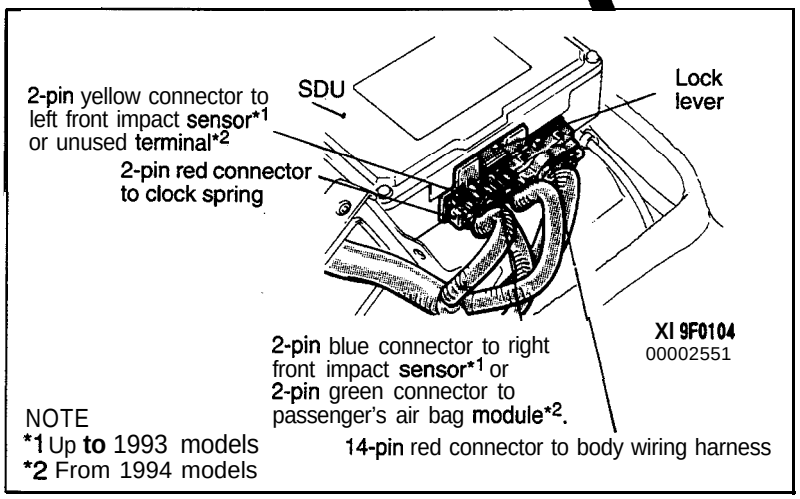
REMOVAL AND INSTALLATION

Pre-removal Operation
- Turn the ignition key to the "LOCK" position







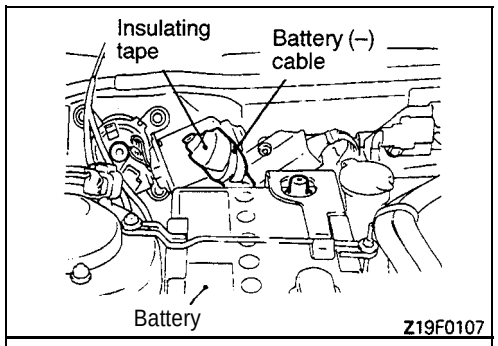


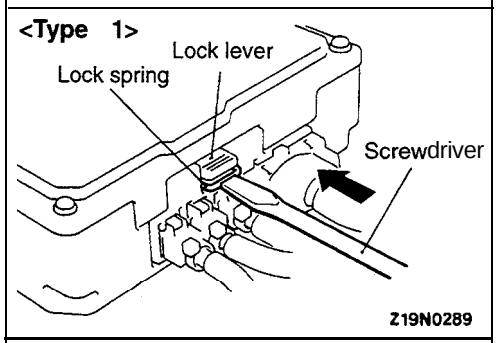
Removal steps

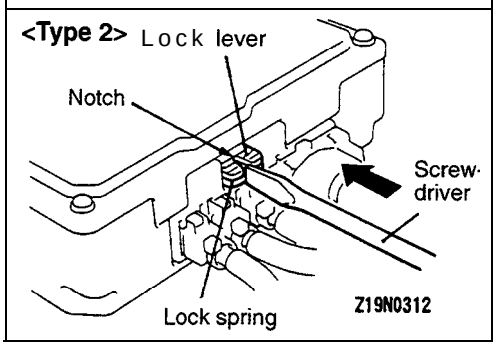
◀A▶ ▶D◀ • Post-installation inspection
1. Negative (–) battery cable connection
2. Cup holder
3. Console plug
4. Rear console assembly

◀B▶ ▶C◀ 5. SRS diagnosis unit and harness connector connection
▶B◀ 6. SRS diagnosis unit (SDU)
▶A◀ • Pre-installation inspection

TSB Revision







REMOVAL SERVICE POINTS

◀A▶ NEGATIVE (–) BATTERY CABLE DISCONNECTION

Turn the ignition key to the "LOCK" position, disconnect the negative battery cable from the battery and tape the terminal.

Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. The SRS system is designed to retain enough voltage to deploy the air bag even after the battery has been disconnected. Serious injury may result from unintended air bag deployment if work is done on the SRS system immediately after the battery cable is disconnected.

◀B▶ SRS DIAGNOSIS UNIT AND HARNESS CONNECTOR DISCONNECTION

Release the lock of SDU connector in accordance with the following procedure:

In case that there is no notch on the lock lever (Type 1)

Place a flat tip screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.

Caution
1. Do not use excessive force to raise the lock lever.
2. Do not insert the screwdriver into the gap between the lock lever and the lock spring.

In case that there is a notch on the lock lever (Type 2)

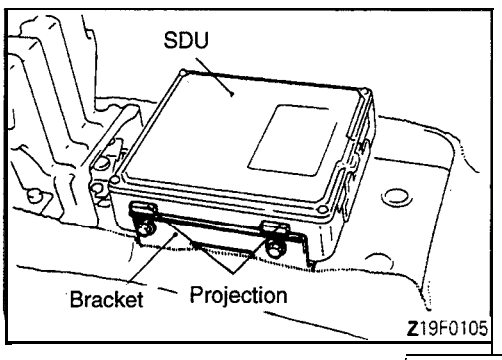
Place a flat tip screwdriver against the lock spring (metal section) at the lock lever notch as shown in the illustration, and push the spring toward the unit.

Caution
Do not use excessive force to raise the lock lever.

INSTALLATION SERVICE POINTS

▶A◀ PRE-INSTALLATION INSPECTION

Before SRS diagnosis unit is installed in the vehicle, it must be visually inspected. If a dent, crack or other deformation is detected, discard the SRS diagnosis unit and replace it with a new one that passes the visual inspection.

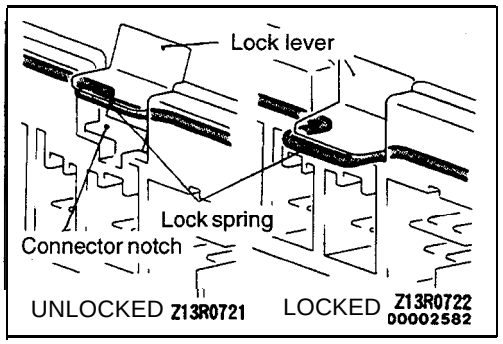


▶B◀ SRS DIAGNOSIS UNIT (SDU) INSTALLATION

With the projection part of the SRS diagnosis unit placed against the bracket as shown in the figure, securely install the SRS diagnosis unit.

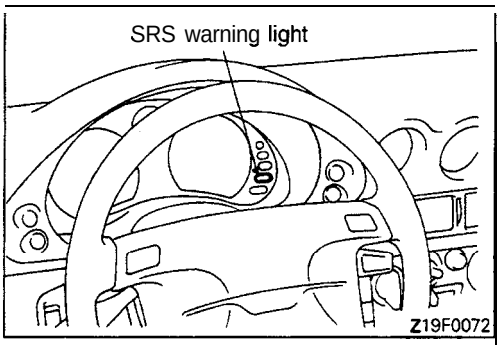
Caution
The SRS may not activate properly if SRS diagnosis unit is not installed properly, which could result in serious injury or death to the vehicle's driver.

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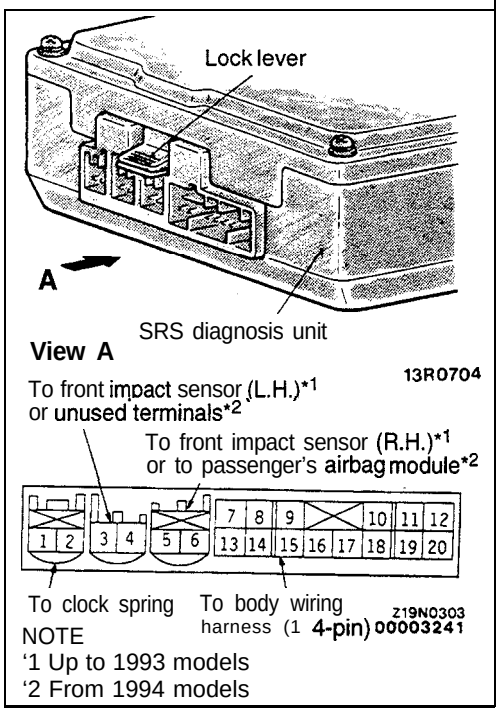
▶C◀ SRS DIAGNOSIS UNIT AND HARNESS CONNECTOR CONNECTION

After connecting each harness connector securely and correctly to the SRS diagnosis unit, be sure to press down the lock lever of the SRS diagnosis unit.



▶D◀ POST-INSTALLATION INSPECTION

Reconnect the negative battery terminal. Turn the ignition switch to "ON". Does the "SRS" warning light illuminate for about 7 seconds, turn OFF and then remain OFF for at least 45 seconds? If yes, SRS system is functioning properly. If no, consult page 52B-23.



INSPECTION

- Check the SRS diagnosis unit case and brackets for dents, cracks or deformities.
- Check connectors and lock lever for damage, and terminals for deformities.

Caution
If a dent, cracks, deformation or rust is discovered, replace the SRS diagnosis unit with a new one.

NOTE
For checking of the SRS diagnosis unit other than described above, refer to the section concerning troubleshooting. (Refer to P.52B-23.)

AIR BAG MODULE AND CLOCK SPRING

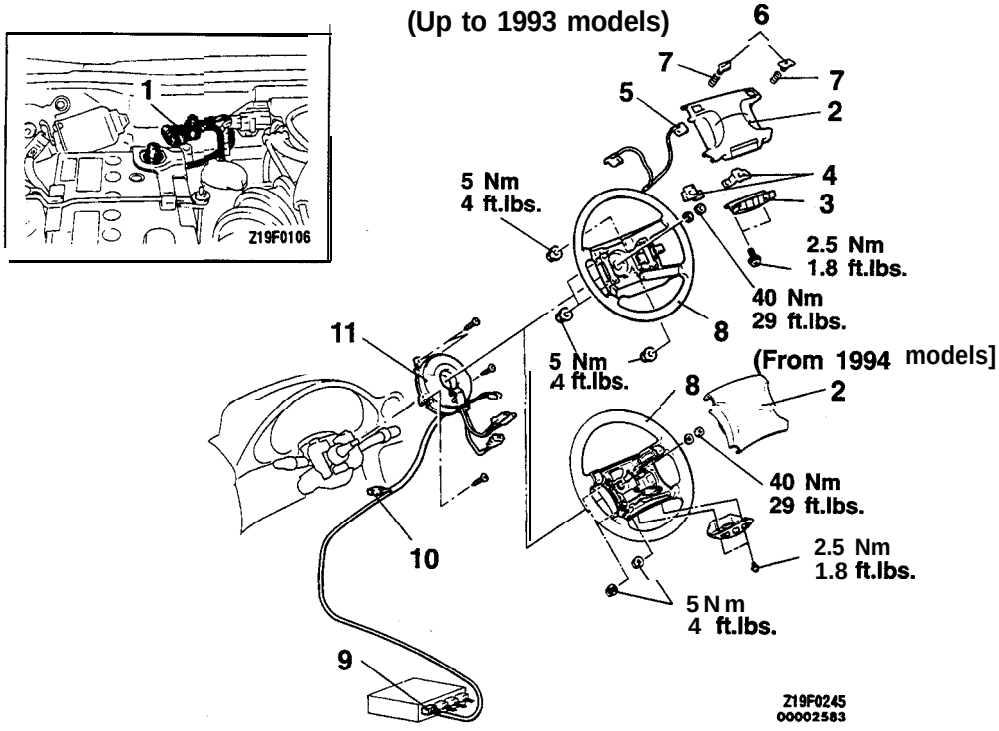
Caution

1. **Never attempt to disassemble or repair the air bag module or clock spring. If faulty, replace it.**
2. **Do not drop the air bag module or clock spring or allow contact with water, grease or oil. Replace it if a dent, crack, deformation or rust are detected.**
3. **The air bag modules should be stored on a flat surface and placed so that the pad surface is facing upward. Do not place anything on top of the air bag modules.**
4. **Do not expose the air bag module to temperature over 93°C (200°F).**
5. **After an air bag has deployed, replace the clock spring with a new one.**
6. **Wear gloves and safety glasses when handling an air bag that has deployed.**
7. **An undeployed air bag module should only be disposed of in accordance with the procedures on P.52B-82–P.52B-87.**

REMOVAL AND INSTALLATION

<Air bag module (driver's side), clock spring>

Pre-removal Operation
- After setting the steering wheel and the front wheels to the straightahead position, remove the ignition key.



Air bag module removal steps

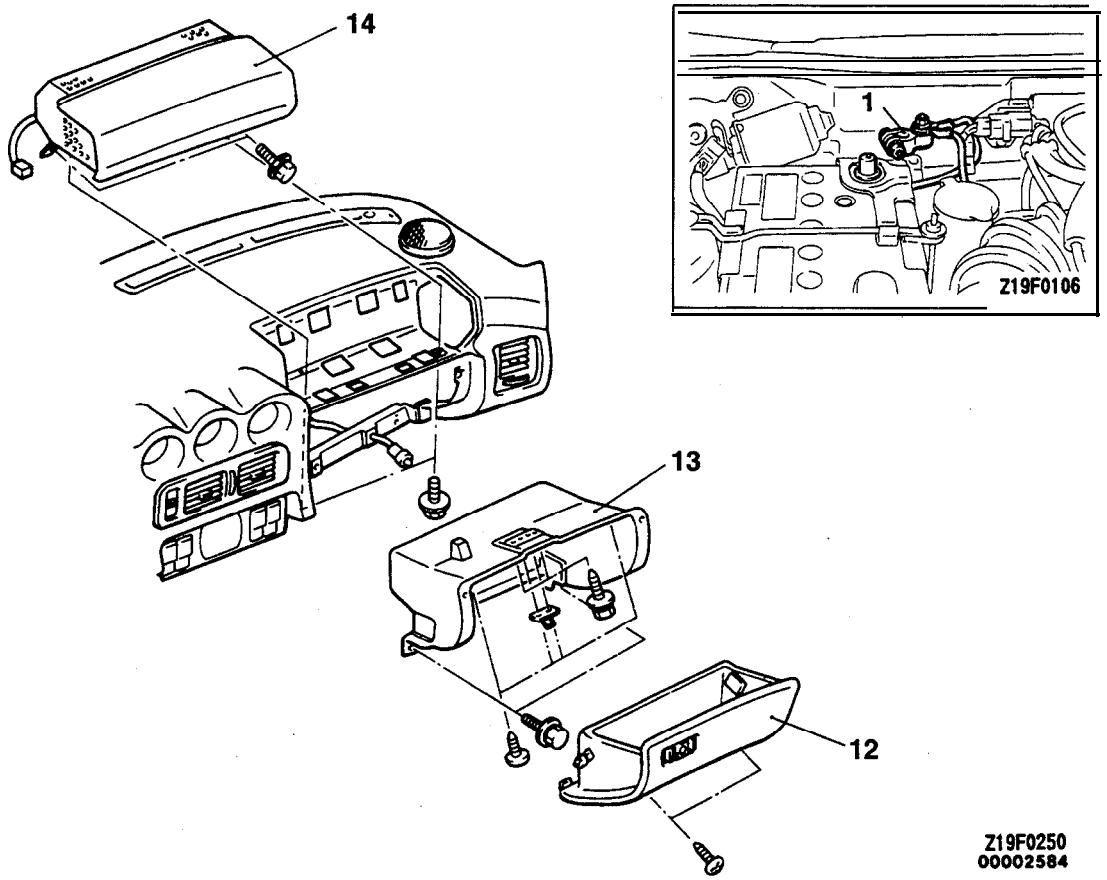
- ▶F◀ • Post-installation inspection
- ◀A▶ 1. Negative (–) battery cable connection
- ◀B▶ ▶E◀ 2. Air bag module (Driver's side)
- 3. Radio remote control assembly
- 4. Horn contact plate
- 5. Horn contact plate and wire
- 6. Horn button
- 7. Spring
- ▶A◀ • Pre-installation inspection

Clock spring removal steps

- ▶F◀ • Post-installation inspection
- ◀A▶ 1. Negative (–) battery cable connection
- ◀B▶ ▶E◀ 2. Air bag module (Driver's side)
- ◀C▶ ▶D◀ 8. Steering wheel
  - Knee protector (Refer to GROUP 52A – Instrument Panel.)
  - Column cover (Refer to GROUP 52A – Instrument Panel.)
  - Floor console (Refer to GROUP 52A – Floor Console.)
- ◀D▶ ▶C◀ 9. Clock spring and SRS diagnosis unit connection
- 10. Clock spring and body wiring harness connection
- ▶B◀ 11. Clock spring
- ▶A◀ • Pre-installation inspection

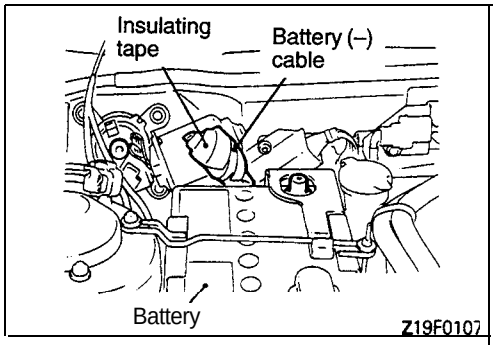
TSB Revision

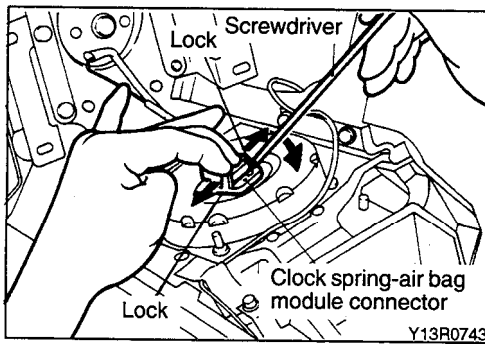
<Air bag module (passenger's side)>

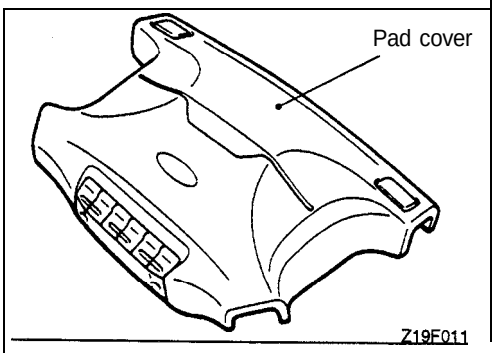


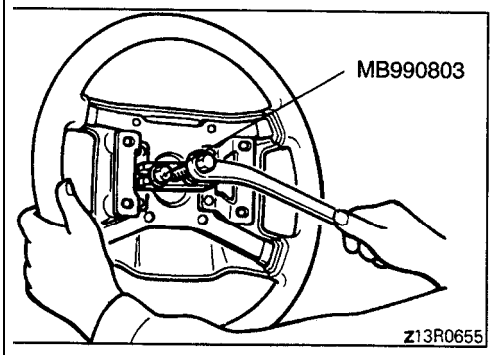
Air bag module removal steps (Passenger's side)

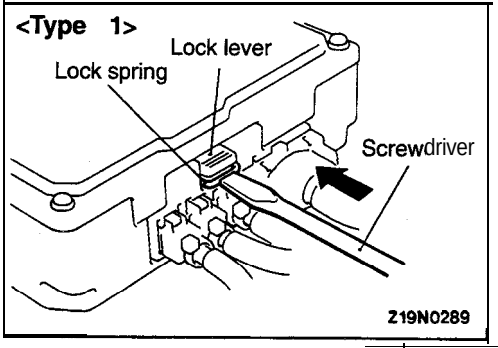
▶F◀ • Post-installation inspection
◀A▶ 1. Negative (–) battery cable connection
12. Glove box assembly
13. Cross pipe cover
14. Air bag module (passenger's side)
▶A◀ • Pre-installation inspection











REMOVAL SERVICE POINTS

◀A▶ NEGATIVE (–) BATTERY CABLE DISCONNECTION

Turn the ignition key to the "LOCK" position, disconnect the negative battery cable from the battery and tape the terminal.

Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. The SRS system is designed to retain enough voltage to deploy the air bag even after the battery has been disconnected. Serious injury may result from unintended air bag deployment if work is done on the SRS system immediately after the battery cable is disconnected.

◀B▶ AIR BAG MODULE (DRIVER'S SIDE) REMOVAL

(1) Remove the air bag module mounting nut using a socket wrench from the back side.
(2) When disconnecting the connector of the clock spring from the air bag module, press the air bag's lock toward the outer side to spread it open. Use a screwdriver, as shown in the figure at the left, to pry so as to remove the connector gently.

Caution
1. When disconnecting the air bag module-clock spring connector, take care not to apply excessive force to it.
2. The removed air bag module should be stored in a clean, dry place with the pad cover face up.

◀C▶ STEERING WHEEL REMOVAL

Remove the steering wheel by using the special tool.

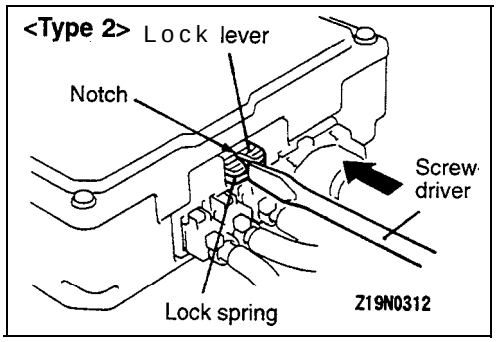
Caution
Do not hammer on the steering wheel. Doing so may damage the collapsible column mechanism.

◀D▶ SRS DIAGNOSIS UNIT AND CLOCK SPRING DISCONNECTION

(1) Release the lock of SDU connector in accordance with the following procedure:

In case that there is no notch on the lock lever (Type 1)

Place a flat tip screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.



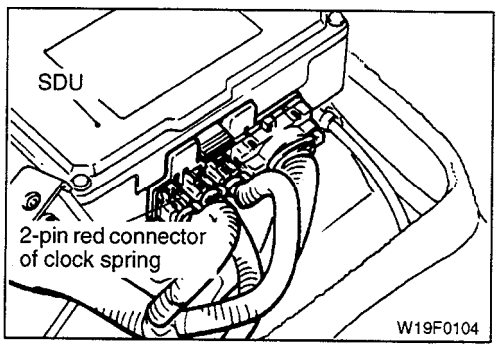
Caution
1. **Do not use excessive force to raise the lock lever.**
2. **Do not insert the screwdriver into the gap between the lock lever and the lock spring.**

In case that there is a notch on the lock lever (Type 2)

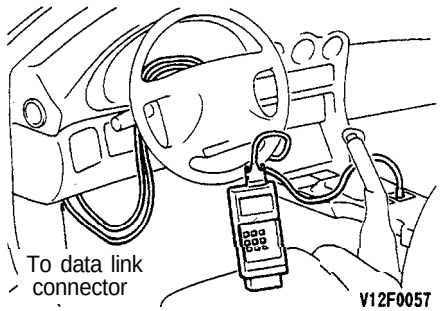
Place a flat tip screwdriver against the lock spring (metal section) at the lock lever notch as shown in the illustration, and push the spring toward the unit.

Caution
Do not use excessive force to raise the lock lever.

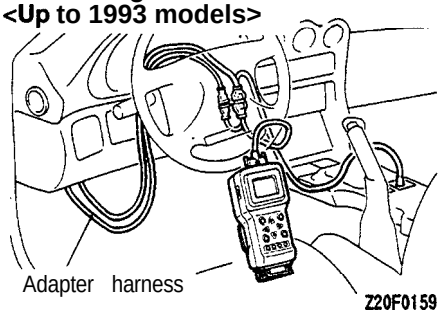
(2) Remove the 2-pin red connector of the clock spring from the SRS diagnosis unit while pressing down the lock of the clock spring's connector. (Refer to P.52B-11.)



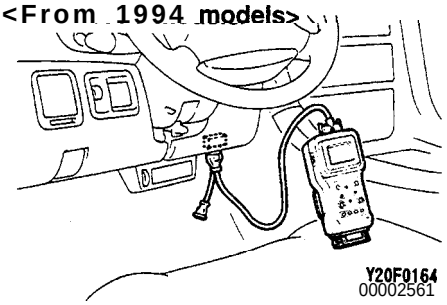
When using the MUT



When using the MUT-II <Up to 1993 models>



<From 1994 models>



INSTALLATION SERVICE POINTS

▶A◀ PRE-INSTALLATION INSPECTION

(1) When installing the new air bag module and clock spring, refer to "INSPECTION".

Caution
Dispose of an air bag module only according to the specified procedure. (Refer to P.52B-82 to P.52B-87.)

(2) Connect the scan tool to the data link connector. When connecting the scan tool (MUT-II) to a vehicle up to 1993 model, use the adapter harness supplied together.

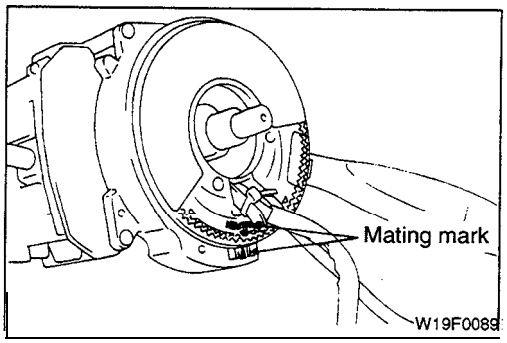
Caution
Make certain that the ignition switch is at OFF when the scan tool is connected or disconnected.

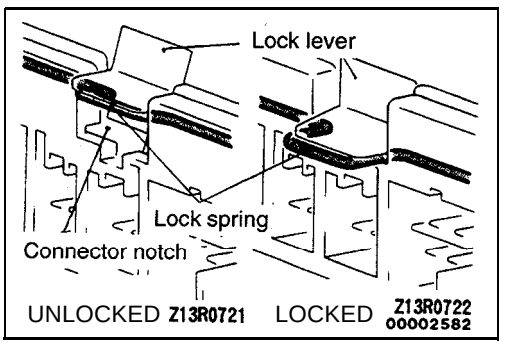
(3) Reconnect negative terminal of battery, and turn the ignition key to the "ON" position.

(4) Conduct on-board diagnostic using scan tool to ensure entire SRS operates properly, except open circuit of air bag module (Diagnostic trouble code No. 22). (Refer to P.52B-25.)

(5) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. The SRS system is designed to retain enough voltage to deploy the air bag even after the battery has been disconnected. Serious injury may result from unintended air bag deployment if work is done on the SRS system immediately after the battery cable is disconnected.





▶B◀ CLOCK SPRING INSTALLATION

Align the mating mark and "NEUTRAL" position indicator of the clock spring, and, after turning the front wheels to the straight-ahead position, install the clock spring to the column switch.

Caution
If the clock spring's mating mark is not properly aligned, the steering wheel may not be completely rotational during a turn, or the flat cable within the clock spring may be severed, obstructing normal operation of the SRS and possibly leading to serious injury to the vehicle's driver.

▶C◀ CLOCK SPRING AND SRS DIAGNOSIS UNIT CONNECTION

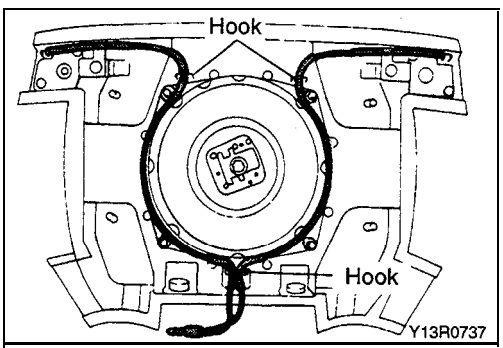
'After securely and correctly installing the clock spring's connector to the SRS diagnosis unit, be absolutely sure to press down the lock lever of the SRS diagnosis unit.

▶D◀ STEERING WHEEL INSTALLATION

(1) Before installing the steering wheel, be sure to first turn the vehicle's front wheels to the straight-ahead position and align the mating mark and "NEUTRAL" position indicator of the clock spring.

Caution
Be sure when installing the steering wheel, that the harness of the clock spring does not become caught or tangled.

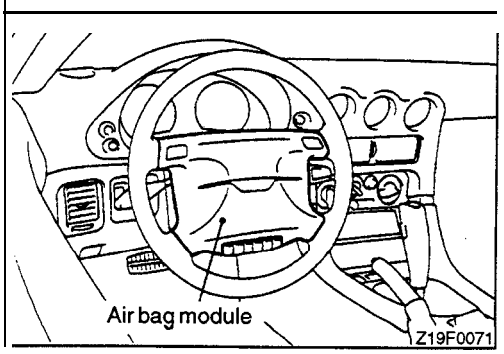
(2) After clamping, turn the steering wheel all the way in both directions to confirm that steering is normal.



▶E◀ AIR BAG MODULE (DRIVER'S SIDE) INSTALLATION

<Up to 1993 models>

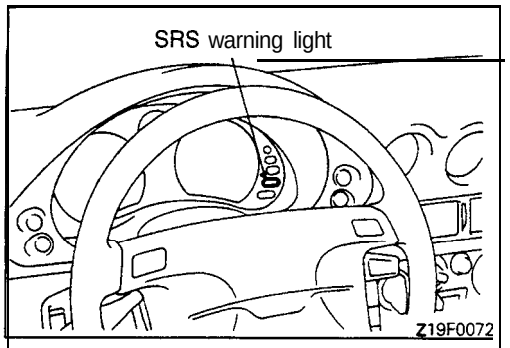
(1) Arrange the wiring of the horn switch as shown in the figure at the left, and hook up in place.
(2) Install the air bag module, being careful not to pinch the wiring.



▶F◀ POST-INSTALLATION INSPECTION

(1) After installing the clock spring, the steering wheel, the column covers and the air bag module, check steering wheel for noise, binds or difficult operation.

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(2) Reconnect the negative battery terminal. Turn the ignition switch to "ON". Does the "SRS" warning light illuminate for about 7 seconds, turn OFF and then remain OFF for at least 45 seconds? If yes, SRS system is functioning properly. If no, consult page 52B-23.

INSPECTION

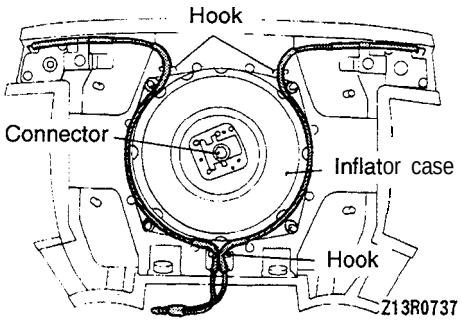
AIR BAG MODULE CHECK

If any improper part is found during the following inspection, replace the air bag module with a new one.
Dispose of the old one according to the specified procedure. (Refer to P.52B-82–P.52B-87.)

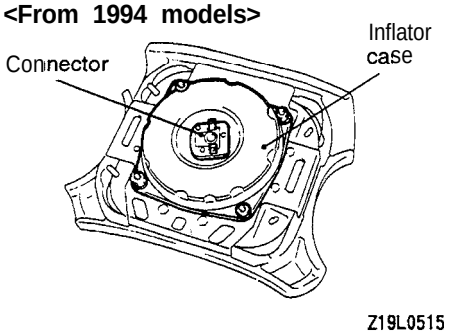
Caution
Never attempt to measure the circuit resistance of the air bag module (squib) even if you are using the specified tester. If the circuit resistance is measured with a tester, accidental air bag deployment will result in serious personal injury.

(1) Check pad cover for dents, cracks or deformities.
(2) Check the air bag module for dents, cracking or deformation.
(3) Check hooks and connectors for damage, terminals for deformities, and harness for binds.
(4) Check air bag inflator case for dents, cracks or deformities.

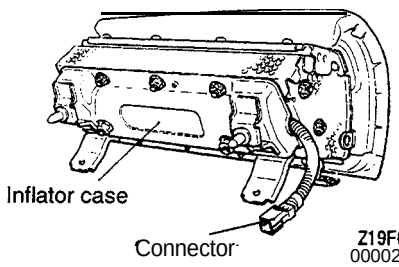
Driver's side
<Up to 1993 models>

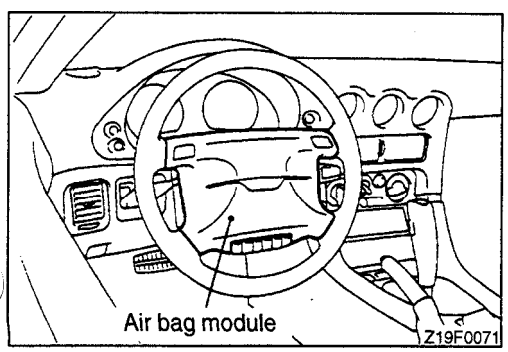


<From 1994 models>



Passenger's side

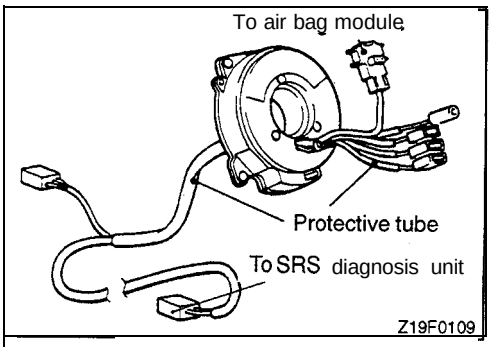


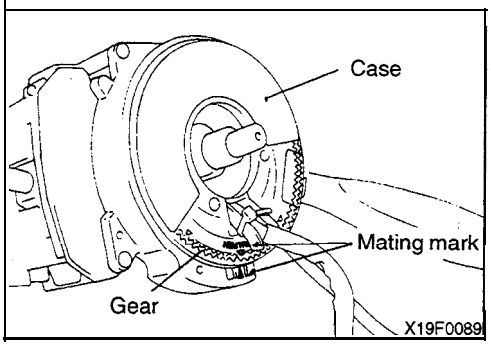


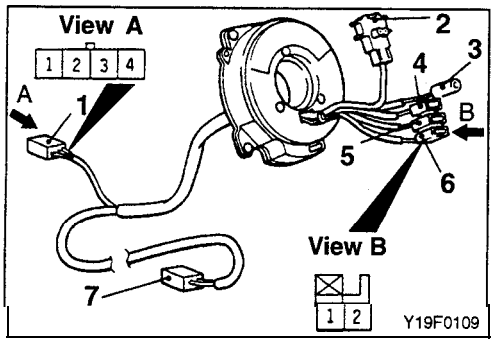
(5) Install the air bag module on the steering wheel to check alignment with the wheel.

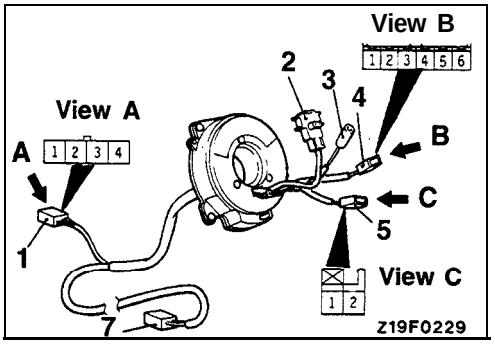
Caution
If a dent, crack or other deformation is discovered, replace the air bag module with a new one. Dispose of the old one according to the specified procedure. (Refer to P.52B-82 to P.52B-87.)

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CLOCK SPRING CHECK

If, as result of the following checks, even one abnormal point is discovered, replace the clock spring with a new one.

(1) Check connectors and protective tube for damage, and terminals for deformities.

(2) Visually check the case and the gears for damage.

(3) Make following checks for continuity of the clock spring.

- (Up to 1993 and 1996 models)
  Check for continuity between the No. 1 connector of the clock spring and connectors No. 3, 4, 5 and 6.

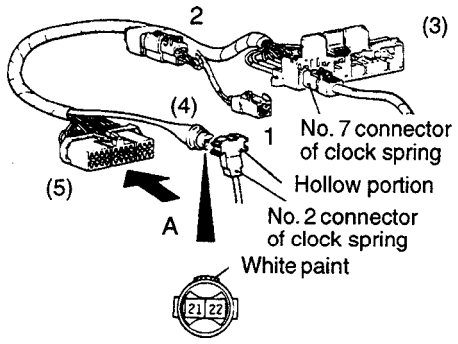
Connector No.	1				3	4	5	6	
Terminal No.	1	2	3	4				1	2
Continuity	○	○	○	○	○	○	○	○	○
Designation	To cruise control unit	To ACC power	To horn relay	To radio	To horn switch	To steering remote control switch		To cruise control switch	

- (1994 and 1995 models)
  Check for continuity between the No. 1 connector of the clock spring and connectors No. 3, 4 and 5.

Connector No.	1				3	4		5	
Terminal No.	1	2	3	4		4	6	1	2
Continuity	○	○	0	○	0	0	○	○	0
Designation	To cruise control unit	To ACC power	To horn relay	To radio	To horn switch	To steering remote control switch		To cruise control switch	

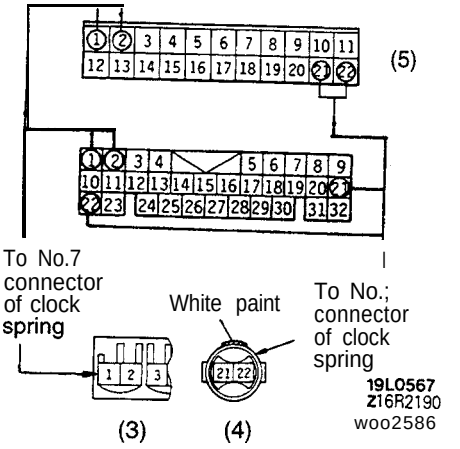
TSB Revision

MB991349 (Up to 1993 models)
MB991530 (From 1994 models)
SRS Check Harness



View A Z19N0201

SRS Check Harness connector



19L0567
Z16R2190
woo2586

(4) Check for the resistance between the terminals.

a. Join the No. 2 connector (air bag module side) and No. 7 connector of clock spring to connector (4) and connector (3), respectively, of the SRS Check Harness.

NOTE
When joining SRS Check Harness connector (4), align its white paint with the hollow portion of the No. 2 connector of the clock spring.

b. Check for continuity between terminal 1 and terminal 21, and terminal 2 and terminal 22, of SRS Check Harness connector (5), using a digital multi-meter.

Standard value: less than 0.4 Ω

AIR BAG MODULE DISPOSAL PROCEDURES

Before either disposing of a vehicle equipped with an air bag, or prior to disposing of the air bag module, be sure to first follow the procedures described below to and deploy the air bag.

UNDEPLOYED AIR BAG MODULE DISPOSAL

Caution

1. **If the vehicle is to be scrapped, junked, or otherwise disposed of, deploy the air bag inside the vehicle. If the vehicle will continue to be operated and only the air bag module is to be disposed of, deploy the air bag outside the vehicle.**
2. **Since a large amount of smoke is produced when the air bag is deployed, select a well-ventilated site. Moreover, never attempt the test near a smoke sensor.**
3. **Since there is a loud noise when the air bag is deployed, avoid residental areas whenever possible. If anyone is nearby, give warning of the impending noise.**
4. **Suitable ear protection should be worn by personnel performing these procedures or by people in the immediate area.**

DEPLOYMENT INSIDE THE VEHICLE (when disposing a vehicle)

(1) Open all windows and doors of the vehicle. Move the vehicle to an isolated spot.

(2) Disconnect the negative (–) and positive (+) battery cables from the battery terminals, and then remove the battery from the vehicle.

Caution

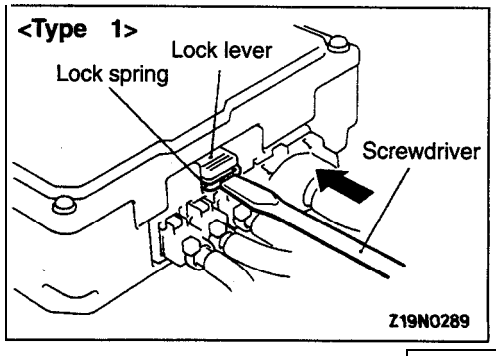
Wait at least 60 seconds after disconnecting the battery cables before doing any further work. The SRS system is designed to retain enough voltage to deploy the air bag even after the battery has been disconnected. Serious injury may result from unintended air bag deployment if work is done on the SRS system immediately after the battery cables are disconnected.

<Driver's side>

1. Remove the rear console assembly. (Refer to GROUP 52A – Floor Console.)
2. Release the lock of SDU connector in accordance with the following procedure:

In case that there is no notch on the lock lever (Type 1)

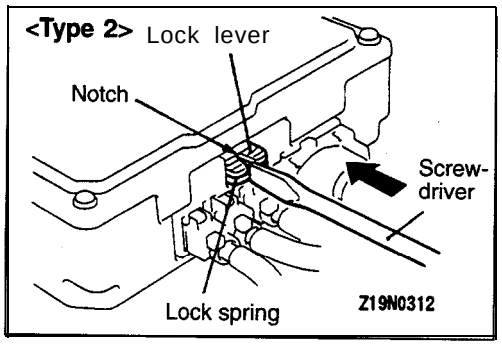
Place a flat tip screwdriver against the lock spring (metal section) of the connector lock lever as shown in the illustration, and push the spring horizontally toward the inside of the unit.



Caution

1. **Do not use excessive force to raise the lock lever.**
2. **Do not insert the screwdriver into the gap between the lock lever and the lock spring.**

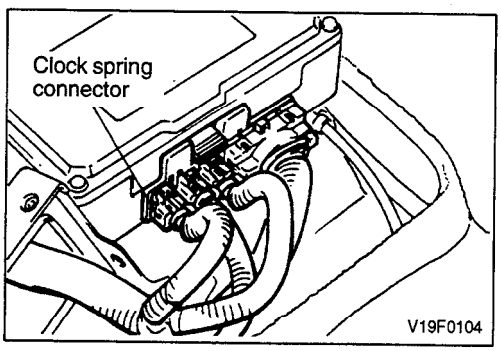
TSB Revision



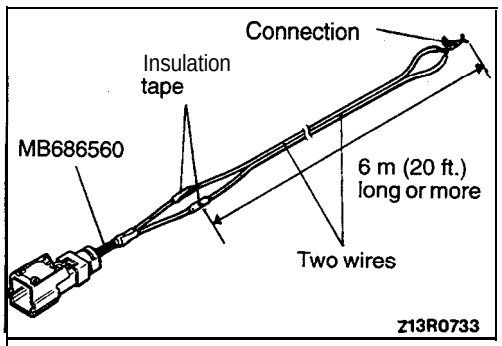
In case that there is a notch on the lock lever (Type 2)

Place a flat tip screwdriver against the lock spring (metal section) at the lock lever notch as shown in the illustration, and push the spring toward the unit.

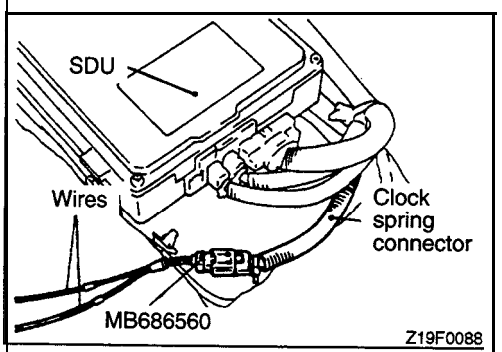
Caution
Do not use excessive force to raise the lock lever.



3. Disconnect the clock spring connector from the SRS diagnosis unit while pressing down the lock of the connector. (Refer to P.52B-11.)



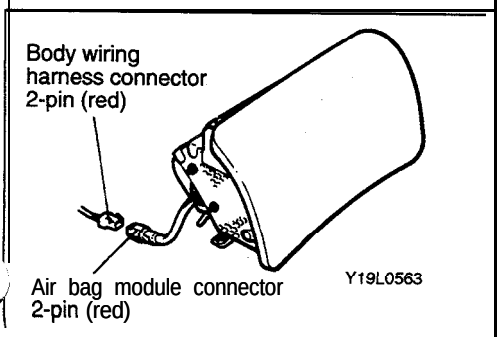
4. Connect two wires each six meters (20 feet) long or more, to the two leads of SRS AIR BAG ADAPTER HARNESS A and cover the connections with insulation tape. The other ends of the two wires should be connected to each other (short-circuited), to prevent sudden unexpected deployment of the air bag.



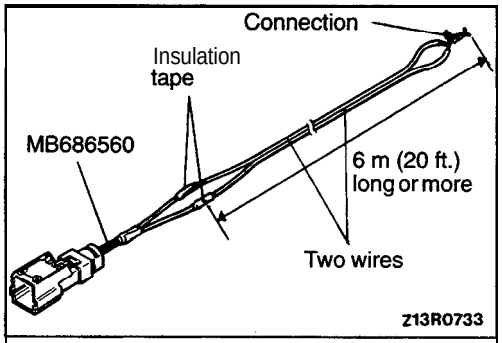
5. Connect the SRS AIR BAG ADAPTER HARNESS A to the clock spring connector (which has been disconnected from the SRS diagnosis unit), and then lead the two connected wires outside the vehicle.

<Deployment of passenger's side>

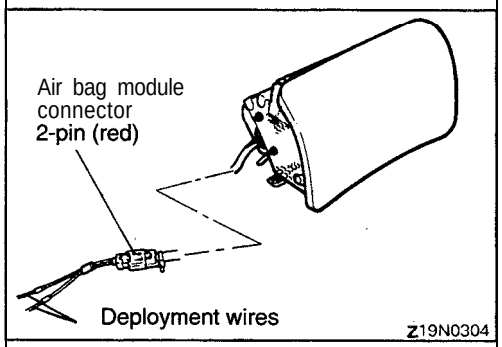
1. Remove the glove box and glove box outer case.
2. Disconnect the passenger's air bag module 2 pin connector (red) from the body wiring harness connector.



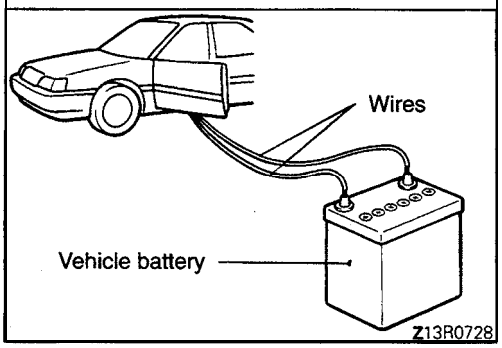
NOTE
If the passenger's air bag module connector is disconnected from the body wiring harness, both electrodes of the passenger's air bag module connector will be automatically shorted to prevent unintended deployment of the air bag due to static electricity, etc.



3. Connect two wires each six meters (20 feet) long or more, to the two leads of SRS AIR BAG ADAPTER HARNESS A and cover the connections with insulation tape. The other ends of the two wires should be connected to each other (short-circuited), to prevent sudden unexpected deployment of the air bag.



4. Connect the passenger's air bag module 2-pin connector (red) to the SRS air bag adapter harness A and take the deployment harness out of the vehicle.



(3) At a location as far away from the vehicle as possible, disconnect the two connected wires from each other, and connect them to the two terminals of the battery (removed from the vehicle) to deploy the air bag.

Caution

1. **Before deploying the air bag in this manner, first check to be sure that there is no one in or near the vehicle. Wear safety glasses, suitable ear protection.**
2. **The inflator will be quite hot immediately following the deployment, so wait at least 30 minutes to allow it to cool before attempting to handle it. Although not poisonous, do not inhale gas from air bag deployment. See Deployed Air Bag Module Disposal Procedures (P.52B-87) for post-deployment handling instructions.**
3. **If the air bag module fails to deploy when the procedures above are followed, do not go near the module. Contact your local distributor.**

DEPLOYMENT OUTSIDE THE VEHICLE

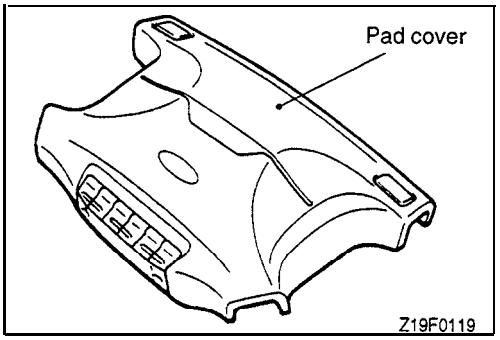
Caution

1. **This operation should be done at a spacious and flat place where there is no people and obstacle around within a radius of more than 8 m (20 feet).**
2. **Do not perform deployment outside, if a strong wind is blowing, and if there is even a slight breeze, the air bag module should be placed and deployed downwind from the battery.**

(1) Disconnect the negative (–) and positive (+) battery cables from the battery terminals, and then remove the battery from the vehicle.

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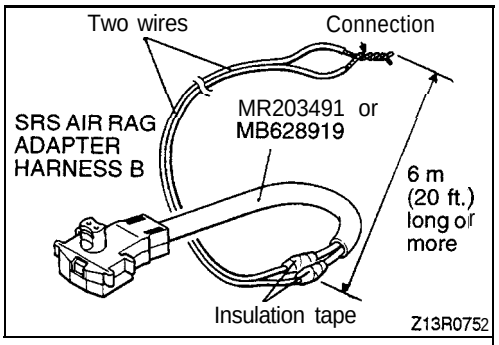
Caution
Wait at least 60 seconds after disconnecting the battery cables before doing any further work. The SRS system is designed to retain enough voltage to deploy the air bag even after the battery has been disconnected. Serious injury may result from unintended air bag deployment if work is done on the SRS system immediately after the battery cables are disconnected.



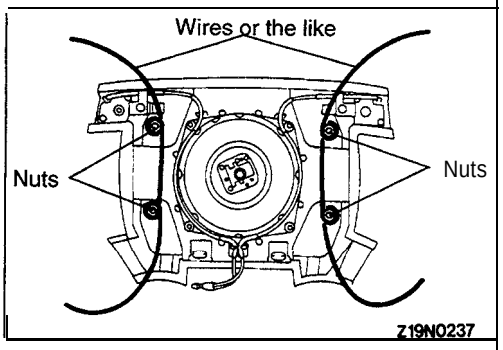
<Driver's side>

1. Remove the air bag module from the vehicle. (Refer to P.52B-74.)

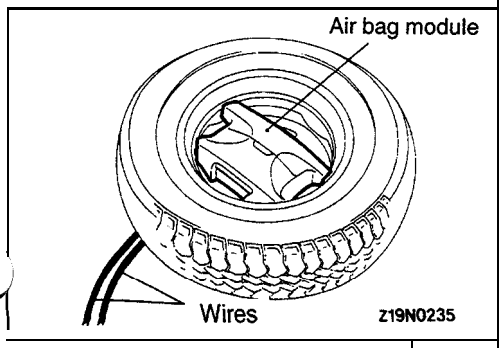
   Caution
   The air bag module should be stored on a flat surface and placed so that the pad cover face up. Do not place anything on top of it.



2. Connect two wires each six meters (20 feet) long or more, to the two leads of SRS AIR BAG ADAPTER HARNESS B, and cover the connections with insulation tape. The other ends of the two wires should be connected to each other (short-circuited), to prevent sudden unexpected deployment of the air bag.

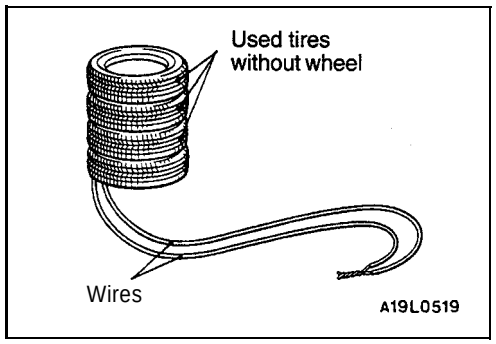


3. Install a disused nut to each of the four bolts at the back of air bag module and connect thick wires to these bolts to secure the module to the wheel.
4. Pass SRS air bag adapter harness B, connected with wires, under the used tire wheel assembly and connect the harness to the air bag module.



5. Put the air bag module in the used wheel. Using the wires or the 'like connected to the module's bolts, secure the air bag module to the wheel. Then place the wheel with the module facing upward.

   Caution
   Slacken the adapter harness under the wheel to allow for the reaction produced in deployment of the module. If not, the adapter harness may be damaged by the reaction created in deployment.

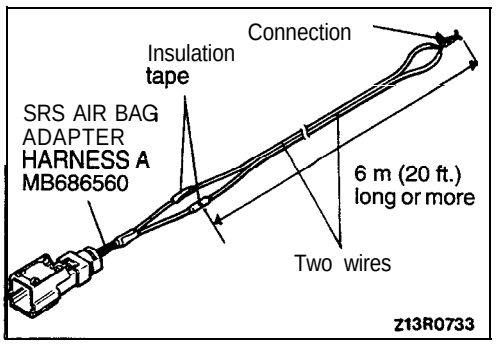


6. Stuck three used tires without wheel, on the tire to which the air bag module has been secured.

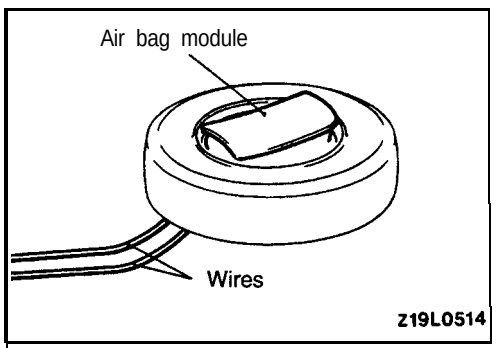
<Passenger's side>

1. Remove the passenger's air bag module. (Refer to P.52B-75.)

Caution
The air bag module should be stored on a flat surface and placed so that the pad cover face up. Do not place anything on top of it.

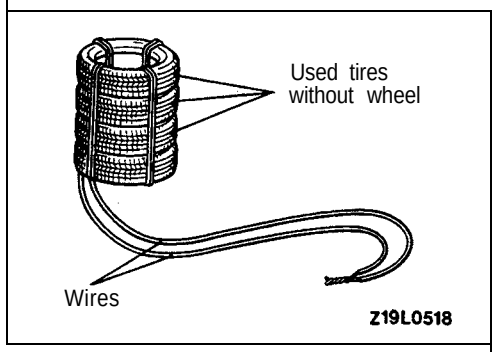


2. Connect two wires each six meters (20 feet) long or more, to the two leads of SRS AIR BAG ADAPTER HARNESS A and cover the connections with insulation tape. The other ends of the two wires should be connected to each other (short-circuited), to prevent sudden unexpected deployment of the air bag.



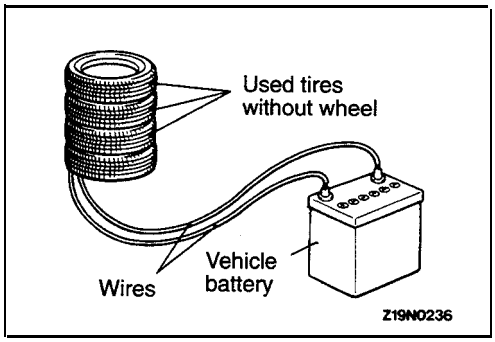
3. Connect, the deployment wires to the SRS air bag adaptor harness A, pass it beneath the tire and wheel assembly, and connect it to the air bag module.
4. Pass the thick wires into the hole of the air bag module bracket, and secure it to the wheel of the old tire with wheel (4 locations), with the air bag facing upwards.

Caution
1. Leave some space below the wheel for the deployment wires.
If there is no space, the reaction of the air bag deployment could result in damage of the adaptor harness.
2. While deployment takes place, do not have the connector of the SRS air bag adaptor harness A inserted between the tires.



5. Place three old tires without wheels on top of the tire secured to the air bag module, and secure all tires with ropes (4 locations).

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(2) At a location as far away from the air bag module as possible, and from a shielded position, if possible, disconnect the two connected wires from each other and connect them to the two terminals of the battery (removed from the vehicle) to deploy the air bag.

Caution

1. Before deployment, check carefully to be sure that no one is nearby, because deployment will cause the air bag module to jump upward about 1.5 to 3 meters (about 5 to 10 feet) into the air.

2. The inflator will be quite hot immediately following deployment, so wait at least 30 minutes to allow it to cool before attempting to handle it.
Although not poisonous, do not inhale gas from air bag deployment. See Deployed Air Bag Module Disposal Procedures (as shown below) for post-deployment handling instructions.

3. If the air bag module fails to deploy when the procedures above are followed, do not near the module. Contact your local distributor.

DEPLOYED AIR BAG MODULE DISPOSAL

After deployment, the air bag module should be disposed of in the same manner as any other scrap parts, except that the following points should be carefully noted during disposal.

(1) The inflator will be quite hot immediately following deployment, so wait at least 30 minutes to allow it to cool before attempting to handle it.

(2) Do not put water or oil on the air bag after deployment.

(3) There may be, adhered to the deployed air bag module, material that could irritate the eyes and/or skin, so wear gloves and safety glasses when handling a deployed air bag module. IF DESPITE THESE PRECAUTIONS, THE MATERIAL DOES, GET INTO THE EYES OR ON THE SKIN, IMMEDIATELY RINSE THE AFFECTED AREA WITH A LARGE AMOUNT OF CLEAN WATER.
IF ANY IRRITATION DEVELOPS, SEEK MEDICAL ATTENTION.



(4) Tightly seal the air bag module in a strong vinyl bag for disposal.

(5) After deployment, be sure to wash hands in water.

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WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

(1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).
(2) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.
(3) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B – Supplemental Restraint System (SRS) and GROUP 00 -Maintenance Service, before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE
The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning light, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

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HEATER, AIR CONDITIONING AND VENTILATION

SPECIFICATIONS

GENERAL SPECIFICATIONS

items		Vehicles using R-12 refrigerant	Vehicles using R-l 34a refrigerant
Heater unit		Three-way-flow full-air-mix system	Three-way-flow full-air-mix system
Heater control assembly		Dial type	Dial type
Compressor	Model	FX-105 VS	MSC 105
	Refrigerant unit lubricant cc (cu.in.)	FREOL S-83 or SUNISO 5GS 160 ± 20 (9.8f1.2)	SUN PAG 56 160 ± 20 (9.8 ± 1.2)
	Drive belt size mm (in.)	1,150 (45.3)	1 ,150 (45.3)
Dual pressure switch	High pressure switch kPa (psi)	OFF: 2,700 (384) ON: 2,100 (299)	OFF: 3,200 (455) ON: 2,600 (370)
	Low pressure switch kPa (psi)	OFF: 210 (30) ON: 235 (33)	OFF: 200 (28) ON: 225 (32)
Freezer prevention °C (°F)		Air temperature thermostat OFF: -2 (28.4) ON: 2 (35.6)	Air temperature thermostat OFF: -2 (28.4) ON: 2 (35.6)
Refrigerant and quantity g (oz.)		R-12 Approx. 960 (34)*1 or Approx. 800 (29)*2	R-l 34a (HFC-134a) 740-790 (26-28)

NOTE
*1: Up to Sept. 1992 models
*2: From Oct. 1992 models

SERVICE SPECIFICATIONS

Items		Standard value
Idle speed when air conditioning on rpm		900 ± 100 <A/T at P range>
Resister resistance value Ω		1.76–2.06 (Across terminals No. 2 and No. 1)
		1.1 O-l .26 (Across terminals No. 2 and No. 3)
		0.38–0.44 (Across terminals No. 2 and No. 4)
Thermostat	ON temperature °C(°F)	Approx. 110 (230) or less
	OFF temperature °C (°F)	Approx. 155 (311) or more
Revolution pick up sensor standard resistance Ω		405 ± 35 when ambient temperature is 20°C (68°F)
Clutch clearance mm (in.)		0.4–0.6 (.01–.02)
Air conditioning engine coolant temperature switch <Up to 1993 models>	Switch-OFF temperature °C (°F)	112–118 (233–244)
Blend air damper potentiometer motor assembly resistance*	MAX. HOT kΩ	0.2
	MAX. COOL kΩ	4.8
Mode selection damper potentiometer assembly resistance*	DEF. position kΩ	0.2
	FACE position kΩ	4.8
Engine coolant temperature sensor*	Sensor-ON temperature °C (“F)	26.5 ± 4 (79.7 ± 7)

NOTE
*: <Fully automatic air conditioning>

LUBRICANTS

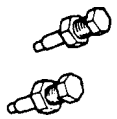
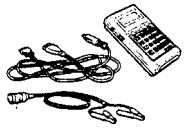
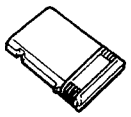
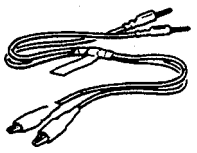
Item	Specified lubricants	Quantity
Each connection of refrigerant line	FREOL S-830r SUNISO 5GS <Vehicles using R-12 refrigerant>	As required
	SUN PAG 56 <Vehicles using R-l 34a refrigerant>	

SEALANT

Item	Specified sealant
A/C engine coolant temperature switch threaded part <Up to 1993 models>	3M Nut Locking Part No. 4171 or equivalent

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SPECIAL TOOLS

Tool	Tool number and name	Supersession	Application
- Special spanner	MB991 367	MB991 367-01	Removal and installation of armature mounting nut of compressor
	MB991 386 Pin	MIT217213	
	MB991 341 Scan tool (Multi-use tester <MUT>)	MB991 341 C	<Up to 1993 models> Inspection of full auto air conditioning
	ROM pack [For the number, refer to GROUP 00 – Precautions Before Service.]		
	MB991 502 Scan tool (MUT-II)	MB991 502	<All models> Inspection of full auto air conditioning
	ROM pack		
	MB991 529 Diagnostic trouble code check harness	MB991 529	<From 1994 models> Inspection of full auto air conditioning using a voltmeter

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HEATERS AND MANUAL AIR CONDITIONING

TROUBLESHOOTING

Symptom	Probable cause	Remedy	Ref. page
Heater insufficient heat	Obstructed heater outlets	Correct	
	Blend air dampers improperly adjusted or binding	Correct	
	Thermostat malfunction	Replace	GROUP 14
	Obstructed heater hoses	Replace	
	Improperly adjusted control cables	Adjust	
	Plugged or partially plugged heater core	Clean or replace	
	Incorrect adjustment of mode selection dampers	Adjust	
No ventilation even when mode selection knob is operated	Incorrect installation of mode selection control wire	Adjust	
	Ducts are incorrectly/incompletely connected, crushed, bent or clogged	Repair or replace	
Blower motor inoperative	Burn-out fuse	Correct	
	Poor grounding	Replace	
	Malfunction blower switch	Replace	55-30
	Malfunction resistor	Replace	55-32
	Malfunction blower motor	Replace	55-35
	Malfunction heater relay	Replace	55-29
	Malfunction blower motor relay	Replace	55-29
Air conditioning does not operate when the ignition switch in the ON position	Open-circuited power circuit harness	Correct harness	
	Defective magnet clutch	Replace	55-41, 42
	Defective thermostat	Replace	55-41, 42
	Defective A/C engine coolant temperature switch for air conditioning cut off <Up to 1993 models>	Replace	55-53
	Defective dual pressure switch	Replace	55-45
	Refrigerant leak	Charge refrigerant, correct leak	55-18, 22
	Excessive refrigerant	Discharge refrigerant	55-21, 25
	Defective air conditioning switch	Replace air conditioning switch	55-33
	Defective A/C compressor lock controller <DOHC>	Replace A/C compressor lock controller	55-32

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Symptom	Probable cause	Remedy	Ref. page
Air conditioning does not operate when the ignition switch in the ON position	Defective air conditioning control unit	Replace air conditioning control unit	55-37
Condenser fan does not operate when the air conditioning is activated	Defective condenser fan motor relay	Replace power relay	55-29
	Defective condenser fan motor	Replace condenser fan motor	55-46
Air conditioning switch indicator blinks <DOHC>	Wet compressor drive belt	Dry	–
	Insufficient compressor drive belt tension	Check and adjust	GROUP 11
	Defective compressor drive belt	Replace	–
	Defective compressor	Check and replace	55-17, 39
	Defective revolution pick-up sensor	Check and replace	55-41, 42, 45
	Defective air conditioning switch	Replace air conditioning switch	55-33
	Defective A/C compressor lock controller	Replace	55-32
	Defective air conditioning control unit	Replace	55-37
	Defective MFI control unit	Replace	–

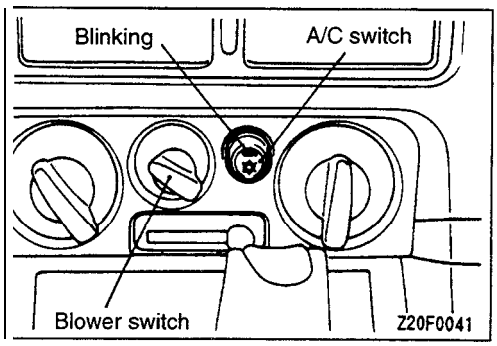
AIR CONDITIONING COMPRESSOR LOCK CONTROLLER

Operation

(1) The A/C compressor lock controller compares compressor rpm with engine rpm to determine if the drive belt is slipping or the compressor has seized. If the rpm difference between the engine and compressor exceed 92 % for more than three seconds, the A/C compressor lock controller turns off the magnetic clutch relay which opens the magnetic clutch circuit.

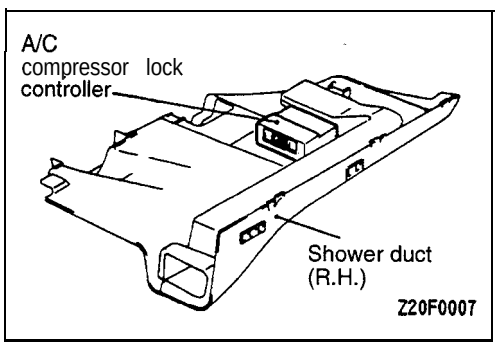
(2) when a signal is received from the ECU requesting compressor operation, the A/C compressor lock controller will energize the magnetic clutch relay to determine if the compressor drive belt is slipping. If the speed difference between the engine and compressor indicates the belt is slipping, the A/C compressor lock controller will de-energize the magnetic clutch relay.

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(3) If the A/C compressor lock controller senses the compressor drive belt is slipping, it will de-activate the magnetic clutch relay. Also, it will send a signal to the A/C ECU to activate the compressor warning indicator.
The indicator will blink.

(4) The NC compressor lock controller does not contain a memory circuit. It will operate the compressor and check for belt slippage each time the ignition is turned on and a signal is sent from the ECU indicating the need for compressor operation.

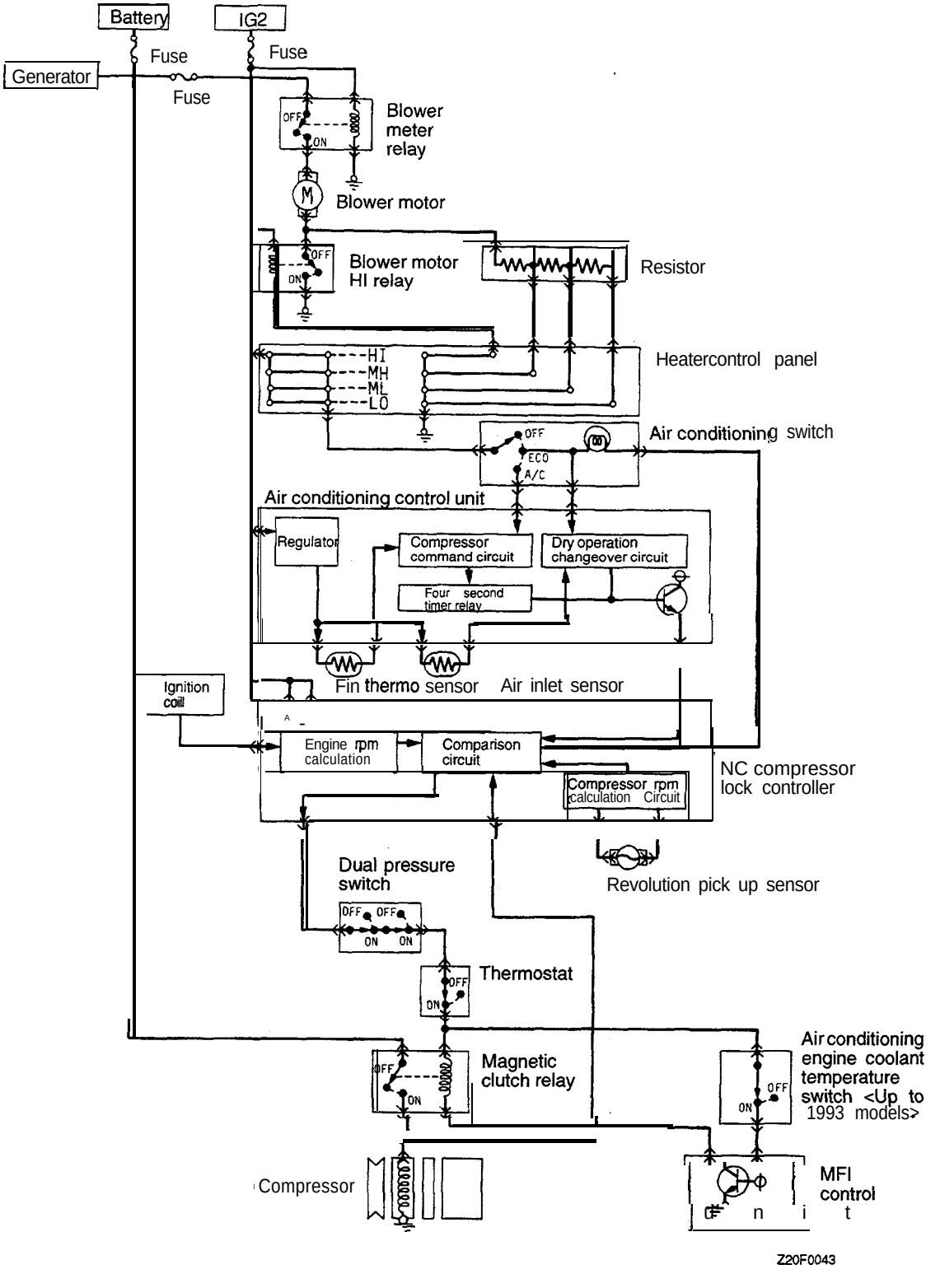


(5) The controller is mounted top of the passenger side under cover.

CIRCUIT DIAGRAM

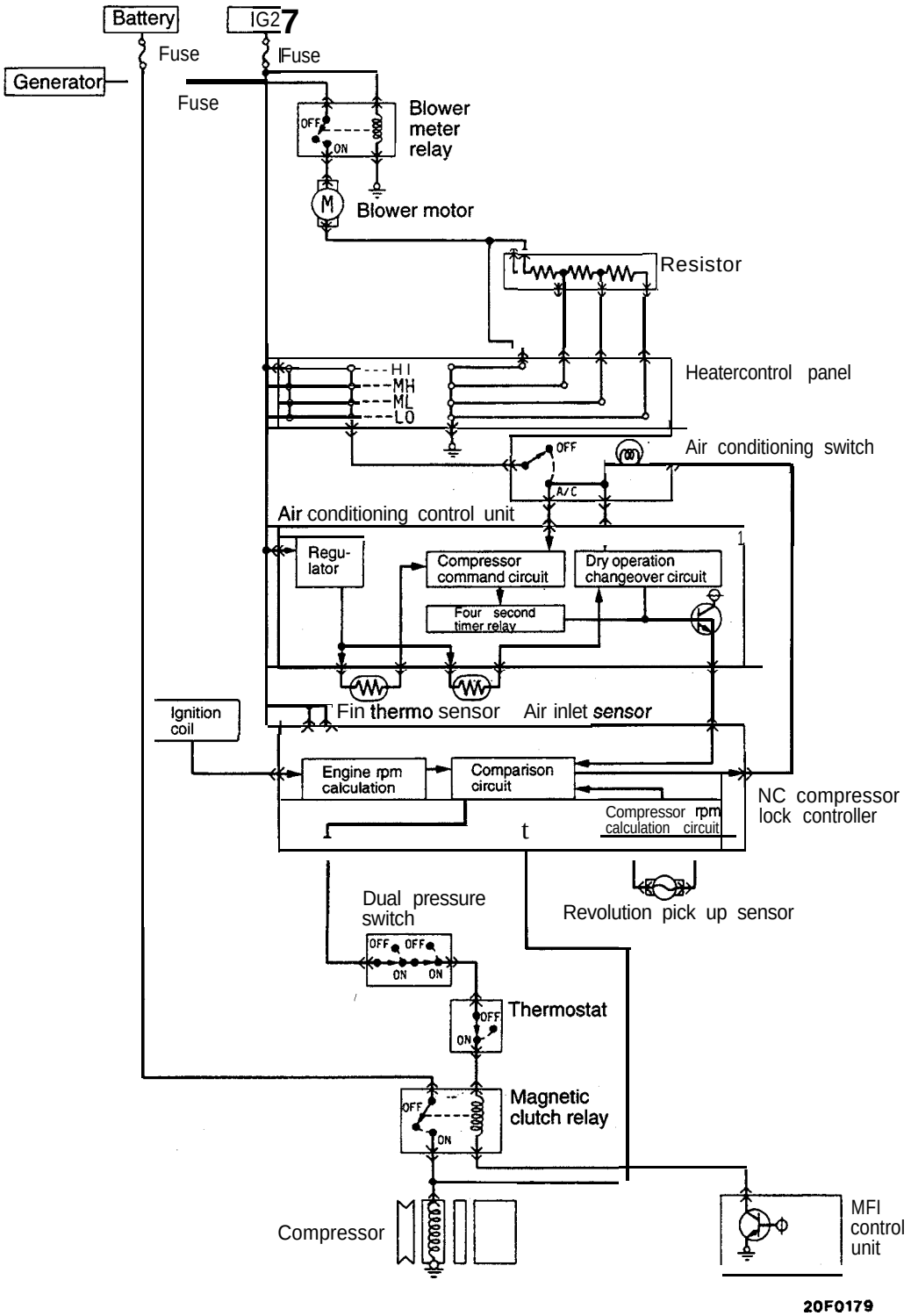
AIR CONDITIONING CONTROL UNIT CIRCUIT

<Up to 1995 models>



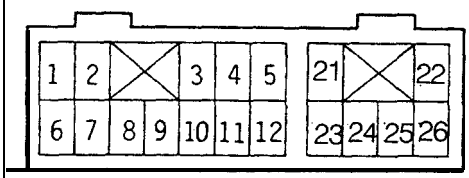
TSB Revision

<From 1996 models>

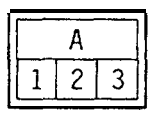


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<Up to 1995 models>



<From 1996 models>



20F0180

TROUBLESHOOTING HINTS

Air Conditioning Control Unit Inspection

Disconnect the amplifier and inspect the connector on the wire harness side as shown in the chart below.

Test Conditions:

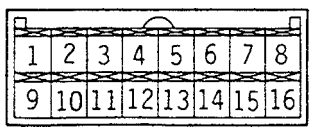
(1) Ignition switch: ON
(2) Air conditioning switch: ON
(3) Temperature control lever: MAX. COOL
(4) Blower switch: HI

<Up to 1995 models>

Terminal No.	Signal	Conditions	Terminal voltage
8, 9	Auto compressor control unit ground	At all times	0 V
1	Auto compressor control unit power supply	When ignition switch is ON	Battery positive voltage
6	Air conditioning compressor relay	When all conditions for switch-ON of the compressor are satisfied	Battery positive voltage
7	Air conditioning switch: A/C	When air conditioning switch pressed in to second step	Battery positive voltage
2	Air conditioning switch: ECONO	When air conditioning switch pressed in to first step	Battery positive voltage
21	Fin-thermo sensor (+)	Ignition switch, blower switch and air conditioning switch: ON	Approx. 2.5 V
22	Air-inlet sensor (+)	Ignition switch, blower switch and air conditioning switch: ON	Approx. 1 V
23	Fin-thermo sensor (–)	Ignition switch, blower switch and air conditioning switch: ON Ambient temperature: 4°C (39°F)	0 V
26	Air-inlet sensor (–)	Ignition switch, blower switch and air conditioning switch: ON Ambient temperature: 4°C (39°F)	0 V

<From 1996 'models>

Terminal No.	Signal	Conditions	Terminal voltage
1	Auto compressor controller power supply (Output side)	The ignition switch, blower switch and A/C switch are all ON	Battery positive voltage
2	Auto compressor controller power supply (Input side)	The ignition switch, blower switch and A/C switch are all ON	Battery positive voltage
3	Auto compressor controller ground	At all times	0 V



20F0176

Air Conditioning Compressor Lock Controller Inspection

Disconnect the amplifier and inspect the connector on the wire harness side as shown in the chart below.

Terminal No.	Signal	Conditions	Terminal voltage
1*	Revolution pick-up sensor	Compressor: ON	0.2 VAC or more
2	A/C compressor lock controller ground	Normal	o v
3	A/C compressor lock controller power source	Ignition switch: ON	System voltage
5	A/C switch indicator	Compressor: ON (Normally)	0.7 VDC-0.9 VDC
		Compressor drive belt: Slipping (slip ratio 92 % or more)	5 VDC
7*	Engine revolution (input)	When engine is running	1 VDC or more
9*	Revolution pick-up sensor	Compressor: ON	0.2 VAC
10	A/C compressor lock controller ground	Normal	o v
11	A/C compressor lock controller power source	Ignition switch: ON	System voltage
13	Compressor	Compressor: ON	6 V or more
		Compressor: OFF	0.5 V or less
14	A/C control unit output	Compressor: ON	9 V or more ,
		Compressor: OFF	0 V
15	Compressor relay output	Compressor: ON	9.5 V or more
		Compressor: OFF	o v

NOTE:
*: The voltage shown is the pulse signal voltage.

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TROUBLESHOOTING QUICK-REFERENCE TABLE

Compressor doesn't operate.

Item no.	Inspection point	Method	Normal condition	Probable cause	Remedy
1	Magnetic clutch	Apply battery voltage to magnetic clutch terminal (1) to check if sound is developed during operation.	Sound is noted	Faulty magnetic clutch	Replace magnetic clutch.
2	Blower switch	Check for continuity between switch terminals. (Refer to P 55-29.)	Continuity	Faulty blower switch	Replace blower switch.
3	Air conditioning switch	Check for continuity between switch terminals. (Refer to P 55-31.)	Continuity	Faulty air conditioning switch	Replace air conditioning switch.
4	Magnetic clutch relay	Check for continuity between terminals (2) and (4)	Continuity	Faulty air magnetic clutch relay	Replace magnetic clutch relay.
		With battery voltage applied between terminals (2) and (4), check for continuity between terminals (1) and (3)			
5	Liquid pipe	Connect adapter valve and gauge manifold to service plug to measure high pressure side refrigerant pressure.	Within range of 2,100 to 2,700 kPa (299 to 384 psi)	Gas leakage	Correct places where gas leaks.
6	Dual-pressure switch	Check for continuity between switch terminals.	Continuity	Faulty dual-pressure switch	Replace dual-pressure switch.
7	Thermostat	Check for continuity between thermostat terminals. (Refer to P.55-41.)	Continuity	Faulty thermostat	Replace thermostat.
3	Fin-thermo sensor	Measure resistance across terminals at a sensing temperature of 25°C (77°F)	Within range of 3.9 to 4.1 kΩ	Faulty fin-thermo sensor	Replace fin-thermo sensor.
9	Air inlet sensor	Measure resistance across terminals at a sensing temperature of 25°C (77°F)	Within range of 0.9 to 1 .1kΩ	Faulty air inlet sensor	Replace air inlet sensor.

If no abnormality is noted at each inspection point after inspection conducted in the sequence shown in this quick-reference table, it is suspected that the compressor is inoperative because of faulty air conditioning control unit. Therefore, replace the air conditioning control unit.

Interior temperature does not lower (No cold air coming out)

Probable cause	Remedy	Ref. page
Excessive refrigerant	Discharge refrigerant.	
Clogged receiver	Replace receiver.	55-48
Clogged expansion valve	Replace expansion valve.	55-38
Defective compressor	Replace compressor.	55-39

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SAFETY PRECAUTIONS

<Vehicles using R-l 2 refrigerant>

R-12 refrigerant is a chlorofluoro-carbon (CFC) that can contribute to the depletion of the ozone layer in the upper atmosphere.
Ozone filters out harmful radiation from the sun. To assist in protecting the ozone layer, Mitsubishi Motor Sales of America recommends that an R-12 refrigerant recycling device that meets SAE Standard J1991 be used.
Contact an automotive service equipment supplier for refrigerant recycling equipment that is available in your area.
The refrigerant used in all air conditioning systems is R-12. It is transparent and colorless in both the liquid and vapor state. Since it has a boiling point of –29.8°C (–21.7°F), at atmospheric pressure, it will be a vapor at all normal temperatures and pressures. The vapor is heavier than air, non-flammable, and nonexplosive. It is nonpoisonous except when It is in direct contact with open flame. It is noncorrosive except when combined with water. The following precautions must be observed when handling R-l 2.

Caution
Wear safety goggles when servicing the refrigeration system.

R-12 evaporates so rapidly at normal atmospheric pressures and temperatures that it tends to freeze anything it contacts. For this reason, extreme care must be taken to prevent any liquid refrigerant from contacting the skin and especially the eyes. Always wear safety goggles when servicing the refrigeration part of the air conditioning system. Keep a bottle of sterile mineral oil handy when working on the refrigeration system. Should any liquid refrigerant get into the eyes, use a few drops of mineral oil to wash them out. R-12 is rapidly absorbed by the oil. Next splash the eyes with plenty of cool water. Call your doctor immediately even though irritation has ceased after treatment.

Caution
Do not heat R-12 above 52°C (125.6°F).

In most instances, moderate heat is required to bring the pressure of the refrigerant in its container above the pressure of the system when charging or adding refrigerant. A bucket or large pan of hot water not over 52°C (1256°F) is all the heat required for this purpose. Do not heat the refrigerant container with a blow torch or any other means that would raise temperature and pressure above this temperature. Do not weld or steam clean on or near the system components or refrigerant lines.

Caution
Keep R-12 containers upright when charging the system.

When adding R-12 into the refrigeration system, keep the supply tank or cans in an upright position. If the refrigerant container is on its side or upside down, liquid refrigerant will enter the system and damage the compressor.

Caution
Always work in a well-ventilated room.

Good ventilation is vital in the working area.
Although R-12 vapor is normally nonpoisonous, contact with an open flame can cause the vapor to become very poisonous. A poisonous gas is produced when using the flame-type leak detector. Avoid inhaling the fumes from the leak detector.

Caution
Do not allow liquid refrigerant to touch bright metal.

Refrigerant will tarnish bright metal and chrome surfaces, and in combination with moisture can severely corrode all metal surfaces.

<Vehicles using R-l 34a refrigerant>

Because R-l 34a refrigerant is a hydrofluorocarbon (HFC) which contains hydrogen atoms in place of chlorine atoms, it will not cause damage to the ozone layer.

Ozone filters out harmful radiation from the sun, To assist in protecting the ozone layer, Mitsubishi Motor Sales of America recommends an R-134a refrigerant recycling device.

Refrigerant R-l 34a is transparent and colorless in both the liquid and vapor state. Since it has a boiling point of –29.8°C (–21.7°F), at atmospheric pressure, it will be a vapor at all normal temperatures and pressures. The vapor is heavier than air, non-flammable, and nonexplosive. The following precautions must be observed when handling R-l 34a.

Caution
Wear safety goggles when servicing the refrigeration system.

R-l 34a evaporates so rapidly at normal atmospheric pressures and temperatures that it tends to freeze anything it contacts. For this reason, extreme care must be taken to prevent any liquid refrigerant from contacting the skin and especially the eyes. Always wear safety goggles when servicing the refrigeration part of the air conditioning system. Keep a bottle of sterile mineral oil handy when working on the refrigeration system. Should any liquid refrigerant get into the eyes, use a few drops of mineral oil to wash them out. R-134a is rapidly absorbed by the oil. Next splash the eyes with plenty of cool water. Call your doctor immediately even though irritation has ceased after treatment.

Caution
Do not heat R-134a above 40°C (104°F).

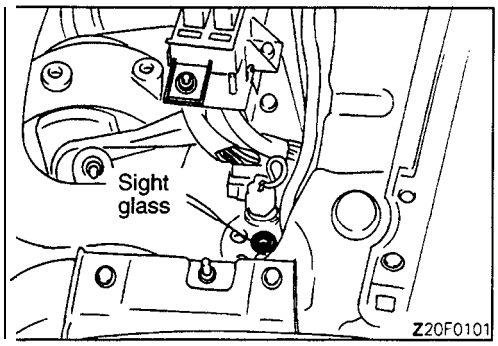
In most instances, moderate heat is required to bring the pressure of the refrigerant in its container above the pressure of the system when charging or adding refrigerant. A bucket or large pan of hot water not over 40°C (104°F) is all the heat required for this purpose. Do not heat the refrigerant container with a blow torch or any other means that would raise temperature and pressure above this temperature. Do not weld or steam clean on or near the system components or refrigerant lines.

Caution
Keep R-134a containers upright when charging the system.

When adding R-134a into the refrigeration system, keep the supply tank or cans in an upright position. If the refrigerant container is on its side or upside down, liquid refrigerant will enter the system and damage the compressor.

Caution
1. **A leak detector designed for R-134a should be used to check for refrigerant gas leaks.**
2. **Do not allow liquid refrigerant to touch bright metal.**

Refrigerant will tarnish bright metal and chrome surfaces, and in combination with moisture can severely corrode all metal surfaces.



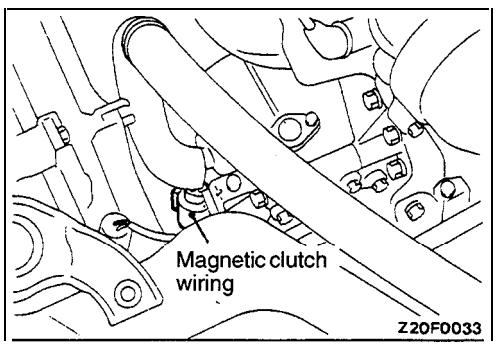
ON-VEHICLE SERVICE

TEST PROCEDURES

SIGHT GLASS REFRIGERANT LEVEL TEST

The sight glass is a refrigerant level indicator. To check the refrigerant level, clean the sight glass and start the vehicle engine. Push the air conditioning button to operate the compressor, place the blower switch to high and move the temperature control lever to MAX. COOL. After operating for a few minutes in this manner, check the sight glass.

(1) If the sight glass is clear, the magnetic clutch is engaged, the compressor discharge line is warm and the compressor inlet line is cool; the system has a full charge.
(2) If the sight glass is clear, the magnetic clutch is engaged and there is no significant temperature difference between compressor inlet and discharge lines; the system has lost most of its refrigerant charge.
(3) If the sight glass shows foam or bubbles, the system could be low on refrigerant or the receiver drier is restricted. The system has to be tested, leak checked then recharged with refrigerant.



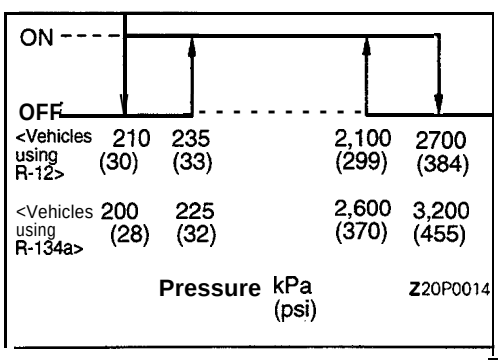
MAGNETIC CLUTCH

(1). Disconnect the wiring to the magnetic clutch.
(2) Connect battery (–) to compressor body.
(3) Connect battery (+) voltage directly to the wiring for the magnetic clutch.
(4) If the magnetic clutch is normal, there will be a “click”. If the pulley and armature do not make contact (“click”), there is a malfunction.

RECEIVER DRIER

To Test the Receiver Drier

(1) Operate the unit and check the piping temperature by touching the receiver drier outlet and inlet.
(2) If there is a difference in the temperatures, the receiver drier is restricted.
Replace the receiver drier.



DUAL PRESSURE SWITCH (LOW PRESSURE SWITCH)

(1) Turn back the adaptor valve handle all the way and install it to the low pressure side service valve.
(2) With the gauge manifold low pressure service valves closed, connect the gauge manifold high pressure side charging hose to the adaptor valve.
(3) Tighten the adaptor valve handle and open the service valve.
(4) If there is continuity between the dual pressure switch terminals when the low pressure side pressure is at the level of dual pressure switch ON condition shown to the left, the switch is functioning normally. If not, replace the switch.

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COMPRESSOR CHECK

After running the compressor for five minutes, check whether the following items are proper or not.

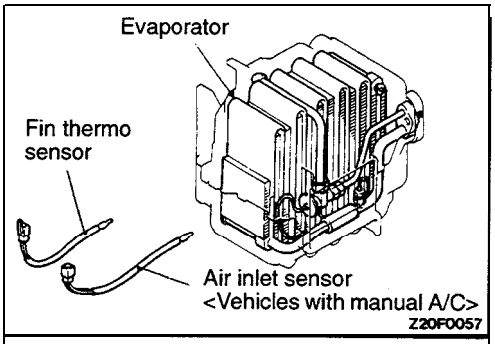
Case	Pressure on the high-pressure side	Pressure on the low-pressure side	Performance test	Criteria	Probable cause	Remedy
Case 1	Saturated pressure of open air + 200–500 kPa 28.4-71.1 psi	150-200 kPa 21.3-28.4 psi	Acceptable	Proper	–	
Case 2		100 kPa or less 14.2 psi or less	Acceptable	Abnormal The magnet clutch is frequently turned on and off.	Faulty compressor*1	Replace compressor.
Case 3	Nearly saturated pressure of open air		Rejected	The difference between the high and low pressures is not observed'.	Faulty compressor*2	
Case 4	Lower than in case 1	150–200 kPa 21.3–28.4 psi.	Rejected	Abnormal Blow-out temperature is high.	Clogged expansion valve	Replace expansion valve.

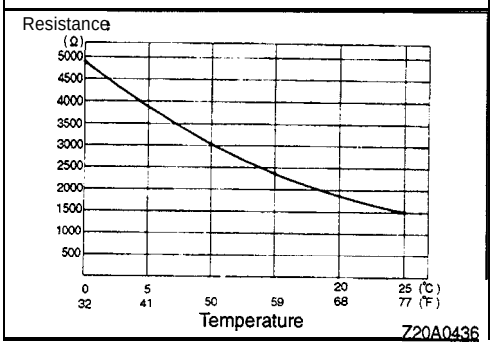
NOTE
(1) Saturated pressure of open air

Temperature °C(°F)	15 (59)	20 (68)	25 (77)	30 (86)	35 (95)	40 (104)
Saturated pressure of open air kPa (psi.)	400 (56.9)	470 (66.8)	560 (79.7)	650 (92.5)	760 (108.1)	870 (123.7)

(2) For the performance testing procedure, refer to P.55-25.
(3) *1 means that the compressor is locked in the full load state (100% delivery).
(4) *2 means that the compressor is locked in the full capacity control (delivery rate: 0) state.

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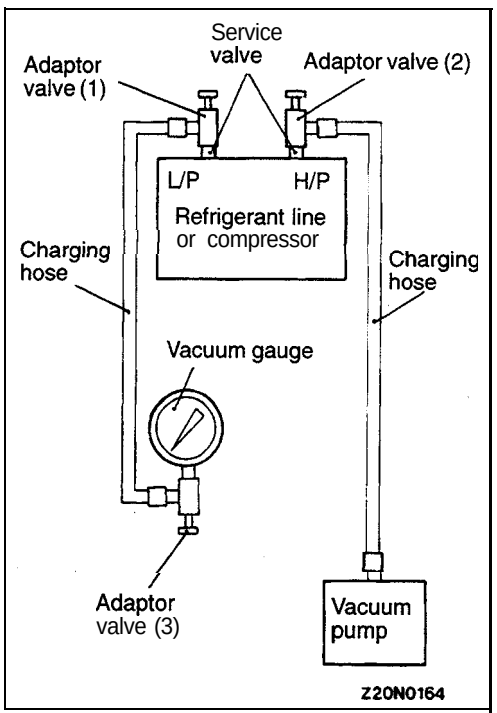


FIN-THERM0 SENSOR AND AIR-INLET SENSOR

(1) Disconnect the sensor's connector at the evaporator case, and by using an ohmmeter, measure the resistance. If the resistance is within ± 10% of value of the characteristic curve, the sensor is functioning normally.
(2) If the sensor is normal, there is a malfunction of the air conditioning control unit, and it should be replaced.

COMPRESSOR DRIVE BELT ADJUSTMENT

Refer to GROUP 11 – On-vehicle Service.



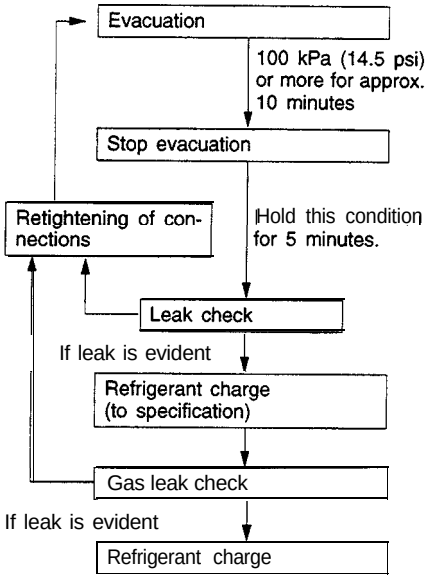
CHARGING PROCEDURES <Vehicles using R-I 2 refrigerant>

CHARGE EQUIPMENT INSTALLATION

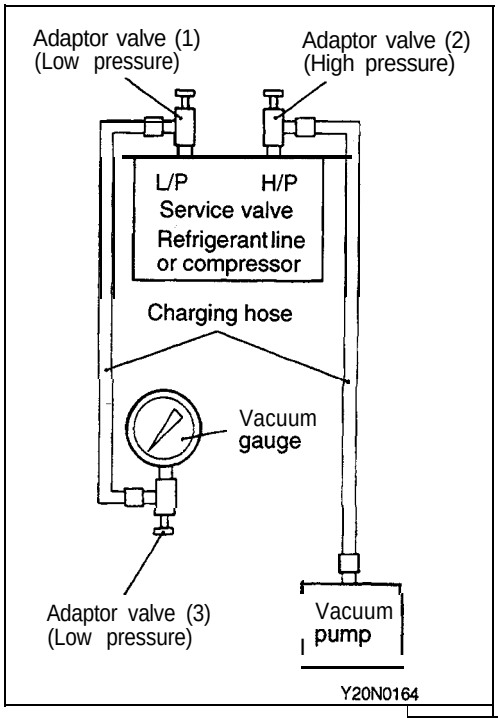
(1) Turn the adaptor valves (1) and (2) handles back fully (valves shut) and attach adaptor valves (1) and (2) to the high and low pressure service valves respectively.
(2) Fully tighten the handles of adaptor valves (1) and (2) (valves open) and open the high and low pressure service valves.
(3) Connect the charging hoses to adaptor valves (1) and (2).
(4) Attach the fully tightened adaptor valve (3) (valve open) handle to the low pressure charging hose.
(5) Attach the vacuum gauge to adaptor valve (3).
(6) Attach the vacuum pump to the high pressure charging hose.

NOTE
(1) Do not connect the high and low pressure sides adversely. (Connect high pressure side to the condenser and low pressure side to the evaporator.)
(2) The indications "DIS" and "SUC" on the compressor indicate high and low pressure sides respectively.

CHARGING SYSTEM



The refrigerant system must have been evacuated using the previous procedure before charging.
Charge using only R-12 refrigerant. R-12 is available in bulk tanks or small cans. Follow the safety precautions for handling R-12 as listed in this group.



CHARGING THE REFRIGERANT <Vehicles using R-l 2 refrigerant>

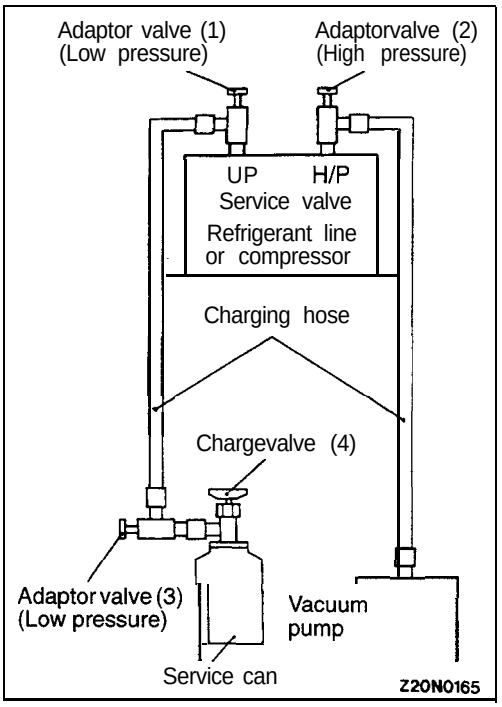
CHARGING WITH SMALL CANS

When using disposable cans of this type, follow carefully the can manufacturer's instructions.
(1) Start up the vacuum pump.
(2) Evacuate to a vacuum reading of 100 kPa (14.5 psi) or higher (approx. 10 minutes).

Caution
To prevent the indication from going wrong, vertically stand the vacuum gauge and read the scale.

(3) Turn the high pressure adaptor valve (2) handle all the way counterclockwise (valve shut).
(4) Stop the vacuum pump and allow to stand for 5 minutes.
(5) Check for leaks. (Good if the vacuum is held.)

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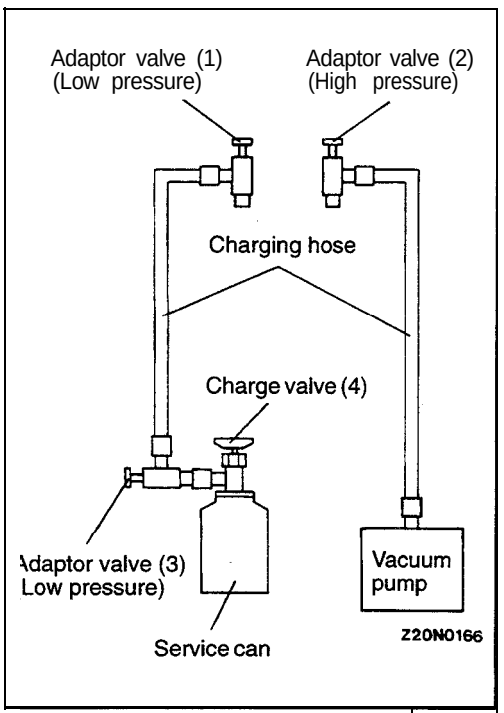
(6) Turn the charge valve (4) handle back (valve open), and attach it to the service can.
(7) Turn the adaptor valve (3) handle back fully (valve shut), remove the vacuum meter and attach the service can.
(8) Tighten the charge valve (4) handle to puncture the service can.
(9) Turn the charge valve (4) handle back (valve open), tighten the handle of adaptor valve (3) fully (valve open), and charge with refrigerant.
(IO) If the refrigerant is not drawn in, turn the adaptor valve (1) handle all the way counterclockwise (valve shut).
(11) Check for gas leaks using a leak detector.
(12) Start the engine.
(13) Operate the air conditioning and set at the lowest temperature (MAX. COOL).
(14) Fix the engine speed at 1,500 rpm.
(15) Turn the adaptor valve (1) handle fully clockwise (valve open).

Caution
If the service can is inverted, liquid refrigerant may be drawn into the compressor damaging it by liquid compression. Keep the service can upright to ensure that refrigerant is charged in gas state.

(16) After charging with refrigerant, turn the adaptor valve (1) handle fully counterclockwise (valve shut).

CHARGING WITH REFRIGERANT RECOVERY AND RECYCLING UNIT

When using refrigerant recovery and recycling unit, follow carefully the instruction manual for the unit.



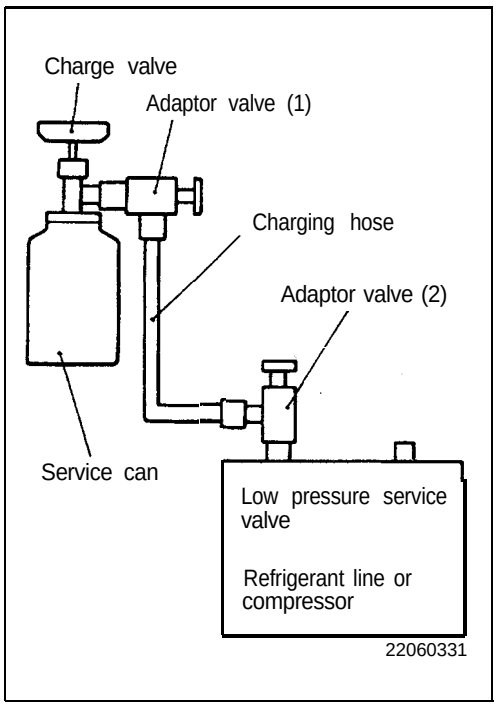
CHARGE EQUIPMENT REMOVAL

(1) Close the charge valve (4) (valve shut).
(2) Remove the adaptor valve (1) and (2) from each service valve.
(3) Remove the vacuum pump.

Caution
If some refrigerant is remaining, keep the charge valve (4) and adaptor valves (1) and (3) connected to the service can until after the next operation.

(4) Remove the charge valve (4).
(5) Remove the adaptor valve (3).
(6) Remove the adaptor valve (1).
(7) Remove the adaptor valve (2).
(8) Remove the vacuum pump.

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CORRECTING LOW REFRIGERANT LEVEL

(1) Install the charge valve to the service can with its handle turned back all the way (valve open).
(2) Attach the adaptor valve (1) with the handle tightened to the charge valve (valve open).
(3) Attach the charge hose to adaptor valve (1).
(4) Turn the handle of adaptor valve (2) back fully (valve shut) and attach the charging hose.
(5) Tighten the charge valve handle to puncture the service can.
(6) Turn the charge valve handle back fully (valve open) and operate the handle of adaptor valve (2) to bleed the air.
(7) Install the adaptor valve (2) to the low pressure side service valve.

Caution
Never attempt to use the high pressure side, or refrigerant will flow reversely and break the service can and charging hose.

(8) Start the engine.
(9) Operate the air conditioning and set at the lowest temperature (MAX. COOL).
(IO) Fix the engine speed at 1,500 rpm.
(11) Tighten the adaptor valve (2) handle (valve open) and charge refrigerant checking level with the sight glass.
(12) Upon completion of charging, turn back the adaptor valve (2) handle all the way (valve shut).
(13) Remove the adaptor valve (2) from the service valve.

NOTE
If the service can is not emptied completely, keep the charge valve and adaptor valves (1) and (2) closed until after the next operation.

DISCHARGING SYSTEM

Use the refrigerant recovery unit to discharge refrigerant gas from the system.

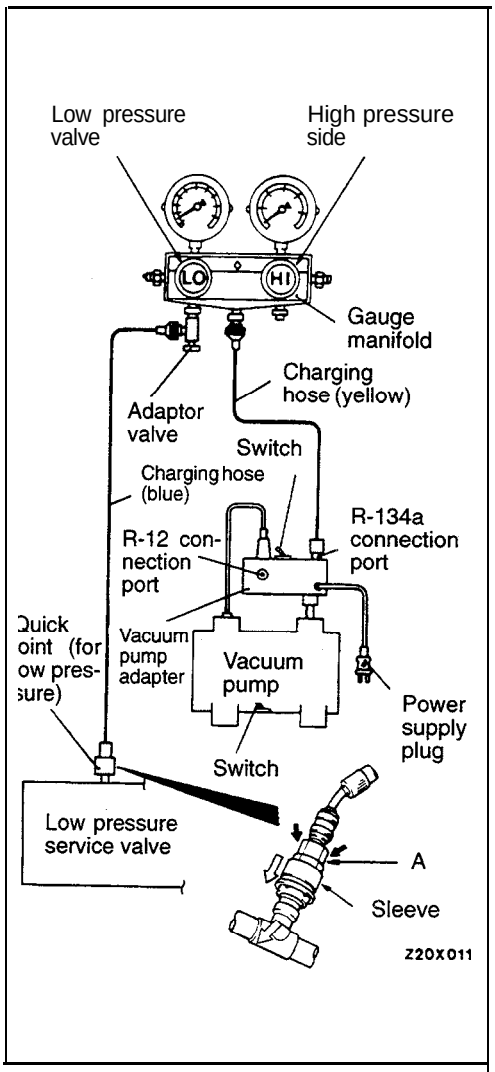
NOTE
Refer to that Refrigerant Recovery and Recycling Unit Instruction Manual for operation of the unit.

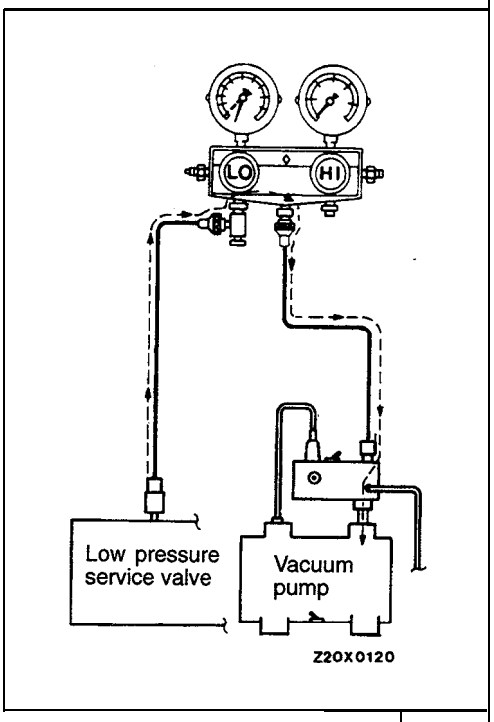
OIL IN THE AIR CONDITIONING SYSTEM REFILLING

Too little oil will provide inadequate compressor lubrication and cause a compressor failure. Too much oil will increase discharge air temperature.
When an FX-105VS compressor is installed at the factory, it contains 160 cm^3 (5.4 fl.oz.) of refrigerant oil. While the air conditioning system is in operation, the oil is carried through the entire system by the refrigerant.
Some of this oil will be trapped and retained in various parts of the system.
When the following system components are charged, it is necessary to add oil to the system to replace the oil being removed with the component.

Compressor oil: FREOL S-83 or SUNISO 5GS
Quantity
Evaporator: 60 cm^3 (2.0 fl.oz.)
Condenser: 15 cm^3 (.5 fl.oz.)
Suction hose: 10 cm^3 (.3 fl.oz.)
Receiver: 10 cm^3 (.3 fl.oz.)

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CHARGING <Vehicles using R-134a refrigerant>

(1) With the handles turned back all the way (valve closed), install the adaptor valve to the low-pressure side of the gauge manifold.
(2) Connect the charging hose (blue) to the adaptor valve.
(3) Connect the quick joint (for low pressure) to the charging hose (blue).
(4) Connect the quick joint (for low pressure) to the low pressure service valve.

NOTE
The low-pressure service valve should be connected to the low pressure hose.

Caution
1. Use tools that are designed for R-134a.
2. To install the quick joint, press section A firmly against the service valve until a click is heard. When connecting, run your hand along the hose while pressing to ensure that there are no bends in the hose.

(5) Close the high and low pressure valves of the gauge manifold.
(6) Install the vacuum pump adaptor to the vacuum pump.
(7) Connect the vacuum pump plug to the vacuum pump adaptor.
(8) Connect the charging hose (yellow) to the R-l 34a connection port of the vacuum pump adaptor.
(9) Tighten the adaptor valve handle (valve open).
(10) Open the low pressure valve of the gauge manifold.
(ll) Turn the power switch of the vacuum pump to the ON position.

NOTE
Even if the vacuum pump power switch is turned ON, the vacuum pump will not operate because of the power supply connection in step (7).

(12) Turn the vacuum pump adaptor switch to the R-134a side to start the vacuum pump.

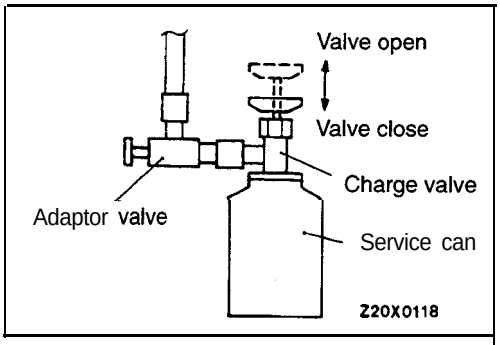
Caution
Do not operate the compressor during evacuation.

(13) Evacuate to a vacuum reading of 100 kPa (29.5 inHg) or higher (takes approx. 10 minutes).
(14) Turn the vacuum pump adaptor switch OFF and allow to stand it for 5 minutes.

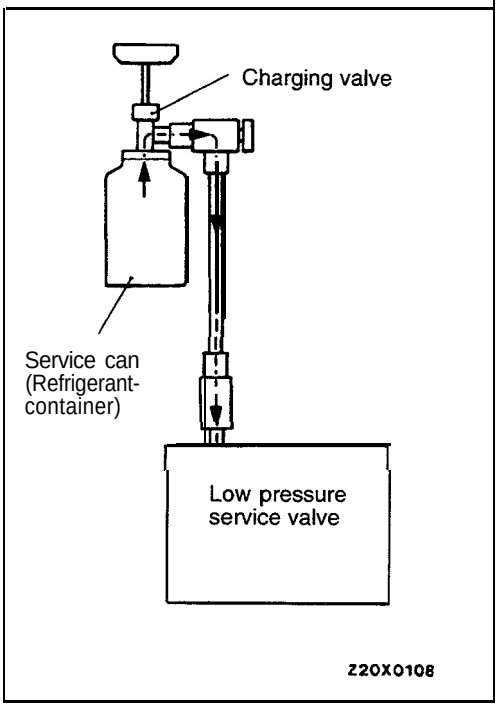
Caution
Do not operate the compressor in the vacuum condition; damage may occur.

(15) Carry out a leak test. (Good if the negative pressure does not drop.)

Caution
If the negative pressure (vacuum) is lost, check for loose connections. Then, repeat the evacuation procedure from step (12). If negative pressure (vacuum) is still lost, add 1 lb of refrigerant and check system using an R-134a compatible leak detector.



(16)With the handle turned out all the way (valve open), install the charging valve to the service can.
(17)Turn the handle of the adaptor valve back all the way (valve closed), remove it from the gauge manifold and install the service can.
(18)Tighten the handle of the charging valve (valve closed) to puncture the service can.



(19)Turn the handle of the charging valve back (valve open) and tighten the handle of the adaptor valve (valve open) to charge the system with refrigerant.

Caution
If the service can is inverted, liquid refrigerant may be drawn into the compressor damaging it by liquid compression. Keep the service can upright to ensure that refrigerant is charged in gas state.

(20)If the refrigerant is not drawn in, turn the handle of the adaptor valve back all the way (valve closed).
(21)Check for gas leaks using a leak detector.
If a gas leak is detected, re-tighten the connections, and then repeat the charging procedure from evacuation in step (12).

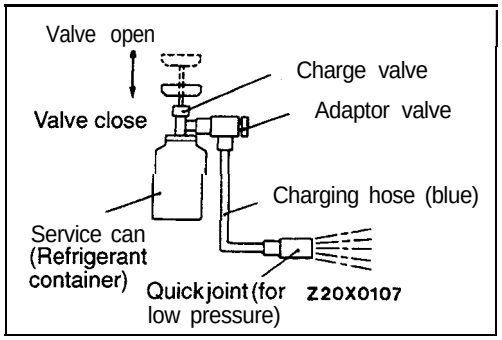
Caution
A leak detector designed for R-134a should be used.

(22)Start the engine.
(23)Operate the A/C and set to the lowest temperature (MAX. COOL).
(24)Fix the engine speed at 1,500 rpm.
(25)Tighten the handle of the adaptor valve (valve open) to charge the required volume of refrigerant.

Caution
If the service can is inverted, liquid refrigerant may be drawn into the compressor damaging it by liquid compression. Keep the service can upright to ensure that refrigerant is charged in gas state.

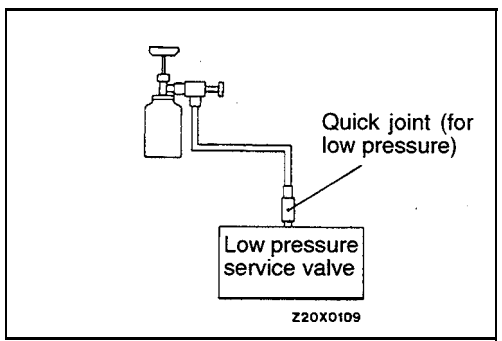
(26)After charging with refrigerant, turn the handle of the adaptor valve back all the way (valve closed).
(27)lighten the charging valve handle (valve closed).
Remove the quick joint (for low pressure) from the low-pressure service valve.

NOTE
If the service can is not emptied completely, keep the handles of the charging valve and adaptor valve closed for the next charging.



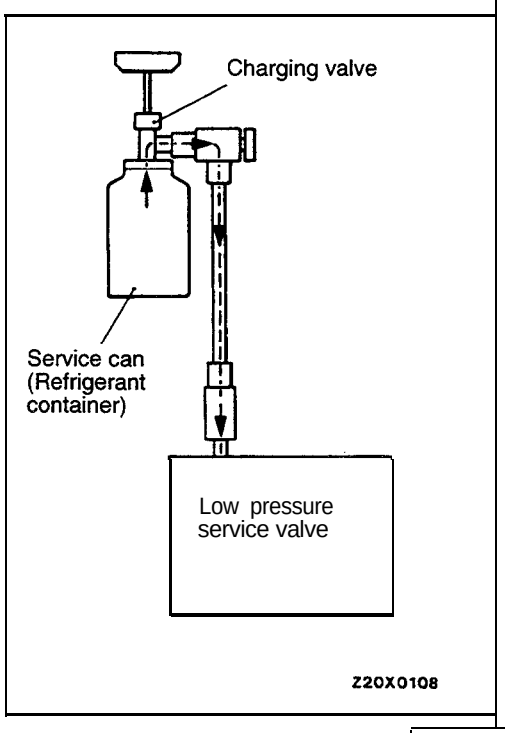
CORRECTING LOW REFRIGERANT LEVEL IN CASE THE SERVICE CAN IS USED

(1) Install the charge valve with the handle turned all the way out (valve open) of the service can.
(2) Install the adaptor valve with the handle turned all the way back (valve close) to the charging valve.
(3) Connect the charging hose (blue) to the adaptor valve.
(4) Connect the charging hose (blue) to the quick joint (for low pressure).
(5) Tighten the handle of the charge valve (valve close), and pierce the service can.
(6) Turn the handle of the adaptor valve to bleed the air.



(7) Install the quick joint (for low pressure) to the low pressure service valve.

NOTE
The low-pressure service valve should be connected to the low-pressure hose.



(8) Start the engine.
(9) Operate, the air conditioner and set at the lowest temperature (MAX. COOL).
(10) Fix the engine speed at 1,500 rpm.
(11) Tighten the handle of the adaptor valve (valve open), and replenish refrigerant checking the quantity through the sight glass.

Caution
If the service can is inverted, liquid refrigerant may be draw into the compressor damaging it by liquid compression. Keep the service can upright to ensure that refrigerant is charged in gas state.

(12) After replenishing is completed, turn the handle of the adaptor valve all the way back (valve close), and remove the quick joint.

NOTE
If any refrigerant is remaining in the service can, close the adaptor valve and save the refrigerant for another vehicle. Do not release into the atmosphere.

METHOD BY USING REFRIGERANT RECOVERY AND RE-CYCLING UNIT

Using the refrigerant recovery and recycling unit, refill the refrigerant.

NOTE
Refer to that Refrigerant Recovery and Recycling Unit Instruction Manual for operation of the unit.

DISCHARGING SYSTEM

Use the refrigerant recovery unit to discharge refrigerant gas from the system.

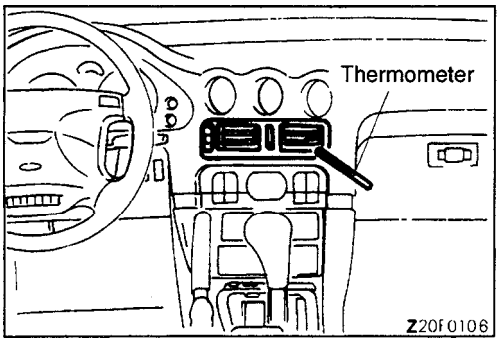
NOTE
Refer to that Refrigerant Recovery and Recycling Unit Instruction Manual for operation of the unit.

OIL REFILLING IN THE AIR CONDITIONING SYSTEM

Too little oil will provide inadequate compressor lubrication and cause a compressor failure. Too much oil will increase discharge air temperature.
When a compressor is installed at the factory, it contains 160 cm^3 (5.4 fl.oz.) of refrigerant oil. While the air conditioning system is in operation, the oil is carried through the entire system by the refrigerant.
Some of this oil will be trapped and retained in various parts of the system.
When the following system components are charged, it is necessary to add oil to the system to replace the oil being removed with the component.

Compressor oil: SUN PAG 56

Quantity
Evaporator: 60 cm^3 (2.0 fl.oz.)
Condenser: 15 cm^3 (.5 fl.oz.)
Suction hose: 10 cm^3 (.3 fl.oz.)
Receiver: 10 cm^3 (.3 fl.oz.)



PERFORMANCE TEST

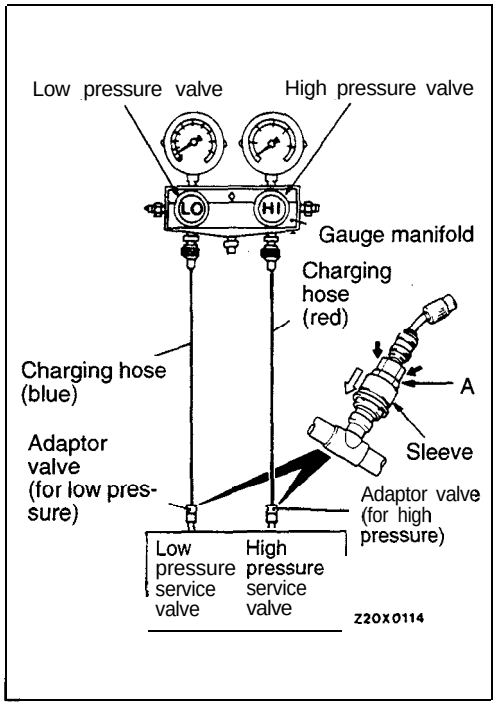
<Vehicles using R-12 refrigerant>

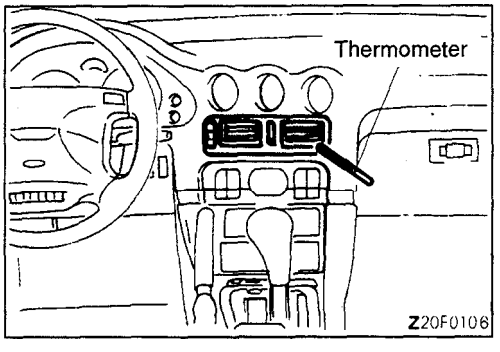
(1) Park the tested vehicle at the area which is not exposed to direct sunlight.
(2) Connect a tachometer.
(3) Turn back the adaptor valve handle all the way and install the adaptor valves to the high pressure and low pressure service valves.
(4) Connect the gauge manifold to the adaptor valves.
(5) Tighten the adaptor valve handle and open the service valves.
(6) Start the engine.
(7) Set the controls to the air conditioning as follows:
Air conditioning switch: Air conditioning – ON position
Mode selection: Face position
Temperature control: MAX. COOL position
Air selection: Recirculation position
Blower switch: HI (Fast) position
(8) Adjust engine speed to 1,000 rpm with air conditioning clutch engaged.
(9) Engine should be warmed up with doors, windows close, and hood open.
(lO)Insert a thermometer in the center air conditioning outlet and operate the engine for 20 minutes.
(ll)Note the discharge air temperature.

NOTE
If the clutch cycles, take the reading before the clutch disengages.

Performance Temperature Chart

Garage ambient temperature °C (°F)	21 (70)	26.7 (80)	32.2 (90)	37.8 (100)	43.3 (110)
Discharge air temperature °C (°F)	0.0–3.0 (32.0–37.4)	1.0–4.0 (33.8–39.2)	1.0-4.0 (33.8-39.2)	1.0–4.0 (33.8–39.2)	2.0–5.0 (35.6–41.0)
Compressor discharge pressure kPa (psi)	690–740 (98.1–105.3)	780–830 (110.9–118.1)	870-920 (123.7-130.9)	1,080–1,130 (153.6–160.7)	1,210–1,260 (172.1–179.2)
Compressor suction pressure kPa (psi)	130-190 (18.5–27.5)	130-190 (18.5-27.5)	130-190 (18.5-27.5)	130-190 (18.5-27.5)	130-190 (18.5-27.5)





<Vehicles using R-134a refrigerant>

(1) The vehicles to be tested should be in a place that is not in direct sunlight.
(2) Close the high and low pressure valve of the gauge manifold.
(3) Connect the charging hose (blue) to the low pressure valve and connect the charging hose (red) to the high pressure valve of the gauge manifold.
(4) Install the quick joint (for low pressure) to the charging hose (blue), and connect the quick joint (for high pressure) to the charging hose (red).
(5) Connect the quick joint (for low pressure) to the low-pressure service valve and connect the quick joint (for high pressure) to the high-pressure service valve.

NOTE
The high-pressure service valve is on high-pressure pipe B, and the low-pressure service valve is on the low-pressure hose.

Caution
To connect the quick joint, press section A firmly against the service valve until a click is heard. When connecting, run your hand along the hose while pressing to ensure that there are no bends in the hose.

(6) Start the engine.
(7) Set the A/C controls as follows:
A/C switch: A/C – ON position
Mode selection: Face position
Temperature control: Max. cooling position
Air selection: Recirculation position
Blower switch: HI (Fast) position
(8) Adjust engine speed to 1,000 rpm with A/C clutch engaged.
(9) Engine should be warmed up with doors and windows closed.
(10) Insert a thermometer in the left center A/C outlet and operate the engine for 20 minutes.
(11) Note the discharge air temperature.

NOTE
If the clutch cycles, take the reading before the clutch disengages.

Performance Temperature Chart

Garage ambient temperature °C (°F)	21 (70)	26.7 (80)	32.2 **(90)**	37.8 **(100)**	43.3 (110)
Discharge air temperature °C (°F)	0.0-3.0 (32.0-37.4)	1 .0-4.0 **(33.8-39.2)**	1 .0-4.0 **(33.8-39.2)**	1 .0-4.0 **(33.8-39.2)**	2.0-5.0 (35.6–41.0)
Compressor discharge pressure kPa (psi)	690-740 (98.1–105.3)	780-830 (110.9-118.1)	**870-920** (123.7-130.9)	1,080–1,130 (153.6-160.7)	1,210-l ,260 (172.1-179.2)
Compressor suction pressure kPa (psi)	130-190 (18.5-27.5)	130-190 (18.5-27.5)	130-190 (18.5–27.5)	130-190 (18.5-27.5)	130-190 (18.5–27.5)

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REFRIGERANT LEAK REPAIR PROCEDURE

LOST CHARGE

If the system has lost all charge due to a leak:
(1) Evacuate the system. (See procedure.)
(2) Charge the system with approximately one pound of refrigerant.
(3) Check for leaks.
(4) Discharge the system.
(5) Repair leaks.
(6) Replace receiver drier.

Caution
Replacement filter-drier units must be sealed while in storage. The drier used in these units will absorb water/water vapor quickly upon exposure to the atmosphere. When installing a drier, have all tools and supplies ready for quick reassembly to avoid keeping the system open any longer than necessary.

(7) Evacuate and charge the system.

LOW CHARGE

If the system has not lost all of its refrigerant charge, locate and repair all leaks. If it is necessary to increase the system pressure to find the leak (because of an especially low charge) add refrigerant. If it is possible to repair the leak without discharging the refrigerant system, use the procedure for correcting low refrigerant level.

HANDLING TUBING AND FITTINGS

Kinks in the refrigerant tubing or sharp bends in the refrigerant hose lines will greatly reduce the capacity of the entire system. High pressures are produced in the system when it is operating. Extreme care must be exercised to make sure that all connections are pressure tight. Dirt and moisture can enter the system when it is opened for repair or replacement of lines or components. The following precautions must be observed.
The system must be completely discharged before opening any fitting of connection in the refrigeration system. Open fittings with caution even after the system has been discharged. If any pressure is noticed as a fitting is loosened, allow trapped pressure to bleed off very slowly.
Never attempt to rebend formed lines to fit. Use the correct line for the installation you are servicing. A good rule for the flexible hose lines is keep the radius of all bends at least 10 times the diameter of the hose.
Sharper bends will reduce the flow of refrigerant. The flexible hose lines should be routed so that they are at least 80 mm (3 in.) from the exhaust manifold.
It is good practice to inspect all flexible hose lines at least once a year to make sure they are in good condition and properly routed.
O-ring used on connections are not reusable.

COMPRESSOR NOISE

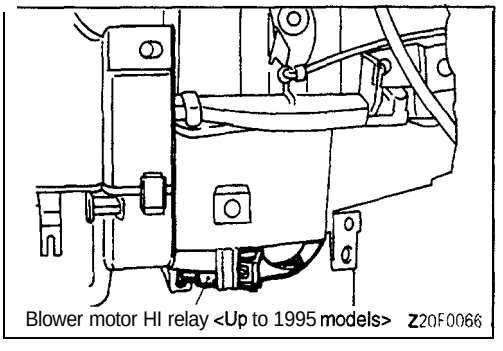
When investigating an air conditioning related noise, you must first know the conditions when the noise occurs. These conditions are: weather, vehicle speed, gear in neutral, engine temperature or any other special conditions.
Noises that develop during air conditioning operation can often be misleading. For example: what sounds like a failed front bearing or connecting rod, may be caused by loose bolts, nuts, mounting brackets, or a loose clutch assembly. Verify accessory drive belt tension (power steering or generator). Improper accessory drive belt tension can cause a misleading noise when the compressor is engaged and little or no noise when the compressor is disengaged.
Drive belts are speed sensitive. That is, at different engine speeds, and depending upon belt tension, belts can develop unusual noises that are often mistaken for mechanical problems within the compressor.

ADJUSTMENT PROCEDURES

(1) Select a quiet area for testing. Duplicate conditions as much as possible. Switch compressor on and off several times to clearly identify compressor noise.
To duplicate high ambient conditions (high head pressure), restrict air flow through condenser. Install manifold gauge set to make sure discharge pressure doesn't exceed 2,070 kPa (300 psi).
(2) Tighten all compressor mounting bolts, clutch mounting bolt, and compressor drive belt. Check to assure clutch coil is tight (no rotation or wobble).
(3) Check refrigerant hoses for rubbing or interference that can cause unusual noises.
(4) Check refrigerant charge. (See "Charging System".)
(5) Recheck compressor noise as in Step 1.
(6) If noise still exists, loosen compressor mounting bolts and retorque. Repeat Step 1.
(7) If noise continues, replace compressor and repeat Step 1.

POWER RELAY CHECK

(1) Remove the radiator fan motor relays (HI) and (LO) from the relay box on the right of the engine compartment.
(2) Remove the radiator fan motor relay (air conditioning) <Up to 1993 models>, condenser fan motor relays (HI) and (LO), and air-conditioning compressor relay from the relay box on the left of the engine compartment.
(3) Remove the blower motor relay from the junction box.
(4) Remove the blower motor HI relay <Up to 1995 models> from the blower case assembly.
(5) Check the continuity between terminals using a circuit tester.


Blower motor HI relay <Up to 1995 models> Z20F0066

IDLE-UP OPERATION CHECK

(1) Before inspection and adjustment set vehicle in the following condition:
- Engine coolant temperature: 80–95°C (176–203°F)
- Lights, electric cooling fan and accessories: Set to OFF
- Transaxle: Neutral (N or P for vehicles with A/T)
- Steering wheel: Straightforward

(2) Check to be sure that the idling speed becomes the standard value when the air conditioning switch is switched ON and the air conditioning is activated.

Standard value: 900 ± 100 rpm

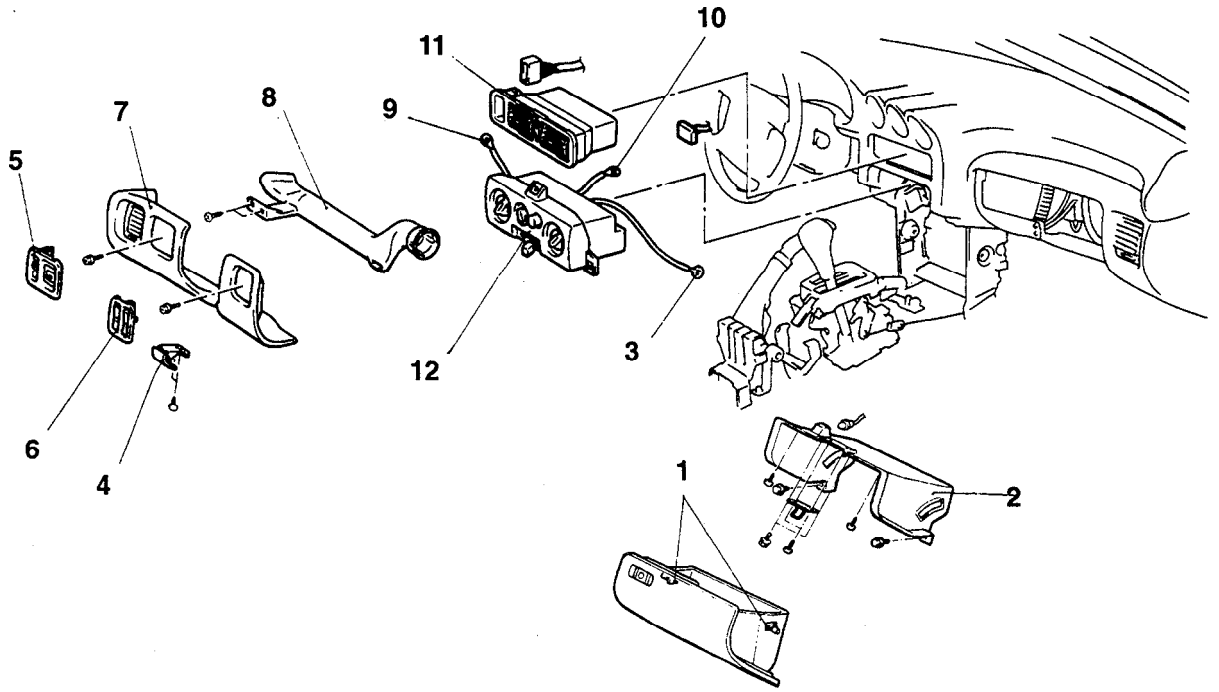
NOTE
Idle speed is controlled by the ISC system and is not adjustable. If, idle speed is not within specifications, check the ISC system.
(Refer to GROUP 13A – On-vehicle Service.)

HEATER CONTROL ASSEMBLY

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Floor Console Removal and Installation (Refer to GROUP 52A – Floor Console.)

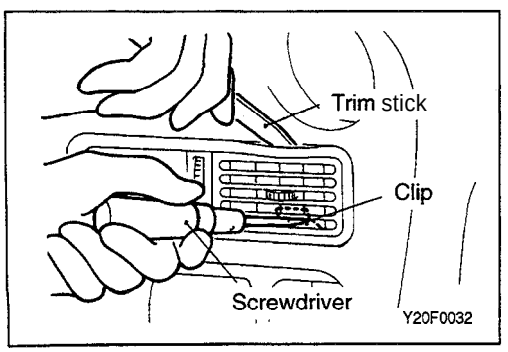
CAUTION: SRS
When installing or removing the floor console, don't allow any impact or shock to the SRS diagnosis unit.



Z20F0078

Removal steps

1. Stopper
2. Glove box outer case assembly
▶C◀ 3. Air-selection control wire connection
4. Hood lock release handle
5. Rheostat assembly
6. Rear wiper and washer switch
7. Knee protector
8. Shower duct
▶B◀ 9. Mode control wire connection
▶A◀ 10. Temperature control wire connection
◀A▶ 11. Center air outlet assembly
12. Heater control assembly

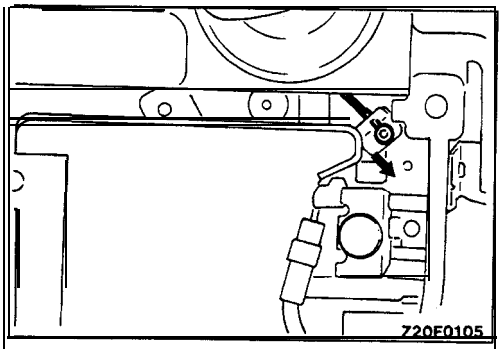


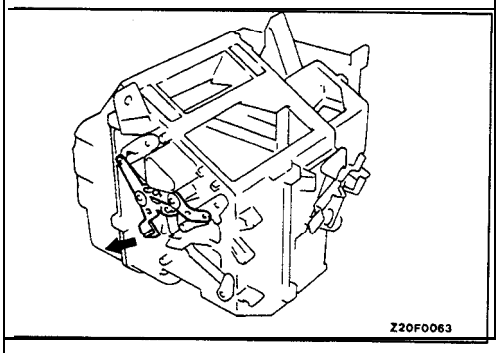
REMOVAL SERVICE POINT

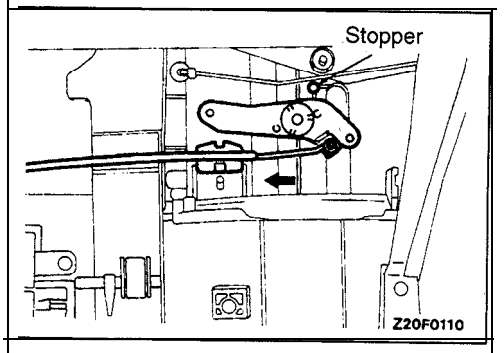
◀A▶ CENTER AIR OUTLET ASSEMBLY REMOVAL

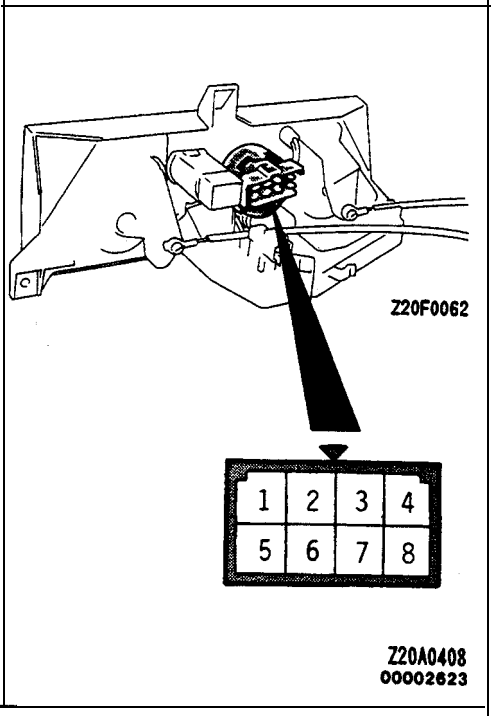
Disengaging the clips (2 positions) of the center air outlet assembly with a flat tip screwdriver, remove the center air outlet assembly with the trim stick.

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INSTALLATION SERVICE POINTS

▶A◀ TEMPERATURE CONTROL WIRE INSTALLATION

Connect the temperature control wire to the blend air damper lever by following the steps below.

(1) Move the temperature control lever to the rightmost position. ("HOT" position)
(2) With the blend air damper lever pressed completely downward in the direction indicated by the arrow, connect the inner cable of the temperature control wire to the end of the blend air damper lever, and then secure the outer cable: by using a clip.

▶B◀ MODE SELECTION CONTROL WIRE INSTALLATION

Connect the mode selection control wire to the mode selection damper lever by following the steps below.

(1) Move the mode selection lever to the defroster position.
(2) With the mode selection damper lever pressed' inward in the direction indicated by the arrow, connect the inner cable of the mode selection control wire to the end of the mode selection lever, and then secure the outer cable by using a clip.

▶C◀ AIR SELECTION CONTROL WIRE INSTALLATION

Connect the air selection control wire to the air selection damper lever by following the steps below.

(1) Move the air selection control lever to the recirculation position.
(2) Set the air selection damper lever as it contacts stopper.
(3) Connect the inner cable of the air selection control wire to the end of the air selection lever, and then secure the outer cable by using a clip.

INSPECTION

BLOWER SWITCH CHECK

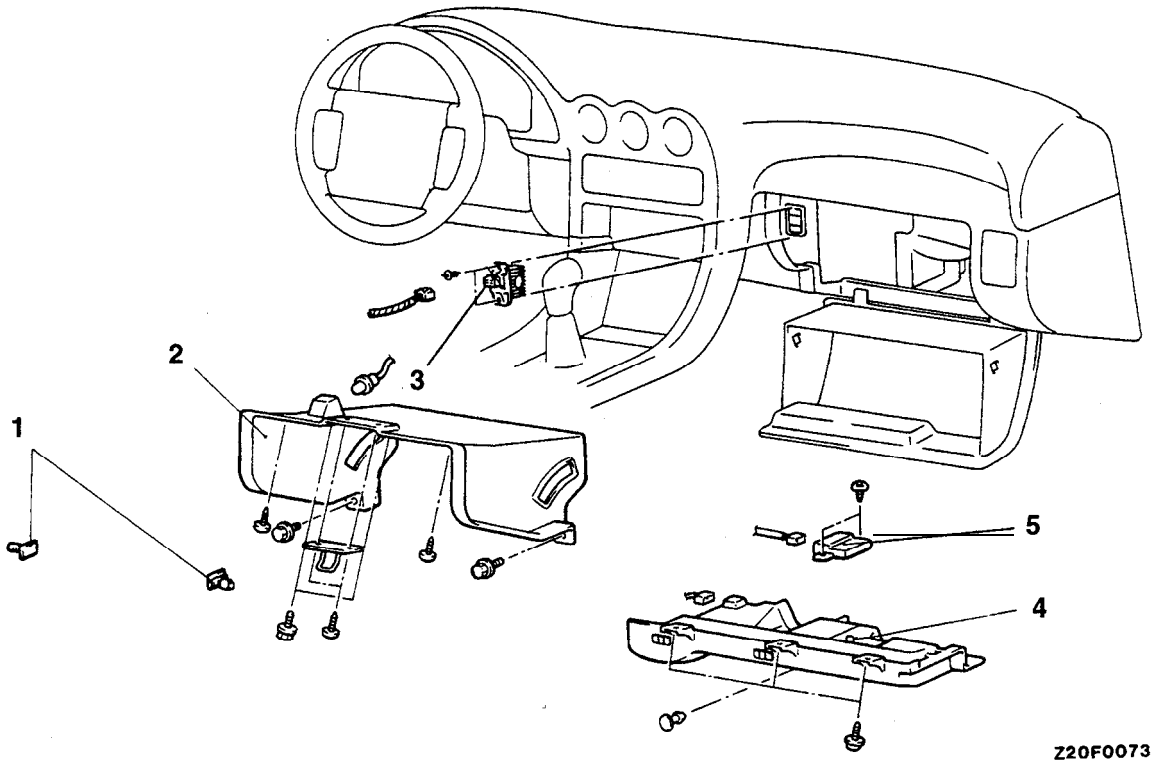
Operate the switch, and check the continuity between the terminals.

Switch position	Terminal No.							
	5	3	6	2	7	8	1	4
OFF								
• (Low)	○	○				○	○	
● (Medium first step)	○		○			○	○	
● (Medium second step)	○			○		○	○	○
● (High)	○				○	○	○	○

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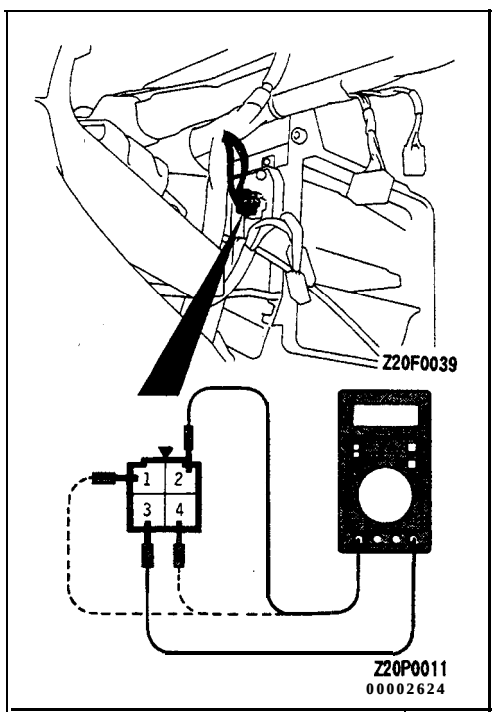
RESISTOR, AIR CONDITIONING COMPRESSOR LOCK CONTROLLER

REMOVAL AND INSTALLATION



Removal steps

1. Stopper
2. Glove box outer case assembly
3. Resistor
4. Under cover
5. A/C compressor lock controller <DOHC>



INSPECTION

RESISTOR CHECK

Using a circuit tester, measure the resistance between the terminals indicated below.
The condition can be considered satisfactory if the value measured at this time is equivalent to the standard value.

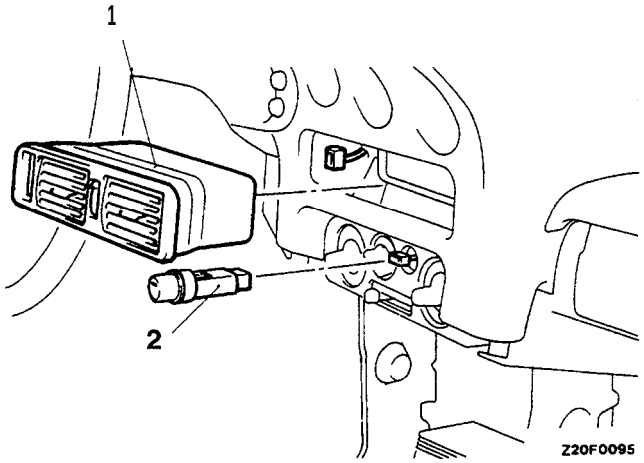
Standard value

Terminals measured	Standard value Ω
Between terminals (2)–(1)	Approx. 1.76-2.06
Between terminals (2)–(4)	Approx. 1.10–1.26
Between terminals (2)–(3)	Approx. 0.38-0.44

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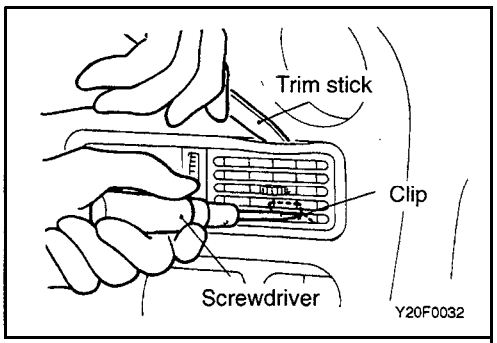
AIR CONDITIONING SWITCH

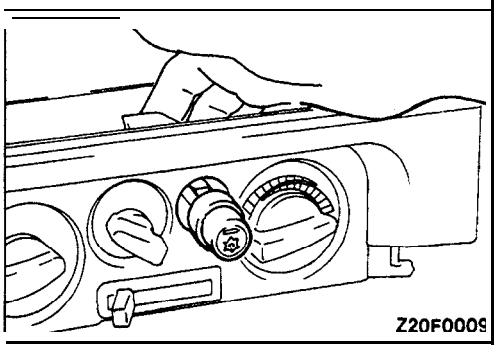
REMOVAL AND INSTALLATION

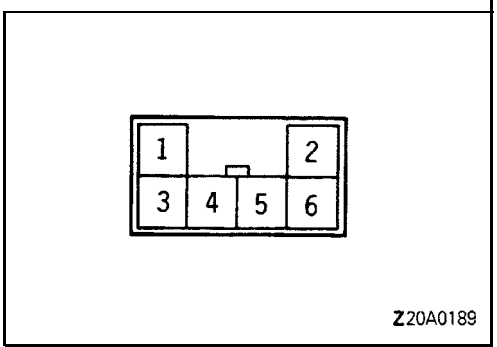


Removal steps

◀A▶ 1. Center air outlet assembly
◀B▶ 2. Air conditioning switch







REMOVAL SERVICE POINTS

◀A▶ CENTER AIR OUTLET ASSEMBLY REMOVAL

Disengaging the clips (2 positions) of the center air outlet assembly with a flat tip screwdriver, remove the center air outlet assembly with the trim stick.

◀B▶ AIR CONDITIONING SWITCH REMOVAL

Remove the center air outlet assembly, and insert hand to the back of the cluster panel assembly through the produced opening. Push it toward you for removal.

INSPECTION

AIR CONDITIONING SWITCH CHECK

<Up to 1995 models>

Switch position	Terminal No.					
	1	2	4	5	13	6
OFF						
If pressed 1 step (ECONOMY)	○		○			
If pressed 2 steps (Air conditioning)	○	○	○	⋈*		Illumination light

<From 1996 models>

Switch position	Terminal No.				
	1	4	5	3	6
OFF					
ON	○	○	⋈*		Illumination light

NOTE
*: <Indication light>

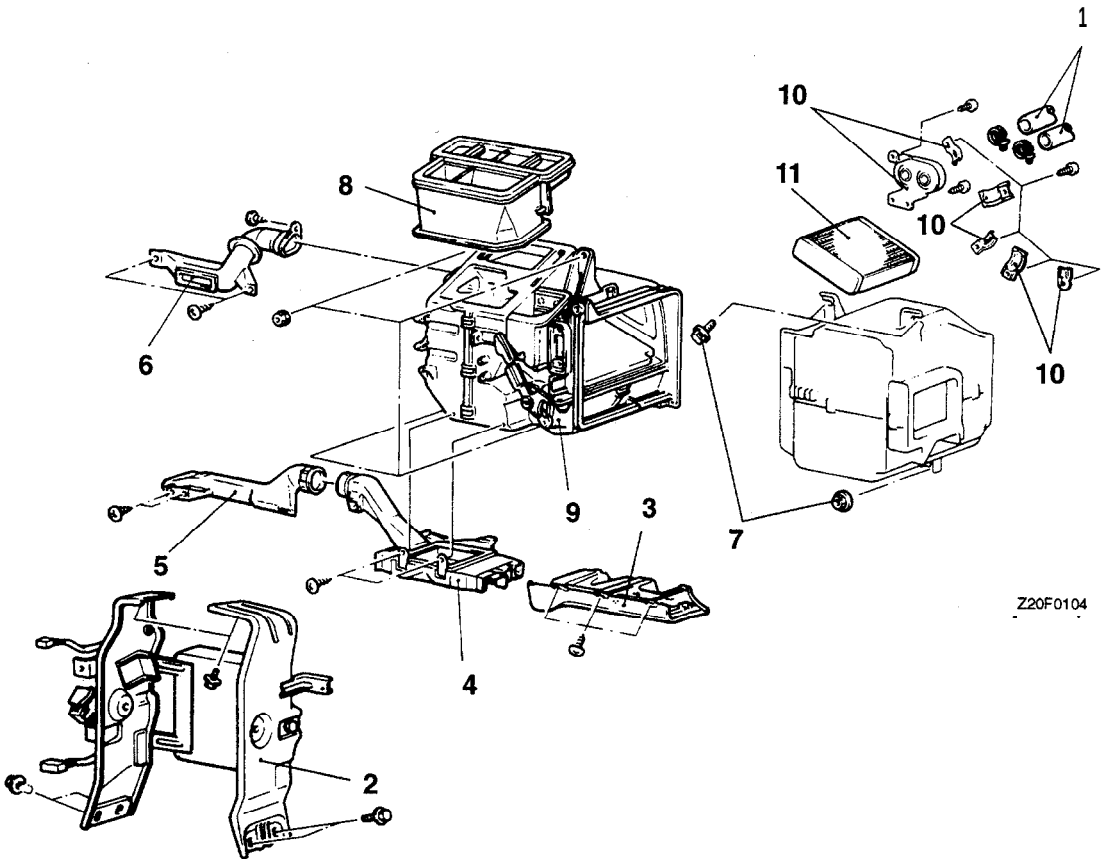
TSB Revision

HEATER UNIT

REMOVAL AND INSTALLATION

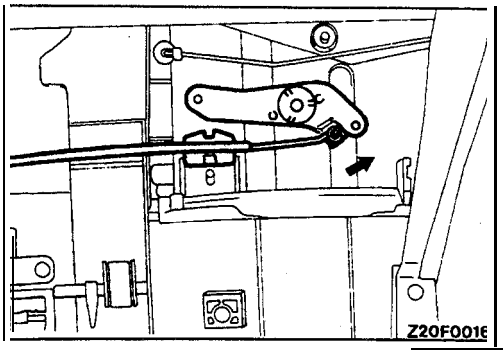
Pre-removal and Post-installation Operation
- Coolant Draining and Supplying (Refer to GROUP 11 – On-vehicle Service.)
- Floor Console and Instrument Panel Removal and Installation (Refer to GROUP 52A – Floor Console and Instrument Panel.)

CAUTION: SRS
When installing or removing the floor console and instrument panel, don't allow any impact or shock to the SRS diagnosis unit.



Removal steps
1. Water hoses connection
2. Center reinforcement
3. Under cover
4. Distribution duct (foot)
5. Foot shower duct
6. Lap cooler duct

◀A▶
7. Evaporator mounting bolt and nut <Vehicles with air conditioning>
8. Center duct
9. Heater unit
10. Plate
11. Heater core



REMOVAL SERVICE POINT

◀A▶ EVAPORATOR MOUNTING BOLT REMOVAL <Vehicles with manual air conditioning>

NOTE
In order to prevent bolts from falling into the blower assembly, set the air-selection damper to the position that permits outside air introduction.

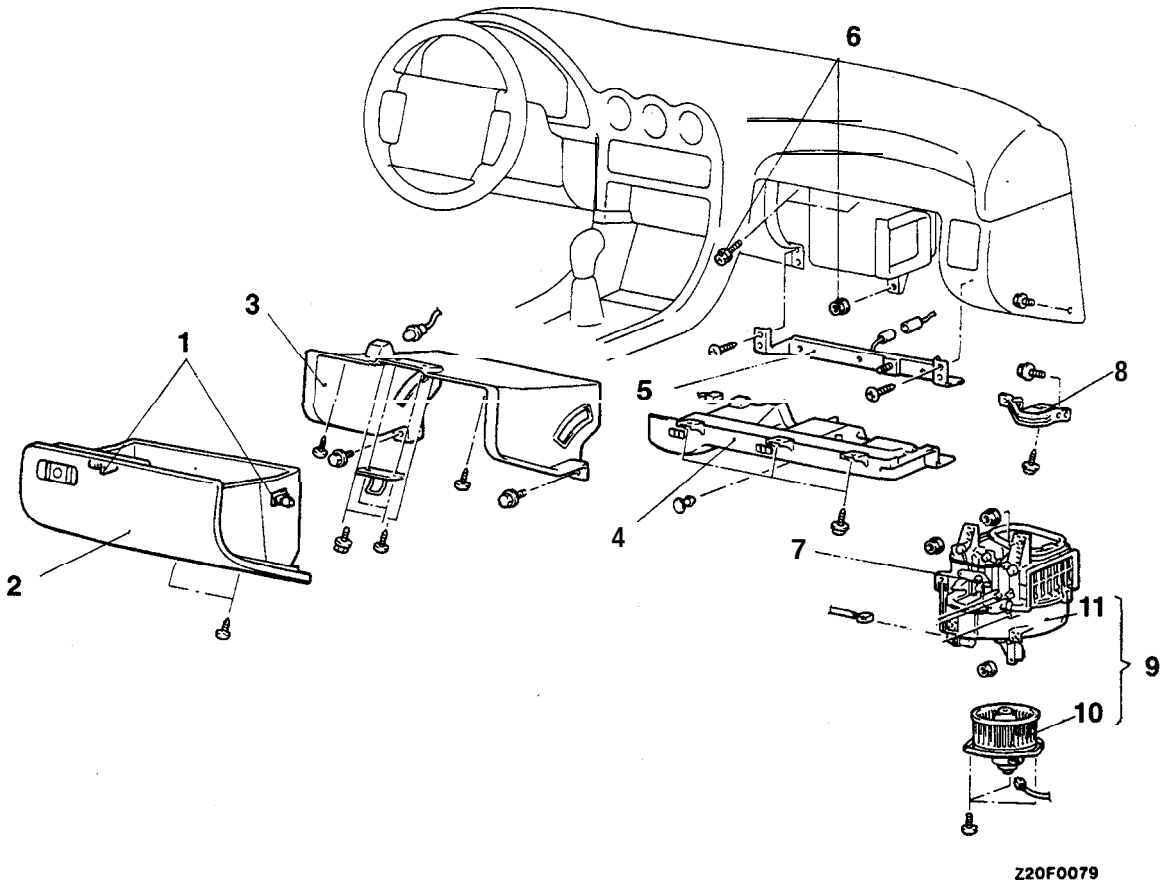
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INSPECTION

- Check the operation of dampers and link mechanism.
- Check the heater core for clogging and water leakage.

BLOWER ASSEMBLY

REMOVAL AND INSTALLATION



Blower case assembly removal steps

1. Stopper
2. Glove box
3. Glove box outer case assembly
4. Under cover
5. Lower frame
6. Evaporator mounting bolt and nut <Vehicles with air conditioning>

▶B◀ 7. Air-selection wire connection

8. Side frame
9. Blower, assembly

▶A◀ 10. Blower motor assembly

11. Blower case assembly

Blower motor assembly removal steps

4. Under cover

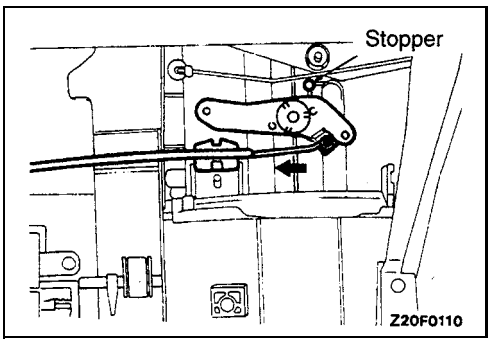
▶A◀ 10. Blower motor assembly

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INSTALLATION SERVICE POINTS

▶A◀ BLOWER MOTOR ASSEMBLY INSTALLATION

Before installing the blower motor assembly, carefully clean away any dust, dirt, etc. adhering to the inner surface of the blower case.



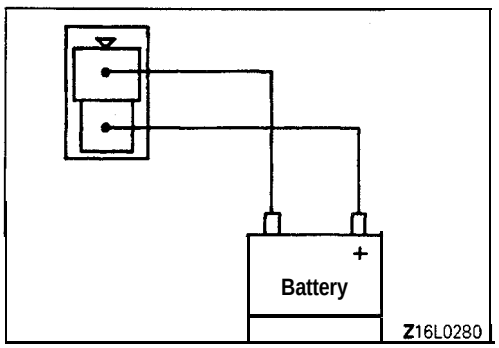
▶B◀ AIR SELECTION CONTROL WIRE INSTALLATION

Connect the air selection control wire to the air selection damper lever by following the steps below.

(1) Move the air selection control lever to the recirculation position.
(2) Set the air selection damper lever as it contacts stopper.
(3) Connect the inner cable of the air selection control wire to the end of the air selection lever, and then secure the outer cable by using a clip.

INSPECTION

- Check for bending or abnormal deflection of the rotating shaft of the blower motor assembly.
- Check for cracking or deterioration of the packing.
- Check for damage to the fan.
- Check for damage to the blower case.
- Check the operation of the inside/outside air selection damper, and for damage.



BLOWER MOTOR ASSEMBLY CHECK

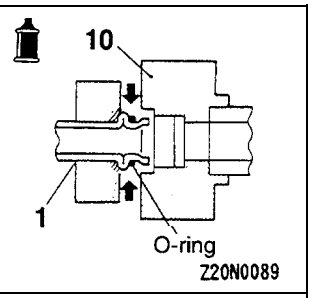
When battery voltage is applied between the terminals, check to be sure that the motor operates. Also, check to be sure that there is no abnormal noise.

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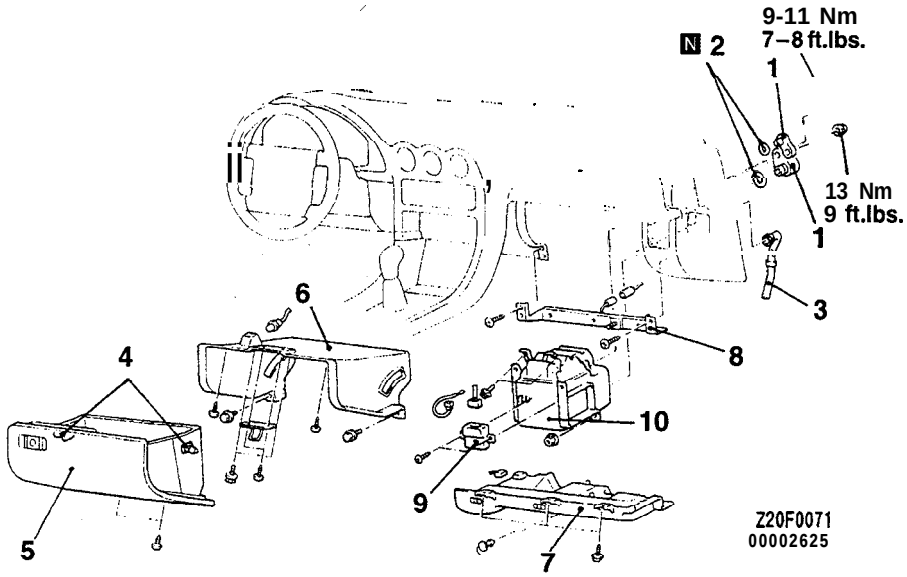
EVAPORATOR

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Refrigerant Discharge and Charging (Refer to P.55-21, 18, 25, 22.)
- Battery Removal and Installation



Compressor oil:
FREOL S-83 or SUNISO 5GS <Vehicles using R-I 2 refrigerant>
SUN PAG 56 <Vehicles using R-134a refrigerant>



Removal steps

◀A▶
1. Discharge pipe C and suction hose B connection
2. O-ring
3. Drain hose
4. Stopper
5. Glove box
6. Glove box outer case assembly
7. Under cover
8. Lower frame
9. A/C control unit <Up to 1995 models>
▶A◀ 10. Evaporator

REMOVAL SERVICE POINT

◀A▶ DISCHARGE PIPE C AND SUCTION HOSE B DISCONNECTION

If the hoses or pipes are disconnected, cap the hoses or pipes with a blank plug to prevent entry of dust, dirt, and water.

INSTALLATION SERVICE POINT

,A(EVAPORATOR INSTALLATION

If a new evaporator is used, fill it with the specified amount of compressor oil before installing on the vehicle.

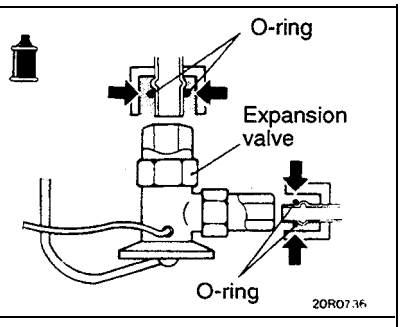
Compressor oil:
FREOL S-83 or SUNISO 5GS <Vehicles R-12 refrigerant>
SUN PAG 56 <Vehicles using R-134a refrigerant>
Quantity: 60 cm³ (2.0 fl.oz.)

INSPECTION

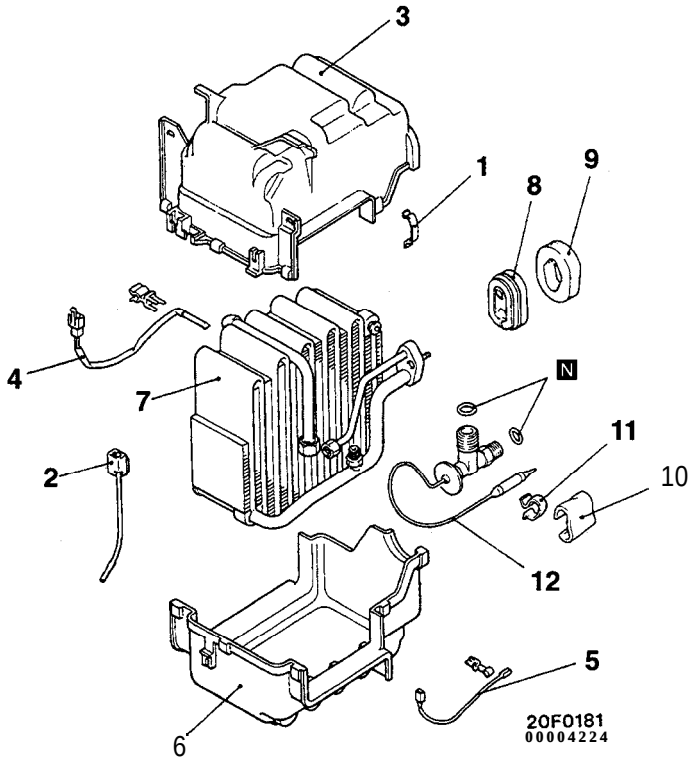
- Check for damage of the evaporator fin part.
- Check for damage or collapse of the drain hose.
- Check for peeling or cracking of the insulator.

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DISASSEMBLY AND REASSEMBLY

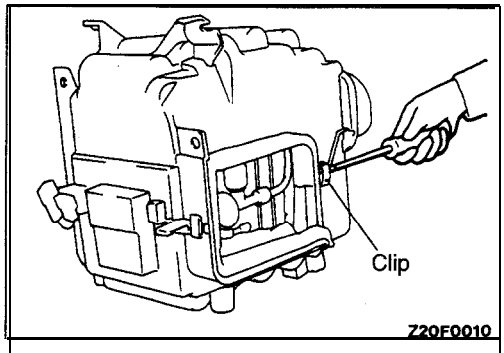


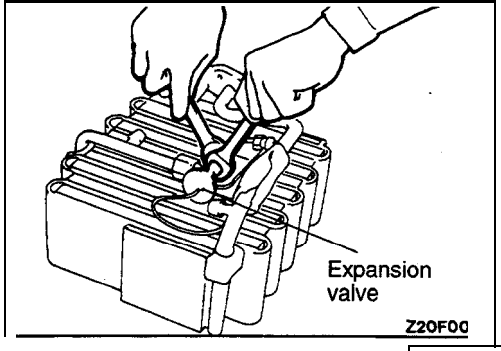
Compressor oil:
FREOL S-83 or SUNISO 5GS
<Vehicles using R-12 refrigerant>
SUN PAG 56
<Vehicles using R-l 34a refrigerant>



Disassembly steps

◀A▶ 1. Clips
2. Auto compressor controller <From 1996 models>
3. Evaporater case (upper)
4. Fin thermo sensor <Up to 1995 models>
5. Air inlet sensor <Up to 1995 models with manual air conditioning>
6. Evaporator case (lower)
7. Evaporator assembly
8. Grommet
9. Insulator
10. Rubber insulator
11. Clip
◀B▶ 12. Expansion valve





DISASSEMBLY SERVICE POINTS

◀A▶ CLIPS REMOVAL

Remove the clips with a screwdriver covered with a shop towel to prevent damage to case surfaces.

◀B▶EXPANSION VALVE REMOVAL

Loosen the flare nut by using two wrenches (for both the inlet and outlet).

INSPECTION

FIN-THERM0 SENSOR AND AIR-INLET SENSOR CHECK

For information concerning the checking procedures, refer to P.55-18.

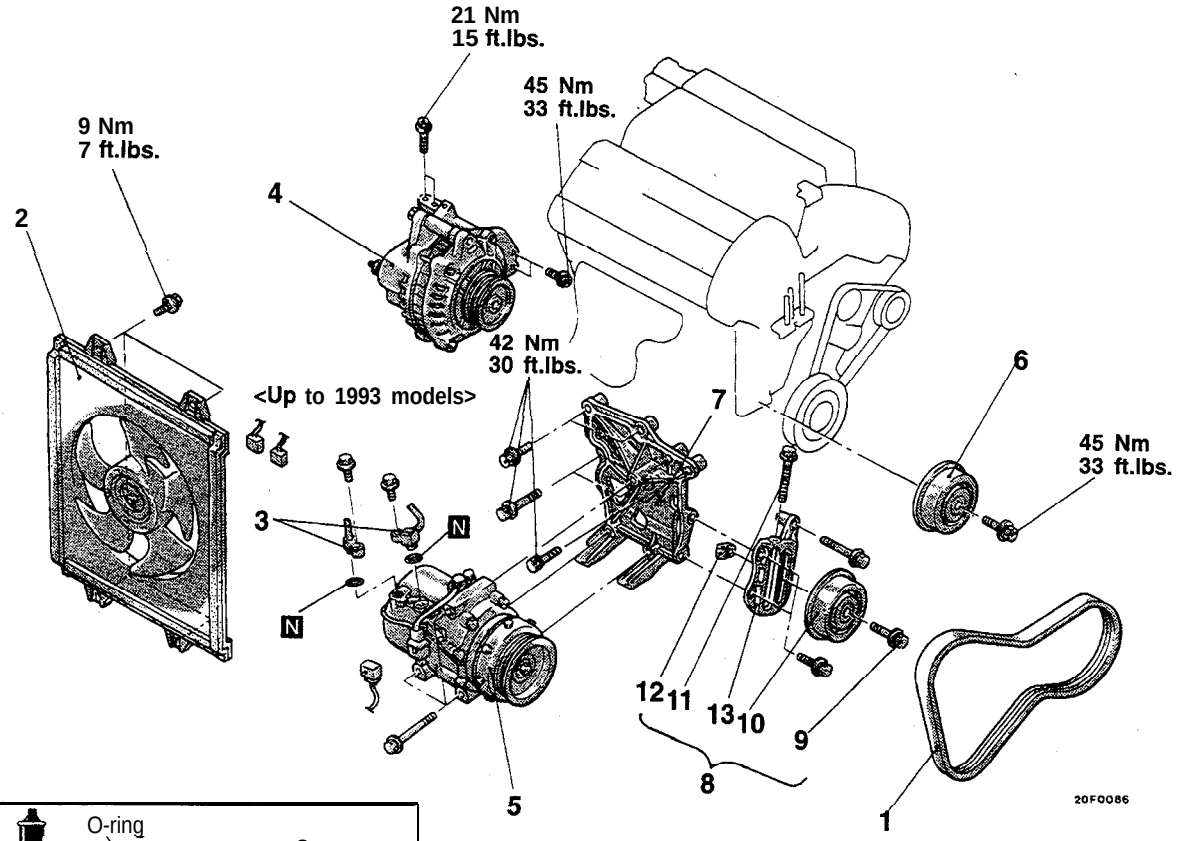
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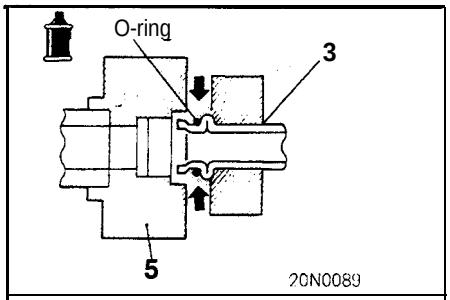
COMPRESSOR

REMOVAL AND INSTALLATION

Pre-removal Operation
- Refrigerant Discharge (Refer to P.55-18, 22.)

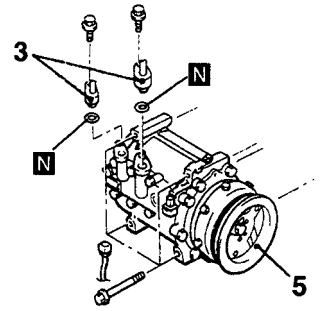
Post-installation Operation
- Compressor Drive Belt Adjustment (Refer to GROUP 11 – On-vehicle Service.)
- Refrigerant Charging (Refer to P.55-21, 25.)





Compressor oil:
FREOL S-83 or SUNISO 5GS <Vehicles using R-12 refrigeranb
SUN PAG 56 <Vehicles using R-134a refrigerant>

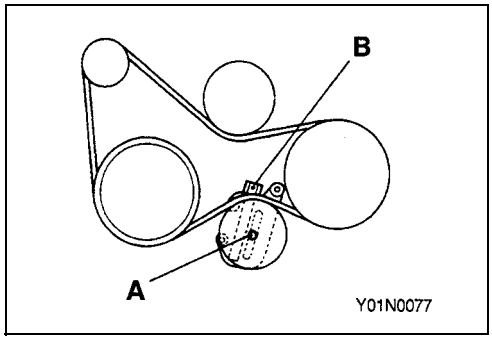
<From 1994 models>



Removal steps

◀A▶ 1. Compressor drive belt
2. Condenser fan motor assembly
◀B▶ 3. Discharge hose and suction hose A connection
4. Generator (Refer to GROUP 16 – Generator.)
◀C▶ ▶A◀ 5. Compressor
6. Idler pulley
7. Compressor bracket
8. Tension pulley assembly
9. Bolt
10. Tension pulley
11. Bolt
12. Adjustment plate
13. Tension pulley bracket

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REMOVAL SERVICE POINTS

(A, COMPRESSOR DRIVE BELT REMOVAL

(1) Loosen bolt "A" for holding the tension pulley.
(2) Loosen bolt "B" for adjustment, and remove the compressor drive belt.

◀B▶ DISCHARGE HOSE AND SUCTION HOSE A REMOVAL

If the hoses are disconnected, cap the hoses with a blank plug to prevent entry of dust, dirt, and water.

◀C▶ COMPRESSOR REMOVAL

Caution
Lay the towel on the brake tube to protect them. When installing the compressor, do not damage the brake tubes. This work must be done carefully so as not to spill the compressor oil.

INSTALLATION SERVICE POINT

▶A◀ COMPRESSOR INSTALLATION

If a new compressor is installed, first adjust the amount of oil according to the procedures described below, and then install the compressor.
(1) Measure the amount [X cm^3 (X fl.oz.)] of oil within the removed compressor.
(2) Wipe away (from the new compressor) the amount of oil calculated according to the following formula, and then install the new compressor.

New compressor oil amount 160 cm^3 – X cm^3 = Y cm^3
(5.4 fl.oz. – x fl.oz. = Y fl.oz.)

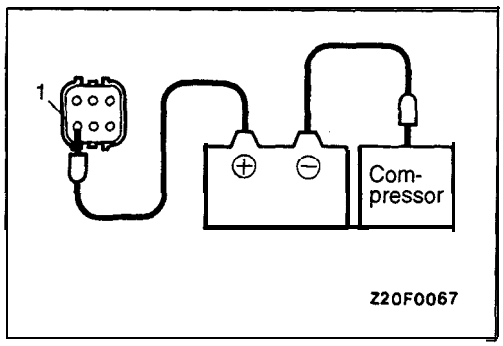
NOTE
(1) Y cm^3 (Y fl.oz.) indicates the amount of oil in the refrigerant line, the condenser, the cooling unit, etc.
(2) If any other air conditioning part is replaced simultaneously with the compressor, remove the oil from the new compressor, taking the specified amount of oil for the part into consideration.

Quantity
Evaporator: 60 cm^3 (2.0 fl.oz.)
Condenser: 15 cm^3 (.5 fl.oz.)
Suction hose: 10 cm^3 (.3 fl.oz.)
Receiver: 10 cm^3 (.3 fl.oz.)

INSPECTION

- Checking for heat damage of the tension pulley.
- Check for excessive play or deflection of the tension pulley.
- Check for unusual wear of the tension pulley.
- Check for hardening of the air conditioning belt.
- Check for unusual wear or abrasion of the air conditioning belt.

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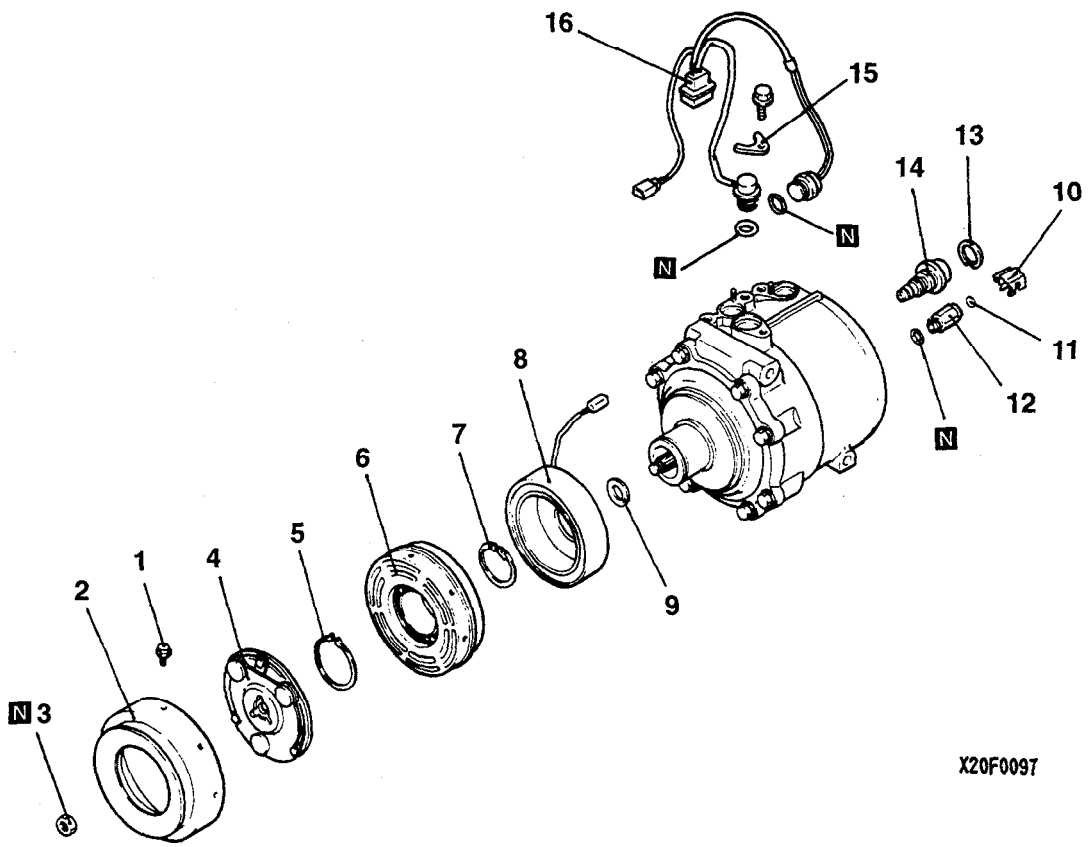


COMPRESSOR'S MAGNETIC CLUTCH OPERATION CHECK

(1) Connect terminal (1) at the compressor side to the positive (+) terminal of the battery, and ground the negative (–) terminal of the battery to the compressor.
(2) The condition of the compressor's magnetic clutch can be considered satisfactory if the operation sound (a "click" sound) of the magnetic clutch can be heard when this check is made.

DISASSEMBLY AND REASSEMBLY

<Up to 1993 models>



Magnetic clutch disassembly steps

1. Bolts
2. Pulley
◀A▶ ▶D◀ 3. Nut
▶C◀ 4. Armature plate
5. Snap ring
6. Rotor
▶B◀ 7. Snap ring.
▶A◀ 8. Clutch coil
9. Shims

High pressure relief valve disassembly steps

10. Cover
11. Dust cover
12. High pressure relief valve

Control valve disassembly

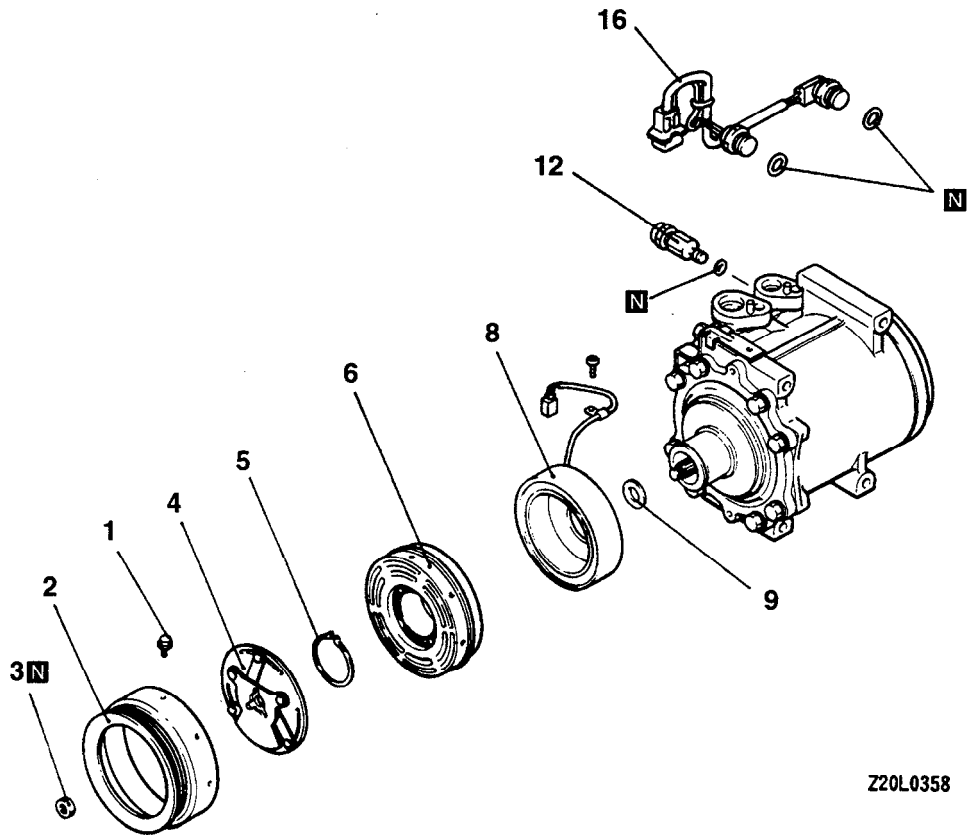
13. Snap ring
14. Control valve

Thermostat and revolution pick up sensor disassembly steps

15. Plate
16. Thermostat and revolution pick up sensor

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<From 1994 models>



Magnetic clutch disassembly steps

1. Bolts
2. Pulley

◀A▶ ▶D◀ **3.** Nut

▶C◀ 4. Armature plate

5. Snap ring

6. Rotor

▶A◀ 8. Clutch coil

9. Shims

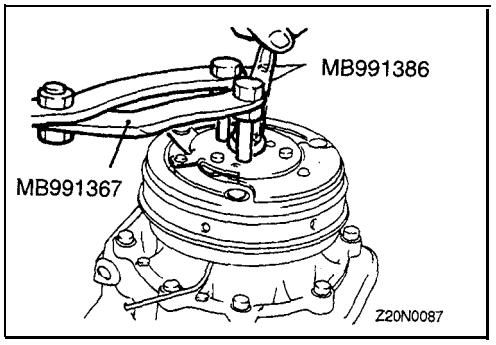
High pressure relief valve disassembly

12. High pressure relief valve

Thermostat and revolution pick up sensor disassembly

◀B▶ 16. Thermostat and revolution pick up sensor

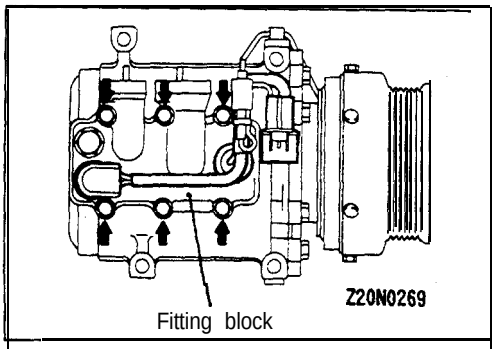
TSB Revision



DISASSEMBLY SERVICE POINTS

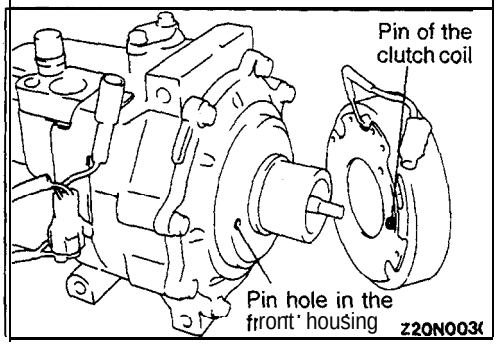
◀A▶ NUT REMOVAL

Use the special tool to loosen the nut.



◀B▶ THERMOSTAT AND REVOLUTION PICK UP SENSOR REMOVAL

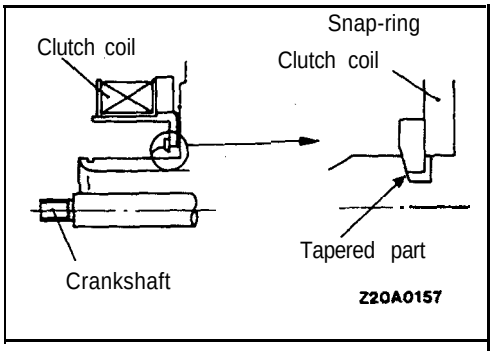
(1) Remove the fitting block from the compressor.
(2) Remove the snap ring from inside the fitting block and remove the refrigerant temperature switch.
(3) Remove the revolution pick-up sensor from the fitting block.



REASSEMBLY SERVICE POINTS

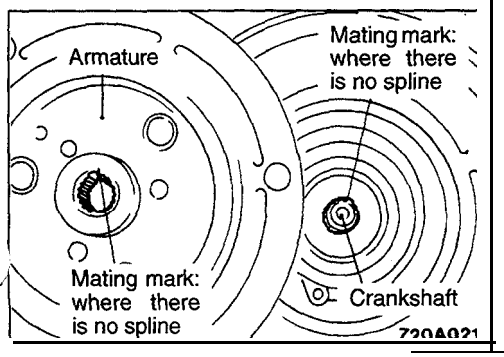
▶A◀ CLUTCH COIL INSTALLATION

Align the pin of the clutch coil with the pin hole in the front housing, and then fit it into the hole.



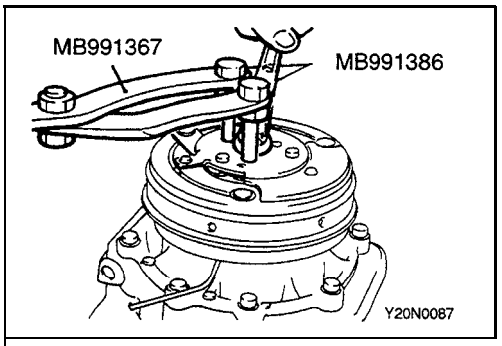
▶B◀ SNAP RING INSTALLATION

Install the snap ring so that the tapered surface is at the outer side.



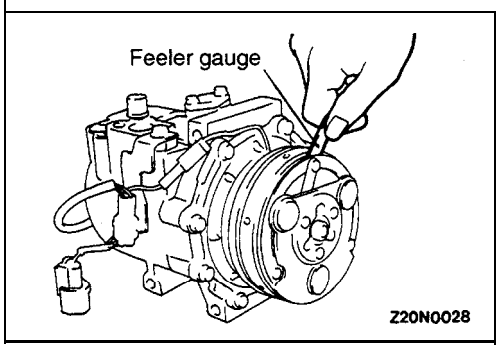
▶C◀ ARMATURE PLATE INSTALLATION

Align the mating mark of the crankshaft spline and the mating mark of the armature plate, and then fit them together.



▶D◀ NUT INSTALLATION

(1) Use the special tool to tighten the nut.



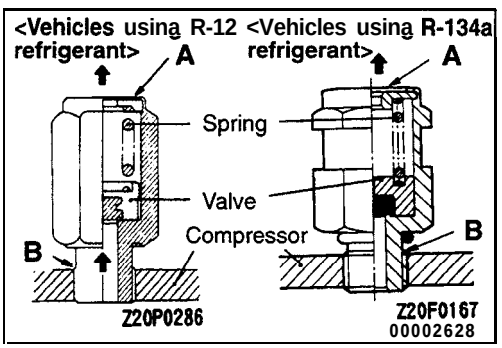
(2) Check whether or not the air gap of the clutch is within the standard value.

Standard value: 0.4-0.6 mm (.01–.02 in.)

NOTE
If there is a deviation of the air gap from the standard value, make the necessary adjustment by adjusting the number of shims.

INSPECTION

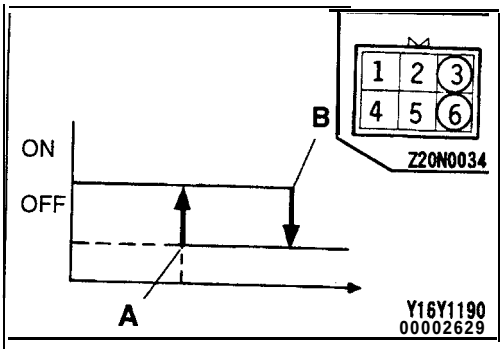
- Check the surface of the armature for scoring or bluing.
- Check the surface of the rotor for scoring or bluing.
- Check the sealing surfaces for cracks, scratches and deformation.
- Check the front housing for cracks or scoring on the sealing surfaces.
- Check the compressor shaft for scoring.



HIGH PRESSURE RELIEF VALVE CHECK'

The high pressure relief valve is a safety feature which releases part of the refrigerant inside the system into the atmosphere when the high pressure level exceeds 3,550 kPa (505 psi): R-12, 3,740 kPa (532 psi): R-134a during air conditioning operation.
Once the pressure inside the system has been reduced to 2,400 kPa (341 psi) or lower: R-12, 2,940 kPa (418 psi) or lower: R-134a, the high pressure relief valve closes, thus allowing continued operation.

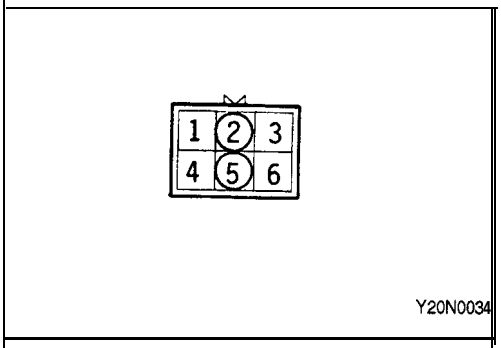
(1) If a leak is detected at section A, replace the high pressure relief valve. The valve can be used unless there is a leak from that section.
(2) If a leak is detected at section B, retighten the valve. If the leak still persists after retightening the valve, replace the packing.



THERMOSTAT CHECK

(1) Dip the thermostat in engine oil.
(2) Check for continuity across terminals (3) and (6) when the engine oil is heated.

Standard value:
Continuity at approx. 110°C (230°F) or less at A point
No continuity at approx. 155°C (311°F) or more at B point

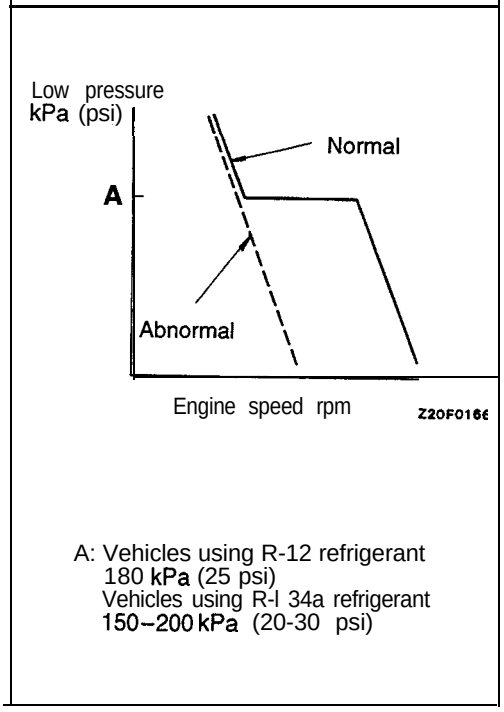


REVOLUTION PICK UP SENSOR CHECK

Measure the resistance between terminals (2) and (5) of the connector.

Normal resistance:
405 ± 35 Ω when ambient temperature is 20°C (68°F)

If the measurement deviates greatly from the above resistance, replace the revolution pick up sensor assembly.



A: Vehicles using R-12 refrigerant
180 kPa (25 psi)
Vehicles using R-l 34a refrigerant
150–200 kPa (20-30 psi)

CONTROL VALVE CHECK

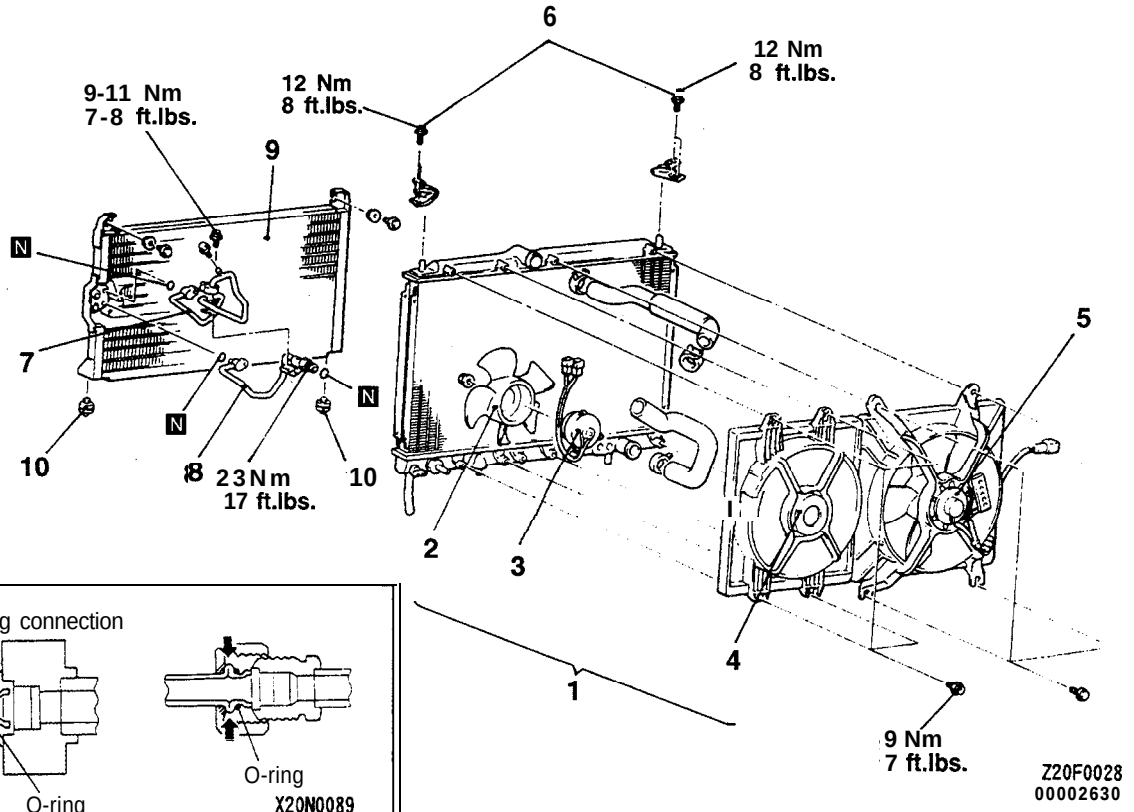
The control valve detects a low pressure level during the operation of the air conditioning, and adjusts the amount of refrigerant to be bypassed.

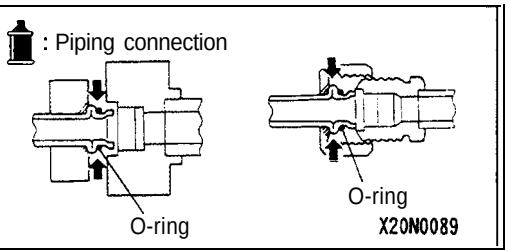
(1) Operate the air conditioning under a high temperature load condition (when vehicle interior temperature is high).
(2) Connect a low pressure gauge to the air compressor.
(3) Operate the air conditioning with the engine running at idle.
(4) Gradually increase the engine speed while observing the low pressure gauge.
If the valve is normal, the low pressure drops slowly as the engine speed increases until a pressure of 180 kPa (25 psi): R-12, 150-200 kPa (20-30 psi): R-134a is reached, at which point the pressure temporarily ceases to drop. Then, the pressure again starts dropping as the engine speed further increases.
If the valve is abnormal, the low pressure drops in direct proportion to the increase in engine speed without a temporary leveling off at the 180 kPa (25 psi): R-12, 150-200 kPa (20-30 psi): R-134a pressure level.
If the low pressure drops like this, replace the control valve.

CONDENSER AND CONDENSER FAN MOTOR

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Refrigerant Discharge and Charging (Refer to P.55-21, 18, 25, 22.)
- Generator Removal and Installation (Refer to GROUP 16 – Generator.)



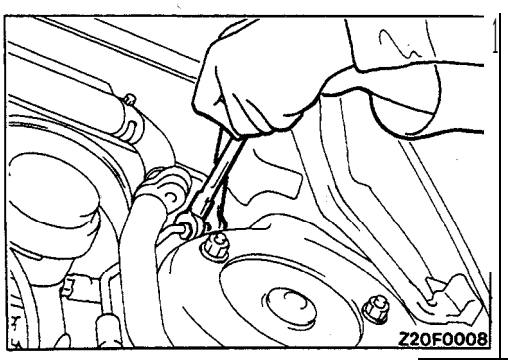


Compressor oil: FREOL S-83 or SUNISO 5GS <Vehicles using R-12 refrigerant>
SUN PAG 56 <Vehicles using R-134a refrigerant>

Removal steps

1. Condenser fan motor assembly
2. Fan
3. Motor assembly
4. Shroud
5. Radiator fan motor assembly (Refer to GROUP 14 – Radiator.)
6. Insulator installation bolts
7. Discharge pipe A
8. Discharge pipe
9. Condenser
10. Bushings

◀A▶
◀A▶
◀B▶ ▶A◀

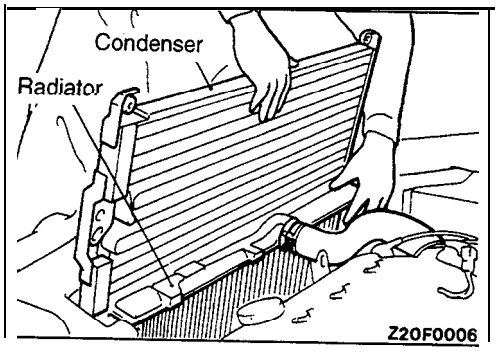


REMOVAL SERVICE POINTS

◀A▶ DISCHARGE PIPE A / DISCHARGE PIPE REMOVAL

(1) Loosen the flare nut by using two wrenches.
(2) Plug the disconnected hose and pipes and the openings of the condenser in order to prevent dust, dirt and other foreign material from entering.

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◀B▶ CONDENSER REMOVAL

Move the radiator toward the engine, and then remove the condenser upward.

INSTALLATION SERVICE POINT

▶A◀ CONDENSER INSTALLATION

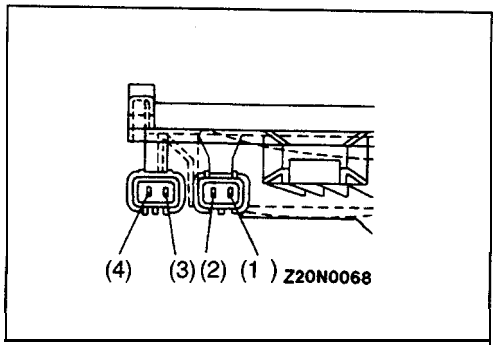
If a new condensor is used, fill it with the specified amount of compressor oil before installing on the vehicle.

Compressor oil:
FREOL S-83 or SUNISO 5GS <Vehicles using R-12 refrigerants
SUN PAG 56 <Vehicles using R-134a refrigerant>

Quantity: 15 cm^3 (.5 fl.oz.)

INSPECTION

- Check the condenser fan for crushing or other damage.
- Check the condenser's discharge hose and pipe installation parts for damage or deformation.
- Check the condenser fan shroud for damage.



CONDENSER FAN MOTOR CHECK

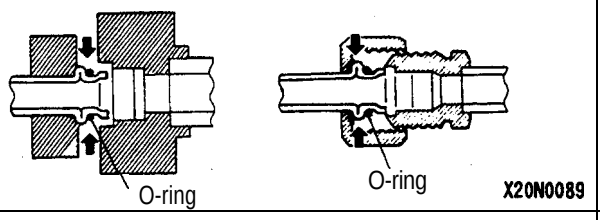
(1) Apply battery voltage (+) to terminal (3) and ground (–) terminal (4); at this time, check that the condenser fan motor turns.
(2) Apply battery voltage (+) to terminal (1) and ground (–) terminal (2); at this time, check that the condenser fan motor turns.

REFRIGERANT LINE

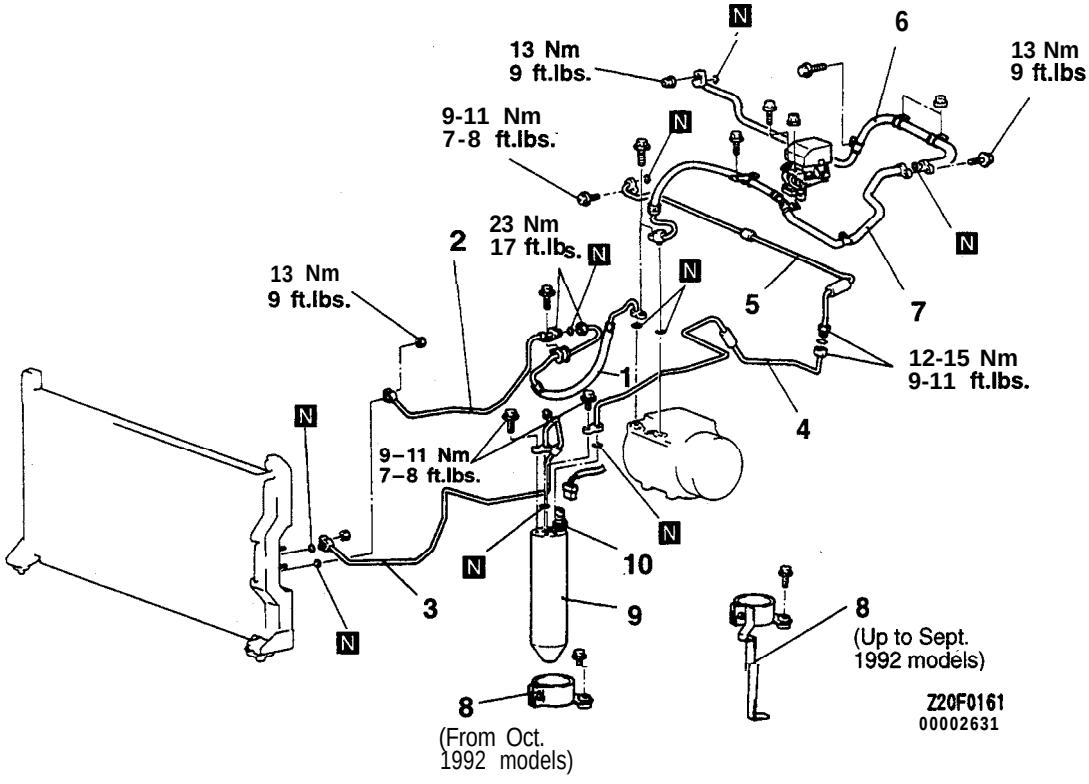
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Refrigerant Discharge and Charging (Refer to P.55-22, 18, 25, 22.)

: Piping connection



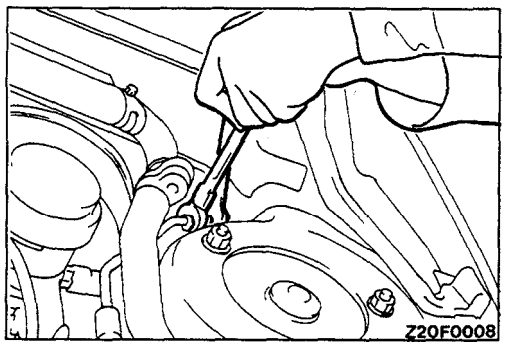
Compressor oil:
FREOL S-83 or SUNISO 5GS
<Vehicles using R-l 2 refrigerant>
SUN PAG 56
<Vehicles using R-l 34a refrigerant>



Removal steps

◀A▶ 1. Discharge hose
◀A▶ 2. Discharge pipe
3. Discharge pipe A
▶B◀ 4. Discharge pipe B
5. Discharge pipe C
▶A◀ 6. Suction hose B
▶A◀ 7. Suction hose A
8. Receiver bracket
▶A◀ 9. Receiver
10. Dual-pressure switch

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REMOVAL SERVICE POINTS

◀A▶ DISCHARGE HOSE / DISCHARGE PIPE REMOVAL

Loosen the flare nut by using two wrenches.

INSTALLATION SERVICE POINTS

▶A◀ RECEIVER / SUCTION HOSE INSTALLATION

If suction hose is replaced with new ones, or if a new receiver is installed, pour the specified amount of oil in the compressor before installing these parts in the vehicle.

Compressor oil:

FREOL S-83 or SUNISO 5GS <Vehicles using R-12 refrigerant>

SUN PAG 56 <Vehicles using R-134a refrigerant>

Quantity

Suction hose: 10 cm^3 (.3 fl.oz.)

Receiver: 10 cm^3 (.3 fl.oz.)

▶B◀ DISCHARGE PIPE B INSTALLATION

Connect discharge pipe B first on the receiver side.

INSPECTION

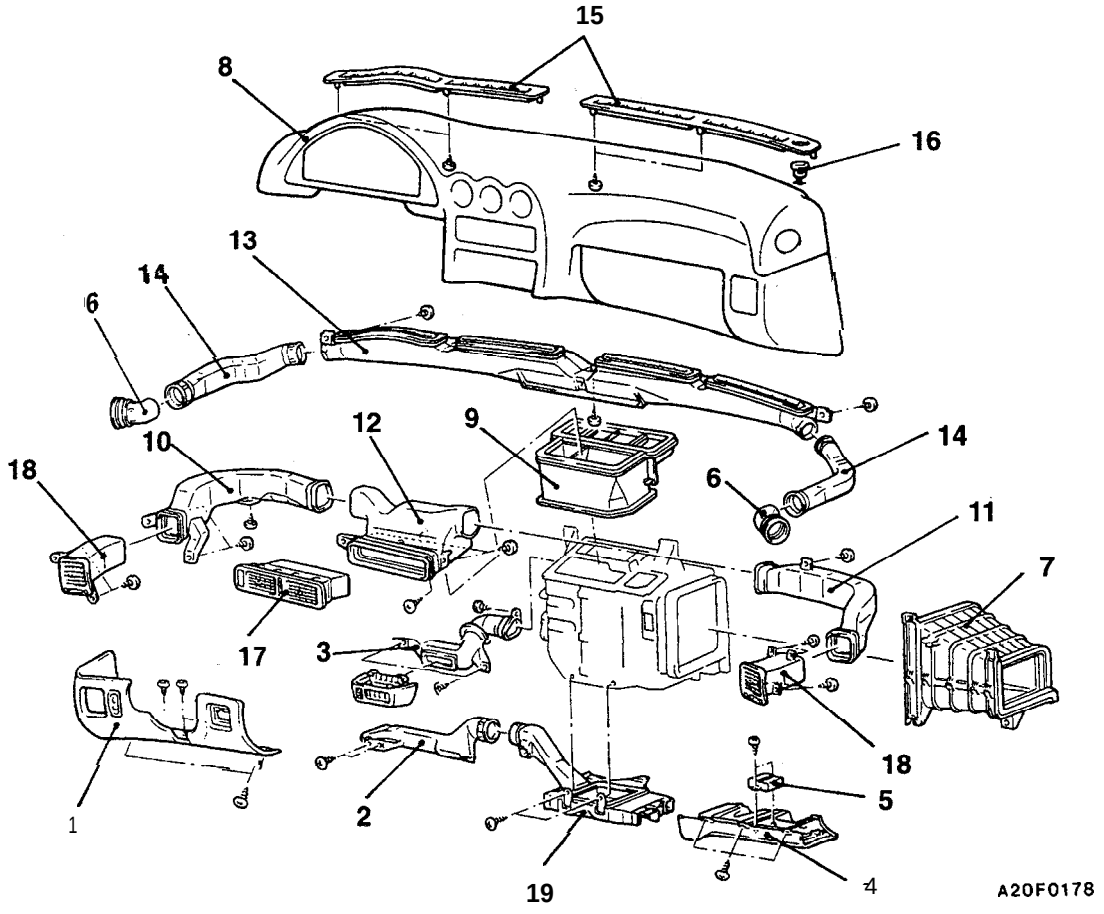
CHECKING DUAL PRESSURE SWITCH

For information concerning the checking procedures of the dual pressure switch, refer to “On-vehicle Service” on P.55-16.

VENTILATORS (INSTRUMENT PANEL)

REMOVAL AND INSTALLATION

CAUTION: SRS
When installing or removing the instrument panel, don't allow any impact or shock to the SRS diagnosis unit.



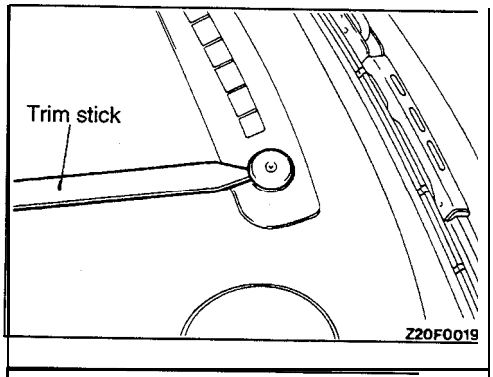
Removal steps

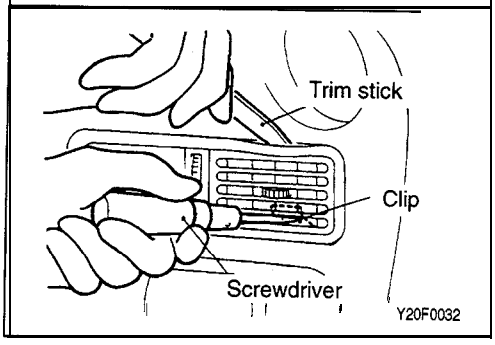
1. Knee protector (Refer to GROUP 52A – Instrument Panel.)
2. Foot shower duct
3. Lap cooler duct
4. Under cover
5. A/C compressor lock controller
6. Side defroster hoses A
7. Duct (Vehicles without air conditioning)
8. Instrument panel (Refer to GROUP 52A – Instrument Panel.)

◀A▶
◀B▶

9. Center duct
10. Air duct (right side)
11. Air duct (left side)
12. Distribution duct (center)
13. Defroster duct
14. Side defroster hoses B
15. Defroster garnishes
16. Photo sensor
17. Center air outlet assembly
18. Side air outlet assembly
19. Distribution duct (foot)

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REMOVAL SERVICE POINTS

◀A▶ PHOTO SENSOR REMOVAL

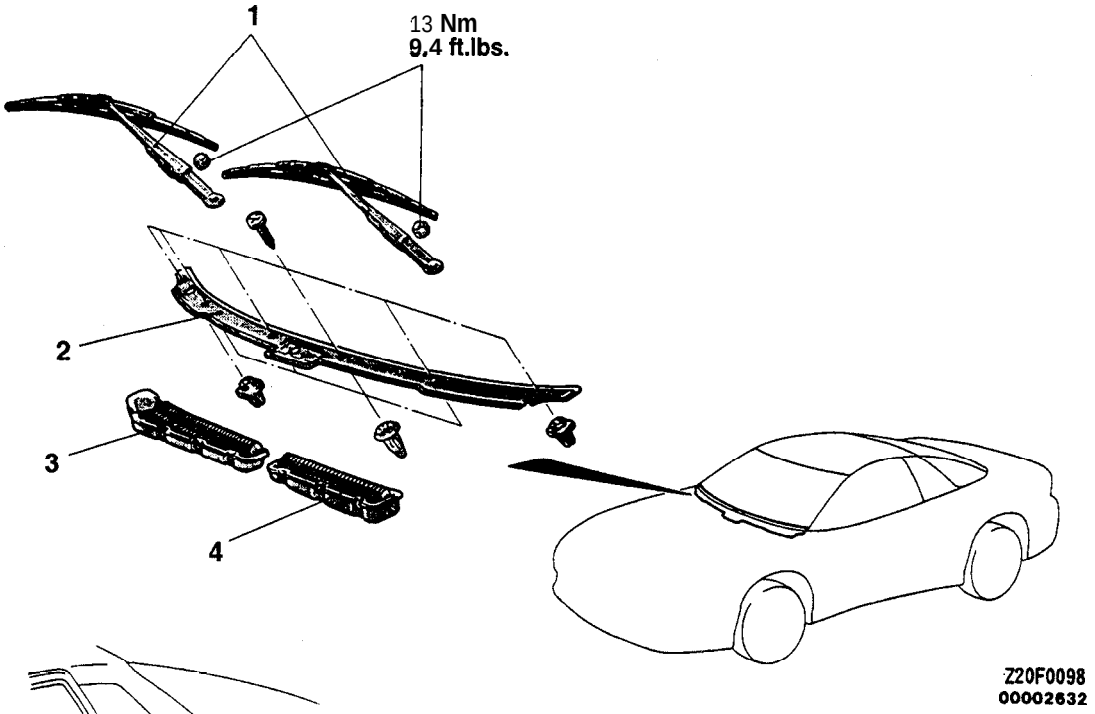
Using the trim stick, remove the photo sensor from the defroster garnish.

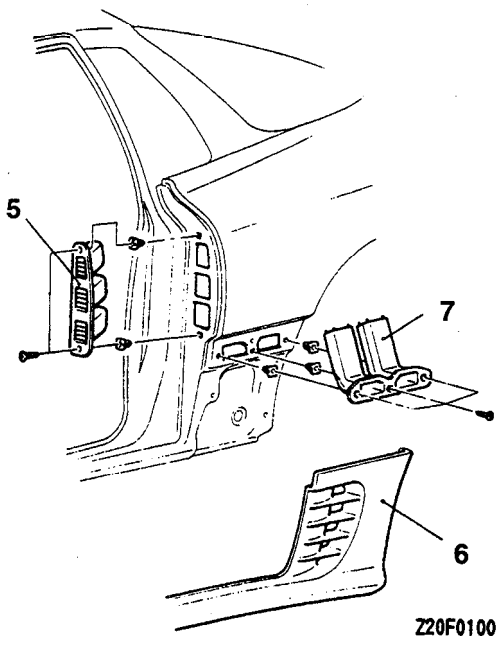
◀B▶ CENTER AIR OUTLET ASSEMBLY REMOVAL

Disengaging the clips (2 positions) of the center air-outlet assembly with a flat. tip screwdriver, remove the center air outlet assembly with the trim stick.

VENTILATORS (AIR INLET AND AIR OUTLET)

REMOVAL AND INSTALLATION





Inlet garnishes removal steps

1. Windshield wiper arm
2. Front deck garnish
3. Inlet garnish (RH)
4. Inlet garnish (LH)

Rear ventilation duct removal steps

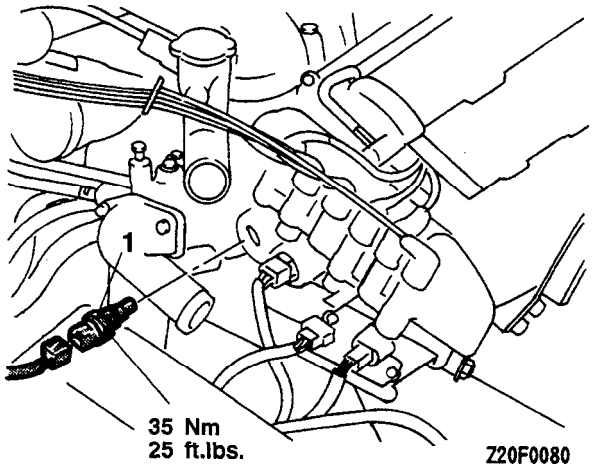
5. Rear ventilation duct A
6. Side air dam (side sill)
   (Refer to GROUP 51 – Aero Parts.)
7. Rear ventilation duct B

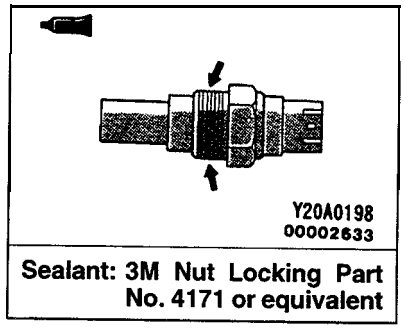
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AIR CONDITIONING ENGINE COOLANT TEMPERATURE SWITCH <Up to 1993 models>

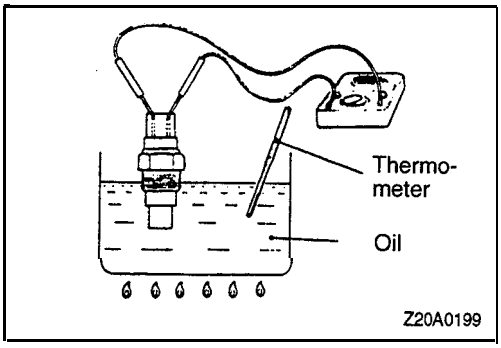
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Engine Coolant Draining and Refilling (Refer to GROUP 00 – Maintenance Service.)





1. Air conditioning engine coolant temperature switch



INSPECTION

AIR CONDITIONING ENGINE COOLANT TEMPERATURE SWITCH (ALWAYS-CLOSED TYPE CHECK)

(1) immerse the A/C engine coolant temperature switch in oil and heat by a gas stove or similar method so as to increase the oil temperature.
(2) Check to be sure that the A/C engine coolant temperature switch is switched OFF when the oil temperature reaches the standard value.

Standard value: 112–118°C (233–244°F)

Caution
Use engine oil for this test; stir it well while heating, and do not heat more than necessary.

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FULL AUTO AIR CONDITIONING

TROUBLESHOOTING

TROUBLESHOOTING PROCEDURE

(1) Check that the air ducts and rods are not off.
(2) Check that connectors are properly connected and fuses are not blown.
(3) Using an analog voltmeter or scan tool, check on-board diagnostic outputs. If failure code is being output, check the failing system and repair as necessary. (Refer to Diagnosis Display Patterns and Codes on P.55-71.)
(4) If the on-board diagnostic outputs are normal, check for terminal voltage or continuity with a circuit tester according to the troubleshooting chart by symptom. (Refer to control unit terminal voltages on P.55-60–67.)
(5) In carrying out the troubleshooting procedure, first look up the Troubleshooting Quick-Reference Chart to know the inspection items and then start the inspection procedure detailed in the following pages.
(6) When checking components, be sure to disconnect the connectors first.

TROUBLESHOOTING QUICK-REFERENCE CHART

Inspection item	1	2	3	4	5	6
	Air conditioning does not operate when the ignition switch in the ON position.	Interior temperature does not raise even the air conditioning is operating (No warm air coming out).	Interior temperature does not lower even the air conditioning is operating (No cold air coming out).	Blower motor does not rotate.	Blower motor does not stop rotating.	Air selection damper does not operate.
Fuse	1		1	1		
Harness (incl. connectors)	2	5	4	4	3	2
Magnetic clutch relay	3		5			
Magnetic clutch	4	2	13			
Sensors			11			
A/C engine coolant temperature switch <Up to 1993 models>	6		12			
Pressure switch	7					
Air conditionig control panel	9	6	14	6	4	3
Refrigerant amount	8		6			
Receiver			7			
Expansion valve			8			
Compressor			9			
Thermostat	5		10			
A/C compressor lock controller	10					
Air conditioning control unit	11	7	15	7	5	4
MFI control unit	12					
On-board diagnostic outputs		1	2			
Blend air damper motor and potentiometer		3	3			
Heater link		4				
Heater relay				2		
Power transistor				3	2	
Blower motor				5		
Blower motor relay					1	
Air selection damper motor						1
Mode selection damper motor/potentiometer						
Condenser fan relay						
Resister						
Condensor fan motor						

NOTE
(1) Numbers indicate the order of inspection.
(2) Use an analog voltmeter or multi-use tester to check the control unit.

TSB Revision

Inspection item	7 Mode selection damper does not operate.	8 Condenser fan does not operate when the air conditioning is activated.	9 Air-conditioning graphic display does not function correctly.	10 Air conditioning control panel blinks.	11 Set temperature returns to 25°C (122°F) when the ignition switch is turned ON and OFF.
Fuse		1	1		1
Harness (incl. connectors)	3		2		2
Magnetic clutch relay					
Magnetic clutch					
Sensors				2	
A/C engine coolant temperature switch <Up to 1993 models>					
Pressure switch					
Air conditionia control panel	4		3	3	3
Refrigerant amount					
Receiver					
Expansion valve					
Compressor				1	
Thermostat					
A/C compressor lock controller				4	
Air conditioning control unit	5		4	5	
MFI control unit				6	
On-board diagnostic outputs	1				
Blend air damper motor and potentiometer					
Heater link					
Heater relav			1		
Power transistor					
310wer motor					
310wer motor relay					
Air selection damper motor					
Mode selection damper motor/potentiometer	2				
Condenser fan relay		2			
Resister		3			
Condensor fan motor		4			

NOTE
(1) Numbers indicate the order of inspection.
(2) Use an analog voltmeter or multi-use tester to check the control unit.

TSB Revision

No.	Symptom	Probable cause	Remedy	Ref. page
1	Air conditioning does not operate when the ignition switch in the ON position.	Open-circuited power circuit harness	Correct harness.	
		Defective control panel	Replace control panel.	55-73
		Defective air conditioning control unit	Check on-board diagnostic output.	55-69
		Defective magnetic clutch relay in relay box	Replace.	55-29
		Defective magnet clutch	Replace.	55-41, 42
		Defective thermostat	Replace.	55-41, 42
		Defective A/C engine coolant temperature switch for air conditioning cut off <Up to 1993 models>	Replace.	55-53
		Defective dual pressure switch	Replace.	55-48
		Refrigerant leak	Charge refrigerant, correct leak.	55-18, 22
		Excessive refrigerant	Discharge refrigerant.	55-21, 25
		Defective A/C compressor lock controller <DOHC>	Replace A/C compressor lock controller.	55-74
		Defective MFI control unit	Replace MFI control unit.	–
2	Interior temperature does not raise (No warm air coming out)	Defective interior temperature sensor input circuit	Check on-board diagnostic output. Replace defective parts.	55-69
		Defective blend air damper potentiometer input circuit		
		Defective blend air damper drive motor	Replace blend air damper drive motor.	55-75
		Incorrect engagement of blend air damper drive motor lever and blend air damper	Engage correctly.	–
		Sticking blend air damper	Correct blend air damper.	–
		Open-circuited harness between blend air damper drive motor and air conditioning control unit	Correct harness.	–
		Defective control panel	Replace control panel.	55-73
		Defective air conditioning control unit	Replace air conditioning control unit.	55-73
3	Interior temperature does not lower (No cold air coming out)	Defective interior temperature sensor input circuit	Check on-board diagnostic output. Replace defective parts.	55-69
		Defective air inlet sensor input circuit		
		Defective air thermo sensor input circuit		
		Defective blend air damper potentiometer input circuit		

TSB Revision

No.	Symptom	Probable cause	Remedy	Ref. page
3	Interior temperature does not lower (No cold air coming out).	Defective blend air damper drive motor	Replace blend air damper drive motor.	55-75
		Incorrect engagement of blend air damper drive motor lever and blend air damper	Engage correctly.	
		Sticking blend air damper	Correct blend air damper.	–
		Open-circuited harness between blend air damper drive motor and air conditioning control unit	Correct harness.	
		Open-circuited harness between photo sensor and air conditioning control unit	Correct harness.	
		Defective air-conditioning compressor relay in the relay box	Replace.	
		Defective thermostat	Replace thermostat.	55-41, 42
		Defective revolution pick up sensor <DOHC>	Replace revolution pick up sensor.	55-41, 42
		Refrigerant leak	Charge refrigerant, correct leak.	–
		Excessive refrigerant	Discharge refrigerant.	–
		Clogged receiver	Replace receiver.	55-48
		Clogged expansion valve	Replace expansion valve.	55-38
		Defective compressor	Replace compressor.	55-39
		Defective air inlet sensor	Replace air inlet sensor.	55-77
		Defective magnetic clutch	Replace.	55-41, 42
		Defective A/C compressor lock controller	Replace A/C compressor lock controller.	55-74
		Defective control panel	Replace control panel.	55-73
		Defective air conditioning control unit	Replace air conditioning control unit.	55-73
4	Blower motor does not rotate.	Defective blower motor	Replace blower motor.	55-35
		Blown thermal fuse inside air conditioning power transistor	Replace air conditioning power transistor.	55-74
		Defective blower motor relay	Replace blower motor relay.	55-29
		Open-circuited harness between fuse and blower motor relay	Correct harness.	
		Open-circuited harness between blower motor relay and blower motor	Correct harness.	
		Open-circuited harness between air conditioning power transistor and air conditioning control unit	Correct harness.	
		Defective control panel	Replace control panel.	55-73
		Defective air conditioning control unit	Replace air conditioning control unit.	55-73

TSB Revision

No.	Symptom	Probable cause	Remedy	Ref. page
5	Blower motor does not stop rotating.	Defective blower motor HI relay	Replace power relay.	55-29
		Short-circuited harness between blower motor relay and air conditioning power transistor air conditioning control unit	Correct harness.	–
		Defective control panel	Replace control panel.	55-73
		Defective air conditioning control unit	Replace air conditioning control unit.	55-73
		Defective air conditioning control unit	Replace air conditioning control unit.	55-73
		Defective air conditioning power transistor	Replace air conditioning power transistor.	55-74
6	Air selection damper does not operate.	Defective air selection drive motor	Replace air selection drive motor.	55-75
		Incorrect engagement of air selection drive motor damper	Engage correctly.	–
		Malfunctioning air selection damper	Correct air selection damper.	–
		Open-circuited harness between air selection motor and air conditioning control unit	Correct harness.	–
		Defective control panel	Replace control panel.	55-73
		Defective control panel	Replace control panel.	55-73
		Defective air conditioning control unit	Replace air conditioning control unit.	55-73
7	Mode selection damper does not operate.	Defective mode selection damper potentiometer input circuit	Check on-board diagnostic output. Replace defective parts.	55-69
		Defective mode selection drive motor	Replace mode selection drive motor.	55-75
		Incorrect engagement of mode selection drive motor and mode selection damper	Engage correctly.	–
		Malfunctioning DEF., FACE, and FOOT damper	Correct DEF., FACE, and FOOT damper.	–
		Open-circuited harness between mode selection motor and control unit	Correct harness.	–
		Defective control panel	Replace control panel.	55-73
		Defective air conditioning control unit	Replace air conditioning control unit.	55-73
	Condenser fan does not operate when the air conditioning is activated.	Defective condenser fan motor relay	Replace power relay.	55-29
		Defective condenser fan motor	Replace condenser fan motor.	55-46

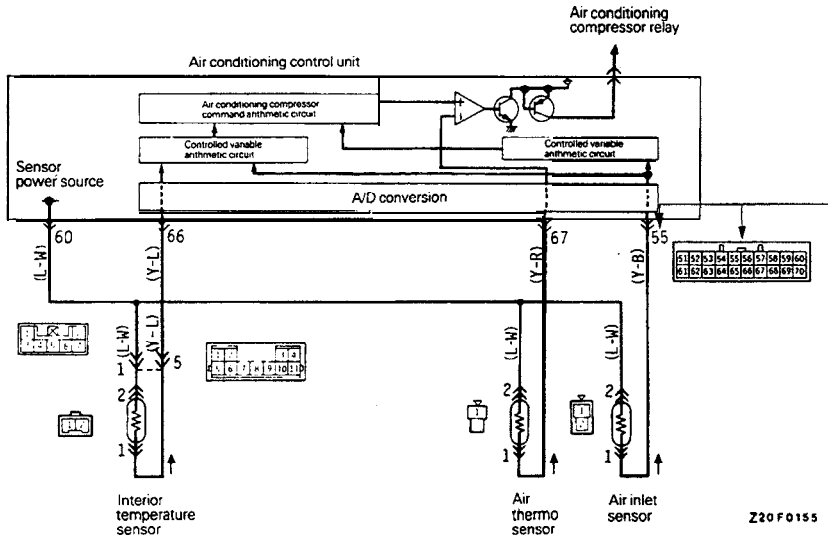
TSB Revision

No.	Symptom	Probable cause	Remedy	Ref. page
9	Air-conditioning graphic display does not function correctly	Open-circuited harness between control panel and air conditioning control unit	Correct harness.	–
		Defective control panel	Replace control panel.	55-73
		Defective air conditioning control unit	Replace air conditioning control unit.	55-73
10	Air conditioning control panel blinks.	Wet compressor drive belt	Dry.	
		Insufficient compressor drive belt tension	Check and adjust.	GROUP 11
		Defective compressor drive belt	Replace.	
		Defective compressor	Check and replace.	55-17, 39
		Defective revolution pick-up sensor	Check and replace.	55-41, 42, 45
		Defective air conditioning switch	Replace air conditioning control panel.	55-73
		Defective A/C compressor lock controller	Replace A/C compressor lock controller.	55-74
		Defective air conditioning control unit	Replace air conditioning control unit.	55-73
		Defective MFI control unit	Replace MFI control unit.	–
11	Set temperature returns to 25°C (112°F) when the ignition switch is turned ON and OFF.	Open-circuited power circuit harness	Correct harness.	
		Defective air conditioning control unit	Replace air conditioning control unit.	55-73

TSB Revision

READING THE "CIRCUIT AND UNIT CHECK"

3. Inspection of interior temperature sensor, air inlet sensor, and air thermo sensor circuits



Connectors are keyed by terminal numbers.

Troubleshooting Hints

- Diagnosis
  - No. 11. 12 [Fix interior temperature sensor input signal at 25°C (77°F).]
  - No. 13. 14 [Fix air inlet sensor input signal at 15°C (59°F).]
  - No. 21. 22 [Fix air thermo sensor input signal at -2°C (-35.6°F).]

Indicates the on-board diagnostic output code number and system condition when the code is output.

* Air conditioning control unit terminal voltages

Terminal No.	Signal name	Condition	Terminal voltage
55	Air inlet sensor	Temperature at sensor 25°C (77°F) (4 kΩ)	2.2 – 2.8 V
60	sensor power source	Normally	4.8 – 5.2 V
66	Interior temperature sensor	Temperature at sensor 25°C (77°F) (4 kΩ)	2.3 – 2.9 V
67	Au then-no sensor	Temperature at sensor 25°C (77°F) (4 kΩ) when air conditioning is OFF	2.3 – 2.9 V

Indicatesthe terminal number to be checked.

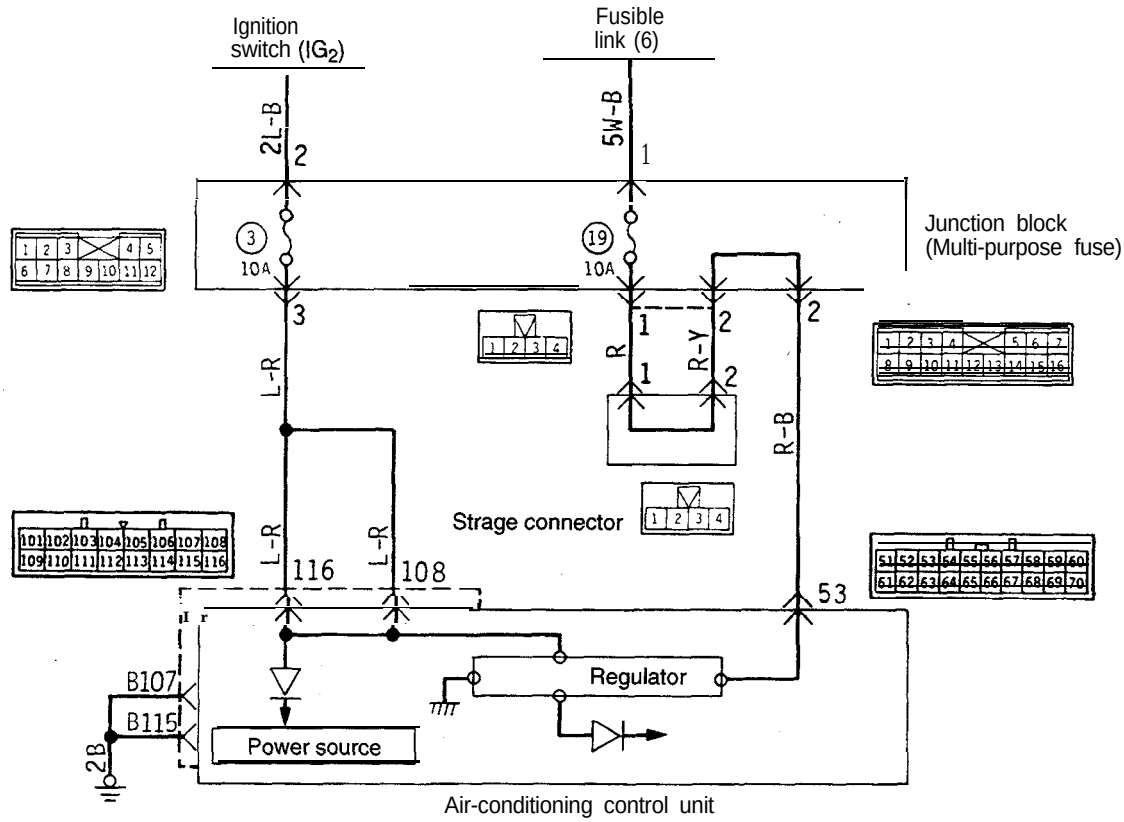
indicates the condition at terminal check.

Indicates the specification criteria.
Where no condition is given in the "Condition" column, the normal specification value is given.

TSB Revision

CIRCUIT AND BENCH CHECK

1. Inspection of air conditioning control unit power source circuit



Z20F0153

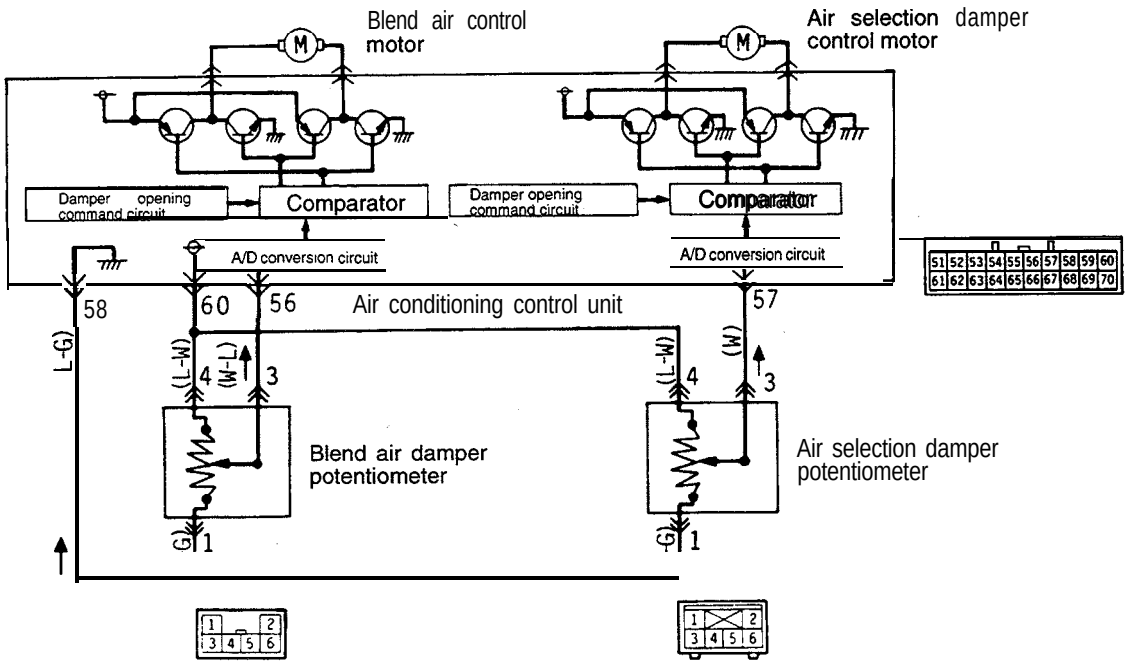
Troubleshooting Hints

- Air conditioning control unit terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
53	Backup power source	Normally	Battery positive voltage
108,116	Air conditioning control unit power source	ignition switch ON	Battery positive voltage
107,115	Air conditioning control unit ground	Normally	o v

TSB Revision

2. Inspection of potentiometer circuit



Z20F0157

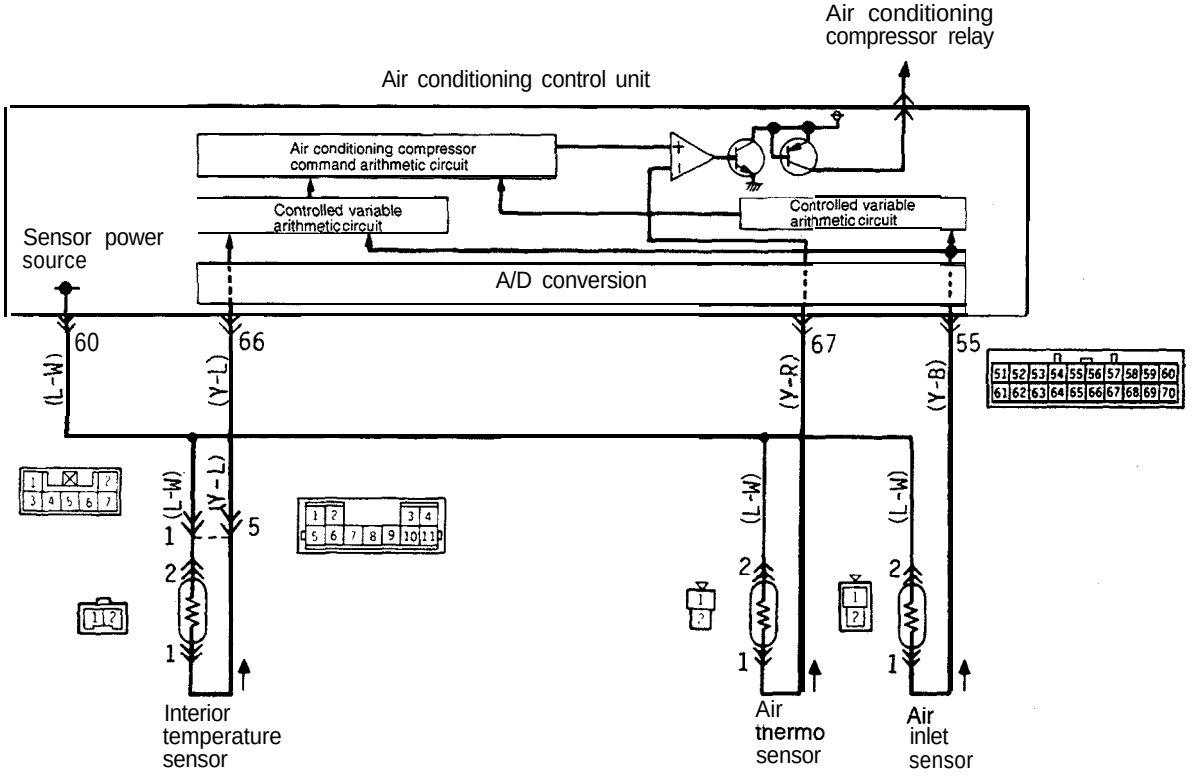
Troubleshooting Hints

- Diagnosis
  No. 31 (Fix blend air damper at MAX. HOT position, or at MAX. COOL position when it is at MAX. COOL position.)
  No. 32 (Fix air selection damper at FACE position, or at FACE position when it is at FACE position.)
- Air conditioning control unit terminal voltages

Terminal No.	Signal name	Condition	Terminal voltage
56	Blend air damper potentiometer (input)	Blend air damper at MAX. COOL position	0.1–0.3 v
		Blend air damper at MAX. HOT position	4.7–5.0 v
57	Mode selection damper potentiometer (input)	Air selection damper at FACE positidn	0.1-0.3 v
		Air selection damper at DEF. position	4.7–5.0 v
58	Blend air damper and mode selection damper potentiometer (–)	Normally	o v
60	Sensor power source	Normally	4.8–5.2 V

TSB Revision

3. Inspection of compartment-temperature sensor, outside-air-temperature sensor, and air thermo sensor circuits



Y20F0155

Troubleshooting Hints

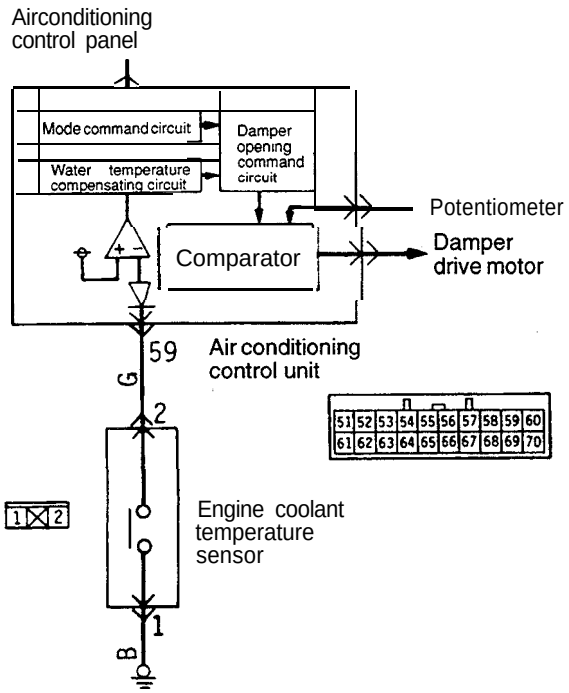
- Diagnosis
  No, 11, 12 [Fix interior temperature sensor input signal at 25°C (77°F).]
  No. 13, 14 [Fix air inlet sensor input signal at 15°C (59°F).]
  No. 21, 22 [Fix air thermo sensor input signal at -2°C (–35.6°F).]
- Air conditioning control unit terminal voltages

Terminal No.	Signal name	Condition	Terminal voltage
55	Air inlet sensor	Temperature at sensor 25°C (77°F) (4 kΩ)	2.2-2.8 V
60	Sensor power source	Normally	4.8-5.2 V
66	Interior temperature sensor	Temperature at sensor 25°C (77°F) (4 kΩ)	2.3-2.9 V
67	Air thermo sensor	Temperature at sensor 25°C (77°F) (4 kΩ) when air conditioning is OFF	2.3-2.9 V

TSB Revision

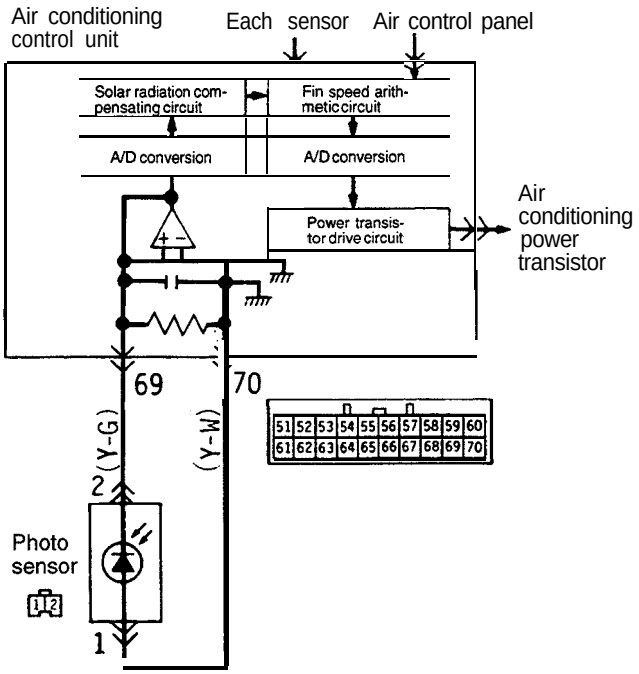
4. Inspection of engine coolant temperature sensor and photo sensor circuits

<Engine coolant temperature sensor>



Z20F0150

<Photo sensor>



Z20F0149
00002634

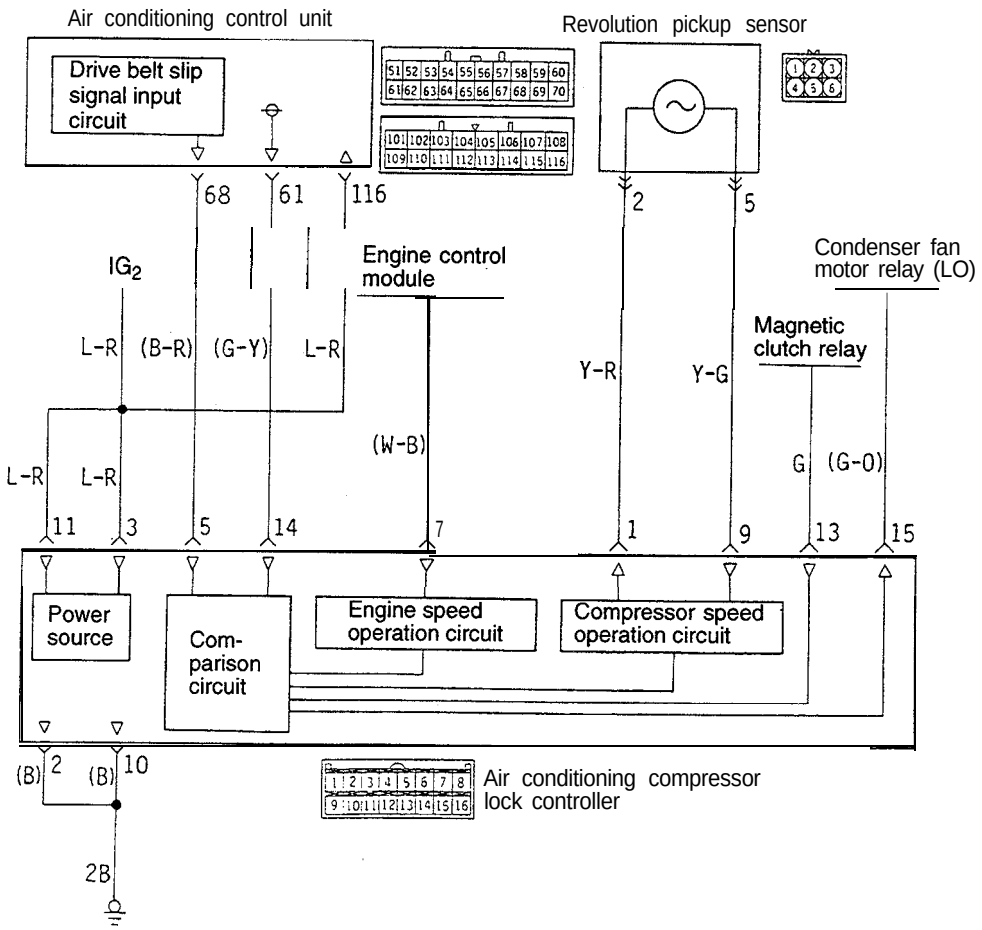
Troubleshooting Hints

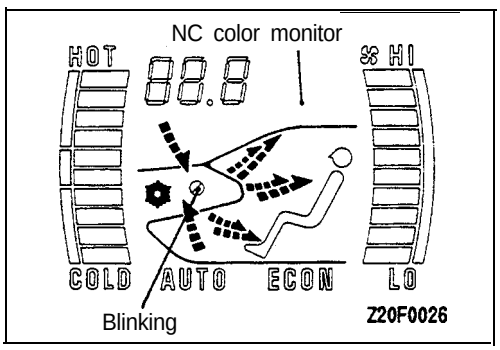
- Air conditioning control unit terminal voltages

Terminal No.	Signal name	Condition	Terminal voltage
69	Photo sensor (–)	Illuminance 100,000 lux or more	-0.1 to -0.2 v
		Illuminance less than 0 lux	OV
70	Photo sensor (+)	Normally	o v
59	Engine coolant temperature sensor (+)	Switch OFF [Engine coolant temperature less than 50°C (122°F)]	Battery positive voltage
		Switch ON [Engine coolant temperature 50°C (122°F) or higher]	0 V

TSB Revision

5. Inspection of air conditioning compressor lock controller circuit





Operation

Refer to P.55-12 except the warning indicator shown in the illustration.

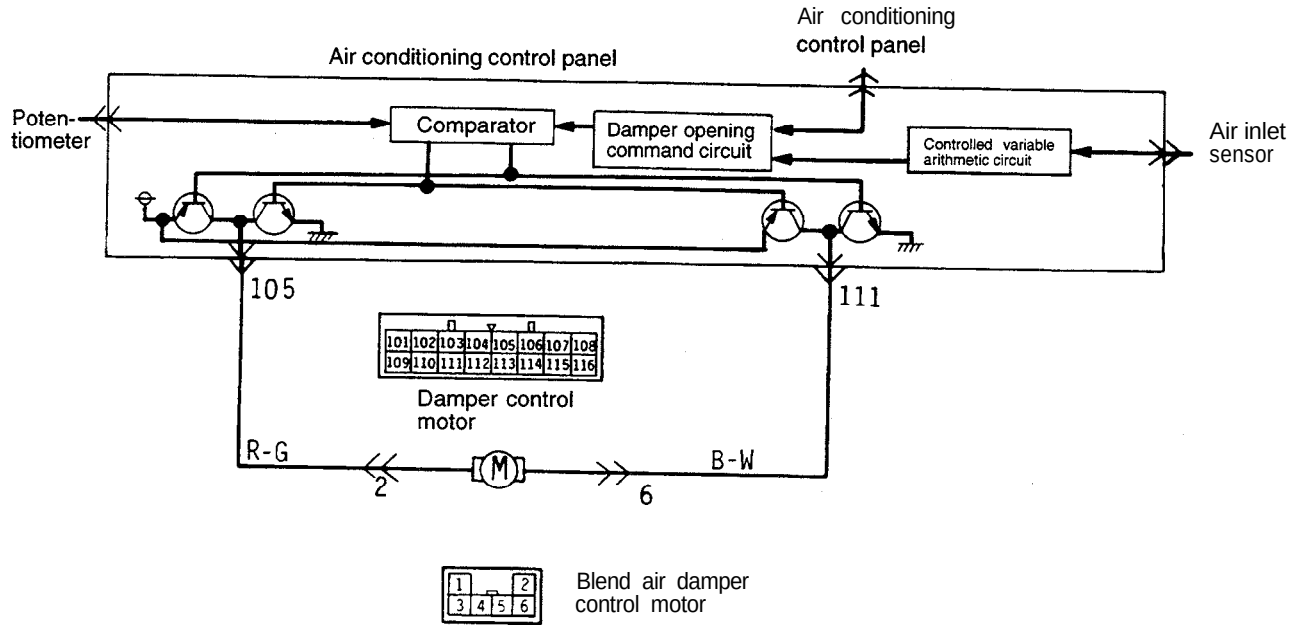
Troubleshooting Hints

Refer to P.55-12.

TSB Revision

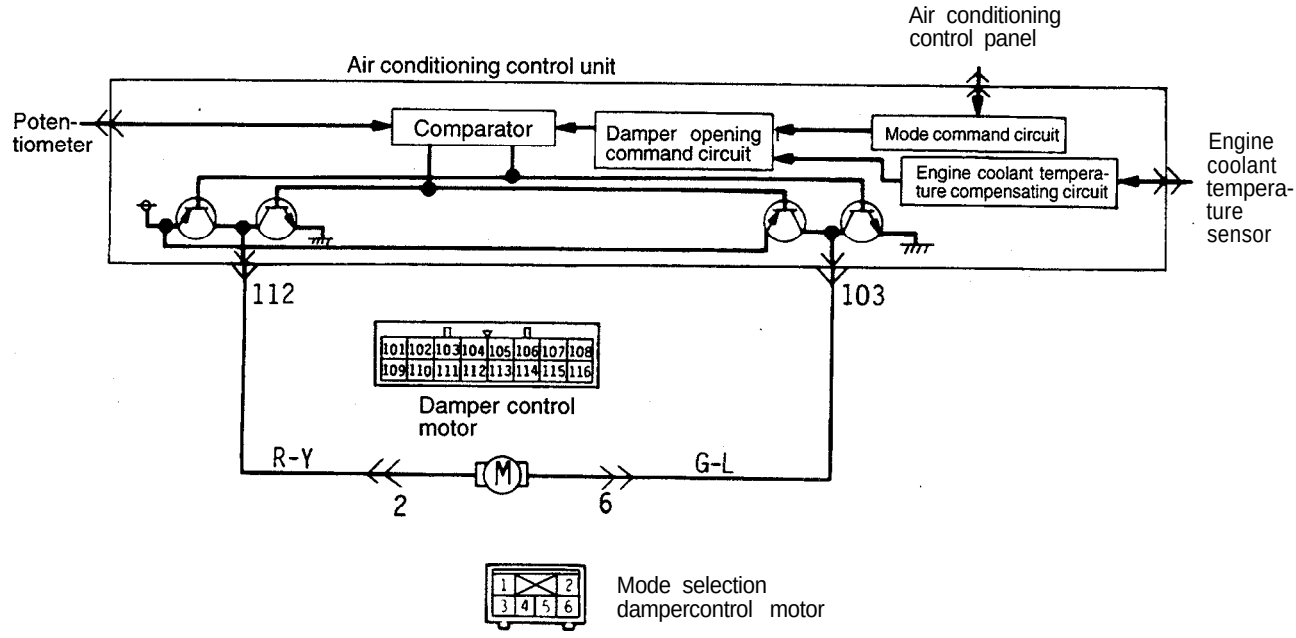
6. Inspection of blend air damper, mode selection damper, air selection damper control motor circuits

<Blend air damper control motor>



Z20F0152

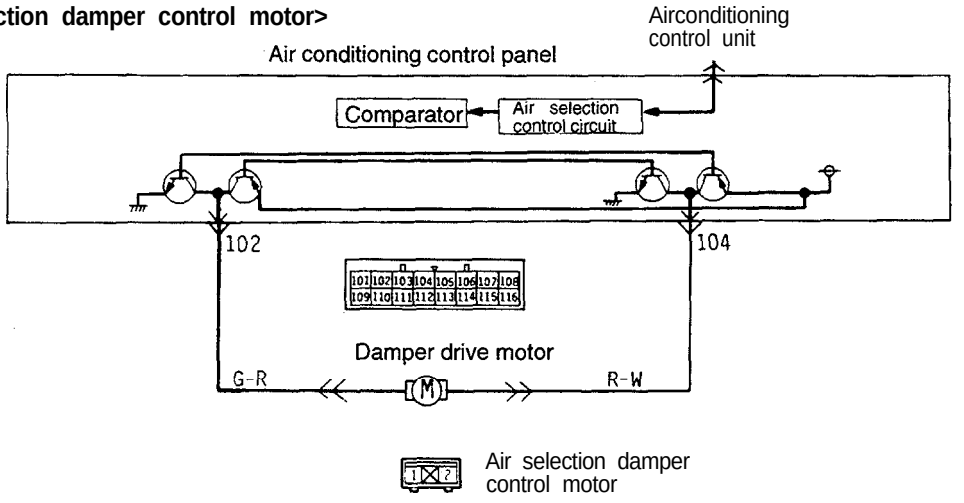
<Mode selection damper control motor>



Z20F0151
00002635

TSB Revision

<Air selection damper control motor>



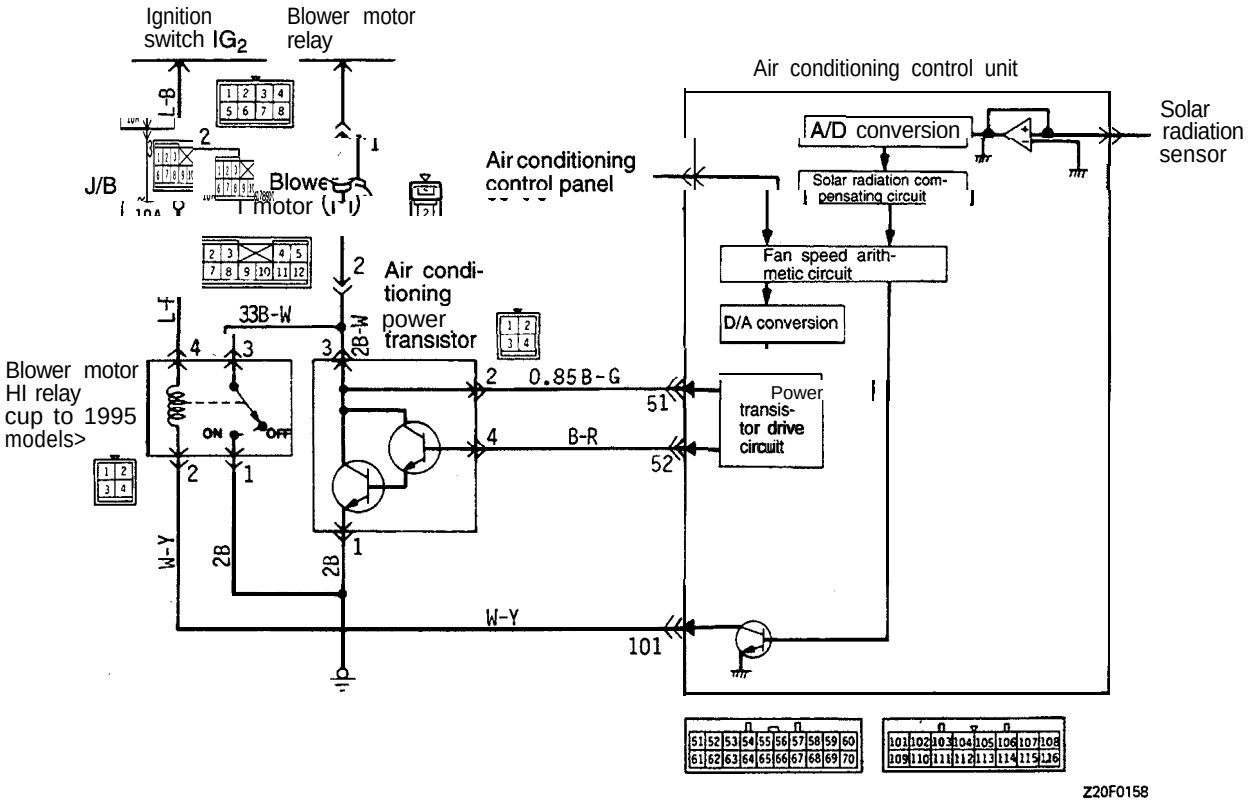
Troubleshooting Hints

- Air conditioning control unit terminal voltages

Terminal No.	Signal name	Condition	Terminal voltage
102	Airselection damper control motor (–)	Inside-air switch ON (Output turns OFF 40 seconds after the damper moved to inside air position.)	0.5 v
		Outside-air switch ON (Output turns OFF 40 seconds after the damper moved to outside air position.)	10 V
103	Mode selection damper control motor (–)	FACE switch ON (Output turns OFF 40 seconds after the damper moved to FACE position.)	0.5 v
		DEF. switch ON (Output turns OFF 40 seconds after the damper moved to DEF. position.)	10 V
104	Air selector damper control motor (+)	Inside-air switch ON (Output turns OFF 40 seconds after inside air has been activated.)	10 V
		Outside-air switch ON (Output turns OFF 40 seconds after outside air has been activated.)	0.5 v
105	Blend air damper control motor (+)	Temperature is set at 17°C (62.6°F). (Output turns OFF 40 seconds after the damper moved to MAXCOOL position.)	0.5 v
		Temperature is set at 32.5°C (90.5°F). (Output turns OFF 40 seconds after the damper moved to MAX. HOT position.)	10 V
111	Blend air damper control motor (–)	Temperature is set at 17°C (62.6°F). (Output turns OFF 40 seconds after the damper moved to MAX. COOL position.)	10 V
		Temperature is set at 32.5°C (90.5°F). (Output turns OFF 40 seconds after the damper moved to MAX. HOT position.)	0.5 v
112	Mode selection damper control motor (+)	FACE switch ON (Output turns OFF 40 seconds after the damper moved to FACE position.)	10 V
		DEF. switch ON (Output turns OFF 40 seconds after the damper moved to DEF. position.)	0.5 v

TSB Revision

7. Inspection of air conditioning power transistor and blower motor relay circuits



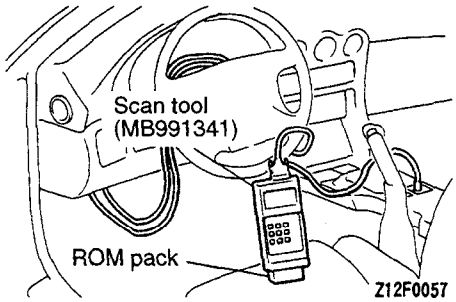
Troubleshooting Hints

- Air conditioning control unit terminal voltages

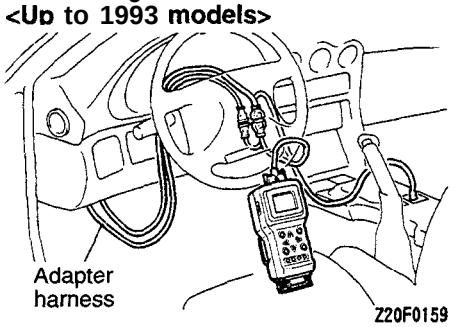
Terminal No.	Signal name	Condition	Terminal voltage
51	Air conditioning power transistor collector	Switch is turned OFF.	Battery positive voltage
		Switch is placed in LO.	Approx. 7 V
		Switch is placed in HI.	OV
52	Air conditioning power transistor base	Blower switch is turned OFF.	o v
		Blower switch is placed in LO.	Approx. 1.3 V
		Blower switch is placed in HI.	Approx. 1.2 V
101	Blower motor HI relay <Up to 1995 models>	Fan switch HI is ON.	1.5 V or less
		Fan switch in ME, LO, or OFF.	Battery positive voltage

TSB Revision

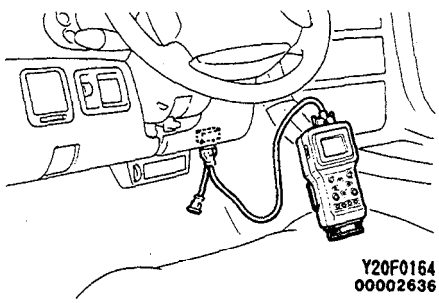
When using the MUT



When using the MUT-II <Up to 1993 models>



<From 1994 models>



ON-BOARD DIAGNOSTIC CHECKING

The following method can be used for checking the diagnosis.

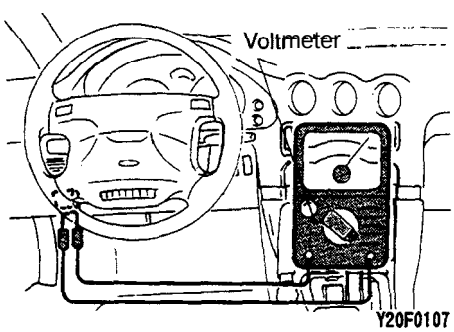
When using the scan tool [Multi-use tester (MUT) <Up to 1993 models> or MUT-II <All models>]

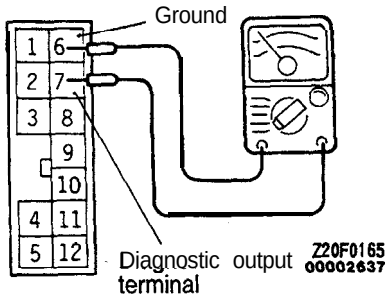
(1) Connect the scan tool to the data link connector to read out the diagnostic trouble codes.
On vehicles up to 1993 model, connect the scan tool using the attached adaptor harness-

Caution
Turn off the ignition switch beforehand whenever the scan tool is connected or disconnected.

(2) Repair the faulty spots by referring to diagnostic chart.
(3) Erase the failure code.
(4) Check the system again.

With voltmeter

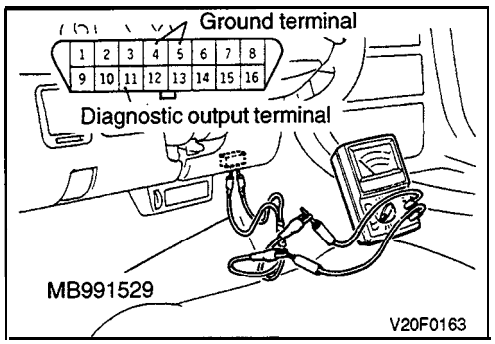




When using the voltmeter <Up to 1993 models>

(1) Connect an analog voltmeter across the diagnostic output terminal (7) and ground terminal (6) of the data link connector.
(2) Turn ON the ignition switch.
(3) According to the voltmeter pointer deflection, read the on-board diagnostic pattern.
(4) Referring to the diagnostic chart, repair the faulty spot.
(5) Erase the failure code by the following procedure.
1) Turn OFF the ignition switch.
2) Disconnect the battery cable from a battery terminal and leave it disconnected for 10 seconds or more; then, reconnect the cable.
3) Turn ON the ignition switch and read the diagnostic trouble code to check that the correct code is being output.

TSB Revision



<From 1994 models>

Connect a voltmeter to the diagnostic output terminal and the ground terminal of the data link connector using the special tool. Read out the diagnostic trouble code by observing the voltmeter pointer deflection.

SERVICE DATA

Item no.	Inspection point	Method	Normal condition	Probable cause	Remedy
11	Interior temperature sensor	Measure resistance of sensor when interior temperature is 25°C (77°F).	Approx. 4 kΩ	Detective interior temperature sensor	Replace interior temperature sensor.
		Measure voltage across terminal 16 of air conditioning control unit and ground wheninteriortemperatureis 25°C (77°F).	In approx. 2.3-2.9 V range	Open-circuited harness between interior temperature sensor and air conditioning control unit	Correct harness.
				Poor connection of air conditioning control unit connector or defective air conditioning control unit	Correct connector connection or replace air conditioning control unit.
13	Air inlet sensor	Measure resistance of sensor when ambient temperature is 25°C (77°F).	Approx. 4 kΩ	Defective air inlet sensor	Replace air inlet sensor.
		Measurevoltageacrossterminal (5) of air conditioning control unit and around when ambient temperature is 25°C (77°F)	In approx. 2.2-2.8 V range	Open-circuited harness betweenairinletsensorandair conditioning control unit	Correct harness.
				Poor connection of air-conditioning control unit connector or defective air conditioning control unit	Correct connector connection or replace air conditioning control unit.
15	Engine coolant temperature sensor	Measure resistance of sensor when engine coolant temperature is 22.5 to 30.5°C (57.6 to 86.9°F)	Conductive	Defective engine coolant temperature sensor	Replace engine coolant temperature sensor.
		Measurevoltageacrossterminal (5) of air conditioning control unit and ground when engine coolant temperature is 22.5 to 30.5°C (57.6 to 86.9°F).	Approx. 12 V	Open-circuited harness between engine coolant temperature sensor and air conditioning control unit	Correct harness.
				Poor connection of air conditioning control unit connector or defective air conditioning control unit	Correct connector connection or replace air conditioning control unit
21	Air thermo sensor	Measure resistance of sensor when sensor's sensing temperatureis25°C(77°F).	Approx. 4 kΩ	Defective air thermo sensor	Replace air thermo sensor
		Measurevoltageacrossterminal 17 of air conditioning control unit and ground when sensor's sensing temperature is 25°C (77°F).	In approx. 2.3-2.9 V range	Open-circuited harness between air thermo sensor and air conditioning control unit	Correct harness.
				Poor connection of air conditioning control unit connector or defective air conditioning control unit	Correct connector connection or replace air conditioning control unit.
31	Blend air damper potentiometer	Refer to P.55-75.		Defective blend air damper potentiometer	Replace blend air damper potentiometer.
		Measure voltage across terminal (5)of air conditioning control unit and ground when potentiometer is in MAX. COOL position.	In approx. 0.1–0.3 V range	Open-circuited harness between blend air damper potentiometer and air conditioning control unit	Correct harness.
				Poor connection of air conditioning control unit connector or defective air conditioning control unit	Correct connector connection or replace air conditioning control unit.
33	Mode selection damper potentiometer	Refer to P.55-75.	–	Defective mode selection damper potentiometer	Replace mode selection damper potentiometer.
		Measure voltage across terminal (5) of air conditioning control unit and ground when potentiometer is in FACE position.	In approx. 0.1–0.3 V range	Open-circuited harness between mode selection damper potentiometer and air conditioning control	Correct harness.
				Poor connection of air conditioning control unit connector or defective air conditioning control unit	Correct connector connection or replace air conditioning control unit.

TSB Revision

DIAGNOSIS DISPLAY PATTERNS AND CODES

Code	Display pattern (output codes) (use with voltmeter)	Cause	Fail safe
0		Normal	–
11		Open-circuited interior temperature sensor	Condition in which 25°C (77°F) is detected
12		Short-circuited interior temperature sensor	
13		Open-circuited air inlet sensor	Condition in which 20°C (68°F) is detected
14		Short-circuited air inlet sensor	
21		Open-circuited air thermo sensor	Condition in which -2°C (–35.6° F) is detected
22		Short-circuited air thermo sensor	
31		Short-circuited and open-circuited blend air damper potentiometer	MAX. HOT (or MAX. COOL when it is at MAX. COOL)
32		Short-circuited and open-circuited mode selection damper potentiometer	DEF. (or FACE when it is at FACE)
41		Defective blend air damper motor	
42		Defective mode selection damper motor	

NOTE:
(1) If two or more abnormal conditions occur at the same time, the code numbers are alternately displayed, in order, repeatedly.
(2) The nature of the malfunction is entered and stored in the memory from the time the malfunction occurs until the ignition switch is next turned to OFF.

TSB Revision

SAFETY PRECAUTIONS

Same as those given in HEATERS AND MANUAL AIR CONDITIONING. (Refer to P.55-14.)

ON-VEHICLE SERVICE

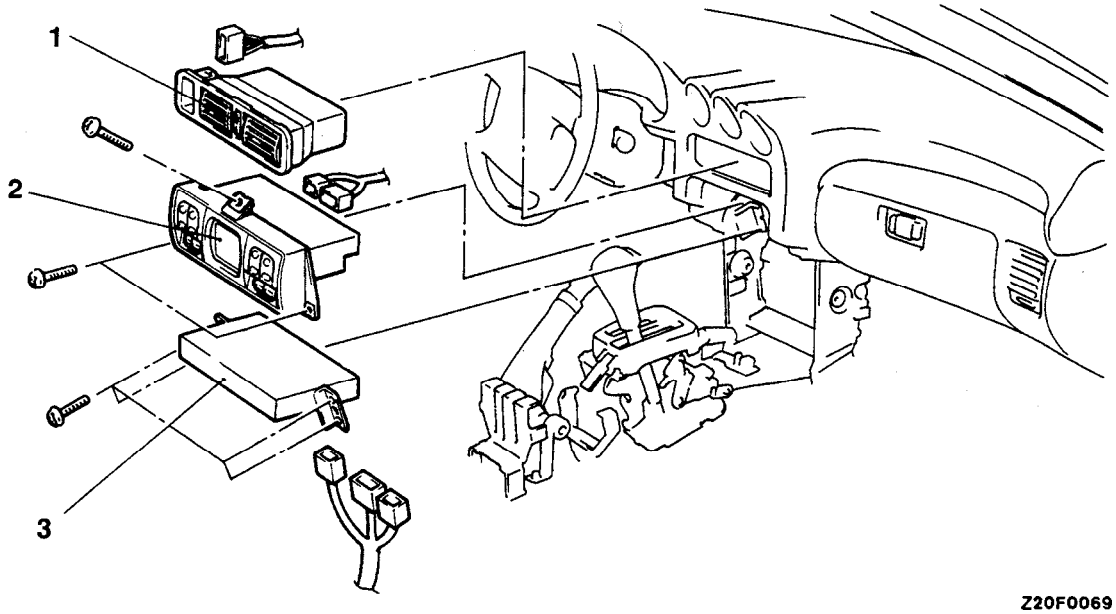
Same as those given in HEATERS AND MANUAL AIR CONDITIONING. (Refer to P.55-16.)

AIR CONDITIONING CONTROL PANEL, AIR CONDITIONING CONTROL UNIT

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Floor Console Removal and Installation (Refer to GROUP 52A – Floor Console.)

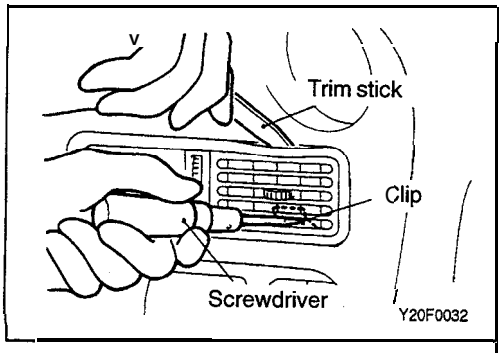
CAUTION: SRS
When installing or removing the floor console, don't allow any impact or shock to the SRS diagnosis unit.



Z20F0069

Removal steps

◀A▶ 1. Center air outlet assembly
2. Air conditioning control panel
3. Air conditioning control unit



REMOVAL SERVICE POINT

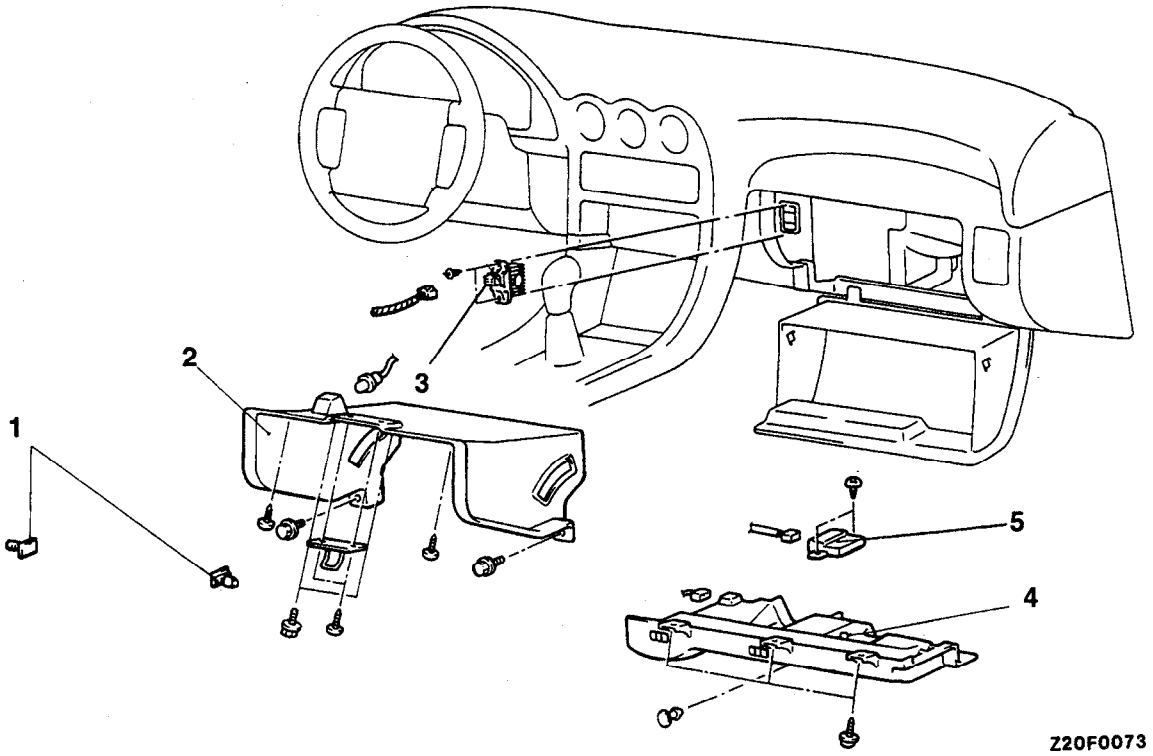
◀A▶ CENTER AIR OUTLET ASSEMBLY REMOVAL

Disengaging the clips (2 positions) of the center air outlet assembly with a flat tip screwdriver, remove the center air outlet assembly with a plastic trim stick.

TSB Revision

POWER TRANSISTOR, AIR CONDITIONING COMPRESSOR LOCK CONTROLLER

REMOVAL AND INSTALLATION



Power transistor removal steps

1. Stopper
2. Glove box outer case assembly
3. Power transistor

A/C compressor lock controller removal steps

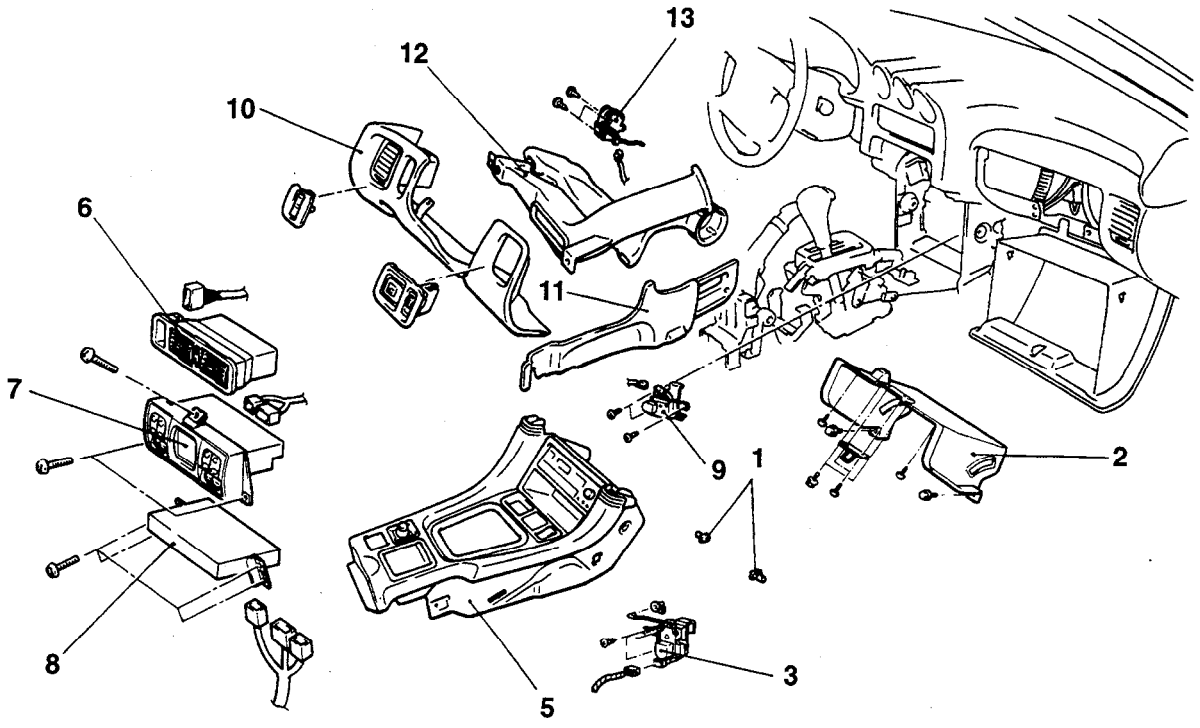
4. Under cover
5. A/C compressor lock controller

TSB Revision

DAMPER CONTROL MOTOR ASSEMBLY

REMOVAL AND INSTALLATION

CAUTION: SRS
When installing or removing the floor console, don't allow any impact or shock to the SRS diagnosis unit.



Z20F0077

Air selection damper motor assembly removal steps

1. Stopper
2. Glove box outer case
3. Air selection damper motor assembly

Blend air damper motor assembly removal steps

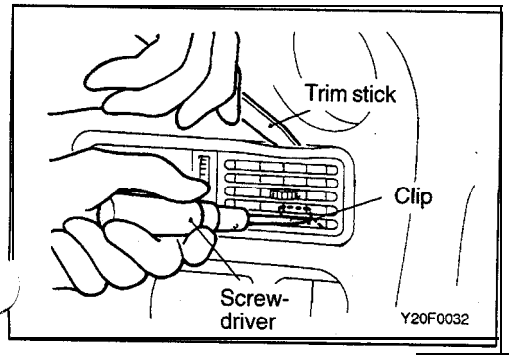
4. Floor console (Refer to GROUP 52A – Floor Console.)
5. Air conditioning control unit
6. Center outlet assembly

◀A▶

7. Air conditioning control panel
8. Air conditioning control unit
9. Blend air damper motor assembly

Mode selection damper motor assembly removal steps

10. Knee protector
11. Side console cover
12. Shower duct and lap cooler duct
13. Mode selection damper motor assembly

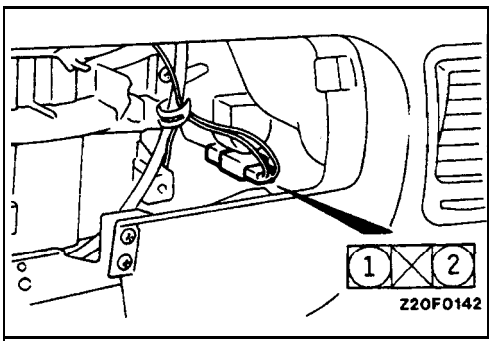


REMOVAL SERVICE POINT

◀A▶ CENTER AIR OUTLET ASSEMBLY REMOVAL

Disengaging the clips (2 positions) of the center air outlet assembly with a fiat tip screwdriver, remove the center air outlet assembly with a plastic trim tool.

TSB Revision



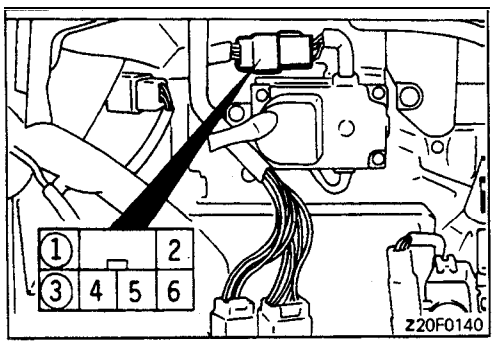
INSPECTION

AIR SELECTION DAMPER MOTOR ASSEMBLY CHECK

Check that the motor rotates when battery voltage is applied to the connector on the motor assembly side.
Check also that the motor rotates in the backward direction when polarity is changed.

Caution

1. **Cut off the voltage when the damper is in the RECIRCULATION or FRESH position.**
2. **Cut off the voltage if the motor does not turn when battery voltage is applied.**

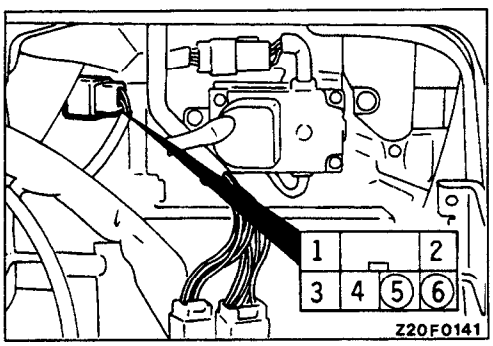


BLEND AIR DAMPER MOTOR CHECK

Check that the motor rotates when battery voltage is applied across terminals (1) and (3) of motor assembly side connector. Check also that the motor turns in the backward direction when polarity is changed.

Caution

1. **Cut off the voltage when the damper is in the MAX. HOT or MAX. COOL position.**
2. **Cut off the voltage if the motor does not turn when battery voltage is applied.**

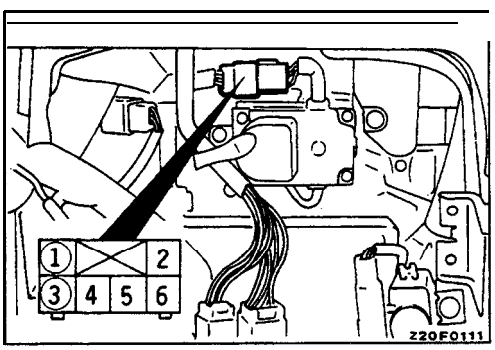


BLEND AIR DAMPER POTENTIOMETER CHECK

Connect a circuit tester across terminals (5) and (6) of the motor assembly connector and check that resistance gradually changes as the damper is moved from MAX. HOT to MAX. COOL position.

Standard value

MAX. HOT: Approx. 0.2. kΩ
MAX. COOL: Approx. 4.8 kΩ

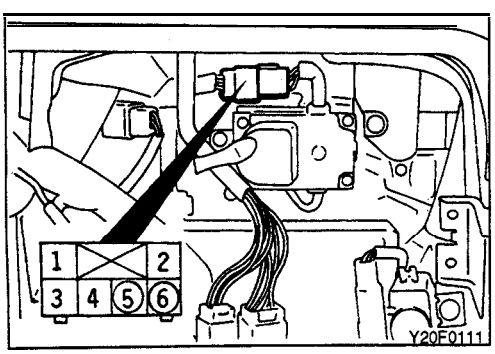


MODE SELECTION DAMPER MOTOR CHECK

Check that the motor turns when battery voltage is applied across terminals (1) and (3) of the motor assembly connector. Check also that the motor turns in the backward direction when polarity is changed.

Caution

1. **Cut off the voltage when the damper is in the DEF. or FACE position.**
2. **Cut off the voltage if the motor does not turn when battery voltage is applied.**



MODE SELECTION DAMPER POTENTIOMETER CHECK

Connect a circuit tester across terminals (5) and (6) of the motor assembly connector and check that resistance gradually changes as the damper is moved from DEF. to FACE position.

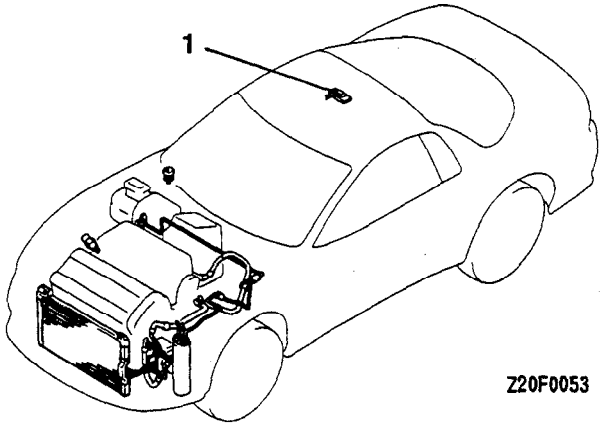
Standard value

DEF. position: Approx. 0.2 kΩ
FACE position: Approx. 4.8 kΩ

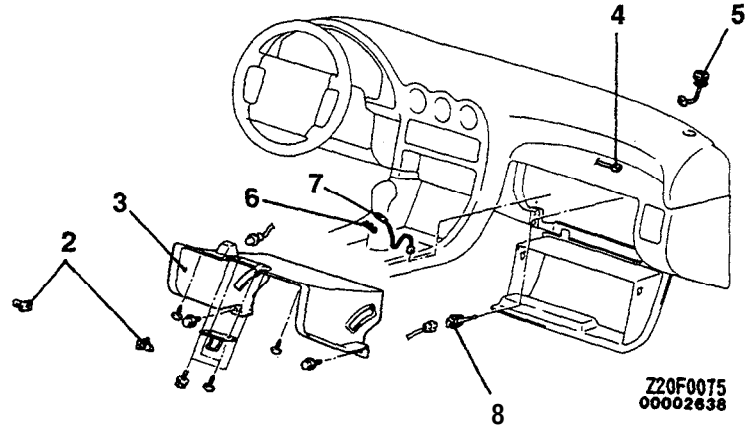
TSB Revision

SENSORS

REMOVAL AND INSTALLATION



Z20F0053



Z20F0075
00002638

◀A▶ 1. Interior temperature sensor

Photo sensor removal steps

2. Stopper
3. Glove box outer case
4. Photo sensor connector connection

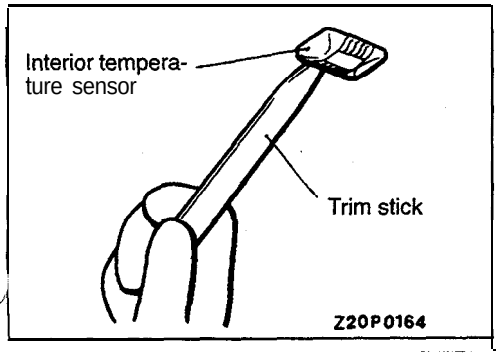
◀B▶ 5. Photo sensor

Engine coolant temperature sensor removal steps

2. Stopper
3. Glove box outer case assembly
6. Plate
7. Engine coolant temperature sensor

Air inlet sensor removal steps

2. Stopper
3. Glove box outer case assembly
8. Air inlet sensor



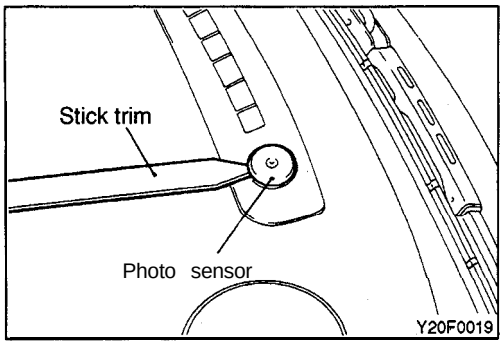
Z20P0164

REMOVAL SERVICE POINTS

(A, INTERIOR TEMPERATURE SENSOR REMOVAL

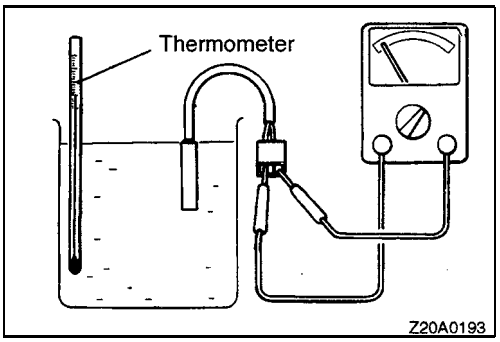
Using the trim stick, remove the interior temperature sensor from the headlining.

TSB Revision



◀B▶ PHOTO SENSOR REMOVAL

Using a trim stick, remove the photo sensor from the defroster garnishes.



INSPECTION

ENGINE COOLANT TEMPERATURE SENSOR CHECK

(1) Dip the engine coolant temperature sensor in hot water and, using a stove, etc., raise the engine coolant temperature.
(2) Check that the engine coolant temperature sensor is conductive when the engine coolant temperature reaches the specified temperature.

Standard value: 26.5 ± 4°C (79.7 ± 7.2°F)

AIR INLET SENSOR CHECK

The condition can be considered normal if the resistances are measured within the ranges of 3.98-4.12 kilohms and 2.21-2.35 kilohms, respectively, when the air inlet sensor is submerged in warm water of 25°C (77°F) and 40°C (104°F) for one minute or longer each.

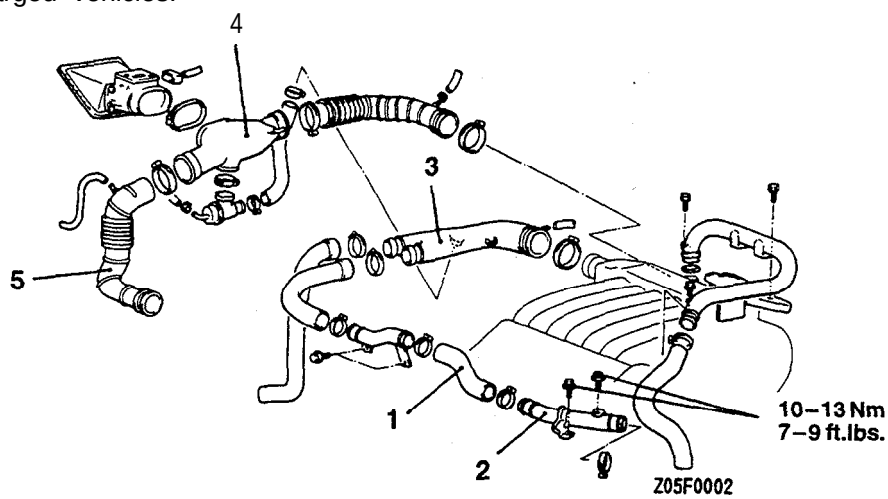
NOTE
The relationship between the air inlet and the resistance values is as shown below.

Ambient temperature °C (°F)	-10 (14)	0 (32)	10 (50)	20 (68)	25 (77)	30 (86)	40 (104)
Resistancevalue (reference) kΩ	19.06	11.71	7.45	4.89	4.00	3.30	2.28

COMPRESSOR, CONDENSER, CONDENSER FAN MOTOR, REFRIGERANT LINE AND AIR CONDITIONING ENGINE COOLANT TEMPERATURE SWITCH <Up to 1993 models>

REMOVAL AND INSTALLATION

The service procedures are the same as those for manual air conditioning except for those parts described below on turbocharged vehicles.



Compressor, condenser and condenser fan motor, refrigerant line removal steps

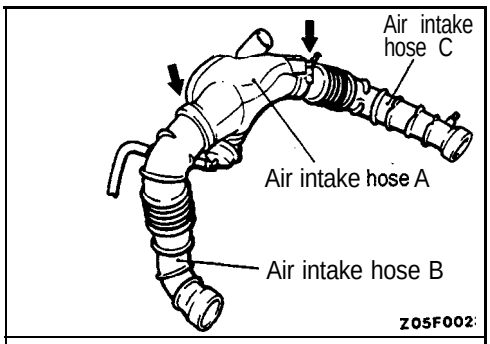
▶B◀ 1. Air hose B
▶B◀ 2. Air pipe

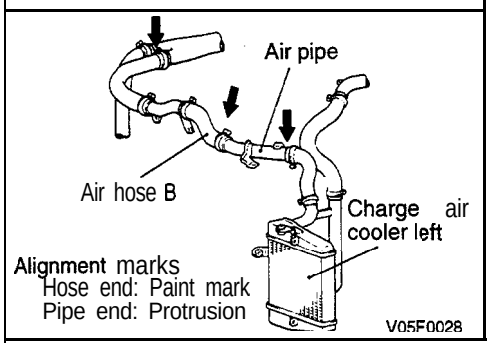
A/C engine coolant temperature switch removal steps <Up to 1993 models>

3. Air hose A
▶A◀ 4. Air intake hose A
▶A◀ 5. Air intake hose B

NOTE
Torque hose clamps to 4 Nm (2.9 ft.lbs.).

TSB Revision





INSTALLATION SERVICE POINTS

▶A◀ AIR INTAKE HOSE B / AIR INTAKE HOSE A INSTALLATION

Align the cutouts in air intake hose A indicated by arrows with the A markings on air intake hoses B and C and insert hoses B and C all the way into hose A.
Insert the other end of air intake hose B all the way into turbocharger side.

▶B◀ AIR PIPE / AIR HOSE B INSTALLATION

When installing the air hoses, make sure that the alignment marks at places indicated by arrows are properly aligned. Insert each air hose until it hits the root of step or it bottoms.

Caution
Be careful not to allow any foreign matter to get into the hoses, pipes, or the charge air cooler itself.

OTHER PARTS

Service procedures for other parts are the same as those in HEATERS AND MANUAL AIR CONDITIONING.

Part name	Ref. page	Part name	Ref. page
Heater Unit	P.55-34	Evaporator – Disassembly and Reassembly	P.55-38
Blower Motor Assembly	P.55-35	Compressor- Disassembly and Reassembly	P.55-41, 42
Evaporator-Removal and Installation	P.55-37	Ventilators	P.55-50

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CABLE 17-4-I
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<Engine and Emission Control> 17-4-I
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<Manual A/C> 55-6-I
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<Manual A/C> 55-39-I
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Maintenance 00-49-I
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<AWD> 27-6-I
<FWD> 27-2-I
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On-vehicle Inspection 13A-91, 217-I
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LINING 35-74-I
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PEDAL 35-84-I
Check and Adjustment 35-63-I
BUMPER
Front 51-8-I
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OIL SEALS 11-21-I
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<Turbo> 15-33-I
CD AUTO CHANGER 54-191-II
CENTER PILLAR GLASS 42-33-I
CENTRAL DOOR LOCKING SYSTEM 42-49-I
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COVER 21-20-I
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MASTER CYLINDER 21-14-I
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COMBINATION LIGHT 54-106-II
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<Manual A/C> 55-46-I
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<Full Auto A/C> 55-79-I
<Manual A/C> 55-46-I
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TRIM 42-42-I
WATERPROOF FILM 42-42-I
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DRIVE BELT
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<M/T AWD> 22-15-I
<M/T FWD> 22-5-I

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OIL FILTER, Maintenance 00-48-I
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CANISTER 17-65-I
CONTROL SYSTEM 17-57-I
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<Turbo> 15-28-I
PIPE
<Non Turbo> 15-30-I
<Turbo> 15-33-I
SYSTEM
Active 15-40-I
Maintenance 00-60-I

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Condenser
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<Manual A/C> 55-46-I
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FENDER 42-24-I
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3000GT Specs-At-A-Glance

			1992	1993–1996
00 General				
Engine code			6G72	6G72
Engine size		cm^3 (cu.in.)	2,972 (181.4)	2,972 (181.4)
Engine oil capacity (total)	<Non-Turbo>	dm^3 (qts.)	4.3 (4.5)	4.3 (4.5)
	<Turbo>	dm^3 (qts.)	4.6 (4.9)	4.6 (4.9)
Cooling system capacity		dm^3 (qts.)	8.0 (8.5)	8.0 (8.5)
A/T capacity		dm^3 (qts.)	7.5 (7.9)	7.5 (7.9)
Power steering capacity	<2WS>	dm^3 (qts.)	0.9 (.95)	0.9 (.95)
	<4WS>	dm^3 (qts.)	1.5 (1.59)	1.5 (1.59)
Rear axle gear oil capacity <AWD>		dm^3 (qts.)	1.1 (1.2)	1.1 (1.2)
11 Engine				
Firing order			1-2-3-4-5-6	1-2-3-4-5-6
Compression pressure	<Non-Turbo>	kPa (psi)	min. 980 (139)	min. 980 (139)
	<Turbo>	kPa (psi)	min. 810 (115)	min. 810 (111.5)
Difference between cylinders		kPa (psi)	100 (14)	100 (14)
13 Fuel				
Fuel tank capacity		dm^3 (gals.)	75 (19.8)	75 (19.8)
Fuel pressure				
(When vacuum hose disconnected)	<Non-Turbo>	kPa (psi)	330 – 350 (47 – 50)	330 – 350 (47 – 50)
	<Turbo>	kPa (psi)	295 – 315 (43 – 45)	295 – 315 (43 – 45)
(When vacuum hose connected)	<Non-Turbo>	kPa (psi)	Approx. 270 (38)	Approx. 270 (38)
	<Turbo>	kPa (psi)	Approx. 235 (34)	Approx. 235 (34)
Basic ignition timing			5° BTDC ± 2°	5° BTDC ± 3°
Curb idle speed		rpm	700 ± 100	700 ± 100
TPS voltage		mV	400 – 1000	400 – 1000
TPS resistance		kΩ	3.5 – 6.5	3.5 – 6.5
Intake air temperature sensor resistance		kΩ [at 20°C (68°F)]	2.7	2.7
Engine coolant temperature sensor resistance		kΩ <20°C (68°F)>	2.4	2.4
		kΩ <80°C (176°F)>	0.3	0.3
14 Cooling				
Radiator pressure cap opens		kPa (psi)	65 (9.2)	65 (9.2)
23 A/T				
Fluid capacity		dm^3 (qts.)	7.5 (7.9)	7.5 (7.9)
26 Front Axle				
Drive shaft nut torque		Nm (ft.lbs.)	200 – 260 (145 – 188)	200 – 260 (145 – 188)
Caliper assembly mounting bolt torque		Nm (ft.lbs.)	90 (65)	90 (65)
27 Rear Axle				
Wheel bearing nut torque <FWD>		Nm (ft.lbs.)	200 – 260 (145 – 188)	200 – 260 (145 – 188)
31 Wheel and Tire				
Tire inflation pressure	<Front>	kPa (psi)	220 (32)	220 (32)
	<Rear>	kPa (psi)	200 (29)	200 (29)
33A Front Suspension				
Front wheel alignment	<Camber>		0° ± 30'	0° ± 30'
	<Caster>		3°55' ± 30'	3°55' ± 30'
	<Toe-in>	mm (in.)	0 ± 3 (0 ± .12)	0 ± 3 (0 ± .12)
34 Rear Suspension				
Wheel bearing nut torque <FWD>		Nm (ft.lbs.)	200 – 260 (145 – 188)	200 – 260 (145 – 188)
35 Brakes				
Front disc runout	<FWD>	mm (in.)	0.07 (.0028) or less	0.07 (.0028) or less
	<AWD>	mm (in.)	0.10 (.004) or less	0.10 (.004) or less
Front disc minimum thickness	<FWD>	mm (in.)	22.4 (.881)	22.4 (.881)
	<AWD>	mm (in.)	28.4 (1.118)	28.4 (1.118)
Rear disc runout		mm (in.)	0.08 (.0031) or less	0.08 (.0031) or less
Rear disc minimum thickness	<FWD>	mm (in.)	16.4 (.645)	16.4 (.645)
	<AWD>	mm (in.)	18.4 (.724)	18.4 (.724)
Rear drum inside diameter, max.		mm (in.)	169 (6.653)	169 (6.653)
36 Parking Brakes				
Parking brake lever stroke			3 – 5 notches	3 – 5 notches
51 Exterior				
Wiper blade length	<Driver's side>	mm (in.)	525 (20.7)	525 (20.7)
	<Passenger's side>	mm (in.)	500 (19.7)	500 (19.7)
55 Heater, A/C, Ventilation				
Refrigerant quantity				
<Vehicles using R-12 refrigerant>		g (oz.)	960 (34)*1 or Approx. 800 (29)*2	Approx. 800 (29)
<Vehicles using R-134a refrigerant>		g (oz.)	—	740 – 790 (26 – 28)

NOTE
*1: Up to Sept. 1992 models
*2: From Oct. 1992 models

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