

3000GT

**Service
Manual
1991**



Volume 1

Engine, Chassis & Body



BackupServiceManual

3000GT

1991: 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.



Mitsubishi Motors Corporation reserves the right to make changes in design or to make additions to or improvements in its products without imposing any obligations upon itself to install them on its products previously manufactured.

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NOTE:
For Electrical, refer to Volume-2 "Electrical"

SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

- (1) A Supplemental Restraint System (SRS), which uses a driver-side air bag, has been installed in the 3000GT.
- (2) The SRS includes the following components: impact sensors, SRS diagnosis unit; SRS warning light, air bag module, clock spring, 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 (*).

The Supplemental Restraint System (SRS)-related components are shown in the following MASTER TABLE OF CONTENTS. Be sure to carefully read and understand the WARNING below before proceeding.

Group number	Group name	SRS-related components	Reference page
13	FUEL	CRUISE CONTROL SYSTEM	P.13-185
22,23	MANUAL TRANSAXLE, AUTOMATIC TRANSAXLE	TRANSAXLE CONTROL	P.22-11, 54 P.23-54
32	POWER PLANT MOUNT	RIGHT MEMBER, LEFT MEMBER AND CROSSMEMBER	P.32-6
33B	ELECTRONIC CONTROL SUSPENSION	STEERING ANGULAR VELOCITY SENSOR	P.33B-19
36	PARKING BRAKES	PARKING BRAKE LEVER AND PARKING BRAKE CABLE	P.36-5
37A	STEERING	POWER STEERING GEAR BOX	P.37A-17
		STEERING WHEEL AND SHAFT	P.37A-13
42	BODY	FENDER	P.42-23
52A	INTERIOR	FLOOR CONSOLE	P.52A-11
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54	CHASSIS ELECTRICAL	COLUMN SWITCH	P.54-73
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55	HEATER, AIR CONDITIONER AND VENTILATION	AIR-CONDITIONER CONTROL PANEL AIR-CONDITIONER CONTROL UNIT	P.55-56
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		HEATER CONTROL ASSEMBLY	P.55-18
		HEATER UNIT	P.55-22
		VENTILATORS (INSTRUMENT PANEL)	P.55-36

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), before beginning any service or maintenance of any component of the SRS or any SRS-related component.

GENERAL

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MO00A-

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HOW TO USE THIS MANUAL

MOOBAAF

SCOPE OF 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 unit 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 attentions to 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 $\pm 10\%$ except the following cases when the upper and lower limits of tightening torque are given.

- (1) The tolerance for the basic value is within $\pm 10\%$.
- (2) Special bolts or the like are in use.
- (3) Special tightening methods are used.

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.

MPI: Indicates the multi-point injection, or engines equipped with the multi-point 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.

EXPLANATION OF MANUAL CONTENTS

Indicates the group number.

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.

Maintenance and Servicing Procedures

- (1) 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.
- (2) The numbers provided within the diagram indicate the sequence for maintenance and servicing procedures; the symbol **N** indicates a non-reusable part; the tightening torque is provided where applicable.

- 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.

- ◆◆: Indicates that there are essential points for removal or disassembly.
- ◆◆: Indicates that there are essential points for installation or reassembly.

Indicates (by symbols) where lubrication is necessary. In this example, sealant is applied (where indicated) to the steering gear box.

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, automatic transmission fluid or a conditioner compressor oil



: Engine oil or gear oil



: Adhesive tape or butyl rubber tape

Indicates the page number.

Indicates the group title.

Indicates the section title.

Denotes tightening torque.

Denotes non-reusable part.

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

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

This number corresponds to the number appearing in "Removal steps", "Disassembly steps", "Installation steps" or "Reassembly steps"

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.

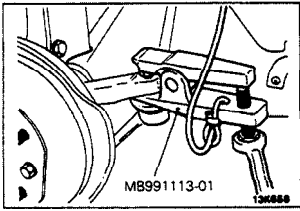
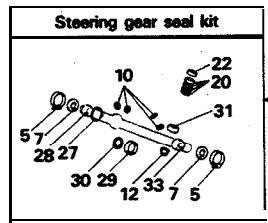
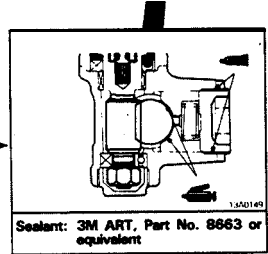
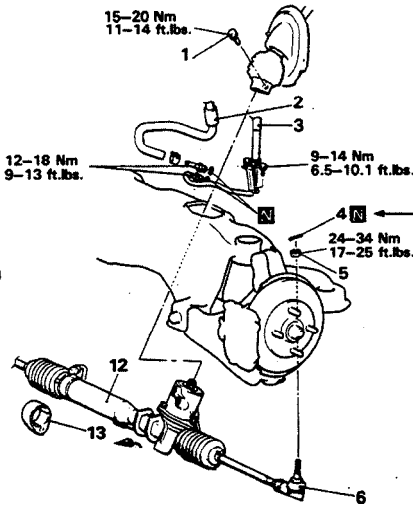
37A-28

STEERING – Power Steering Gear Box.

**POWER STEERING GEAR BOX
REMOVAL AND INSTALLATION**

Pre-removal Operation
• Draining of the Power Steering Fluid

- Removal steps**
1. Joint assembly and gear box connecting bolt
 2. Connection for return tube
 3. Connection for pressure hose
 4. cotter pin
 5. Tie-rod end and knuckle connecting
-
3. Front turn stopper
 10. Center member rear mounting bolt
 11. Front exhaust pipe
 12. Gear box assembly
 13. Mounting rubber



SERVICE POINTS OF REMOVAL

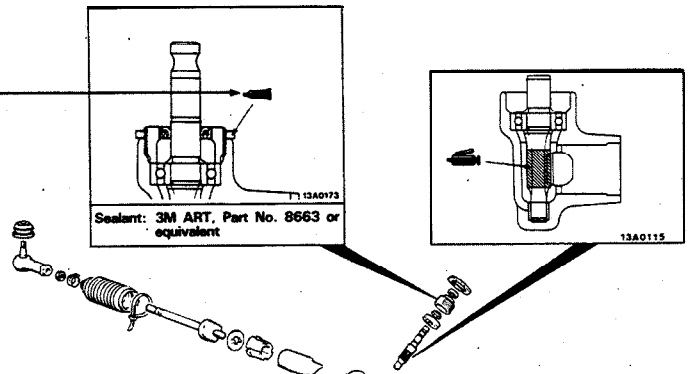
6. DISCONNECTION OF TIE-ROD END
Using the special tool, disconnect the tie rod from the knuckle.
Caution
1. Be sure to tie the cord of the special tool to the nearby part.
2. Loosen the nut but do not remove it.

12. REMOVAL OF GEAR BOX ASSEMBLY

37A-24

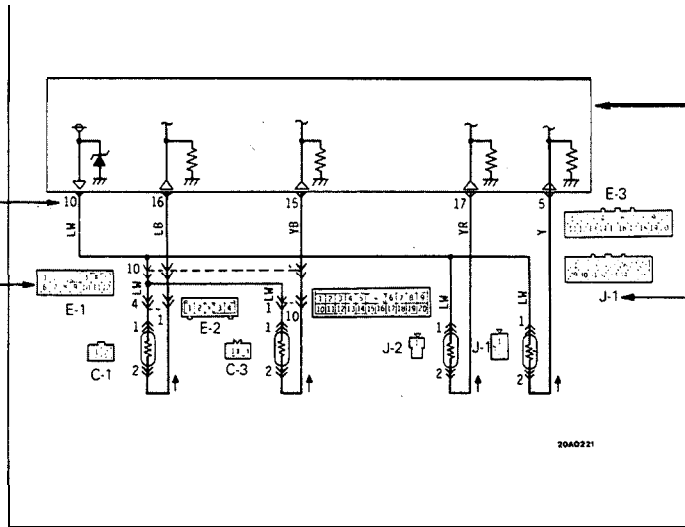
STEERING – Manual Steering Gear Box

LUBRICATION AND SEALING POINTS



EXPLANATION OF THE TROUBLESHOOTING GUIDE

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



Indicates connector's terminal number.

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

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 as 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 a.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 under which the check should be made.

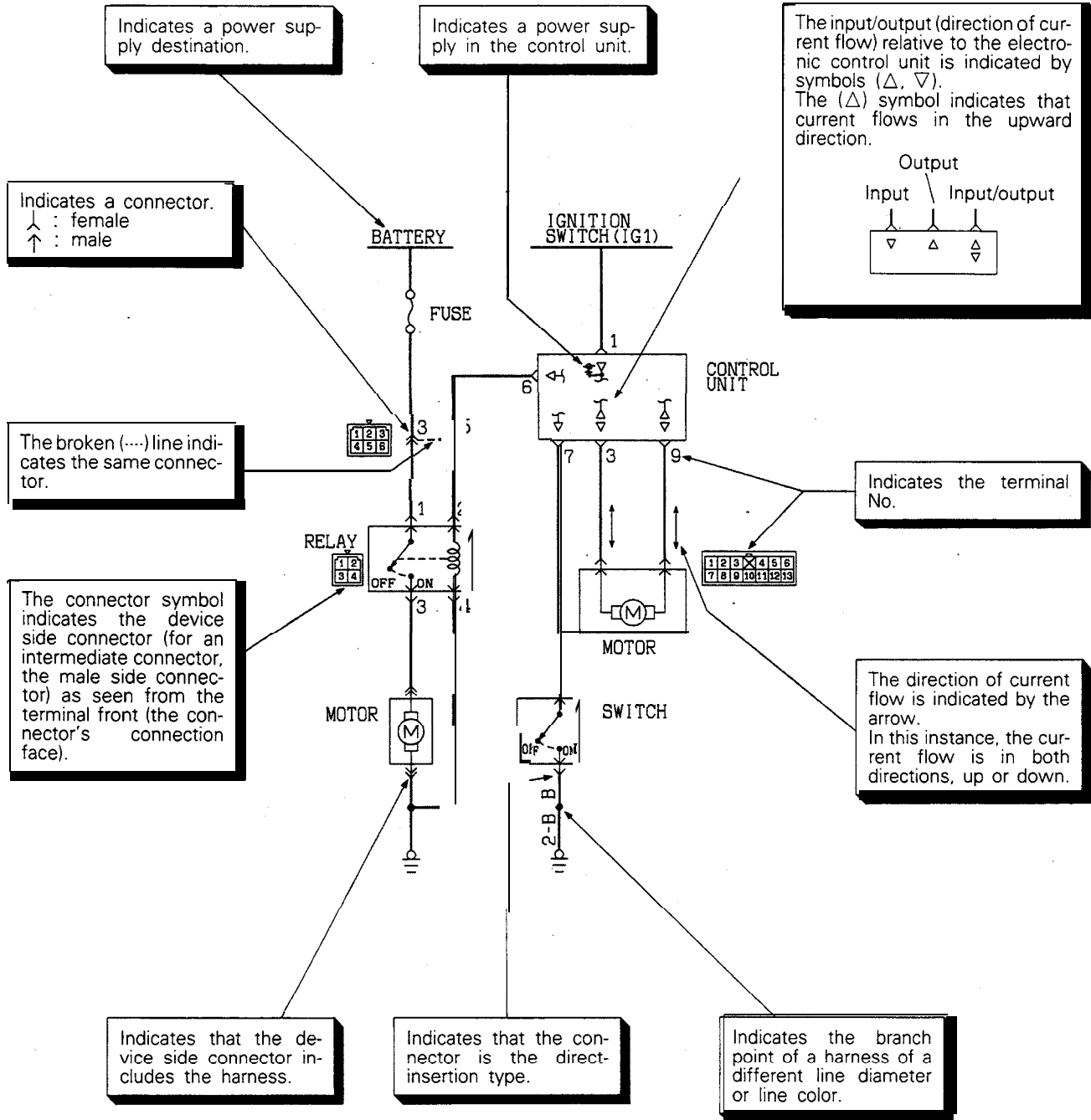
Indicates the specification to be used for judgement of the check results. If there is no particular mention of conditions in the "Conditions" column, the column shows the specification under normal conditions.

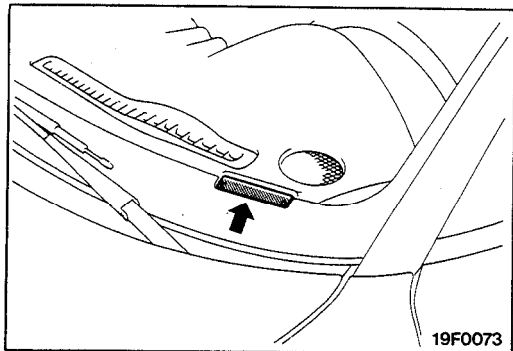
EXPLANATION OF CIRCUIT DIAGRAMS

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.





VEHICLE IDENTIFICATION

MO0CA-

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

M00CB-

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



00F0022

1st Digit	2nd Digit	3rd Digit	4th Digit	5th Digit	6th Digit	7th Digit	8th Digit	9th Digit	10th Digit	11th Digit	12th to 17th Digits
Country	Make	Vehicle type	Others	Line	Price class	Body	Engine	*Check digits	Model year	Plant	Serial number
J- Japan	A- Mitsubishi	3- Passenger Car	X- Driver Air Bag, Passenger Manual Seat Belt	D- 3000GT FWD E- 3000GT AWD	5- Premium 6- Special 7- Ultimate	4- 3-door Hatchback	B- 3.0 liters (181.4 cu.in.) [DOHC-MPI] C- 3.0 liters (181.4 cu.in.) [DOHC-MPI-Turbo]	1 2 3 9 X	M- 1991 Year	Y- Nagoya Plant	000001 to 999999

NOTE

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

VEHICLE IDENTIFICATION NUMBER LIST

MO0CC .

VEHICLES FOR FEDERAL

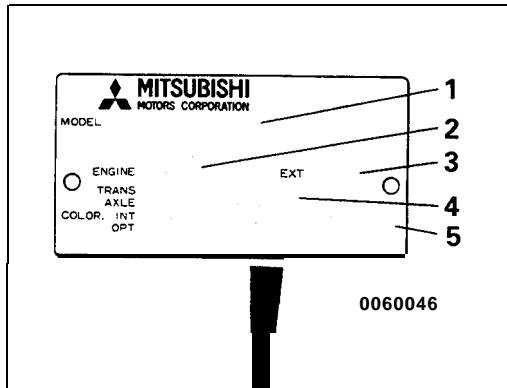
V.I.N. (except sequence number)	Brand	Engine displacement	Models code
JA3XD54B□MY	Mitsubishi 3000GT <FWD>	3.0 liters (181.4 cu.in.) [DOHC-MPI]	Z11AMNXML2M Z11AMRXML2M
JA3XD64B□MY			Z11AMNPML2M Z11AMRPML2M
JA3XE74C□MY	Mitsubishi 3000GT <AWD>	3.0 liters (181.4 cu.in.) [DOHC-MPI-Turbo]	Z15AMNGFL2M Z16AMNGFL2M

VEHICLES FOR CALIFORNIA

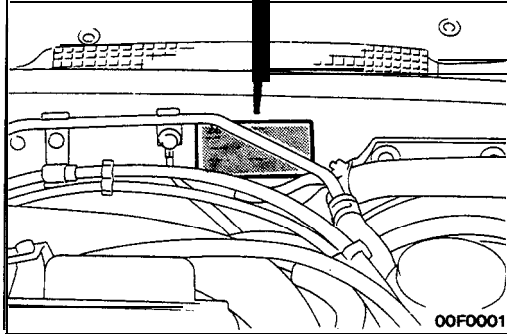
V.I.N. (except sequence number)	Brand	Engine displacement	Models code
JA3XD54B□MY	Mitsubishi 3000GT <FWD>	3.0 liters (181.4 cu.in.) [DOHC-MPI]	Z11AMNXML7M Z11AMRXML7M
JA3XD64B□MY			Z11AMNPML7M Z11AMRPML7M
JA3XE74C□MY*	Mitsubishi 3000GT <AWD>	3.0 liters (181.4 cu.in.) [DOHC-MPI-Turbo]	Z15AMNGFL7M Z16AMNGFL7M

NOTE

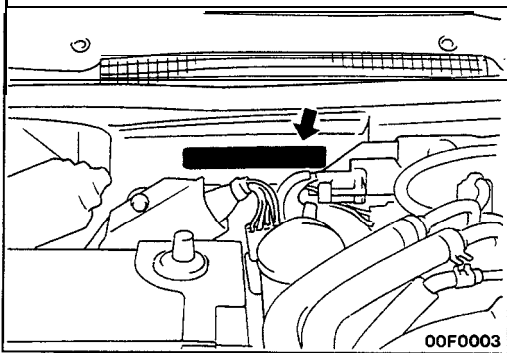
AWD marked with * can also be sold in Federal States. *



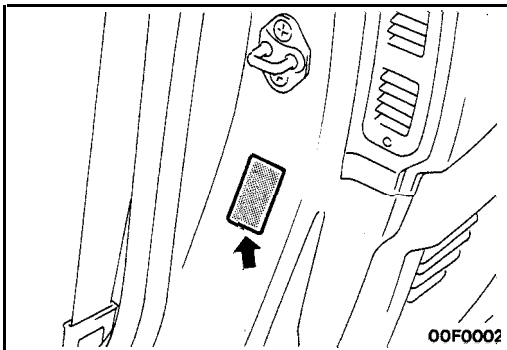
0060046



00F0001



00F0003



00F0002

VEHICLE INFORMATION CODE PLATE

MOOCD -

Vehicle information code plate is riveted onto the bulkhead in the engine compartment.

The plate shows model code, engine model, transaxle model, and body color code.

- 1. MODEL **Z11AMNXML2M**
 - Model series
 - Vehicle model
- 2. ENGINE **6G72**
/ Engine model
- 3. EXT **CA6**
Exterior code
- 4. TRANSAXLE **F5M33**
Transaxle model
- 5. COLOR, INT OPT **R2587V03V**
 - Equipment code
 - Interior code
 - Exterior color code

CHASSIS NUMBER

MOOCE -

STAMPING. LOCATION

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

CHASSIS NUMBER CODE CHART

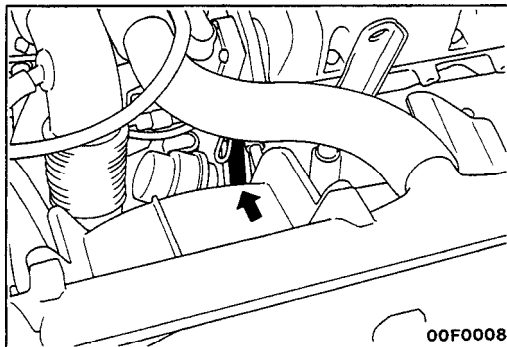
Z 1 □ A M Y □ □ □ □ □ □

- Refer to 10th thru 17th digits of V.I.N. plate.
- Indicates 3000GT-series.

VEHICLE SAFETY CERTIFICATION LABEL

MOOCF -

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.), Gross Axle Weight Rating (G.A.W.R.) front and rear, and Vehicle Identification Number (V.I.N.).



ENGINE MODEL STAMPING

MOOCG -

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 liters (181.4 cu.in.)

2. The engine serial number is stamped near the engine model number, and the serial number cycles, as shown below

Engine serial number	Number cycling
AA0201 to YY9999	AA0201-----→ AA9999
	└ AB0001-----→ AY9999
	└ BA0001-----→ YY9999

Theft protection label

For original parts

00K619

For replacement parts

00K621

THEFT PROTECTION

MOOCIA C

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:



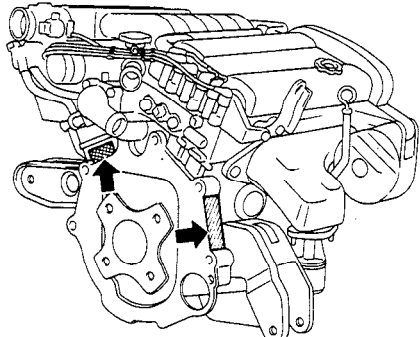
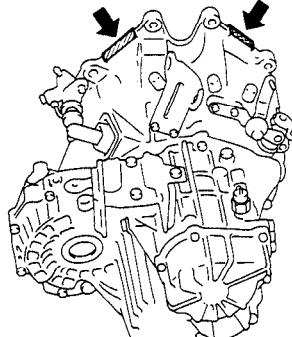
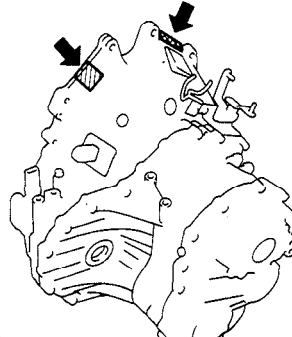
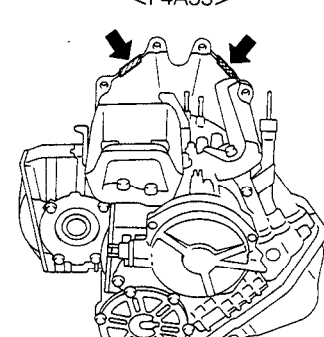
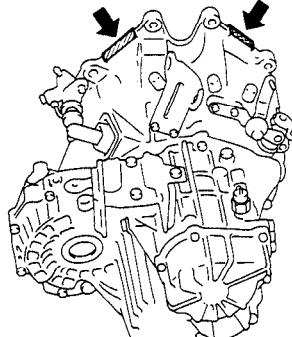
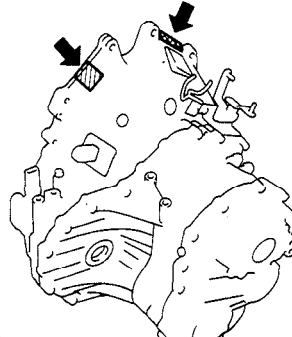
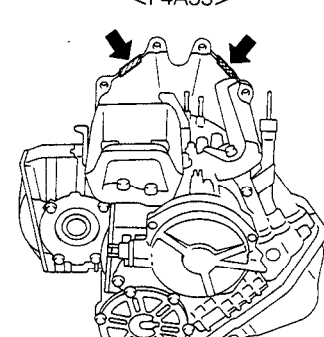
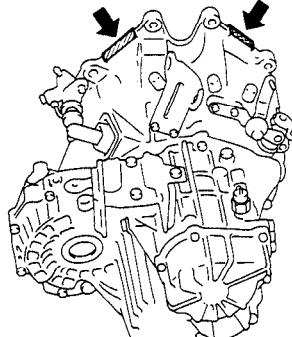
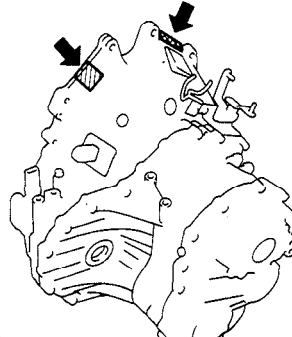
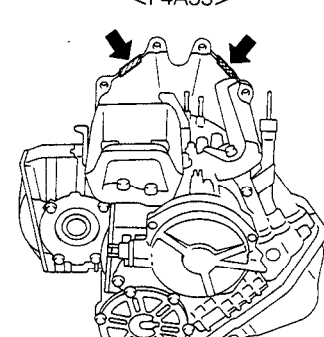
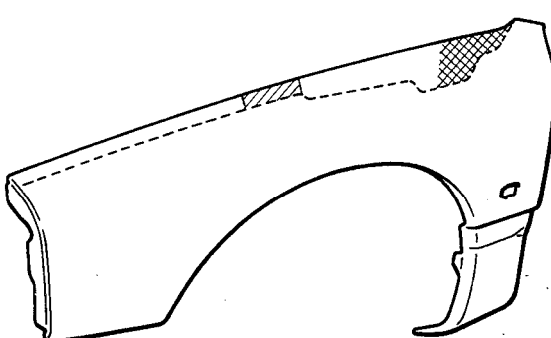
Engine cylinder block, Transaxle housing, Fender, Door, Quarter panel, Hood, Liftgate, Bumpers



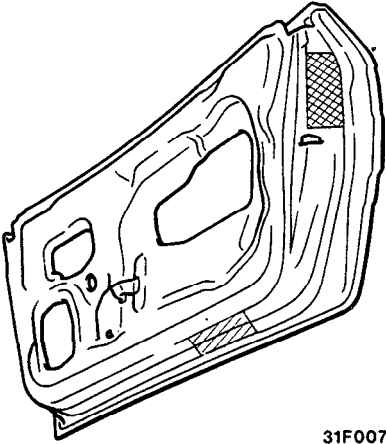
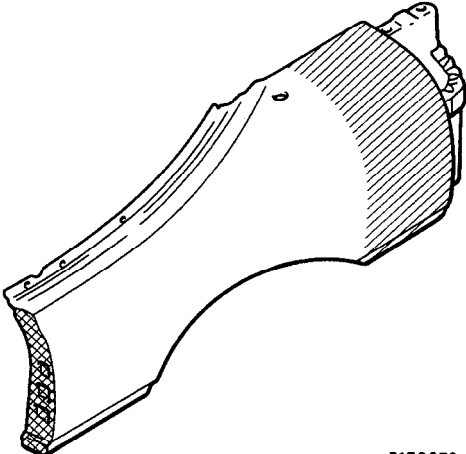
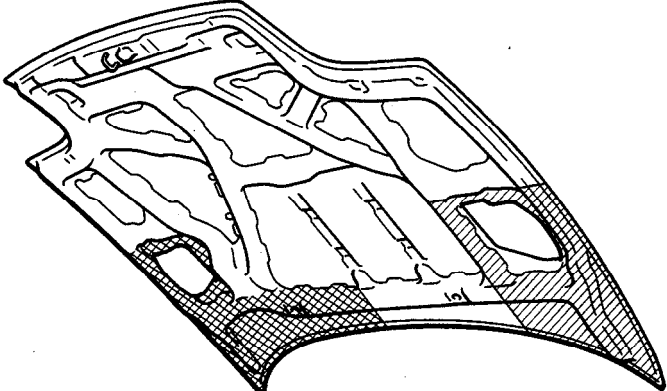
In addition, a theft-protection label is attached to replacement parts for the body outer panel main components, and the same data are stamped into replacement parts for the engine and the transaxle.



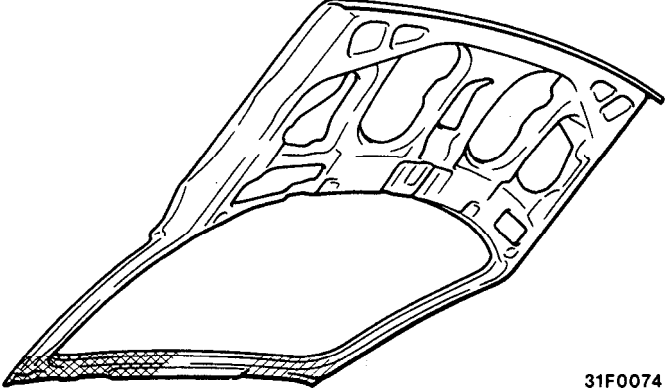
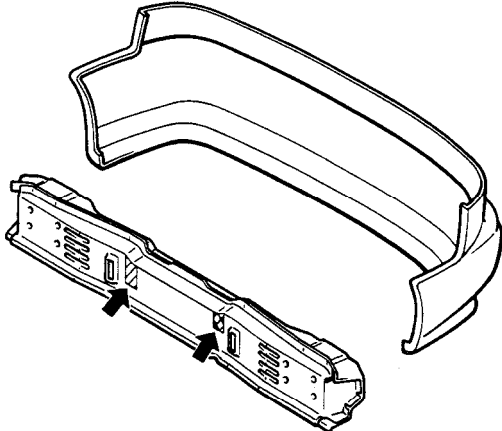
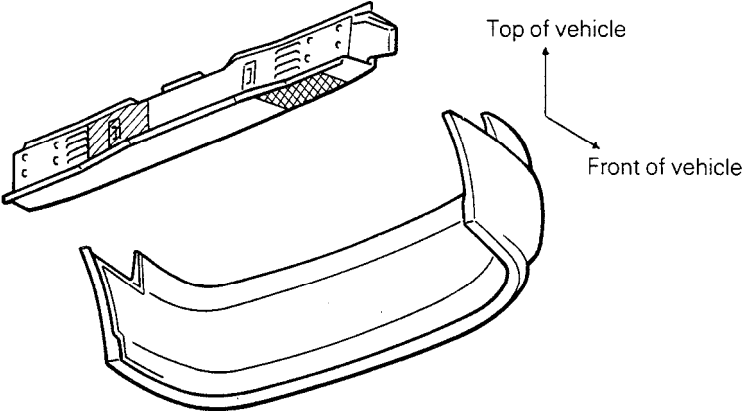
Cautions regarding panel repairs

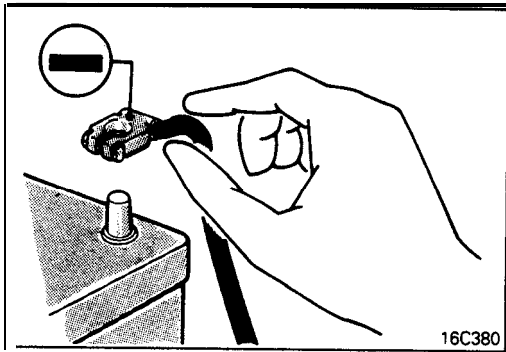
1. When repainting original parts, do so after first masking the theft-protection label, and, after painting, be sure to peel off the masking tape.
2. The theft-protection label for replacement parts is covered by masking tape, so such parts can be painted as is. The masking tape should be removed after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

LOCATIONS

Part	Target area  : for original equipment parts  : for replacement parts			
Engine	 <p style="text-align: right;">00F0033</p>			
Transaxle	<table style="width: 100%; border: none;"> <tr> <td style="width: 33%; text-align: center; border: none;"> Manual transaxle <F5M33>  00F0017 </td> <td style="width: 33%; text-align: center; border: none;"> <W5MG1>  00F0016 </td> <td style="width: 33%; text-align: center; border: none;"> Automatic transaxle <F4A33>  00F0018 </td> </tr> </table>	Manual transaxle <F5M33>  00F0017	<W5MG1>  00F0016	Automatic transaxle <F4A33>  00F0018
Manual transaxle <F5M33>  00F0017	<W5MG1>  00F0016	Automatic transaxle <F4A33>  00F0018		
Fender	 <p style="text-align: right;">31F0070</p> <p>The illustration indicates left hand side, outer. Right hand side is symmetrically opposite.</p>			

Part	Target area  : for original equipment parts  : for replacement parts
Door	 <p data-bbox="1023 661 1096 682">31F0071</p> <p data-bbox="406 703 917 756">The illustration indicates right hand side, outer. Left hand side is symmetrically opposite.</p>
Quarter panel	 <p data-bbox="974 1249 1047 1270">31F0072</p> <p data-bbox="1079 787 1429 871">The replacement part label is attached to the inner side of the part shown in the illustration.</p> <p data-bbox="406 1270 901 1333">The illustration indicates left hand side, outer. Right hand side is symmetrically opposite.</p>
Hood	 <p data-bbox="1144 1858 1226 1879">31F0073</p>

Part	Target area  : for original equipment parts  : for replacement parts
Liftgate	 <p>31F0074</p>
Front bumper	 <p>00F0013</p>
Rear bumper	 <p>00F0047</p>



PRECAUTIONS BEFORE SERVICE

MO00AAO

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 five 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.

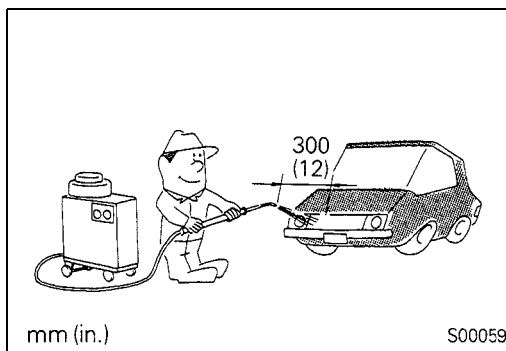
Engine coolant temperature: 80 – 95°C (176 – 203°F)

Lights, electric fans, accessories: OFF

Transaxle: neutral position

(A/T models: "N" or "P")

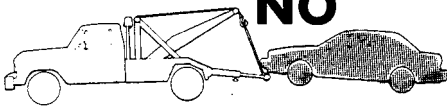
Steering wheel: neutral (center) position



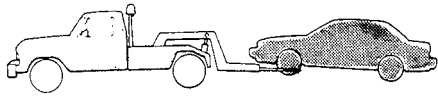
VEHICLE WASHING

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.).

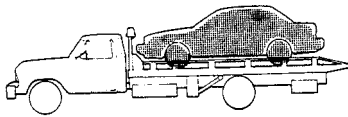
Sling type



Wheel lift type



Flat bed type



00F0027

TOWING AND HOISTING

MOOGAAC

WRECKER TOWING RECOMMENDATION

<FWD>

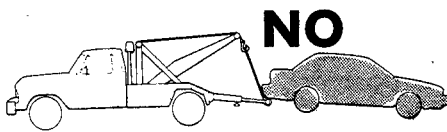
FRONT TOWING PICKUP

Caution

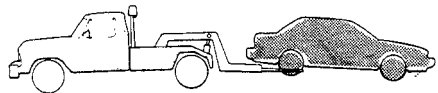
This vehicle cannot be towed by a wrecker using sling-type equipment to prevent the bumper from deformation. If this vehicle is towed, use wheel lift or flat bed equipment.

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.

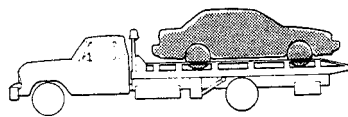
Sling type



Wheel lift type



Flat bed type



00F0026

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

Do not use steering column lock to secure front wheel position for towing.

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

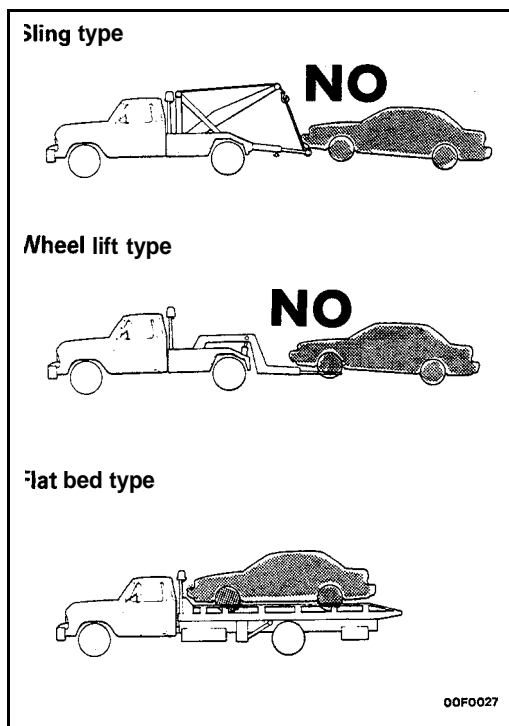
TOWING WHEN KEYS ARE NOT AVAILABLE

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.

SAFETY PRECAUTIONS

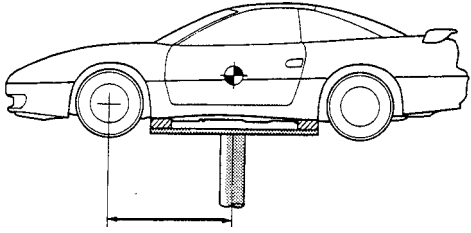
The following precautions should be taken when towing the vehicle.

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 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.

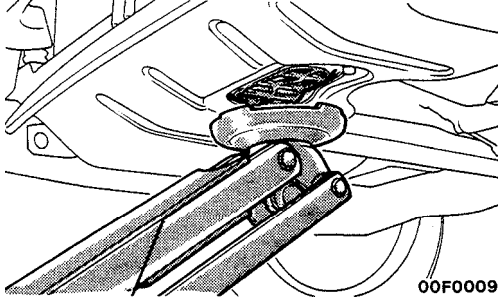
**<AWD>****Caution**

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 result in the viscous coupling causing the vehicle to jump forward suddenly.
3. If this vehicle is towed, use flat bed equipment.

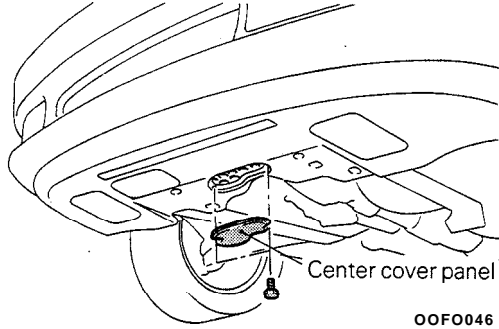
Frame contact support location



<FWD>: 1,070 mm (42.0 in.)
<AWD>: 1,130 mm (44.0 in.) 00F003

Front
 <Vehicles without active-aero system>


<Vehicles with active aero system>

**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

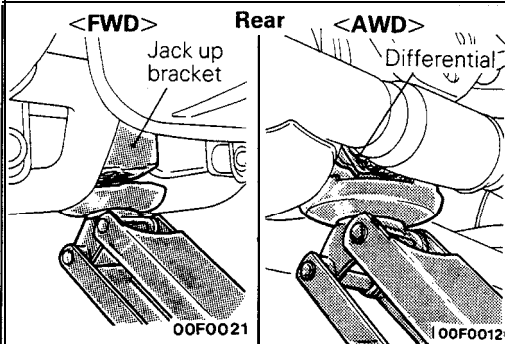
On vehicles with active-aero system, the front jacking point can be accessed by removing the center cover panel from the under cover. Be sure to reinstall the center cover panel after jack-up operation.

Rear:

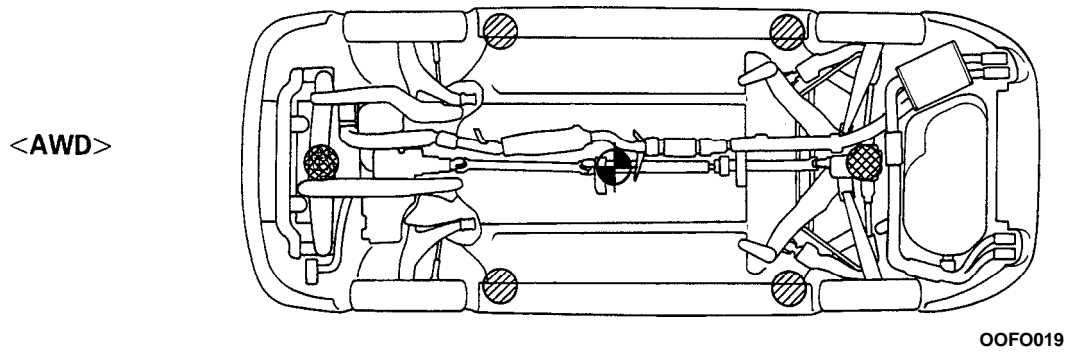
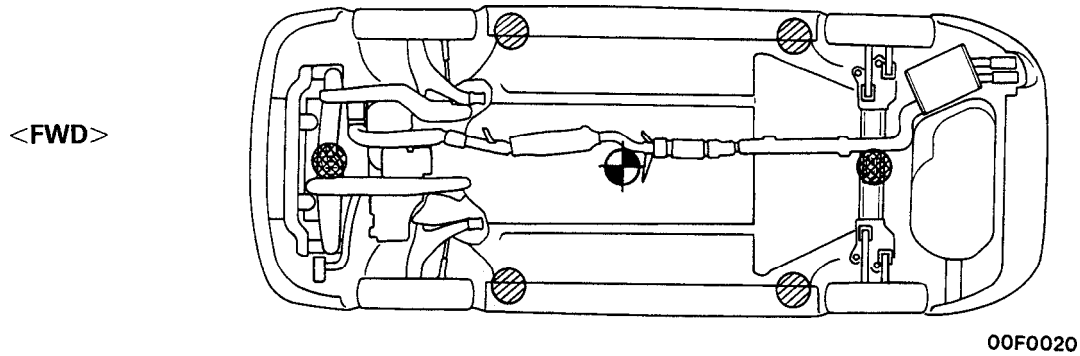
<FWD> Under the jack up bracket of crossmember
<AWD> Under the rear differential

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.



LIFTING, JACKING SUPPORT LOCATION



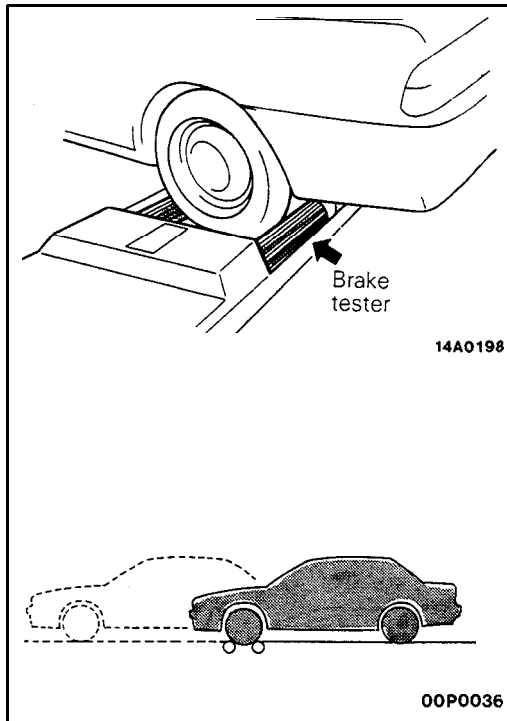
⊠ Floor jack locations

⊕ 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.



SPECIAL HANDLING INSTRUCTIONS FOR AWD MODELS

MO0UAAC

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

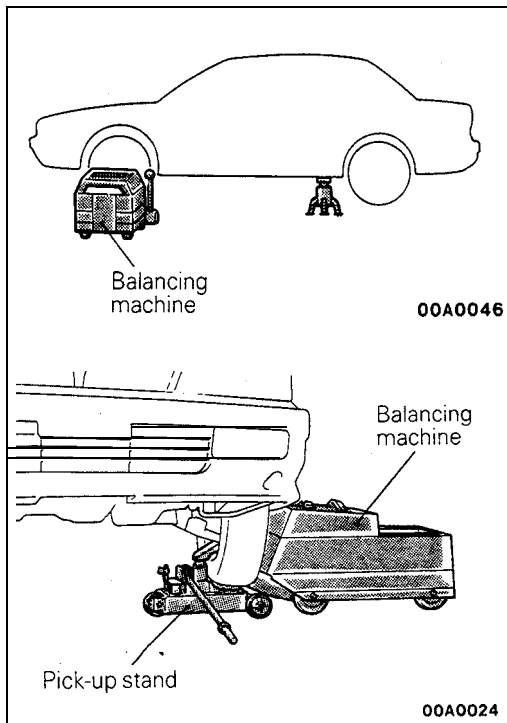
1. **Set so that the front and rear of the vehicle are at the same height.**
 2. **Release the parking brake.**
 3. **Rotate each wheel manually and check to be sure that there is no dragging.**
3. Use the engine to drive the tires, and then make the measurements.

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.**

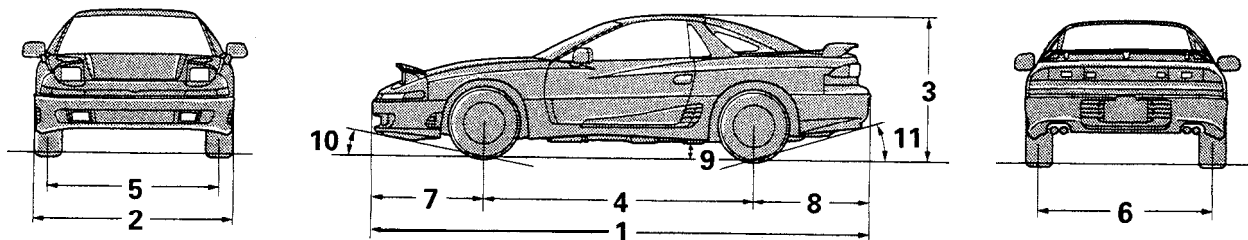
REAR WHEEL MEASUREMENTS

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

M00HA--



OOF0015

GENERAL SPECIFICATIONS

Models		3000GT <DOHC> (Non-Turbo)	3000GT SL <DOHC> (Non-Turbo)	3000GT VR-4 <DOHC> (Turbo)
Items				
Vehicle dimensions	mm (in.)			
Overall length	1	4,545 (178.9)	4,545 (178.9)	4,545 (178.9)
Overall width	2	1,840 (72.4)	1,840 (72.4)	1,840 (72.4)
Overall height	3	1,285 (50.6)	1,285 (50.6)	1,285 (50.6)
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)
	Rear	6	1,580 (62.2)	1,580 (62.2)
Overhang	Front	7	1,025 (40.4)	1,025 (40.4)
	Rear	8	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"
Angle of departure	degrees	11	16.9"	16.9"
Vehicle weight	kg (lbs.)			
Curb weights				
MIT		1,455 (3,208)	1,520 (3,351)	1,710 (3,770) 1,720 (3,792)*1
A/T		1,495 (3,296)	1,560 (3,439)	-
Gross vehicle weight rating		1,925 (4,244)	1,925 (4,244)	2,050 (4,519)
Gross axle weight rating				
Front		1,100 (2,425)	1,100 (2,425)	1,110 (2,447)
Rear		850 (1,874)	850 (1,874)	940 (2,072)
Seating capacity		4	4	4
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)

NOTE

*1: <4WS>

Items	Models	3000GT <DOHC> (Non-Turbo)	3000GT SL <DOHC> (Non-Turbo)	3000GT VR-4 <DOHC> (Turbo)
Transaxle Model No. -Type Manual transaxle Automatic transaxle		F5M33 – 5-speed manual F4A33 – 4-speed automatic	F5M33 – 5-speed manual F4A33 – 4-speed automatic	W5MG1 – 5-speed manual –
Fuel system Fuel supply system		Electronic control multi-point injection	Electronic control multi-point injection	Electronic control multi-point injection

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	F4A33
Type	5-speed M/T	5-speed M/T	4-speed A/T
Gear ratio			
1st	3.090	3.071	2.551
2nd	1.833	1.739	1.488
3rd	1.217	1.103	1.000
4th	0.888	0.823	0.685
5th	0.741	0.659	–
Reverse	3.166	3.076	2.176
Final reduction ratio			
Transaxle	4.153	3.972	3.958
Transfer	–	0.814	

TIGHTENING TORQUE

M00JA--




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 inserted 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 	Head mark 	Head mark 
M5	0.8	2.5 (1.8)	5.0 (3.6)	6.0 (4.3)
M6	1.0	5.0 (3.6)	9.0 (6.5)	10 (7.2)
M8	1.25	12 (8.7)	22 (16)	25 (18)
M10	1.25	24 (17)	45 (33)	53 (38)
M12	1.25	42 (30)	83 (60)	98 (71)
M14	1.5	73 (53)	140 (101)	160 (116)
M16	1.5	113 (82)	210 (152)	240 (174)
M18	1.5	170 (123)	310 (224)	350 (253)
M20	1.5	230 (166)	420 (304)	490 (354)
M22	1.5	310 (224)	570 (412)	660 (477)
M24	1.5	400 (289)	750 (542)	870 (629)

Flange bolt and nut tightening torque

Bolt nominal diameter (mm)	Pitch (mm)	Torque Nm (ft.lbs.)		
		Head mark 	Head mark 	Head mark 
M6	1.0	5.0 (3.6)	10 (7.2)	12 (8.7)
M8	1.25	13 (9.4)	24 (17)	28 (20)
M10	1.25	26 (19)	50 (36)	58 (42)
M10	1.5	24 (17)	45 (33)	55 (40)
M12	1.25	47 (34)	95 (69)	105 (76)
M12	1.75	43 (31)	83 (60)	98 (71)

Taper thread tightening torque

Thread size	Torque Nm (ft.lbs.)	
	Female thread material: Light alloy	Female thread material: Steel
NPTF 1/6	7.0 (5.1)	10 (7.2)
PT 1/8	10 (7.2)	18 (13)
PT 1/4, NPTF 1/4	25 (18)	40 (29)
PT 3/8	48 (35)	68 (49)

NOTE: NPTF is dry seat pipe thread, while PT is pipe thread.

MASTER TROUBLESHOOTING

M00KAAI

ENGINE OVERHEATS

Symptom	Probable cause	Reference page
Engine overheats	Cooling system faulty	14-3
	incorrect ignition timing	11-13

ENGINE WILL NOT CRANK OR CRANKS SLOWLY

Symptom	Probable cause	Reference page
Engine will not crank or cranks slowly	Starting system faulty	16-15

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

Symptom	Probable cause	Reference page
Engine will not start or hard to start (Crank OK)	No fuel supply to injector	–
	injection system problems	–
	Ignition system problems	16-25
	Vacuum leaks <ul style="list-style-type: none"> • Purge control valve hose • Vacuum hoses • Intake manifold • Air intake plenum • Throttle body • EGR valve 	17-3
	Compression too low	11-15

ROUGH IDLE OR ENGINE STALLS

Symptom	Probable cause	Reference page or remedy
Rough idle or engine stalls	Vacuum leaks <ul style="list-style-type: none"> • Purge control valve hose • Vacuum hoses • Intake manifold • Air intake plenum • Throttle body • EGR valve 	17-3
	Ignition system problems	16-25
	Idle speed set too low	Check idle speed control system
	Idle mixture too lean or too rich	–
	Fuel injection system problems	–
	Exhaust gas recirculation (EGR) system problems	17-11
	Engine overheats	14-3
	Compression too low	111-15

ENGINE HESITATES OR POOR ACCELERATION

Symptom	Probable cause	Reference page
Engine hesitates or poor acceleration	Ignition system problem	11-13
	Vacuum leaks <ul style="list-style-type: none"> • Purge control valve hose • Vacuum hoses • Intake manifold • Air intake plenum • Throttle body • EGR valve 	17-3
	Air cleaner clogged	15-9
	Fuel line clogged	–
	Fuel injection system problem	
	Emission control system problem <ul style="list-style-type: none"> • EGR system always on 	17-11
	Engine overheats	14-3
	Compression too low	11-15

ENGINE DIESELING

Symptom	Probable cause	Reference page
Engine dieseling (runs after ignition switch is turned off)	Incorrect ignition timing	11-13

EXCESSIVE OIL CONSUMPTION

Symptom	Probable cause	Reference page or remedy
Excessive oil consumption	Oil leak	Repair as necessary
	Positive crankcase ventilation line clogged	17-5
	Valve stem seal worn or damaged	11-34
	Valve stem worn	11-34
	Piston ring worn or damaged	11-44

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	16-25
	Fuel injection system problems	–
	Compression too low	11-15
	Tires improperly inflated	31-3
	Clutch slips	21-3
	Brakes drag	35-5

NOISE

Symptom	Probable cause	Reference page or remedy
Noise	Loose bolts and nuts	Retighten as necessary
	Engine noise	11-10

HARD STEERING

Symptom	Probable cause	Reference page or remedy
Hard steering	Loose power steering oil pump belt	37A-8
	Low fluid level	Replenish
	Air in power steering system	37A-10
	Low tire pressure	31-3
	Excessive turning resistance of lower arm ball joint	33A-9
	Excessively tightened steering gear box rack support cover	37A-19
	Improper front wheel alignment	33A-4
	Excessive turning resistance of tie-rod ball joint	37A-6
	Sticky flow control valve	37A-30
	Bent rack in steering gear box	37A-19

POOR RETURN OF STEERING WHEEL TO CENTER

Symptom	Probable cause	Reference page
Poor return of steering wheel to center	Improper front wheel alignment	33A-4
	Improper tire pressure	31-3
	Excessive tightened rack support cover	37A-19
	Damaged front wheel bearing	26-10

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-4, 5 34-5, 13, 23, 33
	Malfunctioning shock absorber	
	Broken or worn stabilizer	33A-5, 10 34-13, 15, 33, 34
	Broken or worn coil spring	
	Loose suspension securing bolt(s)	Retighten
	Worn lower arm bushing	33A-8
	Worn suspension arm bushing	33A-8

ABNORMAL TIRE WEAR

Symptom	Probable cause	Reference page
Abnormal tire wear	Improper front or rear wheel alignment	33A-4 34-5, 23
	Improper tire pressure	31-3
	Imbalanced wheels	
	Loose wheel bearings	34-6
	Malfunctioning shock absorber	33A-5 34-1 3.33

ROAD WANDER

Symptom	Probable cause	Reference page
Road wander	Improper front or rear wheel alignment	33A-4 34-5, 23
	Excessive play of steering wheel	37A-5
	Poor turning resistance of lower arm ball joint	33A-9
	Improper tire pressure	31-3
	Loose or worn lower arm bushing	33A-8
	Loose or worn wheel bearings	
	Loose rack support cover in steering gear box	37A-19

VEHICLE PULLS TO ONE SIDE

Symptom	Probable cause	Reference page or remedy
Vehicle pulls to one side	Improper front or rear wheel alignment	33A-4 34-5, 23
	Imbalanced or worn tires	31-3
	Uneven tire pressure	
	Excessive turning resistance of lower arm ball joint	33A-9
	Wheel bearing seizure	Replace
	Broken or worn coil spring	33A-5
	Bent front or rear axle drive shaft	26-11
	Deformed lower arm	33A-8

STEERING WHEEL SHIMMY

Symptom	Probable cause	Reference page or remedy
Steering wheel shimmy	Improper front or rear wheel alignment	33A-4 34-5, 23
	Improper tire pressure	31-3
	Imbalanced wheels	Replace
	Poor turning resistance of lower arm ball joint	33A-9
	Excessive play of steering wheel	37A-5
	Broken or weak front stabilizer	33A-10
	Worn lower arm bushing	33A-8
	Malfunctioning shock absorber	33A-5 34-1 3, 33
	Broken or weak coil spring	
	Wear, play, or seizure of wheel bearing	Replace
	Wear, play, or seizure of drive shaft ball joint	26-1 1 27-1 8

BOTTOMING

Symptom	Probable cause	Reference page or remedy
Bottoming	Overloaded vehicle	Correct
	Broken or weak coil spring	33A-5 34-1 3, 33
	Malfunctioning shock absorber	

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 Insufficient grease
Rust, corrosion	Appears on various areas of the bearing	Use of grease other than 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

M00PA--

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. 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

The SAE grade number indicates the viscosity of engine oils, for example, SAE 30, which is a single grade oil. Engine oils are also identified by a dual number, for example, SAE 1 OW-30, which indicates a multigrade oil.

The API classification system defines oil performance in terms of engine usage. Only engine oil designed "For Service SG" or "For Service SG/CD", when available, should be used. These oils contain sufficient chemical additives to provide maximum

engine protection. Both the SAE grade and the API designation can be found on the container.

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 are recommended for manual trans-axle.

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

Use premium unleaded gasoline having a minimum octane rating of 91, (R+M)/2. However, it is also possible to use unleaded gasoline with an octane rating of at least 87.

Unleaded gasolines only must be used in vehicles equipped with catalyst emission control systems. All vehicles, so equipped, have labels located on the instrument panel and on the back of fuel filler lid that state, "UNLEADED GASOLINE ONLY". These vehicles also have fuel filler tubes especially designed to accept the smaller diameter unleaded gasoline dispensing nozzles only.

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.

RECOMMENDED LUBRICANTS AND LUBRICANT CAPACITIES TABLE

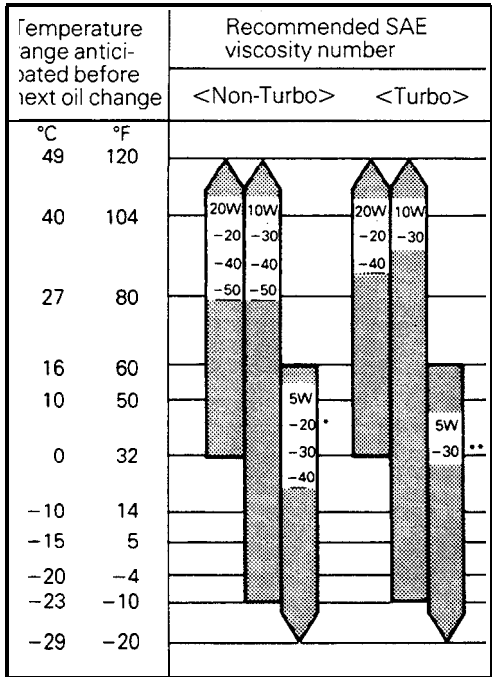
MOORA -

RECOMMENDED LUBRICANTS

Items	Recommended lubricants
Engine oil	API classification SG or SG/CD (For further details, refer to SAE viscosity number)
Manual transaxle	API classification GL-4 or higher, SAE 75W-85W
Transfer	
Automatic transaxle	Dia ATF SP or MITSUBISHI PLUS ATF or equivalent
Power steering	MITSUBISHI PLUS ATF/Automatic transmission fluid "DEXRON" or "DEXRON II"
Rear axle <AWD>	Refer to P.00-33.
Brake and clutch	Conforming to DOT 3
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 (excluding oil filter and oil cooler)	4.0 liters	4.2 qts.
Oil filter	0.3 liter	1/2 qt.
Oil cooler (Turbo)	0.21 liter	112 qt.
Cooling system (including heater and coolant reserve system)	8.0 liters	8.5 qts.
Manual transaxle		
<FWD>	2.3 liters	2.4 qts.
<AWD>	2.4 liters	2.5 qts.
Transfer	0.27 liter	.29 qt.
Automatic transaxle	7.5 liters	7.9 qts.
Rear axle <AWD>	1.1 liters	1.16 qts.
Power steering		
<2WS>	0.9 liter	.95 qt.
<4WS>	1.5 liters	1.59 qts.
Fuel tank	75 liters	19.8 gals.



* SAE 5W-20 Not recommended for sustained high speed vehicle operation.

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

SELECTION OF LUBRICANTS

ENGINE OIL

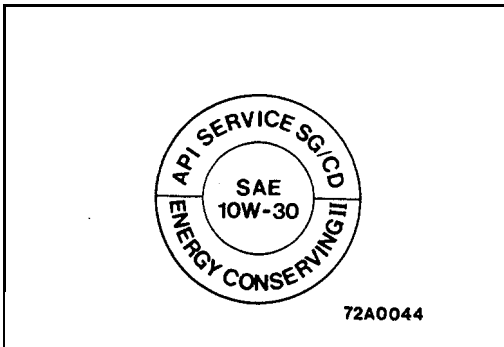
Engine oil should be used which conform to the requirements of the API classification “For Service SG” or “For Service SG/CD”, and have the proper SAE grade number for the expected temperature range.

Caution

Nondetergent or straight mineral oil must never be used.

Energy Conserving Oil

In order to improve fuel economy and conserve energy new, lower friction engine oils have been developed. These oils are readily available and can be identified by such labels as “Energy Conserving II”, “Energy Saving”, “Improved Fuel Economy”, etc.



Oil Identification Symbol

A standard symbol appears on the top of oil containers and has three distinct areas for identifying various aspects of the oil. The top portion will indicate the quality of the oil. The center portion will show the SAE viscosity grade, such as SAE 10W-30. “Energy Conserving II” shown in the lower portion, indicates that the oil has fuel-saving capabilities.

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

00-34 GENERAL – Recommended Lubricants and Lubricant Capacities Table

SELECTION OF COOLANT

COOLANT

Relation between Antifreeze Concentration and Specific Gravity

Engine coolant temperature °C (°F) and specific gravity					Freezing temperature °C (°F)	Safe operating temperature °C (°F)	Engine coolant concentration (Specific volume)
10 (50)	20 (68)	30 (86)	40 (104)	50 (122)			
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.

SCHEDULED MAINTENANCE TABLE

M000A -

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 Intervals	Kilometers in Thousands		24	48	72	80	96
			Mileage	in Thousands	15	30	45	50	60
1	Check Fuel System (Tank, Line and Connections and Fuel Filler Cap) for Leaks Every 5 Years	or						X	
2	Check Fuel Hoses for Leaks or Damage Every 2 Years	or			X				X
3	Replace Air Cleaner Element	at			X				X
4	Replace Spark Plugs	at							X

GENERAL MAINTENANCE SERVICE FOR PROPER VEHICLE PERFORMANCE

No.	General Maintenance		Service Intervals	Kilometers in Thousands		24	48	72	80	96
				Mileage	in Thousands	15	30	45	50	60
5	Timing Belt		Replace	at						X
6	Drive Belt (for Alternator)		Inspect for Tension	at		X				X
7	Engine Oil	Non-Turbo	Change Every Year	or	Every 12,000 km (7,500 miles)					
		Turbo	Change Every 6 Months		Every 8,000 km (5,000 miles)					
8	Engine Oil Filter	Non-Turbo	Change Every Year	or	X	X	X			X
		Turbo	Change Every Year		Every 16,000 km (10,000 miles)					
9	Manual Transaxle Oil		Inspect Oil Level	at		X				X
10	Automatic Transaxle Fluid		Inspect Fluid Level Every Year	or	X	X	X			X
			Change Fluid	at		X				X
11	Engine Coolant		Replace Every 2 Years	or		X				X
12	Disc Brake Pads		Inspect for Wear Every Year	or	X	X	X			X
13	Brake Hoses		Check for Deterioration or Leaks Every Year	or	X	X	X			X
14	Ball Joint and Steering Linkage Seals		Inspect for Grease Leaks and Damage Every 2 Years	or		X				X
15	Drive Shaft Boots		Inspect for Grease Leaks and Damage Every Year	or	X	X	X			X
16	Rear Axle <AWD>	With LSD	Change Oil			X				X
		Without LSD	Inspect Oil Level			X				X
17	Exhaust System (Connection Portion of Muffler, Pipings and Converter Heat Shields)		Check and Service as Required Every 2 Years	or		X				X

NOTE
LSD: Limited-slip differential

SCHEDULED MAINTENANCE UNDER SEVERE USAGE CONDITIONS

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

Maintenance Item	Service to be Performed	Mileage Intervals Kilometers in Thousands (Miles in Thousands)								Severe Usage Conditions							
		12 (7.5)	24 (15)	36 (22.5)	48 (30)	60 (37.5)	72 (45)	80 (50)	84 (52.5)	96 (60)	A	B	C	D	E	F	G
Air Cleaner Element	Replace	More Frequently								X					X		
Spark Plugs	Replace		X		X		X			X		X		X			
Engine Oil	Change Every or 3 Months	Every 4,800 Km (3,000 Miles)								X	X	X	X				X
Engine Oil Filter	Replace Every or 6 Months	Every 9,600 Km (6,000 Miles)								X	X	X	X				X
Disc Brake Pads	Inspect for Wear	More Frequently								X						X	

Severe usage conditions

- A – Driving in dusty conditions
- B – Police, taxi, or commercial type operation
- C – Extensive idling
- D – Short trip operation at freezing temperatures (engine not thoroughly warmed up)

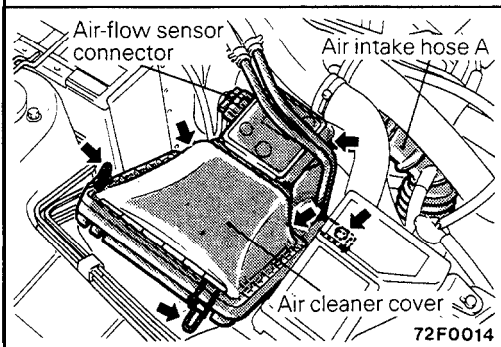
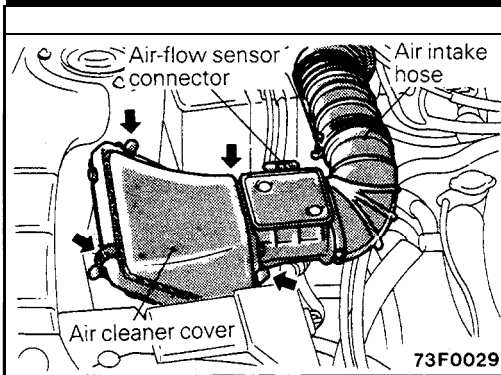
- E – Driving in sandy areas
- F – Driving in salty areas
- G – More than 50% operation in heavy city traffic during hot weather above 32°C (90°F)

MAINTENANCE SERVICE

1. FUEL SYSTEM (TANK, LINES, CONNECTIONS AND FUEL FILLER CAP) (Check for leaks) / 2. FUEL HOSES (Check for leaks or damage)

M06SAGC

1. Check for damage or leakage in the fuel lines and connections and looseness of the fuel filler cap.
2. 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.
3. 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)

MOOSAKH

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

Caution

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

- (5) Take out the air cleaner element.

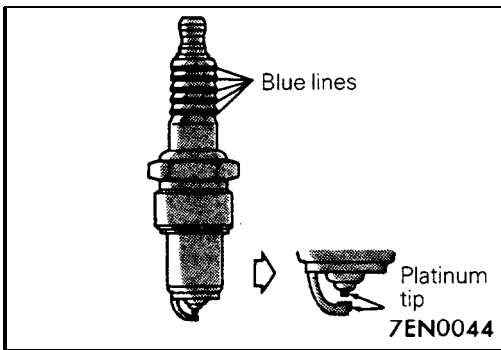
<Turbo>

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

Caution

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

- (6) Take out the air cleaner element.



4. SPARK PLUGS (Replace)

MOOSAOI

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.

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

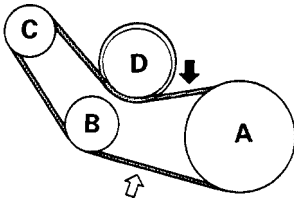
5. TIMING BELT (Replace)

MOOSBAD

Replace the belt with a new one periodically to assure proper engine performance.

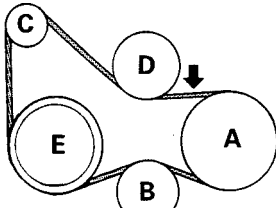
For removal and installation procedures, refer to GROUP 11 – Timing Belt.

<Vehicles without air conditioner>



00F0006

<Vehicles with air conditioner>



00F0007

A: Crankshaft pulley
 B: Tension pulley
 C: Alternator pulley
 D: Idler pulley
 E: Air conditioner compressor pulley

6. DRIVE BELT (For Alternator) (Inspect tension)

MO0SBBQ

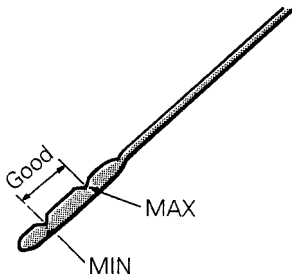
- (1) Measure the deflection with a force of 100 N (22 lbs.) applied to belt mid-point between pulleys shown in the illustration. If the standard value is not obtained, make adjustment.

Standard value: 4.0 – 5.5 mm (.157 – .216 in.)

- (2) On vehicles without air conditioner, set a tension gauge at a position marked with ⇔ in the illustration to measure the belt tension.

7. ENGINE OIL (Inspect oil level)

- (1) Check to see that the engine oil level is within the range indicated on the oil level gauge.
- (2) Make sure that engine oil is not very dirty or is free from coolant or gasoline and has an appropriate viscosity grade.



01L0183

(Change)

MO0SAAH

Always use lubricants which conform to the requirements of the API classification "For Service SG" or "For Service SG/CD" when available, and have the proper SAE grade number for the expected temperature range.

Never use nondetergent or straight mineral oil.

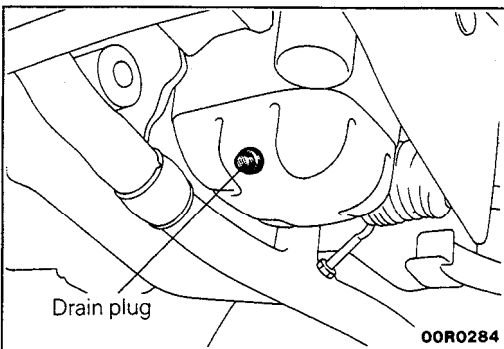
- (1) After warming up the engine, remove the oil filler cap.
- (2) Remove the drain plug and drain the engine oil.
- (3) Tighten the drain plug to 40 Nm (29 ft.lbs.).
- (4) Pour new engine oil through the oil filler.

Caution

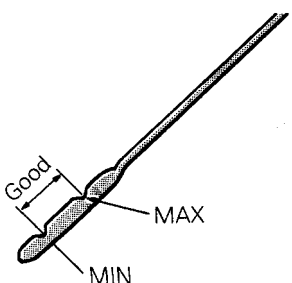
1. Cover the alternator with waste cloth or the like before pouring engine oil to make sure that even if oil is spilt, it may not drop on the alternator.
2. Use an oil mug or a funnel to pour oil.

Engine oil total capacity: 4.0 liters (4.2 qts.)
[excluding oil filter 0.3 liter (1/2 qt.)
and oil cooler 0.21 liter (1/2 qt.)]

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



00R0284



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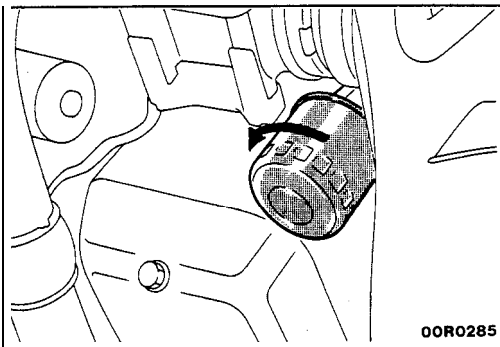
8. ENGINE OIL FILTER (Change)

M00SABJ

The quality of replacement filters varies considerably. Only high quality filters should be used to assure most efficient service. Genuine oil filters require that the filter be capable of withstanding a pressure of 256 psi are high quality filters and are recommended as follows:

Oil Filter Part No.**MITSUBISHI Genuine Parts: MD136790****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. The following is a high-quality filter and is strongly recommended for use on this vehicle: Mitsubishi Engine Oil Filter P/N MD136790.



00R0285

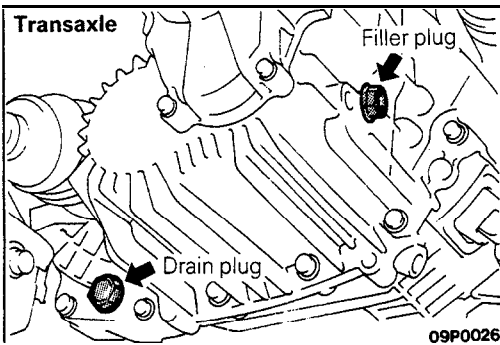
Any replacement oil filter should be installed in accordance with the oil filter manufacturer's installation instructions.

- (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) Turn the oil filter by hand and install to the filter bracket.

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.



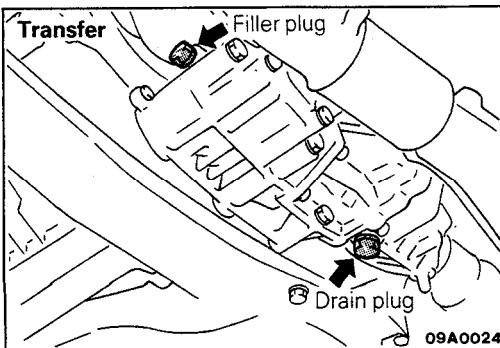
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9. MANUAL TRANSAXLE (Inspect oil level)

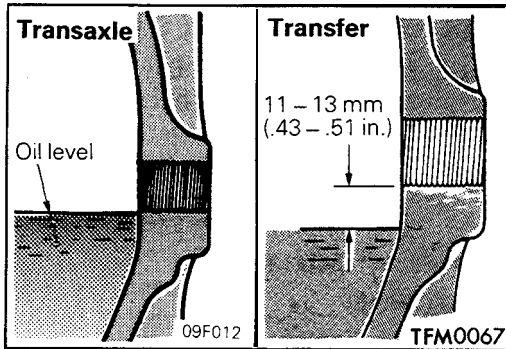
M00SBCG

Inspect each component for evidence of leakage, and check the oil level by remaining 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.



09A0024



- (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.

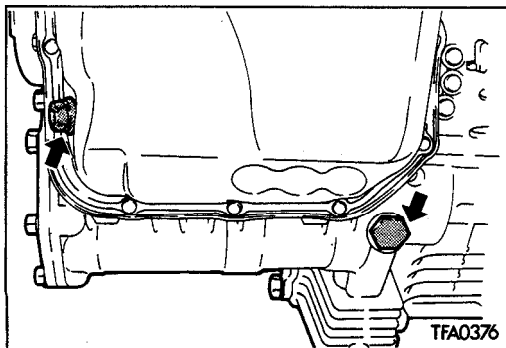
10. AUTOMATIC TRANSAXLE (Inspect fluid level)

M00SBDL

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.



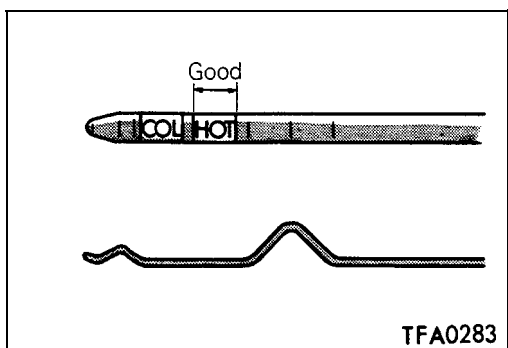
(Change fluid)

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 to 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 to 10 – 12 Nm (7.5 – 8.5 ft.lbs.).



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

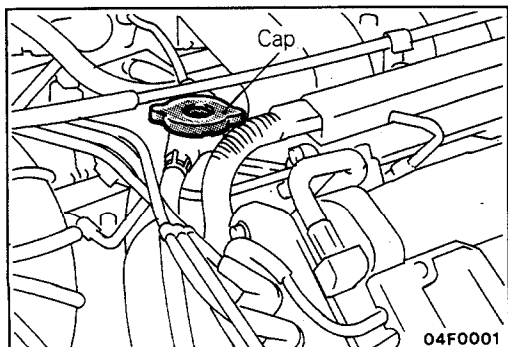
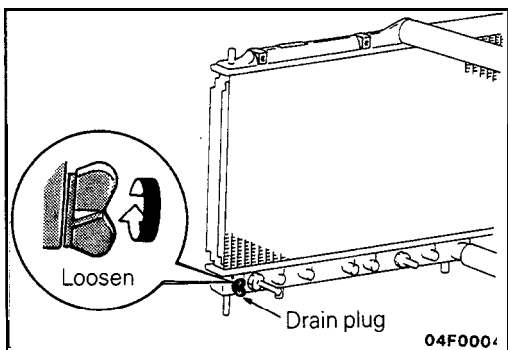
Specified fluid: Dia ATF SP or MITSUBISHI PLUS ATF or equivalent

- (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.
- (10) 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.

11. ENGINE COOLANT (Change)

M00SBEH

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



CHANGING COOLANT

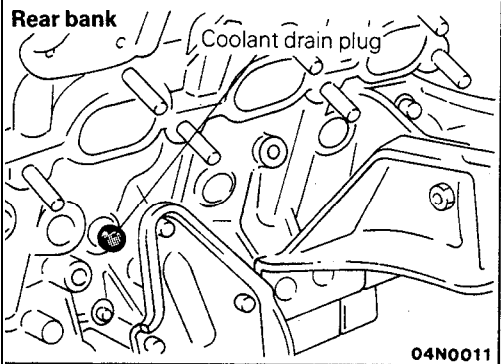
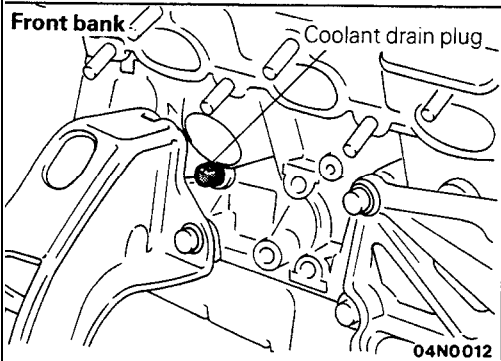
<Non-Turbo>

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.

12. DISC BRAKE PADS (Inspect for wear)

MOOSBFD

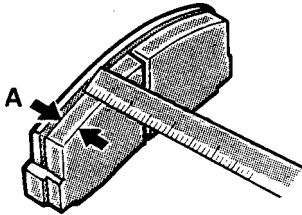
Check for fluid contamination and wear. Replace complete set of pads if defective.

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 (A):

Limit 2.0 mm (.08 in.)



14U0072

13. BRAKE HOSES (Check for deterioration or leaks)

MOOSBHB

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.

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

MOOSBJC

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.

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

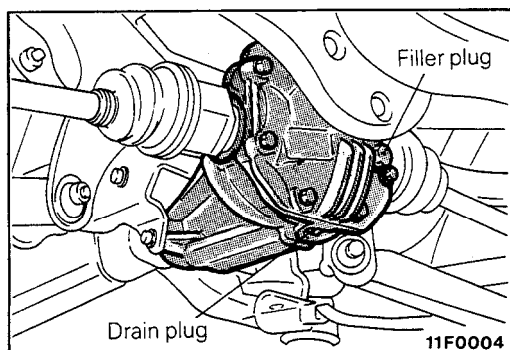
M00SBJD

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.

16. REAR AXLE (CONVENTIONAL DIFFERENTIAL) (Inspect oil level) – AWD

M00SBPD

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.

**16. REAR AXLE (LIMITED-SLIP DIFFERENTIAL) (Oil change) – AWD**

M00SBQE

Before changing the rear axle oil, check to make sure that there is no oil leakage from the rear axle housing. Remove the drain plug and drain out of the oil. Put the oil plug back in place, and then pour new oil in through the filler hole.

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

M00SBLB

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

M002A -

Application	Recommended brand
1. Sealants for engine accessories (1) Sealing between rocker cover and camshaft bearing cap (4G6 DOHC and 6G7 engines only)	3M ATD Part No. 8660 or equivalent
(2) <ul style="list-style-type: none"> Sealing between semi-circular packing and rocker cover and between semi-circular packing and cylinder head Oil pressure switch (except 4G1 and 6G7 engines) 	3M ATD Part No. 8660 or equivalent
(3) 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
(4) Engine coolant temperature gauge unit (small size, MD091 056 only)	3M ATD Part No. 8660 or equivalent
(5) Oil pan (except 4G5 engine)	MITSUBISHI GENUINE Part No. MD9971 10 or equivalent
2. Sealing between glass and weatherstrip (1) <ul style="list-style-type: none"> Sealing between tempered glass and weatherstrip Sealing between body flange and weatherstrip 	3M ATD Part No. 8513 or equivalent 3M ATD Part No. 8509 or equivalent
(2) Sealing between laminated glass and weatherstrip	3M ATD Part No. 8509 or equivalent
3. Adhesion with ribbon sealer <ul style="list-style-type: none"> Waterproof film for door Fender panel Splash shield Mudguard Rear combination lamp 	3M ATD Part No. 8625 or equivalent

Application	Recommended brand
4. Adhesives for interior trim (1) Adhesion of polyvinyl-chloride sheet	3M Part No. EC-I 368 or equivalent
(2) Adhesion of door weatherstrip to body	3M ATD Part No. 8001 or 3M ATD Part No. 8011 or equivalent
(3) Sealing between grommet or packing and metal seal	3M ATD Part No.851 3 or equivalent
(4) <ul style="list-style-type: none"> Adhesion of headlining and other interior trim materials Adhesion of fuel tank to pad 	3M Part No. EC-I 368 or 3M ATD Part No. 8080 or equivalent
5. Body sealant <ul style="list-style-type: none"> Sealing of sheet metal, drip rail, floor, body side panel, trunk, front panel and the like joints Sealing of tailgate hinges 	3M ATD Part No. 8531 or 3M ATD Part No.8646 or equivalent
6. Chassis sealant (1) <ul style="list-style-type: none"> Sealing of flange surfaces and threaded portions Fuel gauge unit packing 	3M ATD Part No. 8659 or equivalent
(2) Sealing of flange surfaces, threaded portions, packing and dust cover <ul style="list-style-type: none"> 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
(3) Sealing between accelerator arm bracket and toeboard	Drying sealant
(4) Sealant for drum brake shoe hold-down pin and wheel cylinder	3M ATD Part No.851 3 or equivalent

Application	Recommended brand
7. Fast bonding adhesive Adhesion of all materials except polyethylene, polypropylene, fluorocarbon resin or other materials with highly absorbent surface	3M ATD Part No. 8155 or equivalent
8. Anaerobic fast bonding adhesives (1) Fixing of bolts and screws <ul style="list-style-type: none">• Tightening of drive gear to differential case• Bolts for coupling tilt steering upper column with lower column (2) Fixing of bearing, fan, pulley and gear connections (3) Sealing of small recess or flange surface	3M Stud locking Part No. 4170 or equivalent
(4) Steering angle stopper bolt (jeep)	3M Nut locking Part No. 4171 or equivalent
9. Undercoat	3M ATD Part No. 8864 or equivalent

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ENGINE

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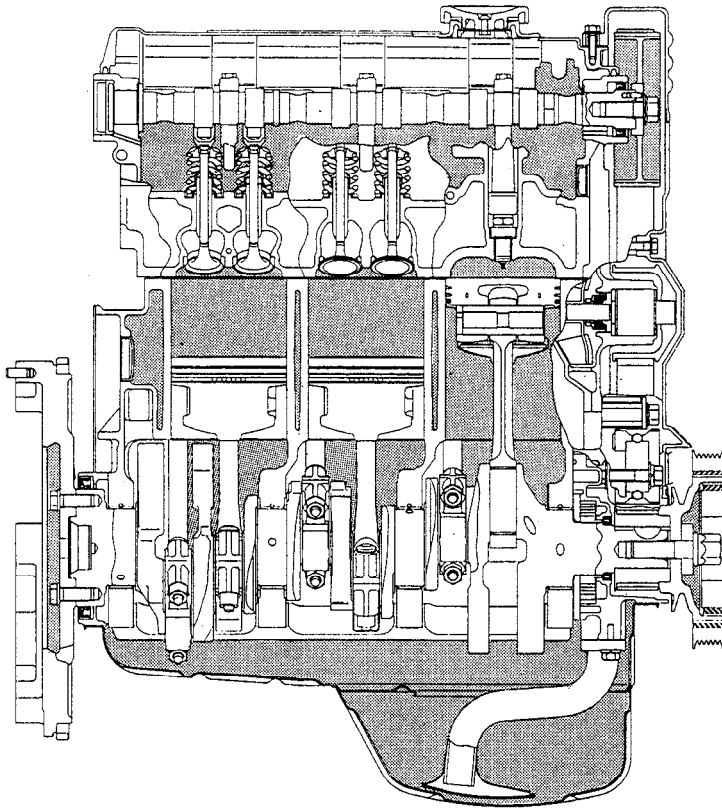
M11AA-

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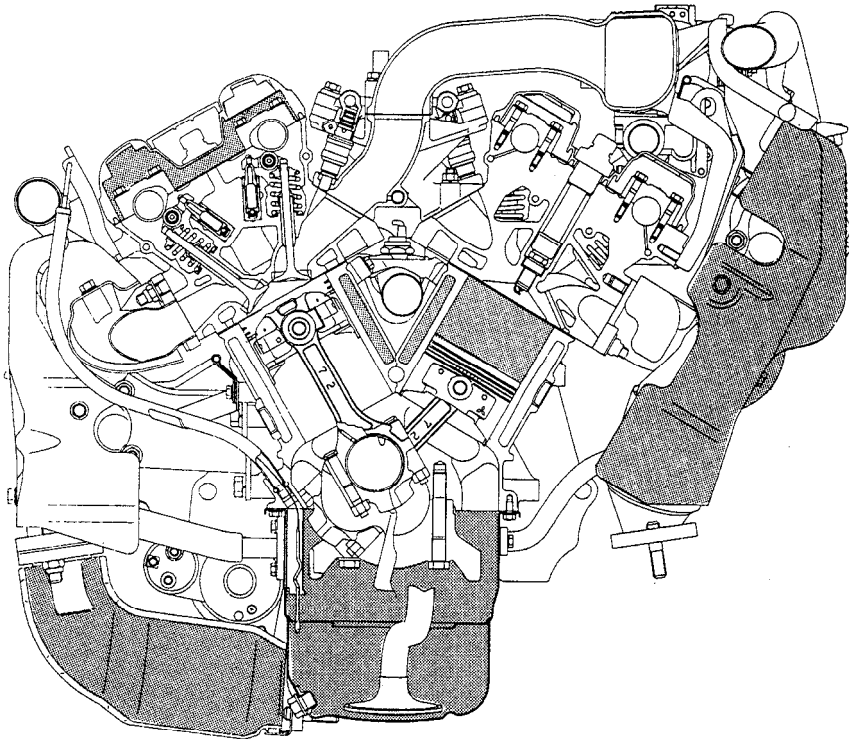
GENERAL INFORMATION

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SECTIONAL VIEW

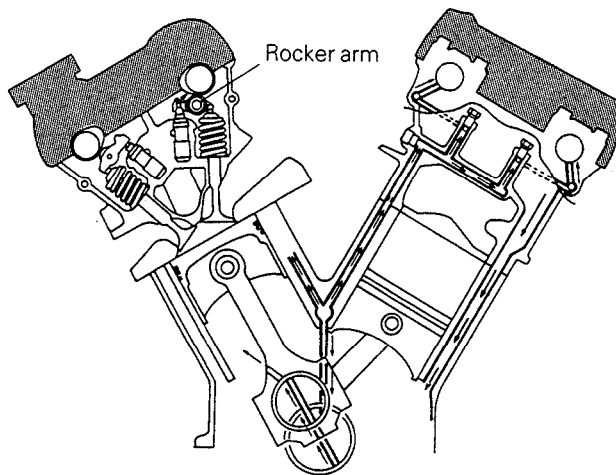
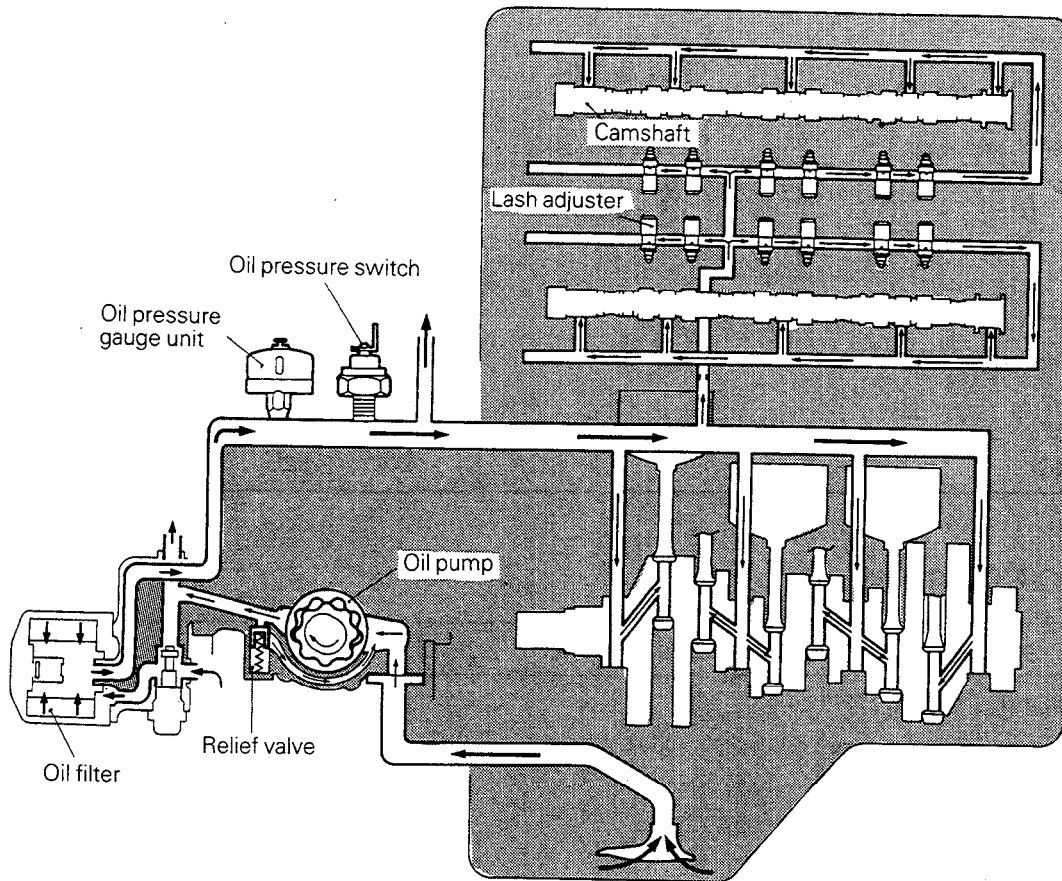


7EN0335



7EN0334

LUBRICATION SYSTEM



7LU0025

SPECIFICATIONS

M11CA--

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

M11CB--

Items	Standard value	Limit
Compression pressure kPa(psi)/rpm		
Non-Turbo	–	min. 980 (139)/250 – 400
Turbo	–	min. 810 (115)/250 – 400
Compression pressure difference of all cylinder kPa (psi)	–	max. 100 (14)
Manifold vacuum mmHg (in.Hg.)		
Non-Turbo	520 (20)	
Turbo	495 (19)	
Basic ignition timing at curb idle speed BTDC	5" ± 2"	
Actual ignition timing at curb idle speed BTDC	Approx. 15"	
Curb idle speed rpm	700 ± 100	

Items	Standard value	Limit
Cylinder head		
Overall height mm (in.)	132 (5.20)	-0.2 (-.008)*
Flatness of gasket surface mm (in.)	Max. 0.03 (.0012)	0.2 (.008)
Oversize rework dimension of valve seat hole mm (in.)		
Intake 0.3 (.012) O.S.	36.300 – 36.325 (1.4291 – 1.4301)	
0.6 (.024) O.S.	36.600 – 36.625 (1.4409 – 1.4419)	
Exhaust 0.3 (.012) O.S.	33.300 – 33.325 (1.3110 – 1.3120)	
0.6 (.024) O.S.	33.600 – 33.625 (1.3228 – 1.3238)	
Oversize rework dimension of valve seat hole depth mm (in.)		
Intake 0.3 (.012) O.S.	7.5 – 7.7 (.295 – .303)	
0.6 (.024) O.S.	7.8 – 8.0 (.307 – .315)	
Exhaust 0.3 (.012) O.S.	7.9–8.1 (.311– .319)	
0.6 (.024) O.S.	8.2 – 8.4 (.323 – .331)	
Oversize rework of valve guide hole (both intake and exhaust) mm (in.)		
0.05 (.002) O.S.	13.050 – 13.068 (.5138 – .5145)	
0.25 (.010) O.S.	13.250 – 13.268 (.5217 – .5224)	
0.50 (.020) O.S.	13.500 – 13.518 (.5315 – .5322)	
Camshaft		
Cam height mm (in.)		
Intake	35.49 (1.3972)	34.99 (1.3776)
Exhaust	35.20 (1.3858)	34.70 (1.3661)
Journal O.D. mm (in.)	26 (1.02)	
Bearing oil clearance mm (in.)	0.05 – 0.09 (.0020 – .0035)	
Valve		
Valve length mm (in.)		
Intake	106.3 (4.185)	
Exhaust	105.4 (4.150)	
Stem O.D. mm (in.)		
Intake	6.6 (.260)	
Exhaust	6.6 (.260)	
Face angle	45 – 45.5°	
Thickness of valve head (Margin) mm (in.)		
Intake	1.0 (.039)	0.5 (.019)
Exhaust	1.5 (.059)	1.0 (.039)
Clearance (Valve stem to guide) mm (in.)		
Intake	0.02 – 0.05 (.0008 – .0020)	0.10 (.0039)
Exhaust	0.05 – 0.09 (.0020 – .0035)	0.12 (.0047)

* Limit must be -0.2 mm (-.008 in.) combined with amount of grinding of cylinder block gasket surface.

Items	Standard value	Limit
Valve guide Length mm (in.) Intake Exhaust Service size mm (in.)	45.5 (1.791) 50.5 (1.988) 0.05 (.002), 0.25 (.010), 0.50 (.020) Oversize	
Valve seat Width of seat contact mm (in.) Seat angle	0.9 – 1.3 (.035 – .051) 44 – 44.5°	
Valve spring Free length mm (in.) Load N (lbs.) Installed height mm (in.) Squareness	46.9 (1.846) 280 (62) at installed height 37.9 (1.492) Less than 2°	45.9 (1.807) 38.9 (1.531) 4°
Cylinder block Cylinder bore mm (in.) Out-of-roundness and taper of cylinder bore mm (in.) Flatness of gasket surface mm (in.)	91.10 (3.5866) Less than 0.02 (.0008) Less than 0.05 (.0020)	0.10 (.0039)
Piston O.D mm (in.) Clearance (Piston to cylinder) mm (in.) Ring groove width mm (in.) No. 1 No. 2 Oil Service size mm (in.)	91.10 (3.5866) 0.03 – 0.05 (.0012 – .0020) 1.2 (.047) 1.5 (.059) 3.0 (.118) 0.25 (.010), 0.50 (.020), 0.75 (.030), 1.00 (.039) Oversize	
Piston ring Side clearance mm (in.) No. 1 No. 2 End gap mm (in.) No. 1 No. 2 Oil ring side rail mm (in.) Service size mm (in.)	0.03 – 0.07 (.0012 – .0028) 0.02 – 0.06 (.0008 – .0024) 0.30 – 0.45 (.0118 – .0177) 0.45 – 0.60 (.0177 – .0236) 0.20 – 0.60 (.0079 – .0236) 0.25 (.010), 0.50 (.020), 0.75 (.030), 1.00 (.039) Oversize	0.1 (.004) 0.1 (.004) 0.8 (.031) 0.8 (.031) 1.0 (.039)
Connecting rod Bend mm (in.) Twist mm (in.) Big end to thrust clearance mm (in.) Piston pin press-in load N (lbs.)	0.05 (.0020) or less 0.1 (0.004) or less 0.10 – 0.25 (.0039 – .0098) 7,500 – 17,500 (1,686 – 3,934)	0.4 (.016)

Items	Standard value	Limit
Connecting rod bearing Oil clearance mm (in.)	0.016 – 0.046 (.0006 – .0018)	0.1 (.004)
Crankshaft main bearing Oil clearance mm (in.)	0.019 – 0.044 (.0007 – .0017)	0.1 (.004)
Crankshaft Pin O.D. mm (in.) Journal O.D. mm (in.) Out-of-roundness of journal and pin mm (in.) Taper of journal and pin mm (in.) End play mm (in.)	49.9 (1.965) 59.9 (2.358) Less than 0.003 (.00012) Less than 0.005 (.0002) 0.05 – 0.25 (.0020 – .0098)	0.3 (.012)
Oil pressure at curb idle speed kPa (psi) [Conditions: oil temperature is 75 to 90°C (167 to 194°F)]	80 (11.4) or more	
Oil pump Side clearance mm (in.) Body clearance Side clearance	0.100-0.181 (.0039 – .0071) 0.040 – 0.095 (.0016 – .0037)	
Relief spring Free length mm (in.) Load [37 N (8.3 lbs.)] mm (in.)	43.8 (1.724) 40.1 (1.579)	
Drive belt For alternator (Vehicle without air conditioner) Deflection mm (in.) Inspection New belt Used belt Tension N (lbs.) Inspection New belt Used belt For alternator and air conditioner compressor Deflection mm (in.) Inspection New belt Used belt For power steering pump Deflection mm (in.)	4.0 – 5.5 (.157 – .216) 3.5 – 4.0 (.138 – .157) 4.0-5.0 (.157 – .197) 350 – 600 (77 – 132) 650 – 850 (143 – 187) 450 – 600 (99 – 132) 4.0 – 5.5 (.157 – .216) 3.5-4.0 (.138 – .157) 4.0 – 5.0 (.157 – .197) 9.0 – 11.0 (.354 – .433)	
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)	

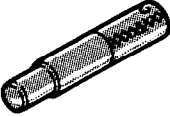
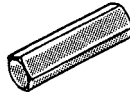
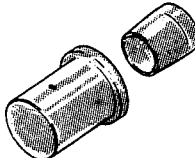

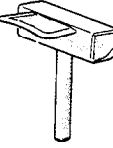
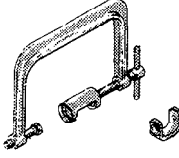
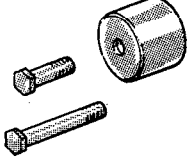
SEALANTS

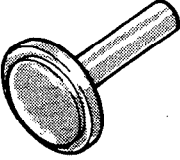
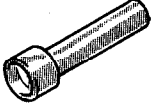
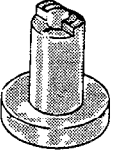
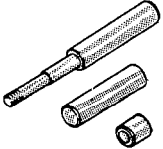
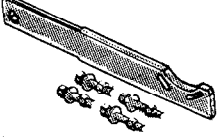
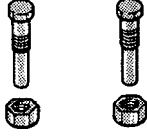
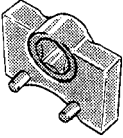
M11CE--

Items	Specified sealant
Oil pan Oil seal case	MITSUBISHI GENUINE Part No. MD9971 10 or equivalent
Oil pressure switch Oil pressure gauge unit Rocker cover	3M ATD Part No.8660 or equivalent

SPECIAL TOOLS

M11DA--

Tool	Number	Name	Use
	MB990938-01	Handle	Use with MD998718-01
	MD998051-01	Cylinder head bolt wrench	Loosening and tightening of cylinder head bolt
	MD998717-01	Crankshaft front oil seal installer	Installation of crankshaft front oil seal
	MD998718-01	Crankshaft rear oil seal installer	Installation of crankshaft rear oil seal
	MD998727	Oil pan remover	Removal of oil pan
	MD998735	Valve spring compressor	Removal and installation of valve and related parts
	MD998761	Camshaft oil seal installer	Installation of camshaft oil seal

Tool	Number	Name	Use
	MD998762	Circular packing installer	Installation of circular packing
	MD998763	Valve stem seal installer	Installation of valve stem seal
	MD998764	Piston pin setting base	Removal and installation of piston pin Use with MD998765
	MD998765	Piston pin setting base	Removal and installation of piston pin Use with MD998764
	MB990767-01	End yoke holder	Supporting the sprocket and shaft pulley when attaching or detaching them.
	MD998754	Crankshaft pulley holder	Supporting the crankshaft pulley when crankshaft bolt and pulley are removed or reinstalled. Use together with MB990767-01
	MD998767	Tensioner pulley socket wrench	Adjustment of timing belt

TROUBLESHOOTING

M11EAAQ

Symptom	Probable cause	Remedy
Compression too low	Cylinder head gasket blown	Replace gasket
	Piston ring worn or damage	Replace rings
	Piston or cylinder worn	Repair or replace piston and/or cylinder block
	Valve seat worn or damage	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 damage	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

SERVICE ADJUSTMENT PROCEDURES

M11FMBG

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) Apply 100 N (22 lbs.) force to the belt back midway between the pulleys as shown in the illustration, measure the deflection or by using a belt-tension gauge, check the belt's tension.

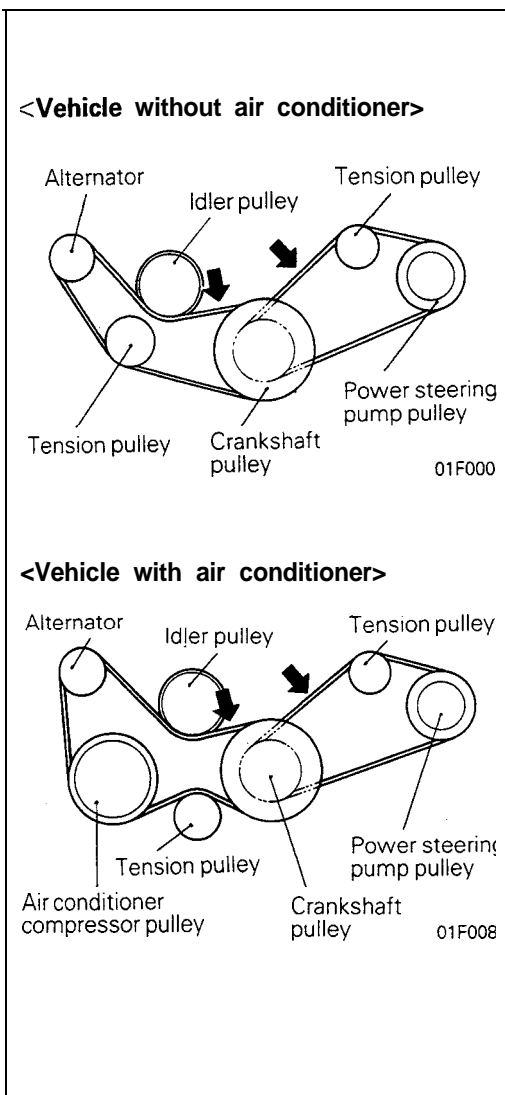
Standard value:

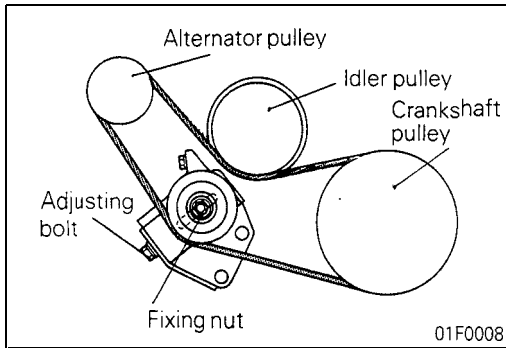
<Vehicle without air conditioner>

Items		Check value	Adjustment value	
			New belt	Used belt
For alternator	Deflection mm (in.)	4.0 – 5.5 (.157 – .216)	3.5 – 4.0 (.138 – .157)	4.0 – 5.0 (.157 – .197)
	Tension N (lbs.)	350 – 600 (77 – 132)	650 – 850 (143 – 187)	450 – 600 (99 – 132)
For P/S pump	Deflection mm (in.)	9.0 – 11.0 (.354 – .433)	←	←

<Vehicle with air conditioner>

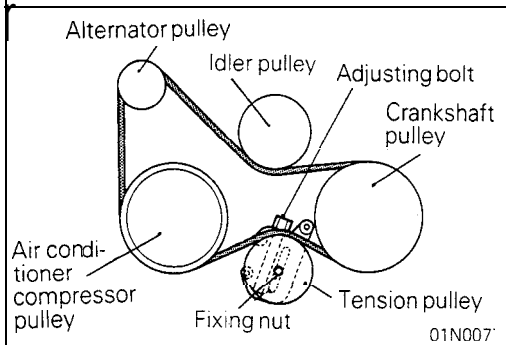
Items		Check value	Adjustment value	
			New belt	Used belt
For alternator and A/C compressor	Deflection mm (in.)	4.0 – 5.5 (.157 – .216)	3.5 – 4.0 (.138 – .157)	4.0 – 5.0 (.157 – .197)
For P/S pump	Deflection mm (in.)	9.0 – 11.0 (.354 – .433)	←	←





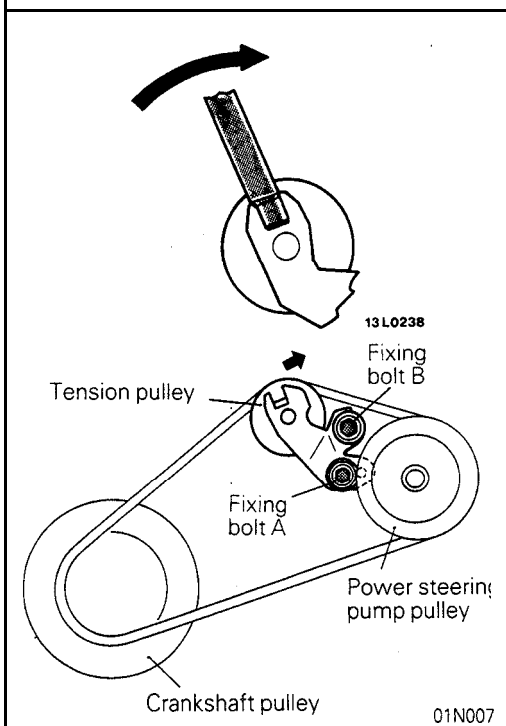
TENSION ADJUSTMENT OF THE ALTERNATOR DRIVE BELT <Vehicle without air conditioner>

- (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.



DEFLECTION ADJUSTMENT OF THE ALTERNATOR AND AIR CONDITIONER COMPRESSOR DRIVE BELT <Vehicle with air conditioner>

- (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.



DEFLECTION ADJUSTMENT OF POWER STEERING PUMP DRIVE BELT

- (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.

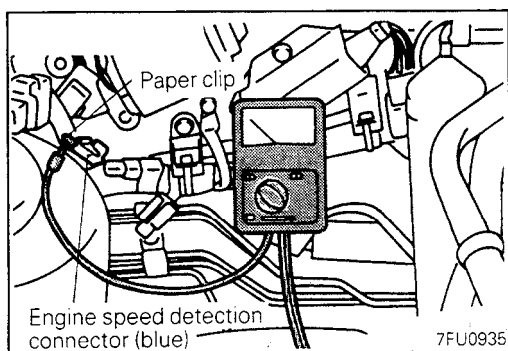
Tightening torque: 35 – 50 Nm (25 – 36 ft.lbs.)

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

IGNITION TIMING ADJUSTMENT

M11FLAF

- (1) The vehicle should be prepared as follows before the inspection and adjustment.
 - Engine coolant temperature: 80 – 95°C (176 – 205°F)
 - Lights, electric cooling fan and accessories: OFF
 - Transaxle: neutral (P for A/T)
 - Steering wheel: neutral position



- (2) Insert a paper clip to the connector, and connect a tachometer to the paper clip.

NOTE

Do not use the Multi-use tester.

If tested with the Multi-use tester connected to the diagnosis connector, the ignition timing will not be the basic timing but be ordinary timing.

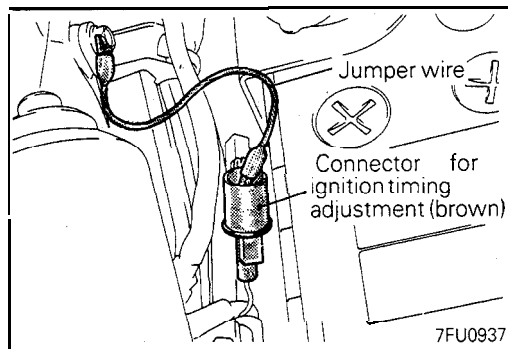
- (3) Set the timing light.
- (4) Start the engine and run at idle.
- (5) Check curb idle speed.

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

NOTE

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

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

Basic ignition timing: 5° BTDC ± 2°

- (10) 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.
- (11) After adjustment, tighten mounting nut taking care not to move the crank angle sensor.
- (12) Turn OFF the ignition switch.
- (13) Disconnect the jumper wire connected at step (7).
- (14) Start and run the engine at curb idle speed.

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

Actual ignition timing: Approx. 15° BTDC

NOTE

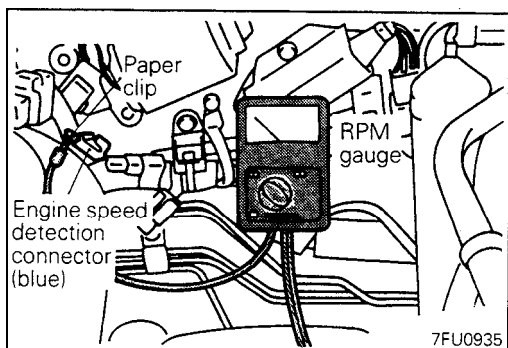
- (1) Ignition timing is variable even under normal operation.
- (2) And it is automatically advanced at higher altitudes.

CURB IDLE SPEED INSPECTION

M11FMAB

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

- Engine coolant temperature: 80 – 95°C (176 – 205°F)
- Lights, electric cooling fan and accessories: OFF
- Transaxle: neutral (P for A/T)
- Steering wheel: neutral position



- (2) Connect a tachometer. (Refer to P.I 1-13.)
- (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 whether or not the ignition timing is the standard value; if not, adjust.

Standard value: 5° BTDC ± 2°

NOTE

Check the ignition timing with the Multi-use tester not connected to the diagnosis connector.

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

Curb idle speed: 700 ± 100 rpm

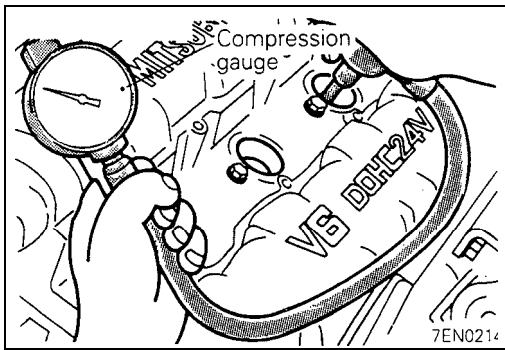
NOTE

- (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 not within the standard value range, refer to GROUP 13 – Service Adjustment Procedures.

COMPRESSION PRESSURE CHECK

M11FFAK

- (1) Before checking compression, ensure that engine oil, the starter motor, and battery are all in normal operating condition.
- (2) Start the engine and wait until engine coolant temperature has risen to 80 – 95°C (176 – 205°F).
- (3) Remove the all spark plugs.



- (4) Crank the engine to remove any foreign objects in the cylinders.

Caution

Cover the spark plug holes with shop towel, etc., in order to keep expelled foreign objects from flying out, and keep away from the holes. When measuring compression with water, oil, or fuel having entered the cylinder through a crack, etc., these will come flying out of the spark plug hole hot and fast, so be sure to take the proper precautions.

- (5) Set the compression gauge to the spark plug hole.
- (6) Holding the throttle valve full open, crank the engine and measure compression.

Limit:

<Non-Turbo>

min. 980 kPa (139 psi)

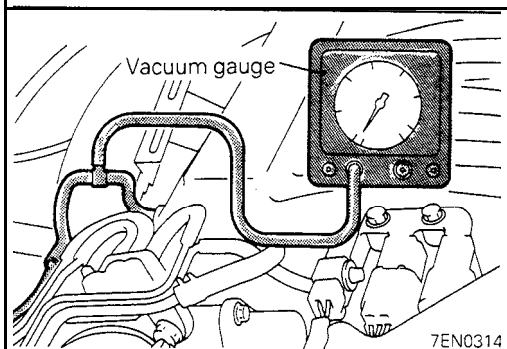
<Turbo>

min. 810 kPa (115 psi)

- (7) Perform (5) and (6) above for all the cylinders, ensuring that compression pressure differential for each of the cylinders is within the specified limit.

Limit: max. 100 kPa (14 psi)

- (8) If a cylinder's compression or pressure differential exceeds the limit, add a small amount of oil through the spark plug hole and repeat steps (5) – (7).
 - ① If the addition of oil brings compression up, it is possible that there is harmful friction between the piston ring and cylinder wall.
 - ② If not compression up, valve seizure, poor valve seating, or a compression leak from the gasket are all possible.

**MANIFOLD VACUUM INSPECTION**

M11FNAR

- (1) The vehicle should be repaired as follows before the inspection.
 - Engine coolant temperature: 80 – 95°C (176 – 205°F)
 - Lights, electric cooling fan, and accessories: OFF
 - Transaxle: Neutral (P for A/T)
 - Steering wheel: neutral position
- (2) Connect a tachometer. (Refer to P.I I-I 3.)
- (3) Disconnect the vacuum hose from the nipple for taking off fuel pressure regulator vacuum from the air intake plenum.
- (4) Connect a three-way joint between the removed vacuum hose and the nipple and connect a vacuum gauge to the joint.
- (5) Start the engine and check that idle speed is within the standard value range.
- (6) Check the manifold vacuum.

Standard value:

<Non-Turbo>

Approx. 520 mmHg (20 in.Hg)

<Turbo>

Approx. 495 mmHg (19 in.Hg)**LASH ADJUSTERS CHECK**

MI 1 FEAF

If an abnormal noise is heard from the lash adjusters, check as follows.

- (1) After warming up the engine, stop it.
- (2) While installed to the cylinder head, press the part where the rocker arm contacts the lash adjuster at the very top. If the adjuster is normal, the part pressed will feel very hard.
- (3) If it easily moves all the way downward when pressed, there is a malfunction of the lash adjuster and it should be replaced with a new one.
- (4) If it feels spongy or elastic, probably oil with air mixed in it has entered the lash adjuster. Check whether the amount of oil is too much or is not enough and the cause of air becoming mixed into the oil is a damaged oil screen or oil screen gasket.
- (5) After repairing the cause of the air leak, warm up the engine and then drive the vehicle at low speed for a while. Stop the engine and leave it off for a few minutes; then restart the engine and drive at low speed. Repeat this procedure several times during the course of about one hour so as to remove the air from the oil.

ENGINE ASSEMBLY

M11SA-B

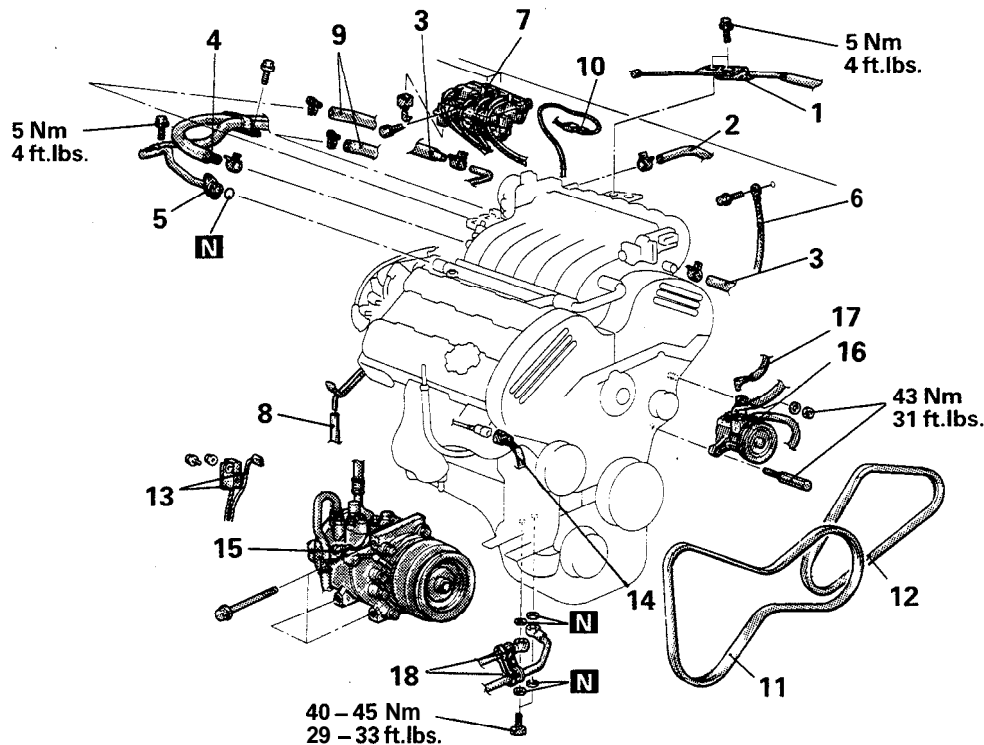
REMOVAL AND INSTALLATION

Pre-removal Operation

- Release of Residual Pressure from High Pressure Fuel Hose
(Refer to GROUP 13 – Service Adjustment Procedures.)
- Removal of Cruise Control Pump and Link Assembly
(Refer to GROUP 13 – Cruise Control.)
- Removal of Hood
(Refer to GROUP 42A – Hood.)
- Removal of Air Hose and Air Pipe <Turbo>
(Refer to GROUP 15 – Inter Cooler.)
- Removal of Front Exhaust Pipe
(Refer to GROUP 15 – Exhaust Pipe and Main Muffler.)
- Removal of Transaxle Assembly
(Refer to GROUP 22, 23 – Transaxle Assembly.)
- Removal of Radiator
(Refer to GROUP 14 – Radiator.)

Post-installation Operation

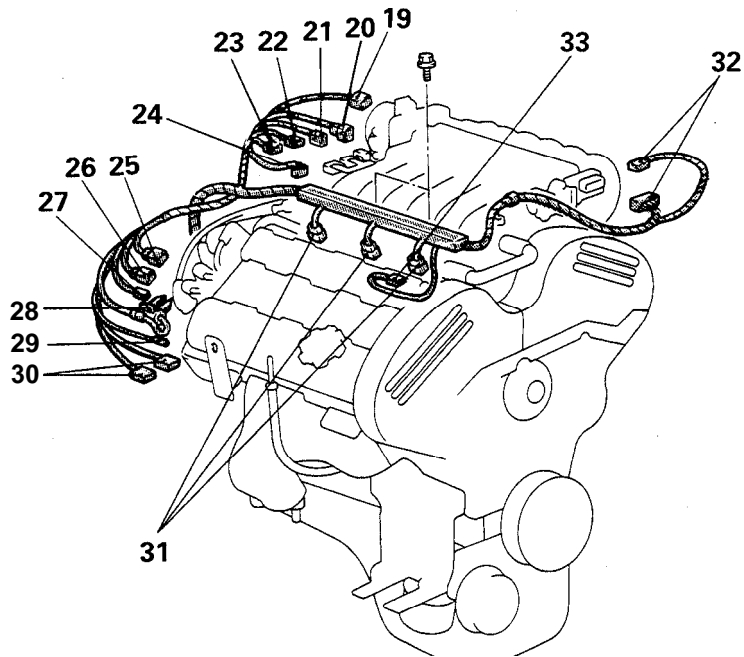
- Installation of Radiator
(Refer to GROUP 14 – Radiator.)
- Installation of Cruise Control Pump and Link Assembly
(Refer to GROUP 13 – Cruise Control.)
- Installation of Transaxle Assembly
(Refer to GROUP 22, 23 – Transaxle Assembly.)
- Installation of Front Exhaust Pipe
(Refer to GROUP 15 – Exhaust Pipe and Main Muffler.)
- Installation of Air Hose and Air Pipe <Turbo>
(Refer to GROUP 14 – Inter Cooler.)
- Installation of Hood
(Refer to GROUP 42A – Hood.)
- Supplying of Engine Oil
(Refer to GROUP 00 – Maintenance Service.)
- Adjustment of the Accelerator Cable
(Refer to GROUP 13 – Engine Control.)

**Removal steps**

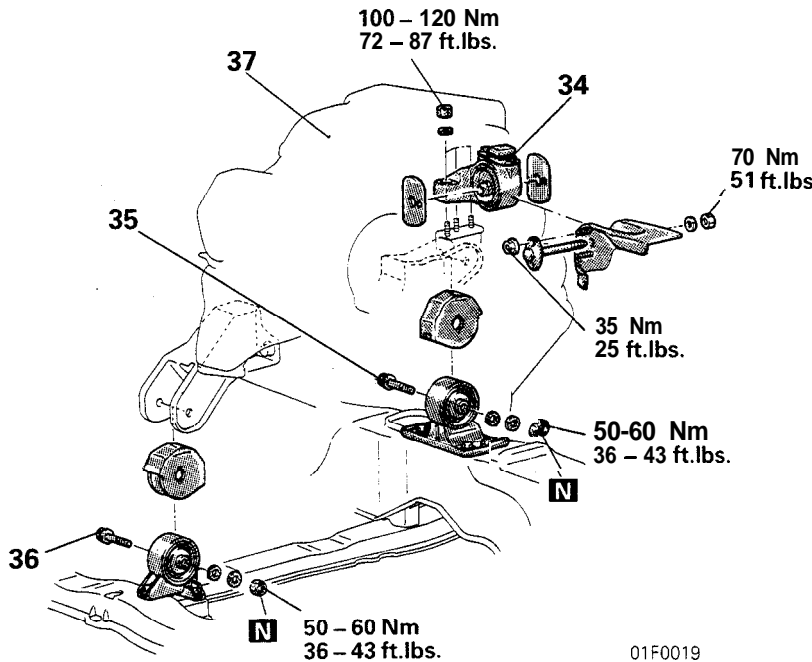
- | | |
|---|--|
| <ol style="list-style-type: none"> 1. Connection of accelerator cable 2. Connection of brake booster vacuum hose 3. Connection of booster vacuum hose <Turbo> 4. Connection of fuel return hose 5. Connection of fuel high pressure hose 6. Connection of ground cable 7. Solenoid valve assembly 8. Connection of vapor hose 9. Connection of heater hose 10. EGR temperature sensor connector <Vehicles for California> | <ol style="list-style-type: none"> 11. Drive belt (Alternator and air conditioner)
(Refer to P.I I-I 1.) 12. Drive belt (Power steering)
(Refer to P.I I-I 1.) 13. Connection of alternator harness 14. Oxygen sensor connector <Turbo> 15. Air conditioner compressor 16. Power steering oil pump 17. Oil pressure switch connector (Power steering) 18. Connection of oil cooler pipes <Turbo> |
|---|--|

01F0043

- 19. ISC servo 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 angle sensor connector
- 25. Engine coolant temperature switch connector (Air conditioner)
- 26. Engine coolant temperature sensor connector
- 27. Engine coolant temperature gauge unit connector
- 28. Condenser connector
- 29. Ignition coil connector
- 30. Power transistor connector
- 31. Fuel injector connector
- 32. Variable induction motor connector <Non-Turbo>
- 33. Oxygen sensor connector <Turbo>



01F0041



01F0019

- ◆◆ ● * 34. Engine mounting bracket
- ◆◆ ● 35. Rear roll stopper bracket and engine connection bolt
- ◆◆ ● 36. Front roll stopper bracket and engine connection bolt
- ◆◆ ● a 37. Engine assembly

SERVICE POINTS OF REMOVAL

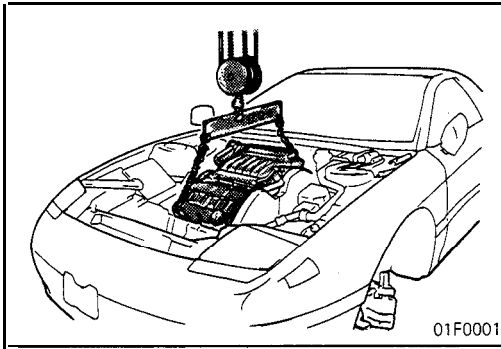
M11SBEH

15. DISCONNECTION OF AIR CONDITIONER COMPRESSOR / 16. POWER STEERING OIL PUMP

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

NOTE

The removed air conditioner 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.

**34. REMOVAL OF ENGINE MOUNT BRACKET**

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).

37. REMOVAL OF ENGINE ASSEMBLY

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.

SERVICE POINTS OF INSTALLATION

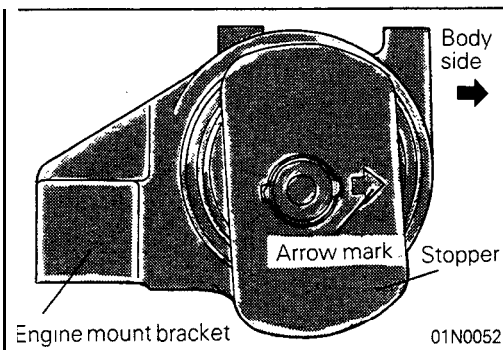
MI 1SDBC

37. INSTALLATION OF ENGINE ASSEMBLY

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

34. INSTALLATION OF ENGINE MOUNT BRACKET

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

M11ZA-B

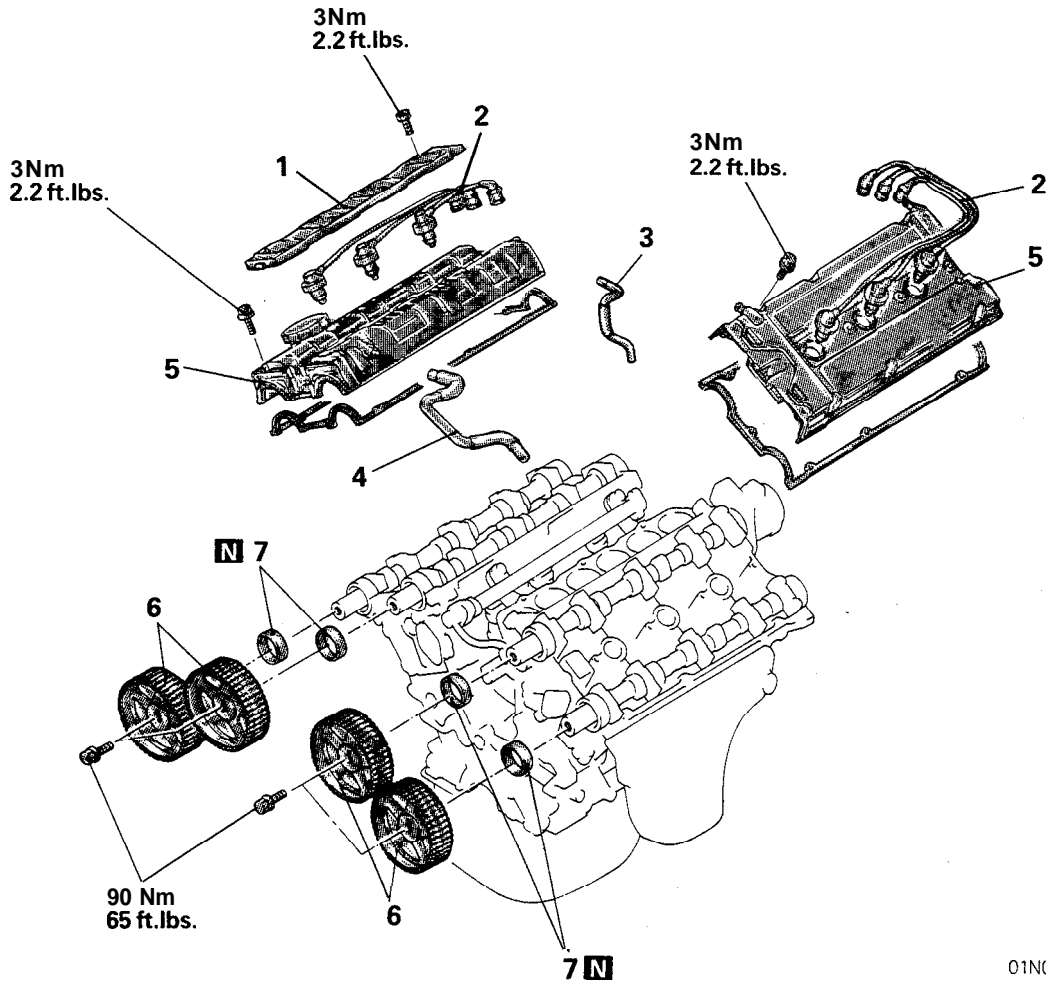
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Removal and Installation of Timing Belt (Refer to P.11-26.)
- Removal and Installation of Intake Manifold (Refer to GROUP 15 – Intake Manifold.)

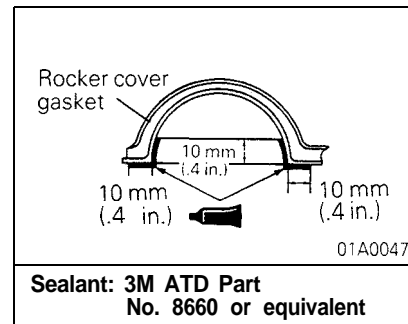
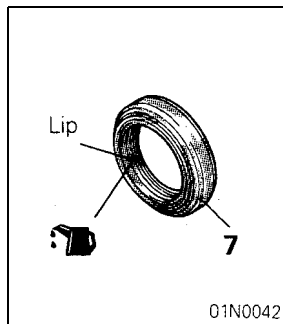
Adjustment

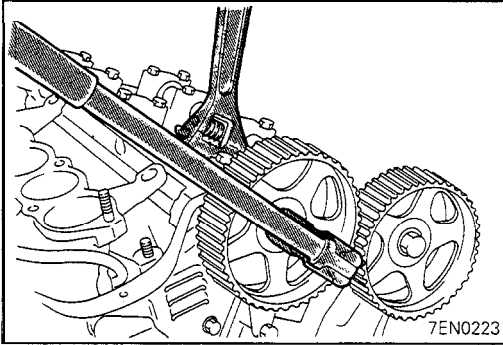
- Accelerator Cable (Refer to GROUP 13 – Engine Control.)



Removal steps

1. Center cover (front bank)
2. Connection for spark plug cables
3. Connection for breather hose
4. Connection for PCV hose
5. Rocker cover
6. Camshaft sprocket
7. Camshaft oil seals





SERVICE POINTS OF REMOVAL

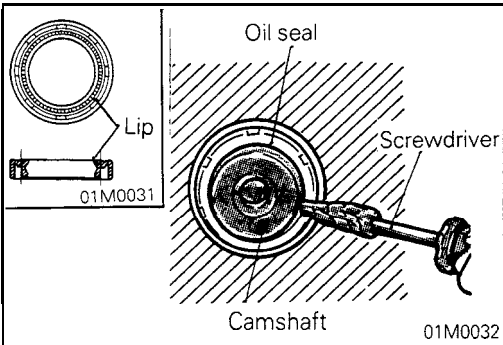
M11ZBAG

6. REMOVAL OF CAMSHAFT SPROCKET

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.

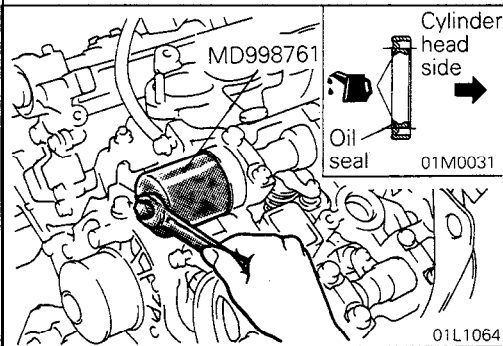


7. REMOVAL OF CAMSHAFT OIL SEAL

- (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.

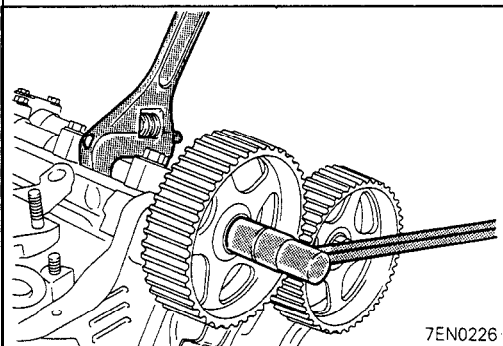


SERVICE POINTS OF INSTALLATION

M11ZDAI

7. INSTALLATION OF CAMSHAFT OIL SEAL

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



6. INSTALLATION OF CAMSHAFT SPROCKET

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

Caution

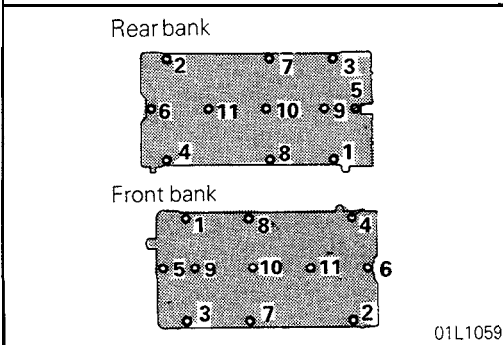
Do not hold the camshaft sprocket with a tool, or a damaged sprocket could result.

5. INSTALLATION OF ROCKER COVER

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 4 Nm (2.9 ft.lbs.).



OIL PAN AND OIL SCREEN

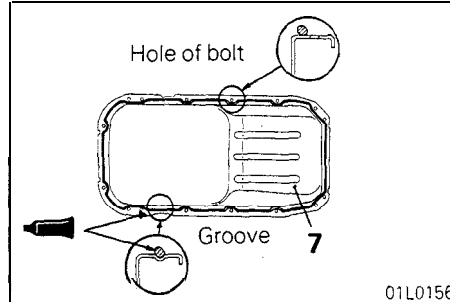
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation Draining and Refilling

- Engine Oil
(Refer to GROUP 00 – Maintenance Service.)

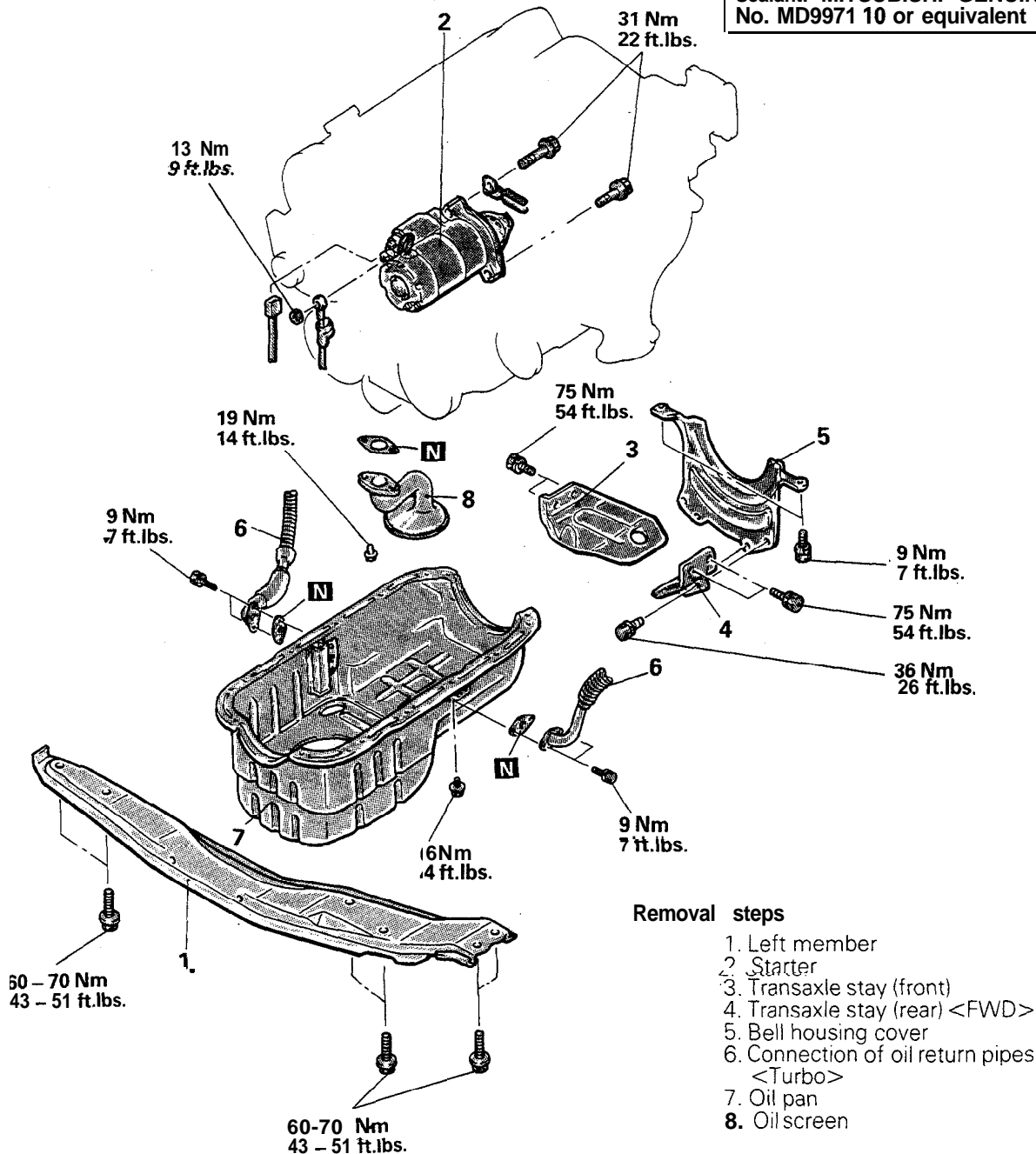
Removal and Installation

- Front Air Dam <Active Aero>
(Refer to GROUP 51 – Aero Parts.)
- Under Cover
- Front Exhaust Pipe
(Refer to GROUP 15 – Exhaust Pipe and Main Muffler.)
- Transfer Assembly <AWD>
(Refer to GROUP 22, 23 – Transfer Assembly.)



01L0156

Sealant: MITSUBISHI GENUINE Part No. MD9971 10 or equivalent



Removal steps

1. Left member
2. Starter
3. Transaxle stay (front)
4. Transaxle stay (rear) <FWD>
5. Bell housing cover
6. Connection of oil return pipes <Turbo>
7. Oil pan
8. Oil screen

*1F0006

CYLINDER HEAD GASKET

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation Draining and Supplying

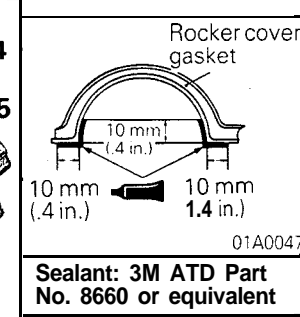
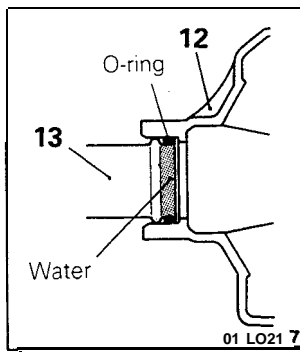
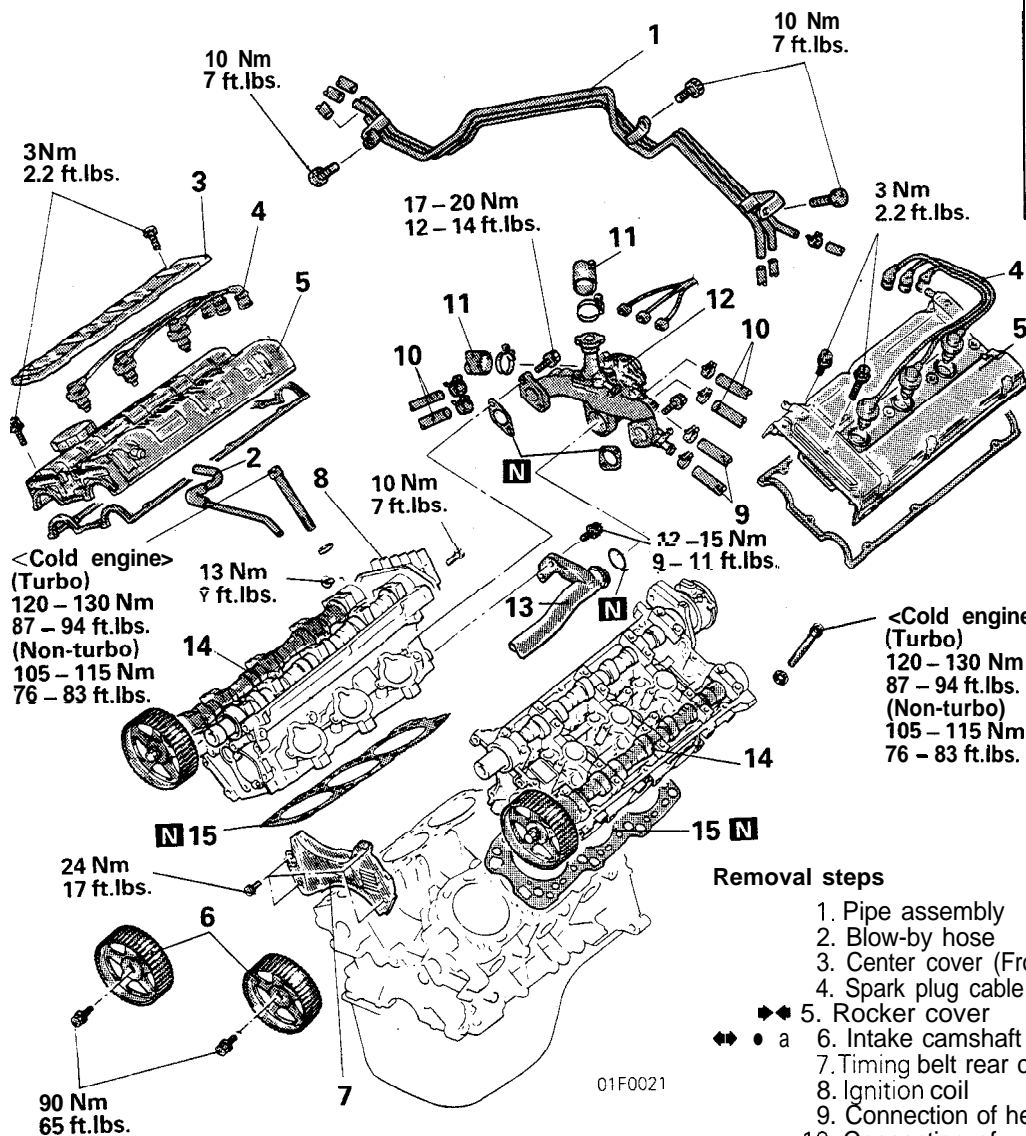
- Engine Coolant
(Refer to GROUP 00 – Maintenance Service.)

Removal and Installation

- Air Intake Manifold
(Refer to GROUP 15 – Air Intake Manifold.)
- Turbocharger <Turbo>
(Refer to GROUP 15 – Turbocharger.)
- Exhaust Manifold
(Refer to GROUP 15 – Exhaust Manifold.)
- Timing Belt
(Refer to P.11-26.)

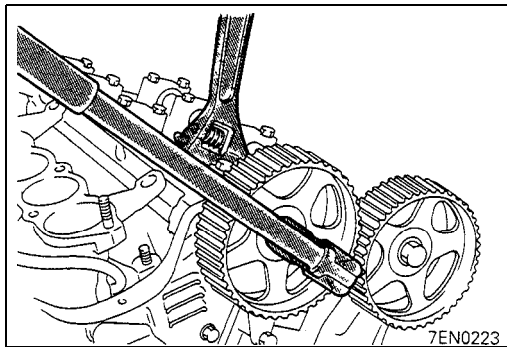
Adjustment

- Accelerator Cable
(Refer to GROUP 13 – Engine Control.)
- Engine Adjustment
(Refer to P.11-11.)



Removal steps

1. Pipe assembly
2. Blow-by hose
3. Center cover (Front bank)
4. Spark plug cable
5. Rocker cover
6. Intake camshaft sprocket
7. Timing belt rear cover (Center)
8. Ignition coil
9. Connection of heater hose
10. Connection of water hoses <Turbo>
11. Connection of radiator hose
12. Thermostat housing
13. Connection of water inlet pipe (Front bank)
14. Cylinder head assembly
15. Cylinder head gasket



SERVICE POINTS OF REMOVAL

M11JBBF

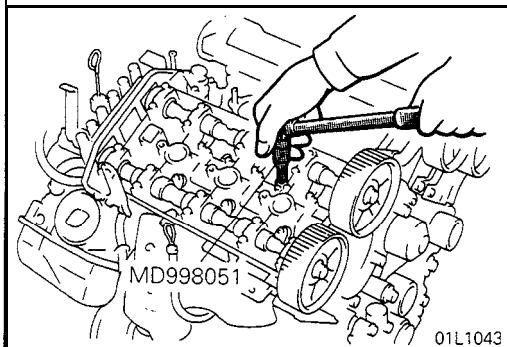
6. REMOVAL OF INTAKE CAMSHAFT SPROCKET

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

Caution

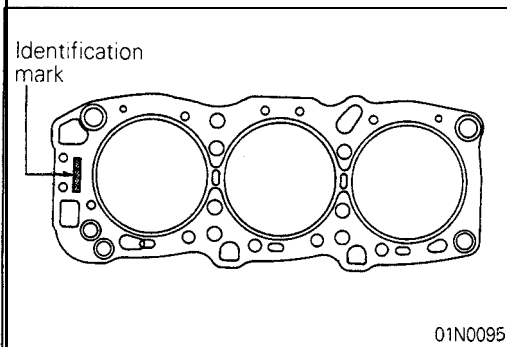
Locking the camshaft sprocket with a tool damages the sprocket.

- (2) Remove the camshaft sprockets.



14. REMOVAL CYLINDER HEAD ASSEMBLY

Using the special tool, remove the cylinder head assembly.

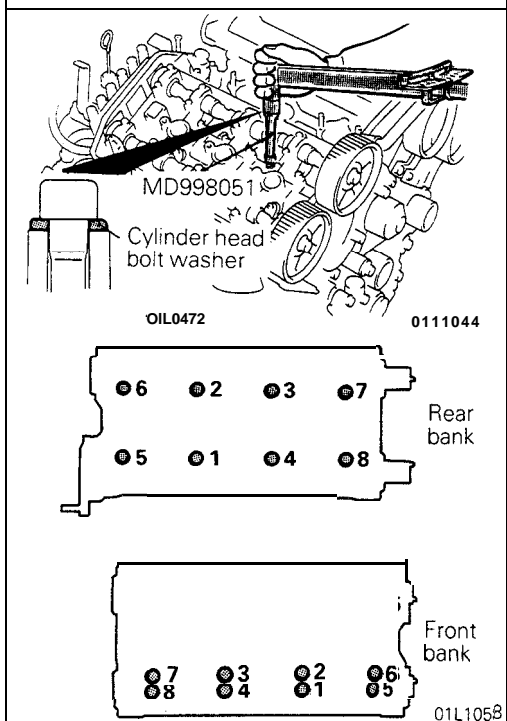


SERVICE POINTS OF INSTALLATION

M11JDEJ

15. INSTALLATION OF CYLINDER HEAD GASKET

- (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.



14. INSTALLATION OF CYLINDER HEAD ASSEMBLY

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

Caution

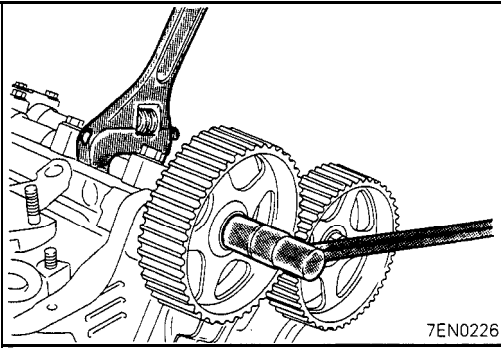
Take care that no foreign material gets into the cylinder, coolant passages or oil passages.

- (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>

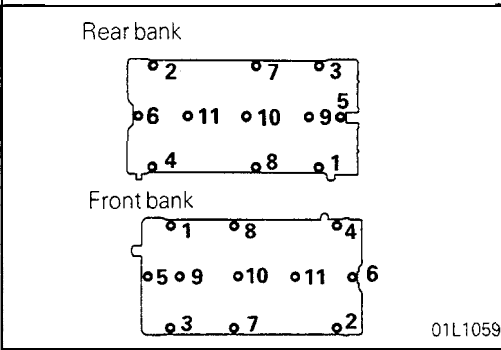


6. INSTALLATION OF INTAKE CAMSHAFT SPROCKET

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.



5. INSTALLATION OF ROCKER COVER

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

NOTE

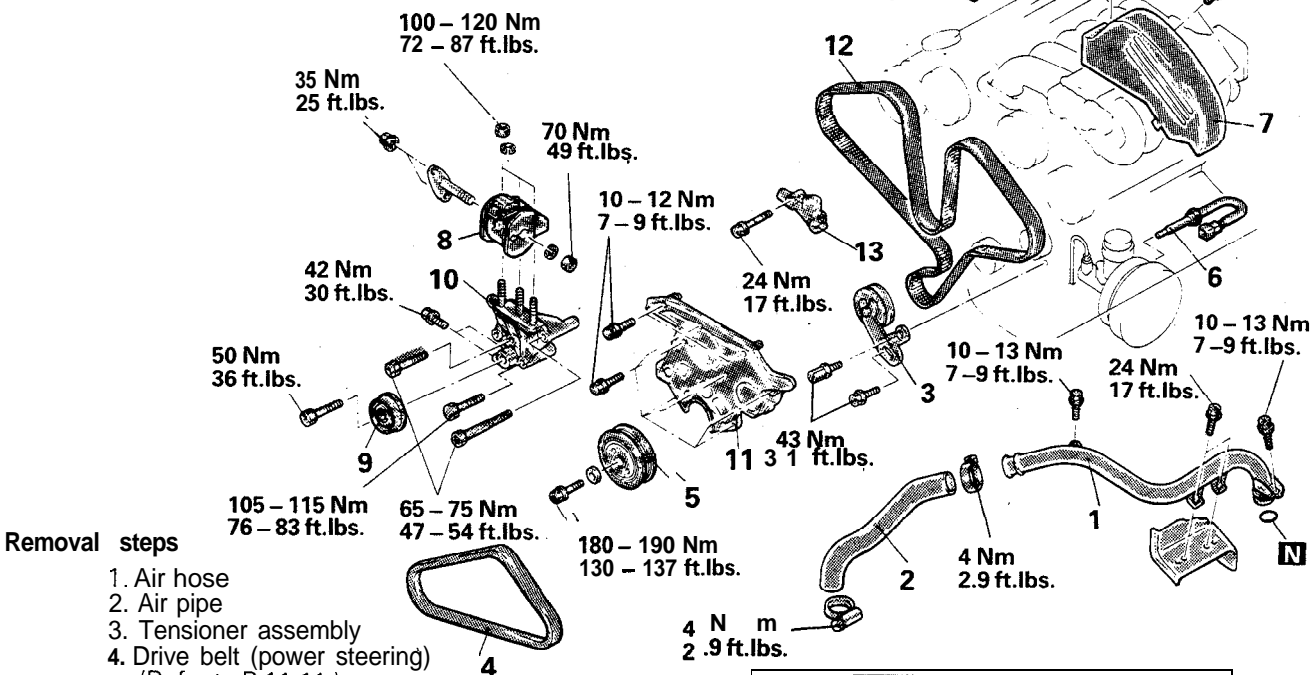
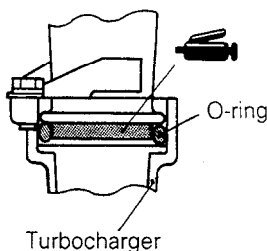
- (1) Only No. 5 bolt in the rear bank differs from other bolts in length.
 Rear bank No. 5 bolt 20 mm (.79 in.)
 Except rear bank No. 5 bolt 10 mm (.39 in.)
- (2) Bolts are color-coded for the front and rear banks as follows:
 Front bank Black
 Rear bank Green
- (3) When the rocker cover gasket has 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

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



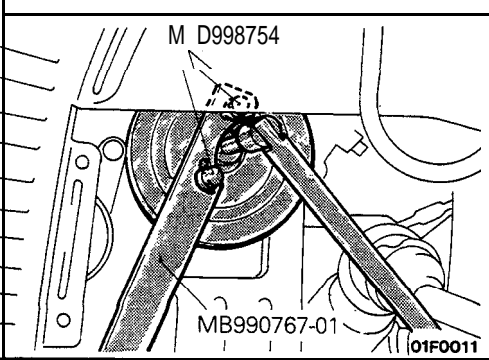
Removal steps

1. Air hose
2. Air pipe
3. Tensioner assembly
4. Drive belt (power steering)
(Refer to P.11-11.)
- ◆◆◆◆ 5. Crankshaft pulley
6. Brake fluid level sensor
7. Timing belt upper cover
8. Engine mount bracket
9. Idler pulley (alternator / air conditioner)
- ◆◆
 - * 10. Engine support bracket
 - * 11. Timing belt lower cover
 - * Adjustment of timing belt tension
- * a 12. Timing belt
- * 13. Auto tensioner

Post-installation Operation

- Installation of Alternator Assembly (Refer to GROUP 16 – Alternator.)
- Installation of the Under Cover (Front L.H., Side L.H.)
- Installation of Front Under Cover Panel <Vehicle with Active Aero>
- Installation of Cruise Control Actuator <Vehicle with Cruise Control> (Refer to GROUP 13 – Cruise Control.)
- Adjustment of the Engine (Refer to P.11-11.)

01F0027



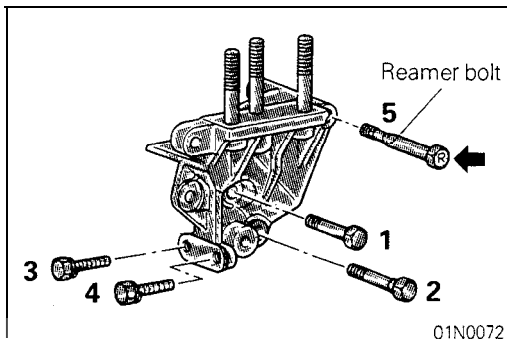
SERVICE POINTS OF REMOVAL

5. REMOVAL OF CRANKSHAFT PULLEY

M11KBEF

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

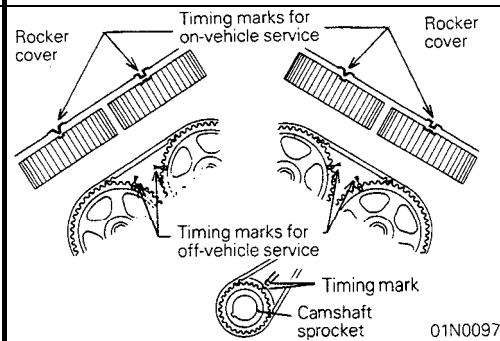
Caution
Use only the specified special tools, or a damaged pulley damper could result.

**10. REMOVAL OF ENGINE SUPPORT BRACKET**

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.

**12. REMOVAL OF TIMING BELT**

(1) Align the timing marks.

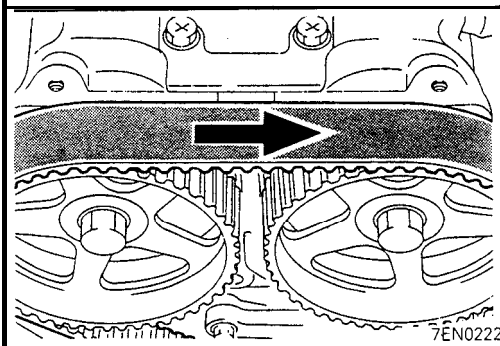
(2) Make a mark on the back of the timing belt indicating the direction of rotation so it may be reassembled in the same direction if it is to be reused.

(3) Loosen the center bolt on the tensioner pulley to remove the timing belt.

Caution

Water or oil on the belt shorten 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.

**SERVICE POINTS OF INSTALLATION**

M11KDD8

13. INSTALLATION OF AUTO TENSIONER

(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.

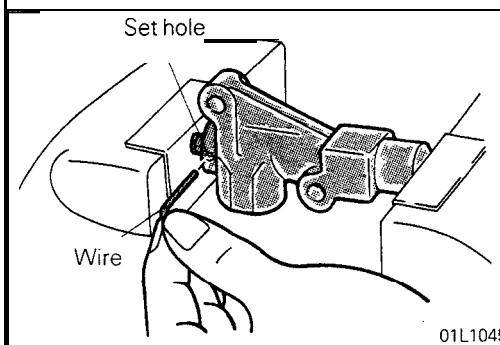
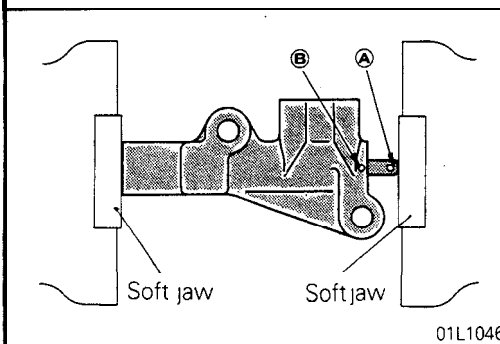
③ Insert a wire [1.4 mm (.055 in.) in diameter] into the set holes.

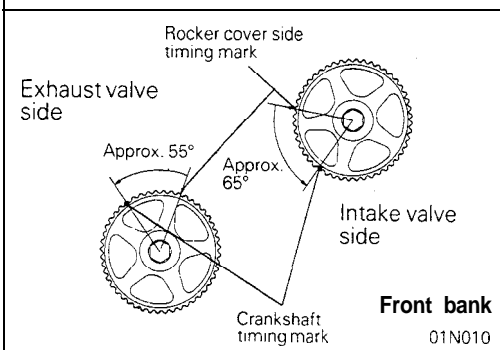
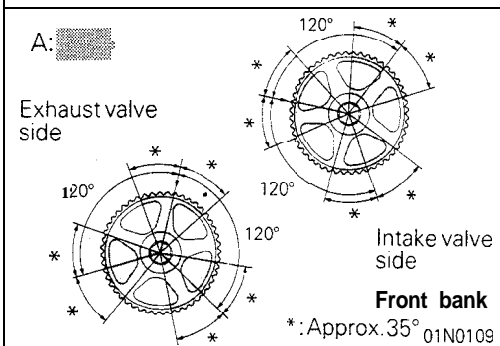
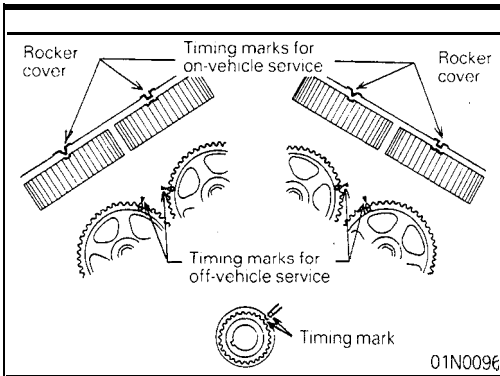
④ Unclamp the auto tensioner from the vise.

(2) Install the auto tensioner.

Caution

Leave the wire installed in the auto tensioner.





12. INSTALLATION OF TIMING BELT

(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 camshaft 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.

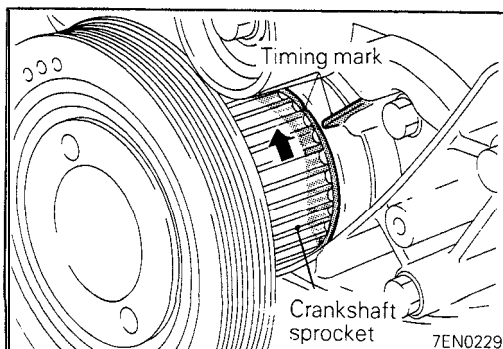
- ④ Turn the camshaft sprocket clockwise to align the timing marks.

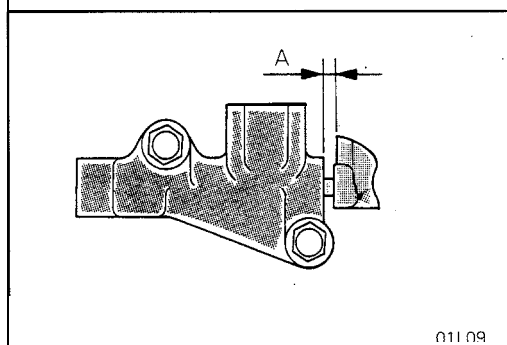
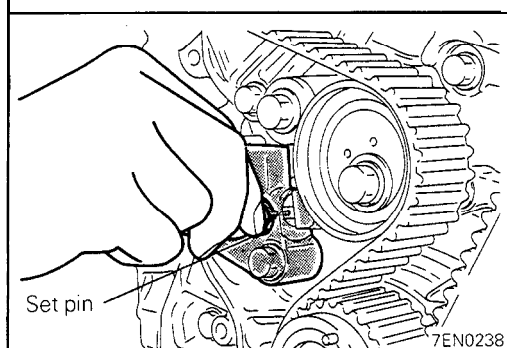
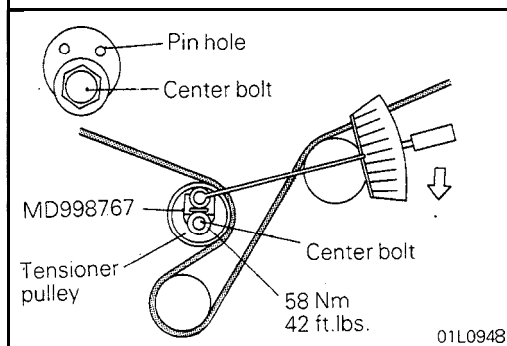
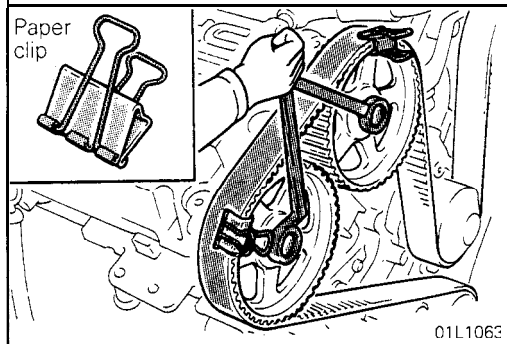
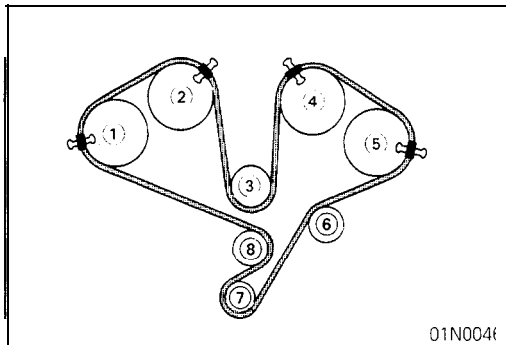
If the camshaft sprocket has been turned excessively, turn it counterclockwise to align the timing marks.

- ⑤ Align the timing mark of the crankshaft sprocket.

NOTE

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





- (2) Using paper 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.

ADJUSTMENT OF TIMING BELT TENSION

- (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.

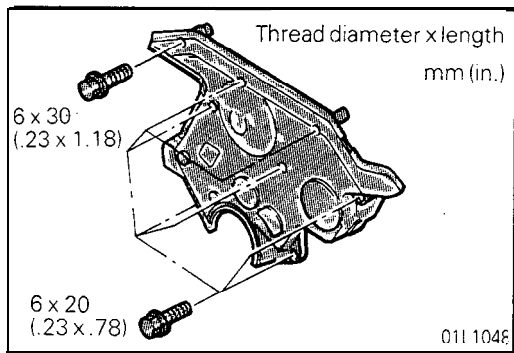
NOTE

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.)

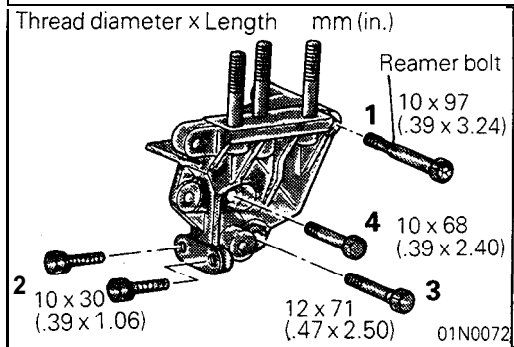
If the protrusion is out of specification, repeat steps (1) to (4).

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



11. INSTALLATION OF TIMING BELT FRONT COVER (LOWER)

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

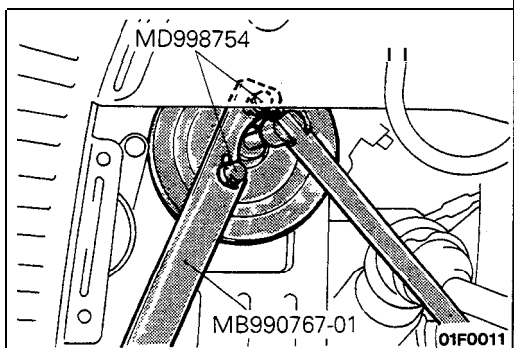


10. INSTALLATION OF ENGINE SUPPORT BRACKET

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.



5. INSTALLATION OF CRANKSHAFT PULLEY

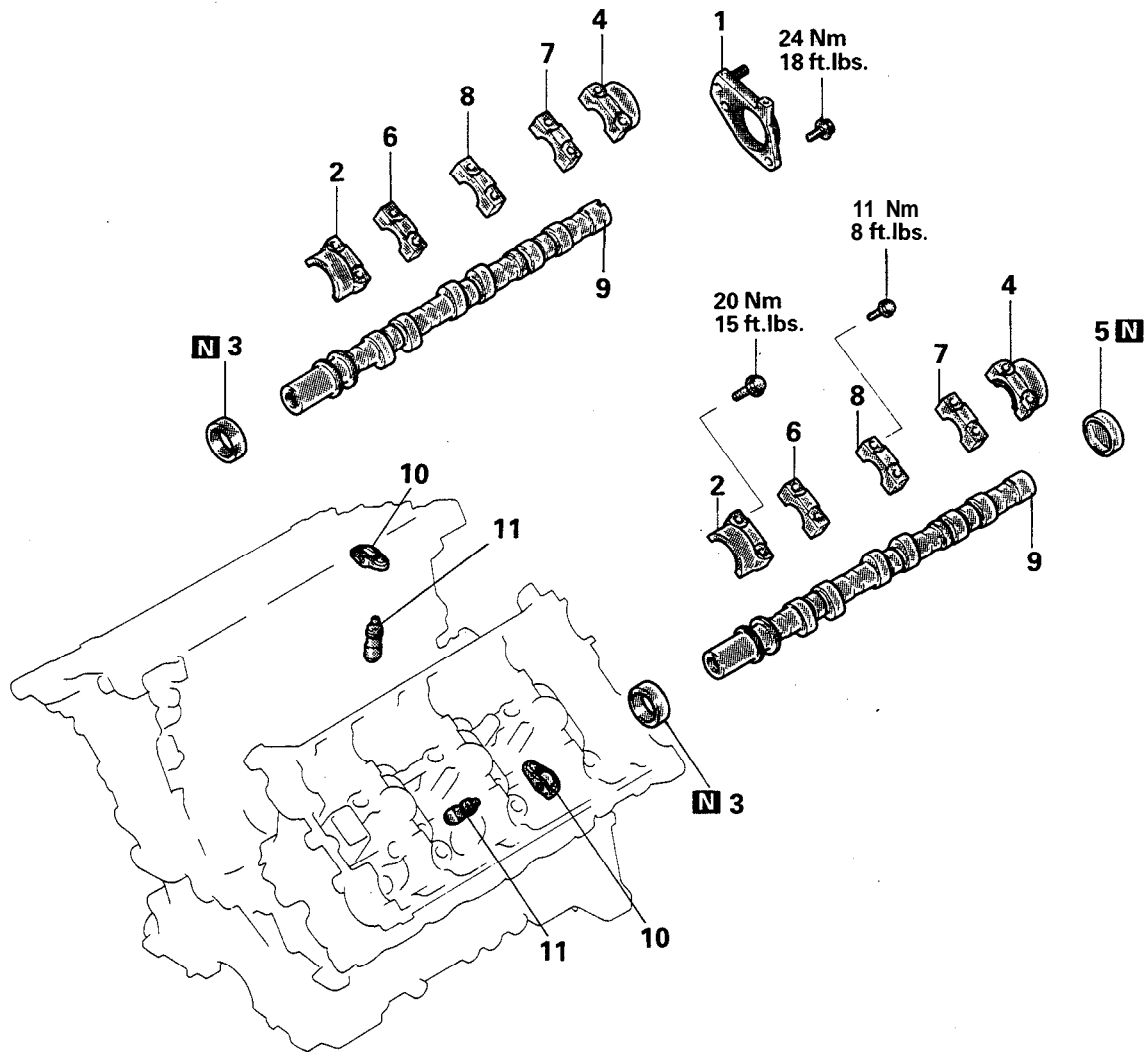
Using the special tool, attach the crankshaft pulley to the crankshaft.

Caution

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

ROCKER ARM AND CAMSHAFT

REMOVAL AND INSTALLATION



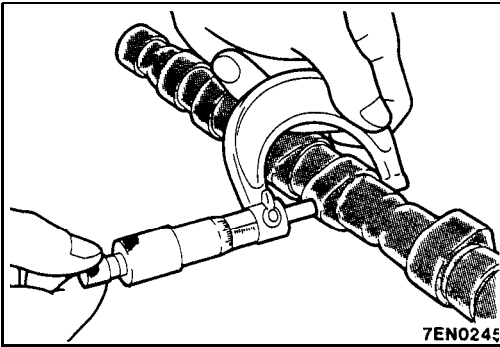
7EN0244

Removal steps

1. Crank angle sensor adaptor
2. Bearing cap front
3. Oil seal
4. Bearing cap rear
5. Circular packing
6. Bearing cap No. 2
7. Bearing cap No. 4
8. Bearing cap No. 3
9. Camshaft
10. Rocker arm
11. Lash adjuster

Installation steps

11. Lash adjuster
10. Rocker arm
- * 9. Camshaft
- ◆◆ 8. Bearing cap No. 3
- * 7. Bearing cap No. 4
- * 6. Bearing cap No. 2
- ◆◆ 4. Bearing cap rear
- ◆◆ 2. Bearing cap front
- ◆◆ 5. Circular packing
- 4 3. Oil seal
1. Crank angle sensor adaptor



7EN0245

INSPECTION

M11ZCAB

CAMSHAFT

Measure cam height (longer diameter of the cam). If it exceeds the limit, replace the camshaft.

Standard value:

Intake side	35.49 mm (1.3972 in.)
Exhaust side	35.20 mm (1.3858 in.)

Limit:

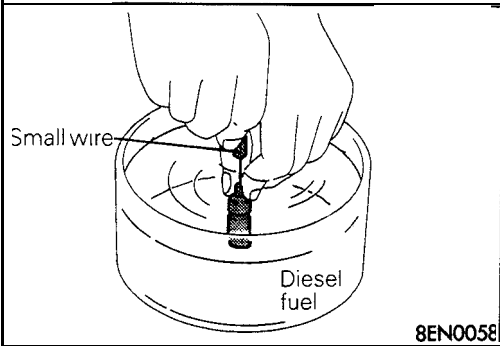
Intake side	34.99 mm (1.3776 in.)
Exhaust side	34.70 mm (1.3661 in.)

SERVICE POINTS OF INSTALLATION

M11ZDAK

11. INSTALLATION OF LASH ADJUSTER

- (1) Immerse the lash adjuster in clean diesel fuel.
- (2) Using a small wire, move the plunger up and down 4 or 5 times while pushing down lightly in the check ball in order to bleed out the air.
- (3) Install the lash adjuster to the cylinder head.



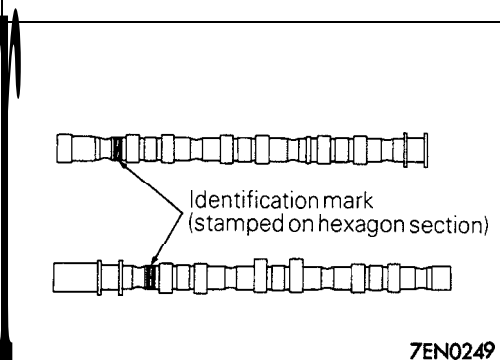
8EN0058

9. INSTALLATION OF CAMSHAFT

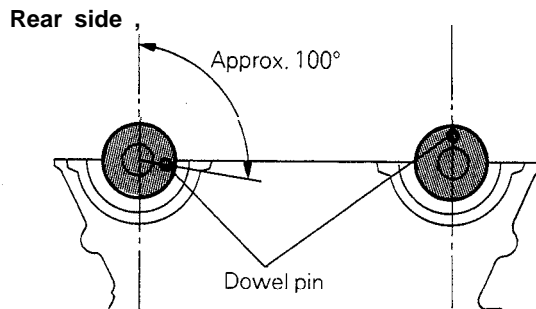
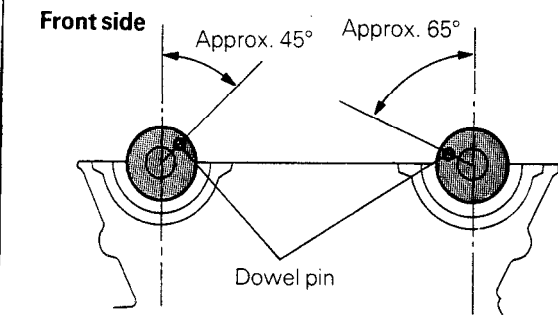
- (1) Turn the crankshaft to bring No.1 cylinder to the top dead center.
- (2) Check that the rocker arm is installed correctly on the lash adjuster and valve.
- (3) Install the camshaft noting the identification mark (stamped on the hexagon section).

**Identification mark: Intake side V
Exhaust side C**

- (4) Install the camshafts with their dowel pins positioned as shown in the illustration.



7EN0249

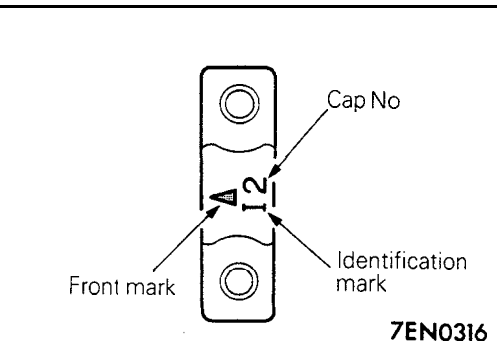


7EN0315

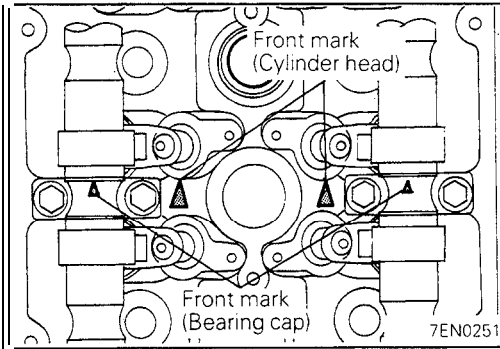
8. 7. 6. 4. 2. INSTALLATION OF BEARING CAPS

- (1) Install noting the identification mark and cap No. No.2, 3 and 4 bearing caps bear the front mark. Install these caps with the mark lined up with the front mark on the cylinder head.

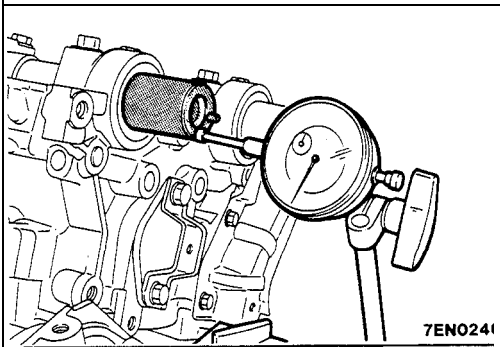
**Identification mark: Intake side I
Exhaust side E**



7EN0316

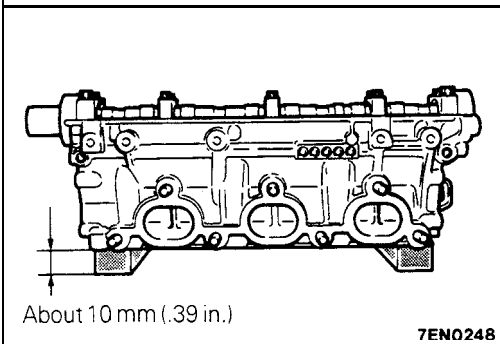


- (2) Tighten gradually in two or three steps and finally tighten to specified torque.



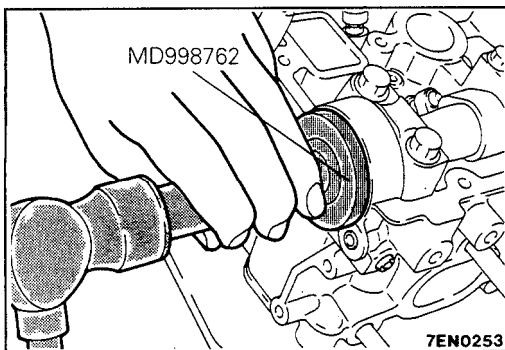
- (3) Measure the camshaft end play. Replace if the limit is exceeded.

Standard value: 0.1 – 0.2 mm (.004 – .008 in.)
Limit: 0.4 mm (.016 in.)



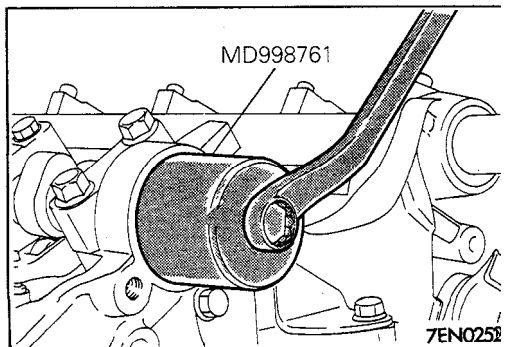
NOTE

If the bearing cap is installed with the cylinder cap removed, the valve will protrude. Install, therefore, with the cylinder head lifted by about 10 mm (.39 in.).



5. INSTALLATION OF CIRCULAR PACKING

Using the special tool, insert the circular packing.

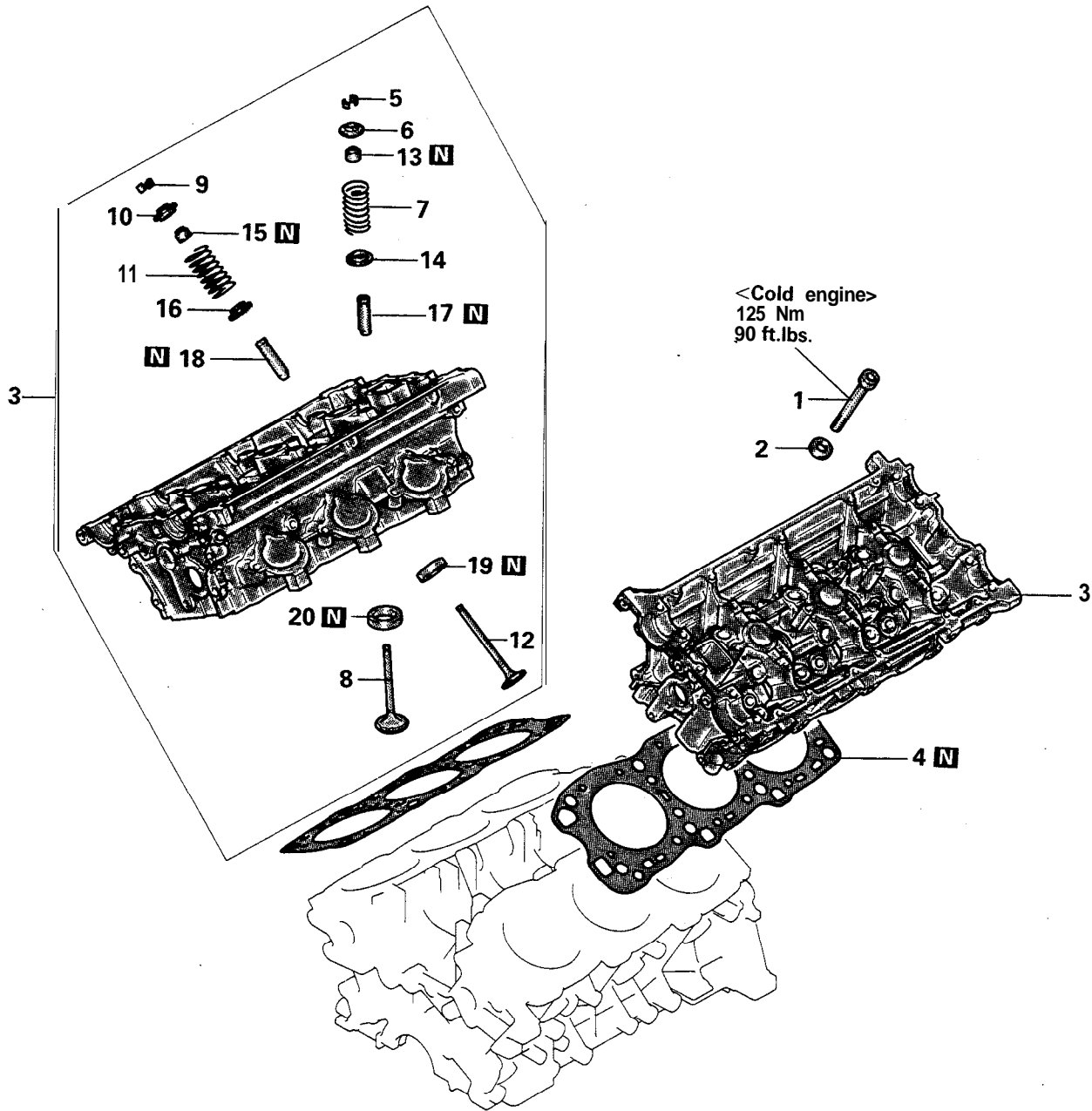


3. INSTALLATION OF OIL SEAL

Using the special tool, insert the oil seal.

CYLINDER HEAD AND VALVE

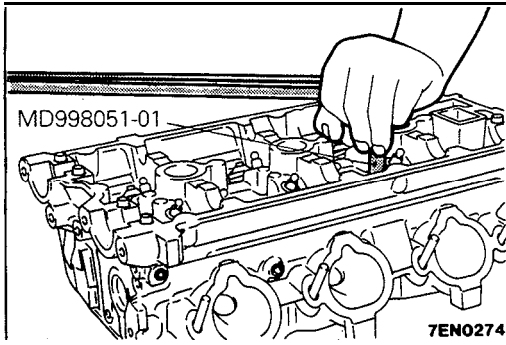
REMOVAL AND INSTALLATION



Removal steps

- * • + 1. Cylinder head bolt
- 2. Washer
- 3. Cylinder head assembly
- + 4. Cylinder head gasket
- ◆◆ • * 5. Retainer lock
- 6. Valve spring retainer
- * 7. Valve spring
- 8. Intake valve
- * • * 9. Retainer lock
- 10. Valve spring retainer
- * 11. Valve spring
- 12. Exhaust valve
- 4 13. Valve stem seal
- 14. Valve spring sheet
- ◆◆ 15. Valve stem seal
- 16. Valve spring sheet
- 17. Intake valve guide
- 18. Exhaust valve guide
- 19. Intake valve sheet
- 20. Exhaust valve sheet

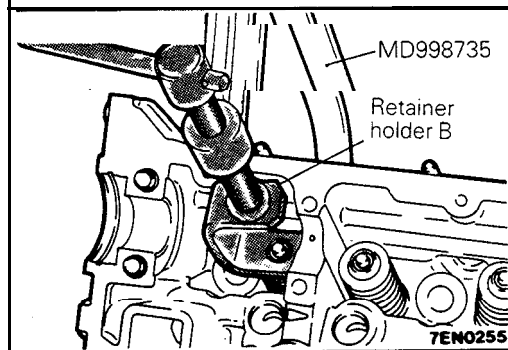
7E N0254

**SERVICE POINTS OF REMOVAL**

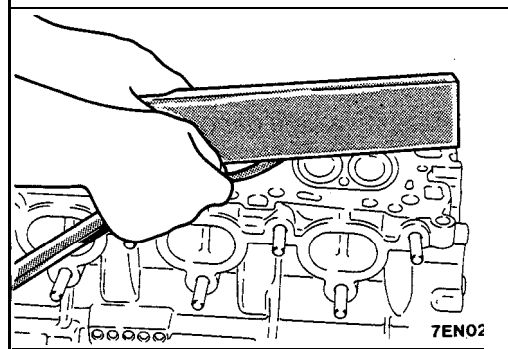
M110BAC

1. REMOVAL OF CYLINDER HEAD BOLT

Using the special tool, remove the cylinder head bolts.

**5. 9. REMOVAL OF RETAINER LOCK**

Using the special tool, remove the retainer lock.

**INSPECTION**

M110CAO

CYLINDER HEAD

- (1) Using a straight edge and feeler gauge, measure the flatness of the cylinder head gasket surface.

Standard value: 0.03 mm (.0012 in.) or less

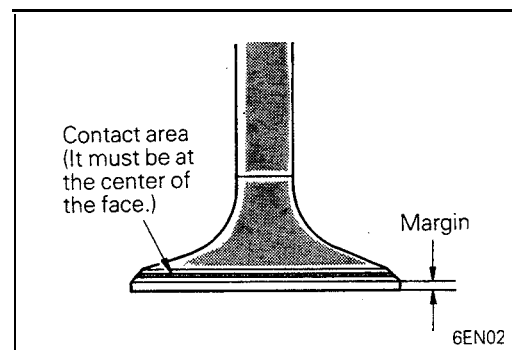
Limit: 0.2 mm (.008 in.)

- (2) If the measured flatness exceeds the limit, grind and repair the surface to gain the flatness of standard value or less.

Grinding Limit: 0.2 mm (.008 in.)

Caution

When the cylinder block is assembled, 0.2 mm (.008 in.) or less of grinding is permissible.

**VALVES**

Replace the valve if the margin (thickness of the valve head) exceeds the limit.

Standard value:

Intake side

1.0 mm (.039 in.)

Exhaust side

1.5 mm (.059 in.)

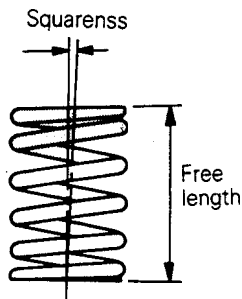
Limit:

Intake side

0.5 mm (.019 in.)

Exhaust side

1.0 mm (.039 in.)



1 EN035

VALVE SPRINGS

- (1) Check free length of each valve spring and replace if necessary.

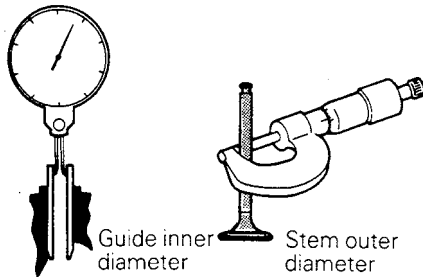
Standard value: 46.9 mm (1.846 in.)

Limit: 45.9 mm (1.807 in.)

- (2) Using a square, test squareness of each valve spring. If spring is excessively out of square, replace it.

Standard value: Less than 2°

Limit: 4



1EN296

VALVE GUIDES

Check the valve stem-to-guide clearance. If the clearance exceeds the service limit, replace the valve guide with new oversize part.

Standard value:

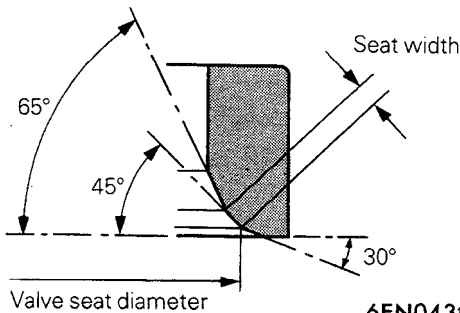
Intake 0.02 – 0.05 mm (.0008 – .0020 in.)

Exhaust 0.05 – 0.09 mm (.0020 – .0035 in.)

Limit:

Intake 0.10 mm (.0039 in.)

Exhaust 0.12 mm (.0047 in.)



6EN0431

VALVE SEAT RECONDITIONING PROCEDURES

- (1) Before valve seat reconditioning, check valve stem to guide clearance.

- (2) Recondition the valve seat with a seat grinder or cutter. The valve seat width should be the specified value at the center of the valve face.

Inspect the valve seat with prussian blue to determine where the valve contacts the seat. To do this, coat valve seat lightly with prussian blue, and then set valve in place. Rotate the valve with light pressure. If the blue is transferred to the center of valve face, contact is satisfactory.

If the blue is transferred to top edge of the valve face, lower valve seat with a 30 degrees stone or cutter. If the blue is transferred to the bottom edge of valve face, raise valve seat with a 65 degrees stone or cutter.

Valve seat diameter:

Intake 34 mm (1.34 in.)

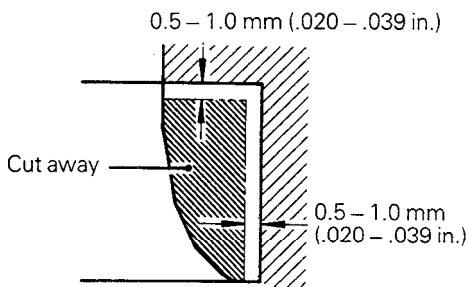
Exhaust 29.5 mm (1.16 in.)

Seat width: 0.9 – 1.3 mm (.035 – .051 in.)

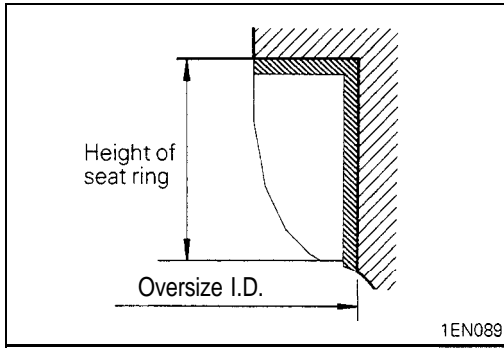
- (3) The valve and valve seat should be lapped with a lapping compound.

VALVE SEAT REPLACEMENT PROCEDURE

- (1) Grind the valve seat to be replaced from the inside to thin the wall thickness. Then, remove the valve seat.



1EN088



- (2) Rebore the valve seat hole in cylinder head to a selected oversize valve seat diameter.

Valve Seat Insert Oversizes

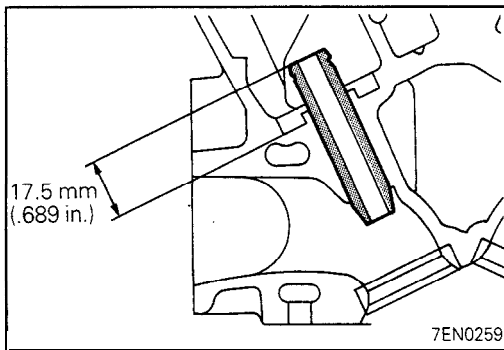
Description	Size mm (in.)	Size mark	Seat insert height H mm (in.)	Cylinder head I.D. mm (in.)
Intake valve seat insert	0.3 (.012) O.S.	30	7.5 – 7.7 (.295 – .303)	36.300-36.325 (1.4291-1.4301)
	0.6 (.024) O.S.	60	7.8 – 8.0 (.307 – .315)	36.600-36.625 (1.4409-1.4419)
Exhaust valve seat insert	0.3 (.012) O.S.	30	7.9 – 8.1 (.311 – .319)	33.300-33.325 (1.3110-1.3120)
	0.6 (.024) O.S.	60	8.2 – 8.4 (.323 – .331)	33.600-33.625 (1.3228-1.3238)

- (3) When press-fitting the valve seat, chill the valve seat with liquid nitrogen so that the cylinder head bore is not damaged by galling.
- (4) Using the valve seat grinder or cutter, correct the valve seat to the specified width and angle.
- (5) See "VALVE SEAT RECONDITIONING PROCEDURES."

VALVE GUIDE REPLACEMENT PROCEDURE M11PJDB

- (1) Using suitable rod and a press, press the valve guide out of the cylinder head toward the cylinder block side.
- (2) Rebore the valve guide hole to the oversize valve guide outside diameter to be press-fitted.

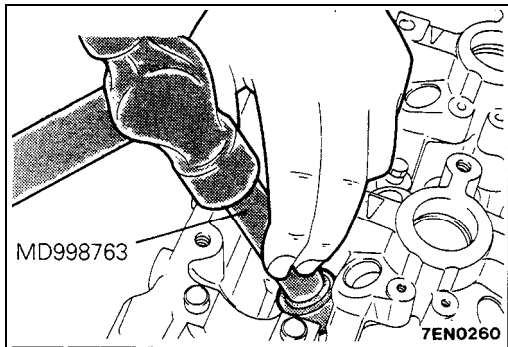
Caution
Do not use a valve guide of the same size as the one removed.



Size mm (in.)	Size mark	Cylinder head hole size mm (in.)
0.05 (.002) O.S.	5	12.050-12.068 (.4744-.4751)
0.25 (.010) O.S.	25	12.250-12.268 (.4823-.4830)
0.50 (.020) O.S.	50	12.500-12.518 (.4921-.4928)

- (3) Install the valve guide until a protrusion of 17.5 mm (.689 in.) is obtained. See the illustration.

- NOTE**
1. Press-fit the valve guide from the cylinder head top surface.
 2. Note the difference in lengths of the valve guides for the intake and exhaust: intake 45.5 mm (1.791 in.) and exhaust 50.5 mm (1.988 in.).
 3. After the valve guide has been installed in position, insert a new valve to ensure that it slides smoothly.

**SERVICE POINTS OF INSTALLATION**

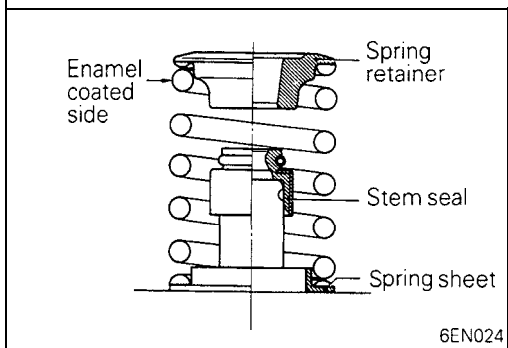
M110DAH

15.13. INSTALLATION OF VALVE STEM SEAL

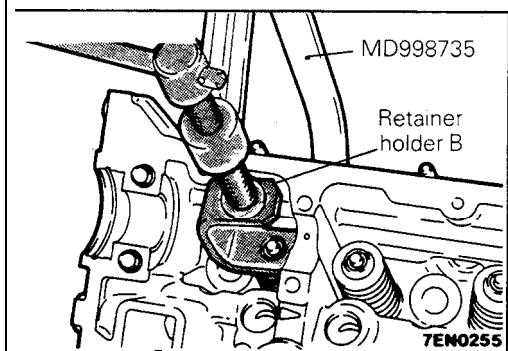
Install the spring seat, then using the special tool, install the stem seal by lightly tapping the tool.

Caution

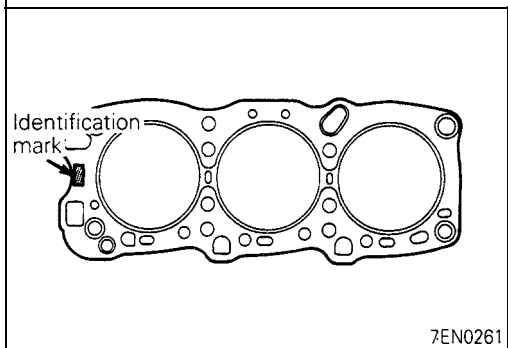
1. Incorrect installation of the seal without using the special tool will result in poor sealing and cause oil leakage down valve guide.
2. Do not reuse stem seal.

**11.7. INSTALLATION OF VALVE SPRING**

Valve springs should be installed with the enamel coated side toward the valve spring retainer.

**9. 5. INSTALLATION OF RETAINER LOCK**

Using the special tool, install the retainer lock

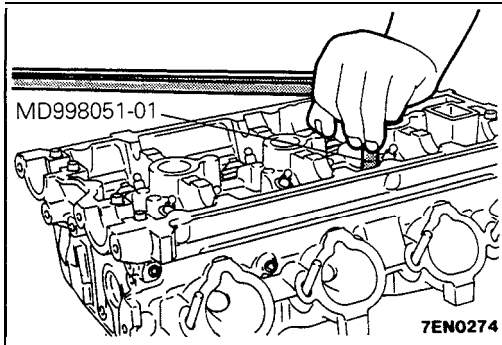
**4. INSTALLATION OF CYLINDER. HEAD GASKET**

Identification mark:

<Non-Turbo>

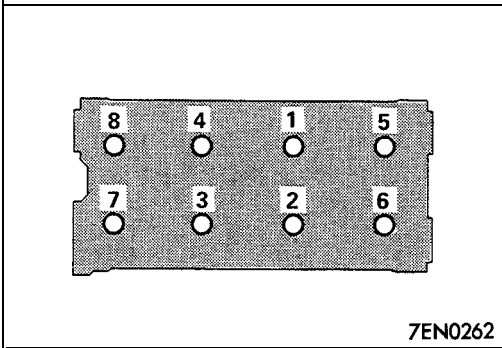
<Turbo>

2DN
2DT



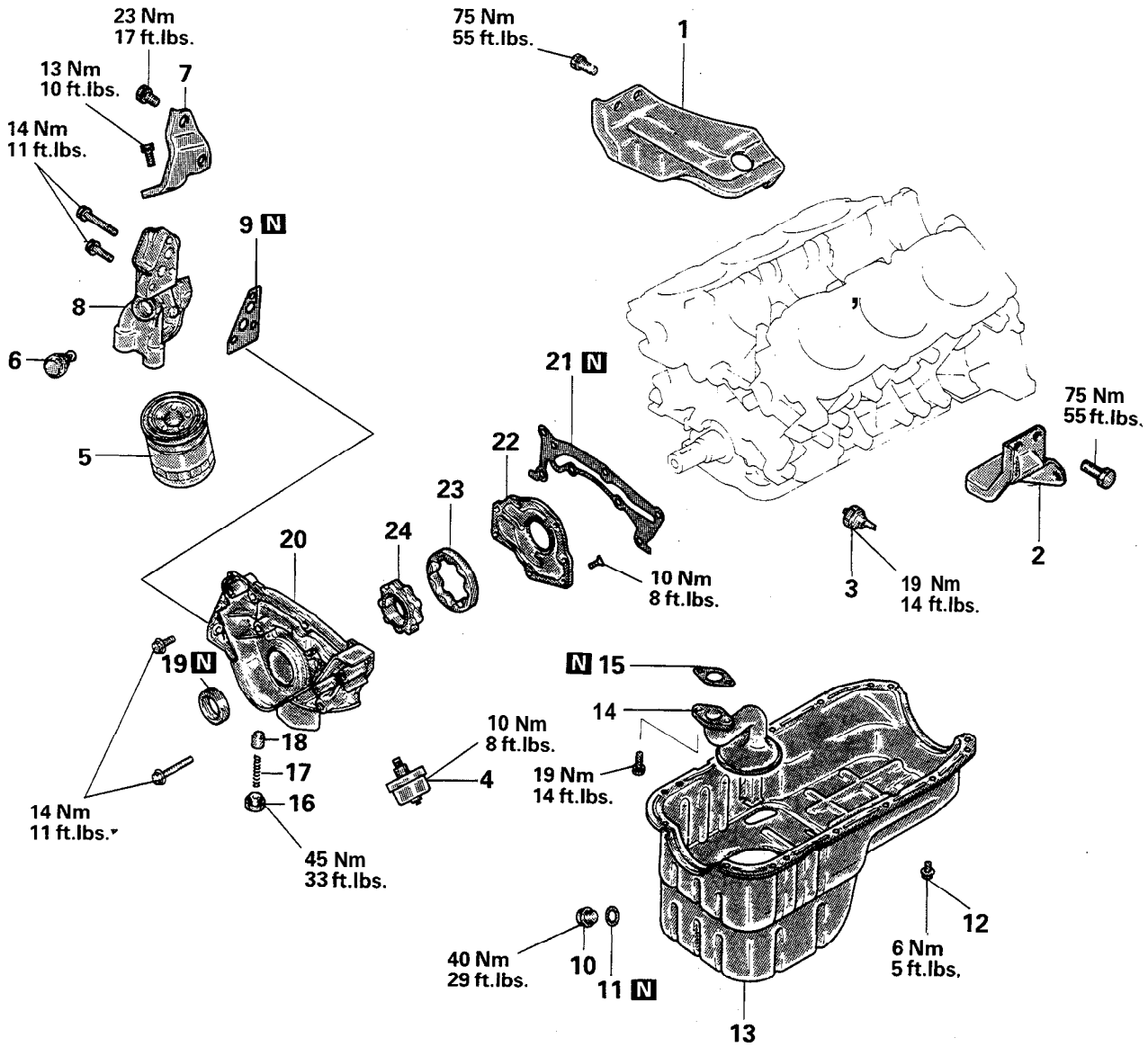
1. INSTALLATION OF CYLINDER HEAD BOLT

- (1) Using the special tool, tighten the bolts in two to three stages in the illustrated sequence.
- (2) Back off the bolts once and tighten them to the specified torque as shown in step (1).

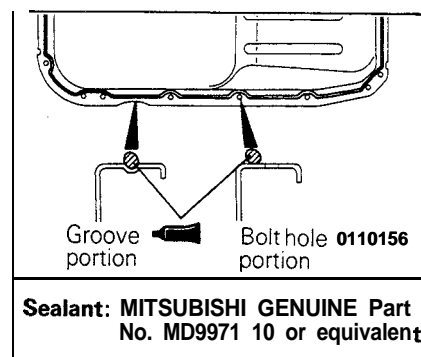
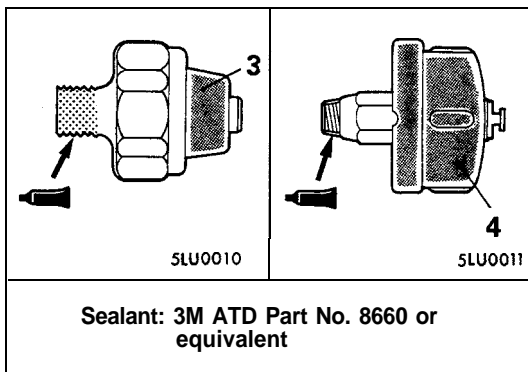


OIL PAN AND OIL PUMP

REMOVAL AND INSTALLATION

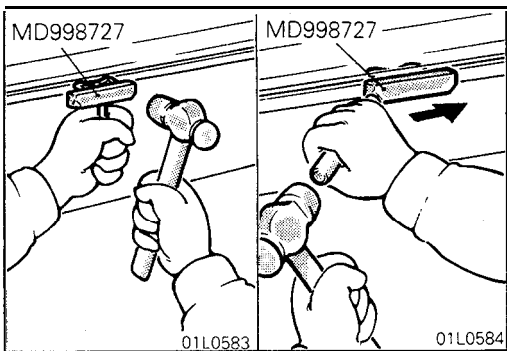


7EN0317



Removal steps

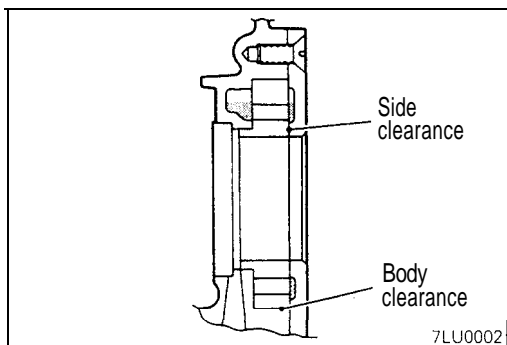
1. Transaxle stay (front)
2. Transaxle stay (rear)
3. Oil pressure switch
4. Oil pressure gauge unit
5. Oil filter
6. Oil cooler by-pass valve <Turbo>
7. Oil filter bracket stay
8. Oil filter bracket
9. Oil filter bracket gasket
10. Drain plug
- □ • Drain plug gasket
- * 12. Oilpan bolt
- * 13. Oilpan
- * 14. Oil screen
15. Oil screen gasket
16. Relief plug
17. Relief spring
18. Relief plunger
- ◀◀ 19. Crankshaft front oil seal
20. Oil pump case
21. Oil pump gasket
22. Oil pump cover
23. Oil pump outer rotor
24. Oil pump inner rotor

**SERVICE POINTS OF REMOVAL**

M11RBBB

13. REMOVAL OF OIL PAN

- (1) Knock the special tool in deeply between the oil pan and cylinder block.
- (2) Hitting the side of the special tool, slide and remove the oil pan.

**INSPECTION**

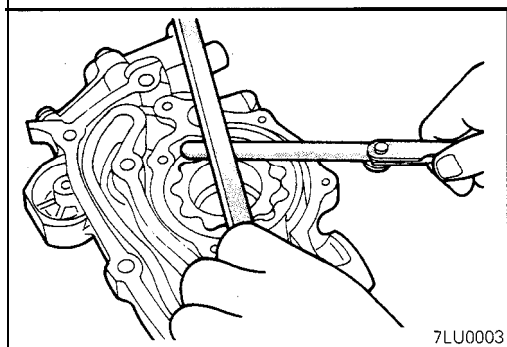
M11RKAB

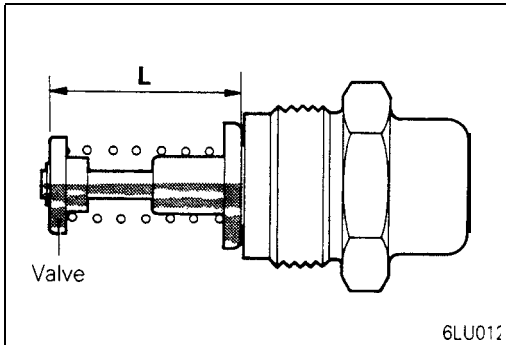
OIL PUMP

Assemble the rotor on the oil pump and check the clearance with a feeler gauge.

Standard value:

Body clearance	0.100 – 0.181 mm (.0039 – .0071 in.)
Side clearance	0.040 – 0.095 mm (.0016 – .0037 in.)





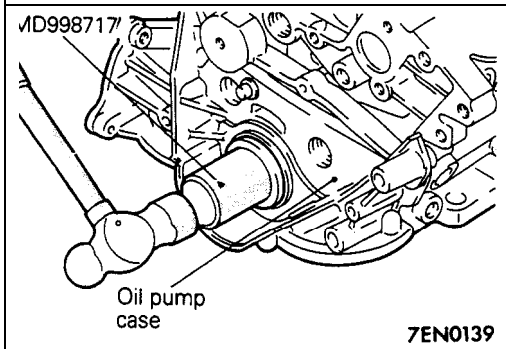
OIL COOLER BY-PASS VALVE <Turbo>

- (1) Make sure that the valve moves smoothly.
- (2) Ensure that the dimension L measures the standard value under normal temperature and humidity.

Dimension L: 34.5 mm (1.358 in.)

- (3) The dimension must be the standard value when measured after the valve has been dipped in 100°C (212°F) oil.

Dimension L: 40 mm (1.57 in.) or more



SERVICE POINTS OF INSTALLATION

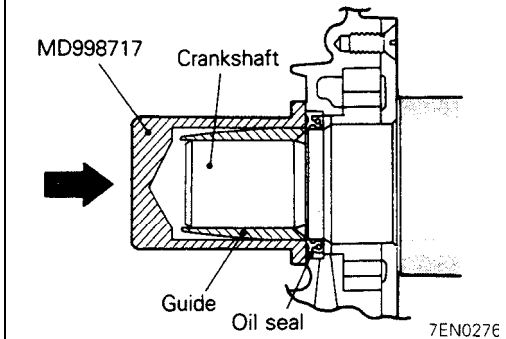
M11RDEC

19. INSTALLATION OF CRANKSHAFT FRONT OIL SEAL

Using the special tool, knock the oil seal into the oil pump case.

NOTE

Knock it as far as the surface.

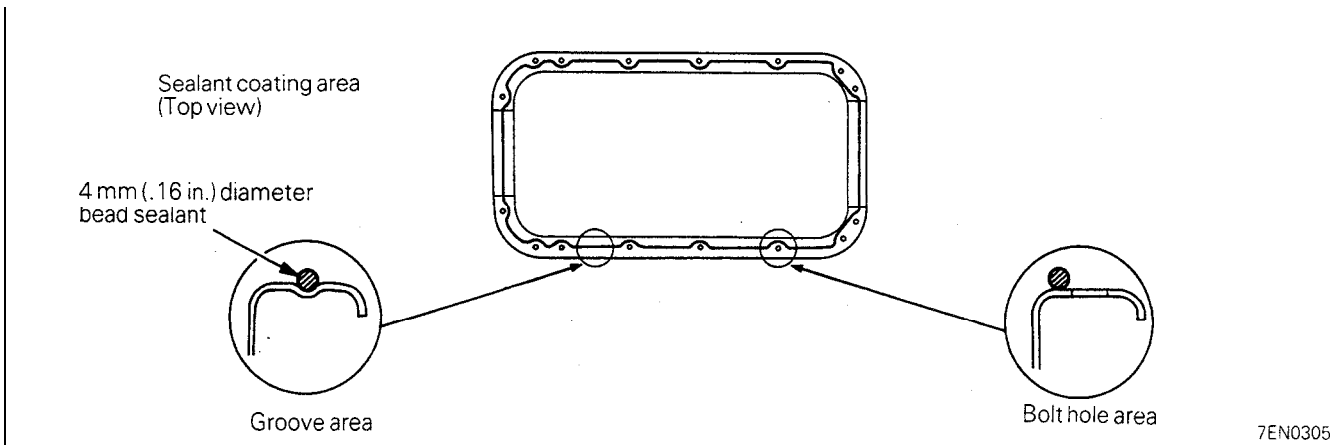


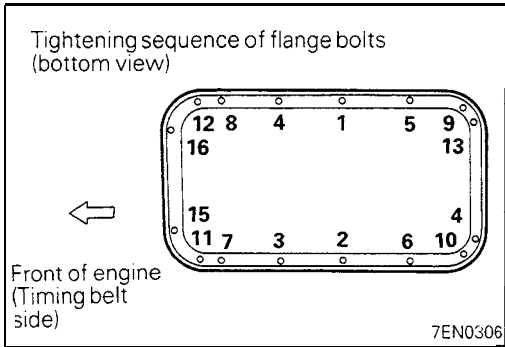
13. APPLICATION OF SEALANT TO OIL PAN

- (1) Apply specified sealant all around the oil pan flange to a diameter of 4 mm (.16 in.).

Specified sealant: MITSUBISHI Genuine Part No. MD9971 10 or equivalent

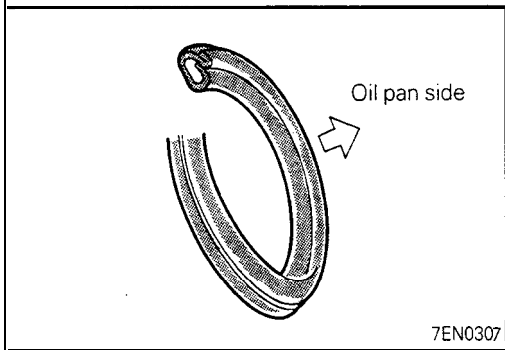
- (2) Install the oil pan within 15 mins. after applying the liquid gasket.





12. TIGHTENING SEQUENCE OF OIL PAN BOLT

Tighten the flange bolts in the sequence shown in the illustration.



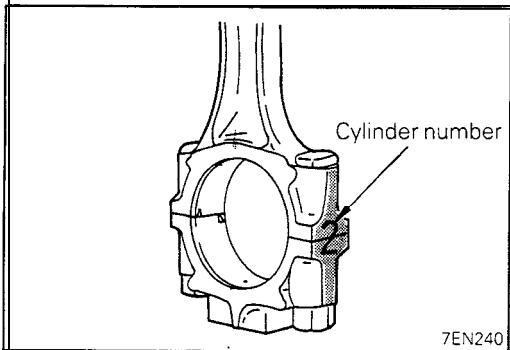
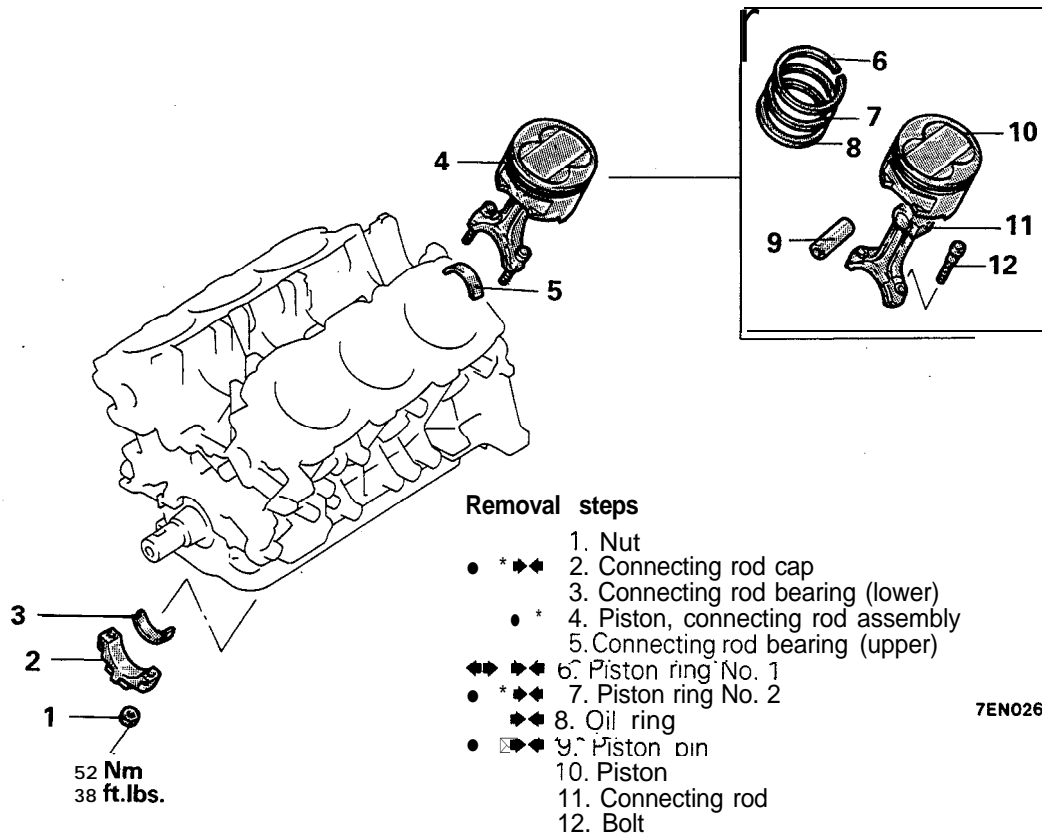
11. INSTALLATION OF DRAIN PLUG GASKET

Install the drain plug gasket in the direction shown in the illustration.

PISTON AND CONNECTING ROD

M11TA--

REMOVAL AND INSTALLATION



SERVICE POINTS OF REMOVAL

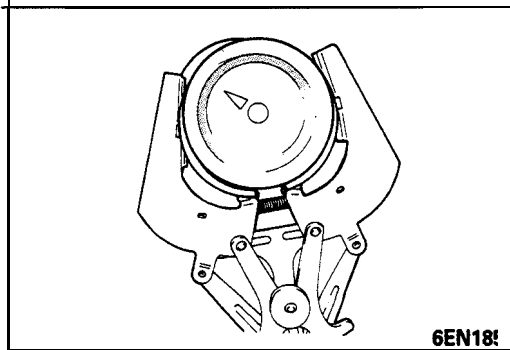
M11TBEC

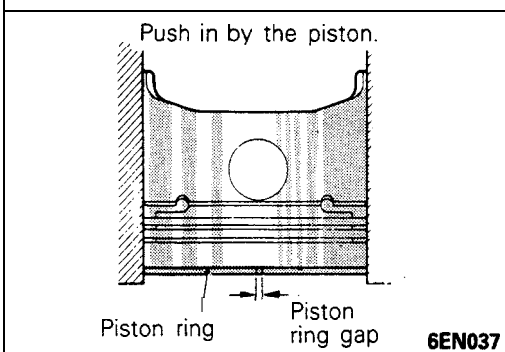
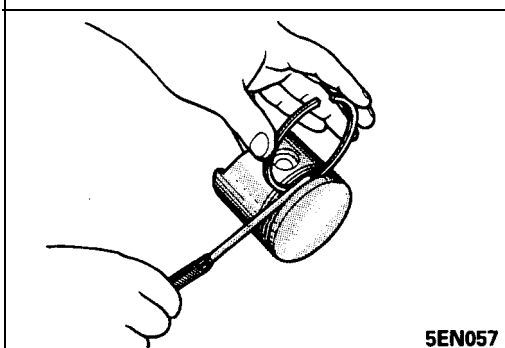
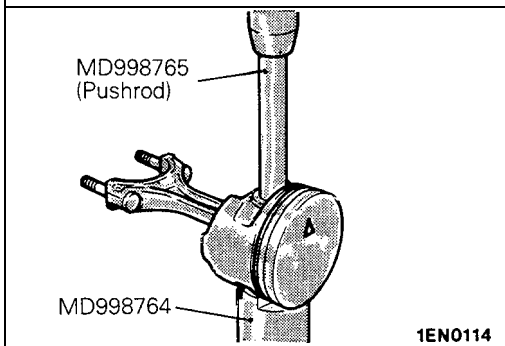
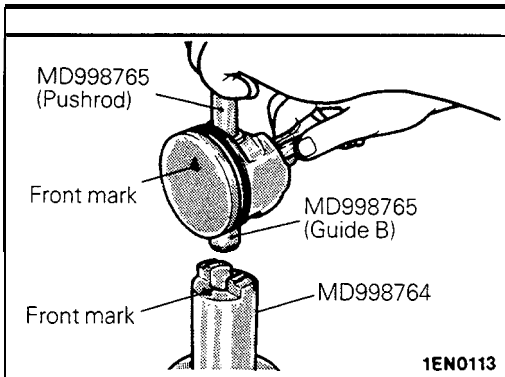
2. REMOVAL OF CONNECTING ROD CAP

Mark the large end of the connecting rod with the cylinder number for use during reassembly.

6. REMOVAL OF PISTON RING No. 1 / 7. PISTON RING No. 2

Remove the piston rings with a piston ring expander.





9. REMOVAL OF PISTON PIN

- (1) Insert the special tool, Pushrod from the front mark side of the piston top and install the guide B.
- (2) With the piston top facing the front mark side of the special tool, Piston Pin Setting Base and the piston front mark facing up, set the piston and connecting rod assembly.

- (3) Using a press, remove the piston pin.

NOTE

After the piston pin is removed, store the piston, piston pin and connecting rod as grouped for each cylinder number.

INSPECTION

M11TCEA

PISTON RING

- (1) Check the clearance between the piston ring and the ring groove. When it exceeds the limit, replace the rings, the piston, or both.

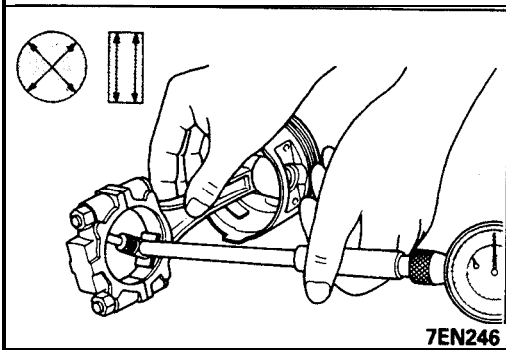
Standard value:

No.1	0.03 – 0.07 mm (.0012 – .0028 in.)
No.2	0.02 – 0.06 mm (.0008 – .0024 in.)
Limit: No.1	0.1 mm (.004 in.)
No.2	0.1 mm (.004 in.)

- (2) Insert the piston ring into the cylinder bore putting it against the top of the piston head and pressing it in. When it makes a right angle, measure the piston ring gap with a feeler gauge. When the gap is too large, replace the piston ring.

Standard value:

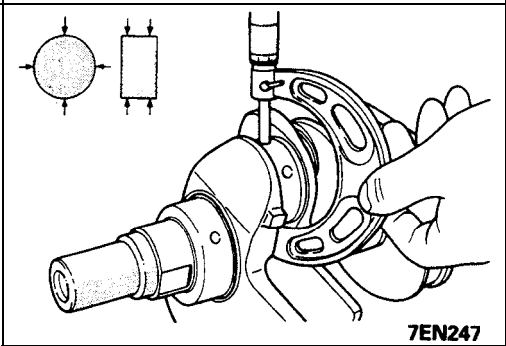
No.1	0.30-0.45 mm (.0118 – .0177 in.)
No.2	0.45 – 0.60 mm (.0177 – .0236 in.)
Oil ring side rail	0.20 – 0.60 mm (.0079 – .0236 in.)
Limit: No.1	0.8 mm (.031 in.)
No.2	0.8 mm (.031 in.)
Oil ring side rail	1.0 mm (.039 in.)

**BEARING**

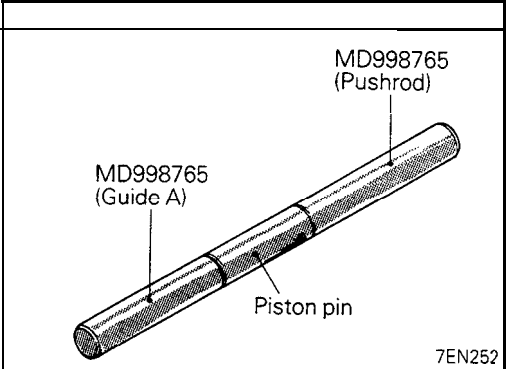
Measure the inner diameter of the connecting rod bearing and the outer diameter of the crankshaft pin. If the oil clearance exceeds the limit, replace the bearing, and crankshaft if necessary.

Standard value: 0.016 – 0.046 mm (.0006 – .0018 in.)

Limit: 0.1 mm (.004 in.)

**NOTE**

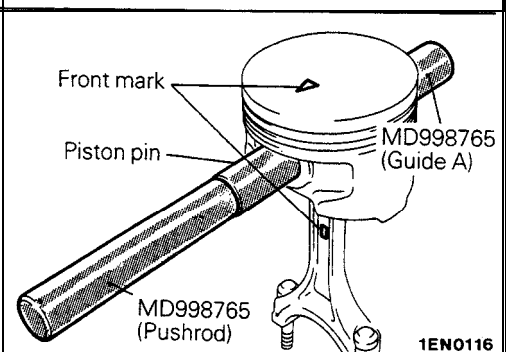
For the method by which the oil clearance is measured using a plastigauge, refer to the item on the crankshaft.

**SERVICE POINTS OF INSTALLATION**

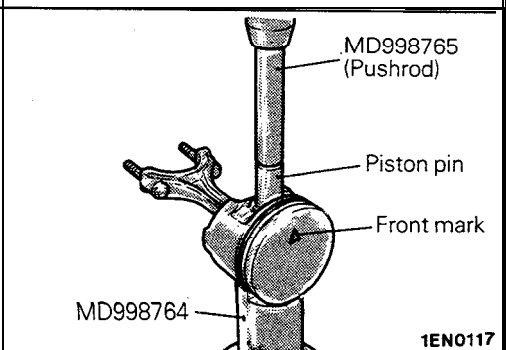
M11TDAQ

9. INSTALLATION OF PISTON PIN

- (1) Insert the special tool, Pushrod into the piston pin and install the guide A.
- (2) Apply engine oil to the outside of the piston pin.



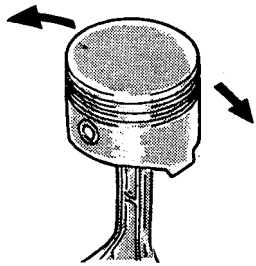
- (3) Assemble the piston and connecting rod lining up the front marks.
- (4) Insert the guide A end of the piston pin assembled in step (1) into the piston through the pin hole on the front mark.



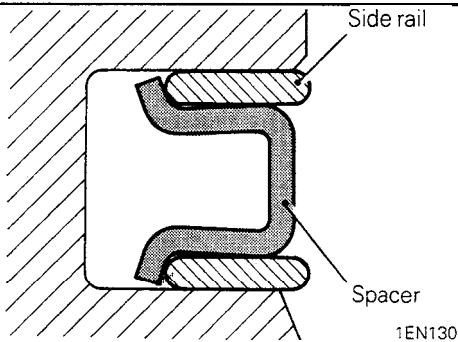
- (5) With the piston top facing the front mark side of the special tool, Piston Pin Setting Base and the piston front mark facing up, set the piston.
- (6) Using a press, install the piston pin.
If the installation load is smaller than the standard value range, replace the piston pin (piston assembly) and/or the connecting rod.

Standard value: 7,500 – 17,500 N (1,686 – 3,934 lbs.)

(7) Check that the piston moves smoothly.



6EN0223



1EN130

8. INSTALLATION OF OIL RING

(1) Fit the oil ring spacer into the piston ring groove.

NOTE

On the side rail and the spacer, no difference exists between the upper and the lower surfaces.

(2) Attach the side rail on the upper side. When attaching the side rail, engage one side of the side rail with the piston groove. If pressed with a finger, as shown in the illustration, it should enter easily.

NOTE

The side rail may be broken like other piston rings if the gap is opened by the ring expander.

(3) In the same procedure as Step (2), position the side rail on the lower side.

(4) Check that the side rail smoothly rotates in both directions.



7EN249

7. INSTALLATION OF PISTON RING No. 2 / 6. PISTON RING No.1

(1) Using a piston ring expander, position the No.2 and No.1 piston rings.

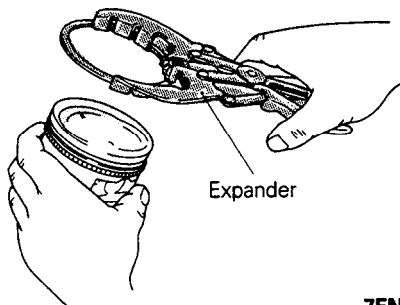
Identification mark: No.1
No.2

T
T2

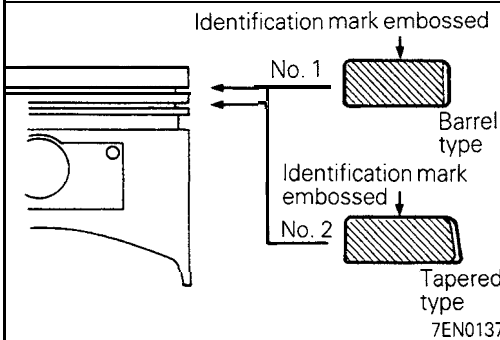
NOTE

(1) Keep in mind that Nos.1 and 2 are different in shape.

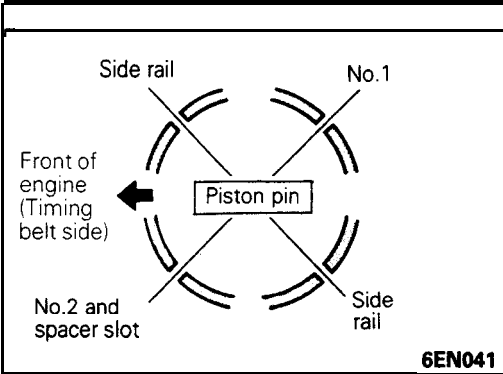
(2) Assemble the Nos.1 and 2 piston rings with the manufacturer and size marks stamped on the side facing upward (toward the piston top).



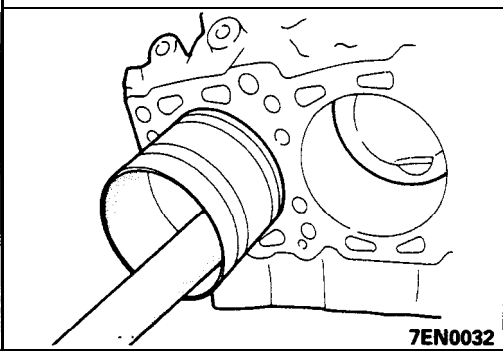
7EN250



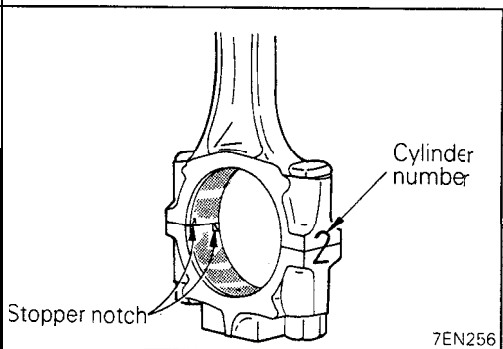
7EN0137



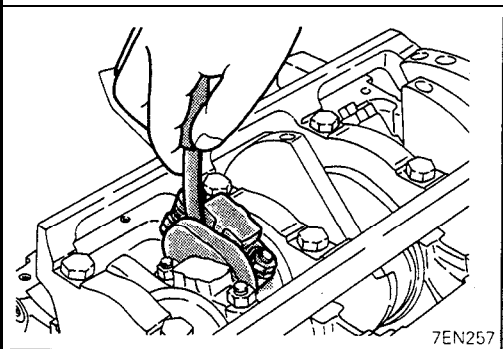
6EN041



7EN0032



7EN256



7EN257

4. INSTALLATION OF PISTON, CONNECTING ROD ASSEMBLY

- (1) Liberally coat engine oil on the circumference of the piston, piston ring, and oil ring.
- (2) Arrange the piston ring and oil ring gaps (side rail and spacer) as shown in the illustration.
- (3) Rotate crankshaft so that crank pin is on center of cylinder bore.
- (4) Use suitable thread protectors on connecting rod bolts before inserting piston and connecting rod assembly into cylinder block. Care must be taken not to nick crank pin.
- (5) Using a suitable piston ring compressor tool, install piston and connecting rod assembly into cylinder block.

Caution

Insert the pistons so that the front marks (arrows) on the piston tops point toward the front of the engine (timing belt side).

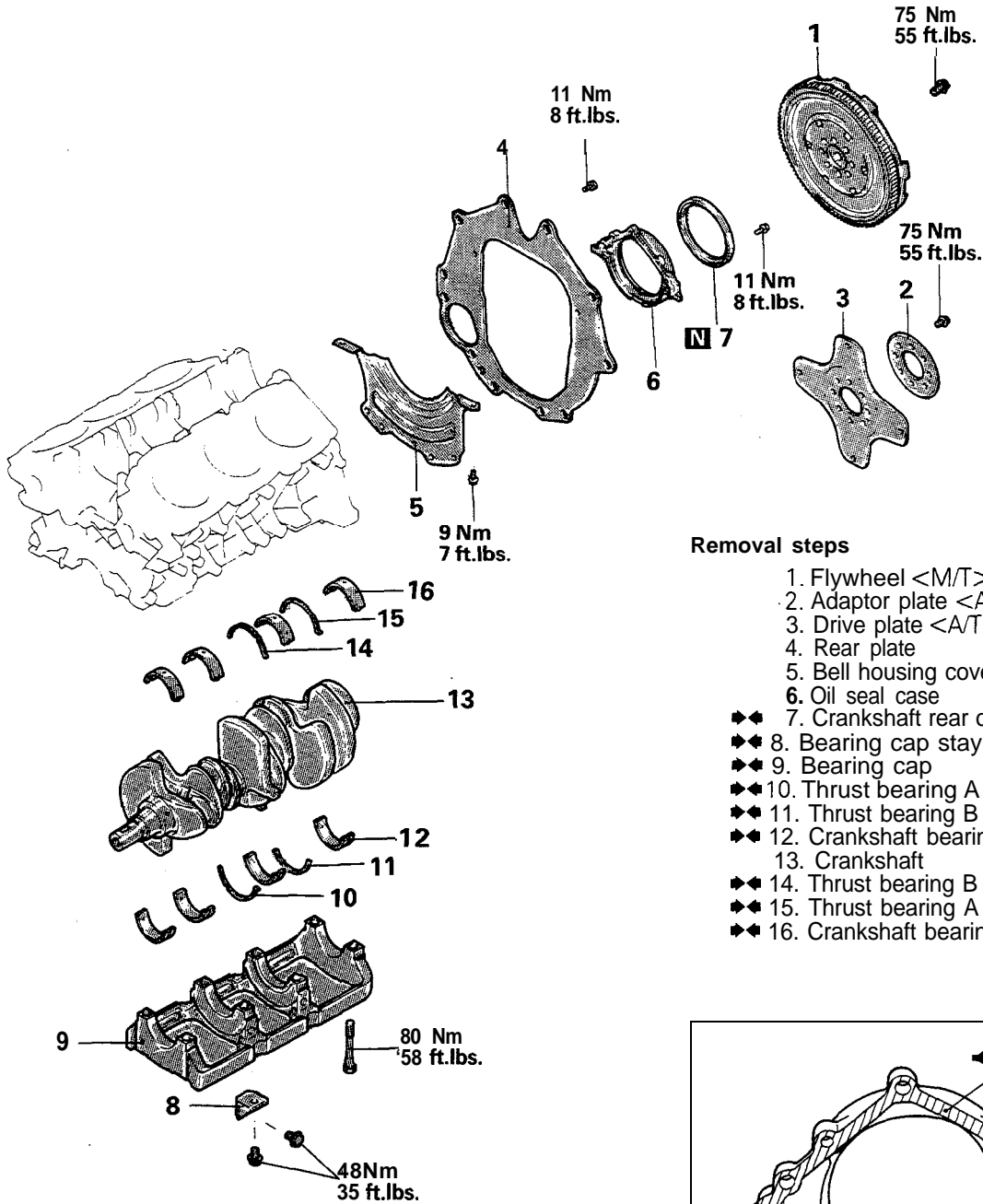
2. INSTALLATION OF CONNECTING ROD CAP

- (1) Install the connecting rod, aligning it with the mark made on the connecting rod cap during disassembly. When the connecting rod being installed is new and has no alignment mark, install it so that the notches in the connecting rod and cap are on the same side, as illustrated.

- (2) Check the connecting rod big end thrust clearance.
Standard value: 0.10 – 0.25 mm (.0039 – .0098 in.)
Limit: 0.4 mm (.016 in.)

CRANKSHAFT, FLYWHEEL AND DRIVE PLATE

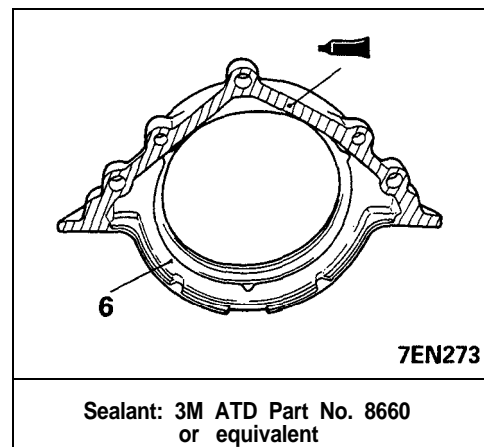
REMOVAL AND INSTALLATION



Removal steps

1. Flywheel <M/T>
2. Adaptor plate <A/T>
3. Drive plate <A/T>
4. Rear plate
5. Bell housing cover
6. Oil seal case
- ◆◆ 7. Crankshaft rear oil seal
- ◆◆ 8. Bearing cap stay <Turbo>
- ◆◆ 9. Bearing cap
- ◆◆ 10. Thrust bearing A
- ◆◆ 11. Thrust bearing B
- ◆◆ 12. Crankshaft bearing (lower)
13. Crankshaft
- ◆◆ 14. Thrust bearing B
- ◆◆ 15. Thrust bearing A
- ◆◆ 16. Crankshaft bearing (upper)

7EN0318



7EN273

Sealant: 3M ATD Part No. 8660
or equivalent

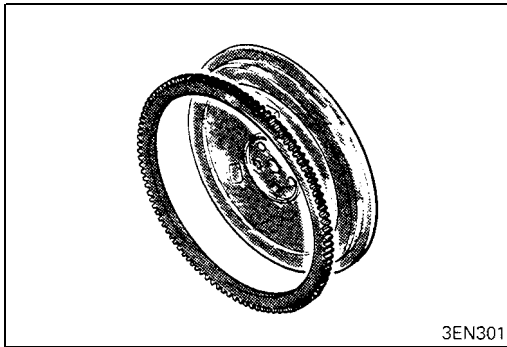
INSPECTION

M11UCHA

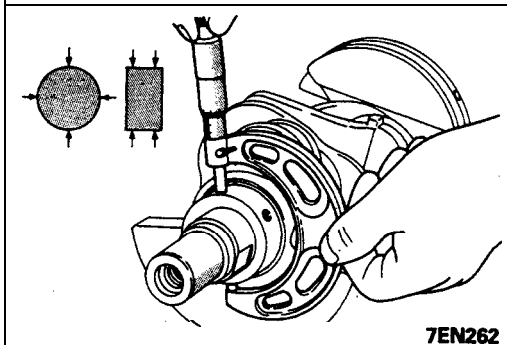
FLYWHEEL (engine with a manual transaxle)

- (1) Make a visual inspection of the clutch disc. If stepped wear, streaking, or seizure are apparent, replace it.
- (2) If flywheel run out exceeds the limit, replace it.

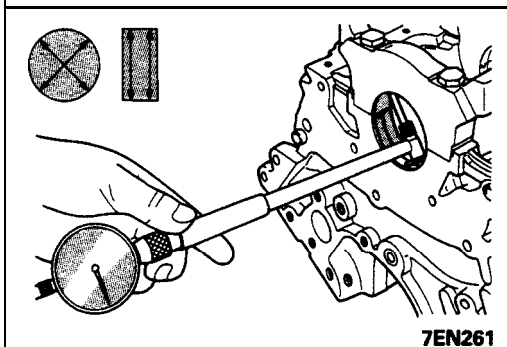
Limit: 0.13 mm (.0051 in.)



3EN301



7EN262



7EN261

RING GEAR (engine with a manual transaxle)

When there is wear, cracks, or other damage to the ring gear teeth, replace the ring gear by the following procedure. Check the starter motor pinion.

Ring gear replacement procedure:

- (1) Tap around the ring gear to loosen and remove it from the flywheel..

Caution

The ring gear cannot be removed while it is hot.

- (2) Heat the ring gear to 300°C (572°F) and install it into the flywheel.

CRANKSHAFT

Inspect out-of-roundness and taper of crankshaft journal and pin.

Limit:

Out-of-roundness of journal and pin:

0.003 mm (.00012 in.)

Taper of journal and pin: 0.005 mm (.00020 in.)

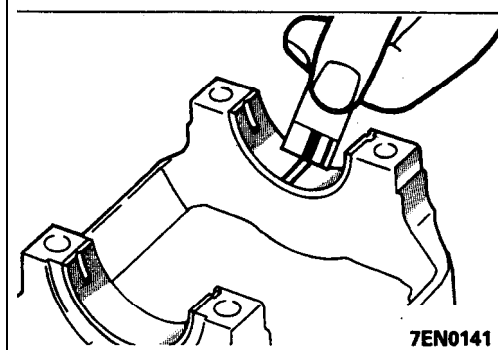
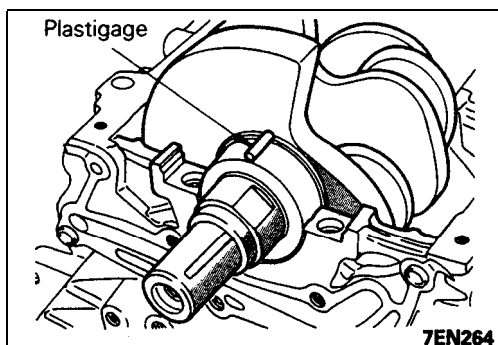
OIL CLEARANCE MEASUREMENT

- (1) To check the oil clearance, measure the outside diameter of the crankshaft journal and the crank pin and the inside diameter of the bearing. The clearance can be obtained by calculating the difference between the measured outside and inside diameters.

Standard value: 0.019 – 0.044 mm (.0007 – .0017 in.)

Limit: 0.1 mm (.004 in.)

- (2) If the oil clearance exceeds the limit, replace the bearing, and crankshaft if necessary.

**PLASTIGAGE METHOD**

M11UIAA

Plastigage may be used to measure the clearance.

- (1) Remove oil and grease and any other dirt from bearings and journals.
- (2) Cut plastigage to the same length as the width of the bearing and place it in parallel with the journal, off oil holes.

- (3) Install the crankshaft, bearings and caps and tighten them to the specified torques. During this operation, do NOT turn the crankshaft. Remove the caps. Measure the width-of the plastigage at the widest part by using a scale printed on the plastigage sleeve.

If the clearance exceeds the repair limit, the bearing should be replaced.

Should the standard clearance not be obtained even after bearing replacement, replace the crankshaft.

SERVICE POINTS OF INSTALLATION

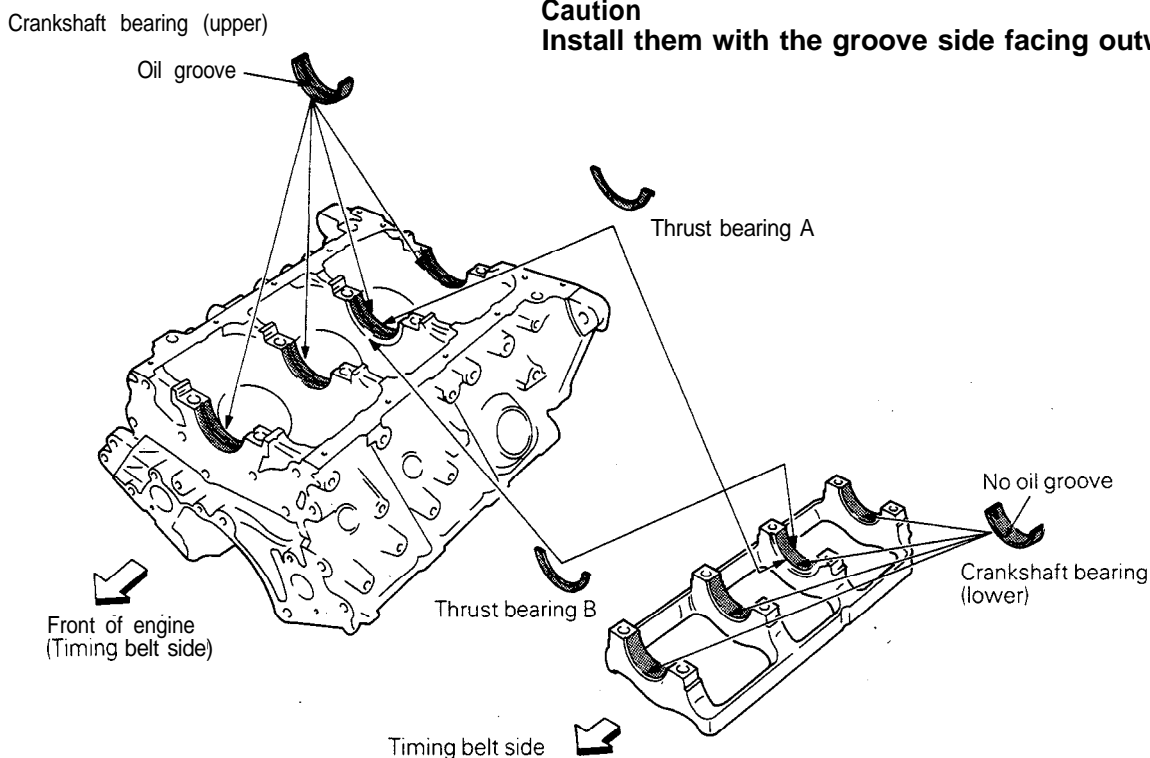
M11UDAM

16. INSTALLATION OF CRANKSHAFT BEARING (UPPER) / 15. 10. THRUST BEARING A / 14.11. THRUST BEARING B / 12. CRANKSHAFT BEARING (LOWER)

- (1) Classify the crankshaft bearings (upper and lower) by whether there is an oil groove or not. Then, assemble as shown in the illustration.
- (2) Assemble the thrust bearings (A and B) on the No.3 journal area as shown in the illustration.

Caution

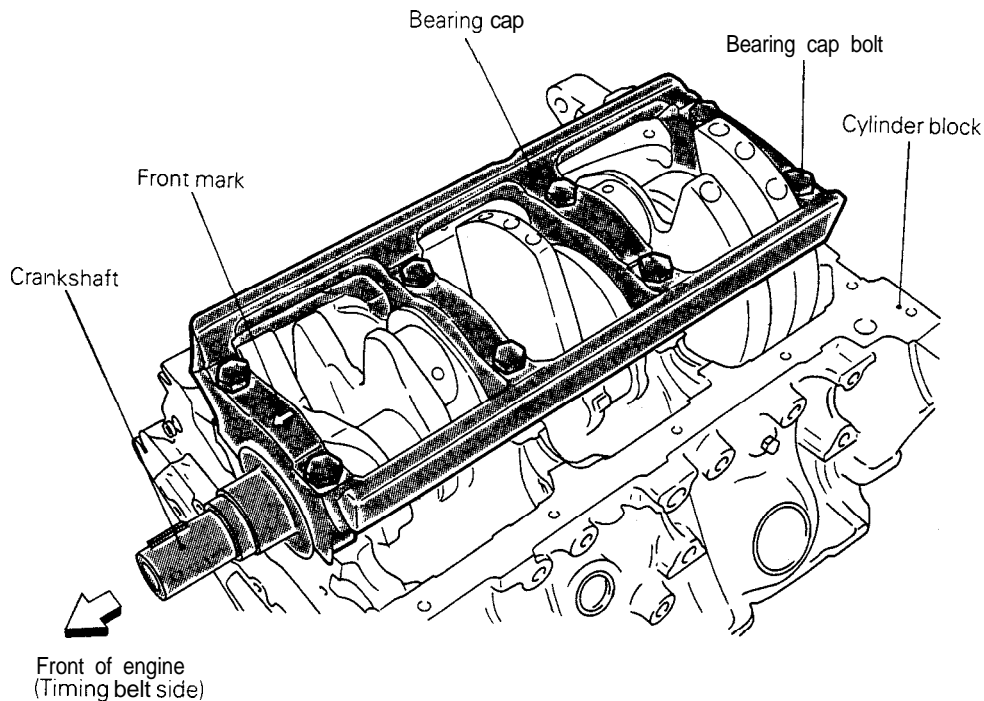
Install them with the groove side facing outward.



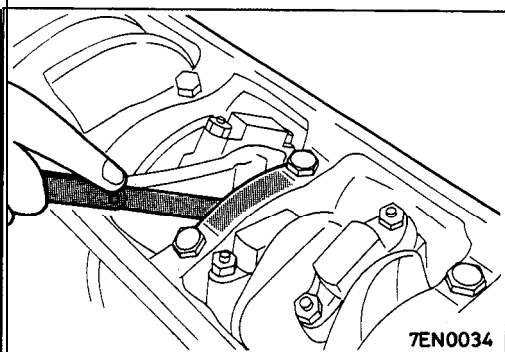
7EN269

9. INSTALLATION OF BEARING CAP

- (1) Attach the bearing cap on the cylinder block as shown in the illustration.
- (2) Tighten the bearing cap bolts to the specified torque in the sequence shown in the illustration.
- (3) Check that the crankshaft rotates smoothly.

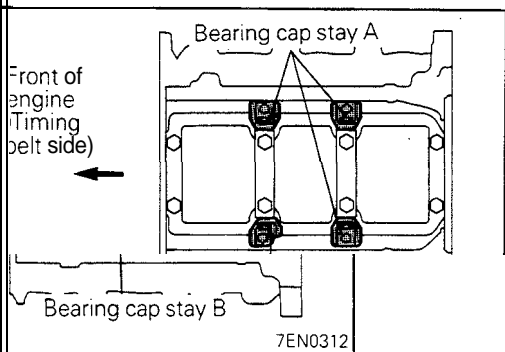


7EN270



- (4) Check the end plate. If it exceeds the limit value, replace the thrust bearing.

Standard value: 0.05 – 0.25 mm (.0020 – .0098 in.)
Limit: 0.3 mm (.012 in.)

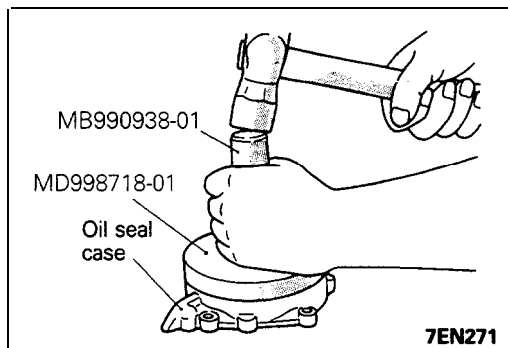


8. INSTALLATION OF BEARING CAP STAY

- (1) Apply engine oil to the thread and bearing surface of each bolt.
- (2) Temporarily tighten the bolts on the cylinder block side.
- (3) Tighten the bolts on the bearing cap side to specified torque.
- (4) Finally, tighten the bolts on the cylinder block side to specified torque.

NOTE

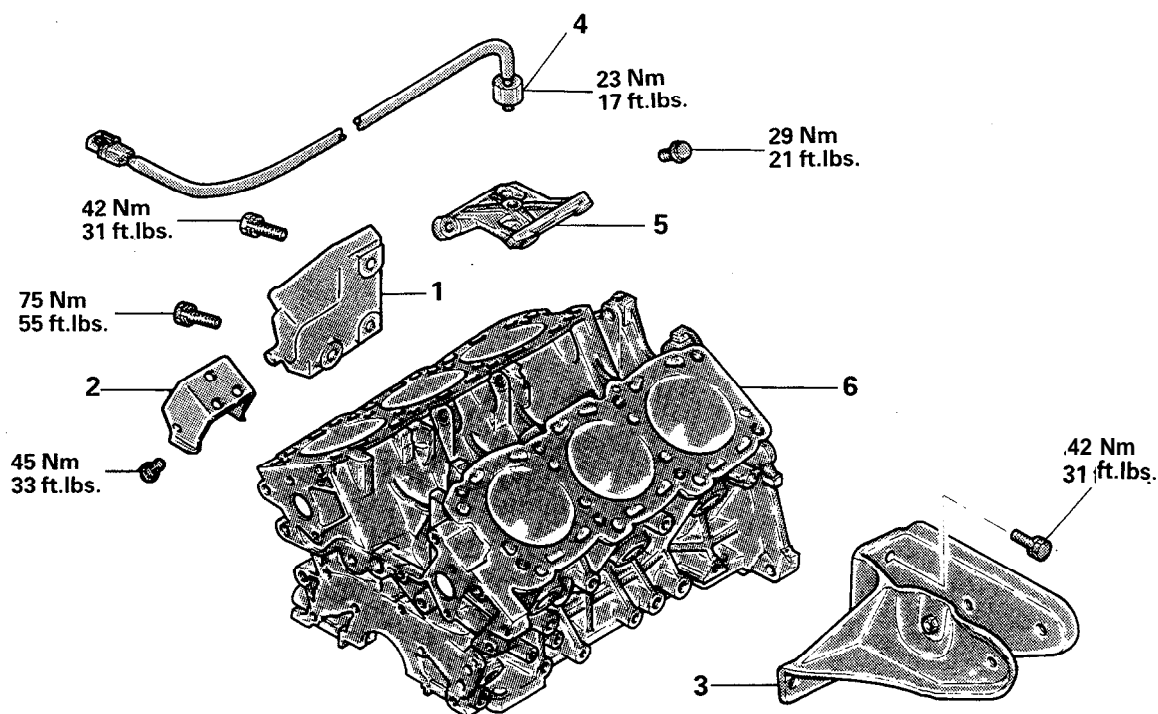
The bearing cap stays A and B differ in shape. Install correct ones on correct sides.

**7. INSTALLATION OF CRANKSHAFT REAR OIL SEAL**

Using the special tool, press-fit a new crankshaft rear oil seal into the oil seal case.

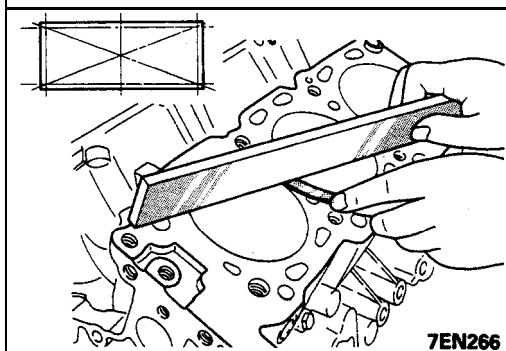
CYLINDER BLOCK REMOVAL AND INSTALLATION

M11VA-



1. Roll stopper bracket front
2. Roll stopper bracket front (AWD only)
3. Roll stopper bracket rear
4. Detonation sensor
- ◆◆ 5. Detonation sensor bracket
6. Cylinder block

7EN0319

**INSPECTION**

M11VCAM

CYLINDER BLOCK

- (1) Using a straight edge and feeler gauge, measure the flatness of the cylinder block upper surface.

Standard value: 0.05 mm (.0020 in.)

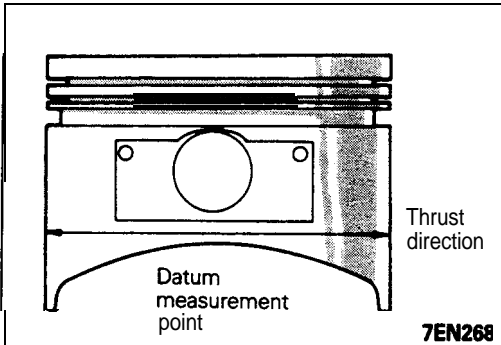
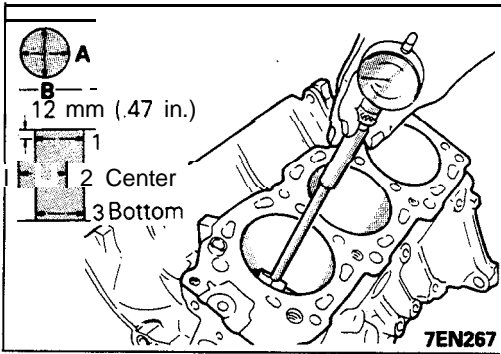
Limit: 0.1 mm (.004 in.)

Grinding limit: 0.2 mm (.008 in.)

Caution

When the cylinder head is assembled, 0.2 mm (.008 in.) or less of grinding is permissible.

TSB Revision



- (2) Using a cylinder gauge, measure the inside diameter and roundness of the cylinder. If excessively worn, repair (over size) the cylinder and replace the piston and piston rings. The measurement points are shown in the illustration.

BORING THE CYLINDER

M11VEEB

- (1) Based on the largest cylinder bore, determine the over sized piston to be used.
- (2) Measure with the outside diameter of the piston as the datum measurement points.

NOTE

There are four sizes of oversize piston -0.25 mm (.010 in.), 0.50 mm (.020 in.), 0.75 mm (.030 in.), 1.00 mm (.039 in.).

- (3) Calculate the reground bore size based on the measured value of the outside piston diameter.

NOTE

Bore size = outside piston diameter + 0.03 to 0.05 mm (.0012 to .0020 in.) (gap between cylinder and piston) – 0.02 mm (.0008 in.) (honing amount)

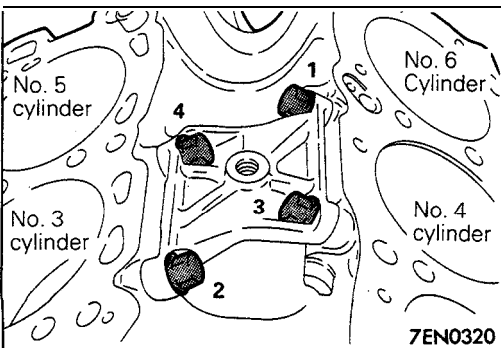
- (4)hone each of the cylinders to the calculated measurement.

Caution

To prevent distortion resulting from the temperature rise during reboring, bore the cylinder holes in the cylinder numbers sequence.

- (5)hone the cylinders, finishing them to the proper dimension (outside piston diameter + gap with cylinder).
- (6) Check the gap between the piston and cylinder.

Standard value: 0.03 – 0.05 mm (.0012 – .0020 in.)



SERVICE POINT OF INSTALLATION

M11VDAL

5. INSTALLATION OF DETONATION SENSOR BRACKET

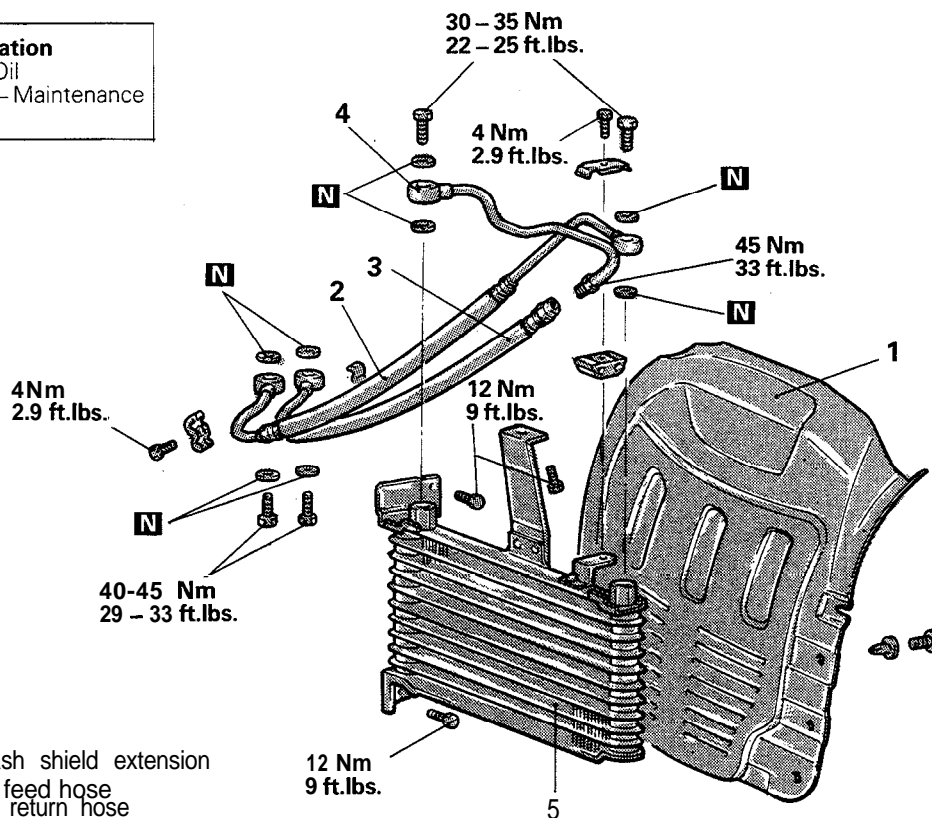
Check that the bracket is in intimate contact with the cylinder block boss and tighten to specified torque in the order shown.

ENGINE OIL COOLER REMOVAL AND INSTALLATION

M11MA-

Post-installation Operation

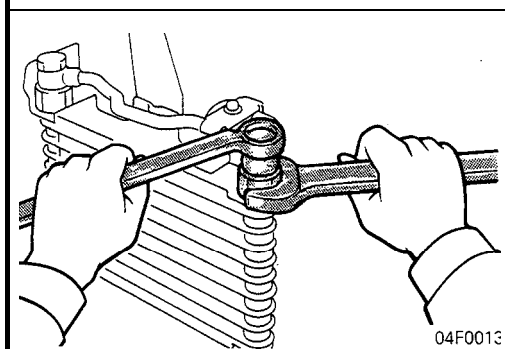
- Supplying of Engine Oil
(Refer to GROUP 00 – Maintenance Service.)



Removal steps

1. Front splash shield extension
- ☒ 2. Engine oil feed hose
3. Engine oil return hose
- ↔ 4. Engine oil return tube
5. Engine oil cooler

02F0001



04F0013

SERVICE POINTS OF REMOVAL

M11MBAC

2. REMOVAL OF ENGINE OIL FEED HOSE / 4. ENGINE OIL RETURN TUBE

Caution

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

INSPECTION

M11MCAC

- Check the engine oil cooler fins for bends, breaks or plugs.
- 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.

01

01

01

FUEL SYSTEM

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M13AA-

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CONTINUED ON NEXT PAGE

SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

- (1) A Supplemental Restraint System (SRS), which uses a driver-side air bag, has been installed in the 3000GT.
- (2) The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning light, air bag module, clock spring, 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 (*).

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) 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), before beginning any service or maintenance of any component of the SRS or any SRS-related component.

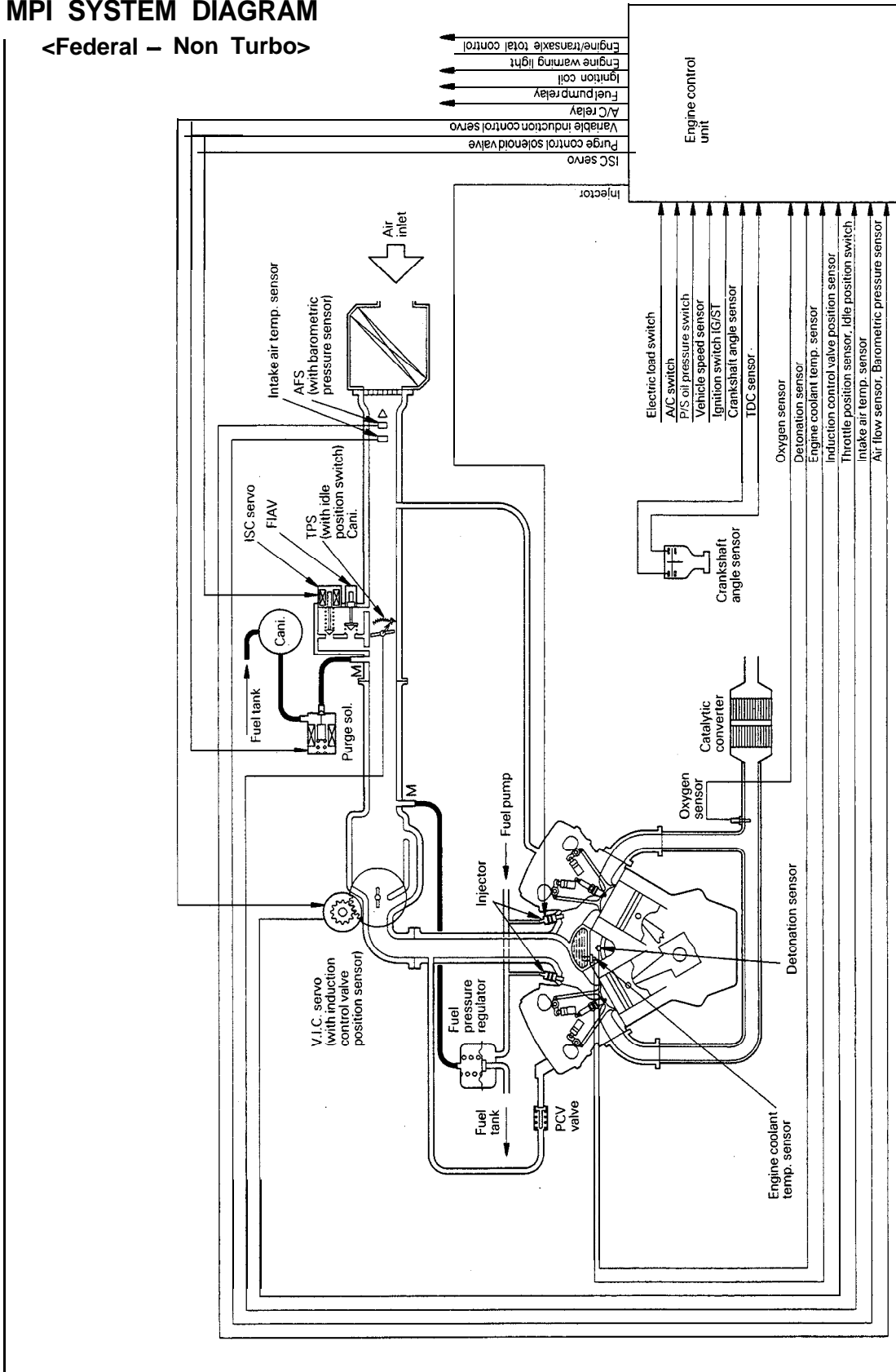
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FUEL SYSTEM

GENERAL INFORMATION

MPI SYSTEM DIAGRAM

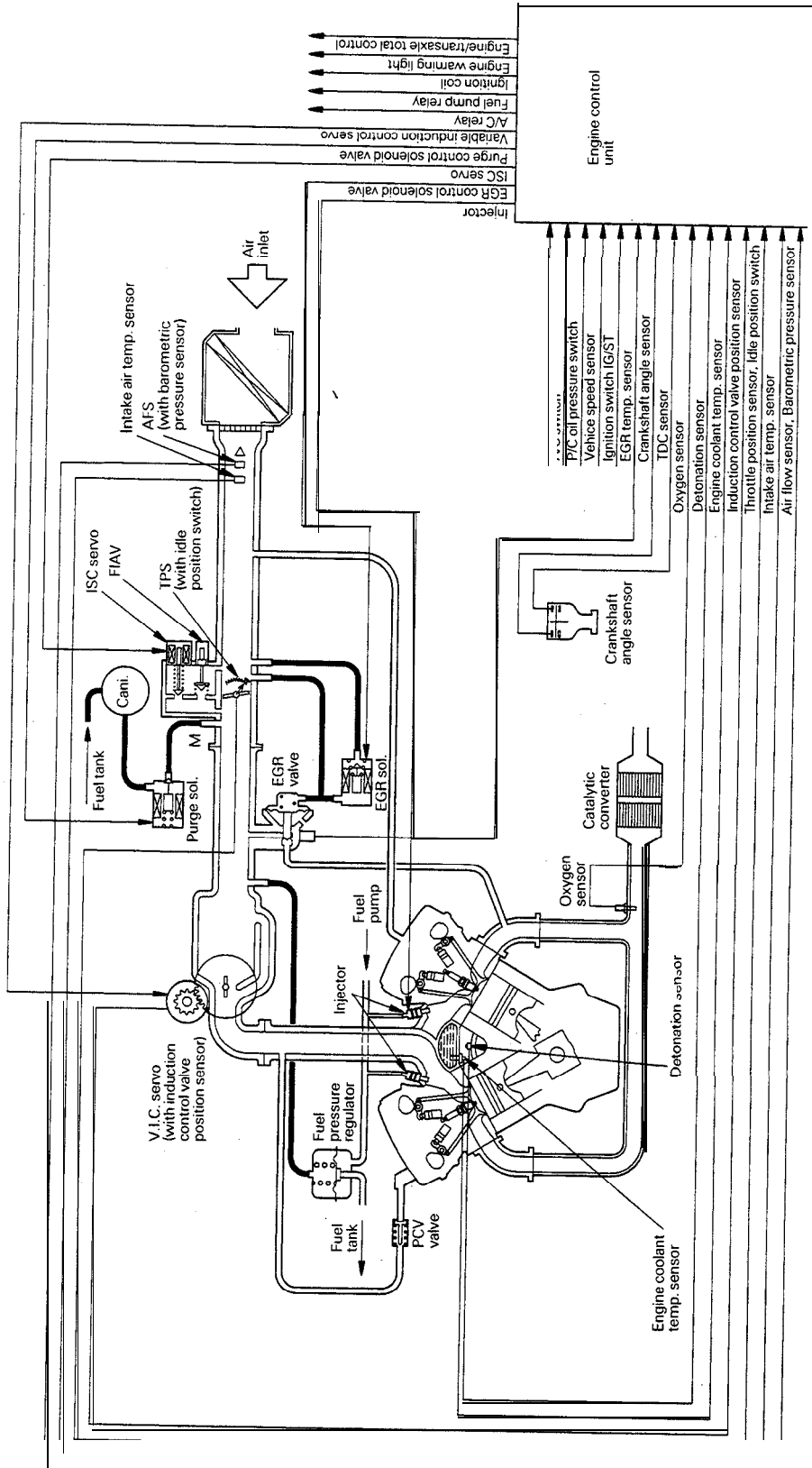
<Federal – Non Turbo>



7FU0994

TSB Revision

<California – Non Turbo>



7FU0995

SPECIFICATIONS

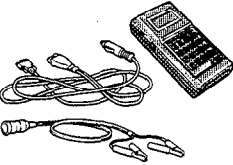

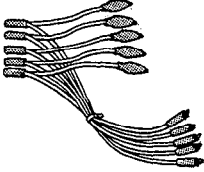

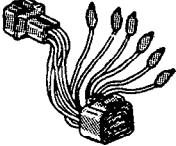
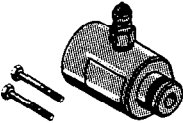
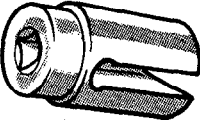
GENERAL SPECIFICATIONS

M13CA-A

Items	Specifications
Fuel Tank capacity liter (gal.) Return system Filter	75 (19.8) Equipped High pressure type
Fuel pump Type Driven by	Electrical, in-tank type Electric motor
Throttle body Throttle bore mm (in.) Throttle position sensor Idle speed control servo Idle position switch	60 (2.36) Variable resistor type Stepper motor type The stepper motor type by-pass air control system with the first idle air valve Rotary contact type
Engine control unit Identification model No. Federal <Non Turbo> <Turbo> California <Non Turbo> <Turbo>	E2T35676 E2T35678 E2T35675 E2T35677
Sensors Air flow sensor Barometric pressure sensor Intake air temperature sensor Engine coolant temperature sensor Oxygen sensor Vehicle speed sensor Detonation sensor Top dead center sensor Crank angle sensor Induction control valve position sensor <Non Turbo> EGR temperature sensor <California> Power steering oil pressure switch	Karman vortex type Semiconductor diffusion type Thermistor type Thermistor type Zirconia type Reed switch type Piezoelectric device type Photo interrupter type Photo interrupter type Variable resistor type Thermistor type Contact switch type

SPECIAL TOOLS

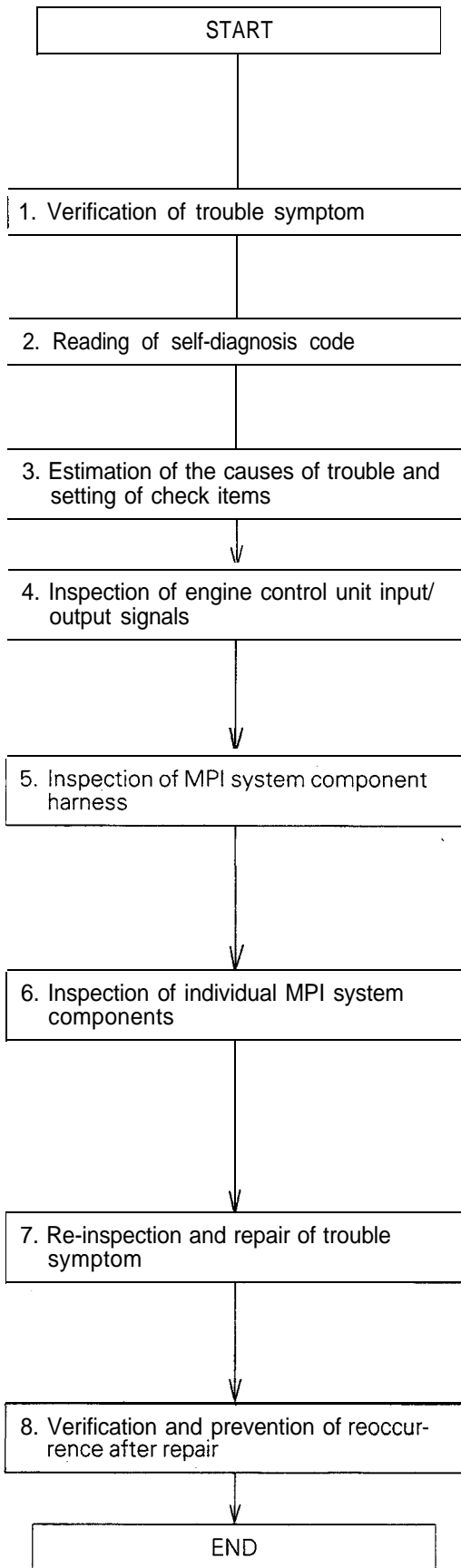
M13DA -

Tool	Number	Name	Use
	MB991341	Multi-use tester sub assembly	<ul style="list-style-type: none"> • Reading diagnosis code • MPI system inspection
	MB991359	ROM pack (for multi-use tester)	<ul style="list-style-type: none"> • Reading diagnosis code • MPI system inspection
	MB991348	Test harness set	<ul style="list-style-type: none"> • Adjustment of idle switch and throttle position sensor • Inspection by oscilloscope
	MD998464	Test harness (4 pin, square)	<ul style="list-style-type: none"> • Oxygen sensor inspection <Turbo>
	MD998463	Test harness (6 pin, square)	<ul style="list-style-type: none"> • Idle speed control servo inspection
	MD998742-01	Hose adapter	<ul style="list-style-type: none"> • Measurement of fuel pressure
	MD998773	Detonation sensor wrench	<ul style="list-style-type: none"> • Removal/Installation of detonation sensor

TROUBLESHOOTING

EXPLANATION OF TROUBLESHOOTING PROCEDURES

Effective troubleshooting procedures for MPI 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 self-diagnosis code

- Read self-diagnosis 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 unit input/output signals

- Using the multi-use tester or oscilloscope, check the engine control unit 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 MPI system component harness

- If the engine control unit input/output signals are abnormal, check the MPI system component body harness and repair as necessary.
- After repair, check the engine control unit input/output signals again. If they are normal, proceed to check the input/output signals of the next check item.

6. Inspection of individual MPI system components

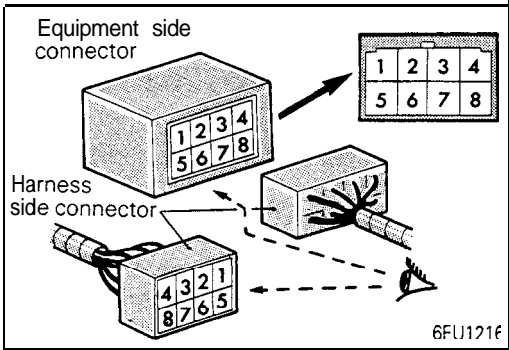
- If the body harness is normal but the engine control unit input/output signals are abnormal, check individual MPI system components and repair or replace as necessary.
- After repair or replacement, check the engine control unit input/output signals again. If they are normal, proceed to check the input/output 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 unit 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.

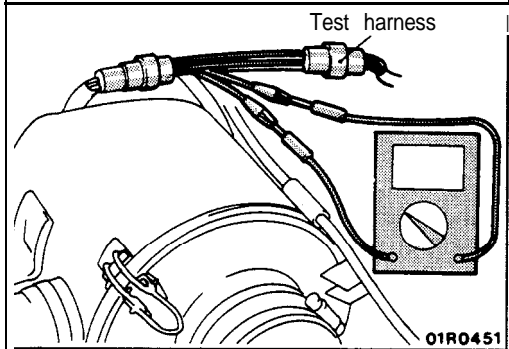
8. Verification and prevention of reoccurrence after repair

- 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.

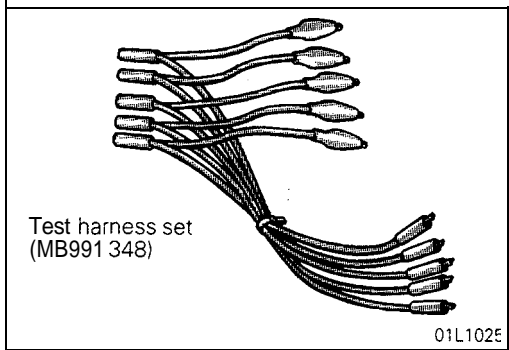


EXPLANATION AND CAUTIONS ABOUT HARNESS CHECK

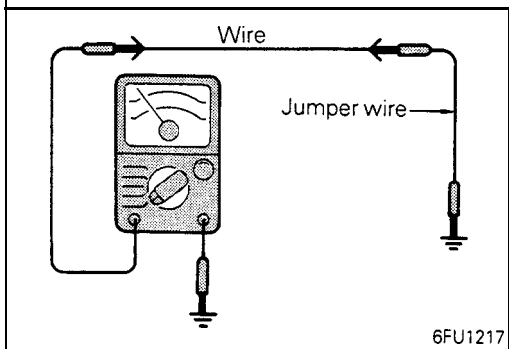
- The connector symbol shown is as viewed from the terminal end of the connector inside the vehicle.
- "SV" used as the standard value in voltage check stands for system voltage.



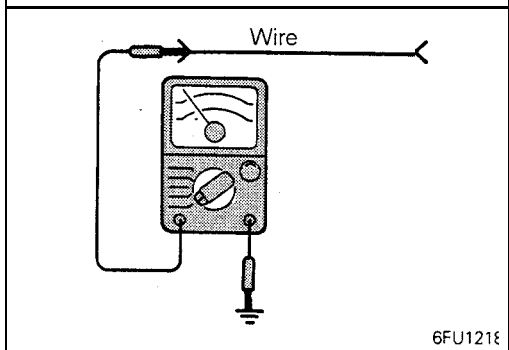
- When checking a waterproof connector for circuit continuity, be sure to use the special tool, Test Harness. Never insert the test probe from the harness side as this causes loss of waterproof characteristics and corrosion may result. There are various test harnesses and the appropriate one for the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



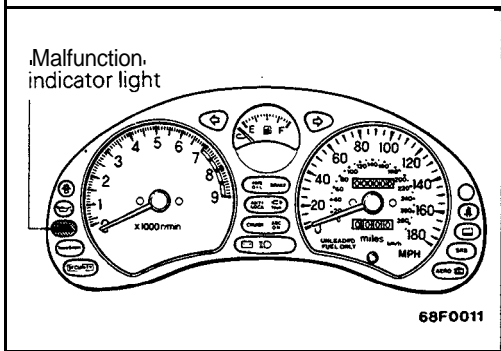
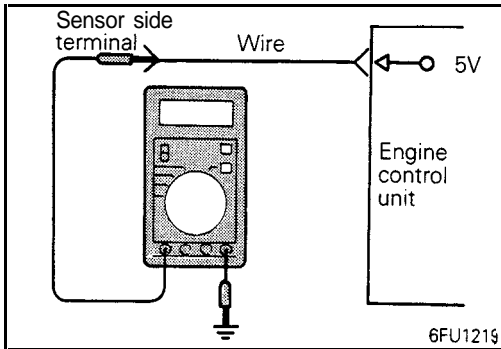
- If the appropriate test harness for the particular connector is not available, the use of the Test Harness Set (MB991348) which can be connected directly between the terminals is recommended.
- When checking the terminal voltage with the connector disconnected, do not insert the test probe if the check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

ENGINE WARNING LIGHT (MALFUNCTION INDICATOR LIGHT)

Among the self-diagnosis items, a malfunction indicator light 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 unit judges that it has returned to normal, the malfunction indicator light goes out.

Moreover, when the ignition switch is turned off, the light goes out. Even if the ignition switch is turned on again, the light does not come on until the irregularity is detected.

Here, immediately after the ignition switch is turned on, the malfunction indicator light is lit for 5 seconds to indicate that the malfunction indicator light operates normally.

ITEMS INDICATED BY THE MALFUNCTION INDICATOR LIGHT

Engine control unit
Oxygen sensor
Air flow sensor
Intake air temperature sensor
Throttle position sensor
Engine coolant temperature sensor
Crank angle sensor
Top dead center sensor
Barometric pressure sensor
Detonation sensor
Ignition timing adjustment signal
Injector
EGR system <California>
Ignition coil, power transistor unit

Caution

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

MALFUNCTION INDICATOR LIGHT INSPECTION

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

SELF-DIAGNOSIS

The engine control unit monitors the input/output signals (some signals at all times and the others under specified conditions) of the engine control unit.

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 unit judges that an irregularity has occurred, memorizes the malfunction code, and outputs the signal to the self-diagnosis output terminal.

There are 21 diagnosis items, including the normal state, and the diagnosis results can be read out with a voltmeter or multi-use tester.

Moreover, since memorization of the malfunction codes is backed up directly by the battery, the diagnosis results are memorized even if the ignition key is turned off. The malfunction codes will, however, be erased when the battery terminal or the engine control unit connector is disconnected.

The malfunction code can also be erased by turning on the ignition switch and sending the malfunction code erase signal from the multi-use tester to the engine control unit.

Caution

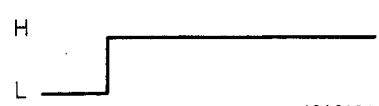






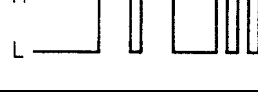
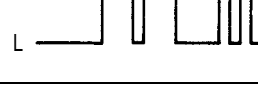
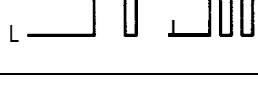
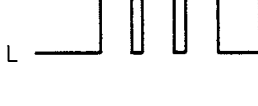
If the sensor connector is disconnected with the ignition switch turned on, the malfunction code is memorized. In this case, send the malfunction code erase signal from the multi-use tester to the engine control unit or disconnect the battery terminal (–) for 10 seconds or more, and the diagnosis memory will be erased.

The 21 diagnosis items are provided as follows, and if plural items are activated, they are all indicated sequentially from the smallest code number.

Caution








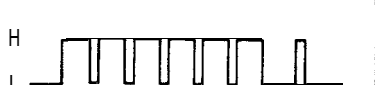


The malfunction code for the ignition timing adjustment signal is output when the line of the ignition timing adjustment terminal is shorted to ground. Therefore, the malfunction code is also output when the ignition timing adjustment terminal is grounded to adjust the ignition timing, but this does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

DIAGNOSIS CHART (FAULT TREE)

output preference order	Diagnosis item	Diagnosis code			Check item (Remedy)
		Output signal pattern	No.	Memory	
1	Engine control unit	 <p>12A0104</p>	–	–	(Replace engine control unit)
2	Oxygen sensor (Turbo: Rear bank)	 <p>12A0104</p>	11	Retained	<ul style="list-style-type: none"> • Harness and connector • Oxygen sensor • Fuel pressure • Injectors (Replace if defective.) • Intake air leaks
3	Air flow sensor	 <p>12A0104</p>	12	Retained	<ul style="list-style-type: none"> • Harness and connector (If harness and connector are normal, replace air flow sensor assembly.)
4	Intake air temperature sensor	 <p>12A0104</p>	13	Retained	<ul style="list-style-type: none"> • Harness and connector • Intake air temperature sensor
5	Throttle position sensor	 <p>12A0104</p>	14	Retained	<ul style="list-style-type: none"> • Harness and connector • Throttle position sensor • Idle position switch
6	Coolant temperature sensor	 <p>12A0107</p>	21	Retained	<ul style="list-style-type: none"> • Harness and connector • Coolant temperature sensor
7	Crank angle sensor	 <p>12A0107</p>	22	Retained	<ul style="list-style-type: none"> • Harness and connector (If harness and connector are normal, replace crank angle sensor assembly.)
8	Top dead center sensor	 <p>12A0107</p>	23	Retained	<ul style="list-style-type: none"> • Harness and connector (If harness and connector are normal, replace crank angle sensor assembly.)
9	Vehicle speed sensor (reed switch)	 <p>12A0107</p>	24	Retained	<ul style="list-style-type: none"> • Harness and connector • Vehicle speed sensor (reed switch)
10	Barometric pressure sensor	 <p>12A0107</p>	25	Retained	<ul style="list-style-type: none"> • Harness and connector (If harness and connector are normal, replace barometric pressure sensor assembly.)
11	Detonation sensor	 <p>12A0468</p>	31	Retained	<ul style="list-style-type: none"> • Harness and connector (If harness and connector are normal, replace detonation sensor.)

NOTE
 Replace the engine control unit if a malfunction code is output although the inspection reveals that there is no problem with the check items.

TSB Revision

output preference order	Diagnosis item	Diagnosis code			Check item (Remedy)
		Output signal pattern	No.	Memory	
12	Ignition timing adjustment signal	H L  12A0105	36	-	<ul style="list-style-type: none"> • Harness and connector
13	Oxygen sensor (Turbo: Front bank)	H L  12A0105	39	Retained	<ul style="list-style-type: none"> • Harness and connector • Oxygen sensor • Fuel pressure • Injectors (Replace if defective) • Intake air leaks
14	Injector	H L  12A0105	41	Retained	<ul style="list-style-type: none"> • Harness and connector • Injector coil resistance
15	EGR <California>	H L  12A0105	43	Retained	<ul style="list-style-type: none"> • Harness and connector • EGR thermo-sensor • EGR valve • EGR control solenoid valve • EGR valve control vacuum
16	Ignition coil, Power transistor unit (No. 1-4 cylinder)	H L  12A0105	44	Retained	<ul style="list-style-type: none"> • Harness and connector • Ignition coil • Power transistor unit
17	Ignition coil, Power transistor unit (No. 2-5 cylinder)	H L  12A0105	52	Retained	<ul style="list-style-type: none"> • Harness and connector • Ignition coil • Power transistor unit
18	Ignition coil, Power transistor unit (No. 3-6 cylinder)	H L  12A0105	53	Retained	<ul style="list-style-type: none"> • Harness and connector • Ignition coil • Power transistor unit
19	A cable from trans-axle control unit, for transmission of torque reduction signal <A/T>	H L  12A0105	61	Retained	<ul style="list-style-type: none"> • Harness and connector (If harness and connector are normal, replace only transaxle control unit.)
20	Induction control valve position sensor <Non Turbo>	H L  12A0105	62	Retained	<ul style="list-style-type: none"> • Harness and connector (If harness, connector and induction control valve are normal, replace air intake plenum assembly.)
21	Normal state	H L  (Continue) 12A0104	-	-	-

NOTE
Replace the engine control unit if a malfunction code is output although the inspection reveals that there is no problem with the check items.

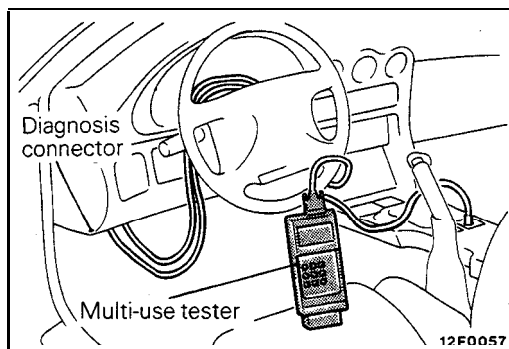
READ OUT OF MALFUNCTION CODE

Precautions for Operation

- (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) Diagnosis item is erased if the battery or the engine control unit connector is disconnected. Do not disconnect the battery before the diagnosis result is completely read.

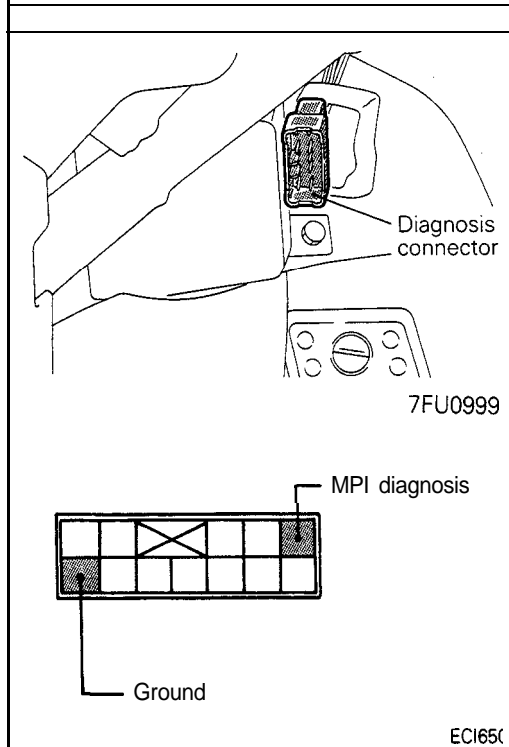
Using Multi-Use Tester

- (1) Read and record the self-diagnosis output.
- (2) Referring to the diagnosis chart, repair the faulty part.
- (3) Turn the ignition switch OFF and then turn it ON.
- (4) Erase the malfunction code.
- (5) Recheck that a normal code is output.



Using Voltmeter

- (1) Connect an analog voltmeter between the self-diagnosis output terminal of the diagnosis connector and ground terminal.
- (2) Turn on the ignition switch.
- (3) Read the diagnosis output pattern from the voltmeter and record it.
- (4) Referring to the diagnosis chart, repair the faulty part.
- (5) Erase the malfunction code using the following procedure.
 - ① Turn OFF the ignition switch.
 - ② Disconnect the negative battery cable from the battery terminal for 10 seconds or more and then reconnect it.
 - ③ Turn ON the ignition switch and read the self-diagnosis code to check that a normal code is output.



Diagnosis by DIAGNOSIS 2 MODE

- (1) Using the multi-use tester, changeover the diagnosis mode of the engine control unit to DIAGNOSIS 2 MODE.
- (2) Road test the vehicle.
- (3) Read the diagnosis code in the same manner as "READ OUT OF MALFUNCTION CODE" and repair the malfunctioning part.
- (4) Remove the multi-use tester.

NOTE

Removal of the multi-use tester will erase all the self-diagnosis malfunction codes in the engine control unit and changeover the diagnosis mode from DIAGNOSIS 2 MODE to DIAGNOSIS 1 MODE.

CHECK CHART CLASSIFIED BY PROBLEM SYMPTOMS

Problem symptoms Check items	Starting		Idling stability			Driving					Reference page	
	Will not start	Starting problem	Idling instability (Rough idling)	Incorrect idling speed	Improper idling continuity	Hesitation, sag	Poor acceleration	Stumble	Shock	Surge		Knocking
Power supply and ignition switch-IG	① [1]											13-41
Engine control unit power ground	② [2]											13-44
Fuel pump	③ [3]	① [1]			① [1]	① [1]	① [1]					13-45 <N/T> 13-48 <T>
Air flow sensor					⑫ [10]	⑫ [12]		⑤ [5]	⑤ [5]		④ [4]	13-54
Intake air temperature sensor			⑤			⑧ [8]	⑨ [9]				② [2]	13-57
Barometric pressure sensor			⑦			⑪ [11]	⑪ [11]				③ [3]	13-60
Engine coolant temperature sensor		③	⑥ [5]	① [1]	⑤ [5]	⑩ [10]	⑩ [10]	④ [4]		⑨ [3]		13-62
Throttle position sensor						⑨ [9]		③ [3]	④ [4]			13-65
Idle position switch			③ [3]	② [2]	④ [4]							13-68
Top dead center sensor	⑤ [5]	⑦ [7]			⑧ [7]				② [2]			13-70
Crank angle sensor	⑥ [6]	⑧ [8]			⑨ [8]				③ [3]			13-72
Ignition switch-ST <M/T>	④ [4]	③ [4]										13-75
Ignition switch-ST and inhibitor switch <A/T>	④ [4]	③ [4]		⑥								13-76
Vehicle speed sensor					⑥				⑥			13-78
Power steering oil pressure switch				③								13-80
Air conditioner switch and power relay				④								13-82
Detonation sensor											① [1]	13-84
Electrical load switch				⑤								13-86
Induction control valve position sensor <Non Turbo>						④ [4]	⑥ [6]					13-90
Oxygen sensor			⑩									13-94 <N/T> 13-98 <T>
Injectors	⑧ [8]	② [2]	② [2]		③ [3]	② [2]	② [2]	① [1]		① [1]		13-101 <N/T> 13-105 <T>
Idle speed control servo (stepper motor type)		④ [5]	① [1]	⑦ [3]	② [2]				⑨ [7]			13-110
Ignition coil and power transistor	⑦ [7]				⑩ [9]		⑫ [12]		① [1]		⑤ [5]	13-115
Purge control solenoid valve			⑧									13-119
EGR control solenoid valve <California – Non Turbo, Turbo>						⑦ [7]		⑥ [6]		④ [4]		13-121
Fuel pressure control valve <Turbo>		⑥	⑨		⑪		④ [4]					13-123
Waste gate control solenoid valve <Turbo>							⑤ [5]					13-126
Active exhaust control unit <Turbo>						⑥ [6]	⑧ [8]					13-130
Variable induction control servo (DC motor) <Non Turbo>						⑤ [5]	⑦ [7]					13-131
Anti-lock brake signal <Turbo>									⑦			13-133
Engine and transaxle total control signal <A/T>									⑧ [6]	⑤ [5]		13-135
Fuel pressure		⑤ [6]	④ [4]		⑦ [6]	③ [3]	③ [3]	② [2]		② [2]		13-137

○: Warm engine (number inside indicates check order)
 □: Cold engine (number inside indicates check order)

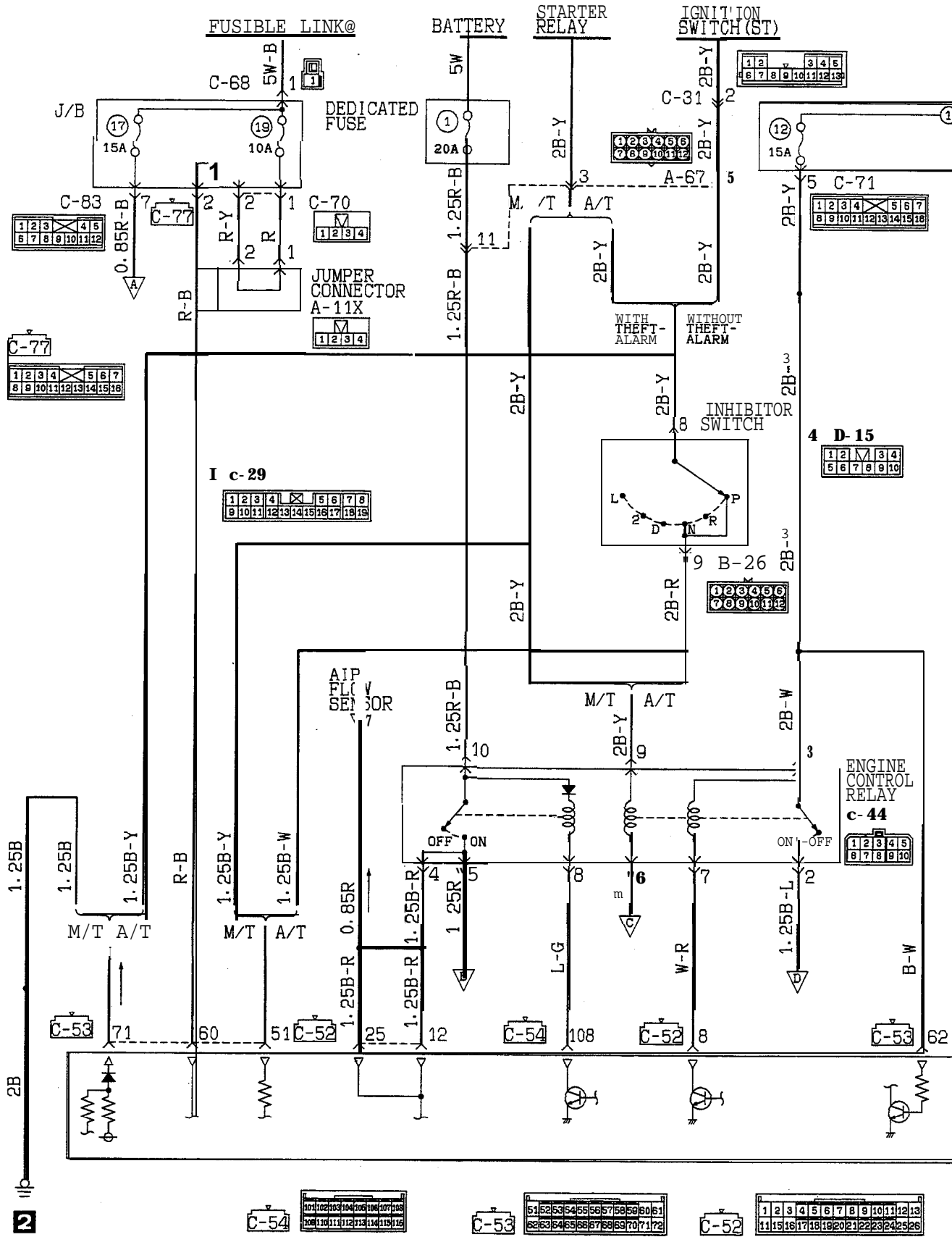
<N/T>: Non Turbo
 <T>: Turbo

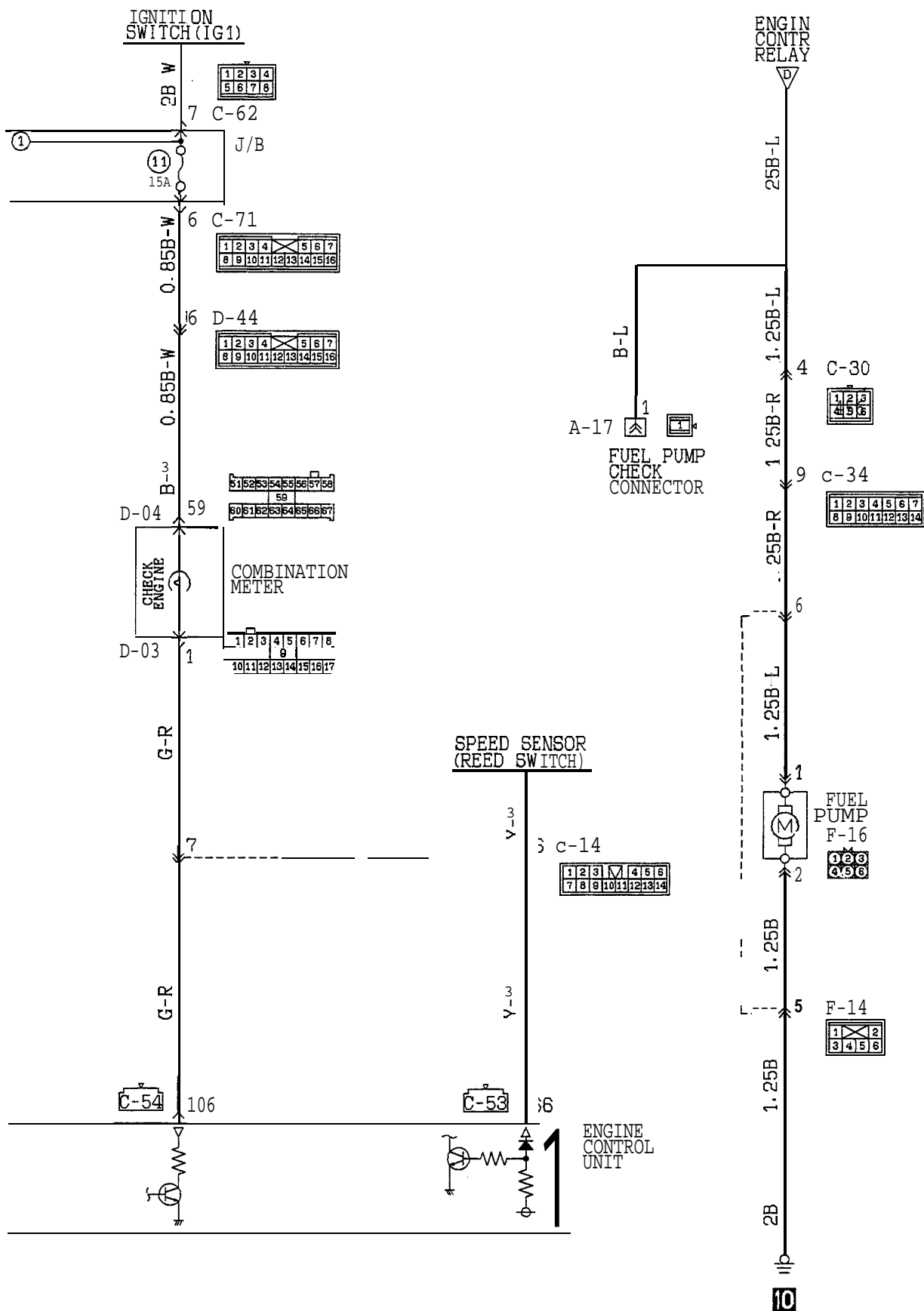
PROBLEM SYMPTOMS TABLE (FOR YOUR INFORMATION)

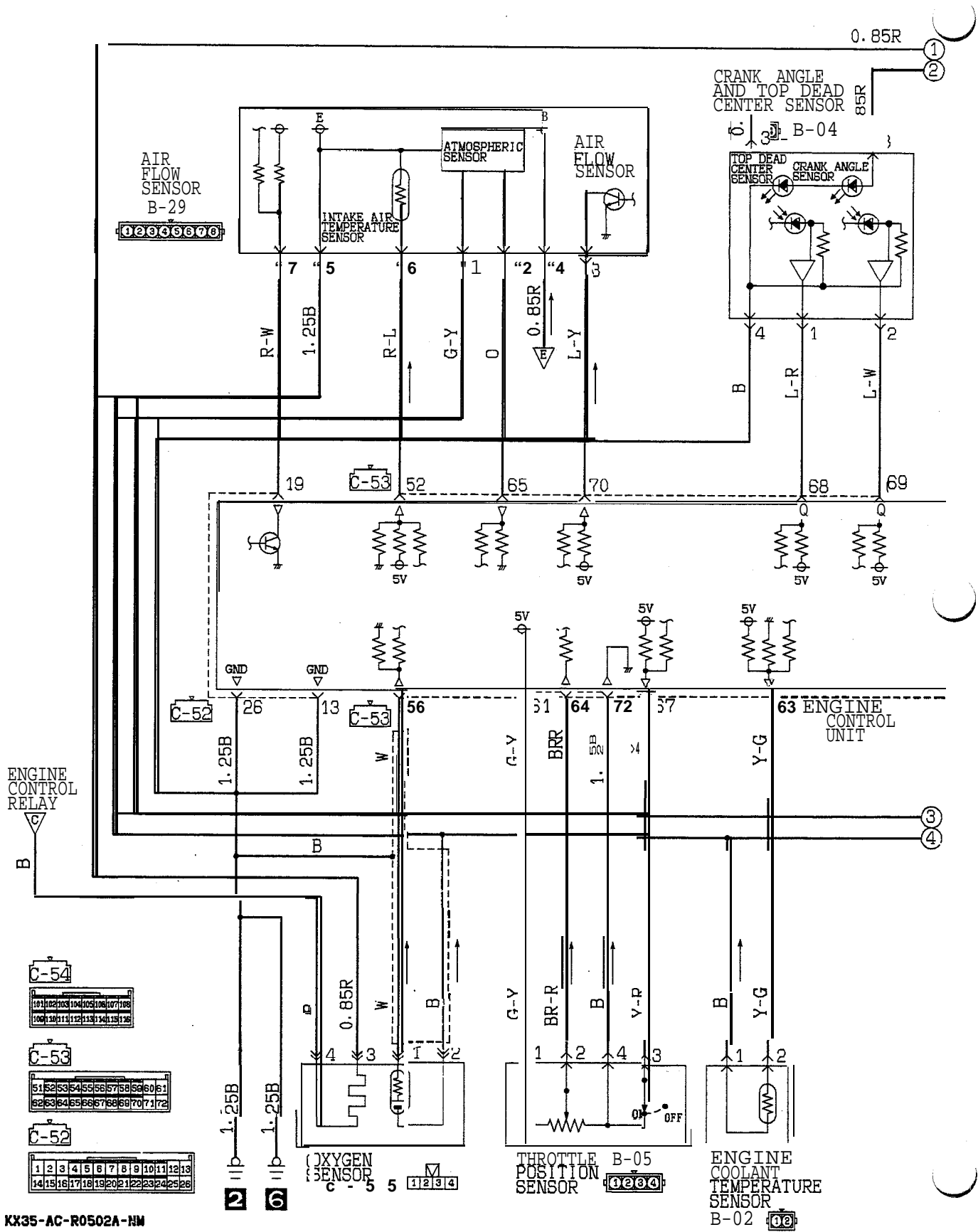
Items		Symptom
Starting	Won't start (no initial combustion)	The starter is used to crank the engine, but there is no combustion within the cylinders, and the engine won't start.
	Starting problem (initial combustion, then stall)	There is combustion within the cylinders, but then the engine soon stalls.
	(Starting takes a long time.)	Engine won't start quickly.
Idling stability	Idling instability (Rough idling)	Engine speed doesn't remain constant; changes during idling. 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 idling.
	Incorrect idling speed	The engine doesn't idle at the usual correct speed.
	Improper idling continuity Die out Pass out	This non-continuity of idling includes the following elements. (1) Die out The engine stalls when the foot is taken from the accelerator pedal, regardless of whether the vehicle is moving or not. (2) Pass out . . . The engine stalls when the accelerator pedal is depressed or while it is being used.
Driving	Hesitation Sag	<p>"Hesitation" is the delay in response of the vehicle speed (engine rpm) 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".</p> <p style="text-align: right;">1 FU0224</p>
	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	<p>Engine rpm response is delayed when the accelerator pedal is initially depressed for acceleration from the stopped condition.</p> <p style="text-align: right;">1 FU0224</p>
	Shock	The feeling of a comparatively large impact or vibration when the engine is accelerated or decelerated.
	Surge	This is repeated surging ahead during constant speed travel or during variable speed travel.
	Knocking	A sharp sound like a hammer striking the cylinder walls during driving and which adversely affects driving.

CIRCUIT DIAGRAM

<Non Turbo>

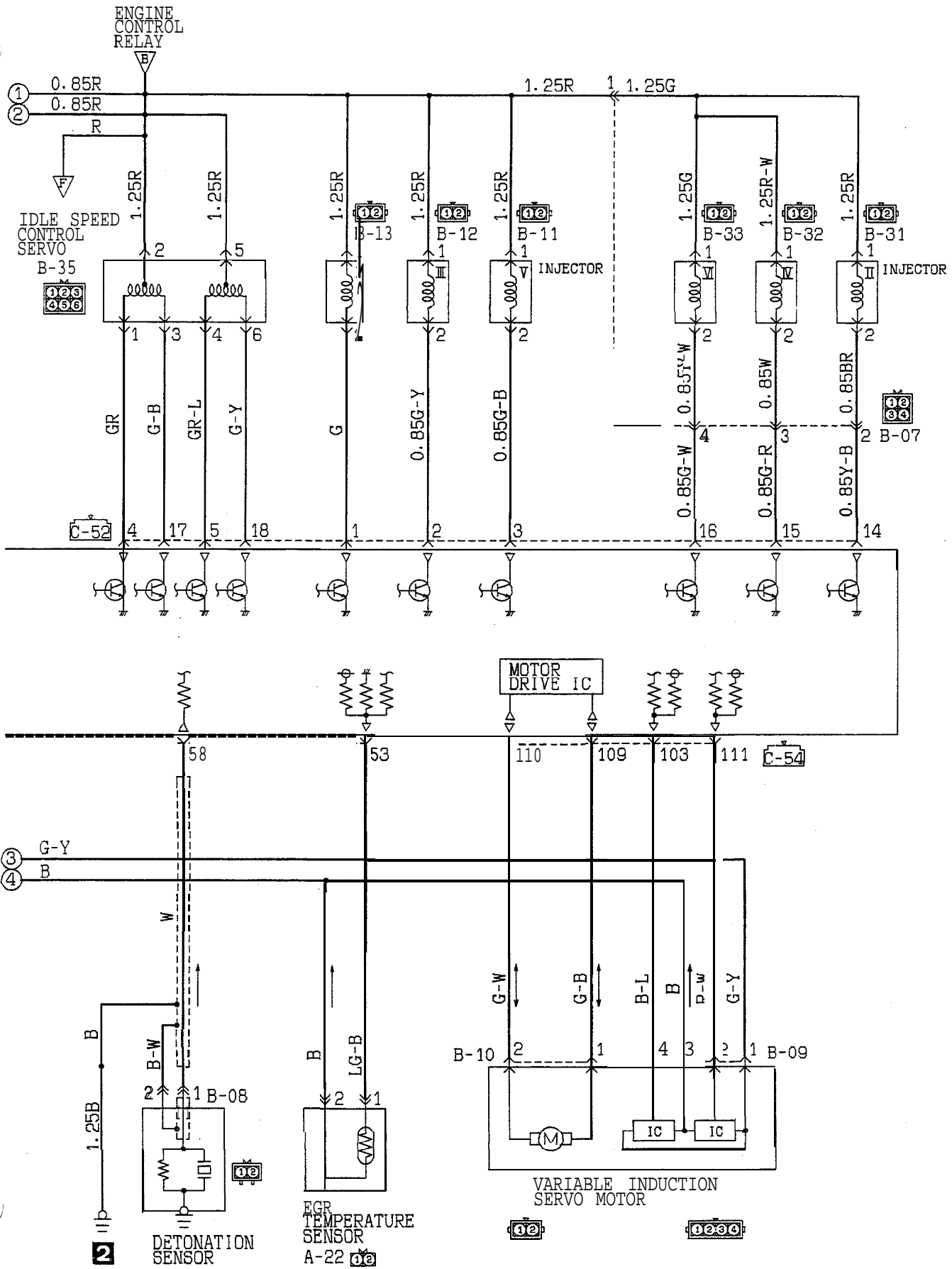




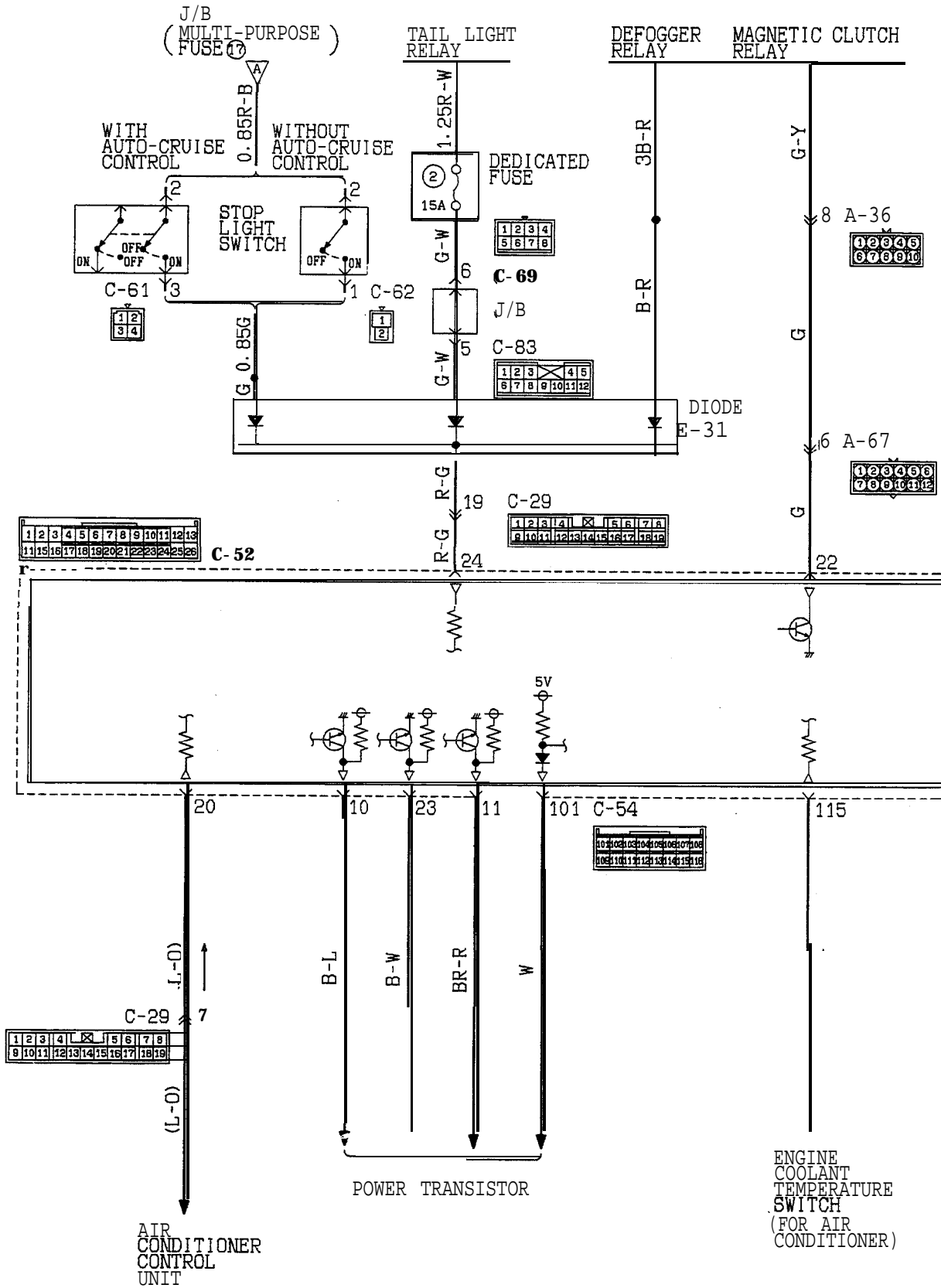


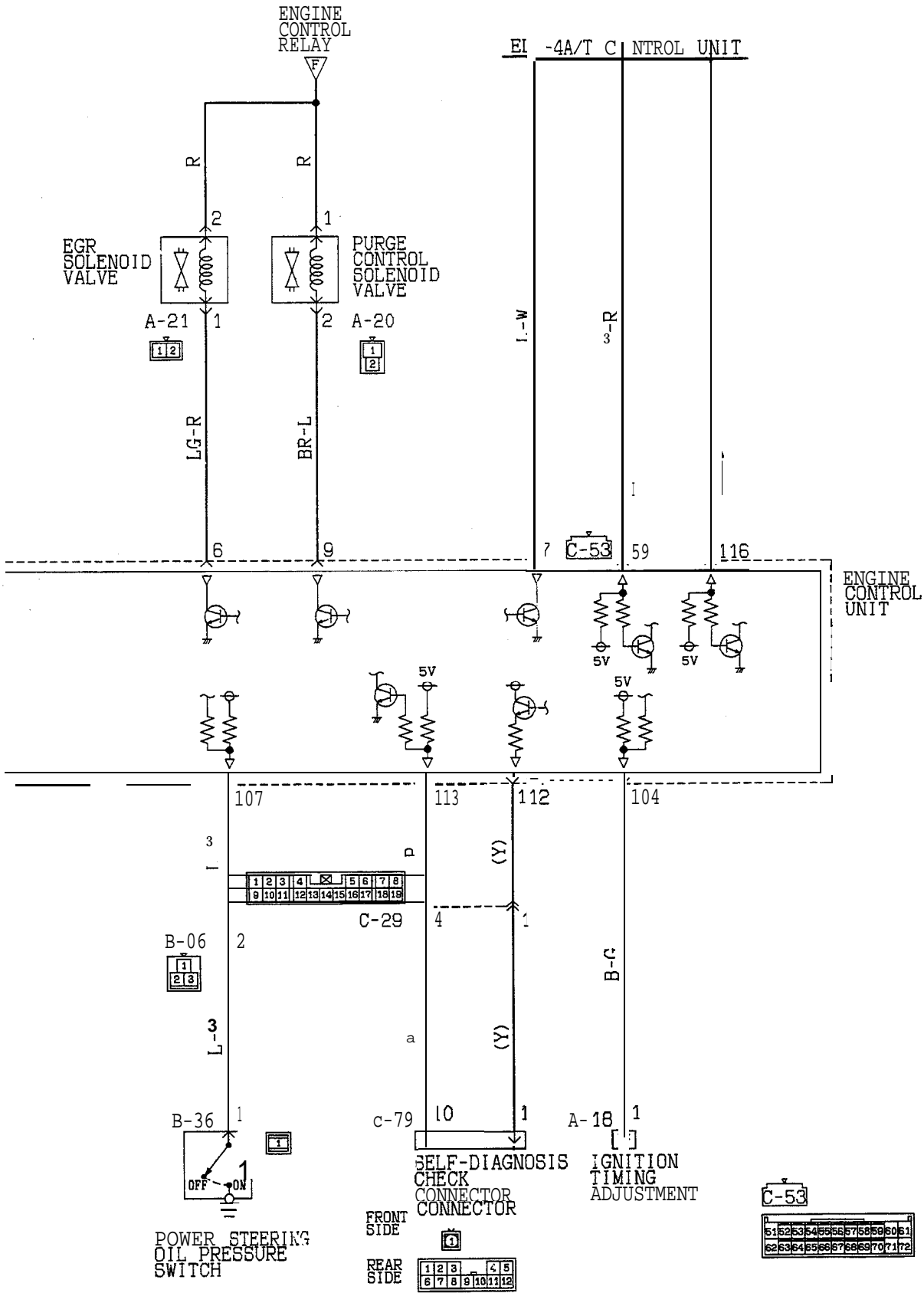
KX35-AC-R0502A-NM

TSB Revision

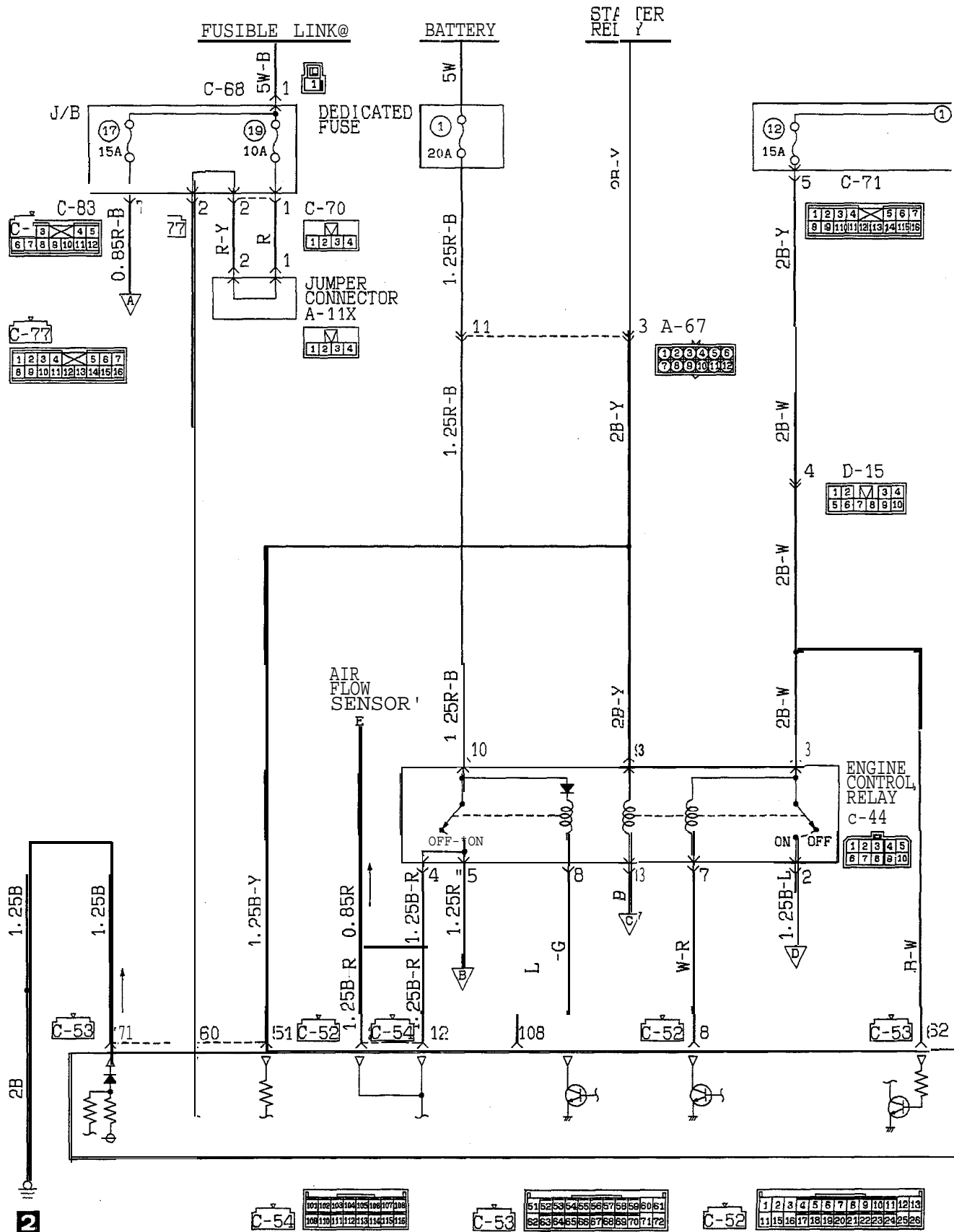


TSB Revision



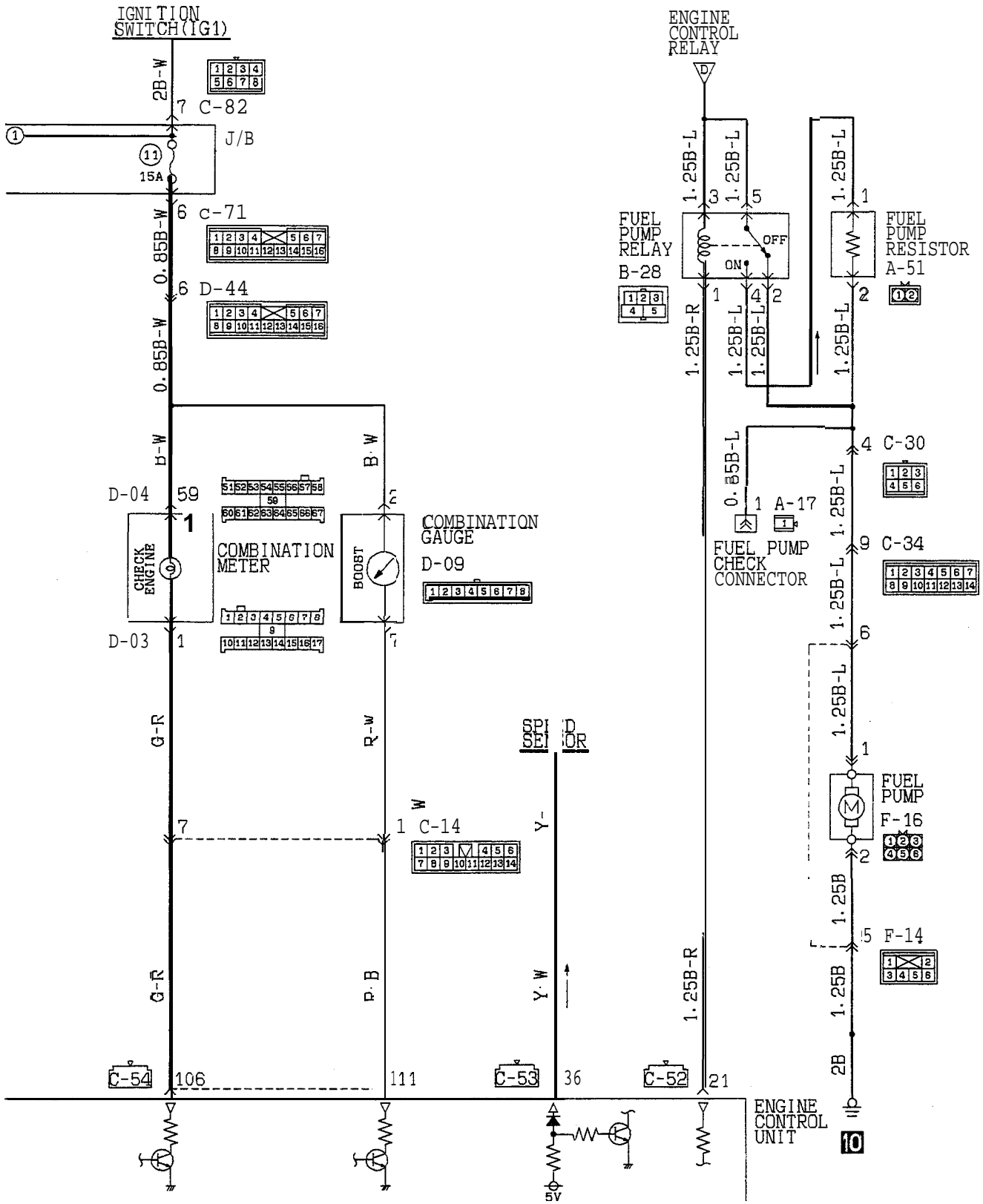


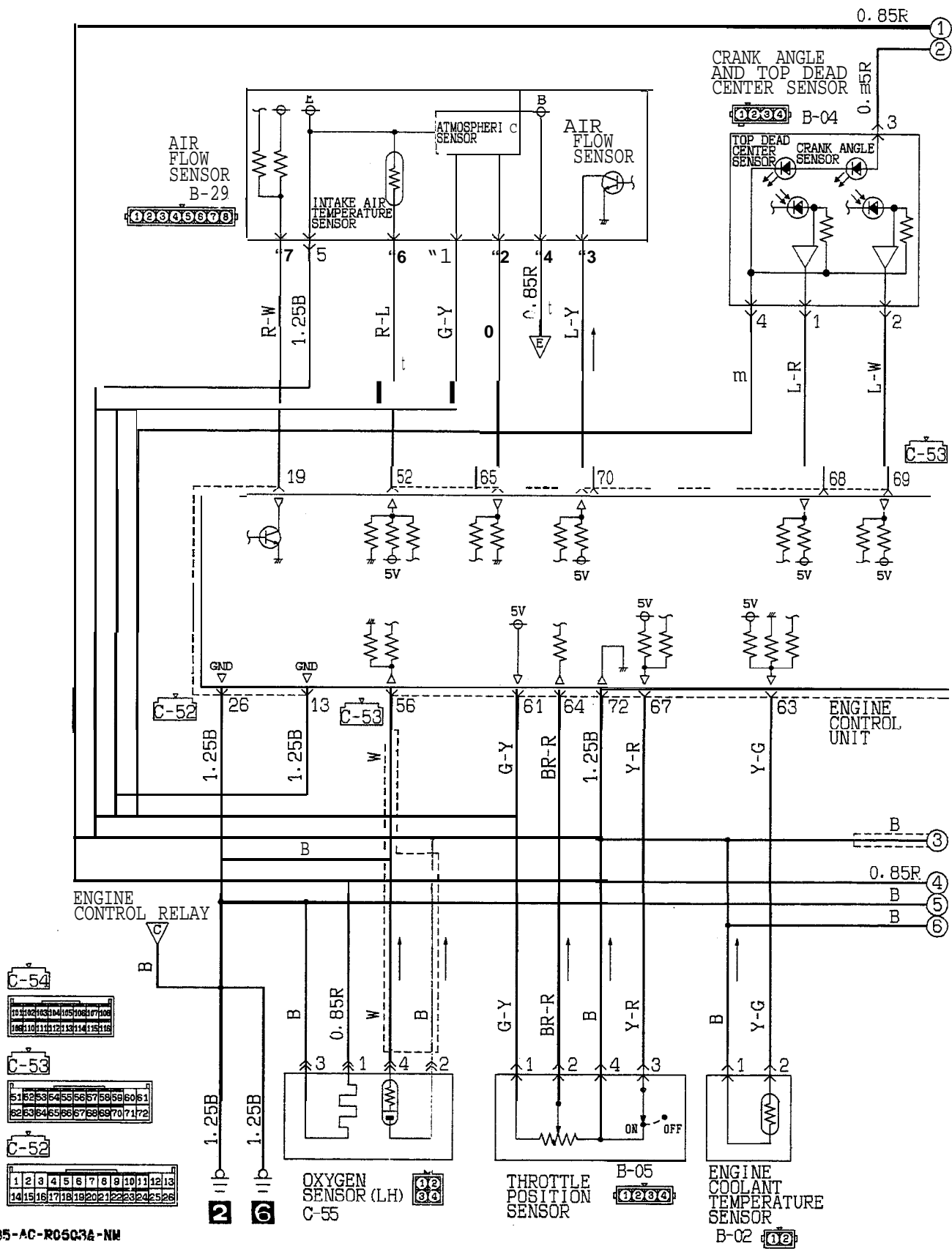
<Turbo>



X35-AC-R0503-NM

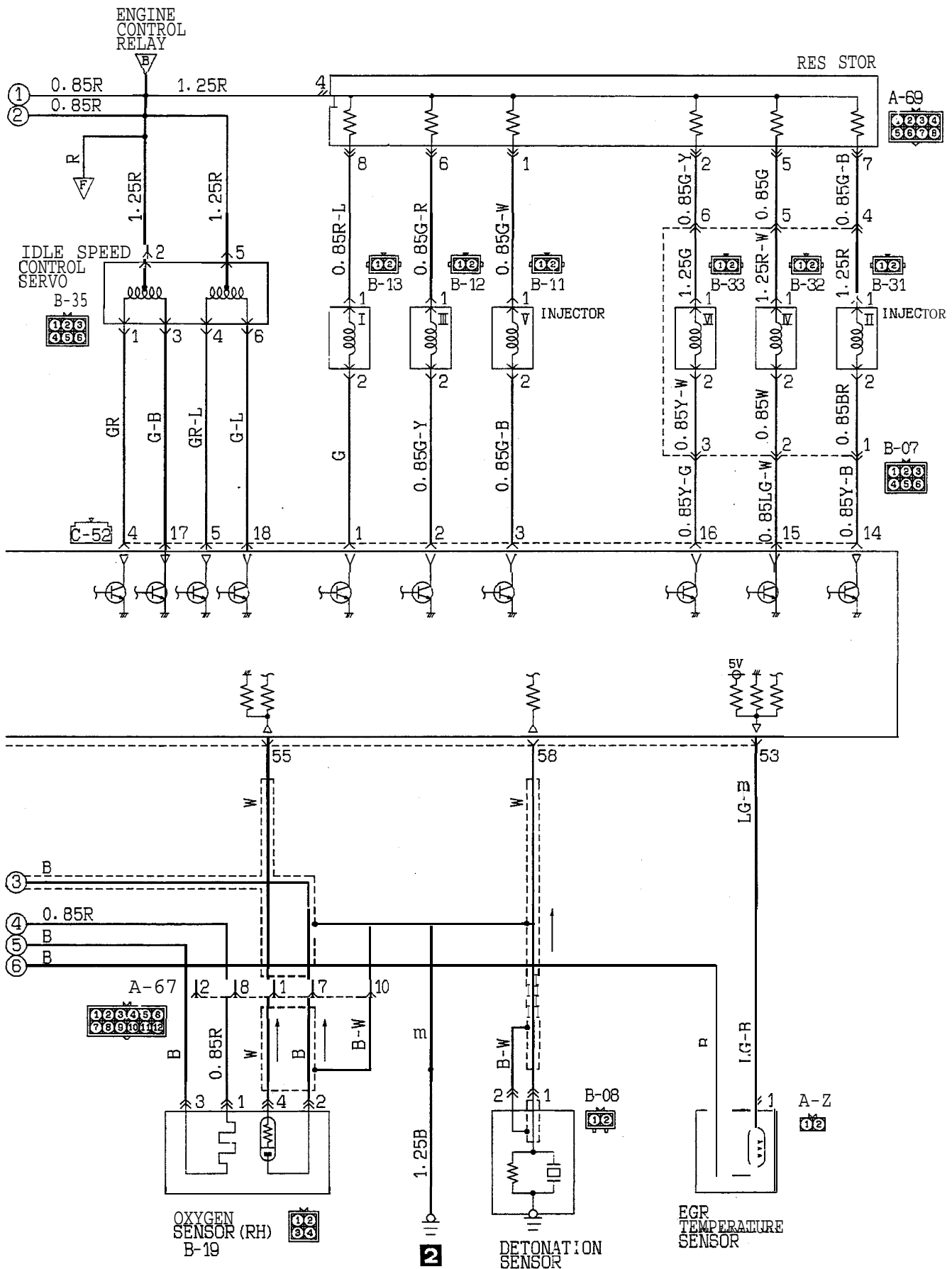
TSB Revision

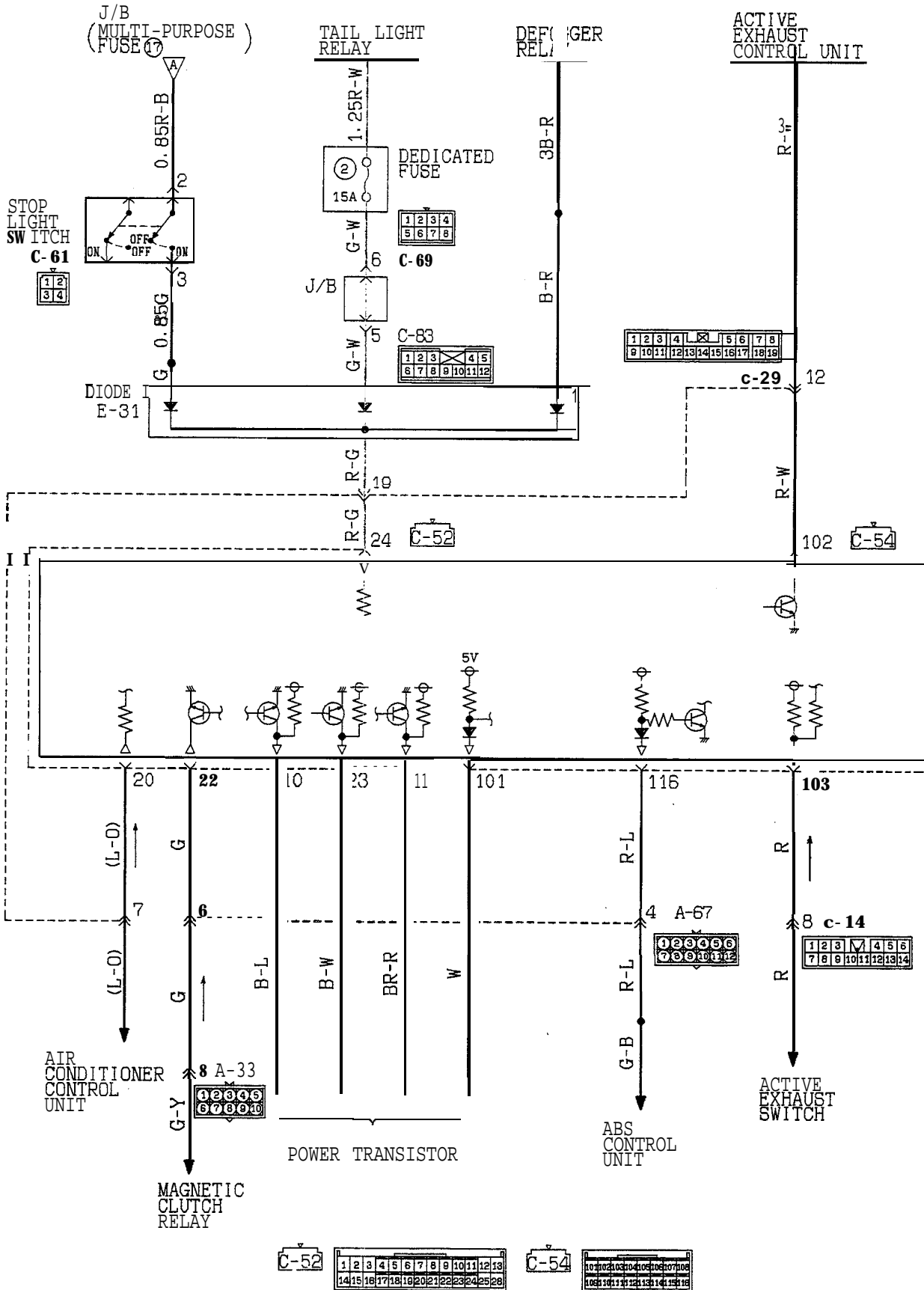


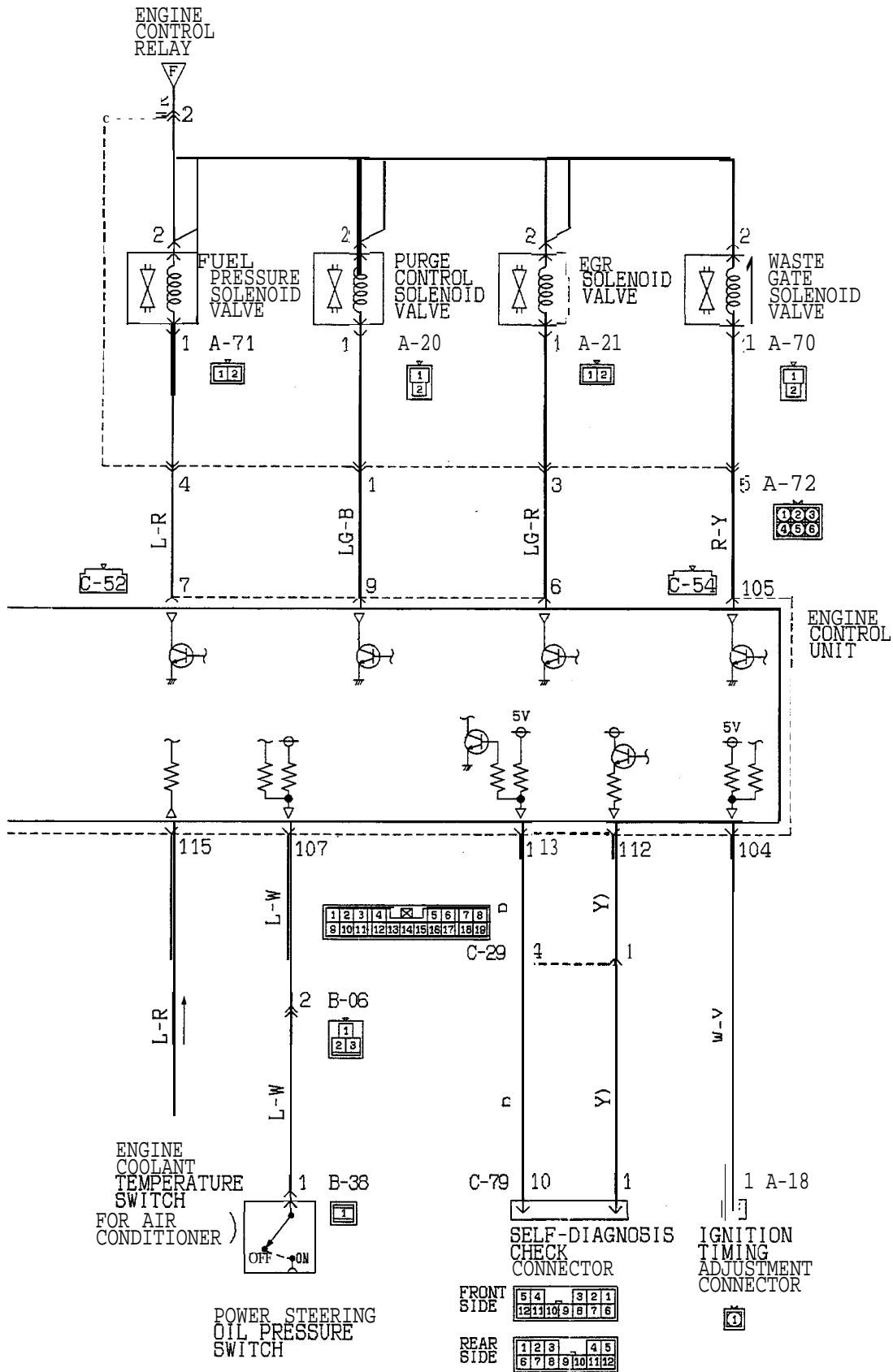


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FUEL TANK AND FUEL LINE

M13EAAB

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)	Misrouting of vapor line	Correct
	Disconnected vapor line piping joint	Correct
	Folded, bent, cracked or clogged vapor line	Replace
	Faulty fuel tank cap	Replace
	Malfunctioning overfill limiter (Two-way valve)	Replace

SERVICE ADJUSTMENT PROCEDURES

M13FH8U

BASIC IDLE SPEED ADJUSTMENT

NOTE

- (1) The basic idle speed has been factory-adjusted with the speed adjusting screw (SAS) and does not normally require adjustment.
- (2) If the adjustment is required, first check that the ignition plug, injector, ISC servo, 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 205°F)
- Lights, electric cooling fan, accessories: OFF
- Transaxle: Neutral (P range on vehicles with automatic transaxle)
- Steering wheel: Straightforward position

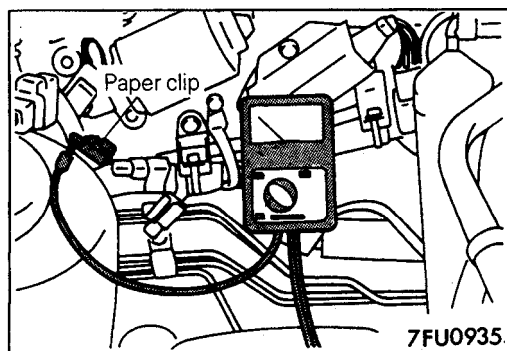
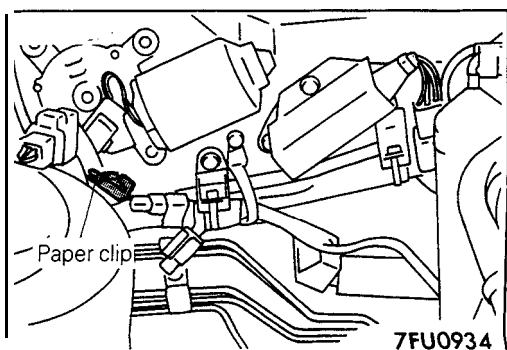
- (2) When using the multi-use tester, connect it to the diagnosis connector.

NOTE

The connection of the multi-use tester grounds the self-diagnosis/data transmission selector terminal.

- (3) When not using the multi-use tester, proceed as follows:

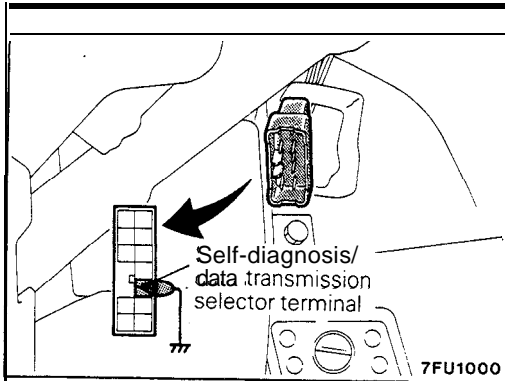
- ① Insert a paper clip into the I-pin blue connector as shown in the illustration.



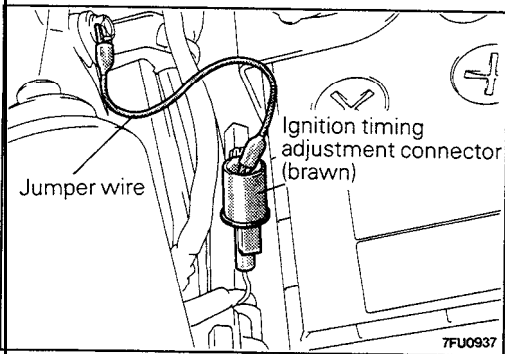
- ② Connect a primary-voltage-detecting tachometer to the paper clip.

NOTE

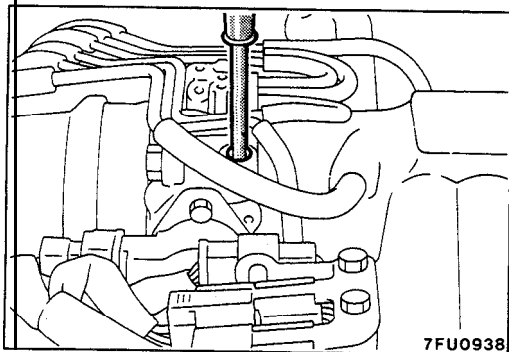
The tachometer should read 1/3 of the actual engine speed. This means that the actual engine speed is the tachometer reading multiplied by 3.



- ③ Using a jumper wire, ground the self-diagnosis/data transmission selector terminal (terminal ⑩) of the diagnosis connector (white).



- (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.
When using the multi-use tester, select item No. 38 and read the idle speed.

Basic idle speed: 700 ± 50 rpm

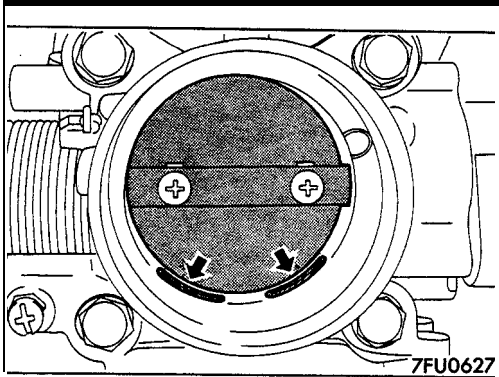
NOTE

- (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.13-33.)
(8) If the basic idle speed is out of specification, adjust by turning the speed adjusting screw (SAS).

NOTE

If the idle speed is higher than the standard value even with SAS fully tightened, check to see if there is evidence of the idle switch (fixed SAS) being moved. If the idle 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 (FIHV). In such a case, replace the throttle body.

- (9) Turn the ignition switch OFF.
(10) When the multi-use tester has not been used, remove the jumper wire from the self-diagnosis/data transmission selector 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.



THROTTLE BODY (THROTTLE VALVE AREA) CLEANING

M13FICS

- (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

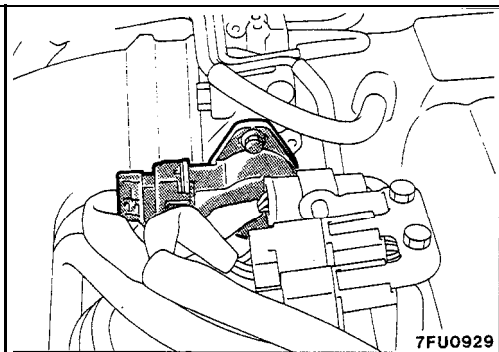
Never allow cleaning agent to flow into the bypass passage.

- (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.

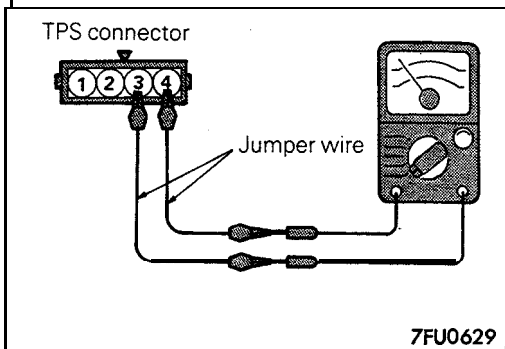
- (6) If the deposit cannot be removed from the throttle valve, repeat steps (4) and (5).
- (7) Disconnect the plug from the inlet of the bypass passage.
- (8) Install the air intake hose.
- (9) Use a multi-use tester to erase the self-diagnosis code or disconnect the battery ground cable for more than 10 seconds and then connect it again.
- (10) Adjust the basic idle speed (speed adjusting screw). (Refer to P.13-31.)



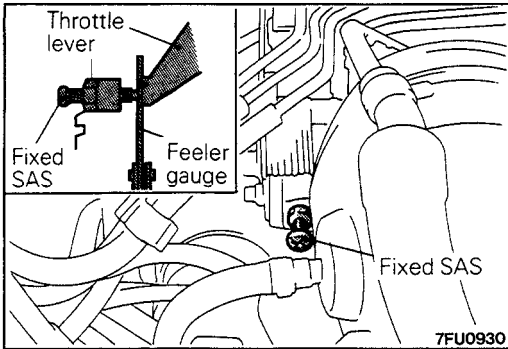
ADJUSTMENT OF IDLE POSITION SWITCH AND THROTTLE POSITION SENSOR (TPS)

M13FIFA

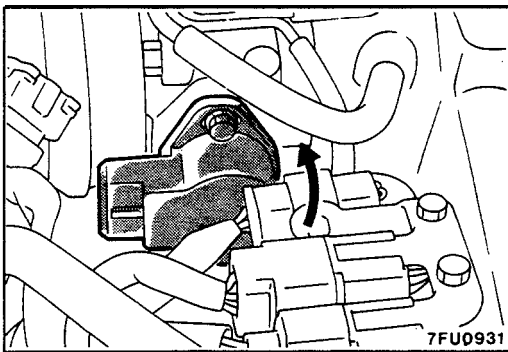
- (1) Disconnect the throttle position sensor connector.



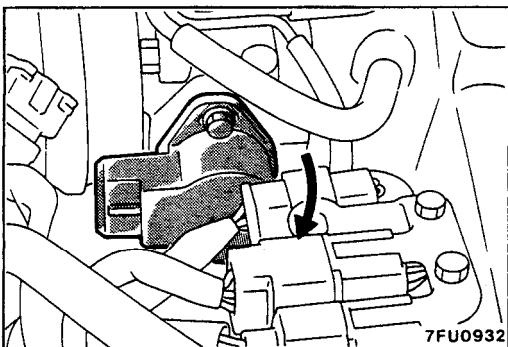
- (2) Using jumper wires, connect an ohmmeter across terminal ③ (idle position switch) and terminal ④ (sensor ground) of the throttle position sensor.



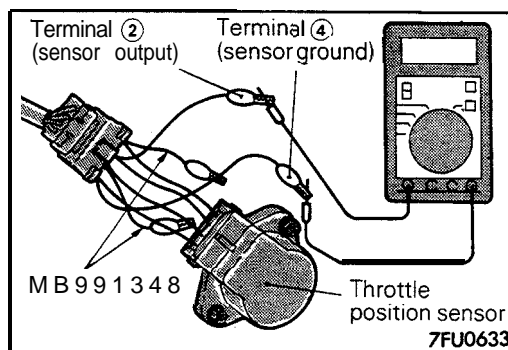
- (3) Insert a 0.65-mm-thick feeler gauge between the fixed SAS and throttle lever.



- (4) Loosen the throttle position sensor mounting bolts and turn the TPS body fully counterclockwise.
 (5) In this condition, check that there is continuity across terminals ③ and ④.



- (6) Slowly turn the throttle position sensor clockwise until you find a point at which there is no continuity across terminals ③ and ④. Then, tighten the throttle position sensor mounting bolt securely.
 (7) Connect the throttle position sensor connector.

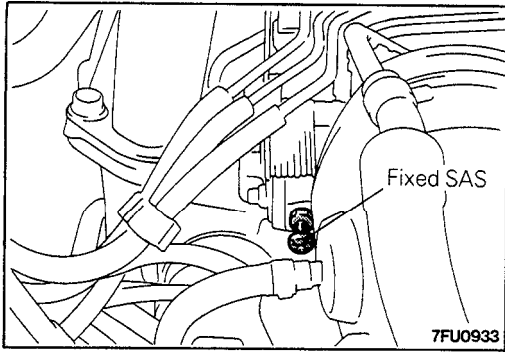


- (8) When using the multi-use tester, connect it to the diagnosis connector.
 (9) When not using the multi-use tester, proceed as follows:
 ① Disconnect the throttle position sensor connectors and connect the special tool, Test Harness Set, between the disconnected connectors.
 ② Connect a digital voltmeter between the throttle position sensor terminal ② (sensor output) and terminal ④ (sensor ground).

- (10) Turn the ignition switch ON (but do not start the engine).
 (11) Check the throttle position sensor output voltage.
 When using the multi-use tester, select item No. 14 and read the throttle position sensor output voltage.

Standard value: 400 – 1,000 mV

- (12) If the voltage is out of specification, check the throttle position sensor and associated harnesses.
 (13) Remove the feeler gauge.
 (14) Turn the ignition switch OFF.



ADJUSTMENT OF FIXED SAS

M13FIDC

NOTE

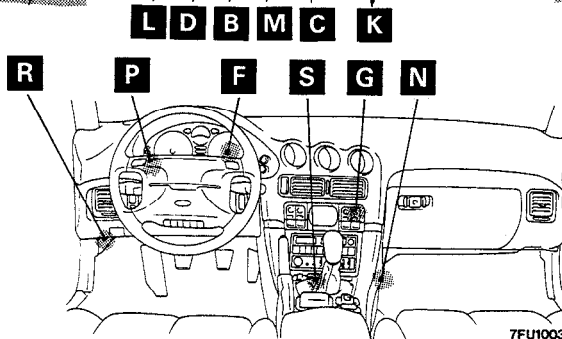
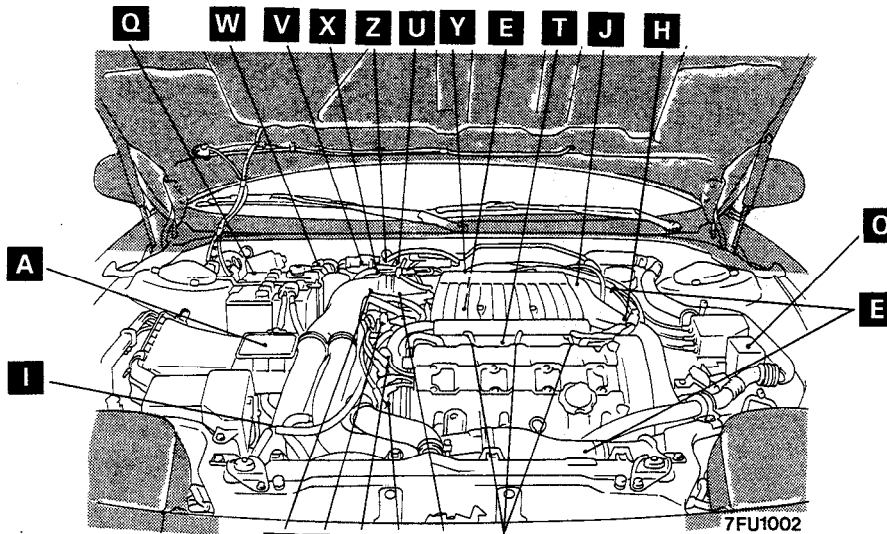
- (1) The fixed SAS has been factory-adjusted. Never attempt to move it.
- (2) Should it be out of proper adjustment, adjust by following the procedure given below.
 - (1) Sufficiently slacken the accelerator cable.
 - (2) Loosen the lock nut on the fixed SAS.
 - (3) Sufficiently loosen the fixed SAS 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 ¼ 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.13-156.)
 - (7) Adjust the basic idle speed. (Refer to P.13-31.)
 - (8) Adjust the idle position switch and throttle position sensor (TPS). (Refer to P.13-33.)

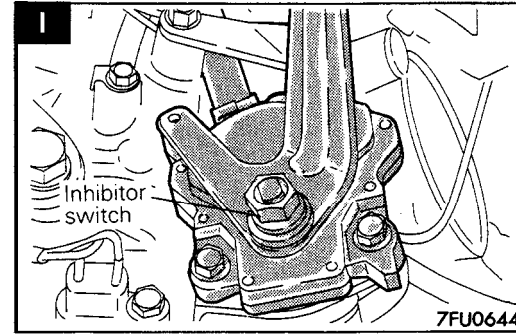
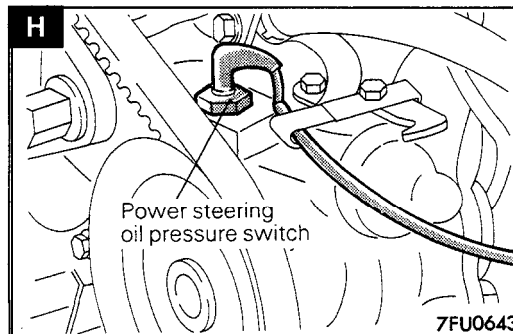
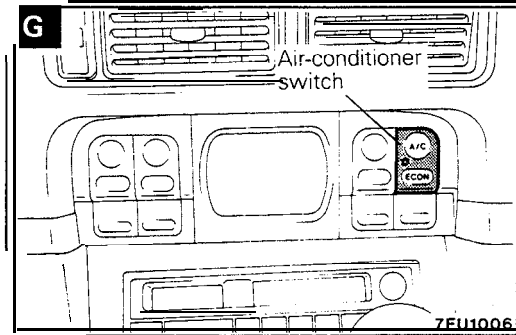
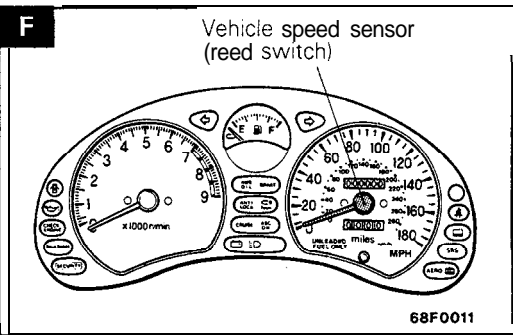
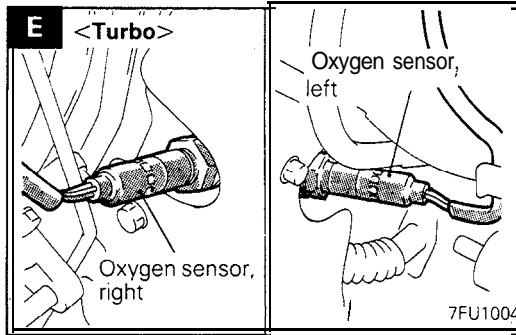
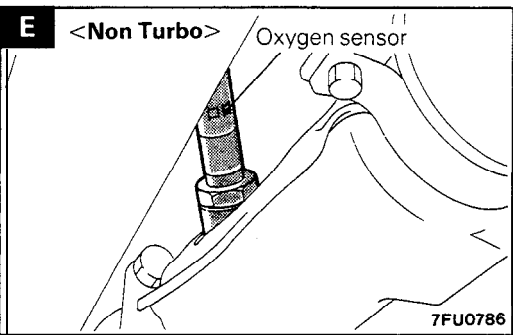
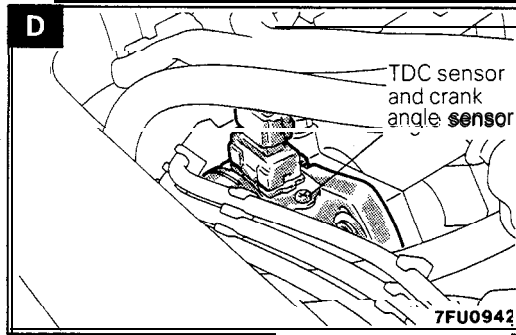
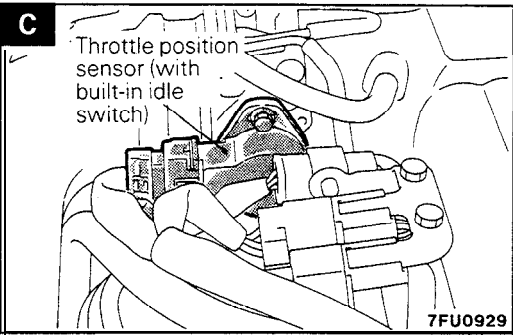
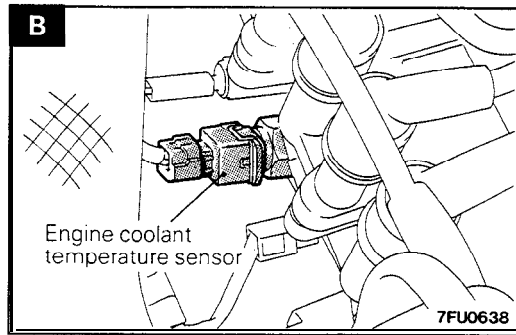
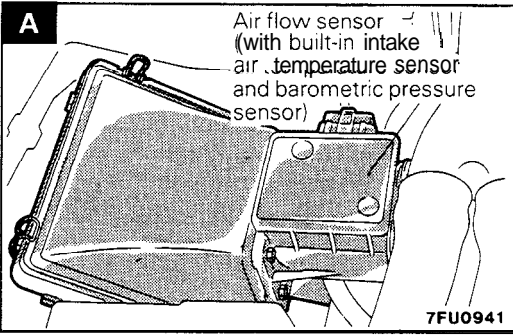
ON-VEHICLE INSPECTION OF MPI COMPONENTS

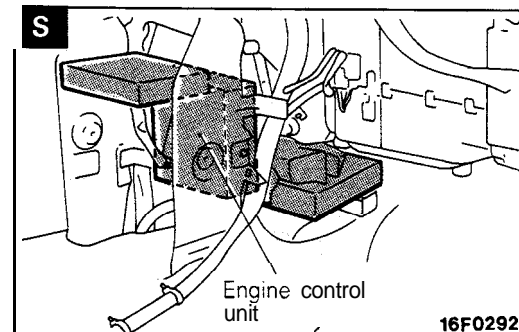
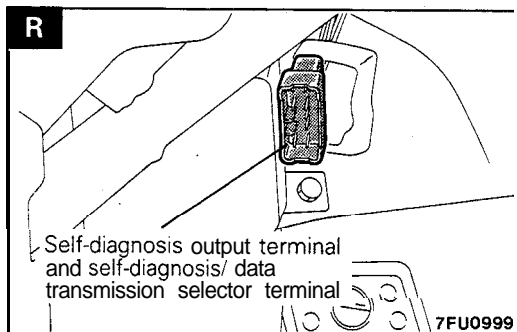
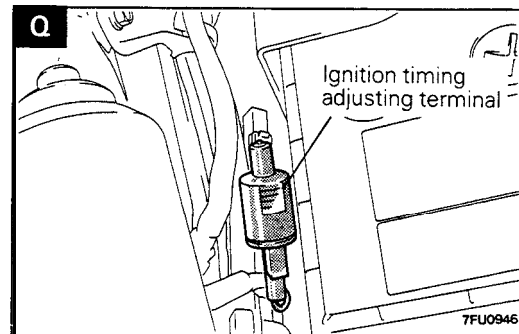
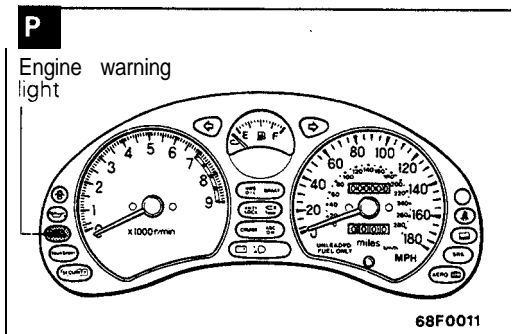
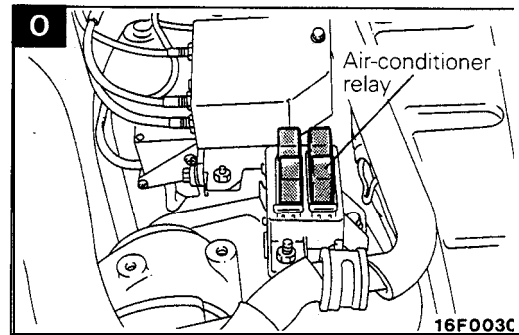
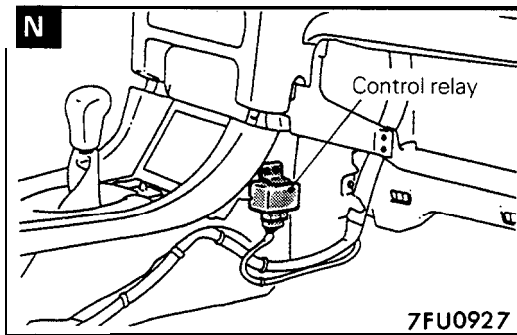
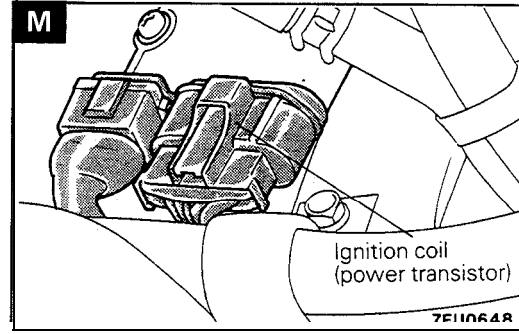
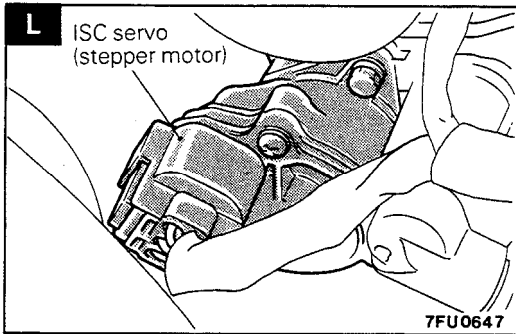
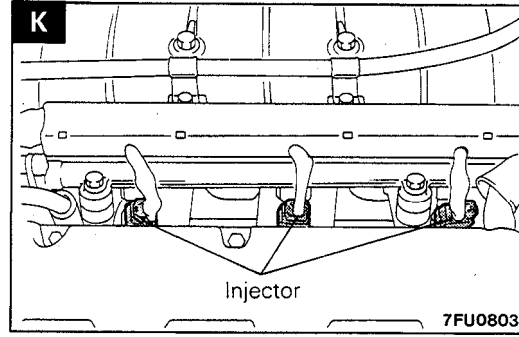
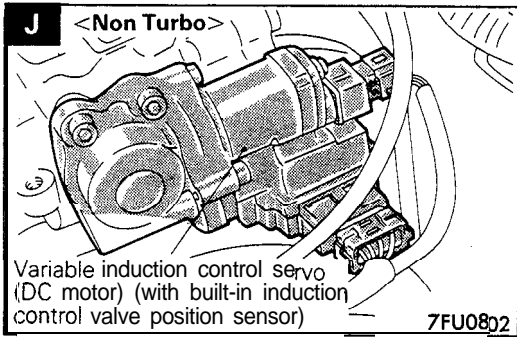
COMPONENTS LOCATION

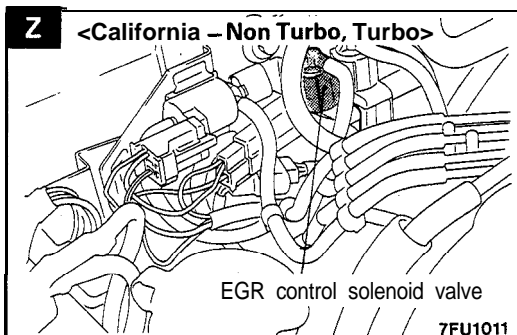
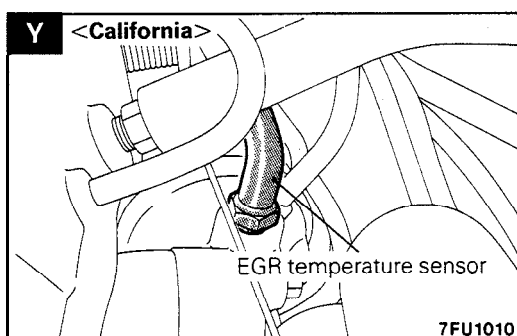
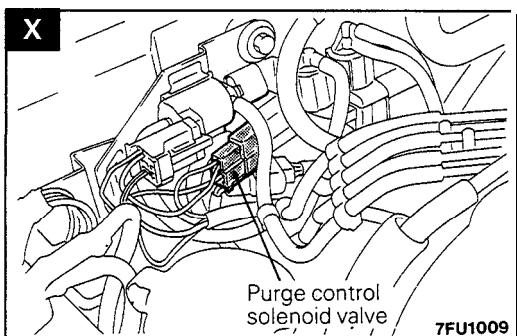
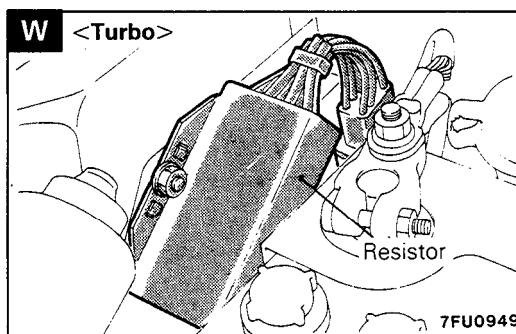
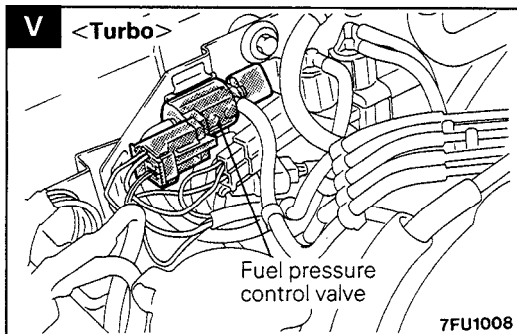
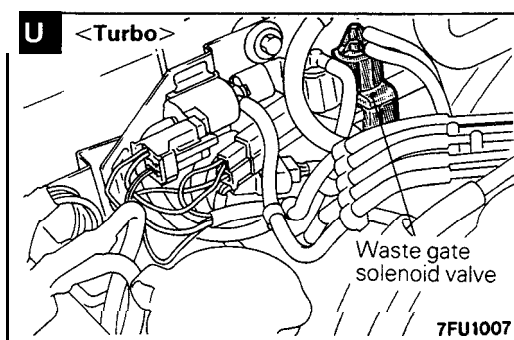
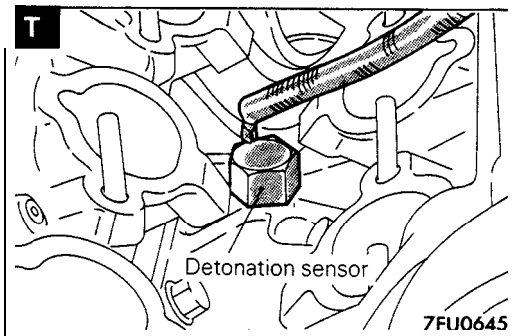
Name	Symbol	Name	Symbol
Air flow sensor (with built-in intake air temperature sensor and barometric pressure sensor)	A	Inhibitor switch <A/T>	I
Air-conditioner relay	O	Injector	K
Air-conditioner switch	G	ISC servo (stepper motor)	L
Control relay	N	Oxygen sensor	E
Detonation sensor	T	Power steering oil pressure switch	H
EGR control solenoid valve <California – Non Turbo, Turbo>	Z	Purge control solenoid valve	X
EGR temperature sensor <California>	Y	Resistor <Turbo>	W
Engine control unit	S	Self-diagnosis output terminal and self-diagnosis/data transmission selector terminal	R
Engine coolant temperature sensor	B	TDC sensor and crank angle sensor	D
Engine warning light	P	Throttle position sensor (with built-in idle switch)	C
Fuel pressure control valve <Turbo>	V	Variable induction control servo (DC motor) (with built-in induction control valve position sensor) <Non Turbo>	J
Ignition coil (power transistor)	M	Vehicle speed sensor (reed switch)	F
Ignition timing adjusting terminal	Q	Waste gate solenoid valve <Turbo>	U

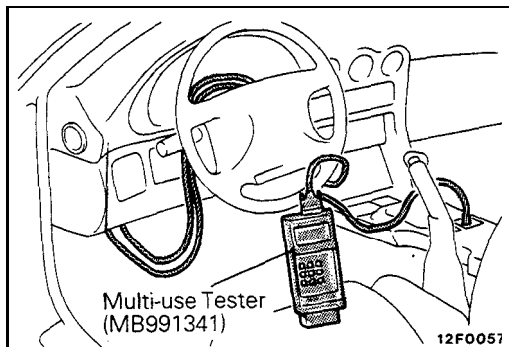
NOTE
The "Name" column is in alphabetical order.









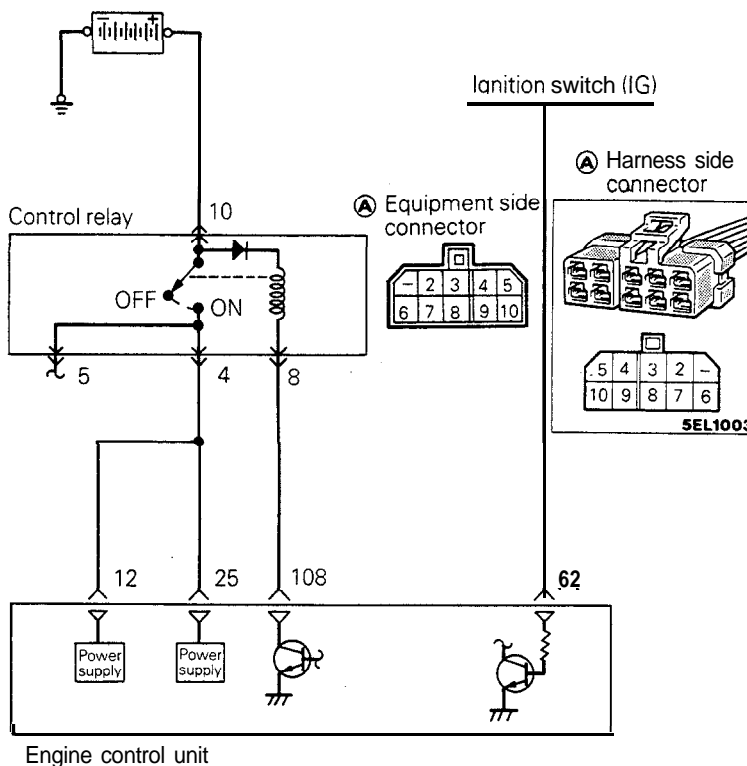
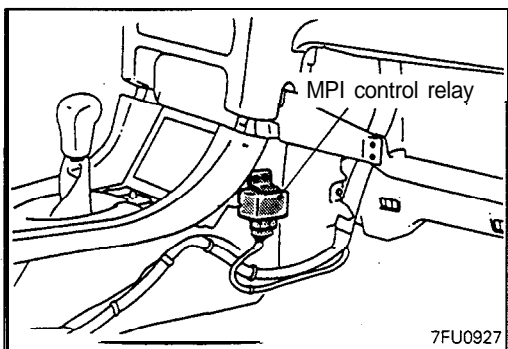
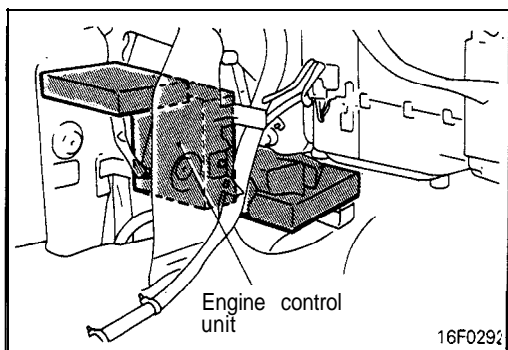


COMPONENTS INSPECTION PROCEDURE M13YBAC USING MULTI-USE TESTER

- (1) Check by the service data 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 multi-use tester to make sure that the input and output signals are now normal.
- (3) Erase the self-diagnosis trouble code in memory.
- (4) Disconnect the multi-use tester.
- (5) Start the engine and perform running test, etc. to make sure that the troubles have been corrected.

M13YCAA

POWER SUPPLY AND IGNITION SWITCH-IG



Engine control unit connector

7FU0950

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	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62
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7FU0653

OPERATION

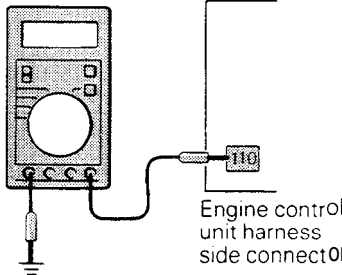
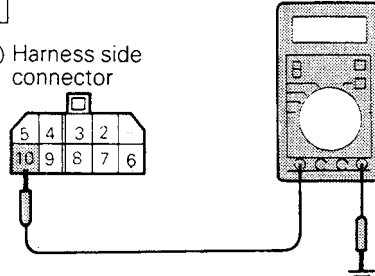
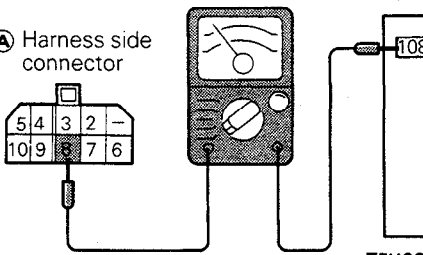
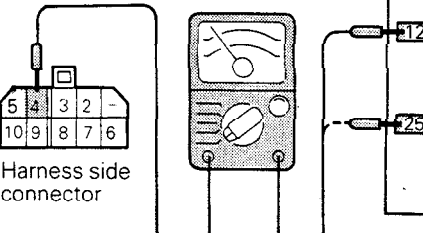
- While the ignition switch is on, battery power is supplied to the engine control unit, the injector, the air flow sensor, etc.
- When the ignition switch is turned on, the battery voltage is applied from the ignition switch to the engine control unit, which then turns ON the power transistor to energize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

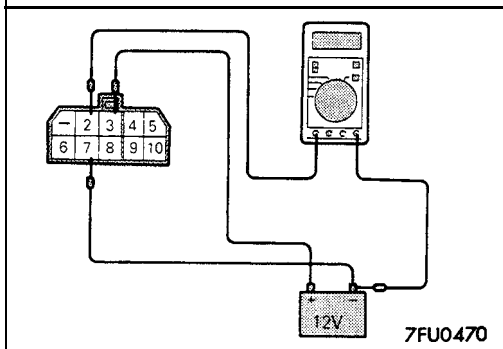
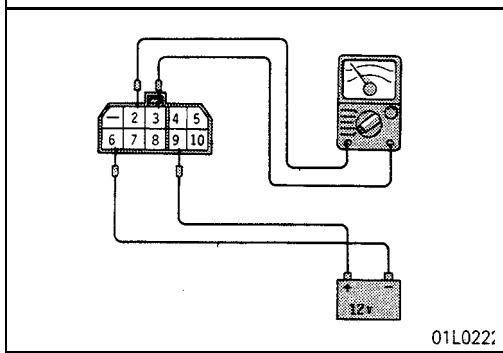
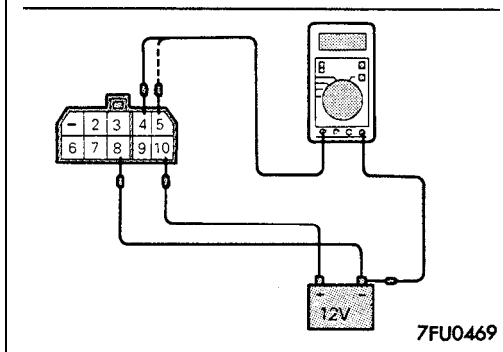
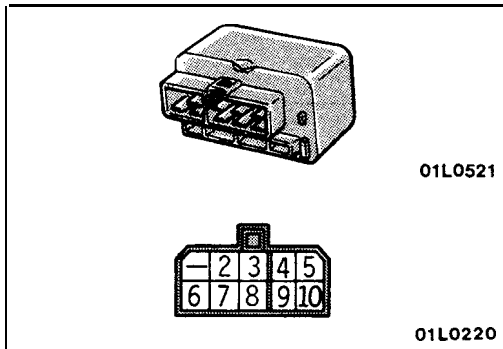
INSPECTION

Using Multi-use Tester

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

HARNESS INSPECTION

<p>1</p>  <p>Engine control unit harness side connector</p> <p>01L0427</p>	<p>Measure the ignition switch terminal input voltage.</p> <ul style="list-style-type: none"> • Engine control unit connector: Disconnected • Ignition switch: ON <p>OK → 2</p> <p>OK → Repair the harness. (Ignition switch – 62)</p> <table border="1" data-bbox="592 325 1015 430"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>SV</td> </tr> </table>	Voltage (V)	SV
Voltage (V)			
SV			
<p>2</p> <p>(A) Harness side connector</p>  <p>7FU0537</p>	<p>Measure the power supply voltage of the control relay.</p> <ul style="list-style-type: none"> • Connector: Disconnected <p>OK → 3</p> <p>OK → Repair the harness. (Battery – (A)10)</p> <table border="1" data-bbox="592 640 1015 745"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>SV</td> </tr> </table>	Voltage (V)	SV
Voltage (V)			
SV			
<p>3</p> <p>(A) Harness side connector</p>  <p>Engine control unit harness side connector</p> <p>7FU0951</p>	<p>Check for an open-circuit, or a short-circuit to ground, between the engine control unit and the control relay.</p> <ul style="list-style-type: none"> • Engine control unit connector: Disconnected • Control relay connector: Disconnected <p>OK → 4</p> <p>OK → Repair the harness. ((A)8 – 108)</p>		
<p>4</p> <p>(A) Harness side connector</p>  <p>Engine control unit harness side connector</p> <p>7FU0468</p>	<p>Check for an open-circuit, or a short-circuit to ground between the engine control unit and the control relay.</p> <ul style="list-style-type: none"> • Control relay connector: Disconnected • Engine control unit connector: Disconnected <p>OK → STOP</p> <p>OK → Repair the harness. ((A)4 – 12, 25)</p>		



CONTROL 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 control relay.

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

Jumper wire	Voltage at terminal ④	Voltage at terminal ⑤
Connected	SV	SV
Disconnected	0 V	0 V

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

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

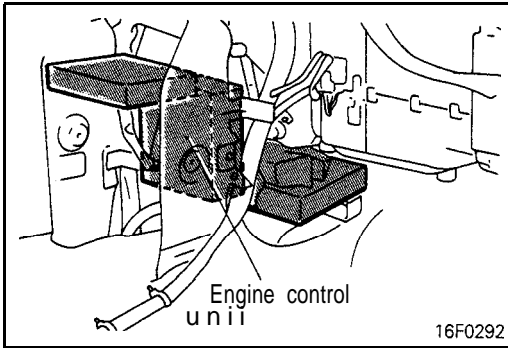
- (6) Using jumper wires, connect terminal ③ of control relay to battery ⊕ terminal and terminal ⑦ of control relay to battery ⊖ terminal.
- (7) Connecting and disconnecting the jumper wire to battery ⊖ terminal, measure the voltage at terminal ② of the control relay.

Jumper wire	Voltage at terminal ②
Connected	SV
Disconnected	0 V

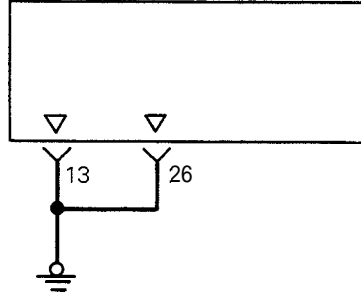
(8) Replace the control relay if any defect is evident.

ENGINE CONTROL UNIT POWER GROUND

M13YDAA



Engine control unit



01A0191

Engine control unit connector

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	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
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7FU0653

OPERATION

Grounds the engine control unit

TROUBLESHOOTING HINTS

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

HARNESS INSPECTION

1

Engine control unit harness side connector

01P0150

Check for continuity of the ground circuit.

- Engine control unit connector: Disconnected

OK

OK

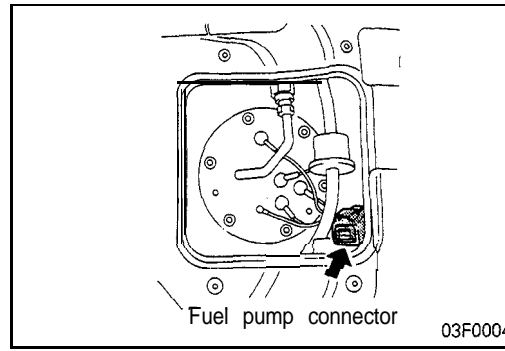
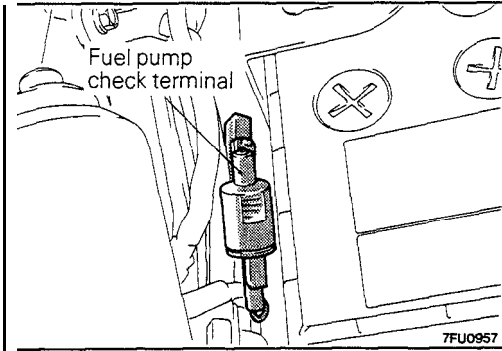
→

STOP

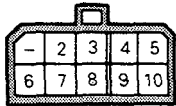
Repair the harness.
(13 – Ground)
(26 – Ground)

FUEL PUMP <Non Turbo>

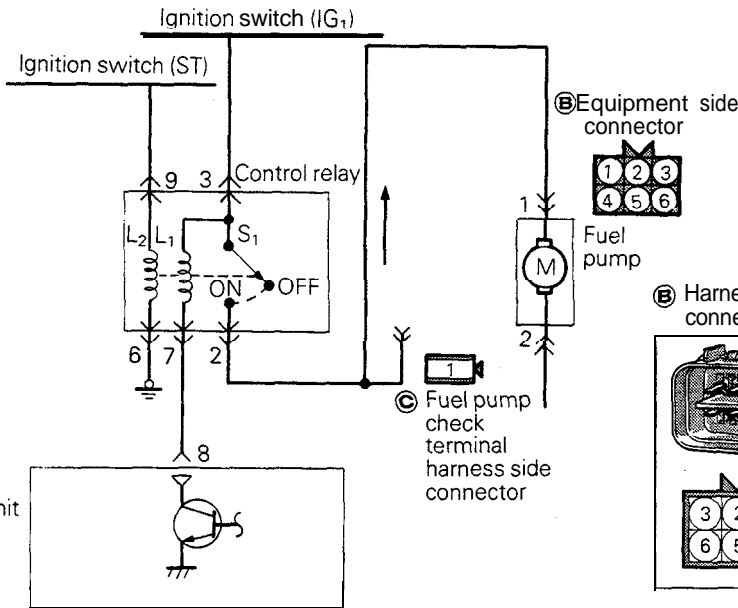
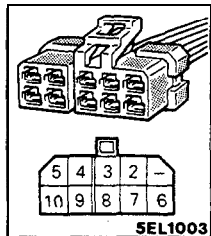
M13YEA2



Ⓐ Equipment side connector

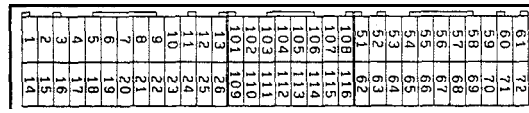


Ⓐ Harness side connector



Engine control unit

Engine control unit connector



7FU0952

7FU0653

OPERATION

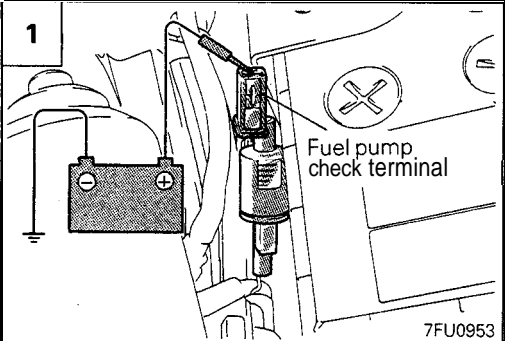
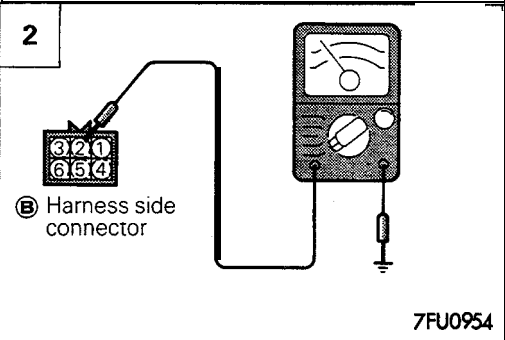
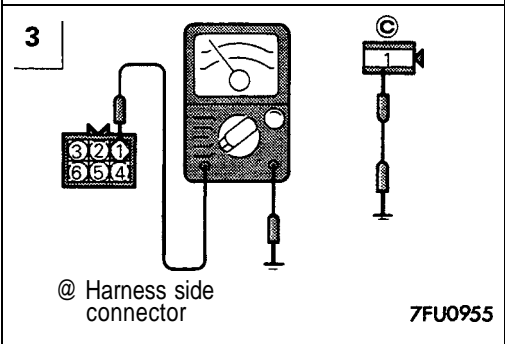
- Drives the fuel pump during cranking and engine operation.
- When the ignition switch is set to START, current flows from the ignition switch through the control relay coil to ground. This turns on the control relay switch and drive power is supplied from the battery through the control relay switch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

INSPECTION

Using Multi-use Tester

Function	Item No.	Drive	Check condition	Check content	Normal state
Actuator test 07	07	Fuel pump is driven to circulate fuel	<ul style="list-style-type: none"> 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

<p>1</p>  <p>Fuel pump check terminal</p> <p>7FU0953</p>	<p>Check the fuel pump.</p> <ul style="list-style-type: none"> Apply battery voltage to the checking terminal and operate the pump. 	<p>OK → 4</p> <p>✗ → 2</p>
<p>2</p>  <p>ⓑ Harness side connector</p> <p>7FU0954</p>	<p>Check for continuity of the ground circuit.</p> <ul style="list-style-type: none"> Fuel pump connector: Disconnected 	<p>OK → 3</p> <p>✗ → Repair the harness. (ⓑ2 - Ground)</p>
<p>3</p>  <p>@ Harness side connector</p> <p>7FU0955</p>	<p>Check for continuity between the fuel pump and the checking terminal.</p> <ul style="list-style-type: none"> Fuel pump connector: Disconnected 	<p>OK → 4</p> <p>✗ → Repair the harness. (ⓑ1 - Ⓒ1)</p>

4

Harness side connector

7FU0813

Check for continuity between the checking terminal and the control relay terminals.

- Control relay connector: Disconnected
- Fuel pump connector: Disconnected

OK → **5**

✗ → Repair the harness. (A2 - C1)

5

A Harness side connector

7FU0474

Measure the power supply voltage of the control relay.

- Connector: Disconnected
- Ignition switch: START (when @@checked)
- Ignition switch: ON (when A3 checked)

Voltage (V)
8 or more

OK → **6**

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

6

A Harness side connector

Engine control unit harness side connector

7FU0475

Check for an open-circuit, or a short-circuit to ground between the control relay and the engine control unit.

- Control relay connector: Disconnected
- Engine control unit connector: Disconnected

OK → **7**

✗ → Repair the harness. (A7 - 8)

7

A Harness side connector

7FU0476

Check for continuity of the ground circuit.

- Connector: Disconnected

OK → **8**

✗ → Repair the harness. (A6 - Ground)

8

A Harness side connector

Harness side connector

7FU0956

Check for an open-circuit, or a short-circuit to ground between the control relay and the fuel pump.

- Control relay connector: Disconnected
- Fuel pump connector: Disconnected

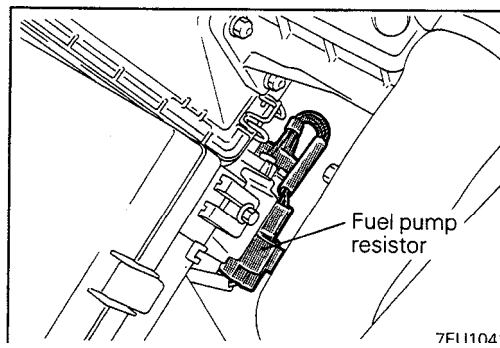
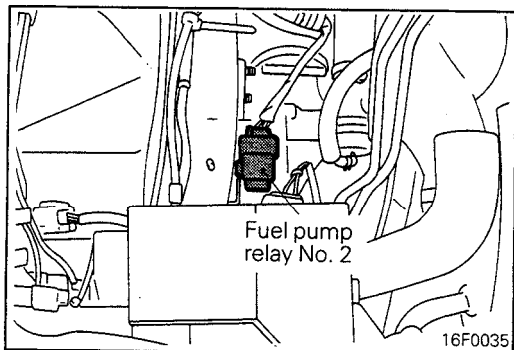
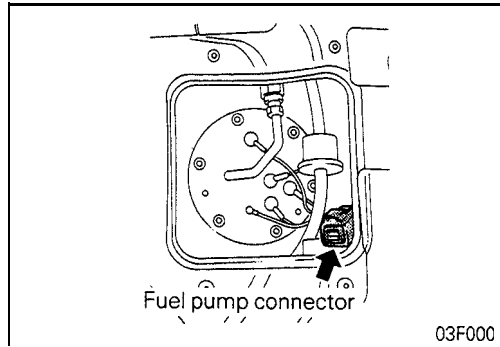
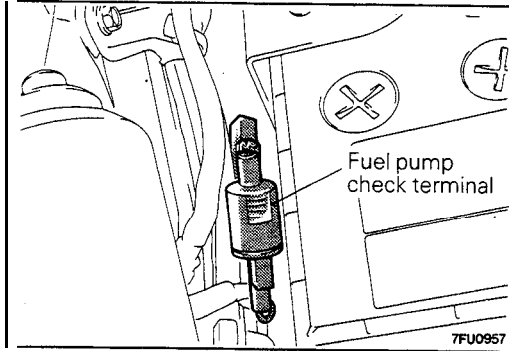
OK → **STOP**

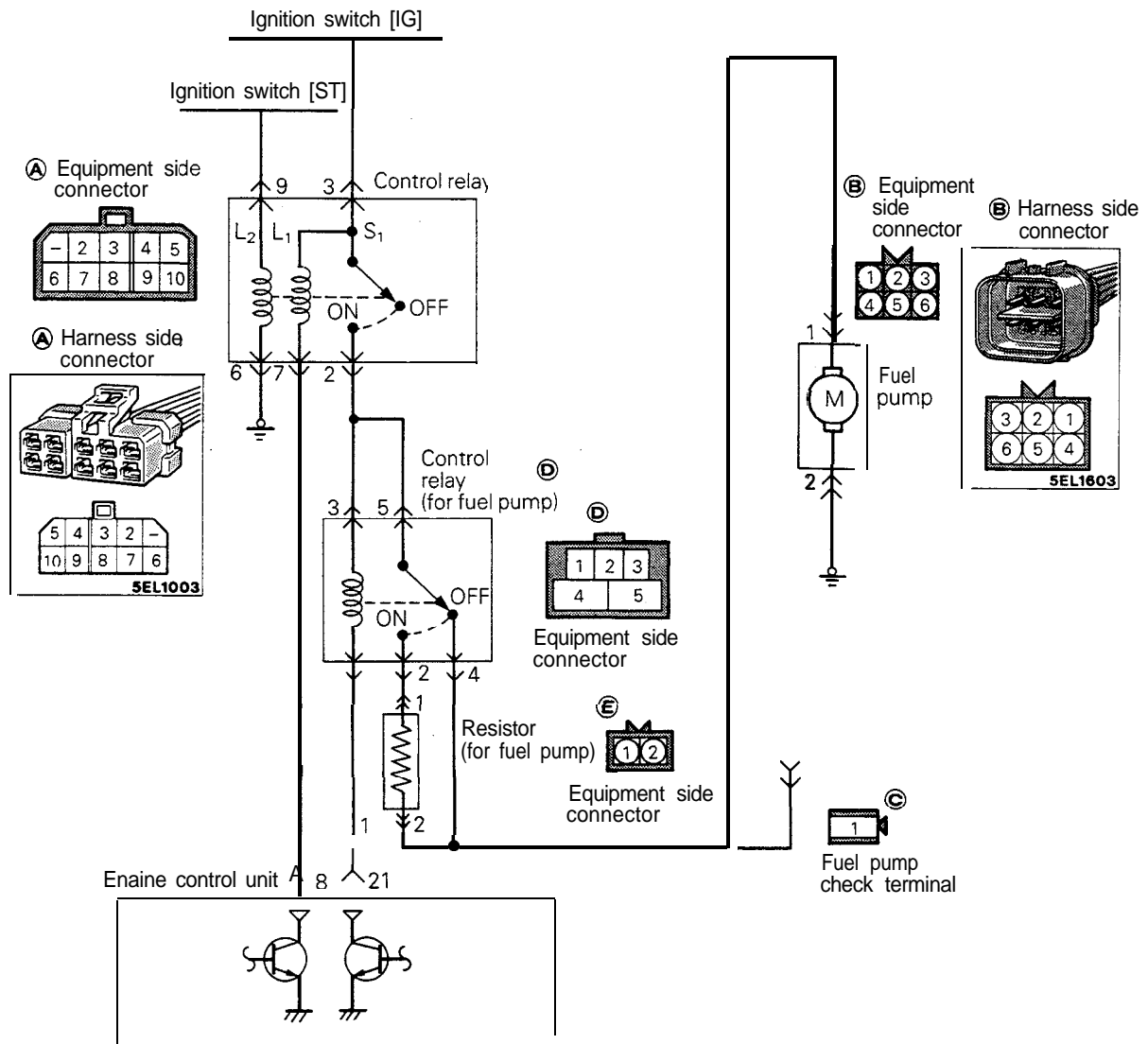
✗ → Repair the harness. (A2 - B1)

CONTROL RELAY INSPECTION

Refer to P.13-43.

FUEL PUMP <Turbo>





Engine control unit connector

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	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
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7FU0959

7FU0653

OPERATION

Control 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 control relay coil to ground. This turns on the control relay switch and drive power is supplied from the battery through the control relay switch to the fuel pump.
- While the engine is running, the engine control unit keeps the power transistor on and energizes the control relay coil so that drive power is supplied to the fuel pump.

Fuel Pump Relay No. 2 Operation

- Change the fuel pump discharge in two stages by ON-OFF operation of the relay switch for fuel pump relay No. 2.
- If the amount of inlet air is small (the engine load is low), the engine control unit turns on the power transistor to energize the coil of fuel pump relay No. 2, 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 unit turns off the power transistor to send drive power directly to the fuel pump without passing through the resistor.

INSPECTION

Using Multi-use Tester

<Fuel Pump>

Function	Item No.	Operation	Check condition	Check item	Normal condition
Actuator test	07	Fuel pump is driven to circulate fuel	<ul style="list-style-type: none"> • 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 No. 2>

Function	Item No.	Operation	Check condition	Normal condition
Actuator test	13	Turn the fuel pump relay No. 2 from OFF to ON	Ignition switch: ON	Operating sound is heard.

HARNESS INSPECTION

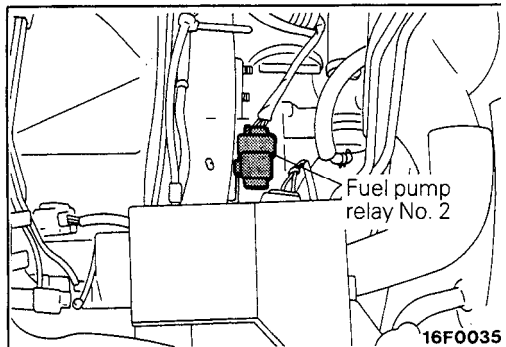
<p>1</p> <p>Fuel pump check terminal</p> <p>7FU0953</p>	<p>Check the fuel pump.</p> <ul style="list-style-type: none"> • Apply battery voltage to the checking terminal and operate the pump. 	<p>OK → 4</p> <p>✗ → 2</p>
<p>2</p> <p>ⓑ Harness side connector</p> <p>L - J</p> <p>7FU0954</p>	<p>Check the ground circuit of the fuel pump.</p> <ul style="list-style-type: none"> • Connector: Disconnected 	<p>OK → 3</p> <p>✗ → Repair the harness. (ⓑ2 - Ground)</p>

<p>3</p> <p>ⓑ Harness side connector</p> <p>7FU095</p>	<p>Check for continuity between the fuel pump and the checking terminal.</p> <ul style="list-style-type: none"> • Connector: Disconnected 	<p>OK → 4</p> <p>✗ → Repair the harness. (ⓑ1 – ⓒ1)</p>		
<p>4</p> <p>ⓓ Harness side connector</p> <p>7FU0960</p>	<p>Check for continuity between the checking terminal and the control relay (for fuel pump), and between the resistor (for fuel pump).</p> <ul style="list-style-type: none"> • Control relay (for fuel pump) connector: Disconnected • Resistor (for fuel pump) connector: Disconnected • Fuel pump connector: Disconnected 	<p>OK → 5</p> <p>✗ → Repair the harness. (ⓒ1 – ⓓ2) (ⓓ2 – ⓑ2)</p>		
<p>5</p> <p>ⓓ Harness side connector</p> <p>Engine control unit harness side connector</p> <p>7FU0961</p>	<p>Check for an open-circuit, or a short-circuit to ground, between the control relay (for fuel pump) and the engine control unit.</p> <ul style="list-style-type: none"> • Control relay (for fuel pump) connector: Disconnected • Engine control unit connector: Disconnected 	<p>OK → 6</p> <p>✗ → Repair the harness. (ⓓ1 – ⓔ1)</p>		
<p>6</p> <p>ⓓ Harness side connector</p> <p>7FU0962</p>	<p>Check for continuity between the control relay (for fuel pump) and the resistor (for fuel pump).</p> <ul style="list-style-type: none"> • Control relay (for fuel pump) connector: Disconnected • Resistor (for fuel pump) connector: Disconnected 	<p>OK → 7</p> <p>✗ → Repair the harness. (ⓓ4 – ⓔ1)</p>		
<p>7</p> <p>ⓐ Harness side connector</p> <p>7FU0474</p>	<p>Measure the power supply voltage of the control relay.</p> <ul style="list-style-type: none"> • Connector: Disconnected • Ignition switch: START (when checking ⓐ9) • Ignition switch: ON (when checking ⓐ3) <table border="1" data-bbox="657 1816 1079 1921"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>8 or higher</td> </tr> </table>	Voltage (V)	8 or higher	<p>OK → 8</p> <p>✗ → Repair the harness. (Ignition switch [IG] – ⓐ3) (Ignition switch [ST] – ⓐ9)</p>
Voltage (V)				
8 or higher				

<p>8</p> <p>A Harness side connector</p> <p>Engine control unit harness side connector</p> <p>7FU0475</p>	<p>Check for an open-circuit, or a short-circuit to ground, between the control relay and the engine control unit.</p> <ul style="list-style-type: none"> Control relay connector: Disconnected Engine control unit connector: Disconnected <p>OK → 9</p> <p>✗ → Repair the harness. (A7 - 8)</p>
<p>9</p> <p>A Harness side connector</p> <p>D Harness side connector</p> <p>7FU0963</p>	<p>Check for continuity between the control relay and the control relay (for fuel pump).</p> <ul style="list-style-type: none"> Control relay connector: Disconnected Control relay (for fuel pump) connector: Disconnected <p>OK → 10</p> <p>✗ → Repair the harness. (A2 - D3) (A2 - D5)</p>
<p>10</p> <p>A Harness side connector</p> <p>7FU0476</p>	<p>Check for continuity of the ground circuit.</p> <ul style="list-style-type: none"> Connector: Disconnected <p>OK → 11</p> <p>✗ → Repair the harness. (A6 - Ground)</p>
<p>11</p> <p>B Harness side connector</p> <p>D Harness side connector</p> <p>7FU0964</p>	<p>Check for an open-circuit, or a short-circuit to ground, between the control relay (for fuel pump) and the fuel pump.</p> <ul style="list-style-type: none"> Control relay (for fuel pump) connector: Disconnected Fuel pump connector: Disconnected <p>OK → STOP</p> <p>✗ → Repair the harness. (B1 - D2)</p>

CONTROL RELAY INSPECTION

Refer to P.13-43.

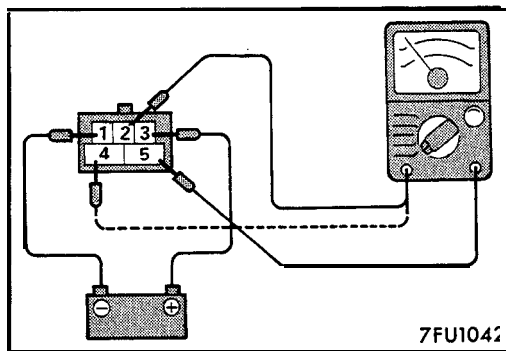


FUEL PUMP RELAY NO. 2

M13RGAA

INSPECTION

(1) Remove fuel pump relay No. 2.

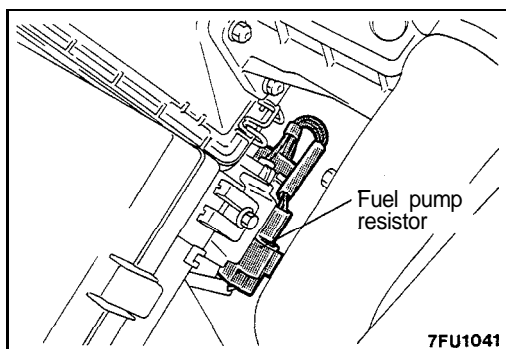


(2) Use a jumper wire to connect terminal ③ of fuel pump relay No. 2 and the positive terminal of the battery and use another jumper wire to connect terminal ① and the negative terminal of the battery.

(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 No. 2 and between terminals ④ and ⑤ of fuel pump relay No. 2.

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 No. 2 if it is faulty.

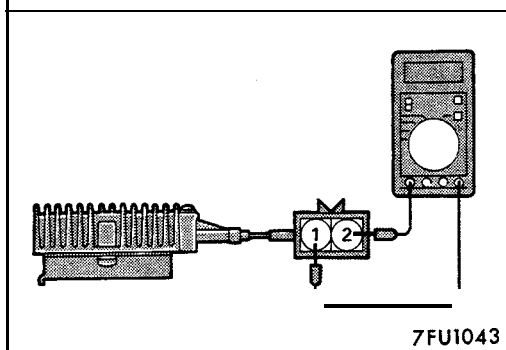


FUEL PUMP RESISTOR

M13RHAA

INSPECTION

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

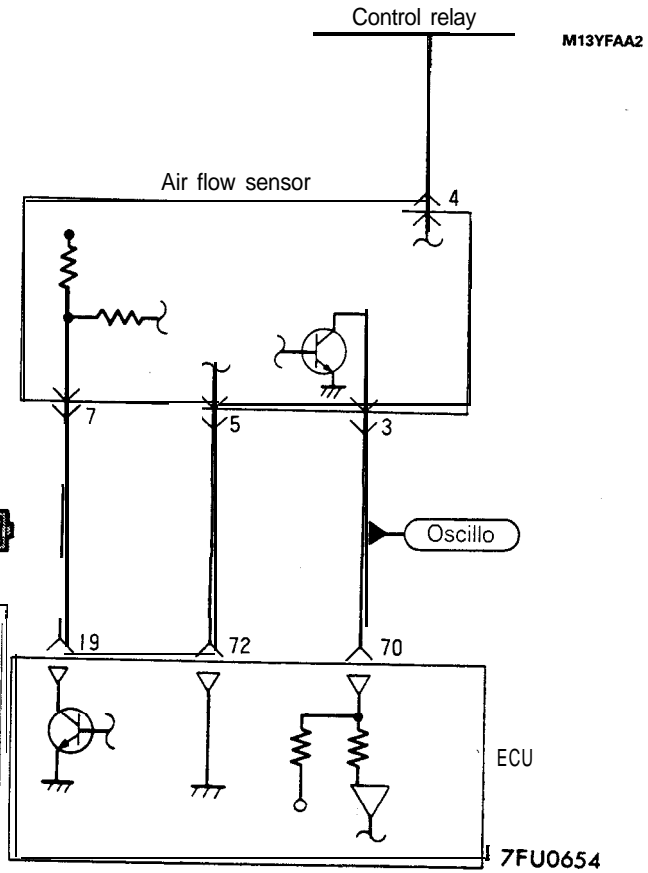
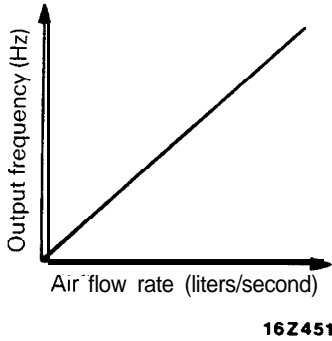
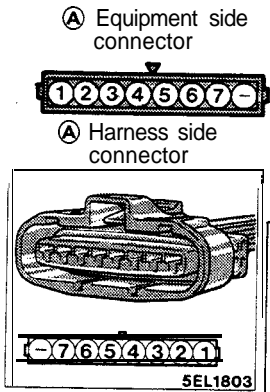
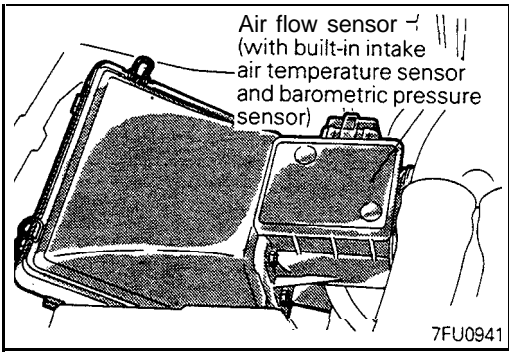


(2) Measure the resistance between the terminals.

Standard value: 0.6 – 0.9 Ω

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

AIR FLOW SENSOR



Engine control unit connector

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	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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7FU0653

OPERATION

- The 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 unit, which then computes the fuel injection rate, etc. based on the input signal.
- The air flow sensor power is supplied from the control relay to the air flow sensor and is grounded in the engine control unit. The air flow sensor generates a pulse signal as it repeatedly opens and closes between the 5 V voltage supplied from the engine control unit and ground.

TROUBLESHOOTING HINTS

- Hint 1: If the engine stalls occasionally, crank the engine and shake the air flow sensor harness. If the engine stalls, poor contact of the air flow sensor connector is suspected.
- Hint 2: If the air flow sensor output frequency is other than 0 when the ignition switch is turned on (but not starting the engine), faulty air flow sensor or engine control unit is suspected.
- Hint 3: If the engine can be run idle even though the air flow sensor output frequency is out of specification, troubles are often found in other than the air flow sensor itself.

[Examples]

- (1) Disturbed 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

INSPECTION

Using Multi-use Tester

<Air Flow Sensor>

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	12	Sensor air volume (frequency)	<ul style="list-style-type: none"> • Engine coolant temperature: 80 to 95°C (176 to 205°F) • Lights and accessories: OFF • Transaxle: Neutral (P range for vehicle with A/T) • Steering wheel: Neutral 	700 rpm (Idle)	25-50 Hz
				2,000 rpm	70 – 100 Hz
				Racing	Frequency increases with racing

NOTE

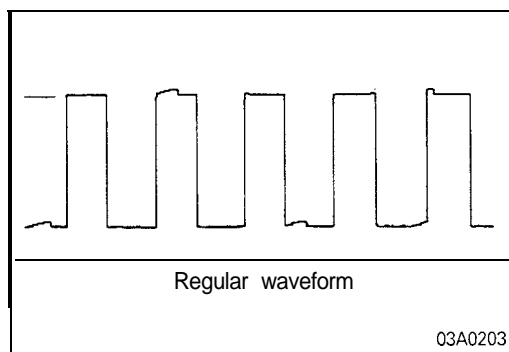
When the vehicle is new [within initial operation of about 500 km (300 miles)], the air flow sensor output frequency may be about 10% higher.

<Air Flow Sensor Reset Signal>

Function	Item No.	Data display	Check conditions	Engine conditions	Standard value
Data list	34	Reset signal condition	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Engine coolant temperature: 80 to 95°C (176 to 205°F) • Lights, electric cooling fan and accessory operation: OFF • Transaxle: Neutral (P range for vehicle with A/T) • Steering wheel: Neutral 	700 rpm (Idle)	20 – 35 %
				2,000 rpm	15 – 30 %
				Racing	Frequency increases with racing



Using Oscilloscope

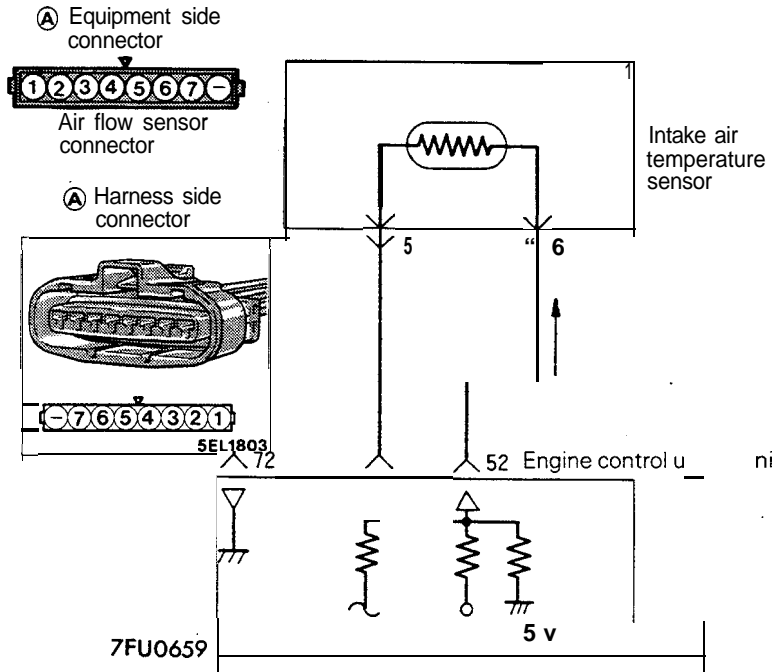
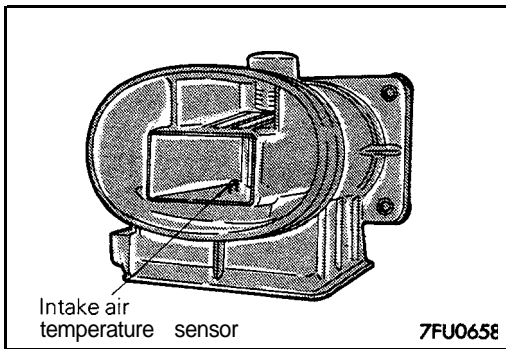
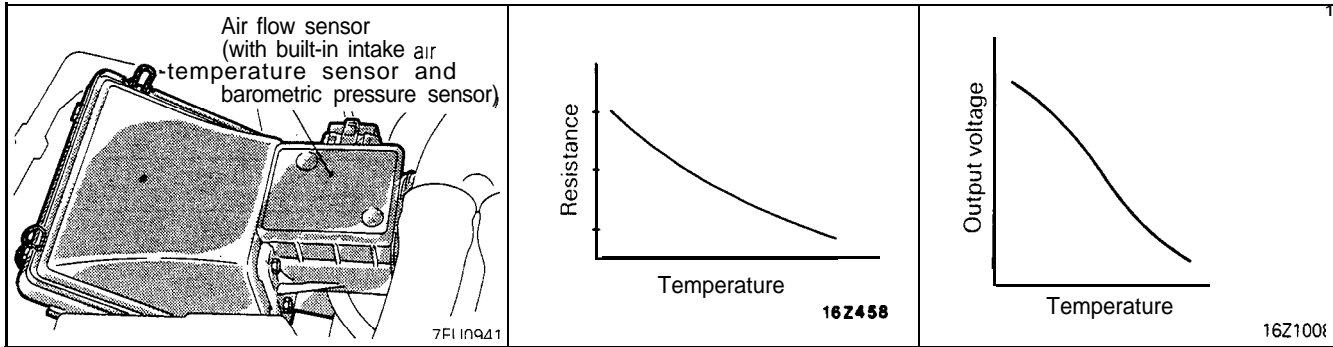
- (1) Run the engine at idle speed.
- (2) Connect the probe to the oscilloscope pick-up point as shown in the circuit diagram, and check the waveform.

HARNESS INSPECTION

<p>1</p> <p>Ⓐ Harness side connector</p> <p>7FU0655</p>	<p>Measure the power supply voltage.</p> <ul style="list-style-type: none"> • Connector: Disconnected • Ignition switch: ON <table border="1" style="width: 100%;"> <tr> <td style="text-align: center;">Voltage (V)</td> </tr> <tr> <td style="text-align: center;">SV</td> </tr> </table> <p>OK →</p> <p>OK →</p>	Voltage (V)	SV	<p>2</p> <p>Repair the harness (Ⓐ4) – Control relay) or check the control relay.</p>
Voltage (V)				
SV				
<p>2</p> <p>Ⓐ Harness side connector</p> <p>7FU0656</p>	<p>Measure the terminal voltage.</p> <ul style="list-style-type: none"> • Connector: Disconnected • Ignition switch: ON <table border="1" style="width: 100%;"> <tr> <td style="text-align: center;">Voltage (V)</td> </tr> <tr> <td style="text-align: center;">4.8 – 5.2</td> </tr> </table> <p>OK →</p> <p>OK →</p>	Voltage (V)	4.8 – 5.2	<p>3</p> <p>Repair the harness (Ⓐ3) – 70</p>
Voltage (V)				
4.8 – 5.2				
<p>3</p> <p>Ⓐ Harness side connector</p> <p>7FU0657</p>	<p>Check for continuity of the ground circuit.</p> <ul style="list-style-type: none"> • Connector: Disconnected <p>OK →</p> <p>OK →</p>	<p>STOP</p> <p>Repair the harness. (Ⓐ5) – 72</p>		
<p>4</p> <p>Ⓐ Harness side connector</p> <p>Engine control unit harness side connector</p> <p>7FU0745</p>	<p>Check for continuity between the air flow sensor and the engine control unit.</p> <ul style="list-style-type: none"> • Air flow sensor connector: Disconnected • Engine control unit connector: Disconnected <p>OK →</p> <p>OK →</p>	<p>STOP</p> <p>Repair the harness. (Ⓐ7) – 19</p>		

INTAKE AIR TEMPERATURE SENSOR

M13YGAA2



OPERATION

- The intake air temperature sensor converts the engine intake air temperature into a voltage and inputs it to the engine control unit, which then corrects the fuel injection rate, etc. based on the input signal.
- The 5 V power in the engine control unit is supplied via a resistor in the unit to the intake air temperature sensor. Via the sensor which is a kind of resistor, it is grounded in the engine control unit. The intake air temperature sensor resistor has such characteristic that 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.

INSPECTION

Using Multi-use Tester

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

7FU0657

Check for continuity of the ground circuit.

- Connector: Disconnected

OK →

✗ →

2

Repair the harness.
(A) 5 - 52

2 (A) Harness side connector

7FU0660

Measure the power supply voltage.

- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
4.5 – 4.9

OK →

✗ →

STOP

Repair the harness.
(A) 6 - 52

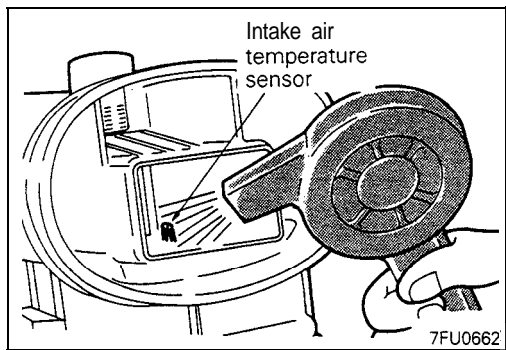
Air flow sensor side connector

7FU0661

SENSOR INSPECTION

- Disconnect the air flow sensor connectors.
- Measure resistance between terminals (5) and (6).

Temperature [°C(°F)]	Resistance (kΩ)
0 (32)	6.0
20 (68)	2.7
80 (176)	0.4



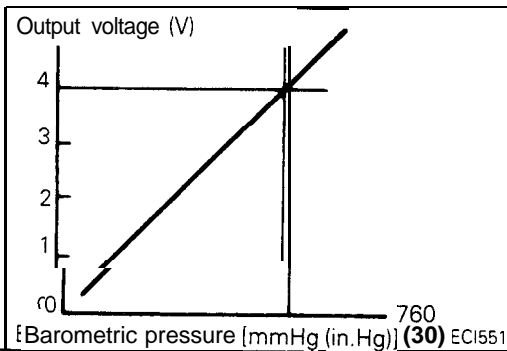
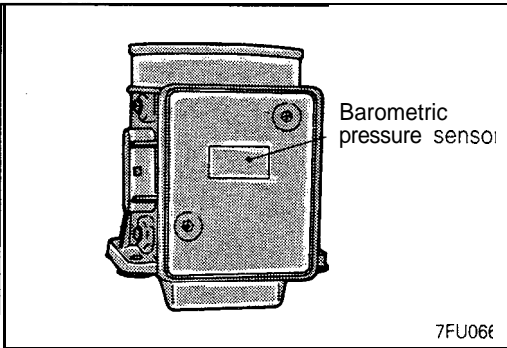
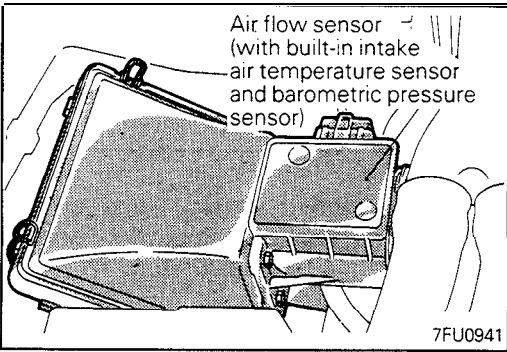
- (3) Measure resistance while heating the sensor using a hair drier.

Temperature [°C (°F)]	Resistance (kΩ)
Higher	Smaller

- (4) If the value deviates from the standard value or the resistance remains unchanged, replace the air flow sensor assembly.

BAROMETRIC PRESSURE SENSOR

M13YHAA2

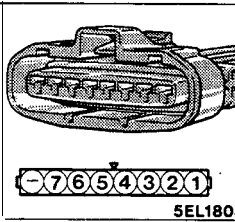


Ⓐ Equipment side connector

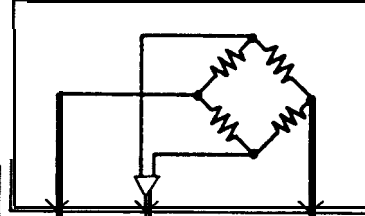


Air flow sensor connector

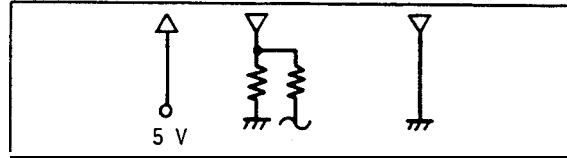
Ⓐ Harness side connector



Barometric pressure sensor



Engine control unit 61 65 72



7F U0664

Engine control unit connector

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	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
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7FU0653

OPERATION

- The barometric pressure sensor converts the barometric pressure into a voltage and inputs it to the engine control unit, which then corrects the fuel injection rate, etc. based on the input signal.
- The 5 V power in the engine control unit is supplied to the barometric pressure sensor. Through the circuit in the sensor, it is grounded in the engine control unit.
- The barometric pressure sensor output voltage which is proportional to the barometric pressure (absolute pressure) is supplied to the engine control unit.

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 Multi-use Tester

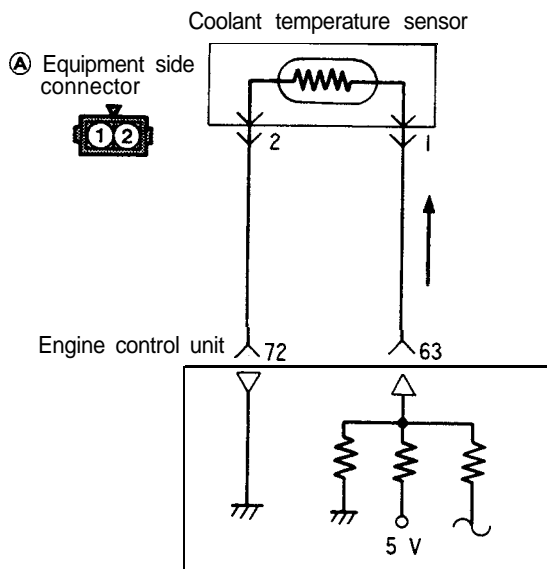
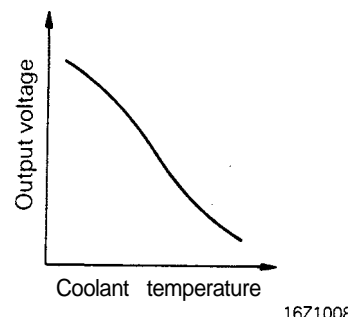
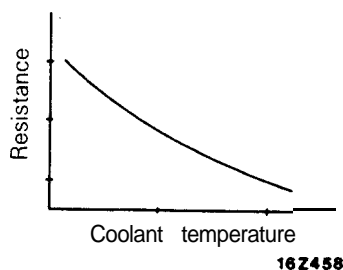
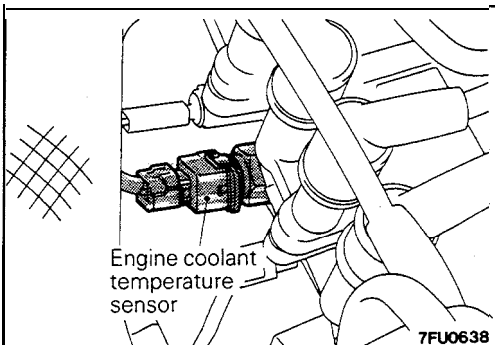
Function	Item No.	Data display	Check condition	Altitude	Standard value
Data reading	25	Sensor pressure	Ignition switch: ON	At 0 m (0 ft.)	760 mmHg
				At 600 m (1,969 ft.)	710 mmHg
				At 1,200 m (3,937 ft.)	660 mmHg
				At 1,800 m (5,906 ft.)	610 mmHg

HARNES INSPECTION

<p>1</p> <p>Ⓐ Harness side connector</p> <p>7FU0657</p>	<p>Check for continuity of the ground circuit.</p> <ul style="list-style-type: none"> Connector: Disconnected 	<p>OK → 2</p> <p>✗ → Repair the harness. (A) 1 - 61</p>		
<p>2</p> <p>Ⓐ Harness side connector</p> <p>7FU0661</p>	<p>Measure the power supply voltage of the barometric pressure sensor.</p> <ul style="list-style-type: none"> Connector: Disconnected Ignition switch: ON <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>4.8 – 5.2</td> </tr> </table>	Voltage (V)	4.8 – 5.2	<p>OK → 3</p> <p>✗ → Repair the harness. (A) 1 - 61</p>
Voltage (V)				
4.8 – 5.2				
<p>3</p> <p>Ⓐ Harness side connector</p> <p>Engine control unit harness side connector</p> <p>7FU0666</p>	<p>Check for an open-circuit, or a short-circuit to ground between the engine control unit and the barometric pressure sensor.</p> <ul style="list-style-type: none"> Air flow sensor connector: Disconnected Engine control unit connector: Disconnected 	<p>OK → STOP</p> <p>✗ → Repair the harness. (A) 2 - 65</p>		

ENGINE COOLANT TEMPERATURE SENSOR

M13YIAA2



7FU0667

OPERATION

- The engine coolant temperature sensor converts the engine coolant temperature into a voltage and inputs it to the engine control unit, 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 unit is supplied via a resistor in the unit to the engine coolant temperature sensor. Through the sensor which is a kind of resistor, it is grounded in the engine control unit. The engine coolant temperature sensor resistor has such characteristic that 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

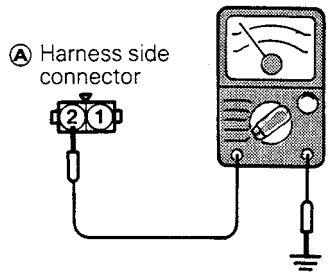
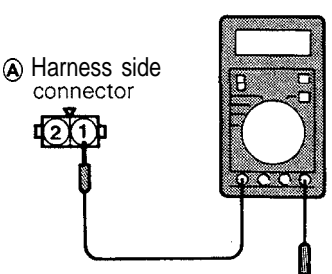
If the fast idle speed is inadequate or the engine emits dark smoke during engine warm up operation, the engine coolant temperature sensor is often faulty.

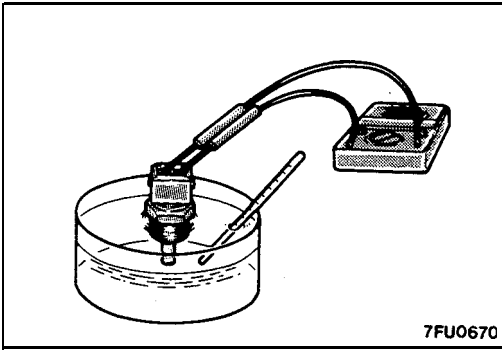
INSPECTION

Using Multi-use Tester

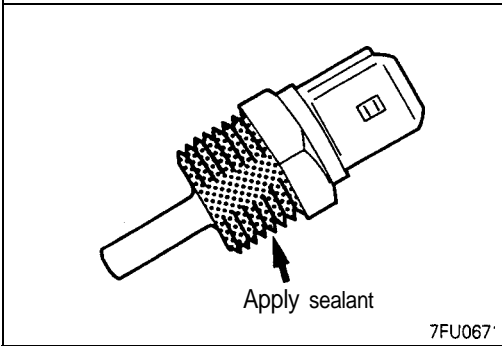
Function	Item No.	Data display	Check condition	Coolant temperature	Standard value
Data reading	21	Sensor temperature	Ignition switch: ON or engine operating	At -20°C (-4°F)	-20°C
				At 0°C (32°F)	0°C
				At 20°C (68°F)	20°C
				At 40°C (104°F)	40°C
				At 80°C (176°F)	80°C

HARNESS INSPECTION

<p>1</p>  <p>Ⓐ Harness side connector</p> <p>7FU0668</p>	<p>Check for continuity of the ground circuit.</p> <ul style="list-style-type: none"> • Connector: Disconnected 	<p>OK → 2</p> <p>OK → Repair the harness. (Ⓐ 2 – 72)</p>		
<p>2</p>  <p>Ⓐ Harness side connector</p> <p>7FU0669</p>	<p>Measure the power supply voltage.</p> <ul style="list-style-type: none"> • Connector: Disconnected • Ignition switch: ON <table border="1" data-bbox="657 1092 1079 1197"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>4.5 – 4.9</td> </tr> </table>	Voltage (V)	4.5 – 4.9	<p>OK → STOP</p> <p>OK → Repair the harness. (Ⓐ 1 – 63)</p>
Voltage (V)				
4.5 – 4.9				



7FU0670



7FU067

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)	5.8
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

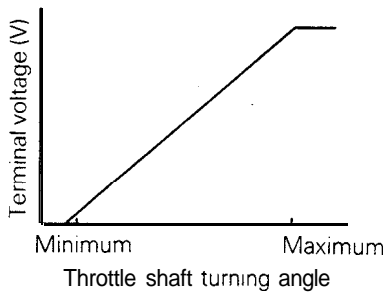
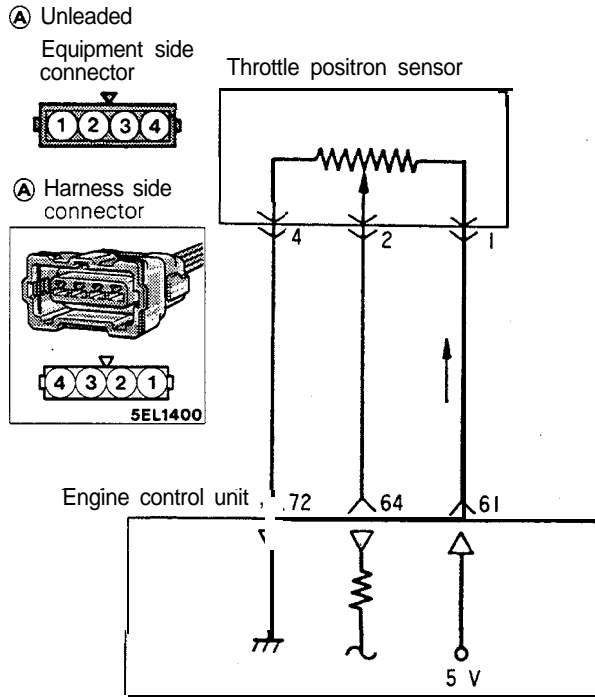
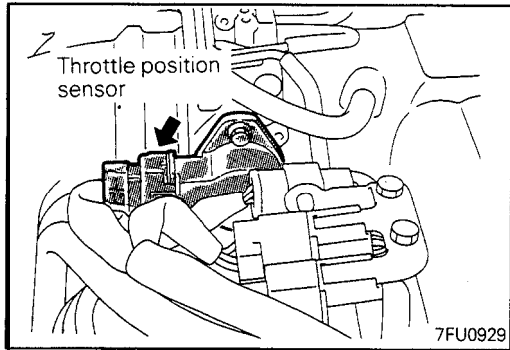
- (2) Install engine coolant temperature sensor and tighten it to specified torque..

Sensor tightening torque: 30 Nm (22 ft.lbs.)

- (3) Fasten harness connectors securely.

M13YJAC

THROTTLE POSITION SENSOR



Engine control unit connector

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	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

7FU0653

OPERATION

- The throttle position sensor converts the throttle position opening into a voltage and inputs it to the engine control unit, which then controls the fuel injection based on the input signal.
- The 5 V power in the engine control unit is supplied to the throttle position sensor. Through the resistor in the sensor, it is grounded in the engine control unit.
- 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 idle position switch (fixed SAS) setting, adjust the idle position switch (fixed SAS).

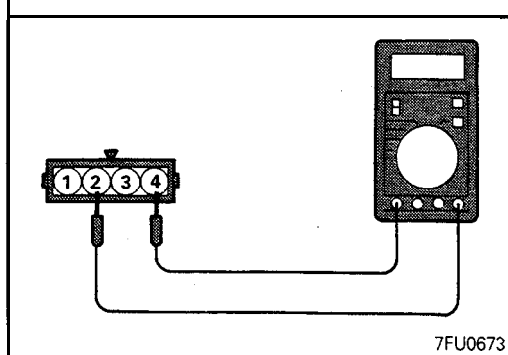
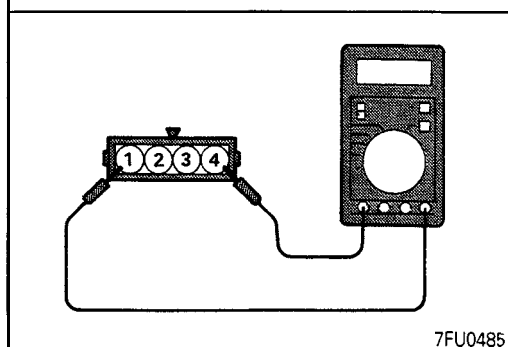
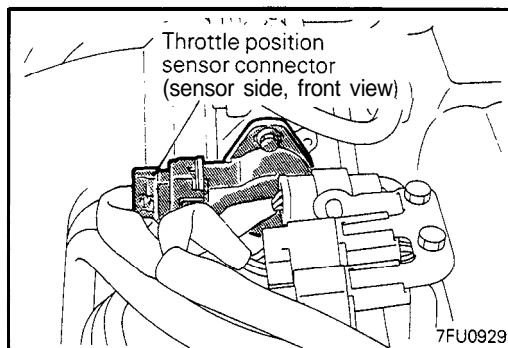
INSPECTION

Using Multi-use Tester

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

<p>1</p> <p>④ ③ ② ① A Harness side connector</p> <p>6FU1241</p>	<p>Measure the power supply voltage of the throttle position sensor.</p> <ul style="list-style-type: none"> Connector: Disconnected Ignition switch: ON <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Voltage (V)</td> </tr> <tr> <td style="text-align: center;">4.8 – 5.2</td> </tr> </table>	Voltage (V)	4.8 – 5.2	<p>OK → 2</p> <p>✗ → Repair the harness. (A1 – 61)</p>
Voltage (V)				
4.8 – 5.2				
<p>2</p> <p>④ ③ ② ① A Harness side connector</p> <p>6FU1242</p>	<p>Check for continuity of the ground circuit.</p> <ul style="list-style-type: none"> Connector: Disconnected 	<p>OK → 3</p> <p>✗ → Repair the harness. (A4 – 72)</p>		
<p>3</p> <p>④ ③ ② ① A Harness side connector</p> <p>Engine control unit harness side connector 64</p> <p>6FU1243</p>	<p>Check for an open-circuit, or a short-circuit to ground between the engine control unit and the throttle position sensor.</p> <ul style="list-style-type: none"> Throttle position sensor connector: Disconnected Engine control unit connector: Disconnected 	<p>OK → STOP</p> <p>✗ → Repair the harness. (A2 – 64)</p>		



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.

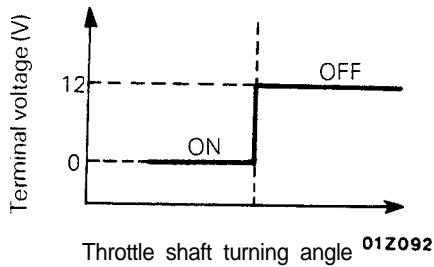
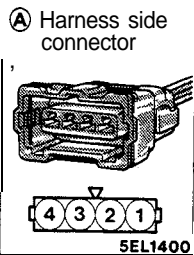
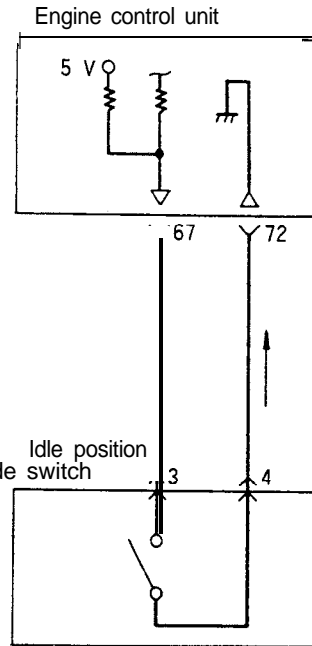
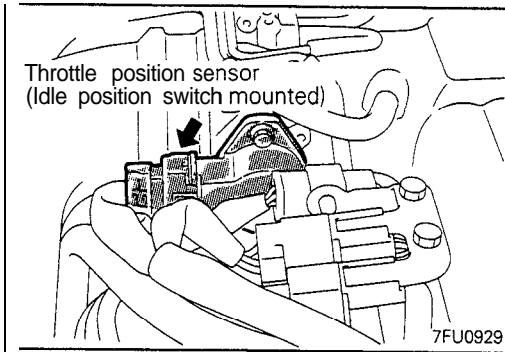
(5) If the resistance is out of specification, or fails to change smoothly, replace the throttle position sensor.

Throttle position sensor installation torque: 2.0 Nm (1.5 ft.lbs.)

For the idle position switch and throttle position sensor adjusting procedure, refer to P. 13-33.

IDLE POSITION SWITCH

M13YKAD



7FU0674

OPERATION

- The idle 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 unit, which then controls the idle speed control servo based on the input signal.
- The voltage in the engine control unit is applied to the idle position switch through a resistor. When the accelerator pedal is released, the idle position switch is turned on to conduct the voltage to ground. This causes the idle position switch terminal voltage to go low from high.

TROUBLESHOOTING HINTS

If the idle position switch harness and individual part check results are normal but the idle position switch output is abnormal, the following troubles are suspected.

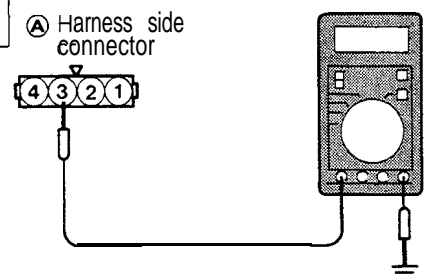
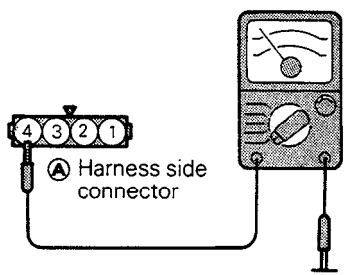

- (1) Poorly adjusted accelerator cable or auto-cruise control cable
- (2) Poorly adjusted idle position switch (fixed SAS)

INSPECTION

Using Multi-use Tester

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	ON
				Open a little	OFF

HARNES INSPECTION

<p>1</p> <p>Ⓐ Harness side connector</p>  <p style="text-align: right;">7FU0675</p>	<p>Measure the power supply voltage of the idle position switch.</p> <ul style="list-style-type: none"> • Connector: Disconnected • Ignition switch: ON <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">Voltage (V)</td> </tr> <tr> <td style="text-align: center;">4 or more</td> </tr> </table>	Voltage (V)	4 or more	<p style="text-align: center;">OK → 2</p> <p style="text-align: center;">OK → Repair the harness. (A3-67)</p>
Voltage (V)				
4 or more				
<p>2</p>  <p style="text-align: right;">6FU1242</p>	<p>Check for continuity of the ground circuit.</p> <ul style="list-style-type: none"> • Connector: Disconnected 	<p style="text-align: center;">OK → </p> <p style="text-align: center;">OK → Repair the harness. (A4-72)</p>		

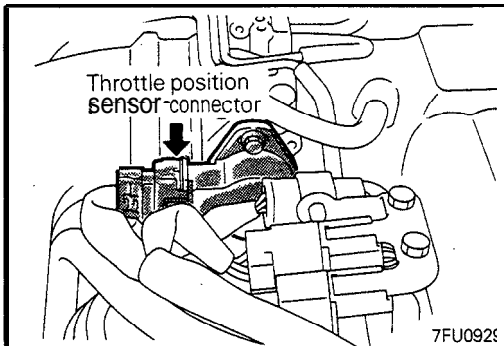
SENSOR INSPECTION

- (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.13-35.)

- (2) Disconnect the throttle position sensor connector.
- (3) Check the continuity across the throttle position sensor connector terminal ④ (Sensor ground) and ③ (Idle position switch).



Accelerator pedal	Continuity
Depressed	Non-conductive ($\infty \Omega$)
Released	Conductive (0Ω)

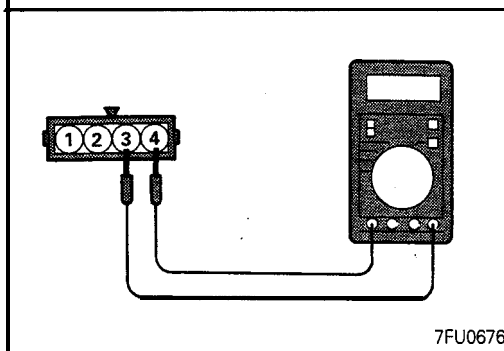
NOTE

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.

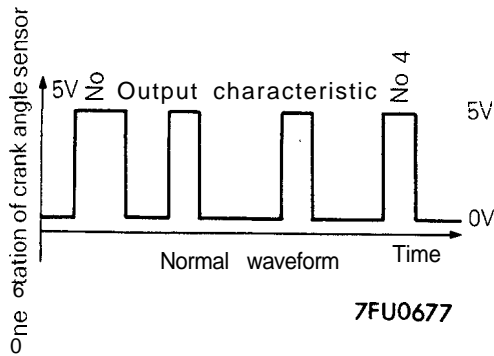
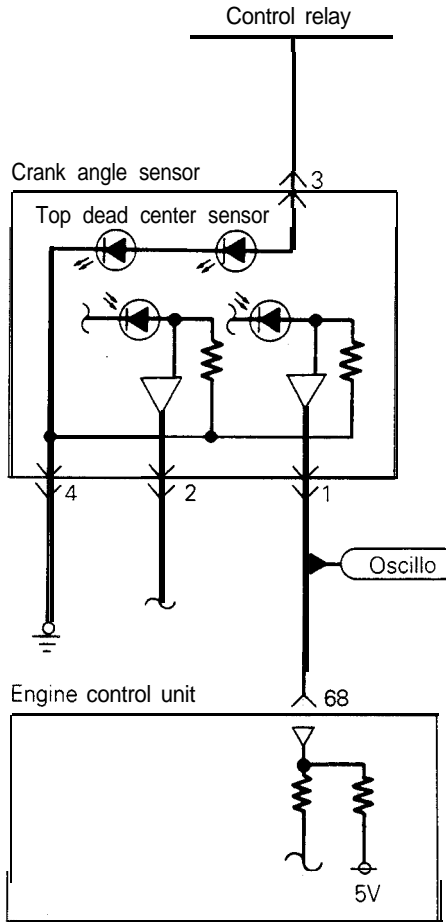
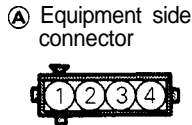
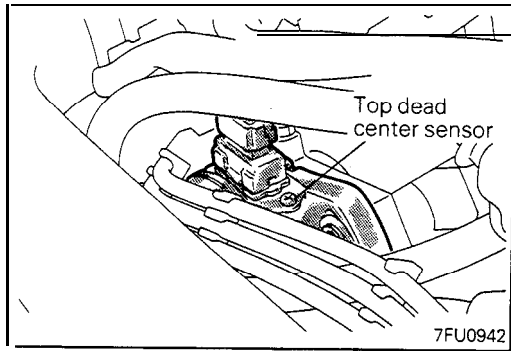
- (4) Replace the throttle-position sensor (idling-position switch incorporated) if there is a malfunction.

NOTE

For the idle position switch and throttle position sensor adjusting procedure, refer to P.13-33.



TOP DEAD CENTER SENSOR

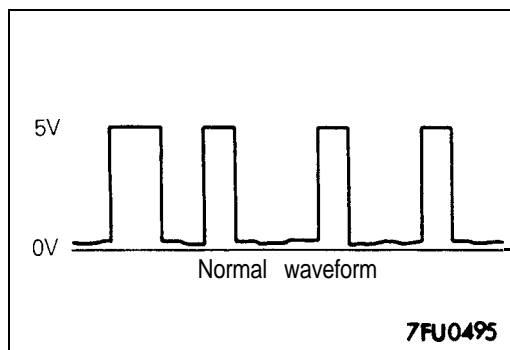


OPERATION

- The top dead center 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 unit, which then computes the fuel injection sequence, etc. based on the input signal.
- Power to the top dead center sensor is supplied from the control relay and is grounded to the body. The top dead center sensor generates a pulse signal as it repeatedly connects and disconnects between 5 V voltage supplied from the engine control unit and ground.

TROUBLESHOOTING HINTS

- Hint 1: If the top dead center 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 top dead center sensor or engine control unit is suspected.



INSPECTION

Using Oscilloscope

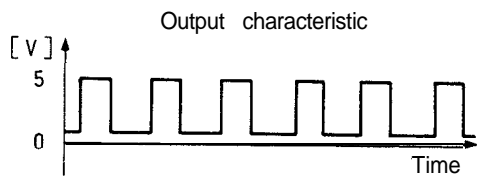
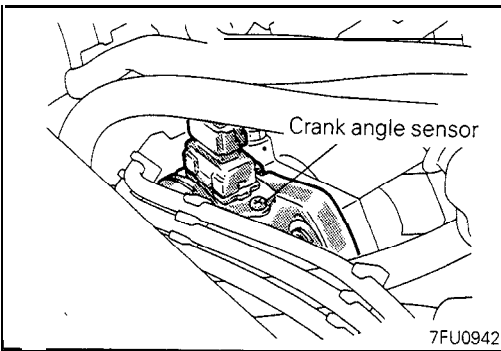
- (1) Run the engine at an idle speed.
- (2) Connect the probe to the oscilloscope pick-up point as shown in the circuit diagram, and check the waveform.

HARNESS INSPECTION

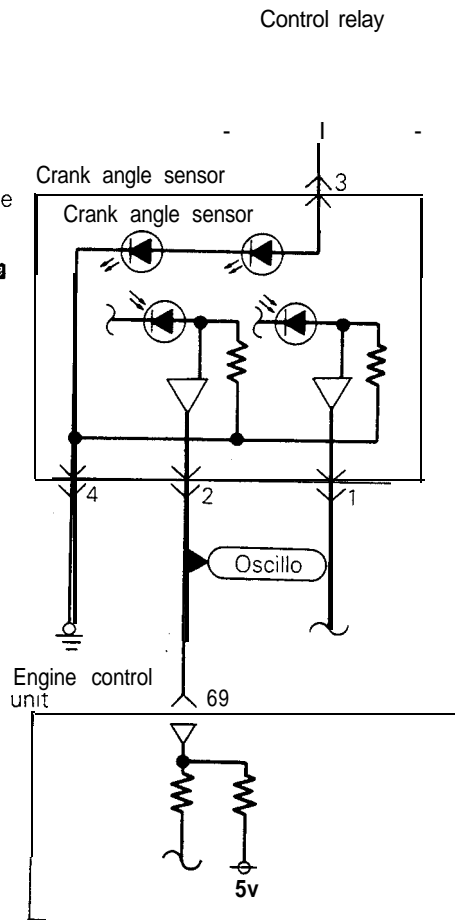
<p>1</p> <p>Ⓐ Harness side connector</p> <p>7FU0496</p>	<p>Measure the power supply voltage</p> <ul style="list-style-type: none"> • Connector: Disconnected • Ignition switch: ON <table border="1" style="width: 100%;"> <tr> <td style="text-align: center;">Voltage (V)</td> </tr> <tr> <td style="text-align: center;">SV</td> </tr> </table> <p>OK → 2</p> <p>✗ → Repair the harness. (Ⓐ3) – Control relay)</p>	Voltage (V)	SV	
Voltage (V)				
SV				
<p>2</p> <p>Ⓐ Harness side connector</p> <p>7FU0497</p>	<p>Check for continuity of the ground circuit.</p> <ul style="list-style-type: none"> • Connector: Disconnected <p>OK → 3</p> <p>✗ → Repair the harness. (Ⓐ4) – Ground)</p>			
<p>3</p> <p>Ⓐ Harness side connector</p> <p>7FU0498</p>	<p>Check the voltage of the output circuit.</p> <ul style="list-style-type: none"> • Connector: Disconnected • Ignition switch: ON <table border="1" style="width: 100%;"> <tr> <td style="text-align: center;">Voltage (V)</td> </tr> <tr> <td style="text-align: center;">4.8 ~ 5.2</td> </tr> </table> <p>OK → STOP</p> <p>✗ → Repair the harness. (Ⓐ1) – 22)</p>	Voltage (V)	4.8 ~ 5.2	
Voltage (V)				
4.8 ~ 5.2				

CRANK ANGLE SENSOR

M13YLAC



Ⓐ Equipment side connector



7FU0499

OPERATION

- The crank angle sensor senses the crank angle (piston position) of each cylinder, converts it into a pulse signal and inputs it to the engine control unit, which then computes the engine speed and controls the fuel injection timing and ignition timing based on the input signal.
- Power to the crank angle sensor is supplied from the control relay and is grounded to the body. The crank angle sensor generates a pulse signal as it repeatedly connects and disconnects between 5 V voltage supplied from the engine control unit and ground.

TROUBLESHOOTING HINTS

- Hint 1: If unexpected shocks are felt during driving or the engine stalls suddenly during idling, shake the crank angle sensor harness. If this causes the engine to stall, poor contact of the sensor connector is suspected.
- Hint 2: If the crank angle sensor outputs a pulse signal when the ignition switch is turned ON (with the engine not running), a faulty crank angle sensor or engine control unit is suspected.
- Hint 3: If the tachometer reads 0 rpm when the engine that has failed to start is cranked, faulty crank angle 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 power transistor is suspected.
- Hint 5: If the engine can be run at idle even though the crank angle sensor reading is out of specification, troubles are often in other than the crank angle sensor.

[Examples]

- (1) Faulty engine coolant temperature sensor
- (2) Faulty idle speed control servo
- (3) Poorly adjusted reference idle speed

INSPECTION

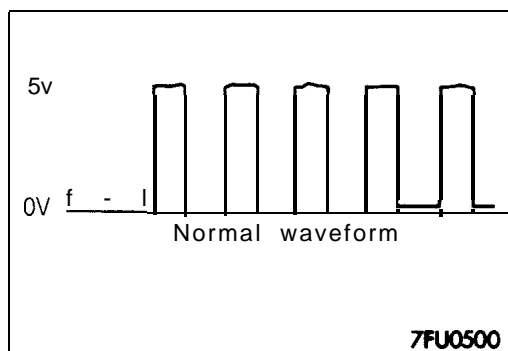
Using Multi-use Tester

Function	Item No.	Data display	Check condition	Check content	Normal state
Data reading	22	Cranking speed	<ul style="list-style-type: none"> • Engine cranking • Tachometer connected (check on and off of primary current of ignition coil by tachometer) 	Compare cranking speed and multi-use tester 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.

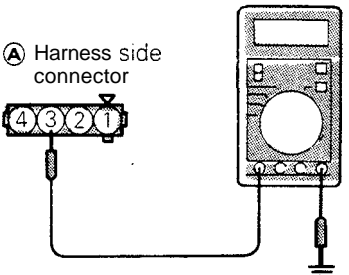
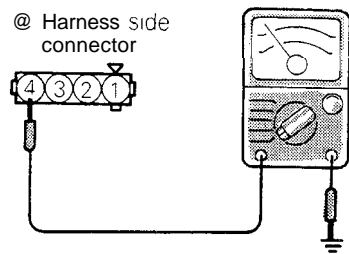
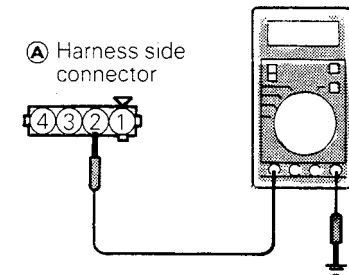
Function	Item No.	Data display	Check condition	Coolant temperature	Standard value
Data reading	22	Idle speed	<ul style="list-style-type: none"> • Engine: Running at idle • Idle position switch: ON 	At -20°C (-4°F)	1,300 – 1,500 rpm
				At 0°C (32°F)	1,250 – 1,450 rpm
				At 20°C (68°F)	1,100 – 1,300 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.

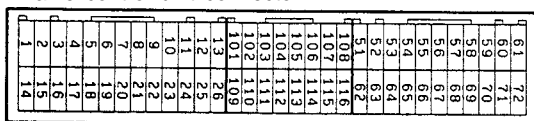
HARNESS INSPECTION

<p>1</p> <p>Ⓐ Harness side connector</p>  <p>7FU0496</p>	<p>Measure the power supply voltage.</p> <ul style="list-style-type: none"> • Connector: Disconnected • Ignition switch: ON <table border="1" data-bbox="609 283 1031 388"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>SV</td> </tr> </table> <p>OK → 2</p> <p>OK → Repair the harness. (Ⓐ3 – Control relay)</p>	Voltage (V)	SV	
Voltage (V)				
SV				
<p>2</p> <p>@ Harness side connector</p>  <p>7FU0497</p>	<p>Check for continuity of the ground circuit.</p> <ul style="list-style-type: none"> • Connector: Disconnected <p>OK → 3</p> <p>OK → Repair the harness. (Ⓐ4 – Ground)</p>			
<p>3</p> <p>Ⓐ Harness side connector</p>  <p>7FU0498</p>	<p>Check the voltage of the output circuit.</p> <ul style="list-style-type: none"> • Connector: Disconnected • Ignition switch: ON <table border="1" data-bbox="609 1050 1031 1155"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>4.8 – 5.2</td> </tr> </table> <p>OK → STOP</p> <p>OK → Repair the harness. (Ⓐ2 – 69)</p>	Voltage (V)	4.8 – 5.2	
Voltage (V)				
4.8 – 5.2				

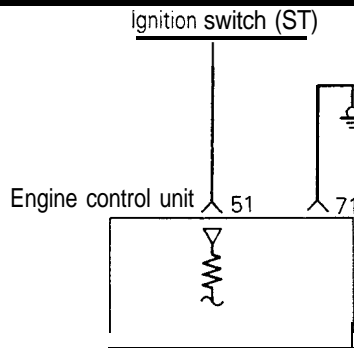
IGNITION SWITCH-ST <M/T>

M13YNAA

Engine control unit connector



7FU0653



1 FU0638

OPERATION

- The ignition switch-ST inputs a high signal to the engine control unit while the engine is cranking. The engine control unit 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 unit, which detects that the engine is cranking.

INSPECTION

Using Multi-use Tester

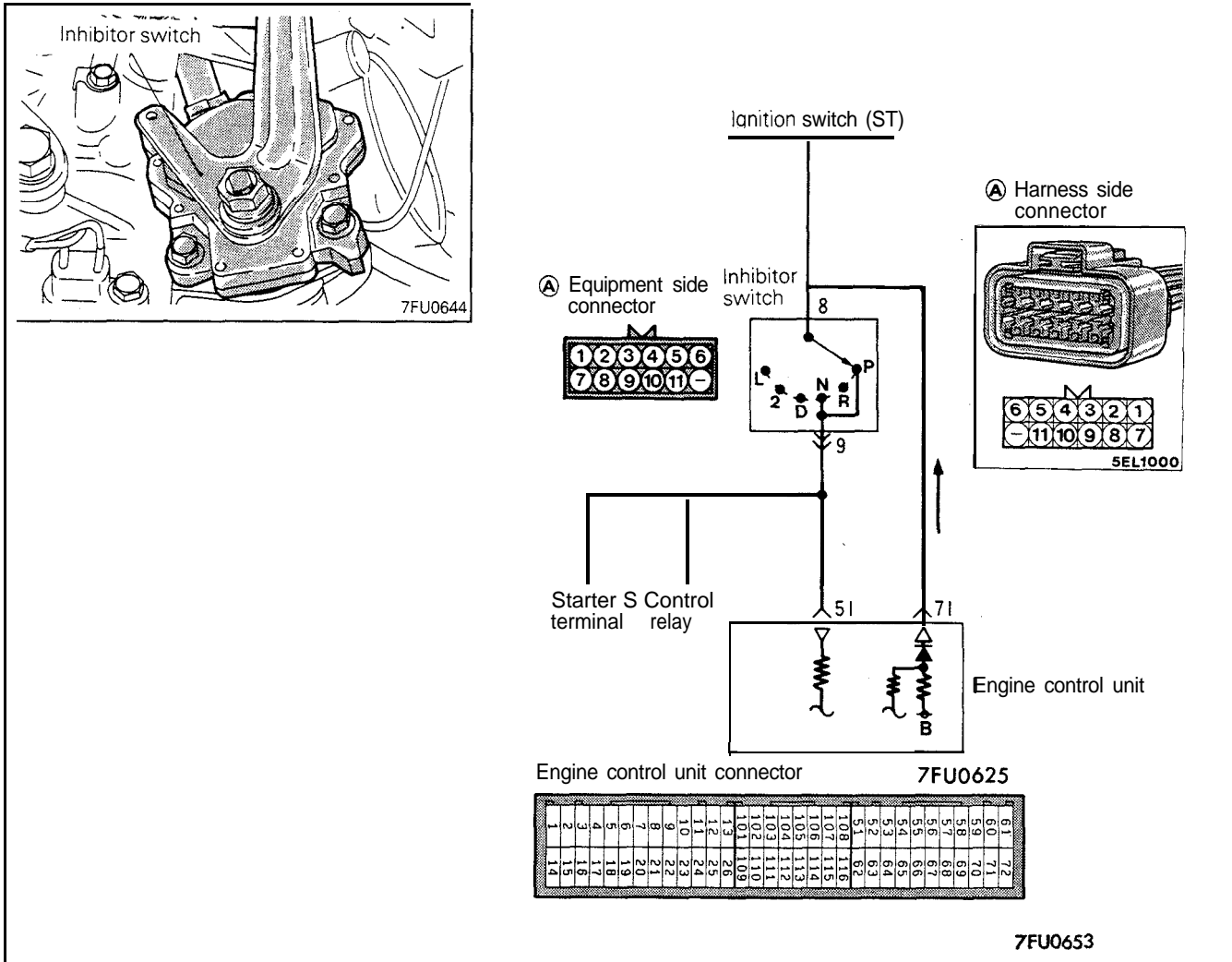
Function	Item No.	Data display	Check condition	Engine	Normal indication
Data reading	18	Switch state	Ignition switch: ON	stop	OFF
				Cranking	ON

HARNESS INSPECTION

<p>1</p> <p>Engine control unit harness side connector</p> <p>51</p> <p>6FU1258</p>	<p>Measure the input voltage to the engine control unit.</p> <ul style="list-style-type: none"> • Engine control unit connector: Disconnected • Ignition switch: START <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">Voltage (V)</td> </tr> <tr> <td style="text-align: center;">8 or more</td> </tr> </table>	Voltage (V)	8 or more	<p>OK → 2</p> <p>✗ → Repair the harness. (51 – Ignition switch)</p>
Voltage (V)				
8 or more				
<p>2</p> <p>Engine control unit harness side connector</p> <p>71</p> <p>6FU1259</p>	<p>Check for continuity of the ground circuit.</p> <ul style="list-style-type: none"> • Engine control unit connector: Disconnected 	<p>OK → STOP</p> <p>✗ → Repair the harness. (71 – Ground)</p>		

IGNITION SWITCH-ST AND INHIBITOR SWITCH <AT>

M13YOAA



OPERATION

- The ignition switch-ST inputs a high signal to the engine control unit while the engine is cranking. The engine control unit 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 inhibitor switch to the engine control unit, 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 unit.
- The inhibitor 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 unit, which then controls the idle speed control servo based on this signal.
- The battery voltage in the engine control unit is applied through a resistor to the inhibitor switch. When the selector lever is set to the P/N range, continuity is produced between the inhibitor switch terminal of the engine control unit and ground through the starter motor, thereby making the terminal voltage go low.

TROUBLESHOOTING HINTS

If the inhibitor switch harness and individual part check have resulted normal but the inhibitor switch output is abnormal, poorly adjusted control cable is suspected.

INSPECTION

Using Multi-use Tester

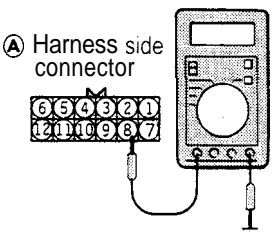


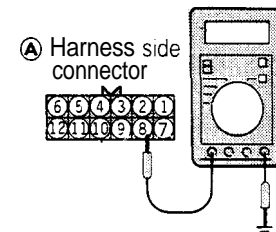


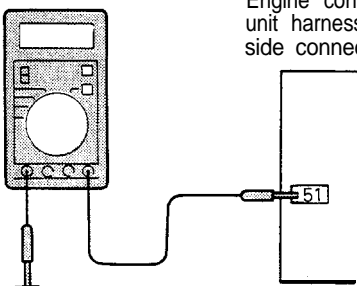



IGNITION SWITCH-ST

Function	Item No.	Data display	Check condition	Engine	Normal indication
Data reading	18	Switch state	Ignition switch: ON	stop	OFF
				Cranking	ON

INHIBITOR SWITCH

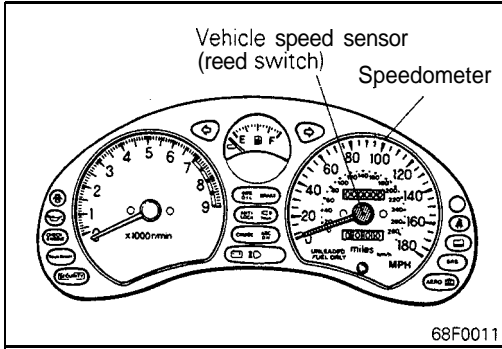
Function	Item No.	Data display	Check condition	Select lever position	Normal indication
Data reading	29	Shift position	Ignition switch: ON	P or N	P or N
				D,2,L or R	D,2,L or R

HARNESS INSPECTION

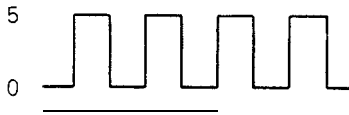
<p>1</p>  <p>A Harness side connector</p> <p>01A0206</p>	<p>Measure the power supply voltage of the inhibitor switch.</p> <ul style="list-style-type: none"> Engine control unit connector: Disconnected Inhibitor switch connector: Disconnected Ignition switch: START <table border="1" data-bbox="649 966 1071 1071"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>SV</td> </tr> </table>	Voltage (V)	SV	 → 2
Voltage (V)				
SV				
		 → Check the power supply circuit.		
<p>2</p>  <p>A Harness side connector</p> <p>01A0206</p>	<p>Measure the inhibitor switch terminal input voltage.</p> <ul style="list-style-type: none"> Engine control unit connector: Connected Inhibitor switch connector: Disconnected Ignition switch: ON <table border="1" data-bbox="649 1333 1071 1438"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>SV</td> </tr> </table>	Voltage (V)	SV	 → 3
Voltage (V)				
SV				
		 → Repair the harness. (A) 8 - 7)		
<p>3</p>  <p>Engine control unit harness side connector</p> <p>01L0427</p>	<p>Measure the input voltage of engine control unit.</p> <ul style="list-style-type: none"> Engine control unit connector: Disconnected Inhibitor switch connector: Connected Select lever: P range Ignition switch: START <table border="1" data-bbox="649 1711 1071 1816"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>8 or more</td> </tr> </table>	Voltage (V)	8 or more	 → 
Voltage (V)				
8 or more				
		 → Repair the harness. (A) 9 - 51)		

VEHICLE SPEED SENSOR

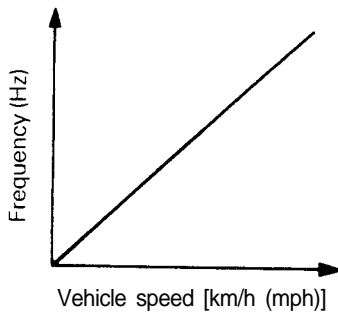
M13YPAA



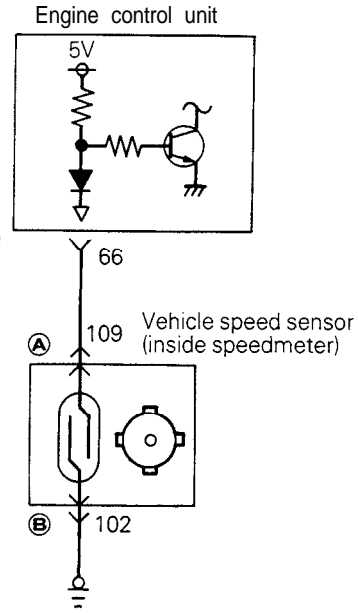
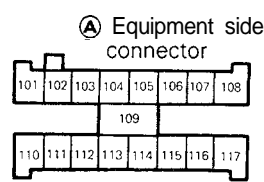
Terminal voltage (V)



16Z478



16Z451



7FU0925

Engine control unit connector

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	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

7FU0653

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 unit, 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 unit 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 unit harness side connector

01A0508

Check the vehicle speed sensor output circuit for continuity.

- Engine control unit connector: Disconnected
- Move the vehicle.

Continuity

Continuity

No continuity

One rotation

OK

→

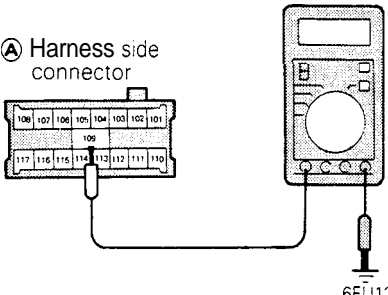
STOP

OK

→

2

2



Ⓐ Harness side connector

6FU1265

Measure the power supply voltage of the vehicle speed sensor.

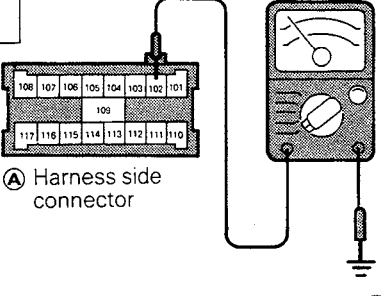
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
4.5 – 4.9

OK → 3

~~OK~~ → Repair the harness. (Ⓐ 109 – 56)

3



Ⓐ Harness side connector

7FU0965

Check for continuity of the ground circuit.

- Connector: Disconnected

OK → STOP

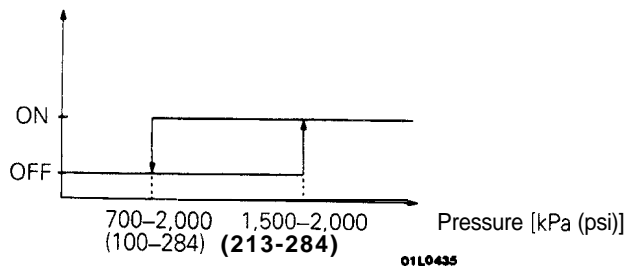
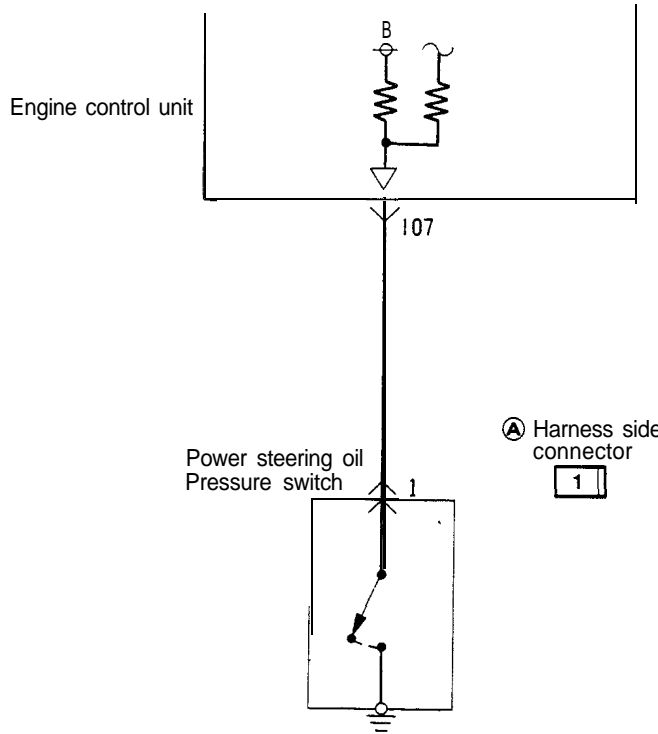
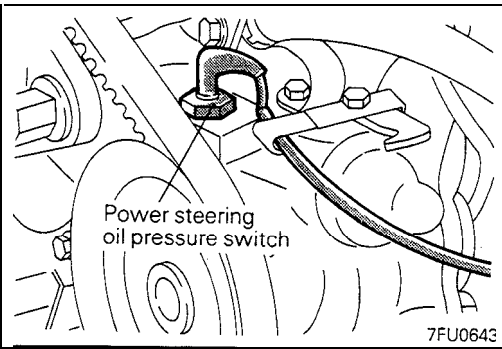
~~OK~~ → Repair the harness. (Ⓐ 102 – Ground)

SENSOR INSPECTION

Refer to GROUP 54 – Meters and Gauges.

POWER STEERING OIL PRESSURE SWITCH

M13YQAA



7FU0536

OPERATION

- The power steering oil pressure switch converts presence/absence of power steering load into low/high voltage and inputs it to the engine control unit, which then controls the idle speed control servo based on this signal.
- The battery voltage in the engine control unit is applied through a resistor to the power steering oil 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 oil pressure terminal voltage to go from high to low.

INSPECTION

Using Multi-use Tester

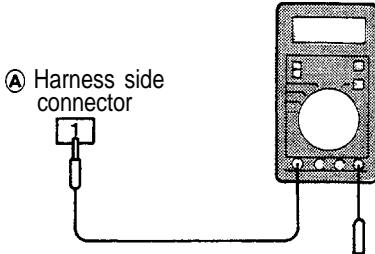
Function	Item No.	Data display	Check condition	Steering wheel	Normal indication
Data reading	27	Switch state	Engine: Idling	Steering wheel neutral position (wheels straight-ahead direction)	OFF
				Steering wheel half turn	ON

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)

HARNES INSPECTION

1





7FU0505


Measure the power supply voltage.

- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
SV







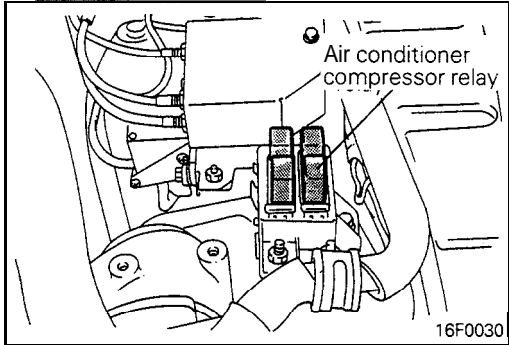
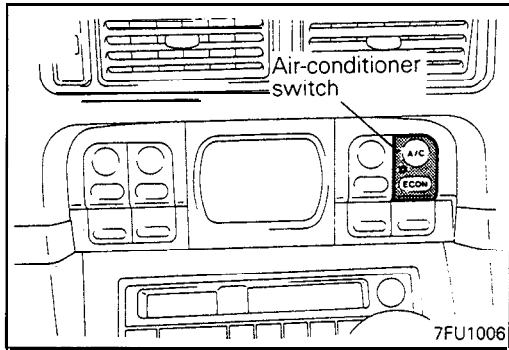
Repair the harness.
(A) 1 – 107

SENSOR INSPECTION

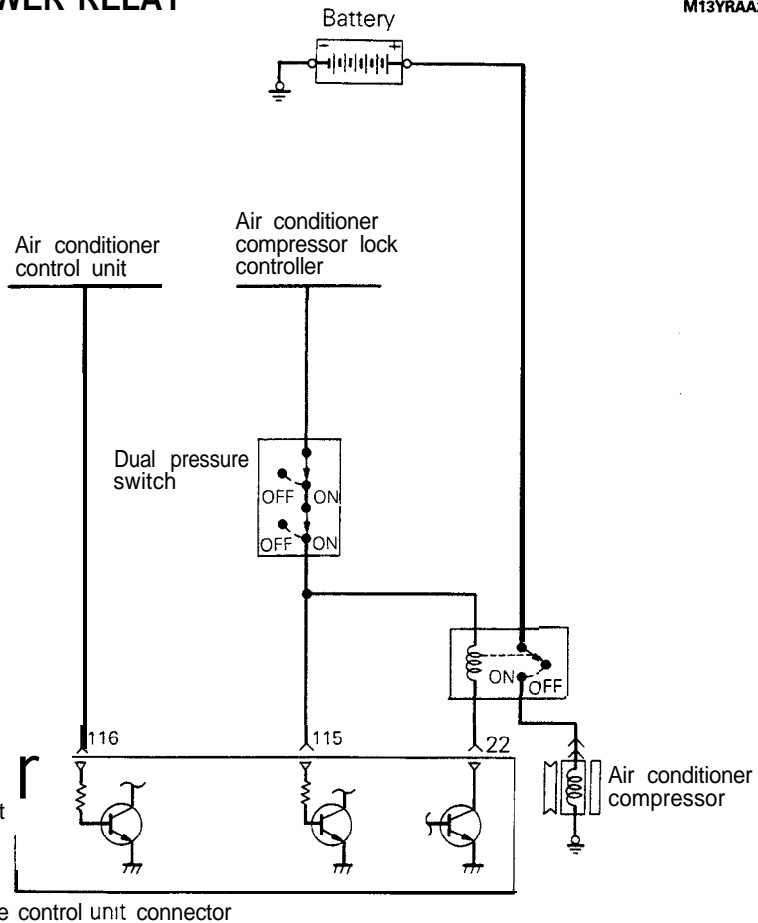
Refer to GROUP 37 – Service Adjustment Procedures.

AIR CONDITIONER SWITCH AND POWER RELAY

M13YRAA2



Engine control unit



Engine control unit connector

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																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V	W	X	Y	Z	aa	ab	ac	ad	ae	af	ag	ah	ai	aj	ak	al	am	an	ao	ap	aq	ar	as	at	au	av	aw	ax	ay	az	ba	bb	bc	bd	be	bf	bg	bh	bi	bj	bk	bl	bm	bn	bo	bp	bq	br	bs	bt	bu	bv	bw	bx	by	bz	ca	cb	cc	cd	ce	cf	cg	ch	ci	cj	ck	cl	cm	cn	co	cp	cq	cr	cs	ct	cu	cv	cw	cx	cy	cz	da	db	dc	dd	de	df	dg	dh	di	dj	dk	dl	dm	dn	do	dp	dq	dr	ds	dt	du	dv	dw	dx	dy	dz	ea	eb	ec	ed	ee	ef	eg	eh	ei	ej	ek	el	em	en	eo	ep	eq	er	es	et	eu	ev	ew	ex	ey	ez	fa	fb	fc	fd	fe	ff	fg	fh	fi	fj	fk	fl	fm	fn	fo	fp	fq	fr	fs	ft	fu	fv	fw	fx	fy	fz	ga	gb	gc	gd	ge	gf	gg	gh	gi	gj	gk	gl	gm	gn	go	gp	gq	gr	gs	gt	gu	gv	gw	gx	gy	gz	ha	hb	hc	hd	he	hf	hg	hh	hi	hj	hk	hl	hm	hn	ho	hp	hq	hr	hs	ht	hu	hv	hw	hx	hy	hz	ia	ib	ic	id	ie	if	ig	ih	ii	ij	ik	il	im	in	io	ip	iq	ir	is	it	iu	iv	iw	ix	iy	iz	ja	jb	jc	jd	je	jf	jj	jk	jl	jm	jn	jo	jp	jq	jr	js	jt	ju	ju	kv	kw	kx	ky	kz	la	lb	lc	ld	le	lf	lg	lh	li	lj	lk	ll	lm	ln	lo	lp	lq	lr	ls	lt	lu	lv	lw	lx	ly	lz	ma	mb	mc	md	me	mf	mg	mh	mi	mj	mk	ml	mm	mn	mo	mp	mq	mr	ms	mt	mu	mv	mw	mx	my	mz	na	nb	nc	nd	ne	nf	ng	nh	ni	nj	nk	nl	nm	nn	no	np	nq	nr	ns	nt	nu	nv	nw	nx	ny	nz	oa	ob	oc	od	oe	of	og	oh	oi	oj	ok	ol	om	on	oo	op	oq	or	os	ot	ou	ov	ow	ox	oy	oz	pa	pb	pc	pd	pe	pf	pg	ph	pi	pj	pk	pl	pm	pn	po	pp	pq	pr	ps	pt	pu	pv	pw	px	py	pz	qa	qb	qc	qd	qe	qf	qg	qh	qi	qj	qk	ql	qm	qn	qo	qp	qq	qr	qs	qt	qu	qv	qw	qx	qy	qz	ra	rb	rc	rd	re	rf	rg	rh	ri	rj	rk	rl	rm	rn	ro	rp	rq	rr	rs	rt	ru	rv	rw	rx	ry	rz	sa	sb	sc	sd	se	sf	sg	sh	si	sj	sk	sl	sm	sn	so	sp	sq	sr	ss	st	su	sv	sw	sx	sy	sz	ta	tb	tc	td	te	tf	tg	th	ti	tj	tk	tl	tm	tn	to	tp	tq	tr	ts	tt	tu	tv	tw	tx	ty	tz	ua	ub	uc	ud	ue	uf	ug	uh	ui	uj	uk	ul	um	un	uo	up	uq	ur	us	ut	uu	uv	uw	ux	uy	uz	va	vb	vc	vd	ve	vf	vg	vh	vi	vj	vk	vl	vm	vn	vo	vp	vq	vr	vs	vt	vu	vv	vw	vx	vy	vz	wa	wb	wc	wd	we	wf	wg	wh	wi	wj	wk	wl	wm	wn	wo	wp	wq	wr	ws	wt	wu	wv	ww	wx	wy	wz	xa	xb	xc	xd	xe	xf	xg	xh	xi	xj	xk	xl	xm	xn	xo	xp	xq	xr	xs	xt	xu	xv	xw	xx	xy	xz	ya	yb	yc	yd	ye	yf	yg	yh	yi	yj	yk	yl	ym	yn	yo	yp	yq	yr	ys	yt	yu	yv	yw	yx	yy	yz	za	zb	zc	zd	ze	zf	zg	zh	zi	zj	zk	zl	zm	zn	zo	zp	zq	zr	zs	zt	zu	zv	zw	zx	zy	zz

7FU0653

OPERATION

- The air conditioner switch applies the battery voltage to the engine control unit when the air conditioner is turned on.
- When the air conditioner ON signal is input, the engine control unit drives the idle speed control servo and turns ON the power transistor. As a result, the air conditioner 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 conditioner switch is turned on during idling, faulty air conditioner control system is suspected.

INSPECTION

Using Multi-use Tester

AIR CONDITIONER SWITCH

Function	Item No.	Data display	Check condition	Air conditioner switch	Normal indication
Data reading	28	Switch state	Engine: Idling (air compressor to be running when air conditioner switch is ON)	OFF	OFF
				ON	ON

AIR CONDITIONER POWER RELAY

Function	Item No.	Data display	Check condition	Air conditioner switch	Normal indication
Data reading	49	Air conditioner relay state	Engine: Idling after warm-up	OFF	OFF (compressor clutch non-activation)
				ON	ON (compressor clutch activation)

HARNESS INSPECTION

1

Engine control unit harness side connector 7FU0695

Measure the power supply voltage of the air conditioner circuit.

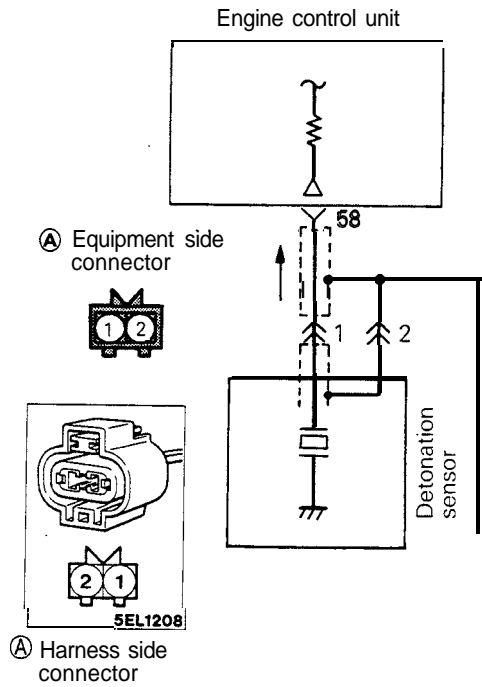
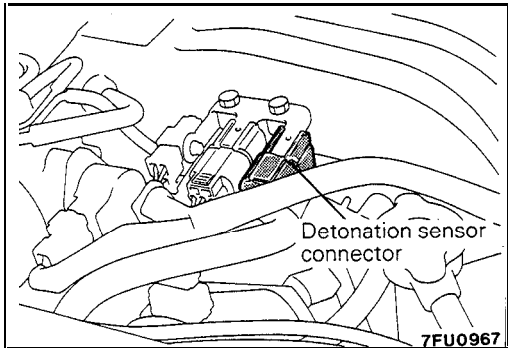
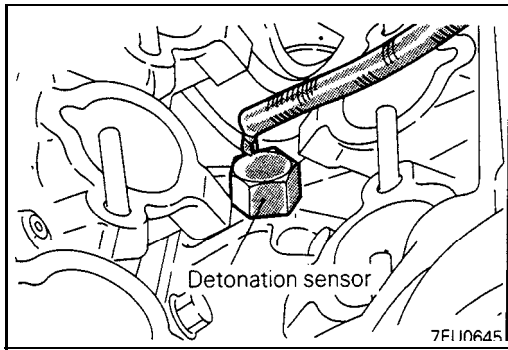
- Air conditioner switch: ON
- Engine control unit connector: Disconnected
- Ignition switch: ON
- Dual air conditioner switch: ON

Voltage (V)
SV

AIR CONDITIONER INSPECTION

Refer to GROUP 55 – Service Adjustment Procedures.

DETONATION SENSOR



Engine control unit connector

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	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

7FU0653

OPERATION

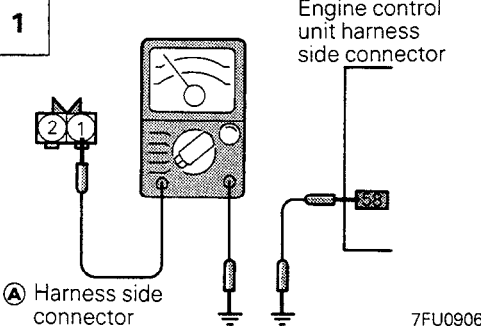
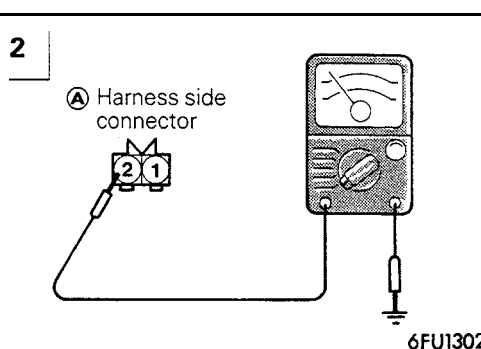
The detonation sensor generates a voltage proportional to the magnitude of cylinder block vibration due to knocking and inputs it to the engine control unit. Based on this signal, the engine control unit provides retard control of the ignition timing.

TROUBLESHOOTING HINTS

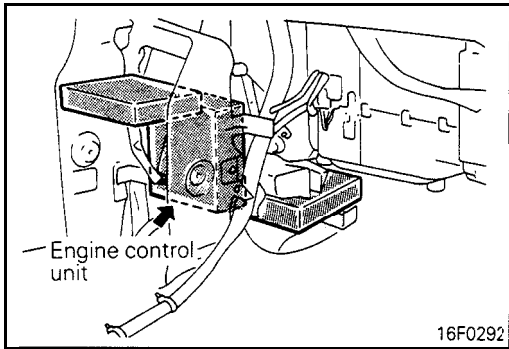
When knocking occurs while driving under high-load conditions, the following problems are suspected in addition to the detonation sensor itself.

- (1) Inappropriate ignition plug heat range
- (2) Inappropriate gasoline
- (3) Incorrectly adjusted reference ignition timing

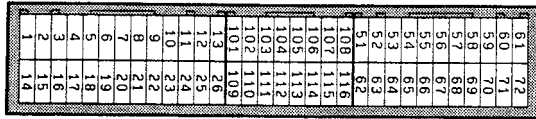
HARNES INSPECTION

<p>1</p>  <p>Engine control unit harness side connector</p> <p>A Harness side connector</p> <p>7FU0906</p>	<p>Check for an open-circuit or a short-circuit to ground, between the engine control unit and detonation sensor.</p> <ul style="list-style-type: none"> • Detonation sensor connector: Disconnected • Engine control unit connector: Disconnected 	<p>OK → 2</p> <p>OK → Repair the harness. (A1 - 58)</p>
<p>2</p>  <p>A Harness side connector</p> <p>6FU1302</p>	<p>Check for continuity of the ground circuit.</p> <ul style="list-style-type: none"> • Connector: Disconnected 	<p>OK → STOP</p> <p>OK → Repair the harness. (A2 - Ground)</p>

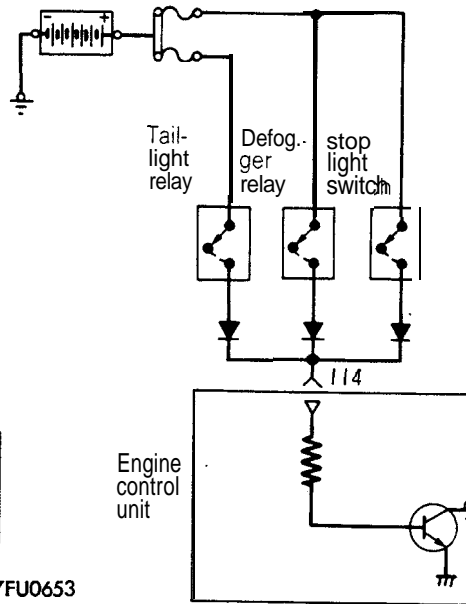
ELECTRICAL LOAD SWITCH



Engine control unit connector



7FU0653



7FU0688

OPERATION

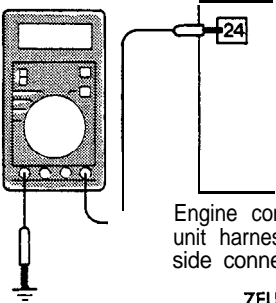
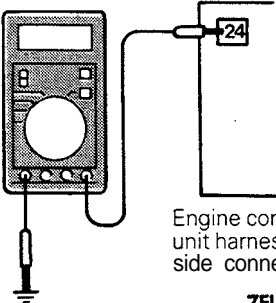
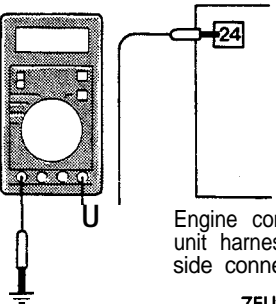
- The electrical load switch inputs ON/OFF state of the switch of equipment that consumes much power during idling, namely, equipment with a large electrical load, to the engine control unit. Based on this signal, the engine control unit controls the idle-speed control servo.
- When the switch of equipment with a large electrical load is turned ON, the battery voltage is applied to the engine control unit to indicate that the equipment switch is turned ON.

INSPECTION

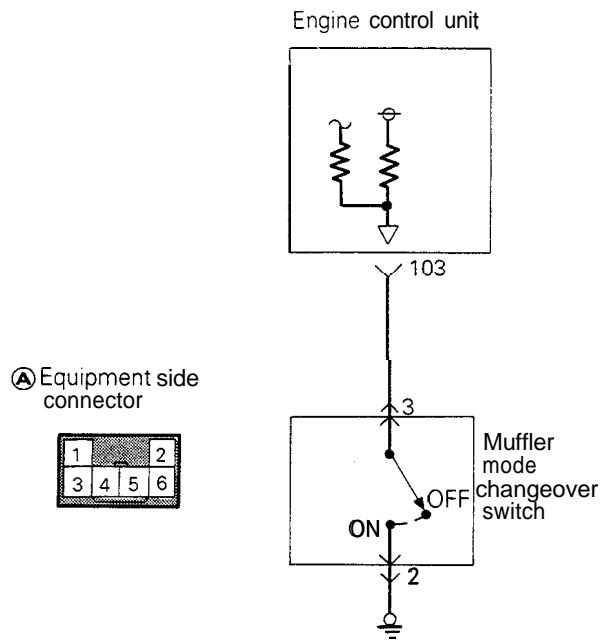
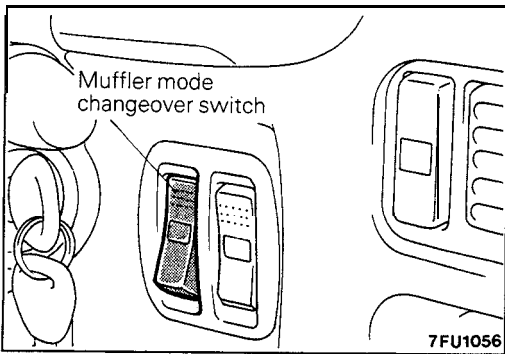
Using Multi-use Tester

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

HARNES INSPECTION

<p>1</p>  <p>Engine control unit harness side connector</p> <p>7FU0689</p>	<p>Measure the input voltage of engine control unit.</p> <ul style="list-style-type: none"> • Engine control unit connector: Disconnected • Lighting switch: ON (Tail light relay ON) <table border="1" data-bbox="657 363 1081 470"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>SV</td> </tr> </table> <p>OK → 2</p> <p>OK → Check circuit related to tail light relay</p>	Voltage (V)	SV
Voltage (V)			
SV			
<p>2</p>  <p>Engine control unit harness side connector</p> <p>7FU0689</p>	<p>Measure the input voltage of engine control unit.</p> <ul style="list-style-type: none"> • Engine control unit connector: Disconnected • Defogger switch: ON (Defogger relay ON) <table border="1" data-bbox="657 732 1081 840"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>SV</td> </tr> </table> <p>OK → 3</p> <p>OK → Check circuit related to defogger relay</p>	Voltage (V)	SV
Voltage (V)			
SV			
<p>3</p>  <p>Engine control unit harness side connector</p> <p>7FU0689</p>	<p>Measure the input voltage of engine control unit.</p> <ul style="list-style-type: none"> • Engine control unit connector: Disconnected • Brake pedal: Depressed (Stop light switch ON) <table border="1" data-bbox="657 1100 1081 1207"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>SV</td> </tr> </table> <p>OK → STOP</p> <p>OK → Check circuit related to stop light relay</p>	Voltage (V)	SV
Voltage (V)			
SV			

MUFFLER MODE CHANGEOVER SWITCH <Turbo>



7FU1053

OPERATION

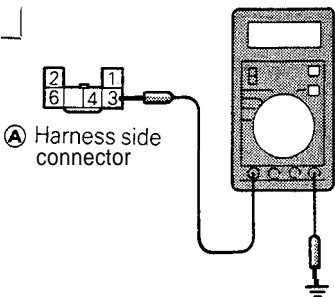
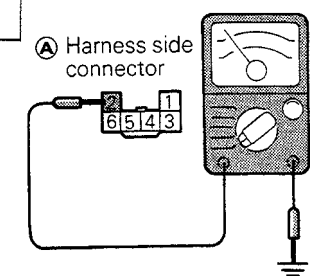
- If the operator turns the muffer mode changeover switch to ON or OFF position, this is converted to high/low voltage to be sent to the engine control unit. Receiving this signal, the engine control unit performs the dual mode (TOUR/SPORT mode) muffer control.
- The output terminal of the muffer mode changeover switch has battery voltage applied to it from the engine control unit through the resistor inside the unit. Place the muffer-mode changeover switch to the ON position, and the muffer mode changeover switch circuit will be closed to short the voltage applied output terminal to the ground.. Accordingly, the output voltage of the muffer mode changeover switch changes from high to low.

INSPECTION

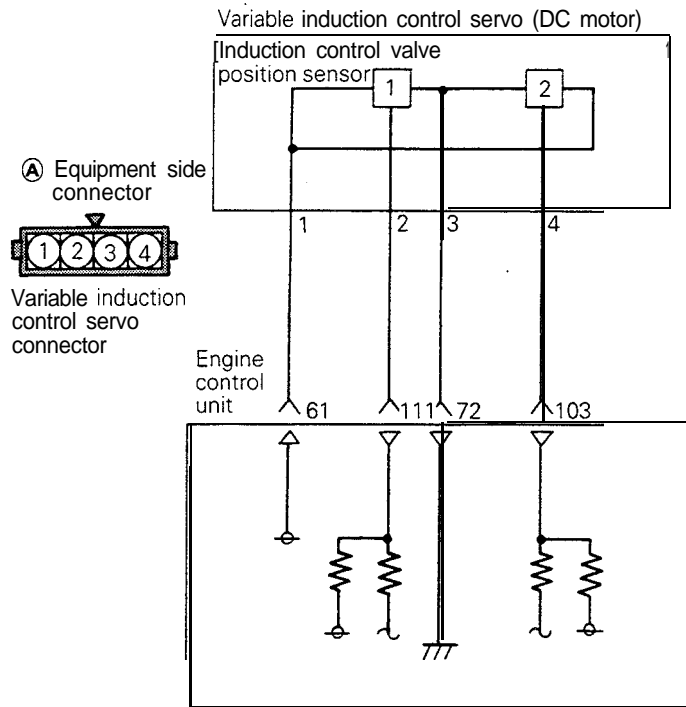
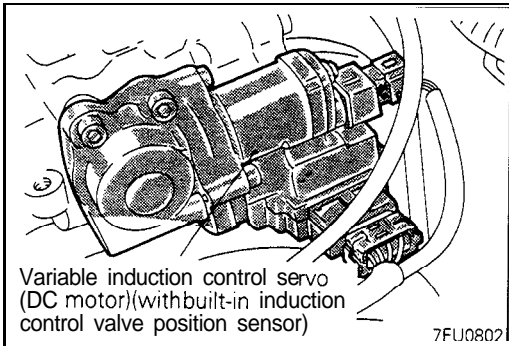
Using Multi-use Tester

Function	Item No.	Data display	Check condition	Muffer mode changeover switch condition	Normal display
Data list	35	Switch condition	Ignition switch: ON	Turn to TOUR mode	ON
				Turn to SPORT mode	OFF

HARNESS INSPECTION

<p>1</p>  <p>Ⓐ Harness side connector</p> <p>7FU1054</p>	<p>Measure the power supply voltage.</p> <ul style="list-style-type: none"> • Connector: Disconnected • Ignition switch: ON <table border="1" data-bbox="641 287 1063 393"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>SV</td> </tr> </table>	Voltage (V)	SV	<p>OK → 2</p> <p>✗ → Repair the harness. (Ⓐ 3 – 108)</p>
Voltage (V)				
SV				
<p>2</p>  <p>Ⓐ Harness side connector</p> <p>7FU1055</p>	<p>Check for continuity of the ground circuit.</p> <ul style="list-style-type: none"> • Connector: Disconnected 	<p>OK → STOP</p> <p>✗ → Repair the harness. (Ⓐ 2 – Ground)</p>		

INDUCTION CONTROL VALVE POSITION SENSOR <Non Turbo>

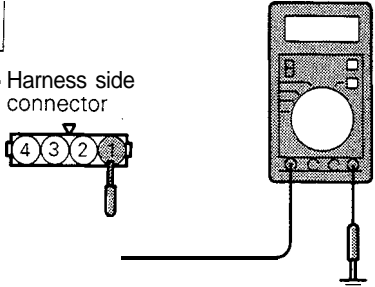
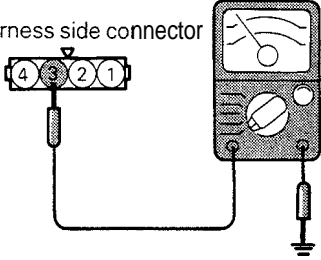
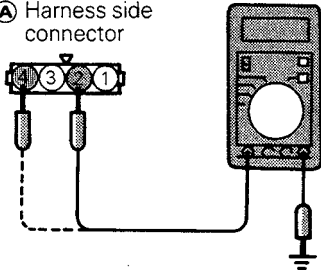


7FU0968

OPERATION

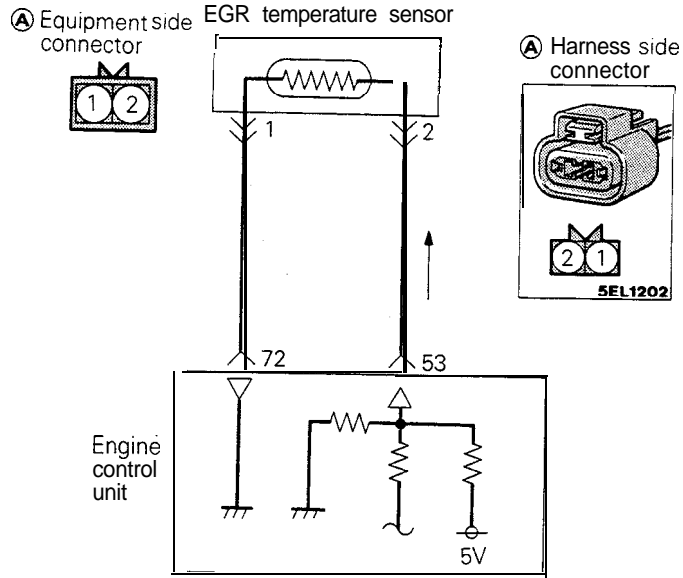
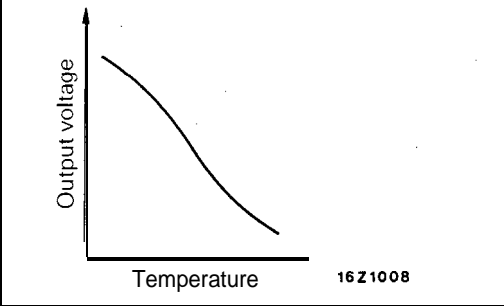
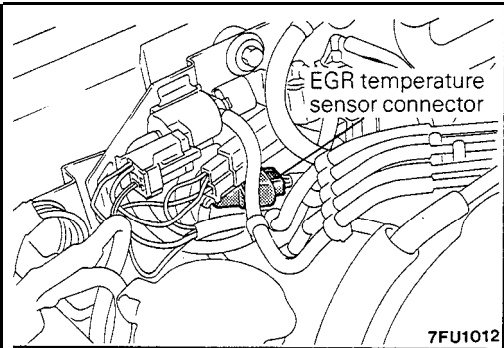
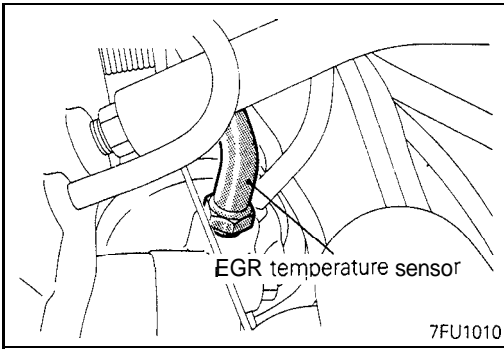
- The induction control valve position sensor detects the induction control valve opening degree and converts it into a pulse signal to be input into the engine control unit, which provides valve opening and closing control based on this signal.
- The induction control valve position sensor is supplied with 5 V power from the engine control unit and is grounded to the engine control unit. A voltage of 5 V from the engine control unit 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.

HARNESS INSPECTION

<p>1</p> <p>Ⓐ Harness side connector</p>  <p>6FU1241</p>	<p>Measure the power supply voltage of the air intake control valve position sensor.</p> <ul style="list-style-type: none"> • Connector: Disconnected • Ignition switch: ON <table border="1" data-bbox="662 331 1084 441"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>4.8 – 5.2</td> </tr> </table>	Voltage (V)	4.8 – 5.2	<p>OK → 2</p> <p>✗ → Repair the harness. (Ⓐ1 – 61)</p>
Voltage (V)				
4.8 – 5.2				
<p>2</p> <p>Ⓐ Harness side connector</p>  <p>7FU0824</p>	<p>Check for continuity of the ground circuit.</p> <ul style="list-style-type: none"> • Connector: Disconnected 	<p>OK → 3</p> <p>✗ → Repair the harness. (Ⓐ3 – 72)</p>		
<p>3</p> <p>Ⓐ Harness side connector</p>  <p>7FU0825</p>	<p>Measure the terminal voltage.</p> <ul style="list-style-type: none"> • Connector: Disconnected • Ignition switch: ON 	<p>OK → STOP</p> <p>✗ → Repair the harness. (Ⓐ2 – 111) (Ⓐ4 – 103)</p>		

EGR TEMPERATURE SENSOR <California>

M13YZAB2



7FU1013

OPERATION

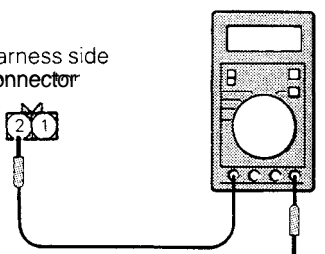
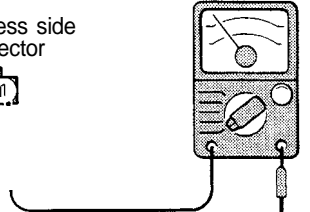
- The EGR temperature sensor converts the temperature of EGR gas downstream from the EGR valve to voltage and inputs it to the engine control unit. The engine control unit judges the condition of the EGR by this signal. If there is abnormal condition, the engine warning light is turned on to notify the driver.
- Five volt power supply in the engine control unit is applied to the EGR temperature sensor through the resistance in the unit. This power supply further passes through the EGR temperature sensor, which is a kind of a resistor, and is grounded at the engine control unit. 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.

INSPECTION

Using Multi-Use Tester

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	700 rpm (Idle)	100°C (212°F) or less
				3,500 rpm	120°C (248°F) or more

HARNESS INSPECTION

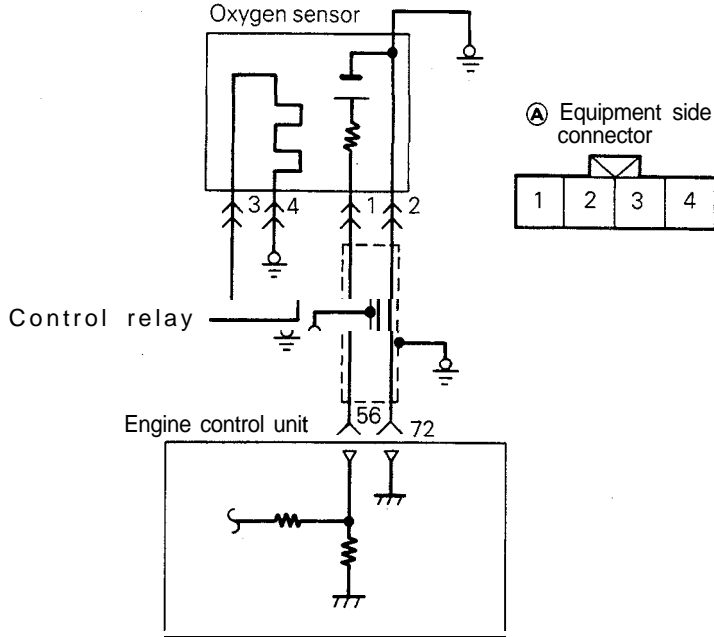
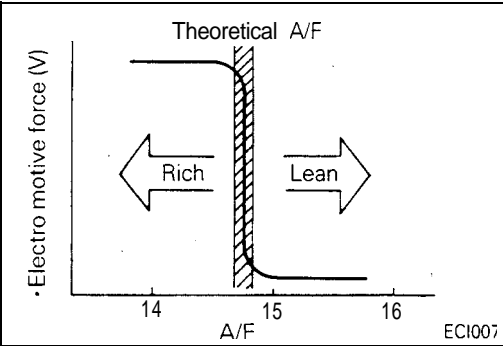
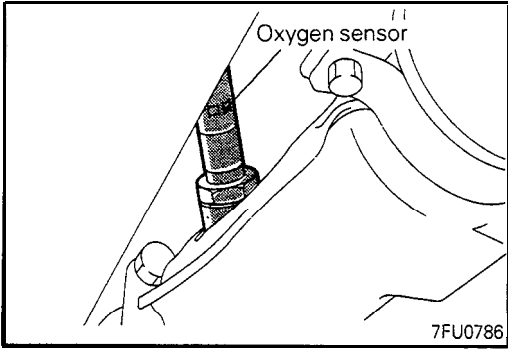
<p>1</p> <p>Ⓐ Harness side connector</p>  <p>01A0523</p>	<p>Measure the power supply voltage.</p> <ul style="list-style-type: none"> • Connector: Disconnected • Ignition switch: ON <table border="1" data-bbox="649 609 1071 714"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>4.3 – 4.7</td> </tr> </table> <p>OK → 2</p> <p>✗ → Repair the harness. (A2 - 72)</p>	Voltage (V)	4.3 – 4.7
Voltage (V)			
4.3 – 4.7			
<p>2</p> <p>Ⓐ Harness side connector</p>  <p>4</p> <p>01A0522</p>	<p>Check for continuity of the ground circuit.</p> <ul style="list-style-type: none"> • Connector: Disconnected <p>OK → STOP</p> <p>✗ → Repair the harness. (A1 - 72)</p>		

SENSOR INSPECTION

Refer to GROUP 17 – Exhaust Gas Recirculation (EGR) System.

OXYGEN SENSOR <Non Turbo>

M13YSAD



7FU0969

Engine control unit connector

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	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
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7FU0653

OPERATION

- The oxygen sensor senses the oxygen concentration in exhaustgas, converts it into a voltage and inputs it to the engine control unit.
- The 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 unit 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 oxygen sensor through the control relay. Therefore, the sensor element is heated by the heater so that the oxygen sensor remains responsive even when the exhaust temperature is low.

TROUBLESHOOTING HINTS

Hint 1: Poor cleaning of exhaust gas will result if the oxygen sensor fails.

Hint 2: If the oxygen sensor check has resulted normal but the sensor output voltage is out of specification, troubles of parts related to air fuel ratio control system are suspected.

[Examples]

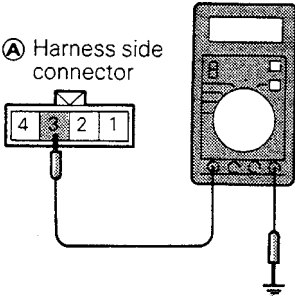
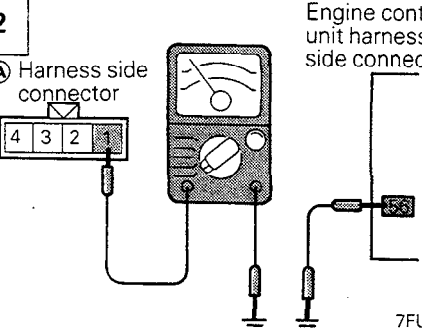
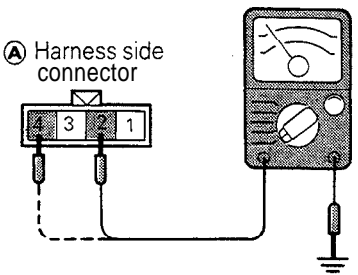
- (1) Faulty injector
- (2) Air leaking into the intake manifold through gasket gap, etc.
- (3) Faulty air flow sensor, intake air temperature sensor, barometric pressure sensor, engine coolant temperature sensor

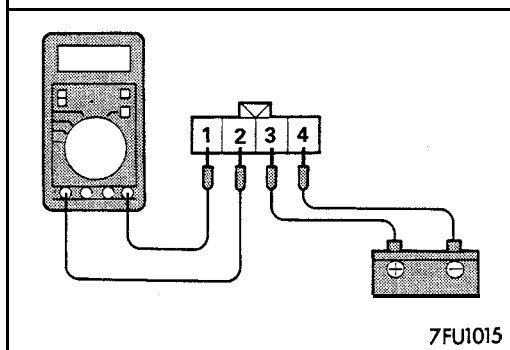
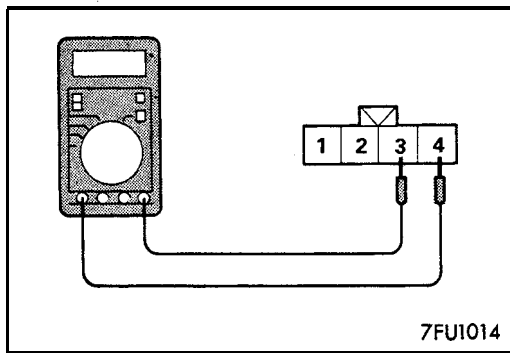
INSPECTION

Using Multi-use Tester

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 oxygen sensor signal, check the air/fuel mixture ratio, and also check the condition of control by the engine control unit)	700 rpm (Idle)	400 mV or lower ↓ (changes) 600 – 1,000 mV
				2,000 rpm	

HARNESS INSPECTION

<p>1</p>  <p>7FU0827</p>	<p>Measure the power supply voltage of the oxygen sensor.</p> <ul style="list-style-type: none"> • Connector: Disconnected • Ignition switch: ON <table border="1" data-bbox="597 315 1019 420"> <tr> <td style="text-align: center;">Voltage (V)</td> </tr> <tr> <td style="text-align: center;">SV</td> </tr> </table>	Voltage (V)	SV	<p>OK → 2</p> <p>OK → Repair the harness. (A3 - Control relay)</p>
Voltage (V)				
SV				
<p>2</p>  <p>7FU0828</p>	<p>Check for an open-circuit, or a short-circuit to ground between the engine control unit and the oxygen sensor.</p> <ul style="list-style-type: none"> • Oxygen sensor connector: Disconnected • Engine control unit connector: Disconnected 	<p>OK → 3</p> <p>OK → Repair the harness. (A1 - 56)</p>		
<p>3</p>  <p>7FU0829</p>	<p>Check for continuity of the ground circuit.</p> <ul style="list-style-type: none"> • Connector: Disconnected 	<p>OK → STOP</p> <p>OK → Repair the harness. (A2 - 72) (A4 - Ground)</p>		



SENSOR INSPECTION

- (1) Disconnect the oxygen sensor connector.
- (2) Check that there is continuity [approx. 20 Ω at 20°C (68°F)] across terminals ③ and ④ of the oxygen sensor connector.
- (3) If there is no continuity, replace the 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 oxygen sensor connector to battery ⊕ and ⊖ terminals respectively.

Caution

Ensure that the jumper wires are connected correctly, as wrong connections result in a broken oxygen sensor.

- (6) Connect a digital voltmeter across terminals ① and ②.
- (7) Racing the engine repeatedly and measure the output voltage of the oxygen sensor.

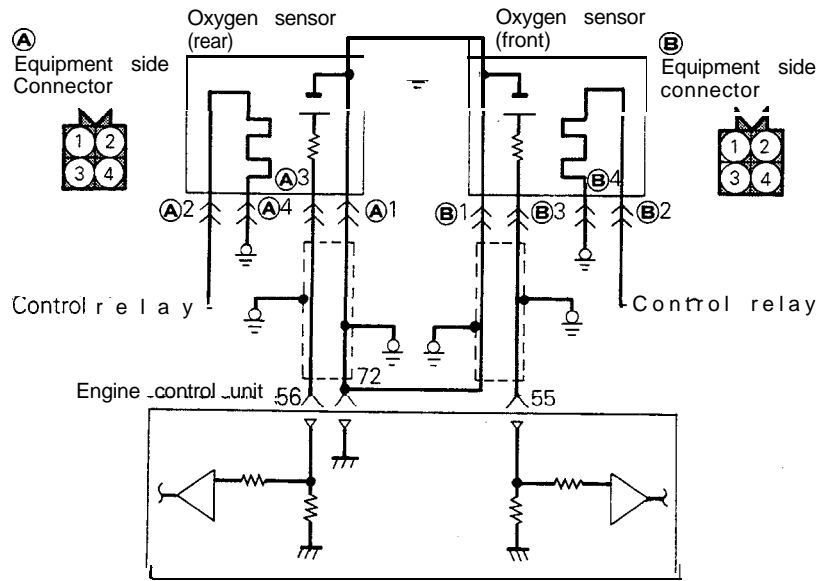
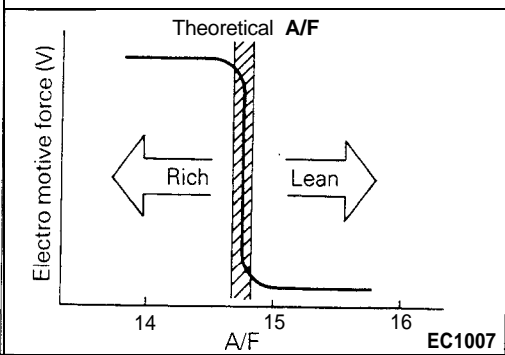
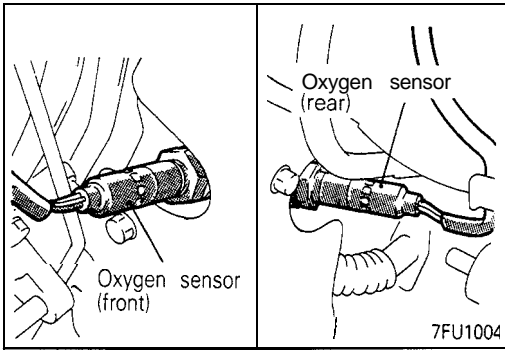
Engine	Oxygen sensor output voltage	Remarks
When engine is raced	0.6 – 1.0 V	When the air-fuel mixture becomes richer as a result of repeated racing, the oxygen sensor should output a voltage of 0.6 – 1.0 V.

NOTE

For removal and installation of the oxygen sensor, refer to GROUP 15 – Exhaust Manifold.

OXYGEN SENSOR <Turbo>

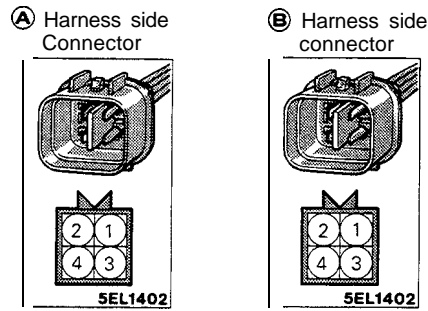
M13YHAA2



Engine control unit connector

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	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
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7FU0653



OPERATION

TROUBLESHOOTING

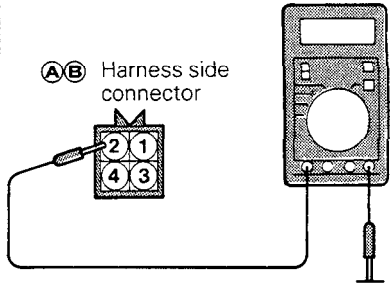
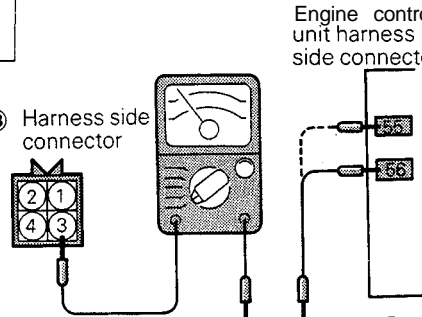
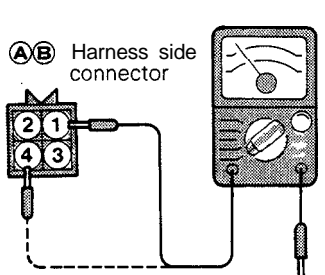
Refer to "OXYGEN SENSOR" <Non Turbo> (P.13-94).

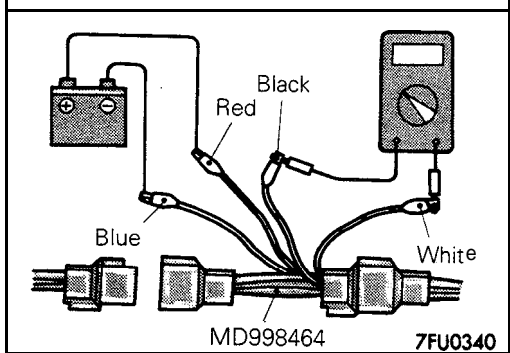
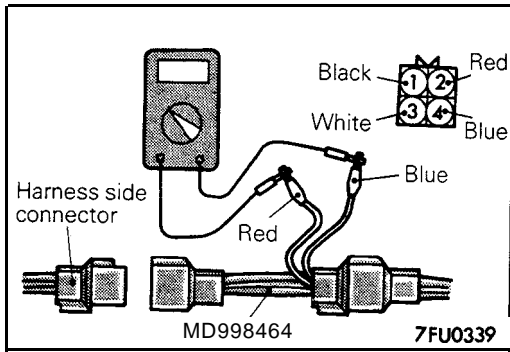
INSPECTION

Using Multi-use Tester

Function	Item No.	Data display	Check condition	Engine condition	Standard value
Data reading	11 (rear)	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
	39 (front)	Engine: Warm-up (Using the oxygen sensor signal, check the air/fuel mixture ratio, and also check the condition of control by the engine control unit)	700 rpm (Idling)	400 mV or lower	
			2,000 rpm	600 – 1,000 mV	↑ (changes)

HARNESS INSPECTION

<p>1</p>  <p>7FU0510</p>	<p>Measure the power supply voltage of the oxygen sensor.</p> <ul style="list-style-type: none"> • Connector: Disconnected • Ignition switch: ON <table border="1" data-bbox="649 315 1071 420"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>SV</td> </tr> </table> <p>OK →</p> <p>OK →</p>	Voltage (V)	SV	<p>2</p> <p>Repair the harness. (A 2, B 2 – Control relay)</p>
Voltage (V)				
SV				
<p>2</p>  <p>7FU1017</p>	<p>Check for an open-circuit, or a short-circuit to ground, between the engine control unit and the oxygen sensor.</p> <ul style="list-style-type: none"> • Oxygen sensor connector: Disconnected • Engine control unit connector: Disconnected <p>OK →</p> <p>OK →</p>	<p>3</p> <p>Repair the harness. (A 3 – 56) (B 3 – 55)</p>		
<p>3</p>  <p>7FU0512</p>	<p>Check for continuity of the ground circuit.</p> <ul style="list-style-type: none"> • Connector: Disconnected <p>OK →</p> <p>OK →</p>	<p>STOP</p> <p>Repair the harness. (A 1, B 1 – 72) (A 4, B 4 – Ground)</p>		



SENSOR INSPECTION

- (1) Disconnect the oxygen sensor (rear) connector and connect the special tool, Test Harness, to the oxygen sensor (rear) connector.
- (2) Check that there is continuity [approx. 20 Ω at 20°C (68°F)] across terminals ② and ④ of the oxygen sensor (rear) connector.
- (3) If there is no continuity, replace the oxygen sensor (rear).

- (4) Warm up the engine until the engine coolant temperature becomes 80°C (176°F) or higher.
- (5) Using jumper wires, connect terminals ② (red clip of the special tool) and ④ (blue clip) of the oxygen sensor connector to battery ⊕ and ⊖ terminals respectively.

Caution

Ensure that the jumper wires are connected correctly, as wrong connections result in a broken oxygen sensor.

- (6) Connect a digital voltmeter across terminals ① (black clip of the special tool) and ③ (white clip).
- (7) Race the engine repeatedly and measure the output voltage of the oxygen sensor (rear).

Engine	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 oxygen sensor should output a voltage of 0.6 – 1.0V.

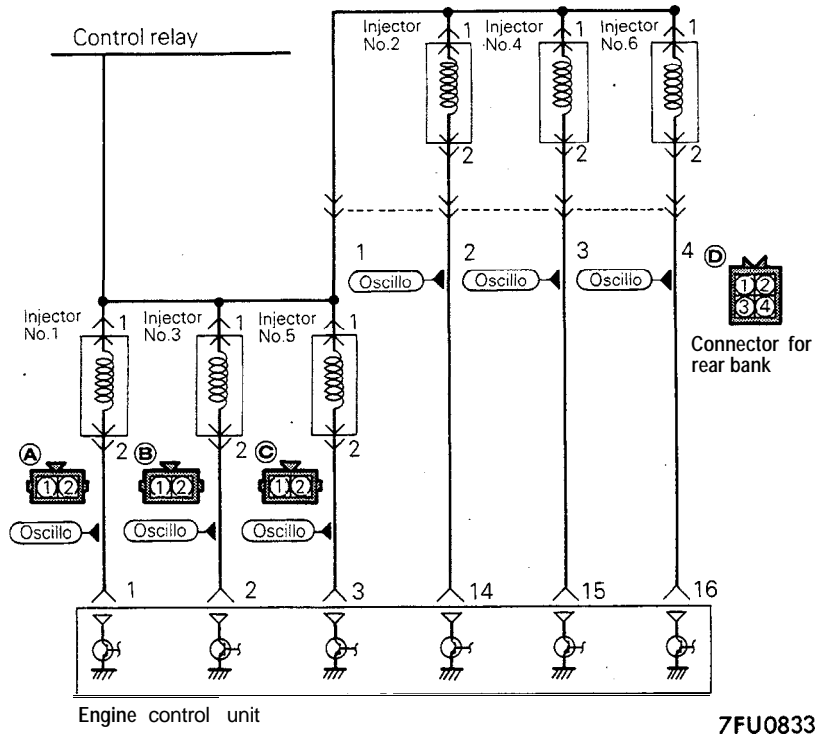
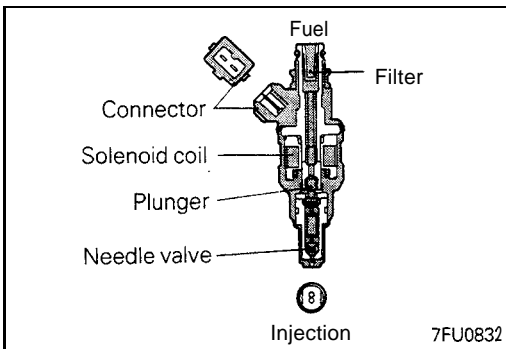
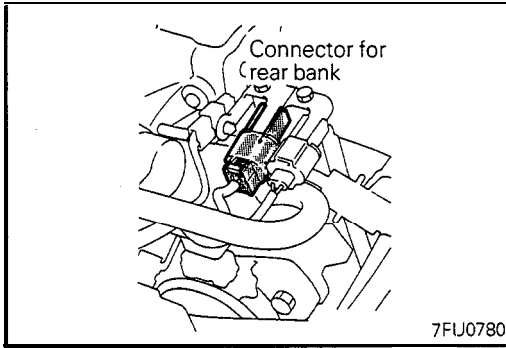
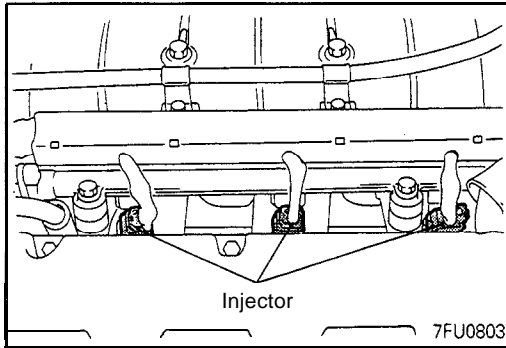
- (8) If the measurements are not as specified, defective oxygen sensor (rear) is suspected.
- (9) Check the oxygen sensor (front) in the same way by following steps (1) through (8).

INSTALLATION

- (1) For removal and installation of oxygen sensor, refer to GROUP 15 – Exhaust Manifold.
- (2) Tighten the oxygen sensor to specified torque.

INJECTORS <Non Turbo>

M13YTAC2



Engine control unit connector

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	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
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7FU0653

OPERATION

- The injector is an injection nozzle with a solenoid valve which injects fuel according to the injection signal coming from the engine control unit.
- 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 control relay to this injector. When the engine control unit turns on the power transistor in the unit, the solenoid coil is energized to open the injector valve, which then injects fuel.

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 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 control relay
- (3) Faulty crank angle sensor, top dead center 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 checks have resulted normal 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 Multi-use Tester

Function	Item No.	Data display	Check condition	Coolant temperature	Standard value
Data reading	41	Drive time* ¹	Engine: Cranking	0°C (32°F)* ²	Approx. 17 ms
				20°C (68°F)	Approx. 46 ms
				80°C (176°F)	Approx. 11 ms

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	41	Drive time* ³	<ul style="list-style-type: none"> • Engine coolant temperature: 80 to 95°C (176 to 205°F) • Lamps, electric cooling fan, accessory units: All OFF • Transaxle: Neutral (P range for vehicle with A/T) • Steering wheel: Neutral 	700 rpm (Idle)	2.4-3.0 ms
				2,000 rpm	2.0-2.6 ms
				When sharp racing is made	To increase

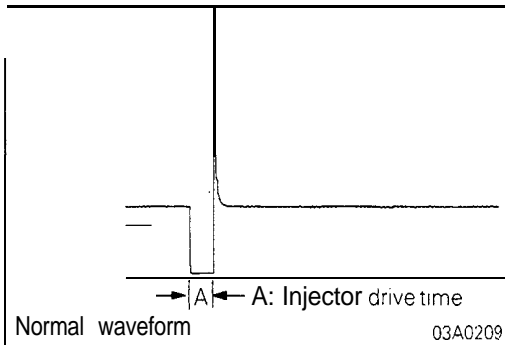
NOTE

*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 four-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 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		

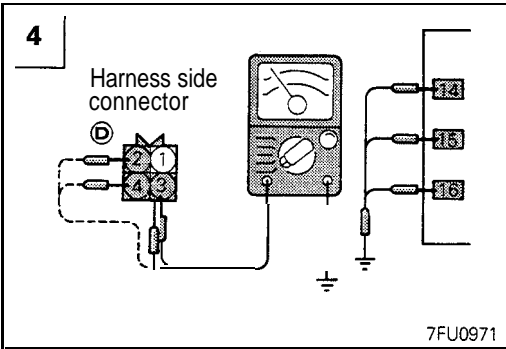


Using Oscilloscope

- (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

<p>1</p> <p>Harness side connector</p> <p>7FU0669</p>	<p>Measure the power supply voltage of the front bank injector.</p> <ul style="list-style-type: none"> • Connector: Disconnected • Ignition switch: ON <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p style="text-align: center;">Voltage (V)</p> <hr/> <p style="text-align: center;">SV</p> </div> <div style="display: flex; align-items: center; justify-content: center; margin-top: 10px;"> <div style="text-align: center; margin-right: 10px;"> <p>OK</p> <p>→</p> </div> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;"> <p style="text-align: center; font-size: 24px;">2</p> </div> </div> <div style="display: flex; align-items: center; justify-content: center; margin-top: 10px;"> <div style="text-align: center; margin-right: 10px;"> <p>OK</p> <p>→</p> </div> <div style="text-align: center;"> <p>Repair the harness. (A B C 1) – Control relay)</p> </div> </div>
<p>2</p> <p>Harness side connector</p> <p>7FU0970</p>	<p>Measure the power supply voltage of the rear bank injector.</p> <ul style="list-style-type: none"> • Connector: Disconnected • Ignition switch: ON <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p style="text-align: center;">Voltage (V)</p> <hr/> <p style="text-align: center;">SV</p> </div> <div style="display: flex; align-items: center; justify-content: center; margin-top: 10px;"> <div style="text-align: center; margin-right: 10px;"> <p>OK</p> <p>→</p> </div> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;"> <p style="text-align: center; font-size: 24px;">3</p> </div> </div> <div style="display: flex; align-items: center; justify-content: center; margin-top: 10px;"> <div style="text-align: center; margin-right: 10px;"> <p>OK</p> <p>→</p> </div> <div style="text-align: center;"> <p>Repair the harness. (D 1) – Control relay)</p> </div> </div>
<p>3</p> <p>Harness side connector</p> <p>7FU0805</p>	<p>Check for an open-circuit, or a short-circuit between the front bank injector and the engine control unit.</p> <ul style="list-style-type: none"> • Injector connector: Disconnected • Engine control unit connector: Disconnected <div style="display: flex; align-items: center; justify-content: center; margin-top: 10px;"> <div style="text-align: center; margin-right: 10px;"> <p>OK</p> <p>→</p> </div> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;"> <p style="text-align: center; font-size: 24px;">4</p> </div> </div> <div style="display: flex; align-items: center; justify-content: center; margin-top: 10px;"> <div style="text-align: center; margin-right: 10px;"> <p>OK</p> <p>→</p> </div> <div style="text-align: center;"> <p>Repair the harness. (A B C 2) – (1 2 3)</p> </div> </div>

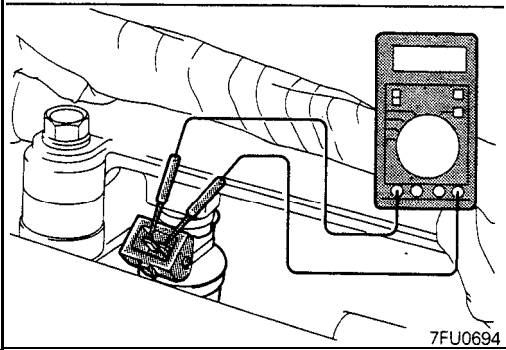
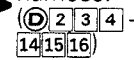


Check for an open-circuit, or a short-circuit between the rear bank injector and the engine control unit.

- Connector: Disconnected
- Engine control unit connector: Disconnected



Repair the harness.



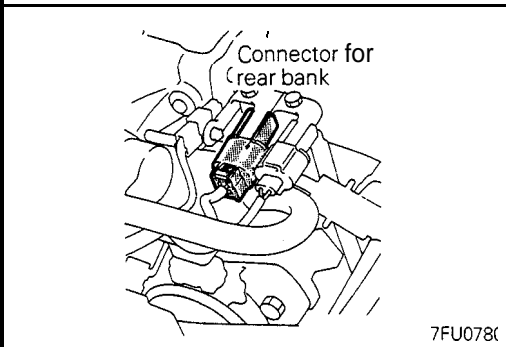
ACTUATOR INSPECTION

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.



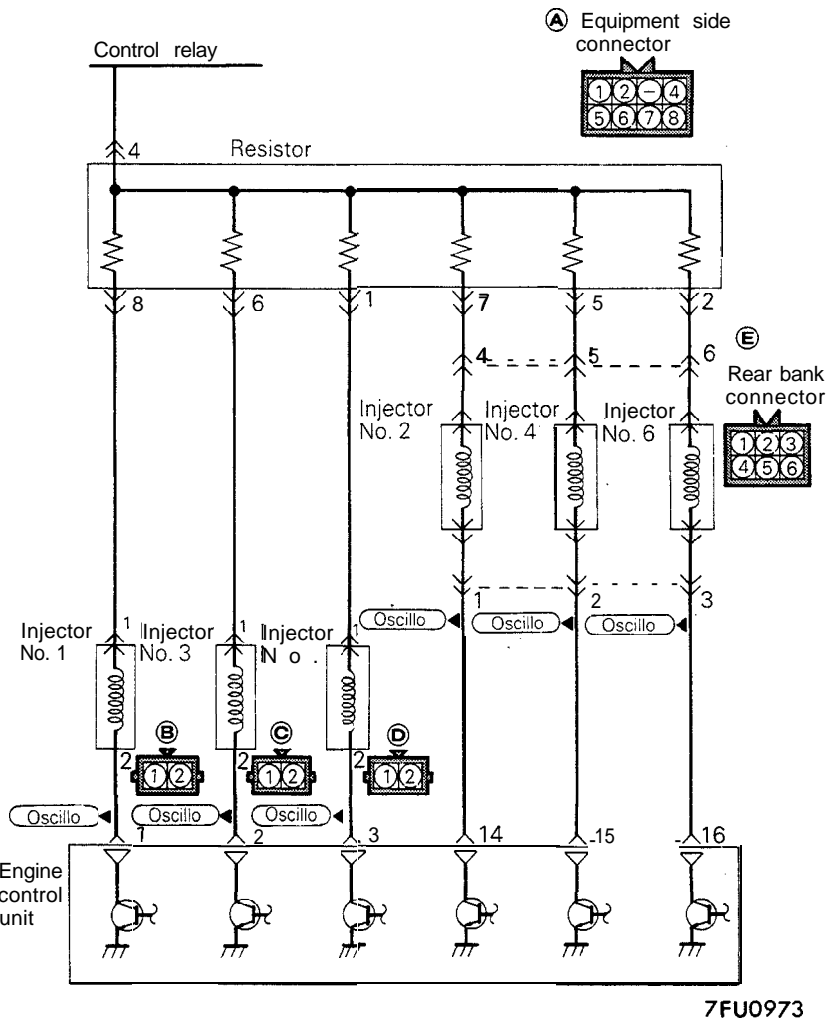
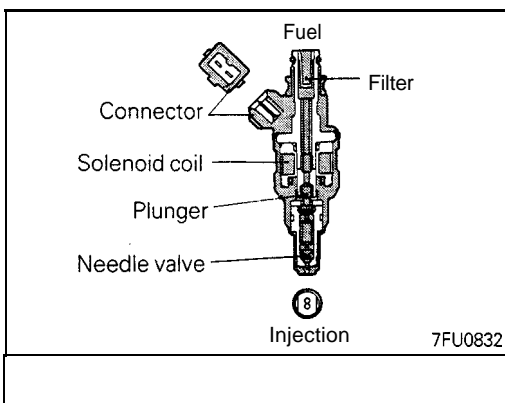
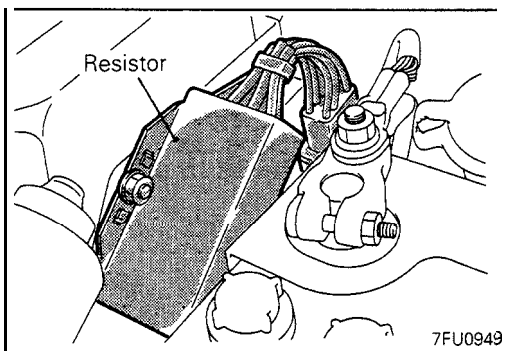
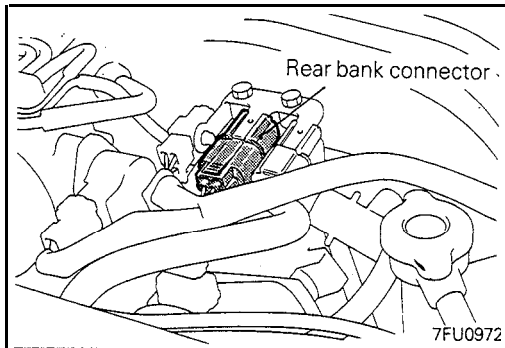
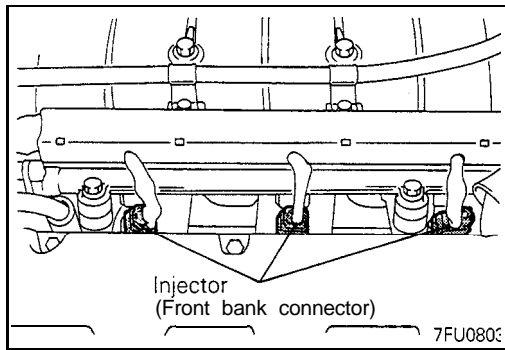
Measurement of Resistance between Rear Bank Terminals

- (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 unit connector

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
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7FU0653

OPERATION

TROUBLESHOOTING HINTS

Refer to "INJECTOR" <Non Turbo> (P.13-101).

INSPECTION

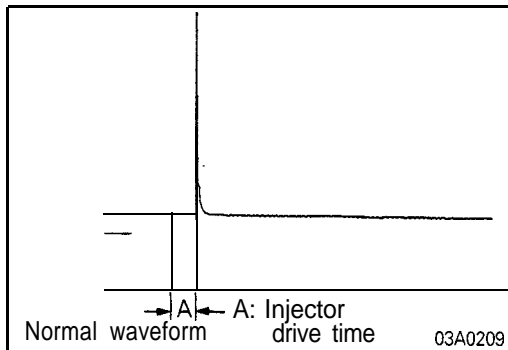
Using Multi-use Tester

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	Approx. 53 ms
				20°C (68°F)	Approx. 29 ms
				80°C (176°F)	Approx. 7 ms

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	41 (Rear bank) 47 (Front bank)	Drive time*3	<ul style="list-style-type: none"> • Engine coolant temperature: 80 to 95°C (176 to 205°F) • Lamps, electric cooling fan, accessory units: All OFF • Transaxle: Neutral (P range for vehicle with A/T) • Steering wheel: Neutral 	700 rpm (Idle)	1.9 – 2.5 ms
				2,000 rpm	1.6 – 2.2 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 four 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.

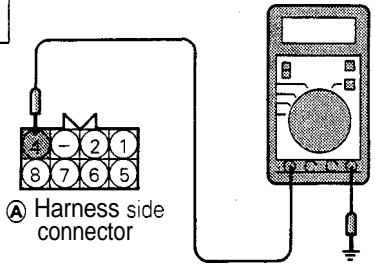
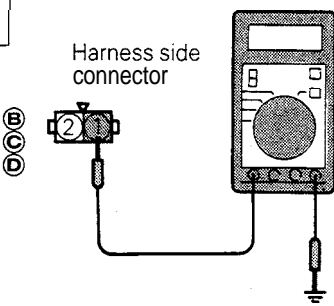
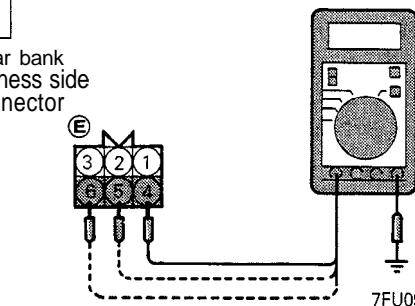
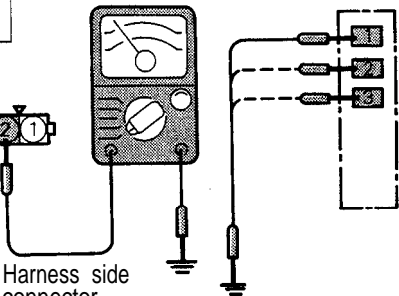
Function	Item No.	Drive content	Check condition	Normal state
Actuator test	01	No. 1 injector shut off	Engine: Idling after warm-up (Shut off the injectors in sequence during after engine warm-up, check the idling condition)	Idle state to change further (becoming less stable or stalling)
	02	No. 2 injector 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		



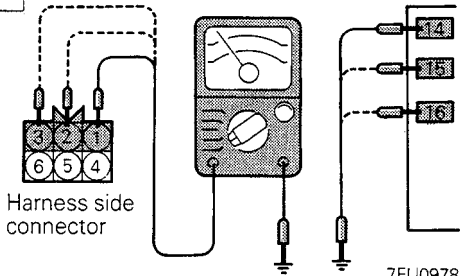
Using Oscilloscope

- (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

<p>1</p>  <p>A Harness side connector</p> <p>7FU0976</p>	<p>Measure the power supply voltage of the resistor.</p> <ul style="list-style-type: none"> • Resistor connector: Disconnected • Ignition switch: ON <p>OK → 2</p> <p>OK → Repair the harness. (A4) – Control relay)</p> <table border="1" data-bbox="657 325 1079 430"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>SV</td> </tr> </table>	Voltage (V)	SV
Voltage (V)			
SV			
<p>2</p>  <p>Harness side connector</p> <p>B C D</p> <p>7FU0669</p>	<p>Measure the power supply voltage of the front bank injector.</p> <ul style="list-style-type: none"> • Resistor connector: Connected • Injector connector: Disconnected • Ignition switch: ON <p>OK → 3</p> <p>OK → Repair the harness. (BCD1) – Control relay) Check power supply Check resistor</p> <table border="1" data-bbox="657 693 1079 798"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>SV</td> </tr> </table>	Voltage (V)	SV
Voltage (V)			
SV			
<p>3</p>  <p>Rear bank harness side connector</p> <p>E</p> <p>7FU0977</p>	<p>Measure the power supply voltage of the rear bank injector.</p> <ul style="list-style-type: none"> • Connector: Disconnected • Ignition switch: ON <p>OK → 4</p> <p>OK → Repair the harness. (E456) – Control relay) Check power supply Check resistor</p> <table border="1" data-bbox="657 1039 1079 1144"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>SV</td> </tr> </table>	Voltage (V)	SV
Voltage (V)			
SV			
<p>4</p>  <p>Harness side connector</p> <p>B C D</p> <p>7FU0805</p>	<p>Check for an open-circuit, or a short-circuit between the front bank injector and the engine control unit.</p> <ul style="list-style-type: none"> • Injector connector: Disconnected • Engine control unit connector: Disconnected <p>OK → 5</p> <p>OK → Repair the harness. (BCD2) – (123)</p>		

5



Harness side connector

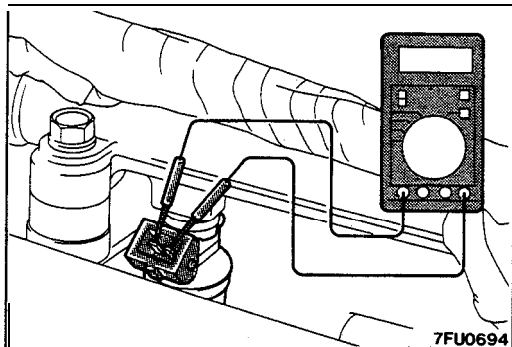
7FU0978

Check for an open-circuit, or a short-circuit between the rear bank injector and the engine control unit.

- Connector: Disconnected
- Engine control unit connector: Disconnected

OK → STOP

~~OK~~ → Repair the harness.
 (E-1 2 3
 14 15 16)



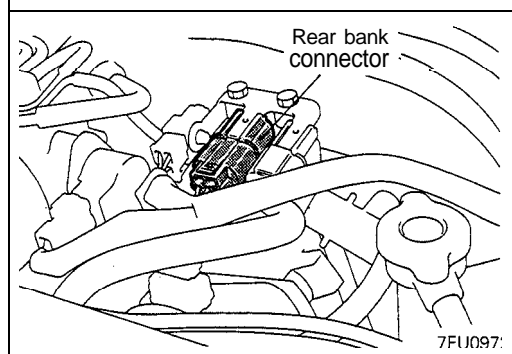
ACTUATOR INSPECTION INJECTORS

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.

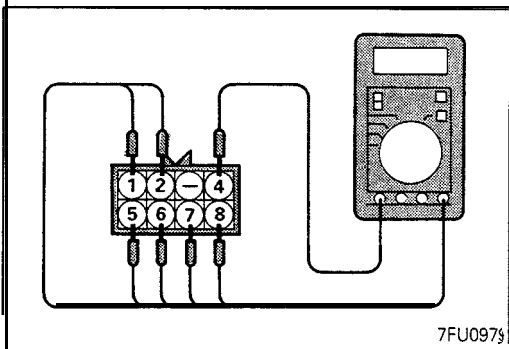
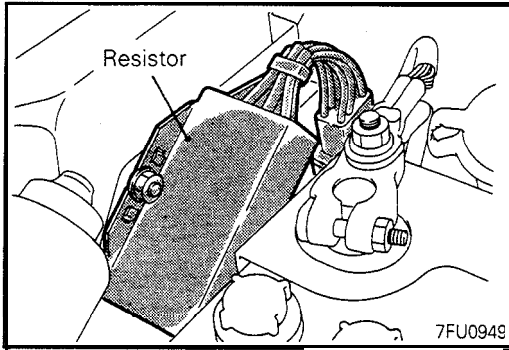


Measurement of Resistance between Rear Bank Terminals

- (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.



RESISTOR

Measurement of Resistance between Terminals

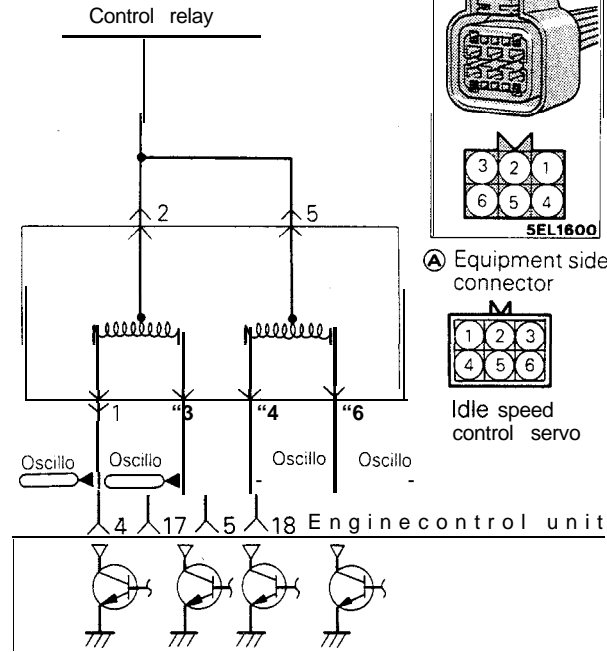
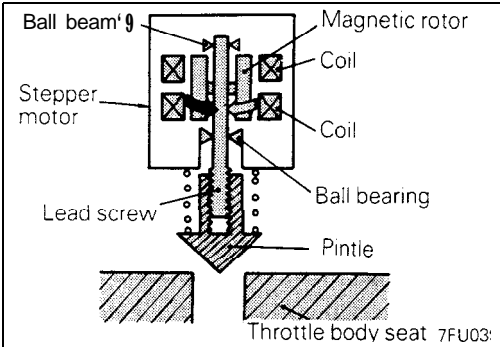
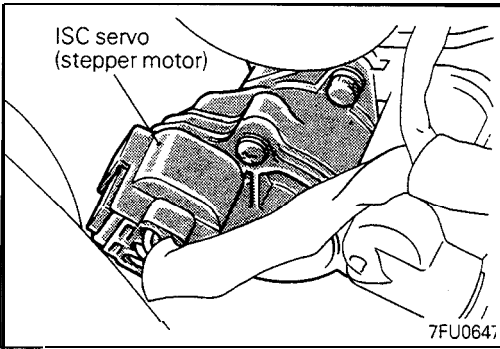
(1) Disconnect the resistor connector.

(2) Measure the resistance between terminals.

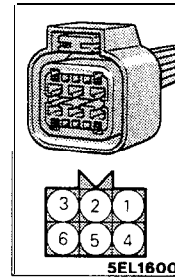
Measuring terminals	Resistance
①-④	5.5 - 6.5 Ω [At 20°C (68°F)]
②-④	
⑤-④	
⑥-④	
⑦-④	
⑧-④	

(3) If the resistance is out of specification, replace the resistor.

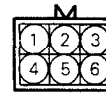
IDLE SPEED CONTROL SERVO (STEPPER MOTOR TYPE)



Ⓐ Harness side connector



Ⓐ Equipment side connector



Idle speed control servo

7FU0518

Engine control unit connector

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	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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7FU0653

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 control relay. As the engine control unit turns on power transistors in the unit 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 speed control servo harness and individual part checks have resulted normal 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.)

INSPECTION

Using Multi-use Tester

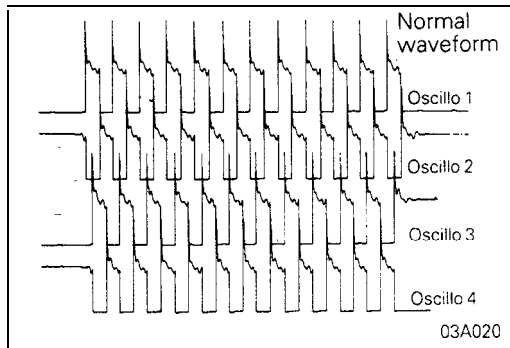
Function	Item No.	Data display	Check condition	Load state	Standard value
Data reading	45	Stepper motor steps	<ul style="list-style-type: none"> • Engine coolant temperature: 80 to 95°C (176 to 205°F) • Lamps, electric cooling fan, accessory units: All OFF • Transaxle: Neutral (P range for vehicle with A/T> • Steering wheel: Neutral • Idle position switch: ON (compressor clutch to be ON if air conditioner switch is ON) • Engine: idling 	Air conditioner switch: OFF	2 - 12 stp
				&conditioner switch:	25 - 65 stp
				<ul style="list-style-type: none"> • Air conditioner switch: ON • Selector lever: Shift to D range 	15 - 63 stp <Non Turbo>

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.



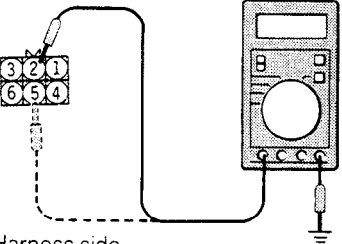
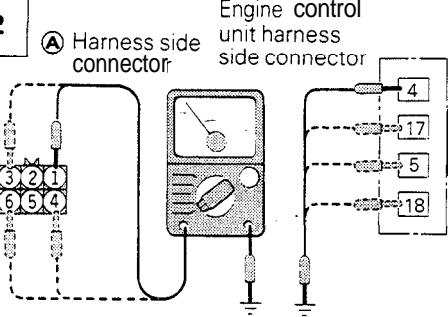
Using Oscilloscope

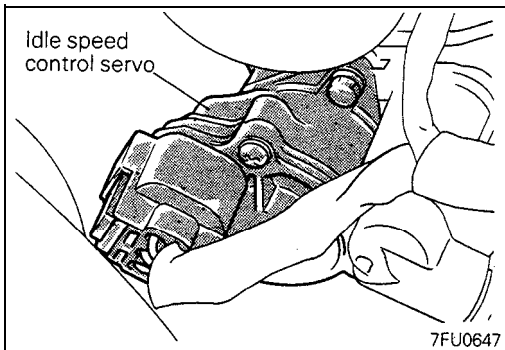
- (1) Connect the probe to each oscilloscope pick-up point as shown in the circuit diagram.
- (2) Start the engine.
- (3) When the air conditioner switch is turned on, the idling speed increases to operate the idle speed control. Check the instantaneous waveform.

NOTE

Keep in mind that the waveform can be observed only when idle speed control is in operation.

HARNESS INSPECTION

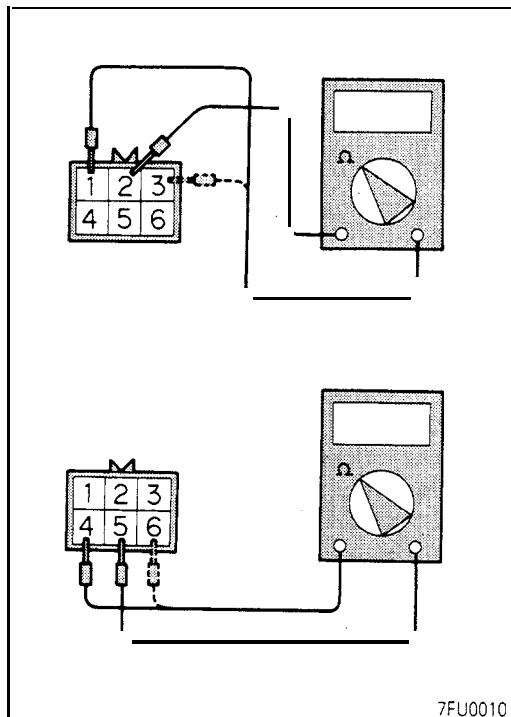
<p>1</p>  <p>Ⓐ Harness side Connector</p> <p>01L0395</p>	<p>Measure the power supply voltage of idle speed control servo.</p> <ul style="list-style-type: none"> Idle speed control servo connector: Disconnected Ignition switch: ON <table border="1" data-bbox="597 336 1019 451"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>SV</td> </tr> </table> <p>OK → 2</p> <p>OK →</p>	Voltage (V)	SV	<p>Repair the harness. (Control relay – Ⓐ2) (Control relay – Ⓐ5)</p>
Voltage (V)				
SV				
<p>2</p>  <p>Ⓐ Harness side connector</p> <p>Engine control unit harness side connector</p> <p>01L0397</p>	<p>Check for an open-circuit, or a short-circuit to ground between the engine control unit and the idle speed control servo.</p> <ul style="list-style-type: none"> Engine control unit connector: Disconnected Idle speed control servo connector: Disconnected <p>OK → STOP</p> <p>OK →</p>	<p>Repair the harness.</p> <p>Ⓐ1 – 4 Ⓐ3 – 17 Ⓐ4 – 5 Ⓐ6 – 18</p>		



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 unit.



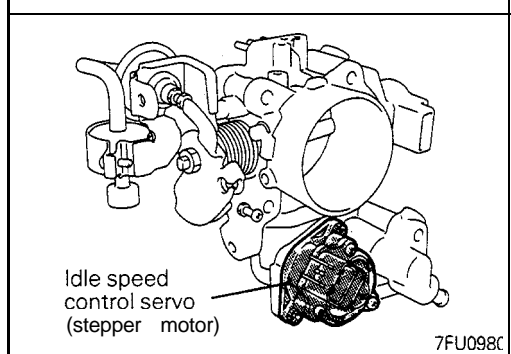
Checking the Coil Resistance

- (1) Disconnect the idle speed control servo 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 speed control servo side.

Standard value: 28 – 33 Ω at 20°C (68°F)

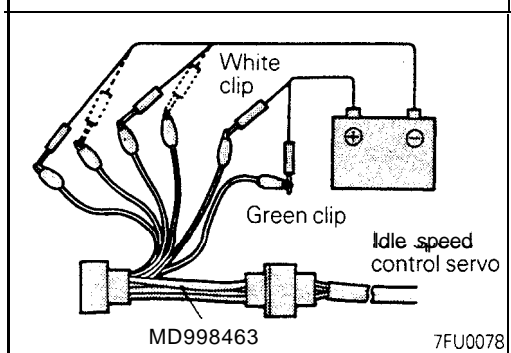
- (3) Measure the resistance between terminal ⑤ (green clip of the special tool) and either terminal ⑥ (yellow clip) or terminal ④ (black clip) of the connector at the idle speed control servo side.

Standard value: 28 – 33 Ω at 20°C (68°F)

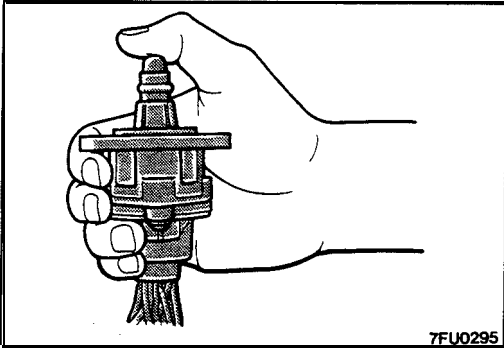


Operational Check

- (1) Remove the throttle body.
- (2) Remove the stepper motor.



- (3) Connect the special tool (test harness) to the idle speed control servo connector.
- (4) Connect the positive ⊕ terminal of a power supply (approx 6 V) to the white clip and the green clip.

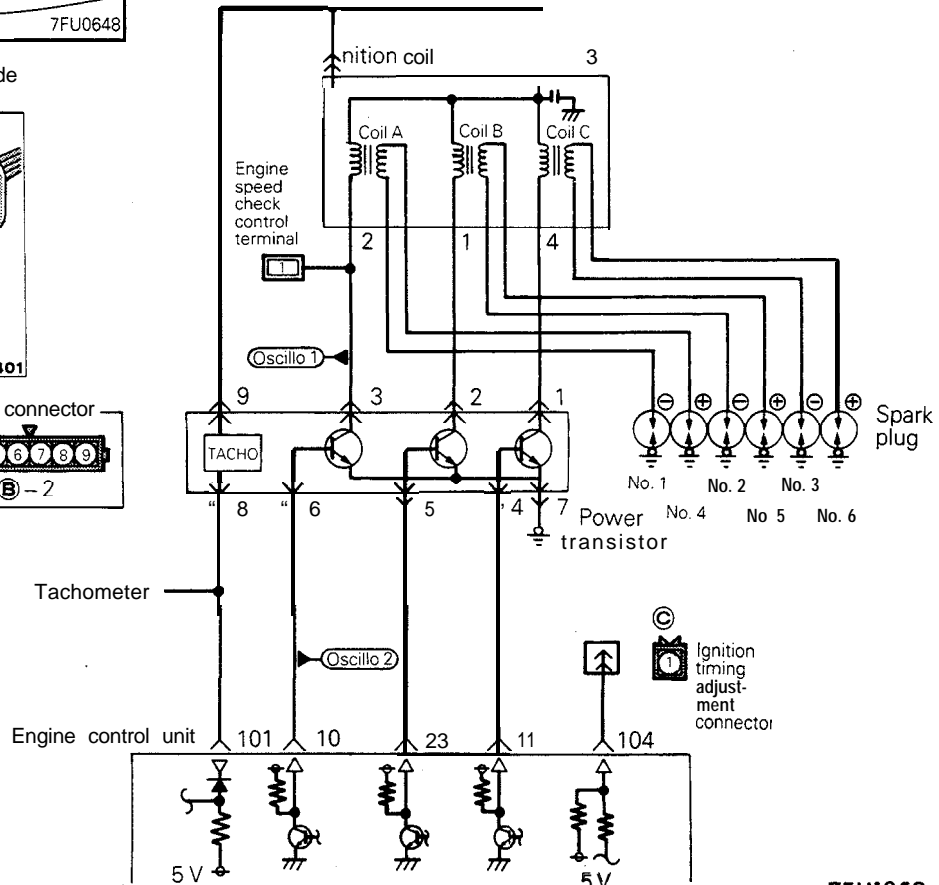
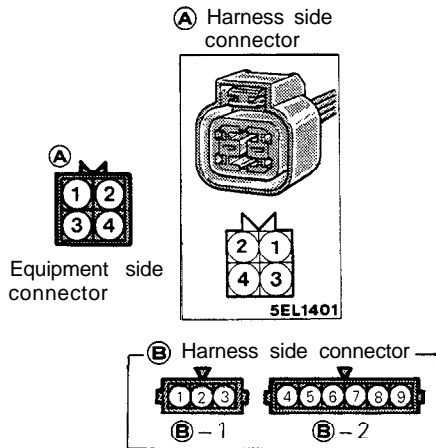
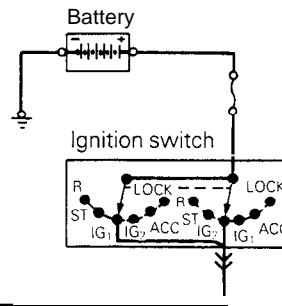
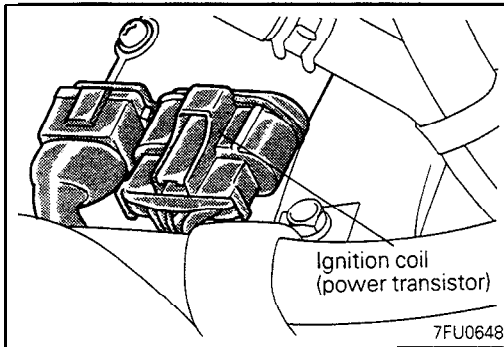


(5) With the idle speed control servo as shown in the illustration, connect the negative \ominus terminal of the power supply to each clip as described in the following steps, and check whether or not a vibrating feeling (a feeling of very slight vibration of the stepper motor) is generated as a result of the activation of the stepper motor.

- ① Connect the negative \ominus terminal of the power supply to the red and black clip.
 - ② Connect the negative \ominus terminal of the power supply to the blue and black clip.
 - ③ Connect the negative \ominus terminal of the power supply to the blue and yellow clip.
 - ④ Connect the negative \ominus terminal of the power supply to the red and yellow clip.
 - ⑤ Connect the negative \ominus 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 POWER TRANSISTOR

M13YVAB



7FU1059

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	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150
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7FU0653

OPERATION

- When the power transistor unit A is turned on by the signal from the engine control unit, primary current flows to the ignition coil A. When the 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 power transistor unit B is turned off, the ignition plugs of No. 2 and No. 3 cylinders spark.
- When the engine control unit turns off the transistor in the unit, the battery voltage in the unit is applied to the power transistor unit to turn it on. When the engine control unit turns on the transistor in the unit, the power transistor unit is turned off.

INSPECTION

Using Multi-use Tester

<Spark Advance>

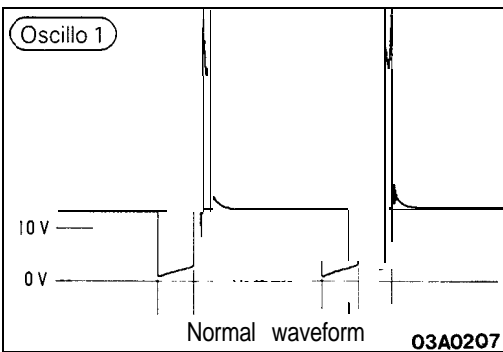
Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	44	Ignition advance	<ul style="list-style-type: none"> • Engine: Warming up • Timing light: Set (set timing light to check actual ignition timing) 	750 rpm (Idle)	7 – 23°BTDC
				2,000 rpm	30 – 40°BTDC <Non Turbo> 28 – 35°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	<ul style="list-style-type: none"> • Engine: Idling 	Ignition timing adjustment terminal is grounded	ON
				Ignition timing adjustment terminal is disconnected from ground	OFF

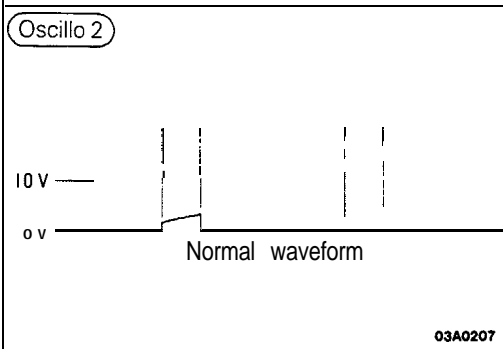
<Standard Ignition Timing>

Function	Item No.	Drive	Check condition	Normal condition
Actuator test	17	Set to ignition timing adjustment mode	<ul style="list-style-type: none"> • Engine: idling • Timing light: set 	5°BTDC



Using Oscilloscope

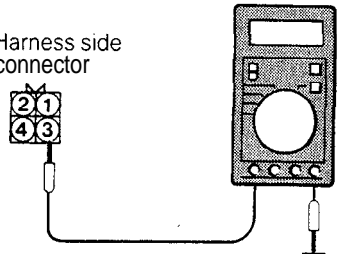
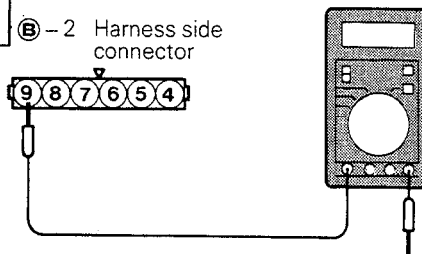
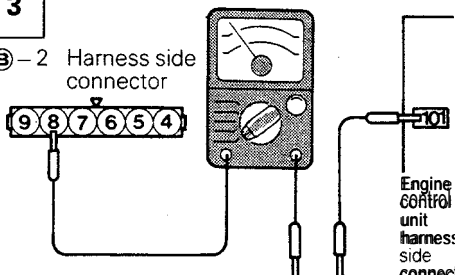
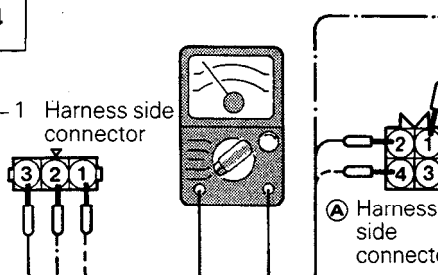
1. Primary signal of ignition coil
 - (1) Run the engine at an idle revolution speed.
 - (2) Connect the probe to oscilloscope pick-up point 1 as shown in the circuit diagram, and check the primary signal of the ignition coil.

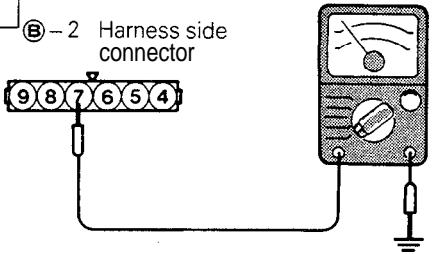


2. Control signal of power transistor

Connect the probe to oscilloscope pick-up point 2 as shown in the circuit diagram, and check the control signal of the power transistor.

HARNES INSPECTION

<p>1</p> <p>Ⓐ Harness side connector</p>  <p>01L0471</p>	<p>Measure the power supply voltage of the ignition coil.</p> <ul style="list-style-type: none"> • Connector: Disconnected • Ignition switch: ON <table border="1" data-bbox="641 304 1063 409"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>SV</td> </tr> </table> <p>OK → 2</p> <p>✗ → Repair the harness. (Ⓐ 3) – Ignition switch)</p>	Voltage (V)	SV
Voltage (V)			
SV			
<p>2</p> <p>Ⓑ – 2 Harness side connector</p>  <p>7FU0698</p>	<p>Measure the power supply voltage of the ignition coil.</p> <ul style="list-style-type: none"> • Connector: Disconnected • Ignition switch: ON <table border="1" data-bbox="641 672 1063 777"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>SV</td> </tr> </table> <p>OK → 3</p> <p>✗ → Repair the harness. (Ⓑ 9) – Ignition switch)</p>	Voltage (V)	SV
Voltage (V)			
SV			
<p>3</p> <p>Ⓑ – 2 Harness side connector</p>  <p>Engine control unit harness side connector 6FU1251</p>	<p>Check for an open-circuit, or a short-circuit to ground between the engine control unit and the power transistor.</p> <ul style="list-style-type: none"> • Engine control unit connector: Disconnected • Power transistor connector: Disconnected <p>OK → 4</p> <p>✗ → Repair the harness. (Ⓑ 8) – 101)</p>		
<p>4</p> <p>Ⓑ – 1 Harness side connector</p>  <p>Ⓐ Harness side connector</p> <p>7FU0699</p>	<p>Check for an open-circuit, or a short-circuit to ground between the power transistor and the ignition coil.</p> <ul style="list-style-type: none"> • Ignition coil connector: Disconnected • Power transistor connector: Disconnected <p>OK → 5</p> <p>✗ → Repair the harness. (Ⓐ 2) – (Ⓑ 3) (Ⓐ 1) – (Ⓑ 2) (Ⓐ 4) – (Ⓑ 1)</p>		

5  **ⓑ** -2 Harness side connector

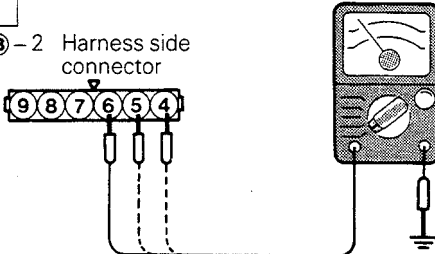
7FU0700

Check for continuity of the ground circuit.

- Connector: Disconnected

OK → **6**

✗ → Repair the harness. **(ⓑ7 - Ground)**

6  **ⓑ** -2 Harness side connector

7FU0701

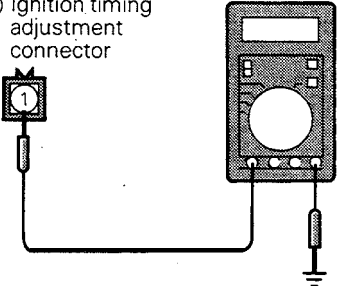
Measure the voltage of the control signal circuit of the power transistor.

- Connector: Disconnected
- Ignition switch: START

Voltage (V)
0.5 – 4.0

OK → **7**

✗ → Repair the harness. **(ⓑ6 - 10)**
(ⓑ5 - 23)
(ⓑ4 - 11)

7  **ⓒ** Ignition timing adjustment connector

7FU1060

Measure the voltage of the ignition timing adjustment terminal.

- Ignition switch: ON

Voltage (V)
4.0 – 5.2

OK → **STOP**

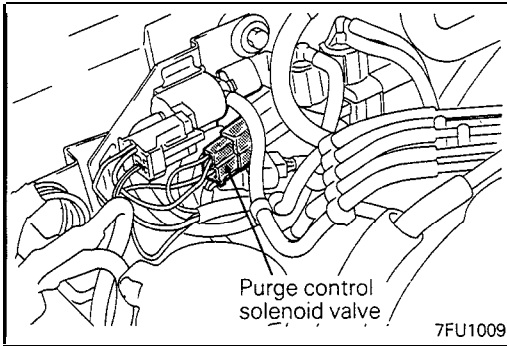
✗ → Repair the harness. **(ⓒ1 - 104)**

ACTUATOR INSPECTION

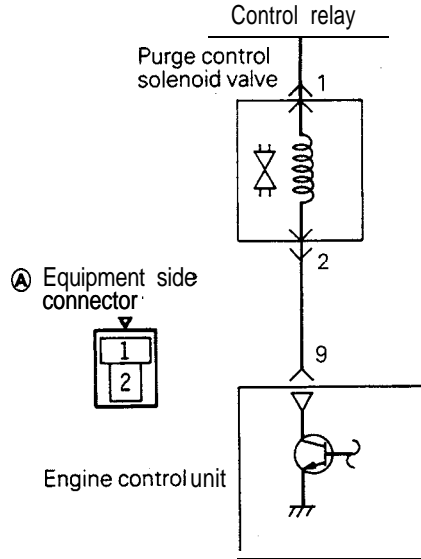
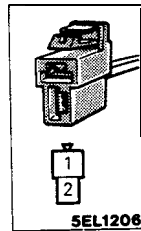
Refer to GROUP 16 – Ignition System.

PURGE CONTROL SOLENOID VALVE

M13YWAA



Ⓐ Harness side connector



01A0324

Engine control unit connector

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	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100

7FU0653

OPERATION

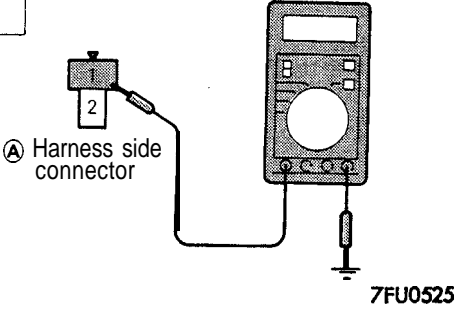
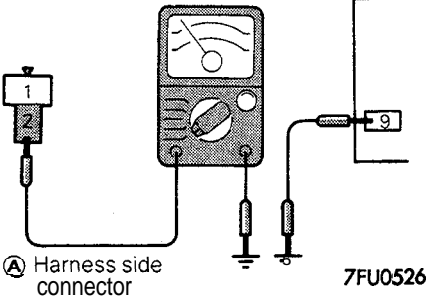
- The purge control solenoid valve is an ON-OFF type one which controls introduction of purge air from the canister into the intake air plenum.
- The battery power is supplied to the purge control solenoid valve through the control relay. When the engine control unit turns ON the power transistor in the unit, current flows to the coil, introducing purge air.

INSPECTION

Using Multi-use Tester

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

HARNESS INSPECTION

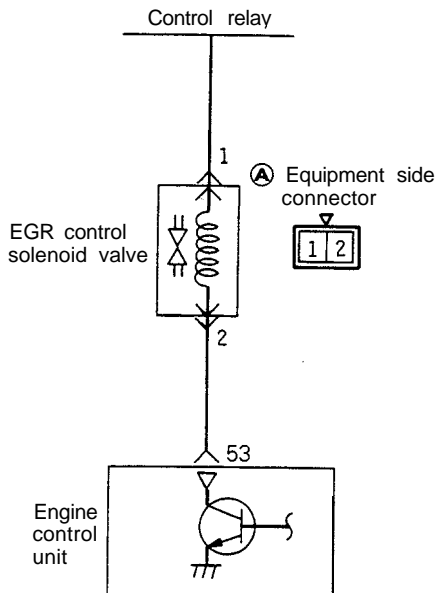
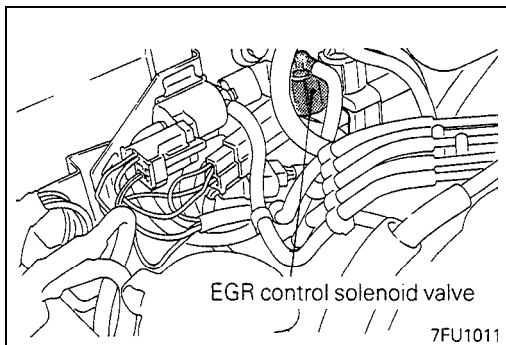
<p>1</p>  <p>Ⓐ Harness side connector</p> <p>7FU0525</p>	<p>Measure the power supply voltage.</p> <ul style="list-style-type: none"> • Connector: Disconnected • Ignition switch: ON <table border="1" data-bbox="597 289 1024 395"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>SV</td> </tr> </table> <p>OK →</p> <p>OK →</p>	Voltage (V)	SV	<p>2</p> <p>Repair the harness. (Control relay - Ⓐ1)</p>
Voltage (V)				
SV				
<p>2</p>  <p>Ⓐ Harness side connector</p> <p>7FU0526</p>	<p>Check for an open-circuit, or a short-circuit to ground between the purge control solenoid valve and the engine control unit,</p> <ul style="list-style-type: none"> • Engine control unit connector: Disconnected • Purge control solenoid valve connector: Disconnected <p>OK →</p> <p>OK →</p>	<p>STOP</p> <p>Repair the harness. (Ⓐ2 - 9)</p>		

ACTUATOR INSPECTION

Refer to GROUP 17 – Evaporative Emission Control System.

EGR CONTROL SOLENOID VALVE <California – Non Turbo, Turbo>

M13YZBA



01W657

Engine control unit connector

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	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
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7FU0653

OPERATION

- The EGR control solenoid valve 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 control relay to the EGR control solenoid valve. When the engine control unit turns off the power transistor inside the unit, current no more flows through the coil and EGR valve operating negative pressure leaks.

TROUBLESHOOTING HINT

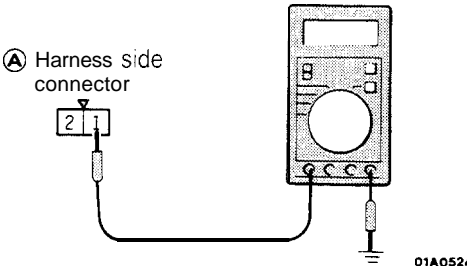
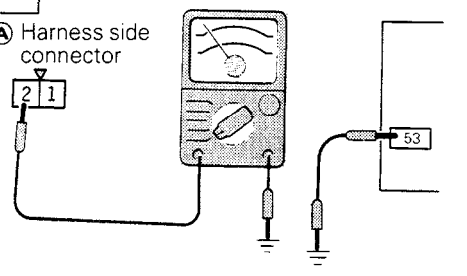
If the results of EGR control solenoid valve on-vehicle and off-vehicle inspections are normal but the self-diagnosis code for EGR system failure is displayed, check the EGR valve, vacuum hose and EGR passage for blocking.

INSPECTION

Using Multi-use Tester

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

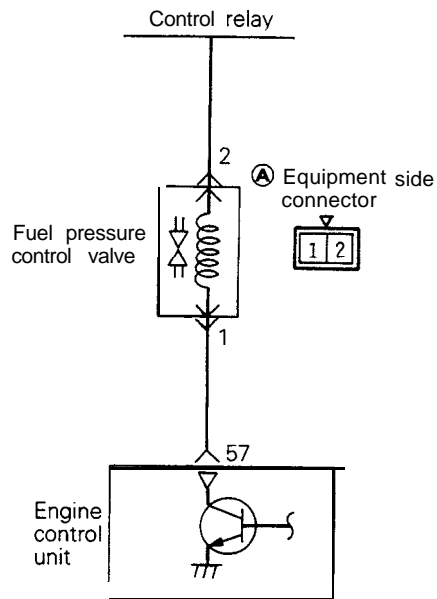
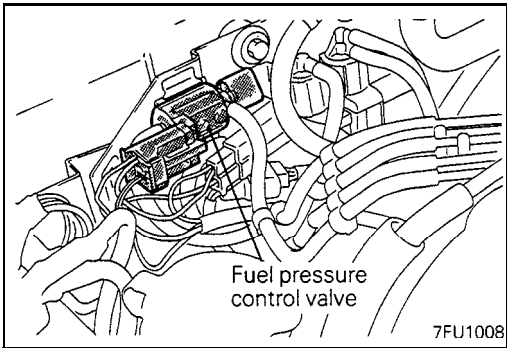
HARNES INSPECTION

<p>1</p>  <p>(A) Harness side connector</p> <p>01A0524</p>	<p>Measure the power supply voltage.</p> <ul style="list-style-type: none"> • Connector: Disconnected • Ignition switch: ON <table border="1" data-bbox="609 535 1031 640"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>SV</td> </tr> </table> <p>OK →</p> <p>OK →</p>	Voltage (V)	SV	<p>2</p> <p>Repair the harness. (A) 1 - Control relay)</p>
Voltage (V)				
SV				
<p>2</p>  <p>(A) Harness side connector</p> <p>Engine control unit harness side connector</p> <p>01A0525</p>	<p>Check for an open-circuit, or a short-circuit to ground between the EGR control solenoid valve and the engine control unit.</p> <ul style="list-style-type: none"> • EGR control solenoid valve connector: Disconnected • Engine control unit connector: Disconnected <p>OK →</p> <p>OK →</p>	<p>STOP</p> <p>Repair the harness. (A) 2 - 53)</p>		

ACTUATOR INSPECTION

Refer to GROUP 17 – Exhaust Gas Recirculation (EGR) System.

FUEL PRESSURE CONTROL VALVE <Turbo>



01W857

Engine control unit connector

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	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
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7FU0653

OPERATION

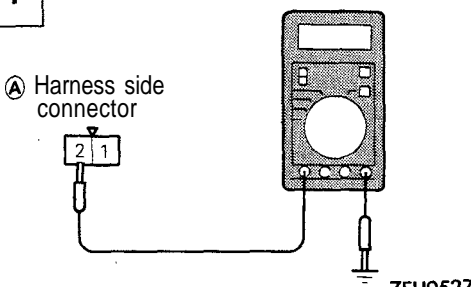

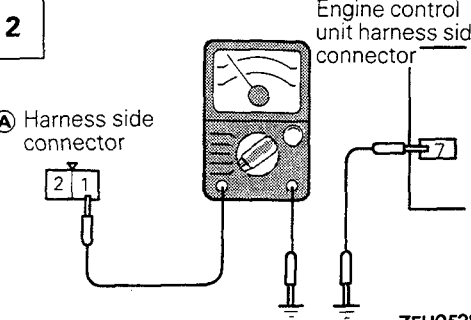

- The fuel pressure control valve is an ON-OFF type solenoid valve that switches the pressure introduced to the fuel pressure regulator between either intake manifold pressure or barometric pressure.
- Battery power is supplied to this valve via the control relay. When the engine control unit turns ON the internal power transistor, the coil is energized to allow barometric pressure to be introduced to the fuel pressure regulator.

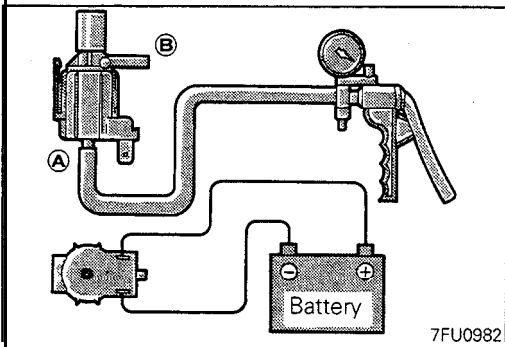
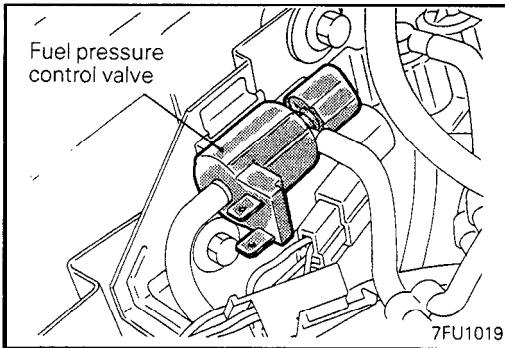
INSPECTION

Using Multi-use tester

Function	Item No.	Drive content	Check condition	Normal state
Actuator test	09	Turn solenoid valve from OFF to ON	Ignition switch: ON	Click heard when driven

HARNESS INSPECTION

<p>1</p>  <p>Ⓐ Harness side connector</p> <p>7FU0527</p>	<p>Measure the power supply voltage.</p> <ul style="list-style-type: none"> • Connector: Disconnected • Ignition switch: ON <table border="1" data-bbox="602 659 1032 776"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>SV</td> </tr> </table> <p>OK →</p> <p>✗ →</p>	Voltage (V)	SV	 <p>Repair the harness. Ⓐ 2 – Control relay</p>
Voltage (V)				
SV				
<p>2</p>  <p>Ⓐ Harness side connector</p> <p>Engine control unit harness side connector</p> <p>7FU0528</p>	<p>Check for an open-circuit, or a short-circuit to ground, between the fuel pressure control solenoid valve and the engine control unit.</p> <ul style="list-style-type: none"> • Engine control unit connector: Disconnected • Fuel pressure control valve connector: Disconnected <p>OK →</p> <p>✗ →</p>	 <p>Repair the harness. Ⓐ 1 – 57</p>		



ACTUATOR INSPECTION

Operation Check

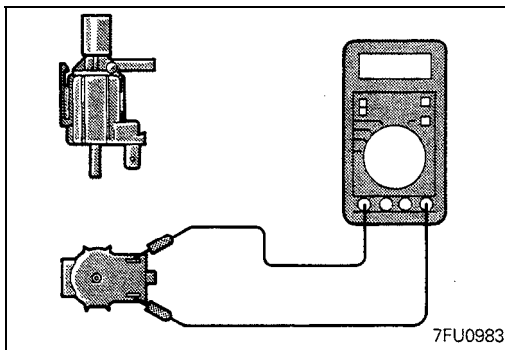
NOTE

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

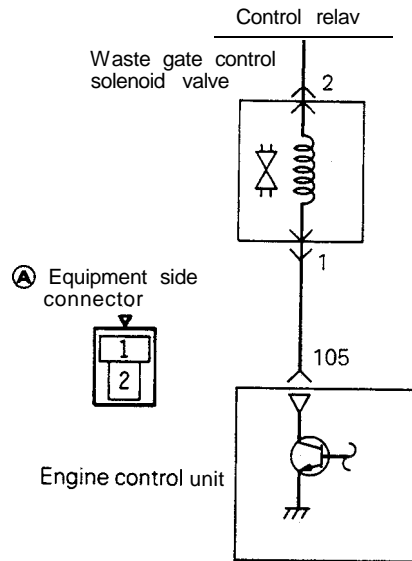
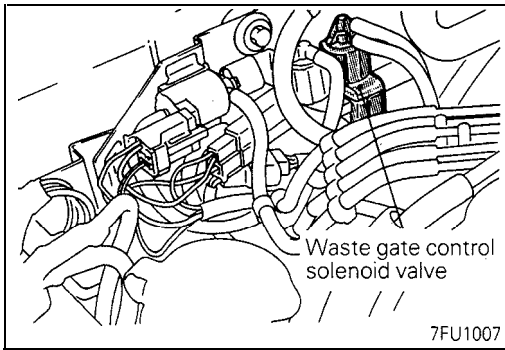


Coil Resistance Check

- (1) Measure the coil resistance with a circuit tester.

Standard value: 36 – 46 Ω [at 20°C (68°F)]

WASTE GATE CONTROL SOLENOID VALVE <Turbo>



0110324

Engine control unit connector

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	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
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7FU0653

OPERATION

- The waste gate control solenoid valve is an ON-OFF type solenoid valve that controls the boost pressure that is introduced to the waste gate actuator.
- Battery power is supplied to this valve via the control relay. When the engine control unit turns ON the internal power transistor, the coil is energized to release part of the boost pressure applied to the waste gate actuator.

TROUBLESHOOTING HINTS

If the waste gate control solenoid valve harness and the unit itself are normal, but poor acceleration or other abnormalities are experienced, the following problems are suspected.

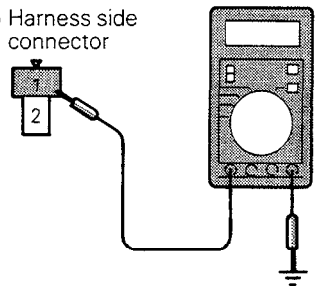
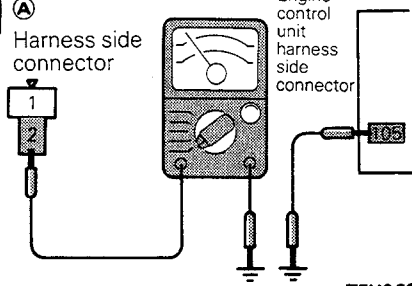
- (1) Faulty boost pressure control system
- (2) Poor connection of intake air hose
- (3) Faulty turbocharger or waste gate actuator
- (4) Clogged exhaust system

INSPECTION

Using Multi-use tester

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

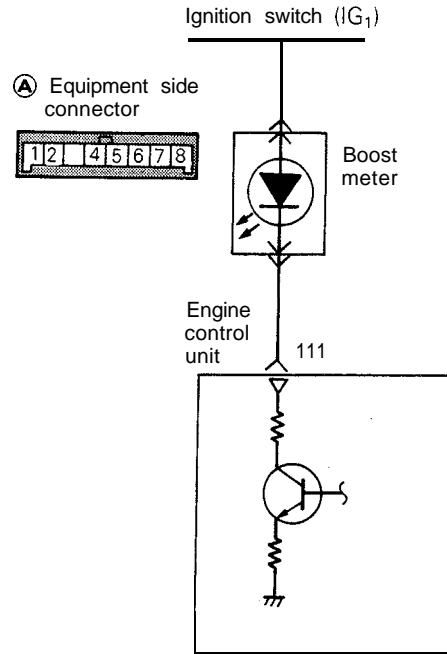
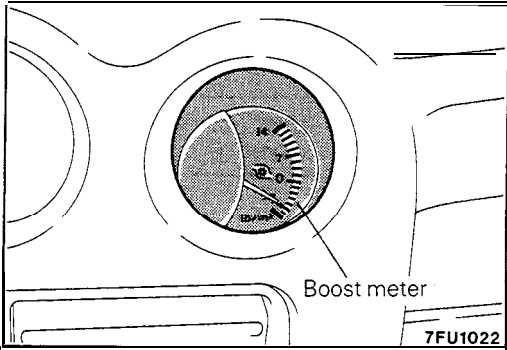
HARNESS INSPECTION

<p>1</p> <p>(A) Harness side connector</p>  <p>7FU0525</p>	<p>Measure the power supply voltage.</p> <ul style="list-style-type: none"> • Connector: Disconnected • Ignition switch: ON <table border="1" data-bbox="641 651 1063 756"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>SV</td> </tr> </table> <p>OK → 2</p> <p>✗ → Repair the harness. (A1) – Control relay)</p>	Voltage (V)	SV
Voltage (V)			
SV			
<p>2</p> <p>(A) Harness side connector</p>  <p>Engine control unit harness side connector</p> <p>7FU0526</p>	<p>Check for an open-circuit, or a short-circuit to ground, between the waste gate control solenoid valve and the engine control unit.</p> <ul style="list-style-type: none"> • Waste gate control solenoid valve connector: Disconnected • Engine control unit connector: Disconnected <p>OK → STOP</p> <p>✗ → Repair the harness. (A2) – 105)</p>		

ACTUATOR INSPECTION

Refer to GROUP 15.

BOOST METER <Turbo>



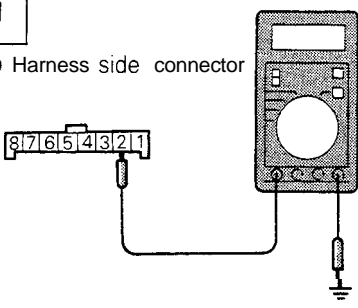
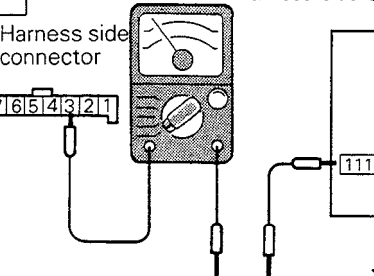
7FU0985

Engine control unit connector

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	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
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7FU0653

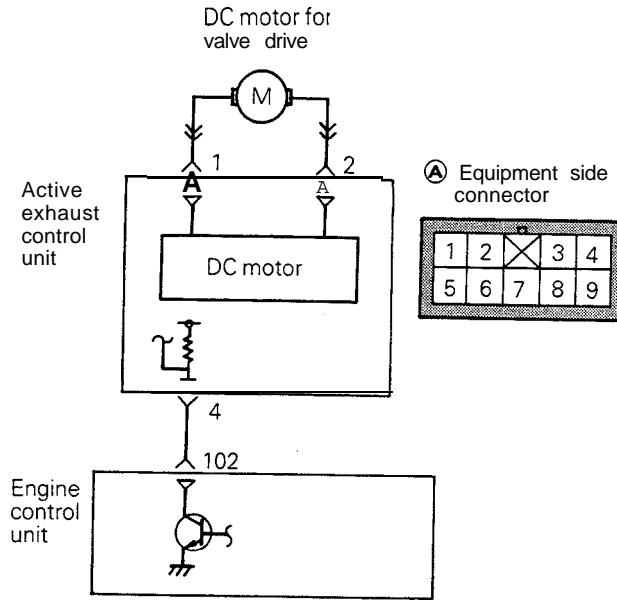
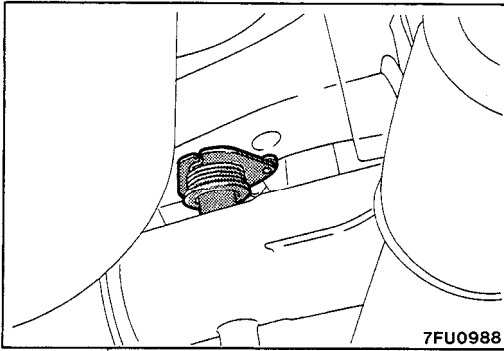
HARNESS INSPECTION

<p>1</p> <p>Ⓐ Harness side connector</p>  <p>7FU0986</p>	<p>Measure the power supply voltage.</p> <ul style="list-style-type: none"> • Connector: Disconnected • Ignition switch: ON <table border="1" data-bbox="657 294 1079 409"> <tr> <td>Voltage (V)</td> </tr> <tr> <td>SV</td> </tr> </table> <p>OK → 2</p> <p>OK → Repair the harness. (Ⓐ2 - Ignition coil [IG])</p>	Voltage (V)	SV
Voltage (V)			
SV			
<p>2</p> <p>Ⓐ Harness side connector</p> <p>Engine control unit harness side connector</p>  <p>7FU0987</p>	<p>Check for an open-circuit or a short-circuit to ground, between the engine control unit and the boost meter.</p> <ul style="list-style-type: none"> • Boost meter connector: Disconnected • Engine control unit connector: Disconnected <p>OK → STOP</p> <p>OK → Repair the harness. (Ⓐ3 - 111)</p>		

ACTUATOR INSPECTION

Refer to GROUP 54.

ACTIVE EXHAUST CONTROL UNIT <Turbo>



7FU0989

Engine control unit connector

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	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
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7FU0653

OPERATION

- Muffler noise is controlled 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 unit opens and closes the valve when it receives the signal produced by the engine control unit.

HARNES INSPECTION

1

Engine control unit harness side connector

7FU0689

Measure the input voltage of engine control unit.

- Engine control unit connector: Disconnected
- Ignition switch: ON

Voltage (V)
SV

OK

→

STOP

OK

→

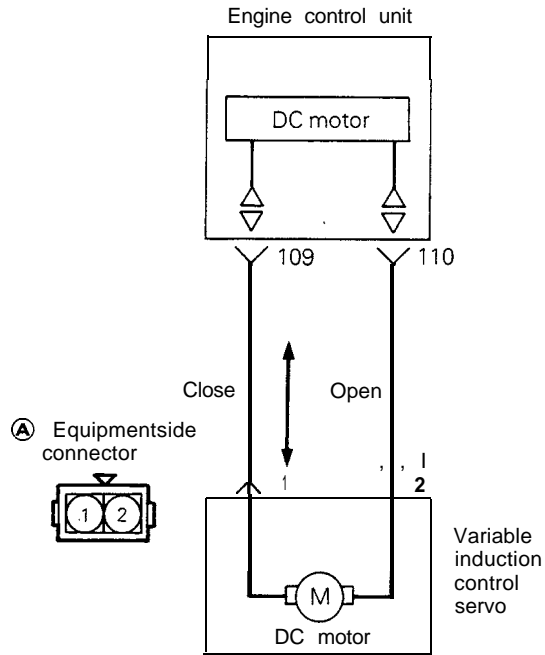
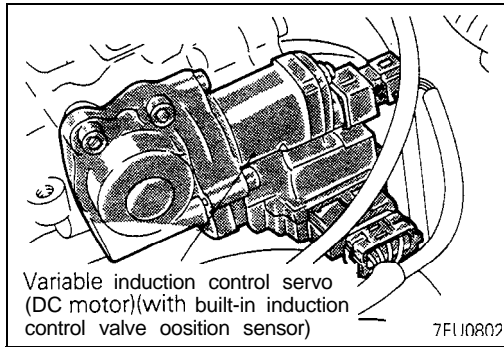
Repair the harness.

(A) 4 - (102)

ACTUATOR INSPECTION

Refer to GROUP 15.

VARIABLE INDUCTION CONTROL SERVO (DC MOTOR) <Non Turbo>



1 FU0646

Engine control unit connector

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	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
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7FU0653

OPERATION

- As the DC motor is driven clockwise or counterclockwise by the signal from the engine control unit, 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 unit.

INSPECTION

Using Multi-use tester

Function	Item No.	Drive content	Check condition	Normal state
Actuator test	11	Drive the variable induction control (VIC) servo (Open and close the variable induction valve)	Ignition switch: ON	Turn the variable induction valve shaft (Variable induction valve: FULL CLOSE → FULL OPEN

HARNESS INSPECTION

1

Engine control unit harness side connector

Ⓐ Harness side connector

7FU084

Check for an open-circuit or a short-circuit to ground, between the engine control unit and the variable induction control servo connector.

- Variable induction control servo connector: Disconnected
- Engine control unit connector: Disconnected

OK →

OK → Repair the harness.

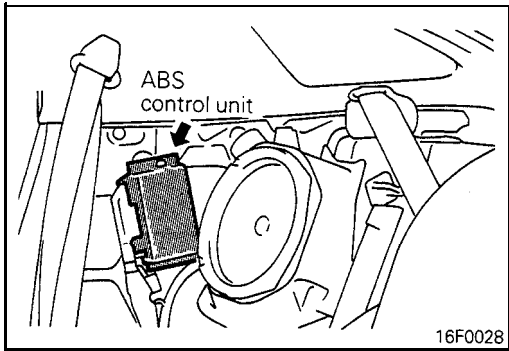
(Ⓐ 1 - 109)

(Ⓐ 2 - 110)

ACTUATOR INSPECTION

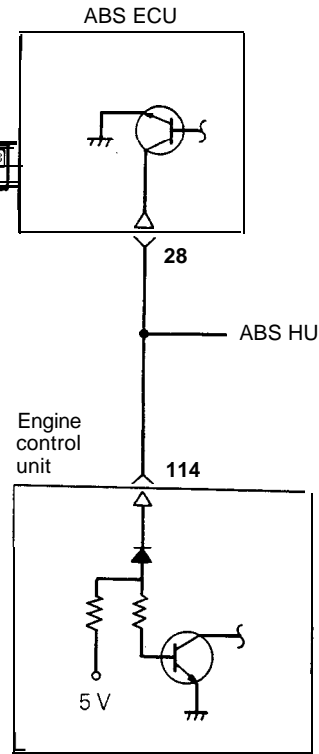
Refer to GROUP 15.

ANTI-LOCK BRAKE SIGNAL <Turbo>



Ⓐ ABS control unit equipment side connector

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	



Engine control unit connector

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	

7FU0653

6FU1542

OPERATION

- The anti-lock brake signal is input to the engine control unit from the anti-lock brake system (ABS) control unit as a signal to indicate whether or not the motor relay is activated. Based on this signal, the engine control unit controls the idle-speed control servo 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 brake signal to go from high to low.

INSPECTION

Using Multi-use Tester

Function	Item No.	Data display	Check condition	. Driving condition	Standard value
Data reading	45	Stepper motor step	Engine warmed up	Apply fairly sharp braking at 50 km/h (4th speed) to stop vehicle	To reach temporarily 70 to 100 steps

NOTE


Select a place where a rear-end collision is unlikely.


HARNESS INSPECTION

1


Check for an open-circuit or a short-circuit to ground, between the ABS control unit and the engine control unit.

- ABS control unit connector: Disconnected
- Engine control unit connector: Disconnected



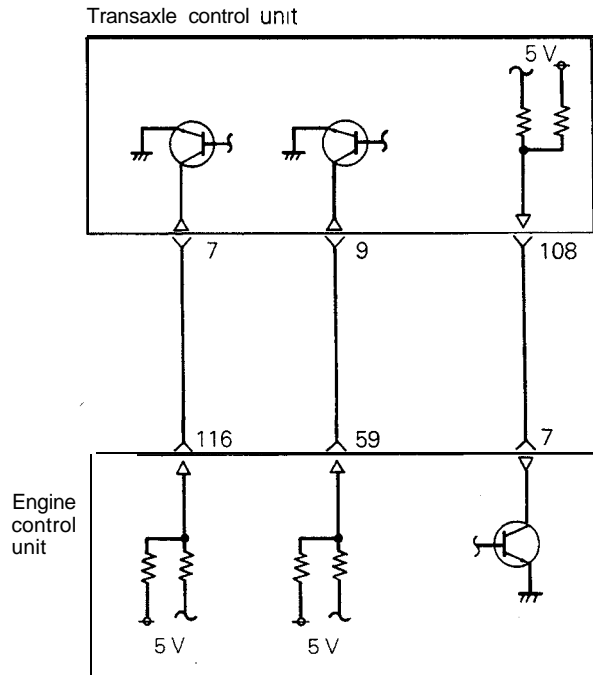
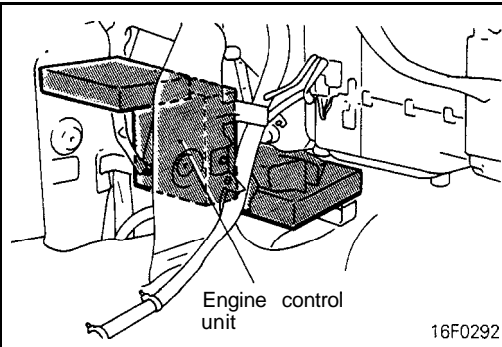


7



Repair the harness.
(A28 - 114)

ENGINE AND TRANSAXLE TOTAL CONTROL SIGNAL <A/T>



7FU0843

Ⓐ Transaxle control unit connector

106	101
107	102
108	103
109	104
110	105
10	1
11	2
12	3
13	4
14	5
15	6
16	7
17	8
18	9
58	51
59	52
60	53
61	54
62	55
63	56
64	57

7FU0903

Engine control unit connector

41	1
42	2
43	3
44	4
45	5
46	6
47	7
48	8
49	9
50	10
51	11
52	12
53	13
54	14
55	15
56	16
57	17
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74	34
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107	67
108	68
109	69
110	70
111	71
112	72
113	73
114	74
115	75
116	76
117	77
118	78
119	79
120	80
121	81
122	82
123	83
124	84
125	85
126	86
127	87
128	88
129	89
130	90
131	91
132	92
133	93
134	94
135	95
136	96
137	97
138	98
139	99
140	100

7FU0653

OPERATION

- Three communication lines are connected between the engine control unit and the transaxle control unit to send and receive the engine and transaxle total control signal.
- If the transistor inside the engine control unit changes from OFF to ON by the command of the engine control unit, the terminal having a voltage of 5 V applied to it from the transaxle control unit is grounded in the engine control unit.

This will change the terminal voltage of the transaxle control unit from HIGH to LOW.

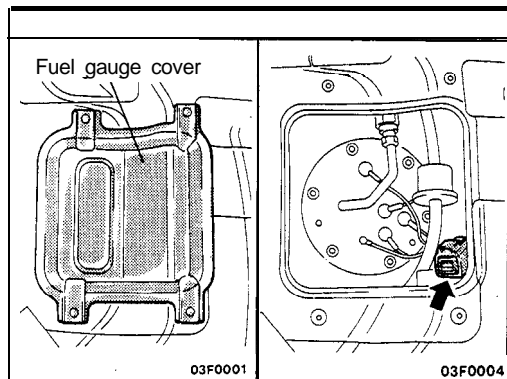
If the transistor fitted inside the engine control unit changes from ON to OFF, the terminal, having applied to it a voltage of 5 V from the transaxle control unit and grounded in the engine control unit, is released and the terminal voltage of the transaxle control unit changes from LOW to HIGH.

In this way, the terminal voltage of the transaxle control unit is controlled by ON/OFF operation of the transistor inside the engine control unit in order to send signal.

On the other hand, the transaxle control unit also controls the terminal voltage of the engine control unit by the ON/OFF operation of the transistor fitted inside the transaxle control unit in order to send signal. In this way, the engine and transaxle send control signal to each other.

HARNESS INSPECTION

<p>1</p> <p>Ⓐ Transaxle control unit harness side connector</p> <p>Engine control unit harness side connector</p> <p>6FU1543</p>	<p>Check for an open-circuit, or a short-circuit to ground between the transaxle control unit and the engine control unit,</p> <ul style="list-style-type: none"> • Transaxle control unit connector: Disconnected • Engine control unit connector: Disconnected 	<p>OK → 2</p> <p>✗ → Repair the harness. (Ⓐ 7 - 116)</p>
<p>2</p> <p>Ⓐ Transaxle control unit harness side connector</p> <p>Engine control unit harness side connector</p> <p>6FU1543</p>	<p>Check for an open-circuit, or a short-circuit to ground between the transaxle control unit and the engine control unit.</p> <ul style="list-style-type: none"> • Transaxle control unit connector: Disconnected • Engine control unit connector: Disconnected 	<p>OK → 3</p> <p>✗ → Repair the harness. (Ⓐ 9 - 59)</p>
<p>3</p> <p>Ⓐ Transaxle control unit harness side connector</p> <p>Engine control unit harness side connector</p> <p>6FU1543</p>	<p>Check for an open-circuit, or a short-circuit to ground between the transaxle control unit and the engine control unit.</p> <ul style="list-style-type: none"> • Transaxle control unit connector: Disconnected • Engine control unit connector: Disconnected 	<p>OK → STOP</p> <p>✗ → Repair the harness. (Ⓐ 108 - 7)</p>

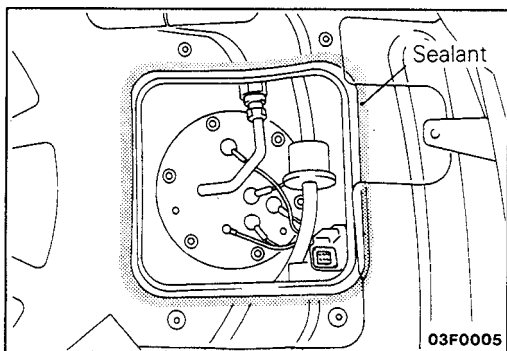


RELEASE OF RESIDUAL PRESSURE FROM HIGH PRESSURE FUEL HOSE

M13FGAI

Make the following operations to release the pressure remaining in fuel pipe line so that fuel will not flow out.

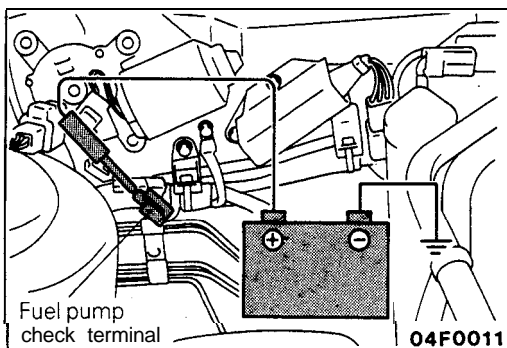
- (1) Remove the fuel gauge cover in the luggage compartment.
- (2) Disconnect the fuel pump harness connector.
- (3) Start the engine and after it stops by itself, turn the ignition switch to OFF.
- (4) Connect the fuel pump harness connector.



- (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

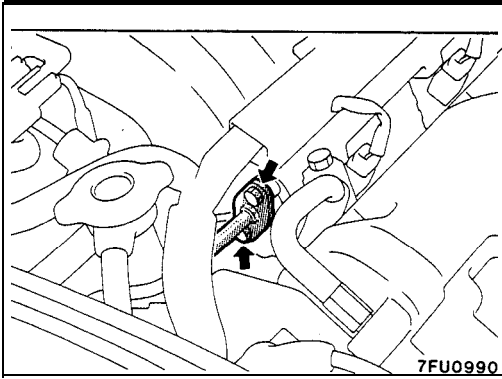
M13FDAI

- (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.

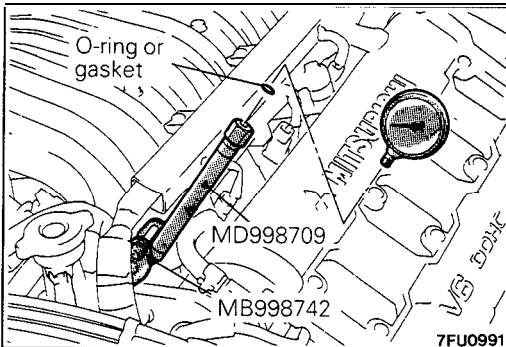
**FUEL PRESSURE TEST**

M13FNAT

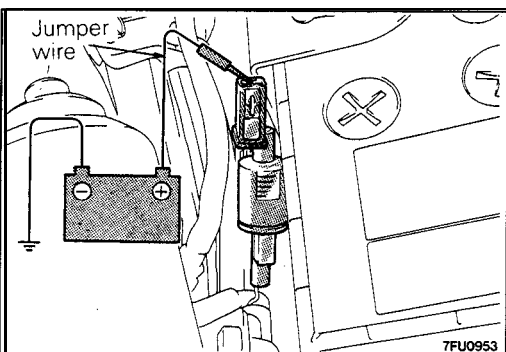
- (1) Reduce the internal pressure of the fuel pipes and hoses.
- (2) Disconnect the fuel high pressure hose at the delivery pipe side.

Caution

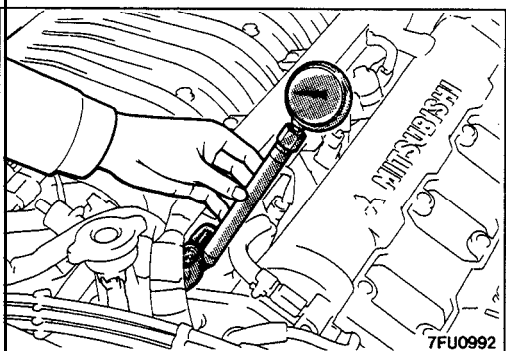
Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.



- (3) Set a fuel pressure gauge on the special tool, placing an adequate O-ring or gasket between the gauge end special tool prevent fuel leaks.
- (4) Attach the special tool set in step (3) to the delivery pipe between high pressure hose.
- (5) Connect the \ominus battery terminal.



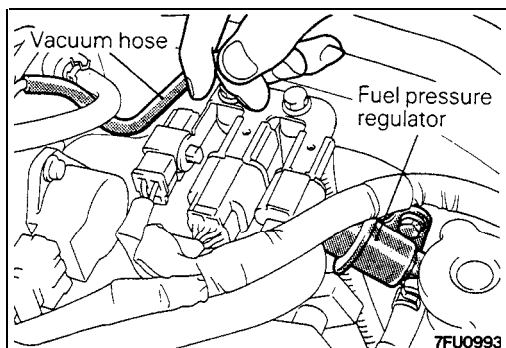
- (6) Connect a jumper wire to the terminal for activation of the fuel pump and to the positive \oplus terminal of the battery to activate the fuel pump. With fuel pressure applied, check to be sure that there is no fuel leakage from the fuel pressure gauge and the special tool connection part.
- (7) Disconnect the jumper wire (from the terminal for activation of the fuel pump) to stop the fuel pump.
- (8) Start the engine and let it idle.



- (9) 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



(10) 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

(11) Check to be sure that the fuel pressure during idling does not decrease even after the engine is raced a few times.

(12) 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.

(13) If the fuel pressure measured in steps (9) to (12) 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
<ul style="list-style-type: none"> • 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>

(14) 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.

(15) Remove all remaining pressure from inside the fuel pipe.

(16) Disconnect the fuel pressure gauge and the special tool from the delivery pipe.

Caution

Because there will be a slight amount of remaining pressure in the fuel pipe line, use rags to cover so that fuel doesn't splatter.

(17) Replace the O-ring at the end of the fuel high-pressure hose with a new one.

(18) After connecting the fuel high-pressure hose to the delivery pipe, tighten the installation bolt at the specified torque.

Tightening torque: 5.0 Nm (3.6 ft.lbs.)

(19) 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.

INJECTOR

M13SA-A

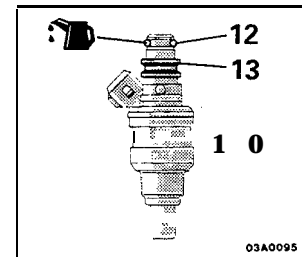
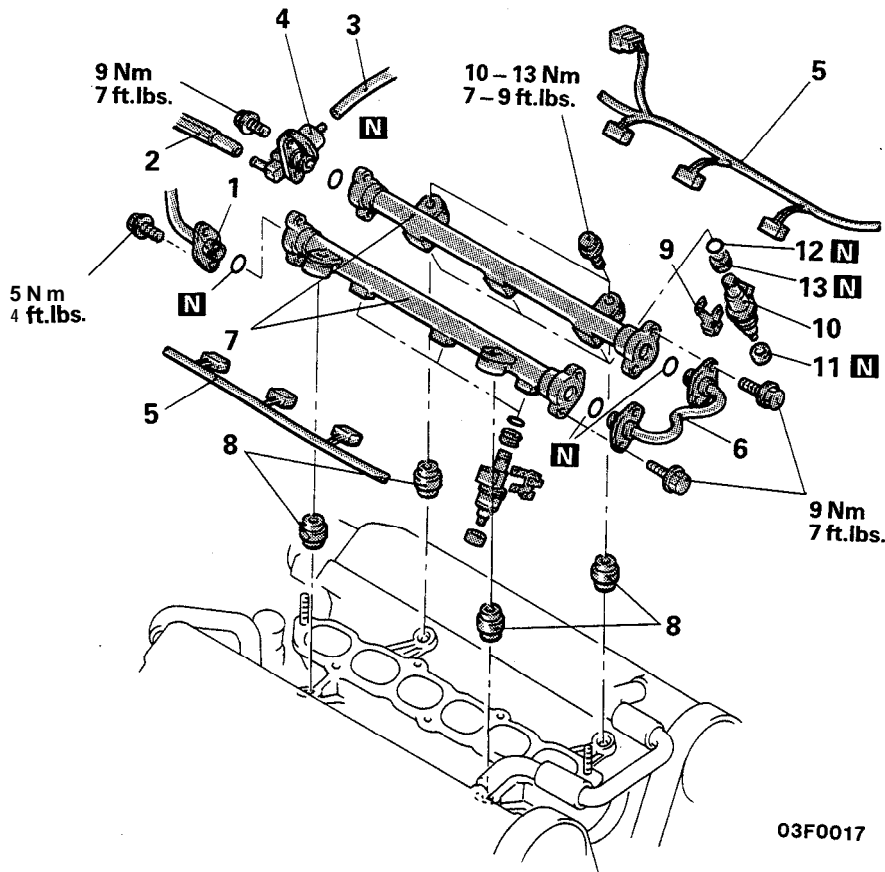
REMOVAL AND INSTALLATION

Pre-removal Operation

- Draining of the Coolant
(Refer to GROUP 00 – Maintenance Service.)
- Removal of Air Intake Plenum
(Refer to GROUP 15 – Air Intake Plenum.)
- Release of Residual Pressure from High Pressure Hose.
(Refer to P.13-137.)

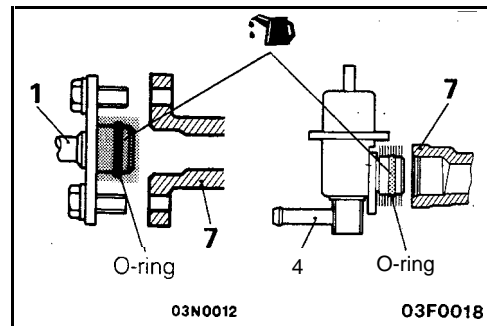
Post-installation Operation

- Supplying of Coolant
(Refer to GROUP 00- Maintenance Service.)
- Installation of Air intake Plenum
(Refer to GROUP 15 -Air Intake Plenum.)
- Checking for Fuel Leakage



Removal steps

- • • 1. Connection of high pressure fuel hose
- 2. Connection of fuel return hose
- 3. Connection of vacuum hose
- • 4. Fuel pressure regulator
- 5. Connection of control harness
- 6. Fuel pipe
- 7. Delivery pipe
- 8. Insulator
- 9. Injector support
- • • 10. Injector
- 11. Insulator
- 12. O-ring
- 13. Grommet



SERVICE POINT OF REMOVAL

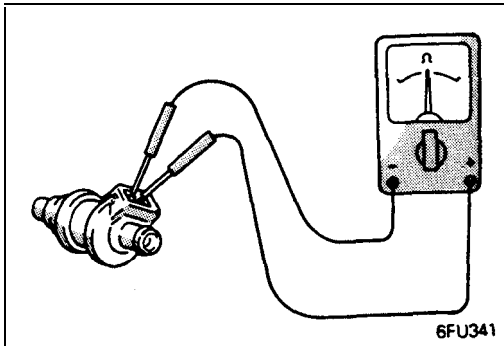
M13SBAI

1. DISCONNECTION OF HIGH PRESSURE FUEL HOSE

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.

**INSPECTION**

M13SCAC

INJECTORS

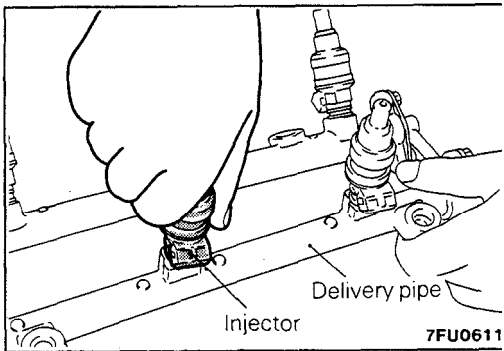
- (1) Measure resistance between terminals of injector using a circuit tester.

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.

**SERVICE POINTS OF INSTALLATION**

M13SDAV

10. INSTALLATION OF INJECTOR

While turning the injector to the left and right, install it to the delivery pipe.

Check to be sure that the injector turns smoothly.

Caution

If it does not turn smoothly, the O-ring may be trapped. Remove the injector and then re-insert it into the delivery pipe and check once again.

4. INSTALLATION OF FUEL PRESSURE REGULATOR

When connecting the fuel pressure regulator to the delivery pipe, apply light oil or petrol to the O-ring, and then insert, being careful not to damage the O-ring.

1. CONNECTION OF HIGH PRESSURE FUEL HOSE

When connecting the high pressure fuel hose to the delivery pipe, apply petrol to the hose union, and then insert, being careful not to damage the O-ring.

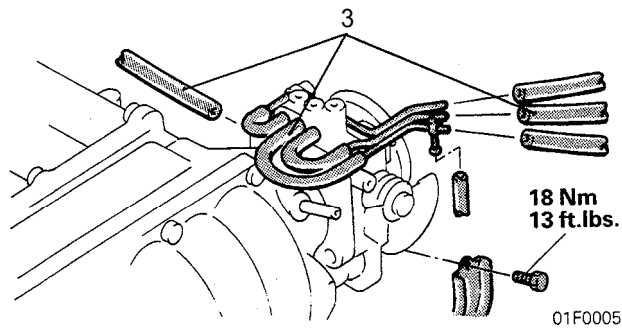
M13SA-B

THROTTLE BODY

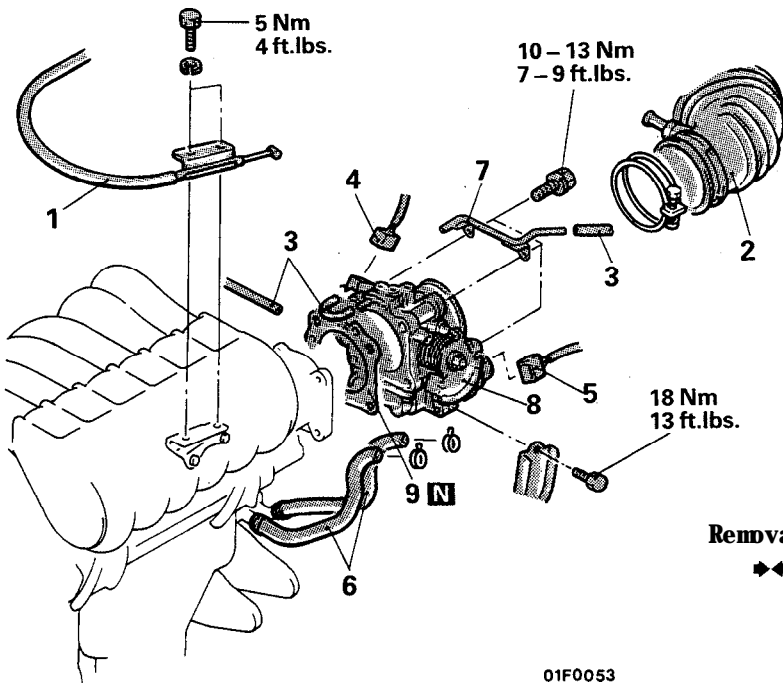
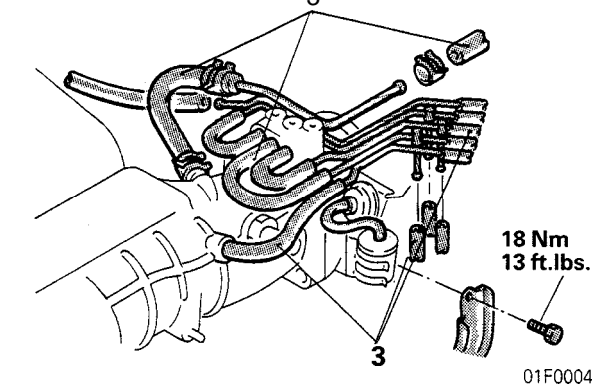
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
 • Draining and Supplying of Engine Coolant
 (Refer to GROUP 00 -Maintenance Service.)

<DOHC (Non Turbo) – California>



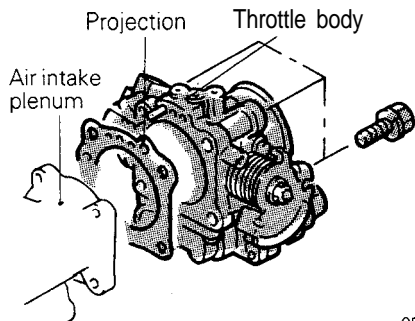
<DOHC (Turbo)>



NOTE
 The layout of vacuum hoses (No. 3) of the construction drawing is for the DOHC (Non Turbo) – Federal.

Removal steps

- ◆◆ 1. Connection of accelerator cable
- ◆◆ 2. Connection of air intake hose
- ◆◆ 3. Connection of vacuum hose
- ◆◆ 4. Connection of TPS connector
- ◆◆ 5. Connection of ISC motor connector
- ◆◆ 6. Connection of water hose
- ◆◆ 7. Vacuum pipe assembly
- ◆◆ 8. Throttle body
- ◆◆ 9. Gasket



SERVICE POINTS OF INSTALLATION

M13SDAW

9. INSTALLATION OF GASKET

Install the gasket so that the projection is where shown in the illustration.

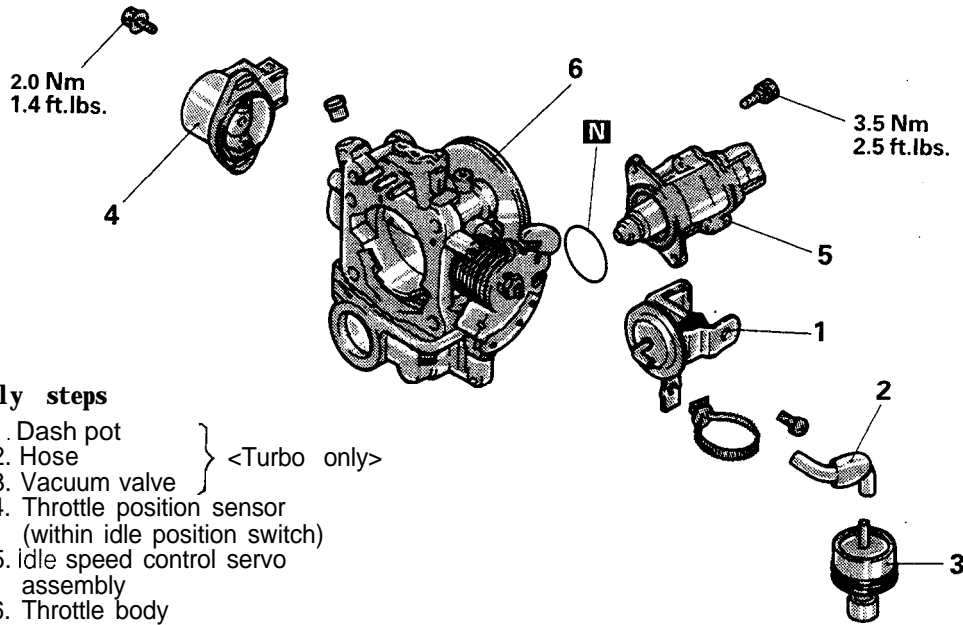
Caution

Poor idling etc. may result if the gasket is installed incorrectly.

1. ACCELERATOR CABLE ADJUSTMENT

For information concerning adjustment of the accelerator cable, refer to P.13-156.

DISASSEMBLY AND REASSEMBLY

**Disassembly steps**

1. Dash pot
 2. Hose
 3. Vacuum valve
 - * 4. Throttle position sensor (within idle position switch)
 5. Idle speed control servo assembly
 6. Throttle body
- } <Turbo only>

7FU1023

SERVICE POINT OF DISASSEMBLY

M13SFAN

Caution

1. When loosening a Phillips screw which has been firmly tightened, use a Phillips screwdriver that is an exact fit for the screw.
2. Do not remove the throttle valve.
3. Be careful when removing the throttle position sensor and idle speed control servo mounting screws, as adhesive has been applied these screws.

INSPECTION

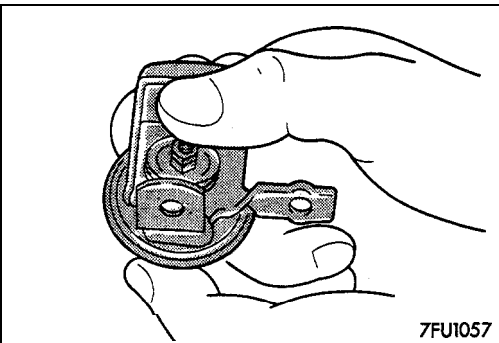
M13SHAM

DASH POT INSPECTION <Turbo>

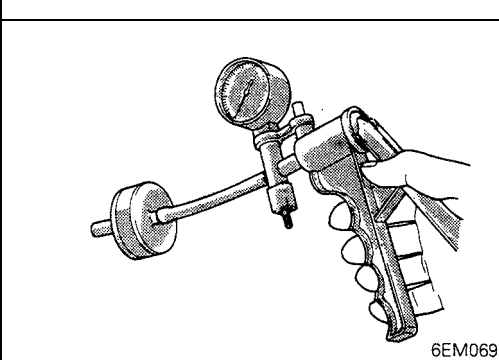
- (1) Check the dash pot diaphragm for damage. First, push up the rod fully and closing tightly the nipple with a finger, release the rod. The diaphragm is intact if the rod does not return to the initial position while the nipple is held closed with a finger. If the rod returns, the diaphragm is broken. Replace the dash pot.

VACUUM VALVE INSPECTION <Turbo>

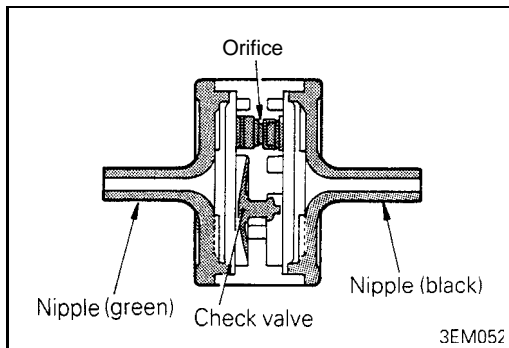
- (1) Remove the filter from the vacuum valve.
- (2) Connect a hand vacuum pump to the black nipple of the vacuum valve.
- (3) With the other nipple closed by the finger, apply a negative pressure of 500 mmHg (19.7 in.Hg.) to make sure that the negative pressure is maintained.
- (4) Let go your finger and make sure that the negative pressure leaks out gradually.



7FU1057



6EM069



- (5) Disconnect the hand vacuum pump and connect it to the other nipple.
- (6) Make sure that the negative pressure leaks out as soon as it is applied.

CLEANING THROTTLE BODY PARTS

- (1) Clean all throttle body parts.
Do not use solvent to clean the following parts:
 - Throttle position sensor (Idle position switch)
 - Idle speed control servo

If these parts are immersed in solvent, their insulation will deteriorate.

Wipe them with cloth only.

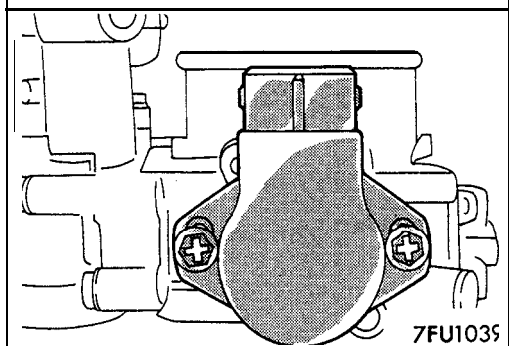
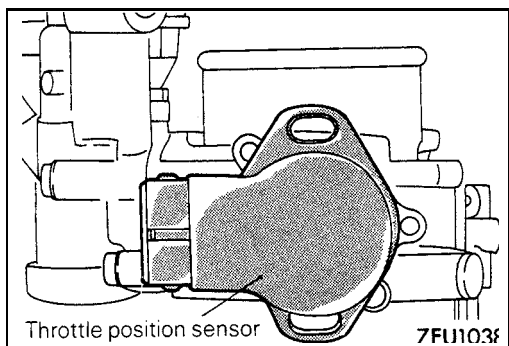
- (2) Check if the vacuum port or passage is clogged. Use compressed air to clean the vacuum passage.

SERVICE POINT OF REASSEMBLY

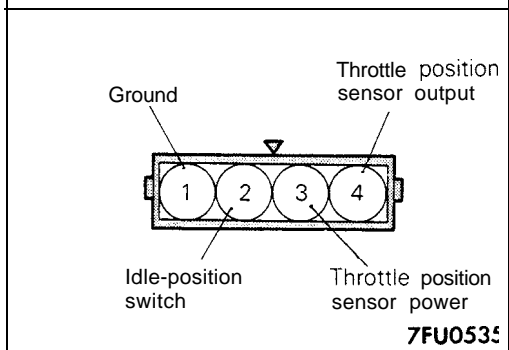
M13SGAN

4. INSTALLATION OF THROTTLE POSITION SENSOR

- (1) Set the throttle position sensor to the throttle body as shown in the diagram.



- (2) After turning the throttle position sensor 90° in the clockwise direction to set it, tighten by turning the screw.
- (3) Connect the circuit tester between 1 (ground) and 3 (output), or between 3 (output) and 4 (power). Then, make sure that the resistance changes smoothly when the throttle valve is slowly moved to the fully open position.
- (4) Check for continuity across terminals 2 (Idle position switch) and 1 (ground) with the throttle valve both fully closed and fully open.



Throttle valve position	Continuity
Fully closed	Conductive
Fully open	Non-conductive

If there is not continuity with the throttle valve fully closed, turn the counterclockwise direction, and then check again.

- (5) If the above specifications are not met, replace the idle position switch.

FUEL TANK

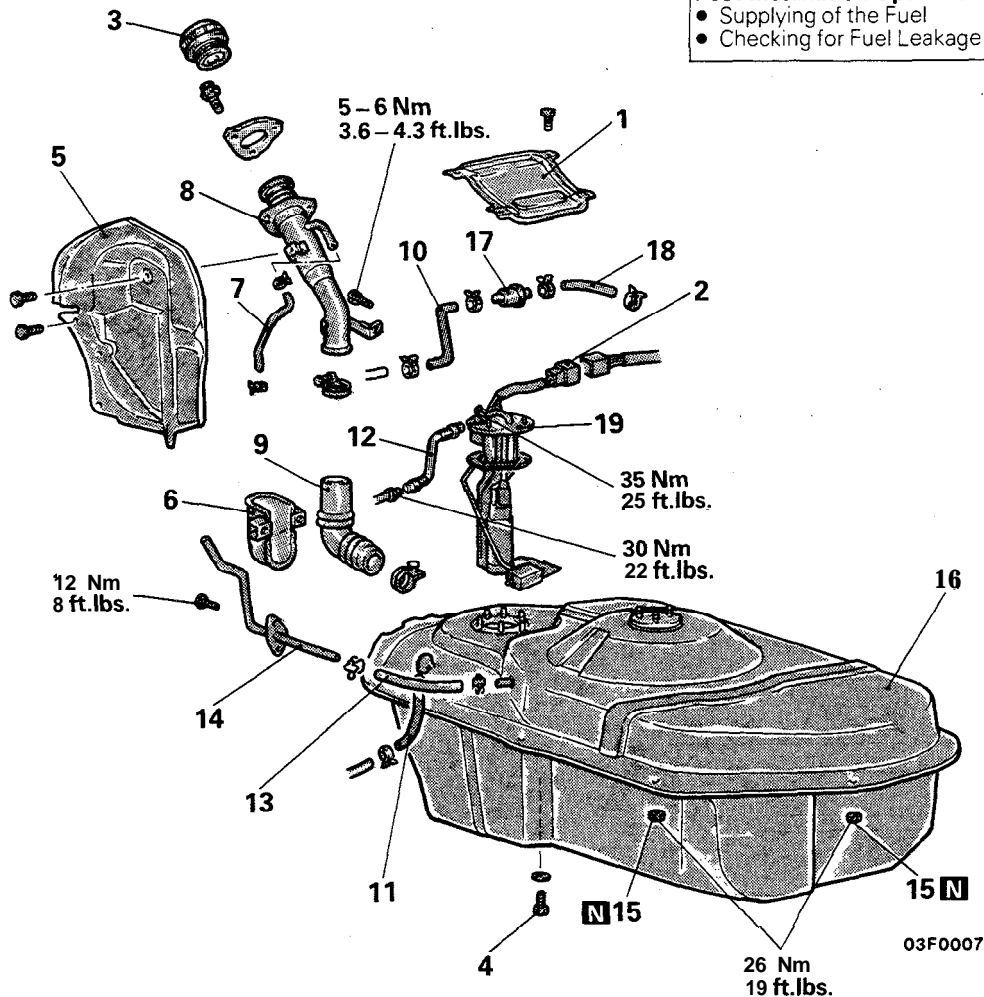
REMOVAL AND INSTALLATION

Pre-removal Operation

- Draining of the Fuel
- Release of Residual Pressure from High Pressure Hose.
(Refer to P.13-137.)

Post-installation Operation

- Supplying of the Fuel
- Checking for Fuel Leakage

**Removal steps**

- ◆◆ 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 filler neck protector
- ◆◆ 7. Vapor hose
- 8. Fuel filler neck
- 9. Fuel filler hose
- ◆◆ * 10. Vapor hose
- 11. Return hose
- ◆◆ * 12. High pressure fuel hose
- * 13. Vapor hose
- 14. Leveling pipe
- 15. Self-locking nut
- 16. Fuel tank
- ◆◆ 17. Overfill limiter (Two-way valve)
- ◆◆ 18. Vapor hose
- + 19. Fuel pump and fuel gauge unit assembly

SERVICE POINT OF REMOVAL

M13GBAK

12. DISCONNECTION OF HIGH PRESSURE FUEL HOSE

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.

INSPECTION

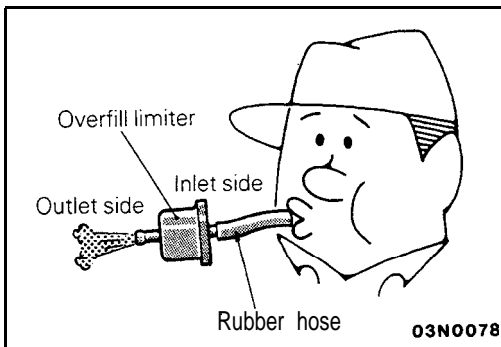
M13GCAM

- Check the hoses and the pipes for crack or damage.
- Check the fuel tank 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:

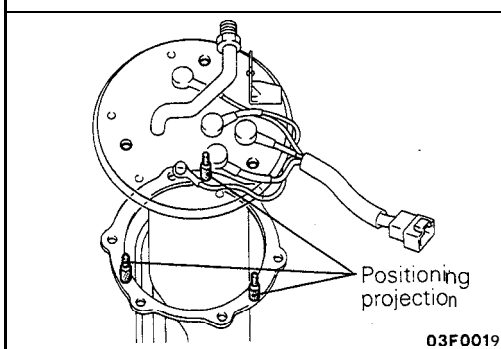
- (1) Kerosene
- (2) Trichloroethylene
- (3) A neutral emulsion type detergent



OVERFILL LIMITER (TWO-WAY VALVE)

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

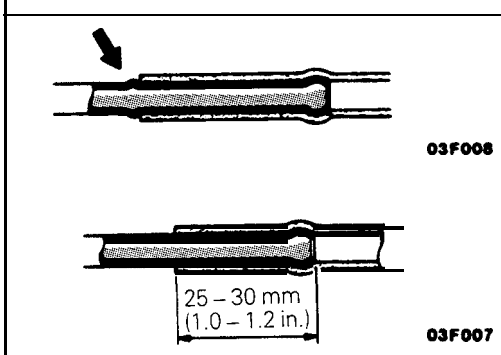


SERVICE POINTS OF INSTALLATION

M13GDAT

19. INSTALLATION OF FUEL PUMP AND FUEL GAUGE UNIT ASSEMBLY

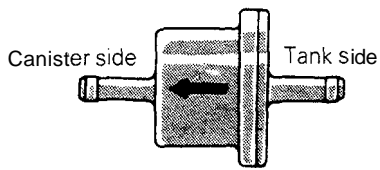
Align the three positioning projections of the packing with the holes in the fuel pump and fuel gauge unit assembly.



18.13. IO. 7. CONNECTION OF VAPOR HOSE

- (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.

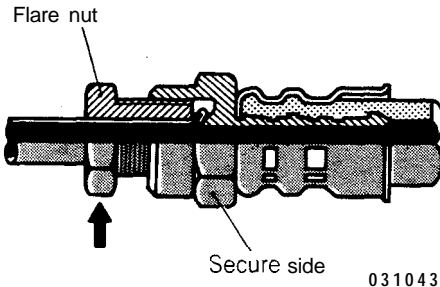
Standard value: 25 – 30 mm (1.0 – 1.2 in.)



D03041

17. INSTALLATION OF OVERFILL LIMITER (TWO-WAY VALVE)

Install so that the overfill limiter is facing in the direction shown in the illustration.



031043

12. CONNECTION OF HIGH PRESSURE FUEL HOSE

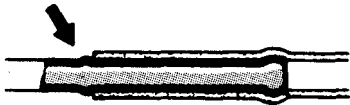
Temporarily tighten the flare nut by hand, and then tighten it to the specified torque, being careful that the high pressure fuel hose does not become twisted.

Caution

When tightening flare nut, be careful not to bend or twist line to prevent fuel pump from damage.

11. CONNECTION OF RETURN HOSE

Connect the return hose to the pipe securely, up to the stepped part, as shown in the illustration.

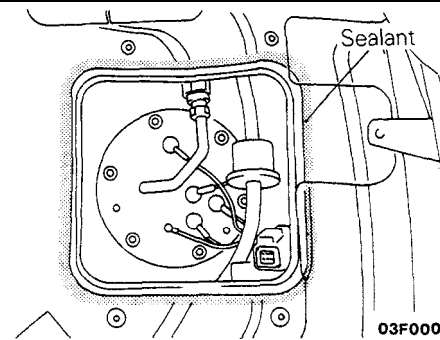


03F008

1. INSTALLATION OF FUEL GAUGE COVER

Before installing the fuel gauge cover, apply the specified sealant to the rear floor pan.

Specified sealant: 3M ATD Part No. 8509 or equivalent



03F0005

FUEL PUMP AND FUEL GAUGE UNIT ASSEMBLY AND OVERFILL LIMITER (TWO-WAY VALVE)

REMOVAL AND INSTALLATION

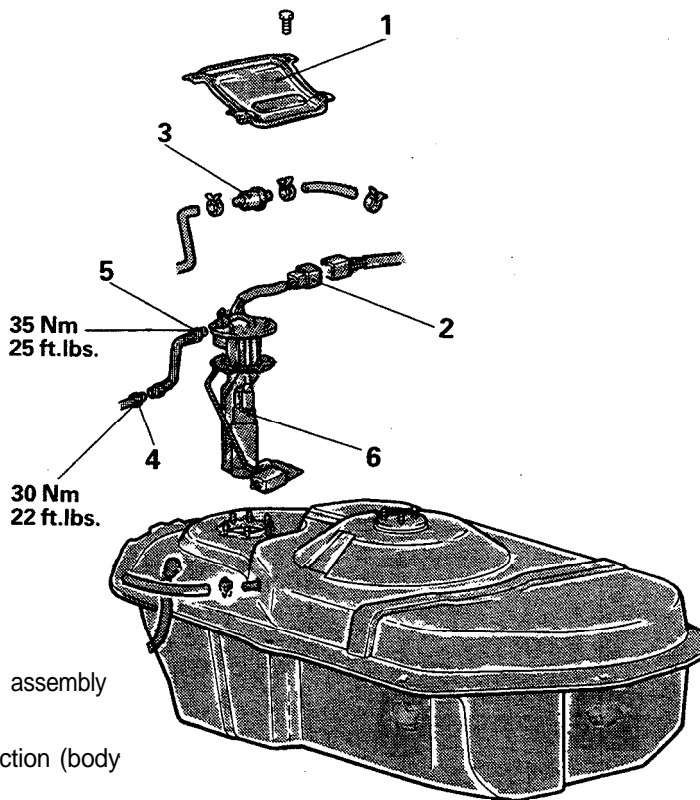
M13UA--

Pre-removal Operation

- Draining of the Fuel
- Release of Residual Pressure from High Pressure Hose (Refer to P.13-137.)

Post-installation Operation

- Supplying of the Fuel
- Checking for Fuel Leakage



Removal steps

- * 1. Fuel gauge cover
- * 2. Fuel pump and fuel gauge unit assembly connector
- * 3. Overfill limiter (Two-way valve)
- ◄◄ ►► 4. High pressure fuel hose connection (body side)
- ◄◄ ►► 5. High pressure fuel hose connection (fuel pump side)
- * 6. Fuel pump and fuel gauge unit assembly

03F0007

SERVICE POINTS OF REMOVAL

M13UBAC

4. DISCONNECTION OF HIGH PRESSURE FUEL HOSE (BODY SIDE)

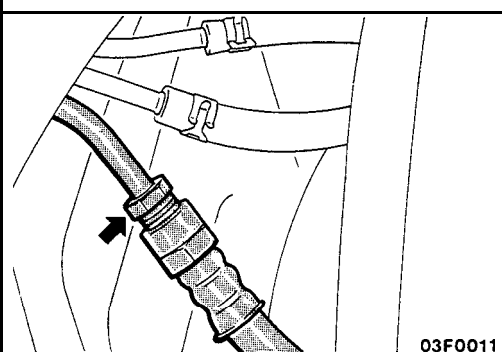
Caution

Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.

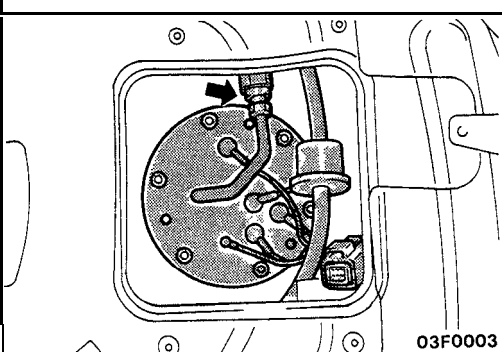
5. DISCONNECTION OF HIGH PRESSURE FUEL HOSE (FUEL PUMP SIDE)

NOTE

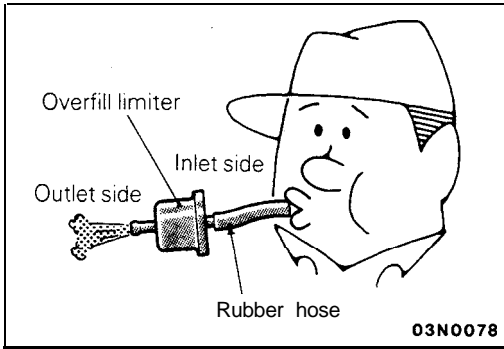
Hold the pump side nut with a wrench while turning the nut on the hose side.



03F0011



03F0003



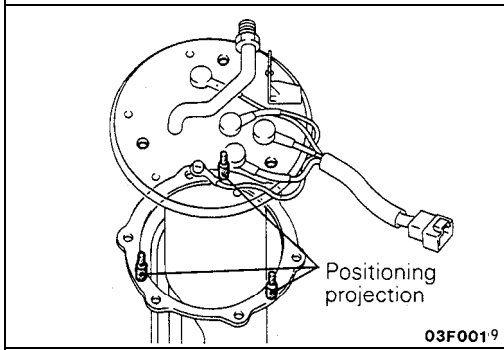
INSPECTION

M13UCAB

OVERFILL LIMITER (TWO-WAY VALVE)

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

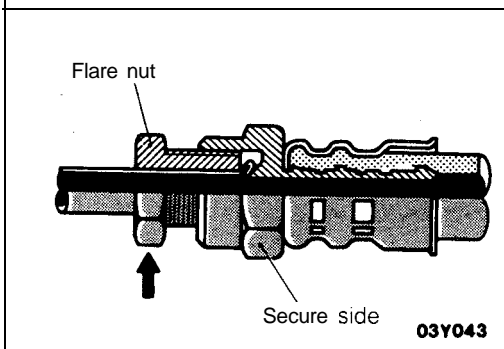


SERVICE POINTS OF INSTALLATION

M13UDAC

6. INSTALLATION OF FUEL PUMP AND FUEL GAUGE UNIT ASSEMBLY

Align the three positioning projections of the packing with the holes in the fuel pump and fuel gauge unit assembly.

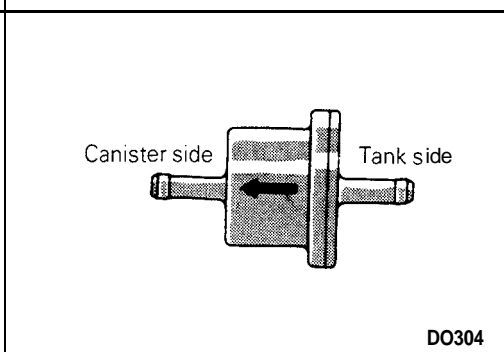


5. 4. CONNECTION OF HIGH PRESSURE FUEL HOSE

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.

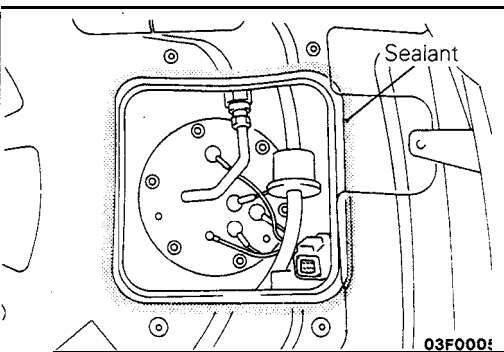
Caution

When tightening flare nut, be careful not to bend or twist line to prevent fuel pump from damage.



3. INSTALLATION OF OVERFILL LIMITER (TWO-WAY VALVE)

Install so that the overfill limiter is facing in the direction shown in the illustration.



1. INSTALLATION OF FUEL GAUGE COVER

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 LINE AND VAPOR LINE

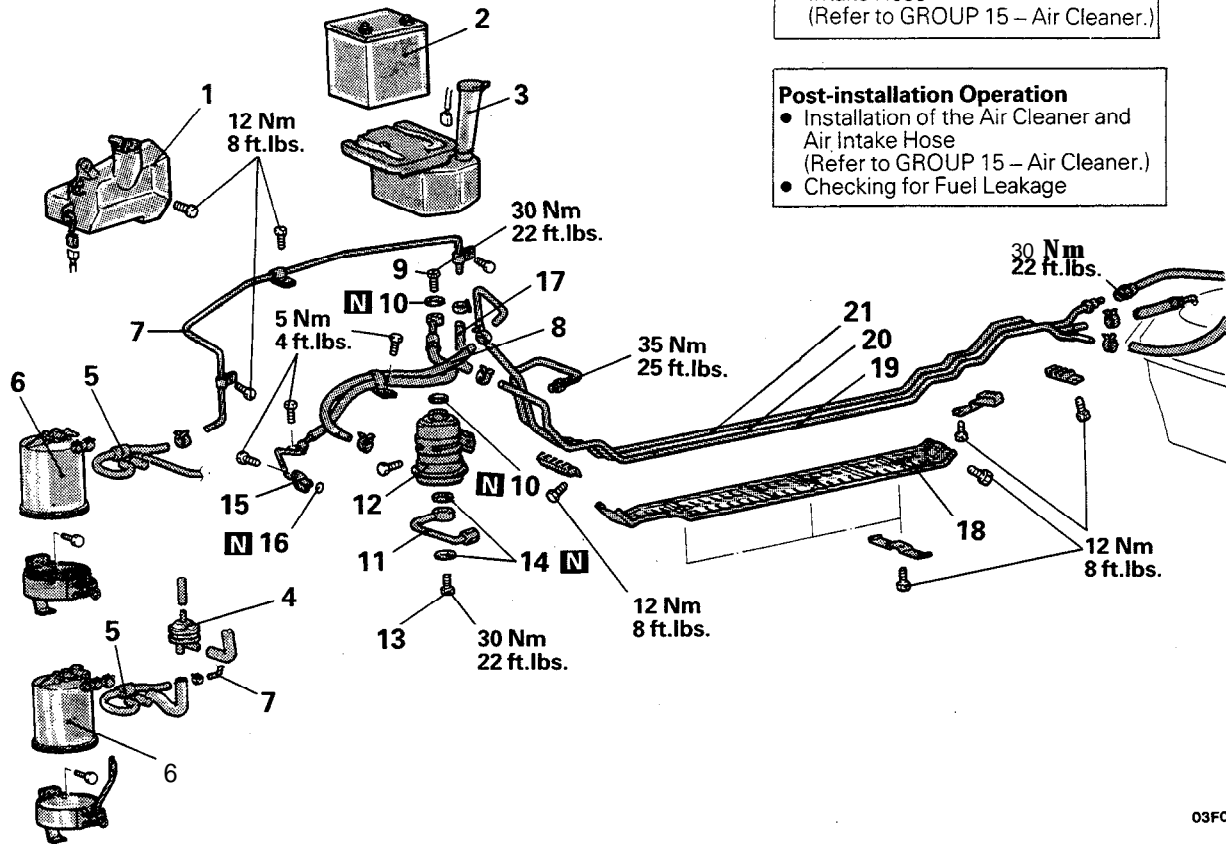
REMOVAL AND INSTALLATION

Pre-removal Operation

- Release of Residual Pressure from High Pressure Hose. (Refer to P.13-137.)
- Removal of the Air Cleaner and Air Intake Hose (Refer to GROUP 15 – Air Cleaner.)

Post-installation Operation

- Installation of the Air Cleaner and Air Intake Hose (Refer to GROUP 15 – Air Cleaner.)
- Checking for Fuel Leakage

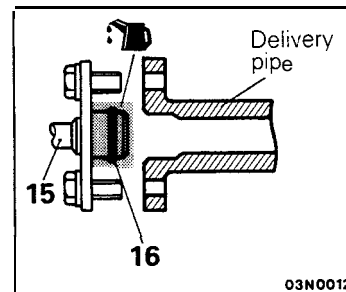


<Turbo>

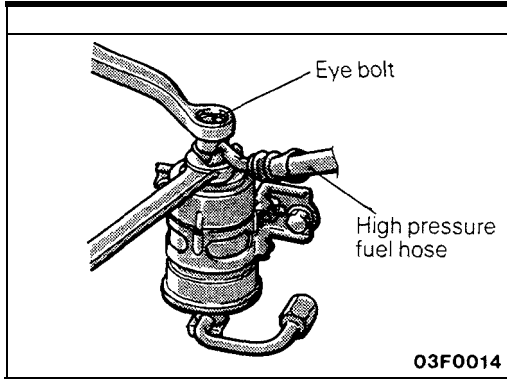
03F0020

Removal steps

1. Reserve tank
2. Battery
3. Battery tray with washer tank assembly
4. Purge control valve
- ◆◆ 5. Fuelvapor hose
6. Canister
7. Vapor pipe assembly
- + 8. Fuel return hose
- ◆◆ 9. Eye bolt
10. Gasket
11. High pressure fuel pipe
- a 12. Fuel filter
- ◆◆ 13. Eye bolt
14. Gasket
- * 15. High pressure fuel hose
16. O-ring
- ◆◆ 17. Fuel vapor hose
18. Stone protector
19. Fuel vapor pipe
20. Fuel return pipe
21. Fuel main pipe



03N0012



SERVICE POINTS OF REMOVAL

M13KBAQ

9. 13. REMOVAL OF EYE BOLT

Remove the eye bolt while holding the fuel filter nut securely.

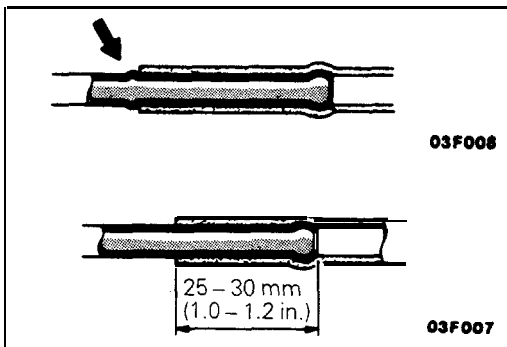
Caution

Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.

INSPECTION

M13KCAJ

- Check the hoses and pipes for cracks, bend, deformation and clogging.
- Check the canister for clogging.
- Check the fuel filter for clogging and damage.



SERVICE POINTS OF INSTALLATION

M13KDAU

17.5. INSTALLATION OF FUEL VAPOR HOSE / 8. FUEL RETURN HOSE

- (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.

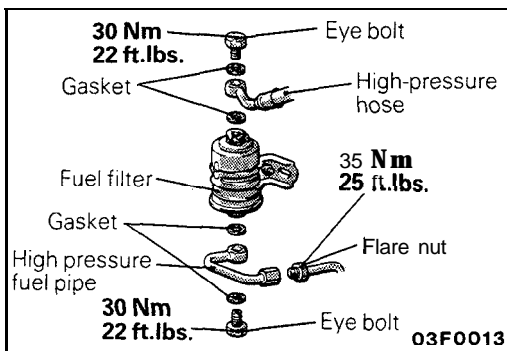
Standard value: 25 – 30 mm (1.0 – 1.2 in.)

15. INSTALLATION OF HIGH PRESSURE FUEL HOSE

Apply 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.



12. INSTALLATION OF FUEL FILTER

- (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.

FUEL FILTER

M13VA--

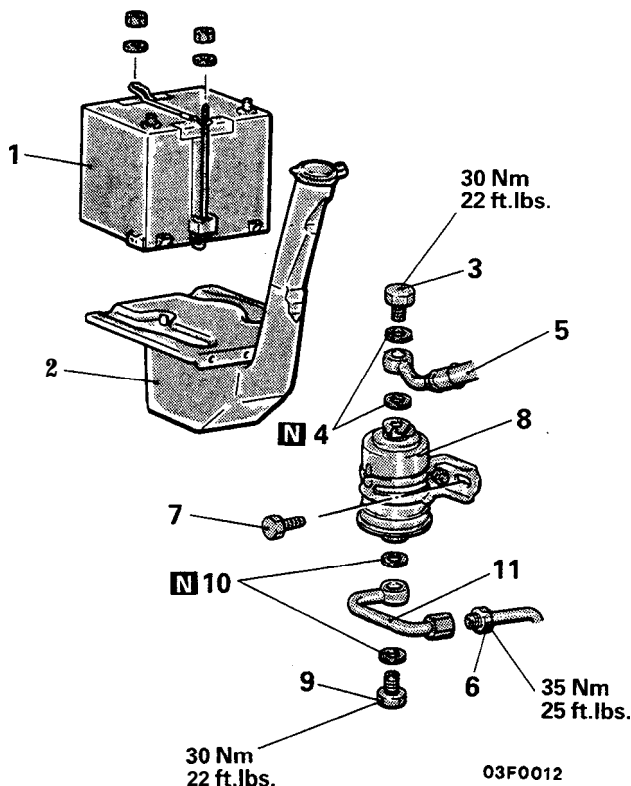
REMOVAL AND INSTALLATION

Pre-removal Operation

- Removal of Residual Pressure from High Pressure Hose. (Refer to P.13-137.)

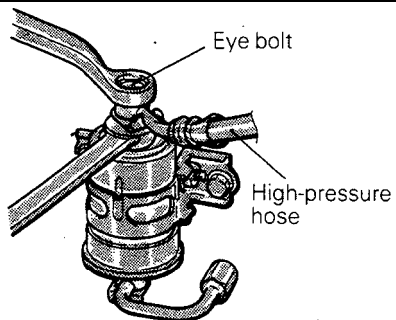
Post-installation Operation

- Checking for Fuel Leakage



Removal steps

1. Battery
2. Battery tray with washer tank assembly
- ↔ 3. Eye bolt
4. Gasket
5. High pressure fuel hose
6. Connection of fuel main pipe
7. Mounting bolt
- * 8. Fuel filter
- ☒ 9. Eye bolt
10. Gasket
11. High pressure fuel pipe



SERVICE POINTS OF REMOVAL

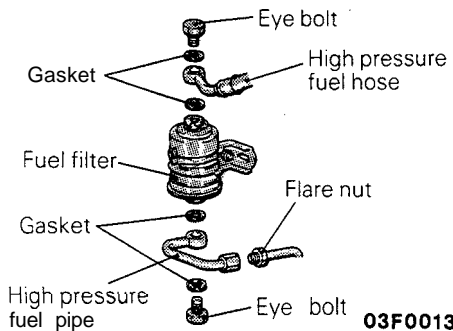
M13VBAB

3. 9. REMOVAL OF EYE BOLT

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.



SERVICE POINT OF INSTALLATION

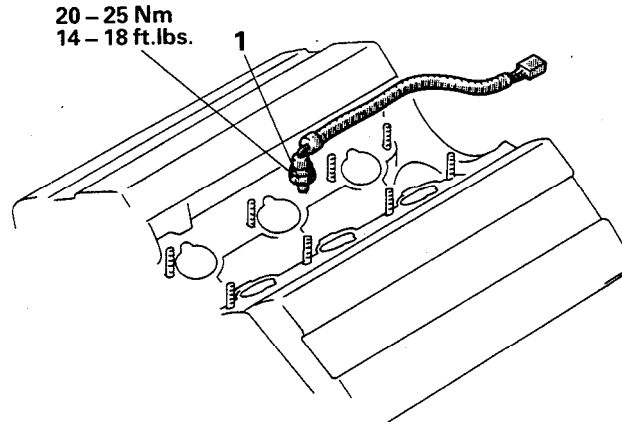
M13VBAB

8. INSTALLATION OF FUEL FILTER

- (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.

DETONATION SENSOR**REMOVAL AND INSTALLATION****Pre-removal and Post-installation Operation**

- Release and Installation of the Air Intake Plenum (Refer to GROUP 15 – Air Intake Plenum.)
- Removal and Installation of the Intake Manifold (Refer to GROUP 15 – Intake Manifold.)

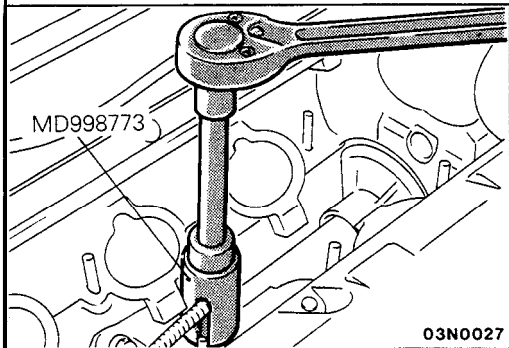


03F0021

- *◆◆ 1. Detonation sensor

SERVICE POINT OF REMOVAL**1. REMOVAL OF DETONATION SENSOR****SERVICE POINT OF INSTALLATION****1. INSTALLATION OF DETONATION SENSOR**

When the detonation sensor is installed, be sure to tighten it precisely to the specified torque as its installation affects the engine control.



ENGINE CONTROL**SPECIFICATIONS****SERVICE SPECIFICATIONS**

M13CB-B

Items	Specifications
Standard value	
Accelerator cable play mm (in.)	
<M/T>	1 – 2 (.04 – .08)
<A/T>	3 – 5 (.12 – .20)
Accelerator switch switching point mm (in.)	2 – 6 (.08 – .24)

TROUBLESHOOTING

M13EGAC

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

SERVICE ADJUSTMENT PROCEDURES

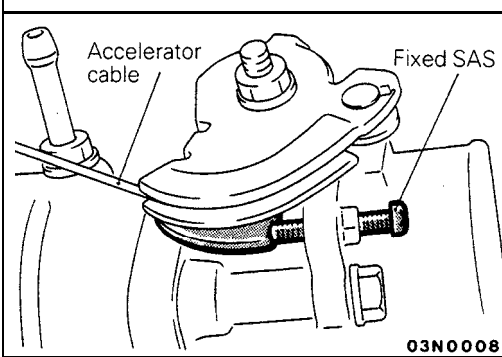
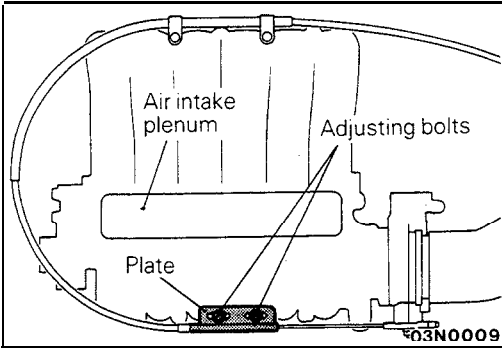
M13FBCX

ACCELERATOR CABLE INSPECTION AND ADJUSTMENT

For models equipped with the cruise control system, refer to P. 13-158.

- (1) Turn air conditioner and lights OFF.
Inspect and adjust at no load.
- (2) Warm engine until stabilized at idle.
- (3) Confirm idle speed is at prescribed rpm.
- (4) Stop engine (ignition switch OFF).
- (5) Confirm there are no sharp bends in accelerator cable.
- (6) Check inner cable for correct slack.
- (7) If there is too much slack or no slack, adjust play by the following procedures.

- ① Turn the ignition switch to the ON position (without starting the engine) and leave in that condition for approximately 15 seconds.



- ② Loosen the adjusting bolts on the air intake plenum, and then secure the outer cable so that the free play of the inner cable will be the standard value.

Standard value:

<M/T>

1 – 2 mm (.04 – .08 in.)

<A/T>

3-5 mm (.12 – .20 in.)

NOTE

If there is excessive play of the accelerator cable, the vehicle speed drop (“undershoot”) when climbing a slope will be large.

If there is no play (excessive tension) of the accelerator cable, the idling speed will increase.

- (8) After adjusting, confirm that throttle valve fully opens and closes by operating pedal.
- (9) Adjust accelerator cable play and confirm throttle lever stopper touches the fixed SAS.

ACCELERATOR SWITCH INSPECTION AND ADJUSTMENT

M13FTBC

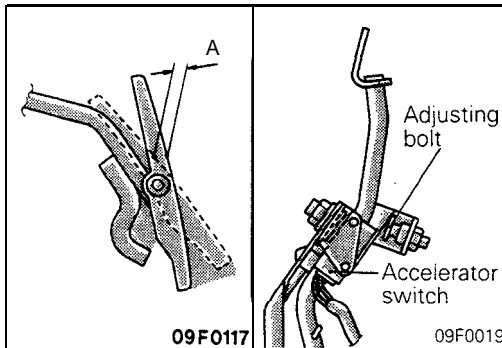
Make sure that when the accelerator pedal is free, there is continuity between the terminals of the accelerator switch and that when the pedal is pressed until the indicated pedal stroke A reaches the standard value, there is no continuity between the terminals of the switch.

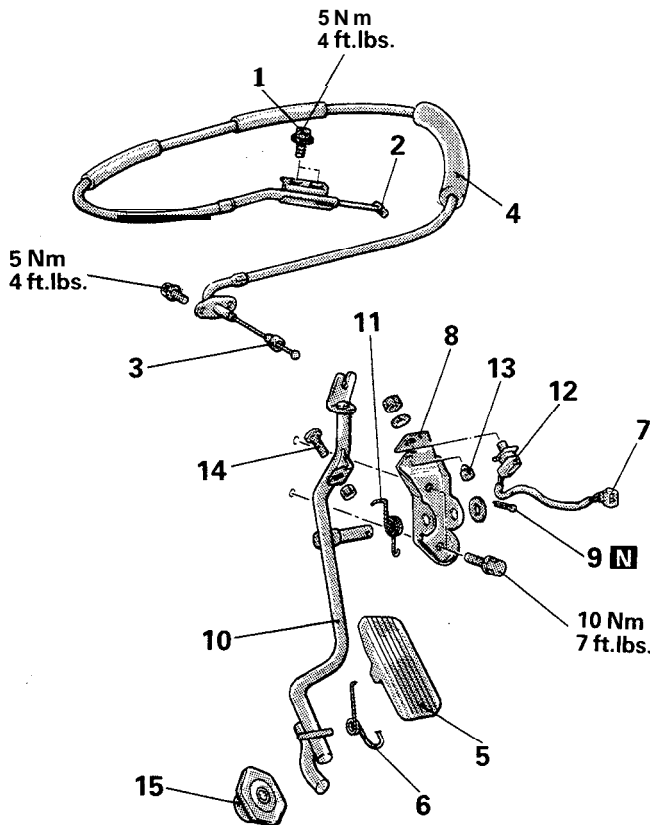
Standard value:

Accelerator switch switching point

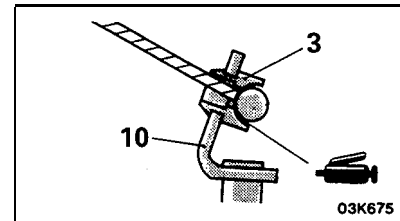
2 – 6 mm (.079 – .24 in.)

If stroke A is out of specification, adjust with adjusting bolt.



ENGINE CONTROL**REMOVAL AND INSTALLATION****Post-installation Operation**

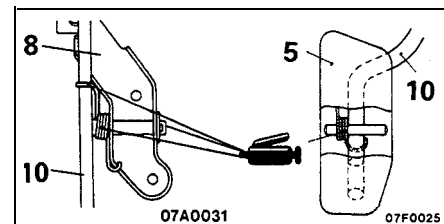
- Accelerator Cable Adjustment (Refer to P. 13-156.)
- Accelerator Switch Adjustment <A/T> (Refer to P.13-156.)



07F0022

Removal steps

1. Adjusting bolt
2. Connection of throttle body side inner cable
3. Bushing
4. Accelerator cable
5. Accelerator pedal
6. Spring
7. Connection of accelerator switch connector <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

**INSPECTION**

M130CAJ

- 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>

CRUISE CONTROL SYSTEM

SPECIFICATIONS

GENERAL SPECIFICATIONS

M13CA--

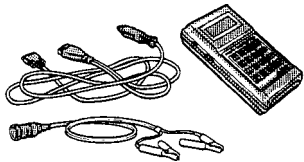

Items	Specifications
Main switch Rated load A Voltage drop V	1.2 0.1 or less
Auto-cruise control switch Rated load A SET RESUME CANCEL	0.03 0.06 0.10
Stop light switch (for cruise control) Rated load A Voltage drop (at rated load) V	0.1 – 1.5 0.15 or less
Clutch switch Rated load A Voltage drop (at rated load) V	0.1 – 1.5 0.15 or less
Auto-cruise control unit Range of speed control km/h (mph)	40 – 145 (25 – 90)
Vacuum pump assembly Vacuum pump Type Rated load A Control valve, release valve Rated load A	Diaphragm type 3.0 or less 0.4 or less
Actuator Drive system Stroke mm (in.)	Vacuum type 38 – 42 (1.5 – 1.7)

SERVICE SPECIFICATIONS

M13CB--

Items	Specifications
Accelerator cable play mm (in.) <M/T> <An->	0 – 1 (0 – .04) 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

SPECIAL TOOLS

Tool	Number	Name	Use
	MB991341	Multi-use tester assembly	<ul style="list-style-type: none"> • Checking of the self-diagnosis output
	MB991 359	ROM pack	

TROUBLESHOOTING

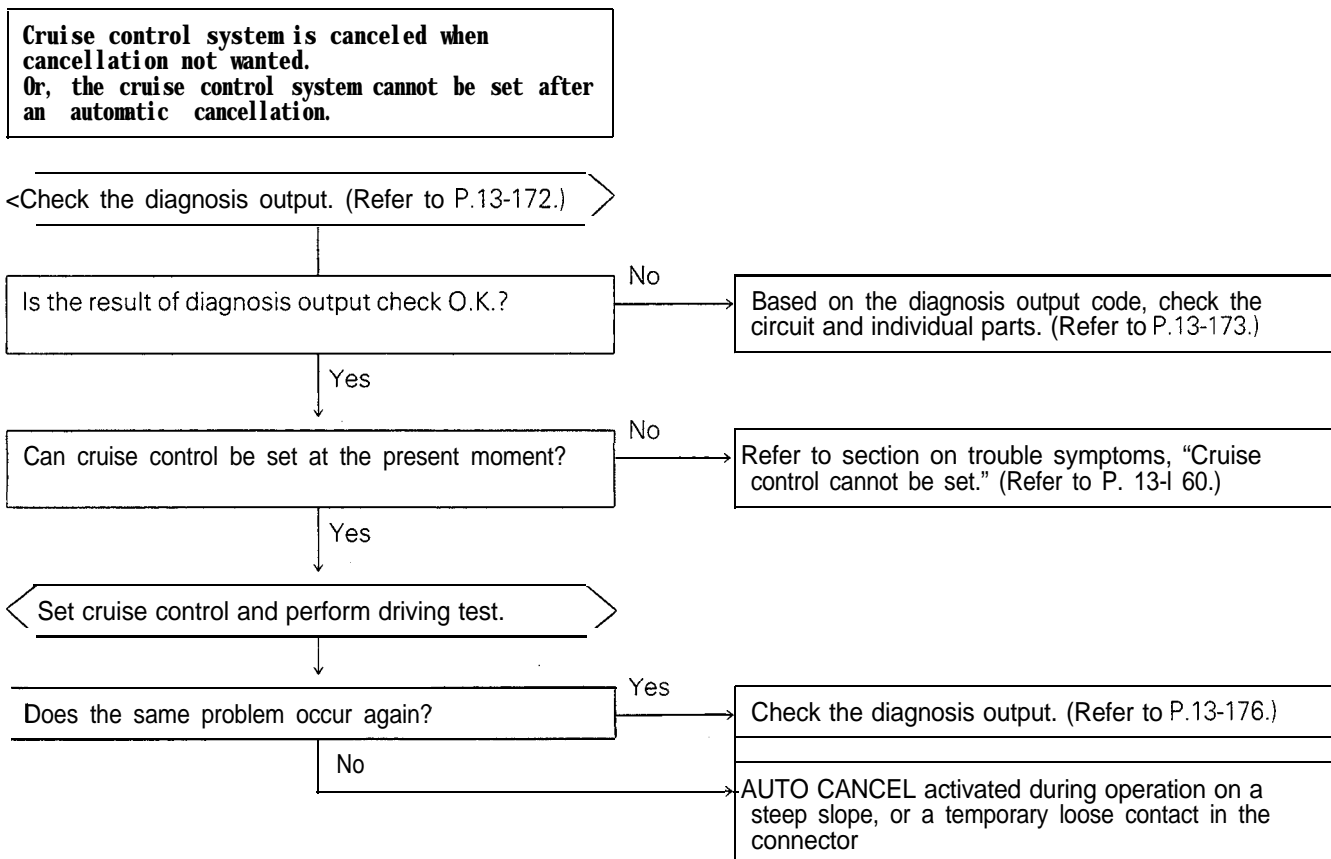
M13EBDW

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



Cruise control system cannot be set.

NOTE

This chart contains troubleshooting procedures to perform when a problem cannot be detected by self diagnosis.

Check input. (Refer to P. 13-1 73.)

Is the result of input check O.K.?

Yes

Check vacuum pump assembly circuit. (Refer to P. 13-1 67.)

No

NOTE

If the results of checks on the vacuum pump assembly circuit and actuator parts (refer to P.13-184.) 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.13-163
	Open circuit in control switch circuit	Replace control switch or repair harness.	P.13-164
	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.13-164
Even when RESUME switch is set to OFF, code No. 22 does not go away.	RESUME switch ON malfunction	Replace control switch.	P.13-164
Even when CANCEL switch is set to OFF, code No. 27 does not go away.	CANCEL switch ON malfunction	Replace control switch.	P.13-164
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.13-168
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 switch circuit	Replace clutch switch or repair harness.	P.13-168
Even when select lever is placed in any position other than "N" and "P", code No. 26 does not go away. <A/T>	Defective inhibitor switch circuit	Replace inhibitor switch or repair harness.	P.13-169
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.13-166
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.			

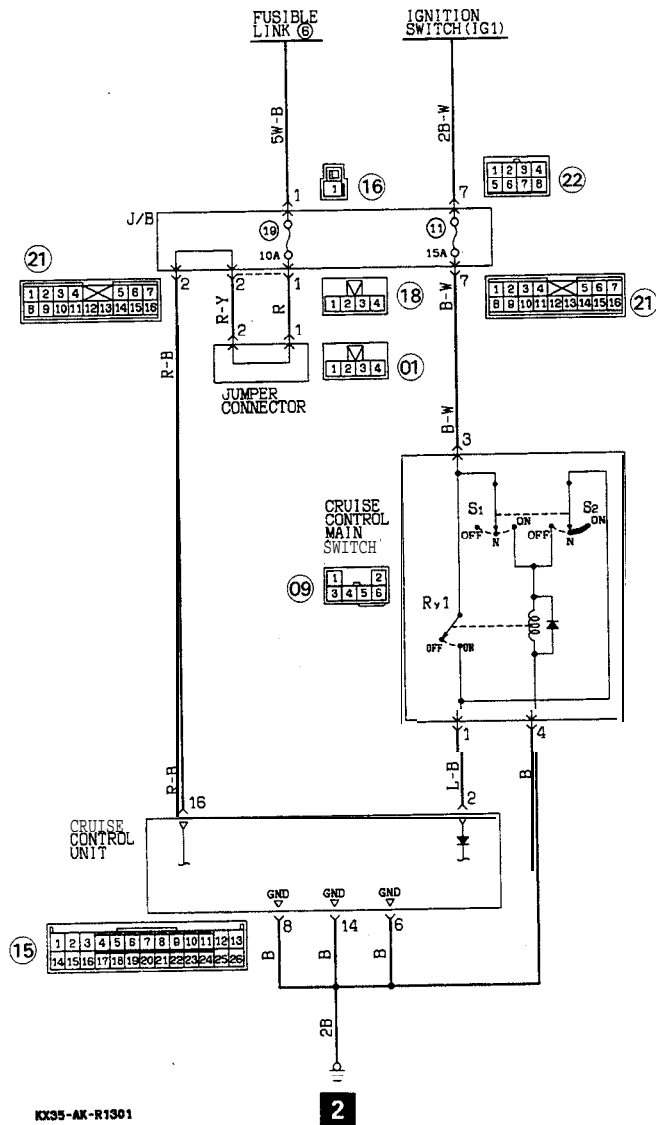
Trouble symptom	Probable cause	Check chart No.	Remedy
<ul style="list-style-type: none"> The set vehicle speed varies greatly upward or downward. "Hunching" (repeated alternating acceleration and deceleration) occurs after setting is made. 	Malfunction of the vehicle speed sensor circuit	No. 4	Repair the vehicle speed sensor system, or replace the part.
	Malfunction of the speedometer cable or speedometer drive gear <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 inhibitor switch input circuit	If the input check code No. 26 indicates a malfunction. No. 8	Repair the harness, or repair or replace the inhibitor switch.
	Improper adjustment of inhibitor 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

Trouble symptom	Probable cause	Check chart No.	Remedy
Cannot accelerate or resume speed by using the RESUME switch.	Open or short 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 <Non turbo>		
	Malfunction of the ECU	–	Replace the ECU.
The cruise control indicator light of 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 AA 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>			

CHECK CHART

1	Inspection of control unit power supply circuit
---	---



DESCRIPTION OF OPERATION

The power is supplied through the ignition switch (IG₁) 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 S₁ flows through relay Ry₁ in the switch. Accordingly, the contact of relay Ry₁ is closed and the power is supplied to the control unit.
2. When the main switch is released, it automatically returns to the neutral position. Since the current from switch S₂ flows to relay Ry₁, the contact of relay Ry₁ remains closed.
3. When the main switch is set to OFF, current to relay Ry₁ is interrupted. This opens the contact of relay Ry₁ to stop the power supply to the control unit. When the switch is released, it automatically returns to the neutral position, but relay Ry₁ stays in the OFF state.
4. When the ignition switch is set to OFF while relay Ry₁ in the main switch is ON, relay Ry₁ 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 Ry₁ 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.13-176) "HARNESS AND COMPONENTS LAYOUT"

TROUBLESHOOTING HINTS

ECU terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
2	Control unit power supply	Main switch ON and neutral position thereafter	System voltage
		Main switch OFF and neutral position thereafter	0V
8, 14	Control unit ground	At all times	0V
16	Control unit back up power supply	At all times	System voltage

2 Inspection of control switch circuit

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

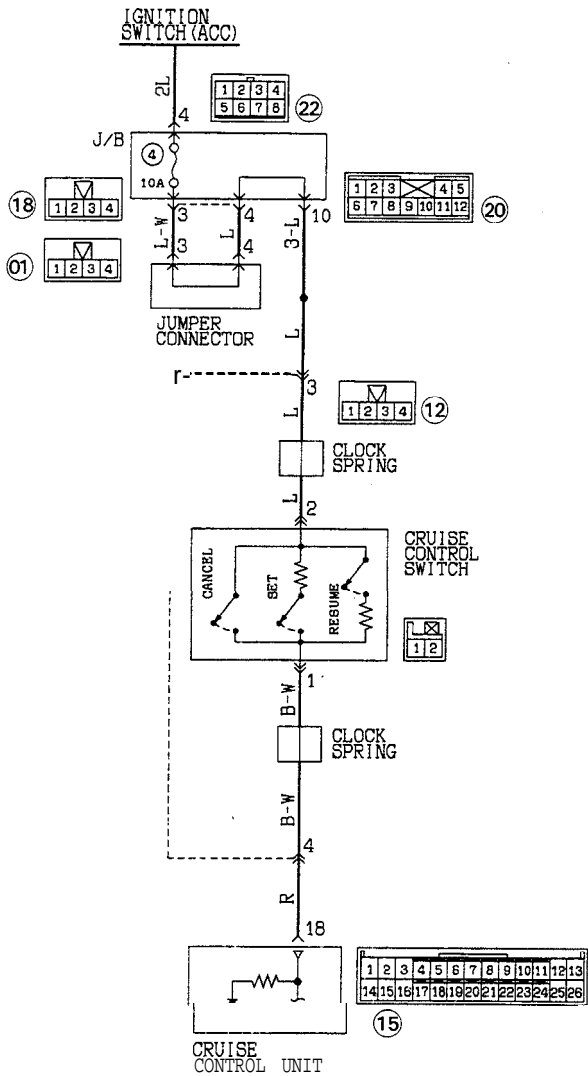
When the cruise control switch is ON, if the SET switch is set to ON while vehicle speed is within a range from about 40 to 145 km/h (25 to 90 mph), the vehicle starts cruising at the speed. If the SET switch is kept at ON during cruise operation, the vehicle coasts, and starts cruising at the speed 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), the vehicle cruises at approximately 145 km/h (90 mph).

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.



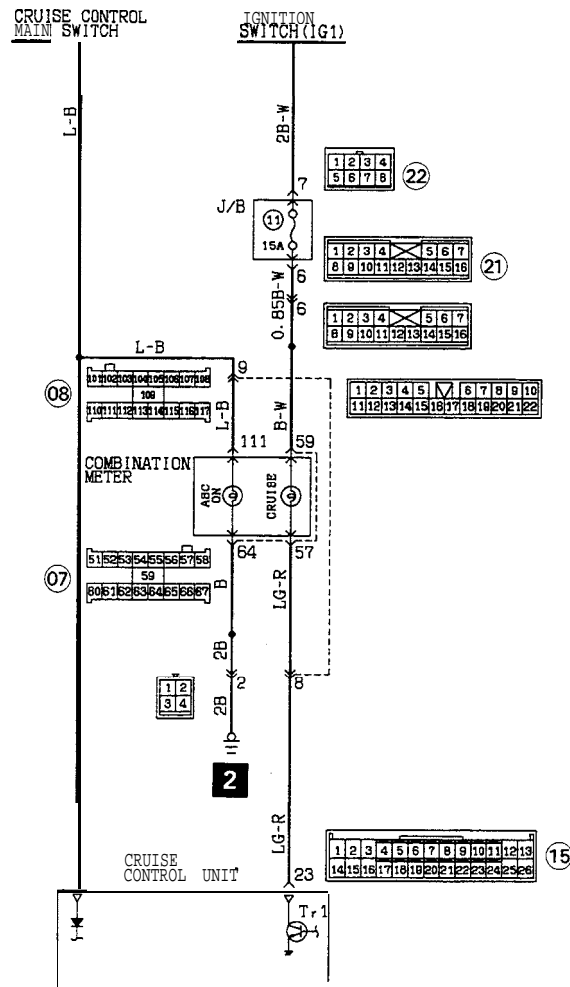
KX35-AK-R1302

TROUBLESHOOTING HINTS

ECU terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
18	Control switch	When all switches are OFF	0v 1
		When SET switch is ON	3v
		When RESUME switch is ON	6V
		When CANCEL switch is ON	System voltage

3 Inspection of indicator light circuit



KK35-AK-R1303

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 Tr₁ in the control unit is kept in the ON state to keep the indicator light on.

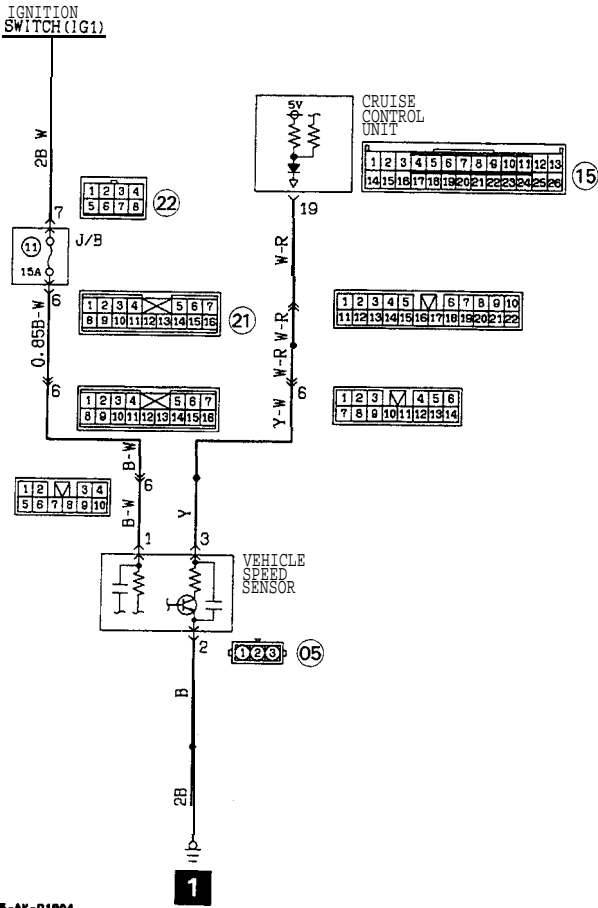
TROUBLESHOOTING HINTS

ECU terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
23	Cruise control (CRUISE) indicator light	When cruise control is active	System voltage
		When cruise control is inactive	0V

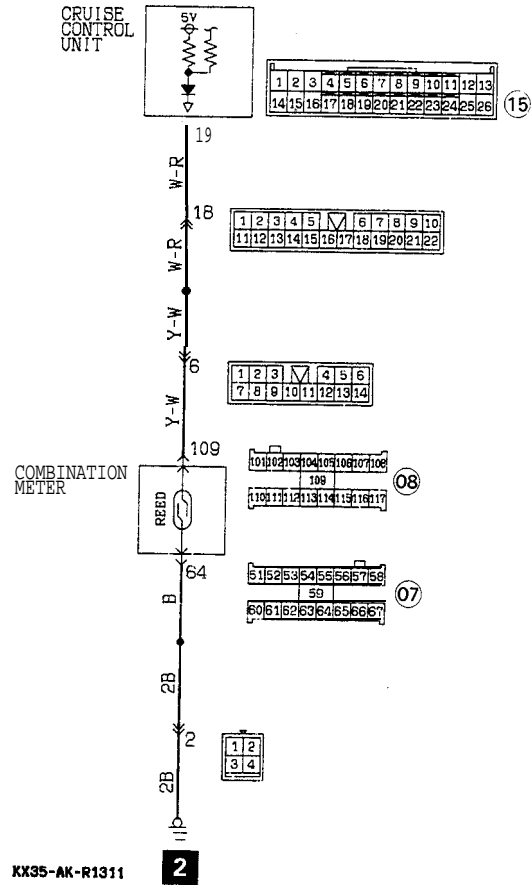
4 Inspection of vehicle speed sensor circuit

<TURBO>



KX35-AK-R1304

<NON-TURBO>



KX35-AK-R1311

DESCRIPTION OF OPERATION

<Turbo>

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 (IG₁).

<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)

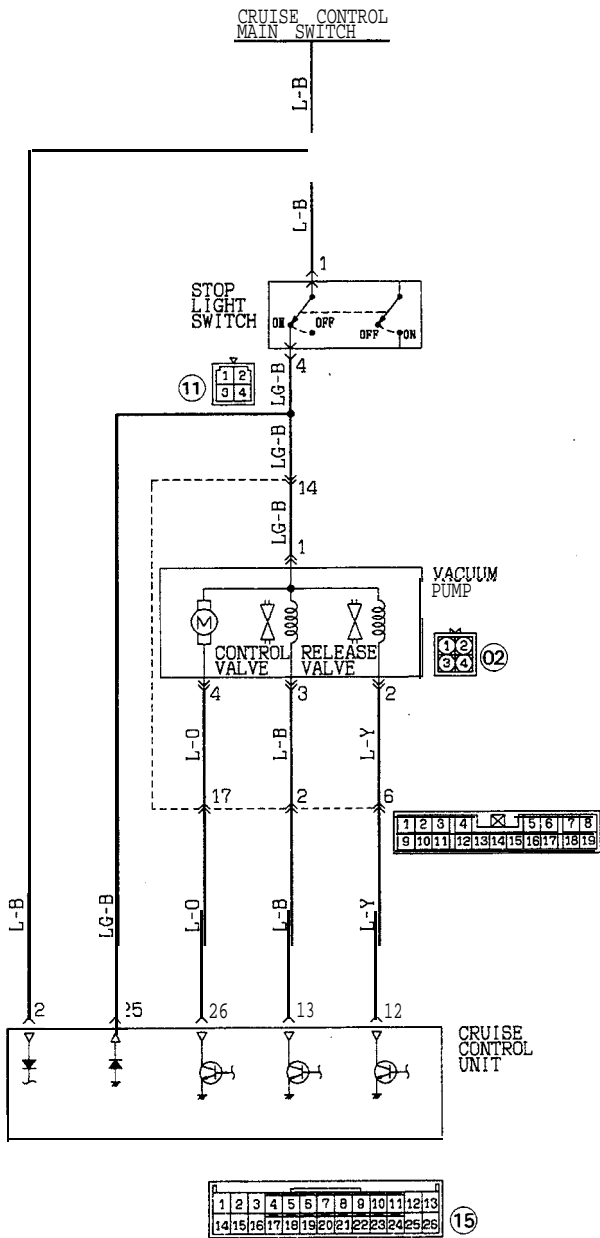
TROUBLESHOOTING HINTS

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 0.6V ↓ Flashing 2V or more

5 Inspection of vacuum pump assembly drive circuit



KX35-AK-R1305

DESCRIPTION OF OPERATION

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.

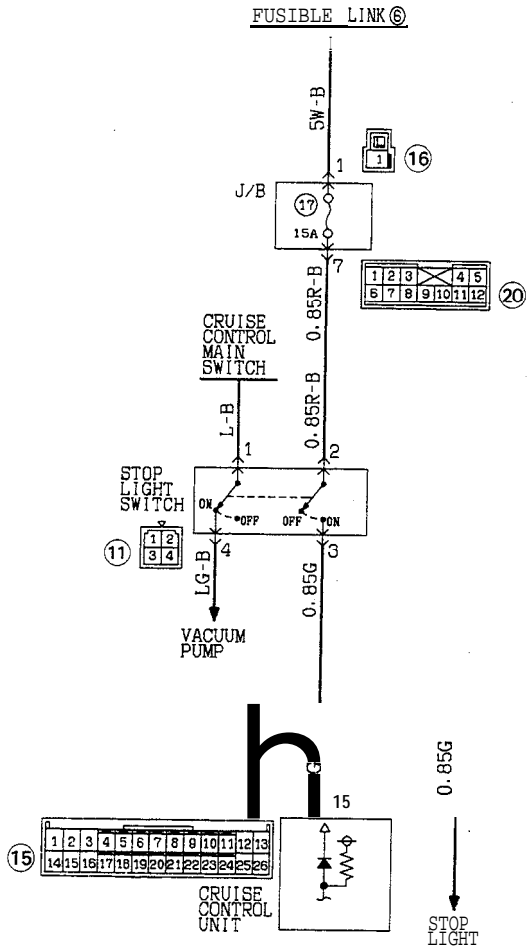
Cruise control operation	DC motor (ON: Current flows) (OFF: No current flows)	Solenoid valve (ON: open OFF: closed)	
		Control valve	Relief valve
Acceleration	ON	ON	ON
Hold	OFF	ON	ON
Deceleration	OFF	OFF	ON
Release	OFF	OFF	OFF

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	0V
		When relief valve is OFF	System voltage
13	Control valve drive signal	When control valve is ON	0V
		When control valve is OFF	System voltage
26	DC motor drive signal	When DC motor is running	0V
		When DC motor is stationary	System voltage
25	Surge absorption circuit terminal	When main switch is ON	System voltage

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. 13-167.) At the same time, the stop light (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.

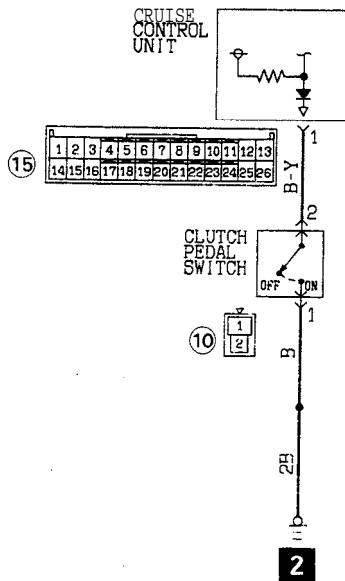
TROUBLESHOOTING HINTS

ECU terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
15	Stop light switch	When brake pedal is depressed	System voltage
		When brake pedal is not depressed	0V

KX35-AK-R1306

7 Inspection of clutch switch circuit <M/T>



DESCRIPTION OF OPERATION

When the clutch pedal is depressed during vehicle speed control, the contact of the clutch 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.

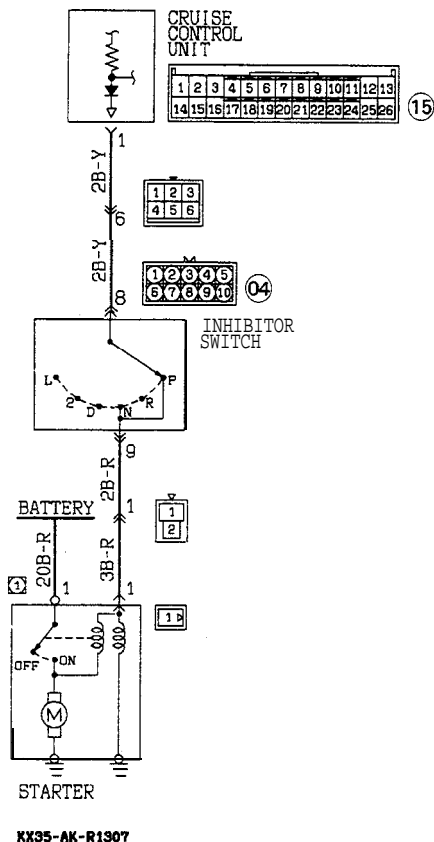
TROUBLESHOOTING HINTS

ECU terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
1	Clutch switch	When clutch pedal is depressed	0V
		When clutch pedal is not depressed	System voltage

KX35-AK-R1307A

8 Inspection of inhibitor switch circuit <A/T>



DESCRIPTION OF OPERATION

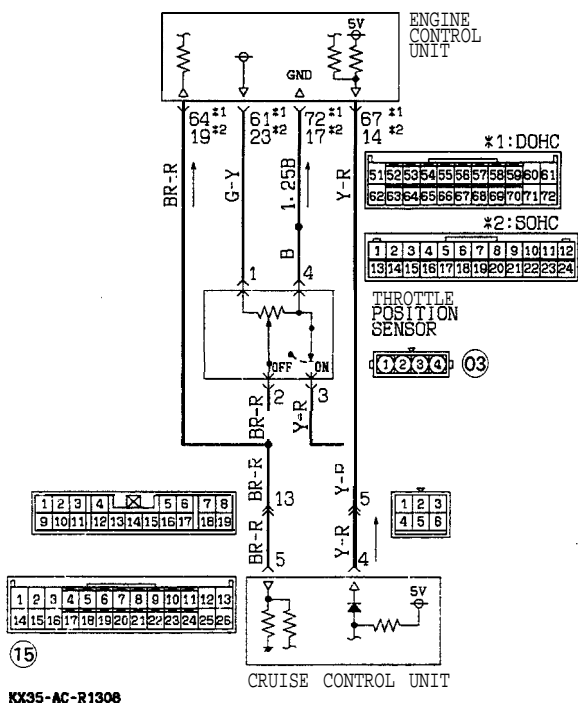
The inhibitor switch is interlocked with the starter switch. When the gear selector lever is placed in the "N" position during vehicle speed control, a cancel signal is input to the control unit which internally interrupts the power supply to the vacuum pump assembly drive circuit for cancellation of vehicle speed.

TROUBLESHOOTING HINTS

ECU terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
1	Inhibitor switch	Inhibitor switch in "N" or "P" position	0V
		Inhibitor switch in "D", "2", "L" or "R" position	System voltage

9 Inspection of throttle position sensor circuit



DESCRIPTION OF OPERATION

The throttle position sensor (with built-in idle 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 idle 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)

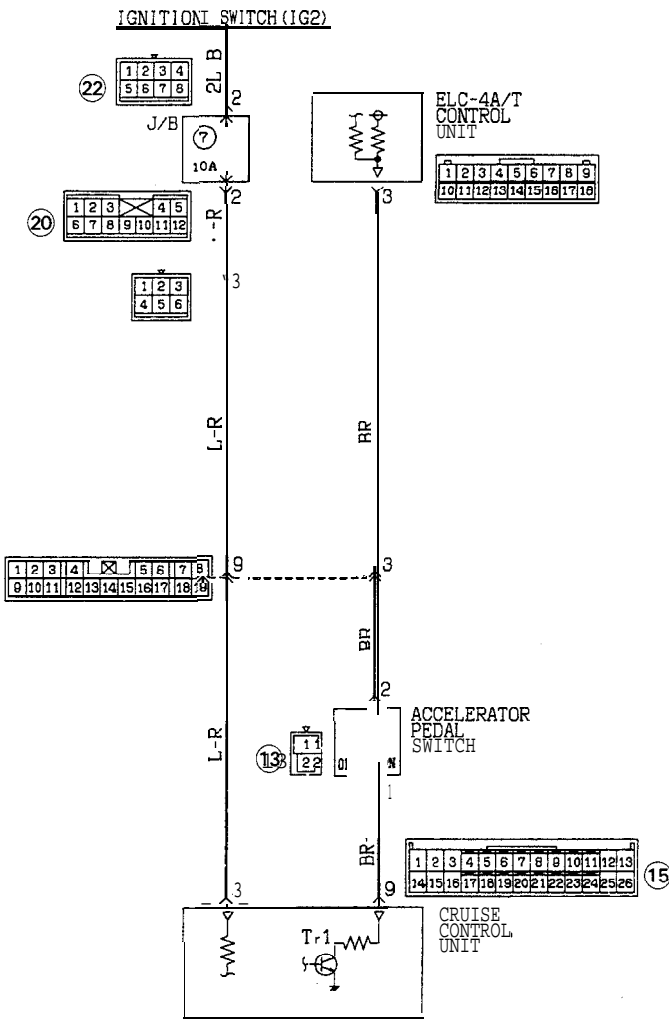
ECU terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
4	Idle switch	When accelerator pedal is depressed	0V
		When accelerator pedal is not depressed	4.5 – 5.5V
5	Throttle position sensor	During idle	0.48 – 0.72V
		When fully opened	4.0 – 5.5V

10 Inspection of circuit associated with accelerator pedal switch OFF function <A/T>

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 Tr₁ into the OFF state, creating the same state as when the accelerator pedal switch is placed in the OFF state.



KX35-AK-R1309

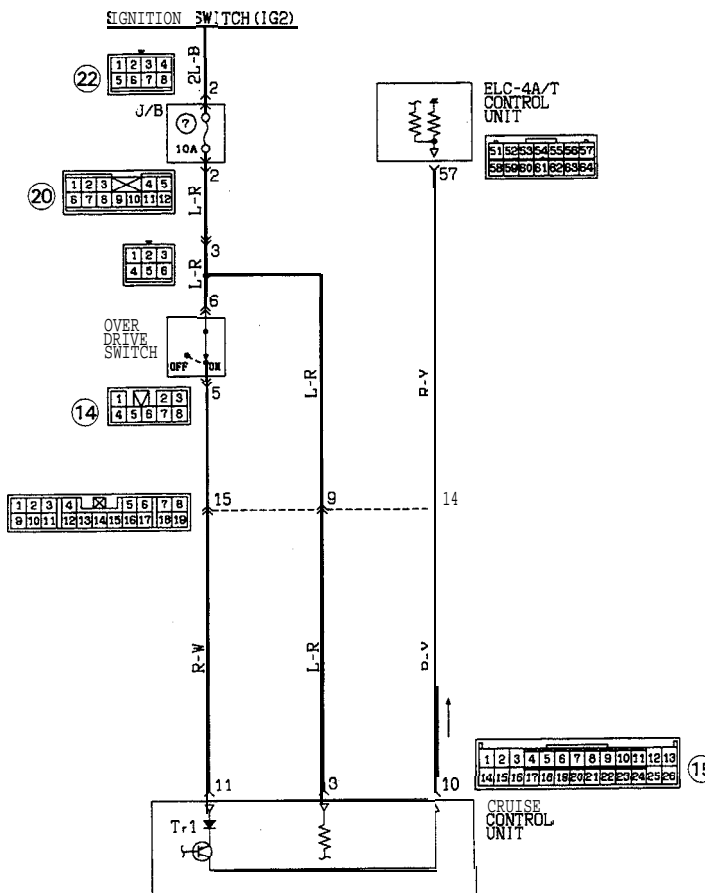
TROUBLESHOOTING HINTS

ECU terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
3	Accelerator pedal switch control power supply	When ignition switch is placed at ON	System voltage
9	Accelerator pedal switch	When accelerator pedal is depressed	0V
		When accelerator pedal is not depressed	System voltage

TSB Revision

11 Inspection of circuits associated with overdrive cancel <A/T>



KX35-AK-R1910

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, the cruise control unit forces transistor Tr₁ 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

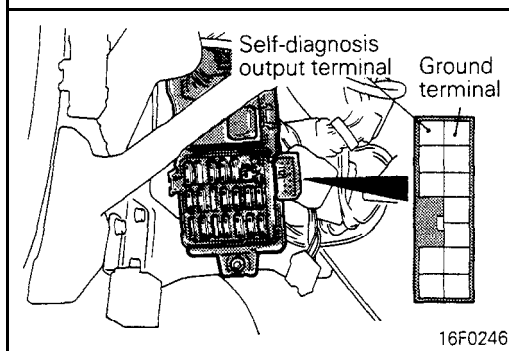
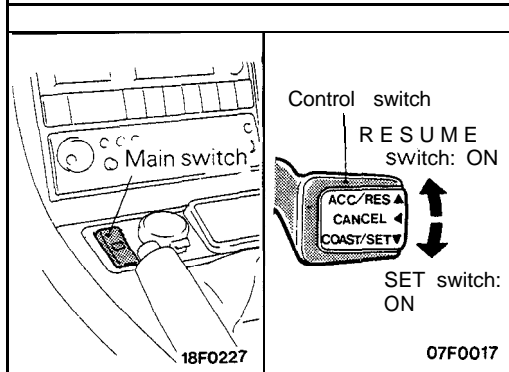
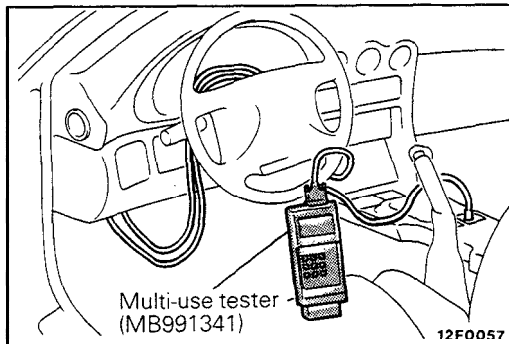
Terminal No.	Signal name	Condition	Terminal voltage
3	OD signal control power supply	When ignition switch is ON	System voltage
10	ELC-4A/T control unit	When overdrive mode is active	System voltage
		When overdrive mode is inactive	0v
11	OD switch	When OD switch is ON	System voltage
		When OD switch is OFF	0v

SELF-DIAGNOSIS CHECKING

Self-diagnosis 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 diagnosis codes are stored and retained, until the battery cable is disconnected, to make sure that the problems encountered in the past can be checked.

**WITH MULTI-USE TESTER**

- (1) Read the self-diagnosis code.
- (2) Refer to the diagnosis chart and repair the defective point.






- (3) Clear the self-diagnosis codes by the following procedure.

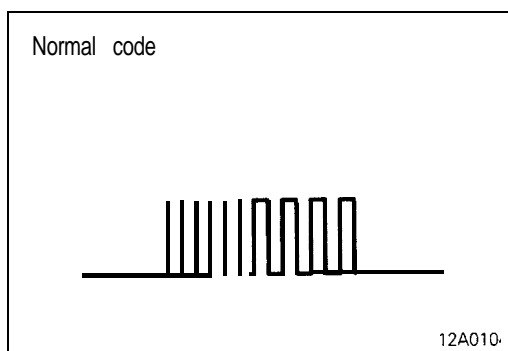
- ① Place the ignition switch in the ON position.
- ② With the SET switch in the ON state, set the main switch to ON. In less than 1.0 second thereafter, set the RESUME switch to ON.
- ③ With the SET switch in the ON state again, keep the stop light switch in the ON state for more than 5 seconds.
- ④ Check the self-diagnosis code to verify that a normal code is output.

WITH VOLTMETER

- (1) Connect an analog voltmeter across the self-diagnosis output terminal and ground terminal of the diagnosis connector.
- (2) Place the ignition switch and main switch in the ON position.
- (3) Read the self-diagnosis code on the basis of the deflection of the pointer of the voltmeter.
- (4) Refer to the diagnosis chart and repair the defective point.
- (5) Clear the self-diagnosis codes in the same way as when a multi-use tester is used.

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 switch out of order	—
17*		Throttle position sensor or idle 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 diagnosis code is displayed as described below.
 - ① If a multi-use tester is used: "NORMAL! !" 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

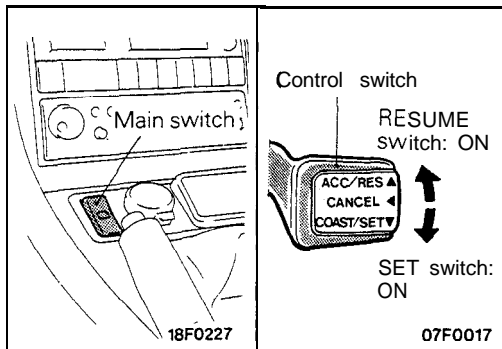
1. If inspection of self-diagnosis is necessary, confirm diagnosis code first and conduct input check.
2. Input check can be conducted by set operations. Self-diagnosis terminal outputs display patterns.
3. Display codes are displayed only if the circuit is normal according to the conditions shown in the table on the next page.

Perform checks using the following procedures.

- (1) Connect a multi-use tester or a voltmeter to the diagnosis inspection connector of the junction block.

NOTE

Connect a voltmeter using the same procedure as for inspection of diagnosis 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

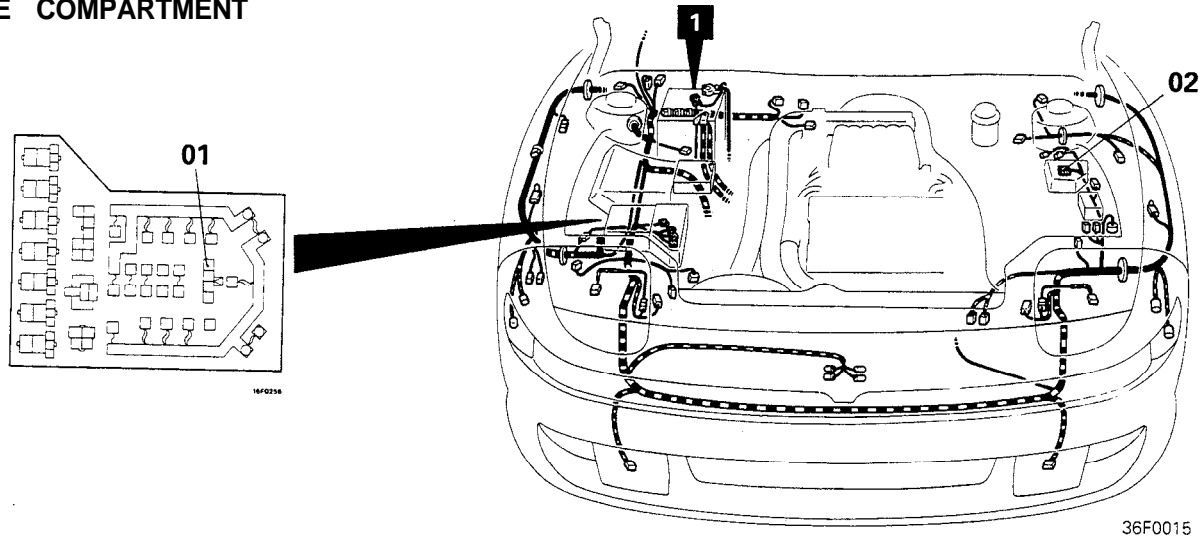
1. When two or more input operations are performed simultaneously, all the associated code numbers are output in ascending order.
2. If no code is output by performing any of the input operations, the control unit power supply circuit or SET and RESUME switches are probably defective. Check the check tables 1 and 2 (P.13-163, 164).

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 switch ON (clutch pedal depressed)	Clutch switch circuit normal
			Inhibitor switch ON (SELECT lever placed in "N" position)	Inhibitor 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		Idle switch OFF (Accelerator pedal depressed)		Idle switch circuit normal

② Set main switch to OFF.

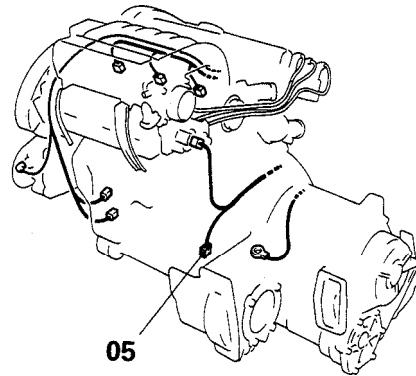
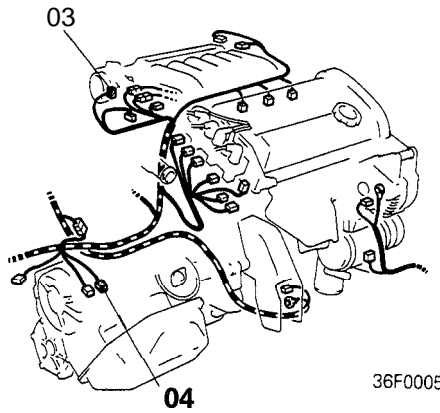
**HARNESS AND COMPONENTS LAYOUT
ENGINE COMPARTMENT**



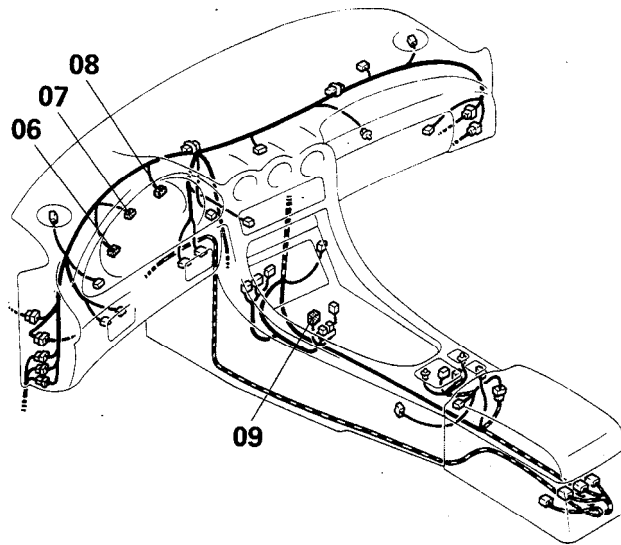
Engine front view

Engine rear view

- 01 Jumper connector
- 02 Vacuum pump
- 03 Throttle position sensor
- 04 Inhibitor switch <A/T>
- 05 Vehicle speed sensor <Turbo>

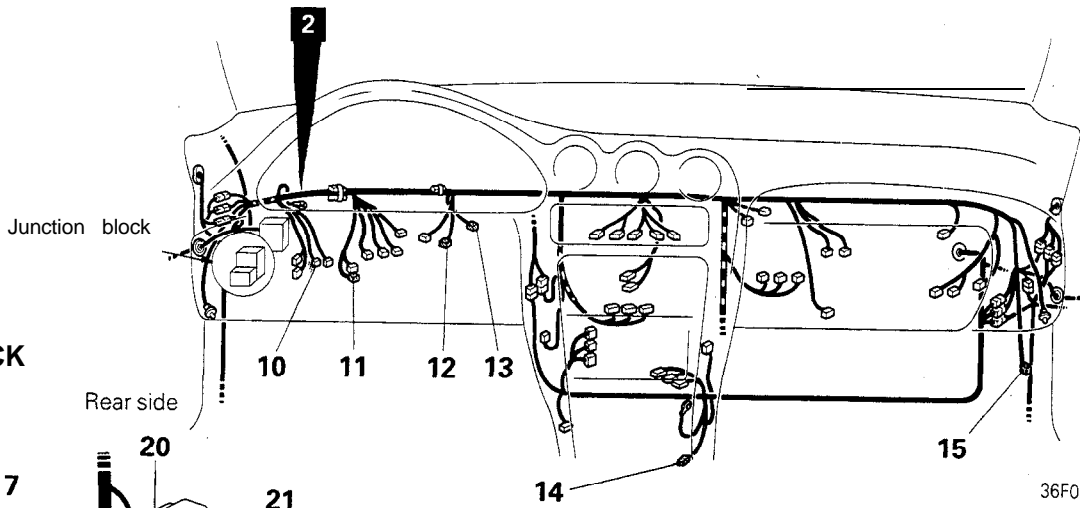


INSTRUMENT PANEL AND FLOOR CONSOLE



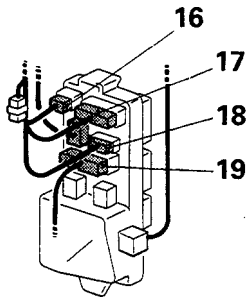
- 06 } Combination meter
- 07 }
- 08 }
- 09 Main switch

DASH PANEL

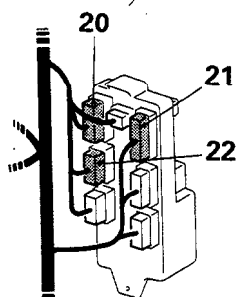


JUNCTION BLOCK

Front side



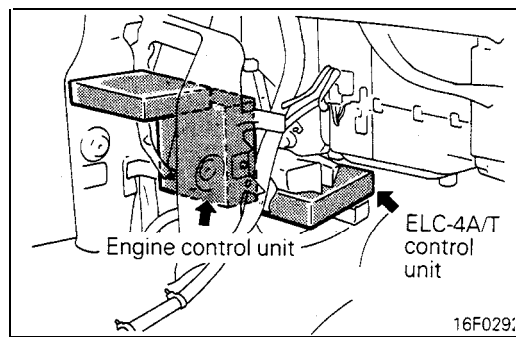
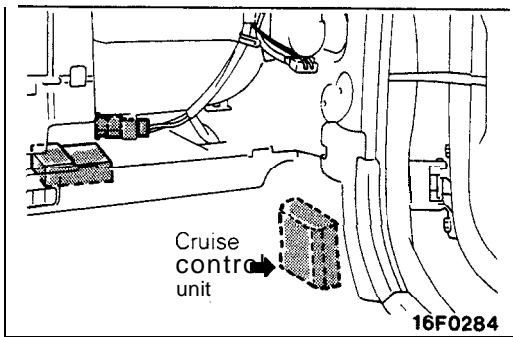
Rear side



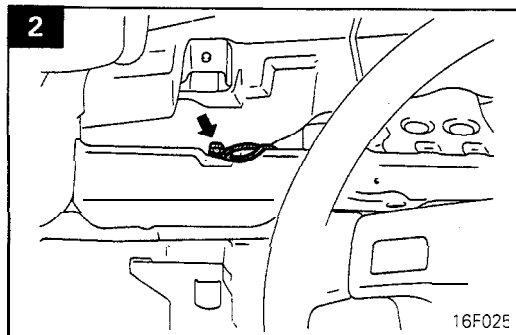
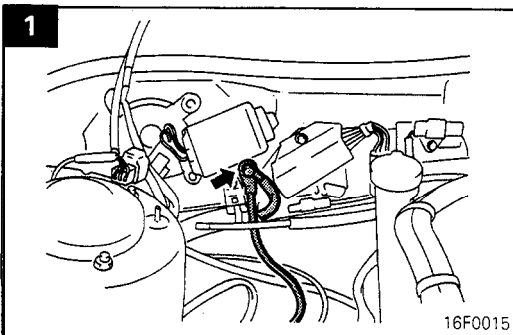
- 10 Clutch pedal switch <M/T>
- 11 Stop light switch
- 12 Clock spring
- 13 Accelerator pedal switch <A/T>

- 14 Over drive switch <A/T>
- 15 Cruise control unit
- 16 } Front wiring harness and junction
- 17 } block combination
- 18 }
- 19 Adapter wiring harness and junction
- 20 } Body wiring harness (LH) and junction block
- 21 } combination
- 22 }

LOCATION OF CONTROL UNIT



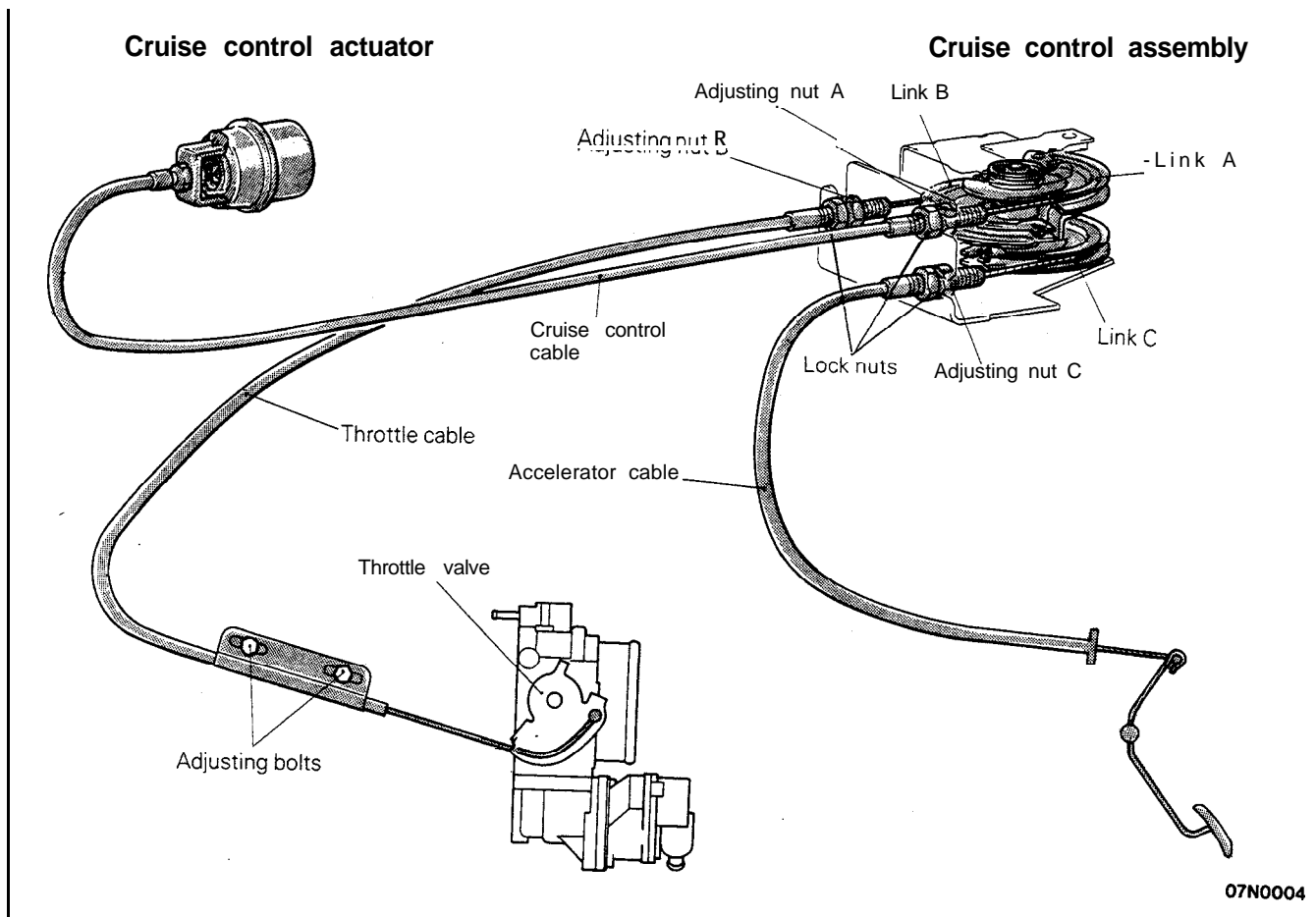
GROUND POINT



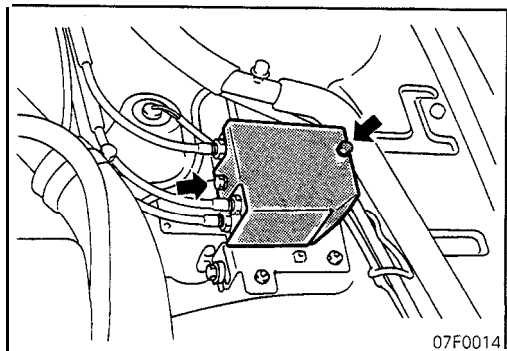
SERVICE ADJUSTMENT PROCEDURES

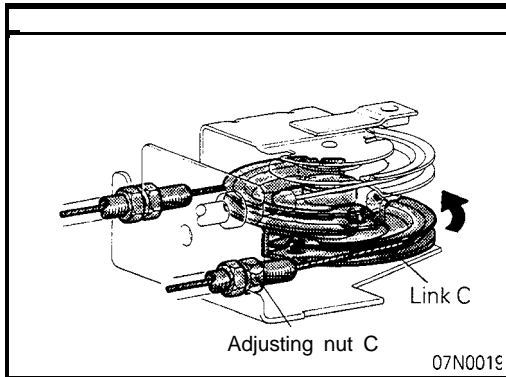
M13FTCA

CRUISE CONTROL CABLES INSPECTION AND ADJUSTMENT



- (1) Set the air conditioner, 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.



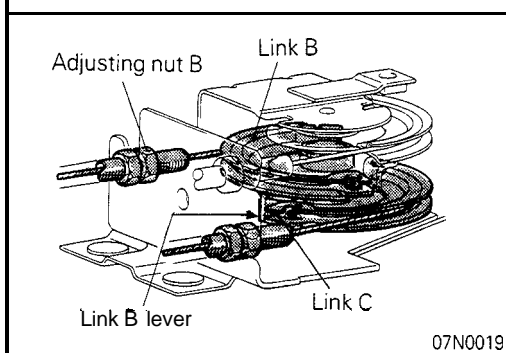


- ③ Set the ignition switch to ON (do not start the engine).
- ④ Rotate intermediate link C in the direction shown until it is blocked by the stopper, turn down adjusting nut C in the direction that the free travel of the inner cable is reduced, and back off adjusting nut C the specified number of turns 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 0 – 1 mm (0 – .04 in.)]

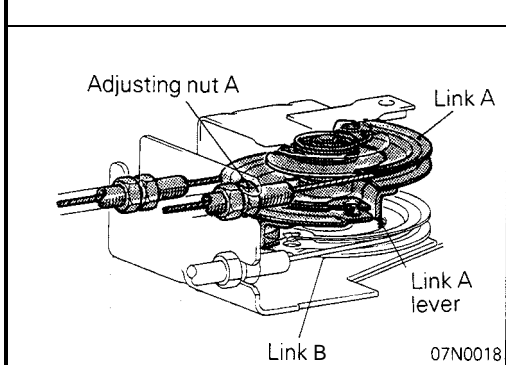
<A/T> About two turns [inner cable free travel 2 to 3 mm (.08 to .12 in.)]



- 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:

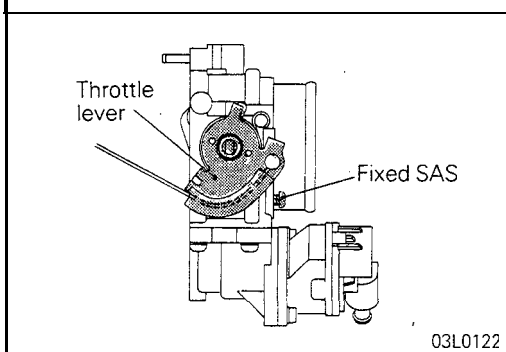
About one turn [inner cable free travel 1 to 2 mm (.04 to .08 in.)]



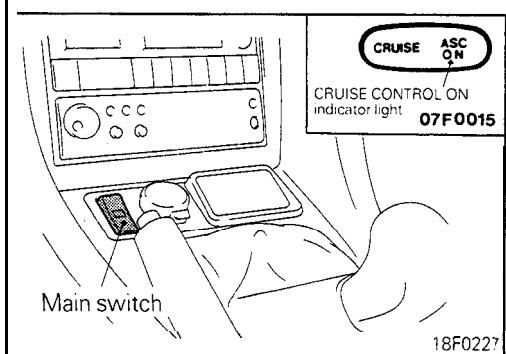
- ⑦ Secure the throttle cable with the lock nut.
- ⑧ Secure the adjusting bolt of the surge tank.
- ⑨ Turn down adjusting nut A in the direction that the free travel of the inner cable of the cruise control cable is reduced. At the position where the lever of intermediate link A is brought into contact 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 1 to 2 mm (.04 to .08 in.)]



- ⑩ Secure the cruise control cable with the lock nut.
- ⑪ After adjustment, check to see that the end of the fixed SAS is in contact with the stopper of the throttle lever.

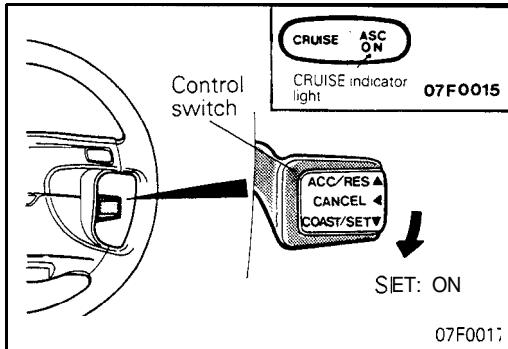


CRUISE CONTROL SYSTEM INSPECTION

M13FTDA

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.

**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).
- (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

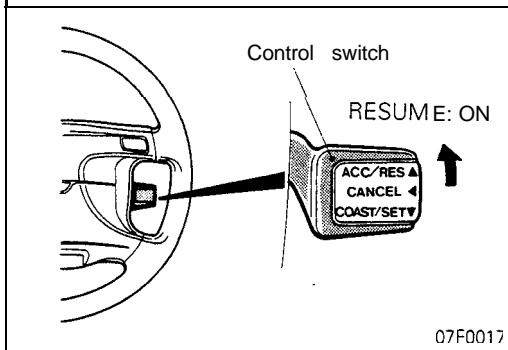
If the vehicle speed decreases to approximately 15 km/h (9 mph) below the set speed, because of climbing a hill for example, the cruise control will be cancelled.

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 hold, 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 [approximately 145 km/h (90 mph)], 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**

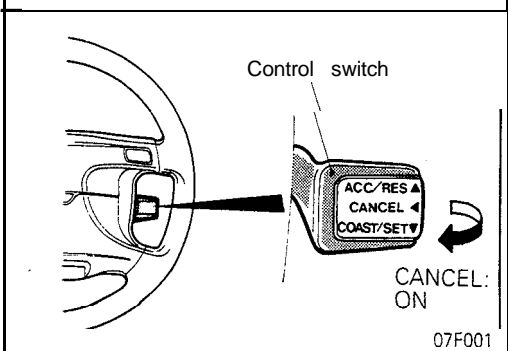
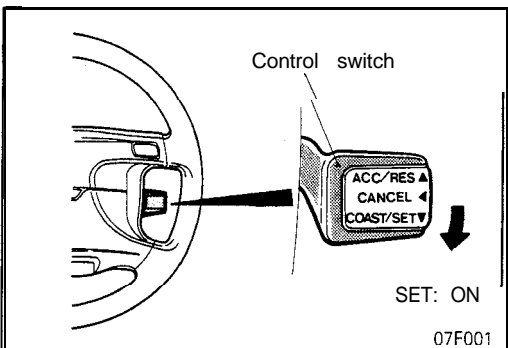
- (1) Set to the desired speed.
- (2) Operate the control switch downward. (SET switch: ON)
- (3) Check to be sure that deceleration continues while the switch is held, and that when it is released the constant speed at the time when it was released becomes the driving speed.

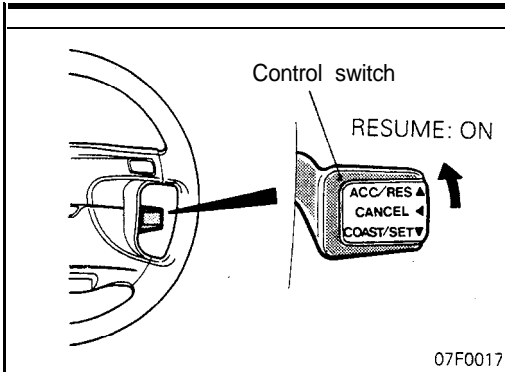
NOTE

When the vehicle speed reaches the low limit [approximately 40 km/h (25 mph)] during deceleration, the cruise control will be cancelled.

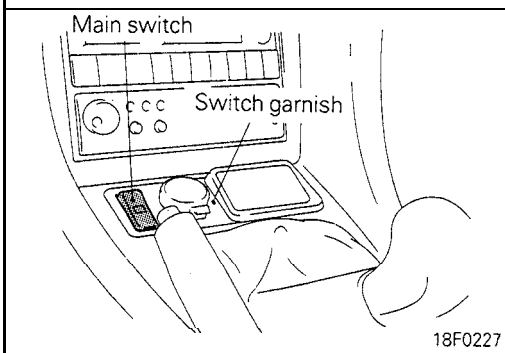
CRUISE CONTROL CANCELLATION AND SET SPEED RESUME CHECK

- (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. <AT>





- (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.

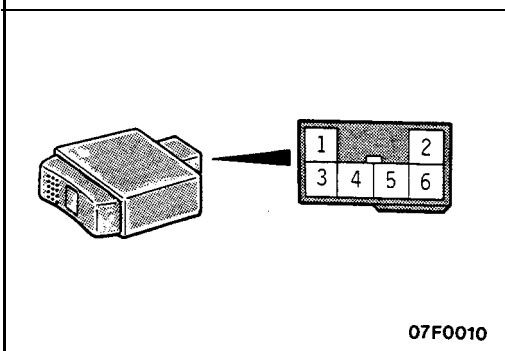


INDIVIDUAL PARTS INSPECTION

M13FTEA

CRUISE CONTROL MAIN SWITCH INSPECTION

- (1) Remove the main switch together with the switch garnish.
- (2) Remove the main switch from the switch garnish.



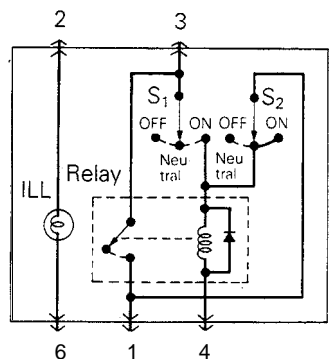
- (3) Operate the main switch and check for continuity across the individual terminals.

Terminal No.	1	ILL	2	3	4	5
Switch state						
Press OFF.	○	⊖	○			
Neutral position		⊖			○	○
Press ON.		⊖		0	A	○

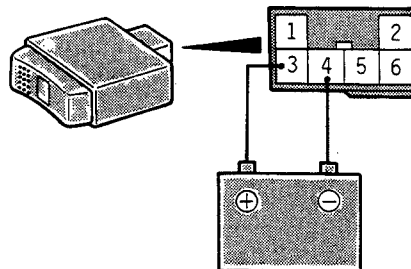
NOTE

- (1) O-O denotes continuity across the terminals.
- (2) ILL: Illumination light

- (4) Connect a positive lead from the battery to terminal ③ and a negative lead from the battery to terminal ⑤ and check that battery voltage is available across terminal ④ 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 ④ and the ground is reduced to 0 V.



ILL: Illumination light



CRUISE CONTROL SWITCH INSPECTION

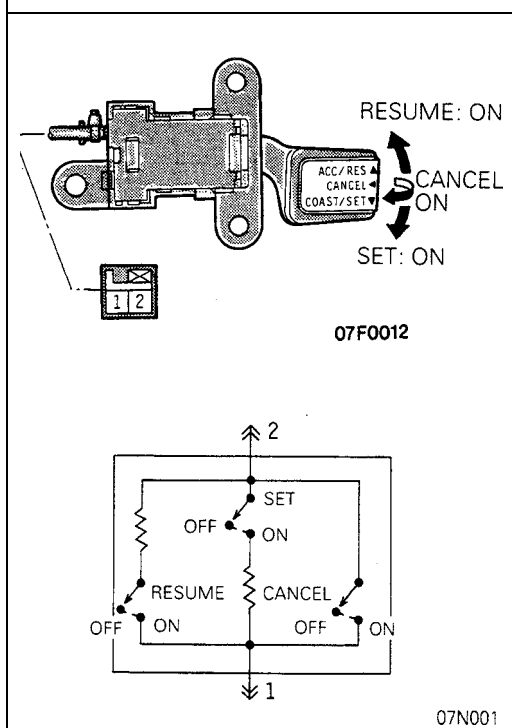
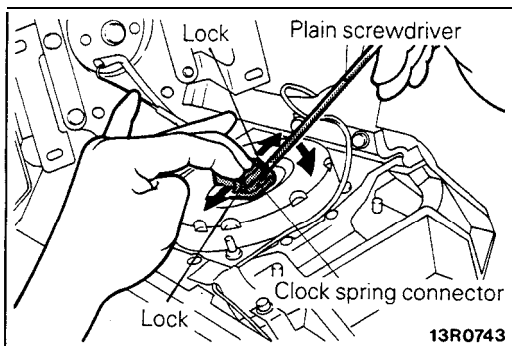
(1) Remove the air bag module using the following procedure.

- ① Remove the negative terminal of the battery and wait for more than 30 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.

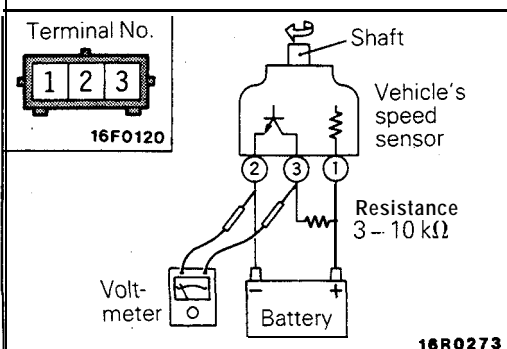
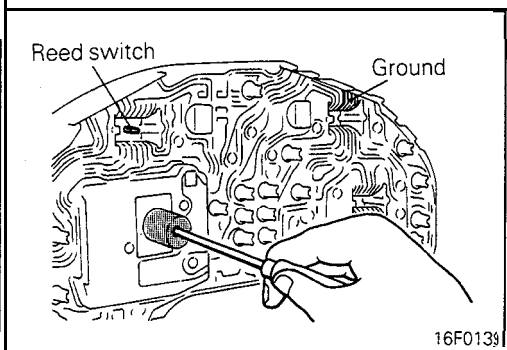
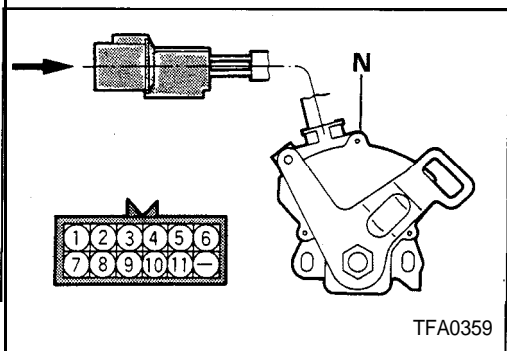
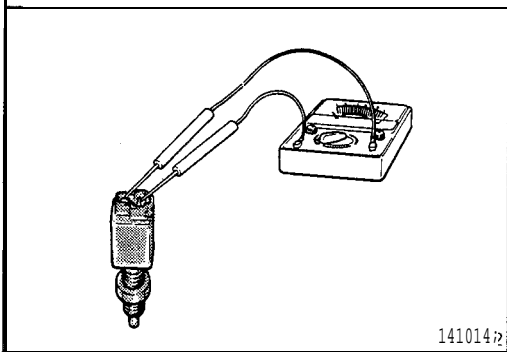
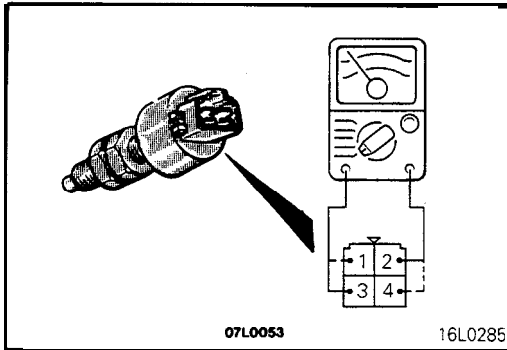
Switch operation	Resistance between terminals
When switch is not operated	No continuity
When switch is operated toward you (CANCEL switch: ON)	Approx. 0 Ω
When switch is operated upward (RESUME switch: ON)	Approx. 820 Ω
When switch is operated downward (SET switch: ON)	Approx. 2,700 Ω

STOP LIGHT SWITCH/BRAKE SWITCH INSPECTION

- (1) Disconnect the connector.
- (2) Check for continuity between the terminals of the switch.

O-O: Continuity

Measurement conditions \ Switch Terminal	Brake switch		Stop light switch	
	1	4	2	3
When brake pedal depressed.			O — O	
When brake pedal not depressed.	O — O			



CLUTCH SWITCH INSPECTION <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.

INHIBITOR SWITCH ("N" POSITION) INSPECTION <A/T>

- (1) Disconnect the connector.
- (2) Check to be sure that there is continuity between connector terminals ⑧ and ⑨ when the shift lever is moved to the "N" range.

VEHICLES SPEED SENSOR INSPECTION

<Non Turbo>

Use circuit tester to check circuit repeats off/on between terminals when speedometer shaft turned several times.

<Turbo>

- (1) Remove the vehicle's speed sensor and connect as shown in the illustration, using a 3 – 10 kΩ 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.)

THROTTLE POSITION SENSOR INSPECTION

For inspection, refer to P.13-65.

IDLE POSITION SWITCH INSPECTION

For inspection, refer to P.13-68.

VACUUM PUMP INSPECTION

Inspection of Solenoid Valves (Control and Relief Valves)

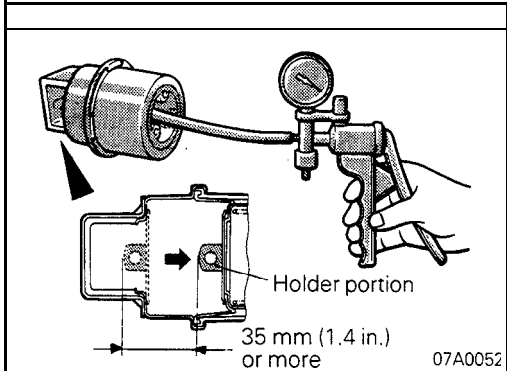
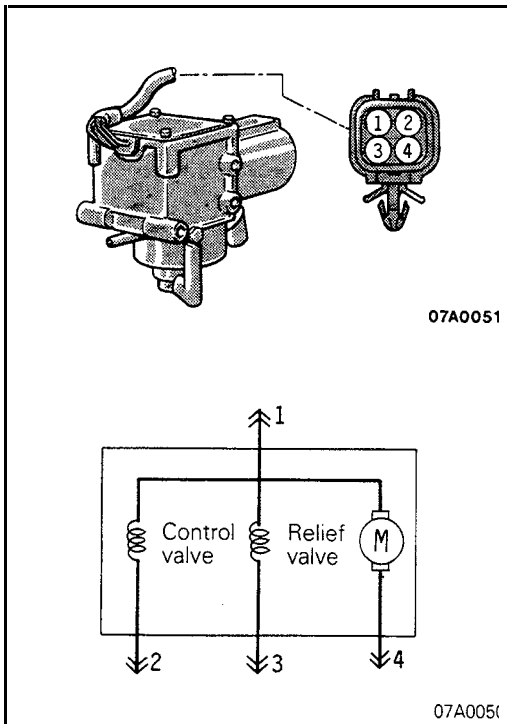
- (1) Disconnect the connector of the vacuum pump assembly.
- (2) Measure the resistance values across terminals ① and ② and across terminals ① and ③.

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.

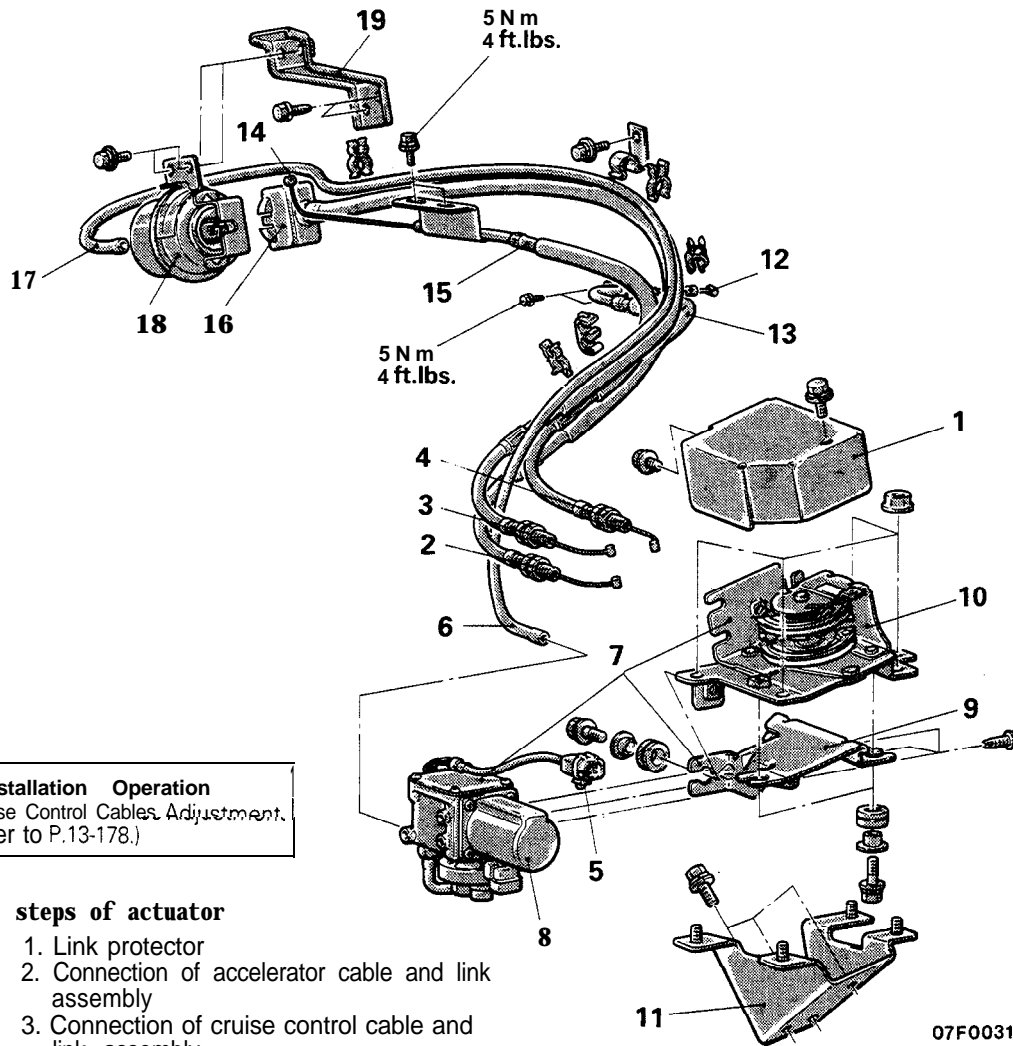
Inspection of Motor

- (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

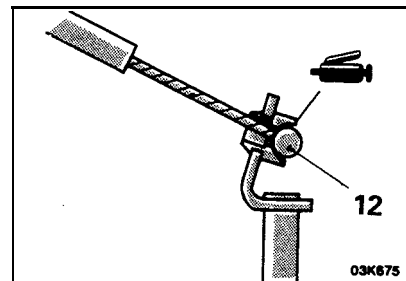
- (1) Remove the actuator.
- (2) Using a vacuum pump, apply a negative pressure to the actuator to check that the holder portion moves more than 35 mm (1.4 in.). Retain the negative pressure in that state to check that the holder portion does not change its position.
- (3) After the actuator has been mounted, check and adjust the cruise control cable. (Refer to P.13-178.)

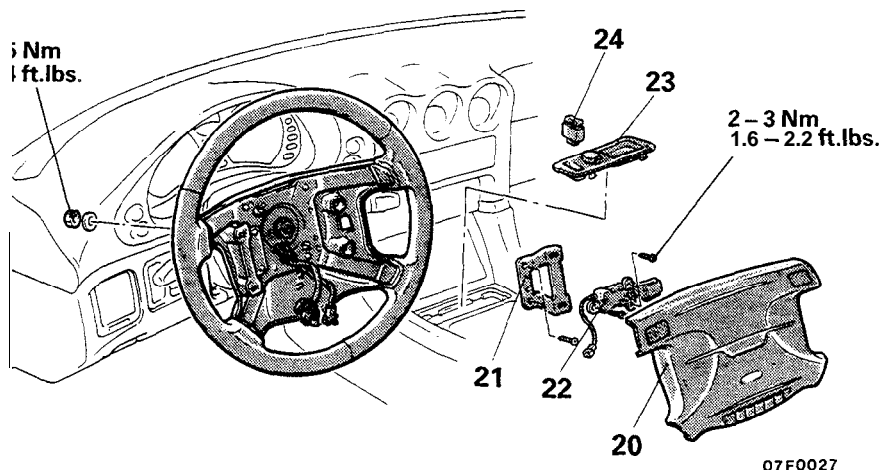
CRUISE CONTROL SYSTEM**REMOVAL AND INSTALLATION****Post-installation Operation**

- Cruise Control Cables Adjustment. (Refer to P.13-178.)

Removal steps of actuator

1. Link protector
2. Connection of accelerator cable and link assembly
3. Connection of cruise control cable and link assembly
4. Connection of throttle cable and link assembly
5. Vacuum pump connector
- * 6. Connection of vacuum hose and vacuum pump
7. Link assembly and vacuum pump
8. Vacuum pump
9. Pump bracket
10. Link assembly
11. Link bracket
12. Connection of accelerator cable and accelerator pedal
13. Accelerator cable
14. Connection of throttle cable and throttle body
15. Throttle cable
16. Actuator and actuator bracket
17. Connection of cruise control cable and actuator
18. Actuator
19. Actuator bracket





Removal steps of control switches

- ☒ 20. Air bag module
- 21. Air bag module bracket
- 22. Cruise control switch
- 23. Switch garnish
- 24. Main switch

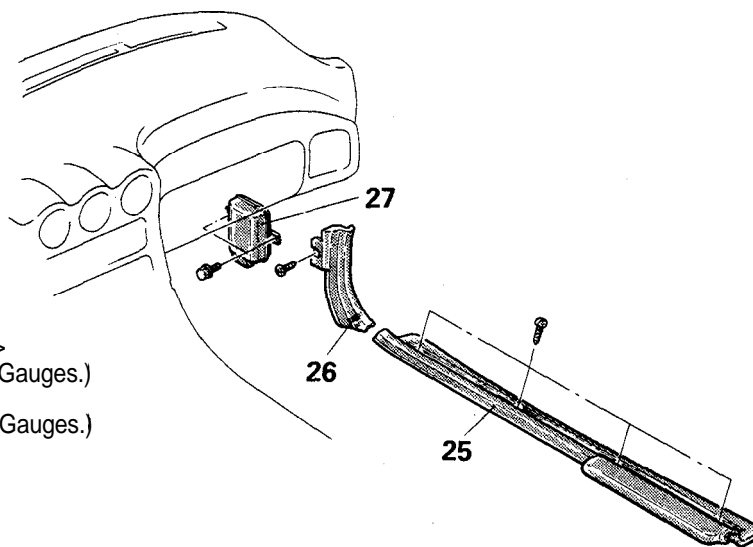
07F0027

Removal steps of control unit

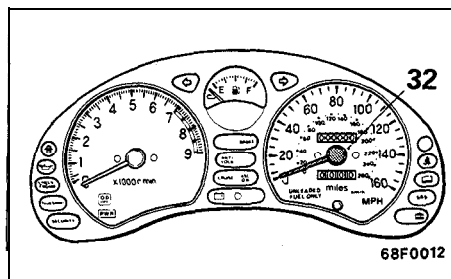
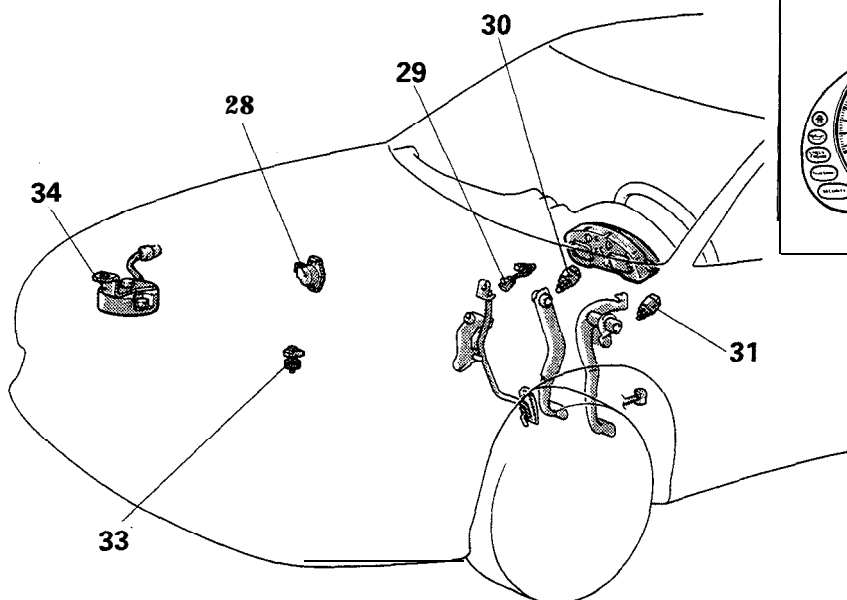
- 25. Scuff plate (R.H.)
- 26. Cowl side trim (R.H.)
- 27. Cruise control unit

Removal steps of sensors and switches

- 28. Throttle position sensor
- 29. Accelerator pedal switch
- 30. Stop light switch
- 31. Clutch switch <M/T>
- ↔ 32. Vehicle speed sensor <Non turbo>
(Refer to GROUP 54 – Meters and Gauges.)
- ↔ 33. Vehicle speed sensor <Turbo>
(Refer to GROUP 54 – Meters and Gauges.)
- 34. Inhibitor switch <A/T>



07F0028



68F0012

07F0020

SERVICE POINT OF REMOVAL

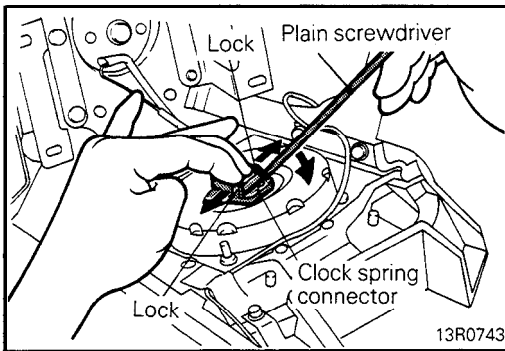
M13TDBG

20. REMOVAL OF AIR BAG MODULE

- (1) Remove the negative terminal of the battery and wait for more than 30 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.

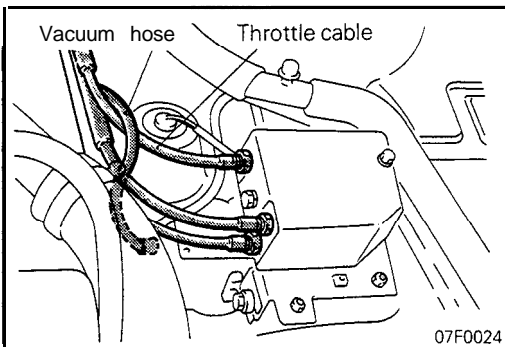
INSPECTION

M13TDCF

- 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 Service Adjustment Procedures – Individual Parts inspection (P.13-181).

**SERVICE POINT OF INSTALLATION**

M13TDDF

6. CONNECTION OF VACUUM HOSE TO VACUUM PUMP

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.

1

2

3

COOLING

CONTENTS

M14AA--

ENGINE COOLANT TEMPERATURE GAUGE UNIT, ENGINE COOLANT TEMPERATURE SENSOR AND ENGINE COOLANT TEMPERATURE SWITCH	15	SPECIFICATIONS	2
RADIATOR	8	General Specifications	2
SERVICE ADJUSTMENT PROCEDURES	7	Lubricant	2
Cap Pressure Test	7	Sealant and Adhesive	3
Engine Coolant Concentration Test	7	Service Specifications	2
Engine Coolant Leak Check	7	THERMOSTAT	11
Engine Coolant Replacement	7	TROUBLESHOOTING	3
		No Rise in Temperature	
		Overheat	
		WATER PUMP, WATER PIPE AND WATER HOSE	13

SPECIFICATIONS**GENERAL SPECIFICATIONS**

M14CA - -

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

M14CB - -

Items	Specifications
Standard value	
Range of coolant antifreeze concentration %	30-60
Thermostat	
Valve opening temperature of thermostat °C (°F)	76.5 (170)
Full-opening temperature of thermostat °C (°F)	90 (194) or more
Opening pressure of cap high pressure valve kPa (psi)	75 – 105 (11 – 15)
Thermo sensor (on radiator) operating temperature	
<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 conditioner>	
OFF → ON °C (°F)	91-99 (196 – 210)
ON → OFF °C (°F)	87 (189) or less
Limit	
Opening pressure cap high pressure valve kPa (psi)	65 (9.2)

LUBRICANT

M14CD - -

Item	Specified lubricant	Quantity
Engine coolant lit. (qts.)	High quality ethylene glycol antifreeze coolant	8.0 (8.5)

SEALANT AND ADHESIVE

M14CE -

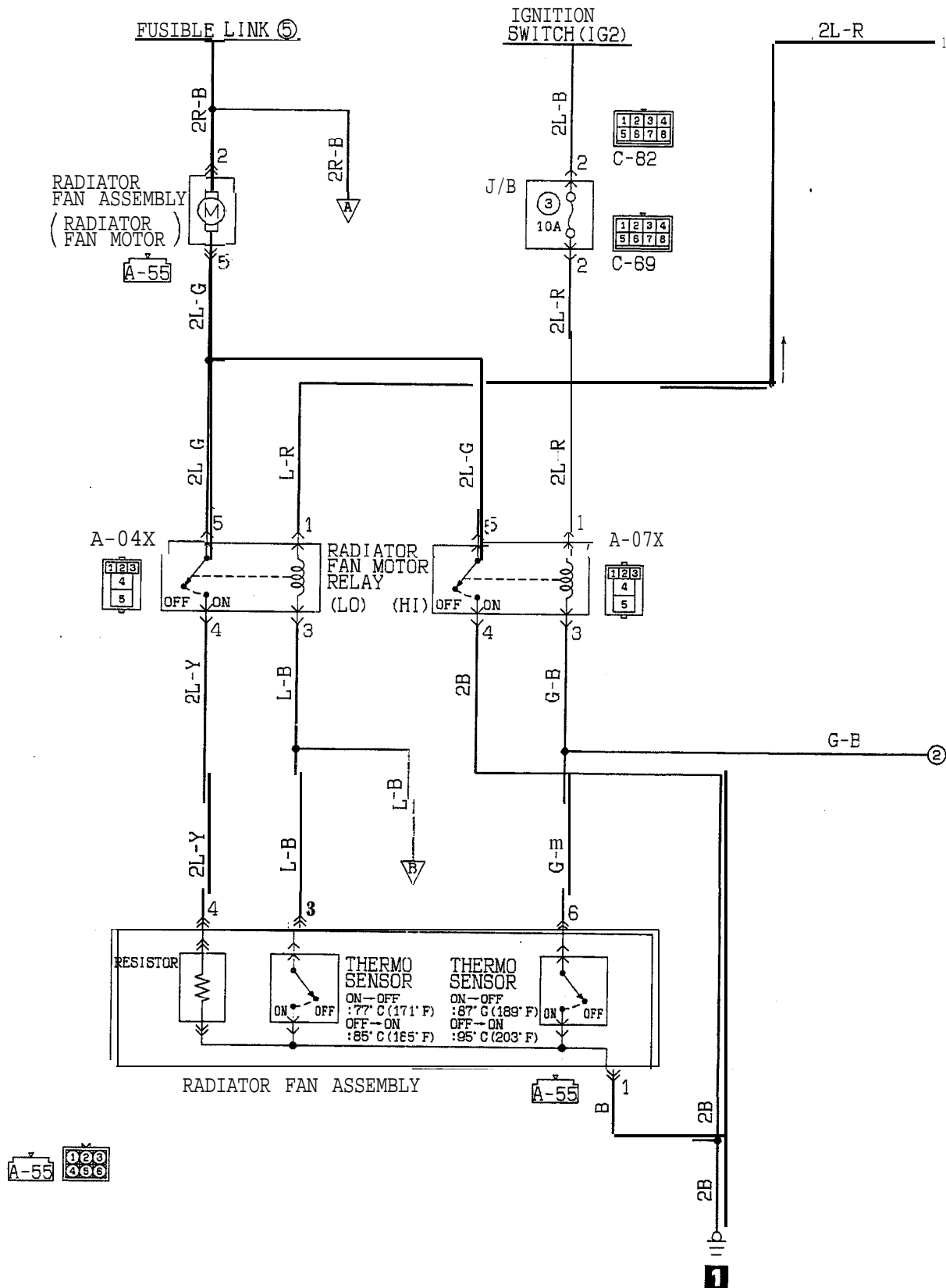
Items	Specified sealants and adhesive
Engine coolant temperature gauge unit	3M Nut Locking Part No. 4171
Engine coolant temperature sensor (Engine control)	
Engine coolant temperature sensor (Air conditioner)	

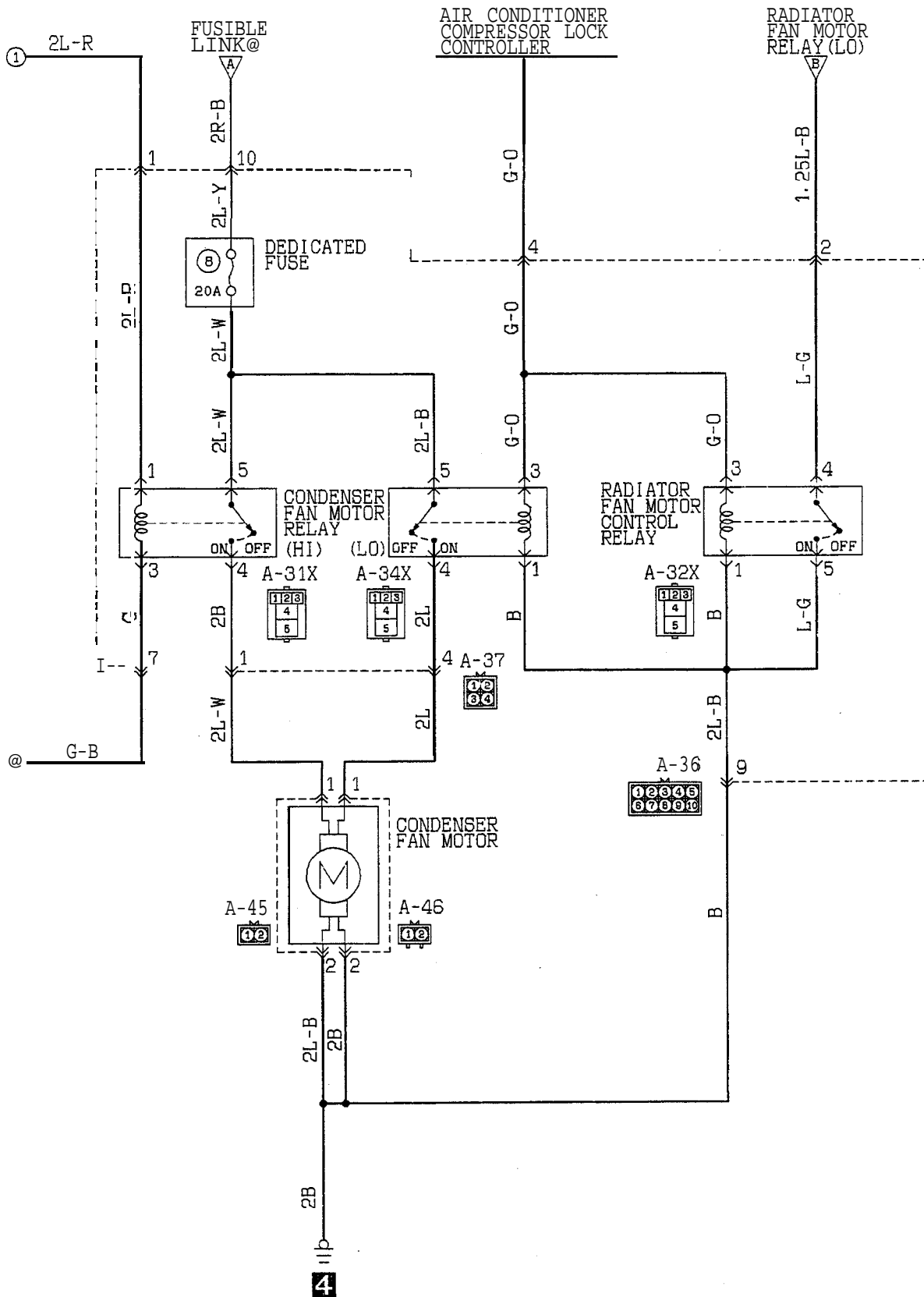
TROUBLESHOOTING

M14EAAL

Symptom	Probable cause	Remedy
Overheat	Insufficient engine coolant	Replenish
	Too high an anti-freeze concentration	Correct anti-freeze concentration
	Inoperative electric cooling fan Faulty thermosensor Faulty electrical motor Faulty radiator fan relay	Replace
	Damaged or blocked (insufficiently ventilated) radiator fins	Correct
	Water leaks Damaged radiator core joint 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 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	Replace Correct or replace Retorque bolts or replace gasket
	Faulty automatic transaxle oil cooler operation Blocked or collapsed hose and pipe Loose hose and pipe connection	Replace Correct
	Faulty thermostat operation	Replace
	Faulty water pump operation	Replace
	Water passage clogged with slime or rust deposit or foreign substance	Clean
	No rise in temperature	Faulty thermostat

CIRCUIT DIAGRAM





TROUBLESHOOTING HINTS

1. Neither the radiator fan nor condenser fan rotate at all.

- Check fusible link No. 5.

2. Only the condenser fan does not operate.

- Check dedicated fuse No. 8.

3. The radiator fan and condenser fan do not operate in the low speed mode, but operate otherwise.

(1) The A/C compressor magnet clutch does not enter the “ON” state.

- Check whether the output of the auto compressor control unit is available.

NOTE

For troubleshooting of the air conditioner control unit, refer to GROUP 55.

(2) The A/C compressor magnet clutch enters the “ON” state.

- Check the resistor.

- Check the radiator fan motor relay (LO) and condenser fan motor relay (LO).
- Check the thermo sensor (for radiator fan).

(3) The radiator fan does not rotate when the air conditioner switch is turned ON.

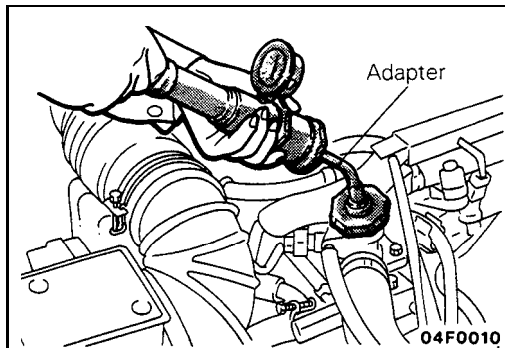
- Check the radiator fan motor control relay.

4. The radiator fan and condenser fan do not operate in the high speed mode, but operate otherwise.

- Check the thermo sensor (for condenser fan).
- Check the radiator fan motor relay (HI) and condenser fan motor relay (HI).

Fan Operating Mode

Switch conditions			Fan revolving operation condition		
Air conditioner switch	Thermo sensor		Engine coolant temperature switch (for air conditioner cut-off) OFF at 115 ± 3°C (239 ± 5°F) or over, ON at 108°C (226°F) or less	Radiator fan motor	Condenser fan motor operates in HIGH only when it receives input from condenser fan motor relay (HI) and (LO).
	For radiator fan ON at 85 ± 4°C (185 ± 7°F) or more OFF at 77°C (171°F) or less	For condenser fan ON at 95 ± 4°C (203 ± 7°F) or more OFF at 87°C (189°F) or less			
OFF	OFF	OFF		OFF	OFF
	ON	OFF		LOW	OFF
		ON		ON	HIGH
ON	OFF	OFF	ON	LOW	LOW
	ON	OFF		LOW	LOW
		ON	ON	HIGH	HIGH
			ON	OFF	HIGH



SERVICE ADJUSTMENT PROCEDURES

ENGINE COOLANT LEAK CHECK

M14FAAF

1. Loosen cap.
2. Confirm that the engine coolant level is up to the filler neck.
3. Install an 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.

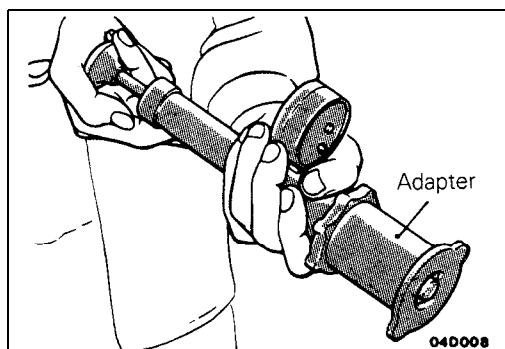
Caution

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

M14FBAH

1. Use a special tool 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

M14FCAG

Refer to GROUP 00 – Maintenance Service.

ENGINE COOLANT CONCENTRATION TEST

M14FDAL

Refer to GROUP 00 – Selection of Coolant.

RADIATOR

REMOVAL AND INSTALLATION

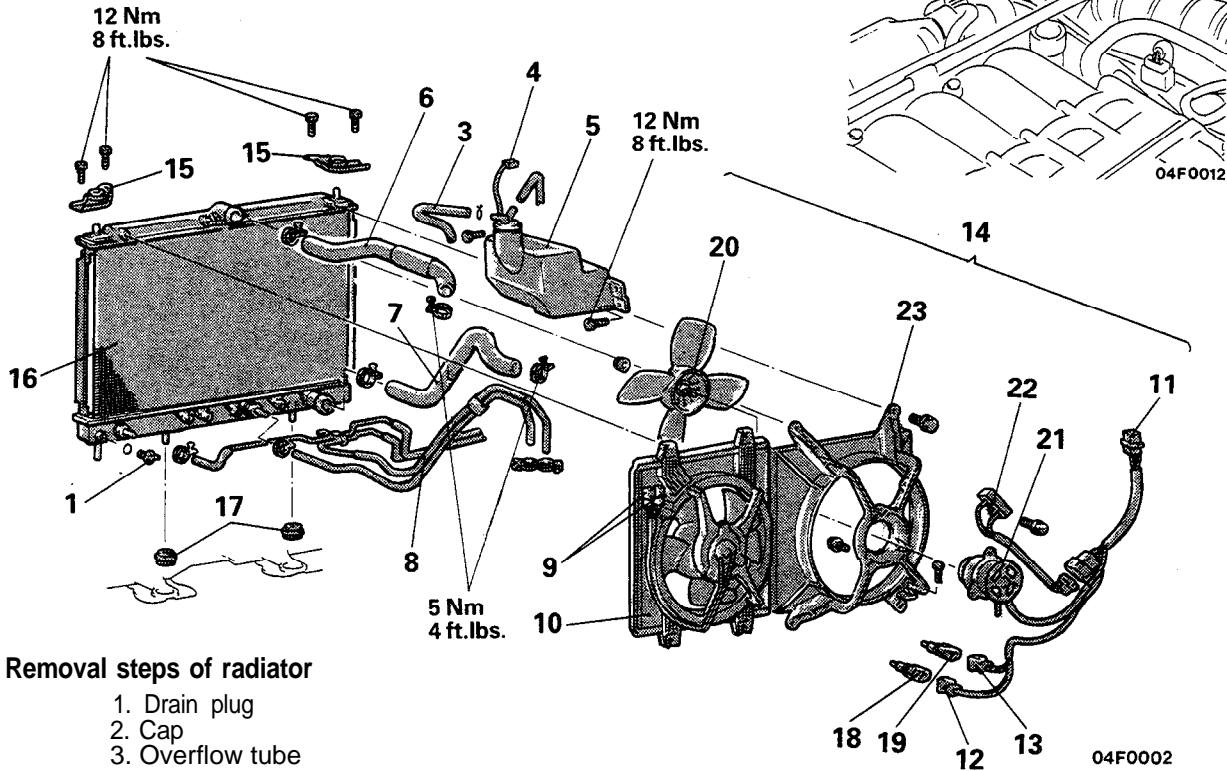
M14QA-

Pre-removal Operation

- Draining of the Engine Coolant (Refer to GROUP 00 – Maintenance Service.)

Post-installation Operation

- Refilling of the Engine Coolant (Refer to GROUP 00 – Maintenance Service.)
- Checking Automatic Transaxle Fluid Level and Refilling If Necessary

**Removal steps of radiator**

1. Drain plug
2. Cap
3. Overflow tube
4. Water level sensor connector
5. Reserve tank
6. Radiator upper hose
7. Radiator lower hose
- ↔ 8. Automatic transaxle oil cooler hoses
<Vehicles with A/T>
9. Condenser fan motor connector
<Vehicles with air conditioner>
10. Condenser fan motor assembly
<Vehicles with air conditioner>
- ◆◆ 11. Radiator fan motor connector
12. Connection of thermo sensor
(For radiator fan)
13. Connection of thermo sensor
(For condenser fan)
<Vehicles with air conditioner>
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 conditioner>
20. Fan
21. Radiator fan motor
22. Resistor
23. Shroud

Removal steps of radiator fan motor assembly

1. Drain plug
2. Cap
6. Radiator upper hose
9. Condenser fan motor connector
<Vehicles with air conditioner>
10. Condenser fan motor assembly
<Vehicles with air conditioner>
- * 11. Radiator fan motor connector
12. Connection of thermo sensor
(For radiator fan)
13. Connection of thermo sensor
(For condenser fan)
<Vehicles with air conditioner>
14. Radiator fan motor assembly
20. Fan
21. Radiator fan motor
22. Resistor
23. Shroud

SERVICE POINT OF REMOVAL

M14QBAK

8. DISCONNECTION OF AUTOMATIC TRANSAXLE OIL COOLER HOSES

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.

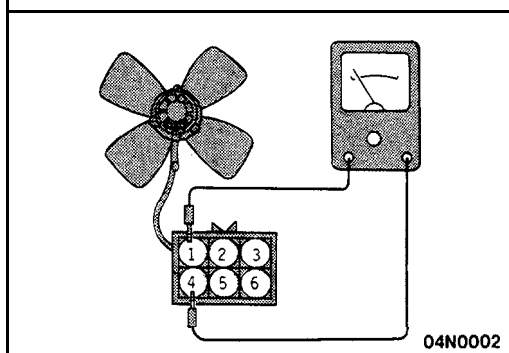
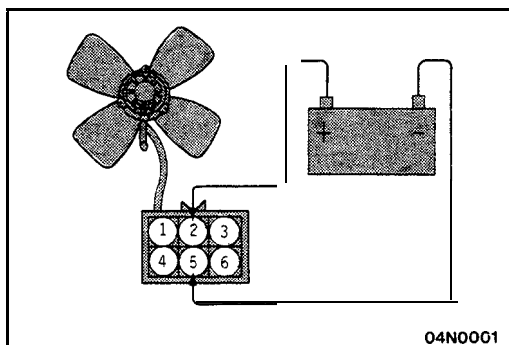
INSPECTION

M14QCAN

- 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 INSPECTION

- (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.



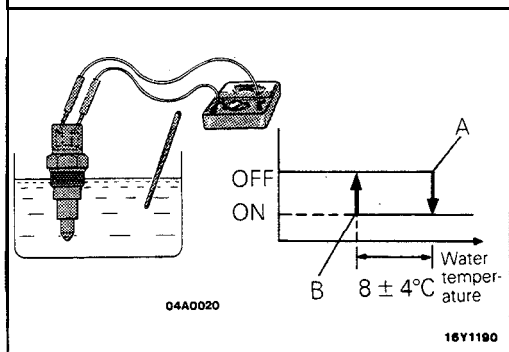
INSPECTION OF RESISTOR

- (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

THERMO SENSOR INSPECTION

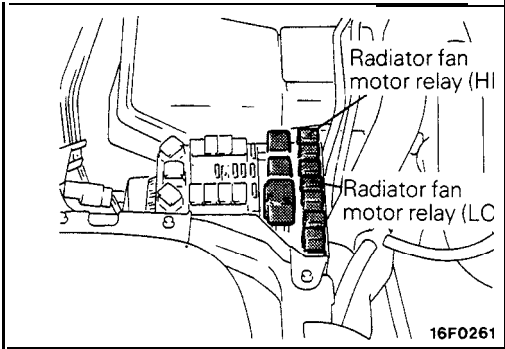
- (1) Immerse the water temperature switch in hot water as shown.
- (2) Change the water temperature and check continuity with a circuit tester.. If it is as specified below, the switch is functioning correctly.



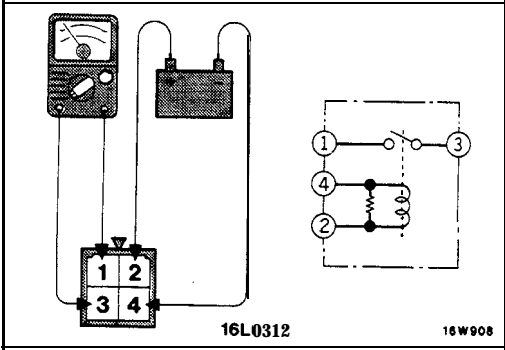
Item	For condenser fan	For radiator fan
With continuity (temperature of point A)	91 – 99°C (196 – 210°F)	81 – 89°C (178 – 192°F)
Without continuity (temperature of point B)	87°C (189°F) or less	77°C (171 °F) or less

RADIATOR FAN MOTOR RELAY INSPECTION

(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.



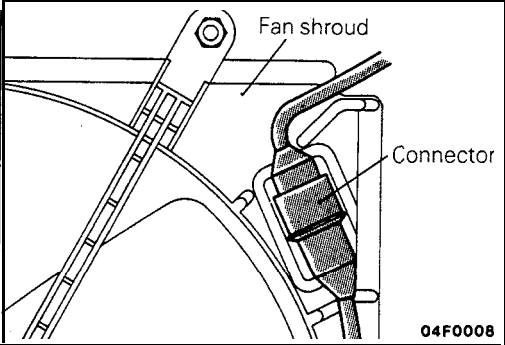
When current flows	Between terminals 1 – 3	Continuity
When no current flows	Between terminals 1 – 3	No continuity
	Between terminals 2 – 4	Continuity

SERVICE POINT OF INSTALLATION

M14QDAH

11. CONNECTION OF RADIATOR FAN MOTOR CONNECTOR

Connect the radiator fan motor connector to the body harness. Then, insert into the shroud hole and fix securely.



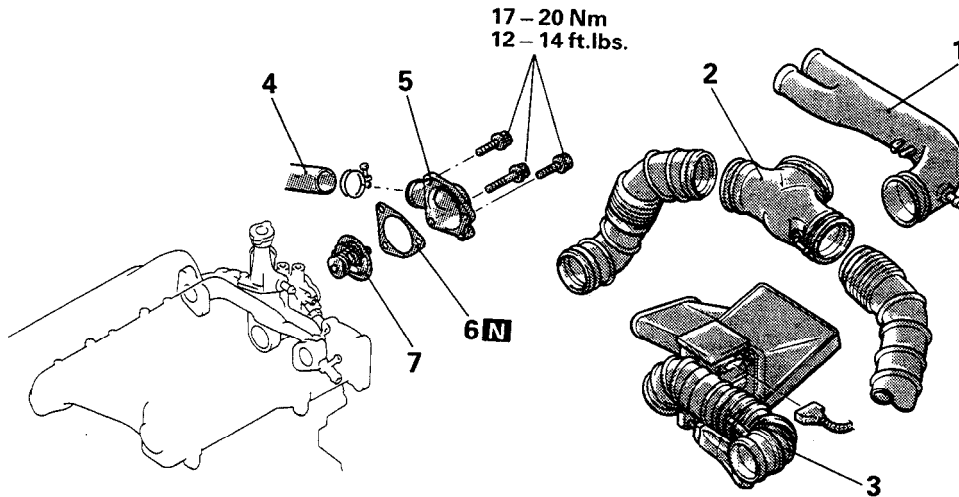
THERMOSTAT

M14GB-

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

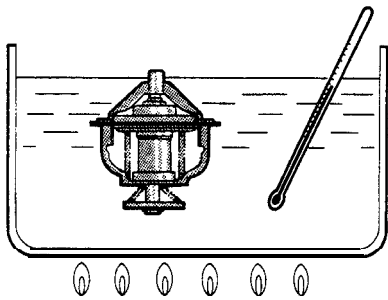
- Draining and Supplying of the Engine Coolant (Refer to GROUP 00 – Maintenance Service.)



Removal steps

- ◆◆ 1. Air hose A <Turbo>
- ◆◆ 2. Air intake hose A <Turbo>
- ◆◆ 3. Air intake hose <Non-Turbo>
- ◆◆ 4. Connection of radiator lower hose
- ◆◆ 5. Water inlet fitting
- ◆◆ 6. Gasket
- a 7. Thermostat

01F0037



7CO0043

INSPECTION

M14GDAL

- 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 10 mm (.39 in.)] are at the standard value.

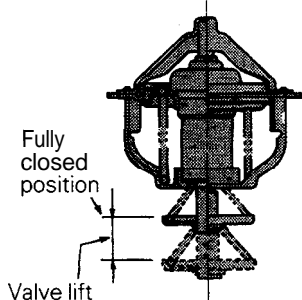
Standard value:

Opening valve temperature
Full-open temperature

76.5°C (170°F)
90°C (194°F)

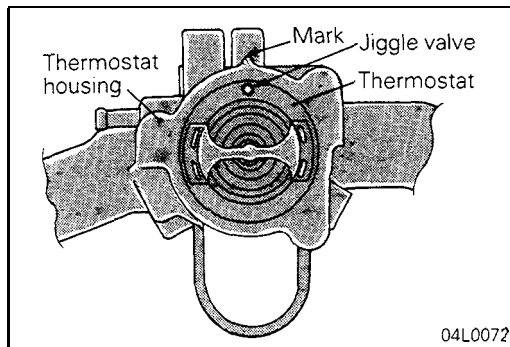
NOTE

Measure valve height when fully closed. Calculate lift by measuring the height when fully open.



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TSB Revision

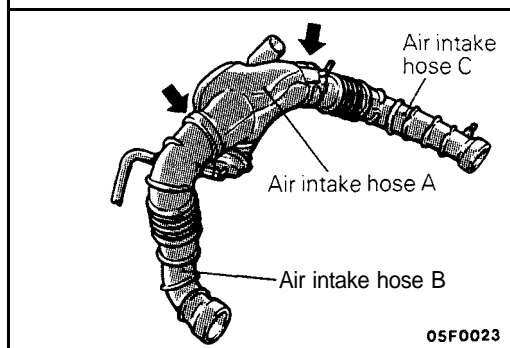


SERVICE POINTS OF INSTALLATION

M14GEAI

7. INSTALLATION OF THERMOSTAT

Install the thermostat with its jiggle valve lined up with the mark on the thermostat housing.



2. INSTALLATION OF AIR INTAKE HOSE A

Assemble the air intake hose A with its notches (arrow-marked) lined up with the Δ marks on the air intake hoses B and C. Insert the hoses into the air intake hose A until they are bottomed.

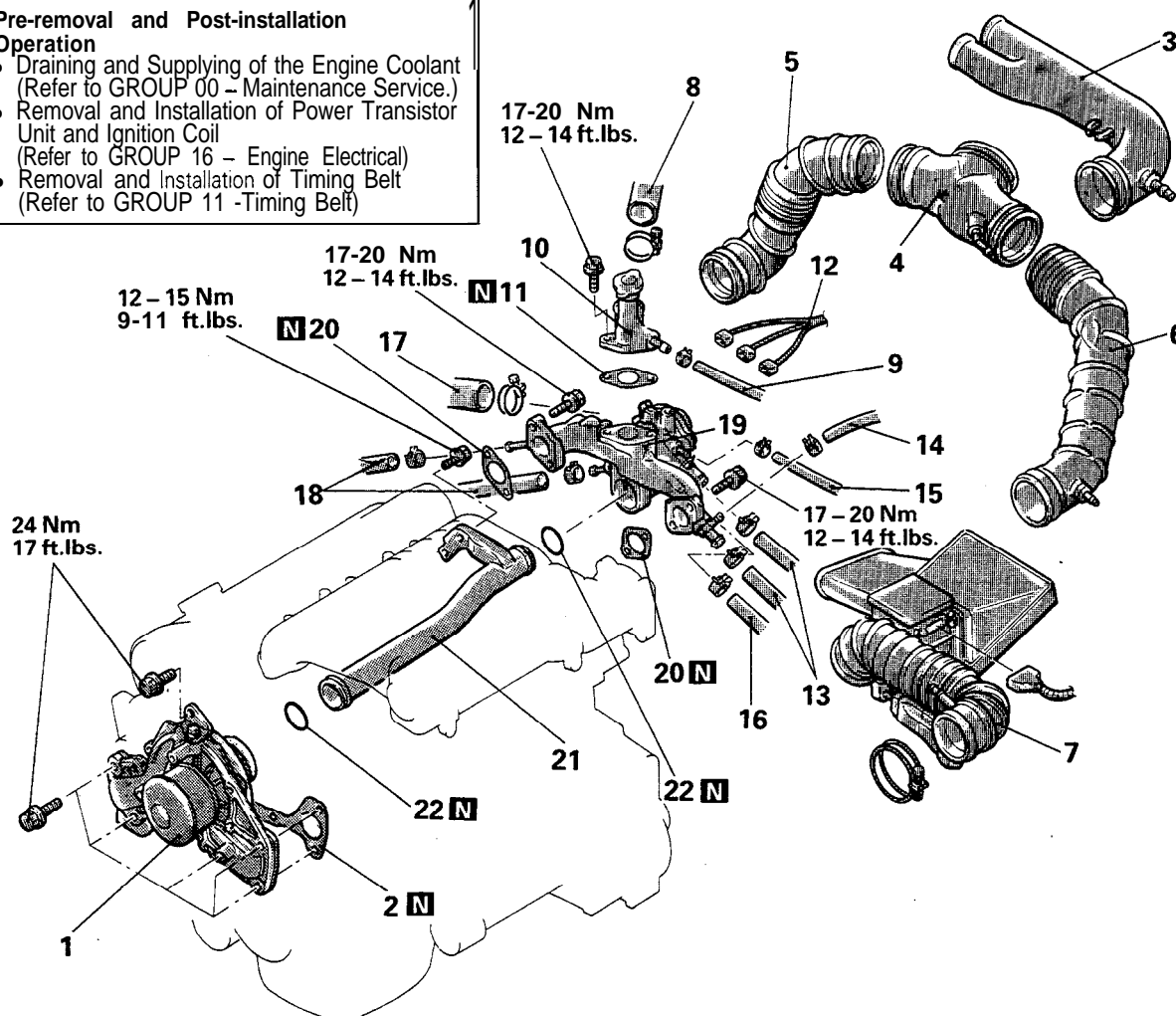
WATER PUMP, WATER PIPE AND WATER HOSE

M14MB-B

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Draining and Supplying of the Engine Coolant (Refer to GROUP 00 – Maintenance Service.)
- Removal and Installation of Power Transistor Unit and Ignition Coil (Refer to GROUP 16 – Engine Electrical)
- Removal and Installation of Timing Belt (Refer to GROUP 11 -Timing Belt)



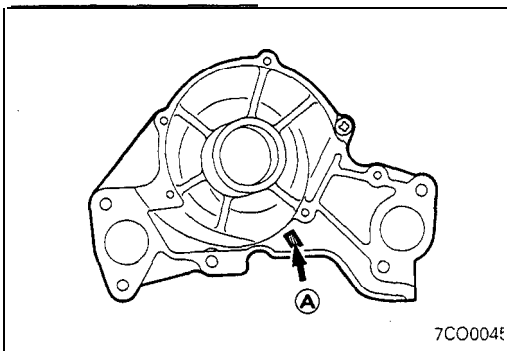
Removal steps

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. Connection of radiator upper hose
9. Connection of water hose <Turbo>
10. Water outlet fitting
11. Gasket
12. Connection of harness
13. Connection of heater hose
14. Connection of water hose A
15. Connection of water hose
16. Connection of water hose <Turbo>
17. Connection of radiator lower hose
18. Connection of water hose <Turbo>
19. Thermostat housing
20. Gasket
21. Inlet water pipe
22. O-ring

Installation steps

2. Gasket
- ◆◆ 1. Water pump
- ◆◆ 22. O-ring
- * 21. Inlet water pipe
20. Gasket
19. Thermostat housing
18. Connection of water hose <Turbo>
17. Connection of radiator lower hose
16. Connection of water hose <Turbo>
15. Connection of water hose
14. Connection of water hose A
13. Connection of heater hose
12. Connection of harness
11. Gasket
10. Water outlet fitting
9. Connection of water hose <Turbo>
8. Connection of radiator upper hose
7. Air intake hose <Non-Turbo>
- * 6. Air intake hose C <Turbo>
- ◆◆ 5. Air intake hose B <Turbo>
- * 4. Air intake hose A <Turbo>
3. Air hose A <Turbo>

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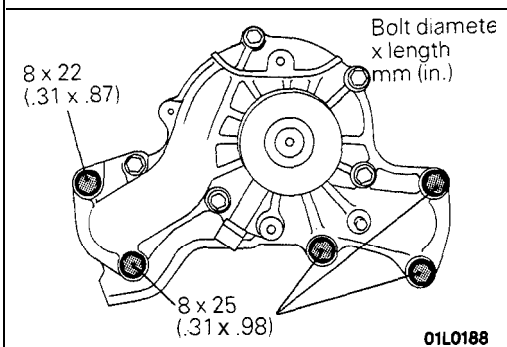
**INSPECTION**

M14MDAQZ

WATER PUMP

If any of the following irregularities are observed, replace the water pump as an assembly.

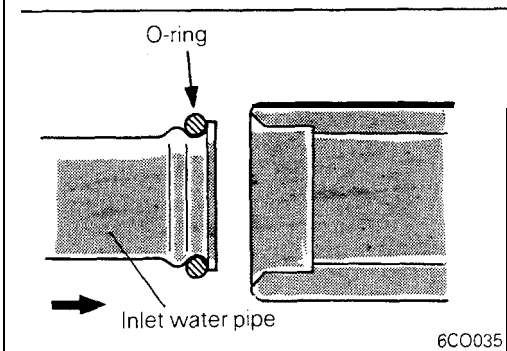
- (1) Damage or crack on the water pump body
- (2) Water leakage. With improper sealing, a water leakage mark may be observed around hole **A**.

**SERVICE POINTS OF INSTALLATION**

M14MEAW

1. INSTALLATION OF WATER PUMP

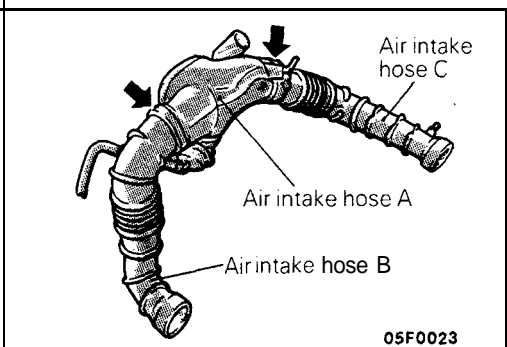
- (1) Clean both gasket surfaces of water pump body and cylinder block.
- (2) Install new water pump gasket and water pump assembly and tighten the bolts.
- (3) Water pump installation bolt size are different and caution must be paid to ensure that they are properly installed.

**22. INSTALLATION OF O-RING / 21. INLET WATER PIPE**

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.

**6. INSTALLATION OF AIR INTAKE HOSE C / 5. AIR INTAKE HOSE B / 4. AIR INTAKE HOSE A**

Assemble the air intake hose A with its notches (arrow-marked) lined up with the Δ 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.

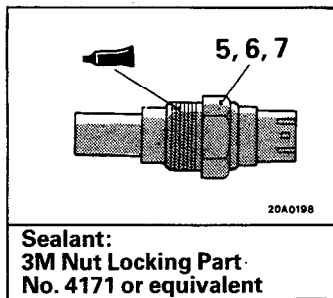
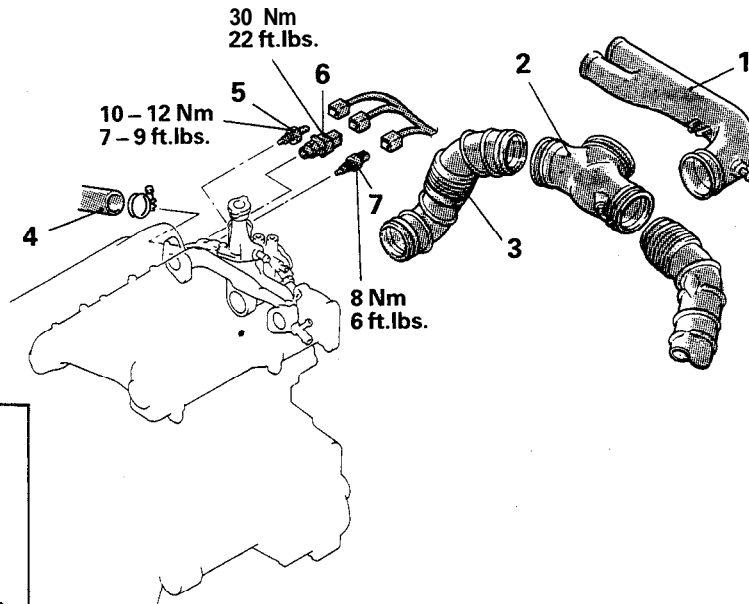
ENGINE COOLANT TEMPERATURE GAUGE UNIT, ENGINE COOLANT TEMPERATURE SENSOR AND ENGINE COOLANT TEMPERATURE SWITCH

REMOVAL AND INSTALLATION

M140B--

Pre-removal and Post-installation Operation

- Draining and Supplying of the Engine Coolant (Refer to GROUP 00 – Maintenance Service.)



Sealant:
3M Nut Locking Part
No. 4171 or equivalent

01F0038

Removal steps

1. Air hose A <Turbo>
- + 2. Air intake hose A <Turbo>
- ◆◆ 3. Air intake hose B <Turbo>
4. Connection of radiator upper hose
5. Engine coolant temperature gauge unit
6. Engine coolant temperature sensor (Engine control)
7. Engine coolant temperature switch (Air conditioner)

INSPECTION

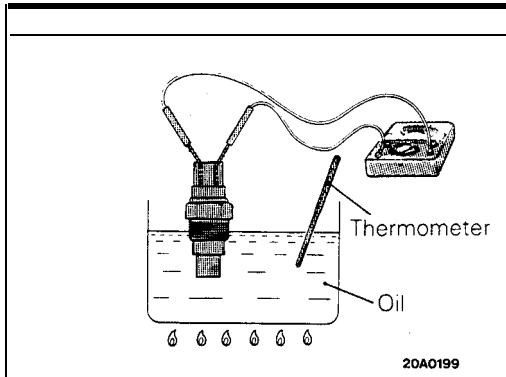
M140DAM

ENGINE COOLANT TEMPERATURE GAUGE UNIT

Refer to GROUP 54 -- Meters and Gauges.

ENGINE COOLANT TEMPERATURE SENSOR (Engine control)

Refer to GROUP 13 -- MPI System Inspection.



ENGINE COOLANT TEMPERATURE SWITCH (Air conditioner)

- (1) Immerse the 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 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.

SERVICE POINTS OF INSTALLATION

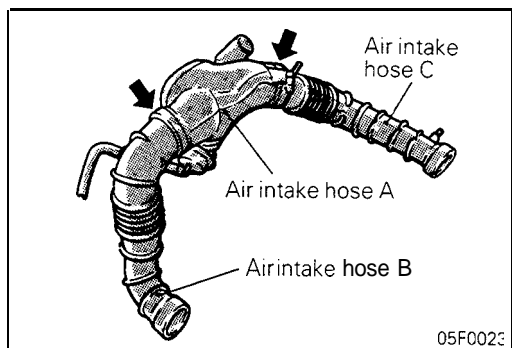
M140EAZ

3. INSTALLATION OF AIR INTAKE HOSE B / 2. AIR INTAKE HOSE A

Assemble the air intake hose A with its notches (arrow-marked) lined up with the Δ 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.



INTAKE AND EXHAUST

CONTENTS

M15AA -

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SPECIFICATIONS

GENERAL SPECIFICATIONS

M15CA-

Items	Specifications
Air cleaner Element	Unwoven cloth type
Exhaust system Front exhaust pipe	Dual type
Muffler	Expansion 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	Waste gate actuator and solenoid valve
Intercooler Type	Air cooled type

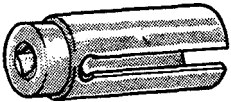
SERVICE SPECIFICATIONS

M15CB-

Items	Standard	Limit
Intake and exhaust manifolds Distortion of cylinder head contacting surface mm (in.)	Less than 0.15 (.0059)	0.2 (.008)
Supercharging pressure solenoid valve terminal resistance [at 20°C (68°F)] Ω	36-44	
Turbocharger Supercharging pressure kPa (psi)	Approx. 20 – 60 (2.9 – 8.7)	
Waste gate valve opening pressure kPa (psi)	Approx. 48 (6.8)	

SPECIAL TOOL

M15DA-

Tool	Number	Name	Use
	MD998770	Oxygen sensor wrench	Removal/Installation of oxygen sensor <Turbo>

TROUBLESHOOTING

M15EAAD

Symptom	Probable cause	Remedy
Exhaust gas leakage	Loose joints	Retighten
	Broken pipe or muffler	Repair or replace
Abnormal noise	Broken separator in muffler Broken rubber hangers	Replace
	Interference of pipe or muffler with vehicle body	Correct
	Broken pipe or muffler	Repair or replace

TROUBLESHOOTING (ACTIVE EXHAUST SYSTEM)

M15EBAA

TROUBLESHOOTING PROCEDURE

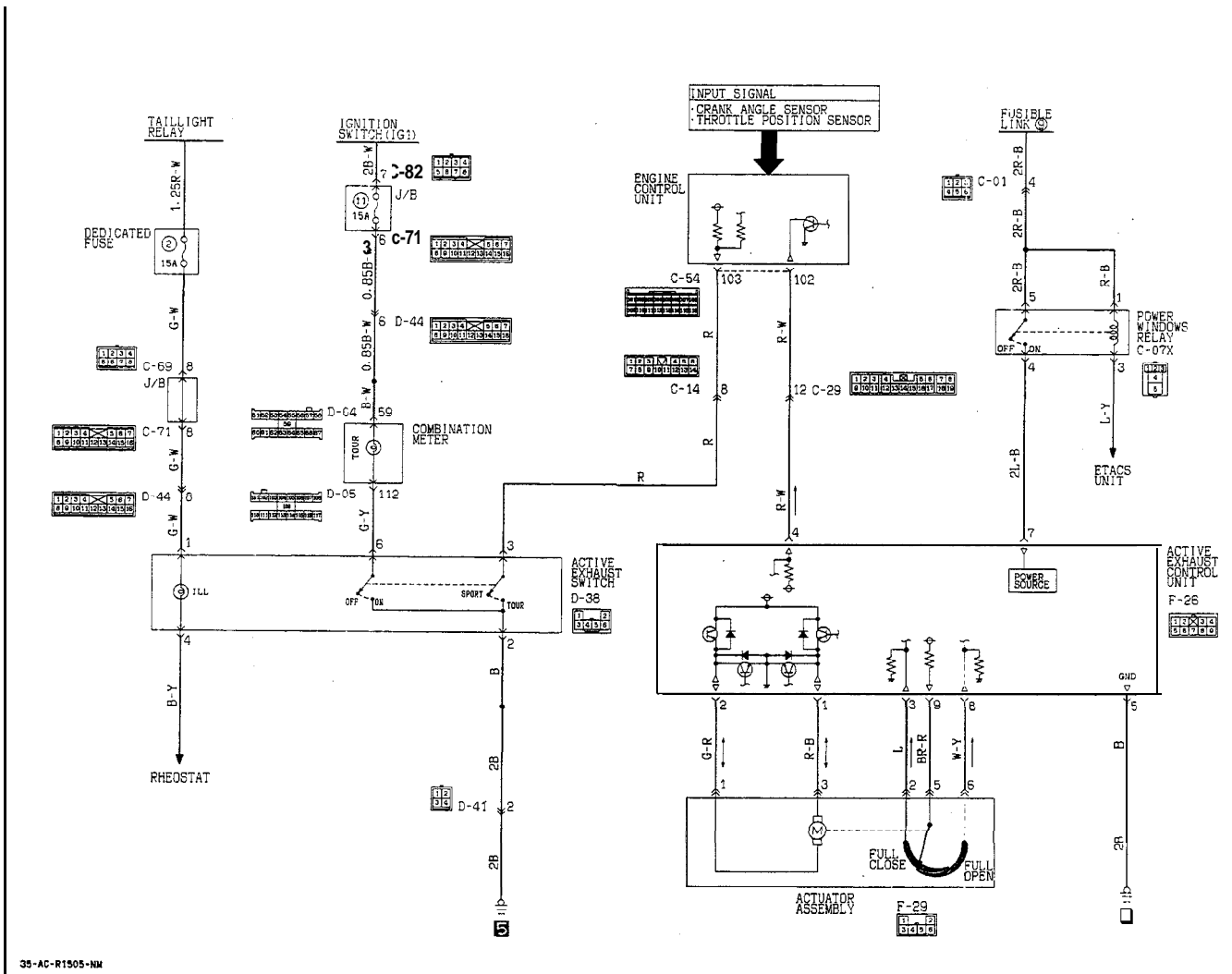
- (1) Make sure that the valve operating cable is not dislocated.
- (2) Make sure that the connectors of each component are positively connected and that no fuse has blown.
- (3) Have an overall understanding of the substance and procedure of checking by reference to the Troubleshooting Quick-Reference 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.

Se- quence	Part to be checked	Checking procedure	Judgement		Probable cause	Remedy
			Normal	Abnormal		
1	Valve	Operate valve manually.	Operates freely.	Does not operate.	Valve sticking	Replace main muffler.
2	Active exhaust switch	Refer to P.15-34.			Faulty switch	Replace switch.
3	Power window relay	Check continuity between terminals @ and ③ of relay.	Continuity present	No continuity	Faulty power window relay	Replace power window relay.
		With battery voltage applied between terminals @ 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 @ and ⑤.	Continuity present between terminals @ and ⑤.	Faulty actuator assembly	Replace actuator assembly.
			Continuity present between terminals @ and ⑥.	No continuity present between terminals ⑤ and ⑥.		
		Check continuity between terminals while idling in TOUR mode.	Continuity present between terminals @ and ⑤.	No continuity present between terminals @ and ⑤.		
			No continuity present between terminals @ and ⑥.	Continuity present between terminals @ and ⑥.		
		Apply battery voltage between terminals @ and ③.	Motor operates.	Motor does not operate.		
			Motor turns in reverse direction when polarity is reversed.	Motor does not turn.		
5	Cable	Operate active exhaust switch (while idling)	Actuator operates and valve operates as well.	Actuator operates, but valve does not work.	Broken or maladjusted cable	Replace or adjust cable

ACTIVE EXHAUST SYSTEM CIRCUIT CHECK



35-AC-R1505-NM

TROUBLESHOOTING HINTS

Checking Active Exhaust Control Unit

Terminal No.	Signal	Status	Terminal voltage
1	SPORT MODE signal	SPORT MODE	Not less than 10V
2	TOUR MODE signal	TOUR MODE	Not less than 10V
3 (8)	Full open position detection signal	SPORT MODE	0V (Not less than 5V)
4	Engine control unit output signal	TOUR MODE, engine speed of not less than 3,500 rpm	Battery voltage
		TOUR MODE, idle	0V
		SPORT MODE	Battery voltage
5	Control unit ground	At all times	0V
7	Control unit ground	At all times	Battery voltage
8 (3)	Full close position detection signal	TOUR MODE	0V (Not less than 5V)
9	Intermediate position detection signal	At all times	Not less than 5V

TSB Revision

SERVICE ADJUSTMENT PROCEDURES

M15G1AA

VARIABLE INDUCTION CONTROL SYSTEM INSPECTION (Non Turbo)

SYSTEM INSPECTION

- (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 SERVO INSPECTION

- (1) Disconnect the variable induction control servo connectors.
- (2) Check the variable induction control servo coil for continuity.

Standard value

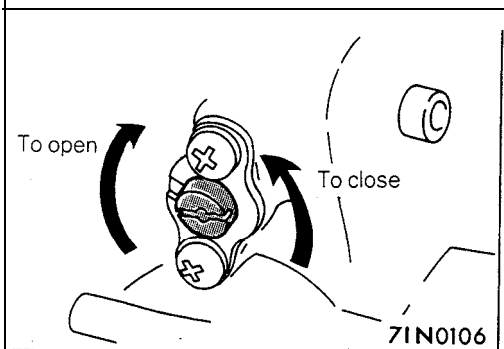
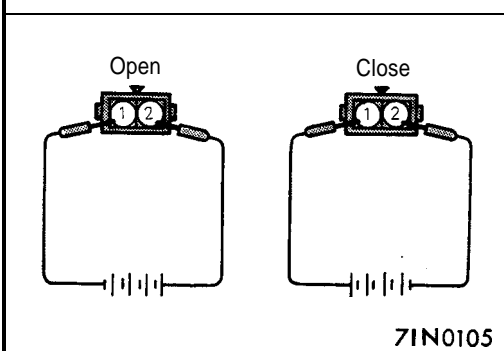
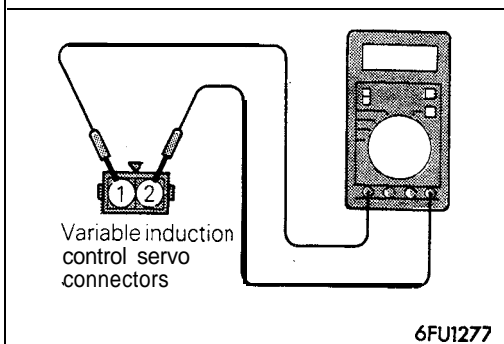
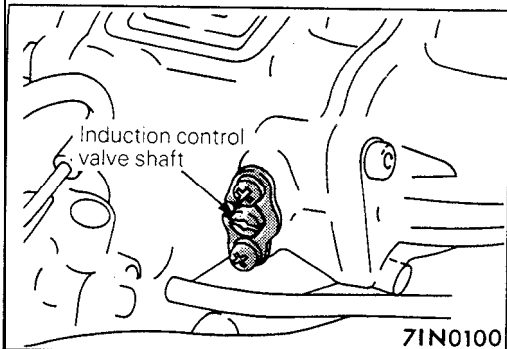
Measured terminal	Continuity
Between terminals ① and ②	Present [5 – 35 Ω: 20°C (68°F)]

- (3) Make sure that when DC 6V is applied to terminals ① and ② of the variable induction control servo 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 servo 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 air intake plenum assembly.



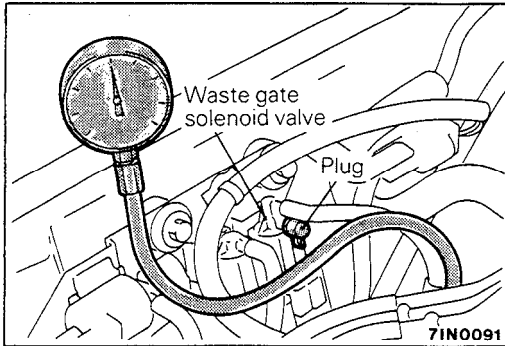
TURBOCHARGER SUPERCHARGING PRESSURE INSPECTION (Turbo)

M15GAAC

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.



- (1) Disconnect the hose (black) from the waste gate solenoid valve, 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:

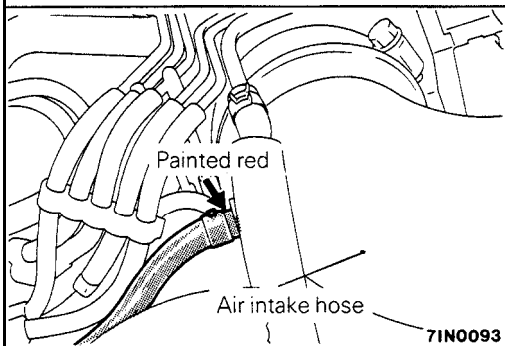
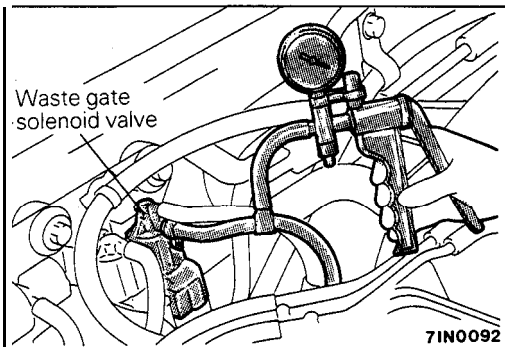
Waste gate actuator malfunction

When pressure is low:

Waste gate actuator malfunction

Supercharging pressure leaks

Faulty turbocharger



SUPERCHARGING PRESSURE CONTROL SYSTEM INSPECTION (Turbo)

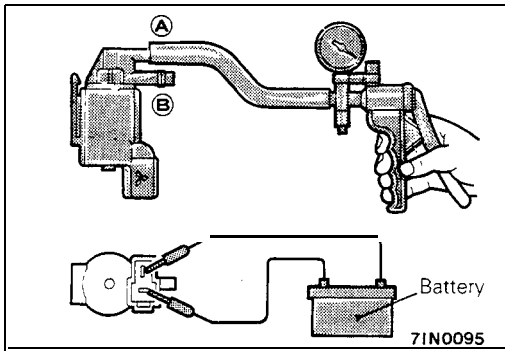
M15GFAB

- (1) After the self-diagnosis code of MPI system is completely read, turn off the ignition switch.
- (2) Disconnect the hose (black) from the waste gate solenoid valve 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 wastegate actuator control boost nipple and plug the nipple.
- (5) Disconnect the battery negative cable from the battery terminal for 10 seconds or more and connect it again.
- (6) 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	Closed by finger	Negative pressure leaks.

NOTE

If this check indicates an abnormal condition, the waste gate actuator, waste gate solenoid valve or hose is broken.

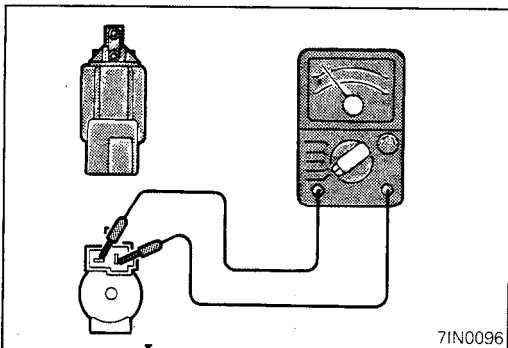


SUPERCHARGING PRESSURE RELIEF SOLENOID VALVE INSPECTION (Turbo)

OPERATION INSPECTION

- (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.

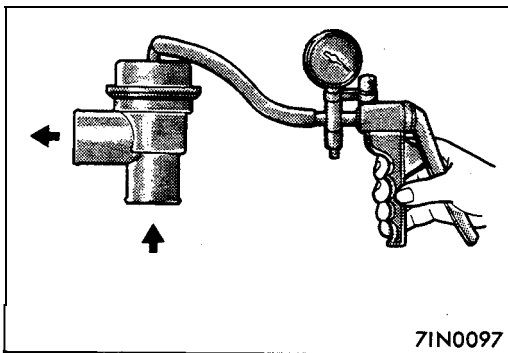
Jumper wire	(B) nipple condition	Normal condition
Connected	Open	Negative pressure leaks.
	Close	Negative pressure is held.
Disconnected	Open	Negative pressure is held.



COIL RESISTANCE INSPECTION

Measure resistance between solenoid valve terminals

Standard value: 36 – 44 Ω [at 20°C (68°F)]



AIR BYPASS VALVE INSPECTION (Turbo)

M15GHAB

- (1) Remove the air bypass valve.
- (2) Connect the hand vacuum pump to the nipple of the air 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

INTAKE MANIFOLD VACUUM INSPECTION

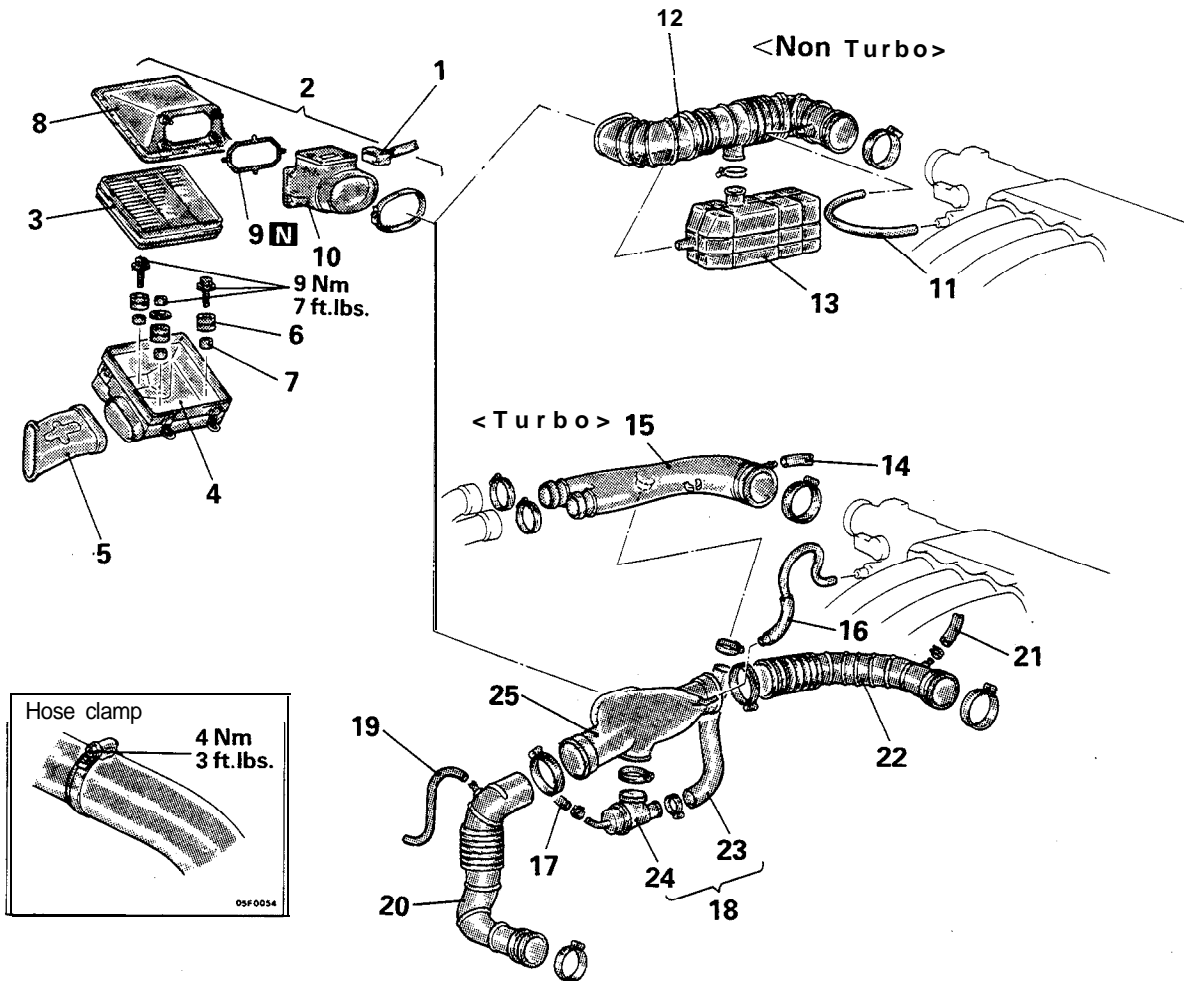
M15GCAC

Refer to GROUP 11 – Service Adjustment Procedures.

AIR CLEANER

REMOVAL AND INSTALLATION

M15FA-



05F0001

Removal steps of air cleaner

1. Connection of air flow sensor connector
2. Air cleaner cover and air flow sensor assembly
3. Air cleaner element
4. Air cleaner body
5. Air duct
6. Insulator
7. Collar
8. Air cleaner cover
9. Air flow sensor gasket
10. Air flow sensor assembly

Removal steps of air intake hose

<Non-Turbo>

11. Breather hose
12. Air intake hose
13. Resonator

Removal steps of air intake hose

<Turbo>

14. Connection of boost hose
15. Air hose A
16. Breather hose
17. Connection of vacuum hose
- * 18. Air intake hose A, air by-pass valve and air by-pass hose
19. Connection of purge hose
- + 20. Air intake hose B
21. Connection of boost hose
- ◆◆ 22. Air intake hose C
23. Air by-pass hose
24. Air by-pass valve
25. Air intake hose A

INSPECTION

M15FCAH

- 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.

AIR-FLOW SENSOR CHECK

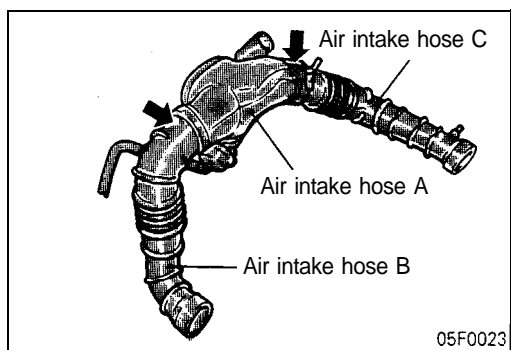
For inspection of air-flow sensor, refer to GROUP 13 -Air-Flow Sensor Check.

SERVICE POINTS OF INSTALLATION

M15FDAB

22. INSTALLATION OF AIR INTAKE HOSE C / 20. AIR INTAKE HOSE B / 18. AIR INTAKE HOSE A, AIR BY-PASS VALVE AND AIR BY-PASS HOSE

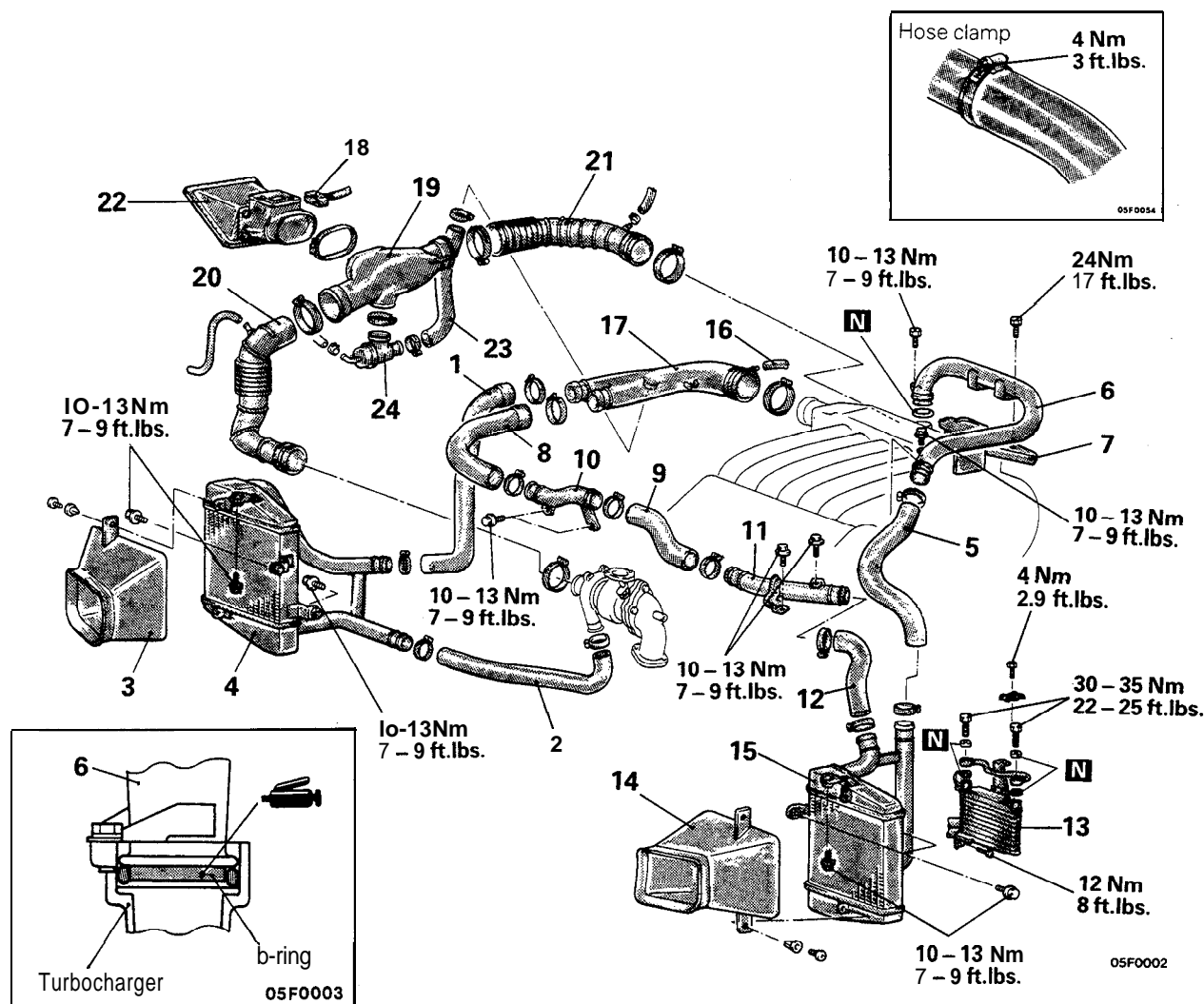
Engaging the notch with the Δ mark at points indicated by the arrows, insert air intake hoses B and C until seated. Insert the turbocharger end of air intake hoses B and C completely.



INTERCOOLER

REMOVAL AND INSTALLATION

M15TA--



Pre-removal Operation

- Removal of Front Bumper (Refer to GROUP 51 – Front Bumper.)

Post-installation Operation

- Supplying of Engine Oil (When equipped with intercooler left) (Refer to GROUP 00 – Maintenance Service.)
- Installation of Front Bumper (Refer to GROUP 51 – Front Bumper.)

Removal steps of intercooler right

- ◆◆ 1. Air hose C
- * 2. Air hose D
- * 3. Intercooler duct (RH)
- * 4. Intercooler right

Removal steps of intercooler left

- * 5. Air hose G
- 6. Air pipe A
- 7. Heat protector F
- ◆◆ 8. Air hose B
- * 9. Air hose E
- 10. Air pipe B
- 11. Air pipe C
- ◆◆ 12. Air hose F
- ◆◆ 13. Engine oil cooler
- 14. Intercooler duct (LH)
- * 15. Intercooler left

Removal steps of air intake hose

- 16. Connection of boost hose
- 17. Air hose A
- 18. Connection of air flow sensor connector
- ◆◆ 19. Air intake hose A
- ◆◆ 20. Air intake hose B
- ◆◆ 21. Air intake hose C
- 22. Air cleaner
- 23. Air by-pass hose
- 24. Air by-pass valve

SERVICE POINT OF REMOVAL

M15TBAC

13. REMOVAL OF ENGINE OIL COOLER

Disconnect the hose from the engine oil cooler and remove the engine oil cooler only.

INSPECTION

M15TCAB

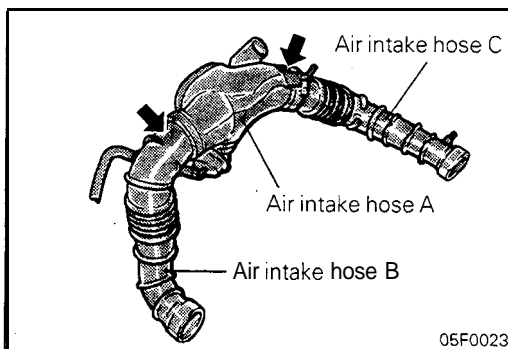
- Check the intercooler fins for bending, damage, or foreign matter.
- Check the intercooler hoses for cracking, damage, or wear.

SERVICE POINTS OF INSTALLATION

M15TDAC

21. INSTALLATION OF AIR INTAKE HOSE C / 20. AIR INTAKE HOSE B / 19. AIR INTAKE HOSE A

Engaging the notch with the Δ 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.

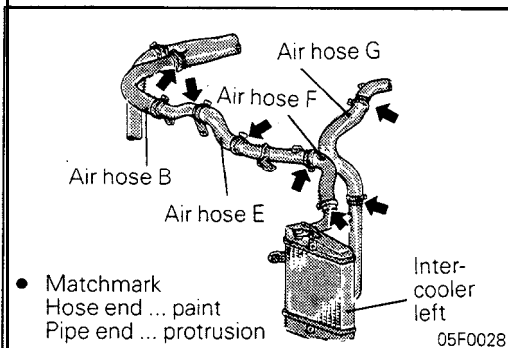


15. INSTALLATION OF INTERCOOLER LEFT / 12. AIR HOSE F / 9. AIR HOSE E / 8. AIR HOSE B / 5. AIR HOSE G

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 intercooler itself.

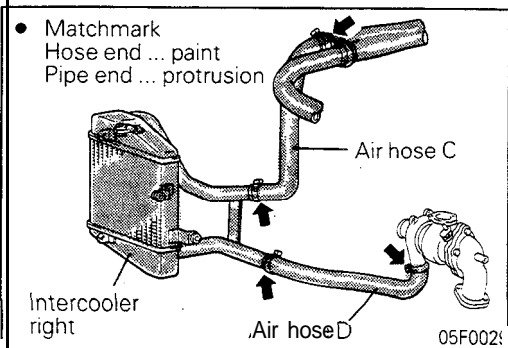


4. INSTALLATION OF INTERCOOLER RIGHT / 2. AIR HOSE D / 1. AIR HOSE C

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 intercooler itself.

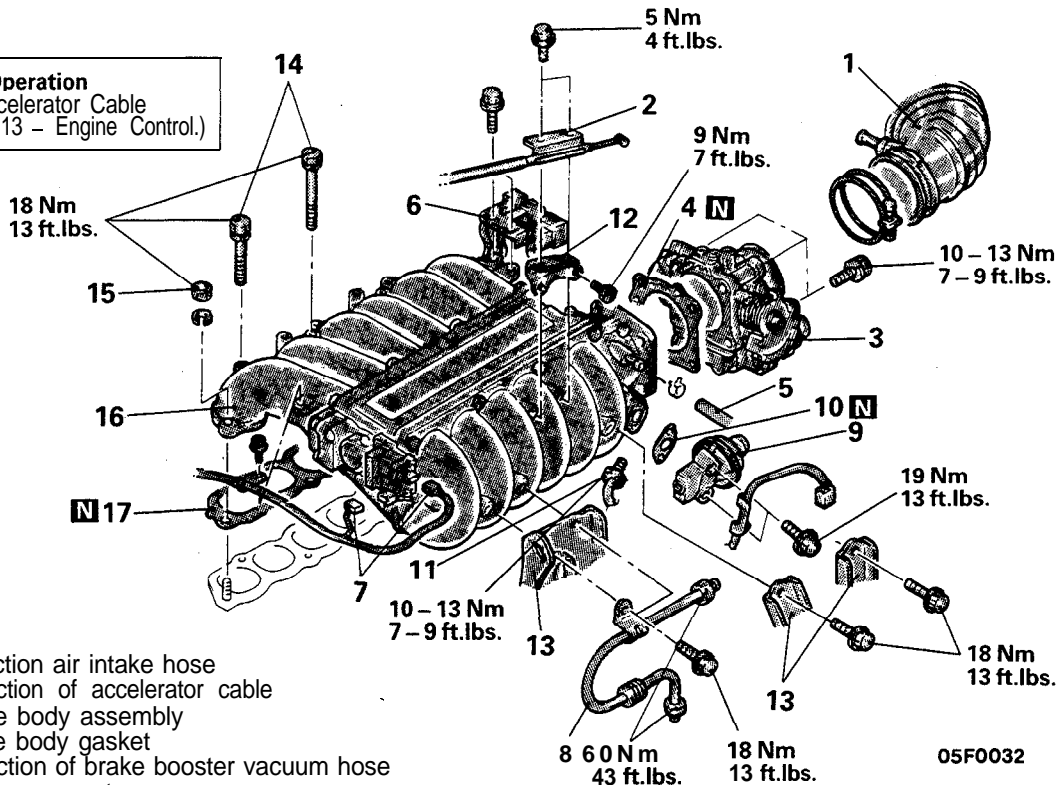


AIR INTAKE PLENUM <Non Turbo>

REMOVAL AND INSTALLATION

M15UA-B

Post-installation Operation
 • Adjustment of Accelerator Cable
 (Refer to GROUP 13 – Engine Control.)



Removal steps

1. Connection air intake hose
 2. Connection of accelerator cable
 3. Throttle body assembly
 4. Throttle body gasket
 5. Connection of brake booster vacuum hose
 6. Harness connectors
 7. Connection of VIC servo motor
 8. EGR pipe
 9. EGR valve
 10. EGR valve gasket
 11. EGR temperature sensor
 12. Accelerator cable bracket
- <Vehicles for California>

13. Connection of air intake plenum stay
14. Air intake plenum installation bolts
15. Air intake plenum installation nuts
16. Air intake plenum
17. Air intake plenum gasket

05F0032

SERVICE POINT OF REMOVAL

M15UBC2

3. REMOVAL OF THROTTLE BODY ASSEMBLY

Leaving the water hoses and vacuum hoses in their installed positions, remove from the air intake plenum.

INSPECTION

M15UCAD2

Check the following points; replace the part if a problem is found.

AIR INTAKE PLENUM

- (1) Check air intake plenum for defect or cracks. Replace if defective or cracked.
- (2) Check load (negative pressure) of drain port. Clean if required.

SERVICE POINT OF INSTALLATION

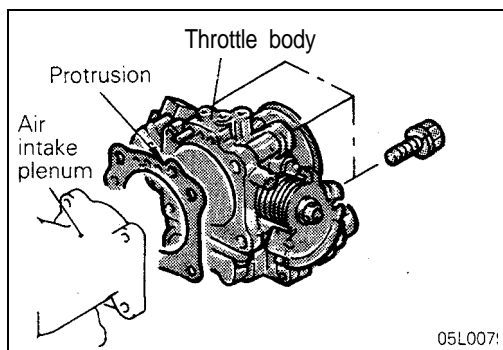
M15UDA82

4. INSTALLATION OF THROTTLE BODY GASKET

Install with the gasket protrusion positioned as shown.

Caution

If installed in an incorrect direction, idling failure or other problems may occur.



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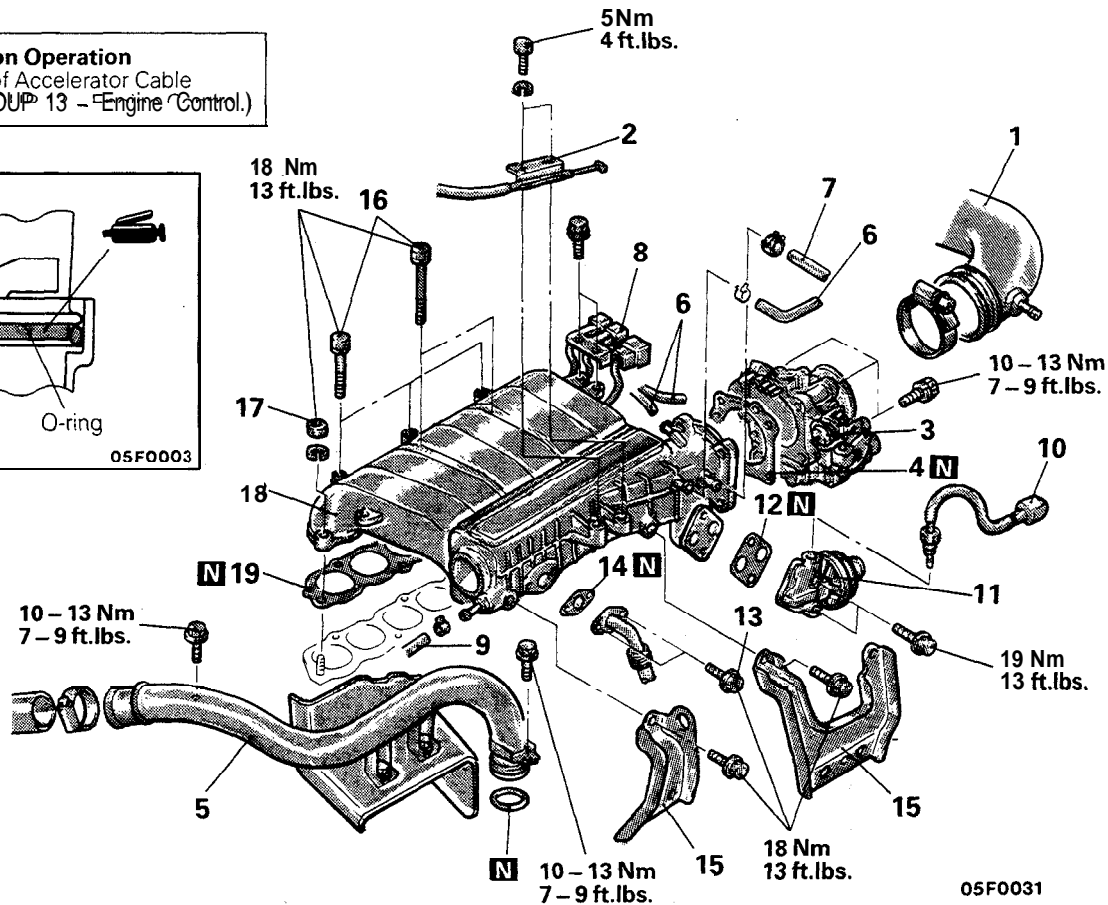
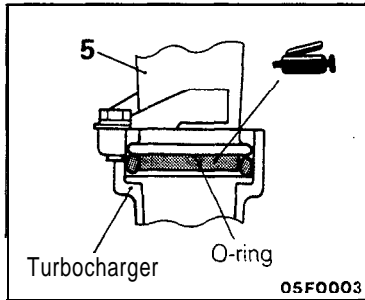
AIR INTAKE PLENUM <Turbo>

M15UA-C

REMOVAL AND INSTALLATION

Post-installation Operation

- Adjustment of Accelerator Cable
(Refer to GROUP 13 – Engine Control.)



Removal steps

- | | |
|--|---|
| <ul style="list-style-type: none"> 1. Connection air hose A 2. Connection of accelerator cable 3. Throttle body assembly • * 4. Throttle body gasket 5. Air pipe A 6. Connection of vacuum hose 7. Connection of brake booster vacuum hose 8. Harness connector 9. Connection of clutch booster vacuum hose 10. EGR temperature sensor <Vehicles for California> | <ul style="list-style-type: none"> 11. EGR valve 12. EGR valve gasket 13. EGR pipe installation bolts 14. EGR pipe gasket 15. Connection of air intake plenum stay 16. Air intake plenum installation bolts 17. Air intake plenum installation nuts 18. Air intake plenum 19. Air intake plenum gasket |
|--|---|

SERVICE POINT OF REMOVAL

M15UBAC3

3. REMOVAL OF THROTTLE BODY ASSEMBLY

Leaving the water hoses and vacuum hoses in their installed positions, remove from the air intake plenum.

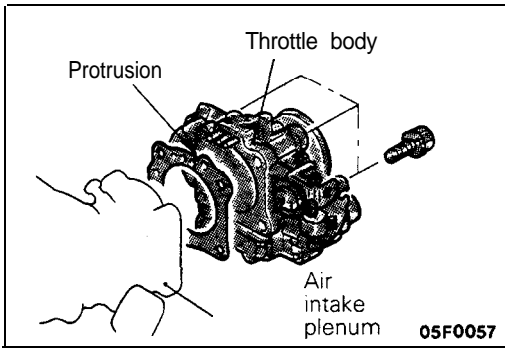
INSPECTION

M15UCAD3

Check the following points; replace the part if a problem is found.

AIR INTAKE PLENUM

- (1) Check air intake plenum for defect or cracks. Replace if defective or cracked.
- (2) Check load (negative pressure) of drain port. Clean if required.



SERVICE POINT OF INSTALLATION

M15UDAB3

4. INSTALLATION OF THROTTLE BODY GASKET

Install with the gasket protrusion positioned as shown.

Caution

If installed in an incorrect direction, idling failure or other problems may occur.

INTAKE MANIFOLD

M15MA-B

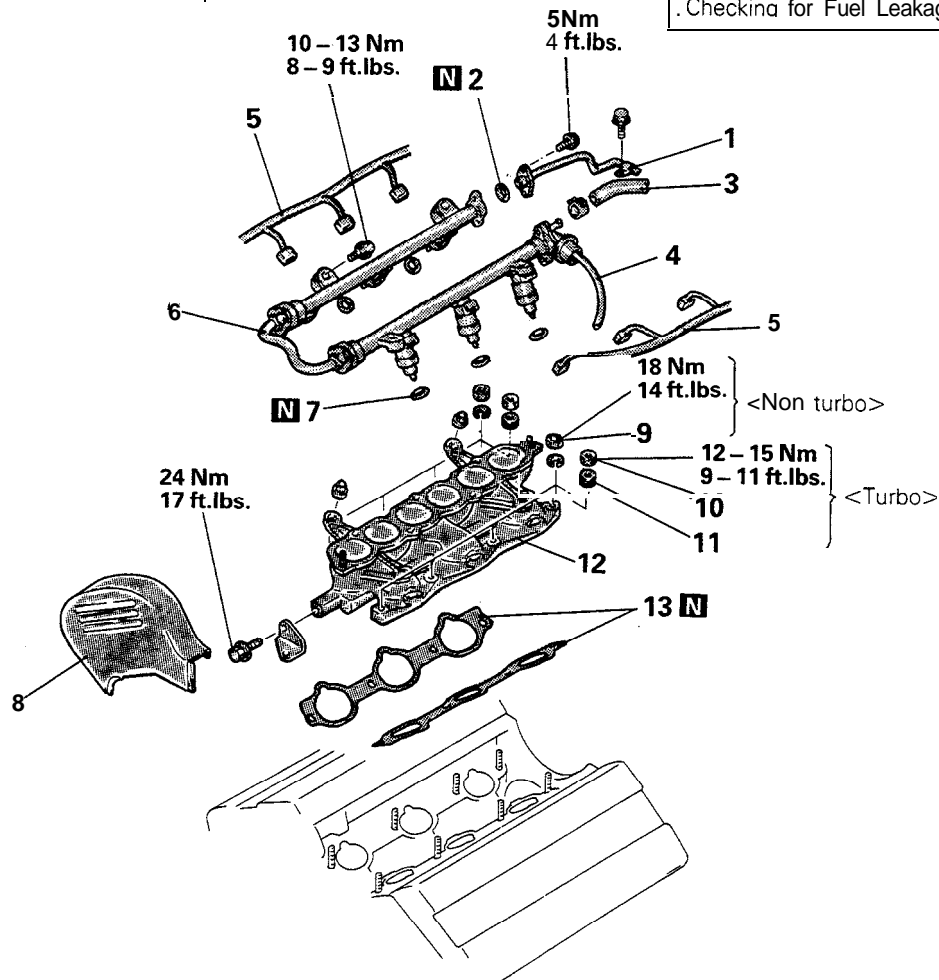
REMOVAL AND INSTALLATION

Pre-removal Operation

- Release of Residual Pressure from High Pressure Fuel Hose (Refer to GROUP 13 – Service Adjustment Procedures.)
- Draining of Engine Coolant (Refer to GROUP 00 -Maintenance Service.)
- Removal of Air Intake Plenum (Refer to P.15-13, 14.)

Post-installation Operation

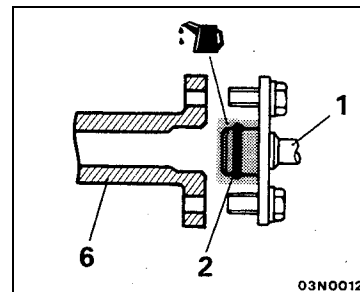
- Installation of Air Intake Plenum (Refer to P.15-13, 14.)
- Filling of Engine Coolant (Refer to GROUP 00 – Maintenance Service.)
- Adjustment of Accelerator Cable (Refer to GROUP 13 – Engine Control.)
- Checking for Fuel Leakage

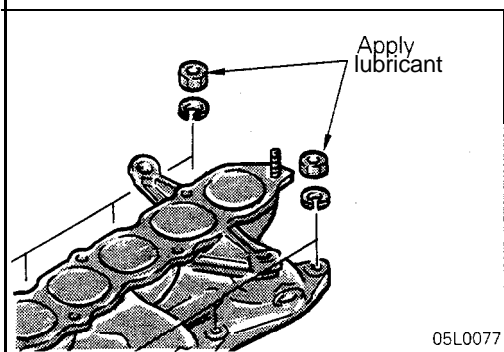
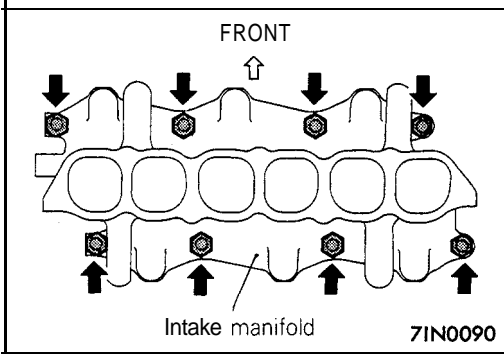
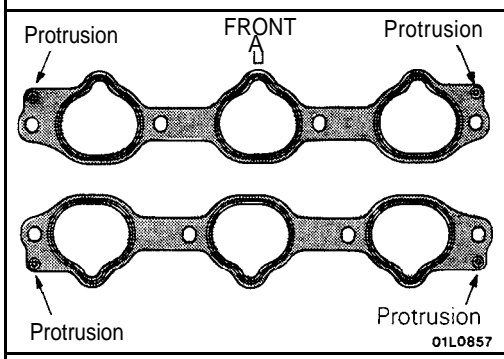
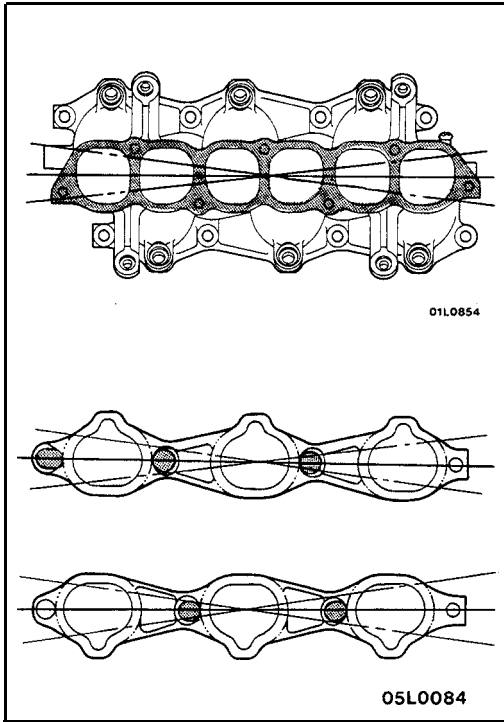


05F0024

Removal steps

1. Connection for high-pressure fuel hose
2. O-ring
3. Connection for fuel return hose
4. Connection for vacuum hoses
5. Connection for injector connector
6. Delivery pipe (with injectors)
7. Insulators
8. Timing belt upper cover
- ◆◆ 9. Intake manifold mounting nut <Non turbo>
- ◆◆ 10. Intake manifold mounting nut <Turbo>
11. Cone disc spring <Turbo>
12. Intake manifold-
- ** 13. Intake manifold gasket





INSPECTION

M15MCA72

Check the following points; replace the part if a problem is found.

INTAKE MANIFOLD

- (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.)

SERVICE POINTS OF INSTALLATION

M15MDAH

13. INSTALLATION OF INTAKE MANIFOLD GASKET

Install with gasket protrusions in the position illustrated.

10. INSTALLATION OF INTAKE MANIFOLD MOUNTING NUT <Turbo>

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.

9. INSTALLATION OF INTAKE MANIFOLD MOUNTING NUT <Non Turbo>

Apply lubricant sparingly to the intake manifold mounting nuts.

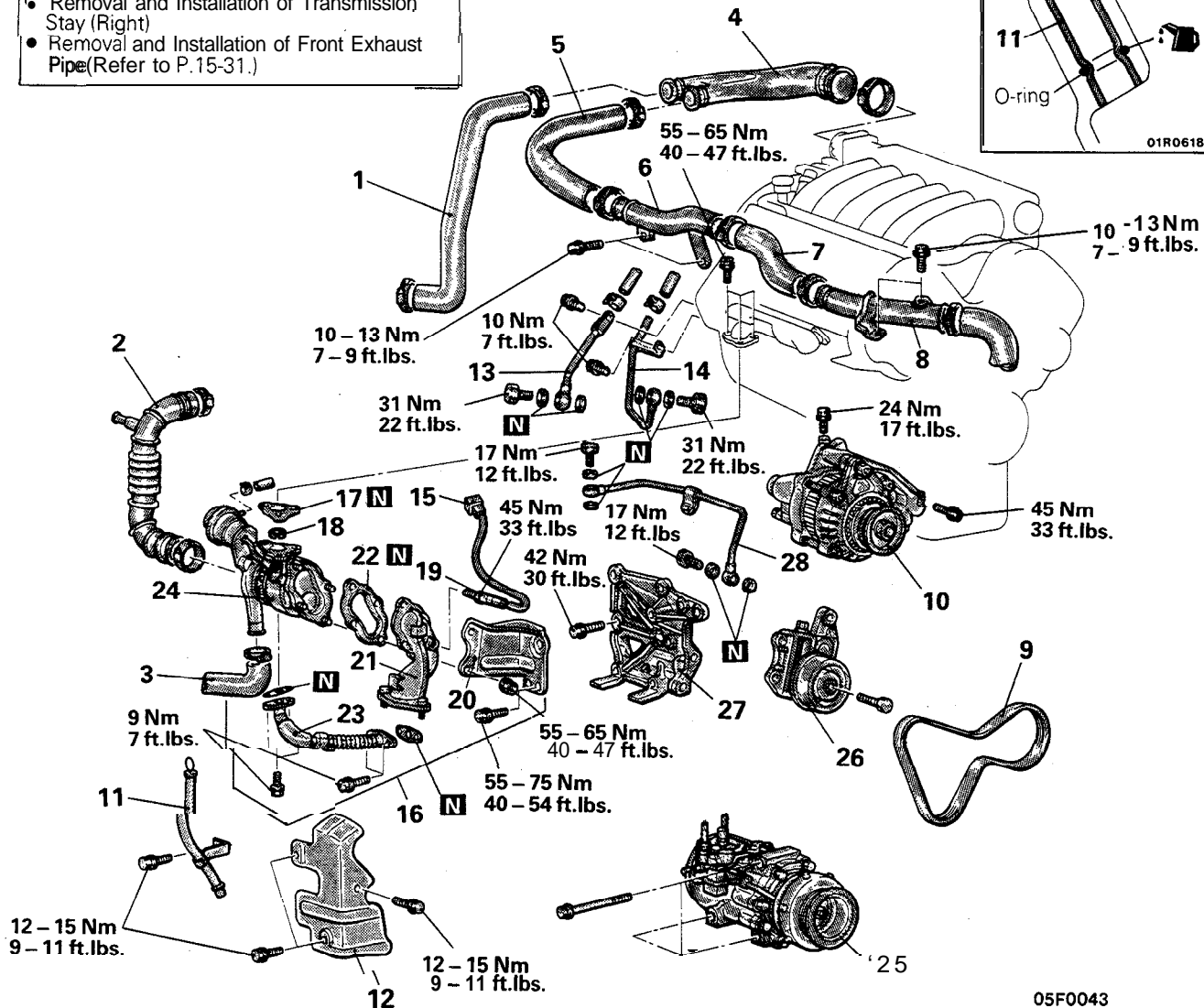
TURBOCHARGER (FRONT)

M15LA-A

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

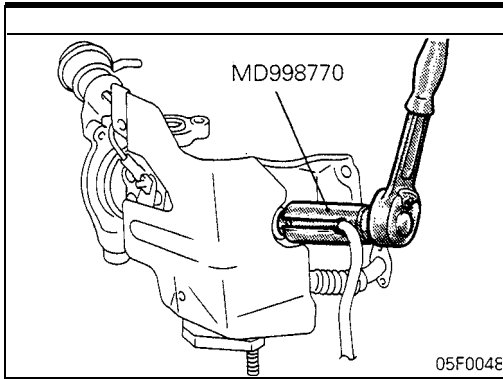
- Removal and Installation of Radiator (Refer to GROUP 14 – Radiator.)
- Removal and Installation of Transmission Stay (Right)
- Removal and Installation of Front Exhaust Pipe (Refer to P.15-31.)



05F0043

Removal steps

- ◆◆ 1. Air hose C
- ◆◆ 2. Air intake hose B
- ◆◆ 3. Air hose D
- * 4. Air hose A
- * 5. Air hose B
- + 6. Air pipe B
- + 7. Air hose E
- 8. Air pipe C
- 9. Drive belt (Refer to GROUP 11 – Service Adjustment Procedures.)
- 10. Alternator assembly (Refer to GROUP 16 – Alternator.)
- 11. Engine oil level gauge guide
- 12. Heat protector B
- 13. Water pipe A
- 14. Water pipe B
- 15. Connection of oxygen sensor
- 16. Turbocharger & fitting assembly
- 17. Gasket
- 18. Ring
- * ◆◆ 19. Oxygen sensor
- * ◆◆ 20. Turbocharger stay
- * ◆◆ 21. Exhaust fitting
- * ◆◆ 22. Gasket
- * ◆◆ 23. Oil return pipe
- * ◆◆ 24. Turbocharger assembly
- * ◆◆ 25. Air conditioner compressor
- * ◆◆ 26. Tension pulley bracket
- * ◆◆ 27. Air conditioner compressor bracket
- * ◆◆ 28. Oil pipe



SERVICE POINTS OF REMOVAL

M15LBAE

19. REMOVAL OF OXYGEN SENSOR

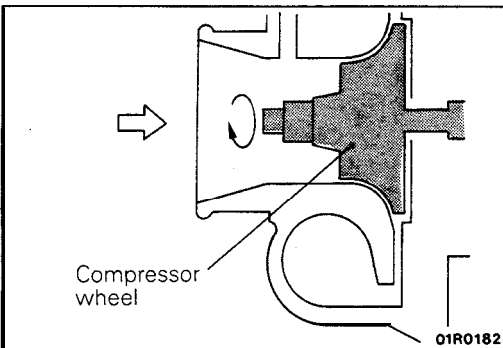
Disconnect the connector of the oxygen sensor, and install the special tool to the oxygen sensor.

25. DISCONNECTION OF AIR CONDITIONER COMPRESSOR

Disconnect air conditioner compressor with hoses from the bracket.

NOTE

The removed air conditioner compressor should be fastened (by using rope, etc.) in a position that will not interfere with the removal/installation of the turbocharger assembly.



INSPECTION

M15LCAD1

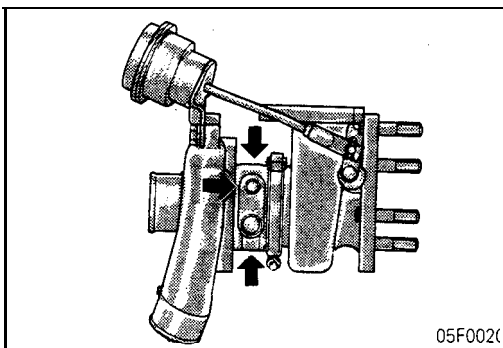
TURBOCHARGER ASSEMBLY CHECK

- 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 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.



SERVICE POINTS OF INSTALLATION

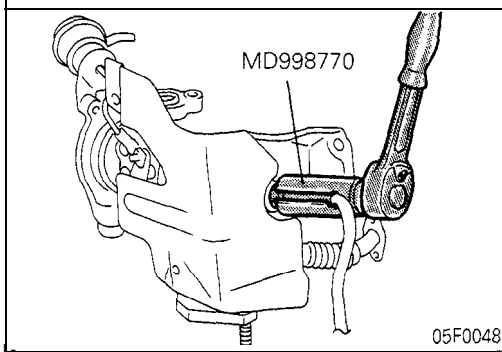
M15LDAE

24. INSTALLATION OF TURBOCHARGER ASSEMBLY

Clean the alignment surfaces shown in the illustration. Supply clean engine oil through the oil pipe installation hole of the turbocharger assembly.

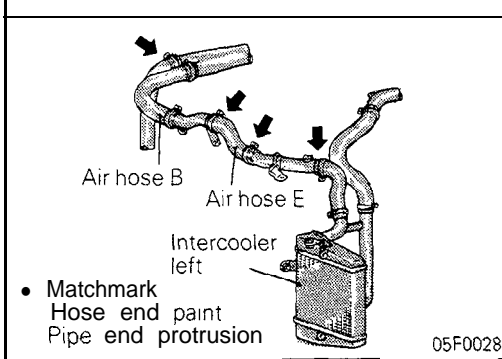
Caution

When cleaning, care must be taken so that a piece of the gasket does not enter the oil passage hole.



19. INSTALLATION OF OXYGEN SENSOR

Use the special tool to install the oxygen sensor.

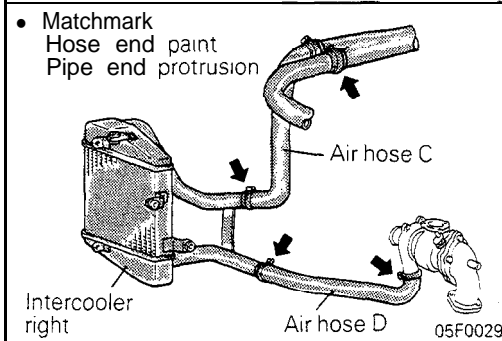


7. INSTALLATION OF AIR HOSE E / 5. AIR HOSE B

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.

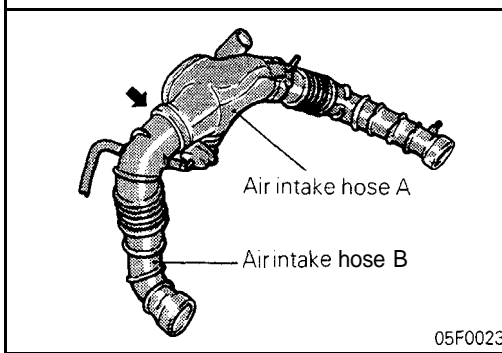


3. INSTALLATION OF AIR HOSE D / 1. AIR HOSE C

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.



2. INSTALLATION OF AIR INTAKE HOSE B

Engaging the notches with Δ marks at the points indicated by the arrows, insert until seated.

Insert the turbocharger end of air intake hose B completely.

TURBOCHARGER (REAR)

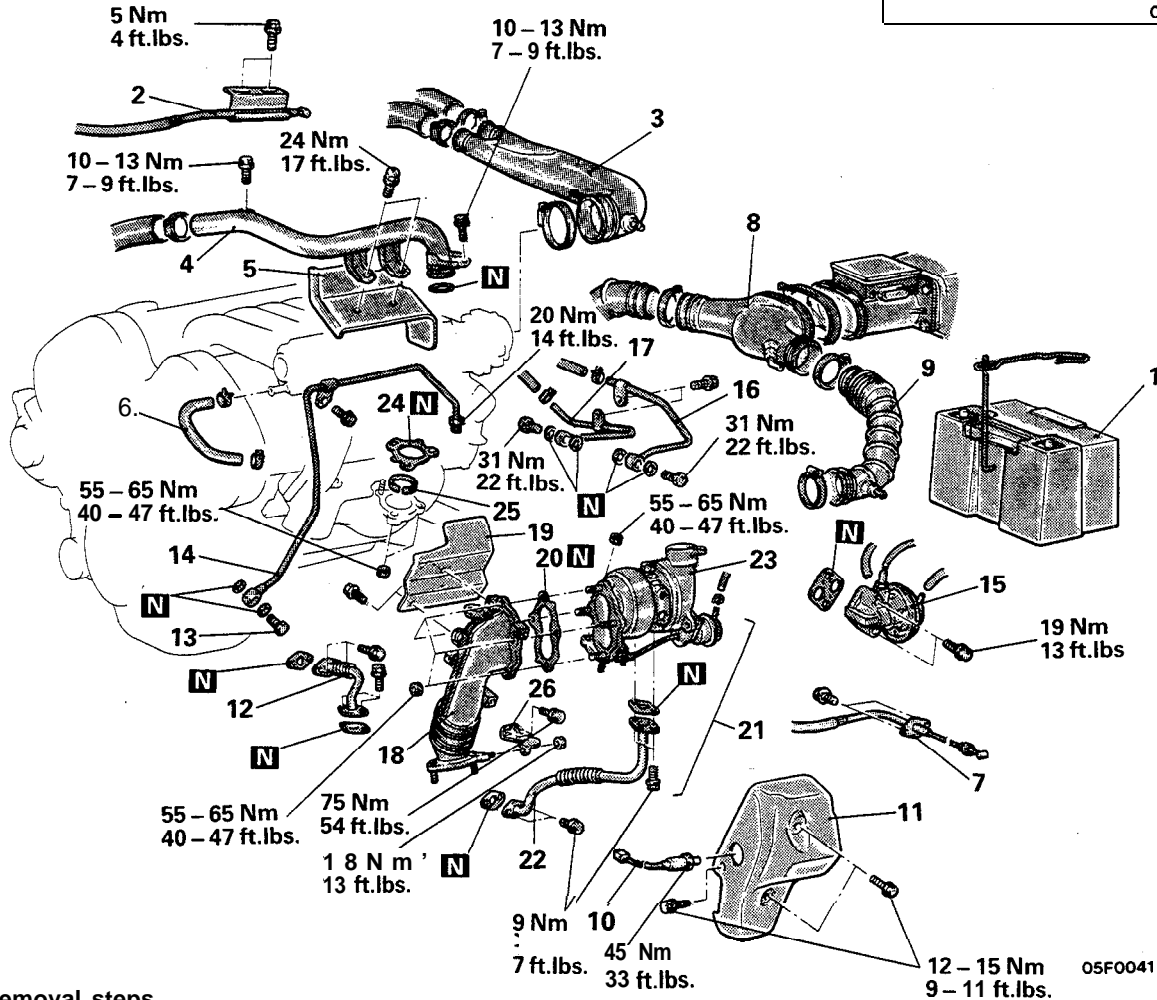
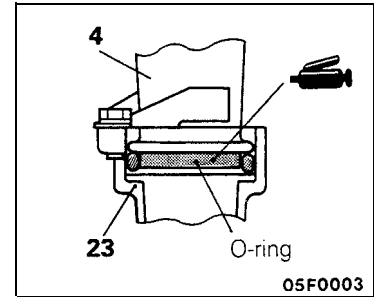
REMOVAL AND INSTALLATION

Pre-removal Operation

- Draining of the Engine Coolant (Refer to GROUP 00 – Maintenance Service.)
- Removal of Front Exhaust Pipe (Refer to P.15-31.)

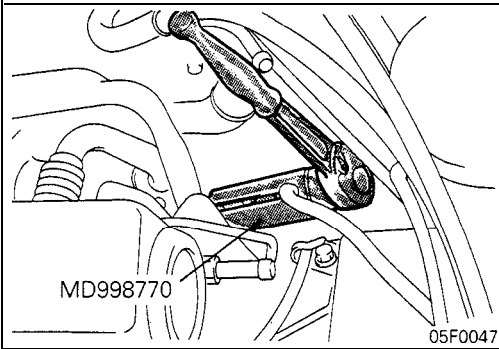
Post-installation Operation

- Installation of Front Exhaust Pipe (Refer to P.15-31.)
- Refilling of the Engine Coolant (Refer to GROUP 00 – Maintenance Service.)
- Adjustment of Accelerator Cable (Refer to GROUP 13 – Engine Control.)



Removal steps

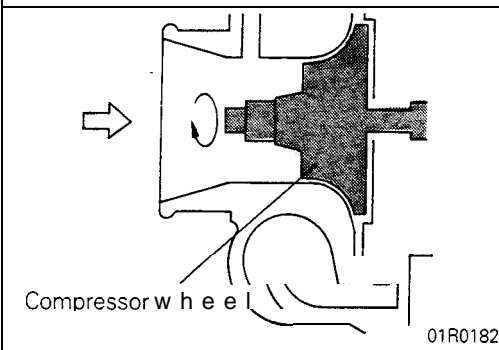
1. Battery
2. Connection of accelerator cable (engine side)
- ◆◆ 3. Air hose A
- * 4. Air pipe A
5. Heat protector F
6. Clutch booster vacuum hose
7. Connection of accelerator cable (pedal side)
- ◆◆ 8. Air intake hose A
- ◆◆ 9. Air intake hose C
- * ◆◆ 10. Oxygen sensor
11. Heat protector D
12. EGR pipe
13. Eye bolt
- * 14. 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. Turbocharger assembly
24. Gasket
25. Ring
26. Exhaust fitting stay

**SERVICE POINT OF REMOVAL**

M15LBAF

10. REMOVAL OF OXYGEN SENSOR

Disconnect the connector of the oxygen sensor, and install the special tool to the oxygen sensor.

**INSPECTION**

M15LCAD2

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 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.

SERVICE POINTS OF INSTALLATION

M15LDAF

23. INSTALLATION OF TURBOCHARGER ASSEMBLY

Clean the alignment surfaces shown in the illustration.

Caution

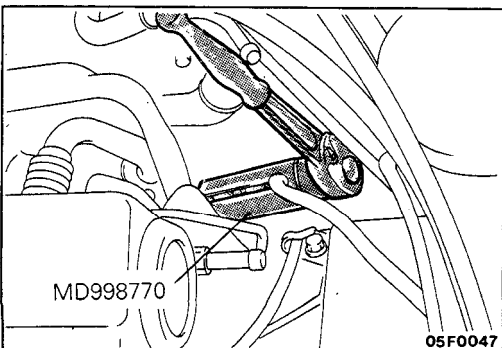
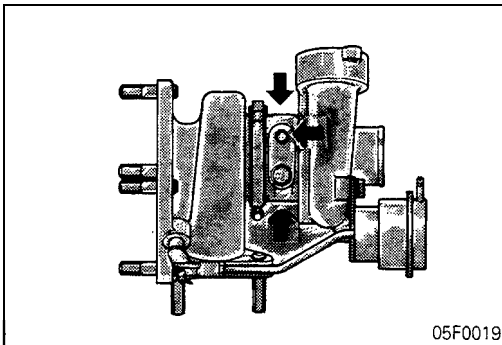
When cleaning, care must be taken so that a piece of the gasket does not enter the oil passage hole.

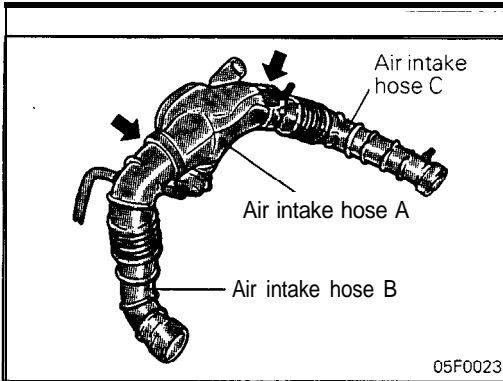
14. INSTALLATION OF OIL PIPE

Supply clean engine oil through the oil pipe installation hole of the turbocharger assembly.

10. INSTALLATION OF OXYGEN SENSOR

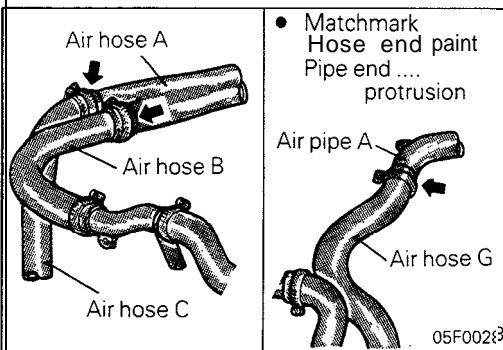
Use the special tool to install the oxygen sensor.





9. INSTALLATION OF AIR INTAKE HOSE C / 8. AIR INTAKE HOSE A

Engaging the notches with Δ marks at the points indicated by the arrows insert until seated.
Insert the turbocharger end of air intake hose C completely.



4. INSTALLATION OF AIR PIPE A / 3. AIR HOSE A

Aligning the marks at the points indicated by the arrows, insert securely into the stepped portion of the pipe.

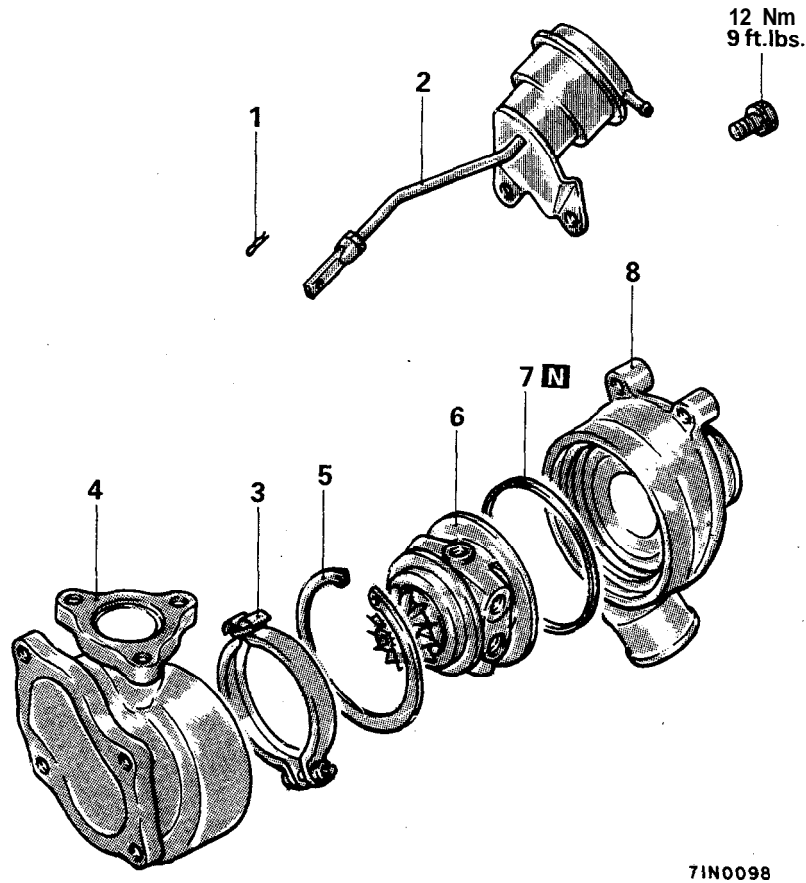
Caution

Be careful not to allow any foreign matter to get into the hoses or pipes..

TURBOCHARGER

DISASSEMBLY AND REASSEMBLY

M15LE--



Disassembly steps

- 1 Snap pin
- 2 Waste gate actuator
- 3 Coupling
- ◆◆ 4 Turbine housing
- ◆◆◆◆ 5 Snap ring
- ◆◆◆◆ * 6 Cartridge assembly
- * 7 O-ring
- 8 Compressor cover

71N0098

SERVICE POINTS OF DISASSEMBLY

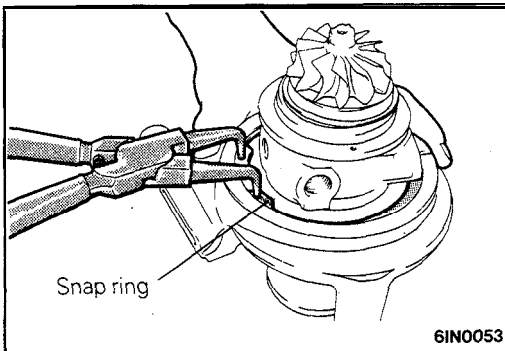
M15LFAC

5. REMOVAL OF SNAP RING

Place the compressor cover assembly on the floor with its end surface down and remove the snap ring with pliers.

Caution

During removal, hold with a finger the snap ring which can spring out.

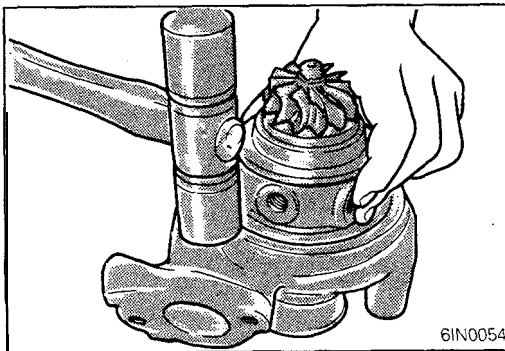


6. REMOVAL OF CARTRIDGE ASSEMBLY

Remove the cartridge assembly by tapping the compressor cover with a soft hammer.

Caution

Some resistance will be experienced in the removal due to the O-ring on the cartridge assembly.



INSPECTION

M15LGAB

TURBOCHARGER

- (1) Manually open and close the waste gate valve to make sure it operates freely.
- (2) Inspect the oil passage in the cartridge for signs of deposits or blockage.
- (3) Clean the inlet section of the compressor cover with a rag. Inspect it for signs of contact with the compressor turbine. If worn, replace it.

SERVICE POINTS OF REASSEMBLY

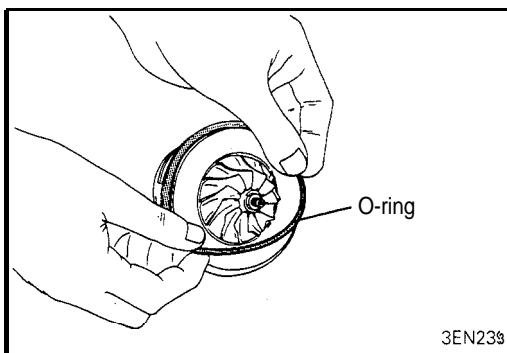
M15LHAC

7. INSTALLATION OF O-RING

Coat the inner surface of a new O-ring with a thin film of engine oil, and set it in the groove of the cartridge assembly.

Caution

Be careful not to damage the O-ring while installing it as oil leakage could result.

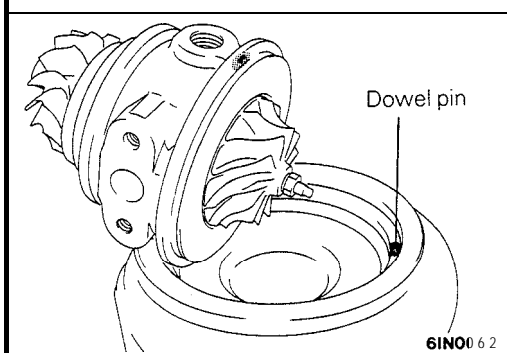


6. INSTALLATION OF CARTRIDGE ASSEMBLY

- (1) Coat the outer circumference of the cartridge assembly O-ring with a thin film of engine oil.
- (2) Install the cartridge assembly on the compressor cover by aligning the dowel pin.

Caution

When installing the cartridge assembly on the compressor cover, be careful not to damage the compressor wheel blades.

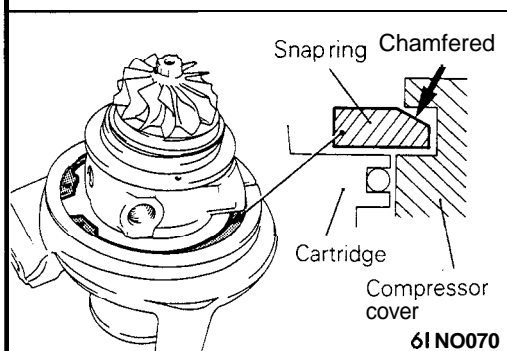


5. INSTALLATION OF SNAP RING

Place the cartridge assembly with the compressor cover faced down and install the snap ring.

Caution

Install the snap ring with the tapered side of its outside diameter up.

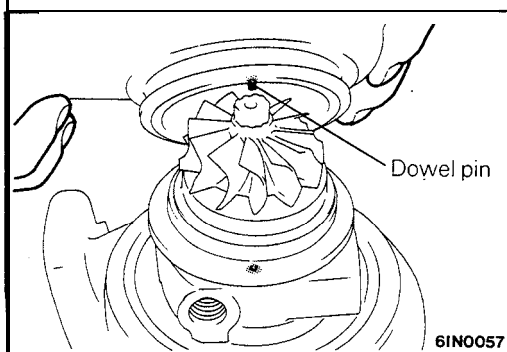


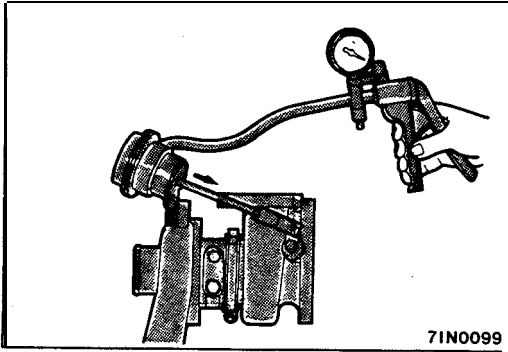
4. INSTALLATION OF TURBINE HOUSING

Install the compressor cover and cartridge assembly on the turbine housing with the dowel pin in alignment.

Caution

1. **Be careful not to damage the blades of the turbine wheel.**
2. **Be careful to install the turbine housing in the correct direction.**



**TEST OF WASTE GATE ACTUATOR OPERATION**

M15LIAC

Using a tester, apply a pressure of approx. 48 kPa (6.8 psi) to the actuator and make sure that the rod moves.

Caution

Do not apply a pressure of more than 61 kPa (8.7 psi) to the actuator. Otherwise, diaphragm may be damaged.
Never attempt to adjust the waste gate valve.

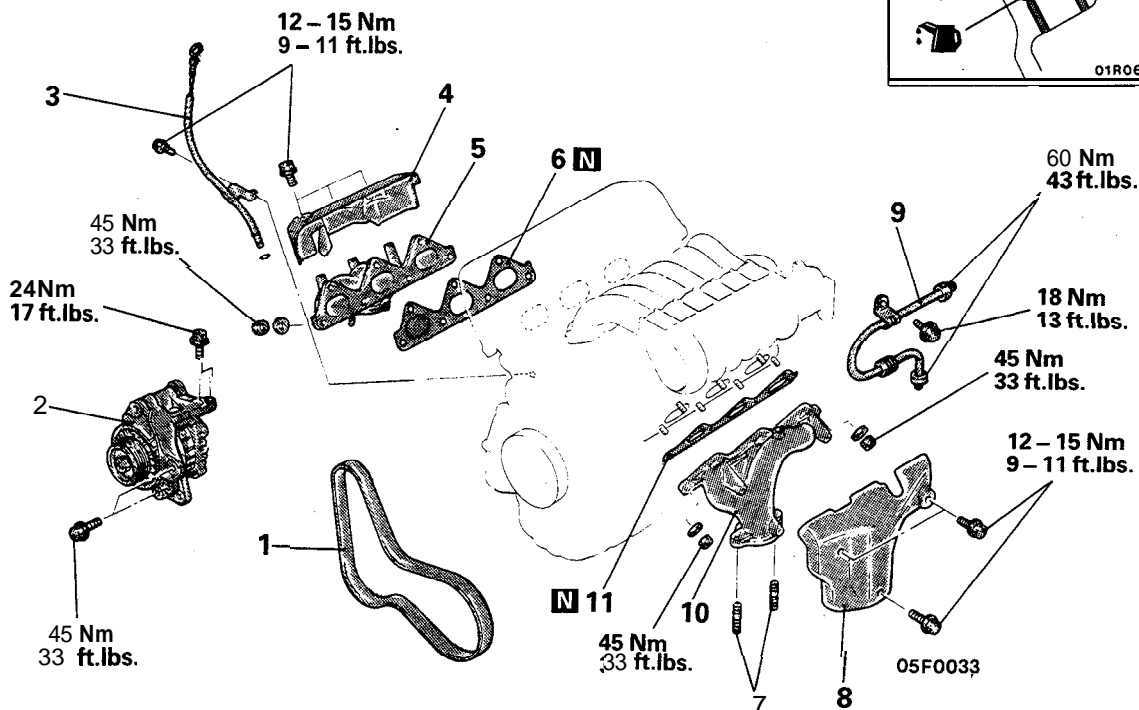
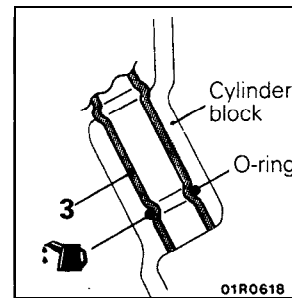
EXHAUST MANIFOLD <Non Turbo>

M15NA-B

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Removal and Installation of Front Exhaust Pipe (Refer to P.15-30.)
- Removal and Installation of Condenser Fan Motor Assembly <Vehicles with Air Conditioner> (Refer to GROUP 14 – Radiator.)



Removal steps of exhaust manifold (front)

1. Drive belt (Alternator)
(Refer to GROUP 11 – Service Adjustment procedures)
2. Alternator assembly
3. Oil level gauge guide
4. Heat protector
5. Exhaust manifold (front)
6. Gasket

Removal steps of exhaust manifold (rear)

7. Stud
8. Heat protector
9. EGR pipe <Vehicles for California>
10. Exhaust manifold (rear)
11. Gasket

INSPECTION

M15NCAU2

Check the following points; replace the part if a problem is found.

- Check for damage of cracking of any part.

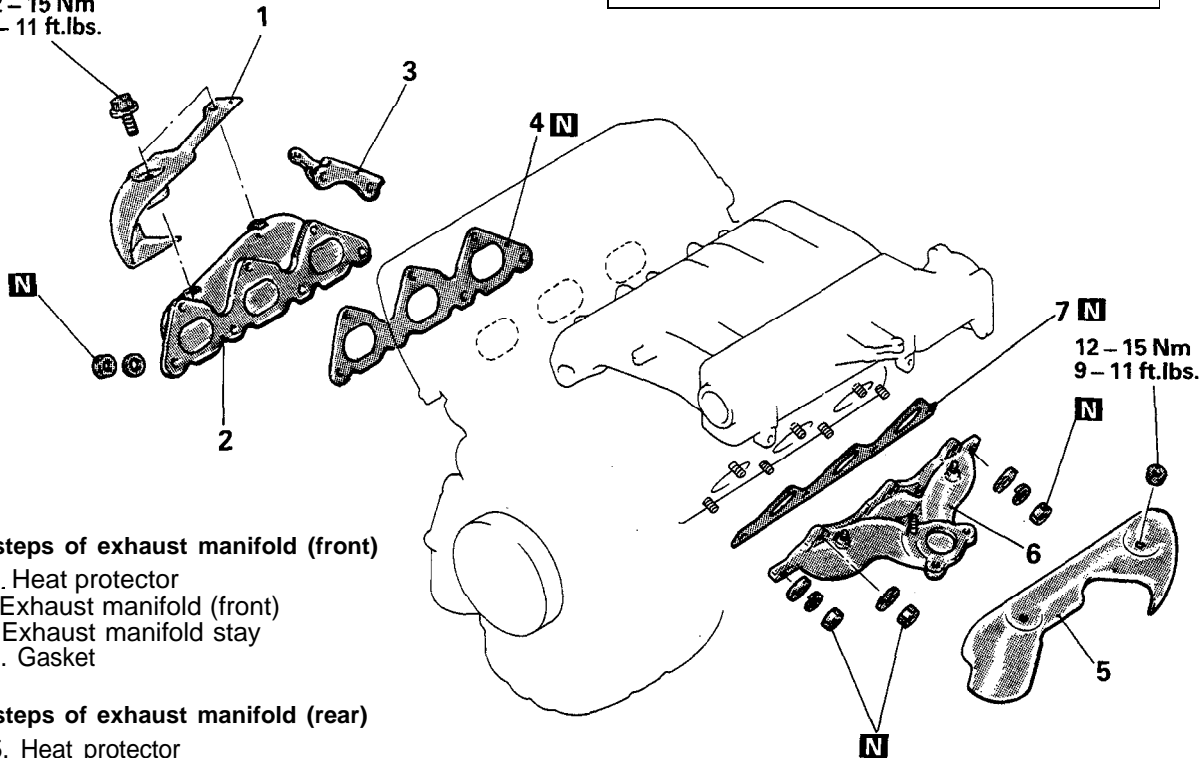
EXHAUST MANIFOLD <Turbo>

M15NA-C

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Removal and Installation of Turbocharger Assembly (Refer to P.15-18, 21.)

12 – 15 Nm
9 – 11 ft.lbs.

Removal steps of exhaust manifold (front)

1. Heat protector
- ◆◆ 2. Exhaust manifold (front)
- ◆◆ 3. Exhaust manifold stay
4. Gasket

Removal steps of exhaust manifold (rear)

5. Heat protector
- ◆◆ 6. Exhaust manifold (rear)
7. Gasket

05F0025

INSPECTION

M15NCAU3

Check the following points; replace the part if a problem is found.

- Check for damage of cracking of any part.

SERVICE POINTS OF INSTALLATION

M15NDAH

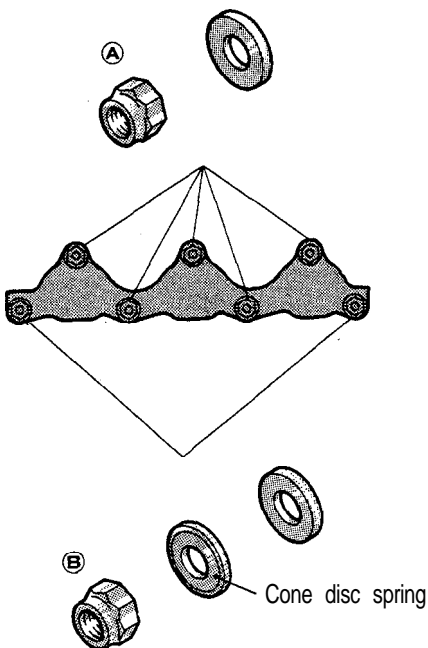
6. INSTALLATION OF EXHAUST MANIFOLD (REAR)

Tighten the nuts in the following order.

- (1) Tighten five nuts (A) to 30 Nm (22 ft.lbs.).
- (2) Tighten nuts (B) to 47 – 53 Nm (34 – 38 ft.lbs.).
- (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.).

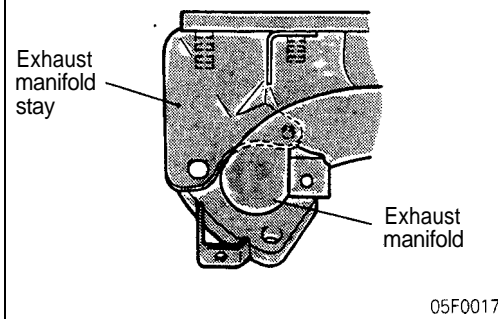
NOTE

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.



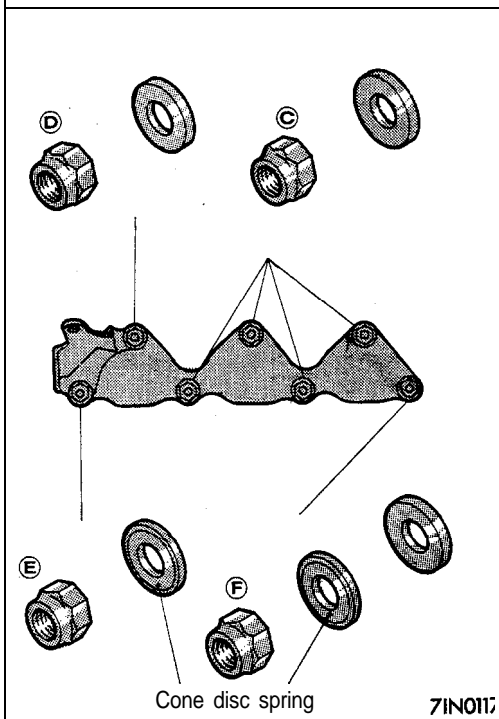
71N0115

TSB Revision



3. INSTALLATION OF EXHAUST MANIFOLD STAY

With the exhaust manifold stay resting on the exhaust manifold, fit it along with the exhaust manifold over the studs.



2. INSTALLATION OF EXHAUST MANIFOLD (FRONT)

Tighten the nuts in the following order.

- (1) Tighten four nuts **C** to 30 Nm (22 ft.lbs.).
- (2) Temporarily tighten the turbocharger to the exhaust manifold.
- (3) Tighten nut **D** to 30 Nm (22 ft.lbs.).
- (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.).

N O T E

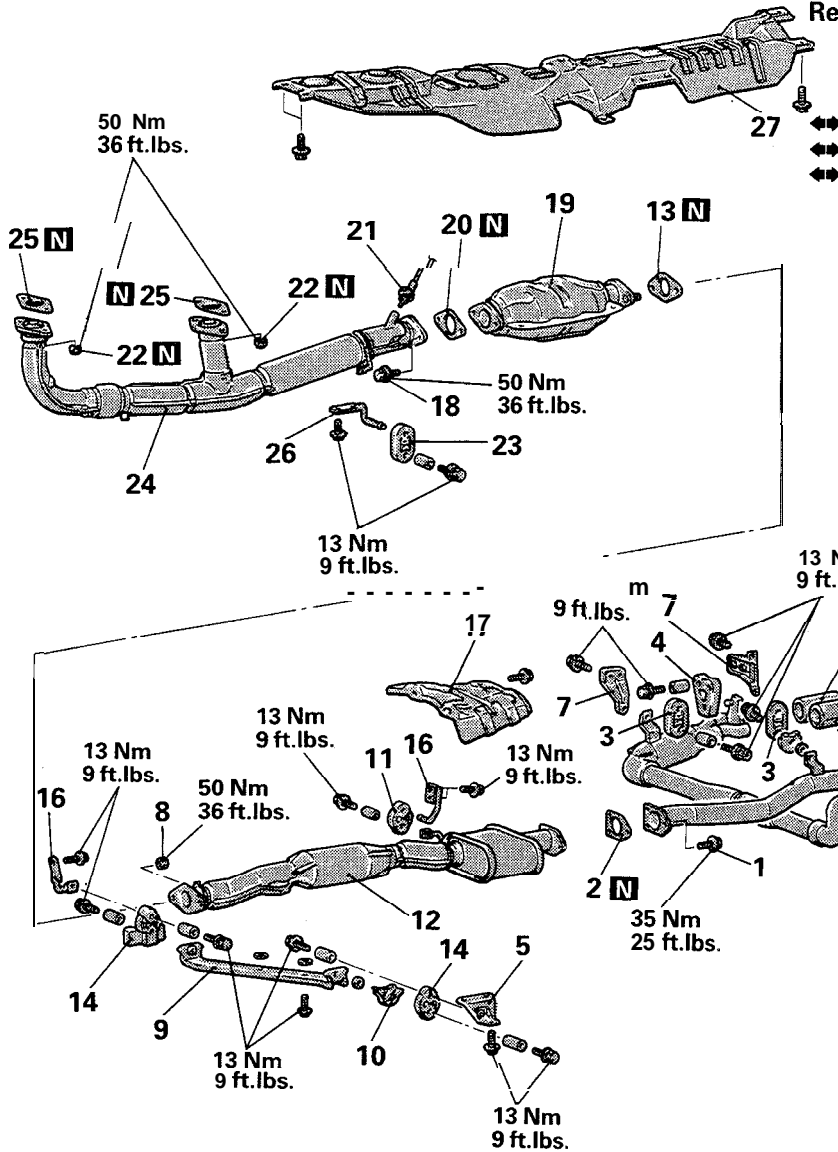
1. Fit the cone disc spring with the grooved side facing the nut.
2. Install the nut, cone disc spring and washer in the order shown in the illustration.

EXHAUST PIPE, MAIN MUFFLER AND CATALYTIC CONVERTER <Non Turbo>

M15RA-A

REMOVAL AND INSTALLATION

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 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. Oxygen sensor connection
22. Self-locking nuts
23. Rubber hanger
24. Front exhaust pipe
25. Gasket
26. Hanger bracket
27. Front floor heat protector

05F0039

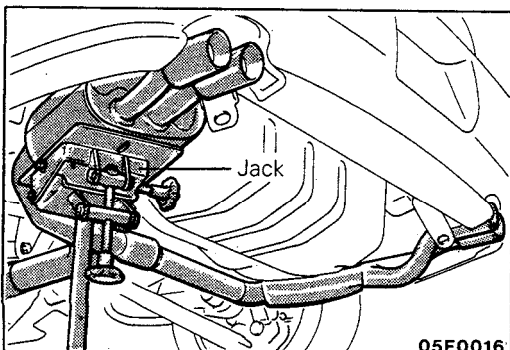
SERVICE POINTS OF REMOVAL

3. 4. REMOVAL OF RUBBER HANGER / 5. MAIN MUFFLER
- Support with a transmission jack, etc.

INSPECTION

M15RCAM

- 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.

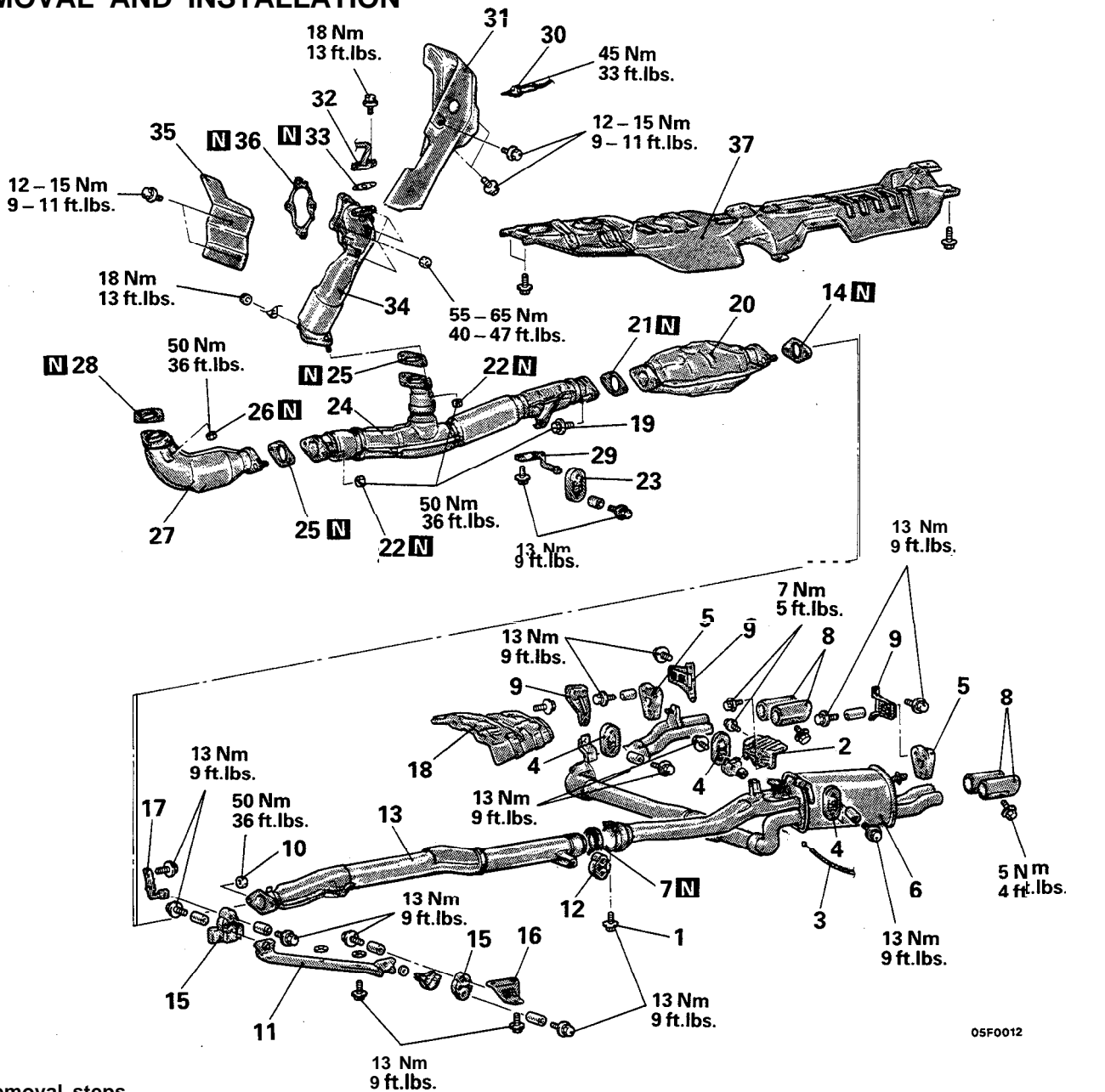


05F0016

EXHAUST PIPE, MAIN MUFFLER AND CATALYTIC CONVERTER <Turbo>

M15RA-B

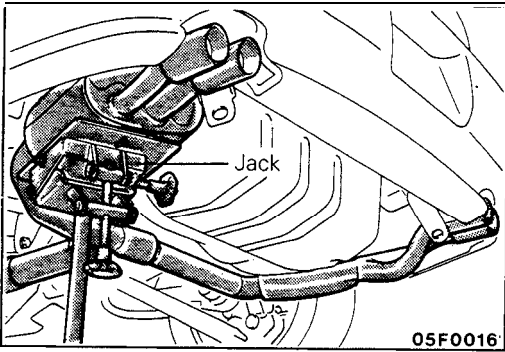
REMOVAL AND INSTALLATION



05F0012

Removal steps

- | | | |
|--|---|--|
| <ul style="list-style-type: none"> 1. Main muffler and center exhaust pipe installation bolts 2. Protector 3. Connection of cable assembly 4. Rubber hangers 5. Rubber hangers 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 | <ul style="list-style-type: none"> 13. Center exhaust pipe 14. Gasket 15. Rubber hangers 16. Hanger brackets 17. Hanger bracket 18. Rear floor heat protector 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 | <ul style="list-style-type: none"> 25. Gaskets 26. Self-locking nuts 27. Catalytic converter (Right) 28. Gasket 29. Hanger bracket 30. Oxygen sensor connection 31. Heat protector D 32. EGR pipe connection 33. Gasket 34. Catalytic converter (Left) 35. Heat protector E 36. Gasket 37. Front floor heat protector |
|--|---|--|

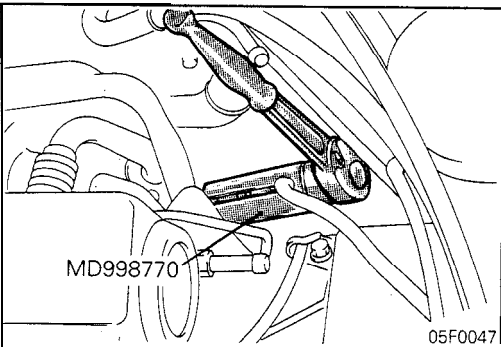


SERVICE POINTS OF REMOVAL

M15RBAA

4. 5. REMOVAL OF RUBBER HANGER / 6. MAIN MUFFLER

Support with a transmission jack, etc.



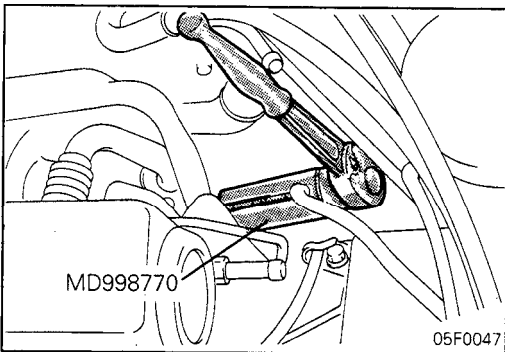
30. REMOVAL OF OXYGEN SENSOR

Disconnect the connector of the oxygen sensor, and install the special tool to the oxygen sensor.

INSPECTION

M15RCAN

- 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.

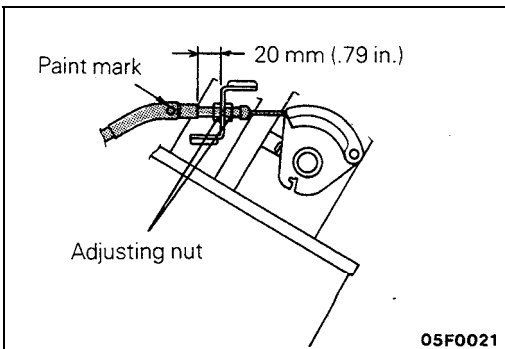


SERVICE POINTS OF-INSTALLATION

M15RDAI

30. INSTALLATION OF OXYGEN SENSOR

Use the special tool to install the oxygen sensor.

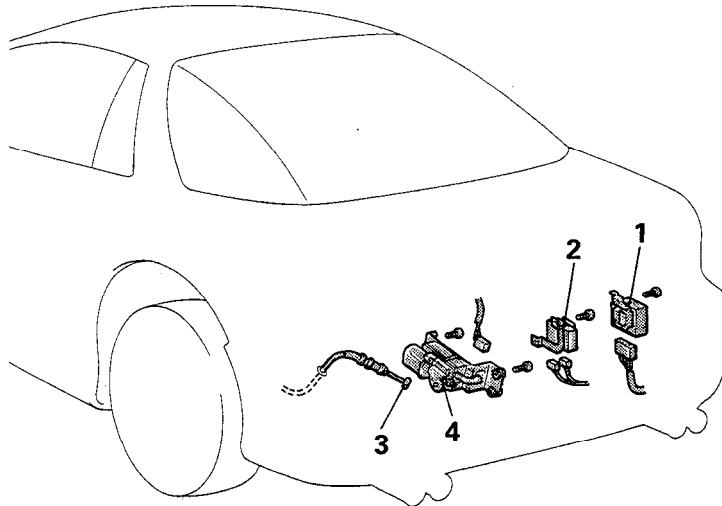
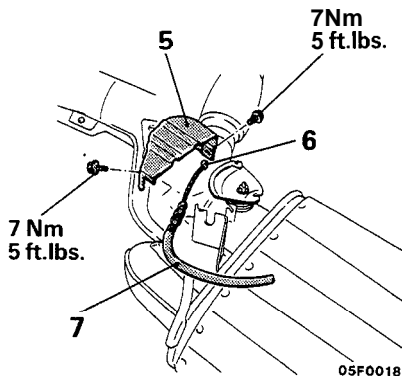


3. INSTALLATION OF CABLE ASSEMBLY

Install with the paint mark facing up and adjust the adjusting nut to obtain the illustrated dimension.

**ACTIVE EXHAUST SYSTEM
REMOVAL AND INSTALLATION**

M15WA--

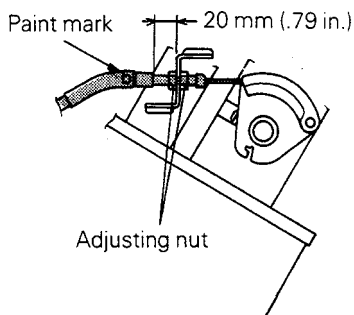


Removal steps

- ◆◆ 1. Active exhaust system control unit
- ◆◆ 2. Connection of cable (Actuator side)
- ◆ 3. Actuator
- ◆ 4. Protector
- ◆ + 5. Connection of cable (Muffler side)
- ◆ 6. Cable

Pre-removal and Post-installation Operation

- ◆ Removal and Installation of Rear Side Trim (LH)
(Refer to GROUP 52A – Trims.)



SERVICE POINTS OF INSTALLATION

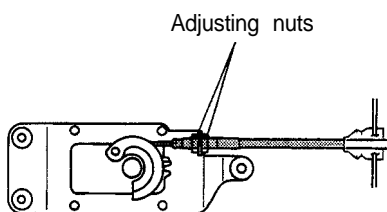
M15WDAA

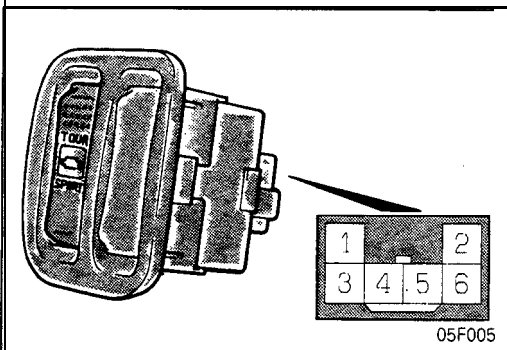
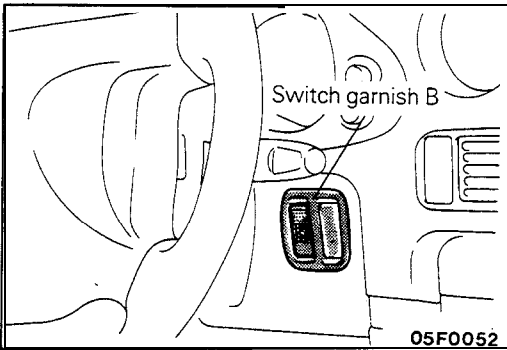
5. INSTALLATION OF CABLE (Muffler Side)

Install with the paint mark facing up and adjust the adjusting nut to obtain the illustrated dimension.

2. INSTALLATION OF CABLE (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.).





INSPECTION

M15WCAA

ACTIVE EXHAUST SWITCH

(1) Remove switch garnish B from the knee protector.

(2) Operate the switch and check the continuity between the terminals.

Terminal	2	3	5	6	1	4
Switch position						
TOUR	○	○	○	○		
SPORT						

NOTE
O-O indicates that there is continuity between the terminals.

EMISSION CONTROL

CONTENTS

M17AA- -

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Crankcase Ventilation System Inspection	5	EGR Temperature Sensor <California>	13
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SPECIFICATIONS

GENERAL SPECIFICATIONS

M17CA -

Items	Specifications
Crankcase emission control system	Closed type with positive crankcase ventilation valve
Evaporative emission control system Canister Purge control solenoid valve	Canister storage type Charcoal type ON/OFF solenoid valve
Exhaust emission control system Exhaust gas recirculation system EGR valve EGR temperature sensor <California> EGR control solenoid valve <California – Non Turbo, Turbo> Catalytic converter Location <Non-Turbo> <Turbo>	Vacuum-activated diaphragm type Thermistor type Duty cycle solenoid valve Monolith type Under floor Turbocharger outlet (front bank and rear bank,) and under floor

SERVICE SPECIFICATIONS

M17CB -

Items	Specifications
Purge control solenoid valve coil resistance Ω	36 – 44 [at 20°C (68°F)]
EGR temperature sensor resistance $k\Omega$	60 – 83 [at 50°C (122°F)] 11 – 14 [at 100°C (212°F)]
EGR control solenoid valve coil resistance Ω	36 – 44 [at 20°C (68°F)]

TROUBLESHOOTING

M17EA -

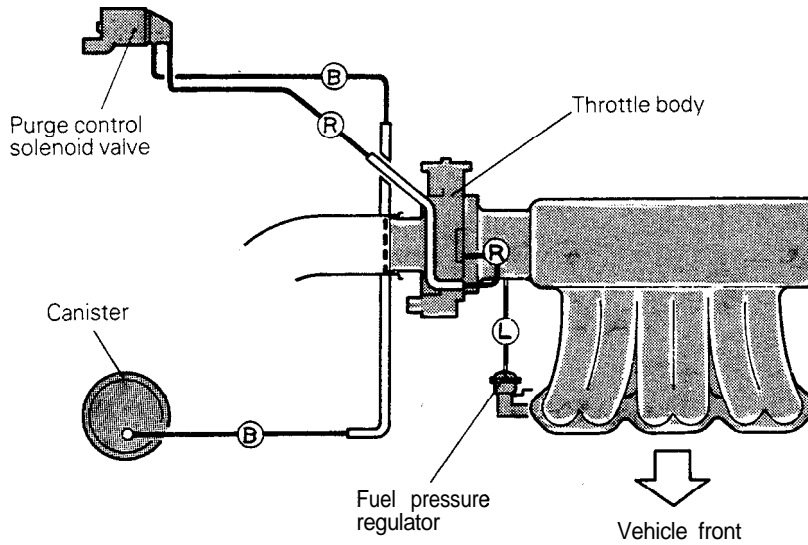
Symptom	Probable cause	Remedy
Engine will not start or hard to start	Vacuum hose disconnected or damaged	Repair or replace
	The EGR valve is not closed	Repair or replace
	Malfunction of the purge control solenoid valve	Repair or replace
Rough idle or engine stalls	The EGR valve is not closed	Repair or 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 system	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

M17JA--

VACUUM HOSES

VACUUM HOSES ROUTING

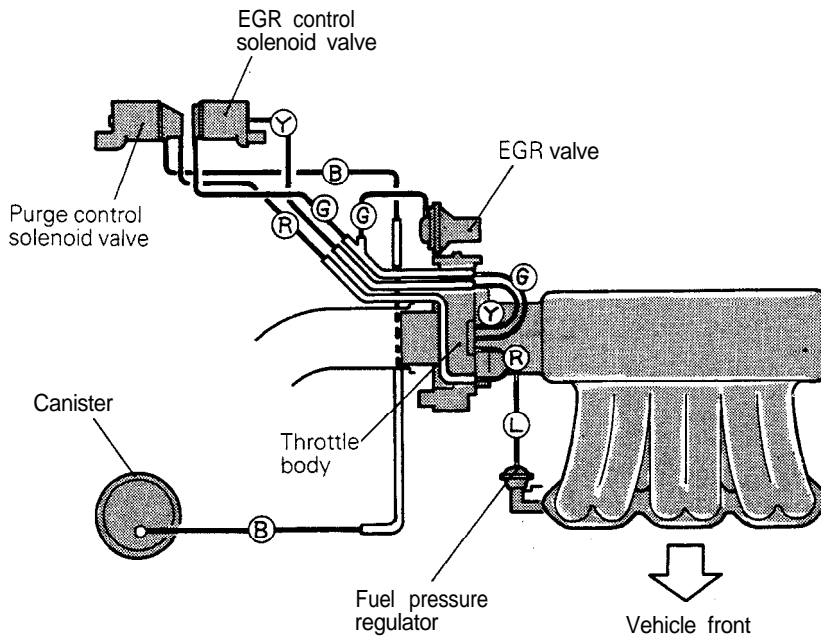
<Federal - Non Turbo>



L: Light blue
R: Red
B: Black

7EM0131

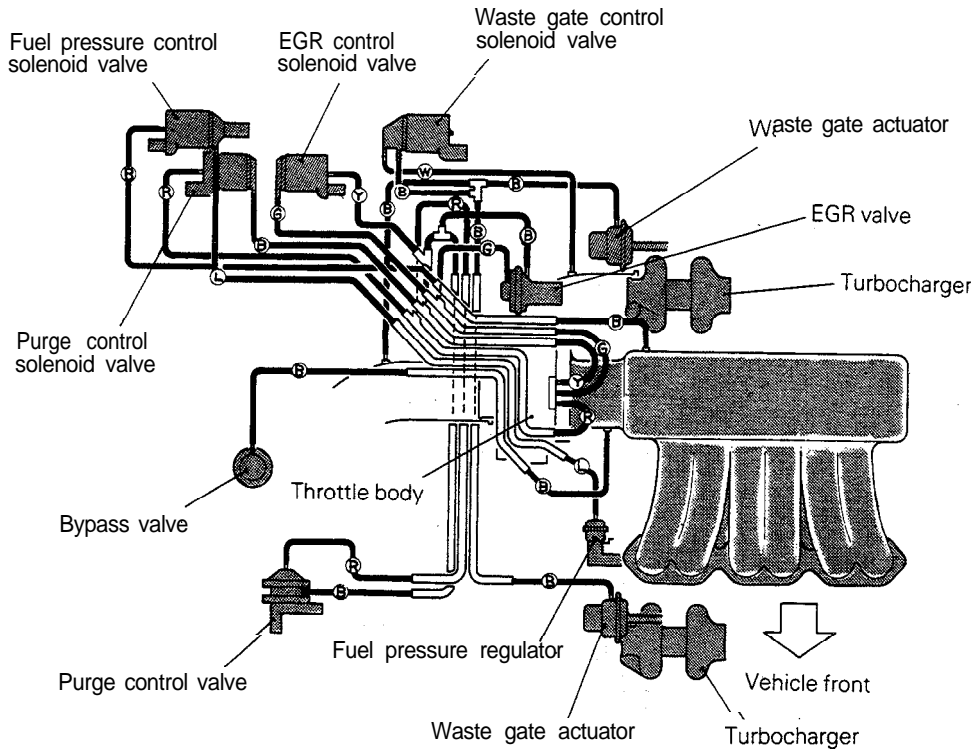
<California - Non Turbo>



G: Green
Y: Yellow
L: Light blue
R: Red
B: Black

7EM0132

<Turbo>



7EM0133

INSPECTION

M17JCAF

- (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.

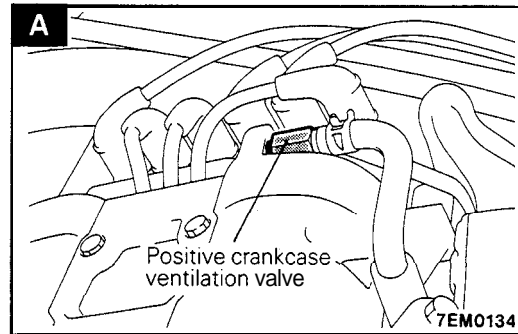
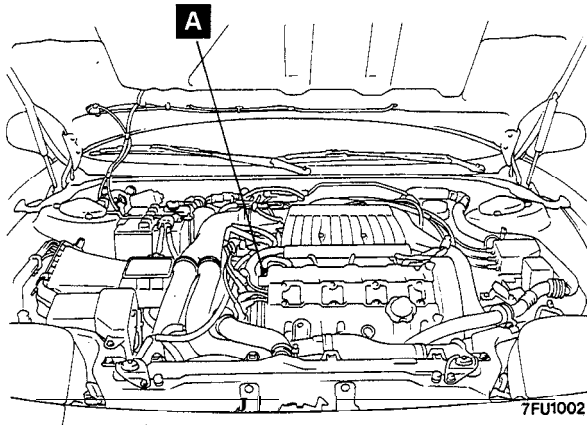
INSTALLATION

M17JDAF

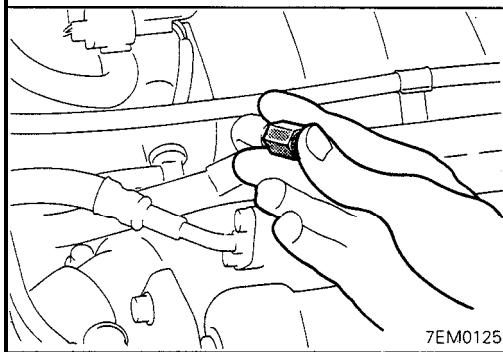
- (1) When connecting a hose, firmly press it onto the nipple.
- (2) Referring to the VACUUM HOSES ROUTING, connect the hoses correctly.

CRANKCASE EMISSION CONTROL SYSTEM

M17KA-

COMPONENTS LOCATION

Name	Symbol
Positive crankcase ventilation valve	A

**CRANKCASE VENTILATION SYSTEM INSPECTION**

M17IABG

- (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

M17IACC

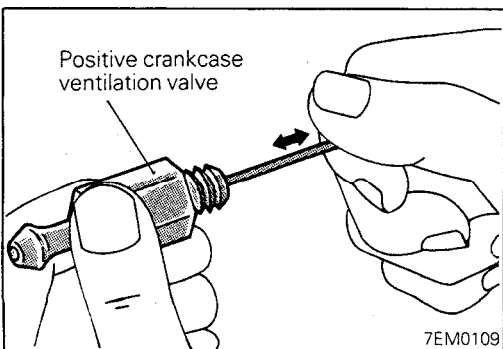
INSPECTION

- (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.)

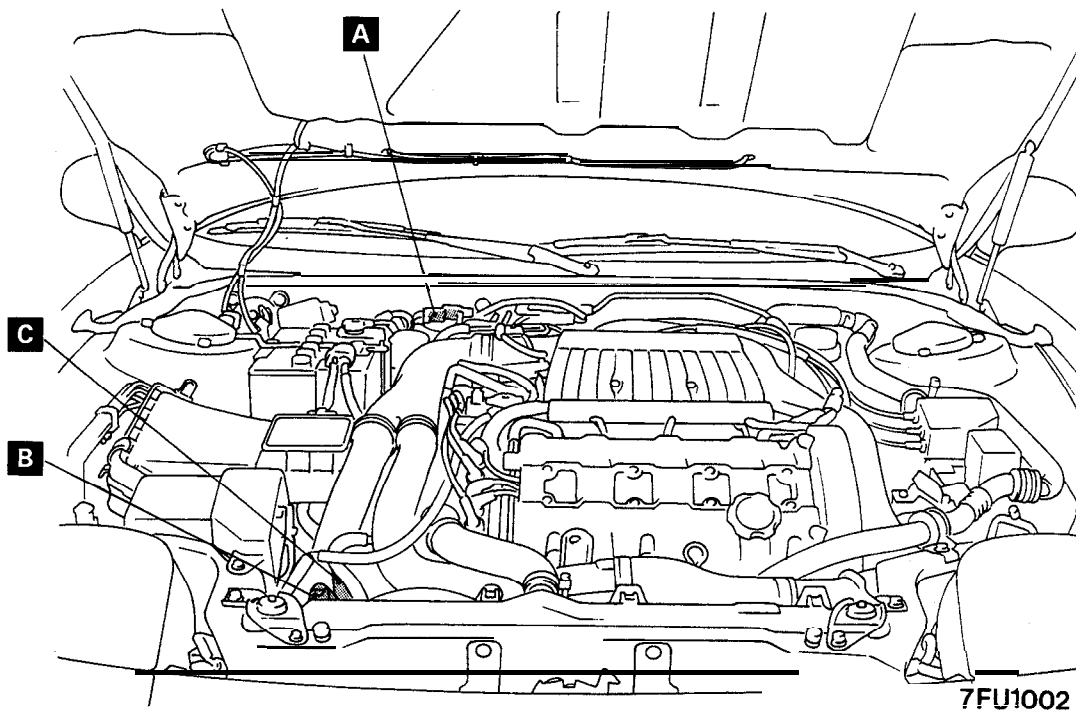


TSB Revision

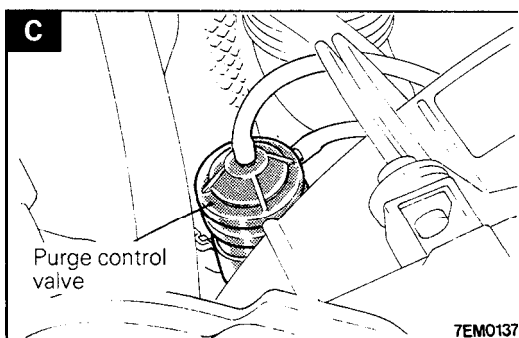
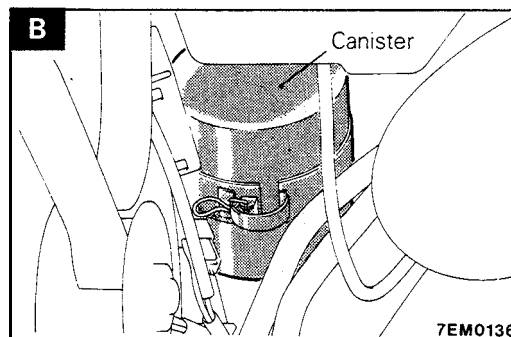
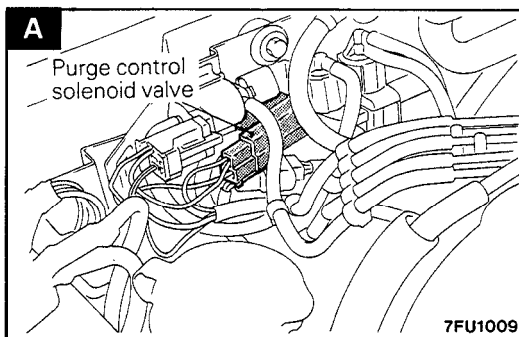
EVAPORATIVE EMISSION CONTROL SYSTEM

M17LA--

COMPONENTS LOCATION

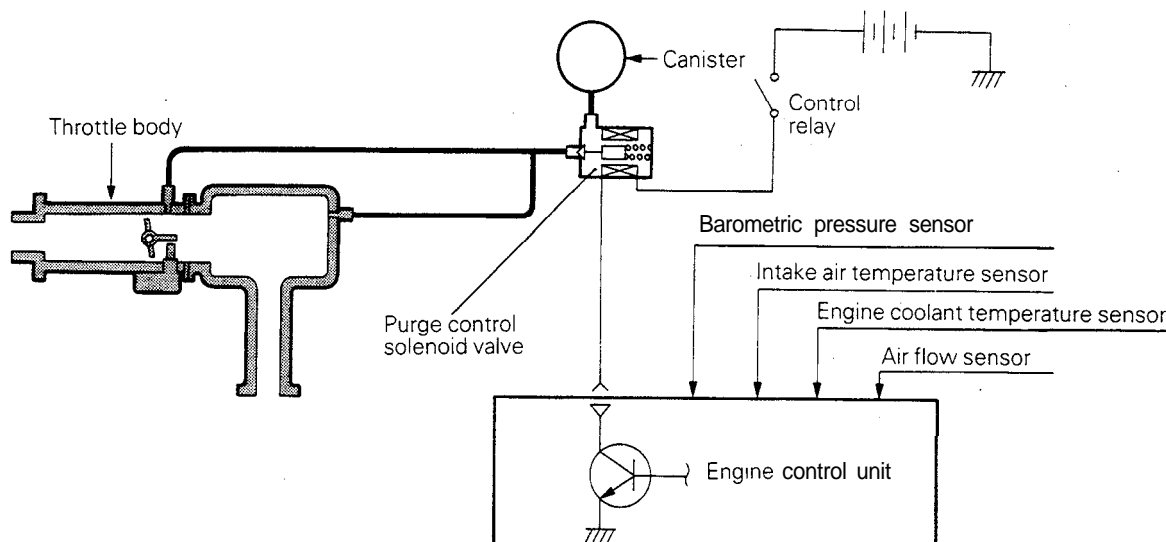


Name	Symbol
Canister	B
Purge control solenoid valve	A
Purge control valve <Turbo>	C

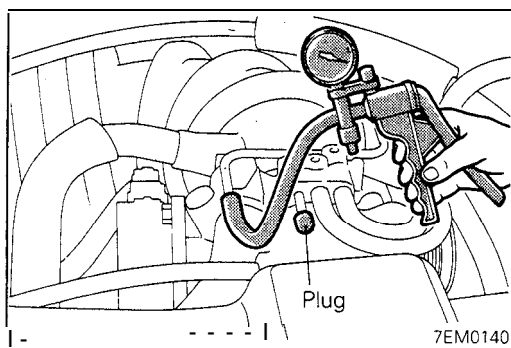


PURGE CONTROL SYSTEM INSPECTION <Non Turbo>

M171B8P



7EM0161



- (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**

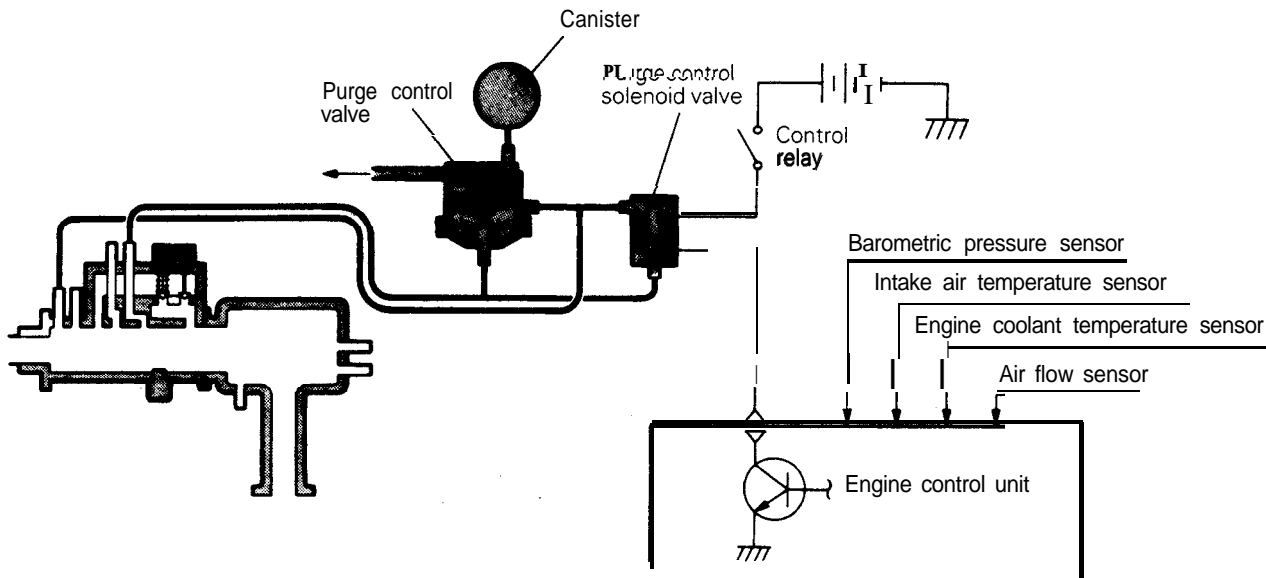
Engine operating condition	Applying vacuum	Result
Idling	375 mmHg (14.8 in.Hg)	Vacuum is maintained
3,000 rpm		

**When engine is hot – engine coolant temperature:
70°C (158°F) or higher**

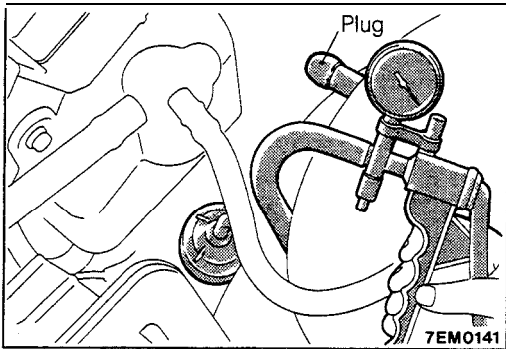
Engine operating condition	Applying vacuum	Result
Idling	375 mmHg (14.8 in.Hg)	Vacuum is maintained
3,000 rpm within three minutes after starting engine	Try applying vacuum	Vacuum leaks
3,000 rpm after three minutes have elapsed after starting engine	375 mmHg (14.8 in.Hg)	Vacuum will be maintained momentarily, after which it will leak. NOTE 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.

PURGE CONTROL SYSTEM INSPECTION <Turbo>

M171B8Q



6EM0215



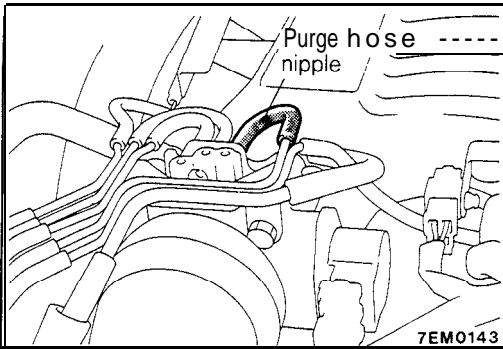
- (1) Disconnect the purge air hose from the air intake hose, and plug the air intake hose. Then, connect the hand vacuum pump to the purge air hose.
- (2) Under the engine conditions shown below, check by applying vacuum from a hand vacuum pump.

**When engine is cold – engine coolant temperature:
60°C (140°F) or less**

Engine operating condition	Applying vacuum	Result
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.



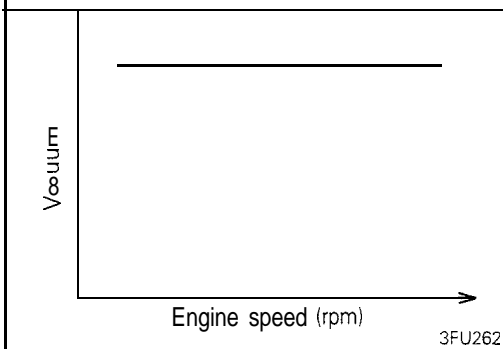
PURGE PORT VACUUM CHECK

M171BKD

Check Condition

Engine coolant temperature: 80 – 95°C (176 – 205°F)

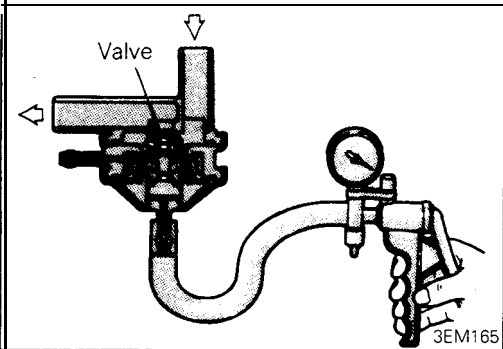
- (1) Disconnect the vacuum hose from the throttle body purge hose nipple and connect a hand vacuum pump to the nipple.



- (2) Start the engine and check to see that, after raising the engine speed by racing the engine, vacuum remains fairly constant.

NOTE

If there is no vacuum created, it is possible that the throttle body port may be clogged and require cleaning.



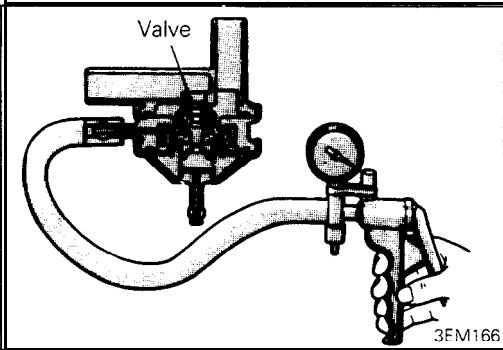
PURGE CONTROL VALVE <Turbo>

M171BCE

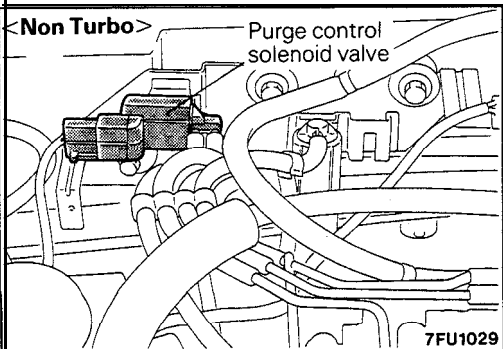
INSPECTION

- (1) Remove the purge control valve.
- (2) Connect a hand vacuum pump to the vacuum nipple of the purge control valve.
- (3) Apply a vacuum of 400 mmHg (15.7 in.Hg.) and check 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.
- (6) Apply a vacuum of 400 mmHg (15.7 in.Hg.) and check airtightness.



PURGE CONTROL SOLENOID VALVE

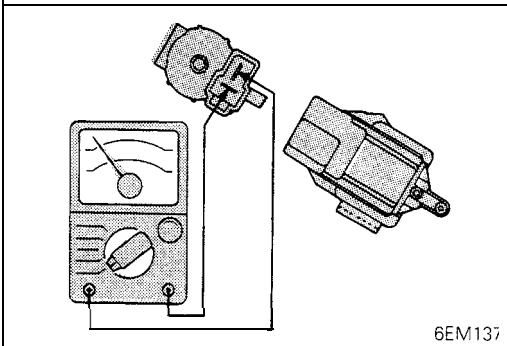
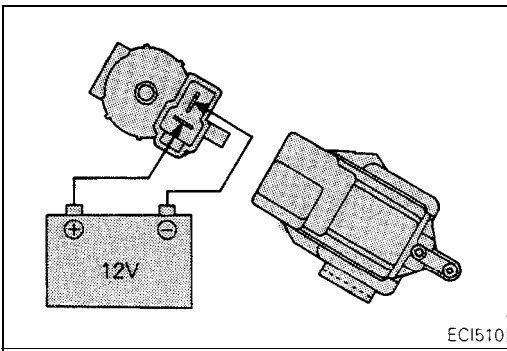
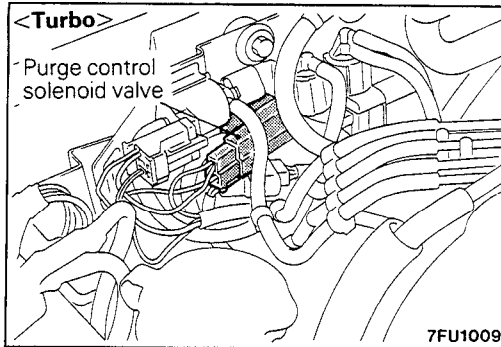
M171BFI

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 valve.
- (2) Disconnect the harness connector from solenoid valve.
- (3) Connect a hand vacuum pump to the nipple to which the red-striped vacuum hose was connected.



- (4) Apply a vacuum and check for airtightness when voltage applied directly to the purge control solenoid valve and when the voltage is discontinued.

	Battery voltage	Result
Non-Turbo	When applied	Vacuum leaks
	When discontinued	Vacuum is maintained
Turbo	When applied	Vacuum is maintained
	When discontinued	Vacuum leaks

- (5) Measure the resistance between the terminals of the solenoid valve.

Standard value: 36 – 44 Ω [at 20°C (68°F)]

AIR FLOW SENSOR, ENGINE COOLANT TEMPERATURE SENSOR AND INTAKE AIR TEMPERATURE SENSOR

M17IBGF

To inspect these parts, refer to GROUP 13 – MPI System Components.

AIR CONDITIONER SWITCH

M17IBHF

To inspect the air conditioner switch, refer to GROUP 55 – Air Conditioner Switch.

OVERFILL LIMITER (TWO-WAY VALVE)

M17IBEF

To inspect the overfill limiter (two-way valve), refer to GROUP 13 – Fuel Tank.

CANISTER

M17IBIF

To inspect the canister, refer to GROUP 13 – Fuel Line and Vapor Line.

FUEL FILLER CAP INSPECTION

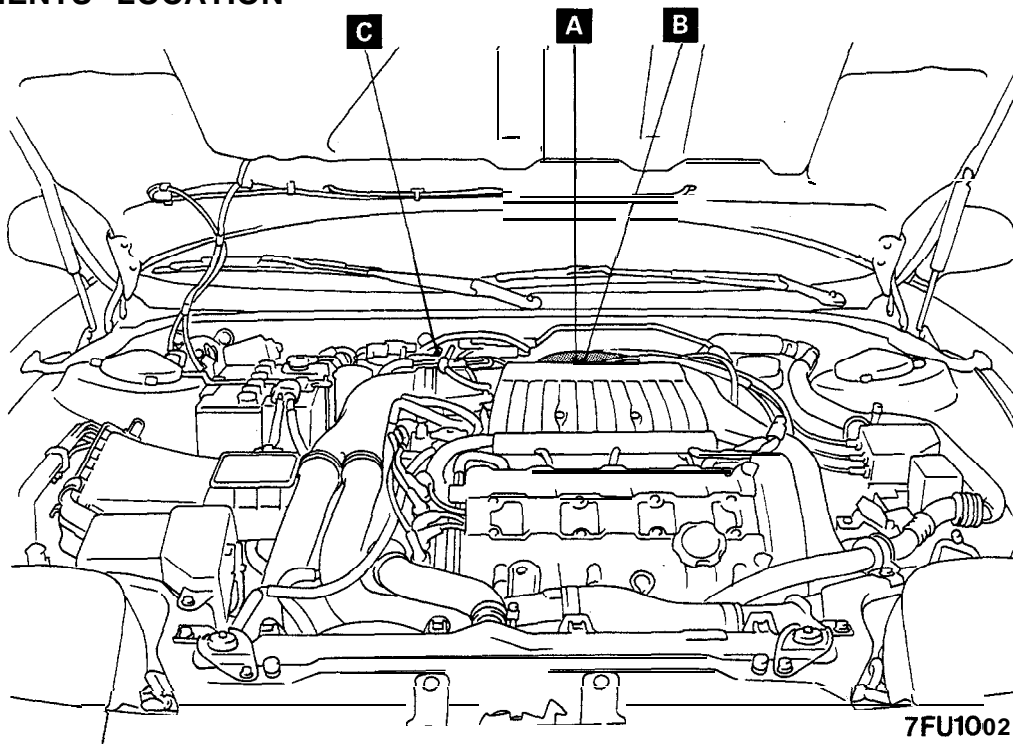
M17IBJB

Check the gasket of the fuel filler cap, and the filler cap itself, for damage or deformation; replace the cap if necessary.

EXHAUST GAS RECIRCULATION (EGR) SYSTEM

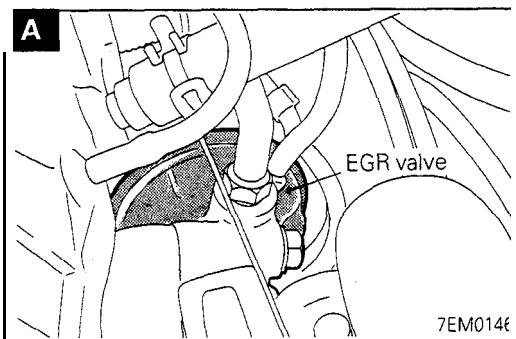
M17MA -

COMPONENTS LOCATION

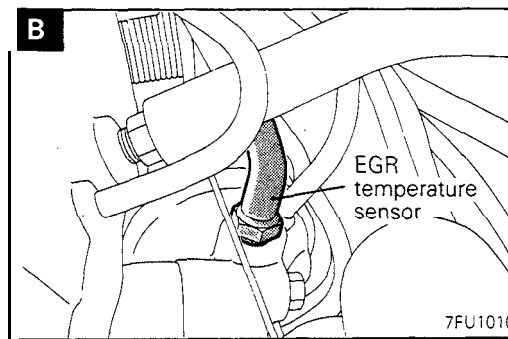


7FU1002

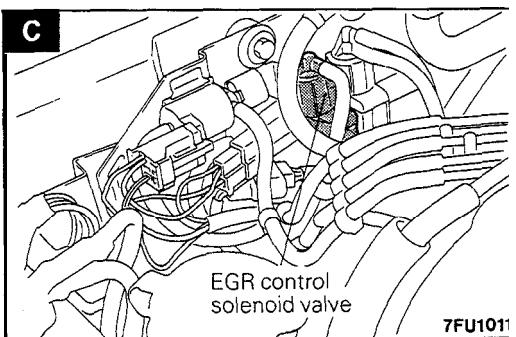
Name	Symbol
EGR control solenoid valve <California – Non Turbo, Turbo>	C
EGR temperature sensor <California>	B
EGR valve <California – Non Turbo, Turbo>	A



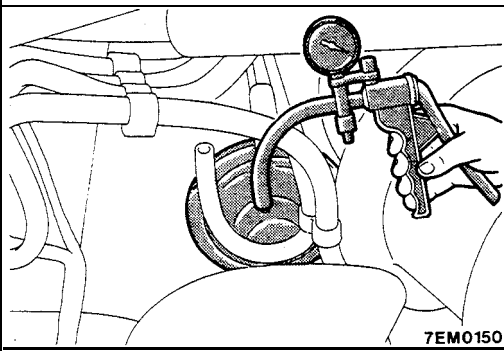
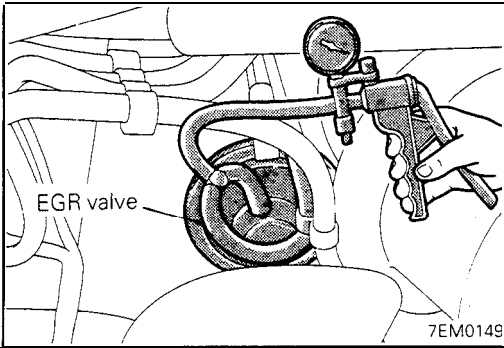
7EM014E



7FU1010



7FU1011



EGR SYSTEM INSPECTION <California – Non Turbo, Turbo>

M171CJQ

- (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:

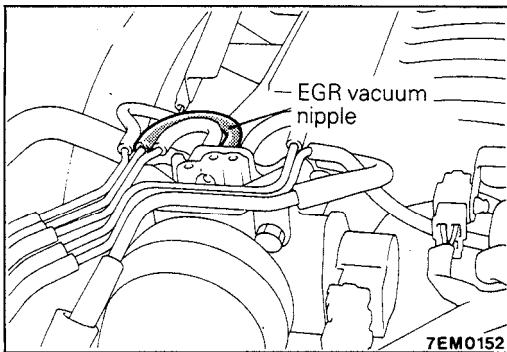
<Cold condition of engine>

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>

M171CMF

Check Condition

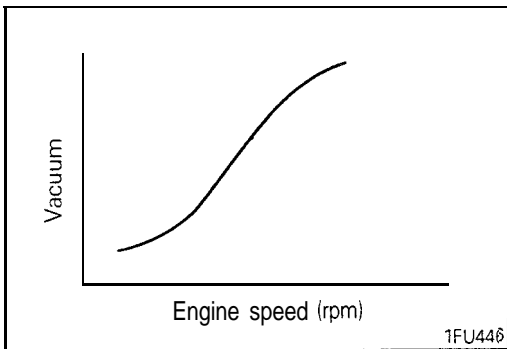
Engine coolant temperature: 80 – 95°C (176 – 205°F)

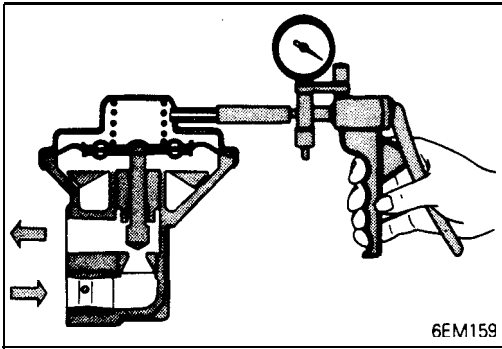
- (1) Disconnect the vacuum hose from the throttle body EGR vacuum nipple and connect a hand vacuum pump to the nipple.

- (2) Start the engine and check to see that, after raising the engine speed by racing the engine, 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 port may be clogged and require cleaning.





6EM159

EGR VALVE <California – Non Turbo, Turbo>

M171CKJ

INSPECTION

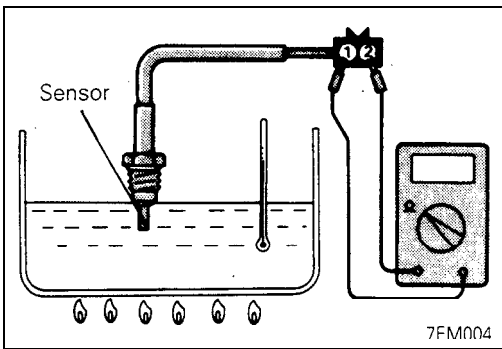
- (1) Remove the EGR valve and check it for sticking, deposit of carbon, etc.
If such condition exists, clean with adequate solvent to ensure tight valve seat contact.
- (2) Connect a hand vacuum pump to the EGR valve.
- (3) Apply a vacuum of 500 mmHg (19.8 in.Hg.) and check airtightness.
- (4) Blow 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: 19 Nm (13 ft.lbs.)



7FM004

EGR TEMPERATURE SENSOR <California>

M171CVC

INSPECTION

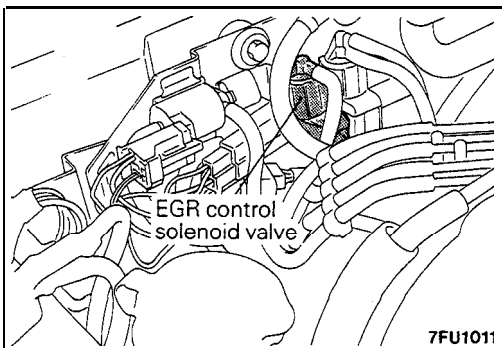
- (1) Remove the EGR temperature sensor.
- (2) Place the EGR temperature sensor in water, and then measure the resistance value between terminals 1 and 2 while increasing the water's temperature.
Replace the EGR temperature sensor if there is a significant deviation from the standard value.

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.)



7FU1011

EGR CONTROL SOLENOID VALVE <California – Non Turbo, Turbo>

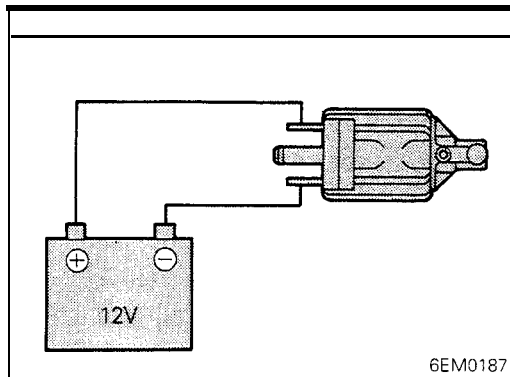
M171CRE

INSPECTION

NOTE

When disconnecting the vacuum hose, make an identification mark on it so that it can be reconnected to the original position.

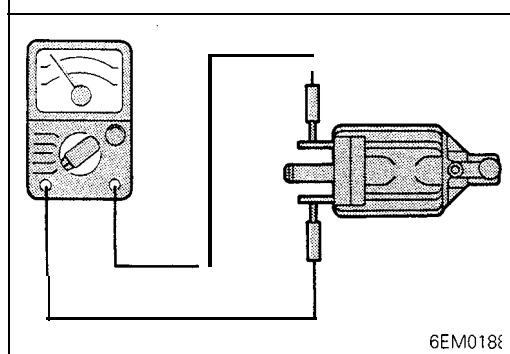
- (1) Disconnect the vacuum hose (yellow and green stripe) from the solenoid valve.
- (2) Disconnect the harness connector.
- (3) Connect a hand vacuum pump to the nipple to which the green-striped vacuum hose was connected.



6EM0187

(4) Apply a vacuum and check for air-tightness when voltage applied directly to the EGR control solenoid valve and when the voltage is discontinued.

Battery voltage	Result
When applied	Vacuum is maintained
When discontinued	Vacuum leaks



6EM0188

(5) Measure the resistance between the terminals of the solenoid valve.

Standard value: 36 – 44 Ω [at 20°C (68°F)]

AIR-FUEL RATIO CONTROL (MPI) SYSTEM M17ICAJ

- To inspect the air-fuel ratio control (MPI) system, refer to GROUP13 – Service Adjustment Procedures.
- For detailed information concerning the illumination pattern of the malfunction-indicator light and other aspects of the self-diagnosis function, refer to GROUP 13 -Self-diagnosis.

CATALYTIC CONVERTER M17NA--

REMOVAL AND INSTALLATION

Refer to GROUP 15 – Exhaust Pipe, Main Muffler and Catalytic Converter.

INSPECTION M17NCAA

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.

CLUTCH

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M21AA--

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Bleeding	7	Clutch Vibrates	
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Clutch Booster Operating Inspection <AWD>	6	Heavy Clutch Pedal	
Clutch Pedal Inspection and Adjustment	5	Noisy Clutch	

SPECIFICATIONS

GENERAL SPECIFICATIONS

M21CA--

Items	Specifications	
	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 (8.9 x 5.9)	250 x 160 (9.8 x 6.3)
Clutch cover assembly Type	Diaphragm spring strap drive type	Diaphragm spring strap drive type
Setting load N (lbs.)	6,300 (1,386)	9,200 (2,024)
Clutch release cylinder I.D. mm (in.)	19.05 (3/4)	19.05 (3/4)
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

M21CB--

Items	Specifications
Standard value	
Clutch pedal height mm (in.)	177 – 182 (6.97 – 7.17)
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 clevis pin play mm (in.)	1 – 3 (.04 – .12)
Clutch pedal free play mm (in.)	6 – 13 (.24 – .51)
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 (0.8 – 1.0)
Limit	
Facing rivet sink mm (in.)	0.3 (.012)
Diaphragm spring end height difference mm (in.)	0 5 (.020)

LUBRICANTS

M21CD--

Items	Specified lubricants
Contact surface of release bearing and fulcrum of clutch release fork Inner surface of clutch release bearing Inner surface of clutch disc spline Contact portion of release fork to release cylinder push rod	mitsubishi genuine grease Part No.0101 011 or equivalent
Clutch fluid 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	Conforming to DOT3

SEALANT

M21CE--

Items	Specified sealant
Thread part fitting	3M ADT Part No. 8660 or equivalent

TROUBLESHOOTING

M21EAAM

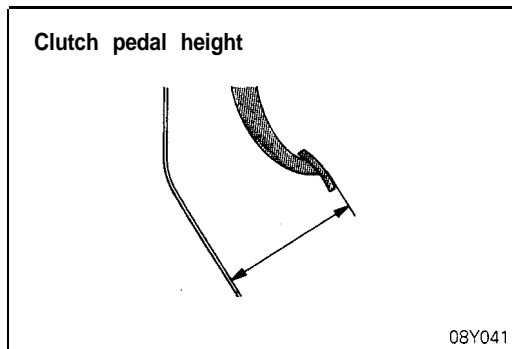
Symptom	Probable cause	Remedy
Clutch slips	Clutch pedal play too small	Adjust
	Excessive wear of clutch disc facing	Replace
	Hardened clutch disc facing or oil on facing	Replace
	Clutch release fork not operating smoothly	Repair or replace
	Settled or damaged diaphragm spring	Replace
	Clogged hydraulic 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	

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
Heavy clutch pedal	Poorly lubricated bearing sleeve sliding surface	Repair
	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
Clutch vibrates	Leaky or clogged vacuum system <AWD>	Repair
	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

SERVICE ADJUSTMENT PROCEDURES

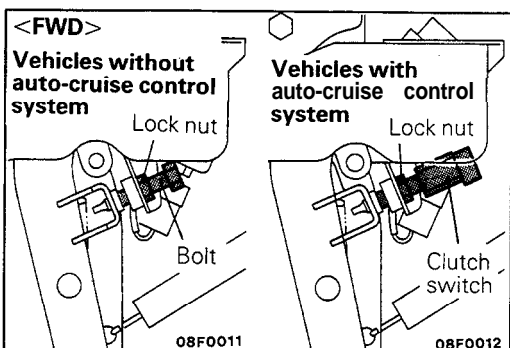
CLUTCH PEDAL INSPECTION AND ADJUSTMENT

M21FAAP



1. Measure the clutch pedal height (from the face of the pedal pad to the firewall).

Standard value: 177 – 182 mm (6.97 – 7.17 in.)



If the clutch pedal height is not within the standard value range, adjust as follows:

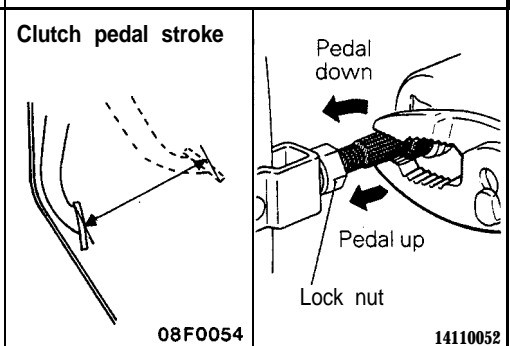
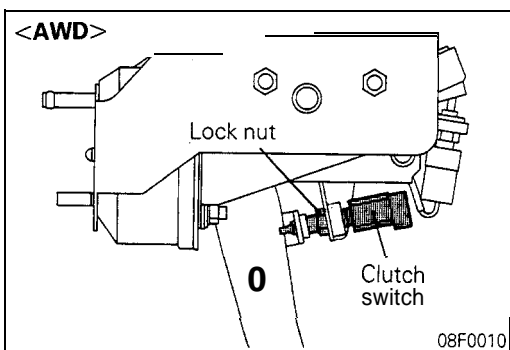
For vehicles without auto-cruise control system, turn and adjust the bolt so that the pedal height is the standard value, and then secure by tightening the lock nut to the specified torque.

Vehicles with auto-cruise control system, disconnect the clutch 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

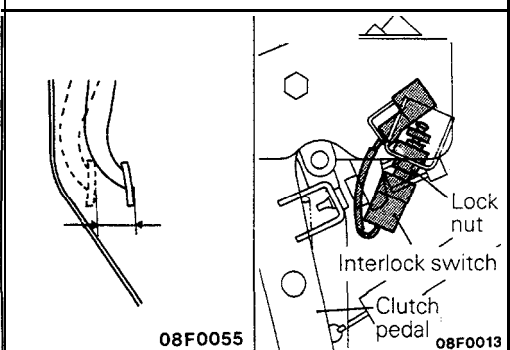
When the pedal height is lower than the standard value, loosen the bolt or clutch switch, and then turn the push rod to make the adjustment. After making the adjustment, tighten the bolt or clutch switch to reach the pedal stopper, and then lock with the lock nut.



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.

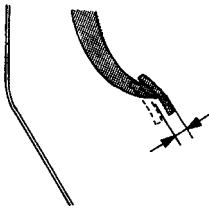


3. Return the clutch pedal gradually from its full-stroke position to measure amount of the return made by the pedal until the interlock switch makes an operating sound.

Standard value: 10 – 15 mm (.394 – .591 in.)

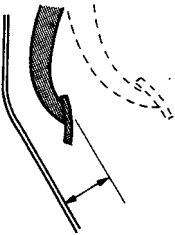
If the amount of pedal return deviates from the standard value, adjust it by loosening the lock nut and turning the interlock switch.

Clutch pedal free play



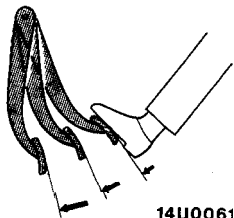
08Y043

Distance between the clutch pedal and the firewall when the clutch is disengaged



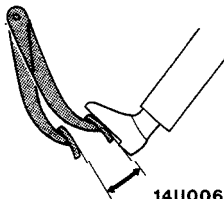
08N001C

Good



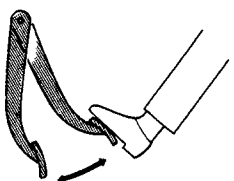
14U0061

No good



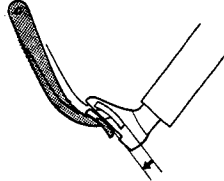
14U0062

When engine is stopped



14U0059

When engine is started



14U0060

4. 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 (including play of clevis pin)
Standard value: 6 – 13 mm (.24 – .51 in.)

5. 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

6. If the play and/or clearance is out of specification, bleed the hydraulic system or check the master cylinder, release cylinder or clutch proper.

CLUTCH BOOSTER OPERATING INSPECTION
<AWD>

M21FCAA

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.

- (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>

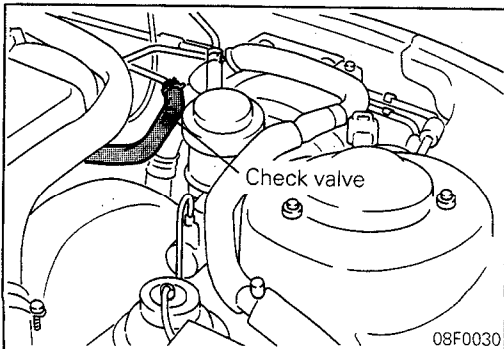
M21FDAA

When checking the check valve, keep the check valve fit in the vacuum hose.

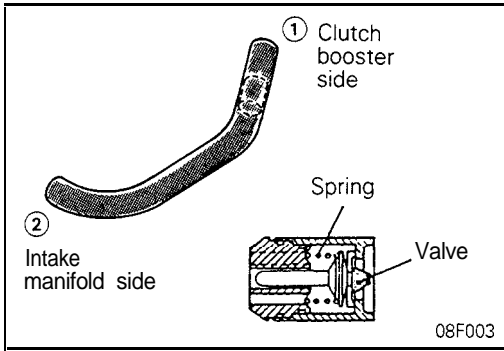
1. Remove the vacuum hose.

Caution

The check valve is press-fit inside the vacuum hose and do not remove the check valve from the vacuum hose.



08F0030

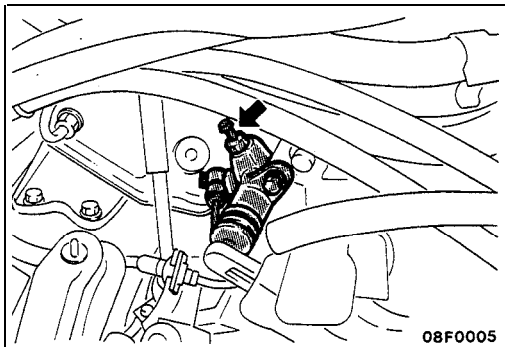


2. Check the operation of the check valve by using a vacuum pump.

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

M21FBAG

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

Caution

Use the specified fluid. Avoid using a mixture of the specified fluid and other fluid.

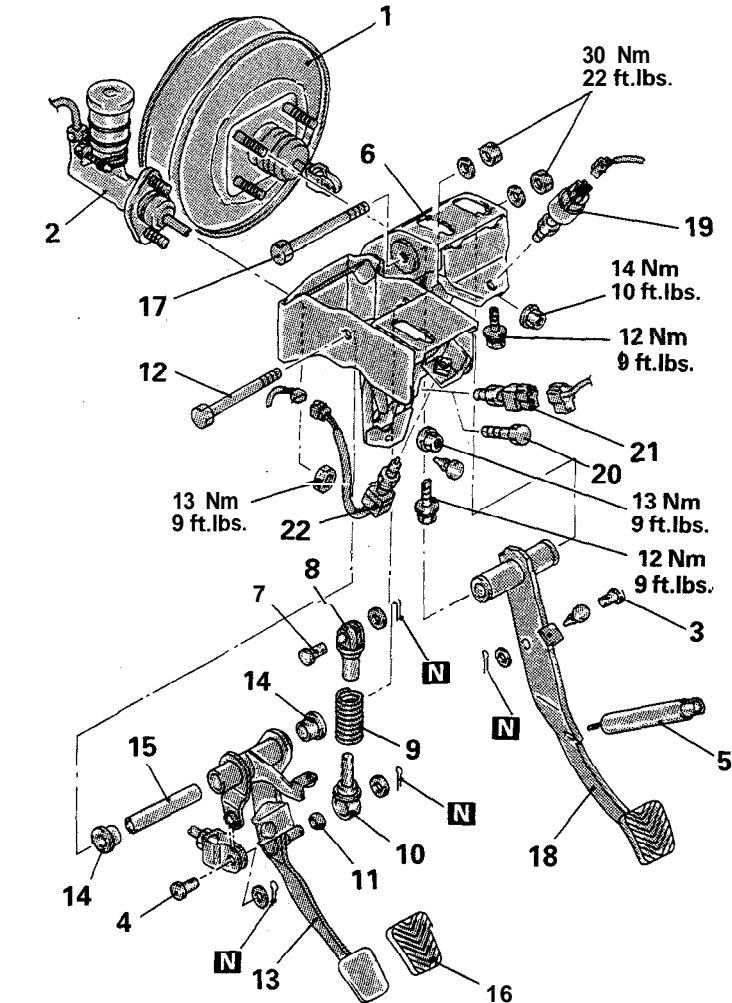
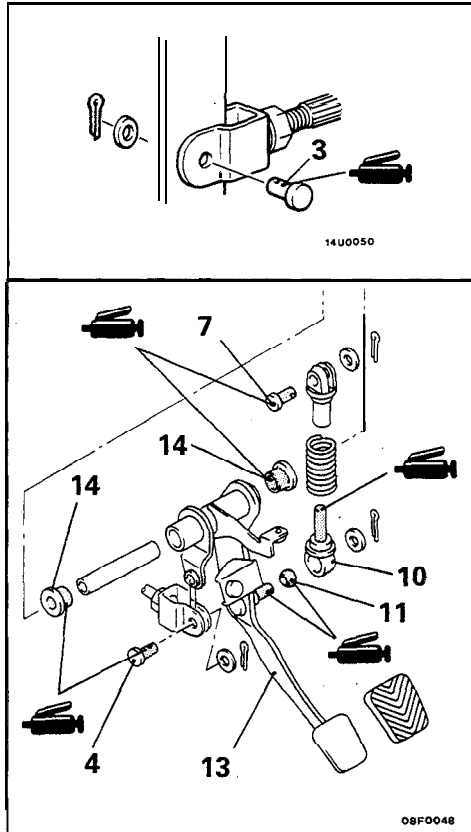
CLUTCH PEDAL**REMOVAL AND INSTALLATION****Pre-removal and Post-installation Operation**

- Removal and Installation of Steering Column Assembly (Refer to GROUP 37A – Steering Wheel and Shaft.)

Adjustment

- Adjustment of Clutch Pedal (Refer to P.21-5.)

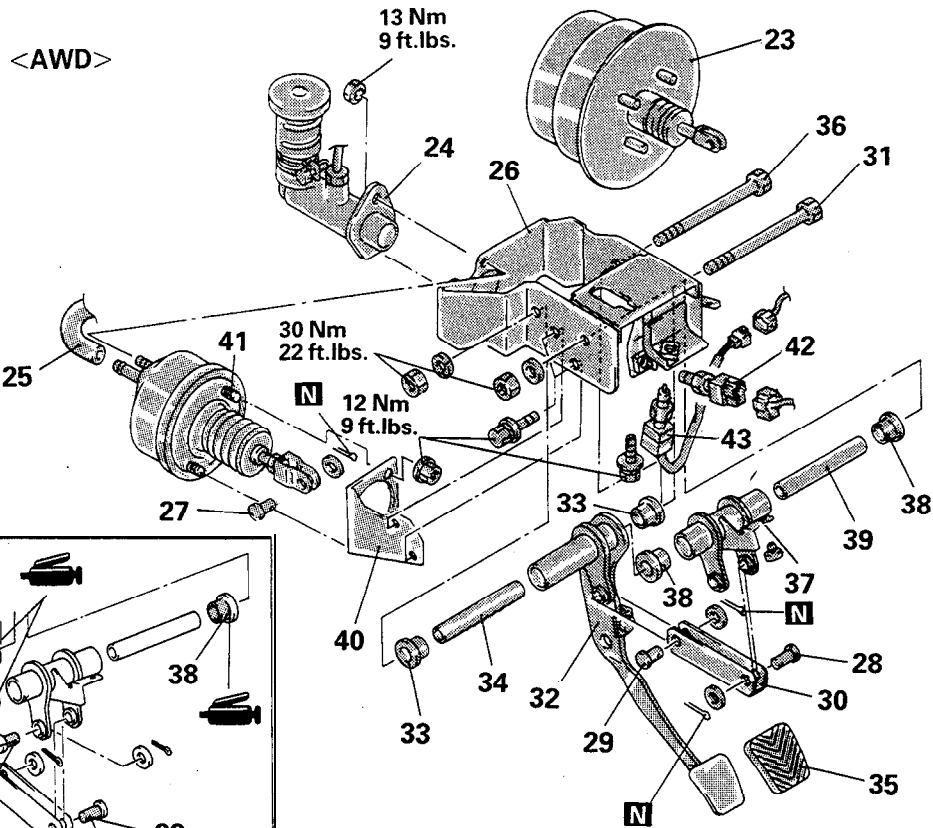
<FWD>



08F0047

Removal steps

1. Connection of brake booster
Adjustment of brake pedal
(Refer to GROUP 35 – Service Adjustment Procedures.)
2. Connection of clutch master cylinder
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 switch <Vehicles with auto-cruise control system>
22. Interlock switch



08F0025

Removal steps

- | | |
|---|--|
| <ul style="list-style-type: none"> 23. Brake booster
(Refer to GROUP 35 – Brake Booster.) 24. Connection of clutch master cylinder 25. Connection for vacuum hose 26. Pedal support bracket 27. Clevis pin 28. Clevis pin 29. Clevis pin 30. Yoke 31. Clutch pedal shaft 32. Clutch pedal | <ul style="list-style-type: none"> 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 switch 43. Interlock switch |
|---|--|

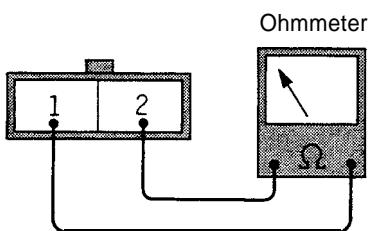
INSPECTION

M21PCAL

- 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 INSPECTION

- (1) Disconnect the connector.
- (2) Check to be sure that there is continuity between connector terminals 1 and 2.



08A004

TSB Revision

CLUTCH CONTROL

M21JA--

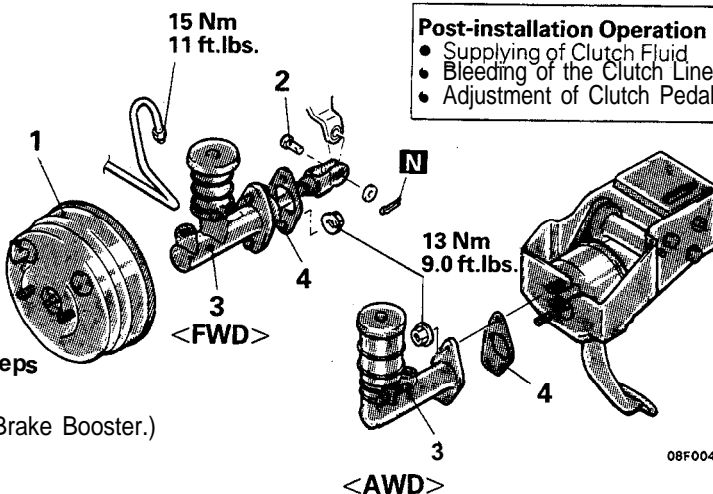
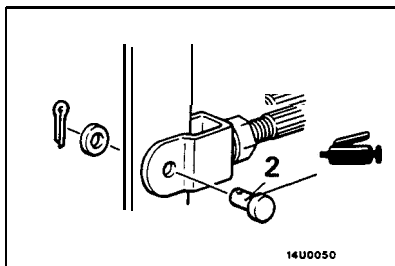
REMOVAL AND INSTALLATION

Pre-removal Operation

- Draining of the Clutch Fluid

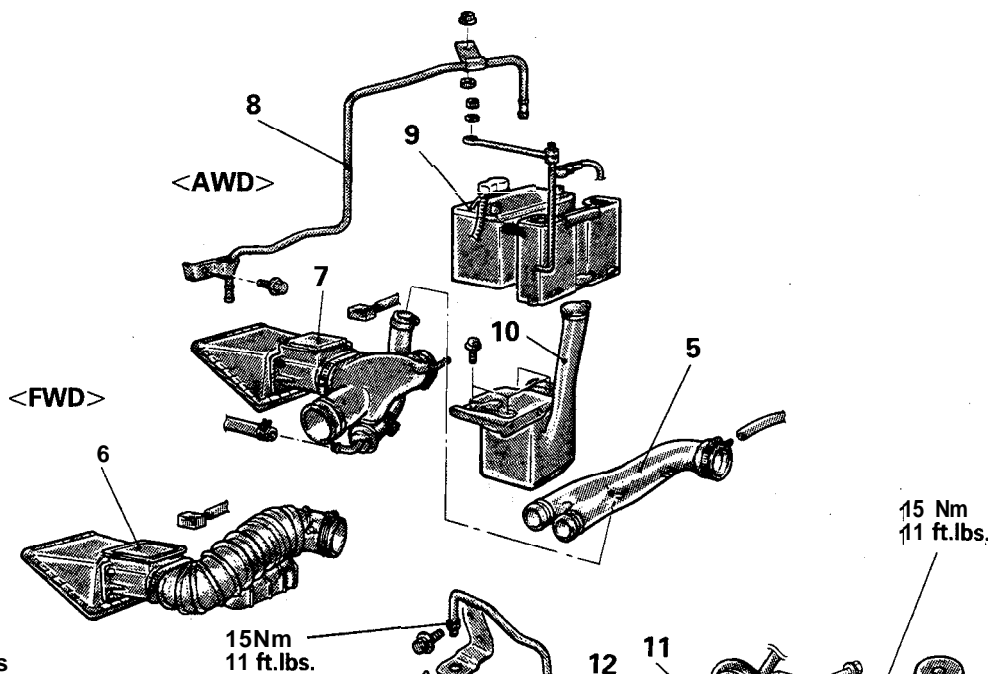
Post-installation Operation

- Supplying of Clutch Fluid
- Bleeding of the Clutch Line (Refer to P.21-7.)
- Adjustment of Clutch Pedal (Refer to P.21-5.)



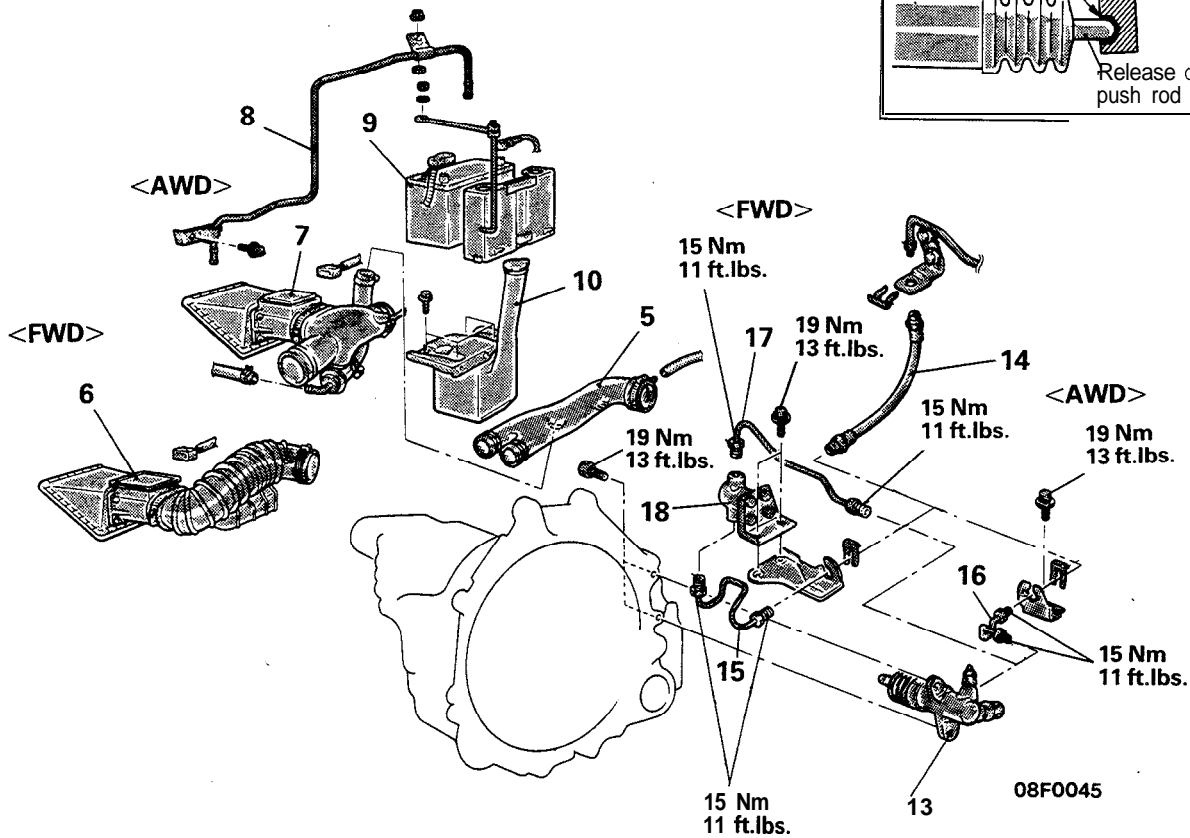
Clutch master cylinder removal steps

1. Brake booster
(Refer to GROUP 35 – Brake Booster.)
2. Clevis pin <FWD>
3. Clutch master cylinder
- ☒ Adjustment of piston to push rod clearance <AWD>
4. Sealer



Clutch tube removal steps

1. Brake booster
(Refer to GROUP 35 – Brake Booster.)
- • 5. Air hose A <AWD>
- + 6. Air cleaner cover, air intake hose <FWD>
- + 7. Air cleaner cover, air intake hose A <AWD>
- • 8. Vacuum pipe <AWD>
9. Battery
10. Battery seat, washer tank
11. Steering column assembly
(Refer to GROUP 37A – Steering Wheel and Shaft.)
- • * 12. Clutch tube



Clutch release cylinder removal steps

- 4 5. Air hose A <AWD>
- 6. Air cleaner cover, air intake hose <FWD>
- * 7. Air cleaner cover, air intake hose A <AWD>
- * 8. Vacuum pipe <AWD>
- 9. Battery
- 10. Battery seat, washer tank
- ◆◆◆◆ 13. Clutch release cylinder

Clutch hose removal steps

- 4 5. Air hose A <AWD>
- 6. Air cleaner cover, air intake hose <FWD>
- * 7. Air cleaner cover, air intake hose A <AWD>
- ◆◆◆ 8. Vacuum pipe <AWD>
- 9. Battery
- 10. Battery seat, washer tank
- ◆◆◆◆ 14. Clutch hose

Clutch tube A, tube B, tube C, damper removal steps

- 5. Air hose A <AWD>
- 6. Air cleaner, air intake hose <FWD>
- 7. Air cleaner cover, air intake hose A <AWD>
- ◆◆◆ 8. Vacuum pipe <AWD>
- 9. Battery
- 10. Battery seat, washer tank
- ◆◆◆ 15. Clutch tube A <FWD>
- ◆◆◆ 16. Clutch tube B <AWD>
- 17. Clutch tube C <FWD>
- 18. Clutch damper <FWD>

SERVICE POINTS OF REMOVAL

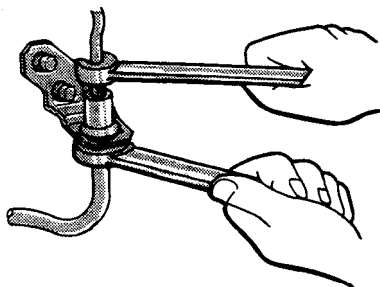
M21JBAH

12. REMOVAL OF CLUTCH TUBE (CLUTCH HOSE SIDE)

While holding the clutch hose side nut, loosen the clutch tube flare nut.

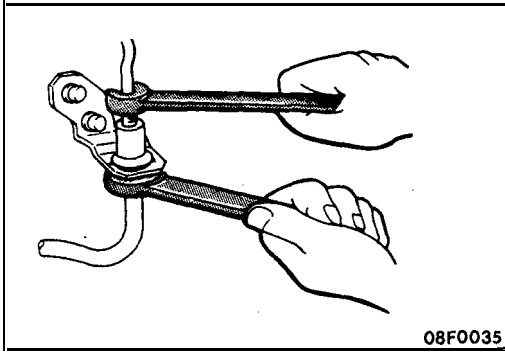
13. REMOVAL OF CLUTCH RELEASE CYLINDER

On AWD-vehicles, use a flat type short box wrench to remove the clutch release cylinder mounting bolts.



08F0035

TSB Revision



14. REMOVAL OF CLUTCH HOSE

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.

15. REMOVAL OF CLUTCH TUBE A <FWD> (CLUTCH HOSE SIDE) / 16. CLUTCH TUBE B <AWD> (CLUTCH HOSE SIDE)

While holding the clutch hose side nut, loosen the clutch tube flare nut.

INSPECTION

M21JCAF

- Check the clutch hose or tube for cracks or clogging.

SERVICE POINTS OF INSTALLATION

M21HDAO

16. INSTALLATION OF CLUTCH TUBE B <AWD> / 15. CLUTCH TUBE A <FWD> / 14. CLUTCH HOSE / 12. CLUTCH TUBE

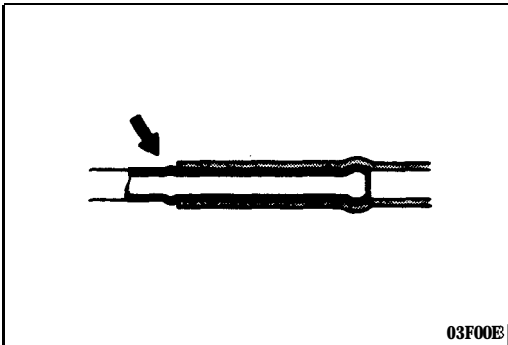
Be careful that the clutch hose does not become twisted.

13. INSTALLATION OF CLUTCH RELEASE CYLINDER

On AWD-vehicles, use a flat type short box wrench to tighten the clutch release cylinder mounting bolts.

8. INSTALLATION OF VACUUM PIPE <AWD>

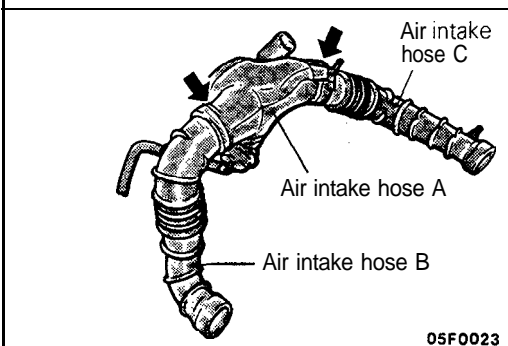
If the vacuum pipe has a stepped part, connect the vacuum hose to the pipe securely, up to the stepped part, as shown in the illustration.



7. INSTALLATION OF AIR CLEANER COVER, AIR INTAKE HOSE A

Align slots indicated by arrows in air intake hose A with Δ 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.



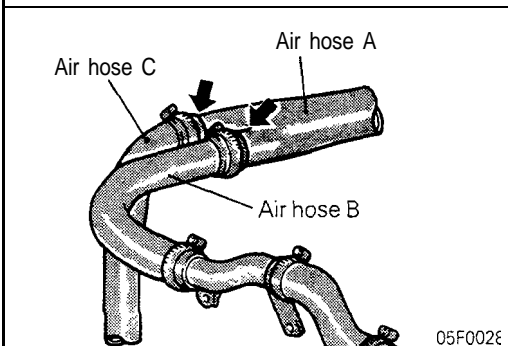
5. INSTALLATION OF AIR HOSE A

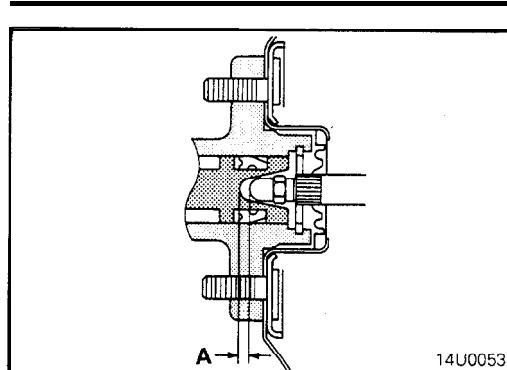
Connect the air hoses ensuring that alignment marks are aligned with projections.

Insert air hoses B and C into pipe all the way to its step.

Caution

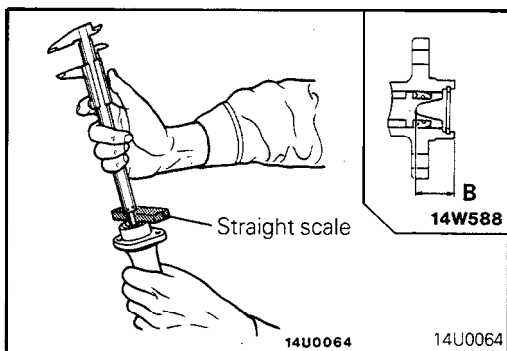
Be careful not to allow any foreign matter to get into the hoses, pipes, or the intercooler itself.





ADJUSTMENT OF CLEARANCE BETWEEN CLUTCH BOOSTER PUSH ROD AND PISTON <AWD>

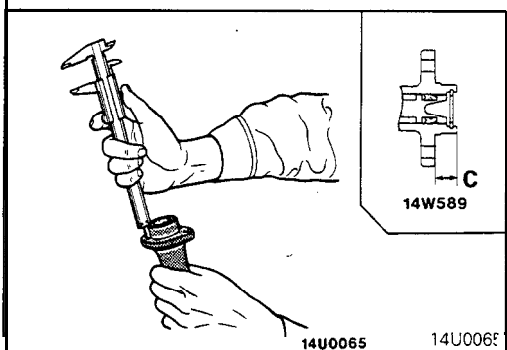
Adjust the clearance (A) between the clutch booster push rod and piston as follows:



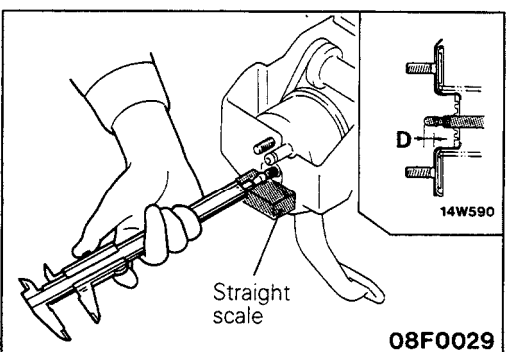
- (1) Measure the dimension (B) between the master cylinder end face and piston.

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 the clutch booster and the push rod end.

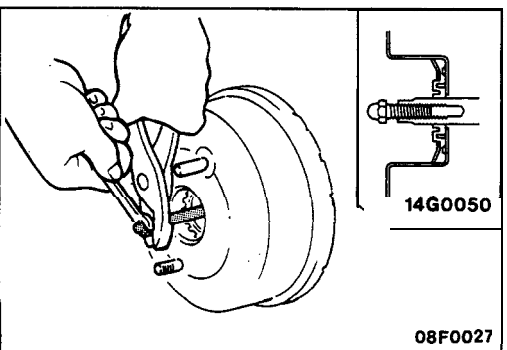
NOTE

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.)]



- (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

Improper clearance may cause excessive brake drag.

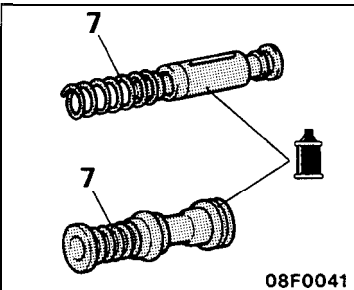
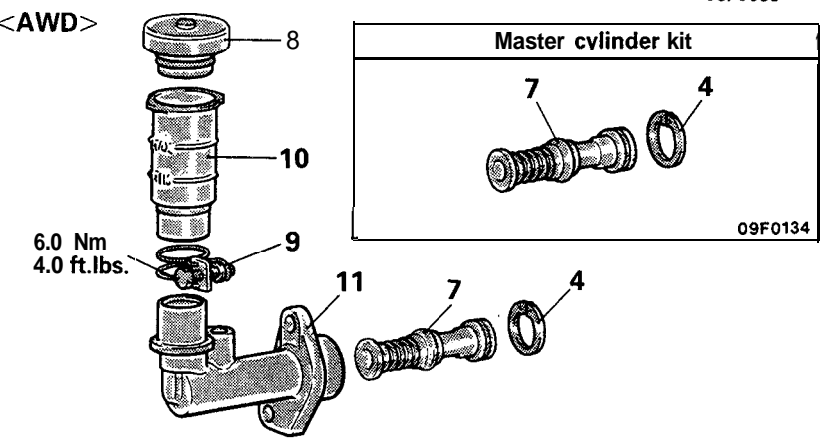
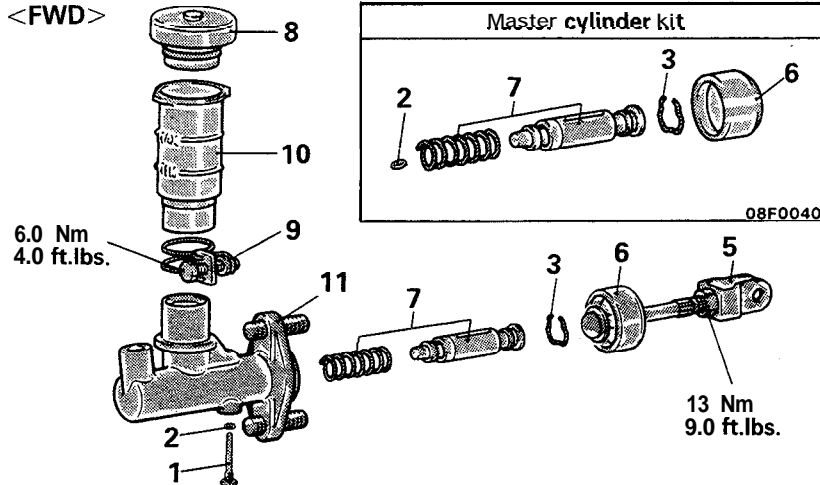
CLUTCH MASTER CYLINDER

M21NA-

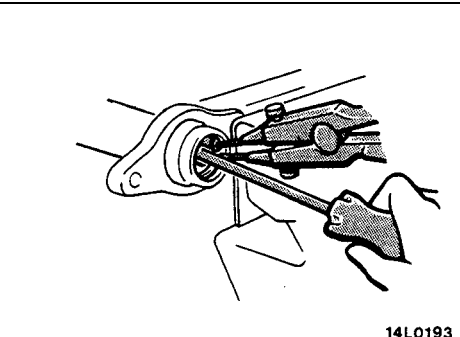
DISASSEMBLY AND REASSEMBLY

Disassembly steps

1. Piston stop bolt <FWD>
2. Gasket <FWD>
3. Piston stop ring <FWD>
4. Snap ring <AWD>
5. Push rod <FWD>
6. Boot <FWD>
7. Piston assembly
8. Reservoir cap
9. Reservoir band
10. Reservoir
11. Master cylinder body



**Brake fluid:
Conforming to DOT3**



SERVICE POINTS OF DISASSEMBLY

M21NBAE

3. DISASSEMBLY OF PISTON STOP RING <FWD> / 4. SNAP RING <AWD>

Remove the piston stop ring or snap ring, while depressing the piston.

7. REMOVAL OF PISTON ASSEMBLY

Caution

1. Do not damage the master cylinder body and piston assembly.
2. Do not disassemble piston assembly.

INSPECTION

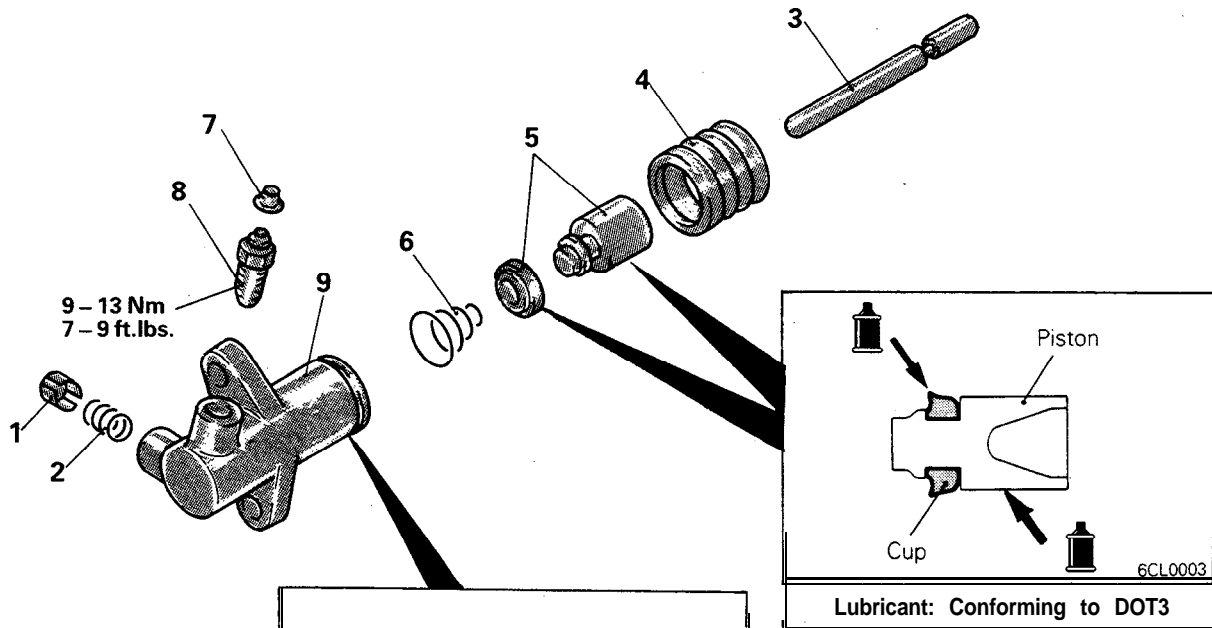
M21NCAD

- Check the inside cylinder body for rust or scars.
- Check the piston cup for wear or deformation.
- Check the piston for rust or scars.
- Check the clutch tube connection part for clogging.

CLUTCH RELEASE CYLINDER

DISASSEMBLY AND REASSEMBLY

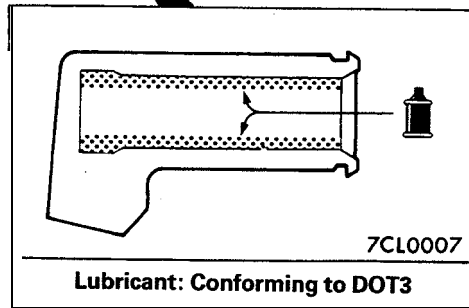
M21LA-



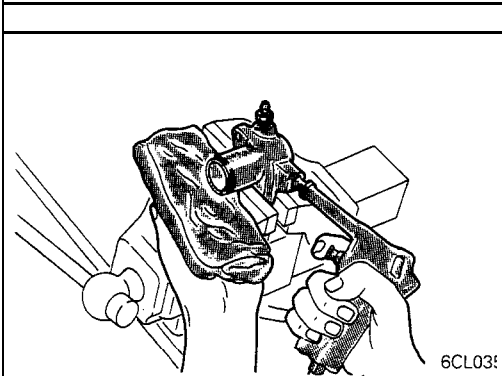
Disassembly steps

1. Valve plate
2. Spring
3. Push rod
4. Boots
5. Piston and cup
6. Conical spring
7. Cap
8. Bleeder plug
9. Release cylinder

◆ ◆ • *



7CL0001



SERVICE POINTS OF DISASSEMBLY

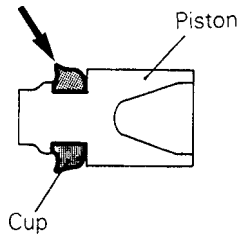
M21LBAF

5. DISASSEMBLY OF PISTON AND CUP

- (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.

**INSPECTION**

M21LCAF

- (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.

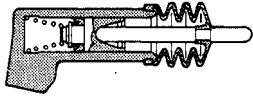
SERVICE POINTS OF REASSEMBLY

M21LDAH

5. APPLICATION OF FLUID 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.

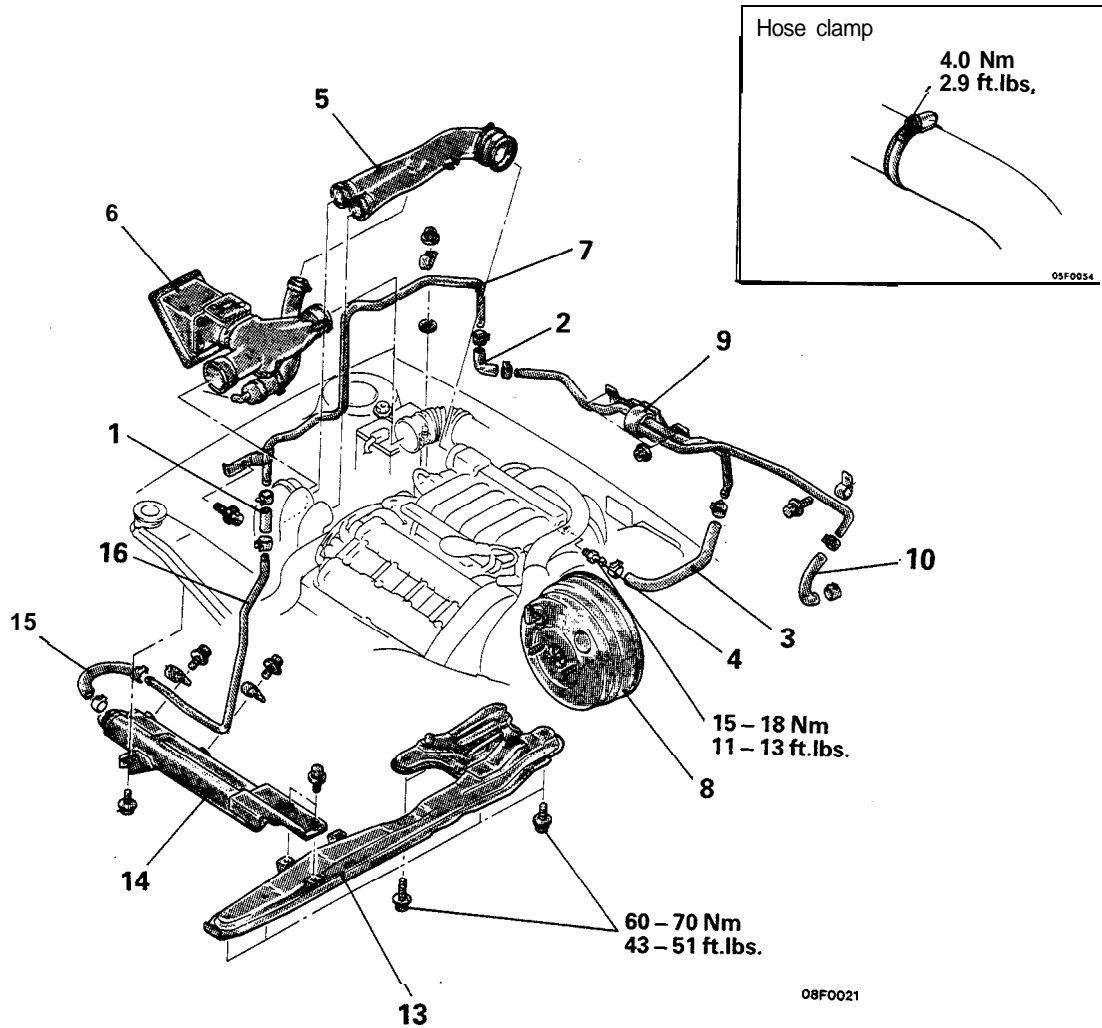
Specified brake fluid: Conforming to DOT3



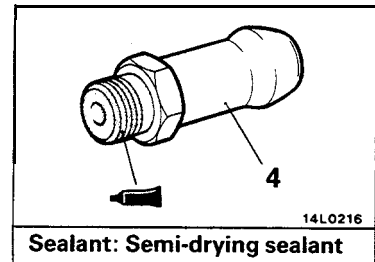
CLUTCH VACUUM LINE, VACUUM TANK <AWD>

REMOVAL AND INSTALLATION

M21VA--



08F0021



- + 1. Vacuum hose A
- ◆◆ 2. Vacuum hose B
- ◆◆◆ 3. Vacuum hose C with check valve
- 4. Fitting

Vacuum pipe A removal steps

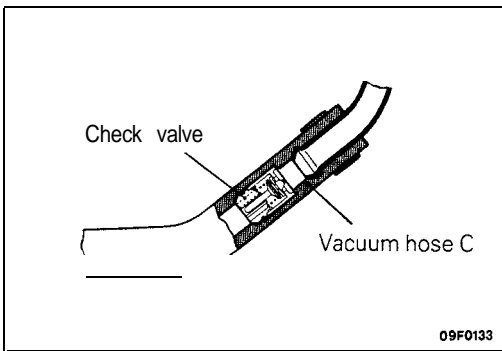
- * 5. Air hose A
- ◆◆ 6. Air cleaner cover, air intake hose A
- 7. Vacuum pipe A

Vacuum pipe B, vacuum hose D removal steps

- 8. Brake booster
(Refer to GROUP 35 – Brake Booster.)
- 9. Vacuum pipe B
- + 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
- * 13. Vacuum hose E
- 14. Vacuum pipe C



SERVICE POINTS OF REMOVAL

M21VBAA

3. REMOVAL OF VACUUM HOSE C WITH CHECK VALVE

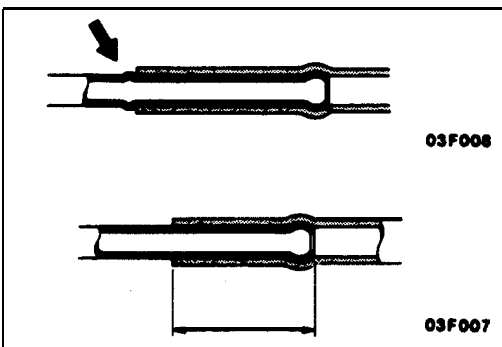
NOTE

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.

INSPECTION

M21VCAA

- Check the hose and pipes for cracks, bend, deformation and clogging.
- Check the vacuum tank for deformation or crack.



SERVICE POINTS OF INSTALLATION

M21VDAA

13. INSTALLATION OF VACUUM HOSE E / 10. VACUUM HOSE D / 3. VACUUM HOSE C WITH CHECK VALVE / 2. VACUUM HOSE B / 1. VACUUM HOSE A

If a hose is connected to a pipe with a stepped part, insert the hose up to the stepped part.

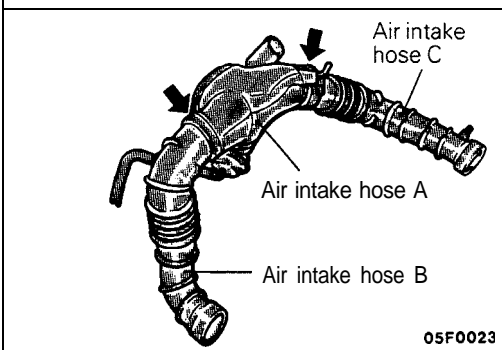
If it is connected to a pipe without any stepped part, insert the hose until the insertion amount reaches the standard value.

Standard value: 20 – 25 mm (.8 – 1.0 in.)

6. INSTALLATION OF AIR CLEANER COVER, AIR INTAKE HOSE A

Align slots indicated by arrows in air intake hose A with Δ 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.



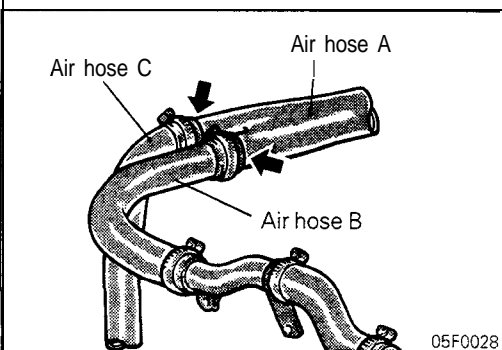
5. INSTALLATION OF AIR HOSE A

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.



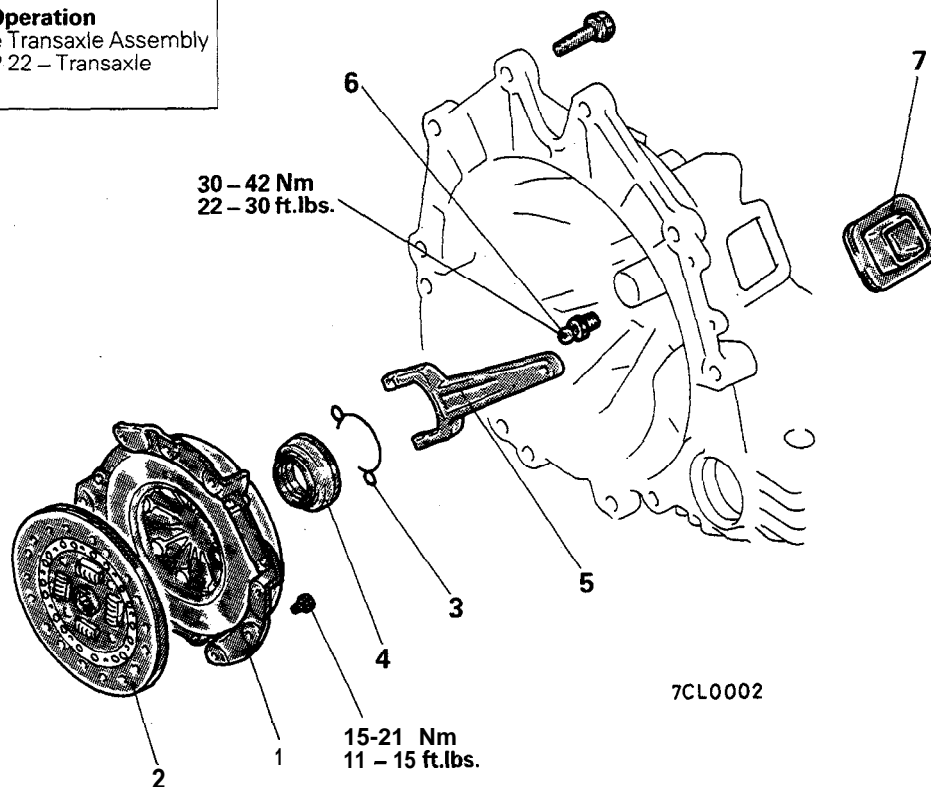
CLUTCH COVER AND DISC REMOVAL AND INSTALLATION

Pre-removal Operation

- Removal of the Transaxle Assembly
(Refer to GROUP 22 – Transaxle Assembly.)

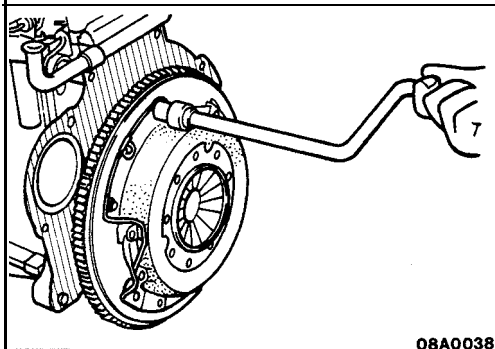
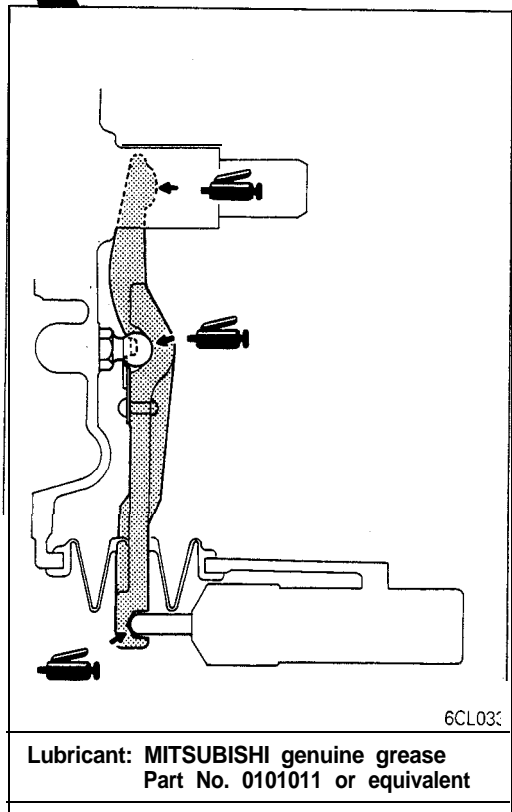
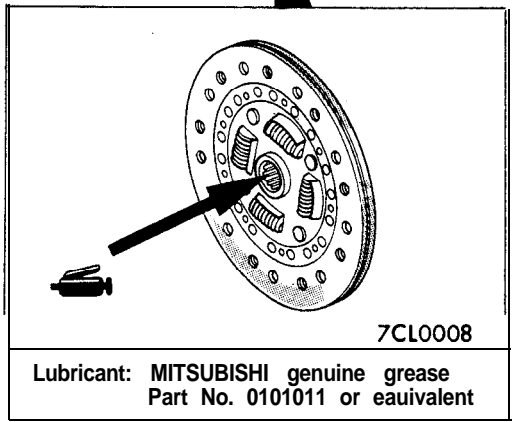
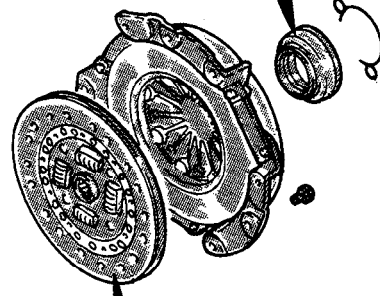
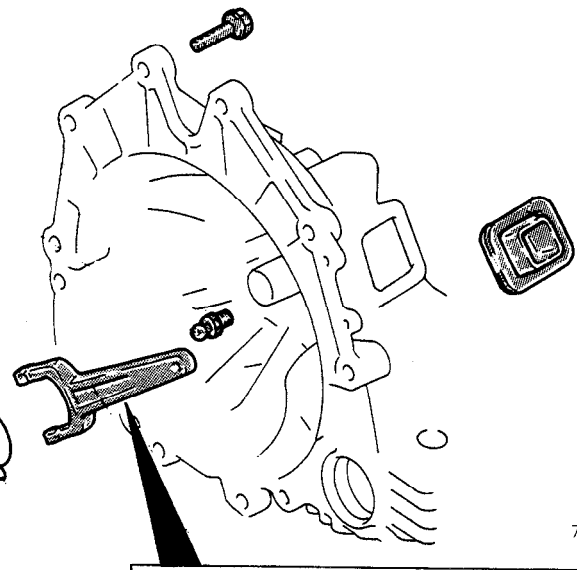
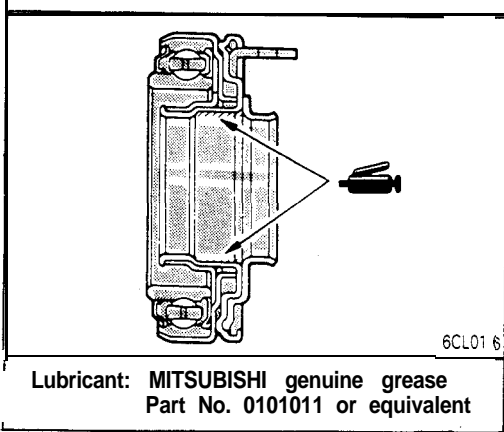
Post-installation Operation

- Installation of the Transaxle Assembly
(Refer to GROUP 22 – Transaxle Assembly.)



Removal steps

- ◆◆◆◆ 1. Clutch cover assembly
- ◆◆◆◆ 2. Clutch disc
- ◆◆◆ 3. Return clip
- ◆◆ 4. Clutch release bearing
- ◆◆ 5. Release fork
- ◆ 6. Fulcrum
- ◆ 7. Release fork boot



SERVICE POINTS OF REMOVAL

M21GBAK

1. REMOVAL OF CLUTCH COVER ASSEMBLY / 2. CLUTCH DISC

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.

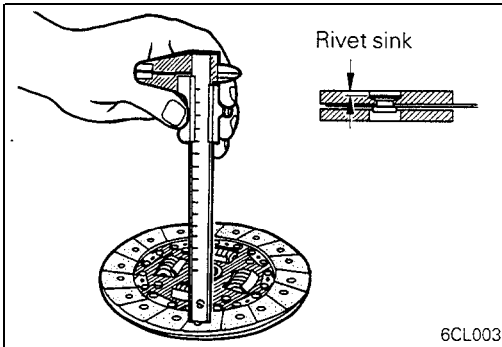
Caution
DO NOT clean clutch disc or release bearing with cleaning solvent.

INSPECTION**CLUTCH COVER ASSEMBLY**

- 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 (.02 in.)

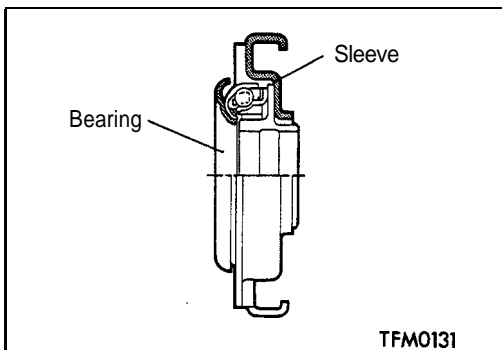
- Check the pressure plate surface for wear, cracks and color change.
- Check the strap plate rivets for looseness and replace the clutch cover assembly if loose.

**CLUTCH DISC**

- Check 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****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

If there is abnormal wear at the point of contact with the bearing, replace the release fork.

SERVICE POINTS OF INSTALLATION

M21GDAU

5. APPLICATION OF GREASE 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.

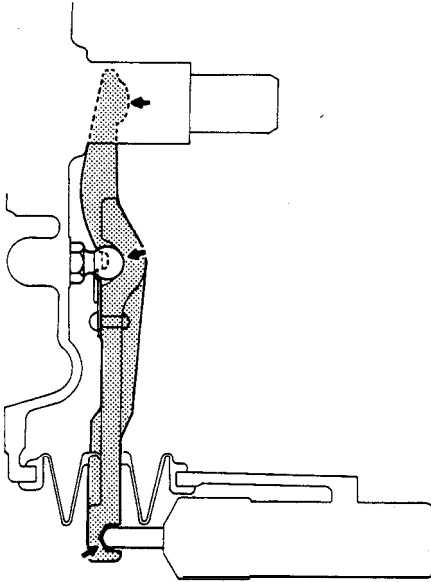
**Specified grease: MITSUBISHI genuine grease
Part No. 0101011 or equivalent**

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**

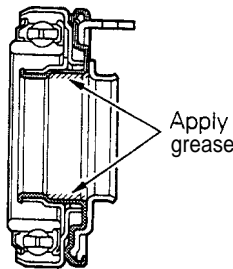


6CL03:

4. APPLICATION OF GREASE 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**



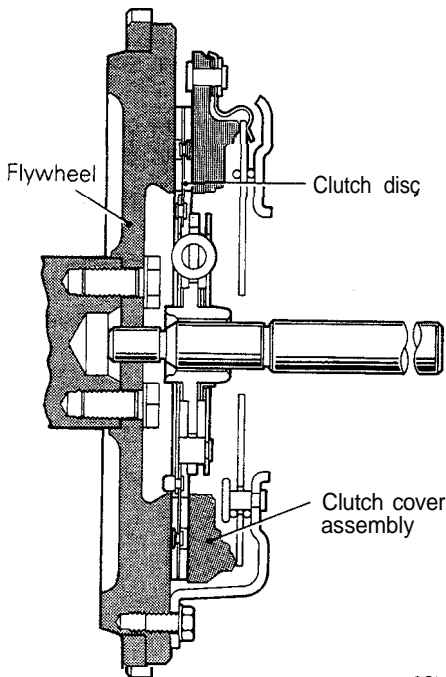
6CL016

2. APPLICATION OF GREASE TO CLUTCH DISC / 1. 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.



6CL028

MANUAL TRANSAXLE

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M22AA-

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DIFFERENTIAL ASSEMBLY	43	TRANSAXLE ASSEMBLY	14
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SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

- (1) A Supplemental Restraint System (SRS), which uses a driver-side air bag, has been installed in the 3000GT.
- (2) The SRS includes the following components: impact sensors, SRS diagnosis unit: SRS warning light, air bag module, clock spring, 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 (*).

WARNING!

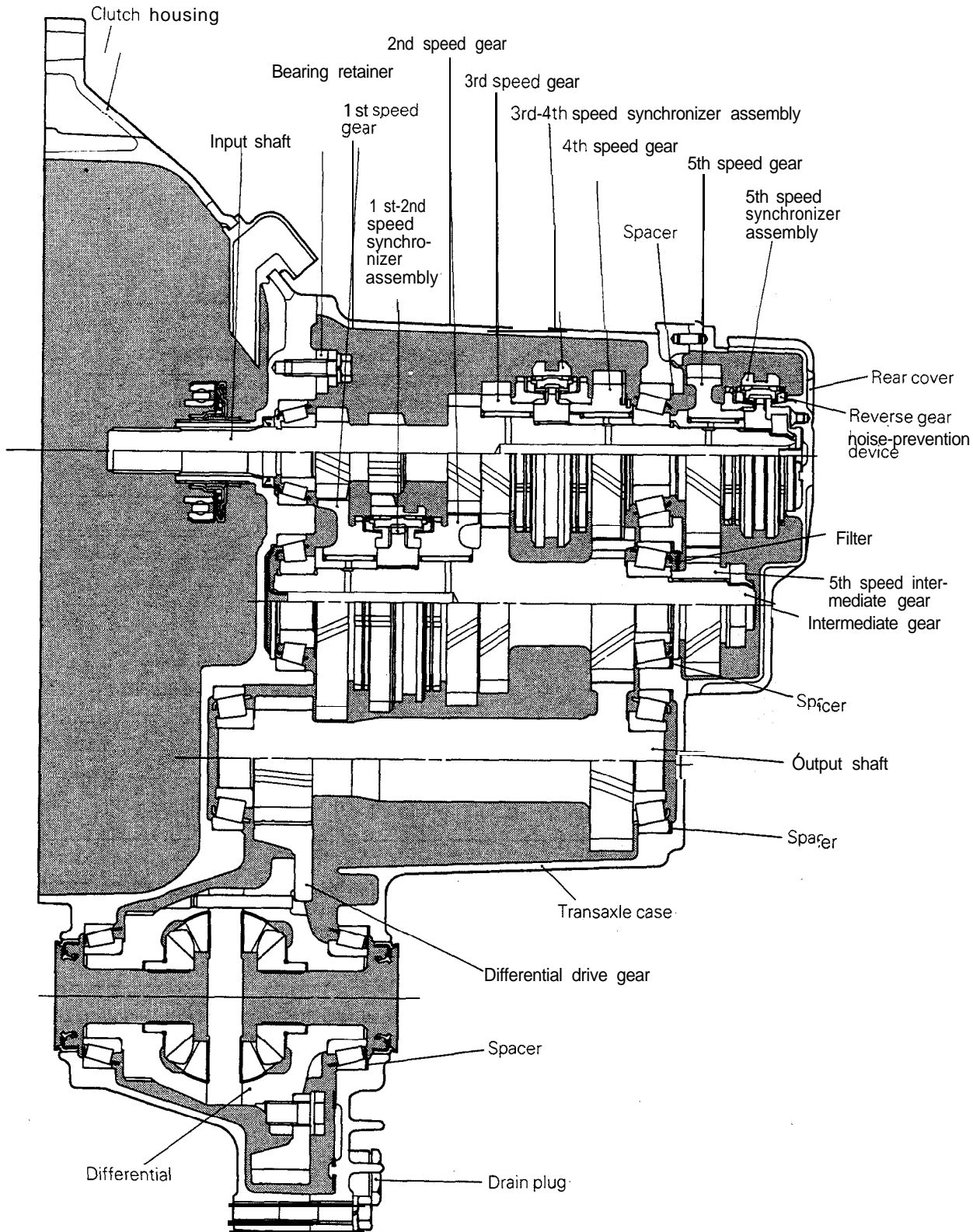
- (1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver (from rendering the SRS inoperative).
- (2) Service or maintenance of any SRS component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

MANUAL TRANSAXLE <FWD>

GENERAL INFORMATION

M22BAAU

F5M33



TFM0111

SPECIFICATIONS

GENERAL SPECIFICATIONS

M22CA-A

items	Specifications
Model	F5M33-2-SNZR
Applicable engine	6G72-DOHC MPI
Type	5-speed transaxle floor shift
Gear ratio	
1st	3.090
2nd	1.833
3rd	1.217
4th	0.888
5th	0.741
Reverse	3.166
Final reduction ratio	4.153
Speedometer gear ratio (driven/drive)	28/36
Oil quantity liters (qts.)	2.3 (2.4)

SERVICE SPECIFICATIONS

M22CB-A

mm (in.)

Items	Specifications
Standard value	
Transaxle	
Input shaft end play	0 – 0.05 (0 – .002)
Input shaft rear bearing end play	0.01 – 0.09 (.0004 – .004)
Intermediate gear bearing end play	0.01 -0.14 (.0004 – .006)
Intermediate gear preload	0.05 – 0.10 (.002 – .004)
Output shaft preload	0.05 – 0.10 (.002 – .004)
Differential	
Differential case preload	0.05 – 0.10 (.002 – .004)
Differential pinion backlash	0.025 – 0.150 (.001 – .006)
Limit	
Synchronizer ring and clutch gear clearance	0.5 (.02)

SNAP RING (FOR ADJUSTMENT) AND SPACER

M22CF-A

Part name	Thickness mm (in.)	Identification symbol	Part No.
Spacer (For adjustment of input shaft end play)	0.80 (.0315)	80	MD727661
	0.83 (.0327)	83	MD720937
	0.86 (.0338)	86	M D720938
	0.89 (.0350)	89	MD720939
	0.92 (.0362)	92	MD720940

TSB Revision

Part name	Thickness mm (in.)	Identification symbol	Part No.
Spacer (For adjustment of input shaft end play)	0.95 (.0374)	95	MD720941
	0.98 (.0386)	98	MD720942
	1.01(.0398)	01	M D720943
	1.04 (.0409)	04	MD720944
	1.07 (.0421)	07	MD720945
	1.10 (.0433)	J	MD71 0454
	1.13 (.0445)	D	MD700270
	1.16 (.0457)	K	MD710455
	1.19 (.0468)	L	MD710456
	1.22 (.0480)	G	MD700271
	1.25 (.0492)	M	MD710457
	1.28 (.0504)	N	MD710458
	1.31 (.0516)	E	MD706574
	1.34 (.0527)	O	M D7 10459
	1.37 (.0539)	P	MD71 0460
	1.40 (.0551)	–	MD706573
	1.43 (.0563)	Q	MD710461
1.46 (.0575)	R	MD710462	
Snap ring (For adjustment of intermediate gear front bearing end play)	1.4 (.0551)	None	MD703779
	1.5 (.0591)	Brown	MD703780
	1.6 (.0630)	Blue	MD703781
Spacer (For adjustment of intermediate gear preload)	0.80 (.0315)	80	MD7241 42
	0.83 (.0327)	83	MD7241 43
	0.86 (.0338)	86	MD724144
	0.89 (.0350)	89	MD7241 45
	0.92 (.0362)	92	MD7241 46
	0.95 (.0374)	95	MD724147
	0.98 (.0386)	98	MD7241 48
	1.01(.0398)	01	MD724149
	1.04 (.0409)	04	MD7241 50
	1.07 (.0421)	07	MD7241 51
	1.10 (.0433)	10	MD7241 52
	1.13 (.0445)	13	MD7241 53
	1.16 (.0457)	16	MD7241 54
	1.19 (.0468)	19	MD7241 55
	1.22 (.0480)	22	MD7241 56
	1.25 (.0492)	25	MD7241 57
	1.28 (.0504)	28	MD7241 58
1.31 (.0516)	31	MD7241 59	
1.34 (.0527)	34	MD7241 60	
1.37 (.0539)	37	MD7241 61	

Part name	Thickness mm (in.)	Identification symbol	Part No.
Spacer (For adjustment of output shaft preload)	0.83 (.0327)	83	MD720937
	0.86 (.0338)	86	MD720938
	0.89 (.0350)	89	MD720939
	0.92 (.0362)	92	MD720940
	0.95 (.0374)	95	MD720941
	0.98 (.0386)	98	MD720942
	1.01 (.0398)	01	MD720943
	1.04 (.0409)	04	MD720944
	1.07 (.0421)	07	MD729945
	1.10 (.0433)	J	MD71 0454
	1.13 (.0445)	D	MD700270
	1.16 (.0457)	K	MD71 0455
	1.19 (.0468)	L	MD71 0456
	1.22 (.0480)	G	MD700271
	1.25 (.0492)	M	MD710457
	1.28 (.0504)	N	MD710458
1.31 (.0516)	E	M D706574	
1.34 (.0527)	O	MD71 0459	
Spacer (For adjustment of differential case preload)	0.80 (.0315)	80	MD727661
	0.83 (.0327)	83	M D720937
	0.86 (.0338)	86	M D720938
	0.89 (.0350)	89	M D720939
	0.92 (.0362)	92	MD720940
	0.95 (.0374)	95	M D720941
	0.98 (.0386)	98	MD720942
	1.01 (.0398)	01	MD720943
	1.04 (.0409)	04	MD720944
	1.07 (.0421)	07	MD720945
	1.10 (.0433)	J	MD71 0454
	1.13 (.0445)	D	MD700270
	1.16 (.0457)	K	MD710455
	1.19 (.0468)	L	MD71 0456
	1.22 (.0480)	G	MD700271
	1.25 (.0492)	M	MD71 0457
Spacer (For adjustment of differential pinion backlash)	0.75 – 0.82 (.0295 – .0323)	–	MA1 80862
	0.83 – 0.92 (.0327 – .0362)	–	MA1 80861
	0.93 – 1.00 (.0366 – .0394)	–	MA1 80860
	1.01 -1.08 (.0398 – .0425)	–	MA1 80875
	1.09-1.16 (.0429 – .0457)	–	MA1 80876

22-6 MANUAL TRANSAXLE <FWD> – Specifications / Special Tools

LUBRICANTS

M22CD-A

Items	Specified lubricant	Quantity lit. (qts)
Manual transmission oil	Hypoid gear oil, SAE 75W-90 or 75W-85W conforming to API classification GL-4 or higher	2.3 (2.4)
Drive shaft oil seal lip		As required




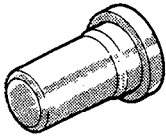

SEALANTS AND ADHESIVES

M22CE -

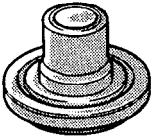
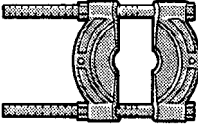
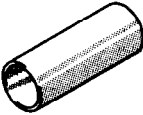
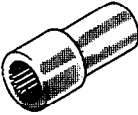
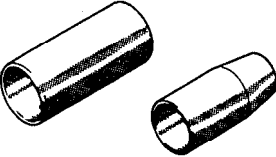


Items	Specified sealants and adhesives
Transaxle case – clutch housing mating surfaces Transaxle case – rear cover mating surfaces	Mitsubishi genuine part No. 997740 or equivalent
Differential drive gear bolts Bearing retainer screw (flush head screw) Reverse brake cone mounting screw bolts	3M Stud Locking part No. 4170 or equivalent
Air breather	3M ATD part No. 8001 or equivalent

SPECIAL TOOLS

M22DA-A

Tool	Number	Name	Use
	MB991113-01	Steering linkage puller	<ul style="list-style-type: none"> • 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
	MD998245-01	Lock pin installer	Installation of spring pin and lock pin
	MD998318-01	Bearing installer	Installation of input shaft bearing and input shaft gear and input shaft bearing sleeve
	MD998321-01	Oil seal installer	Installation of input shaft oil seal
	MD998323-01	Bearing installer	Installation of input shaft bearing

TSB Revision

Tool	Number	Name	Use
	MD998325-01	Differential oil seal installer	Installation of differential oil seal
	MD998348-01	Bearing remover	Removal of gears and bearings of input shaft, intermediate gear and output shaft
	MD998350-01	Bearing installer	Installation of intermediate gear bearing and intermediate gear
	MD998802	Input shaft holder	Installation and removal of input shaft and intermediate shaft lock nut
	MD998808-01	Snap ring installer	Installation of input shaft rear snap ring
	MD998812	Installer cap	Use with MD998818
	MD998822	installer adapter	Installation of differential case bearings

TROUBLESHOOTING

M22EAAG

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 or 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

SERVICE ADJUSTMENT PROCEDURES

M22FBAE1

TRANSMISSION OIL LEVEL INSPECTION

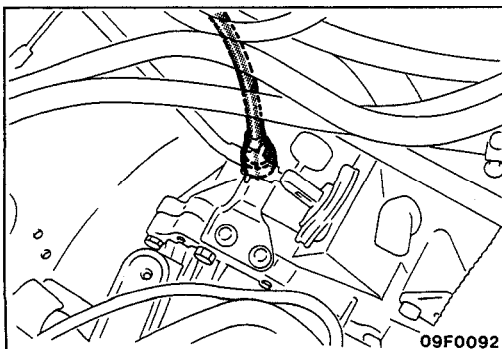
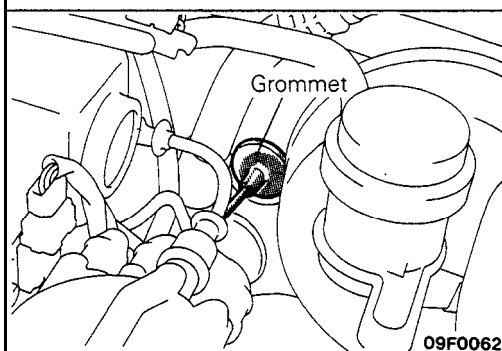
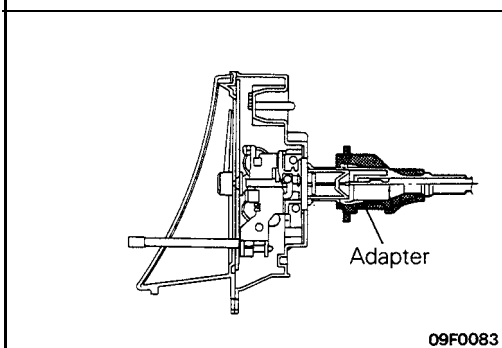
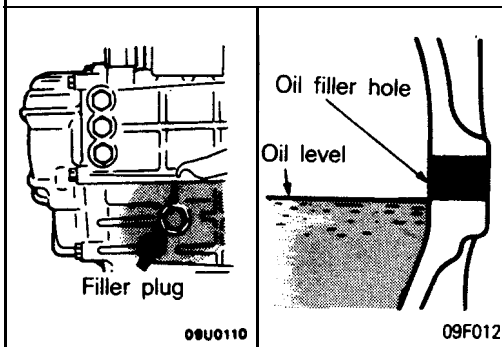
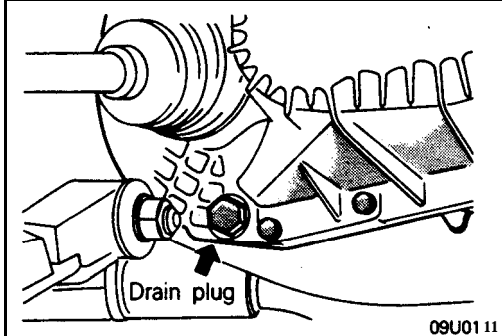
Refer to GROUP 00 – Maintenance Service.

TRANSMISSION OIL REPLACEMENT

M22FCA1

- (1) Position vehicle on a flat level.
- (2) Remove filler and drain plugs and allow the transmission oil to drain.
- (3) Refill the transaxle to the proper level with specified transmission oil. The oil level should be the bottom of the oil filler hole.

Transmission oil: Hypoid gear oil, SAE 75W-85W conforming to API classification GL-4 or higher [2.3 liters (2.4 pts.)]



SPEEDOMETER CABLE REPLACEMENT

M22FEAL1

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

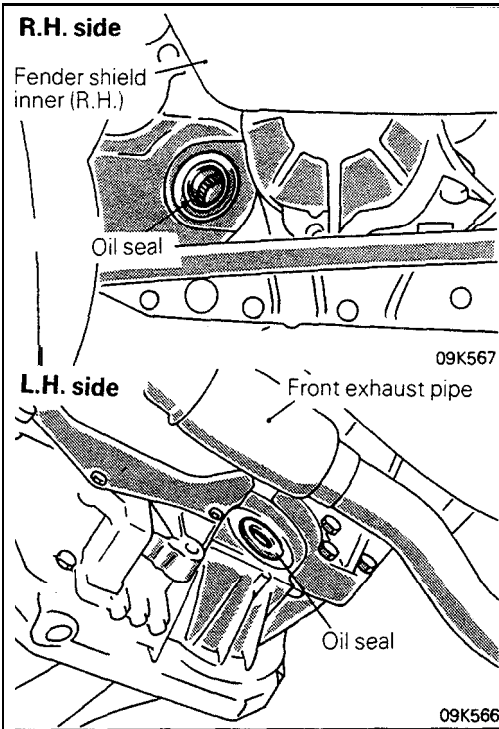
The cable arrangement should be made so that the radius of cable bends is 150 mm (5.9 in.) or more.

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.

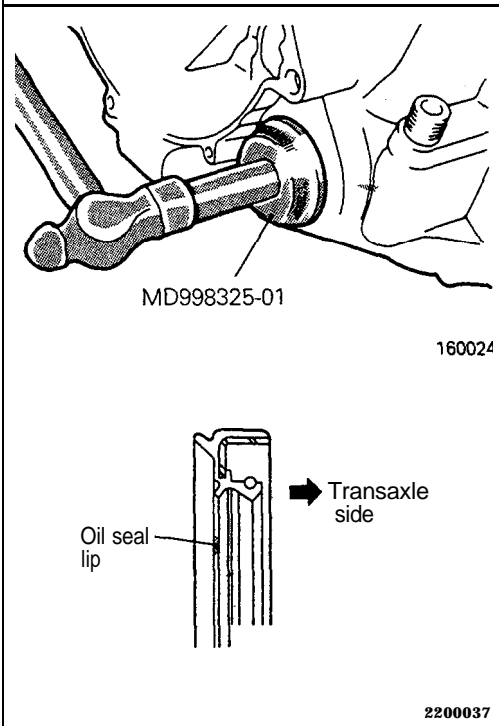
22-10 MANUAL TRANSAXLE <FWD> – Service Adjustment Procedures



DRIVE SHAFT OIL SEALS REPLACEMENT

M22FDAI

- (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.

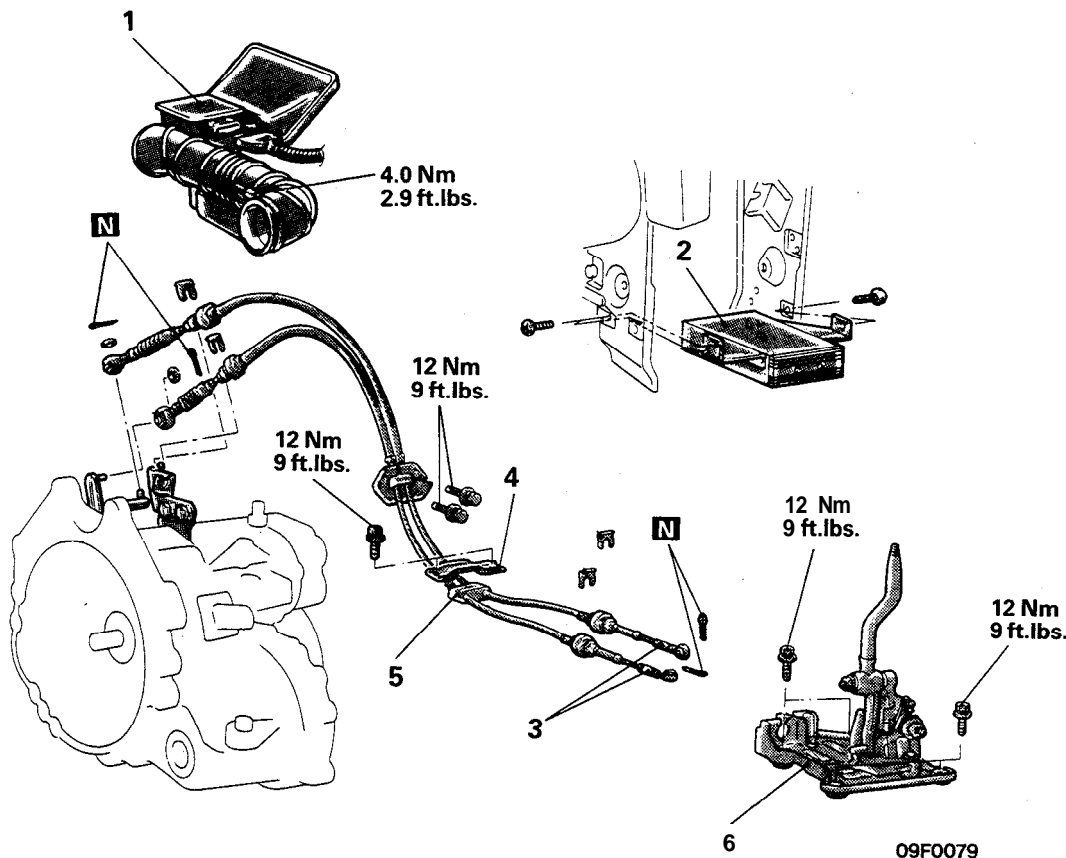
Transmission oil: Hypoid gear oil, SAE 75W-90 or 75W-85W conforming to API classification GL-4 or higher

**TRANSAXLE CONTROL
REMOVAL AND INSTALLATION**

M22JA-A

**Pre-removal and Post-installation
Operation**

- Removal and Installation of Front Console Assembly
(Refer to GROUP 52A – Floor Console.)



**Transaxle control cable assembly
removal steps**

1. Air cleaner, Air intake hose
2. CD amp. (Vehicles with CD player)
- ◆◆ 3. Connection for transaxle control cable assembly (Shift lever assembly side)
4. Retainer
5. Transaxle control cable assembly

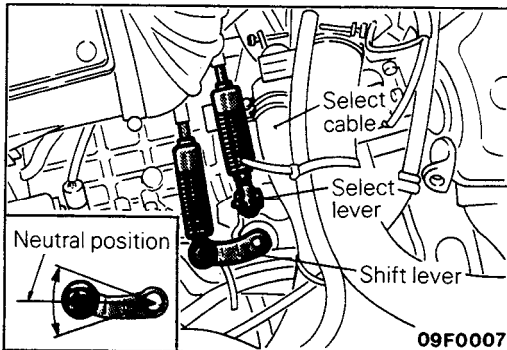
Shift lever assembly removal steps

1. Air cleaner, Air intake hose
- a 3. Connection for transaxle control cable assembly (Shift lever assembly side)
6. Shift lever assembly

INSPECTION

M22JCAF1

- 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.



SERVICE POINTS OF INSTALLATION

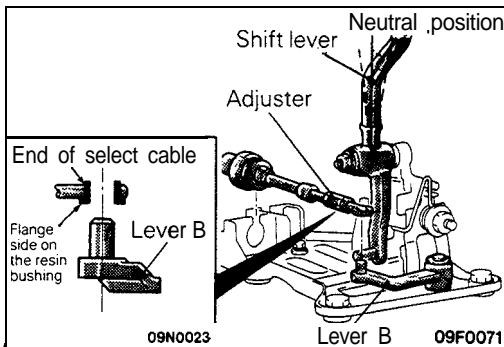
M22JDAL

3. CONNECTION OF TRANSAXLE CONTROL CABLE ASSEMBLY (SHIFT LEVER ASSEMBLY SIDE)

- (1) Move the transaxle shift lever to the neutral position.

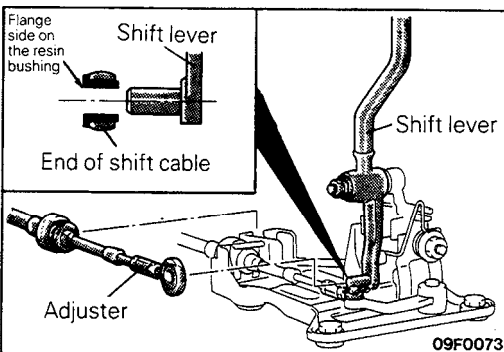
NOTE

The select lever will be set to the neutral position when the transaxle shift lever is moved to the neutral position.



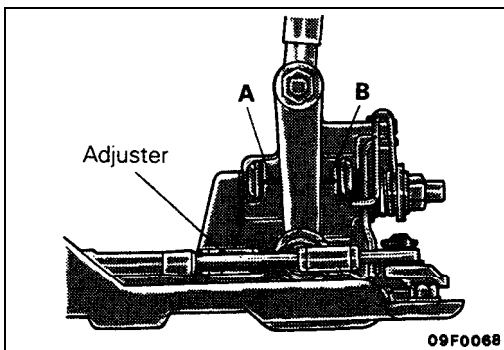
- (2) With the shift lever on the passenger compartment side in the neutral position, turn adjuster on select cable so that select cable end is positioned as shown with reference to lever B of shift lever.

- (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.



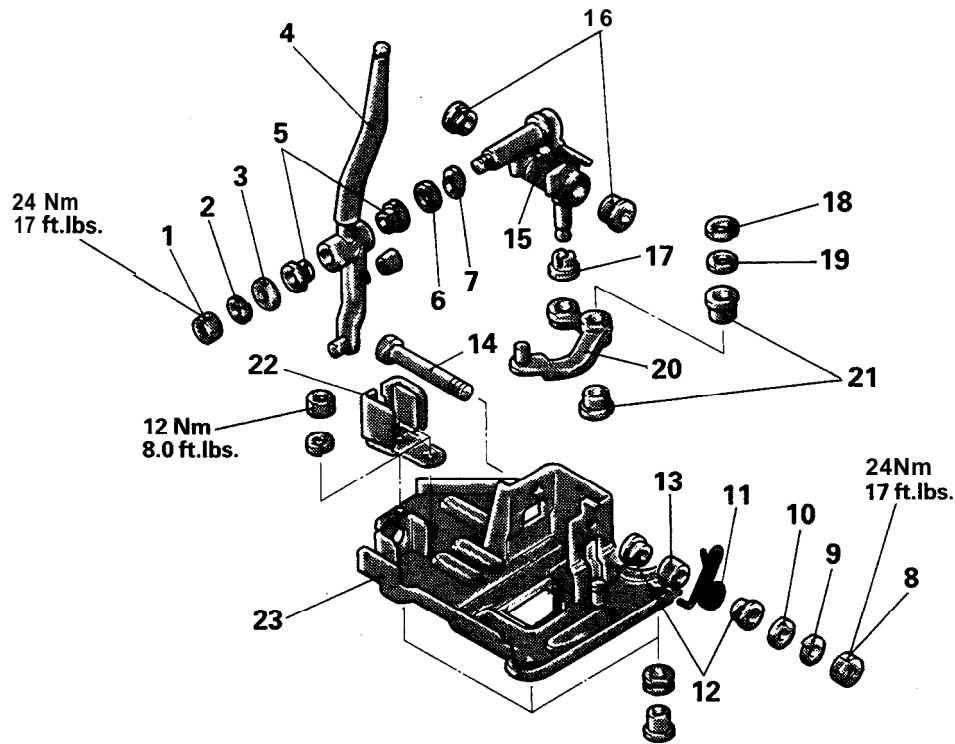
- (6) Connect the shift cable, then turn adjuster on shift cable so that dimension A equals dimension B.

- (7) Move the shift lever to each position and check that the shifting is smooth.

M22GE-A

SHIFT LEVER ASSEMBLY

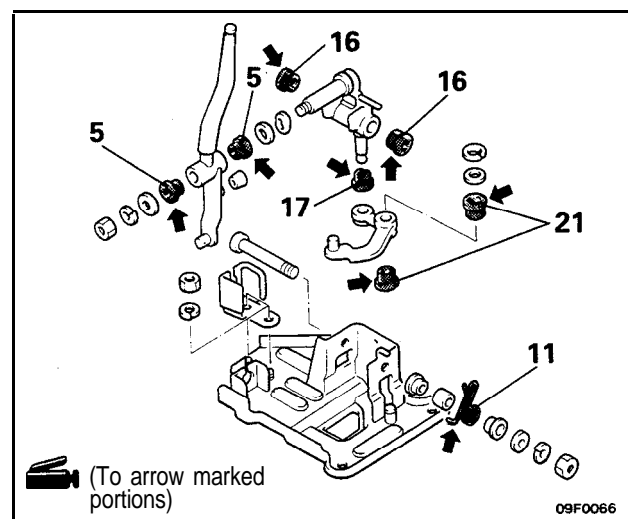
DISASSEMBLY AND REASSEMBLY



09F0017

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



09F0066

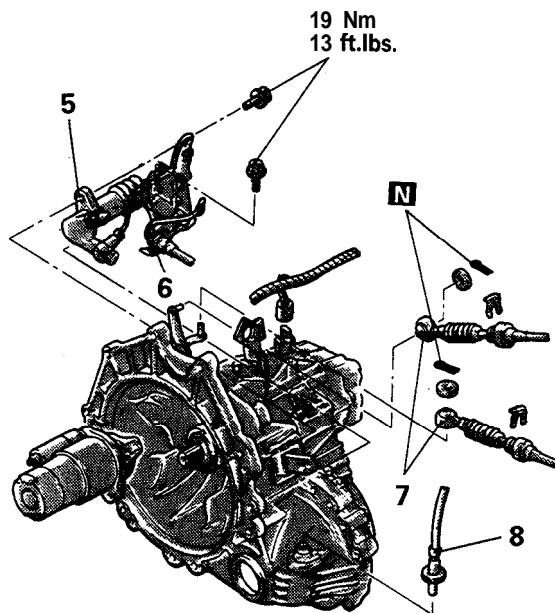
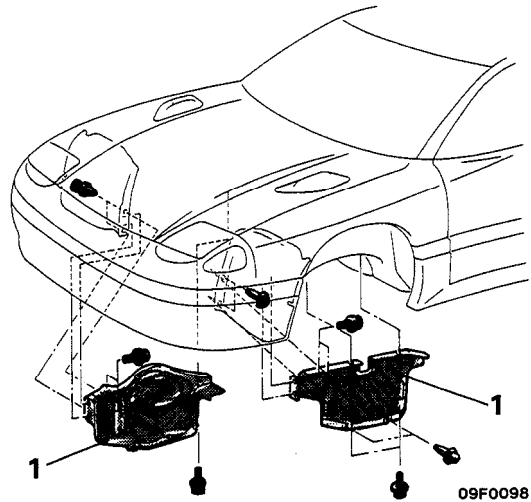
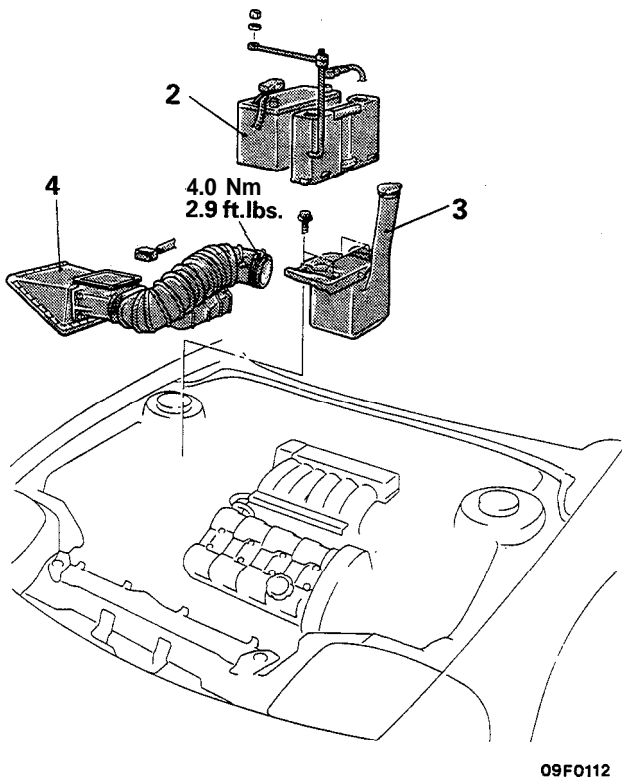
TRANSAXLE ASSEMBLY

REMOVAL AND INSTALLATION

M22MA-A

Pre-removal Operation

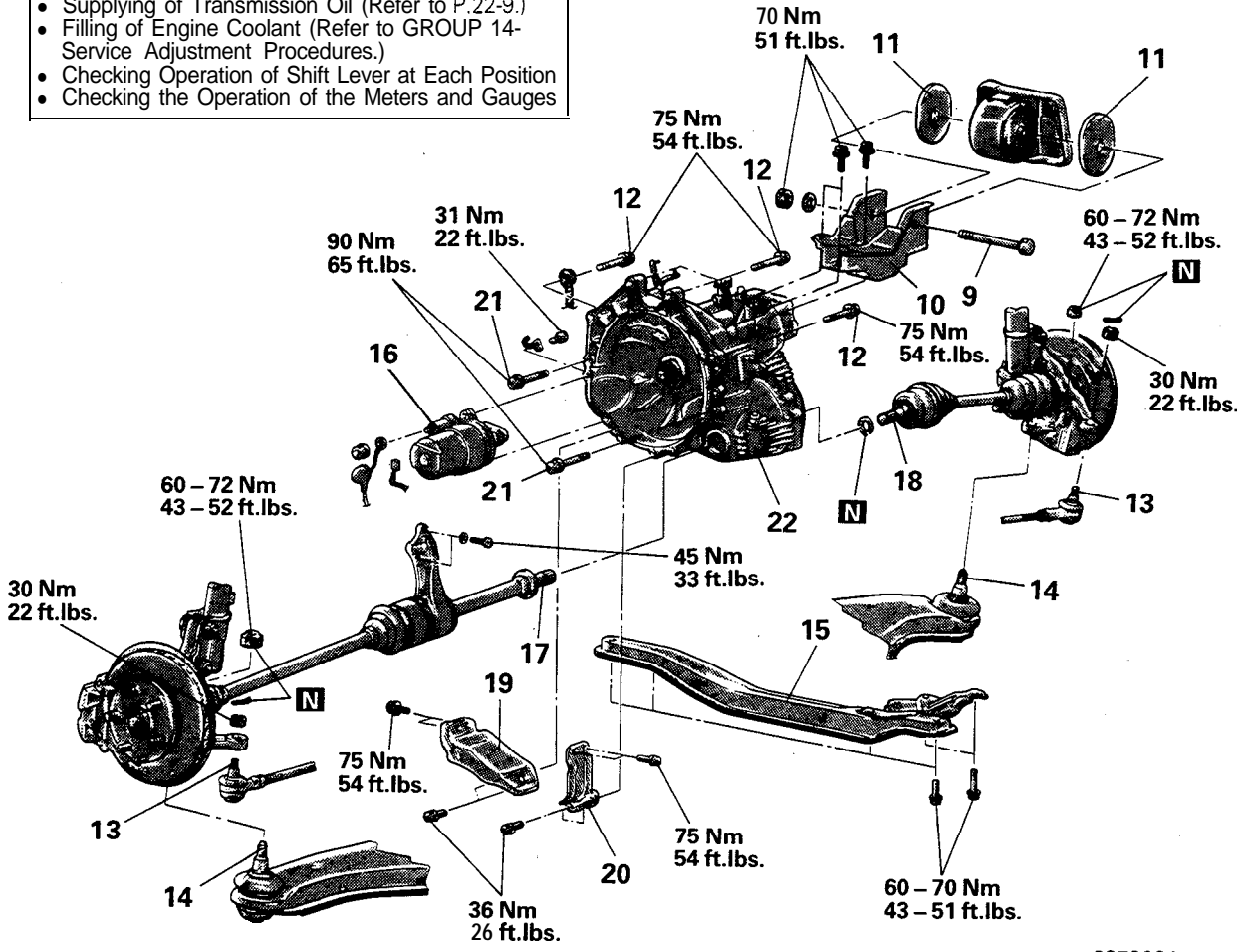
- Draining of the Transmission Oil (Refer to P.22-9.)
- Removal of Front Under Cover
(Refer to GROUP 51 -Front Bumper.)



Removal steps

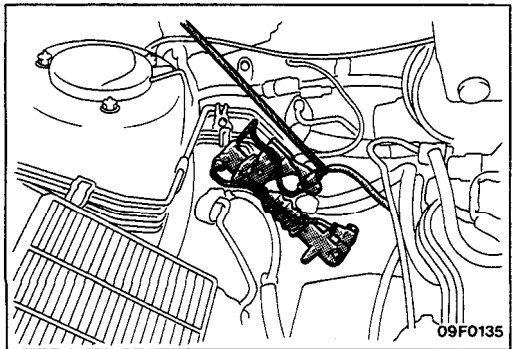
1. Side under cover
2. Battery
3. Battery seat, Washer tank
4. Air cleaner cover,
Air intake hose
5. Connection for clutch release cylinder
6. Connection for clutch tube bracket
and clutch damper assembly
7. Connection for transaxle control
cable
8. Connection for speedometer cable

- Post-installation Operation**
- Installation of Front Under Cover (Refer to GROUP 51 -Front Bumper.)
 - Supplying of Transmission Oil (Refer to P.22-9.)
 - Filling of Engine Coolant (Refer to GROUP 14-Service Adjustment Procedures.)
 - Checking Operation of Shift Lever at Each Position
 - Checking the Operation of the Meters and Gauges



09F0084

- ↔ 9. Connection for transaxle mount
- ↔ 10. Transaxle mount bracket
- * 11. Mounting stopper
- ↔ 12. Transaxle assembly upper part coupling bolt
- ↔ 13. Connection for tie rod end
- ↔ 14. Connection for lower arm ball joint
- ↔ 15. Right member
- ↔ 16. Starter
- ↔ 17. Drive shaft (Left side), inner shaft assembly
- ↔↔↔ 18. Drive shaft (Right side)
- ↔↔ 19. Transaxle stay (Front bank side)
- ↔↔ 20. Transaxle stay (Rear bank side)
- ↔ 21. Transaxle assembly lower part coupling bolt
- ↔ 22. Transaxle assembly



TSB Revision

SERVICE POINTS OF REMOVAL

6. DISCONNECTION OF THE CLUTCH TUBE BRACKET AND CLUTCH DAMPER ASSEMBLY

M22MBBA

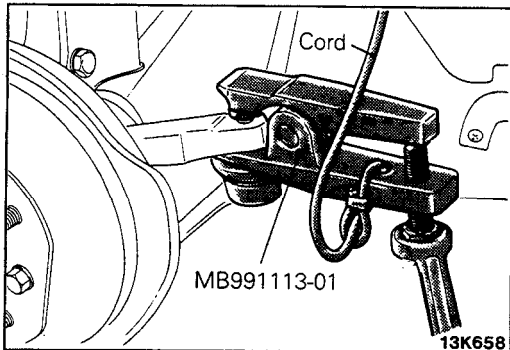
Remove the clutch release cylinder and clutch oil line bracket installation bolt, and then secure at the body side without disconnecting the oil line coupling.

9. DISCONNECTION OF TRANSAXLE MOUNT

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

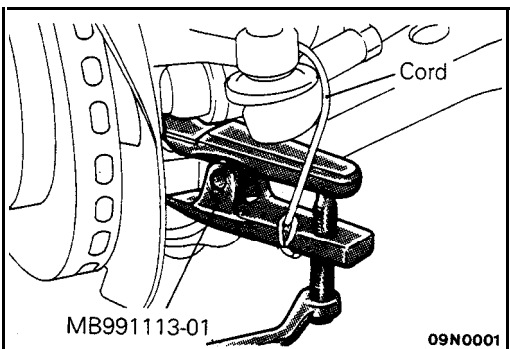
Support the transaxle assembly with the jack so that no localized force is applied to the assembly.

**13. DISCONNECTION OF TIE ROD END**

Using the special tool, disconnect the tie rod end from the knuckle.

Caution

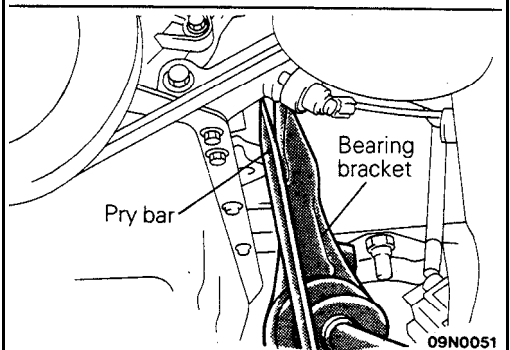
1. Be sure to tie the cord of the special tool to the nearby part.
2. Loosen the nut but do not remove it.

**14. DISCONNECTION OF LOWER ARM BALL JOINT**

Using the special tool, disconnect the lower arm ball joint from the knuckle.

Caution

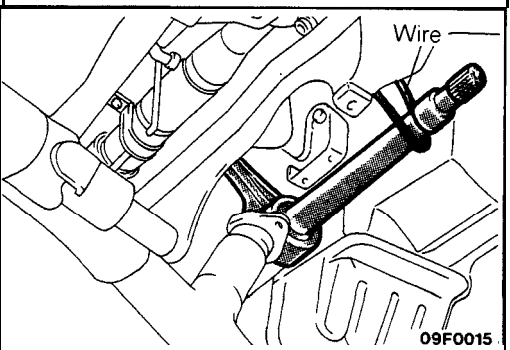
1. Be sure to tie the cord of the special tool to the nearby part.
2. Loosen the nut but do not remove it.

**17. REMOVAL OF DRIVE SHAFT (LEFT SIDE), INNER SHAFT ASSEMBLY**

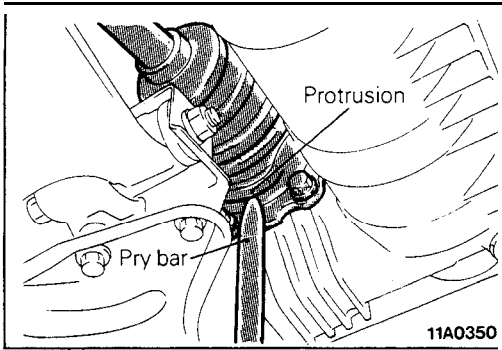
- (1) Remove the bearing bracket mounting bolts and insert the pry bar between the bearing bracket and the cylinder block.
- (2) Remove drive shaft (left side) and inner shaft assembly from transaxle assembly.

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.



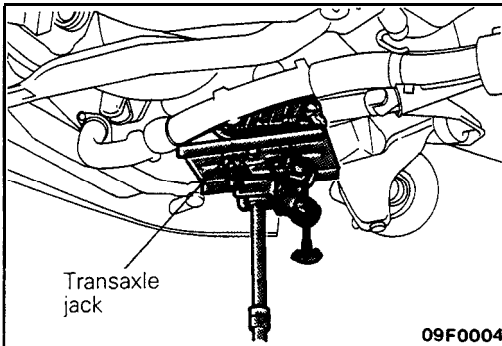
18. REMOVAL OF DRIVE SHAFT (RIGHT SIDE)

- (1) To remove drive shaft (right side) from transaxle assembly, apply pry bar to the protrusion.

NOTE

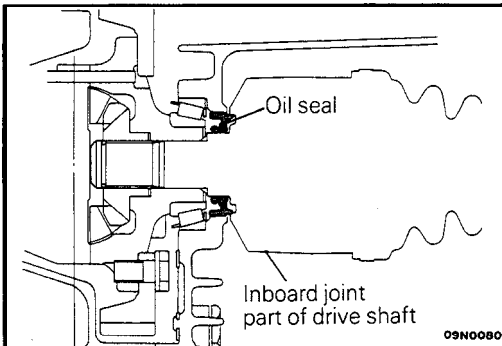
Remove drive shaft (right side) as an assembly together with hub, knuckle, and other parts.

- (2) Suspend the removed drive shaft (right side) with wire or something similar to prevent it from sharply bending or turning at each joint.



21. REMOVAL OF TRANSAXLE ASSEMBLY LOWER PART COUPLING BOLT / 22. TRANSAXLE ASSEMBLY

Support transaxle assembly with a transaxle jack and remove transaxle assembly lower part coupling bolt; then, lower transaxle assembly.



SERVICE POINTS OF INSTALLATION

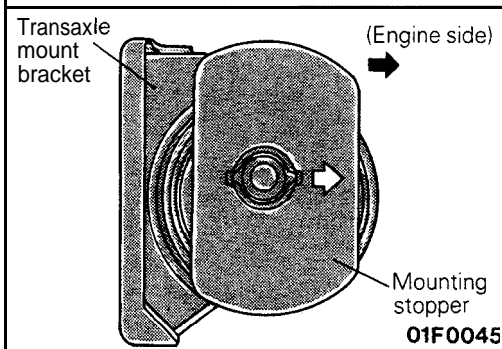
M22MDAT

18. INSTALLATION OF DRIVE SHAFT (RIGHT SIDE)

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).



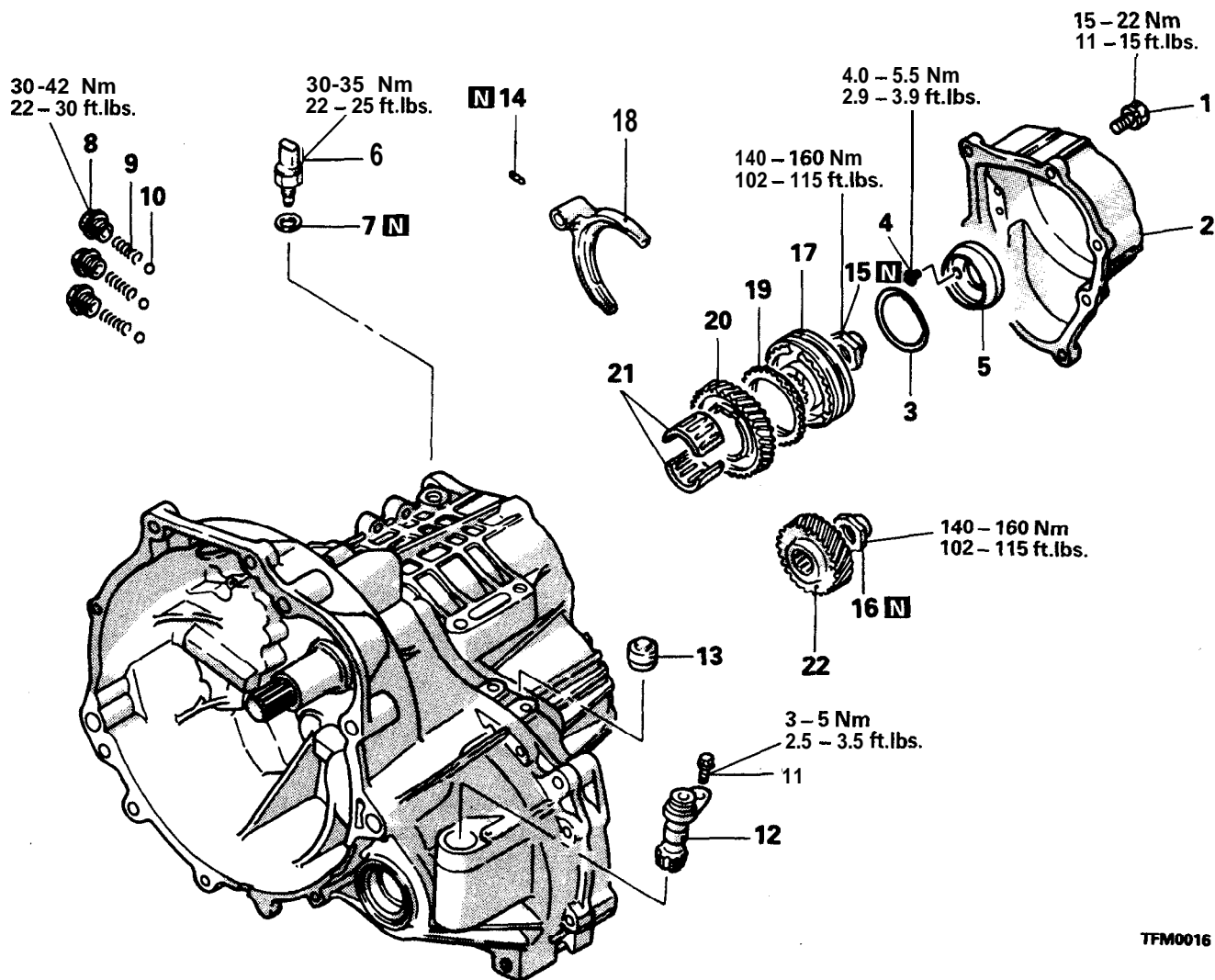
11. INSTALLATION OF MOUNTING STOPPER

Install mounting stopper in the direction shown.

TRANSAXLE ASSEMBLY

M22ME-A

DISASSEMBLY AND REASSEMBLY



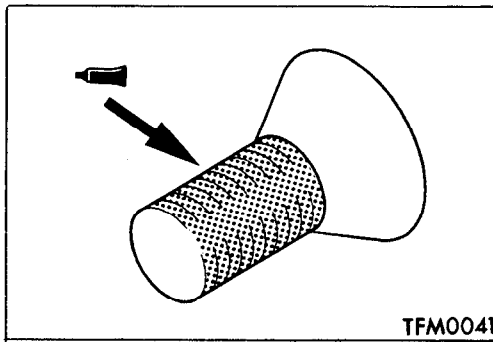
TFM0016

Disassembly steps

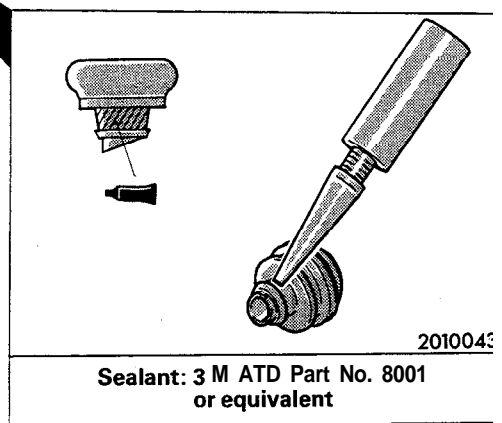
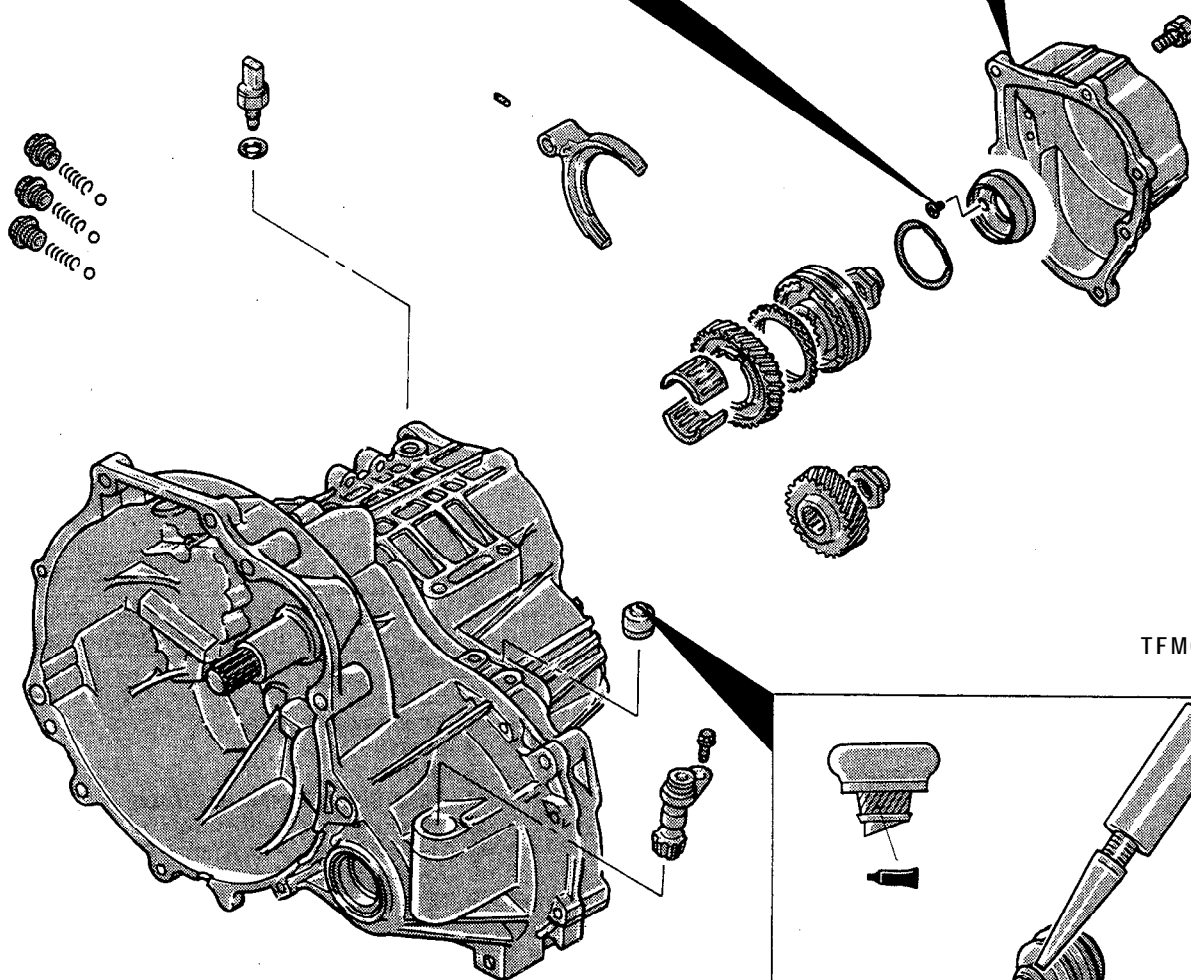
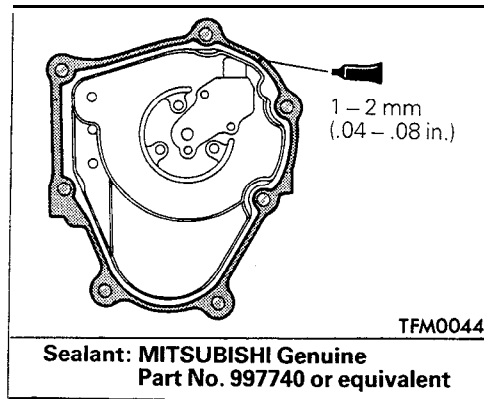
1. Bolt
2. Rear cover
3. Wave spring
4. Screw bolts
5. Reverse brake cone
6. Backup light switch
7. Gasket
8. Poppet plug
9. Poppet spring
10. Poppet ball
11. Bolt
12. Speedometer driven gear assembly
13. Air breather
- ◆◆◆◆ 14. Spring pin

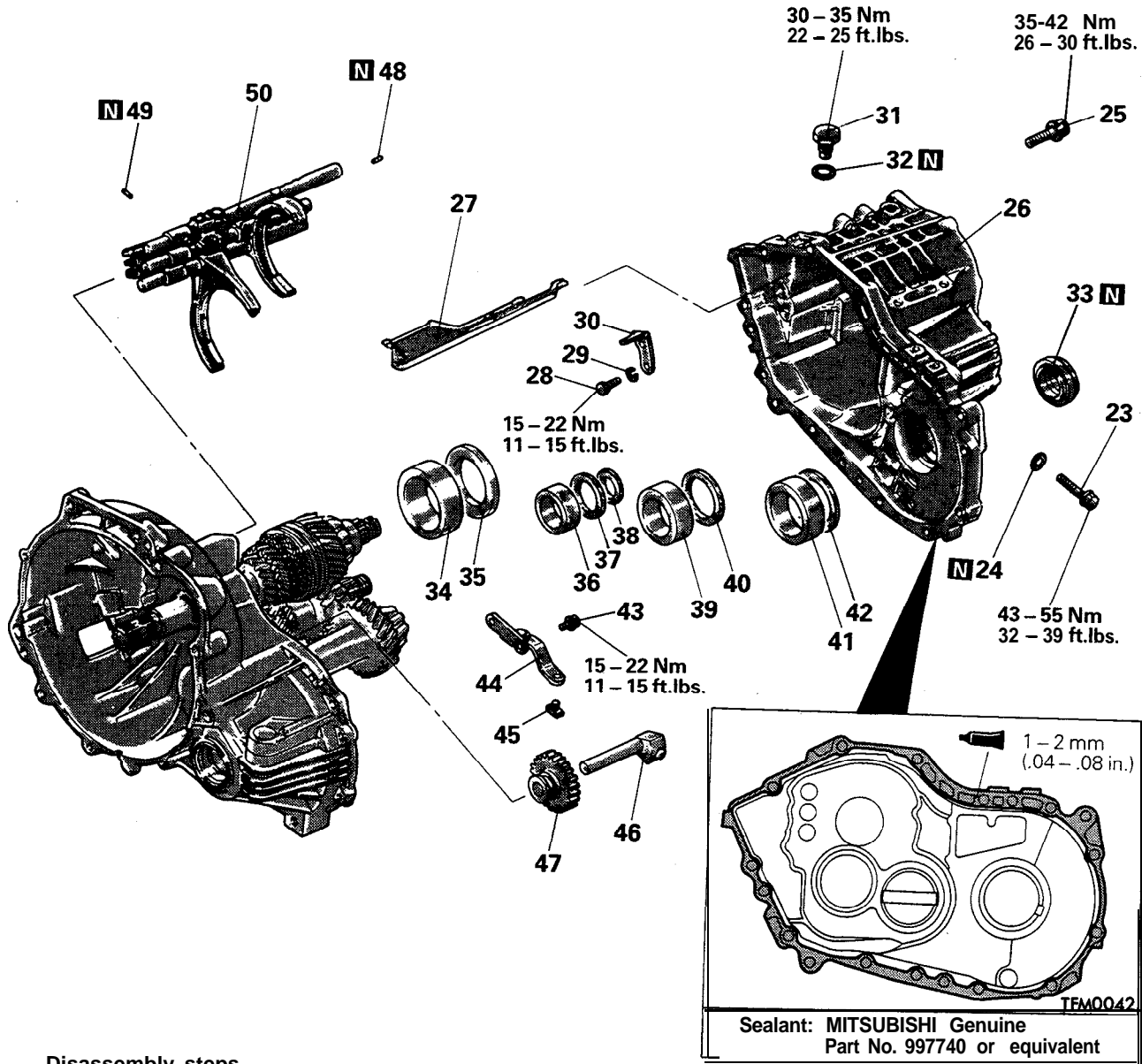
- ◆◆ ● * 15. Lock nut
- ◆◆ ● + 16. Lock nut
- 17. 5th speed synchronizer assembly
- 18. 5th speed shift fork
- 19. Synchronizer ring
- 20. 5th speed gear
- 21. Needle bearing
- 22. 5th speed intermediate gear

SEALING AND ADHESION POINTS



Adhesive: 3M Stud Locking Part No. 4170 or equivalent



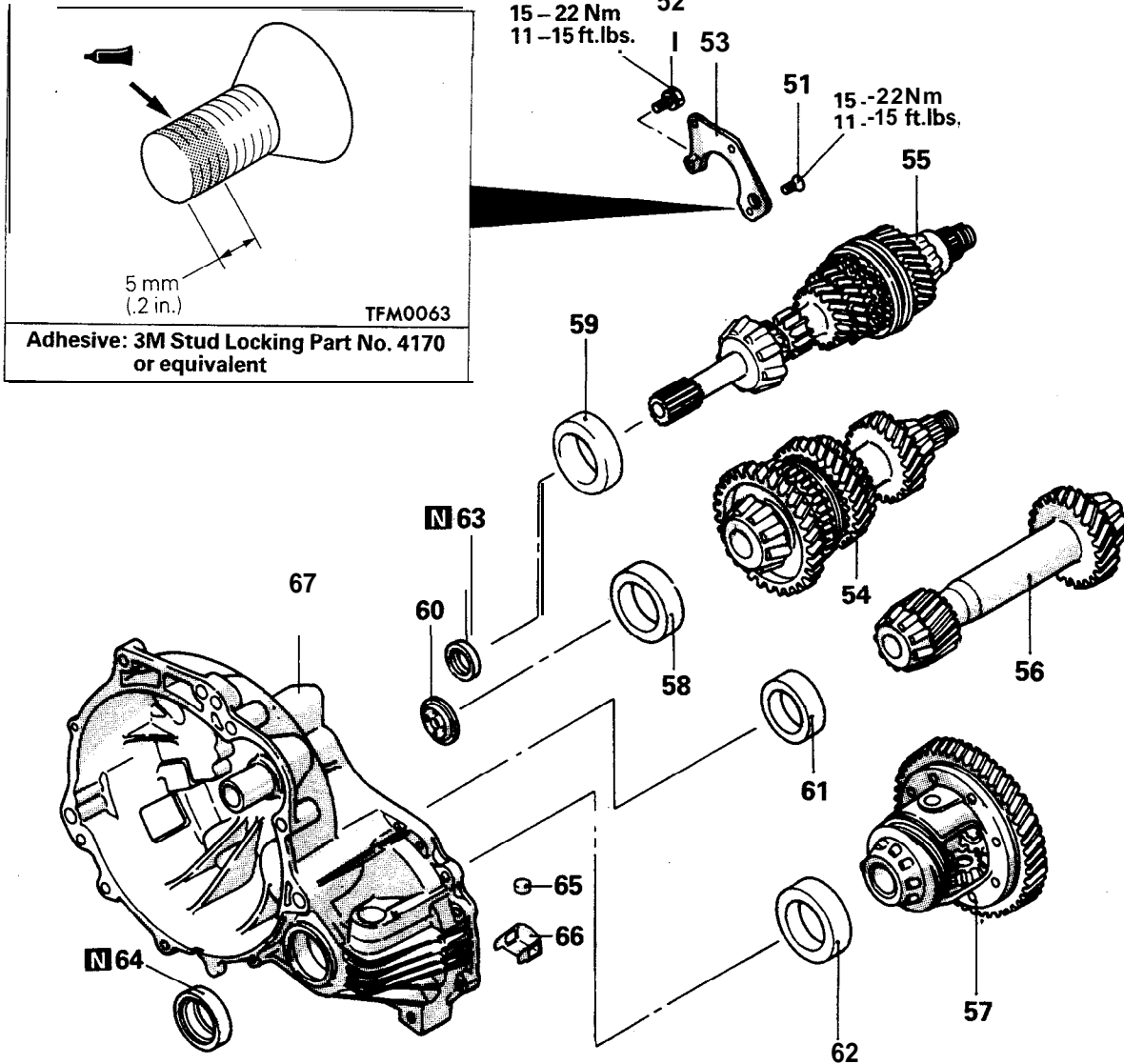


Disassembly steps

- 23. Reverse idler gear shaft bolt
- 24. Gasket
- 25. Bolt
- * 26. Transaxle case
- ◆◆ 27. Oil guide
- 28. Bolt
- 29. Spring washer
- 30. Stopper bracket
- 31. Restrict ball assembly
- 32. Gasket
- ◆◆ 33. Oil seal
- 34. Bearing outer race
- a 35. Spacer
- 36. Bearing outer race
- a 37. Spacer
- 38. Filter
- 39. Bearing outer race

- ◆◆ 40. Spacer
- 41. Bearing outer race
- * 42. Spacer
- 43. Bolt
- 44. Reverse shift lever assembly
- 45. Reverse shift lever shoe
- ◆◆ 46. Reverse idler gear shaft
- 47. Reverse idler gear
- ◆◆◆◆ 48. Spring pin
- ◆◆ ● * 49. Spring pin
- ◆◆◆◆ 50. Shift rail assembly

TFM0109

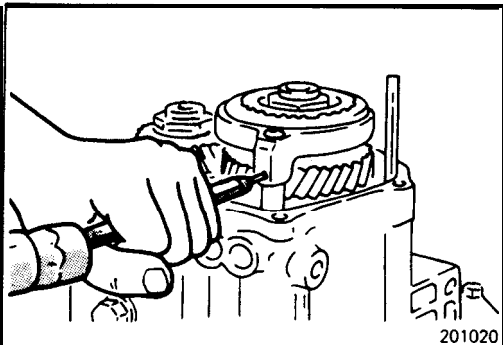


TFM0063

Adhesive: 3M Stud Locking Part No. 4170 or equivalent

TFM0026

- 51. Screw
- 52. Bolt
- 53. Bearing retainer
- 54. Intermediate gear assembly
- 55. Input shaft assembly
- 56. Output shaft assembly
- 57. Differential gear assembly
- 58. Bearing outer race
- 59. Bearing outer race
- 60. Oil guide
- 61. Bearing outer race
- 62. Bearing outer race
- ◆◆ 63. Oil seal
- 4 64. Oil seal
- 65. Magnet
- 66. Magnet holder
- 67. Clutch housing assembly



SERVICE POINTS OF DISASSEMBLY

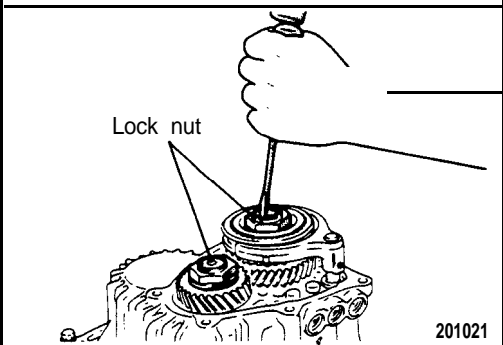
M22MFAW

14. REMOVAL OF SPRING PIN

Remove the spring pin using a pin punch.

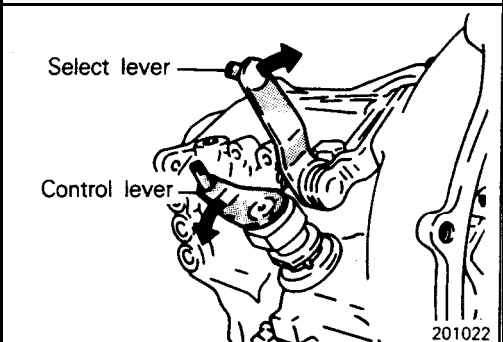
NOTE

If the spring pin interferes with the synchronizer ring or cone gear, rotate the gear for dislocation and remove the spring pin.

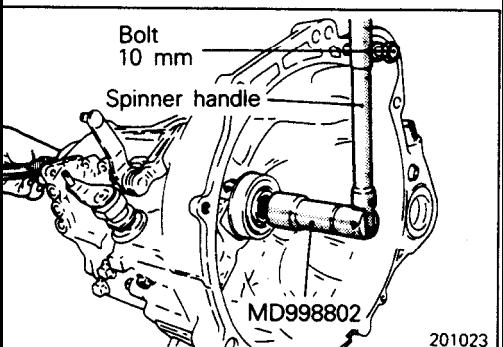


15.16. REMOVAL OF LOCK NUTS

(1) Unstake lock nuts of the input shaft and intermediate gear.



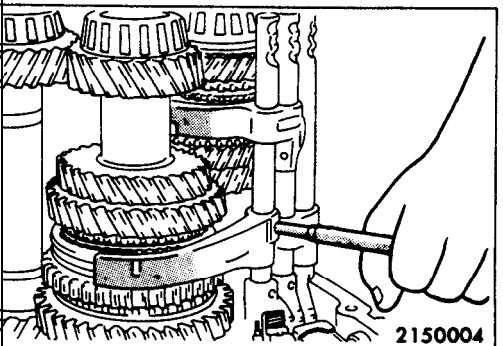
(2) Shift the transaxle in reverse using the control lever and select lever.



(3) Install the special tool onto the input shaft.

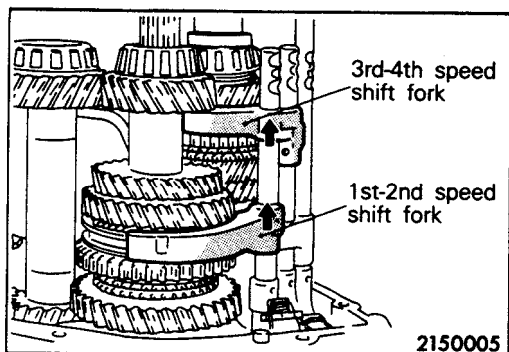
(4) Screw a bolt [10 mm] into the hole on the periphery of clutch housing and attach a spinner handle to the special tool.

(5) Remove the lock nut, while using the bolt as a spinner handle stopper.



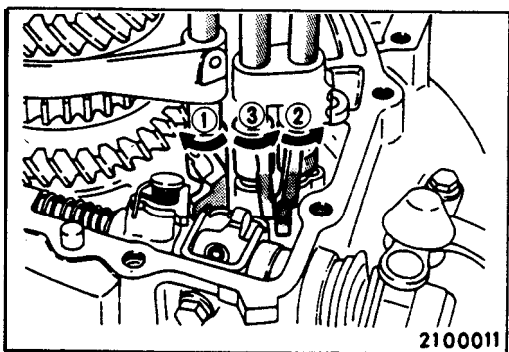
48.49. REMOVAL OF SPRING PINS

Remove the spring pins for 1 st-2nd and 3rd-4th speed shift forks using a pin punch.

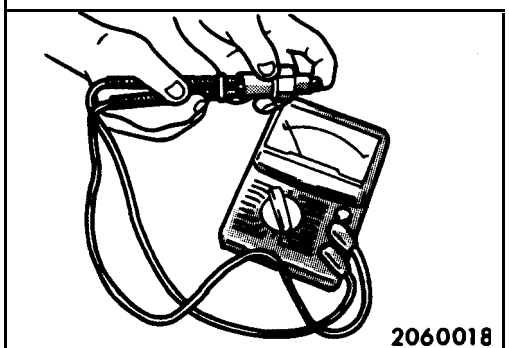


50. REMOVAL OF SHIFT RAIL ASSEMBLY

- (1) Shift the 1st-2nd speed shift fork to the 2nd speed.
- (2) Shift the 3rd-4th speed shift fork to the 4th speed.



- (3) Remove the shift rail assembly.

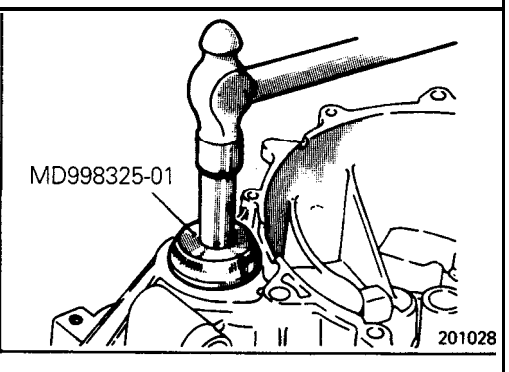


INSPECTION

M22MOAB

BACKUP LIGHT SWITCH

Operate the backup light switch to check continuity with a circuit tester.
If without continuity, replace the switch.

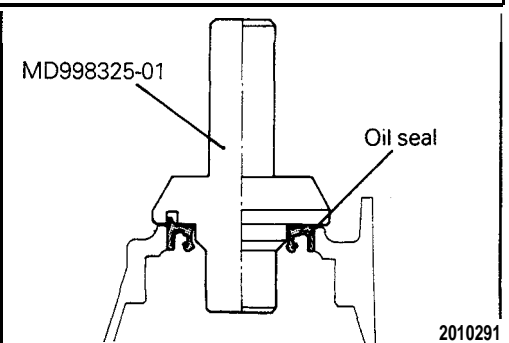


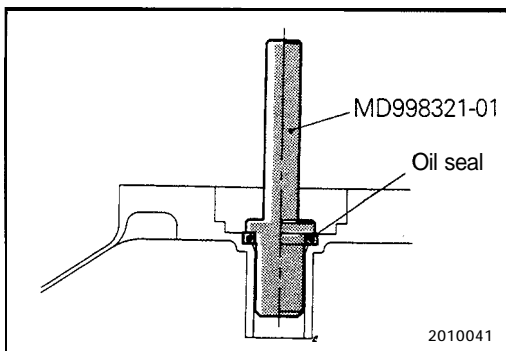
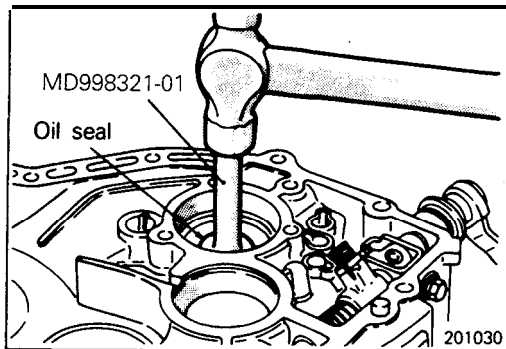
SERVICE POINTS OF REASSEMBLY

M22MGAX

54. INSTALLATION OF OIL SEAL

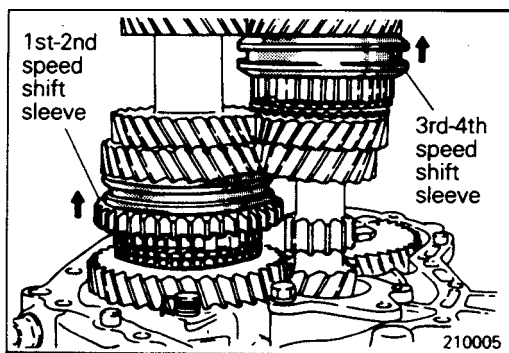
Install the drive shaft oil seal using the special tool.





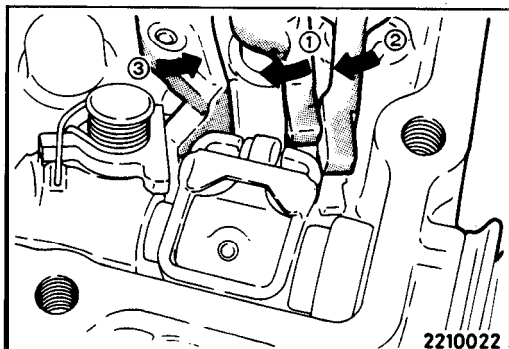
63. INSTALLATION OF OIL SEAL

Install the input shaft front oil seal using the special tool.

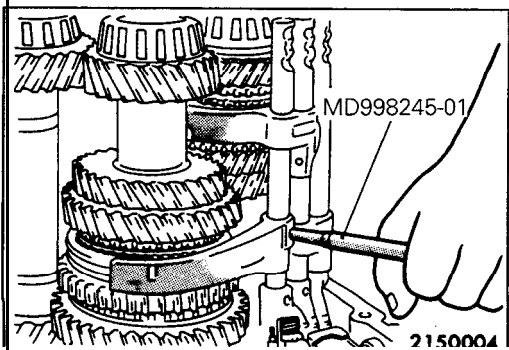


50. INSTALLATION OF SHIFT RAIL ASSEMBLY

- (1) Set the 1 st-2nd speed shift sleeve at 2nd speed.
- (2) Set the 3rd-4th speed shift sleeve at 4th speed.
- (3) Fit the shift forks of shift rail assembly to groove of sleeves.



- (4) Insert the shift rails into the shift rail holes of clutch housing.
- (5) Turn the shift rails in the directions indicated by the arrows in the order shown in the illustration, and engage the shift lugs to control finger and the interlock plate.

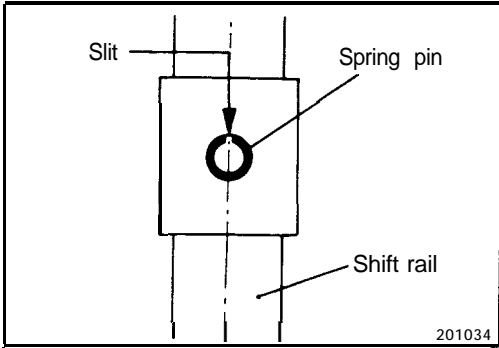


48.49. INSTALLATION OF SPRING PINS

- (1) Install the spring pins using the special tool or a pin punch.

Caution

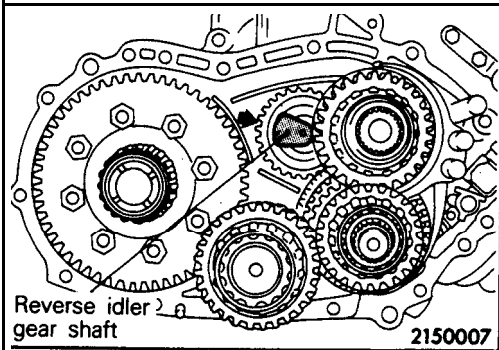
Do not reuse the spring pins.



- (2) When installing, make sure that the slit of the spring pin is aligned with the shift rail center line.

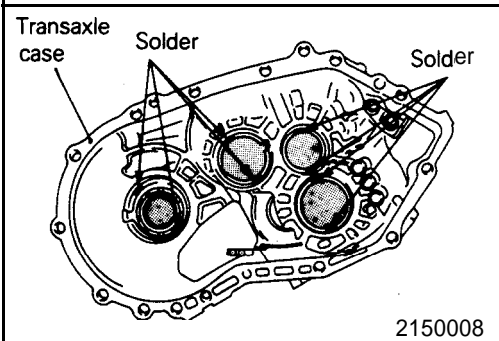
46. INSTALLATION OF REVERSE IDLER GEAR SHAFT

Install in the direction illustrated.



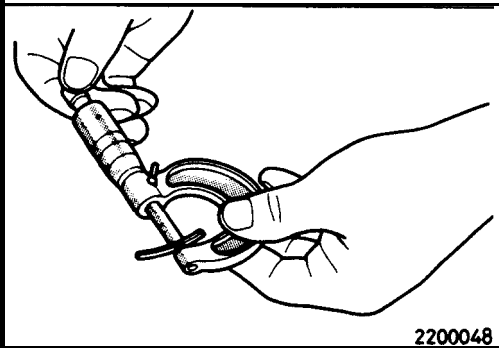
35.37. 40. 42. INSTALLATION OF SPACERS

- (1) Place two pieces of solder measuring about 10 mm (.4 in.) in length and 1.6 mm (.06 in.) in diameter as illustrated and install the outer races.
- (2) Install the transaxle case and tighten the bolts to specified torque.
- (3) Remove the transaxle case.
- (4) Remove the outer races and remove the solder.
- (5) If solder is not crushed, perform steps (1) to (4) with a solder with a larger diameter.
- (6) Measure the thickness of the crushed solder with a micrometer and select and install a spacer of thickness that gives standard preload and end play.



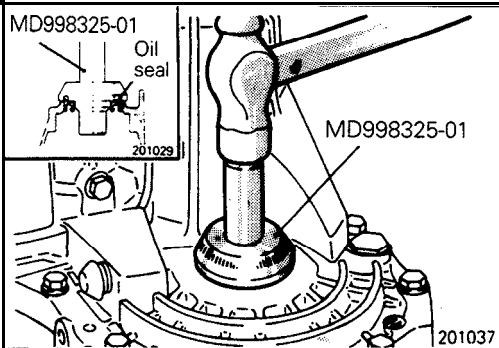
Standard value:

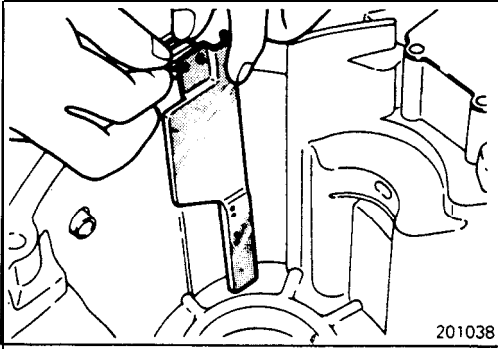
- Input shaft end play**
0 – 0.05 mm (0 – .002 in.)
- Intermediate gear preload**
0.05 – 0.10 mm (.002 – .004 in.)
- Output shaft preload**
0.05 – 0.10 mm (.002 – .004 in.)
- Differential case preload**
0.05 – 0.10 mm (.002 – .004 in.)



33. INSTALLATION OF OIL SEAL

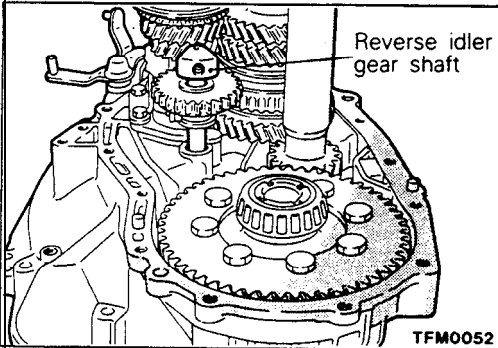
Install the drive shaft oil seal using the special tool.





27. INSTALLATION OF OIL GUIDE

Install the oil guide to the transaxle case as illustrated.



26. INSTALLATION OF TRANSAXLE CASE

- (1) Place the selected spacers on the intermediate gear and differential's bearing outer race. Also insert the selected spacer between the output shaft bearing outer race and the transaxle case.
- (2) Set so that the threaded hole of the reverse idler gear shaft's head is facing in the direction indicated in the illustration.

NOTE

If there is a great deviation in the direction in which the threaded hole is facing, it will be impossible to align the threaded hole and the hole in the case after the transaxle case is installed.

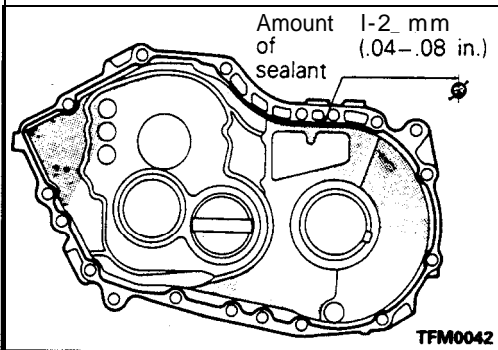
- (3) Apply specified sealant to the clutch housing side of the transaxle case.

**Specified' sealant: MITSUBISHI genuine
Part No. MD997740 or equivalent**

Caution

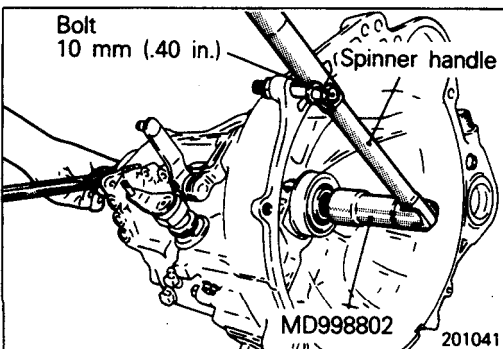
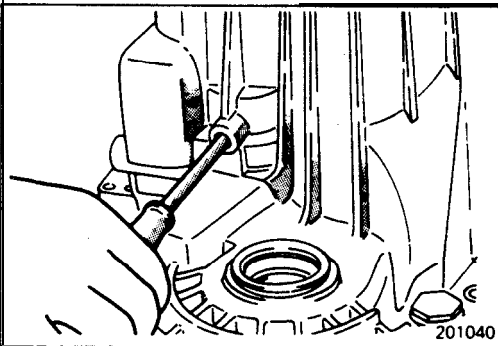
Squeeze out sealant from the tube uniformly without excess or discontinuity.

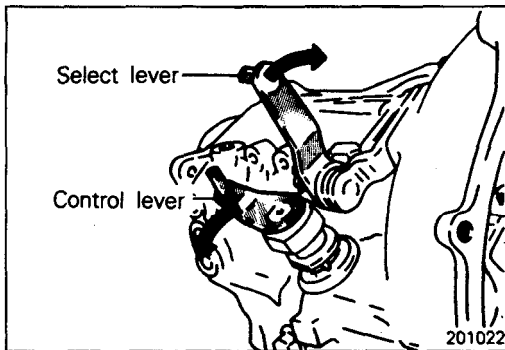
- (4) Install the transaxle case onto the clutch housing.
- (5) Insert a Phillips screwdriver [8 mm (.32 in.) shaft diameter] into the bolt hole in the case, as shown in the figure, and use it to align the threaded hole of the reverse idler gear shaft with the bolt hole in the transaxle case.
- (6) Install the reverse idler gear shaft bolt and tighten the bolt by fingers.
- (7) Tighten the all transaxle tightening bolts to specified torque.
- (8) Tighten the reverse idler gear shaft bolt to specified torque.



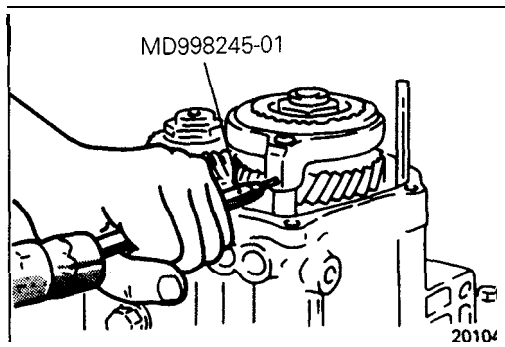
16.15. INSTALLATION OF LOCK NUTS

- (1) Install the special tool to the splined end of input shaft.
- (2) Screw a bolt [10 mm (.40 in.)] into the hole on the periphery of clutch housing and attach a spinner handle to the special tool.





- (3) Shift the transaxle in reverse using control lever and select lever.
- (4) Tighten the lock nut to specified torque, while using the bolt attached in the above step as a spinner handle stopper.
- (5) Loosen the lock nuts.
- (6) Retighten the lock nuts to the specified torque.
- (7) Stake the lock nut.

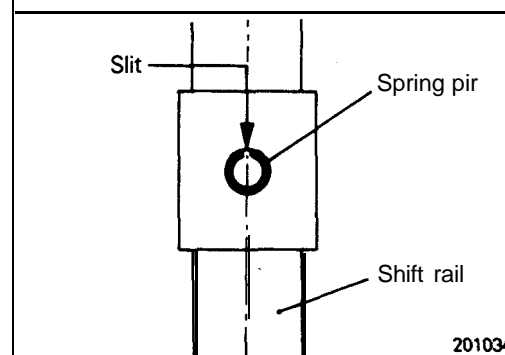


14. INSTALLATION OF SPRING PIN

- (1) Install the spring pin using the special tool or a pin punch.

Caution

Do not reuse the spring pins.

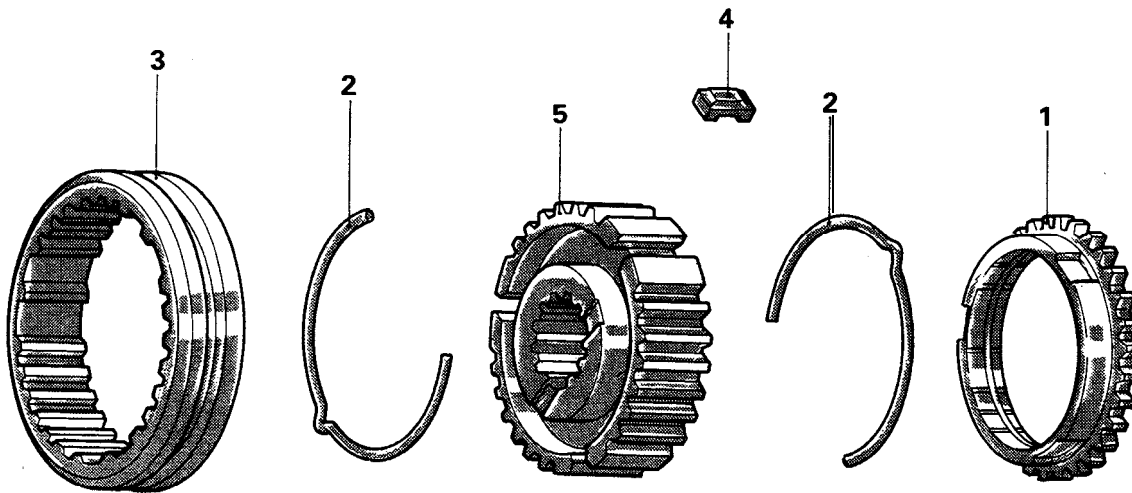


- (2) When installing, make sure that the slit of the spring pin is aligned with the shift rail center line.

5TH SPEED SYNCHRONIZER ASSEMBLY

DISASSEMBLY AND REASSEMBLY

M22MHAN



TEM0118

Disassembly steps

1. Reverse brake ring
- * 2. Synchronizer spring
3. Synchronizer sleeve
- ◆◆ 4. Synchronizer key
- * 5. Synchronizer hub

INSPECTION

SYNCHRONIZER SLEEVE AND HUB

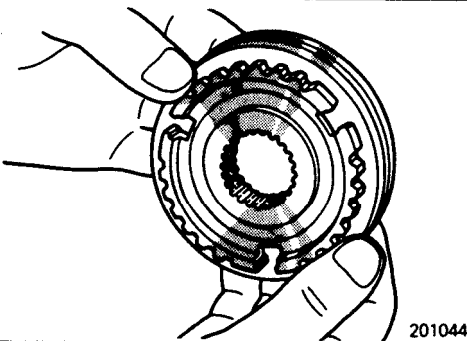
- Combine the synchronizer sleeve and hub and check that they slide smoothly.
- Check that the sleeve is free from damage at its inside front and rear ends.
- Check for wear of the hub front end (surface in contact with the 5th speed gear).

Caution

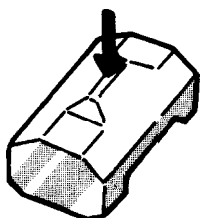
When replacing, replace the synchronizer hub and sleeve as a set.

SYNCHRONIZER KEY AND SPRING

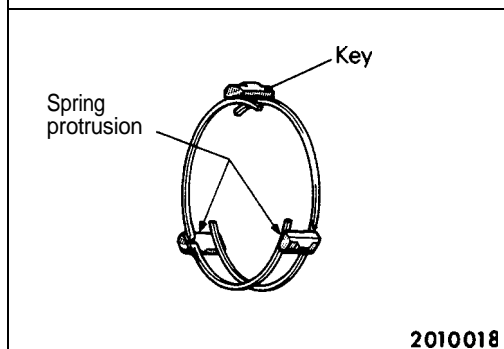
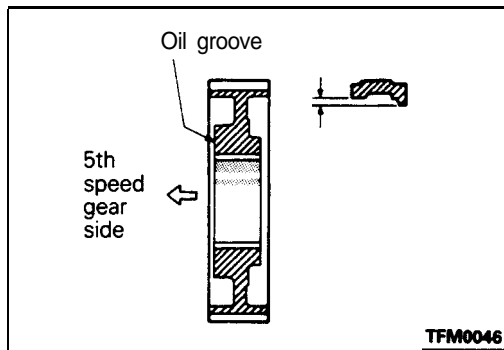
- Check for wear of the synchronizer key center protrusion.
- Check the spring for weakness, deformation and breakage.



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SERVICE POINTS OF REASSEMBLY

5. INSTALLATION OF SYNCHRONIZER HUB / 4. SYNCHRONIZER KEY / 2. SYNCHRONIZER SPRING

- (1) Assemble the synchronizer hub, and key noting their direction.

- (2) Assemble the synchronizer spring so that its projection may be engaged in the groove of the synchronizer key.

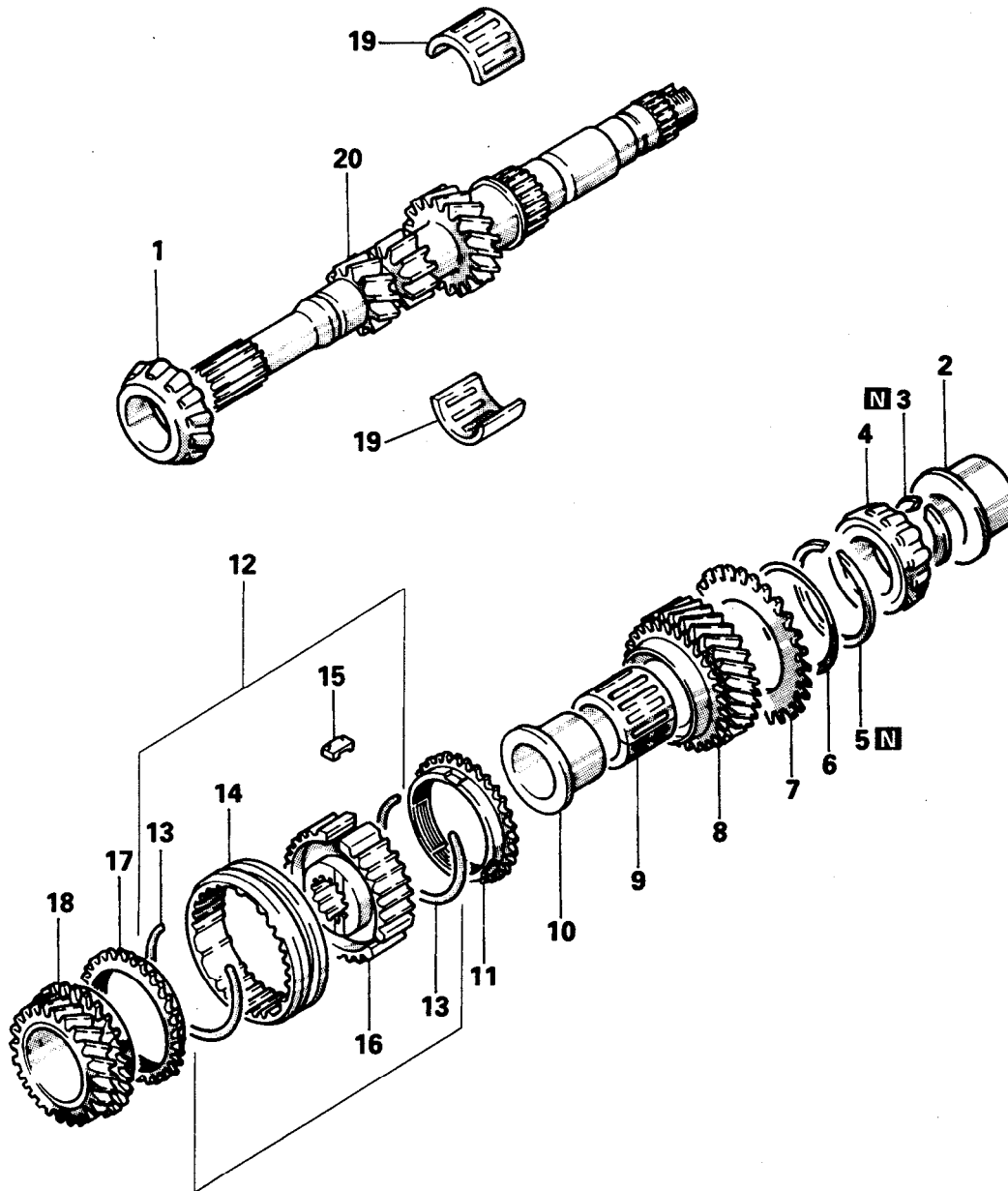
NOTE

Take care to prevent the projections of the front and rear spring from sitting in the groove of the same key.

INPUT SHAFT ASSEMBLY

M22MICA

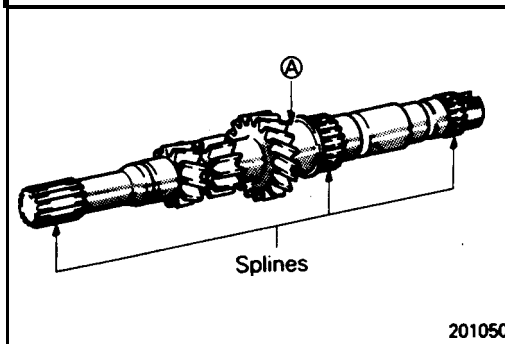
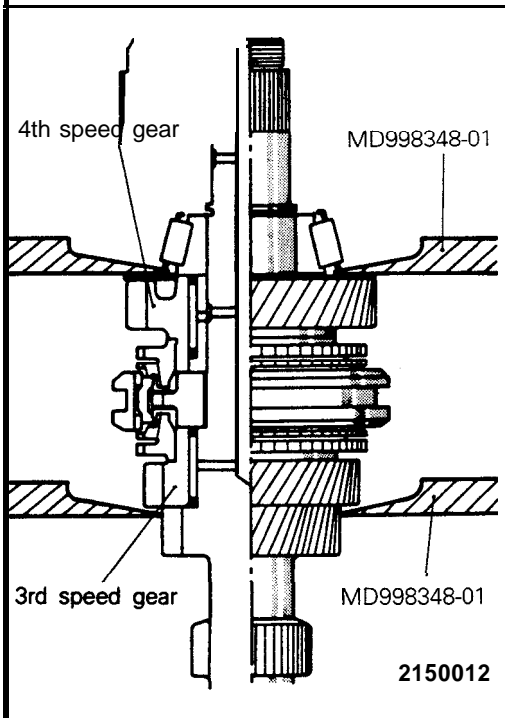
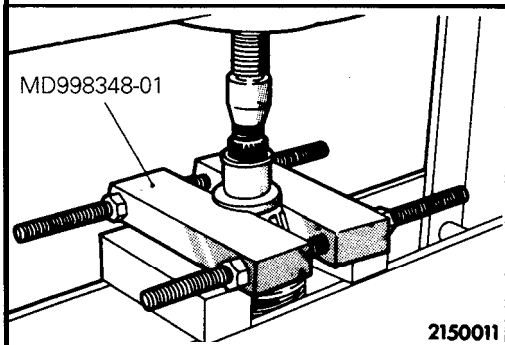
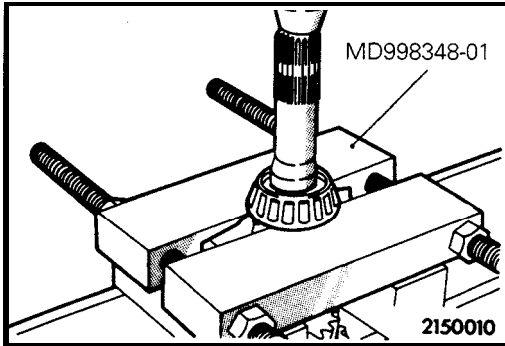
DISASSEMBLY AND REASSEMBLY



2150009

Disassembly steps

- * • a 1. Taper roller bearing
- * ♦♦ 2. Bearing sleeve
- ♦♦ 3. Snap ring
- * • a 4. Taper roller bearing
- 4 5. Snap ring
- ♦♦ 6. Conespring
- * 7. Sub gear
- 8. 4th speed gear
- 9. Needlebearing
- * 10. Bearing sleeve
- 11. Synchronizer ring
- * 12. 3rd-4th speed synchronizer assembly
- ♦♦ 13. Synchronizer spring
- 14. Synchronizer sleeve
- 15. Synchronizer key
- 16. Synchronizer hub
- 17. Synchronizer ring
- 18. 3rd speed gear
- 19. Needle bearing
- 20. Input shaft



SERVICE POINTS OF DISASSEMBLY

1. REMOVAL OF TAPER ROLLER BEARING

Remove the front bearing using the special tool as illustrated.

2. REMOVAL OF BEARING SLEEVE

Remove the bearing sleeve using the special tool as illustrated.

4. REMOVAL OF TAPER ROLLER BEARING

Remove the taper roller bearing together using the special tool as illustrated.

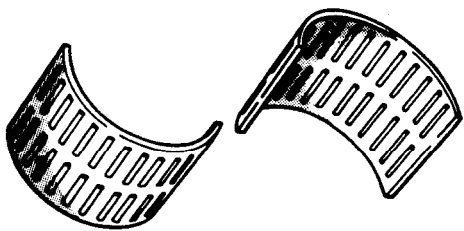
18. REMOVAL OF 3RD SPEED GEAR

Remove the bearing sleeve, 3rd-4th speed synchronizer assembly and 3rd speed gear together using the special tool as illustrated.

INSPECTION

INPUT SHAFT

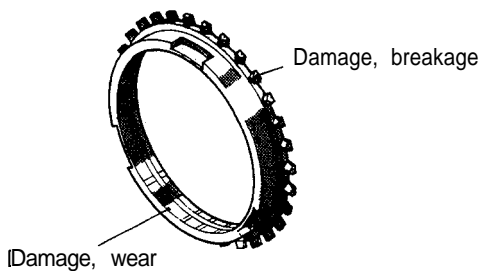
- Check the outer surface of the input shaft where the needle bearing is mounted for damage, abnormal wear and seizure [portion A].
- Check the splines for damage and wear.



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NEEDLE BEARING

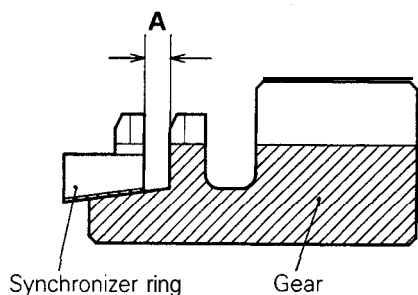
- Combine the needle bearing with the shaft or bearing sleeve and gear and check that it rotates smoothly without abnormal noise or play.
- Check the needle bearing cage for deformation



TFM011*

SYNCHRONIZER RING

- Check the clutch gear teeth for damage and breakage.
- Check paper lining on cone I.D. for damage, wear, and flaking.



Synchronizer ring

Gear

TFM011

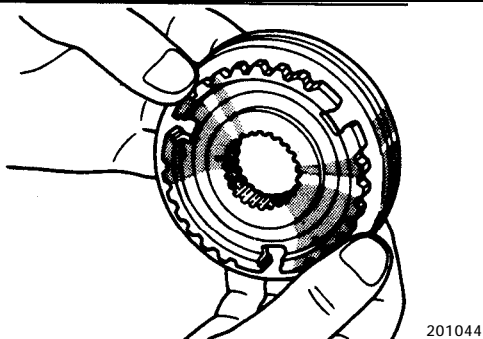
- Force the synchronizer ring toward the clutch gear and check clearance "A". Replace if it is out of specification.
Limit: 0.5 mm (.02 in.)

SYNCHRONIZER SLEEVE AND HUB

- Combine the synchronizer sleeve and hub and check that they slide smoothly.
- Check that the sleeve is free from damage at its inside front and rear ends.
- Check for wear of the hub end surfaces (in contact with each speed gear).

Caution

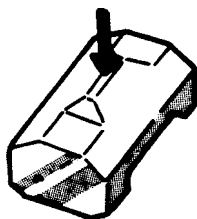
When replacing, replace the synchronizer hub and sleeve as a set.



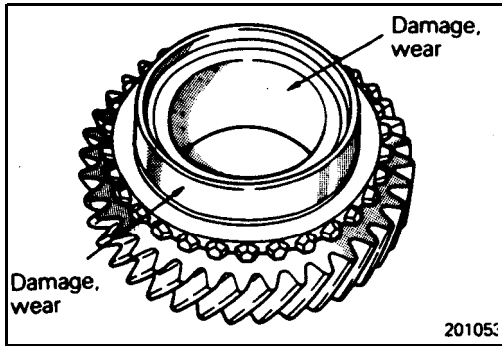
201044

SYNCHRONIZER KEY AND SPRING

- Check for wear of the synchronizer key center protrusion.
- Check the spring for deterioration, deformation and breakage.

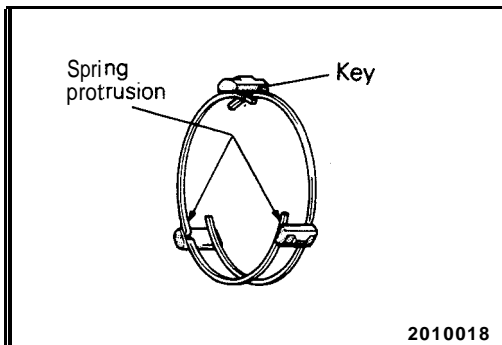


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SPEED -GEARS

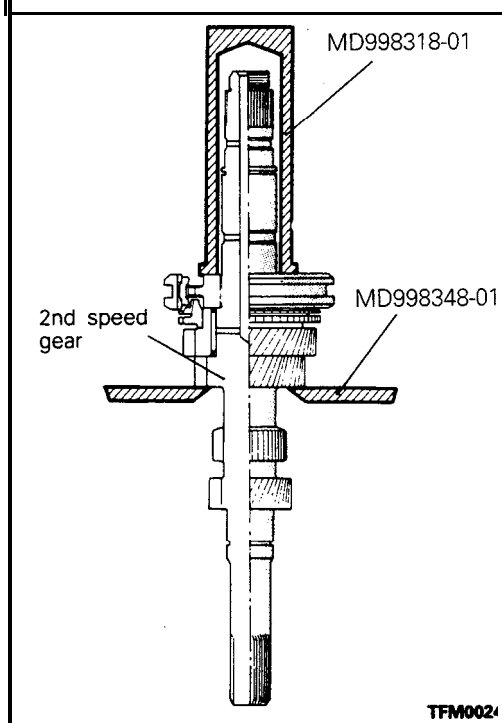
- Check the bevel gear and clutch gear teeth for damage and wear.
- Check the synchronizer cone for rough surface, damage and wear.
- Check the gear bore and front and rear ends for damage and wear.



SERVICE POINTS OF REASSEMBLY

13. INSTALLATION OF SYNCHRONIZER SPRING

Assemble the synchronizer spring so that its projection may be engaged in the groove of the synchronizer key. Take care to prevent the projections of the front and rear spring from sitting in the groove of the same key.



12. INSTALLATION OF 3RD-4TH SPEED SYNCHRONIZER ASSEMBLY

- (1) Install the synchronizer assembly so that the part that has the small round indentation is in the oil groove at the hub end.

NOTE

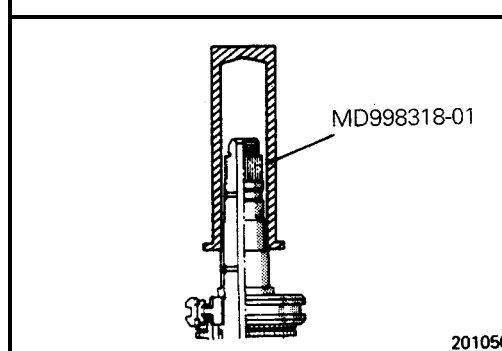
If the installation is in the opposite way, press-in might not be possible. This is because the edge of the hub inner diameter spline at the part that has the small round indentation is made to facilitate pressing in.

- (2) Press the 3rd-4th speed synchronizer assembly onto the input shaft using the special tool as illustrated.

Caution

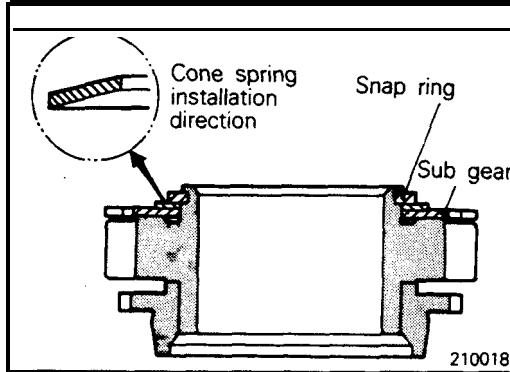
When installing the synchronizer assembly, make sure that three synchronizer keys are seated correctly in respective grooves of the synchronizer ring.

- (3) Check the 3rd speed gear rotates smoothly.



10. INSTALLATION OF BEARING SLEEVE

Use the special tool as illustrated.



7. INSTALLATION OF SUB GEAR / 6. CONE SPRING / 5. SNAP RING

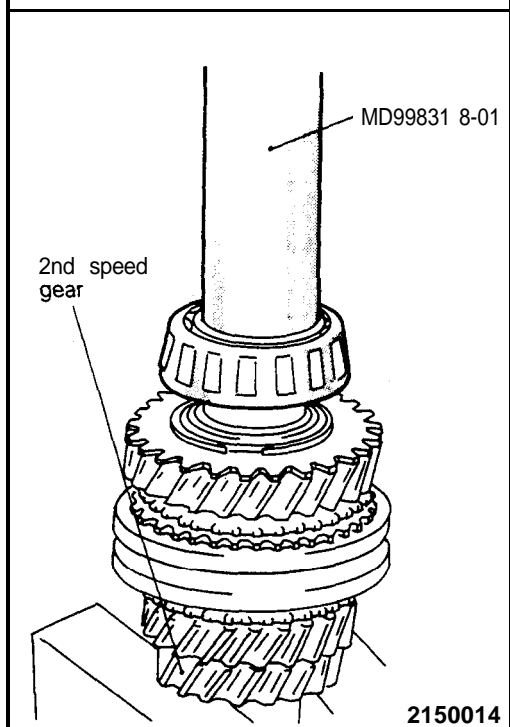
Install the sub gear and cone spring to 4th gear, and then install the snap ring.

NOTE

Be sure that the cone spring is installed so that it is facing in the correct direction.

4. INSTALLATION OF TAPER ROLLER BEARING

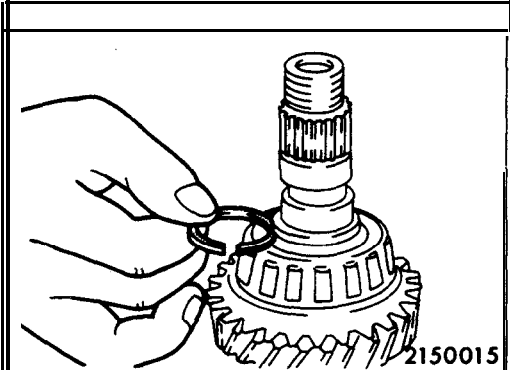
Install the taper roller bearing over the input shaft using the special tool.



3. REASSEMBLY OF SNAP RING

- (1) Select thickest possible snap ring which can enter the snap ring groove.

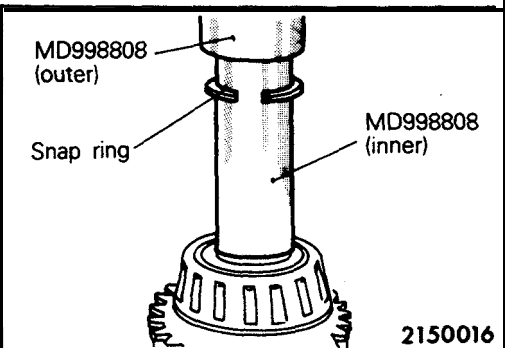
Standard value: 0.01 – 0.09 mm (.0004 – .004 in.)

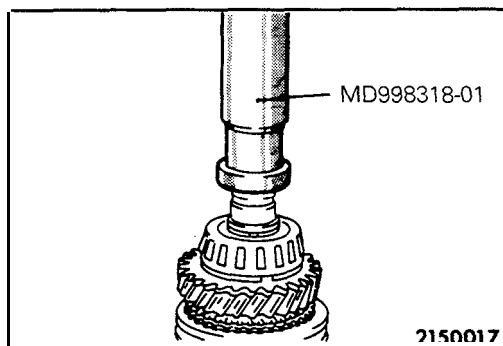


- (2) Using a special tool, attach the snap ring to the input shaft.

Caution

1. Don't reuse the old snap ring.
2. If snap ring pliers are used, the snap ring may sometimes be expanded excessively. This will prevent proper mounting of the sleeve.



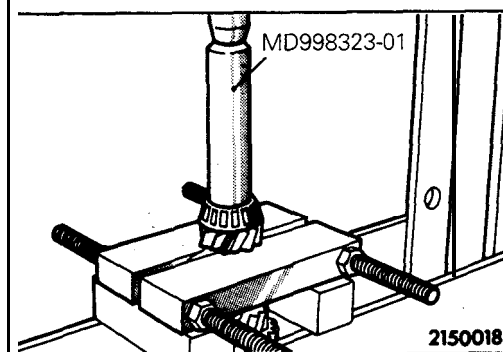


2. REASSEMBLY OF BEARING SLEEVE

- (1) Using a special tool, fit the bearing sleeve to the input shaft.

Caution

After fitting, check that the sleeve flange is closely fit to the bearing.



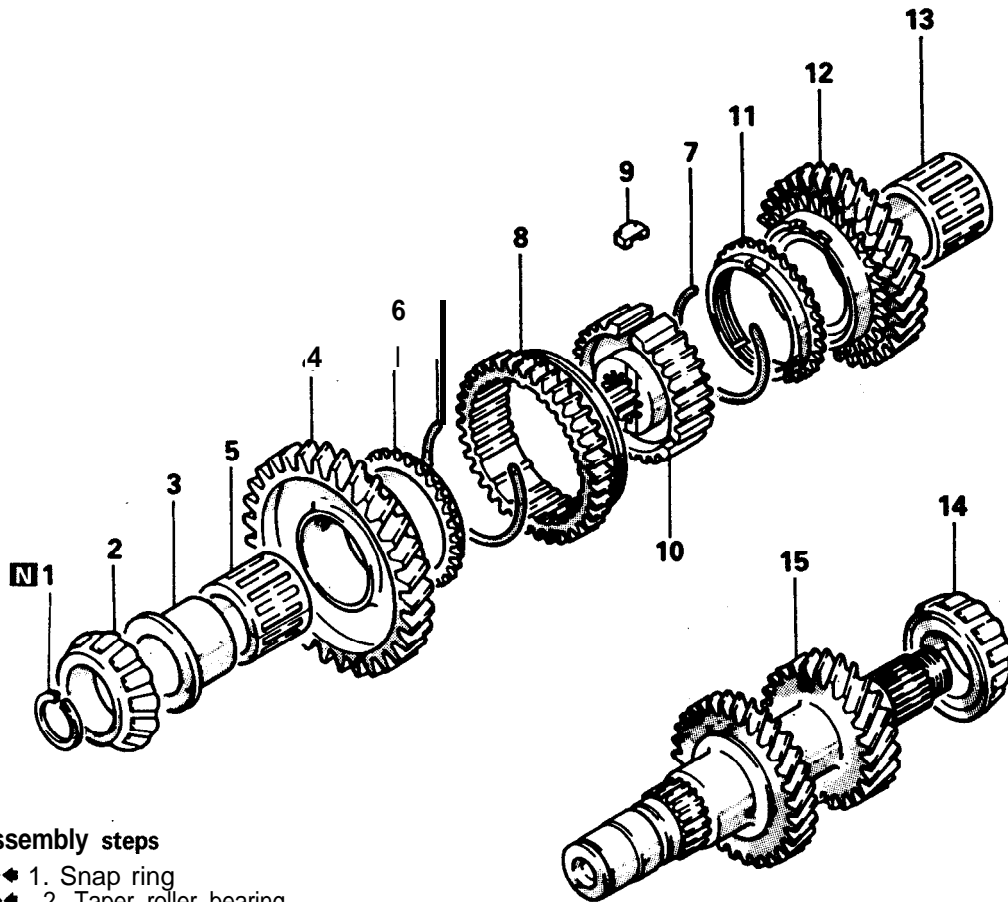
1. INSTALLATION OF TAPER ROLLER BEARING

Install the taper roller bearing over the input shaft using the special tool.

INTERMEDIATE GEAR ASSEMBLY

M22MJAS

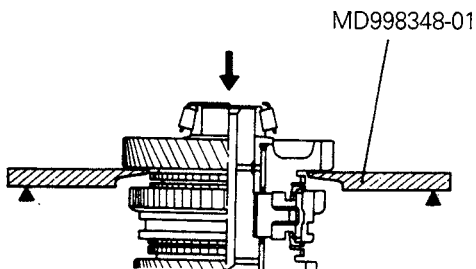
DISASSEMBLY AND REASSEMBLY



Disassembly steps

- ◆◆ 1. Snap ring
- *◆◆ 2. Taper roller bearing
- ◆◆ 3. Bearing sleeve
- ☒ 4. 1st speed gear
- 5. Needle bearing
- a 6. Synchronizer ring
- * 7. Synchronizer spring
- ◆◆ 8. 1st-2nd speed synchronizer sleeve
- ◆◆ 9. Synchronizer key
- ◆◆◆◆ 10. 1st-2nd speed synchronizer hub
- * 11. Synchronizer ring
- ☒ 12. 2nd speed gear
- 13. Needle bearing
- ◆◆ ● * 14. Taper roller bearing
- 15. Intermediate gear

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SERVICE POINTS OF DISASSEMBLY

2. REMOVAL OF TAPER ROLLER BEARING / 4. 1ST SPEED GEAR

Remove the taper roller bearing, 1st speed gear and bearing sleeve using the special tool as illustrated.

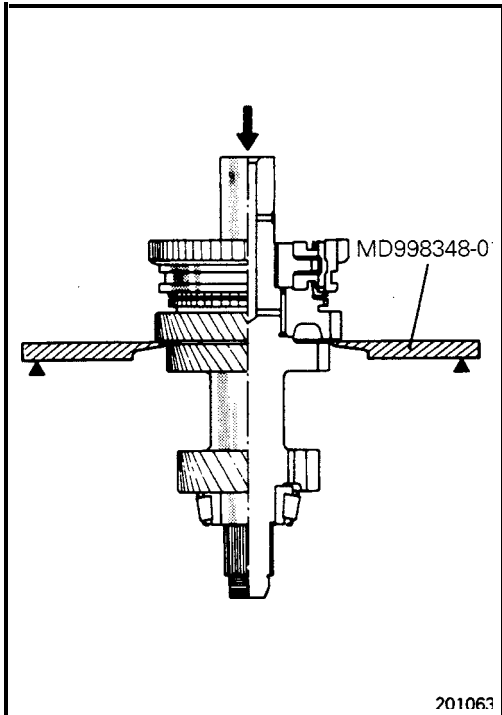
Caution

1. Do not reuse the bearing removed from the shaft.
2. Replace the inner and outer races of the taper roller bearing as a set.

TSB Revision

**10. REMOVAL OF 1ST-2ND SPEED SYNCHRONIZER HUB /
12. 2ND SPEED GEAR**

Remove the 1 st-2nd speed synchronizer assembly and 2nd speed gear together using the special tool as illustrated.

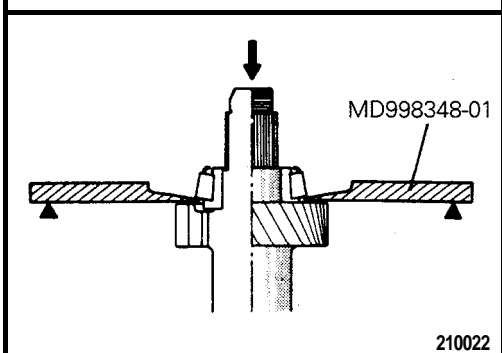


14. REMOVAL OF TAPER ROLLER BEARING

Use the special tool as illustrated.

Caution

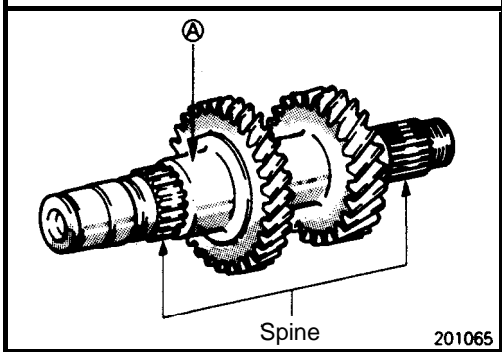
1. Do not reuse the bearing removed from the shaft.
2. Replace the inner and outer races of the taper roller bearing as a set.



INSPECTION

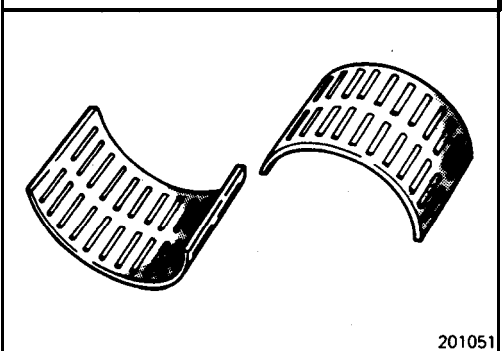
INTERMEDIATE GEAR

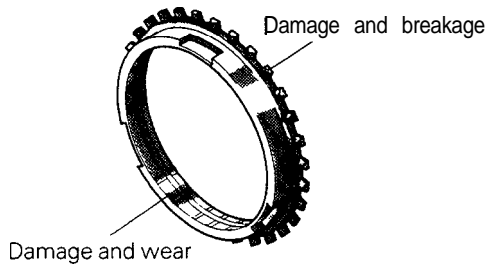
- Check the outer surface of the intermediate gear where the needle bearing is mounted for damage, abnormal wear and seizure [portion Ⓐ].
- Check the splines for damage and wear.



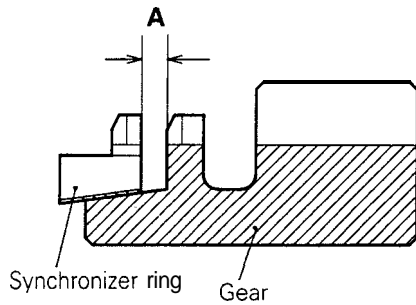
NEEDLE BEARING

- Combine the needle bearing with the shaft or bearing sleeve and gear and check that it rotates smoothly without abnormal noise or play.
- Check the needle bearing cage for deformation.





TFM0119



TFM0117

SYNCHRONIZER RING

- Check the clutch gear teeth for damage and breakage.
- Check paper lining on cone I.D. for damage, wear, and flaking.

- Force the synchronizer ring toward the clutch gear and check clearance "A". Replace if it is out of specification.

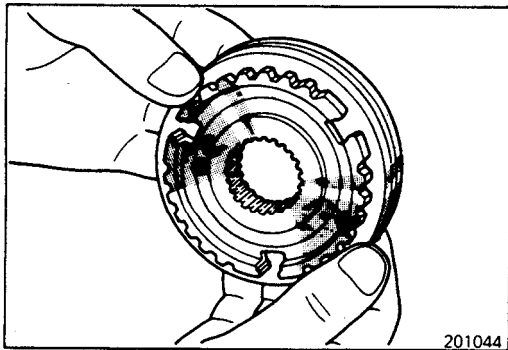
Limit: 0.5 mm (.02 in.)

SYNCHRONIZER SLEEVE AND HUB

- Combine the synchronizer sleeve and hub and check that they slide smoothly.
- Check that the sleeve is free from damage at its inside front and rear ends.
- Check for wear of the hub end surfaces (in contact with each speed gear).

Caution

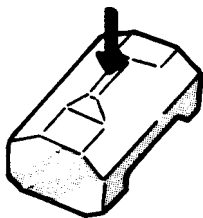
When replacing, replace the synchronizer hub and sleeve as a set.



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SYNCHRONIZER KEY AND SPRING

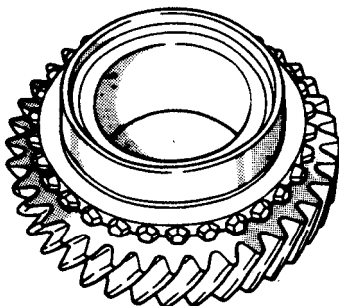
- Check for wear of the synchronizer key center protrusion.
- Check the spring for weakness, deformation and breakage.



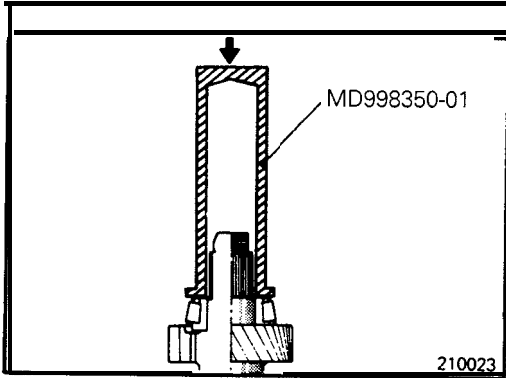
201045

SPEED GEARS

- Check the bevel gear and clutch gear teeth for damage and wear.
- Check the synchronizer cone for rough surface, damage and wear.
- Check the gear bore and front and rear ends for damage and wear.



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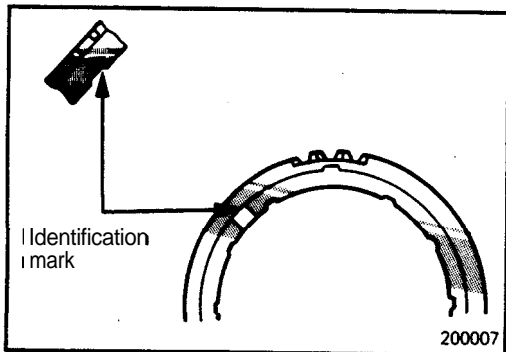
SERVICE POINTS OF REASSEMBLY

14. INSTALLATION OF TAPER ROLLER BEARING

Install the taper roller bearing over the intermediate gear using the special tool.

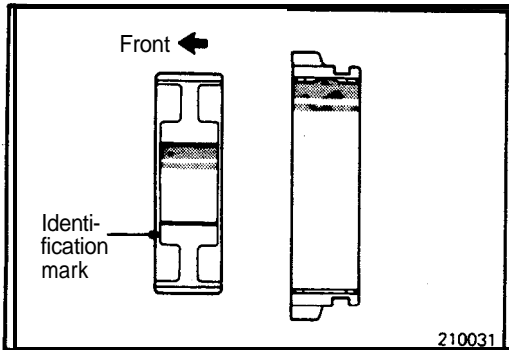
Caution

When installing the bearing, push the inner race only.



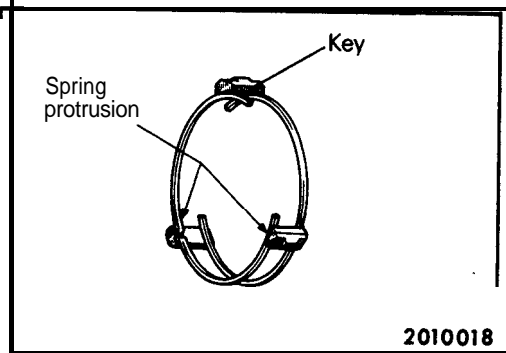
11. 6. INSTALLATION OF SYNCHRONIZER RINGS

The 1 st speed synchronizer ring has an identification mark.



10. INSTALLATION OF 1ST-2ND SPEED SYNCHRONIZER HUB / 9. SYNCHRONIZER KEY / 8. 1ST-2ND SPEED SYNCHRONIZER SLEEVE / 7. SYNCHRONIZER SPRING

(1) Combine the 1st-2nd speed synchronizer hub and sleeve as illustrated.

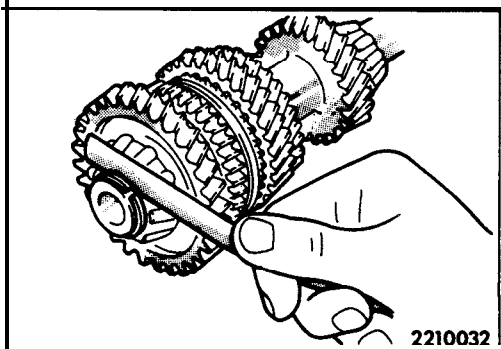
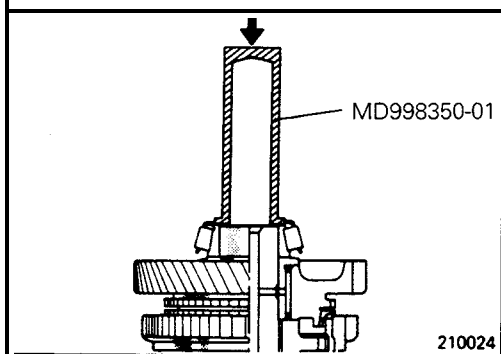
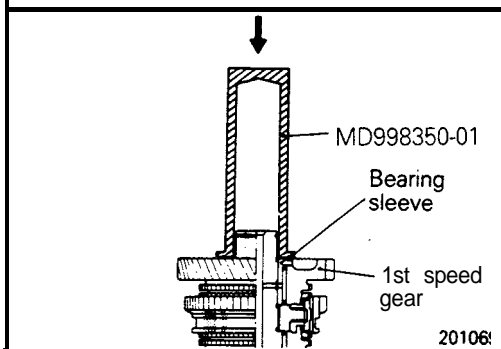
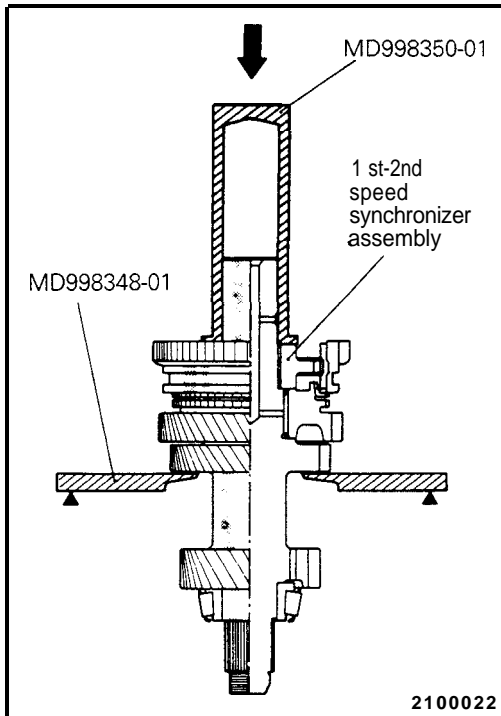


(2) Assemble the synchronizer spring so that its projection may be engaged in the groove of the synchronizer key.

NOTE

(1) Take care to prevent the projections of the front and rear spring from sitting in the groove of the same key.

(2) A synchronizer spring of a different shape from what is shown may be installed; however, there is no difference in installation procedure.



- (2) Install the 1st-2nd speed synchronizer assembly over the intermediate gear using the special tool.

Caution

1. When installing the synchronizer assembly, make sure that three synchronizer keys are seated correctly in respective grooves of the synchronizer ring.
2. After installation of the synchronizer assembly, check that the 3rd speed gear rotates smoothly.

3. INSTALLATION OF BEARING SLEEVE

Install the 1st speed gear and bearing sleeve together over the intermediate gear using the special tool.

2. INSTALLATION OF TAPER ROLLER BEARING

Install the taper roller bearing over the intermediate using the special tool.

Caution

When installing the bearing, push the inner race only.

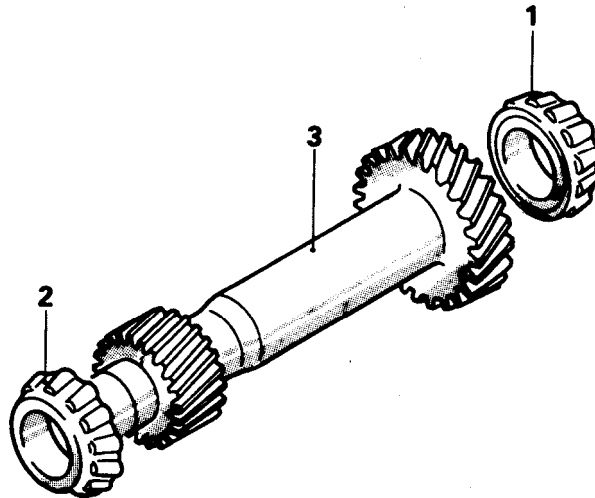
1. INSTALLATION OF SNAP RING

Select and install a snap ring that will result in an intermediate gear bearing end play that is the standard value.

Standard value: 0.01 – 0.14 mm (.0004 – .006 in.)

OUTPUT SHAFT ASSEMBLY
DISASSEMBLY AND REASSEMBLY

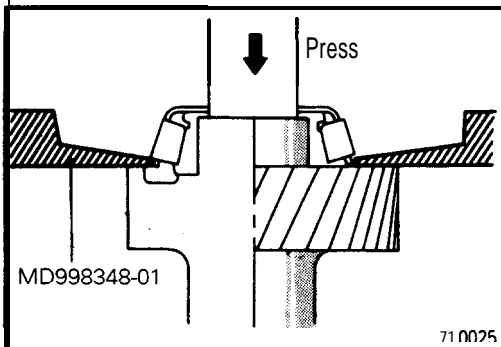
M22MKAH



Disassembly steps

- ◆◆ ● * 1. Taper roller bearing
- ◆◆ ◆◆ 2. Taper roller bearing
- 3. Output shaft

210028



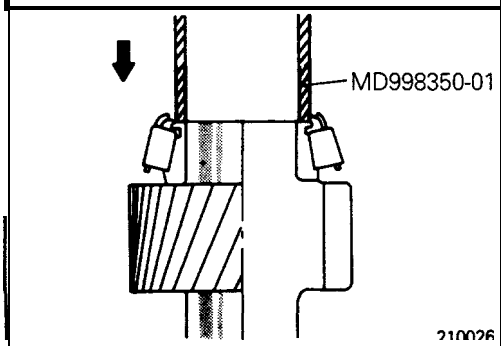
SERVICE POINTS OF DISASSEMBLY

1. 2. REMOVAL OF TAPER ROLLER BEARINGS

Remove the taper roller bearing using the special tool as illustrated.

Caution

1. Do not reuse the bearings removed from the shaft.
2. Replace the inner and outer races of the taper roller bearing as a set.



SERVICE POINTS OF REASSEMBLY

1. 2. INSTALLATION OF TAPER ROLLER BEARINGS

Install the taper roller bearing using the special tool.

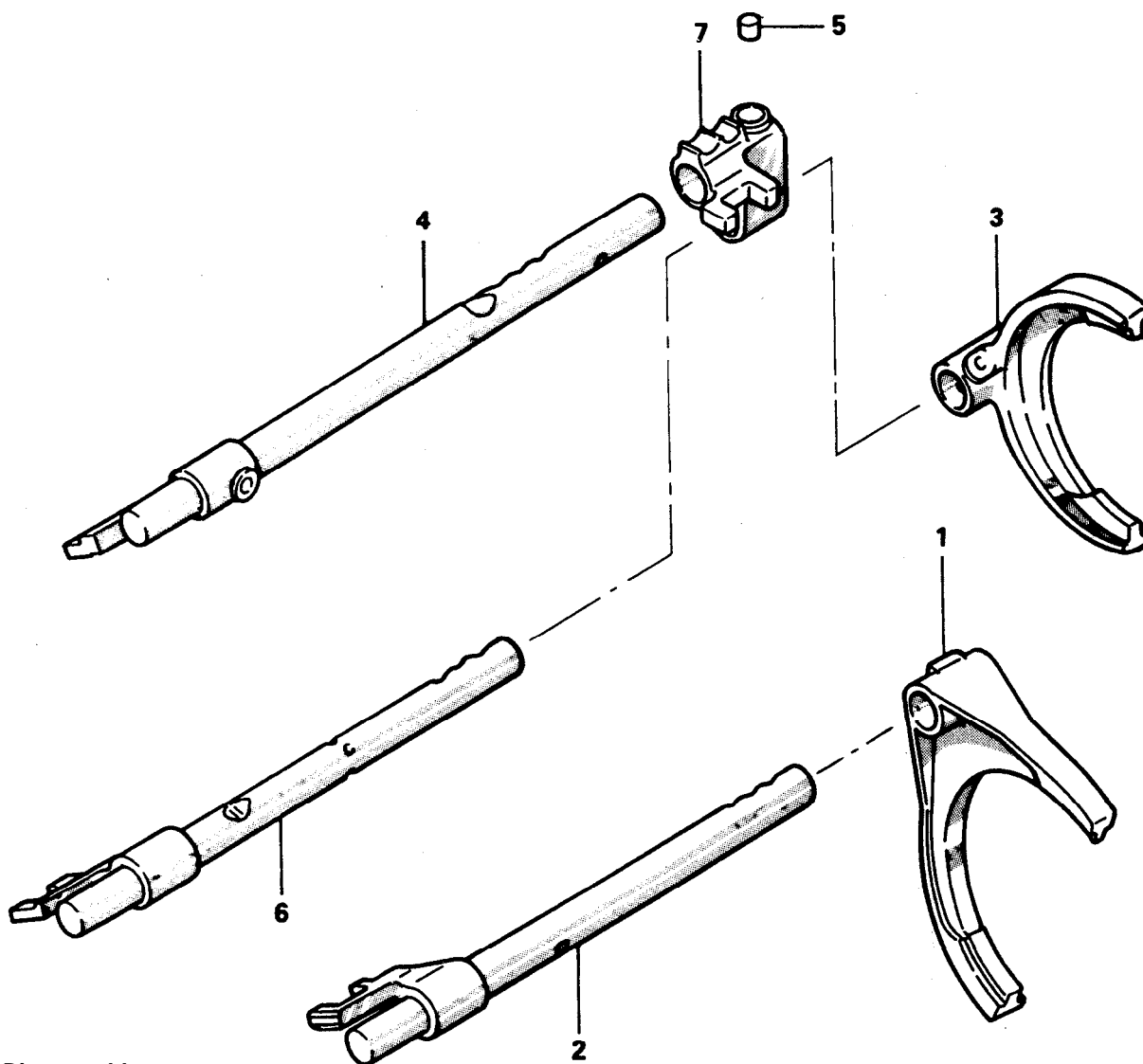
Caution

When installing the bearing, push the inner race only.

SHIFT RAILS AND FORKS

M22MLAF

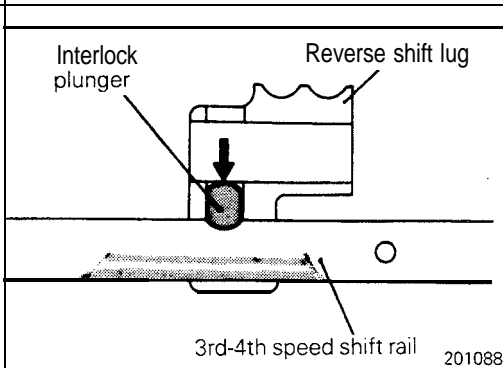
DISASSEMBLY AND REASSEMBLY



Disassembly steps

1. 1st-2nd speed shift fork
2. 1st-2nd speed shift rail
3. 3rd-4th speed shift fork
4. 5th-reverse speed shift rail
- a 5. Interlock plunger
6. 3rd-4th speed shift rail
7. Reverse shift lug

201073



SERVICE POINT OF REASSEMBLY

5. INSTALLATION OF INTERLOCK PLUNGER

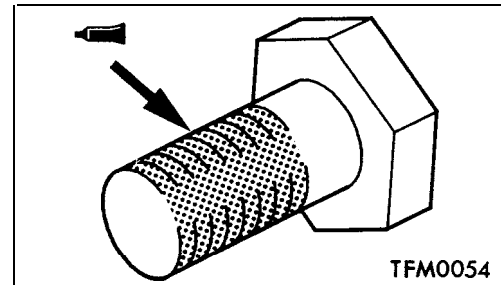
Insert the interlock plunger at illustrated position of the 3rd-4th speed shift rail.

M22MMAH

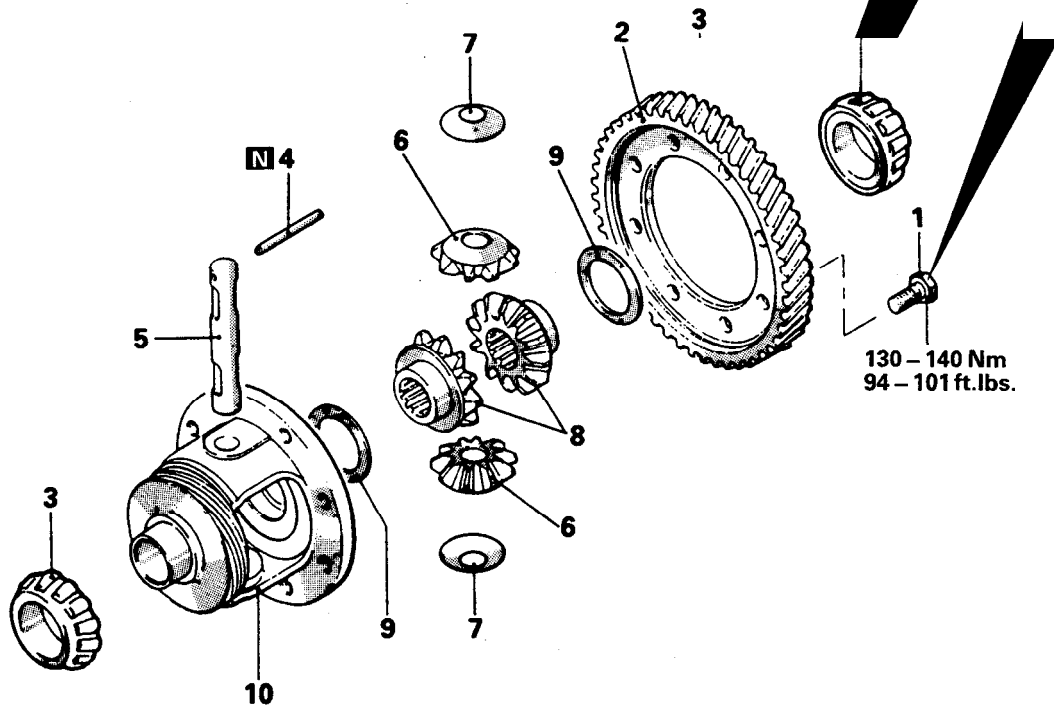
DIFFERENTIAL ASSEMBLY
DISASSEMBLY AND REASSEMBLY

Disassembly steps

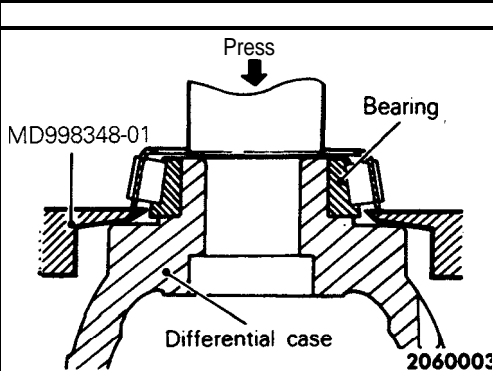
- ◆◆ 1. Bolt
- 2. Differential drive gear
- ◆◆◆◆ 3. Taper roller bearing
- + 4. Lock pin
- * 5. Pinion shaft
- * 6. Pinion
- * 7. Washer
- ◆◆◆ 8. Side gear
- * 9. Spacer (Select)
- 10. Differential case



Adhesive: 3M Stud Locking
 Part No. 4170 or equivalent



163025



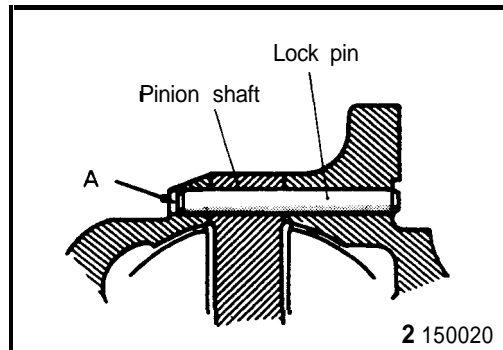
SERVICE POINTS OF DISASSEMBLY

3. REMOVAL OF TAPER ROLLER BEARING

Remove the taper roller bearing using the special tool as illustrated.

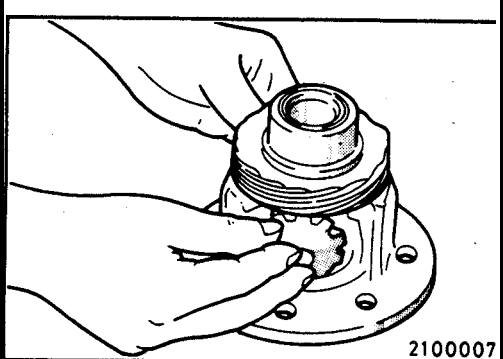
Caution

1. Do not reuse the bearing removed from the differential case.
2. Replace the inner and outer races of the taper roller bearing as a set. ,



4. REMOVAL OF LOCK PIN

Drive out the lock pin from the hole A using a punch.



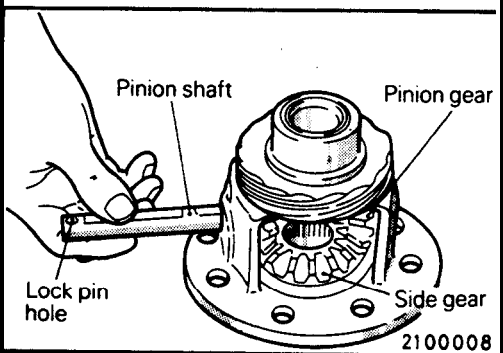
SERVICE POINTS OF REASSEMBLY

9. INSTALLATION OF SPACER / 8. SIDE GEAR / 7. WASHER / 6. PINION / 5. PINION SHAFT

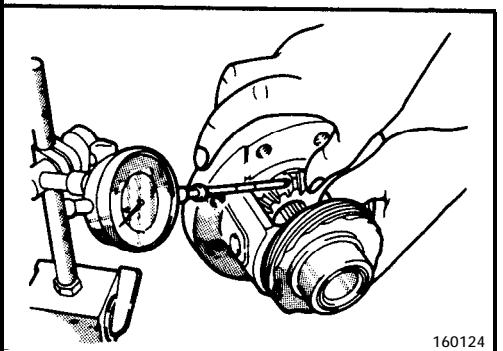
- (1) Install the spacer on the back of the side gear and then install the gear in the differential case.

Caution

When installing a new side gear, use a spacer of medium thickness [0.93 – 1.00 mm (.036 – .04 in.)].



- (2) Set the washer on the back of each pinion and insert the two pinions to specified position while engaging them with the side gears and turning them.
- (3) Insert the pinion shaft.



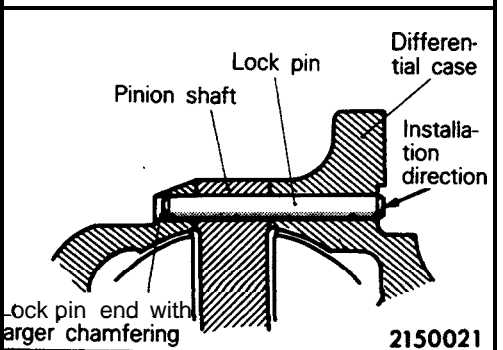
- (4) Measure the backlash between the side gears and pinions.

Standard value: 0.025 – 0.150 mm (.001 – .006 in.)

- (5) If the backlash is out of specification, disassemble again and using correct spacer, reassemble and adjust.

Caution

Adjust for same backlash of both side gears.

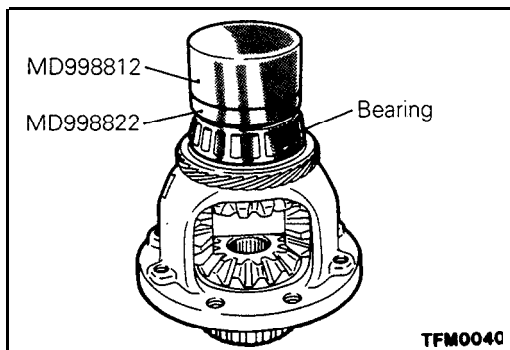


4. INSTALLATION OF LOCK PIN

Align the pinion shaft lock pin hole with the case lock pin hole and insert the lock pin.

Caution

1. Do not reuse the lock pin.
2. The lock pin head must be sunk from the flange surface of the differential case.

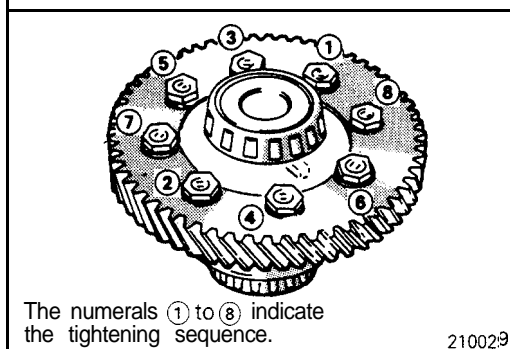


3. INSTALLATION OF TAPER ROLLER BEARING

Install the taper roller bearings on both sides of the differential case.

Caution

When press-fitting the bearings, push the inner race only.



1. INSTALLATION OF BOLTS

Apply specified adhesive to the entire threads of the bolts and quickly tighten in the order shown to specified torque.

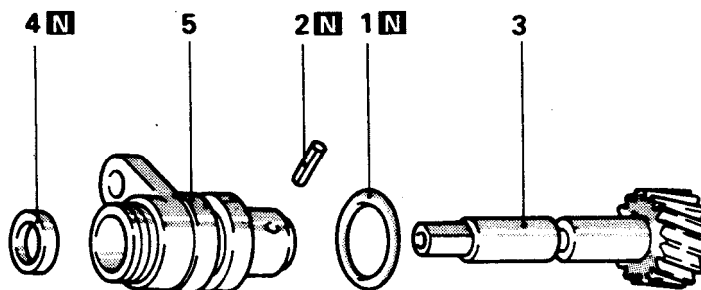
Specified adhesive: 3M Stud Locking Part No. 4170 or equivalent

Caution

If a bolt is reused, remove traces of oil adhesive completely from the threads.

SPEEDOMETER DRIVEN GEAR ASSEMBLY DISASSEMBLY AND REASSEMBLY

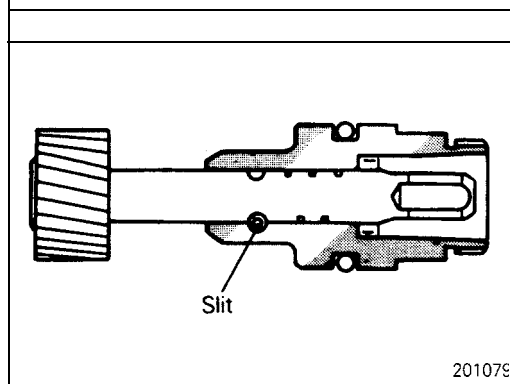
M22MNAE



Disassembly steps

- 1. O-ring
- * 2. Spring pin
- * 3. Speedometer driven gear
- 4. Oil seal
- 5. Sleeve

201078



SERVICE POINTS OF REASSEMBLY

3. INSTALLATION OF SPEEDOMETER DRIVEN GEAR

Apply gear oil sparingly to the speedometer driven gear shaft and insert the shaft.

2. INSTALLATION OF SPRING PIN

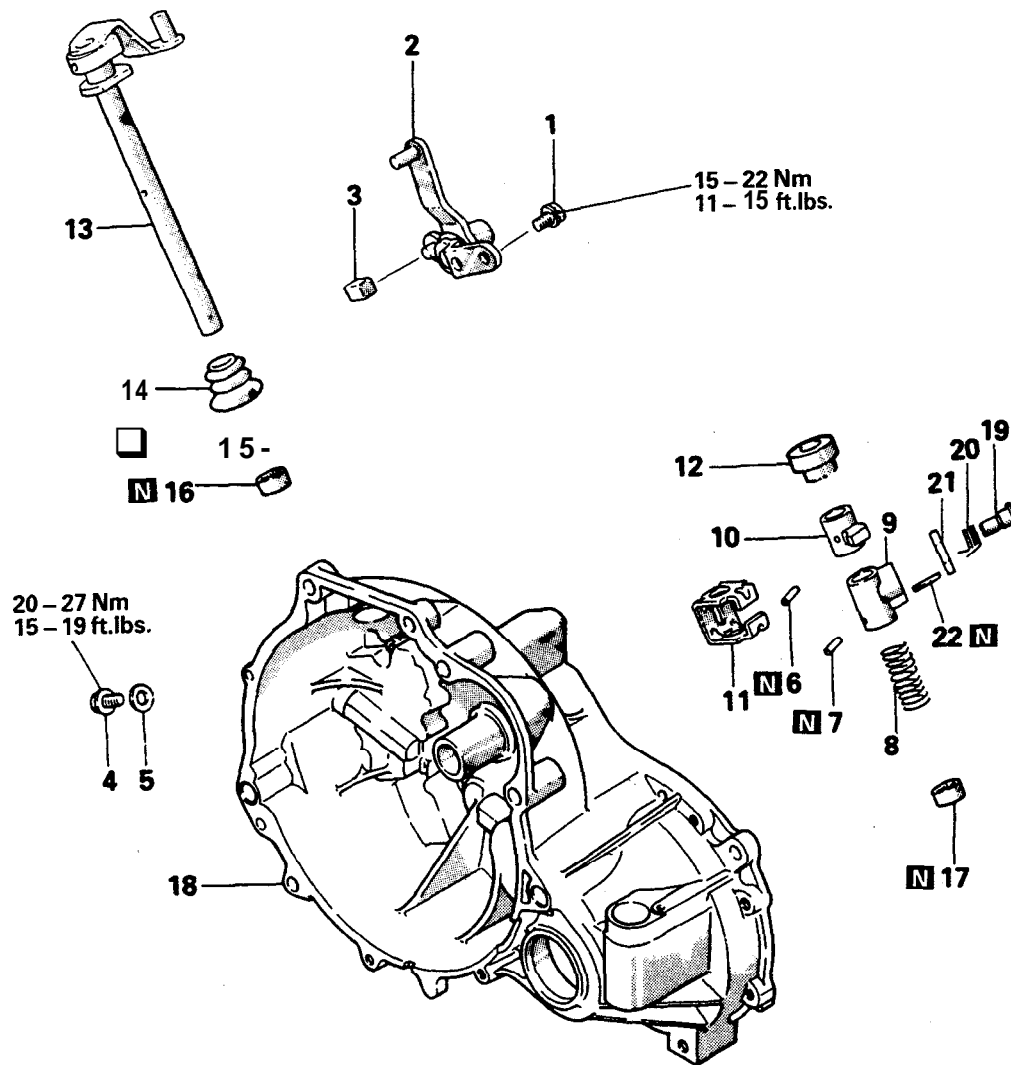
Install the spring pin in such a way that its slit does not face the gear shaft.

201079

CLUTCH HOUSING ASSEMBLY

M22MPAM

DISASSEMBLY AND REASSEMBLY

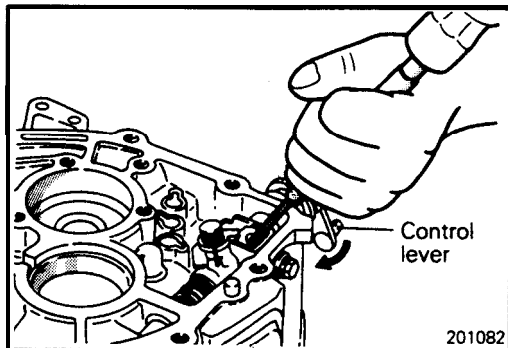


2100019

Disassembly steps

1. Bolt
2. Select lever assembly
3. Select lever shoe
4. Interlock plate bolt
5. Gasket
- ◆◆ ● a 6. Lock pin
- ◆◆◆◆ 7. Spring pin
8. Neutral return spring
9. Stopper body
10. Control finger
11. Interlock plate
12. Neutral return spring assembly
13. Control shaft
14. Control shaft boot
- ☒ 15. Oil seal

- * 16. Needle bearing
- ◆◆◆ 17. Needle bearing
- 18. Clutch housing
- 19. Pin
- 20. Return spring
- 21. Stopper plate
- 22. Spring pin



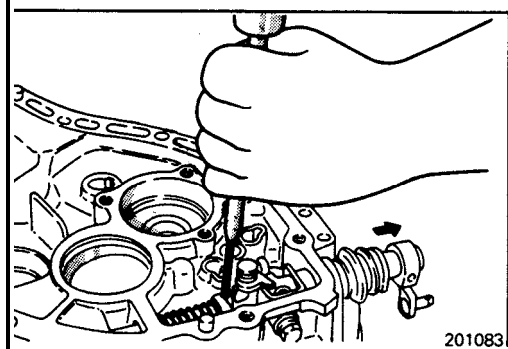
SERVICE POINTS OF DISASSEMBLY

6. REMOVAL OF LOCK PIN

Drive out the lock pin from the control finger using the pin punch.

Caution

When removing the lock pin, turn the control lever to such position that the lock pin will not contact the clutch housing.

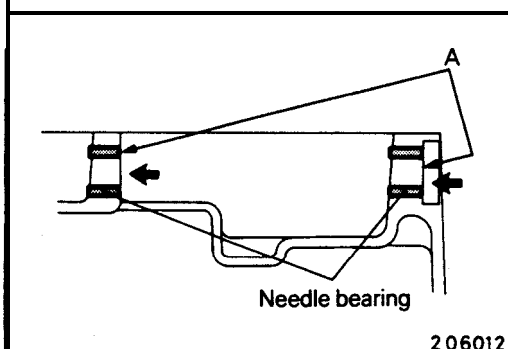


7. REMOVAL OF SPRING PIN

Drive out the spring pin from the stopper body using the pin punch.

Caution

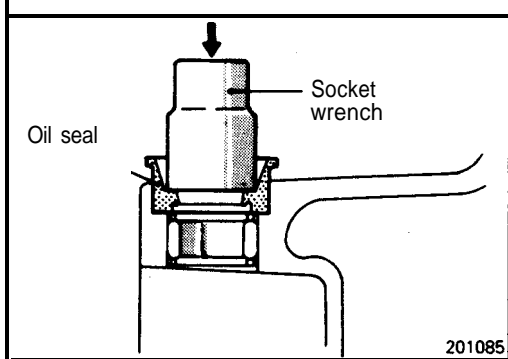
When removing the spring pin, pull the control shaft in the direction illustrated so that the spring pin will not contact the clutch housing.



SERVICE POINTS OF REASSEMBLY

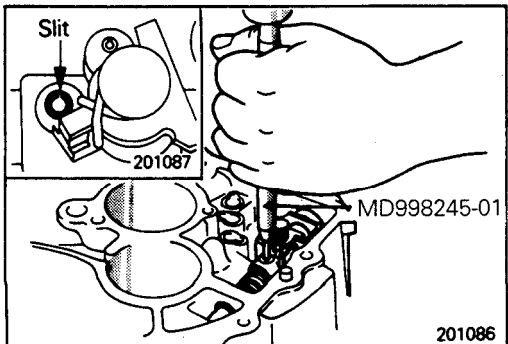
17.16. INSTALLATION OF NEEDLE BEARINGS

Install the needle bearing flush with the surface A of the clutch housing.



15. INSTALLATION OF OIL SEAL

Install the control shaft oil seal using a socket wrench.



7. INSTALLATION OF SPRING PIN / 6. LOCK PIN

(1) Install new spring pin and lock pin using the special tool.

Caution

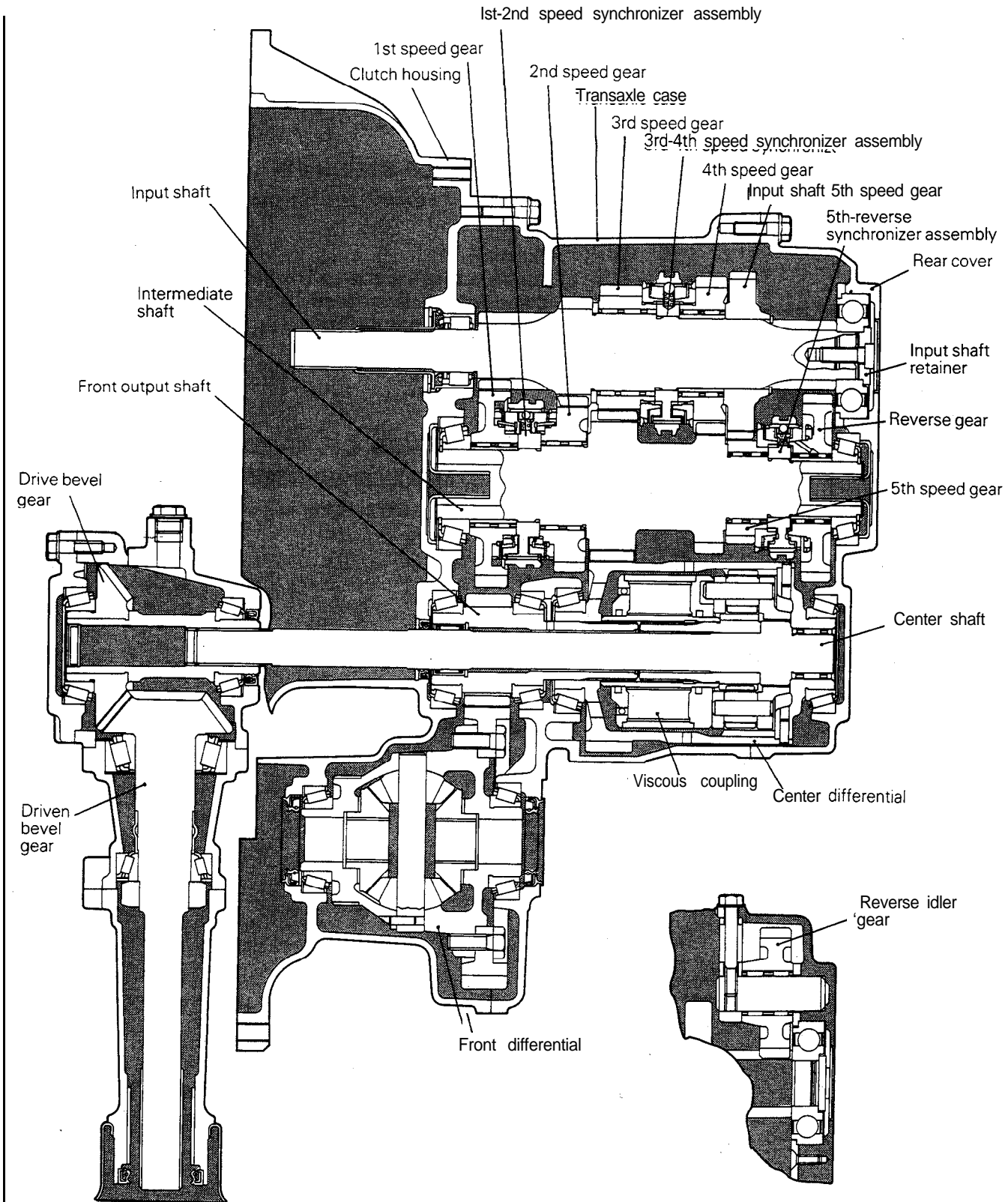
Do not reuse the spring pin and lock pin.

(2) Install the spring pin with its slit at right angle to the control shaft center.

MANUAL TRANSAXLE <AWD>

GENERAL INFORMATION

M22BAAV



TFM0110

TSB Revision

SPECIFICATIONS

M22CA-B

GENERAL SPECIFICATIONS

Items	Specifications
Model	W5MG1-0-FNBR
Applicable engine	6G72-DOHC (Turbo)
Type	5-speed transaxle floor shift
Gear ratio	
1 st	3.071
2nd	1.739
3rd	1.103
4th	0.823
5th	0.659
Reverse	3.076
Reduction ratio	
Primary	1.375
Front differential	2.888
Transfer	0.814
Speedometer gear ratio (driven/drive)	27/36
Oil quantity liters (qts.)	
Transaxle	2.4 (2.5)
Transfer	0.27 (.29)

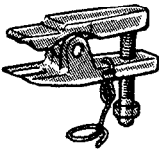
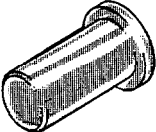




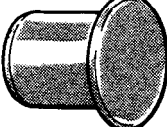
LUBRICANTS

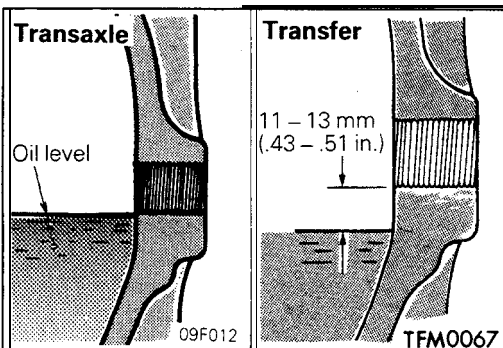
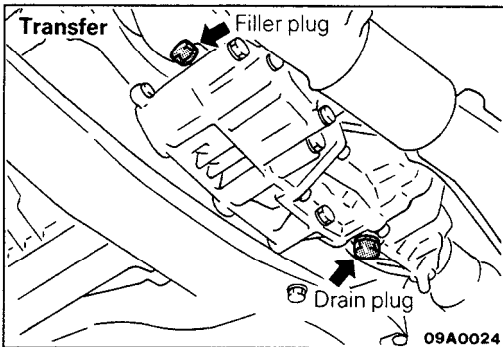
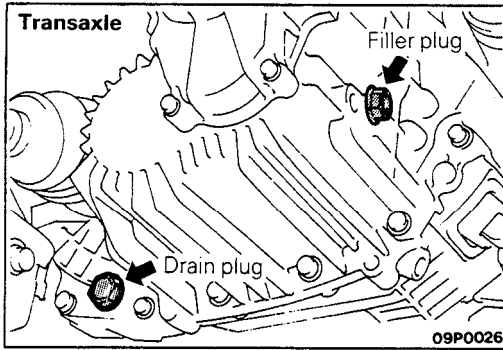
M22CD-B

I t e m s	Specified lubricants	Quantity lit. (qts.)
Transmission oil	Hypoid gear oil, SAE 75W-90 or 75W-85W conforming to API classification GL-4 or higher	2.4 (2.5)
Transfer oil		0.27 (.29)
Drive shaft oil seal lip		As required
Transfer oil seal lip		

SPECIAL TOOLS

M22DA-B

Tool	Number	Name	Use
	MB991113-01	Steering linkage puller	<ul style="list-style-type: none"> • 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
	MD998304-01	Oil seal installer	Installation of front output shaft bearing and transfer extension housing oil seal
	MD998325-01	Differential oil seal installer	Installation of differential oil seal
	MD998803	Differential oil seal installer	Installation of differential oil seal
	MD998812	Installer cap	Use with MD998824
	MD998824	Installer adapter	Installation of transfer case oil seal
	MB991193	Plug	Prevention of transfer oil discharge and foreign object entry



SERVICE ADJUSTMENT PROCEDURES

TRANSMISSION OIL LEVEL INSPECTION

M22FBAE2

Refer to GROUP 00 – Maintenance Service.

TRANSMISSION OIL REPLACEMENT

M22FCAJ

- (1) Position vehicle on a flat level and remove filler and drain plugs to drain transmission oil.

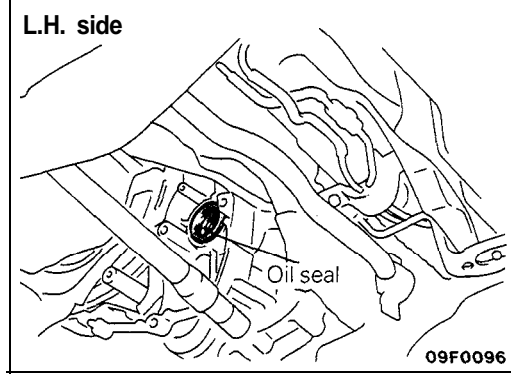
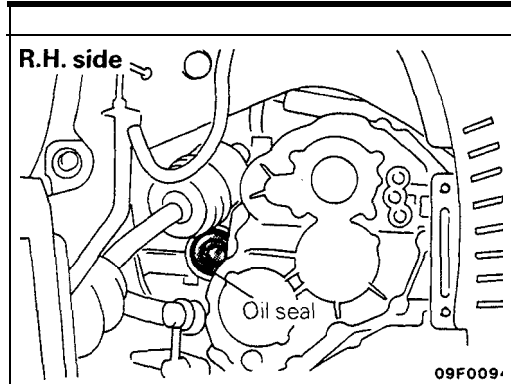
- (2) Pour in fresh transmission oil through filler port.

Transmission oil: Hypoid gear oil, SAE 75W-85W conforming to API classification GL-4 or higher

Transaxle: 2.4 liters (2.5 qts.)

Transfer: 0.27 liters (.29 qts.)

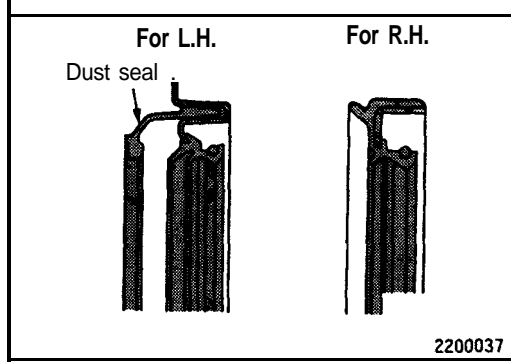
- (3) After checking to be sure that the oil level is the specified level, tighten the filler plug at the specified torque.



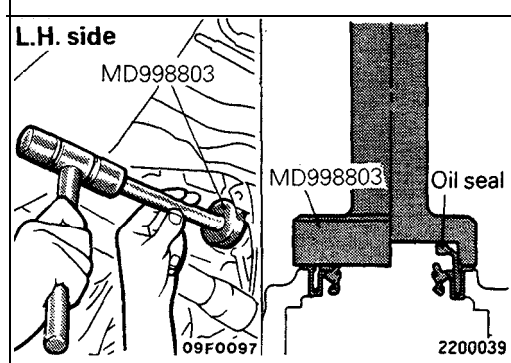
DRIVE SHAFT OIL SEALS REPLACEMENT

M22FDAJ

- (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.

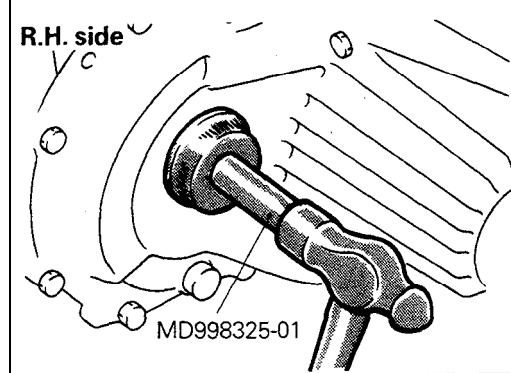


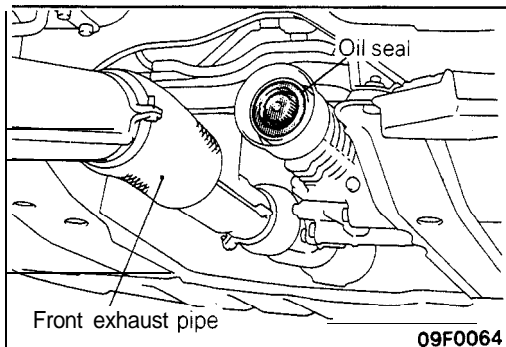
- (4) Install the oil seals using the following procedure:
Using the special tool, tap the oil seal into the transaxle.
Note that there are two types of oil seals, one for R.H. and the other for L.H., and the shape of each type is different, as shown.



- (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 or higher

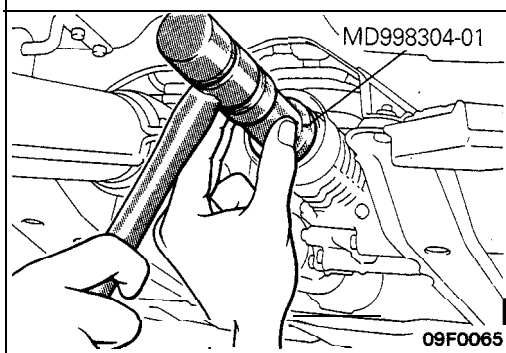




TRANSFER OIL SEAL REPLACEMENT

M22FGAH

- (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 or higher

SPEEDOMETER CABLE REPLACEMENT

M22FEAH

Refer to P.22-9.

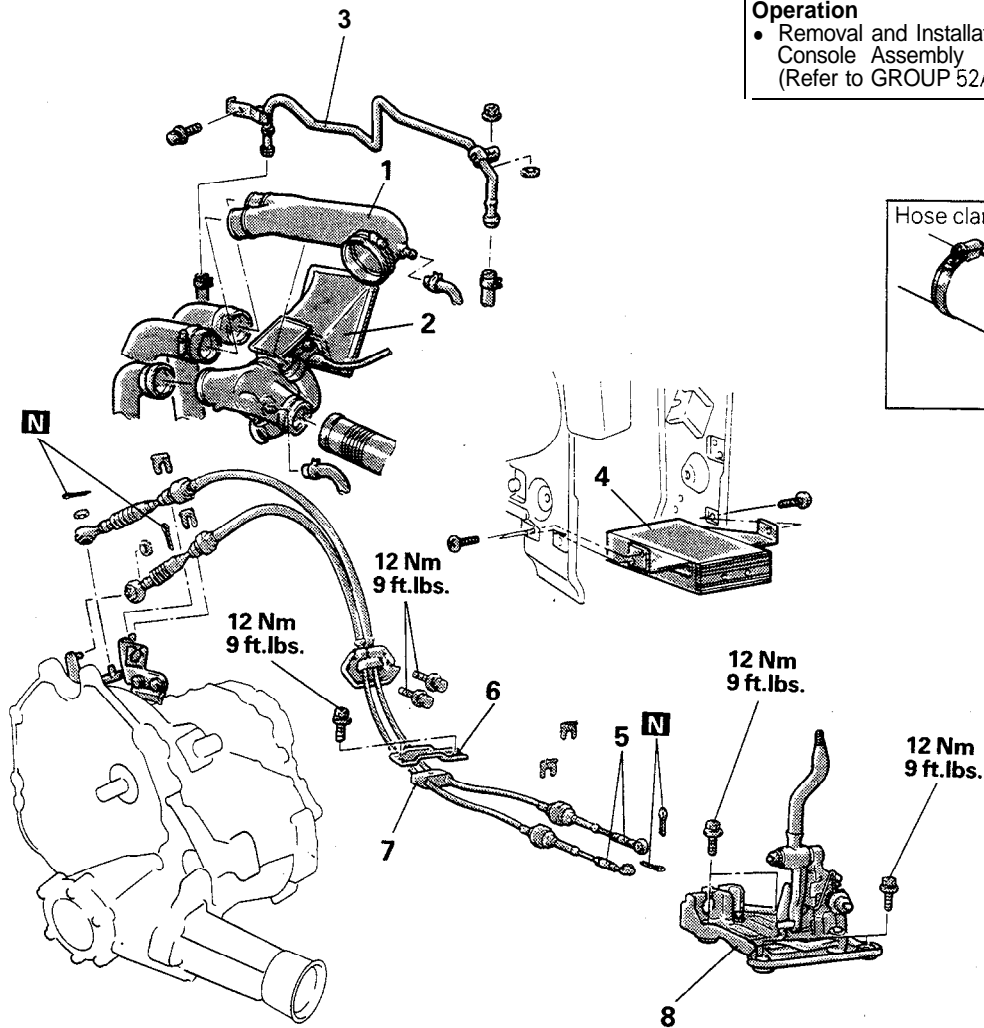
SHIFT LEVER ASSEMBLY

M22GE-B

Refer to P.22-13.

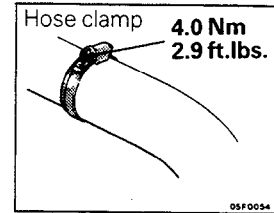
TRANSAXLE CONTROL

REMOVAL AND INSTALLATION



Pre-removal and Post-installation Operation

- Removal and Installation of Front Console Assembly (Refer to GROUP 52A – Floor Console.)



09F0080

Transaxle control cable assembly removal steps

- * 1. Air hose A
- ◆◆ 2. Air cleaner cover, Air intake hose A
- ◆◆ 3. Vacuum pipe
- * 4. CD amp. (vehicles with CD player)
- * 5. Connection for transaxle control cable assembly (Shift lever assembly side)
- 6. Retainer
- 7. Transaxle control cable assembly

Shift lever assembly removal steps

- * 1. Air hose A
- ◆◆ 2. Air cleaner cover, Air intake hose A
- * 3. Vacuum pipe
- ◆◆ 5. Connection for transaxle control cable assembly (Shift lever assembly side)
- 8. Shift lever assembly

INSPECTION

M22JCAF2

- 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.

SERVICE POINTS OF INSTALLATION

M22JDAM

5. CONNECTION OF TRANSAXLE CONTROL CABLE ASSEMBLY (SHIFT LEVER ASSEMBLY SIDE)

Refer to P.22-12.

3. INSTALLATION OF VACUUM PIPE

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.

2. CONNECTION OF AIR CLEANER COVER, AIR INTAKE HOSE A

Align slots indicated by arrows in air intake hose A with Δ markings on air intake hoses B and C; then, insert hoses B and C all the way into air intake hose A.

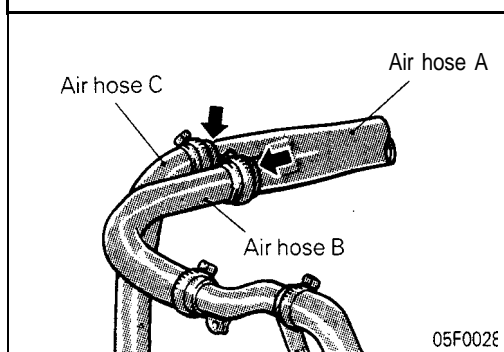
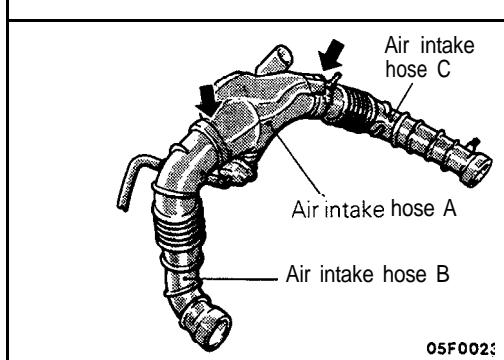
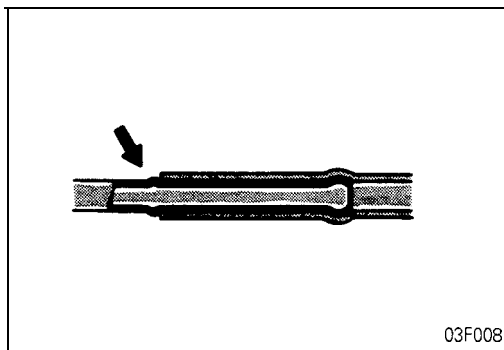
1. CONNECTION OF AIR HOSE A

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.



TRANSAXLE ASSEMBLY

REMOVAL AND INSTALLATION

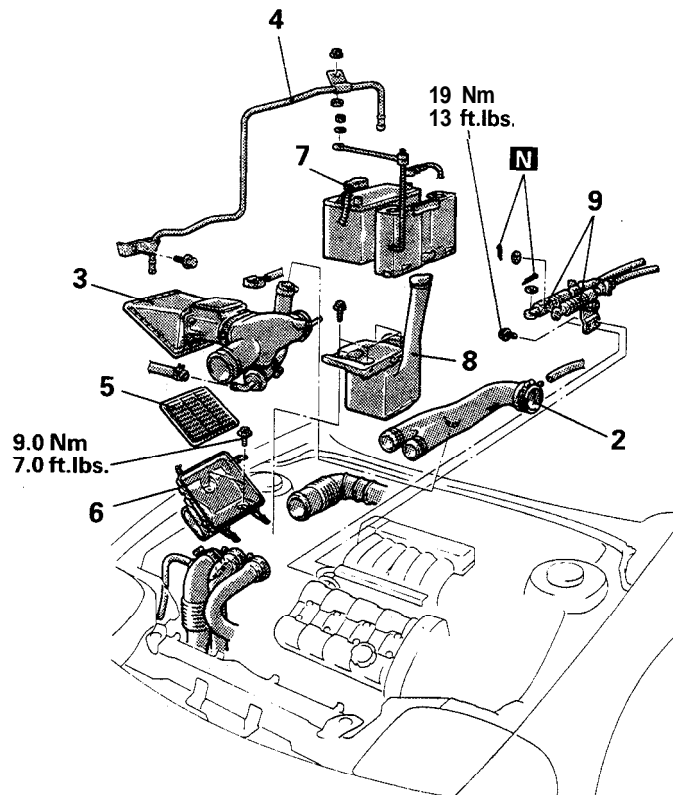
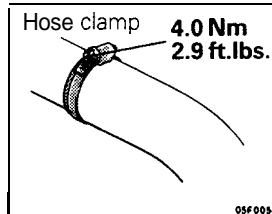
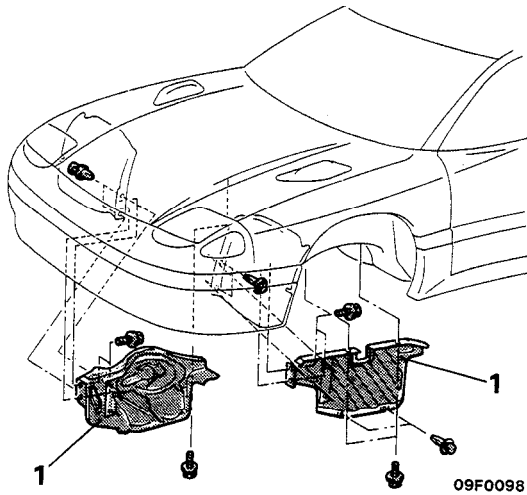
M22MA-B

Pre-removal Operation

- Draining of Transmission Oil (Refer to P.22-51.)
- Removal of Transfer Assembly (Refer to P.22-59.)

Post-installation Operation

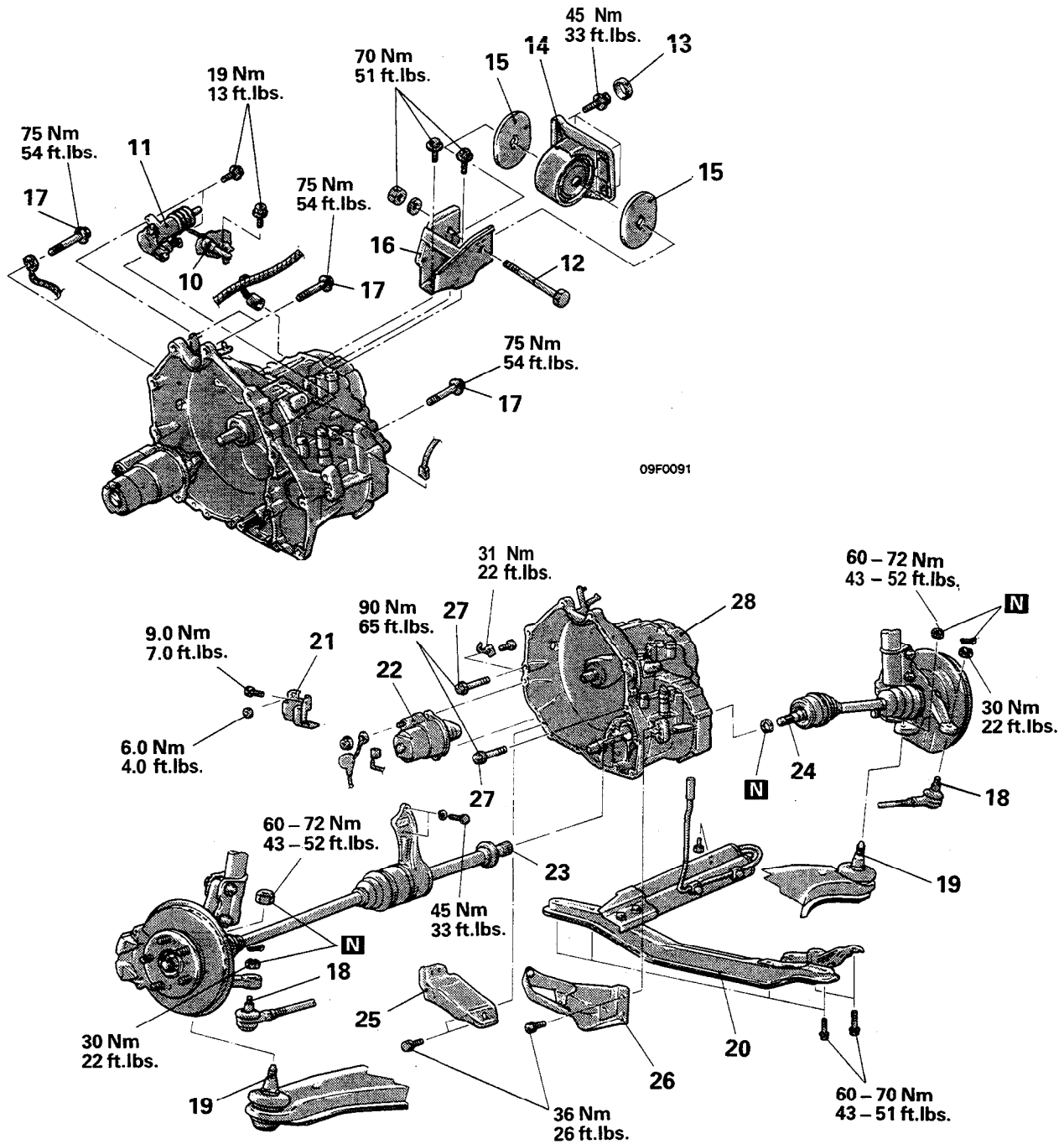
- Installation of Transfer Assembly (Refer to P.22-59.)
- Supplying of Transmission Oil (Refer to P.22-51.)
- Checking Operation of Shift Lever at Each Position
- Checking the Operation of Meters and Gauges



09F0110

Removal steps

1. Side under cover
- * 2. Air hose A
- 4 3. Air cleaner cover, Air intake hose A
- ◆◆ 4. Vacuum pipe
5. Air cleaner element
6. Air cleaner body
7. Battery
8. Battery seat, Washer tank
9. Connection for transaxle control cable



- | | |
|---|---|
| 10. Connection for clutch tube bracket | 20. Right member |
| ↔ 11. Connection for clutch release cylinder | 21. Starter cover |
| ↔ 12. Connection for transaxle mount | 22. Starter |
| 13. Plug | ↔ 23. Drive shaft (Left side), Inner shaft assembly |
| 14. Transaxle mount bracket (Body side) | ↔ • 24. Drive shaft (Right side) |
| ↔ 15. Mounting stopper | 25. Connection for transaxle stay (Front bank side) |
| 16. Transaxle mount bracket (Transaxle side) | 26. Connection for transaxle stay (Rear bank side) |
| 17. Transaxle assembly lower part coupling bolt | ↔ 27. Transaxle assembly lower part coupling bolt |
| ↔ 18. Connection for tie rod end | ↔ 28. Transaxle assembly |
| • 19. Connection for lower arm ball joint | |

SERVICE POINTS OF REMOVAL

M22M8BB

11. REMOVAL OF CLUTCH RELEASE CYLINDER / 12. CONNECTION OF TRANSAXLE MOUNT

Refer to P.22-15.

18. DISCONNECTION OF TIE ROD END / 19. LOWER ARM BALL JOINT

Refer to P.22-16.

23. REMOVAL OF DRIVE SHAFT (LEFT SIDE), INNER SHAFT ASSEMBLY / 24. DRIVE SHAFT (RIGHT SIDE) / 27. TRANSAXLE ASSEMBLY LOWER COUPLING BOLT / 28. TRANSAXLE ASSEMBLY

Refer to P.22-16.

SERVICE POINTS OF INSTALLATION

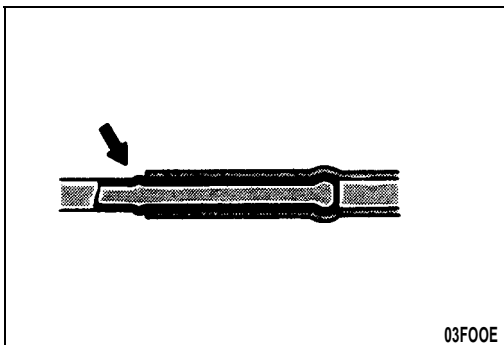
M22MDAU

24. INSTALLATION OF DRIVE SHAFT (RIGHT SIDE) / 15. MOUNTING STOPPER

Refer to P.22-17.

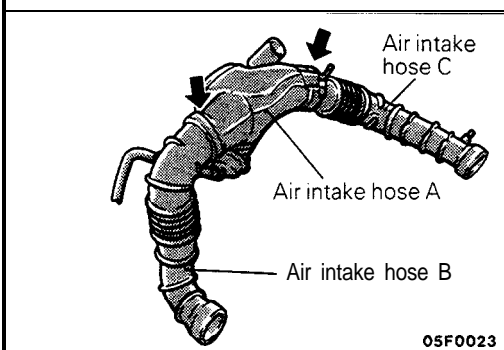
4. INSTALLATION OF VACUUM PIPE

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.

**3. INSTALLATION OF AIR CLEANER COVER, AIR INTAKE HOSE A**

Align slots indicated by arrows in air intake hose A with Δ 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.

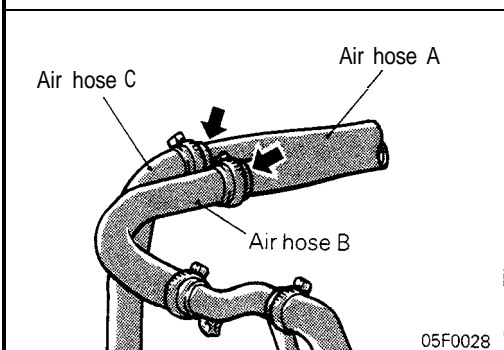
**2. INSTALLATION OF AIR HOSE A**

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.

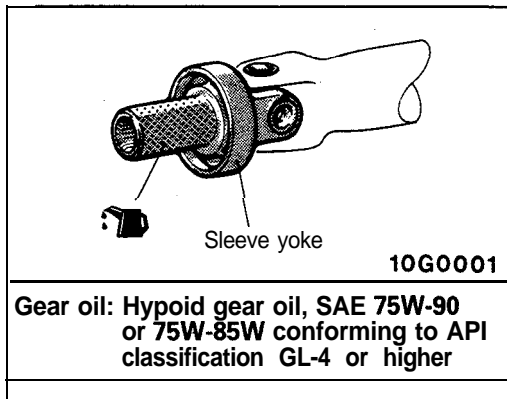
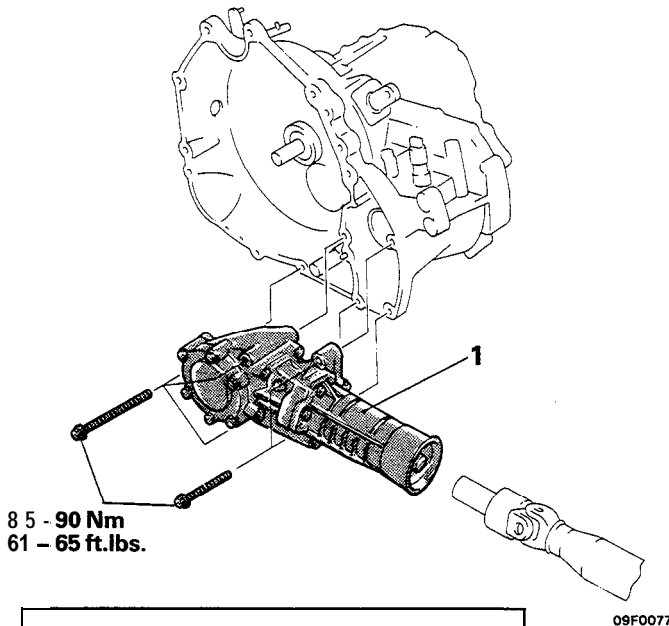
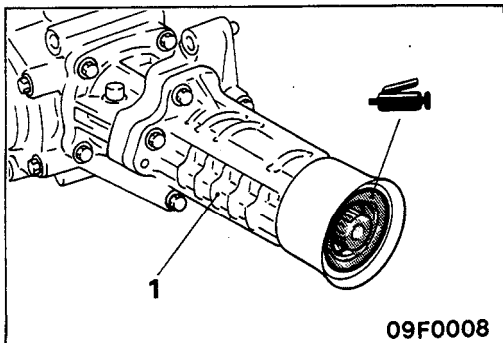


TRANSFER ASSEMBLY REMOVAL AND INSTALLATION

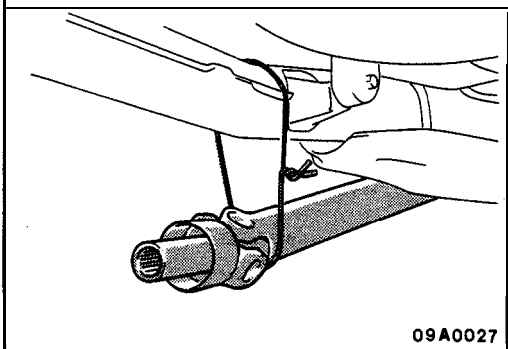
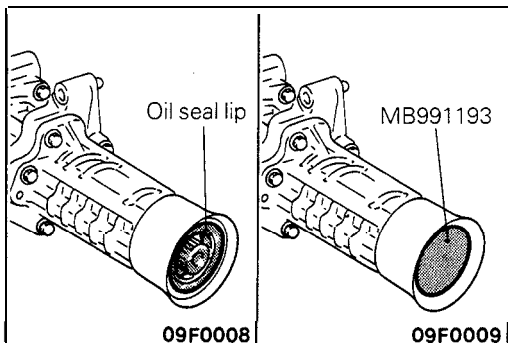
M22VA--

Pre-removal and Post-installation Operation

- Draining and Supplying of Transfer Oil (Refer to P.22-51.)
- Removal and Installation of Active Front Venturi Skirt (Refer to GROUP 51 -Front Bumper.)
- Removal and Installation of Front Exhaust Pipe (defer to GROUP 15 – Exhaust Pipe and Main Muffler.)



◄► 1. Transfer assembly



SERVICE POINT OF REMOVAL

M22VBAC

1. REMOVAL OF TRANSFER ASSEMBLY

Caution

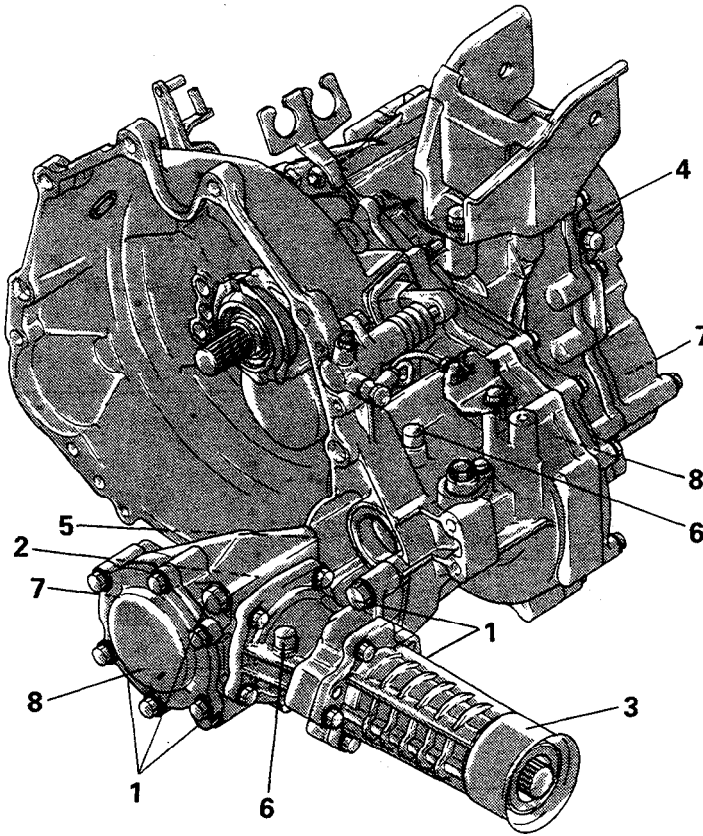
1. Be cautious to avoid damaging the transfer oil seal lip.
2. Cover the transfer opening with the special tool to prevent transaxle oil discharge and the entry of foreign objects.
3. The propeller shaft should be suspended so that it is not sharply bent.

TRANSAXLE ASSEMBLY

The W5MG1 transaxle cannot be disassembled.

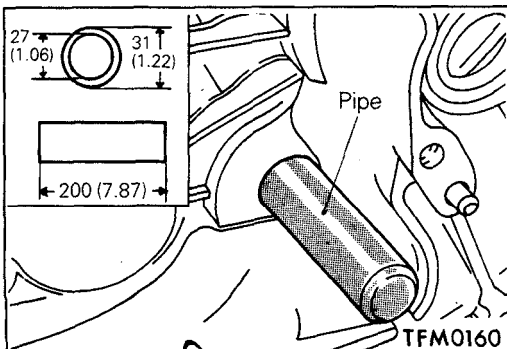
If any parts other than describes below are defective, replace the transaxle assembly.

REPLACEABLE PART



- 1. Transaxle to transfer connecting bolt
- * 2. Transfer case oil seal
- 3. Transfer oil seal guide
- ◆◆ 4. Input shaft rear seal cap
- 4 5. Center shaft oil seal
- 6. Air vents (breather caps) for transaxle and transfer
- 7. Oil filler plugs for transaxle and transfer
- 8. Oil drain plugs for transaxle and transfer

TFM0157



SERVICE POINTS OF INSTALLATION

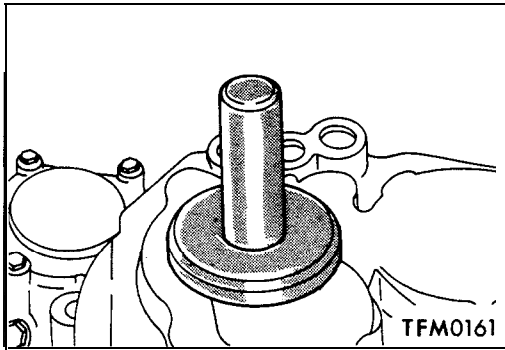
6. INSTALLATION OF CENTER SHAFT OIL SEAL

Fabricate a tool having the following dimensions from a pipe to install the oil seal.

Dimension :

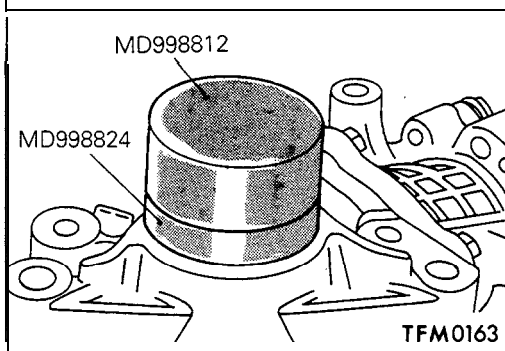
I.D.	Approx. 27 mm (1.06 in.)
O.D.	Approx. 31 mm (1.22 in.)
Length	Approx. 200 mm (7.87 in.)

TSB Revision



5. INSTALLATION OF INPUT SHAFT REAR SEAL CAP

Install the input shaft rear seal cap.



2. INSTALLATION OF TRANSFER CASE OIL SEAL

Using the special tool, install the transfer case oil seal.

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AUTOMATIC TRANSAXLE

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M23AA- -

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SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

- (1) A Supplemental Restraint System (SRS), which uses a driver-side air bag, has been installed in the **3000GT**.
- (2) The SRS includes the following components: impact sensors, SRS diagnosis unit: SRS warning light, air bag module, clock spring, 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 (*).

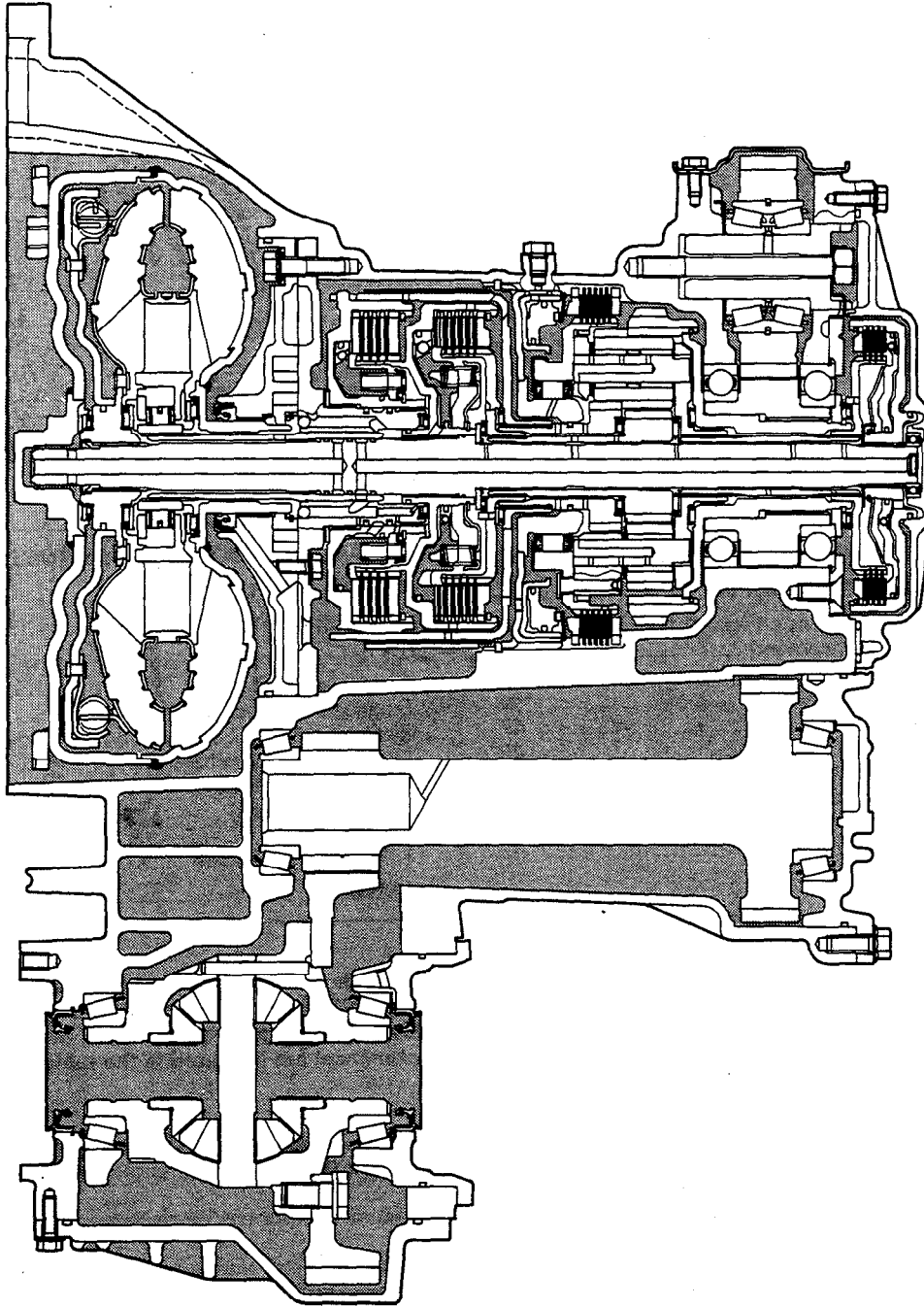
WARNING!

- (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) 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)**, before beginning any service or maintenance of any component of the SRS or any SRS-related component.

GENERAL INFORMATION

M23B8BW

CROSS-SECTIONAL VIEW

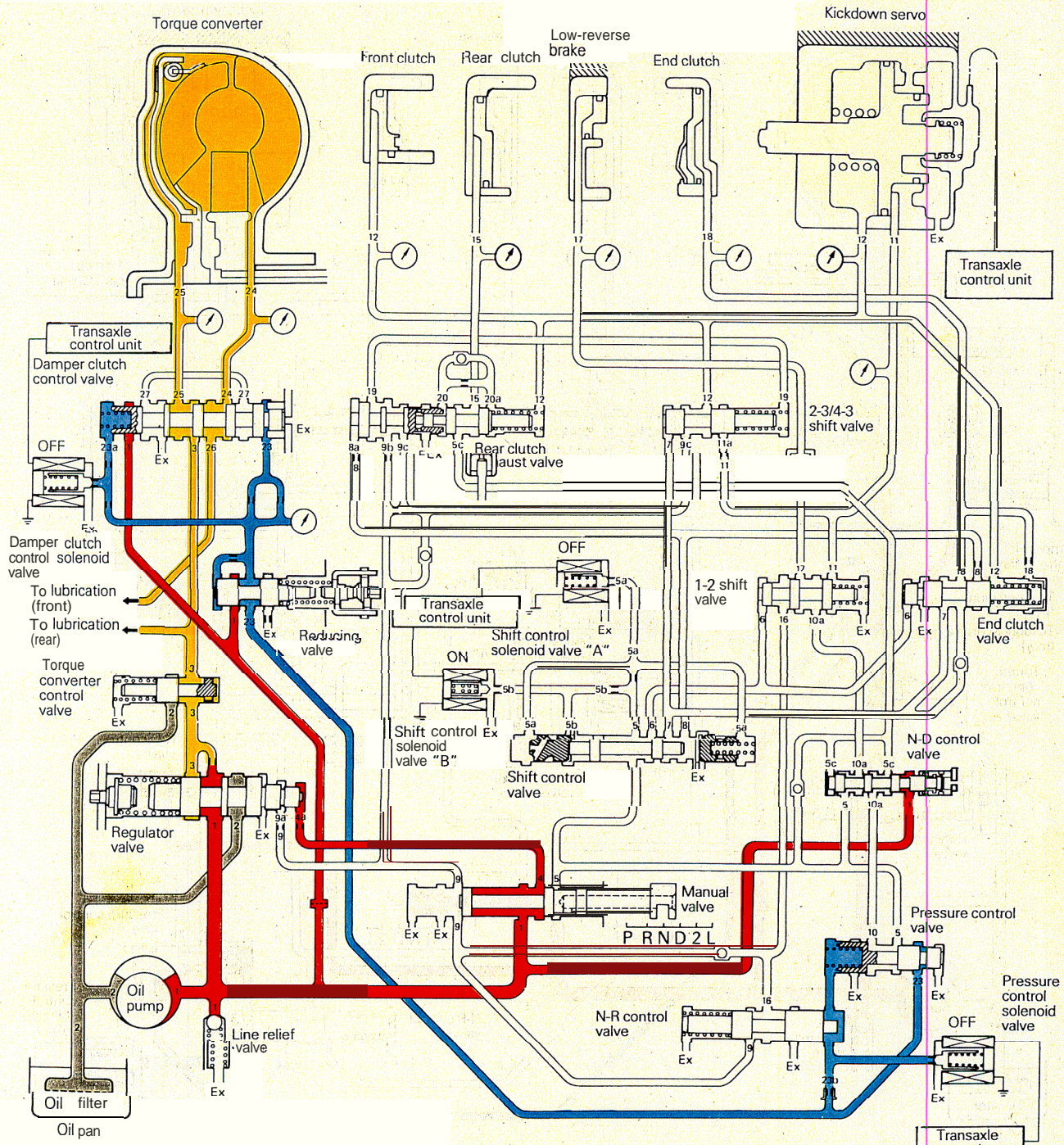


TFA0540

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HYDRAULIC CONTROL SYSTEM

<F4A21 – Neutral>



- Line pressure
- Torque converter and lubrication pressure
- Reducing pressure
- Oil pump suction pressure
- Modulated line pressure
- Pressure control solenoid valve pressure
- Damper clutch pressure
- Damper clutch control solenoid valve pressure

Neutral

TFA0070

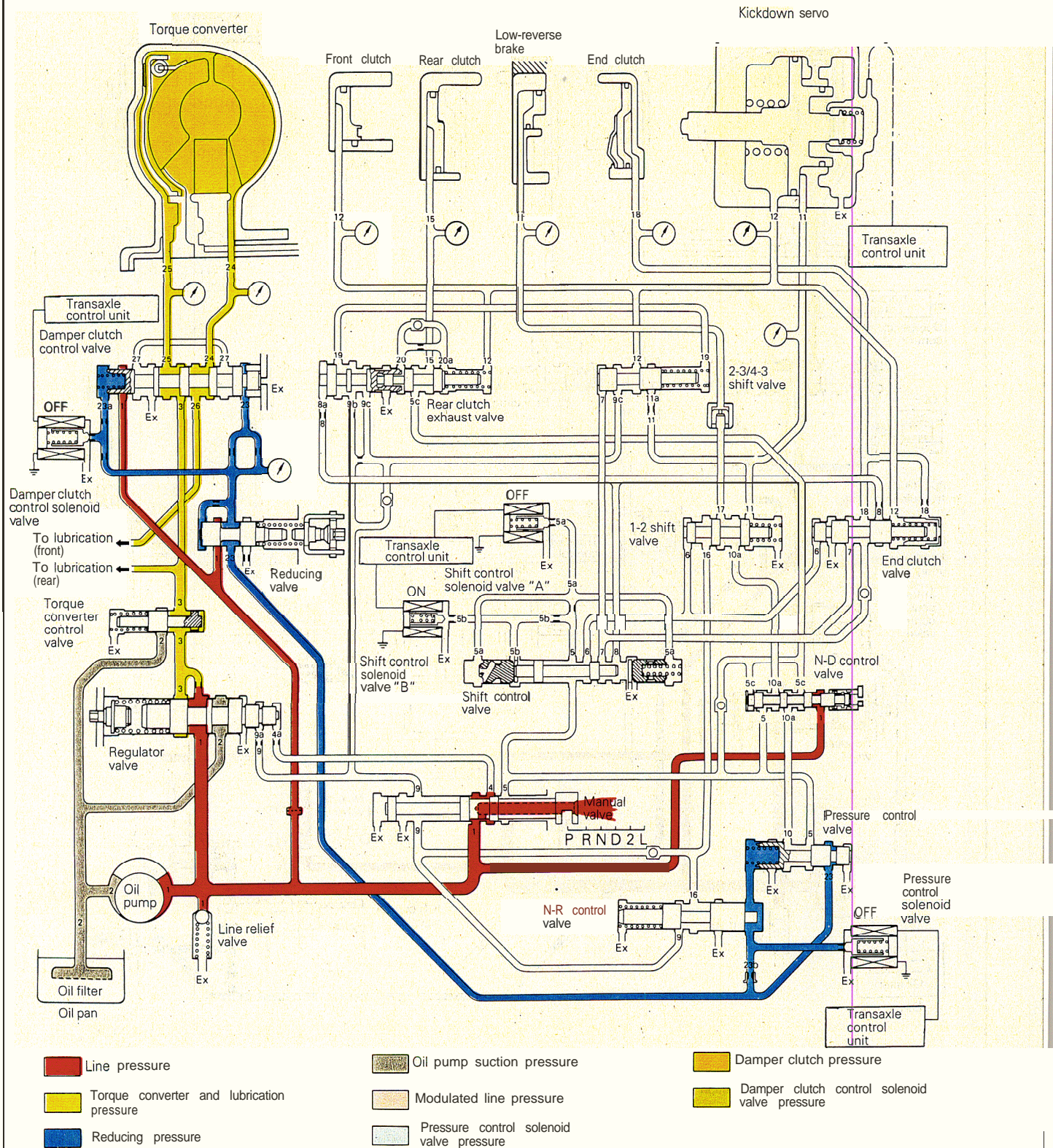
TSB Revision

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<F4A21 – Parking>



Parking

TFA0071

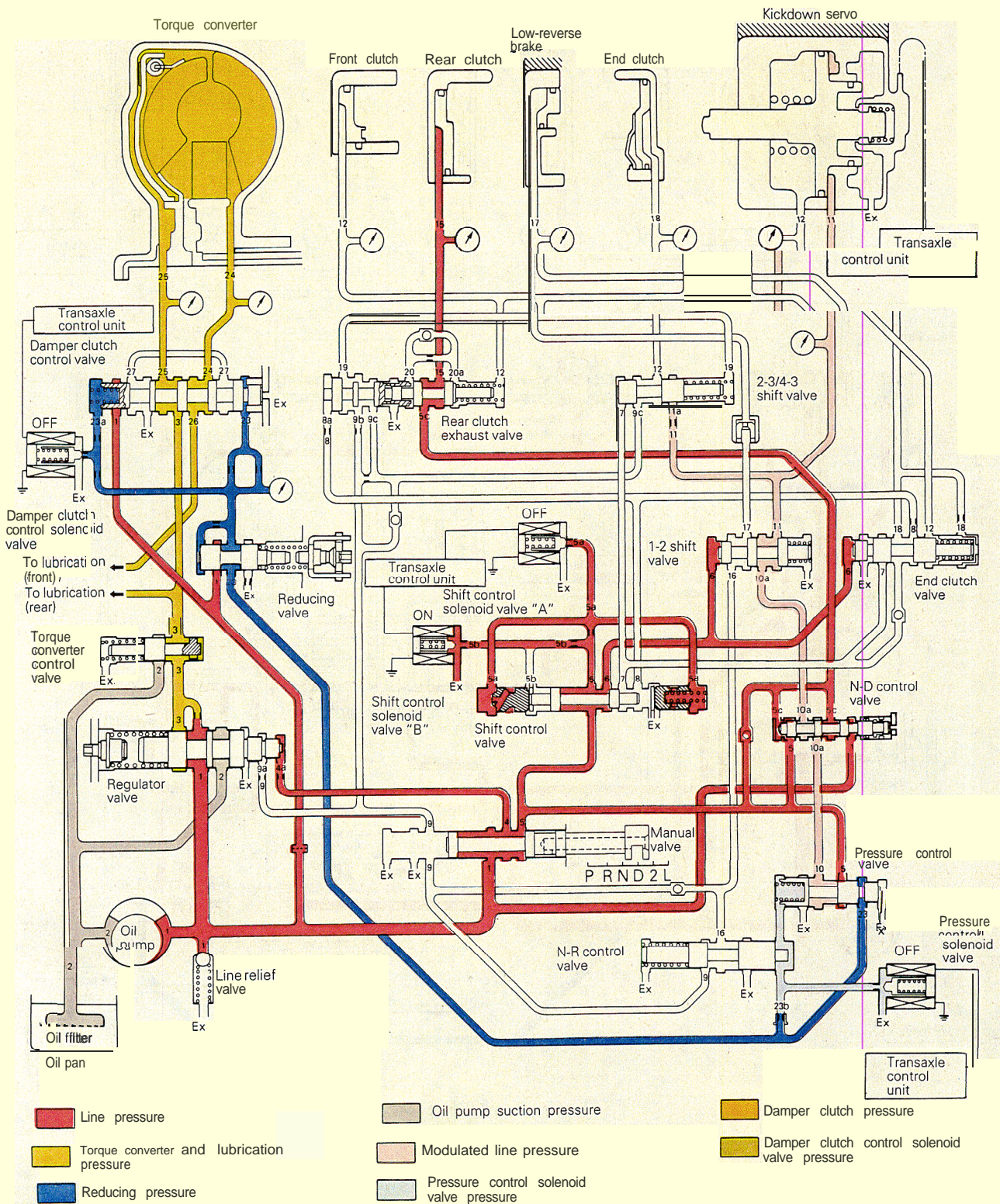
TSB Revision

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<F4A21– Drive-Stopping>



(Stop)

TFA0242

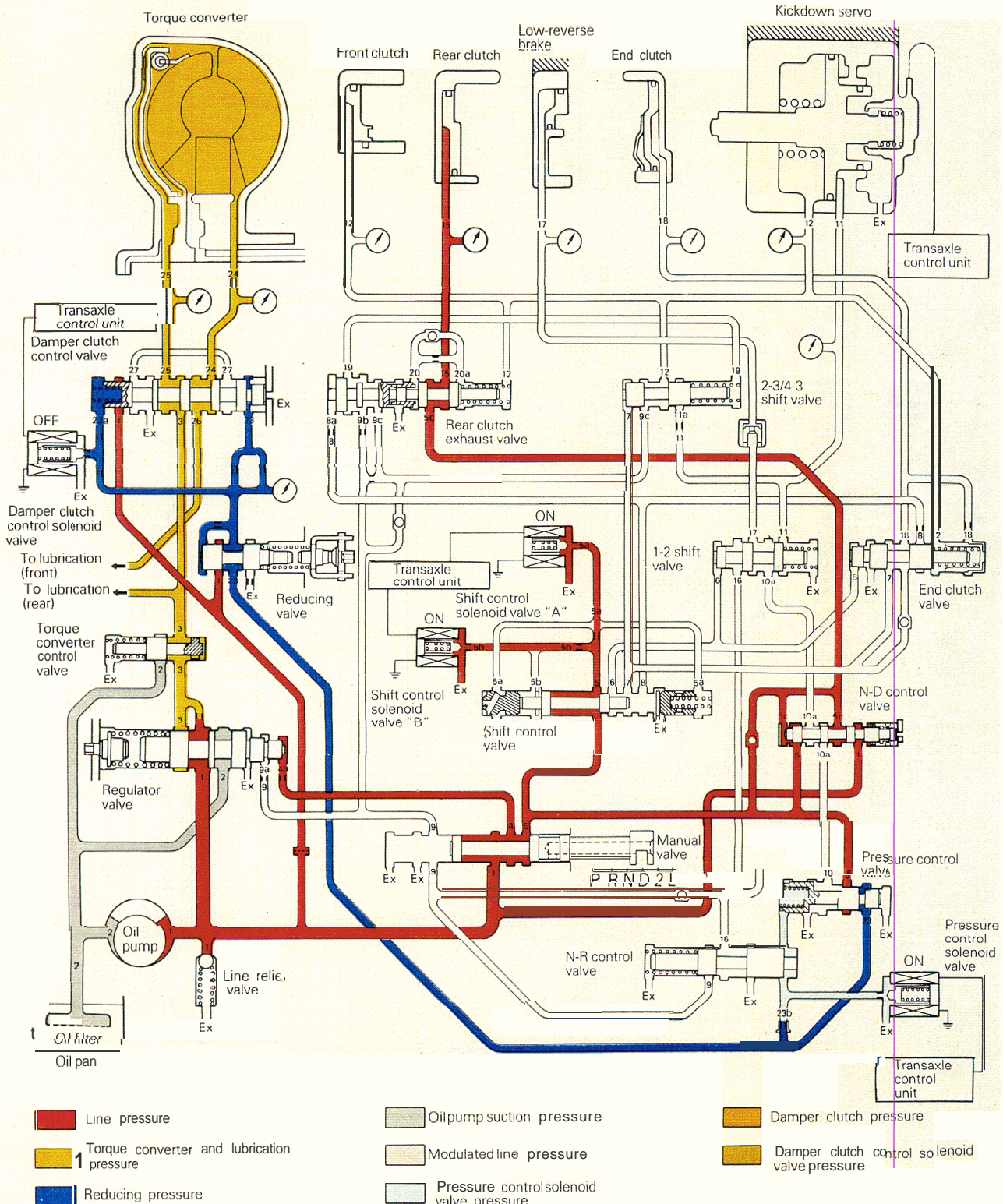
TSB Revision

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<F4A21 – Drive-First>



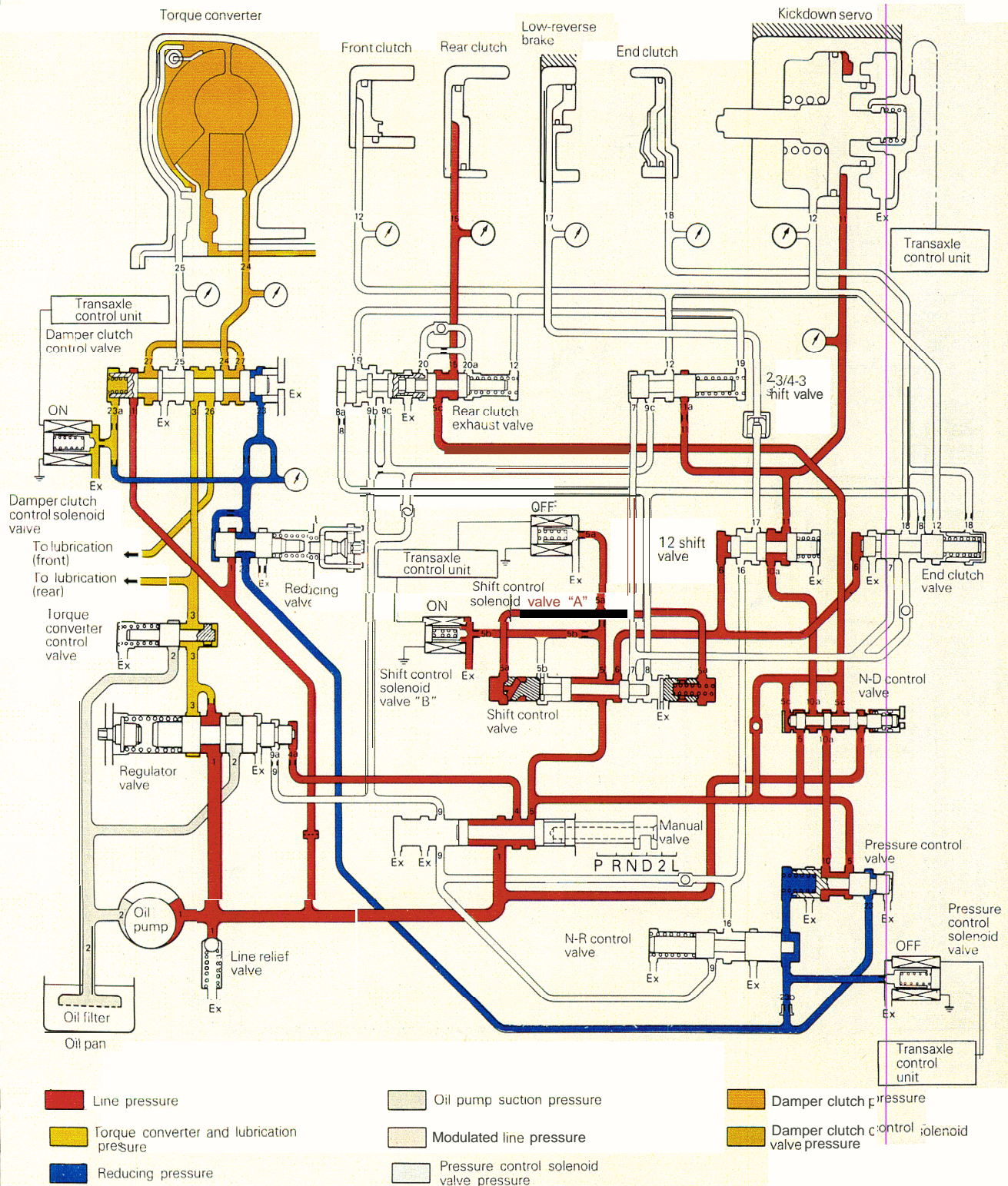
Drive (First)

TFA0072

TSB Revision



<F4A21– Drive-Second>



Drive (Second)

TFA0073

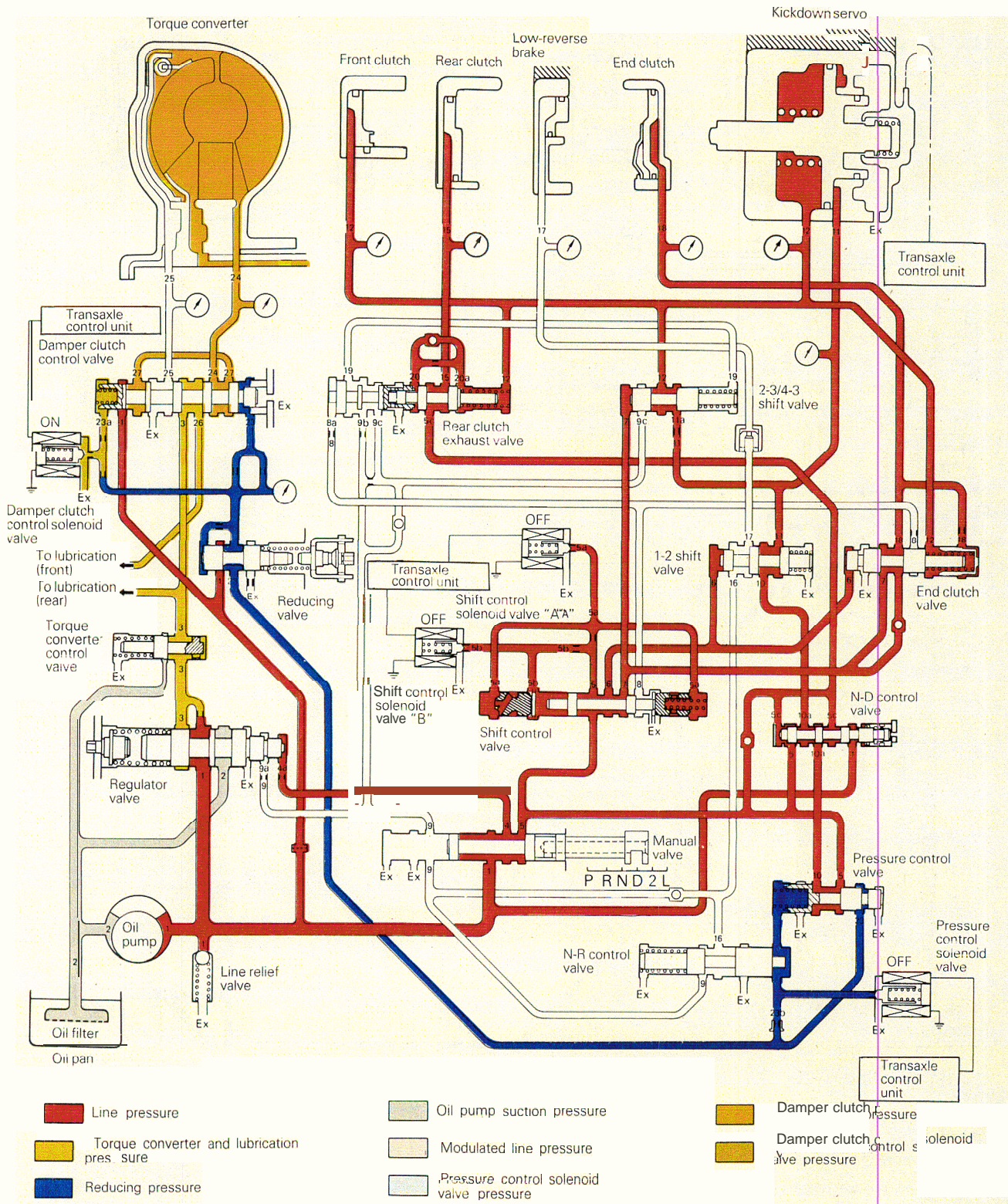
TSB Revision

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<F4A21– Drive-Third>



(Drive i r d)

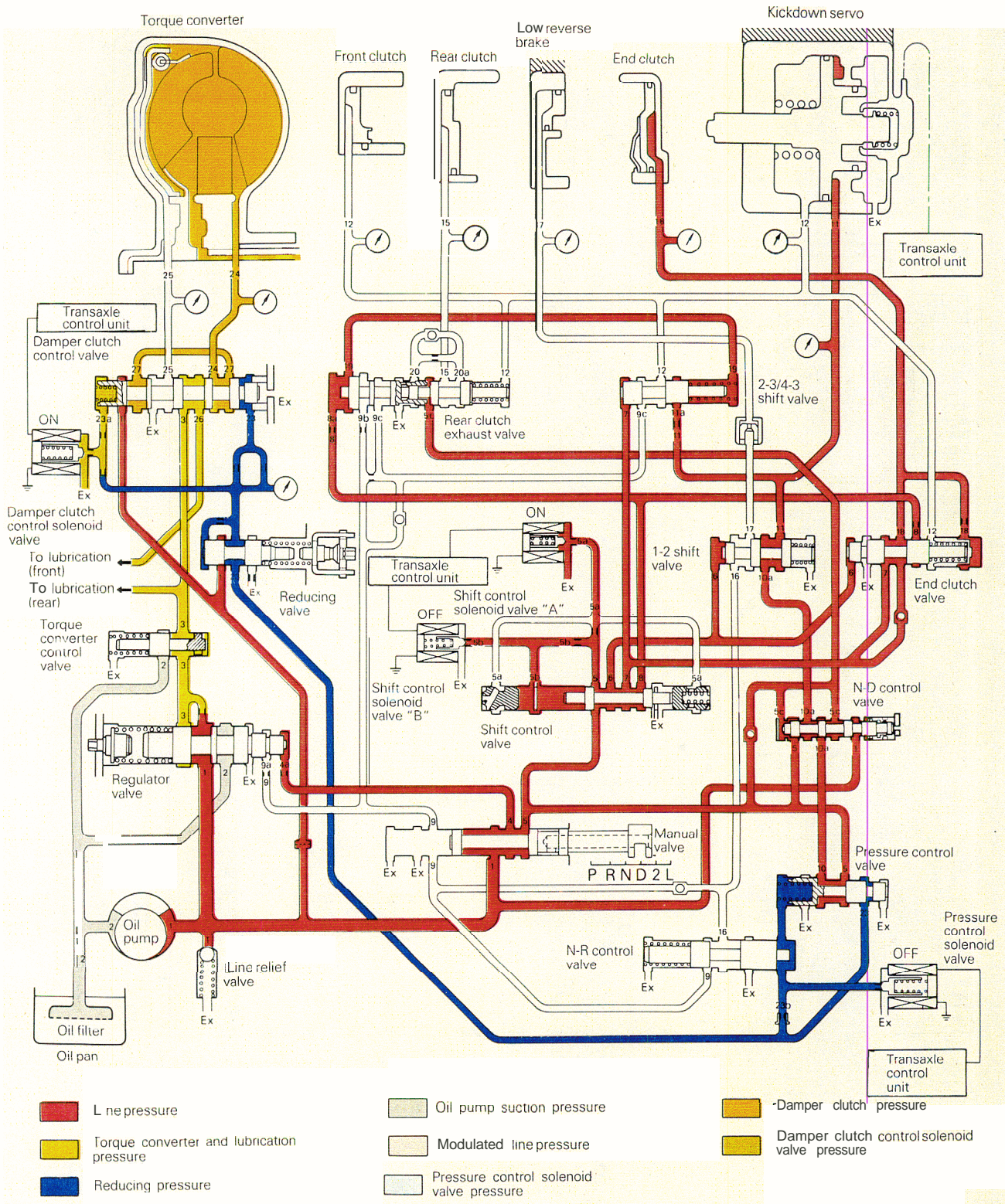
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<F4A21– Drive-Fourth>



Drive (Fourth)

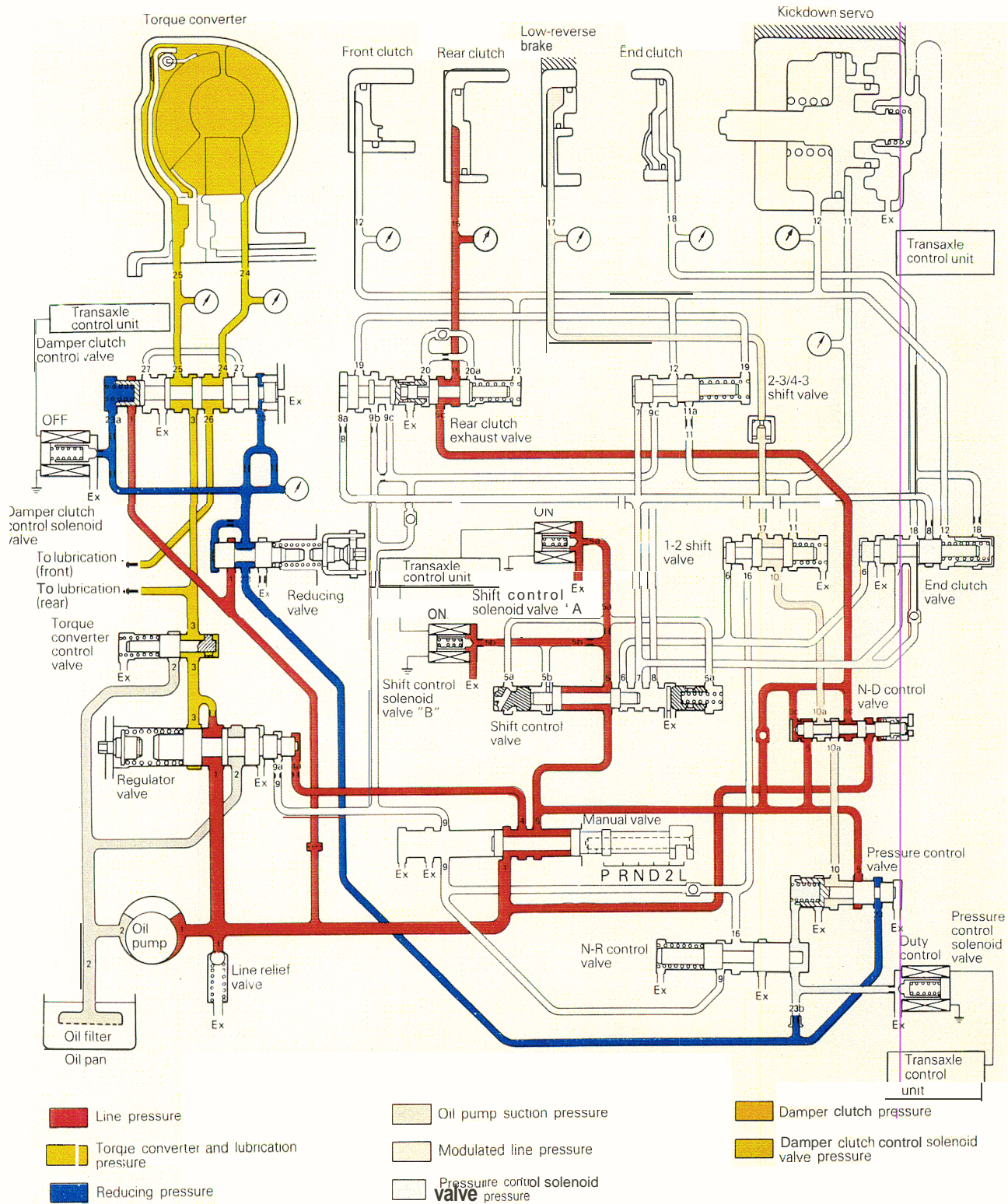
TFA007

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<F4A21– Lock-up-First>



Lock-up-First

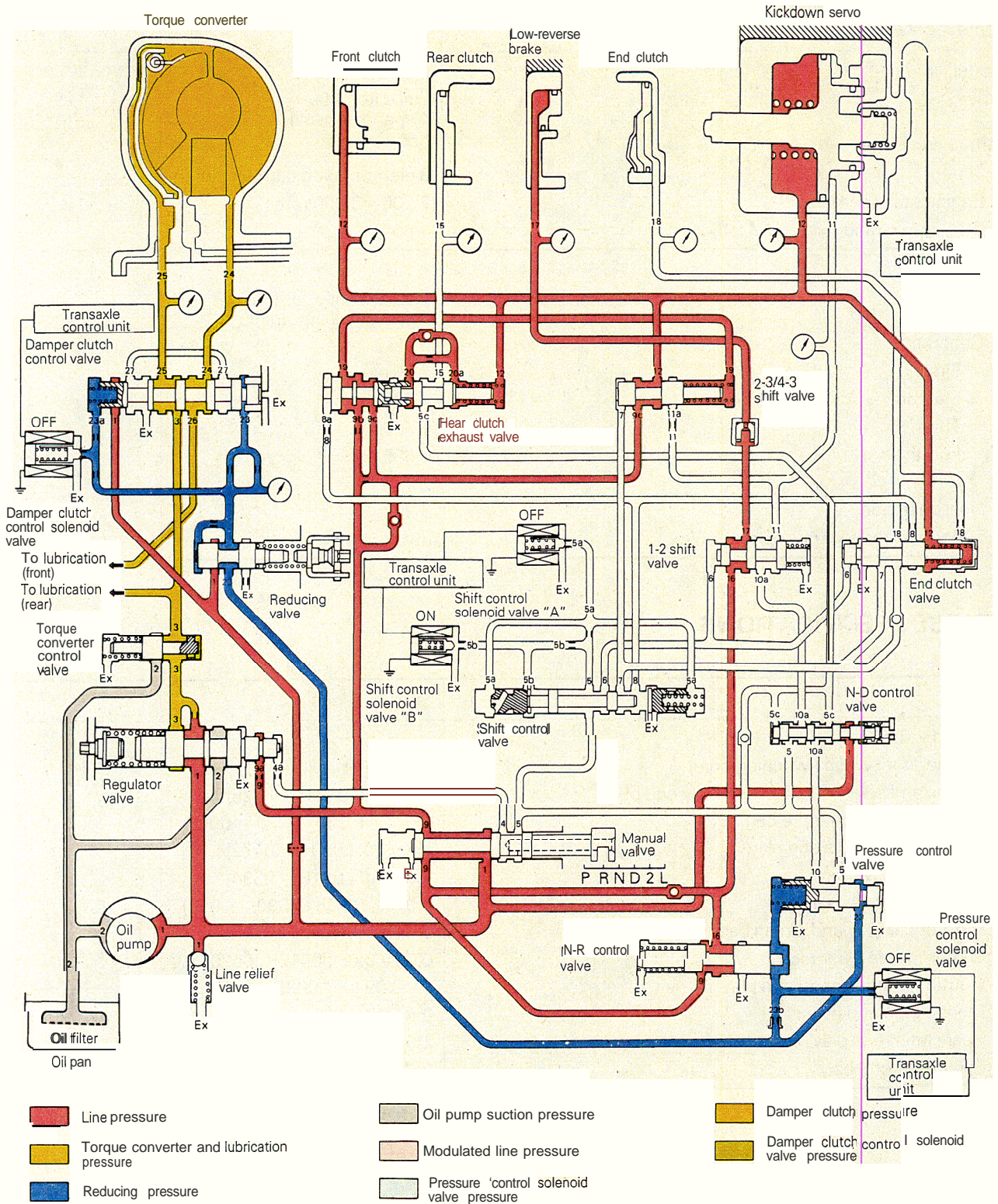
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<F4A21 – Reverse>



| Reverse |

TFA0077

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SPECIFICATIONS

GENERAL SPECIFICATIONS

M23CA.C

Items	Specifications
Model	F4A33-1-MNN2
Type	Full automatic 4 speed transaxle
Torque converter	
Type	3 element with damper clutch
Engine stall speed	2,200 – 3,200 rpm
Stall torque ratio	1.80
Transaxle	
Type	Electronically controlled 4-speed full-automatic
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)	36/28

SERVICE SPECIFICATIONS

M23CB-C
mm (in.)

Items	Specifications
Standard value	
Accelerator switch switching point	2 – 6 (.079 – .24)
Sleeve and selector lever assembly end play	15.2 – 15.9 (.598 – .625)
Transfer driven gear preload	0.075-0.135 (.0030 – .0053)
Low-reverse brake end play	1.0 – 1.2 (.0394 – .0472)
Input shaft end play	0.3 – 1.0 (.0118 – .0394)
Differential case preload	0.075 – 0.135 (.0030 – .0053)
Differential gear and pinion backlash	0.025 – 0.150 (.0010 – .0059)
Oil pump side clearance	0.03 – 0.05 (.0012 – .0020)
Output flange bearing end play	0 – 0.09 (0 – .0035)
Front clutch end play	0.8 – 1.0 (.0315 – .0394)
Rear clutch end play	1.0 – 1.2 (.0394 – .0472)
End clutch end play	0.60 – 0.85 (.0236 – .0335)

VALVE BODY SPRING IDENTIFICATION CHART

M23CG-
mm (in.)

Part name	Wire diameter	Outside diameter	Length	No. of turns
Regulator valve spring	1.4 (.055)	15 (.59)	52 (2.05)	11.5
I-2 shift valve spring	0.6 (.024)	7.6 (.299)	26.6 (1.047)	13.5
Pressure control valve spring	0.45 (.0177)	7.6 (.299)	21.3 (.839)	8.5
Rear clutch exhaust valve spring	0.7 (.028)	6.8 (.268)	27.4 (1.079)	12.5
End clutch valve spring	0.6 (.024)	6.6 (.260)	24.4 (.961)	15.5
2-3 shift valve spring	0.8 (.031)	7.0 (.276)	27.5 (1.083)	15.5
N-R control valve spring	0.7 (.028)	9.2 (.362)	32.1 (1.264)	8.5
Reducing valve spring	1.2 (.047)	8.9 (.350)	29.5 (1.161)	12.5
Line relief spring	1.0 (.039)	7.0 (.276)	17.3 (.681)	10
Torque converter valve spring	1.3 (.051)	9.0 (.354)	22.6 (.890)	9.5
Shift control valve spring	0.5 (.020)	5.7 (.224)	26.8 (1.055)	22
Damper clutch control valve spring	0.7 (.028)	6.2 (.244)	14.2 (.559)	9.5

SPACER AND SNAP RING

M23CF-B

Part name	Thickness mm (in.)	Identification symbol	Part No.
Spacer (for adjustment of transfer driven gear preload)	0.62 (.0244)	62	MD737444
	0.65 (.0256)	65	MD737445
	0.68 (.0268)	68	MD737446
	0.71 (.0280)	71	MD737447
	0.74 (.0291)	74	MD728802
	0.77 (.0303)	77	MD728803
	0.80 (.0315)	80	MD726804
	0.83 (.0327)	83	MD728805
	0.86 (.0339)	86	MD728806
	0.89 (.0350)	89	MD726807
	0.92 (.0362)	92	MD726808
	0.95 (.0374)	95	MD728809
	0.98 (.0386)	98	MD72881 0
	1.01 (.0398)	01	MD72881 1
	1.04 (.0409)	04	MD72881 2
	1.07 (.0421)	07	MD72681 3
	1.10 (.0433)	10	MD72881 4
	1.13 (.0445)	13	MD72881 5
	1.16 (.0457)	16	MD72881 6
	1.19 (.0469)	19	MD72881 7
1.22 (.0480)	22	MD72881 8	
1.25 (.0492)	25	MD72981 9	
1.28 (.0504)	28	MD728820	
1.31 (.0516)	31	MD72682 1	

Part name	Thickness mm (in.)	Identification symbol	Part No.
Pressure plate (for adjustment of low-reverse brake end play)	5.9 (.232)	A	MD731 736
	6.0 (.236)	0	MD731 737
	6.1 (.240)	1	MD731738
	6.2 (.244)	2	MD731 739
	6.3 (.248)	3	MD731 740
	6.4 (.252)	4	MD731 588
	6.5 (.256)	5	MD731 741
	6.6 (.260)	6	MD731742
	6.7 (.264)	7	MD731 743
	6.8 (.268)	8	MD731744
6.9 (.272)	9	MD731 745	
Spacer (for adjustment of differential case preload)	0.83 (.0327)	83	MD720937
	0.86 (.0339)	86	MD720938
	0.89 (.0350)	89	MD720939
	0.92 (.0362)	92	MD720940
	0.95 (.0374)	95	MD720941
	0.98 (.0386)	98	MD720942
	1.01 (.0398)	01	MD720943
	1.04 (.0409)	04	MD720944
	1.07 (.0421)	07	MD720945
	1.10 (.0433)	J	MD710454
	1.13 (.0445)	D	MD700270
	1.16 (.0457)	K	MD710455
	1.19 (.0469)	L	MD710456
	1.22 (.0480)	G	MD700271
	1.25 (.0492)	M	MD710457
	1.28 (.0504)	N	MD71 0458
1.31 (.0516)	E	MD706574	
1.34 (.0528)	0	MD710459	
1.37 (.0539)	P	MD710460	
Snap ring (for adjustment of output flange bearing end play)	1.76 (.0693)	Brown	MD73331 4
	1.82 (.0717)	None	MD722538
	1.88 (.0740)	Blue	MD721 014
	1.94 (.0764)	Brown	MD721015
	2.00 (.0787)	None	MD721016
	2.06 (.0811)	Blue	MD721017
	2.12 (.0835)	Brown	MD722539
	2.18 (.0858)	None	MD73331 5

Part name	Thickness mm (in.)	* Identification symbol	Part No.
Spacer (for adjustment of differential gear and pinion backlash)	0.75 – 0.82 (.0295 – .0323)	–	MD722986
	0.83 – 0.92 (.0327 – .0362)	–	MD722985
	0.93 – 1.00 (.0366 – .0394)	–	MD722984
	1.01 – 1.08 (.0398 – .0425)	–	MD722982
	1.09 – 1.16 (.0429 – .0457)	–	MD722983
Snap ring (for adjustment of front clutch and rear clutch end play) * ... Only for rear clutch	1.3" (.051)	None	MD731 747
	1.4* (.055)	Blue	MD731 748
	1.5 (.059)	Brown	MD731 749
	1.6 (.063)	None	MD731750
	1.7 (.067)	Blue	MD731751
	1.8 (.071)	Brown	MD731 752
	1.9 (.075)	None	MD731 753
	2.0 (.079)	Blue	MD731 754
	2.1 (.083)	B r o w n	MD731 755
	2.2 (.087)	None	MD731756
2.3 (.091)	Blue	MD731757	
2.4 (.094)	Brown	MD731 758	
Snap ring (for adjustment of end clutch end play)	1.05 (.0413)	White	MD71 5800
	1.30 (.0512)	Yellow	MD71 5801
	1.55 (.0610)	None	MD71 5802
	1.80 (.0709)	Green	MD71 5803
	2.05 (.0807)	Pink	MD720849


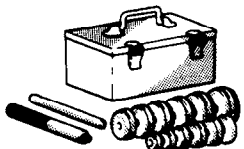

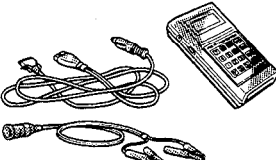
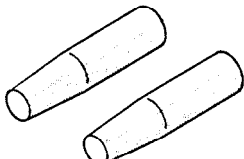
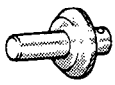
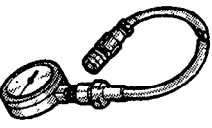
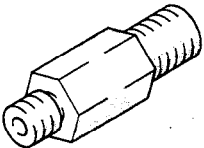
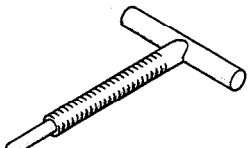
LUBRICANTS

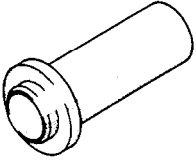
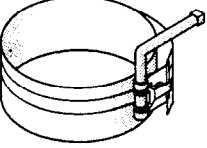
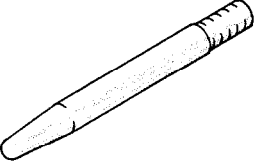
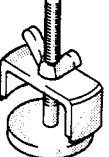
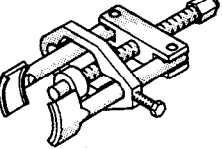




M23CD-B


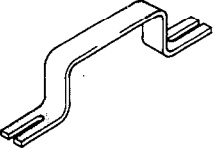

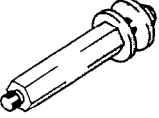
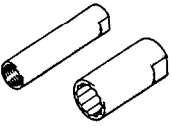
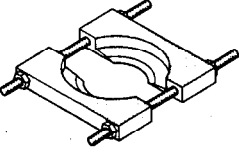
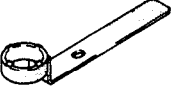
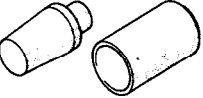
Items	Specified lubricants	Quantity
Transaxle fluid liters (qts.)	Dia ATF SP or MITSUBISHI PLUS ATF or equivalent	7.5 (7.9)
Drive shaft oil seal lip		As required

SPECIAL TOOLS

M23DA-B

Tool	Number	Name	Use
	MB991113-01	Steering linkage puller	<ul style="list-style-type: none"> • 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
	MB990925-01	Bearing and oil seal installer	Installation of bearing outer race
	MB991359	ROM pack	Checking of the diagnosis code
	MB991341	Multi-use tester sub assembly	Checking of the diagnosis code
	MD998226-01	Guide pin	Reassembly of valve body
	MD998325-01	Oil seal installer	Installation of drive shaft oil seal
	MD998330-01	Oil pressure gauge	Measuring oil pressure
	MD998332-01	Adapter	Connection of the oil pressure gauge
	MD998333-01	Oil pump remover	Removal and installation of oil pump

Tool	Number	Name	Use
	MD998334-01	Oil seal installer	Installation of oil pump oil seal
	MD998335-01	Oil pump band	Reassembly of oil pump
	MD998336-01	Guide pin	Removal and installation of oil pump assembly
	MD998337-01	Spring compressor	Disassembly and reassembly of front clutch and rear clutch
	MD998348-01	Bearing and gear puller	Removal of bearing
	MD998812	Installer cap	Driving of bearing
	MD998822	Installer adapter (46)	Driving of bearing
	MD998825	Installer adapter (52)	Driving of bearing
	MD998829	Installer adapter (60)	Driving of bearing

Tool	Number	Name	Use
	MD998830	Installer adapter (66)	Driving of bearing
	MD998905	Handle	Removal and installation of low/reverse brake piston
	MD998907	Spring compressor	Disassembly and reassembly of front clutch and rear clutch
	MD998915	Kickdown servo wrench adapter	Adjustment of kickdown servo
	MD998916-01 MD998916-1-01 MD998916-2-01 MD998916-3-01	Kickdown servo wrench adapter set Kickdown servo wrench adapter Outer sleeve Inner sleeve	Adjustment of kickdown servo
	MD998917	Bearing remover	Disassembly and reassembly of output flange
	MD998918	Kickdown servo wrench	Adjustment of kickdown servo
	MD998919	Snap ring installer	Reassembly of end clutch

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 abnormal condition somewhere 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 oil-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 oil-pressure passages for leakage, etc.

If the problem is unusually dirty ATF, abnormal noises, oil leakage, or slippage of the clutch or brakes, or an abnormal condition of the transaxle itself, disassemble and repair the transaxle.

TROUBLESHOOTING

M23EBAY

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

Problem		Driving impossible or abnormal (before start-off)												
		Starter motor won't function	Forward/backward movement impossible	Forward movement impossible	Backward movement impossible	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	
* resumed cause														
Engine	1 Abnormal idling rpm					⊗							X	
	2 Performance malfunction					X			X					
Transaxle (power train)	3 Improper adjustment of manual linkage	X	⊗	⊗	⊗		⊗	⊗		⊗	⊗	⊗	⊗	
	4 Malfunction of torque converter		X	X	X	X	X	X	X					
	5 Operation malfunction of oil pump		X	X	X		X	X						
	6 Malfunction of one-way clutch			X			X							
	7 Damaged or worn gear or other rotating part, or improper adjustment of the preload													
	8 Malfunction of parking mechanism									X		X		
	9 Cracked drive plate, or loose bolt		X											
	10 Worn inside diameter of front clutch retainer				X			X						
	Air-pressure system (including friction elements)	11 Low fluid level		⊗	⊗	⊗		X	X					
		12 Line pressure too low (seal damaged, leakage, looseness, etc.)		⊗	⊗	⊗		⊗	⊗					
13 Malfunction of valve body (sticking valve, working cavity, adjustment, etc.)			⊗	⊗	⊗	X	X	X		X	X		X	
14 Malfunction of front clutch or piston					X			X					X	
15 Malfunction of rear clutch or piston				⊗			X			X			X	
16 Malfunction of kickdown band or piston													X	
17 Improper adjustment of kickdown servo													X	
18 Malfunction of low-reverse brake or piston					X			X					X	
19 O-ring of low-reverse brake circuit between valve body and case not installed					X			X						
20 Malfunction of end clutch or piston (check ball hole, other)														
Electronic control system	21 Malfunction of inhibitors switch, damaged or disconnected wiring, or improper adjustment	X									X		X	
	22 Malfunction of TPS, or improper adjustment												X	
	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												X	
	28 Incorrectly grounded ground strap													
	29 PCSV damaged or disconnected wiring, or short-circuit												X	
	30 PCSV damaged or disconnected wiring (valve open)		⊗	⊗	⊗		X	X						
	31 DCCSV damaged or disconnecting wiring (valve closed)						X							
	32 DCCSV short-circuit or sticking (valve open)					⊗								
	33 Malfunction of overdrive control switch													
	34 Malfunction of accelerator switch, or improper adjustment												X	
	35 Malfunction of oil-temperature sensor													
	36 Malfunction of lead switch													
	37 Poor contact of ignition switch	X												
	38 Malfunction of transaxle control unit												X	

NOTE- ⊗ indicates items of priority during inspection.
 PCSV = Pressure control solenoid valve

Abbreviations TPS = Throttle position sensor
 DCCSV = Damper clutch control solenoid valve

SCSV = Shift control solenoid valve
 OD = Overdrive

Transaxle malfunction of shift/shock (after start-off)															Abnormal noise, other																							
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	38	
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	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	Excessive vibration/shock (other than already described)	Damper 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					X																																	
2				X		X	X	X	X			X	X		X																							
3	X																																					
4				X										X	X																							
5																																						
6										X	X																									X		
7																																						
8																																						
9																																					X	
10	X	X								X	X																											
11										X	X																											
12										⊗	⊗		X																									
13	X	X		X		X	X	X	X	X	X	X	X	X	X																							
14	X						X	X		X																												
15																																						
16						X			X	X	X																											
17						X			X	X	X						X																					
18																																						
19																																						
20		⊗				X				X																												
21	X	X																																			X	
22			⊗			X	X	⊗	X	⊗	X		X	X	X																							
23						X	X	X	X	X	X		X	X	X																							
24				X											X	X																					X	
25						X			X	X	X																											
26																																					X	
27														X																								
28																																						X
29																	X																				X	
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34				X	X									X	X	X																						
35														X	X	X																					X	
36																																						X
37																																						X
38	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X																						X

DIAGNOSIS AND TEST**FLUID LEVEL AND CONDITION**

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 automatic transaxle 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 transaxle fluid.

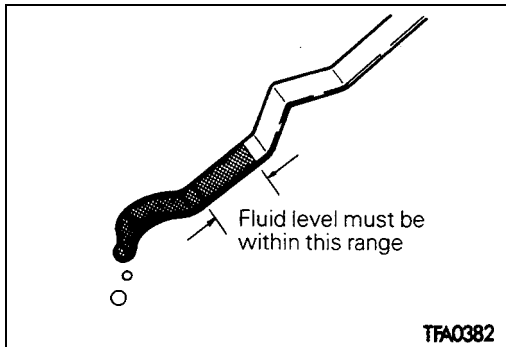
In either case, air bubbles can cause overheating, fluid oxidation, which can interfere with normal valve, clutch, and servo operation. Foaming can also result in fluid escaping from transaxle vent where it may be mistaken for a leak.

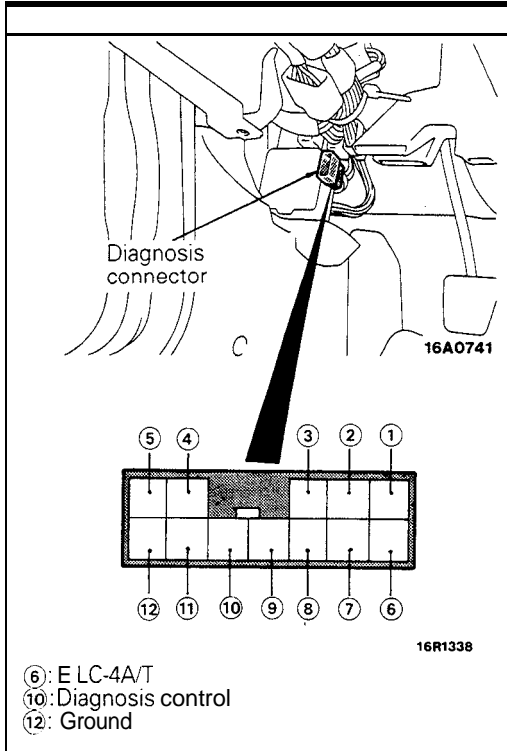
6. Be sure to examine fluid on dipstick closely.

CONTROL CABLE

Whether control cable is properly adjusted can be confirmed by checking whether inhibitor 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.



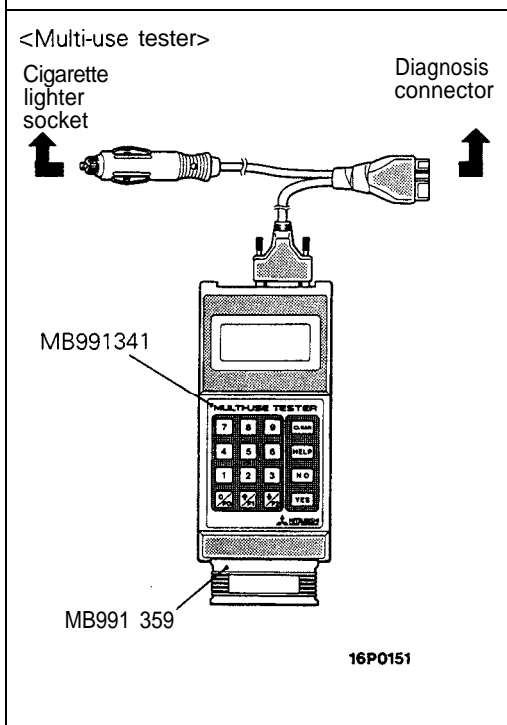


OBTAINING FAULT CODES












- (1) Connect the voltmeter or multi-use tester to the connector for diagnosis.
 - (2) Read the output fault codes.
- Then follow the remedy procedures according to the "FAULT CODE DESCRIPTION" on the following page.

NOTE











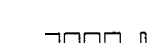
- As many as a maximum of ten fault codes, in the sequence of occurrence, can be stored in the Random Access Memory (RAM) incorporated within the control unit.
 - If the number of stored fault codes or fault patterns exceeds ten, already stored fault codes will be erased, in sequence beginning with the oldest.
 - Do not disconnect the battery until all fault codes or fault patterns have been read out, because all stored fault codes or fault patterns will be canceled when the battery is disconnected.
- (3) If the fail-safe system is activated and the transaxle is locked in 3rd gear, the fault code in the Fail-Safe Code Description will be stored in the RAM. Three of these fault codes can be stored.
 - (4) The cancellation will occur if, with the transaxle locked in 3rd gear, the ignition key is turned to the OFF position, but the fault code is stored in the RAM.




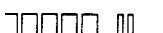




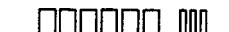
FAULT CODE DESCRIPTION

Code No.	Display Pattern	Item	Remedial Action
11		Excessively large throttle position sensor output	<ul style="list-style-type: none"> • 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).
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	<ul style="list-style-type: none"> • Check oil temperature sensor connector. • Check oil temperature sensor on bench.
16		Short-circuited high-oil-temperature sensor	
17		Open-circuited high-oil-temperature sensor or short-circuited low-oil-temperature sensor	
21		Open-circuited kickdown servo switch	<ul style="list-style-type: none"> • Check kickdown servo switch connector. • Check kickdown servo switch on bench.
22		Short-circuited kickdown servo switch	
23		Open-circuited ignition pulse pickup cable	<ul style="list-style-type: none"> • Check ignition pulse signal line.
24		Open-circuited or improperly adjusted accelerator switch	<ul style="list-style-type: none"> • Check accelerator switch connector • Check accelerator switch on bench. • Adjust accelerator switch.

12A0104
12A0107







Code No.	Display Pattern	Item	Remedial Action
31		Open-circuited pulse generator A	<ul style="list-style-type: none"> • Check pulse generator A or B on bench. • Check vehicle-speed reed switch (chattering).
32		Open-circuited pulse generator B	
41		Open-circuited shift control solenoid valve A	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Check solenoid valve connector. • Check pressure control solenoid valve on bench.
46		Short-circuited pressure control solenoid valve	
47		Open-circuited damper clutch control solenoid valve	<ul style="list-style-type: none"> • Check solenoid valve connector. • Check damper clutch control solenoid valve on bench.
48		Short-circuited damper clutch control solenoid valve	
49		Defective damper clutch system	<ul style="list-style-type: none"> • Check damper clutch hydraulic circuit. • Check damper clutch control solenoid valve on bench. • Replace control unit.

12A0107
12A0105

Code No.	Display Pattern	Item	Remedial Action
51		1 st speed shift not finish	<ul style="list-style-type: none"> • Check connectors of pulse generators A and B. • Check pulse generators A and B on bench. • Rear clutch slipping
52		2nd speed shift not finish	<ul style="list-style-type: none"> • Check connectors of pulse generators A and B. • Check pulse generators A and B on bench. • Rear clutch slipping • Kickdown brake slipping
53		3rd speed shift not finish	<ul style="list-style-type: none"> • Check connectors of pulse generators A and B. • Check pulse generators A and B on bench. • Front clutch slipping • Rear clutch slipping
54		4th speed shift not finish	<ul style="list-style-type: none"> • Check connectors of pulse generators A and B. • Check pulse generators A and B on bench. • End clutch slipping • Kickdown brake slipping
61		Short-circuited torque reduction request signal line or open-circuited torque reduction execution signal line	<ul style="list-style-type: none"> • Check torque reduction request signal line. • Check torque reduction execution signal line.
62		Open-circuited torque reduction request signal line	<ul style="list-style-type: none"> • Check torque reduction request signal line.
63		Short-circuited torque reduction execution signal line	<ul style="list-style-type: none"> • Check torque reduction execution signal line.

12A0106

FAIL-SAFE CODE DESCRIPTION

Code No.	Display Pattern	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
8	3 	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		Shift not finish	Fixed at 3rd (D) or 2nd (2, L)	51, 52 53, 54

12L0296

INSPECTION OF CONTROL SYSTEM

Check the control system by using the multi-use tester and following the procedure given below.

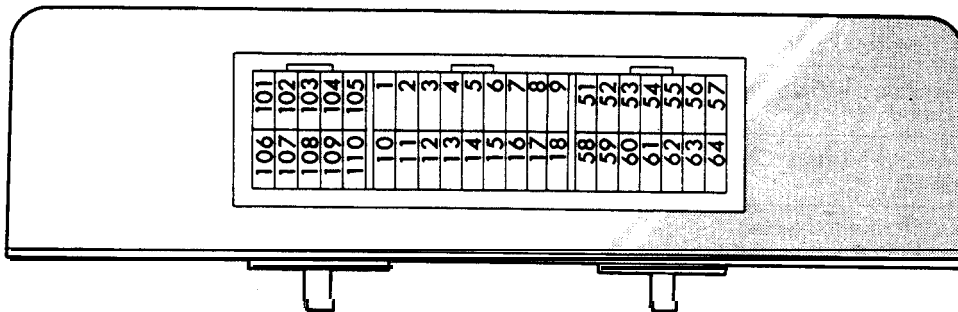
CONTROL SYSTEM INSPECTION TABLE

Check Item	Description		Possible Cause of Trouble (or Remedy)
	Condition	Criteria	
Throttle position sensor (TPS) ● Data list ● Item No. 11	Accelerator pedal fully released	0.4 – 1.0 V	<ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> ● Defective ignition system ● Defective ignition signal pickup circuit harness
	N range, 2,500 rpm (tachometer reading)	2,400 – 2,600 rpm	
Accelerator pedal switch ● Data list ● Item No. 24	Accelerator pedal fully released	ON	<ul style="list-style-type: none"> ● Improperly adjusted accelerator pedal switch ● Defective accelerator pedal switch or circuit harness
	Accelerator pedal slightly depressed	OFF	
Idle switch ● Data list ● Item No. 25	Accelerator pedal fully released	ON	<ul style="list-style-type: none"> ● Improperly adjusted TPS ● Defective TPS or circuit harness
	Accelerator pedal slightly depressed	OFF	
Air conditioner relay signal ● Data list ● Item No. 26	D range, air conditioner idle-up	ON	<ul style="list-style-type: none"> ● Defective air-conditioner power relay ON signal detection circuit harness
	D range, air conditioner idle OFF	OFF	
Transaxle gear position ● Data list ● Item No. 27	D range, idle	C	<ul style="list-style-type: none"> ● Defective TCU ● Defective accelerator pedal switch circuit ● Defective inhibitor 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	
Pulse generator A ● Data list ● Item No. 31	D range, stop	0 rpm	<ul style="list-style-type: none"> ● 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	

Check Item	Description		Possible Cause of Trouble (or Remedy)
	Condition	Criteria	
Pulse generator B • Data list • Item No. 32	D range, stop	0 rpm	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Defective power/economy select switch or circuit harness
	Economy pattern selected	Economy	
Inhibitor switch • Data list • Item No. 37	Shifted to P range	P	<ul style="list-style-type: none"> Improperly adjusted inhibitor switch Defective inhibitor 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)	<ul style="list-style-type: none"> 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%	<ul style="list-style-type: none"> Duty should become 100% when accelerator pedal is depressed even a little from D range idle conditions. Defective TCU Defective TPS circuit Defective accelerator pedal switch circuit
	D range, 1st speed	100%	
	D range, gear being shifted	Depends on conditions	
Damper clutch slip • Data list • Item No. 47	D range, 3rd speed, 1,500 rpm (tachometer reading)	100 – 300 rpm	<ul style="list-style-type: none"> Defective damper clutch Defective ignition signal line or pulse generator B circuit Incorrect transmission fluid pressure Defective DCCSV
	D range, 3rd speed, 3,500 rpm (tachometer reading)	0 rpm	
DCCSV duty • Data list • Item No. 49	D range, 3rd speed, 1,500 rpm (tachometer reading)	0%	<ul style="list-style-type: none"> Defective TCU Defective TPS circuit Defective pulse generator B circuit
	D range, 3rd speed, 3,500 rpm (tachometer reading)	Depends on loads	

TRANSMISSION CONTROL UNIT

The connector has 42 pins to accommodate the increased number of sensor inputs. Here are the pin assignments.



- | | |
|------|--|
| 101. | Damper clutch control solenoid valve |
| 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. | Diagnosis output terminal |
| 6. | Air-conditioner relay signal |
| 7. | Engine communication signal |
| 8. | Diagnosis control terminal |
| 9. | Engine communication signal |
| 10. | Power source (backup) |
| 11. | Kickdown servo switch |
| 12. | Idle 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. | Inhibitor switch (P) |
| 52. | Inhibitor switch (R) |
| 53. | Inhibitor switch (N) |
| 54. | Inhibitor switch (D) |
| 55. | Inhibitor switch (2) |
| 56. | Inhibitor 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 |

TFA0360

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	
						C1	C2	C3	OWC	B1	B2
P	–	Neutral	–	Possible	•						
R	–	Reverse	2.176			•					•
N	–	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

- C1 Front clutch
- C2 . Rear clutch
- C3 End clutch
- B1 . . . Low reverse brake
- B2 . . Kickdown brake
- OWC One way clutch

SHIFT PATTERNS

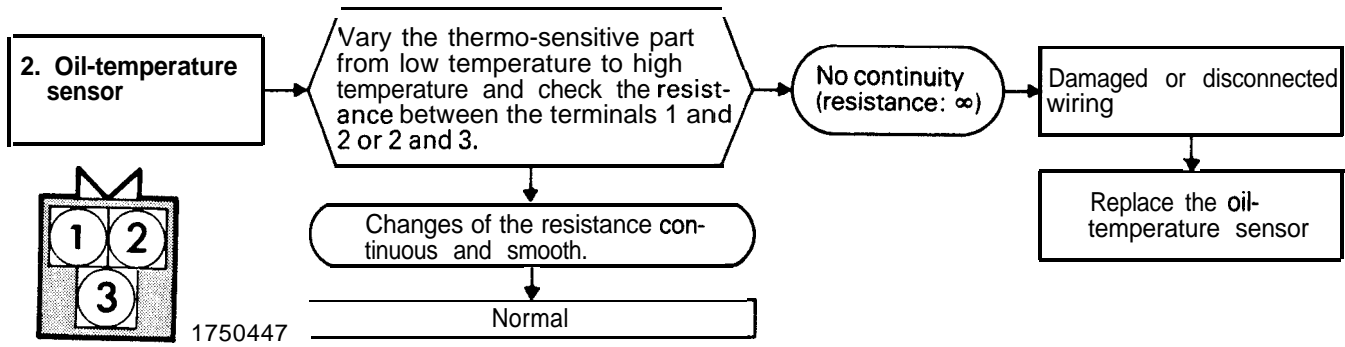
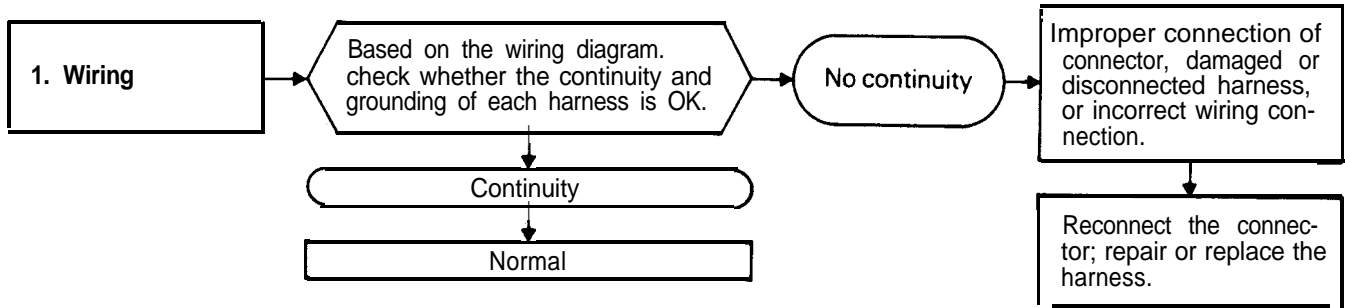
Two shift patterns are pre-stored in the control unit of this transaxle. One is the power pattern (for more powerful performance), and the other is the economy pattern (for improved fuel consumption and quieter operation).

The driver can select and switch to the desired pattern by using the power/economy select switch on the center console.

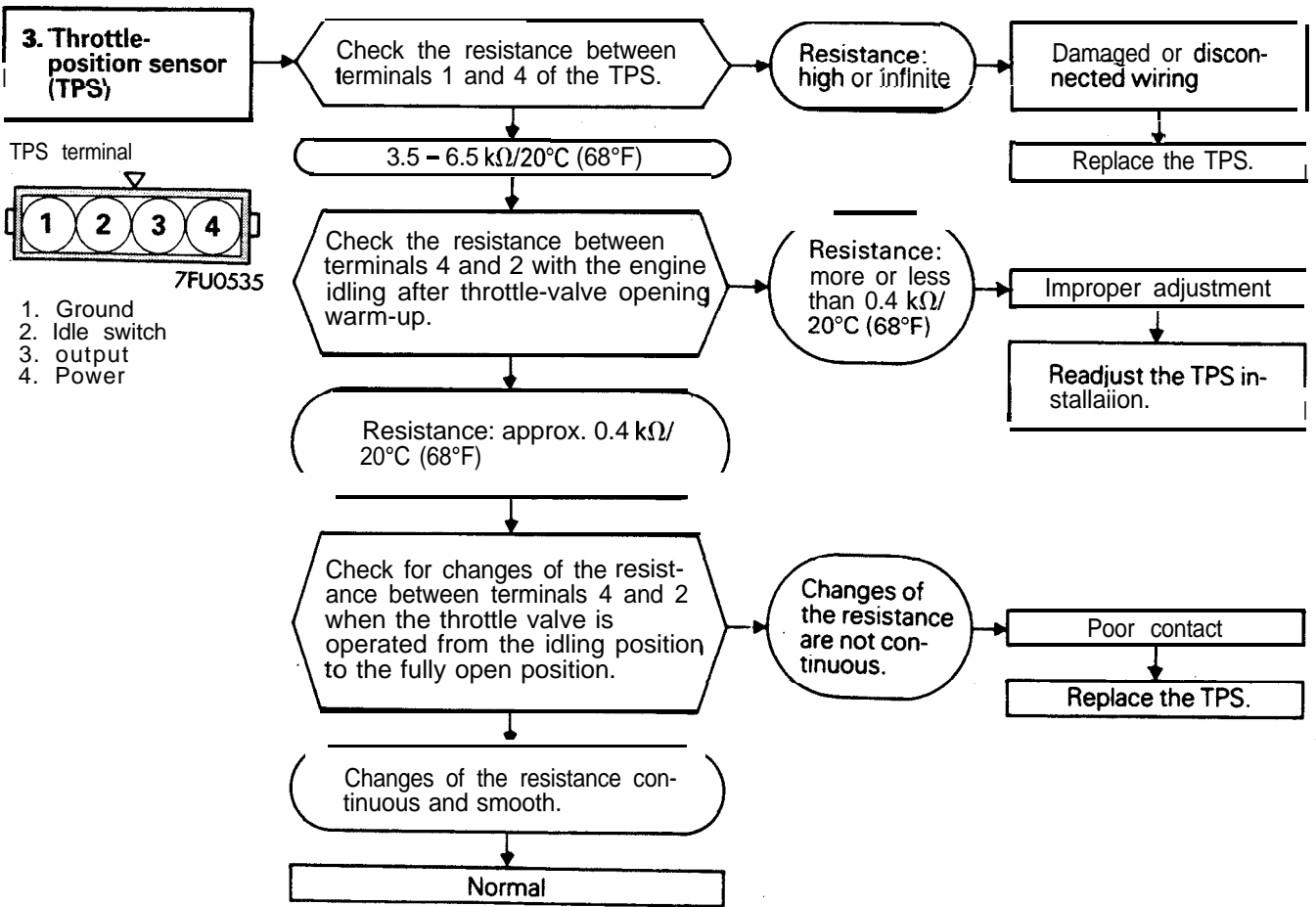
The solid lines shown in these shift patterns indicate up-shifts, and the broken lines indicate down-shifts. The reason why there is a difference between the shift points for upshifts and for down-shifts is so that up-shifts and down-shifts will not occur frequently when driving at a speed in the vicinity of the shift point.

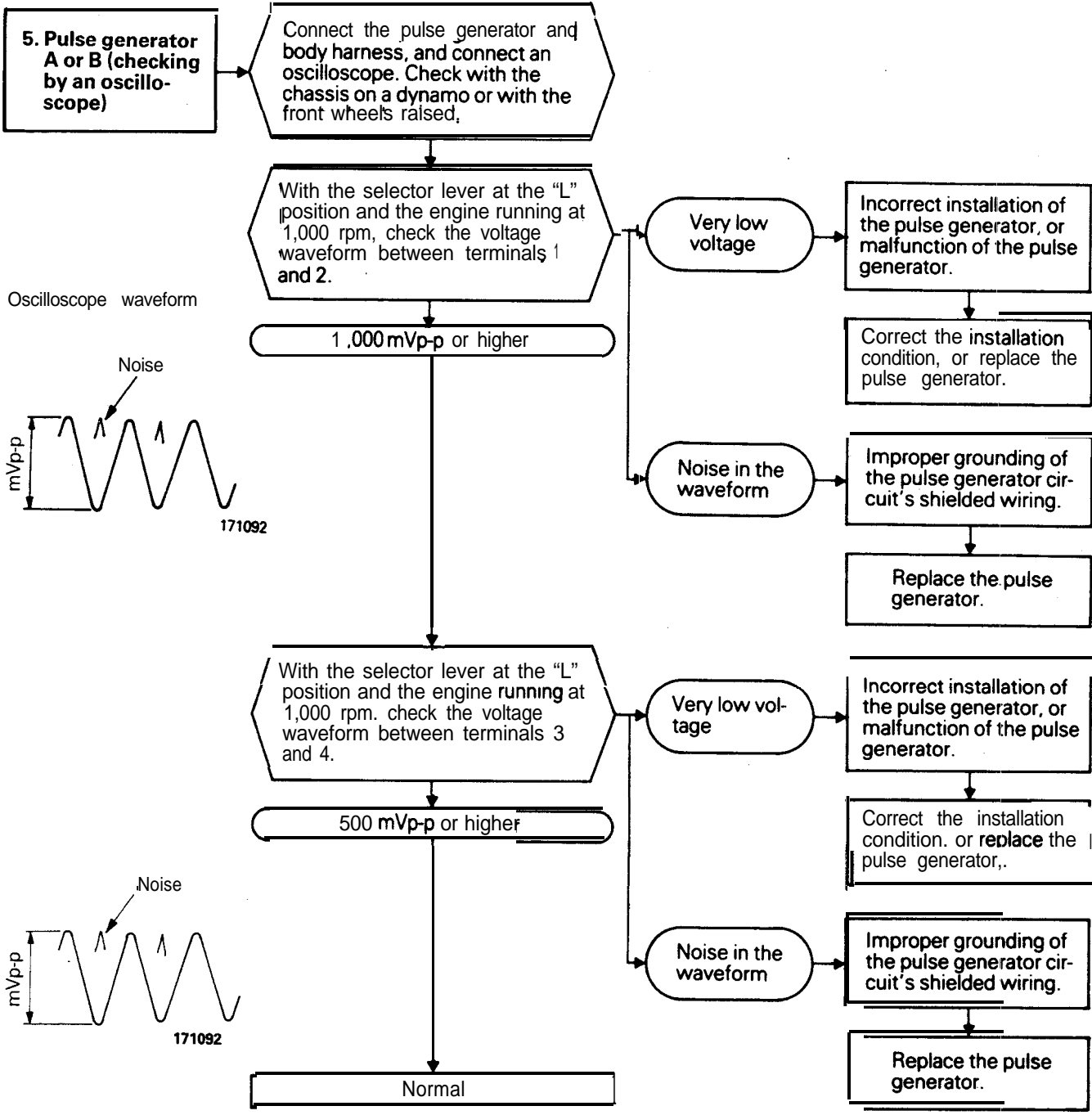
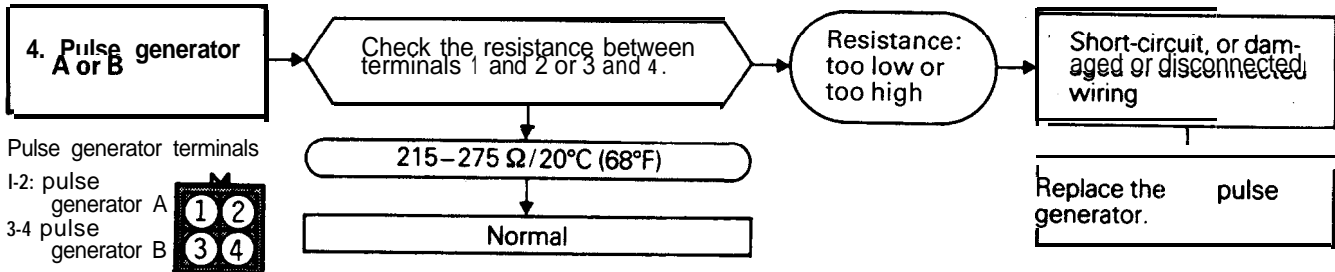
When the vehicle is stopped, there is a shift to 2nd gear in order to obtain a suitable “creeping”, but when the accelerator pedal is then depressed the vehicle starts off in 1st gear.

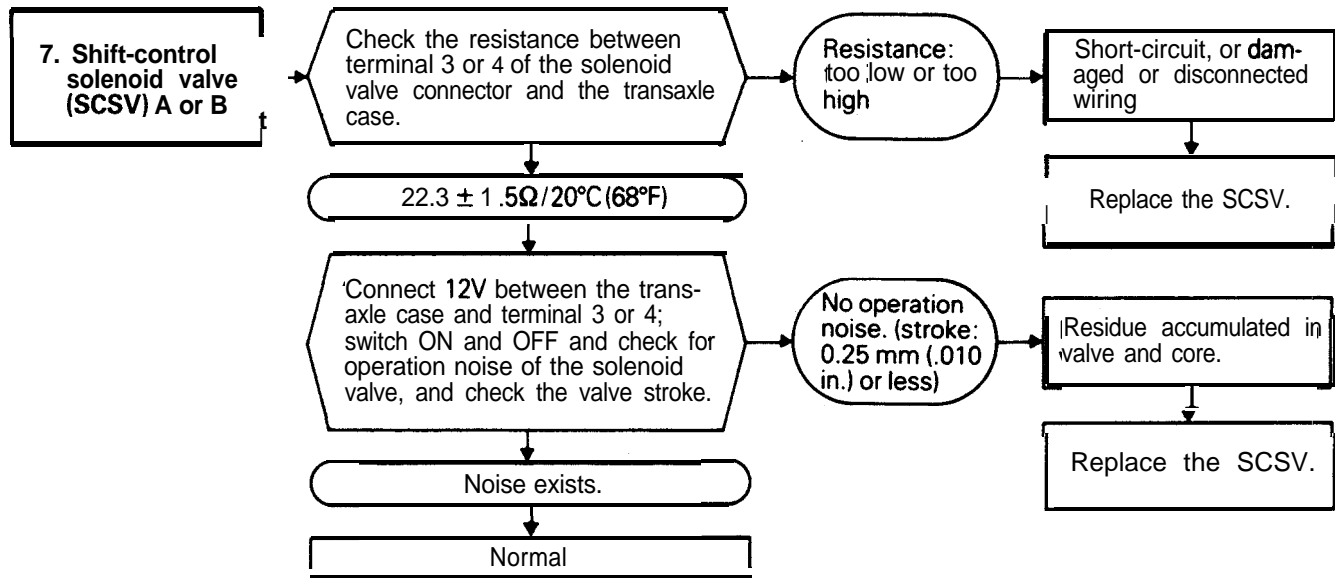
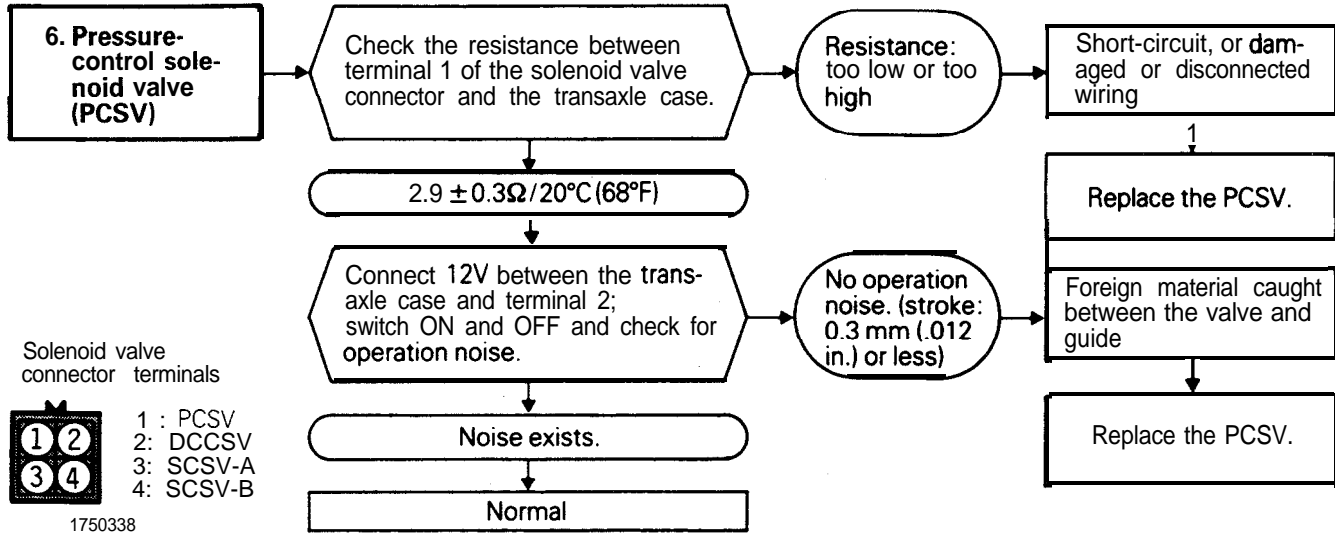
INSPECTION OF ELECTRONIC CONTROL SYSTEM COMPONENTS

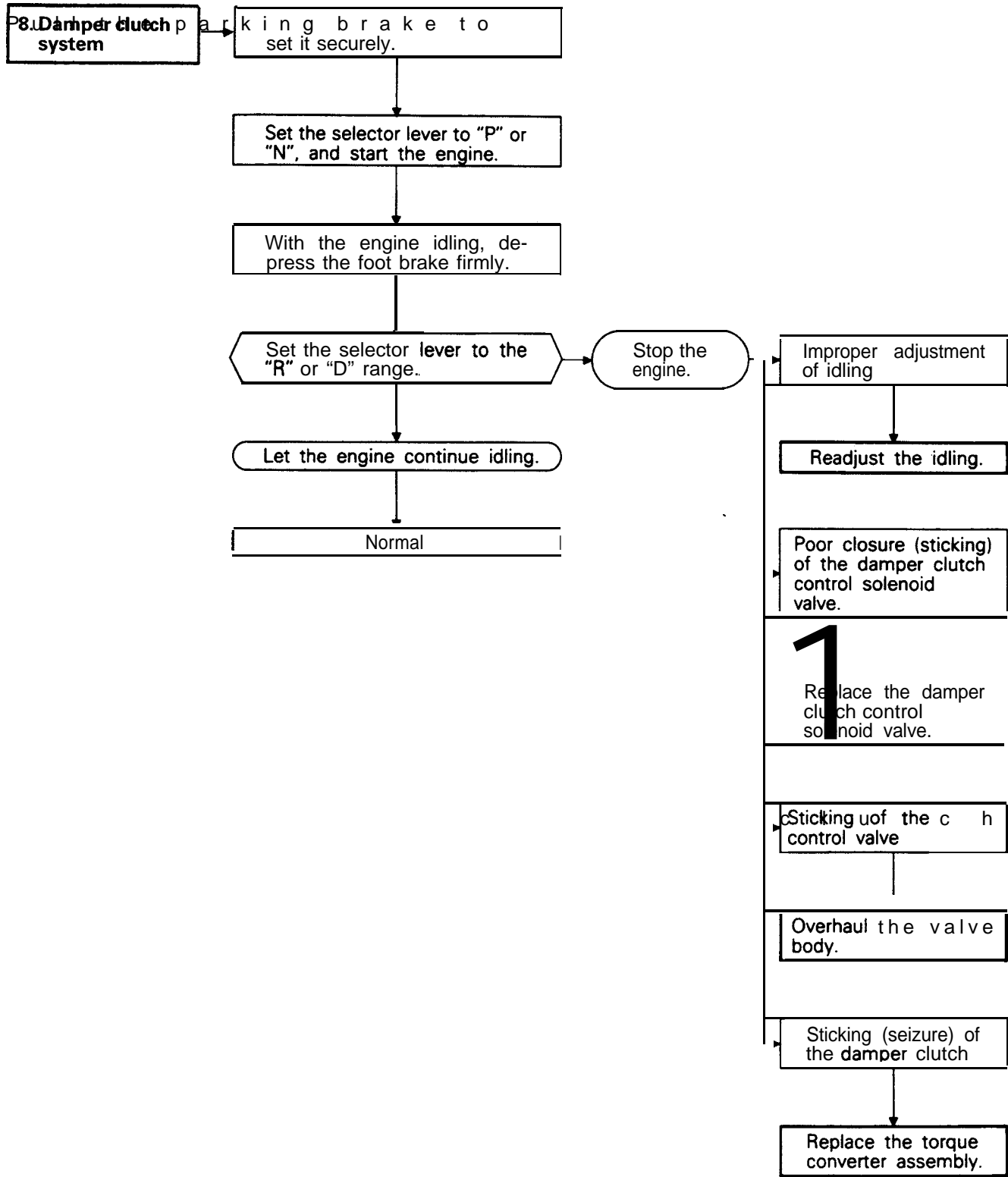


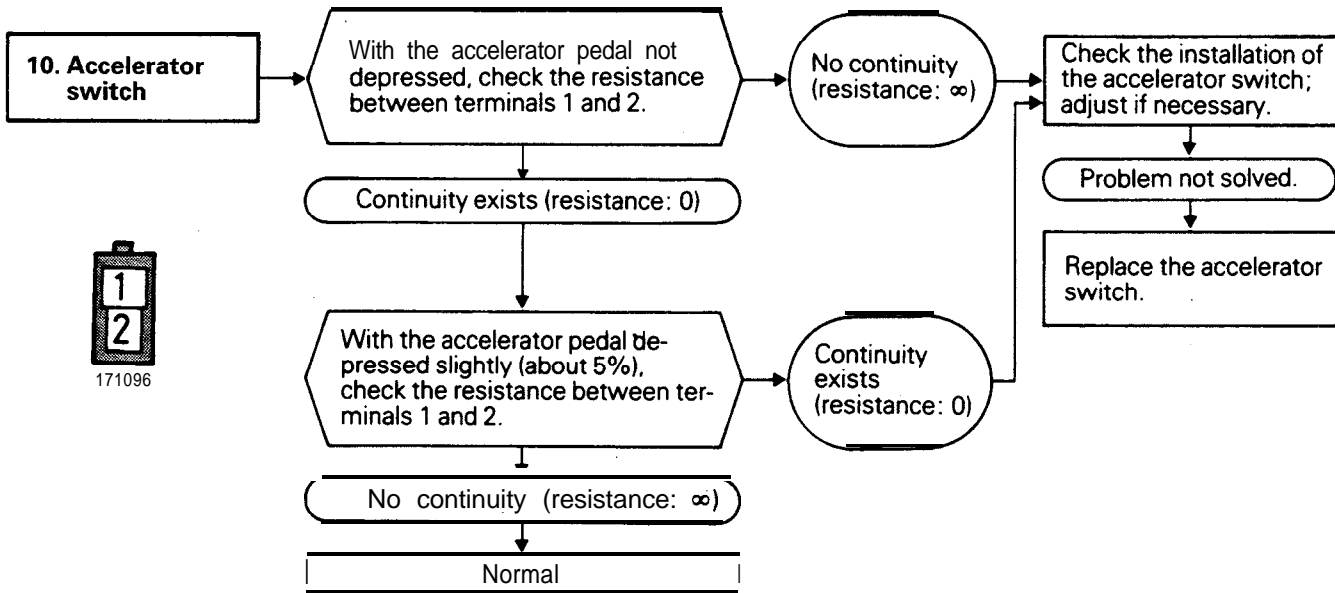
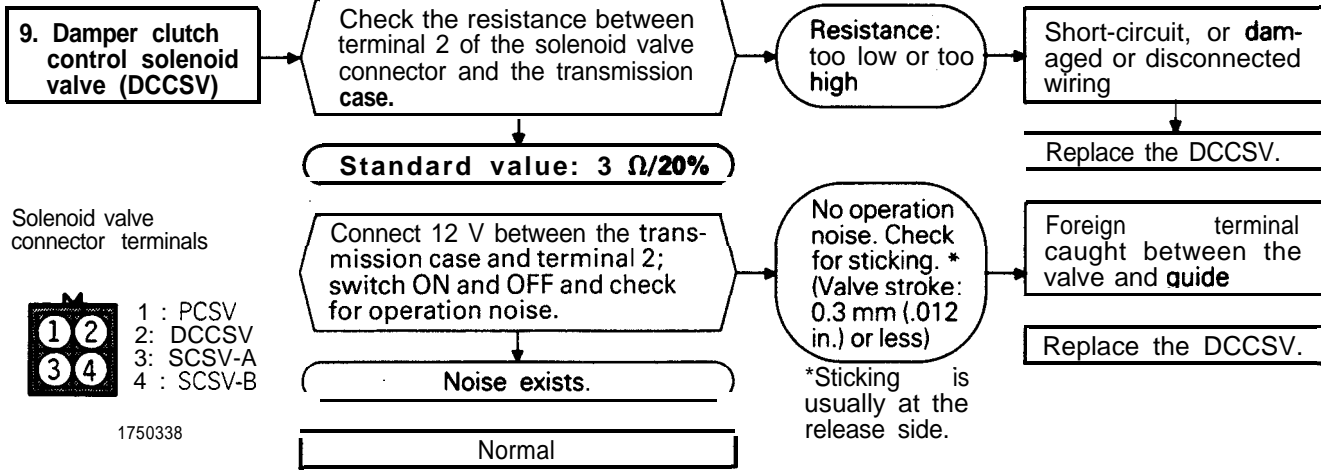
- 1: Low temperature side
- 2: Ground
- 3: High temperature side







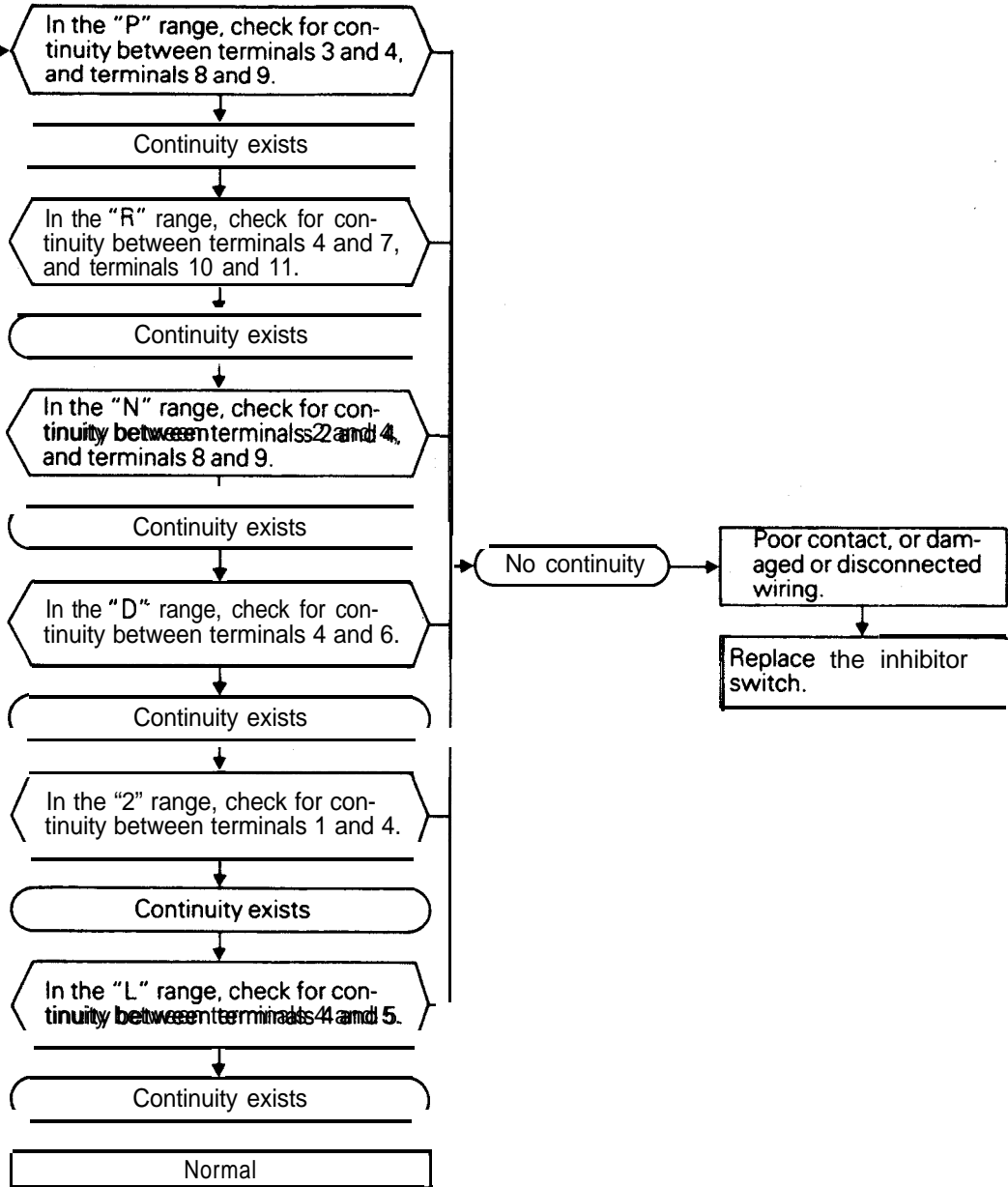


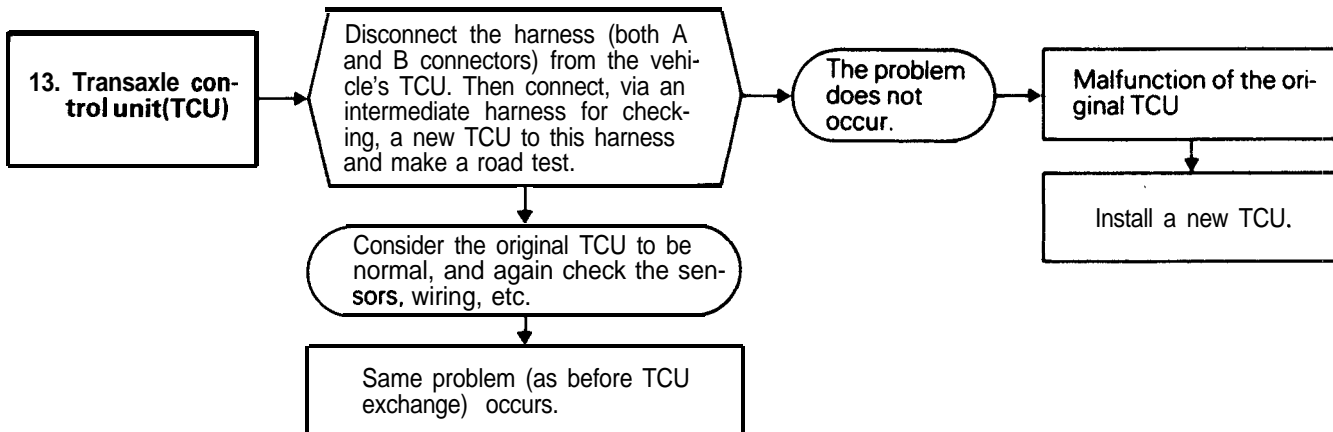
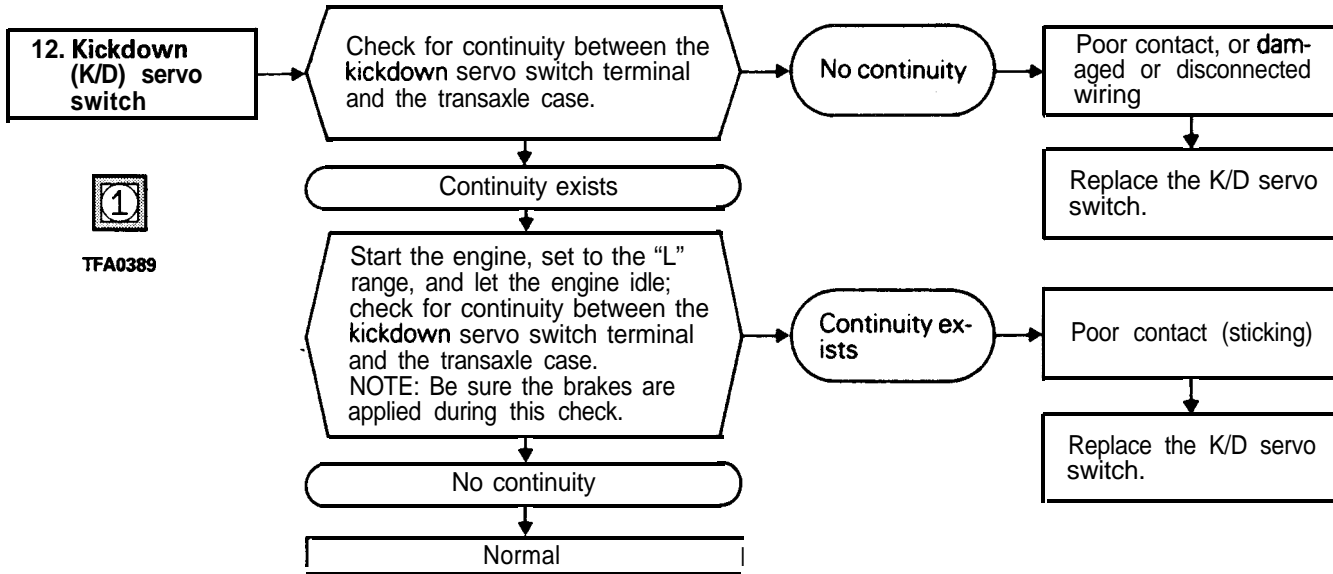


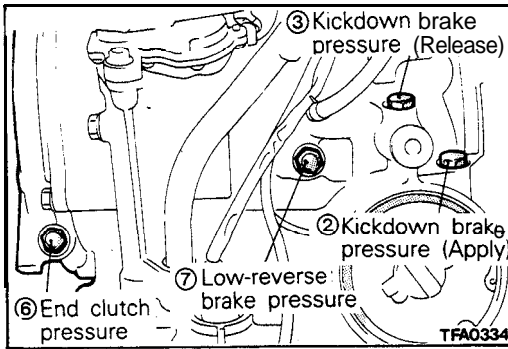
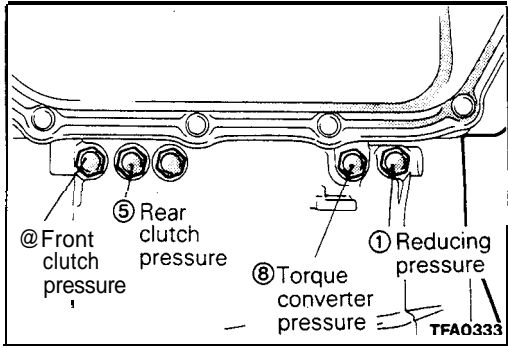
11. Inhibitor switch



1750339







OIL 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 (MD998330-01) and the adaptor (MD998332-01) to each oil-pressure outlet port. When the reverse pressure is to be tested, the 3,000 kPa (400 psi) type of gauge should be used.

5. Measure the oil 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 steps if oil pressure is not normal" on the next page.

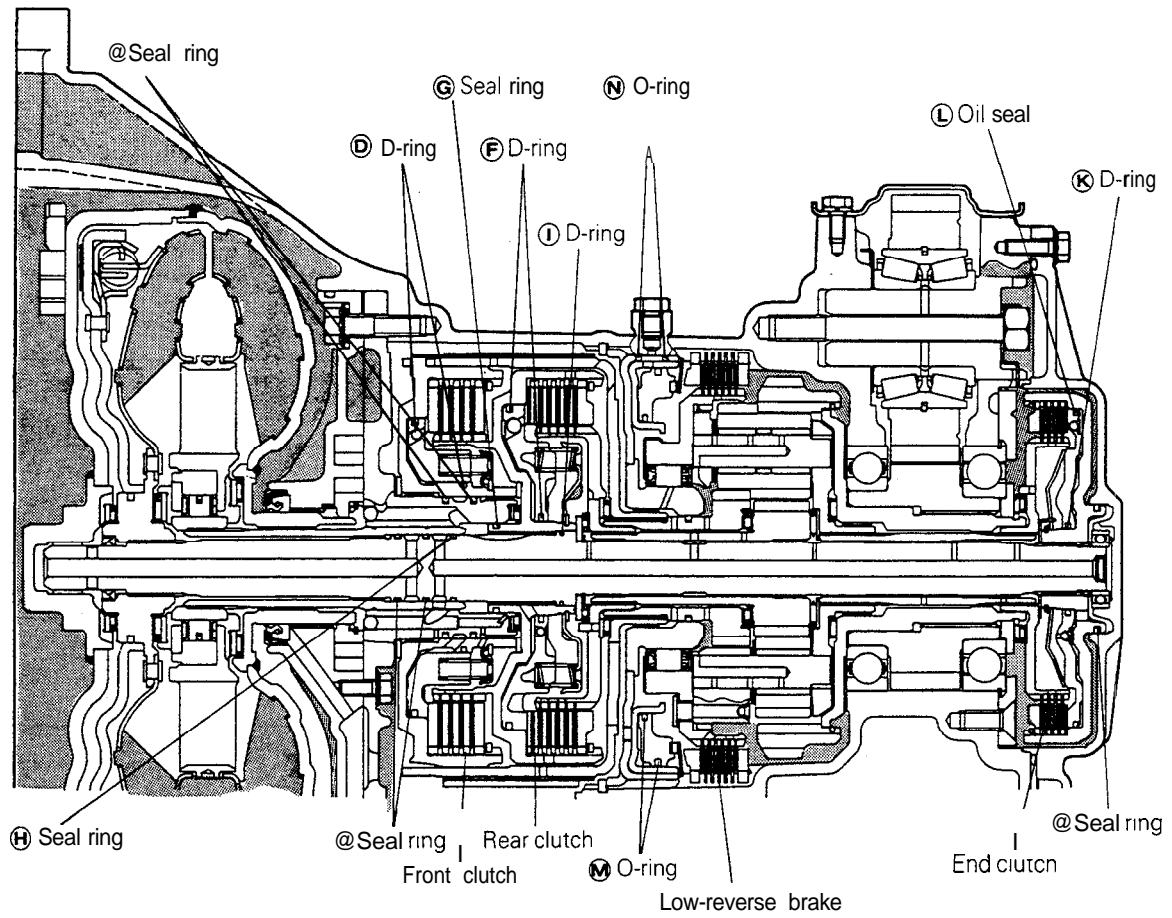
STANDARD OIL PRESSURE TABLE

No	Conditions			Standard oil pressure kPa (psi)							
	Select lever position	Engine speed rpm	Gear position	① Reducing pressure	② K/D brake pressure (application)	③ K/D brake pressure (release)	④ Front clutch pressure	⑤ Rear clutch pressure	⑥ End clutch pressure	⑦ Low-reverse brake pressure	⑧ 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	(SW-ON)	Approx. 2,500	4th	360 - 480 (51 - 68)	830 - 900 (118 - 128)				830 900 (118 128)		450 - 650 (64 - 92)
4	(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)
		Approx. 1,000	Reverse	360 - 480 (51 - 68)		1,500 (213) or more	1,500 (213) or more			1,500 (213) or more	450 - 650 (64 - 92)

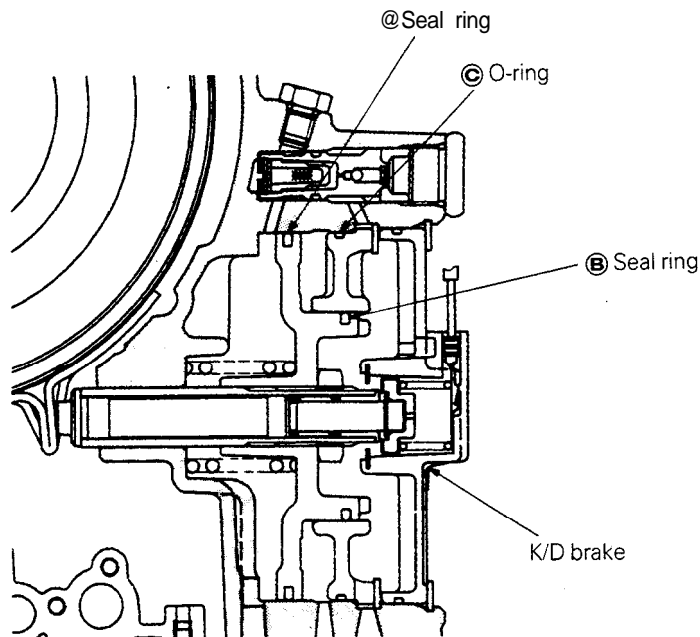
- NOTE
- (1) - : Indicates pressure is below 10 kPa (1.4 psi).
 - (2) SW-ON: OD switch in ON position.
 - (3) SW-OFF: OD switch in OFF position.
 - (4) ☆: Pressure is not standard.

REMEDIAL ACTION TO TAKE FOR INADEQUATE OIL PRESSURE

Symptom	Possible cause	Remedy
1. All line pressures are low (or high). NOTE: Line pressures are ②, ③, ④, ⑤, ⑥ and ⑦ shown on the Standard Oil Pressure Table on the preceding page.	a. Plugged oil filter b. Improperly adjusted regulator valve line pressure c. Defective valve body assembly d. Valve body left loose e. Improper oil pump delivery pressure	a. Visually check oil filter and replace it if plugged. b. Measure line pressure ② (KID brake pressure) and readjust line pressure if it is out of specifications. Or, replace valve body assembly. c. Replace valve body assembly. d. Torque valve body clamp bolt and mounting bolt to specification. e. Check oil pump gear side clearance and replace oil pump assembly as necessary.
2. Improper reducing pressure	a. Plugged reducing pressure circuit filter (L-shaped) b. Improperly adjusted reducing pressure c. Defective valve body assembly	a. Disassemble valve body assembly to check filter and replace filter if it is plugged. b. Measure reducing pressure @and readjust as necessary. c. Replace valve body assembly.
3. Improper K/D brake pressure (application)	a. Defective seal ring ① and D-ring ② of K/D servo piston and seal ring ③ of sleeve b. Defective valve body assembly	a. Disassemble K/D servo and check seal ring and D-ring for damage. Replace seal ring or D-ring if damaged or scratched. b. Replace valve body assembly.
4. Improper K/D brake pressure (release)	a. Defective seal ring ① and D-ring ② of K/D servo piston and seal ring ③ of sleeve b. Defective valve body assembly	a. Disassemble K/D servo and check seal ring and D-ring for damage. Replace seal ring or D-ring if damaged or scratched. b. Replace valve body assembly.
5. Improper front clutch pressure	a. Defective seal ring @and D-ring ① of K/D servo piston and seal ring ② of sleeve b. Defective valve body assembly c. Worn front clutch piston and retainer or defective D-ring ③ or seal ring ④	a. Disassemble K/D servo and check seal ring and D-ring for damage. Replace seal ring or D-ring if damaged or scratched. b. Replace valve body assembly. c. 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.
5. Improper rear clutch pressure	a. Defective D-ring ⑤ of piston, seal ring ⑥ of retainer, and seal ring ⑦ and D-ring ⑧ of input shaft b. Defective valve body assembly	a. Disassemble rear clutch and check input shaft D-ring, center support seal ring, and piston D-ring; replace if damaged or scratched. b. Replace valve body assembly.
7. Improper end clutch pressure	a. Defective seal ring ⑨, D-ring ⑩, and oil seal ⑪ of end clutch b. Defective valve body assembly	a. Disassemble the end clutch and check piston oil seal, D-ring, and center support seal ring; replace if damage or scratches are evident. b. Replace valve body assembly.
8. Improper low-reverse brake pressure	a. Damaged O-ring between valve body and transmission b. Defective valve body assembly c. Defective D-ring ⑫ of piston or O-ring ⑬ of center support	a. Remove valve body assembly and check O-ring on top of upper valve body; replace if damage or scratches are evident. b. Replace valve body assembly. c. Disassemble transaxle and check D-ring and O-ring; replace if damage or scratches are evident.
3. Improper torque converter pressure	a. Sticking damper clutch control solenoid valve (DCCSV) or damper clutch control valve b. Plugged or leaky oil cooler and pipings c. Damaged seal ring ⑭ of input shaft d. Defective torque converter	a. Check damper clutch system and DCCSV for operation. b. Repair or replace cooler or pipings. c. Disassemble transaxle and check seal ring; replace if it is damaged. d. Replace torque converter.



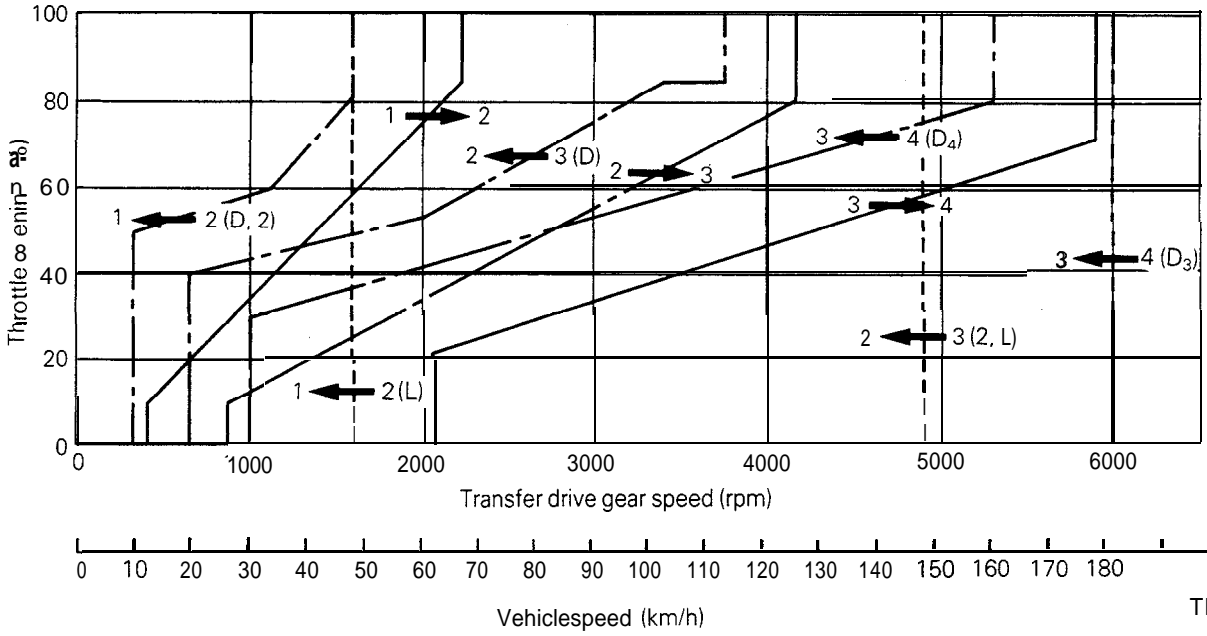
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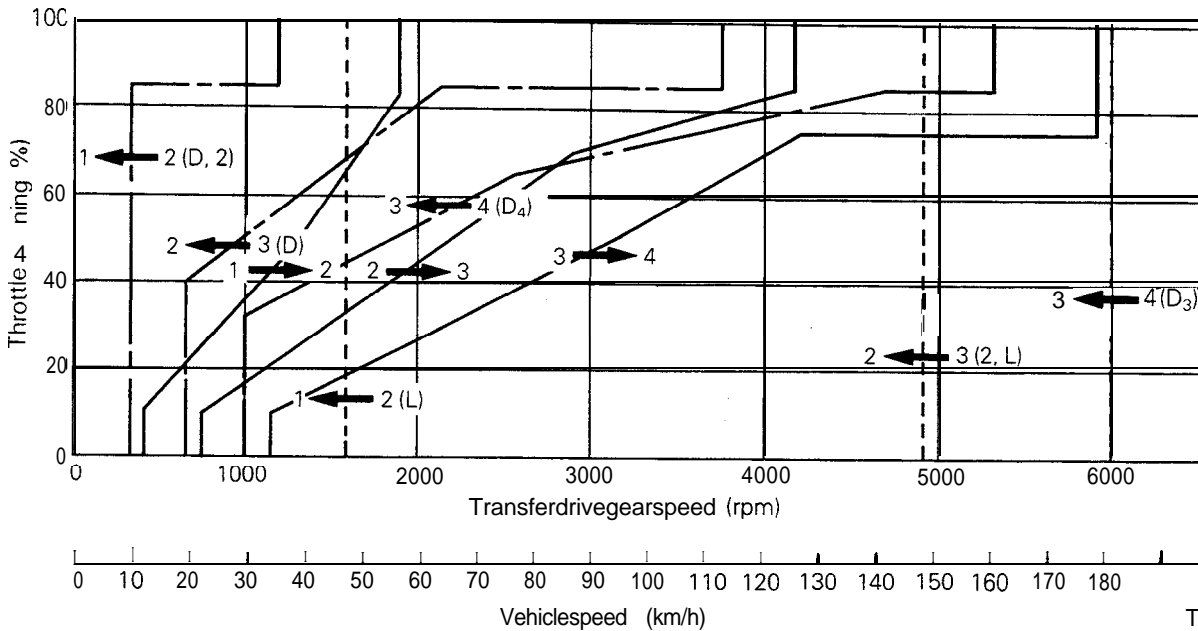
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SHIFT PATTERNS

P range



E range



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 transaxle fluid level. Fluid should be at normal operating temperature [70– 80°C (160 – 180°F)]. Engine coolant should also be at normal operating temperature [80– 90°C (180 – 190°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 transaxle 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 inhibitor switch	Replace
	Incorrect adjustment of control cable	Adjust
	Malfunction of starter relay	Replace
Will not shift to 4-speed	Malfunction of OD switch	Replace

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.	23-58
	Improperly adjusted shift lock cable, broken inner cable, loose or off connections	Check, adjust or replace the shift lock cable.	23-56
	Broken or sagging outer cable (shift lock cable) return spring	Check and replace shift lock cable.	23-55
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.	23-54
	Sticking shift lock cable, key interlock cable, and transaxle control cable	Check and replace shift lock cable, key interlock cable, and transaxle control cable.	23-54
	Foreign matter wedged in lock cams A and B	Check and adjust lock cams A and B.	23-58
	Improperly adjusted shift lock cable, elongated inner cable	Check, adjust, and replace shift lock cable.	23-55
	Sticking slide lever and cam lever inside key cylinder	Check and adjust slide lever and cam lever.	23-55
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.	23-58
	Broken or disconnected key interlock cable	Check and replace key interlock cable.	23-55
	Damaged slide lever and cam lever inside key cylinder	Check and replace slide lever and cam lever.	23-55
Selector lever operation from P to R is not smooth.	Improperly adjusted key interlock cable	Check and adjust key interlock cable.	23-57
	Improperly adjusted shift lock cable, elongated inner cable	Check, adjust, and replace shift lock cable.	23-55
	Binding lock cams A and B (in rotation)	Check rotating parts of lock cams A and B.	23-58
	Defective selector lever assembly	Check and replace selector lever assembly.	23-54
	Binding slide lever inside key cylinder	Check slide lever and cam lever.	23-55

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.	23-54
	Improperly adjusted transaxle control cable	Adjust transaxle control cable.	23-56
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.	23-58
	Improperly adjusted key interlock cable, sticking inner cable	Check, adjust, and replace key interlock cable.	23-55
	Binding slide lever inside key cylinder	Check slide lever.	23-55
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.	23-58
	Loose key cylinder cover	Check and retighten cover.	23-55
	Broken key interlock cable, loose connections, elongated inner cable	Check and replace key interlock cable.	23-55
	Damaged cam lever inside key cylinder	Check and replace cam lever.	23-55
Buzzer does not sound even when selector lever is placed in R position.	Defective buzzer	Check and replace buzzer.	23-55
	Open-circuited buzzer circuit harness	Check or correct harness.	–
	Defective inhibitor switch	Check and replace inhibitor switch.	–
	Improperly adjusted transaxle control cable	Adjust transaxle control cable.	23-52

SERVICE ADJUSTMENT PROCEDURES

M23FBBJ

TRANSMISSION FLUID LEVEL INSPECTION

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.
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.

Transmission fluid: MITSUBISHI PLUS ATF/Automatic transmission fluid “DEXRON” or “DEXRON II”

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, causing delayed shift, slippy clutch and brakes, etc.

Improper filling can also raise fluid level too high. When transaxle has too much fluid, gears churn up foam and cause the same conditions which occur with low fluid level, resulting in accelerated deterioration of automatic transaxle fluid.

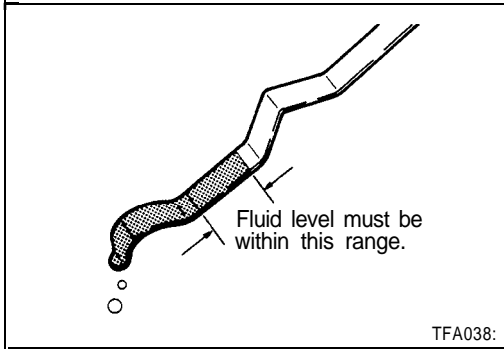
In either case, air bubbles can cause overheating, fluid oxidation, which can interfere with normal valve, clutch, and servo operation. Foaming can also result in fluid escaping from transaxle vent where it may be mistaken for a leak.

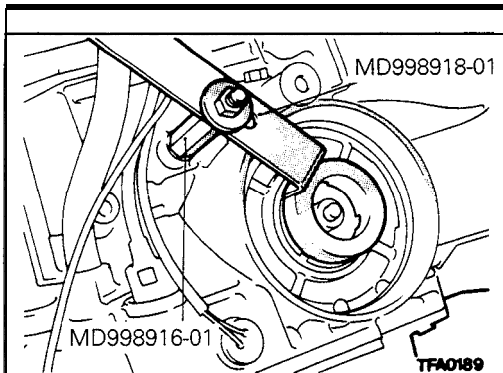
6. Be sure to examine fluid on dipstick closely.

TRANSMISSION FLUID REPLACEMENT

M23FCBH

Refer to GROUP 00 – Maintenance Service.





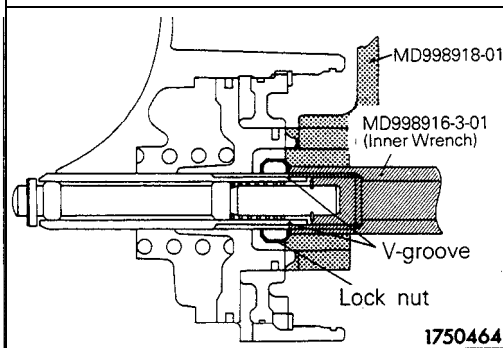
KICKDOWN SERVO ADJUSTMENT

M23FRAC

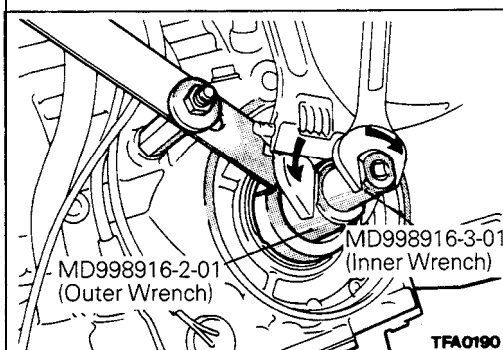
- (1) Remove dust, dirt, and other contaminants completely from kickdown (K/D) servo cover and surrounding areas.
- (2) Snap off the snap ring and remove K/D servo switch.
- (3) Fit claw of special tool into cutout in piston to prevent piston from turning and use adapter to fix the piston into position.

Caution

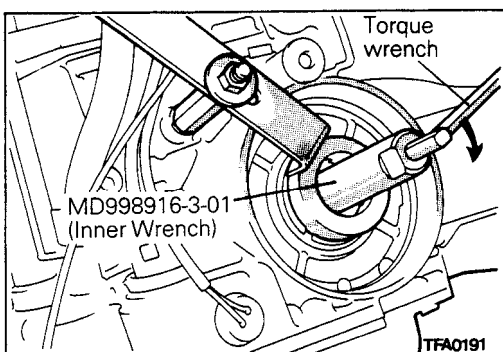
1. Do not push piston with the special tool.
2. Secure adapter only hand-tight to L/R brake pressure take-up port and do not apply excessive torque.



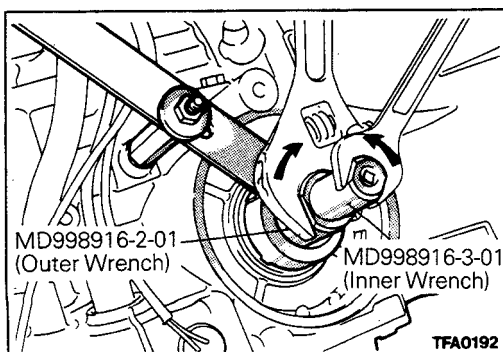
- (4) Loosen lock nut to immediately before V-groove in adjust rod (see illustration on left) and tighten special tool (Inner Wrench) until it contacts lock nut.



- (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).



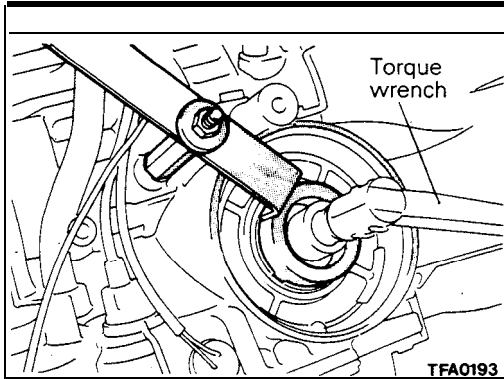
- (6) Fit torque wrench to special tool (Inner Wrench) and repeat tightening and loosening cycle two times with a torque of 10 Nm (7.2 ft.lbs.). Then, torque to 5 Nm (3.6 ft.lbs.). Next, back off special tool (Inner Wrench) 2 to 2¼ turns.



- (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.



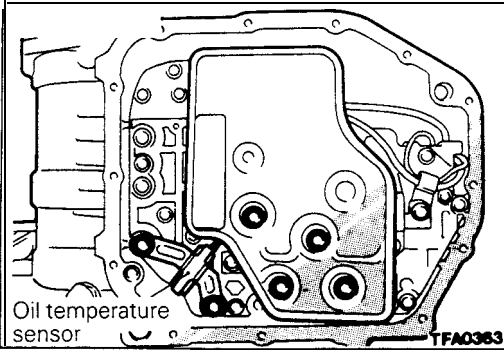
- (8) Tighten lock nut by hand until it contacts piston. Then, using torque wrench, tighten to specification.

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.

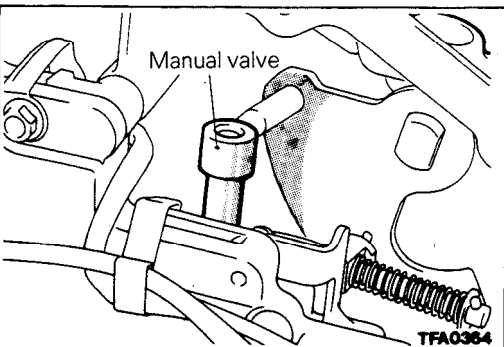
- (9) Remove the special tool to secure the piston and torque plug to specification at L/R brake pressure take-up port.



LINE PRESSURE ADJUSTMENT

M23FSAC

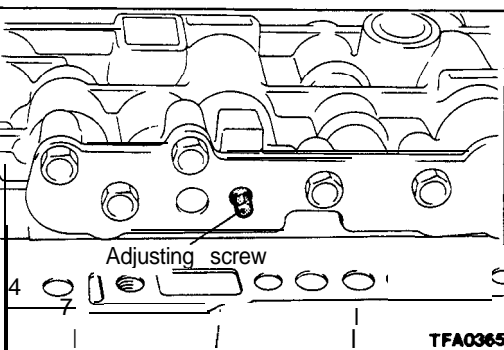
- (1) Discharge AFT.
- (2) Remove oil pan.
- (3) Remove oil filter.
- (4) Remove oil temperature sensor.



- (5) Press solenoid valve harness grommet catch to push in grommet; then, remove valve body assembly.

Caution

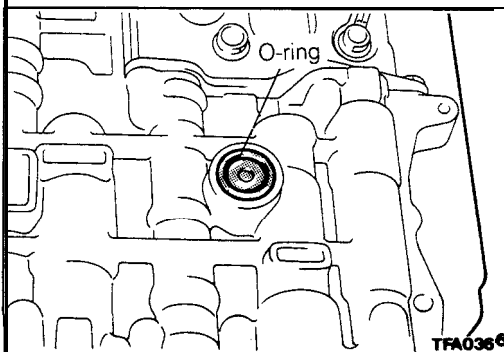
Do not let manual valve fall.



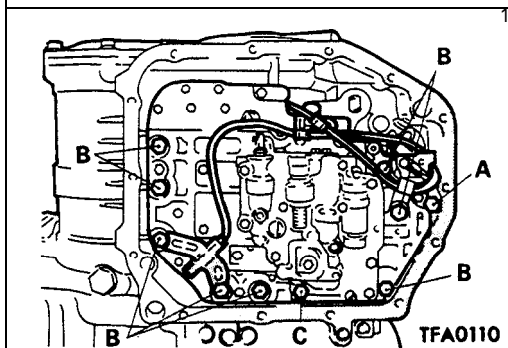
- (6) Turn adjusting screw of regulator valve to obtain the specified line pressure (K/D brake pressure).

Standard value: 870 – 890 kPa (124 – 127 psi)

Oil pressure change for each turn of adjustment screw: 38 kPa (54 psi)



- (7) Check that an O-ring is fitted at the location shown on top off valve body.
- (8) Replace O-ring of solenoid valve intermediate grommet with a new one and then fit the O-ring into case.



(9) Install valve body and oil temperature sensor.

Bolt A = Length 18 mm (.709 in.)

Bolt B = Length 25 mm (.984 in.)

Bolt C = Length 40 mm (1.575 in.)

Caution

Secure solenoid valve and oil temperature sensor harness at locations shown.

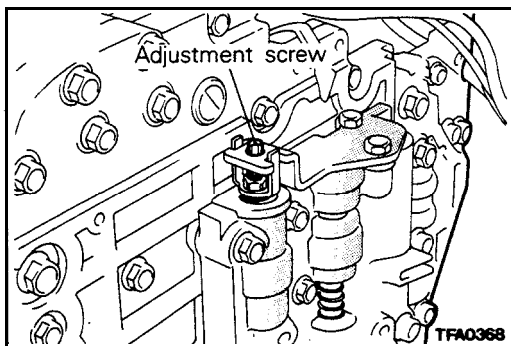
(10) Install oil filter.

(11) Install new oil pan gasket and oil pan.

(12) Add the specified amount of ATF.

(13) Carry out hydraulic test.

Readjust as necessary.



REDUCING PRESSURE ADJUSTMENT

M23FTAD

When multi-use tester 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 multi-use tester is used

(1) Adjust to obtain the specified K/D brake pressure when PC solenoid is energized at duty 50% with the multi-use tester.

Standard value: **275 kPa (39 psi)**

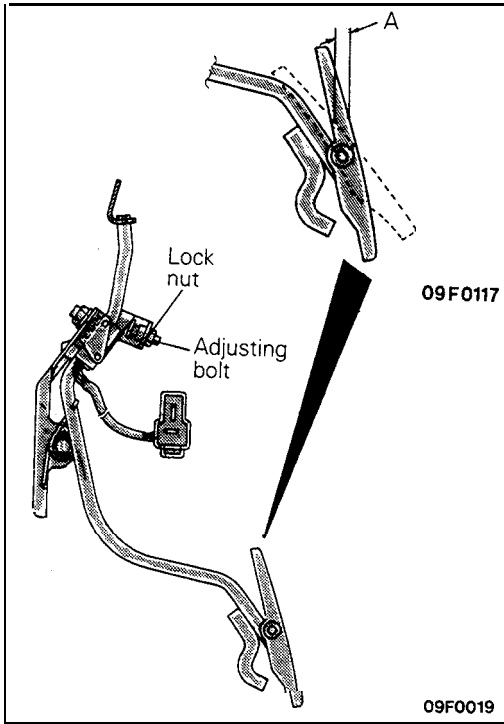
Oil pressure change for each turn of adjusting screw: **50 kPa (7 psi)**

(2) After adjustment has been made, check that the recuding pressure is in the range 360 – 480 kPa (51 – 68 psi).

Caution

This adjustment should be made with oil temperature 70 – 80°C (160 – 180°F).

The adjustment made with high oil temperature could result in improper adjustment due to a line pressure drop at idle.



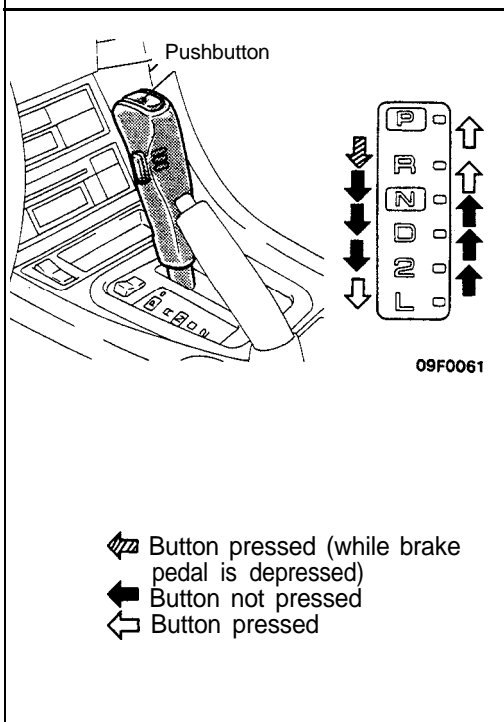
ACCELERATOR SWITCH INSPECTION AND ADJUSTMENT

M23FZAA

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.



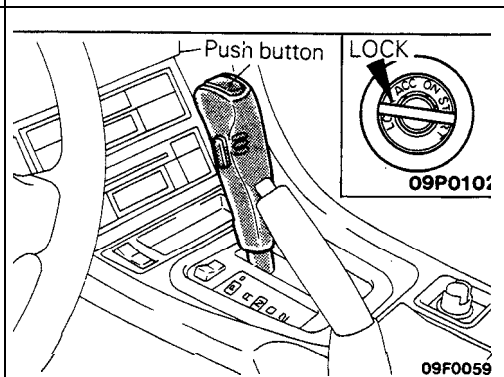
SELECTOR LEVER OPERATION CHECK

M23FIAG

1. Shift selector lever to each range and check that lever moves smoothly and is controlled. 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

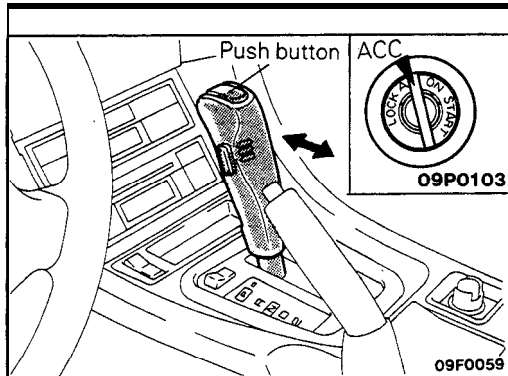
M23FUAC

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.

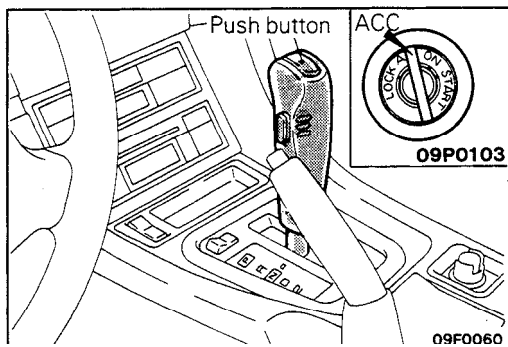
Also check, at the same time, that the button cannot be pressed.

Ignition key position: "LOCK" or removed
Brake pedal: Depressed



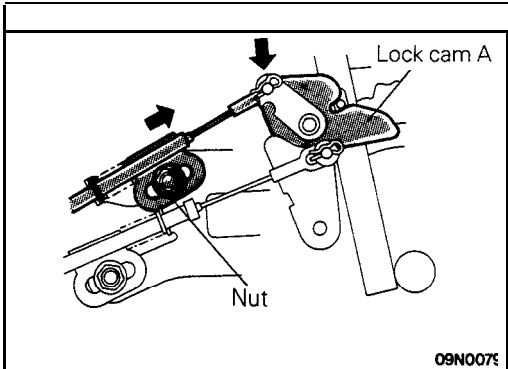
2. Check to be sure that, under the following conditions, the selector lever can be moved from the "P" position to any other position.
Press the button a few times and check to be sure that the selector lever moves smoothly.

Ignition key position: "ACC"
Brake pedal: Depressed
Button : Pressed



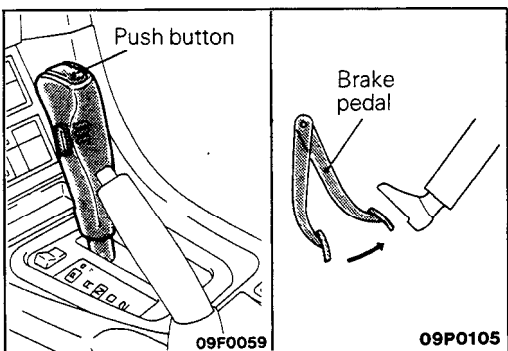
3. Check to be sure that, at all positions of the selector lever (other than "P"), the ignition key cannot be turned to the "LOCK" position.
Check to be sure that the ignition key smoothly turns to the "LOCK" position when the selector lever is then set to the "P" position and the button is released.
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

M23FVAC

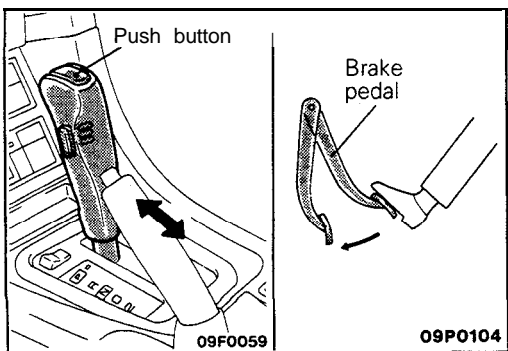


1. Check to be sure that, under the following conditions, the selector lever cannot be moved from the "P" position to any other position.

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 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

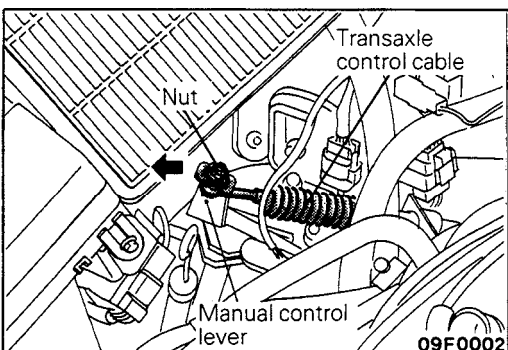
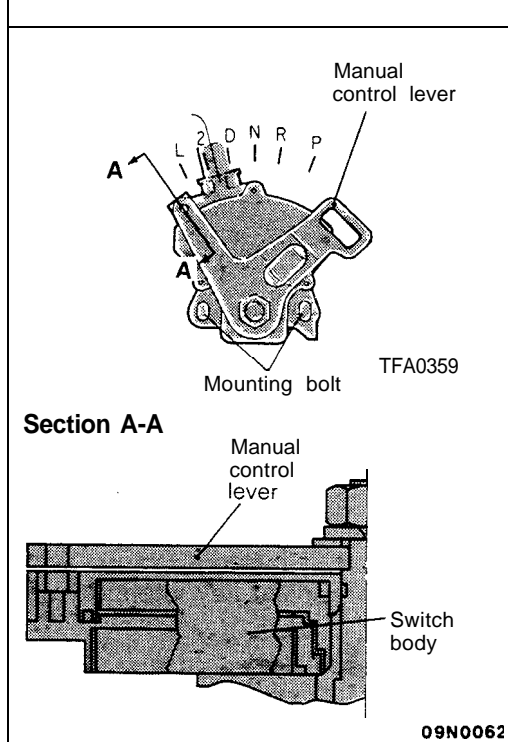
4. If a malfunction is discovered when following the above checking procedures, either adjust or check the shift lock cable mechanism. (Refer to P.23-56.)

INHIBITOR SWITCH AND CONTROL CABLE ADJUSTMENT

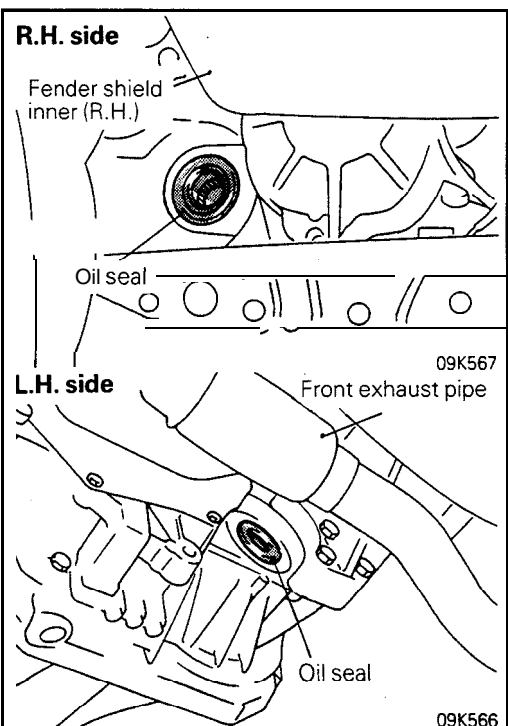
M23FJAD

1. Place selector lever in "N" (Neutral) position.
2. Place manual control lever in "N" (Neutral) position.
3. For adjustment, turn inhibitor switch body so that the end (section A-A in illustration on left) of manual control lever is aligned with the hole in inhibitor switch body flange.
4. Tighten the mounting bolts of the inhibitor switch body to the specified torque. At this time, take care to prevent dropping the switch body.

Specified torque: 10 – 12 Nm (7 – 9 ft.lbs.)



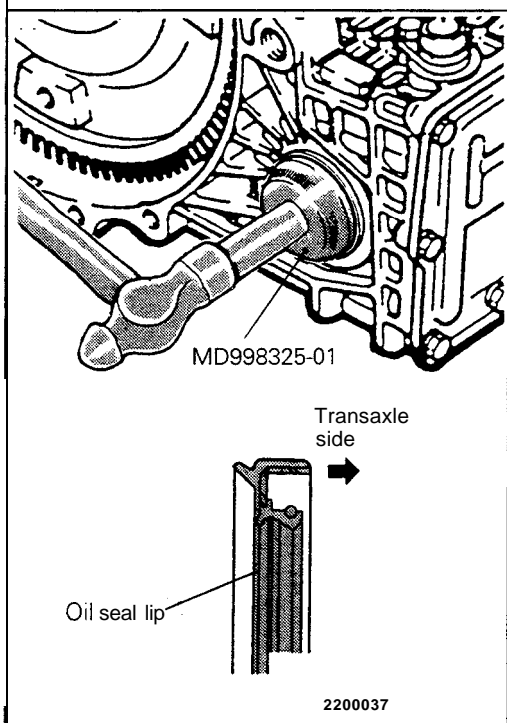
5. Loosen the nut shown in the figure, and lightly pull the end of the transaxle control cable in the direction of arrow by hand.
 6. Tighten the nut to the specified torque.
- Specified torque: 13 Nm (9 ft.lbs.)**
7. Check that the selector lever is in "N" position.
 8. Check that it securely operates and functions on the transaxle side in the range which corresponds to each position of the selector lever.



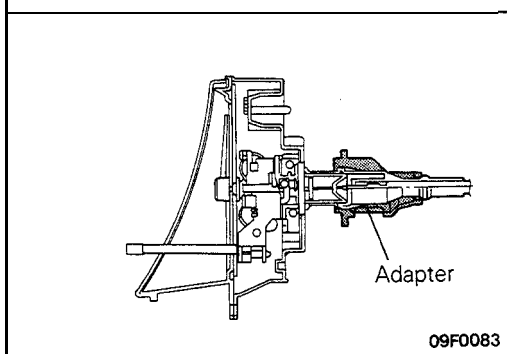
DRIVE SHAFT OIL SEALS REPLACEMENT

M23FD8D

- (1) Disconnect the drive shaft from the transaxle. (Refer to GROUP 26 – Drive Shaft.)
- (2) Using a flat-tip (-) screwdriver, remove the oil seal.



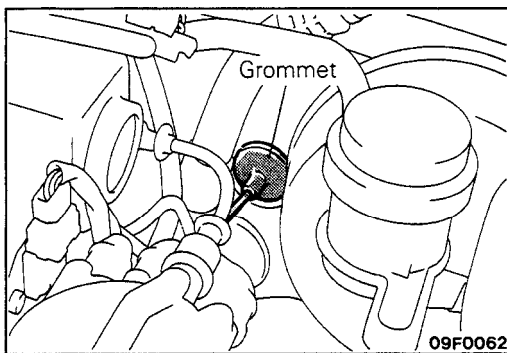
- (3) Using the special tool, tap the drive shaft oil seal into the transaxle.
Note in illustration the direction of installation of drive shaft oil seal.
- (4) Apply a coating of the transaxle fluid to the lip of the oil seal.
Transaxle fluid: Dia ATF SP or MITSUBISHI PLUS ATF or equivalent



SPEEDOMETER CABLE REPLACEMENT

M23FEAL2

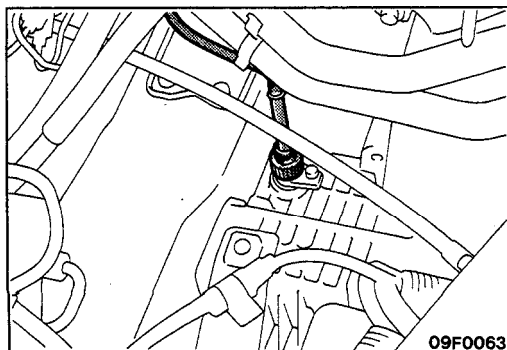
1. Correctly insert the adapter into the instrument panel, and fasten the new speedometer cable.



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.

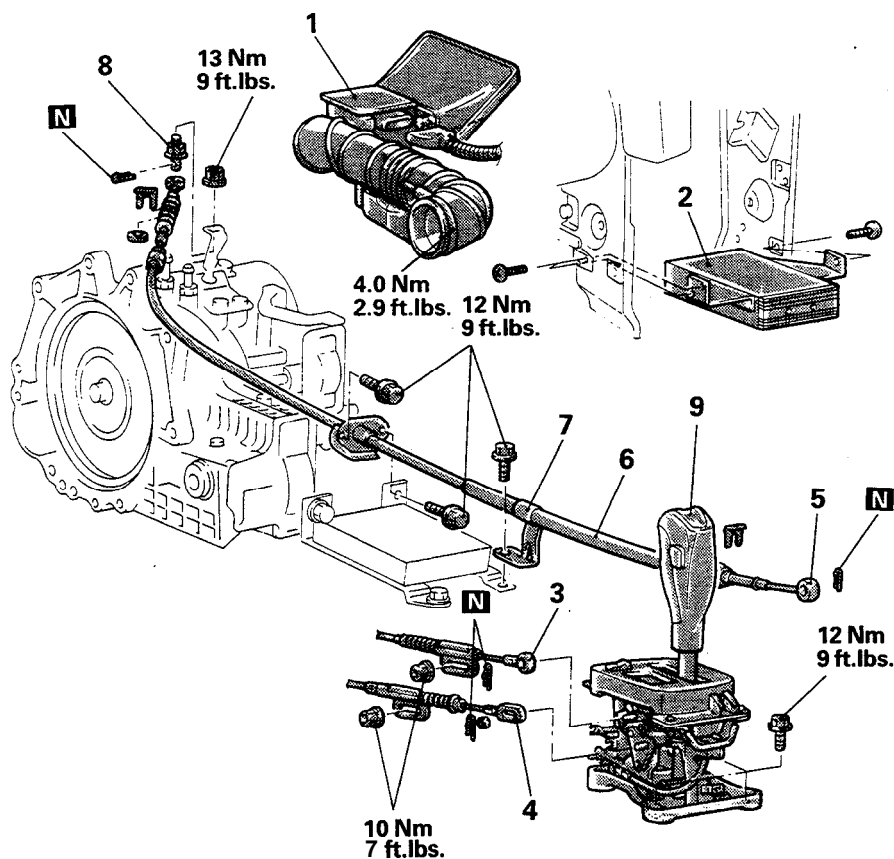
Caution

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.

TRANSAXLE CONTROL REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Removal and Installation of Front Console Assembly
(Refer to GROUP 52A – Floor Console.)



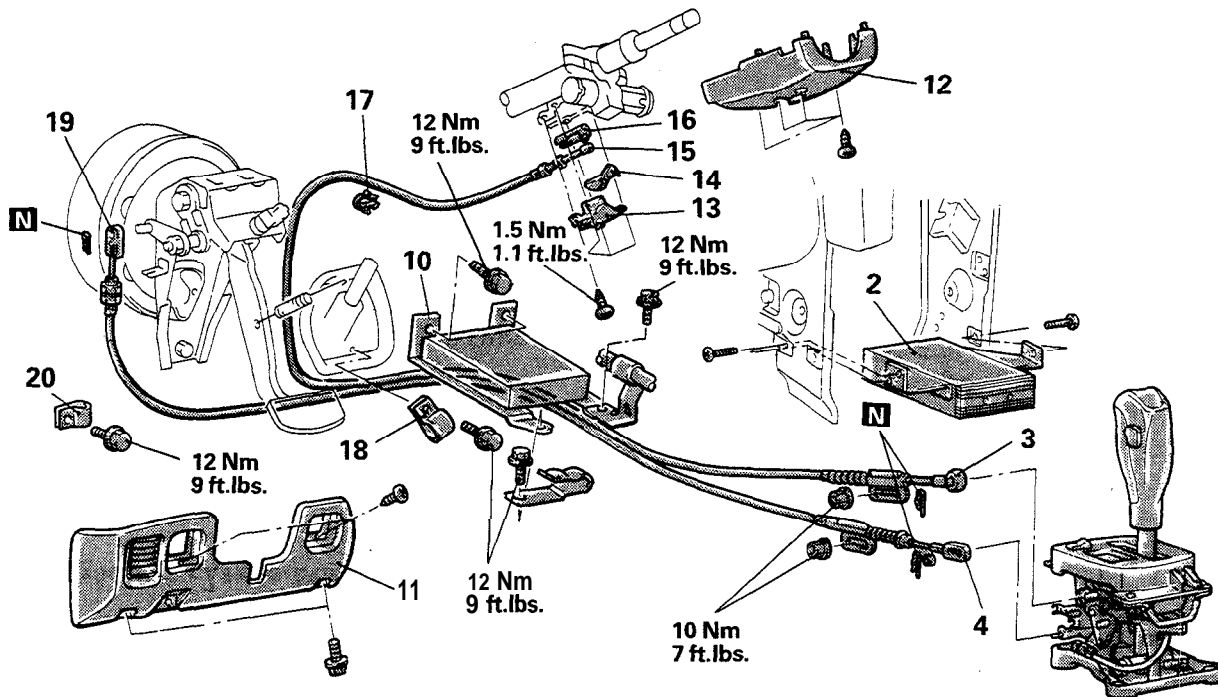
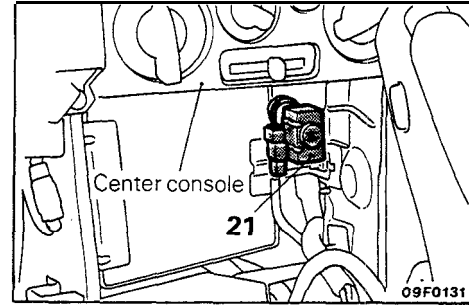
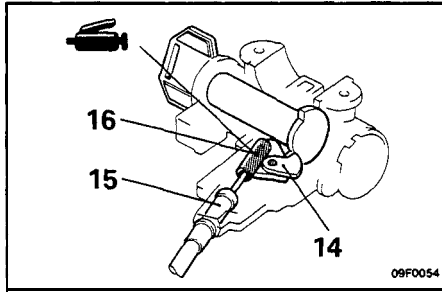
09F0031

Transaxle control cable removal steps

1. Air cleaner cover, Air intake hose
2. CD amp. (Vehicles with CD player)
- 5. Connection for transaxle control cable assembly (Selector lever assembly side)
6. Transaxle control cable, assembly
7. Clamp
8. Adjuster

Selector lever assembly removal steps

1. Air cleaner cover, Air intake hose
- + 3. Connection for key-interlock cable (Selector lever assembly side)
- 4. Connection for shift-lock cable (Selector lever assembly side)
- 5. Connection for transaxle control cable (Selector lever assembly side)
9. Selector lever assembly



09F0035

Key-interlock cable removal steps

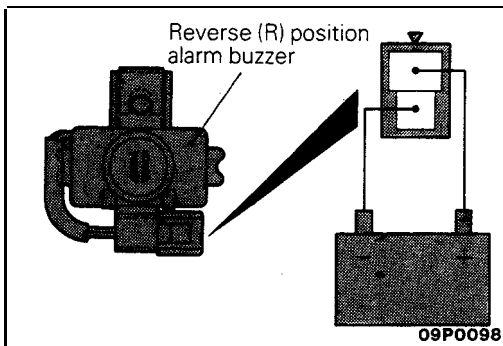
- 2. CD amp. (Vehicles with CD player)
- ◆◆ 3. Connection for key-interlock cable (Selector lever assembly side)
- 10. Connection for transaxle control unit
- 11. Knee protector (Refer to GROUP 52A – Instrument Panel)
- 12. Column cover lower
- 13. Cover
- ◆◆ 14. Cam lever
- ◆◆ 15. Key-interlock cable
- ◆◆ 16. Slide lever
- 17. Cable guide
- 18. Clamp

Shift-lock cable removal steps

- 2. CD amp.
- ◆◆ 4. Connection for shift-lock cable (Selector lever assembly side)
- 10. Connection for transaxle control unit:
- ◆◆ 19. Shift-lock cable
- 20. Clamp

Reverse (R) position alarm buzzer removal

- 21. Reverse (R) position alarm buzzer

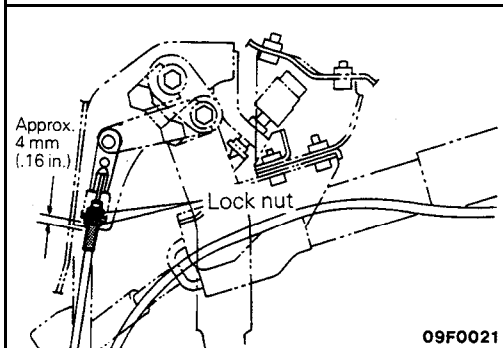
**INSPECTION**

M231CAM

- 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 that the buzzer sounds when battery voltage is applied across terminals.

**SERVICE POINTS OF INSTALLATION**

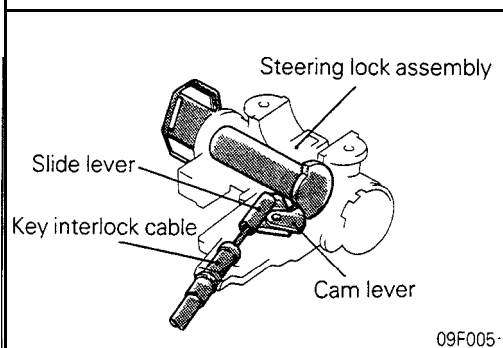
M231DAW

19. CONNECTION OF SHIFT LOCK CABLE (BRAKE PEDAL SIDE)

Connect the shift lock cable so that its threads measure about 4 mm (.16 in.).

Caution

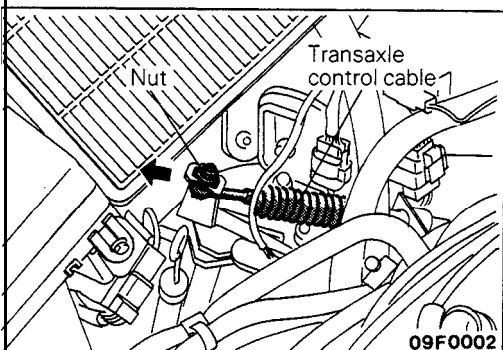
Do not change the routing of shift lock cable to the selector lever assembly.

**16. INSTALLATION OF SLIDE LEVER / 15. KEY INTERLOCK CABLE (STEERING LOCK ASSEMBLY SIDE) / 14. CAM LEVER**

- (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.

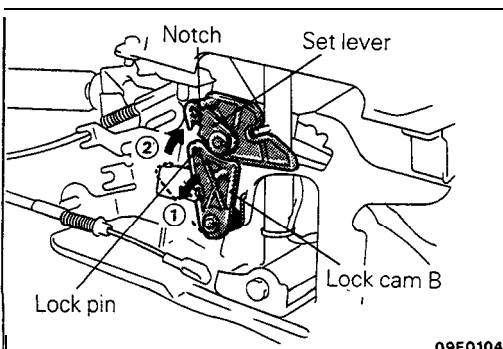
Caution

Do not change the routing of key interlock cable to the selector lever assembly.

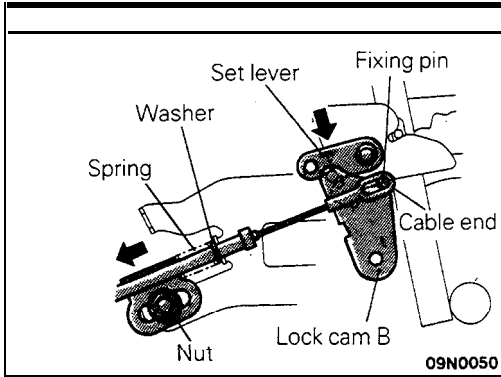
**5. CONNECTION OF TRANSAXLE CONTROL CABLE (SELECTOR LEVER ASSEMBLY SIDE)**

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.

**4. CONNECTION OF SHIFT LOCK CABLE (SELECTOR LEVER ASSEMBLY SIDE)**

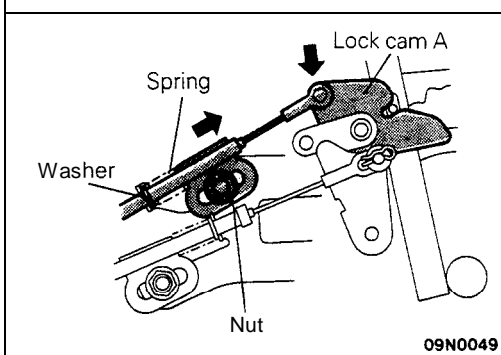
- (1) Place the selector lever in "P" position.
- (2) Disconnect the key interlock cable from the selector lever assembly side.
- (3) Turn the lock cam B counterclockwise (arrow ①) to move the set lever upward (arrow ②).
- (4) Fit the cutout in set lever to the jock pin of lock cam B.



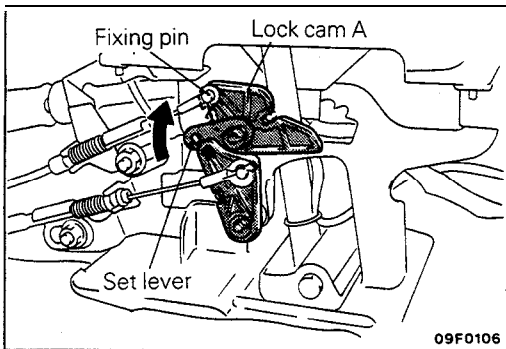
- (5) Connect the shift lock cable to lock cam B and temporarily tighten the nut.
At this time, install the spring and washer, which have been fitted to the shift lock cable, as shown.
- (6) Pressing the set lever to prevent lock cam B from moving, lightly pull the shift lock cable to take up slack and 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.

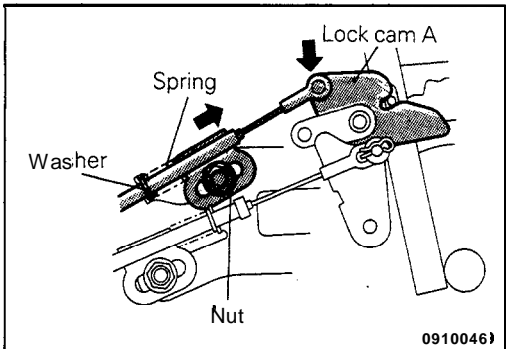


- (7) Connect the key interlock cable to lock cam A and temporarily tighten the nut.
At this time, install the spring and washer, which have been fitted to the key interlock cable, as shown.
- (8) Lightly pressing lock cam A in the direction of arrow, lightly push the key interlock cable to take up slack and tighten the nut to secure the key interlock cable in position.

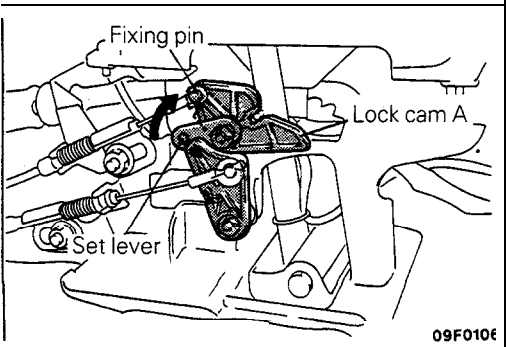


- (9) Turn the set lever and fit it onto the fixing pin on lock cam A, then install the snap pin.
- (10) After the key interlock cable has been connected, check the shift lock and key interlock mechanism. (Refer to P.23-50.)

3. CONNECTION OF KEY INTERLOCK CABLE (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.

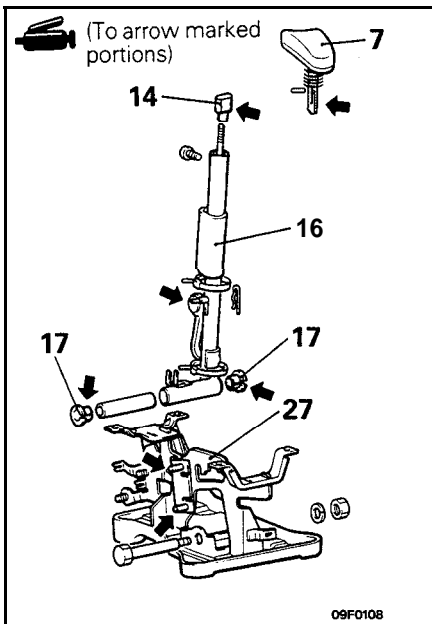


- (4) Turn the set lever and fit it onto the fixing pin on lock cam A, then install the snap pin.
- (5) After the key interlock cable has been connected, check the key interlock mechanism. (Refer to P.23-50.)

SELECTOR LEVER ASSEMBLY

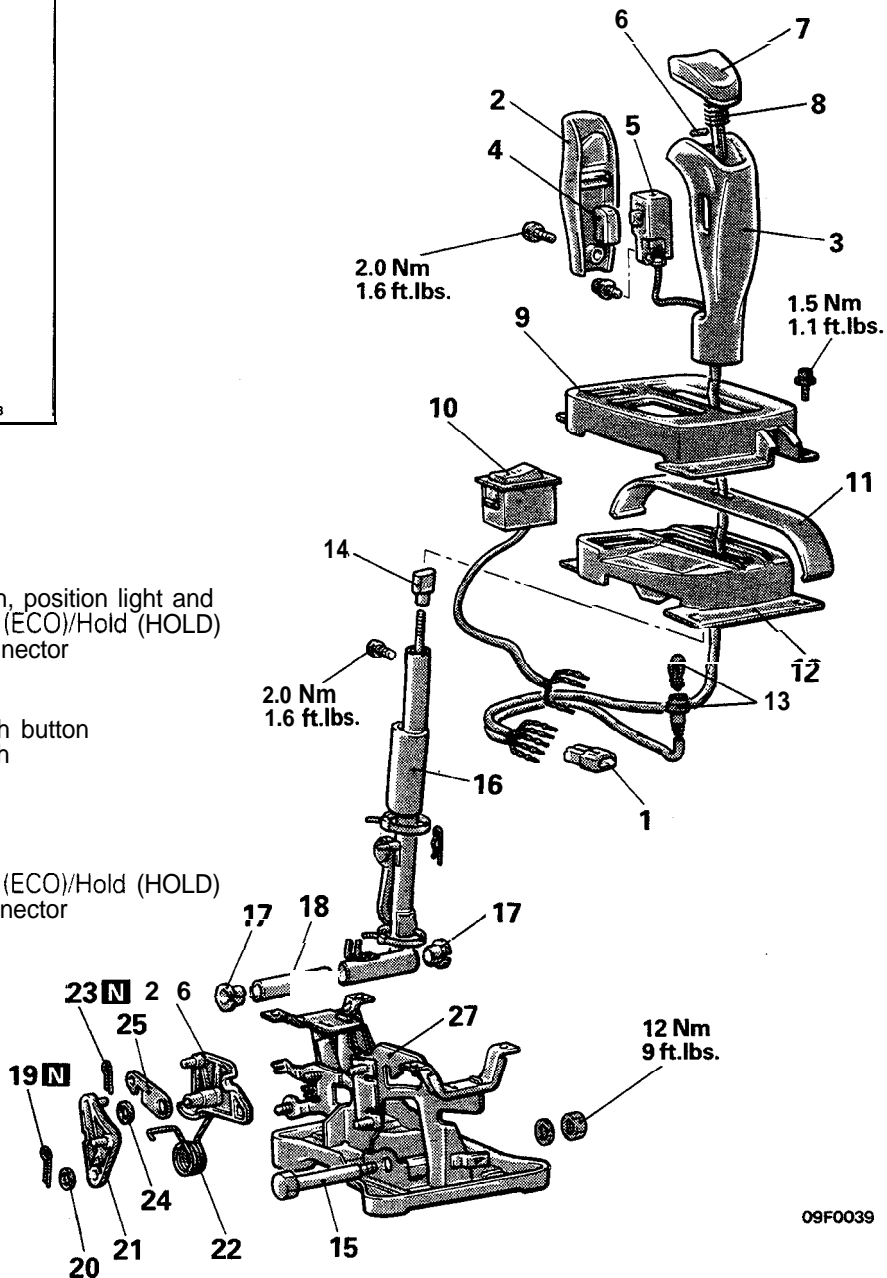
DISASSEMBLY AND REASSEMBLY

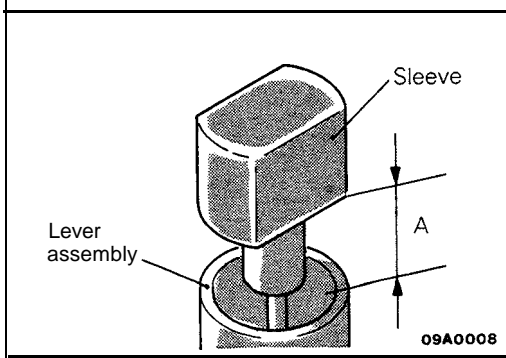
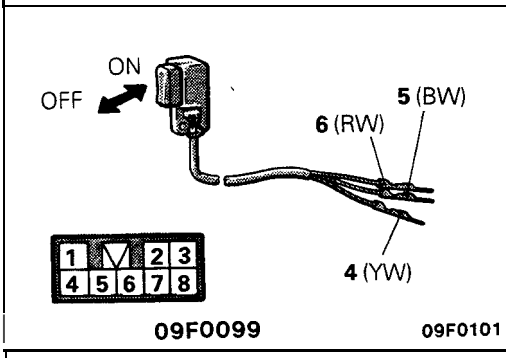
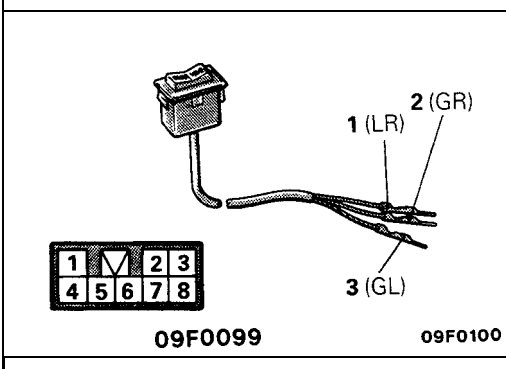
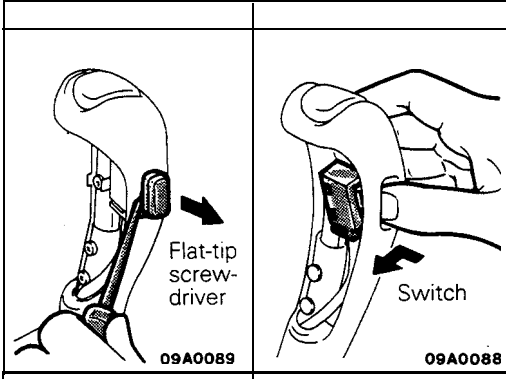
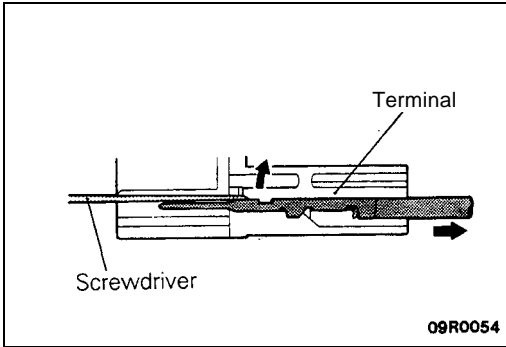
M230E--



Disassembly steps

- Overdrive control switch, position light and Power (PWR)/Economy (ECO)/Hold (HOLD) changeover switch connector
- 2. Cover
- 3. Selector knob
- ↔ 4. Overdrive control switch button
- ↔ 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
- * 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





SERVICE POINTS OF DISASSEMBLY

M230FAD

1. REMOVAL OF OVERDRIVE CONTROL SWITCH CONNECTOR

Disconnect the overdrive control switch connector and then remove the terminal from the overdrive control switch connector.

4. REMOVAL OF OVERDRIVE CONTROL SWITCH BUTTON / 5. OVERDRIVE CONTROL SWITCH

- (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.

INSPECTION

M230GAE

- 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 for continuity between terminals when the switch is OFF and when ON.

Terminal	1	2	3
Switch position			
ON (PWR)	O—O		
OFF (ECO)			
ON (HOLD)		O—O	

NOTE

O-O indicates that there is continuity between the terminals.

OVERDRIVE CONTROL SWITCH

Check for continuity between terminals when the switch is OFF and when ON.

Terminal	4	5	6
Switch position			
ON (Overdrive activation)		O—O	
OFF (Overdrive non-activation)	0—		O—

NOTE

O-O indicates that there is continuity between the terminals.

SERVICE POINT OF REASSEMBLY

M230HAO

14. INSTALLATION OF SLEEVE

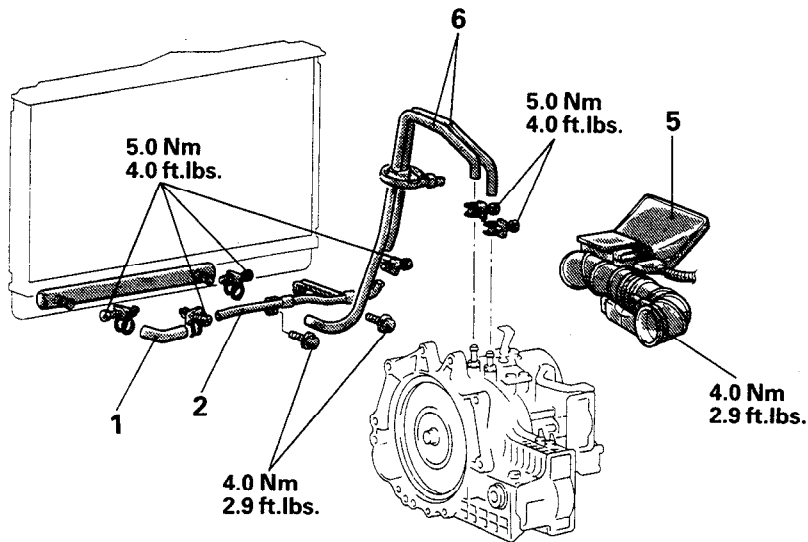
Place the selector lever in the "N" position, and then turn the sleeve so that the clearance between the sleeve and the lever assembly end is within the standard value.

Standard value (A): 15.2 – 15.9 mm (.598 – .625 in.)

TRANSAXLE OIL COOLER, HOSES, TUBES

REMOVAL AND INSTALLATION

<Vehicles without oil cooler>

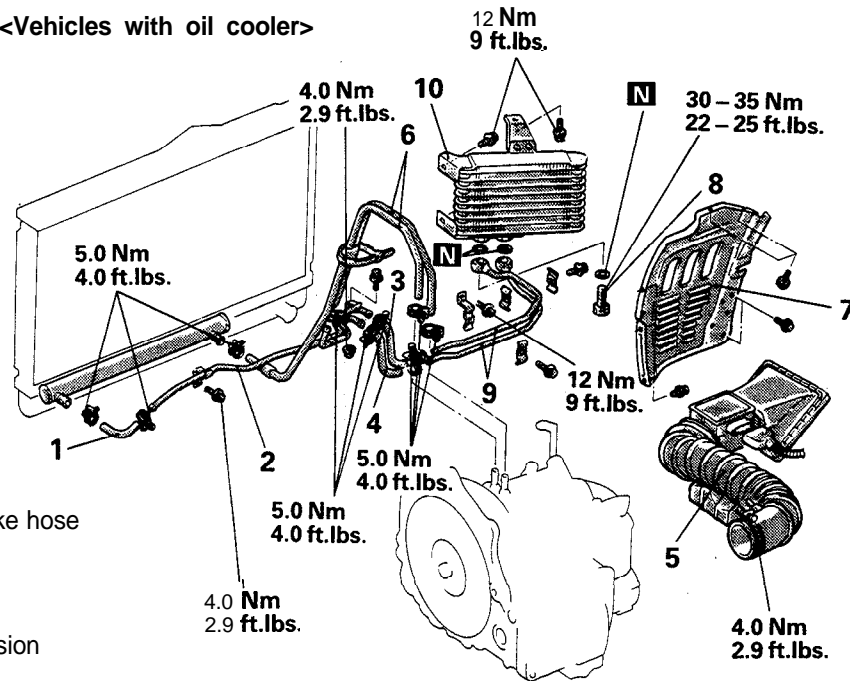


Pre-removal and Post-installation Operation

- Drainage and Filling of Automatic Transaxle Fluid (Refer to GROUP 00 – Maintenance Service.)
- Removal and Installation of Front Under Cover (Refer to GROUP 51 – Front Bumper.)

09F0038

<Vehicles with oil cooler>



- ↔ 1. Hose
- ↔ 2. Tube assembly
- ↔ 3. Feed hose
- ↔ 4. Return hose

Hose assembly removal steps

- ↔ 5. Air cleaner cover, Air intake hose
- ↔ 6. Hose assembly

Tube assembly removal steps

- ↔ 7. Front splash shield extension (right side)
- ↔ • 4 8. Eye bolt
- ↔ 9. Tube assembly

Transaxle oil cooler removal steps

- ↔ 7. Front splash shield extension (right side)
- * ↔ 8. Eye bolt
- ↔ 10. Transaxle oil cooler

09F0116

SERVICE POINTS OF REMOVAL

M23SBAG

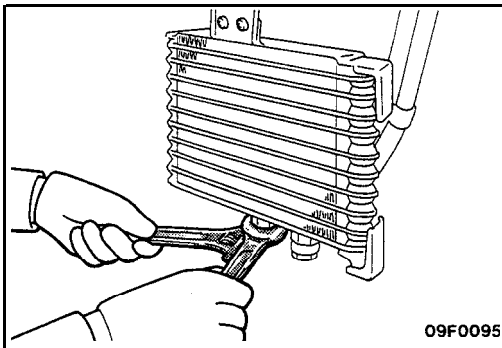
1. REMOVAL OF HOSE / 2. TUBE ASSEMBLY / 3. FEED HOSE / 4. RETURN HOSE

Caution

Take care not to spill the transaxle fluid when removing components.

6. REMOVAL OF HOSE ASSEMBLY**Caution**

1. When removing the hose assembly, use care not to allow the transaxle fluid to spill.
2. After removing the hose assembly, plug so that foreign materials cannot enter the transaxle.

**8. REMOVAL OF EYE BOLT**

- (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.

INSPECTION

M23SCAH

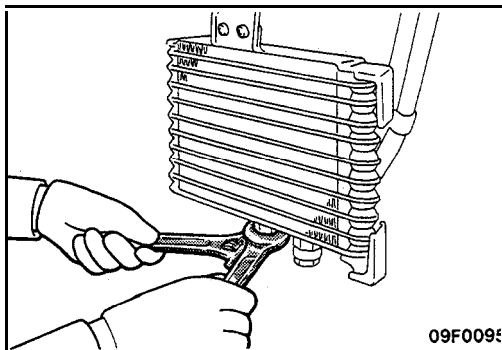
- Check the hose for crack, damage and clog.
- Check for rusted or clogged radiator oil cooler.
- Check oil cooler fins for bend, damage, and clogged foreign matter.

SERVICE POINT OF INSTALLATION

M23SDAD

8. INSTALLATION OF EYE BOLT

- (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.

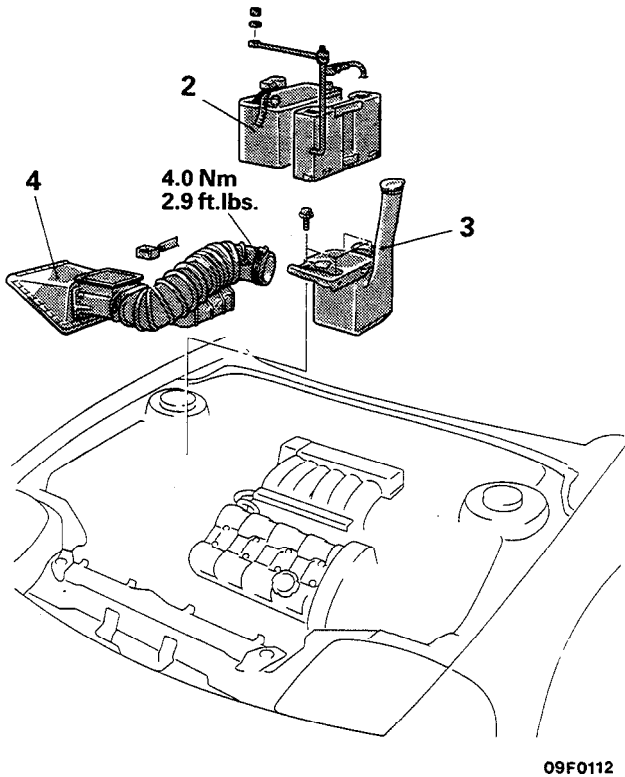


TRANSAXLE ASSEMBLY

REMOVAL AND INSTALLATION

Pre-removal Operation

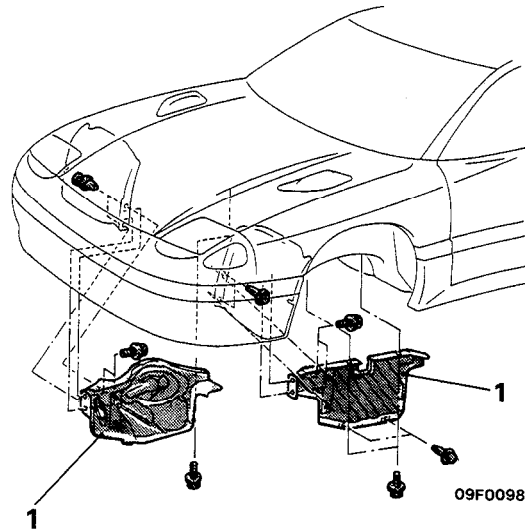
- Place Selector Lever in "N" Position and Stop the Engine.
- Draining of Transaxle Fluid (Refer to GROUP 00 – Maintenance Service.)
- Removal of Front Under Cover (Refer to GROUP 51 -Front Bumper.)



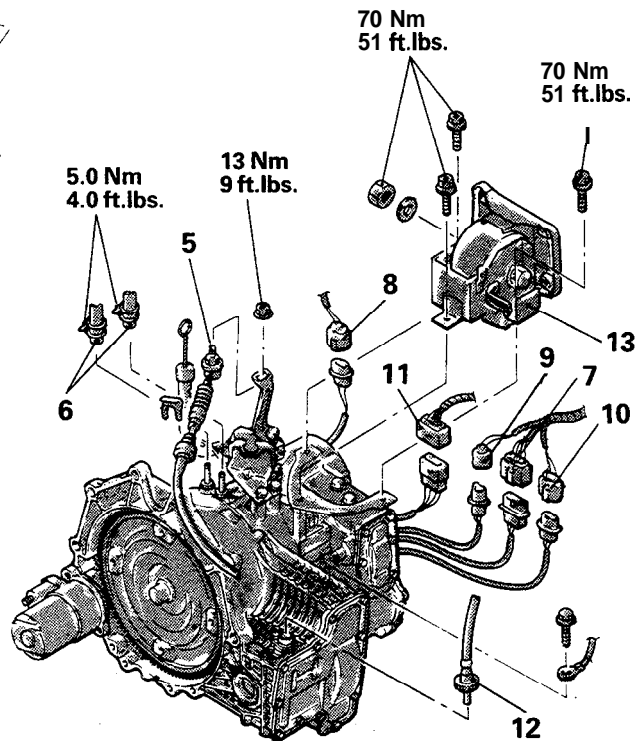
09F0112

Removal steps

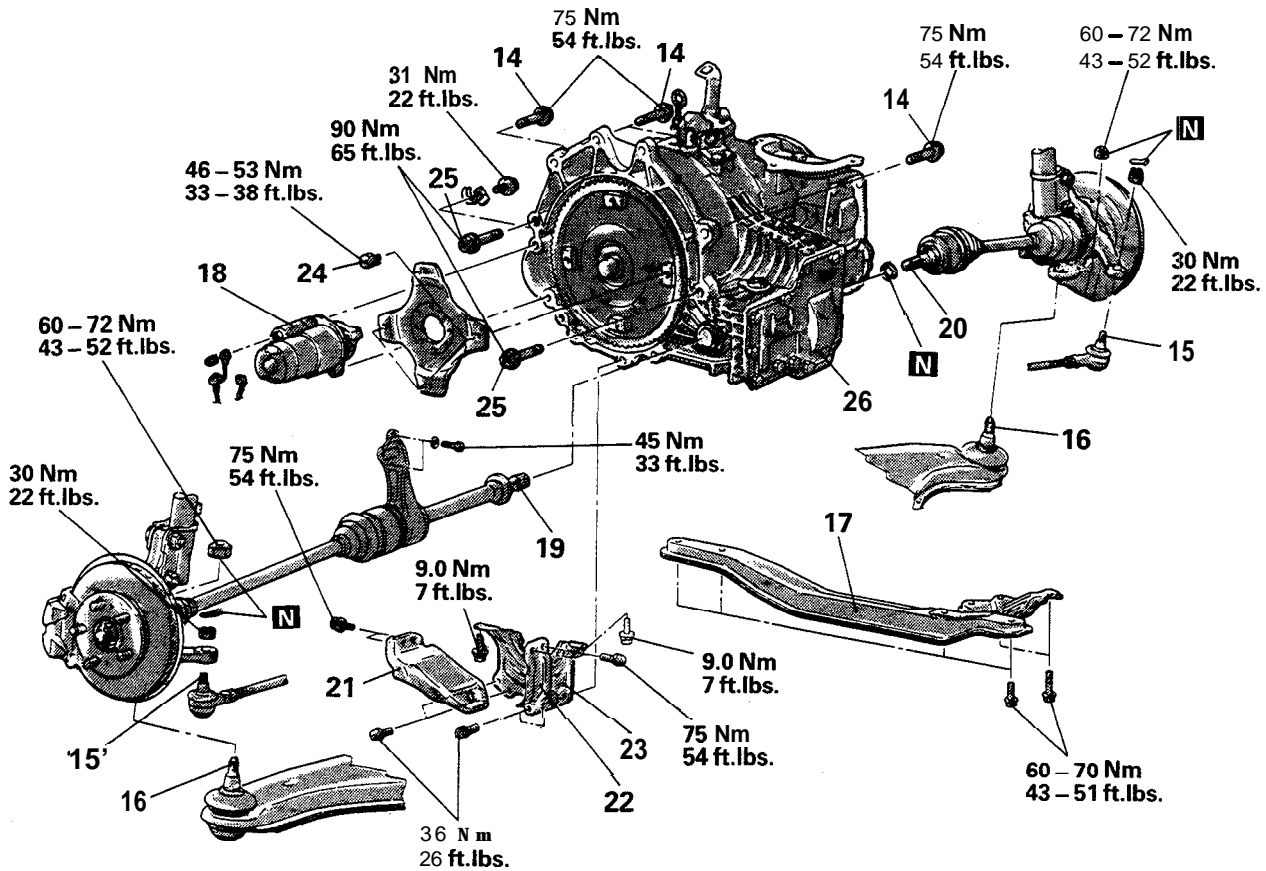
1. Side under cover
2. Battery
3. Battery seat, Washer tank
4. Air cleaner cover, Air intake hose
- + 5. Connection for transaxle control cable
6. Connection for oil cooler hose
7. Inhibitor switch connector
8. Kickdown servo switch connector
9. Pulse generator connector
- 10 Oil temperature sensor connector
11. Shift control solenoid valve connector
12. Connection for speedometer cable
- + 13. Connection for transaxle mount bracket



09F0098



09F0081

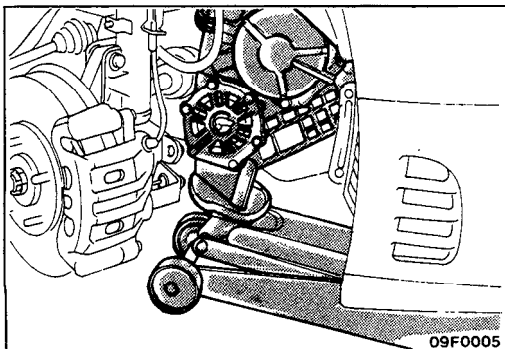


09F0088

- 14. Transaxle assembly upper part coupling bolt
- ↔ 15. Connection for tie rod end
- ↔ 16. Connection for lower arm ball joint
- 17. Right member
- 18. Starter
- ↔ 19. Drive shaft (left side), Inner shaft assembly
- * • * 20. Drive shaft (right side)
- 21. Transaxle stay (front bank side)
- 22. Transaxle stay (rear bank side)
- 23. Bell housing cover
- ↔ 24. Special bolts
- ↔ 25. Transaxle assembly lower part coupling bolt
- ↔ 26. Transaxle assembly

Post-installation Operation

- Installation of Front Under Cover (Refer to GROUP 51 -Front Bumper.)
- Supplying of Transaxle Fluid (Refer to GROUP 00 – Maintenance Service.)
- Checking the Operation of Selector Lever
- Checking the Operation of Speedometer



SERVICE POINTS OF REMOVAL

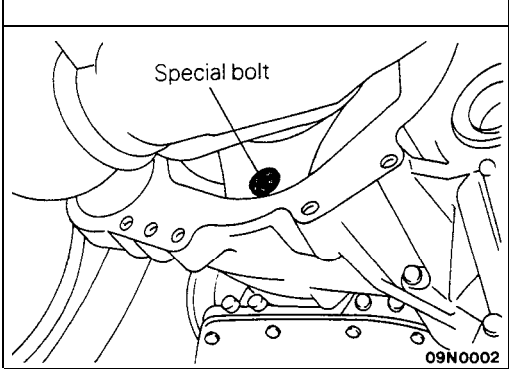
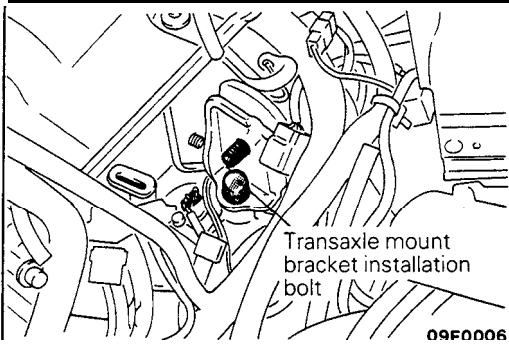
M23LBAV

13. DISCONNECTION OF TRANSAXLE MOUNT BRACKET

- (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.



- (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.

15. DISCONNECTION OF TIE ROD END / 16. LOWER ARM BALL JOINT

Refer to GROUP 22 – Manual Transaxle.

19. REMOVAL OF DRIVE SHAFT (LEFT SIDE) AND INNER SHAFT ASSEMBLY / 20. DRIVE SHAFT (RIGHT SIDE)

Refer to GROUP 22 – Manual Transaxle.

24. REMOVAL OF SPECIAL BOLTS / 25. TRANSAXLE ASSEMBLY LOWER PART COUPLING BOLT / 26. TRANSAXLE ASSEMBLY

- (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.

SERVICE POINTS OF INSTALLATION

M23LDAD

26. INSTALLATION OF TRANSAXLE ASSEMBLY

Attach the torque converter on the transaxle side and mount the transaxle assembly on the engine.

Caution

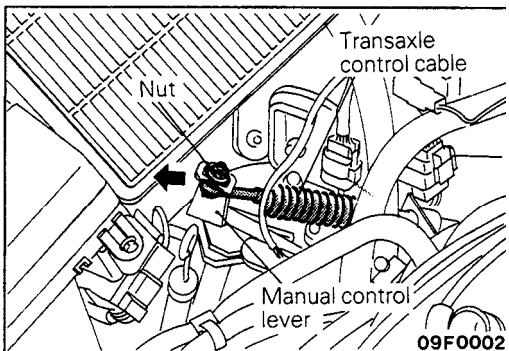
If the torque converter is mounted first on the engine, the oil seal on the transaxle side may be damaged. Therefore, be sure to first assemble the torque converter on the transaxle side.

20. INSTALLATION OF DRIVE SHAFT (RIGHT SIDE)

Refer to GROUP 22 – Manual Transaxle.

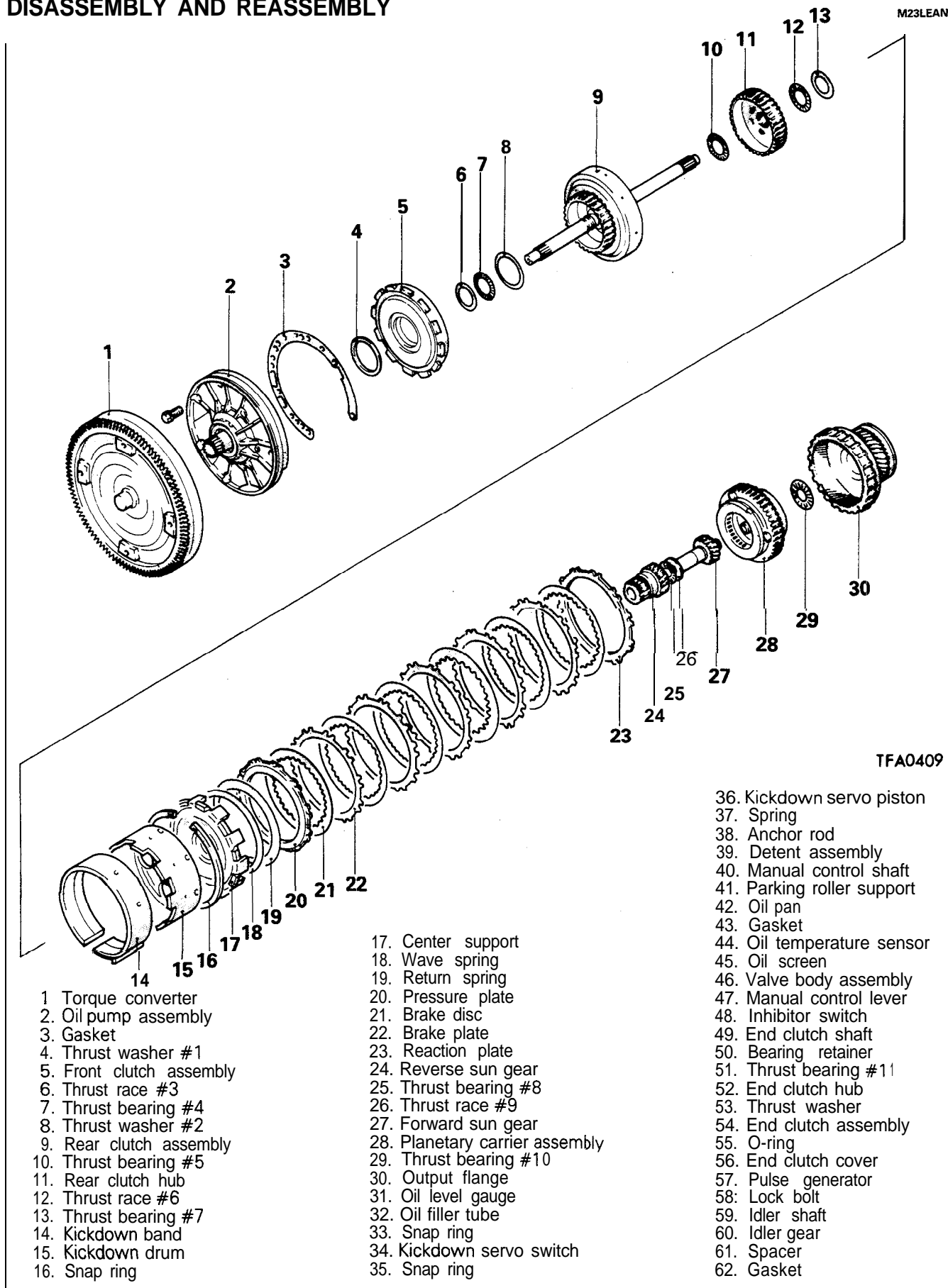
5. CONNECTION OF TRANSAXLE CONTROL CABLE

- (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.



DISASSEMBLY AND REASSEMBLY

M23LEAN



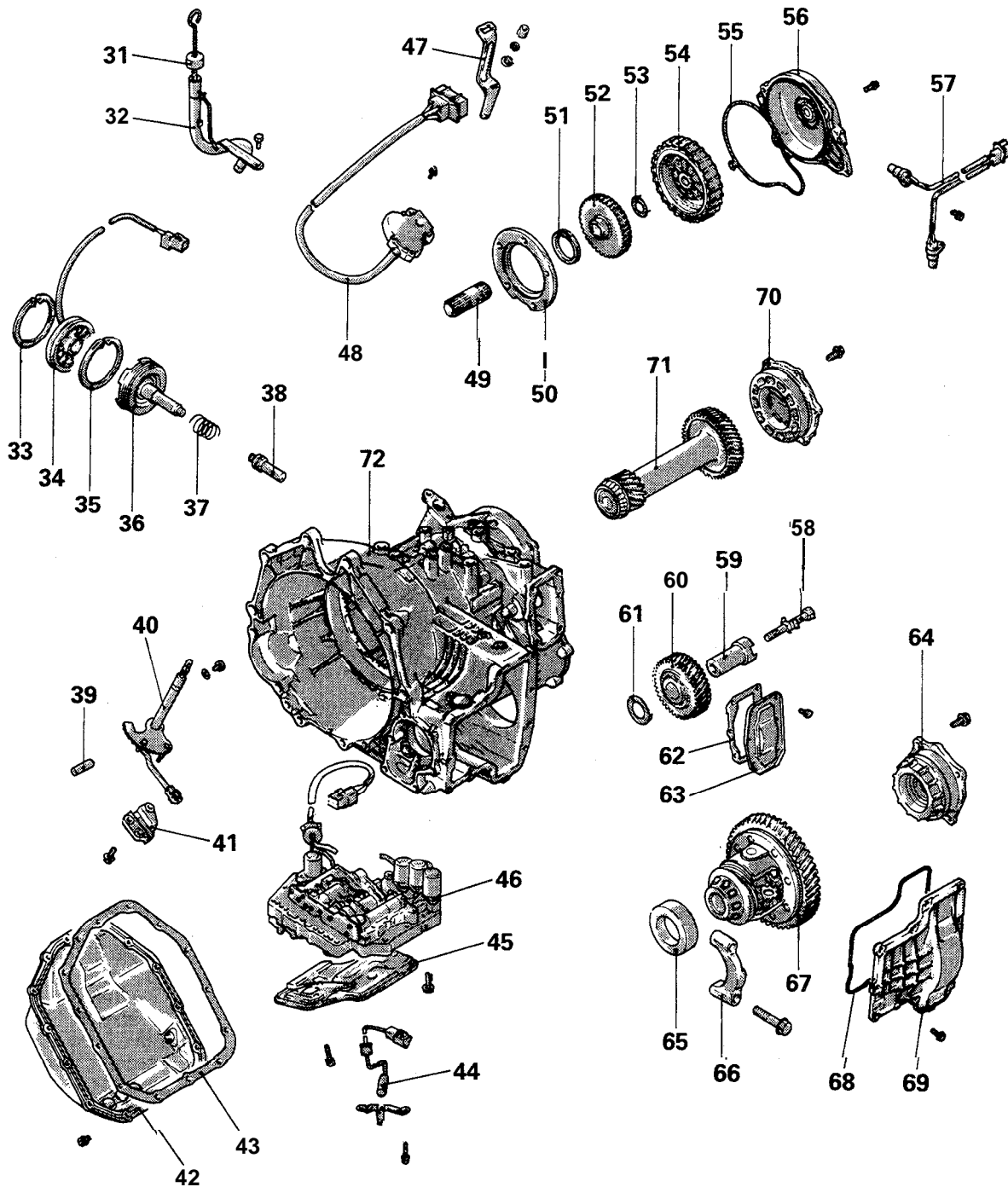
TFA0409

- 1 Torque converter
- 2 Oil pump assembly
- 3 Gasket
- 4 Thrust washer #1
- 5 Front clutch assembly
- 6 Thrust race #3
- 7 Thrust bearing #4
- 8 Thrust washer #2
- 9 Rear clutch assembly
- 10 Thrust bearing #5
- 11 Rear clutch hub
- 12 Thrust race #6
- 13 Thrust bearing #7
- 14 Kickdown band
- 15 Kickdown drum
- 16 Snap ring

- 17 Center support
- 18 Wave spring
- 19 Return spring
- 20 Pressure plate
- 21 Brake disc
- 22 Brake plate
- 23 Reaction plate
- 24 Reverse sun gear
- 25 Thrust bearing #8
- 26 Thrust race #9
- 27 Forward sun gear
- 28 Planetary carrier assembly
- 29 Thrust bearing #10
- 30 Output flange
- 31 Oil level gauge
- 32 Oil filler tube
- 33 Snap ring
- 34 Kickdown servo switch

- 36 Kickdown servo piston
- 37 Spring
- 38 Anchor rod
- 39 Detent assembly
- 40 Manual control shaft
- 41 Parking roller support
- 42 Oil pan
- 43 Gasket
- 44 Oil temperature sensor
- 45 Oil screen
- 46 Valve body assembly
- 47 Manual control lever
- 48 Inhibitor switch
- 49 End clutch shaft
- 50 Bearing retainer
- 51 Thrust bearing #11
- 52 End clutch hub
- 53 Thrust washer
- 54 End clutch assembly
- 55 O-ring
- 56 End clutch cover
- 57 Pulse generator
- 58 Lock bolt
- 59 Idler shaft
- 60 Idler gear
- 61 Spacer
- 62 Gasket

TSB Revision

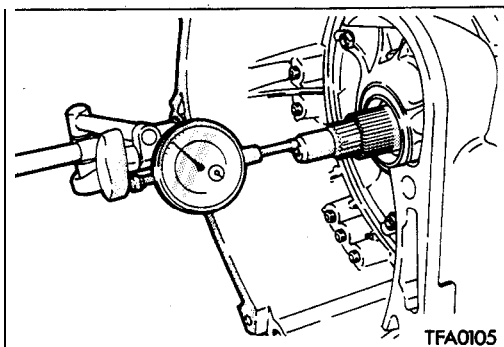


63. Idler gear cover
 64. Differential bearing retainer
 65. Outer race
 66. Differential front bearing cap
 67. Differential assembly

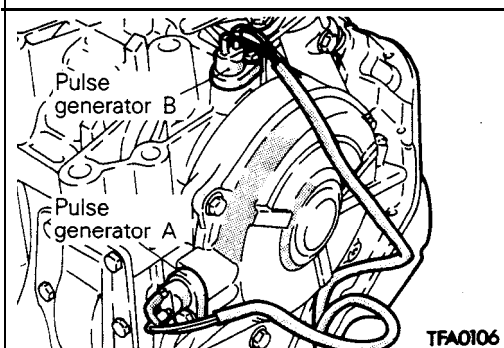
68. Gasket
 69. Differential cover
 70. Output bearing retainer
 71. Transfer shaft
 72. Transaxle case

DISASSEMBLY**Caution**

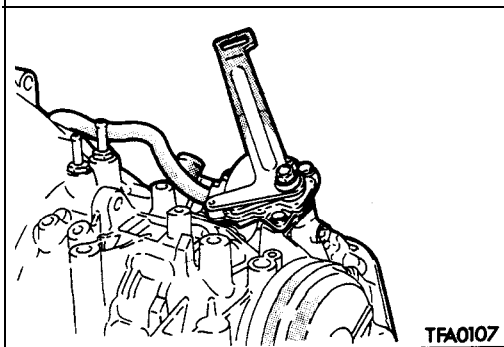
1. The automatic transaxle consists of high-precision parts and utmost care must be exercised during disassembly and reassembly to prevent damage to the parts.
2. Place a rubber mat on the workbench and keep it clean at all times.
3. Do not use cotton work gloves or waste cloth for the disassembly job. Use nylon cloth or paper towel if necessary.
4. Clean all disassembled parts. Commercially available detergent may be used to clean the metallic parts; however, be sure to dry them completely with air.
5. Clean the clutch disc, plastic thrust plates, and rubber parts with ATF (automatic transmission fluid) to prevent adhesion of dust and dirt.
6. If the transaxle is damaged, the cooler system should also be disassembled and cleaned.



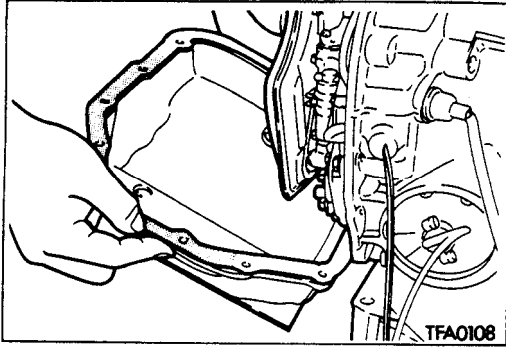
- (1) Remove the torque converter.
- (2) Install the dial indicator to the transaxle case and measure the end play in the input shaft.
- (3) Remove brackets.
- (4) Remove the oil level gauge and oil level gauge guide.



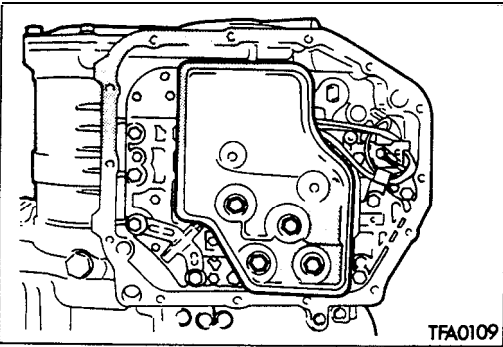
- (5) Remove pulse generators A and B



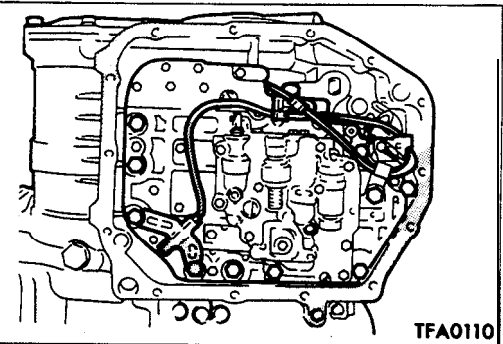
- (6) Remove the manual control lever and then remove the inhibitor switch.
- (7) Remove the speedometer drive gear assembly.



(8) Remove the oil pan, magnet, and gasket.

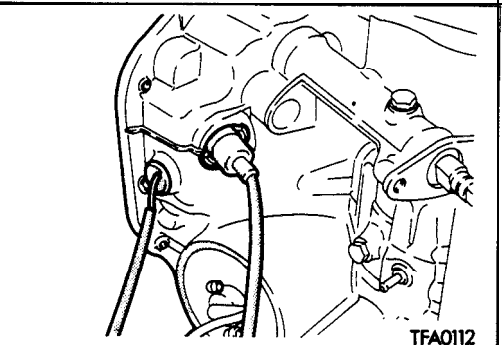


(9) Remove the oil screen.



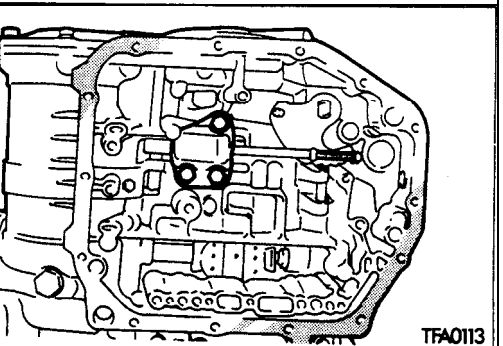
(10) Remove the ten valve body mounting bolts.

(11) Remove the oil temperature sensor holder and remove the oil temperature sensor harness from the clamp.

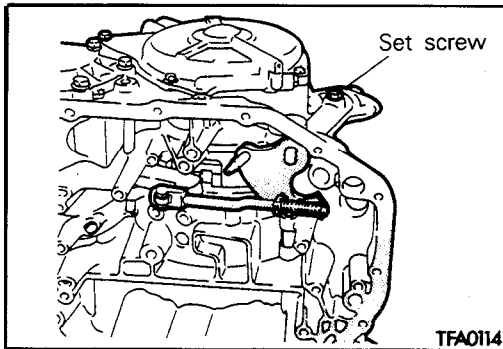


(12) Press the solenoid valve harness grommet claw to push the grommet into the case; then, remove the valve body assembly.

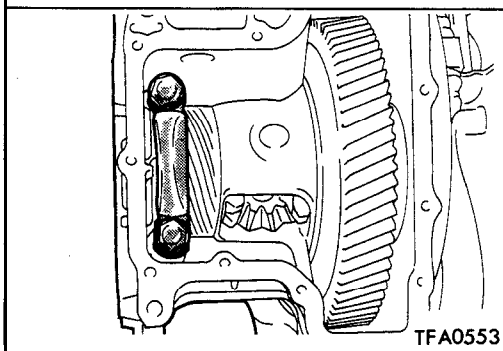
(13) Pull off the oil temperature sensor.



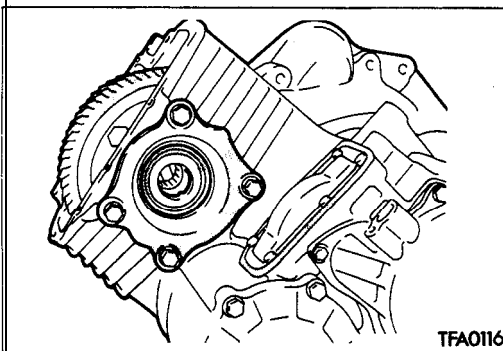
(14) Remove the parking roller support.



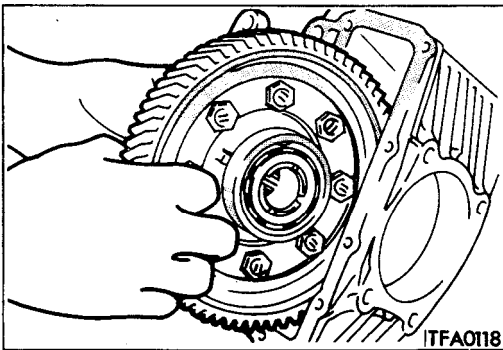
- (15) Remove the set screw from the manual control shaft and remove the manual control shaft assembly.
(16) Remove the detent assembly.



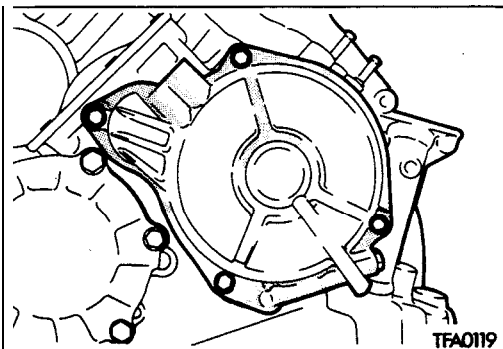
- (17) Remove the differential cover and gasket.
(18) Remove the differential front bearing cap.



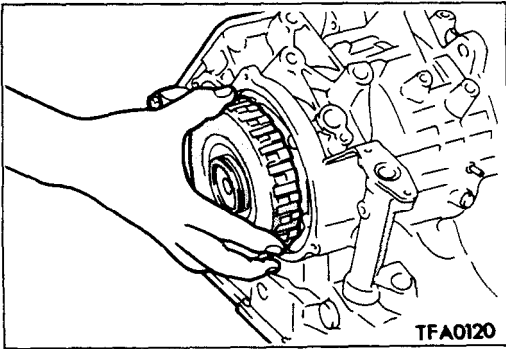
- (19) Remove the differential bearing retainer, spacer, and outer race.



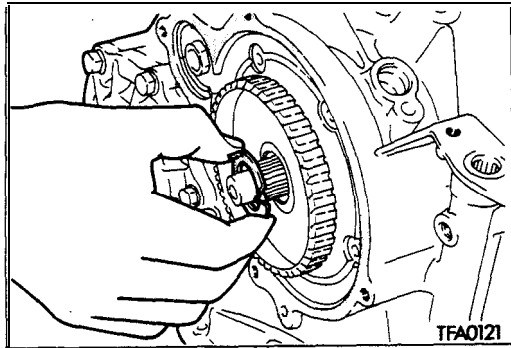
- (20) Remove the differential assembly



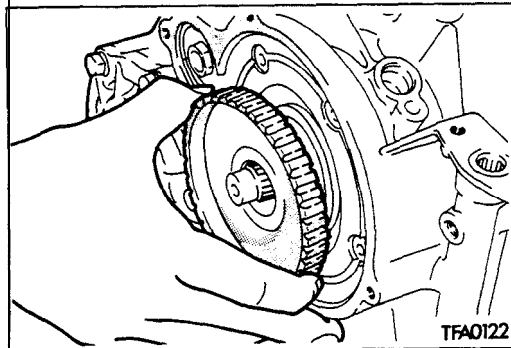
- (21) Remove the end clutch cover mounting bolts and remove the end clutch cover.



(22) Remove the end clutch assembly.



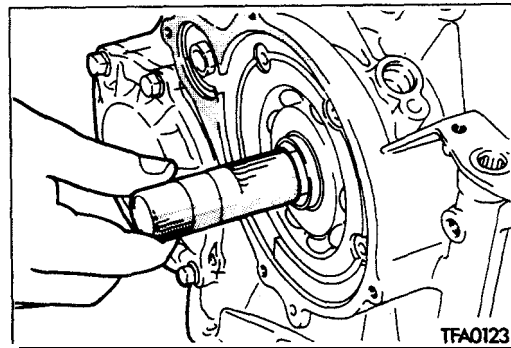
(23) Remove the thrust plate.



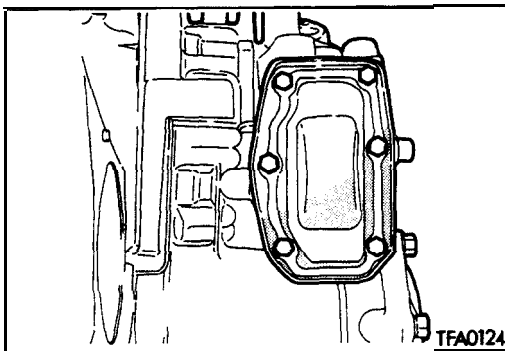
(24) Remove the end clutch hub.
(25) Remove the thrust bearing.

NOTE

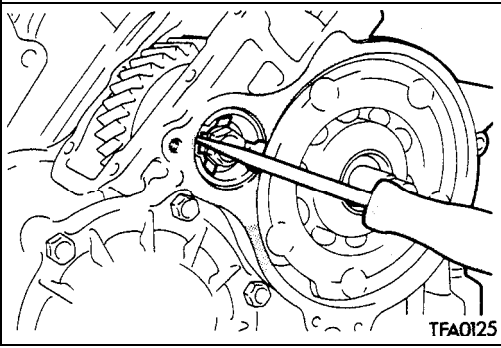
The bearing may be adhering to the end clutch hub.



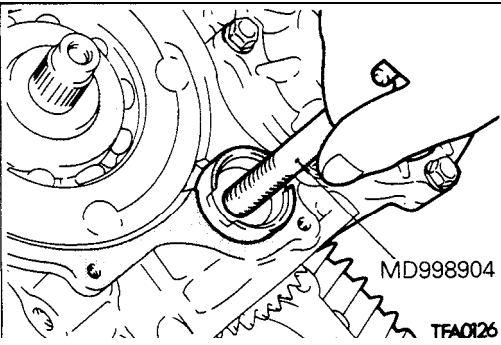
(26) Pull out the end clutch shaft.



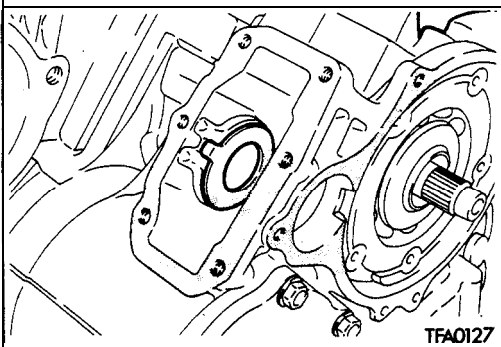
(27) Remove the idler gear cover mounting bolts and remove the idler gear cover and gasket.



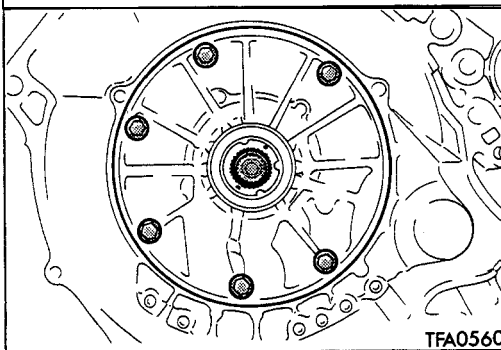
(28) Straighten the lock where it forms over the bolt and remove the bolt.



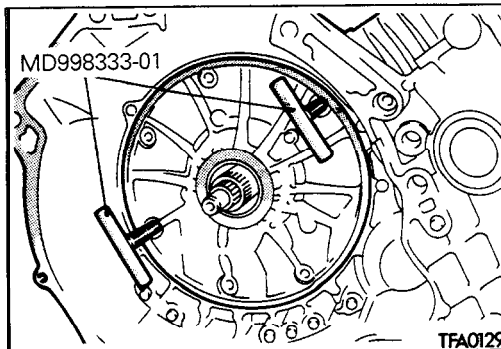
(29) Pull off the idler shaft and remove the idler gear and bearing inner race.



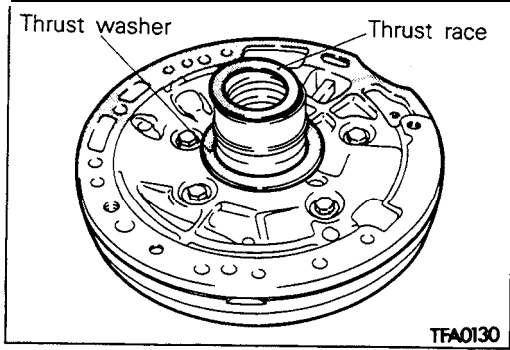
(30) Remove the spacer.



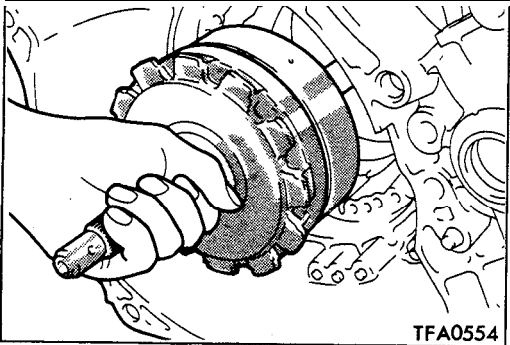
(31) Remove the oil pump bolts.



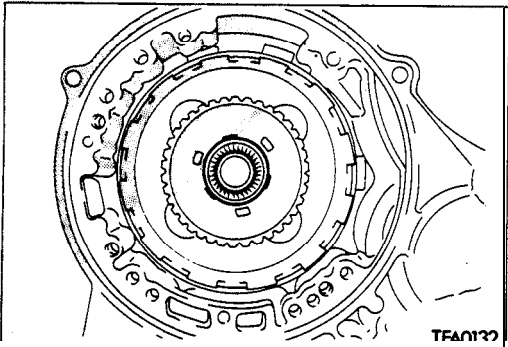
(32) Using the special tool, remove the oil pump.



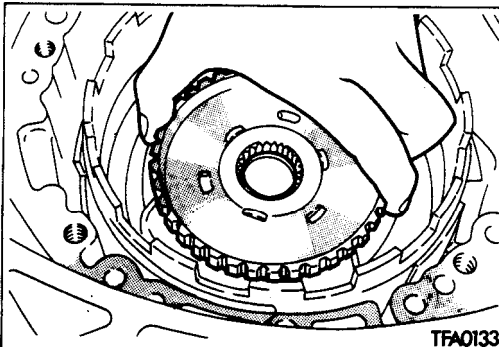
(33) Remove the thrust washer and thrust race.



(34) Holding ' onto the input shaft, remove the front clutch assembly and rear clutch assembly together.



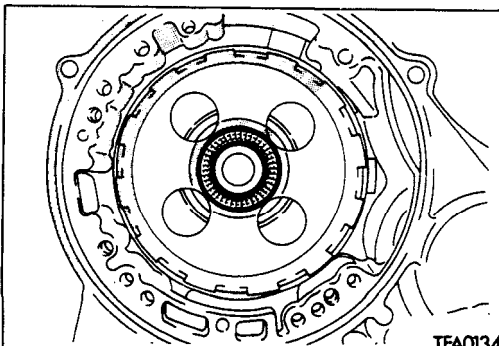
(35) Remove the thrust bearing.



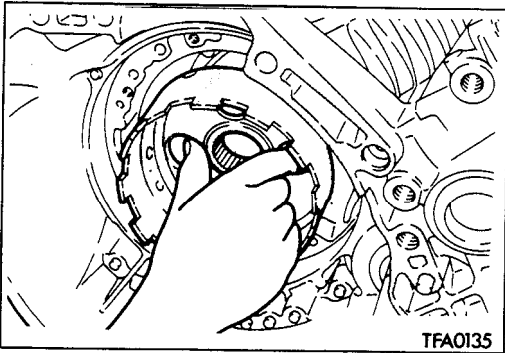
(36) Remove the rear clutch hub.

NOTE

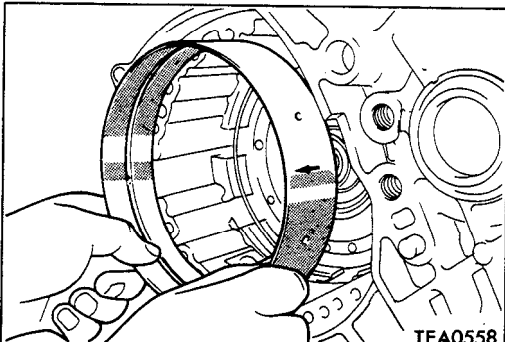
The thrust race may be sticking to the clutch hub.



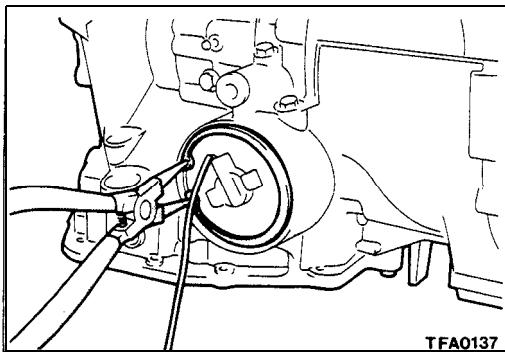
(37) Remove the thrust bearing.



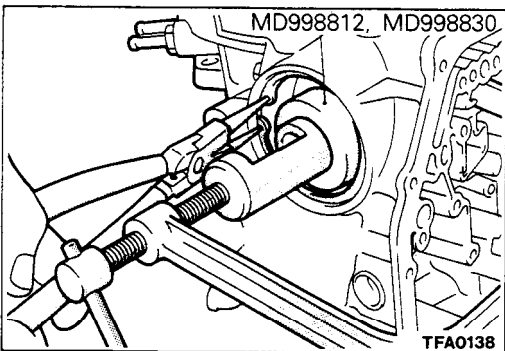
(38) Remove the kickdown drum.



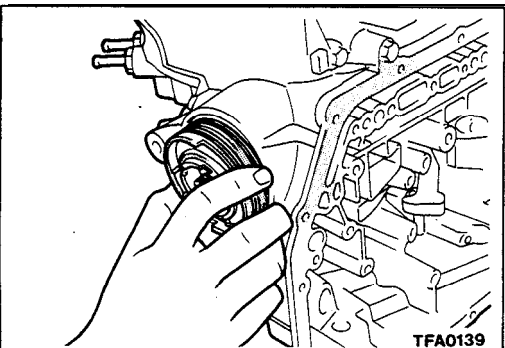
(39) Remove the kickdown band.



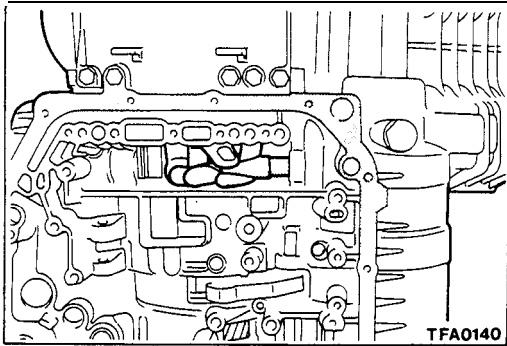
(40) Snap off the snap ring and remove the kickdown servo switch.



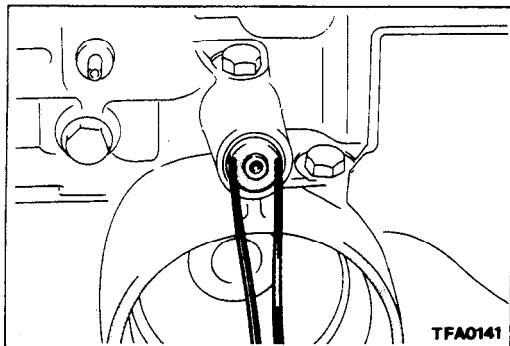
(41) Using the special tool, push in the kickdown servo piston to snap off the snap ring.



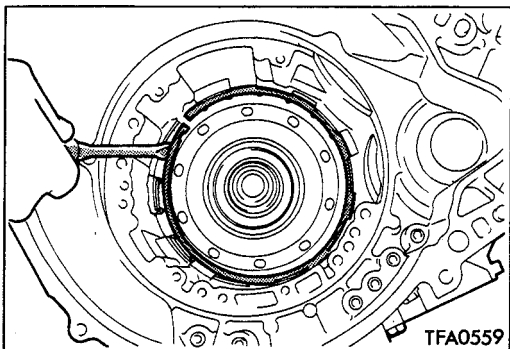
(42) Remove the kickdown servo piston.



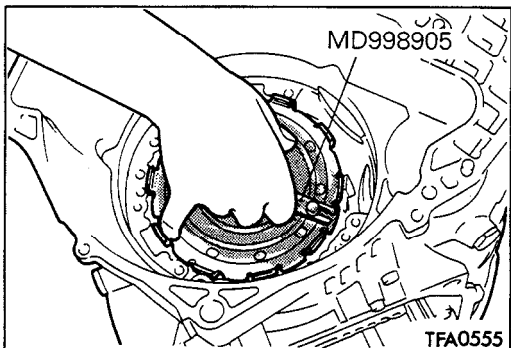
(43) Remove the anchor rod.



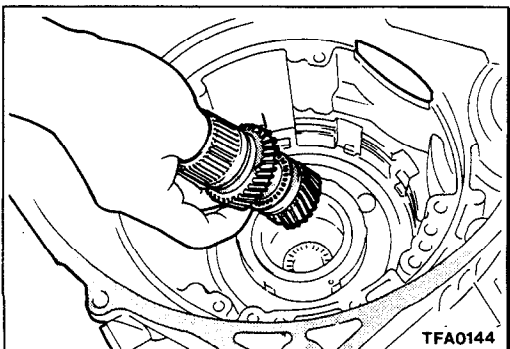
(44) Remove the plug and pull out the air exhaust plug.



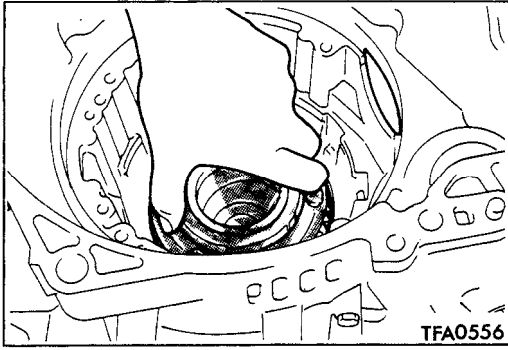
(45) Remove the snap ring.



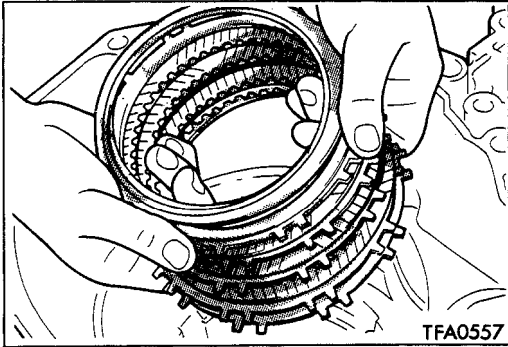
(46) Using the special tool, remove the center support



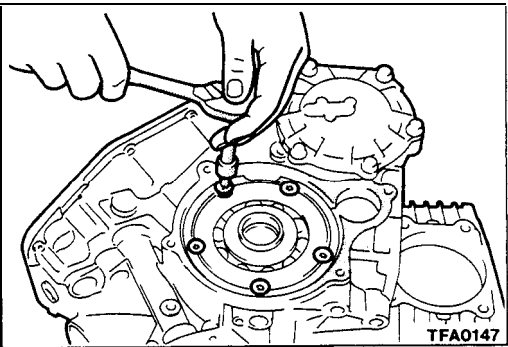
(47) Remove the reverse sun gear and forward sun gear.



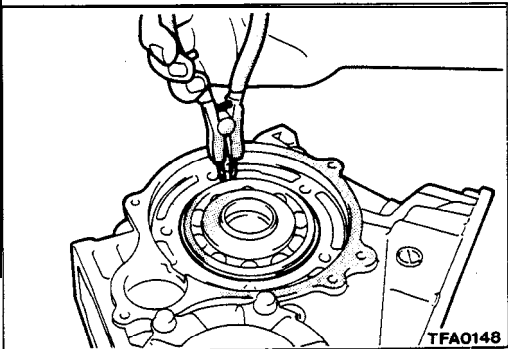
(48) Remove the planetary carrier assembly.



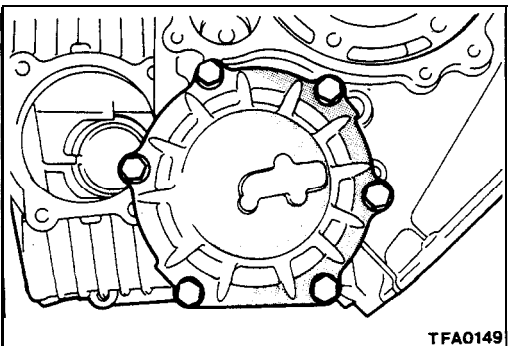
(49) Remove the wave spring, return spring, reaction plate, brake disc, and brake plate.



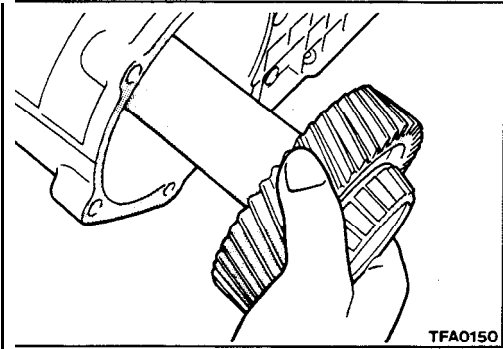
(50) Remove the screw and remove the rear bearing retainer.



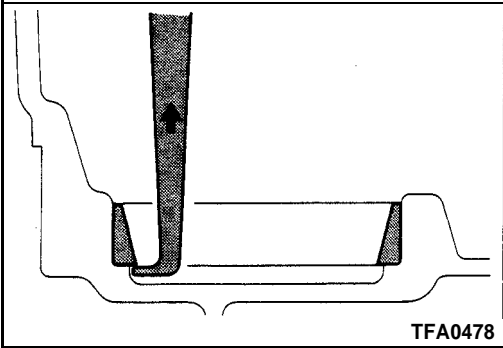
(51) Snap off the snap ring and remove the output flange assembly.



(52) Remove the output bearing retainer mounting bolts and remove the output bearing retainer and outer race.



(53) Remove the transfer shaft.



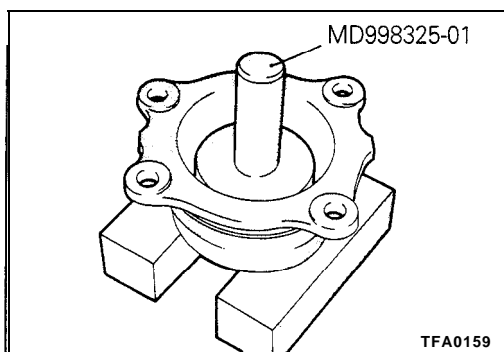
(54) Using a sliding hammer, remove the outer race.
(55) Remove oil seals.

REASSEMBLY

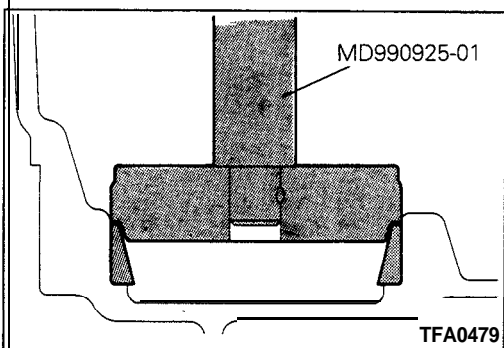
M23LFAP

Caution

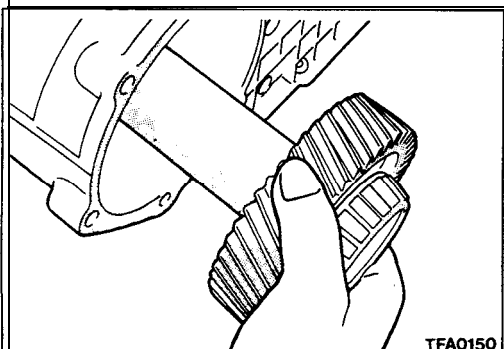
1. The gasket, O-ring, and oil seal should never be reused. Whenever they have been removed, they must be replaced with new ones. (Note: The rubber used in the oil level gauge does not require replacement.)
2. Never use grease other than petrolatum.
3. Be sure to apply ATF to the friction elements and rotary and sliding surfaces before reassembly.
A new clutch disc and brake disc should be dipped in ATF for more than 2 hours before installation.
4. Do not use sealant or adhesive for gaskets.
5. When replacing a bushing, replace the whole assembly containing that bushing.
6. Do not use cotton work gloves or waste cloth for the reassembly job. Use nylon cloth or paper towel if necessary.
7. Replace oil in the cooler.



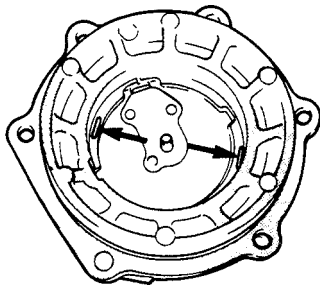
- (1) Using the special tool, press-fit the drive shaft oil seal into position.



- (2) Using the special tool, press-fit the outer race into the transaxle case.

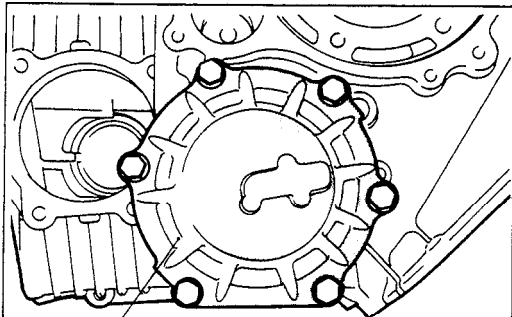


- (3) Install the transfer shaft.



TFA0167

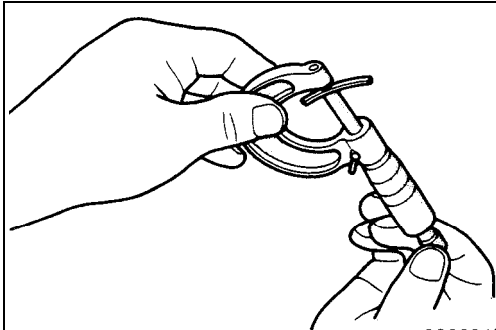
- (4) Place 10 mm-long (.39 in.), 1.6 mm-dia. (.06 in.) solders at the locations shown of the output bearing retainer and install the outer race.



Output bearing retainer

TFA0149

- (5) Install the output bearing retainer and tighten bolts to specification.
 (6) Loosen the bolts and remove the output bearing retainer.

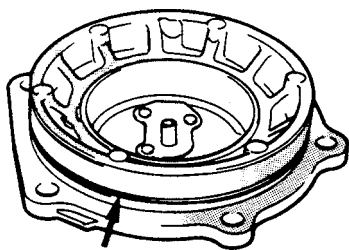


2200048

- (7) Remove the outer race from the output bearing retainer and remove the solders. If the solders are not crushed, use larger dia. (3 mm or .12 in.) solders to repeat steps (4) to (6). Measure the thickness of the solders crushed with a micrometer and select a spacer to obtain the specified preload.

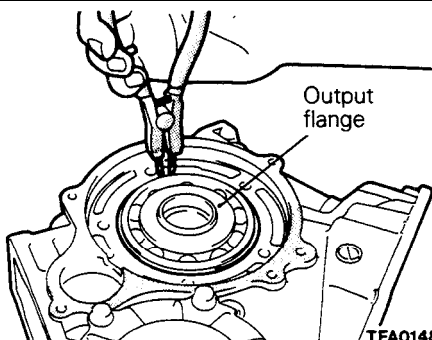
Standard value: 0.075 – 0.135 mm (.003 – .0053 in.)

- (8) Install the spacer selected in the preceding step as well as outer race into the output bearing retainer.



TFA0168

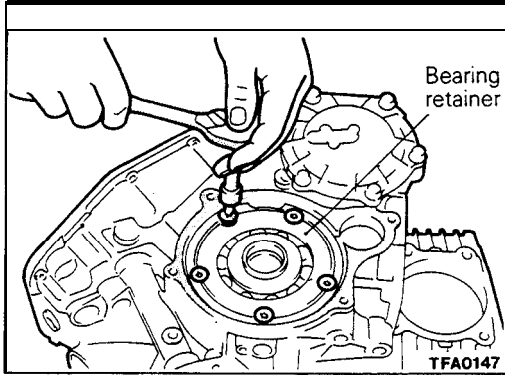
- (9) Fit a new O-ring over the periphery of the output bearing retainer.
 (10) Coat the O-ring with ATF and tighten the output bearing retainer mounting bolts to specification.



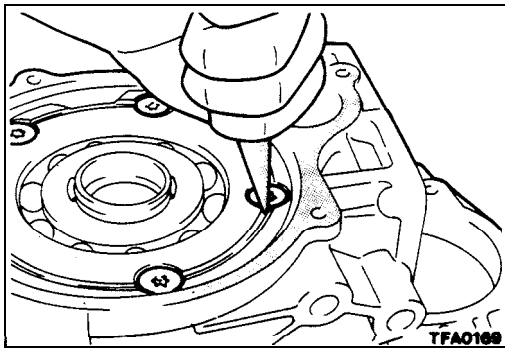
Output flange

TFA0148

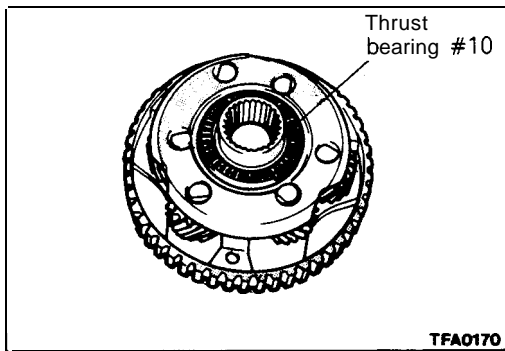
- (11) Insert the output flange into the case and fit the snap ring over the periphery of the bearing.



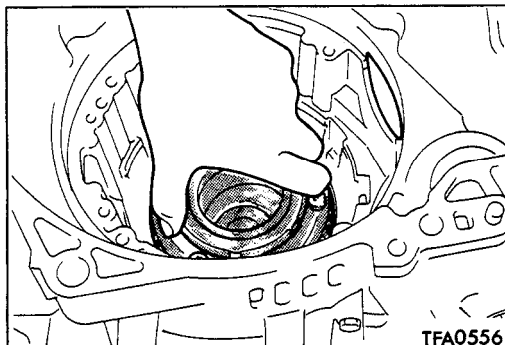
(12) Install the bearing retainer with new bolts.



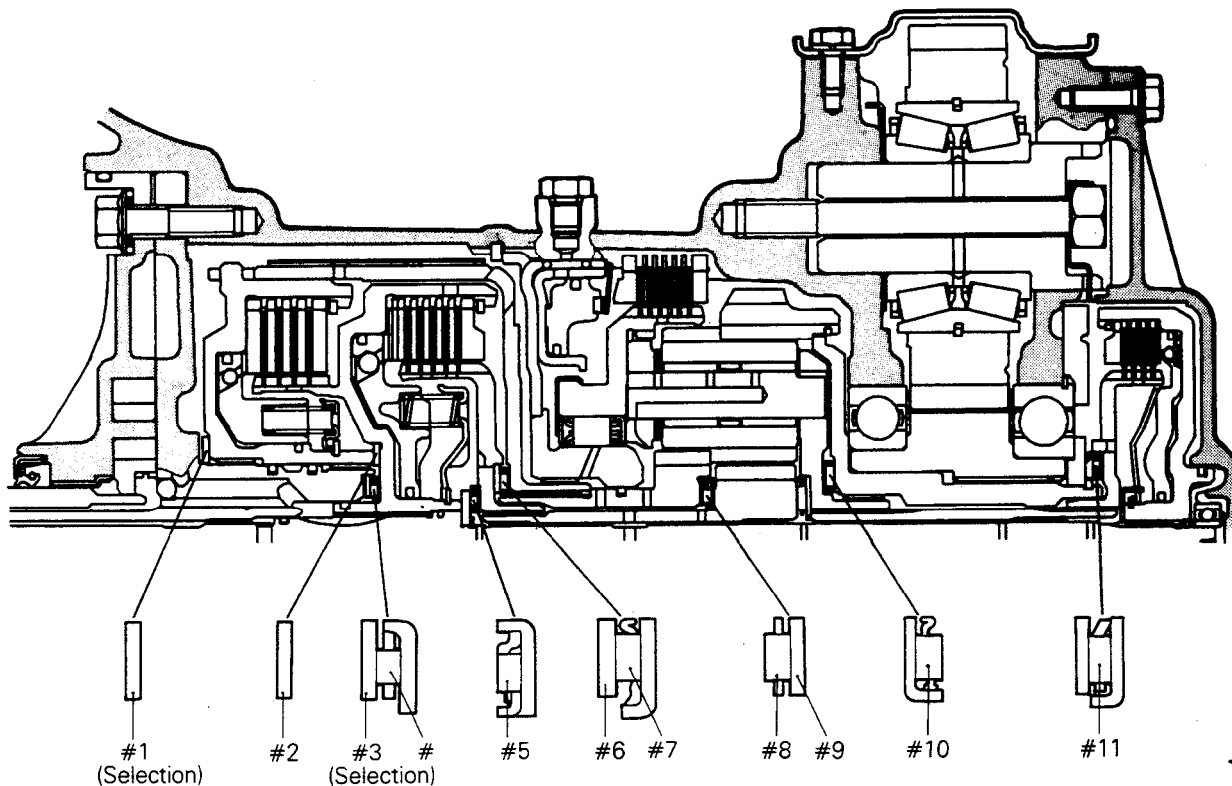
(13) Stake the heads of the bolts.



(14) Coat thrust bearing #10 with petrolatum and affix the bearing to the planetary carrier.



(15) Install the planetary carrier.



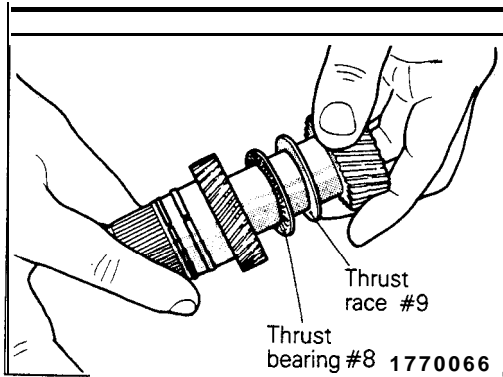
TFA0243

IDENTIFICATION OF THRUST BEARINGS, THRUST RACES AND THRUST WASHERS LOCATION

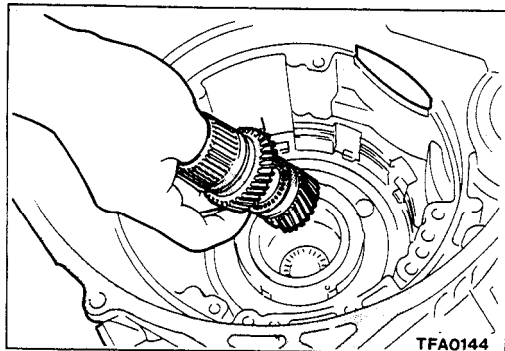
mm (in.)

O.D.	I.D.	Thickness	Part No.	Code	O.D.	I.D.	Thickness	Part No.	Code
70 (2.76)	55.7 (2.193)	1.4 (.055)	*1	#1	48.9 (1.925)	37 (1.46)	2.2 (.087)	MD997852 (included *4)	#3
70 (2.76)	55.7 (2.193)	1.8 (.071)	*2		48.9 (1.925)	37 (1.46)	2.4 (.094)	MD997853 (included *4)	
70 (2.76)	55.7 (2.193)	2.2 (.087)	*3		48.1 (1.874)	34.4 (1.354)	-	M D 7 0 7 2 7 1	#4
70 (2.76)	55.7 (2.193)	2.6 (.102)	*4		42.6 (1.677)	28 (1.10)	-	M D 7 2 0 7 5 3	#5
66 (2.60)	54 (2.13)	1.8 (.071)	M D 7 3 1 2 1	2 #2	54 (2.13)	38.7 (1.524)	1.6 (.063)	M D 7 0 4 9 3 6	#6
48.9 (1.925)	37 (1.46)	1.0 (.039)	MD997854 (Included *1)	#3	52 (2.05)	36.4 (1.433)	-	MD72001 0	#7
48.9 (1.925)	37 (1.46)	1.2 (.047)	MD997847 (included *1)		45 (1.77)	28 (1.10)	-	M D 7 3 5 0 6 2	#8
48.9 (1.925)	37 (1.46)	1.4 (.055)	MD997848 (included *2)		46 (1.81)	31 (1.22)	0.8 (.031)	M D 7 3 5 0 6 3	#9
48.9 (1.925)	37 (1.46)	1.6 (.063)	MD997849 (included *2)		52 (2.05)	36.4 (1.453)	-	MD72001 0	#10
48.9 (1.925)	37 (1.46)	1.8 (.071)	M D 997850 (included *3)		58 (2.28)	44 (1.73)	-	MD724206	#11
48.9 (1.925)	37 (1.46)	2.0 (.079)	MD997851 (included *3)						

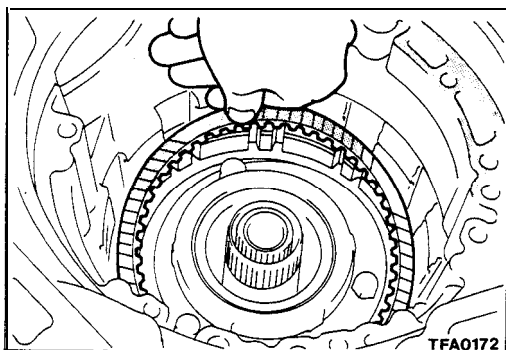
TSB Revision



(16) Assemble the forward sun gear, thrust race #9, thrust bearing #8, and reverse sun gear.

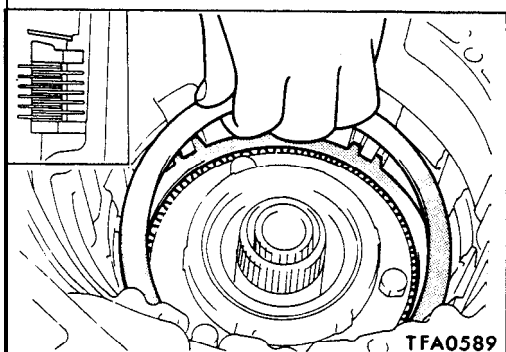


(17) Install the two sun gears assembled in the preceding step into the planetary carrier.



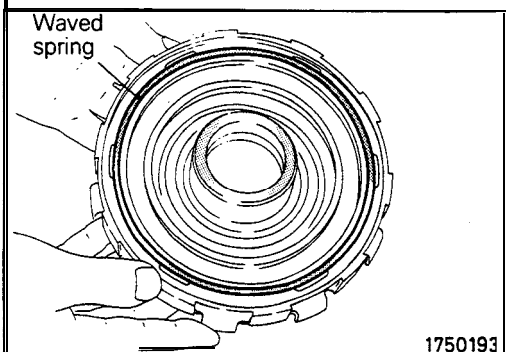
(18) Install the reaction plate, brake disc, and brake plate.

Caution
If a new brake disc is to be used, it should be dipped in ATF for more than two hours.

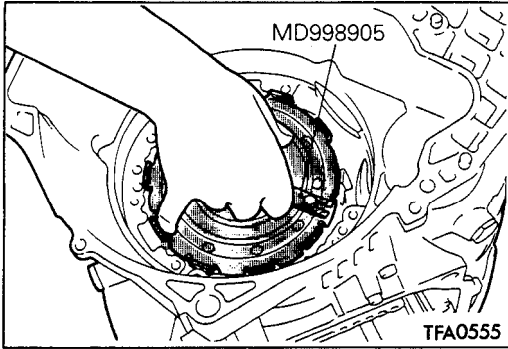


(19) Install the pressure plate disassembled and return spring.

Caution
Make sure the return spring is installed in the correct direction.



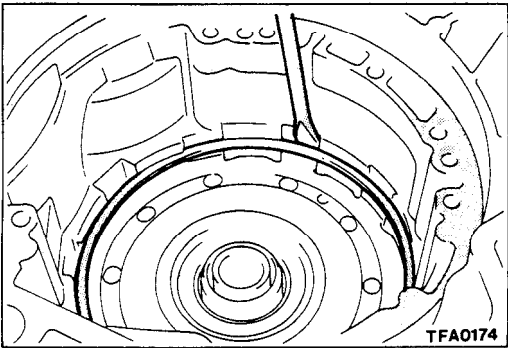
(20) Coat the wave spring with petrolatum and affix it to the center support.



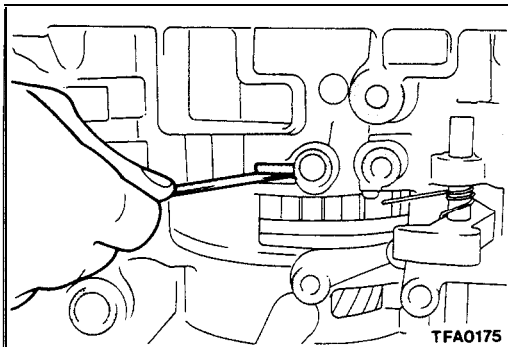
(21) Install the special tool to the center support, fit new O-rings (at two places), and press the center support into the transaxle case.

Caution

1. Coat the O-rings with ATF and align oil holes.
2. Install with care not to allow the wave spring to shift its position.

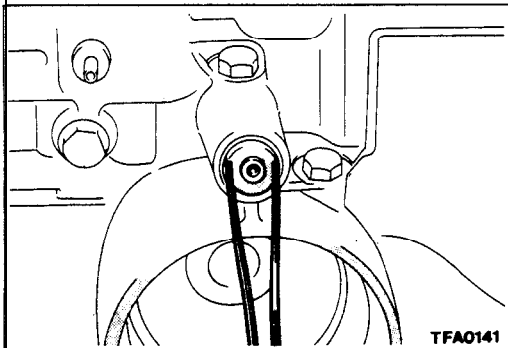


(22) Fit the snap ring.

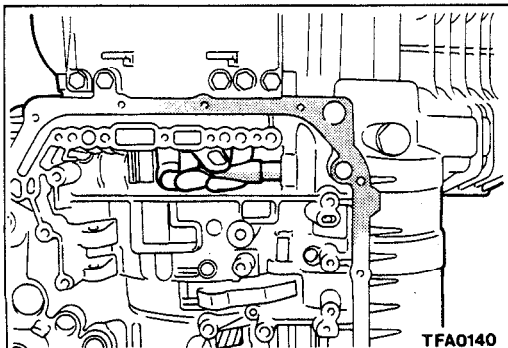


(23) Using a feeler gauge, measure the end play in low-reverse brake. Select a pressure plate to obtain the specified end play.

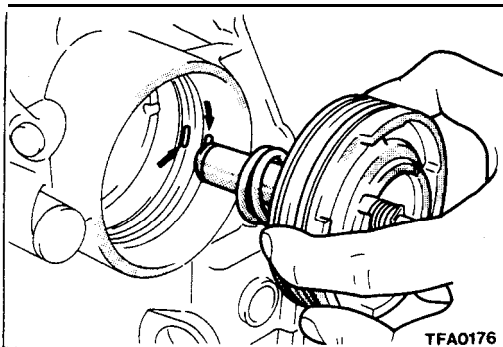
Standard value: 1.0 – 1.2 mm (.039 – .047 in.)



(24) Install the air exhaust plug and mount the plug.



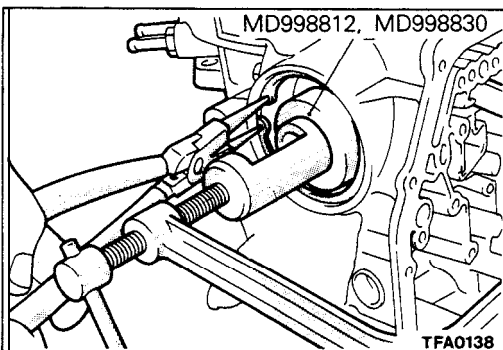
(25) Install the anchor rod.



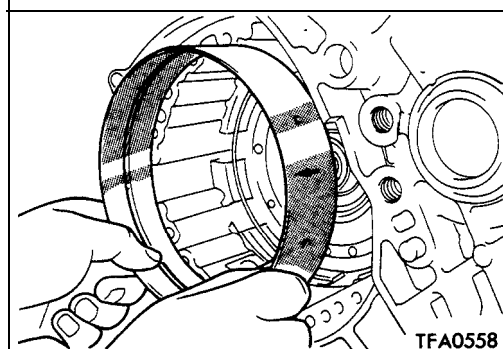
(26) Install the kickdown servo spring, piston, and sleeve.

Caution

Make sure that the ends of seal ring on the kickdown servo piston are not located at the oil supply port (indicated by arrows).



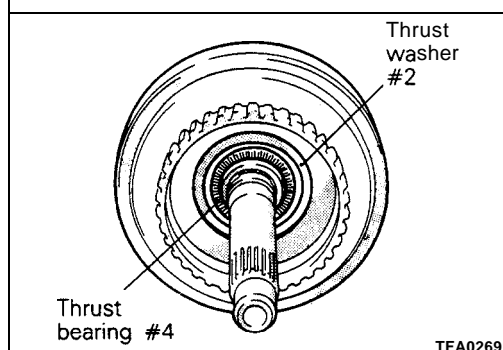
(27) Using the special tools, press the kickdown servo piston and sleeve into position and fit the snap ring.



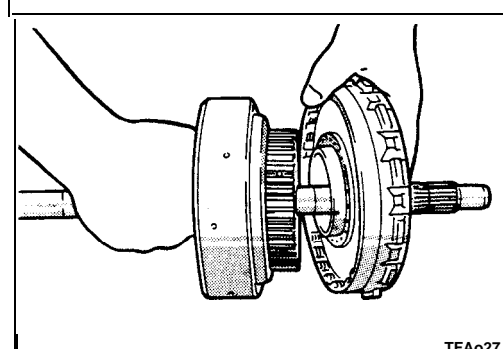
(28) Fit the kickdown band.

Caution

Install so that the arrow points to the front.

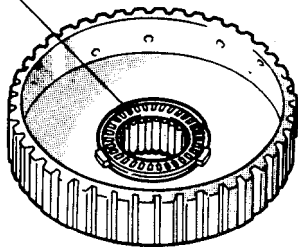


(29) Install thrust bearing #4 and thrust washer #2 to the rear clutch.



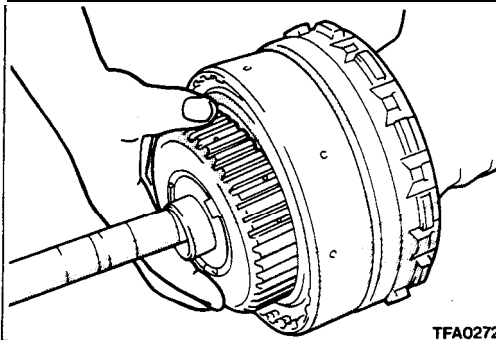
(30) Mate the rear clutch with the front clutch.

Thrust bearing #5



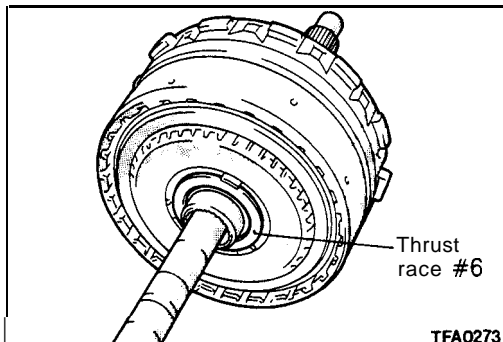
TFA0271

(31) Mount thrust bearing #5 to the rear clutch hub .



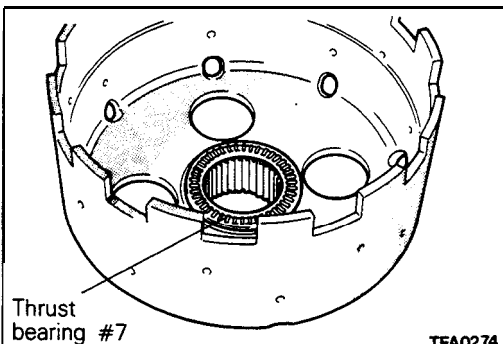
TFA0272

(32) Assemble the rear clutch hub to rear clutch.

Thrust
race #6

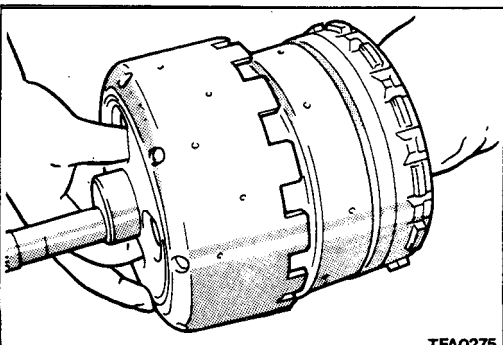
TFA0273

(33) Install thrust race #6 to the rear clutch hub end face.

Thrust
bearing #7

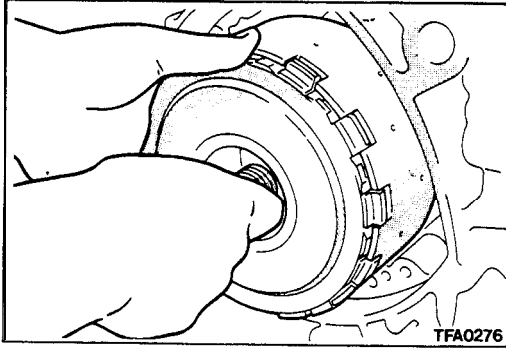
TFA0274

(34) Install thrust bearing #7 to the kickdown drum

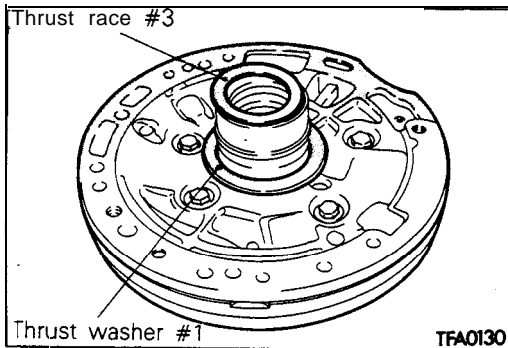


TFA0275

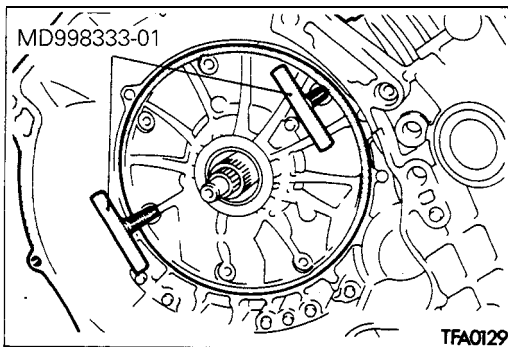
(35) Assemble the clutch assembly to kickdown drum.



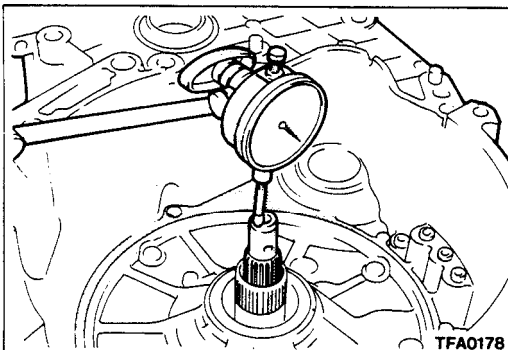
(36) Install the clutch assembly and kickdown drum to the transaxle case at the same time.



(37) Using petrolatum, affix thrust race #3 and thrust washer #1 to the rear end face of oil pump.

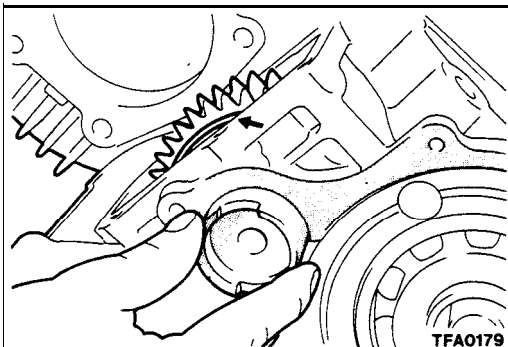


(38) Using the special tool, install a new oil pump gasket and oil pump assembly.



(39) Measure the end play in input shaft. If the measurement is out of specification, replace thrust race #3 and thrust washer #1 to obtain the specified end play.

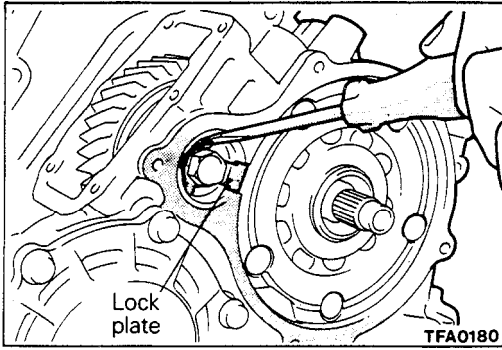
Standard value: 0.3 – 1.0 mm (.012 – .039 in.)



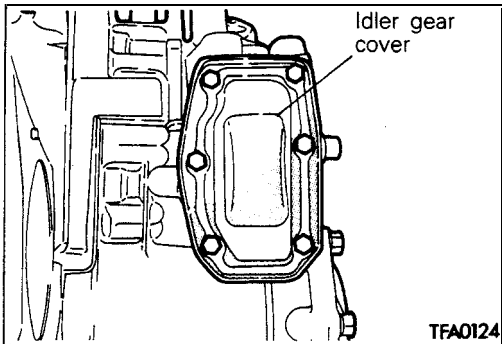
(40) Install the spacer, idler gear, and bearing and insert the idler shaft.

Caution

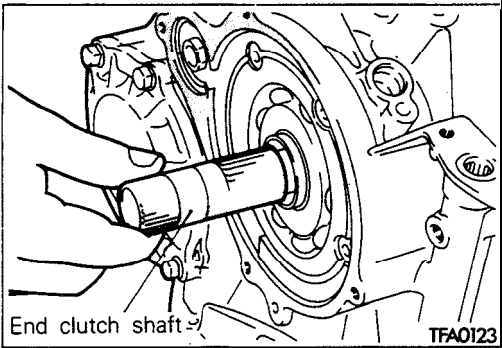
Install so that the identification groove in the idler gear end face is on the rear face side.



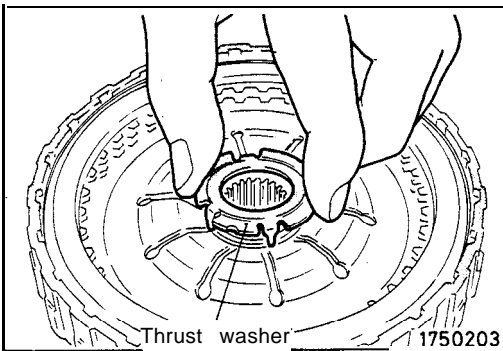
(41) Tighten the idler shaft lock bolt to specification and raise the new lock plate for locking.



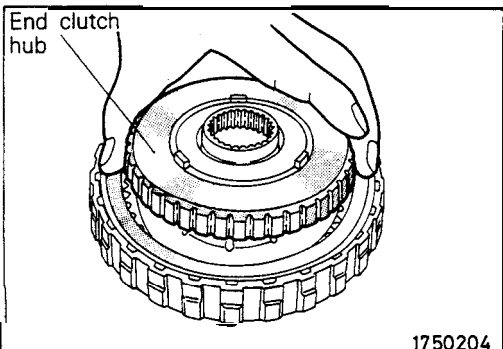
(42) Install the idler gear cover and new gasket



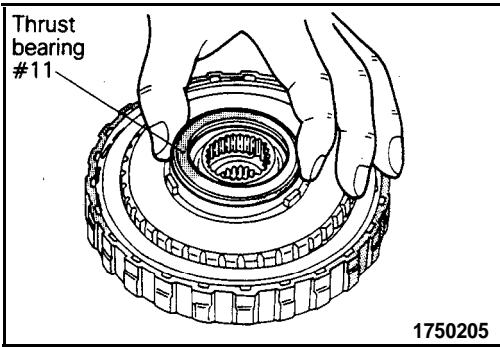
(43) Insert the end clutch shaft with its longer splines facing front.



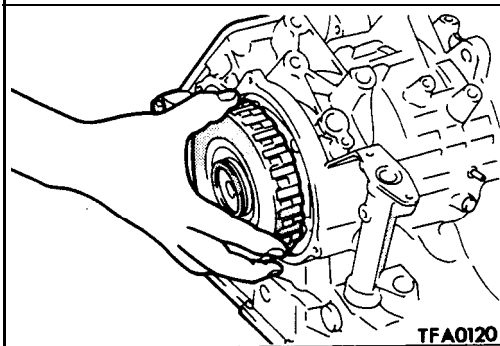
(44) Fit the thrust washer onto the end clutch return spring.



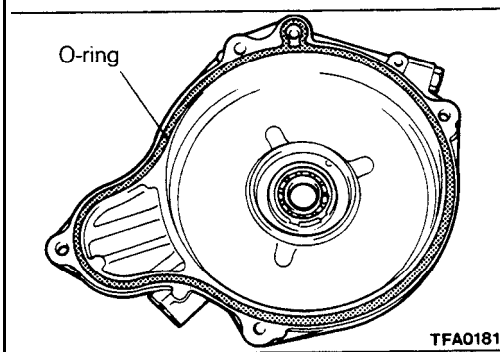
(45) Install the end clutch hub to the end clutch assembly.



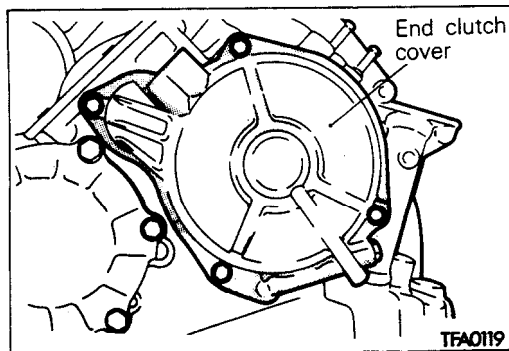
(46) Using petrolatum, affix the thrust bearing to the end clutch hub.



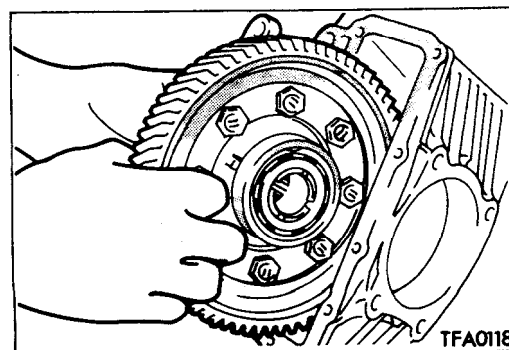
(47) Install the end clutch assembly.



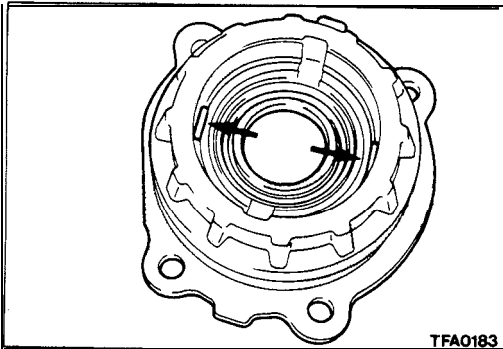
(48) Mount a new O-ring onto the end clutch cover.



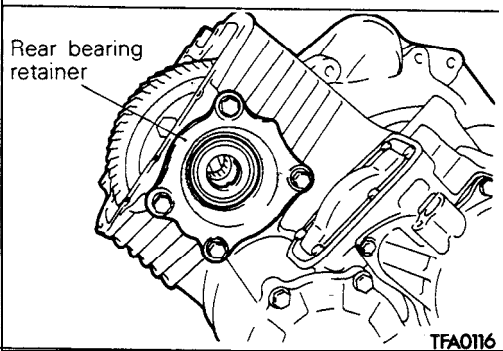
(49) Install the end clutch cover and tighten bolts to specification.



(50) Install the differential assembly.

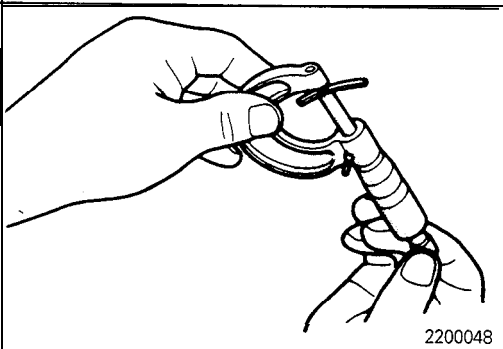


(51) Place 10 mm-long (.39 in.), 1.6 mm-dia. (.06 in.) solders at the locations shown of the differential rear bearing retainer and install the outer race.



(52) Install the differential rear bearing retainer and tighten bolts to specification.

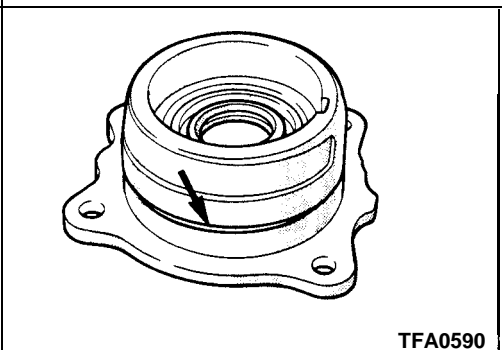
(53) Loosen the bolts, remove the differential rear bearing retainer, and remove the solders. If the solders are not crushed, use larger dia. [3 mm (.12 in.)] solders to repeat steps (51) to (53).



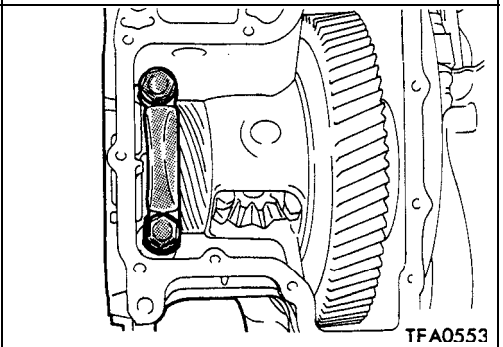
(54) Measure the thickness of the solders crushed with a micrometer and select a spacer to obtain the specified end play and preload.

Standard value:

Front differential case preload
0.075 – 0.135 mm (.003 – .0053 in.)

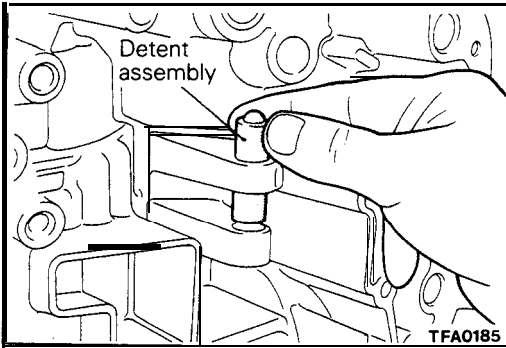


(55) Fit a new O-ring to the differential rear bearing retainer, apply ATF, and mount the retainer to the transaxle case before torquing the bolts to specification.

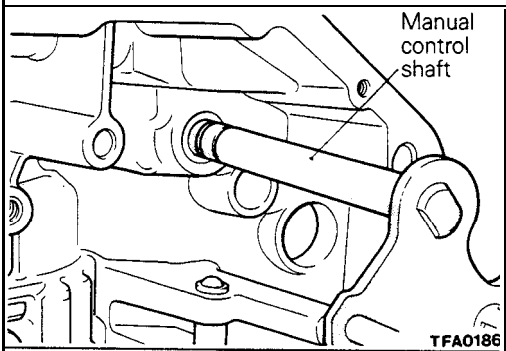


(56) Mount the front bearing cap and tighten bolts to specification.

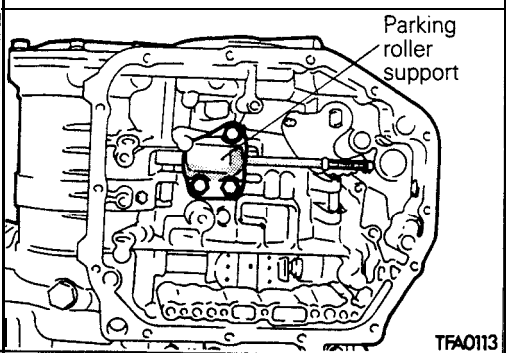
(57) Install the differential cover and new gasket.



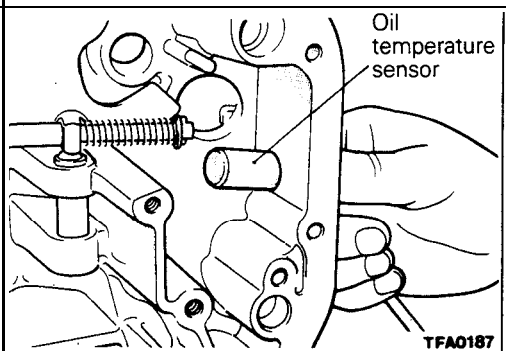
(58) Install the detent assembly.



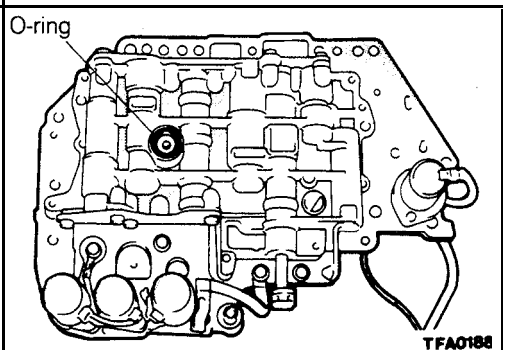
(59) Fit a new O-ring to the manual control shaft assembly, apply ATF, and insert it into the transaxle case.
 (60) Align the groove in manual control shaft with the set screw hole and install the set screw.



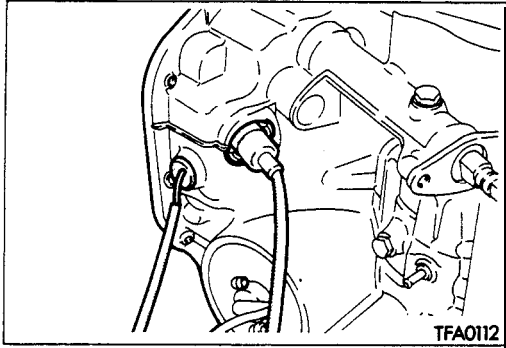
(61) Mount the parking roller support.



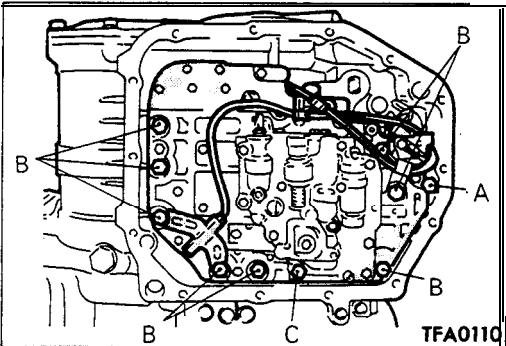
(62) Install the oil temperature sensor into the case.



(63) Fit the O-ring into the O-ring groove in the top surface of valve body assembly.



- (64) Replace the solenoid valve harness grommet O-ring with a new one.
 (65) Pass the solenoid valve connector into the hole in transaxle case from the inside.
 (66) Press the solenoid valve harness grommet into the case hole.

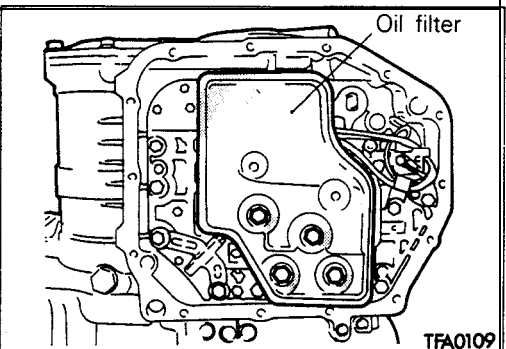


- (67) Fitting the detent plate pin into the groove in manual valve, temporarily secure the valve body. Then, install the oil temperature sensor and holder and tighten bolts to specification.

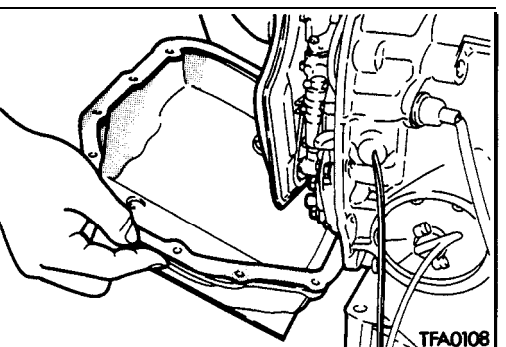
Bolt A = 18 mm (.71 in.)
Bolt B = 25 mm (.98 in.)
Bolt C = 40 mm (1.57 in.)

Caution

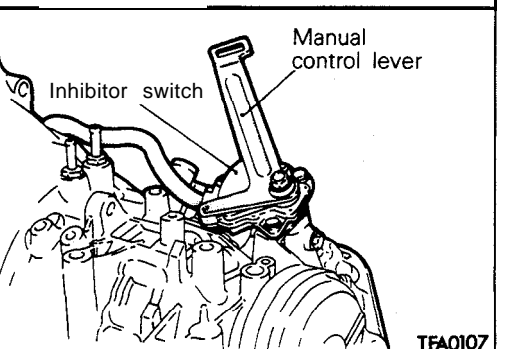
Secure the solenoid valve and oil temperature sensor harnesses as shown.



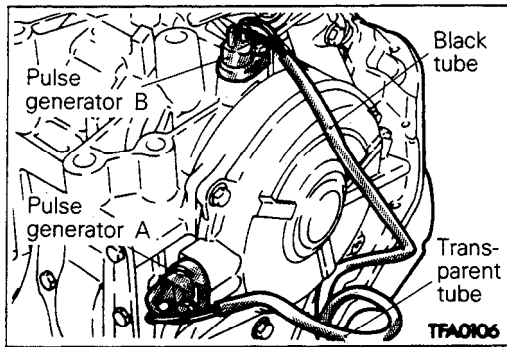
- (68) Install the oil screen.



- (69) Mount the magnet to oil pan and install the oil pan



- (70) Install the inhibitor switch and manual control lever.
 (71) Install the speedometer gear assembly.



(72) Install pulse generator A and B.

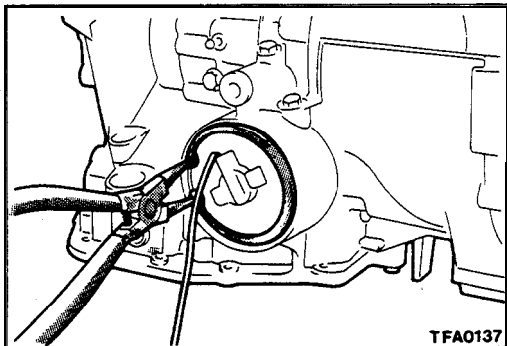
Caution

Install the black tube to the output gear side and transparent tube to end clutch side.

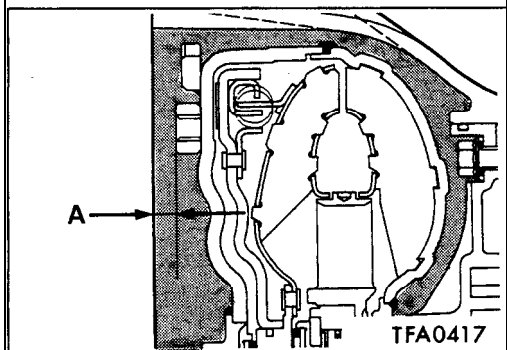
(73) Mount the oil filler tube and insert the level gauge.

(74) Install the brackets.

(75) Adjust the kickdown servo.



(76) Install the kickdown servo switch and secure it with the snap ring.



(77) Apply ATF to the oil pump drive hub, install the torque converter, and push converter into position so that dimension A is up to specification.

Standard value: Approx. 16.3 mm (.642 in.)

COMPONENT DISASSEMBLY/REASSEMBLY PRECAUTIONS

M23NEAB

GENERAL CLEANING PRECAUTIONS

- (1) Clean parts and blow the oil passages and oil holes with compressed air to check that they are not clogged.
- (2) For the cleaning solution, use the specified ATF or kerosene.
- (3) When drying parts with compressed air, use care not to allow ATF or kerosene to splash over your face.

PARTS HANDLING PRECAUTIONS

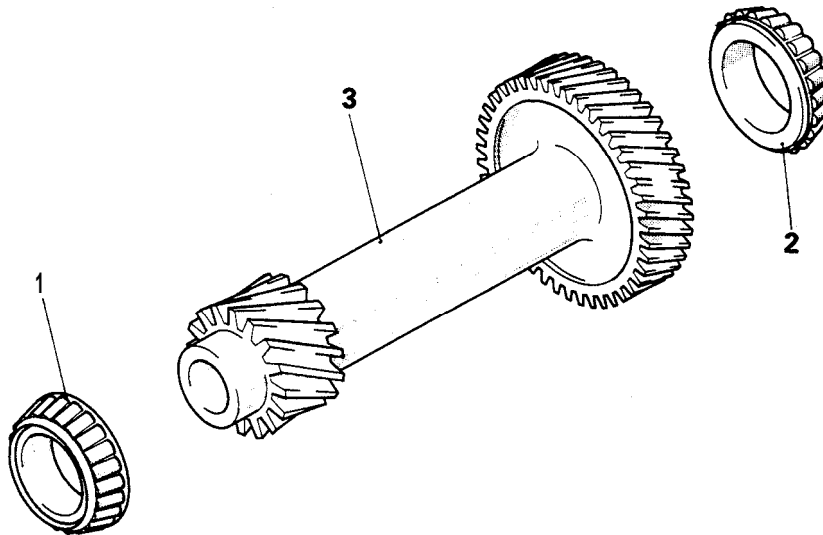
- (1) Keep parts after cleaning in good order to ensure correct inspection, repair, and reinstallation.
- (2) When disassembling the valve body, keep each valve with the mating spring.
- (3) Keep the new brake disc and clutch disc for replacement dipped in ATF for more than two hours.

GENERAL REASSEMBLY PRECAUTIONS

- (1) Coat the seal rings, clutch disc, clutch plate, and rotary and sliding surfaces with ATF before installation.
- (2) Replace all gaskets and O-rings with new parts. They should not be reused.
- (3) Use petrolatum to secure parts in position.

**TRANSFER SHAFT
DISASSEMBLY AND REASSEMBLY**

M23LMAE



Disassembly steps

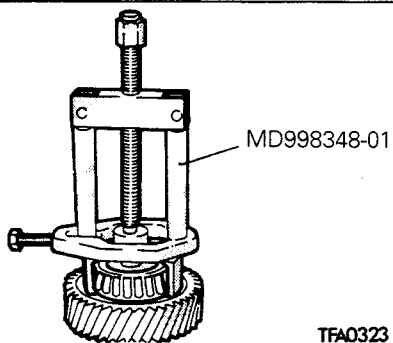
- ◆◆◆ 1. Bearing
- 2. Transfer shaft
- ◆◆ ● 4 3. Bearing

TFA0322

SERVICE POINTS OF DISASSEMBLY

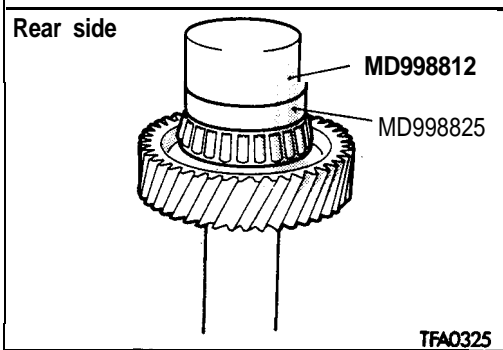
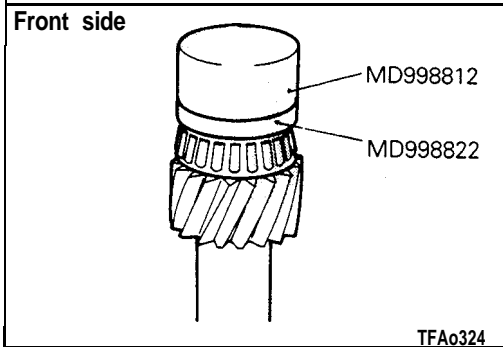
1. 3. REMOVAL OF BEARING

Using the special tool, remove bearings from both ends of the transfer shaft.



TFA0323

TSB Revision



SERVICE POINTS OF REASSEMBLY

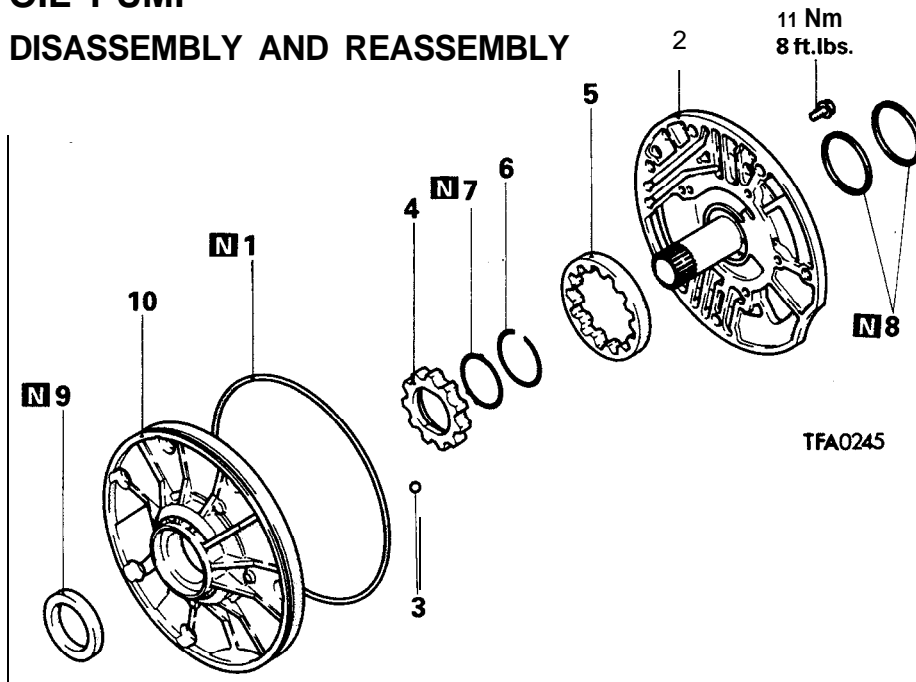
1. 3. INSTALLATION OF BEARING

Using the special tool, install the bearings to the transfer shaft.

OIL PUMP

DISASSEMBLY AND REASSEMBLY

M23LGAL



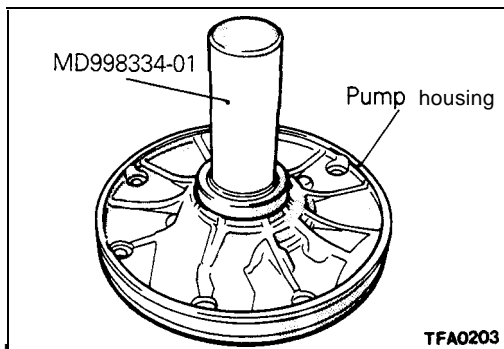
Disassembly steps

- ◆◆ 1. O-ring
- ◆◆ 2. Reaction shaft support
- * 3. Steel ball
- * + 4. Drive gear
- ◆◆ ● * 5. Driven gear
- 6. Snap ring
- 7. Oil seal
- 8. Seal ring
- 4 9. Oil seal
- 10. Oil pump housing

SERVICE. POINTS OF DISASSEMBLY

4. REMOVAL OF DRIVE GEAR / 5. DRIVEN GEAR

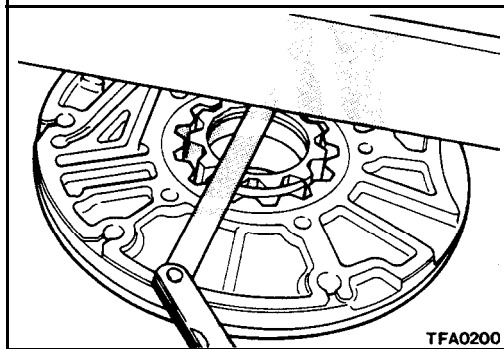
Make reassembly alignment marks on the drive and driven gears.



SERVICE POINTS OF REASSEMBLY

9. INSTALLATION OF OIL SEAL

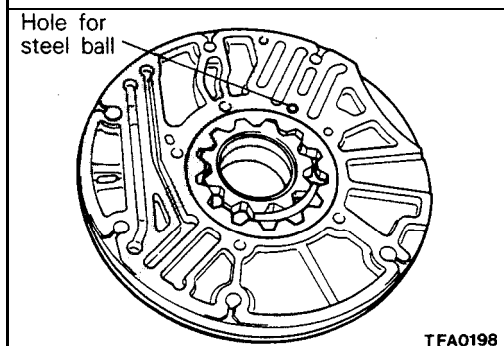
Using the special tool, install the oil seal to the pump housing.



5. MEASUREMENT SIDE CLEARANCE OF DRIVEN GEAR / 4. DRIVE GEAR

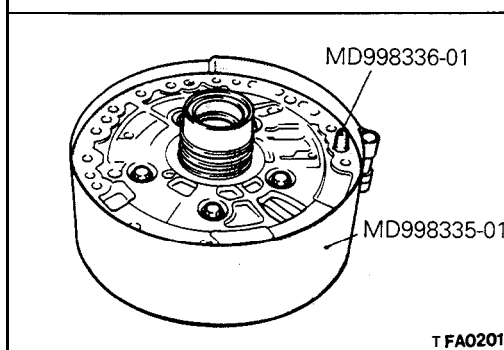
Measure the side clearance of the oil pump gear and, if the specification is exceeded, replace the gear or oil pump assembly.

Standard value: 0.03 – 0.05 mm (.001 – .002 in.)



3. LOCATION OF STEEL BALL

Install the steel ball at the location shown.



2. INSTALLATION OF REACTION SHAFT SUPPORT

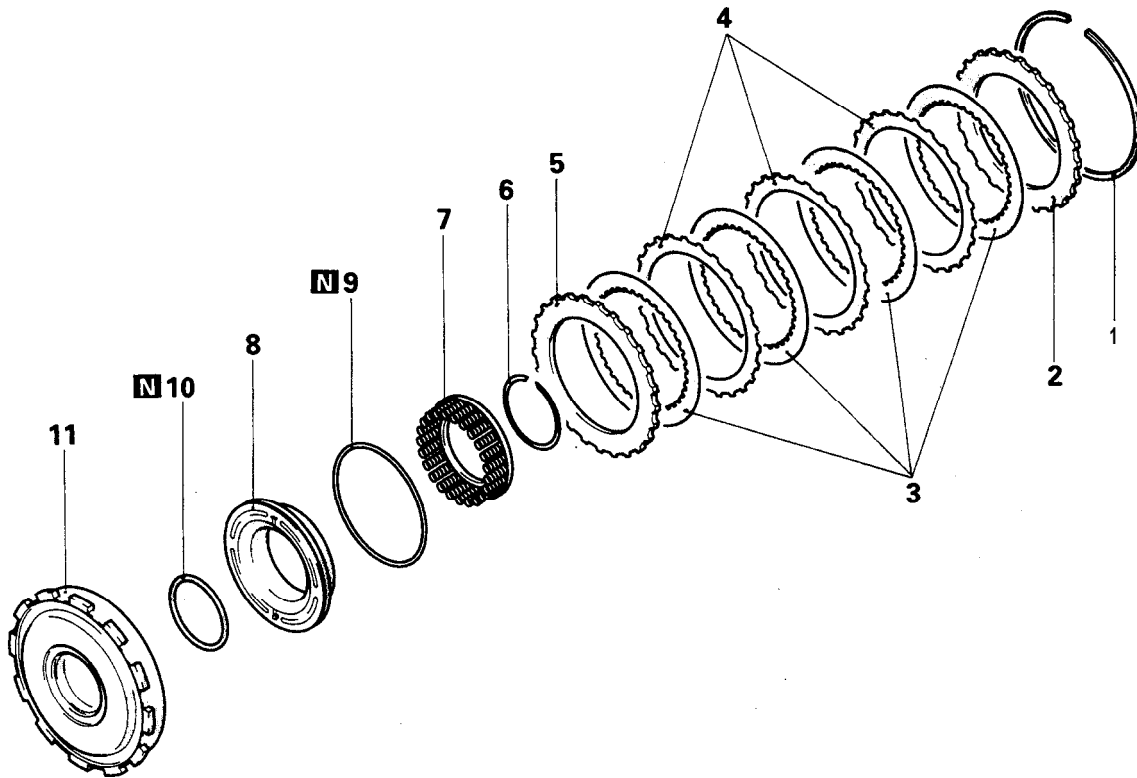
- (1) Assemble the reaction shaft support and the pump housing, and tighten the bolts by fingers.
- (2) Insert the special tool (Guide Pin, MD998336-01) into the oil pump mounting bolt hole and clamp the periphery with the special tool (Band, MD998335-01) to position the support and housing.
- (3) Tighten the five bolts to the specified torque.
- (4) Make sure that the oil pump gear turns freely.

1. INSTALLATION OF O-RING

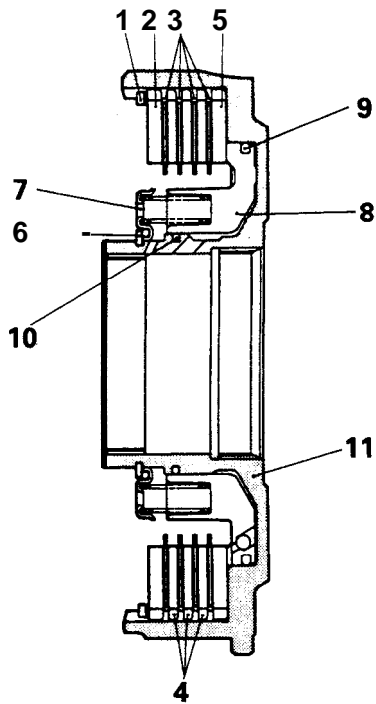
Install a new O-ring in the groove of the pump housing and apply petrolatum jelly to the O-ring.

**FRONT CLUTCH ASSEMBLY
DISASSEMBLY AND REASSEMBLY**

MWLHAH



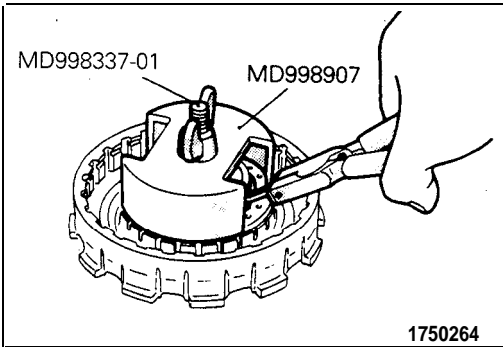
TFA0422



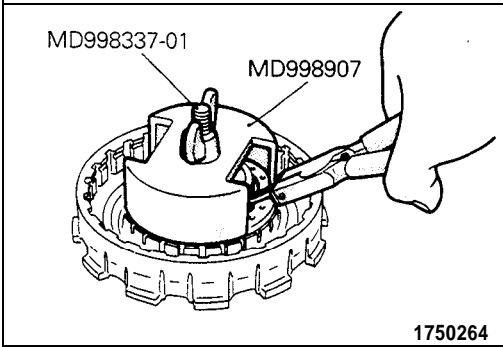
- a 1. Snap ring
- a 2. Clutch reaction plate
- * 3. Clutch plate
- * 4. Clutch disc
- * 5. Clutch pressure plate
- * * 6. Snap ring
- * * 7. Return spring
- * * 8. Front clutch piston
- * * 9. D-ring
- * * 10. D-ring
- * * 11. Front clutch retainer

TFA0423

TSB Revision

**SERVICE POINT OF DISASSEMBLY****6. REMOVAL OF SNAP RING**

- (1) Compress the return spring with the special tool.
- (2) Remove the snap ring.

**SERVICE POINTS OF REASSEMBLY****6. INSTALLATION OF SNAP RING**

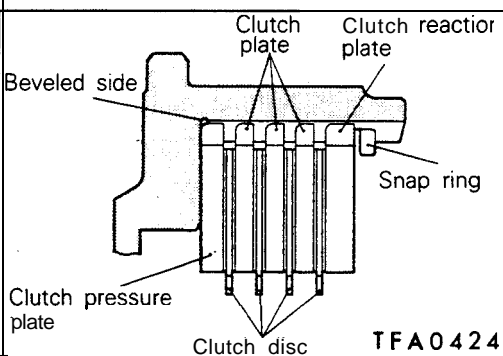
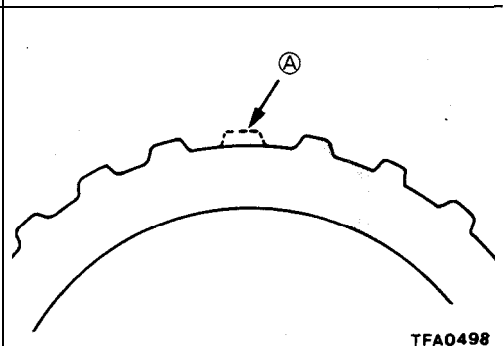
- (1) Compress the return spring with the special tool.
- (2) Install the snap ring.

5. INSTALLATION OF CLUTCH PRESSURE PLATE / 3. CLUTCH PLATE / 2. CLUTCH REACTION PLATE

- (1) When installing the clutch pressure plate, clutch plate, and clutch reaction plate, align the areas where one tooth is missing [indicated by **A**].

N O T E

This ensures that the automatic transmission fluid escapes well and the plate and disc are cooled efficiently.

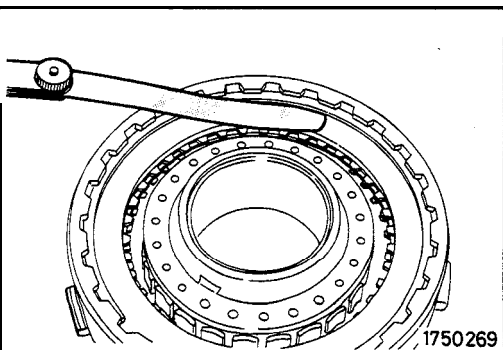


- (2) Install the plates so that the shear droop side of each plate is located as shown.
- (3) Make sure that the thickest plate (clutch reaction plate) is located on the snap ring side.

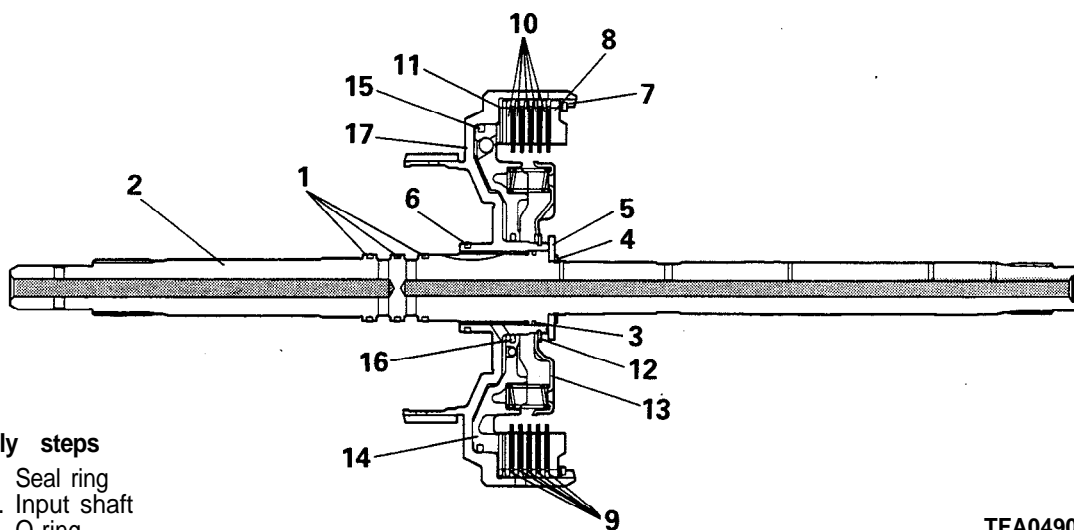
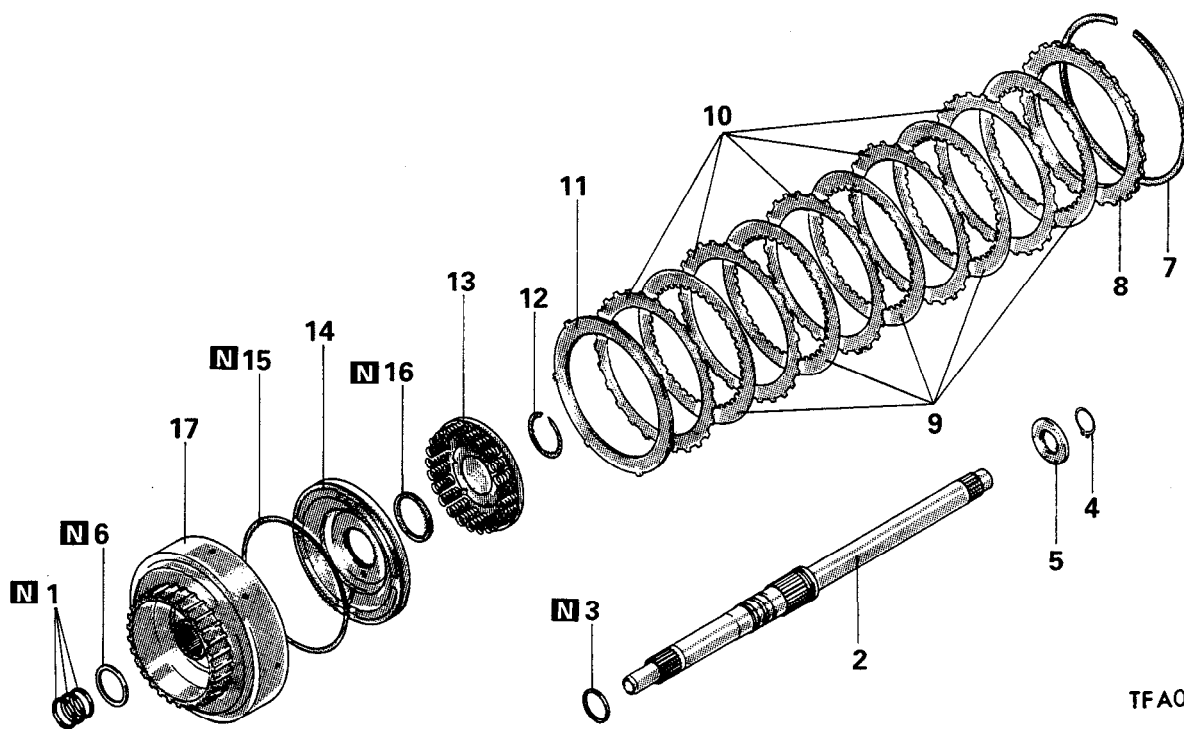
1. SELECTION OF SNAP RING

- (1) Check clearance between the snap ring and clutch reaction plate. To check the clearance, hold entire circumference of the clutch reaction plate down with 50 N (11 lbs.) force. If clearance is out of standard value, select a snap ring to obtain the standard value.

Standard value: 0.8 – 1.0 mm (.032 – .039 in.)

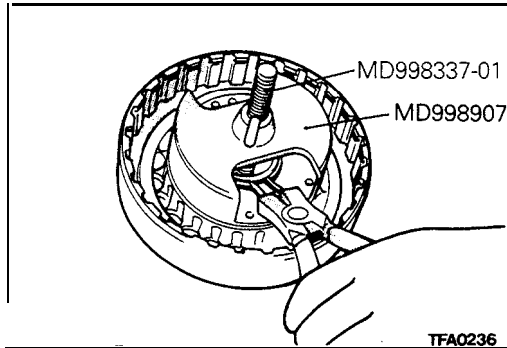


**REAR CLUTCH ASSEMBLY
DISASSEMBLY AND REASSEMBLY**

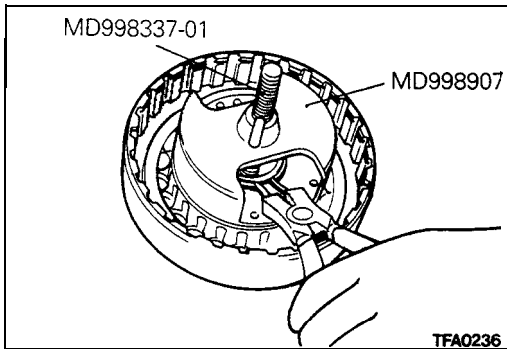


Disassembly steps

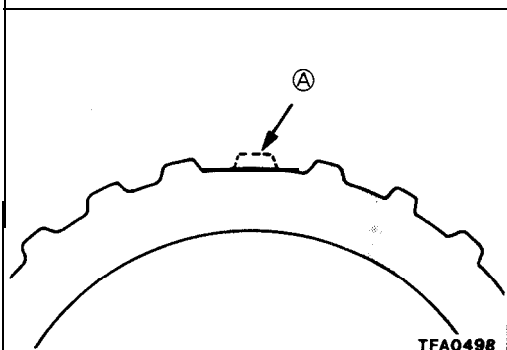
- 1. Seal ring
- + 2. Input shaft
- 3. O-ring
- 4. Snap ring
- 5. Thrust race
- 6. Seal ring
- * 7. Snap ring
- ◆◆ 8. Clutch reaction plate
- 9. Clutch disc
- + 10. Clutch plate
- 11. Wave spring
- ◆◆ • a 12. Snap ring
- 13. Return spring
- 14. Rear clutch piston
- 15. D-ring
- 16. D-ring
- 17. Rear clutch retainer

**SERVICE POINT OF DISASSEMBLY****12. REMOVAL OF SNAP RING**

- (1) Using the special tool, compress the return spring.
- (2) Using the snap ring pliers, remove the snap ring.

**SERVICE POINTS OF REASSEMBLY****12. INSTALLATION OF SNAP RING**

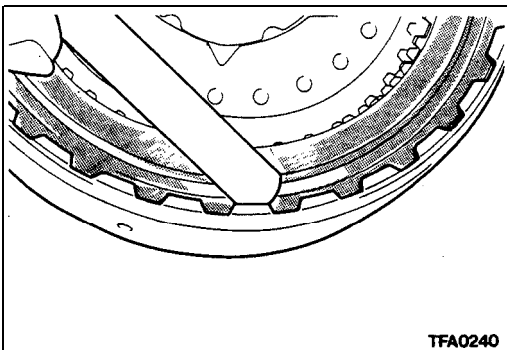
- (1) Using the special tool, compress the return spring.
- (2) Using the snap ring pliers, install the snap ring.

**10. INSTALLATION OF CLUTCH PLATE / 8. CLUTCH REACTION PLATE**

Install the clutch plate and reaction plate so that the areas where one tooth is missing [indicated by (A)] are aligned with each other.

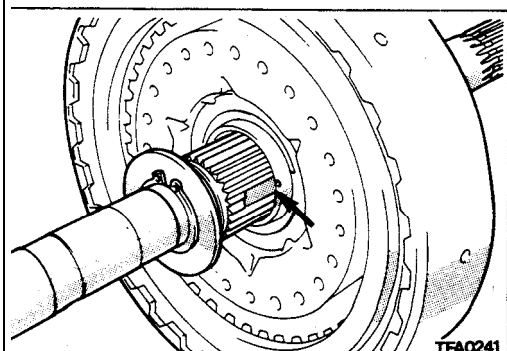
NOTE

This ensures that the automatic transmission fluid escapes well and the plate and disc are cooled efficiently.

**7. SELECTION OF SNAP RING**

Check clearance between the snap ring and clutch reaction plate. To check the clearance, hold entire circumference of the clutch reaction plate down with 50 N (11 lbs.) force. If clearance is out of standard value, select a snap ring to obtain the standard value.

Standard value: 1.0 – 1.2 mm (.034 – .047 in.)

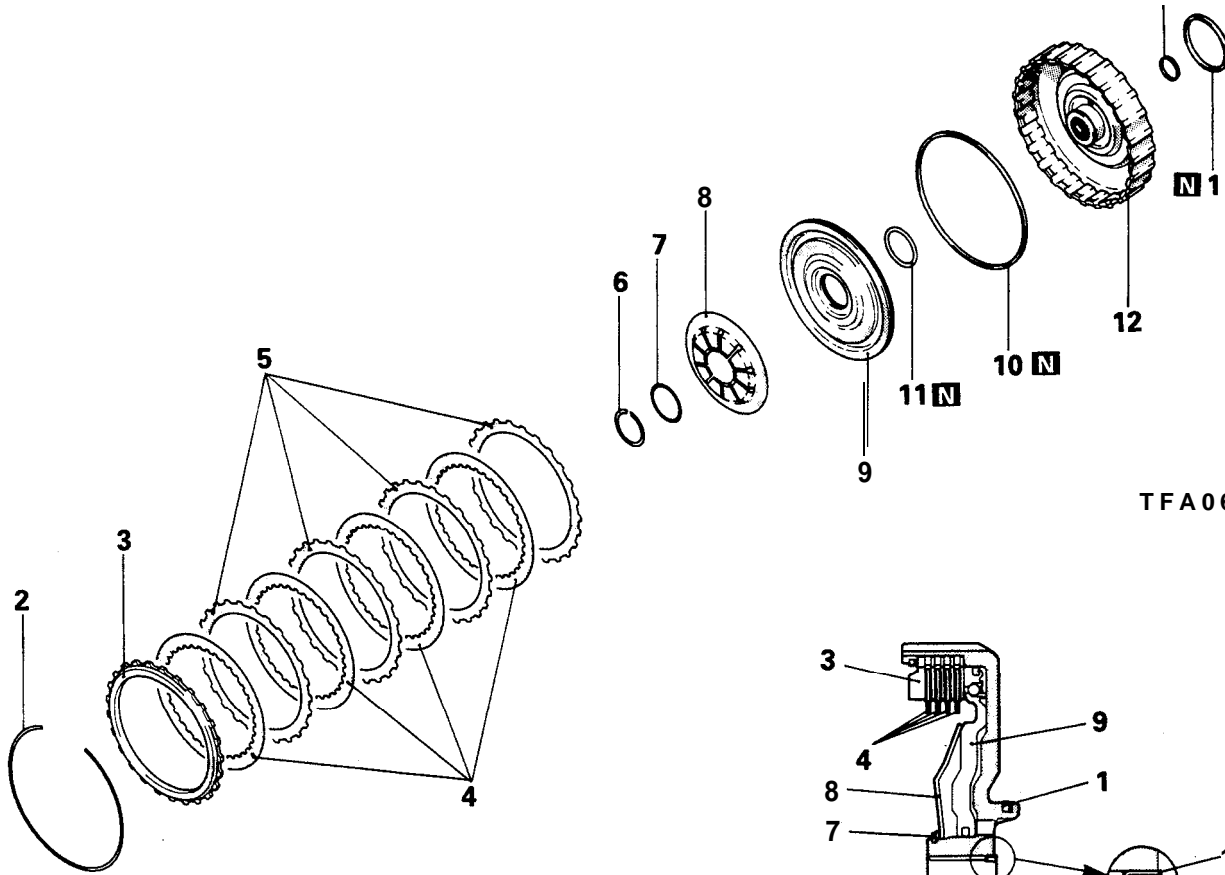
**2. INSTALLATION OF INPUT SHAFT**

Align the oil groove in the input shaft with the alignment mark on the rear clutch retainer.

**END CLUTCH ASSEMBLY
DISASSEMBLY AND REASSEMBLY**

M23LHFF

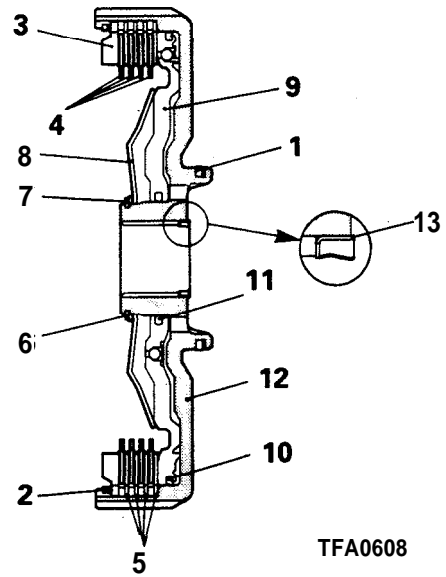
N 13



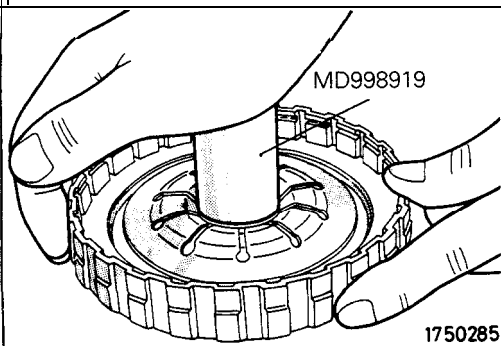
TFA0607

Disassembly steps

1. Seal ring
- ◆◆ 2. Snap ring
3. Clutch reaction plate
4. Clutch disc
5. Clutch plate
- 6. Snap ring
7. Washer
8. Return spring
9. End clutch piston
10. Oil seal
11. D-ring
12. End clutch retainer
13. Oil seal



TFA0608



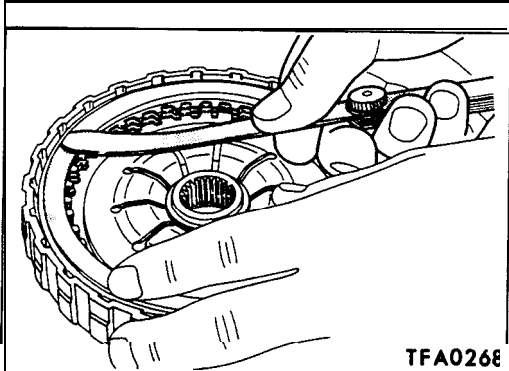
SERVICE POINTS OF REASSEMBLY

6. INSTALLATION OF SNAP RING

Using the special tool, fit the snap ring.

Caution

Make sure that the snap ring is fitted in position in the groove.

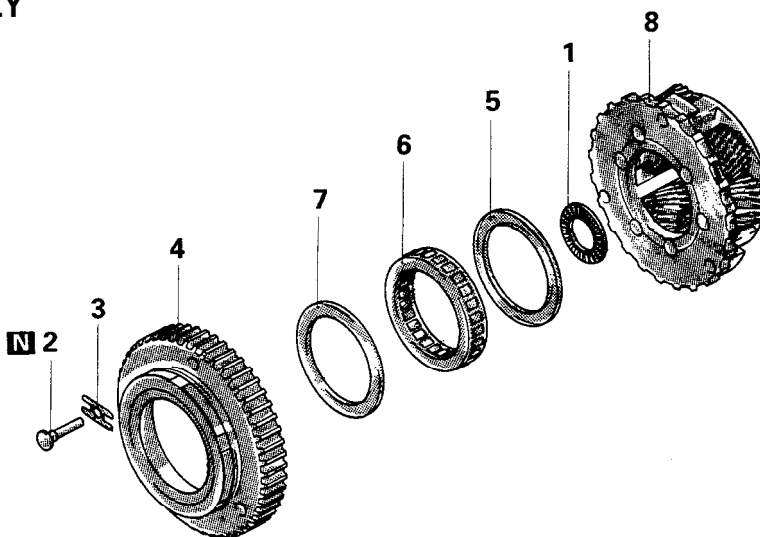


2. SELECTION OF SNAP RING

After the snap ring has been installed, check to see if the clearance between the snap ring and clutch reaction plate is up to specification. When measuring the clearance, press the entire periphery of the clutch reaction plate with a force of 50 N (11 lbs.). If the clearance is out of specification, reselect the snap ring to obtain the specified clearance.
Standard value: 0.6 – 0.85 mm (0.24 – 0.33 in.)

**PLANETARY GEAR
 DISASSEMBLY AND REASSEMBLY**

M23LKAL



Disassembly steps

- 1. Thrust bearing
- ← 2. Rivet
- 3. Waved washer
- 4. One-way clutch outer race
- 5. End plate
- 6. One-way clutch
- 7. End plate
- 8. Planet carrier

TFA0491

SERVICE POINT OF DISASSEMBLY

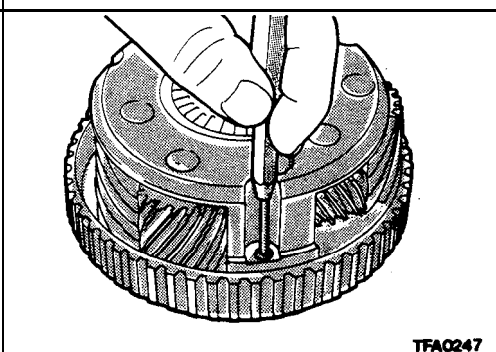
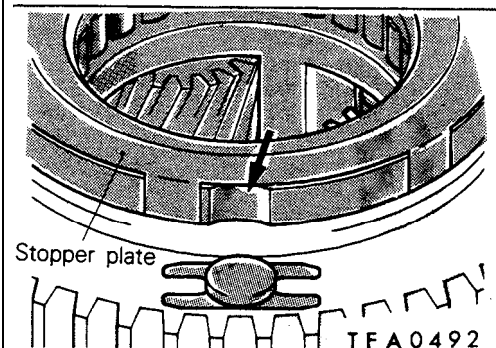
2. REMOVAL OF RIVET

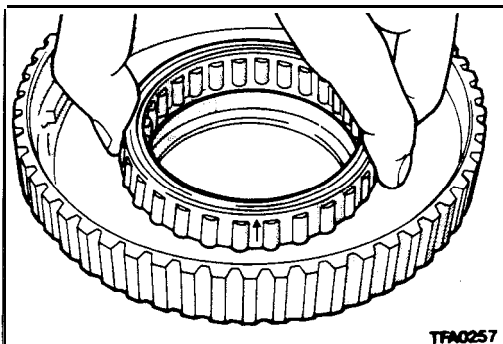
- (1) Shift the stopper plate to ensure that the rivet head does not hit it.

NOTE

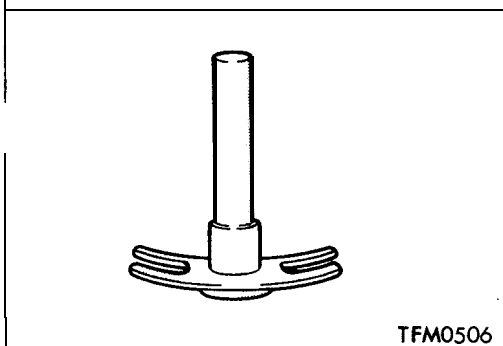
Make sure that the stopper plate claw is not located at the groove in the one-way clutch outer race.

- (2) Using a pin punch, drive out the rivet.

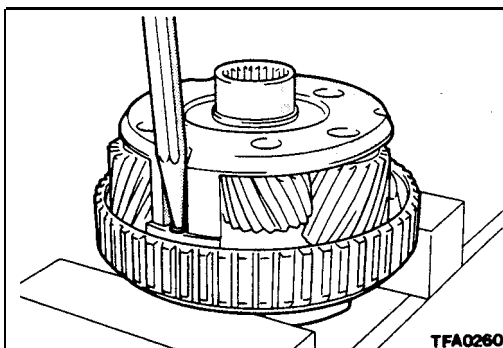


**SERVICE POINTS OF REASSEMBLY****6. INSTALLATION OF ONE-WAY CLUTCH**

Push the one-way clutch into position so that the arrow on its gauge points at a direction as shown.

**3. INSTALLATION OF WAVED WASHER**

Install the waved washer to the rivet so that its indentation is placed on the outer race side.

**2. INSTALLATION OF RIVET**

Stake the rivet using a punch and press.

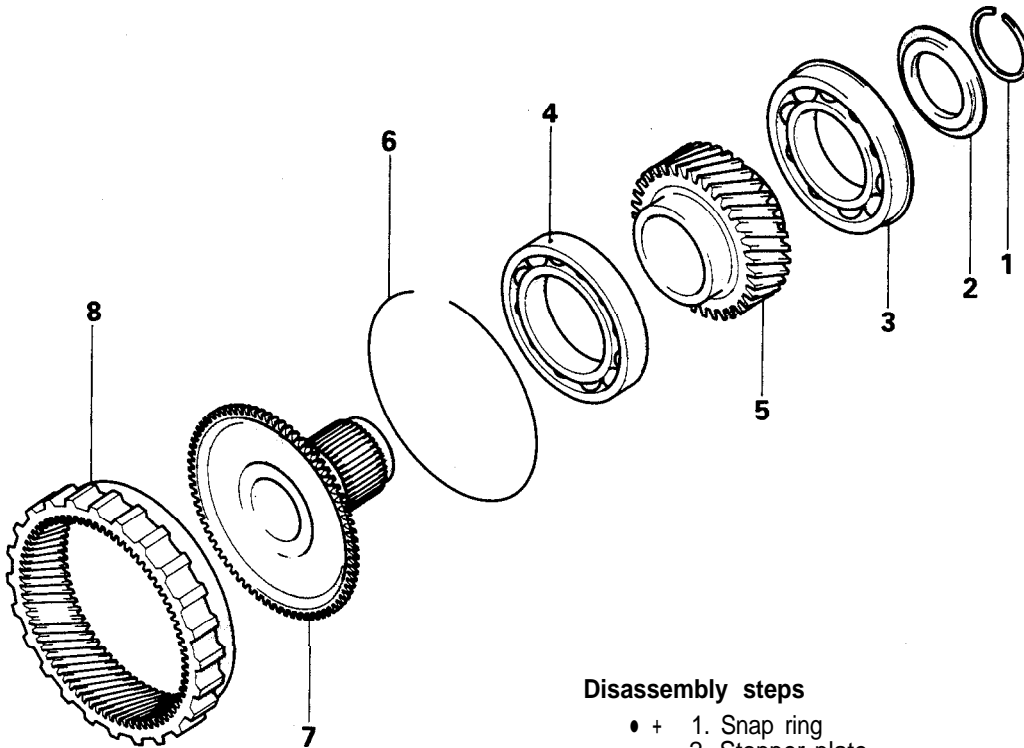
NOTE

- (1) Use a punch with a 60° tip angle.
- (2) Stake the rivet with a load of 11,000 – 13,000 N (2,425 – 2,866 lbs.).

ANNULUS GEAR AND TRANSFER DRIVE GEAR SET

M23LLAG

DISASSEMBLY AND REASSEMBLY



TFA0262

Disassembly steps

- + 1. Snap ring
- 2. Stopper plate
- * ◆◆ 3. Bearing
- ◆◆◆◆ 4. Bearing
- ◆◆◆◆ 5. Transferdrivegear
- 6. Snap ring
- 7. Output flange
- 8. Annulus gear

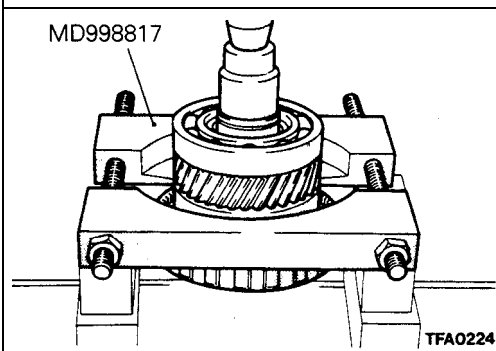
SERVICE POINTS OF DISASSEMBLY

3. 4. REMOVAL OF BEARING / 5. TRANSFER DRIVE GEAR

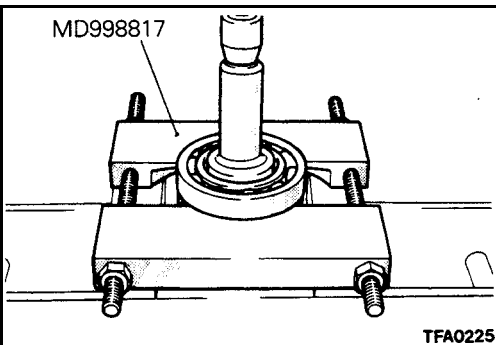
- (1) Using the special tool, remove the transfer drive gear together with two bearings from the output flange.

Caution

Install the special tool in position between the output flange and bearings.



TFA0224



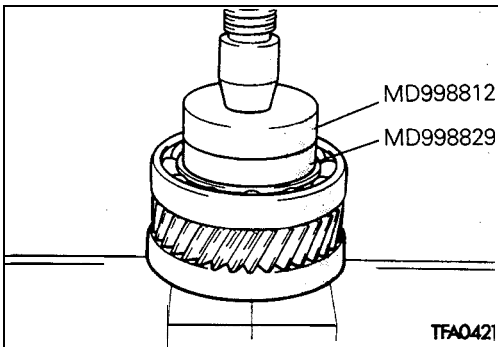
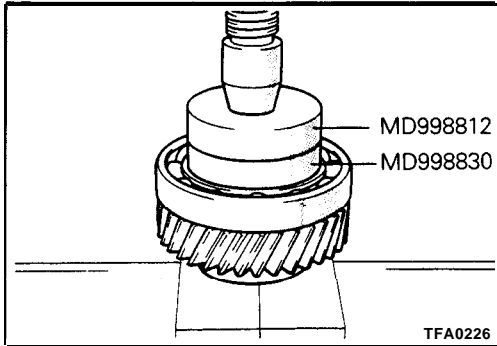
TFA0225

- (2) Using the special tool, remove the bearings from both sides of the transfer drive gear.

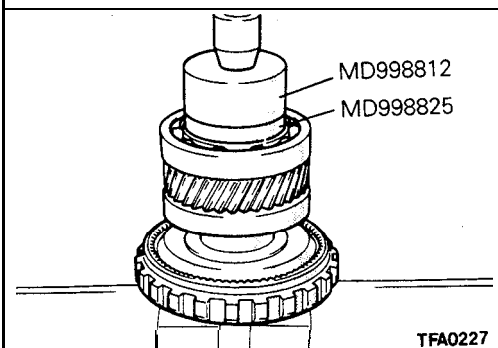
TSB Revision

SERVICE POINTS OF REASSEMBLY**5. INSTALLATION OF TRANSFER DRIVE GEAR / 4. 3. BEARING**

- (1) Using the special tool, press-fit the bearings into both sides of the transfer drive gear.

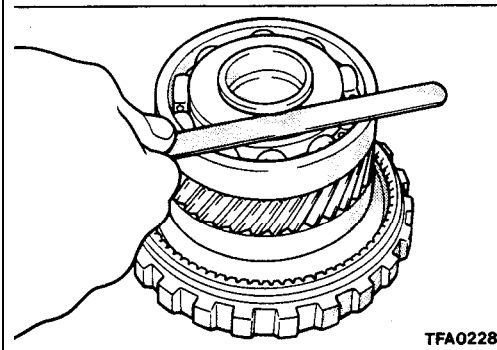


- (2) Using the special tool, install the transfer drive gear to the output flange.

**1.. SELECTION. OF SNAP RING**

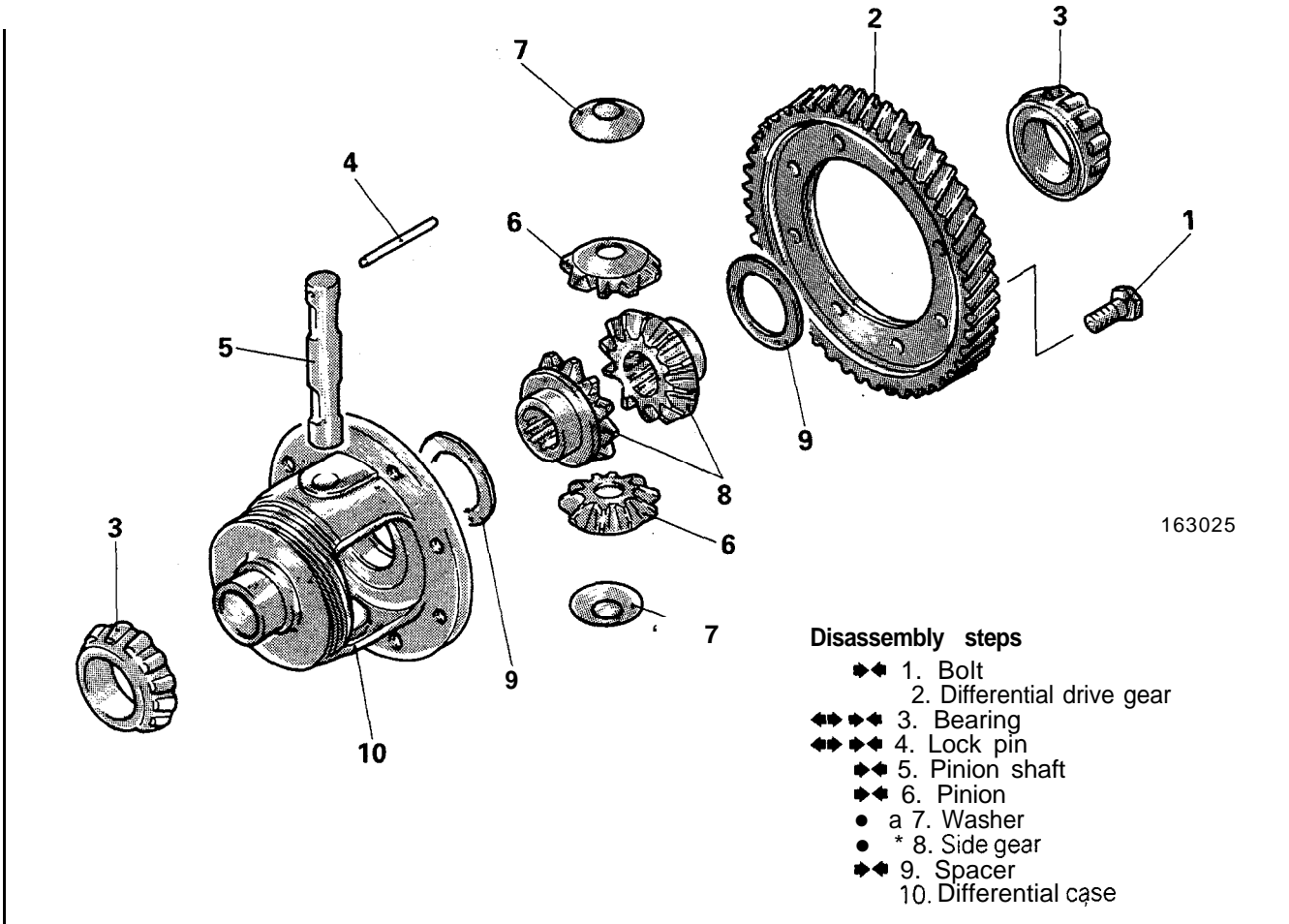
Measure the snap ring groove clearance and select the appropriate spacer to obtain the specified end play.

Standard value: 0 – 0.09 mm (0 – .0035 in.)



DIFFERENTIAL

DISASSEMBLY AND REASSEMBLY



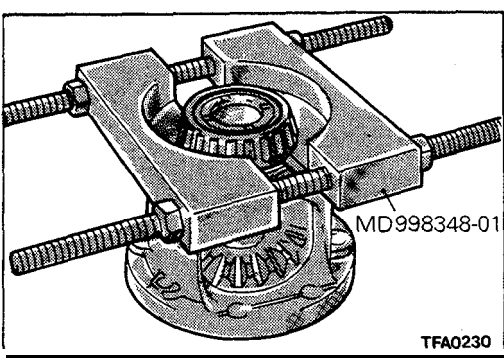
163025

- Disassembly steps**
- ◆◆ 1. Bolt
 - ◆◆ 2. Differential drive gear
 - ◆◆◆◆ 3. Bearing
 - ◆◆◆◆ 4. Lock pin
 - ◆◆◆ 5. Pinion shaft
 - ◆◆ 6. Pinion
 - a 7. Washer
 - * 8. Side gear
 - ◆◆ 9. Spacer
 - ◆◆ 10. Differential case

SERVICE POINTS OF DISASSEMBLY

3. REMOVAL OF BEARING

Using the special tool; remove the bearing.

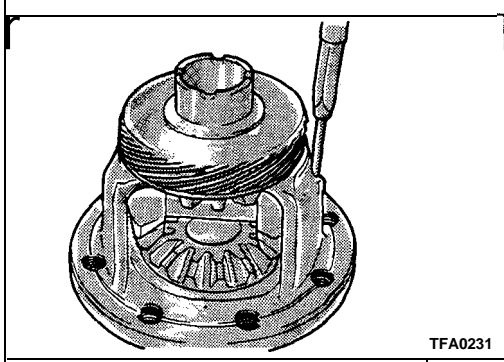


TFA0230

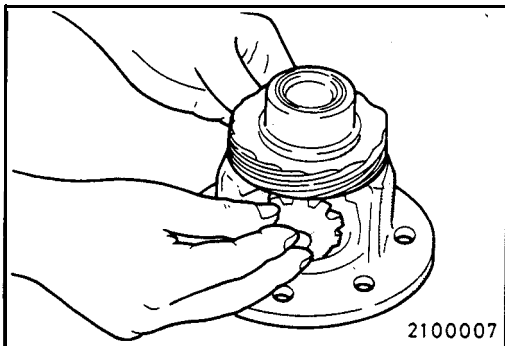
4. REMOVAL OF LOCK PIN

Using a pin punch, drive out the lock pin.

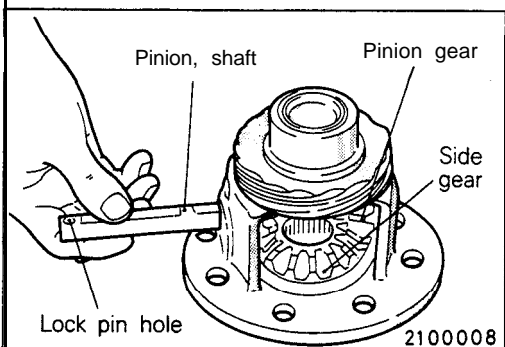
NOTE
The lock pin can be easily driven out.



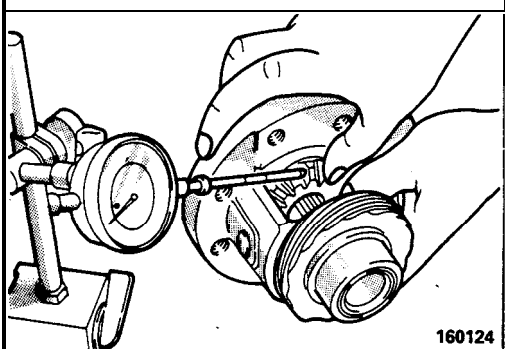
TFA0231

**SERVICE POINTS OF DISASSEMBLY****9. INSTALLATION OF SPACER / 8. SIDE GEAR / 7. WASHER / 6. PINION / 5. PINION SHAFT**

- (1) Fit the spacer to the back face of the side gear, then install the gear into the differential case.
- (2) Fit washer to back of pinion and rotate two pinions at the same time into position to mesh with the side gear.



- (3) Insert the pinion shaft



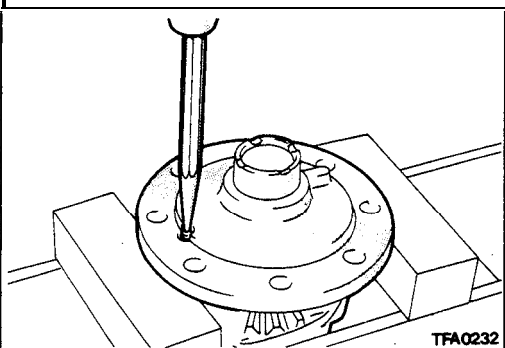
- (4) Measure the backlash between the side gear and pinion.

Standard value: 0.025 – 0.150 mm (.001 – .0059 in.)

- (5) If the backlash is out of specification, select the appropriate spacer and disassemble and reassemble the gears as necessary.

NOTE

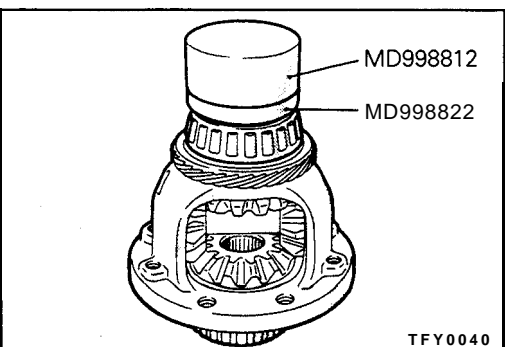
Adjust so that the backlash in both side gears equals.

**4. INSTALLATION OF LOCK PIN**

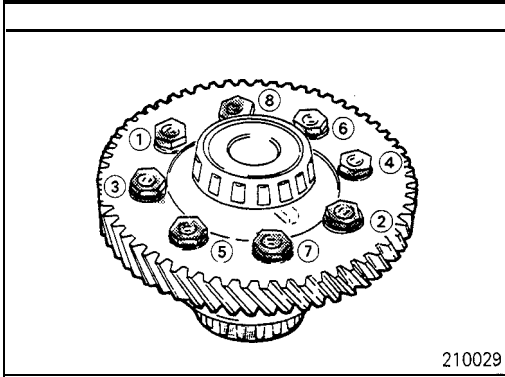
Align the lock pin hole in pinion shaft with that in the case and install the lock pin.

Cautipn

The lock pin should be lower than the differential case flange surface.

**3. INSTALLATION OF BEARING**

Using the special tool, press-fit the bearings into both sides of the differential case.



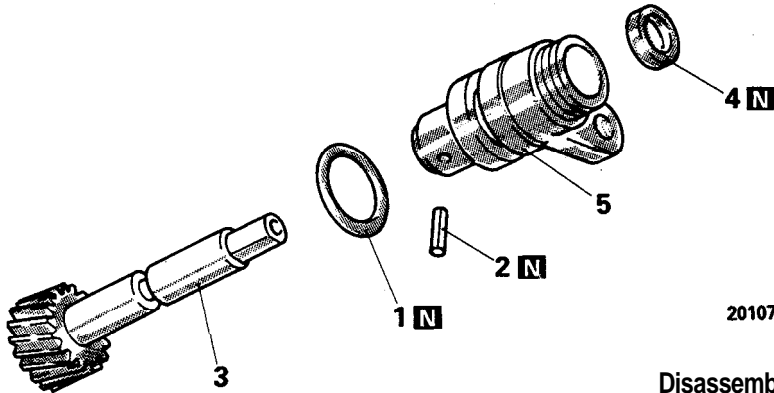
210029

1. INSTALLATION OF BOLTS

Coat the differential drive gear bolts with ATF and tighten them to specification in the numerical order shown.

SPEEDOMETER DRIVEN GEAR ASSEMBLY DISASSEMBLY AND REASSEMBLY

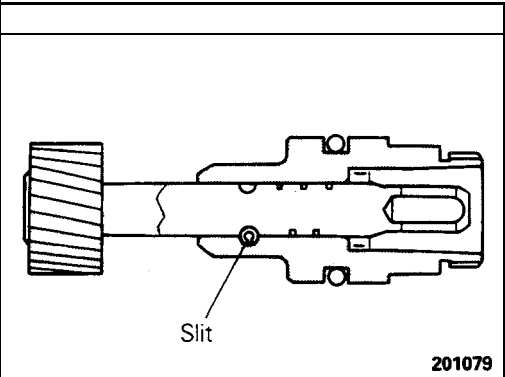
M23LQAF



201078

Disassembly steps

- 1. O-ring
- * 2. Spring pin
- * 3. Speedometer driven gear
- 4. Oil seal
- 5. Sleeve



201079

SERVICE POINTS OF REASSEMBLY

3. INSTALLATION OF SPEEDOMETER DRIVEN GEAR

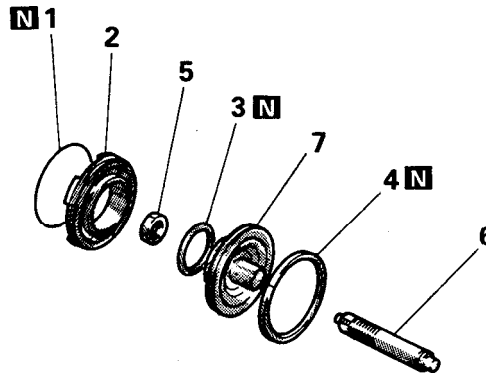
Apply gear oil sparingly to the speedometer driven gear shaft and insert the shaft.

2. INSTALLATION OF SPRING PIN

Install the spring pin in such a way that its slit does not face the gear shaft.

**KICKDOWN SERVO
DISASSEMBLY AND REASSEMBLY**

M23LPAF



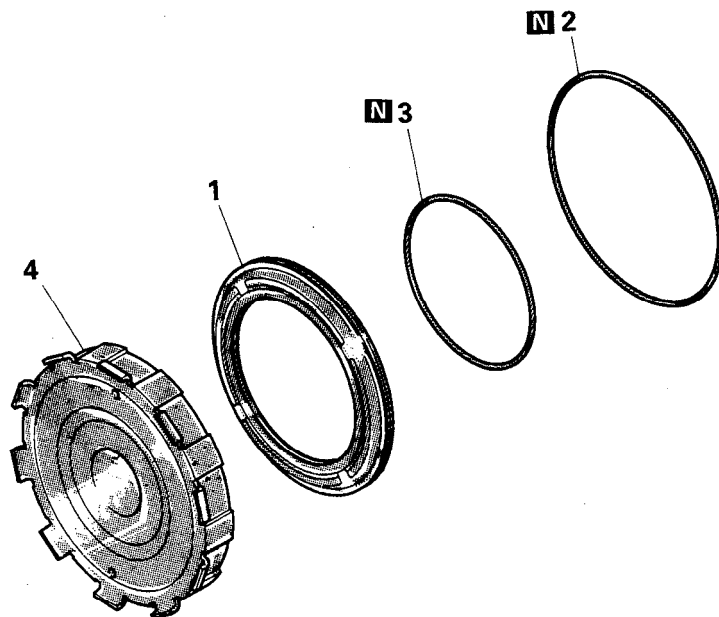
Disassembly steps

1. O-ring
2. Kickdown servo
3. D-ring
4. Seal ring
5. Lock nut
6. Kickdown servo rod
7. Kickdown servo piston

1750299

**LOW-REVERSE BRAKE
DISASSEMBLY AND REASSEMBLY**

M23LJAF



Disassembly steps

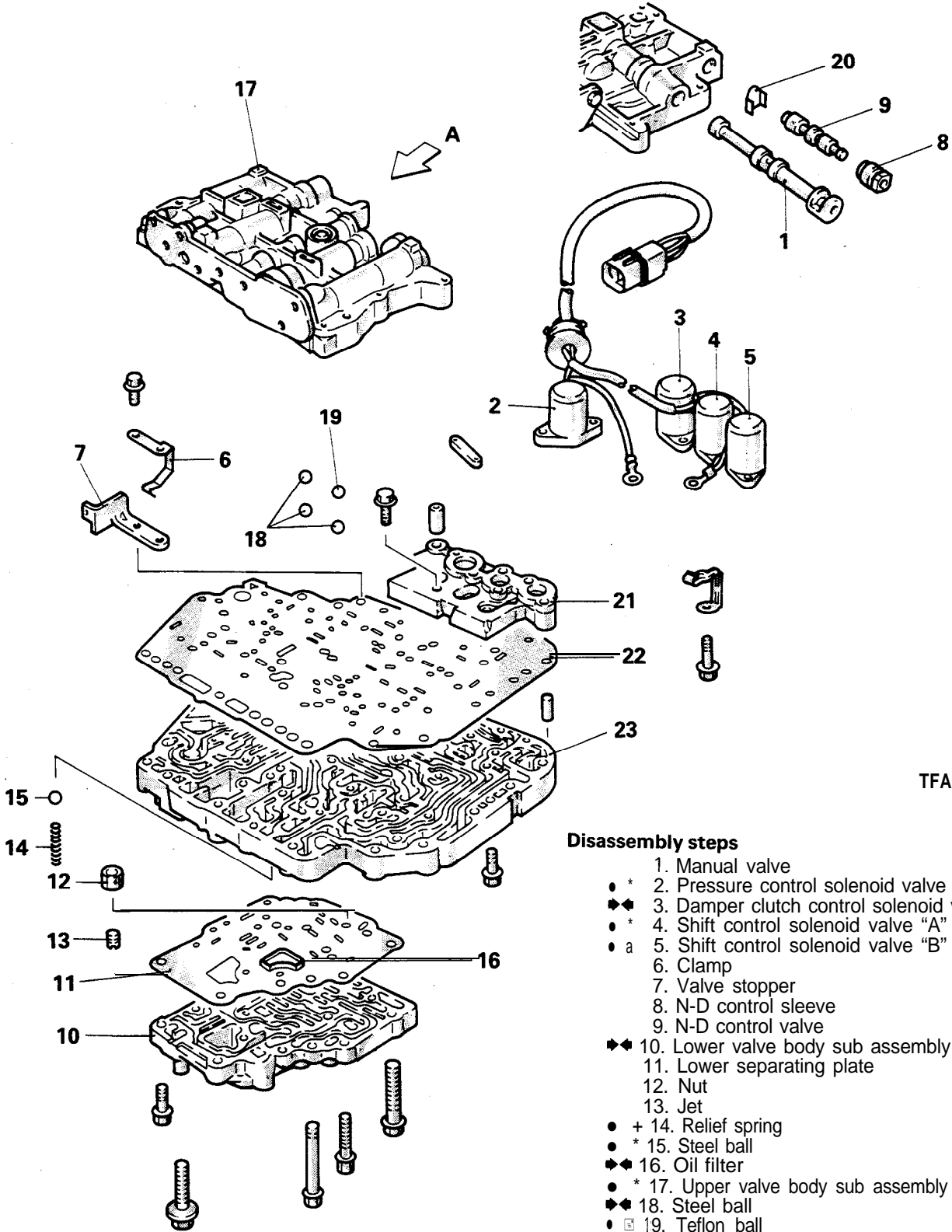
1. Low-reverse brake piston
2. D-ring
3. D-ring
4. Center support

TFA0386

VALVE BODY

DISASSEMBLY AND REASSEMBLY

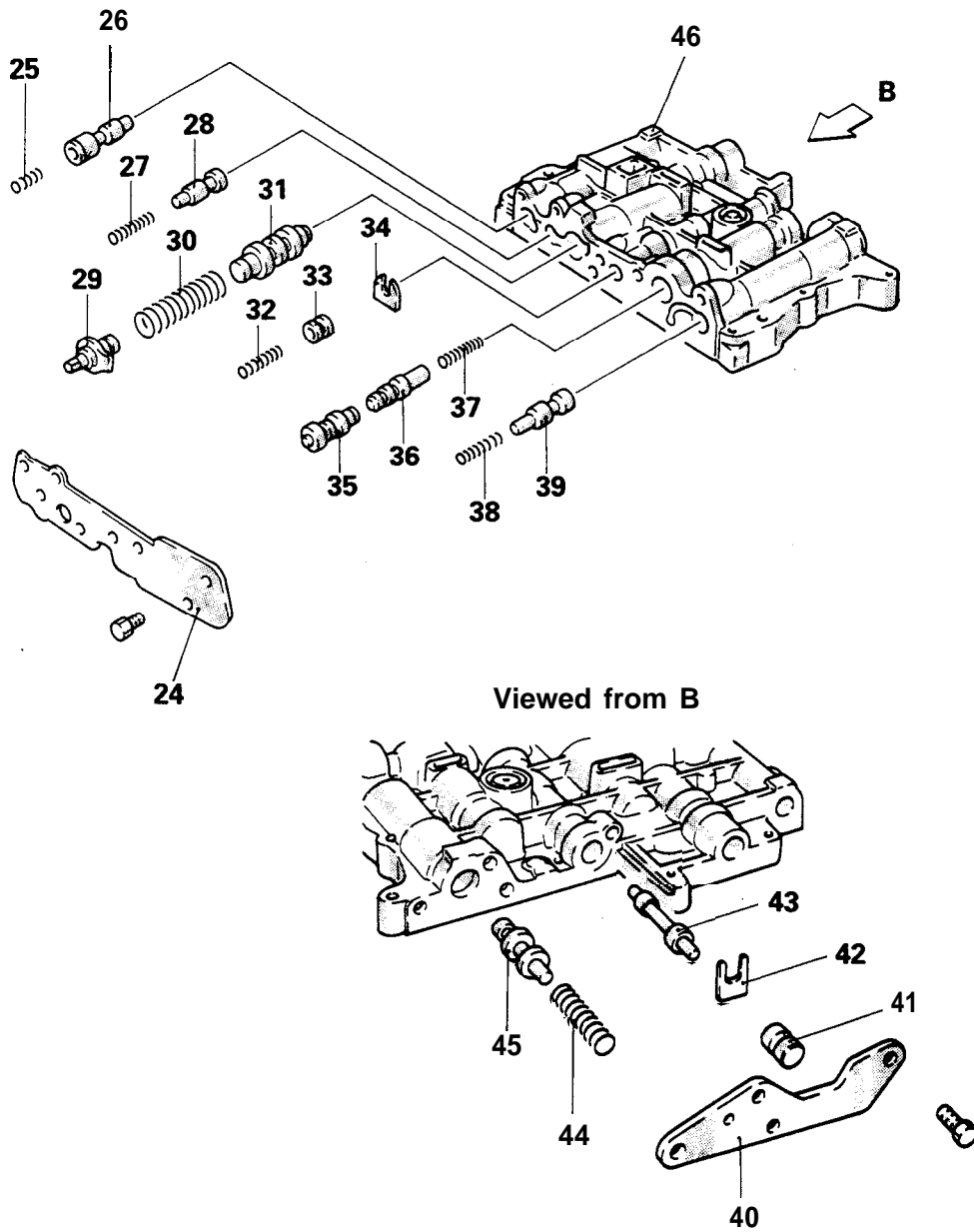
Viewed from A



TFA0523

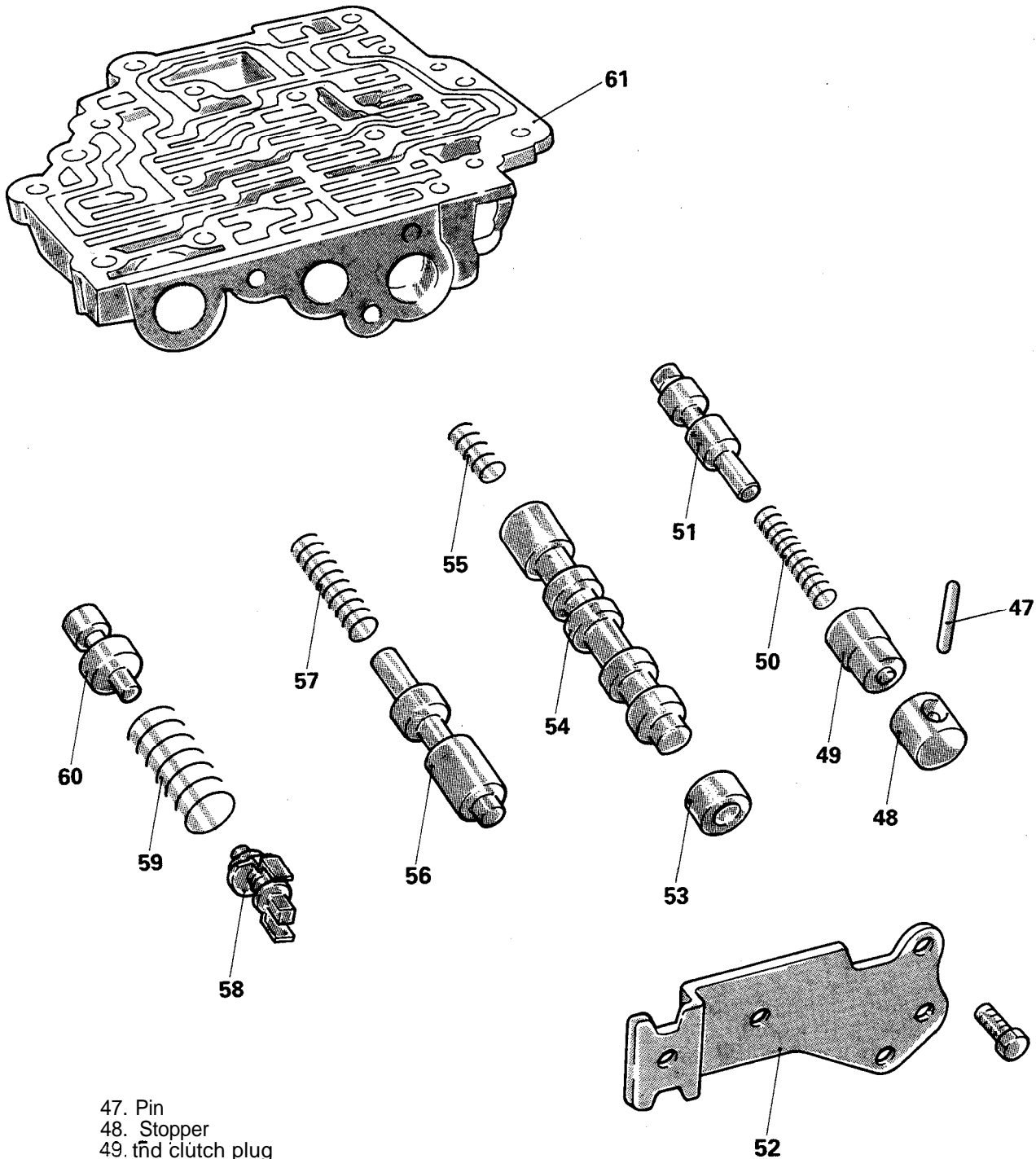
Disassembly steps

1. Manual valve
- * 2. Pressure control solenoid valve
- ◆◆ 3. Damper clutch control solenoid valve
- * 4. Shift control solenoid valve "A"
- a 5. Shift control solenoid valve "B"
6. Clamp
7. Valve stopper
8. N-D control sleeve
9. N-D control valve
- ◆◆ 10. Lower valve body sub assembly
11. Lower separating plate
12. Nut
13. Jet
- + 14. Relief spring
- * 15. Steel ball
- ◆◆ 16. Oil filter
- * 17. Upper valve body sub assembly
- ◆◆ 18. Steel ball
- □ 19. Teflon ball
- ** 20. N-D plate
21. Block
22. Upper separating plate
23. Intermediate plate



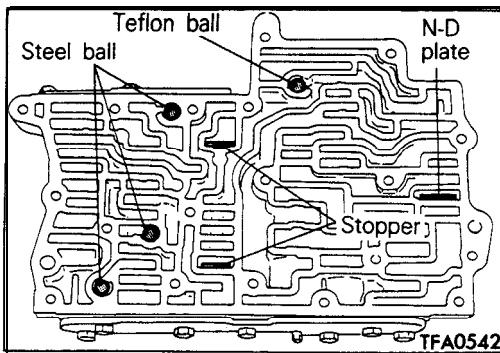
- 24. Front end cover
- 25. Pressure control spring
- 26. Pressure control valve
- 27. Torque converter control spring
- 28. Torque converter control valve
- 29. Adjusting screw
- 30. Regulator spring
- 31. Regulator valve
- 32. Shift control spring
- + 33. Stopper plate
- 34. Shift control plug
- 35. Rear clutch exhaust valve A
- 36. Rear clutch exhaust valve B
- 37. Rear clutch exhaust spring
- 38. 2-3/4-3 shift spring
- 39. 2-3/4-3 shift valve
- 40. Rear end cover
- 41. Shift control plug B
- * 42. Stopper plate
- 43. Shift control valve
- 44. 1-2 shift spring
- 45. 1-2 shift valve
- 46. Upper valve body

TFA0518



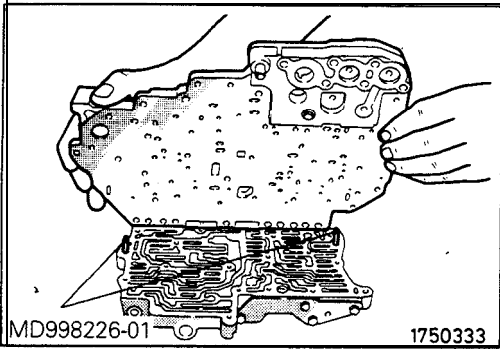
- 47. Pin
- 48. Stopper
- 49. End clutch plug
- 50. End clutch spring
- 51. End clutch valve
- 52. End cover
- 53. Damper clutch control sleeve
- 54. Damper clutch control valve
- 55. Damper clutch control spring
- 56. N-R control valve
- 57. N-R control spring
- 58. Adjusting screw
- 59. Reducing spring
- 60. Reducing valve
- 61. Lower valve body

T F A 0 5 4 1



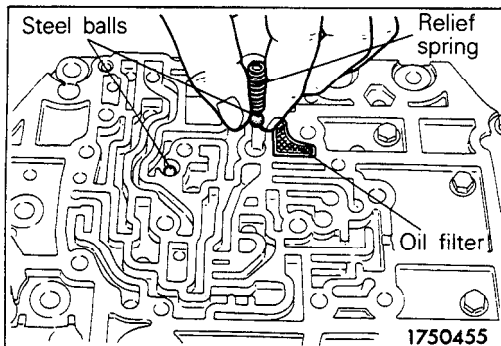
42.33. LOCATION OF STOPPER PLATE / 20. N-D PLATE / 19. TEFLON BALL / 18. STEEL BALL

Install the stopper plates, N-D plate, teflon ball, and steel balls into the upper valve body as shown.



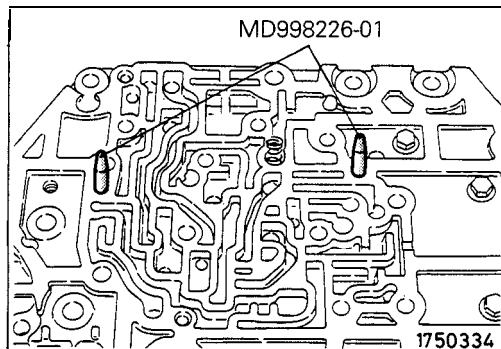
17. INSTALLATION OF UPPER VALVE BODY SUB ASSEMBLY

Install the special tool and secure the upper separating plate and intermediate plate with eight mounting bolts. Then, remove the special tool.



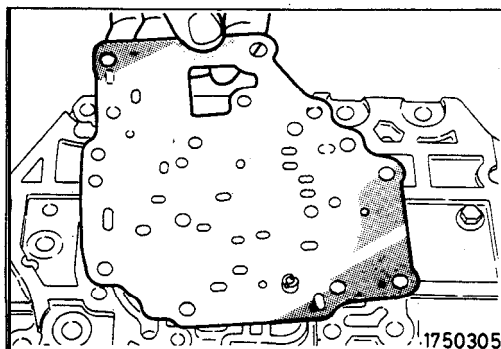
16. INSTALLATION OF OIL FILTER / 15. STEEL BALL / 14. RELIEF SPRING

Install the oil filter, two steel balls, and spring to the intermediate plate.

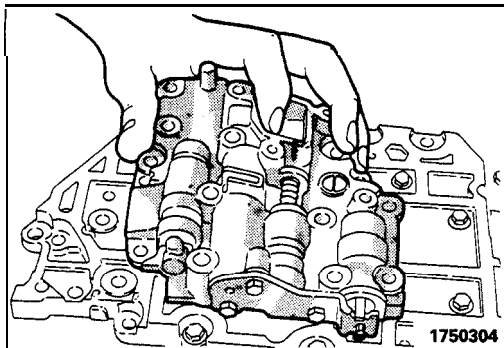


10. INSTALLATION OF LOWER VALVE BODY SUB ASSEMBLY

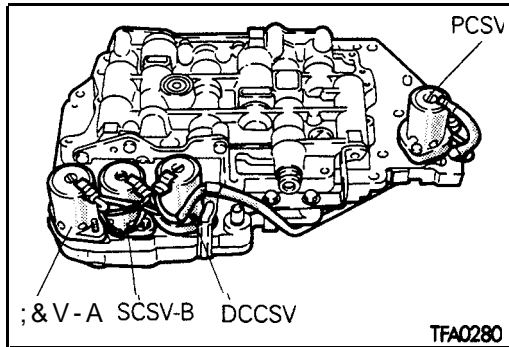
(1) Mount the special tool to the intermediate plate.



(2) Install the separating plate.



(3) Secure the lower valve body with mounting bolts and then remove the special tool.



5. 4. 3.2. INSTALLATION OF SOLENOID VALVE ASSEMBLY

Install the solenoid valves as shown.

Solenoid valve	Wire color
Shift control solenoid valve A	Orange
Shift control solenoid valve B	Yellow
Damper clutch control solenoid valve	Red
Pressure control solenoid valve	Blue

PROPELLER SHAFT

CONTENTS

M25AA -

PROPELLER SHAFT	3	Lubricants	2
SPECIAL TOOL	3	Service Specifications	2
SPECIFICATIONS	2	TROUBLESHOOTING	3
General Specifications	2	Noise and Vibration at High Speed	
		Noise at Start	

SPECIFICATIONS

M25CA - -

GENERAL SPECIFICATIONS

Items	Specifications
Propeller shaft	
Type	4 joint propeller shaft
Length x O.D. mm (in.)	
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)
Universal joint	
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

M25CB - -

Items	Specifications
Limit	
Propeller shaft runout (Dial indicator reading)	
Front mm (in.)	0.6 (.024) or less
Center mm (in.)	0.6 (.024) or less
Rear mm (in.)	0.6 (.024) or less

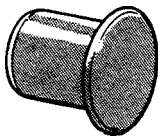
LUBRICANTS

M25CD - -

Items	Specified lubricant	Quantity
Sleeve yoke surface	Hypoid Gear Oil/API classification GL-4 or higher, SAE 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.)
Rubber packing	3M ATD Part No. 8155 or equivalent	As required

SPECIAL TOOL

M25DA--

Tool	Number	Name	Use
	MB991 193	Plug	Prevention of entry of foreign objects into the transaxle and transfer

TROUBLESHOOTING

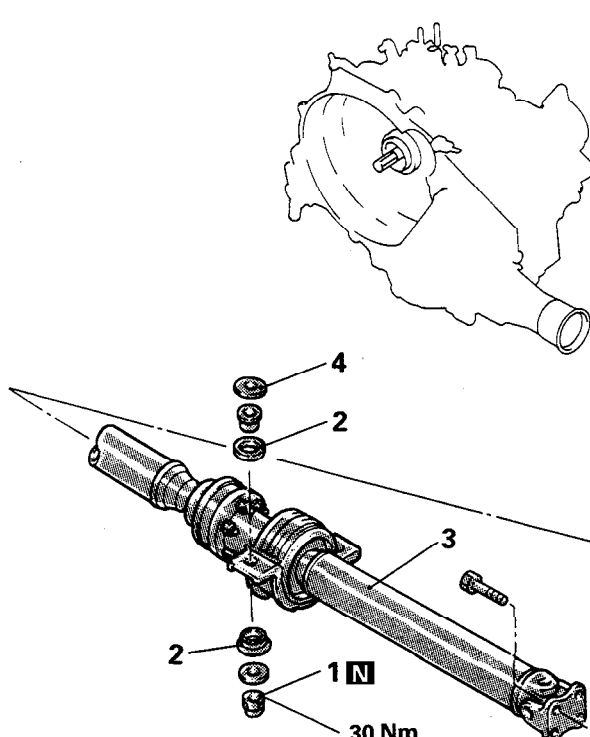
M25EAAF

Symptom	Probable cause	Remedy
Noise at start	Worn journal bearing	Replace
	Worn sleeve yoke spline	
Noise and vibration at high speed	Loose propeller shaft installation	Retighten
	Unbalanced propeller shaft	Replace
	Worn journal bearing	Replace

PROPELLER SHAFT

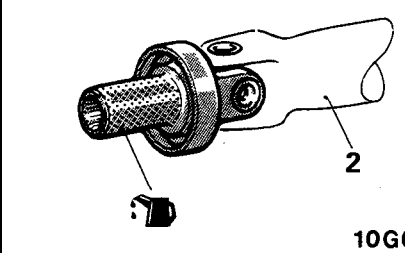
REMOVAL AND INSTALLATION

M25GA--



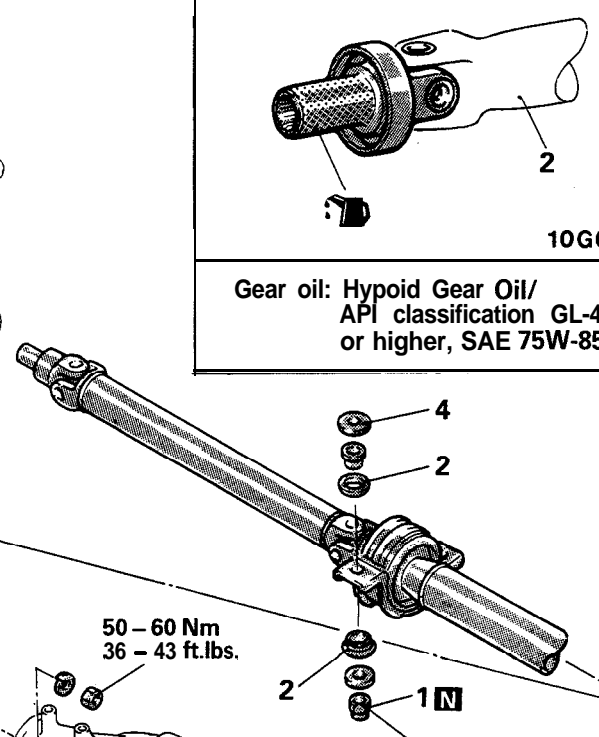
Removal steps

- 1. Self-locking nut
- + 2. Insulator
- * • 4 3. Propeller shaft
- ◀▶ 4. Spacer



10G0001

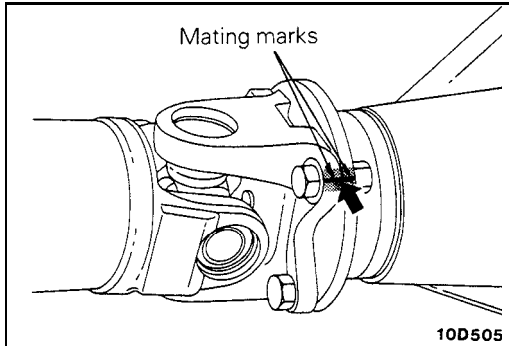
**Gear oil: Hypoid Gear Oil/
API classification GL-4
or higher, SAE 75W-85W**



**50 – 60 Nm
36 – 43 ft.lbs.**

**30 Nm
22 ft.lbs.**

10N0013

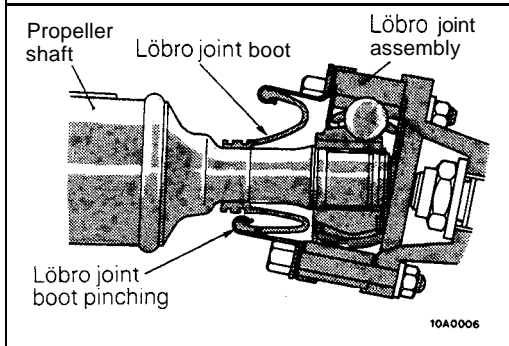


SERVICE POINTS OF REMOVAL

M25GBAI

3. REMOVAL OF PROPELLER SHAFT

- (1) Make mating marks on the differential companion flange and flange yoke.

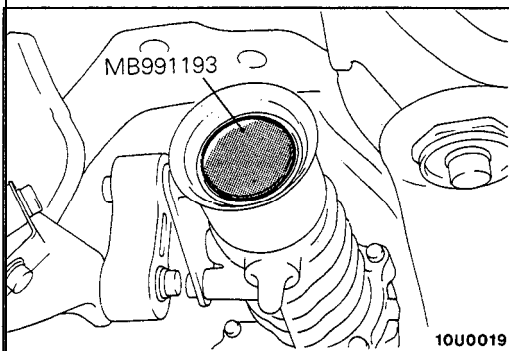


Caution

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.

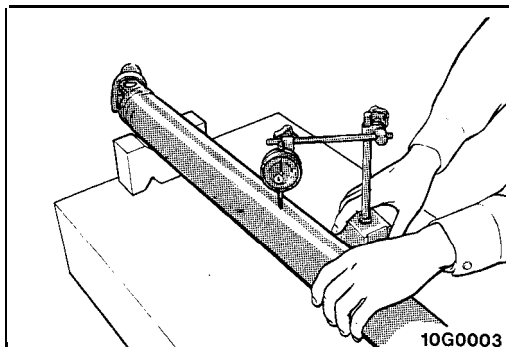
4. REMOVAL OF SPACER

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.

INSPECTION

M25GCAI

- 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.



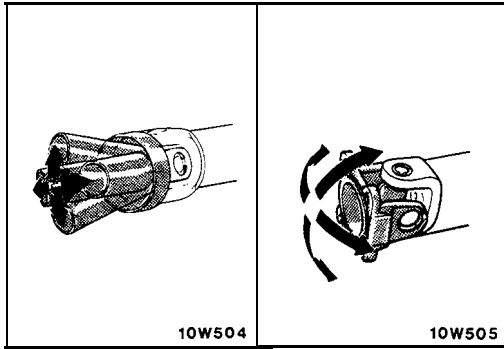
- Measure the propeller shaft runout with a dial indicator.

Limit:

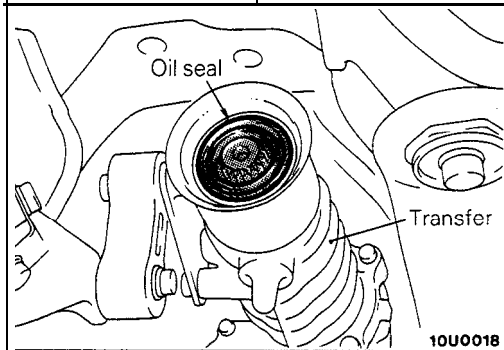
Front propeller shaft	0.6 mm (.024 in.) or less
Center propeller shaft	0.6 mm (.024 in.) or less
Rear propeller shaft	0.6 mm (.024 in.) or less

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.



SERVICE POINTS OF INSTALLATION

M25GDAP

3. INSTALLATION OF PROPELLER SHAFT

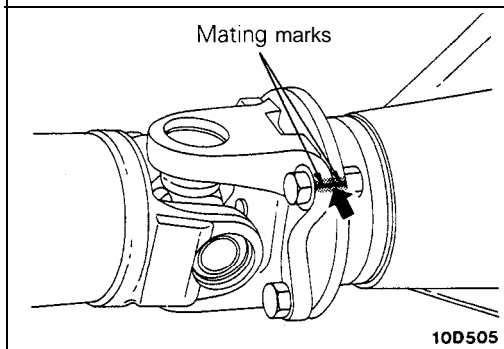
(1) **Caution**

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.

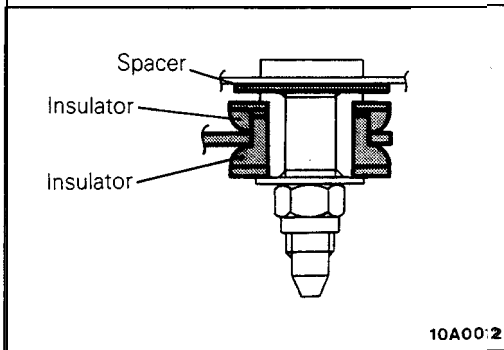


2. INSTALLATION OF INSULATOR

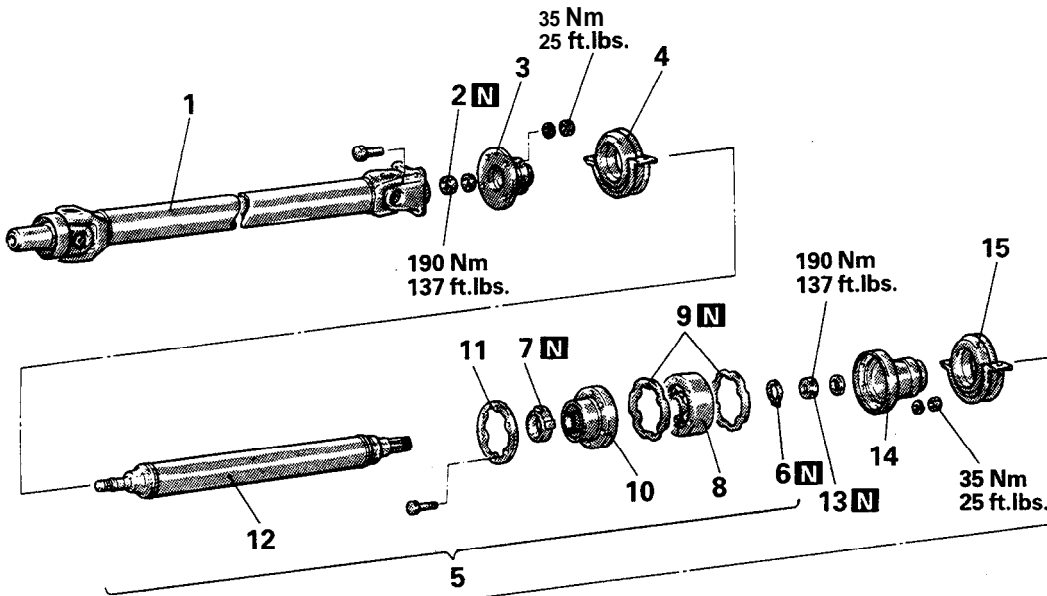
Install spacers and insulators as indicated in the illustration.

Caution

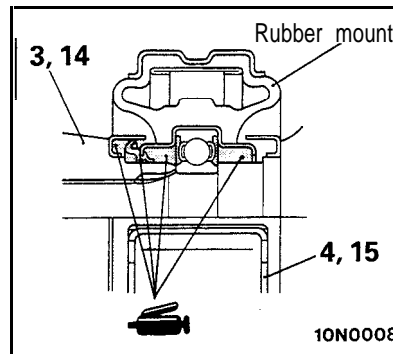
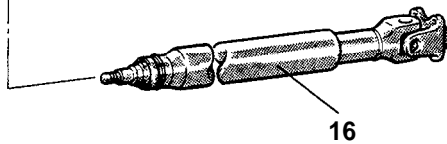
When installing the center bearing, assemble the same spacers as removed from it (or new spacers of equal thickness).



DISASSEMBLY AND REASSEMBLY



10F0003



10N0008

Löbro joint assembly

Löbro joint Löbro joint
(outer race) (inner race) 10X0018

10X0040

**Grease: Repair kit grease
[45 – 55 g (1.59 – 1.94 oz.)]**

10N0009

**3M ATD Part No. 8155 or
equivalent**

Disassembly steps

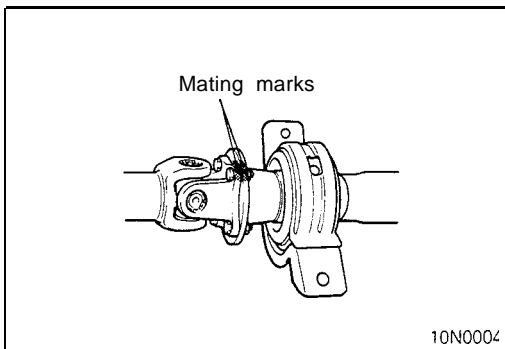
- ◆◆ 1. Front propeller shaft assembly
- ◆◆◆ 2. Self-locking nut
- ◆◆◆◆ 3. Companion flange
- ◆◆ • * 4. Center bearing assembly
- ◆◆ • + 5. Center propeller shaft assembly
- ◆◆ • 6. Snap ring
- ◆◆ • * 7. Boot band
- ◆◆◆◆ 8. Lobro joint assembly
- ◆◆◆◆◆ 9. Rubber packing
- ◆◆◆◆◆ 10. Lobro joint boot
- ◆◆◆◆◆ 11. Washer
- ◆◆◆◆◆ 12. Center propeller shaft
- ◆◆◆◆◆ • + 13. Self-locking nut
- ◆◆◆◆◆ • * 14. Companion flange
- ◆◆◆◆◆ • * 15. Center bearing assembly
- ◆◆◆◆◆◆ 16. Rear propeller shaft

SERVICE POINTS OF DISASSEMBLY

M25GFA0

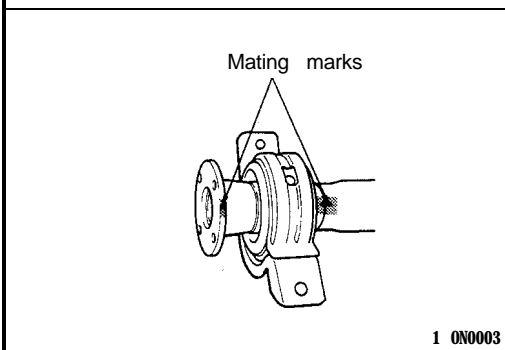
1. REMOVAL OF FRONT PROPELLER SHAFT ASSEMBLY

Put mating marks on the front propeller shaft flange yoke and the companion flange before removing the front propeller shaft assembly.



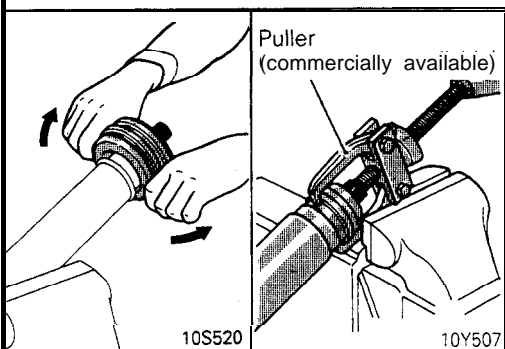
3. REMOVAL OF COMPANION FLANGE

Put mating marks on the companion flange and the center propeller shaft before removing the companion flange.



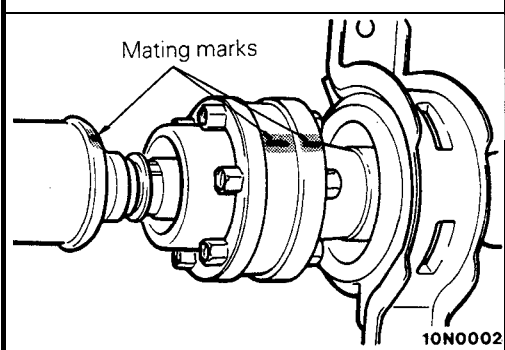
4. REMOVAL OF CENTER BEARING ASSEMBLY

First remove the center bearing bracket and then remove the center bearing using a puller (commercially available).



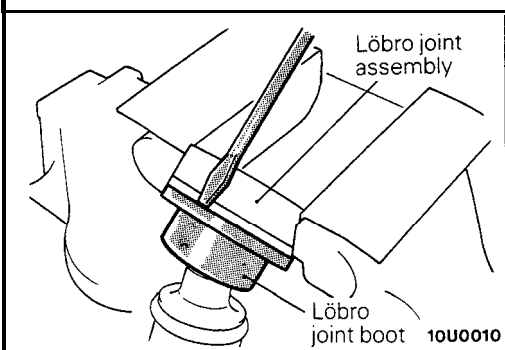
5. REMOVAL OF CENTER PROPELLER SHAFT ASSEMBLY

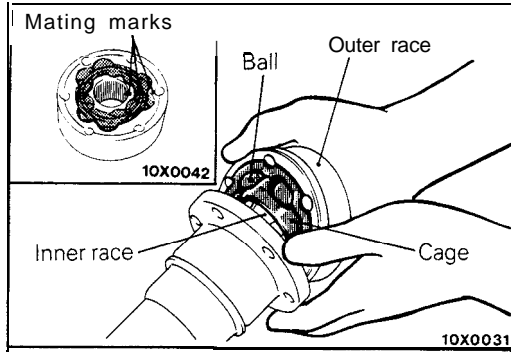
Put mating marks on the center propeller shaft, the Lobro joint assembly and the companion flange before removing the center propeller shaft assembly.



8. REMOVAL OF LÖBRO JOINT ASSEMBLY

(1) Remove the Lobro joint boot from the Lobro joint assembly.

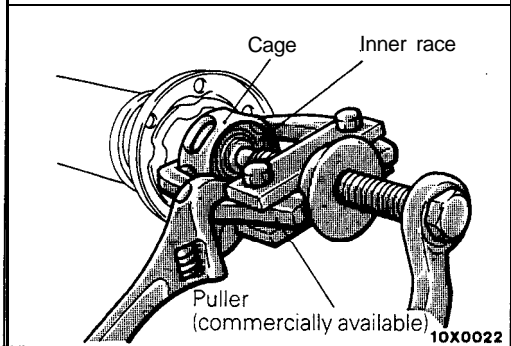




- (2) Put mating marks on the outer race, cage and inner race with a scriber before removing the outer race and balls.

Caution

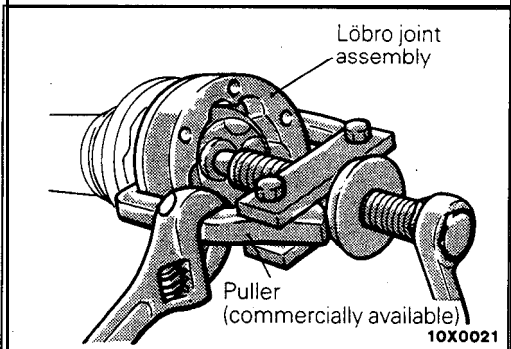
Note the positions of balls so that they can be reinstalled in their original positions.



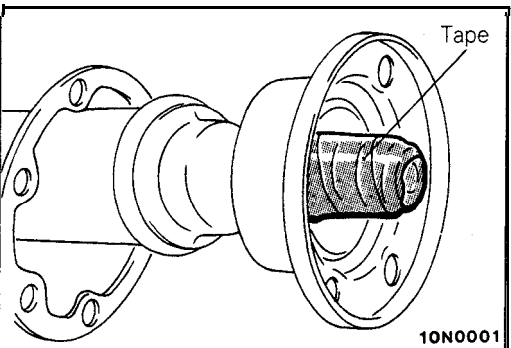
- (3) Remove the inner race with cage from the center propeller shaft by using a puller (commercially available).

NOTE

When changing the grease on the Lobro joint assembly, wipe off the grease and clean the outer and inner races, cage and balls.

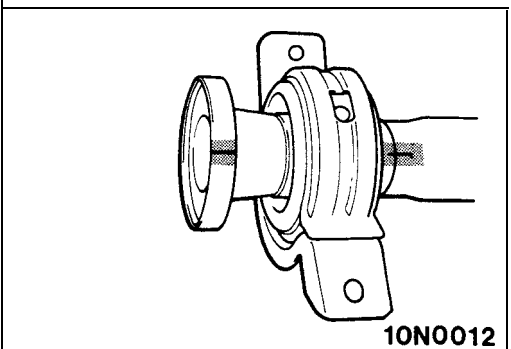


- (4) If the outer race cannot be removed, remove the complete Lobro joint assembly from the center propeller shaft by using a puller (commercially available).



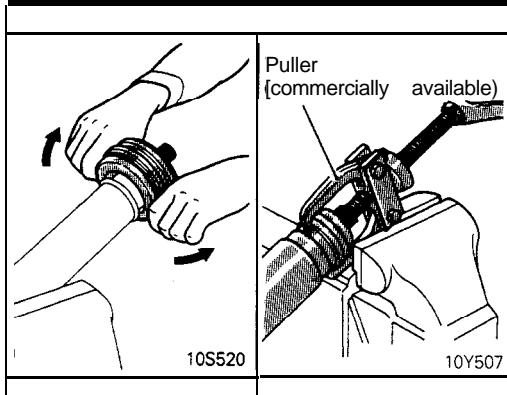
10. REMOVAL OF LÖBRO JOINT BOOT

Tape the serration of the center propeller shaft and then remove the Lobro joint boot.



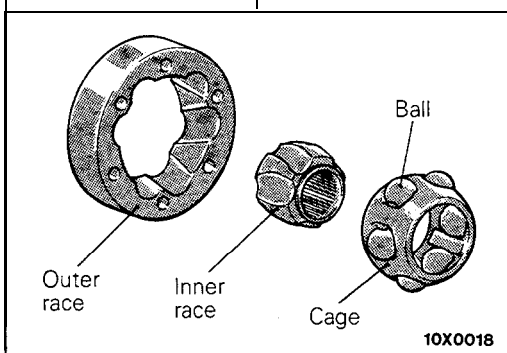
14. REMOVAL OF COMPANION FLANGE

Put mating marks on the companion flange and the rear propeller shaft before removing the companion flange.



15. REMOVAL OF CENTER BEARING ASSEMBLY

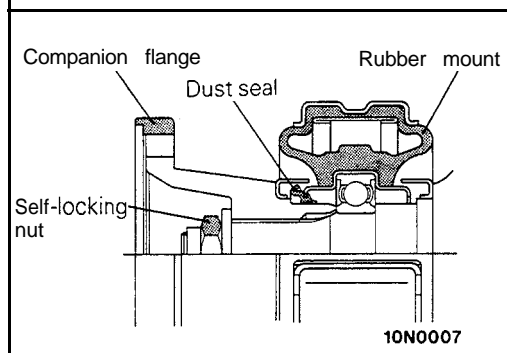
First remove the center bearing bracket and then remove the center bearing using a puller (commercially available).



INSPECTION

M25GIAA

- 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.

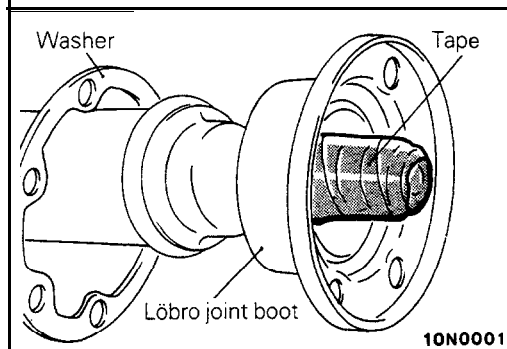


SERVICE POINTS OF REASSEMBLY

M25GHAR

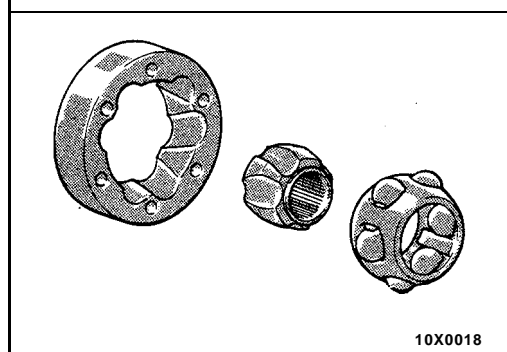
15. INSTALLATION OF CENTER BEARING ASSEMBLY / 14. COMPANION FLANGE / 13. SELF-LOCKING NUT

- (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.



10. INSTALLATION OF LÖBRO JOINT BOOT

Tape the serration of the center propeller shaft and then install the Lobro joint boot.

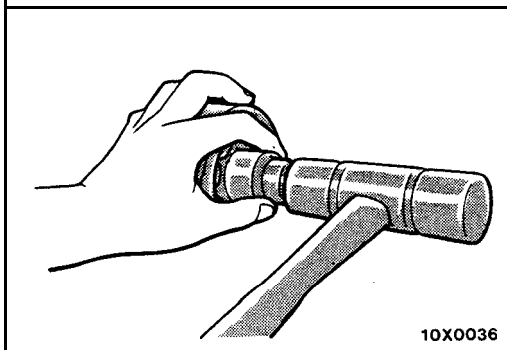
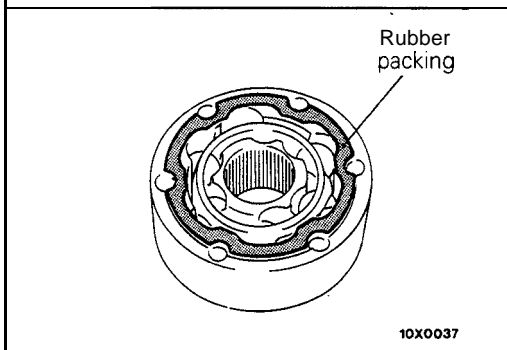
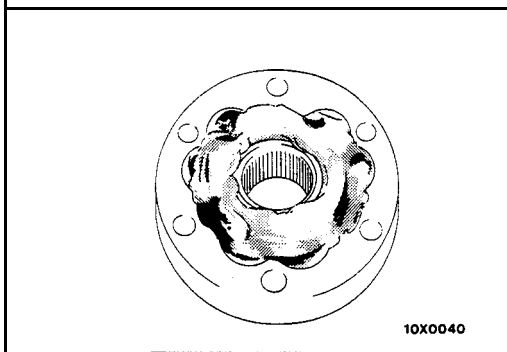
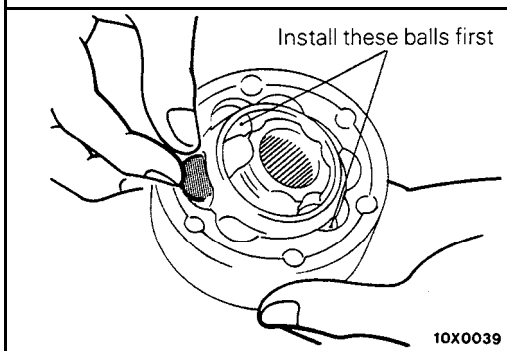
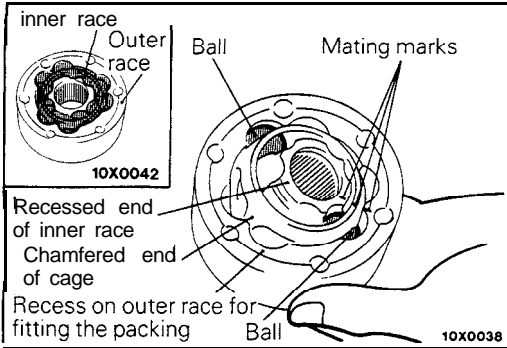


8. INSTALLATION OF LÖBRO JOINT ASSEMBLY

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.

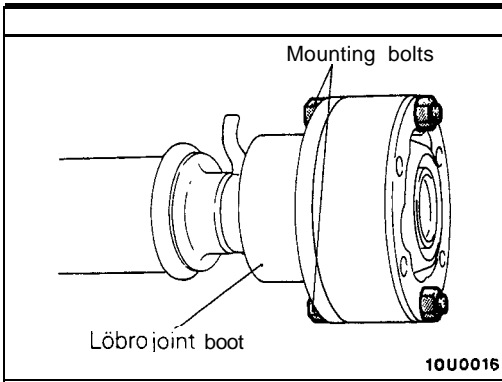
- (6) Apply specified grease to the Lobro joint assembly.

Specified grease: Repair kit grease
[45 – 55 g (1.59 – 1.94 oz.)]

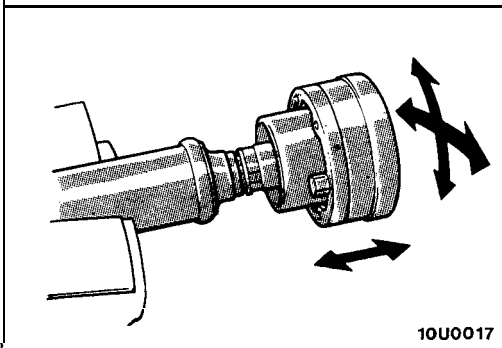
- (7) Apply quick fix adhesive at three locations illustrated to prevent displacement of the rubber packing and fix it to the Lobro joint assembly temporarily.

Specified adhesive: 3M ATD Part No. 8155 or equivalent

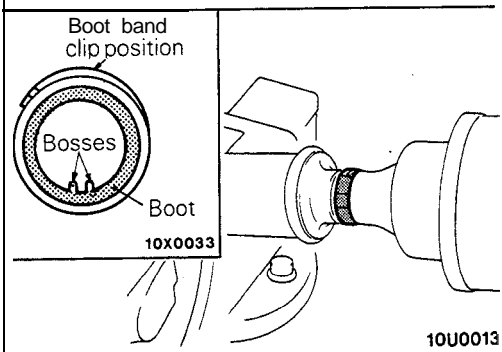
- (8) Lining up the mating marks on the Lobro joint assembly and the center propeller shaft and applying the socket to the inner race of the Lobro joint assembly, install the Lobro joint assembly to the center propeller shaft.



(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.



(10) Check that the Lobro joint assembly moves smoothly.



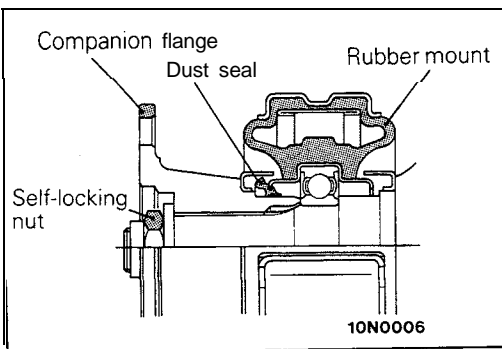
7. INSTALLATION OF BOOT BAND

Caution

Position the boot band clip on the side opposite to the bosses which are provided in the boot for ventilation. Be sure to remove grease, if present, from around the bosses. Grease obstructs the ventilation air passage.

5. INSTALLATION OF CENTER PROPELLER SHAFT ASSEMBLY

Install, lining up the mating marks on the center propeller shaft, the Lobro joint assembly and the companion flange.



4. INSTALLATION OF CENTER BEARING ASSEMBLY / 3. COMPANION FLANGE / 2. SELF-LOCKING NUT

- (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.

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FRONT AXLE

CONTENTS

M26AA- -

DRIVE SHAFT	11	SPECIFICATIONS	2
HUB AND KNUCKLE	6	General Specifications	2
SERVICE ADJUSTMENT PROCEDURES	5	Lubricants	2
Hub End Play Inspection	5	Service Specifications	2
SPECIAL TOOLS	3	TROUBLESHOOTING	5



SPECIFICATIONS

M26CA-A

GENERAL SPECIFICATIONS

Items	FWD	AWD
Wheel bearing Type O.D. x I.D. mm (in.)	Double-row angular-contact ball bearing 84 x 45 (3.31 x 1.77)	Unit ball bearing
Drive shaft Joint type Outer Inner Length mm (in.) L.H. shaft R.H. shaft	B.J. T.J. 417 (16.4) 405 (15.9) or 393 (15.5)"	B.J. T.J. 419 (16.5) 391 (15.4)

NOTE

*: <A/T>

SERVICE SPECIFICATIONS

M26CB-A

Items	Specifications
Standard value Setting of T.J. boot length mm (in.) L.H. R.H.	 85 ± 3 (3.35 ± .12) 85 ± 3 (3.35 ± .12)
Limit Hub end play mm (in.) Wheel bearing starting torque (Hub starting torque) Nm (in.lbs.)	 0.05 (.002) 1.8 (16)

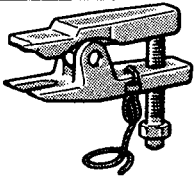
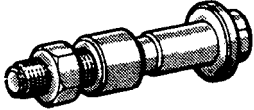
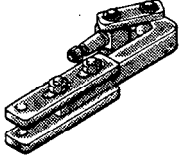
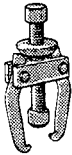
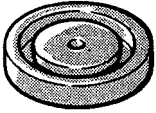
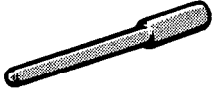
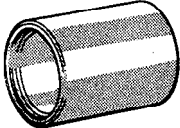

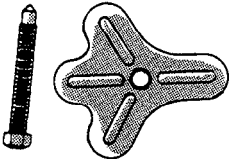
LUBRICANTS

M26CD-A

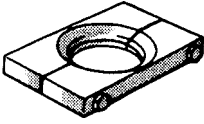
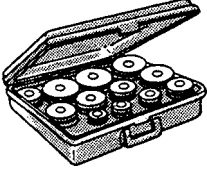

Items	Specified lubricants	Quantity
T.J. boot grease	Repair kit grease	160 g (5.64 oz.)
B.J. boot grease <FWD> <AWD>	Repair kit grease	145 g (5.11 oz.) 135 g (4.76 oz.)
Dust seal inner Dust seal outer	Multipurpose grease	14 – 20 g (.49 – .71 oz.) 8 – 12 g (.28 – .42 oz.)

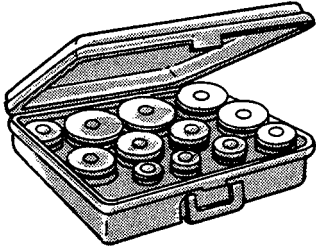
SPECIAL TOOLS

M26DA-A

Tool	Number	Name	Use
	MB990635-01	Steering linkage puller	Removal of the lower arm ball joint and tie rod
	MB990998-01	Front hub remover and installer	Removal or press-in the front hub <FWD> Measurement of front hub unit bearing rotation starting torque <AWD>
	MB991355	Knuckle arm bridge	Removal of the hub <FWD>
	MB990810-01	Side bearing puller	Removal of the wheel bearing inner race <FWD>
	MB990955-01	Oil seal installer	Press-fitting of the oil seal (hub side)
	MB990947	Lower arm bushing arbor	
	MB990890-01	Rear suspension bushing base	Press-fitting of the wheel bearing and oil seal <FWD>
	MB990883-01	Rear suspension arbor	
	MB990241-01	Axle puller	Removal of the drive shaft

TSB Revision

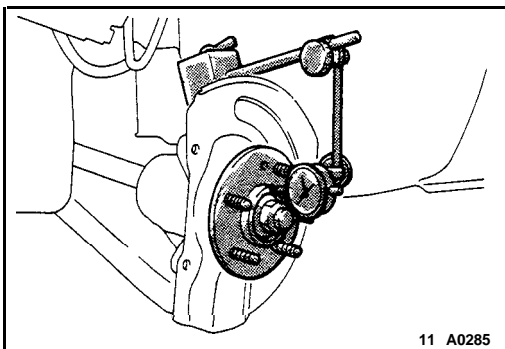
Tool	Number	Name	Use
	MB991 248 or MD998801	Inner shaft remover	Removal of the inner shaft
	MB990925-01	Bearing and oil seal installer set	Removal of wheel bearing MB990932-01 MB990938-01 Removal and installation of center bearing MB990930-01 MB990932-01 MB990938-01
	MB990938-01	Handle	

MB990925-01	Tool number	Installer disc O.D. mm (in.)
		MB990926-01
	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)

TROUBLESHOOTING

M26EBAA

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



SERVICE ADJUSTMENT PROCEDURES

HUB END PLAY INSPECTION

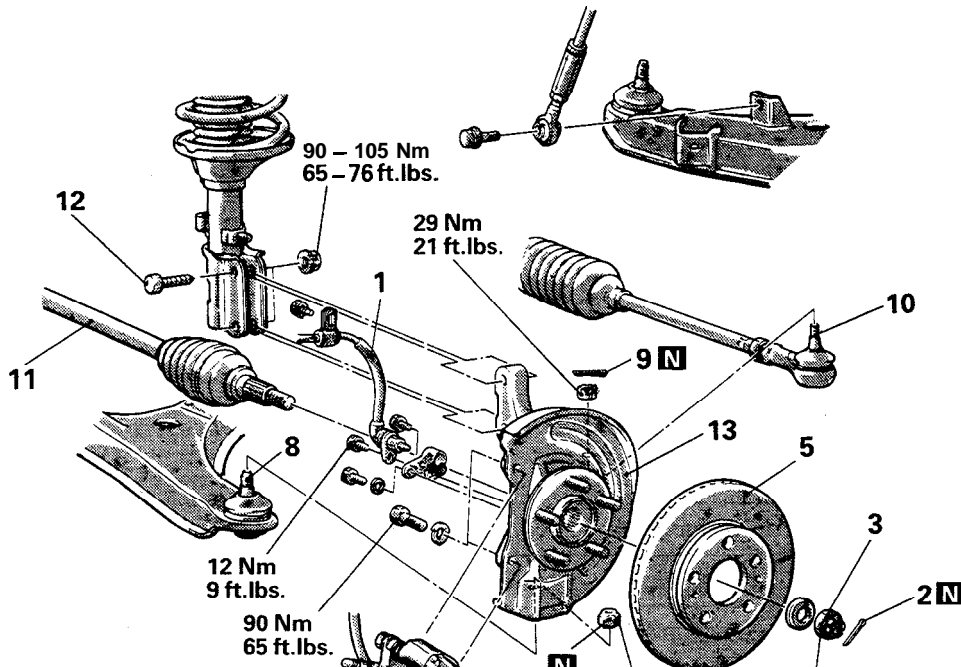
M26FAAE

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 – Service Adjustment Procedures.)
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.

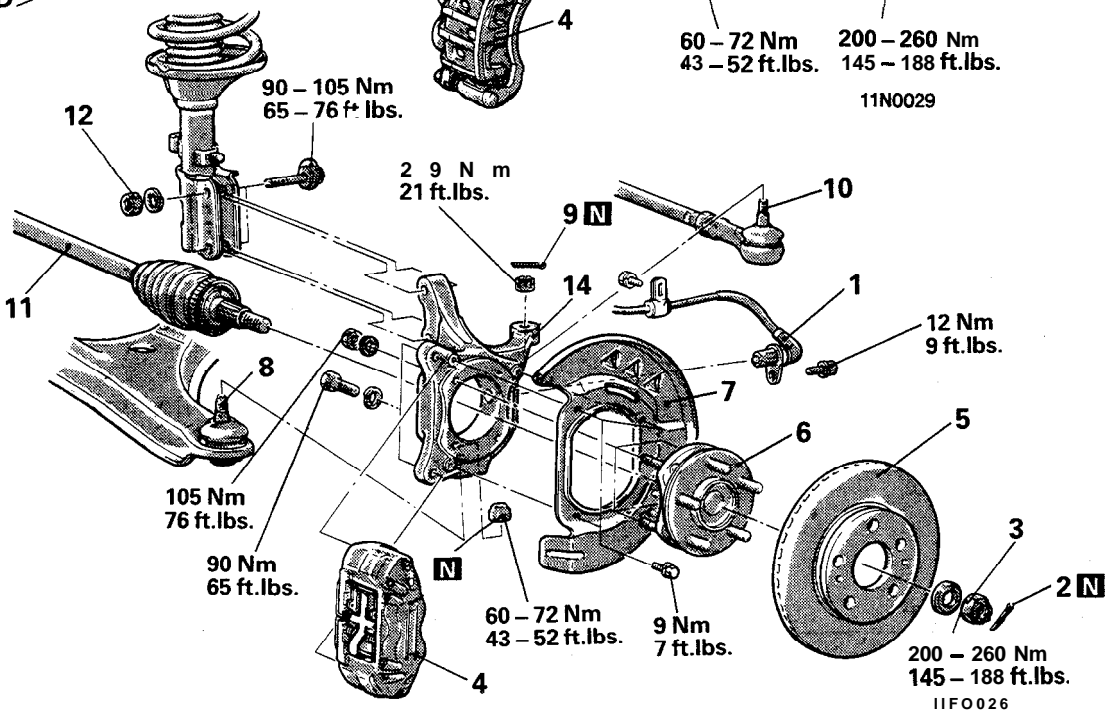
HUB AND KNUCKLE

REMOVAL AND INSTALLATION

<FWD>



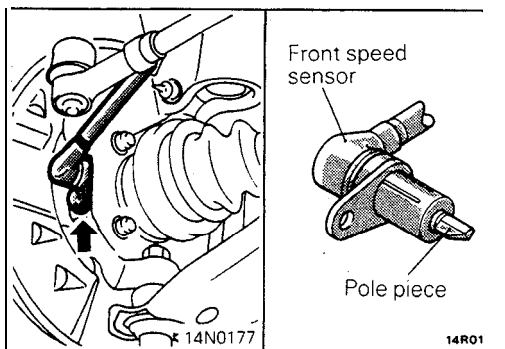
<AWD>



Removal steps

- ↔ 1. Front speed sensor connection
<Vehicles with A.B.S.*>
- * 2. Cotter pin
- ↔ • + 3. Drive shaft nut
- ↔ 4. Caliper assembly
- 5. Brake disc
- 6. Front hub unit bearing
- 7. Dust shield
- ↔ 8. Lower arm ball joint connection
- ↔ 9. Cotter pin
- ↔ 10. Tie rod end connection
- ↔ 11. Drive shaft
- ↔ 12. Front strut mounting bolt
- ↔ 13. Hub and knuckle
- ↔ 14. Hub

NOTE
*: Anti-lock braking system

**SERVICE POINTS OF REMOVAL**

M261BAH

1. DISCONNECTION OF FRONT SPEED SENSOR

Remove the mounting bolts which hold the speed sensor bracket to the knuckle, and then remove the speed sensor.

Caution

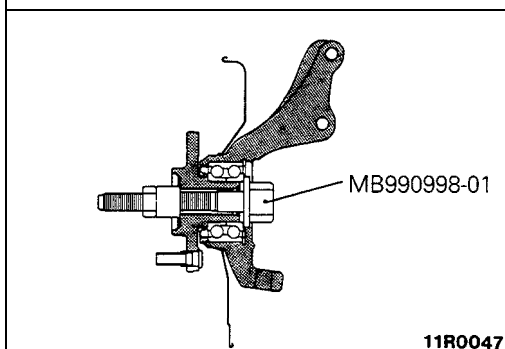
Be careful when handling the pole piece at the tip of the speed sensor and the toothed edge of the rotor so as not to damage them by striking against other parts.

3. REMOVAL OF DRIVE SHAFT NUT

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 losing 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, MB990998-01, etc.

**4. REMOVAL OF CALIPER ASSEMBLY**

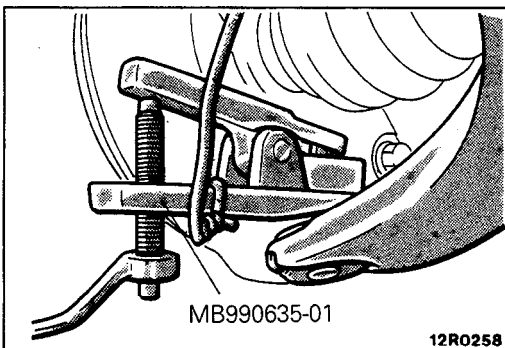
Remove the caliper assembly and suspend it with wires.

8. DISCONNECTION OF LOWER ARM BALL JOINT

Using the special tool, disconnect the lower arm ball joint from the knuckle.

Caution

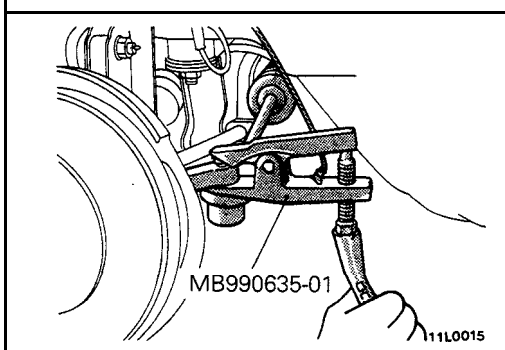
1. Be sure to tie the cord of the special tool to the nearby part.
2. Loosen the nut but do not remove it.

**10. DISCONNECTION OF TIE ROD END**

Using the special tool, disconnect the tie rod end from the knuckle.

Caution

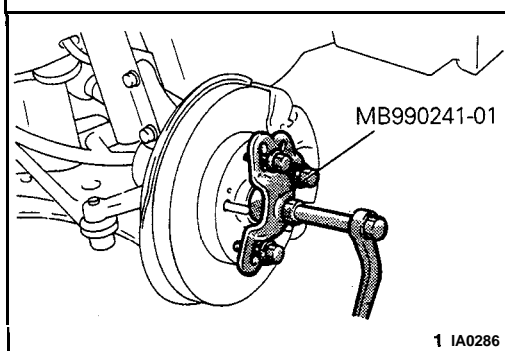
1. Be sure to tie the cord of the special tool to the nearby part.
2. Loosen the nut but do not remove it.

**11. REMOVAL OF DRIVE SHAFT**

Use the special tool to push out the drive shaft from the front hub.

14. REMOVAL OF HUB

In the case of AWD-vehicles with A.B.S., take care not to damage the rotor for A.B.S. installed to the B.J. outer race when removing the hub.



INSPECTION

M26ICAE

- 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.

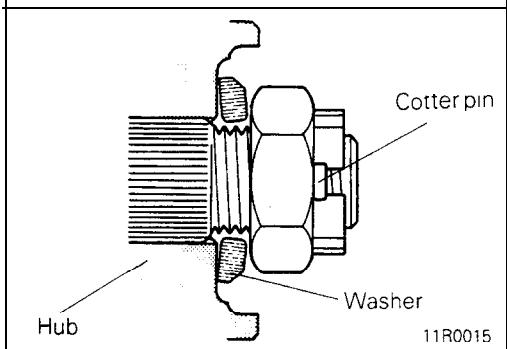
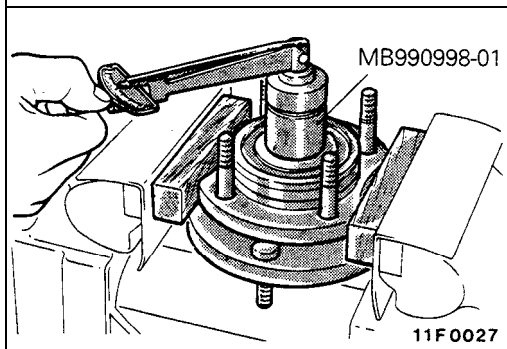
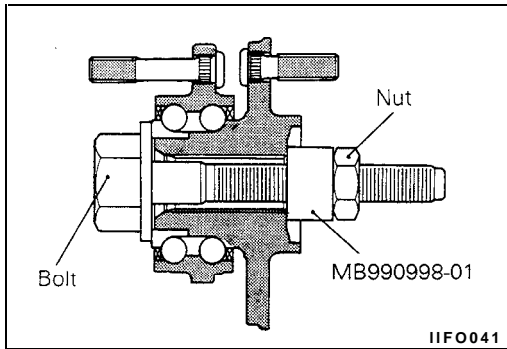
Limit: 1.8 Nm (16 in.lbs.) or less

SERVICE POINT OF INSTALLATION

M26IDAG

3. INSTALLATION OF DRIVE SHAFT NUT / 2. COTTER PIN

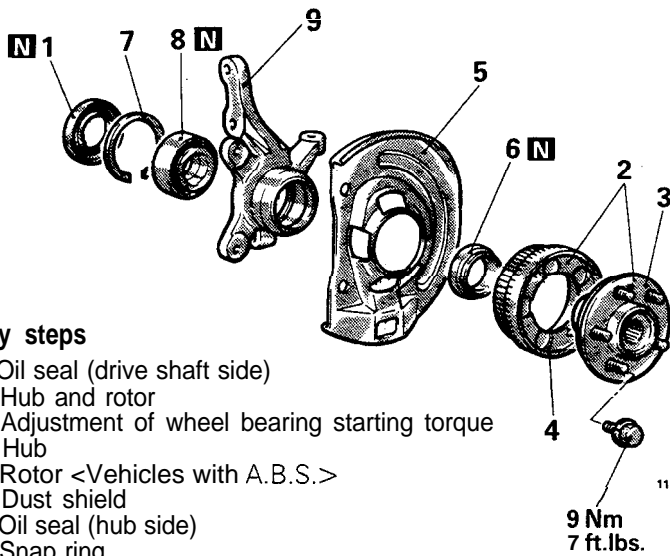
- (1) Be sure to install the washer and wheel bearing nut in the specified direction.
- (2) After installing the wheel, lower the vehicle to the ground and finally tighten the wheel bearing nut.
- (3) If the position of the cotter pin holes does not match, tighten the nut up to 260 Nm (188 ft.lbs.) in maximum.
- (4) Install the cotter pin in the first matching holes and bend it securely.



DISASSEMBLY AND REASSEMBLY

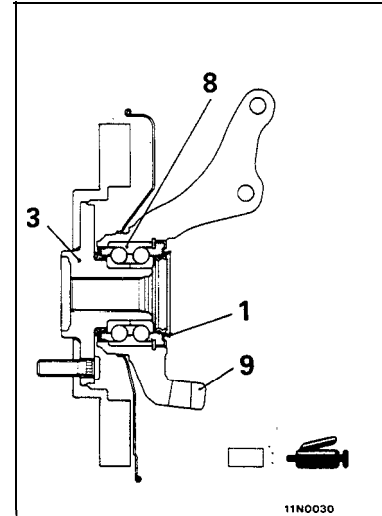
M26IE.

<FWD>



Disassembly steps

- ◆◆ 1. Oil seal (drive shaft side)
- ◆◆ 2. Hub and rotor
- 3. Adjustment of wheel bearing starting torque
- 3. Hub
- 4. Rotor <Vehicles with A.B.S.>
- 5. Dust shield
- * 6. Oil seal (hub side)
- 7. Snap ring
- ◆◆ ● * 8. Wheel bearing
- 9. Knuckle



SERVICE POINTS OF DISASSEMBLY

M26IFAP

2. REMOVAL OF HUB AND ROTOR

- (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.

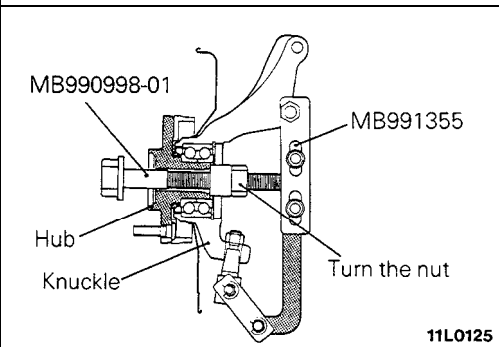
8. REMOVAL OF WHEEL BEARING

- (1) Crush the oil seal in two places so that the tabs of the special tool will be caught on the wheel bearing inner race.

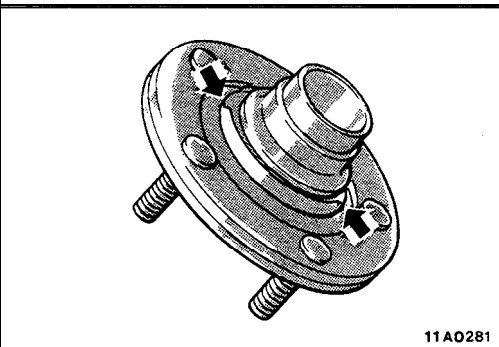
- (2) Remove the wheel bearing inner race from the hub by using the special tool.

Caution

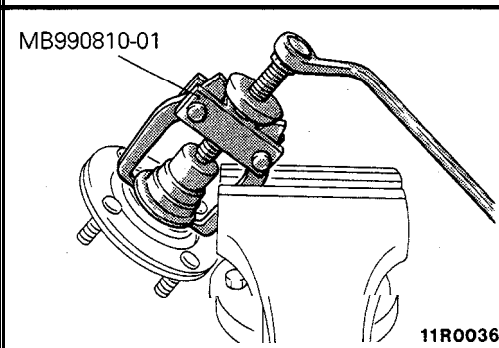
Be careful that the hub will not fall down as the wheel bearing inner race (outer side) is removed from the hub.



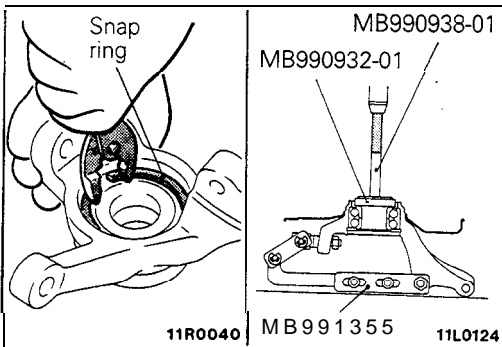
11L0125



11A0281



11R0036



- (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.

INSPECTION

M26IGAC

- 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.

SERVICE POINTS OF REASSEMBLY

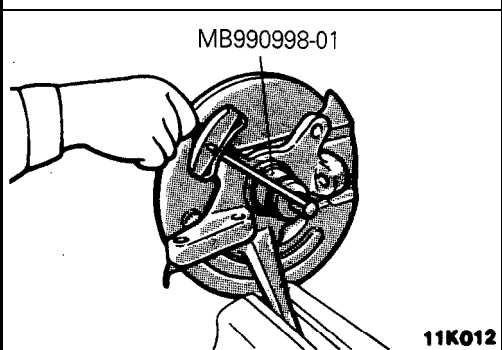
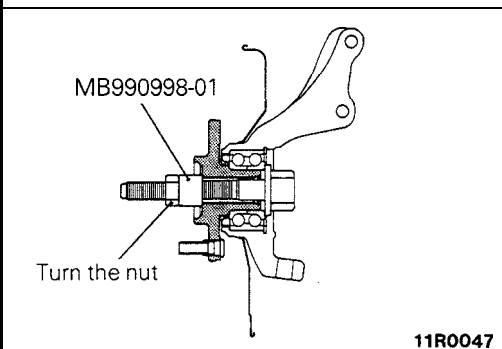
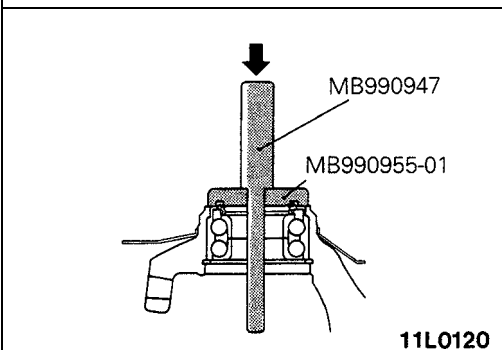
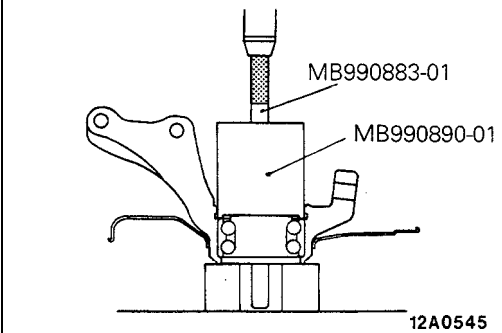
M26IHAO

8. INSTALLATION OF WHEEL BEARING

- (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.

6. INSTALLATION OF OIL SEAL (HUB SIDE)

- (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.

**ADJUSTMENT OF WHEEL BEARING STARTING TORQUE**

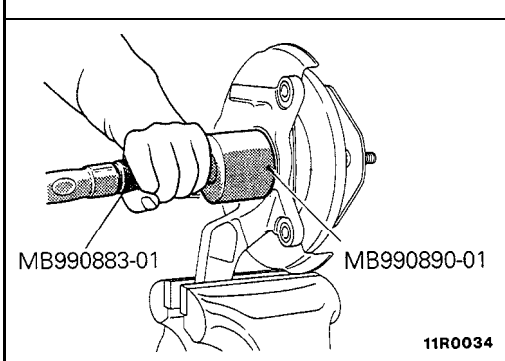
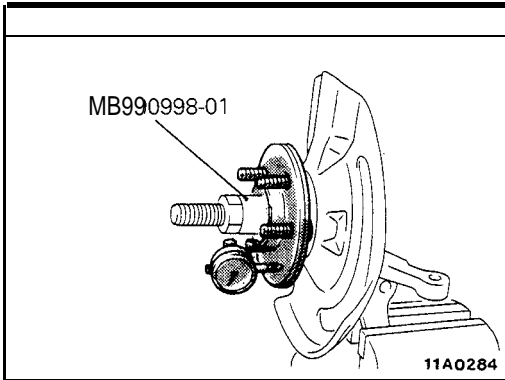
- (1) Use the special tool to mount the hub assembly onto the knuckle.
- (2) Tighten the nut of the special tool to 200 – 260 Nm (145 – 188 ft.lbs.).
- (3) Rotate the hub assembly in order to seat the bearing.

- (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 dis-assembly and assembly procedure.

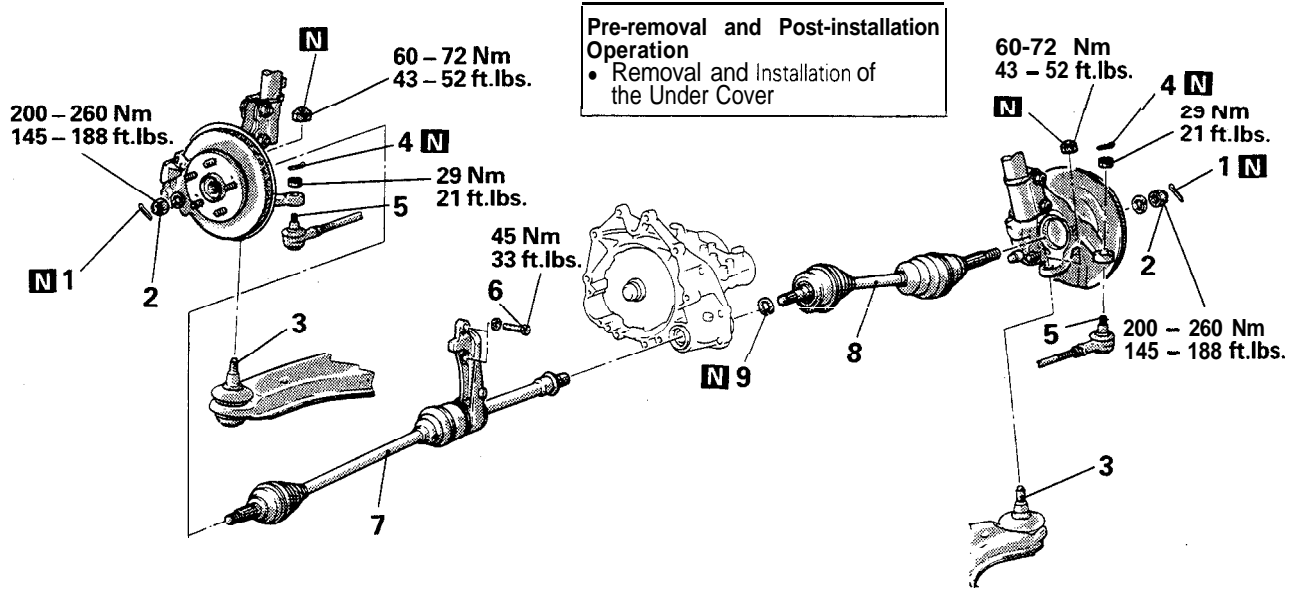
1. INSTALLATION OF OIL SEAL (DRIVE SHAFT SIDE)

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.

**DRIVE SHAFT
REMOVAL AND INSTALLATION**

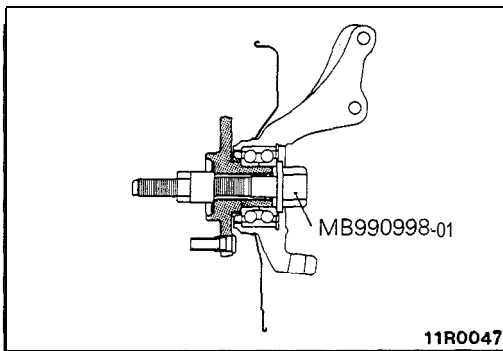
M26QA--



Removal steps

- 1. Cotter pin
- ↔ • a 2. Drive shaft nut
- ↔ 3. Lower arm ball joint connection
- ↔ 4. Cotter pin
- ↔ 5. Tie rod end connection
- ↔ 6. Center bearing bracket installation bolt
- ↔ 7. Drive shaft and inner shaft assembly (L.H.)
- ↔ 8. Drive shaft (R.H.)
- ↔ 9. Circlip

Caution
In the case of AWD-vehicles with A.B.S., take care not to damage the rotor for A.B.S. installed to the B.J. outer race.



SERVICE POINTS OF REMOVAL

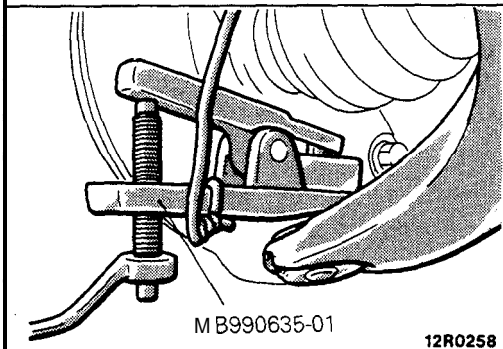
M26QBAY

2. REMOVAL OF DRIVE SHAFT NUT

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 losing 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, MB990998-01, etc.

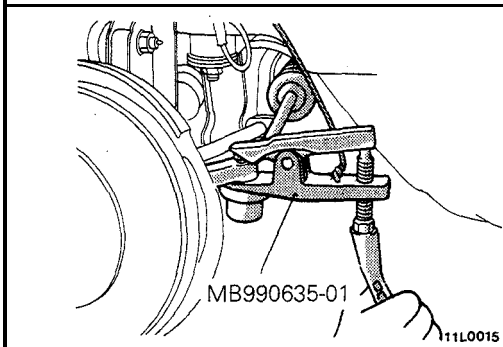


3. DISCONNECTION OF LOWER ARM BALL JOINT

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.

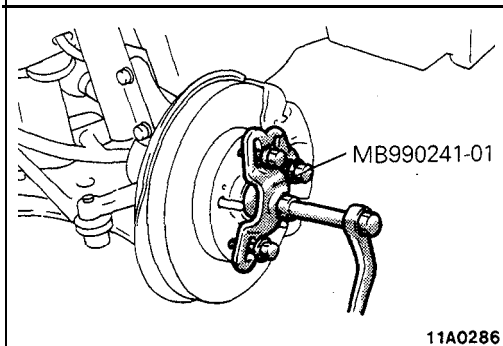


5. DISCONNECTION OF TIE ROD END

Using the special tool, disconnect the tie rod end from the knuckle.

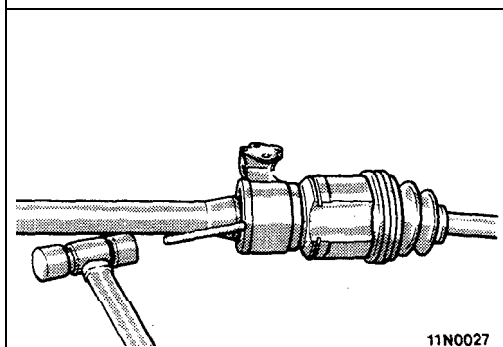
Caution

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

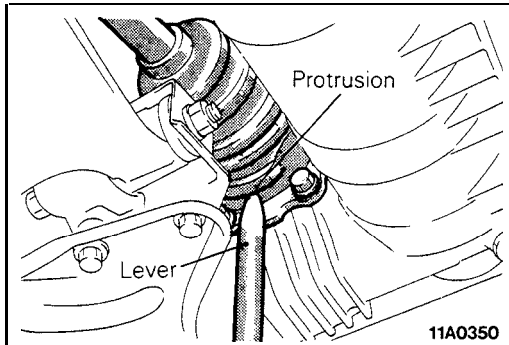


7. REMOVAL OF DRIVE SHAFT AND INNER SHAFT ASSEMBLY (L.H.) / 8. DRIVE SHAFT (R.H.)

- (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.



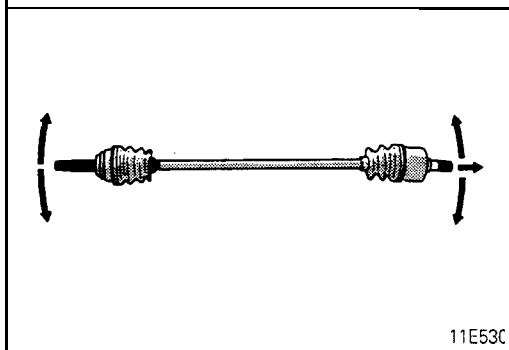
- (2) If the inner shaft is hard to remove from the transaxle, strike the center bearing bracket lightly with a plastic hammer.



- (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

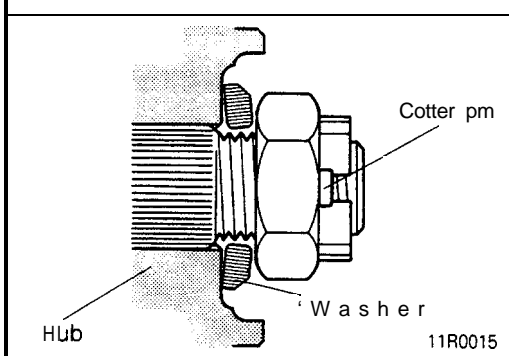
Pulling the drive shaft can cause damage to the T.J. Be sure to use a lever.



INSPECTION

M26QCAG

- 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.



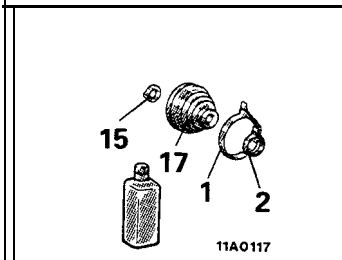
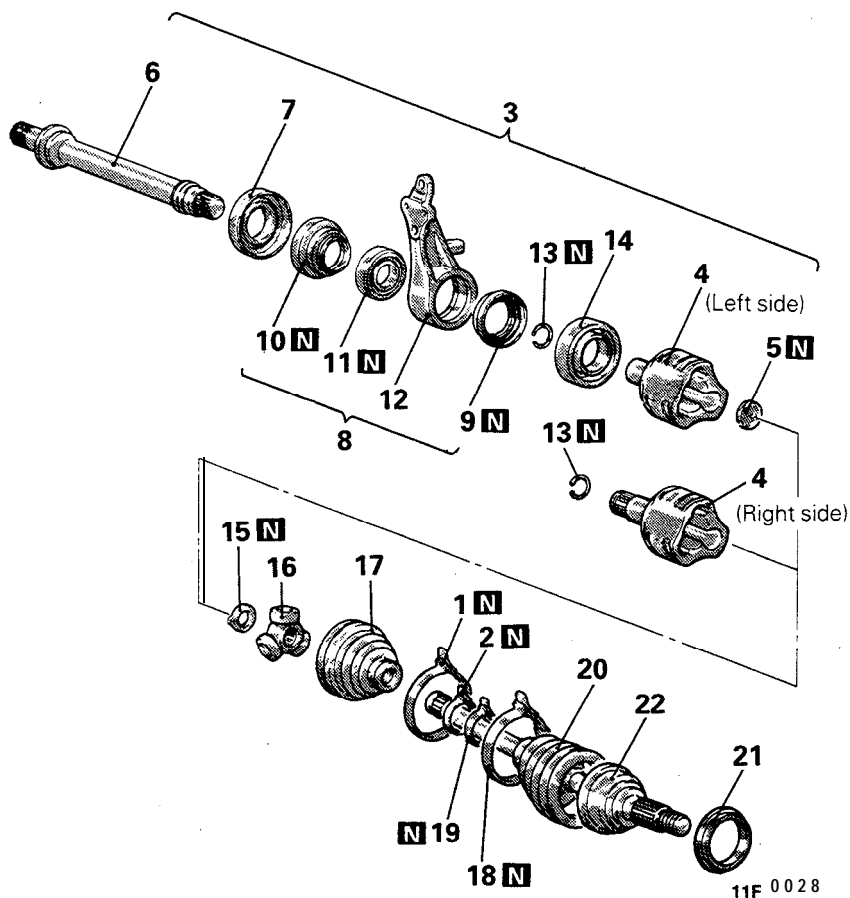
SERVICE POINT OF INSTALLATION

M26QDAR

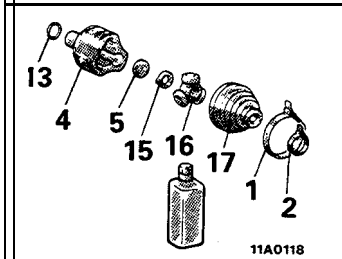
2. INSTALLATION OF DRIVE SHAFT NUT

- (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.

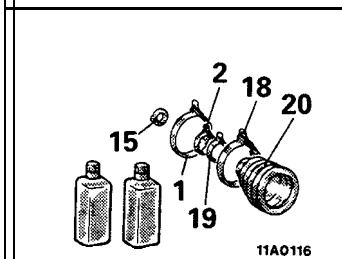
DISASSEMBLY AND REASSEMBLY



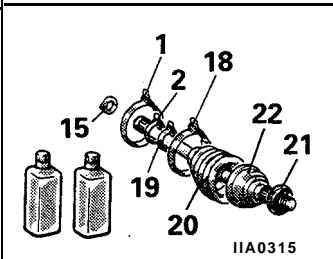
T.J. Boot Repair Kit



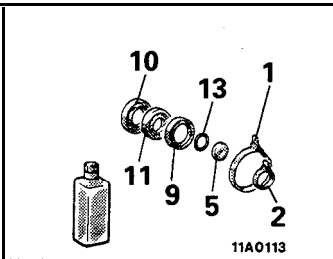
T.J. Repair Kit



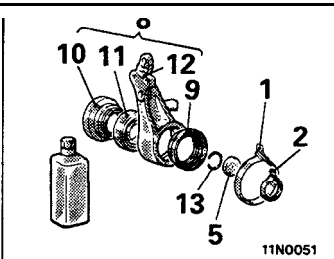
B.J. Boot Repair Kit



B.J. Repair Kit



Bearing Dust Seal Repair Kit



Bracket Assembly Repair Kit

Disassembly steps

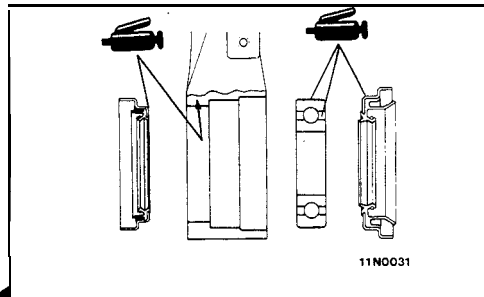
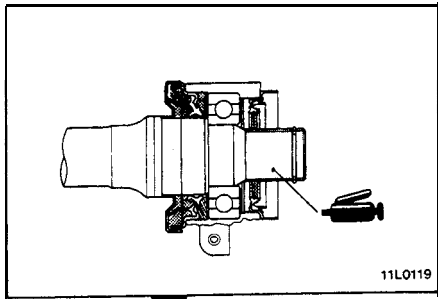
- + 1. T.J. boot band (large)
- * 2. T.J. boot band (small)
- ♦♦ 3. T.J. case and inner shaft assembly
- 4. T.J. case
- * • + 5. Seal plate
- 6. Inner shaft
- 7. Dust shield
- 8. Bracket assembly
- a 9. Dust seal outer
- ♦♦♦ 10. Dust seal inner
- ♦♦♦♦ 11. Center bearing
- 12. Center bearing bracket
- 13. Circlip

- 14. Dust shield
- 15. Snap ring
- * 16. Spider assembly
- ♦♦ • * 17. T.J. boot
- 18. B.J. boot band (large)
- 19. B.J. boot band (small)
- * ♦♦♦ 20. B.J. boot
- 21. Dust shield
- ♦♦♦ 22. B.J. assembly

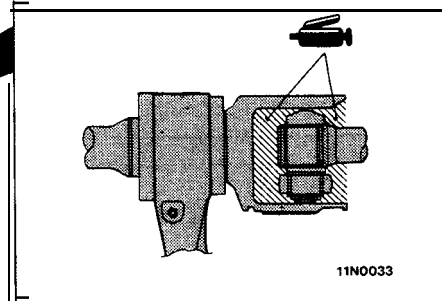
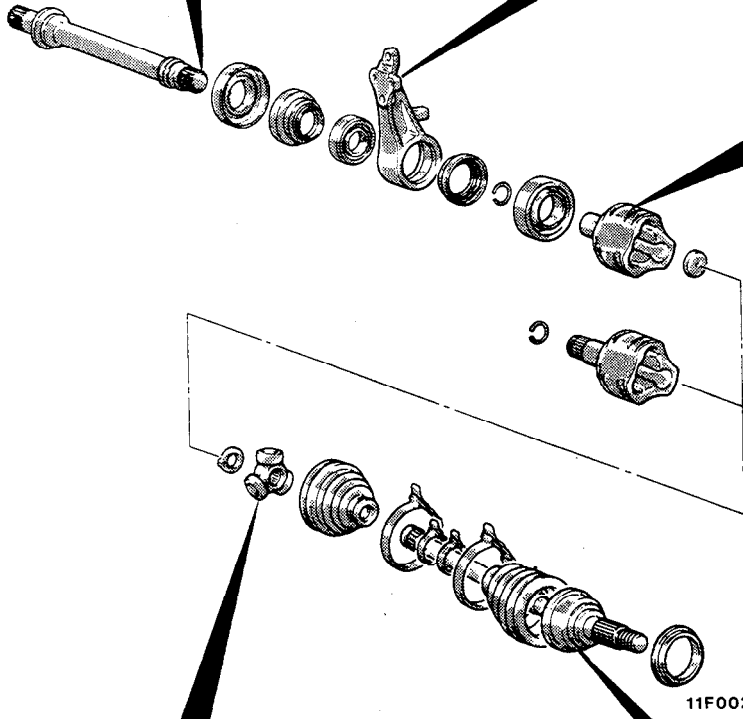
Caution

In the case of AWD-vehicles with A.B.S., take care not to damage the rotor installed to the B.J. outer race.

Lubrication Points

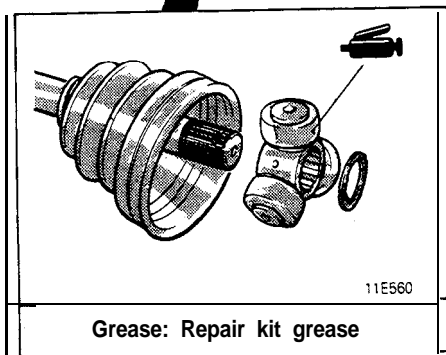


Grease: Multipurpose grease
 Dust seal inner 14 – 20 g (.49 – .71 oz.)
 Dust seal outer 8 – 12 g (.28 – .42 oz.)

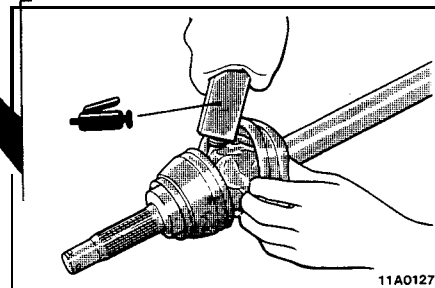


Grease: Repair kit grease
 160 g (5.64 oz.)

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.

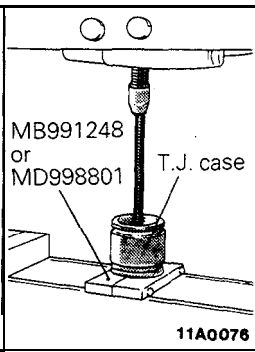
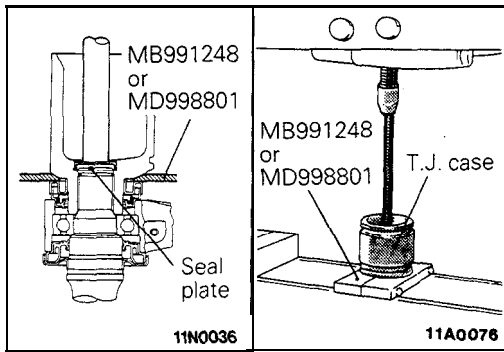


Grease: Repair kit grease



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.

**SERVICE POINTS OF DISASSEMBLY**

M26QFDE

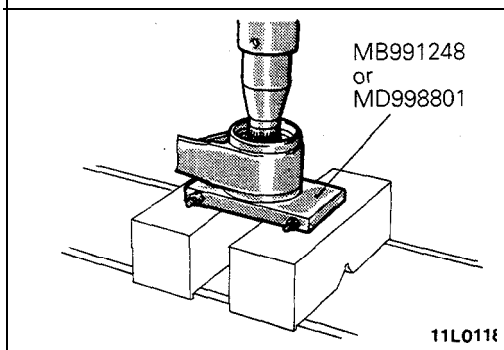
6. REMOVAL OF INNER SHAFT

- (1) Using the special tool, remove the inner shaft assembly, together with the seal plate, from the T.J. case.

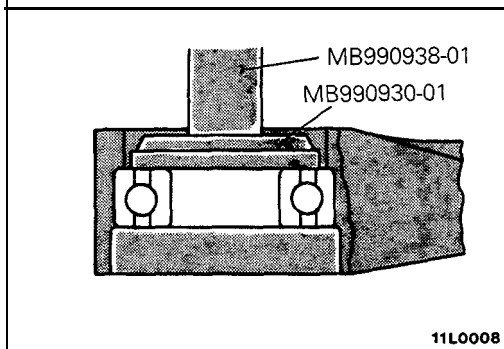
NOTE

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.

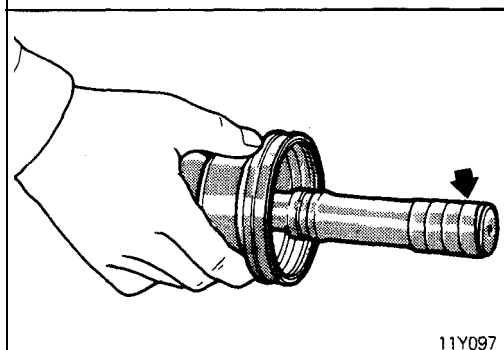
- (2) Use the special tool to remove the inner shaft from the center bearing bracket.

**11. REMOVAL OF CENTER BEARING**

Use the special tools to remove the center bearing from the center bearing bracket.

**17. REMOVAL OF T.J. BOOT / 20. B.J. BOOT**

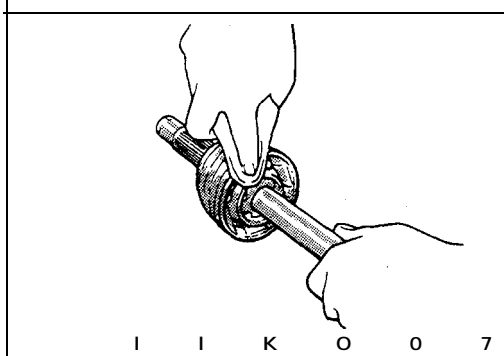
- (1) Wrap vinyl tape around the spline on the T.J. side of the drive shaft so that the T.J. and B.J. boots are not damaged when they are removed.
- (2) Withdraw the T.J. and B.J. boots from the drive shaft.

**22. REMOVAL OF GREASE FROM B.J. ASSEMBLY**

Wipe off grease from the B.J. assembly.

Caution

B.J. assembly cannot be disassembled.



INSPECTION

M26QGDD

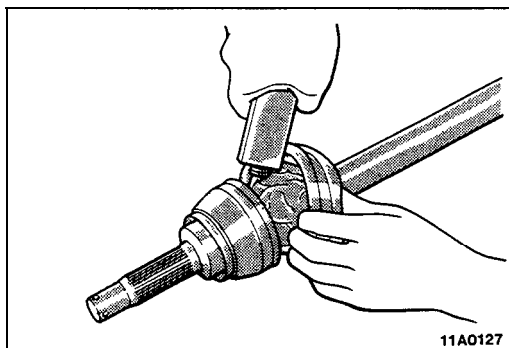
- Check the drive shaft for damage, bending or corrosion.
- Check the inner shaft for damage, bending or corrosion.
- Check the drive shaft splines for wear or damage.
- Check the inner shaft splines for wear or damage.
- Check for entry of water and/or foreign material into B.J.
- Check the spider assembly for roller rotation, wear or corrosion.
- Check the groove inside T.J. case for wear or 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.

SERVICE POINTS OF REASSEMBLY

M26QHDF

20. INSTALLATION OF B.J. BOOT / 17. T.J. BOOT

- (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.

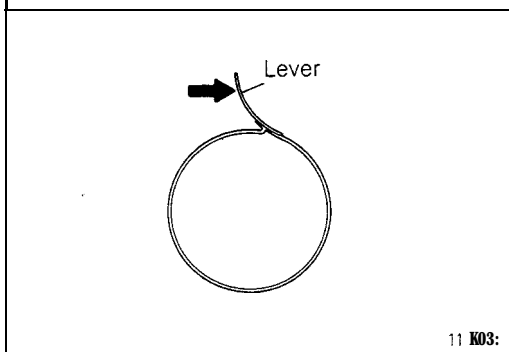
Specified grease: Repair kit grease

<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.

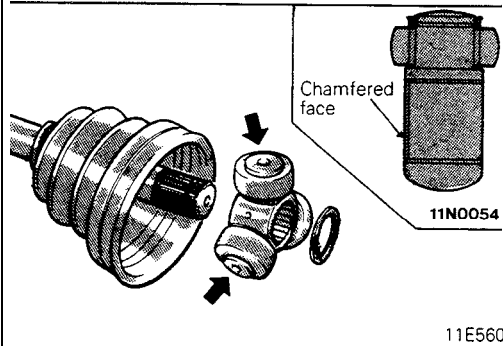
- (3) Secure the boot bands.



Models		FWD	AWD
		Boot band	
B.J. boot band	Large	20-22#BJ104	20-75#BJ100L
	Small	20-15#BJ104	20-72#BJ100
T.J. boot band	Large	20-131#BJ100	20-13 1 #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.



16. INSTALLATION OF SPIDER ASSEMBLY

- (1) Pack specified grease amply between the spider shaft and rollers of the spider assembly.

Specified grease: Repair kit grease

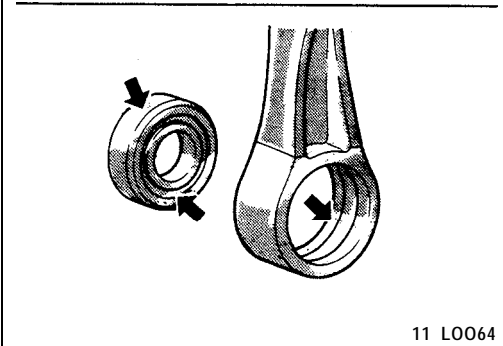
Caution

Special grease is used to lubricate the joint. Do not mix old and new grease or different types of grease.

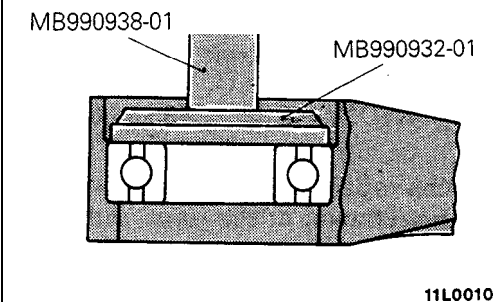
- (2) To install the spider assembly to the shaft, insert the shaft from the chamfered end of the spider.

11. INSTALLATION OF CENTER BEARING

- (1) Apply multipurpose grease to the center bearing and inside the center bearing bracket.



- (2) Use the special tools to press-fit the center bearing into the center bearing bracket.

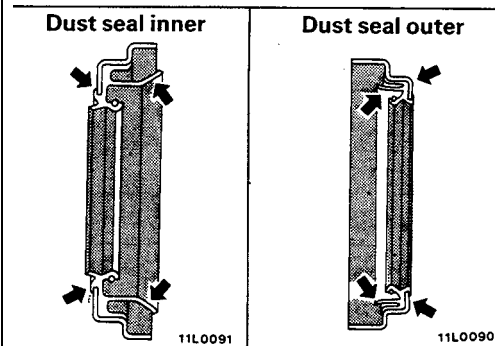


10.9. INSTALLATION OF DUST SEALS

- (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.)



- (2) Press the oil seal into the center bearing bracket using the special tool.

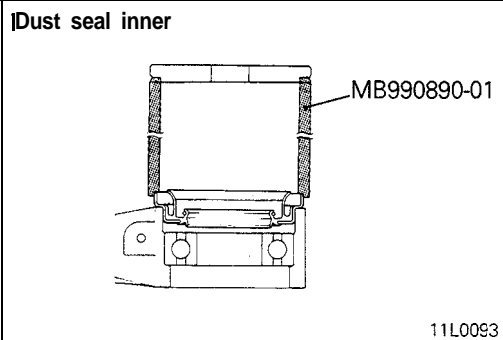
Caution

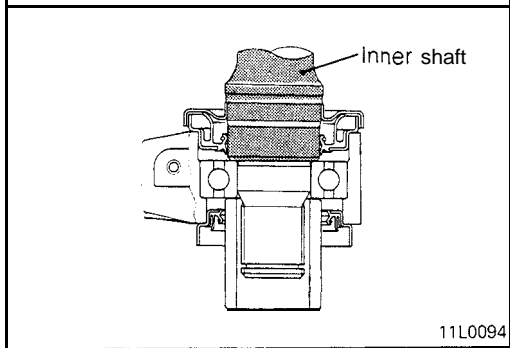
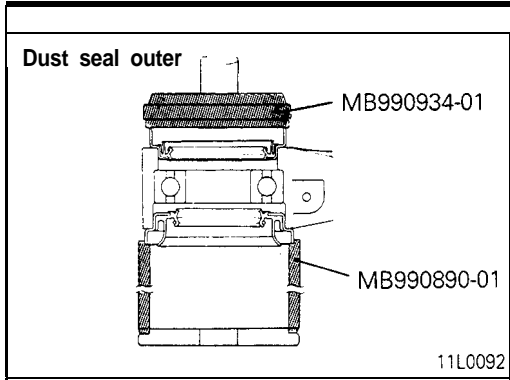
Take care not to damage the rubber part on the periphery of the dust seal.

- (3) Apply multipurpose grease to the lip of each dust seal.

NOTE

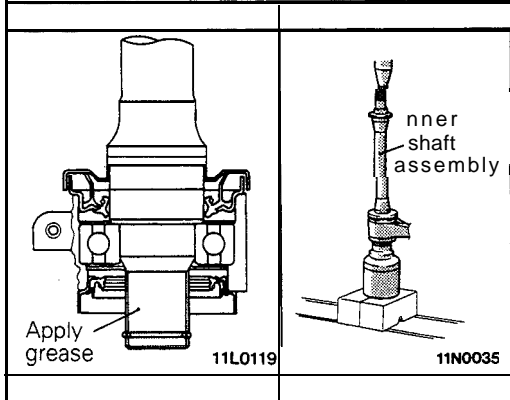
When applying grease, make sure that it does not adhere to anything outside the lip.





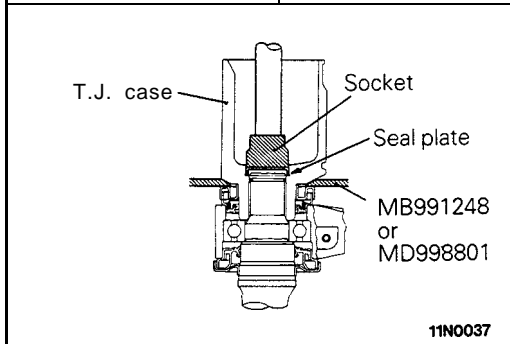
6. INSTALLATION OF INNER SHAFT

Use the pipe to hold the inner race of the center bearing and force the inner shaft into place.

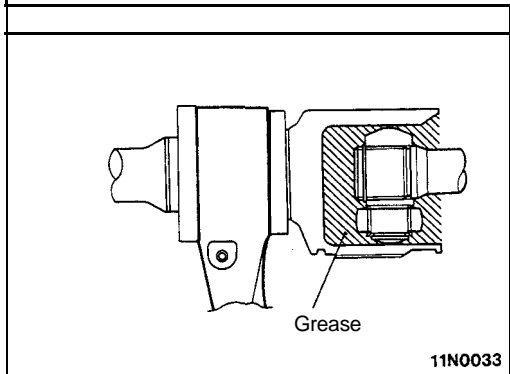


3. INSTALLATION OF T.J. CASE AND INNER SHAFT ASSEMBLY

(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.

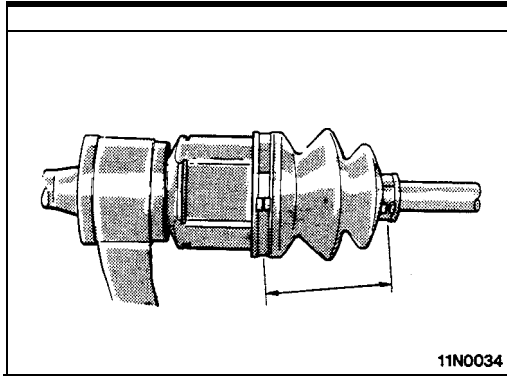


(3) Fill the specified grease furnished in the repair kit to the T.J. case.

**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.



2. 1. INSTALLATION OF T.J. BOOT BANDS

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: 85 ± 3 mm (3.35 ± .12 in.)

REAR AXLE

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M27AA- -

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DIFFERENTIAL CARRIER	24	Abnormal noise when cornering	
DRIVE SHAFT	18	Break down	
LSD CASE ASSEMBLY	39	Gear noise	
SERVICE ADJUSTMENT PROCEDURES	13	Gear oil leakage	
Gear Oil Level Check	13	Seizure	
Limited-Slip Differential Check	14	The limited slip differential does not function	
Rear Axle Total Backlash Check	13	Drive Shaft	
Rear Wheel Bearing End Play Check	13	Noise	
Rear Wheel Bearing Rotation Torque Check	14		
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Sealants and Adhesives	7	Rear Hub Rotary-sliding Resistance (Torque) Inspection	3
Service Specifications	7	Wheel Bearing End Play Inspection	3
TROUBLESHOOTING	11	SPECIFICATIONS	2
Axle Shaft		General Specifications	2
Grease leakage		Service Specifications	2
Noise while wheels are rotating		TROUBLESHOOTING	2
		Abnormal Sound	

REAR AXLE <FWD>**SPECIFICATIONS****GENERAL SPECIFICATIONS**

M27CA-A

Items	Specifications
Wheel bearing Type	Unit ball bearing

SERVICE SPECIFICATIONS

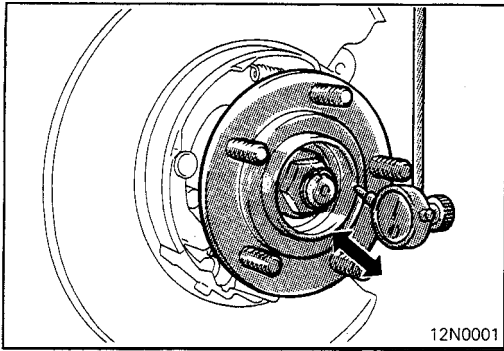
M27CB-A

Items	Specifications
Limit	
Wheel bearing end play mm (in.)	0.05 (.002) or less
Rear hub rotary-sliding resistance N (lbs.)	31 (7) or less
Rear hub rotary-sliding torque Nm (ft.lbs.)	1.8 (1.30) or less

TROUBLESHOOTING

M27EAAI

Symptom	Probable cause	Remedy
Abnormal sound	Loose wheel nuts	Tighten
	Damaged or worn wheel bearings Bent or distorted brake discs	Replace



SERVICE ADJUSTMENT PROCEDURES

WHEEL BEARING END PLAY INSPECTION M27FBAG

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

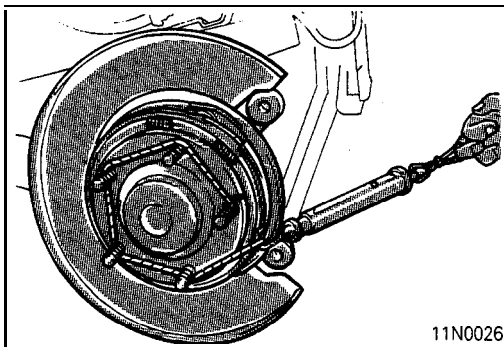
NOTE

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 (TORQUE) INSPECTION M27FFAD

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 (the rotary-sliding torque of the rear hub) is the standard value.

Limit:

Rear hub rotary-sliding resistance
31 N (7 lbs.) or less

Rear hub rotary-sliding torque
1.8 Nm (1.30 ft.lbs.) or less

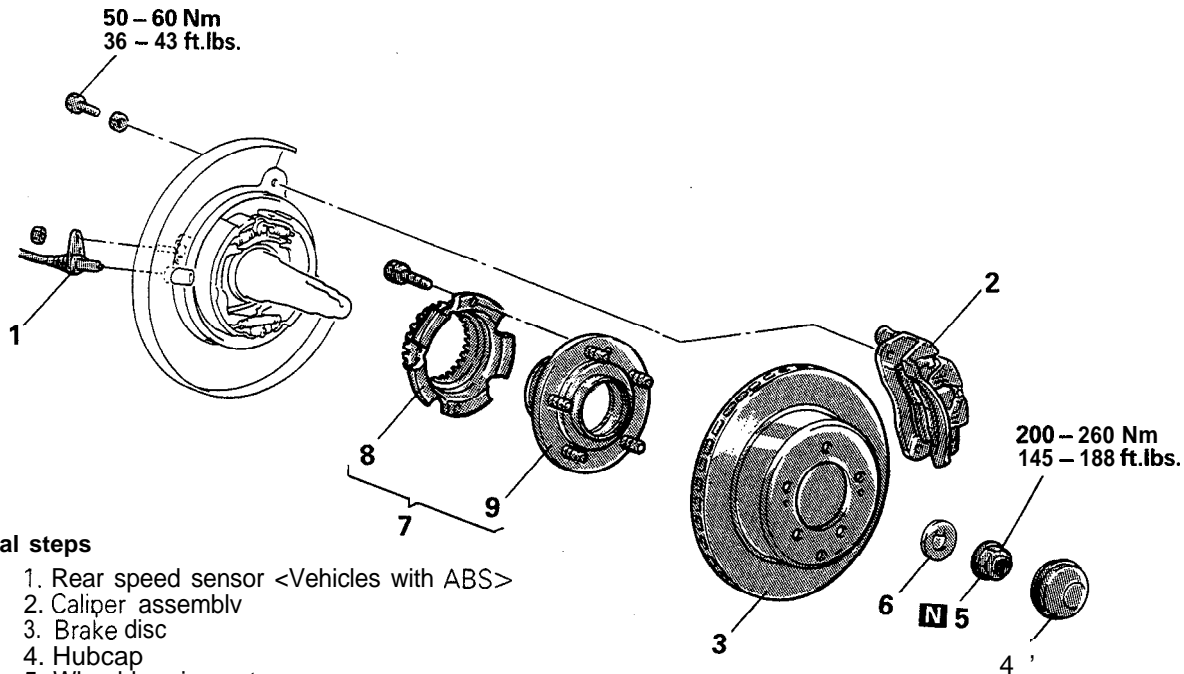
NOTE

If the limit value is exceeded, loosen the nut and then tighten it to the specified torque, and check the rear hub rotary-sliding torque again.

5. Replace the rear hub unit bearing if an adjustment cannot be made to within the limit.

REAR AXLE HUB REMOVAL AND INSTALLATION

M27MA--

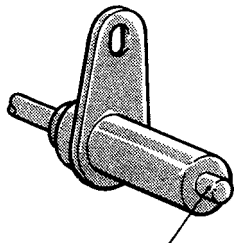


Removal steps

- ↔ 1. Rear speed sensor <Vehicles with ABS>
- ↔ 2. Caliper assembly
- 3. Brake disc
- 4. Hubcap
- * 5. Wheel bearing nut
- 6. Tongued washer
- 7. Rear hub assembly
- ↔ 8. Rear rotor <Vehicles with ABS>
- 9. Rear hub unit bearing

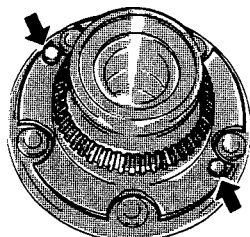
Caution
Rear hub unit bearing cannot be disassembled.

11N0018



Pole piece

14N0107



14N0099i

SERVICE POINTS OF REMOVAL

M27MBAC

1. REMOVAL OF REAR SPEED SENSOR <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.

2. REMOVAL OF CALIPER ASSEMBLY

Remove the caliper assembly and suspend it with a piece of wire.

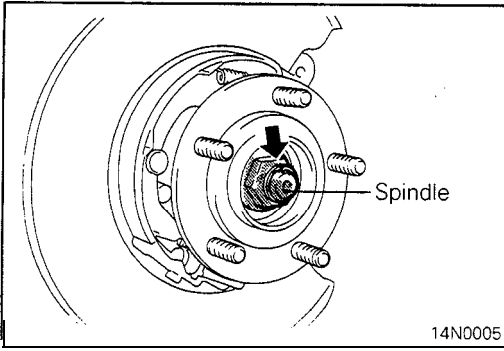
8. REMOVAL OF REAR ROTOR <VEHICLES WITH ABS>

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.

TSB Revision



SERVICE POINT OF INSTALLATION

M27MDAG

5. INSTALLATION OF WHEEL BEARING NUT

After tightening the wheel bearing nut, align with the spindle's indentation and crimp.

REAR AXLE <AWD>**SPECIFICATIONS****GENERAL SPECIFICATIONS**

M27CA-B

Items	Specifications
Axle shaft	
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. x I.D. mm (in.)	
Outer	72 x 35 (2.83 x 1.38)
Inner	58 x 28 (2.28 x 1.10)
Drive shaft	
Joint type	
Outer	B.J.
Inner	T.J.
Length (joint to joint) x diameter mm (in.)	395 x 28 (15.6 x 1.10)
Differential	
Reduction gear type	Hypoid gear
Reduction ratio	3.545
Differential gear type and configuration	
Side gear	Straight bevel gear x 2*
Pinion gear	Straight bevel gear x 4
Number of teeth	
Drive gear	39
Drive pinion	11
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.

B.J.: Birfield Joint

T.J.: Tripod Joint

SERVICE SPECIFICATIONS

M27CB-B

Items	Specifications
Standard value	
Rear wheel bearing rotation torque N (lbs.) [Nm (in.lbs.)]	12 (2.6) [0.7 (6)] or less
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 (1 – 2)
Limit	
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

M27CD--

Items	Specified lubricants	Quantity
Rear axle gear oil	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	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.)

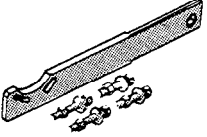
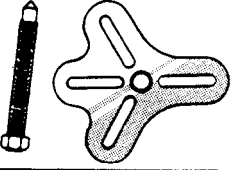
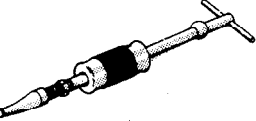
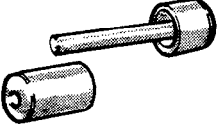
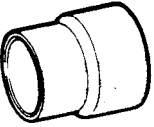

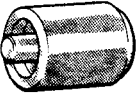

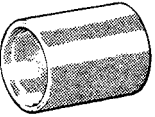
SEALANTS AND ADHESIVES

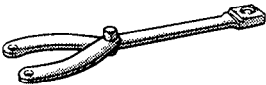
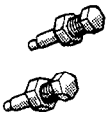
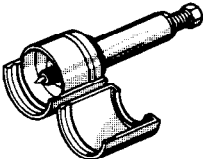




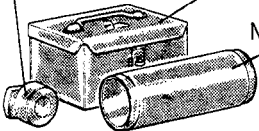
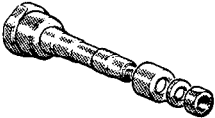
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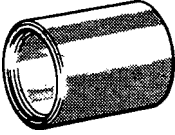



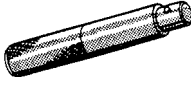

Items	Specified sealants and adhesives
Drive gear threaded hole	3M Stud Locking Part No. 4170 or equivalent
Vent plug	3M ATD Part No. 8663 or equivalent
Differential cover	

SPECIAL TOOLS

M27DA-

Tool	Number	Name	Use
	MB990767-01	End yoke holder	Removal of the axle shaft and companion flange
	MB990241-01	Axle shaft puller	
	MB990211-01	Sliding hammer with adapter	
	MB990641	Lower arm bushing installer and remover A	Driving-out and press-fitting of differential support member bushing
	MB990799-01	Ball joint dust shield installer	Press-fitting of rear axle shaft dust shield
	MB991380	Oil seal installer	Press-fitting of differential oil seal
	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	

Tool	Number	Name	Use
	MB991367	Special spanner	Removal and installation of side bearing nut
	MB991385	Pin	
	MB990339-01	Pinion carrier bearing puller	Removal of the side bearing inner race Removal of the drive pinion rear bearing inner race
	MIT303173	Insert	
	MIT44801	Collet set	
	MB990811-01	Side bearing cap remover step plate	Removal of the side bearing inner race
	MB99081 0-01	Side bearing puller	Removal of the drive pinion
 MB991366* MB991379 MB991378 MB991365		Drive pinion setting gauge set	Drive pinion height adjustment (Use head of MB990903 in place of head marked *)
	MB990903	Dammy pinion	

Tool	Number	Name	Use
	M B990890	Rear suspension bushing base	Press-fitting of drive gear (for 4WS)
	MB990802-01	Bearing installer	Pressing of drive pinion rear bearing inner race Pressing of side bearing inner race
	MB991168	Drive pinion oil seal installer	Press-fitting of the drive pinion oil seal
	MB990925-01	Bearing and oil seal installer set	Installation of drive pinion rear bearing outer race Installation of drive pinion front bearing outer race MB990932-01 MB990935-01 MB990938-01
	MB990938-01	Handle	Removal of axle shaft inner bearing MB990928-01 M B990938-01 Installation of axle shaft inner bearing MB990931-01 MB990938-01
	MB991 294	Side gear holding tool	Inspection of differential gear backlash

TROUBLESHOOTING

M27EAAH

Symptom	Probable cause	Remedy
4XLE SHAFT Noise while wheels are rotating	Brake drag Bent axle shaft Worn or scarred axle shaft bearing	Replace
	Grease leakage	Worn or damaged oil seal Malfunction of bearing seal
DRIVE SHAFT Noise	Wear, play or seizure of ball joint Excessive drive shaft spline looseness	Replace
DIFFERENTIAL (LIMITED SLIP DIFFERENTIAL) Abnormal noise during driving or gear changing	Excessive final drive gear backlash Insufficient drive pinion preload	Adjust
	Excessive differential gear backlash	Adjust or replace
	Worn spline of a side gear	Replace
	Loose companion flange self-locking nut	Retighten or replace
<p>NOTE 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.</p>		
Abnormal noise when cornering	Damaged differential gears Damaged pinion shaft	Replace
	Insufficient gear oil quantity	Replenish
Gear noise	Improper final drive gear tooth contact adjustment	Adjust or replace
	Incorrect final drive gear backlash Improper drive pinion preload adjustment	Adjust
	Damaged, broken, and/or seized tooth surfaces of the drive gear and drive pinion Damaged, broken, and/or seized drive pinion bearings Damaged, broken, and/or seized side bearings Damaged differential case inferior gear oil	Replace
	Insufficient gear oil quantity	Replenish
<p>NOTE 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.</p>		

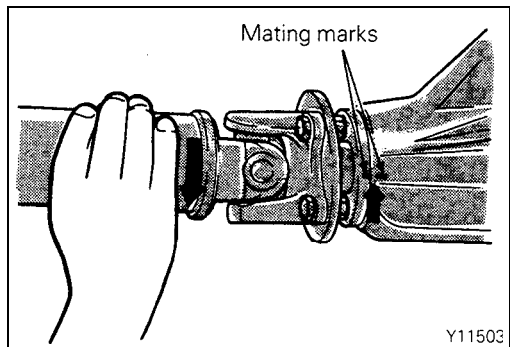
Symptom	Probable cause	Remedy
Gear oil leakage	Worn or damaged front oil seal, or an improperly installed oil seal Damaged gasket	Replace
	Loose companion flange self-locking nut	Retighten or replace
	Loose filler or drain plug	Retighten or apply adhesive
	Clogged or damaged vent plug	Clean or replace
Seizure	Insufficient final drive gear backlash Excessive drive pinion preload Excessive side bearing preload Insufficient differential gear backlash Excessive clutch plate preload	Adjust
	Inferior gear oil	Replace
	Insufficient gear oil quantity	Replenish
<p>NOTE 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.</p>		
Break down	Incorrect final drive gear backlash Insufficient drive pinion preload Insufficient side bearing preload Excessive differential gear backlash	Adjust
	Loose drive gear clamping bolts	Retighten
<p>NOTE In addition to disassembling and replacing the failed parts, be sure to check all components for irregularities and repair or replace as necessary.</p>		
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

SERVICE ADJUSTMENT PROCEDURES**REAR AXLE TOTAL BACKLASH CHECK**

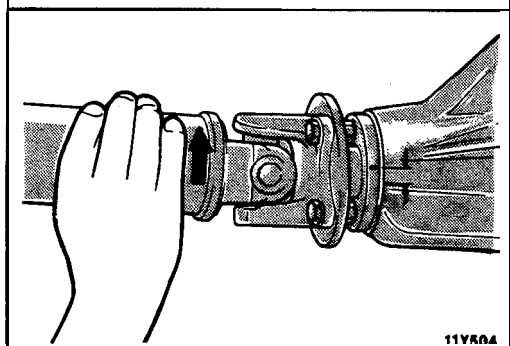
M27FAAG

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.



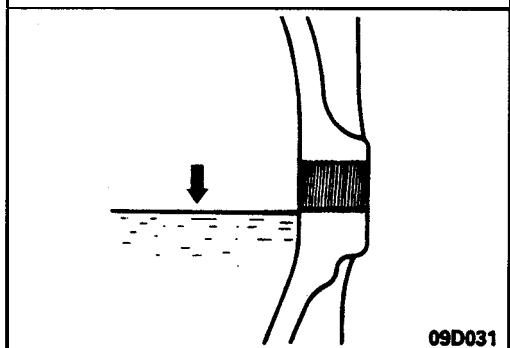
- (2) Manually turn the propeller shaft clockwise as far as it will go and make mating marks on the companion flange dust shield and the differential carrier.



- (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.27-26.)

**GEAR OIL LEVEL CHECK**

M27FCAG

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

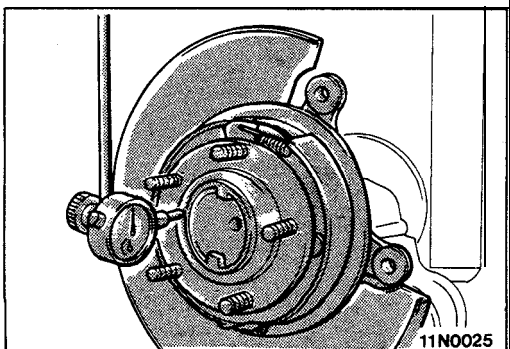
Above -23°C (-10°F): SAE 90, 85W-90, 80W-90

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

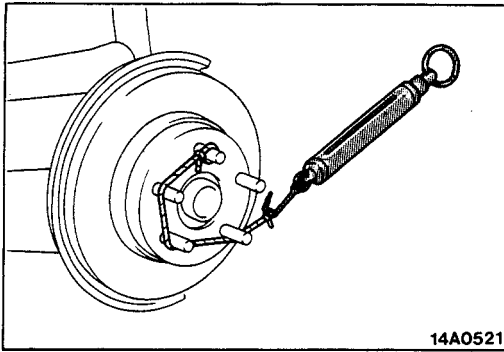
M27FBAF



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.



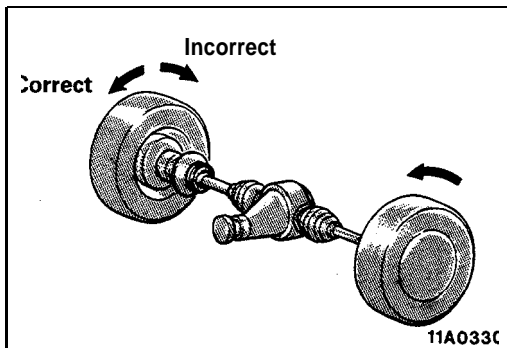
REAR WHEEL BEARING ROTATION TORQUE CHECK

M27FIAB

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 rotation torque (rotation starting torque) to see whether it is within the standard value.

Standard value: 12 N (2.6 lbs.) [rotation starting torque 0.7 Nm (6 in.lbs.)] or less

4. If the rotation starting torque exceeds the standard value, check the tightening torque of the axle shaft companion flange. If it is normal, replace the bearing.



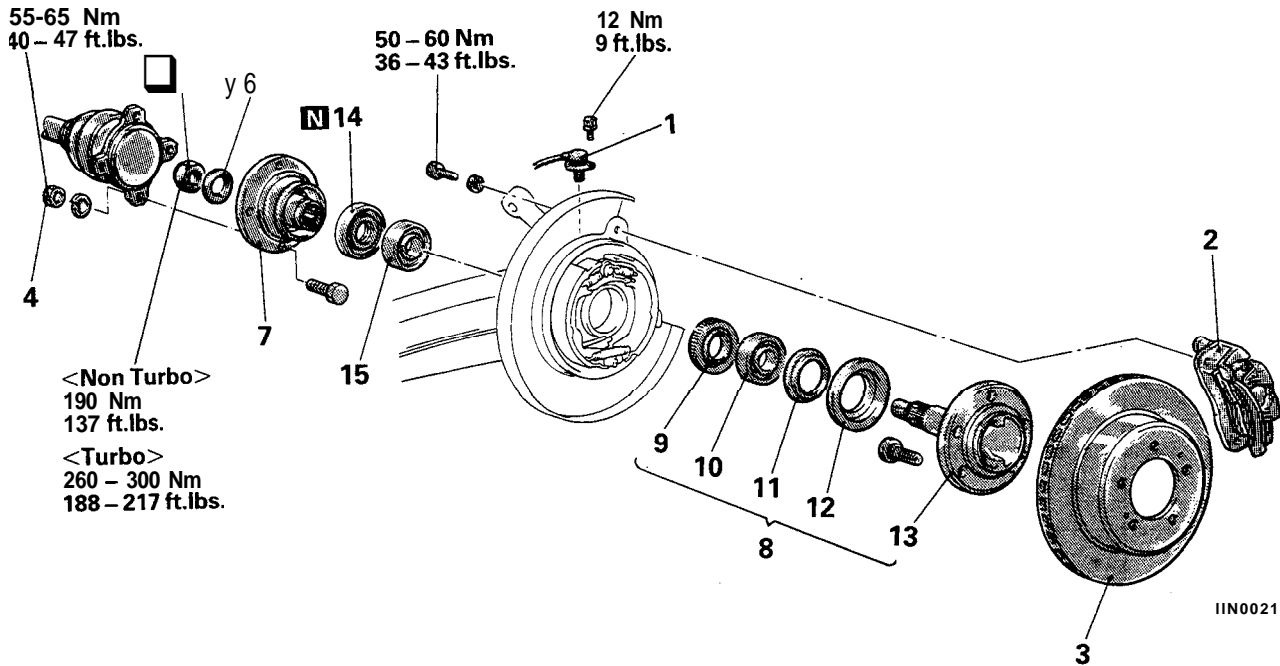
LIMITED-SLIP DIFFERENTIAL CHECK

M27FIAB

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.

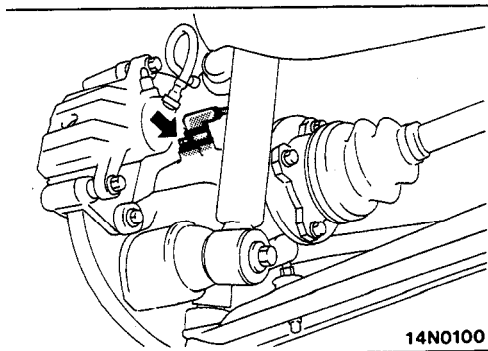
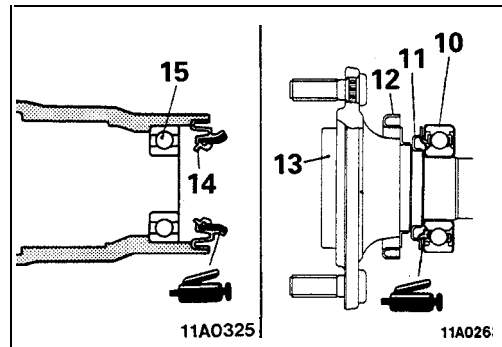
**AXLE SHAFT
REMOVAL AND INSTALLATION**

M27HA -



Removal steps

- ☒ 1. Rear speed sensor
<Vehicles with A.B.S.>
- ⇄ 2. Brake caliper assembly
- 3. Brake disc
- ⇄ 4. Drive shaft mounting nut
- ⇄ • * 5. Self-locking nut
- 6. Washer
- 7. Companion flange
- ☒ 8. Axle shaft assembly
- ⇄ • + 9. Rear rotor
<Vehicles with A.B.S.>
- ⇄ • + 10. Outer bearing
- ⇄ • a 11. Dust shield
- a 12. Dust shield
- 13. Axle shaft
- * • ⇄ 14. Oil seal
- * • ⇄ 15. Inner bearing



SERVICE POINTS OF REMOVAL

M27HBAQ

1. REMOVAL OF REAR SPEED SENSOR <VEHICLES WITH A.B.S.>

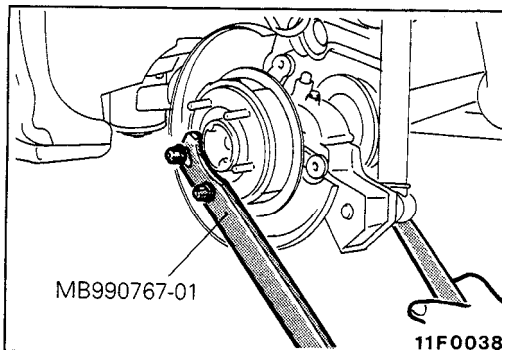
Caution

Be cautious to ensure that the tip of the pole piece does not come in contact with other parts when removing the speed sensor.

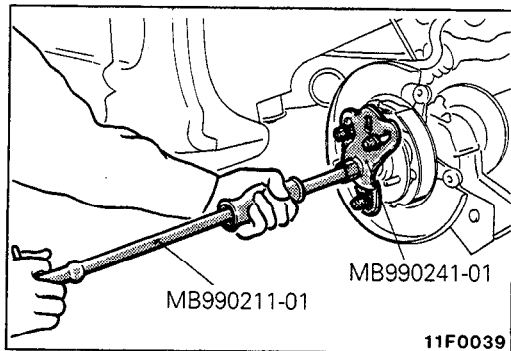
2. REMOVAL OF BRAKE CALIPER ASSEMBLY

Remove the brake caliper assembly and suspend it with a piece of wire.

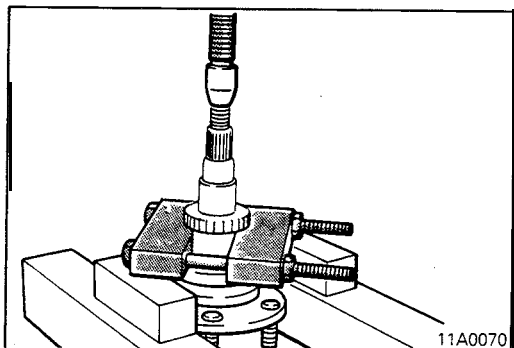
TSB Revision

**5. REMOVAL OF SELF-LOCKING NUT**

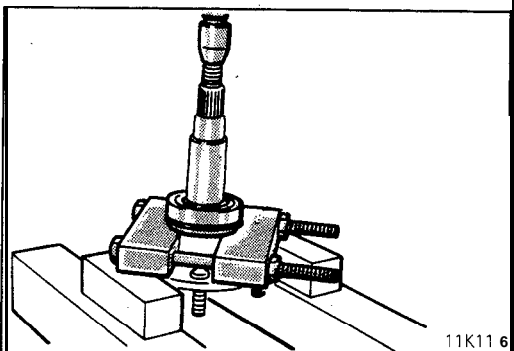
With the special tool, secure the axle shaft and remove the companion flange self-locking nut.

**8. REMOVAL OF AXLE SHAFT ASSEMBLY**

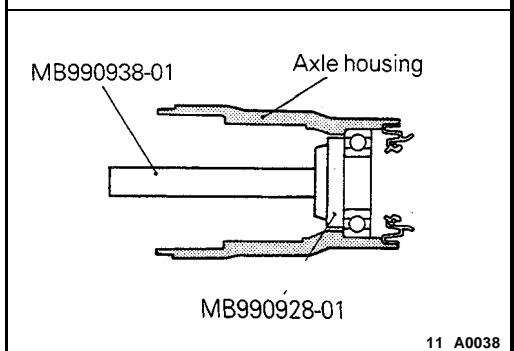
With the special tool, remove the axle shaft from the axle housing.

**9. REMOVAL OF REAR ROTOR <VEHICLES WITH A.B.S.>**

Remove the rear rotor from the axle shaft.

**10. REMOVAL OF OUTER BEARING / 1.1. DUST SHIELD**

Remove the outer bearing and dust shield concurrently from the axle shaft.

**14. REMOVAL OF OIL SEAL / 15. INNER BEARING**

With the special tool, remove the inner bearing and oil seal from the axle housing.

INSPECTION

M27HCAG

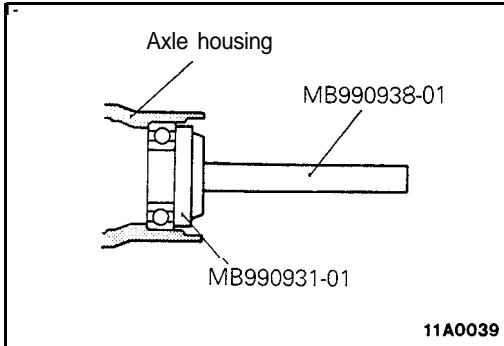
- Check the companion flange for wear or damage.
- Check the dust shield for deformation or damage.
- Check the wheel bearings for burning or discoloration.
- Check the wheel bearing for unsmooth rotation.
- Check the axle shaft for cracking, wear or damage.
- Check oil seal for cracking or damage.

M27HDAS

SERVICE POINTS OF INSTALLATION

15. INSTALLATION OF INNER BEARING

With the special tool, press fit the inner bearing onto the axle housing.



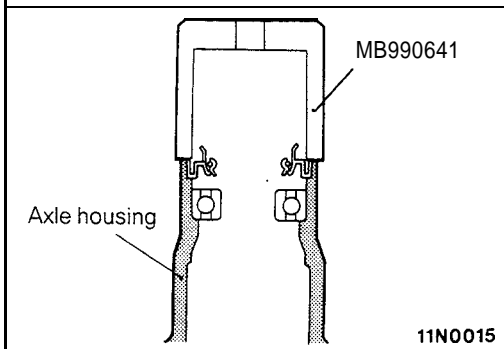
14. INSTALLATION OF OIL SEAL

(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.

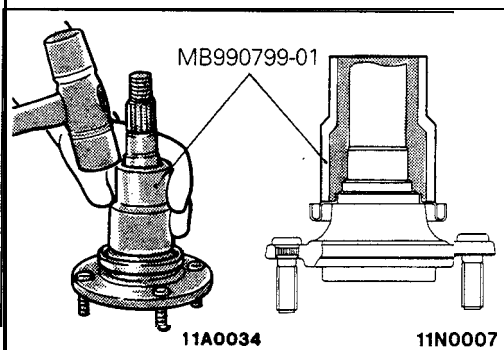


12. INSTALLATION OF DUST SHIELD

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.

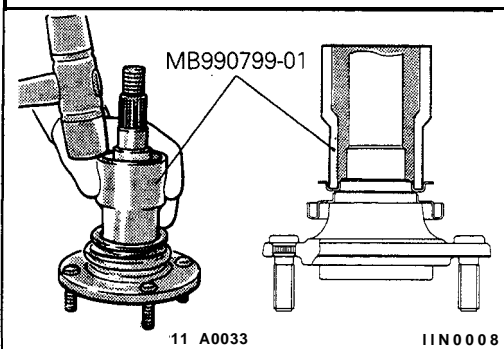


I I. INSTALLATION OF DUST SHIELD

With the special tool, install the dust shield so that the depression is facing upward.

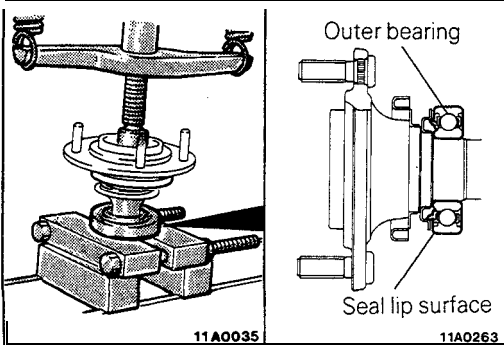
NOTE

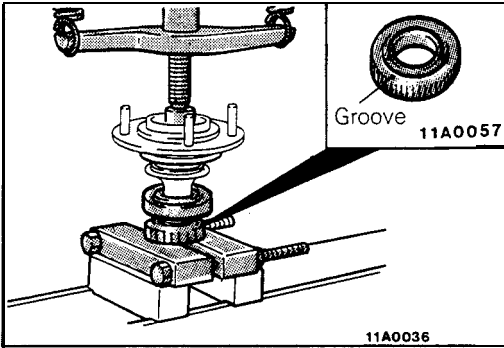
When tapping the oil seal in, use a plastic hammer to lightly tap the top and circumference of the special tool, press fitting gradually and evenly.



IO. INSTALLATION OF OUTER BEARING

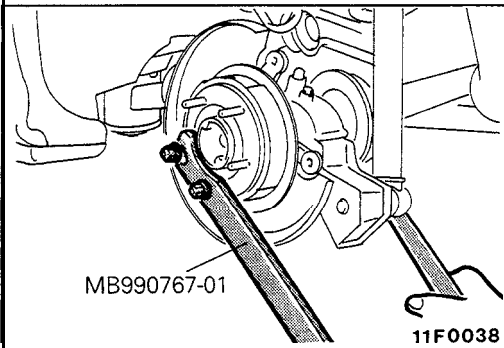
- (1) Apply multipurpose grease around the entire circumference of the inner side of the outer bearing seal lip.
- (2) Press fit the outer bearing to the axle shaft so that the bearing seal lip surface is facing towards the axle shaft flange.





9. INSTALLATION OF REAR ROTOR <VEHICLES WITH A.B.S.>

Press fit the rear rotor to the axle shaft with the rear rotor groove surface toward the axle shaft flange.



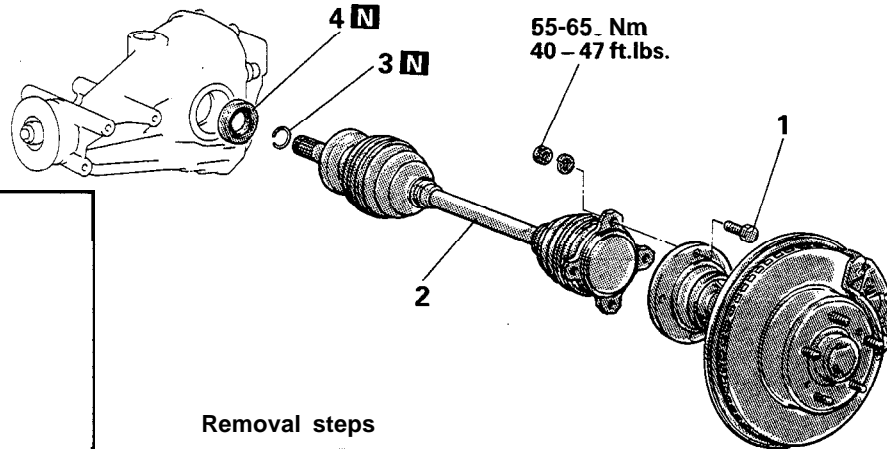
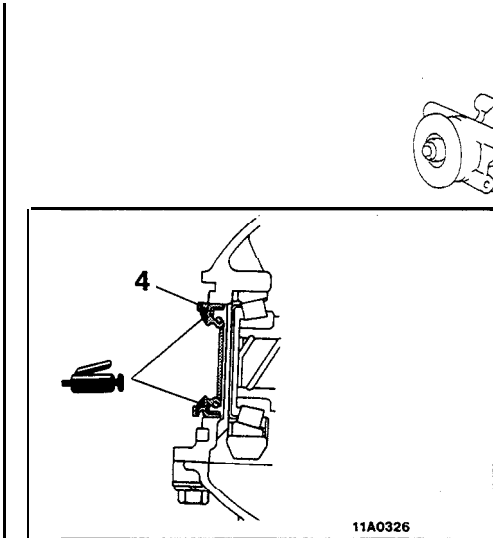
5. INSTALLATION OF SELF-LOCKING NUT

With the special tool, secure the axle shaft and tighten the companion flange self-locking nut.

DRIVE SHAFT

M27JA--

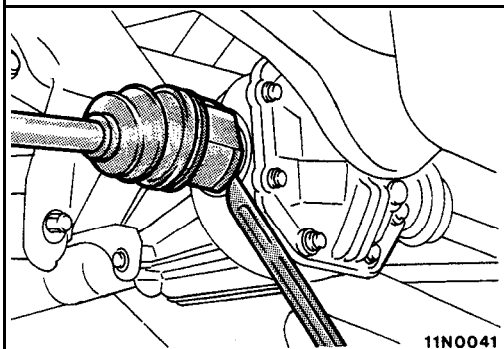
REMOVAL AND INSTALLATION



Removal steps

- 1. Bolt
- ◄ ● 4 2. Driveshaft
- 3. Circlip
- * 4. Oil seal

IINO020



SERVICE POINT OF REMOVAL

M27JBAE

2. REMOVAL OF DRIVE SHAFT

Using a tire lever, etc. remove the drive shaft from the differential carrier.

INSPECTION

M27JHAB

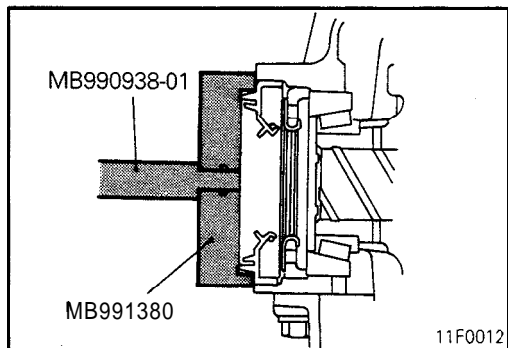
- Check the drive shaft boots for damage or deterioration.
- Check the ball joints for excessive play or check operation.
- Check the drive shaft spline for wear or damage.

SERVICE POINTS OF INSTALLATION

M27JCAG

4. INSTALLATION OF OIL SEAL

- (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.



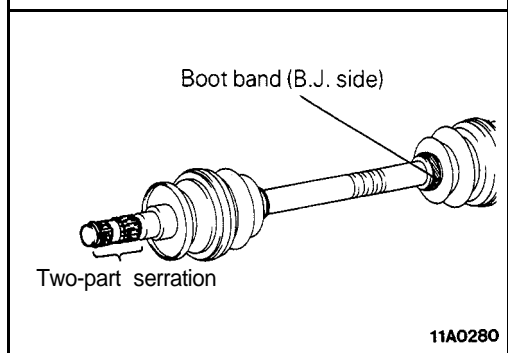
2. INSTALLATION OF DRIVE SHAFT

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).

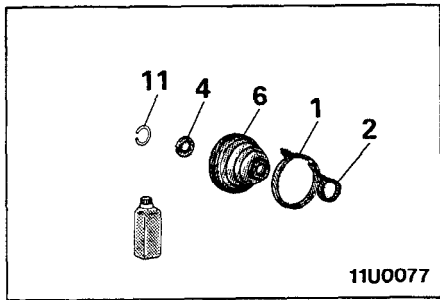


Item	Drive shaft	
	LH	RH
Boot band (B.J. side) identification color	White	Blue

Caution

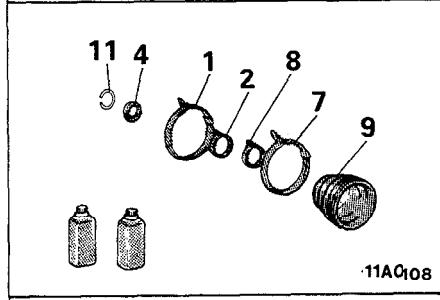
Be sure to thoroughly remove any oil or grease, etc. from the threaded part of the bolt and nut used for installation to the companion flange, because any oil, grease, etc. on these parts might cause later loosening even though tightening is at the specified torque.

DISASSEMBLY AND REASSEMBLY



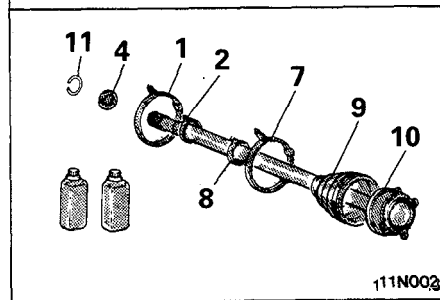
11U0077

T.J. boot repair kit



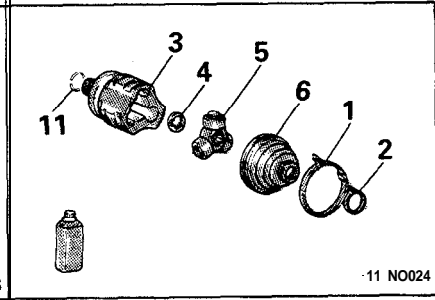
11A0108

B.J. boot repair kit



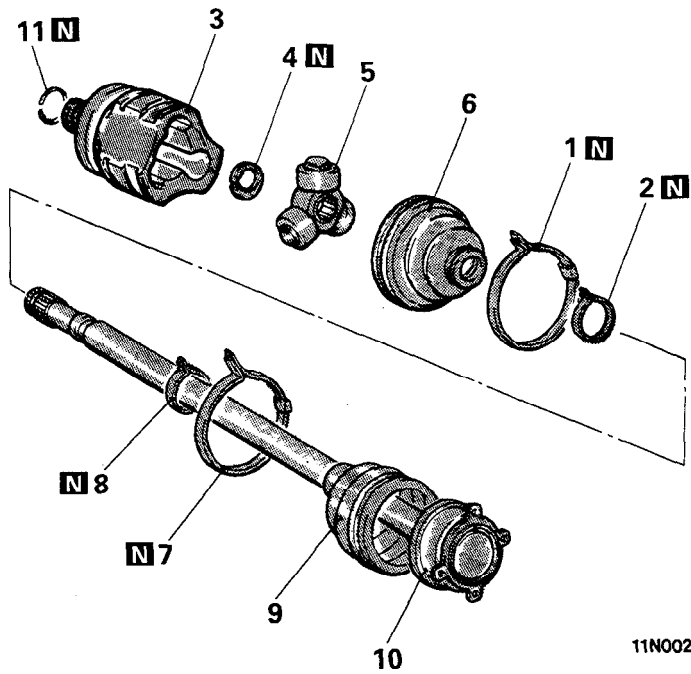
111N0023

B.J. repair kit



11 N0024

T.J. repair kit



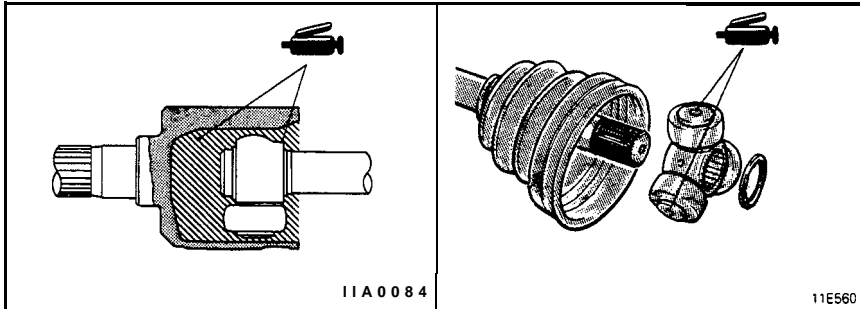
11N0022

Disassembly steps

- ◆◆ 1. T.J. boot band (large)
- ◆◆ 2. T.J. boot band (small)
- ◆◆ 3. T.J. case
- ◆◆ 4. Snap ring
- ◆◆◆◆ 5. Spider assembly
- ◆◆◆◆ 6. T.J. boot

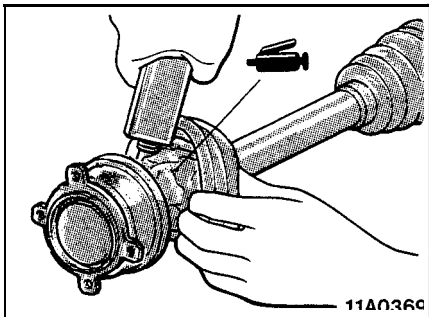
- ◆ + 7. B.J. boot band (large)
- ◆◆ 8. B.J. boot band (small)
- ◆◆ ◆ * 9. B.J. boot
- ◆◆ 10. B.J. assembly.
- ◆◆ 11. Circlip

Lubrication Points



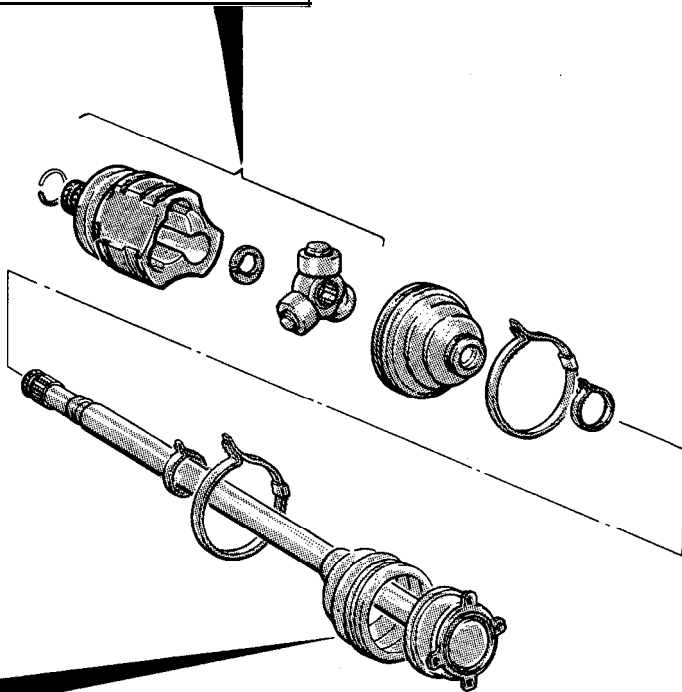
Grease: Repair kit grease
Quantity to use: 135 g (4.76 oz.)

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.

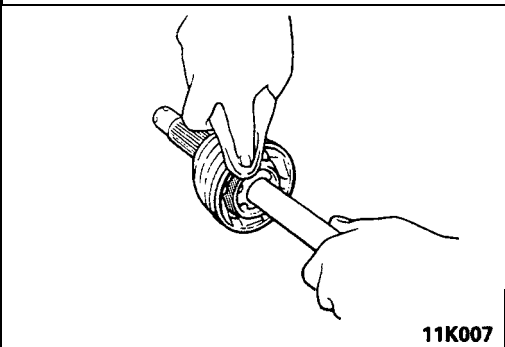
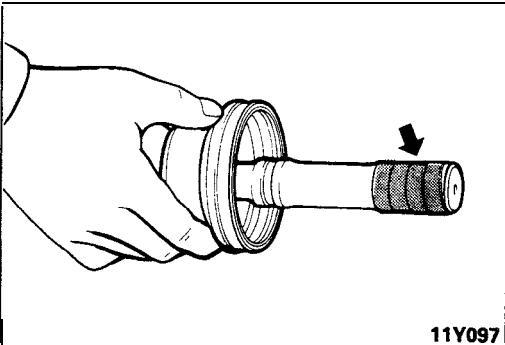
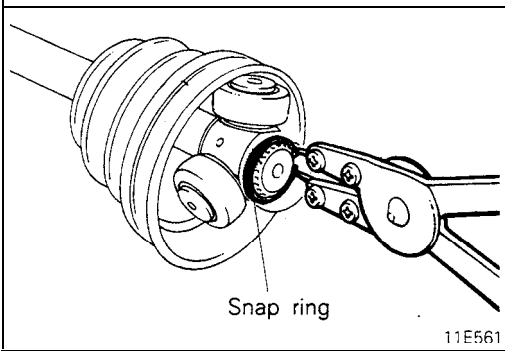


Grease: Repair kit grease
Quantity to use: 125 g (4.41 oz.)

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.



11N0022



SERVICE POINTS OF DISASSEMBLY

M27JEAD

4. REMOVAL OF SNAP RING / 5. SPIDER ASSEMBLY

- (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.

6. REMOVAL OF T.J. BOOT / 9. B.J. BOOT

- (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.

10. REMOVAL OF GREASE FROM B.J.

Wipe out the grease from the B.J.

Caution

Do not disassemble the B.J.

INSPECTION

M27JFAD

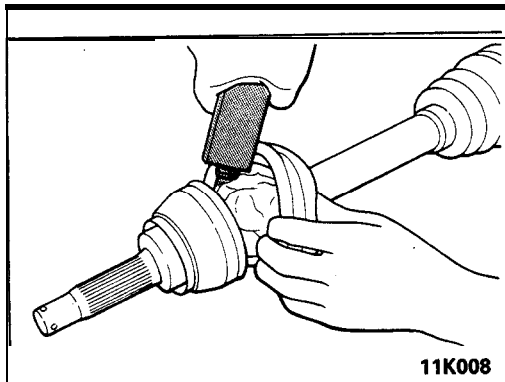
- Check the drive shaft for damage, bending or corrosion.
- Check the drive shaft spline part for wear or damage.
- Check for entry of water and/or foreign material into B.J.
- Check the spider assembly for roller rotation, wear or corrosion.
- Check the groove inside T.J. case for wear or corrosion.
- Check the boots for deterioration, damage or cracking.

SERVICE POINTS OF REASSEMBLY

M27JGAE

9. INSTALLATION OF B.J. BOOT / 8. B.J. BOOT BAND (SMALL) / 7. B.J. BOOT BAND (LARGE) / 6. T.J. BOOT

- (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 (4.4102.)

Caution

The grease in the repair kit should be divided in half for use, respectively, at the joint and inside the boot.

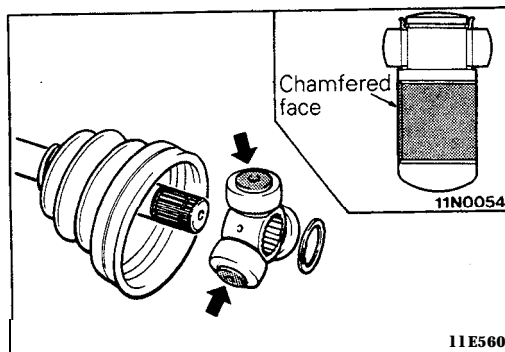
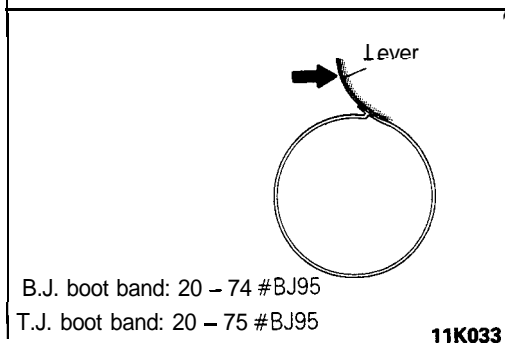
A special type of grease is used on the joint. Be cautious to ensure that not other grease is allowed to come in contact with the joint.

- (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.

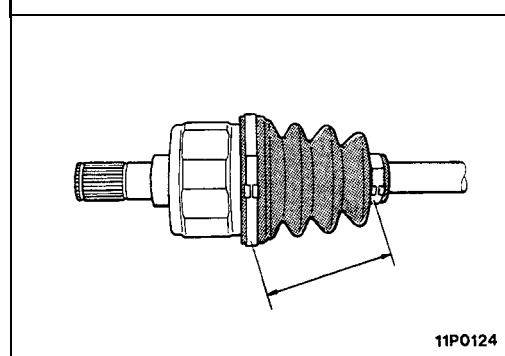


5. INSTALLATION OF SPIDER ASSEMBLY

- (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.



2. 1. INSTALLATION OF T.J. BOOT BANDS

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.

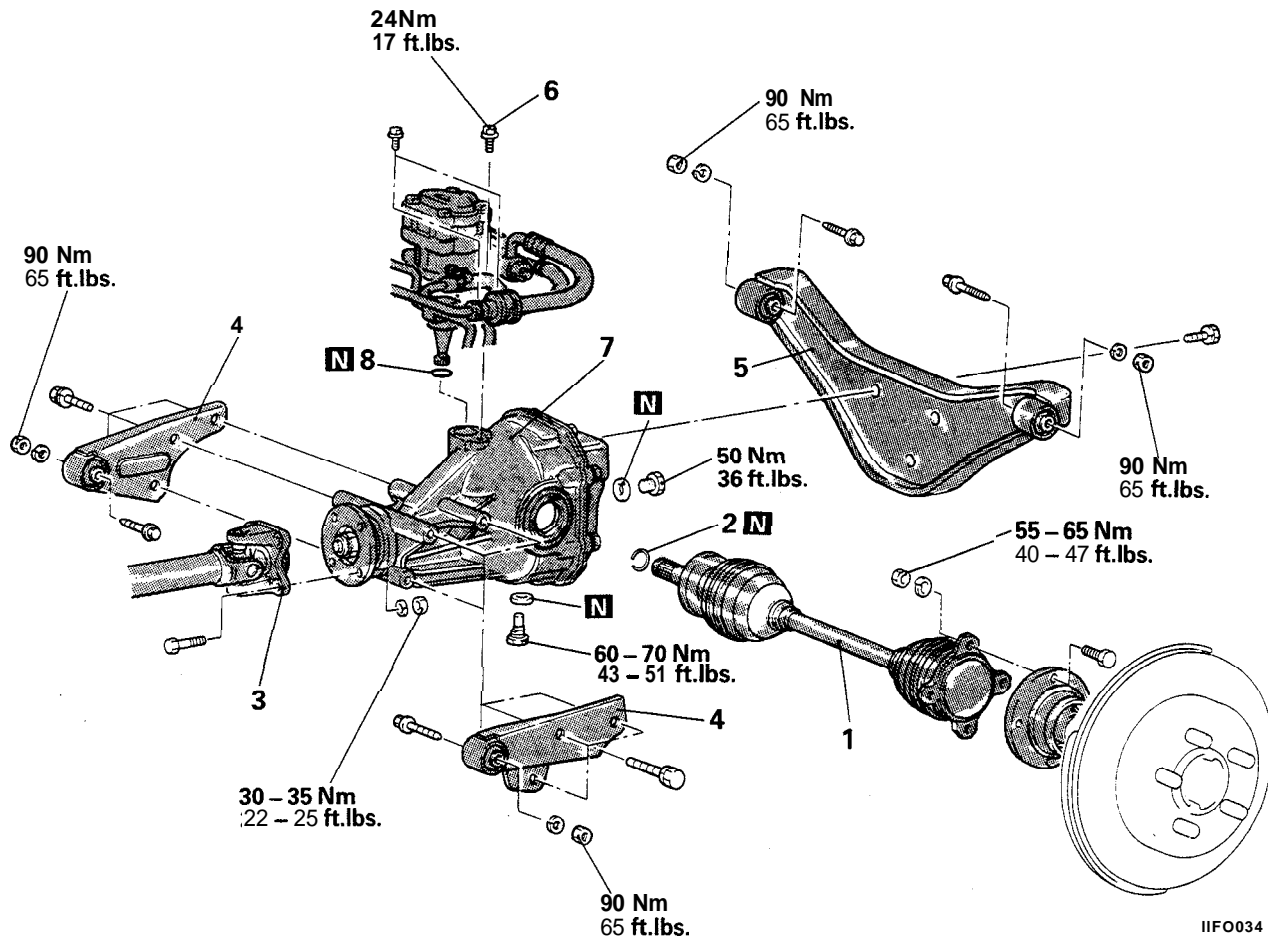
Standard value: 85 ± 3 mm (3.35 ± .12 in.)

DIFFERENTIAL CARRIER

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

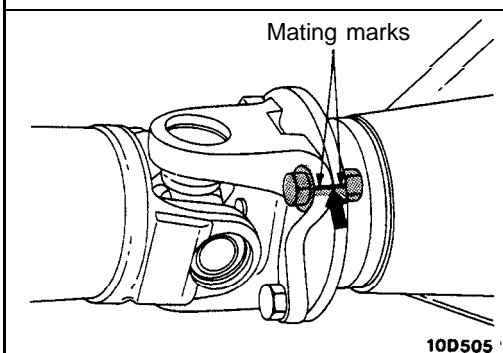
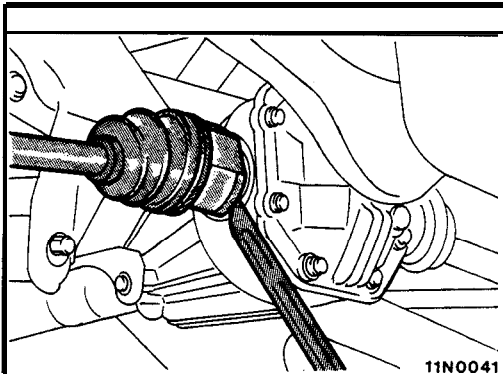
- Draining and Filling of Differential Gear Oil
(Refer to Group 00 – Maintenance Service.)
- Removal and Installation of Main Muffler
(Refer to Group 15 – Exhaust Pipe and Muffler.)



IIF0034

Removal steps

- ◆◆ 1. Drive shaft
- ◆◆ 2. Circlip
- • a 3. Propeller shaft connection
- • a 4. Differential support assembly
- • a 5. Differential support member assembly
- • * 6. Rear wheel oil pump installation bolt
- • * 7. Differential carrier
- • * 8. O-ring



SERVICE POINTS OF REMOVAL

M271BAM

1. REMOVAL OF DRIVE SHAFT

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.

3. DISCONNECTION OF PROPELLER SHAFT

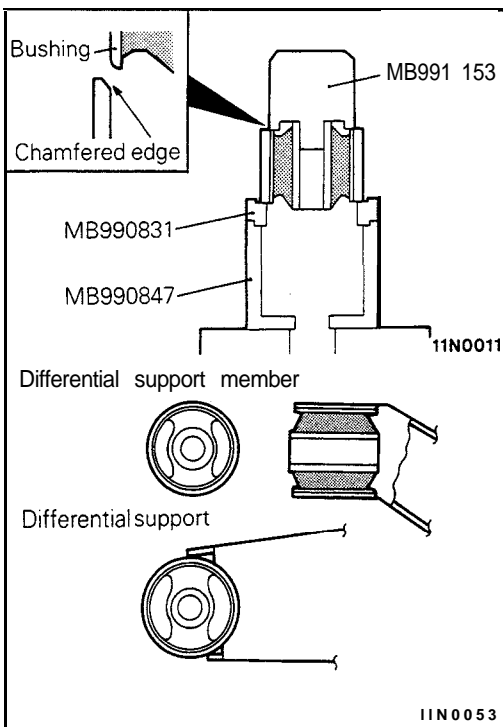
- (1) Make mating marks on the differential companion flange and the propeller shaft flange yoke for reference during reassembly.
- (2) Remove the differential carrier and propeller shaft connection.
- (3) Support the propeller shaft with wire.

7. REMOVAL OF DIFFERENTIAL CARRIER

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

M271YAB

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.

SERVICE POINTS OF INSTALLATION

M271DAL

7. INSTALLATION OF DIFFERENTIAL CARRIER

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.

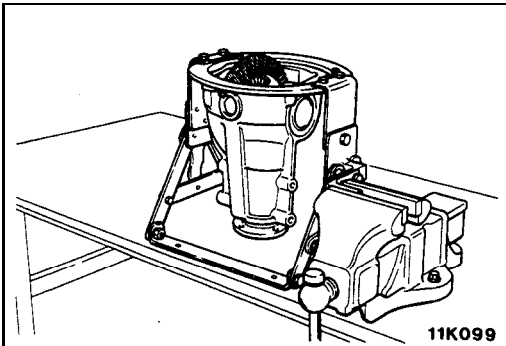
3. CONNECTION OF PROPELLER SHAFT

Align the mating marks on the flange yoke and the companion flange to install the propeller shaft.

INSPECTION BEFORE DISASSEMBLY

M271EAJ

Hold the working base in a vice, and attach the differential carrier to the working base.



11K099

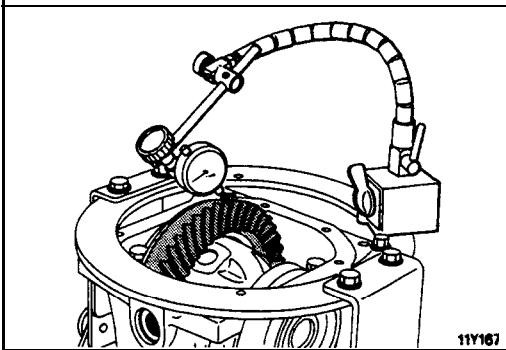
FINAL DRIVE GEAR BACKLASH

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.)

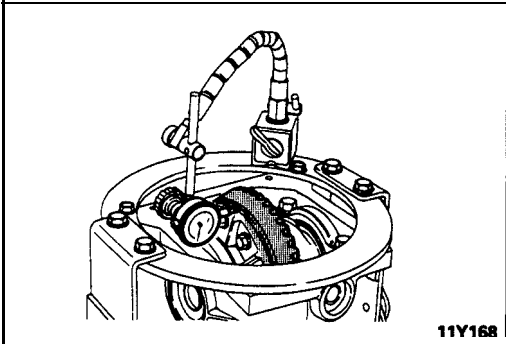


11Y167

DRIVE GEAR RUNOUT

Measure the drive gear runout at the shoulder on the reverse side of the drive gear.

Limit: 0.05 mm (.002 in.)

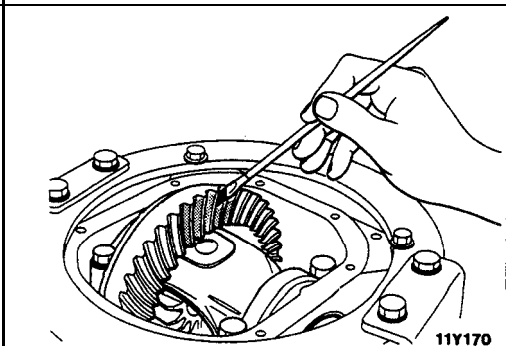


11Y168

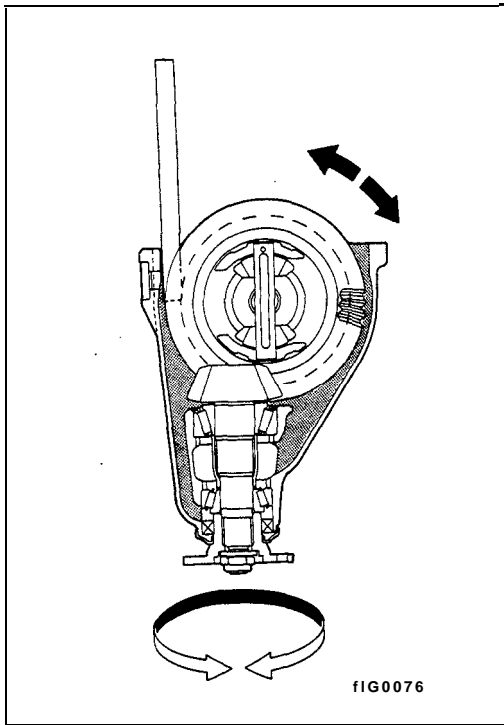
FINAL DRIVE GEAR TOOTH CONTACT

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.



11Y170



- (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.

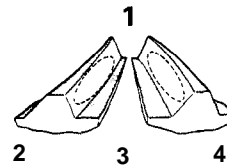
Caution

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

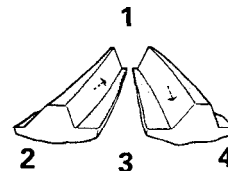
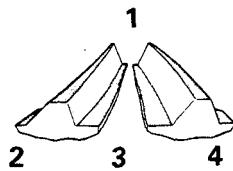
- 1 Narrow tooth side
- 2 Drive-side tooth surface (the side applying power during forward movement)
- 3 Wide tooth side
- 4 Coast-side tooth surface (the side applying power during reverse movement)



Problem

Solution

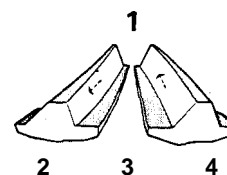
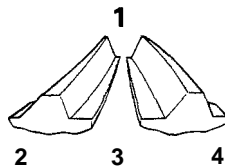
Tooth contact pattern resulting from excessive pinion height



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.

11 S642

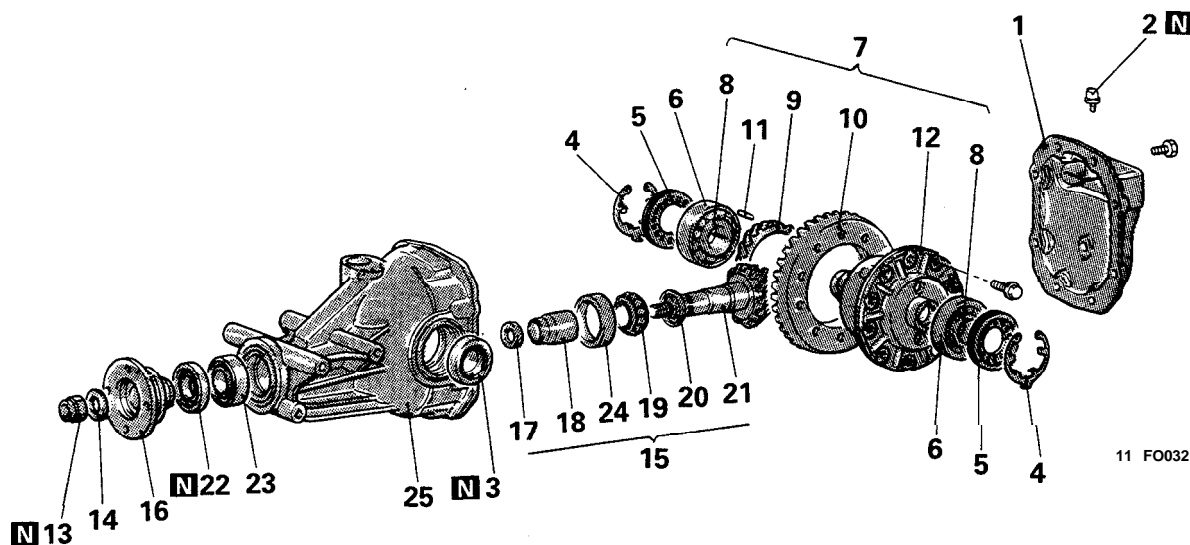
- NOTE
- (1) Tooth contact pattern is a method for judging the result of the adjustment of drive pinion height and final drive gear backlash. The adjustment of drive pinion height and final drive gear backlash should be repeated until tooth contact patterns bear a similarity to the standard tooth contact 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.

DISASSEMBLY

M271F-

inspection Before Disassembly

- Final Drive Gear Backlash
(Refer to P.27-26.)
- Drive Gear Runout
(Refer to P.27-26.)
- Final Drive Gear Tooth Contact
(Refer to P.27-26.)



Disassembly steps

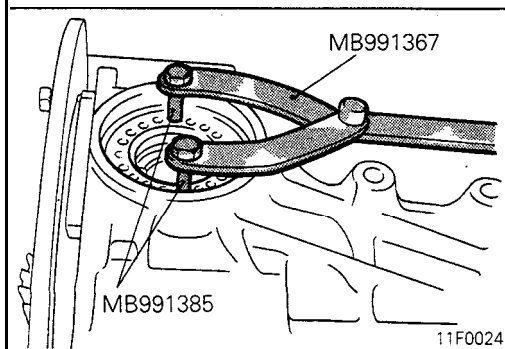
- | | | |
|-----------------------------------|---|--|
| 1. Differential cover assembly | ↔ | 15. Drive pinion assembly |
| 2. Vent plug | | 16. Companion flange |
| 3. Oil seal | | 17. Drive pinion front shim
(for preload adjustment) |
| ↔ 4. Snap ring | | 18. Drive pinion spacer |
| ↔ 5. Side bearing nut | ↔ | 19. Drive pinion rear bearing inner race |
| ↔ 6. Side bearing outer race | | 20. Drive pinion rear shim
(for pinion height adjustment) |
| ↔ 7. Differential case assembly | | 21. Drive pinion |
| ↔ 8. Side bearing inner race | | ↔ 22. Oil seal |
| ↔ 9. Drive gear (for 4WS) | | ↔ 23. Drive pinion front bearing |
| ↔ 10. Drive gear | | ↔ 24. Drive pinion rear bearing outer race |
| ↔ 11. Spring pin (for 4WS) | | 25. Differential carrier |
| ↔ 12. LSD case (refer to P.2759.) | | |
| ↔ 13. Self-locking nut | | |
| ↔ 14. Washer | | |

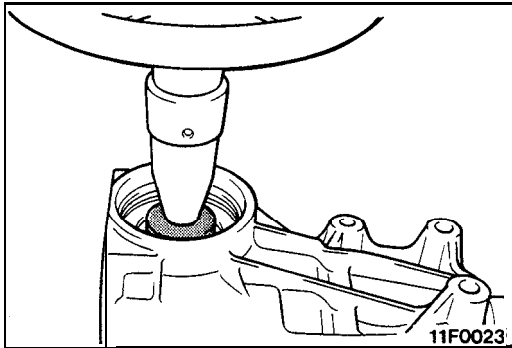
SERVICE POINTS OF DISASSEMBLY

M271GBD

5. REMOVAL OF SIDE BEARING NUT

Using the special tool, remove the side bearing nut.





6. REMOVAL OF SIDE BEARING OUTER RACE

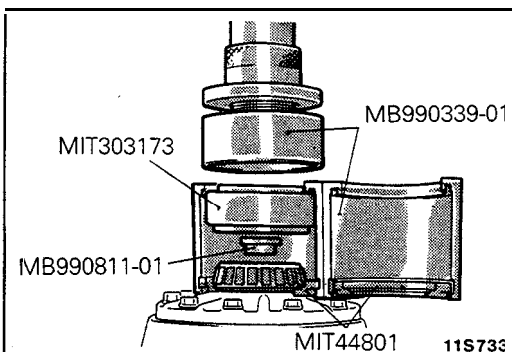
- (1) Using a press, push the differential case until it is pressed against the carrier.
- (2) Remove the differential case from the press. Insert two spacers in diagonally opposed positions between the side bearing outer race to be removed and the inner race. Using the press again, remove the outer race.

Caution

Use care not to drop the side bearing outer race.

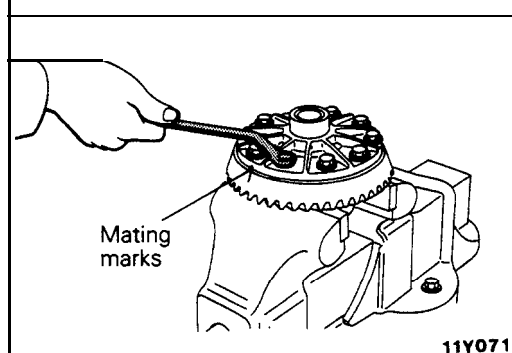
NOTE

- (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.



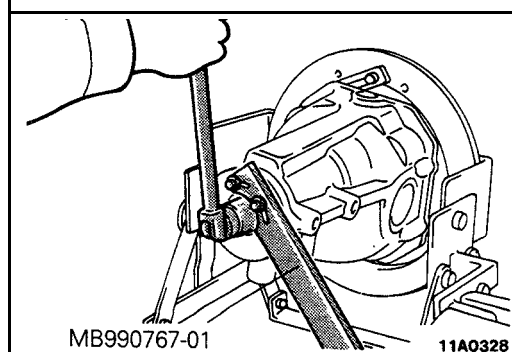
8. REMOVAL OF SIDE BEARING INNER RACES / 9. DRIVE GEAR (FOR 4WS)

Pull out the side bearing inner races by using the special tools.



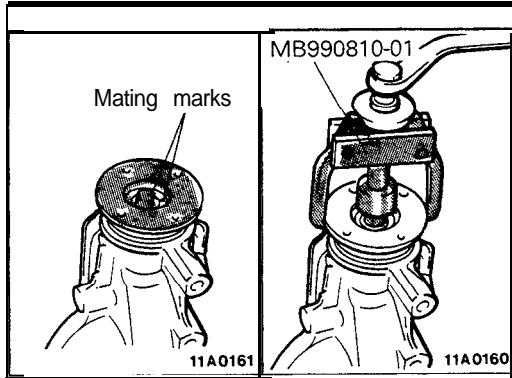
10. REMOVAL OF DRIVE GEAR

- (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.



13. REMOVAL OF SELF-LOCKING NUT

Use the special tools to hold the companion flange and remove the companion flange self-locking nut.



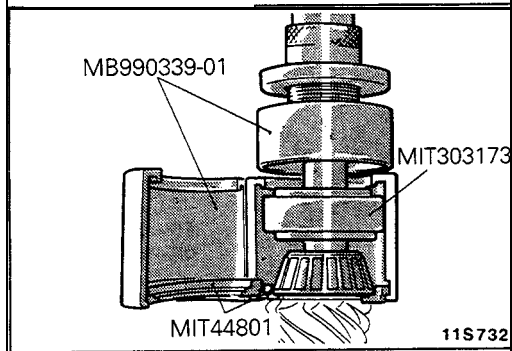
15. REMOVAL OF DRIVE PINION ASSEMBLY

- (1) Make the mating marks to the drive pinion and companion flange.

NOTE

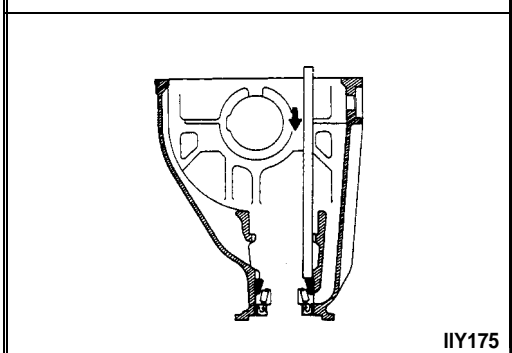
Mating marks should not be made to the contact surfaces of companion flange and propeller shaft.

- (2) Drive out the drive pinion together with the drive pinion spacer and drive pinion front shims.



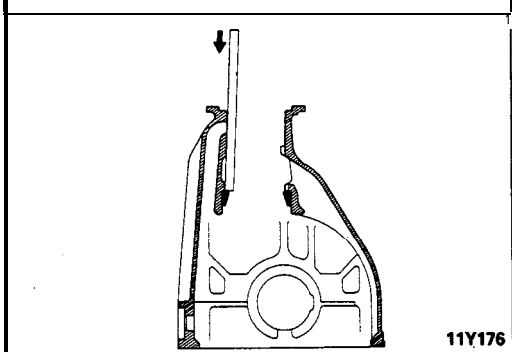
19. REMOVAL OF DRIVE PINION REAR BEARING INNER RACE

Pull out the drive pinion rear bearing inner race by using the special tools.



22. REMOVAL OF OIL SEAL / 23. DRIVE PINION FRONT BEARING

Drive out the drive pinion front bearing from the gear carrier.



24. REMOVAL OF DRIVE PINION REAR BEARING OUTER RACE

Drive out the drive pinion rear bearing outer race from the gear carrier.

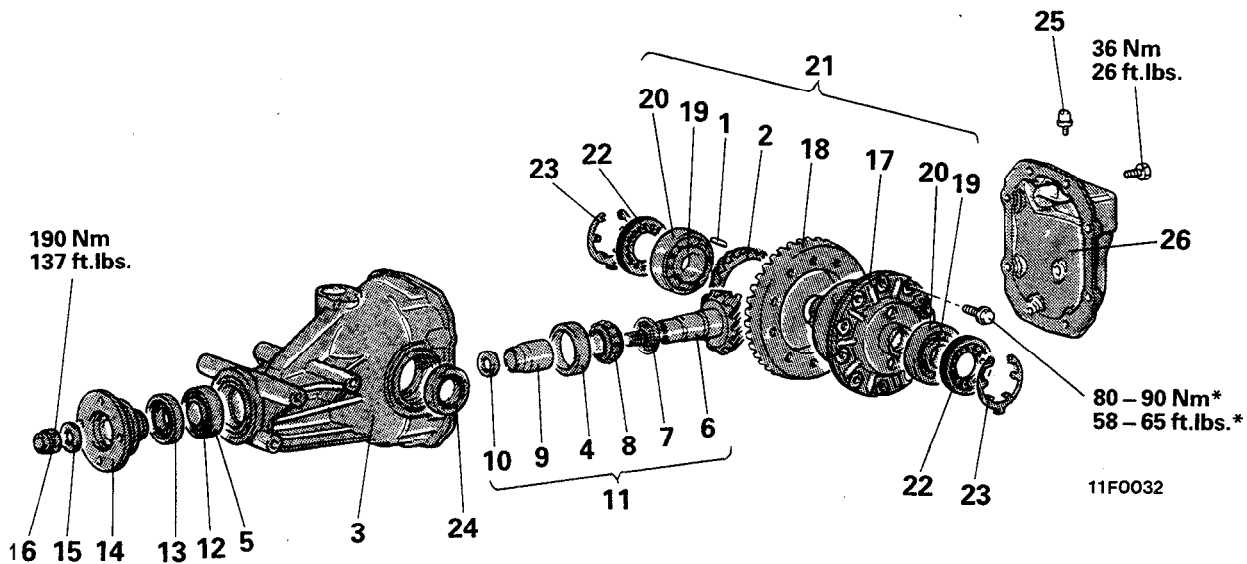
INSPECTION

M27IHBB

- 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.

REASSEMBLY

M27H-



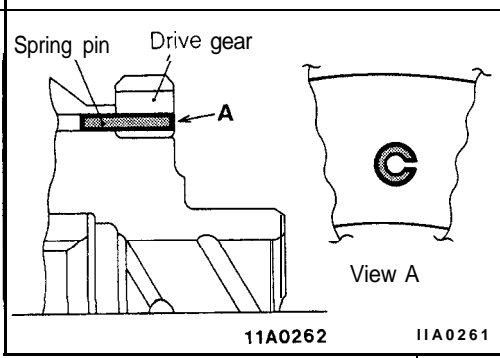
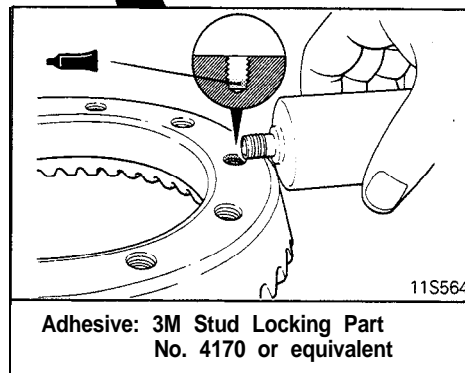
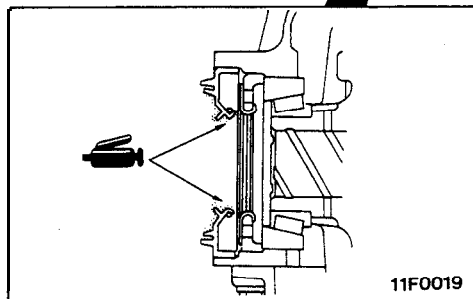
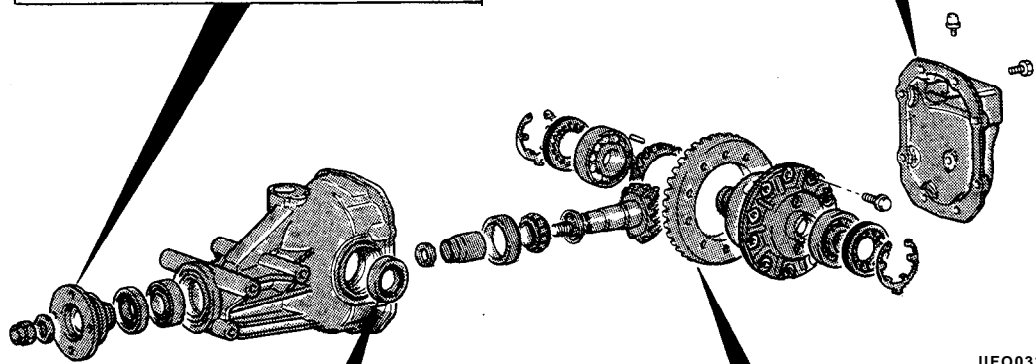
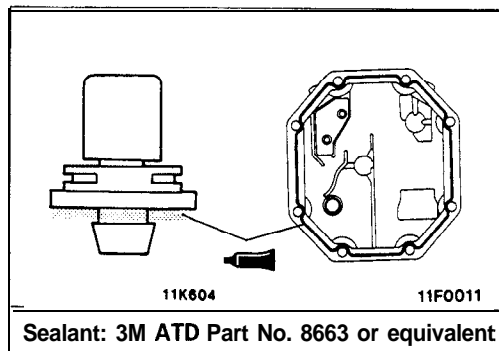
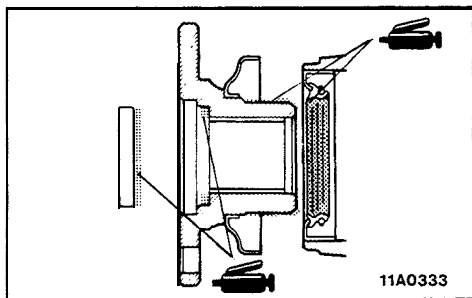
Reassembly steps

- ◆◆ 1. Spring pin (for 4WS)
- * 2. Drive gear (for 4WS)
- 3. Differential carrier
- * 4. Drive pinion rear bearing outer race
- ◆◆ 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
- ☒ 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.27-39.)
- ◆◆ 18. Drive gear
- ◆◆ 19. Side bearing inner race
- 20. Side bearing outer race
- ☒ Final drive gear backlash adjustment
- 21. Differential case assembly
- 22. Side bearing nut
- 23. Snap ring
- ◆◆ 24. Oil seal
- 25. Vent plug
- 26. Differential cover assembly

NOTE

*: Tightening torque with oil applied.

Lubrication, Sealing and Adhesion Points

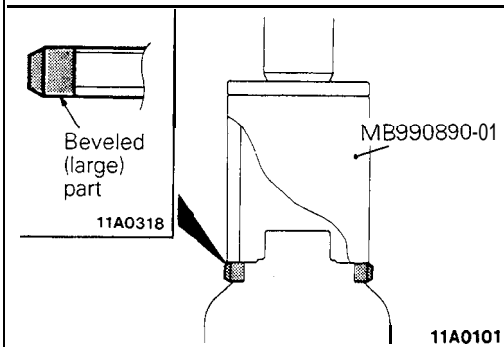


SERVICE POINTS OF REASSEMBLY

M271JBG

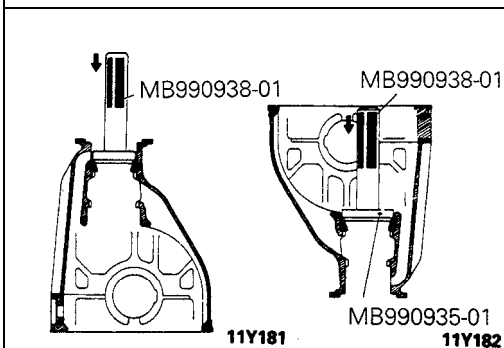
1. INSTALLATION OF SPRING PIN (FOR 4WS)

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.



2. PRESS-IN OF THE DRIVE GEAR (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.

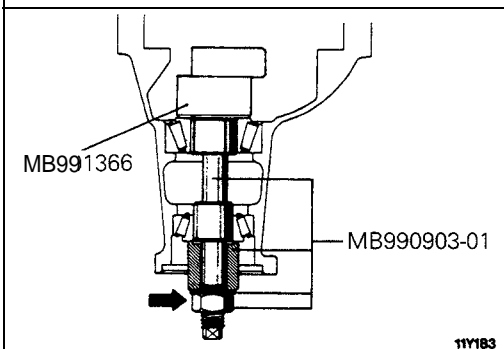


4. INSTALLATION OF DRIVE PINION REAR BEARING OUTER RACE / 5. DRIVE PINION FRONT BEARING OUTER RACE

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.



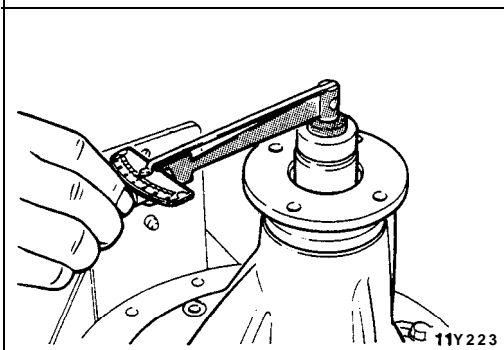
DRIVE PINION HEIGHT ADJUSTMENT

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.



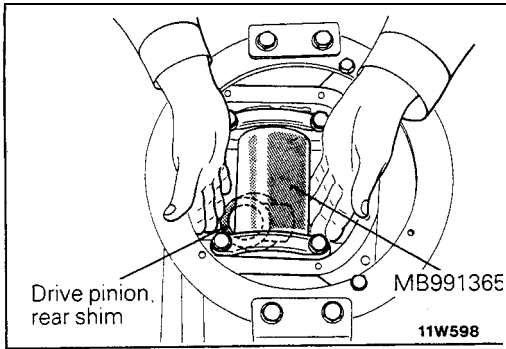
- (2) Tighten the handle of the special tool until the standard value of drive pinion rotation torque is obtained.
- (3) Measure the drive pinion rotation torque (without the oil seal).

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.

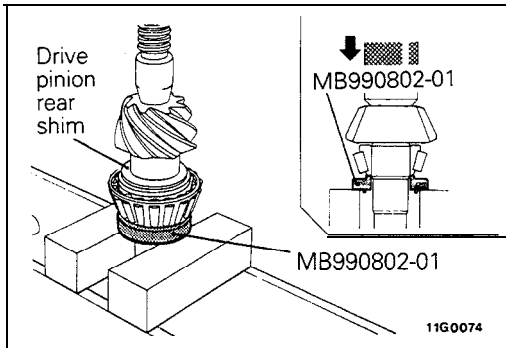


- (4) Position the special tool in the side bearing seat of the gear carrier, and then select a drive pinion rear shim of a thickness which corresponds to the gap between the special tools.

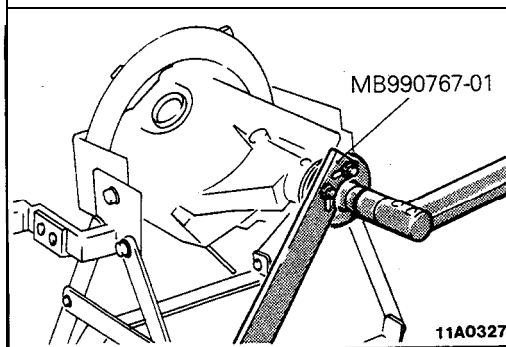
NOTE

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.



DRIVE PINION PRELOAD ADJUSTMENT

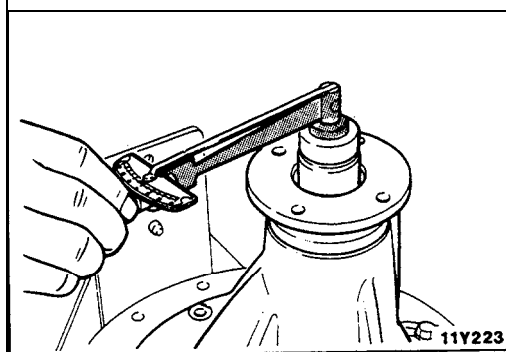
Adjust the drive pinion rotation torque by using the following procedures:

- (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 tools.

NOTE

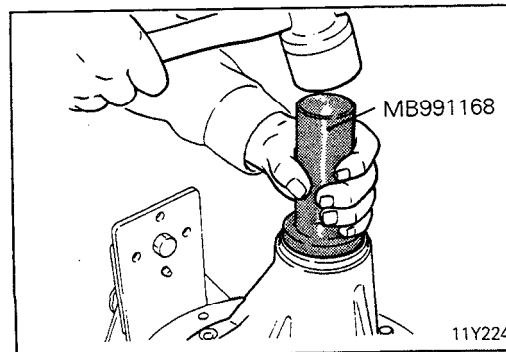
Do not install the oil seal.

- (3) Measure the drive pinion rotation torque (without the oil seal) by using the special tools.



Standard value

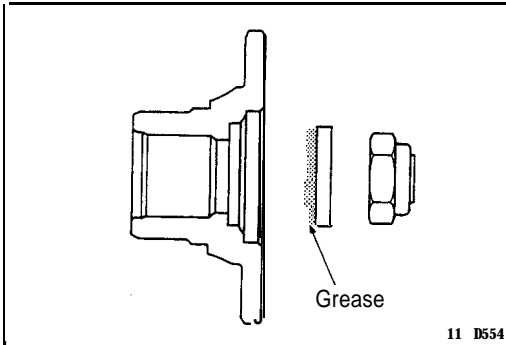
Bearing classification	Bearing lubrication	Rotation torque Nm (in.lbs.)
New	None (with -rust-prevention oil)	0.3 – 0.5 (3 – 4)
New/reused	Gear oil application	0.15 – 0.25 (1 – 2)



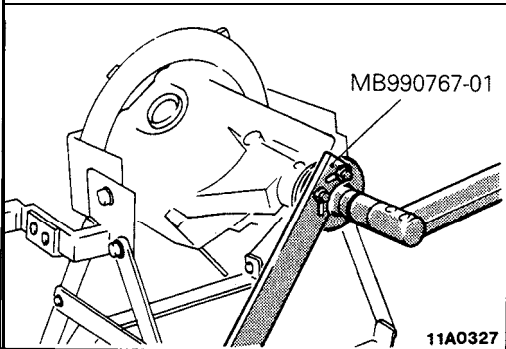
- (4) If the drive pinion rotation torque is not within the range of the standard value, adjust the rotation torque by replacing the drive pinion, front shim(s) or the drive pinion spacer.

NOTE

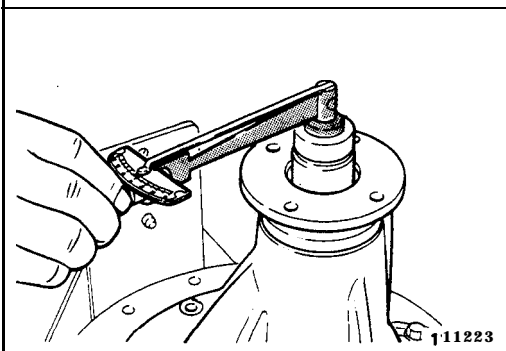
When selecting the drive pinion front shims, if the number of shims is large, reduce the number of shims to a minimum by selecting the drive pinion spacers.



- (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.

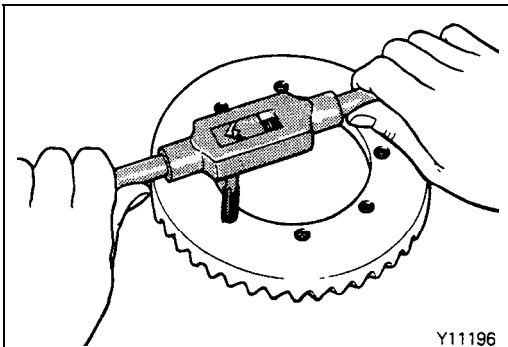


- (8) Measure the drive pinion rotation torque (with oil seal) to verify that the drive pinion rotation torque complies with the standard value.

Standard value

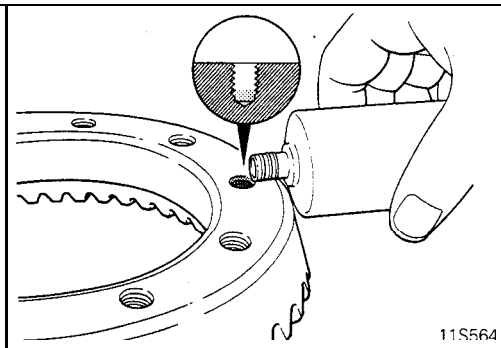
Bearing classification	Bearing lubrication	Rotation torque Nm (in.lbs.)
New	None (with rust-prevention oil)	0.5 – 0.7 (4 – 6)
New/reused	Gear oil application	0.35 – 0.45 (3 – 4)

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.



18. INSTALLATION OF DRIVE GEAR

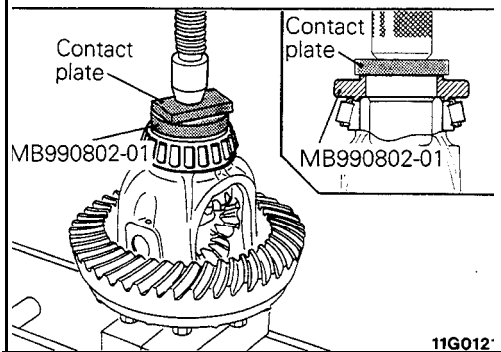
- (1) Clean the drive gear attaching bolts.
(2) Use an M10 x 1.25 tap to remove the adhesive adhering to the threaded holes of the drive gear, and then clean the threaded holes by applying compressed air.



(3) Apply multipurpose adhesive to the threaded holes of the drive gear.

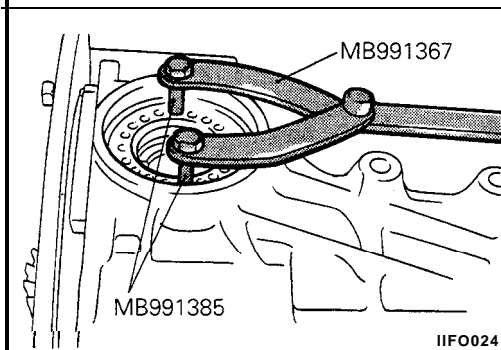
Specified adhesive: 3M Stud Locking Part No. 4170 or equivalent

(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.



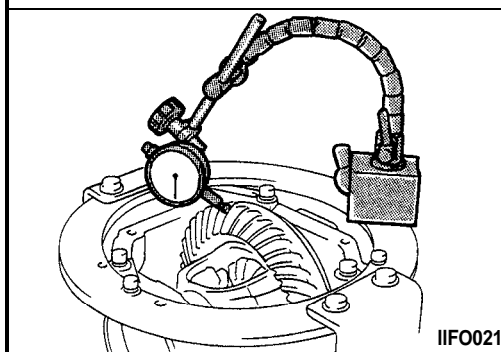
19. PRESS-FITTING OF SIDE BEARING INNER RACE

Press-fit the side bearing inner races to the differential case by using the special tool.



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.

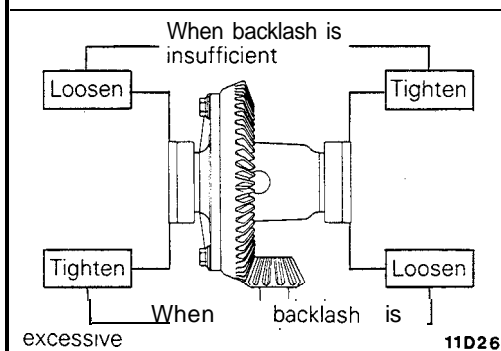


(2) Measure the final drive gear backlash.

Standard value: 0.11 – 0.16 mm (.004 – .006 in.)

NOTE

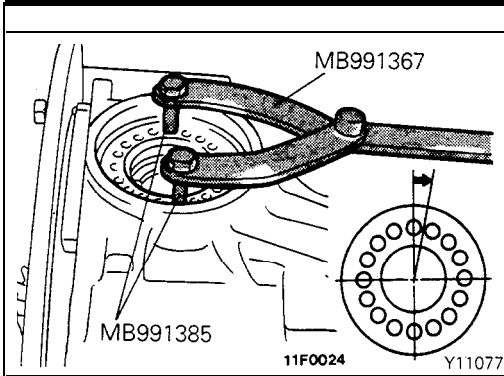
Measure at four or more points around the drive gear circumference.



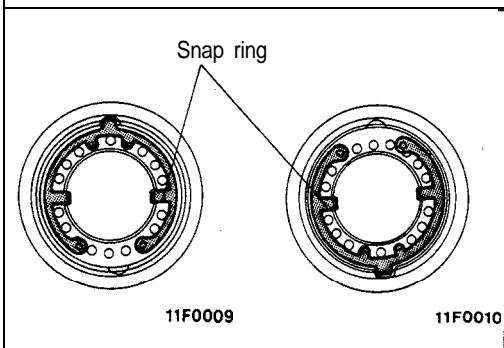
(3) Using the special tool (MB991367 and MB991385), adjust the backlash to standard value by moving the side bearing nut as shown.

NOTE

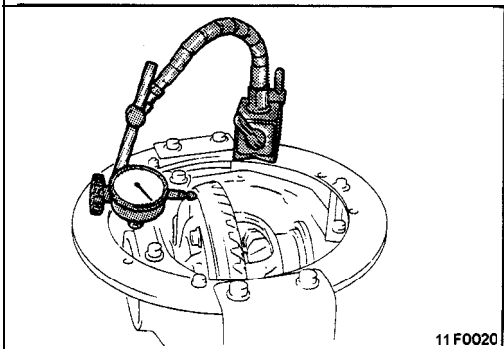
First turn the side bearing nut for loosening, and then turn (by the same amount) the side bearing nut for tightening.



- (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.27-28.)

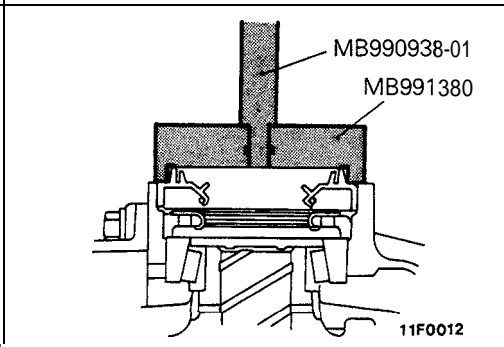


- (7) Measure the drive gear runout at the shoulder on the reverse side of the drive gear.

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.

24. INSTALLATION OF OIL SEAL

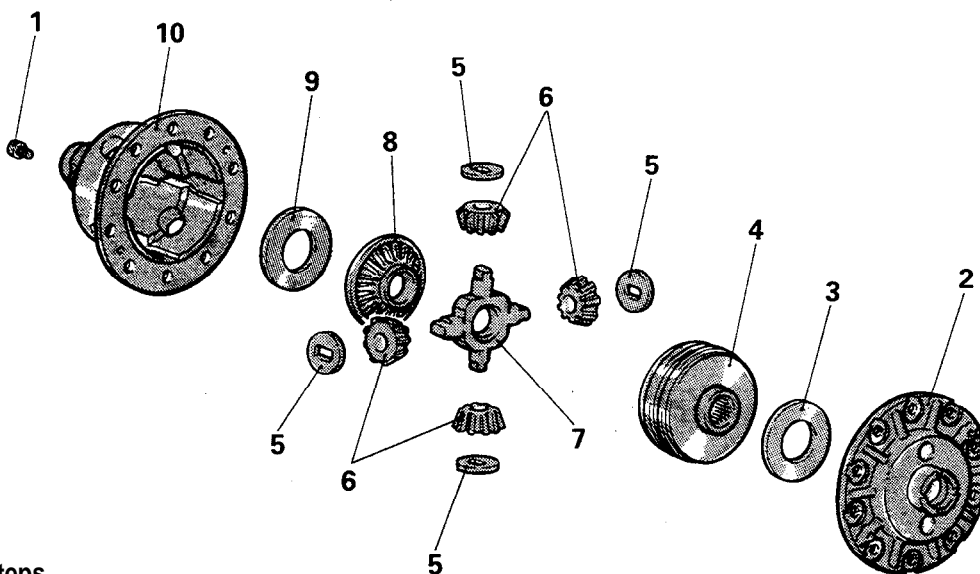


- (1) Using the special tool, install the oil seal flush with the gear carrier end face.
 (2) Apply a thin coat of Multi-purpose grease to the oil seal lip.

LSD CASE ASSEMBLY

DISASSEMBLY AND REASSEMBLY

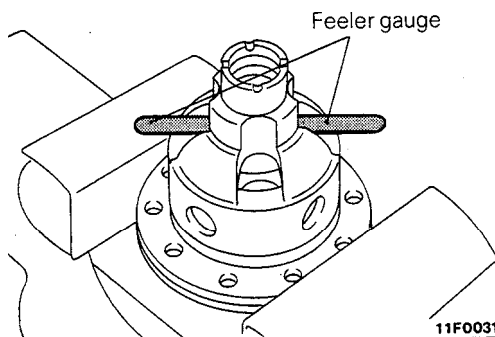
M27NE--



Disassembly steps

- 1. Screw
- + 2. Differential case A
- 3. Thrust washer (L.H.)
- 4. Viscous unit
- 5. Pinion mate washer
- 6. Differential pinion mate
- 7. Differential pinion shaft
- 8. Differential side gear (R.H.)
- ☒ 9. Thrust washer (R.H.)
- 10. Differential case B

11F0033



11F0031

INSPECTION BEFORE DISASSEMBLY

M27NFAA

1. CHECKING THE DIFFERENTIAL GEAR BACKLASH

- (1) Secure the differential case assembly in a vise so that the differential side gear (right) is facing upward.

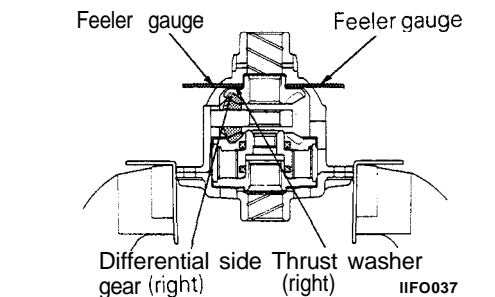
Caution

When securing the vise, be sure not to hold the differential case assembly too tightly.

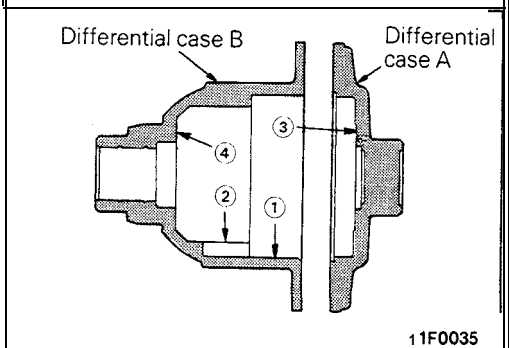
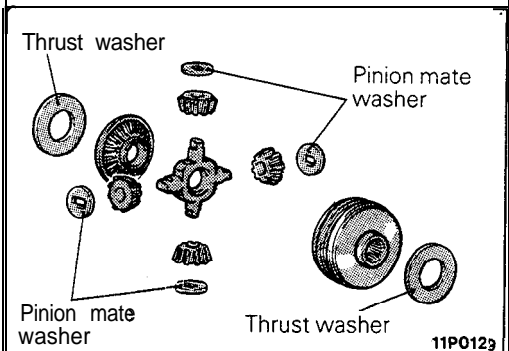
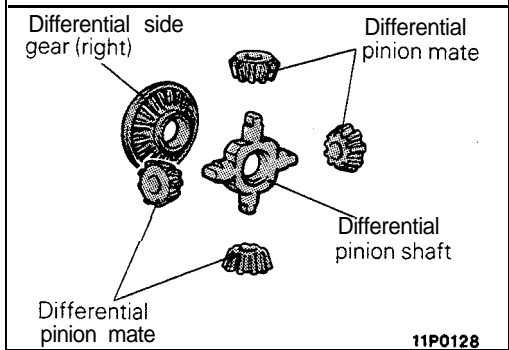
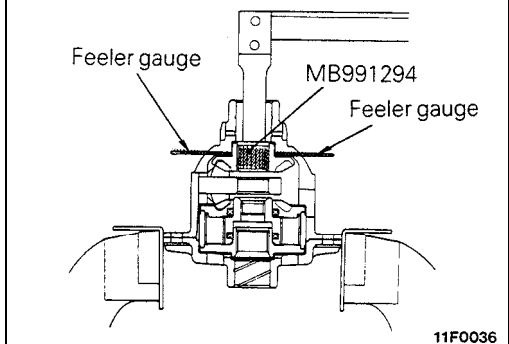
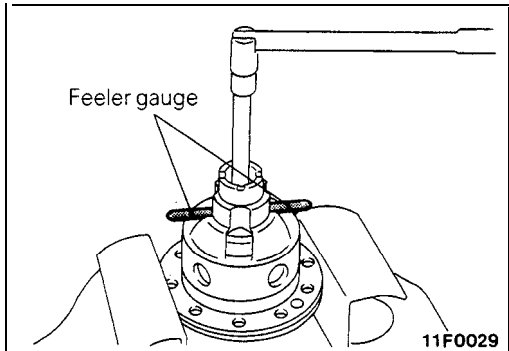
- (2) Insert a 0.03 mm (.0012 in.) feeler gauge at two places (diagonally) between differential case B and the thrust washer (right).

Caution

Do not insert a feeler gauge in the oil groove of differential case B.



11F0037



- (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).

SERVICE POINTS OF DISASSEMBLY

M27NGAA

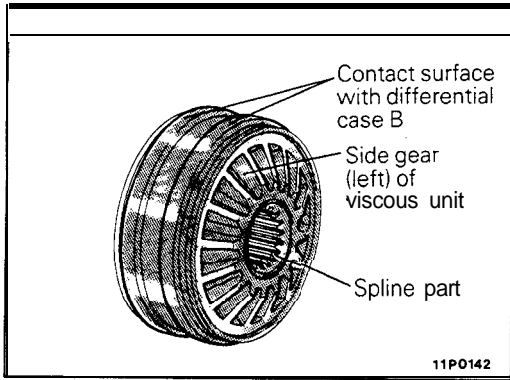
3. REMOVAL OF THE THRUST WASHER (LEFT) / 9. THRUST WASHER (RIGHT)

The thrust washers (left and right) are of different thickness, and so should be discriminated in some way for reference during installation.

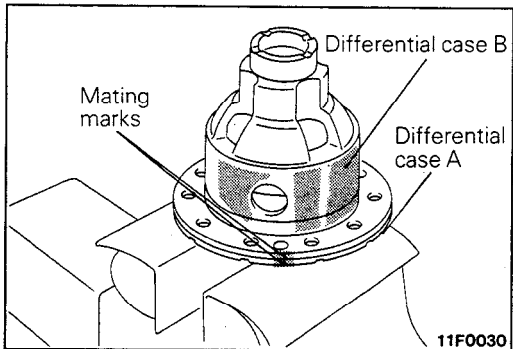
INSPECTION

M27NHAA

- (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.
- (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.

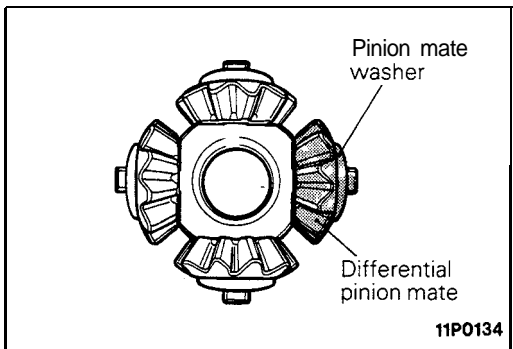


SERVICE POINTS OF REASSEMBLY

M27NIAA

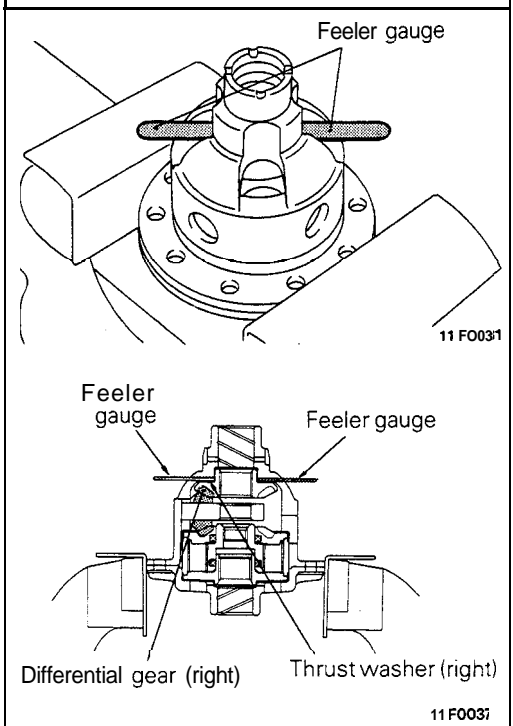
10. INSTALLATION OF THE DIFFERENTIAL CASE B / 2. DIFFERENTIAL CASE A

Align the mating marks of differential cases B and A, and assemble the cases.



6. INSTALLATION OF THE DIFFERENTIAL PINION MATE / 5. PINION MATE WASHER

With the washer in the position shown in the illustration, install to the differential pinion shaft, and then install to differential case B.



3. SELECTION OF THE THRUST WASHER (LEFT)

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.

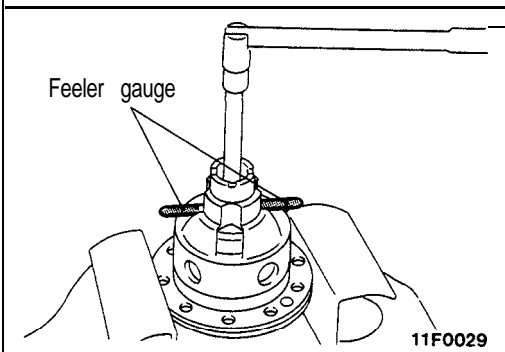
Caution

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 case B.



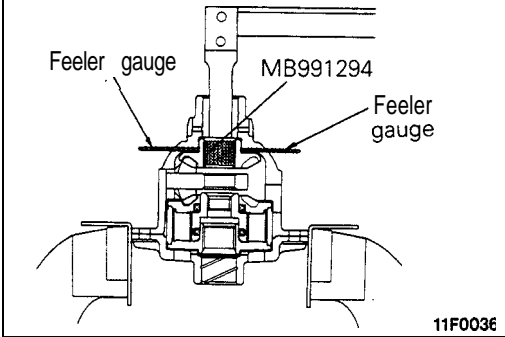
- (5) Insert the special tool at the spline part of differential side gear (right) and check to be sure the side gear (right) rotates.
- (6) Then insert a 0.09 mm (.0035 in.) feeler gauge to replace a 0.03 mm (.0012 in.) gauge.
- (7) Insert the special tool at the spline part of the differential side 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.)
MB569243	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.)
MB569528	0.8 (.031)

NOTE


Select one thrust washer (left) from the eleven types in the kit.

WHEEL. AND TIRE

CONTENTS

M31AA -

SERVICE ADJUSTMENT PROCEDURES	4	TROUBLESHOOTING	3
Tire Inflation Pressure Check	4	Bald Spots	
Tire Wear Check	4	Cracked Treads	
Wheel Runout Check	4	Feathered Edge	
SPECIFICATIONS	2	Rapid Wear at Center	
General Specifications	2	Rapid Wear at Shoulders	
Service Specifications	2	Scalloped Wear	
Torque Specifications	2	Wear on One Side	



SPECIFICATIONS

M31CA--

GENERAL SPECIFICATIONS

Items	DOHC-N/A	DOHC-T/C
Wheel		
Tire size	225/55R 16 93U	245/45ZR 17
Wheel type	Aluminum type	Aluminum type
Wheel size	16 x 8J	17 x 8.5J
Amount of wheel offset mm (in.)	46 (1.8)	46 (1.8)
Tire inflation pressure kPa (psi)		
Front	220 (32)	220 (32)
Rear	200 (29)	200 (29)
Spare wheel		
Tire size	T125/90D16	T135/90D16
Wheel size	16 x 4T	16 x 4T
Amount of wheel offset mm (in.)	46 (1.8)	46 (1.8)
Tire inflation pressure kPa (psi)	420 (60)	420 (60)

SERVICE SPECIFICATIONS

M31CB--

Items	Specifications
Limit	
Wheel runout	
Radial mm (in.)	2.0 (.08)
Lateral mm (in.)	2.0 (.08)
Tread depth of tire mm (in.)	1.6 (.06)

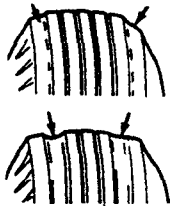
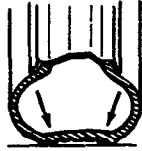
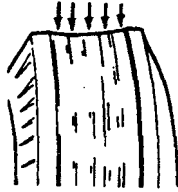
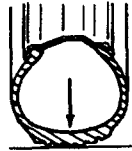

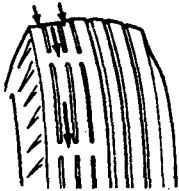
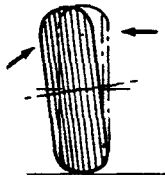
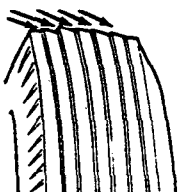
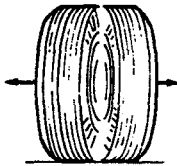
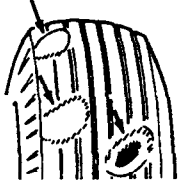
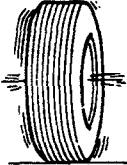
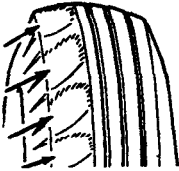
TORQUE SPECIFICATIONS

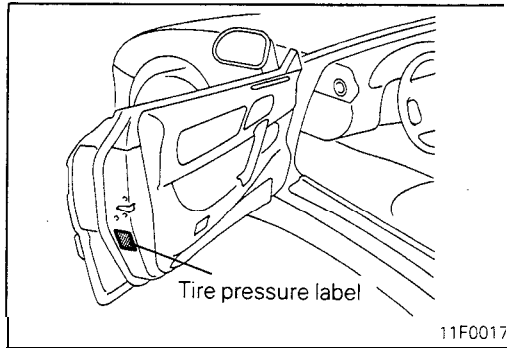
M31CC--

Items	Nm	ft.lbs.
Hub nuts	120 – 140	87 – 101

TROUBLESHOOTING

M31EAAB

Symptom	Probable cause	Remedy
Rapid wear at shoulders 	Under-inflation or lack of rotation 	Adjust the tire pressure
Rapid wear at center 	Over-inflation or lack of rotation 	
Cracked treads 	Under-inflation	
Wear on one side 	Excessive camber 	Inspect the camber
Feathered edge 	Incorrect toe-in 	Adjust the toe-in
Bald spots 	Unbalanced wheel 	Adjust the unbalanced wheels
Scalloped wear 	Lack of rotation of tires or worn or out-of-alignment suspension	Rotate the tires Inspect the front suspension alignment

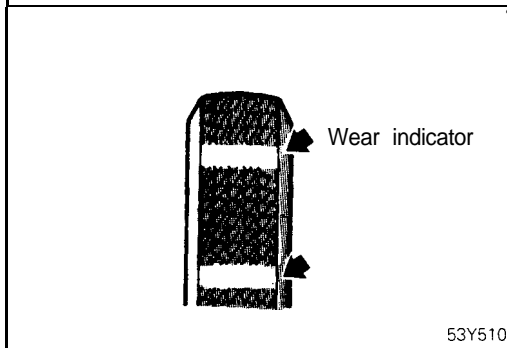


SERVICE ADJUSTMENT PROCEDURES

TIRE INFLATION PRESSURE CHECK

M31FDAE

Check the inflation pressure of the tires. If it is not within the standard value, make the necessary adjustment.



TIRE WEAR CHECK

M31FBAC

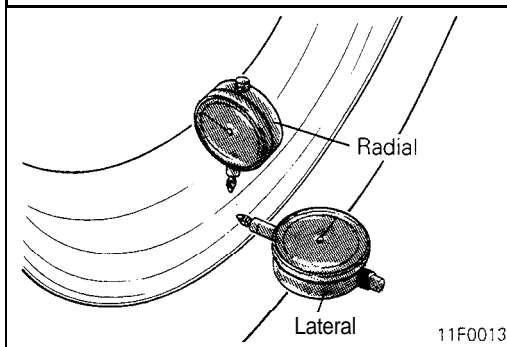
Measure the tread depth of tires.

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

M31 FCAE

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 2.0 mm (.08 in.)

Lateral 2.0 mm (.08 in.)

If wheel runout exceeds the limit, replace the wheel.

POWER PLANT MOUNT

CONTENTS

M32AA -

ENGINE MOUNTING	3	SPECIFICATIONS	2
ENGINE ROLL STOPPER	5	Service Specifications	2
RIGHT MEMBER, LEFT MEMBER AND CROSSMEMBER”	6	TRANSAXLE MOUNTING	4
SPECIAL TOOLS	2	TROUBLESHOOTING	2
		Abnormal Noise	
		Excessive Engine Wobble or Vibration	

SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

- (1) A Supplemental Restraint System (SRS), which uses a driver-side air bag, has been installed in the 300GT.
- (2) The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning light, air bag module, clock spring, 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 (*).

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) 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), before beginning any service or maintenance of any component of the SRS or any SRS-related component.

SPECIFICATIONS

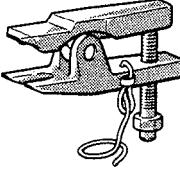
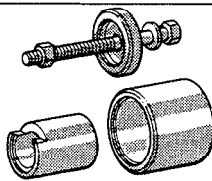
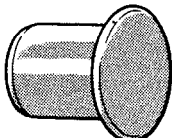
SERVICE SPECIFICATIONS

M32CB-

Items	Specifications
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

M32DA-

Tool	Number	Name	Use
	MB991113-01 or MB990635	Steering linkage puller	Removal of the lower arm ball joint and tie rod
	MD991045	Bushing remover and installer	Removal and installation of the crossmember bushing
	MB991193	Plug	Prevention of transfer oil discharge and foreign object entry

TROUBLESHOOTING

M32EAAC

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	Insufficiently tightened parts	Retighten

**ENGINE MOUNTING
REMOVAL AND INSTALLATION**

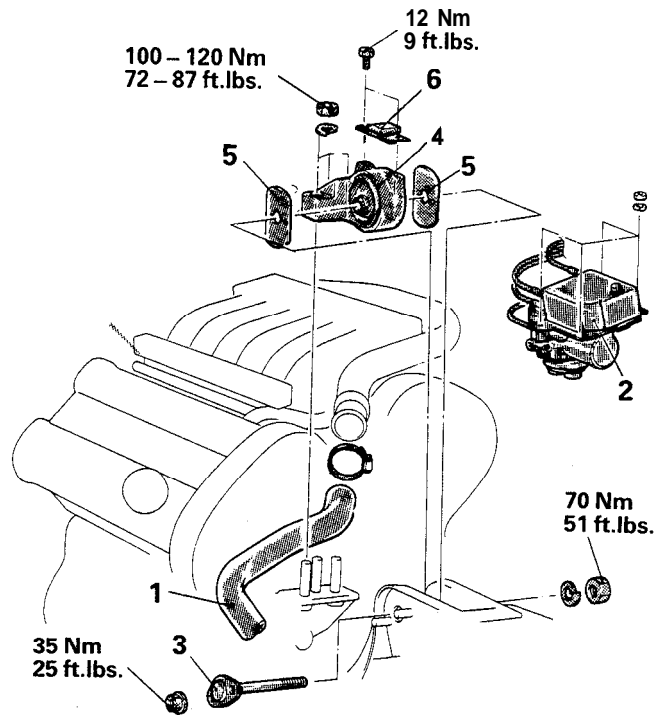
M32GA-

Pre-removal Operation

- Raise and Suspend the Engine to the Extent Force is not Applied to the Engine Mount

Post-installation Operation

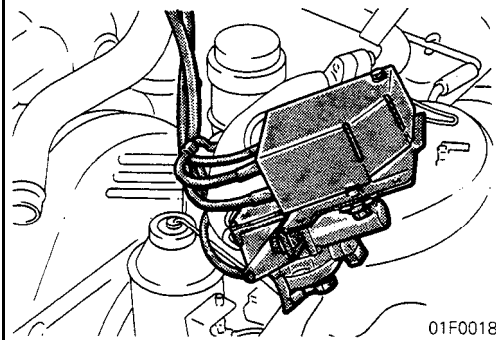
- Lower the Engine.



Removal steps

1. Connection for air hose G <Turbo>
2. Cruise control pump and link assembly <Vehicles with Cruise Control>
3. Engine mount bracket and body connection bolt
4. Engine mount bracket
- * 5. Mounting stopper
6. Dynamic damper

01F0050



01F0018

SERVICE POINT OF REMOVAL

M32GBAK

2. REMOVAL OF CRUISE CONTROL PUMP AND LINK ASSEMBLY

Remove the actuator mounting nuts and place the actuator where it will not interfere with the work.

INSPECTION

M32GCAM1

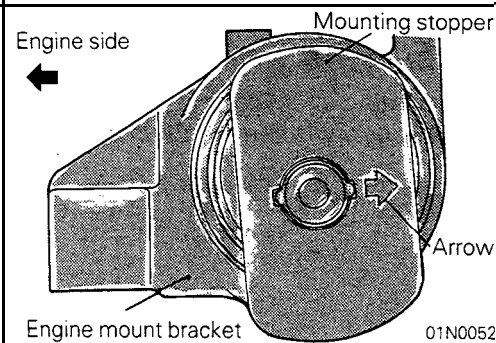
- Check each insulator for cracks or damage.
- Check each bracket for deformation or damage.

SERVICE POINT OF INSTALLATION

M32GDAW

5. INSTALLATION OF MOUNTING STOPPER

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

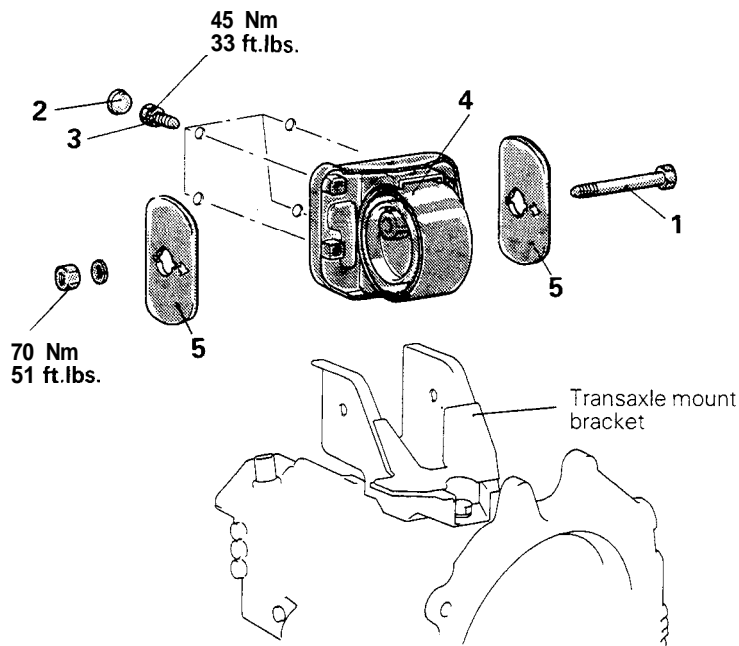


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TRANSAXLE MOUNTING

REMOVAL AND INSTALLATION

M32GE--



Pre-removal Operation

- Raise and Suspend the Transaxle to the Extent Force is not Applied to the Transaxle Mount
- Removal of the Air Cleaner (Refer to GROUP 15 -Air Cleaner.)

Post-installation Operation

- Lower the Transaxle.
- Installation of Air Cleaner (Refer to GROUP 15 -Air Cleaner.)

Removal steps

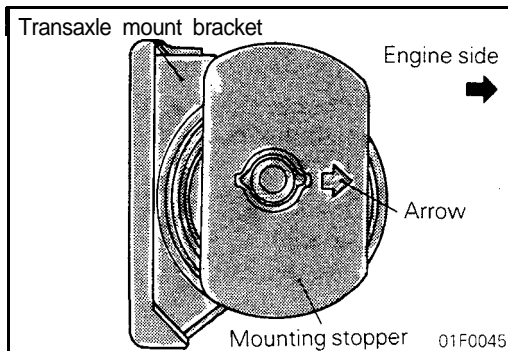
1. Transaxle mount bracket and transaxle connection bolt
2. Cap
3. Transaxle mount bracket installation bolt
4. Transaxle mount bracket
- * 5. Mounting stopper

01F0044

INSPECTION

M32GCAM2

- Check each insulator for cracks or damage.
- Check each bracket for deformation or damage.



SERVICE POINT OF INSTALLATION

M32GDAX

5. INSTALLATION OF MOUNTING STOPPER

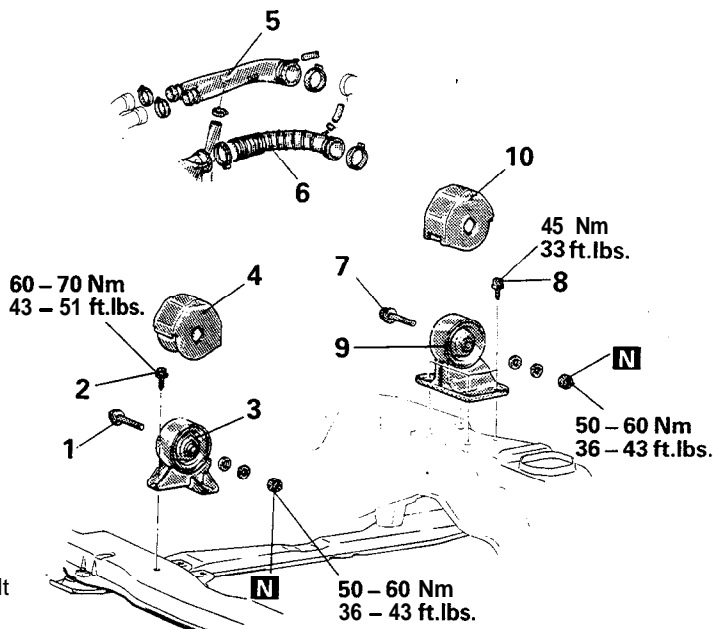
Attach the transaxle mounting bracket so that the arrow mark on the mounting stopper is in the direction as shown in the illustration.

**ENGINE ROLL STOPPER
REMOVAL AND INSTALLATION**

M32GF-

Pre-removal and Post-installation Operation

- Removal and Installation of Condenser Fan Motor Assembly <Turbo> (Refer to GROUP 55 – Condenser and Condenser Fan Motor.)
- Removal and installation of Catalytic Converter (Left) <Turbo> (Refer to GROUP 15 -Turbocharger <Rear>.)



Front stopper bracket removal steps

1. Front roll 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>
- + 7. Rear roll stopper bracket and engine connection bolt
8. Rear roll stopper bracket installation bolt
- ◄◄ 9. Rear roll stopper bracket
10. Heat protector <Turbo>

01F0030

SERVICE POINT OF REMOVAL

M32GBAL

9. REMOVAL OF REAR ROLL STOPPER BRACKET

- (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.

INSPECTION

M32GCAM3

- Check each insulator for cracks or damage.
- Check each bracket for deformation or damage.

SERVICE POINTS OF INSTALLATION

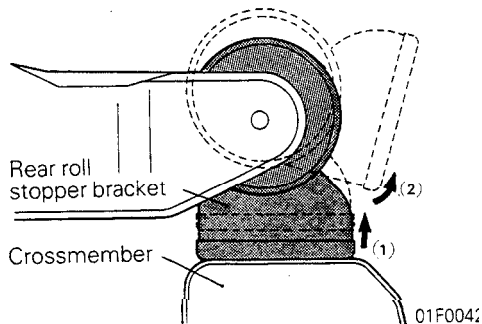
M32GJAC

9. INSTALLATION OF REAR ROLL STOPPER BRACKET

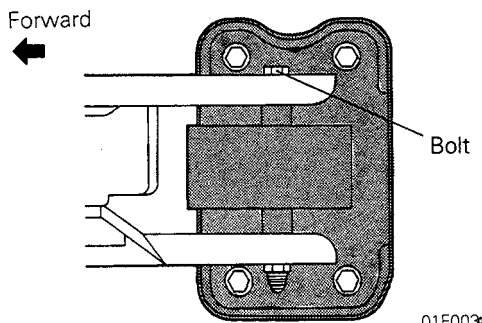
Install the rear roll stopper bracket as shown in the illustration.

7. INSTALLATION OF REAR ROLL STOPPER BRACKET AND ENGINE CONNECTION BOLT

Install the bolt as shown in the illustration.



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01F0039

RIGHT MEMBER, LEFT MEMBER AND CROSSMEMBER

M32YA-

REMOVAL AND INSTALLATION

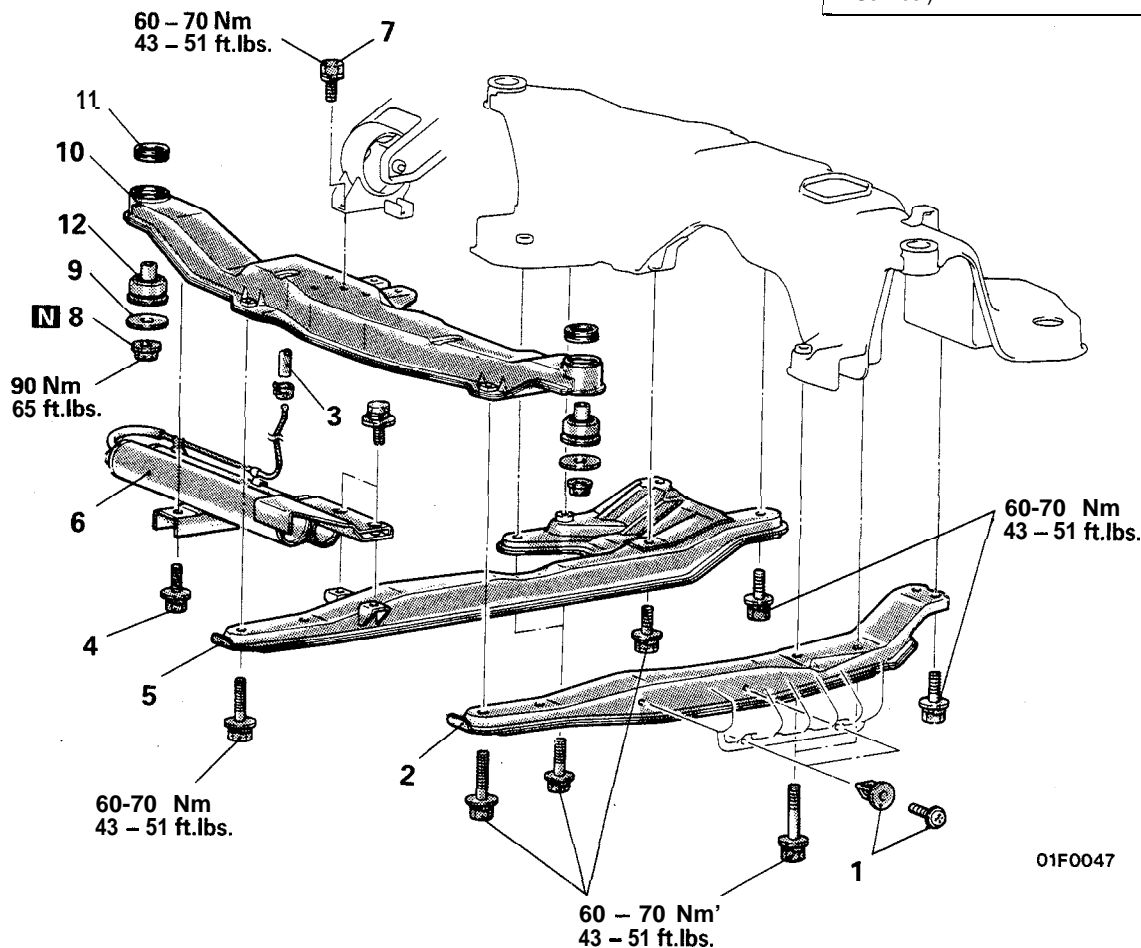
Pre-removal Operation

- Removal of Under Cover
(Refer to GROUP 51 -Front Bumper.)

Post-installation Operation

- Installation of Under Cover
(Refer to GROUP 51 -Front Bumper.)
- Air Bleeding of the Power-steering Fluid (Refer to GROUP 37A – Service Adjustment Procedures.)
- Adjustment of the Front Wheel Alignment (Refer to GROUP 33A – Service Adjustment Procedures.)
- Supplying of Transfer Oil <AWD>
(Refer to GROUP 00 – Maintenance Service.)

No. 1 crossmember, Left member,
Right member



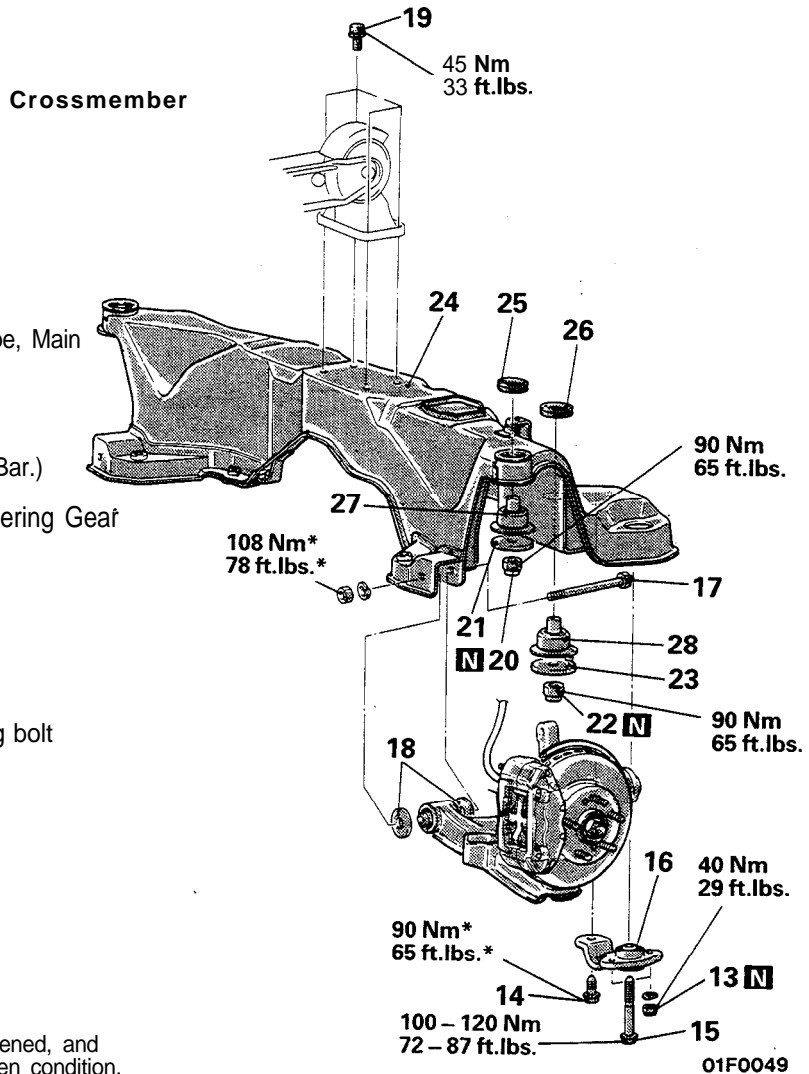
01F0047

**Removal steps of No. 1 crossmember,
Left member, right member**

1. Cover installation screw
2. Left member
3. Connection of clutch vacuum hose <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)

Removal steps of crossmember

- Front exhaust pipe
(Refer to GROUP 15 – Exhaust Pipe, Main Muffler and Catalytic Converter.)
 - 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



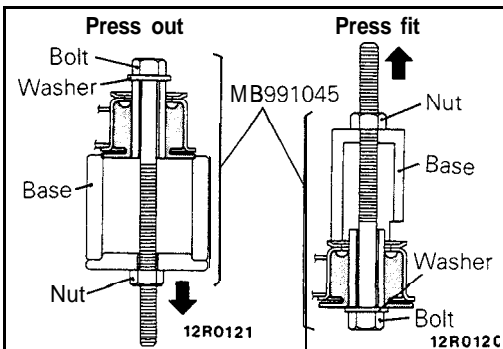
NOTE

*: Indicates parts which should be temporarily tightened, and then fully tightened with the vehicle in the unladen condition.

INSPECTION

M32YCAC

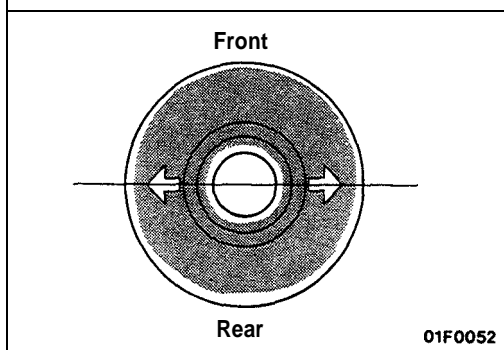
- Check the crossmember for cracks or deformation.
- Check the bushings for cracks or deterioration.
- Check the right member for cracks or deformation.
- Check the left member for cracks or deformation.



BUSHING A AND B REPLACEMENT

M32YDAC

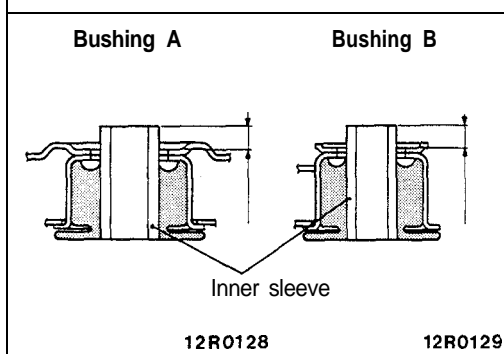
Use the special tool to remove and press in bushings A and B.



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 $\pm 5^\circ$ 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.

FRONT SUSPENSION

CONTENTS

M33AA-A

LOWER ARM	8	SPECIFICATIONS	2
		General Specifications	2
SERVICE ADJUSTMENT PROCEDURES	4	Service Specifications	2
Front Wheel Alignment	4	STABILIZER BAR	10
Wheel Bearing Adjustment	4	STRUT ASSEMBLY	5
SPECIAL TOOLS	3	TROUBLESHOOTING	3



SPECIFICATIONS

M33CA-A

GENERAL SPECIFICATIONS

Items	FWD		AWD
	Vehicles without ECS	Vehicles with ECS	
Suspension system	McPherson strut with coil spring and compression rod type		
Coil spring			
Wire dia. x O.D. x free length mm (in.)	M/T: 14.8 x 170 x 322.5 (.58 x 6.69 x 12.70) A/T, M/T*: 15.0 x 170 x 331.0 (.59 x 6.69 x 13.03)		15.7 x 170 x 301.5 (.62 x 6.69 x 11.87)
Coil spring identification color	M/T: Orange x 1 A/T: Orange x 2		Blue x 1
Spring constant N/mm (lbs./in.)	30 ± 1.5 (168 ± 8)		39 ± 2 (218 ± 11)
Shock absorber	Hydraulic, cylindrical double acting type		
Type	Hydraulic, cylindrical double acting type	Hydraulic, cylindrical double acting type	
Maximum length mm (in.)	485 ± 3 (19.09 ± .12)	485 ± 3 (19.09 ± .12)	
Compressed length mm (in.)	335 ± 3 (13.19 ± .12)	335 ± 3 (13.19 ± .12)	
Stroke mm (in.)	150 (5.91)	150 (5.91)	
Damping force [at 0.3 m/sec. (0.984 ft./sec.)]			
Expansion N (lbs.)	1,100 ± 170 (243 ± 37)	Hard : 2,650 ± 360 (584 ± 79) Medium : 1,650 ± 230 (363 ± 51) Soft : 650 ± 100 (143 ± 22)	
Contraction N (lbs.)	550 ± 80 (121 ± 18)	Hard : 1,200 ± 170 (265 ± 37) Medium : 1,150 ± 170 (253 ± 37) Soft : 1,000 ± 150 (220 ± 33)	

NOTE

*: Option

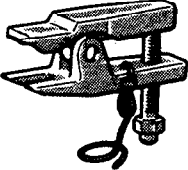
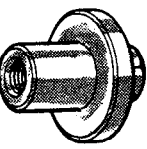
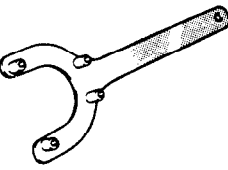
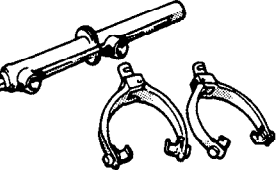

SERVICE SPECIFICATIONS

M33CB-A

Items	Specifications
Standard value	
Camber	0° ± 30'
Caster	3°55' ± 30'
Toe-in mm (in.)	0 ± 3 (0 ± .12)
Lower arm ball joint starting torque Nm (in.lbs.)	10 – 22 (86-191)
Stabilizer link ball joint starting torque Nm (in.lbs.)	1.7 – 3.2 (15 – 28)
Steering angle	
Inner wheel	33°45'
Outer wheel	28°21'

SPECIAL TOOLS

M33DA-A

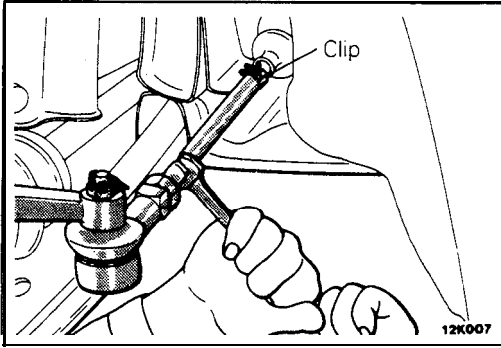
Tool	Number	Name	Use
	MB991113-01	Steering linkage puller	Removal of the lower arm ball joint and tie rod
	MB991004	Wheel alignment gauge attachment	Measurement of the wheel alignment
	MB991176	Spring seat holder	Disassembly/assembly of the strut assembly
	MB991237 MB991238	Spring compressor body Arm set	Compression of the front coil spring
	MB990799-01	Ball joint remover and installer	Installation of the dust shield

TROUBLESHOOTING

M33EBAA

Symptom	Probable cause	Remedy
Steering wheel is heavy, vibrates or pulls to one side	Suspension malfunction Ball joint Coil spring Wheel alignment	Adjust or replace
	Unbalanced or worn tires	Adjust or replace
Excessive vehicle rolling	Broken or deteriorated stabilizer Shock absorber malfunction	Replace
Poor riding	Improper tire inflation pressure	Adjust
	Broken or deteriorated coil spring Shock absorber malfunction	Replace
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 Shock absorber malfunction	Replace

TSB Revision



SERVICE ADJUSTMENT PROCEDURES

M33FBAT

FRONT WHEEL ALIGNMENT

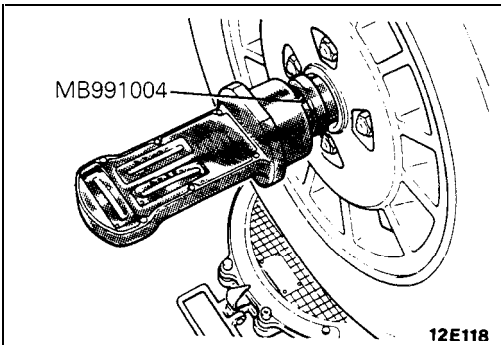
TOE-IN

Standard value: 0 ± 3 mm ($0 \pm .12$ 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 – Service Adjustment Procedures.)

Standard value:

Inner wheel	$33^{\circ}45'$
Outer wheel	$28^{\circ}21'$



CAMBER AND CASTER

Standard value:

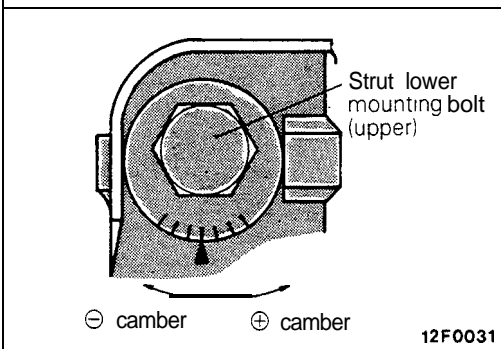
Camber	$0'' \pm 30'$
Caster	$3^{\circ}55' \pm 30'$

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 $0^{\circ}30'$.



WHEEL BEARING ADJUSTMENT

M33FCAA

Bearing preload is pre-set to the specified value by design and therefore can not be adjusted.

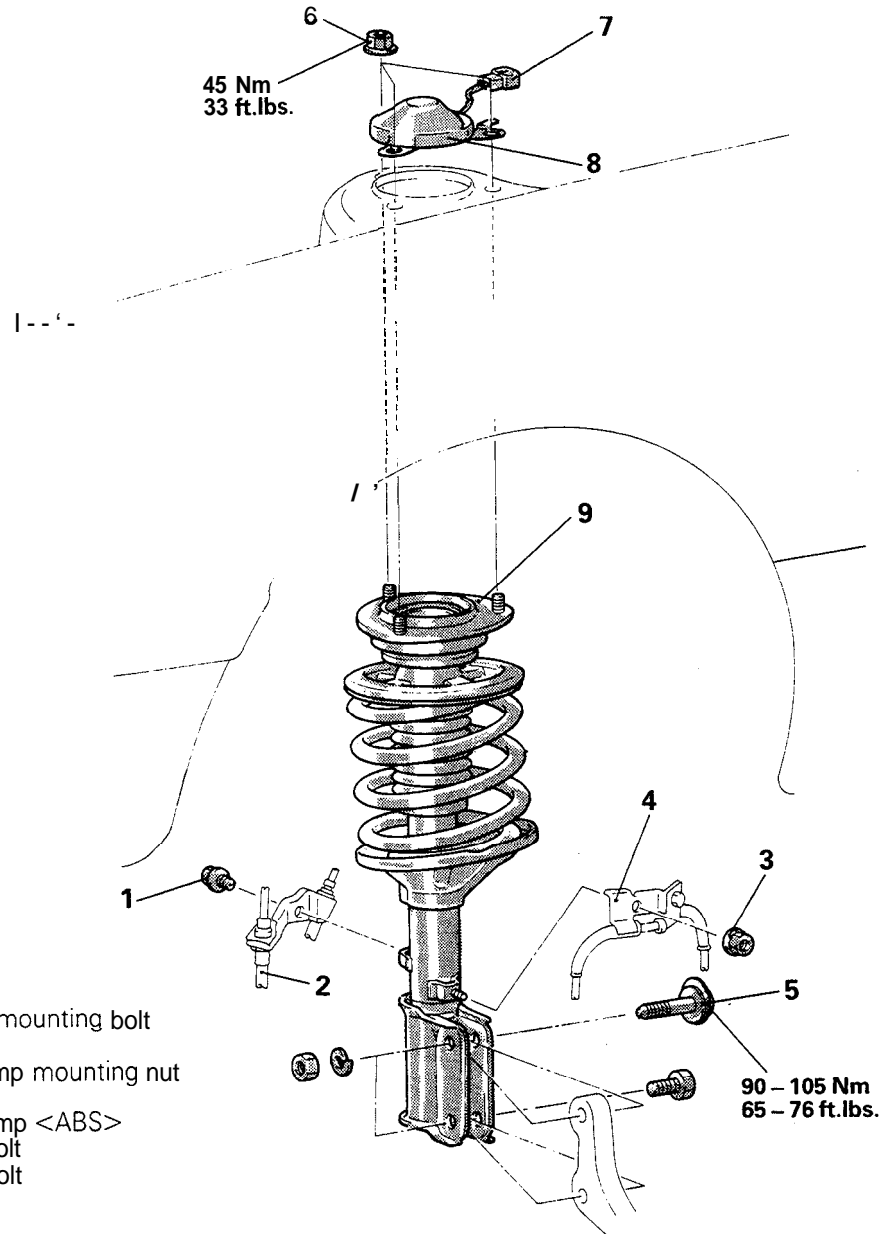
STRUT ASSEMBLY

REMOVAL AND INSTALLATION

M33LA-

Post-installation Operation

- Adjustment of Wheel Alignment
(Refer to P.33A-4.)



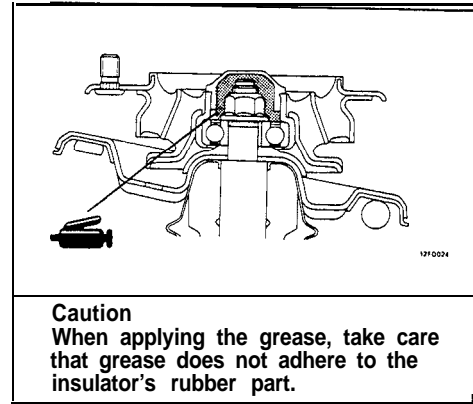
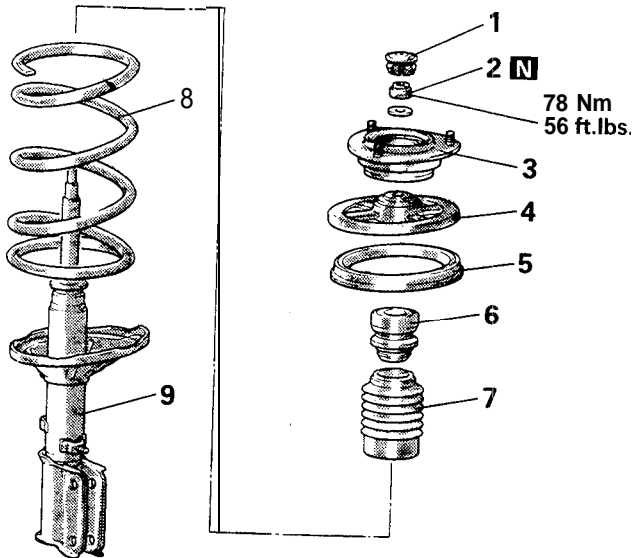
Removal steps

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 <ECS>
8. Cap <ECS>
9. Strut assembly

12F0029

DISASSEMBLY AND REASSEMBLY

M33LE-



Disassembly steps

- ◆◆ ● * 1. Dust shield
- ◆◆ ● * 2. Self-locking nut
- ◆◆ ● * 3. Strut insulator assembly
- ◆◆ ● * 4. Spring upper seat assembly
- ◆◆ ● * 5. Upper spring pad
- ◆◆ ● * 6. Bump rubber
- ◆◆ ● * 7. Dust shield
- ◆◆ ● * 8. Front coil spring
- ◆◆ ● * 9. Strut assembly

SERVICE POINT OF DISASSEMBLY

M33LFAI

2. REMOVAL OF SELF-LOCKING NUT

- (1) Holding the spring upper seat with the special tool, loosen the self-locking nut.

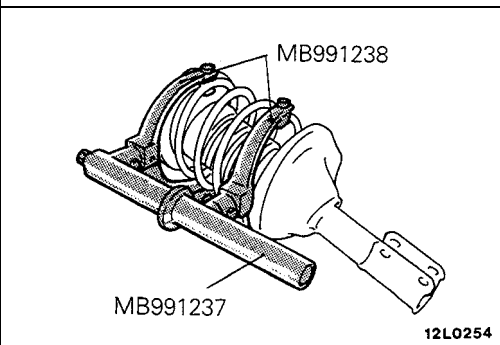
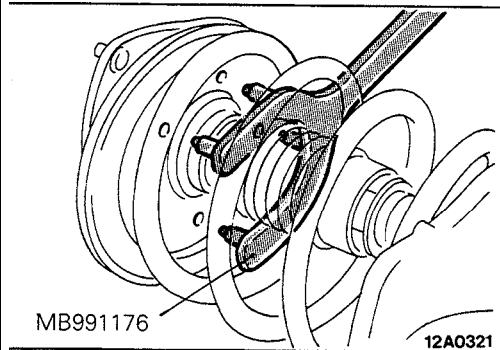
Caution

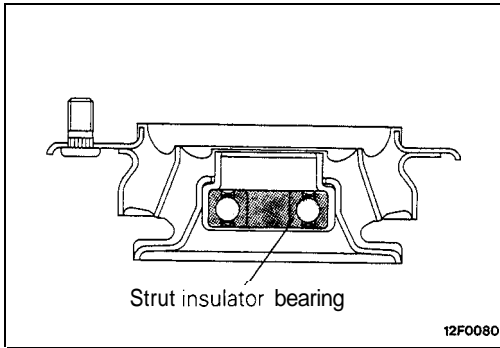
The self-locking nut should be loosened only, not removed.

- (2) Using the special tools, compress the coil spring, and then remove the self-locking nut.

NOTE

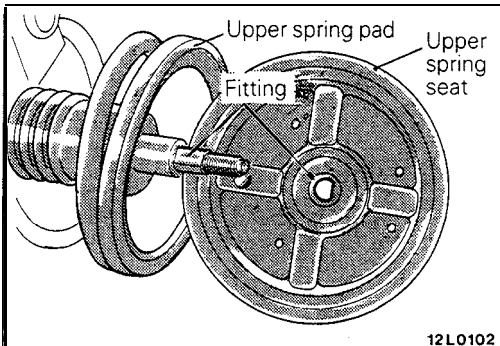
Install the special tools evenly, and so that the maximum length will be attained within the installation range.



**INSPECTION**

M33LGAF

- Check the strut insulator bearing- for wear or rust.
- Check the rubber parts for damage or deterioration.
- Check the spring for deformation, deterioration or damage.
- Check the shock absorber for deformation,

**SERVICE POINTS OF REASSEMBLY**

M33LHAM

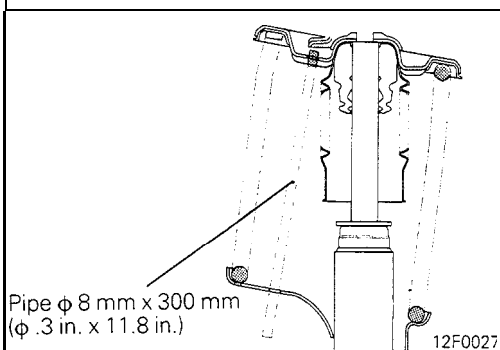
4. INSTALLATION OF SPRING UPPER SEAT ASSEMBLY

- (1) Assemble the spring upper seat to the piston rod, fitting the notch in the rod to the shaped hole in spring seat.

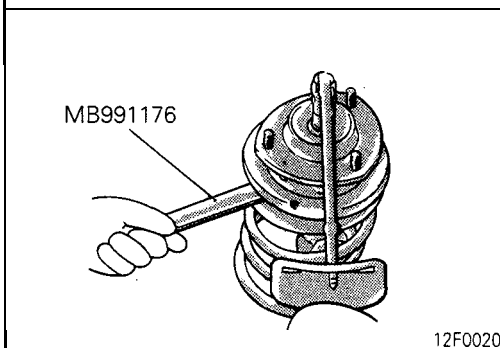
- (2) Line up the holes in the strut assembly spring lower seat with the hole in the spring upper seat.

NOTE

The job is easily accomplished with a pipe [ϕ 8 mm x 300 mm (ϕ .3 in. x 11.8 in.)].

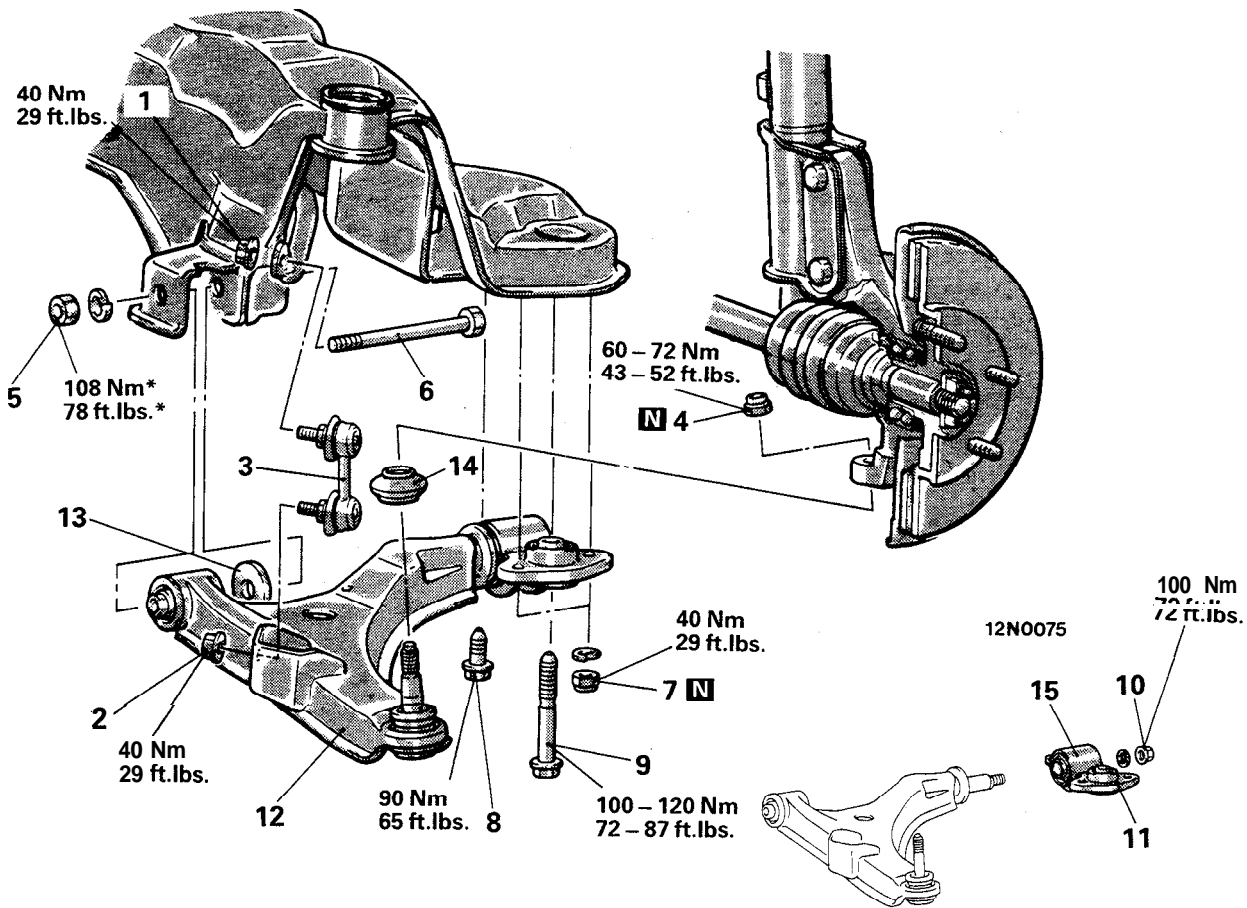
**2. INSTALLATION OF SELF-LOCKING NUT**

- (1) With the coil spring held compressed by the special tools (MB991 237 and MB991 238). provisionally tighten the self-locking nut.
- (2) Correctly align both ends of the coil spring with the grooves in the spring seat, and then loosen the special tools (MB991 237 and MB991 238).
- (3) Using the special tool, tighten the strut insulator at the specified torque.



LOWER ARM

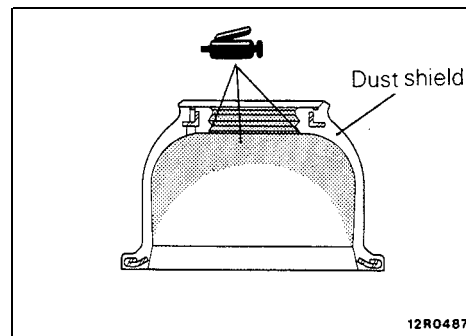
REMOVAL AND INSTALLATION

**Post-installation Operation**

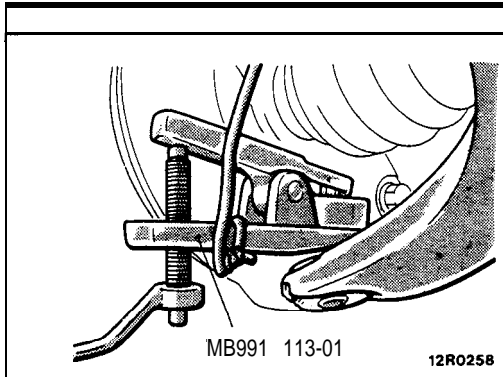
- Adjustment of Wheel Alignment (Refer to P.33A-4.)

Removal steps

1. Stabilizer link mounting nut (stabilizer bar side)
2. Stabilizer link mounting nut (lower arm side)
3. Stabilizer link
- 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)
- ◆◆ 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**

For tightening points marked with *, first temporarily tighten them, then ground the vehicle and torque to specification where the vehicle is empty.



SERVICE POINT OF REMOVAL

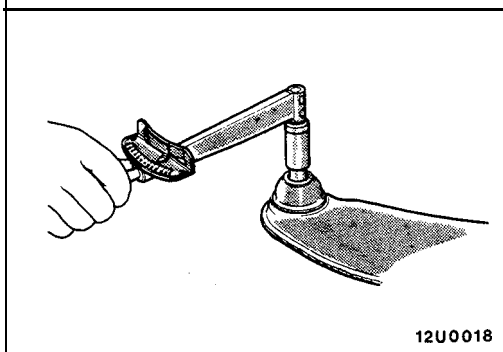
M33NBAO

4. REMOVAL OF LOWER ARM BALL JOINT

Using the special tool, disconnect the knuckle from the lower arm ball joint.

NOTE

- (1) Do not remove the nut from the ball joint, but just loosen it.
- (2) Suspend the special tool with a rope to prevent it from dropping.



INSPECTION

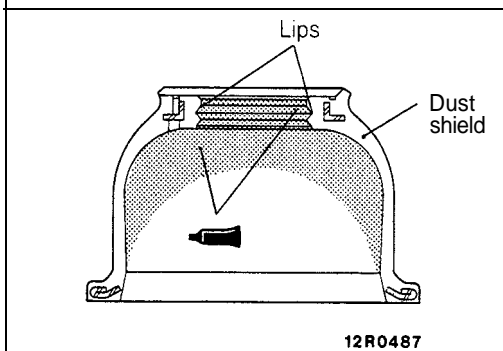
M33NCAF

- 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 STARTING TORQUE

Mount two nuts on the ball joint, and then measure the ball joint starting torque.

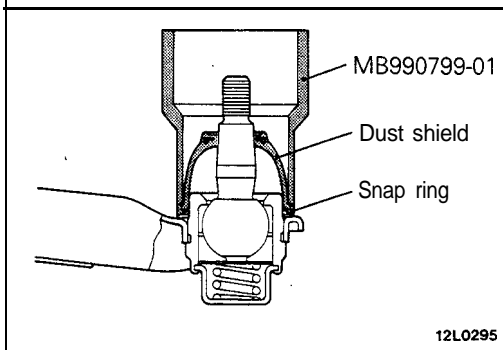
Standard value: 10 – 22 Nm (86 – 191 in.lbs.)



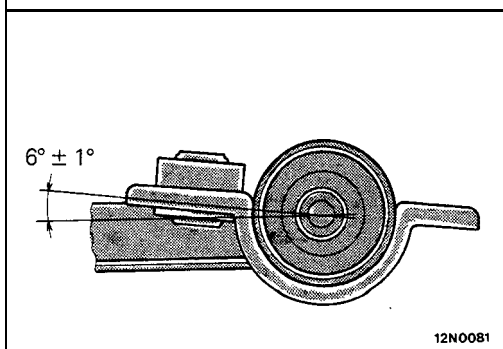
BALL JOINT DUST SHIELD REPLACEMENT

M33NEAH

- (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.



SERVICE POINT OF INSTALLATION

M33NFAP

10. INSTALLATION OF LOWER ARM CLAMP MOUNTING SELF-LOCKING NUT

Place the lower arm bushing bracket so that its mounting surface tilts $6^\circ \pm 1^\circ$ with respect to the bottom surface of the lower arm; then, mount the self-locking nut.

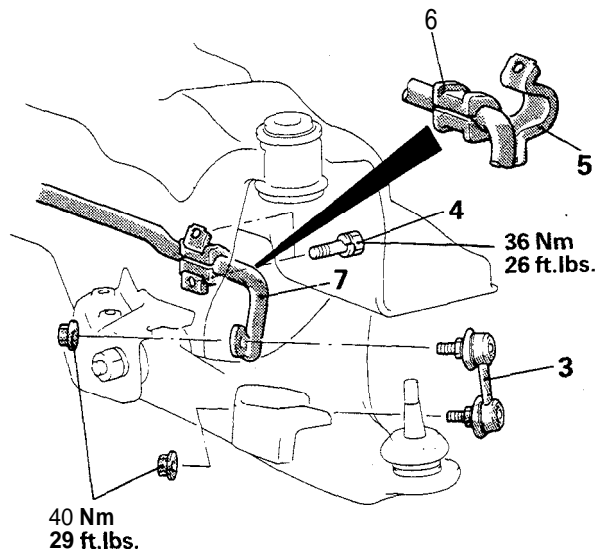
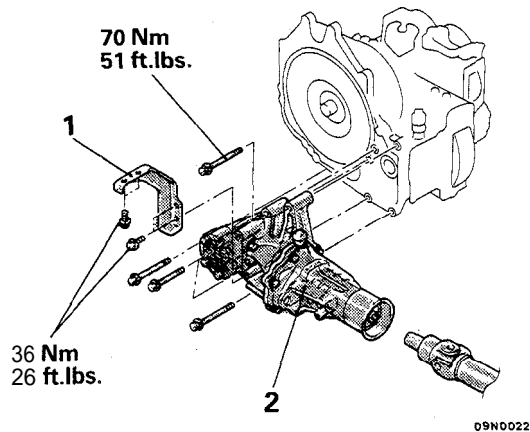
STABILIZER BAR

M33TA--

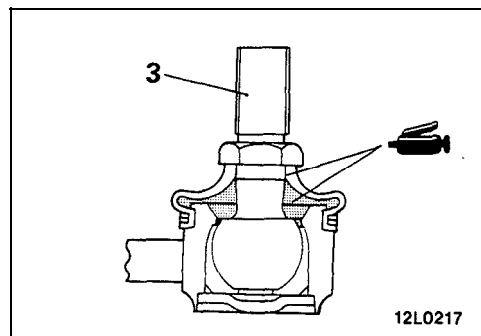
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Removal and installation of the Front Exhaust Pipe (Refer to GROUP 15 – Exhaust Pipe and Main Muffler.)
- Removal and Installation of the Under Cover
- Removal and installation of the Left Member and Right Member (Refer to GROUP 32 – Right Member, Left Member and Crossmember.)

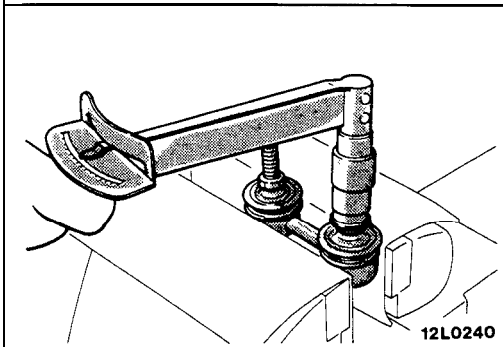
**Removal steps**

1. Transmission stay B
<AWD vehicles with automatic transaxle>
- ◆ • a 2. Transfer (AWD)
(Refer to GROUP 22 -Transfer.)
3. Stabilizer link
4. Stabilizer bar bracket mounting bolt
- + 5. Stabilizer bar bracket
6. Bushing
7. Stabilizer bar

**INSPECTION**

M33TCAJ

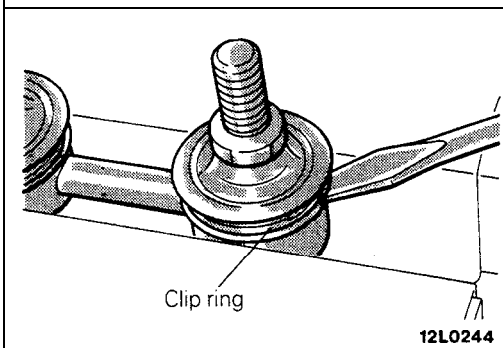
- Check the bushing for wear and deterioration.
- Check the stabilizer bar for deterioration or damage.
- Check the stabilizer link ball joint dust cover for cracks.
- Check all bolts for condition and straightness.



CHECKING STABILIZER LINK BALL JOINT STARTING TORQUE

Mount two nuts on the ball joint, and then measure the ball joint starting torque.

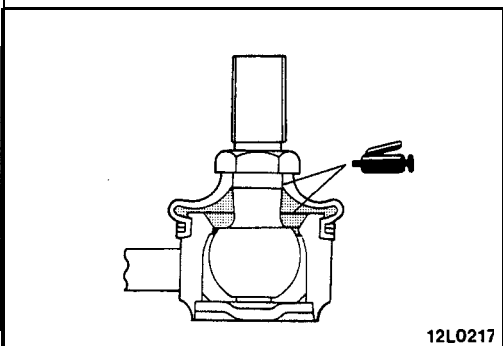
Standard value: 1.7 – 3.2 Nm (15 – 28 in.lbs.)



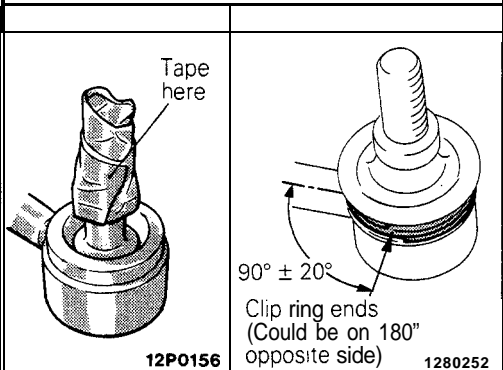
BALL JOINT DUST SHIELD REPLACEMENT

M33TEAF

(1) Remove the clip ring and the dust shield.



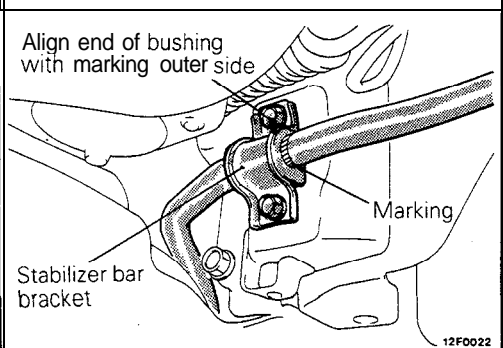
(2) Apply multipurpose grease to the lip and inside of the dust shield.



(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.



SERVICE POINT OF INSTALLATION

M33TDA0

5. POSITIONING OF STABILIZER BAR BRACKET

- (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:



ELECTRONIC CONTROL SUSPENSION

CONTENTS

M33AA-B

CIRCUIT DIAGRAM	22	SPECIAL TOOLS	3
DAMPING FORCE CHANGEOVER ACTUATOR	20	SPECIFICATIONS	2
ECS CONTROL UNIT	21	General Specifications	2
ECS INDICATOR LIGHT	20	Service Specifications	3
ECS SWITCH	19	STEERING ANGULAR VELOCITY SENSOR*	19
G SENSOR	19	STOP LIGHT SWITCH	20
POSITION DETECTION SWITCH	20	THROTTLE POSITION SENSOR	20
SERVICE ADJUSTMENT PROCEDURES	12	TROUBLESHOOTING	4
On-Vehicle Inspection	12	VEHICLE SPEED SENSOR	19

SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

- (1) A Supplemental Restraint System (SRS), which uses a driver-side air bag, has been installed in the 3000GT.
- (2) The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning light, air bag module, clock spring, 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 (*).

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) 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), before beginning any service or maintenance of any component of the SRS or any SRS-related component.

SPECIFICATIONS
GENERAL SPECIFICATIONS

M33CA-B

FRONT SUSPENSION

Items	FWD		AWD
	M/T	A/T	M/T
Suspension system	McPherson strut type		
Coil spring			
Wire dia. x center dia. x free length mm (in.)	14.8 x 170 x 322.5 (.58 x 6.69 x 12.70)	15.0 x 170 x 331.0 (.59 x 6.69 x 13.03)	15.7 x 170 x 301.5 (.62 x 6.69 x 11.87)
Effective No. of coils (color coded)	3.29 (orange x 1)	3.47 (orange x 2)	3.21 (blue x 1)
Shock absorber	Hydraulic, cylindrical double-acting type		
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	2,650 (584)		
Medium	1,650 (364)		
Soft	650 (143)		
Contraction			
Hard	1,200 (265)		
Medium	1,150 (254)		
Soft	1,000 (220)		
Stabilizer bar	Pillow ball type		
Mounting method			
Outside dia. mm (in.)	22 (.86)		23 (.91)

REAR SUSPENSION

Items	FWD	AWD
Suspension system	Multi-link type	Double-wishbone type
Coil spring		
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)
Effective No. of coils (color coded)	5.5 (orange x 1)	6.8 (blue x 2)

Items	FWD	AWD
Shock absorber	Hydraulic, cylindrical double-acting type	
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	1,800 (397)	
Medium	1,200 (265)	
Soft	550 (121)	
Contraction		
Hard	950 (209)	
Medium	850 (187)	
Soft	850 (143)	
Stabilizer bar	Pillow ball type	
Mounting method		
Outside dia. mm (in.)	10 (.37)	22 (.86)

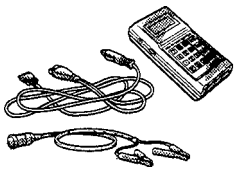

SERVICE SPECIFICATIONS

M33CB-B

Items	Front suspension	Rear suspension	
		F	W D. 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

M33DA-B

Tool	Number	Name	Use
	MB991 341	Multi-use tester sub-assembly	Inspection of electronic control suspension system <ul style="list-style-type: none"> • Reading and erasing self-diagnosis codes • Reading service data • Actuator test
	MB991 359	ROM pack	

TROUBLESHOOTING

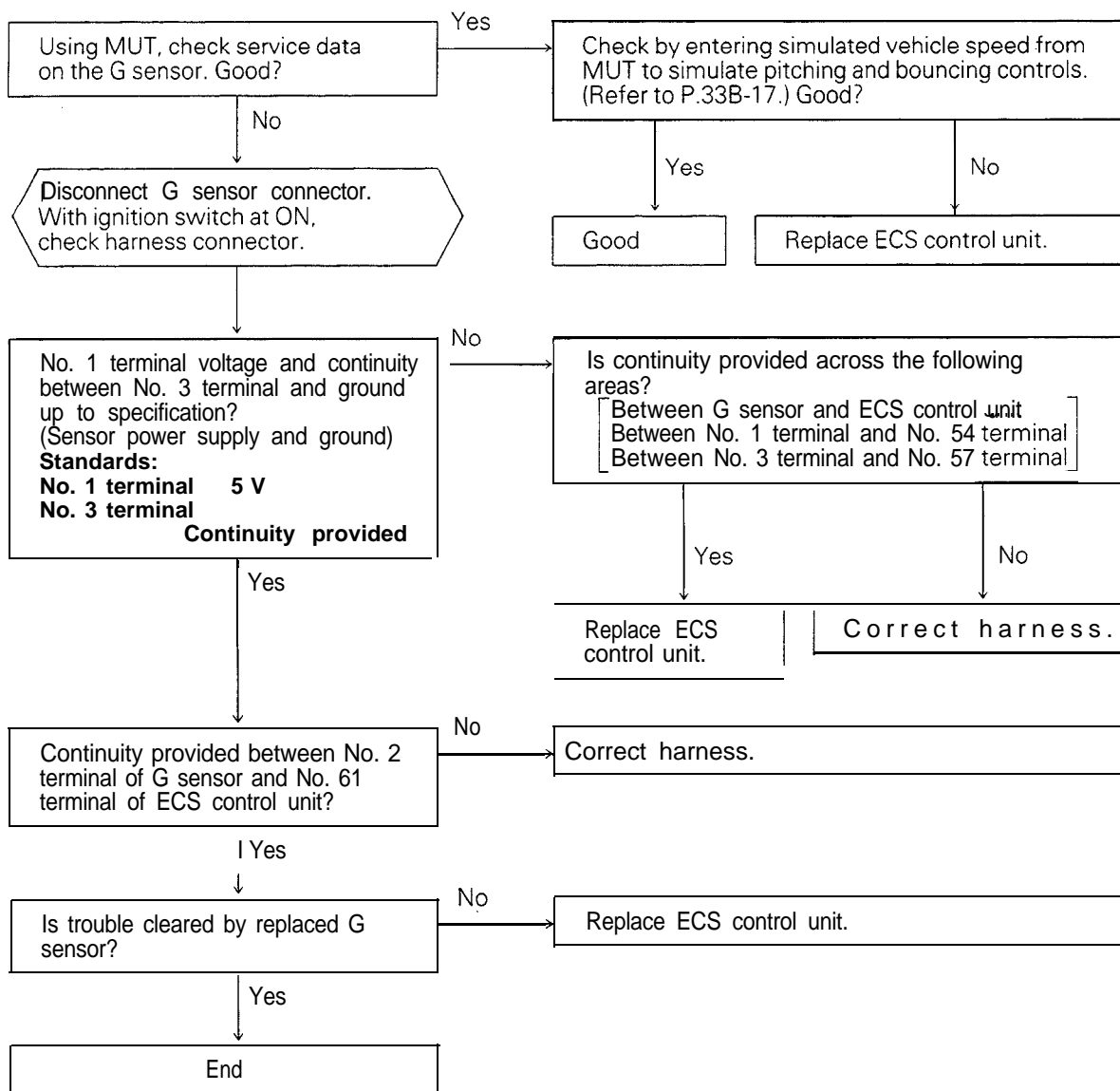
QUICK REFERENCE CHART FOR TROUBLESHOOTING

Symptoms	Associated components										Pages to refer to
	ECS switch	ECS indicator light	Steering angular velocity sensor* ²	Stop light switch	Throttle position sensor* ⁴	Vehicle speed sensor* ³	G sensor* ¹	Position detection switch	Damping force change-over actuator	ECS control unit	
When self diagnosis code No. 11 is output. * ¹							○			○	P.33B-5
When self diagnosis code No. 21 is output. * ²			○							○	P.33B-6
When self diagnosis code No. 24 is output. * ³						○				○	P.33B-7
When self diagnosis code Nos. 61 through 64 are output.								○	○	○	P.33B-8
ECS indicator light does not switch when ECS switch is operated.	○	○								○	P.33B-9
Anti-roll control only stops. * ²			○							○	P.33B-6
Anti-dive control only stops.				○						○	P.33B-10
Anti-squat control only stops. * ⁴					○					○	P.33B-11

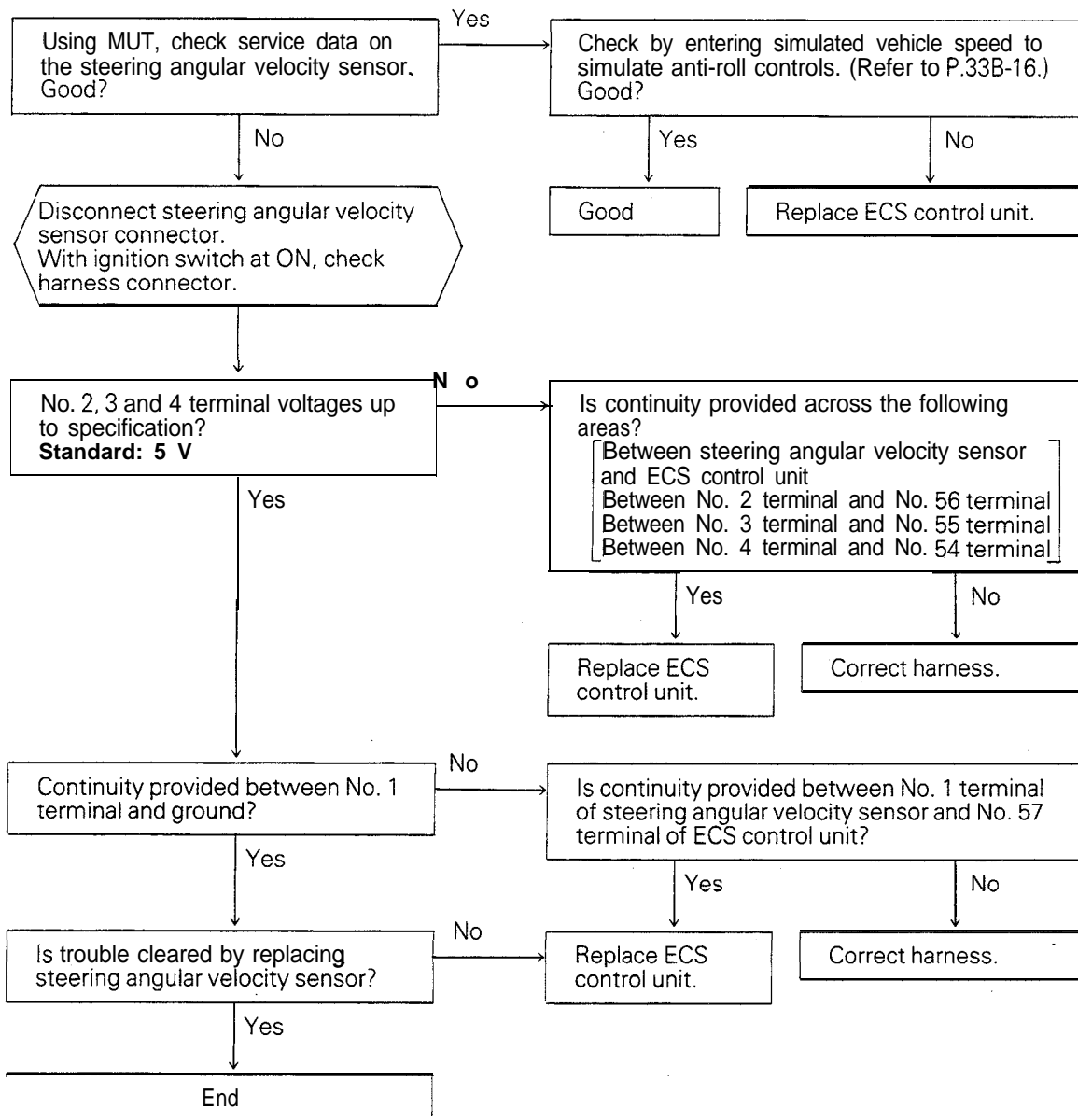
TROUBLESHOOTING HINTS

- *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 self-diagnosis 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 light in the combination meter will light, and engine self-diagnosis code No. 14 will be output. In a situation where anti-squat control only stops, therefore, if the check engine light does not light, defective wiring is suspected between the ECS control unit and throttle position sensor.

1 When diagnosis code No. 11 is output



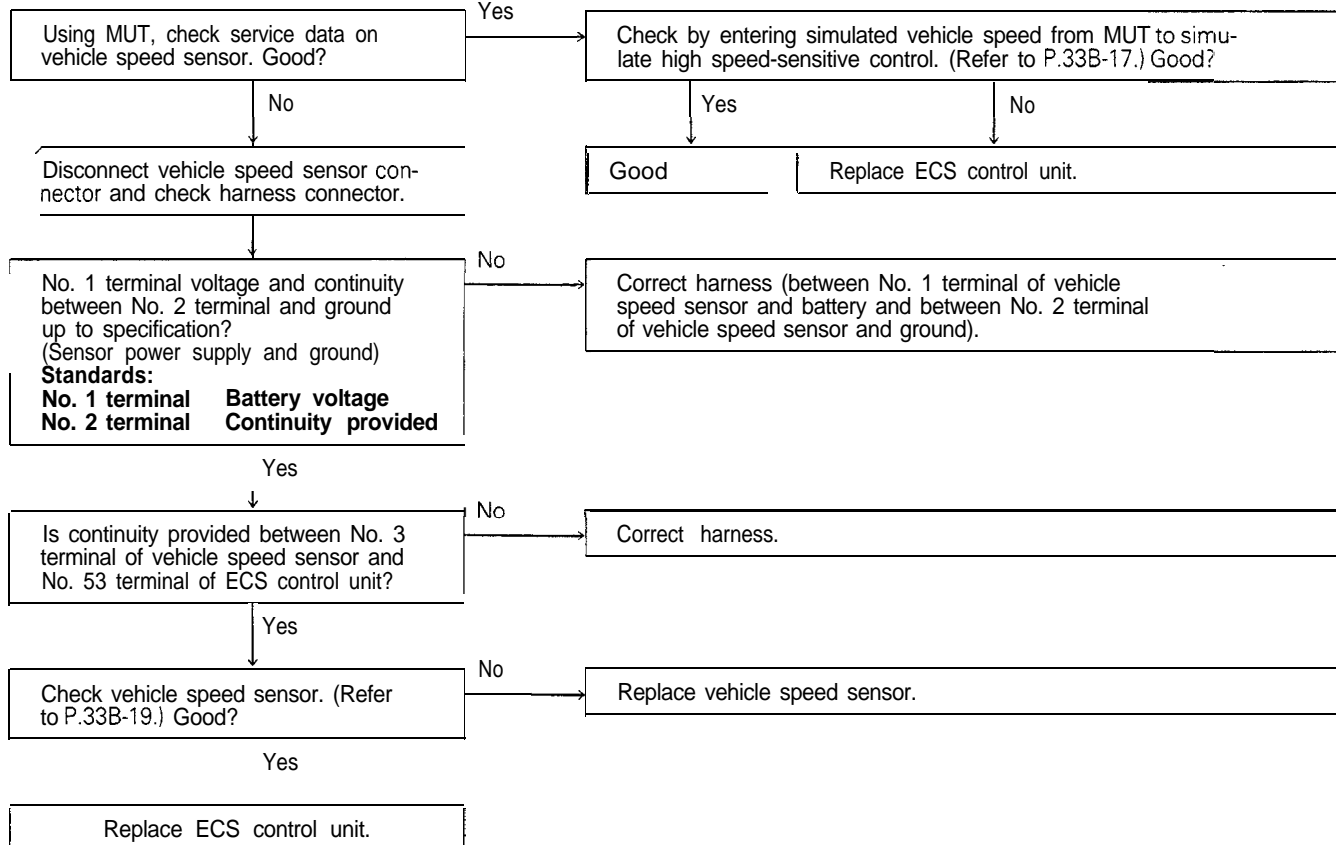
2 | When diagnosis code No. 21 is output, or when anti-roll control only stops.



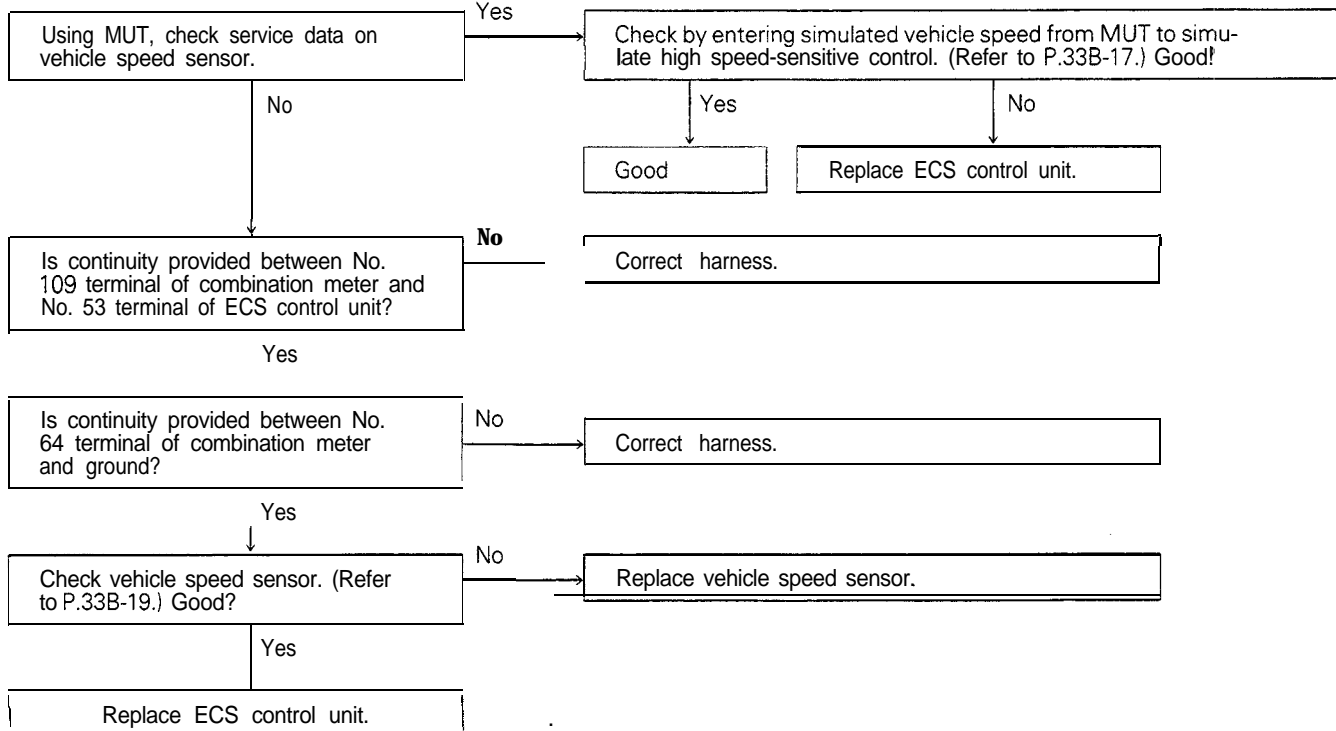
3 When diagnosis code No. 24 is output

1

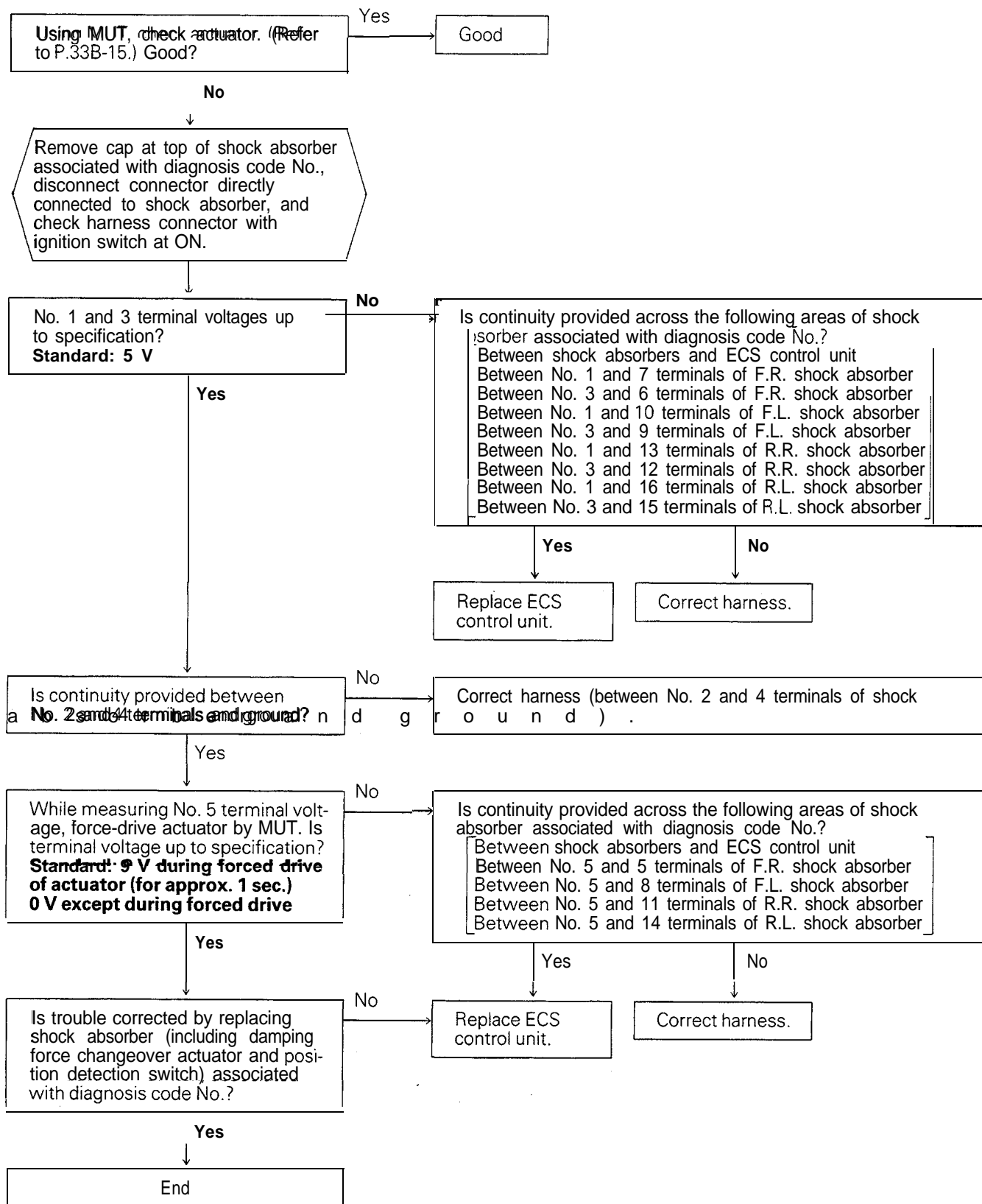
<Turbo>



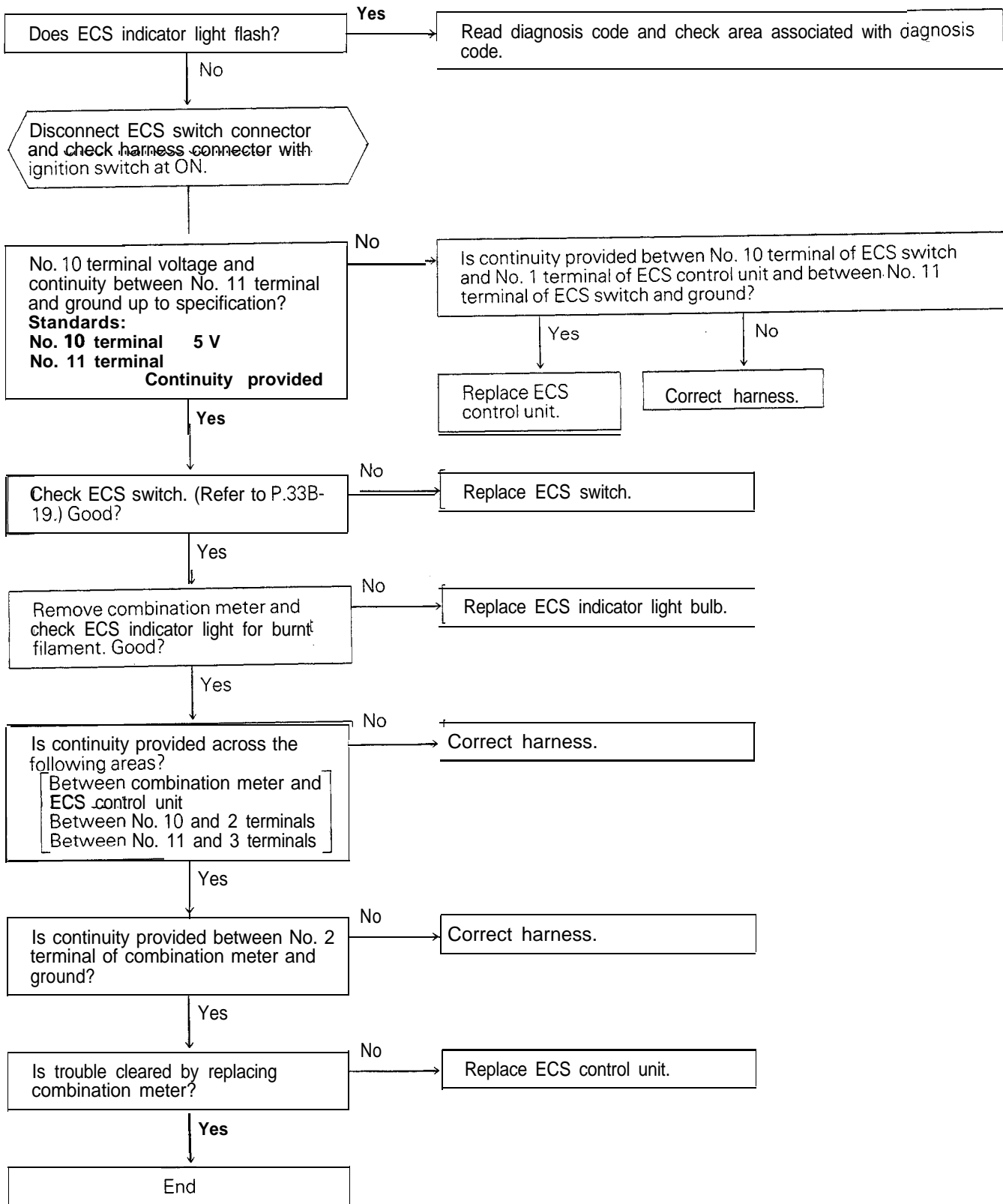
<Non-Turbo>



4 | When diagnosis code Nos. 61, 62, 63 and 64 are output.

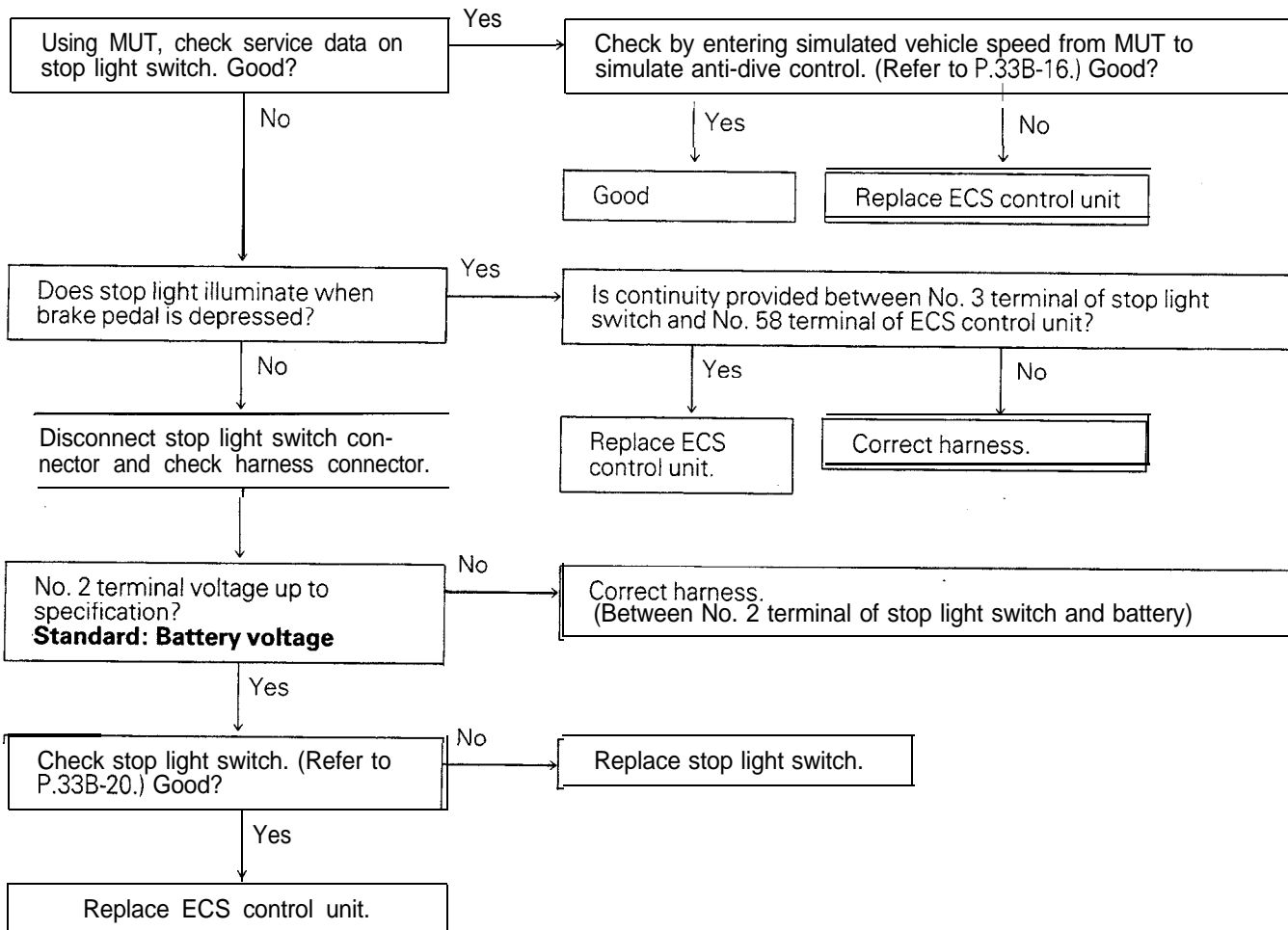


5 | ECS indicator light does not switch when ECS switch is operated.



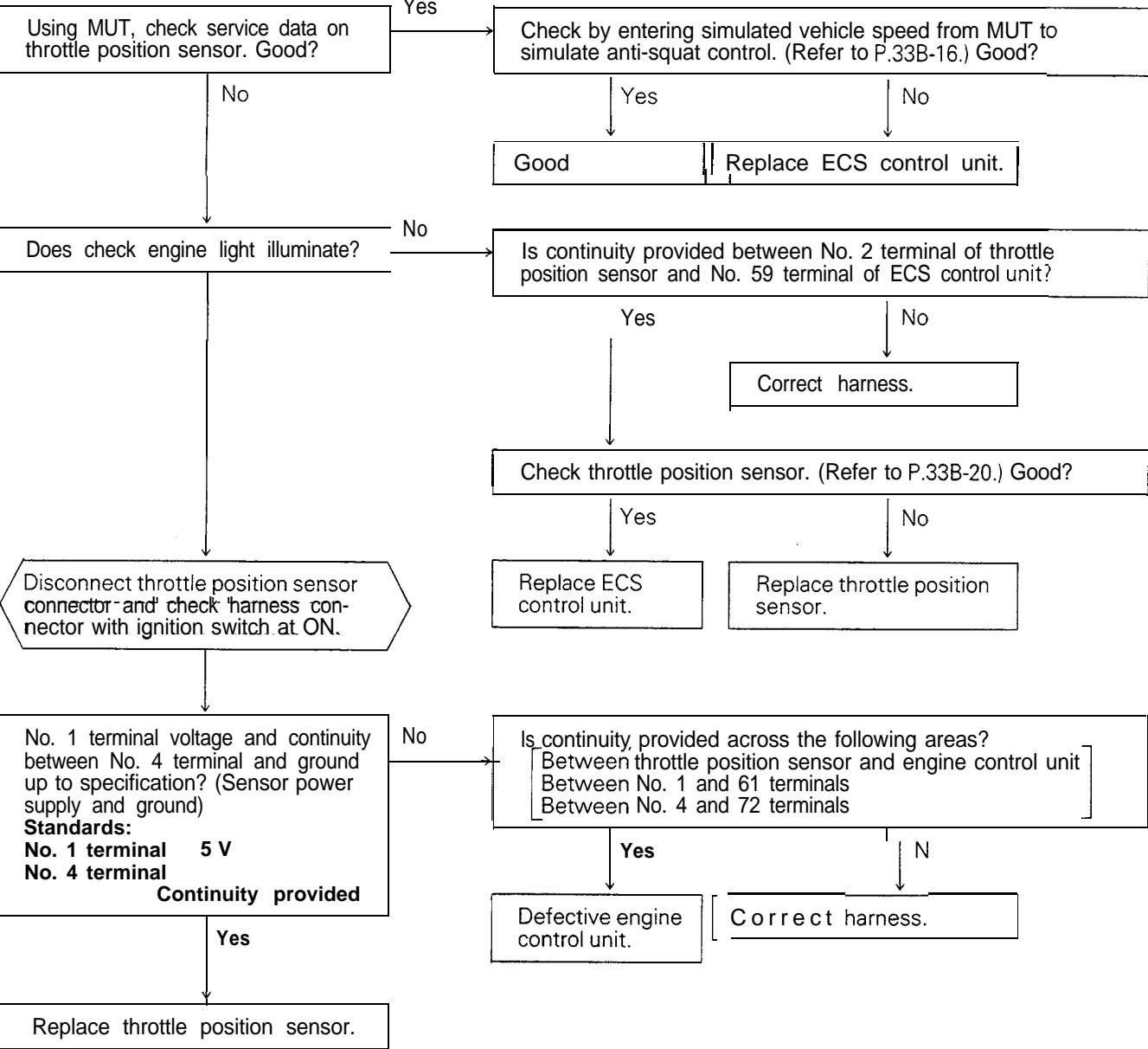
33B-10 ELECTRONIC CONTROL SUSPENSION (ECS) – Troubleshooting

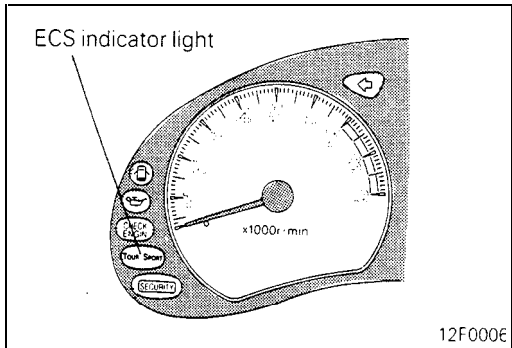
6 Anti-dive control only stops.



ELECTRONIC CONTROL SUSPENSION (ECS) – Troubleshooting 33B-11

7 | Anti-squat control only stops.





SERVICE ADJUSTMENT PROCEDURES

ON-VEHICLE INSPECTION

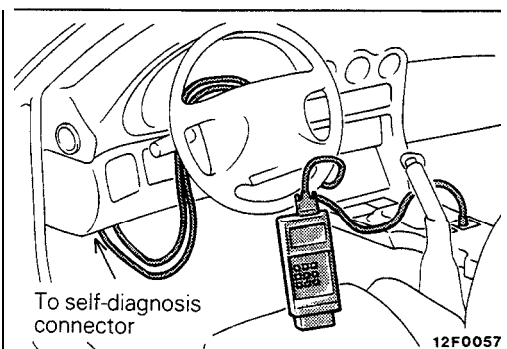
M33FHAD

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 self-diagnosis code associated with the problem is output to the diagnosis connector.

Warning Indication Items

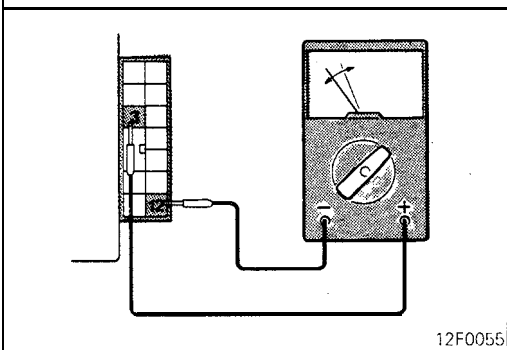
- G sensor
- Steering angular velocity sensor
- Vehicle speed sensor
- Damping force changeover actuator (including position detection switch)



2. SELF-DIAGNOSIS OUTPUT CHECK

<When multi-use tester (MUT) is used>









- (1) Check the self-diagnosis code.
- (2) After the defective portion has been repaired, erase the self-diagnosis code. (If the defective portion is not completely repaired, it may be impossible to erase the self-diagnosis code by the MUT.)
- (3) Perform self-diagnosis output check again and check that the self-diagnosis code is good.



<When voltmeter is used>

- (1) Set the ignition switch to OFF.
- (2) Connect the positive (+) terminal of the voltmeter to the No. 3 terminal of the diagnosis 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 self-diagnosis code on the basis of the deflection of the pointer of the voltmeter.
- (5) Based on the self-diagnosis 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 self-diagnosis check again, and check that the self-diagnosis code is good.

Fail Safe and Diagnosis List

Output Code		Diagnosis Item	Fail Safe
Code No.	Indication Pattern		
0		[Good]	[Good]
11		G sensor defective*	<ul style="list-style-type: none"> Ride controls (pinching and bouncing control, bad road detection control) stop.
21		Steering angular velocity sensor open-circuited*	<ul style="list-style-type: none"> Anti-roll control stops.
24		Vehicle speed sensor *open-circuited	<ul style="list-style-type: none"> Steering stability controls (anti-roll, 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	<ul style="list-style-type: none"> All ECS controls stop. Normal shock absorber damping force fixed at HARD.
62	 changeover actuator defective	F. L. damping force changeover actuator defective	
63		R. R. damping force changeover actuator defective	
64		R. L. damping force changeover actuator defective	

NOTE

- 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.
- Even if control stop warning indication and fixed damping force return to normal as described above, the self-diagnosis code is stored in the memory in the ECS control unit.
- The self-diagnosis code can be force-cleared by use of the MUT 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 self-diagnosis code has been output, provided that no new self-diagnosis code is output during the period.

Self-Diagnosis Determination Conditions

Code No.	What is Defective	Self-Diagnosis 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 after actuator drive 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 MUT, 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	ST1 and ST2 indications change in the following combinations.				
			ST1	ON	ON	OFF	OFF
			ST2	ON	OFF	OFF	ON
		Slowly turn steering wheel clockwise.	ST1	ON	OFF	OFF	ON
			ST2	ON	ON	OFF	OFF

Item No.	Check Point	Check Condition	Soundness Determination Value
24	Vehicle speed sensor	Check by actually operating vehicle.	Speedometer indication and MUT 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

4. ACTUATOR CHECK

- (1) Using the MUT, 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. MUT disconnected

Actuator Check List

Item No.	Check Point	Check Condition	MUT 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

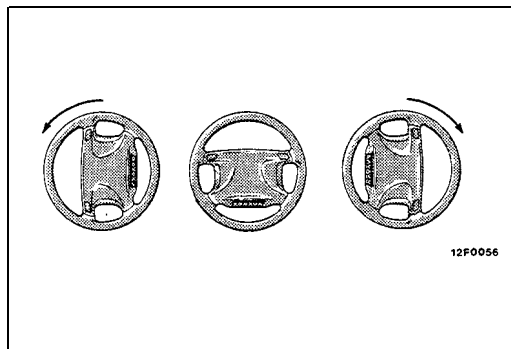
Using the MUT, check all control functions during operation with the vehicle in stationary condition.

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 MUT.
- (5) Using the MUT, check the indications of service data items No. 61 through 64.

MUT indication: SOFT

- (6) Turn the steering wheel clockwise or counterclockwise from the straight ahead position.
- (7) Using the MUT, check that the indications of service data items No. 61 through 64 change over.



Steering turning speed	MUT indication
Approx. 0.3 seconds for 90° rotation	MEDIUM
Approx. 0.2 seconds for 90° rotation	HARD

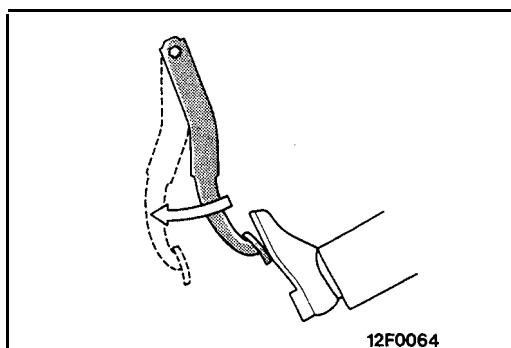
- (8) Check that the original damping force indication (SOFT) is restored a second later.

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 MUT.
- (3) Using the MUT, check the indications of service data items No. 61 through 64.

MUT indication: SOFT

- (4) Depress the brake pedal and simultaneously change the entered simulated vehicle speed by the MUT. (Change the speed in 0.4 seconds after depressing the brake pedal.)
- (5) Using the MUT, check that the indications of service data items No. 61 through 64 change over.



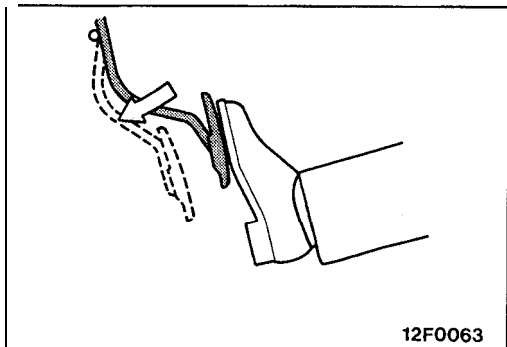
Changing entered simulated vehicle speed	MUT indication
100 km/h (62 mph) to 80 km/h (50 mph)	HARD

- (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 MUT.
- (3) Using the MUT, check the indications of service data items No. 61 through 64.

MUT indication: SOFT



- (4) Check that when the accelerator pedal is operated, the indications of service data items No. 61 through 64 on the MUT 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 MUT indications change over.

Entered simulated vehicle speed	Accelerator operating condition	
	Quickly depress	A second later with pedal depressed
30 km/h (19 mph)	HARD	MEDIUM
60 km/h (37 mph)	MEDIUM	MEDIUM
90 km/h (56 mph)	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

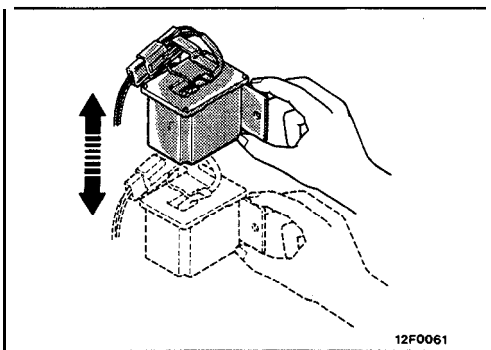
- (1) Select the Tour mode by the ECS switch.
- (2) Check that when the entered simulated vehicle speed is changed by the MUT, the indications of service data items No. 61 through 64 change.
(If the simulated vehicle speed is continuously changed by the ↑ and ↓ keys of the MUT, however, the indications of service data items No. 61 through 64 do not change during the period the ↑ or ↓ key is pressed.)

Changing entered simulated vehicle speed	MUT 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

5-5. Pitching and Bouncing Control Function Check

- (1) Select the Tour mode by the ECS switch.
- (2) Using the MUT, check the indications of service data items No. 61 through 64.

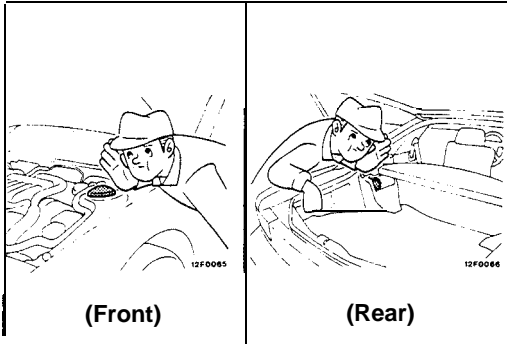
MUT indication: SOFT



- (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	MUT 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

M33FJAA

6-1. Actuator Operating Sound Check

- (1) Set the ignition switch to ON.
- (2) Bring your ear near the top of the shock absorber.

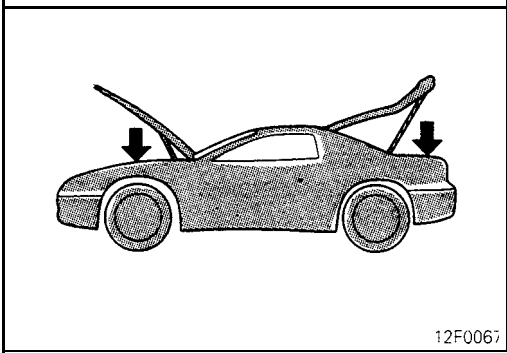
NOTE

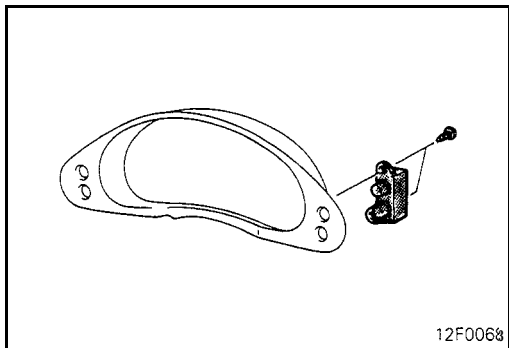
In the case of the rear shock absorbers, remove the trim cover at the top of the shock absorber before bringing your ear near the shock absorber.

- (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.

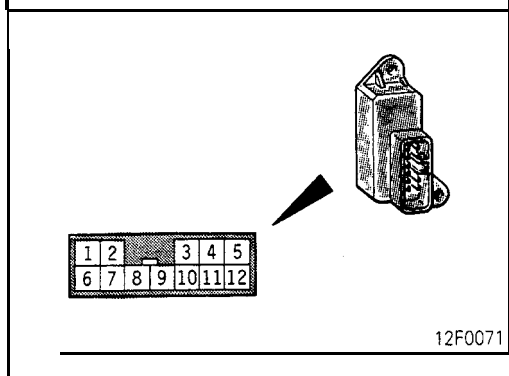
6-2. Damping Force Check

- (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.

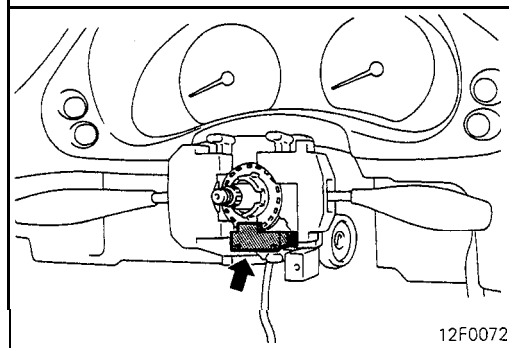




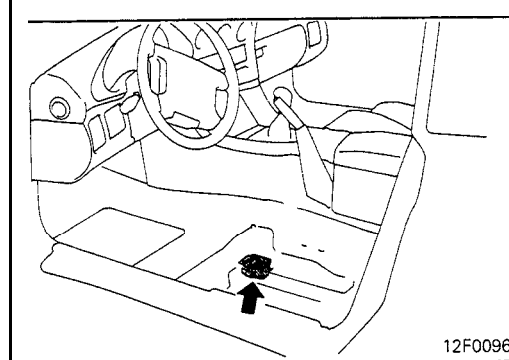
12F0068



12F0071



12F0072



12F0096

ECS SWITCH

M33ZCAB

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.

INSPECTION

Operate the switch to check for continuity between the individual terminals.

Terminal		3	4	10	11
		Switch position			
ECS switch	ON	0 — ○		○ — ○	
	OFF	0 — ○			

NOTE
O-O indicates that there is continuity between the terminals.

STEERING ANGULAR VELOCITY SENSOR

M33ZHAB

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.

G SENSOR

M33ZIAB

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

M33ZJAB

To mount or remove the vehicle speed sensor, refer to GROUP 54 – Meters and Gauges.

INSPECTION

Refer to GROUP 54 – Meters and Gauges.

THROTTLE POSITION SENSOR INSPECTION AND ADJUSTMENT

M33ZKAB

Refer to GROUP 13 – Fuel System.

STOP LIGHT SWITCH

M33ZCAC

To remove or mount the stop light switch, refer to GROUP 35 – Brake Pedal.

INSPECTION

Refer to GROUP 35 – Brake Pedal.

POSITION DETECTION SWITCH and DAMPING FORCE CHANGEOVER ACTUATOR

M33ZCAD

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.

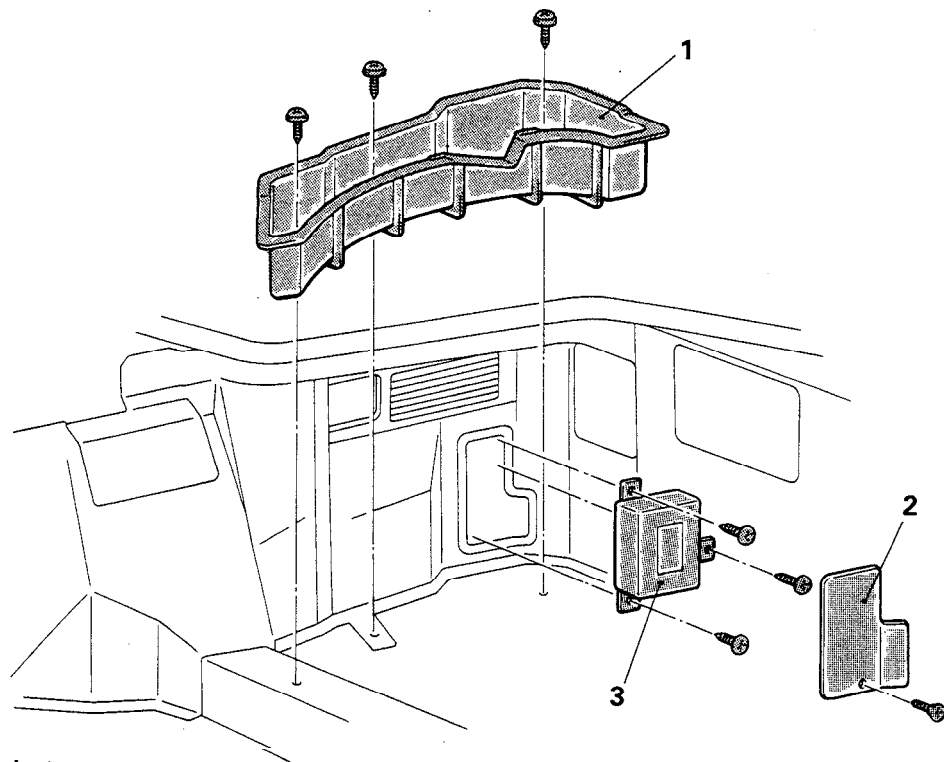
ECS INDICATOR LIGHT

M33ZLAB

To remove or mount the ECS indicator lights, refer to GROUP 54 – Meters and Gauges.

**ECS CONTROL UNIT
REMOVAL AND INSTALLATION**

M33ZXAD

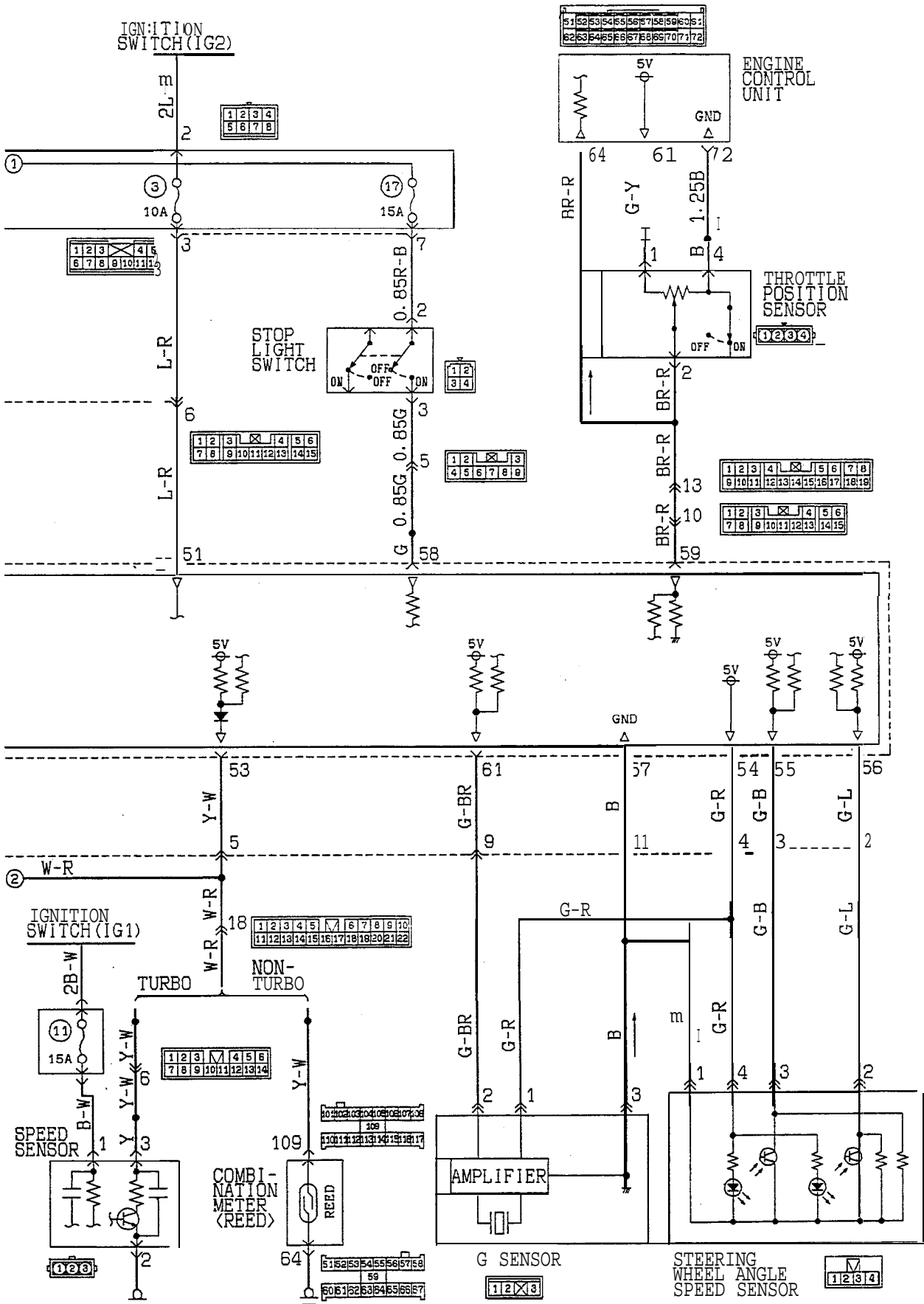


Removal steps

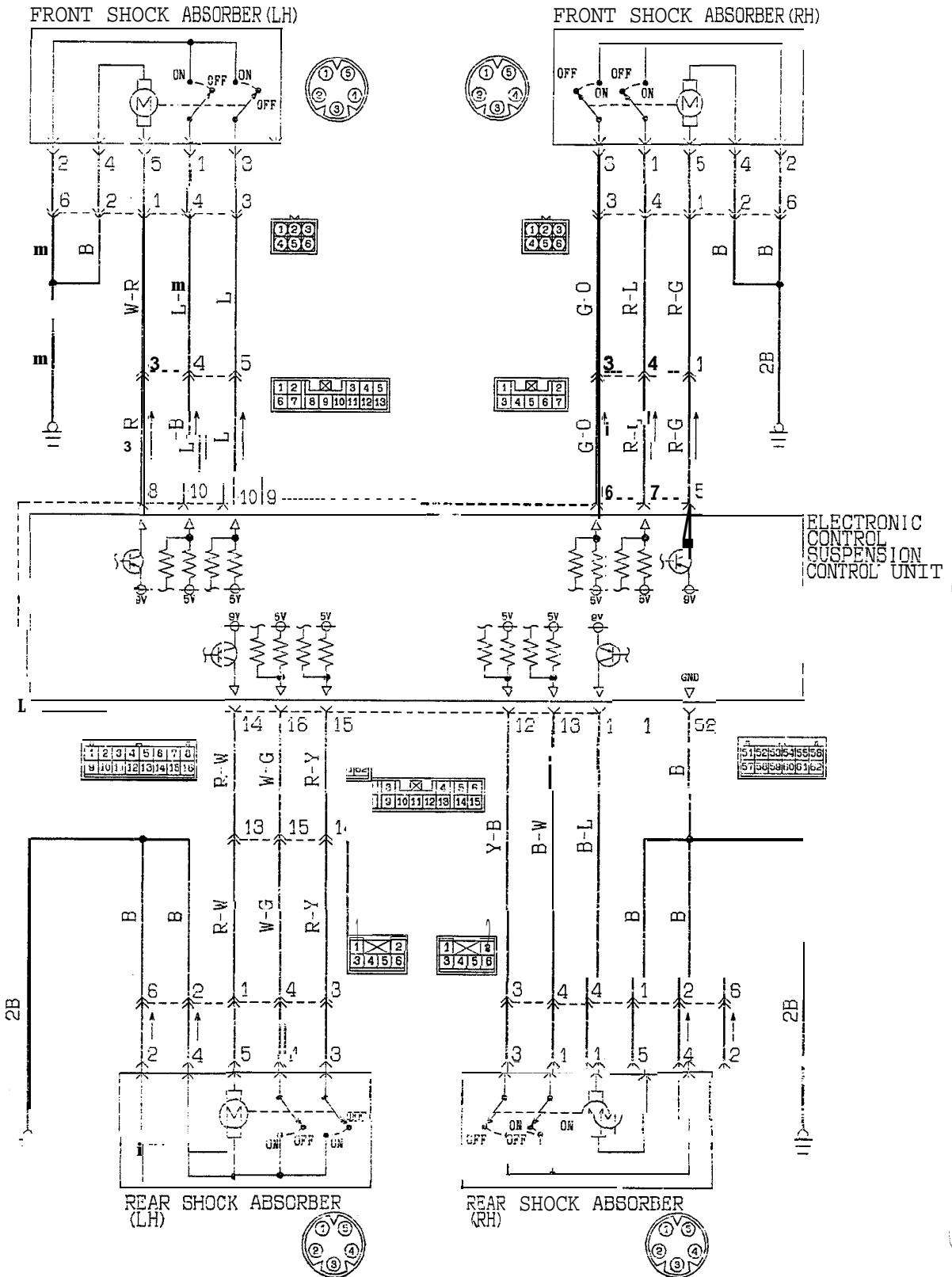
1. Cargo floor box (R.H.)
2. Lid
3. ECS control unit

12F0098

ELECTRONIC CONTROL SUSPENSION (ECS) – Circuit Diagram 33B-23



33B-24 ELECTRONIC CONTROL SUSPENSION (ECS) – Circuit Diagram



KX35-AX-R1701A-NM

TSB Revision

REAR SUSPENSION

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M34AA-

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<FWD>

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SPECIFICATIONS <FWD>

M34CA-A

GENERAL SPECIFICATIONS

Items	Vehicles without ECS	Vehicles with ECS
Suspension system	Multi-link	
Coil spring		
Wire dia. x O.D. x free length mm (in.)	12 x 95 x 350 (.47 x 3.74 x 13.78)	12.2 x 105 x 350 (.48 x 4.13 x 13.78)
Coil spring identification color	Pink x 1	Orange x 1
Spring constant N/mm (lbs./in.)	35 ± 1.8 (196 ± 10.1)	35 ± 1.8 (196 ± 10.1)
Shock absorber		
Type	Hydraulic cylindrical double-acting type	Hydraulic cylindrical double-acting type
Max. length mm (in.)	515 ± 3 (20.2 ± .1)	515 ± 3 (20.2 ± .1)
Min. length mm (in.)	356 ± 3 (14.0 ± .1)	356 ± 3 (14.0 ± .1)
Stroke mm (in.)	159 (6.3)	159 (6.3)
Damping force [at 0.3 m/sec.(.9ft./sec.)]		
Expansion N (lbs.)	1,000 ± 150 (220 ± 33)	Hard: 1,800 ± 250 (397 ± 55) Medium: 1,200 ± 170 (265 ± 37) Soft: 550 ± 90 (121 ± 20)
Contraction N (lbs.)	550 ± 80 (121 ± 18)	Hard: 950 ± 140 (209 ± 31) Medium: 850 ± 130 (187 ± 29) Soft: 650 ± 100 (143 ± 22)
Wheel bearing	Unit ball bearing	
Type		

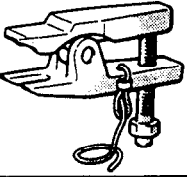
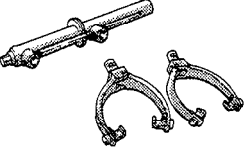
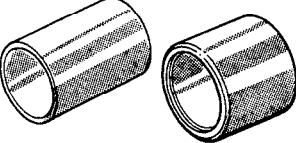
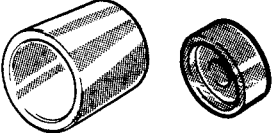
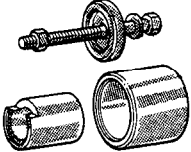

SERVICE SPECIFICATIONS

M34CB-A

Items	Specifications
Standard value	
Toe-in (Left-right difference) mm (in.)	0.5 ± 2.5 (.01 ± .09)
Camber	0° ± 30'
Stabilizer link ball joint starting torque Nm (in.lbs.)	1.7 – 3.2 (15 – 28)
Ball joint rotation starting 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)
Limit	
Wheel bearing end play mm (in.)	0.05 (.002) or less
Rear hub rotary-sliding resistance N (lbs.)	31 (7) or less
Rear hub rotary-sliding torque Nm (ft.lbs.)	1.8 (1.30) or less

SPECIAL TOOLS

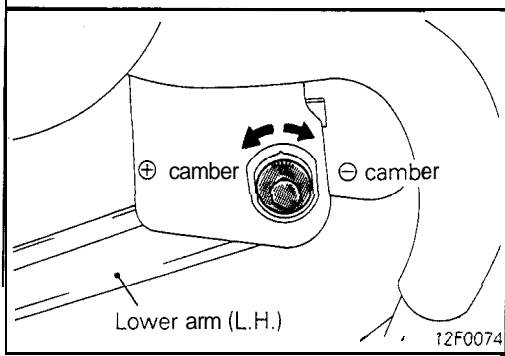
M34DA-A

Tool	Number	Name	Use
	MB991113-01	Steering linkage puller	Removal of the ball joint
	MB991237 MB991238	Spring compressor body Arm set	Compression of the coil spring
	MB991389 MB991005	Bushing remover base Arbor	Removal and installation of trailing arm bushing
	MB991071-01 MB991072 MB991073	Bushing remover and installer Base Arbor	Removal and installation of bushing from/to upper arm, lower arm, and assist link
	MB991045	Bushing remover and installer	Removal and installation of the crossmember bushing
	MB990800-01	Ball joint remover and installer	Installation of the dust cover

TROUBLESHOOTING

M34EA-A

Symptom	Probable cause	Remedy
Squeaks or other abnormal noise	Loose rear suspension installation bolts and nuts	Retighten
	Malfunction of shock absorber Worn bushings	Replace
	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 Weak or broken springs	Replace
	Stabilizer bar and/or stabilizer link deformed or damaged	
Body tilting	Weak or deteriorated bushings Weak or broken springs	Replace
	Upper arms and/or lower arms and/or assist link deformed or damaged	
	Trailing arms deformed or damaged	
	Crossmember deformed or damaged	



SERVICE ADJUSTMENT PROCEDURES

REAR WHEEL ALIGNMENT INSPECTION

M34FAAH

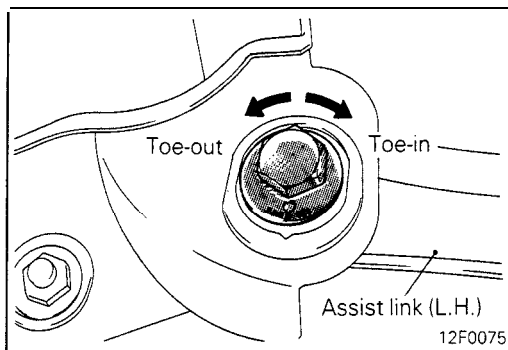
CAMBER

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'.



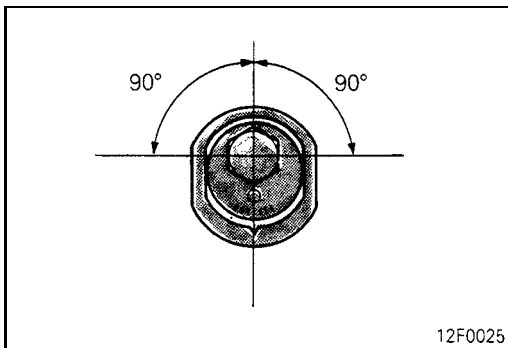
TOE-IN

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.

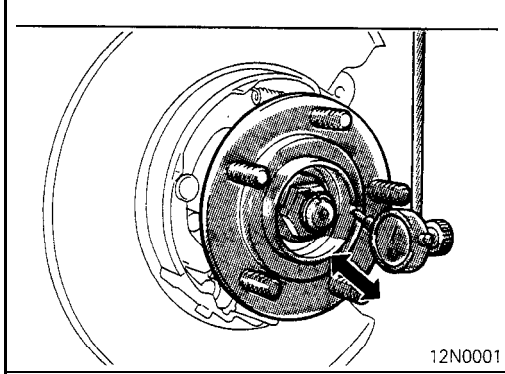
NOTE

- (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.

**WHEEL BEARING END PLAY INSPECTION**

M34FBAG

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**

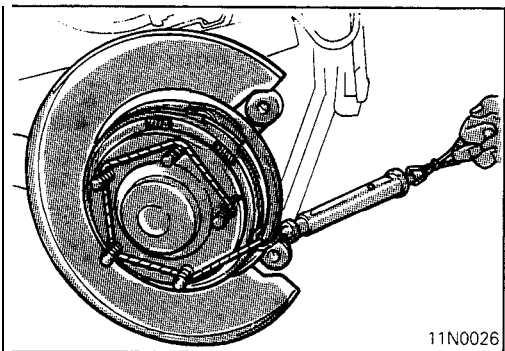
If the limit value is exceeded, the lock nut should be tightened to the specified torque and check the end play again.

5. Replace the rear hub bearing unit if an adjustment cannot be made to within the limit.

REAR HUB ROTARY-SLIDING RESISTANCE (TORQUE) INSPECTION

M34FCAC

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 (the rotary-sliding torque of the rear hub) is the standard value.

Limit:**Rear hub rotary-sliding resistance****31 N (7 lbs.) or less****Rear hub rotary-sliding torque****1.8 Nm (1.30 ft.lbs.) or less****NOTE**

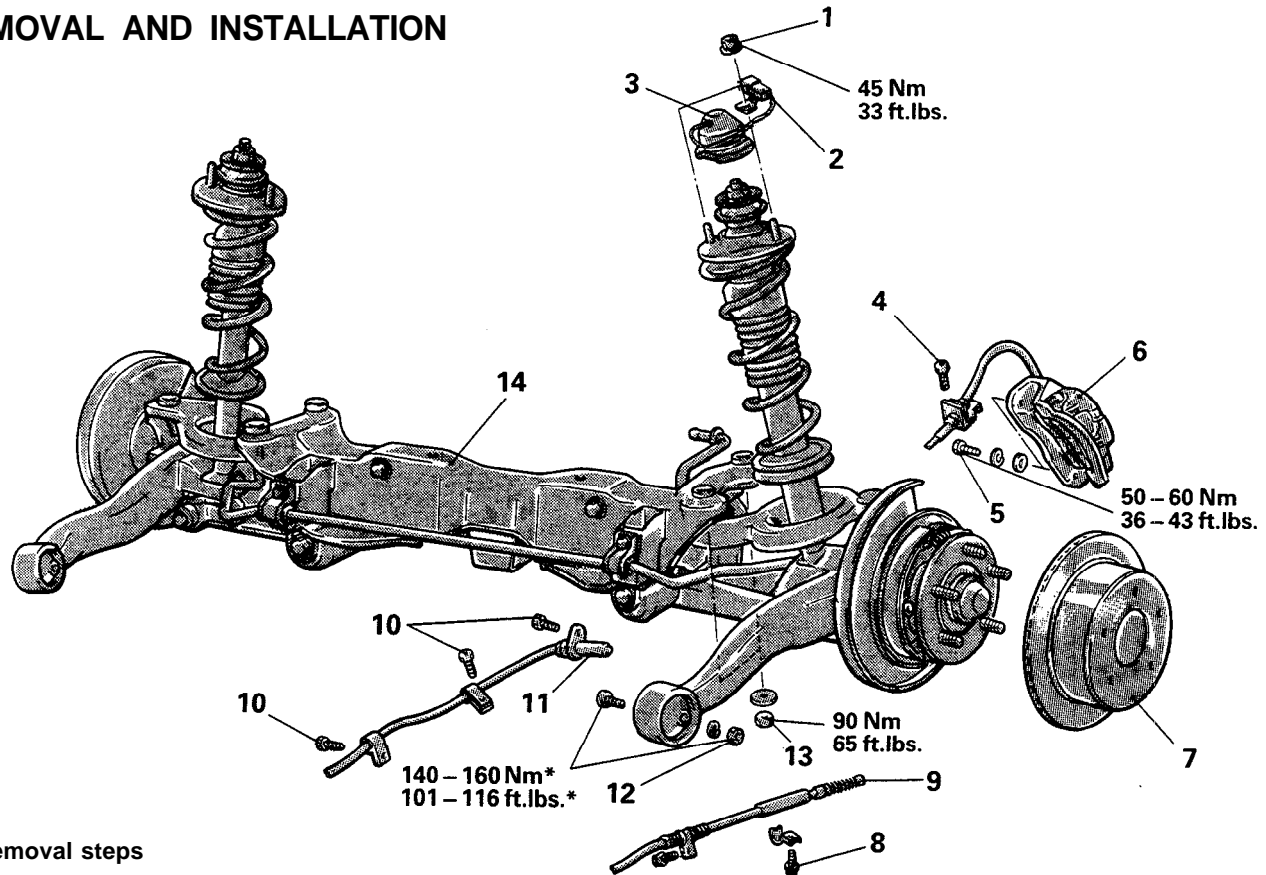
If the limit value is exceeded, the lock nut should be tightened to the specified torque and check the end play again.

5. Replace the rear hub unit bearing if an adjustment cannot be made to within the limit.

REAR SUSPENSION ASSEMBLY

M34GA-A

REMOVAL AND INSTALLATION



Removal steps

1. Shock absorber mounting nuts (upper)
2. ECS connector (ECS)
3. Cap
4. Brake line 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

NOTE

* indicates parts which should be temporarily tightened, and then fully tightened with the vehicle in the unladen condition.

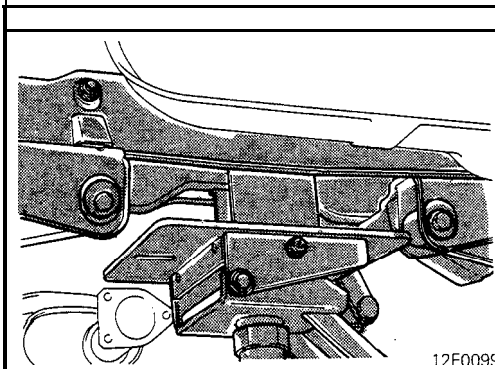
Pre-removal Operation

- Removal of the Absorber Lid from Rear Side Trim (Refer to GROUP 52A – Trims.)
- Removal of the Main Muffler (Refer to GROUP 15 – Exhaust Pipe and Main Muffler.)

Post-installation Operation

- Installation of the Main Muffler (Refer to GROUP 15 – Exhaust Pipe and Main Muffler.)
- Check of Wheel Alignment (Refer to P.34-5.)
- Check of Parking Brake Lever Stroke (Refer to GROUP 36 -Service Adjustment Procedures.)
- Installation of the Absorber Lid to Rear Side Trim (Refer to GROUP 52A – Trims.)

12F0110



12F0095

SERVICE POINTS OF REMOVAL

M34GBAT

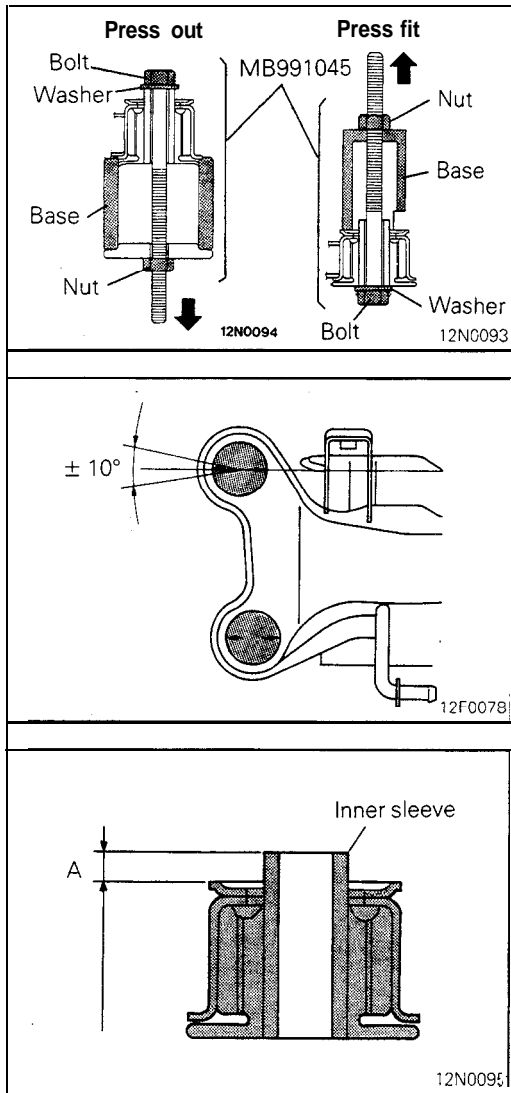
13. REMOVAL OF CROSSMEMBER MOUNTING NUT / 14. REAR SUSPENSION ASSEMBLY

Support the crossmember with a transmission jack, then remove the crossmember mounting nut and rear suspension assembly.

INSPECTION

M34GCAN1

- Check the crossmember for cracks or deformation.
- Check the bushings for cracks or deterioration.



CROSSMEMBER BUSHING REPLACEMENT M34GTAF

(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.

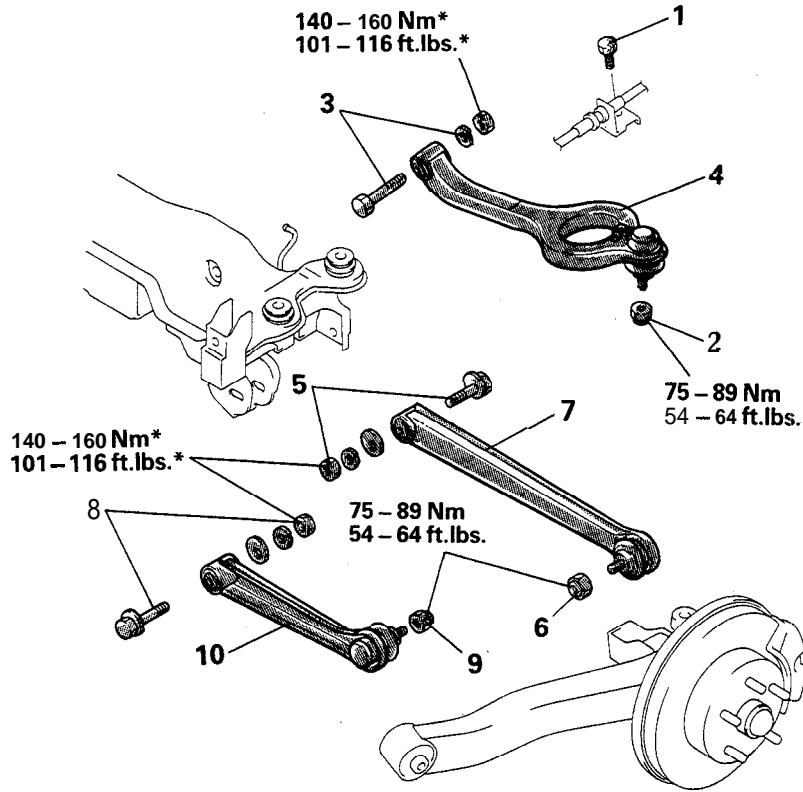
(3) Make sure that the protrusion (dimension A) of the inner sleeve is up to specification.

Standard value: 8.5 – 9.5 mm (.33 – .37 in.)

UPPER ARM, LOWER ARM AND ASSIST LINK

REMOVAL AND INSTALLATION

M34SA-S



Pre-removal Operation

- Removal of the Shock Absorber (Refer to P.34-13.)

Post-installation Operation

- Check of Wheel Alignment (Refer to P.34-5.)
- Installation of the Shock Absorber (Refer to P.34-13.)

Upper arm removal steps

- ◆◆ 1. Brake line clamp bolt
- 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
- 6. Self-locking nut
- 7. Lower arm

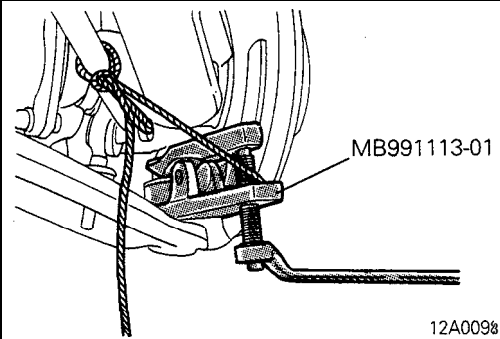
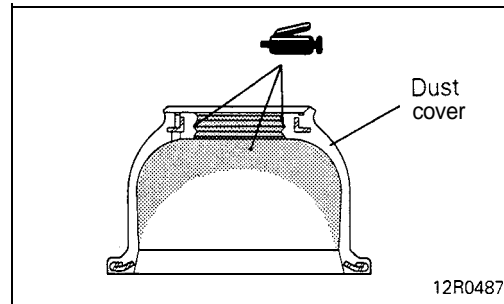
Assist link removal steps

- ◆◆ 8. Assist link mounting bolt and nut
- 9. Self-locking nut
- 10. Assist link

NOTE

*: indicates parts which should be temporarily tightened, and then fully tightened with the vehicle in the unladen condition.

12F0101



SERVICE POINTS OF REMOVAL

M34SBAB

2. 6. 9. REMOVAL OF SELF-LOCKING NUT

Using the special tool, disconnect the knuckle from the upper arm, lower arm, and assist link.

NOTE

- (1) Do not remove the nut from the ball joint, but just loosen it.
- (2) Suspend the special tool with a rope to prevent it from dropping.

INSPECTION

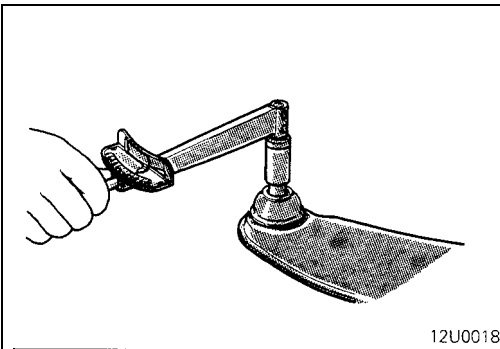
M34SCAB

- 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.

CHECKING OF BALL JOINT FOR STARTING TORQUE

Mount two nuts on the ball joint, and then measure the ball joint starting torque.

Standard value: 2 – 9 Nm (17 – 78 in.lbs.)

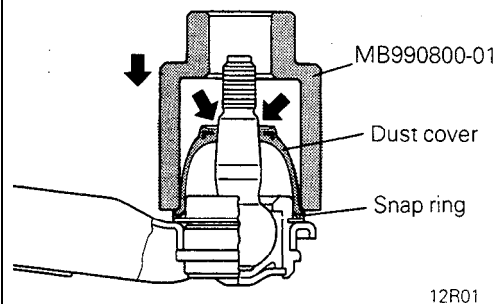


12U0018

BALL JOINT DUST COVER REPLACEMENT

M34SEAB1

- (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.

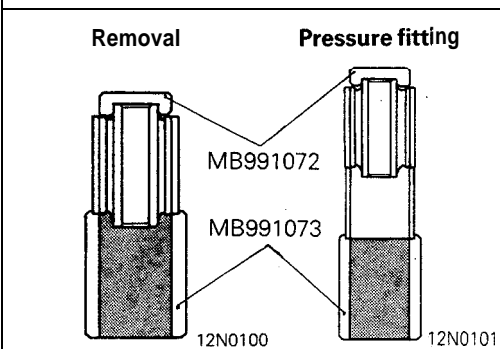


12R01

LOWER ARM, UPPER ARM, ASSIST LINK BUSHING REPLACEMENT

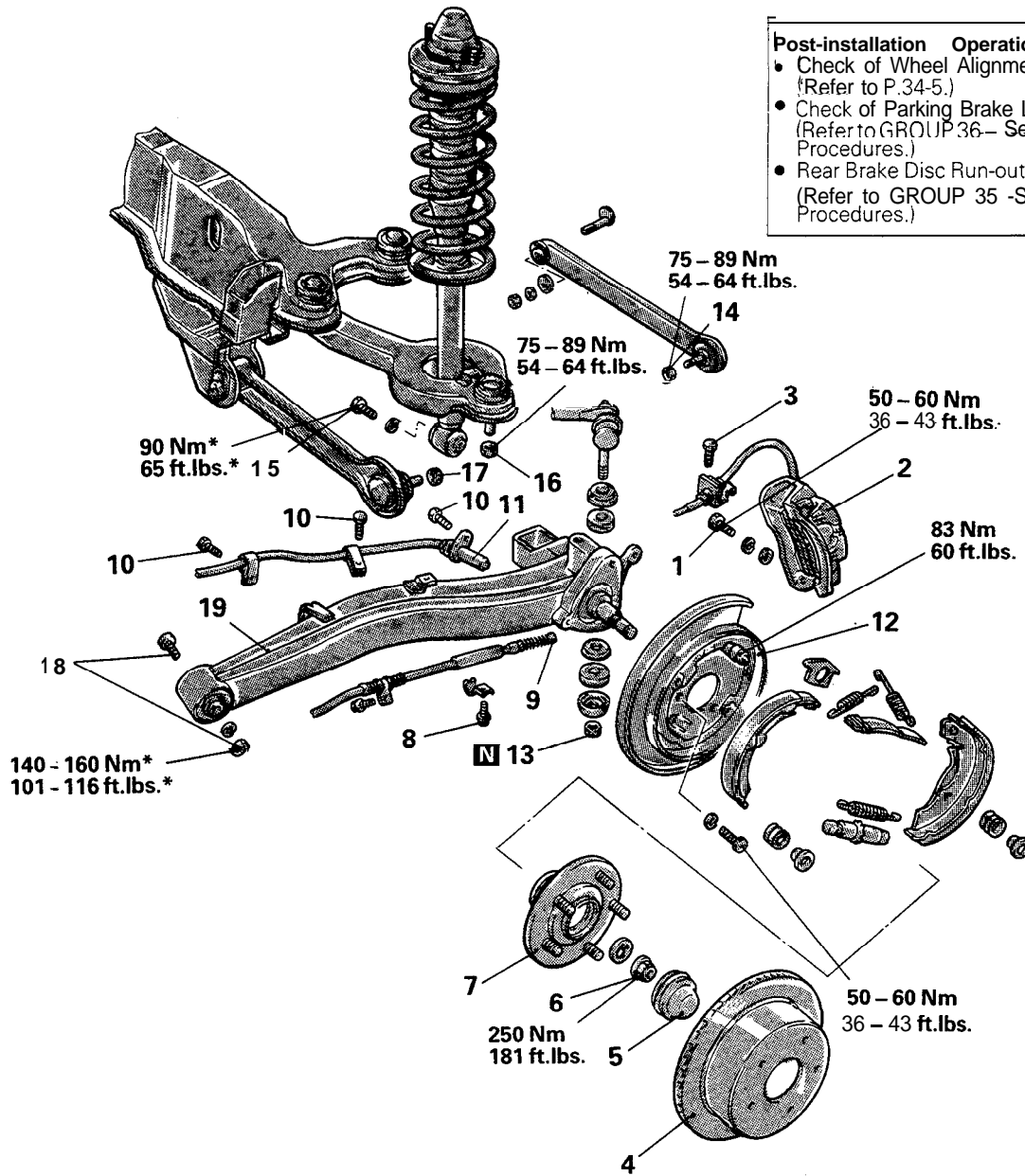
M34SFAB

Use the special tool to remove and press-fit the bushing.



M34TA-A

**TRAILING ARM
REMOVAL AND INSTALLATION**



Post-installation Operation

- Check of Wheel Alignment (Refer to P.34-5.)
- Check of Parking Brake Lever Stroke (Refer to GROUP 36 – Service-Adjustment Procedures.)
- Rear Brake Disc Run-out Check (Refer to GROUP 35 -Service Adjustment Procedures.)

Removal steps

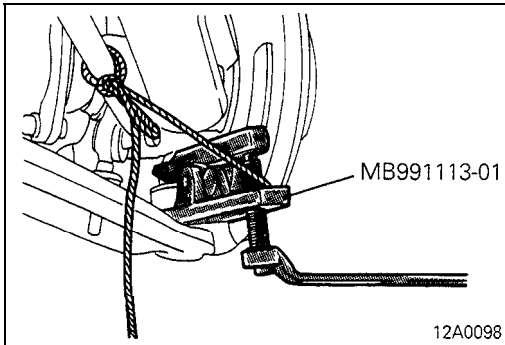
1. Brake caliper mounting bolt
2. Brake caliper
3. Brake line clamp bolt
4. Rear brake disc
5. Hubcap
6. Wheel bearing nut
7. Hub assembly
8. Parking brake cable clamp bolt
- ◆◆◆ 9. Parking brake cable end (Refer to GROUP 36 – Parking Brake.)
- ◆◆◆ 10. Rear speed sensor clamp bolt (ABS)
- ◆◆◆ 11. ABS speed sensor (ABS)

12. Backing plate
- ◆◆ 13. Stabilizer link mounting nut
- 14. Self-locking nut
- 15. Shock absorber mounting bolt (upper)
- 16. Self-locking nut
- 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 in the unladen condition.

12FOIII

**SERVICE POINTS OF REMOVAL**

M34TBAB

14.16. 17. REMOVAL OF SELF-LOCKING NUT

Using the special tool, remove the knuckle from the lower, arm, upper arm, and assist link.

NOTE

- (1) Do not remove the nut from the ball joint, but just loosen it.
- (2) Suspend the special tool with a rope to prevent it from dropping.

INSPECTION

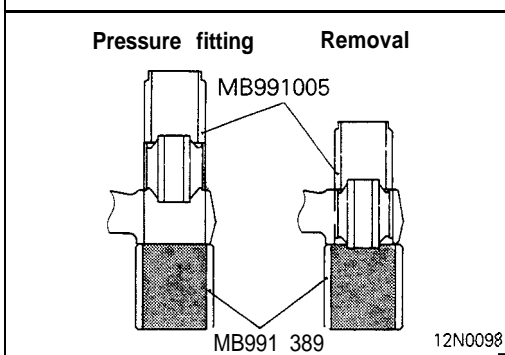
M34TCAB1

- Check trailing arm for cracks and deformation.
- Check bushing for cracks, deterioration and wear.

TRAILING ARM BUSHING REPLACEMENT

M34TEAB1

Use the special tool to remove and press-fit the bushing.

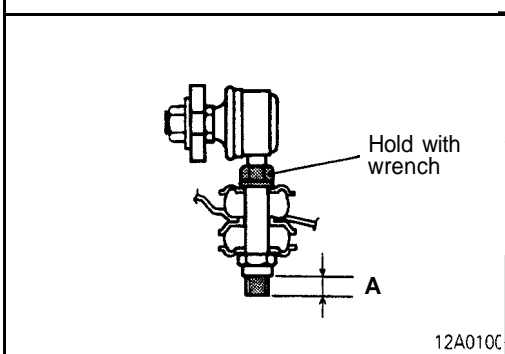
**SERVICE POINT OF INSTALLATION**

M34TDAA

13. INSTALLATION OF STABILIZER LINK MOUNTING NUT

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: 5 – 7 mm (.197 – .276 in.)



SHOCK ABSORBER ASSEMBLY

M34NA-A

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

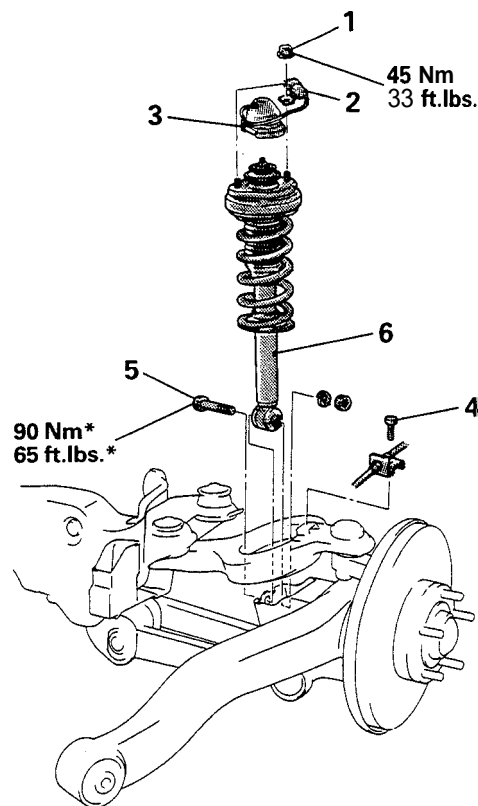
- Removal and Installation of the Rear Side Trim Absorber Lid (Refer to GROUP 52A – Trims.)

Removal steps

1. Shock absorber upper mounting nut
2. ECS connector (ECS)
3. Cap
4. Brake line 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 in the unladen condition.



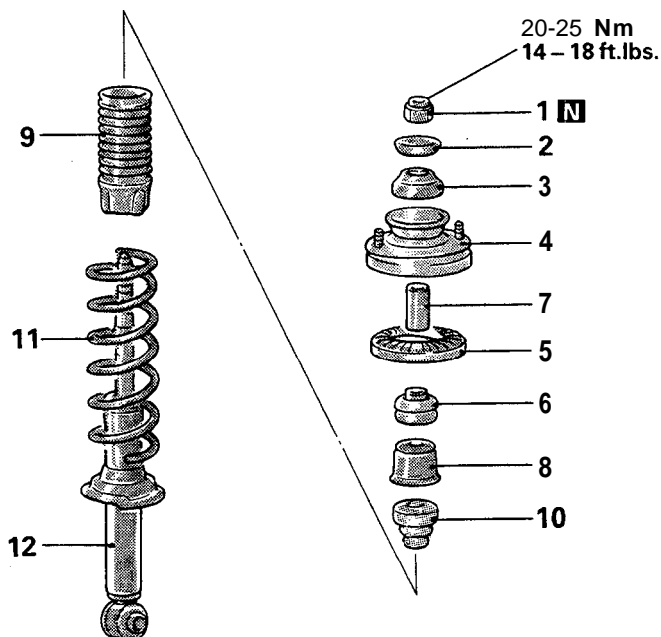
12F0087

DISASSEMBLY AND REASSEMBLY

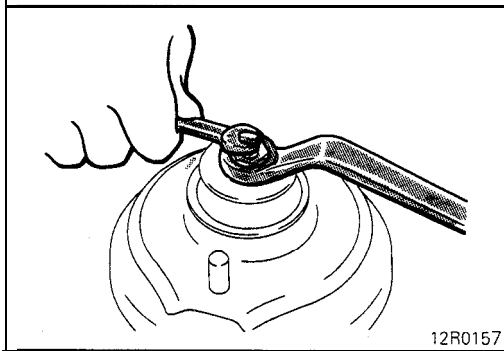
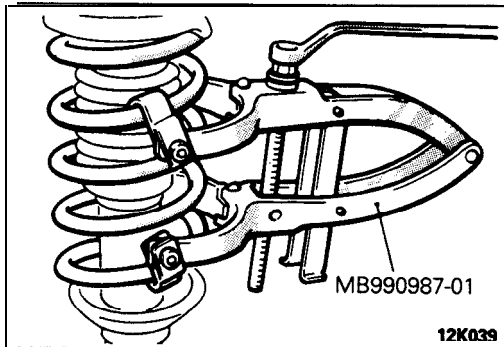
M34GM-A

Disassembly steps

- *• a 1. Piston rod tightening nut
- 2. Washer
- 3. Upper bushing (A)
- ◆◆ 4. Bracket assembly
- 5. Upper spring pad
- 6. Upper bushing (B)
- 7. Collar
- 8. Cup assembly
- 9. Dust cover
- 10. Bump rubber
- ◆◆ 11. Coil spring
- 12. Shock absorber



12A0328

**SERVICE POINT OF DISASSEMBLY**

M34GNAB

1. REMOVAL OF PISTON ROD TIGHTENING NUT

- (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.

INSPECTION

M34GOAC1

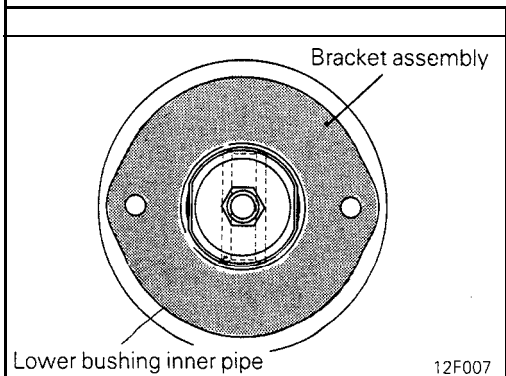
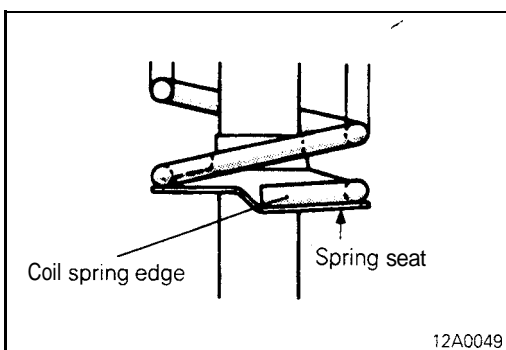
- Check the rubber parts for damage.
- Check the coil springs for crack, damage or deterioration.

SERVICE POINTS OF REASSEMBLY

M34GPAC

11. INSTALLATION OF COIL SPRING

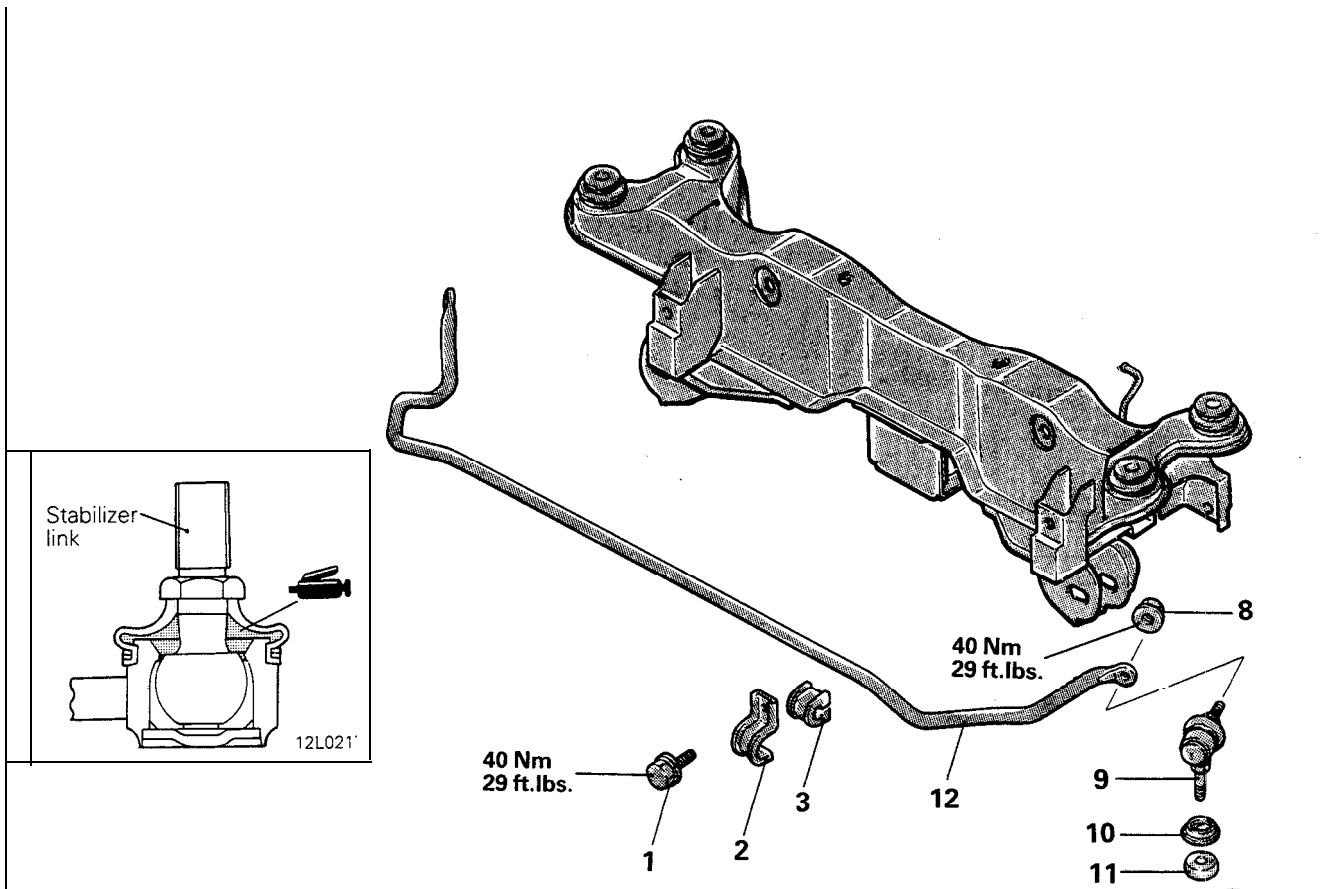
- (1) Use the special tool (MB990987-01) to compress the coil spring and insert it in the shock absorber.
- (2) Align the edge of the coil spring to the position of the shock absorber spring seat as shown.

**4. INSTALLATION OF BRACKET ASSEMBLY / 1. PISTON ROD TIGHTENING NUT**

- (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 (MB990987-01).

**STABILIZER BAR
REMOVAL AND INSTALLATION**

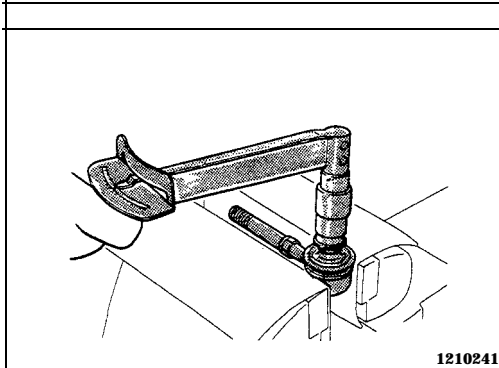
M341A-A



Removal steps

- 1. Stabilizer bracket mounting bolt
- * 2. Stabilizer bar bracket
- 3. Bushing
- * 4. Self-locking nut
- 5. Joint cup (A)
- 6. Stabilizer rubber
- 7. Joint cup (B)
- * 8. Self-locking nut
- * 9. Stabilizer link
- 10. Joint cup (A)
- 11. Stabilizer rubber
- 12. Stabilizer bar

12F0100



1210241

INSPECTION

M341BAC1

- 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 OF STABILIZER LINK BALL JOINT FOR STARTING TORQUE

Mount two nuts on the ball joint, and then measure the ball joint starting torque.

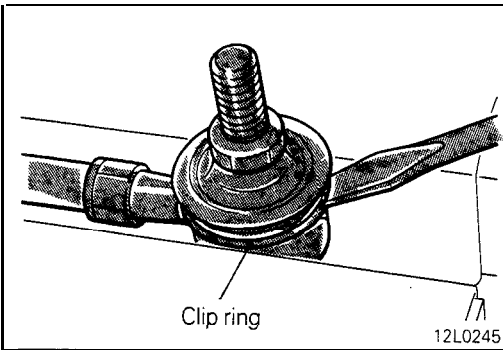
Standard value: 1.7 – 3.2 Nm (15 – 28 in.lbs.)

TSB Revision

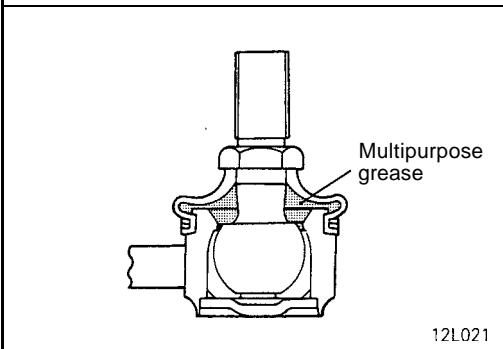
BALL JOINT DUST COVER REPLACEMENT

M34IEAA

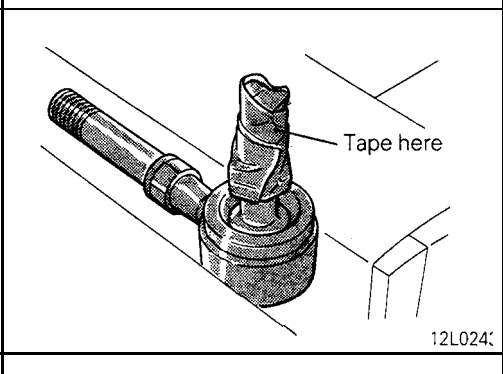
- (1) Remove the clip ring and the dust cover.



- (2) Apply multipurpose grease to the lip and inside of the dust cover.



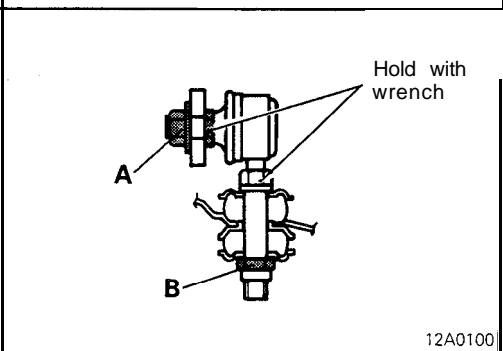
- (3) Use vinyl tape to tape the stabilizer link where shown in the illustration, and then install the dust cover to the stabilizer link.



- (4) Secure the dust cover by the clip ring.

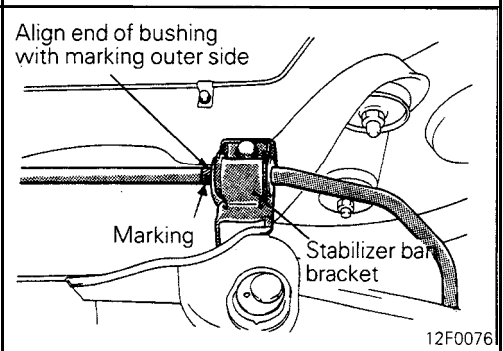
SERVICE POINTS OF INSTALLATION

M34ICAE

9. INSTALLATION OF STABILIZER LINK / 8. SELF-LOCKING NUT / 4. SELF-LOCKING NUT

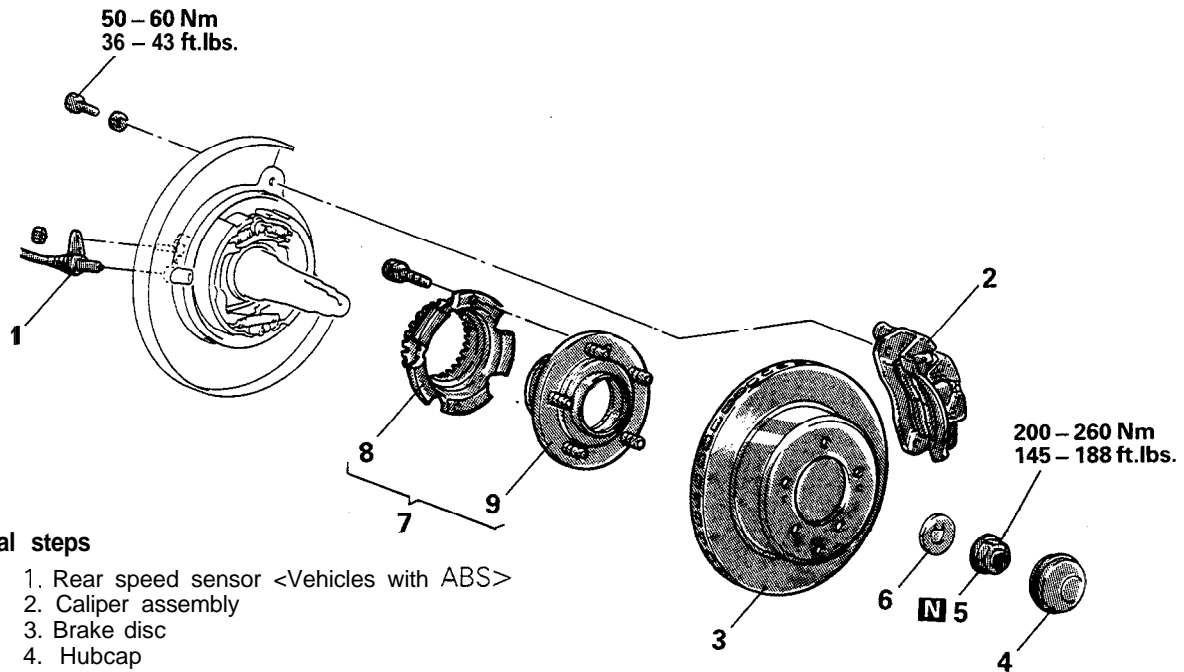
- (1) Hold the stabilizer link ball studs with a wrench and install the self-locking nut (A).
- (2) Holding the stabilizer link with a wrench, tighten the self-locking nut (B) so that the protrusion of the stabilizer link is within the standard value.

Standard value: 5 – 7 mm (.197 – .276 in.)

2. INSTALLATION OF STABILIZER BAR BRACKET

- (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.

REAR AXLE HUB REMOVAL AND INSTALLATION

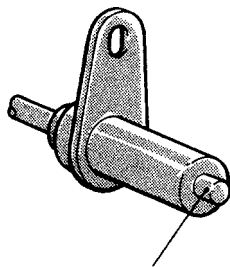


Removal steps

- ↔ 1. Rear speed sensor <Vehicles with ABS>
- ↔ 2. Caliper assembly
- 3. Brake disc
- 4. Hubcap
- + 5. Wheel bearing nut
- 6. Tongued washer
- 7. Rear hub assembly
- ↔ 8. Rear rotor <Vehicles with ABS>
- ↔ 9. Rear hub unit bearing

Caution
Rear hub unit bearing cannot be disassembled.

11N0018



Pole piece

14N010

SERVICE POINTS OF REMOVAL

M34MBAC

1. REMOVAL OF REAR SPEED SENSOR <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.

2. REMOVAL OF CALIPER ASSEMBLY

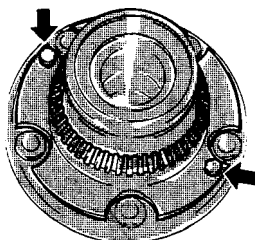
Remove the caliper assembly and suspend it with a piece of wire.

8. REMOVAL OF REAR ROTOR <VEHICLES WITH ABS>

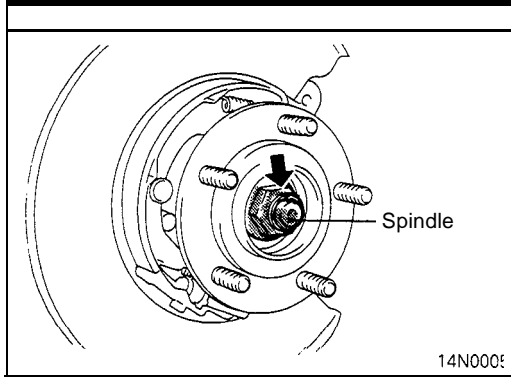
Caution

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.



14N0099

**SERVICE POINT OF INSTALLATION**

M34MDAG

5. INSTALLATION OF WHEEL BEARING NUT

After tightening the wheel bearing nut, align with the spindle's indentation and crimp.

SPECIFICATIONS <AWD>

M34CA-B

GENERAL SPECIFICATIONS

Items	Specifications
Suspension system	Double wishbone suspension type
Coil spring Wire dia. x O.D. x free length mm (in.) Coil spring identification color Spring constant N/mm (lbs./in.)	12.2 x 105 x 379.3 (.48 x 4.13 x 14.93) Blue x 2 28.0 ± 1.4 (157 ± 8)
Shock absorber Type Max. length mm (in.) Min. length mm (in.) Stroke mm (in.) Damping force [at 0.3 m/sec. (0.9 ft./sec.)] Expansion N (lbs.) Contraction N (lbs.)	Hydraulic, cylindrical, double-acting type 610 ± 3 (24.0 ± .1) 407 ± 3 (16.0 ± .1) 203 (8.0) Hard: 1,800 ± 250 (397 ± 55) Medium: 1,200 ± 170 (265 ± 37) Soft: 550 ± 90 (121 ± 20) Hard: 950 ± 140 (209 ± 31) Medium: 850 ± 130 (187 ± 29) Soft: 650 ± 100 (143 ± 22)


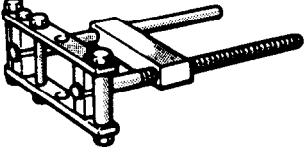
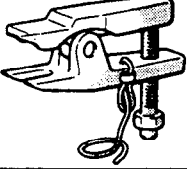
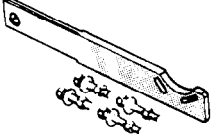
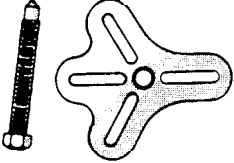
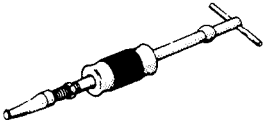
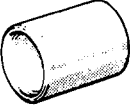
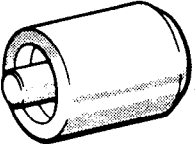
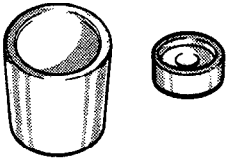
SERVICE SPECIFICATIONS


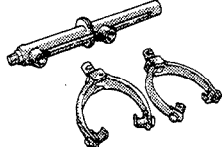
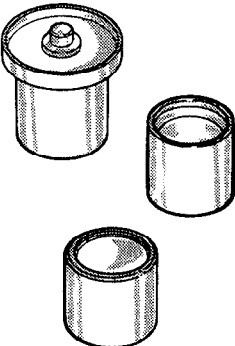
M34CB-B

Items	Specifications
Standard value Toe-in mm (in.) Camber Protruding length of stabilizer bar mounting bolt mm (in.) Lower arm ball joint starting torque Nm (in.lbs.) Stabilizer link ball joint starting torque Nm (in.lbs.) Crossmember support bushing projection mm (in.) Upper part Lower part Differential support bushing projection mm (in.)	0.5 ± 2.5 (.01 ± .09) - 0°10' ± 30' 5 - 7 (.197 - .276) 2.0 - 9.0 (17 - 78) 1.7 - 3.2 (15 - 28) 15.5 (.59) 2.1 - 3.7 (.08 - .15) 6.7-7.3 (.26 - .29)

SPECIAL TOOLS

M34DA-B

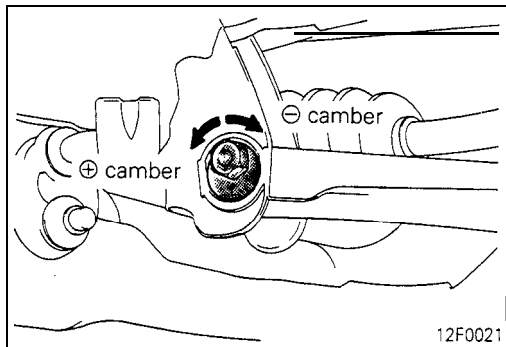
Tool	Number	Name	Use
	MB990800-01	Ball joint remover and installer	Installation of the ball joint dust cover
	MB991254	Rod remover and installer	Replacement of trailing arm connecting rod
	MB991113-01	Steering linkage puller	Disconnection of the ball joint
	MB990767-01	End yoke holder	Removal of the rear axle shaft
	MB990241-01	Axle puller	
	MB990211-01	Sliding hammer with adapter	
	MB990847	Base	Removal and press-fitting of the trailing arm bushing
	MB990880	Arbor	
	MB991071-01 MB991072 MB991073	Bushing remover and installer Base Arbor	Removal and installation of lower arm bushings

Tool	Number	Name	Use
	MB990958-01	Arbor	Removal and installation of crossmember bushings
	MB991237 MB991239	Spring compressor body Arm set	Compression of the coil spring
	MB991387 MB991388 MB990890	Arbor Base Base	Removal and installation of the crossmember bushing

TROUBLESHOOTING

M34EA-B

Symptom	Probable cause	Remedy
Squeaks or other abnormal noise	Loose rear suspension installation bolts and nuts	Retighten
	Malfunction of shock absorber Worn bushings	Replace
	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 Weak or broken springs	Replace
	Stabilizer bar and/or stabilizer link deformed or damaged	
Body tilting	Weak or deteriorated bushings Weak or broken springs	Replace
	Upper arms and/or lower arms deformed or damaged	
	Trailing arms deformed or damaged	
	Crossmember deformed or damaged	



SERVICE ADJUSTMENT PROCEDURES

REAR WHEEL ALIGNMENT INSPECTION

M34FDAC

CAMBER

Standard value: $-0^{\circ}10' \pm 30'$

To adjust camber, turn the lower arm mounting bolt on the crossmember side.

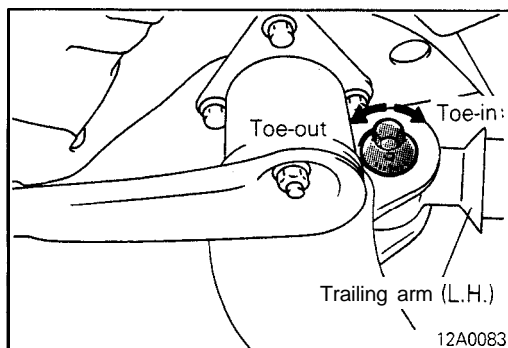
NOTE

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 ($.01 \pm .09$ 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-in)

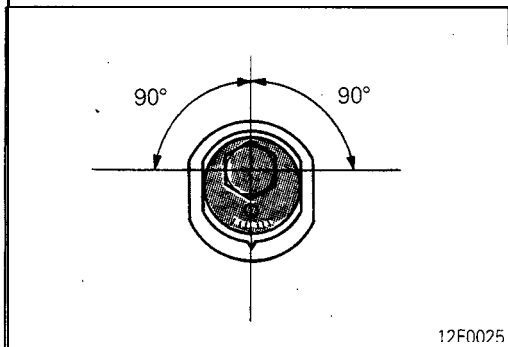
Right wheel: Clockwise (toe-out)

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. For the vehicles with 4WS, make the adjustments with the 4WS tie rod end disconnected from the trailing arm.



REAR SUSPENSION ASSEMBLY

M34GA-B

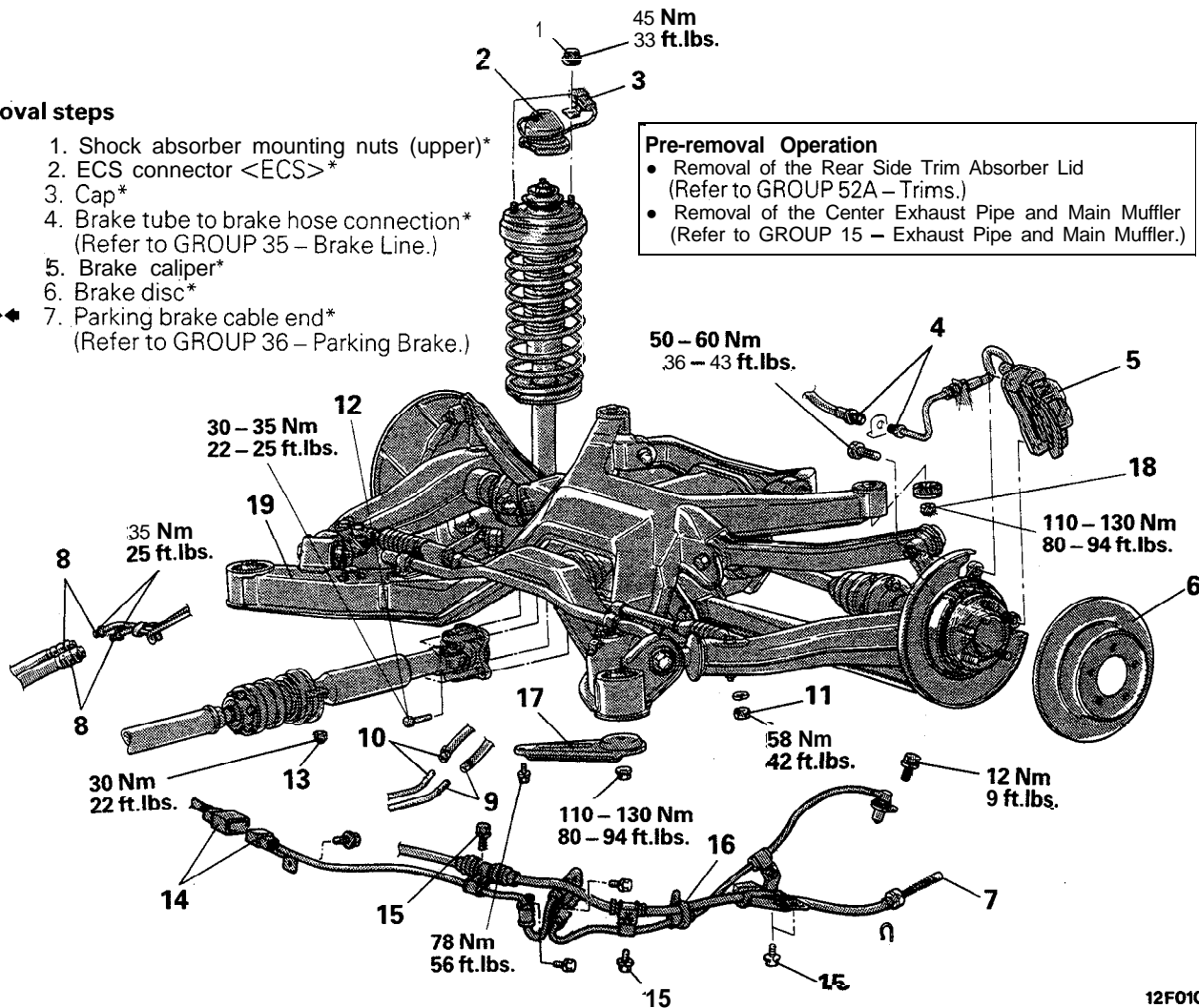
REMOVAL AND INSTALLATION

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.)

Pre-removal Operation

- Removal of the Rear Side Trim Absorber Lid
(Refer to GROUP 52A – Trims.)
- Removal of the Center Exhaust Pipe and Main Muffler
(Refer to GROUP 15 – Exhaust Pipe and Main Muffler.)



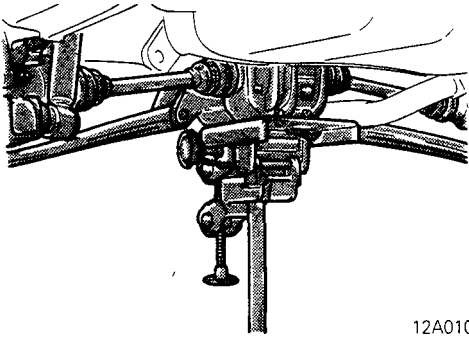
12F0108

8. Pressure tube assembly to pipe assembly connection <4WS>
9. Feed pipe assembly to suction hose connection <4WS>
10. Return pipe assembly to rubber hose connection <4WS>
11. Power cylinder tie rod coupling nut <4WS>*
12. Differential carrier to propeller shaft coupling bolt and nut
13. Center bearing mounting nut
14. Harness connector connection <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

Post-installation Operation

- Installation of the Center Exhaust Pipe and Main Muffler
(Refer to GROUP 15 – Exhaust Pipe and Main Muffler.)
- Installation of the Rear Side Trim Absorber Lid
(Refer to GROUP 52A – Trims.)
- Refilling and Bleeding of the Power Steering System
(Refer to GROUP 37A – Service Adjustment Procedures.)
- Checking Wheel Alignment
(Refer to P.34-23.)
- Bleeding of 4WS System
(Refer to GROUP 37B – Service Adjustment Procedures.)
- Operation Inspection of the 4WS System
(Refer to GROUP 37B – Service Adjustment Procedures.)
- Checking the Parking Brake Lever Stroke
(Refer to GROUP 36 – Service Adjustment Procedures.)

NOTE
Parts marked with * are symmetrical.



12A0109

SERVICE POINTS OF REMOVAL

M34GBAU

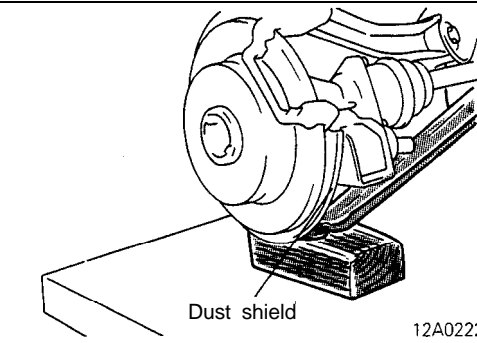
17. REMOVAL OF CROSSMEMBER BRACKET / 18. CROSSMEMBER MOUNTING NUT (ON DIFFERENTIAL SIDE) / 19. REAR SUSPENSION ASSEMBLY

- (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.)

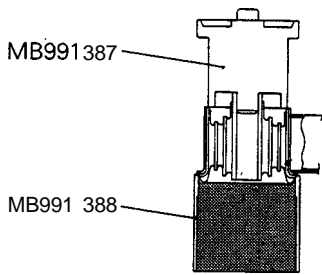
- (3) Apply a wood block to the ball joint of the lower arm to prevent the dust shield from being deformed.



Dust shield

12A0222

Press out



MB991387

MB991 388

12N008E

INSPECTION

M34GCAN2

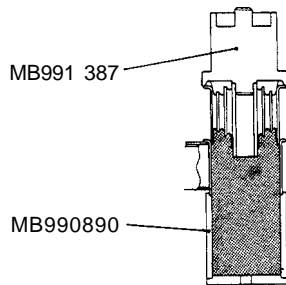
- Check the crossmember for cracks or deformation.
- Check the bushings for cracks or deterioration.

CROSSMEMBER SUPPORT BUSHING (FRONT) REPLACEMENT

M34GTAG

- (1) Using the special tool, remove and press-fit the crossmember support bushing.

Press-fit



MB991 387

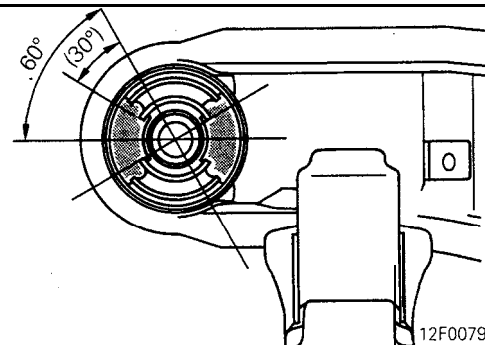
MB990890

12N008F

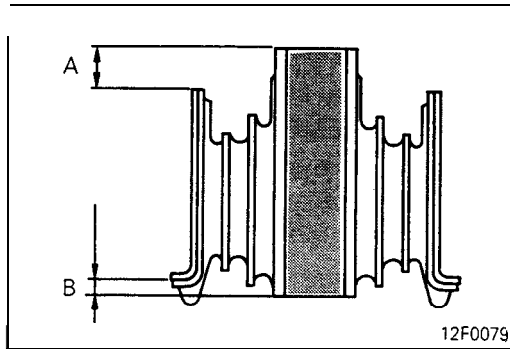
- (2) When press-fitting the bushing, make sure that the hollow portions are positioned as shown.

NOTE

Ensure that the shift in rotating direction is within $\pm 5^\circ$.



12F0079



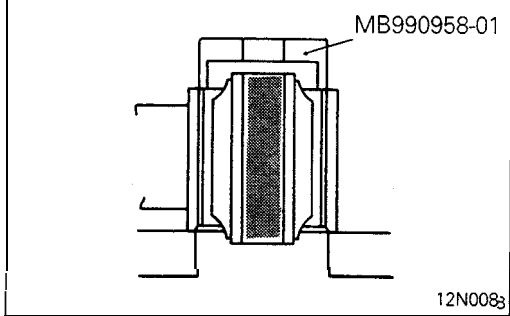
- (3) Make sure that the protrusion of the inner sleeve (dimension A and B) are up to specifications.

Standard value

Dimension A: 15.5 mm (.59 in.)

Dimension B: 2.1 - 3.7 mm (.08 - .15 in.)

Press out

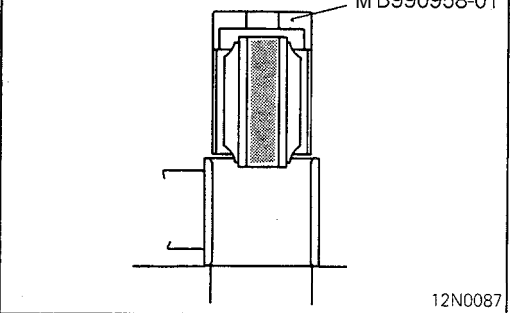


CROSSMEMBER BUSHING (REAR) REPLACEMENT

M34GTAH

- (1) Using the special tool, remove and press-fit the bushing.

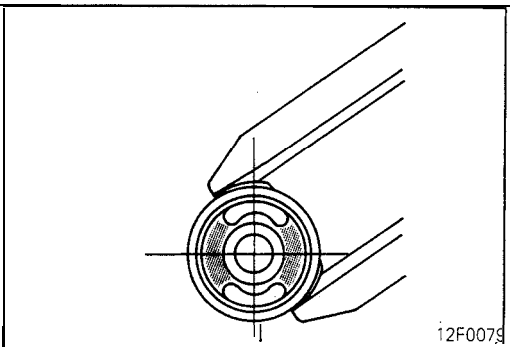
Press-fit



- (2) When press-fitting, position the bushing as shown.

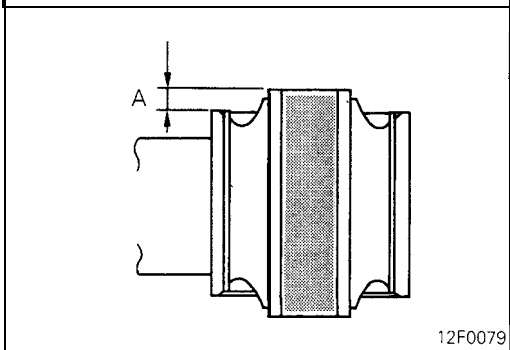
NOTE

Ensure that the shift in rotating direction is within $\pm 5^\circ$.



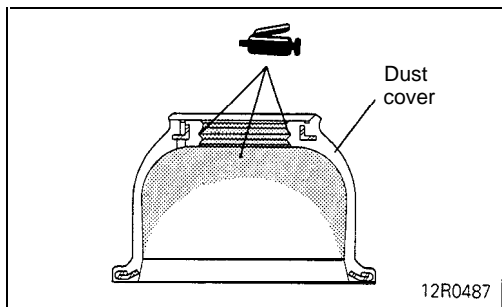
- (3) Make sure that the protrusion of the inner sleeve (dimension A) is up to specification.

Standard value: 6.7 - 7.3 mm (.26 - .29 in.)

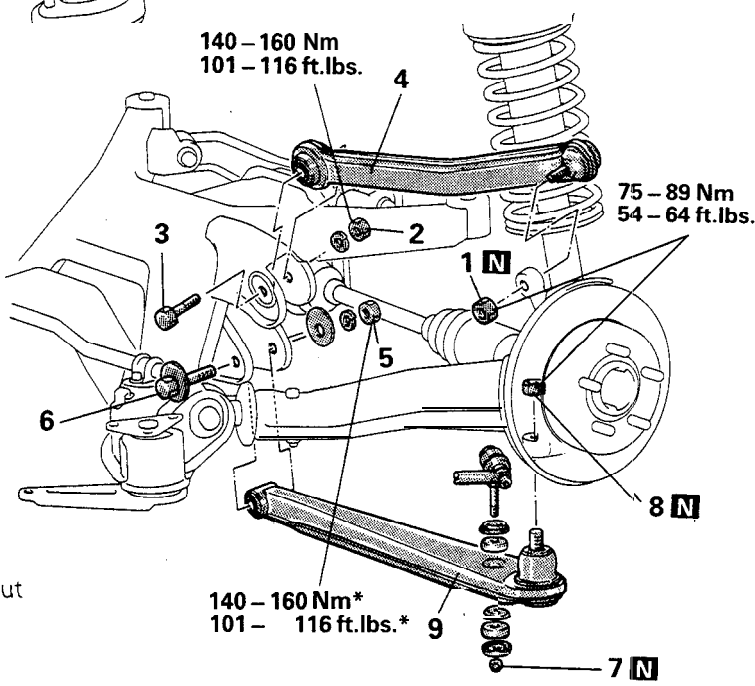


M34SA-B

UPPER AND LOWER ARM REMOVAL AND INSTALLATION



Post-installation Operation
 - Check of Wheel Alignment
 (o P.34-23)



12F0093

Upper arm removal steps

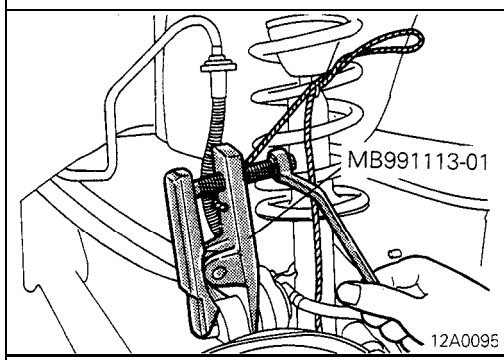
- ◆◆ 1. Self-locking nut
- ◆◆ 2. Upper arm mounting nut
- ◆◆ 3. Upper arm mounting bolt
- ◆◆ 4. Upper arm

Lower arm removal steps

- ◆◆ 5. Lower arm mounting nut
- ◆◆ 6. Lower arm mounting bolt
- ◆◆◆ 7. Stabilizer link to lower arm coupling nut
- ◆◆ 8. Self-locking nut
- ◆◆ 9. Lower arm

NOTE

For tightening points marked with *, first temporarily tighten and then ground the vehicle to torque to specification where the vehicle is empty.



SERVICE POINTS OF REMOVAL

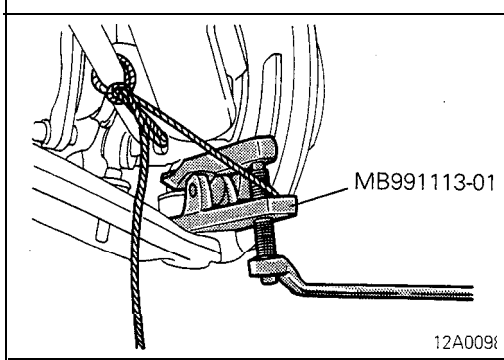
M34SBAC

1. REMOVAL OF SELF-LOCKING NUT

Using the special tool, disconnect the upper arm ball joint from the knuckle.

NOTE

- (1) Do not remove the nut from the ball joint, but just loosen it.
- (2) Suspend the special tool with a rope to prevent it from dropping.



8. REMOVAL OF SELF-LOCKING NUT

Lower down the lower arm on the crossmember side. Then, install the special tool and disconnect the lower arm ball joint from the knuckle.

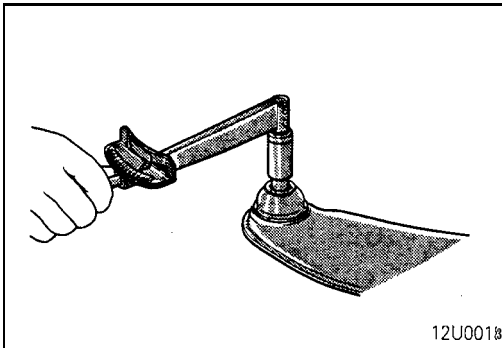
NOTE

- (1) Do not remove the nut from the ball joint, but just loosen it.
- (2) Suspend the special tool with a rope to prevent it from dropping.

INSPECTION

M34SCAC

- 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.

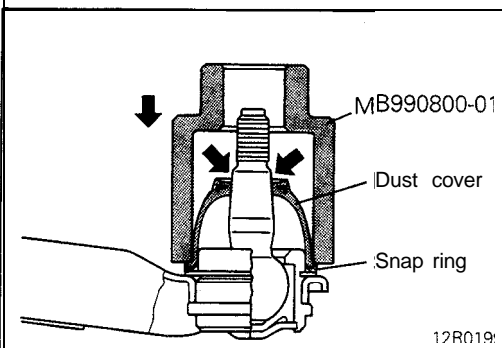


12U0018

CHECKING OF BALL JOINT FOR STARTING TORQUE

Mount two nuts on the ball joint, and then measure the ball joint starting torque.

Standard value: 2 – 9 Nm (17 – 78 in.lbs.)

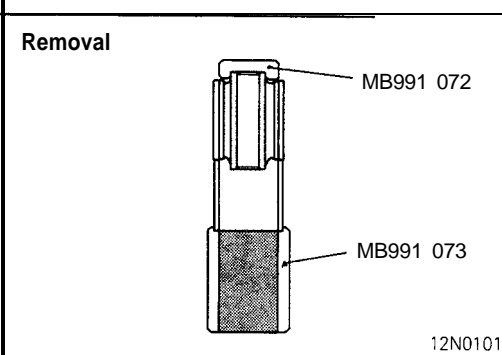


12R0199

BALL JOINT DUST COVER REPLACEMENT

M34SEAB2

- (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.

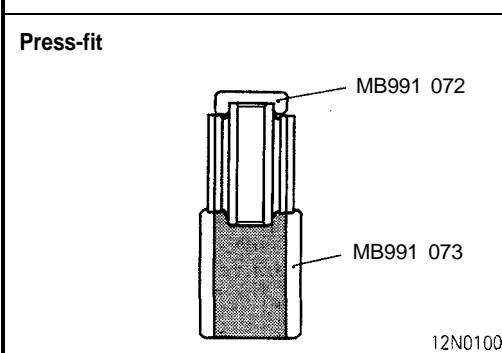


12N0101

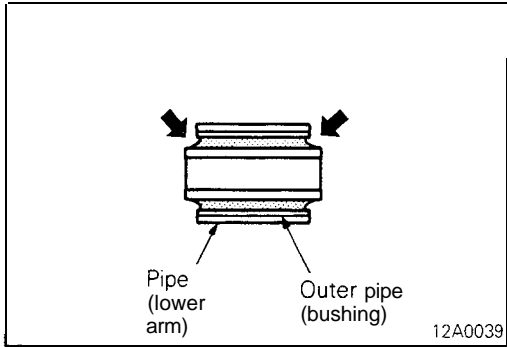
Removal**LOWER ARM BUSHING REPLACEMENT**

M34SFAC

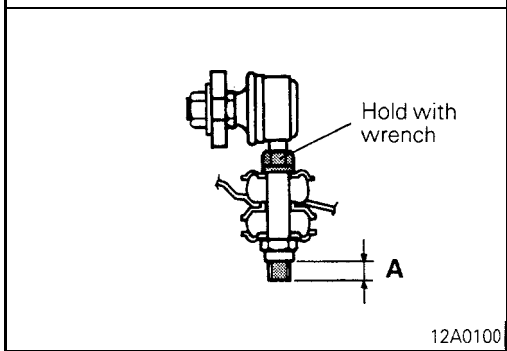
- (1) Use the special tool to remove and press-fit the bushing.



12N0100



- (2) Press-fit the lower arm bushing until the bushing outer pipe edge flush with the lower arm pipe edge.



SERVICE POINT OF INSTALLATION

M34SDAB

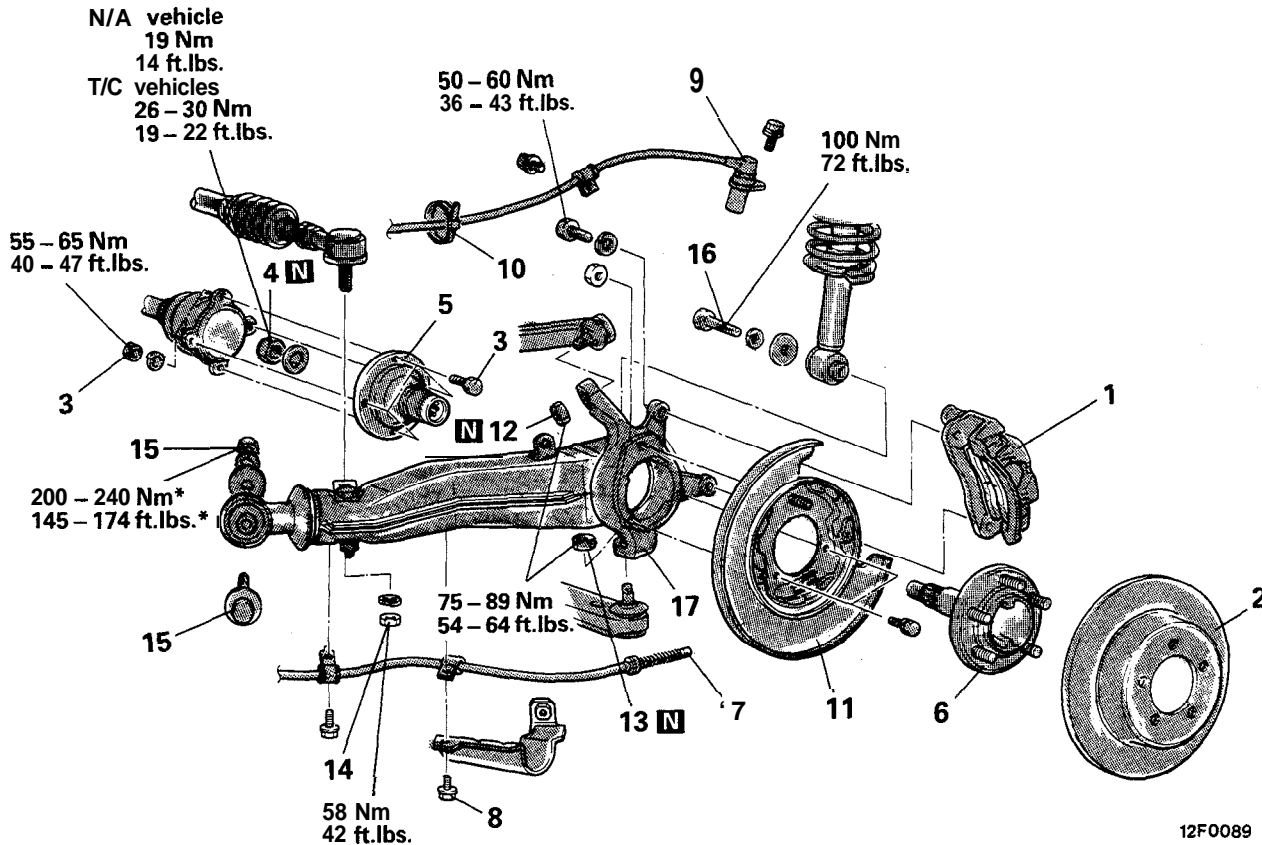
7. INSTALLATION OF STABILIZER LINK TO LOWER ARM COUPLING NUT

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: 5 – 7 mm (.197 – .276 in.)

TRAILING ARM

REMOVAL AND INSTALLATION



12F0089

Removal steps

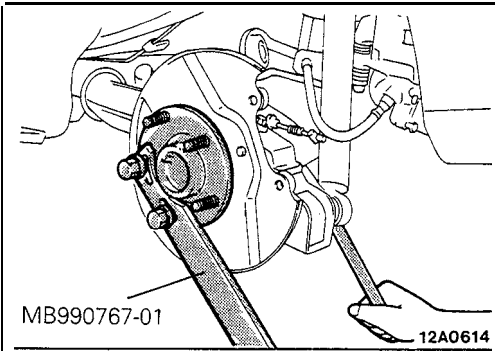
1. Rear brake caliper assembly
2. Rear brake disc
3. Drive shaft to companion flange mounting bolt and nut
- ◆◆ 4. Self-locking nut
- ◆◆ 5. Companion flange
- ◆◆ 6. Rear axle shaft
7. Parking brake cable end
8. Parking brake cable clamp bolt
9. Rear speed sensor (ABS)
10. Rear speed sensor cable and parking brake cable bands (ABS)
11. Dust shield
- ◆◆ 12. Self-locking nut (upper arm)
- ◆◆ 13. Self-locking nut (lower arm)
14. Tie rod end mounting nut
15. Trailing arm mounting bolt and nut
16. Rear shock absorber mounting bolt
17. Trailing arm

Post-installation Operation

- Check of Wheel Alignment (Refer to P.34-23)
- Check of Parking Brake Lever Stroke (Refer to GROUP 36 – Service Adjustment Procedures.)
- Rear Brake Disc Run-out Check (Refer to GROUP 35 – Service Adjustment Procedures.)

NOTE

For tightening points marked with *, first temporarily tighten and then ground the vehicle to torque to specification where the vehicle is empty.

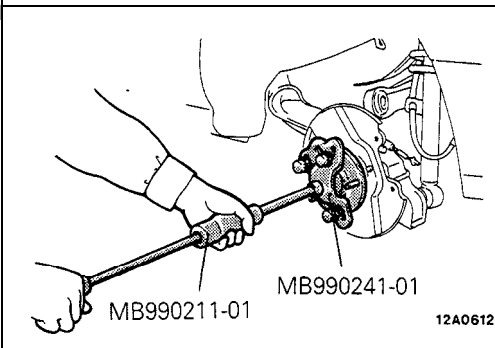


SERVICE POINTS OF REMOVAL

M34TBAC

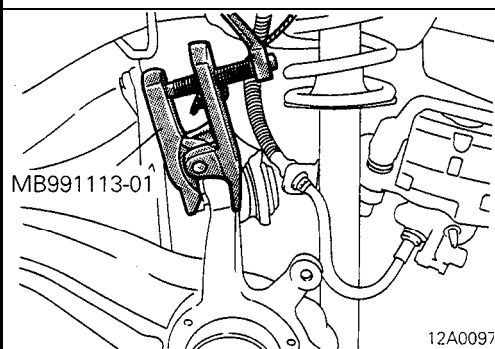
4. REMOVAL OF SELF-LOCKING NUT

With the special tool, secure the rear axle shaft, then remove the self-locking nut.



6. REMOVAL OF REAR AXLE SHAFT

With the special tool, remove the rear axle shaft

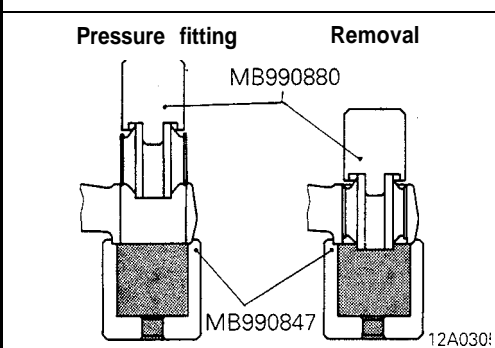


12. REMOVAL OF SELF-LOCKING NUT (UPPER ARM) / 13. SELF-LOCKING NUT (LOWER ARM)

Using the special tool, disconnect the ball joint from the knuckle.

NOTE

- (1) Do not remove the nut from the ball joint, but just loosen it.
- (2) Suspend the special tool with a rope to prevent it from dropping.



INSPECTION

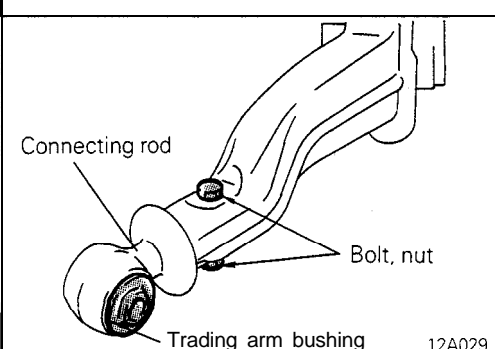
M34TCAB2

- Check trailing arm for cracks and deformation.
- Check bushing for cracks, deterioration and wear.

TRAILING ARM BUSHING REPLACEMENT

M34TEAB2

Use the special tool to remove and press-fit the bushing.

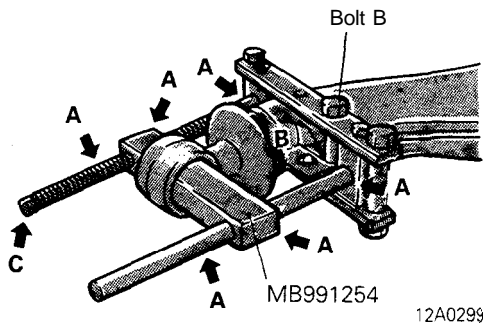


CONNECTING ROD REPLACEMENT

M34TFAB

Replace the connecting rod using the following procedure:

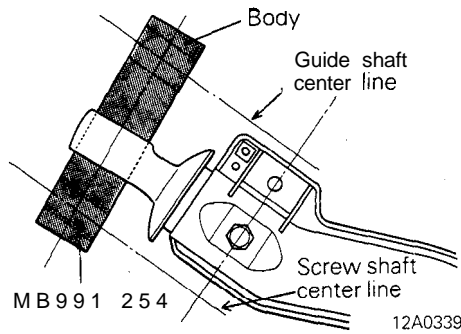
- (1) Remove the trailing arm bushing.
- (2) Remove the bolt and nut.



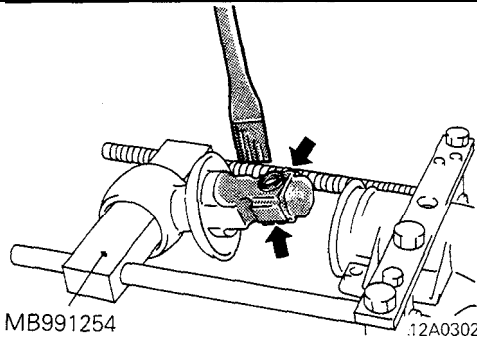
- (3) Set the special tool onto the trailing arm as shown in the illustration.

NOTE

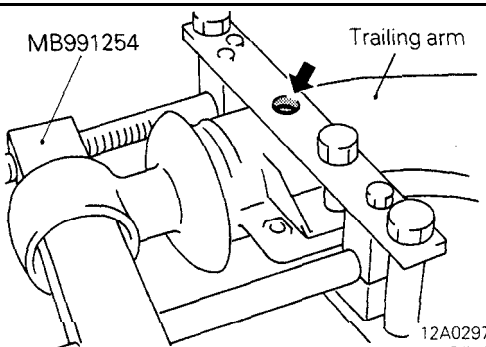
- (1) Apply lubricant to the sliding portion of the special tool (at the arrow marked "A" in the illustration).
 (2) Install bolt B to the trailing arm, at the point shown in the figure.
 (4) Use a spanner, etc., to turn the portion marked "C" in the illustration to remove the connecting rod.



- (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.34-31.)

SHOCK ABSORBER ASSEMBLY

M34NA-B

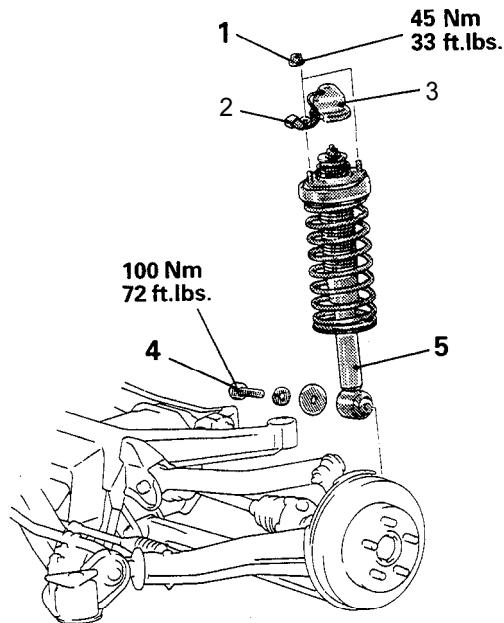
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Removal and Installation of the Rear Side Trim Absorber Lid (Refer to GROUP 52A – Trims.)

Removal steps

1. Shock absorber upper mounting nut
2. ECS connector (ECS)
3. Cap
4. Shock absorber lower mounting bolt
5. Shock absorber assembly



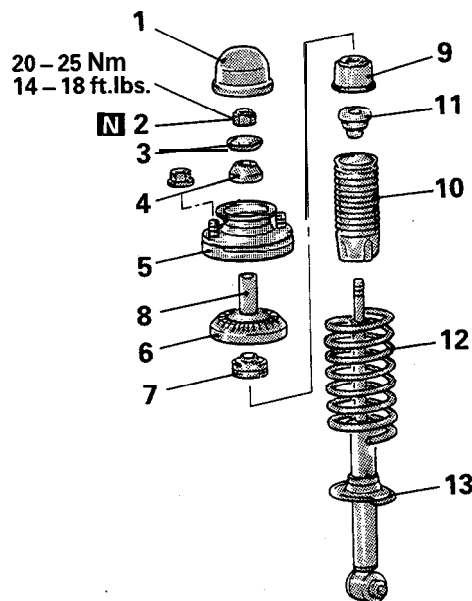
12F0086

DISASSEMBLY AND REASSEMBLY

M34GM-B

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.34-14.)
6. Spring pad
7. Upper bushing (B)
8. Collar
9. Cup assembly
10. Dust cover
11. Bump rubber
12. Coil spring (Refer to P.34-14.)
13. Shock absorber



12A0360

INSPECTION

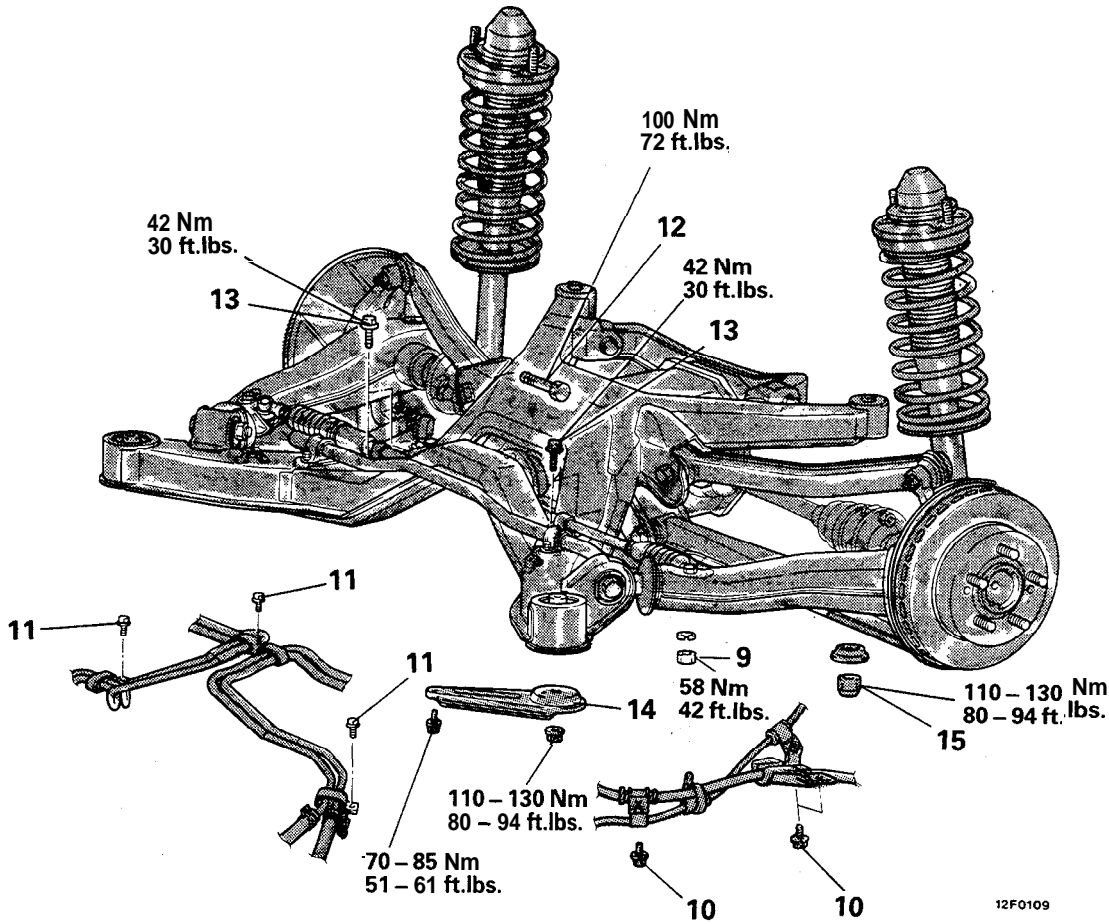
M34GOAC2

- Check the rubber parts for damage.
- Check the coil springs for crack, damage or deterioration.

STABILIZER BAR

REMOVAL AND INSTALLATION

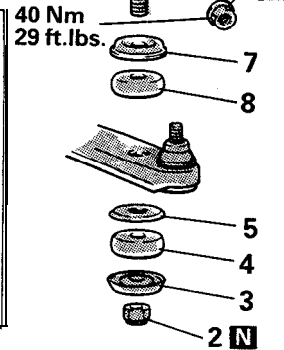
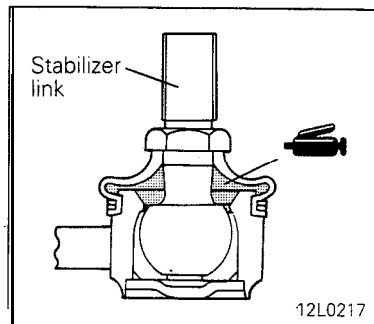
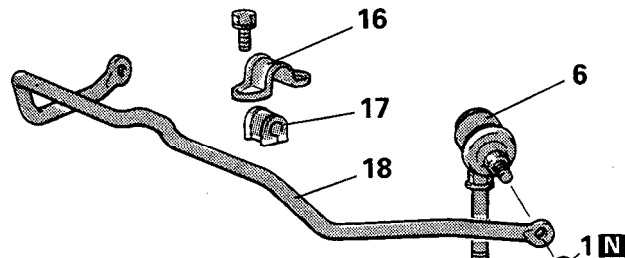
M341A-B



12F0109

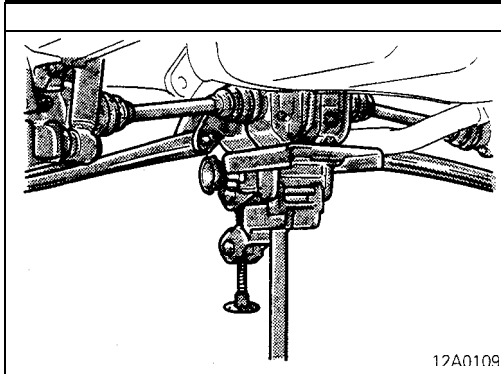
Removal steps

- * 1. Self-locking nut*
- a 2. Self-locking nut*
- 3. Joint cup A*
- 4. Stabilizer rubber*
- 5. Joint cup B*
- ◆◆ 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>
- ◆◆ 14. Crossmember bracket*
- ◆◆ 15. Crossmember mounting nut*
- 16. Stabilizer bracket*
- 17. Bushing*
- ◆◆ 18. Stabilizer bar



NOTE
Parts marked with * are symmetrical

12A0113

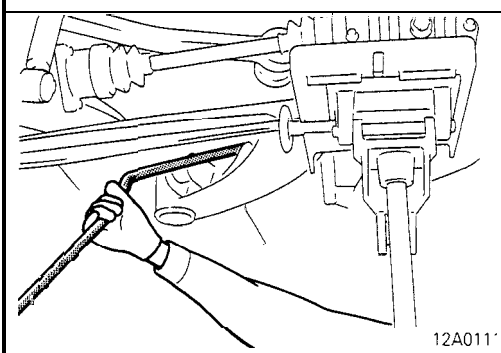


SERVICE POINTS OF REMOVAL

M34IDAC

14. REMOVAL OF CROSSMEMBER BRACKET / 15. CROSSMEMBER MOUNTING NUT

- (1) Support the rear suspension assembly with the transmission jack.
- (2) Remove the crossmember bracket and crossmember mounting nut.



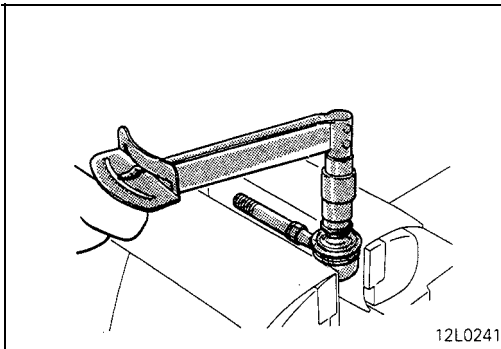
18. REMOVAL OF STABILIZER BAR

- (1) Lower the transmission jack a little to obtain a gap between the rear suspension and body.
- (2) Remove the stabilizer bar.

INSPECTION

M34IBAC2

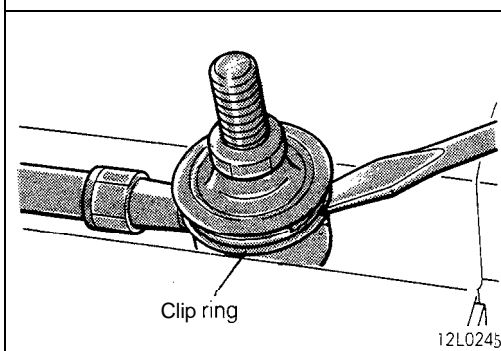
- Check the bushing for wear and deterioration.
- Check the stabilizer bar for deterioration or damage.
- Check the stabilizer link ball joint dust cover for cracks.
- Check all bolts for condition and straightness.



CHECKING OF STABILIZER LINK BALL JOINT FOR STARTING TORQUE

Mount two nuts on the ball joint, and then measure the ball joint starting torque.

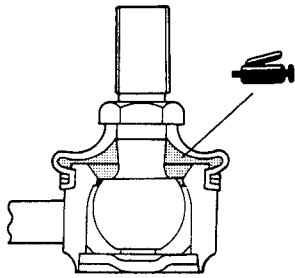
Standard value: 1.7 – 3.2 Nm (15 – 28 in.lbs.)



BALL JOINT DUST COVER REPLACEMENT

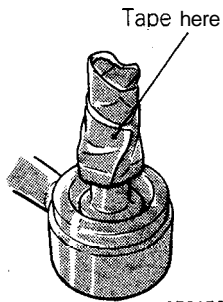
M34IEBA

- (1) Remove the clip ring and the dust cover.

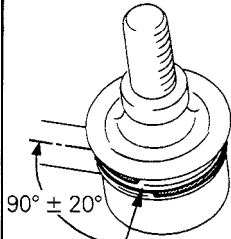


12L0217

- (2) Apply multipurpose grease to the lip and inside of the dust cover.



12P0156



90° ± 20°
Clip ring ends
(Could be 180°
opposite end) 12P0252

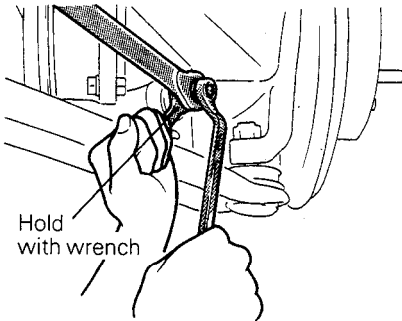
- (3) Wind tape around the threads of the stabilizer link stud and install the dust cover.
(4) Secure the dust cover with the clip ring.
At this time, make sure that the clip ring ends are located at a point 90° ± 20° with reference to the link axis.

SERVICE POINTS OF INSTALLATION

M34ICAF

6. INSTALLATION OF STABILIZER LINK / 2. SELF-LOCKING NUT / 1. SELF-LOCKING NUT

- (1) Secure the stabilizer link ball stud with a wrench and mount the self-locking nut.

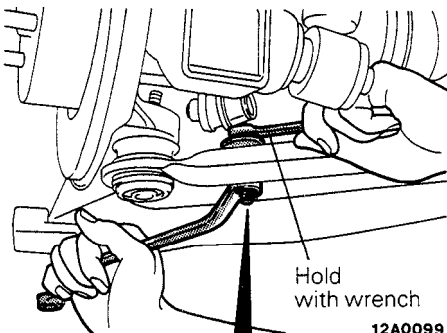


Hold
with wrench

12A0110

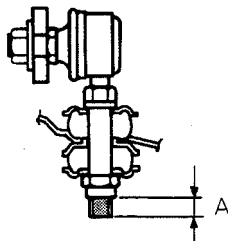
- (2) Hold the stabilizer link with a wrench so that its protrusion on the lower arm side (dimension A) is up to specification, then mount the self-locking nut.

Standard value: 5 – 7 mm (.197 – .276 in.)



Hold
with wrench

12A0099



12A010C

SERVICE BRAKES

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M35AA-

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SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

- (1) A Supplemental Restraint System (SRS), which uses a driver-side air bag, has been installed in the 3000GT.
- (2) The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning light, air bag module, clock spring, 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 (*).

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) 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), before beginning any service or maintenance of any component of the SRS or any SRS-related component.

SPECIFICATIONS

GENERAL SPECIFICATIONS

Items	FWD	AWD
Master cylinder Type I.D. mm (in.)	Tandem type (with level sensor) 25.4 (1) or 26.9 (1 ¹ / ₁₆)*	Tandem type (with level sensor) 26.9 (1 ¹ / ₁₆)
Brake booster Type Effective dia. of power cylinder mm (in.) Boosting ratio [Brake pedal depressing force]	Vacuum type, tandem 180 (7.0) + 205 (8.0) or 203 (8.0) + 230 (9.0)" 6.0 [at 247 N (54 lbs.)] or 7.0 [at 261 N (58 lbs.)]*	Vacuum type, tandem 203 (8.0) + 230 (9.0) 7.0 [at 261 N (58 lbs.)]
Proportioning valve Split point MPa (psi) Decompression ratio	3.75 – 4.25 (533 – 604) 0.37	3.75 – 4.25 (533 – 604) 0.37
Front brakes Type Disc effective dia. mm (in.) Disc thickness mm (in.) Pad thickness mm (in.) Wheel cylinder I.D. mm (in.) Clearance adjustment	Floating caliper, 2-piston, ventilated disc (M-R57W) 227 (9.0) 24 (.94) 16 (.63) 42.8 (1 ¹¹ / ₁₆) x 2 Automatic	Rigid caliper, 4-piston, ventilated disc (M-R66Z) 249 (9.8) 30 (1.18) 15 (.59) 40.4 (1 ¹⁹ / ₃₂) x 2 + 42.8 (1 ¹¹ / ₁₆) x 2 Automatic
Rear brakes Type Disc effective dia. mm (in.) Disc thickness mm (in.) Pad thickness mm (in.) Wheel cylinder I.D. mm (in.) Clearance adjustment	Floating caliper, 1-piston, ventilated disc (M-R45V) 228 (9.0) 18 (.71) 15.5 (.61) 34.9 (1 ³ / ₈) Automatic	Floating caliper, 1 -piston, ventilated disc (M-R58V) 237 (9.4) 20 (.79) 15.5 (.61) 38.1 (1 ¹ / ₂) Automatic
Rotor teeth Front wheel side Rear wheel side	47 47	47 47
Speed sensor	Magnet coil type	Magnet coil type

NOTE
* : ABS

SERVICE SPECIFICATIONS

M35CB-

Units	FWD	AWD
Standard value		
Brake pedal height mm (in.)	177 – 182 (7.0 – 7.2)	177 – 182 (7.0 – 7.2)
Brake pedal free play mm (in.)	3 – 8 (.1 – .3)	3 – 8 (.1 – .3)
Brake pedal to floorboard clearance mm (in.)	80 (3.1) or more	80 (3.1) or more
Pad thickness mm (in.)	10.0 (.39)	10.0 (.39)
Front disc thickness mm (in.)	24.0 (.94)	30.0 (1.18)
Rear disc thickness mm (in.)	18.0 (.71)	20.0 (.79)
Proportioning valve pressure MPa (psi)		
Split point	3.75 – 4.25 (533 – 604)	3.75 – 4.25 (533 – 604)
Output pressure [input pressure]	5.23 – 5.73 (744 – 815) [8.0 (1, 138)]	5.23 – 5.73 (744 – 815) [8.0 (1, 138)]
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)	0.65 – 0.85 (.026 – .033)
Disc brake drag force (tangential force of wheel mounting bolts) N (lbs.)	70 (15.4) or less	70 (15.4) or less
[Disc brake dragging torque [Nm (ft.lbs.)]	[4 (3) or less]	[4 (3) or less]
Speed sensor's (ABS) internal resistance kΩ		
Front	1.4-2.2	0.8 – 1.2
Rear	1.3-2.1	0.8 – 1.2
Rear speed sensor pole piece-to-rotor tooth surface clearance mm (in.)	–	28.15 – 28.45 (1.11 -1.12)
Clearance between the speed pole piece and the toothed rotor mm (in.)		
Front	0.3 – 0.9 (.012 – .035)	–
Rear	0.2 – 0.7 (.008 – .028)	–
Unit		
Left/right proportioning valve output pressure difference MPa (psi)	0.4 (57)	0.4 (57)
Front disc run-out mm (in.)	0.1 (.004) or less	0.1 (.004) or less
Pad thickness mm (in.)	2.0 (.08)	2.0 (.08)
Front disc thickness mm (in.)	22.4 (.88)	28.4 (1.12)
Front hub end play mm (in.)	0.05 (.002)	0.05 (.002)
Rear disc thickness mm (in.)	16.4 (.65)	18.4 (.72)
Rear disc run-out mm (in.)	0.08 (.0031) or less	0.08 (.0031) or less
Rear hub end play mm (in.)	0.05 (.002)	0.8 (.031)

LUBRICANTS

M35CD -

Items	Specified lubricant
Brake fluid	Conforming to DOT3
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

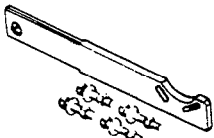
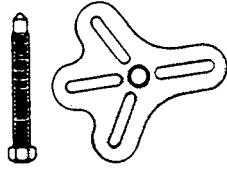
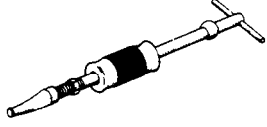
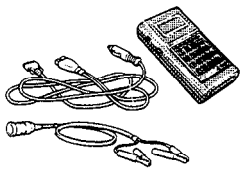


SEALANTS AND ADHESIVES

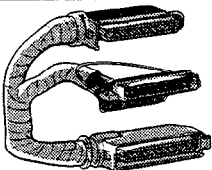
M35CE -

Items	Specified sealant
Thread part fitting	3M ATD Part No.8663 or equivalent

SPECIAL TOOLS

M35DA -

Tool	Number	Name	Use
	MB990767-01	End yoke holder	Removal of rear axle shaft
	MB990241-01	Axle puller	
	MB990211-01	Slide hammer with adapter	
	MB991341	Multi-use tester assembly	For checking of A.B.S.
	MB991 359	ROM pack (for multi-use tester)	
	MB991 377	Adapter harness	

Tool	Number	Name	Use
	MB991356	Adapter harness	For checking of A.B.S.

TROUBLESHOOTING

M35EAAS

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 brakesystem	Bleed air
	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
Increased pedal stroke (Reduced pedal to floorboard clearance)	Air in brake system	Bleed air
	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
	Insufficient push rod to master cylinder clearance	Adjust
	Defective master cylinder piston return spring	Replace
	Clogged master cylinder return port	Correct

Symptom	Probable cause	Remedy
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
Squealing noise when brakes are not applied	Disc brakes – rusted, stuck	Lubricate or replace
	Loose or extra parts in brakes	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	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 shim	Replace
	Disc brakes – loose installation bolt	Retighten
	Incorrect adjustment of brake pedal or booster push-rod	Adjust

ANTI-LOCK BRAKING SYSTEM TROUBLESHOOTING

M35EBAF

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 self-diagnosis function is built into the electronic control unit (E.C.U.) 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 multi-use tester.

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

MUT: Multi-use tester

TROUBLESHOOTING (ABS – FWD)

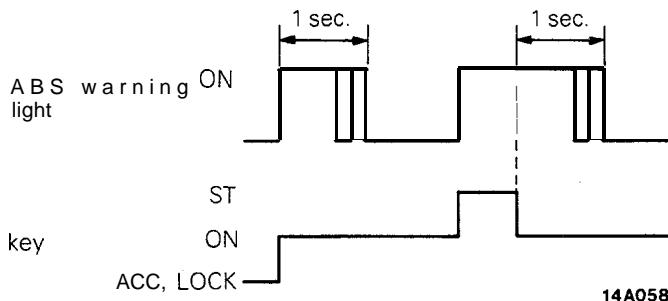
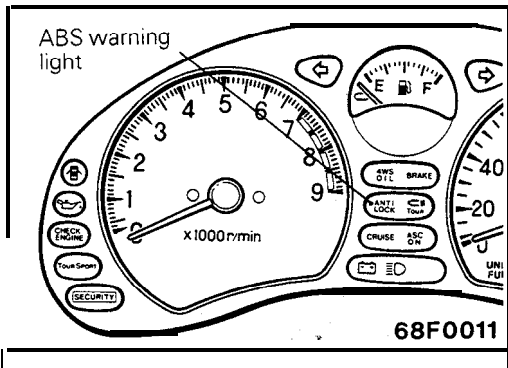
Confirm condition in the following way and diagnosis accordingly.

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.



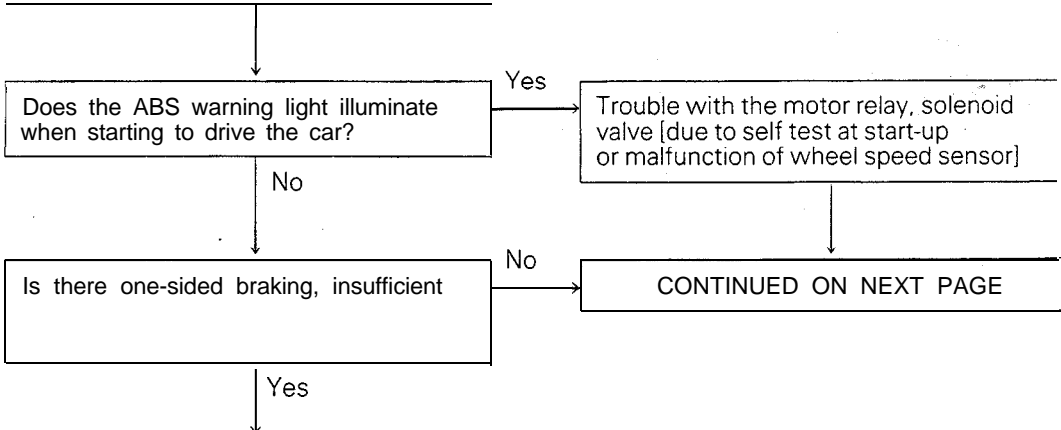
Yes → CONTINUED ON NEXT PAGE

No ↓

No.	Trouble condition	Major causes	Remedy
1	<p>ABS warning light does not light up at all.</p> <p>ON —————</p> <p>ABS warning light OFF —————</p> <p>ST —————</p> <p>Ignition key ON —————</p> <p>ACC, LOCK —————</p> <p style="text-align: right;">14A0590</p>	<ul style="list-style-type: none"> • ABS warning light bulb is burnt out. • Open in ABS warning light electrical circuit (check for blown fuse) 	<p>Check, using flow chart A (Refer to P.35-13.)</p>
2	<p>When the ignition key is turned to the "ON" position, it remains lighted.</p> <p>ON —————</p> <p>ABS warning light OFF —————</p> <p>ST —————</p> <p>Ignition key ON —————</p> <p>ACC, LOCK —————</p> <p style="text-align: right;">14A0591</p>	<ul style="list-style-type: none"> • Fail safe is functioning due to ECU self diagnosis. • Short in ECU warning light drive circuit • Malfunction of ECU 	<p>Check, using flow chart B (Refer to P.35-16.)</p>
3	<p>Does not illuminate when ignition key is in "START" position.</p> <p>ON —————</p> <p>ABS warning light OFF —————</p> <p>ST —————</p> <p>Ignition key ON —————</p> <p>ACC, LOCK —————</p> <p style="text-align: right;">14A0592</p>	<ul style="list-style-type: none"> • Malfunction of valve relay • Break in harness between ABS warning light and HU • Break in harness between HU and body ground 	<p>Check, using flow chart C (Refer to P.35-18.)</p>

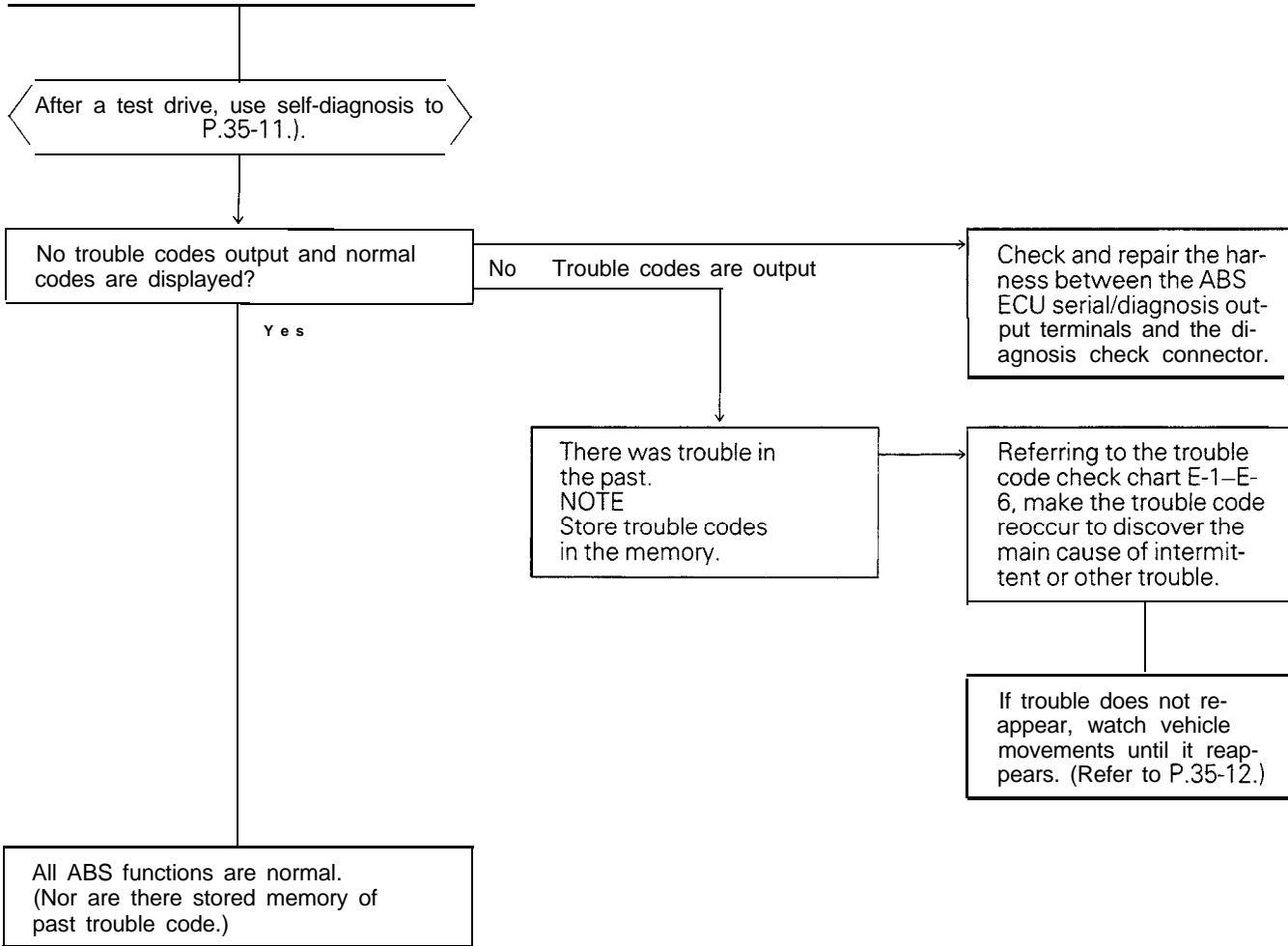
No.	Trouble condition	Major causes	Remedy
4	<p>After the ignition key is turned to the "ON" position, it blinks once and then illuminates when it is turned to the "START" position. When the key is returned to the "ON" position, the light blinks again. (Blinking with the ignition key in the "ON" position is synchronized with operation noise of the valve relay.)</p> <p>14A0593</p>	<ul style="list-style-type: none"> • Break in harness for ECU warning light drive circuit • Malfunction of ECU 	<p>Check, using flow P.35-19.)</p>

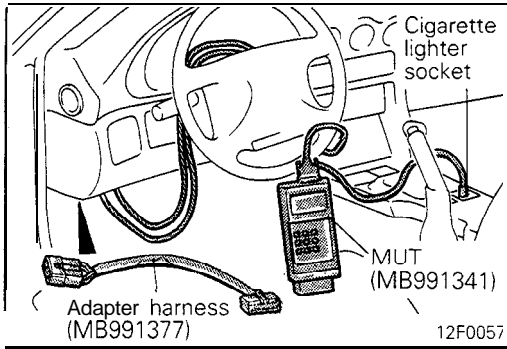
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Trouble condition		Remedy
One-sided braking Insufficient braking force	<ul style="list-style-type: none"> • Hydraulic • Malfunction in HU solenoid valve 	<p>Check HU operation and, if necessary, replace HU. If HU is normal, check structural parts for normal braking.</p>
ABS sometimes functions even when there is no sudden braking. (ABS operation vibration is transmitted.)	<p>Insufficient wheel speed sensor output voltage (sensor malfunction, too large a gap between sensor rotor,</p> <ul style="list-style-type: none"> • Malfunction of ABS ECU 	<p>(Refer to P.35-57.) and, if necessary, replace sensor, If tests indicate that there are no mechanical or electrical failures, replace the ECU.</p>

CONTINUED FROM PREVIOUS PAGE





CHECK USING SELF DIAGNOSIS FUNCTION

(1) With the ignition switch OFF, connect the MUT through the adapter harness (MB991377), turn the ignition ON and select the ABS system. (The ABS warning light lights up, it goes into the MUT mode. **In the MUT mode, ABS does not function.**)

If it does not go into the MUT mode, check the ECU power circuit and the harness between the ECU and diagnosis check terminals.

(2) Read the diagnosis output codes from the ECU memory.
 (3) Clear the diagnosis 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 trouble codes cannot be cleared, or when the ABS ECU goes into fail safe during another test drive and trouble codes are output, check according to trouble code check charts (E-I-E-6).

DIAGNOSIS CODE CHART

Diagnosis code		Check chart name or remedy	Reference page	Diagnosis code		Check chart name or remedy	Reference page
No.	MUT display letters			No.	MUT display letters		
11	FR SNSR. OPEN	E-1	P.35-20	41	FR SOL. VALVE	E-4	P.35-23
12	FL SNSR. OPEN			42	FL SOL. VALVE		
13	RR SNSR. OPEN			43	REAR SOL. V.		
14	RL SNSR. OPEN			51	VALVE RELAY	E-5	P.35-24
15	VEH. SPD. SNSR.	E-2	P.35-20	52	MOTOR RELAY	E-6	P.35-25
22	STOP LAMP SW	E-3	P.35-20	55	CONT. UNIT	ECU replacement	—

METHOD OF CLEARING DIAGNOSIS CODE MEMORY

Caution

- When servicing is finished, clear the diagnosis 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 MUT.
(No. 7 "DIAG. ERASE" in the actuator test is selected to erase the diagnosis code.)
- (2) After clearing, recheck the diagnosis codes, and check that memory is cleared.

ACTUATOR TEST FUNCTION

The actuator can be forcibly driven in the following way by using the MUT.

NOTE

- The actuator test cannot be carried out when the ABS ECU system is in fail safe.
- When using forced drive using the MUT, the vehicle must be stopped.
- During forced drive using the MUT, forced drive operation is stopped when any wheel speed reaches 10 km/h (6 mph).

Actuator test specifications

No.	MUT 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>	
05	FL VALVE M		
06	REAR VALVE M		

14A0588

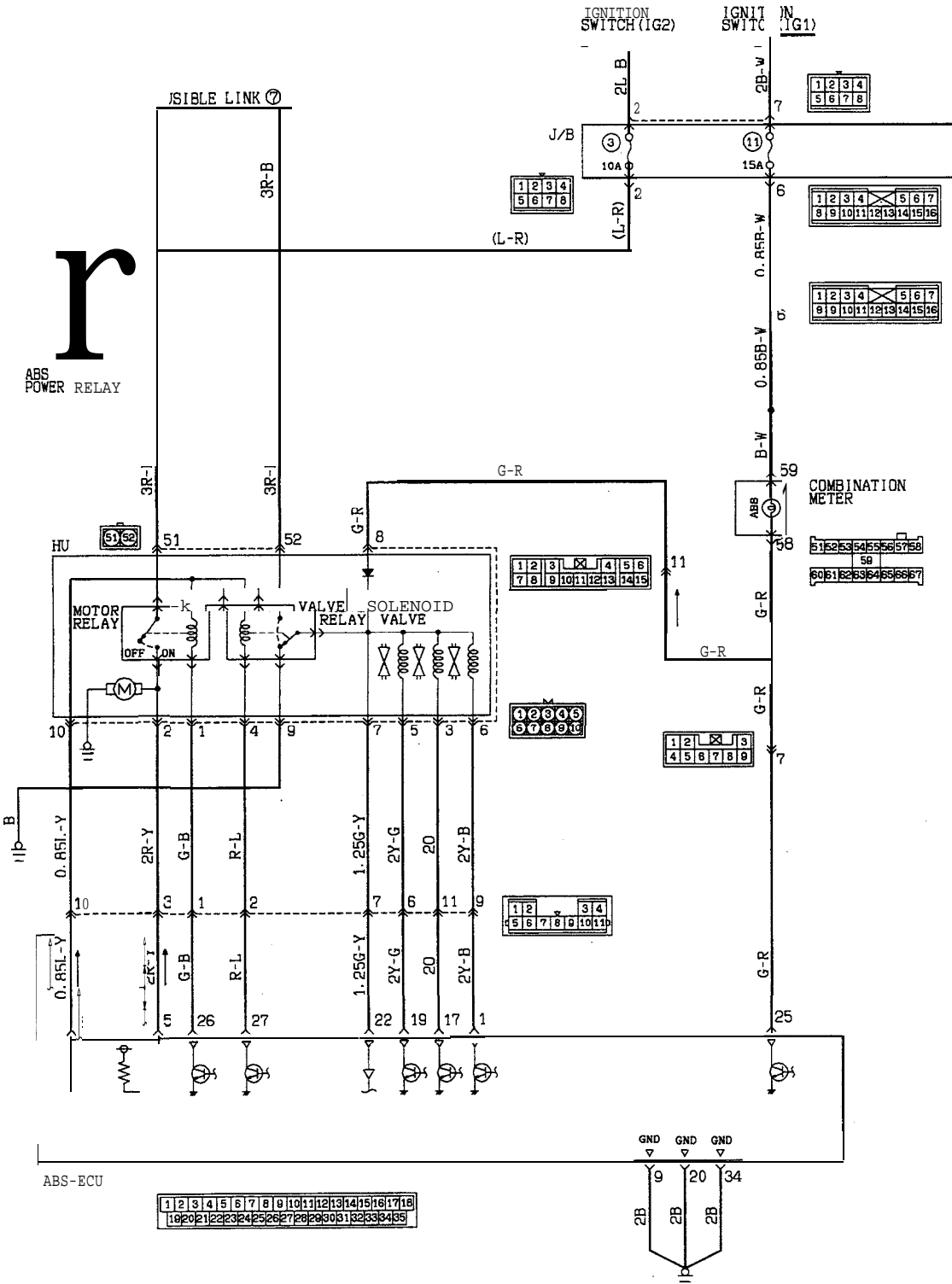
A ABS warning light does not light at all.

[Explanation]

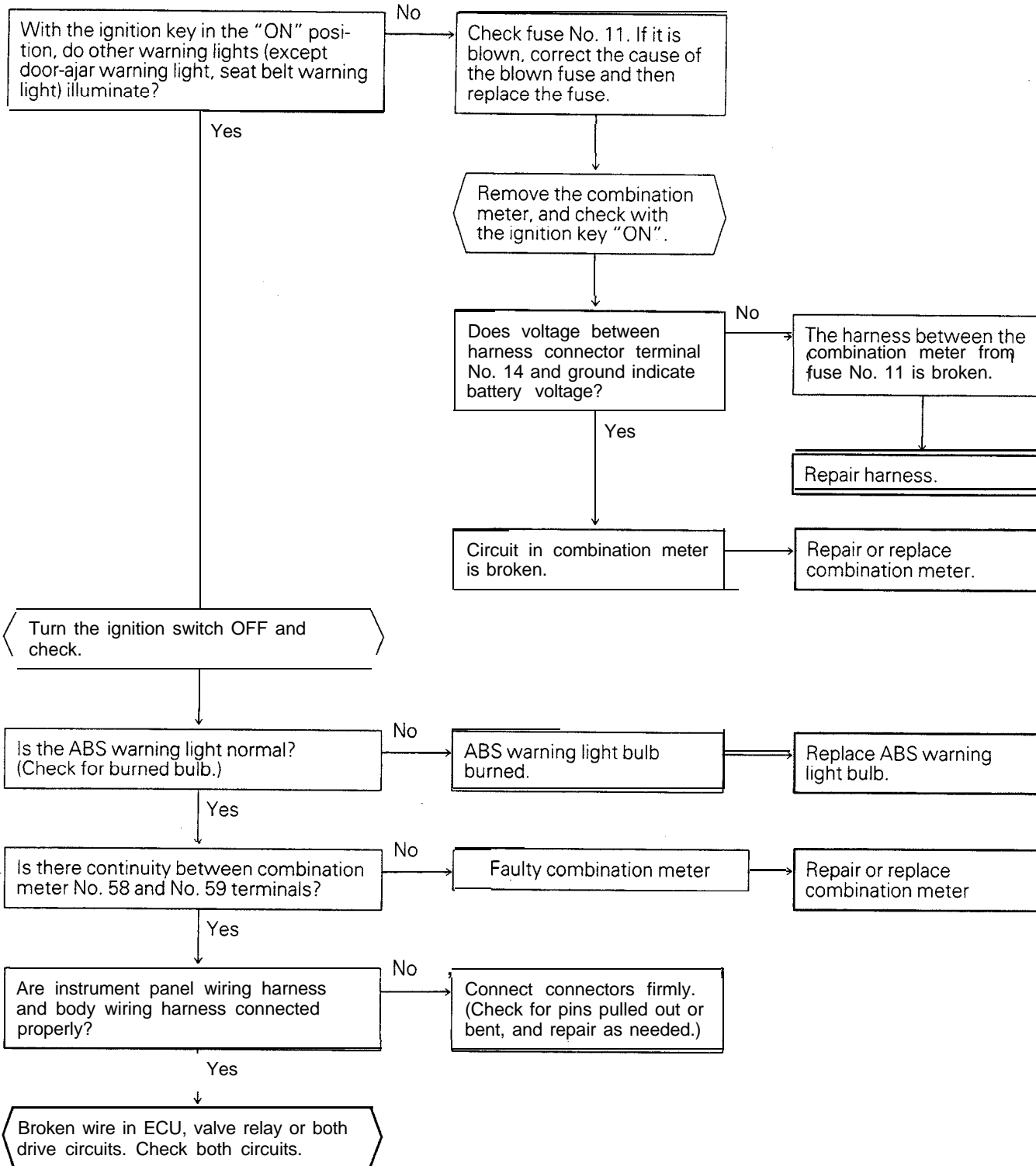
When it does not light up at all, there is a strong possibility that there is trouble with ABS warning light or with power to the light.

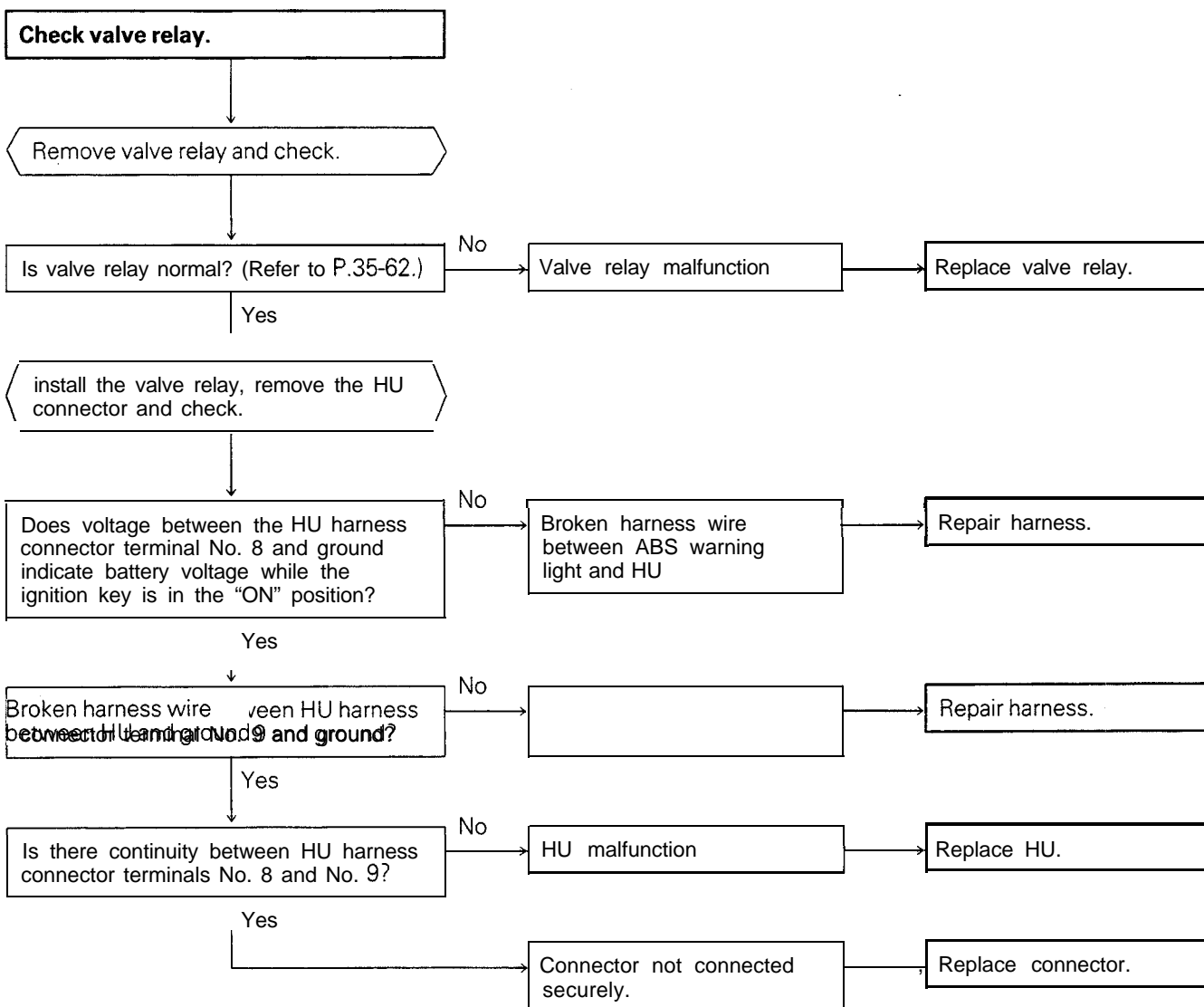
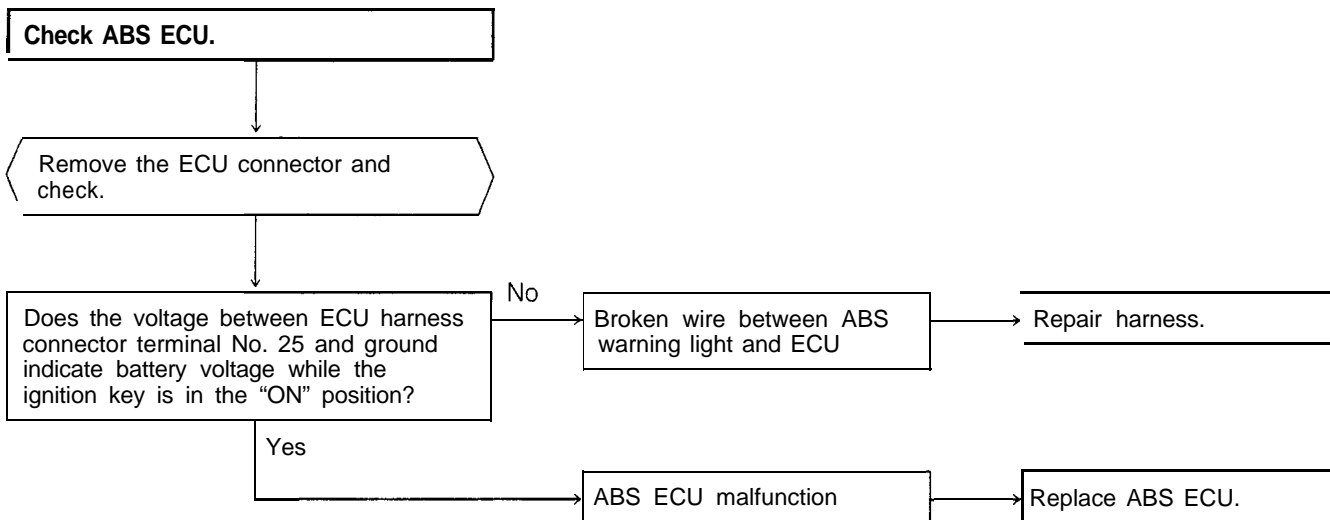
[Hint]

If other warning lights do not light up either, fuse is probably blown.



KX35-AK-R3501A





B ABS warning light stays on when the ignition key is in the "ON" position.

[Explanation]

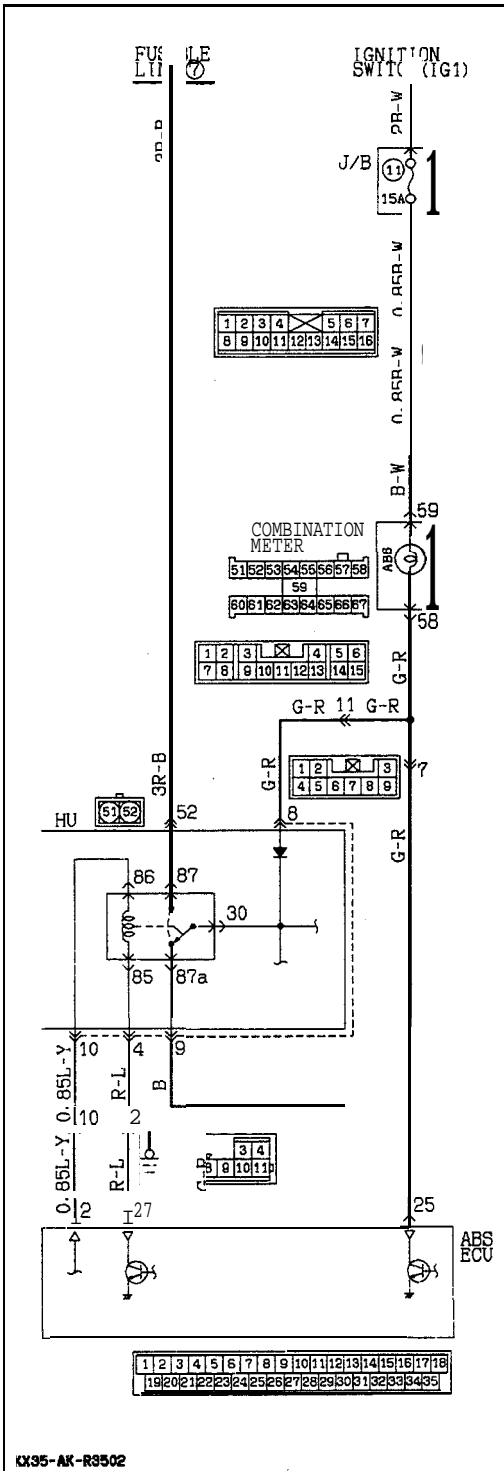
This is the symptom when the ABS ECU does not power up due to broken ECU power circuit, etc., when the fail safe function operates and isolates the system or when the warning light drive circuit is short circuited.

[Hint]

Check the diagnosis output and if there is no output voltage or if the MUT and ABS ECU cannot communicate, there is a good possibility that power is not flowing to the ECU.

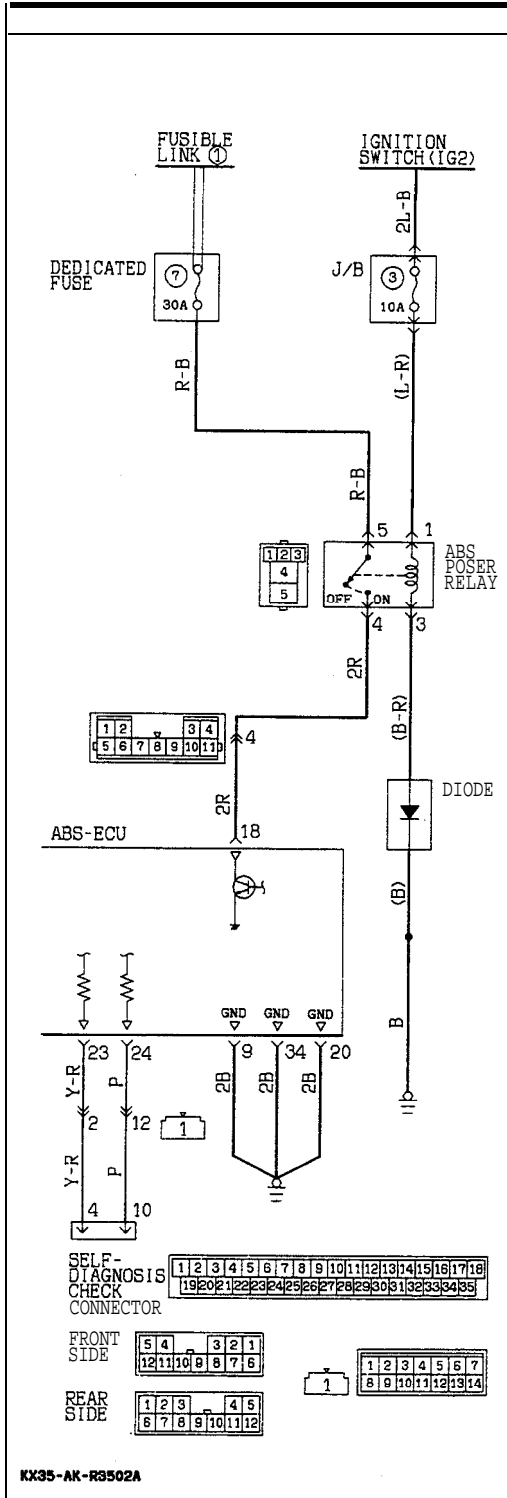
Caution

- If the trouble code is output, the system can be in the fail safe mode. In such a case, erase the trouble code and then restart the engine to check if the system is currently in a fault condition.

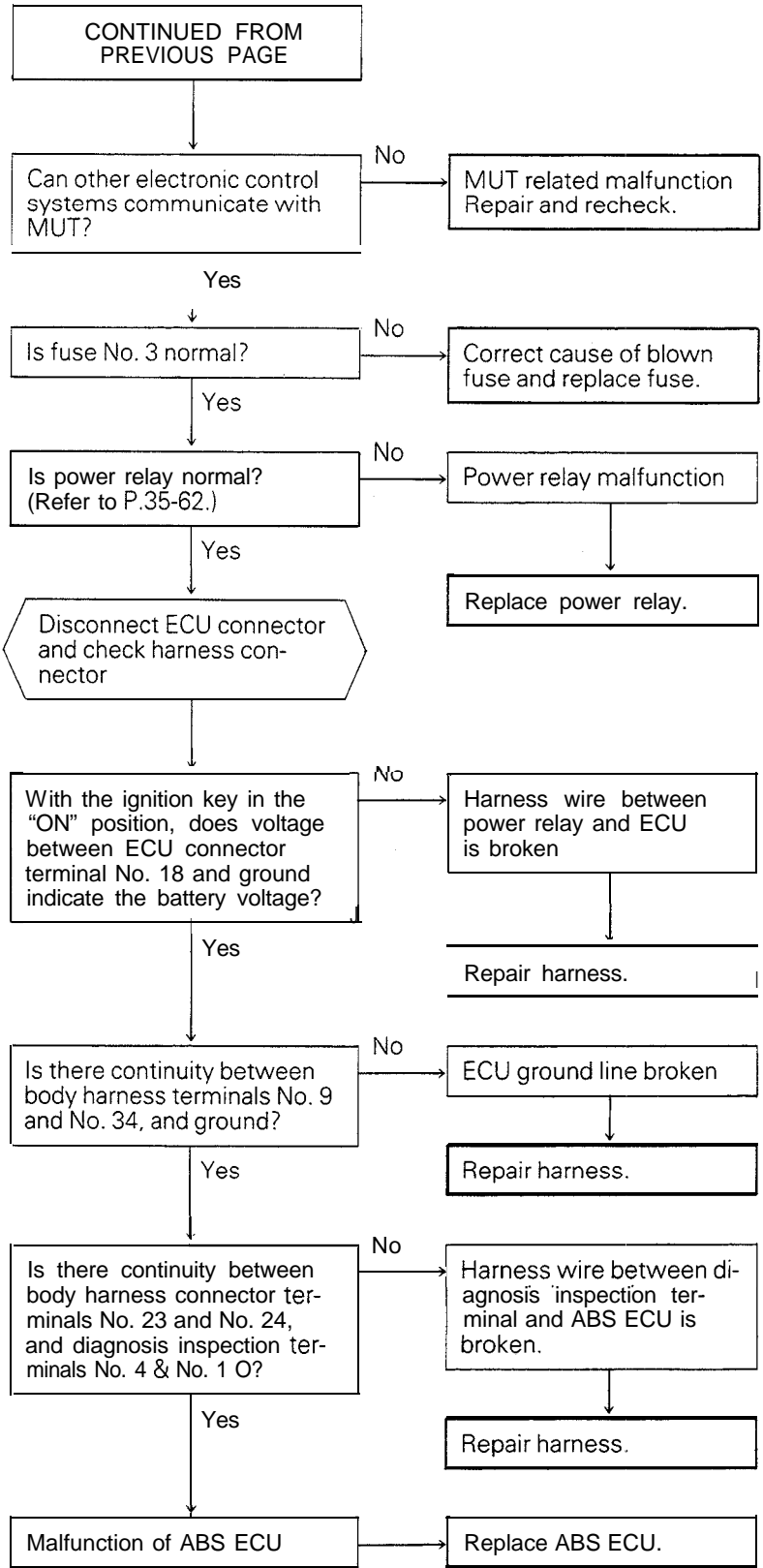


```

    graph TD
      Q1[Is there diagnosis output?  
(Is there communication with MUT?)] -- No --> A1[CONTINUED ON NEXT PAGE]
      Q1 -- Yes --> Q2[Does diagnosis code output display normal codes?]
      Q2 -- No --> A2[Check, using the trouble code check chart (Refer to P.35-20.).]
      Q2 -- Yes --> Q3[Does the ABS warning light remain illuminated even with the ECU connector disconnected?]
      Q3 -- No --> A3[Short in ECU transistor]
      A3 --> A4[Replace ECU.]
      Q3 -- Yes --> Q4[Does the ABS warning light remain illuminated even with the HU connector disconnected?]
      Q4 -- No --> A5[Short in HU harness or sticking of valve relay contact]
      A5 --> A6[Replace HU or replace valve relay.]
      Q4 -- Yes --> A7[Short-circuit in harness between HU or ECU and ABS warning light]
      A7 --> A8[Repair harness or replace combination meter.]
    
```



KX35-AK-R3502A

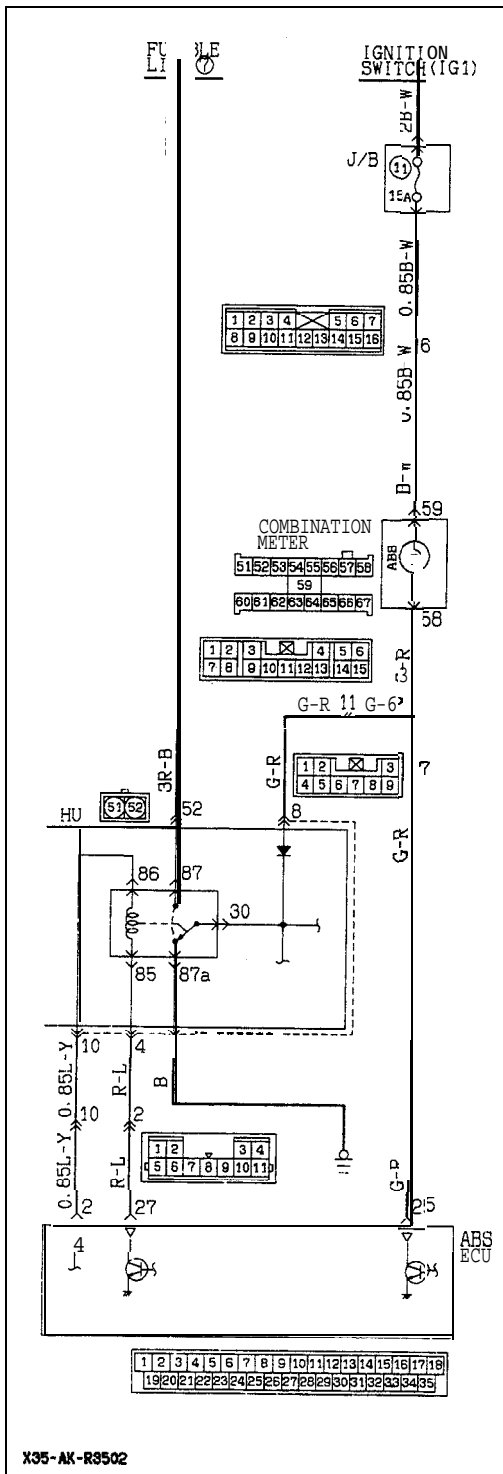


C ABS warning light does not illuminate when the ignition key is in the "START" position.

[Explanation]

The ABS ECU uses the IG₂ power source which is turned off in the "START" position. The ABS warning light uses the IG₁ 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.



```

    graph TD
      Start([Remove the hydraulic unit (HU) connector and check.]) --> Q1{With the ignition key in the "ON" position, does voltage between body connector terminal No. 8 and ground indicate the battery voltage?}
      Q1 -- No --> A1[Harness wire between HU and warning light is broken.]
      Q1 -- Yes --> Q2{Is there continuity between body connector terminal No. 9 and ground?}
      Q2 -- No --> A2[Broken line between HU and body ground]
      Q2 -- Yes --> Q3{Is there continuity between HU connector terminal No. 8 and terminal No. 9?}
      Q3 -- No --> A3[Valve relay malfunction or break in HU harness wire]
      Q3 -- Yes --> Q4{Remove the valve relay. Is there continuity between terminal No. 87a and No. 30?}
      Q4 -- No --> A4[Valve relay malfunction]
      Q4 -- Yes --> A5[Replace valve relay.]
      A4 --> A6[Replace HU.]
      A5 --> A6
  
```

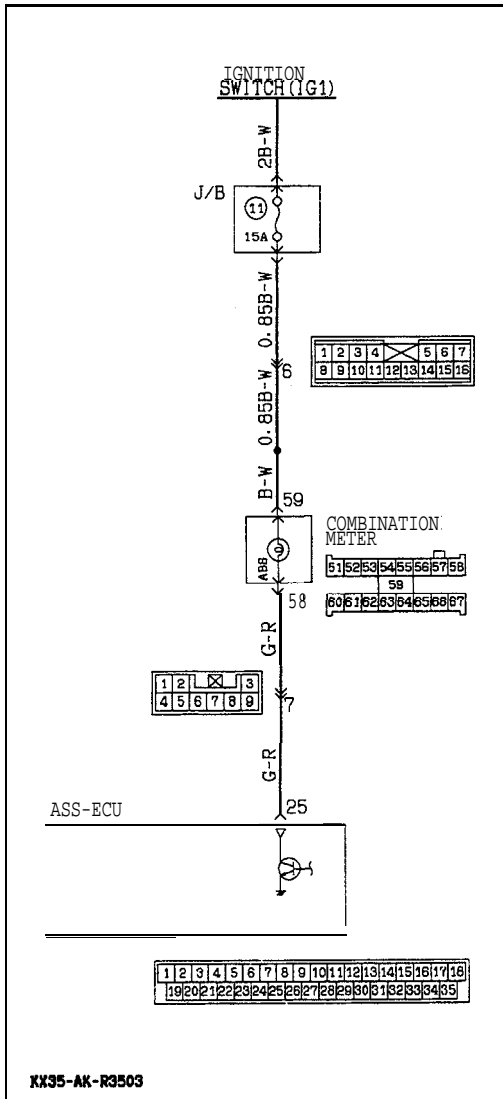
NOTE
When performing the check marked *, note polarity of the diode (refer to the circuit diagram).

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.

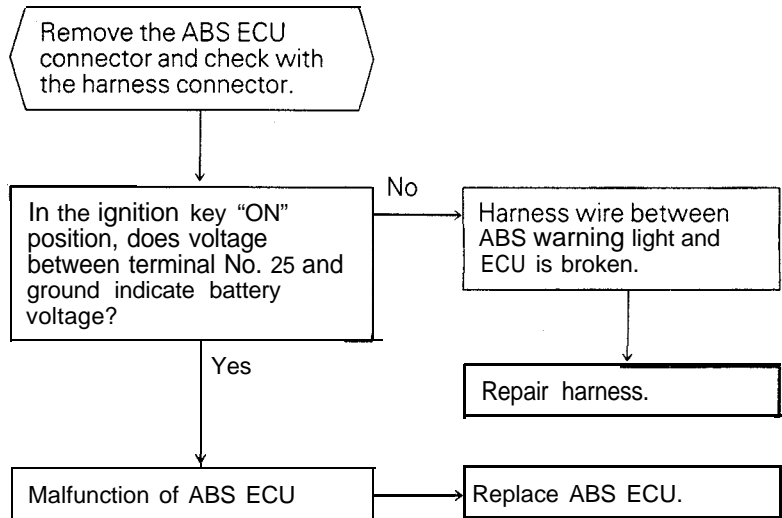
[Explanation]

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.



KX35-AK-R3503



E-1 When the following diagnosis codes are displayed “11 FR SNSR. OPEN”
 “12 FL SNSR. OPEN” “13 RR SNSR. OPEN” “14 RL 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 diagnosis 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]

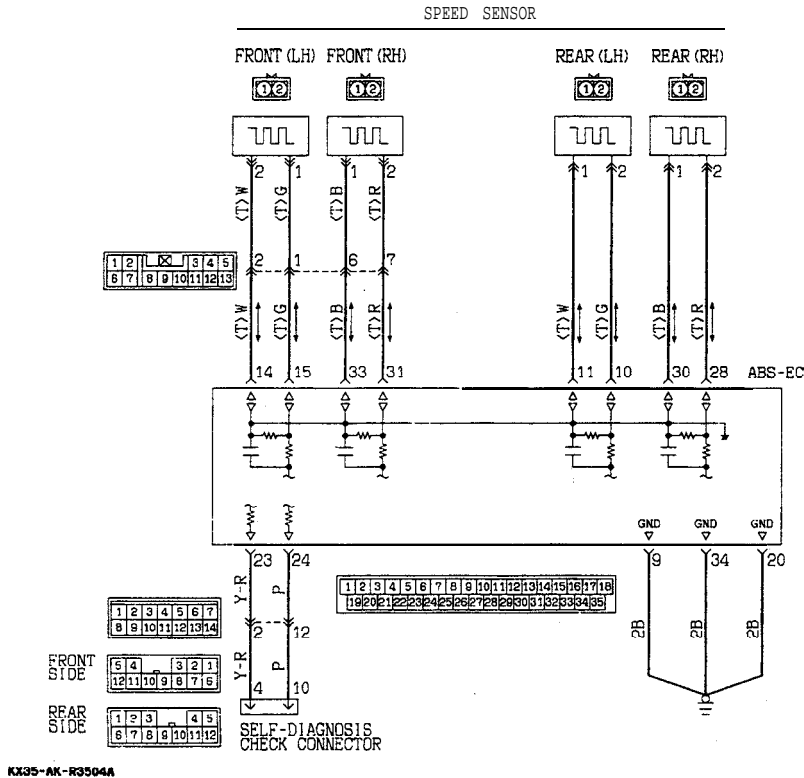
The following can be considered as the cause of the wheel speed sensor output abnormality.

- 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 diagnosis code and turn the ignition switch to OFF once, and then test-drive again. If the same 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.)



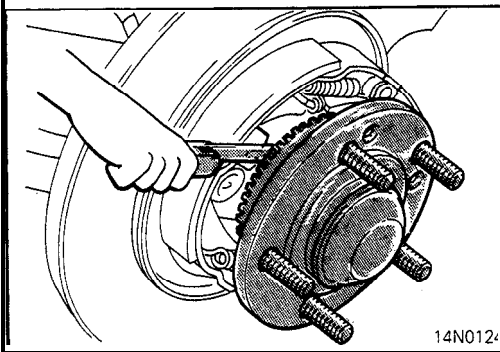
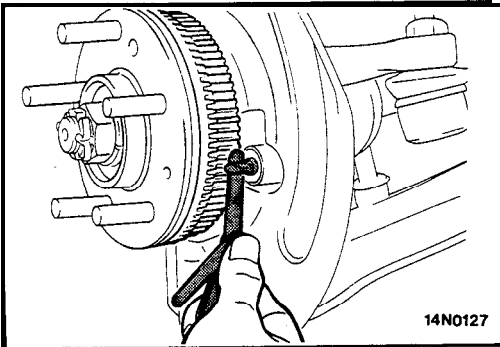
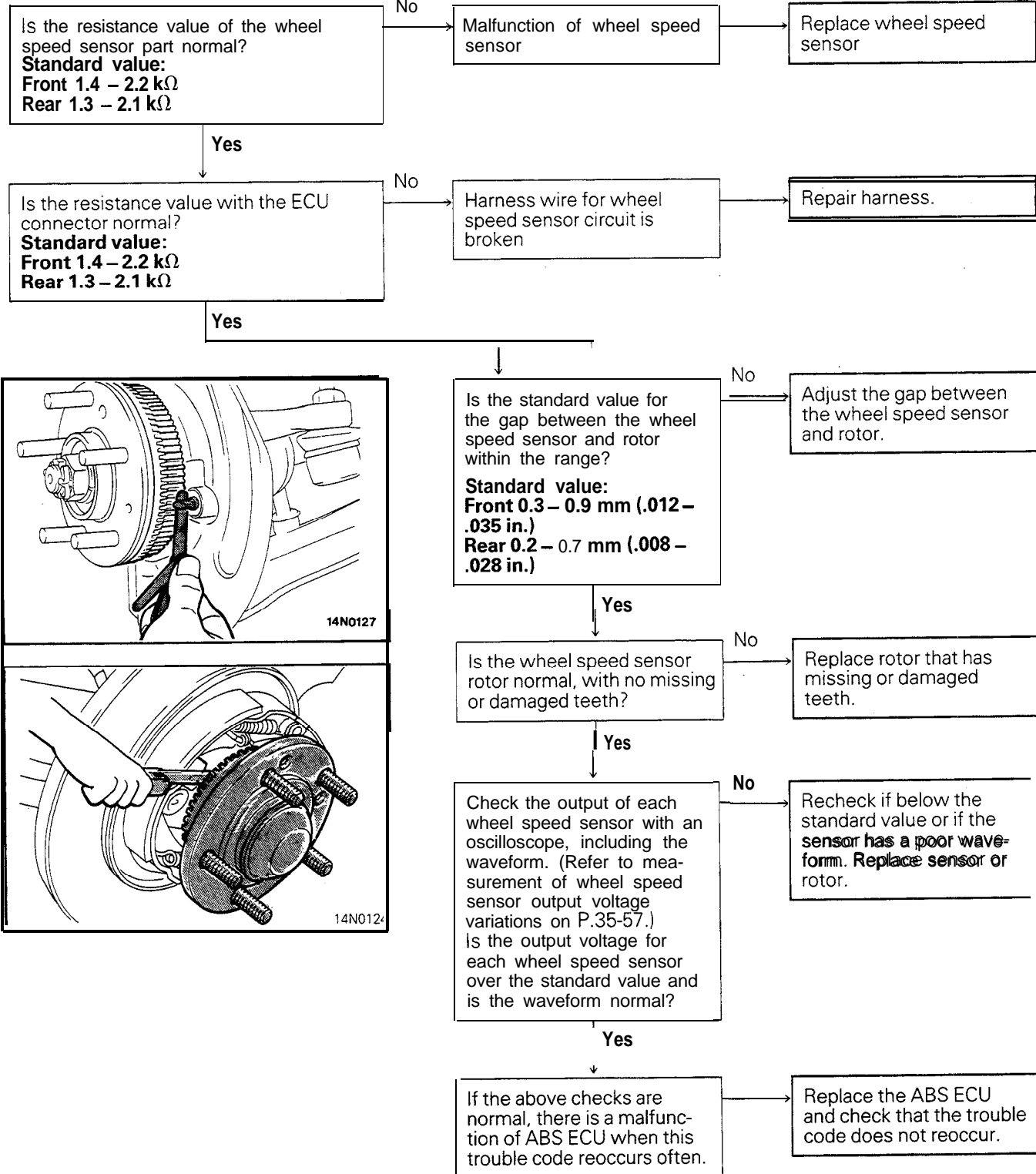
KX35-AK-R3504A

TSB Revision

Check flow connected with wheel speed sensor

N O T E

When checking with an oscilloscope, first measure voltage variations in the wheel speed sensor output. (Refer to P.35-57.)



E-3 When diagnosis code "22 STOP LAMP SW" is displayed

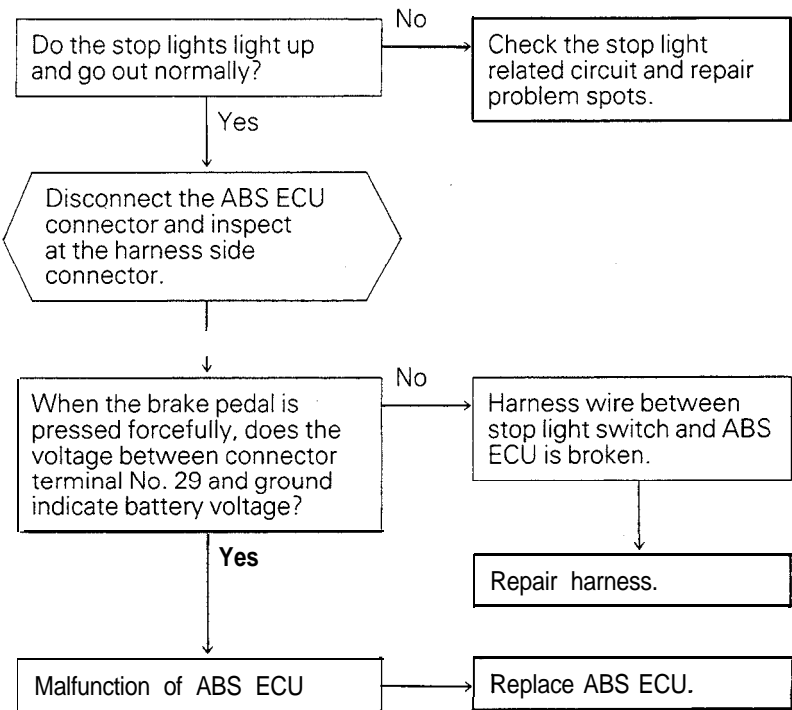
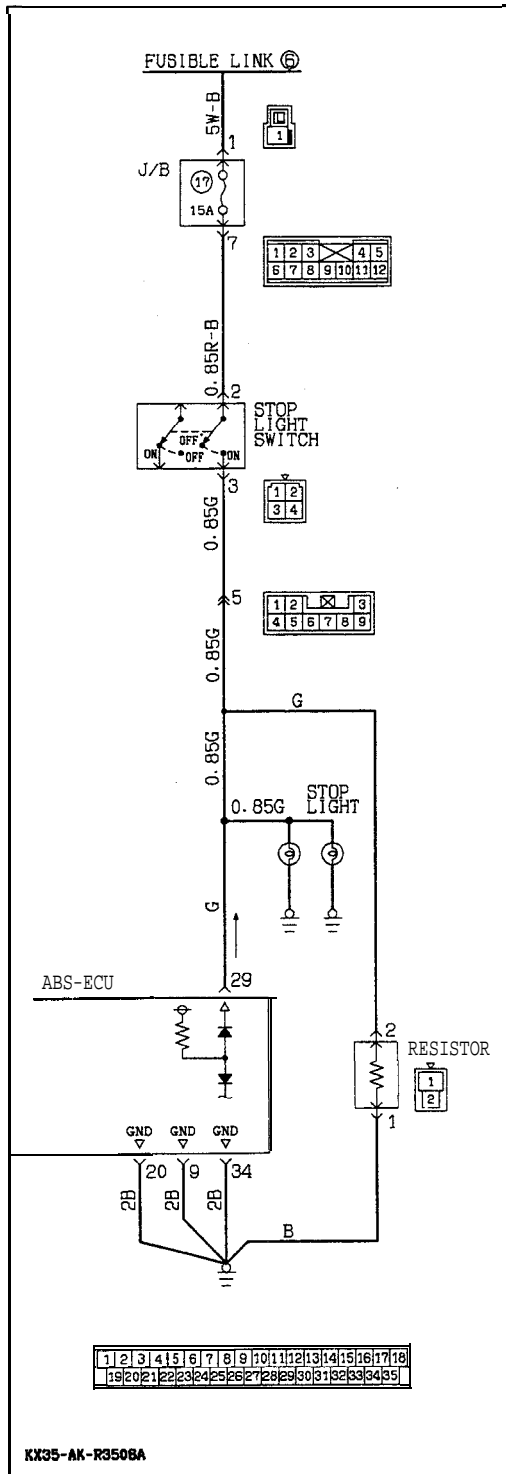
[Explanation]

The ABS ECU outputs this 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.

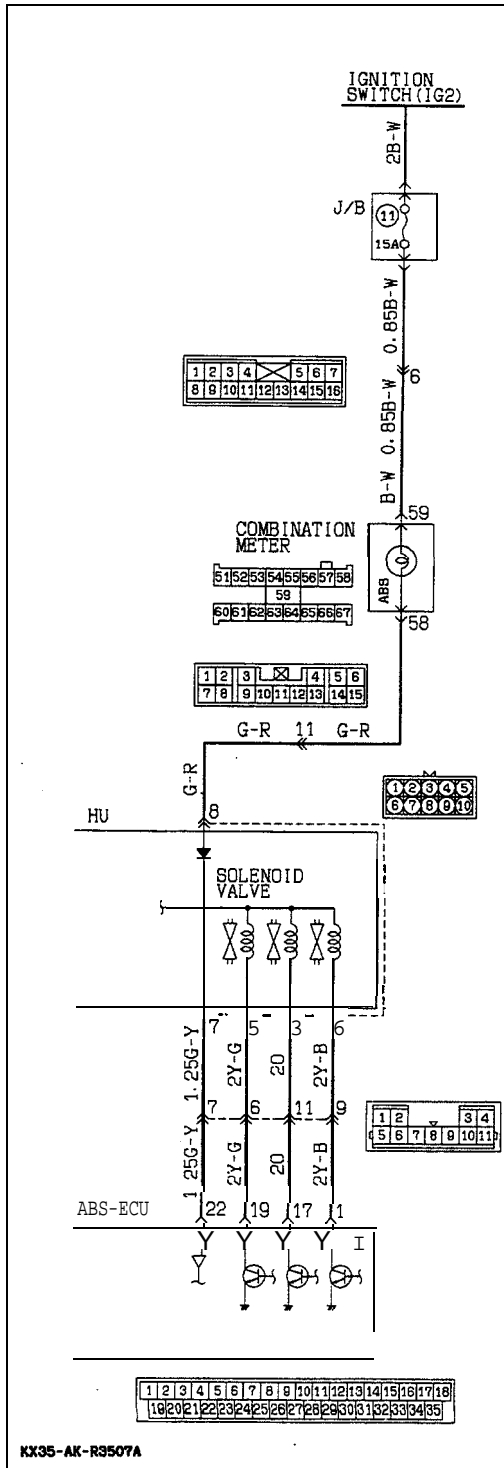


E-4 When diagnosis codes “41 FR SOL. VALVE”, “42 FL SOL. VALVE” or “43 REAR SOL. V.” are displayed.

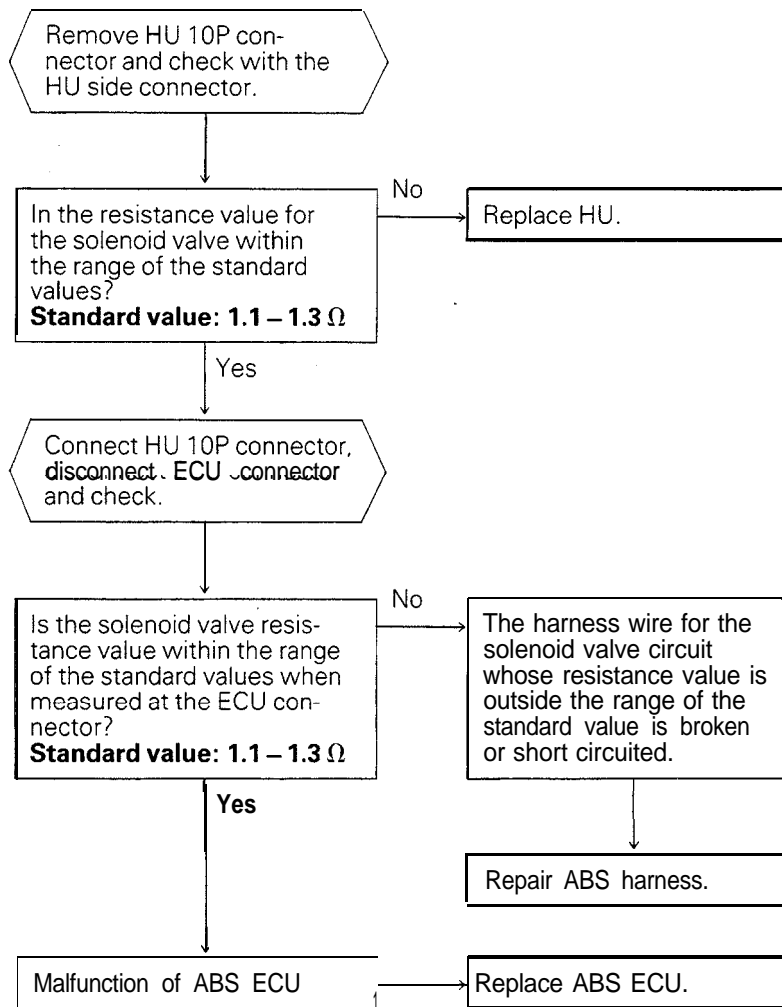
[Explanation]

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 trouble codes are output.



KX35-AK-R3507A



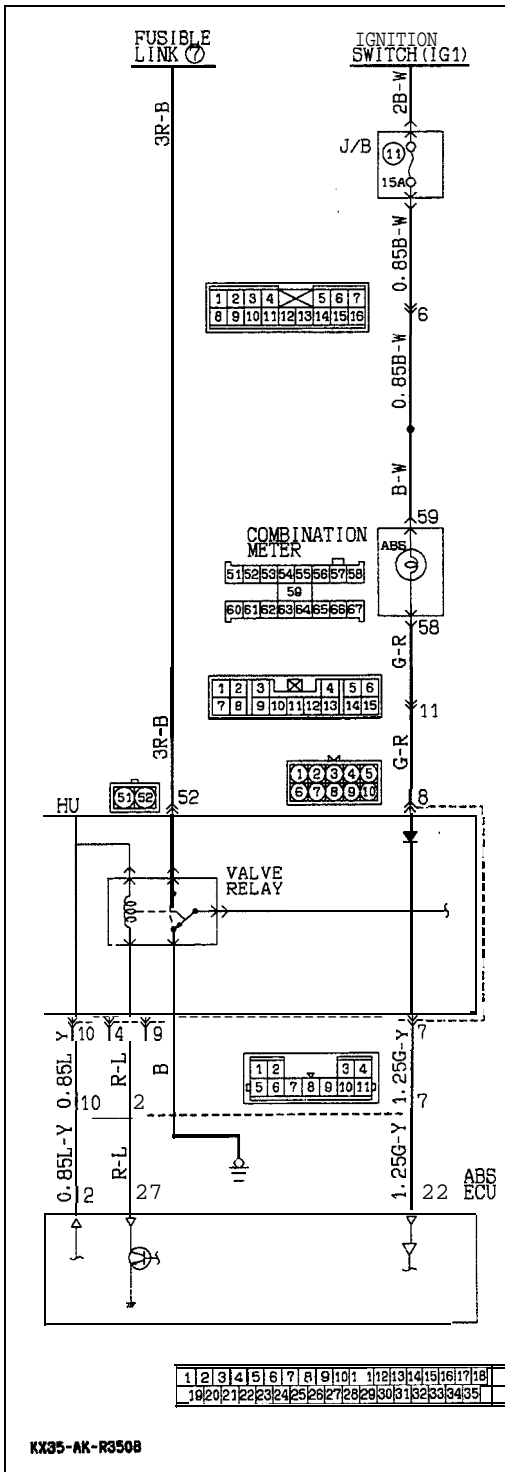
TSB Revision

E-5 When diagnosis 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 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 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 – 120Ω
 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

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 voltage?

Yes

Is there continuity between HU No. 8 and No. 7 terminals?

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

Yes

With the ignition key "ON", does the voltage between terminal No. 22 and ground indicate battery voltage?

Yes

ABS ECU malfunction

No → Valve relay malfunction

Replace valve relay.

No → HU power harness wire is broken.

Repair harness.

Faulty harness in HU

Repair harness or replace HU.

No → Malfunction of harness between HU and ECU.

Repair harness.

No → Malfunction of harness between HU and ABS ECU.

Repair harness.

Replace ABS ECU.

E-6 | When diagnosis code “52 MOTOR RELAY” is displayed

[Explanation]

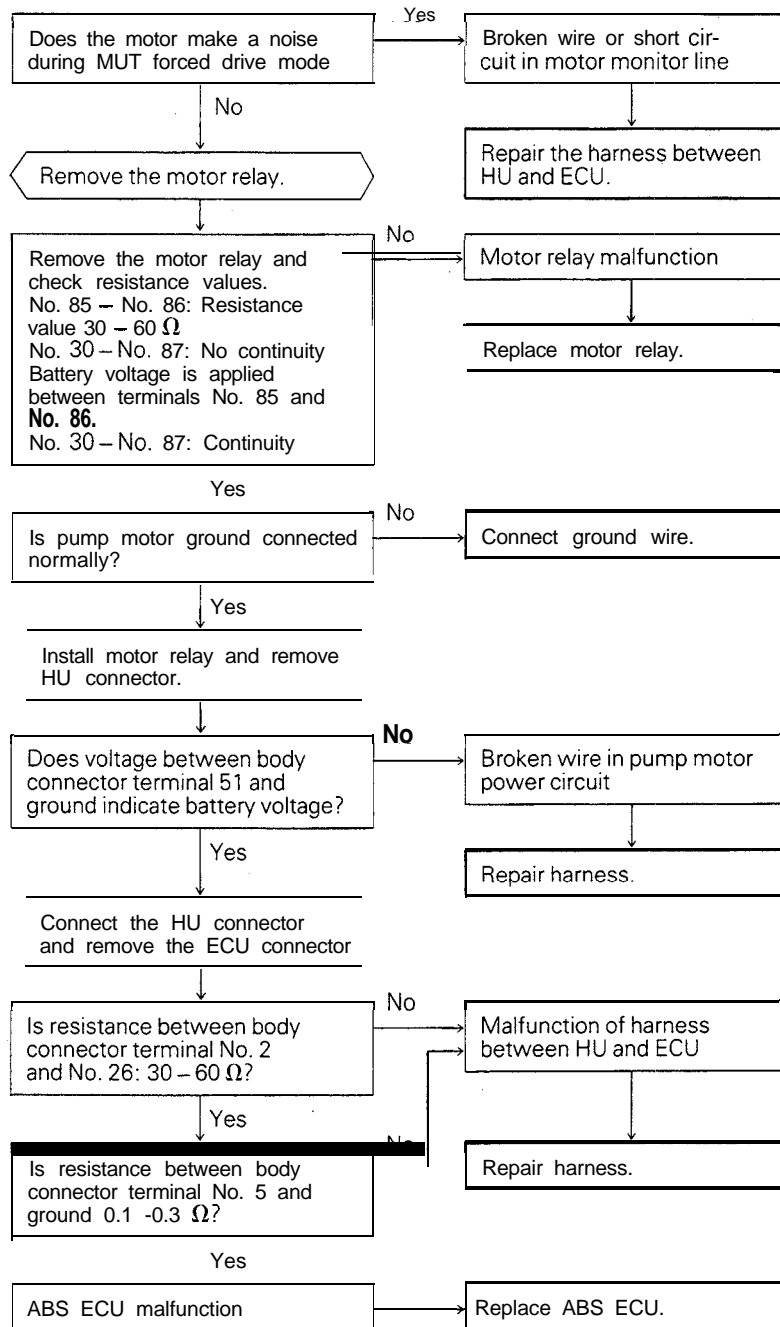
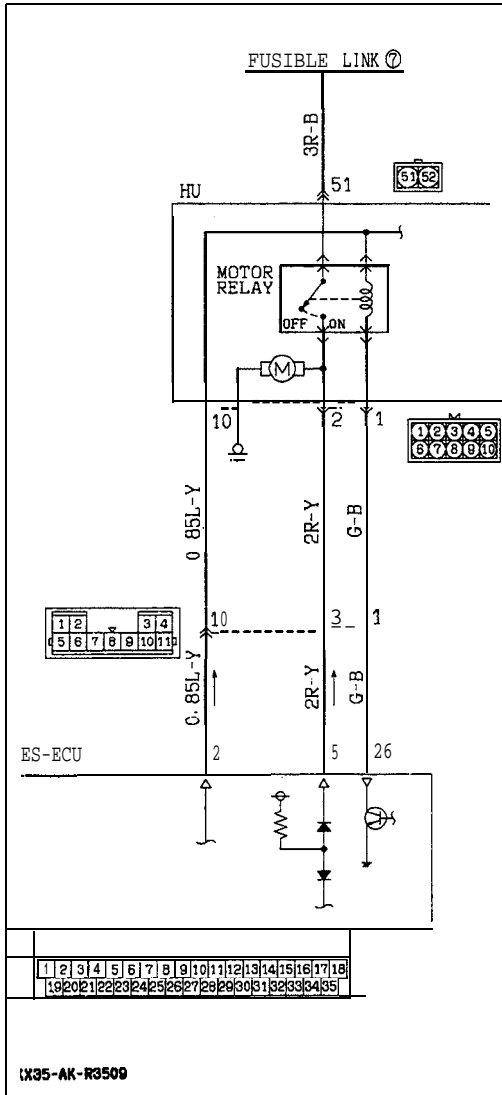
The ABS ECU outputs this trouble code for the motor relay and motor in the following cases.

- 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 MUT forced drive mode, there is a broken or short circuited motor monitor wire.



TROUBLESHOOTING (ABS – AWD)

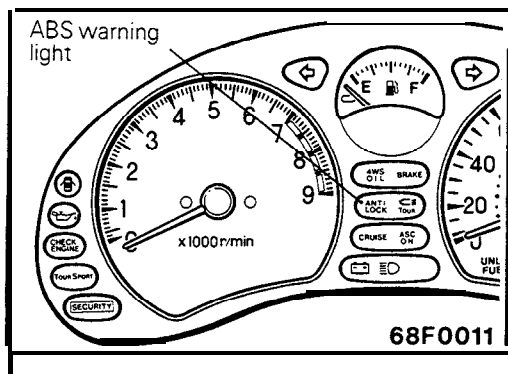
Confirm condition in the following way and diagnosis accordingly.

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.

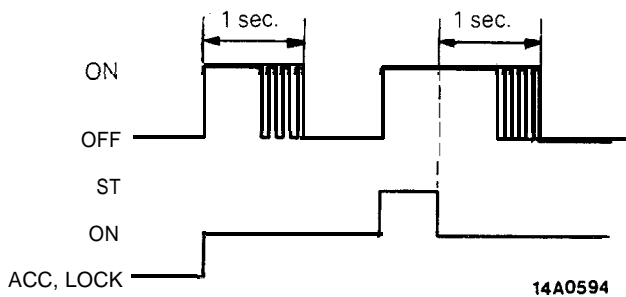
- (2) With the ignition key in the "START" position, power to the ABS ECU is interrupted and the ABS warning light remains lit because the valve relay is OFF.

- (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.



ABS warning light

Ignition key



Yes

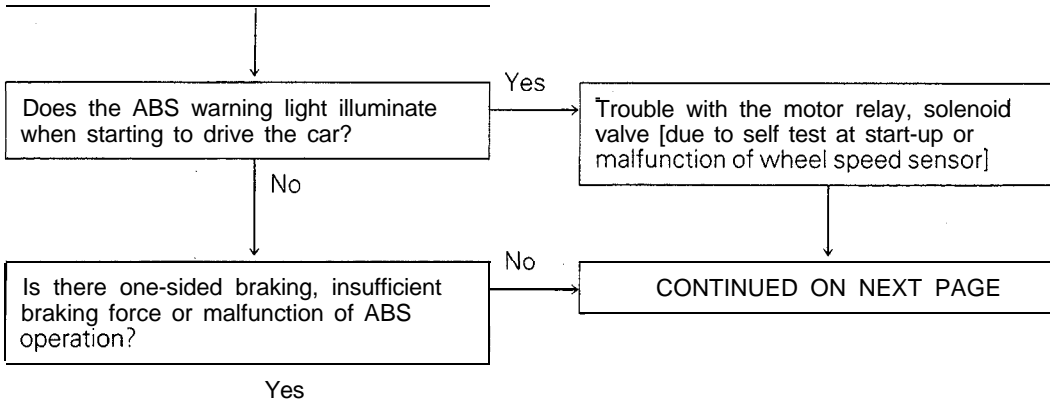
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No

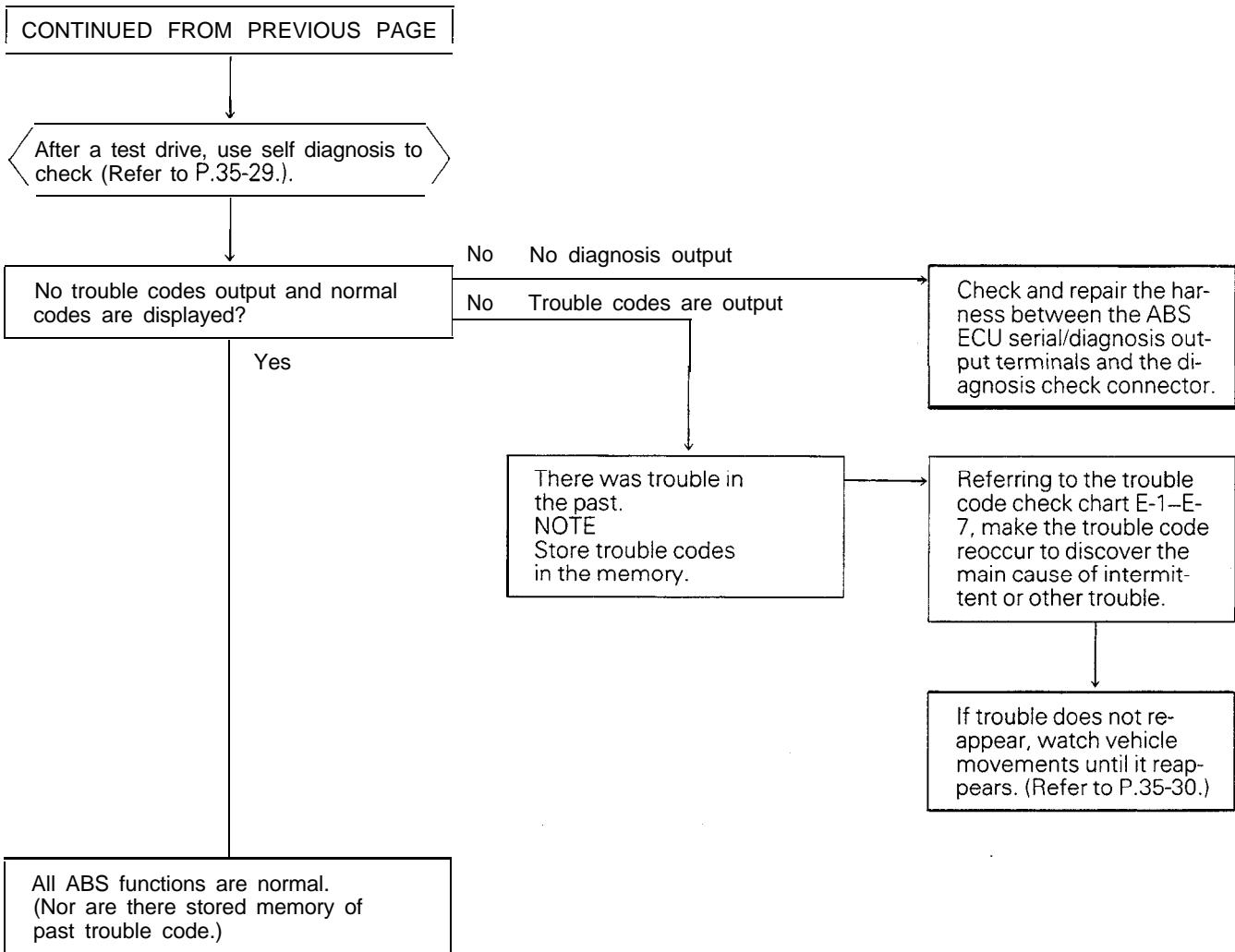
No.	Trouble condition	Major causes	Remedy
1	<p>ABS warning light does not light up at all.</p>	<ul style="list-style-type: none"> • ABS warning light bulb is burnt out. • Open in ABS warning light electrical circuit (check for blown fuse) 	<p>Check, using flow chart A (Refer to P.35-31.)</p>
2	<p>When the ignition key is turned to the "ON" position, it remains lighted.</p>	<ul style="list-style-type: none"> • Fail safe is functioning due to ECU self diagnosis. • Short in ECU warning light drive circuit • Malfunction of ECU 	<p>Check, using flow chart B (Refer to P.35-34.)</p>
3	<p>Does not illuminate when ignition key is in "START" position.</p>	<ul style="list-style-type: none"> • Malfunction of valve relay • Break in harness between ABS warning light and HU • Break in harness between HU and body ground 	<p>Check, using flow chart C (Refer to P.35-36.)</p>

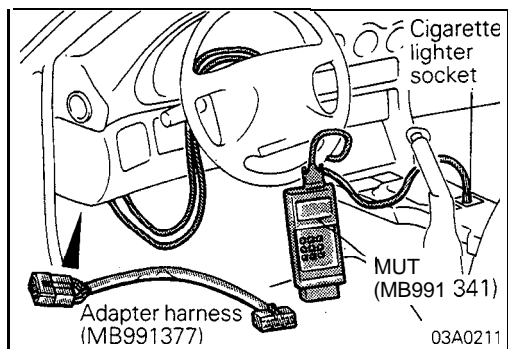
No.	Trouble condition	Major causes	Remedy
4	<p>After the ignition key is turned to the "ON" position, it blinks once and then illuminates when it is turned to the "START" position. When the key is returned to the "ON" position, the light blinks again. (Blinking with the ignition key in the "ON" position is synchronized with operation noise of the valve relay.)</p> <p>ABS warning light ON OFF</p> <p>ST Ignition key ON A.C.C. LOCK</p> <p style="text-align: right;">14A0593</p>	<ul style="list-style-type: none"> • Break in harness for ECU warning light drive circuit • Malfunction of ECU 	<p>Check, using flow chart D (Refer to P.35-37.)</p>

CONTINUED FROM PREVIOUS PAGE



Trouble condition	Major causes	Remedy
One-sided braking Insufficient braking force	<ul style="list-style-type: none"> • Hydraulic line in HU is clogged. • Mechanical lock of HU solenoid valve 	<p>Check HU operation and, if necessary, replace HU. If HU is normal, check structural parts for normal braking.</p>
Decline in ABS function	<ul style="list-style-type: none"> • Hydraulic line in HU is clogged. • Malfunction in HU solenoid valve operation 	<p>Check wheel speed sensor (Refer to P.35-57.) and, if necessary, replace sensor, adjust gap or replace rotor. If tests indicate that there are no mechanical or electrical failures, replace the ECU.</p>
ABS sometimes functions even when there is no sudden braking. (ABS operation vibration is transmitted.)	<ul style="list-style-type: none"> • Insufficient wheel speed sensor output voltage (sensor malfunction, too large a gap between sensor rotor, missing rotor teeth) • Malfunction of ABS ECU 	<p>Check wheel speed sensor (Refer to P.35-57.) and, if necessary, replace sensor, adjust gap or replace rotor. If tests indicate that there are no mechanical or electrical failures, replace the ECU.</p>





CHECK USING SELF DIAGNOSIS FUNCTION

(1) With the ignition switch OFF, connect the MUT through the adapter harness (MB991377), turn the ignition ON and select the ABS system. (The ABS warning light lights up, it goes into the MUT mode. **In the MUT mode, ABS does not function.**)

If it does not go into the MUT mode, check the ECU power circuit and the harness between the ECU and diagnosis check terminals.

(2) Read the diagnosis output codes from the ECU memory.
 (3) Clear the diagnosis codes once from memory. (Refer to P.35-30.)

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 trouble codes cannot be cleared, or when the ABS ECU goes into fail safe during another test drive and trouble codes are output, check according to trouble code check charts (E-I-E-7).

DIAGNOSIS CODE CHART

Diagnosis code		Check chart name or remedy	Reference page	Diagnosis code		Check chart name or remedy	Reference page
No.	MUT display letters			No.	MUT display letters		
11	FR SNSR. OPEN	E-1	P.35-38	41	FR SOL. VALVE	E-5	P.35-42
12	FL SNSR. OPEN			42	FL SOL. VALVE		
13	RR SNSR. OPEN			43	VALVE DRIFT		
14	RL SNSR. OPEN			51	VALVE RELAY	E-6	P.35-43
15	VEH. SPD. SNSR.	E-2	P.35-38	52	MOTOR RELAY	E-7	P.35-44
21	G SNSR.	E-3	P.35-40	55	CONT. UNIT	ECU replacement	-
22	STOP LAMPSW	E-4	P.35-41				

METHOD OF CLEARING DIAGNOSIS CODE MEMORY

Caution

- When servicing is finished, clear the diagnosis code memory

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 MUT.
(No. 7 "DIAG. ERASE" in the actuator test is selected to erase the diagnosis code.)
- (2) After clearing, recheck the diagnosis codes, and check that memory is cleared.

ACTUATOR TEST FUNCTION

The actuator can be forcibly driven in the following way by using the MUT.

NOTE

- The actuator test cannot be carried out when the ABS ECU system is in fail safe mode.
- When using forced drive using the MUT, the vehicle must be stopped.
- During forced drive using the MUT, forced drive operation is stopped, when any wheel speed reaches 10 km/h (6 mph).

Actuator test specifications

No.	MUT 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		

14A0588

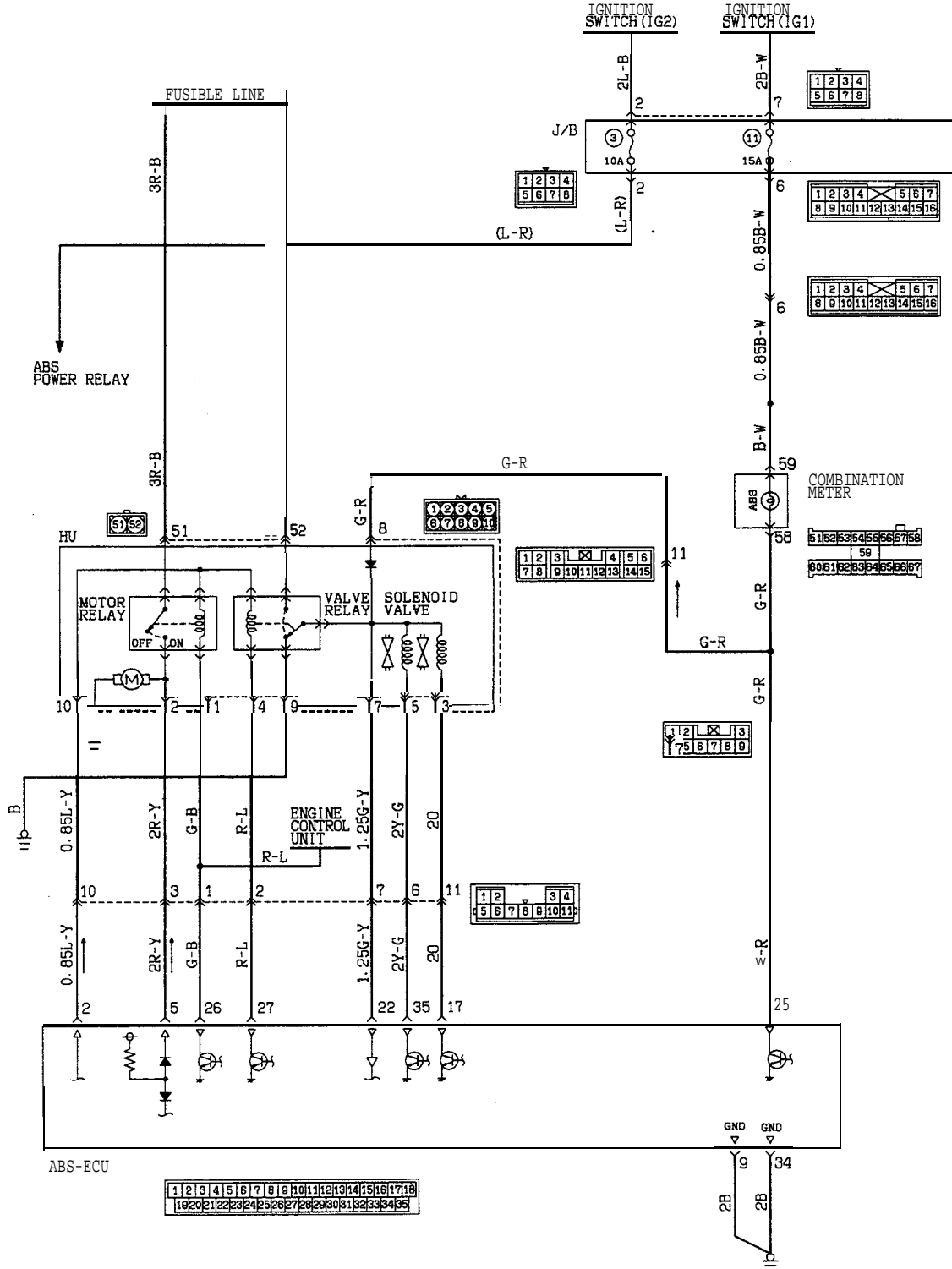
A ABS warning light does not light at all.

[Explanation]

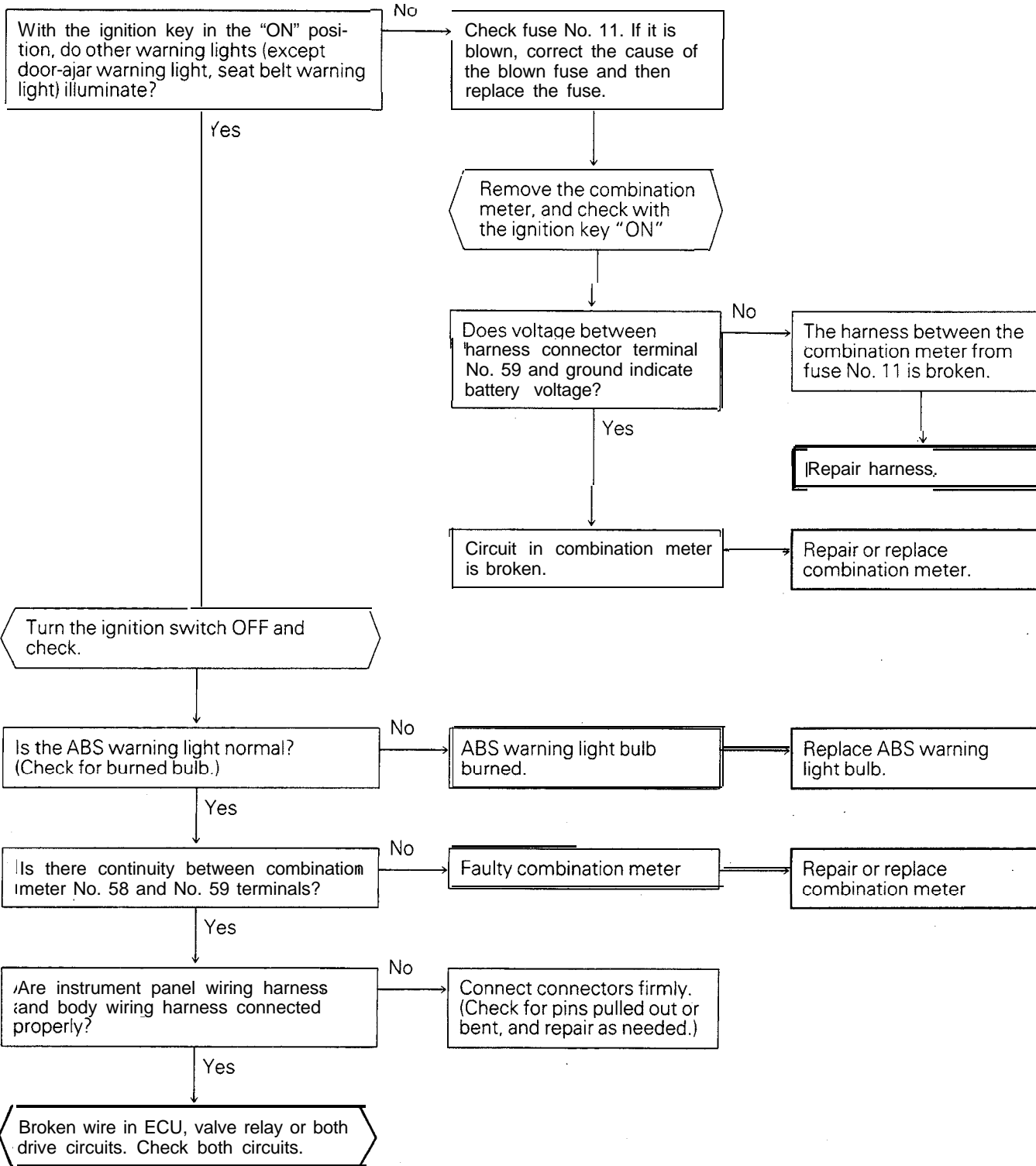
When it does not light up at all, there is a strong possibility that there is trouble with ABS warning light or with power to the light.

[Hint]

If other warning lights do not light up either, fuse is probably blown.



KX35-AK-R3501



Check ABS ECU.

Remove the ECU connector and check.

Does the voltage between ECU harness connector terminal No. 25 and ground indicate battery voltage while the ignition key is in the "ON" position?

No

Broken wire between ABS warning light and ECU

Repair harness.

Yes

ABS ECU malfunction

Replace ABS ECU.

Check valve relay.

Remove valve relay and check.

Is valve relay normal? (Refer to P.35-62.)

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 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.

B ABS warning light stays on when the ignition key is in the "ON" position.

[Explanation]

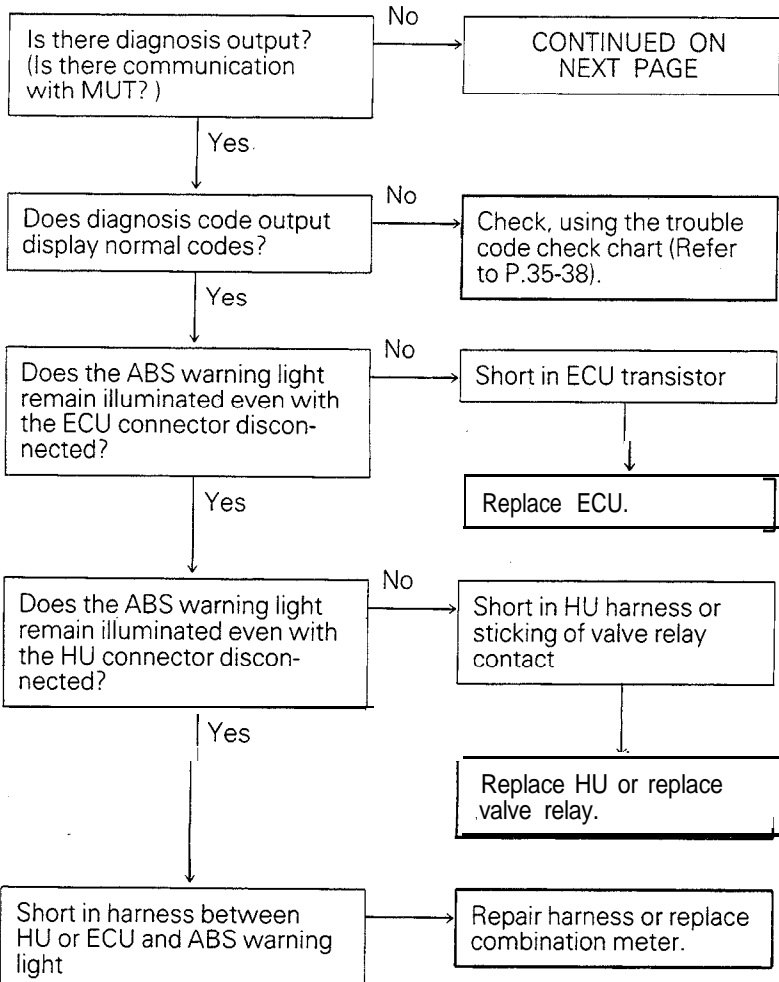
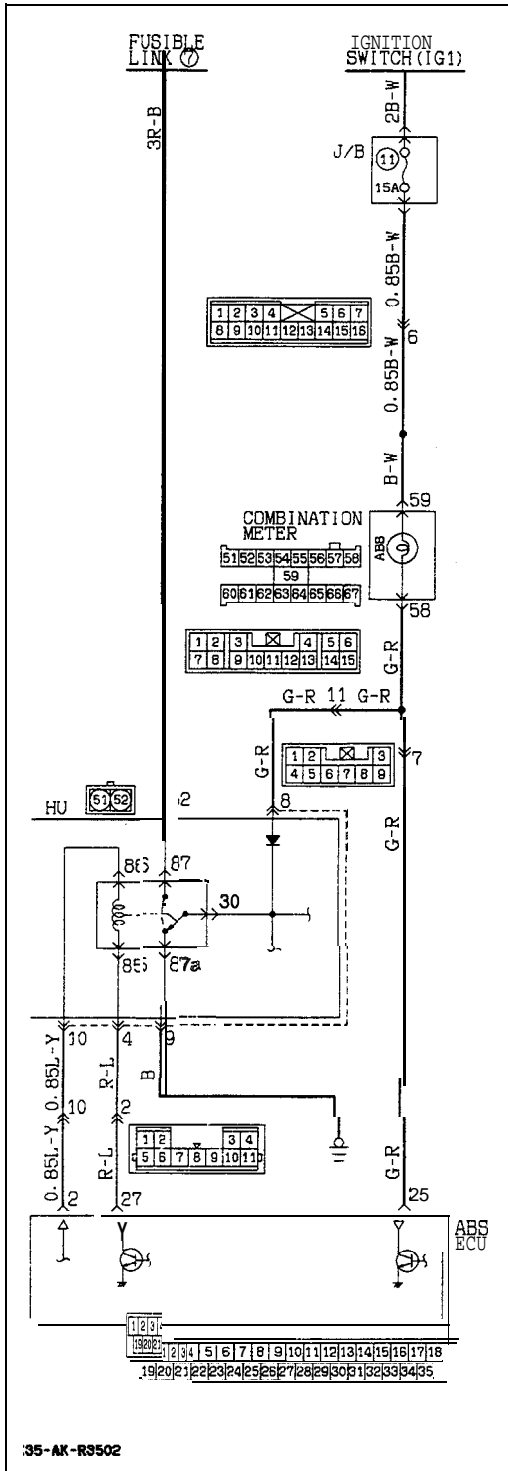
This is the symptom when the ABS ECU does not power up due to broken ECU power circuit, etc., when the fail safe function operates and isolates the system or when the warning light drive circuit is short circuited.

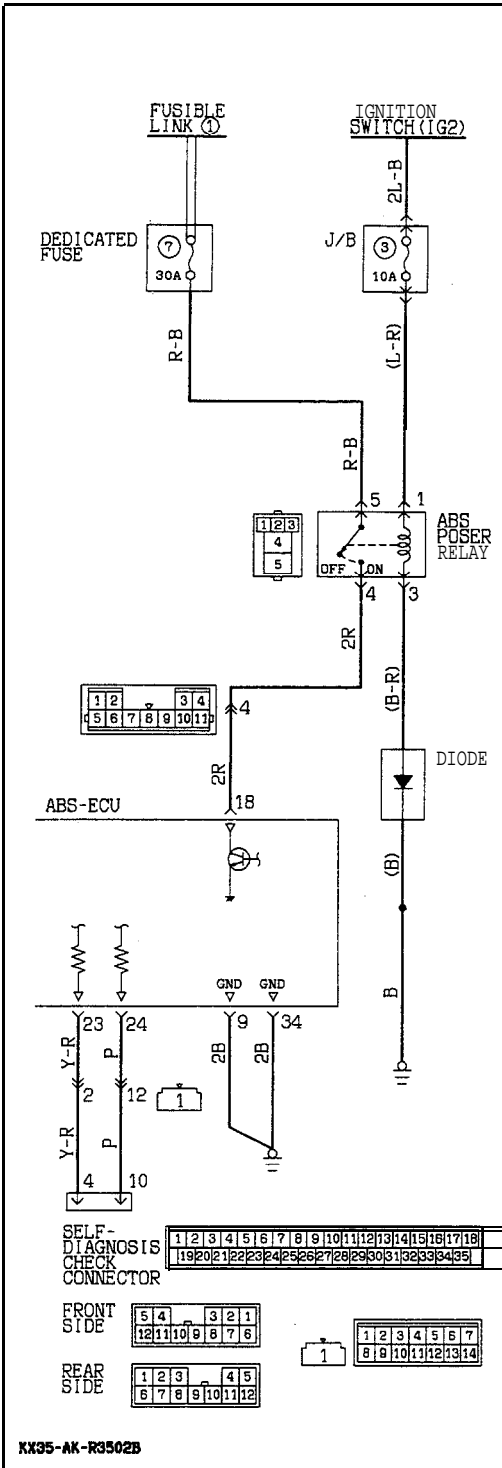
[Hint]

Check the diagnosis output and if there is no output voltage or if the MUT and ABS ECU cannot communicate, there is a good possibility that power is not flowing to the ECU.

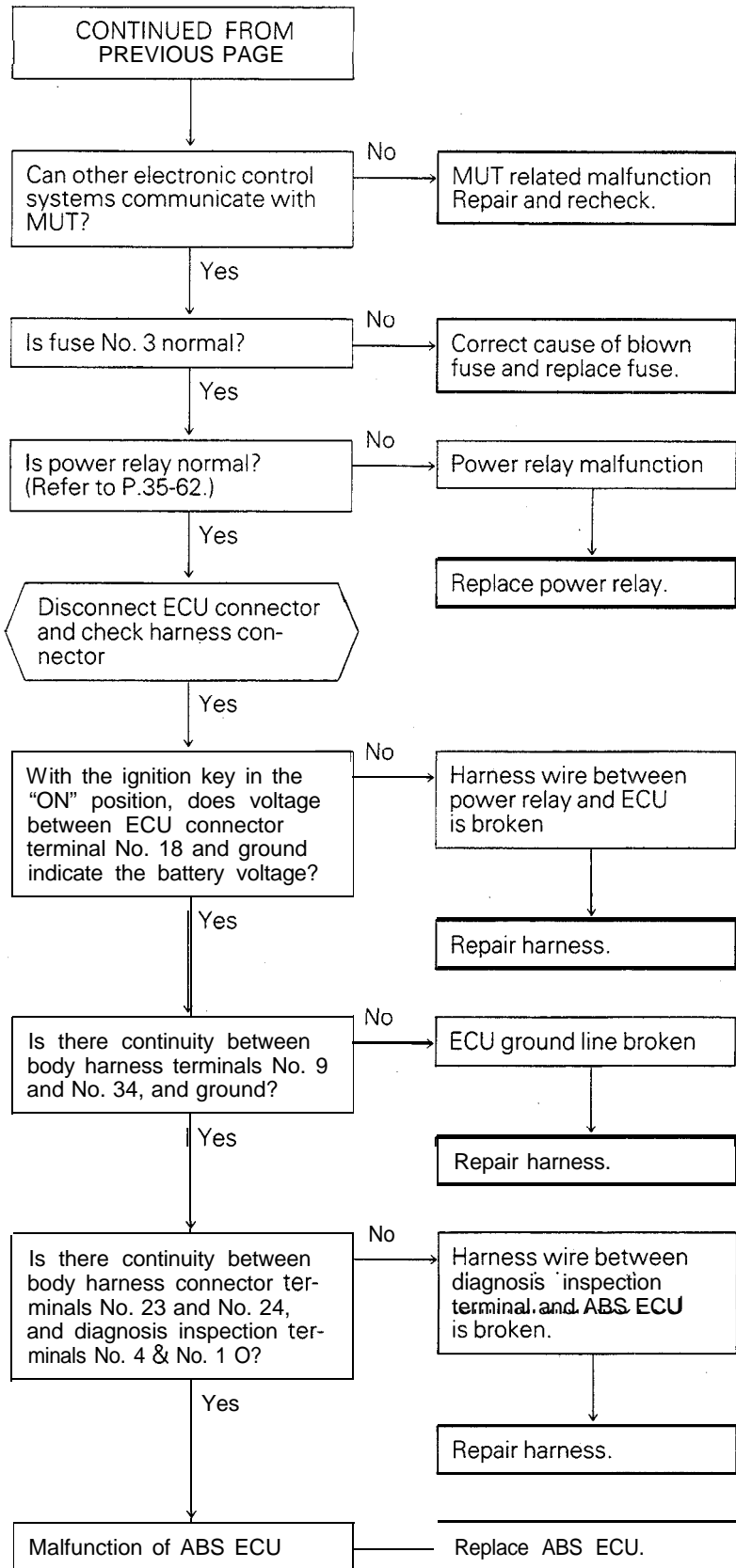
Caution

- If the trouble code is output, the system can be in the fail safe mode. In such a case, erase the trouble code and then restart the engine to check if the system is currently in a fault condition.





KX35-AK-R3502B

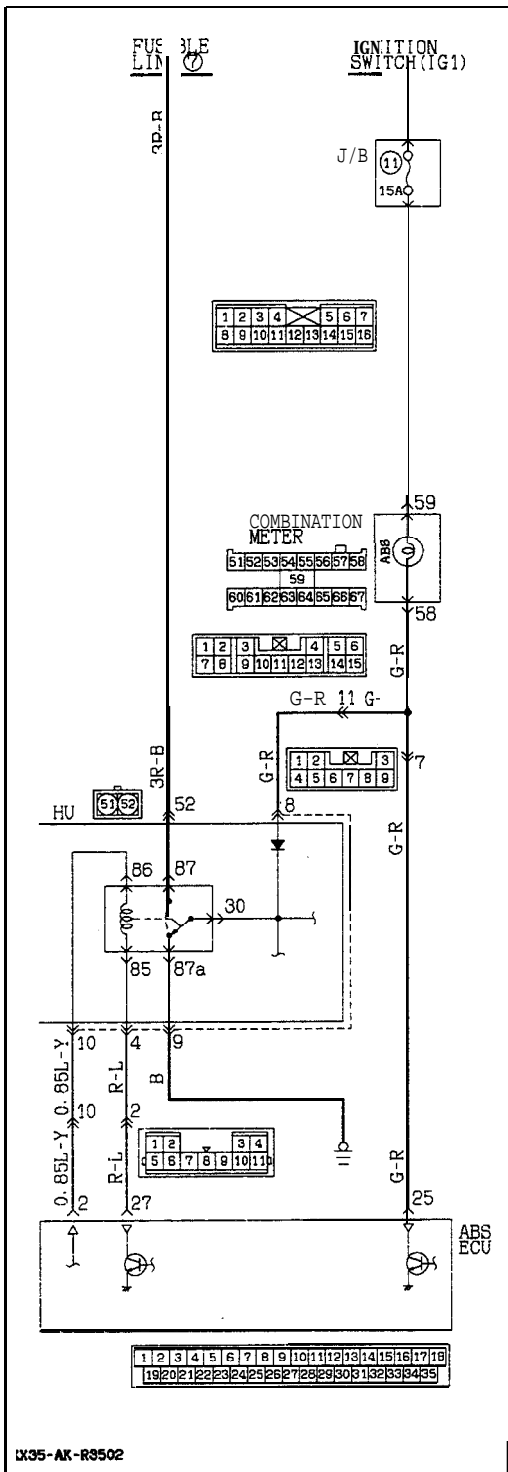


C ABS warning light does not illuminate when the ignition key is in the "START" position.

[Explanation]

The ABS ECU uses the IG₂ power source which is turned off in the "START" position. The ABS warning light uses the IG₁ 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.



```

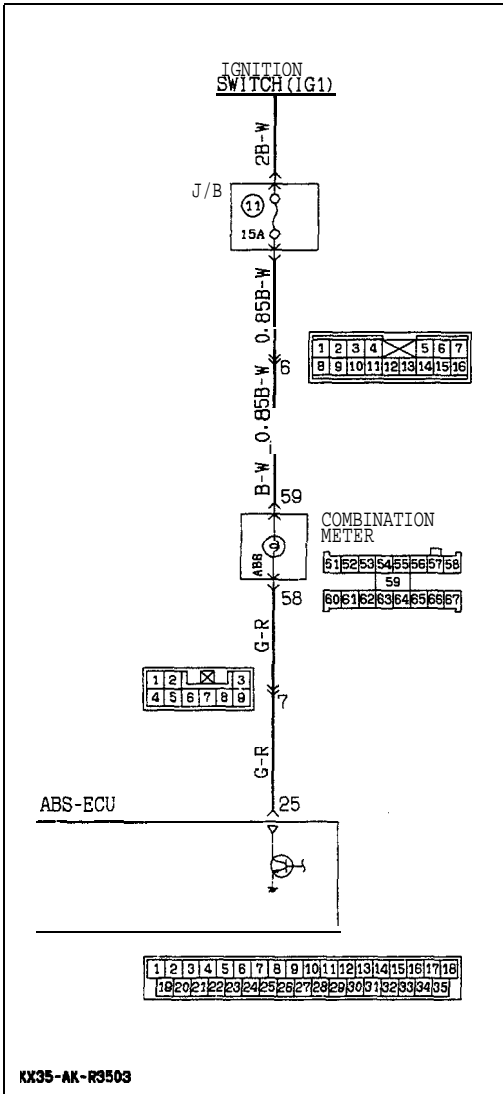
    graph TD
        Start([Remove the hydraulic unit (HU) connector and check.]) --> Q1{Is there continuity between body connector terminal No. 9 and ground?}
        Q1 -- No --> A1[Broken line between HU and body ground]
        Q1 -- Yes --> Q2{Is there continuity between HU connector terminal No. 8 and terminal No. 9?}
        Q2 -- No --> A2[Valve relay malfunction or break in HU harness wire]
        Q2 -- Yes --> Q3{Remove the valve relay. Is there continuity between terminal No. 87a and No. 30?}
        Q3 -- No --> A3[Valve relay malfunction]
        Q3 -- Yes --> A4[Replace valve relay.]
        A3 --> A4
        A4 --> A5[Replace HU.]
    
```

NOTE
When performing the check marked *, note polarity of the diode (refer to the circuit diagram).

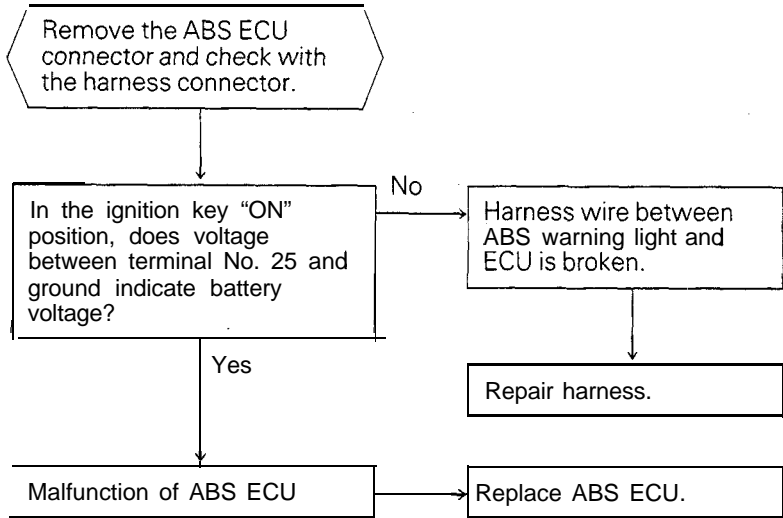
D ABS warning light blinks once after the ignition key is turned to the “ON” position. It illuminates in the “START” position and blinks once again when turned to the “ON” position.

[Explanation]

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.



KX35-AK-R3503



E-1 When the following diagnosis codes are displayed “11 FR SNSR. OPEN”
 “12 FL SNSR. OPEN” “13 RR SNSR. OPEN” “14 RL 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 diagnosis 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]

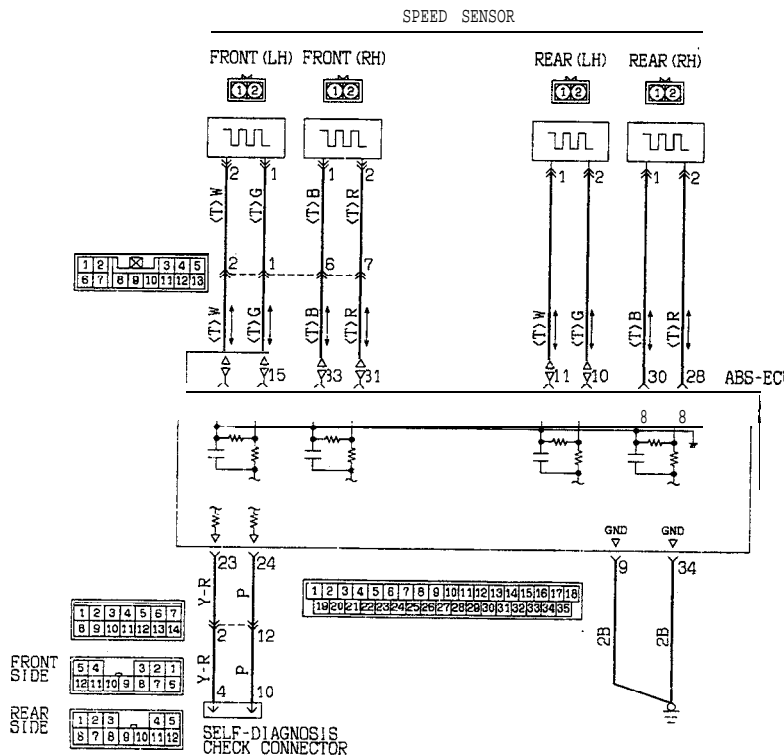
The following can be considered as the cause of the wheel speed sensor output abnormality.

- 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 diagnosis code and turn the ignition switch to OFF once, and then test-drive again.
 If the same 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.)



KX35-AK-R3504

TSB Revision

Check flow connected with wheel speed sensor

NOTE

Check speed sensor harness and connector connection and then observe with oscilloscope. (Refer to P.35-57.)

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

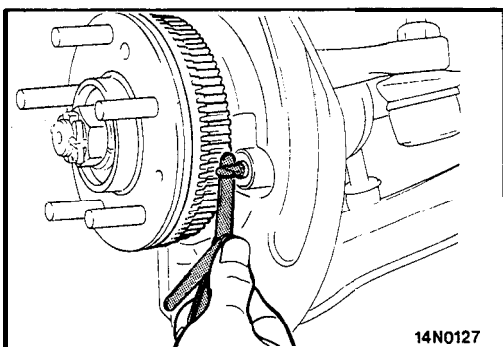
Is the resistance value at the ECU connector normal?
Standard value: 0.8 – 1.2 kΩ

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.35-57.) Is the output voltage for each wheel speed sensor over the standard value and is the waveform normal?

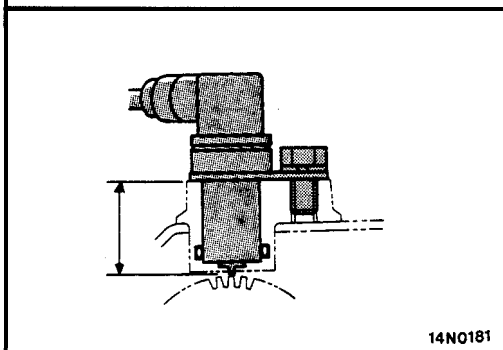
No

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 trouble code reoccurs often.

Replace the ABS ECU and check that the trouble code does not reoccur.

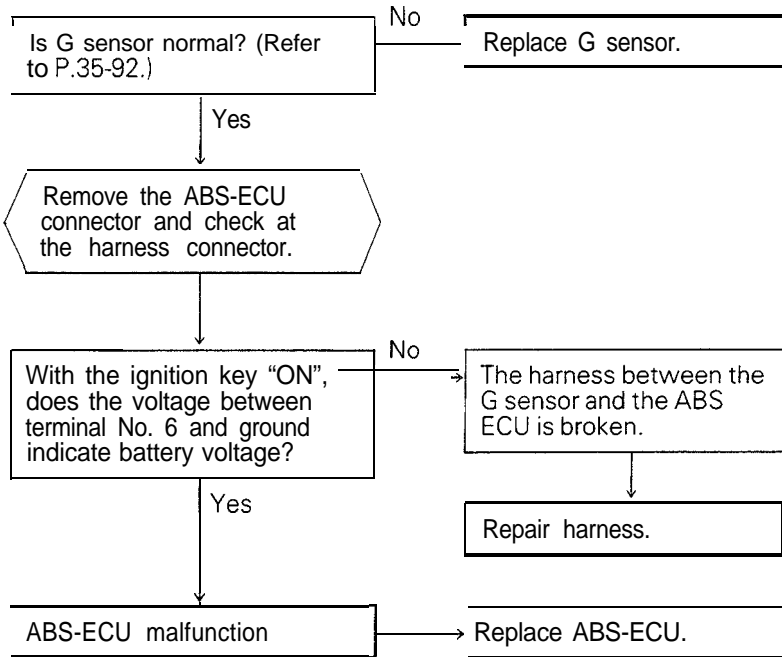
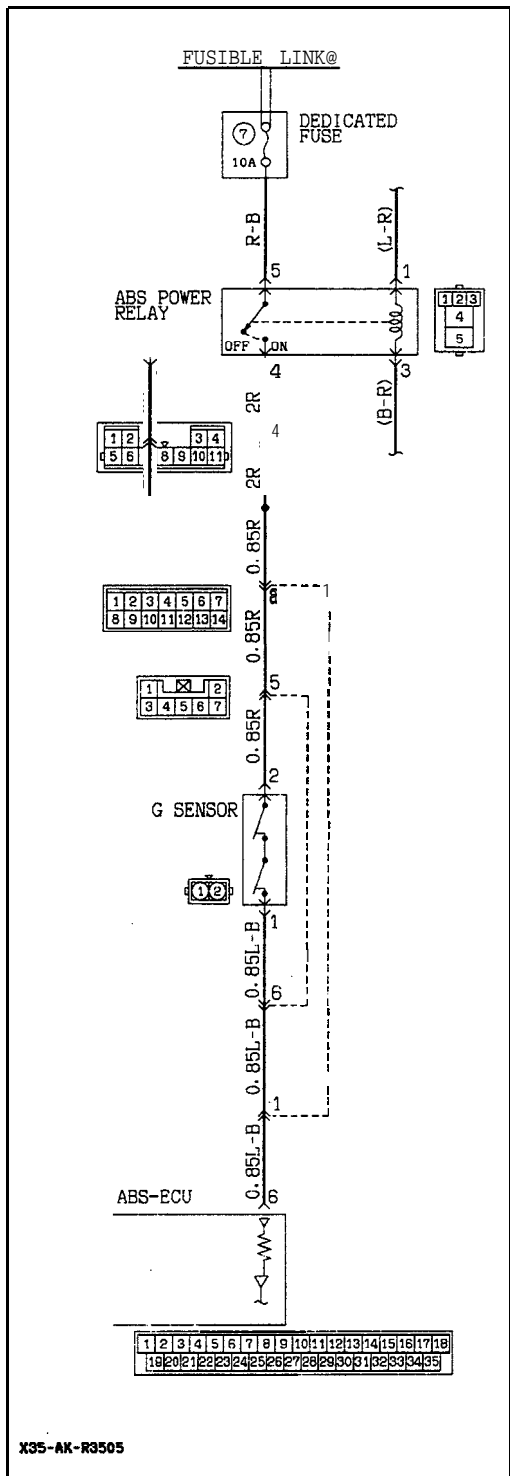


E-3 When diagnosis code "21 G SNSR." is displayed

[Explanation]

The ABS-ECU outputs this 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.



E-4 When diagnosis code "22 STOP LAMP SW" is displayed

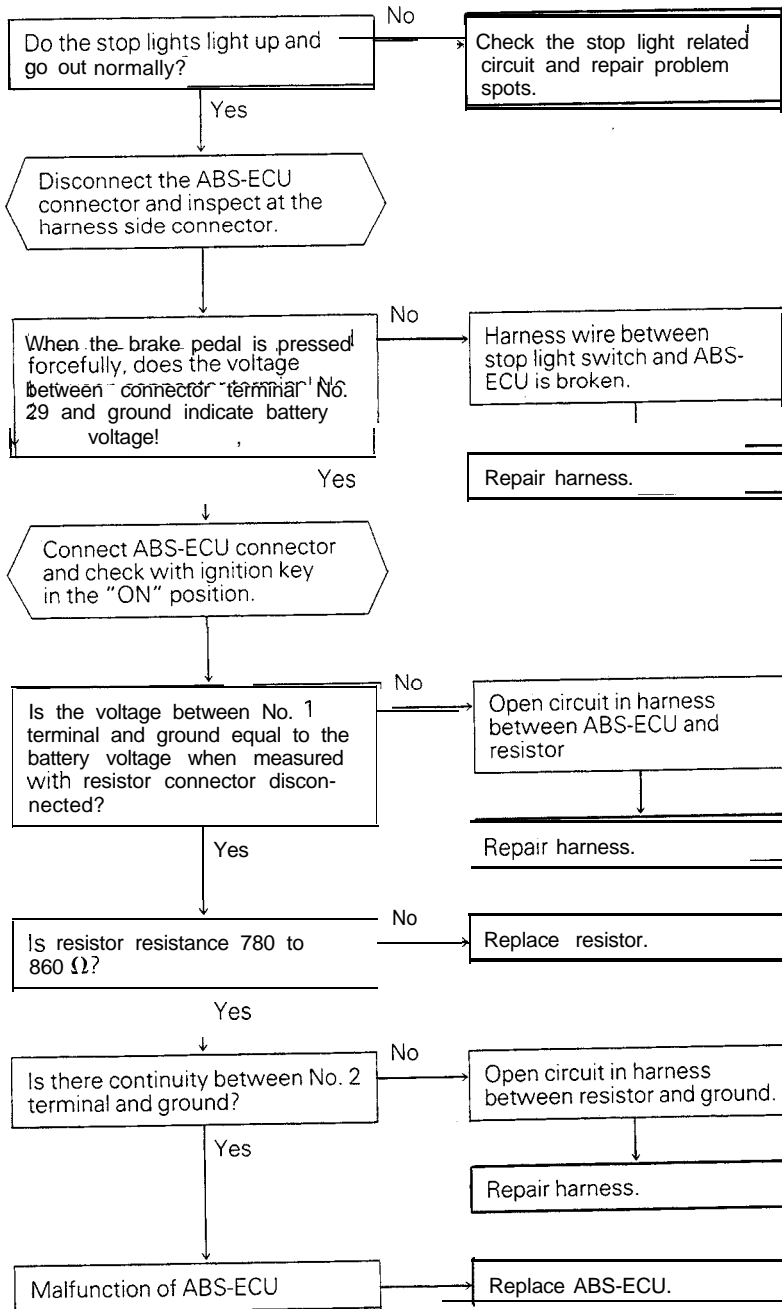
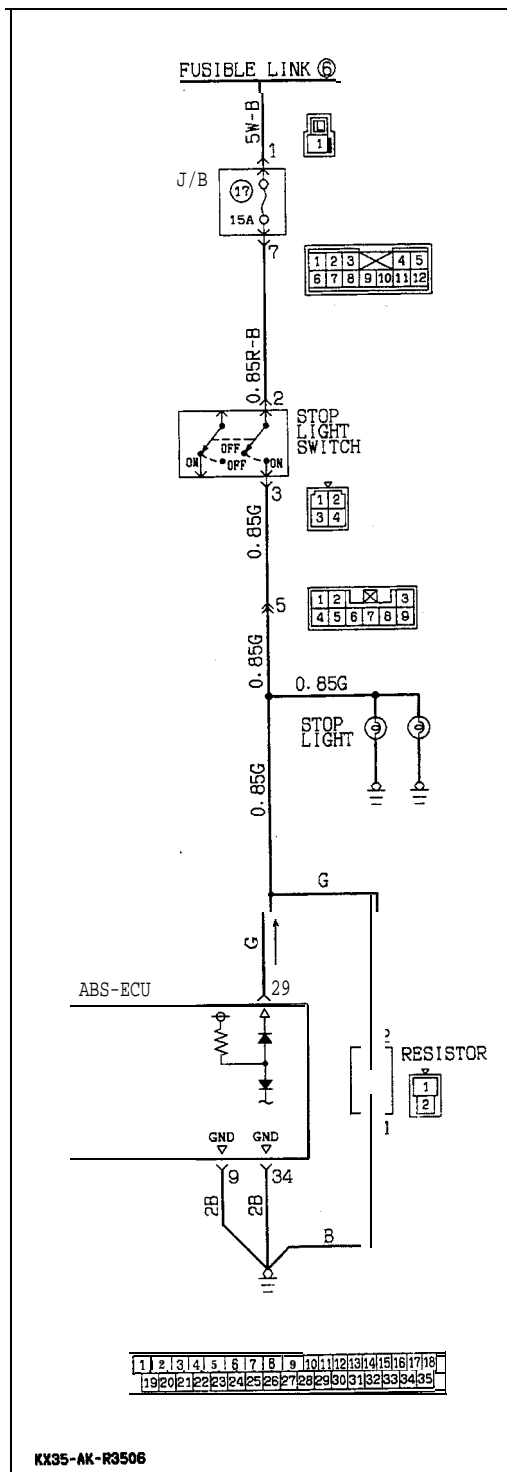
[Explanation]

The ABS-ECU outputs this 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.



E-5 When diagnosis codes “41 FR SOL. VALVE”, “42 FL SOL. VALVE” or “43 VALVE DRIFT” are displayed.

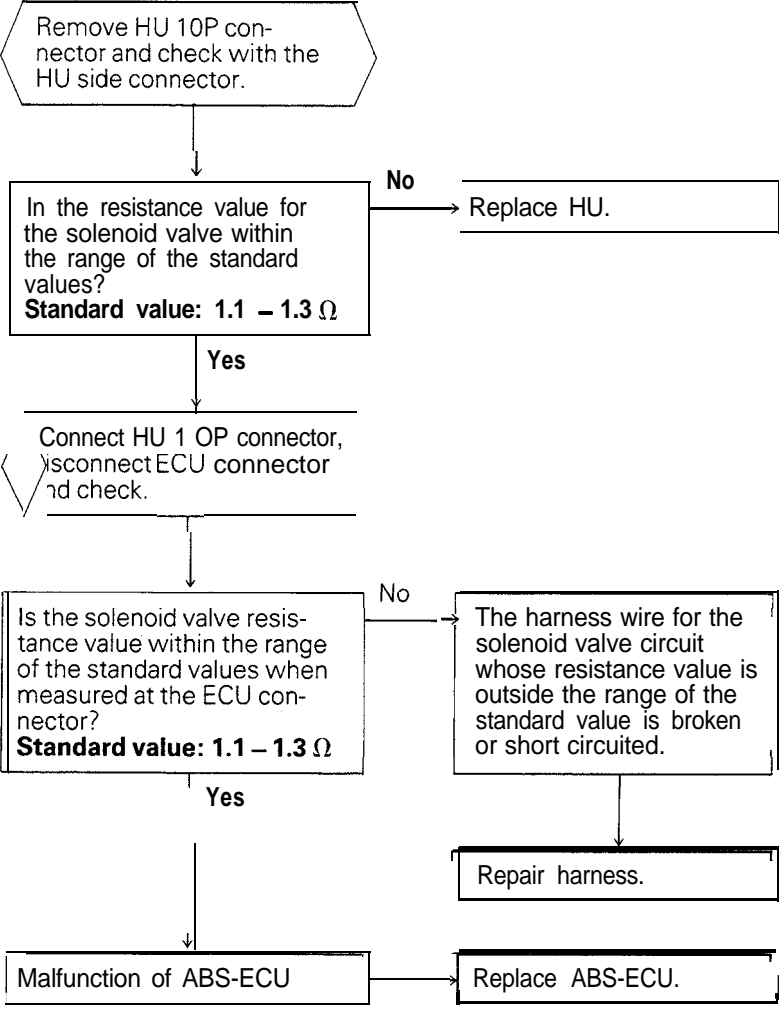
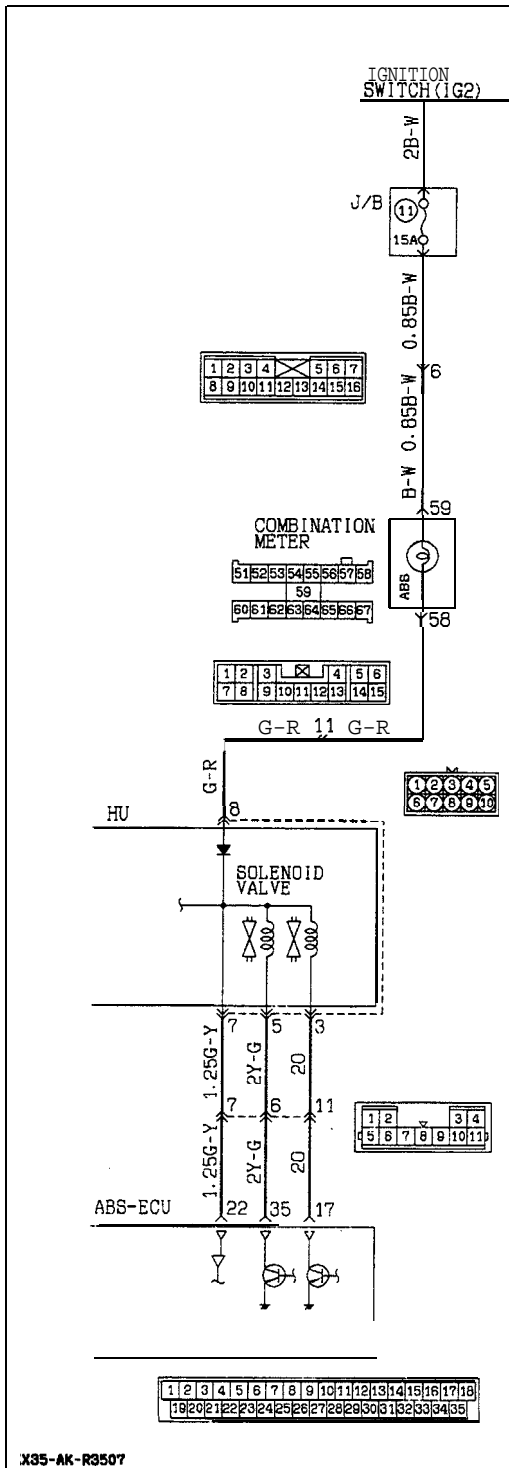
[Explanation]

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 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.



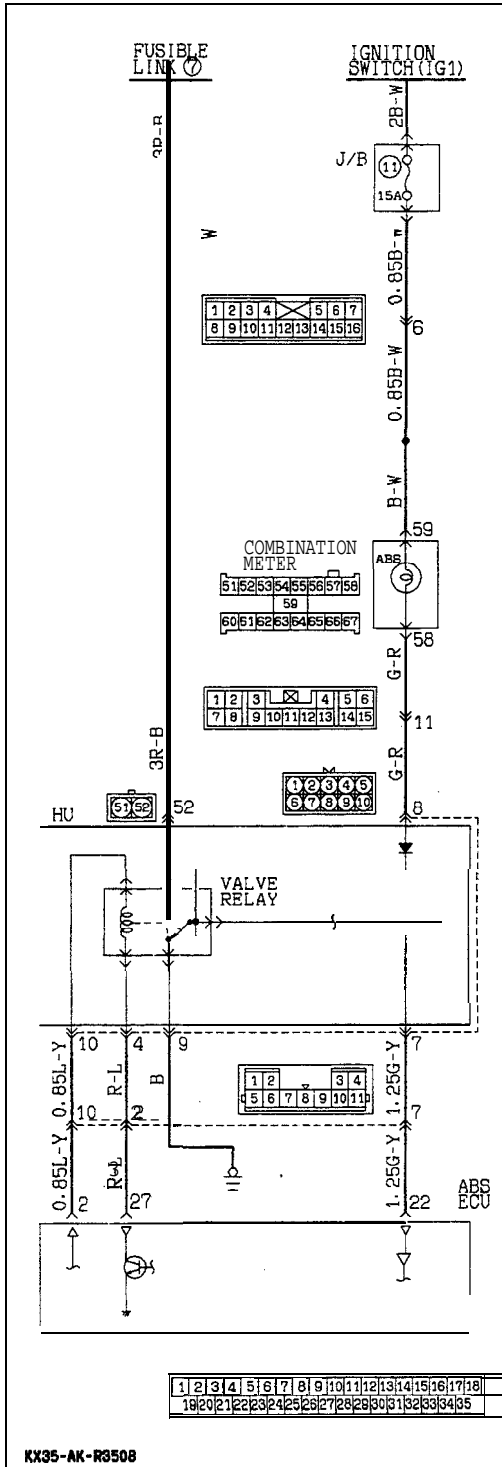
X35-AK-R3507

E-6 When diagnosis 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 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 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

Valve relay malfunction
 Replace valve relay.

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 voltage?

HU power harness wire is broken.
 Repair harness.

Is there continuity between HU No. 8 and No. 7 terminals?

Faulty harness in HU
 Repair harness or replace HU

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?

Malfunction of harness between HU and ECU
 Repair harness.

With the ignition key “ON”, does the voltage between the connector terminal No. 22 and ground indicate battery voltage?

Malfunction of harness between HU and ABS ECU
 Repair harness.

ABS ECU malfunction
 Replace ABS ECU.

KX35-AK-R3508

TSB Revision

E-7 When diagnosis code "52 MOTOR RELAY" is displayed

[Explanation]

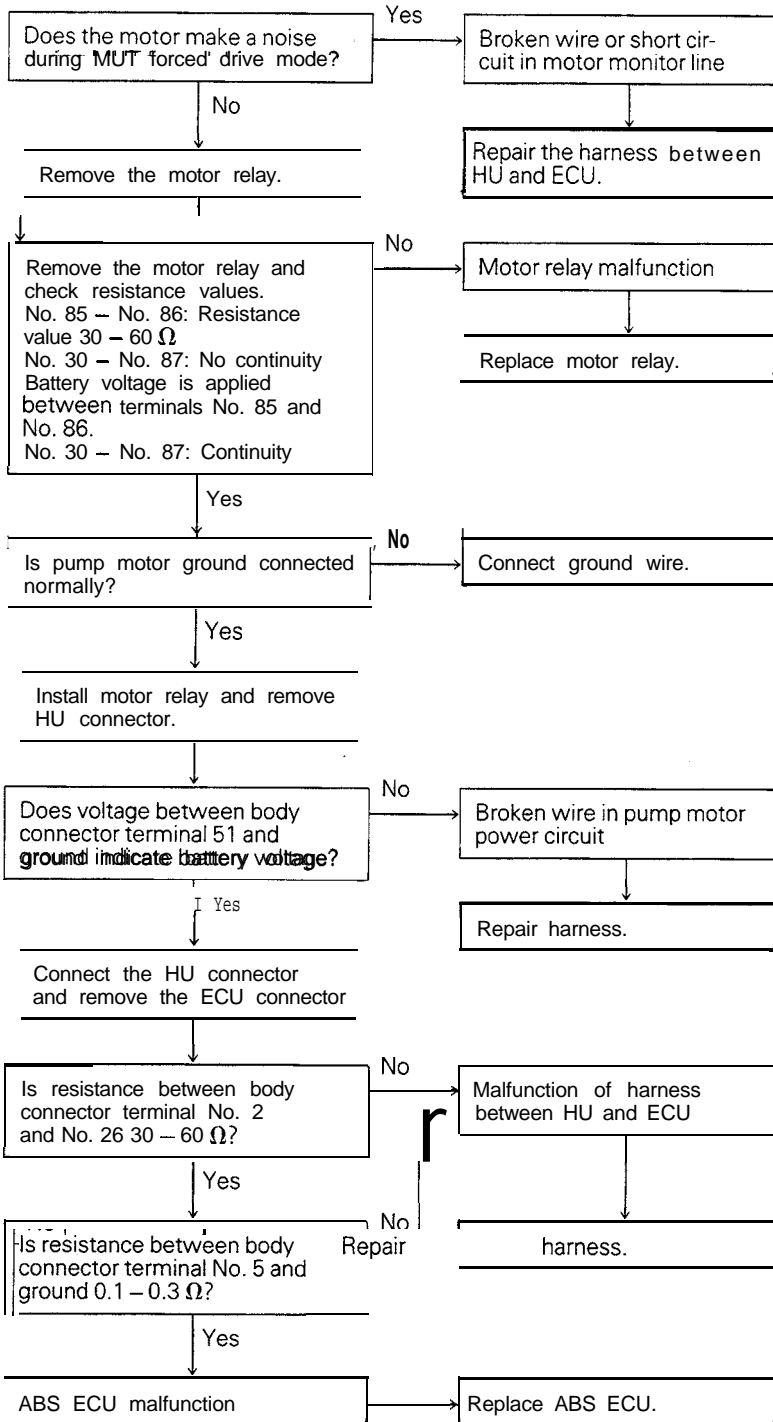
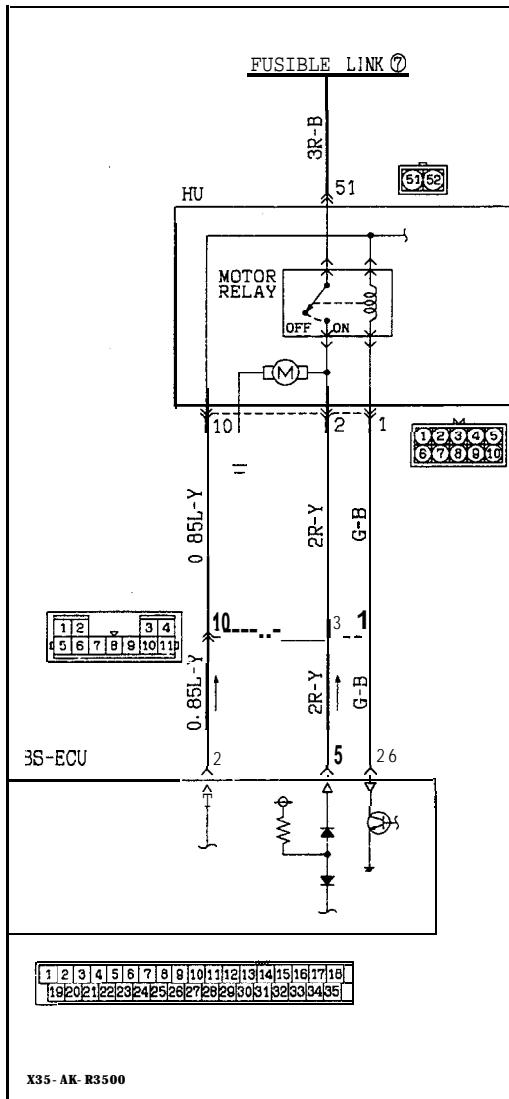
The ABS ECU outputs this trouble code for the motor relay and motor in the following cases.

- 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 MUT forced drive mode, there is a broken or short circuited motor monitor wire.



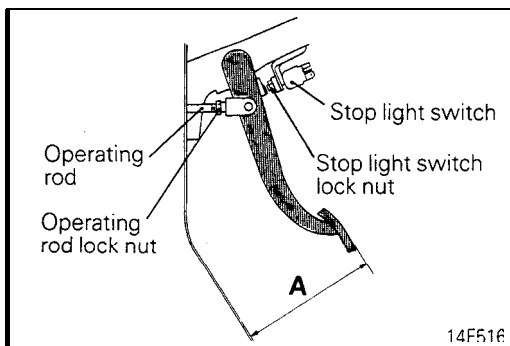
SERVICE ADJUSTMENT PROCEDURES

M35FAAN

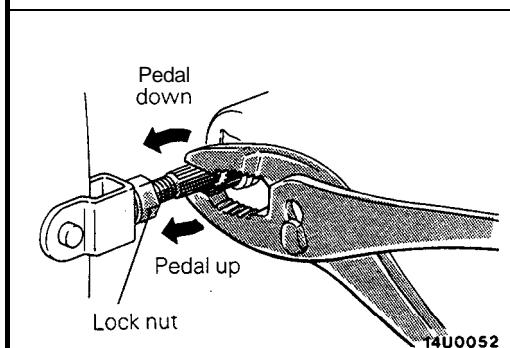
BRAKE PEDAL INSPECTION AND ADJUSTMENT

1. Measure the brake pedal height as illustrated. If the brake pedal height is not within the standard value, adjust as follows.

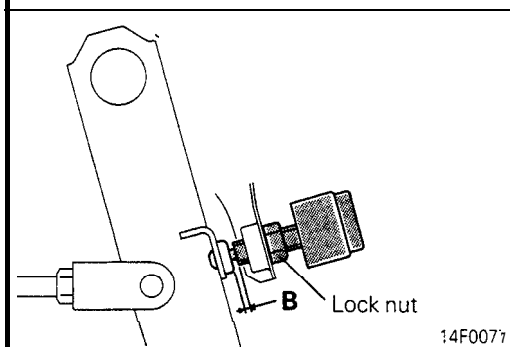
Standard value (A): 177 – 182 mm (7.0 – 7.2 in.)



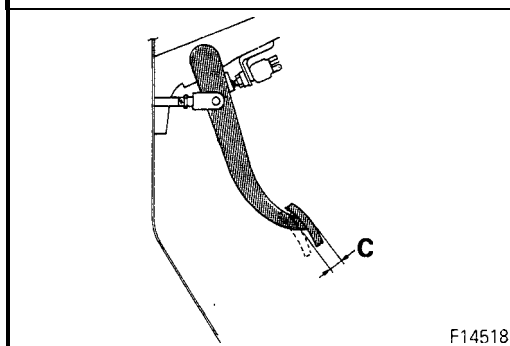
14F516



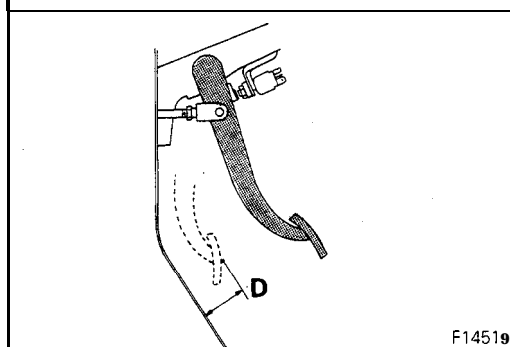
14U0052



14F0077



F14518



F14519

- (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) After screwing in the stop light switch until it contacts the brake pedal stopper (just before the brake pedal is caused to move), return 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 unpressed.

Reference value (B): 0.5 – 1.0 mm (.02 – .04 in.)

2. On vehicles with automatic transaxle, check the shift-lock mechanism. (Refer to GROUP 23 – Transaxle Control.)

3. With the engine stopped, depress 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 resistance is met (the free play) is within the standard value range.

Standard value (C): 3 – 8 mm (.1 – .3 in.)

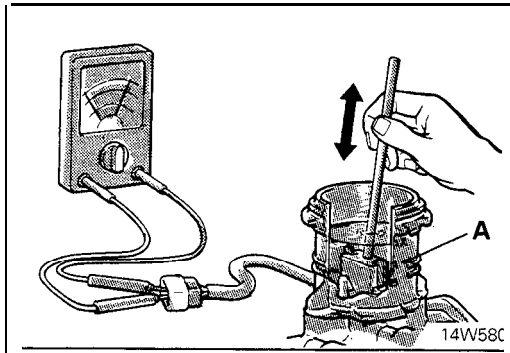
If the free play is less than the standard value, confirm that the clearance between the stop light switch and brake pedal is within the standard value.

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.

4. 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.

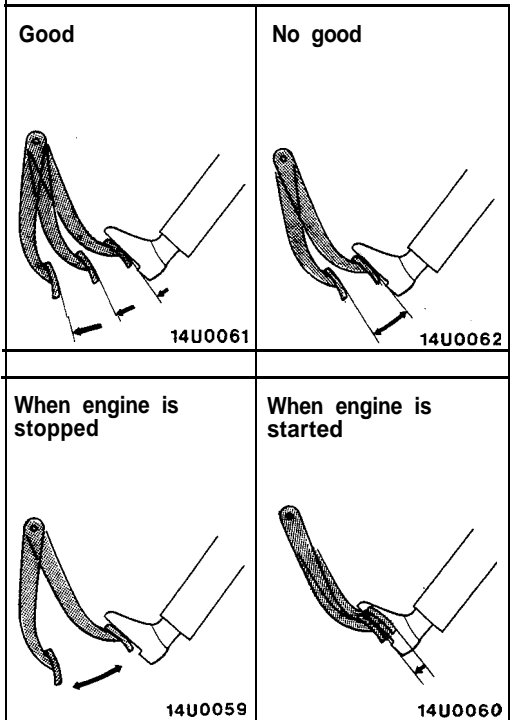
Standard value (D): 80 mm (3.1 in.) or more

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.

**BRAKE FLUID LEVEL SENSOR CHECK**

M35FBAF

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 INSPECTION**

M35FCAO

For simple checking of brake booster operation, carry out the following tests.

1. Run the engine for one or two minutes, and then stop it.
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.

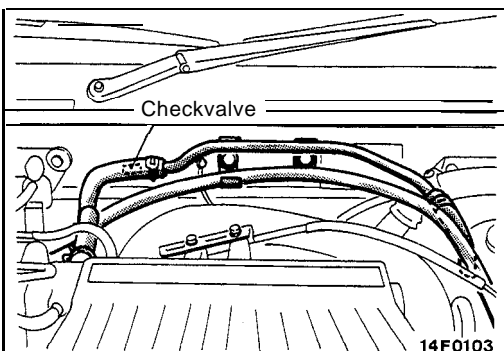
If the pedal moves downward slightly, the booster is in good condition. If there is no change, the booster is faulty.

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 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**

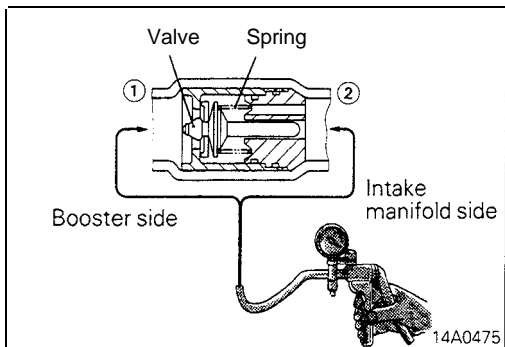
M35FNAL

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.

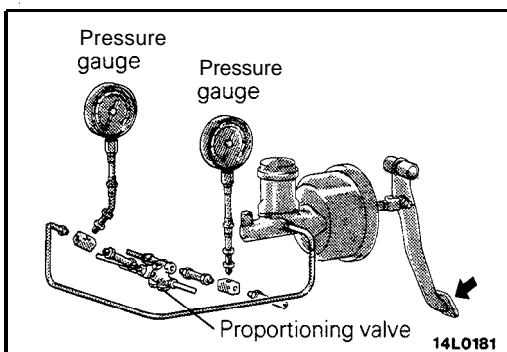


2. Check the operation of the check valve by using a vacuum pump.

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

M35FKAK

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: 3.75 – 4.25 MPa (533 -- 604 psi)

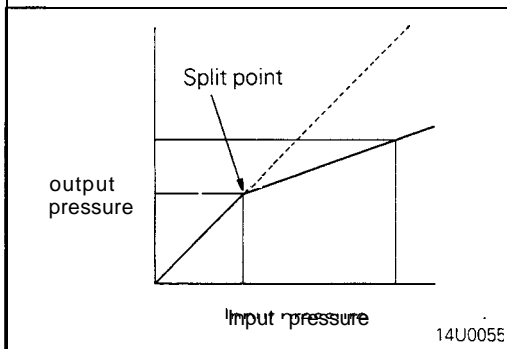
(2) Output fluid pressure when input fluid pressure is 8.0 MPa (1,138 psi)

Standard value: 5.23 – 5.73 MPa (744 -- 815 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 the permissible ranges, replace the proportioning valve.



BLEEDING

M35FYAO

Caution

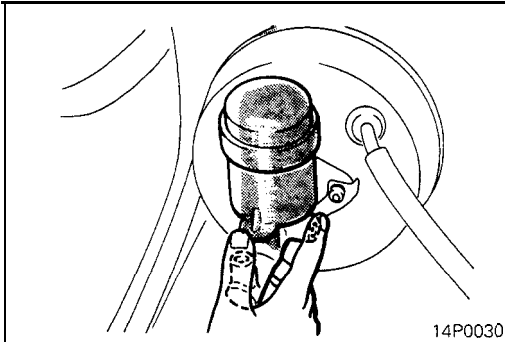
Use the specified brake fluid. Avoid using a mixture of the specified brake fluid and other fluid.

Specified brake fluid: Conforming to DOT3

BLEEDING THE MASTER CYLINDER

If the master cylinder is empty of brake fluid, bleed the cylinder as follows.

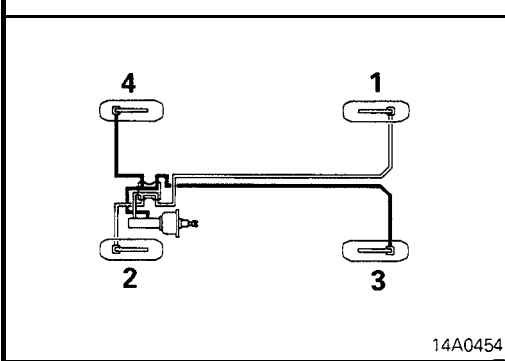
- (1) Fill the reserve tank with brake fluid.
- (2) Depress and hold the brake pedal.
- (3) Let your fellow worker plug the master cylinder outlet with finger.
- (4) Keeping the condition (3), release the brake pedal.
- (5) Repeat steps (2) to (4) three to four times while filling the master cylinder with brake fluid.

**BLEEDING THE BRAKE PIPE LINE**

Bleed the brake pipe line with the engine running in the order shown in the illustration.

Caution

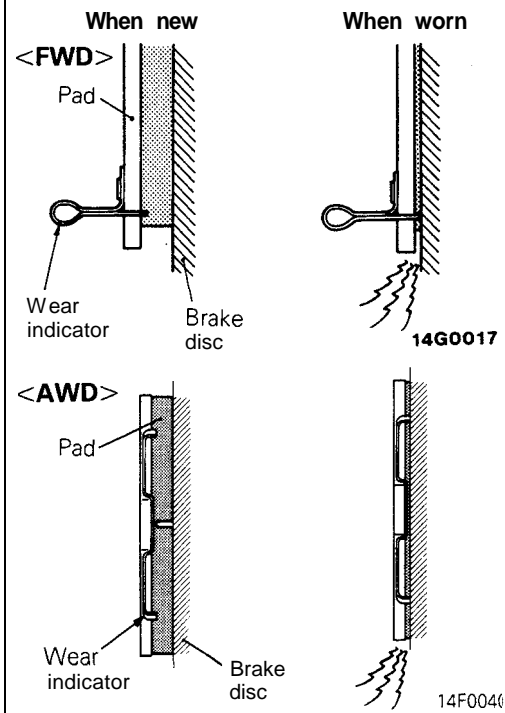
When adding brake fluid on vehicles with ABS, be sure to fit the filter to the reserve tank.

**FRONT DISC BRAKE PAD CHECK AND REPLACEMENT**

M35FQAG

NOTE

The brake pads have wear indicators that contact the brake disc when the brake pad thickness becomes 2 mm (.079 in.), and emit a squealing sound to warn the driver.



<FWD>

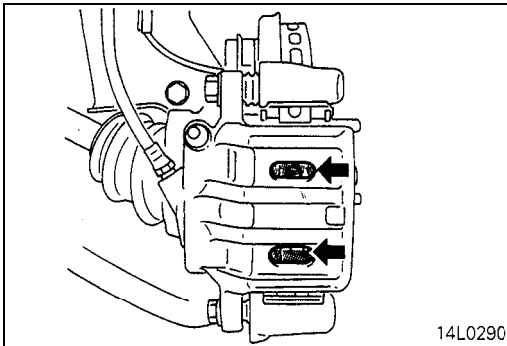
1. Visually check the brake pad thickness through the inspection hole in the caliper body.

Standard value: 10.0 mm (.39 in.)

Limit: 2.0 mm (.08 in.)

Caution

Replace the pad if worn beyond the limit. At this time, replace the pads on right and left wheels as a set.

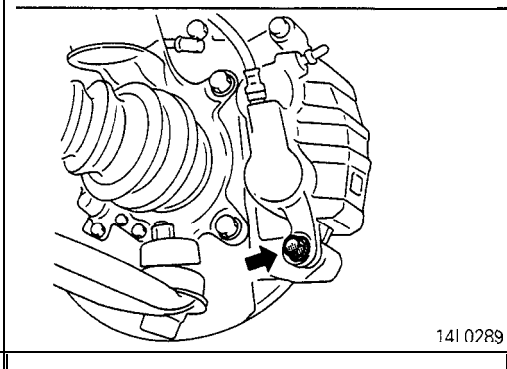


14L0290

2. Remove the guide pin, raise the caliper assembly, and support it with a wire, etc.

Caution

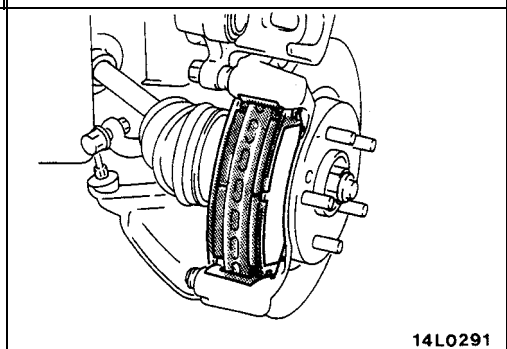
The guide pin has been coated with special grease. Do not wipe off the special grease on the lock pin, and do not contaminate the lock pin.



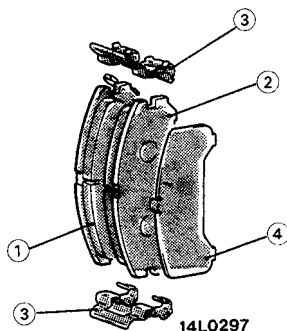
141 0289

3. Remove the following parts from the caliper support.

- ① Pad and wear indicator assembly
- ② Pad assembly
- ③ Clip
- ④ Outer shim



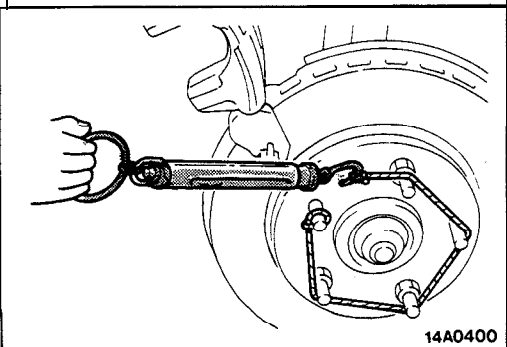
14L0291



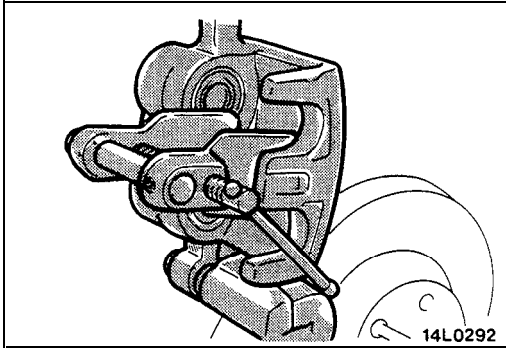
14L0297

141029

4. Measure the rotating torque of the hub with the pads removed to determine brake drag torque after pads are installed.
5. Install the pad clips to the caliper support in position.



14A0400



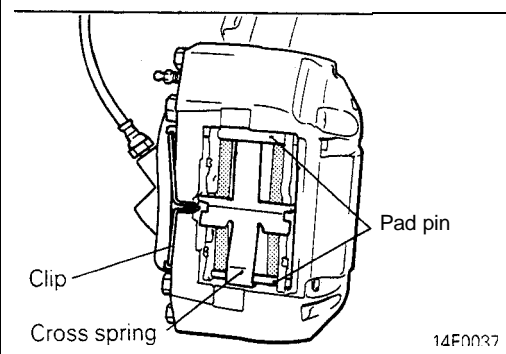
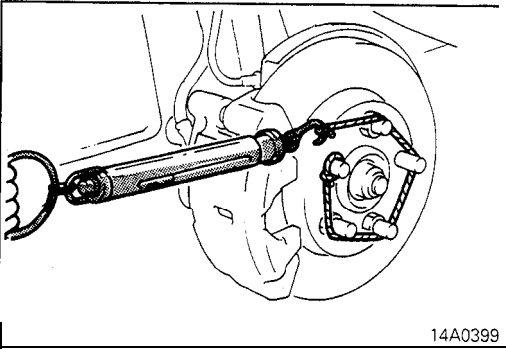
6. Clean the piston and, using the special tool, push the piston into the cylinder.
7. With care not to allow the piston boot to be wedged, lower the caliper assembly and fit the lock pin.
8. Using the following procedure, check the brake drag torque.

- ① Start the engine and depress and hold the brake pedal for five seconds.
- ② Stop the engine. (Approx. 200 N [44 lbs.])
- ③ Rotate the brake disc ten turns in the forward direction.

- ④ Using a spring balance, check the brake drag force.

9. If the difference between the brake drag force and hub rotating force exceeds the standard value, disassemble the piston and check the piston sliding surfaces for dirt and rust, piston seal for deterioration, and lock pin and guide pin for sliding motion.

Standard value: 70 N (15.4 lbs.) [4 Nm (3 ft.lbs.)] or less



<AWD>

1. Visually check the brake pad' thickness. Through the opening in the caliper body.

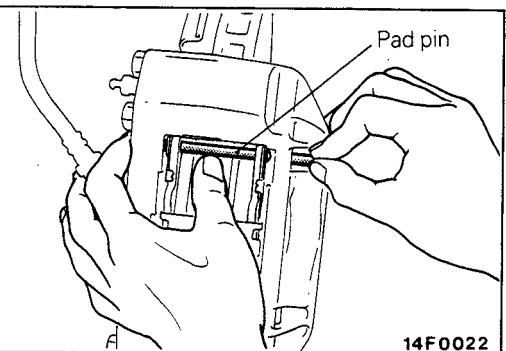
Standard value: 10.0 mm (.39 in.)

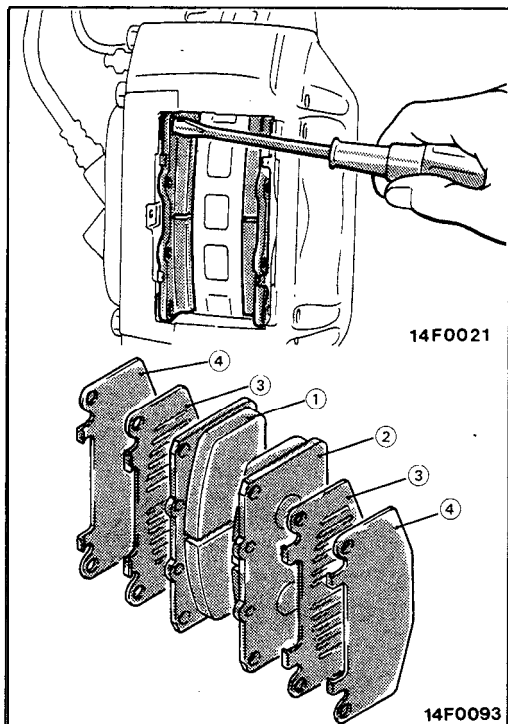
Limit: 2.0 mm (.08 in.)

Caution

Replace the pad if worn beyond the limit. At this time, replace the pads on right and left wheels as a set.

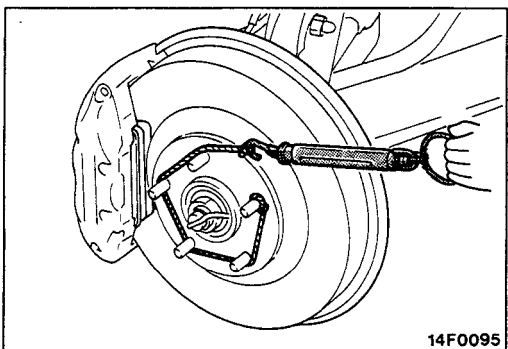
2. Remove the clip and, holding the cross spring with hand, remove the pad pins.



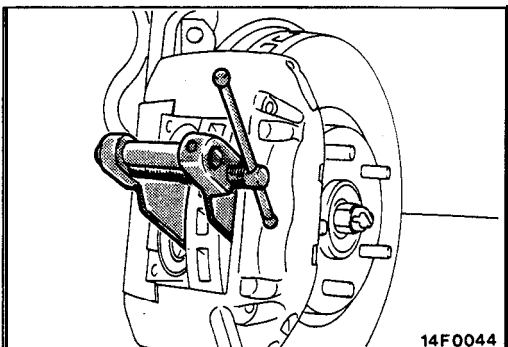


3. Using a screwdriver, remove the pads and shims.

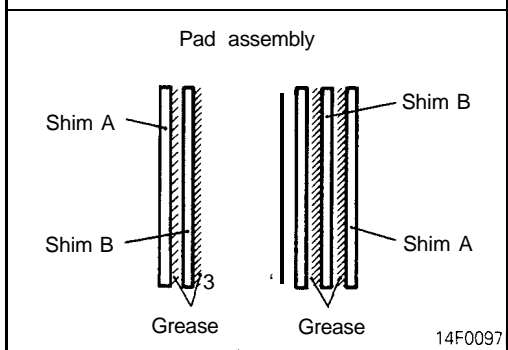
- ① Inner pad (with wear indicator)
- ② Outer pad
- ③ Shim B
- ④ Shim A



4. Measure the rotating torque of the hub with the pads removed to determine brake drag torque after pads are installed.



5. Clean the piston and then push the piston into the cylinder.

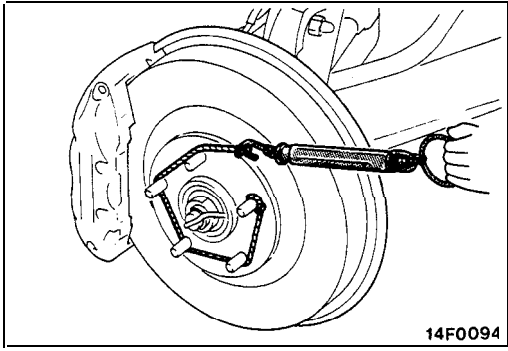


6. Apply repair kit grease to both sides of the inner shims.

**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.



14F0094

7. Using the following procedure, check the brake drag torque.
 - ① Start the engine and depress and hold the brake pedal for five seconds. [Approx. 200 N (44 lbs.)]
 - ② Stop the engine.
 - ③ Rotate the brake disc ten turns in the forward direction.
 - ④ Using a spring balance, check the brake drag force.
8. If the difference between the brake drag force and hub rotating force exceeds the standard value, disassemble the piston and check the piston sliding surfaces for dirt and rust, piston seal for deterioration, and lock pin and guide pin for sliding motion.

Standard value: 70 N (15.4 lbs.) [4 Nm (3 ft.lbs.)] or less

INSPECTION OF FRONT BRAKE DISC THICKNESS

M35FRAF

1. Remove dirt and rust off the surface of the brake disc.
2. Measure the thickness of disc at four or more places of the pad contacting surface.

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.)

3. If the wear exceeds the limit even at one place, replace the right and left discs and brake pads as a set.

FRONT BRAKE DISC RUN-OUT CHECK

M35FSAF

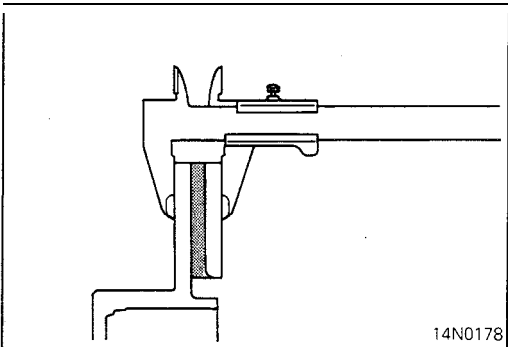
1. Remove the front brake assembly; and support it with a wire, etc.

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.

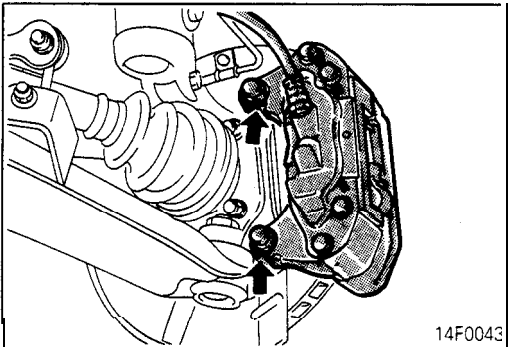
Limit: 0.10 mm (.004 in.) or less

NOTE

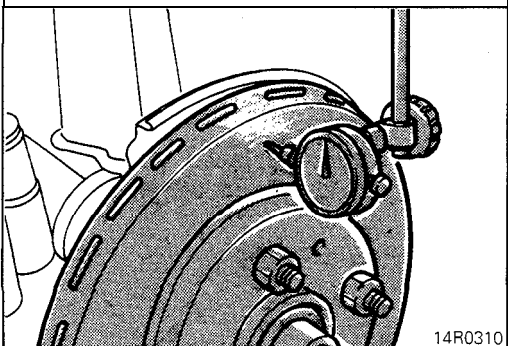
Secure the disc to the hub with wheel nuts.



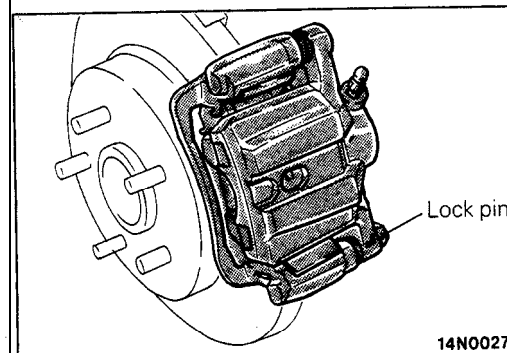
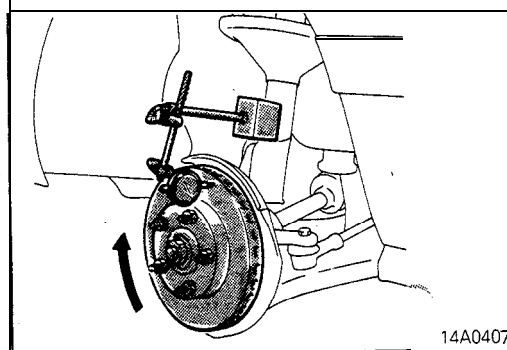
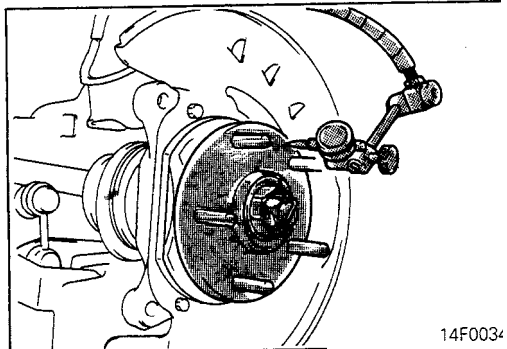
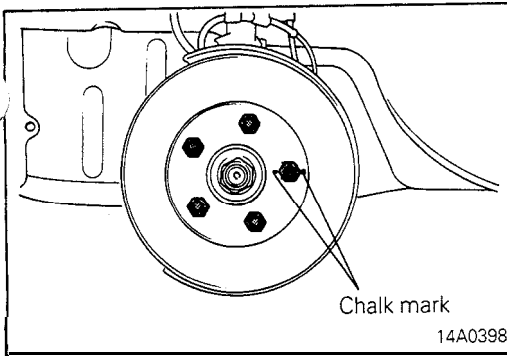
14N0178



14F0043



14R0310



FRONT BRAKE DISC RUN-OUT CORRECTION

M35FTAC

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.

REAR DISC BRAKE PAD CHECK AND REPLACEMENT

M35FUAЕ

1. Check brake pad thickness through caliper body check port.

Standard value: 10.0 mm (.39 in.)

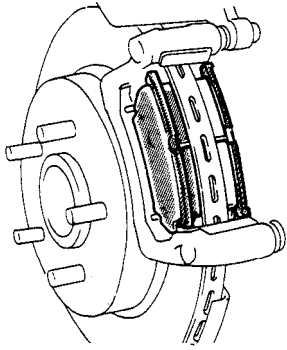
Limit: 2.0 mm (.08 in.)

Caution

1. When the limit is exceeded, replace the pads at both sides, and also the brake pads for the wheels on the opposite side at the same time.
2. If there is a significant difference in the thicknesses of the pads on the left and right sides, check the sliding condition of the piston, lock pin sleeve and guide pin sleeve.
2. Loosen the parking brake cable (from the vehicle interior), and disconnect the parking brake end installed on the rear brake assembly.
3. Remove lock pin. Lift caliper assembly and retain with wires.

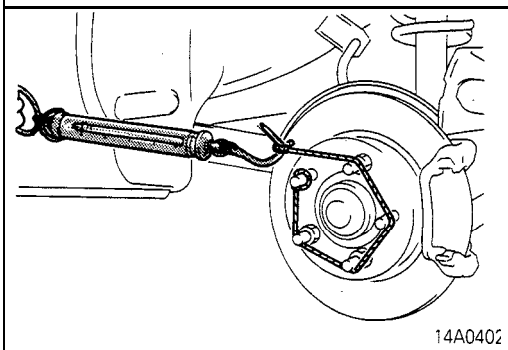
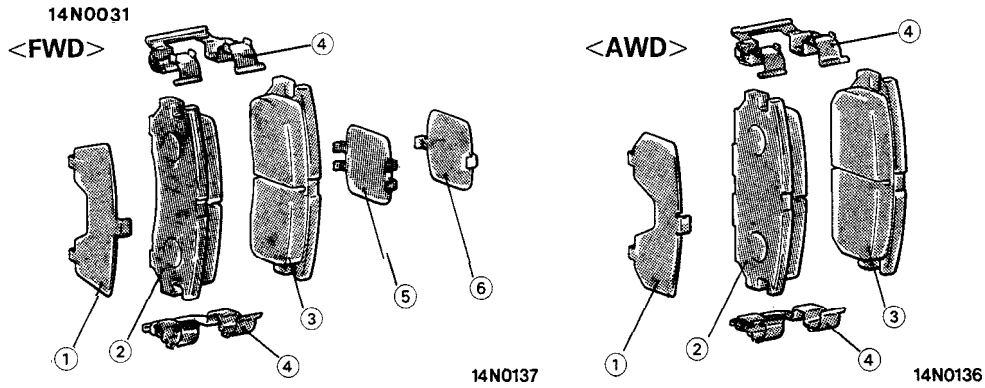
Caution

Do not smear special grease on lock pin or make it dirty.



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



14A0402

5. Measure hub torque with pad removed to measure brake drag torque after pad installation.
On vehicles with VCU-equipped LSD, disengage the drive shaft and companion flange.

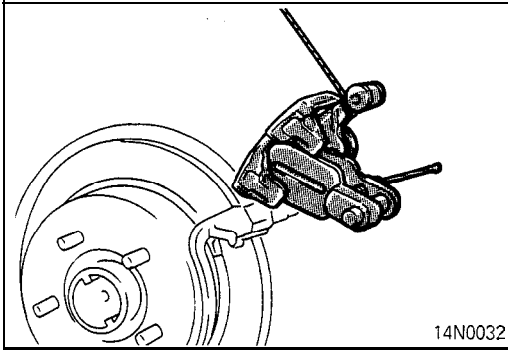
NOTE

Secure the disc to the hub with wheel nuts.

6. Securely attach the pad clip to the caliper support.

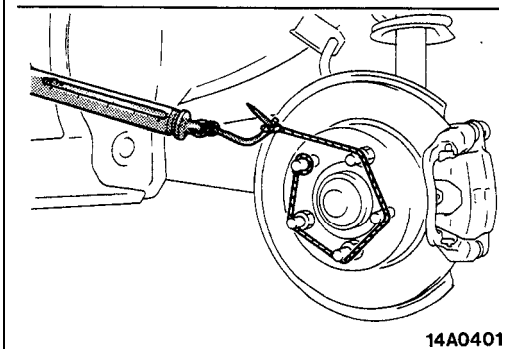
Caution

Do not deposit grease or other dirt on pad or brake disc friction surfaces.



14N0032

7. Clean the piston and then push the piston into the cylinder.
8. With care not to allow the piston boot to be wedged, lower the caliper assembly and fit the lock pin.



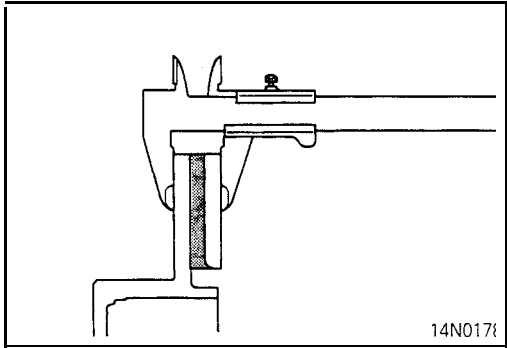
14A0401

9. Check brake drag torque as follows.

- (1) Start engine and hold brake pedal down for 5 seconds. [Approx. 200 N (44 lbs.)]
- (2) Stop engine.
- (3) Turn brake disc forward 10 times.
- (4) Check brake drag torque with spring scale.

If the difference between brake drag torque and hub torque exceeds the standard value, disassemble piston and clean piston. Check for corrosion or worn piston seal, and check the sliding condition of the lock pin sleeve and guide pin sleeve.

Standard value: 70 N (15.4 lbs.) [4 Nm (3 ft.lbs.)] or less



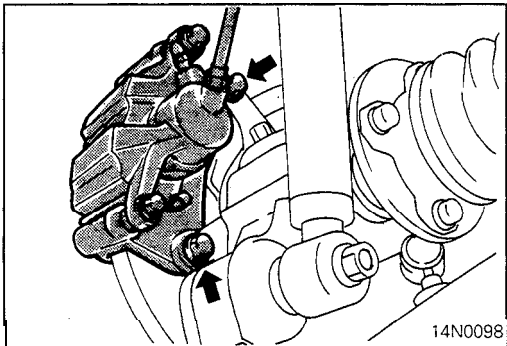
REAR BRAKE DISC THICKNESS CHECK

M35FVAD

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.)

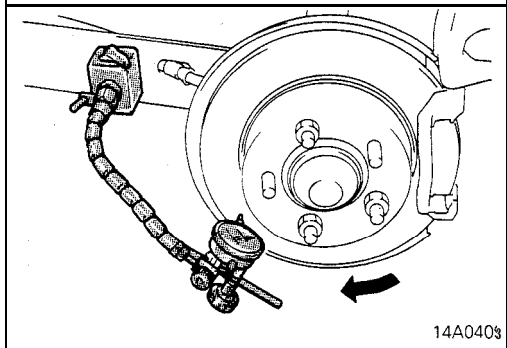
Replace the discs and pad assembly for both sides left and right of the vehicle if they are worn beyond the specified limit.



REAR BRAKE DISC RUN-OUT CHECK

M35FWAC

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

M35FXAB

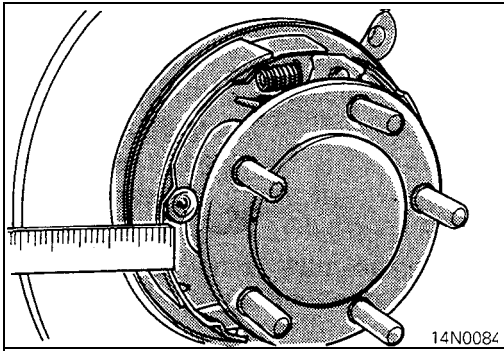
1. If the run-out of the brake disc is equivalent to or exceeds the limit specification, change the phase of the disc and hub, and then measure the run-out again.

NOTE

The procedures for checking by changing the installation phase of the disc are the same as those for the front brake discs. Note, however, that the axial play (limit) in the hub differs. (Refer to P.35-53.)

Limit: <FWD>	0.05 mm (.002 in.)
<AWD>	0.8 mm (.031 in.)

2. If the problem cannot be corrected by changing the phase of the brake disc, replace the disc.

**BRAKE LINING THICKNESS CHECK**

M35FIAD

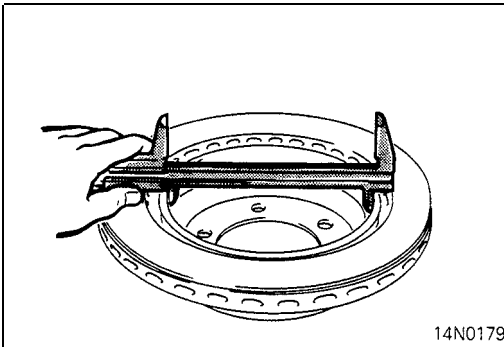
1. Remove the rear brake assembly, and support it by a wire, etc.
2. Remove the brake disc.
3. Measure the wear of the brake lining at the place worn the most.

Standard value: 2.8 mm (.11 in.)**Limit: 1.0 mm (.04 in.)**

Replace the shoe and lining assembly if brake lining thickness is less than the limit and/or if it is not worn evenly.

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.

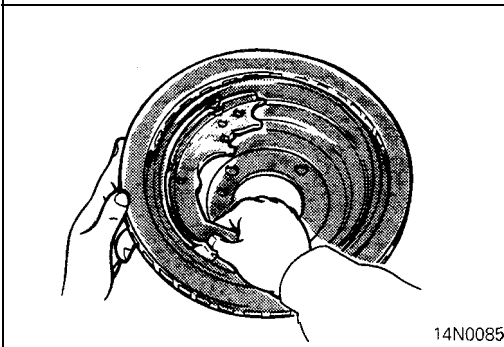
**BRAKE DRUM INSIDE DIAMETER CHECK**

M35FJAD

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 assembly when wear exceeds the limit value or is badly imbalanced.

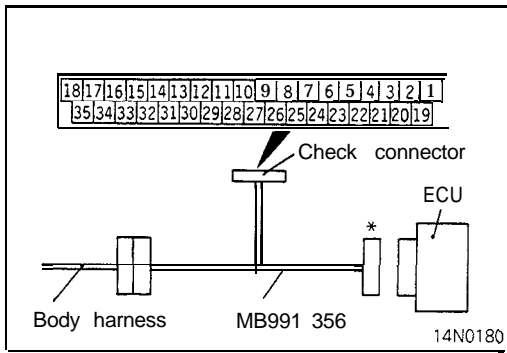
**BRAKE LINING AND BRAKE DRUM CONNECTION CHECK**

M35FPAD

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.

NOTE

Clean off chalk after check.



MEASUREMENT OF WHEEL SPEED SENSOR OUTPUT VOLTAGE

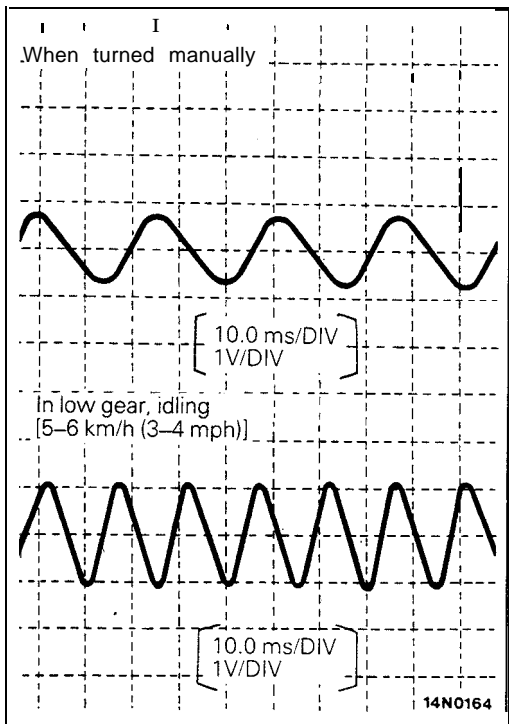
M35FOAO

1. Lift up the vehicle and release the parking brake.
2. Disconnect the ECU harness connector and measure with the adapter harness (MB991 356) 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.

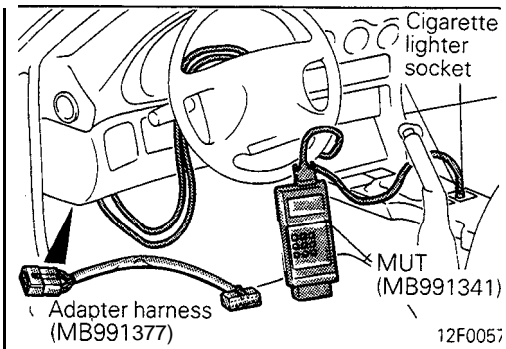
NOTE

1. Waveform may also be observed by actually driving the vehicle.
2. The output voltage is low when the wheel speed is low and increases 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 100mV 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

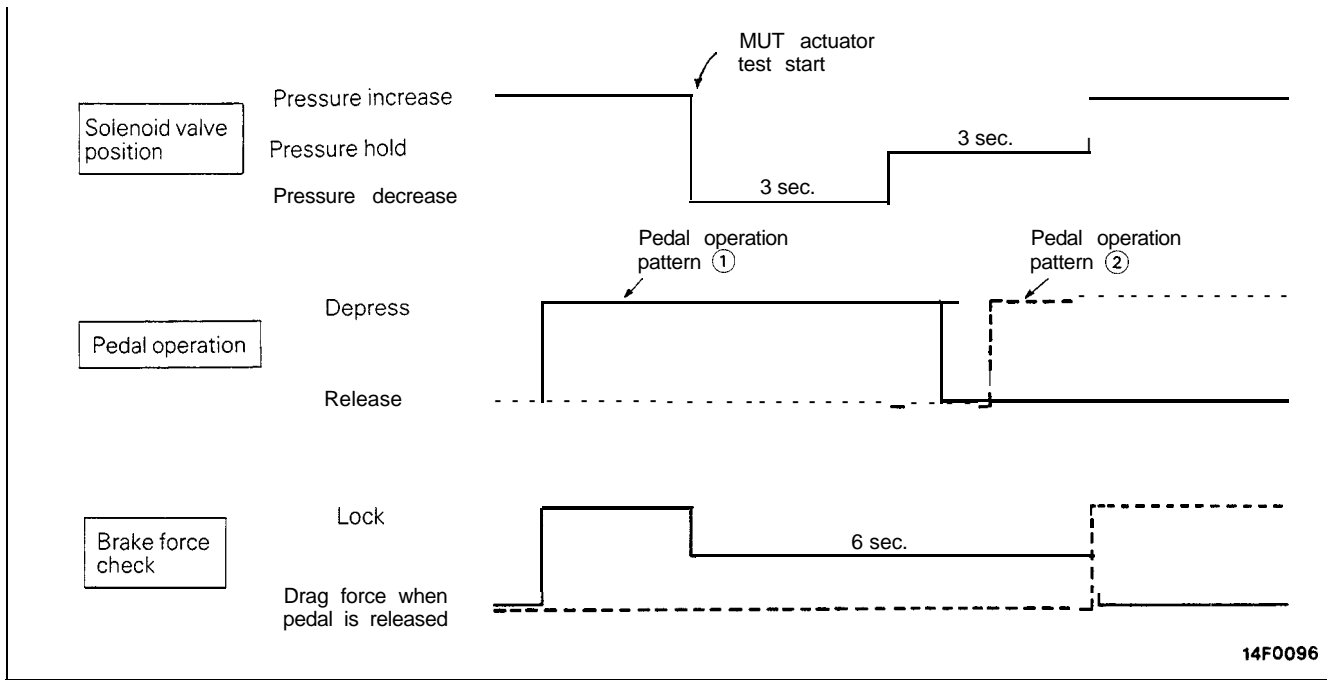
NOTE
The wheel speed sensor cable moves following motion of the front or rear suspension. Therefore, it is likely that it has an open circuit only when driving on rough roads and it functions normally on ordinary roads. It is, therefore, recommended to observe sensor output voltage waveform also under special conditions, such as rough road driving,

**INSPECTION OF HYDRAULIC UNIT****INSPECTION BY FEEL**

- (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 MUT through the adapter harness (MB991377) as illustrated.
- (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 MUT mode. In the MUT mode, ABS does not function.
- (5) Operate the MUT 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 MUT 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

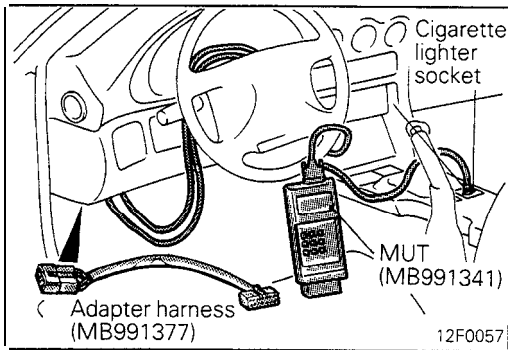
No.	MUT display	Operation	Judgement		Probable cause	R e m e d y
			Normal	Abnormal		
04	FR VALVE M	(1) Depress brake pedal to lock wheel. (2) Using the MUT, select the wheel to be checked and force the actuator to operate. (3) Turn the selected wheel manually to check the change of brake force.	Brake 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
05	FL VALVE M			Brake force is not released	Incorrect HU brake tube connection	Replace HU assembly
06"	Rear VALVE M*				HU solenoid valve not functioning correctly	Connect correctly

NOTE
*: FWD

INSPECTION BY USING BRAKE FORCE TESTER

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.



- (1) Place the front or rear wheels on the brake force tester roller.
- (2) Set the MUT through the adapter harness (MB991377) as illustrated.
- (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 MUT mode. In the MUT 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 MUT 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 MUT actuator test cannot be made.

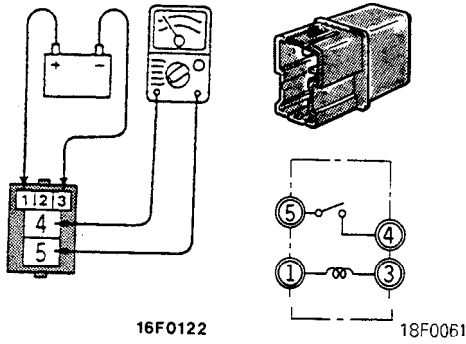
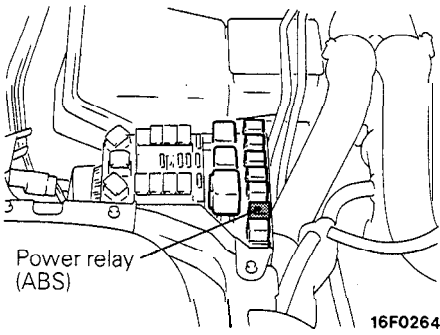
Judgement in Inspection by Using Brake Force Tester

No.	MUT display	Operation	Judgement (reading of brake force tester)		Probable cause	Remedy
			Normal	Abnormal		
04	FR VALVE M	After brake force tester indication has stabilized, operate MUT to force the actuator to operate and check the change in brake force.	<p>(1) When the actuator is driven by MUT, brake force changes as shown below.</p> <p>Front wheels: N (lbs.)</p> <div style="text-align: center;"> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">1,000 (220)</div> <p>↓</p> <p>Step 1</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">FWD: 250±200 (55±44) AWD: 350±200 (77±44)</div> <p>↓</p> <p>Step 2 (In approx. 6 s)</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">1,000 ± 200 (220 ± 44)</div> </div> <p>Rear wheels:</p> <div style="text-align: center;"> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">650 (143)</div> <p>↓</p> <p>Step 1</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">FWD: 150±150 (33±33) AWD: 300±150 (66±33)</div> <p>↓</p> <p>Step 2 (In approx. 6 s)</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">650 ± 150 (143 ± 33)</div> </div>	Brake force in Step 1 shows very little or almost no decrease.	Incorrect HU brake tube connection	Connect correctly
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
06	REAR VALVE M			Faulty HU	Replace HU assembly	
			(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

NOTE

- (1) During forced drive using the MUT, forced drive operation is stopped when any wheel speed reaches 1 km/h (≈ mp h).
- (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 if necessary.
- (3) The probable causes given above all assume that all the other brake parts are normal.

TSB Revision



INSPECTION OF POWER RELAY

M35FOAP

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	No continuity
	Between terminals 1 and 3	Continuity

REMEDY IN CASE OF DISCHARGED BATTERY

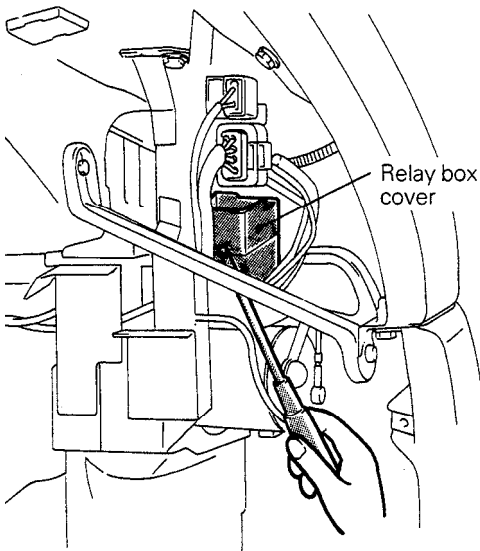
M35FOAQ

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 battery to recover sufficiently. 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 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.

INSPECTION OF VALVE RELAY AND MOTOR RELAY (ABS)

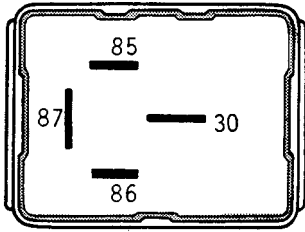
M35FOAR

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.

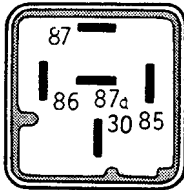


3. Check continuity of the relays both when they are energized and de-energized.

Motor Relay



16R067C



16R0670

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. 0Ω)

When de-energized	Between terminals 85 and 86	60 – 120 Ω
	Between terminals 30 and 87a	Continuity (approx. 0Ω)
	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. 0Ω)

BRAKE PEDAL

M35GA -

REMOVAL AND INSTALLATION

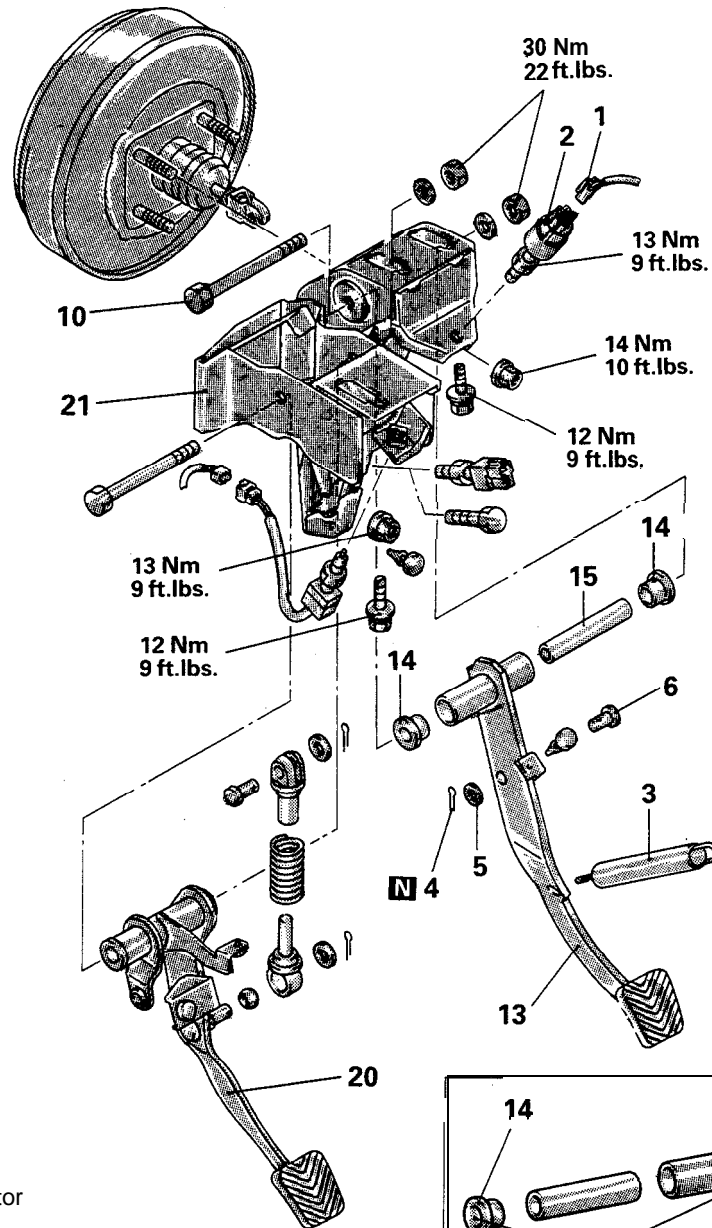
<FWD-M/T>

Pre-removal Operation

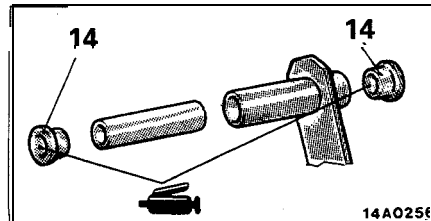
- Removal of Steering Column Assembly (Refer to GROUP 37A – Steering Wheel and Shaft.)

Post-installation Operation

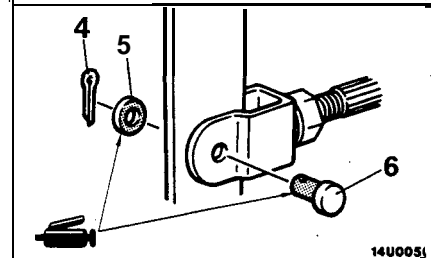
- Installation of Steering Column Assembly (Refer to GROUP 37A – Steering Wheel and Shaft.)
- Clutch Pedal Adjustment (Refer to GROUP 21 -Clutch Pedal.)
- Brake Pedal Adjustment (Refer to P.35-45.)



14F0106



14A025f



14U005j

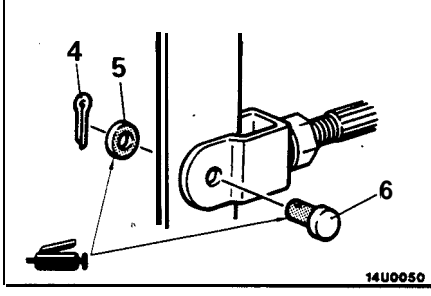
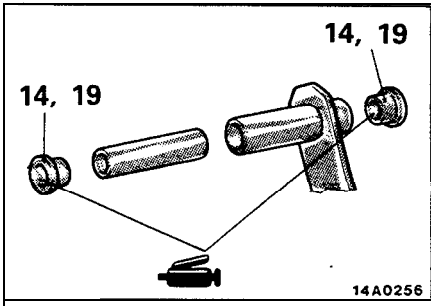
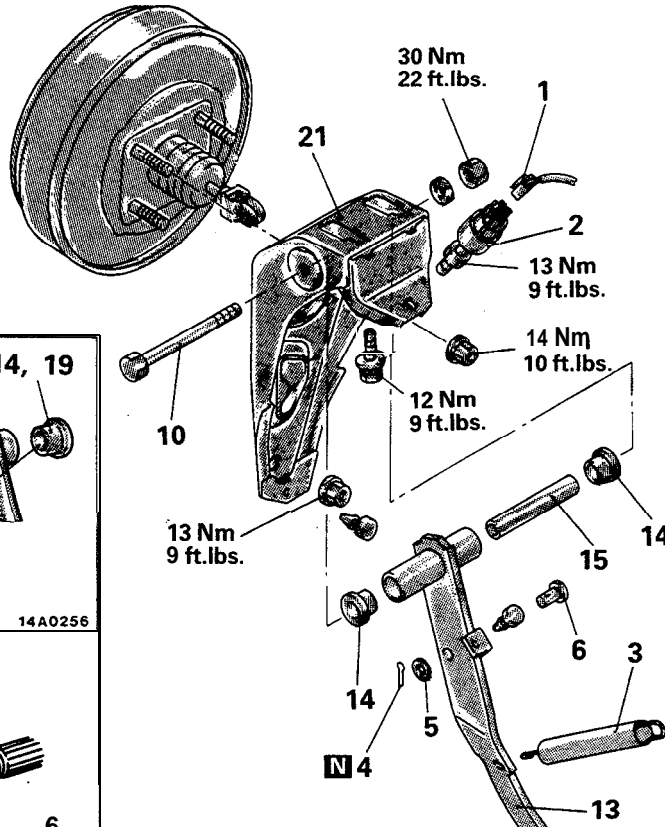
Stop light switch removal steps

1. Stop light switch connector
2. Stop light switch

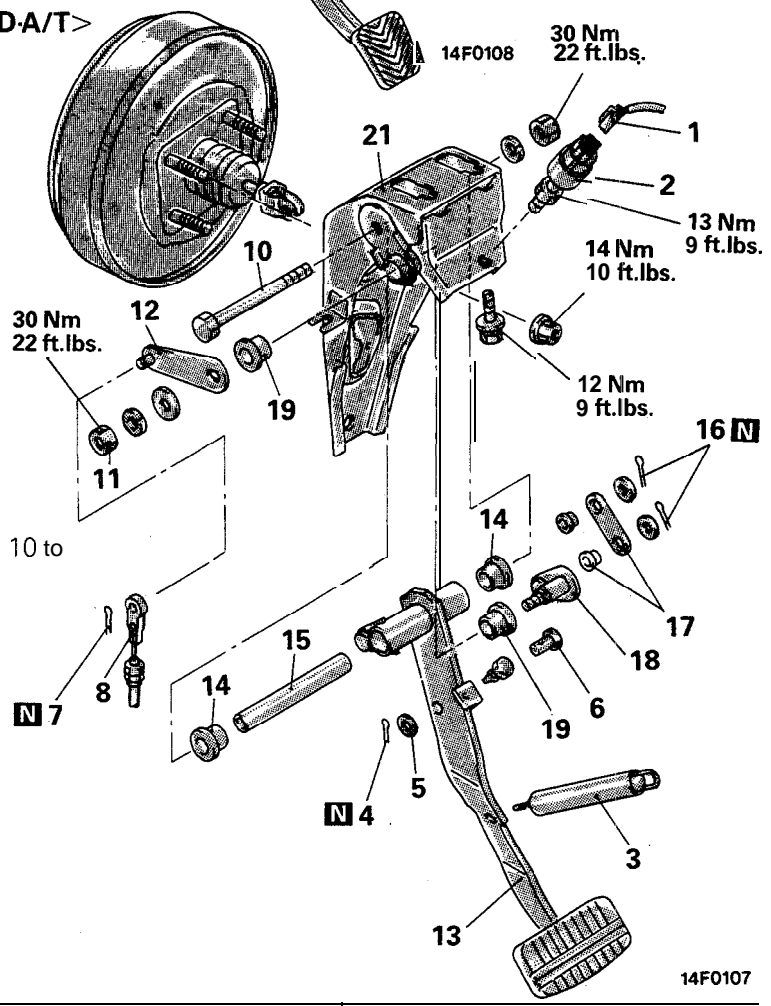
Brake pedal removal steps

- ◆◆ 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 2 1 -Clutch Pedal.)
- 21. Brake pedal support member

<AWD>



<FWD-A/T>



Stop light switch removal steps

1. Stop light switch connector
2. Stop light switch

Brake pedal removal steps

- 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

14F0107

INSPECTION

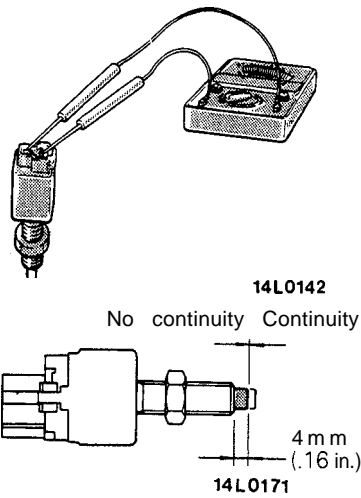
M35GCAN

- Check the bushing for wear.
- Check the brake pedal for bend or twisting.
- Check the brake pedal return spring for damage.

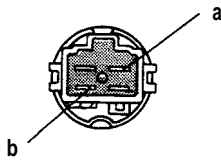
STOP LIGHT SWITCH

- (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.



>Vehicles with cruise control<



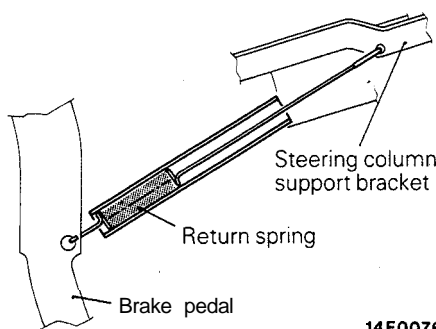
14L017C

SERVICE POINT OF INSTALLATION

M35GDBG

3. INSTALLATION OF RETURN SPRING

Install the return spring with the shorter hook on the brake pedal.



14F0076

MASTER CYLINDER AND BRAKE BOOSTER

M351A-

REMOVAL AND INSTALLATION

Pre-removal Operation

- Draining Brake Fluid

Post-installation Operation

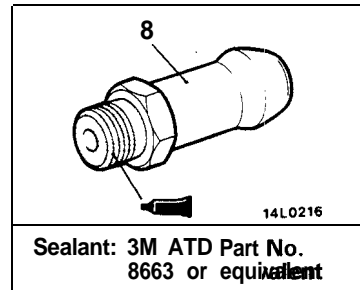
- Supplying Brake Fluid
- Bleeding
(Refer to P.35-48.)
- Adjustment of Brake Pedal
(Refer to P.35-45.)

Brake tube flare nut

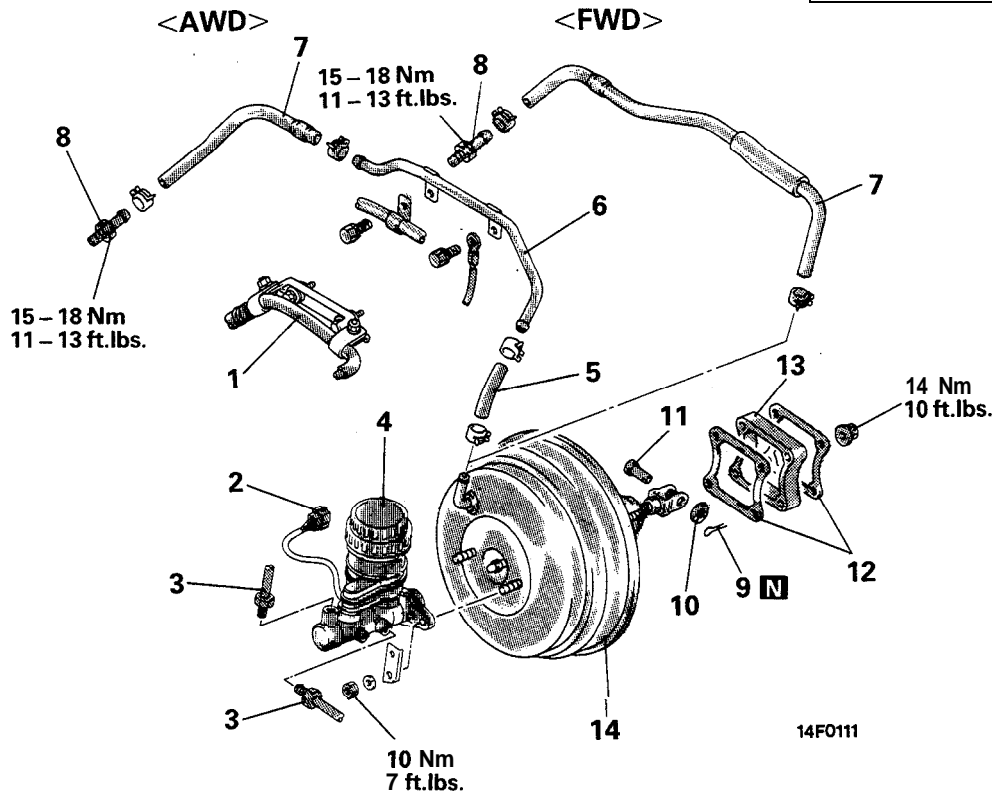
1.5 N m
11 ft.lbs.



14F038



Sealant: 3M ATD Part No. 8663 or equivalent

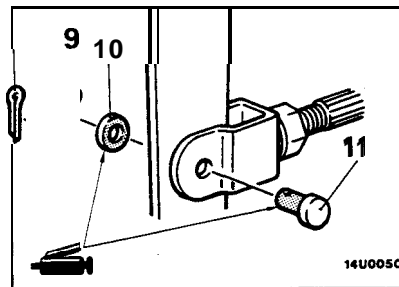


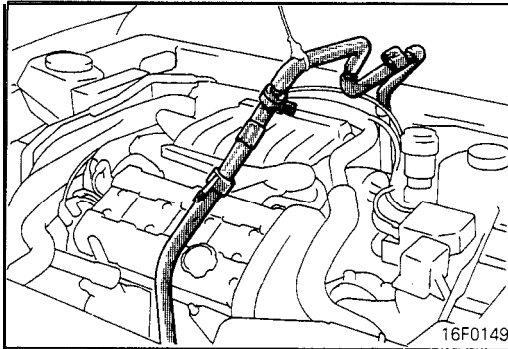
Master cylinder removal steps

1. Low-pressure hose
 2. Brake fluid level sensor connector
 3. Brake tube connection
 4. Master cylinder
- Adjustment of clearance between brake booster push rod and primary piston

Brake booster removal steps

4. Master cylinder
5. Vacuum hose
6. Vacuum tube
7. Vacuum hose with check valve
8. Fitting
9. Cotter pin
10. Washer
11. Clevis pin
12. Sealer
13. Spacer
14. Brake booster





SERVICE POINT OF REMOVAL

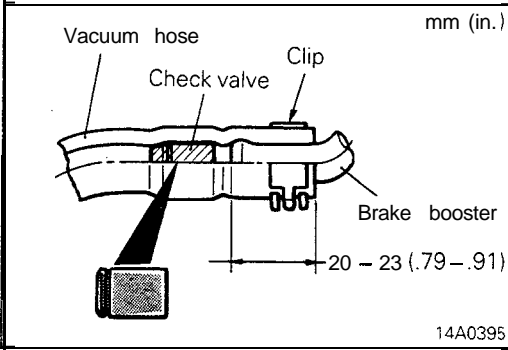
M351BAK

1. 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.



SERVICE POINTS OF INSTALLATION

M351DAU

VALVE

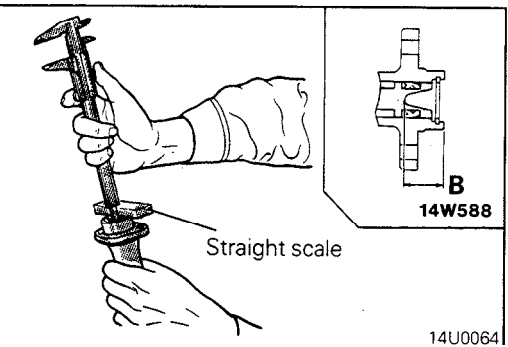
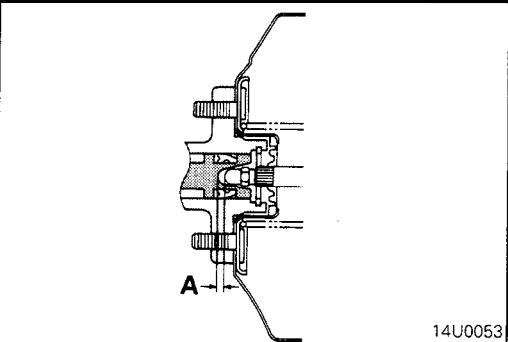
(1) In the case of AWD, insert the vacuum hose of the not to allow it to contact the check valve. Then, secure the hose with hose clip.

connected until it contacts the hexagonal edge of the fitting, and then should be secured by the hose clip.

If the check valve is defective, replace the vacuum hose.

BOOSTER PUSH ROD AND PRIMARY PISTON

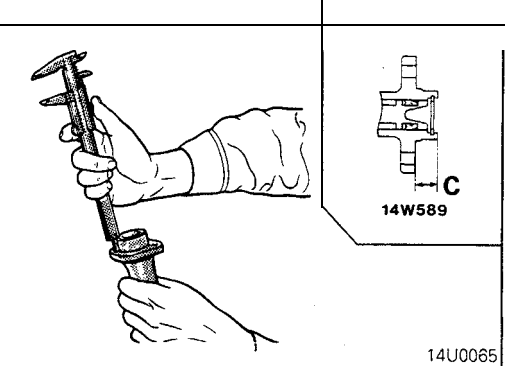
Adjust the clearance (A) between the brake booster push



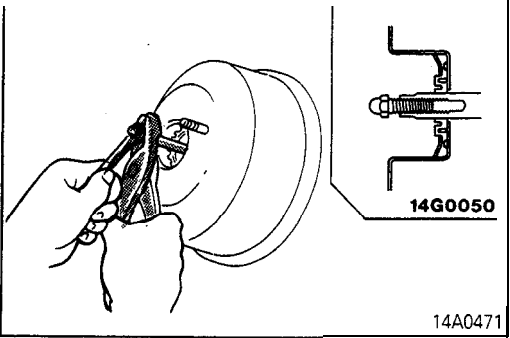
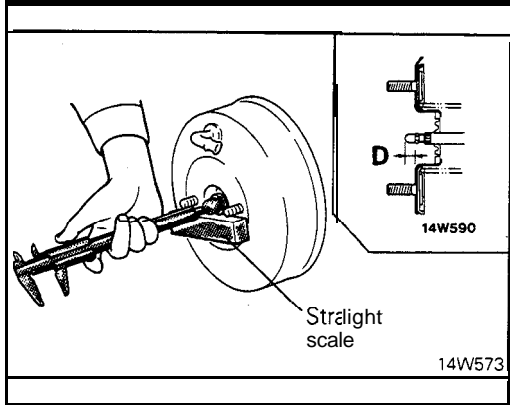
(1) Measure the dimension (B) between the master cylinder end face and piston.

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) der 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 thick- (D).

(3),

push rod and primary piston.

Standard value: A (A = - 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.)

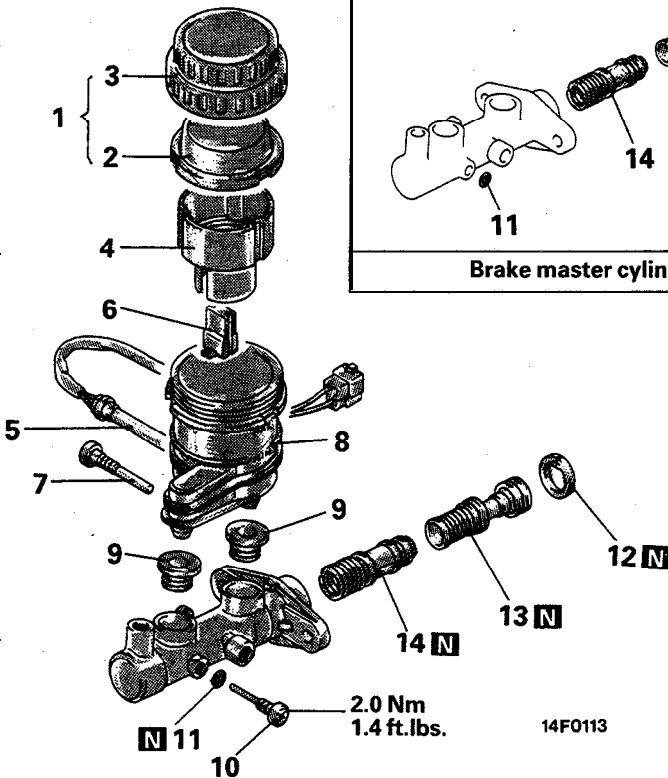
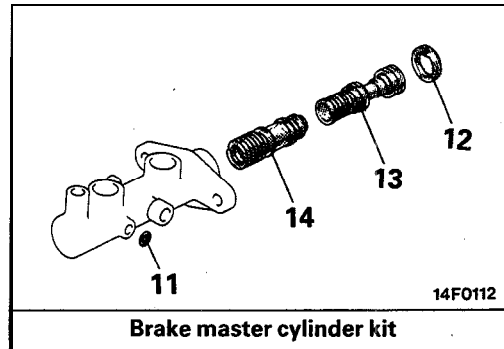
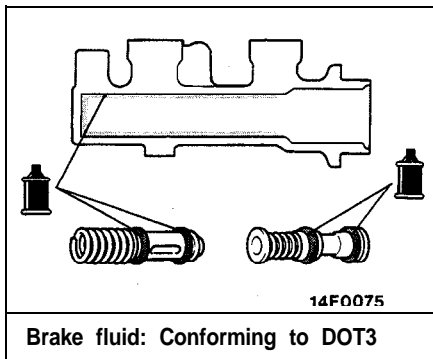
(5) If the clearance is not within the standard value range, adjust by changing the push rod length by turning the adjustable end of the push rod.

Caution

Improper clearance may cause excessive brake drag.

DISASSEMBLY AND REASSEMBLY

M35HA - -

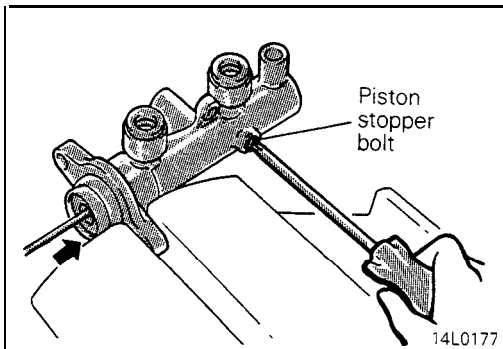


Disassembly steps

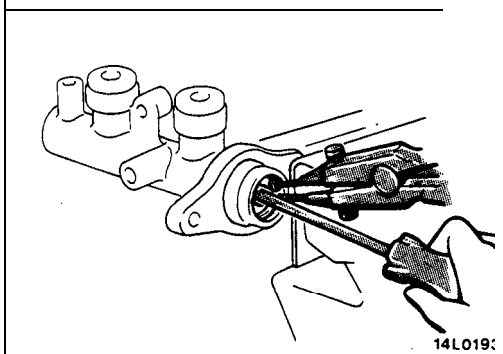
1. Reservoir cap assembly
2. Diaphragm
3. Reservoir cap
4. Filter <Vehicles with ABS>
5. Brake fluid level sensor
6. Float
7. Reservoir stopper bolt
8. Reservoir
9. Reservoir seal
10. Piston stopper bolt
11. Gasket
12. Piston stopper ring
13. Primary piston assembly
14. Secondary piston assembly
15. Master cylinder body



Do not disassemble the primary and secondary piston assembly.



14L0177



14L019:

SERVICE POINTS OF DISASSEMBLY

M35HBAF

10. DISASSEMBLY OF PISTON STOPPER BOLT

Remove the piston stopper bolt, while depressing the piston.

12. DISASSEMBLY OF PISTON STOPPER RING

Remove the piston stopper ring, while depressing the piston.

14. DISASSEMBLY OF SECONDARY PISTON ASSEMBLY

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

M35HDAF

- Check the inner surface of master cylinder body for rust or pitting.
- Check the primary and secondary pistons for rust, scoring, wear, damage or wear.
- Check the diaphragm for cracks and wear.

BRAKE LINE REMOVAL AND INSTALLATION

M35KA -

<Vehicles without ABS>

Pre-removal Operation

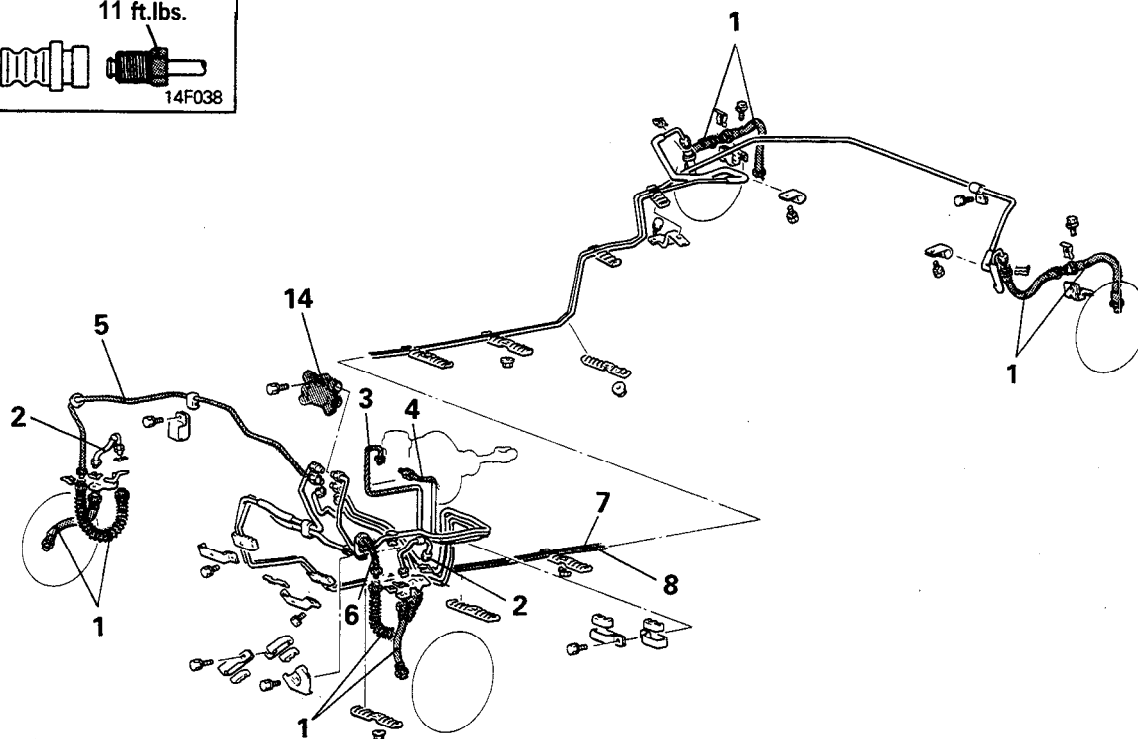
- Draining of Brake Fluid

Post-installation Operation

- Supplying Brake Fluid
- Bleeding (Refer to P.35-48.)

Flared brake line nuts

15 Nm
11 ft.lbs.



14F0109

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.

<Vehicles with ABS>

Pre-removal Operation

- Draining of Brake Fluid

Post-installation Operation

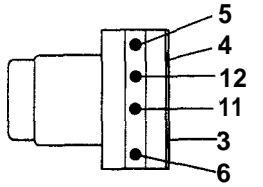
- Supplying Brake Fluid
- Bleeding (Refer to P.35-48.)

Flared brake line nuts

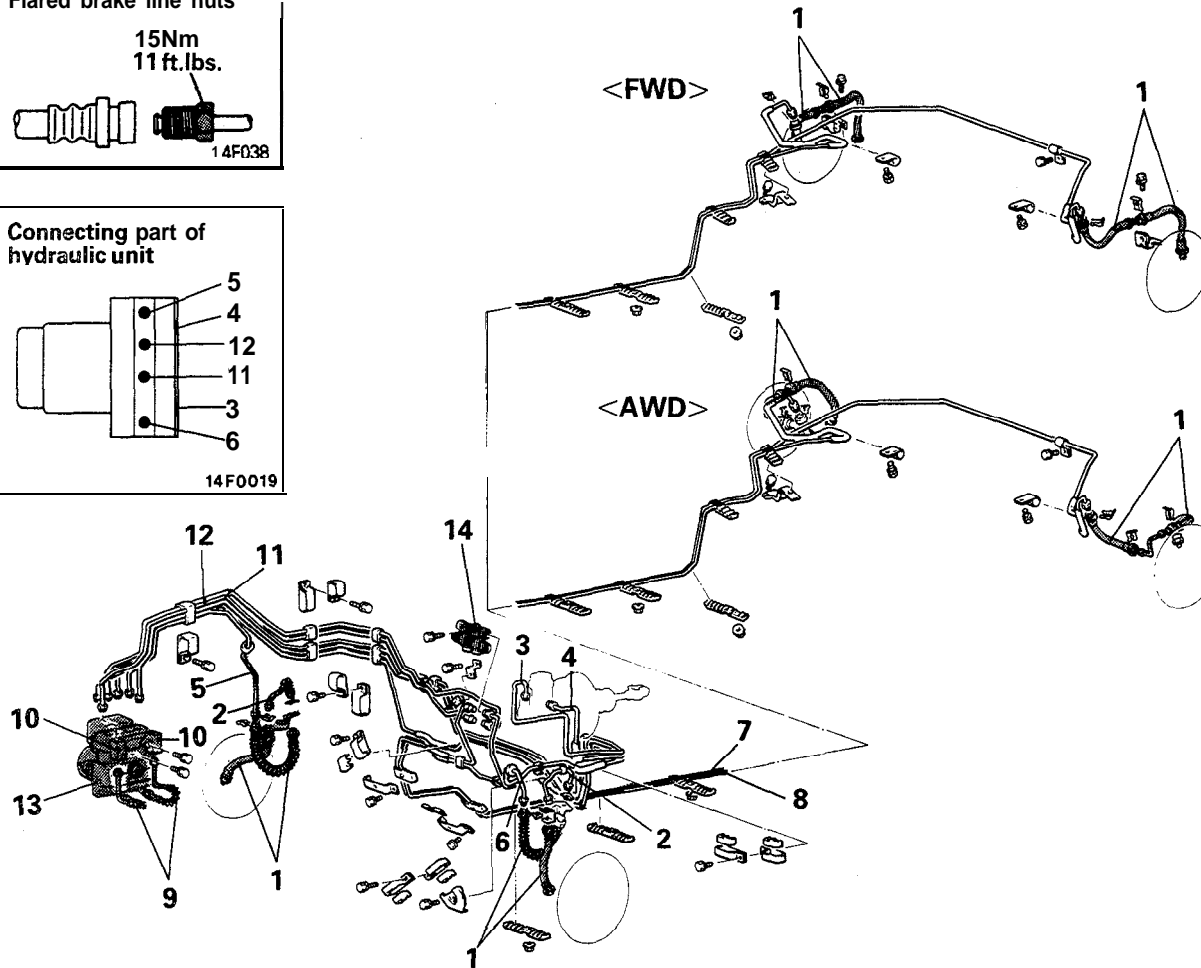
15Nm
11 ft.lbs.



Connecting part of hydraulic unit

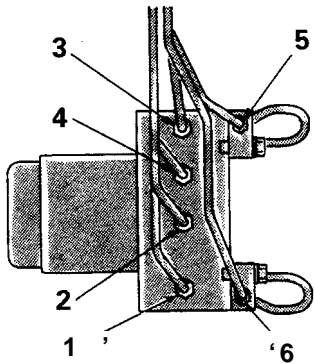


14F0019



14F0110

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
10. Z-way connector
11. Brake tube (rear, R.H.)
12. Brake tube (rear, L.H.)
- ◆◆ 13. Hydraulic unit
14. Proportioning valve



14F0020

1. From the hydraulic unit to the front brake (L.H.)
2. From the hydraulic unit to the rear brake (R.H.)
3. From the hydraulic unit to the front brake (R.H.)
4. From the hydraulic unit to the rear brake (L.H.)
5. From the master cylinder (for left front and right rear)
6. From the master cylinder (for right front and left rear)

INSPECTION

M35KCAE

- 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.

SERVICE POINT OF INSTALLATION

M35KDAK

13. CONNECTION OF TUBE TO HYDRAULIC UNIT

Connect the tubes to the hydraulic unit as shown in the illustration.

FRONT DISC BRAKE

M35LA-

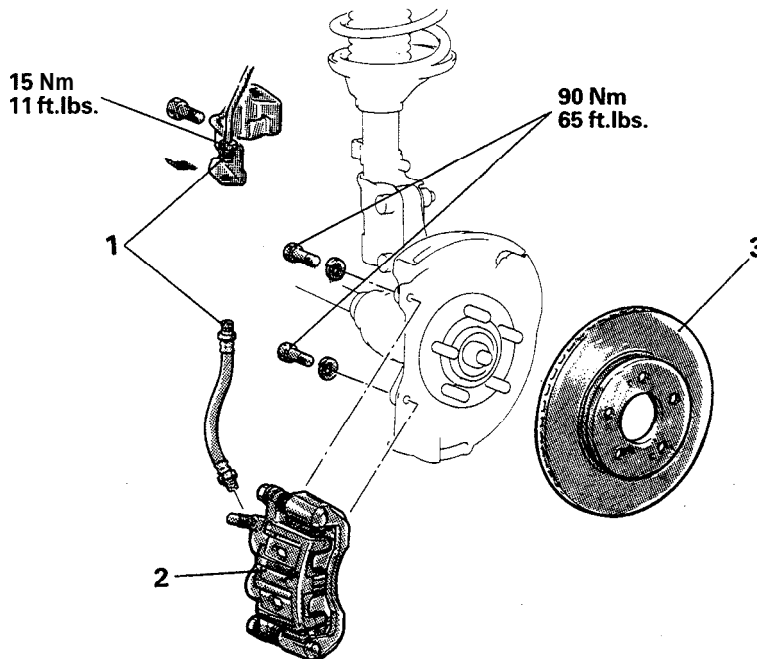
REMOVAL AND INSTALLATION

Pre-removal Operation

- Draining of Brake Fluid

Post-installation Operation

- Supplying Brake Fluid
- Bleeding (Refer to P.35-48.)



Removal steps

1. Brake hose and the brake tube connection
- a 2. Front brake assembly
3. Brake disc

14N0140

INSPECTION

M35LCAE

- Check disc for wear. (Refer to P.35-52.)
- Check disc for runout. (Refer to P.35-52, 53.)
- Check disc for damage.

SERVICE POINTS OF INSTALLATION

M35LDDA

2. INSTALLATION OF FRONT BRAKE ASSEMBLY

- (1) Measure hub torque with pad removed to measure brake drag torque after pad installation.

NOTE

Secure the disc to the hub with wheel nuts.

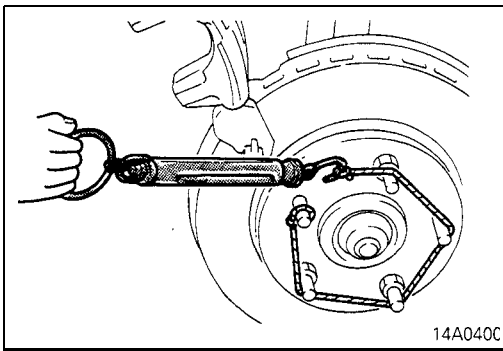
- (2) After installing the caliper support to the knuckle, expand the piston, and then install the caliper body.

- (3) Check brake drag torque as follows.

- ① Start engine and hold brake pedal down for 5 seconds. [Approx. 200 N (44 lbs.)]
- ② Stop engine.
- ③ Turn brake disc forward 10 times.
- ④ Check brake drag torque with spring scale.

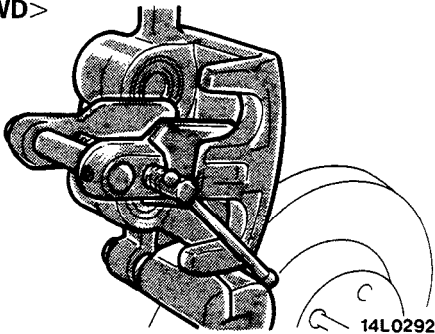
If the difference between brake drag torque and **hub** torque exceeds the standard value, disassemble piston and clean the piston. Check for corrosion or worn piston seal.

Standard value: 70 N (15.4 lbs.) [4 Nm (3 ft.lbs.)] or less



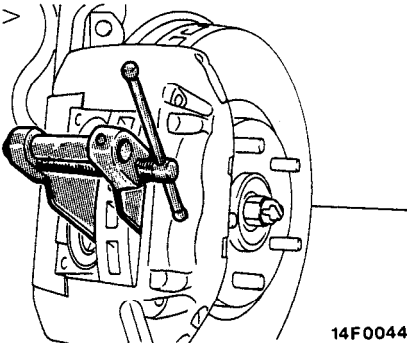
14A040C

<FWD>

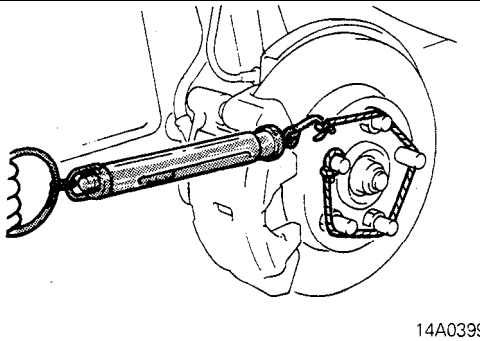


14L0292

<AWD>



14F0044

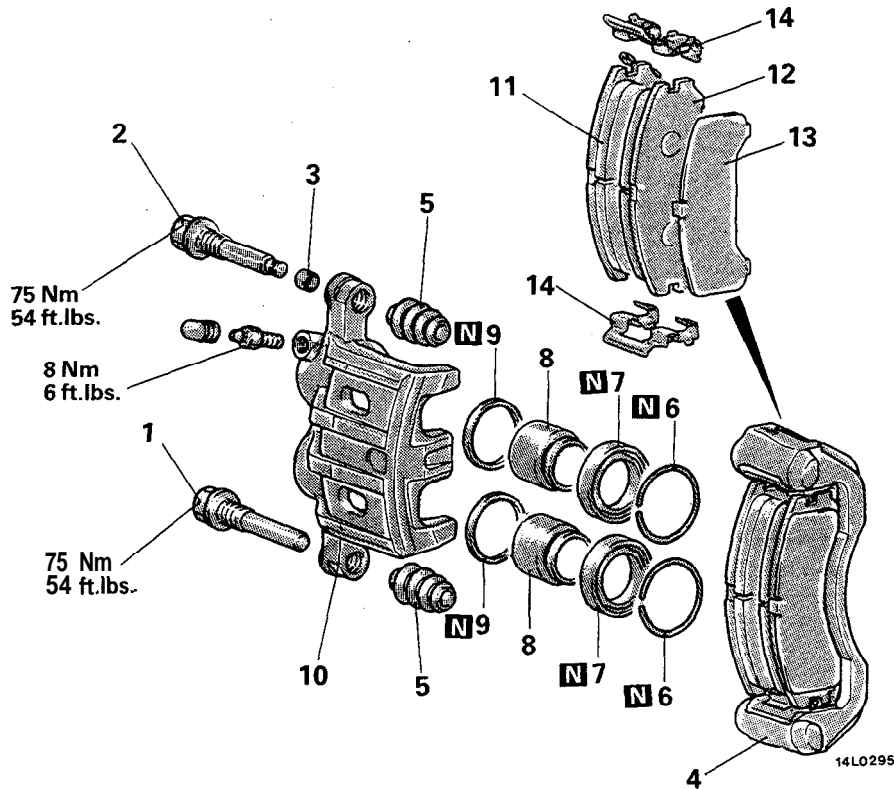


14A039E

DISASSEMBLY AND REASSEMBLY

M35LE-A

<FWD>

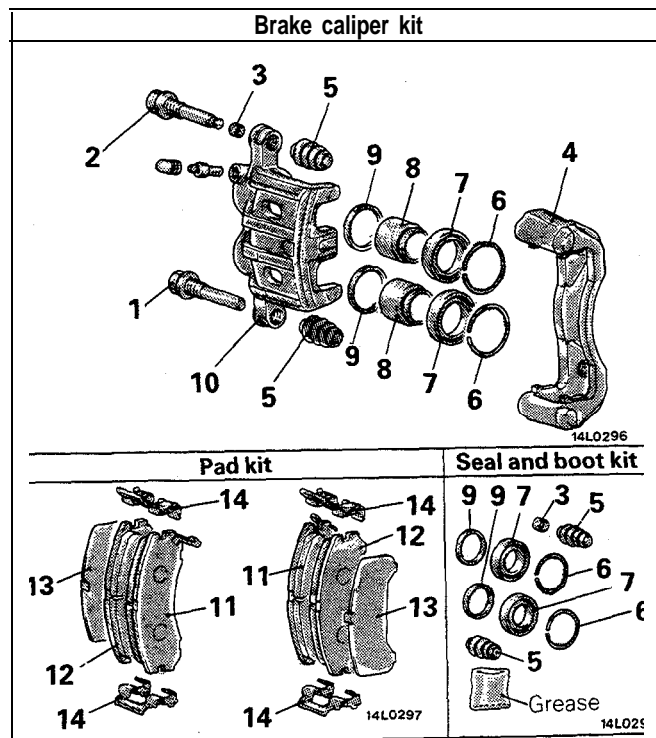


Caliper assembly disassembly steps

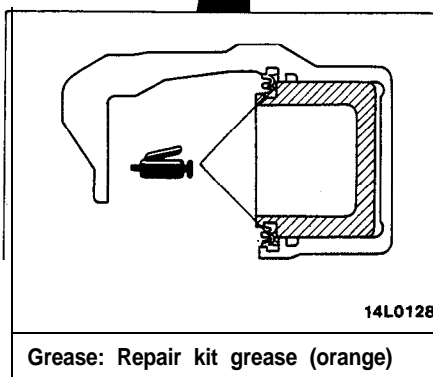
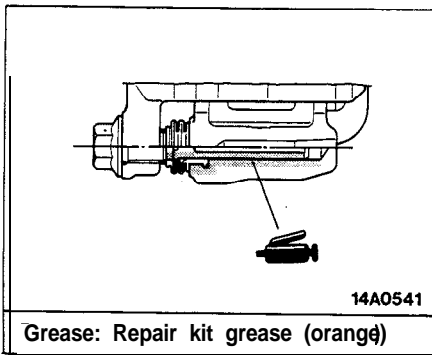
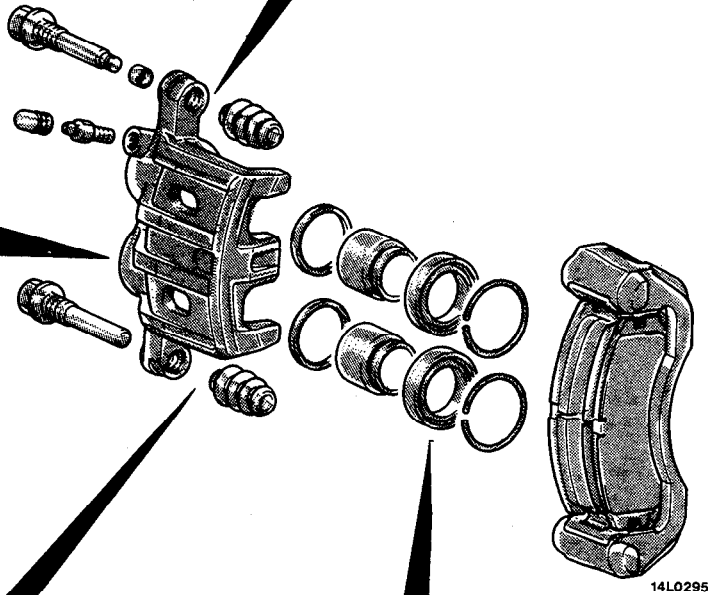
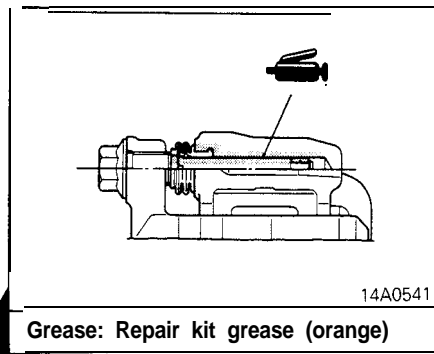
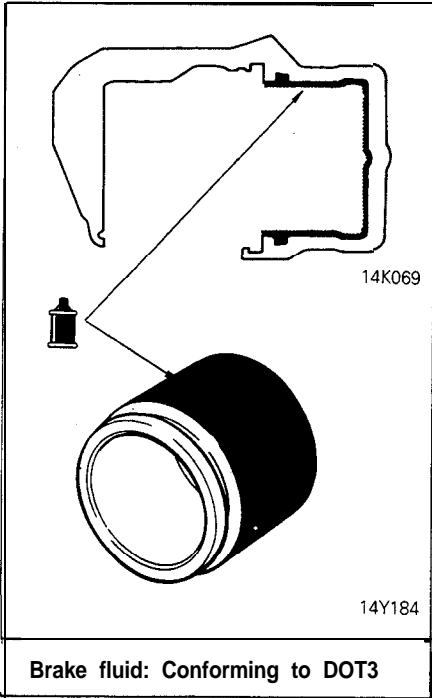
- ◆◆ 1. Guide pin
- 2. Lock pin
- 3. Bushing
- 4. Caliper support (pad. clip, shim)
- 5. Pin boot
- 6. Boot ring
- ◆◆ 7. Piston boot
- 8. Piston
- 9. Piston seal
- 10. Caliper body

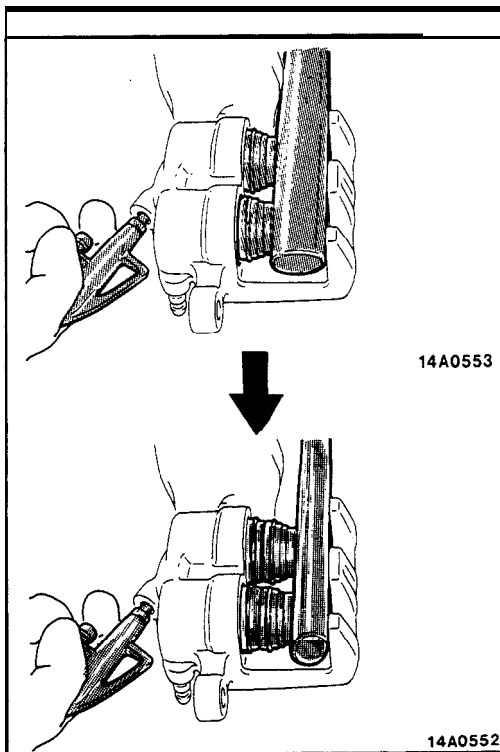
Pad assembly disassembly steps

- ◆◆ 1. Guide pin
- ◆◆ 2. Lock pin
- 3. Bushing
- 4. Caliper support (pad, clip, shim)
- 11. Pad & wear indicator
- 12. Pad assembly
- 13. Outer shim
- 14. Clip



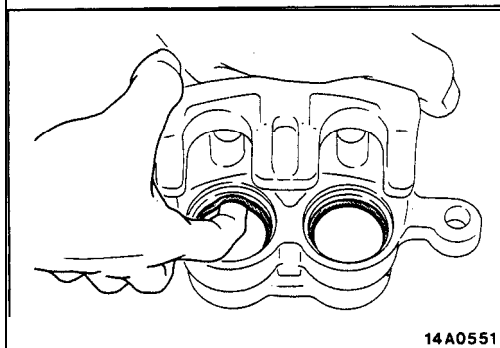
Lubrication points





14A0553

14A0552



14A0551

SERVICE POINTS OF DISASSEMBLY

M35LFCB

When disassembling the front disc brakes, disassemble both sides (left and right) as a set.

7. REMOVAL OF PISTON BOOT / 8. PISTON

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.

9. REMOVAL OF PISTON SEAL

- (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

INSPECTION

M35LGCB

- 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

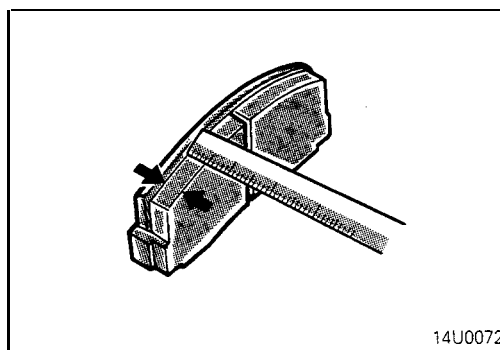
Measure thickness at the thinnest and worn area of the pad. Replace pad assembly, when pad thickness is less than the limit value.

Standard value: 10.0 mm (.39 in.)

Limit value: 2.0 mm (.08 in.)

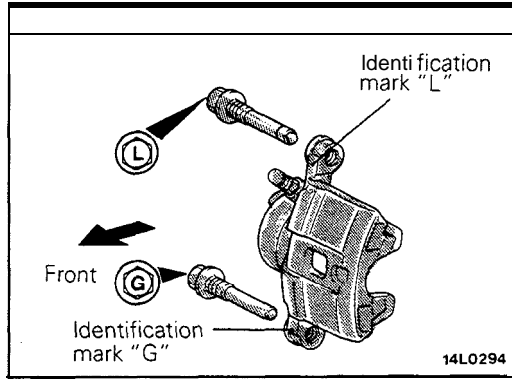
Caution

1. Whenever the pad is to be replaced, replace the pads on both 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.



14U0072

TSB Revision

**SERVICE POINTS OF REASSEMBLY**

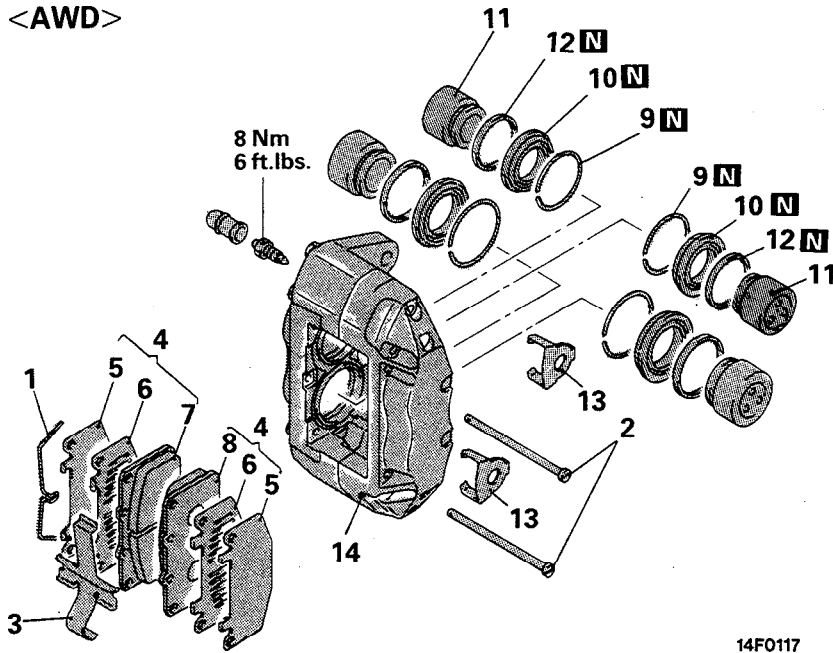
M35LHCC

2. INSTALLATION OF LOCK PIN / 1. GUIDE PIN

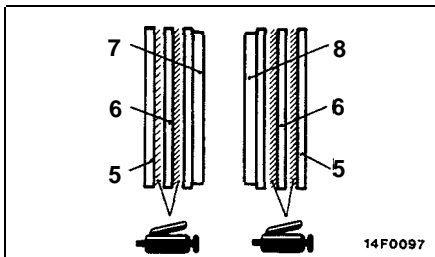
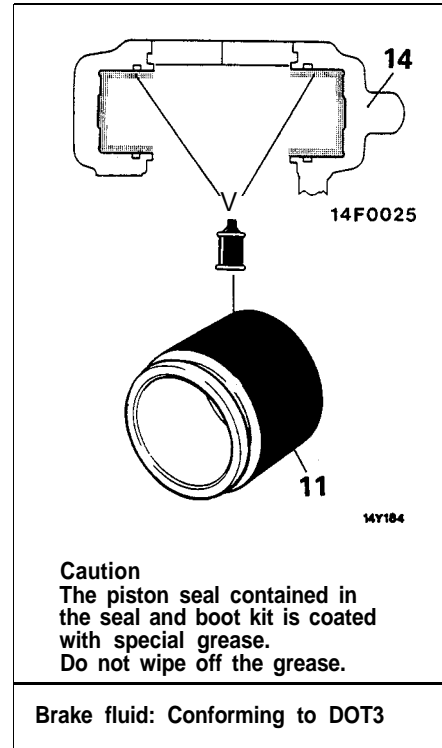
Install the guide pin and lock pin mating the head markings on the guide and lock pins with the identification markings on the caliper body.

DISASSEMBLY AND REASSEMBLY

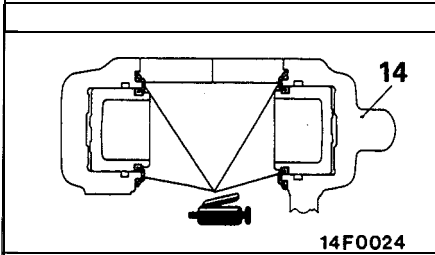
<AWD>



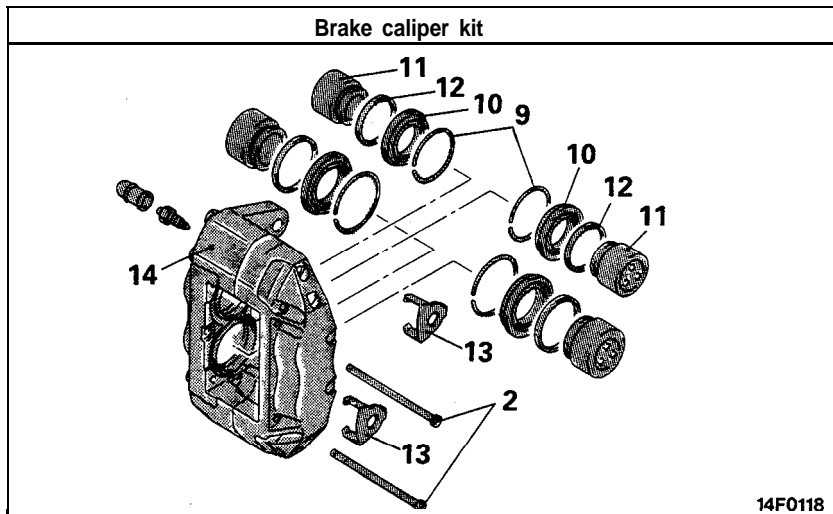
14F0117



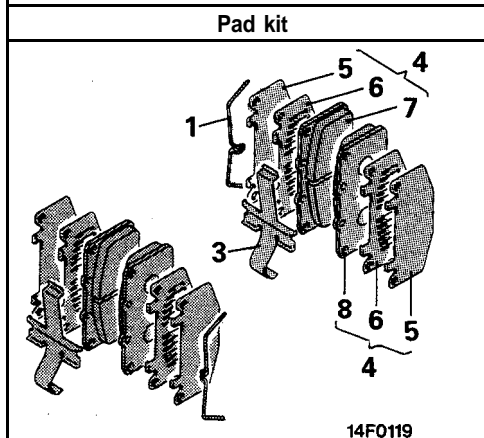
Grease: Brake grease SAEJ310, NLGI No. 1



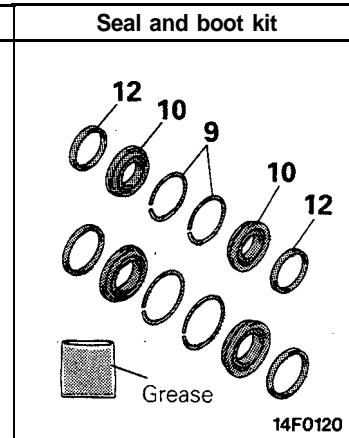
Grease: Repair kit grease (orange)



14F0118



14F0119



14F0120

Disassembly steps

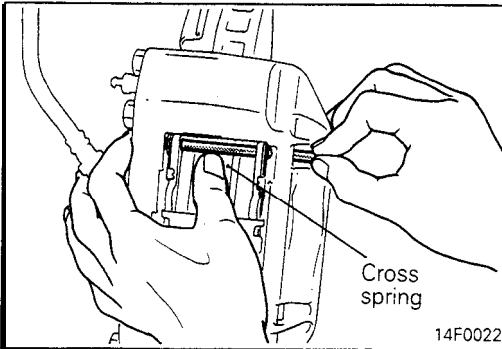
- 1. Clip
- ➡ 2. Pad pin
- 3. Cross spring
- ☒ 4. Pad assembly
- 5. Shim A
- 6. Shim B
- 7. Inner pad (with wear indicator)
- 8. Outer pad
- 9. Retaining ring
- 10. Piston boot
- ↔ 11. Piston
- ↔ 12. Piston seal
- 13. Washer
- 14. Caliper body

SERVICE POINTS OF DISASSEMBLY

M35LFCC

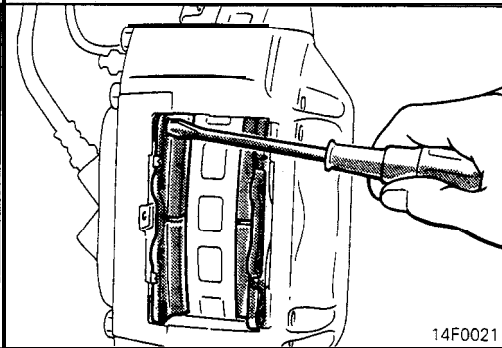
2. REMOVAL OF PAD PIN

Holding the cross spring with hand, remove the pad pin.



4. REMOVAL OF PAD ASSEMBLY

Using a screwdriver, remove the pad assembly.



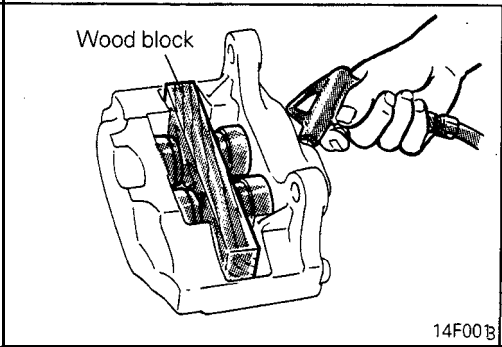
11. REMOVAL OF PISTONS

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. Use care not to let the brake fluid splash.



12. REMOVAL OF PISTON SEAL

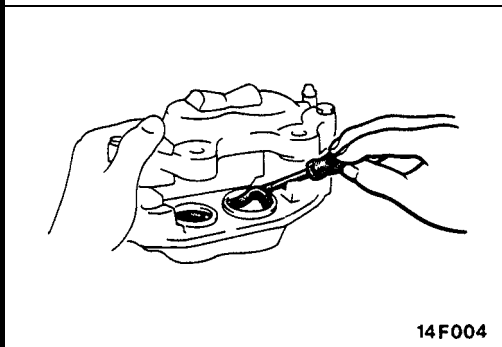
- (1) Remove the piston seal.

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



INSPECTION

M35LGCC

INSPECTION OF PAD WEAR

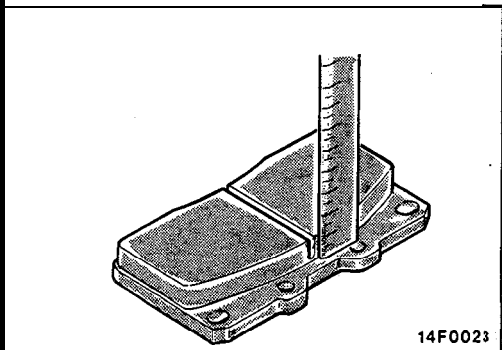
Measure the thickness of the pad at a point which wears most. Replace the pad assembly if the measurement is less than the limit.

Standard value: 10.0 mm (.39 in.)

Limit: 2.0 mm (.08 in.)

Caution

Whenever the pad is to be replaced, replace the pads on the right and left wheels as a set.



M35MA-

**REAR DISC BRAKE
REMOVAL AND INSTALLATION**

Pre-removal Operation

- Draining of Brake Fluid

Post-installation Operation

- Brake Fluid Filling
- Brake Line Bleeding (Refer to P.35-48.)

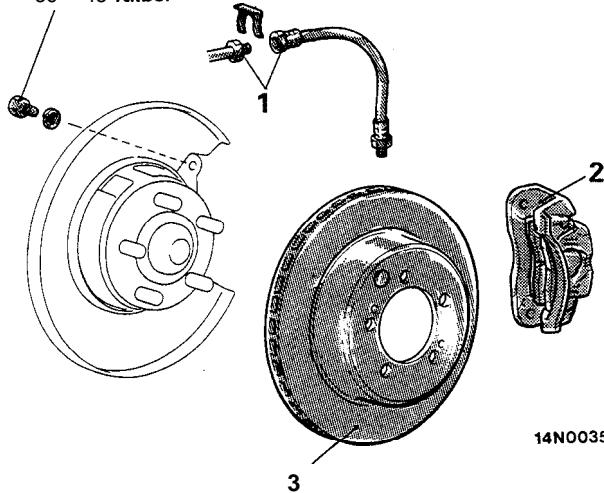
Flared brake line nuts

15 Nm
11 ft.lbs.



<FWD>

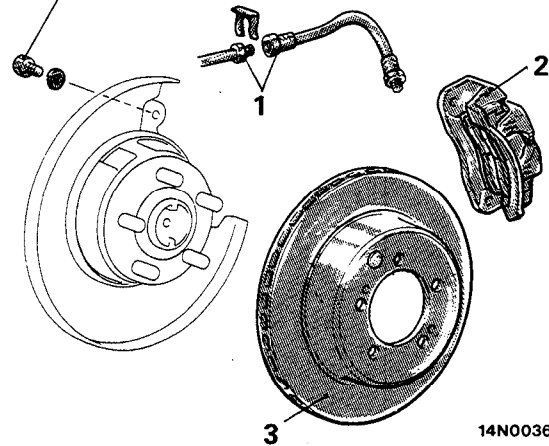
50 – 60 Nm
36 – 43 ft.lbs.



14N0035

<AWD>

50 – 60 Nm
36 – 43 ft.lbs.



14N0036

Removal steps

1. Brake hose
- ◆◆ 2. Rear brake assembly
3. Brake disc

INSPECTION

M35MDAC

INSPECTING THE BRAKE DISC

- Check disc for wear. (Refer to P.35-55.)
- Check disc for runout. (Refer to P.35-55.)
- Check disc for damage.

SERVICE POINT OF INSTALLATION

M35MCAG

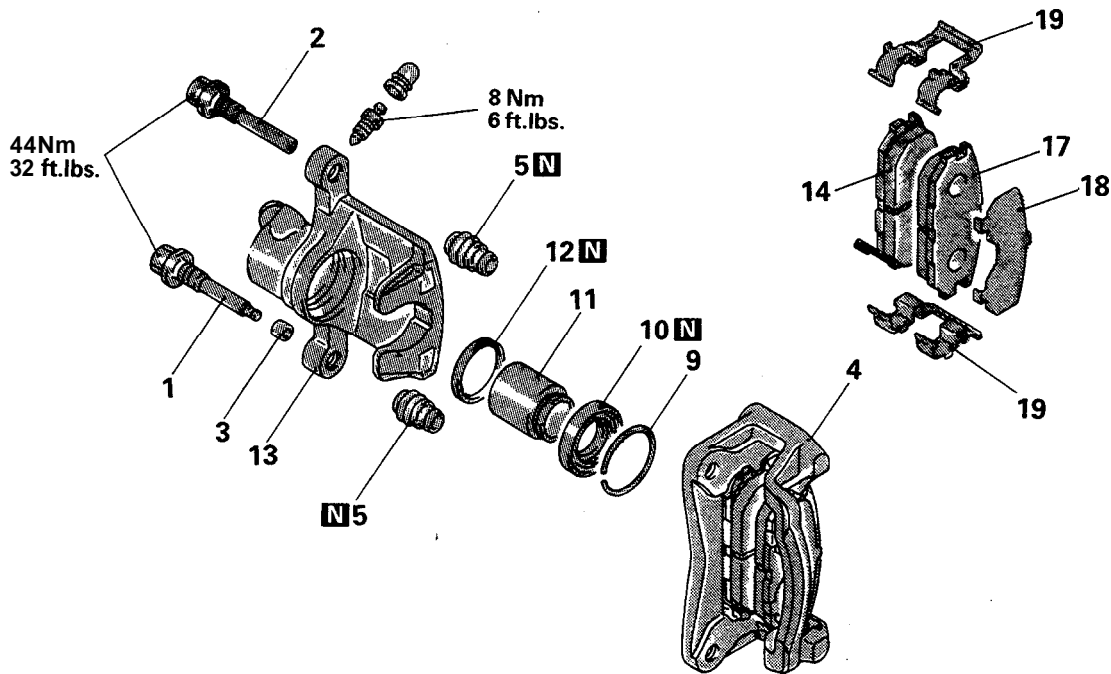
2. INSTALLATION OF THE REAR BRAKE ASSEMBLY

Install the rear brake assembly using the same procedure as that for the front brake assembly. (Refer to P.35-74.)

DISASSEMBLY AND REASSEMBLY

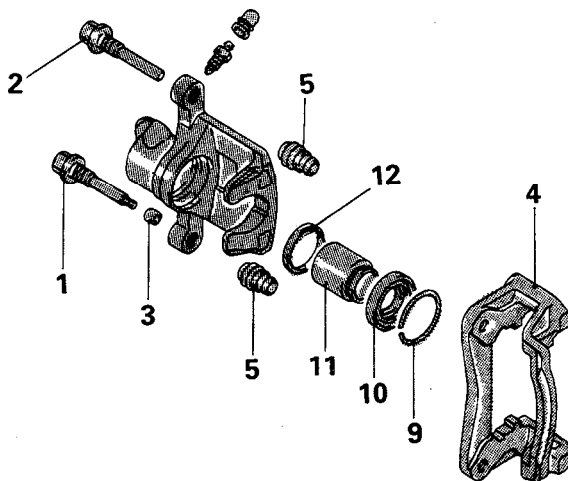
M35NA -

<AWD>



14N0158

Brake caliper kit



14N0159

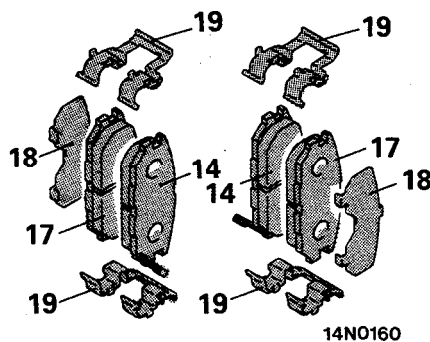
Caliper assembly disassembly steps

- * 1. Lock pin
- * 2. Guide pin
- 3. Bushing
- 4. Caliper support (pad, clip, shim)
- 5. Pin boot
- 9. Boot ring
- ☒ 10. Piston boot
- ⇄ 11. Piston
- ⇄ 12. Piston seal
- 13. Caliper body

Pad assembly disassembly steps

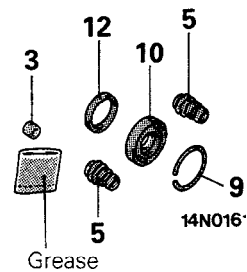
- ⇄ 1. Lock pin
- * 2. Guide pin
- 3. Bushing
- 4. Caliper support (pad, clip, shim)
- 14. Pad and wear indicator assembly
- 17. Pad assembly
- 18. Outer shim
- 19. Clip

Pad kit



14N0160

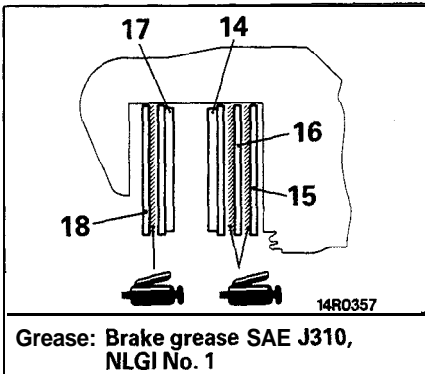
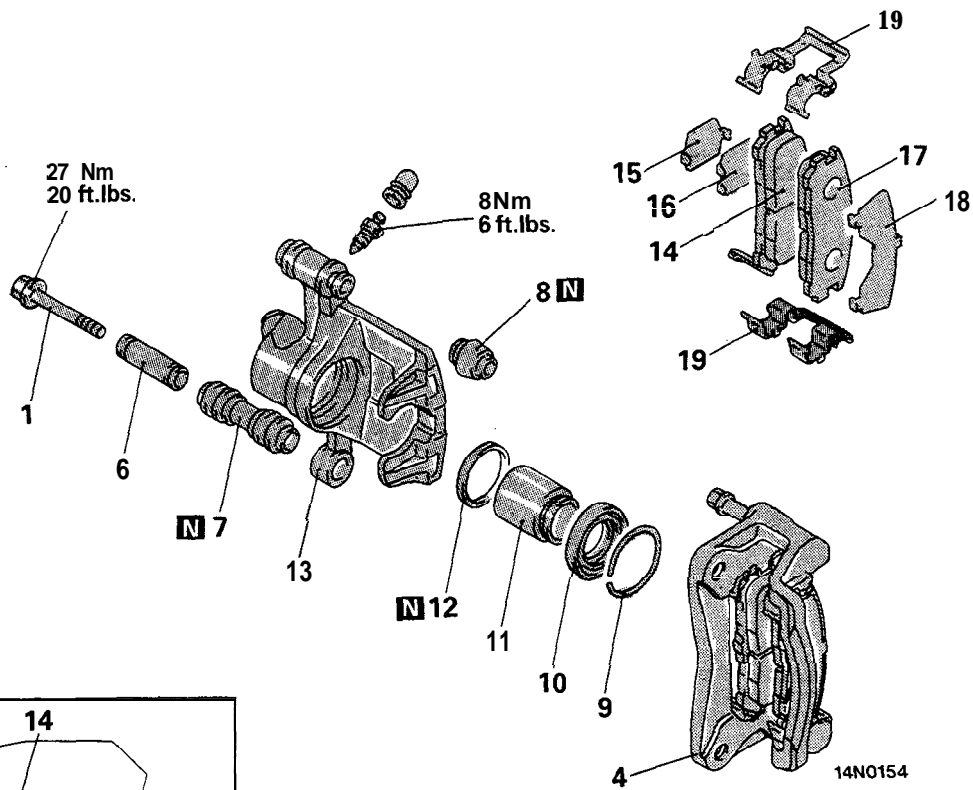
Seal and boot kit



14N016*

Grease

<FWD>

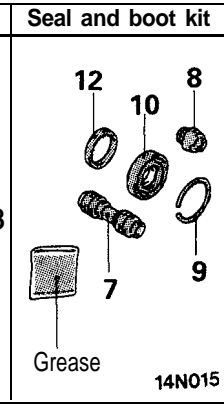
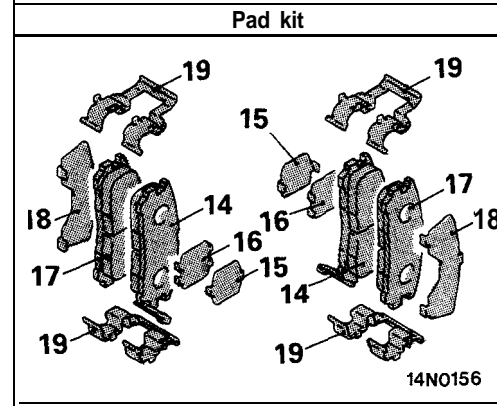
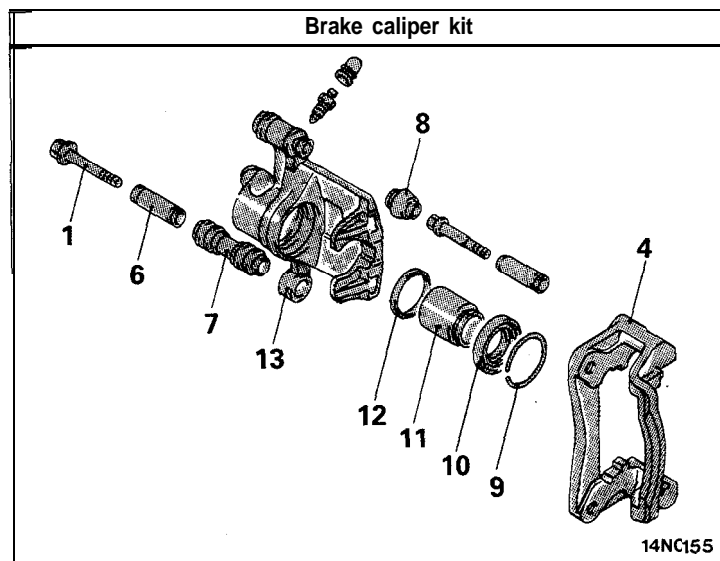


Caliper disassembly steps

1. Lock pin
4. Caliper support (pad, clip, shim)
6. Sleeve
7. Lock pin boot
8. Guide pin boot
9. Boot ring
- ↔ 10. Piston boot
- ↔ 11. Piston
- ↔ 12. Piston seal
13. Caliper body

Pad assembly disassembly steps

1. Lock pin
4. Caliper support (pad, clip, shim)
14. Pad and wear indicator assembly
15. Inner shim B
16. Inner shim A
17. Pad assembly
18. Outer shim
19. Clip



TSB Revision

Lubrication Points

14L0125

14Y184

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

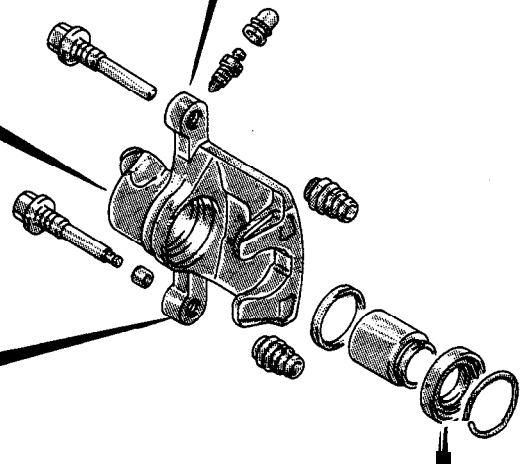
<AWD>

14N0121

<FWD>

14L0124

Grease: Repair kit grease (orange)



<AWD>

14N0121

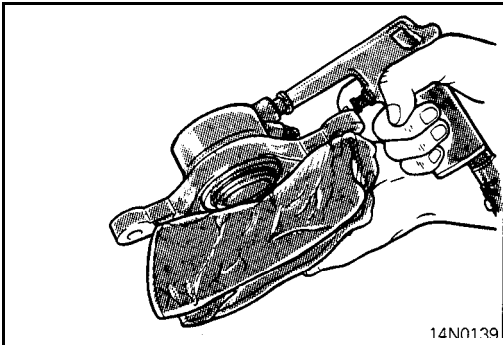
<FWD>

14L0121

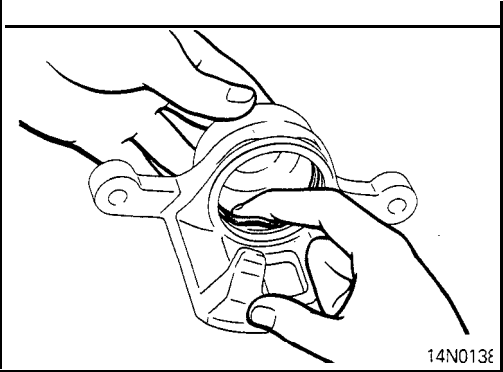
Grease: Repair kit grease (orange)

14L0126

Grease: Repair kit grease (orange)



14N0139



14N0136

SERVICE POINTS OF DISASSEMBLY

M35NBAF

10. REMOVAL OF PISTON BOOT / 11. PISTON

Protect caliper body with cloth. Blow compressed air through brake hose to remove piston boot and piston.

Caution

Blow compressed air gently.

12. REMOVAL OF PISTON SEAL

(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

INSPECTION

M35NCAD

- 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.

PAD WEAR CHECK

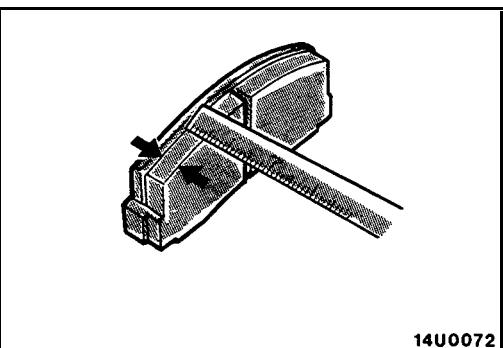
Measure the thickness at the thinnest worn area of the pad. Replace pad assembly when pad thickness is less than the limit value.

Standard value: 10.0 mm (.39 in.)

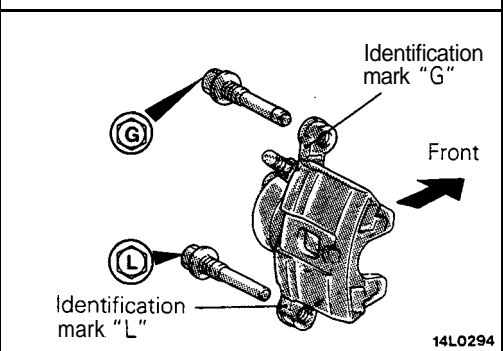
Limit: 2.0 mm (.08 in.)

Caution

1. Whenever the pad is to be replaced, replace the pads on the 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.



14U0072



14L0294

SERVICE POINTS OF REASSEMBLY

M35NDAI

2. INSTALLATION OF GUIDE PIN / 1. LOCK PIN

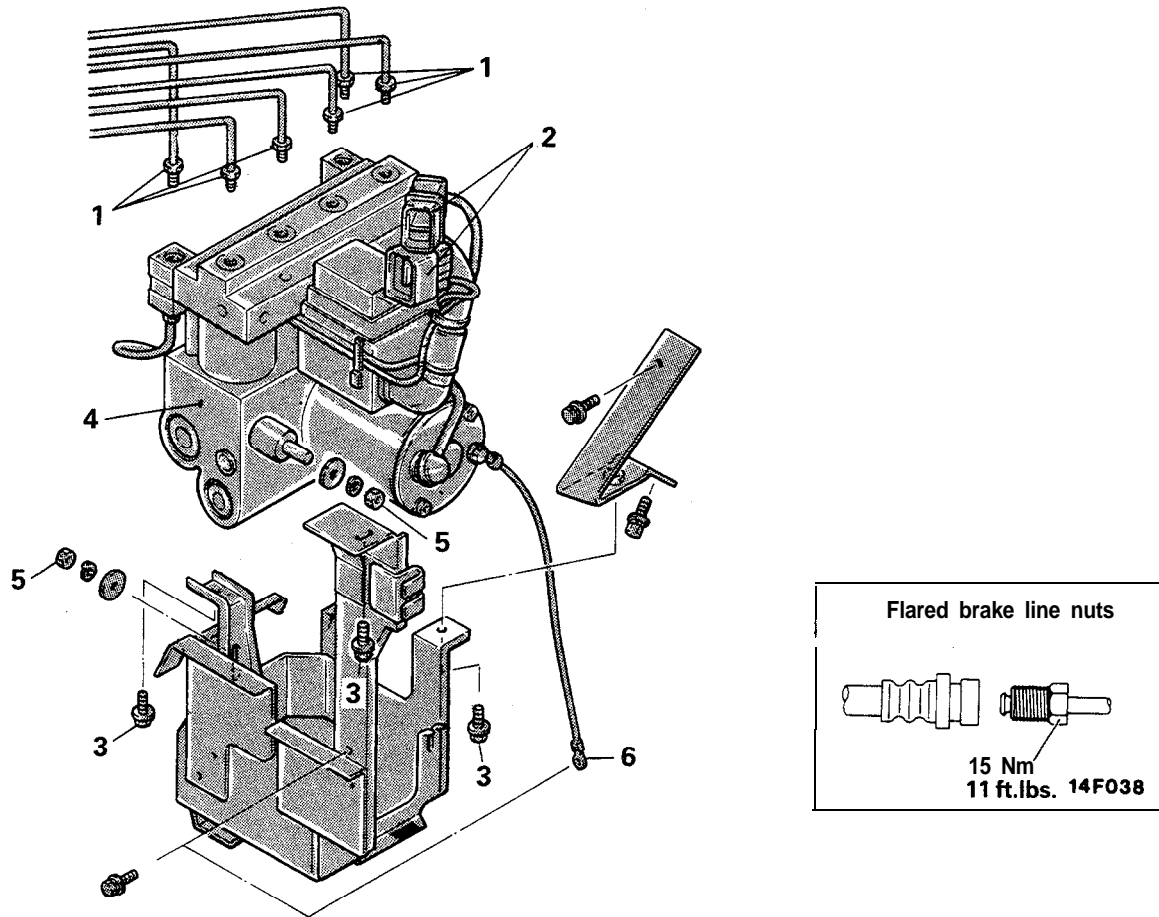
<AWD>

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.

HYDRAULIC UNIT (ABS)

REMOVAL AND INSTALLATION

M350A-A



Removal steps

- ◄◄ 1. Brake tube connection
- 2. Harness connector connection
- 3. Bracket bolt
- ◄◄ 4. Hydraulic unit (with bracket)
- 5. Hydraulic unit bolt
- 6. Grounding wire connection

Installation steps

- a 6. Grounding wire connection
- 5. Hydraulic unit bolt initial tightening
- 4. Hydraulic unit (with bracket)
- 3. Bracket bolt
- 2. Harness connector connection
- ◄◄ 1. Brake tube connection

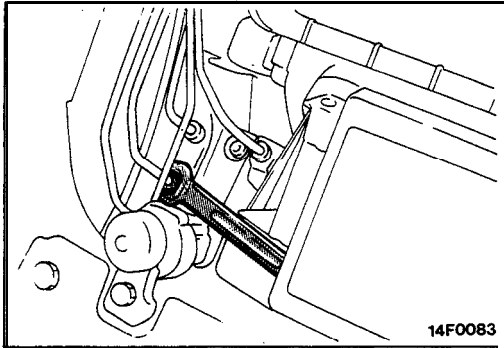
Pre-removal Operation

- Removal of Splash Shield
- Draining of Brake Fluid
- Removal of Relay Box
- Removal of Air Duct

Post-installation Operation

- Installation of Splash Shield
- Installation of Air Duct
- Installation of Relay Box
- Charging of Brake Fluid and Air Bleeding
- Inspection with HU Checker

19F0127

**SERVICE POINTS OF REMOVAL**

M350BAB

1. REMOVAL OF BRAKE TUBES

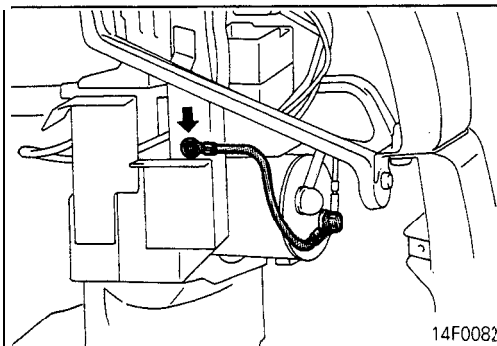
Pull up the relay box with harness attached and inserting a hand under the relay box, remove the brake tubes using the flare nut wrench.

4. REMOVAL OF HYDRAULIC UNIT (HU)

Remove the hydraulic unit together with the bracket from the wheel house.

Caution

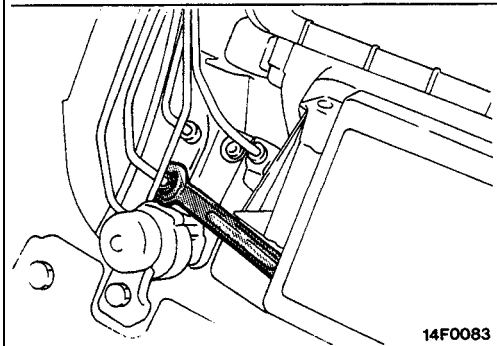
1. The HU is heavy. Use care when removing it.
2. The HU cannot be disassembled. Never loosen its nuts or bolts.
3. Do not drop or shock the HU.
4. Do not turn the HU upside down or lay it on its side.

**SERVICE POINTS OF INSTALLATION**

M350DAB

6. CONNECTION OF GROUNDING WIRE

Connect the grounding wire at the point shown in the illustration.

**1. INSTALLATION OF BRAKE TUBE**

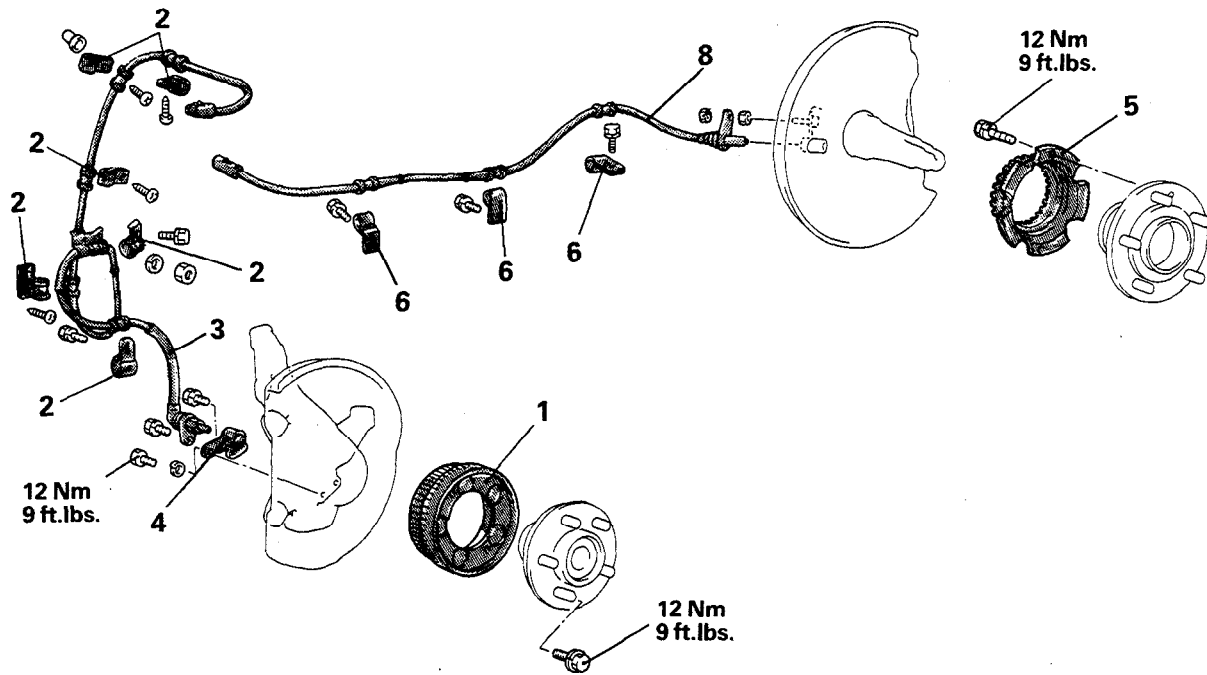
Pull up the relay box with harness attached and inserting a hand under the relay box, install the brake tubes using flare nut wrench.

Connect the tube and hose to the hydraulic unit correctly. (Refer to P.35-73.)

**WHEEL SPEED SENSOR (ABS)
REMOVAL AND INSTALLATION**

M350A-B

<FWD>



14F0078

↔ 1. Front rotor

Front speed sensor removal steps

- ↔ 2. Clip
- ↔↔↔ 3. Front speed sensor
- ↔↔↔ 4. Front speed sensor bracket
- ↔ 5. Rear rotor

Rear speed sensor removal steps

- ↔ 6. Clip
- ↔ • + 8. Rearspeedsensor

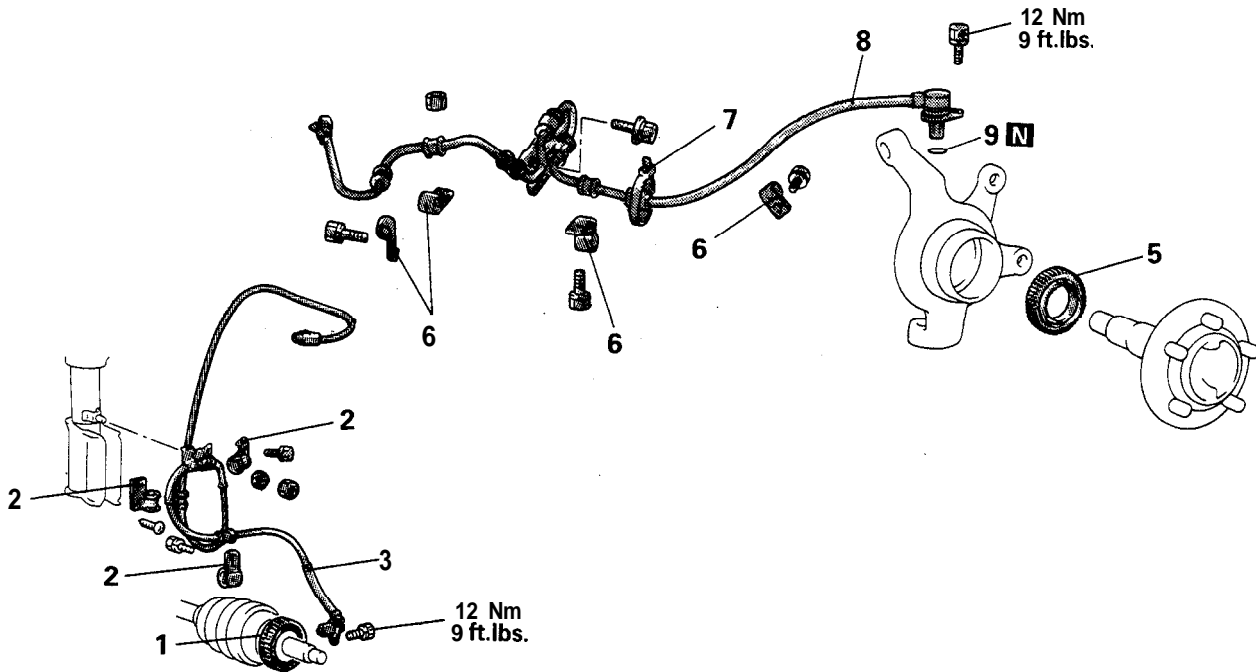
Pre-removal Operation

- Removal of Splash Shield (Refer to Group 42 – Fender.)

Post-installation Operation

- Installation of Splash Shield (Front Only) (Refer to Group 42 – Fender.)
- Inspection of A.B.S. (Refer to P.35-7.)

<AWD>



◆◆ 1. Front rotor

Front speed sensor removal steps

- * ◆◆ 2. Clip
- ◆◆ 3. Front speed sensor
- ◆◆ 5. Rear rotor

Rear speed sensor removal steps

- ◆◆ ● * 6. Clip
- ◆◆ ● * 7. Cable band
- ◆◆ ● * 8. Rear speed sensor
- ◆◆ ● * 9. O-ring

Pre-removal Operation

- Removal of Splash Shield (Front Only)
(Refer to Group 42 – Fender.)

Post-installation Operation

- Installation of Splash Shield (Front Only)
(Refer to Group 42 – Fender.)
- Inspection of A.B.S.
(Refer to P.35-7.)

SERVICE POINTS OF REMOVAL

M350BAC

1. REMOVAL OF FRONT ROTOR / 5. REMOVAL OF REAR ROTOR

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.

3. REMOVAL OF FRONT SPEED SENSOR / 8. REAR SPEED SENSOR

Caution

When removing the speed sensor from the knuckle, use care not to strike the tip of the pole piece against the rotor teeth or any other parts.

INSPECTION

M350CAC

INSPECTION OF SPEED SENSOR

- (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

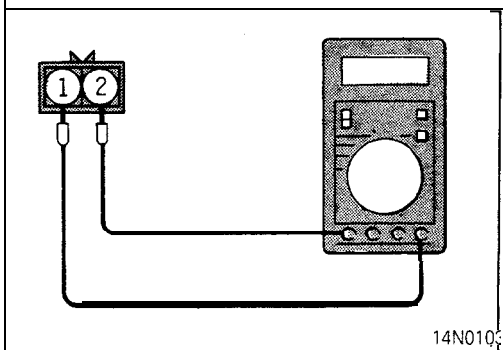
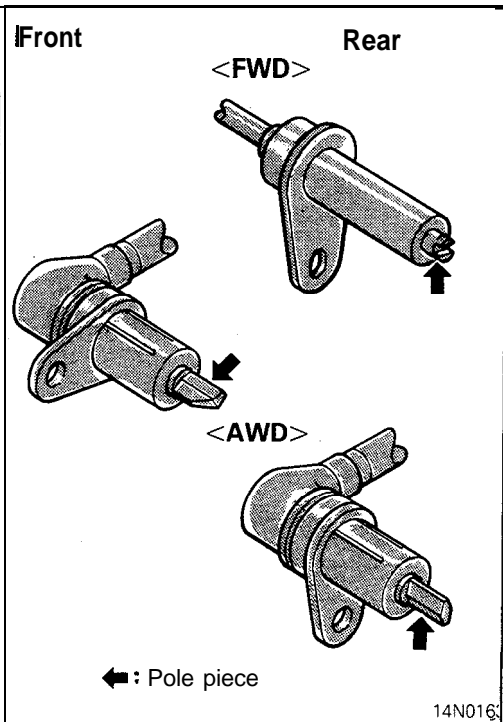
The speed sensor pole piece is magnetized by a built-in magnet inside the sensor, so it tends to attract metal. If the pole piece is damaged, accurate wheel speed detection may not be expected.

- (2) Measure resistance between speed sensor terminals.

Standard value:

<FWD>	Front	1.4-2.2 k Ω
	Rear	1.3-2.1 k Ω
<AWD>		0.8 – 1.2 k Ω

If the internal resistance of the speed sensor is out of specification, replace with a new one.



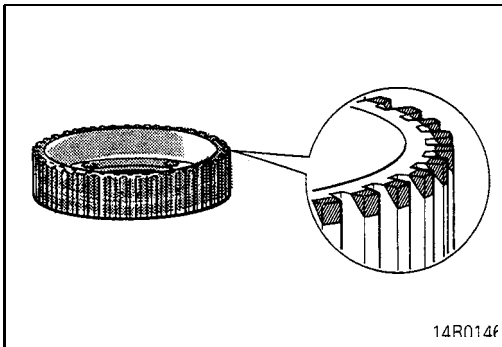
- (3) Check the speed sensor cable for open circuit and replace if faulty.

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.

INSPECTION OF ROTOR

Check the rotor for missing or worn teeth and replace if faulty.



SERVICE POINTS OF INSTALLATION

M350DAC

8. INSTALLATION OF REAR SPEED SENSOR <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.)

4. INSTALLATION OF FRONT SPEED SENSOR BRACKET

NOTE

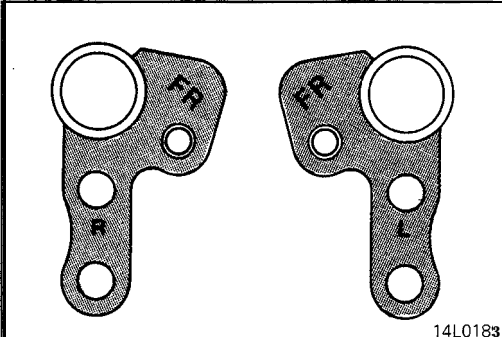
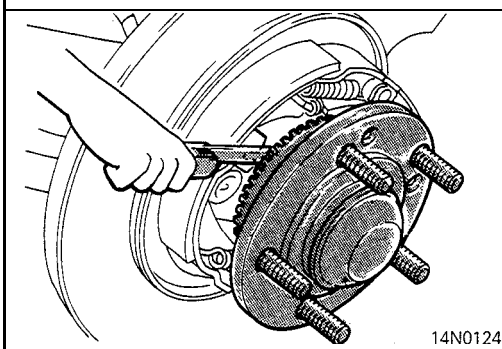
- (1) The right and left speed sensor brackets differ in shape. Install correctly referring to the identification symbols.

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.



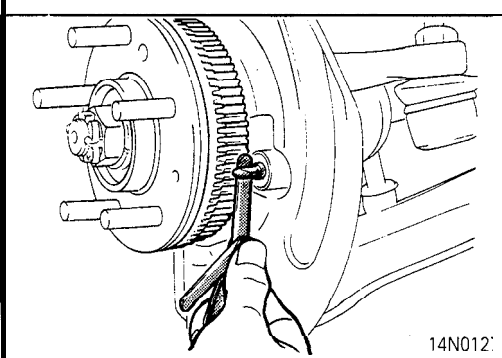
3. INSTALLATION OF FRONT SPEED SENSOR

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.

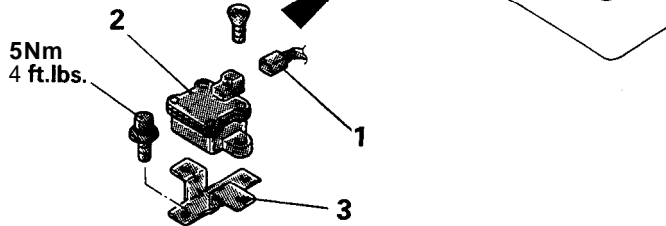
Standard value: 0.3 – 0.9 mm (.012 – .035 in.)



G SENSOR (AWD – ABS)**REMOVAL AND INSTALLATION**

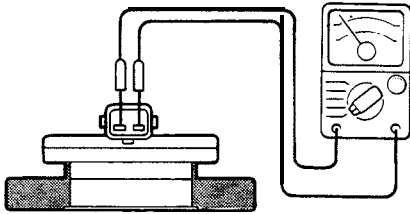
M350A-C

Pre-removal and Post-installation Operation
Removal and installation of Front
and Rear Console Assemblies
(Refer to Group 52A – Console Box.)

**Removal steps**

1. G sensor connector
2. G sensor
3. G sensor bracket

14F0115



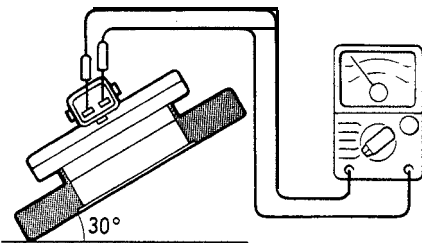
14A0194

INSPECTION

M350CAD

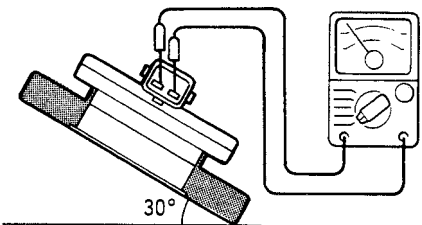
1. INSPECTION OF G SENSOR

- (1) Lay the G sensor on a level surface and check for continuity between its terminals.



14A0195

- (2) Incline the G sensor toward the vehicle front gradually and check that continuity is lost at an angle of 30° or more.



14A0196i

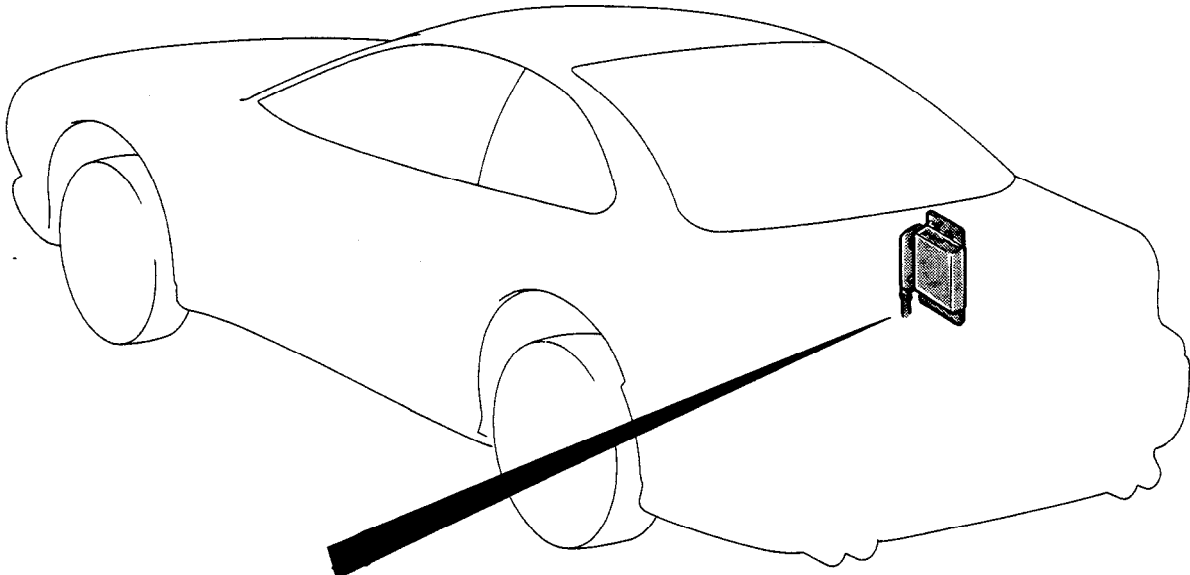
- (3) Incline the G sensor toward the vehicle rear gradually and check that continuity is lost at an angle of 30° or more.

TSB Revision

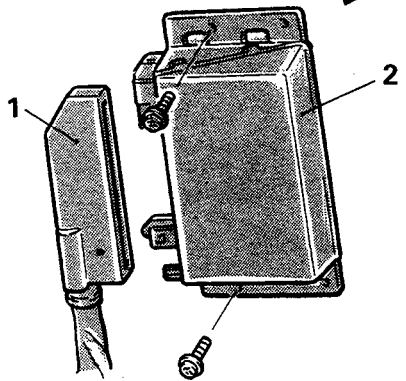
ELECTRONIC CONTROL UNIT (ABS)

REMOVAL AND INSTALLATION

M350A-D



14F0080



14F0079

Pre-removal Operation

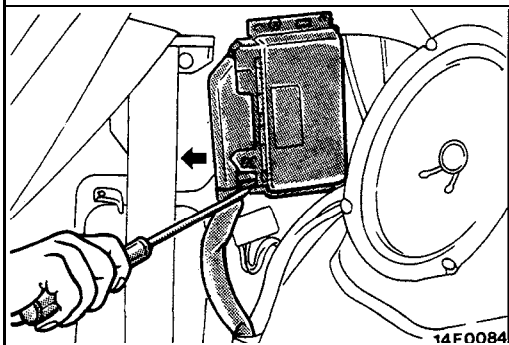
- Removal of Rear Seat Cushion
- Removal of Rear Seatback (R)
- Removal of Quarter Trim

Post-installation Operation

- Installation of Quarter Trim
- Installation of Rear Seatback (R)
- Installation of Rear Seat Cushion
- inspection of A.B.S.
(Refer to P.35-7.)

Removal steps

- ◄► 1. Control unit connector connection
- 2. Electronic control unit



14F0084

SERVICE POINT OF REMOVAL

M350BAD

1. REMOVAL OF CONTROL UNIT CONNECTOR

Insert a screwdriver into the lock section as illustrated and pull out the connector from below.

TSB Revision



PARKING BRAKES

CONTENTS

M36AA-

PARKING BRAKE	8	SPECIAL TOOLS	3
PARKING BRAKE LEVER AND PARKING BRAKE CABLE*	5	SPECIFICATIONS	2
SERVICE ADJUSTMENT PROCEDURES	4	General Specifications	2
Parking Brake Lever Stroke Check	4	Lubricants	2
Parking Brake Switch Check	4	Sealants and Adhesives	2
		Service Specifications	2
		TROUBLESHOOTING	3

SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

- (1) A Supplemental Restraint System (SRS), which uses a driver-side air bag, has been installed in the 3000GT.
- (2) The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning light, air bag module, clock spring, 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 (*).

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) 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), before beginning any service or maintenance of any component of the SRS or any SRS-related component.

SPECIFICATIONS

M36CA--

GENERAL SPECIFICATIONS

Items	Specifications
Parking brakes Type Brake lever type Cable arrangement	Mechanical brake acting on rear wheels Lever type V-type

SERVICE SPECIFICATIONS

M36CB--

Items	Specifications
Standard value Parking brake lever stroke Brake lining thickness mm (in.) Brake drum I.D. mm (in.) Clearance between the speed sensor pole piece and the rotor tooth mm (in.)	3 – 5 notches 2.8 (.11) 168.0 (6.6) 0.2 – 0.7 (.008 – .028)
Limit Brake lining thickness mm (in.) Brake drum I.D. mm (in.)	1.0 (.039) 169.0 (6.7)

LUBRICANTS

M36CD--

items	Specified lubricant
Rear brake shoe and backing plate contact surfaces Contact surface between shoe & lining assembly's strut and adjuster Contact surface between shoe & lining assembly and shoe-adjustment bolt and shoe-support piece	Brake grease SAE J310, NLGI No. 1

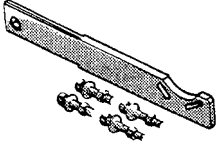
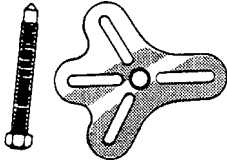
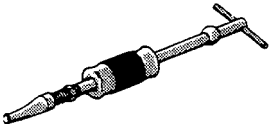
SEALANTS AND ADHESIVES

M36CE--

Items	Specified sealant
Shoe hold-down pin installation surface	3M ATD Part No. 8513 or equivalent

SPECIAL TOOLS

M36DA--

Tool	Number	Name	Use
	MB990767-01	End yoke holder	Removal of the rear axle shaft assembly
	MB990241-01	Axle puller	
	MB99021 1-01	Side hammer with adapter	

TROUBLESHOOTING

M36EAAL

Symptom	Probable cause	Remedy
Brake drag	Incomplete release of parking brake	Correct
	Incorrect parking brake adjustment	Adjust
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

SERVICE ADJUSTMENT PROCEDURES

PARKING BRAKE LEVER STROKE CHECK

M36FEAK

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

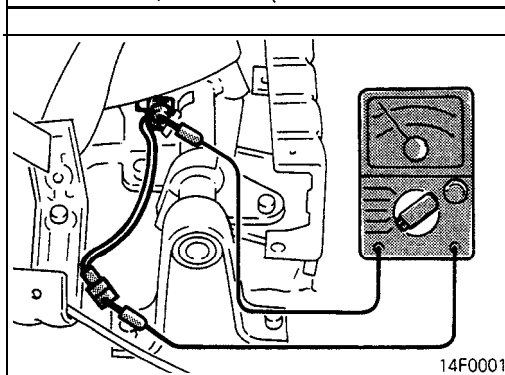
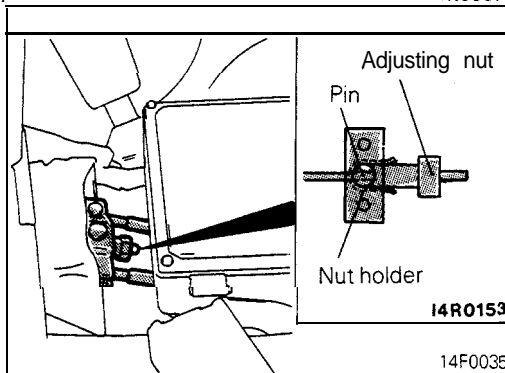
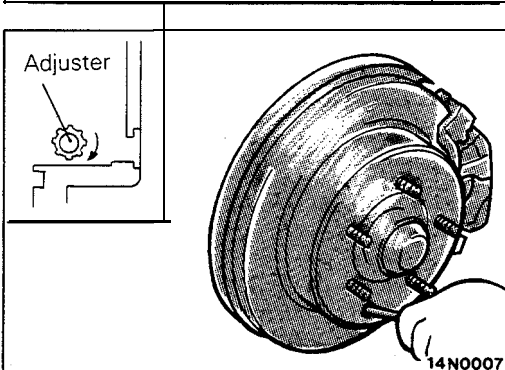
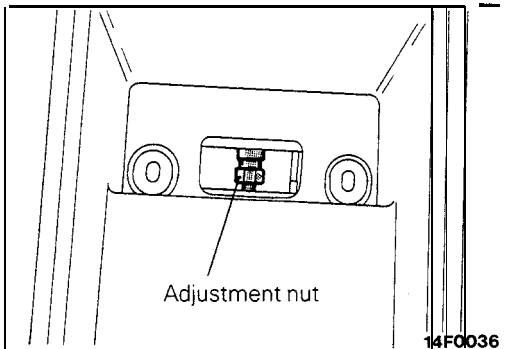
Do not adjust parking brake lever stroke too tight, less than the standard value, or brake drag could result.

- (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

M36FDAG

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.



PARKING BRAKE LEVER AND PARKING BRAKE CABLE

M36WA -

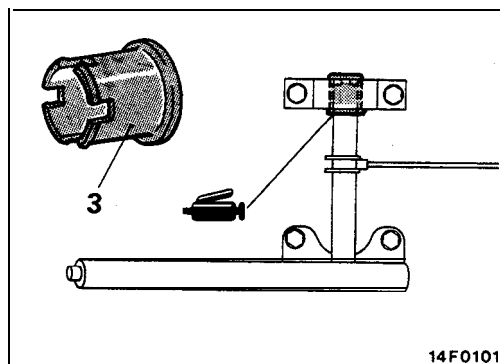
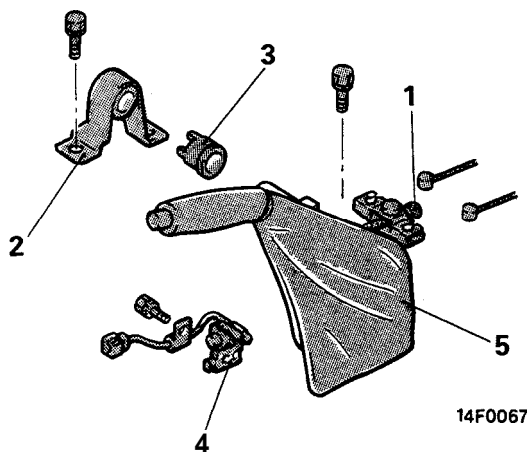
REMOVAL AND INSTALLATION

Pre-removal Operation

- Removal of Front and Rear Console
(Refer to GROUP 52A – Console Box.)

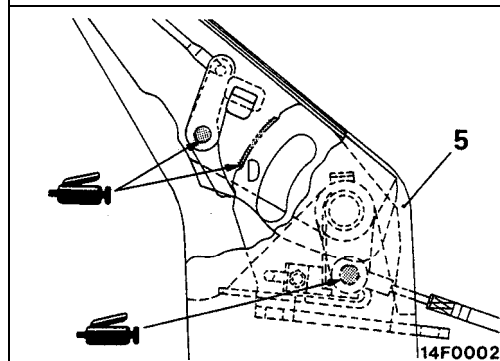
Post-installation Operation

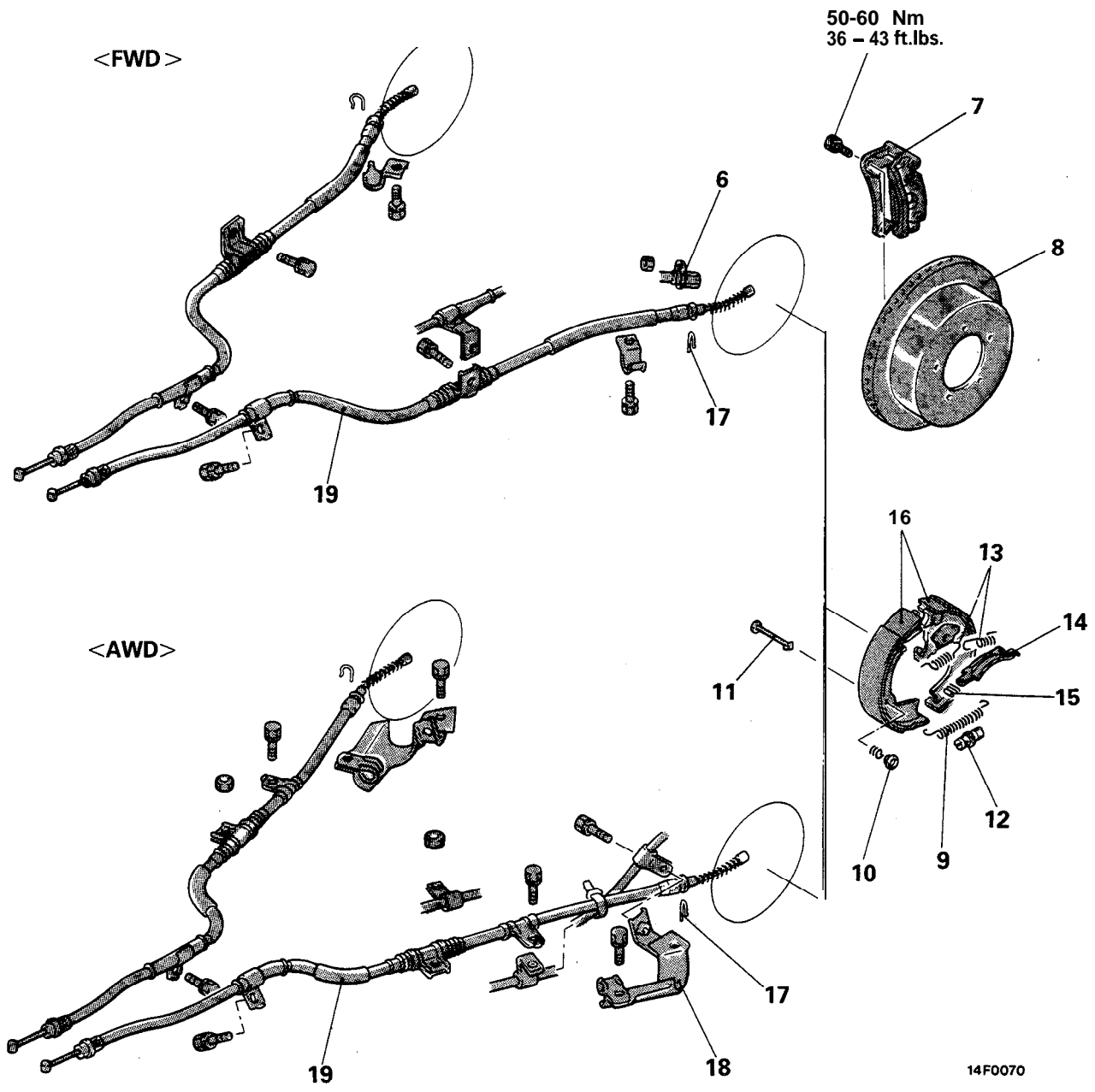
- Parking Brake Lever Stroke Adjustment
(Refer to P.36-4.)
- Installation of Front and Rear Console
(Refer to GROUP 52A – Console Box.)



Parking brake lever removal steps

1. Cable adjuster
2. Parking brake stay
3. Bushing
4. Parking brake switch
5. Parking brake lever

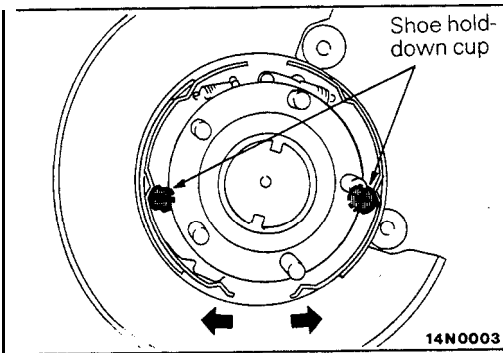




14F0070

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
- ◄► 10. Shoe hold-down cup
- 11. Shoe hold-down pin
- ◄► 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

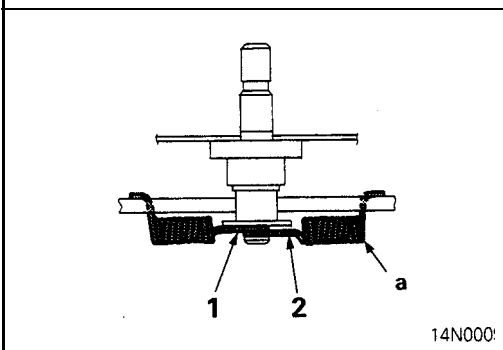


SERVICE POINTS OF REMOVAL

M36WBAE

10. REMOVAL OF SHOE HOLD DOWN CUP

Expand the shoe & lining assembly and remove the shoe hold down cup.



SERVICE POINTS OF INSTALLATION

M36WDAH

13. INSTALLATION OF SHOE TO ANCHOR SPRINGS

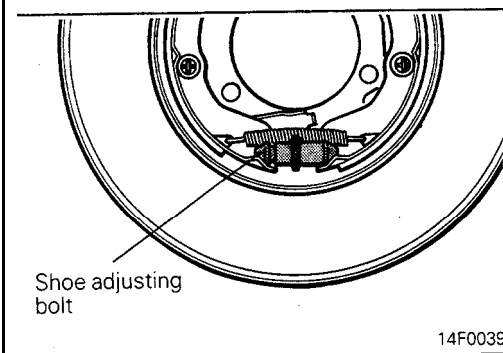
The shoe-to-anchor spring must be installed in the sequence shown in the illustration.

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 is symmetrical.



12. INSTALLATION OF ADJUSTER

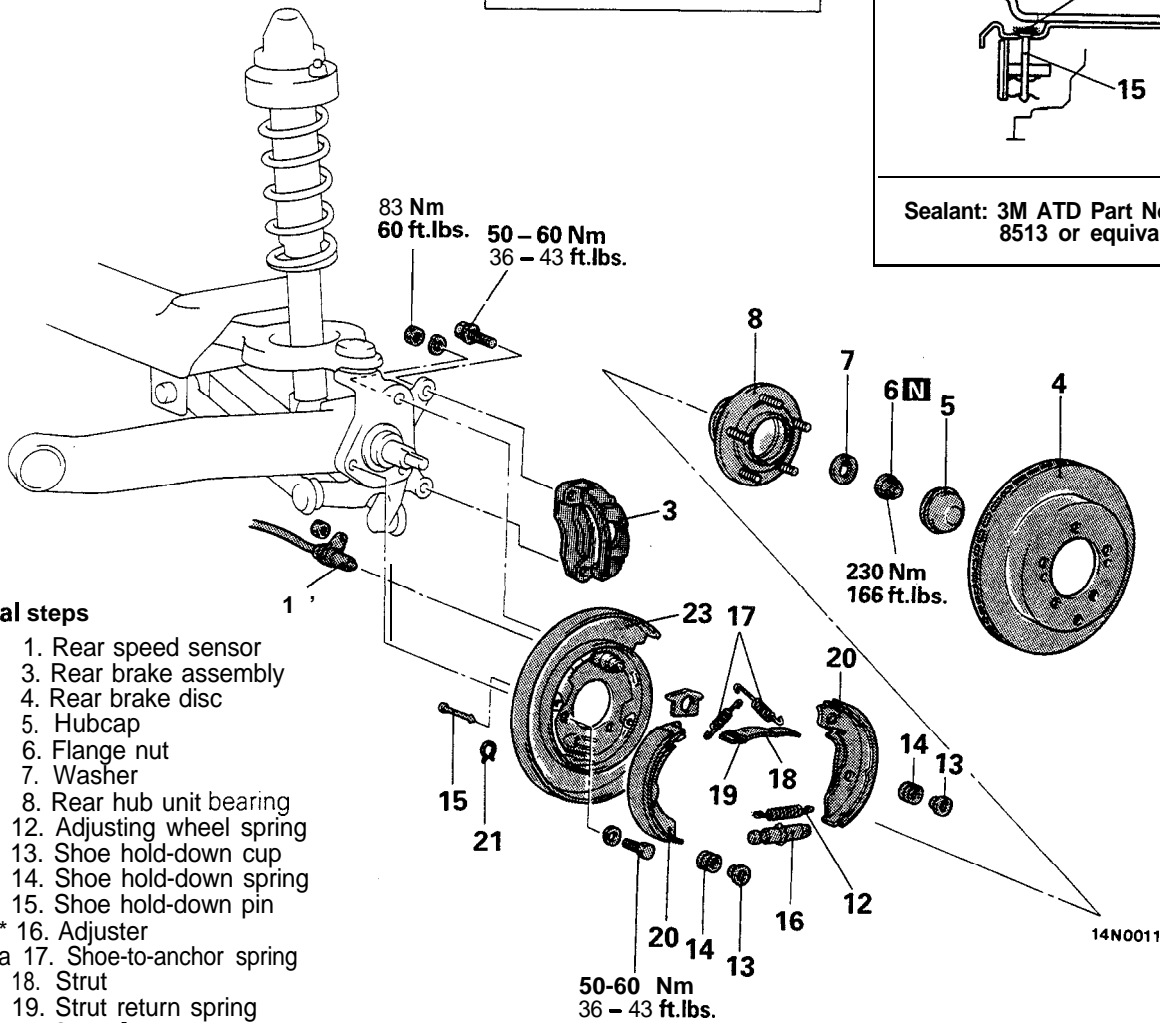
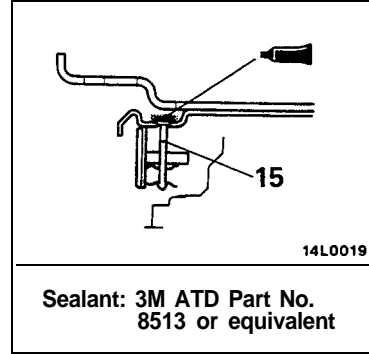
Install the adjuster facing the left adjusting bolt to the vehicle front and right adjusting bolt to the vehicle rear.

PARKING BRAKE

REMOVAL AND INSTALLATION

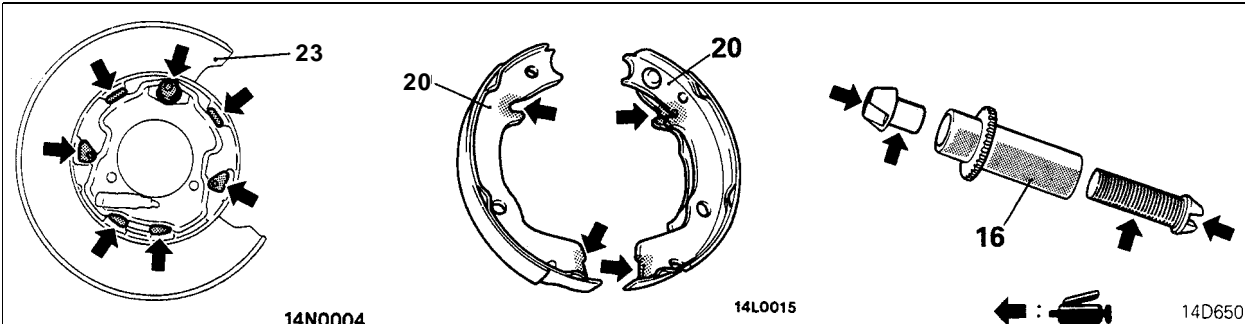
<FWD>

Post-installation Operation
 • Parking Brake Lever Stroke Adjustment (Refer to P.36-4.)



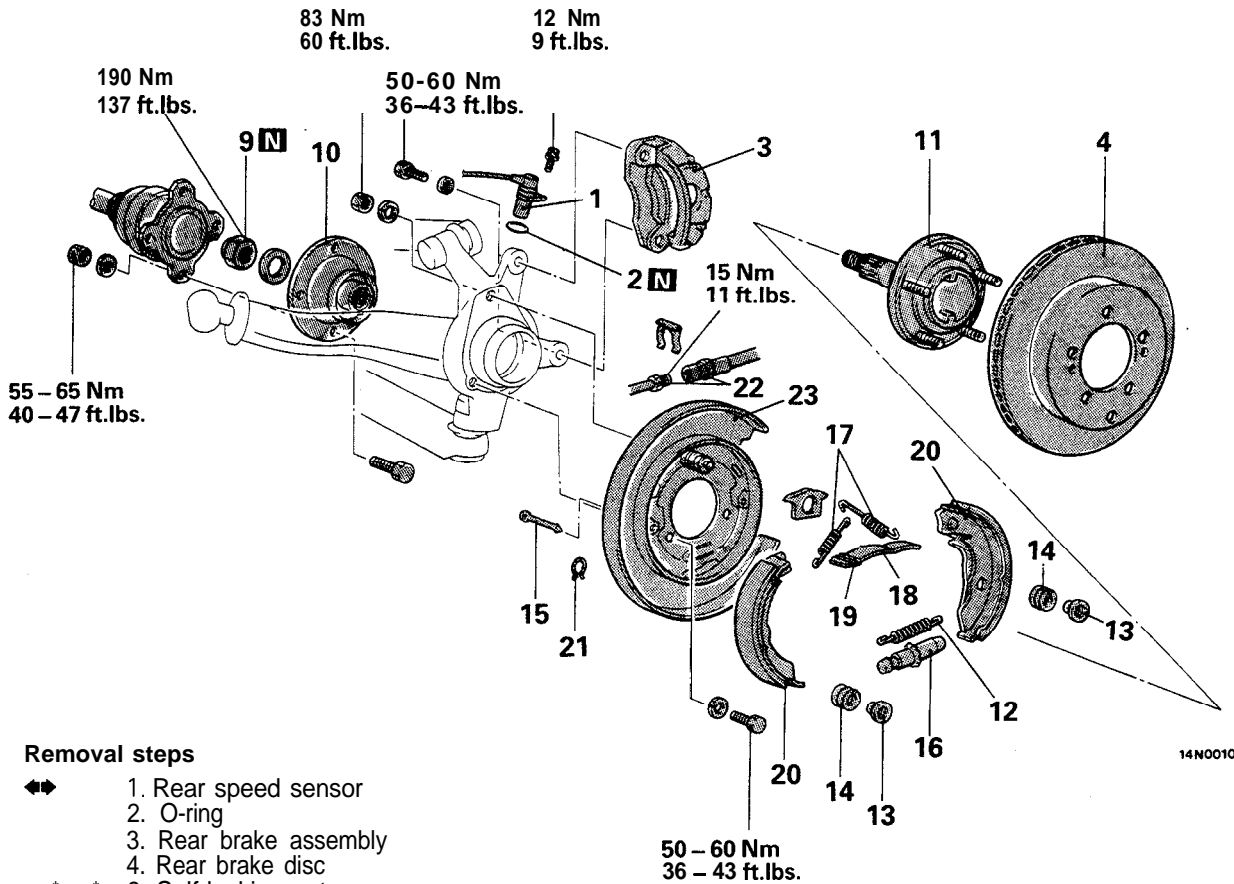
Removal steps

- ➔ • * 1. Rear speed sensor
- 3. Rear brake assembly
- 4. Rear brake disc
- 5. Hubcap
- + 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
- * 16. Adjuster
- a 17. Shoe-to-anchor spring
- 18. Strut
- 19. Strut return spring
- 20. Shoe & lining assembly
- 21. Clip
- 23. Backing plate



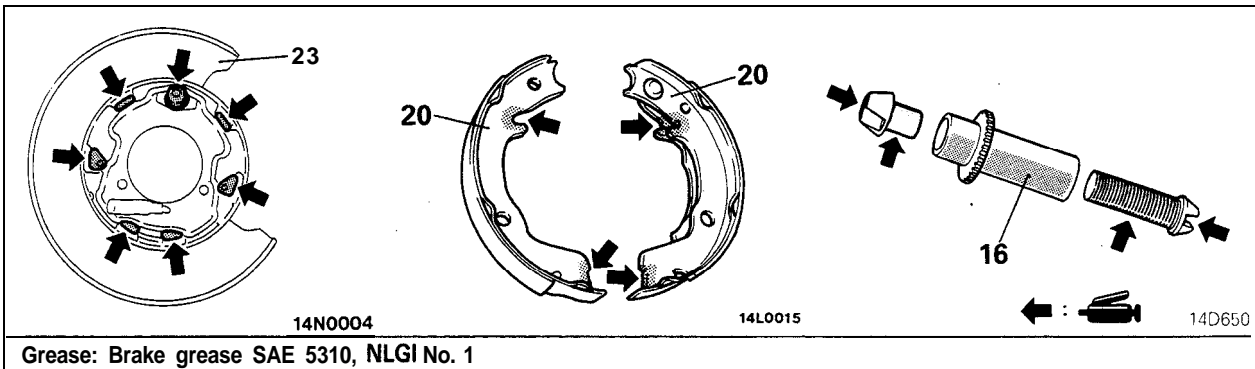
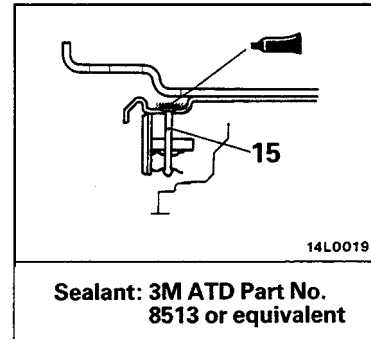
Grease: Brake grease SAE J310, NLGI No. 1

<AWD>



Removal steps

- ↔ 1. Rear speed sensor
- ↔ 2. O-ring
- ↔ 3. Rear brake assembly
- ↔ 4. Rear brake disc
- * • 9. Self-locking nut
- * • 10. Companion flange
- ☒ 11. Rear axle shaft
- 12. Adjusting wheel spring
- 13. Shoe hold-down cup
- 14. Shoe hold-down spring
- 15. Shoe hold-down pin
- ♦ ♦ 16. Adjuster
- ♦ ♦ 17. Shoe-to-anchor spring
- 18. Strut
- 19. Strut return spring
- 20. Shoe & lining assembly
- 21. Clip
- 22. Brake tube connection
- 23. Backing plate



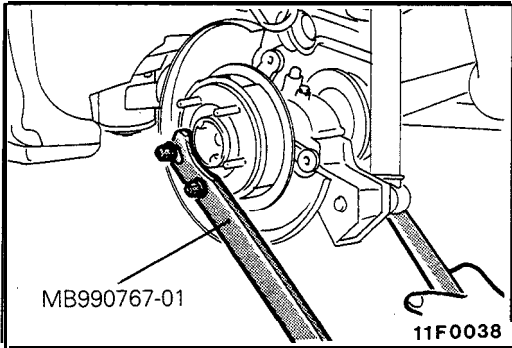
SERVICE POINTS OF REMOVAL

M36YBAL

I. REMOVAL OF REAR SPEED SENSOR

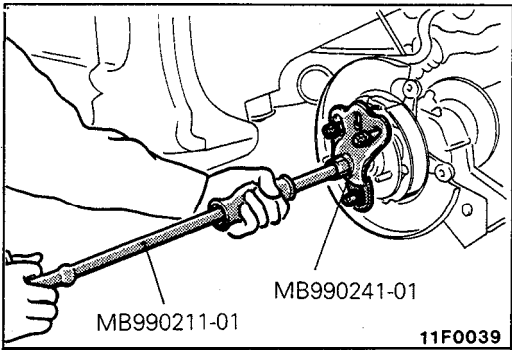
Caution

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.



9. REMOVAL OF SELF-LOCKING NUT

With the special tool, secure the axle shaft and remove the companion flange self-locking nut.



II. REMOVAL OF AXLE SHAFT ASSEMBLY

With the special tool, remove the axle shaft from the trailing arm.

INSPECTION

M36YCAI

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.

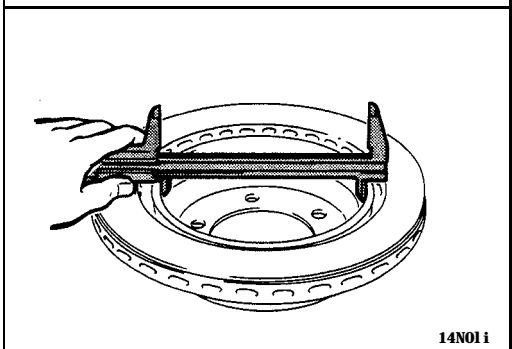
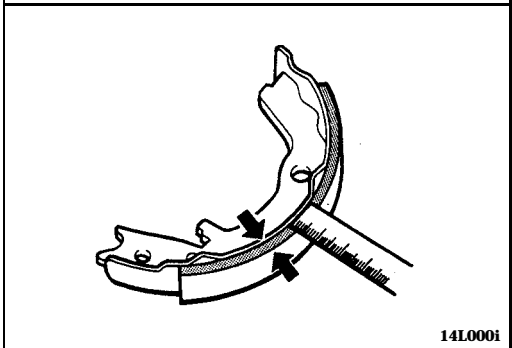
(2) Measure the brake disc drum inner diameter at two or more places.

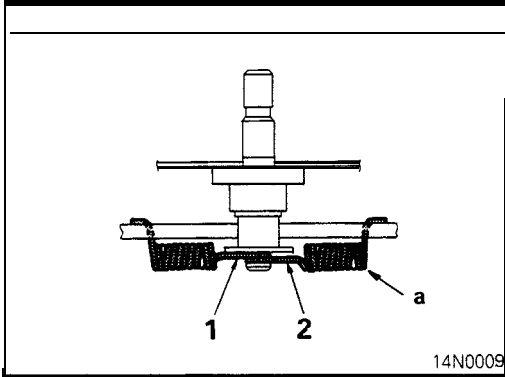
Standard value: 168.0 mm (6.6 in.)

Limit: 169.0 mm (6.7 in.)

Caution

Replace if the brake disc drum inner diameter is the limit value or more.





SERVICE POINTS OF INSTALLATION

M36YDAP

17. INSTALLATION OF SHOE-TO-ANCHOR SPRING

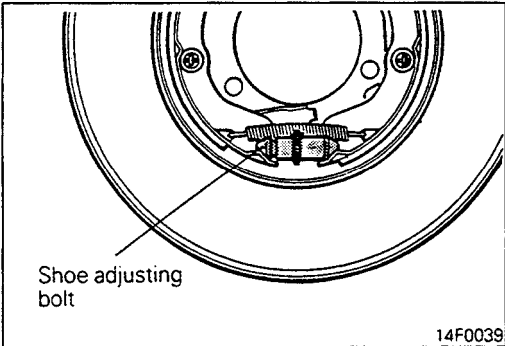
The shoe-to-anchor spring must be installed in the sequence shown in the illustration.

Caution

Each shoe-to-anchor spring has a unique spring load and the spring "a" is painted to prevent erroneous installation.

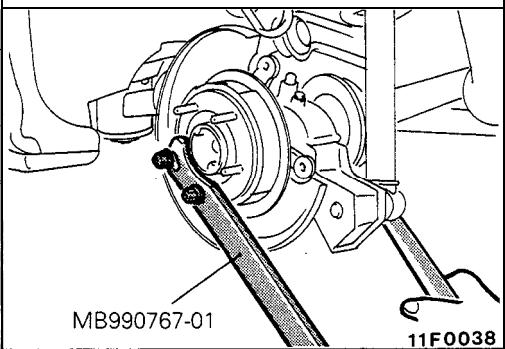
NOTE

The figure shows the left wheel; for the right wheel, the position is symmetrical.



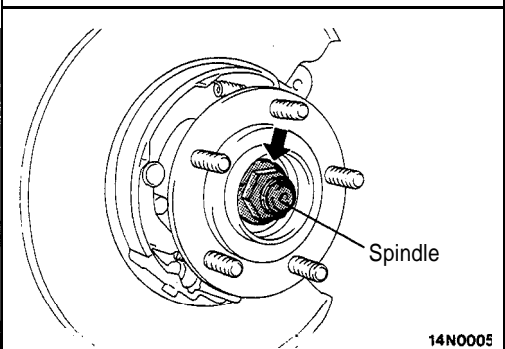
16. INSTALLATION OF ADJUSTER

Install the adjuster facing the left adjusting bolt to the vehicle front and right adjusting bolt to the vehicle rear.



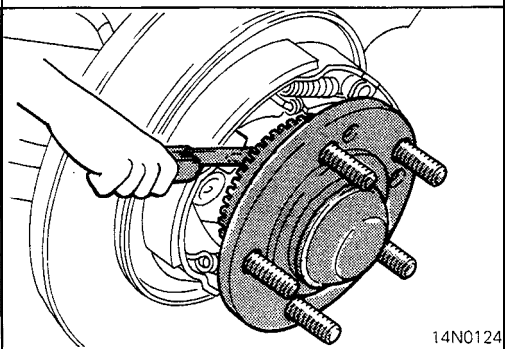
9. INSTALLATION OF SELF-LOCKING NUT

With the special tool, secure the axle shaft and tighten the companion flange self-locking nut.



6. INSTALLATION OF FLANGE NUT <FWD>

After tightening the flange nut, align with the spindle's indentation and crimp.



1. INSTALLATION OF REAR SPEED SENSOR <FWD>

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.)

○

○

○

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STEERING

CONTENTS

M37AA-A

POWER STEERING GEAR BOX*	17	Steering Wheel Return to Center Check	8
POWER STEERING HOSES	32	Tie Rod End Ball Joint Starting Torque Check	6
POWER STEERING OIL PUMP	28	Tie Rod End Ball Joint Variation Check (Shaft direction)	5
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Bleeding	10	SPECIAL TOOLS	3
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Oil Pump Pressure Test	11	Sealant and Adhesives	3
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Steering Wheel Centering	6		
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SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

- (1) A Supplemental Restraint System (SRS), which uses a driver-side air bag, has been installed in the 3000GT.
- (2) The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning light, air bag module, clock spring, 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 (*).

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) 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), before beginning any service or maintenance of any component of the SRS or any SRS-related component.

SPECIFICATIONS

GENERAL SPECIFICATIONS

M37CA-A

Items	Specifications
Steering wheel	
Steering wheel O.D. mm (in.)	390 (15.4)
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)

SERVICE SPECIFICATIONS

M37CB-A

Items	Specifications
Standard value	
Steering wheel free play (with engine stopped) mm (in.)	11 (.43)
Steering angle	
Inner wheel	33°45' ± 2"
Outer wheel	28°21'
Tie rod end ball joint starting torque Nm (in.lbs.)	
FWD	0.5 – 3.0 (4 – 26)
AWD	1.0 – 3.0 (9 – 26)
Stationary steering effort N (lbs.)	35 (8) or less
V-belt deflection mm (in.)	
When belt tension is inspected or readjusted	9 - 11 (.35 – .43)
When new belt is installed	7 – 8.5 (.28 – .33)
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)
Limit	
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	
Pressure gauge valve opened MPa (p s i)	1.5 (213)
Space between vane and rotor mm (in.)	0.06 (.0024)

LUBRICANTS

M37CD-A

Items	Specified lubricant	Quantity
Power steering gear box		
Bearing	MITSUBISHI PLUS ATF/Automatic transmission fluid "DEXRON" or "DEXRON II"	As required
O-ring	MITSUBISHI PLUS ATF/Automatic transmission fluid "DEXRON" or "DEXRON II"	As required
Oil seal	MITSUBISHI PLUS ATF/Automatic transmission fluid "DEXRON" or "DEXRON II"	As required
Special tool (MB991 213)	MITSUBISHI PLUS ATF/Automatic transmission fluid "DEXRON" or "DEXRON II"	As required
Pinion and valve assembly seal ring part	MITSUBISHI PLUS ATF/Automatic transmission fluid "DEXRON" or "DEXRON II"	As required
Bellows	Silicone grease	As required
Power steering oil pump		
Power steering fluid	MITSUBISHI PLUS ATF/Automatic transmission fluid "DEXRON" or "DEXRON II"	0.9 liter (.95 qt.)
Flow control valve	MITSUBISHI PLUS ATF/Automatic transmission fluid "DEXRON" or "DEXRON II"	As required
Friction surface of rotor, vane, cam ring and pump cover	MITSUBISHI PLUS ATF/Automatic transmission fluid "DEXRON" or "DEXRON II"	As required
O-ring	MITSUBISHI PLUS ATF/Automatic transmission fluid "DEXRON" or "DEXRON II"	As required

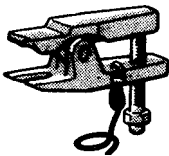
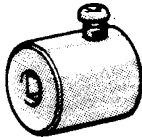
SEALANT AND ADHESIVES

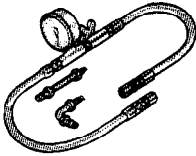

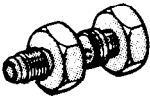
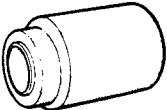
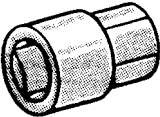
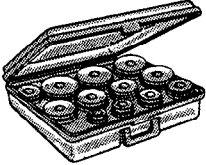
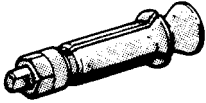
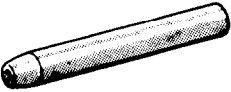
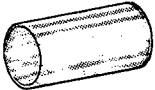
M37CE-A

Items	Specified sealant and adhesive
Power steering gear box	
End plug screw	3M ART Part No. 8663 or equivalent
Power steering rack support cover screw	3M ART Part No. 8663 or equivalent
Dust cover	3M ART Part No. 8663 or equivalent

SPECIAL TOOLS

M37DA-A

Tool	Number	Name	Use
	MB991 113-01	Steering linkage puller	Disconnection of tie-rod end
	MB991 006-01	Preload socket	Measurement of the total pinion torque

Tool	Number	Name	Use
	MB990662-01	Oil pressure gauge assembly	Measurement of oil pressure
	MB990993-01	Power steering oil pressure gauge adapter (pump side)	Measurement of oil pressure
	MB990994-01	Power steering oil pressure gauge adapter (hose side)	Measurement of oil pressure
	MB990776-01	Front axle base	Installation of the dust cover
	MB991 204	Torque wrench socket	Removal and installation of the rack support cover
	MB990925-01	Bearing and oil seal installer set (Refer to GROUP 26)	Installation of the oil seal and bearing MB990927-01 MB990939-01
	MB991120	Needle bearing puller	Removal of rack housing needle bearing
	MB991213	Rack installer	Rack installation
	MB991317	Seal ring installer	Compression of the seal rings after replacement of the pinion seal rings

SERVICE ADJUSTMENT PROCEDURES**STEERING WHEEL FREE PLAY CHECK**

M37FABI

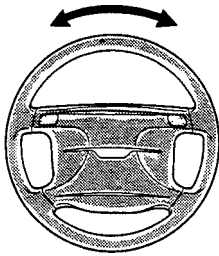
1. With engine running (hydraulic operation), set front wheels straight ahead.
2. Measure the play on steering wheel circumference before wheels start to move when slightly moving steering wheel in both directions.

Limit: 30 mm (1.2 in.)

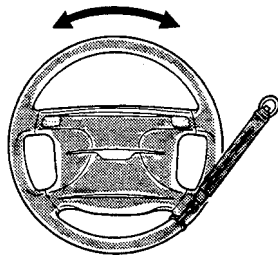
3. When the play exceeds the limit, check for play on steering shaft connection and steering linkage. Correct or replace.
4. If the free play still exceeds the limit value set steering wheel straight ahead with engine stopped. Load 5 N (1 lb.) towards steering wheel circumference and check play.

Standard values (steering wheel play with engine stopped): 11 mm (.43 in.)

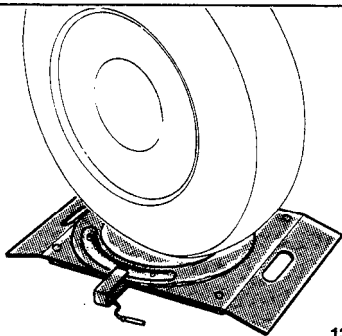
If the play exceeds the standard value, remove steering gear box and check total pinion torque.



13F0001



13F0003



13A0295

STEERING ANGLE CHECK

M37FDBK

1. Set front wheels on turning radius gauge and measure steering angle.

Standard values:**Inner wheel** $33^{\circ}45' \pm 2''$ **Outer wheel** $28^{\circ}21'$

2. When not within the standard value, it is probably a toe problem. Adjust toe (refer to GROUP 33A – Service Adjustment Procedures) and recheck.

TIE ROD END BALL JOINT VARIATION CHECK (SHAFT DIRECTION)

M37FPAF

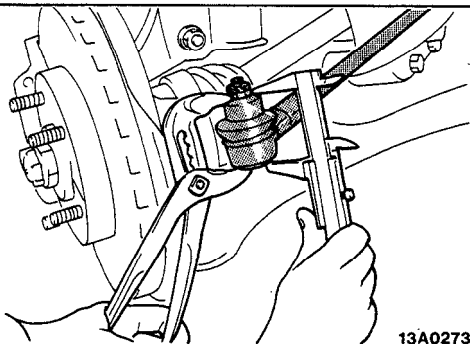
1. Hold the ball joint with pliers.
2. Set a caliper gauge as illustrated and measure the displacement with the ball stud compressed.

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.

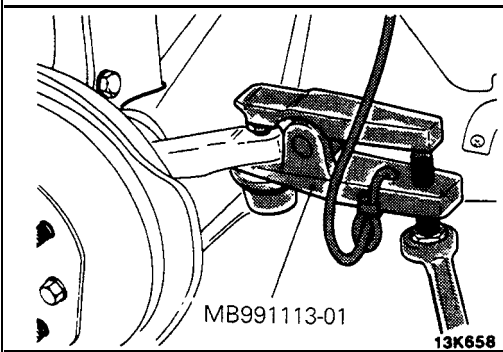


13A0273

TIE ROD END. BALL JOINT STARTING TORQUE CHECK

M37FEBF

1. Disconnect tie rod and knuckle with special tool.

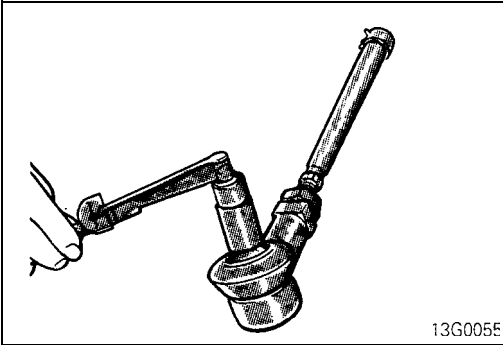


2. Move ball joint stud several times and install nut on stud. Measure ball joint starting torque.

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.



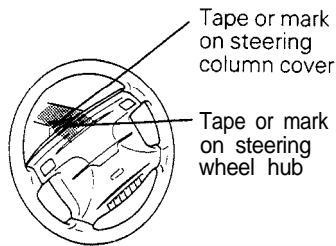
STEERING WHEEL CENTERING

M37FNAI

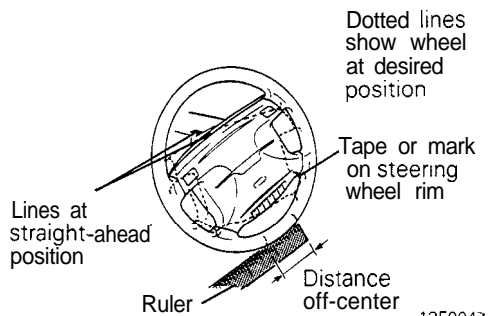
SIMPLIFIED STEERING WHEEL CENTERING

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.



13F0047

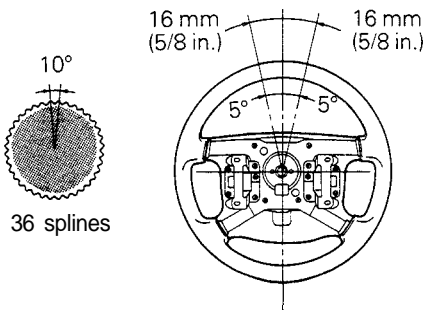


13F0047

Indexing Steering Wheel to Center It

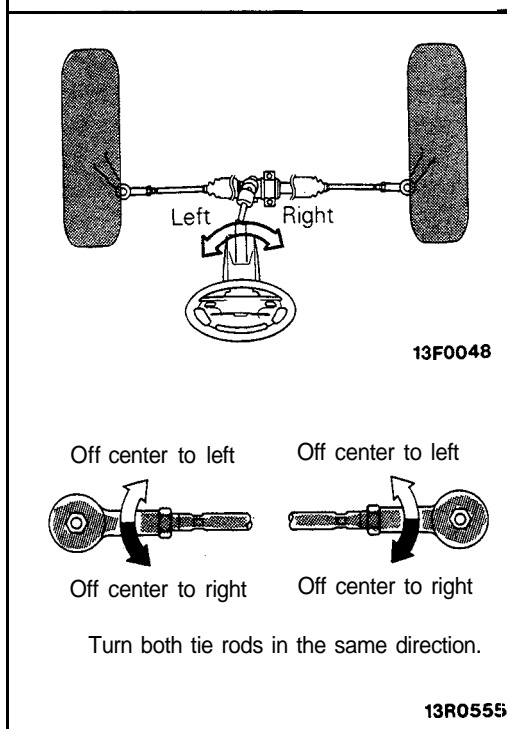
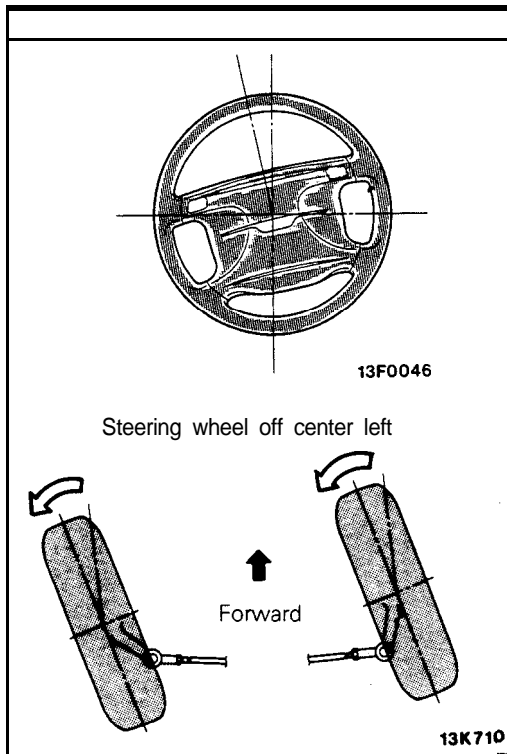
The steering wheel shaft has 36 splines, allowing the steering wheel to be indexed in ten-degree increments.

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.



13W589

13F0045



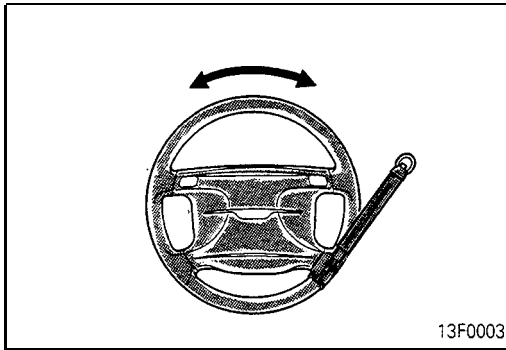
PRECISION STEERING WHEEL CENTERING

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.

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.

**STATIONARY STEERING EFFORT CHECK**

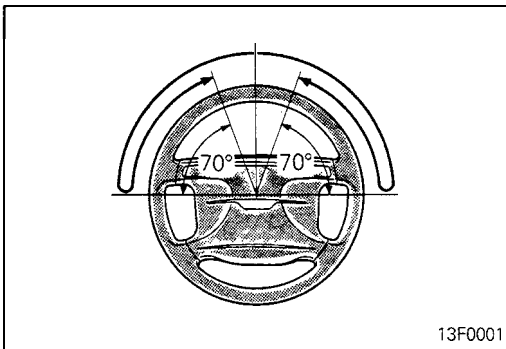
M37FFAM

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 $1,000 \pm 100$ 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****STEERING WHEEL RETURN TO CENTER CHECK**

M37FGAG

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 be 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.)

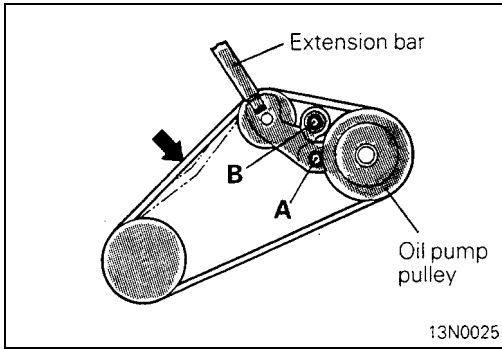
V-BELT TENSION CHECK

M37FHAJ

Check to be sure that the belt is not damaged and that the V-belt is correctly attached to the groove of the pulley.

NOTE

If there is abnormal noise or belt slippage, check the belt tension and check for unusual wear or abrasion, or damage, of the pulley contact surface, and for scars or scratches on the pulley.

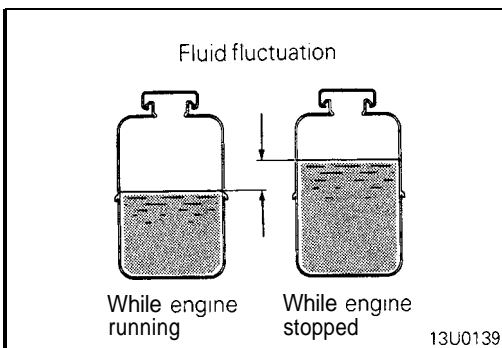


1. Press in V-belt at the illustrated position with about 100 N (22 lbs.) and measure deflection.

Standard value:

When belt tension is inspected or readjusted	9 – 11 mm (.35 – .43 in.)
When new belt is installed	7 – 8.5 mm (.28 – .33 in.)

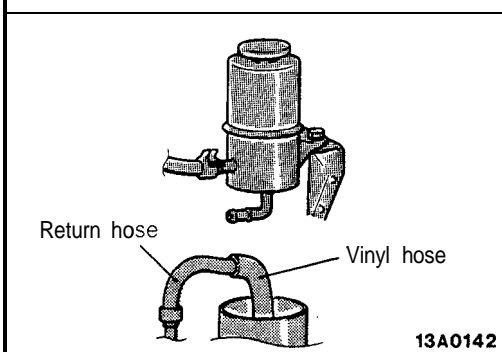
2. If the deflection is out of the standard values, adjust the belt tension using the following procedure.
 - (1) Loosen the tension pulley's securing bolts A and B.
 - (2) Mount the extension bar on the tension pulley.
 - (3) While increasing the tension of the V-belt with the extension bar, retighten the tension pulley's securing bolts A and B in the order mentioned.



FLUID LEVEL CHECK

M37FIAJ

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

M37FJAL

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: MITSUBISHI PLUS ATF/Automatic transmission fluid "DEXRON" or "DEXRON II"

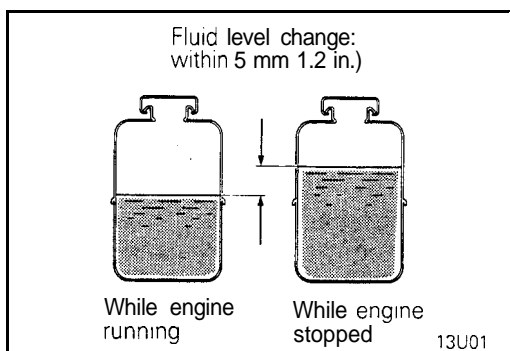
BLEEDING

M37FKAI

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.**

M37FLAH

OIL PUMP PRESSURE TEST**CHECKING THE OIL PUMP RELIEF PRESSURE**

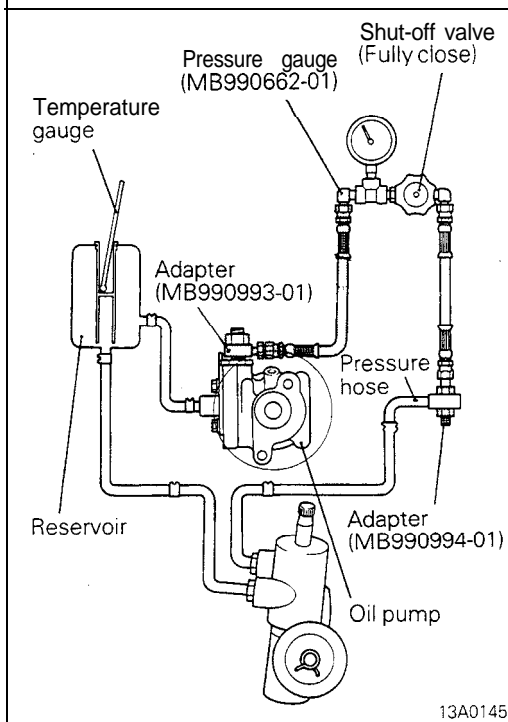
1. Disconnect the pressure hose from the oil pump, and then connect the special tools.
2. Bleed the air, and then turn the steering wheel several times while the vehicle is not moving so that the temperature of the fluid rises to approximately 50 – 60°C (122 – 140°F).
3. Start the engine and idle it 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.



13A0145

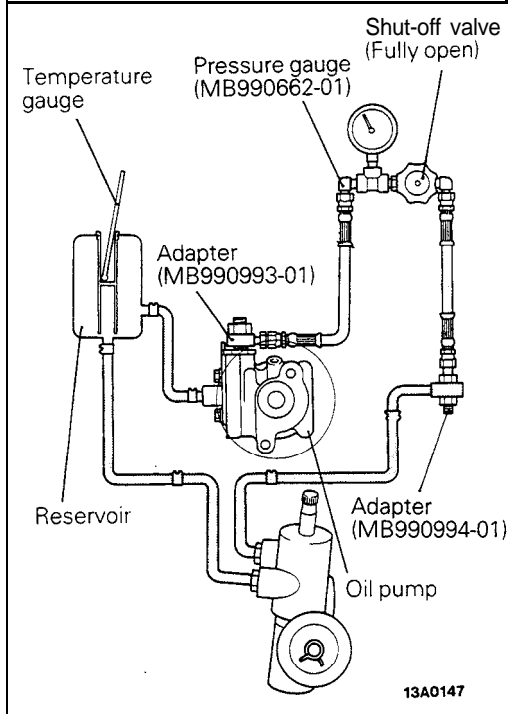
CHECKING THE PRESSURE UNDER NO-LOAD CONDITIONS

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.

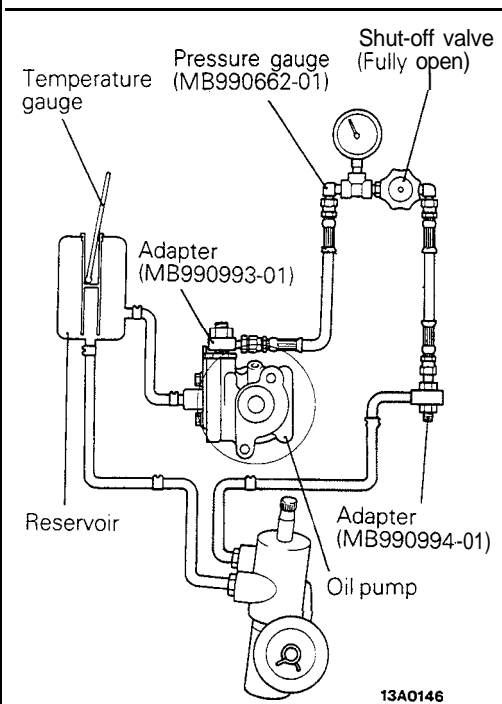
Standard value: 0.8 – 1.0 MPa (114 – 142 psi)

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.



13A0147

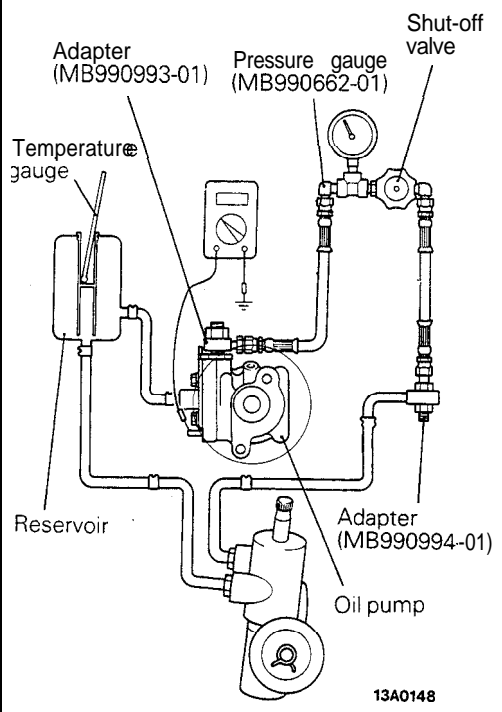


CHECKING THE STEERING GEAR RETENTION HYDRAULIC PRESSURE

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 close and 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

M37FUAC

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)

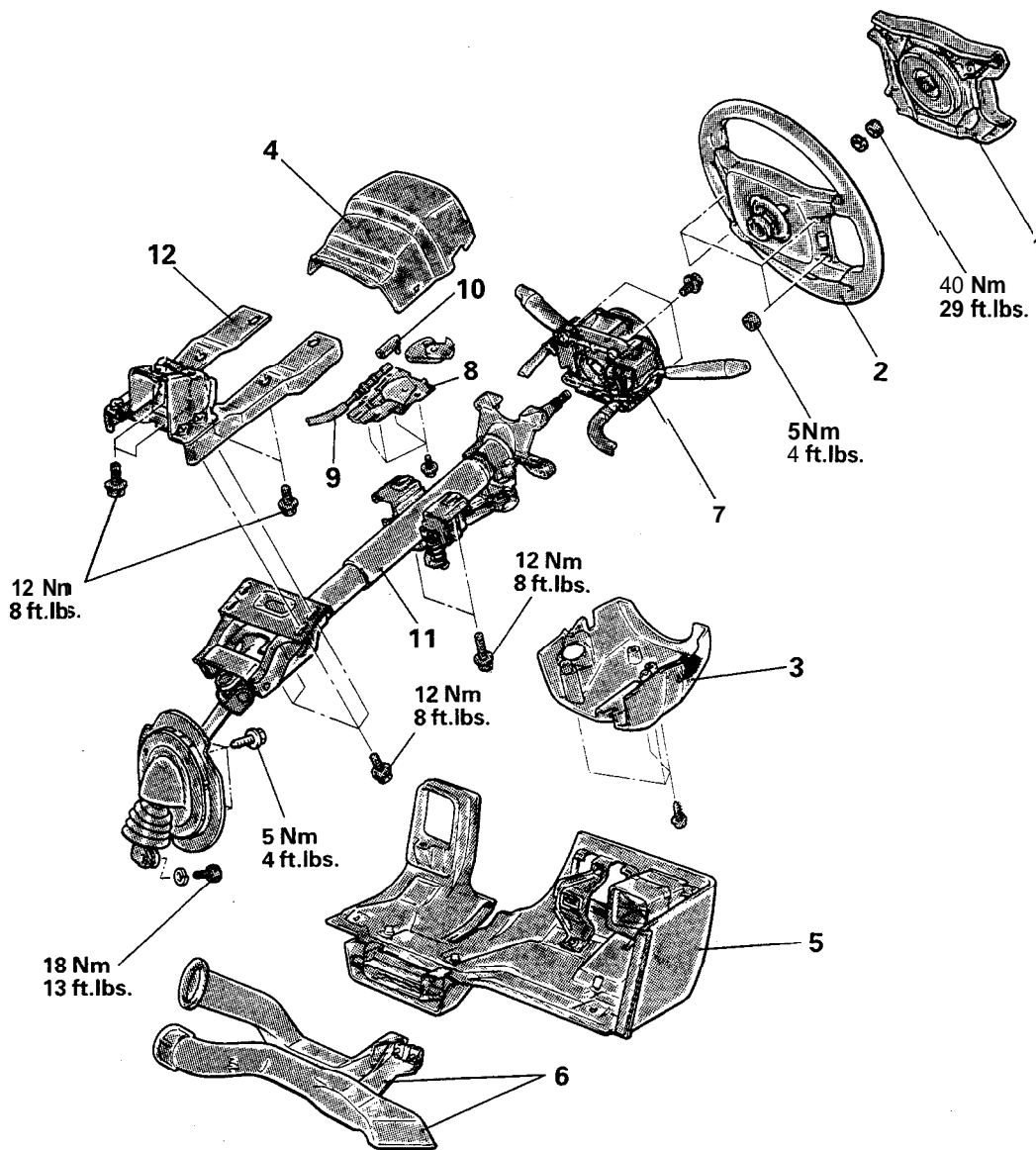
7. Remove the special tools, and then tighten the pressure hose to the specified torque.
8. Bleed the system.

STEERING WHEEL AND SHAFT

REMOVAL AND INSTALLATION

Post-installation Operation

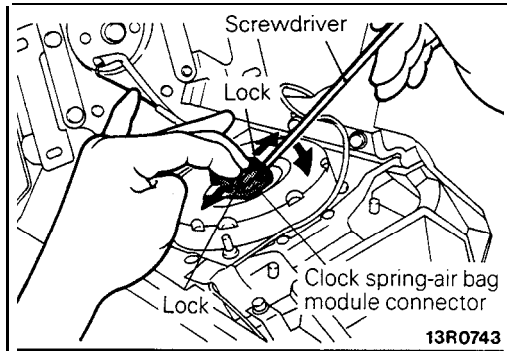
- Checking of Steering Wheel Position with Wheels Straight Ahead



13F0035

Removal steps

- ↔ 1. Air bag module
- ↔ • 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
- 9. Key interlock cable } <Automatic transaxle vehicles>
- 10. Slide lever } (Refer to GROUP 23 – Transaxle Control.)
- 11. Steering column assembly
- 12. Column support assembly



SERVICE POINTS OF REMOVAL

M37GBAV

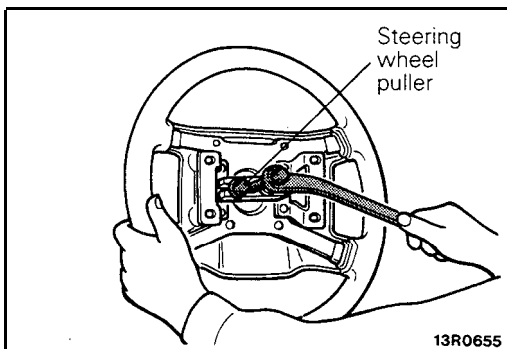
1. REMOVAL OF AIR BAG MODULE

- (1) Remove the air bag module mounting nut using a socket wrench from the back side.
- (2) To remove the clock spring connector (squib connector) from the air bag module, force the lock outward and pry it with a standard screwdriver, as shown in the illustration at the left, to make sure that no undue force is exerted to the connector when it is removed.

Caution

Wait at least 30 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 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 cable is disconnected.

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

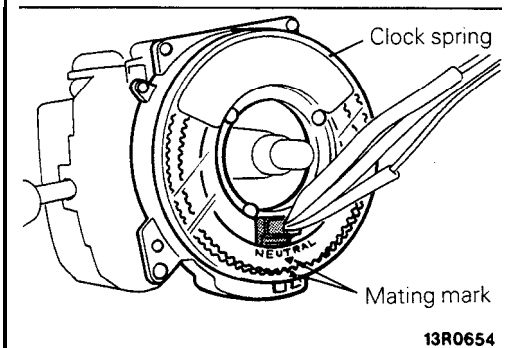


2. REMOVAL OF STEERING WHEEL

Remove the steering wheel by using a steering wheel puller.

Caution

Do not hammer on the steering wheel to remove it; doing so may damage the collapsible mechanism.



SERVICE POINT OF INSTALLATION

M37GDAR

2. INSTALLATION OF STEERING WHEEL

Line up the "NEUTRAL" mark of the clock spring with the mating mark before installing the steering wheel.

Caution

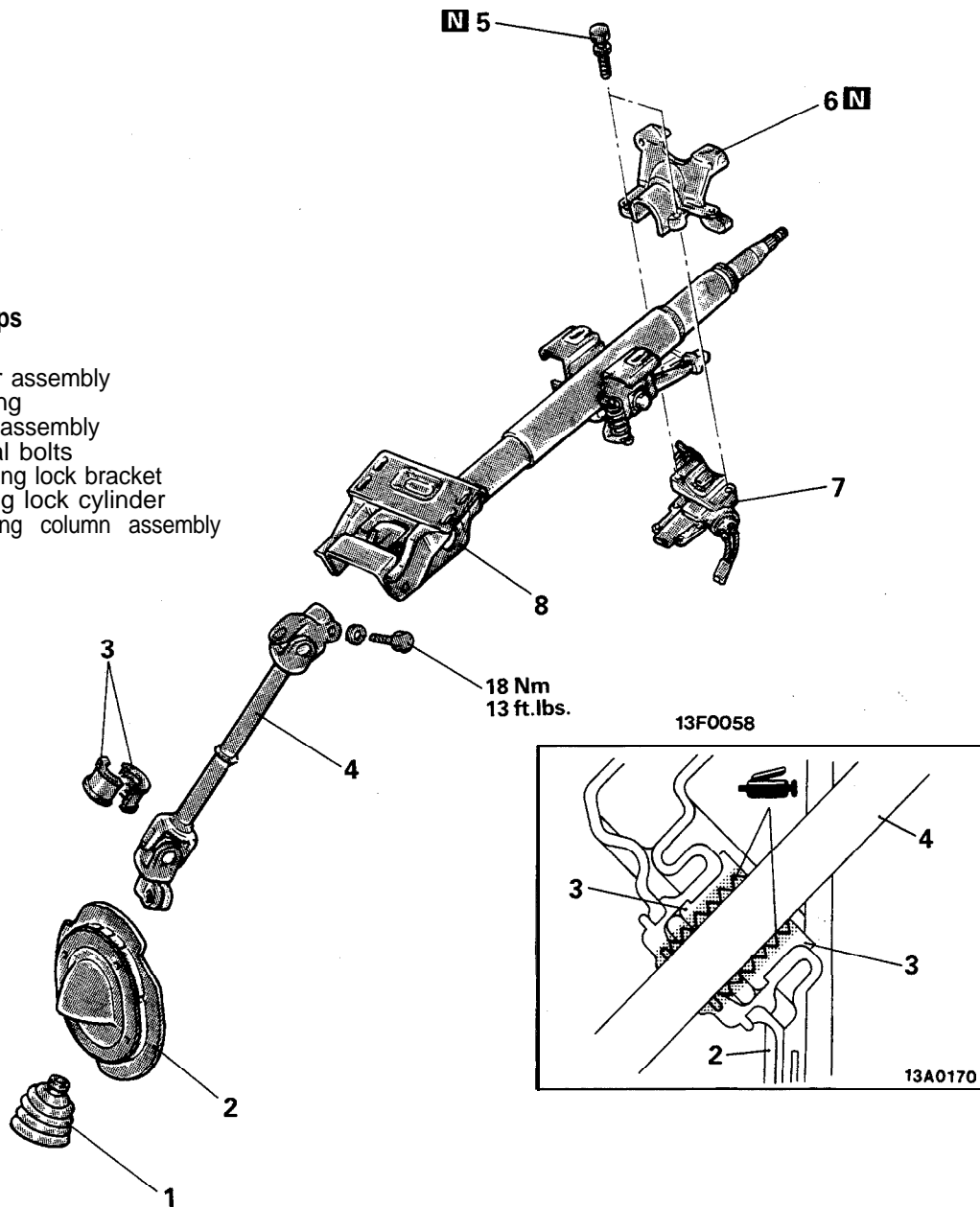
If the clock spring's mating mark is not properly aligned, the steering wheel may not be completely rotational during a turn, or the flat cable within the clock spring may be severed, obstructing normal operation of the SRS and possibly leading to serious injury to the vehicle's driver.

DISASSEMBLY AND REASSEMBLY

M37GE -

Disassembly steps

- 1. Boot
- 2. Cover assembly
- ◆◆ 3. Bearing
- ◆◆ 4. Joint assembly
- ◆◆ 5. Special bolts
- * ● a 6. Steering lock bracket
- ◆◆◆◆ 7. Steering lock cylinder
- 8. Steering column assembly

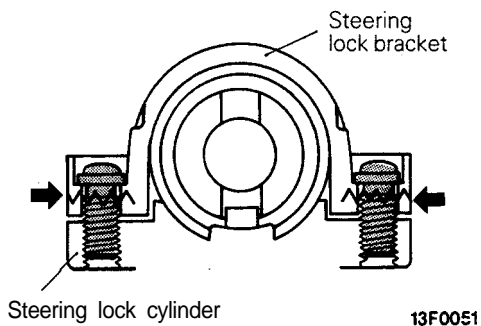


SERVICE POINTS OF DISASSEMBLY

M37GFAS

6. REMOVAL OF STEERING LOCK BRACKET / 7. STEERING LOCK CYLINDER

If it is necessary to remove the steering lock cylinder, use a hacksaw to cut the special bolts at the steering lock bracket side.



TSB Revision

INSPECTION

M37GGAK

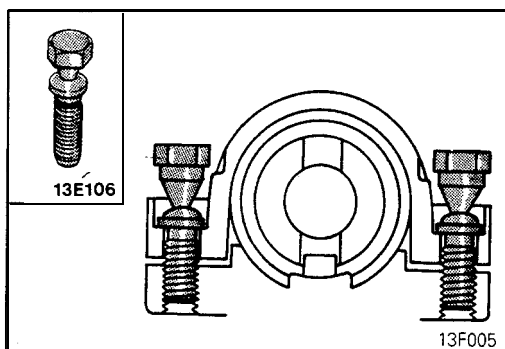
- Check the steering shaft for play and round movement.
- Check the joints for play, damage, or rough movement.
- Check the joint bearing for wear and damage.
- Check the dust shield for damage.

SERVICE POINTS OF REASSEMBLY

M37GHBE

7. INSTALLATION OF STEERING LOCK CYLINDER / 6. STEERING LOCK BRACKET / 5. SPECIAL BOLT

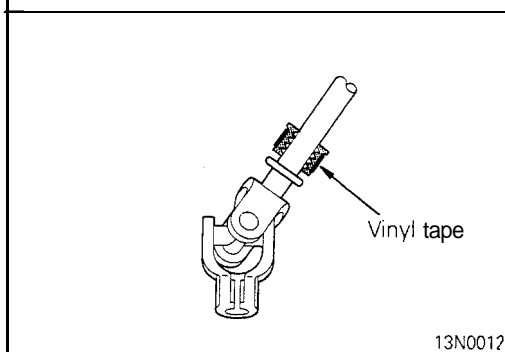
- (1) When installing the steering lock cylinder and steering lock bracket to the column tube, temporarily install the steering lock in alignment with the column boss.



- (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.

**3. INSTALLATION OF BEARING**

- (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.

POWER STEERING GEAR BOX

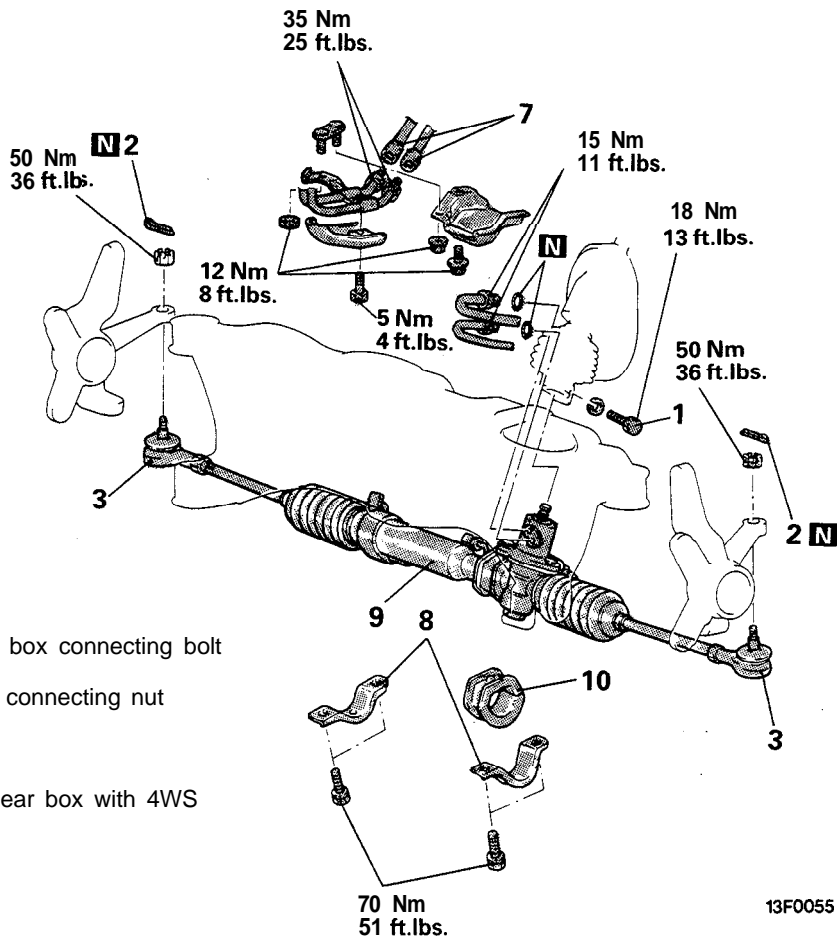
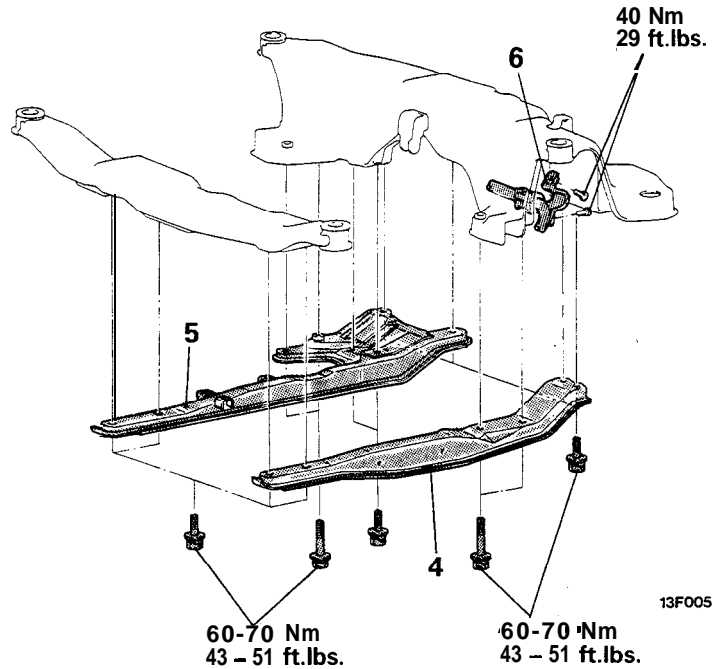
REMOVAL AND INSTALLATION

Pre-removal Operation

- Draining of the Power Steering Fluid (Refer to P.37A-9.)
- Removal of Front Exhaust Pipe (Refer to GROUP 15 – Exhaust Pipe and Main Muffler.)
- Removal of Transfer Assembly (Refer to GROUP 22 -Transfer.)

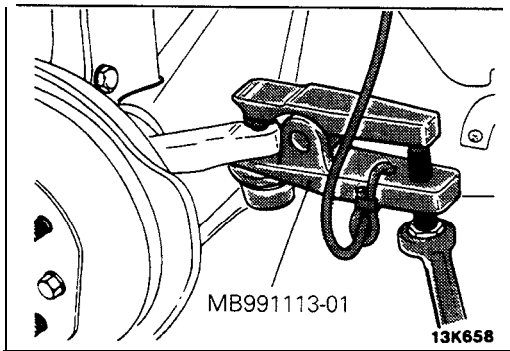
Post-installation Operation

- Installation of Transfer Assembly (Refer to GROUP 22 -Transfer.)
- Installation of Front Exhaust Pipe (Refer to GROUP 15 – Exhaust Pipe and Main Muffler.)
- Supplying of the Power Steering Fluid (Refer to P.37A-9.)
- Bleeding of the Power Steering Fluid Line (Refer to P.37A-10.)
- Checking of Steering Wheel Position with Wheels Straight Ahead
- Adjustment of the Front Wheel Alignment (Refer to GROUP 33A – Service Adjustment Procedures.)



Removal steps

1. Joint assembly and gear box connecting bolt
2. Cotter pin
- ↔ 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
- ↔ ↔ 9. Gear box assembly
- ↔ ↗ 10. Mounting rubber

**SERVICE POINTS OF REMOVAL**

M37PBAI

3. DISCONNECTION OF TIE-ROD END

Using the special tool, disconnect the tie rod from the knuckle.

9. REMOVAL OF GEAR BOX ASSEMBLY

- (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.

INSPECTION

M37PCAF

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.

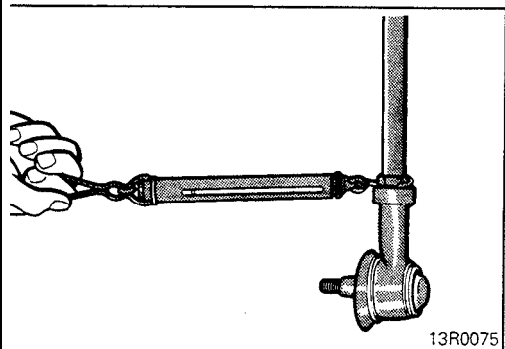
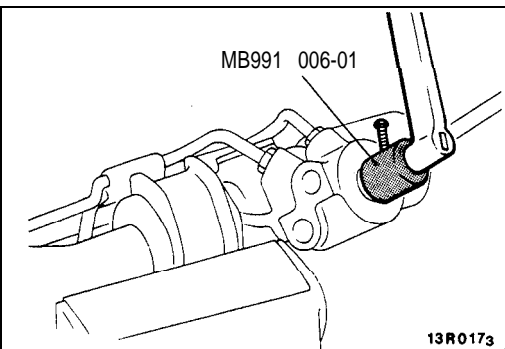
Standard value: 0.6 – 1.3 Nm (5 – 11 in.lbs.)

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

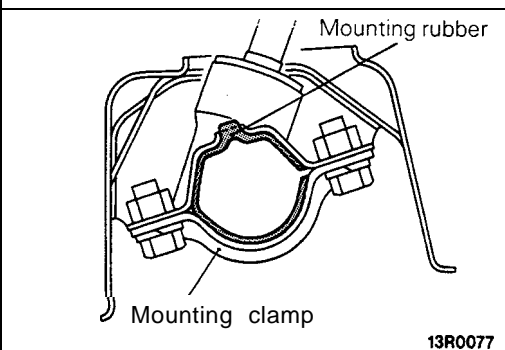
Even if the measured value is below the standard value, the tie rod which swings smoothly without excessive play may be used.

SERVICE POINTS OF INSTALLATION

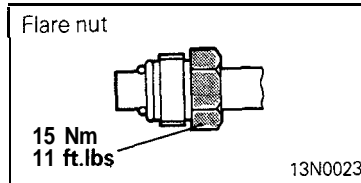
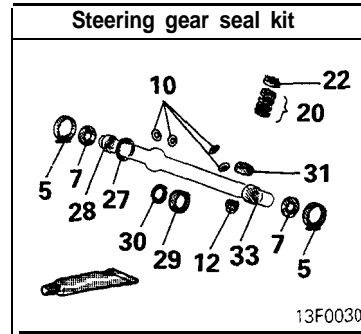
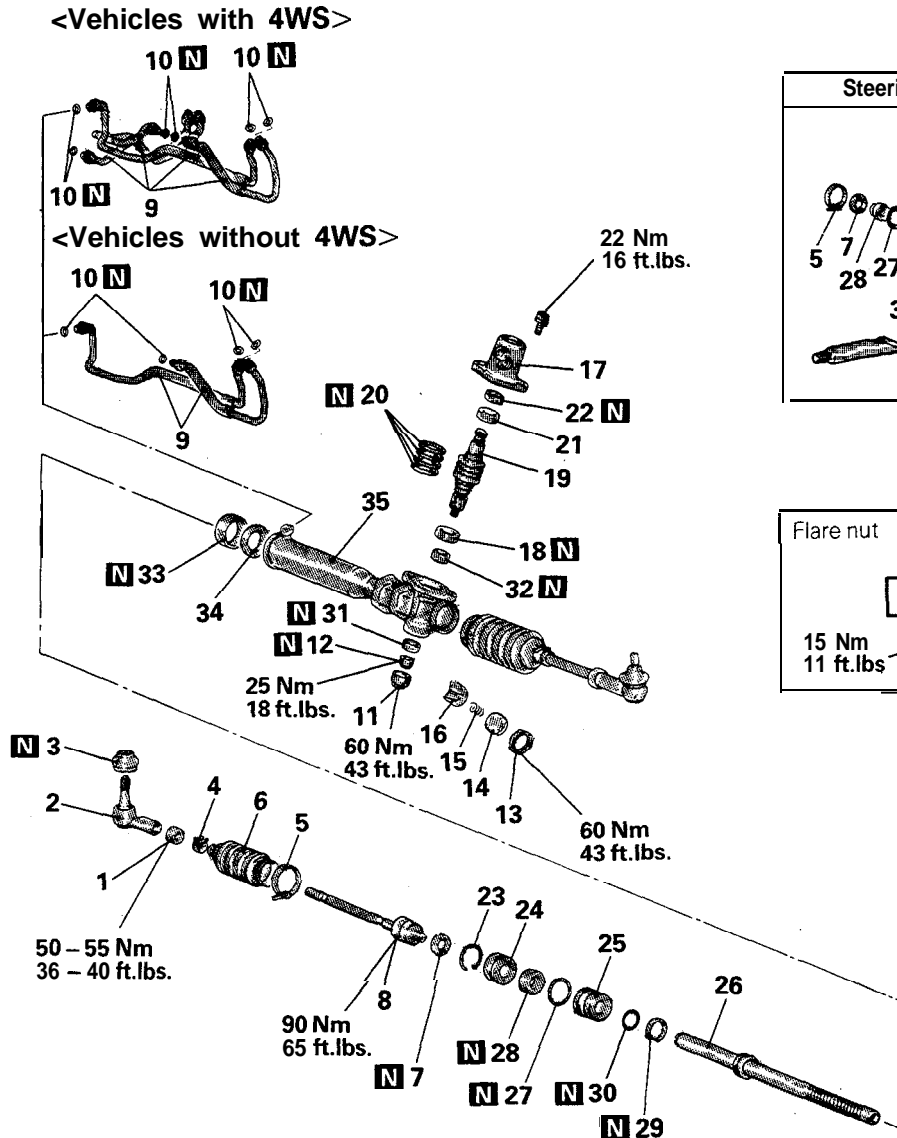
M37PDAE

10. INSTALLATION OF MOUNTING RUBBER / 9. GEAR BOX ASSEMBLY

When installing the mounting rubber, align the projection of the mounting rubber with the indentation in the crossmember to install the gear box.



DISASSEMBLY AND REASSEMBLY



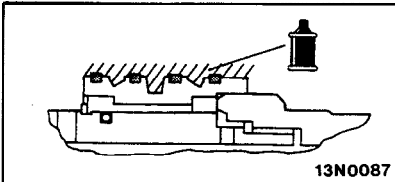
13F0030

Disassembly steps

- 1. Tie rod end locking nuts
- ◆◆ 2. Tie rod ends
- ◆◆◆ 3. Dust shield
- ◆ 4. Bellows clips
- ◆ 5. Bellows bands
- ◆ 6. Bellows
- ◆ 7. Tab washers
- ◆◆ 8. Tie rods
- 9. Feed tubes
- 10. O-rings
- ◆◆ Adjustment of total pinion torque
- ◆◆◆ 11. End plug
- 12. Self-locking nut
- 13. Locking nut
- ◆◆ 14. Rack support cover
- 15. Rack support spring
- 16. Rack support
- 17. Valve housing

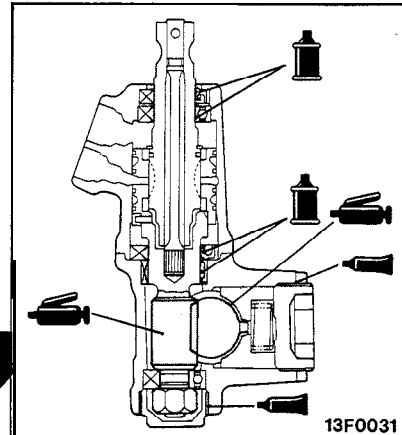
- ◆◆ 4 18. Oil seal
- ◆ a 19. Pinion and valve assembly
- ◆◆ 20. Seal rings
- ◆◆ 21. Ball bearing
- ◆◆ 22. Oil seal
- ◆◆ + 23. Circlip
- ◆◆ 24. Rack stopper
- ◆◆ + 25. Rack bushing
- ◆◆ + 26. Rack
- ◆◆◆ 27. O-ring
- ◆◆◆◆ 28. Oil seal
- 29. Seal rings
- 30. O-ring
- ◆◆ + 31. Ball bearing
- ◆◆ + 32. Needle roller bearing
- ◆◆◆◆ 33. Oil seal
- ◆◆ * 34. Back-up washer
- 35. Rack housing

LUBRICATION AND SEALING POINTS



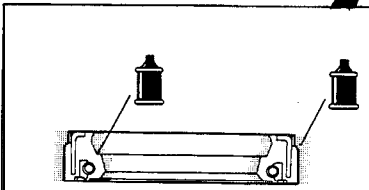
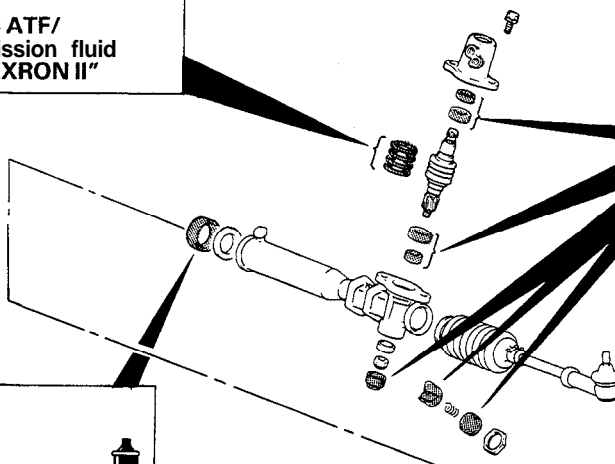
13N0087

Fluid:
MITSUBISHI PLUS ATF/
Automatic transmission fluid
"DEXRON" or "DEXRON II"



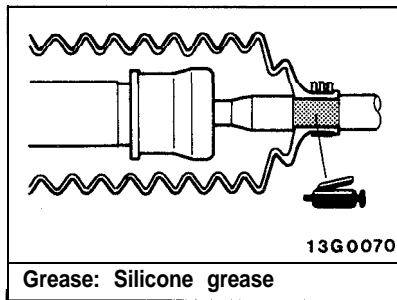
13F0031

Fluid:
MITSUBISHI PLUS ATF/
Automatic transmission fluid
"DEXRON" or "DEXRON II"
Sealant:
3M ART, Part No. 8663 or
equivalent



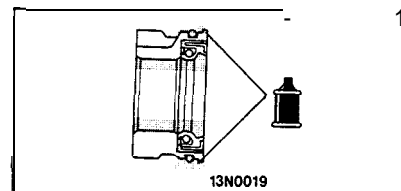
13N0022

Fluid:
MITSUBISHI PLUS ATF/
Automatic transmission fluid
"DEXRON" or "DEXRON II"



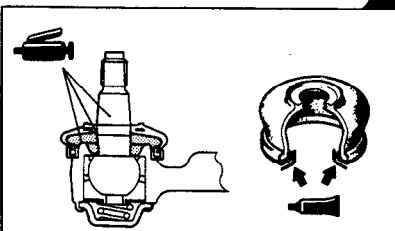
13G0070

Grease: Silicone grease



13N0019

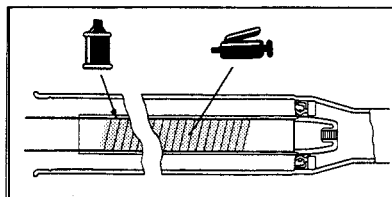
Fluid:
MITSUBISHI PLUS ATF/
Automatic transmission fluid
"DEXRON" or "DEXRON II"



13P0077

13Y564

Sealant:
3M ART, Part No. 8663 or
equivalent



1360186

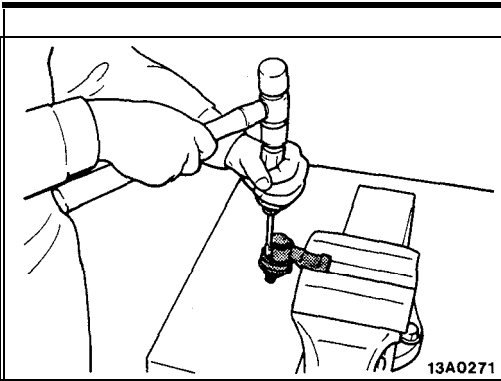
Fluid:
MITSUBISHI PLUS ATF/
Automatic transmission fluid
"DEXRON" or "DEXRON II"

M37PFAN

SERVICE POINTS OF DISASSEMBLY

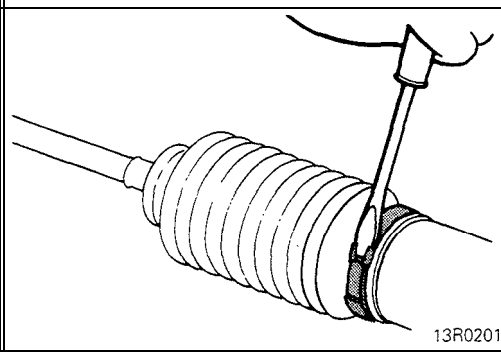
3. REMOVAL OF DUST SHIELD

Remove the dust shield from the tie rod end.



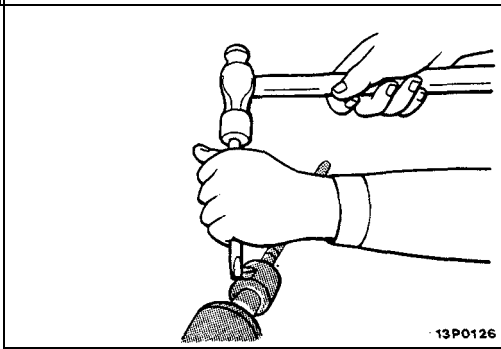
5. REMOVAL OF BELLOWS BANDS

Using a screwdriver or similar tool, loosen and then remove the boot retaining band.



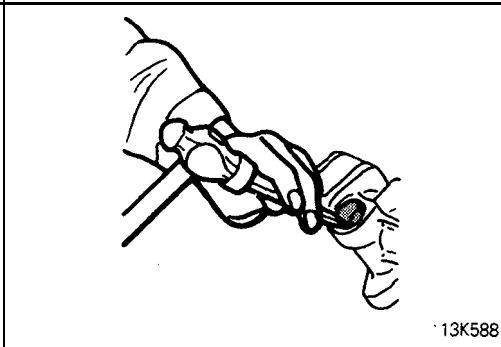
7. REMOVAL OF TAB WASHER

Unstake the tab washer which fixes the tie rod and rack with a chisel.



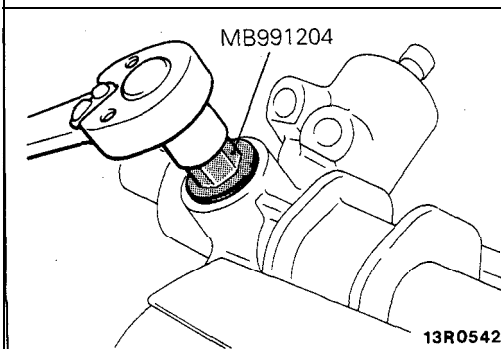
11. REMOVAL OF END PLUG

Disconnect end plug caulking and remove end plug.



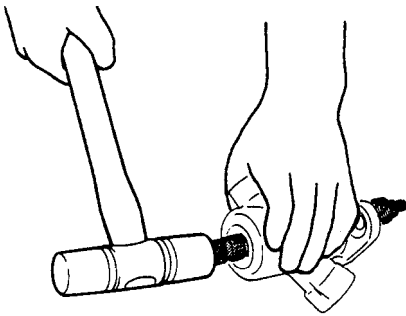
14. REMOVAL OF RACK SUPPORT COVER

Using the special tool, remove the rack support cover from the gear box.



18. REMOVAL OF OIL SEAL

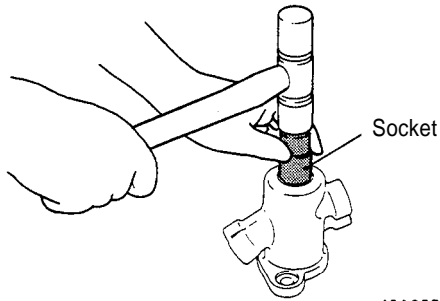
Using a plastic hammer, gently tap the pinion to remove it.



13A0284

21. REMOVAL OF BALL BEARING / 22. OIL SEAL

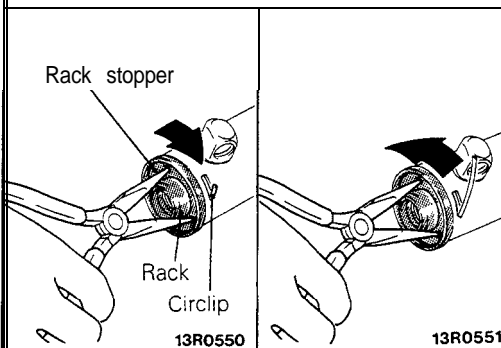
Using a socket, remove the oil seal and the ball bearing from the valve housing simultaneously.



13A0285

23. REMOVAL OF CIRCLIP

- (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.



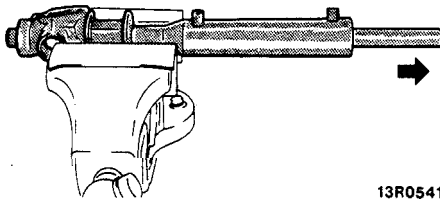
13R0550

13R0551

26. REMOVAL OF RACK

Pull out the rack slowly.

At this time also take out the rack stopper and the rack bushing simultaneously.



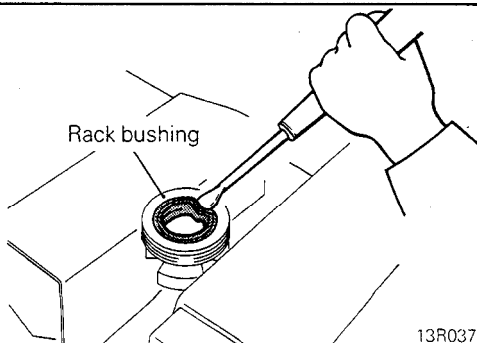
13R0541

28. REMOVAL OF OIL SEAL

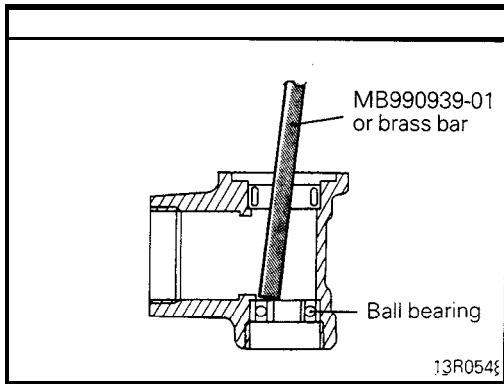
Partially bend oil seal and remove from rack bushing.

Caution

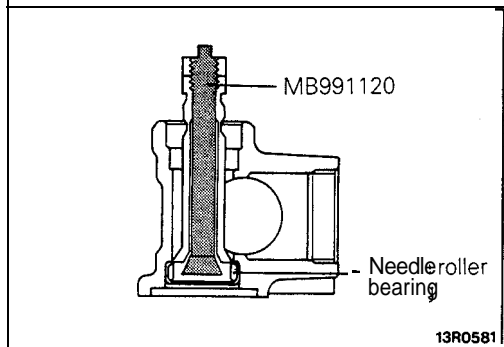
Do not damage oil seal press fitting surface.



13R0377

**31. REMOVAL OF BALL BEARING**

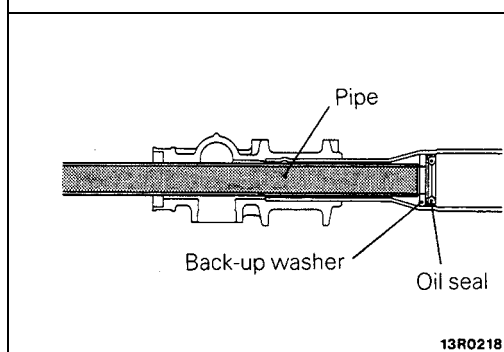
Use a brass bar to remove the ball bearing from the gear housing.

**32. REMOVAL OF NEEDLE ROLLER BEARING**

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.

**33. REMOVAL OF OIL SEAL / 34. BACK-UP WASHER**

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.

INSPECTION

M37PGAH

RACK

- 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

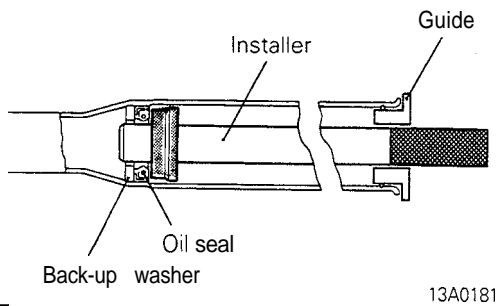
- Check the pinion gear tooth surfaces for damage or wear.
- Check for worn or defective seal ring.

BEARING

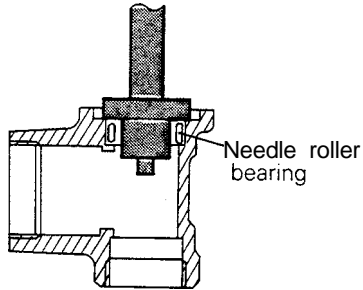
- Check for roughness or abnormal noise during bearing operation.
- Check the bearing for play.
- Check the needle roller bearings for roller slip-off.

OTHERS

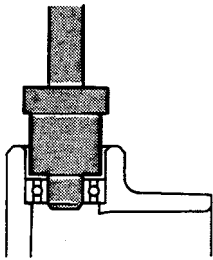
- Check the cylinder inner surface of the rack housing for damage.
- Check the boots for damage, cracking or deterioration.
- Check the rack support for uneven wear or dents.
- Check the rack bushing for uneven wear or damage.



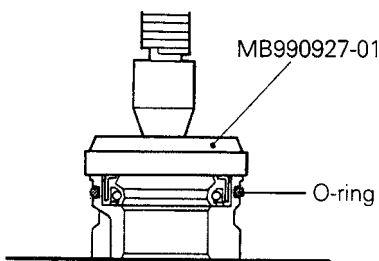
13A0181



13R0547



13R0380



13R0378



Vent hole

13K583

SERVICE POINTS OF REASSEMBLY

M37PHAW

34. INSTALLATION OF BACK-UP WASHER / 33. OIL SEAL

- (1) Apply a coating of the specified fluid to the outside of the oil seal.

Specified fluid: MITSUBISHI PLUS ATF/Automatic transmission fluid "DEXRON" or "DEXRON II"

- (2) Using a 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).

32. INSTALLATION OF NEEDLE ROLLER BEARING

- (1) Apply specified fluid to housing, bearing and oil seal press fitting surface.

Specified fluid: MITSUBISHI PLUS ATF/Automatic transmission fluid "DEXRON" or "DEXRON II"

- (2) Press fit needle roller bearing.

Caution

Press fit straight as valve housing is aluminium.

31. INSTALLATION OF BALL BEARING

Press fit ball bearing.

28. INSTALLATION OF OIL SEAL / 27. O-RING

- (1) Apply a coating of the specified fluid to the outside of the oil seal and O-ring.

Specified fluid: MITSUBISHI PLUS ATF/Automatic transmission fluid "DEXRON" or "DEXRON II"

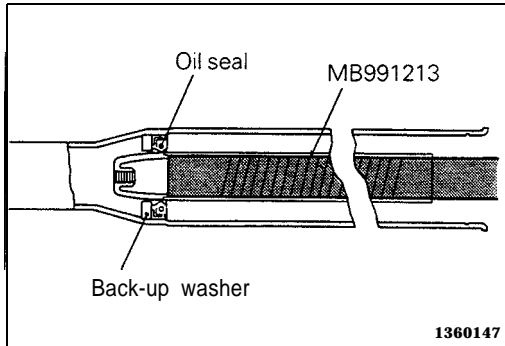
- (2) Press fit oil seal until it touches rack bush end.

26. INSTALLATION OF RACK

- (1) Apply a coating of multipurpose grease to the rack teeth face.

Caution

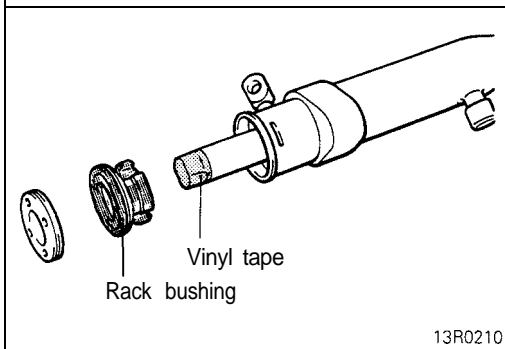
Do not close the vent hole in the rack with grease.



- (2) Cover rack serrations with special tool.
- (3) Apply specified fluid on special tool.

Specified fluid: MITSUBISHI PLUS ATF/Automatic transmission fluid "DEXRON" or "DEXRON II"

- (4) Match oil seal center with rack to prevent retainer spring from slipping and slowly insert rack from power cylinder side.



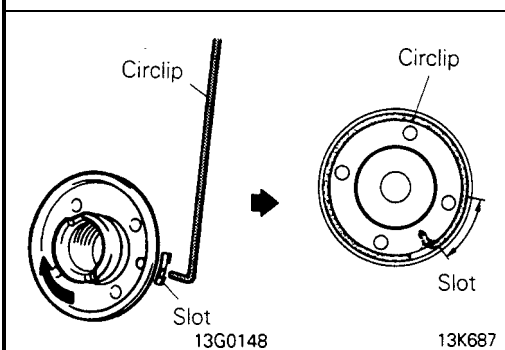
25. INSTALLATION OF RACK BUSHING

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: MITSUBISHI PLUS ATF/Automatic transmission fluid "DEXRON" or "DEXRON II"

Caution

Do not allow oil seal retainer spring to slip out.

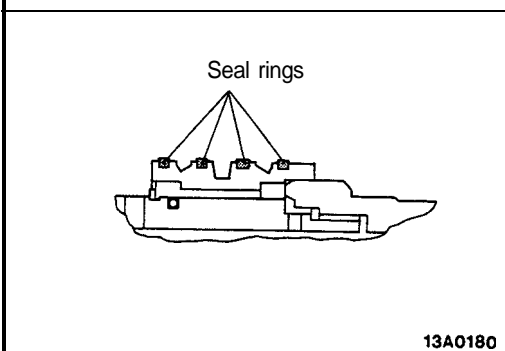


23. INSTALLATION OF CIRCLIP

Insert circlip to rack stopper hole through cylinder hole. Turn rack stopper clockwise and insert circlip firmly.

Caution

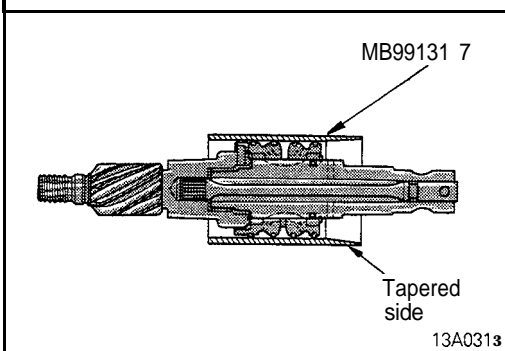
Insert circlip to rack stopper hole while turning rack stopper clockwise.



20. INSTALLATION OF SEAL RINGS / 19. PINION AND VALVE ASSEMBLY

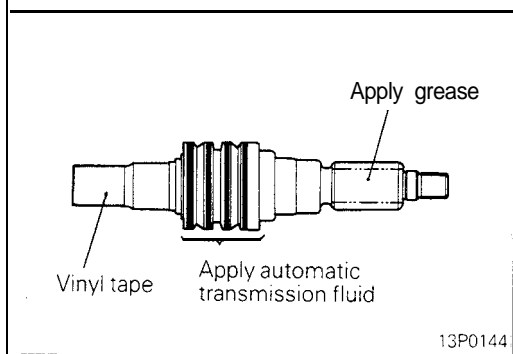
- (1) When installing seal rings, press firmly into valve groove. Apply specified fluid.

Specified fluid: MITSUBISHI PLUS ATF/Automatic transmission fluid "DEXRON" or "DEXRON II"

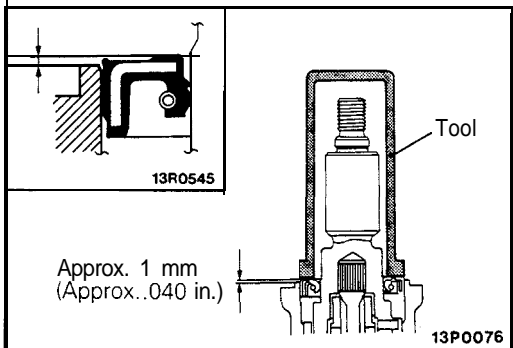


NOTE

Because the seal rings expand at the time of installation, use the special tool to compress the seal rings so that they are well seated.



- (2) Apply multipurpose grease to pinion gear and housing bearing.
- (3) Wrap vinyl tape around the serrated part so that the oil seal won't be damaged when the pinion and valve assembly is installed to the valve housing.
- (4) Mount the pinion and valve assembly to the valve housing.

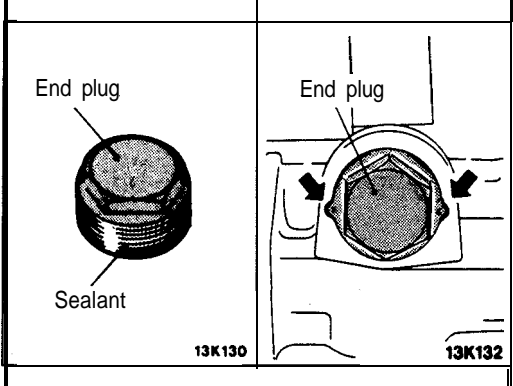


18. INSTALLATION OF OIL SEAL

Using a 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.

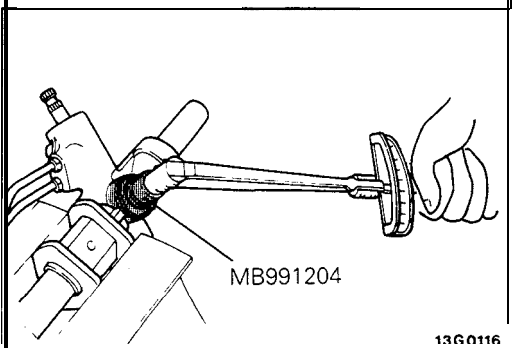


11. INSTALLATION OF END PLUG

- (1) Apply the semi-drying sealant to the threaded part of the end plug.

Specified sealant: 3M ART Part No. 8663 or equivalent

- (2) Secure the threaded portion of the end plug at two places by using a punch.



. ADJUSTMENT OF TOTAL PINION TORQUE

- (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.)

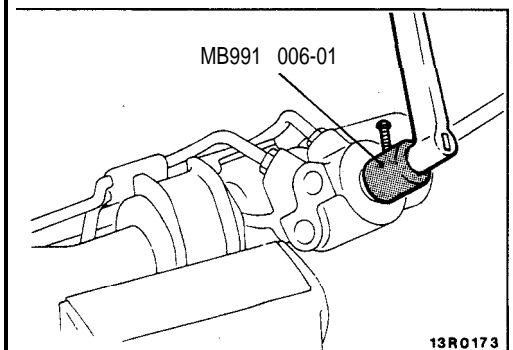
Caution

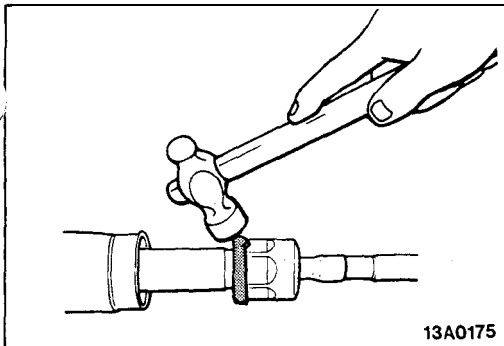
1. When adjusting, set the standard value at its highest value.
2. Assure no ratcheting or catching when operating rack towards the shaft direction.

NOTE

When it cannot be adjusted within the specified return angle, check rack support cover components or replace.

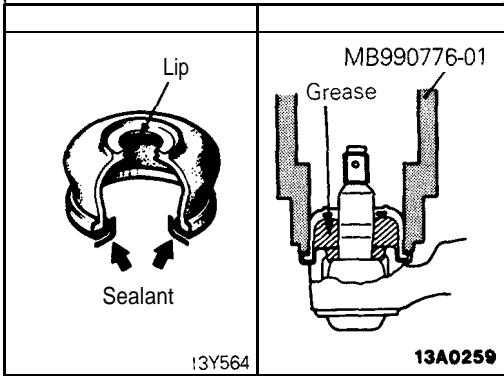
- (3) After adjusting, lock rack support cover with lock nut.





8. INSTALLATION OF TIE ROD

After installing tie rod to rack, fold tab washer end (2 locations) to tie rod notch.



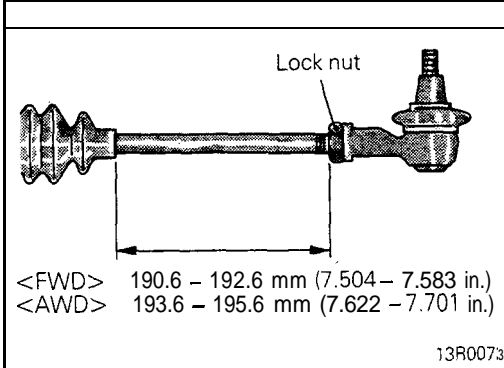
3. INSTALLATION OF DUST SHIELD

(1) Pack dust shield interior and lip with multipurpose grease.

(2) Apply semi-drying sealant to dust shield.

Specified sealant: 3M ART Part No. 8663 or equivalent

(3) Using the special tool, press dust shield to tie rod end.



2. INSTALLATION OF TIE ROD END

Screw in tie rod end to have its right and left length as illustrated. Lock with lock nut.

POWER STEERING OIL PUMP REMOVAL AND INSTALLATION

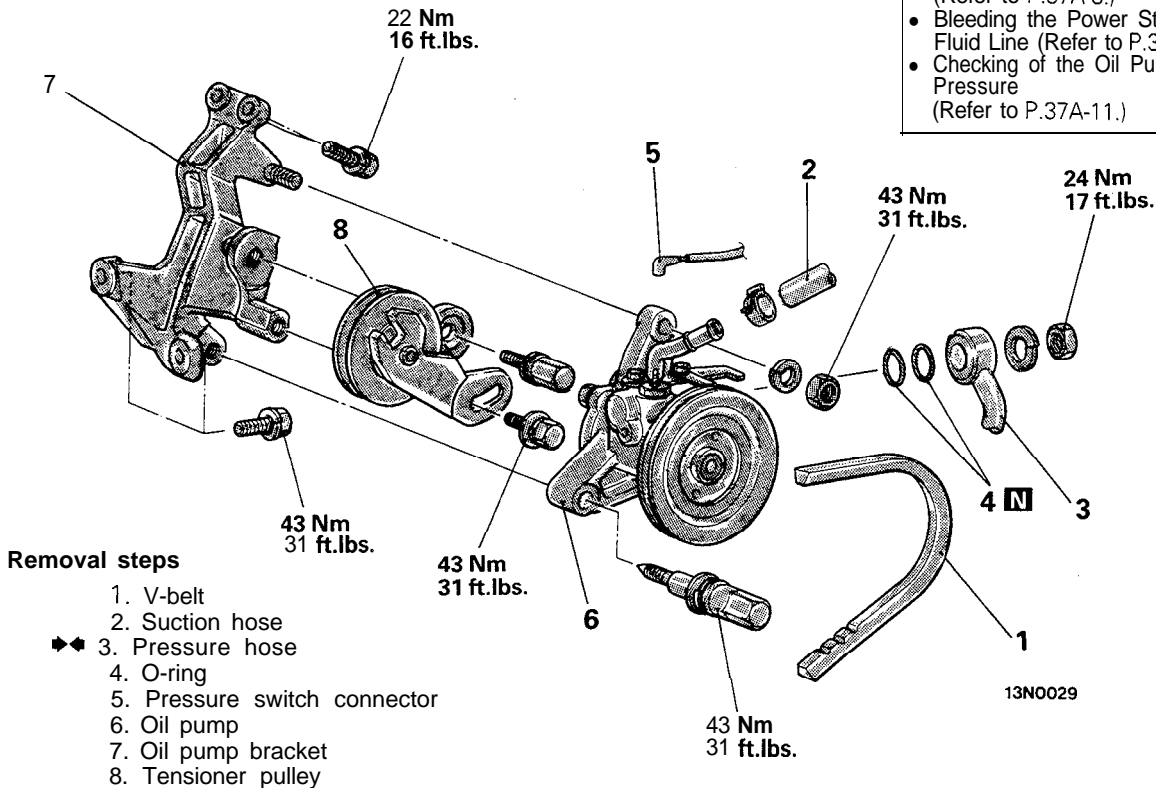
M37RA-

Pre-removal Operation

- Draining the Power Steering Fluid

Post-installation Operation

- Supplying of the Power Steering Fluid
- Adjusting V-belt Tension (Refer to P.37A-8.)
- Bleeding the Power Steering Fluid Line (Refer to P.37A-10.)
- Checking of the Oil Pump Pressure (Refer to P.37A-11.)



Removal steps

1. V-belt
2. Suction hose
- ◆◆ 3. Pressure hose
4. O-ring
5. Pressure switch connector
6. Oil pump
7. Oil pump bracket
8. Tensioner pulley

INSPECTION

M37RCAC

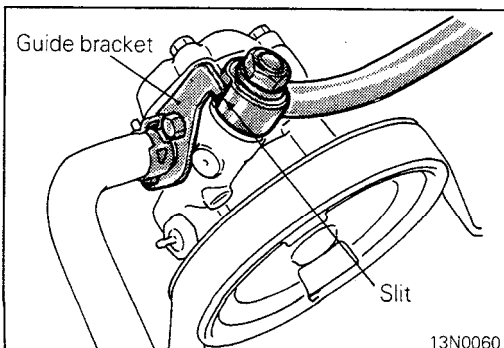
- Check the V-belt for cracks.
- Check the pulley assembly for uneven rotation.

SERVICE POINT OF INSTALLATION

M37RDAL

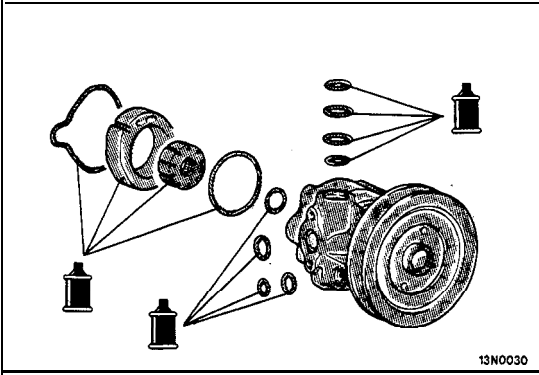
3. INSTALLATION OF PRESSURE HOSE

Connect the pressure hose so that its slit part contacts the oil pump's guide bracket.



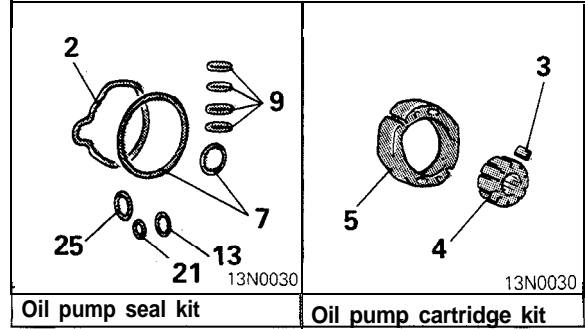
DISASSEMBLY AND REASSEMBLY

M37RE--



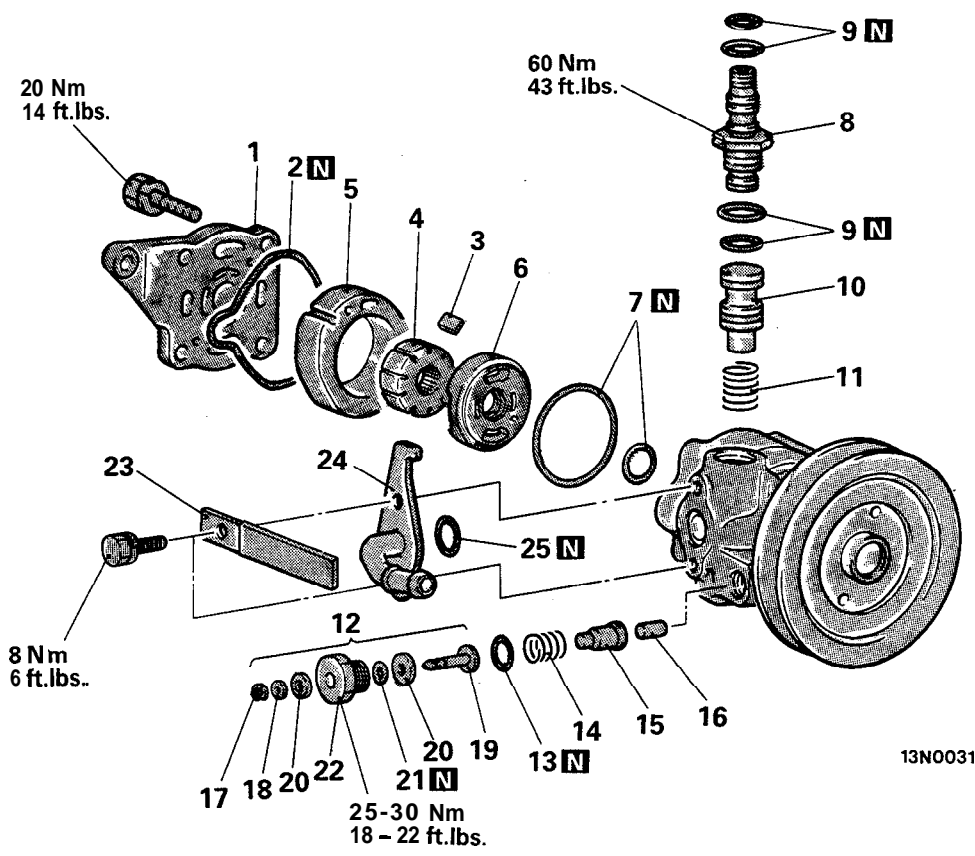
13N0030

Fluid:
MITSUBISHI PLUS ATF/Automatic transmission fluid "DEXRON" or "DEXRON II"



Oil pump seal kit

Oil pump cartridge kit



13N0031

Disassembly steps

- 1. Pump cover
- 2. O-ring
- ◆◆ 3. Vanes
- 4. Rotor
- a 5. Cam ring
- a 6. Side plate
- ◆◆ 7. O-ring
- ◆◆ 8. Connector
- ◆◆ 9. O-ring
- 10. Flow control valve
- 11. Flow control spring
- 12. Terminal assembly
- * 13. O-ring
- * 14. Spring

- 15. Plunger
- 16. Piston rod
- 17. Snap ring
- 18. Terminal
- 19. Washer
- 20. Insulator
- ◆◆ 21. O-ring
- 22. Plug
- 23. Clip
- ◆◆ 24. Suction connector
- ◆◆ 25. O-ring
- 26. Oil pump body and Pulley assembly

Caution
Do not disassemble the flow control valve.

INSPECTION

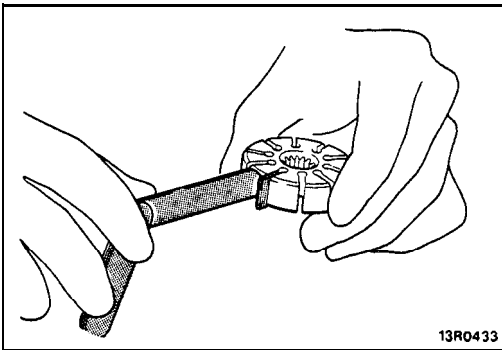
M37RGAM

- 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.)



13R0433

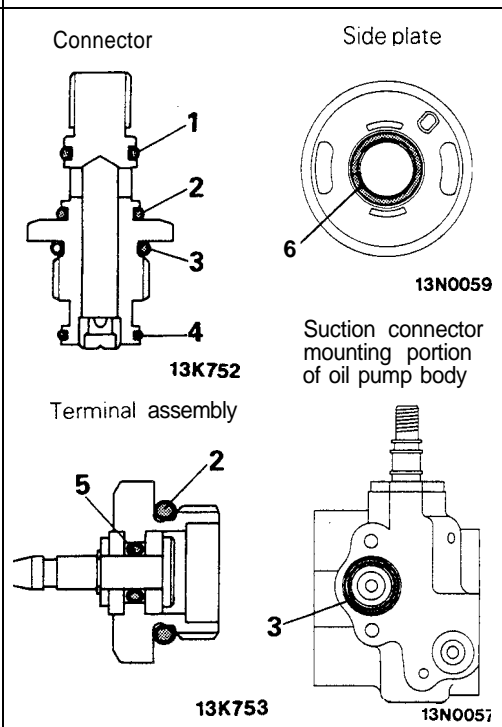
SERVICE POINTS OF REASSEMBLY

M37RHBI

25. 21. 13. 9. 7. INSTALLATION OF O-RINGS

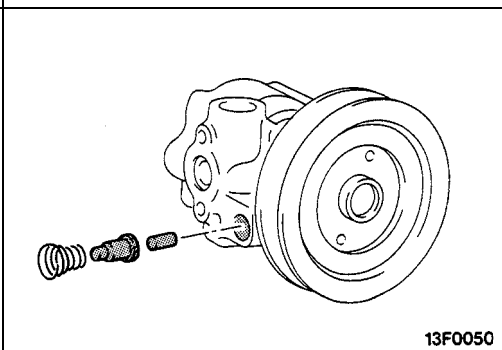
Apply specified fluid on O-rings to install.

No.	I.D. x Width	mm (in.)
1	11 x 1.9	(.433 x .075)
2	13x1.9	(.512 x .075)
3	17.8 x 2.4	(.701 x .094)
4	13.5x1.5	(.531 x .059)
5	3.8 x 1.9	(.150 x .075)
6	16.8 x 2.4	(.661 x .094)

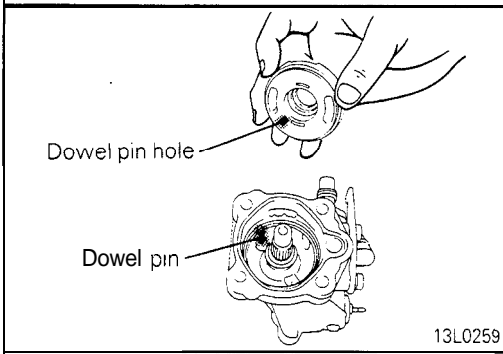


14. INSTALLATION OF SPRING

Fit the spring to the oil pump body with the larger-diameter end at the terminal assembly side.

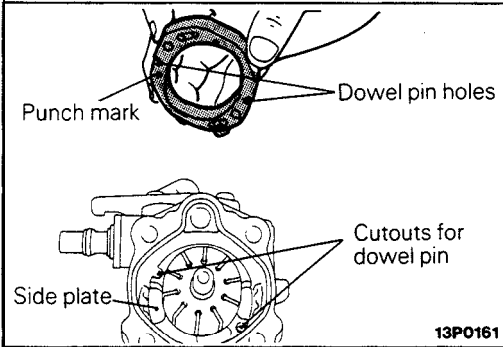


13F0050



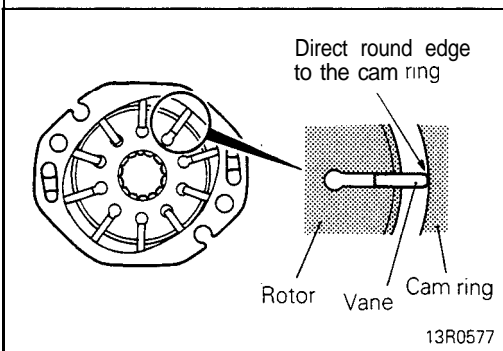
6. INSTALLATION OF SIDE PLATE

Line up the dowel pin hole of the side plate with the dowel pin of the pump body when installing the side plate.



5. INSTALLATION OF CAM RING

Install the cam ring with the punch mark facing the side plate.



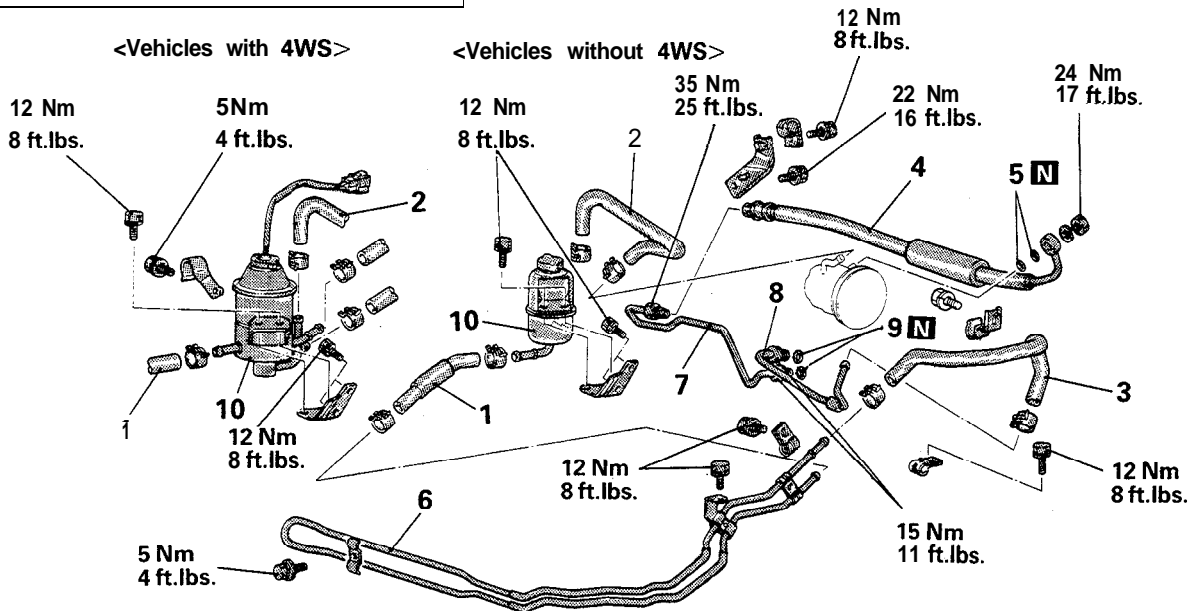
3. INSTALLATION OF VANES

Install the vanes on the rotor, paying close attention to the installation direction.

**POWER STEERING HOSES
REMOVAL AND INSTALLATION**

M37TA--

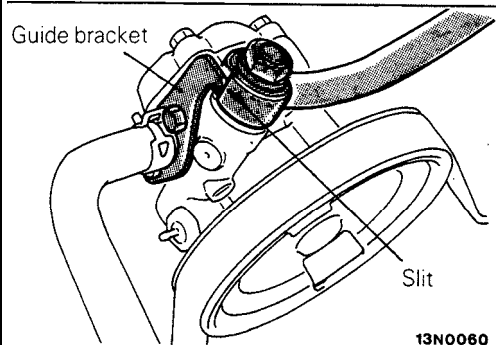
Pre-removal and Post-installation Operation
 • Draining, Supplying, and Bleeding of the Power Steering Fluid
 (Refer to P.37A-9, 10.)



13F0029

Removal steps

- | | |
|----------------------|-------------------|
| 1. Return hose | 6. Cooler tube |
| 2. Suction hose | 7. Pressure tube |
| 3. Return hose | 8. Return tube |
| • a 4. Pressure hose | 9. O-ring |
| 5. O-ring | 10. Oil reservoir |



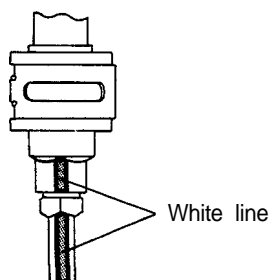
13N0060

**SERVICE POINT OF INSTALLATION
4. INSTALLATION OF PRESSURE HOSE**

M37TDAG

(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.



13P0143

4-WHEEL STEERING SYSTEM (4WS)

CONTENTS

M37AA-B

CONTROL VALVE	9	SPECIAL TOOLS	2
POWER CYLINDER	6	SPECIFICATIONS	2
REAR OIL LINE	10	General Specifications	2
REAR OIL PUMP	11	Lubricants	2
SERVICE ADJUSTMENT PROCEDURES	4	Service Specifications	2
Ball Joint Rotation Starting Torque Check	5	TROUBLESHOOTING	3
Bleeding	4		
Function Check	5		
Rear Oil Pump Discharge Flow Volume Check	5		

SPECIFICATIONS

GENERAL SPECIFICATIONS

M37CA-B

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 (.78) [one side 10 (.39)]

SERVICE SPECIFICATIONS

M37CB-B

Items	Specifications
Standard value Rear oil pump displacement [at speedometer reading of 31 mph (50 km/h) for 30 seconds] liter (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

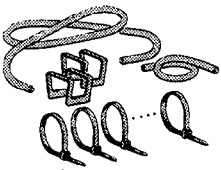

LUBRICANTS

M37CD-B

Items	Specified lubricant	Quantity
Power steering fluid	MITSUBISHI PLUS ATF/Automatic Transmission fluid "DEXRON" or "DEXRON II"	1.45 liter (1.53 qts.)
Dust cover	'Silicone grease	As required

SPECIAL TOOLS

M37DA-B

Tool	Number	Name	Use
	MB991230	Air bleeder set	Air bleed
	MB990993-01	Power steering oil pressure gauge adapter	Measurement of fluid flow volume

TROUBLESHOOTING

M37EAAK

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

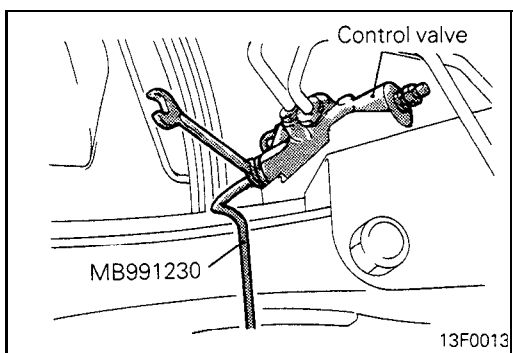
Malfunction symptom	Malfunctioning system	Inspection item
4WS does not operate	Power cylinder	Tie rod swing torque
		Power cylinder slide resistance
	Rear oil pump	Flow volume check
	Control valve	–
Poor steering feeling Feeling of friction in steering Poor steering return	Steering gears and linkage	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 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
Poor steerability (extreme tire wear)	Power cylinder	Tie rod length improperly adjusted after toe-in adjustment

SERVICE ADJUSTMENT PROCEDURES

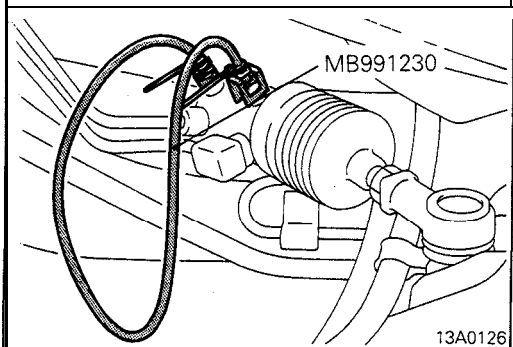
M37FKAH

BLEEDING

- (1) Bleed air from power steering system (Refer to GROUP 37A – Service Adjustment Procedures.)
- (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, then check to ensure that all air has been bled from the system.
- (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, running the vehicle at an indicated speed of about 70-80 km/h (43-50 mph) to circulate the fluid.

Caution

When replenishing the fluid, take special care as all four wheels will be rotating.

- (10) Maintain an indicated speed of about 30-40 km/h (19-25 mph), turning the steering wheel all the way to both left and right.

When the wheel is steered all the way in either direction, pressure will rise and air will circulate inside the tube (special tool). Check to ensure that this air is discharged into the oil reservoir.

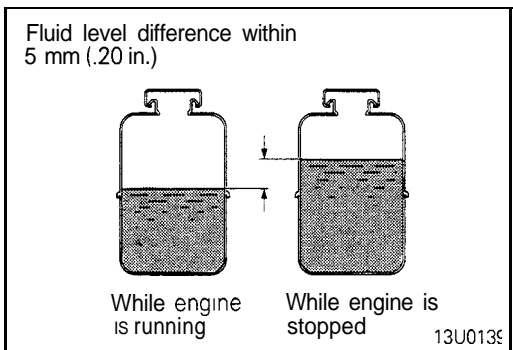
- (11) Repeat step (10) several times until that all air in the system has been bled.

- (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.



FUNCTION CHECK

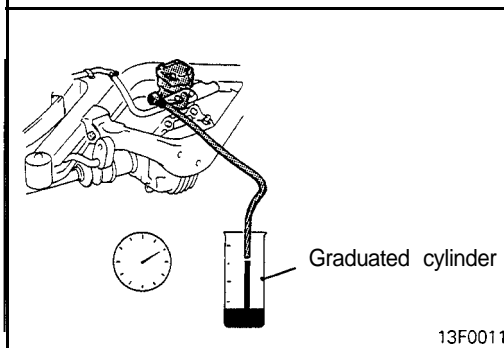
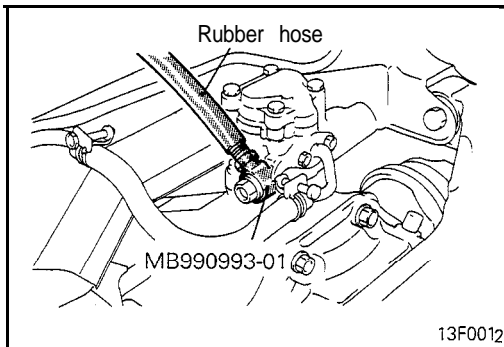
M37FWAA

- (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

M37FLBA

- (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-liter 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.

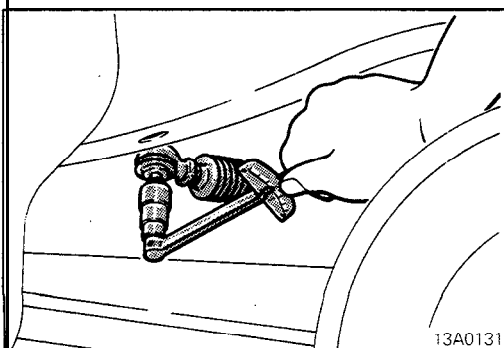
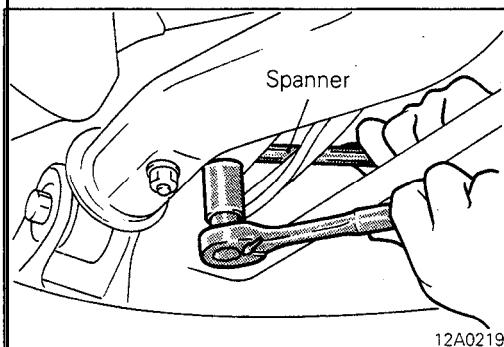
Standard value: Approximately 1.0 liter (1.06 qts.)

- (4) If the discharge flow volume is extremely high or low, the rear oil pump should be replaced.

BALL JOINT ROTATION STARTING TORQUE CHECK

M37FECA

- (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

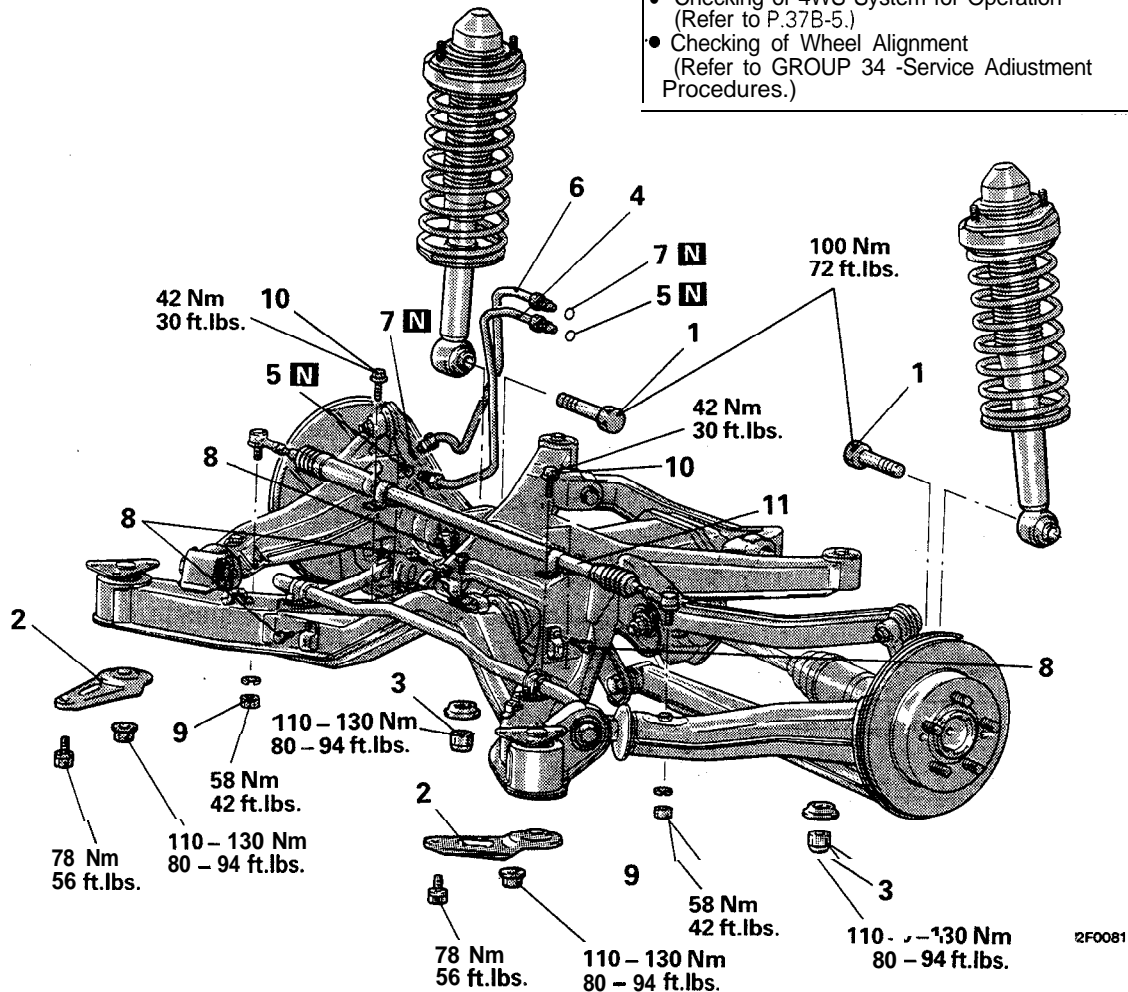
REMOVAL AND INSTALLATION

Pre-removal Operation

- Cleaning of Pipings with Steam
- Draining of Power Steering Fluid (Refer to GROUP 37A – Service Adjustment Procedures.)
- Removal of 'Main' Muffler Assembly (Refer to GROUP 15 – Exhaust Pipe and Muffler.)

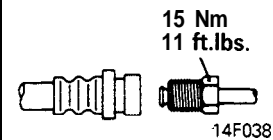
Post-installation Operation

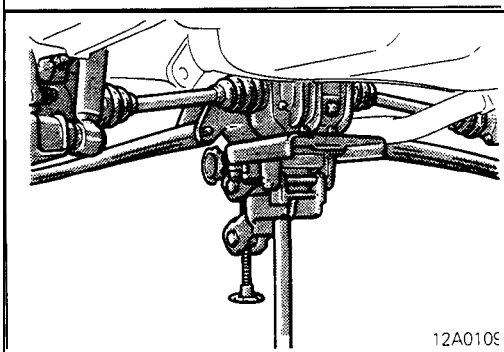
- Installation of 'Main' Muffler Assembly (Refer to GROUP 15 – Exhaust Pipe and Muffler.)
- Refilling and Bleeding of Power Steering System (Refer to GROUP 37A – Service Adjustment Procedures.)
- Bleeding of 4WS System (Refer to P.37B-4.)
- Checking of 4WS System for Operation (Refer to P.37B-5.)
- Checking of Wheel Alignment (Refer to GROUP 34 -Service Adjustment Procedures.)

**Removal steps**

1. Rear shock absorber lower mounting bolt
2. Crossmember bracket
3. Crossmember mounting nut (on differential side)
4. Pressure tube (RL)
5. O-ring
6. Pressure tube (RR)
7. O-ring
8. Oil line clamp bolt
9. Tie rod end nut
- * 10. Power cylinder installation bolt
- * 11. Power cylinder

Fluid line flared nut

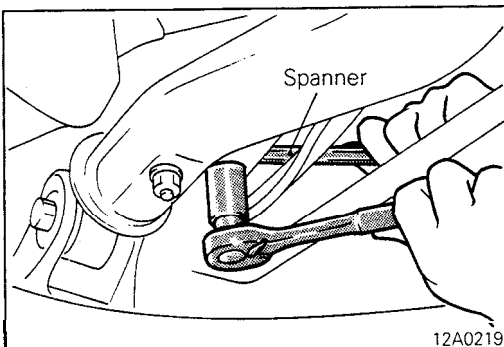


**SERVICE POINTS OF REMOVAL**

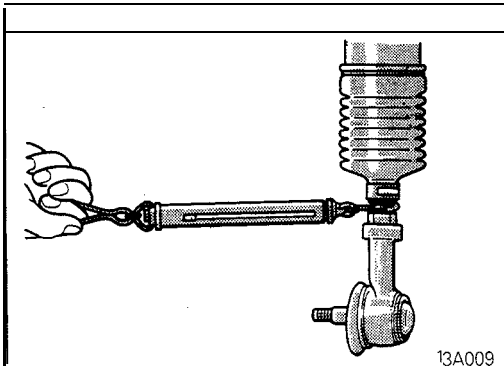
M37SBAA

3. REMOVAL OF CROSSMEMBER MOUNTING NUT

- (1) Before removing the self-locking nuts, support the differential case with a transaxle jack.
- (2) Remove the self-locking nuts.

**9. REMOVAL OF TIE ROD END NUT**

Secure the power cylinder on the tie rod side with a spanner and remove the power cylinder mounting nut.

**INSPECTION**

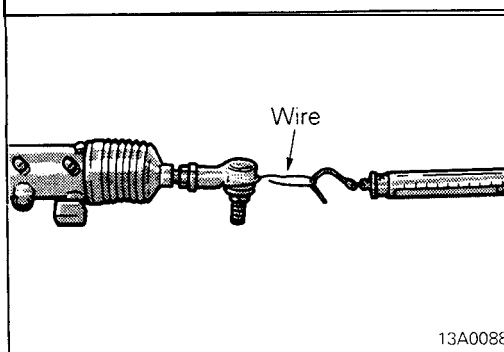
M37SCAA

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.)]

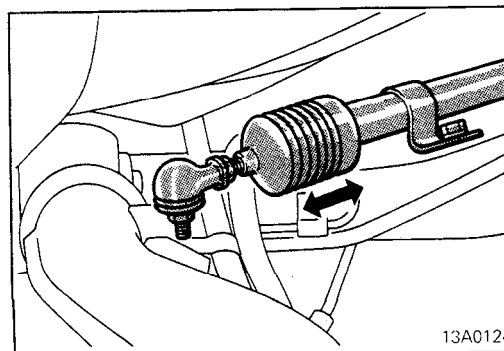
- (3) If the swing resistance exceeds the standard value, replace the tie rod.
- (4) If the swing resistance is less than the standard value, the ball joint may be reused as long as it is not loose and operates smoothly.

**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

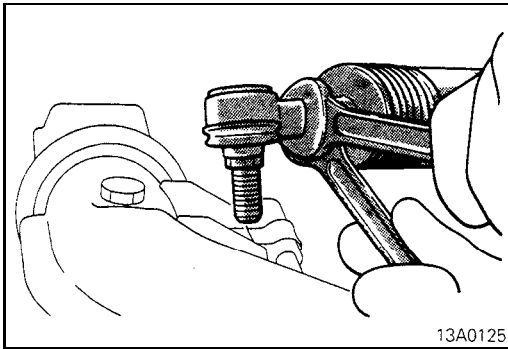
- (3) If the slide resistance exceeds the standard value, replace the power cylinder.
- (4) If the slide resistance is less than the standard value, the power cylinder may be reused as long as it is not loose and slides smoothly.

**SERVICE POINTS OF INSTALLATION**

M37SDAA

11. INSTALLATION OF POWER CYLINDER / 10. POWER CYLINDER INSTALLATION BOLTS

- (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.



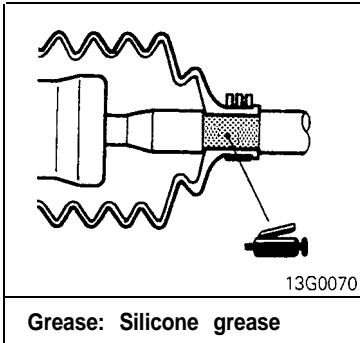
- (4) When the tie rod ends and the installation holes at the trailing arm do not meet, loosen the tie rod end securing nut, then adjust the length. The dust cover fastener clip should be removed for this.
- (5) The difference between the lengths of the left and right tie rods should be less than 1 mm (.039 in.).

NOTE

The threads of the tie rod ends may be used as a guide for this.

DISASSEMBLY AND REASSEMBLY

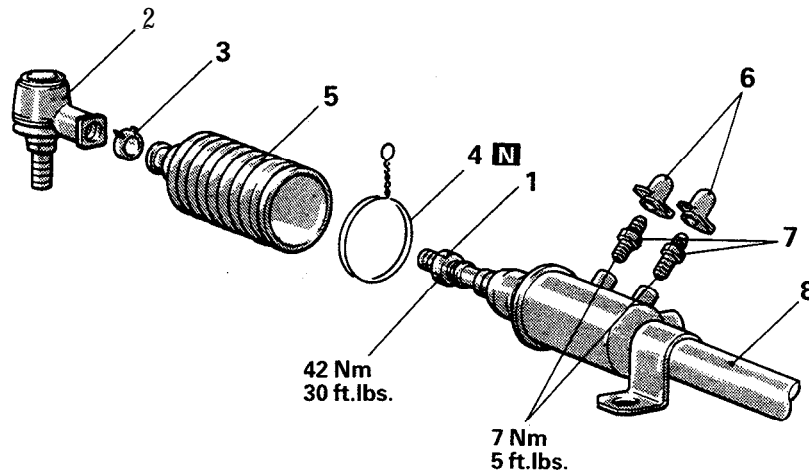
M37SE-



Grease: Silicone grease

Disassembly steps

1. Nut
- ◆◆ 2. Tie rod end assembly
3. Clip
4. Wire
- * 5. Dust cover
6. Bleeder caps
7. Bleeder screws
8. Cylinder assembly



13A0128

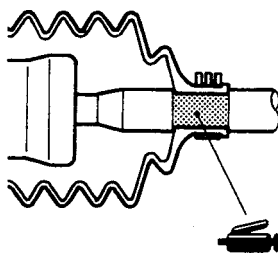
SERVICE POINTS OF REASSEMBLY

M37SHAA

5. INSTALLATION OF DUST COVER

Apply the specified grease to the place indicated in the illustration, then install the dust cover to the cylinder assembly.

Specified grease: Silicone grease



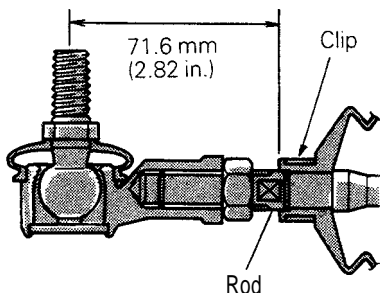
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2. INSTALLATION OF TIE ROD END ASSEMBLY

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.



13A025

CONTROL VALVE REMOVAL AND INSTALLATION

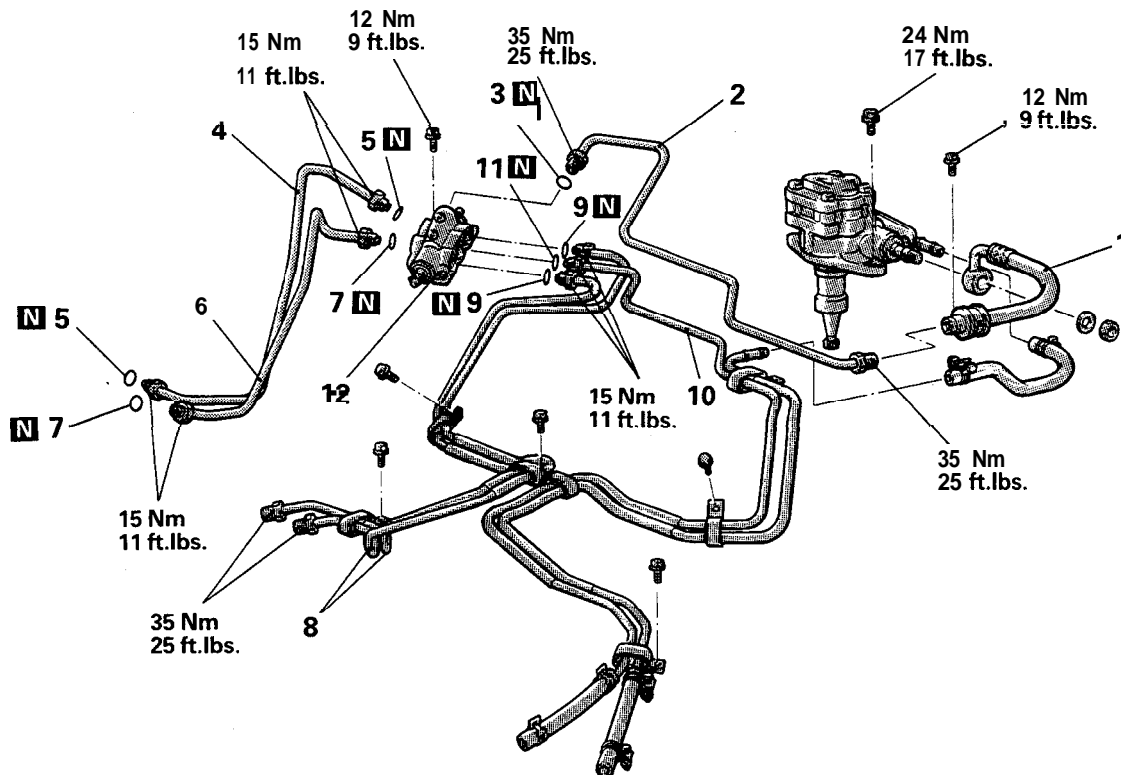
M37UA--

Pre-removal Operation

- Cleaning of Pipings with Steam
- Draining of Power Steering Fluid
(Refer to GROUP 37A – Service Adjustment Procedures.)
- Removal of Rear Suspension Assembly
(Refer to GROUP 34 – Rear Suspension Assembly.)

Post-installation Operation

- Installation of Rear Suspension Assembly
(Refer to GROUP 34 – Rear Suspension Assembly.)
- Refilling and Bleeding of Power Steering System
(Refer to GROUP 37A – Service Adjustment Procedures.)
- Bleeding of 4WS System
(Refer to P.37B-4.)
- Checking of 4WS System for Operation
(Refer to P.37B-5.)



13F0025

Removal steps

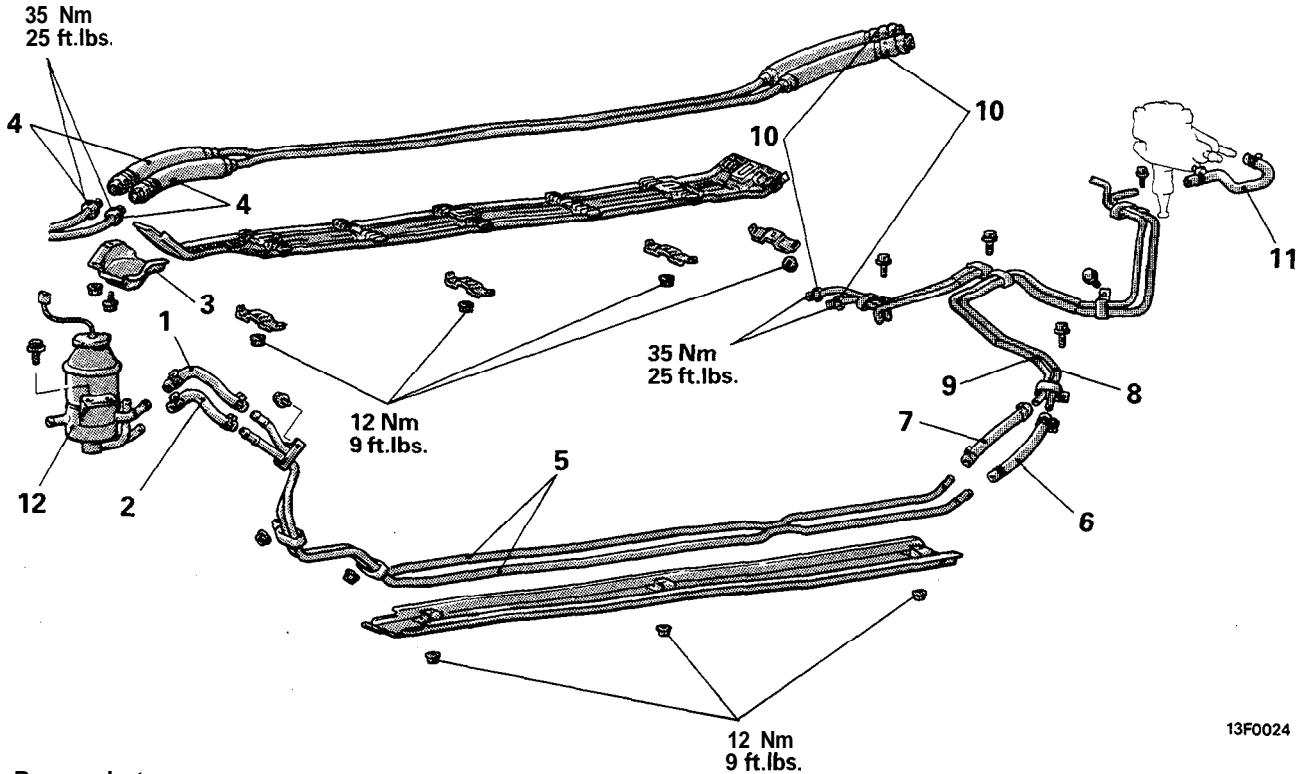
1. Pressure hose
2. Pressure tube
3. O-ring
4. Pressure tube (RR)
5. O-ring
6. Pressure tube (RL)
7. O-ring
8. Pressure tube (FL, FR)
9. O-ring
10. Return pipe
11. O-ring
12. Control valve

TSB Revision

REAR OIL LINE

REMOVAL AND INSTALLATION

M37YA- -



13F0024

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

Pre-removal Operation

- Cleaning of Piping with Steam
- Draining of Power Steering Fluid (Refer to GROUP 37A – Service Adjustment Procedures.)

Post-installation Operation

- Refilling and Bleeding of Power Steering System (Refer to GROUP 37A – Service Adjustment Procedures.)
- Bleeding of 4WS System (Refer to P.37B-4.)
- Checking of 4WS System for Operation (Refer to P.37B-5.)

INSPECTION

M37YCAA

- Check tubes and pipes for cracking, damage or corrosion.
- Check hoses for cracking, damage, leakage or fluid seepage.
- Check flare nuts for damage.

REAR OIL PUMP

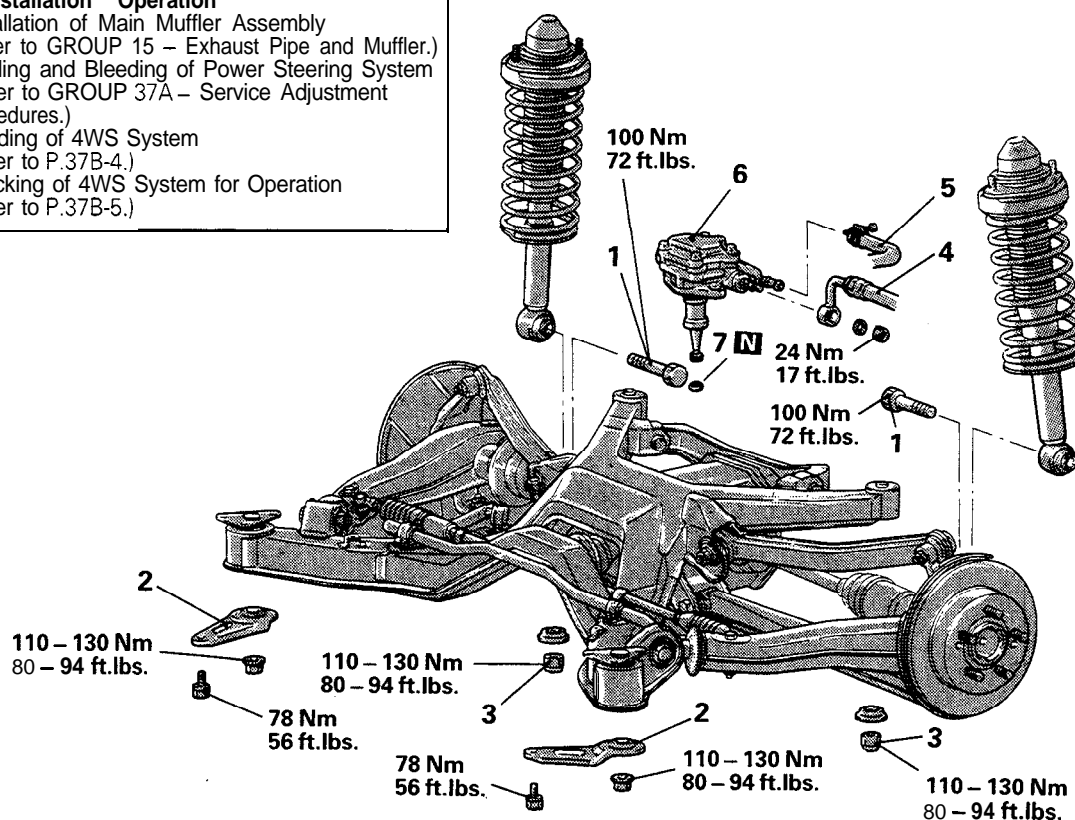
REMOVAL AND INSTALLATION

Pre-removal Operation

- Draining of Power Steering Fluid
(Refer to GROUP 37A – Service Adjustment Procedures.)
- Removal of Main Muffler Assembly
(Refer to GROUP 15 – Exhaust Pipe and Muffler.)

Post-installation Operation

- Installation of Main Muffler Assembly
(Refer to GROUP 15 – Exhaust Pipe and Muffler.)
- Refilling and Bleeding of Power Steering System
(Refer to GROUP 37A – Service Adjustment Procedures.)
- Bleeding of 4WS System
(Refer to P.37B-4.)
- Checking of 4WS System for Operation
(Refer to P.37B-5.)



13F0023

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

NOTE

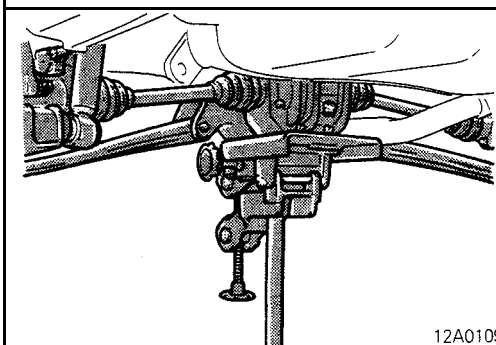
Do not disassemble the rear-wheel oil pump.

SERVICE POINTS OF REMOVAL

M37MBAA

2. REMOVAL OF CROSSMEMBER BRACKET / 3. CROSSMEMBER MOUNTING NUT (ON DIFFERENTIAL SIDE)

- (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.



12A0109

TSB Revision



BODY

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M42AA -

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SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

- (1) A Supplemental Restraint System (SRS), which uses a driver-side air bag, has been installed in the 3000GT.
- (2) The SRS includes the following components: impact sensors, SRS diagnosis unit: SRS warning light, air bag module, clock spring, 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 (*).

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) 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), before beginning any service or maintenance of any component of the SRS or any SRS-related component.

SPECIFICATIONS

GENERAL SPECIFICATIONS

Items	Specifications
Hood Type	Rear hinged, front opening type (with gas damper)
Door Construction Regulator system Locking system	Front-hinged, sashless Wire type Pin-fork type
Liftgate Type	Inner-hinged, with gas damper
Glass installation method Windshield glass Quarter window glass Liftgate window glass	Adhesive type Adhesive type Adhesive type
Glass thickness mm (in.) Windshield glass Liftgate window glass Door glass Quarter window glass	5.3 (.21) 3.5 (.14) 5.0 (.20) 3.5 (.14)
Power window motor Type Revolutions under no load rpm Revolutions under load rpm At 1 Nm (.72 ft.lbs.) At 2 Nm (1.45 ft.lbs.) Bound current A Direction of rotation	Permanent magnet type (Built-in circuit breaker) 75 or more 45-75 50-80 34 or less Clockwise and counter-clockwise
Power window main switch Type Rated load current A Lock switch Power window switch	Automatic reset type 10 10
Power window sub switch Type Rated load current A	Automatic reset type 10
Power window relay Maximum contact current A Rated coil current A Voltage drop between terminals V (At 12 V and the rated load current)	20 Max. 0.2 0.2 or less

Item	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

M42CB--

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)

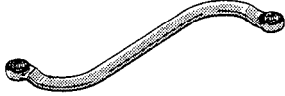


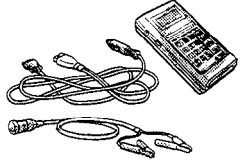
SEALANTS AND ADHESIVES

M42CE--

Items	Specified sealant	Remarks
Front fender panel Splash shield Waterproof film	3M ATD Part No. 8625 or equivalent	Ribbon sealer
Windshield Quarter window glass Liftgate glass	3M SUPER FAST URETHAN 8609 or equivalent and 3M SUPER FAST URETHAN PRIMER 8608 or equivalent	

SPECIAL TOOLS

M42DA--

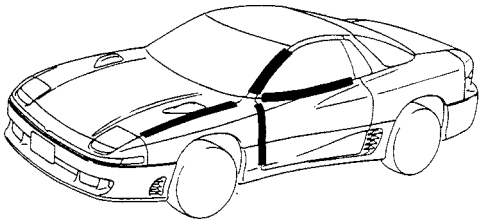
Tool	Number	Name	Use
	MB990834-01	Door adjusting wrench	Adjustment of door fit
	MB990449	Window moulding remover	Removal of window moulding
	MB991359	ROM pack	Checking the power-windows system and the central door-locking system (ETACS input check)
	MB991341	Multi-use tester assembly	Checking the power-windows system and the central door-locking system (ETACS input check)

TROUBLESHOOTING

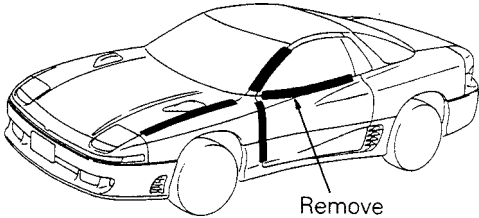
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HOOD, LIFTGATE, GLASS AND DOORS

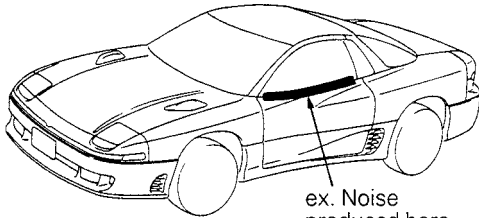
Symptom		Probable cause	Remedy
Hood/ Liftgate	Improper closure	Striker and latch not properly aligned	Adjust the alignment
	Difficult locking and unlocking	Striker and latch not properly aligned	Adjust the alignment
	Uneven body clearance	Incorrectly installed hood or liftgate	Adjust the installation 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	



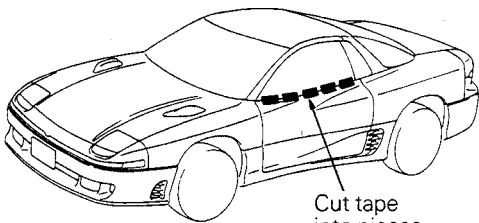
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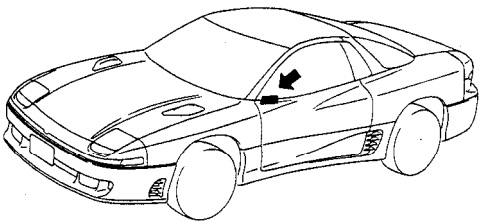
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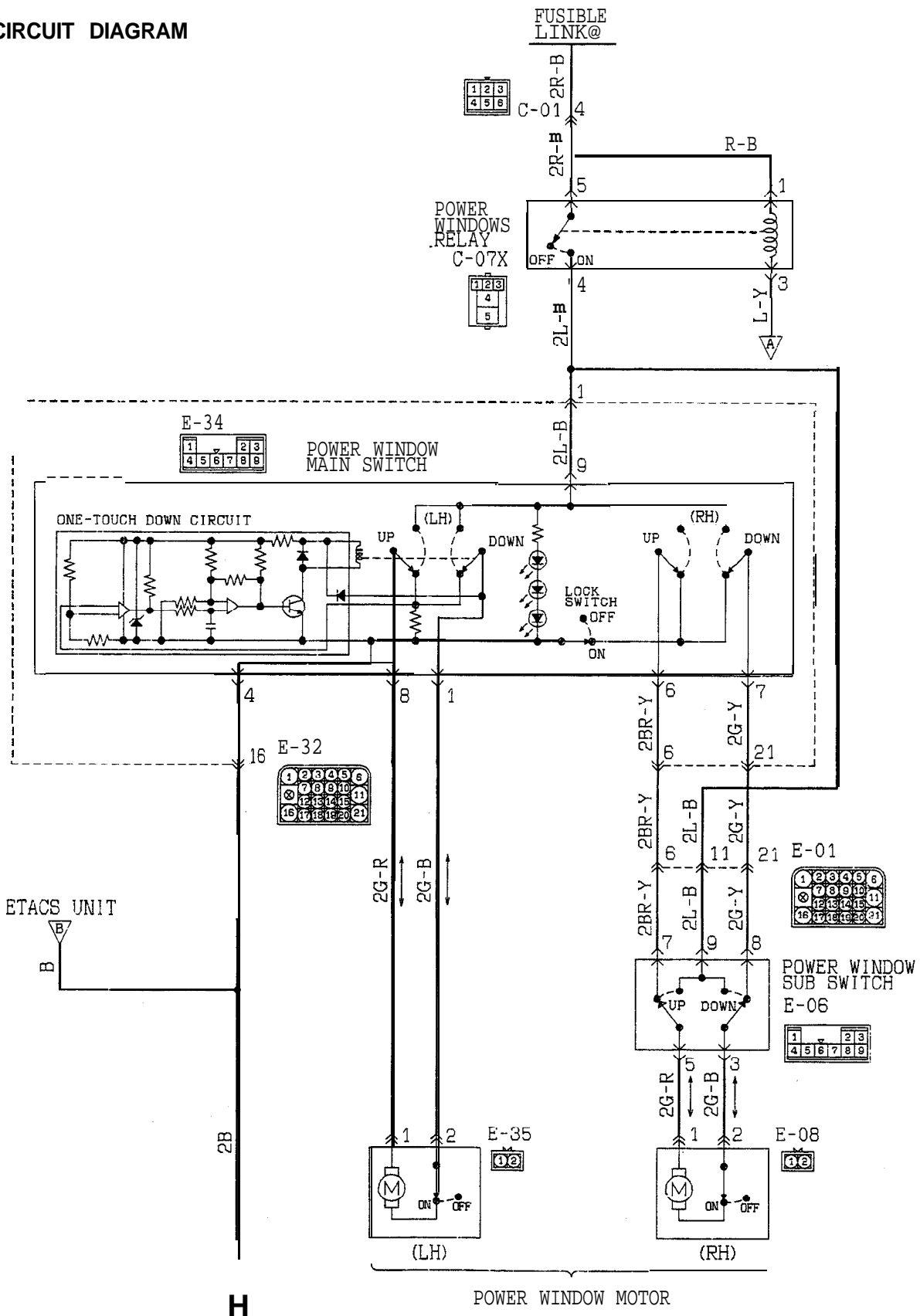
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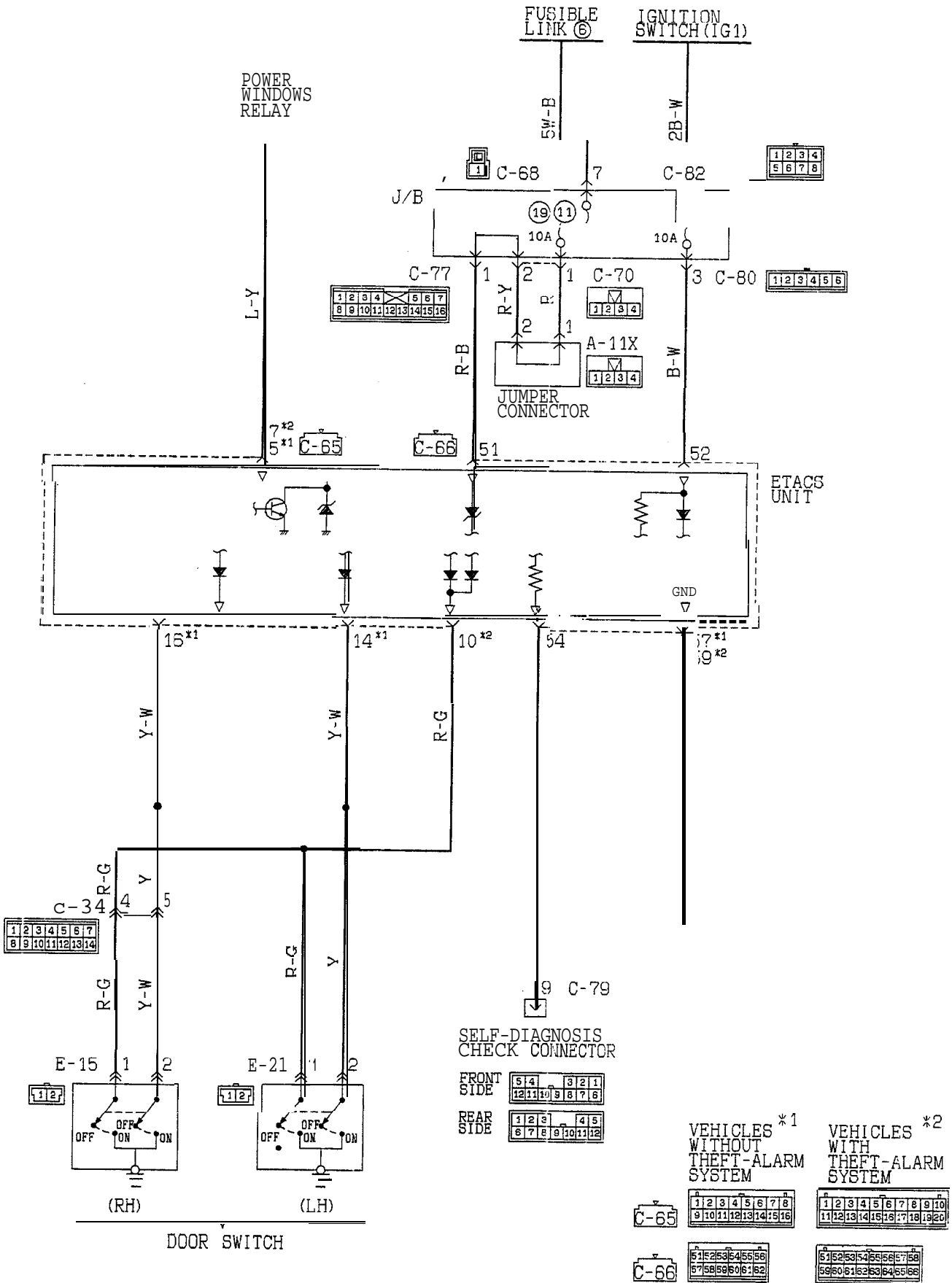
HOW TO LOCATE WIND NOISES

- (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.
- (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.
- (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.
- (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.
- (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.

POWER WINDOW

CIRCUIT DIAGRAM





SELF-DIAGNOSIS
CHECK CONNECTOR

FRONT
SIDE

5	4	3	2	1
12	11	10	9	8
7	6			

REAR
SIDE

1	2	3	4	5
6	7	8	9	10
11	12			

VEHICLES *1
WITHOUT
THEFT-ALARM
SYSTEM

VEHICLES *2
WITH
THEFT-ALARM
SYSTEM

C-65

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

C-66

51	52	53	54	55	56	57	58
59	60	61	62	63	64	65	66

51	52	53	54	55	56	57	58
59	60	61	62	63	64	65	66

OPERATION

- When, with the ignition switch at the ON position, a power-window (main or sub) switch (“UP” side or “DOWN” side) is pressed, current flows through sub-fusible link No. 8 and to the power-window motor, thus causing the door window glass to close or open.
- When the “DOWN” side of the power-window main switch at the driver’s side is pressed all the way, it is locked at the pressed-in position, and the power-window motor operates until the door glass is fully opened.
- When the power-window lock switch is set to the “LOCK (ON)” position, the power-window motor will not operate if any switch (main or sub) other than at the driver’s side is operated.
- A circuit breaker is provided in the power-window motor in order to prevent damage to the motor as a result of excessive current.

For reference: Circuit breaker characteristics

Motor operation is restricted at high temperatures [20 – 25°C (68 – 77°F)]. Current flow is cut by an initial current flow time of four to 40 seconds; reset occurs within 60 seconds if then left as is.
--

- The timer function of the ETACS permits the power-window relay to remain ON for 30 seconds after the ignition switch is switched OFF.
If, during that period of time, the front door is opened, the power-window relay is switched OFF, and the power windows can no longer be operated.

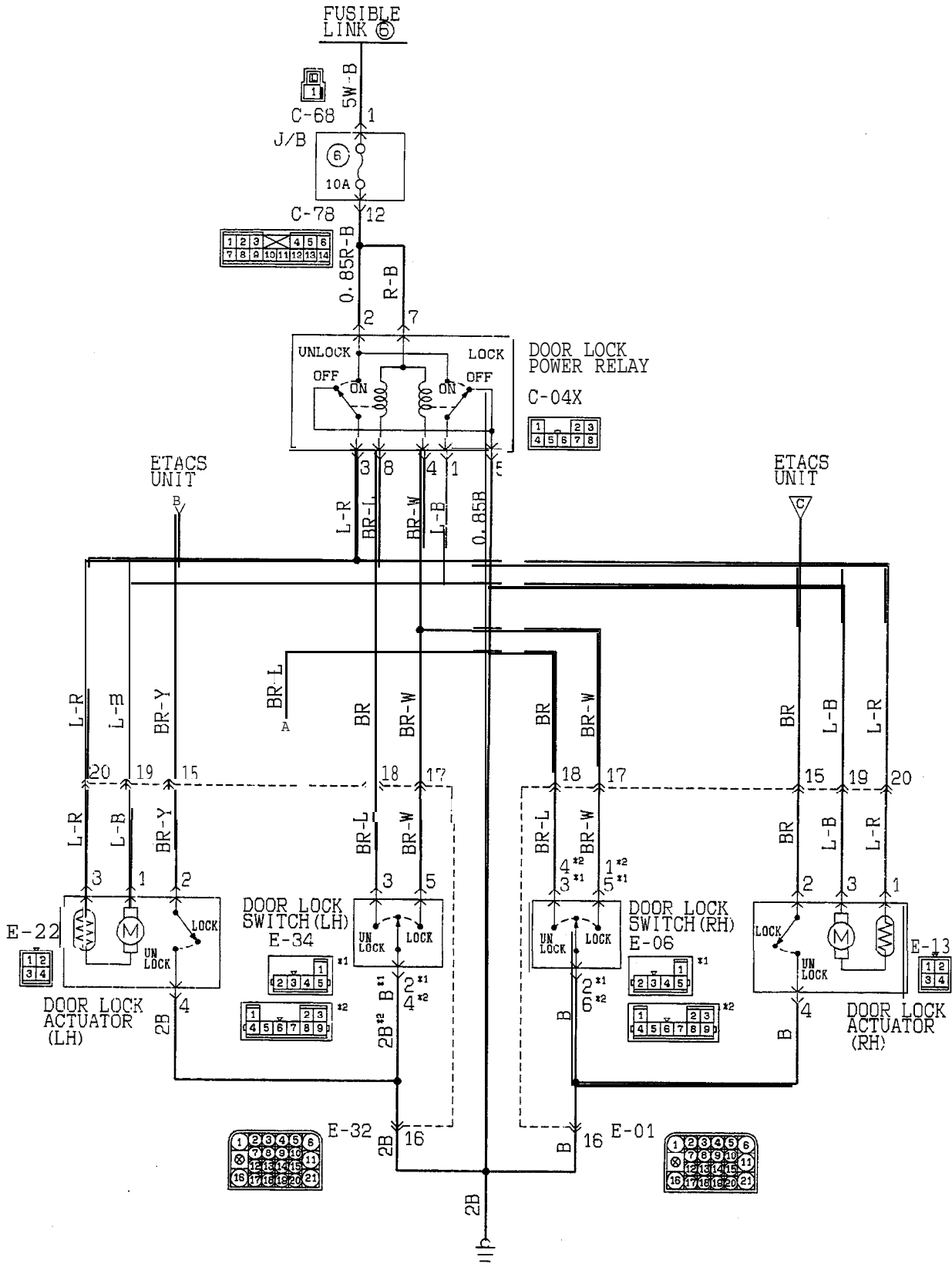
TROUBLESHOOTING HINTS

1. All door windows cannot be opened or closed.
 - Check sub-fusible link No. 8.
 - Check the power-window relay.
 - Check the power-window main switch.
2. One of the door windows cannot be opened or closed.
 - (1) Neither of the power-window switches (main or sub) operates.
 - Check the power-window main switch.
 - Check the power-window motor for the power window that does not operate.
 - (2) Either the power-window main switch or sub switch does not operate.
 - Check the power-window switch for the power window that does not operate.
3. The one-touch down switch function only does not operate.
 - Replace the power-window main switch.
4. The power window operation by ETACS control after the ignition switch is switched OFF does not function.
 - Refer to P.42-43.

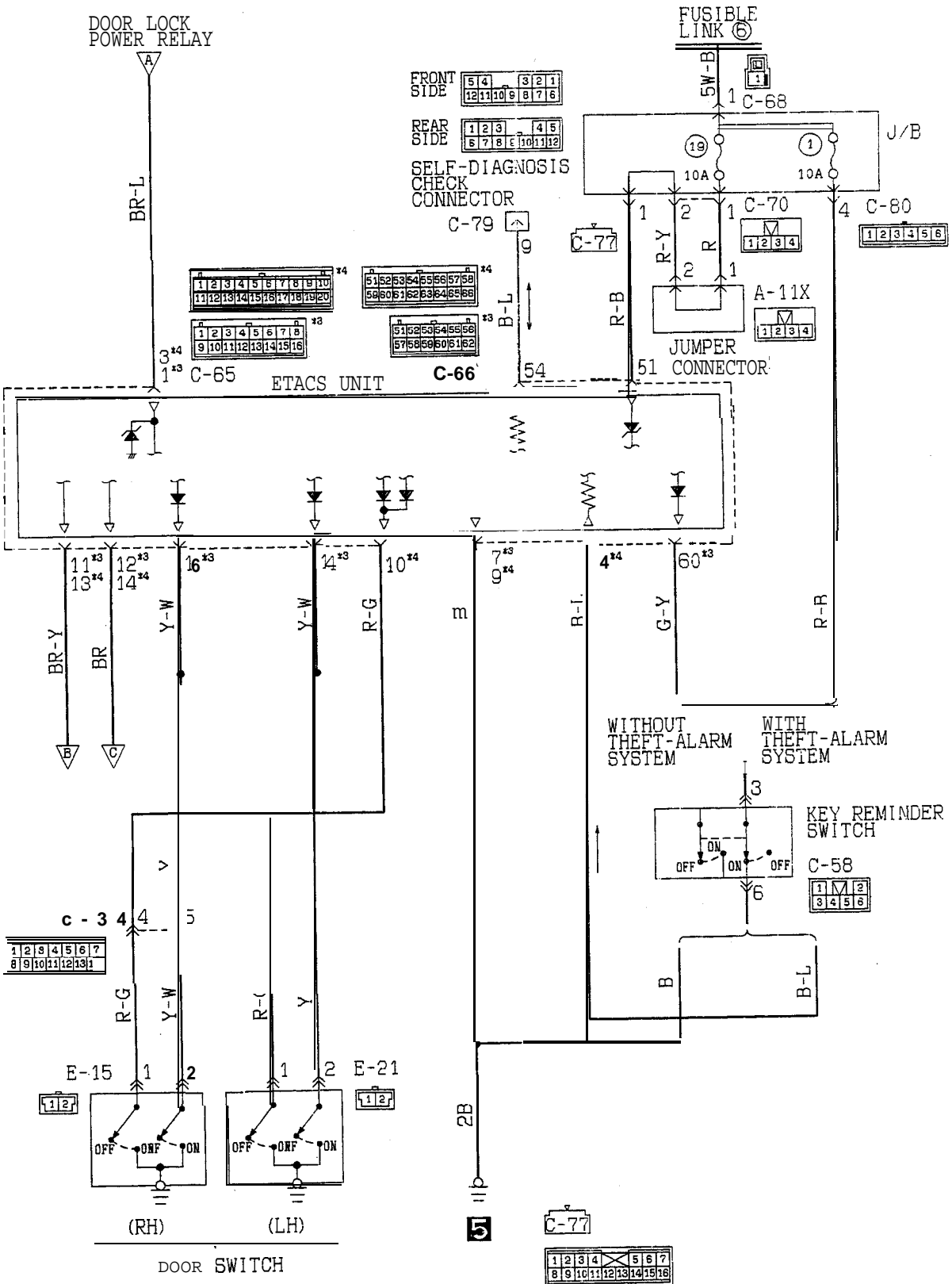
CENTRAL DOOR LOCKING SYSTEM

M42EBFH

CIRCUIT DIAGRAM



*1: VEHICLES WITHOUT POWER WINDOW
 *2: VEHICLES WITH POWER WINDOW



*3: VEHICLES WITHOUT THEFT-ALARM SYSTEM
 *4: VEHICLES WITH THEFT-ALARM SYSTEM

OPERATION

- When the door lock switch is set to the LOCK side (or UNLOCK side), the LOCK side (or UNLOCK side) of the door lock relay is turned ON and the door actuators of all doors operate.
- If the driver seat side door (or assistant seat side door) is opened and the driver seat side inside lock knob (or assistant seat side inside lock knob) is locked with the key inserted in the ignition switch, the ETACS unit grounds the unlock side circuit of the door lock relay to unlock all doors. This way, failure to remove the key is prevented.

NOTE

The door lock actuator contains a PTC thermister to prevent damage caused by overheating of the motor. If the central door lock is frequently used, the actuator may temporarily fail to operate. If it returns to normal in a few minutes, it is not defective.

TROUBLESHOOTING HINTS

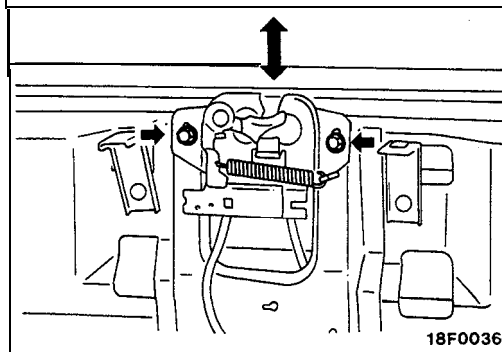
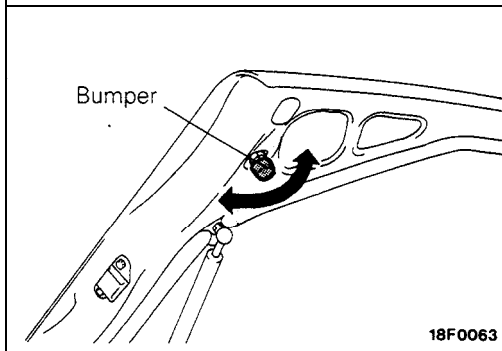
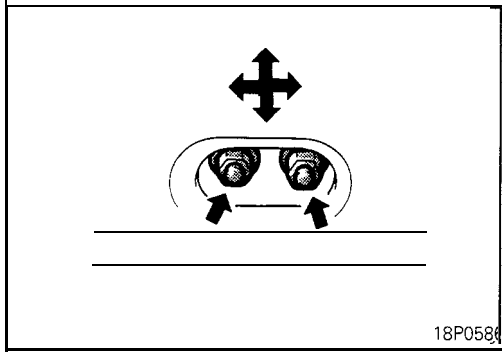
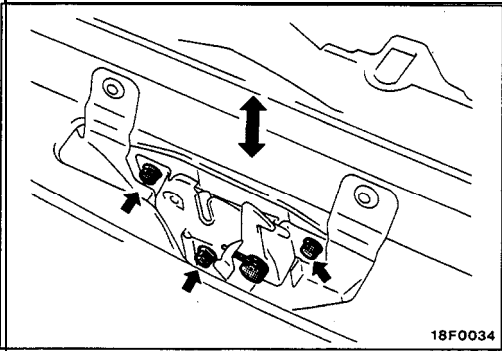
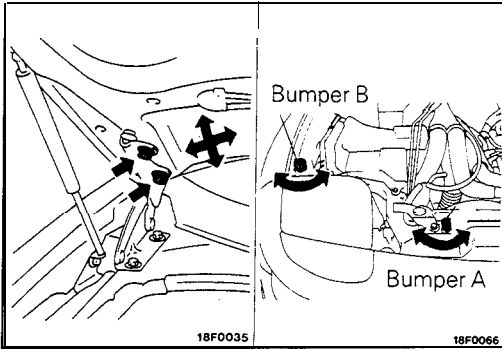
1. One of the door lock actuators fails to operate.
 - Check the door actuator which fails to operate.
2. The ignition key reminder system does not function.
 - For information concerning ETACS control, refer to P.42-55.

SERVICE ADJUSTMENT PROCEDURES

HOOD ADJUSTMENT

M42FAAL

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.

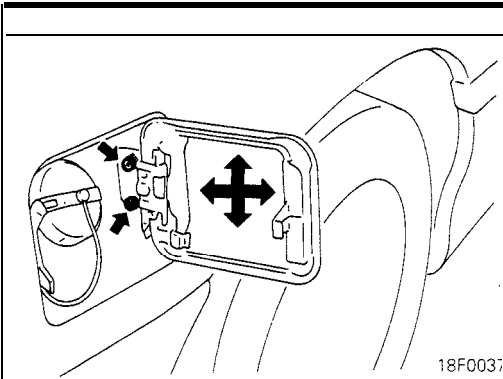
LIFTGATE ADJUSTMENT

M42FCAF

1. Loosen the liftgate hinges mounting bolts, and then adjust the liftgate by moving it so that the clearance is equal on all sides.

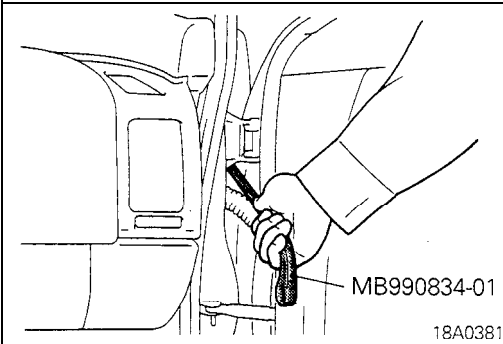
2. Turn the bumper to adjust the liftgate height.

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**

M42FDAF

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**

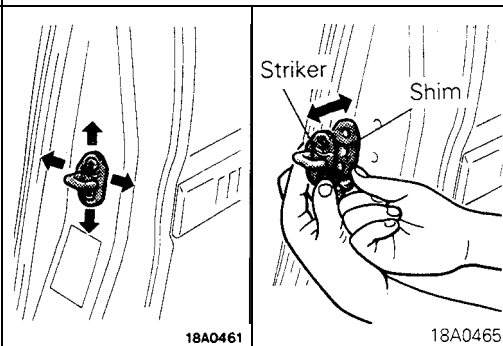
M42FEAG

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.

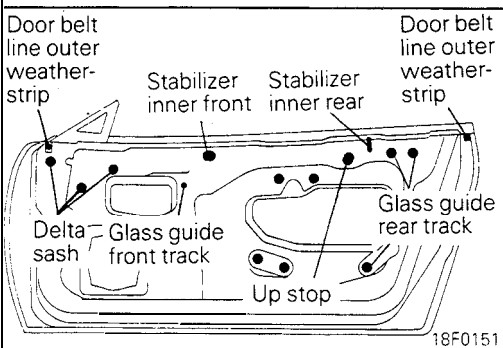
**DOOR WINDOW GLASS ADJUSTMENT**

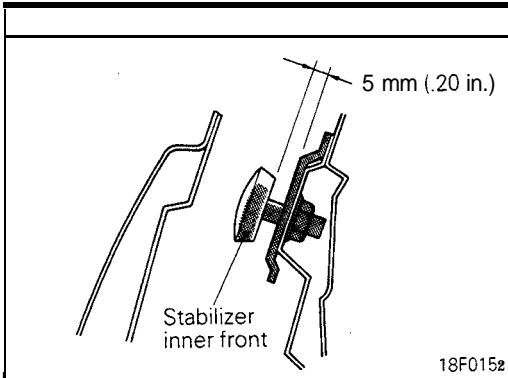
M42FFAL

1. Remove the door trim and waterproof film. (Refer to P.42-41.)
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

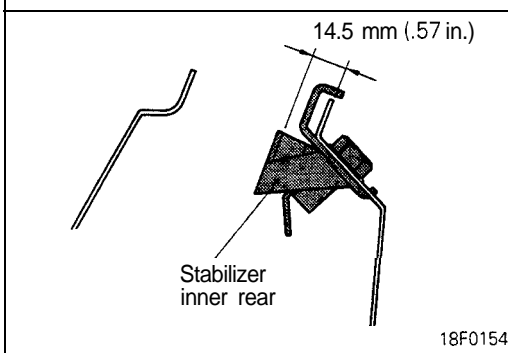
NOTE

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.



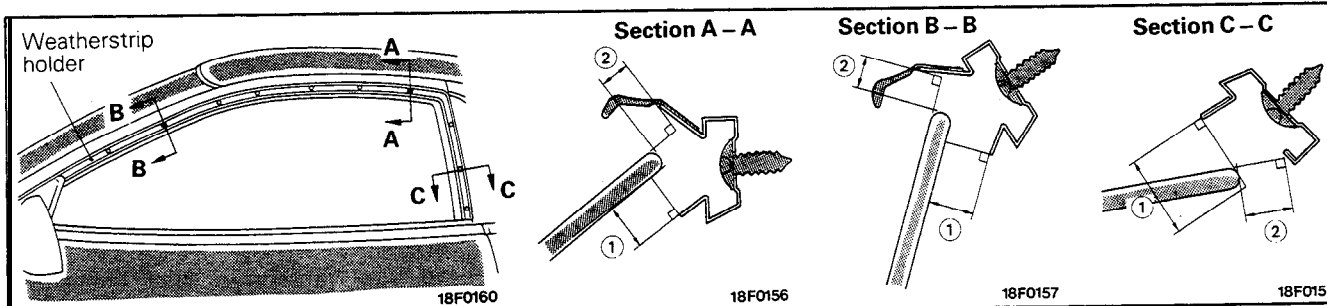
6. Adjust the adjusting bolt for the stabilizer inner rear dimension shown here.

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.

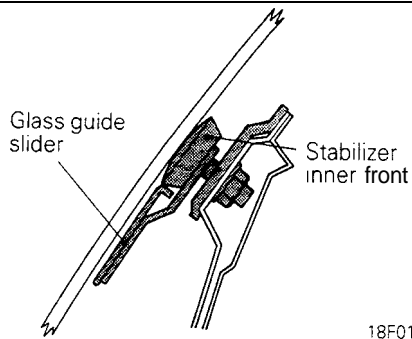
8. Adjust glass to have standard clearance between the weatherstrip holder and window glass.

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.)							
		Section A-A		Section B-B		Section C-C			
		(1)	(2)	(1)	(2)	(1)	(2)		
1	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.	<p>18N0114</p>		11.7 ± 1.0 (.46 ± .04)	-	11.8 ± 1.0 (.46 ± .04)	-	20.5 ± 1.0 (.80 ± .04)	-
2	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.	<p>18F0162</p>		-	7.0 ± 1.0 (.28 ± .04)	-	7.7 ± 1.0 (.30 ± .04)	-	12.0 ± 1.0 (.47 ± .04)

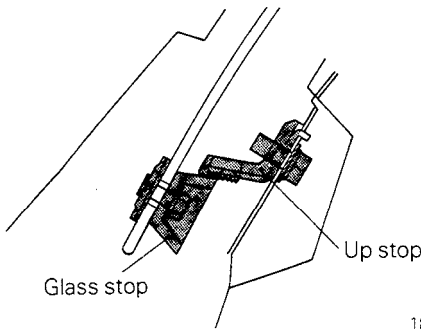


18F0153

NOTE

Adjust both inward tilt and forward or backward tilt of glass at the same time.

9. Force the stabilizer inner front onto the glass guide slider of the window glass assembly and tighten in position.

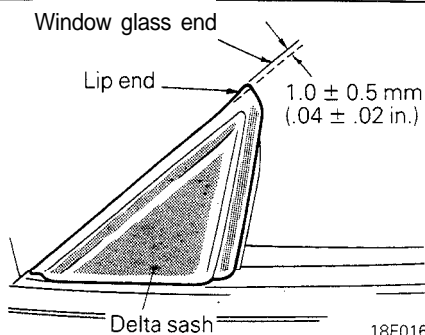


18F0158

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.



18F0161

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.42-41.)
16. Open and close the door and move up and down the window glass to check fitting of the door.

DOOR INSIDE HANDLE PLAY CHECK

M42FGA

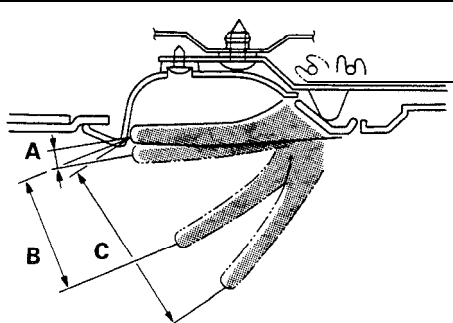
1. Check that the door inside handle play is as specified.

Standard value

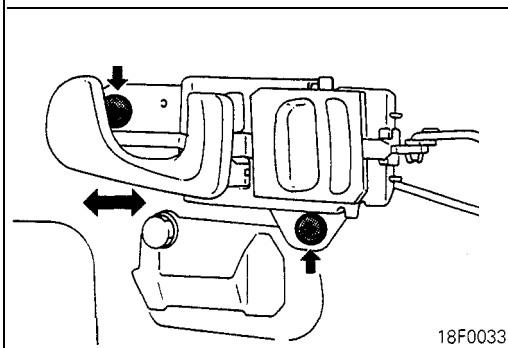
A (play): 7 mm (.28 in.)

B (OPEN): 46 ± 9 mm (1.81 ± .35 in.)

C (FULL): 69 mm (2.72 in.)

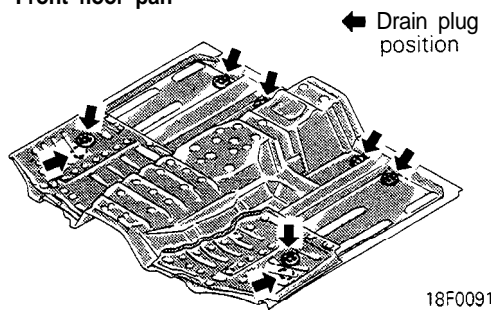


18F0043

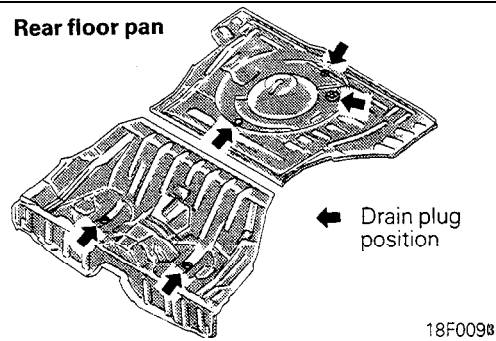


2. If out of specifications, adjust as described below.
 - ① Remove the door trim. (Refer to P.42-41.)
 - ② Loosen the screw attaching the inside handle and slide the inside handle back and forth to adjust the inside handle play.

Front floor pan



Rear floor pan



FLOOR PAN INSPECTION

M42FIAD

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.

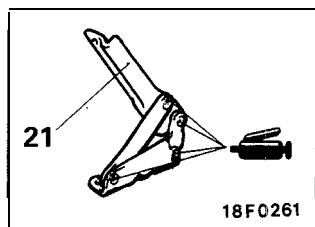
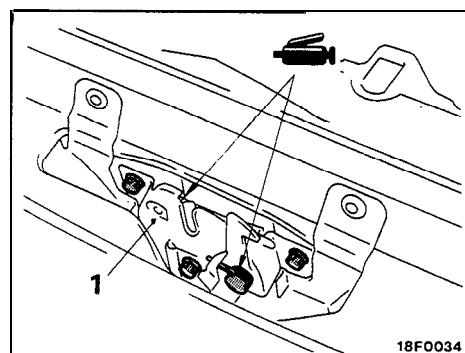
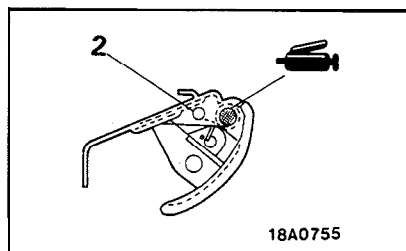
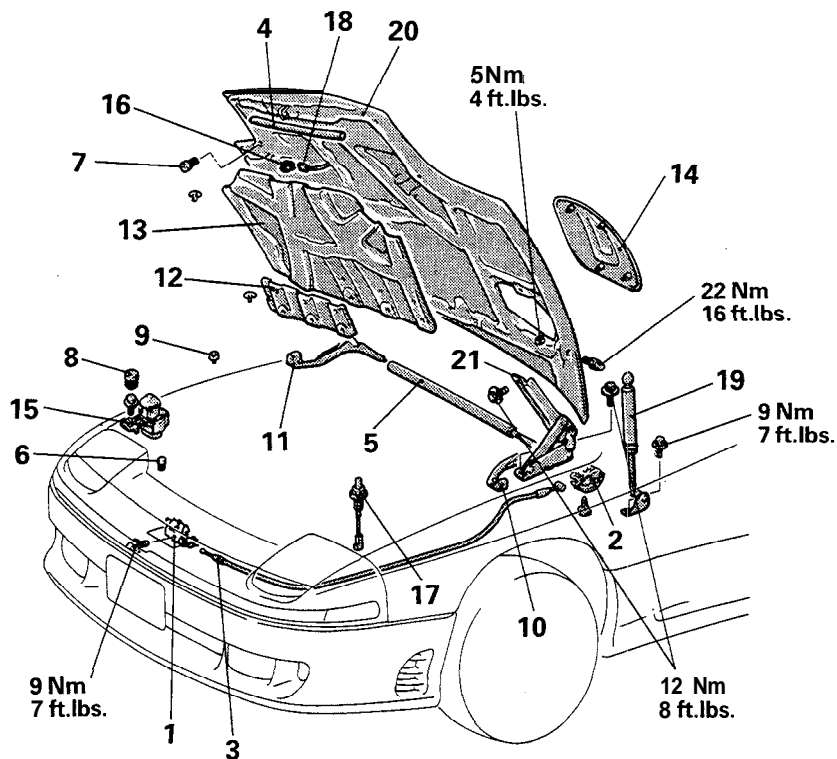
ENGINE HOOD

M42HAAV

REMOVAL AND INSTALLATION

Adjustment

- Hood Adjustment (Refer to P.42-13.)



1. Hood latch
2. Hood lock release handle
3. Hood lock release cable
4. Hood weatherstrip (Front)
5. Hood weatherstrip (Rear)
- a 6. Bumper A (Body side)
- ♦ 7. Bumper A (Hood side)
- * 8. 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

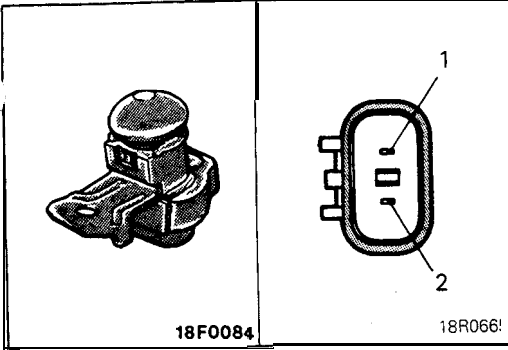
Hood hinge removal steps

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.

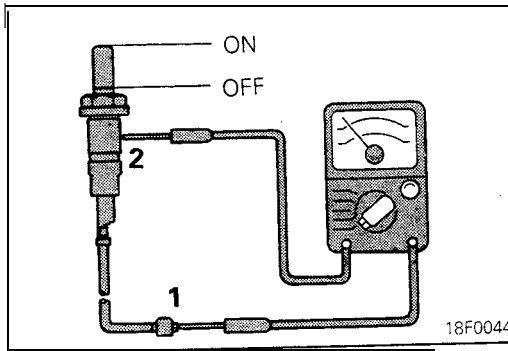


**INSPECTION
HOOD SWITCH**

Check the continuity between the terminal.

Terminal	1	2
Lid switch unpressed	0	0
Lid switch depressed		

NOTE
○—○ indicates that there is continuity between the terminals.

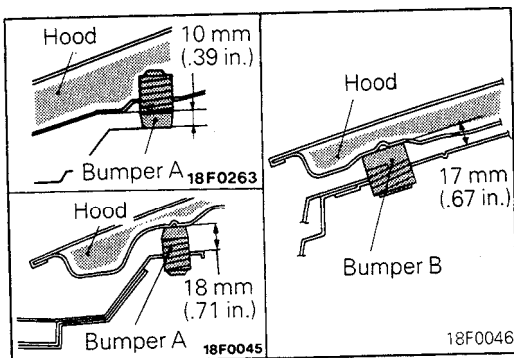


INSPECTION LIGHT SWITCH

Turn the switch ON/OFF and check continuity between terminals (between the connector terminal and the switch body).

Terminal	1 (Connector terminal)	2 (Switch body)
Switch position		
ON	○—○	○—○
OFF		

NOTE
○—○ indicates that there is continuity between the terminals.



SERVICE POINTS OF INSTALLATION

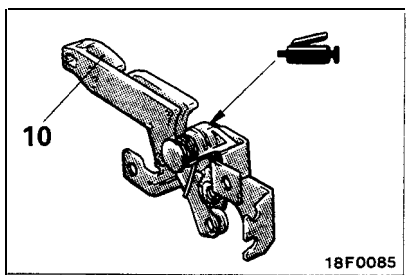
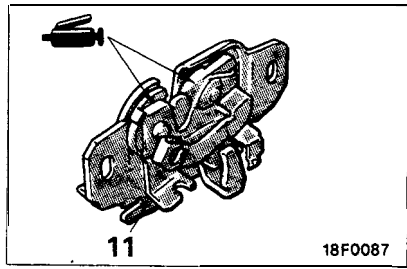
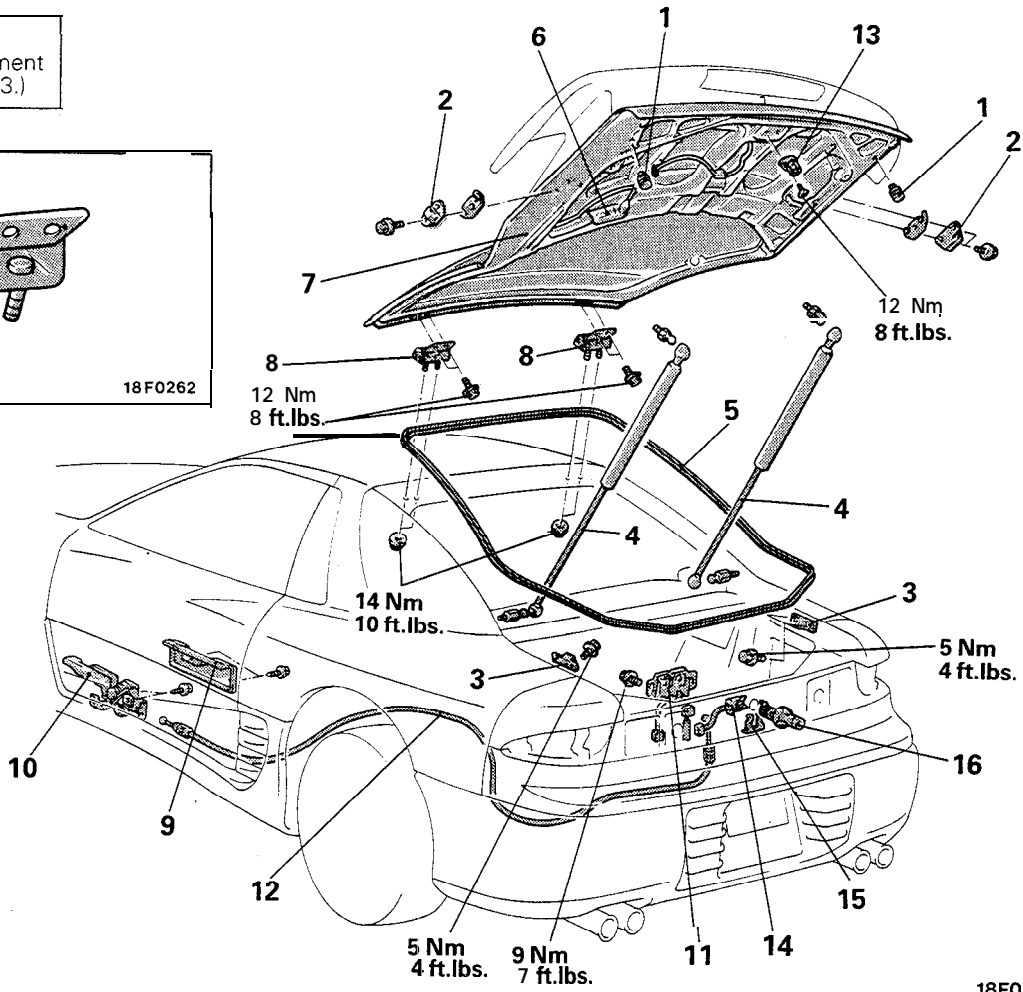
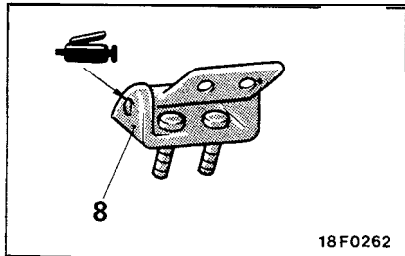
8. 7. 6. INSTALLATION OF BUMPER B, A

install the bumpers as illustrated.

LIFTGATE

REMOVAL AND INSTALLATION

Adjustment
 • Liftgate Adjustment
 (Refer to P.42-13.)



- + 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 }
- 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) }
- Rear side trim }
- 4. Liftgate gas spring
- 6. Connection for liftgate wiring harness
- 7. Liftgate Headlining (Refer to GROUP 52A – Headlining.)
- 8. Liftgate hinge

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 }
- Rear end trim }
- 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-
Rear panel garnish } Garnishes and
Mouldings.)
- 14. Liftgate lock cylinder switch
- 15. Retainer
- 16. Liftgate lock cylinder

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.

INSPECTION

LIFTGATE LATCH SWITCH

- (1) Unlock the liftgate latch.
- (2) Check the continuity between the terminals.

Terminal	1	2
Liftgate latch locked		
Liftgate latch unlocked	○ — ○	○ — ○

NOTE

O-O indicates that there is continuity between the terminals.

LIFTGATE LOCK CYLINDER SWITCH

Check the continuity between the terminals.

Terminal	1	2
When switch is pressed		
When switch is not pressed	○ — ○	○ — ○

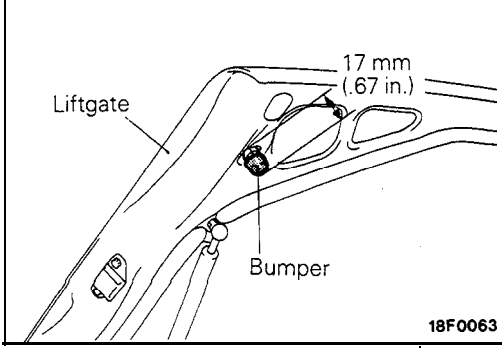
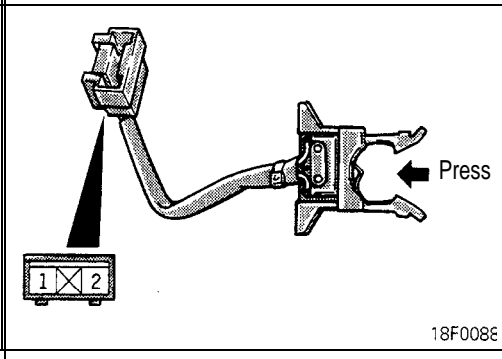
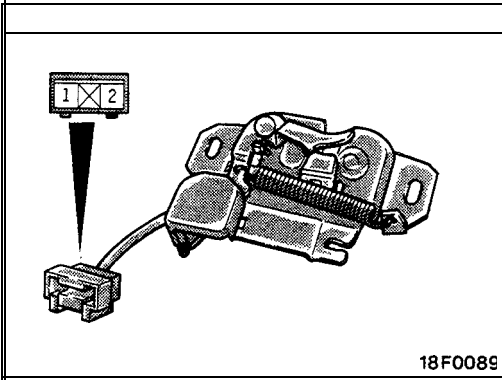
NOTE

O-O indicates that there is continuity between the terminals.

SERVICE POINT OF INSTALLATION

1. INSTALLATION OF BUMPER

Install the bumper so that the amount of projection from the liftgate is as shown in the illustration.



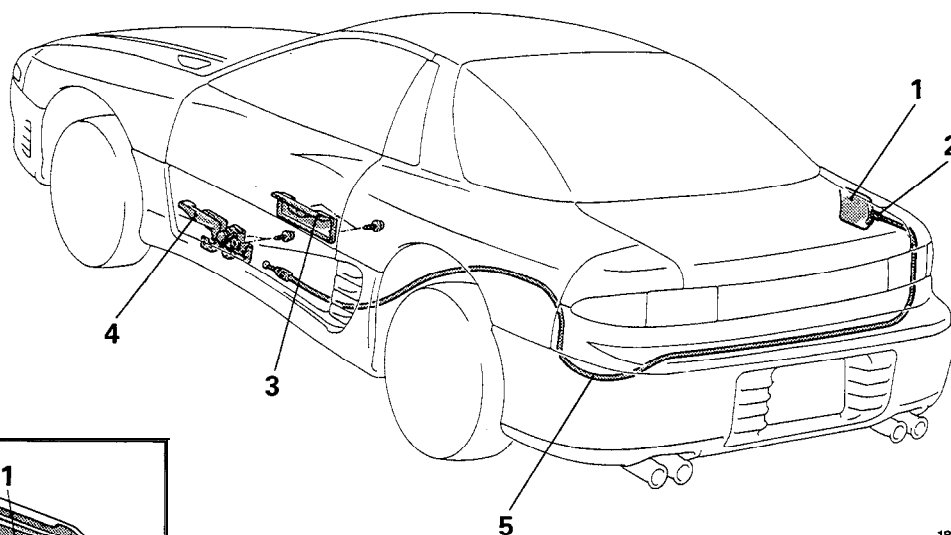
FUEL TANK FILLER DOOR REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

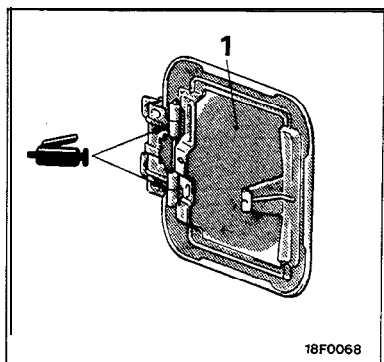
- Removal and Installation of Rear Side Trim, Quarter Trim and Scuff Plate (Refer to GROUP 52A – Trims.)

Adjustment

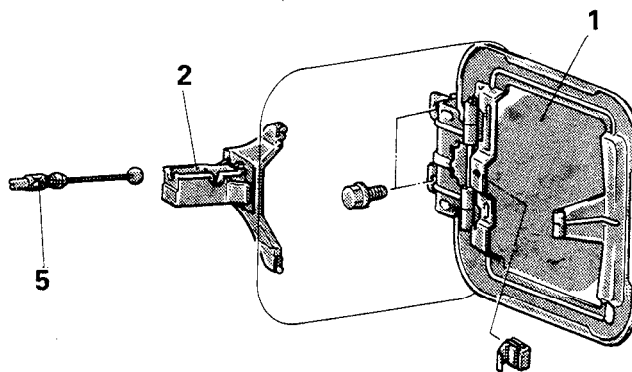
- Fuel Filler Door Adjustment (Refer to P.42-14.)



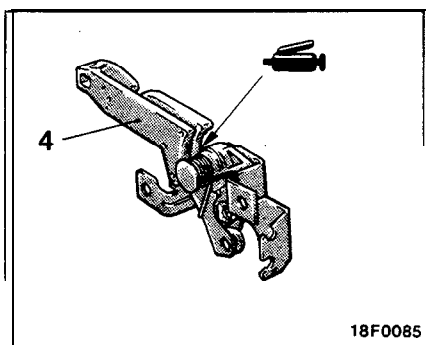
18F0130



18F0068



18F0069



18F0085

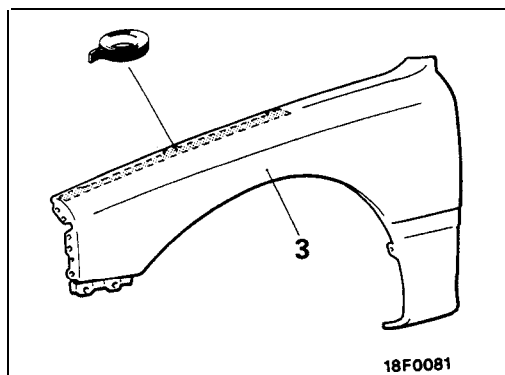
Removal steps

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

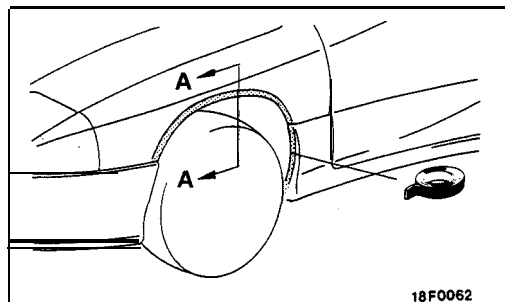
FENDER

M42KAAX

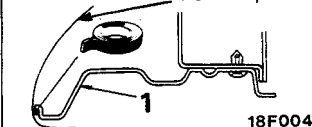
REMOVAL AND INSTALLATION



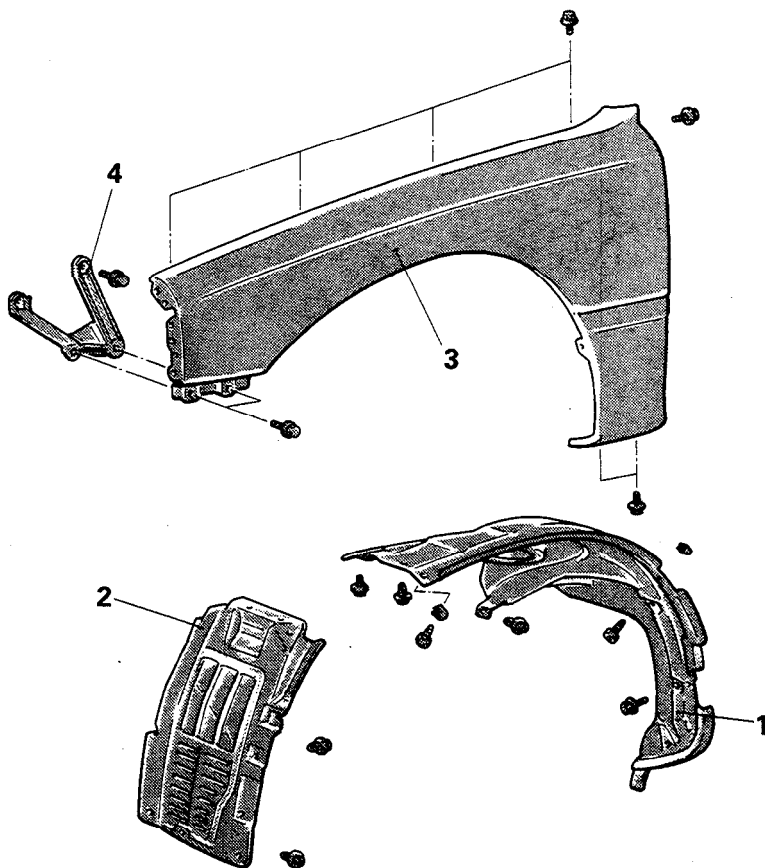
Sealant:
3M ATD Part No. 8625 or equivalent



Section A – A Fender panel



Sealant:
3M ATD Part No. 8625 or equivalent

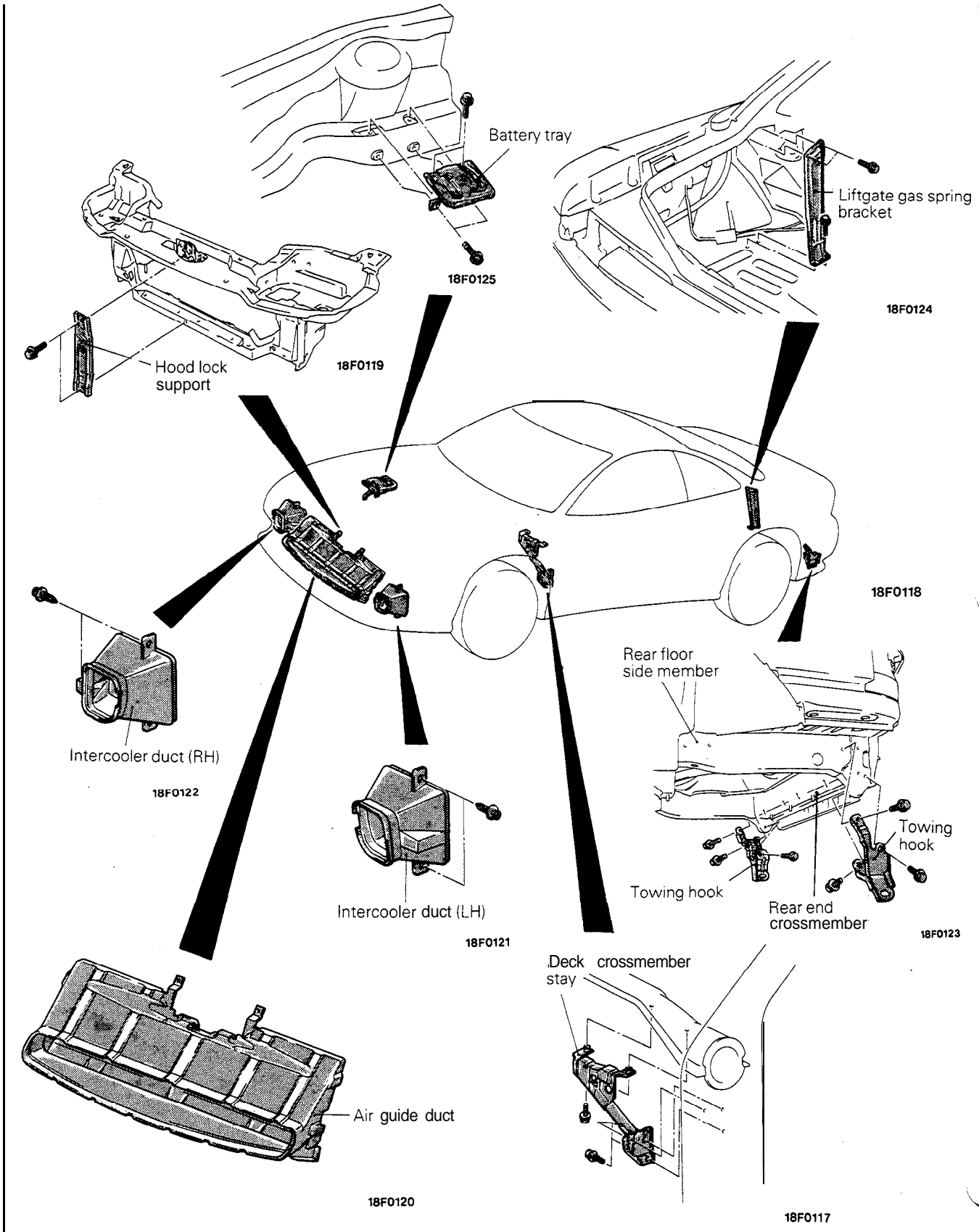


18F0126

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

LOOSE PANEL REMOVAL AND INSTALLATION



WINDOW GLASS

M42LAAL

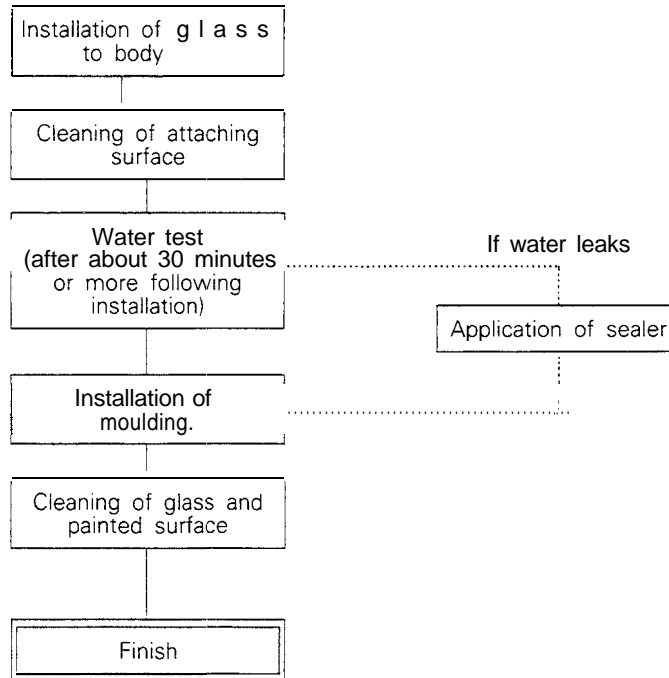
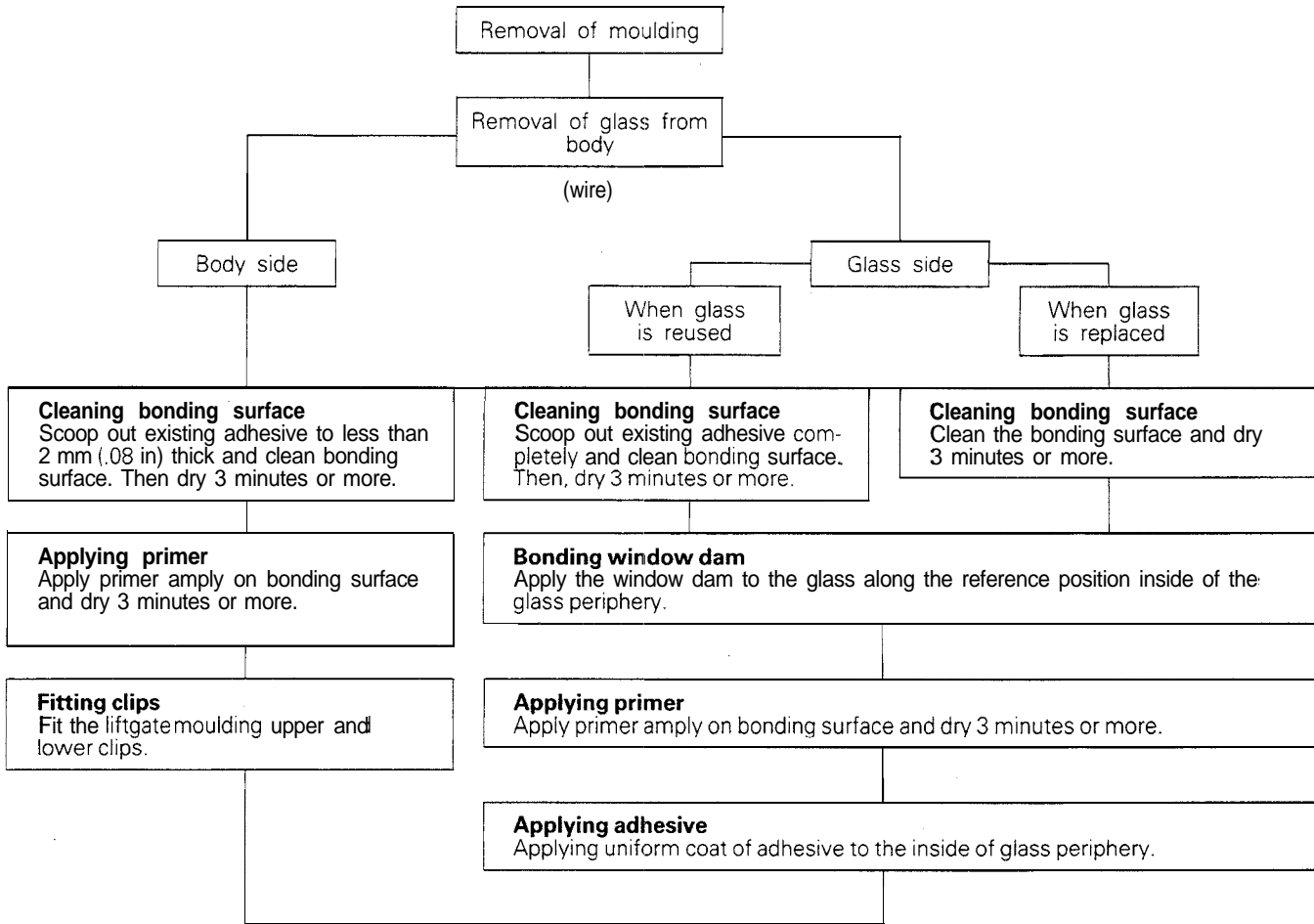
GENERAL

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
<p>Adhesive 3M SUPER FAST URETHAN 8609 3M SUPER FAST URETHAN PRIMER 8608</p>		<p>One cartridge As required</p>
<p>Reserve items Wire (dia. x length) Adhesive gun 3M ATD Part No. 8906 Wiping rags Sealer Glass holder Windshield moulding (Service Part) Window dam (Service Part)</p>	<p>for cutting adhesive for adhesive application for cleaning jointing surfaces for prevention of water leaks and gathering after adhesive application</p>	<p>Five pieces of wire 0.6 mm x 1 m (.02 in. x 3.3 ft.) One As required As required As required Two One As required</p>

WINDSHIELD AND LIFTGATE GLASS INSTALLATION PROCEDURE

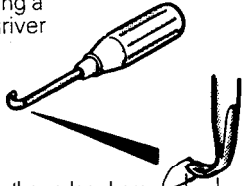


REPLACEMENT OF MOULDING (BONDING TYPE)

M42LABD

Recommended tool

Make the tool by modifying a screwdriver



Sharpen the edge here 4mm (.16 in.)

18U0161

1. Remove the mouldings.
2. To cut the existing adhesive, make a tool such as the one shown.

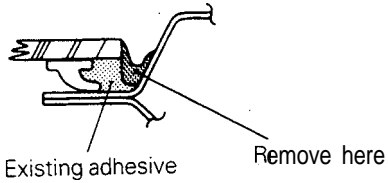
3. Using the tool, scoop out the existing adhesive.

Caution

1. Do not remove existing adhesive more than necessary.

Use care not to damage the coated surface.

2. If the coated surface is damaged, apply paint.



Existing adhesive

Remove here

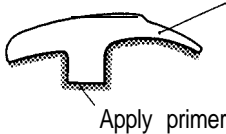
18U0160

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.

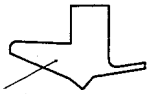
Caution

Never touch the primer coated surface.

Upper portion of moulding



Apply primer

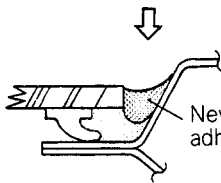


Lower portion of moulding

18F005I

6. Apply adhesive to the illustrated area and install the moulding before it hardens.

Moulding



Newly applied adhesive

18F005I

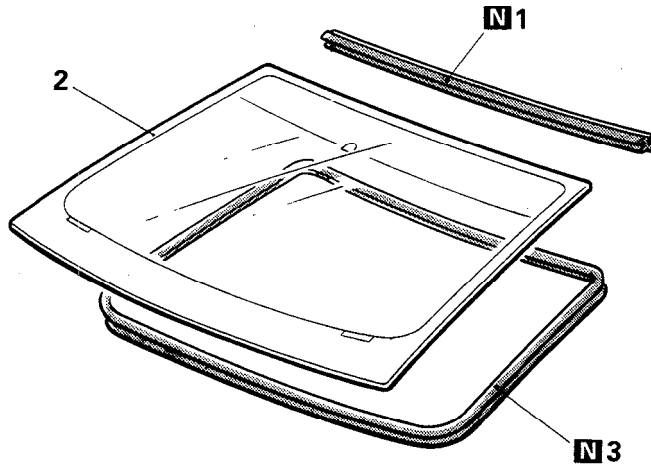
7. Scrape away excessive sealant forced out during installation of the moulding from the glass or body and wipe the surfaces clean with 3M ATD Part No. 8906 or equivalent.
8. After the work, leave the vehicle as it is until the adhesive hardens.

WINDSHIELD

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

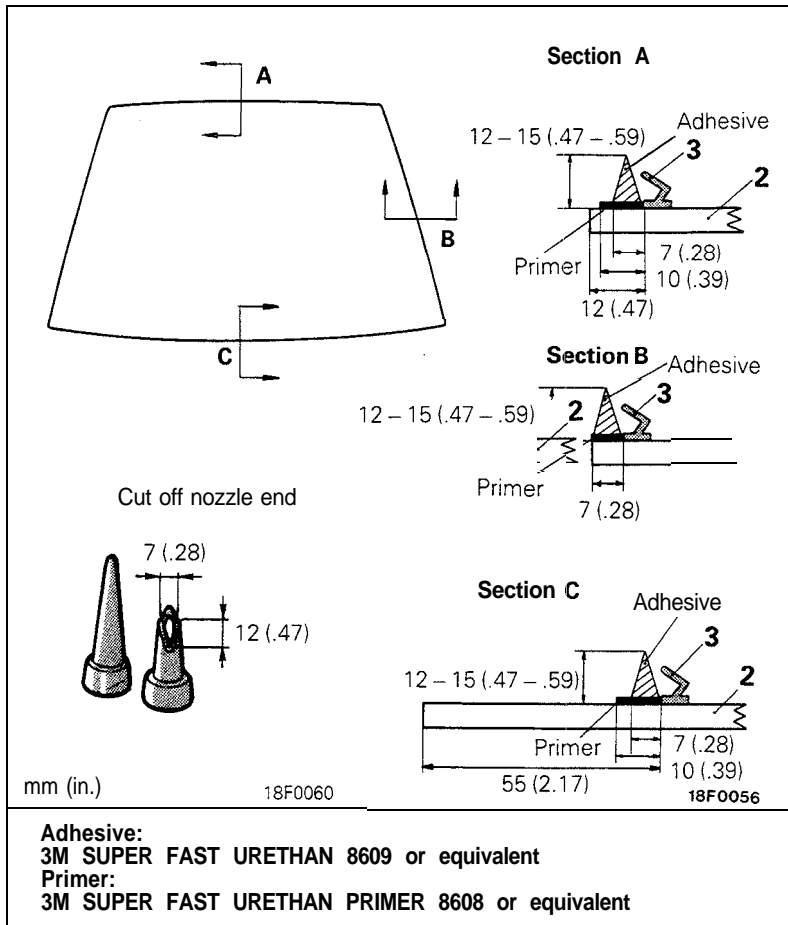
- Removal and Installation of Deck Garnish (Refer to GROUP 51 – Garnishes and Mouldings.)
- Removal and Installation of Roof Drip Moulding (Refer to GROUP 51 – Garnishes and Mouldings.)
- Removal and Installation of Headlining (Refer to GROUP 52A – Headlining.)
- Removal and Installation of Front Pillar Trim (Refer to GROUP 52A – Trims.)

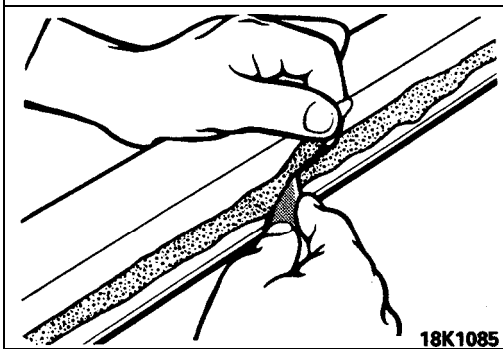
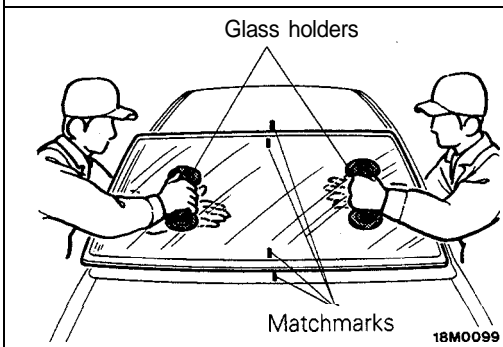
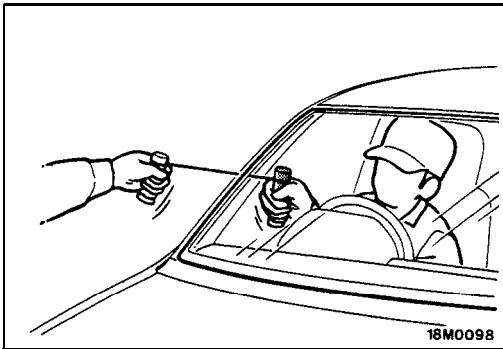


Removal steps

- * • * 1. Windshield moulding
- 2. Windshield glass
- 3. Window dam

18F0059





SERVICE POINTS OF REMOVAL

2. REMOVAL OF WINDSHIELD GLASS

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

Use care to prevent contact of the wire with the windshield glass edge.

- (5) Put matchmarks on the body and the glass.
- (6) Using the glass holders, 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. Use care 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.
- (10) Degrease the body same way.

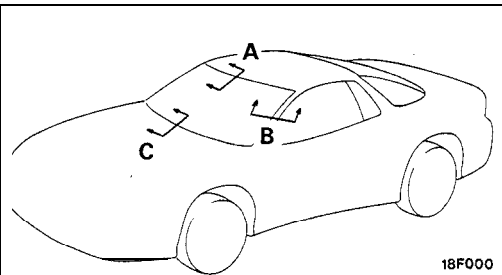
Caution

After degreasing, allow three minutes or more to dry well before next work. Do not touch the degreased surface.

SERVICE POINT OF INSTALLATION

2. INSTALLATION OF WINDSHIELD GLASS

- (1) When replacing glass, fit a new glass once to the body and put matchmarks on the body and glass.



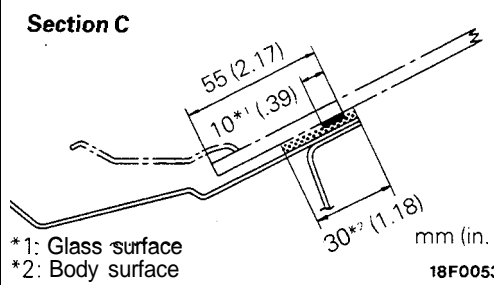
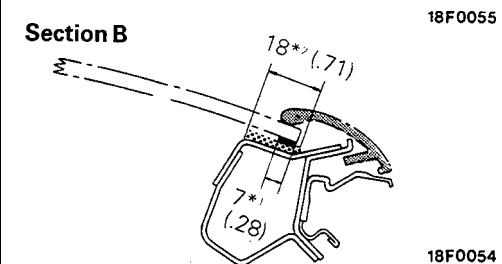
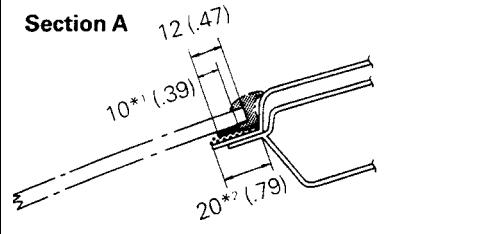
- (2) Apply a uniform coat of primer to the illustrated areas of the body and glass making sure it is applied without breaks or thin spots.

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.

- (3) Allow 3 to 30 minutes to dry the primer.



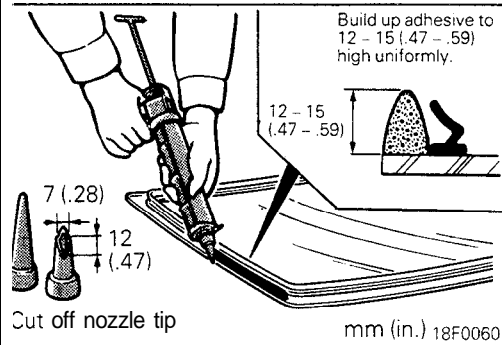
- (4) Within 30 minutes of primer application, apply the adhesive all around the windshield glass uniformly.

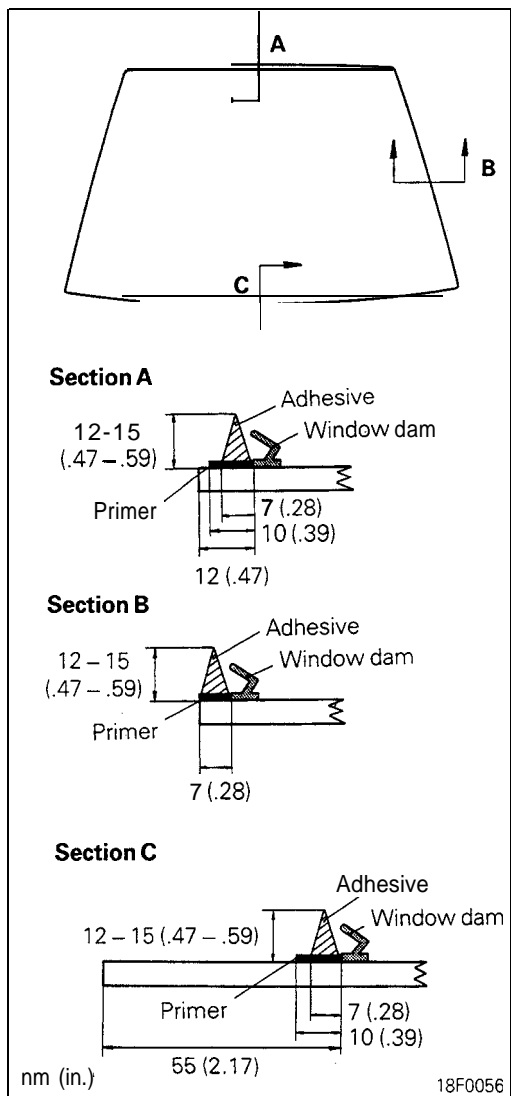
Adhesive: 3M SUPER FAST URETHAN 8609 or equivalent

NOTE

Cutting the nozzle tip of the sealant gun to a V-shape will help application.

- (5) Install the windshield moulding.





- (6) 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.
- (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 windshield glass to the body, check for water leaks.

Caution

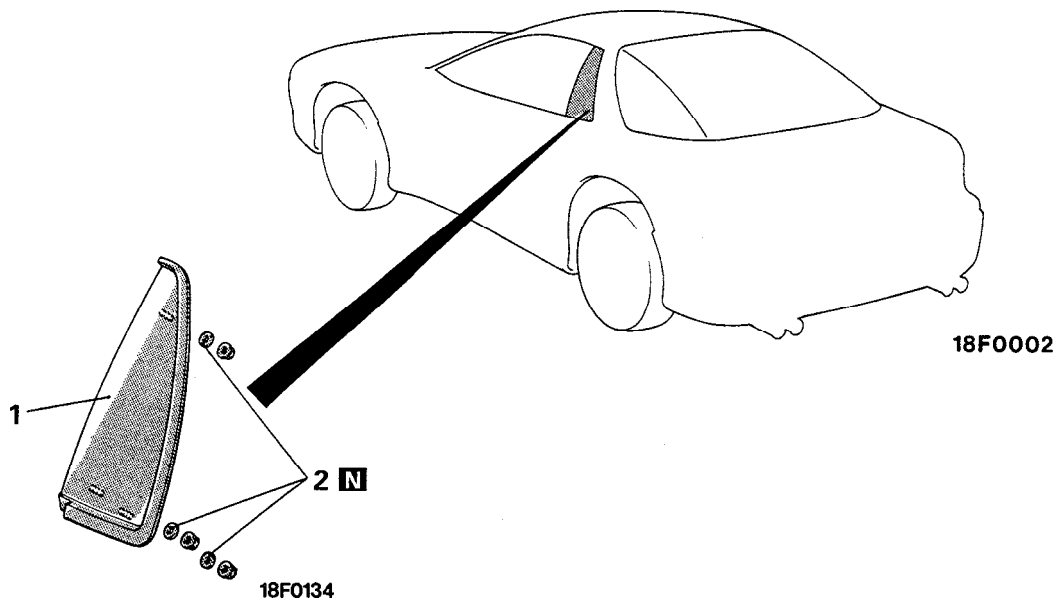
1. If the vehicle is to be moved, do so gently.
2. When checking for water leaks, do not apply water with the hose end squeezed.

CENTER PILLAR GLASS

M42LFAA

REMOVAL AND INSTALLATION**Pre-removal and Post-installation Operation**

- Removal and Installation of Quarter Upper Trim
(Refer to GROUP 52A – Trims.)
- Removal and Installation of Center Pillar Garnish
(Refer to GROUP 51 -Garnishes and Mouldings.)



1. Center pillar glass
2. Packing

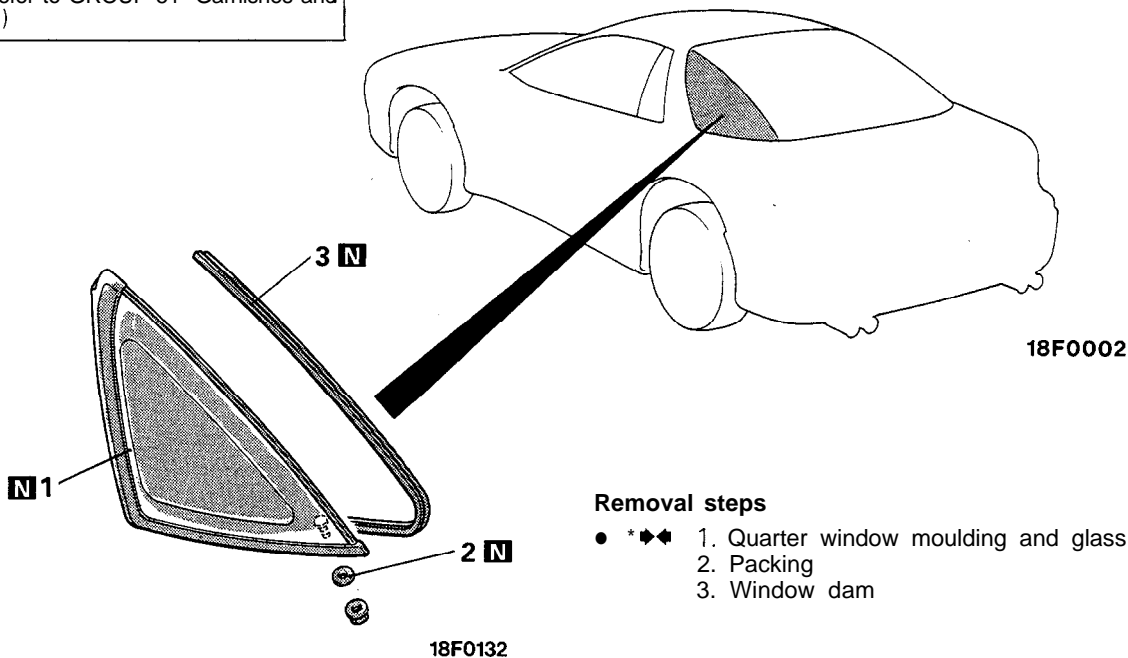
QUARTER WINDOW GLASS

REMOVAL AND INSTALLATION

Pre-removal and Post-installation

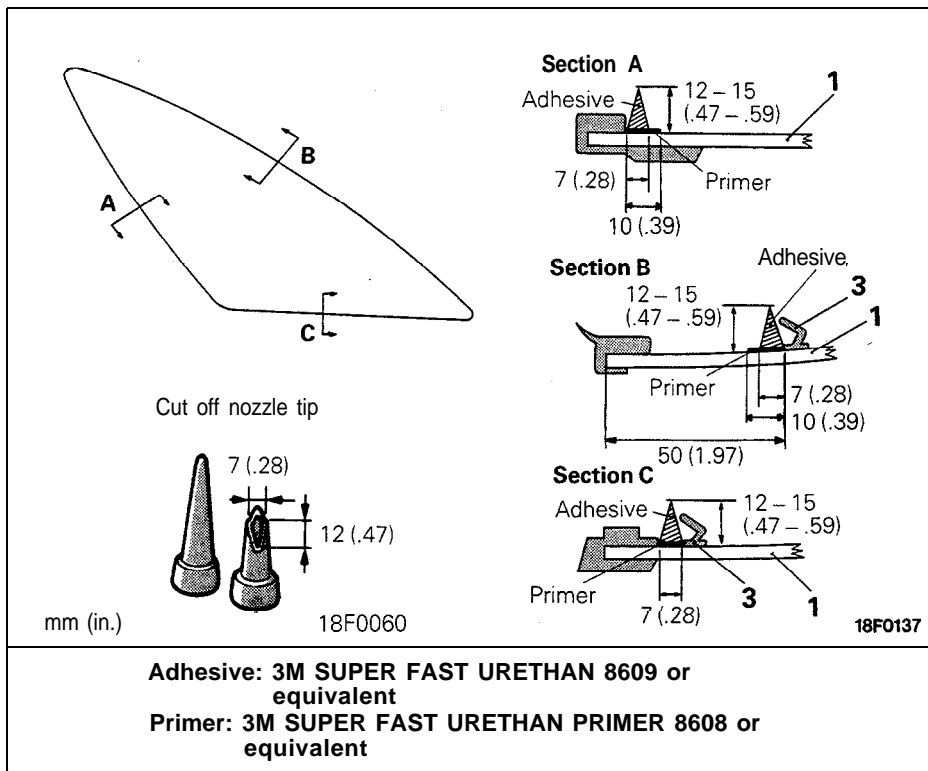
Operation

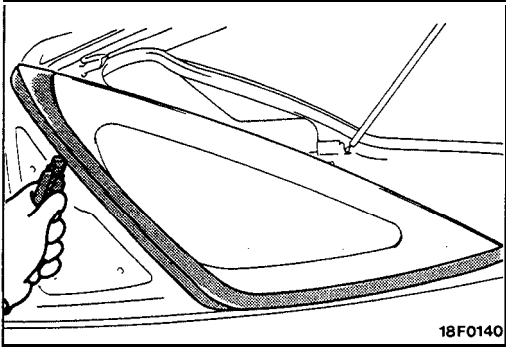
- Removal and Installation of Quarter Upper Trim (Refer to GROUP 52A – Trims.)
- Removal and Installation of Center Pillar Garnish (Refer to GROUP 51 -Garnishes and Mouldings.)



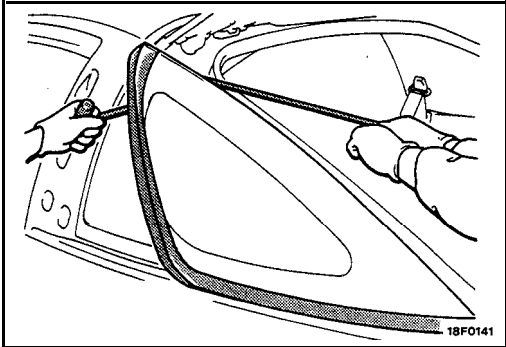
Removal steps

- *♦♦ 1. Quarter window moulding and glass
- 2. Packing
- 3. Window dam

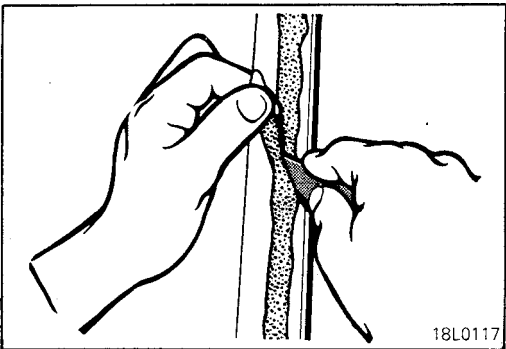




18F0140



18F0141



18L0117

SERVICE POINT OF REMOVAL

1. REMOVAL OF QUARTER WINDOW MOULDING AND GLASS

- (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.

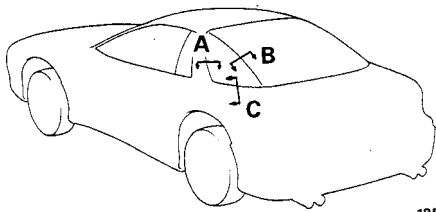
Caution

1. Do not remove the adhesive more than necessary.
2. Use care 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.

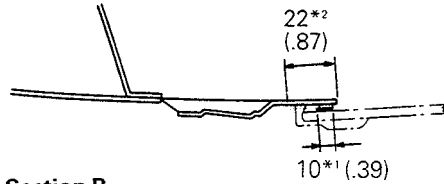
Caution

After degreasing, allow three minutes or more to dry well before next work. Do not touch the degreased surface.

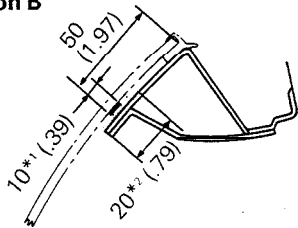


18F0002

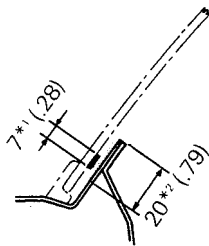
Section A



Section B



Section C



*1: Glass surface
*2: Body surface
mm (In.)

18F0143

SERVICE POINT OF INSTALLATION

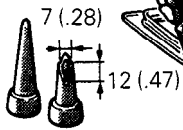
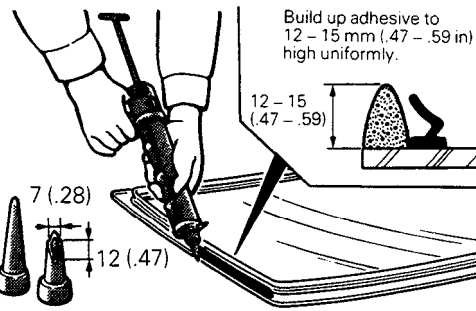
1. INSTALLATION OF QUARTER WINDOW MOULDING AND GLASS

- (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.



Cut off nozzle tip mm (tn.)

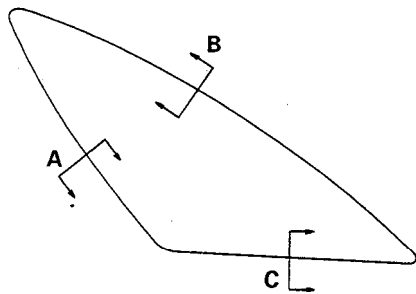
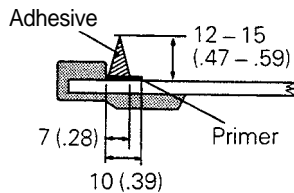
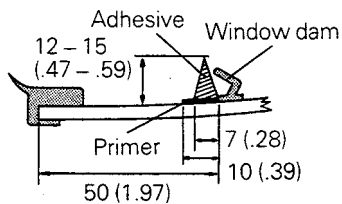
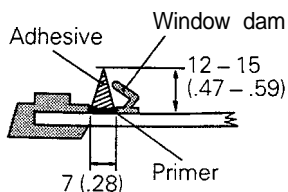
18F0060

- (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.

**Section A****Section B****Section C**

mm (in.)

18F0137

- (4) 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.
- (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.**

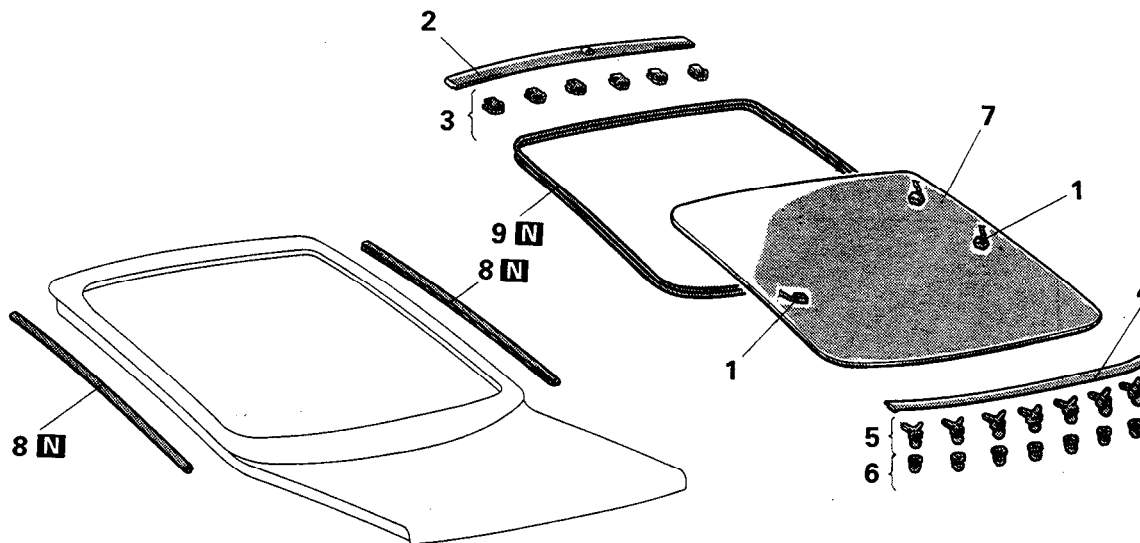
- (7) After about 30 minutes or more following bonding of the windshield glass to the body, check for water leaks.

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



18F0145

Removal steps

- 1. Defogger connector
- 2. Liftgate moulding upper clip
- 3. Liftgate moulding upper clip
- 4. Liftgate moulding lower clip
- 5. Liftgate moulding lower clip
- 6. Clip grommet
- 7. Lift gate glass
- 8. Liftgate moulding side
- 9. window dam

Pre-removal and Post-installation Operation

- Removal and Installation of Rear Wiper Arm (Refer to GROUP 51 -Windshield Wiper and Washer
- Removal and Installation of Liftgate Upper Trim (Refer to GROUP 52A – Trims.)
- Removal and Installation of Liftgate Trim (Refer to GROUP 52A – Trims.)
- Removal and Installation of Liftgate Side Trim (Refer to GROUP 52A – Trims)

Cut off nozzle tip

7 (.28)
12 (.47)

Section A

Adhesive
12 – 15 (.47 – .59)
Primer
7 (.28)
10 (.39)
27 (1.06)
9
7

Section B

Adhesive
12 – 15 (.47 – .59)
Primer
7 (.28)
10 (.39)
27 (1.06)
9
7

Section C

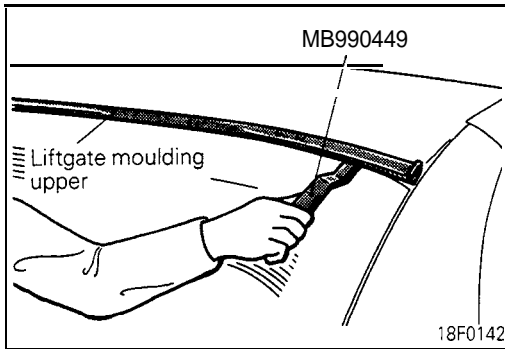
Adhesive
12 – 15 (.47 – .59)
Primer
18F0145 (1.28)
10 (.39)
9
7

mm (in.)

18F0060

Adhesive:
3M SUPER FAST URETHAN 8609 or equivalent

Primer:
3M SUPER FAST URETHAN PRIMER 8608 or equivalent



SERVICE POINTS OF REMOVAL

2. REMOVAL OF LIFTGATE MOULDING UPPER / 4. LIFTGATE MOULDING LOWER

Using the special tool, pry up the clipped portions to remove the liftgate moulding upper and lower.

7. REMOVAL OF LIFTGATE GLASS

Remove the same way as the windshield glass. (Refer to P.42-29.)

SERVICE POINT OF INSTALLATION

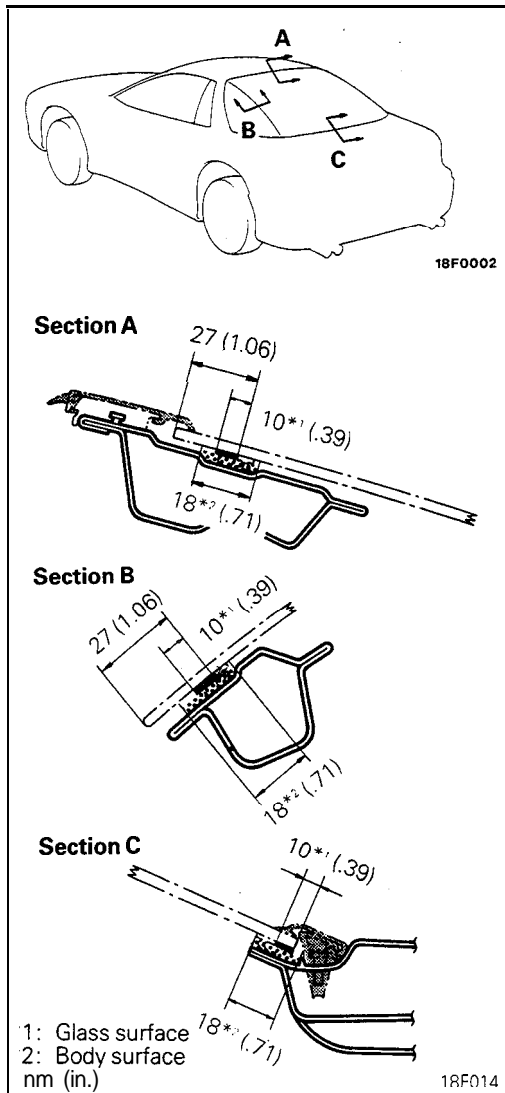
7. INSTALLATION OF LIFTGATE GLASS

- (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.

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.
- (2) Allow 3 to 30 minutes to dry the primer.

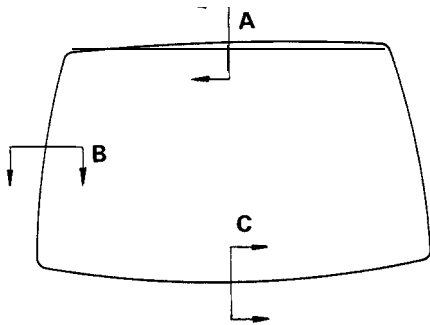


- (3) Within 30 minutes of primer application, apply the adhesive all around the liftgate glass uniformly.

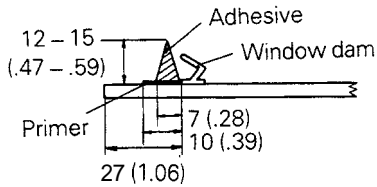
Adhesive: 3M SUPER FAST URETHAN 8609 or equivalent

NOTE

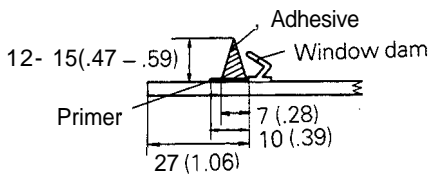
Cutting the nozzle tip of the sealant gun to a V-shape will help application.



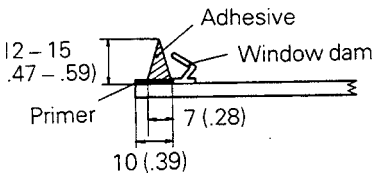
Section A



Section B



Section C



nm (in.)

18F014E

- (4) After application of the adhesive, line up the matchmarks on the glass and liftgate and force the glass lightly and evenly 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 liftgate glass to the tail gate, 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.

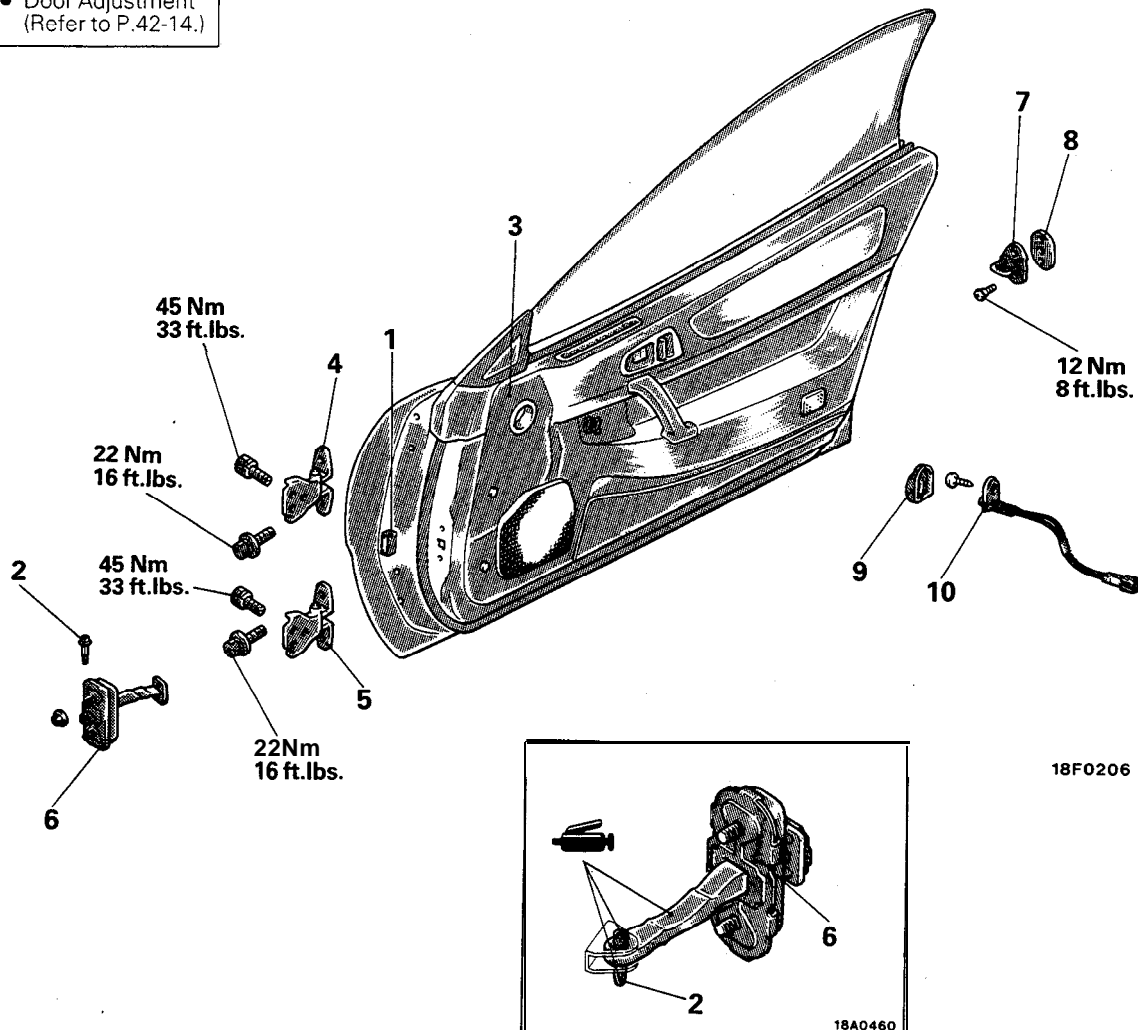
DOOR ASSEMBLY

M42MABC

REMOVAL AND INSTALLATION

Adjustment

- Door Adjustment
(Refer to P.42-14.)

**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

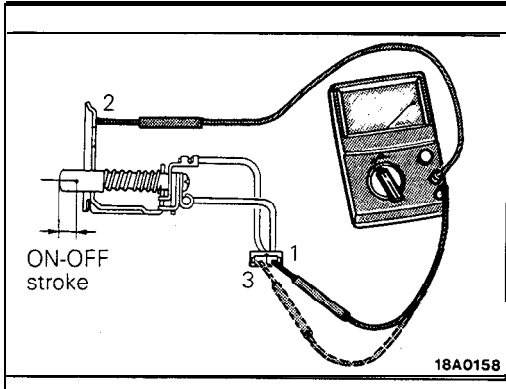
- Door trim (Refer to P.42-41.)
Waterproof film (Refer to P.42-41.)
2. Spring pin
 - ◆◆ 6. Door check strap

Striker removal steps

7. Striker
8. Striker shim

Door switch removal steps

9. Door switch cap
10. Door switch



18A0158

INSPECTION

DOOR SWITCH

Operate the switch, and check the continuity between the terminals.

		Terminal		
		1	2	3
Switch position				
Switch	Open (ON)	0	—●—	—●—
	Depressed (OFF)			

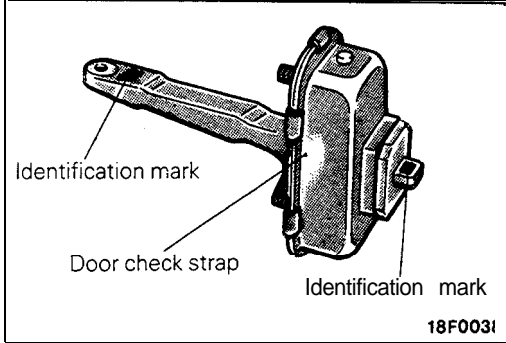
NOTE

O-O indicates that there is continuity between the terminals

SERVICE POINT OF INSTALLATION

6. INSTALLATION OF DOOR CHECK STRAP

Install the door check strap with the identification mark facing up.



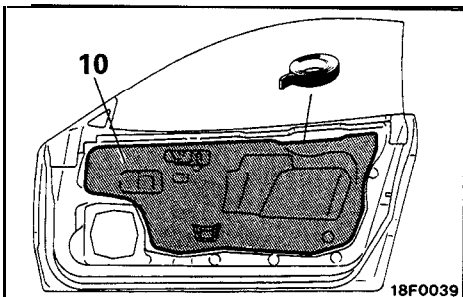
18F0031

Position	Identification mark	
	Door (LH)	WL
Door (RH)	WR	R

DOOR TRIM AND WATERPROOF FILM

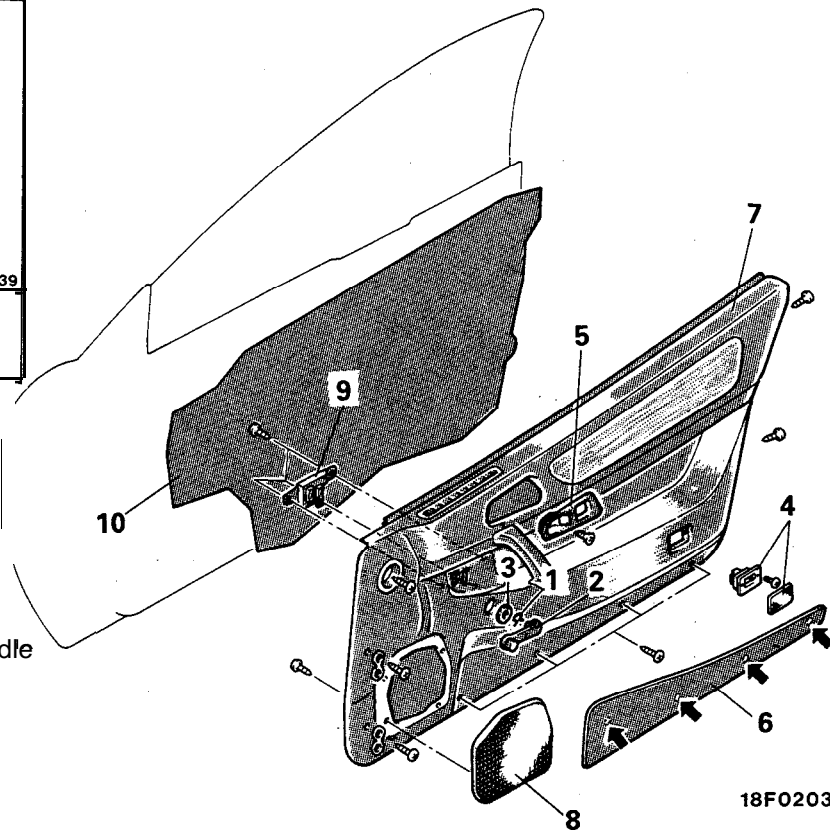
M42MBBD

REMOVAL AND INSTALLATION



18F0039

Sealant:
3MATD Part No. 8625 or equivalent



18F0203

Removal steps

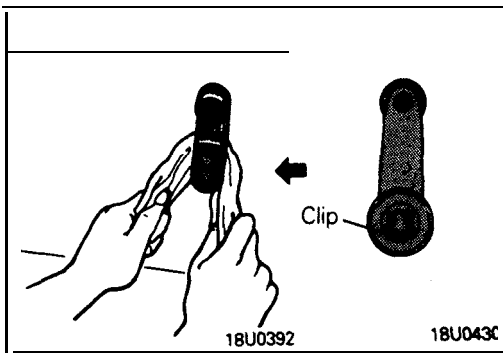
1. Clip
2. Door window regulator handle
3. Escutcheon
4. Door light
5. Inside handle cover
6. Door trim carpet
7. Door trim
8. Speaker garnish
9. Power window switch
10. Waterproof film

NOTE
←: Clip locations

SERVICE POINT OF REMOVAL

1. REMOVAL OF CLIP

Use a shop towel to remove the clip; and remove door window regulator handle.

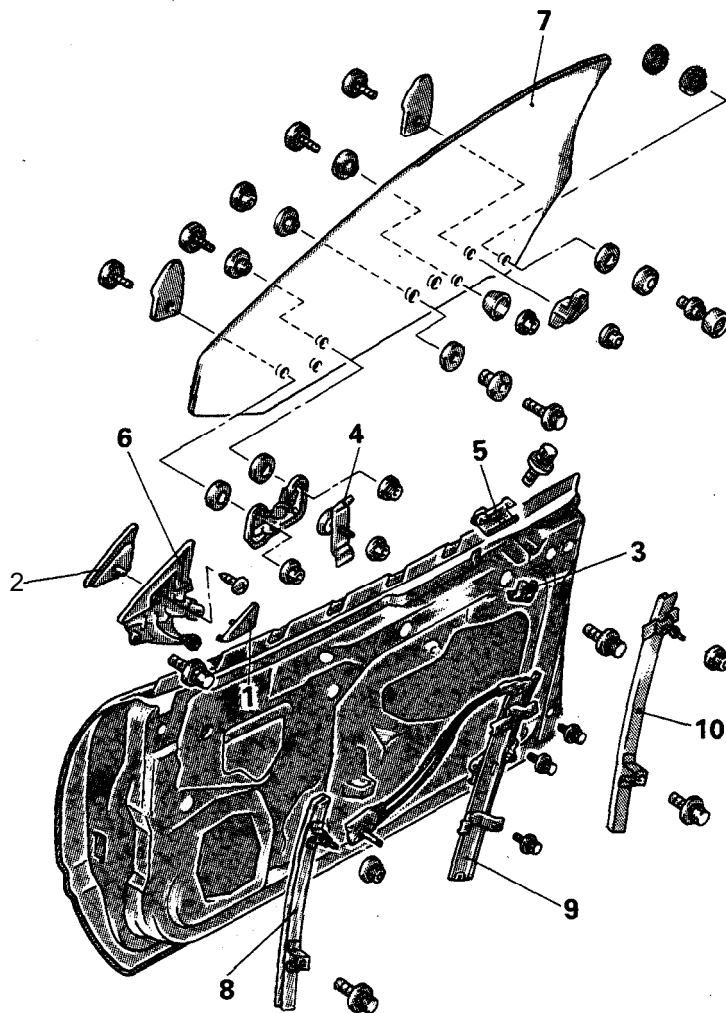
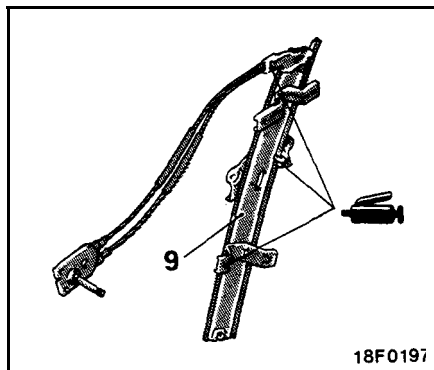


DOOR GLASS AND REGULATOR REMOVAL AND INSTALLATION

M42MCCA

Adjustment

- Door Window Glass Adjustment
(Refer to P.42-14.)

**Removal steps**

Door trim (Refer to P.42-41.)
Waterproof film (Refer to P.42-41.)

1. Delta cover inner
2. Delta cover outer
Door belt line outer weatherstrip
(Refer to P.42-65.)
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

18F0200

M42MHAH

POWER WINDOW

TROUBLESHOOTING GUIDE

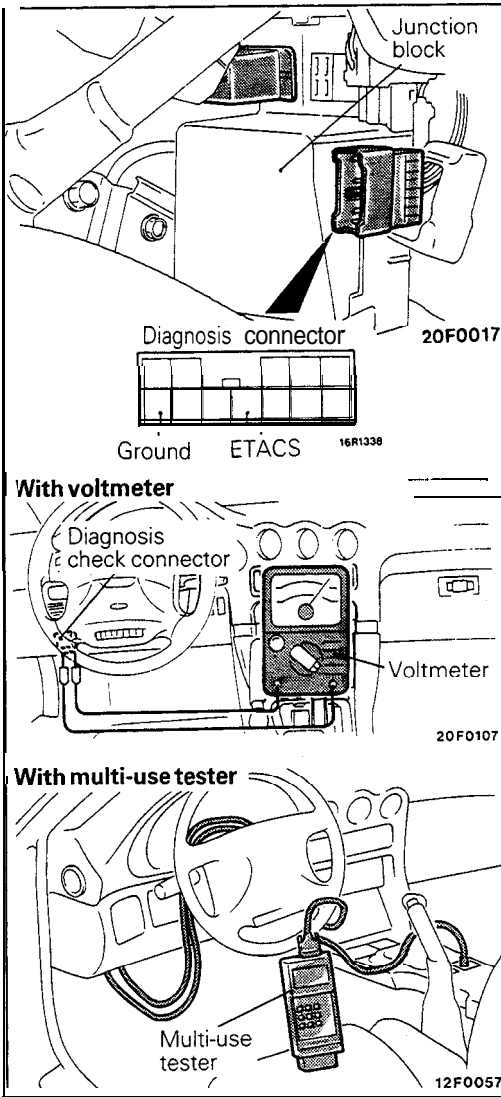
INPUT CHECK

Using the multi-use tester or voltmeter, check whether or not the input signals from each switch are being input to the ETACS unit.

- (1) Connect the multi-use tester to the diagnosis check 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 multi-use tester sounds or the needle of the voltmeter moves when each switch noted below 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.

- Ignition switch
- Door switch



TROUBLESHOOTING QUICK-REFERENCE TABLE

For information concerning the locations of electrical components, refer to P.42-51.

Problem	Probable cause	Check method	Remedy
The power windows do not operate when the ignition switch is at the "ON" position.	Damaged or disconnected wiring of the ignition switch input circuit	If a malfunction is indicated as a result of checking the input signals, check by following individual part and the circuit check No. 2 procedures (P.42-46).	Repair the wiring harness.
	Damaged or disconnected wiring of the power window relay activation circuit	Check by following individual part and the circuit check No. 3 procedures (P.42-47).	Repair the wiring harness, or replace the power window relay.
	Malfunction of the electronic control unit	—	Replace the electronic control unit.

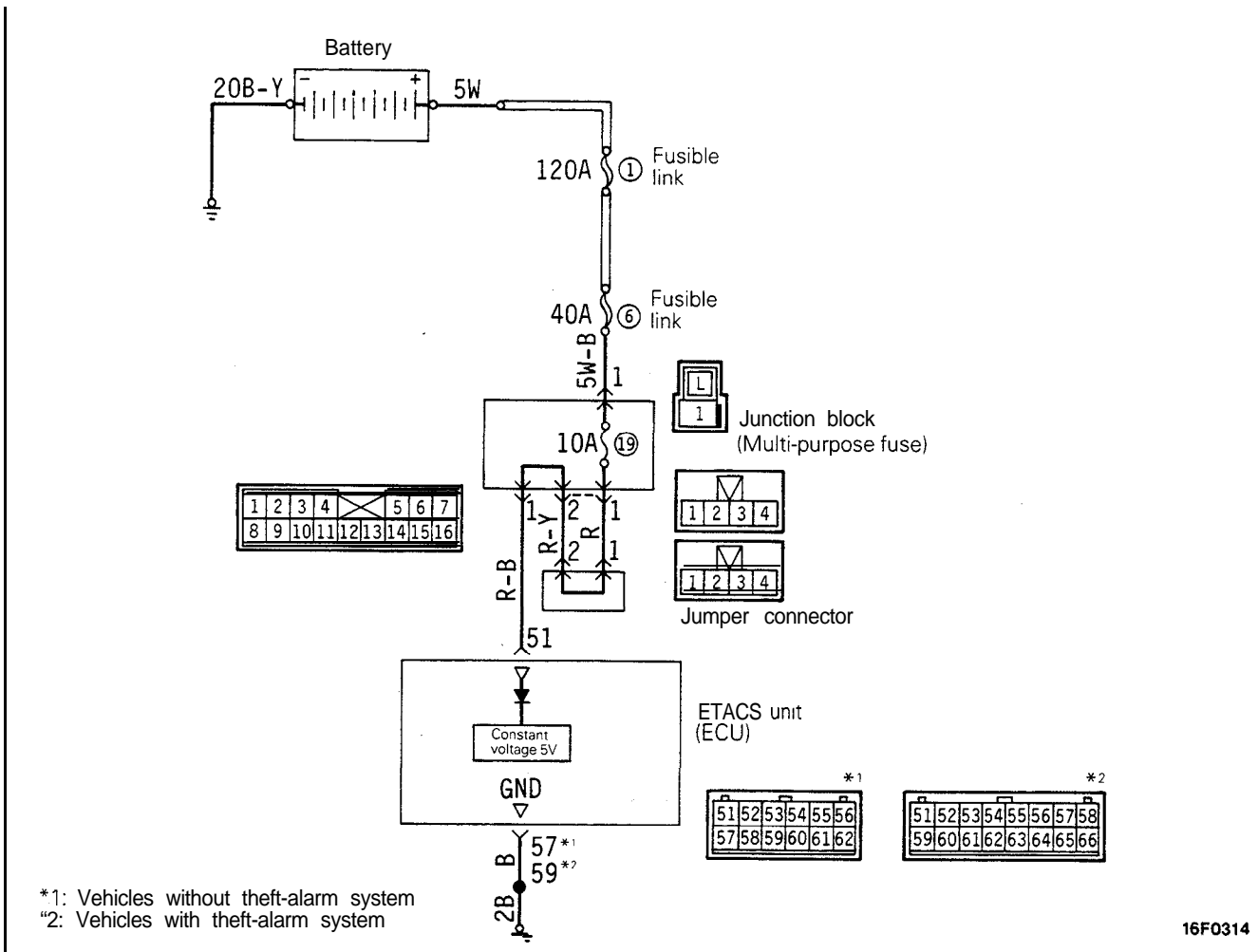
Problem	Probable cause	Check method	Remedy
The power windows can be opened and closed immediately after the ignition switch is switched "OFF", but the power window operation does not stop if a front door is opened within 30 seconds.	Damaged or disconnected wiring of the front door switch input circuit	If a malfunction is indicated as a result of checking the input signals, check by following individual part and the circuit check No. 4 procedures (P.42-49).	Repair the wiring harness, or replace the front door switch.
	Malfunction of the front door switch		
	Malfunction of the electronic control unit	—	Replace the electronic control unit.
The opening and closing operations of the power windows are possible after the timer operation time has elapsed when the ignition switch is set to the "OFF" position.	Short-circuit of the power window relay activation circuit	Check by following individual part and circuit check No. 3 procedures (P.42-47).	Repair the wiring harness, or replace the power window relay.
	Malfunction of the front door switch		
	Malfunction of the electronic control unit	—	Replace the electronic control unit.

NOTE

"ECU" (electronic control unit) indicates the ETACS unit.

CHECKING INDIVIDUAL PART AND CIRCUIT

1. ETACS POWER-SUPPLY AND GROUND CIRCUITS



Description of operation

The battery supplies a stabilized 5V power supply to the electronic control unit, via the constant-voltage circuit and terminal (51) directly connected to the battery. If there is an abnormal condition of the power-supply circuit, other ETACS functions also will not operate.

Electronic control unit terminal voltage (Connection status of electronic control unit connector)

ECU terminal No.	Signal	Condition	Terminal voltage
51	Electronic control unit power supply	At all times	System voltage

Checking the ground circuit (Disconnect the connector and check the wiring harness side.)

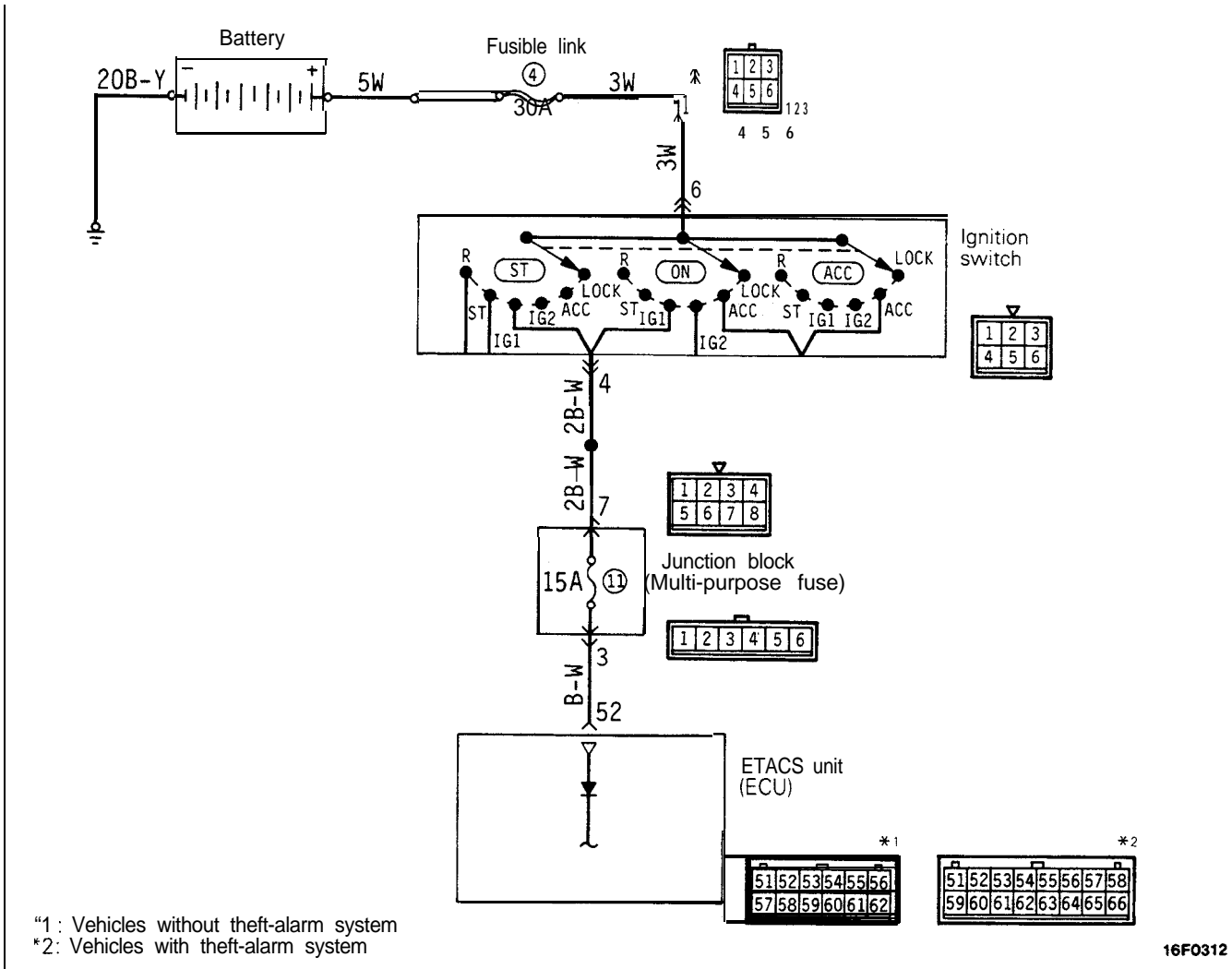
Terminal No.	Connected to/measured part	Measurement	Tester connection	Check conditions	Standard
57** 59**	Electronic control unit ground	Resistance	57*1-ground 59*2-ground	At all times	Continuity

NOTE

- *1: Vehicles without theft-alarm system
- *2: Vehicles with theft-alarm system

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2. IGNITION SWITCH INPUT CIRCUITS



Description of operation

A condition for operation of this system is the sending of HIGH-level signals to the electronic control unit when the ignition switch is switched to the "ON" position.

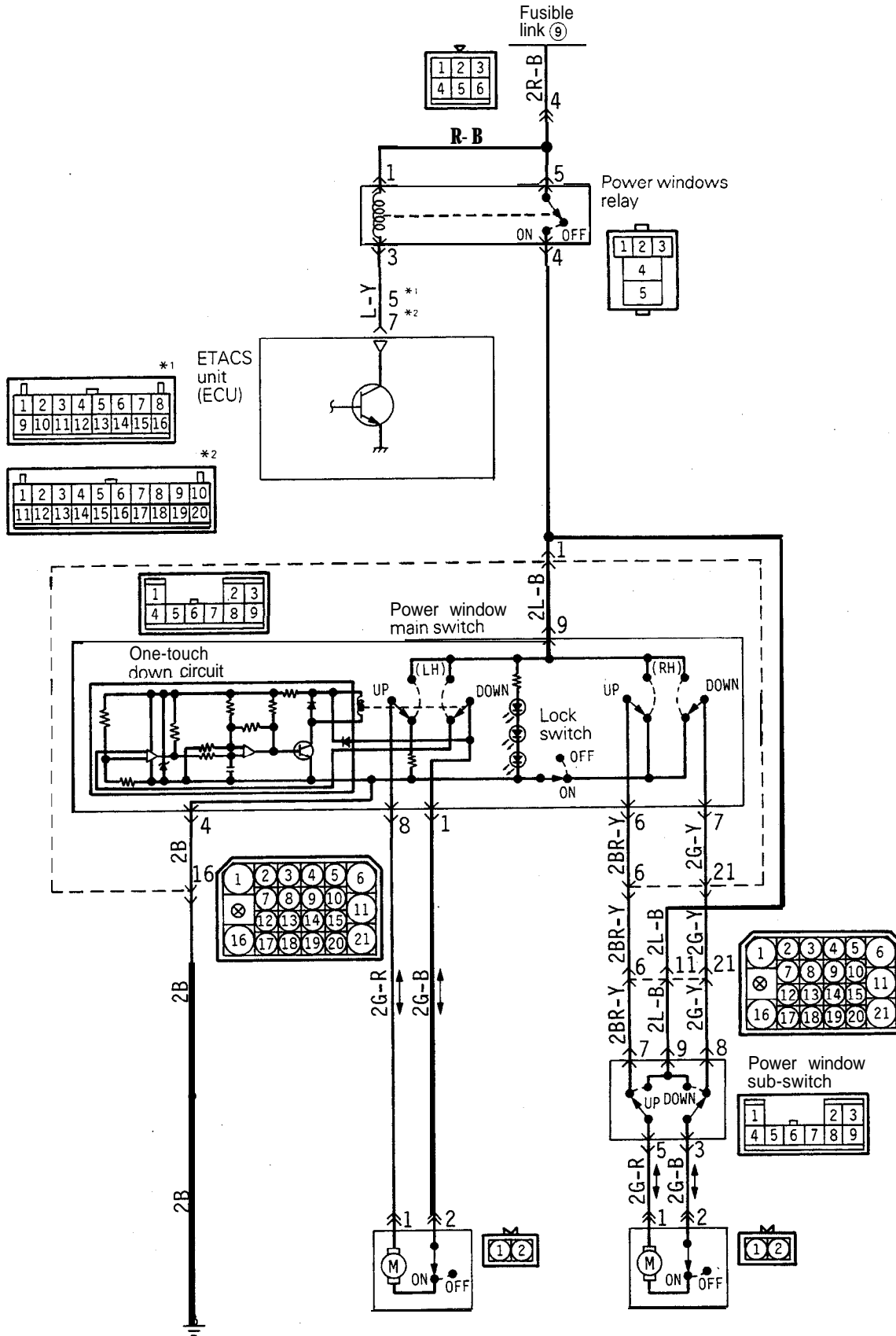
Electronic control unit terminal voltage (Disconnect the connector of the electronic control unit and check the wiring harness side.)

ECU terminal No.	Signal	Condition	Standard	
52	Ignition switch: "ON"	Ignition switch	OFF	ov
			ON	System voltage

Checking the individual part

Ignition switch: Refer to GROUP 54 – Ignition Switch.

POWER WINDOW RELAY ACTIVATION CIRCUIT



*1: Vehicles without theft-alarm system
 *2: Vehicles with theft-alarm system

16F0324

Description of operation

When the ignition switch is switched to the "ON" position, and also for a period of 30 seconds after the ignition switch is switched to the "OFF" position, the transistor of the electronic control unit is switched ON, and battery voltage is supplied from the battery (through fusible link No. 9) to the power window relay. In addition, voltage is supplied (through fusible link No. 9) to power window switch and motor as a result of the switch-ON of the power window relay.

NOTE

Turn the ignition switch from ON to OFF, and power will be supplied to the power window relay for 30 seconds. However, power supply will be stopped if the door is opened during this period.

Electronic control unit terminal voltage (Disconnect the connector of the electronic control unit and check the wiring harness side.)

ECU terminal No.	Signal	Condition	Terminal voltage
5* ¹ 7* ²	Power window relay signal	At all times	System voltage

NOTE

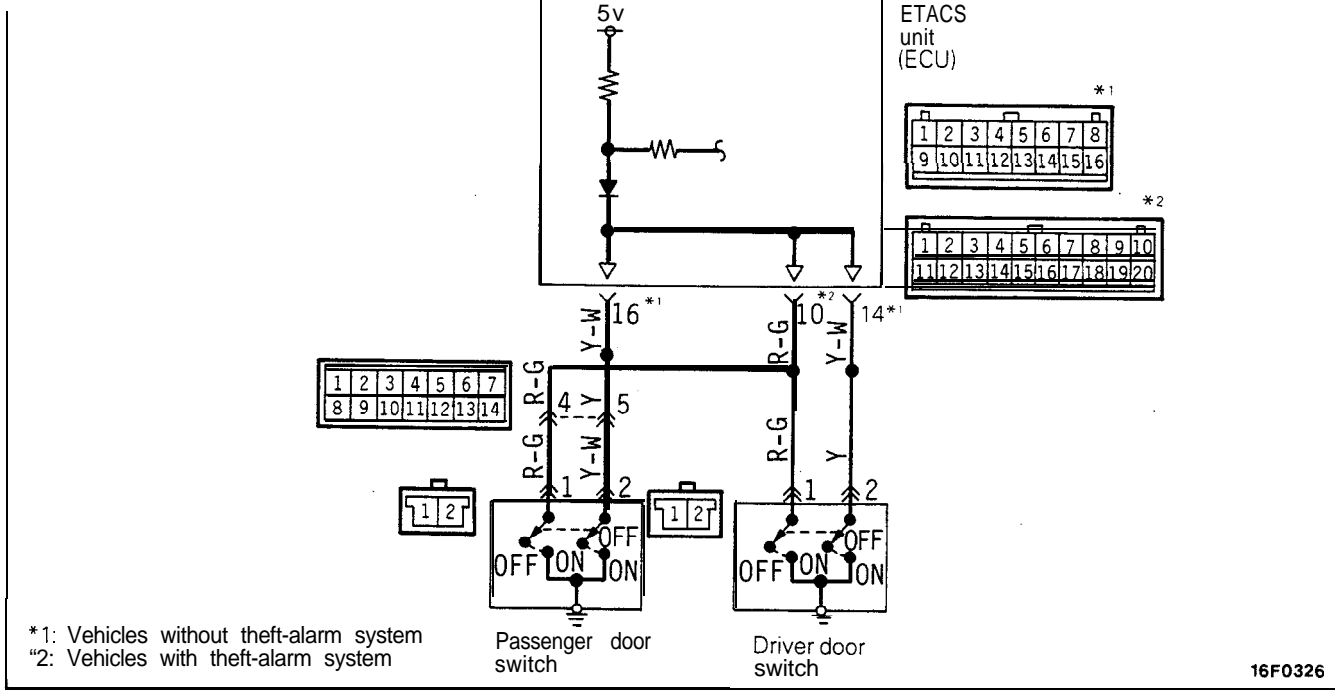
*1: Vehicles without theft-alarm system

*2: Vehicles with theft-alarm system

Checking the individual part

Power window relay: Refer to P.42-51.

4. DOOR SWITCH INPUT CIRCUIT



Description of operation

When the front door is closed (the door switch is switched OFF), HIGH-level signals are sent to the electronic control unit; when the front door is opened (the door switch is switched ON), LOW-level signals are sent to the electronic control unit.

Electronic control unit terminal voltage (Connection status of electronic control unit connector)

ECU terminal No.	Signal	Condition	Terminal voltage
14**	Driver door switch signal	Driver door	Open o v
			Closed 5 V
16**	Passenger door switch signal	Passenger door	Open o v
			Closed 5 V
10*2	Driver door switch signal and passenger door switch signal	Driver door and/or passenger door	Open o v
		Driver door and passenger door	Closed 5 v

NOTE

*1: Vehicles without theft-alarm system
 *2: Vehicles with theft-alarm system

Checking the driver door switch circuit (Disconnect the connector of the electronic control unit and check the wiring harness side.)

ECU Terminal No.	Connected to/ measured part	Measurement	Tester connection	Check conditions		Standard
14 ¹	Driver door switch	Resistance	14 ^{*1} -ground	Driver door	Closed	No continuity
					Open	Continuity
16 ¹	Passenger door switch	Resistance	16 ^{*1} -ground	Passenger door	Closed	No continuity
					Open	Continuity
10 ^{*2}	Driver door switch and passenger door switch	Resistance	10 ^{*2} -ground	Driver door and/or passenger door	Closed	No continuity
				Driver door and passenger door	Open	Continuity

NOTE

*1: Vehicles without theft-alarm system

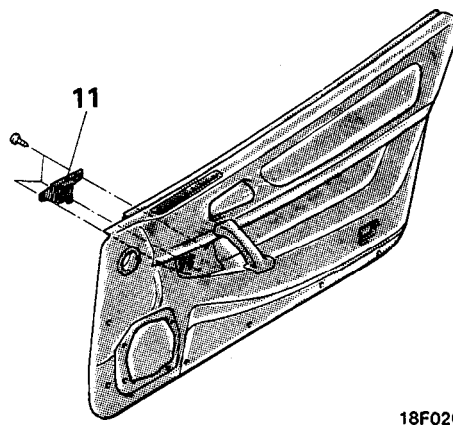
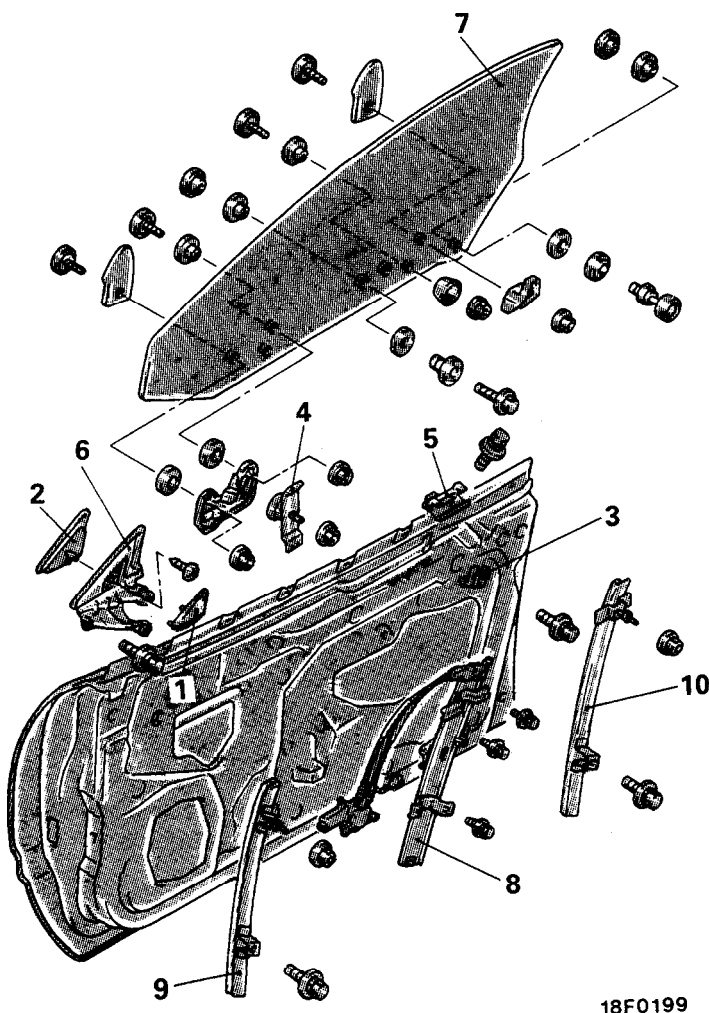
*2: Vehicles with theft-alarm system

Check the individual part

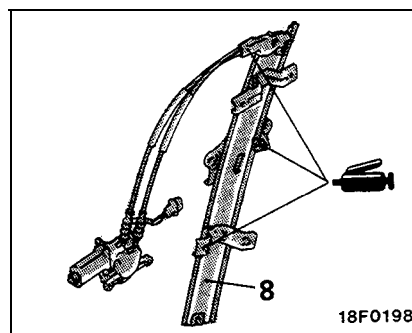
Door switch: Refer to P.42-41.

REMOVAL AND INSTALLATION

Adjustment
 • Door Window Glass Adjustment
 (Refer to P.42-14.)



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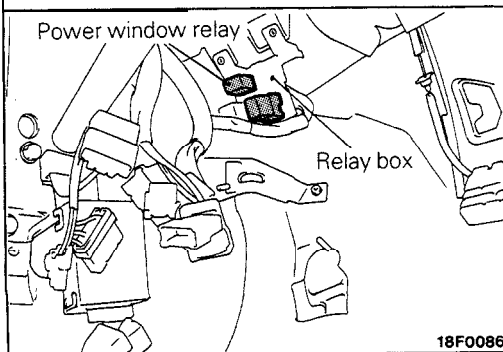
Door window regulator assembly removal steps

- Door trim (Refer to P.42-41.)
- Waterproof film (Refer to P.42-41.)
- 1. Delta cover inner
- 2. Delta cover outer
- Door belt line outer weatherstrip (Refer to P.42-65.)
- 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.42-41.)
- 11. Power window switch assembly

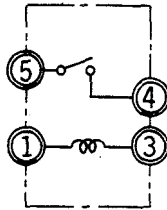
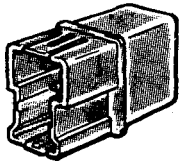


18F0086

INSPECTION

POWER WINDOW RELAY

- (1) Remove the knee protector assembly.
 (Refer to GROUP 52A — Instrument Panel.)
- (2) Remove the power window relay from indoor relay box.



18F0061

- (3) Apply battery voltage to terminal 1, and check for continuity when terminal 3 is grounded.

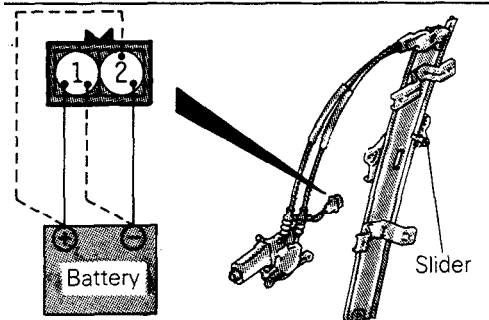
Terminal	1	3	4	5
Battery voltage				
Continuity no voltage	○	○		
Continuity with voltage			○	○

NOTE

O-O indicates that there is continuity between the terminals.

POWER WINDOW MOTOR

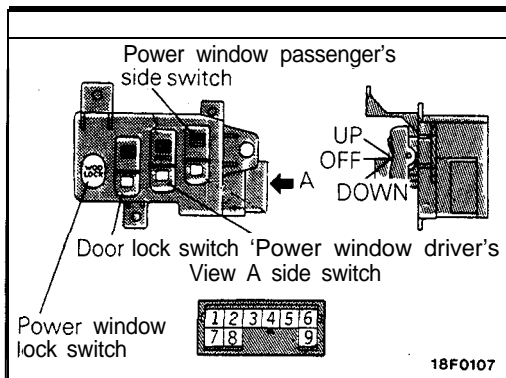
- (1) Connect the battery directly to the motor terminal and check that the slider moves smoothly.
- (2) Connect the battery in reverse polarity and check that the slider moves in opposite direction.



18F0195

CIRCUIT BREAKER (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.

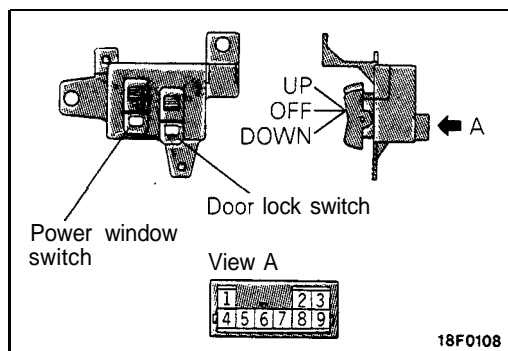


POWER WINDOW MAIN SWITCH

Check for continuity in accordance to the following connection table.

Switch position		Power window switch (normal)			Power window switch (lock)		
		UP	OFF	DOWN	UP	OFF	DOWN
Driver's side switch	1	○		○	○		○
	2	○	○	○	○	○	○
	9	○	○	○	○	○	○
	6	○	○	○	○	○	○
Passenger's side switch	1	○		○	○		○
	4	○	○	○	○	○	○
	3	○	○	○		○	○
	6	○	○	○			

NOTE
O-O indicates that there is continuity between the terminals



POWER WINDOW SUB SWITCH

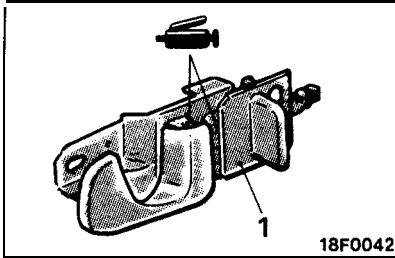
Check for continuity in accordance to the following connection table.

Switch position		Sub switch		
		UP	OFF	DOWN
Sub switch	9	○		○
	5	○	○	○
	7		○	○
	3	○	○	○
	8	○	○	

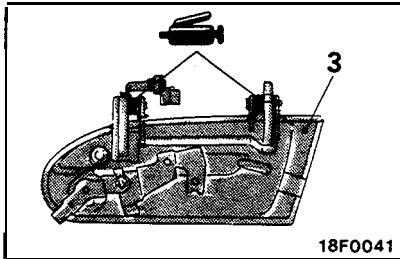
NOTE
O-O indicates that there is continuity between the terminals.

DOOR HANDLE AND LATCH

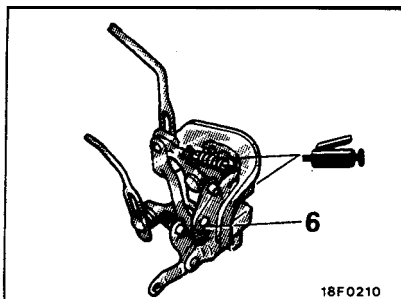
M42MDCA

REMOVAL AND INSTALLATION

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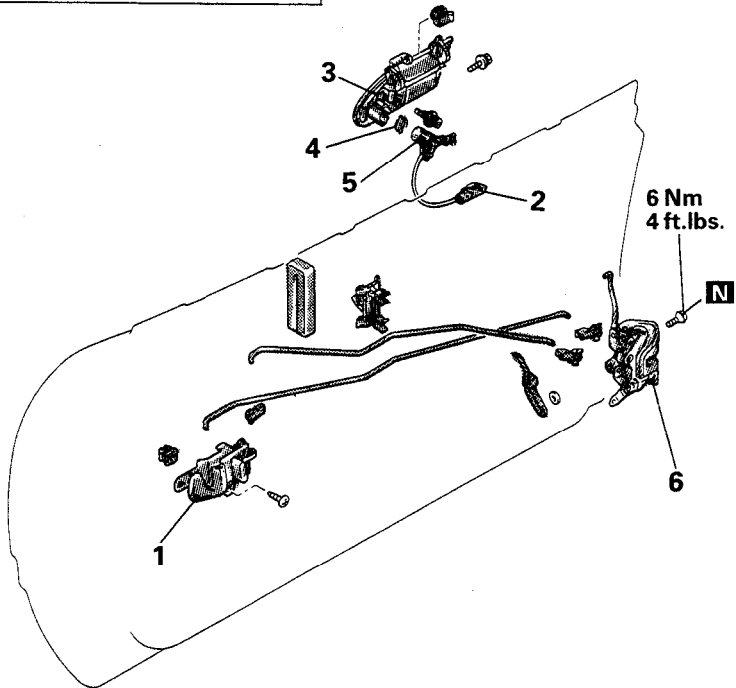
18F0041



18F0210

Pre-removal and Post-installation Operation

- Removal and Installation of Door Trim and Waterproof Film (Refer to P.42-41.)



18F0202

Door inside handle removal

Door Inside Handle Play Check (Refer to P.42-16.)

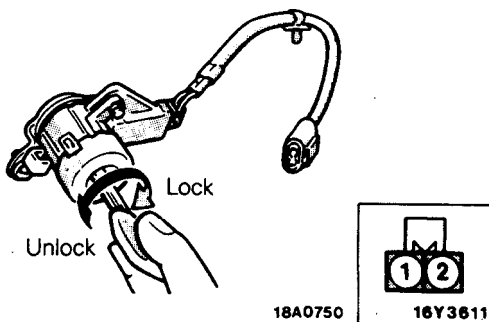
1. Door inside handle

Door outside handle and latch removal steps

2. Door key cylinder unlock switch connector (Vehicles with theft-alarm system)
3. Door outside handle
4. Ring
5. Door lock key cylinder
6. Door latch assembly

INSPECTION**DOOR KEY CYLINDER UNLOCK SWITCH**

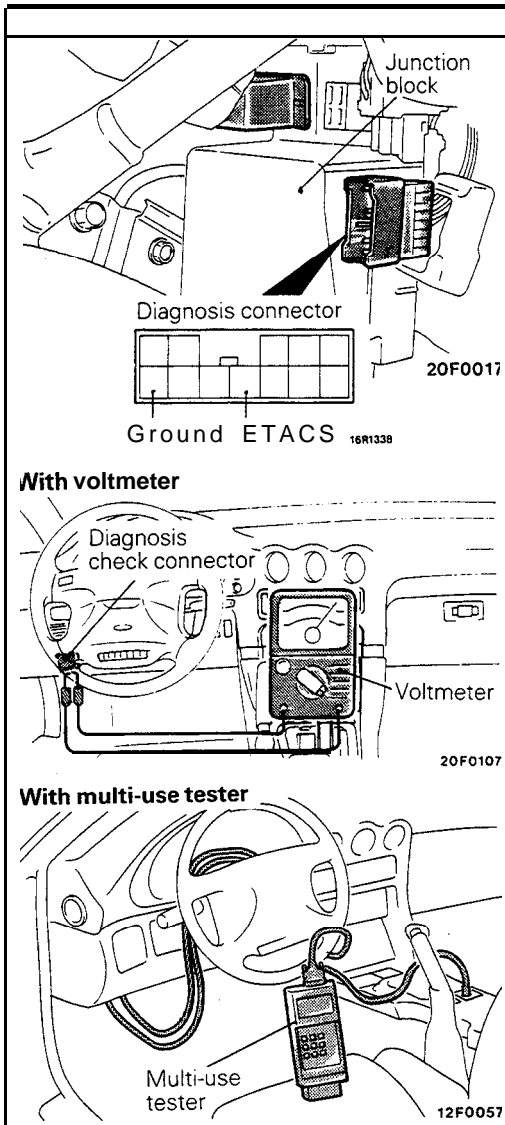
The key cylinder unlock switch is normal if there is not continuity between terminals 1 and 2 when the key is turned approx. 20° clockwise or counterclockwise from the neutral position, and there is continuity when it is turned further.



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TSB Revision



CENTRAL DOOR LOCKING SYSTEM M42ZDAJ

IGNITION KEY REMINDER TROUBLESHOOTING GUIDE

INPUT CHECK

Using the multi-use tester or voltmeter, check whether or not the input signals from each switch are being input to the ETACS unit.

- (1) Connect the multi-use tester to the diagnosis check 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 multi-use tester sounds or the needle of the voltmeter moves when each switch noted below 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.

- Door lock actuator
- Door switch
- Key reminder switch

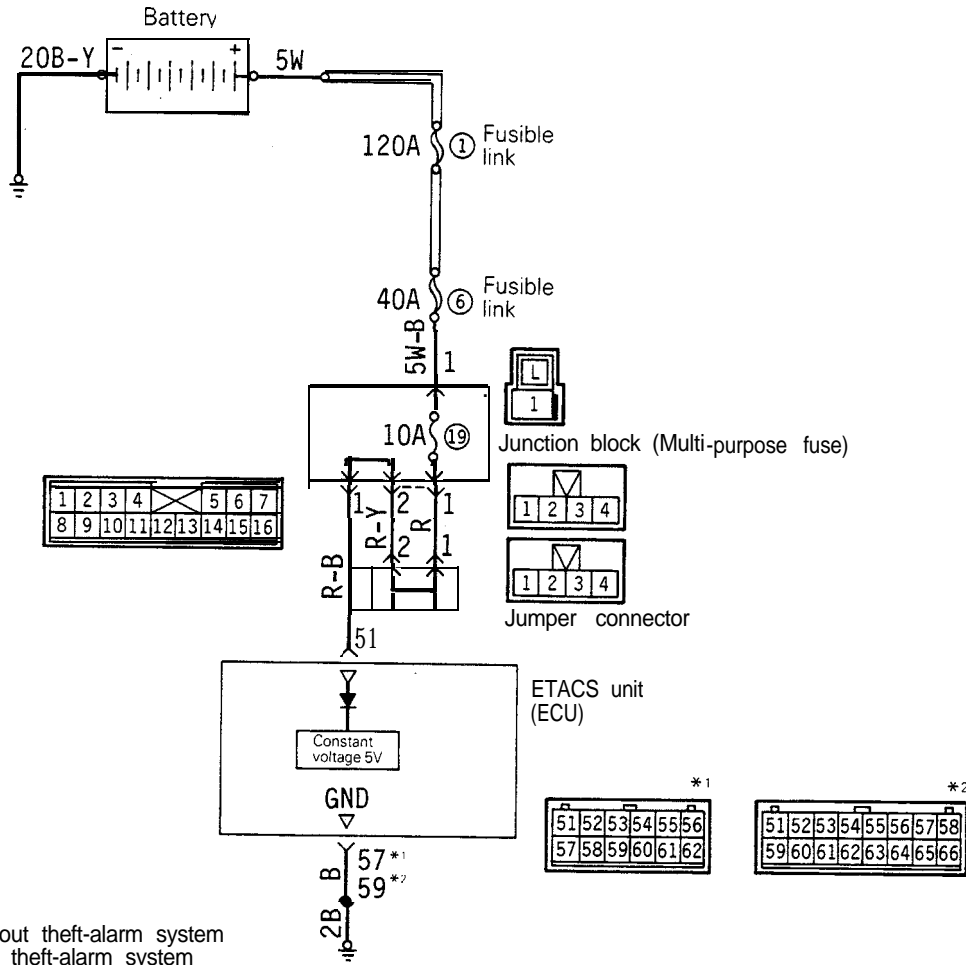
IGNITION KEY REMINDER TROUBLESHOOTING QUICK-REFERENCE TABLE CENTRAL DOOR LOCKING SYSTEM

Problem	Probable cause	Check method	Remedy
No unlock operation can be made by pressing door lock knob after fulfillment of following conditions. <ul style="list-style-type: none"> • Insertion of key in ignition switch (key reminder switch OFF) • Opening of door (door switch ON) 	Key reminder switch input circuit shorted	If found defective after input check, check circuit bench test No. 4 (P.42-59).	Correct harness or replace key reminder switch
	Key reminder switch shorted		
	Door switch input circuit broken	If found defective after input check, check circuit bench test No. 5 (P.42-60).	Correct harness or replace door switch
	Breaks in door switch		
	Faulty electronic control unit	—	Replace the electronic control unit

NOTE
"ECU" (Electronic Control Unit) indicates the ETACS unit

CHECKING INDIVIDUAL PART AND CIRCUIT (IGNITION KEY REMINDER SYSTEM)

1. ETACS POWER-SUPPLY AND GROUND CIRCUITS



*1: Vehicles without theft-alarm system
 *2: Vehicles with theft-alarm system

16F0314

Description of operation

The battery supplies a stabilized 5V power supply to the electronic control unit, via the constant-voltage circuit and terminal (51) directly connected to the battery. If there is an abnormal condition of the power-supply circuit, other ETACS functions also will not operate.

Electronic control unit terminal voltage (Connection status of electronic control unit connector)

ECU terminal No.	Signal	Status	Terminal voltage
51	Electronic control unit power supply	At all times	System voltage

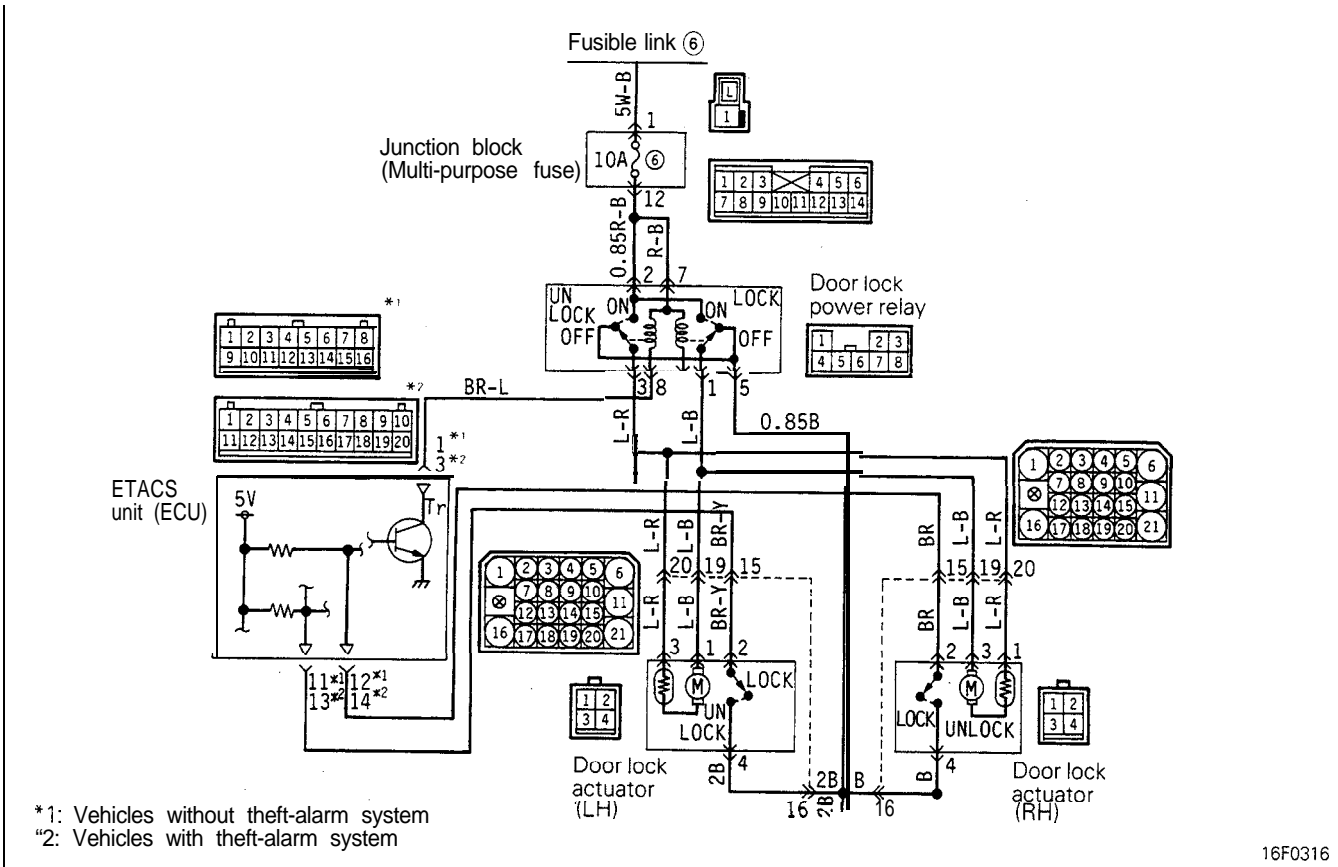
Checking the ground circuit (Disconnect the connector and check the wiring harness side.)

Terminal No.	Connected to/measured part	Measurement	Tester connection	Check conditions	Standard
57*1 59*2	Electronic control unit ground	Resistance	57*1-ground 59*2-ground	At all times	Continuity

NOTE

*1: Vehicles without theft-alarm system
 *2: Vehicles with theft-alarm system

2. DOOR LOCK ACTUATOR INPUT CIRCUIT



Description of operation

If the door is opened with the ignition key inserted and then locking is made by means of inside lock knob, the door lock actuator is brought to the OFF position, sending H signal to the electronic control unit. This signal operates the timer. circuit of the electronic control unit and the driving circuit operates to actuator all the door lock actuators.

Electronic control unit terminal voltage (Connection status of electronic control unit connector)

ECU terminal No.	Signal	Condition	Terminal voltage
11*1, 13** (LH) 12*1, 14** (RH)	Door lock actuator switch signal	Door lock actuator switch	Lock (OFF) 5 v
			Unlock (ON) 0 v

Door lock actuator switch circuit test (Disconnect the connector of the electronic control unit and check the wiring harness side.)

ECU Terminal No.	Connected to/ measured part	Measurement	Tester connection	Check conditions	Standard
11*1, 13** (LH)	Door lock actuator switch signal	Resistance	11*1-ground 12*1-ground	Door lock actuator switch	Lock (OFF) No continuity
12*1, 14** (RH)			13*1-ground 14*1-ground		Unlock (ON) Continuity

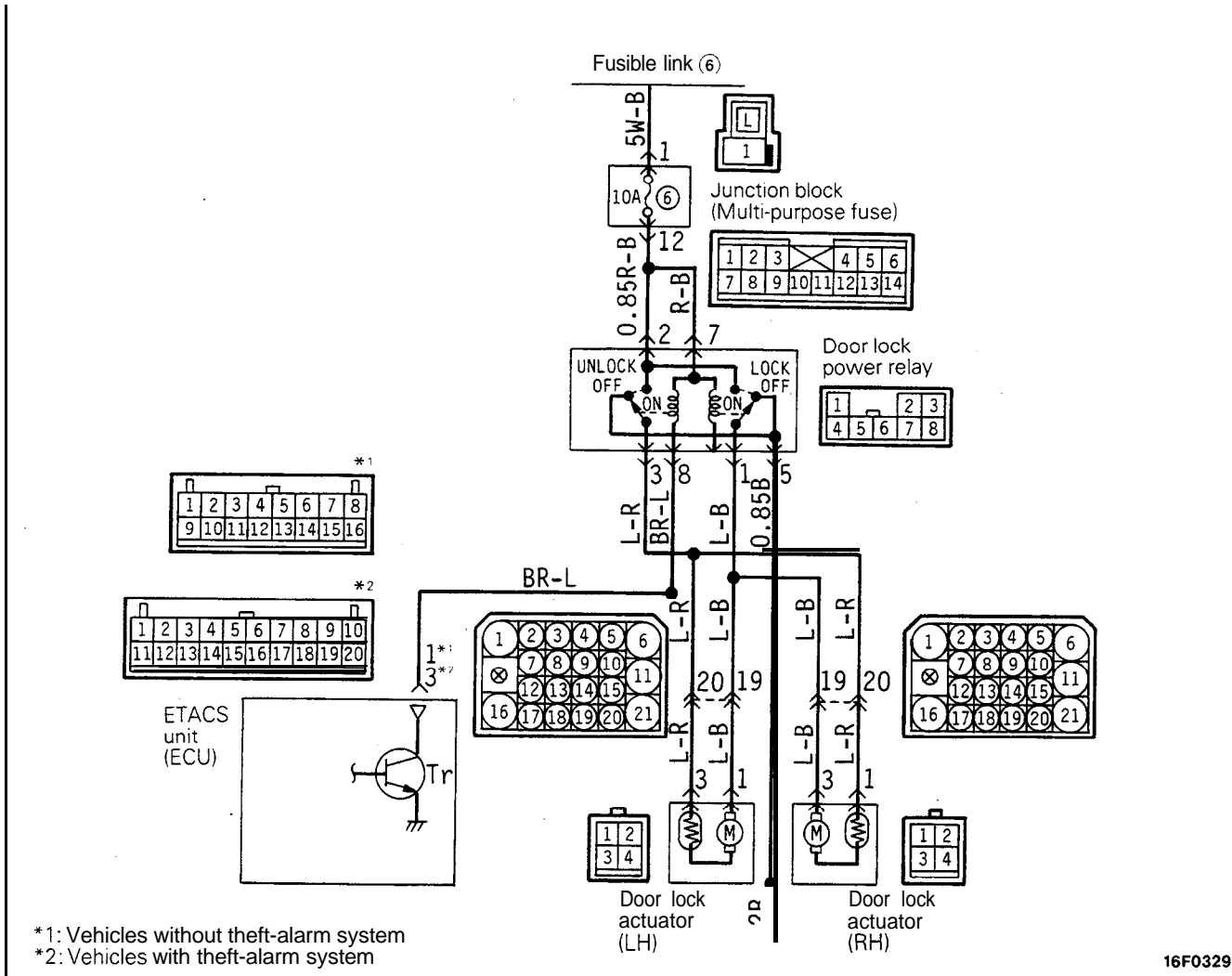
NOTE

*1: Vehicles without theft-alarm system
 *2: Vehicles with theft-alarm system

Checking the individual part

Door lock actuator: Refer to P.42-62.

3. DOOR LOCK POWER RELAY ACTIVATION CIRCUIT



Description of operation

If the door is opened with the ignition key inserted and then door locking is made, transistor Tr of the electronic control unit is turned ON to operate the door lock power relay (unlock side) and the door lock actuator is unlocked.

NOTE

Before locking the front seat passenger door, make sure that the driver door lock actuator is in the LOCK position. If the driver door lock actuator is in the UNLOCK position, the front passenger door lock actuator does not operate.

Electronic control unit terminal voltage (Connection status of electronic control unit connector)

ECU terminal No.	Signal	Condition	Terminal voltage
1*1, 3*2	Door lock power relay (unlock side) signal	At all times (except when door unlock is in operation)	System voltage

NOTE

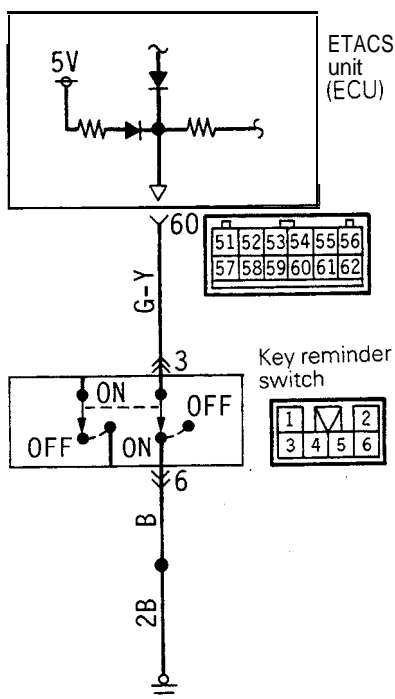
*1: Vehicles without theft-alarm system
*2: Vehicles with theft-alarm system

Checking the individual part

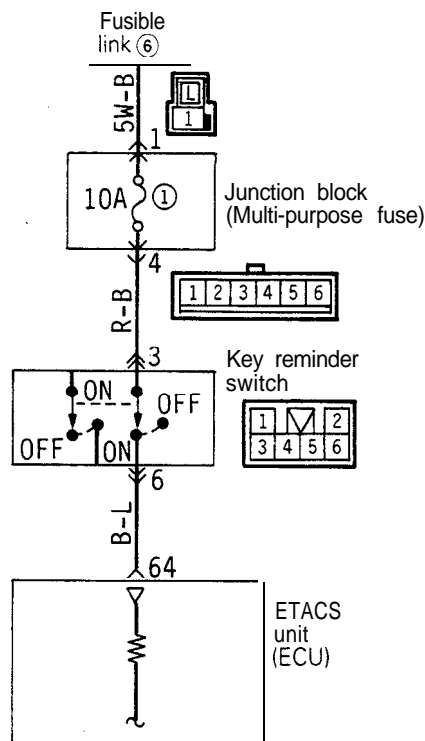
Door lock power relay: Refer to P.42-63.

4. KEY REMINDER SWITCH INPUT CIRCUIT

<Vehicles without theft-alarm system>



<Vehicles with theft-alarm system>



16F0319

16F0318

Description of operation

Insert the key in the ignition key cylinder, and the key reminder switch will be turned OFF, sending H signal to the electronic control unit. Pulling the key out of the cylinder will turn on the key reminder switch, sending L signal to the electronic control unit.

If there is any abnormality in the key reminder switch input circuit, abnormal key reminder buzzer will result.

Electronic control unit terminal voltage (Connection status of electronic control unit connector)

ECU terminal No.	Signal	Condition	Terminal voltage
60" 64"	Key reminder switch signal	Key is pulled out	0 v
		Key is inserted	5 v

Checking the key reminder switch circuit (Disconnect the connector of the electronic control unit and check the wiring harness side.)

Terminal No.	Connected to/measured part	Measurement	Tester connection	Check conditions	Standard
60"	Key reminder switch	Resistance	60*-ground	Key is pulled out	Continuity
				Key is inserted	No continuity

NOTE

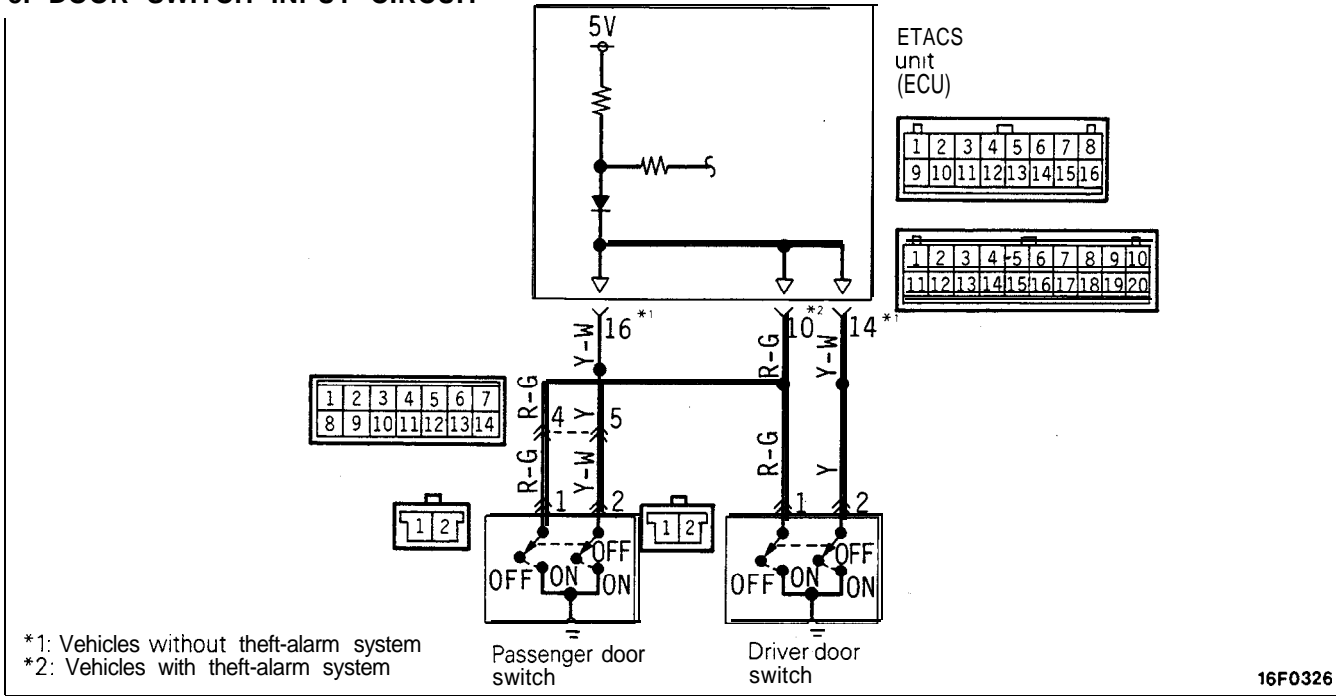
*1: Vehicles without theft-alarm system

*2: Vehicles with theft-alarm system

Checking the individual part

Key reminder switch: Refer to GROUP 54 – Ignition Switch.

5. DOOR SWITCH INPUT CIRCUIT



Description of operation

When the front door is closed (the door switch is switched OFF), HIGH-level signals are sent to the electronic control unit; when the front door is opened (the door switch is switched ON), LOW-level signals are sent to the electronic control unit.

Electronic control unit terminal voltage (Connection status of electronic control unit connector)

ECU terminal No.	Signal	Condition	Terminal voltage	
14*1	Driver door switch signal	Driver door	Open	0 V
			Closed	5 V
16*1	Passenger door switch signal	Passenger door	Open	0 V
			Closed	5 V
10*2	Driver door switch signal and passenger door switch signal	Driver door and/or passenger door	Open	0 V
			Driver door and passenger door	Closed

NOTE

*1: Vehicles without theft-alarm system

*2: Vehicles with theft-alarm system

Checking the driver door switch circuit (Disconnect the connector of the electronic control unit and check the wiring harness side.)

ECU Terminal No.	Connected to/ measured part	Measurement	Tester connection	Check conditions		Standard
14* ¹	Driver door switch	Resistance	14* ¹ -ground	Driver door	Closed	No continuity
					Open	Continuity
16* ¹	Passenger door switch	Resistance	16* ¹ -ground	Passenger door	Closed	No continuity
					Open	Continuity
10* ²	Driver door switch and passenger door switch	Resistance	10* ² -ground	Driver door and/or passenger door	Closed	No continuity
					Open	Continuity

NOTE

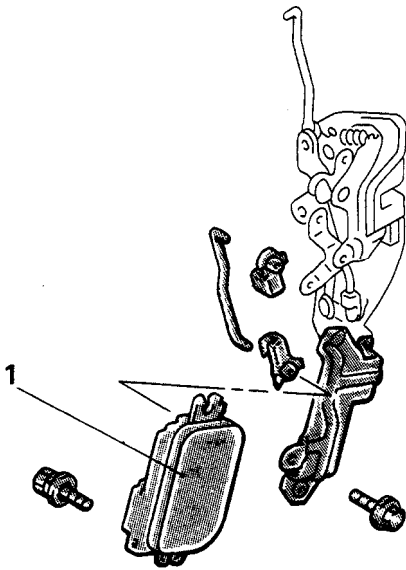
*1: Vehicles without theft-alarm system

*2: Vehicles with theft-alarm system

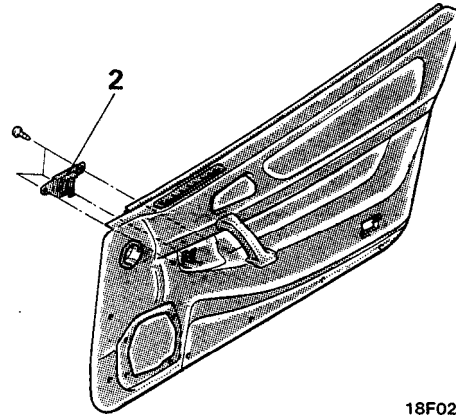
Check the individual part

Door switch: Refer to P.42-41.

REMOVAL AND INSTALLATION



18F0196



18F0205

Door lock actuator removal

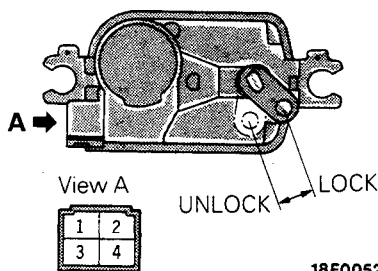
Door trim and waterproof film (Refer to P.42-41.)
 Door latch assembly (Refer to P.42-54.)

1. Door lock actuator

Door lock switch removal

Door trim (Refer to P.42-41.)
 2. Door lock switch

<Driver's side>

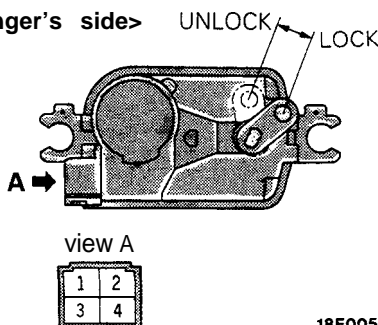


18F0052

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.

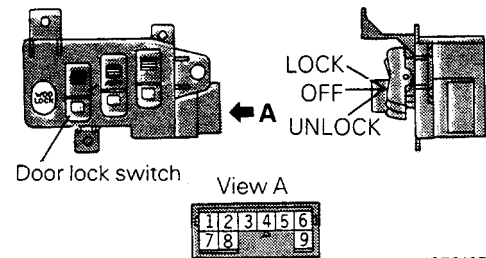
<Passenger's side>



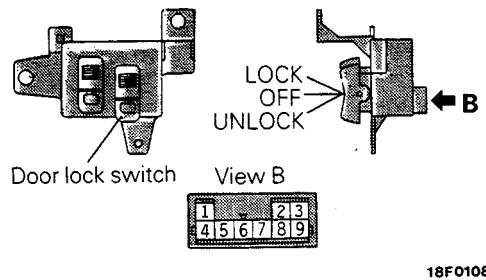
18F0051

<Vehicles with power window>

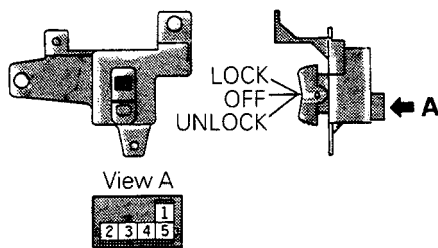
Dower window main switch side



Power window sub switch side



<Vehicles without power window>



DOOR LOCK SWITCH

Check for continuity in accordance to the following connection table.

<Vehicles with power window>

Power window main switch side

Terminal	7	6	5
LOCK	o - - + - - Q		
OFF			
UNLOCK		o — — o	

NOTE
O-O indicates that there is continuity between the terminals

Power window sub switch side

Terminal	4	6	1
LOCK	o - - - + - o		
OFF			
UNLOCK		o — — o	

NOTE
O-O indicates that there is continuity between the terminals.

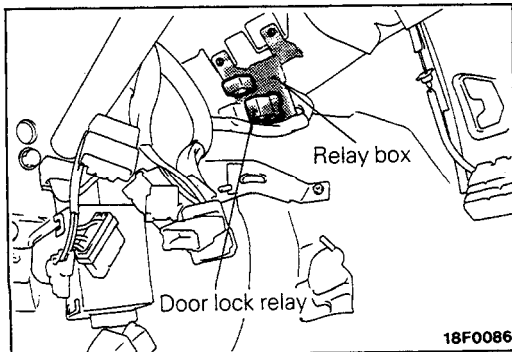
<Vehicles without power window>

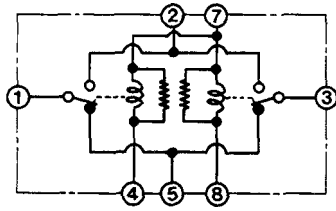
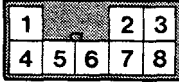
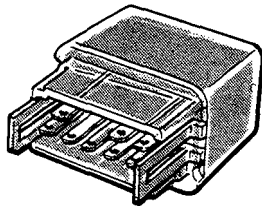
Terminal	3	2	5
LOCK	o — — o		
OFF			
UNLOCK		o — — o	

NOTE
O-O indicates that there is continuity between the terminals.

DOOR LOCK RELAY

- (1) Remove the knee protector assembly:
(Refer to GROUP 52A – Instrument Panel.)
- (2) Remove the door lock relay from indoor relay box.





18A0061

(3) Check for continuity between terminals under the conditions described below.

Terminal	1	2	3	4	5	7	8
Battery voltage							
Continuity no voltage	○	—	○	○	○	○	○
Continuity with voltage	○	○	○	⊖	⊖	⊕	⊕

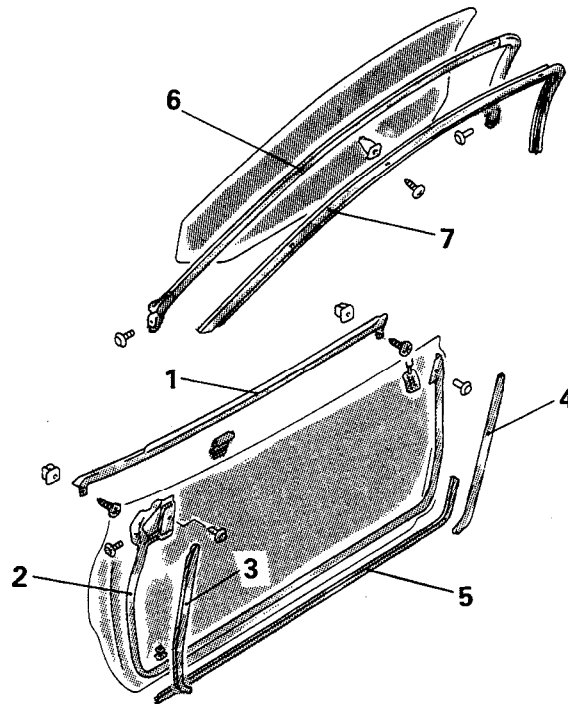
NOTE

- (1) ○-○ indicates that there is continuity between the terminals.
- (2) ⊕----⊖ indicates terminals to which battery voltage is applied.

DRIP LINE WEATHERSTRIP

M42MFAL

REMOVAL AND INSTALLATION



Removal steps

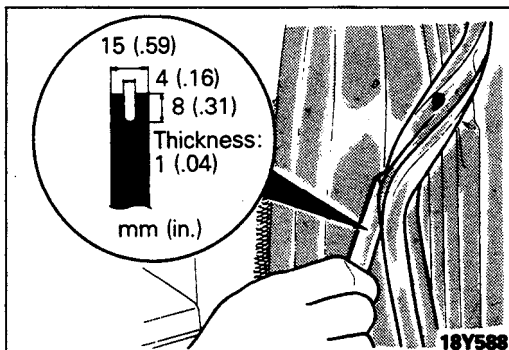
Delta cover inner } (Refer to
Delta cover outer } P.42-42, 51.)
Door trim (Refer to P.42-41.)

- 1. Door belt line outer weatherstrip
- 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

18F0219



SERVICE POINT OF REMOVAL

2. REMOVAL OF DOOR OUTER OPENING WEATHERSTRIP

Make a tool as shown in the illustration to remove the door opening weatherstrip.

SERVICE POINT OF INSTALLATION

2. INSTALLATION OF DOOR OUTER OPENING WEATHERSTRIP

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

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EXTERIOR

CONTENTS

M51AA -

AERO PARTS	20	SERVICE ADJUSTMENT PROCEDURES	10
DOOR MIRROR	38	Inspection of Active Aero System	10
FRONT BUMPER	11	SPECIAL TOOLS	4
GARNISHES AND MOULDINGS	16	SPECIFICATIONS	2
REAR BUMPER	14	General Specifications	2
REAR WIPER AND WASHER	35	Sealants and Adhesives	3
		Service Specifications	3
		TROUBLESHOOTING	5
		WINDSHIELD WIPER AND WASHER	24

SPECIFICATIONS

GENERAL SPECIFICATIONS

M51KB-

Items	Specifications
Windshield wiper motor Type Speed control system Braking system rpm at load of 1 Nm (0.72 ft.lbs.) Low speed High speed Nominal torque Nm (ft.lbs.)	Ferrite-magnet type Third brush system Dynamic brake system 48 ± 4 70 ± 7 24 (17)
Rear wiper motor Motor type Braking system rpm at load of 0.6 Nm (0.43 ft.lbs.)	Ferrite-magnet type Dynamic braking system 38 ± 5
Windshield wiper blade Wiping angle Driver's side Passenger's side Wiper blade length mm (in.) Driver's side Passenger's side	89" 91" 525 (20.7) 500 (19.7)
Rear wiper blade Wiping angle Wiper blade length mm (in.)	87" ± 1.5" 550 (21.7)
Nindow washer motor and pump Motor type Pump type Power consumption A Time of continuous use sec. With washer fluid Empty operation Nozzle jet pressure kPa (psi) Tank capacity lit. (qts.)	Direct current ferrite magnet type Centrifugal type 3.8 or less Max. 60 Max. 20 120 (17) or more 2.0 (2.1) or more
Rear window washer motor and pump Motor type Pump type Power consumption A Time of continuous use sec. With washer fluid Empty operation Nozzle jet pressure kPa (psi) Tank capacity lit. (qts.)	Direct current ferrite magnet type Centrifugal type 3.8 or less Max. 60 Max. 20 120 (17) or more 1.2 (1.3) or more

Items	Specifications
Wiper and washer switch Rated load A Wiper switch LO, HI INT Washer switch Voltage drop (at 12V and the rated load) V Wiper switch Washer switch	 4 0.22 ± 0.05 Max. 4 0.2 or less 0.5 or less
Rear wiper and washer switch Rated load A Wiper switch Washer switch Voltage drop V	 5 5 0.1 or less
Intermittent wiper relay <Front (incorporated in column switch)> Intermittent interval (min.-max.) sec. Variable-interval intermittent wiper Delay time in washer moving sec. <Rear> Intermittent interval sec.	 Approx. 3 – 12 0.6 8 ± 2
Door mirror Printed heater lines Working voltage V Operating current A Resistance Ω	 10 – 15 3.5 or less 7.7 – 10.2

SERVICE SPECIFICATIONS

M51KC--

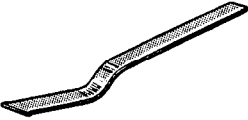
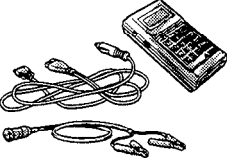

Items	Specifications
Standard value Front wiper blade park position (A) mm (in.)	15 ⁺⁵ ₋₀ (.6 ⁺² ₋₀)

SEALANTS AND ADHESIVES

items	Specified adhesive
Side protect moulding	3M ATD Part No. 8609 SUPER FAST URETHAN or equivalent
Side air dam	3M ATD Part No. 6382 or equivalent
Side garnish	3M ATD Part No. 6382 or equivalent

SPECIAL TOOLS

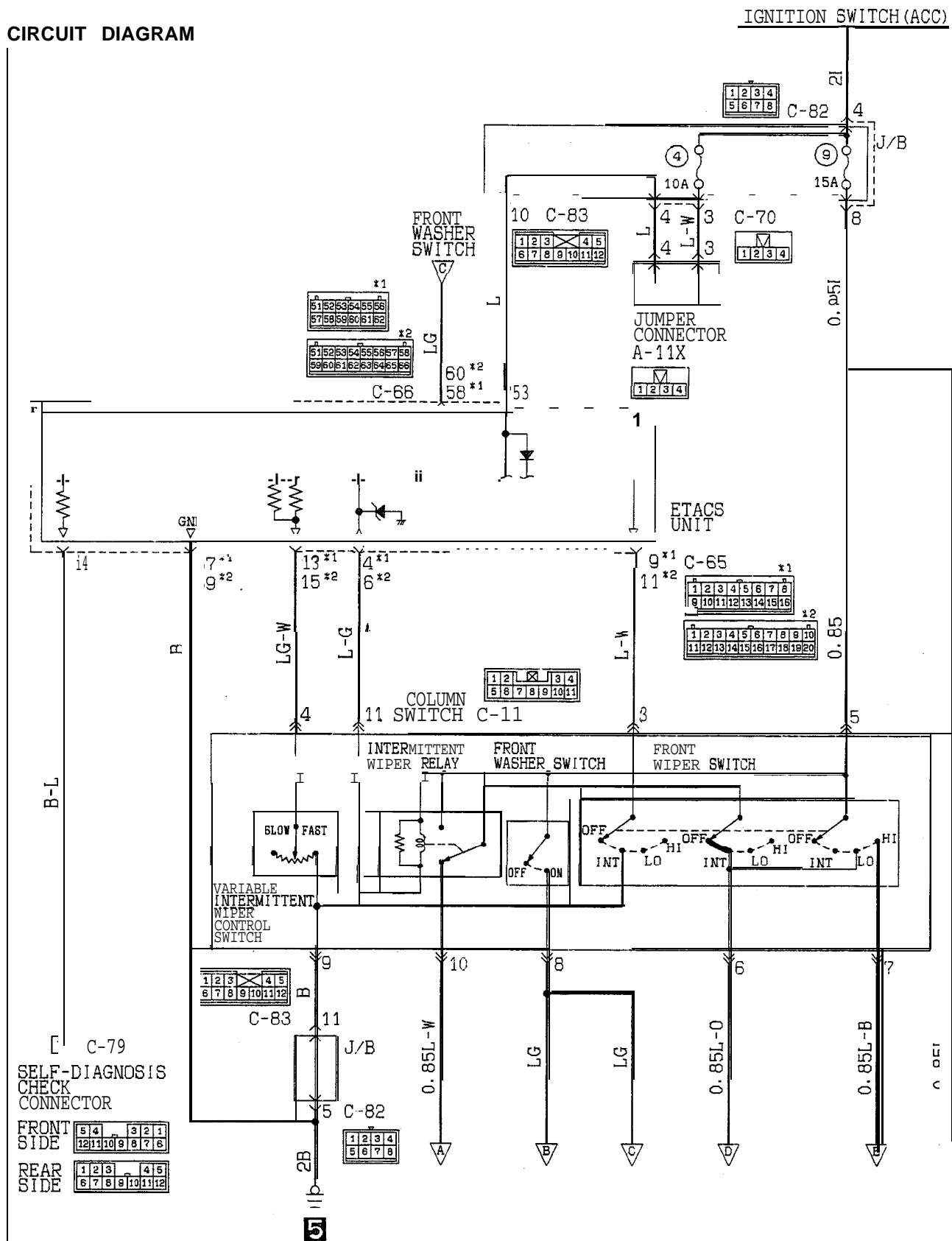
M51KG-

Tool	Number	Name	Use
	MB990449	Window moulding remover	Removal of liftgate moulding, upper and liftgate moulding, lower
	MB991341	Multi-use tester assembly	ETACS input check and active aero system inspection
	MB991 359	ROM pack	ETACS input check and active aero system inspection

TROUBLESHOOTING

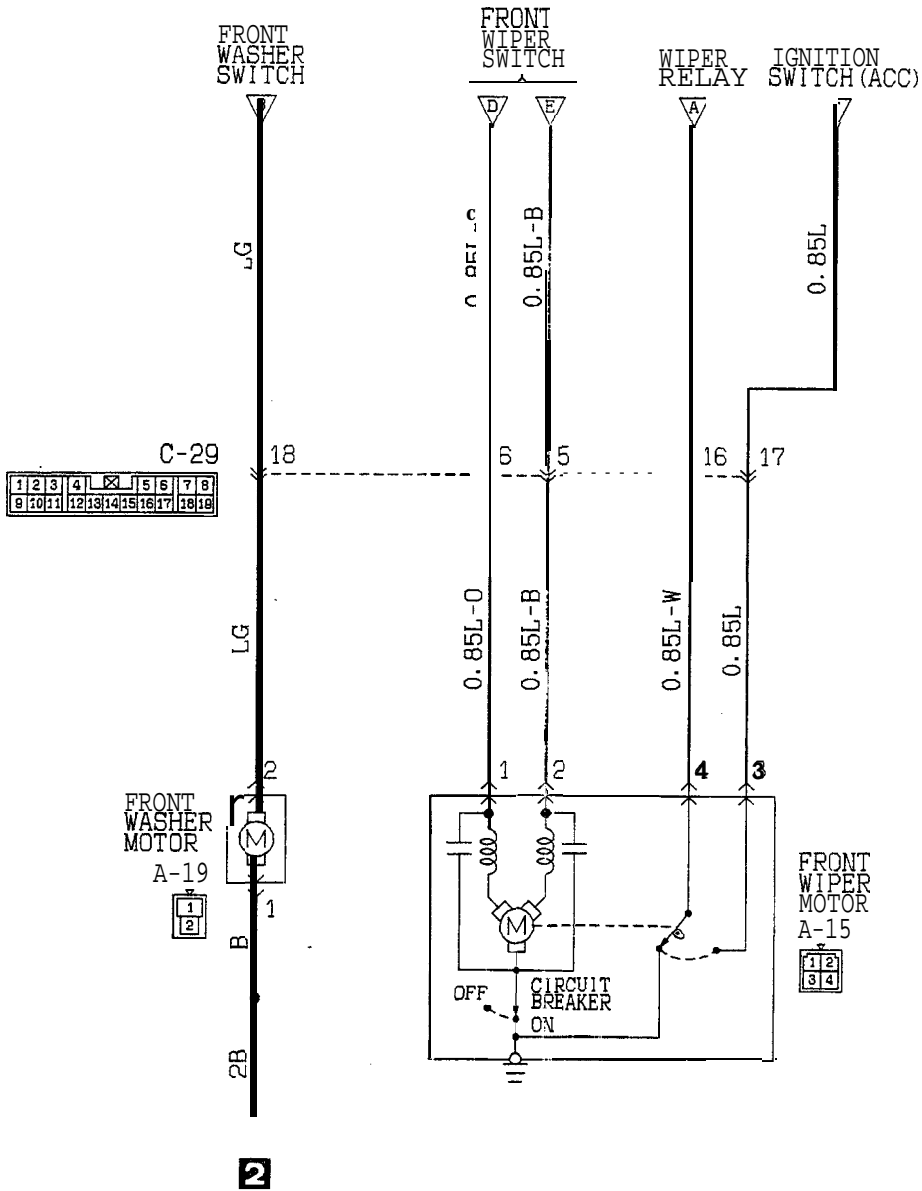
WINDSHIELD WIPER AND WASHER

CIRCUIT DIAGRAM



X35-AC-R1301-NH

TSB Revision



*1:VEHICLES WITHOUT THEFT-ALARM SYSTEM
 *2:VEHICLES WITH THEFT-ALARM SYSTEM

OPERATION

<Low-speed (and high-speed) wiper operation>

- When the wiper switch is placed in the LO position with the ignition switch in the ACC or ON position, wipers operate continuously at low speed.
- Placing the wiper switch in the HI position causes the wipers to operate at high speed.

<Auto wiper stop operation>

- When the wiper switch is placed in the OFF position, the cam contacts of wiper motor causes current to flow through the auto wiper stop circuit, allowing the wiper blades to cycle before they reach to the stop positions.

<Washer operation>

- When the washer switch is placed in the ON position with the ignition switch in the ACC or ON position, washers operate.

REAR WIPER AND WASHER

OPERATION

<Low-speed wiper operation>

- When the rear wiper switch is placed in the ON position with the ignition switch in the ACC or ON position, wipers operate continuously at low speed.

<Auto wiper stop operation>

- When the rear wiper switch is placed in the OFF position, the cam contacts of wiper motor causes current to flow through the auto wiper stop circuit, allowing the wiper blades to cycle before they reach to the stop positions.

<Intermittent wiper operation>

- When the rear wiper switch is placed in the INT position with the ignition switch in ACC or ON position, the rear intermittent wiper relay is energized causing the rear intermittent wiper relay contacts to close and open repeatedly.
- When the contacts are closed, the wiper motor is energized.
- When the rear wiper motor is energized, the rear intermittent wiper relay contacts open; however, the cam contacts keep the rear wiper motor energized until the wiper blades return to their stop position.

TROUBLESHOOTING HINTS

1. Wipers do not operate.
 - (1) Washer is not operative, either.
 - Check multi-purpose fuse No. ⑨.
 - Check ground.
2. Low-speed (or high-speed) wiper operation only is inoperative.
 - Check wiper switch.
3. Wipers do not stop.
 - Check wiper motor.
 - Check intermittent wiper relay.
 - Check wiper switch.
4. Washer is inoperative.
 - Check washer motor.
 - Check washer switch.

NOTE

For information concerning the ETACS control unit, refer to P.51-24.

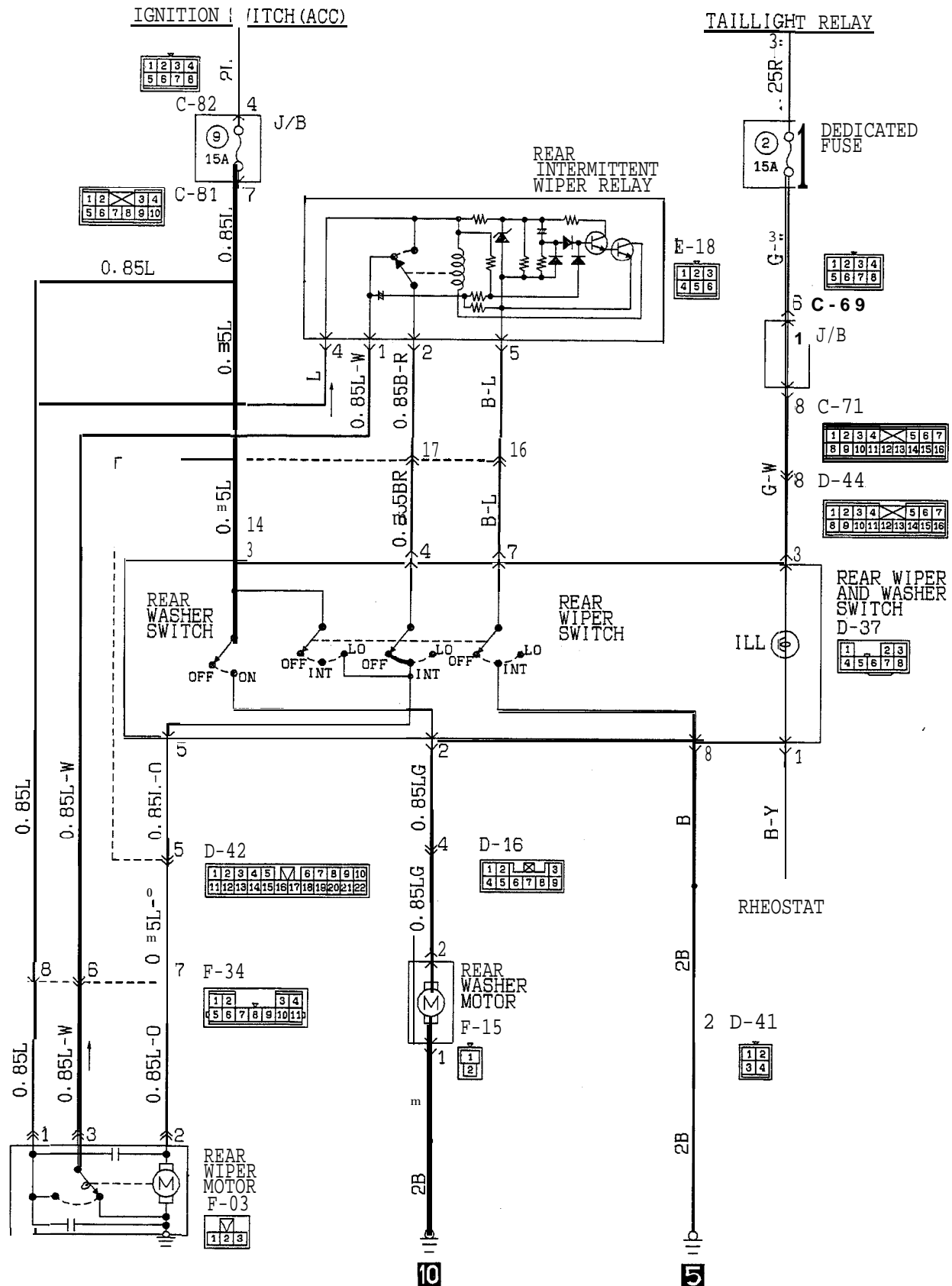
TROUBLESHOOTING HINTS

1. Wipers do not operate.
 - (1) Washer is not operative, either.
 - Check multi-purpose fuse No. ⑨.
 - Check ground.
2. Low-speed wiper operation only is inoperative.
 - Check wiper switch.
3. Wipers do not stop.
 - Check wiper motor.
 - Check rear intermittent wiper relay.
 - Check rear wiper switch.
4. Intermittent wiper operation is inoperative.
 - Check terminal voltage of the rear intermittent wiper relay energized.
(Refer to P.51-34 for information concerning the installation position of the intermittent wiper relay.)

Terminal No.	Voltage	Check
2	0V	Rear intermittent wiper relay or rear wiper switch
	12v	Rear intermittent wiper relay
	0 ↔ 12v (alternating)	-(Normal)

5. Washer is inoperative.
 - Check washer motor.
 - Check washer switch

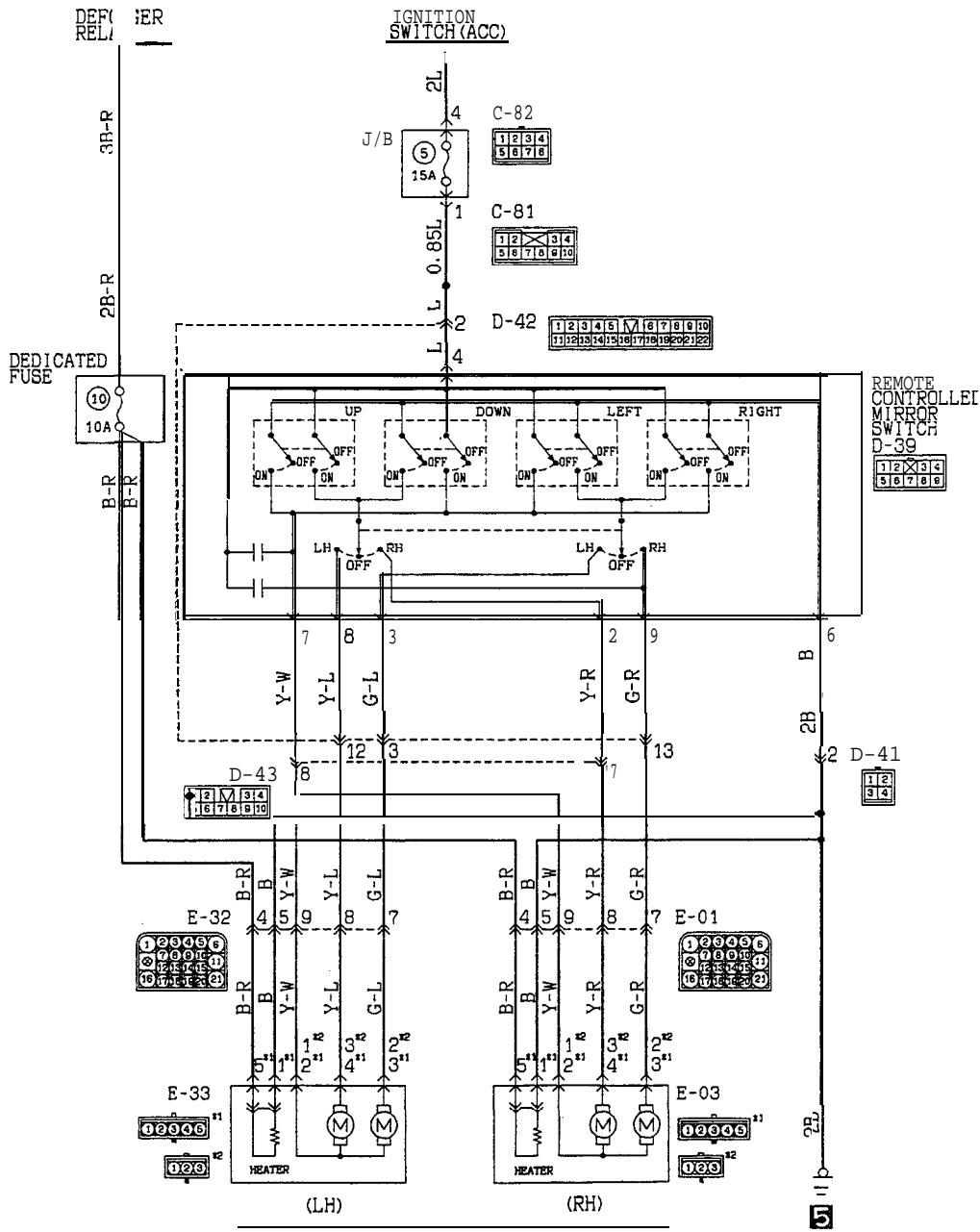
CIRCUIT DIAGRAM



ELECTRIC REMOTE CONTROLLED MIRROR

M51EBBF

CIRCUIT DIAGRAM



KX35-AC-R1303-NM

REMOTE CONTROLLED MIRROR

*1: VEHICLES WITH MIRROR HEATER
*2: VEHICLES WITHOUT MIRROR HEATER

OPERATION

- When the remote controlled mirror switch is operated while the ignition key is in "ACC" or "ON" position, current flows through fuse No. ⑤ remote controlled mirror switch, remote controlled mirror, remote controlled mirror switch, and ground, causing the mirror to move.

TROUBLESHOOTING HINTS

- Neither right nor left mirror operates
- Also cigarette lighter does not operate
 - Check multi-purpose fuse No. ⑤.
 - Cigarette lighter operates
 - Check remote controlled mirror switch.

SERVICE ADJUSTMENT PROCEDURES

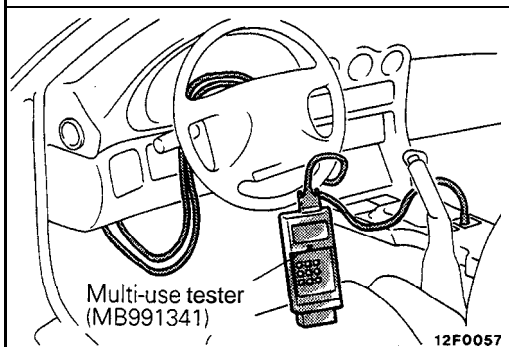
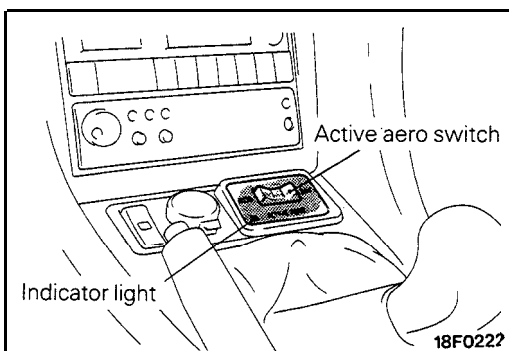
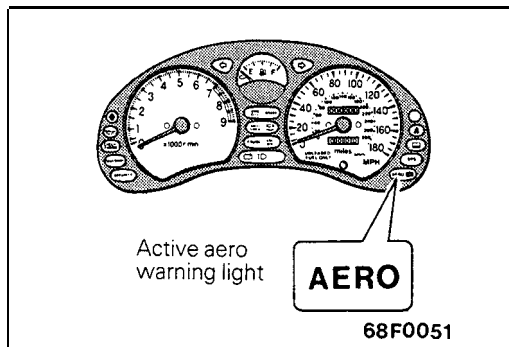
INSPECTION OF ACTIVE AERO SYSTEM

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

3. INSPECTION WITH MULTI-USE TESTER

Using pseudo vehicle speed input function of the multi-use tester, inspection can be made by means of vehicle speed.

- (1) Set the multi-use tester to the diagnosis connector.
- (2) Turn the ignition switch to "ACC" or "ON".
- (3) Place the active aero switch to AUTO 1.
- (4) Using the multi-use tester, 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.

M51ZAAW

FRONT BUMPER**REMOVAL AND INSTALLATION OF CLIP WITH SCREW**

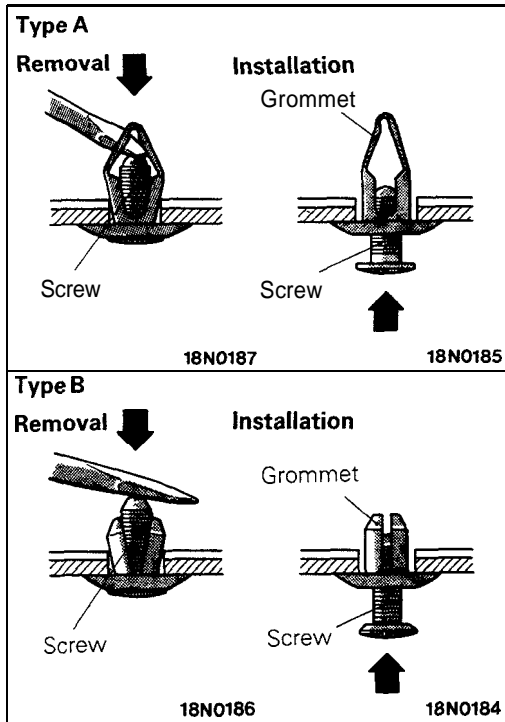
Normally, remove the clip with a Phillips screwdriver. If, however, there is enough space to insert a screwdriver or the like behind the clip, use the following procedure for ease of work.

1. Removal

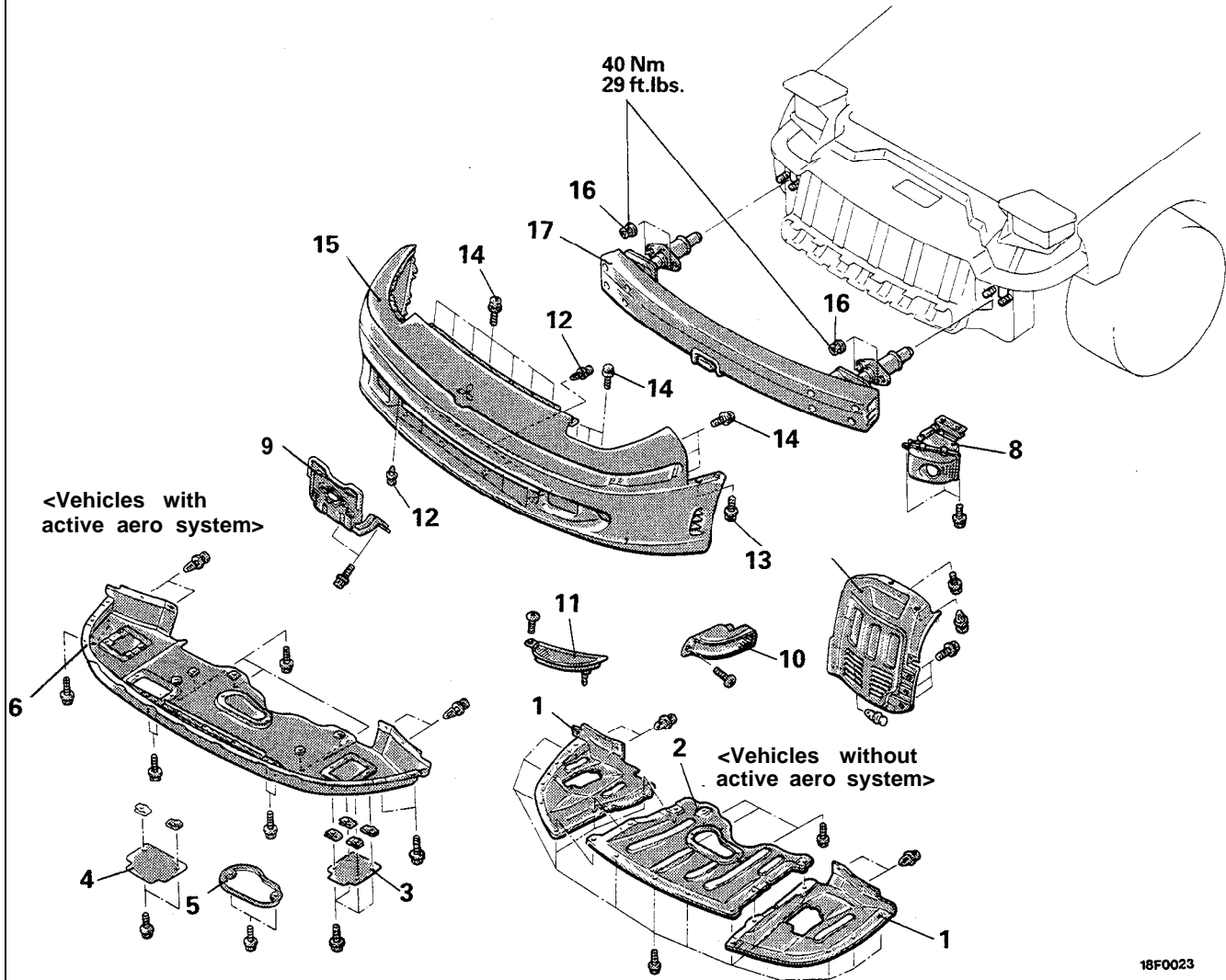
Using a screwdriver or the like, press the screw from the inside of the bumper to remove the clip.

2. Installation

With the grommet inserted in the hole, press the screw in.



REMOVAL AND INSTALLATION



<Vehicles with active aero system>

<Vehicles without active aero system>

18F0023

Removal steps

1. Front under cover side panel
2. Front under cover center panel
3. Side cover panel
4. Front cover panel
5. Center cover panel
6. Front under cover panel
7. Front splash shield extension
8. Fog light
9. License plate bracket

(Vehicles without active aero system)
(Vehicles with active aero system)

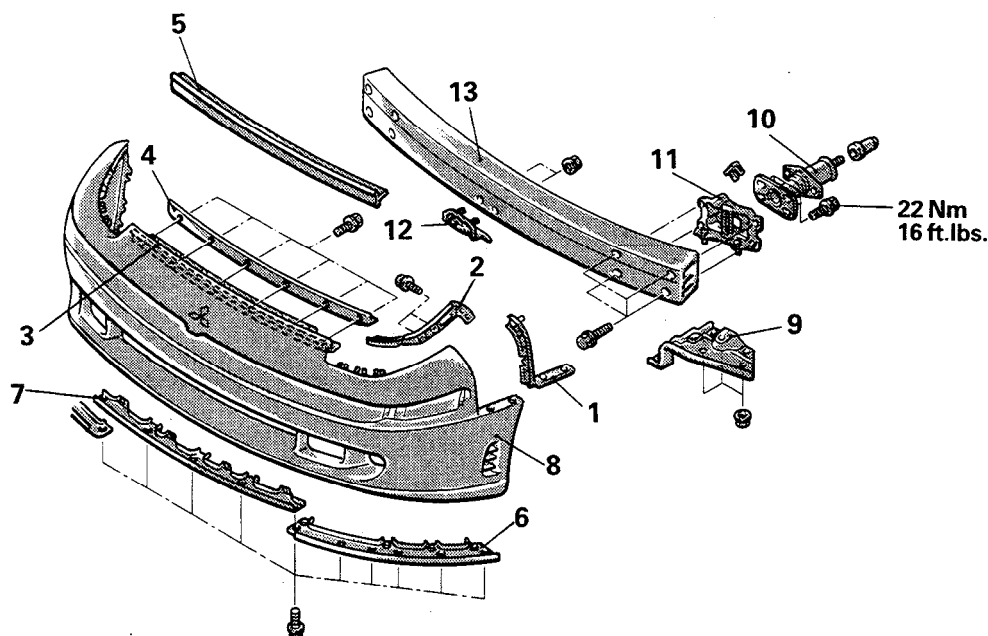
10. Front combination light
11. Optical horn lens
12. Clips with screw
13. Tapping screws
14. Bolts
15. Bumper face assembly
16. Nuts
17. Bumper reinforcement assembly

SERVICE POINT OF INSTALLATION

6. INSTALLATION OF FRONT UNDER COVER PANEL

Install the air dam link assembly in the operative condition for ease of front under cover panel.

DISASSEMBLY AND REASSEMBLY



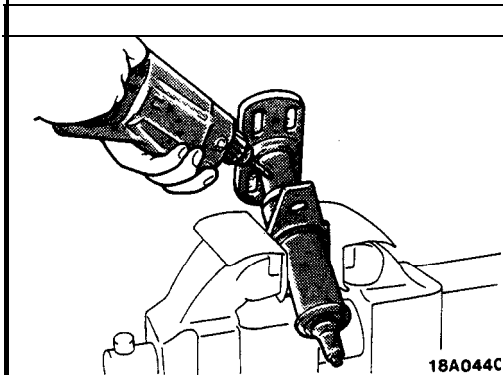
18F0021

Bumper face disassembly steps

1. Bumper face side plate
2. Bumper face corner plate
3. Bumper face upper front plate
4. Bumper face upper center plate
5. Bumper face protector
6. Side lower plate
7. Center lower plate
8. Bumper face

Bumper reinforcement disassembly steps

- 9. Fog light bracket
- *10. Bumper absorber
- 11. Bumper reinforcement stay
- 12. License plate bracket support
- 13. Bumper reinforcement



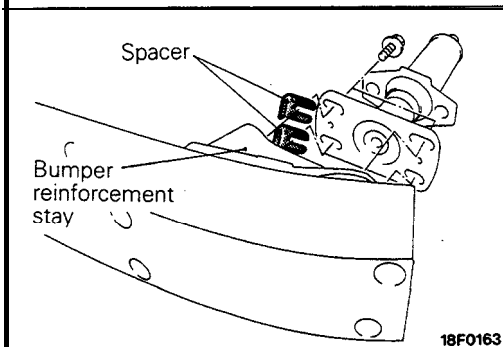
18A044C

SERVICE POINT OF DISASSEMBLY

10. REMOVAL OF BUMPER ABSORBER

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.



18F0163

SERVICE POINT OF REASSEMBLY

10. INSTALLATION OF BUMPER ABSORBER

If the squareness between the bumper reinforcement stay and the bumper absorber is improper, adjust it by putting a spacer between them.

REAR BUMPER

M51ZAAX

REMOVAL AND INSTALLATION OF CLIP WITH SCREW

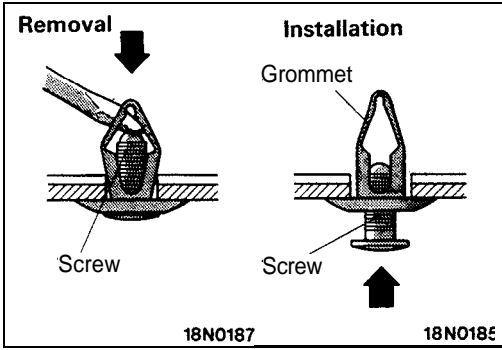
Normally, remove the clip with a Phillips screwdriver. If, however, there is enough space to insert a screwdriver or the like behind the clip, use the following procedure for ease of work.

1. Removal

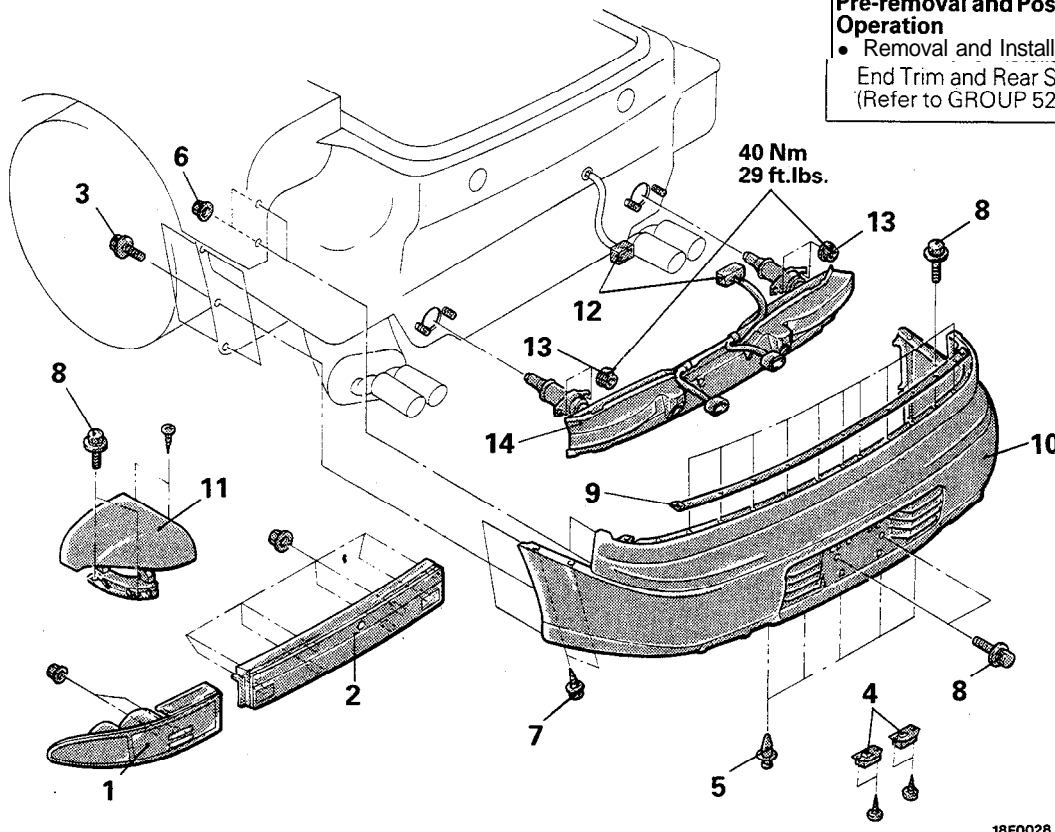
Using a screwdriver or the like, press the screw from the inside of the bumper to remove the clip.

2. Installation

With the grommet inserted in the hole, press the screw in.



REMOVAL. AND INSTALLATION

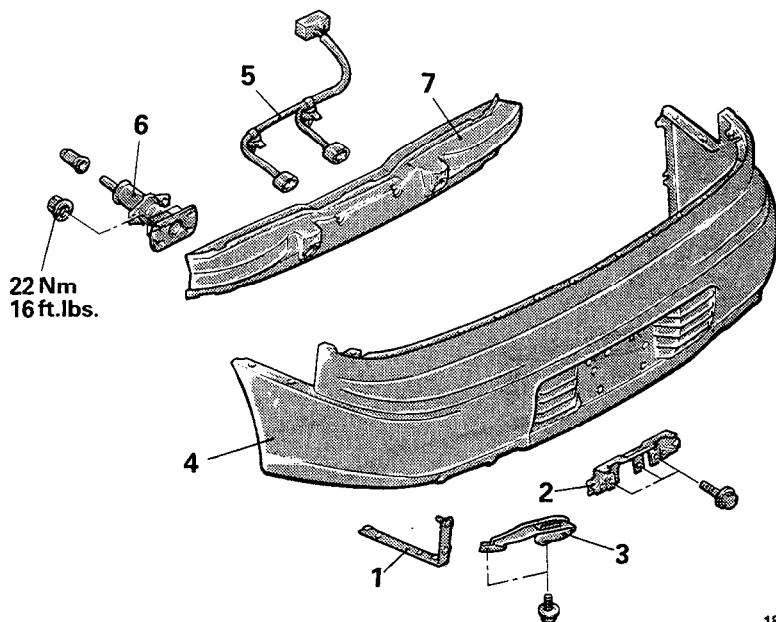


Pre-removal and Post-installation Operation
 • Removal and Installation of Rear End Trim and Rear Side Trim (Refer to GROUP 52A – Trims.)

Removal steps

- | | | |
|---|------------------------|-----------------------------------|
| ECS control unit (Refer to GROUP 33B – ECS Control Unit.) | 3. Bolts | 9. Bumper face upper plate |
| 1. Rear combination light | 4. License plate light | 10. Bumper face assembly |
| 2. Rear panel garnish | 5. Clips with screw | 11. Rear bumper upper extension |
| | 6. Nuts | 12. Rear bumper harness connector |
| | 7. Tapping screws | 13. Nuts |
| | 8. Bolts | 14. Bumper reinforcement assembly |

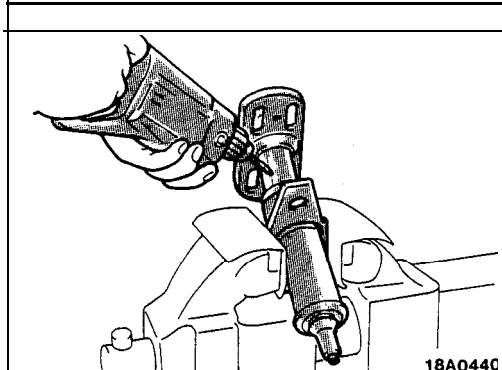
DISASSEMBLY AND REASSEMBLY

**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 absorber
 7. Bumper reinforcement

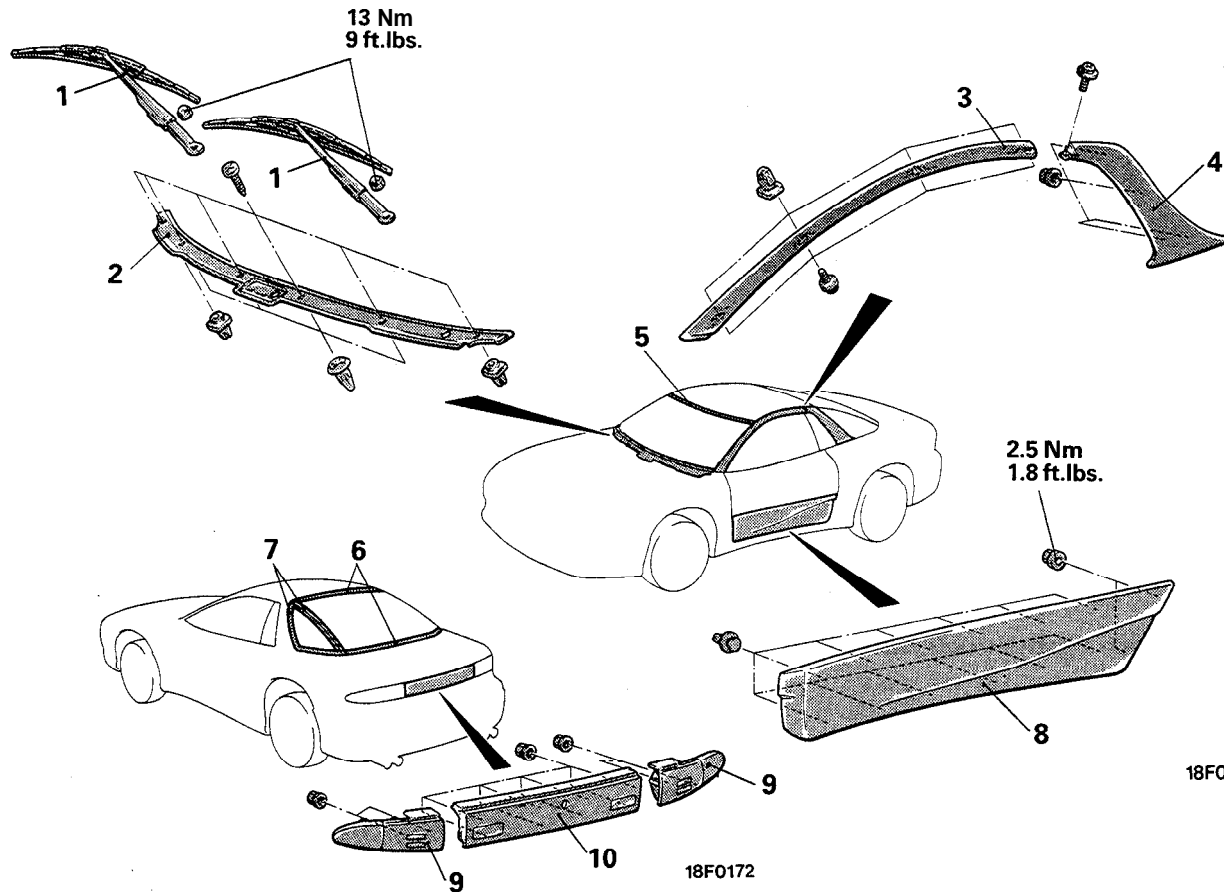
**SERVICE POINT OF DISASSEMBLY****6. REMOVAL OF BUMPER ABSORBER****Caution**

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.

GARNISHES AND MOULDINGS

M51RDAF

REMOVAL AND INSTALLATION

**Front deck garnish removal steps**

1. Wiper arm assembly
2. Front deck garnish

Drip moulding and center pillar garnish removal steps

- Drip line weatherstrip } (Refer to GROUP 42 –
Door weatherstrip holder } Drip Line Weatherstrip.)
3. Drip moulding
 - Quarter upper trim (Refer to GROUP 52A – Trims.)
 4. Center pillar garnish

Windshield moulding removal steps

3. Drip moulding
5. Windshield moulding (Refer to GROUP 42 – Windshield.)

Liftgate moulding removal

6. Liftgate moulding (Refer to GROUP 42 – Liftgate Glass.)

Quarter window moulding and glass removal steps

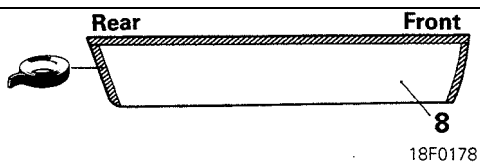
4. Center pillar garnish
7. Quarter window moulding and glass (Refer to GROUP 42 – Quarter Window Glass.)

Side garnish removal

- • • 8. Sidegarnish

Rear panel garnish removal steps

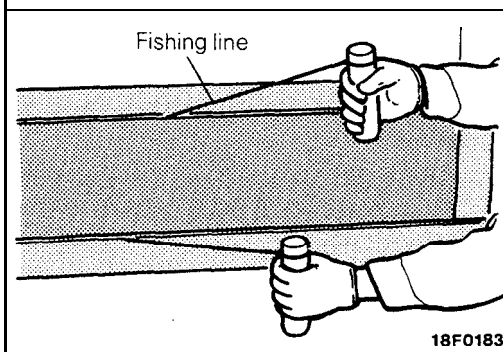
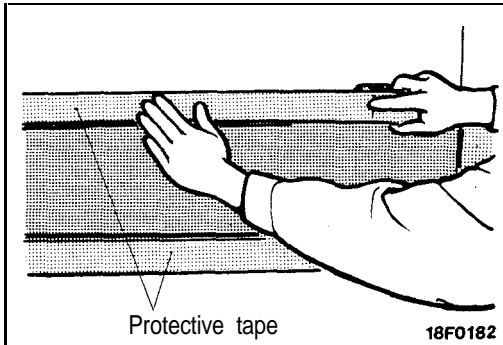
- Rear end trim (Refer to GROUP 52A – Trims.)
- Rear side trim 3
9. Rear combination light
 10. Rear panel garnish



Adhesive tape:
3M ATD Part No. 6382 or equivalent

SERVICE POINT OF REMOVAL

8. REMOVAL OF SIDE GARNISH



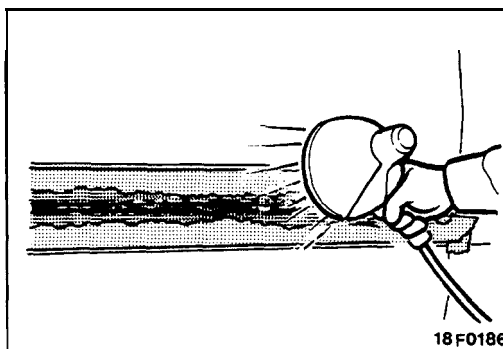
- (1) Remove the side garnish mounting nuts.
- (2) Affix protective tape to the periphery of the side garnish.

- (3) Insert a fishing line [$\phi 0.8$ 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

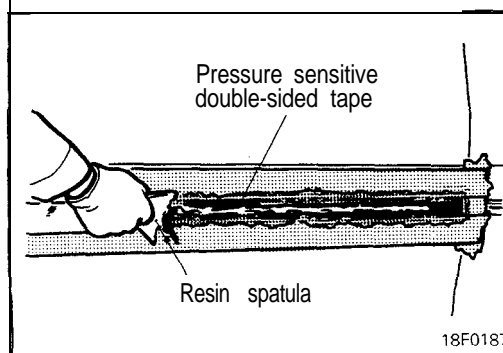
1. To reuse the side garnish, remove it by pulling the fishing line along the body so as not to damage the edges of the side garnish.
2. If it is hard to cut through adhesive material, heat it to approx. 40°C (104°F).



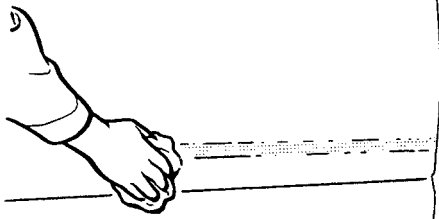
- (5) Use an infrared lamp or the like to heat the pressure sensitive double-sided tape remaining on the body to 40 to 60°C (104 to 140°F) for 5 to 10 minutes.

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.



18F0188

- (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.

SERVICE POINT OF INSTALLATION**8. INSTALLATION OF SIDE GARNISH****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).

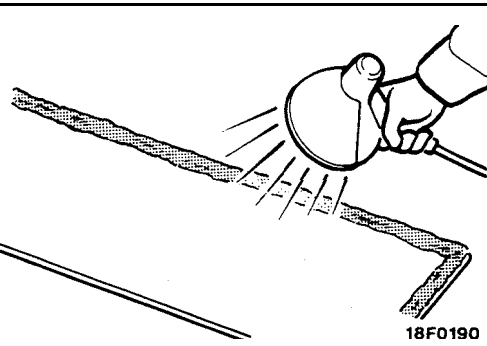
- (4) Use cloth moistened with degreaser (3M ATD Part No. 8906 or equivalent) to wipe the side garnish clean.
 (5) Scrape old adhesive slightly.

Caution

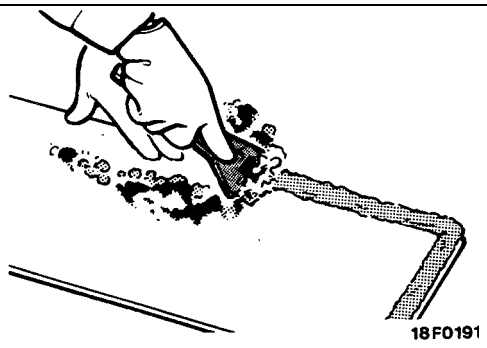
Do not scrape off all old adhesive.

- (6) Affix specified pressure sensitive double-sided tape to the side garnish.

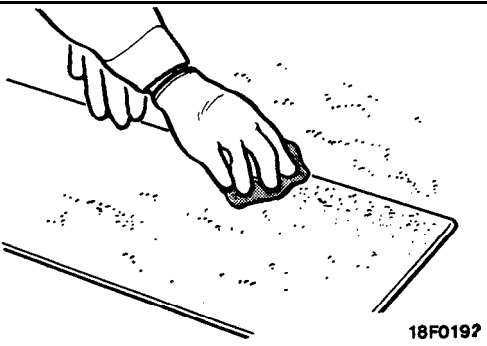
Specified adhesive tape: 3M ATD Part No. 6382 or equivalent



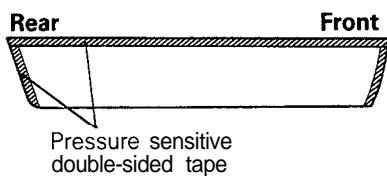
18F0190



18F0191

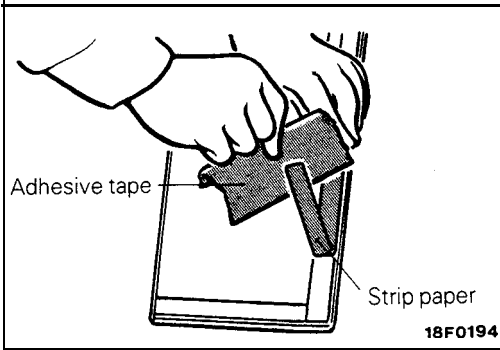


18F0192



Pressure sensitive double-sided tape

18F0178

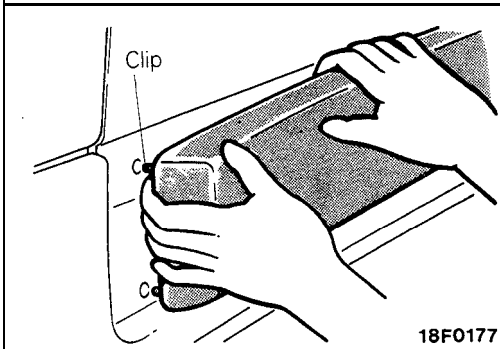


Installation of Side Garnish

- (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)

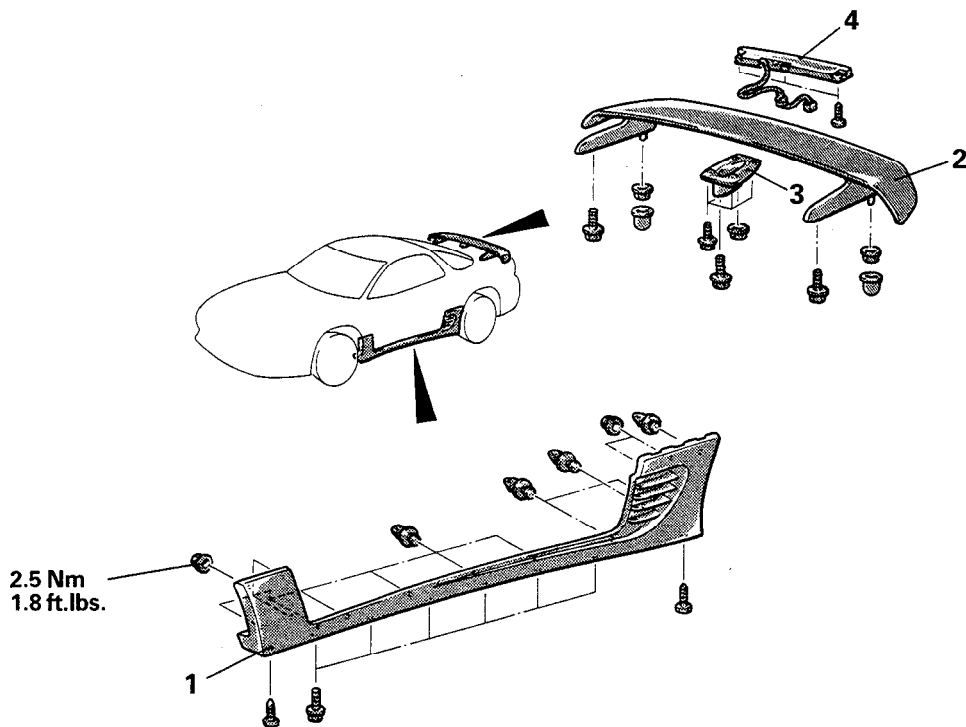
- (3) Apply pressure fully to the side garnish.

AERO PARTS

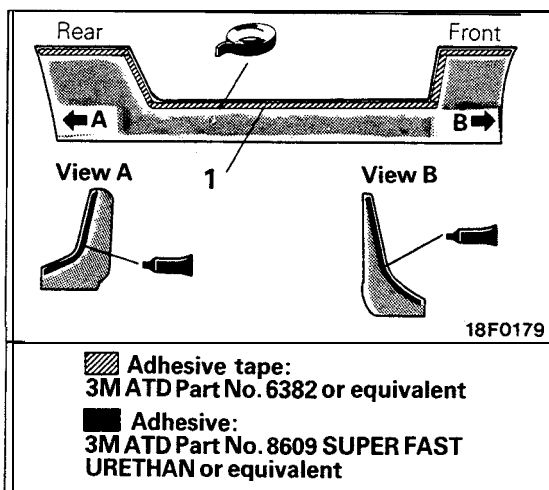
M51XAAJ

REMOVAL AND INSTALLATION

<Vehicles without active aero system>



18F0251



18F0179

Side air dam removal steps

- Front splash shield (Refer to GROUP 42 – Fender.)
- Quarter trim (Refer to GROUP 52A – Trims.)

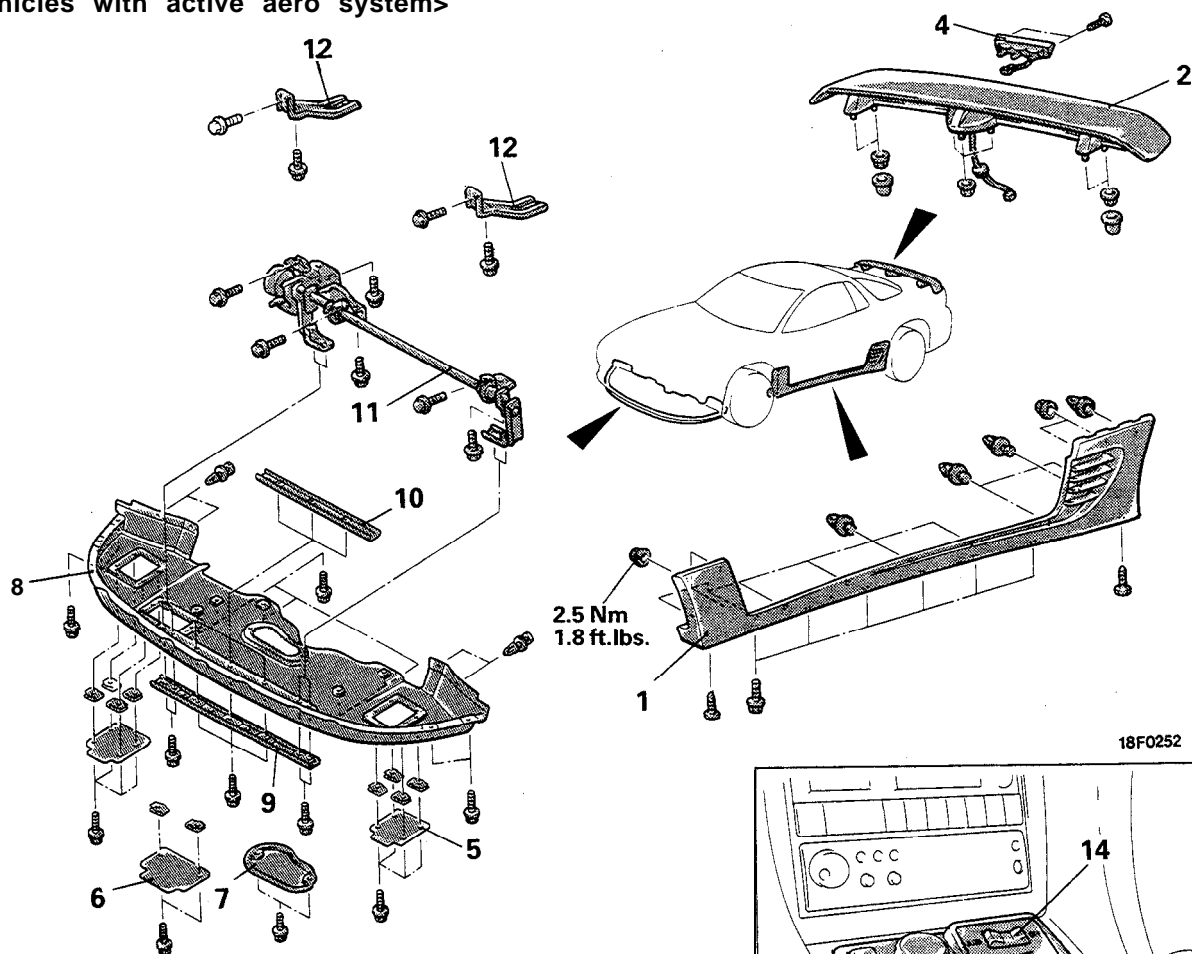
- *♦♦♦ 1. Side air dam

Rear spoiler removal steps

- Liftgate lower trim (Refer to GROUP 52A – Trims.)

- 2. Rear spoiler assembly
- 3. Center stay
- 4. High mounted stop light

<Vehicles with active aero system>



Side air dam removal steps

Front splash shield
(Refer to GROUP 42 – Fender.)

- ◆◆ ● + 1. Side air dam

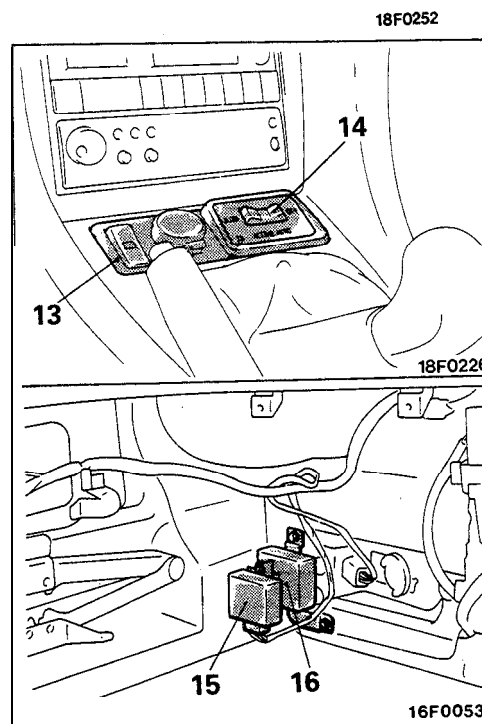
Rear spoiler removal steps

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
- ◆◆ 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
- 16. Active aero control unit

SERVICE POINT OF REMOVAL

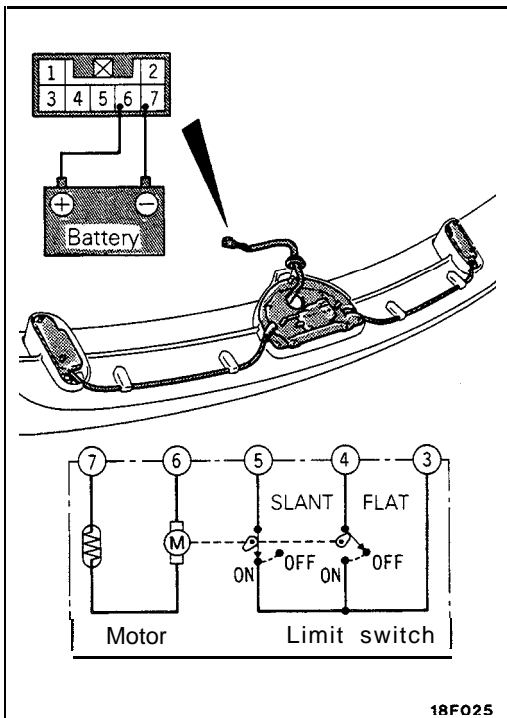
1. REMOVAL OF SIDE AIR DAM

Remove the side air dam by the same procedure as the side garnish. (Refer to P.51-17.)

INSPECTION

1. INSPECTION OF REAR SPOILER MOTOR AND LIMIT SWITCH

- (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.

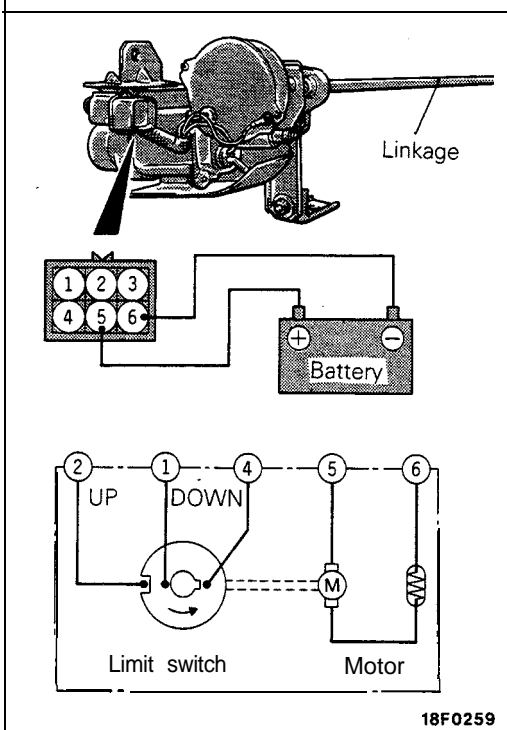


Spoiler position	Terminal	3	4	5
FLAT (standard position)		○	○	○
During operation		○—○	○—○	○
SLANT (operative position)		○—○	○	

NOTE
O-O indicates that there is continuity between the terminals.

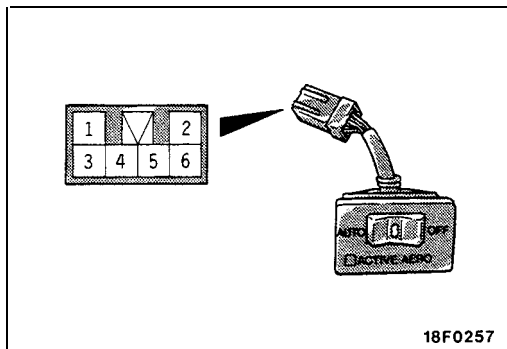
2. INSPECTION OF AIR DAM LINK ASSEMBLY MOTOR AND LIMIT SWITCH

- (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	1	2	4
UP (standard position)		○	○	○
During operation		○—○	○—○	○—○
DOWN (operative position)			○—○	

NOTE
O-O indicates that there is continuity between the terminals.



3. INSPECTION OF ACTIVE AERO SWITCH

Operate the switch to check the continuity between the terminals.

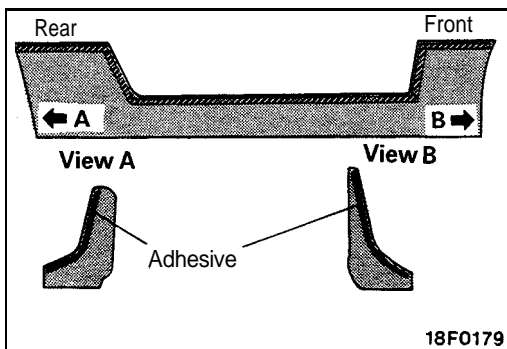
Terminal	5	1	2	4	6	3
Switch position						
OFF			○—○	→		
AUTO 1	○	○	○	○	○	○
AUTO 2 (Automatic reset type)	ILL			○—○		IND

NOTE
○—○ indicates that there is continuity between the terminals.

SERVICE POINTS OF INSTALLATION

11. INSTALLATION OF AIR DAM LINK ASSEMBLY

Install the air dam link assembly in the operative condition for ease of front under cover panel.



1. INSTALLATION OF SIDE AIR DAM

Install the side air dam by the same procedure as the side garnish (refer to P.51-18), provided that specified adhesive is used.

Specified adhesive: 3M ATD Part No. 8609 SUPER FAST URETHAN or equivalent

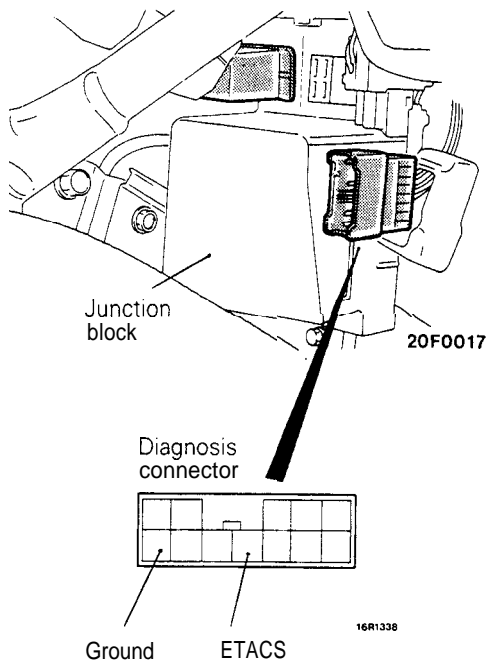
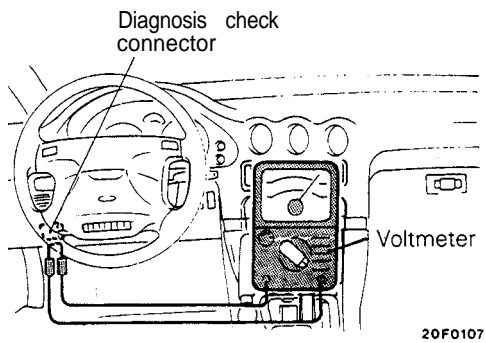
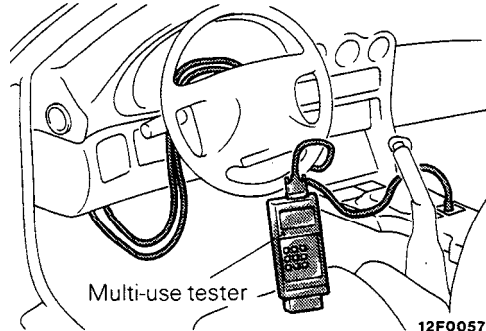
WINDSHIELD WIPER AND WASHER**TROUBLESHOOTING GUIDE****INPUT CHECK**

Using the multi-use tester or voltmeter, check whether or not the input signals from each switch are being input to the ETACS unit.

- (1) Connect the multi-use tester to the diagnosis check 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 multi-use tester sounds or the needle of the voltmeter moves when each switch noted below 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.

- Ignition switch
- Wiper switch (INT)
- Intermittent variable-volume switch
- Washer switch

**With voltmeter****With multi-use tester**

TROUBLESHOOTING QUICK-REFERENCE TABLE

INTERMITTENT WIPERS

Problem	Probable cause(s)	Checking procedure	Remedy
The wipers don't operate when the wiper switch is set to the "INT" position. [The wipers do operate, however, when the wiper switch is set to the "1" (low speed) position.]	Damage or disconnection of the wiring of the wiper switch ("INT") input circuit.	If a malfunction is discovered as a result of the checking of the input (P.51-24), conduct check No. 2 (P.51-28) of the individual part and circuit.	Repair the wiring harness, or replace the column switch.
	Damage or disconnection of the wiring of the wiper switch ("INT").		
	Damage or disconnection of the wiring of the ignition switch input circuit.	If a malfunction is discovered as a result of the checking of the input (P.51-24), conduct check No. 1 (P.51-27) of the individual part and circuit.	Repair the wiring harness.
	Damage or disconnection of the wiring of the wiper relay activation circuit.	Conduct check No. 4 (P.51-30) of the individual part and circuit.	Repair the wiring harness, or replace the column switch.
	Malfunction of the wiper relay.		
	Malfunction of the electronic control unit.	–	Replace the electronic control unit.
The wipers don't stop when the wiper switch is OFF. [This problem occurs at the low speed of the wipers.] NOTE If the wipers continue operating (without stopping) at the "2" position (high speed) of the wiper switch, there is a short-circuit in the circuit at the wiper motor high-speed side.	Short-circuit in the wiper switch ("INT") input circuit.	If a malfunction is discovered as a result of the checking of the input (P.51-24), conduct check No. 2 (P.51-28) of the individual part and circuit.	Repair the wiring harness, or replace the column switch.
	Short-circuit in the wiper switch ("INT").		
	Short-circuit in the wiper relay activation circuit.	Conduct check No. 4 (P.51-30) of the individual part and circuit.	Repair the wiring harness.
	Malfunction of the electronic control unit.	–	Replace the electronic control unit.
When the wiper switch is set to the "INT" position, the wipers operate continuously at low speed, not intermittent operation. [The wipers stop, however, when the wiper switch is set to "OFF".]	Short-circuit in the wiper switch ("INT") input circuit.	If a malfunction is discovered as a result of the checking of the input (P.51-24), conduct check No. 2 (P.51-28) of the individual part and circuit.	Repair the wiring harness, or replace the column switch.
	Short-circuit in the wiper switch ("INT").		
	Malfunction of the electronic control unit.	–	Replace the electronic control unit.
The intermittent time does not change when the intermittent variable volume switch setting is changed.	Damage or disconnection of the wiring of the intermittent variable volume switch input circuit.	If a malfunction is discovered as a result of the checking of the input (P.51-24), conduct check No. 3 (P.51-29) of the individual part and circuit.	Repair the wiring harness, or replace the column switch.
	Damage or disconnection of the wiring of the intermittent variable volume switch.		
	Malfunction of the electronic control unit.	–	Replace the electronic control unit.

MIST WIPERS/WASHER-INTERLOCKED WIPERS

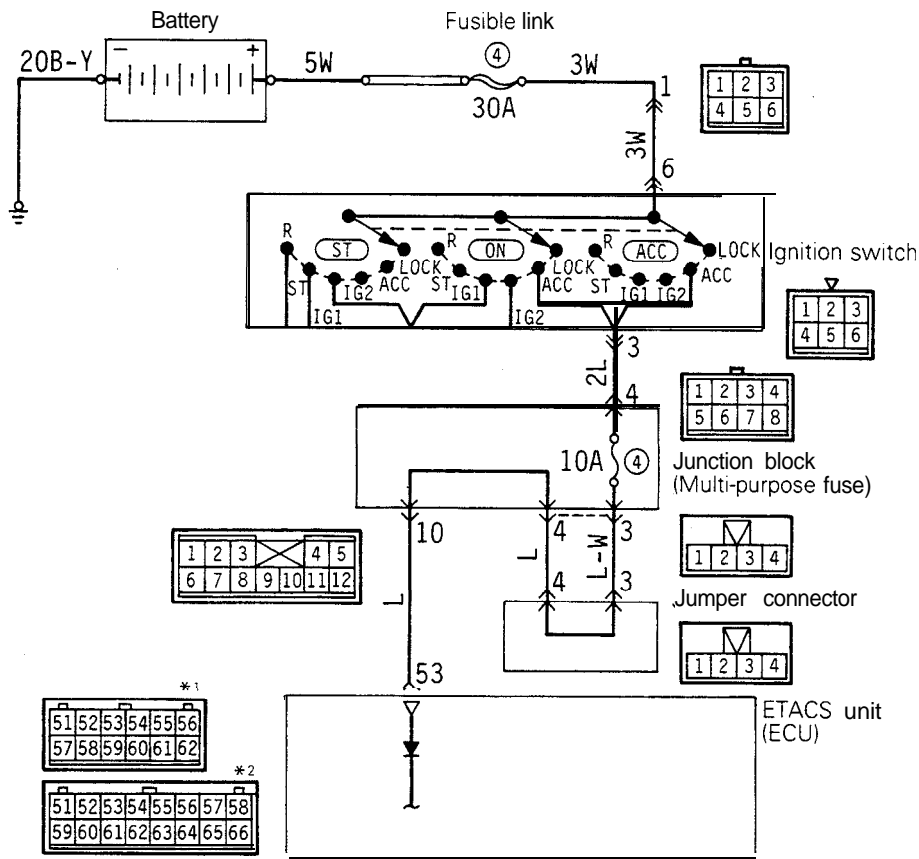
Problem	Probable cause(s)	Checking procedure	Remedy
The wipers do not function when the washer switch is switched ON for 0.6 second or longer. (With the wiper switch at the "INT" position, however, intermittent operation of the wipers is normal, and the washer function is normal.)	Damage or disconnection of the wiring of the washer switch input circuit.	If a malfunction is discovered as a result of the checking of the input (P.51-24), conduct check No. 5 (P.51-31) of the individual part and circuit,	Repair the wiring harness, or replace the column switch.
	Damage or disconnection of the wiring of the washer switch.		
	Malfunction of the electronic control unit.	–	Replace the electronic control unit.
The wipers do not function when the washer switch is switched ON for less than 0.6 second. (The wipers and washer do function, however, when the washer switch is switched ON for 0.6 second or longer.)	Malfunction of the electronic control unit.	–	Replace the electronic control unit.

NOTE

"ECU" (electronic control unit) indicates the ETACS unit.

CHECKING INDIVIDUAL PART AND CIRCUIT

1. IGNITION SWITCH INPUT CIRCUIT



*1: Vehicles without theft-alarm system
 *2: Vehicles with theft-alarm system

16F0313

Operation Description

As the condition for operation of the system, HIGH-level signals are sent to the electronic control unit when the ignition switch is set to the “ACC” or “ON” position.

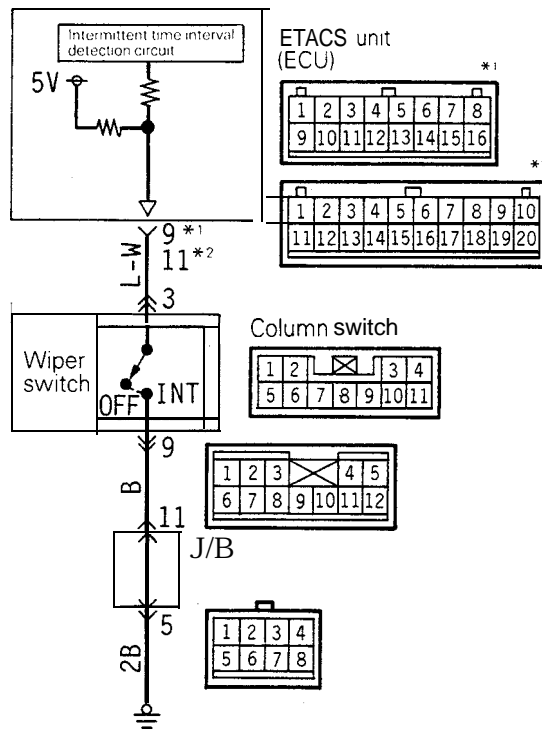
Electronic Control Unit Terminal Voltage (Disconnect the ECU Connector and Check at the Wiring Harness Side.)

ECU terminal No.	Signal	Status	Standard
53	Ignition switch (ACC)	Ignition switch	OFF ov
			ACC System voltage

Checking Individual Part

Ignition switch: Refer to GROUP 54 – Ignition Switch.

2. WIPER SWITCH “INT” INPUT CIRCUIT



*1: Vehicles without theft-alarm system
 *2: Vehicles with theft-alarm system

16F0320

Operation Description

When the wiper switch is set to the “INT” position, LOW-level signals are input to the electronic control unit; the intermittent time interval detection circuit is then activated, and the wipers operate at the intermittent time interval according to the setting of the intermittent variable volume switch.

Electronic Control Unit Terminal Voltage (Connection Status of Electronic Control Unit Connector)

ECU terminal No.	Signal	Status	Terminal voltage
9*1	Wiper switch “INT” signal	Wiper switch “OFF”	5V
11*2		Wiper switch “INT”	0V

Checking the Wiper Switch (“INT” Position) Circuit (Disconnect the ECU Connector and Check at the Wiring Harness Side.)

ECU terminal No.	Connected to/measured component	Measurement	Tester connection	Check conditions	Standard
9*1	Wiper switch “INT”	Resistance	9*1-ground	Wiper switch “OFF”	No continuity
11*2			11*2-ground	Wiper switch “INT”	Continuity

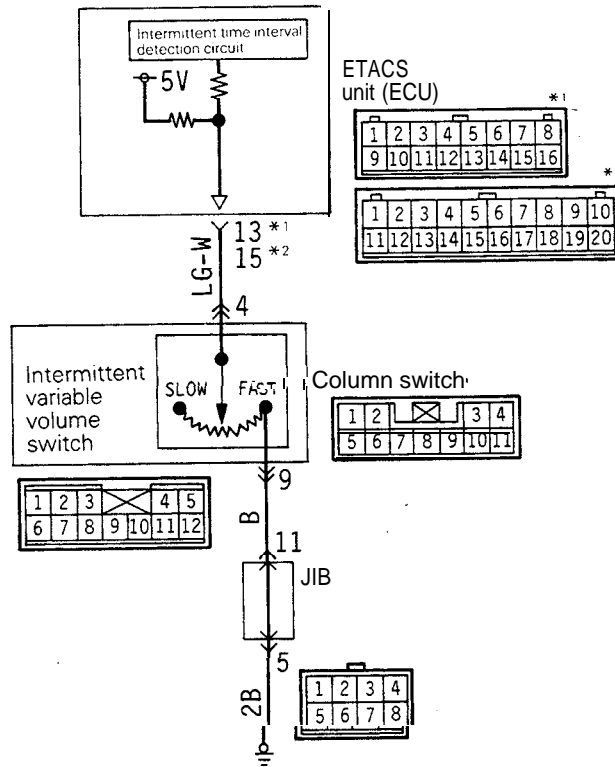
Checking Individual Part

Wiper switch: Refer to P.51-33.

NOTE

*1: Vehicles without theft-alarm system
 *2: Vehicles with theft-alarm system

3. INTERMITTENT VARIABLE VOLUME SWITCH INPUT CIRCUIT



*1: Vehicles without theft-alarm system
 *2: Vehicles with theft-alarm system

16F0321

Operation Description

This circuit functions to input (to the intermittent time interval detection circuit of the electronic control unit) the set value of the intermittent variable volume switch.

Electronic Control Unit Terminal Voltage (Connection Status of Electronic Control Unit Connector)

ECU terminal No.	Signal	Status	Terminal voltage
13** 15*2	Intermittent variable volume switch signal	Intermittent variable volume switch "FAST" → "SLOW"	0 → 2.5V

Checking the Intermittent Variable Volume Switch Circuit (Disconnect the Connector of the Electronic Control Unit and Check at the Wiring Harness Side.)

ECU terminal No.	Connected to/measured component	Measurement	Tester connection	Check condition	Standard
13** 15*2	Intermittent variable volume switch	Resistance	13*1-ground 15*2-ground	"FAST" → "SLOW" (Should change in accordance with changes of the intermittent variable volume.)	0 → 1kΩ

Checking Individual Part

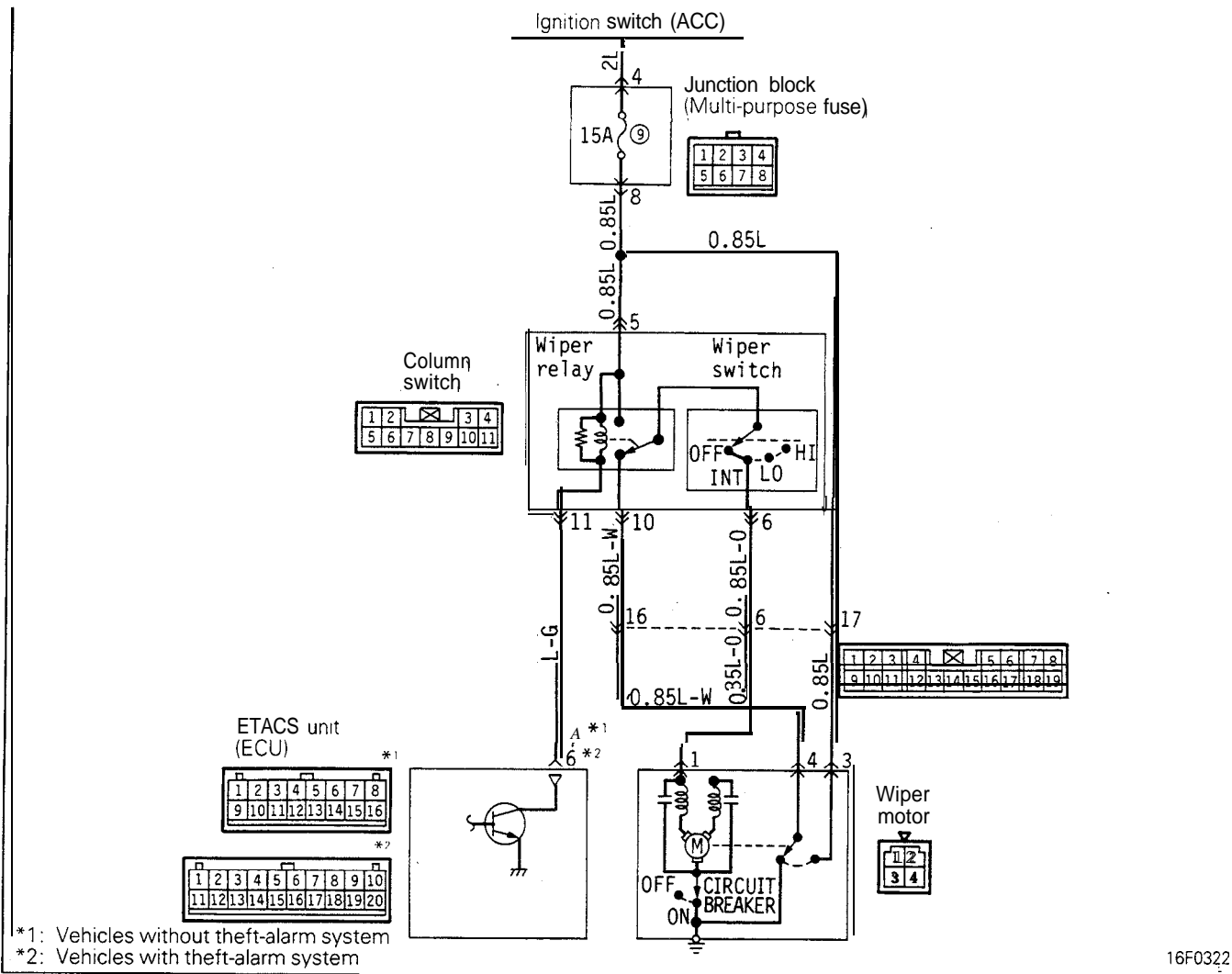
Intermittent variable volume switch: Refer to P.51-33.

NOTE

*1: Vehicles without theft-alarm system

*2: Vehicles with theft-alarm system

4. WIPER RELAY ACTIVATION CIRCUIT



16F0322

Operation Description

With the wiper switch at the "INT" position, switch ON the transistor (by the intermittent activation signal from the electronic control unit) in order to activate the wiper relay.

Electronic Control Unit Terminal Voltage (Connection Status of Electronic Control Unit Connector)

ECU terminal No.	Signal	Status	Terminal voltage
4*1 6*2	Wiper relay signal	Wiper switch "OFF"	Ignition switch "OFF"
			Ignition switch "ACC"
			0V
			System voltage

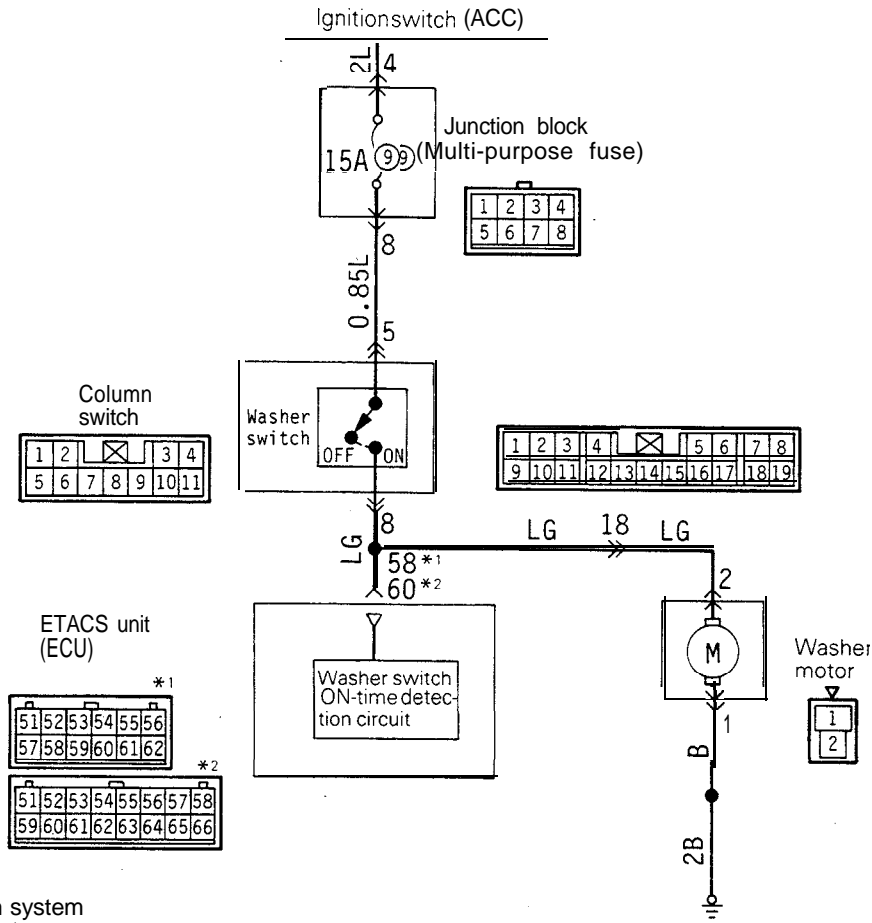
NOTE

*1: Vehicles without theft-alarm system
 *2: Vehicles with theft-alarm system

Checking Individual Part

Wiper relay: Refer to P.51-34.

5. WASHER SWITCH INPUT CIRCUIT



*1: Vehicles without theft-alarm system
 *2: Vehicles with theft-alarm system

16F0323

Operation Description

While the washer switch is ON, HIGH-level signals are sent to the washer switch ON-time detection circuit simultaneous with the activation of the washer motor, thus causing the transistor to be switched ON and the wipers to be activated for a certain fixed time.

Electronic Control Unit Terminal Voltage (Connection Status of Electronic Control Unit Connector)

ECU terminal No.	Signal	Status	Terminal voltage	
58** 60*2	Washer switch signal	Ignition switch "ACC"	Washer switch "OFF"	0V
			Washer switch "ON"	System voltage

NOTE

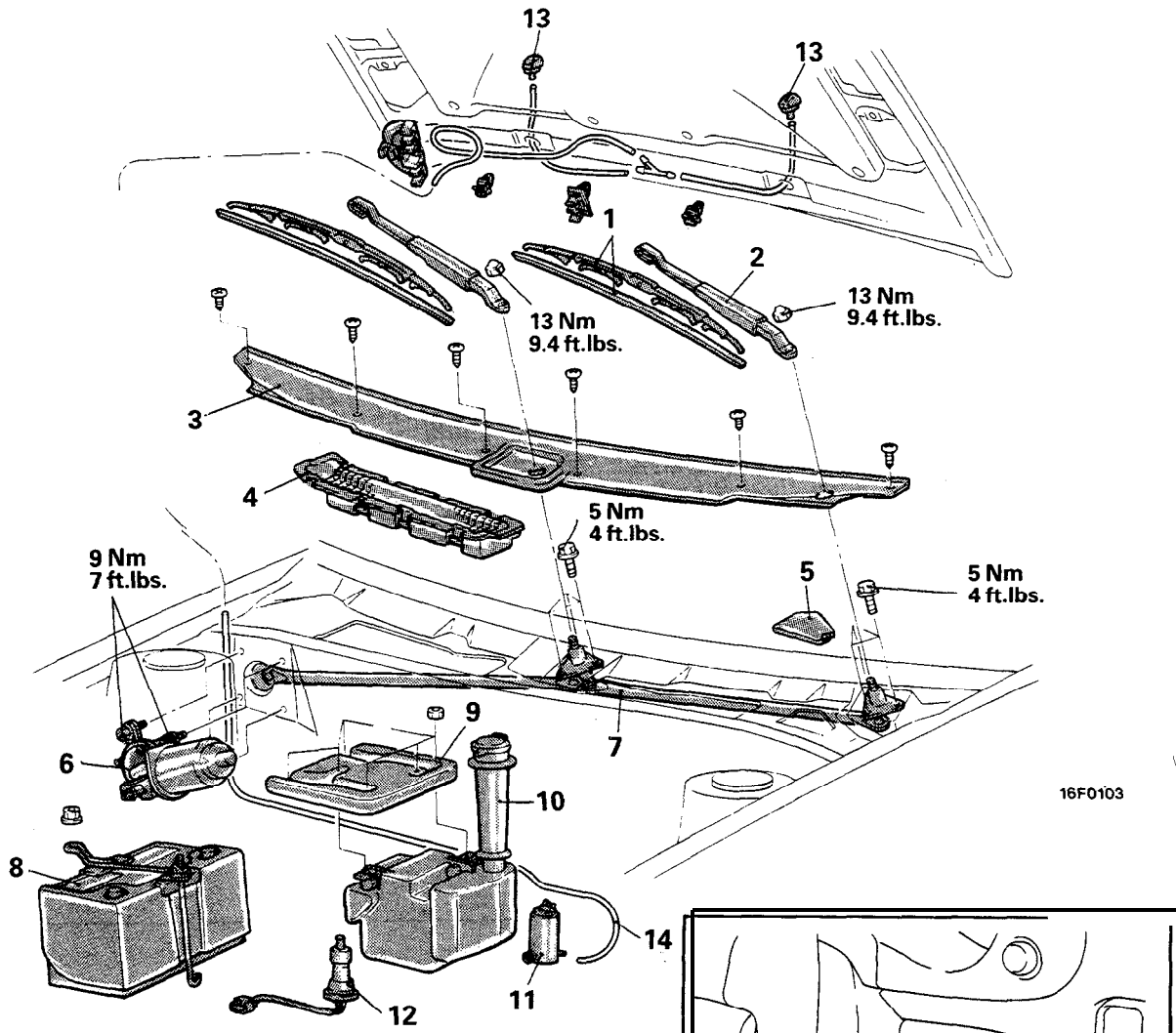
*1: Vehicles without theft-alarm system
 *2: Vehicles with theft-alarm system

Checking Individual Part

Washer switch: Refer to P.51-33

TSB Revision

REMOVAL AND INSTALLATION



Removal steps of linkage

- 1. Wiper blade
- ◆◆ 2. Wiper arm
- 3. Front deck garnish
- 4. Air inlet garnish (RH)
- 5. Hole cover
- ◆◆ 6. Wiper motor
- 7. Linkage

Removal steps of wiper motor

- 1. Wiper blade
- * 2. Wiper arm
- 5. Hole cover
- ◆◆ 6. Wiper motor

Removal of column switch (wiper and washer switch)

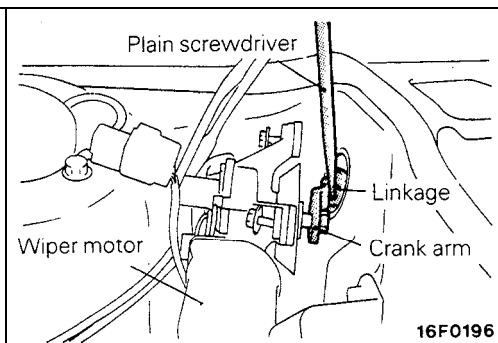
- 15. Column switch (Refer to GROUP 54 – Column Switch.)

Removal steps of washer tank

- 8. Battery
- 9. Battery tray
- 10. Washer tank
- 11. Washer motor
- 12. Washer fluid level sensor

Removal steps of washer tube

- 8. Battery
- 9. Battery tray
- 13. Washer nozzle
- 14. Washer tube



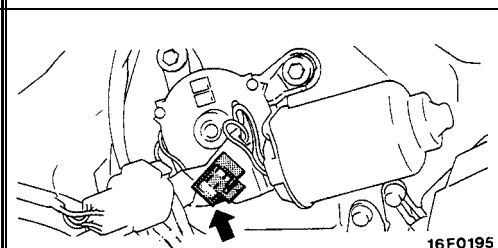
SERVICE POINT OF REMOVAL

6. REMOVAL OF WIPER MOTOR

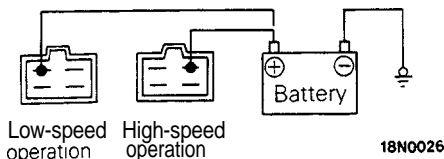
- (1) Remove the wiper motor mounting bolts.
- (2) Using a plain screwdriver, detach the crank arm of the wiper motor from the linkage to remove the wiper motor.

Caution

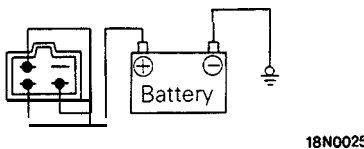
Do not remove the crank arm from the wiper motor except when necessary, as the auto stop angle has been preset. When the crank arm is to be removed, make a mark on both of them before removal.



Inspection of Operation



Inspection of Stop Position



INSPECTION

INSPECTION OF WIPER MOTOR

Inspect the wiper motor mounted on the vehicle with its connector disconnected.

Inspection of Wiper Motor Operation at LOW and HIGH Speeds

Connect the battery to the wiper motor as shown, and check its operation at LOW and HIGH speeds.

Inspection of Wiper Motor STOP Position

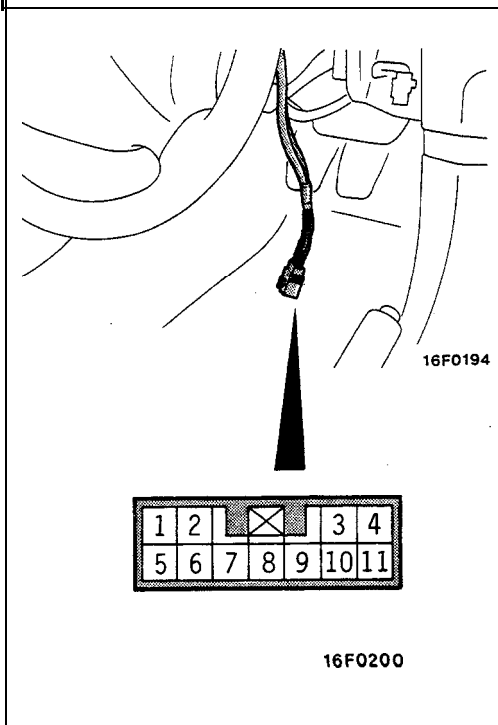
- (1) Operate the wiper motor at LOW speed and intermediately disconnect the battery to let the wiper motor stop.
- (2) Connect the terminals as well as the battery, as shown, and check that the wiper motor stops at the automatically-stopped position following LOW-speed operation.

INSPECTION OF COLUMN SWITCH

- (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).

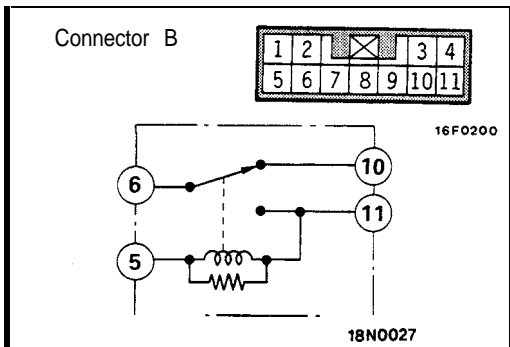
Inspection of Wiper and Washer Switch

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				○	—	—	—	○
	INT	○	—		○	—		○	—
	LO			○	—	○			
	HI			○	—	○			
Variable intermittent wiper control switch			○	—				○	
Washer switch				○	—	○			

NOTE
○—○ denotes that there is continuity between the terminals.

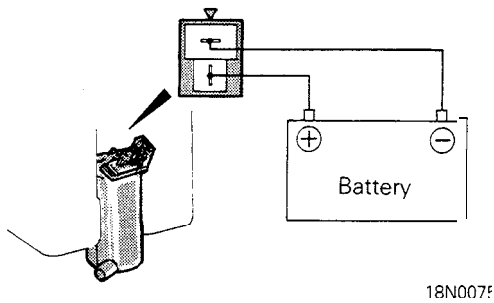


Inspection of Wiper Relay (Built-in Column Switch)

- (1) Check to ensure that there is continuity between terminals ⑤ and ⑪ and between the terminals ⑥ and ⑩, and that there is no continuity between terminals ⑥ and ⑪.
- (2) Connect the positive terminal of the battery to terminal ⑤ and the negative terminal to terminal ⑪ to check that the battery voltage is available at terminal ⑥.

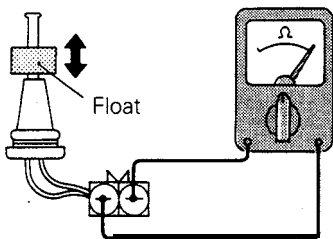
INSPECTION OF WASHER MOTOR

- (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.



INSPECTION OF WASHER FLUID LEVEL SENSOR

- (1) Connect a circuit tester to the connector of the level sensor as shown.
- (2) Check that when the float is moved down, the circuit is closed and that when the float is moved up, the circuit is opened.

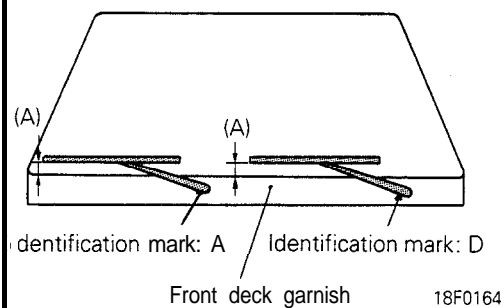


SERVICE POINT OF INSTALLATION

2. INSTALLATION OF WIPER ARM

- (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).

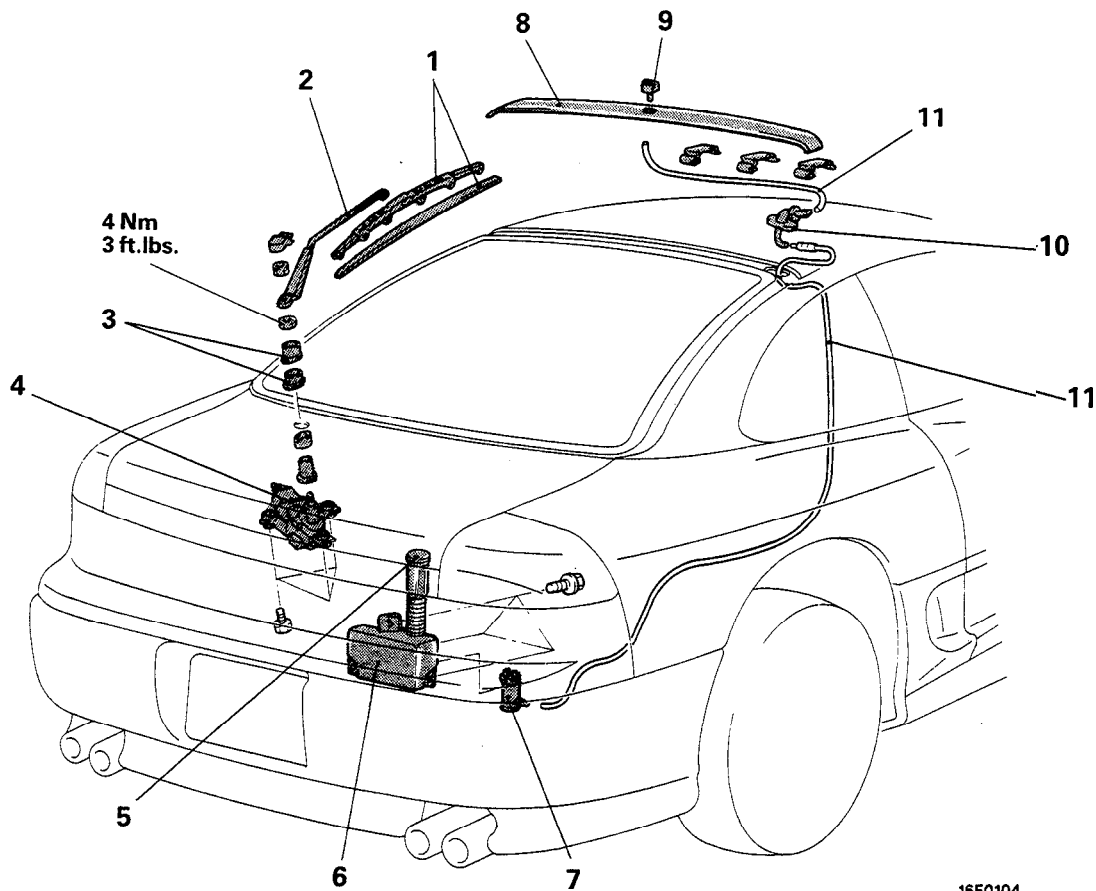
Standard value: (A) $15 \begin{smallmatrix} +5 \\ -0 \end{smallmatrix} \text{ mm } (.6 \begin{smallmatrix} +.2 \\ -0 \end{smallmatrix} \text{ in.})$



REAR WIPER AND WASHER

M51KKA0

REMOVAL AND INSTALLATION



16F0104

Removal steps of wiper motor

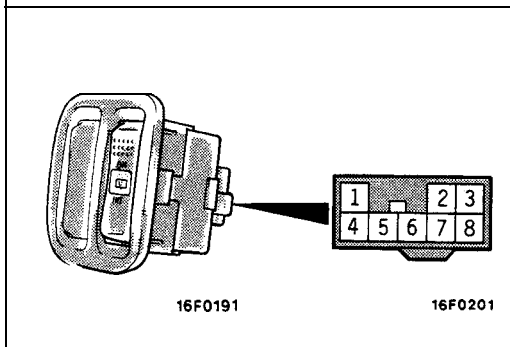
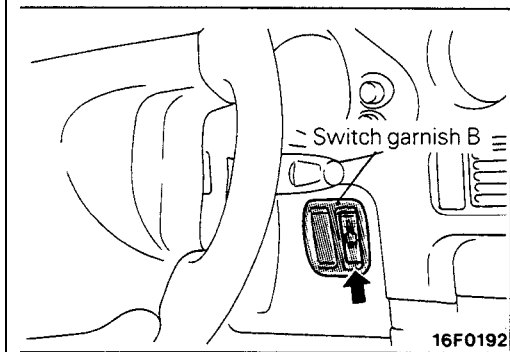
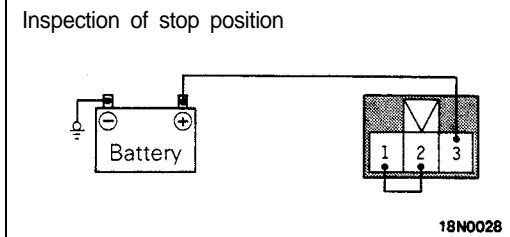
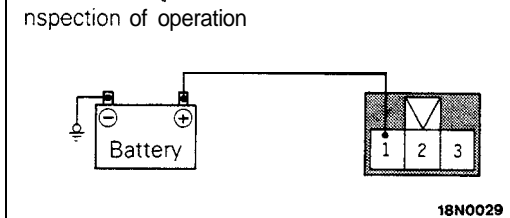
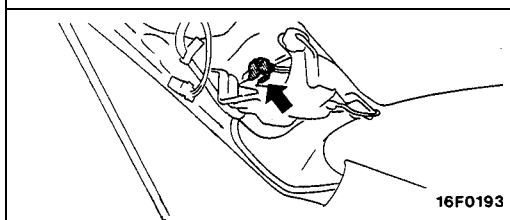
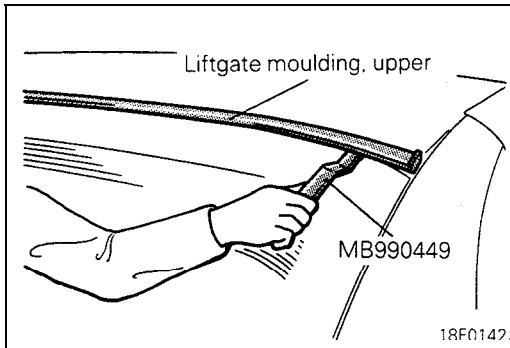
- 1. Wiper blade
- * 2. Wiper arm
- 3. Spacer
- Liftgate lower trim (Refer to GROUP 52A – Trims.)
- 4. Wiper motor

Removal steps of washer tank

- Rear end trim (Refer to GROUP 52A – Trims.)
- 5. Cap
- 6. Washer tank
- 7. Washer motor

Removal steps of washer tube

- Front pillar trim (RH)
- Quarter trim (RH)
- Quarter upper trim (RH)
- Rear roof rail trim
- Rear side trim (RH)
- } (Refer to GROUP 52A – Trims.)
- ☒ 8. Liftgate moulding, upper
- 9. Washer nozzle
- 10. Tube and grommet assembly
- 11. Washer tube



SERVICE POINT OF REMOVAL

8. REMOVAL OF LIFTGATE MOULDING, UPPER

Using a special tool, pry the clip portion to remove the upper liftgate moulding.

INSPECTION

WIPER MOTOR

Check the wiper motor with it mounted on the vehicle and with its harness connector disconnected.

Operation of Wiper Motor

Connect a battery to the wiper motor, as shown, to check the operation of the wiper motor.

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.

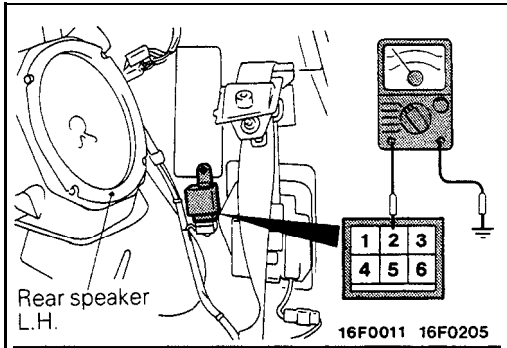
WIPER WASHER SWITCH

- (1) Remove switch garnish B from the knee protector.
- (2) Operate the switch to check for continuity between the terminals.

Terminal		Switch position							
		2	4	5	6	7	8	1	3
Wiper switch	OFF		○—○						
	INT		○—○			○—○			
	ON			○—○					
Washer switch	OFF								ILL
	ON	○—○			○—○				

NOTE

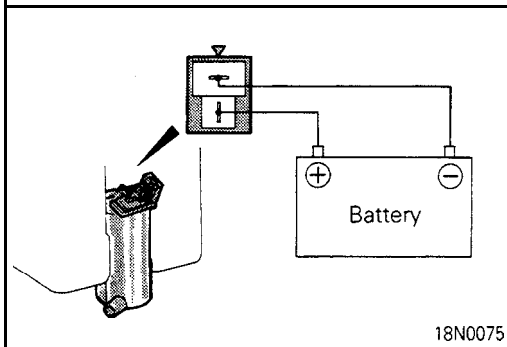
○—○ denotes that there is continuity between the terminals.



INTERMITTENT WIPER RELAY

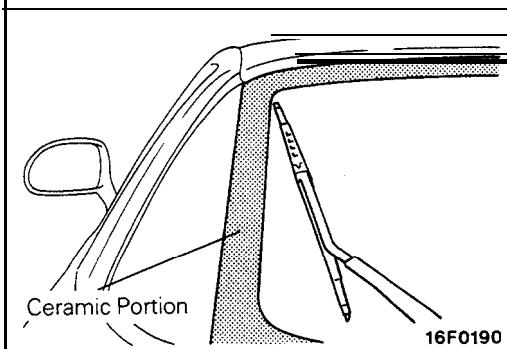
- (1) Remove the quarter trim. (Refer to GROUP 52A — Trims.)
- (2) With the intermittent wiper relay connected to the wiring harness connector, let the wiper operate intermittently and check the voltage at terminal ②.

Condition	Standard
When wiper is stationary	0V
When wiper is in operation	System voltage



WASHER MOTOR

- (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.



SERVICE POINT OF INSTALLATION

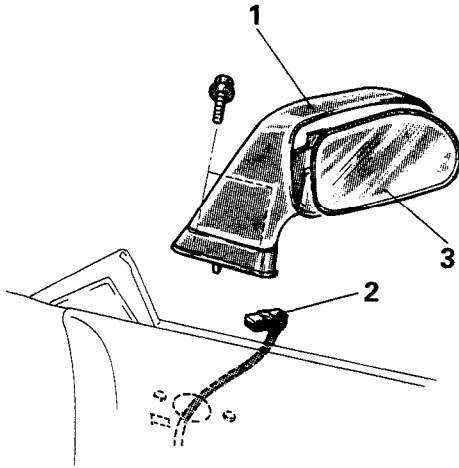
2. INSTALLATION OF WIPER ARM

After assembling the wiper blade to the wiper arm, install the wiper arm with its tip positioned along the ceramic part.

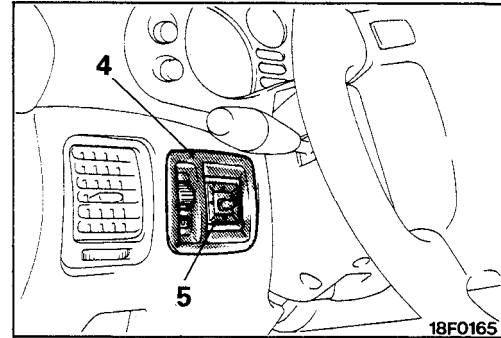
DOOR MIRROR

M51QAAR

REMOVAL AND INSTALLATION



18F0166



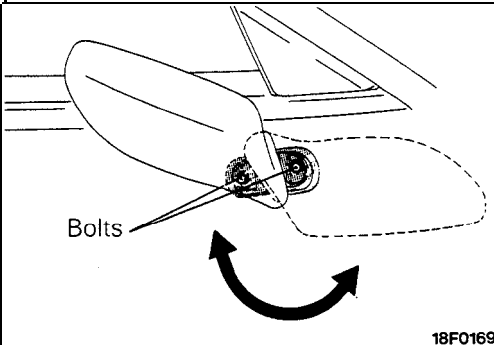
18F0165

Door mirror removal steps

- ☒ 1. Door mirror
- 2. Harness connector
- ◄◄ 3. Mirror

Electric remote controlled mirror switch removal

- 4. Instrument panel switch
- 5. Electric remote controlled mirror switch



18F0169

SERVICE POINTS OF REMOVAL**1. REMOVAL OF DOOR MIRROR**

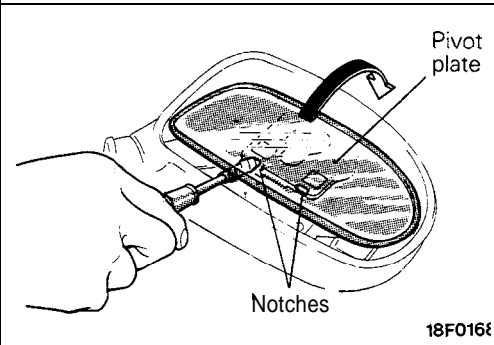
Tilt the door mirror backward and forward to remove the attaching bolts.

3. REMOVAL OF MIRROR

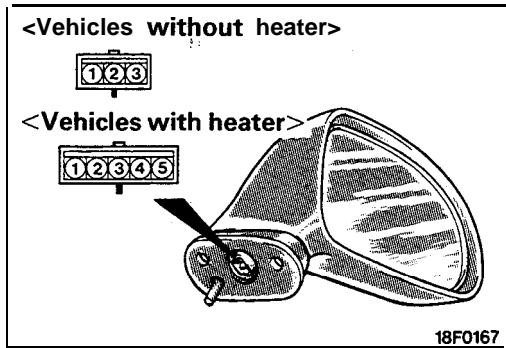
Tilt the mirror upward and fit a screwdriver blade covered with protective tape in the notch between the mirror and the pivot plate to pry up the mirror.

Caution

Do not fit the screwdriver blade between the pivot plate and actuator assembly.



18F0168



INSPECTION

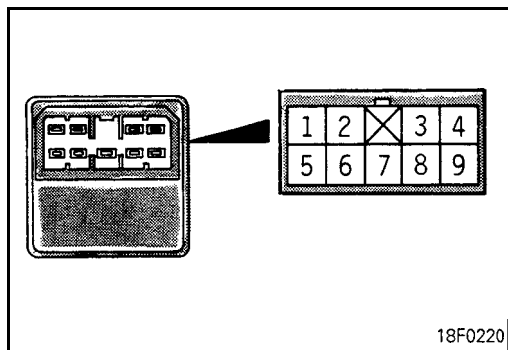
DOOR MIRROR

- (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.

Connection \ Direction	Battery		Terminal				
	(+)	(-)	2 (1)*	3 (2)*	4 (3)*	1	5
UP	○	○	○		○		
DOWN	○	○	○		○		
RIGHT	0			0			
LEFT	0		0		0		

NOTE

- (1) O-O indicates that each terminal is connected to the battery
- (2) * indicates door mirror terminal on vehicles without heater.



ELECTRIC REMOTE CONTROL MIRROR SWITCH

Operate switches and check for continuity between terminals.

Terminal \ Direction	Left side					Right side				
	3	4	6	7	8	2	4	6	7	9
UP		○	○	○	○	○	○	○	○	
DOWN		○	○	○	○	○	○	○	○	
LEFT		○	○	○			○	○	○	○
RIGHT	○	○					○	○	○	○

C

C

C

INTERIOR

CONTENTS

M52AA-A

FLOOR CONSOLE*	11	REAR SEAT	24
FRONT SEAT*	18	SEAT BELT*	25
HEADLINING	17	TRIMS	12
INSTRUMENT PANEL*	8	TROUBLESHOOTING	2

SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

- (1) A Supplemental Restraint System (SRS), which uses a driver-side air bag, has been installed in the 3000GT.
- (2) The SRS includes the following components: impact sensors, SRS diagnosis unit: SRS warning light, air bag module, clock spring, 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 (*).

WARNING!

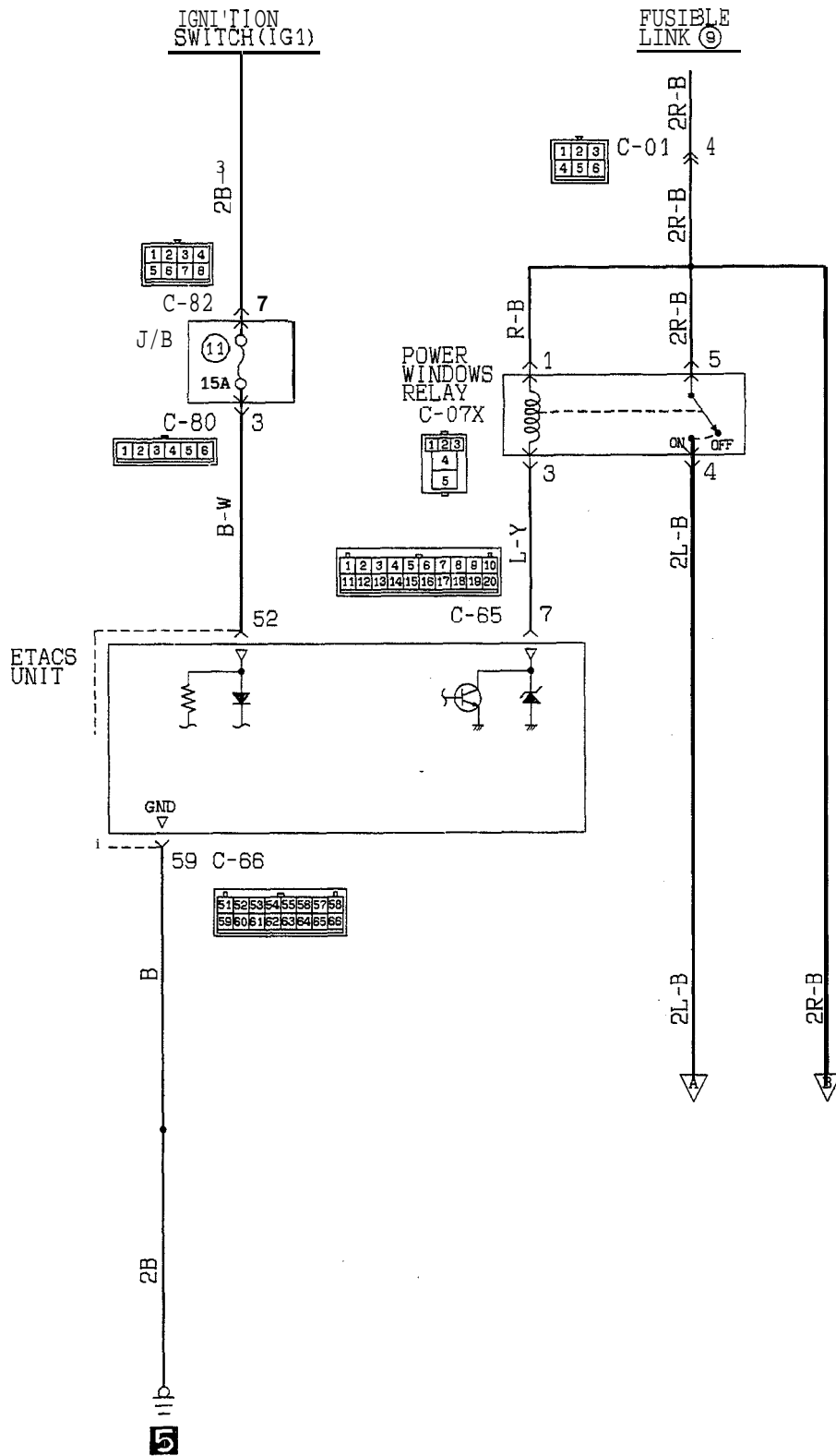
- (1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver (from rendering the SRS inoperative).
- (2) Service or maintenance of any SRS component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

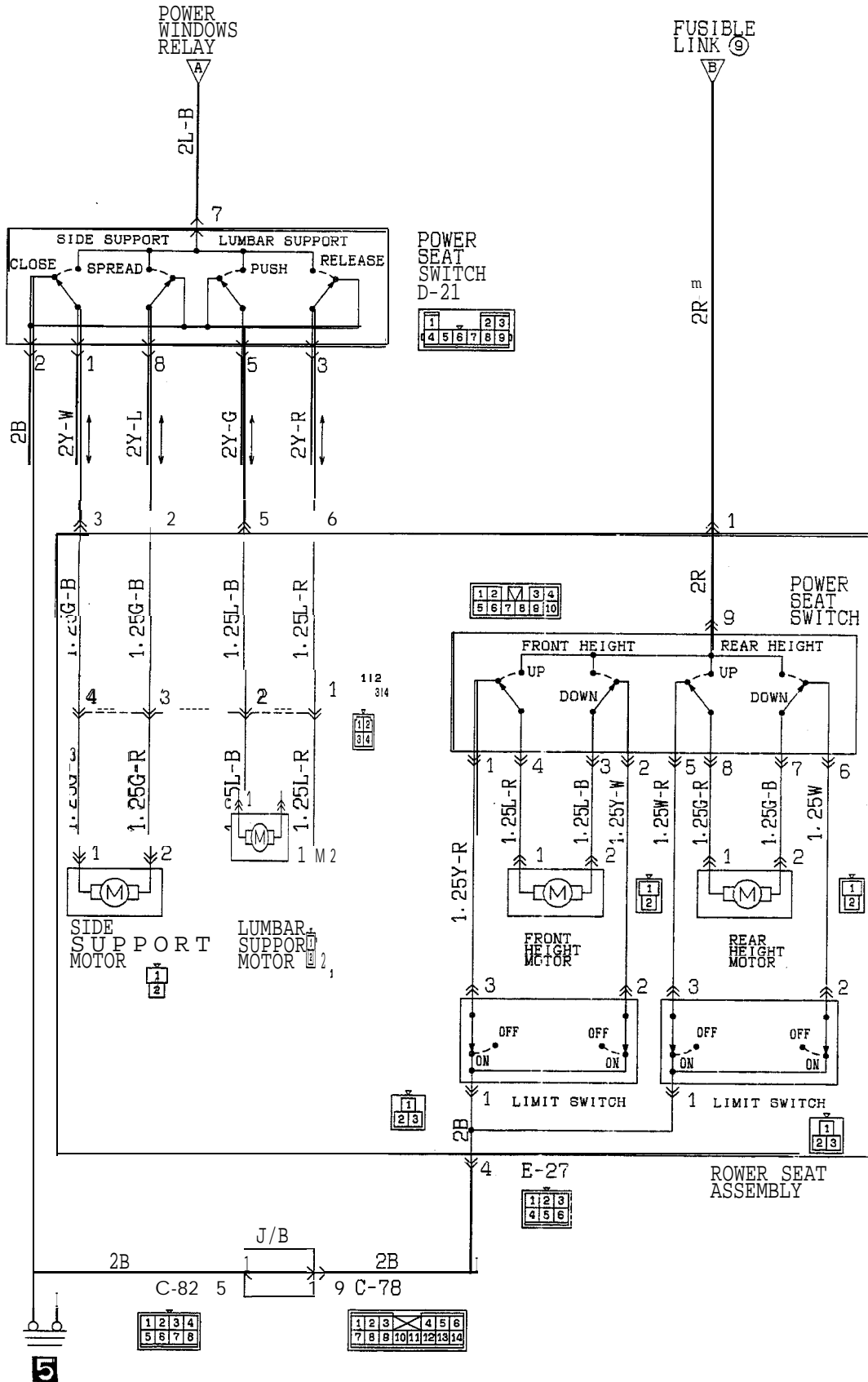
TROUBLESHOOTING

POWER SEAT

M52EBHA

CIRCUIT DIAGRAM

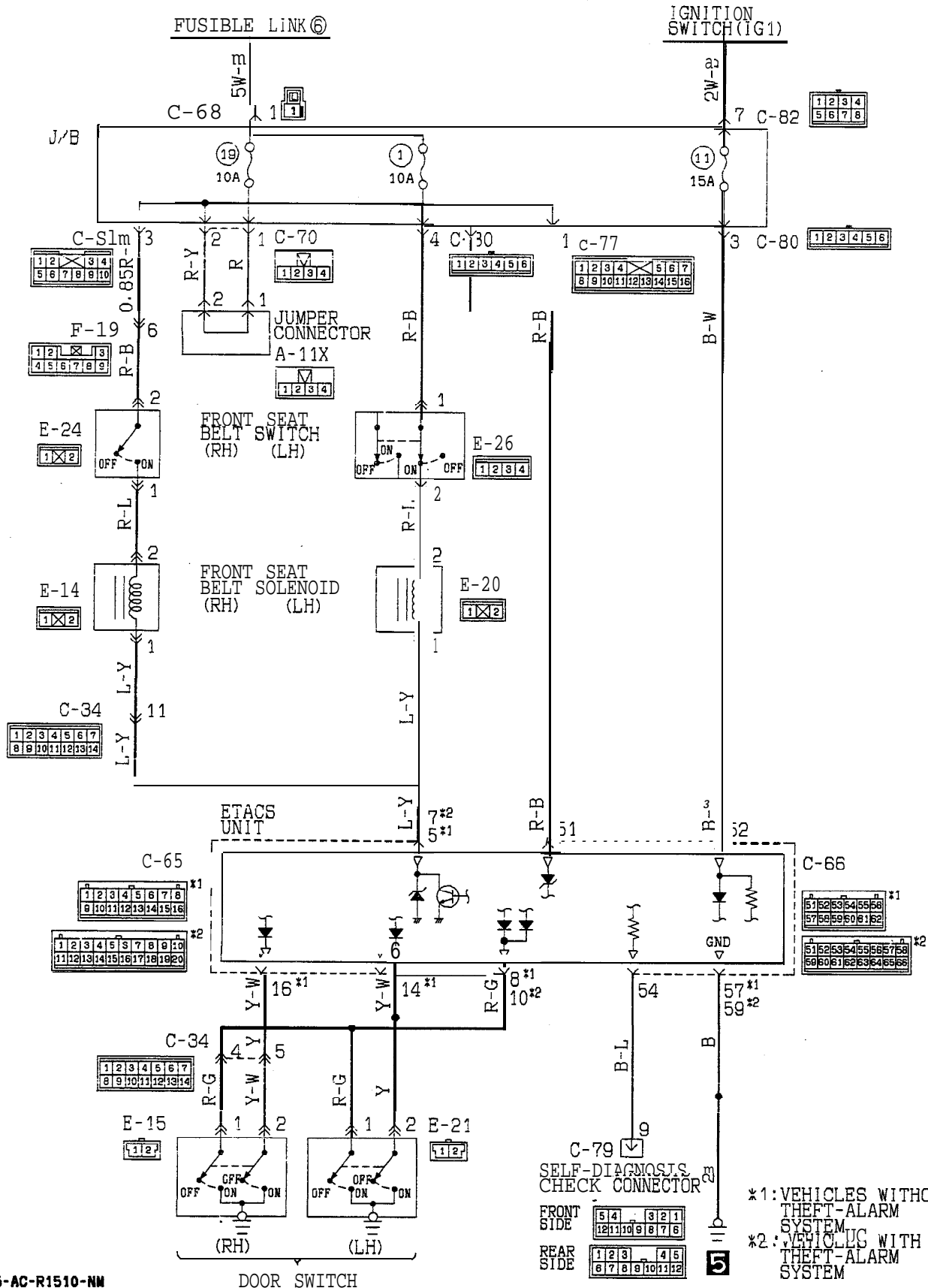




TENSION-REDUCER TYPE SEAT BELT

M52EBIA

CIRCUIT DIAGRAM



KX35-AC-R1510-NM

TSB Revision

OPERATION

- If the driver fastens the seat belt with the ignition switch placed in the "ON" position, the seat belt switch in the seat belt buckle is turned "ON" to operate the seat belt solenoid in the retractor.
- This will reduce the seat belt rewinding torque to minimize a sense of oppression given by the belt.
- Owing to the timer function of the ETACS unit, the seat belt solenoid is kept in operation for 30 seconds after turning off the ignition switch, with due consideration to elimination of the sudden rise in a sense of oppression caused by the belt immediately after the ignition switch is turned off.

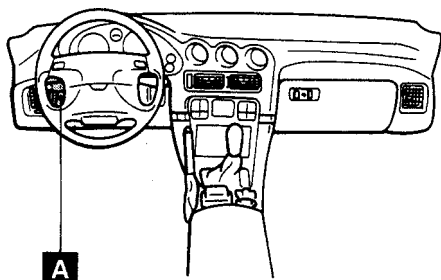
TROUBLESHOOTING HINTS

The seat belt solenoid does not function

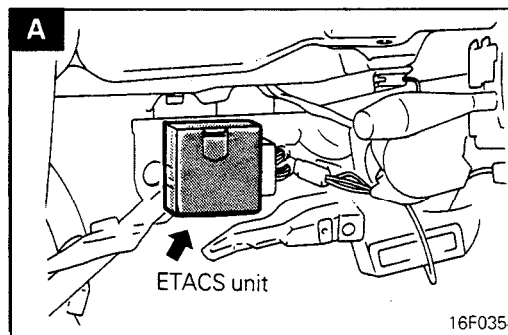
- (1) The power window does not operate as well.
 - Check the ETACS unit. (Refer to GROUP 42 – Power Window.)
- (2) The power window operates.
 - Check dedicated fuse No. 1 and 19.
- (3) Some of the tension reducers do not operates
 - Check the inoperative seat belt switch.
 - Check the inoperative seat belt solenoid.

COMPONENT LOCATION

Name	Symbol
ETACS unit	A



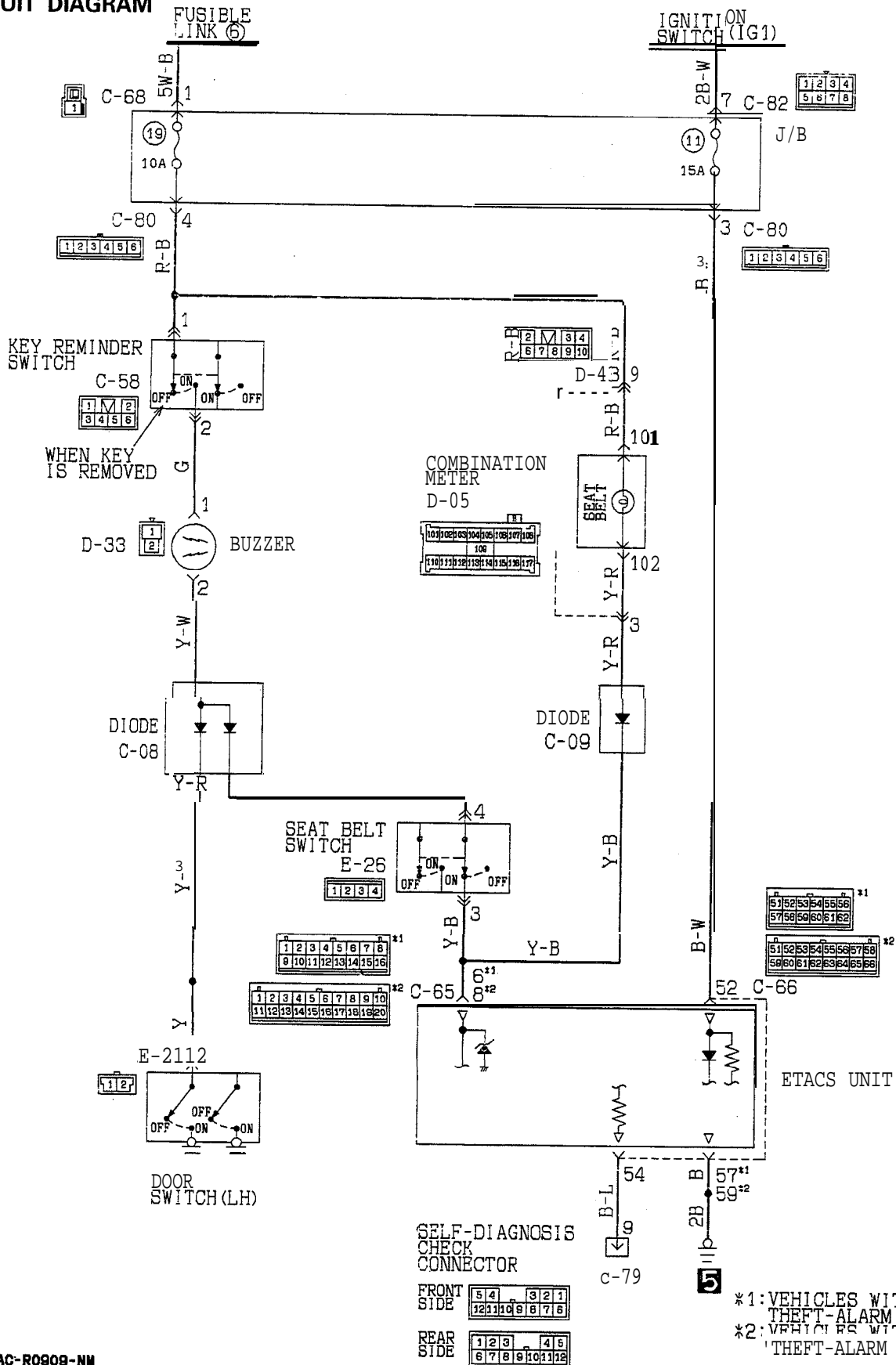
19F0134



16F0354

BUZZER

CIRCUIT DIAGRAM



KX35-AC-R0909-NW

TSB Revision

OPERATION

Key-reminder warning

- Battery voltage is always supplied, through fusible link No. 6 to the key-reminder switch.
- When the driver's seat is opened while the ignition key is still in the key cylinder, the door switch is switched ON, electricity flows to fusible link No. 6, the key-reminder switch, the buzzer, the door switch, and ground, and the buzzer sounds.

Seat belt warning

- Battery voltage is applied, through fuse No. 11 to the ETACS unit when the ignition key is at the "ON" position.
- Electricity flows to fusible link No. 6, the seat belt warning light, the ETACS unit, and ground, and the seat belt warning light flashes for approx. 6 seconds.
- If the driver does not buckle the seat belt, the seat belt switch is switched ON, electricity flows to fusible link No. 6, the key-reminder switch, the buzzer, the seat belt switch, the ETACS unit, and ground, and the buzzer sounds for approx. 6 seconds.
- When the driver buckles the seat belt, the seat belt switch is switched OFF and the buzzer stops.

TROUBLESHOOTING HINTS

Key-reminder warning

The key-reminder warning doesn't sound.

- (1) The seat belt warning function is OK.
 - Check the door switch.
- (2) The seat belt warning also doesn't function.
 - Check the buzzer.

Seat belt warning

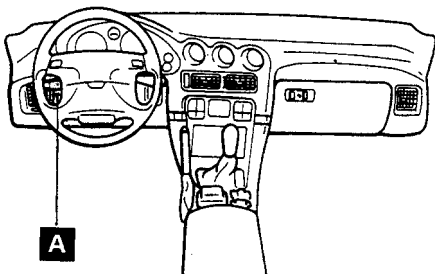
1. The seat belt warning doesn't function.
 - (1) The seat belt warning light flashes.
 - Check the seat belt switch.
 - (2) The seat belt warning light also does not function (and the key-reminder warning also does not function).
 - Check the key-reminder switch.
2. The buzzer doesn't stop even though the driver's seat belt has been buckled.
 - Check the seat belt switch.
3. The seat belt warning light doesn't flashes (but the buzzer sounds).
 - Check the light bulb.

NOTE

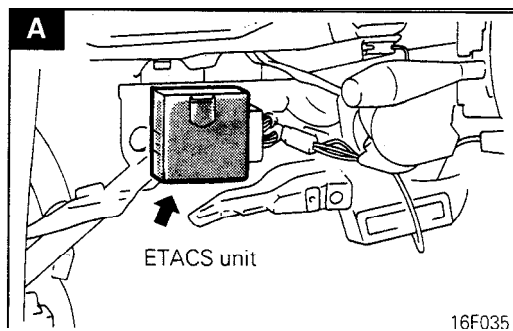
For the inspection of the ETACS unit, refer to P.52A-25.

COMPONENT LOCATION

Name	Symbol
ETACS unit	A



19F0134

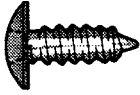

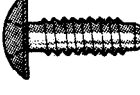


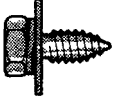



16F035

INSTRUMENT PANEL

M52UAAT

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 x L)	Color	Shape
Tapping screw	A	5 x 16 (.20 x .63)	–	
	B	5 x 30 (.20 x 1.2)	–	
	C	4 x 12 (.16 x .47)	Black	
	D	5 x 16 (.20 x .63)	Black	
	E	4 x 16 (.16 x .63)	–	
Washer assembled screw	F	5 x 16 (.20 x .63)	–	
	G	4 x 12 (.16 x .47)	–	
Washer assembled bolt	H	6 x 16 (.24 x .63)	–	
	I	6 x 16 (.24 x .63)	–	
	J	6 x 20 (.24 x .79)	–	
	K	6 x 20 (.24 x .79)	Black	
	L	6 x 25 (.24 x .98)	Black	

19N0001

NOTE

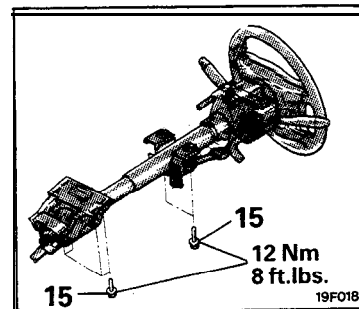
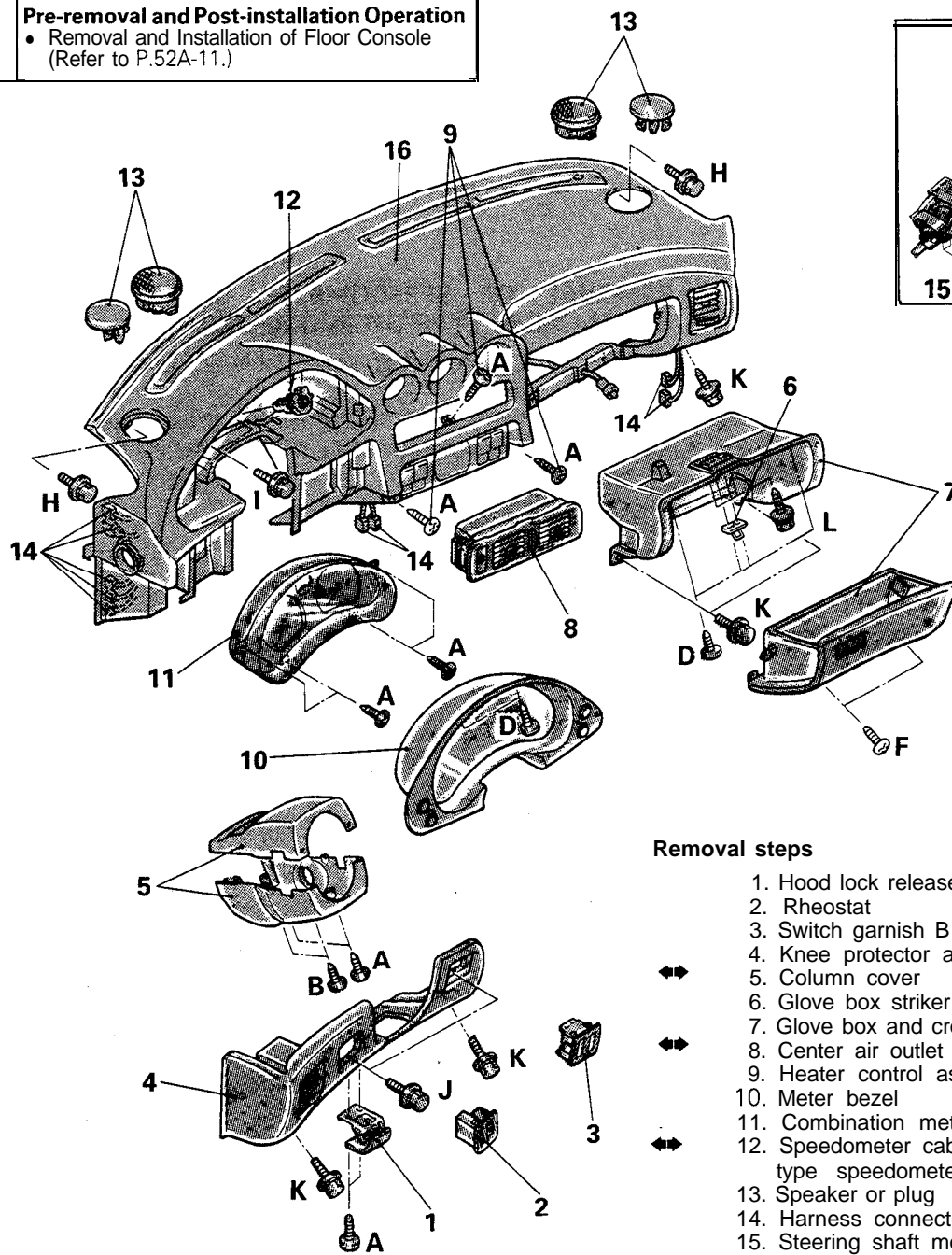
D = Thread diameter

L = Effective thread length

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Removal and Installation of Floor Console (Refer to P.52A-11.)

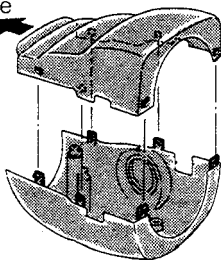


Removal steps

1. Hood lock release handle
2. Rheostat
3. Switch garnish B
4. Knee protector assembly
5. Column cover
6. Glove box striker
7. Glove box and cross pipe cover
8. Center air outlet assembly
9. Heater control assembly installation screws
10. Meter bezel
11. Combination meter
12. Speedometer cable adapter (Mechanical type speedometer)
13. Speaker or plug
14. Harness connector
15. Steering shaft mounting bolts
16. Instrument panel assembly

19F0131

Front of vehicle

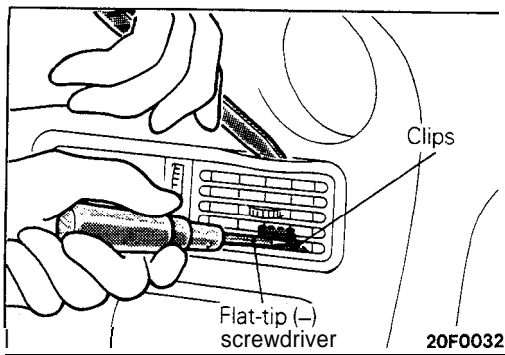


19F0123

SERVICE POINTS OF REMOVAL

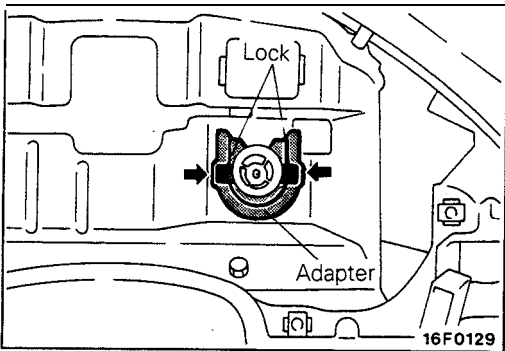
5. REMOVAL OF COLUMN COVER

Remove the screws and remove the column cover while using care not to break the claws.



8. REMOVAL OF CENTER AIR OUTLET ASSEMBLY

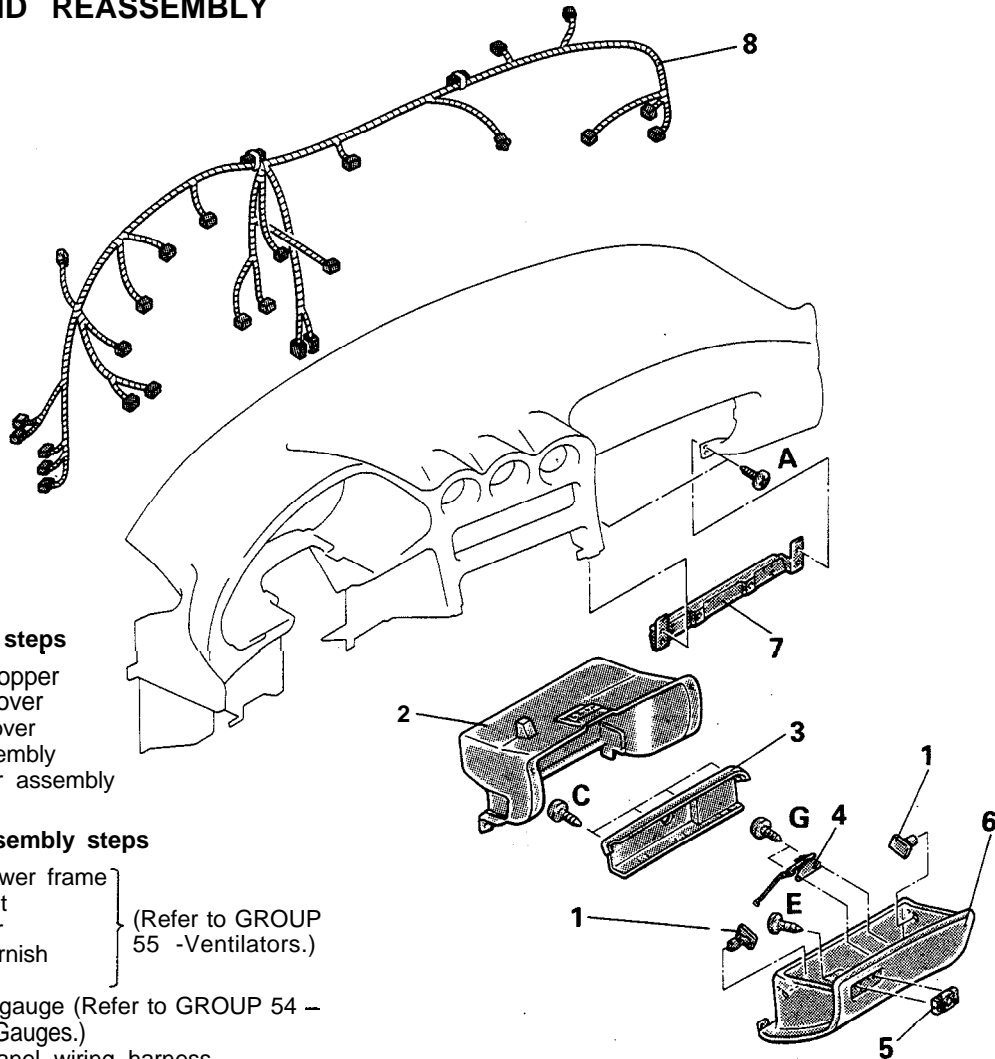
Disengaging the clips of the center air outlet assembly with a flat tip (-) screwdriver, remove the center air outlet assembly with the trim stick.



12. REMOVAL OF SPEEDOMETER CABLE ADAPTER (MECHANICAL TYPE SPEEDOMETER)

- (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

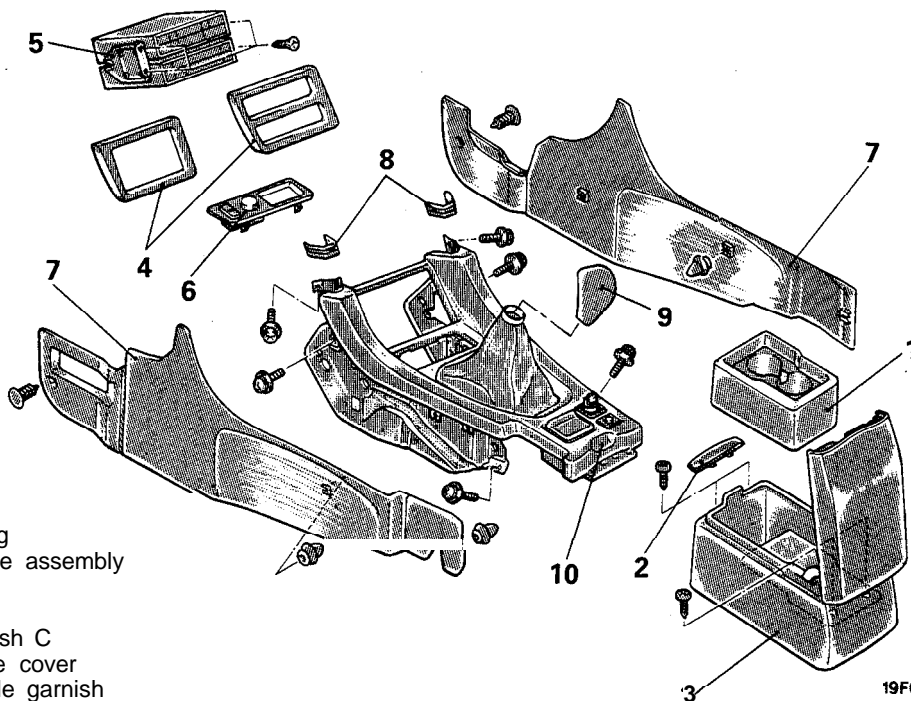
1. Glove box stopper
2. Cross pipe cover
3. Glove box cover
4. Ratchet assembly
5. Lock cylinder assembly
6. Glove box

Instrument panel disassembly steps

7. Glove box lower frame } (Refer to GROUP 55 -Ventilators.)
- Side air outlet
- Photo sensor
- Defroster garnish
- Heater ducts
- Combination gauge (Refer to GROUP 54 - Meters and Gauges.)
8. Instrument panel wiring harness

FLOOR CONSOLE

REMOVAL AND INSTALLATION

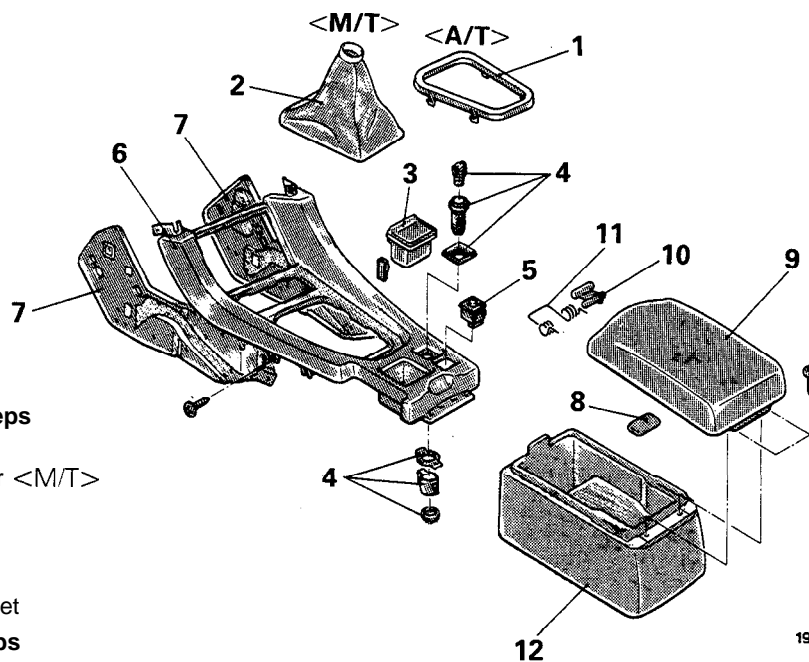


Removal steps

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

19F0130

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

19F0129

TRIMS

M52UCBJ

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

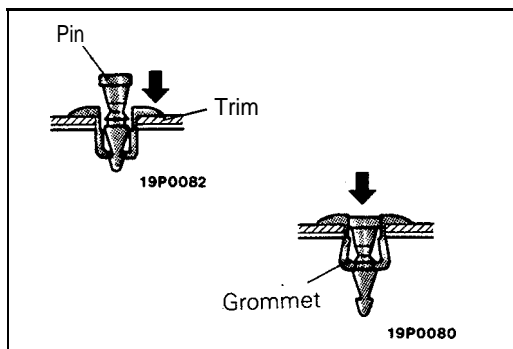
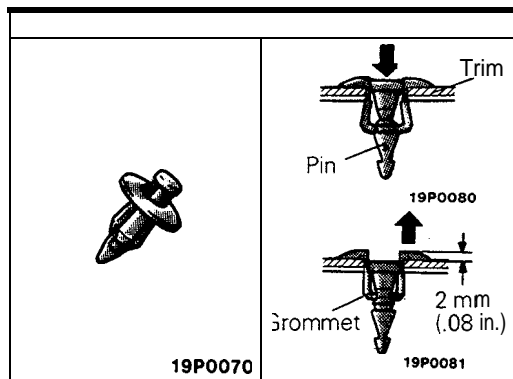
- (1) Use a cross-tip (+) screwdriver to push inward the pin (at the center of the trim clip) to a depth of about 2 mm (.08 in.).
- (2) Pull the trim clip outward to remove it.

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.

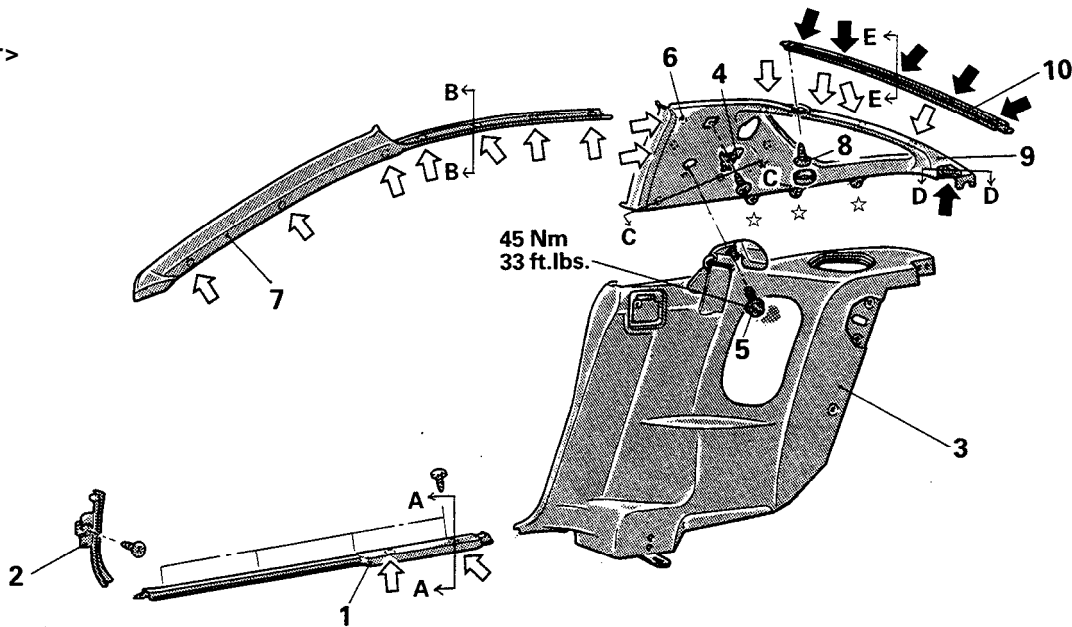
INSTALLATION

- (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.

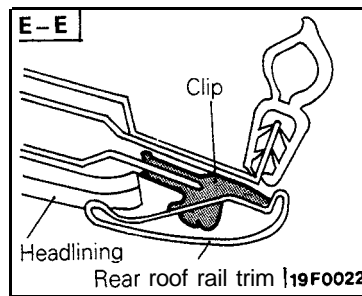
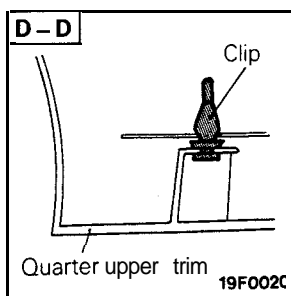
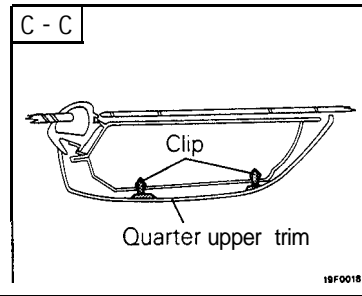
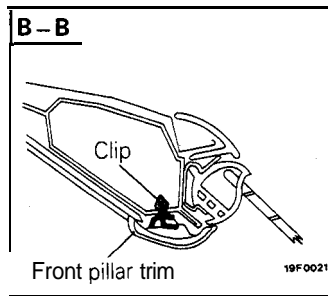
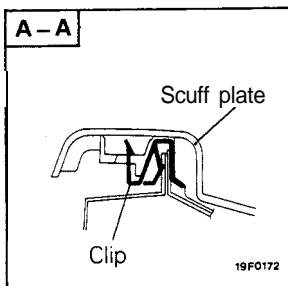


REMOVAL AND INSTALLATION

<Interior>



19F0033



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

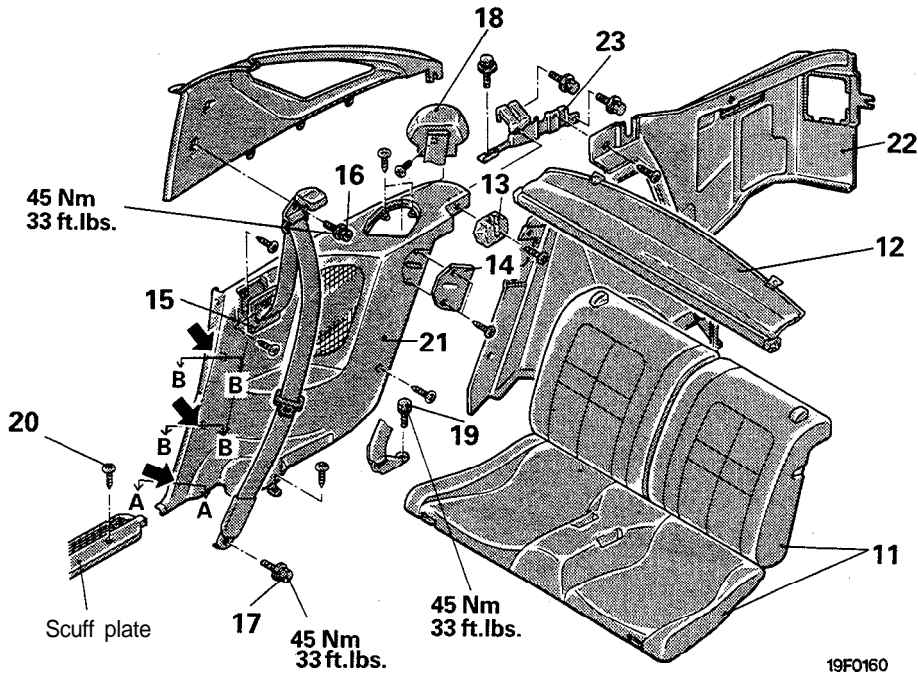
3. Quarter trim (Refer to P.52A-14.)
4. Coat hanger
8. Screw
9. Quarter upper trim

Rear roof rail trim removal steps

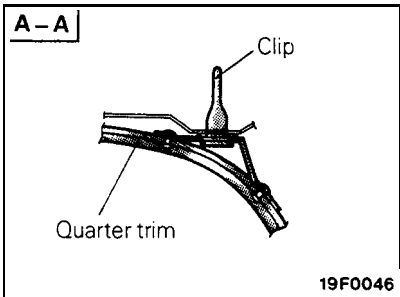
8. Screw
10. Rear roof rail trim

NOTE

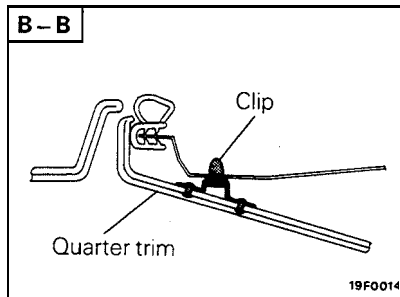
- (1) ↖ : Location of metallic clip
- (2) ↗ : Location of resin clip
- (3) ☆ indicates trim clip. (Refer to P.52A-12.)
- (4) For door trim, refer to GROUP 42 – Door Trim and Waterproof Film.



19F0160



19F0046



19F0014

Quarter trim removal steps

- ◆◆◆◆ 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-15.)
- 23. Quarter trim bracket

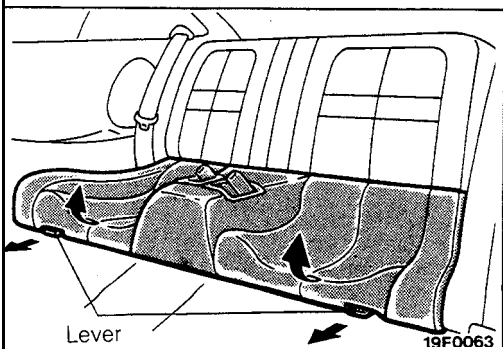
NOTE

◀: Location of resin clip

SERVICE POINT OF REMOVAL

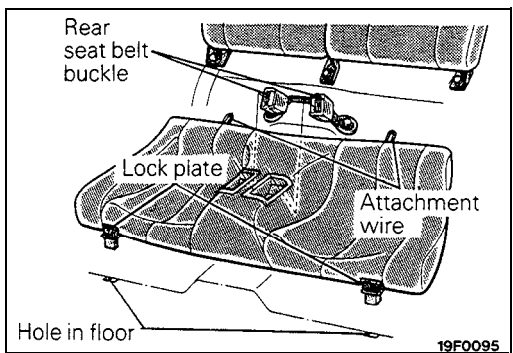
11. REMOVAL OF REAR SEAT

With the lever pulled forward, raise the seat cushion to remove it.



19F0063

TSB Revision

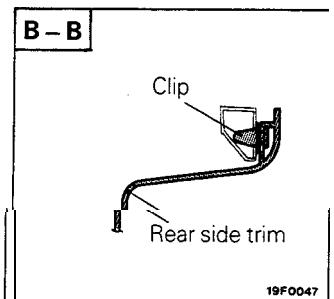
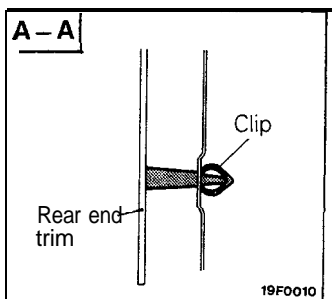
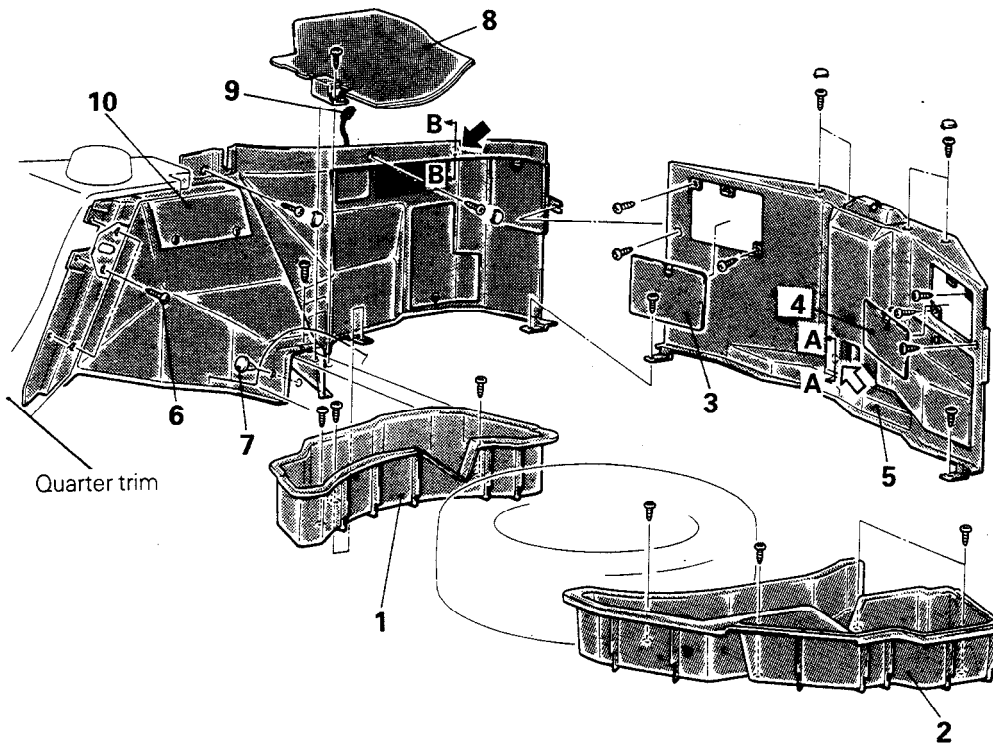


SERVICE POINT OF INSTALLATION

11. INSTALLATION OF REAR SEAT

- (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.

<Luggage compartment>



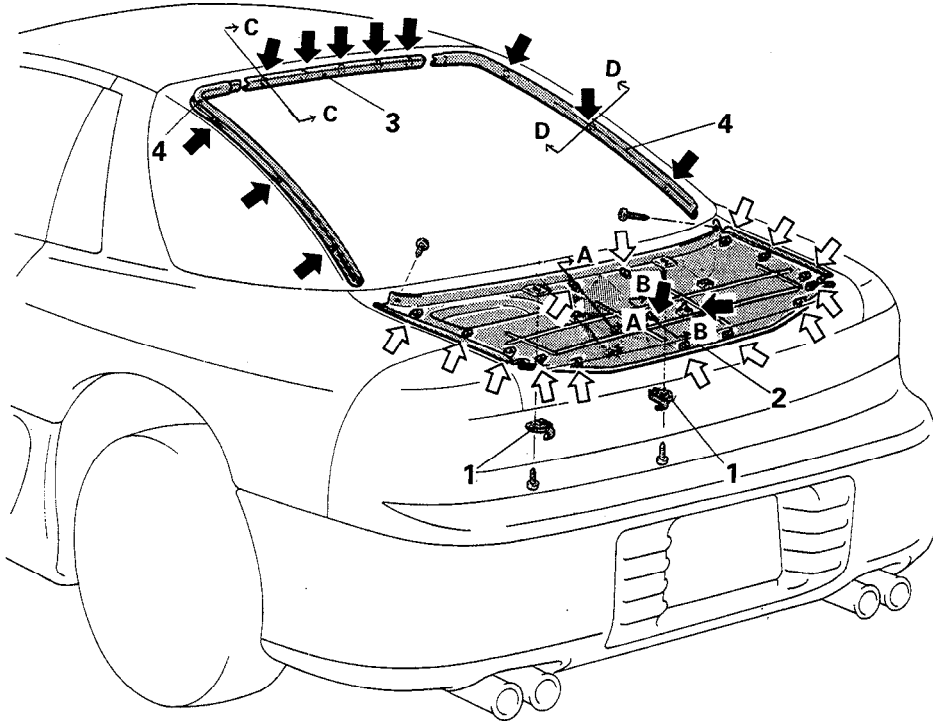
Rear side trim, rear end trim removal steps

- | | |
|---|---|
| <ol style="list-style-type: none"> 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 | <ol style="list-style-type: none"> 9. Luggage compartment light connector connection 10. Rear side trim |
|---|---|

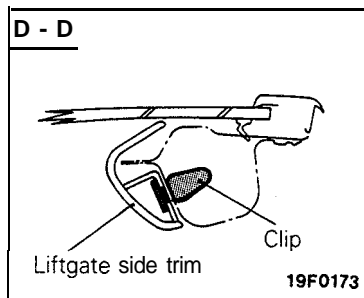
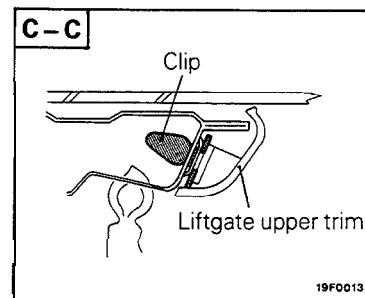
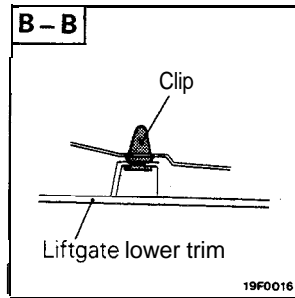
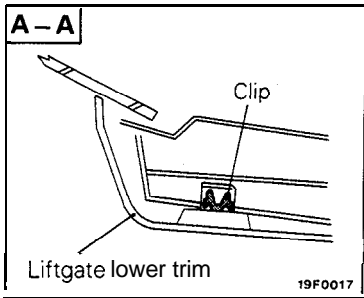
NOTE

- (1) ←: Location of metallic clip
 (2) ←: Location of resin clip

<Liftgate>



19F0027



Liftgate trim removal steps

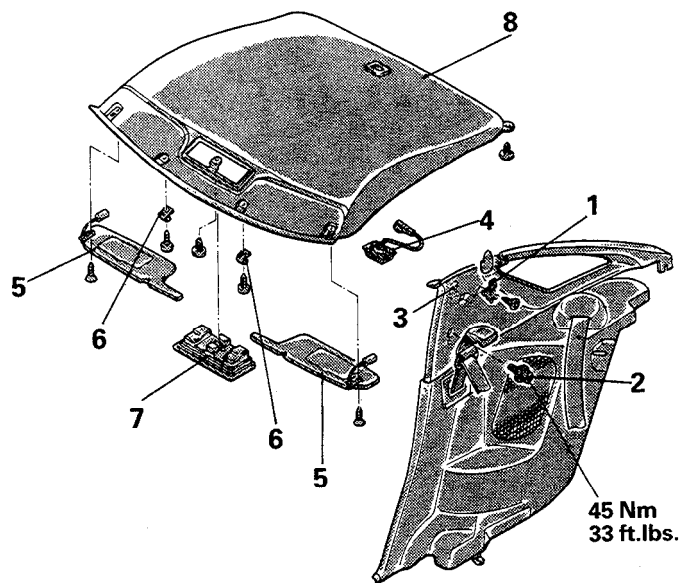
1. Shelf hook
2. Liftgate lower trim
3. Liftgate upper trim
4. Liftgate side trim

NOTE

- (1) ↖ : Location of metallic clip
 (2) ● : Location of resin clip

HEADLINING**REMOVAL AND INSTALLATION****Pre-removal and Post-installation Operation**

- Removal and Installation of Rear Roof Rail Trim (Refer to P.52A-13.)
- Removal and Installation of Front Pillar Trim (Refer to P.52A-13.)

**Removal steps**

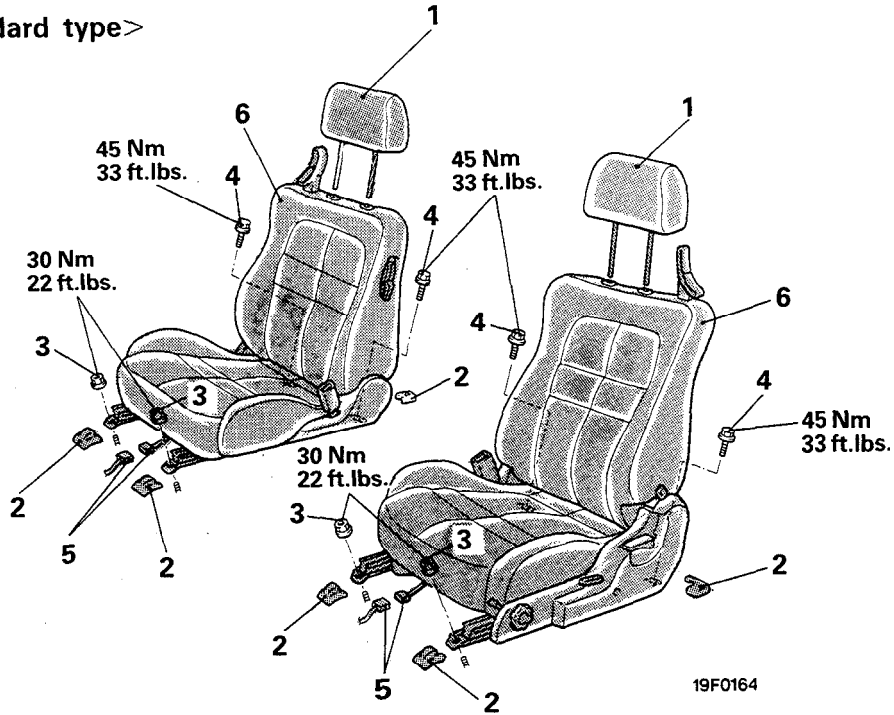
1. Hanger bracket
2. Sash guide cover mounting bolt
3. Clip
4. Passenger compartment temperature sensor (Vehicles with full automatic air conditioner)
5. Sunvisor assembly
6. Sunvisor holder
7. Room light assembly
8. Headlining

19F0162

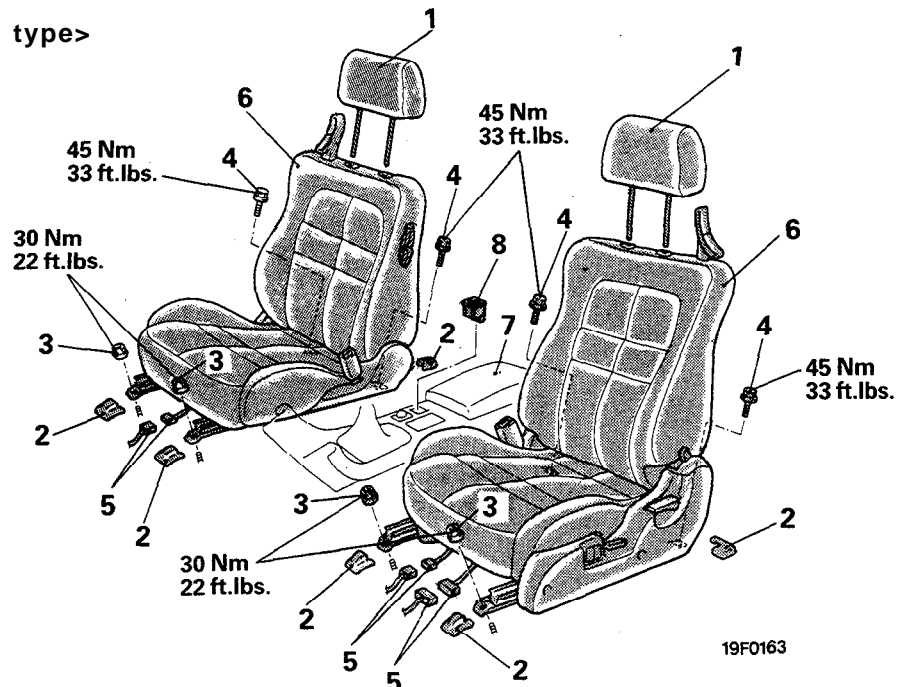
FRONT SEAT

REMOVAL AND INSTALLATION

<Standard type>



<Sporty type>



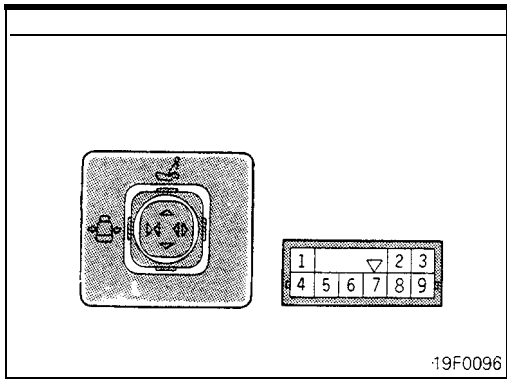
1. Head restraint

Front seat removal steps

- * 2. Seat anchor covers
- 3. Seat mounting nut
- 4. Seat mounting bolt
- 5. Harness connector
- * 6. Front seat assembly

Power seat switch removal steps

- 7. Front console assembly (Refer to P.52A-11.)
- 8. Power seat switch A



INSPECTION

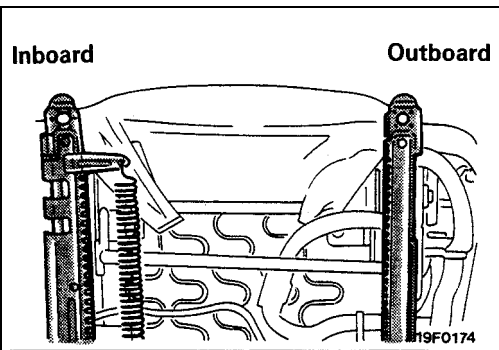
POWER SEAT SWITCH A INSPECTION

Operate the power seat switch A to check for continuity.

Lumbar support					Side support				
Terminal No.	2	3	5	7	Terminal No.	1	2	7	8
Switch position					Switch position				
PUSH (Δ)	0	○	○	0	SPREAD (◁▷)	0	0	0	0
OFF	0	n	0		OFF	0	A		0
RELEASE(O)	0	0	○	0	CLOSE (▷◁)	○		○	0

NOTE

O-O indicates that there is continuity between the terminals.



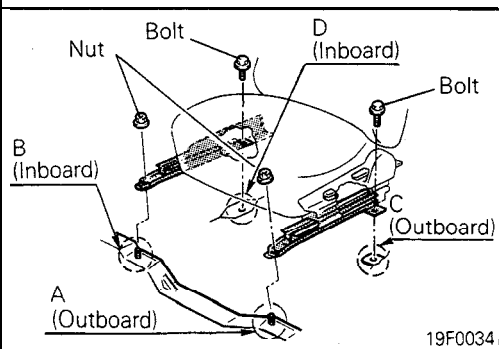
SERVICE POINTS OF INSTALLATION

6. INSTALLATION OF FRONT SEAT ASSEMBLY

- (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.

Caution

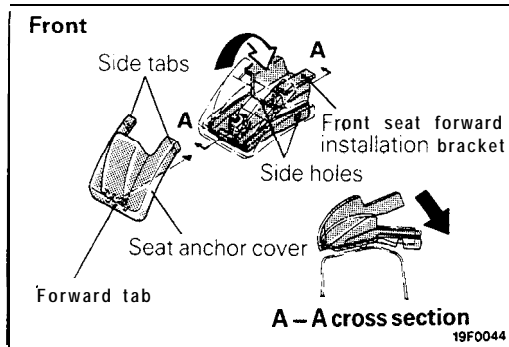
Note that when the slide is pulled, the inboard slide rail is unlocked, causing the slide rail to be pulled back by spring force.



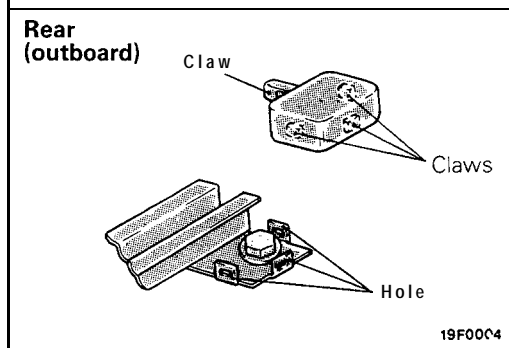
- (2) After checking that the seat adjuster is locked at both sides, provisionally tighten (in the A, B, C and D sequence) the seat installation nuts and the seat installation bolts; then fully tighten at the specified torque.

2. INSTALLATION OF SEAT ANCHOR COVERS

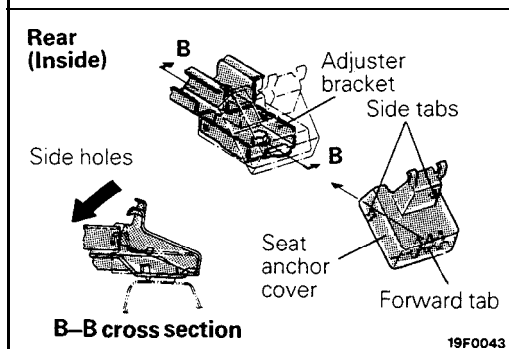
- (1) Install the forward tab of the front seat anchor cover to the front seat forward mounting bracket positively. Then rotate the cover in the direction of arrow to install the side tabs in the side holes of the bracket.



- (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.



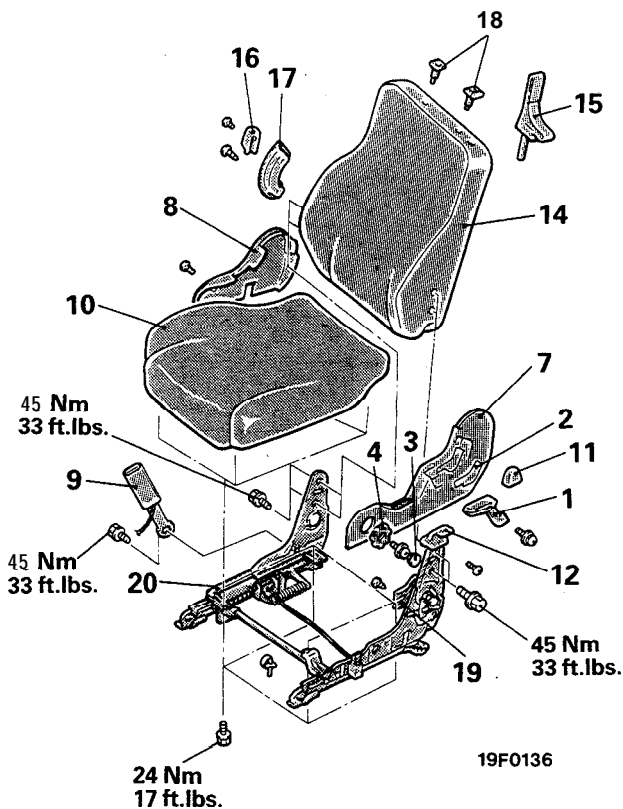
- (3) Insert the rear tab of the rear seat anchor cover in the front seat rear mounting bracket positively. Then rotate the cover in the direction of arrow to install the side tabs in the side holes of the bracket.



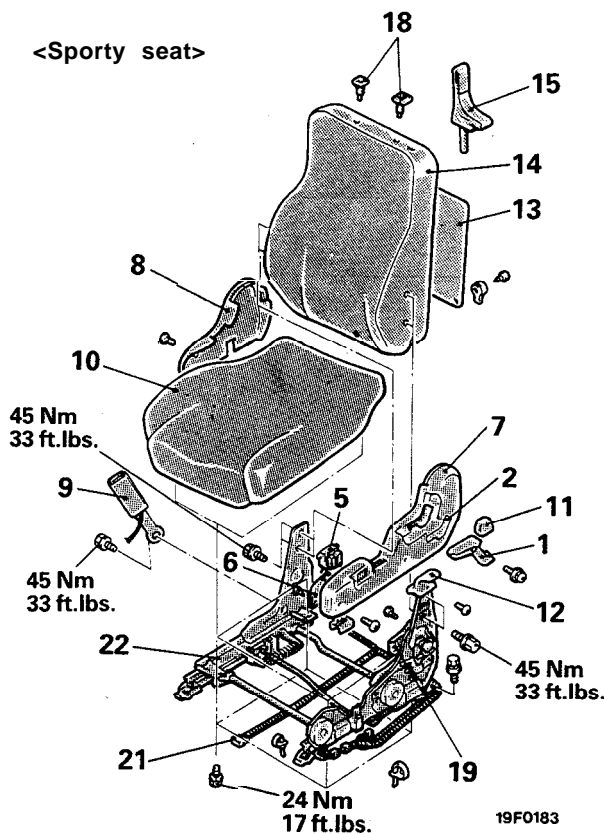
DISASSEMBLY AND REASSEMBLY

DRIVER SEAT

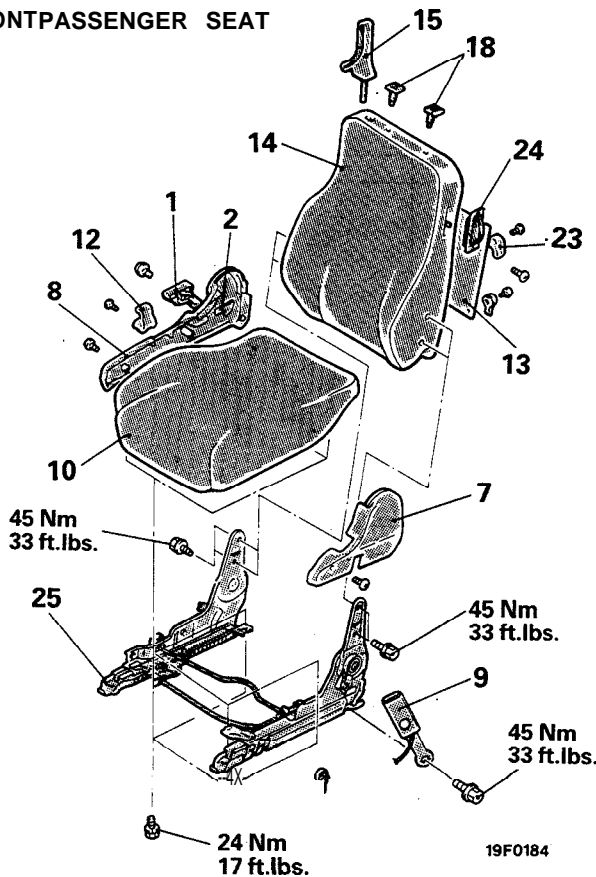
<Standard seat>



<Sporty seat>

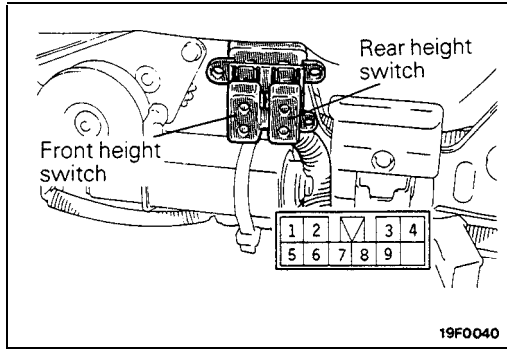


FRONT PASSENGER SEAT



Removal steps

1. Reclining adjuster knob
2. Plug
3. Cap
4. Height adjuster lever } (Standard driver seat)
5. Powerseat switch B } (Sporty driver seat)
6. Adjuster cover
7. Side shield cover (L.H.)
8. Side shield cover (R.H.)
- a 9. Inner seat belt
10. Seat cushion assembly
11. Memory reclining knob (Driver seat)
12. Sliding adjuster knob
13. Seat back panel (Except standard driver seat)
14. Seat back assembly
15. Seat belt guide
16. Lumbar support knob
17. Lumbar support garnish } (Standard driver seat)
18. Head restraint guide
19. Reclining adjuster lower cover (Driver seat)
20. Height adjuster (Standard driver seat)
21. Power seat harness } (Sporty driver seat)
22. Power seat adjuster
23. Walk-in knob
24. Walk-in knob garnish } (Front passenger seat)
25. Slide adjuster



INSPECTION

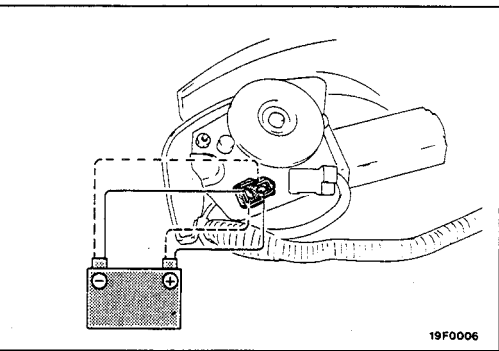
INSPECTION OF POWER SEAT SWITCH B

Operate the power seat switch B to check for continuity.

		Terminal No.								
		1	2	3	4	5	6	7	8	9
Front height switch	UP		○—○		○—					○
	OFF	○—	○—○		○—					
	DOWN	○—		○—	○—					○
Rear height switch	UP						○—○		○—○	
	OFF					○—	○—○		○—	
	DOWN					○—		○—	○—	○—

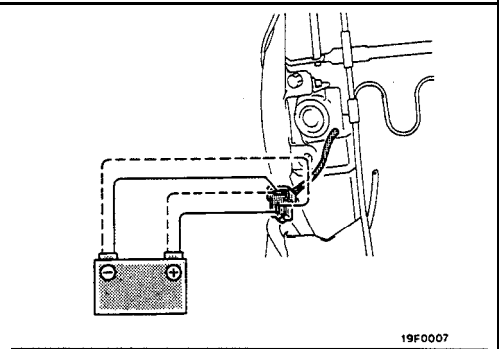
NOTE

O-O indicates that there is continuity between the terminals



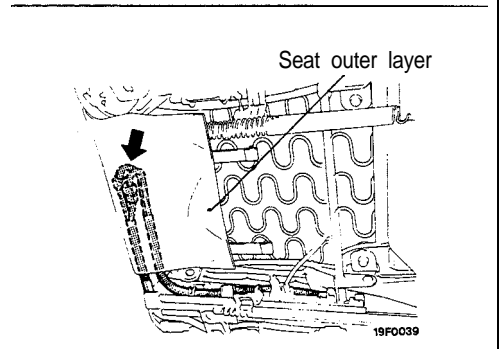
INSPECTION OF FRONT HEIGHT MOTOR AND REAR HEIGHT MOTOR

- (1) Disconnect the connector of each motor.
- (2) Connect the battery directly to the terminal of the motor and check to see that the power seat adjuster rotates smoothly until it strikes the limit switch.
- (3) Connect the battery with its polarity changed and check to see that the motor rotation is reversed.



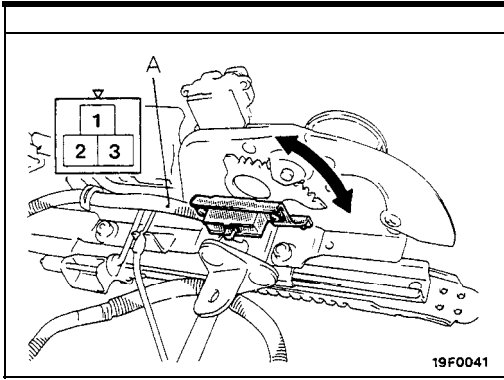
INSPECTION OF LUMBAR SUPPORT MOTOR AND SIDE SUPPORT MOTOR

- (1) Disconnect the connector of each motor.
- (2) Connect the battery directly to the terminal of the motor and check to see that either of the motors, namely, the lumbar support and side support, operates.
- (3) Connect the battery with its polarity changed and check to see that either of the motors, namely, the lumbar support and side support motors, operates.



INSPECTION OF LIMIT SWITCH

- (1) Connect the battery directly to the connector terminal of each of the front height motor and rear height motor and move the seat to each of the positions shown below. (Refer to Inspection of Front Height Motor and Rear Height Motor.)

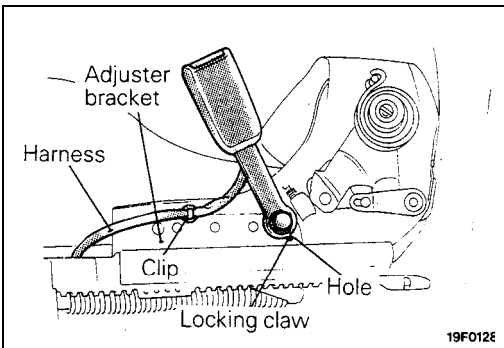


(2) Disconnect the connector of each limit switch and check for continuity between terminals.

Terminal No.	1	2	3
Front/rear height			
Highest	0 ————— 0		
Medium		○ ————— 0	
Lowest	0 ——— 0		

NOTE
O-O indicates that there is continuity between the terminals,

(3) Make sure that portion A of the harness does not interfere with the selector gear.



SERVICE POINT OF REASSEMBLY

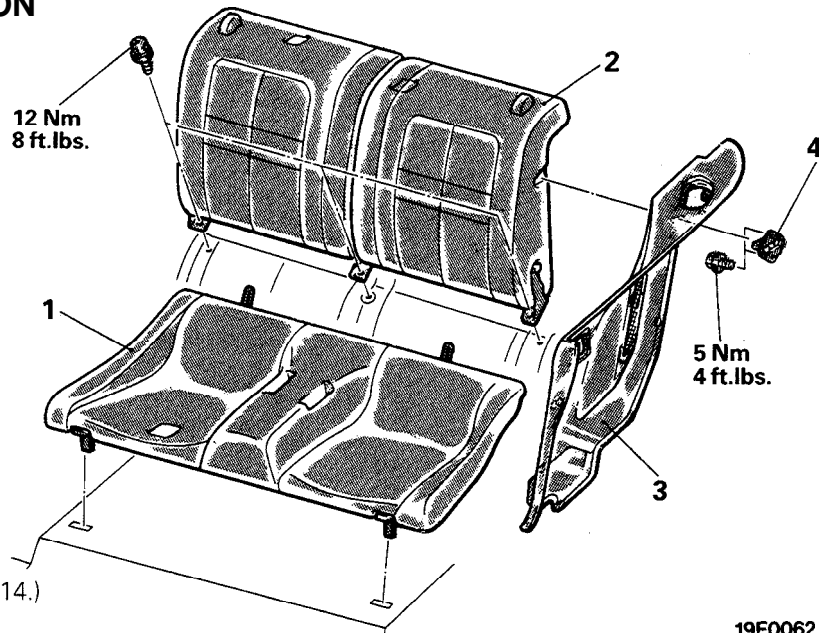
9. INSTALLATION OF INNER SEAT BELT

- (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.

REAR SEAT

M52UFAQ

REMOVAL AND INSTALLATION



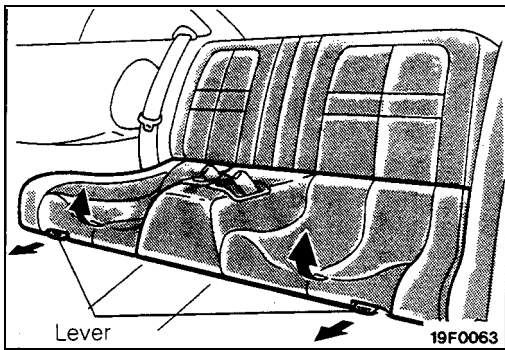
Rear seat removal steps

- *♦♦ 1. Rear seat cushion
- 2. Rear seat back

Striker removal steps

- 3. Quarter trim (Refer to P.52A-14.)
- 4. Striker

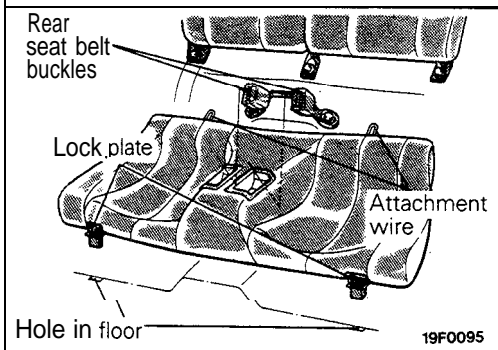
19F0062



SERVICE POINT OF REMOVAL

1. REMOVAL OF REAR SEAT CUSHION

With the lever pulled, raise the seat cushion, and remove the seat cushion.



SERVICE POINT OF INSTALLATION

1. INSTALLATION OF REAR SEAT CUSHION

- (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.

M52UGBH

SEAT BELT

TROUBLESHOOTING GUIDE

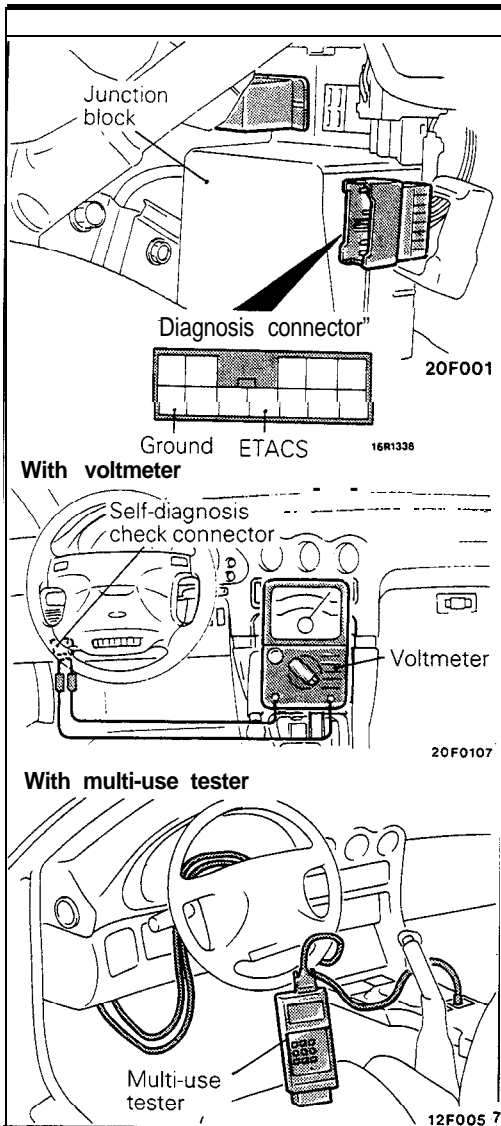
INPUT CHECK

Using the multi-use tester or voltmeter, check whether or not the input signals from each switch are being input to the ETACS unit.

- (1) Connect the multi-use tester to the diagnosis check 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 multi-use tester sounds or the needle of the voltmeter moves when each switch noted below 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.

- Ignition switch



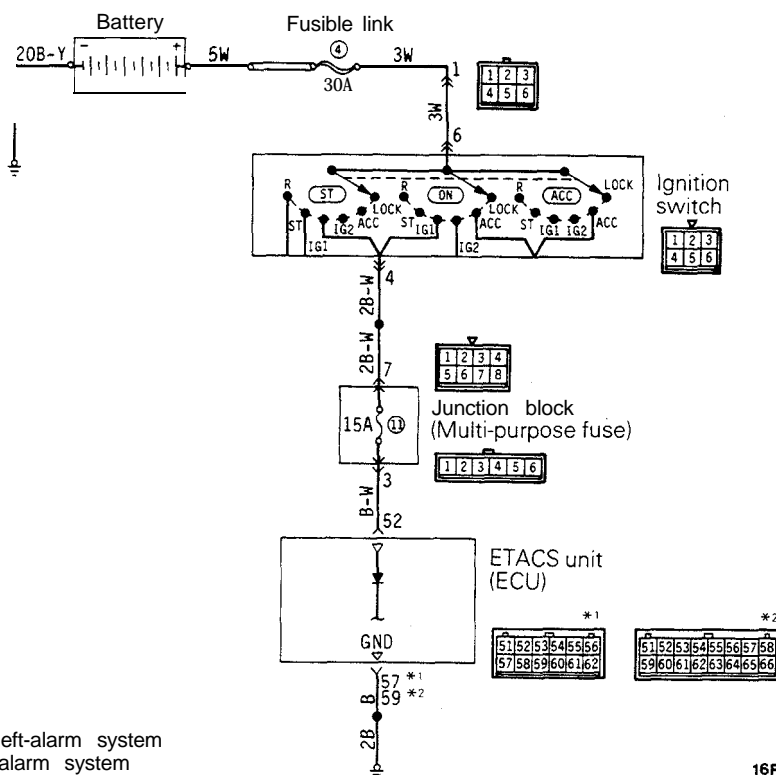
TROUBLESHOOTING QUICK-REFERENCE TABLE

Problem	Probable cause	Check method	Remedy
The warning light does not flash and the warning buzzer also does not sound.	Damaged or disconnected wiring of the ignition switch input circuit	If a malfunction is indicated as a result of checking the input signals, check by following individual part and the circuit check No. 1 procedures (P.52A-27).	Repair the wiring harness.
	Damaged or disconnected wiring of the seat belt warning and buzzer activation circuit	Check by following individual part and the circuit check No. 2 procedures (P.52A-28).	Repair the wiring harness.
	Blown fuse		Replace the fuse.
	Malfunction of the electronic control unit	—	Replace the electronic control unit.

Problem	Probable cause	Check method	Remedy
The warning light flashes, but the warning buzzer does not sound.	Damaged or disconnected wiring of the seat belt warning buzzer activation circuit	Check by following individual part and the circuit check No. 2 procedures (P.52A-28).	Repair the wiring harness,
	Malfunction of the warning buzzer		Replace the warning buzzer.
	Malfunction of the key reminder switch or the seat belt switch		Replace the key reminder switch or the seat belt switch.
The warning buzzer sounds, but the warning light does not flash.	Damaged or disconnected wiring of the seat belt warning light activation circuit	Check by following individual part and the circuit check No. 2 procedures (P.52A-28).	Repair the wiring harness.
	Bulb worn out		Replace bulb.
The warning light stays on.	Short-circuit of the seat belt warning light and buzzer activation circuit	Check by following individual part and circuit check No. 2 procedures (P.52A-28).	Repair the wiring harness.
	Malfunction of the electronic control unit		Replace the electronic control unit.
The warning light keeps blinking	Malfunction of the electronic control unit	-	Replace the electronic control unit.

CHECKING INDIVIDUAL PART AND CIRCUIT

1 IGNITION SWITCH INPUT CIRCUIT



Description of operation

A condition for operation of this system is the sending of HIGH-level signals to the electronic control unit when the ignition switch is switched to the "ON" position.

Electronic control unit terminal voltage (Disconnect the connector of the electronic control unit and check the wiring harness side.)

ECU terminal No.	Signal	Condition	Standard	
52	Ignition switch "ON"	Ignition switch	OFF	0 v
			ON	System voltage

Checking the ground circuit (Disconnect the connector and check the wiring harness side.)

Terminal No.	Connected to/measured part	Measurement	Tester connection	Check conditions	Standard
57*1 59*2	Electronic control unit ground	Resistance	57*1-ground 59*2-ground	At all times	Continuity

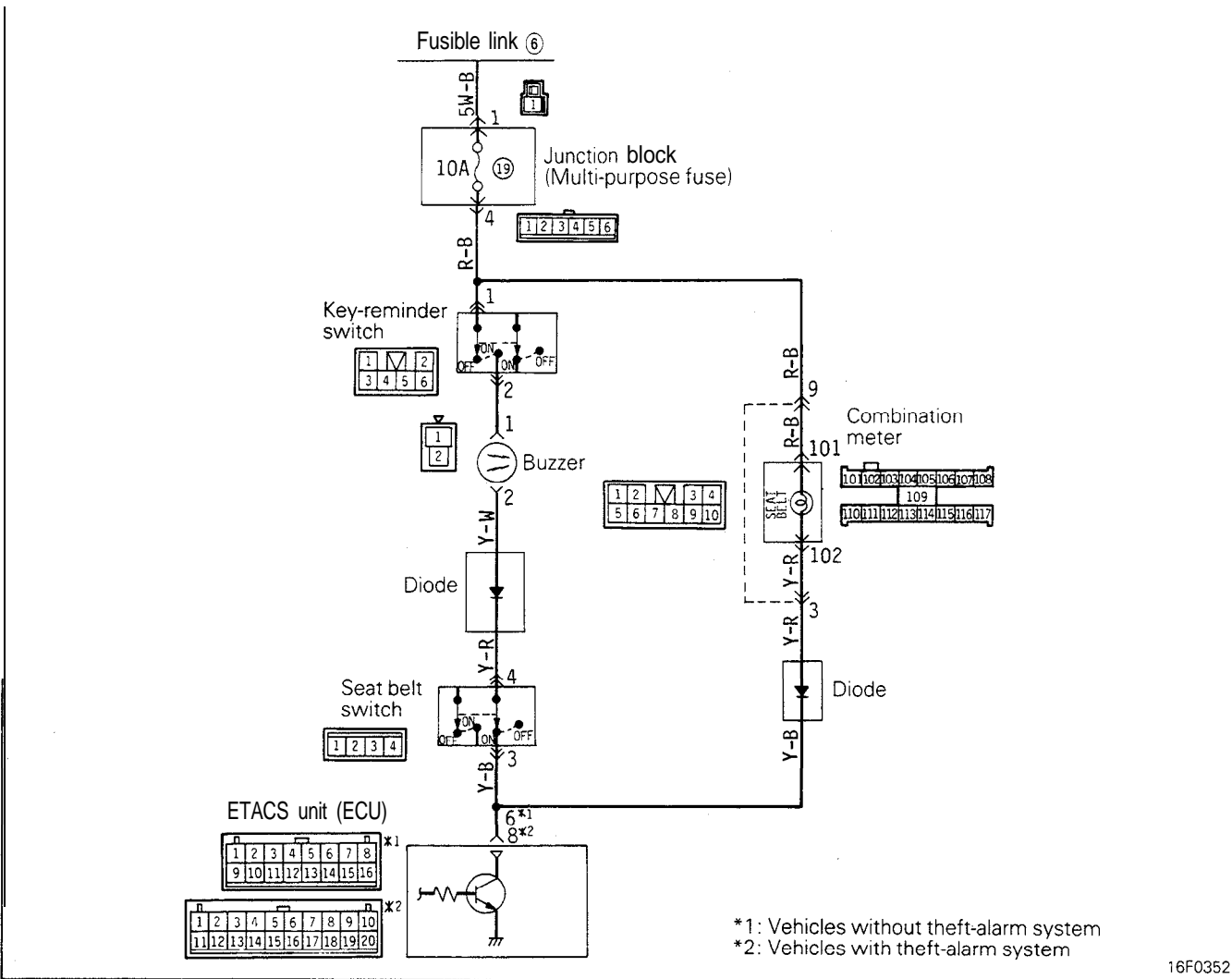
NOTE

*1: Vehicles without theft-alarm system
*2: Vehicles with theft-alarm system

Checking the individual part

Ignition switch: Refer to GROUP 54 – Ignition Switch.

2. SEAT BELT WARNING LIGHT AND BUZZER ACTIVATION CIRCUIT



Description of operation

Place the ignition switch in the ON position, and the transistor will be turned on, blinking the warning light and sounding the buzzer four times. However, the warning buzzer will not sound unless the key-reminder switch and seat belt switch are in the ON position.

Electronic control unit terminal voltage (Disconnect the connector of the electronic control unit and check the wiring harness side.)

ECU terminal No.	Signal	Condition	Terminal voltage
6*1	Warning light signal	At all times	System voltage
8*2	Warning buzzer signal	Key-reminder switch or seat belt switch "OFF"	0 v
		Key-reminder switch and seat belt switch "ON"	System voltage

NOTE

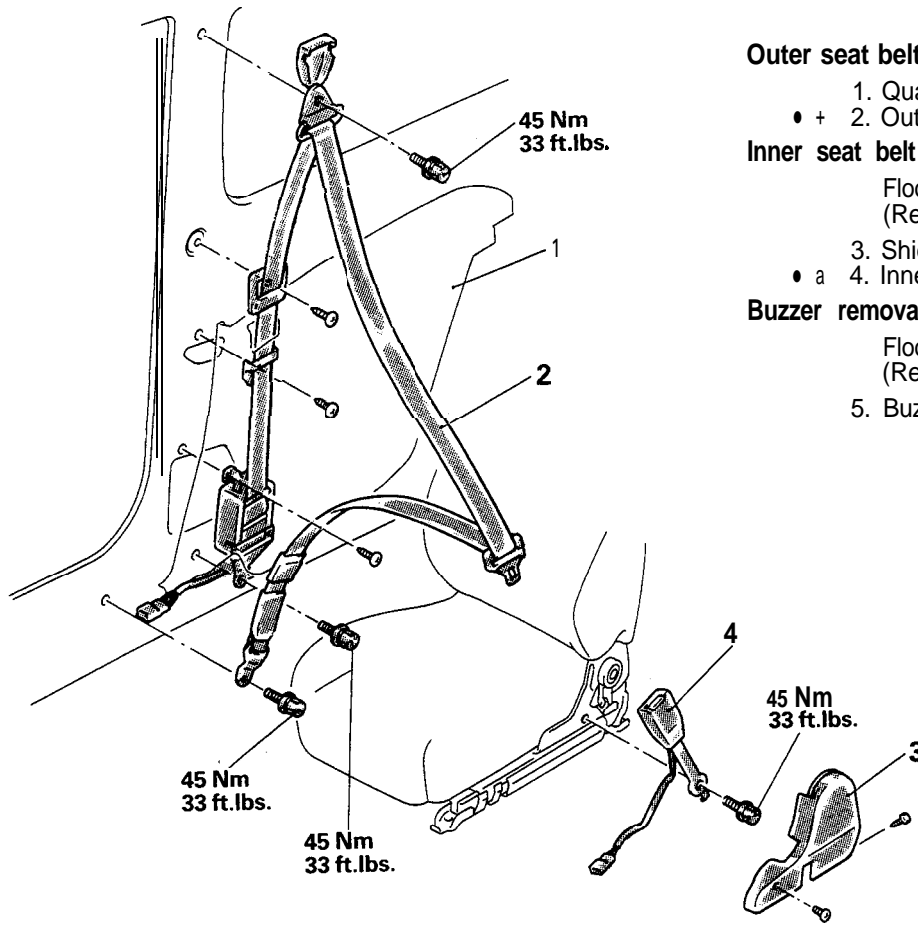
*1: Vehicles without theft-alarm system
*2: Vehicles with theft-alarm system

Checking the individual part

Key-reminder switch: Refer to GROUP 54 – Ignition Switch.
Seat belt switch: Refer to P.52A-30.

REMOVAL AND INSTALLATION

<Front Seat Belt>



Outer seat belt removal steps

- 1. Quarter trim (Refer to P.52A-14.)
- + 2. Outer seat belt

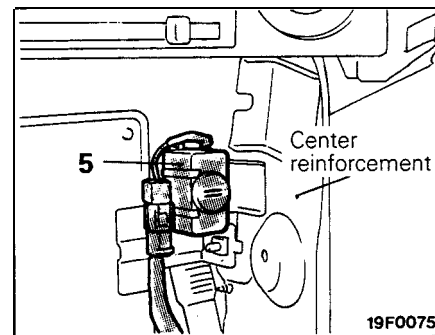
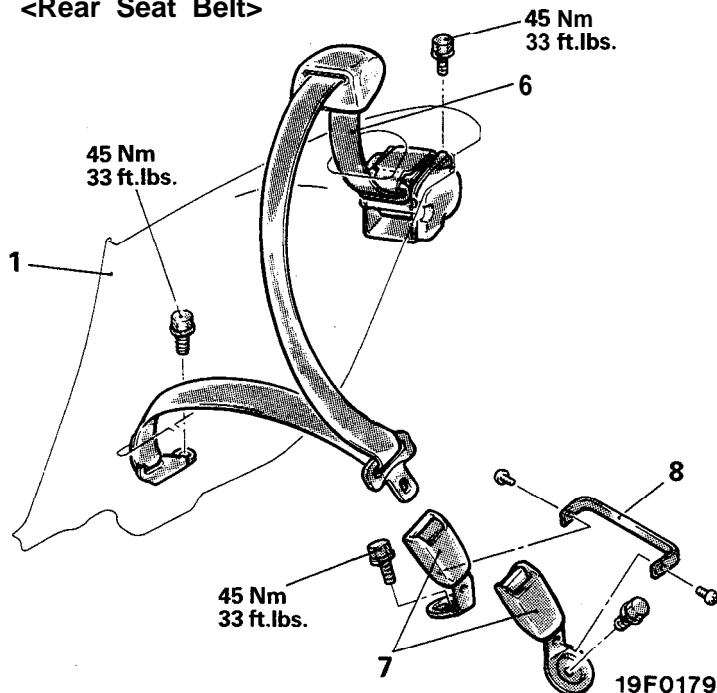
Inner seat belt removal steps

- Floor console assembly (Refer to P.52A-11.)
- 3. Shield cover
- a 4. Inner seat belt

Buzzer removal steps

- Floor console assembly (Refer to P.52A-11.)
- 5. Buzzer

<Rear Seat Belt>



Outer seat belt removal steps

- 1. Quarter trim (Refer to P.52A-14.)
- a 6. Outerseat belt

Inner seat belt removal steps

- Rear seat cushion (Refer to P.52A-24.)
- 7. Inner seat belt
- 8. inner seat belt bracket

INSPECTION

BUCKLE SWITCH

- (1) Disconnect the buckle switch connector.
- (2) Check the continuity between the terminals.

Terminal	1	2	3	4
Buckle unlock			0 — 0	
Buckle lock	0 — 0			

NOTE

O-O indicates that there is continuity between the terminals.

BUZZER

Check that buzzer sounds when battery voltage is applied to the buzzer terminal.

SERVICE POINTS OF INSTALLATION

6. INSTALLATION OF OUTER SEAT BELT

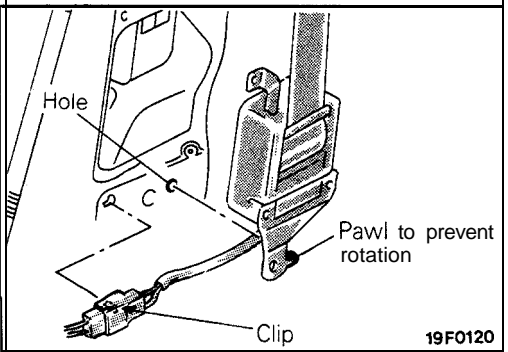
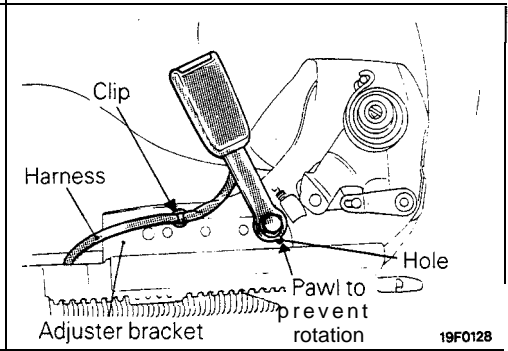
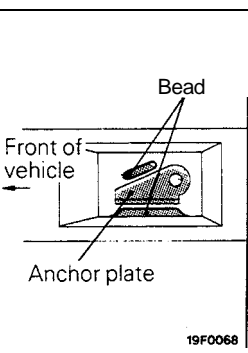
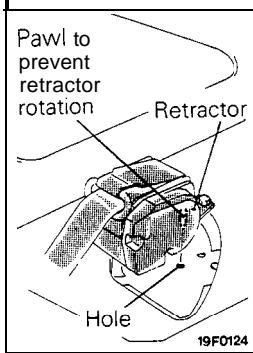
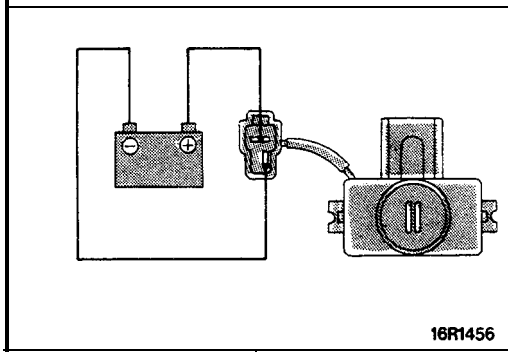
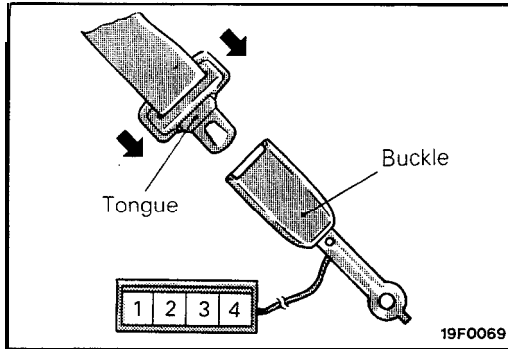
- (1) Positively insert the pawl to prevent the retractor from rotating in the hole provided on the body.
- (2) Install the anchor plate along the bead of the body.

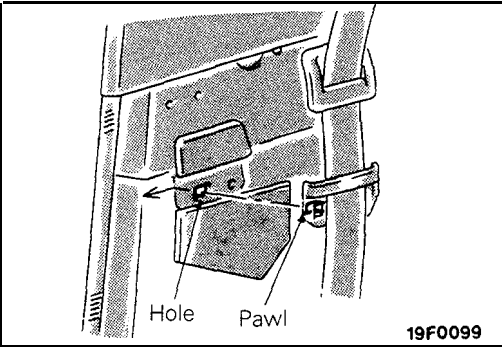
4. INSTALLATION OF INNER SEAT BELT

- (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.

2. INSTALLATION OF OUTER SEAT BELT

- (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.

01

01

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SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

CONTENTS

M52AA-B

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SRS SERVICE PRECAUTIONS	14		
Test Equipment To Be Used For Troubleshooting	16		
TROUBLESHOOTING	17		
Diagnostic Sequence	18		
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CAUTION

- Carefully read and observe the information in the SRS SERVICE PRECAUTIONS (P.52B-14) prior to any service.
- For information concerning troubleshooting or maintenance, always observe the procedures in the Troubleshooting (P.52B-17) or the SRS Maintenance and Post-collision Diagnosis (P.52B-49) sections, respectively.
- If any SRS components are removed or replaced in connection with any service procedures, be sure to follow the procedures in the INDIVIDUAL COMPONENT SERVICE section (P.52B-56) for the components involved.
- In case of any questions about the SRS, call the regional Tech Line at 1-800-446-6064.

GENERAL INFORMATION

M52BAAF

INTRODUCTION

The Supplemental Restraint System (SRS) is designed to supplement the driver's seat belt to help reduce the risk or severity of injury to the driver by activating and deploying a driver's-side air bag in certain frontal collisions.

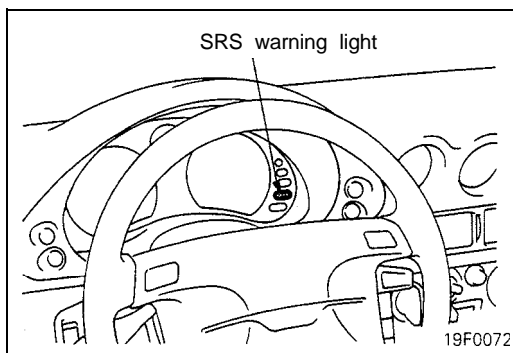
The SRS consists of: left front and right front impact sensors located, one each, on the right and left front upper frame lowers; an air bag module located in the center of the steering wheel, which contains the folded air bag and an inflator unit; the SRS diagnosis unit located under the rear console assembly, which monitors the system, and which contains a safing impact sensor; an SRS warning light located on the instrument panel, which indicates the operational status of the SRS; a clock spring interconnection located within the steering column; system wiring and wiring connectors; and a knee bolster located

under the steering column.

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 switches "ON".

That is designed to occur in frontal or near-frontal impacts of moderate to severe force.

Only authorized service personnel should do work on or around the SRS components. Those service personnel should read this manual carefully before starting any such work. Extreme care must be used when servicing the SRS, to avoid injury to the service personnel (by inadvertent deployment of the air bag) or the driver (by rendering the SRS inoperative).



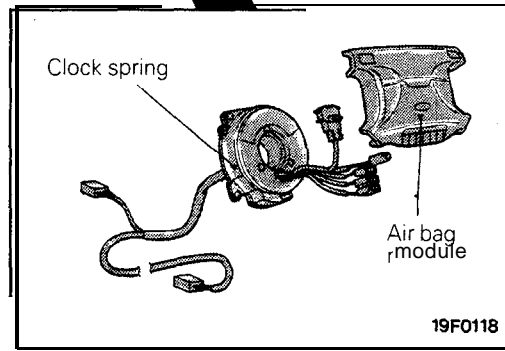
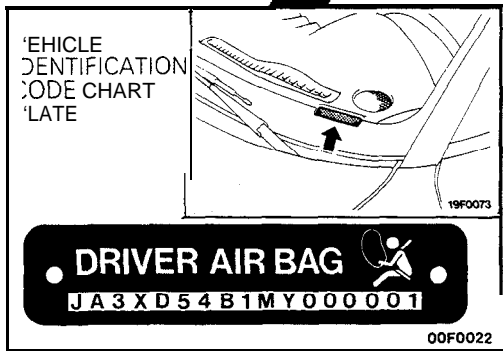
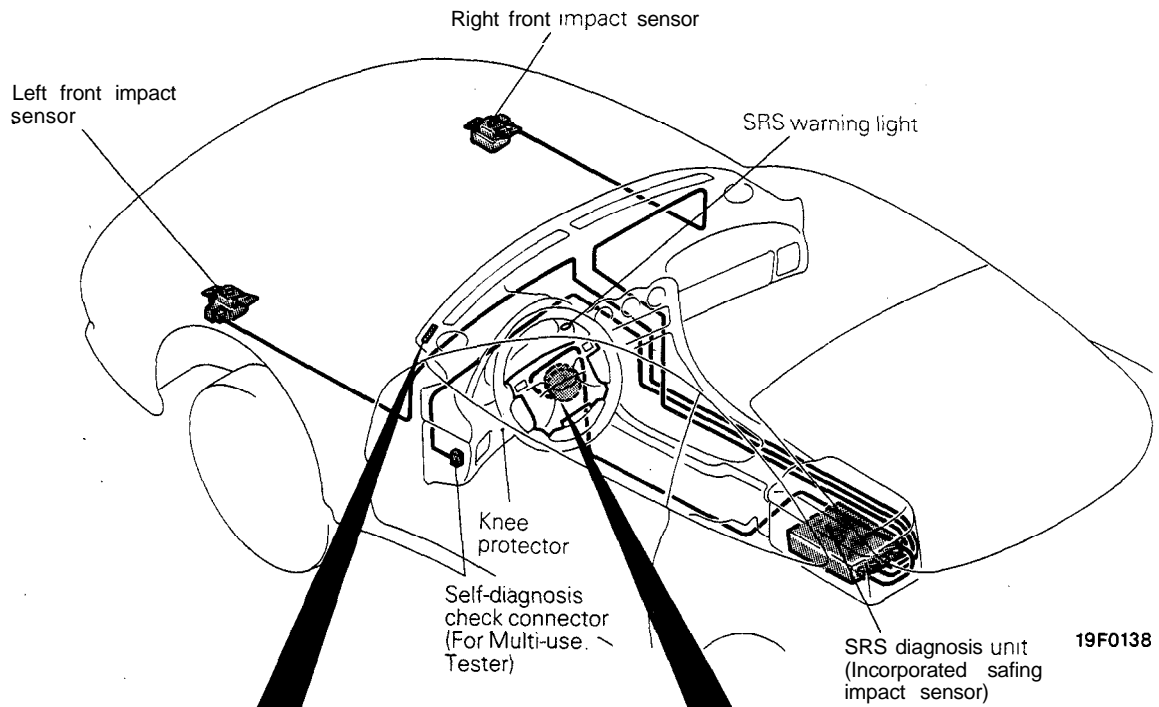
SELF-DIAGNOSIS/SRS WARNING LIGHT FUNCTION

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



NOTE

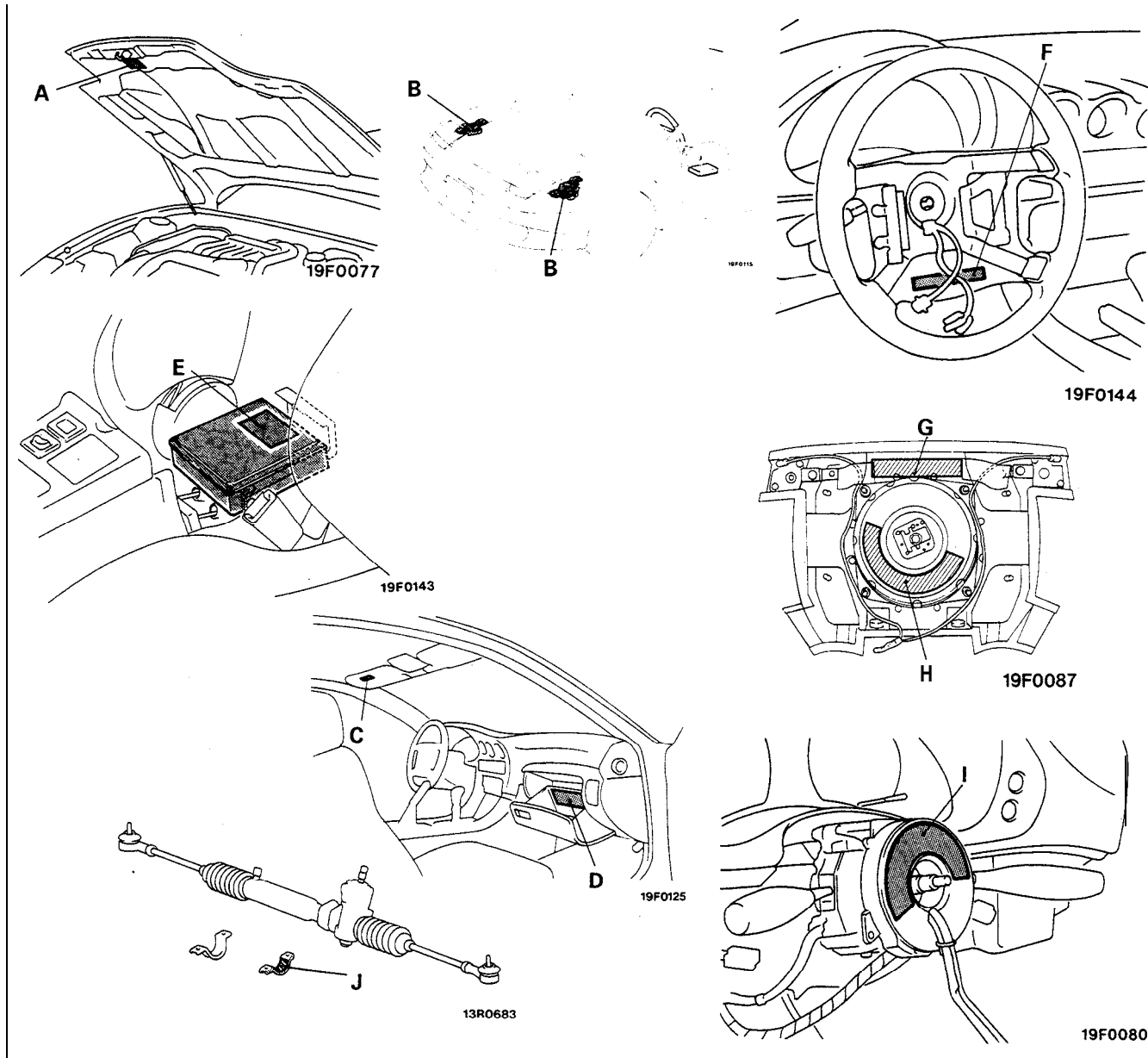
This construction diagram displays the general view of the SRS components. For details, refer to "SRS Schematic" (P.52B-6), "Configuration Diagrams" (P.52B-7) and "SRS Circuit Diagram" (P.52B-11).

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.



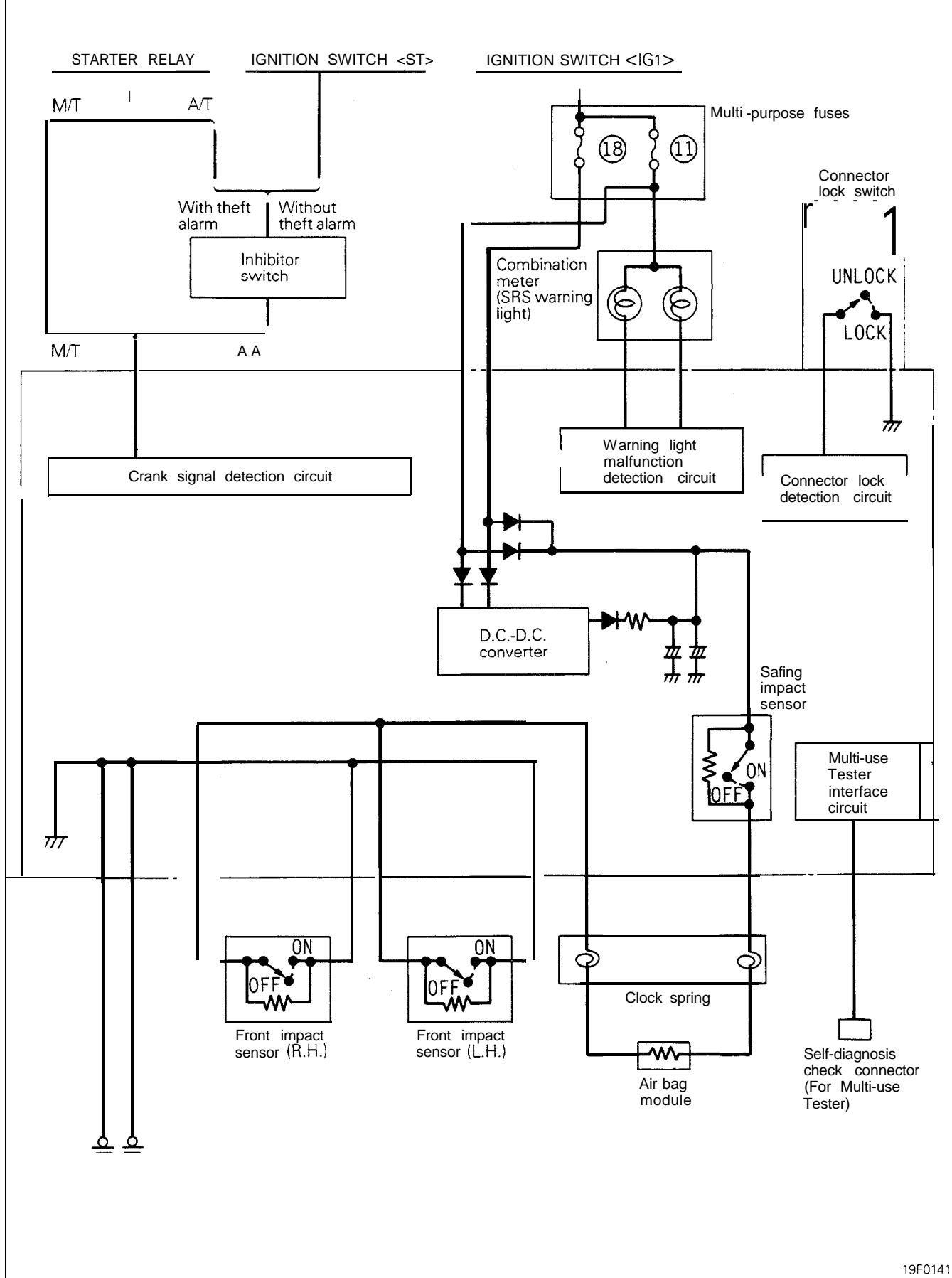
A. **WARNING**
 This vehicle has a supplemental driver's side air bag.
 Refer to service manual before servicing or disassembling underhood components. Read "SRS" section of manual for important instructions.
 Improper service procedures can result in the air bag firing or becoming inoperative, leading to injury.

B. **CAUTION: SRS**
 Read service manual.
 Do not drop.
 Do not tamper or disassemble.

C. This vehicle has a driver's side air bag to supplement the driver's seatbelt in certain frontal collisions.
 The driver and all other occupants must wear seatbelts at all times to reduce possible injury.

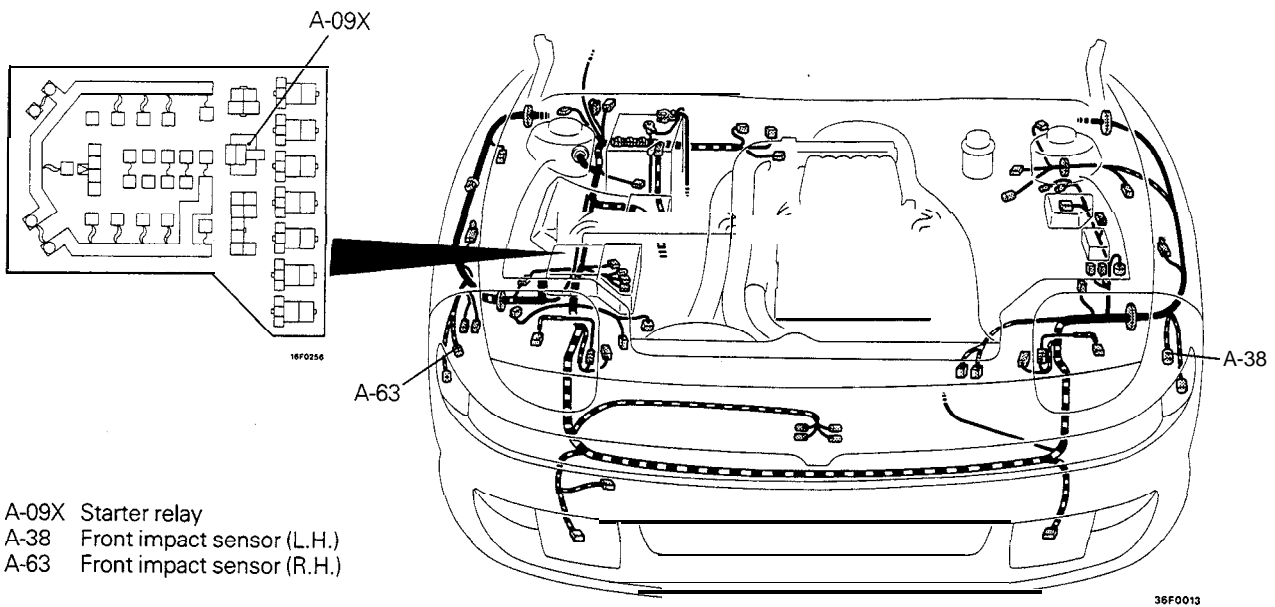
<p>D. Driver's air bag information This vehicle has an air bag which will supplement the driver's seatbelt in certain frontal collisions. The air bag is not a substitute for the driver's seatbelt in any type of collision. The driver, and all other occupants, should wear seatbelts at all times.</p> <p>WARNING! If the "SRS" warning light does not come on for about 7 seconds when ignition key is turned to "ON" or engine is started, or if it stays on while driving, drive the vehicle to your nearest authorized dealer right away. Also do so if vehicle's front end is damaged or if air bag has deployed.</p> <p>The air bag system must be inspected by an authorized dealer ten years after vehicle manufacture date shown on certification label located on left front door-latch post or door frame.</p> <p>Read "SRS" section of your owner's manual before driving, for important information, about operation, service and disposal of the air bag system.</p>	<p>G. WARNING: SRS This air bag module cannot be repaired. Do not disassemble or 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.</p>
<p>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.</p>	<p>H. Danger! Poison. Keep out of the reach of children. Contains sodium acid 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 or bring into contact with electricity or store at temperatures exceeding (93.3°C) 200°F. Fast 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.</p>
<p>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.</p>	<p>I. CAUTION: SRS clock spring This is not a repairable part. Do not disassemble or 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.</p>
	<p>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.</p>

SRS SCHEMATIC



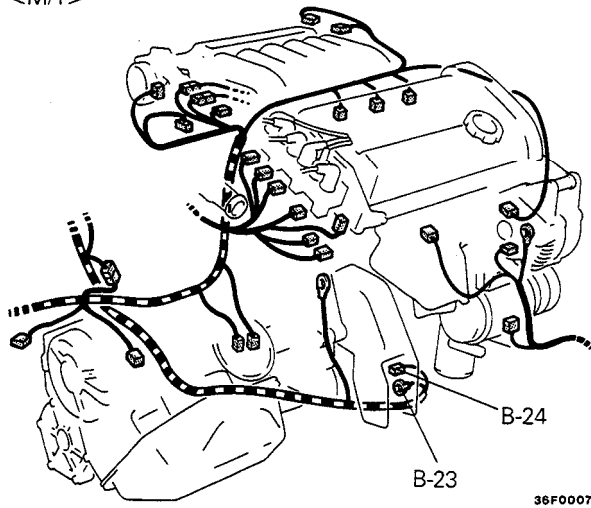
CONFIGURATION DIAGRAMS

☐ Engine compartment



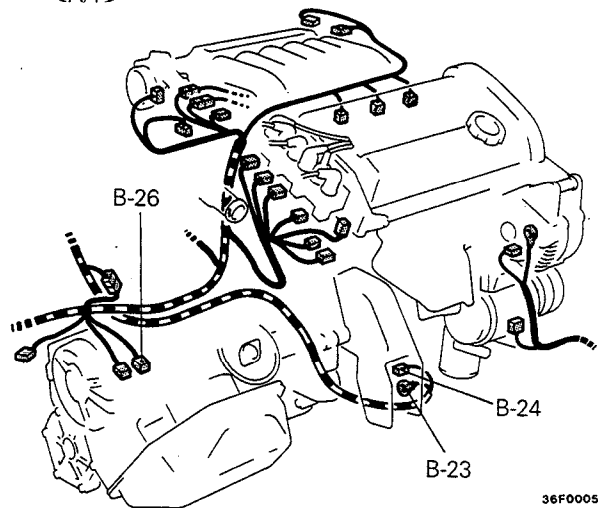
☐ Engine and transaxle (Front view)

<M/T>

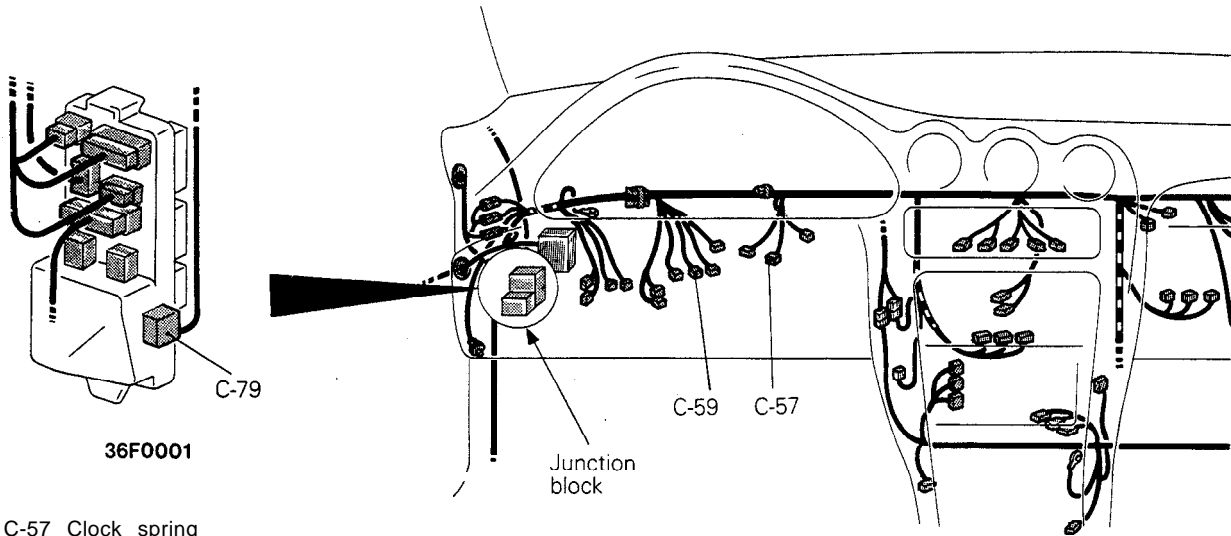


- B-23 } Starter motor
- B-24 } Inhibitor switch

<A/T>



C Dash panel

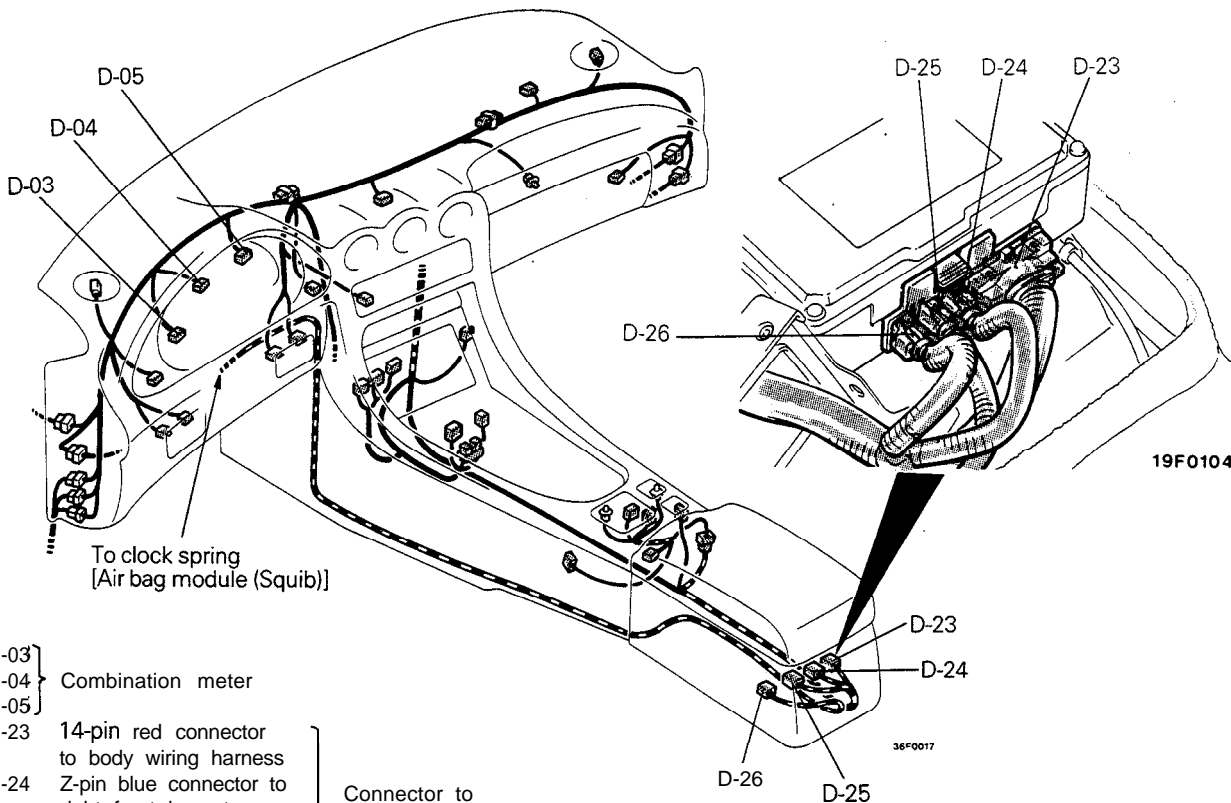


36F0001

- C-57 Clock spring
- C-59 Ignition switch
- C-79 Self-diagnosis check connector (For Multi-use Tester)

36F0018

D Instrument panel and floor console

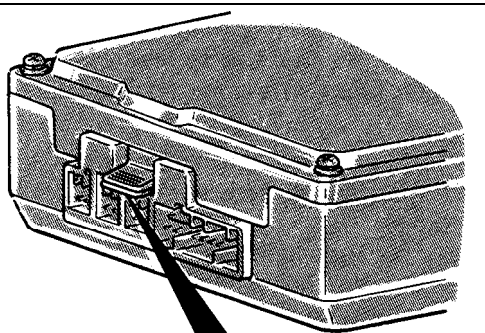


19F0104

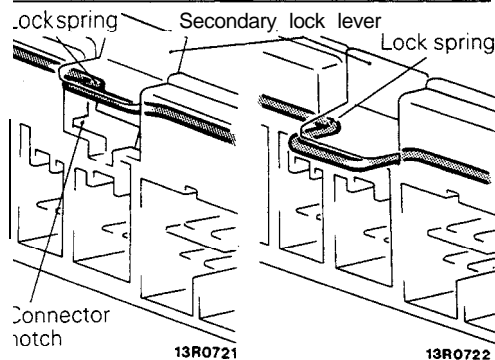
- D-03 } Combination meter
- D-04 }
- D-05 }
- D-23 } 14-pin red connector to body wiring harness
- D-24 } Z-pin blue connector to right front impact sensor
- D-25 } 2-pin yellow connector to left front impact sensor
- D-26 } 2-pin red connector to clock spring

Connector to SRS Diagnosis Unit

36F0017



13R0704



SRS 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 double lock mechanism comprises a mechanism for locking the connector of the SRS diagnosis unit and the connector of the harness, and a mechanism for locking the locked connectors by the lock secondary lever mounted to the SRS diagnosis unit side connector.

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 fitted. (Primary lock)
- (2) The secondary lock lever mounted to the SRS diagnosis unit side connector is pressed down by finger 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.

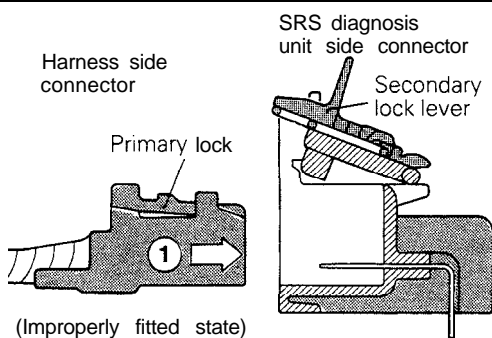
When Connectors Are Unlocked

- (1) Press the lock spring on the lock lever side in with a flat tip (-) screwdriver to unlock the secondary lock lever (secondary lock).

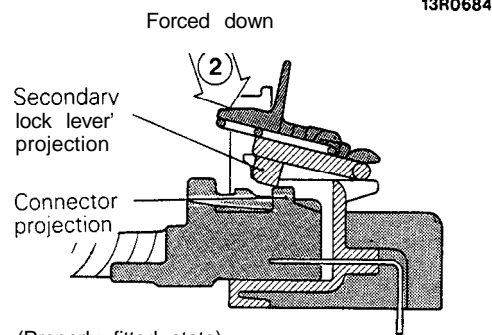
Caution

Forced removal of the connector without releasing the secondary lock lever will result in a damaged lock lever.

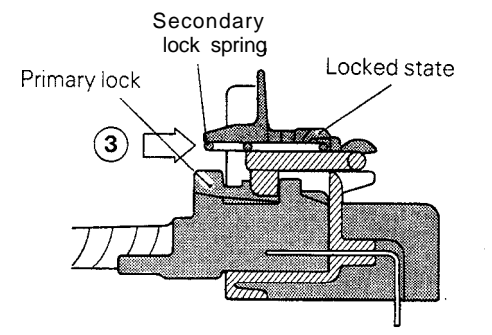
- (2) Press the primary lock of each of the harness side connectors and remove the harness side connector.



13R0684



13R0685



13R0686

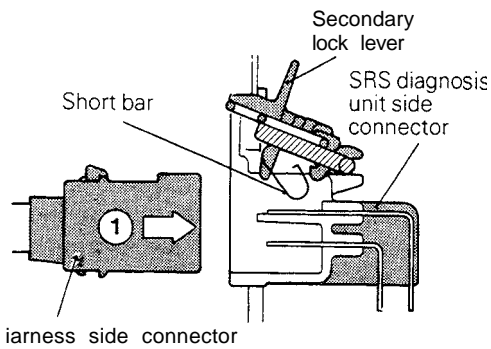
FIT VERIFICATION MECHANISM

The mechanism electrically verifies that the connectors of the SRS diagnosis unit have been fitted. The operating principle is described below.

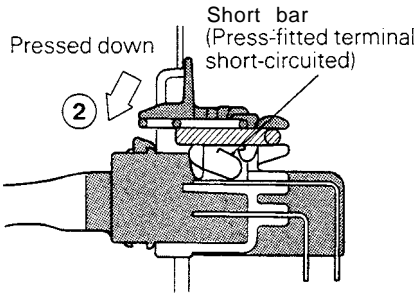
- (1) Securely connect the SRS diagnosis unit and harness side connectors and press the secondary lock lever down to lock the connectors.
- (2) At the time, the short bar provided on the rear of the secondary lock lever shorts the associated two pole terminals of the SRS diagnosis unit. The SRS diagnosis unit supplies monitoring current to the circuit to electrically verify that the connectors have been locked.

CONNECTOR SHORTING MECHANISM

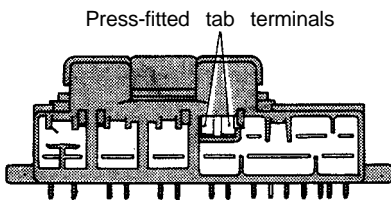
The mechanism is designed for prevention of accidental explosion of the inflator when the clock spring connector (for the squib circuit) is removed from the SRS diagnosis unit. The operating principle is described below.



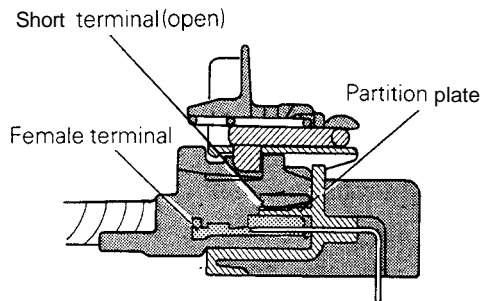
13R0687



13R0688



13R0689



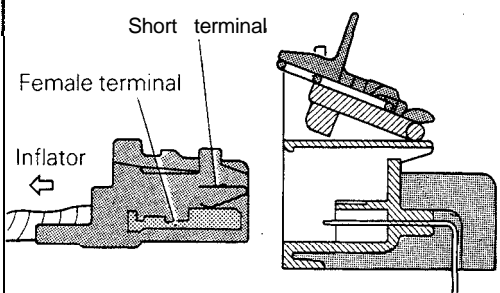
13R0690

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 are kept in the OFF state by the partition plate provided in the connector of the SRS diagnosis unit.

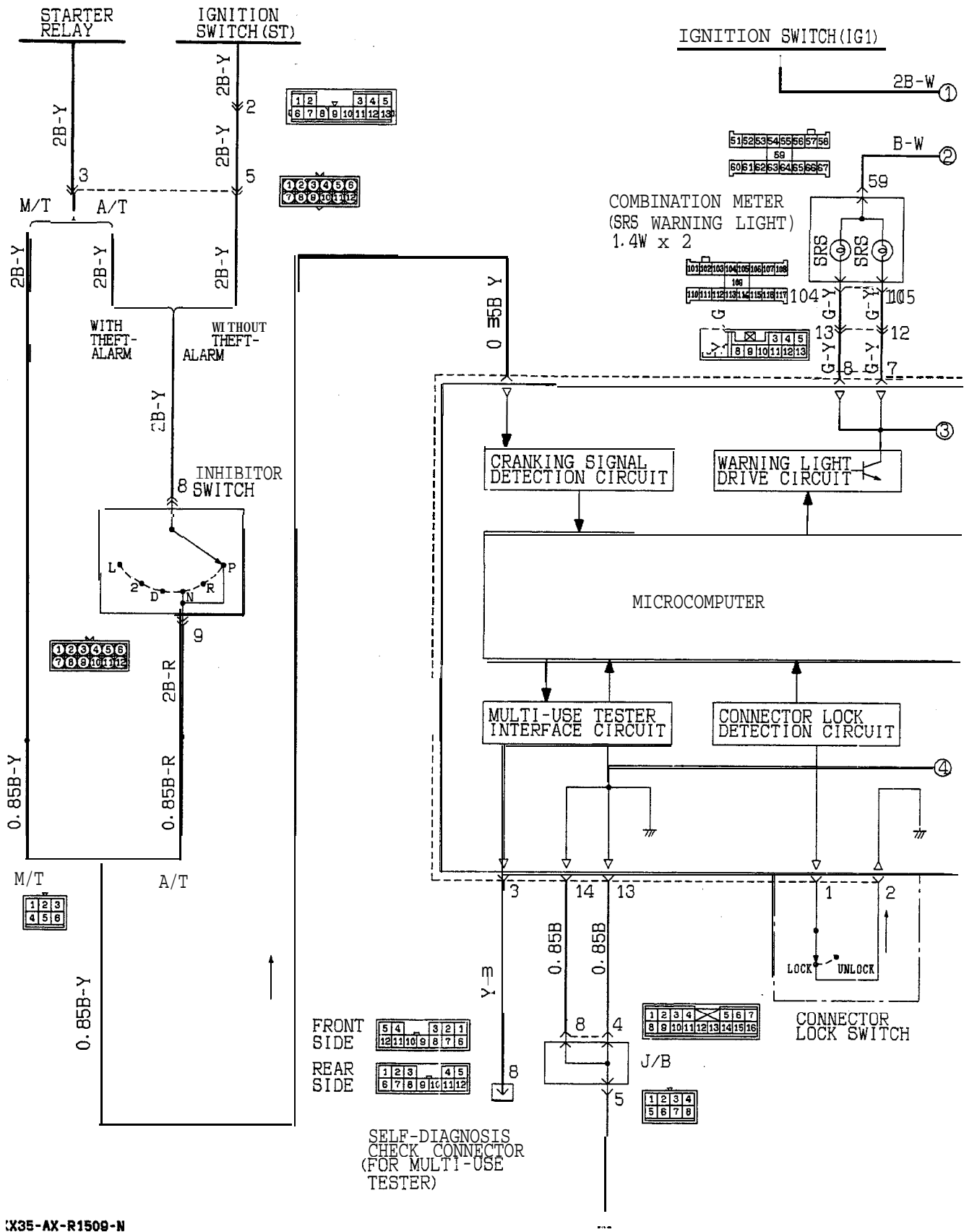
When Connectors Are Disconnected

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.



13R0691

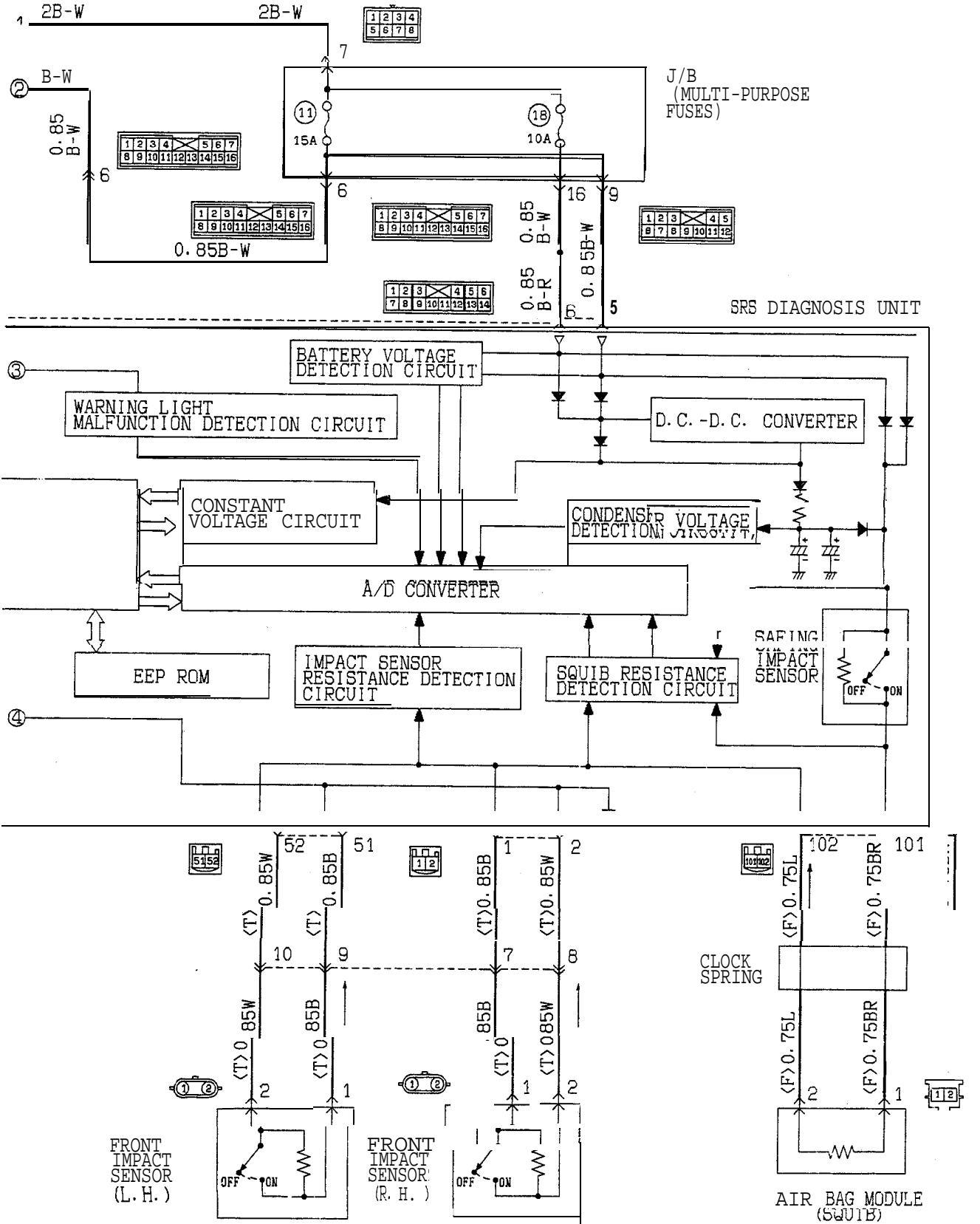
SRS CIRCUIT DIAGRAM



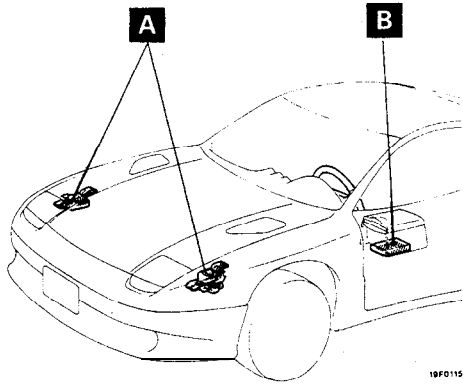
IX35-AX-R1509-N

CAUTION

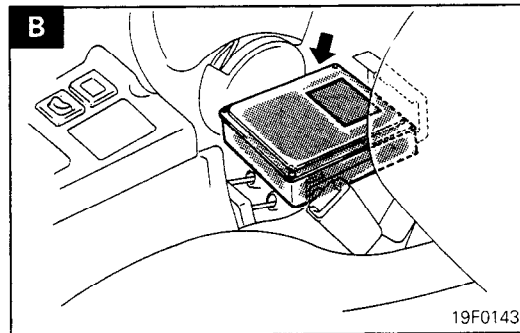
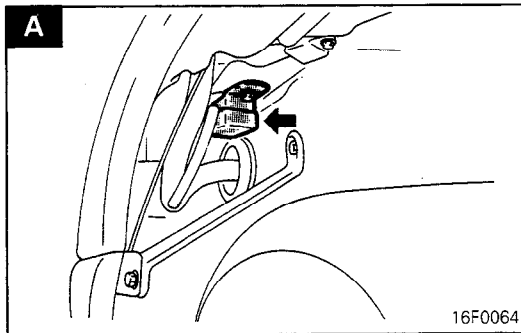
1. Do not repair, splice or modify SRS wiring (except for specific repairs to the body wiring harness shown on page 52B-14 replace wiring if necessary, after reading and following all precautions and procedures in this manual.
2. Do not use an analogue ohmmeter to check SRS wiring or components; use only special tools and digital multi-meter shown on page 52B-16.



COMPONENT LOCATION



Name	Symbol
Front impact sensor	A
SRS diagnosis unit	B



SRS SERVICE PRECAUTIONS

M52PBAA

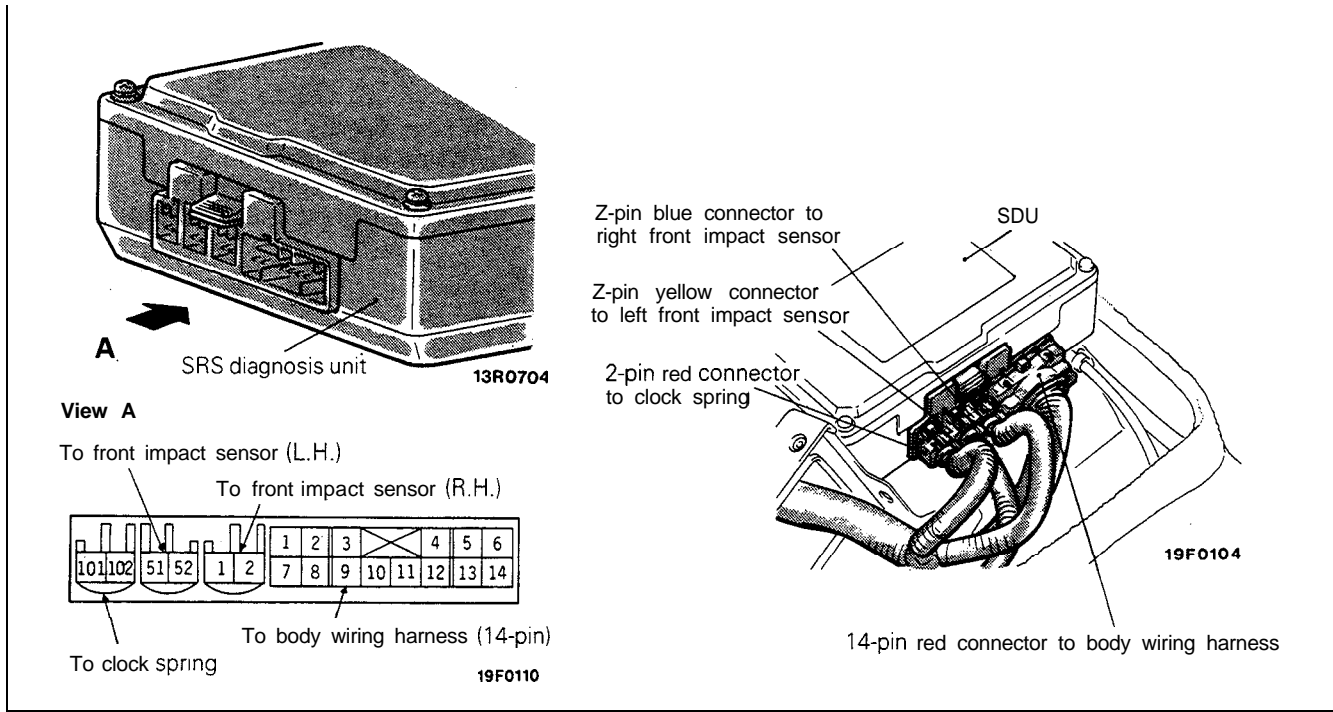
1. In order to avoid injury to yourself or others from accidental deployment of the air bag during SRS servicing, read and carefully follow all the precautions and procedures described in this manual.
2. Do not use any electrical test equipment on or near SRS components, except those specified on P.52B-16.
Never use an analogue 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 INDIVIDUAL COMPONENT SERVICE procedures in this manual, starting at page [52B-56].
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.

SDU Terminal No.	Harness Connector (No. of Terminals, Color)	Destination of Harness	Corrective Action		
101	2 pins, red	Clock spring	Replace clock spring.		
102					
51	2 pins, yellow	→ Front wiring Harness → Front impact sensor (LH)	Replace with sensor cable.*		
52					
1	2 pins, blue	→ Front wiring Harness → Front impact Sensor (RH)			
2					
1	14 pins, red	Body wiring Harness	-		
2			-		
3			→ Diagnosis check pin	Correct or replace control wiring, instrument panel wiring harness or body wiring harness.	
4			→ Control wiring harness → Ignition switch (ST)		
5			→ General purpose fuse No. 11		
6			→ General purpose fuse No. 18		
7			→ Instrument panel wiring harness → SRS warning light		
8					
9 to 12			-	-	
13			→ Junction block → Body wiring harness → Ground		Correct or replace body wiring harness.
14					

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.



5. 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. Recheck SRS system operability after re-installing them.
6. Whenever you finish servicing the SRS, check the SRS warning light operation to make sure that the system function properly. (Refer to P.52B-2.)
7. In case of any questions about the SRS, call the regional Tech Line at 1-800-446-6064.

NOTE

SERIOUS INJURY CAN RESULT FROM UNINTENDED AIR BAG DEPLOYMENT, SO USE ONLY THE PROCEDURES AND EQUIPMENT SPECIFIED IN THIS MANUAL.

SPECIFICATIONS

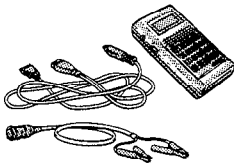

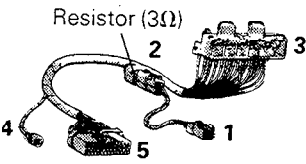


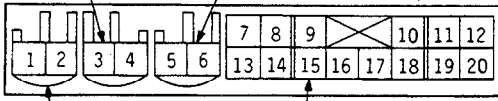

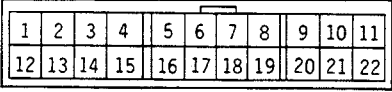
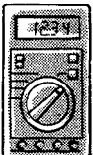
M52CB-B

SERVICE SPECIFICATION

Items	Specification
Standard value	
Front impact sensor resistance Ω	2,000 ± 40

TEST EQUIPMENT TO BE USED FOR TROUBLESHOOTING

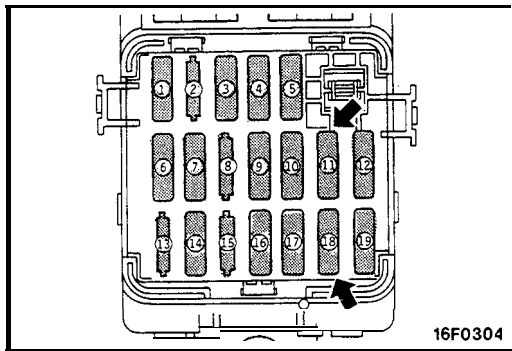
M52DA-B

Tool	Number	Name	Use
	MB991341	Multi-use tester sub assembly	<ul style="list-style-type: none"> • Reading diagnosis codes • Erasing diagnosis code <p>[Refer to MULTI-USE TESTER INSTRUCTION MANUAL (MB991342)]</p>
	MB991359	ROM pack (for multi-use tester)	
  <p>1 To SDU connector for clock spring</p>  <p>2 (connected 3Ω resistor)</p> <p>To front impact sensor (L.H.)</p> <p>To front impact sensor (R.H.)</p>  <p>3</p> <p>To clock spring</p> <p>To body wiring harness (14-pin)</p>  <p>4 White paint</p> <p>To clock spring connector for air bag module</p>  <p>5 (check connector)</p> <p>13R0747</p>	MB991349	SRS Check Harness	<ul style="list-style-type: none"> • Checking the SRS electrical circuitry with a digital multi-meter <p>NOTE SRS check harness is used on various Diagnostic Tests. For details, refer to DIAGNOSTIC SEQUENCE (P.52B-18 – P.52B-48.)</p>
 <p>Use a multi-meter for which the maximum test current is 2 mA or less at the minimum range of resistance measurement</p> <p>13R0746</p>		Digital multi-meter	<ul style="list-style-type: none"> • Checking the SRS electrical circuitry with SRS Check Harness

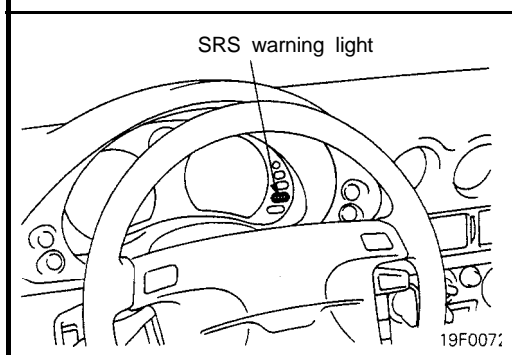
TROUBLESHOOTING

SRS DIAGNOSTIC PROCEDURES – INITIAL STEPS

FOLLOW THESE STEPS WHEN BEGINNING ANY SRS SERVICE:



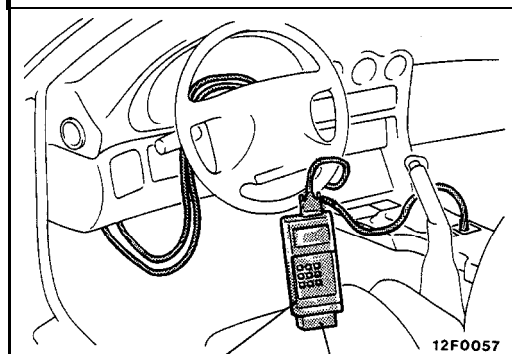
1. Check the SRS fuses (multi-purpose fuses No. 11 and No. 18).
If either is loose, tighten it; if damaged or blown, replace it.



2. After performing step 1, start engine. 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

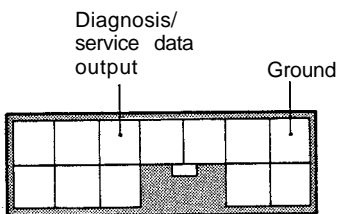
If the battery power supply (multi-purpose fuses No. 11 or No. 18) is disconnected with the ignition key in the “ON” position, the SRS warning light will continue to illuminate even after the fuses are replaced in their original positions. In this case, the SRS warning light can be extinguished by turning the ignition switch ON and OFF 10 times.



3. Turn the ignition key to the “LOCK” position.
4. Insert ROM pack into the Multi-use Tester and connect tester to Diagnosis Check Connector in glove compartment.
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 or page [52B-19].

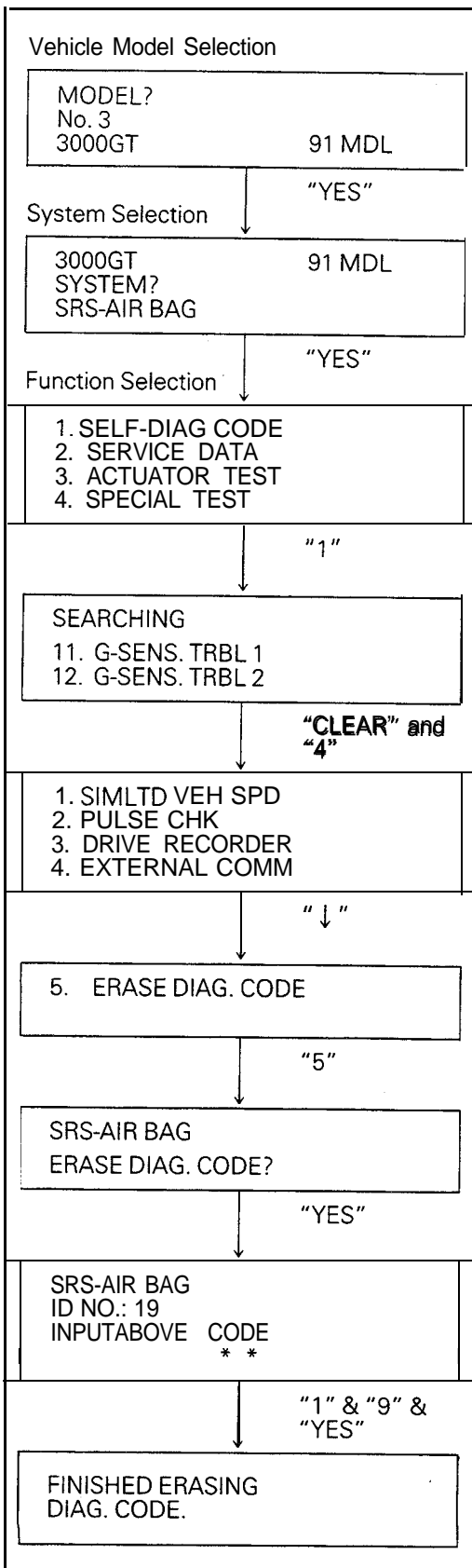
Multi-use tester
(MB991341)

ROM pack
(MB991359)



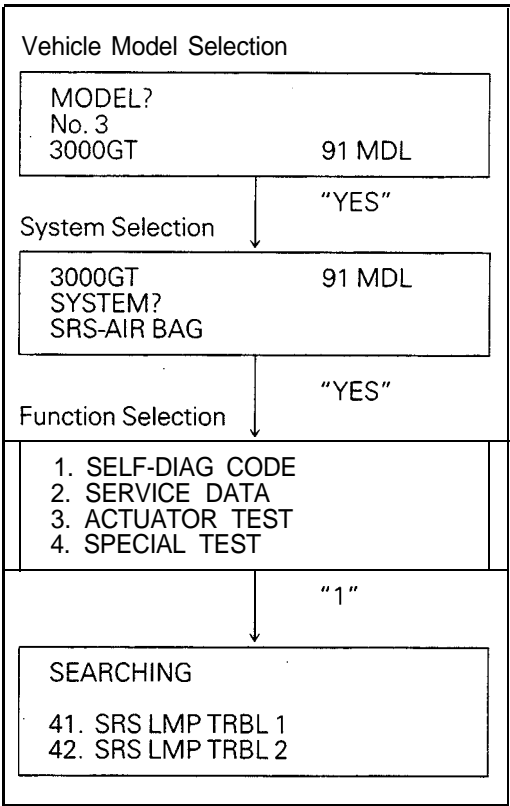
DIAGNOSTIC SEQUENCE

TEST 1	SRS WARNING LIGHT DOES NOT EXTINGUISH
---------------	--



- (1) Turn the ignition key to the "ON" position.
- (2) The Multi-use Tester display section successfully passes the self-check and the model selection menu is displayed after completing the self-check of the Multi-use Tester. Select 3000GT 91 MDL [No. 3 (Non-Turbo) or No. 4 (Turbo)] and SRS-AIR BAG system by entering the "YES" key.
- (3) If the Multi-use Tester displays "CAN'T COMM.", check the Multi-use Tester and vehicle side self-check diagnosis connector for poor connections (Refer to the previous page.) and perform **TEST 3**.
If the 3000GT 91 MDL SRS-AIR BAG system selection is successful, continue with following steps.
- (4) Select the "1. SELF-DIAG CODE" function and read (and write down) all displayed diagnosis codes.
- (5) Press the "CLEAR" key to return to the Function Selection and select the "4. SPECIAL TEST".
- (6) Press the "↓" key and select the "5. ERASE DIAG. CODE".
- (7) Erase the diagnosis codes following the Multi-use Tester messages.
- (8) 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 diagnosis codes written down at step (4) above, refer to SELF-DIAGNOSIS QUICK REFERENCE CHART (P.52B-20) and perform service indicated there.

TEST 2	SRS WARNING LIGHT DOES NOT ILLUMINATE
---------------	--



- (1) Turn the ignition key to the "ON" position.
- (2) The Multi-use Tester display section successfully passes the self-check and the model selection menu is displayed after completing the self-check of the Multi-use Tester, select 3000GT 91 MDL [No. 3 (Non-Turbo) or No. 4 (Turbo)] and SRS-AIR BAG system by entering the "YES" key.
- (3) If the Multi-use Tester displays "CAN'T COMM.", check the Multi-use Tester and vehicle side self-check diagnosis connector for poor connections (Refer to P.52B-17.) and perform TEST 4.
If the 3000GT 91 MDL SRS-AIR BAG svstem selection is successful, continue with following steps.
- (4) Select the "1. SELF-DIAG CODE" function and read (and write down) all displayed diagnosis codes.
- (5) Check diagnosis codes against SELF-DIAGNOSIS QUICK REFERENCE CHART and perform service indicated there.

52B-20 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) – Troubleshooting

SELF-DIAGNOSIS QUICK REFERENCE CHART

Fault No.	Diagnosis code name [Failure mode]	Explanation	Service
–	(NORMAL)	Normal. The SRS is in good order.	–
11	G-SENS. TRBL 1 [Short circuit]	The circuits for the front impact sensor are shorted to each other.	Perform TEST 5
12	G-SENS. TRBL 2 [One open-circuit]	Right or left impact sensor circuit is open or the wire from the sensor to the SDU is open-circuit.	
13	G-SENS. TRBL 3 [Two open-circuit]	Right and left impact sensor circuits are open or the wires from the sensors to the SDU are open-circuit.	
21	SQUIB TRBL 1 [Short circuit]	The circuits for the air bag module (squib) are shorted to each other or the circuit is grounded.	Perform TEST 6
22	SQUIB TRBL 2 [Open-circuit]	The air bag module (squib) circuit is open or the wire from the air bag to the SDU (clock spring) is open-circuit.	
31	CONDENS. VO. HI	The capacitor (integrated in the SDU) terminal voltage is higher than the specified value for 5 seconds.	(1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal. (2) After waiting at least 30 seconds, replace the SDU. (Refer to P.52B-59.)
32	CONDENS. VO. LO	The capacitor (integrated in the SDU) terminal voltage is lower than the specified value for 5 seconds.	
33	CRANKING TRBL	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 7
34	CONN. UNLOCKED	The lock switch (short bar) of the SDU double lock connector is open.	Perform TEST 8

NOTE – IMPORTANT

(1) After repairing the SRS, reconnect the battery cable, erase the diagnosis code memory from the Multi-use Tester and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)

(2) SDU = SRS Diagnosis Unit

SUPPLEMENTAL RESTRAINT SYSTEM (SRS) – Troubleshooting 52B-21

Fault No.	Diagnosis code name [Failure mode]	Explanation	Service
41	IG VOLT LOW 1	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. It takes at least 5 seconds that the SDU detects this fault.	Perform TEST 9
42	IG VOLT LOW 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. It takes at least 5 seconds that the SDU detects this fault.	Perform TEST 10
43	SRS LMP TRBL 1 [Open circuit or ground short]	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 11 When SRS warning light does not illuminate: Perform TEST 12
44	SRS LMP TRBL 2 [SRS warning light drive transistor is open-circuit]	The SRS warning light drive transistor (integrated in the SDU) is open-circuit.	(1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal. (2) After waiting at least 30 seconds, replace the SDU. (Refer to P.52B-59.)
45	SRS DIAG. UNIT	The EEP ROM or A/D converter (integrated in the SDU) is defective.	

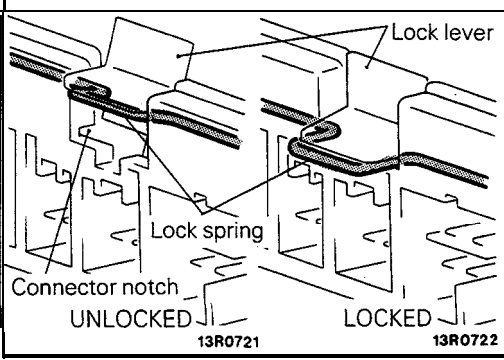
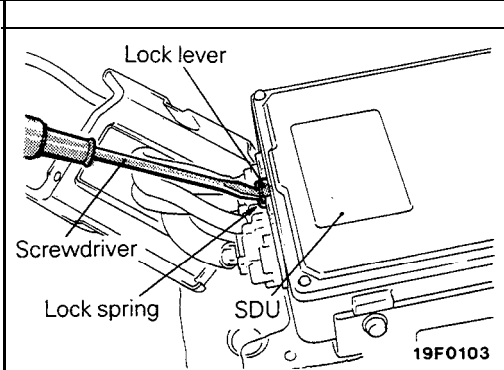
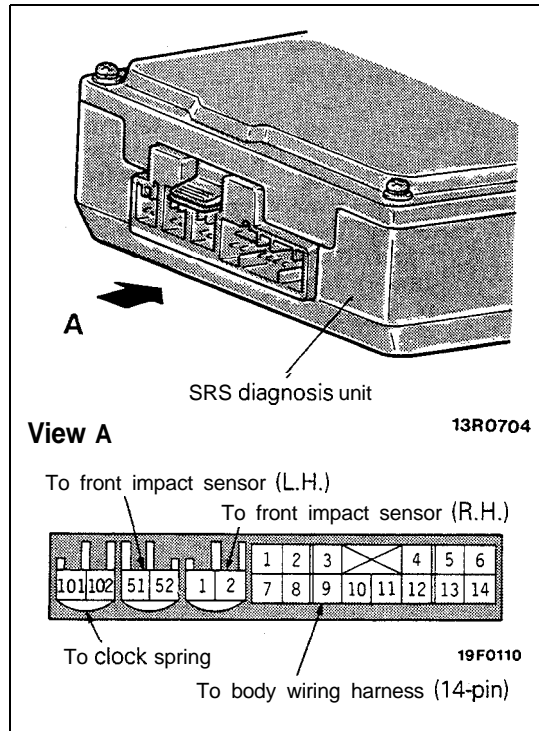
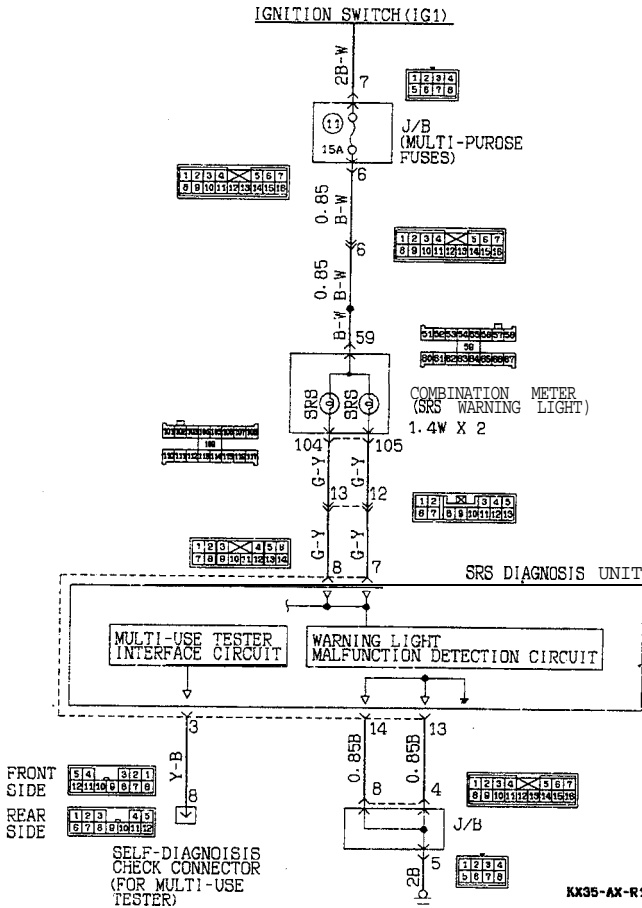
NOTE – IMPORTANT

(1) After repairing the SRS, reconnect the battery cable, erase the diagnosis code memory from the Multi-use Tester and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)

(2) SDU = SRS Diagnosis Unit

TEST 3

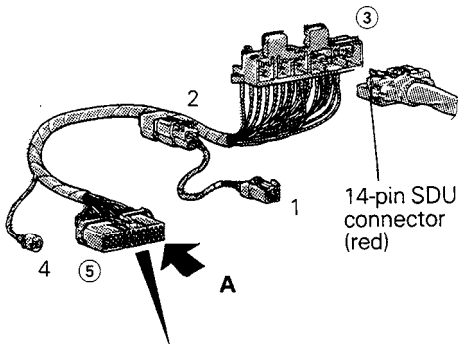
NO COMMUNICATION BETWEEN MULTI-USE TESTER AND SDU (SRS warning light does not extinguish)



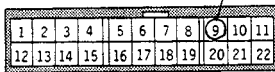
- Turn the ignition key to the "LOCK" position, disconnect the negative ignition battery cable and tape the terminal.
Caution
Wait at least 30 seconds after disconnecting the battery cable before doing any further work. The SRS system is designed to retain enough voltage to deploy the air bag for a short 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 cable is disconnected.
- Remove the rear console assembly. (Refer to GROUP 52A – Floor Console.)
- Use a screwdriver to push in the lock spring of the lock lever of the SRS diagnosis unit to unlock the lock lever.
Caution
A double-lock mechanism is employed for the connector of the SRS diagnosis unit, so care must be taken not to damage it by using excessive force or by not disconnecting it correctly.
- Disconnect the red 14-pin connector from the SRS diagnosis unit while pressing down the lock of the connector. (Refer to P.52B-9.)

SUPPLEMENTAL RESTRAINT SYSTEM (SRS) – Troubleshooting 52B-23

MB991349
SRS Check Harness



View A
SRS Check Harness connector ⑤
Diagnosis check connector

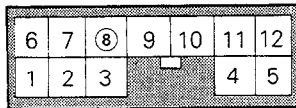


16R2188

- (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 below, using the specified digital multi-meter.

Is there continuity between the No. 9 terminal of SRS Check Harness connector ⑤ and the No. 8 terminal of the diagnosis check connector (next to the right side of the junction block)?

Diagnosis check connector



13R0735

No → Body wiring harness damaged or disconnected between the SDU and the diagnosis check connector → Repair or replace the body wiring harness. (Refer to P.52B-14.)

Yes

Is there continuity between the No. 13 or No. 14 terminal of SRC Check Harness connector ⑤ and ground?

No → Malfunction of the SDU. → Replace the SDU. (Refer to P.52B-59.)

Yes

The harness between the SRS warning light and the SDU is grounded.

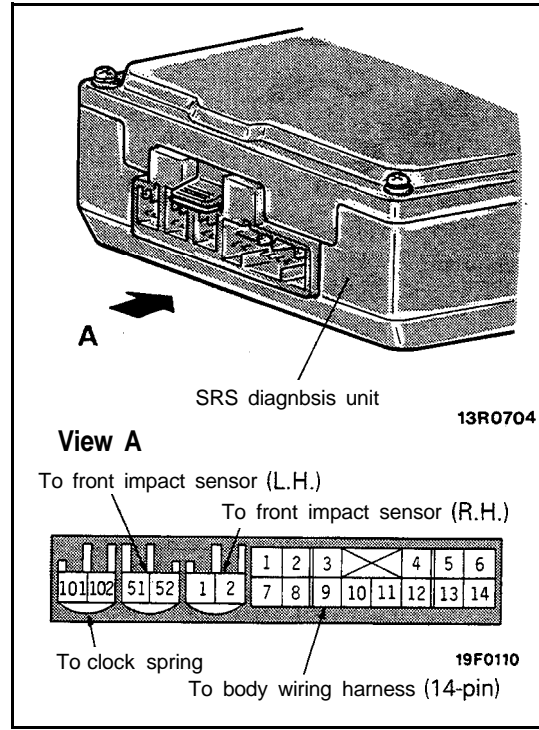
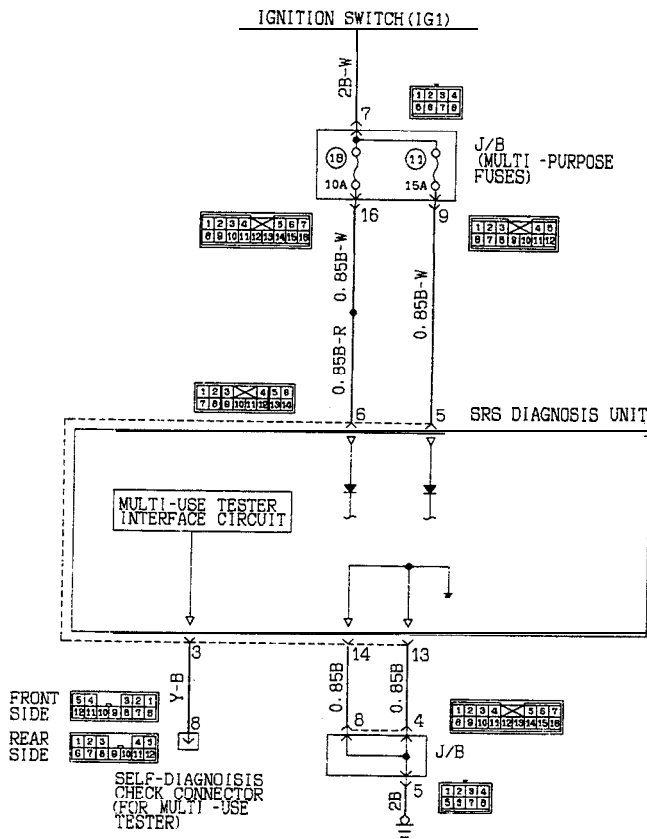
Repair or replace the body wiring harness at the location of the short circuit. (Refer to P.52B-14.)

NOTE – IMPORTANT

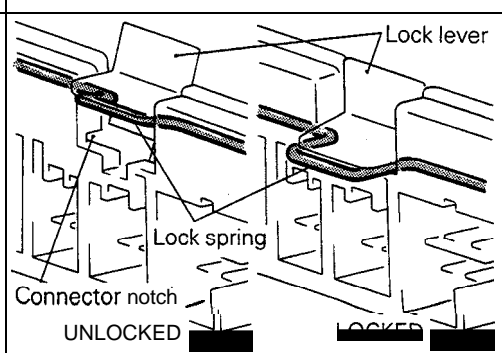
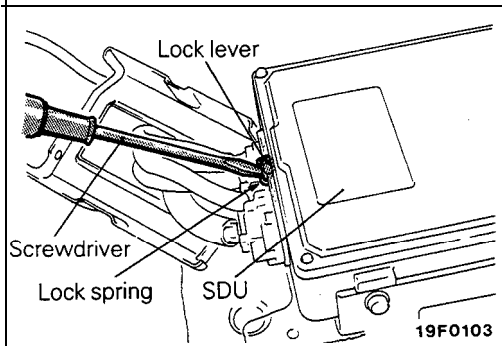
- (1) After repairing the SRS, reconnect the battery cable, erase the diagnosis code memory from the Multi-use Tester and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)
- (2) SDU = SRS Diagnosis Unit

TEST 4

NO COMMUNICATION BETWEEN MULTI-USE TESTER AND SDU
(SRS warning light does not illuminate)



KX35-AX-R1502-N



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

Caution

Wait at least 30 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 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 cable is disconnected.

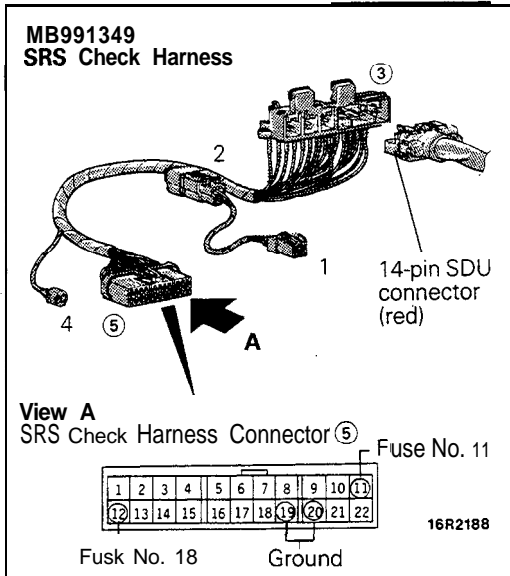
- Remove the rear console assembly. (Refer to GROUP 52A – Floor Console.)

- Use a screwdriver to push in the lock spring of the lock lever of the SRS diagnosis unit to unlock the lock lever.

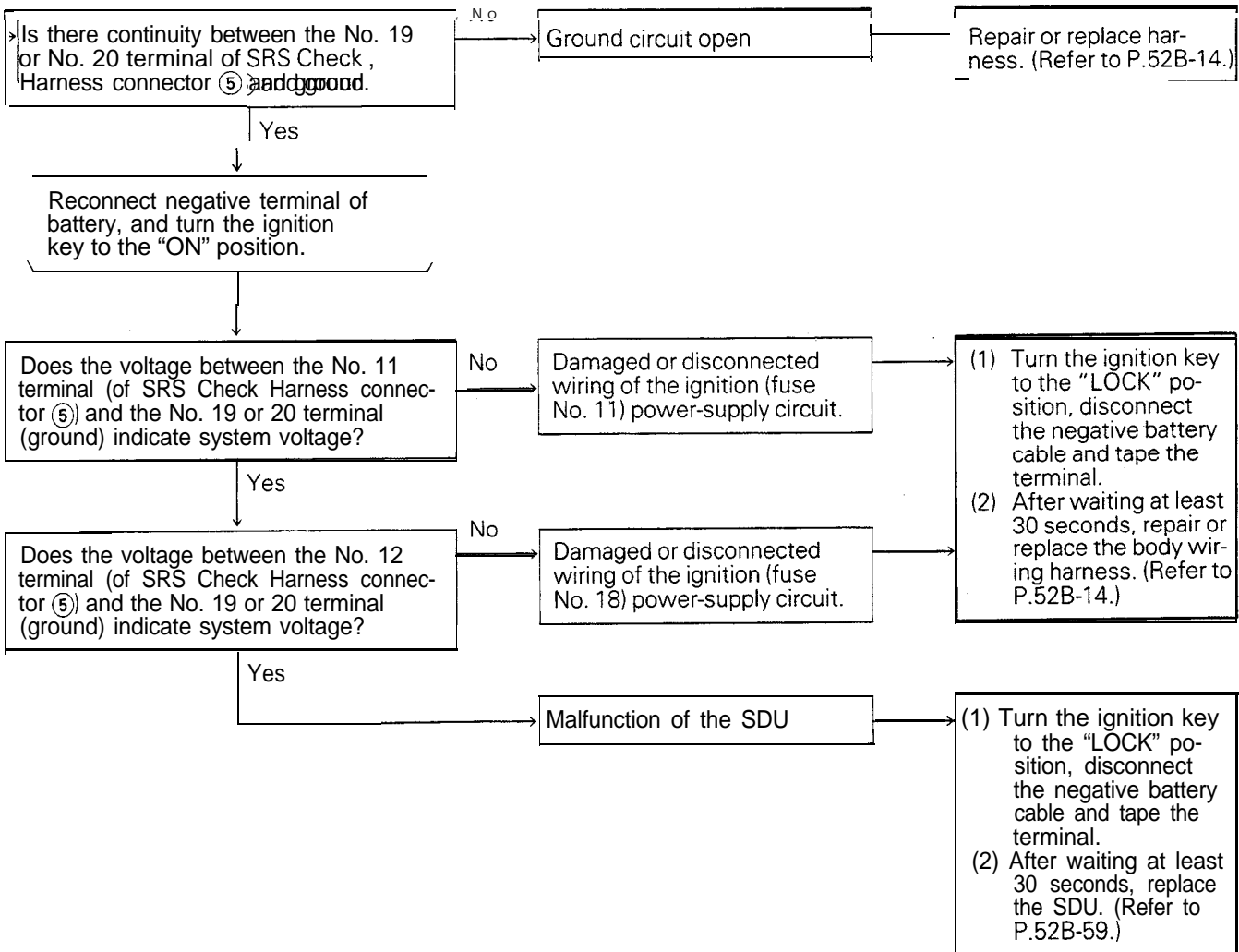
Caution

A double-lock mechanism is employed for the connector of the SRS diagnosis unit, so care must be taken not to damage it by using excessive force or by not disconnecting it correctly.

- Disconnect the red 14-pin connector from the SRS diagnosis unit while pressing down the lock of the connector. (Refer to 52B-9)



- (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 below using the digital multi-meter.

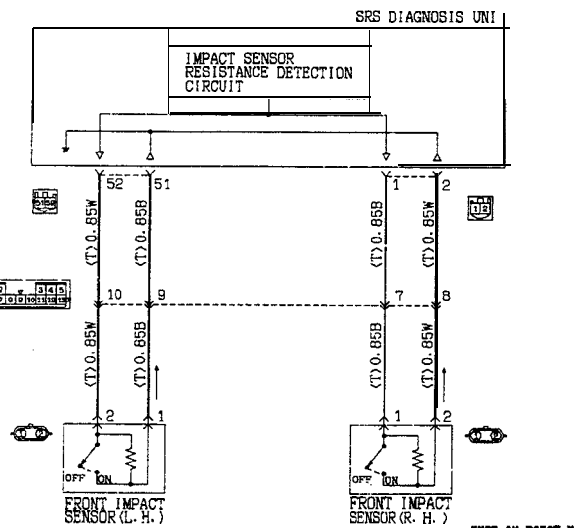


NOTE –IMPORTANT

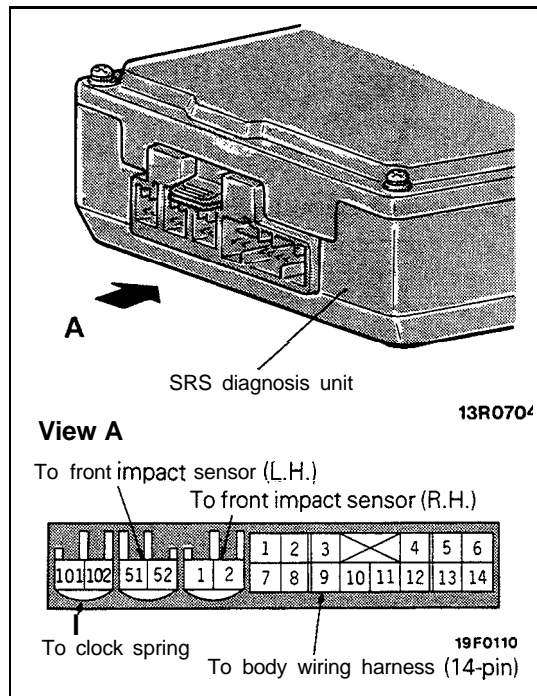
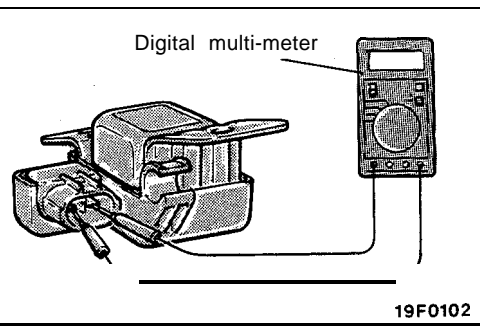
- (1) After repairing the SRS, reconnect the battery cable, erase the diagnosis code memory from the Multi-use Tester and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)
- (2) SDU= SRS Diagnosis Unit

TEST 5

REPAIR REQUIRED FOR "11. G-SENS. TRBL 1", "12. G-SENS. TRBL 2" or "13. G-SENS. TRBL 3" FAULT



Front impact sensor resistance check

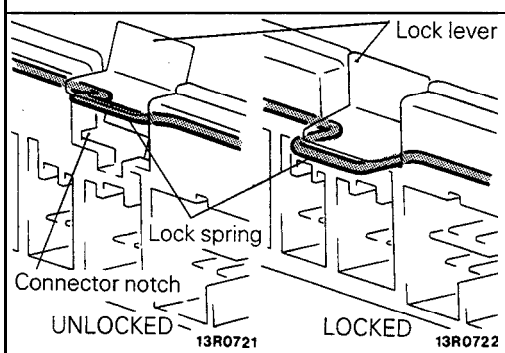
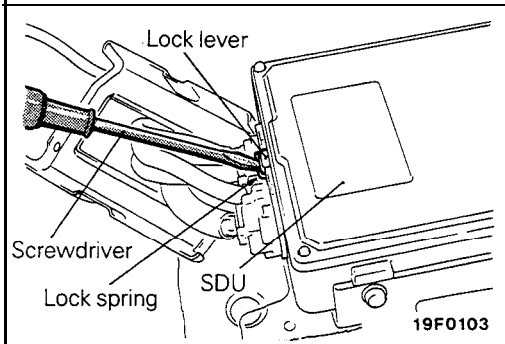


NOTE
 If combined front impact sensor and air bag module (squib) failure modes simultaneously occur in two places, the preconditions for the respective detection circuits will go out of order. For this reason, both diagnosis codes may not be stored but only one of them may be indicated. Their relationships are shown in the following table.

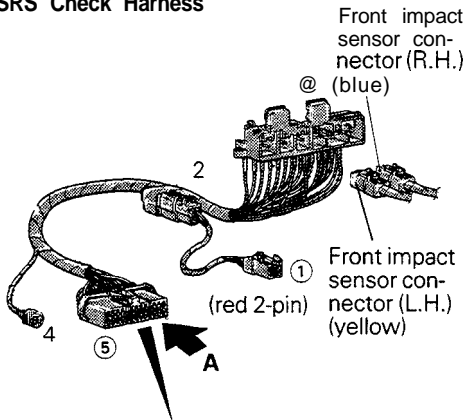
		Front impact sensors		
		Short-circuited	One open-circuited	Two open-circuited
Air bag module (Squib)	Short-circuited	11 and/or 21	12 and/or 21	13 and/or 21
	Open-circuited	11 and/or 22	12 and/or 22	13 and/or 22

The numbers in the boxes are diagnosis codes numbers. (Refer to P.52B-20.)

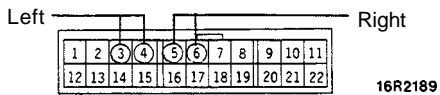
SUPPLEMENTAL RESTRAINT SYSTEM (SRS) – Troubleshooting 52B-27



MB991 349 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 30 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 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 cable is disconnected.

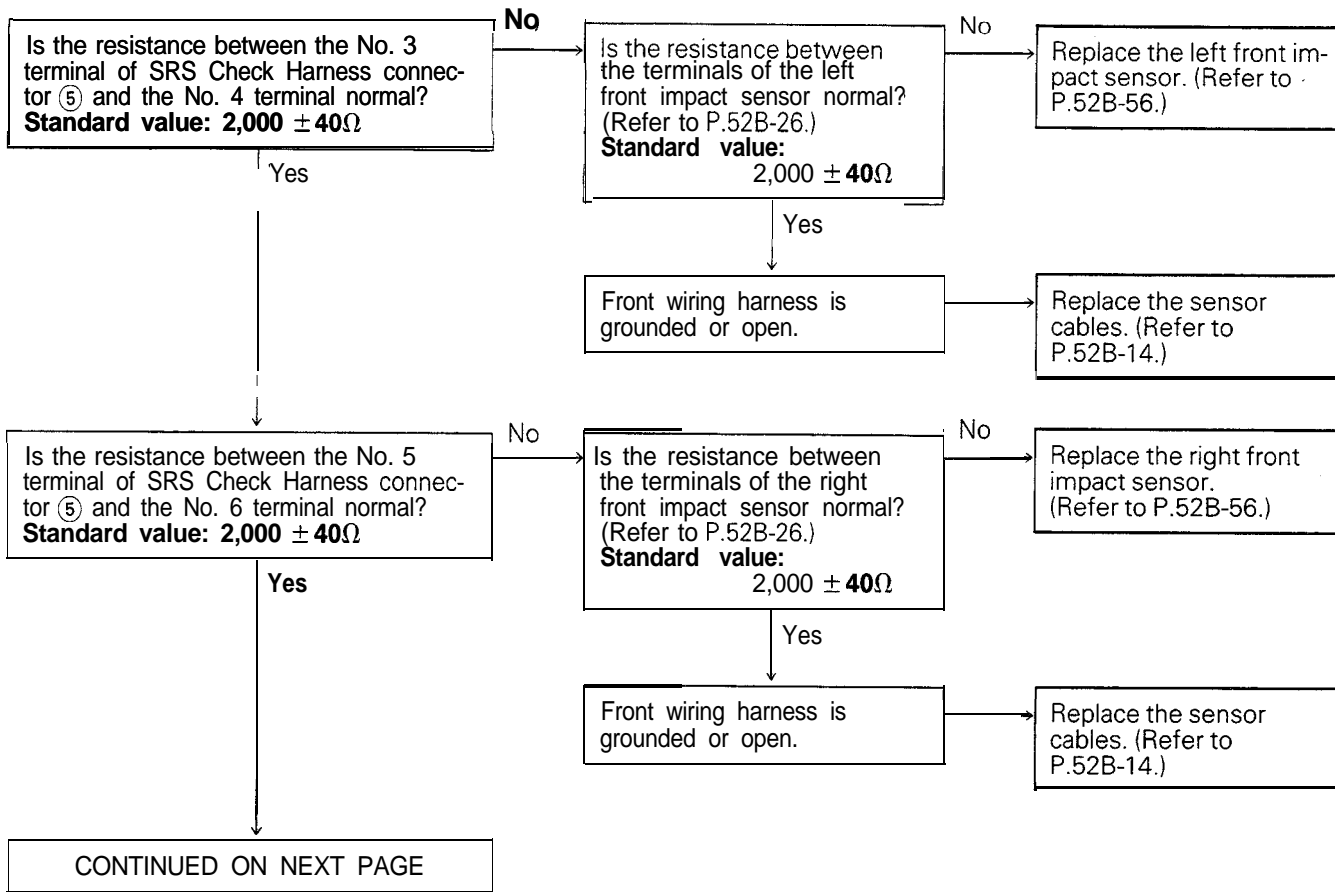
- (2) Remove the rear console assembly. (Refer to GROUP 52A – Floor Console.)
- (3) Use a screwdriver to push in the lock spring of the lock lever of the SRS diagnosis unit to unlock the lock lever.

Caution

A double-lock mechanism is employed for the connector of the SRS diagnosis unit, so care must be taken not to damage it by using excessive force or by not disconnecting it correctly.

- (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-9.)
- (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 below, using the digital multi-meter and Multi-use Tester.

52B-28 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) – Troubleshooting



NOTE – IMPORTANT

(1) After repairing the SRS, reconnect the battery cable, erase the diagnosis code memory from the Multi-use Tester and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)

(2) SDU = SRS Diagnosis Unit

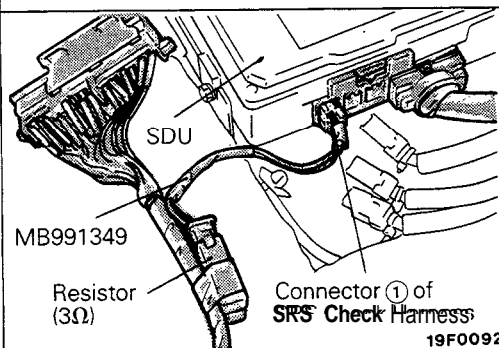
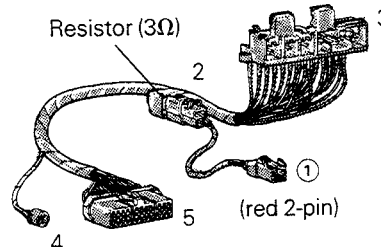
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- (1) Connect the red 2-pin connector ① of the SRS Check Harness to the SDU in place of the now-disconnected clock spring-SDU connector.

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.

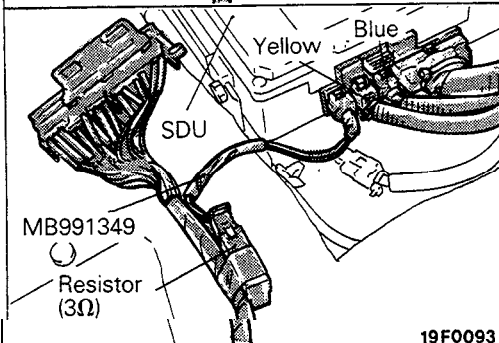
**MB991 349
SRS Check Harness**



- (2) Reconnect blue and yellow connectors, for the wiring leading to the front impact sensors, to the SDU and double lock them. (Refer to P.52B-9.)

NOTE

If double locking cannot be made, the connector is incorrectly or incompletely inserted; re-check to insert the connector correctly and securely.



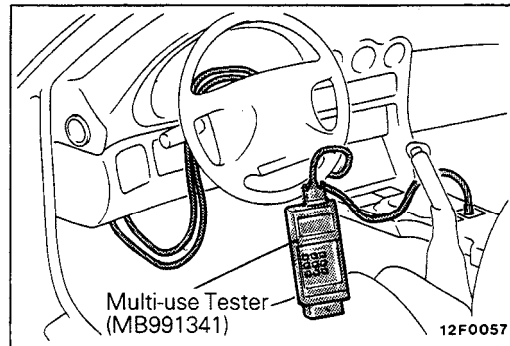
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NOTE – IMPORTANT

- (1) After repairing the SRS, reconnect the battery cable, erase the diagnosis code memory from the Multi-use Tester and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)
- (2) SDU = SRS Diagnosis Unit

CONTINUED FROM PREVIOUS PAGE

- (1) Reconnect negative terminal of battery, and turn the ignition key to the "ON" position.
- (2) Using the Multi-use Tester, erase the diagnosis code memory. (Refer to TEST 1.)
- (3) 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?

Yes

No

Malfunction of the SDU.

- (1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.
- (2) After waiting at least 30 seconds, replace the SDU. (Refer to P.52B-59.)

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

Caution

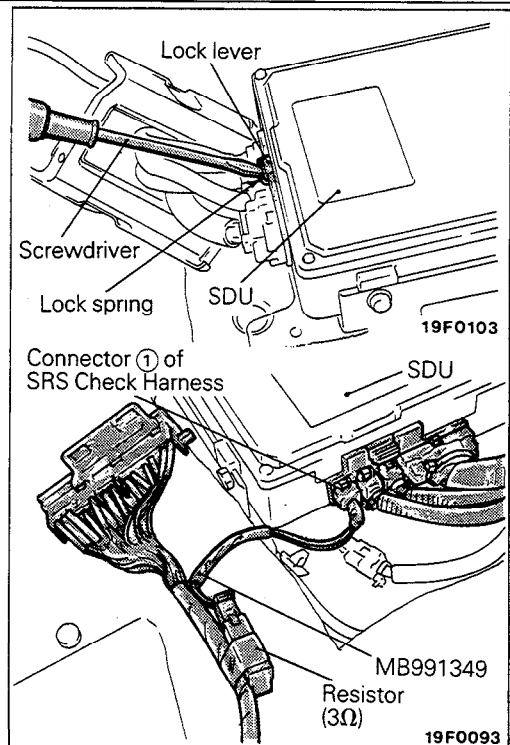
Wait at least 30 seconds after disconnecting the battery cable before doing any further work. The SRS system is designed to retain enough voltage to deploy the air bag for a short time even after the battery has been disconnected, so serious injury may result from unintended air bag deployment if work is done on the SRS system immediately after the battery cable is disconnected.

- (2) Use a screwdriver to push in the lock spring of the lock lever of the SRS diagnosis unit to unlock the lock lever.

Caution

A double-lock mechanism is employed for the connector of the SRS diagnosis unit, so care must be taken not to damage it by using excessive force or by not disconnecting it correctly.

- (3) Disconnect the red 2-pin connector of the SRS Check Harness from the SDU while pressing down the lock of the connector. (Refer to P.52B-9.)



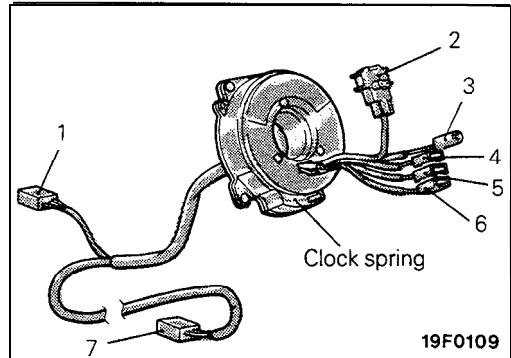
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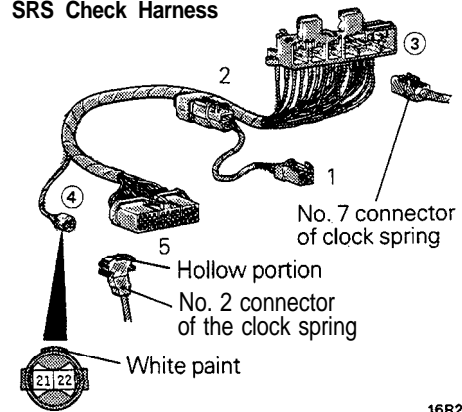
- (1) Remove the air bag module. (Refer to P.52B-62.)
- (2) Join the No. 2 and No. 7 connectors of the clock spring to SRS Check Harness connector ④ and SRS Check Harness connector ③, respectively.

NOTE

When joining SRS Check Harness connector ④, align its white paint with the hollow portion of the No. 2 connector of the clock spring.



**MB991349
SRS Check Harness**



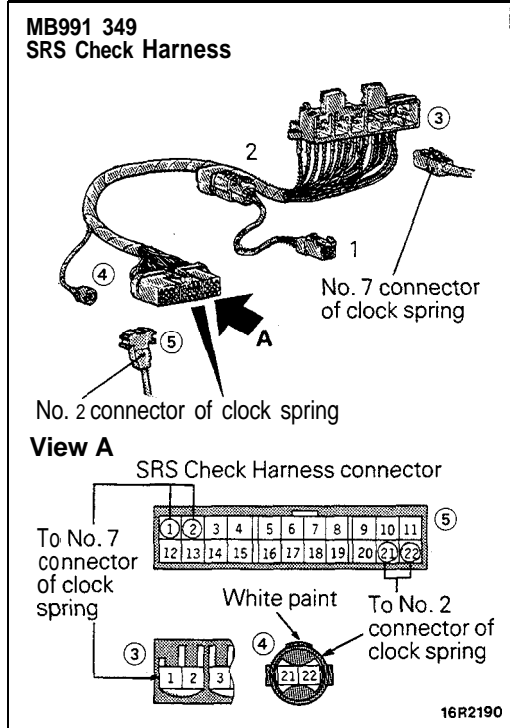
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52B-32 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) – Troubleshooting

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- (1) 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 0.4Ω



Yes

No

Malfunction of the clock spring.

Replace the clock spring. (Refer to P.52B-62.)

Malfunction of the air bag module.

Replace the air bag module. (Refer to P.52B-62.)

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 diagnosis code memory from the Multi-use Tester and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)

(2) SDU = SRS Diagnosis Unit

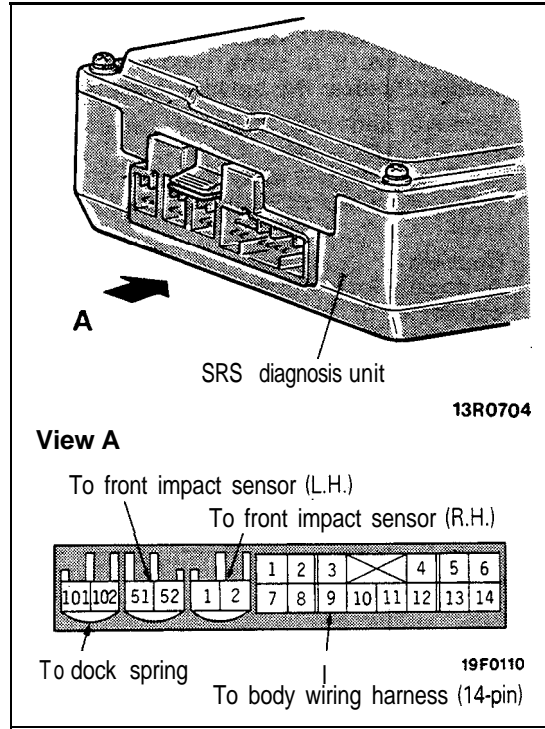
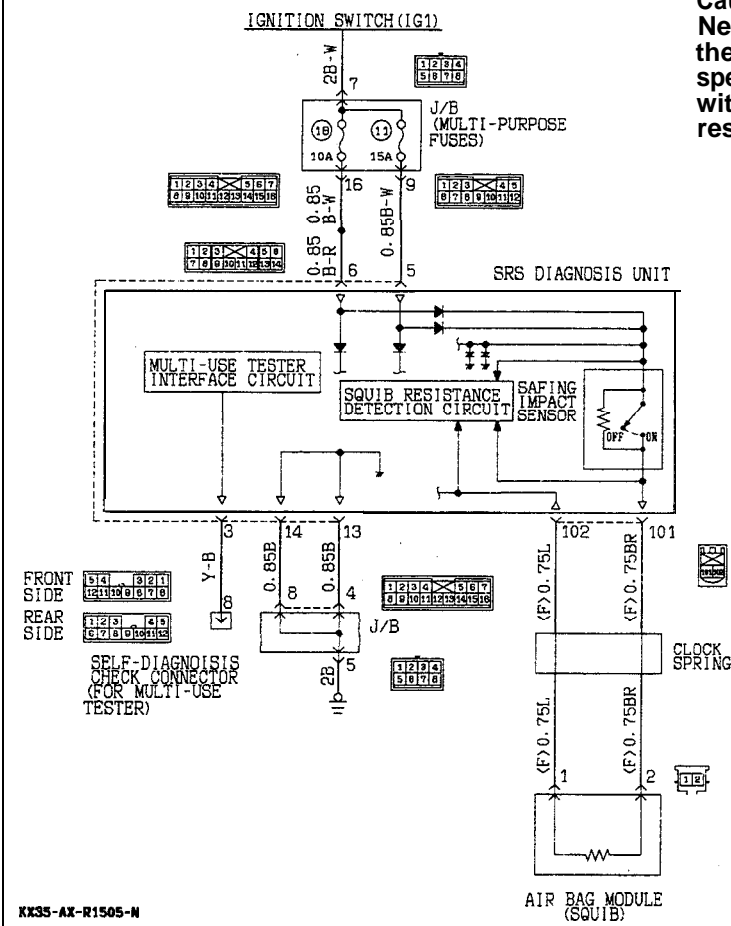
SUPPLEMENTAL RESTRAINT SYSTEM (SRS) – Troubleshooting 52B-33

TEST 6

REPAIR REQUIRED FOR “21. SQUIB TRBL 1” or “22. SQUIB TRBL 2” FAULT

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.



Have the other diagnosis code test(s) been finished? No → Perform the other diagnosis code test(s) prior to this test.

Yes

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 diagnosis codes may not be stored but only one of them may be indicated. Their relationships are shown in the following table.

		Front impact sensors		
		Short-circuited	One open-circuited	Two open-circuited
Air bag module (Squib)	Short-circuited	11 and/or 21	12 and/or 21	13 and/or 21
	Open-circuited	11 and/or 22	12 and/or 22	13 and/or 22

The numbers in the boxes are diagnosis codes numbers. (Refer to P.52B-20.)

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TSB Revision

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

Caution

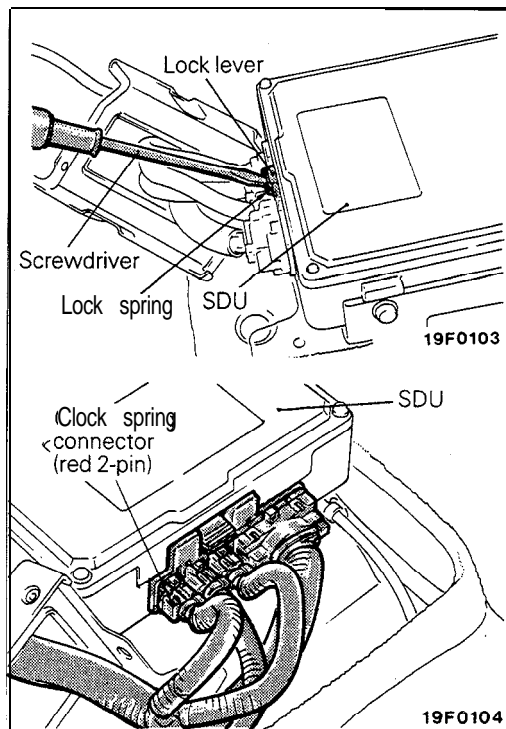
Wait at least 30 seconds after disconnecting the battery cable before doing any further work. The SRS system is designed to retain enough voltage to deploy the air bag for a short time even after the battery has been disconnected, so serious injury may result from unintended air bag deployment if work is done on the SRS system immediately after the battery cable is disconnected.

- (2) Remove the rear console assembly. (Refer to GROUP 52A – Floor Console.)
- (3) Use a screwdriver to push in the lock spring of the lock lever of the SRS diagnosis unit to unlock the lock lever.

Caution

A double-lock mechanism is employed for the connector of the SRS diagnosis unit, so care must be taken not to damage it by using excessive force or by not disconnecting it correctly.

- (4) Disconnect the red 2-pin connector from the SDU while pressing down the lock of the connector. (Refer to P.52B-9.)



- (1) 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 air bag module (squib) through the clock spring.

NOTE

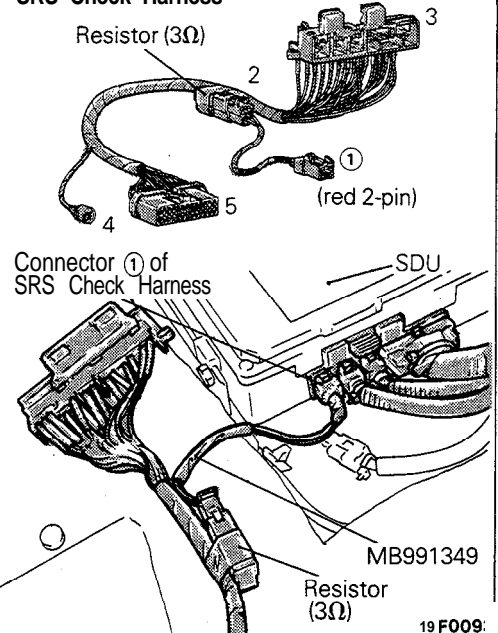
A 3-ohm resistor that corresponds to the resistance of the air bag module (squib) and the wiring resistance is connected between the terminals of the connector ① of the SRS Check Harness.

- (2) Make the double locking.

NOTE

If double locking cannot be made, the connector is incorrectly or incompletely inserted; re-check to insert the connector correctly and securely.

**MB991349
SRS Check Harness**

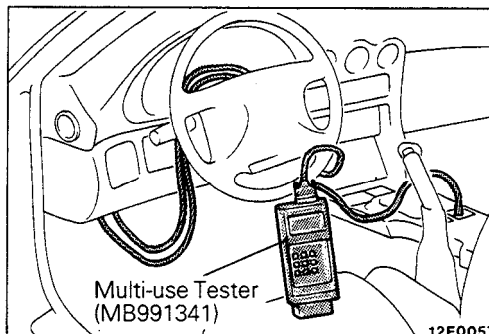


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TSB Revision

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- (1) Reconnect negative terminal of battery, and turn the ignition key to the "ON" position.
- (2) Using the Multi-use Tester, erase the diagnosis code memory. (Refer to TEST 1.)
- (3) Return the ignition key from the "ON" to the "LOCK" position and then back to the "ON" position.



Malfunction of the SDU.

tion

No

Yes

- (1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.
- (2) After waiting at least 30 seconds, replace the SDU. (Refer to P.52B-59.)

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

Caution

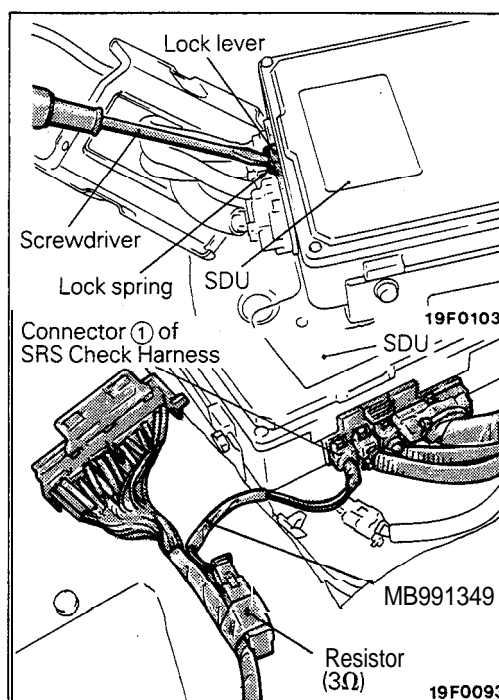
Wait at least 30 seconds after disconnecting the battery cable before doing any further work. The SRS system is designed to retain enough voltage to deploy the air bag for a short time even after the battery has been disconnected, so serious injury may result from unintended air bag deployment if work is done on the SRS system immediately after the battery cable is disconnected.

- (2) Use a screwdriver to push in the lock spring of the lock lever of the SRS diagnosis unit to unlock the lock lever.

Caution

A double-lock mechanism is employed for the connector of the SRS diagnosis unit, so care must be taken not to damage it by using excessive force or by not disconnecting it correctly.

- (3) Disconnect the red 2-pin connector of the SRS Check Harness from the SDU while pressing down the lock of the connector. (Refer to P.52B-9.)



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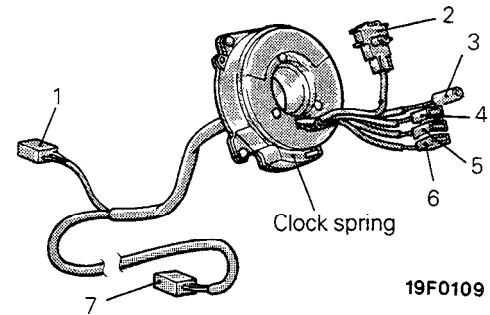
TSB Revision

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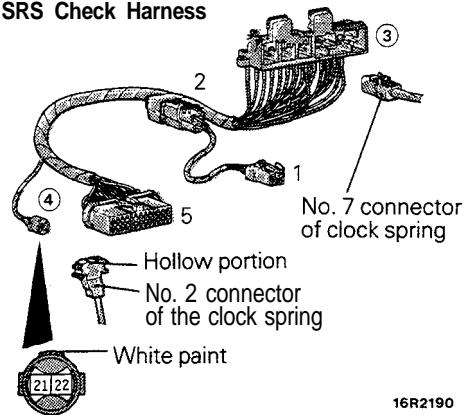
- (1) Remove the air bag module. (Refer to P.52B-62.)
- (2) Join the No. 2 and No. 7 connectors of the clock spring to SRS Check Harness connector ④ and SRS Check Harness connector ③, respectively.

NOTE

When joining SRS Check Harness connector ④, align its white paint with the hollow portion of the No. 2 connector of the clock spring.



**MB991349
SRS Check Harness**

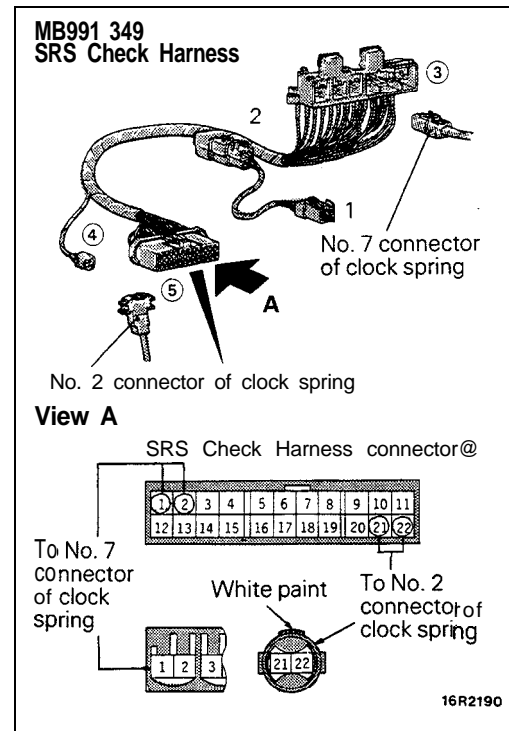


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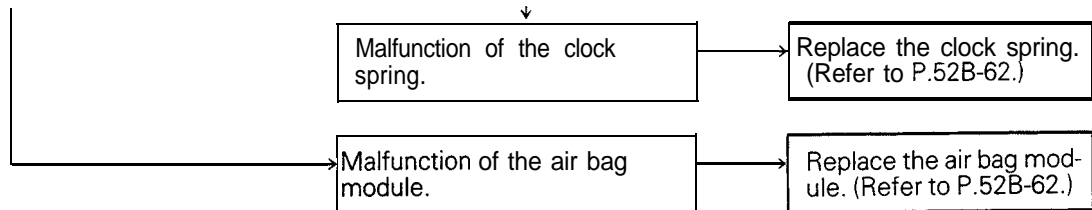
(1) Is the resistance between terminal 1 and terminal 2 of SRS Check Harness connector (5), and between terminal 2 and terminal 22 of SRS Check Harness connector (5) normal?

Standard value: less than 0.4Ω



Yes

No



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.

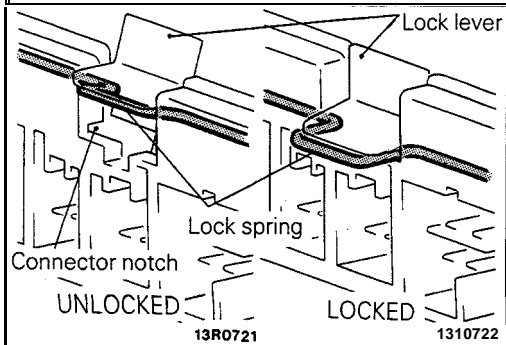
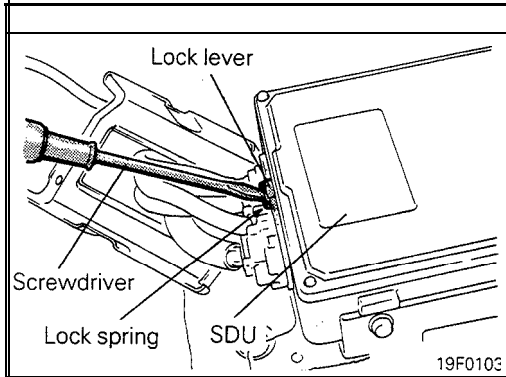
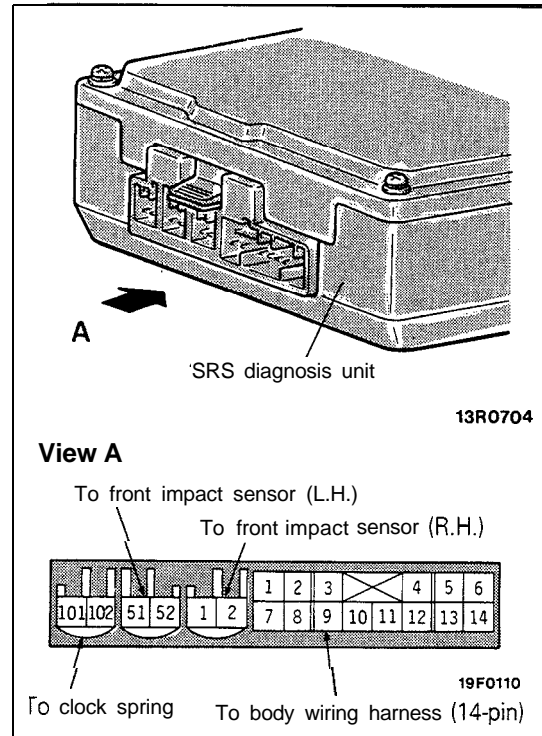
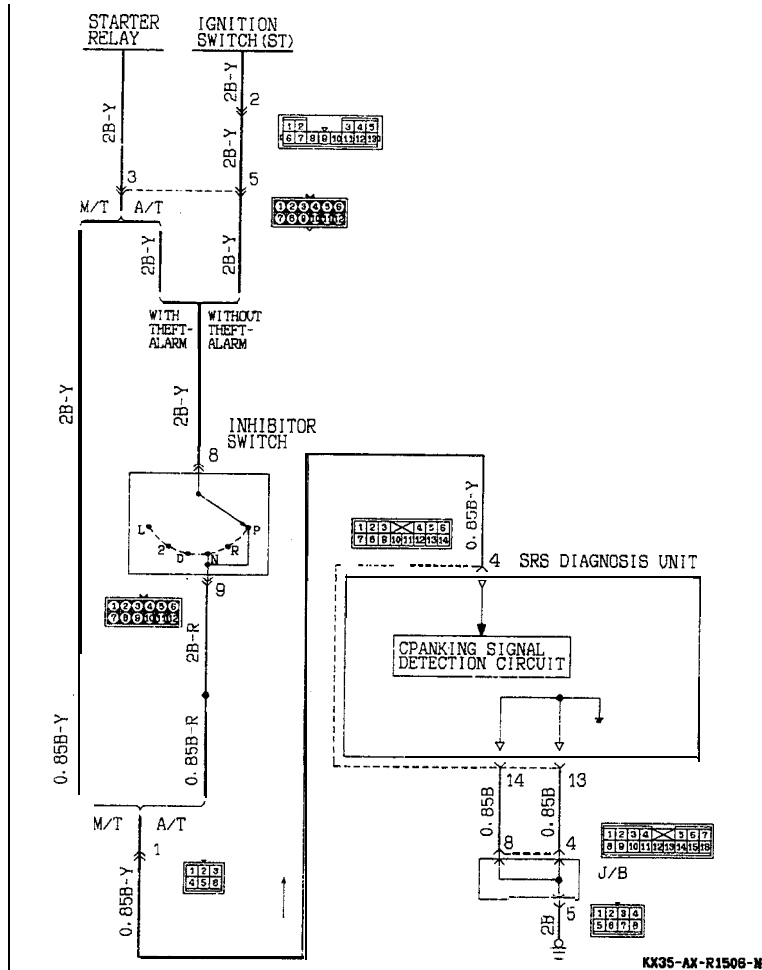
NOTE – IMPORTANT

(1) After repairing the SRS, reconnect the battery cable, erase the diagnosis code memory from the Multi-use Tester and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)

(2) SDU = SRS Diagnosis Unit

TEST 7

REPAIR REQUIRED FOR "33. CRANKING TRBL" FAULT



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

Caution

Wait at least 30 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 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 cable is disconnected.

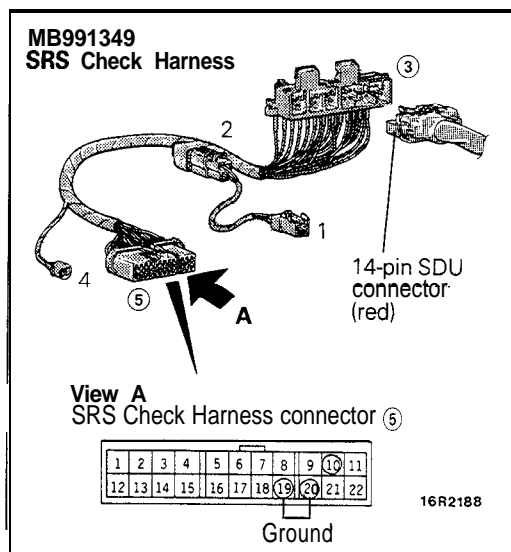
- Remove the rear console assembly. (Refer to GROUP 52A – Floor Console.)
- Use a screwdriver to push in the lock spring of the lock lever of the SRS diagnosis unit to unlock the lock lever.

Caution

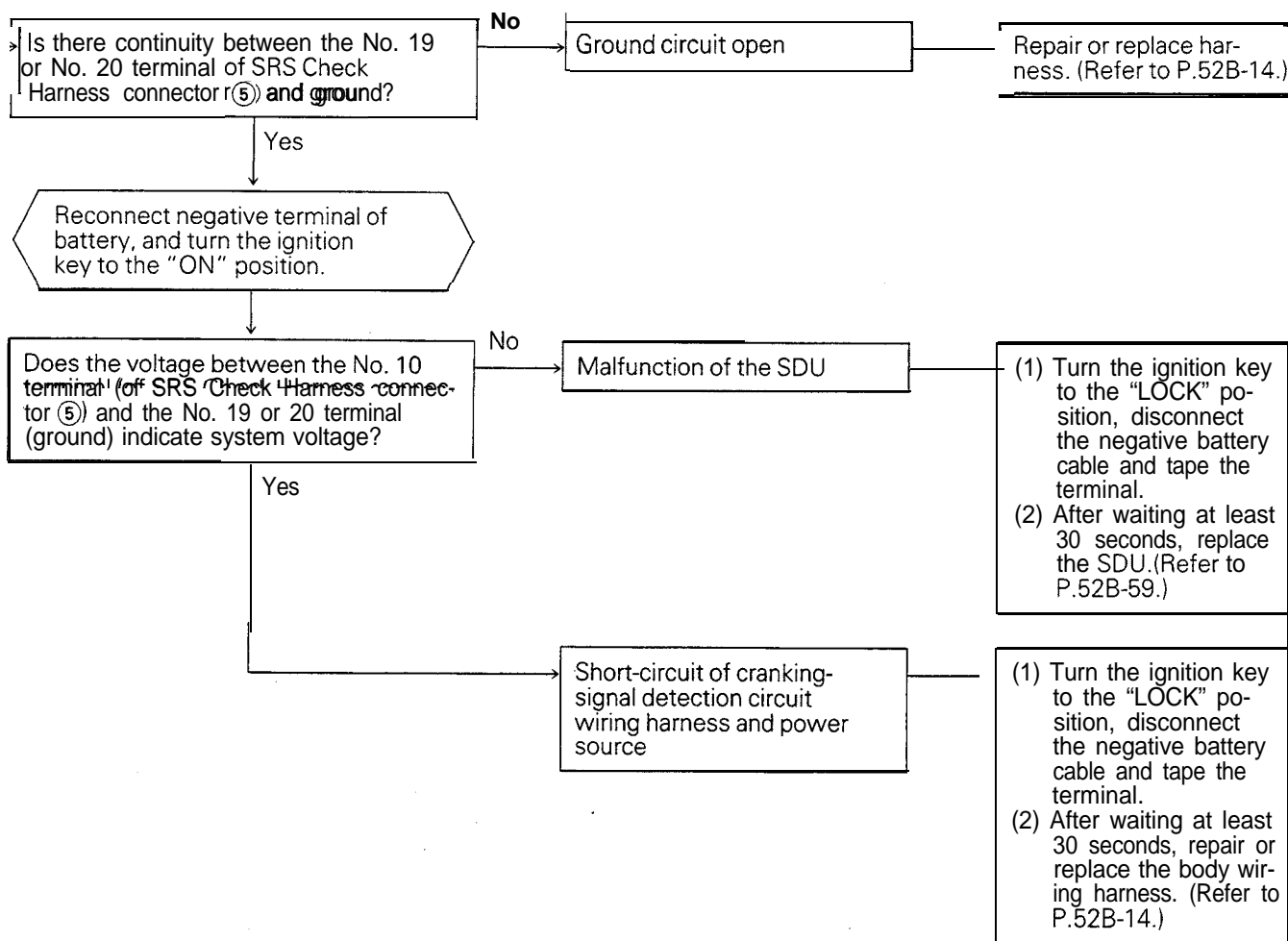
A double-lock mechanism is employed for the connector of the SRS diagnosis unit, so care must be taken not to damage the connector by using excessive force or by not disconnecting it correctly.

- Remove the red 14-pin connector from the SRS diagnosis unit while pressing down the lock of the connector. (Refer to P.52B-9.)

SUPPLEMENTAL RESTRAINT SYSTEM (SRS) – Troubleshooting 52B-39



- (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 below, using the digital multi-meter.



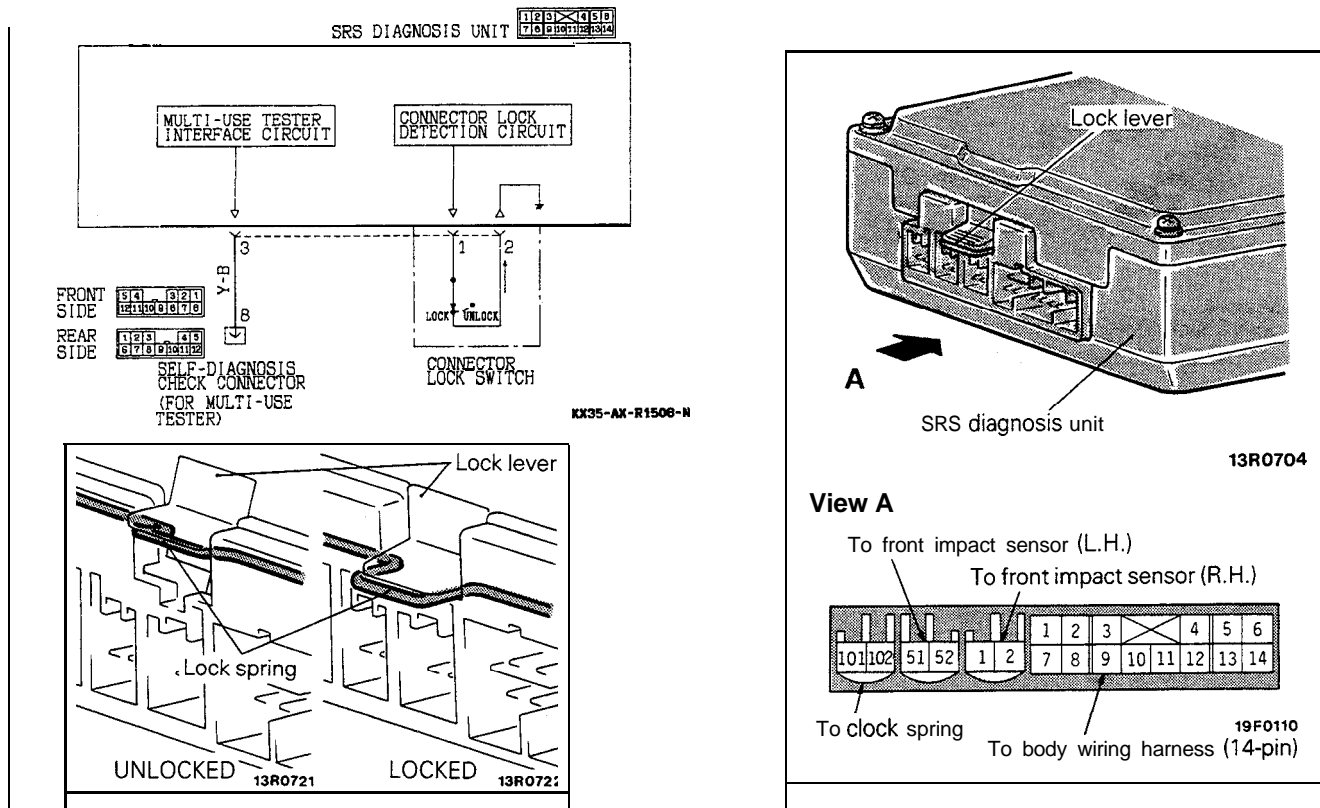
NOTE – IMPORTANT

- (1) If more than 45 seconds of cranking is required to start up the engine, the diagnosis code will be stored in memory, but if there is no problem, the diagnosis code will be cleared and the SRS will return to normal.
- (2) After repairing the SRS, reconnect the battery cable, erase the diagnosis code memory from the Multi-use Tester and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)
- (3) SDU = SRS Diagnosis Unit

52B-40 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) – Troubleshooting

TEST 8

REPAIR REQUIRED FOR “34. CONN. UNLOCKED” FAULT



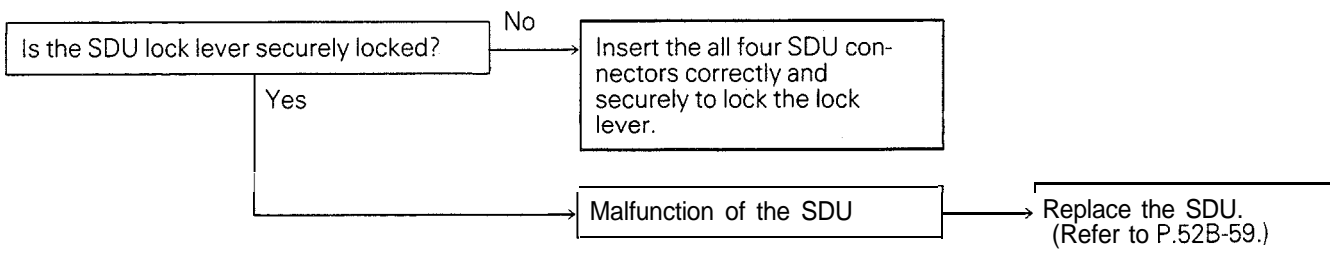
(1) Turn the ignition key to the “LOCK” position, disconnect the negative battery cable and tape the terminal.

Caution

Wait at least 30 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 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 cable is disconnected.

(2) Remove the floor console. (Refer to GROUP 52A – Floor Console.)

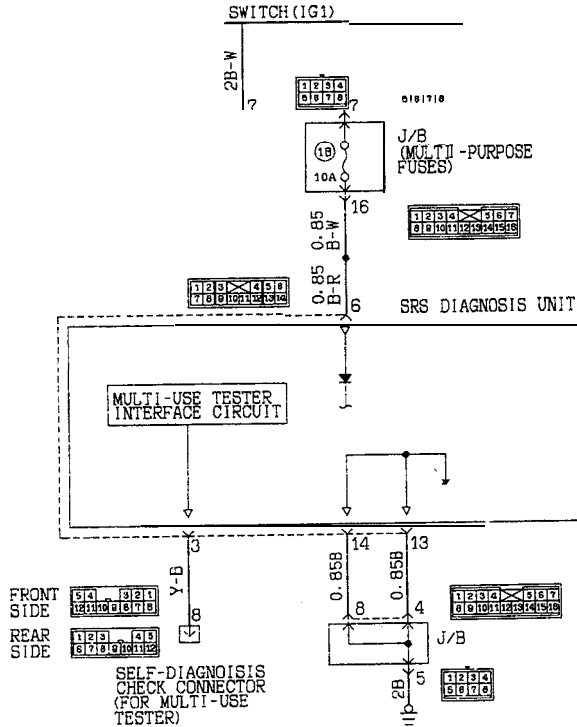


NOTE – IMPORTANT

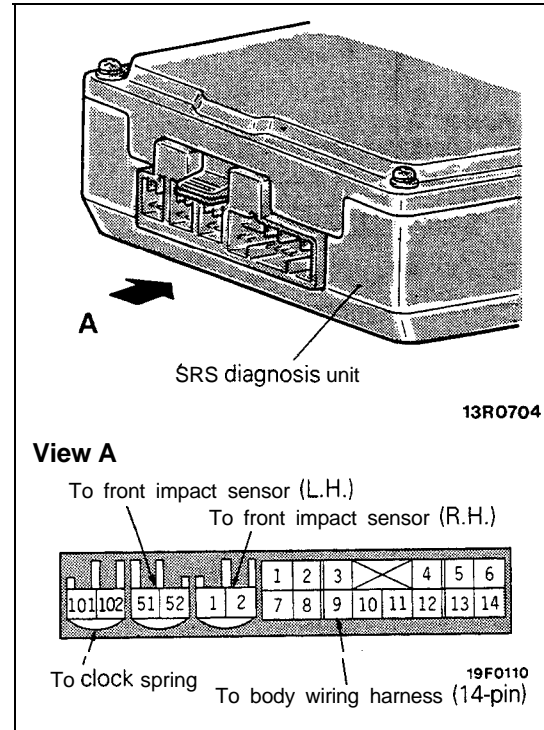
(1) After repairing the SRS, reconnect the battery cable, erase the diagnosis code memory from the Multi-use Tester and check the SRS warning light operation to verify the system functions properly. (Refer to Test 1.)

(2) SDU = SRS Diagnosis Unit

TEST 9 | REPAIR REQUIRED FOR “41. IG VOLT LOW 1” FAULT



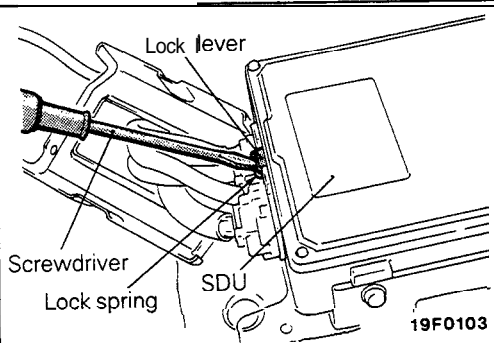
KX35-AX-R1504-N



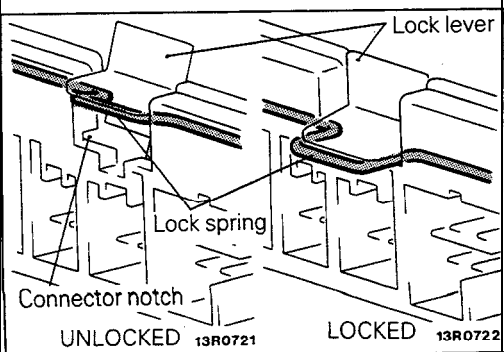
13R0704

View A

19F0110



19F0103



UNLOCKED 13R0721

LOCKED 13R0722

- Turn the ignition key to the “LOCK” position, disconnect the negative battery cable and tape the terminal.

Caution

Wait at least 30 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 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 cable is disconnected.

- Remove the rear console assembly. (Refer to GROUP 52A – Floor Console.)

- Use a screwdriver to push in the lock spring of the lock lever of the SRS diagnosis unit to unlock the lock lever.

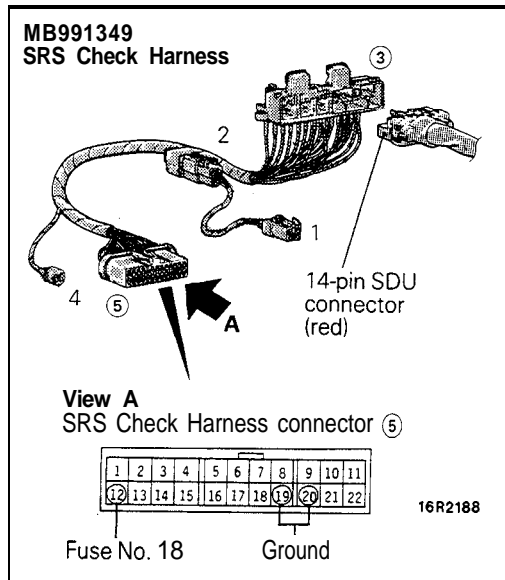
Caution

A double-lock mechanism is employed for the connector of the SRS diagnosis unit, so care must be taken not to damage it by using excessive force or by not disconnecting it correctly.

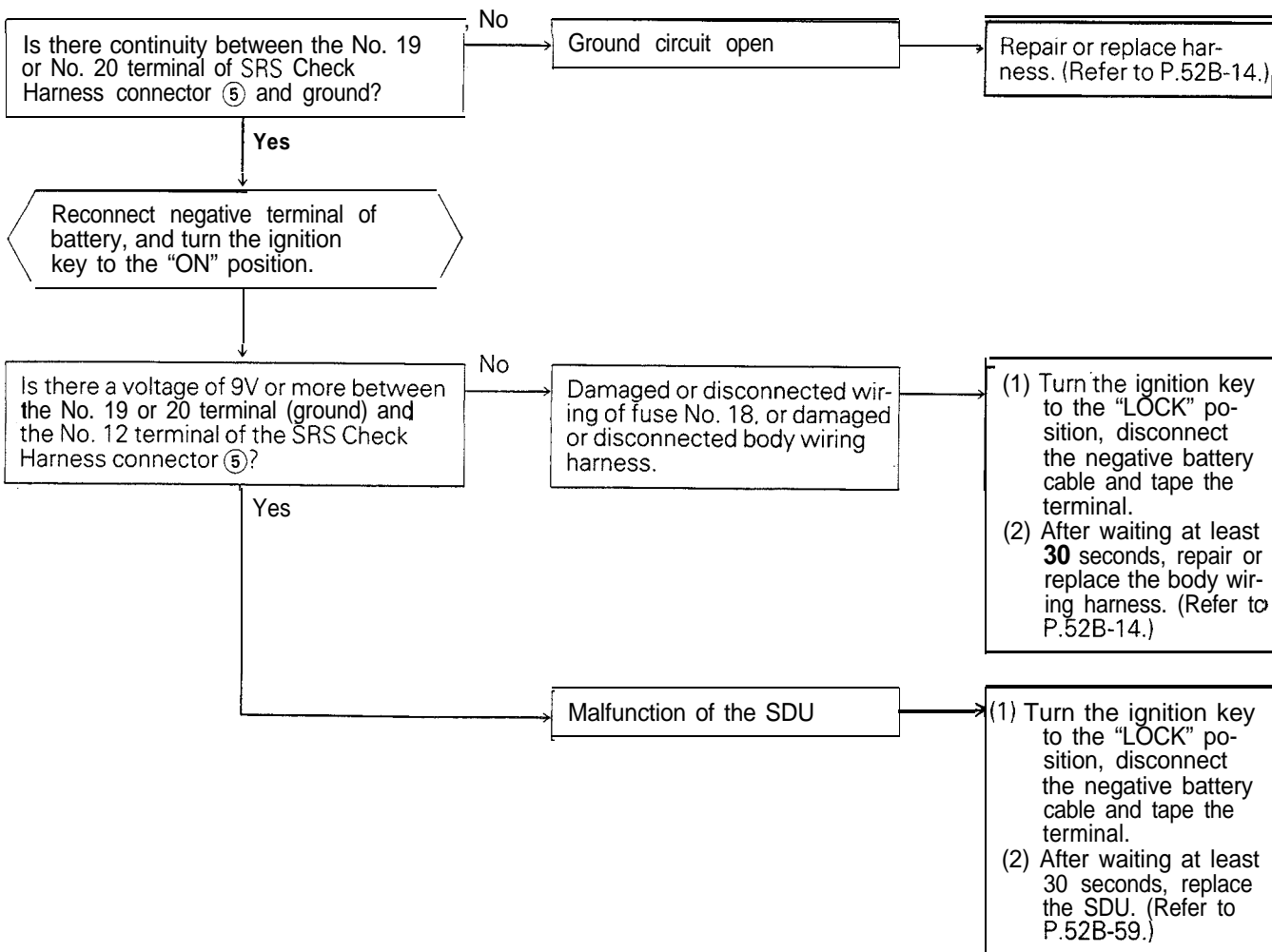
- Disconnect the red 14-pin connector from the SRS diagnosis unit while pressing down the lock of the connector. (Refer to P.52B-9.)

TSB Revision

52B-42 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) – Troubleshooting



- (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 below, using the digital multi-meter.

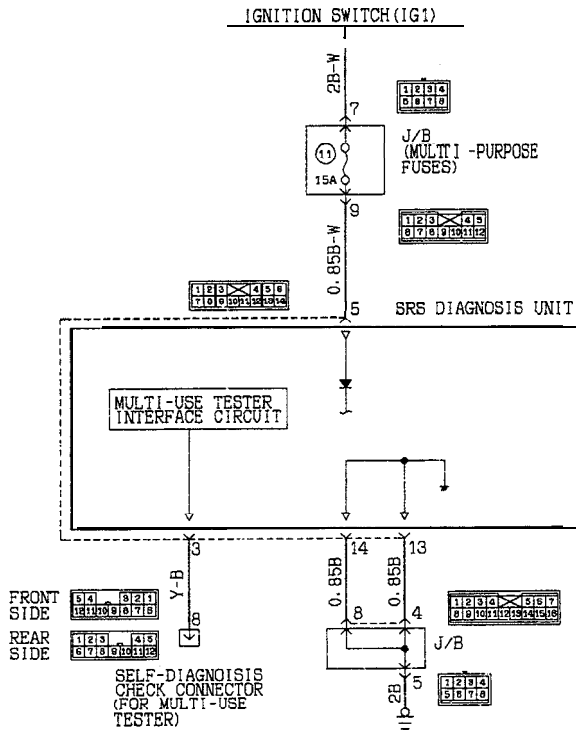


NOTE – IMPORTANT

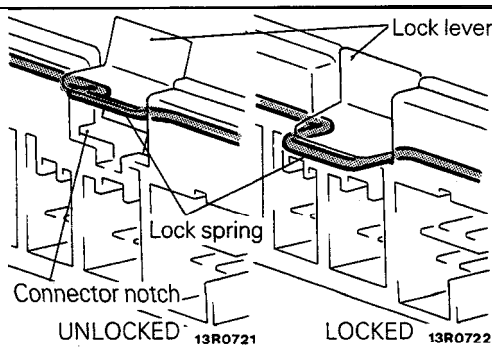
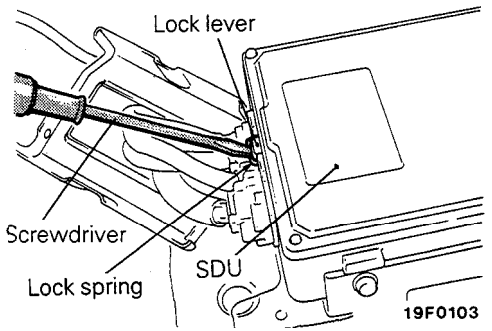
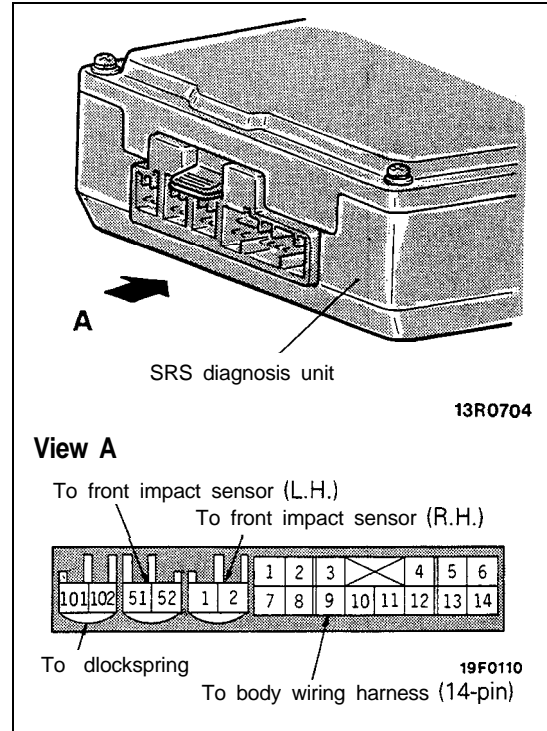
(1) After repairing the SRS, reconnect the battery cable, erase the diagnosis code memory from the Multi-use Tester and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)

(2) SDU = SRS Diagnosis Unit

TEST 10 | REPAIR REQUIRED FOR “42. IG VOLT LOW 2” FAULT



KX35-AX-R1503-N



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

Caution

Wait at least 30 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 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 cable is disconnected.

- (2) Remove the rear console assembly. (Refer to GROUP 52A – Floor Console.)
- (3) Use a screwdriver to push in the lock spring of the lock lever of the SRS diagnosis unit to unlock the lock lever.

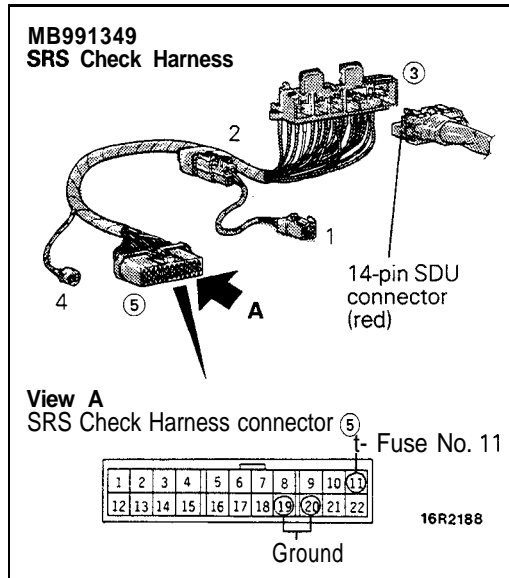
Caution

A double-lock mechanism is employed for the connector of the SRS diagnosis unit, so care must be taken not to damage it by using excessive force or by not disconnecting it correctly.

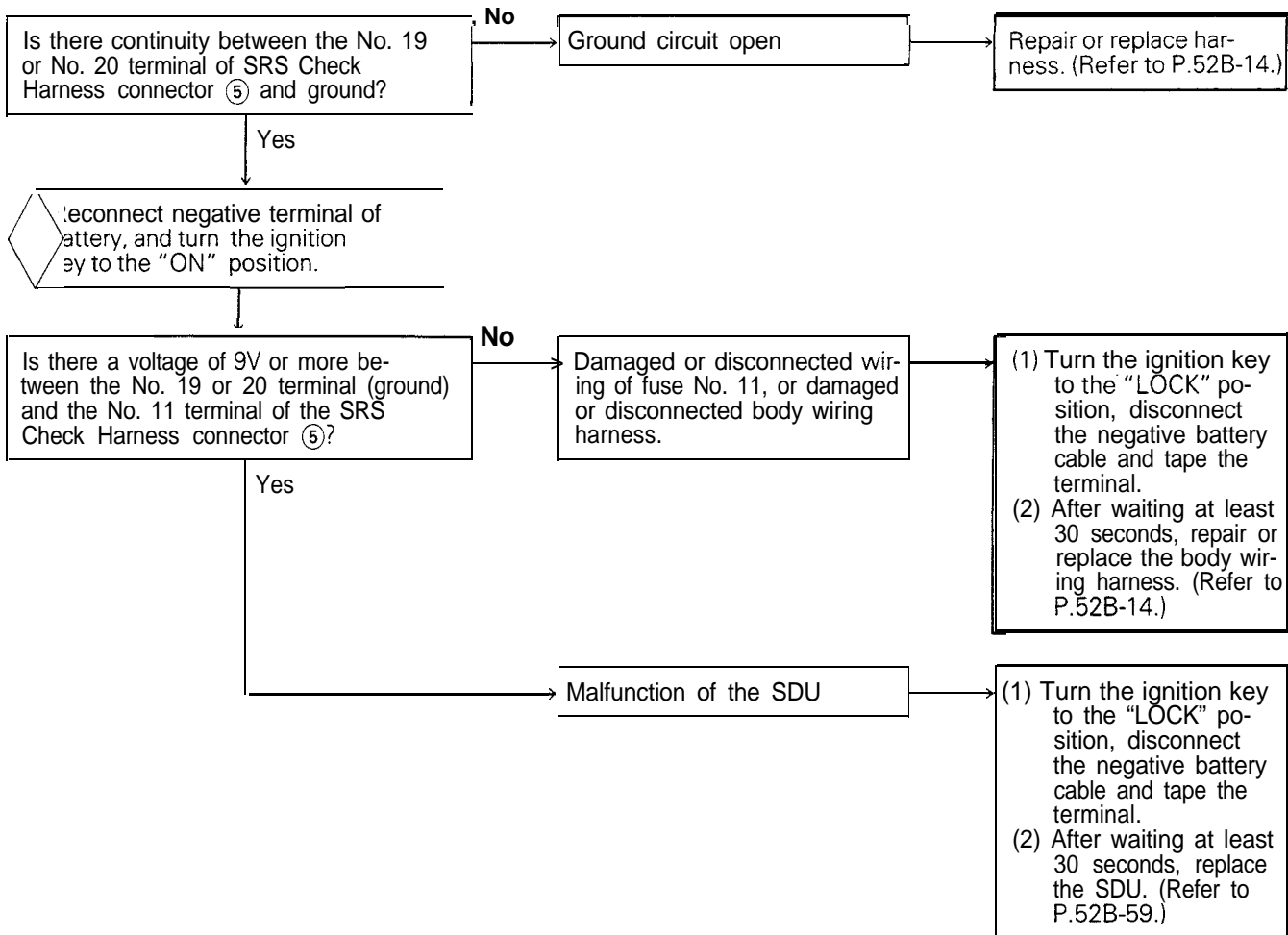
- (4) Disconnect the red 14-pin connector from the SRS diagnosis unit while pressing down the lock of the connector. (Refer to P.52B-9.)

TSB Revision

52B-44 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) – Troubleshooting



- (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 below using the digital multi-meter.

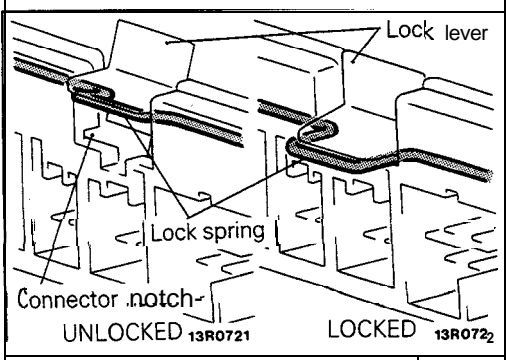
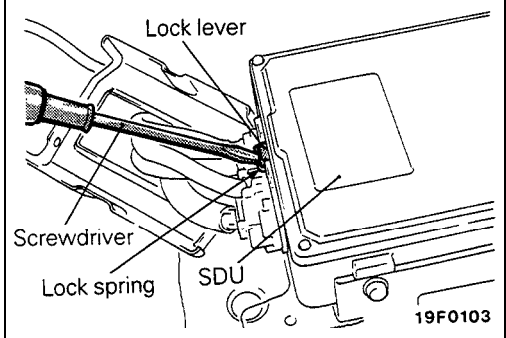
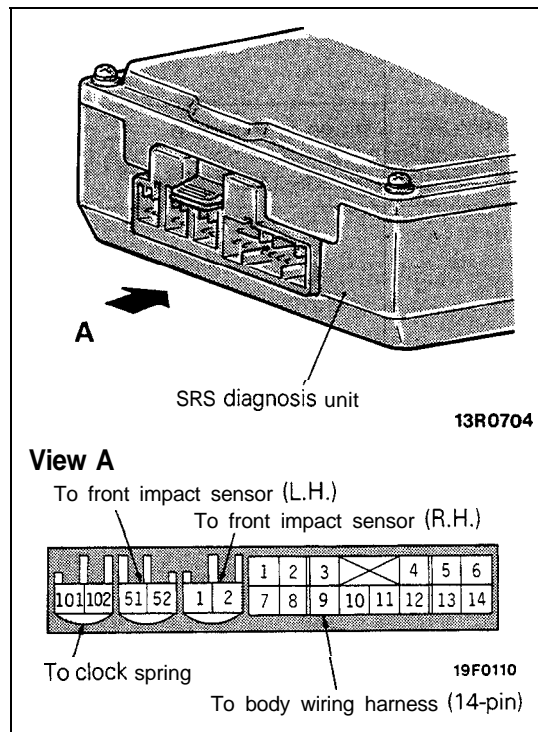
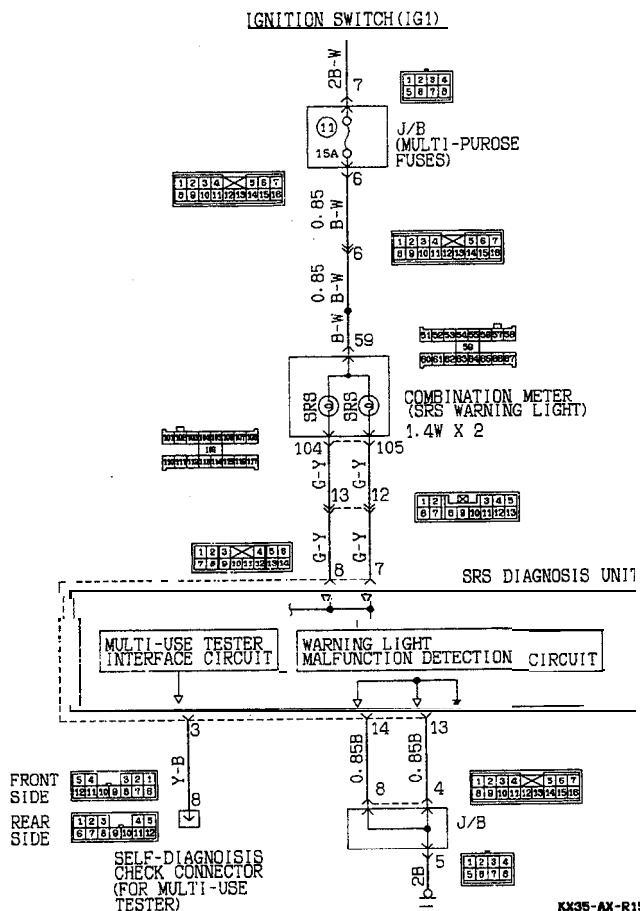


NOTE – IMPORTANT

- (1) After repairing the SRS, reconnect the battery cable, erase the diagnosis code memory from the Multi-use Tester and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)
- (2) SDU = SRS Diagnosis Unit

TEST 11

REPAIR REQUIRED FOR “43. SRS LMP TRBL 1” FAULT
(SRS warning light does not extinguish)



- Turn the ignition key to the “LOCK” position, disconnect the negative battery cable and tape the terminal.

Caution

Wait at least 30 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 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 cable is disconnected.

- Remove the rear console assembly. (Refer to GROUP 52A – Floor Console.)
- Use a screwdriver to push in the lock spring of the lock lever of the SRS diagnosis unit to unlock the lock lever.

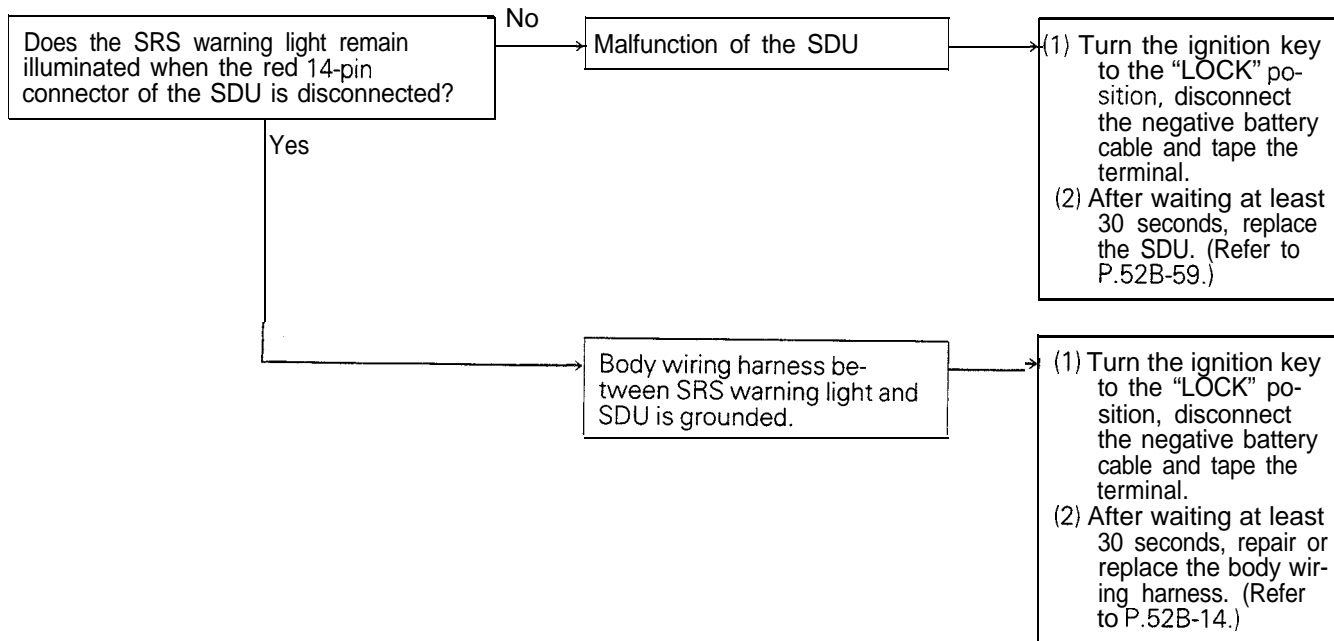
Caution

A double-lock mechanism is employed for the connector of the SRS diagnosis unit, so care must be taken not to damage it by using excessive force or by not disconnecting it correctly.

- Disconnect the red 14-pin connector from the SRS diagnosis unit while pressing down the lock of the connector. (Refer to P.52B-9.)

52B-46 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) – Troubleshooting

- (5) Reconnect negative terminal of battery, and turn the ignition key to the "ON" position.
- (6) Check according to the flow chart below.

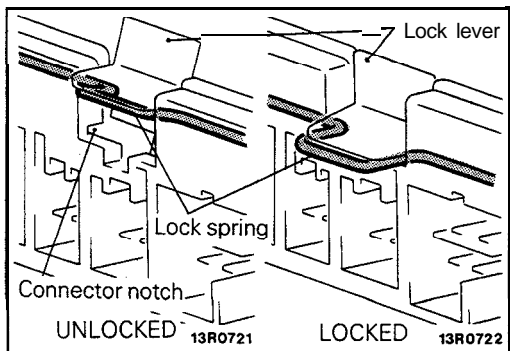
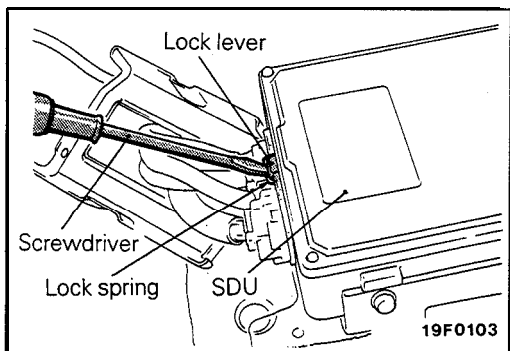
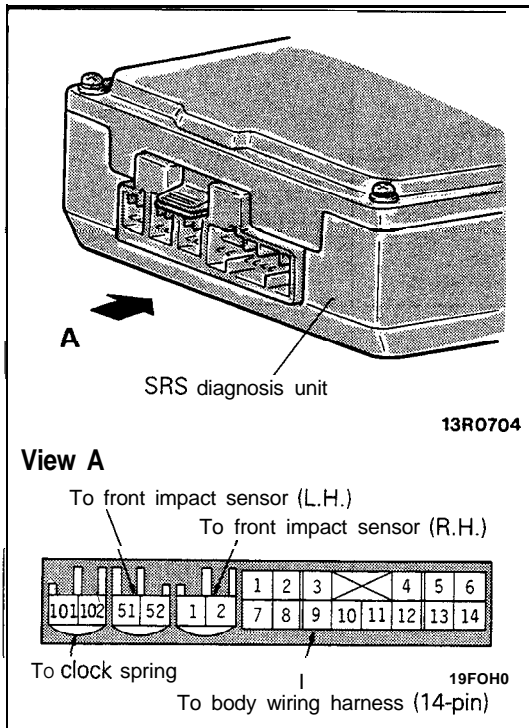
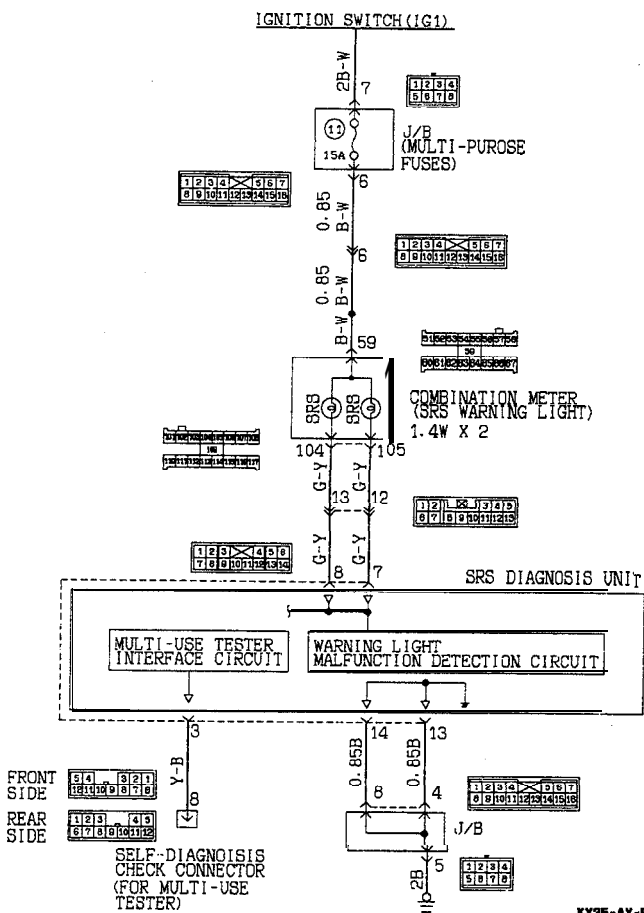


NOTE – IMPORTANT

- (1) After repairing the SRS, reconnect the battery cable, erase the diagnosis code memory from the Multi-use Tester and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)
- (2) SDU = SRS Diagnosis Unit

TEST 12

REPAIR REQUIRED FOR "43. SRS LMP TRBL 1" FAULT (SRS warning light does not illuminate)



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

Caution

Wait at least 30 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 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 cable is disconnected.

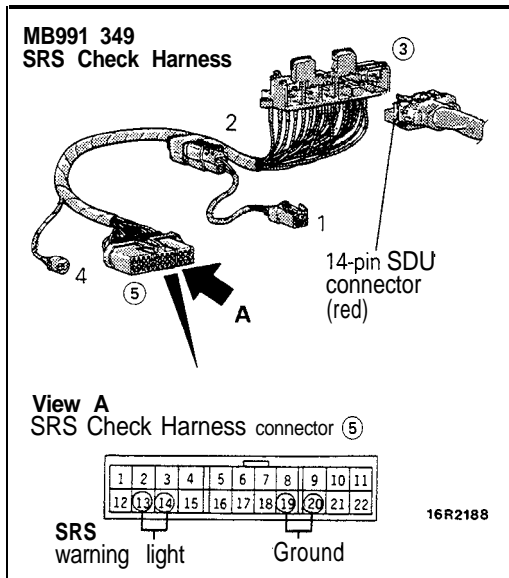
- (2) Remove the rear console assembly. (Refer to GROUP 52A – Floor Console.)
- (3) Use a screwdriver to push in the lock spring of the lock lever of the SRS diagnosis unit to unlock the lock lever.

Caution

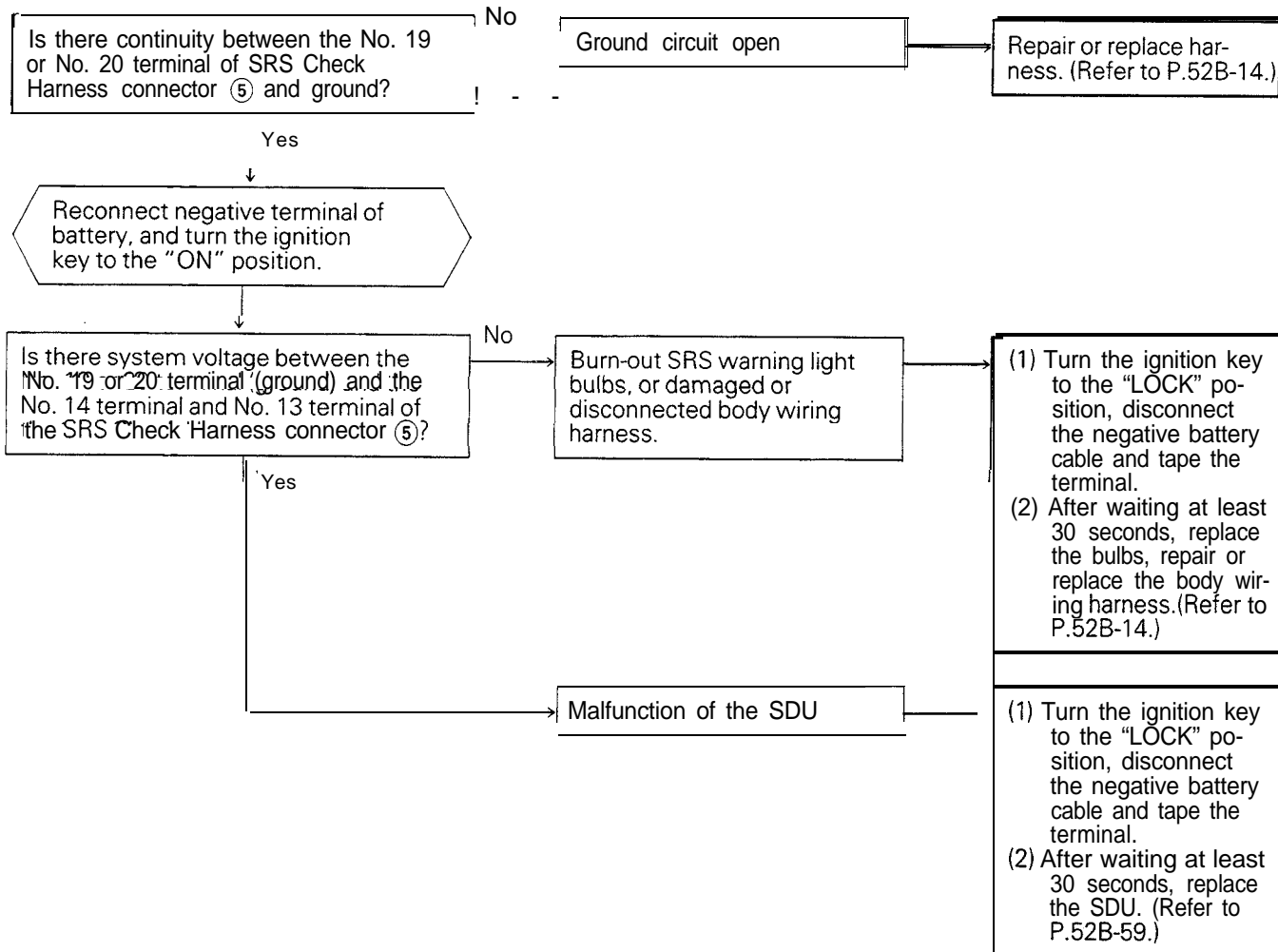
A double-lock mechanism is employed for the connector of the SRS diagnosis unit, so care must be taken not to damage it by using excessive force or by not disconnecting it correctly.

- (4) Disconnect the red 14-pin connector from the SRS diagnosis unit while pressing down the lock of the connector. (Refer to P.52B-9.)

52B-48 SUPPLEMENTAL RESTRAINT SYSTEM (SRS) – Troubleshooting



- (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 below, using the digital multi-meter.



NOTE – IMPORTANT

(1) After repairing the SRS, reconnect the battery cable, erase the diagnosis code memory from the Multi-use Tester and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)

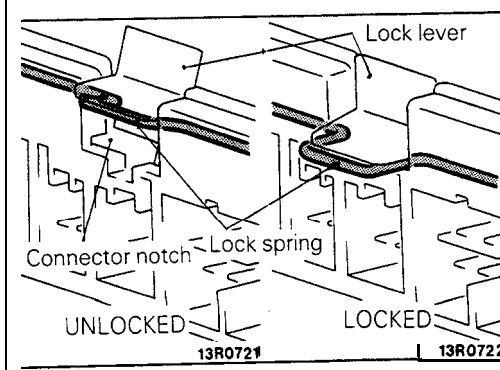
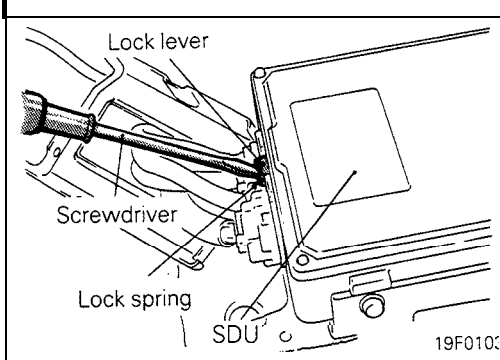
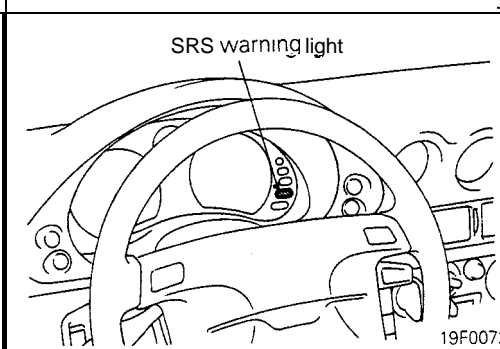
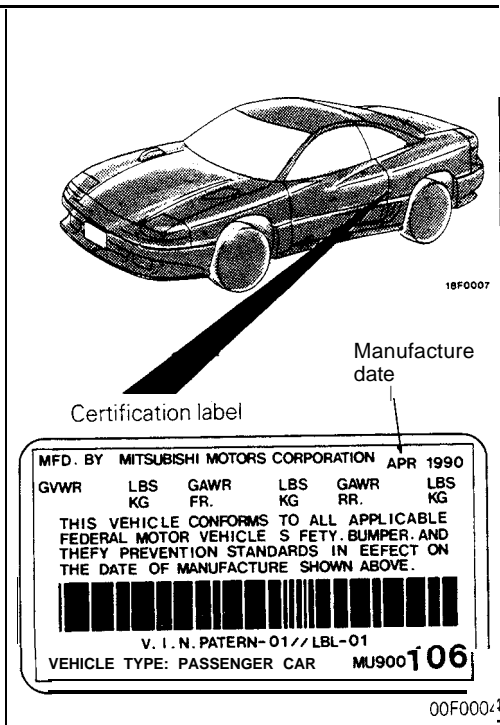
(2) SDU = SRS Diagnosis Unit

M52PCAA

SRS MAINTENANCE AND POST-COLLISION DIAGNOSIS

MAINTENANCE

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

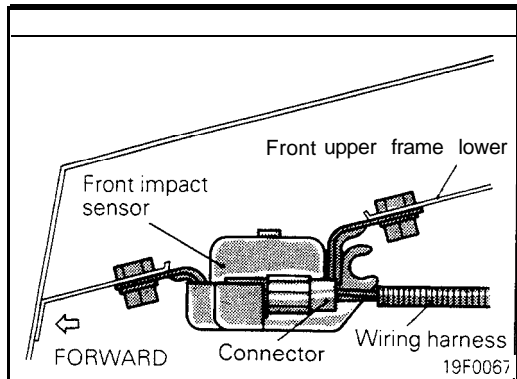
Wait at least 30 seconds after disconnecting the battery cable before doing any further work. The SRS system is designed to retain enough voltage to deploy the air bag for a short time even after the battery has been disconnected, so serious injury may result from unintended air bag deployment if work is done on the SRS system immediately after the battery cable is disconnected.

- (2) Remove the rear console assembly. (Refer to GROUP 52A — Floor Console.)
- (3) Use a screwdriver to push in the lock spring of the lock lever of the SRS diagnosis unit to unlock the lock lever.

Caution

A double-lock mechanism is employed for the connector of the SRS diagnosis unit, so care must be taken not to damage it by using excessive force or by not disconnecting it correctly.

- (4) Disconnect the red 14-pin connector from the SRS diagnosis unit while pressing down the lock of the connector. (Refer to P.52B-9.)



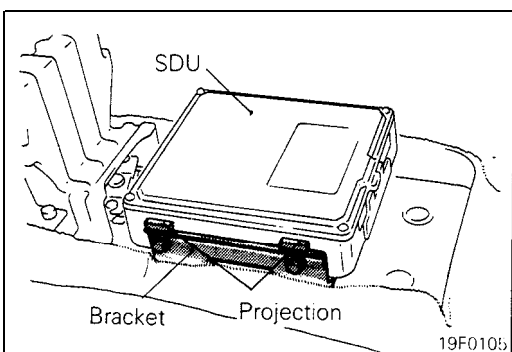
2-1 Front Impact Sensors

- (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 lowers 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 vehicles driver.

- (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 P.52B-56 and P.52B-14.)

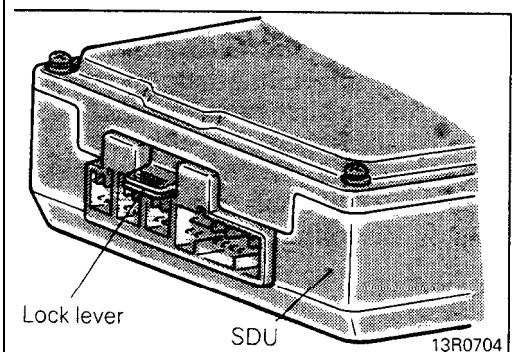


2 - 2 SRS Diagnosis Unit (SDU)

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

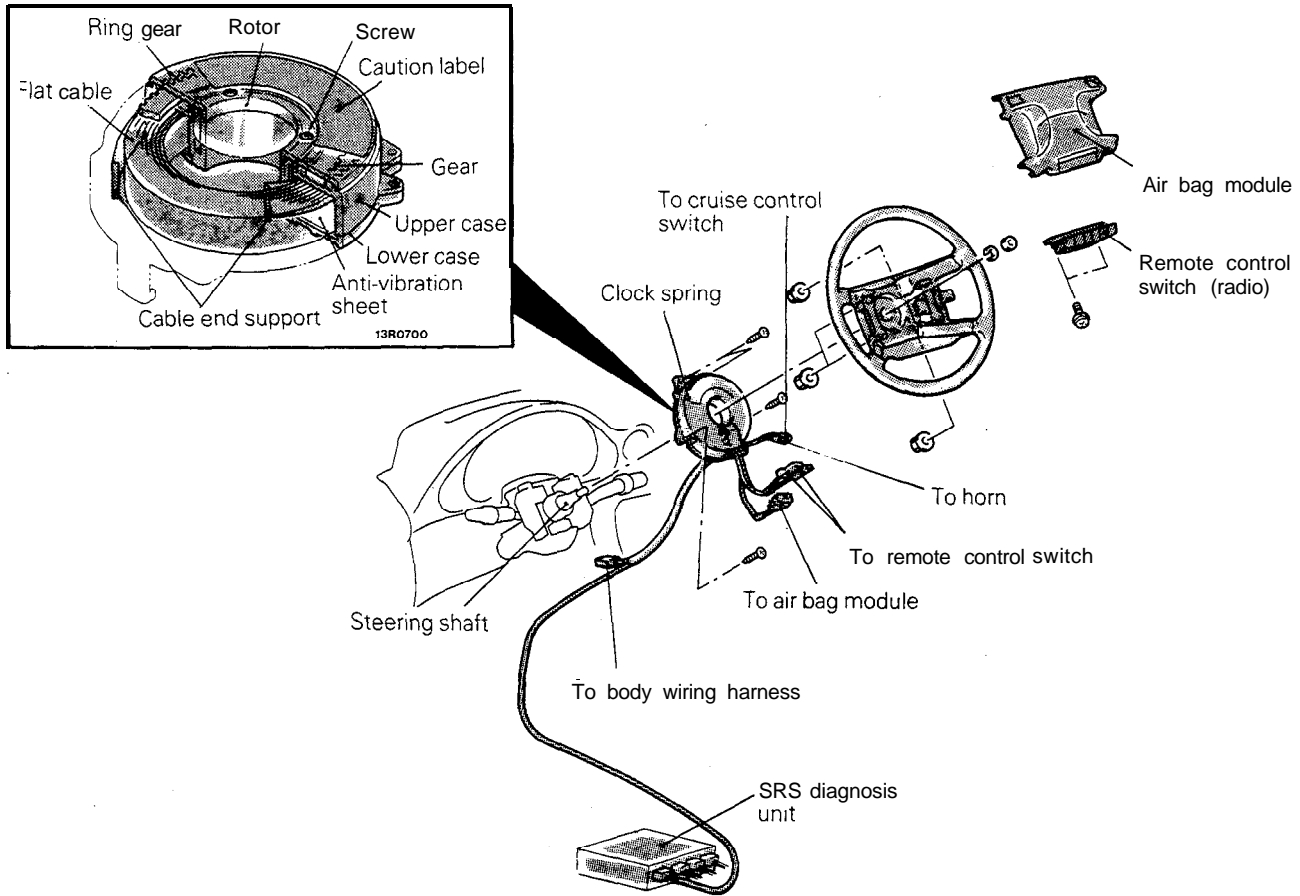
Caution

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.

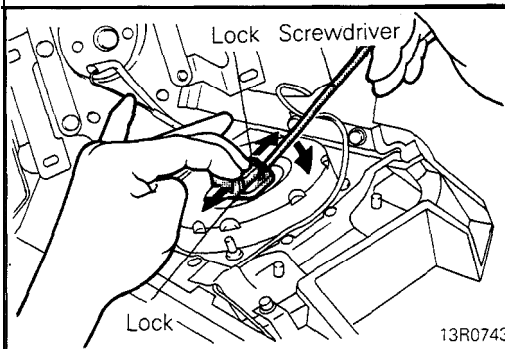


- (2) Check connectors and lock lever for damage, and terminals for deformities or rust. Replace SDU if it fails visual check. (Refer to P.52B-59.)

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

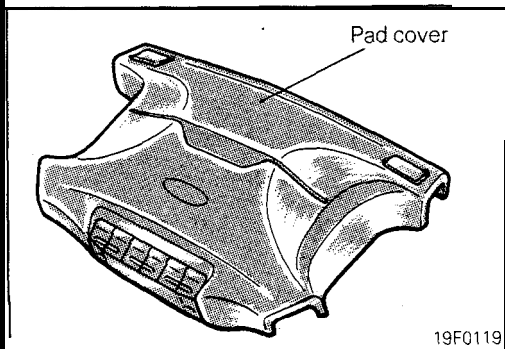


19F0150



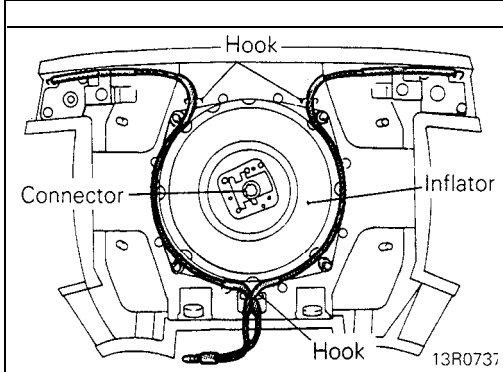
- (1) Remove air bag module from steering wheel. (Refer to P.52B-62.)

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

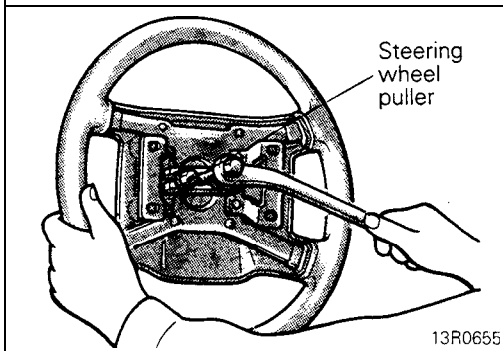


- (2) Check pad cover for dents, cracks or deformities.

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



- (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.

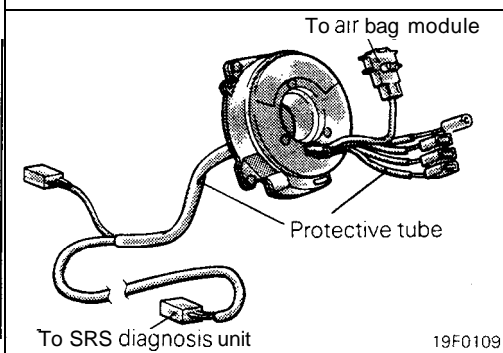


- (6) Remove the steering wheel by using a steering wheel puller.

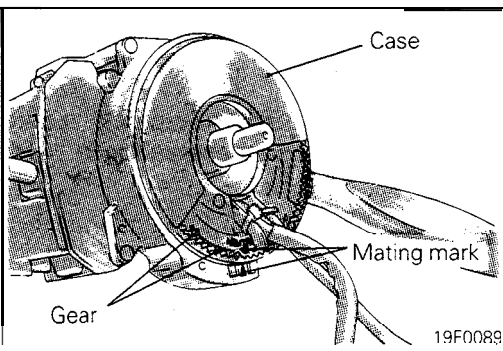
Caution

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 P.52B-62.)



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

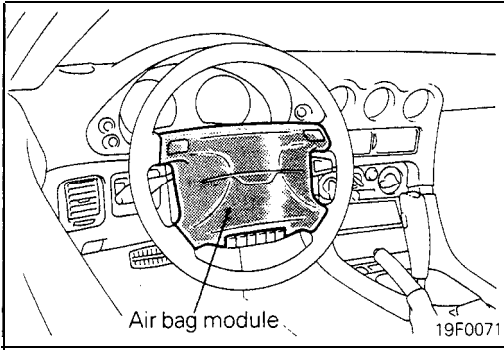


- (10) Visually check the clock spring case and the gears for damage.

- (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.



- (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.

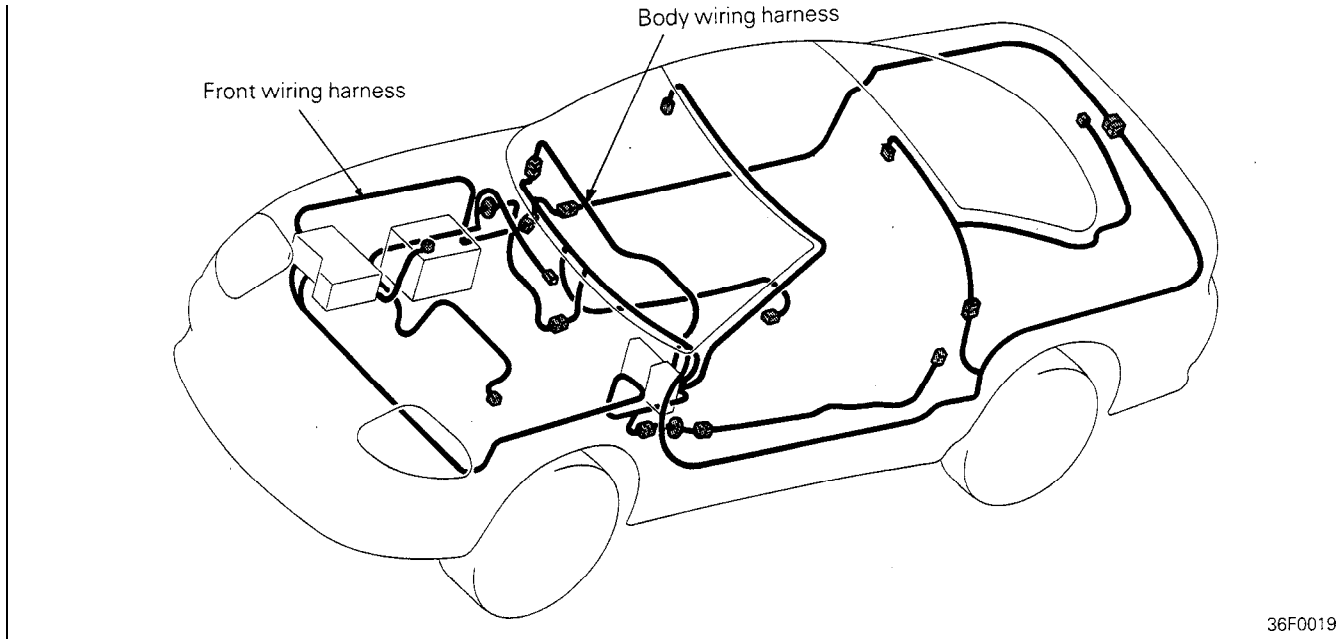
REPLACE ANY VISUALLY INSPECTED PART IF IT FAILS THAT INSPECTION.

(Refer to P.52B-62.)

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.

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.

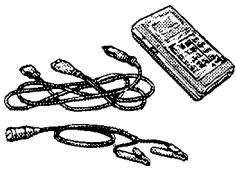

(Refer to P.52B-14.)

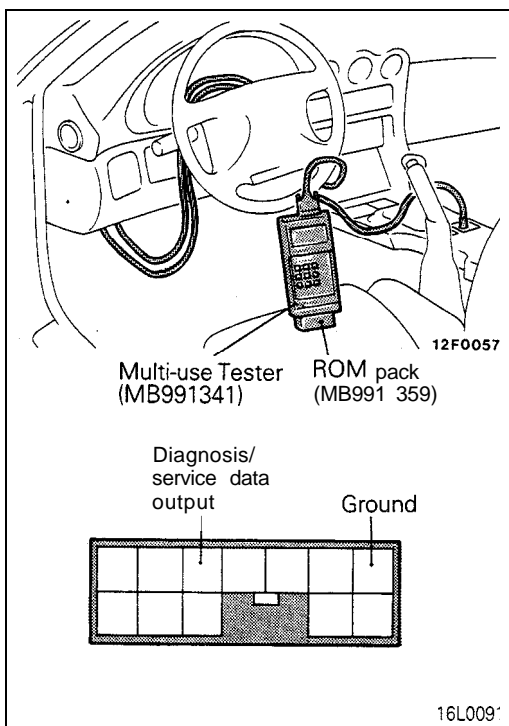
Caution

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.

POST-COLLISION DIAGNOSIS

TEST EQUIPMENT TO BE USED FOR POST-COLLISION DIAGNOSIS

Tool	Number	Name	Use
	MB991 341	Multi-use tester sub assembly	<ul style="list-style-type: none"> • Reading diagnosis codes • Reading trouble period • Erasing diagnosis code • Reading erase times <p>[Refer to MULTI-USE TESTER INSTRUCTION MANUAL (MB991342)]</p>
	MB991 359	ROM pack (for Multi-use Tester)	



To inspect and service the SRS after a collision (whether or not the air bag has deployed), perform the following steps.

1. SRS Diagnosis Unit Memory Check

- (1) Insert ROM pack into the Multi-use Tester and connect the tester to Diagnosis Check Connector in glove compartment.
- (2) Read (and write down) all displayed diagnosis codes. (Refer to P.52B-18.)

NOTE

If the battery power supply has been disconnected or disrupted by the collision, the Multi-use Tester cannot communicate with the SRS diagnosis unit. Inspect and, if necessary, repair the body wiring harness before proceeding further.

- (3) Select the "2. SERVICE DATA" function and read (and write down) all displayed "91. TRBL PERIOD" (Fault duration) and "92. ERASE TIMES" (how many times memories are erased.). Refer to Multi-use Tester Instruction Manual (MB991 342).

NOTE

- Maximum stored period: 9999 minutes (approximately 7 days)
- Maximum number of times to be stored: 250

- (4) Erase the diagnosis codes and after waiting 45 seconds or more read (and write down) all displayed diagnosis codes. (Refer to P.52B-18.)

Function Selection
1. SELF-DIAG CODE 2. SERVICE DATA 3. ACTUATOR TEST 4. SPECIAL TEST
Data List
↓ "2" 91.TRBL PERIOD 9999 min 92.ERASE TIMES 250

2. Repair Procedure

- (1) If air bag deployed in the collision, remove the deployed air bag module. (Refer to P.52B-62.)
- (2) Check the SRS components using the table shown below.
If the SRS components are showing any visible damage such as dents, cracks, or deformation, replace them with new ones.
Refer to appropriate INDIVIDUAL COMPONENT SERVICE, P.52B-56.
- (3) Conduct self-diagnosis using Multi-use Tester to ensure entire SRS operates properly except open circuit of air bag module (22. SQUIB TRBL 2).
- (4) Install new air bag module. (Refer to P.52B-62.)

SRS Components	Inspection (when air bag deploys in collision)	Inspection (when air bag does not deploy in low-speed collision)
Front impact sensors	Replace front impact sensors. (Refer to P.52B-56.)	<ol style="list-style-type: none"> (1) Check front upper frame lower and sensor brackets for deformities or rust. (2) Check sensor cases for dents, cracks deformities or rust. (3) Check sensor harnesses for binds, connectors for damage, and terminals for deformities.
SRS diagnosis unit (SDU)	Replace SRS diagnosis unit. (Refer to P.52B-59.)	<ol style="list-style-type: none"> (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	Replace air bag module. (Refer to P.52B-62.)	<ol style="list-style-type: none"> (1) Check pad cover for dents, cracks or deformities. (2) Remove air bag module from steering wheel. Check hooks and connector for damage, terminals for deformities, and harness for binds. (Refer to P.52B-62.) (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.
Steering wheel/steering column/intermediate joint	Replace steering wheel, steering column and intermediate joint. (Refer to GROUP 37A – Steering Wheel and Shaft.)	<ol style="list-style-type: none"> (1) Remove air bag module from steering wheel. (Refer to P.52B-62.) (2) Check wiring harness (built into steering wheel) and connectors for damage, and terminals for deformities. (3) Install air bag module to check fit or alignment with steering wheel. (4) Check steering wheel for noise, binds or difficult operation and excessive free play,
Clock spring	Replace clock spring.	<ol style="list-style-type: none"> (1) Check clock spring connectors and protective tube for damage, and terminals for deformities. (2) Visually check the case and the gears for damage.
Harness connector [Body and Front wiring harness]	<ol style="list-style-type: none"> (1) Check connectors for poor connections. (2) Check harnesses for binding, connectors for damage, and terminals for deformities. (Refer to P.52B-53 and P.52B-14.) 	

INDIVIDUAL COMPONENT SERVICE

M52PDAA

If the SRS components are to be removed or replaced as a result of maintenance, troubleshooting, etc., follow each procedure (P.52B-56—P.52B-68).

Caution

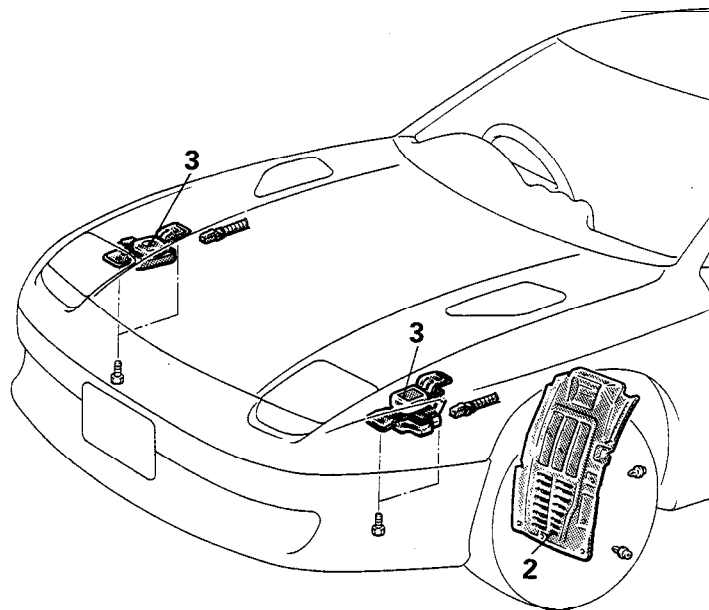
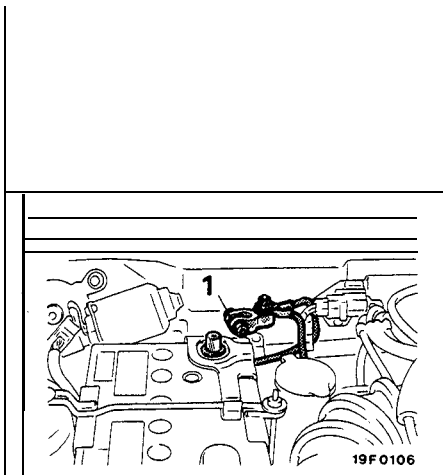
1. SRS components should not be subjected to heat over 93°C (200°F), so remove the front impact sensors, SRS diagnosis unit and air bag module and clock spring before drying or baking the vehicle after painting. Recheck SRS system operability after re-installing them.
2. If the SRS components are removed for the purpose of check, 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

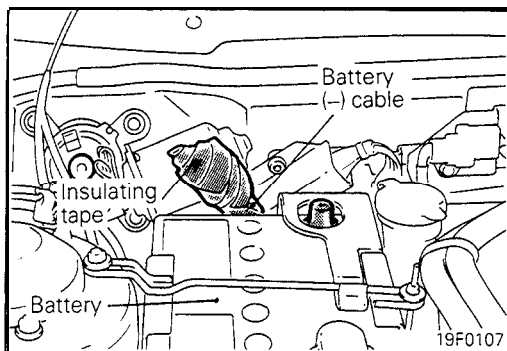
- Turn the ignition key to the "LOCK" position

Removal steps

- □ Post-installation inspection
- ◀▶ 1. Connection of the negative (-) battery cable to the battery
- 2. Front splash shield extension
- ▶▶ 3. Front impact sensor
- ▶▶ Pre-installation inspection

19F0133

TSB Revision



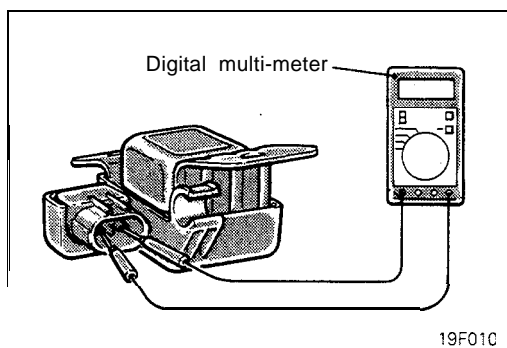
SERVICE POINTS OF REMOVAL

1. DISCONNECTION OF THE NEGATIVE (-) BATTERY CABLE FROM THE BATTERY

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

Caution

Wait at least 30 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 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 cable is disconnected.



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.

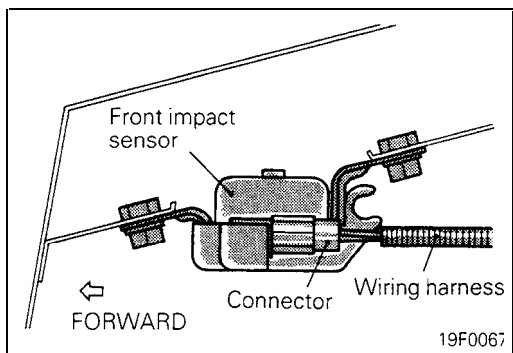
SERVICE POINT OF INSTALLATION

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: $2,000 \pm 40\Omega$

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.

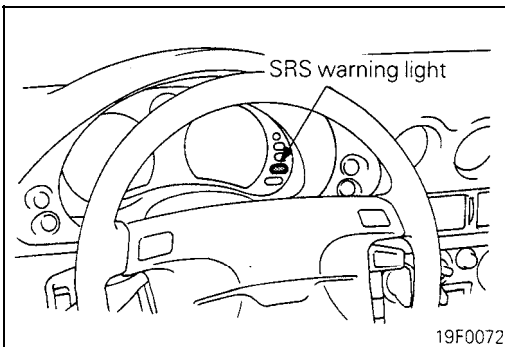


4. INSTALLATION OF FRONT IMPACT SENSOR

- (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 serious injury or death to the vehicle's driver.



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 extinguished for at least 45 seconds? If yes, SRS system is functioning properly. If no, consult page 52B-17.

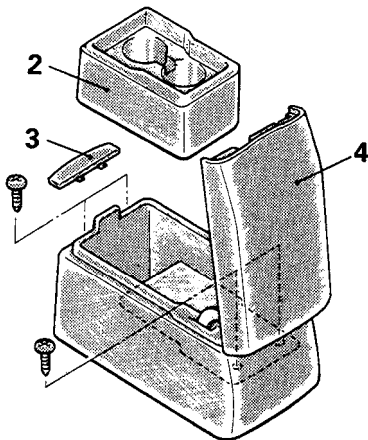
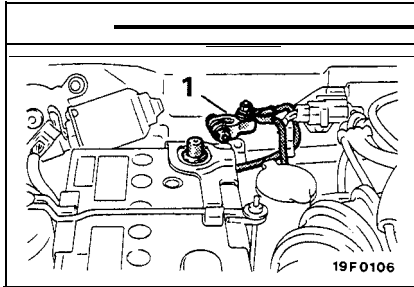
SRS DIAGNOSIS UNIT (SDU)

Caution

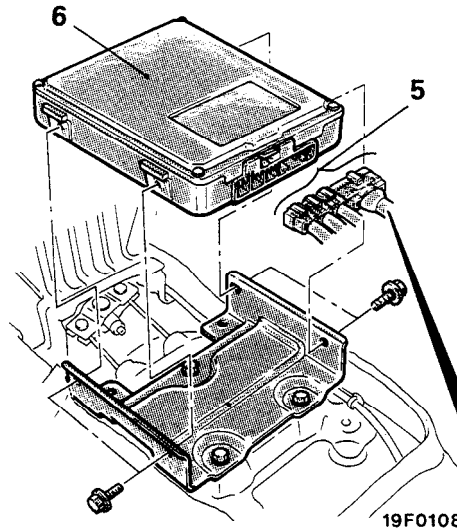
1. Never attempt to disassemble or repair the SRS diagnosis unit. If faulty, replace it.
2. Do not drop or subject the SRS diagnosis unit to impact or vibration.
If denting, cracking, deformation, or rust are discovered in the SRS diagnosis unit, replace it with a new SRS diagnosis unit. Discard the old one.

3. After deployment of an air bag, 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-16.

REMOVAL AND INSTALLATION



19F0130



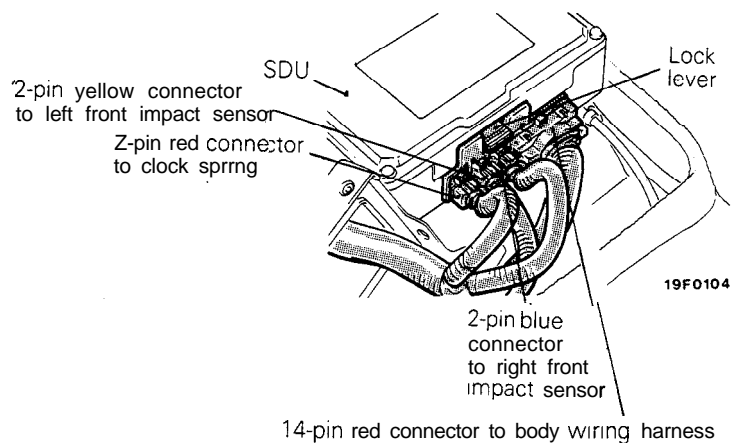
19F0108

Pre-removal Operation

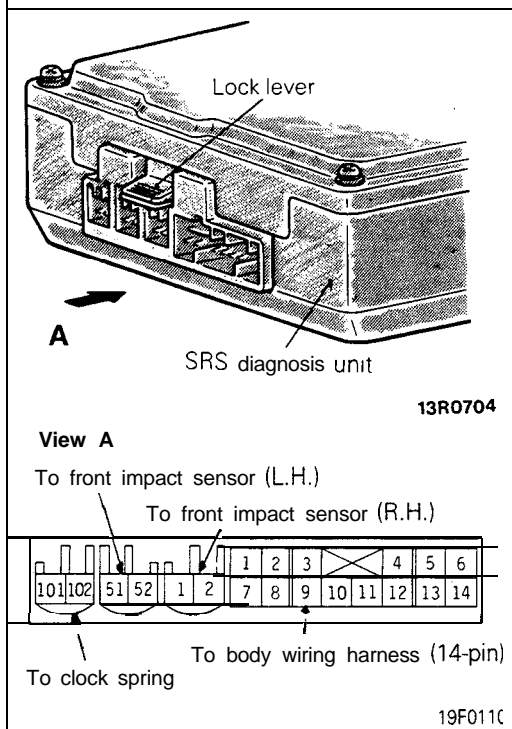
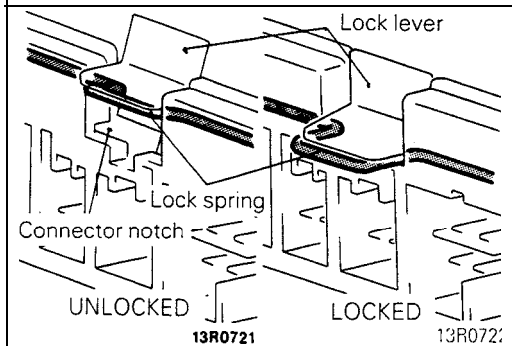
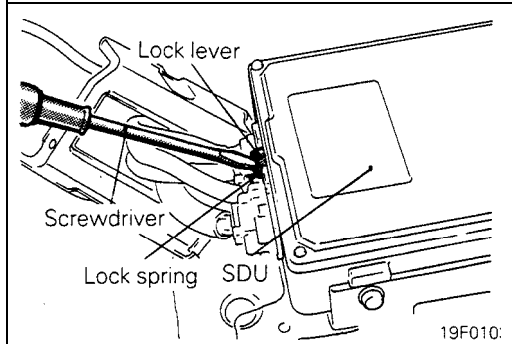
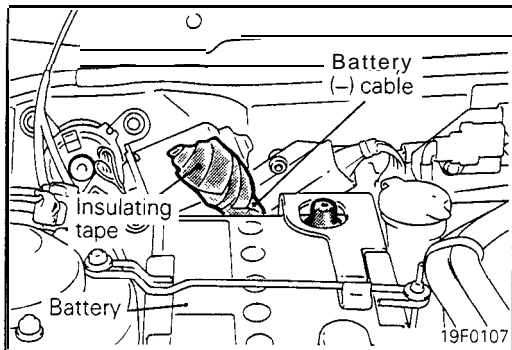
- Turn the ignition key to the "LOCK" position

Removal steps

- ◆◆ Post-installation inspection
- ◆◆ 1. Connection of the negative (-) battery cable to the battery
- 2. Cup holder
- 3. Console plug
- 4. Rear console assembly
- ◆◆ ● d 5. Connection of the SRS diagnosis unit and each harness connector
- * 6. SRS diagnosis unit
- ◆◆ Pre-installation inspection



19F0104



SERVICE POINTS OF REMOVAL

1. DISCONNECTION OF THE NEGATIVE (-) BATTERY CABLE FROM THE BATTERY

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

Caution

Wait at least 30 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 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 cable is disconnected.

5. DISCONNECTION OF THE SRS DIAGNOSIS UNIT AND EACH HARNESS CONNECTOR

(1) Use a screwdriver to push in the lock spring of the lock lever of the SRS diagnosis unit to unlock the lock lever.

Caution

A double-lock mechanism is employed for the connector of the SRS diagnosis unit, so care must be taken not to damage the connector by using excessive force or by not disconnecting it correctly.

(2) Remove each connector from the SRS diagnosis unit while pressing down the lock of each connector. (Refer to P.52B-9.)

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 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-17.)

SERVICE POINTS OF INSTALLATION

PRE-INSTALLATION INSPECTION

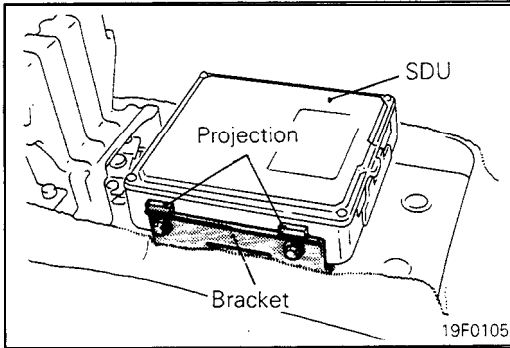
Before SRS diagnosis unit is installed in the vehicle, it must be visually inspected. If a dent, crack or other deformation is detected, discard the SRS diagnosis unit and replace it with a new one that passes the visual inspection.

6. INSTALLATION OF SRS DIAGNOSIS UNIT

With the projection part of the SRS diagnosis unit placed against the bracket as shown in the figure, securely install the SRS diagnosis unit.

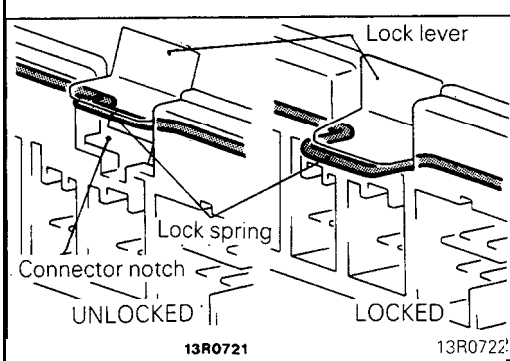
Caution

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.



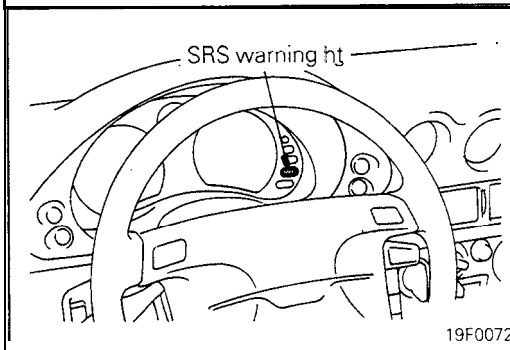
5. CONNECTION OF THE SRS DIAGNOSIS UNIT AND EACH HARNESS CONNECTOR

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.



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 extinguished for at least 45 seconds? If yes, SRS system is functioning properly. If no, consult page 52B-17.



AIR BAG MODULE AND CLOCK SPRING

Caution

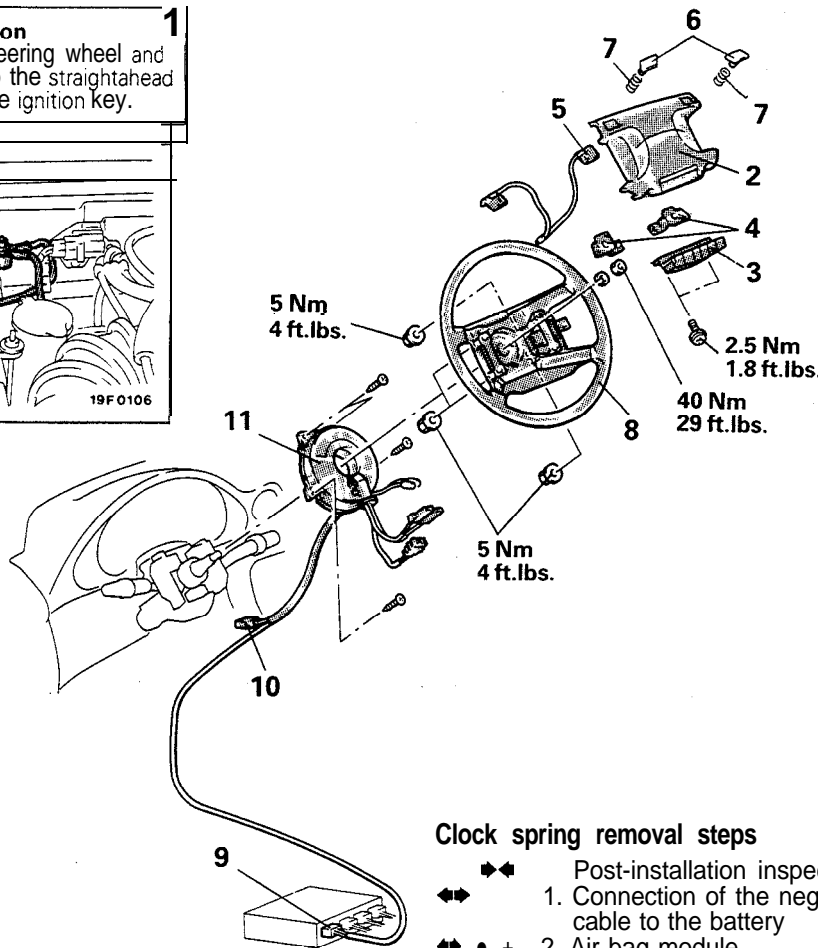
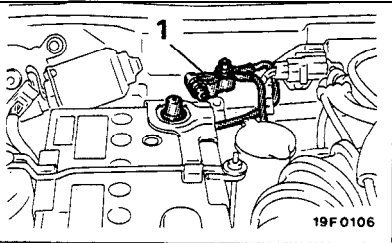
1. Never attempt to disassemble or repair the air bag module or clock spring.
If faulty, replace it.
2. Do not drop the air bag module or clock spring or allow contact with water, grease or oil.
Replace it if a dent, crack, deformation or rust are detected.
3. The air bag module should be stored on a flat surface and placed so that the pad surface is facing upward.

4. Do not place anything on top of it.
4. Do not expose the air bag module to temperature over 93°C (200°F).
5. After an air bag has deployed, replace with a new air bag module and check the SRS operability.
6. Wear gloves and safety glasses when handling an air bag that has already deployed.
7. An undeployed air bag module should only be disposed of in accordance with the procedures [P.52B-69 – P.52B-72].

REMOVAL AND INSTALLATION

Pre-removal Operation

1. After setting the steering wheel and the front wheels to the straightahead position, remove the ignition key.

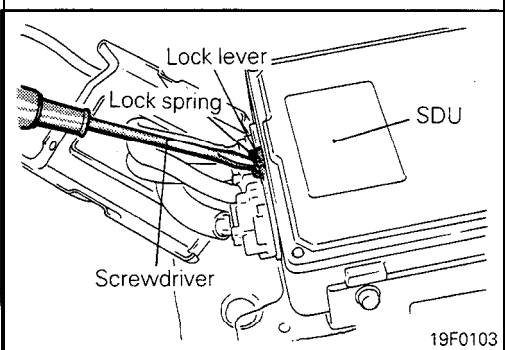
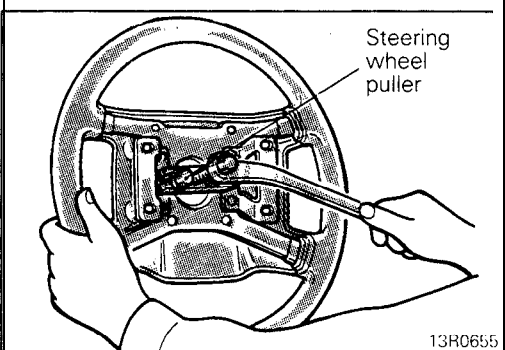
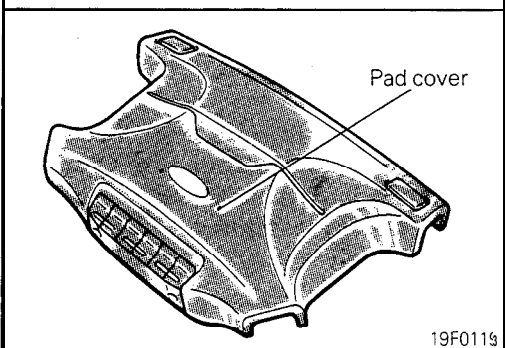
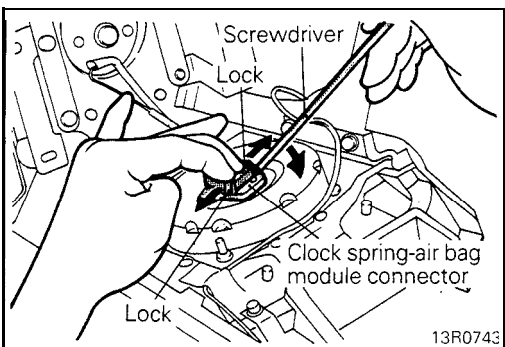
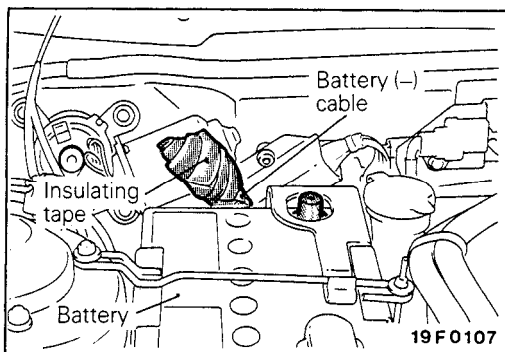


Air bag module removal steps

- ◆◆ Post-installation inspection
- ◆◆ 1. Connection of the negative (-) battery cable to the battery
- ◆◆◆◆ 2. Air bag module
- ◆◆◆◆ 3. Radio remote control assembly
- ◆◆◆◆ 4. Horn contact plate
- ◆◆◆◆ 5. Horn contact plate and wire
- ◆◆◆◆ 6. Horn button
- ◆◆◆◆ 7. Spring
- ◆◆ Pre-installation inspection

Clock spring removal steps

- ◆◆ Post-installation inspection
- ◆◆ 1. Connection of the negative (-) battery cable to the battery
- ◆◆◆◆ 2. Air bag module
- ◆◆◆◆ 3. a 8. Steering wheel
Knee protector } (Refer to GROUP 52A –
Column cover } Instrument Panel.)
Floor console (Refer to GROUP 52A – Floor
Console.)
- ◆◆◆◆ 9. Clock spring and SRS diagnosis unit connection
- ◆◆◆◆ 10. Clock spring and body wiring harness connection
- ◆◆◆◆ 11. Clock spring
- ◆◆ Pre-installation inspection



SERVICE POINTS OF REMOVAL

1. DISCONNECTION OF THE NEGATIVE (-) BATTERY CABLE FROM THE BATTERY

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

Caution

Wait at least 30 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 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 cable is disconnected.

2. REMOVAL OF AIR BAG MODULE

- (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

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

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

8. REMOVAL OF STEERING WHEEL

Remove the steering wheel by using a steering wheel puller.

Caution

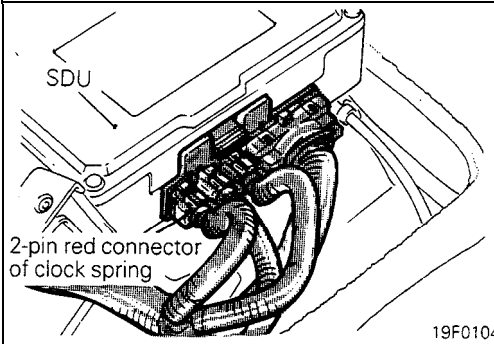
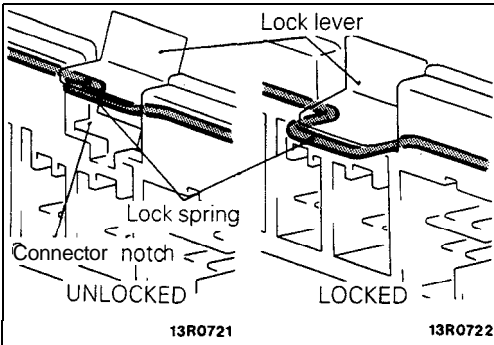
Do not hammer on the steering wheel. Doing so may damage the collapsible column mechanism.

9. DISCONNECTION OF THE SRS DIAGNOSIS UNIT AND CLOCK SPRING CONNECTION

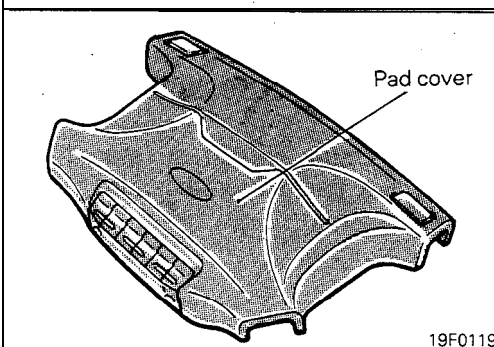
- (1) Remove the rear console assembly.
(Refer to GROUP 52A — Floor Console.)
- (2) Use a screwdriver to push in the lock spring of the lock lever of the SRS diagnosis unit to unlock the lock lever.

Caution

A double-lock mechanism is employed for the connector of the SRS diagnosis unit, so care must be taken not to damage it by using excessive force or by not disconnecting it correctly.



- (3) 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-9.)

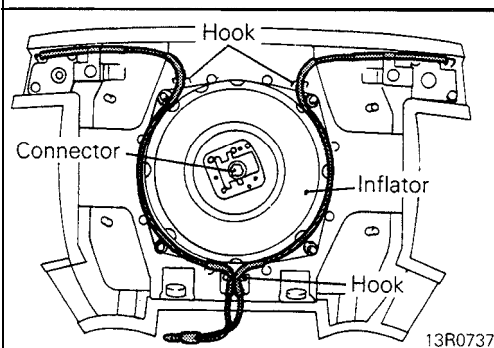


INSPECTION

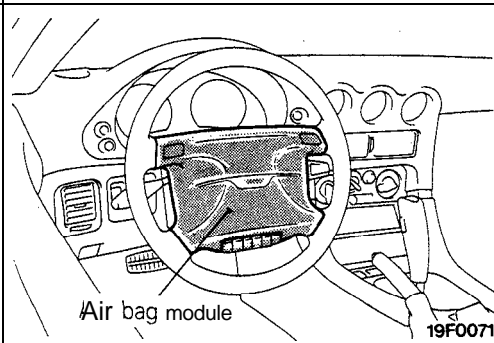
AIR BAG MODULE

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.



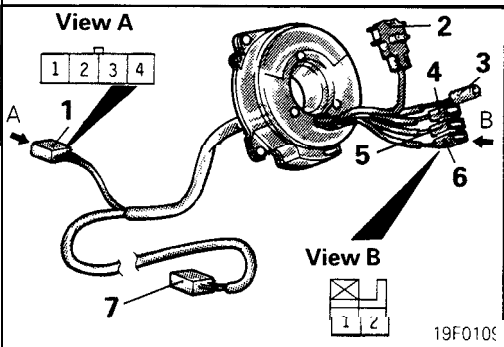
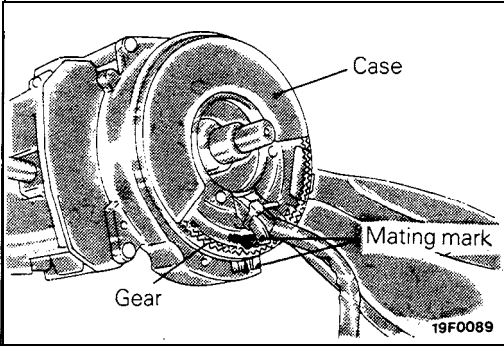
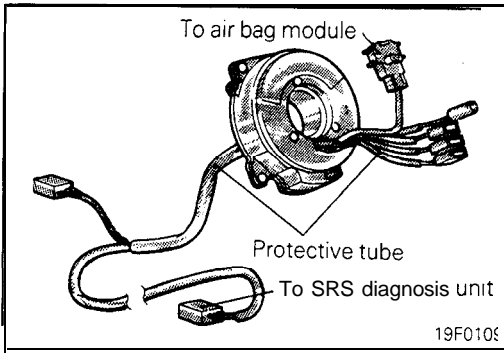
- (1) Check pad cover for dents, cracks or deformities.
- (2) Check the air bag module for denting, cracking or deformation.
- (3) Check hooks and connectors for damage, terminals for deformities, and harness for binds.
- (4) Check air bag inflator case for dents, cracks or deformities.



- (5) Install the air bag module to steering wheel to check fit or 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-69 to P.52B-72.)



CLOCK SPRING

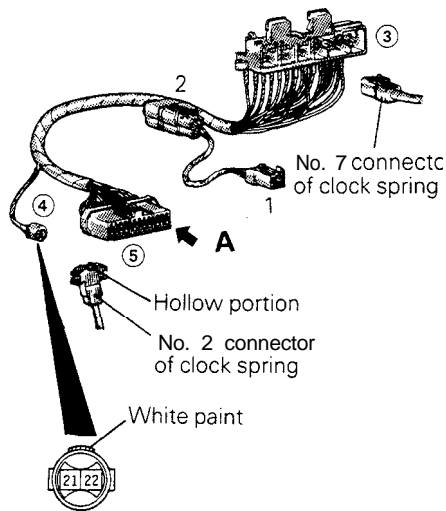
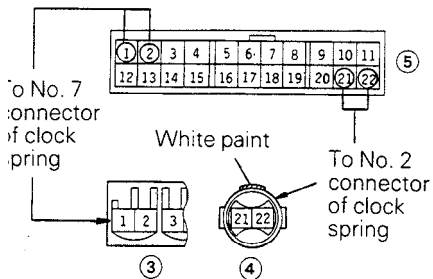
(1) Check connectors and protective tube for damage, and terminals for deformities.

(2) Visually check the case and the gears for damage.

(3) Check for continuity between the No. 1 connector of the clock spring and connectors No. 3, 4, 5 and 6.

No. 1 connector				No. 3 connector	No. 4 connector	No. 5 connector	No. 6 connector	
Terminal 1	Terminal 2	Terminal 3	Terminal 4				Terminal 1	Terminal 2
○								○
	○						○	
		○						
			○					
				○				
					○			
						○		
To cruise control unit	To ACC power	To horn relay	To radio	To horn switch	To steering remote control switch			To cruise control switch

NOTE
O-O Indicates that there is continuity between the terminal

MB991349
SRS Check Harness

View A SRS Check Harness connector


16R219C

- (4) Joint 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.

- (5) 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 0.4Ω

- (6) If, as result of above checks, even one abnormal point is discovered, replace the clock spring with a new one.

SERVICE POINTS OF INSTALLATION

PRE-INSTALLATION INSPECTION

- (1) Before the clock spring and air bag module are installed in the vehicle, they must be visually inspected.

If a dent, crack or other deformation, or any rust, is detected, discard the clock spring and/or air bag module and replace it with a new one that passes the visual inspection.

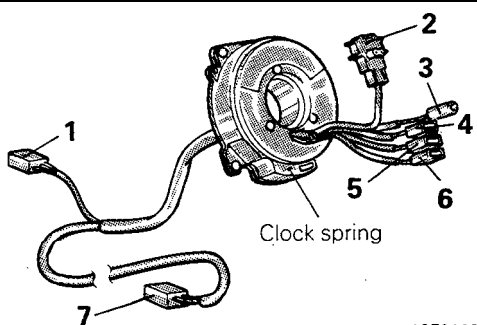
Caution

Dispose of an air bag module only according to the specified procedure. (Refer to P.52B-69 to P.52B-72.)

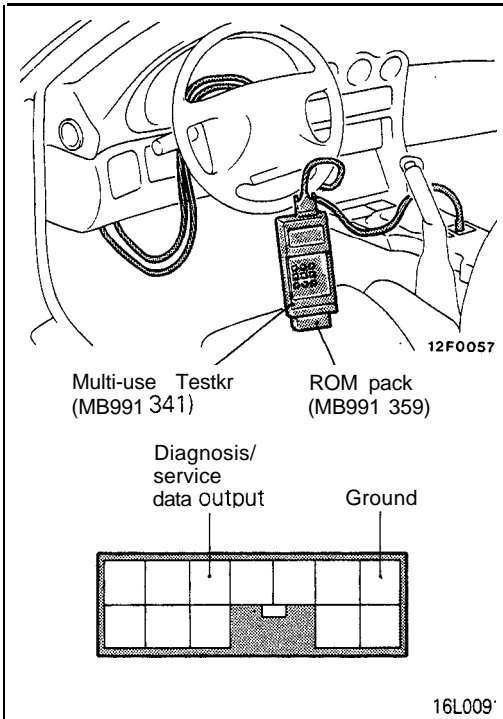
- (2) Before the clock spring is installed in the vehicle, the resistance between No. 2 and No. 7 connectors of clock spring must be confirmed to be within standard value; less than 0.4Ω.

Use the SRS Check Harness and digital multi-meter. (Refer to "CHECKING THE CLOCK SPRING".)

If the clock spring is not within that standard value range, discard it and replace it with a new one that has the proper standard value.



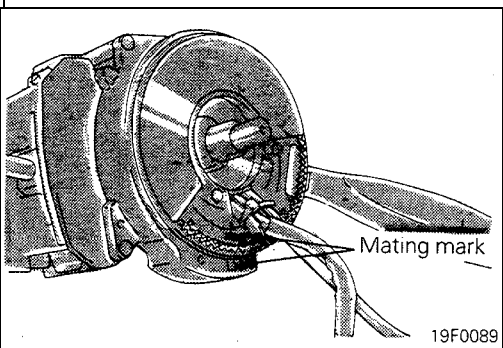
19F0109



- (3) Insert ROM pack into the Multi-use Tester and connect tester to Diagnosis Check Connector in glove compartment.
- (4) Reconnect negative terminal of battery, and turn the ignition key to the "ON" position.
- (5) Conduct self-diagnosis using Multi-use Tester to ensure entire SRS operates properly, except open circuit of air bag module ("22. SQUIB TRBL 2"). (Refer to P.52B-18.)
- (6) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

Caution

Wait at least 30 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 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 cable is disconnected.

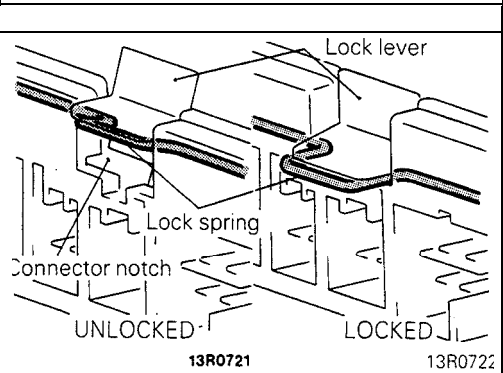


11. INSTALLATION OF CLOCK SPRING

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.



9. 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.

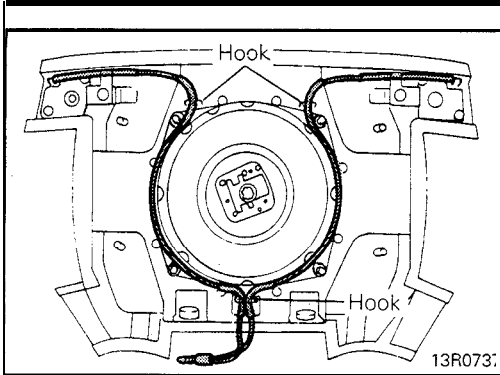
8. INSTALLATION OF STEERING WHEEL

- (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

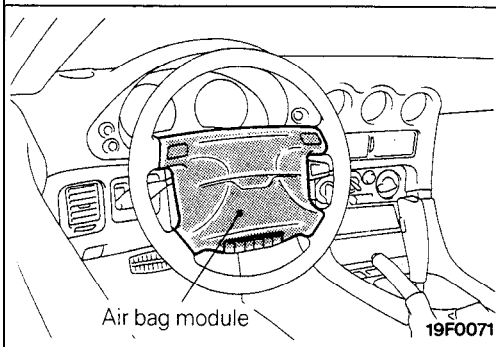
Be sure when installing the steering wheel, that the harness of the clock spring does not become caught or tangled.

- (2) After clamping, turn the steering wheel all the way in both directions to confirm that steering is normal.



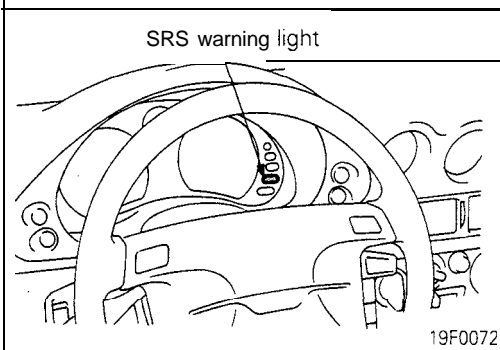
2. INSTALLATION OF AIR BAG MODULE

- (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, taking care that no wiring is caught by it.



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.



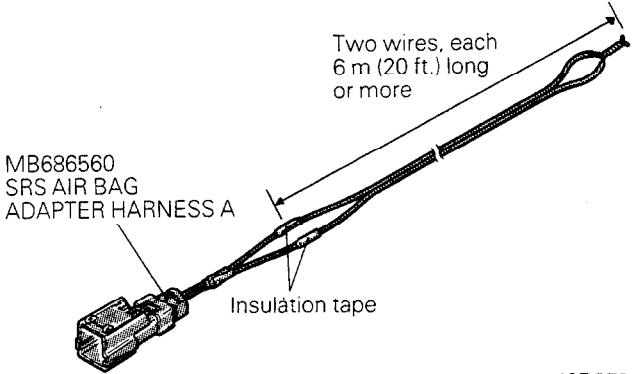
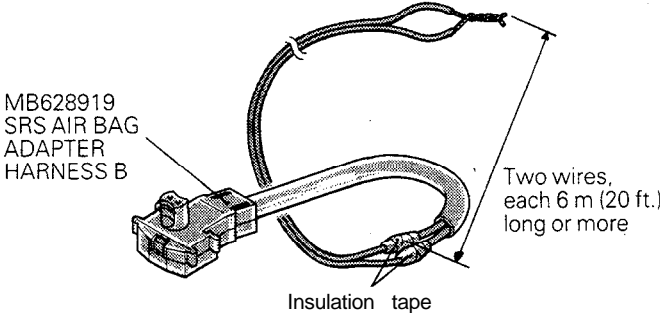
- (2) Reconnect the negative battery terminal. Turn the ignition switch to "ON". Does the "SRS" warning light illuminate for about 7 seconds, turn OFF and then remain extinguished for at least 45 seconds? If yes, SRS system is functioning properly. If no, consult page 52B-17.

AIR BAG MODULE DISPOSAL PROCEDURES

M52PEAA

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.

AIR BAG REMOTE DEPLOYMENT DEVICES

Tool, Number, Name	Use
 <p>MB686560 SRS AIR BAG ADAPTER HARNESS A</p> <p>Two wires, each 6 m (20 ft.) long or more</p> <p>Insulation tape</p> <p align="right">13R0733</p>	<ul style="list-style-type: none"> • Deployment inside the vehicle (when vehicle will not longer be driven)
 <p>MB628919 SRS AIR BAG ADAPTER HARNESS B</p> <p>Two wires, each 6 m (20 ft.) long or more</p> <p>Insulation tape</p> <p align="right">13R0752</p>	<ul style="list-style-type: none"> • Deployment outside the vehicle

UNDEPLOYED AIR BAG MODULE DISPOSAL

Caution

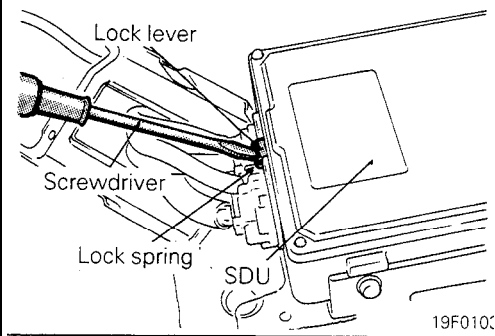
If the vehicle is to be scrapped, junked, or otherwise disposed of, deploy the air bag inside the vehicle. If the vehicle will continue to be operated and only the air bag module is to be disposed of, deploy the air bag outside the vehicle.

1. DEPLOYMENT INSIDE THE VEHICLE (when vehicle will no longer be driven)

- (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

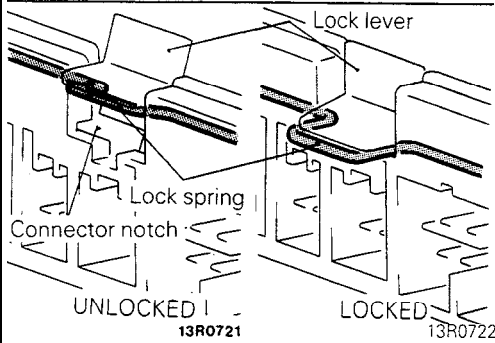
Wait at least 30 seconds after disconnecting the battery cables before doing any further work. The SRS system is designed to retain enough voltage to deploy the air bag for a short time even after the battery has been disconnected, so serious injury may result from unintended air bag deployment if work is done on the SRS system immediately after the battery cables are disconnected.



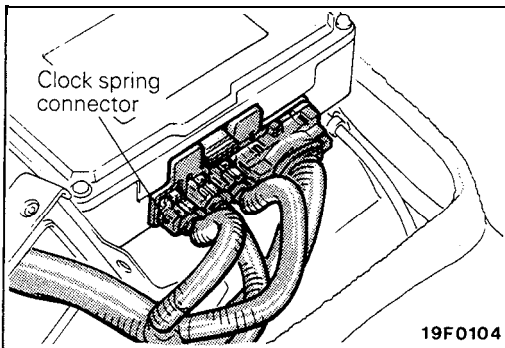
- (3) Remove the rear console assembly. (Refer to GROUP 52A – Floor Console.)
- (4) Use a screwdriver to push in the lock spring of the lock lever of the SRS diagnosis unit to unlock the lock lever.

Caution

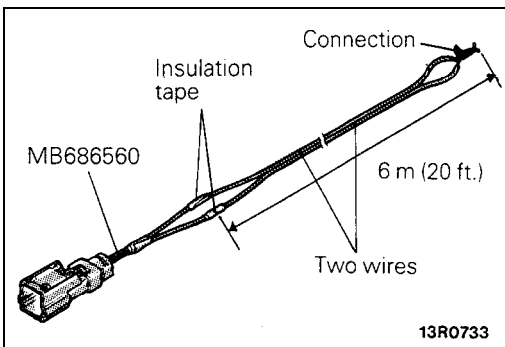
A double-lock mechanism is employed for the connector of the SRS diagnosis unit, so care must be taken not to damage it by using excessive force or by not disconnecting it correctly.



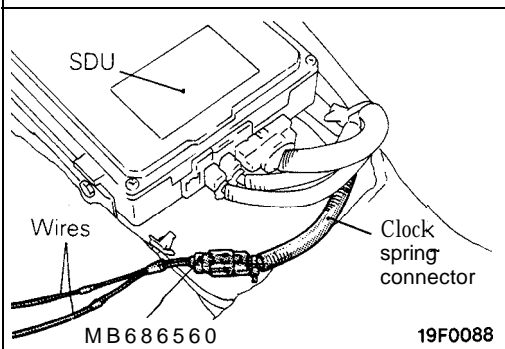
- (5) Disconnect the clock spring connector from the SRS diagnosis unit while pressing down the lock of the connector. (Refer to P.52B-9.)

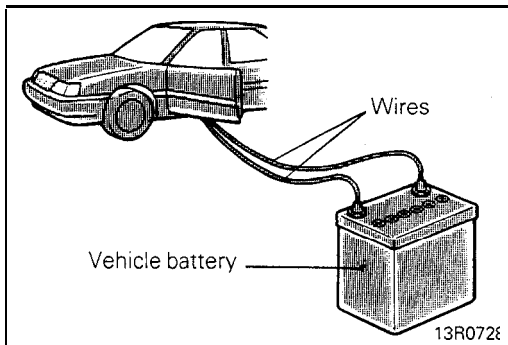


- (6) Connect two wires each six meters (20 feet) long, to the two leads of SRS AIR BAG ADAPTER HARNESS A and cover the connections with insulation tape. The other ends of the two wires should be connected to each other (short-circuited), to prevent sudden unexpected deployment of the air bag.



- (7) 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.





- (8) 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.
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-72) for post-deployment handling instructions.

3. If the air bag fails to deploy when the procedures above are followed, do not go near the module. Contact your regional Tech Line at 1-800-446-6064 for instructions.

2. DEPLOYMENT OUTSIDE THE VEHICLE

- (1) Disconnect the negative (-) and positive (+) battery cables from the battery terminals, and then remove the battery from the vehicle.

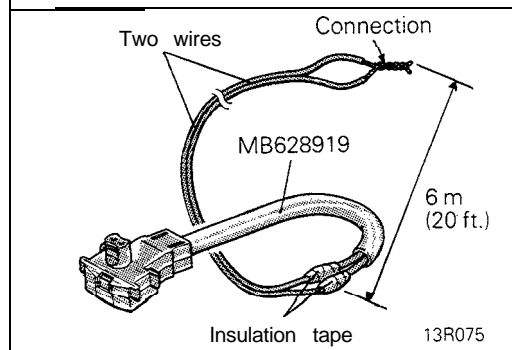
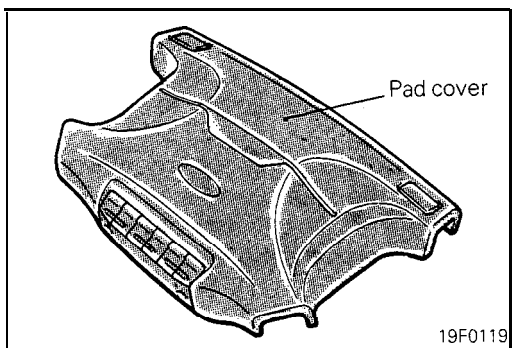
Caution

Wait at least 30 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 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.

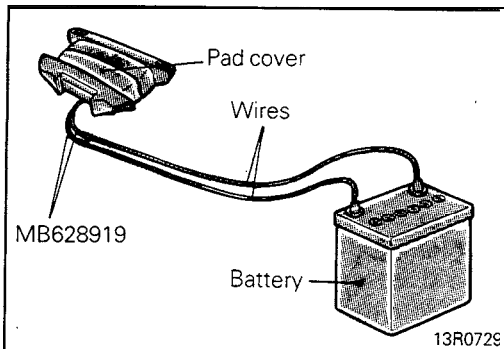
- (2) Remove the air bag module for the vehicle. (Refer to P.52B-62.)

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.



- (3) Connect two wires each six meters (20 feet) long, 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.



- (4) Place the air bag module, with the pad cover face up, in a flat, spacious area at least 6 meters (20 feet) away from any people, equipment or other objects. Connect SRS AIR BAG ADAPTER HARNESS B to the air bag module connector on the module's underside.
- (5) 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. 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.
2. 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.
3. 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.
4. If the air bag module fails to deploy when the procedures above are followed, do not go near the module. Contact your regional Tech Line at 1-800-446-6064 for instructions.

DEPLOYED AIR BAG MODULE DISPOSAL PROCEDURES

After deployment, the air bag module should be placed in a plastic bag and 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) Put the deployed air bag in a hermetically sealed container and discarded it.

HEATER, AIR CONDITIONER AND VENTILATION

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M55AA- -

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CONTINUED ON NEXT PAGE

SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

- (1) A Supplemental Restraint System (SRS), which uses a driver-side air bag, has been installed in the 3000GT.
- (2) The SRS includes the following components: impact sensors, SRS diagnosis unit: SRS warning light, air bag module, clock spring, 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 (*).

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) 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), before beginning any service or maintenance of any component of the SRS or any SRS-related component.

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HEATER, AIR CONDITIONER AND VENTILATION

SPECIFICATIONS

M55CA--

GENERAL SPECIFICATIONS

Items	Specifications
Heater unit	
Type	Three-way-flow full-air-mix system
Heater control assembly	Dial type
Compressor	
Model	Scroll type (FX-105 VS)
Refrigerant unit lubricant cc (cu.in.)	FREOL S-83 or SUNISO 5GS 160 ± 20 (9.8 ± 1.2)
V belt size mm (in.)	1,150 (45.3)
Dual pressure switch	
High pressure switch kPa (psi)	OFF: 2,700 (384) ON: 2,100 (299)
Low pressure switch kPa (psi)	OFF: 210 (30) ON: 235 (33)
Freezer prevention °C (°F)	Air temperature thermostat
	OFF: - 2 (28.4) ON: 2 (35.6)
Refrigerant and quantity g (oz.)	R-12 Approx. 970 (34)

SERVICE SPECIFICATIONS

M55CB--

Items	Specifications
Standard value	
Idle speed when air conditioner on rpm	900 ± 100 <A/T at P range>
Resister resistance value Ω	1.76 – 2.06 (Across terminals ② and ①) 1.10 – 1.26 (Across terminals ② and ③) 0.38 – 0.44 (Across terminals ② and ④)
Refrigerant temperature sensor	
Sensor-ON temperature °C (°F)	Approx. 110 (230) or less
Sensor-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)
Engine coolant temperature switch	
Switch-OFF temperature °C (°F)	112 – 118 (233 – 244)
<Fully automatic air conditioner>	
Air mix damper potentiometer motor assembly resistance	
MAX. HOT kΩ	0.2
MAX. COOL kΩ	4.9
Outlet selector damper potentiometer assembly resistance	
DEF. position kΩ	2.0
FACE position kΩ	4.3
Water temperature sensor	
Sensor-ON temperature °C (°F)	26.5 ± 4 (79.7 ± 7)

LUBRICANTS

M55CD--

Items	Specified lubricants	Quantity
Each connection of refrigerant line	FREOL S-83 or SUNISO 5GS	As required

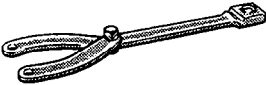

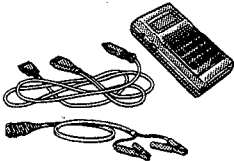

SEALANT AND ADHESIVE

M55CE--

Items	Specified sealant and adhesive
Engine coolant temperature switch threaded part	3M Nut Locking Part No. 4171 or equivalent

SPECIAL TOOLS

M55DA--

Tool	Number	Name	Use
	MB991367	Special spanner	Removal and installation of armature mounting nut of compressor
	MB991386	Pin	
	MB991341	Multi-use tester sub assembly	Inspection of full auto air conditioner
	MB991359	ROM pack (for multi-use tester)	

HEATERS AND MANUAL AIR CONDITIONER

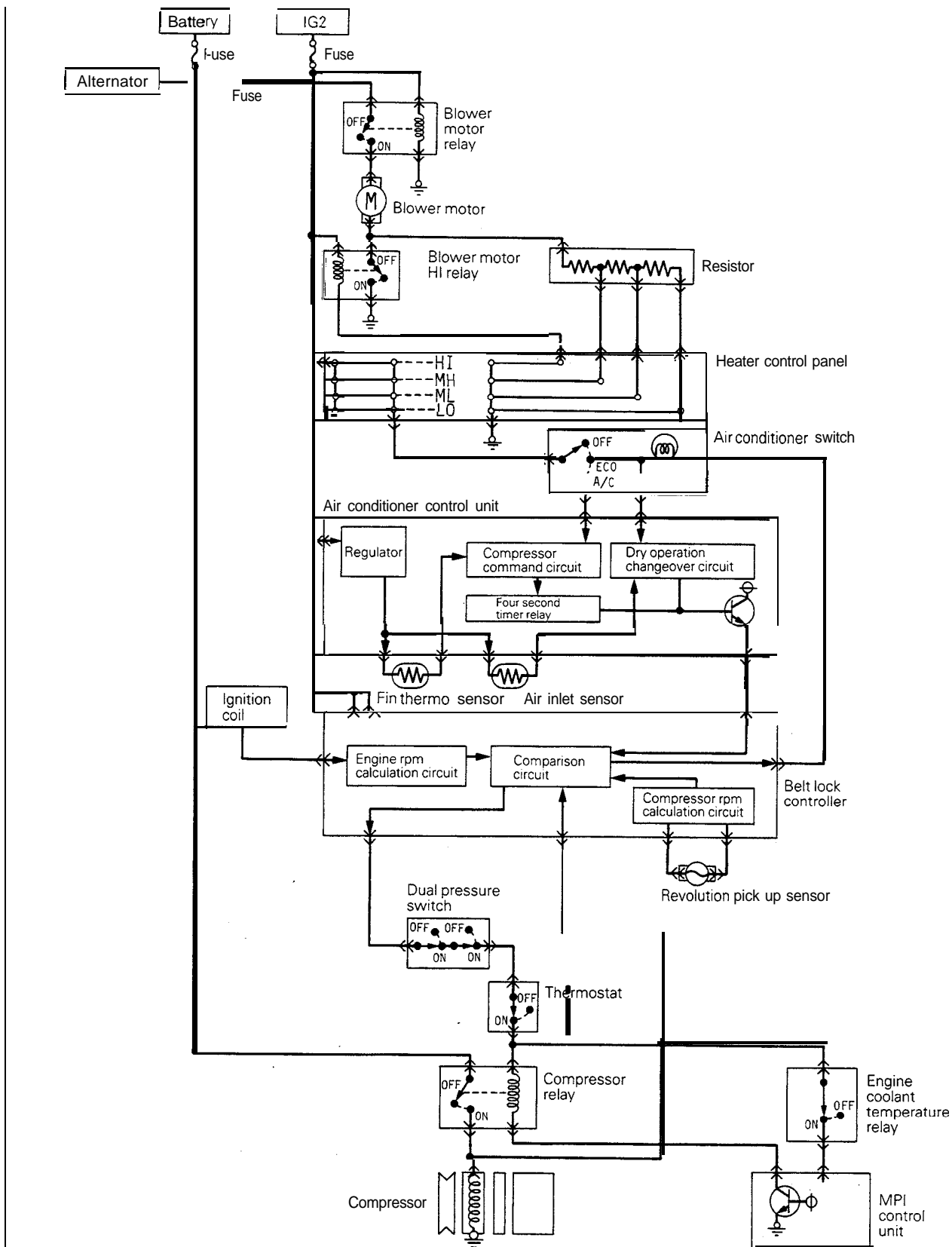
TROUBLESHOOTING

M55ECAE

Symptom	Probable cause	Remedy
Heater insufficient heat	Obstructed heater outlets	Correct
	Blend air dampers improperly adjusted or binding	
	Thermostat malfunction	Replace
	Obstructed heater hoses	
	Improperly adjusted control cables	Adjust
	Plugged or partially plugged heater core	Clean or replace
No ventilation even when mode selection knob is operated	Incorrect adjustment of mode selection dampers	Adjust
	Incorrect installation of mode selection control wire	
	Ducts are incorrectly/incompletely connected, crushed, bent or clogged	Repair or replace
Blower motor inoperative	Burnt-out fuse	Replace
	Poor grounding	Correct
	Malfunction blower switch	Replace
	Malfunction resistor	
	Malfunction blower motor	
	Malfunction heater relay	
	Malfunction blower motor relay	

CIRCUIT DAIGRAM

AIR CONDITIONER CONTROL UNIT CIRCUIT



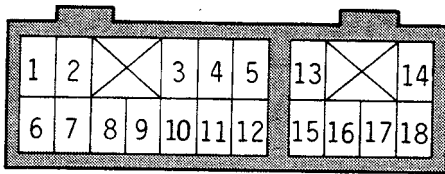
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TROUBLESHOOTING HINTS**Inspection of Air Conditioner Control Unit**

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 conditioner switch: ON
- (3) Temperature control lever: MAX. COOL
- (4) Blower switch: HI



20F0085

Terminal No.	Signal	Conditions	Terminal voltage
8	Auto compressor control unit ground	At all times	0V
1	Auto compressor control unit power supply	When ignition switch is ON	Battery voltage
6	Air conditioner compressor relay	When all conditions for switch-ON of the compressor are satisfied	Battery voltage
7	Air conditioner switch: A/C	When air conditioner switch pressed in to second step	Battery voltage
2	Air conditioner switch: ECONO	When air conditioner switch pressed in to first step	Battery voltage
13	Fin-thermo sensor ⊕	Ignition switch, blower switch and air conditioner switch: ON	Approx. 2.5V
14	Air-inlet sensor ⊕	Ignition switch, blower switch and air conditioner switch: ON	Approx. IV
15	Fin-thermo sensor ⊖	Ignition switch, blower switch and air conditioner switch: ON Ambient temperature: 4°C (39°F)	0V
18	Air-inlet sensor ⊖	Ignition switch, blower switch and air conditioner switch: ON Ambient temperature: 4°C (39°F)	ov

TROUBLESHOOTING QUICK-REFERENCE TABLE

Compressor doesn't operate.

Item no.	Inspection point	Method	Criteria		Probable cause	Remedy
			Normal	Abnormal		
1	Magnetic clutch	Apply battery voltage to magnetic clutch terminal ① to check if sound is developed during operation.	Sound is noted	No sound is noted	Faulty magnetic clutch	Replace magnetic clutch.
2	Blower switch	Check for continuity between switch terminals. (Refer to P.55-19.)	Continuity	No continuity	Faulty blower switch	Replace blower switch
3	Air conditioner switch	Check for continuity between switch terminals. (Refer to P.55-21.)	Continuity	No continuity	Faulty air conditioner switch	Replace air conditioner switch.
4	Magnetic clutch relay	Check for continuity between terminals ② and ④	Continuity	No 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)	Outside 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	No continuity	Faulty dual-pressure switch	Replace dual-pressure switch.
7	Thermostat	Check for continuity between thermostat terminals. (Refer to P.55-30.)	Continuity	No continuity	Faulty thermostat	Replace thermostat.
8	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	Outside 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 1.1 kΩ	Outside range of 0.9 to 1.1 kΩ	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 conditioner control unit. Therefore, replace the air conditioner control unit.

SAFETY PRECAUTIONS

M55PAAF

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 a 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 conditioner 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-12.

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 cold 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 (125.6°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 metering 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.

SERVICE ADJUSTMENT PROCEDURES

M55FEAU

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 conditioner 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 some refrigerant.
- (3) If the sight glass shows foam or bubbles, the system could be low on charge. The system has to be charged with some refrigerant.

MAGNETIC CLUTCH

- (1) Disconnect the wiring to the magnetic clutch.
- (2) Connect battery (+) voltage directly to the wiring for the magnetic clutch.
- (3) 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.

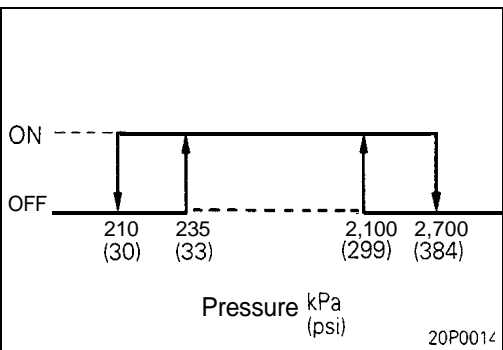
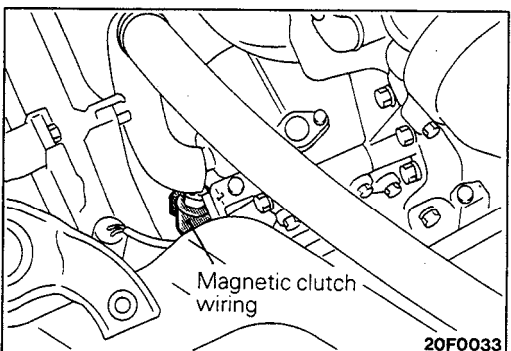
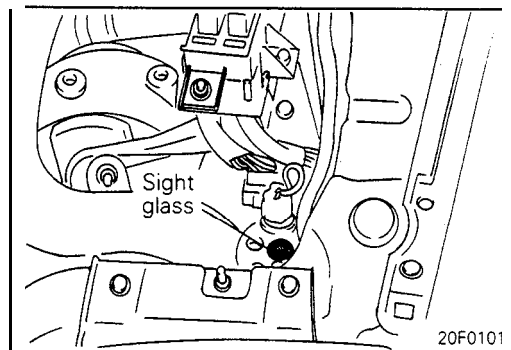
RECEIVER DRIER

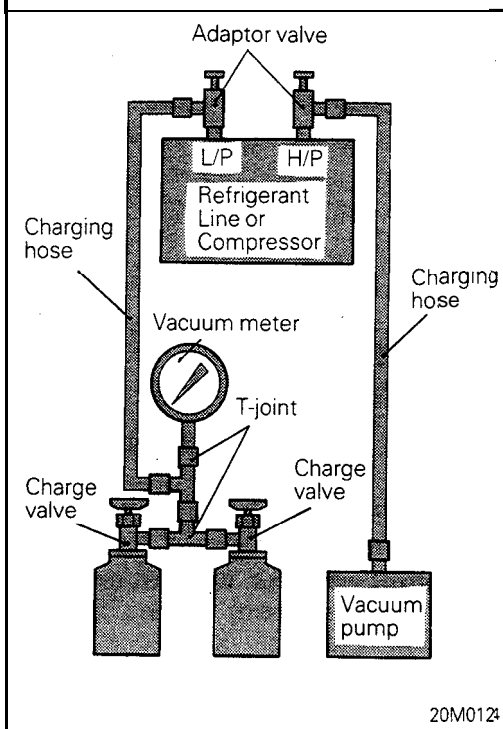
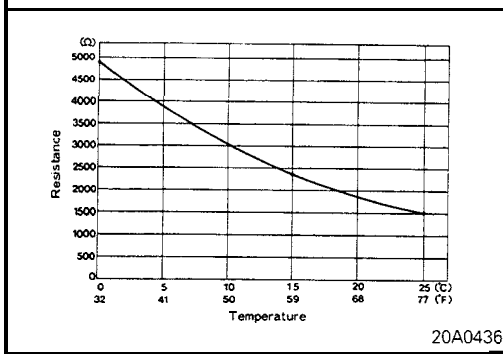
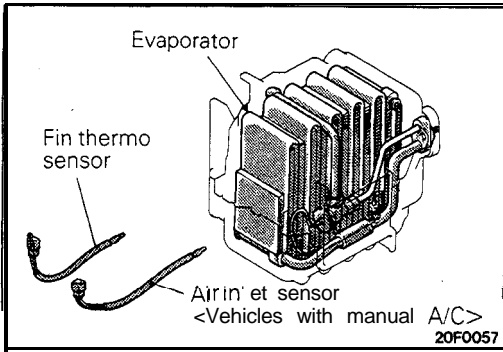
To Test the Receiver Drier

- (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.





FIN-THERMO 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 $\pm 10\%$ of value of the characteristic curve, the sensor is functioning normally.
- (2) If the sensor is normal, there is a malfunction of the air conditioner control unit, and it should be replaced.

COMPRESSOR DRIVE BELT ADJUSTMENT

M55FJAG

Refer to GROUP 11 – Engine Adjustment.

CHARGING PROCEDURES

M55FTAB

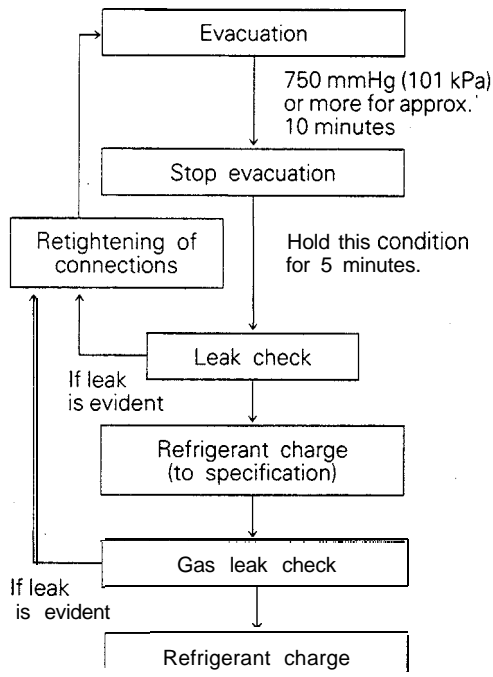
INSTALLATION OF CHARGE EQUIPMENT

- (1) Turn back the adaptor valve handle all the way and install each adaptor valve to the high and low pressure service valves.
- (2) Tighten the adaptor valve handle and open the service valves.
- (3) Connect the charge valve to the T-joint:
- (4) With the charge valve handle turned back all the way, install the service can.
- (5) Connect each charge equipment as illustrated.

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 CHARGING WITH SMALL CANS

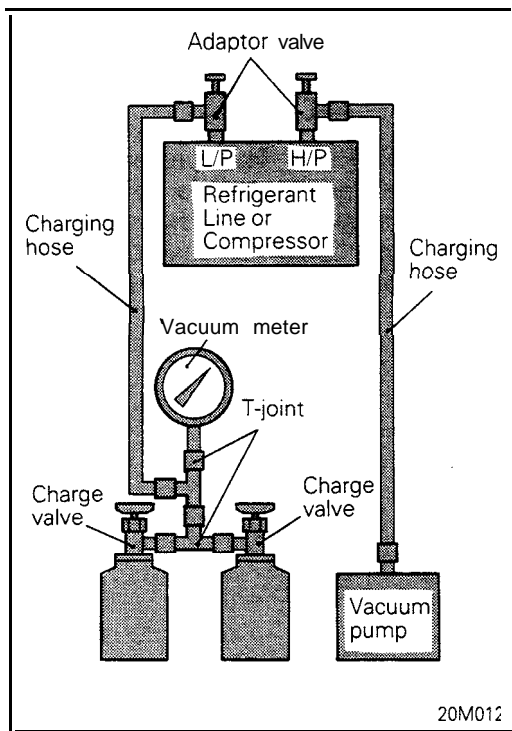
When using disposable cans of this type, follow carefully the can manufacturers instructions.

- (1) Start up the vacuum pump.

Caution

1. Do not use the compressor for evacuation.
2. Do not operate the compressor in the vacuum condition; damage may occur.

- (2) Evacuate to a vacuum reading of 100 kPa (89.5 psi) or higher (approx. 10 minutes).
- (3) Turn back the high pressure side adaptor valve all the way and close the service valve.
- (4) Stop the vacuum pump and allow to stand for 5 minutes.
- (5) Check for leaks. (Good if the vacuum is held.)
- (6) Tighten the charge valve handle to puncture the service can.
- (7) Open the charge valve to charge the system with refrigerant.
- (8) When the refrigerant is no longer drawn in, turn back the low pressure side adaptor valve handle all the way and close the service valve.
- (9) Check for gas leaks using a leak detector.



- (10) Start the engine.
- (11) Operate the air conditioner and set at the lowest temperature (MAX. COOL).
- (12) Fix the engine speed at 1,500 rpm.
- (13) Tighten the low pressure side adaptor valve and open the service valve to charge specified amount of refrigerant.

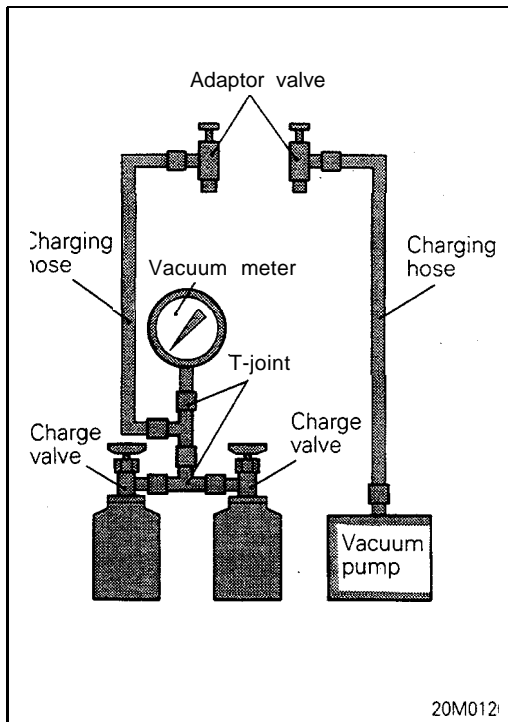
Caution

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.

- (14) Upon completion of charging, turn back the low pressure side adaptor valve handle all the way and close the service valve.

CHARGING WITH REFRIGERANT RECOVERY AND RECYCLING UNIT

When using refrigerant recovery and recycling unit, follow carefully the instruction manual for the unit.

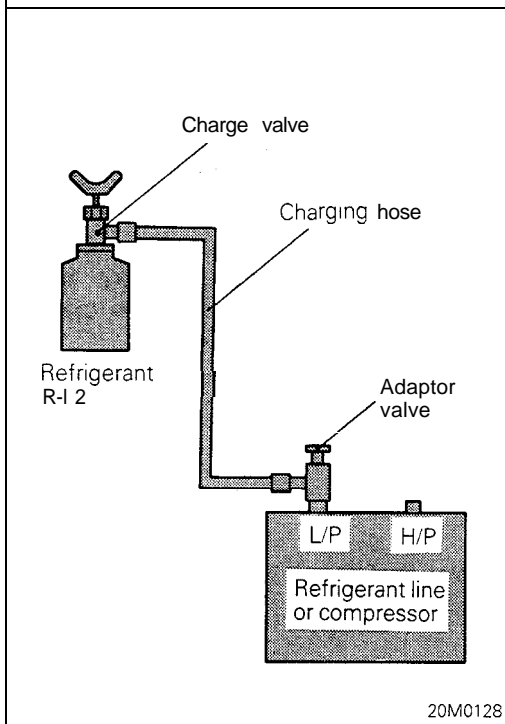


REMOVAL OF CHARGE EQUIPMENT

- (1) Close the charge valve.
- (2) Remove the adaptor valve from each service valve.
- (3) Remove the vacuum pump.

Caution

Do not remove the service can, T-joints and adaptor valves but keep them connected for next charge operation.



CORRECTING LOW REFRIGERANT LEVEL

- (1) Install the charge valve to the service can with its handle turned back all the way.
- (2) Connect the charging hose to the charge valve.
- (3) Connect the adaptor valve to the charging hose with its handle turned back all the way.
- (4) Tighten the charge valve handle to puncture the can.
- (5) Operate the adaptor valve handle to bleed air.
- (6) Install the adaptor valve to the low pressure side service valve.

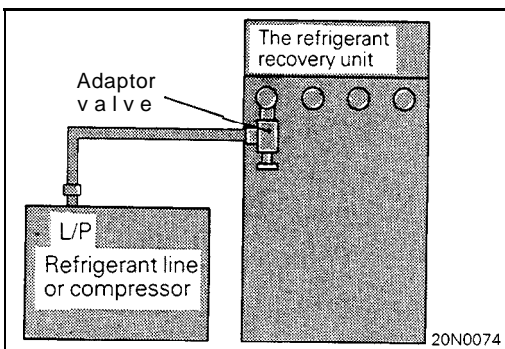
Caution

Never use the high pressure side as this may cause refrigerant to flow back, using rupture of the service can.

- (7) Start the engine.
- (8) Operate the air conditioner and set at the lowest temperature (MAX. COOL).
- (9) Fix the engine speed at 1,500 rpm.
- (10) Open the adaptor valve and charge refrigerant checking level with the sight glass.
- (11) Upon completion of charging, close the adaptor valve and charge valve.
- (12) Remove the adaptor valve from the service valve.

NOTE

If the service can is not emptied completely, keep the charge valve and adaptor valve connected to the can for next charging.



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.

REFILLING OF OIL IN THE AIR CONDITIONER SYSTEM

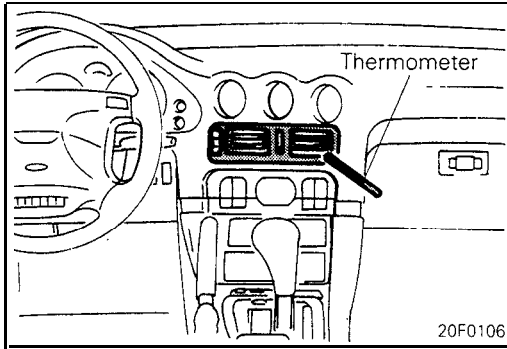
Too little oil will provide inadequate compressor lubrication and cause a compressor failure. Too much oil will increase discharge air temperature.

When a FX-105VS compressor is installed at the factory, it contains 160 cc (9.8 cu.in.) 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.

- Condenser: 8 cc (.5 cu.in.)**
- Evaporator: 72 cc (4.4 cu.in.)**
- Piping: 9.6 cc (.6 cu.in.)**
- Receiver drier: 6.4 cc (.4 cu.in.)**



PERFORMANCE TEST

M55FWAH

- (1) Park the tested vehicle at the area which is not exposed to the 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 conditioner as follows:
 Air conditioning switch: Air conditioner — 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 conditioner clutch engaged.
- (9) Engine should be warmed up with doors, windows close, and hood open.
- (10) Insert a thermometer in the center air conditioner 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)	(32.0 0.0 -- 3.0 37.4)	(33.8 1.0 -- 4.0 39.2)	(33.8 1.0 -- 4.0 39.2)	(33.8 1.0 -- 4.0 39.2)	(35.6 2.0 -- 41.0 5.0)
Compressor pressure kPa discharge (psi)	(98.1 690 -- 105.3 740)	(110.9 780 -- 830 118.1)	(123.7 870 -- 920 130.9)	(153.6 1,080 -- 1,130 160.7)	(172.1 1,210 -- 1,260 179.2)
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)

REFRIGERANT LEAK REPAIR PROCEDURE

M55FHAQ

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 saturate water 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.

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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 of 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

M55FIAF

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.

Unified plumbing connections with O-rings. These O-rings are not reusable.

COMPRESSOR NOISE

M55FLAD

When investigating an air conditioning related noise, you must first know the conditions when the noise occurs. These conditions are: weather, vehicle speed, in gear on 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 alternator).

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.

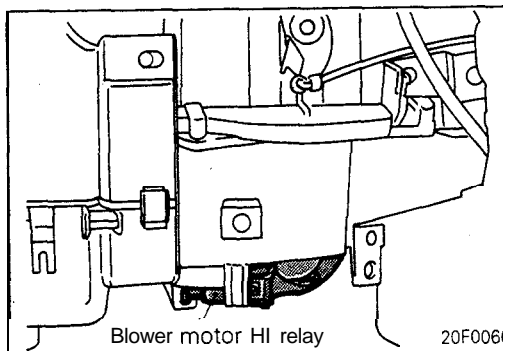
ADJUSTMENT PROCEDURES

- (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

M55FNAK

- (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 conditioner), condenser fan motor relays (HI) and (LO), and air-conditioner 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 from the blower case assembly.
- (5) Check the continuity between terminals using a circuit tester.

**IDLE-UP OPERATION CHECK**

M55FOAB

- (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 conditioner switch is switched ON and the air conditioner is activated.

Standard value: 900 ± 100 rpm**NOTE**

There is no necessity to make an adjustment, because the idling speed is automatically adjusted by the ISC* system. If, however, there occurs a deviation from the standard value for some reason, check the ISC* system.

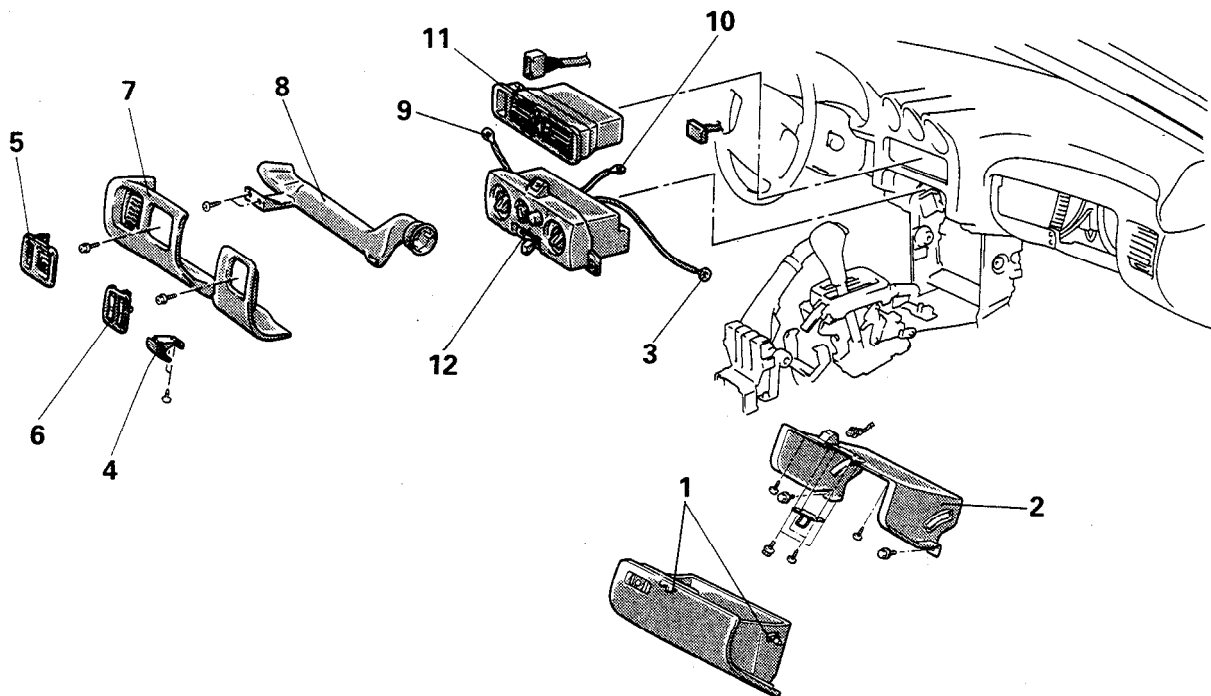
ISC: Idle Speed Control

HEATER CONTROL ASSEMBLY

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Removal and installation of Floor Console
(Refer to GROUP 52A – Floor Console.)



20F0078

Removal steps

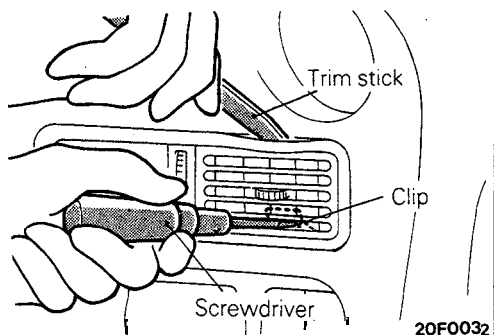
1. Stopper
2. Glove box outer case assembly
- ◆◆ 3. Connection of the air-selection control wire
4. Hood lock release handle
5. Rheostat assembly
6. Rear wiper & washer switch
7. Knee protector
8. Shower duct
- * 9. Connection of the mode control wire
- * 10. Connection of the temperature control wire
- ◆◆ 11. Center air outlet assembly
12. Heater control assembly

SERVICE POINT OF REMOVAL

M55GBAM1

11. REMOVAL OF CENTER AIR OUTLET ASSEMBLY

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.



20F0032

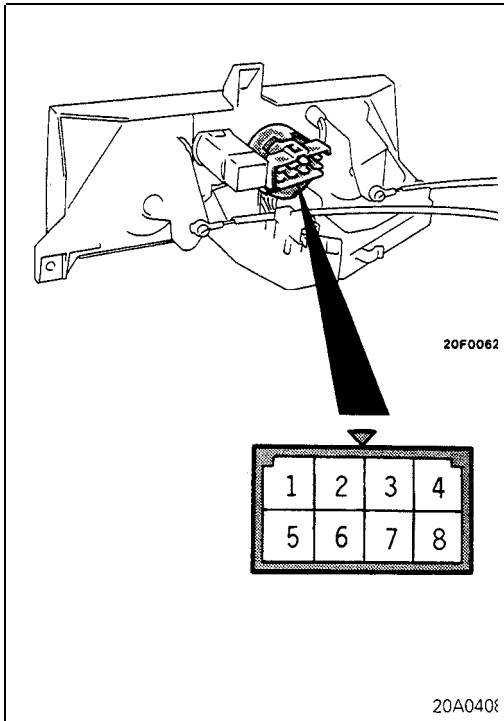
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M55GCAI

INSPECTION

BLOWER SWITCH

Operate the switch, and check the continuity between the terminals.



Terminal	5	3	6	2	7	8	1	4
Switch position								
OFF								
• (Low)	○—○					○—○		
• (Medium first step)	○—○	○—○				○—○		
● (Medium second step)	○—○	○—○	○—○			○—○	○—○	
● (High)	○—○	○—○	○—○	○—○		○—○	○—○	○—○

NOTE
○—○ indicates that there is continuity between the terminals.

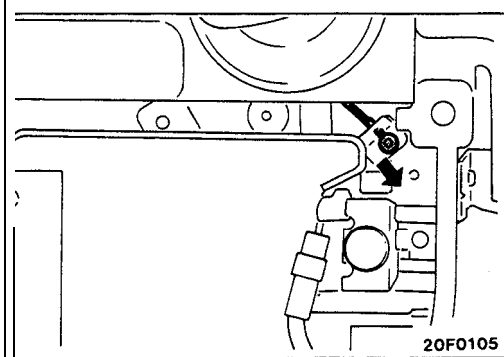
SERVICE POINTS OF INSTALLATION

M55GDAQ

10. INSTALLATION OF TEMPERATURE CONTROL WIRE


Connect the temperature control wire to the blend air damper lever by following the steps below.

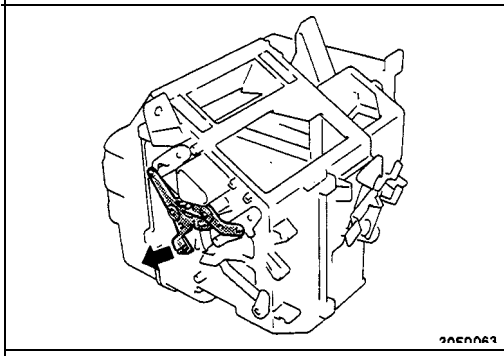
- (1) Move the temperature control lever to the rightmost position. ("HOT" position)
- (2) With the blend air damper lever pressed completely downward in the direction indicated by the arrow, connect the inner cable of the temperature control wire to the end of the blend air damper lever, and then secure the outer cable by using a clip.



9. INSTALLATION OF MODE SELECTION CONTROL WIRE


Connect the mode selection control wire to the mode selection damper lever by following the steps below.

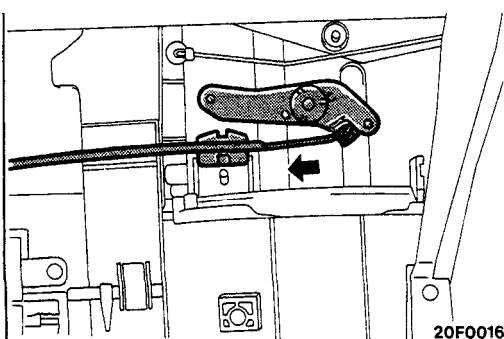
- (1) Move the mode selection lever to the  position.
- (2) With the mode selection damper lever pressed inward in the direction indicated by the arrow, connect the inner cable of the mode selection control wire to the end of the mode selection lever, and then secure the outer cable by using a clip.



3. INSTALLATION OF AIR SELECTION CONTROL WIRE

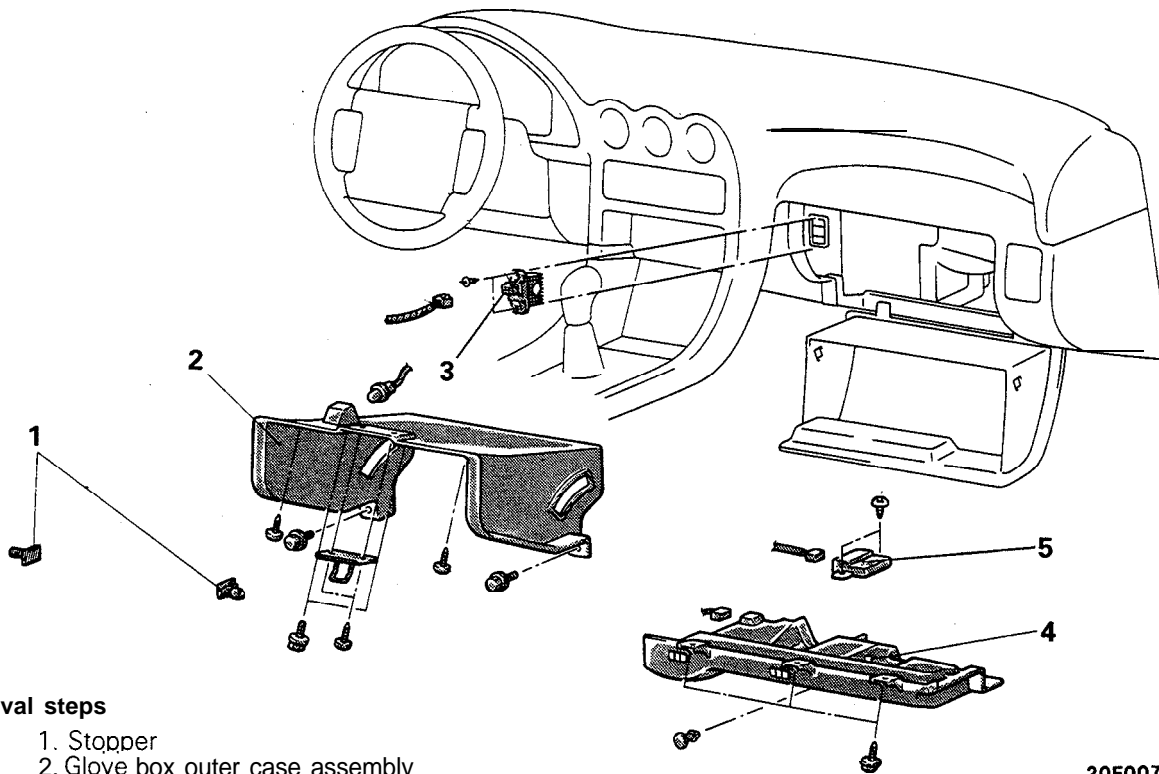
Connect the air selection control wire to the air selection damper lever by following the steps below.

- (1) Move the air selection control lever to the  position.
- (2) With the air selection damper lever pressed inward in the direction indicated by the arrow, 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.



RESISTOR, BELT LOCK CONTROLLER REMOVAL AND INSTALLATION

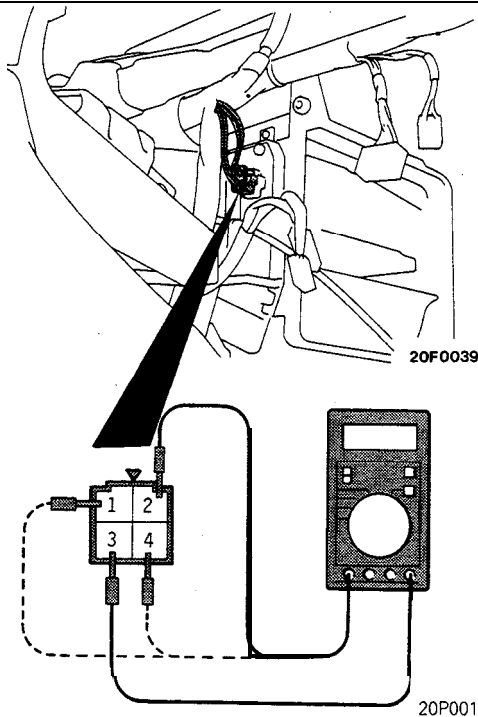
M55JA- -



Removal steps

1. Stopper
2. Glove box outer case assembly
3. Resistor
4. Under cover
5. Belt lock controller

20F0073



INSPECTION

M55JCAD

RESISTOR CHECK

Using a circuit tester, measure the resistance between the terminals indicated below.

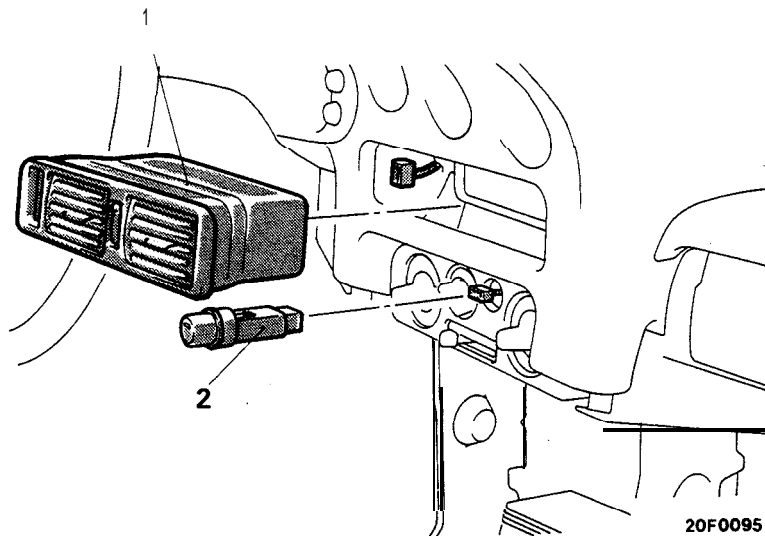
The condition can be considered satisfactory if the value measured at this time is equivalent to the standard value.

Standard value

Terminals measured	Standard value Ω
Between terminals ②-①	Approx. 1.79 - 2.06
Between terminals ②-④	Approx. 1.10 - 1.26
Between terminals ②-③	Approx. 0.38 - 0.44

AIR CONDITIONER SWITCH REMOVAL AND INSTALLATION

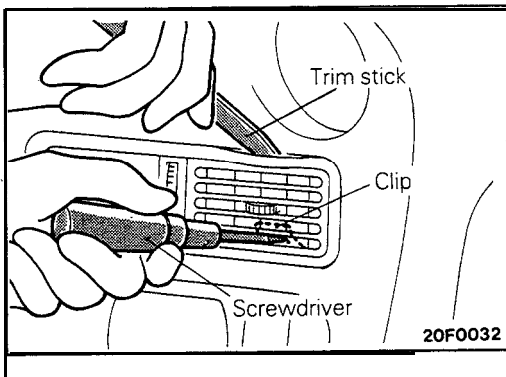
M55QA-•



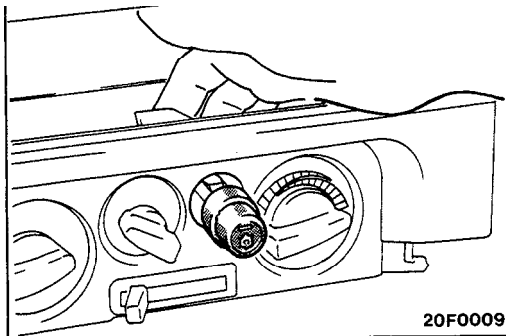
Removal steps

- ◄◄ 1. Center air outlet assembly
- ◄◄ 2. Air conditioner switch

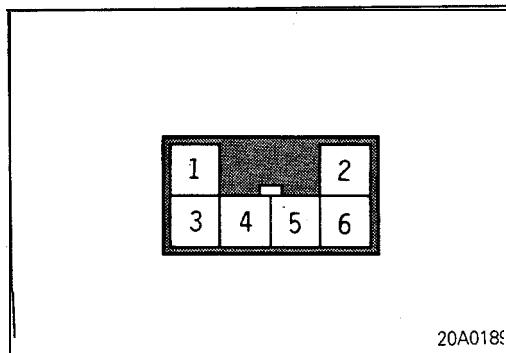
20F0095



20F0032



20F0009



20A0189

SERVICE POINTS OF REMOVAL

M55QBAH

1. REMOVAL OF CENTER AIR OUTLET ASSEMBLY

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.

2. REMOVAL OF AIR CONDITIONER SWITCH

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

M55QCAD

AIR CONDITIONER SWITCH CHECK

Terminal	1	2	4	5	3	6
Switch position						
OFF						O-O
If pressed 1 step (ECONOMY)	0					illumination light
If pressed 2 steps (Air conditioner)				*		

NOTE

- (1) The O-O symbol indicates continuity
- (2) *: <Indication light>

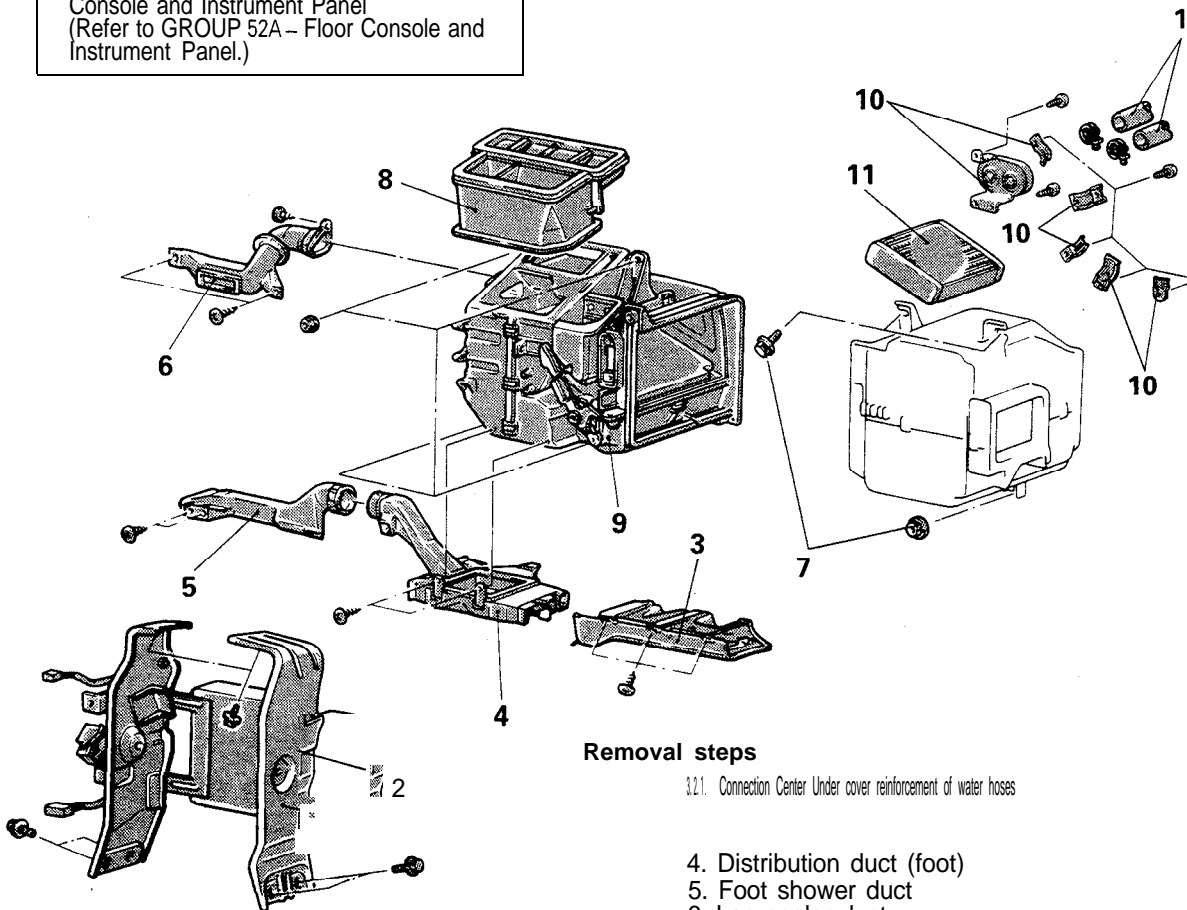
HEATER UNIT

M55IA-

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Draining and Supplying of the Coolant (Refer to GROUP 11 -Service Adjustment Procedures.)
- Removal and Installation of the Floor Console and Instrument Panel (Refer to GROUP 52A – Floor Console and Instrument Panel.)



20F0104

Removal steps

3.21. Connection Center Under cover reinforcement of water hoses

4. Distribution duct (foot)
5. Foot shower duct
6. Lap cooler duct
7. Evaporator mounting bolt and nut <Vehicles with air conditioner>
8. Center duct
9. Heater unit
10. Plate
11. Heater core

SERVICE POINT OF REMOVAL

M55IBAS

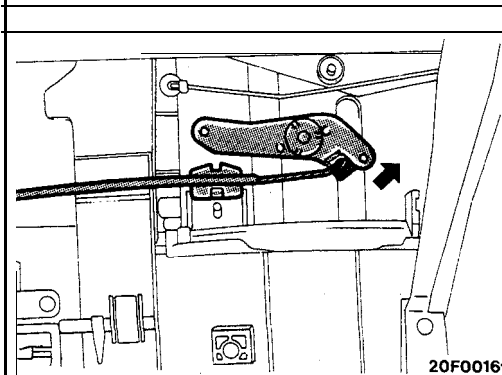
**7. REMOVAL OF EVAPORATOR MOUNTING BOLT
<Vehicles with. manual air conditioner>****NOTE**

In order to prevent bolts from falling into the blower assembly, set the inside/outside air-selection damper to the position that permits outside air introduction.

INSPECTION

M55ICAJ

- Check the operation of dampers and link mechanism.
- Check the heater core for clogging and water leakage.

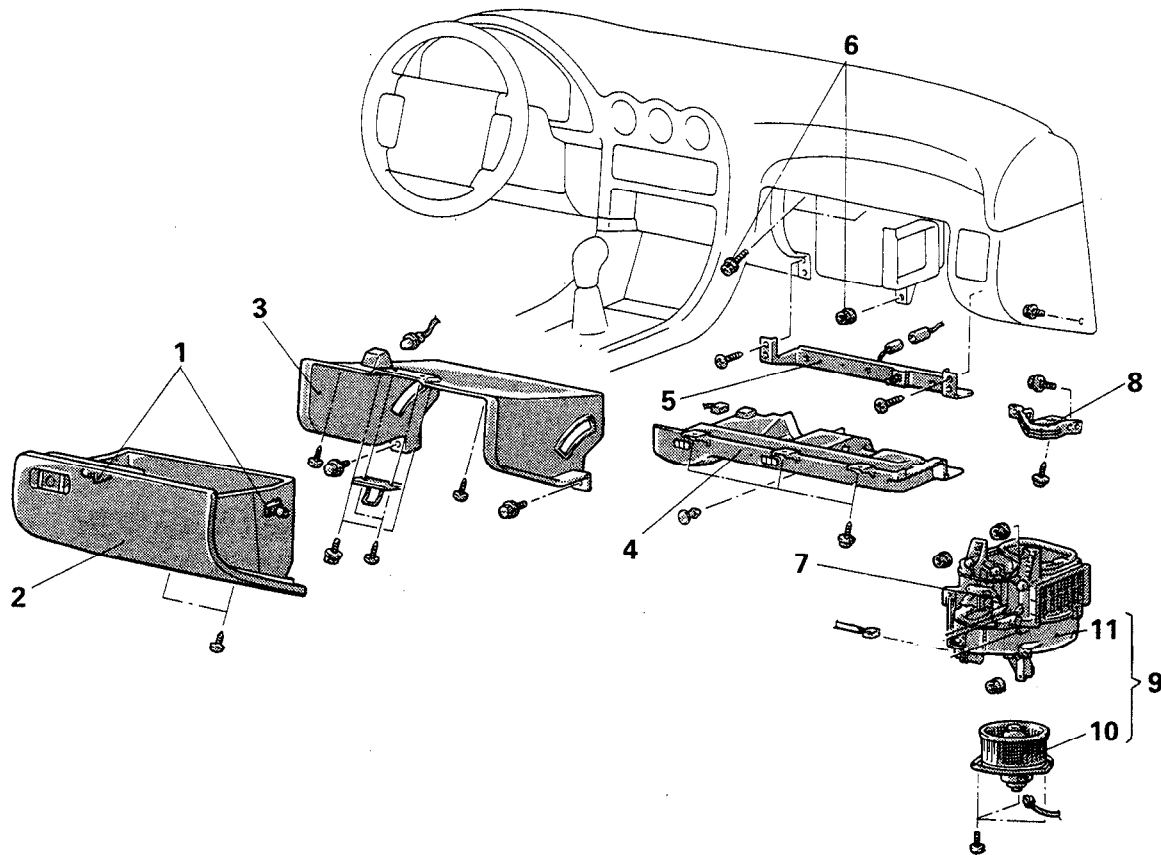


20F0016

TSB Revision

BLOWER ASSEMBLY

REMOVAL AND INSTALLATION



20F0079

Removal steps of blower case assembly

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 conditioner>
- a 7. Connection of the air-selection wire
8. Side frame
9. Blower assembly
- ◆◆ 10. Blower motor assembly
11. Blower case assembly

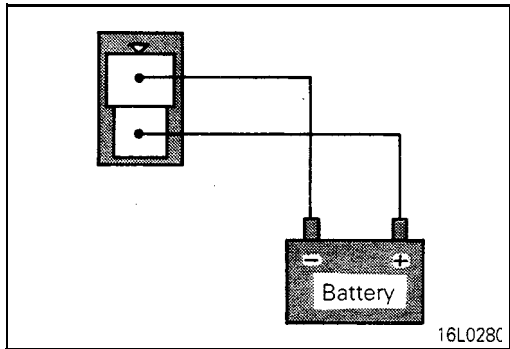
Removal steps of blower motor assembly

4. Under cover
- * 10. Blower motor assembly

INSPECTION

M55KCAM

- 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

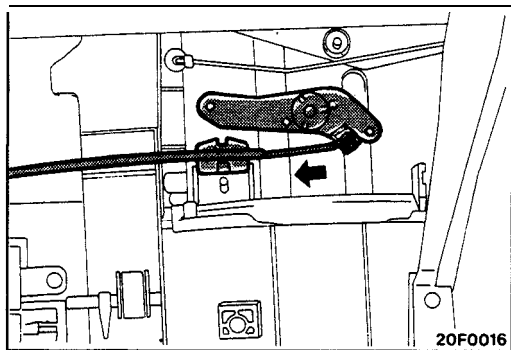
- (1) Disconnect the blower motor terminals.
- (2) Connect the blower motor terminals directly to the battery and check that the blower motor operates smoothly.
- (3) Next, reverse the polarity and check that the blower motor operates smoothly in the reverse direction.

SERVICE POINTS OF INSTALLATION

M55KDAH

10. INSTALLATION OF BLOWER MOTOR ASSEMBLY

Before installing the blower motor assembly, carefully clean away any dust, dirt, etc. adhering to the inner surface of the blower case.



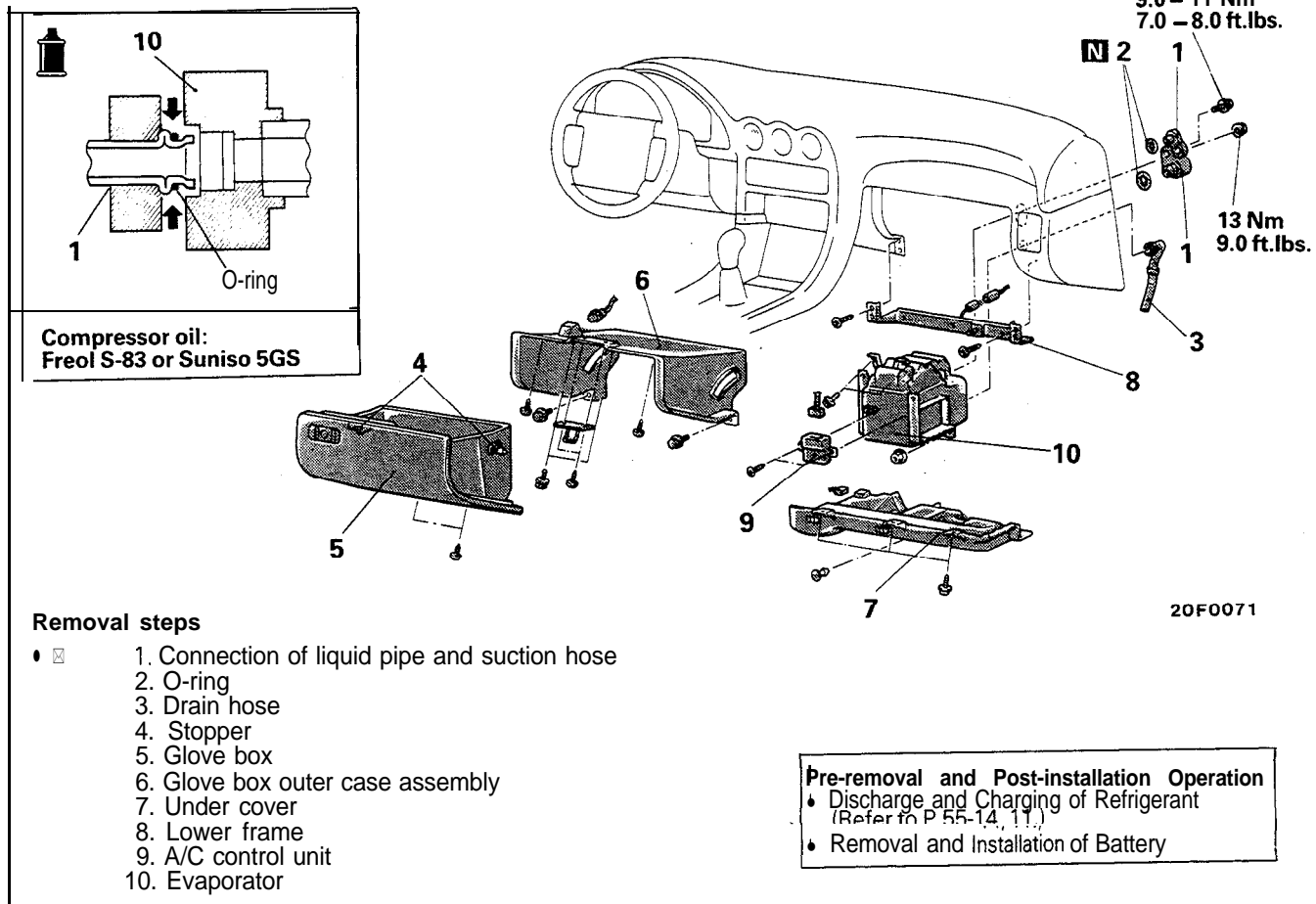
7. INSTALLATION OF AIR SELECTION CONTROL WIRE

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 position.
- (2) With the air selection damper lever pressed inward in the direction indicated by the arrow, 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.

EVAPORATOR

REMOVAL AND INSTALLATION



SERVICE POINTS OF REMOVAL

M55RBAI

1. DISCONNECTION OF LIQUID PIPE AND SUCTION HOSE

If the hoses or pipes are disconnected, cap the hoses or pipes with a blank plug to prevent entry of dust, dirt, and water.

INSPECTION

M55RCAD

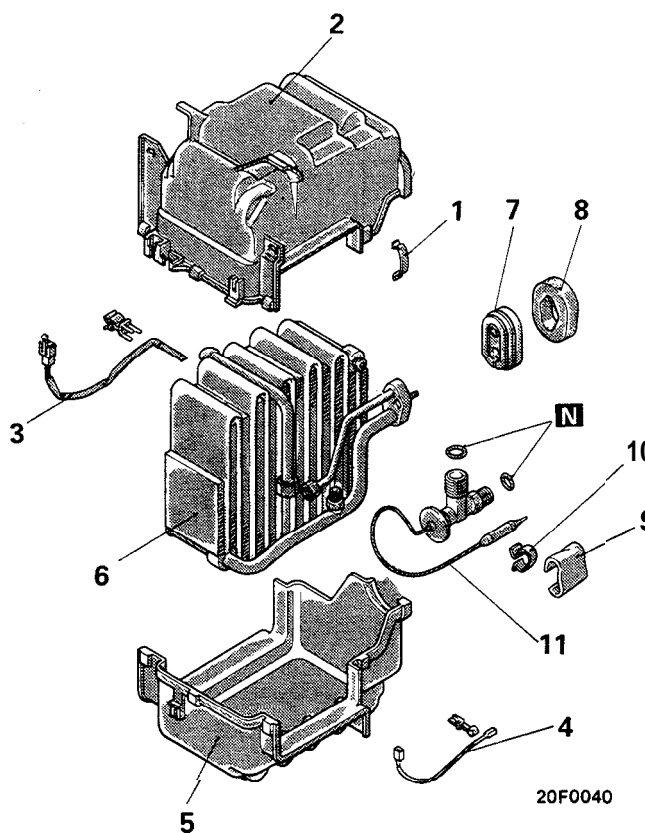
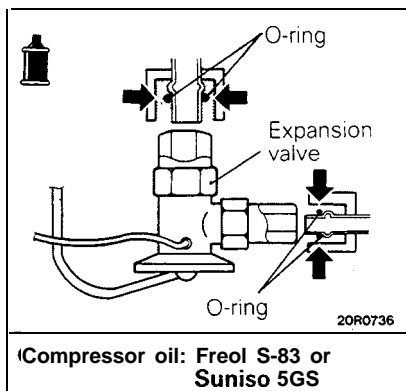
- Check for damage of the evaporator fin part.
- Check for damage or collapse of the drain hose.
- Check for peeling or cracking of the insulator.

FIN-THERMO SENSOR AND AIR-INLET SENSOR CHECK

For information concerning the checking procedures, refer to P.55-11.

DISASSEMBLY AND REASSEMBLY

M55RE--



Disassembly steps

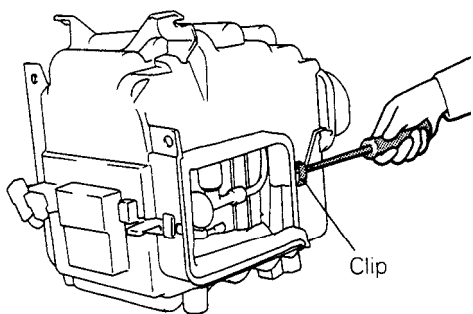
- ◄◄ 1. Clips
- 2. Evaporator case (upper)
- 3. Fin thermo sensor
- 4. Air inlet sensor
- <Vehicles with manual air conditioner>
- 5. Evaporator case (lower)
- 6. Evaporator assembly
- 7. Grommet
- 8. Insulator
- 9. Rubber insulator
- 10. Clip
- ◄◄ 11. Expansion valve

SERVICE POINTS OF DISASSEMBLY

M55RFAJ

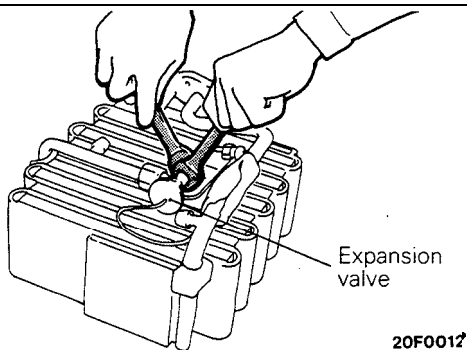
1. REMOVAL OF CLIPS

Remove the clips with a screwdriver covered with a shop towel to prevent damage to case surfaces.



11. REMOVAL OF EXPANSION VALVE

Loosen the flare nut by using two wrenches (for both the inlet and outlet).



TSB Revision

COMPRESSOR

M55SA

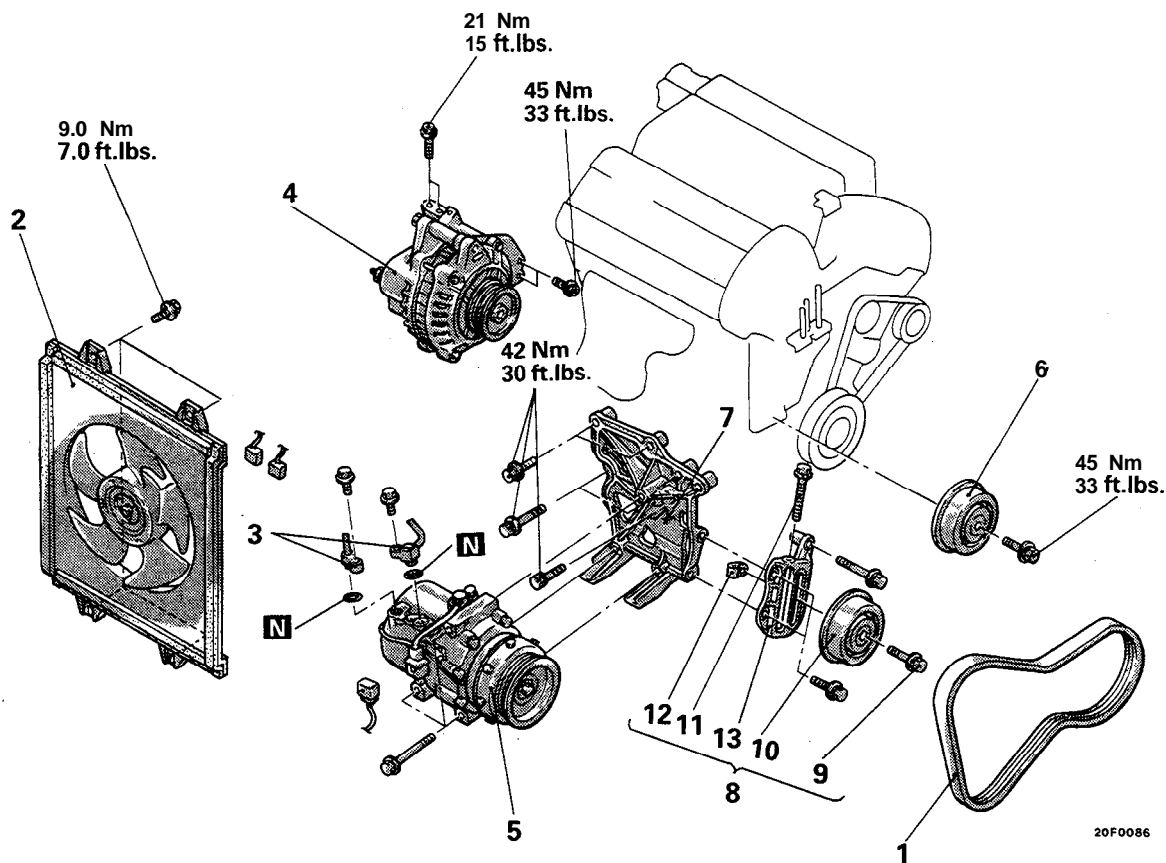
REMOVAL AND INSTALLATION

Pre-removal Operation

- Discharge of the Refrigerant (Refer to P.55-14.)

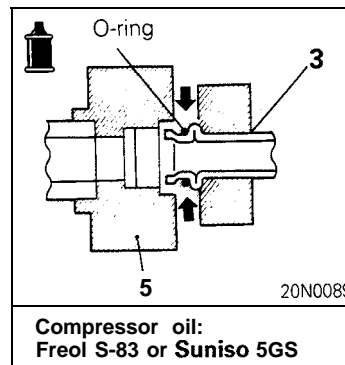
Post-installation Operation

- Adjustment of the Compressor Drive Belt (Refer to GROUP 11 – Service Adjustment Procedures.)
- Charging of Refrigerant (Refer to P.55-11.)

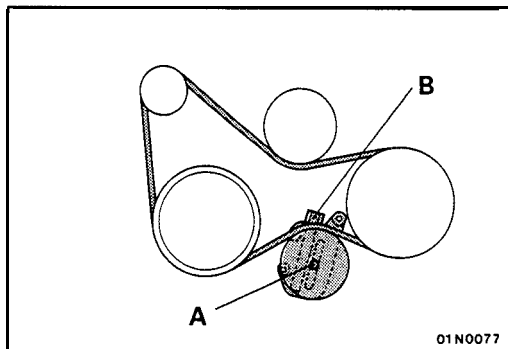


Removal steps

- ◄◄ 1. Compressor drive belt
- ◄◄ 2. Condenser fan motor assembly
- ◄◄ 3. Connection of suction hose and discharge hose
- ◄◄ • + 4. Alternator (Refer to GROUP 16 – Alternator.)
- ◄◄ • * 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



Compressor oil:
Freol S-83 or Suniso 5GS



SERVICE POINTS OF REMOVAL

M55SBAE

1. REMOVAL OF COMPRESSOR DRIVE BELT

- (1) Loosen bolt "A" for holding the tension pulley.
- (2) Loosen bolt "B" for adjustment, and remove the compressor drive belt.

3. REMOVAL OF SUCTION HOSE AND DISCHARGE HOSE

If the hoses are disconnected, cap the hoses with a blank plug to prevent entry of dust, dirt, and water.

5. REMOVAL OF COMPRESSOR

Caution

Lay the towel on the brake tube to protect them. When install the compressor, do not damage the brake tubes. This work must be done carefully so as not to spill the compressor oil.

INSPECTION

M55SCAE

- 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 conditioner belt.
- Check for unusual wear or abrasion of the air conditioner belt.

OPERATION CHECK OF THE COMPRESSOR'S MAGNETIC CLUTCH

- (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.

SERVICE POINTS OF INSTALLATION

M55SDAF

5. INSTALLATION OF COMPRESSOR

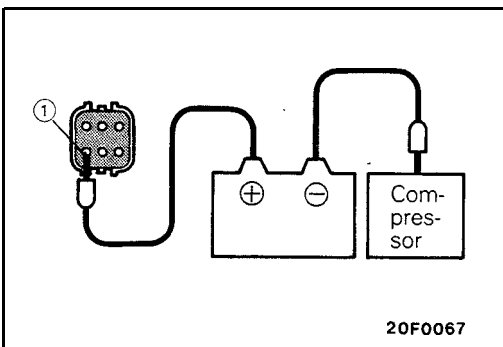
If a new compressor is installed, first adjust the amount of oil according to the procedures described below, and then install the compressor.

- (1) Measure the amount (X cc) 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.

$$\text{New compressor oil amount } 160 \text{ cc (9.8 cu.in.)} - X \text{ cc} = Y \text{ cc}$$

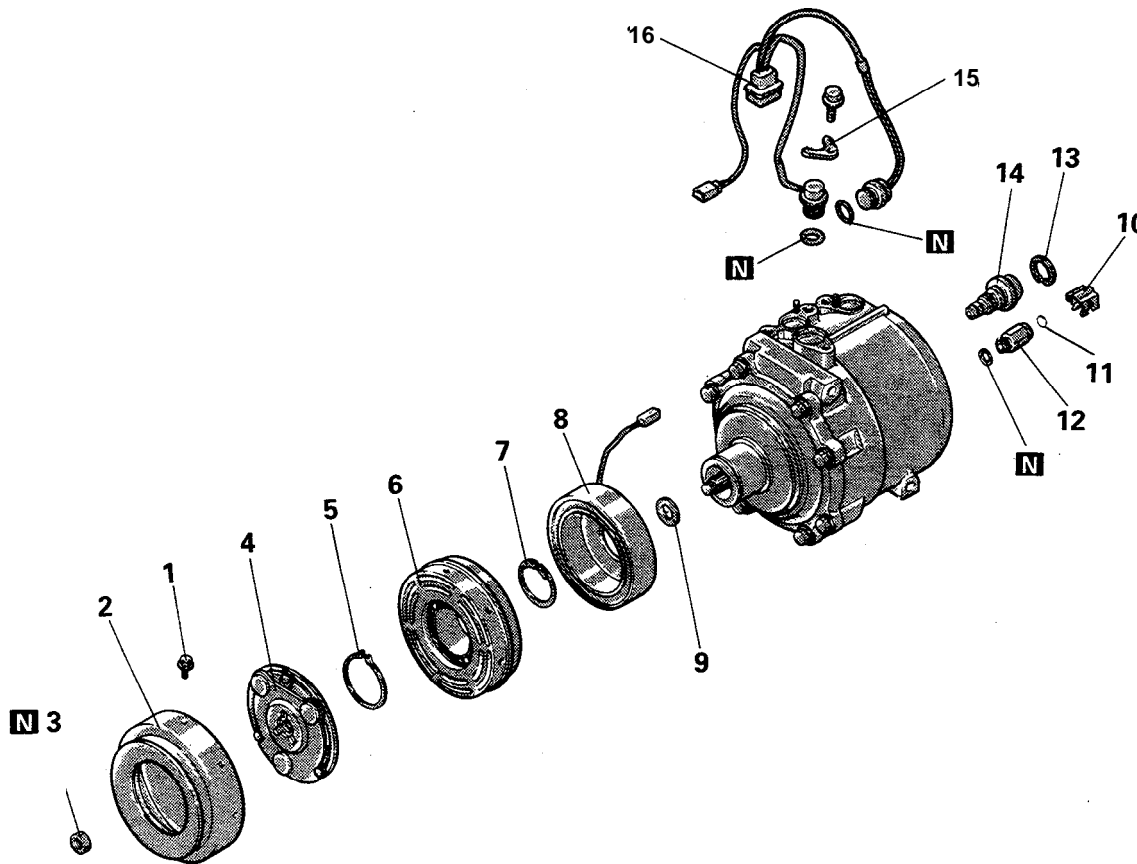
NOTE

Y cc indicates the amount of oil in the refrigerant line, the condenser, the cooling unit, etc.



DISASSEMBLY AND REASSEMBLY

M55SE-



20F0097

Magnetic clutch disassembly steps

- 1. Bolts
- 2. Pulley
- ☒ • * 3. Nut
- * 4. Armature plate
- * 5. Snap ring
- 6. Rotor
- * 7. Snap ring
- ◀▶ 8. Clutch coil
- 9. Shims

Control valve disassembly

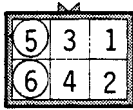
- 13. Snap ring
- 14. Control valve

Thermostat and revolution pick up sensor disassembly steps

- 15. Plate
- 16. Thermostat and revolution pick up sensor

High pressure relief valve disassembly steps

- 10. Cover
- 11. Dust cover
- 12. High pressure relief valve



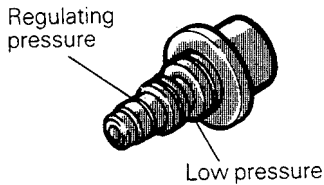
20N0034

REVOLUTION PICK UP SENSOR CHECK

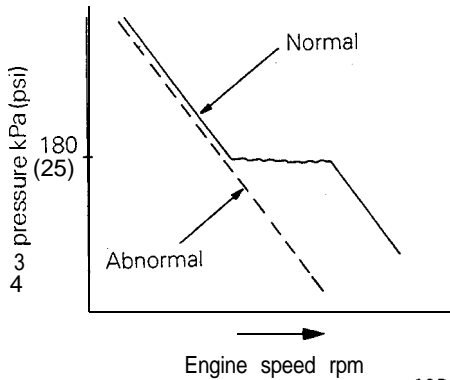
Measure the resistance between terminals ⑤ and ⑥ of the connector.

Normal resistance: $405 \pm 35 \Omega$ when ambient temperature is 20°C (68°F)

If the measurement deviates greatly from the above resistance, replace the revolution pick up sensor assembly.



20F0096



20P0285

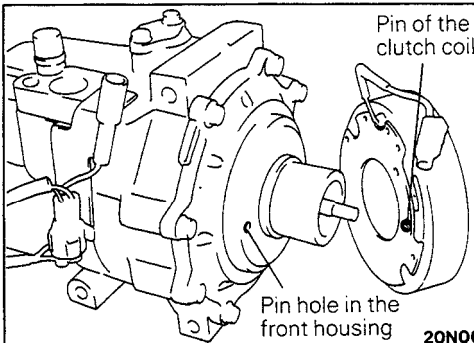
CONTROL VALVE CHECK

The control valve detects a low pressure level during the operation of the air conditioner, and adjusts the amount of refrigerant to be bypassed.

- (1) Operate the air conditioner 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 conditioner 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) 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) pressure level. If the low pressure drops like this, replace the control valve.



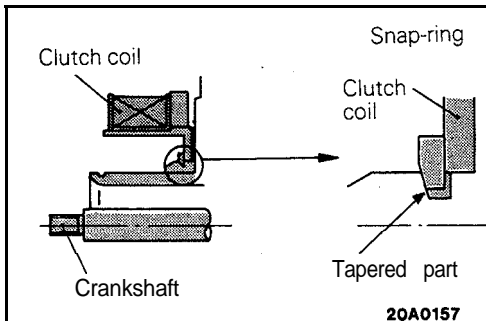
20N0030

SERVICE POINTS OF REASSEMBLY

M55SHAF

8. INSTALLATION OF CLUTCH COIL

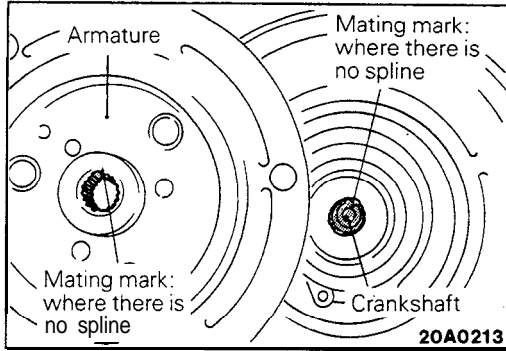
Align the pin of the clutch coil with the pin hole in the front housing, and then fit it into the hole.



20A0157

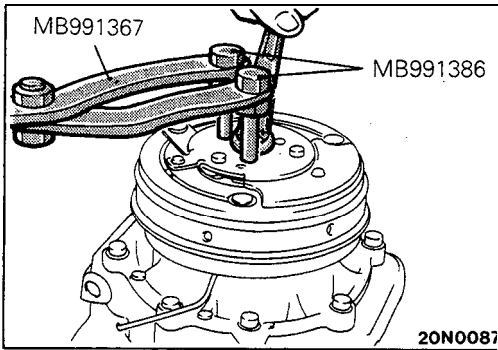
7. INSTALLATION OF SNAP RING

Install the snap ring so that the tapered surface is at the outer side.



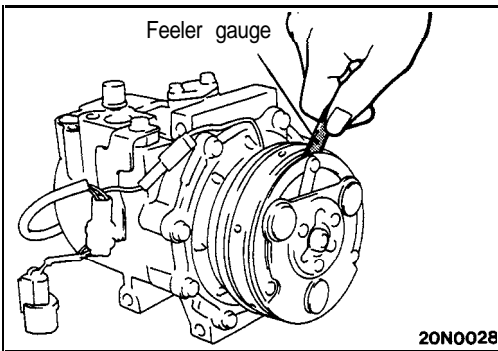
4. INSTALLATION OF ARMATURE PLATE

Align the mating mark of the crankshaft spline and the mating mark of the armature plate, and then fit them together.



3. INSTALLATION OF NUT

(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

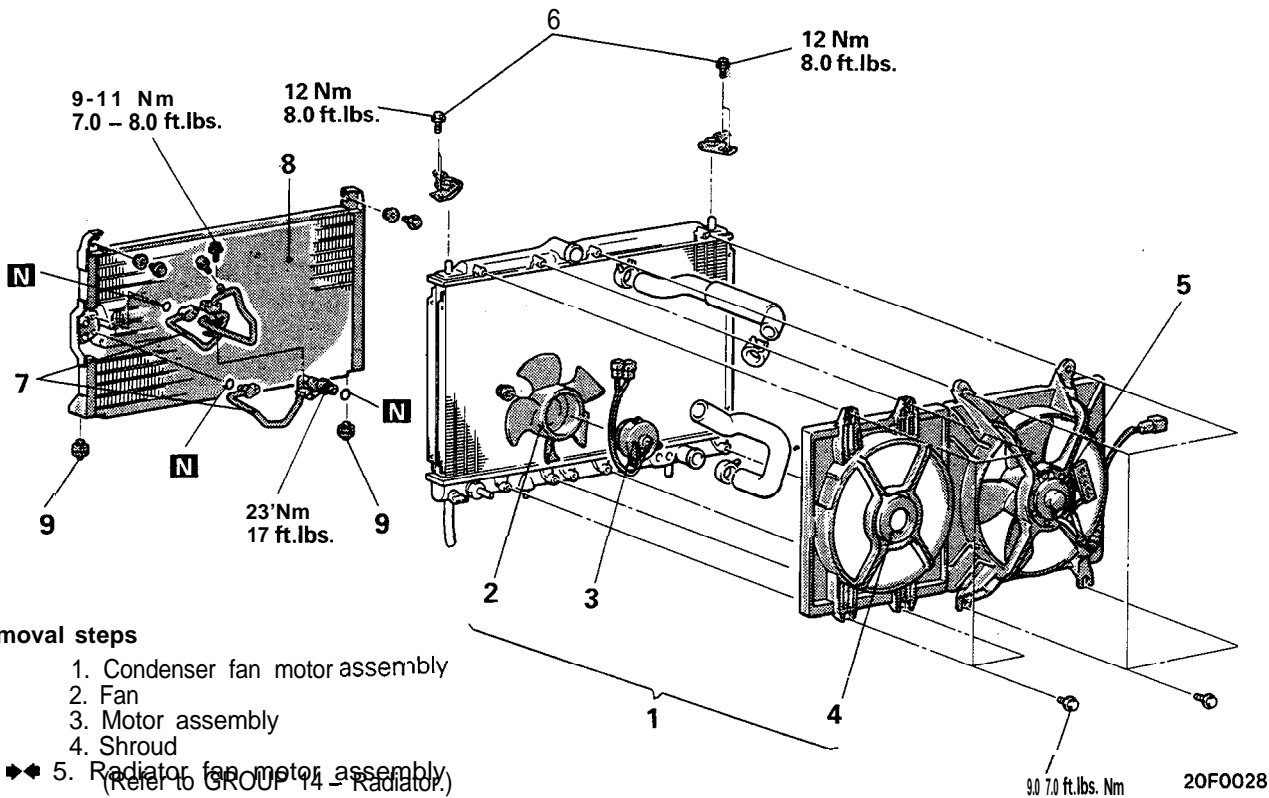
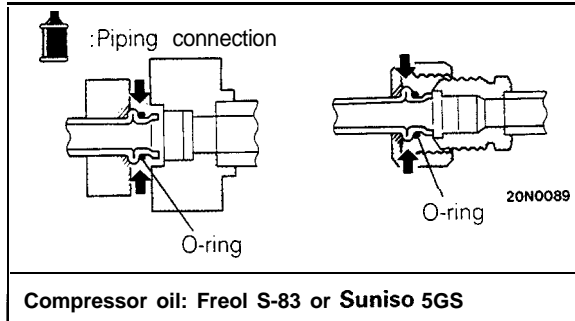
If there is a deviation of the air gap from the standard value, make the necessary adjustment by adjusting the number of shims.

CONDENSER AND CONDENSER FAN MOTOR REMOVAL AND INSTALLATION

M55TA-A

Pre-removal and Post-installation Operation

- Discharge and Charging of the Refrigerant (Refer to P.55-14, 11.)
- Removal and Installation of the Alternator (Refer to GROUP 16 -Alternator.)

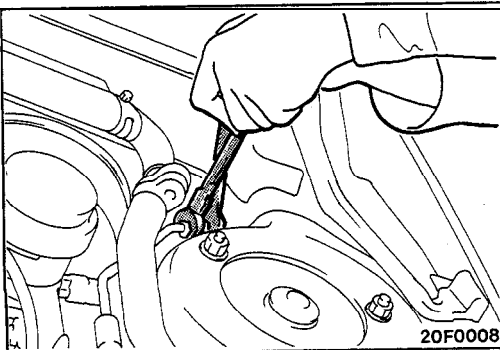


Removal steps

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. Liquid pipe A and liquid pipe B
- ◆ 8. Condenser
- ◆ 9. Bushings

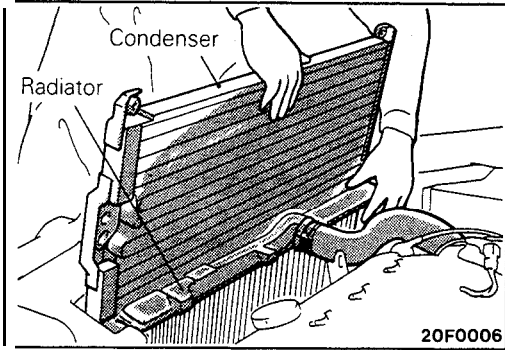


SERVICE POINTS OF REMOVAL

M55TBAC

7. REMOVAL OF LIQUID PIPE A AND LIQUID HOSE B

- (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.



8. REMOVAL OF CONDENSER

Move the radiator toward the engine, and then remove the condenser upward.

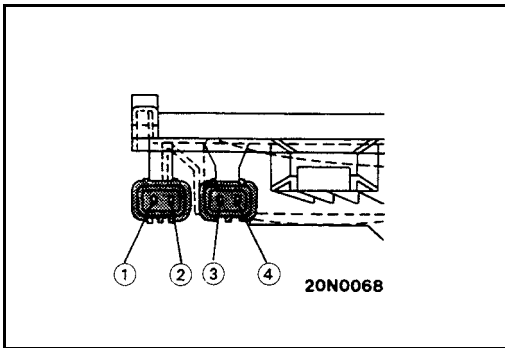
INSPECTION

M55TCAK

- Check the condenser fan for crushing or other damage.
- Check the condenser's high-pressure 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 ① and ground terminal ④; at this time, check that the condenser fan motor turns.
- (2) Apply battery voltage to terminal ② and ground terminal ③; at this time, check that the condenser fan motor turns.



**REFRIGERANT LINE
REMOVAL AND INSTALLATION**

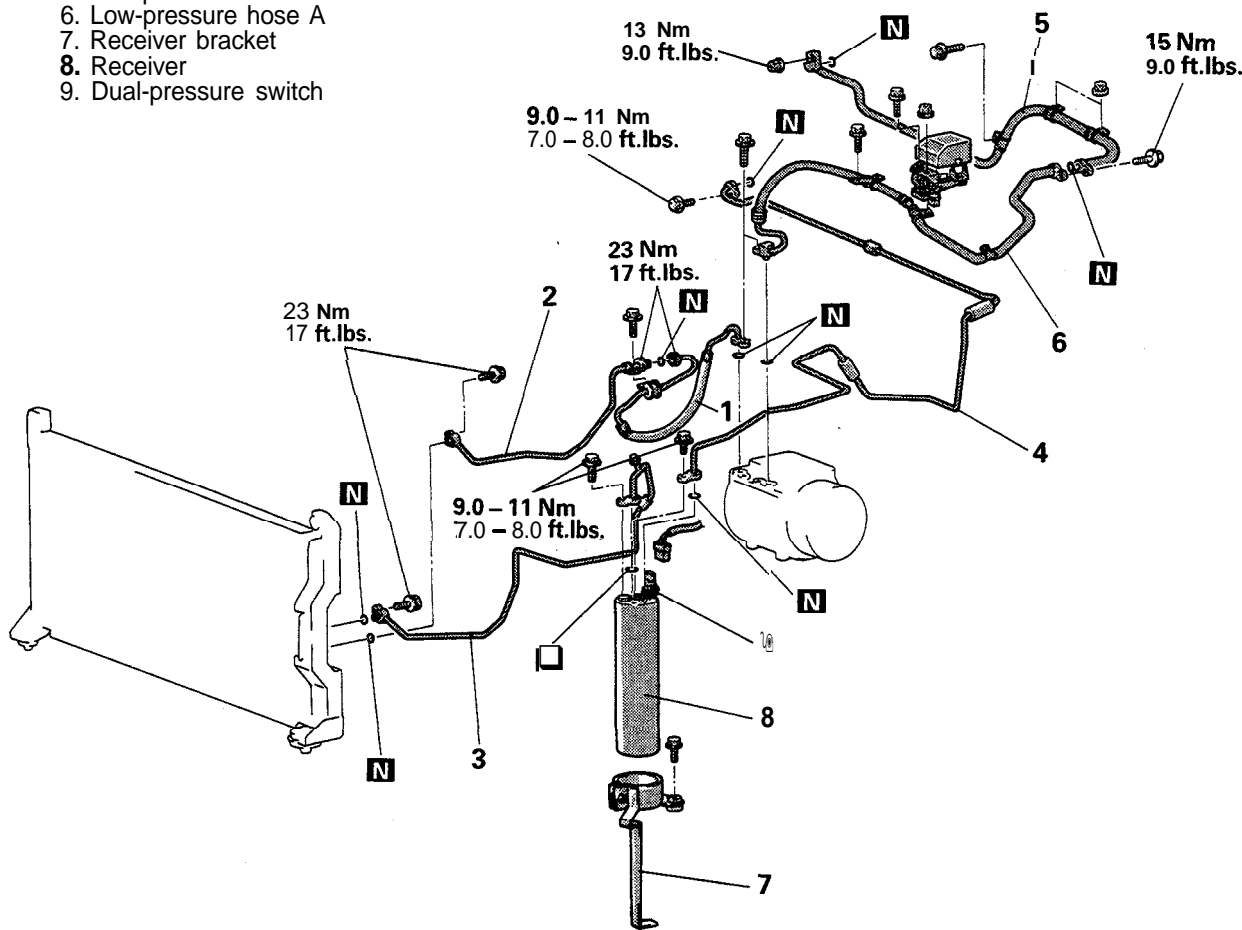
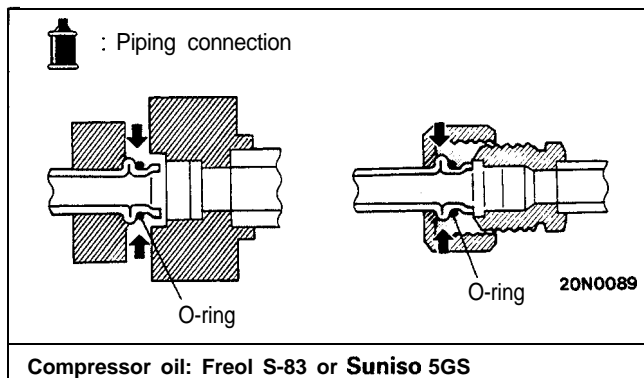
M55UA--

Pre-removal and Post-installation Operation

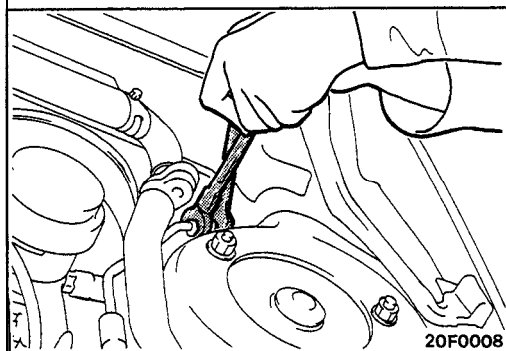
- Discharge and Charging of Refrigerant (Refer to P.55-14,11.)

Removal steps

- ◆◆ 1. High-pressure hose
- ☒ 2. High-pressure pipe
- 3. Liquid pipe A
- 4. Liquid pipe B
- 5. Low-pressure hose B
- 6. Low-pressure hose A
- 7. Receiver bracket
- 8. Receiver
- 9. Dual-pressure switch



20F0068



SERVICE POINTS OF REMOVAL

M55UBAC

1. REMOVAL OF HIGH-PRESSURE HOSE / 2. HIGH-PRESSURE PIPE

Loosen the flare nut by using two wrenches.

INSPECTION

M55UCAD

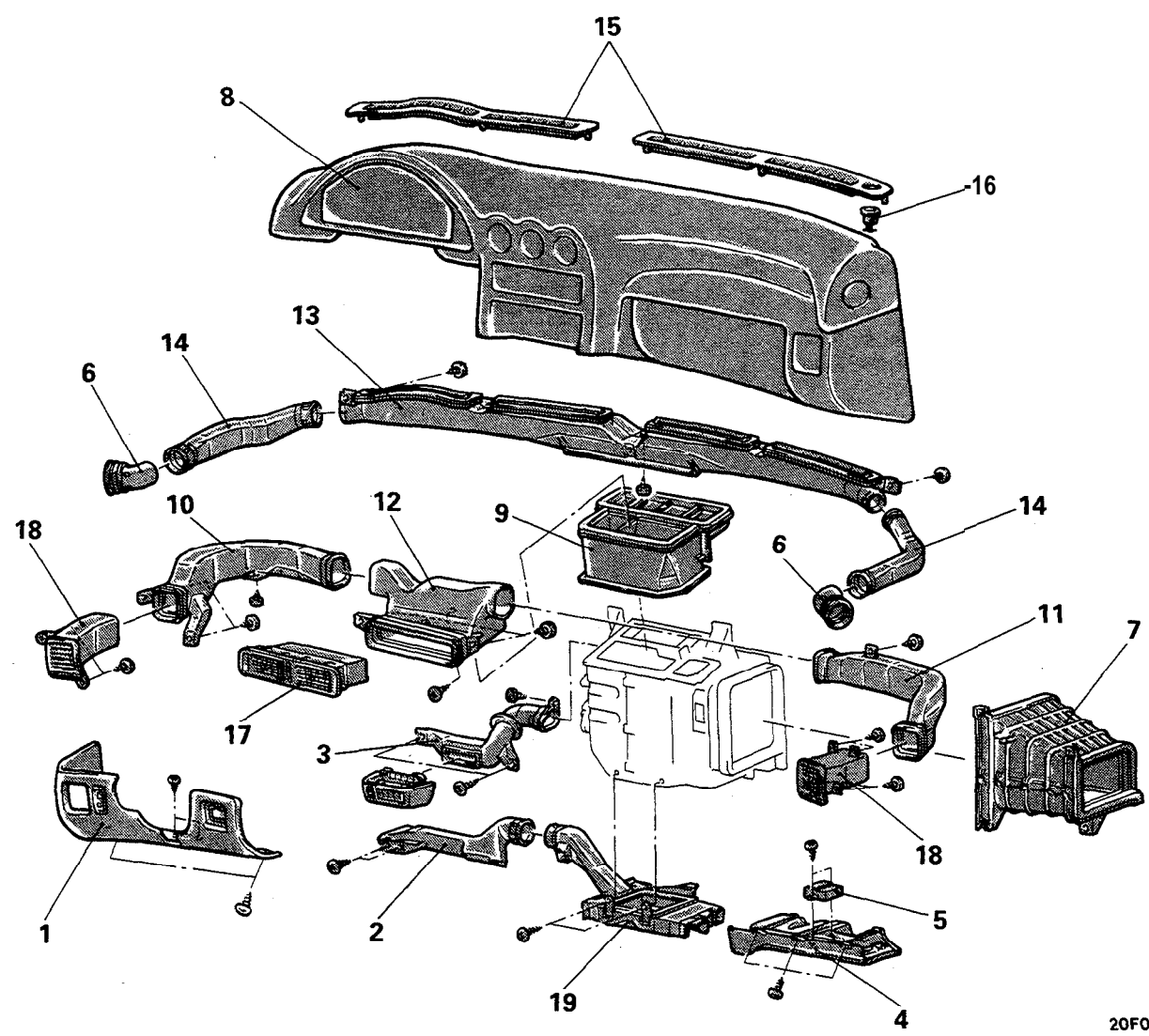
CHECKING DUAL PRESSURE SWITCH

For information concerning the checking procedures of the dual pressure switch, refer to "Service Adjustment Procedures" on P.55-10.

TSB Revision

VENTILATORS (INSTRUMENT PANEL)

REMOVAL AND INSTALLATION



20F0055

Removal steps

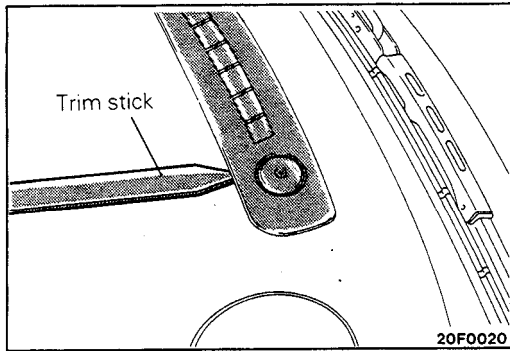
- *◆◆ 1. Knee protector
(Refer to GROUP 52A—Instrument Panel.)
- 2. Foot shower duct
- 3. Lap cooler duct
- 4. Under cover
- 5. Belt lock controller
- 6. Side defroster hoses A
- 7. Duct (Vehicles without air conditioner)
- ◆◆ ● + 8. instrument panel (Refer to GROUP 52A—
instrument Panel.)
- 9. Center 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)

M55YBAH

SERVICE POINTS OF REMOVAL

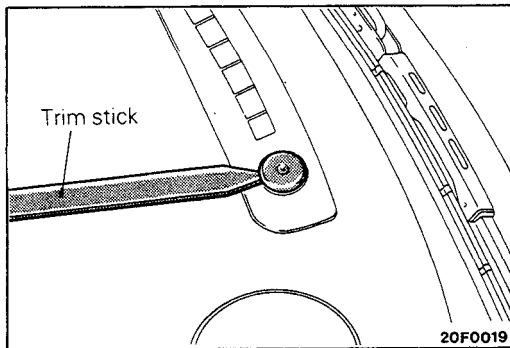
15. REMOVAL OF DEFROSTER GARNISHES

Using the trim stick, remove the defroster garnishes from the instrument panel.



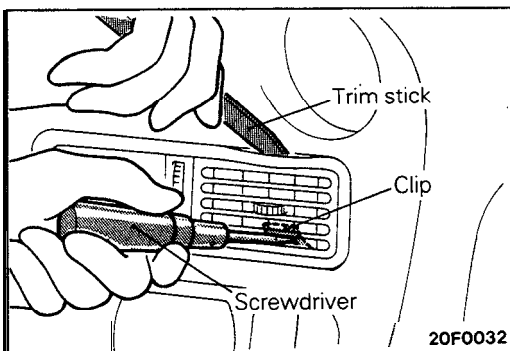
16. REMOVAL OF PHOTO SENSOR

Using the trim stick, remove the photo sensor from the defroster garnish.



17. REMOVAL OF CENTER AIR OUTLET ASSEMBLY

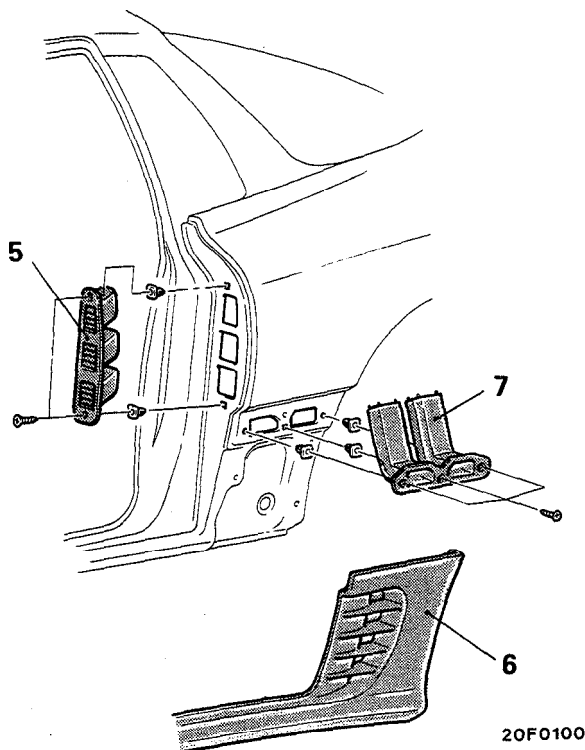
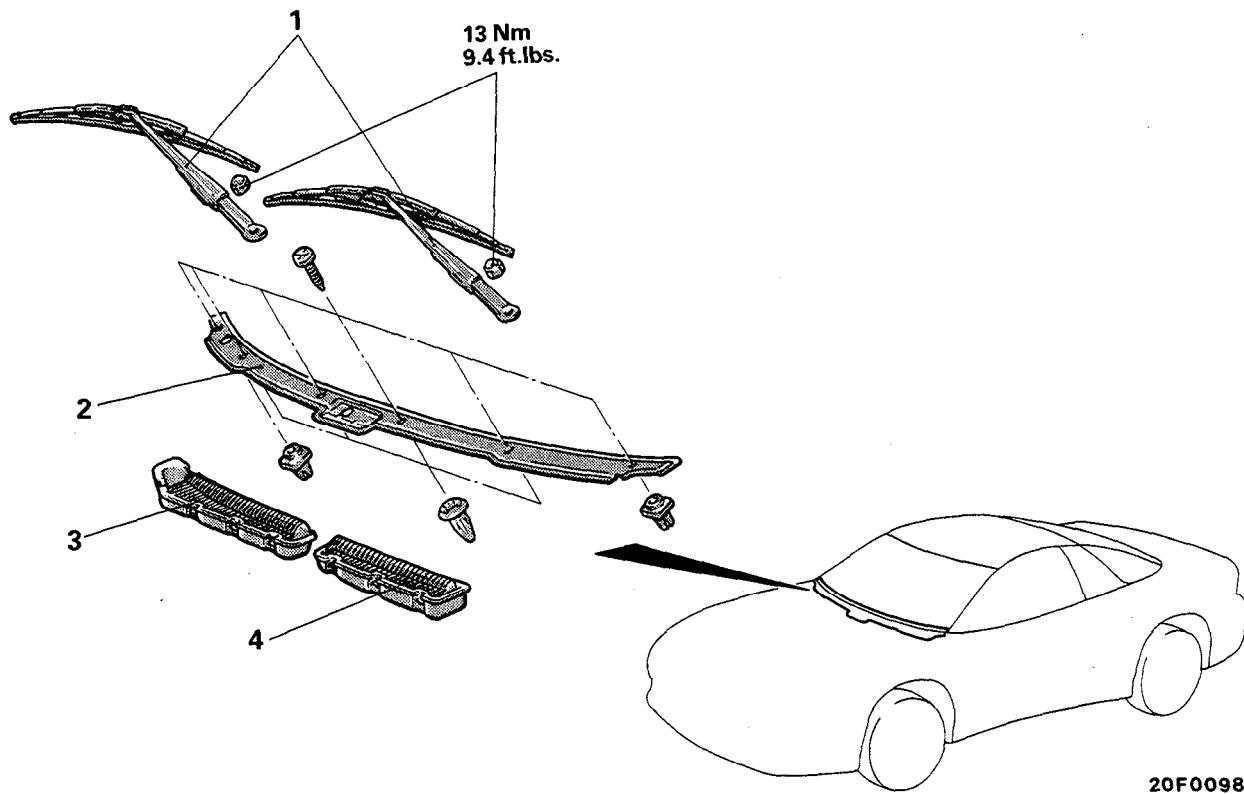
Disengaging the clips (2 positions) of the center air-outlet assembly with a flat tip screwdriver, remove the center air outlet assembly with the trim stick.



VENTILATORS (AIR INLET AND AIR OUTLET)

M55YD -

REMOVAL AND INSTALLATION

**inlet garnishes removal steps**

1. Windshield wiper arm
2. Front deck garnish
3. Inlet garnish (right)
4. Inlet garnish (left)

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

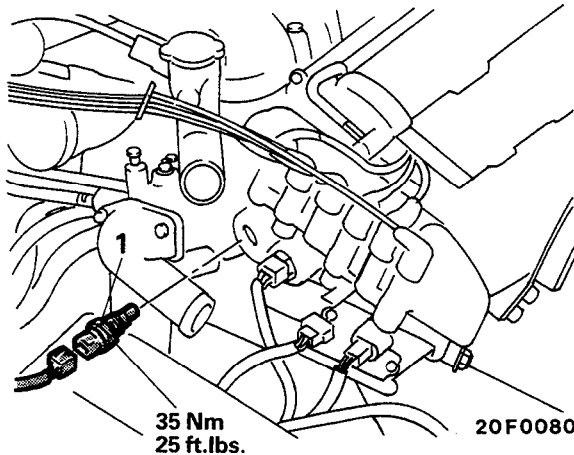
ENGINE COOLANT TEMPERATURE SWITCH

REMOVAL AND INSTALLATION

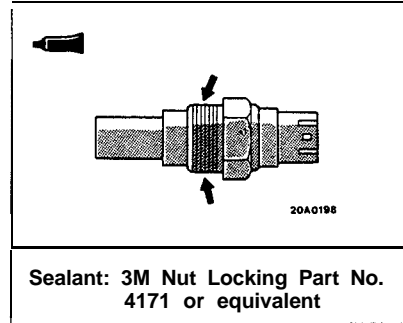
M55XA -

Pre-removal and Post-installation Operation

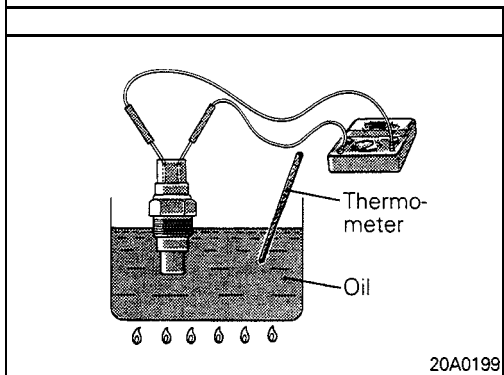
- Draining and Refilling of Engine Coolant
(Refer to GROUP 00 – Maintenance Service.)



1. Engine coolant temperature switch



Sealant: 3M Nut Locking Part No.
4171 or equivalent



INSPECTION

M55XCAA

ENGINE COOLANT TEMPERATURE SWITCH (ALWAYS-CLOSED TYPE CHECK)

- (1) Immerse the 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 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.

FULL AUTO AIR CONDITIONER

TROUBLESHOOTING

M55ECAF

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 multi-use tester, check diagnosis outputs. If failure code is being output, check the failing system and repair as necessary. (Refer to Diagnosis Display Patterns and Codes on P.55-55.)
- (4) If the diagnosis 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.55-45 – 52.)
- (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

Symptom		Inspection item																				
		Fuse	Air conditioner control unit (diagnosis outputs)	Harness (incl. connectors)	Air-conditioner control panel	Air mix damper motor/potentiometer	4	Heater relay	Power transistor	Blower motor	Blower motor relay	Compressor relay	Magnetic clutch	Inside/outside-air selector damper motor	Outlet selector damper motor/potentiometer	Pressure switch	Sensors	Condenser fan relay	Condenser fan motor	Water temperature switch	Belt lock controller	
1	Air conditioner does not operate when the ignition switch is in the ON position.	①	②	③	④																	
2	Interior temperature does not raise even the air conditioner is operating (No warm air coming out).		①	⑤	⑥	③	④									②						
3	Interior temperature does not lower even the air conditioner is operating (No cold air coming out).	①	②	⑥	⑩	④	⑤				a	⑧				③				⑨	⑪	
4	Blower motor does not rotate.	①	②	⑥	⑦			⑤	④	③												
5	Blower motor does not stop rotating.		①	③	④						②											
6	Inside/outside-air selector damper does not operate.		①	③	④								②									
7	Outlet selector damper does not operate.		①	③	④								②									
8	Condenser fan does not operate when the air conditioner is activated.	①	⑥												⑤	③	②	④				
9	Air-conditioner graphic display does not function correctly.	①	②	③	④																	
10	Set temperature returns to 25°C (122°F) when the ignition switch is turned ON and OFF.	①	②	③																		

NOTE
 (1) 0 indicates the component requiring inspection. (Numbers in 0 are the priority order.)
 (2) Use an analog voltmeter or multi-use tester to check the control unit.

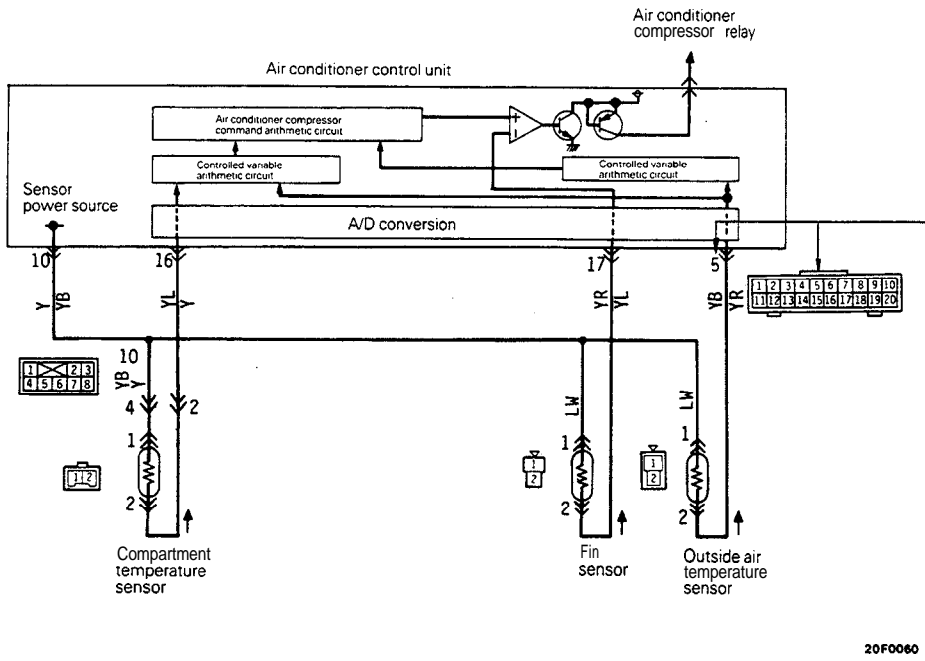
No	Symptom	Probable cause	Remedy	Ref. page
1	Air conditioner does not operate when the ignition switch in the ON position.	Open-circuited power circuit harness	Correct harness.	
		Defective control panel	Replace control panel.	55-56
		Defective air conditioner control unit	Check diagnosis output.	55-56
2	Interior temperature does not raise (No warm air coming out).	Defective room-temperature sensor input circuit	Check diagnosis output. Replace defective parts.	55-55
		Defective air mix damper potentiometer input circuit		
		Defective air mix damper drive motor	Replace air mix damper drive motor.	55-58
		Incorrect engagement of air mix damper drive motor lever and air mix damper	Engage correctly.	
		Sticking air mix damper	Correct air mix damper.	
		Open-circuited harness between air mix damper drive motor and air conditioner control unit	Correct harness.	
		Defective control panel	Replace control panel.	55-56
		Defective air conditioner control unit	Replace air conditioner control unit.	55-56
3	Interior temperature does not lower (No cold air coming out).	Defective room-temperature sensor input circuit	Check diagnosis output. Replace defective parts.	55-55
		Defective outside-air-temperature sensor input circuit		
		Defective air thermo sensor input circuit		
		Defective refrigerant-temperature sensor input circuit		
		Defective air mix damper potentiometer input circuit		
		Defective photo sensor	Replace photo sensor.	55-60
		Defective air mix damper drive motor	Replace air mix damper drive motor.	55-58
		Incorrect engagement of air mix damper drive motor lever and air mix damper	Engage correctly.	
		Sticking air mix damper	Correct air mix damper.	
		Open-circuited harness between air mix damper drive motor and air conditioner control unit	Correct harness.	
		Open-circuited harness between photo sensor and air conditioner control unit	Correct harness.	
Defective air-conditioner compressor relay in the relay box	Replace.			

No.	Symptom	Probable cause	Remedy	Ref. page
3	Interior temperature does not lower (No cold air coming out)	Defective water-temperature sensor	Replace water-temperature sensor.	55-60
		Refrigerant leak	Charge refrigerant, correct leak.	55-14
		Defective air inlet sensor	Replace air inlet sensor.	55-60
		Defective magnetic clutch	Replace.	55-29
		Defective belt lock controller	Replace belt lock controller.	55-20
		Defective control panel	Replace control panel.	55-56
		Defective air conditioner control unit	Replace air conditioner control unit.	55-56
4	Blower motor does not rotate.	Defective blower motor	Replace blower motor.	
		Blown thermal fuse inside power transistor	Replace power transistor.	55-57
		Defective heater relay	Replace heater relay.	
		Open-circuited harness between fuse and heater relay	Correct harness.	
		Open-circuited harness between heater relay and blower motor		
		Open-circuited harness between power transistor and air conditioner control unit	Correct harness.	
		Defective control panel	Replace control panel.	55-56
		Defective air conditioner control unit	Replace air conditioner control unit.	
5	Blower motor does not stop rotating.	Defective blower motor relay	Replace power relay.	
		Short-circuited harness between blower motor relay and power transistor air conditioner control unit	Correct harness.	
		Defective control panel	Replace control panel.	55-56
		Defective air conditioner control unit	Replace air conditioner control unit.	55-56
6	Inside/outside-air selector damper does not operate.	Defective inside/outside-air selector drive motor	Replace inside/outside-air selector drive motor.	55-58
		Incorrect engagement of inside/outside-air selector drive motor and inside/outside-air selector damper	Engage correctly.	
		Malfunctioning inside/outside-air selector damper	Correct inside/outside-air selector damper.	
		Open-circuited harness between inside/outside-air selector motor and air conditioner control unit	Correct harness.	

No	Symptom	Probable cause	Remedy	Ref. page
6	Inside/outside-air selector damper does not operate.	Defective control panel	Replace control panel.	55-56
		Defective air conditioner control unit	Replace air conditioner control unit.	55-56
7	Outlet selector damper does not operate.	Defective outlet selector damper potentiometer input circuit	Check diagnosis output. Replace defective parts.	55-55
		Defective outlet selector drive motor	Replace outlet selector drive motor.	55-58
		Incorrect engagement of outlet selector drive motor and outlet selector damper	Engage correctly.	
		Malfunctioning DEF., FACE, and FOOT damper	Correct DEF., FACE, and FOOT damper.	
		Open-circuited harness between outlet selector motor and control unit	Correct harness.	
		Defective control panel	Replace control panel.	55-56
		Defective air conditioner control unit	Replace air conditioner control unit.	55-56
8	Condenser fan does not operate when the air conditioner is activated.	Defective condenser fan motor relay	Replace power relay.	
		Defective water temperature switch	Replace water temperature switch.	GROUP 14
		Defective condenser fan motor	Replace condenser fan motor.	5 5 - 3 3
9	Air-conditioner graphic display does not function correctly	Open-circuited harness between control panel and air conditioner control unit	Correct harness.	
		Defective control panel	Replace control panel.	55-56
		Defective air conditioner control unit	Replace air conditioner control unit.	55-56
10	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 conditioner control unit	Replace air conditioner control unit.	55-56

READING THE “CIRCUIT AND UNIT CHECK”

3. Inspection of compartment-temperature sensor, outside-air-temperature sensor, and air thermo sensor circuits



- Connectors are keyed by terminal numbers.

20F0060

Troubleshooting Hints

Diagnosis

- No. 11, 12 [Fix compartment temperature sensor input signal at 25°C (77°F).]
- No. 13, 14 [Fix outside-air-temperature sensor input signal at 15°C (59°F).]
- No. 21, 22 [Fix fin thermo sensor input signal at -2°C (-35.6°F).]

Indicates the diagnosis output code number and system condition when the code is output.

Air conditioner control unit terminal voltages

Terminal No.	Signal name	Condition	Terminal voltage
5	Outside-air-temperature sensor	Temperature at sensor 25°C (77°F) (4 kΩ)	2.2 – 2.8 V
10	Sensor power source	Normally	4.8 – 5.2 V
16	Compartment temperature sensor	Temperature at sensor 25°C (77°F) (4 kΩ)	2.3 – 2.9 V
17	Fin thermo sensor	Temperature at sensor 25°C (77°F) (4 kΩ) when air conditioner is OFF	2.3 – 2.9 V

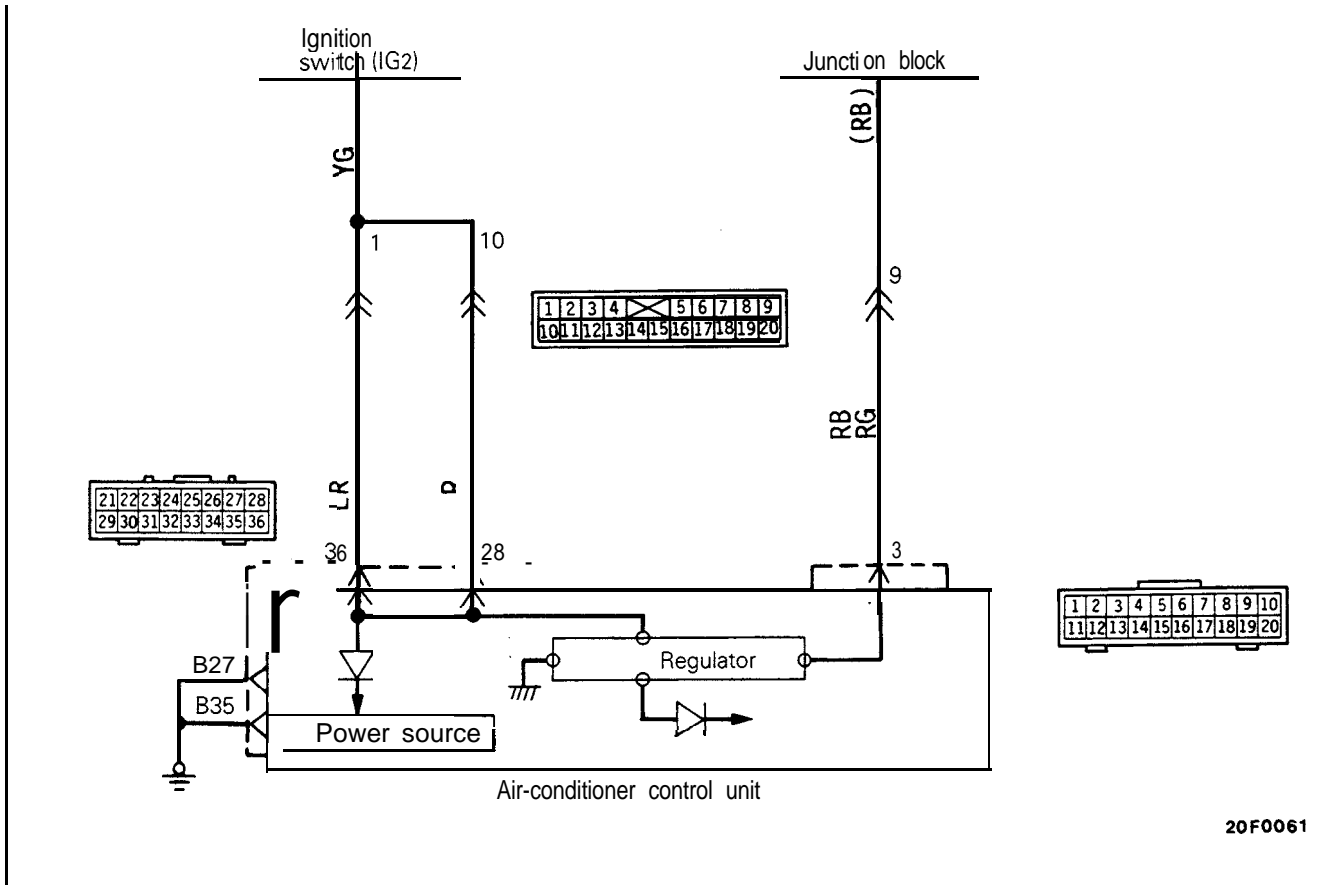
Indicates the terminal number to be checked.

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.

CIRCUIT AND BENCH CHECK

1. Inspection of air conditioner control unit power source circuit

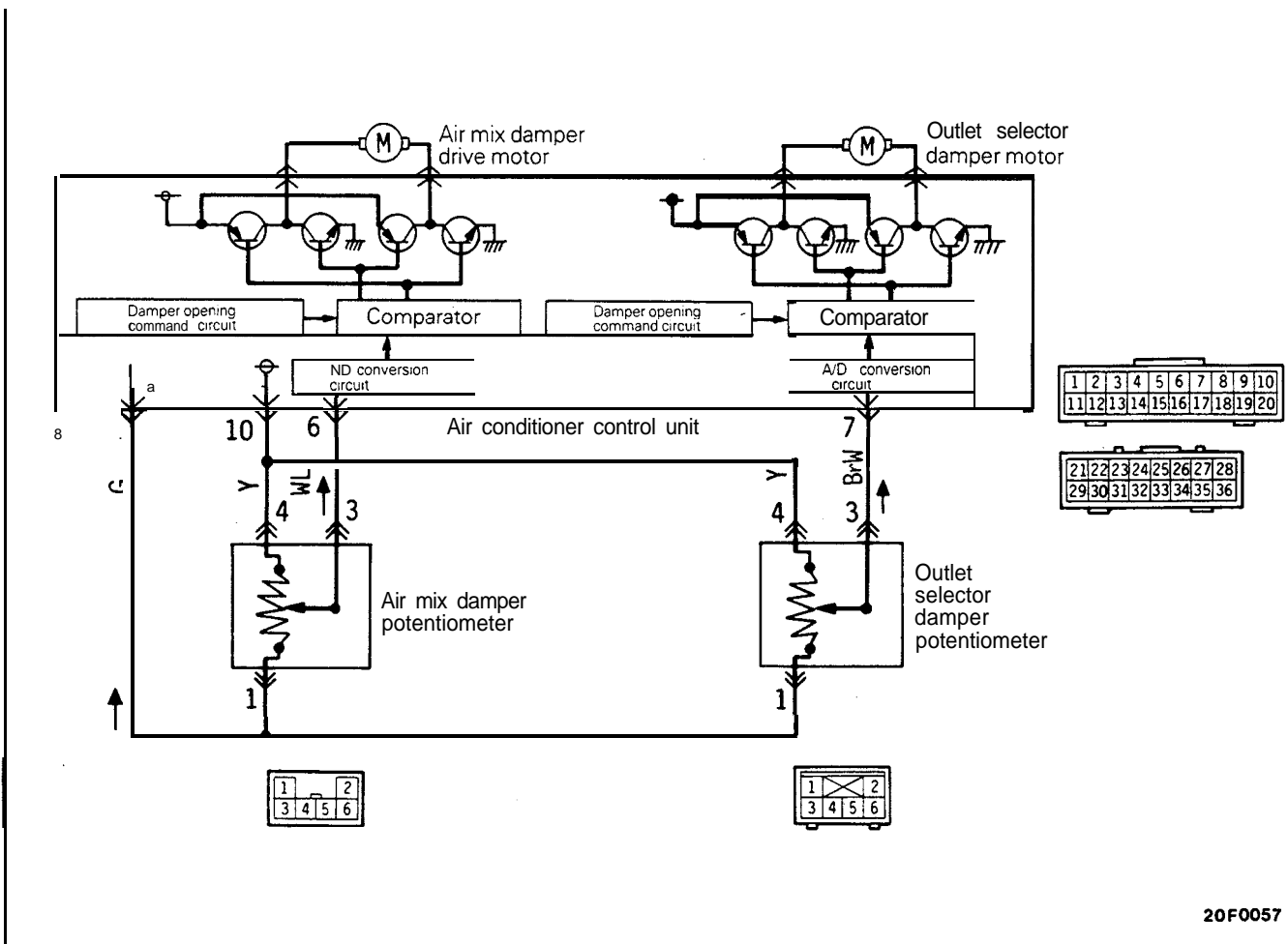


Troubleshooting Hints

- Air conditioner control unit terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
3	Backup power source	Normally	Battery voltage
28, 36	Air conditioner control unit power source	Ignition switch ON	Battery voltage
27, 35	Air conditioner control unit ground	Normally	0 V

2. Inspection of potentiometer circuit

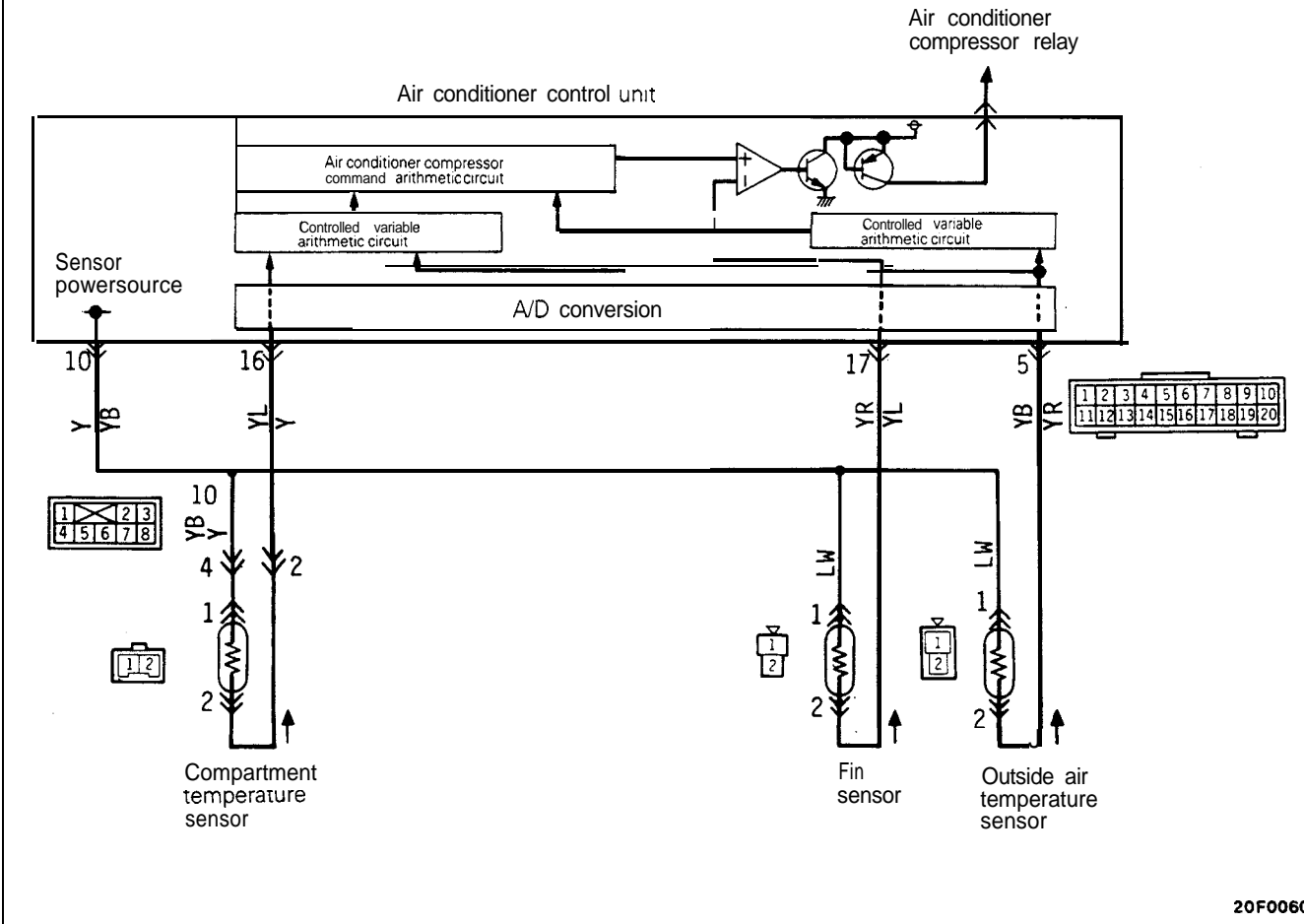


Troubleshooting Hints

- Diagnosis
 - No. 31 (Fix air mix damper at MAX. HOT position, or at MAX. COOL position when it is at MAX. COOL position.)
 - No. 32 (Fix outlet selector damper at FACE position, or at FACE position when it is at FACE position.)
- Air conditioner control unit terminal voltages

Terminal No.	Signal name	Condition	Terminal voltage
6	Air mix damper potentiometer (input)	Air mix damper at MAX. COOL position	0.1 – 0.3 V
		Air mix damper at MAX. HOT position	4.7 – 5.0 V
7	Outlet selector damper potentiometer (input)	Outlet selector damper at FACE position	0.1 – 0.3 V
		Outlet selector damper at DEF. position	4.7 – 5.0 V
8	Air mix damper and outlet selector damper potentiometer ⊖	Normally	0 V
10	Sensor power source	Normally	4.8 – 5.2 V

3. Inspection of compartment-temperature sensor, outside-air-temperature sensor, and air thermo sensor circuits



20F0060

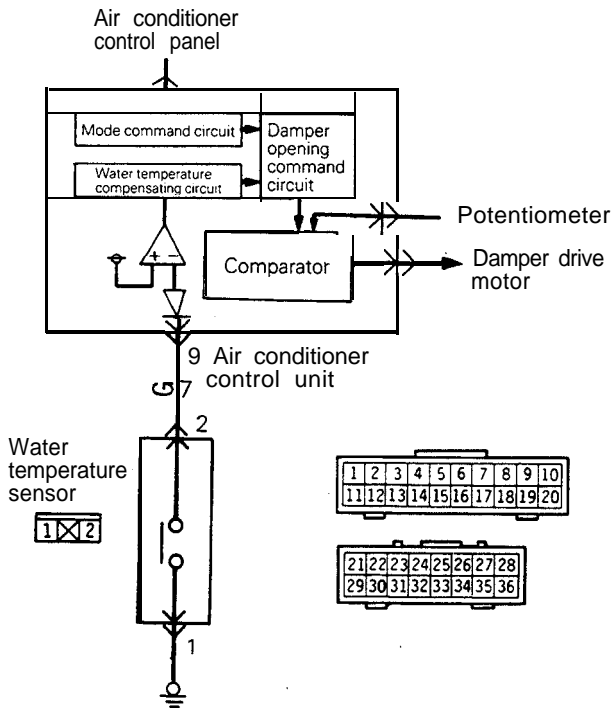
Troubleshooting Hints

- Diagnosis
 - No. 11, 12 [Fix compartment temperature sensor input signal at 25°C (77°F).
 - No. 13, 14 [Fix outside-air-temperature sensor input signal at 15°C (59°F).]
 - No. 21, 22 [Fix fin thermo sensor input signal at -2°C (-35.6°F).]
- Air conditioner control unit terminal voltages

Terminal No.	Signal name	Condition	Terminal voltage
5	Outside-air-temperature sensor	Temperature at sensor 25°C (77°F) (4 kΩ)	2.2 – 2.8 V
10	Sensor power source	Normally	4.8 – 5.2 V
16	Compartment temperature sensor	Temperature at sensor 25°C (77°F) (4 kΩ)	2.3 – 2.9 V
17	Fin thermo sensor	Temperature at sensor 25°C (77°F) (4 kΩ) when air conditioner is OFF	2.3 – 2.9 V

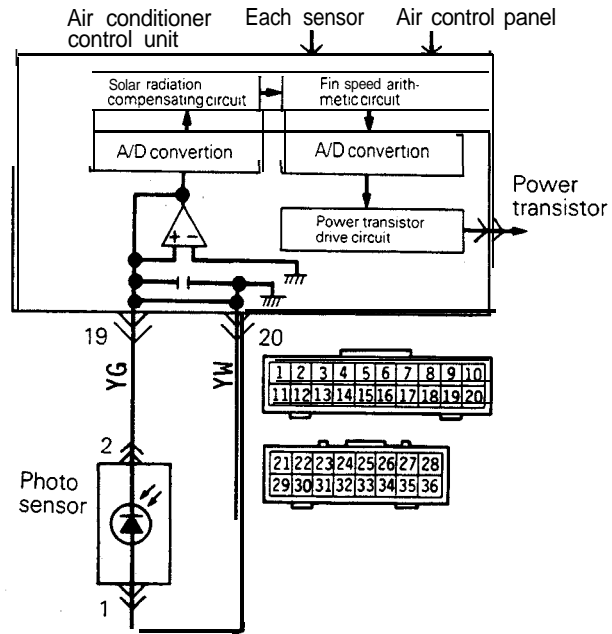
4. Inspection of water-temperature sensor and photo sensor circuits

<Water temperature sensor>



20N0044

<Photo sensor>



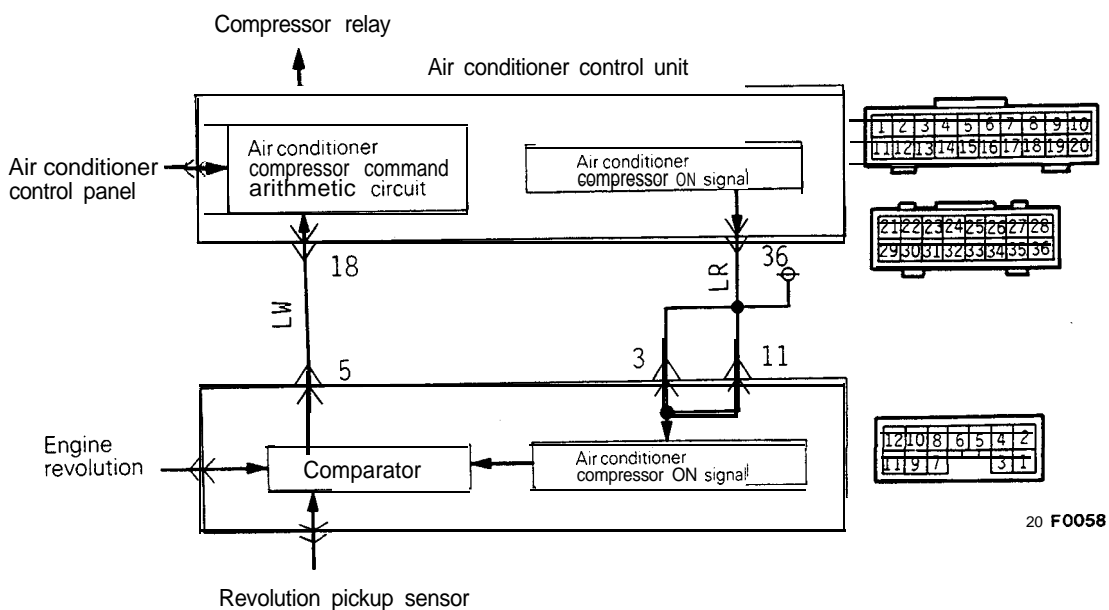
2010043

Troubleshooting Hints

- Air conditioner control unit terminal voltages

Terminal No.	Signal name	Condition	Terminal voltage
19	Photo sensor ⊖	Illuminance 100,000 lux or more	-0.1 to -0.2 v
		Illuminance less than 0 lux	0 v
20	Photo sensor ⊕	Normally	0 v
9	Water-temperature sensor ⊕	Switch OFF [Engine coolant temperature less than 50°C (122°F)]	Battery voltage
		Switch ON [Engine coolant temperature 50°C (122°F) or higher]	0 V

5. Inspection of belt lock controller circuit



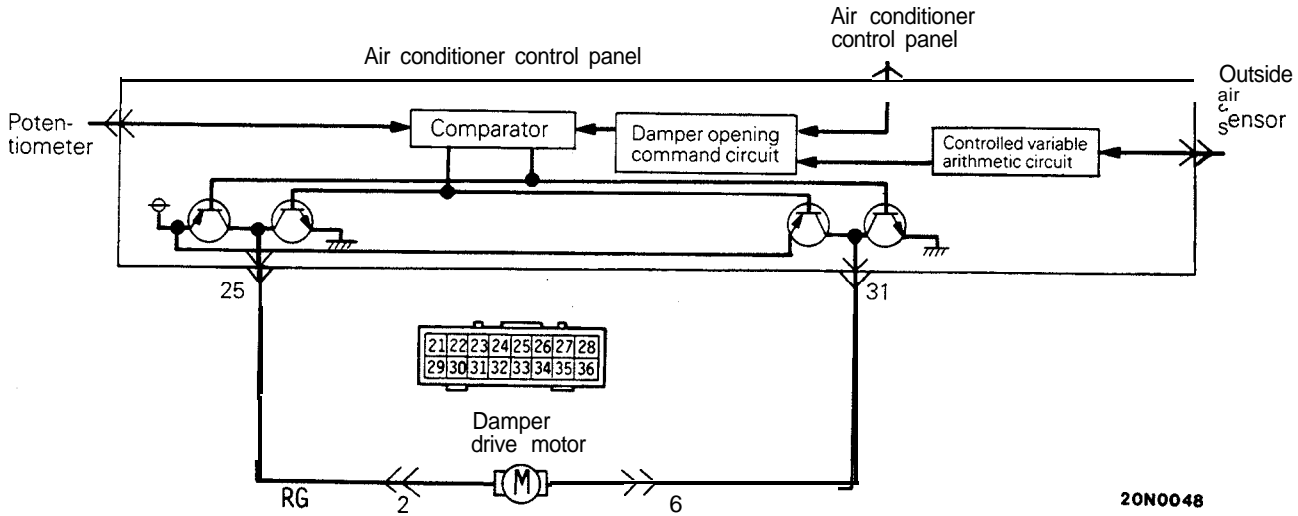
Troubleshooting Hints

- Air conditioner control unit terminal voltages

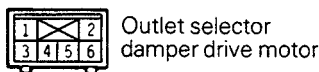
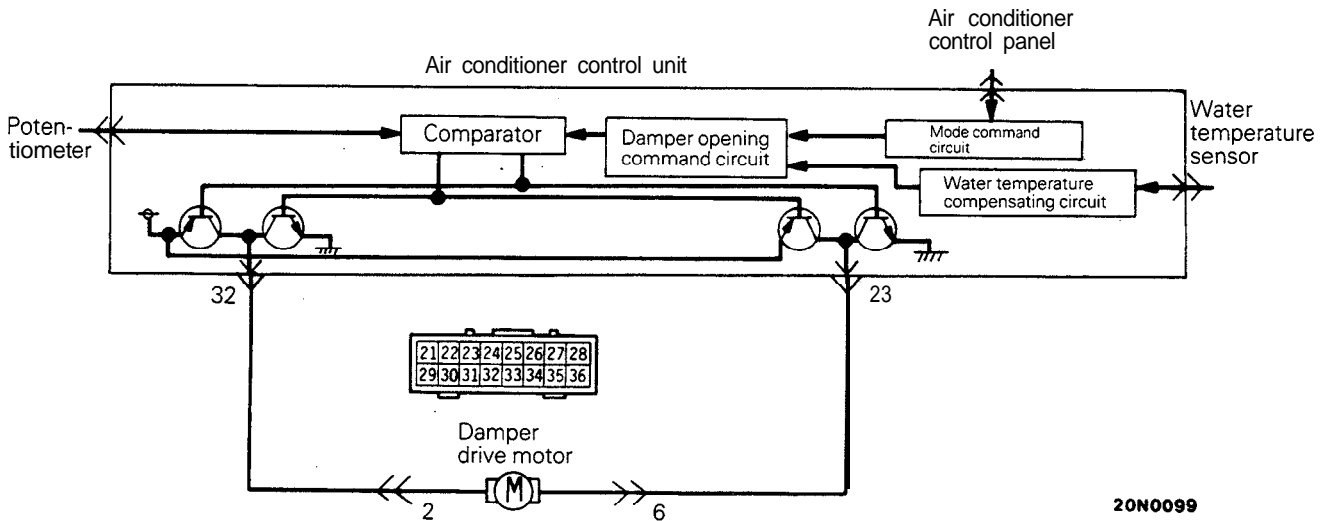
Terminal No.	Signal name	Condition	Terminal voltage
11	Air conditioner output	Compressor ON	10 V to battery voltage

6. Inspection of air mix damper, outlet selector damper, inside/outside-air selector damper drive motor circuits

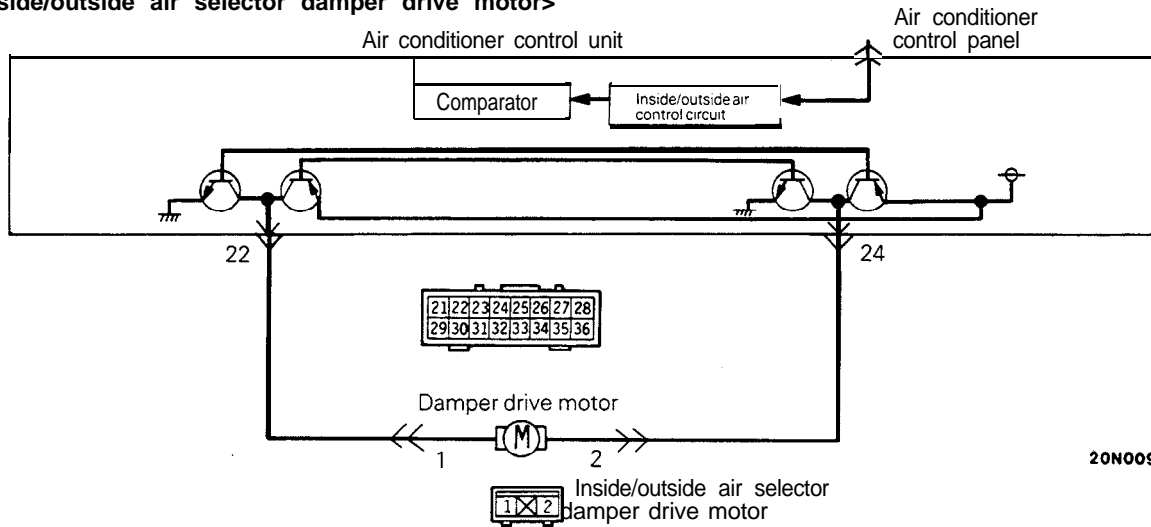
<Air mix damper drive motor>



<Outlet selector damper drive motor>



<Inside/outside air selector damper drive motor>



20N0098

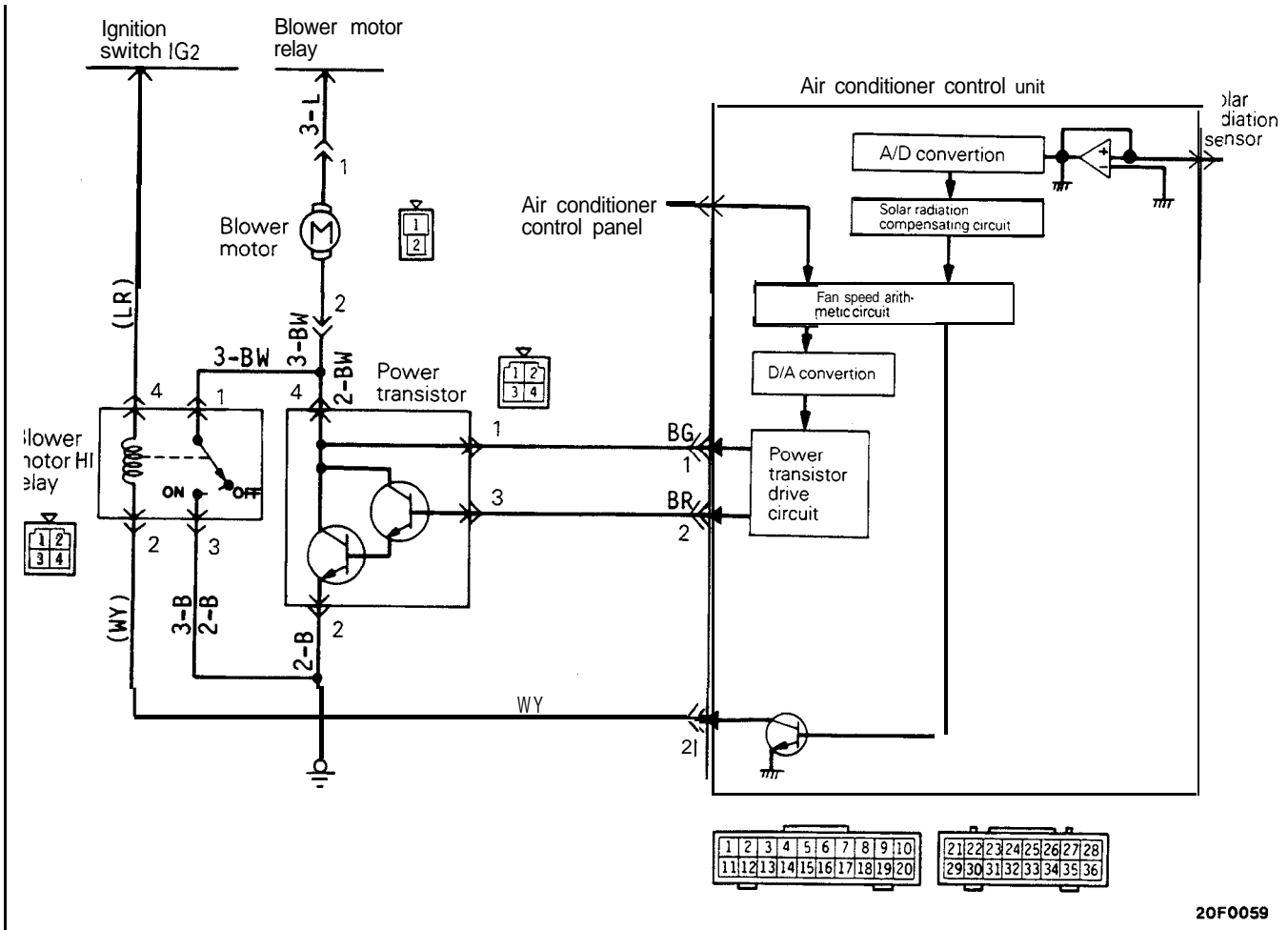
Troubleshooting Hints

- Air conditioner control unit terminal voltages

Terminal No.	Signal name	Condition	Terminal voltage
22	Inside/outside-air selector damper drive 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
23	Outlet selector damper drive 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
24	Inside/outside-air selector damper drive 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
25	Air mix damper drive motor ⊕	Temperature is set at 17°C (62.6°F). (Output turns OFF 40 seconds after the damper moved to MAX. COOL 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
31	Air mix damper drive 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
32	Outlet selector damper drive 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

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7. Inspection of power transistor and blower motor relay circuits

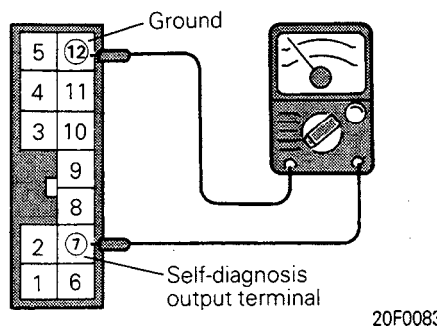
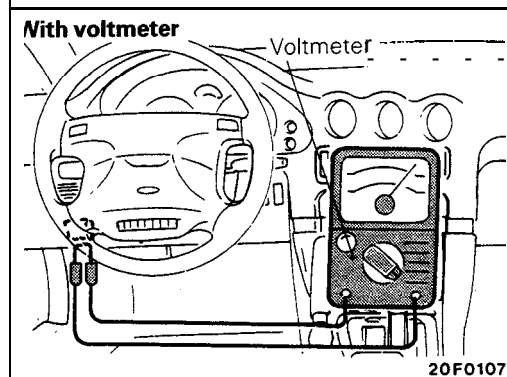
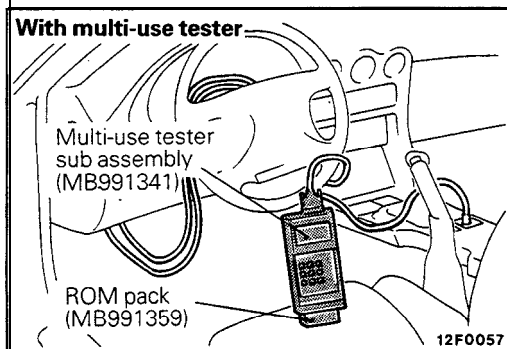
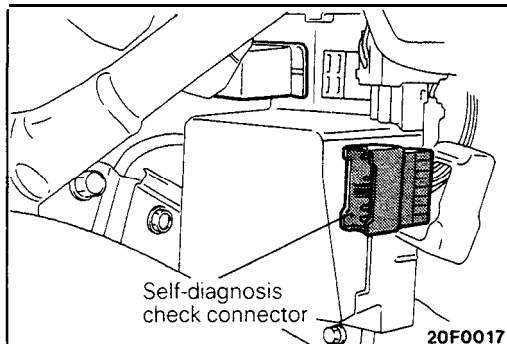


20F0059

Troubleshooting Hints

- Air conditioner control unit terminal voltages

Terminal No.	Signal name	Condition	Terminal voltage
1	Power transistor collector	Switch is turned OFF.	Battery voltage
		Switch is placed in LO.	Approx. 7 V
		Switch is placed in HI.	0 V
2	Power transistor base	Blower switch is turned OFF.	0 V
		Blower switch is placed in LO.	Approx. 1.3 V
		Blower switch is placed in HI.	Approx. 1.2 V
21	Blower motor HI relay	Fan switch HI is ON.	1.5 V or less
		Fan switch in ME, LO, or OFF.	Battery voltage



SELF-DIAGNOSIS CHECKING

Self-diagnosis checking is performed when there has been an automatic cancellation, without cancel switch operation. The following method can be used for checking the diagnosis. Note that the diagnosis check connector is located under the driver's side instrument panel.

When multi-use tester is used

- (1) Read and record the self-diagnosis outputs.
- (2) Repair the faulty spots by referring to diagnosis chart.
- (3) Erase the failure code.
- (4) Check the system again.

When voltmeter is used

- (1) Connect an analog voltmeter across the self-diagnosis output terminal ⑦ and ground terminal ⑫ of the diagnosis connector.
- (2) Turn ON the ignition switch.
- (3) According to the voltmeter pointer deflection, read the self-diagnosis pattern.
- (4) Referring to the diagnosis 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 self-diagnosis code to check that the correct code is being output.

SERVICE DATA

Item no.	Inspection point	Method	Criteria		Probable cause	Remedy
			Normal	Abnormal		
11	Room-temperature sensor	Measure resistance of sensor when room temperature is 25°C (77°F).	Approx. 4 kΩ	Largely deviates from approx. 4 kΩ	Defective room-temperature sensor	Replace room-temperature sensor.
		Measure voltage across terminal (16) of air conditioner control unit and ground when room temperature is 25°C (77°F).	In approx. 2.3 – 2.9 V range	–	Open-circuited harness between room-temperature sensor and air conditioner control unit	Correct harness.
		–	Outside approx. 2.3 – 2.9 V range	Poor connection of air conditioner control unit connector or defective air conditioner control unit	Correct connector connection or replace air conditioner control unit.	
13	Outside-air-temperature sensor	Measure resistance of sensor when ambient temperature is 25°C (77°F).	Approx. 4 kΩ	Largely deviates from approx. 4 kΩ	Defective outside-air sensor	Replace outside-air-temperature sensor.
		Measure voltage across terminal (5) of air conditioner control unit and ground when ambient temperature is 25°C (77°F).	In approx. 2.2 – 2.8 V range	–	Open-circuited harness between outside-air-temperature sensor and air conditioner control unit	Correct harness.
		–	Outside approx. 2.2 – 2.8 V range	Poor connection of air conditioner control unit connector or defective air conditioner control unit	Correct connector connection or replace air conditioner control unit.	
15	Water-temperature sensor	Measure resistance of sensor when water temperature is 22.5 to 30.5°C (57.6 to 86.9°F).	Conductive	Nonconductive	Defective water-temperature sensor	Replace water-temperature sensor.
		Measure voltage across terminal (8) of air conditioner control unit and ground when water temperature is 22.5 to 30.5°C (57.6 to 86.9°F).	Approx. 12 V	–	Open-circuited harness between water-temperature sensor and air conditioner control unit	Correct harness.
		–	Largely deviates from approx. 12 V	Poor connection of air conditioner control unit connector or defective air conditioner control unit	Correct connector connection or replace air conditioner control unit.	
21	Air thermo sensor	Measure resistance of sensor when sensor's sensing temperature is 25°C (77°F).	Approx. 4 kΩ	Largely deviates from approx. 4 kΩ	Defective air thermo sensor	Replace air thermo sensor.
		Measure voltage across terminal (17) of air conditioner 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 conditioner control unit	Correct harness.
		–	Outside approx. 2.3 – 2.9 V range	Poor connection of air conditioner control unit connector or defective air conditioner control unit	Correct connector connection or replace air conditioner control unit.	
31	Air mix damper potentiometer	Refer to P. 55-59.			Defective air mix damper potentiometer	Replace air mix damper potentiometer.
		Measure voltage across terminal (8) of air conditioner control unit and ground when potentiometer is in MAX. COOL position.	In approx. 0.1 – 0.3 V range	–	Open-circuited harness between air mix damper potentiometer and air conditioner control unit	Correct harness.
		–	Outside approx. 0.1 – 0.3 V range	Poor connection of air conditioner control unit connector or defective air conditioner control unit	Correct connector connection or replace air conditioner control unit.	
33	Outlet selector damper potentiometer	Refer to P. 55-59.			Defective outlet selector damper potentiometer	Replace outlet selector damper potentiometer.
		Measure voltage across terminal (8) of air conditioner control unit and ground when potentiometer is in FACE position.	In approx. 0.1 – 0.3 V range	–	Open-circuited harness between outlet selector damper potentiometer and air conditioner control unit	Correct harness.
		–	Outside approx. 0.1 – 0.3 V range	Poor connection of air conditioner control unit connector or defective air conditioner control unit	Correct connector connection or replace air conditioner control unit.	

DIAGNOSIS DISPLAY PATTERNS AND CODES

Code	Display pattern (output codes) (use with voltmeter)	Cause	Fail safe
0		Normal	
11		Open-circuited room-temperature sensor	Condition in which 25°C (77°F) is detected
12		Short-circuited room-temperature sensor	
13		Open-circuited outside-air sensor	Condition in which 20°C (68°F) is detected
14	<p style="text-align: right;">12A0104</p>	Short-circuited outside-air 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 air mix damper potentiometer	MAX. HOT (or MAX. COOL when it is at MAX. COOL)
32	<p style="text-align: right;">12A0107</p>	Short-circuited and open-circuited mode selector damper potentiometer	DEF. (or FACE when it is at FACE)
41		Defective air mix damper motor	
42	<p style="text-align: right;">12A0105</p>	Defective mode selector 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.

SAFETY PRECAUTIONS

M55PAAG

Same as those given in HEATERS AND MANUAL AIR CONDITIONER. (Refer to P.55-9.)

SERVICE ADJUSTMENT PROCEDURES

M55FEAV

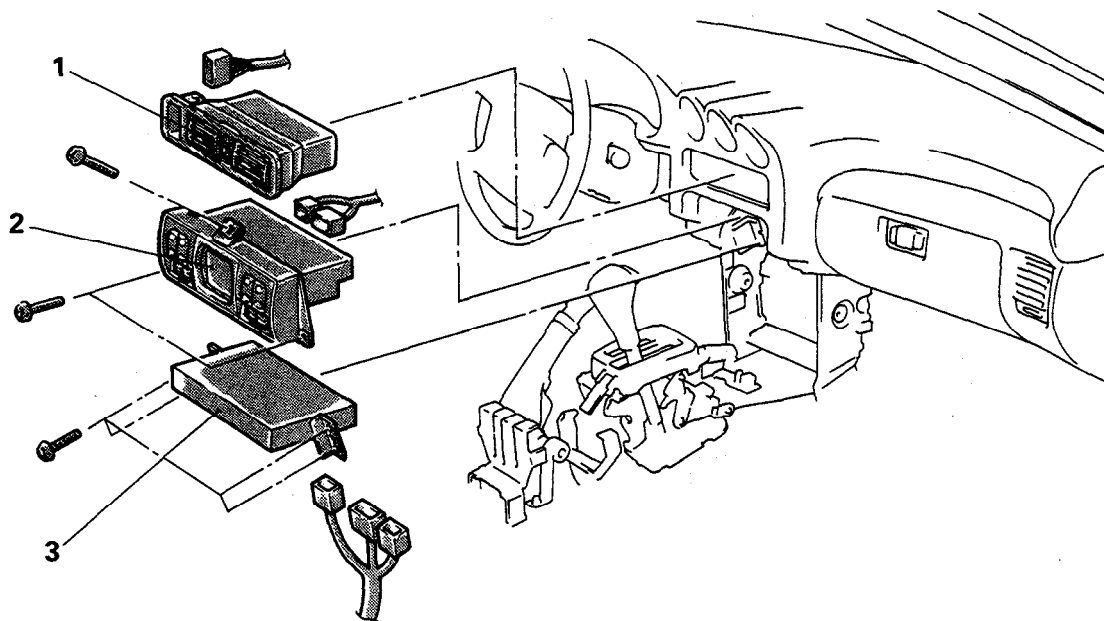
Same as those given in HEATERS AND MANUAL AIR CONDITIONER. (Refer to P.55-10.)

AIR CONDITIONER CONTROL PANEL, AIR CONDITIONER CONTROL UNIT**REMOVAL AND INSTALLATION**

M55GA-B

Pre-removal and Post-installation Operation

- Removal and Installation of Floor Console (Refer to GROUP 52A – Floor Console.)

**Removal steps**

1. Center air outlet assembly
2. Air conditioner control panel
3. Air conditioner control unit

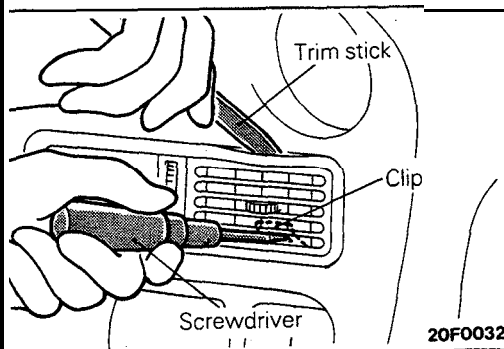
20F0069

SERVICE POINT OF REMOVAL

M55GBAM2

1. REMOVAL OF CENTER AIR OUTLET ASSEMBLY

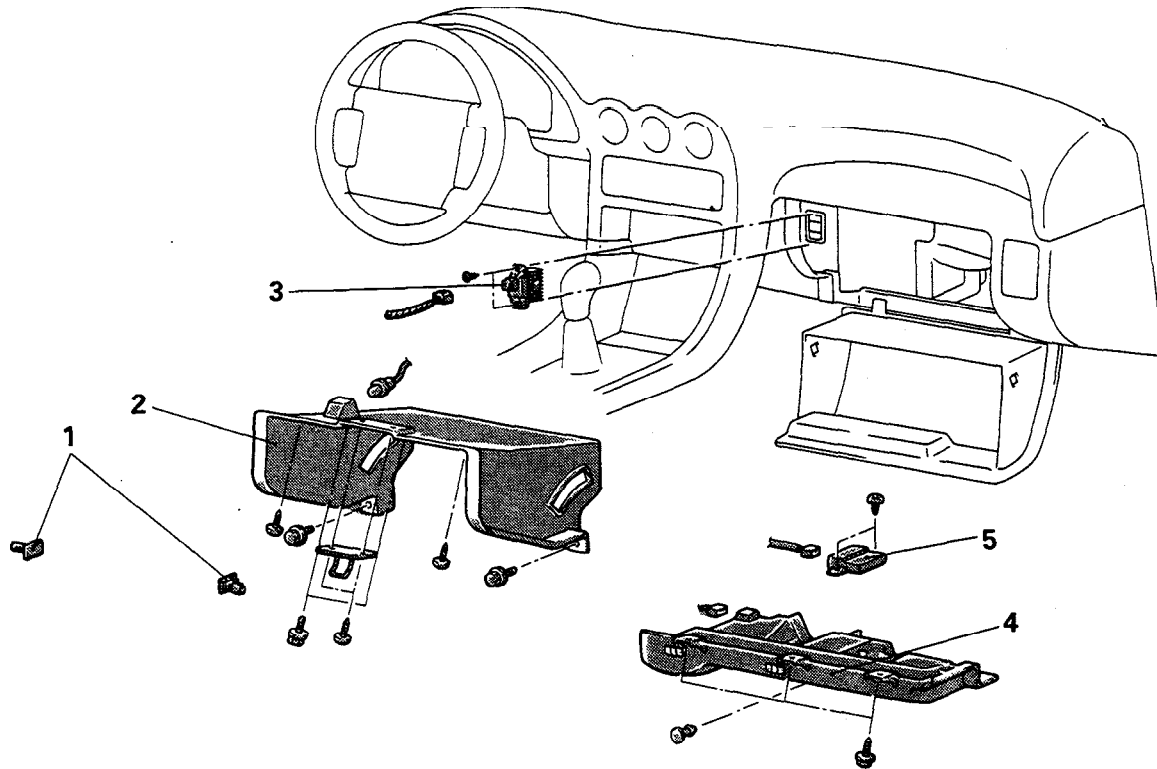
Disengaging the clips (2 positions) of the center air outlet assembly with a flat tip screwdriver, remove the center air outlet assembly with a plastic trim stick.



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**POWER TRANSISTOR, BELT LOCK CONTROLLER
REMOVAL AND INSTALLATION**

M55LA--



Power transistor removal steps

1. Stopper
2. Glove box outer case assembly
3. Power transistor

Belt lock controller removal steps

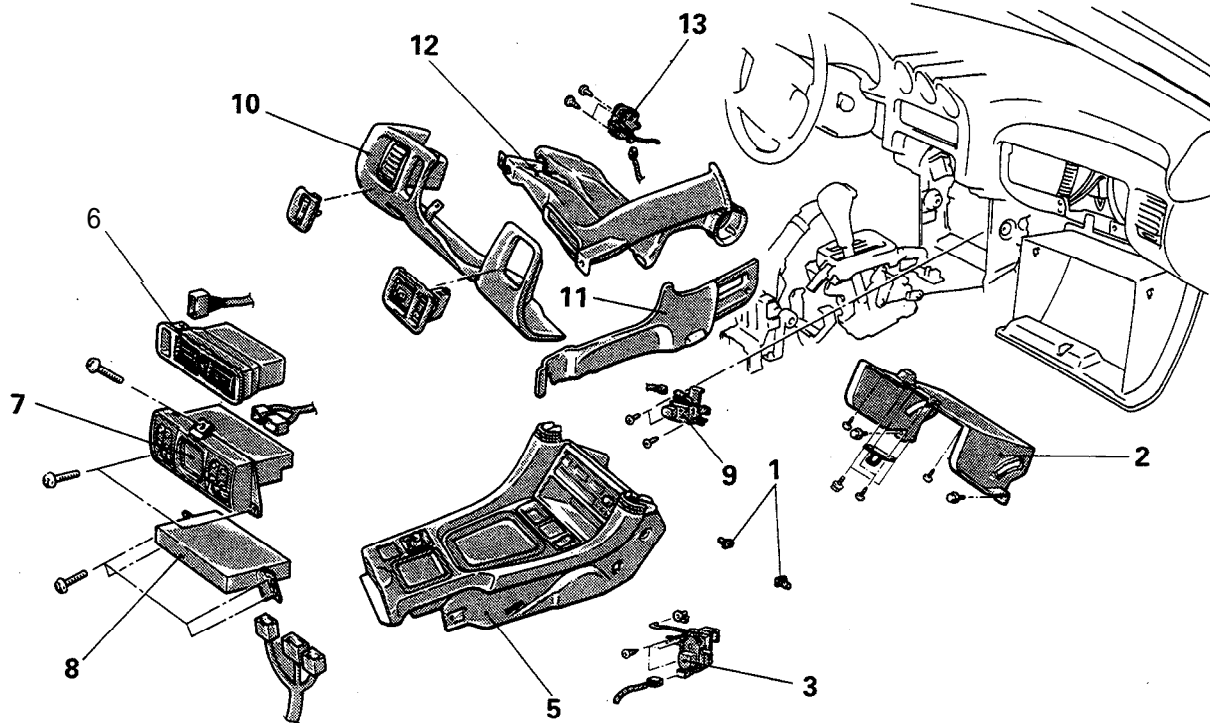
4. Under cover
5. Belt lock controller

20F0073

DAMPER CONTROL MOTOR ASSEMBLY

REMOVAL AND INSTALLATION

M55VA- -



20F0077

Inside/outside-air selector damper motor assembly removal steps

1. Stopper
2. Glove box outer case
3. Inside/outside-air selector damper motor assembly

Air mix damper motor assembly removal steps

- ◄◄ ◄◄ 4. Floor console (Refer to GROUP 52A – Floor Console.)
- ◄◄ 5. Air conditioner control unit
- ◄◄ 6. Center outlet assembly
- ◄◄ 7. Air conditioner control panel

- 8. Air conditioner control unit
- 9. Air mix damper motor assembly

Outlet selector damper motor assembly removal steps

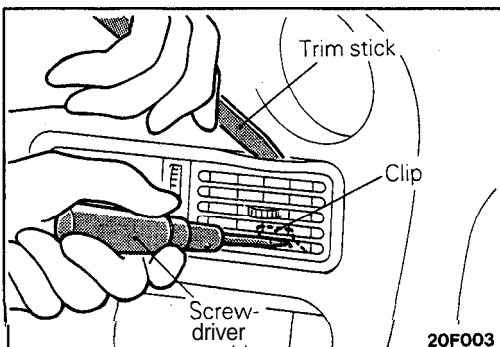
- 10. Knee protector
- 11. Side console cover
- 12. Shower duct and lap cooler duct
- 13. Outlet selector damper motor assembly

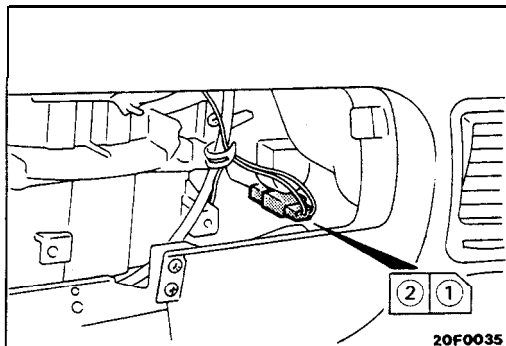
SERVICE POINTS OF REMOVAL

M55VBAA

6. REMOVAL OF CENTER AIR OUTLET ASSEMBLY

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 tool.





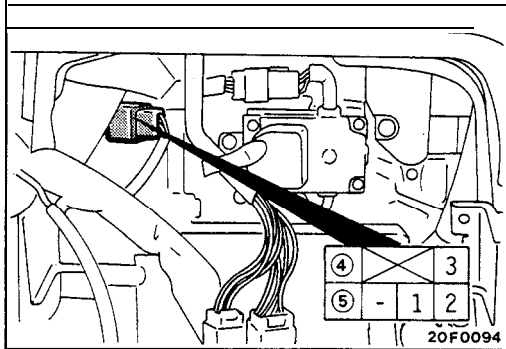
INSPECTION

INSPECTION OF INSIDE/OUTSIDE-AIR DAMPER MOTOR ASSEMBLY

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.

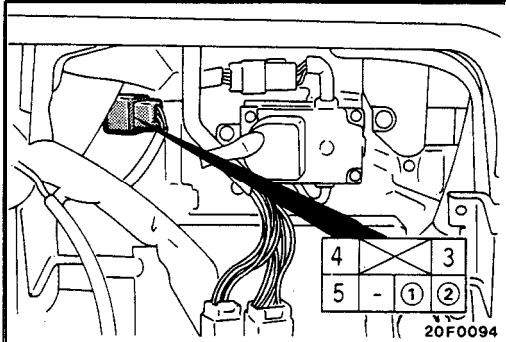


INSPECTION OF AIR MIX DAMPER MOTOR

Check that the motor rotates when battery voltage is applied across terminals ④ and ⑤ 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.

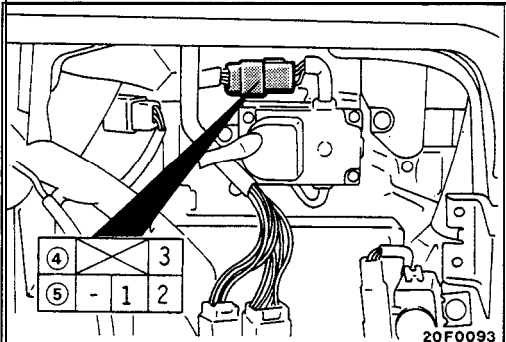


INSPECTION OF AIR MIX DAMPER POTENTIOMETER

Connect a circuit tester across terminals ① and ② 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. 4.9 kΩ

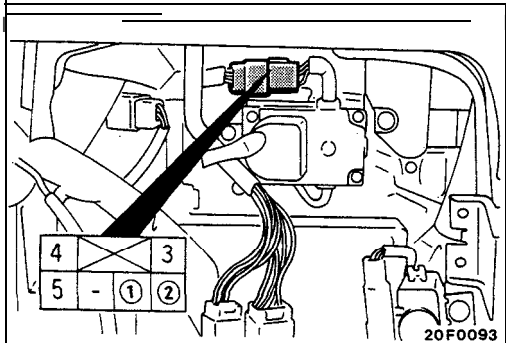


INSPECTION OF OUTLET SELECTOR DAMPER MOTOR

Check that the motor turns when battery voltage is applied across terminals ④ and ⑤ 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.



INSPECTION OF OUTLET SELECTOR DAMPER POTENTIOMETER

Connect a circuit tester across terminals ① and ② of the motor assembly connector and check that resistance gradually changes as the damper is moved from DEF. to FACE position.

Standard value

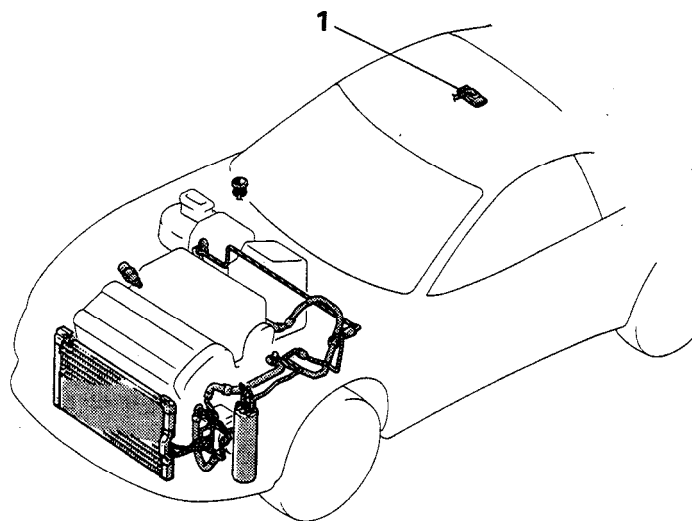
- DEF. position: Approx. 2.0 kΩ
- FACE position: Approx. 4.3 kΩ

SENSORS

REMOVAL AND INSTALLATION

M550A--

- ◄► 1. Passenger compartment temperature sensor



20F0053

Outside air sensor removal steps

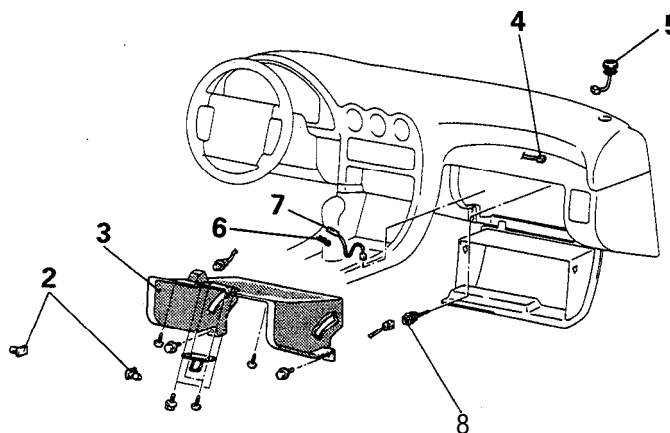
2. Stopper
3. Glove box outer case
4. Photo sensor connector connection
5. Photo sensor

Water temperature sensor removal steps

2. Stopper
3. Glove box outer case assembly
6. Plate
7. Water temperature sensor

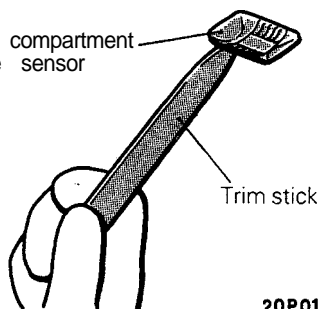
Outside-air-temperature sensor removal steps

2. Stopper
3. Glove box outer case assembly
8. Outside-air-temperature sensor



20F0075

Passenger compartment
temperature sensor



Trim stick

20P0164

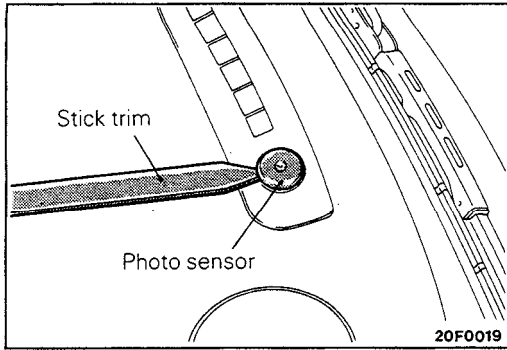
SERVICE POINTS OF REMOVAL

M550BAE

1. REMOVAL OF PASSENGER COMPARTMENT TEMPERATURE SENSOR

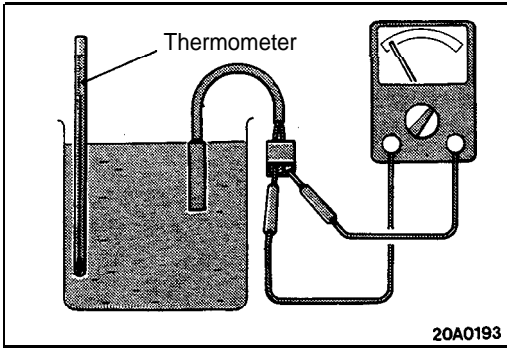
Using the trim stick, remove the passenger compartment temperature sensor from the headlining.

TSB Revision



5. REMOVAL OF PHOTO SENSOR

Using a trim stick, remove the photo sensor from the defroster garnishes.



INSPECTION

M550CAD

WATER TEMPERATURE SENSOR

- (1) Dip the water-temperature sensor in hot water and, using a stove, etc., raise the water temperature.
- (2) Check that the water-temperature sensor is conductive when the water temperature reaches the specified temperature.

Standard value: 26.5 ± 4°C (79.7 ± 7.2°F)

OUTSIDE-AIR-TEMPERATURE SENSOR

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 outside-air-temperature sensor is submerged in warm water of 25°C (77°F) and 40°C (104°F) for one minute or longer each.

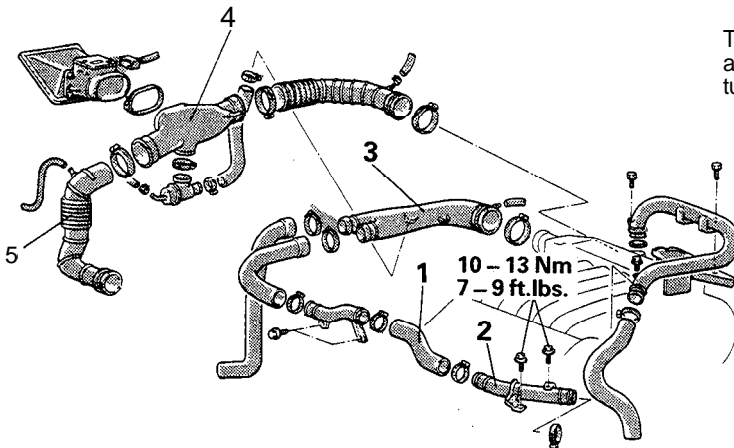
NOTE

The relationship between the outside-air-temperature 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)
Resistance value (reference) kΩ	19.06	11.71	7.45	4.89	4.00	3.30	2.28

COMPRESSOR, CONDENSER, CONDENSER FAN MOTOR, REFRIGERANT LINE AND ENGINE COOLANT TEMPERATURE SWITCH

M55TA-B



The service procedures are the same as those for manual air conditioner except for those parts described below on turbocharged vehicles.

Compressor, condenser and condenser fan motor, refrigerant line removal steps

- * 1. Air hose B
- + 2. Air pipe

Engine coolant temperature switch removal steps

- * 3. Air hose A
- * 4. Air intake hose A
- ◀▶ 5. Air intake hose B

NOTE

Torque hose clamps to 4 Nm (2.9 ft.lbs.).

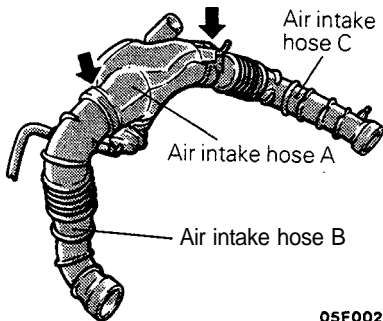
SERVICE POINTS OF INSTALLATION

M55TDAF

5. INSTALLATION OF AIR INTAKE HOSE B / 4. AIR INTAKE HOSE A

Align the cutouts in air intake hose A indicated by arrows with the Δ 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.



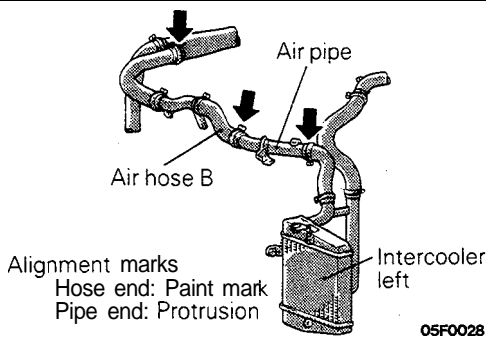
05F0023

2. INSTALLATION OF AIR PIPE / 1. AIR HOSE B

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 intercooler itself.



05F0028

OTHER PARTS

M55WA--

Service procedures for other parts are the same as those in HEATERS AND MANUAL AIR CONDITIONER.

Part name	Ref. page	Part name	Ref. page
Heater Unit	P.55-22	Evaporator – Disassembly and Reassembly	P.55-26
Blower Motor Assembly	P.55-23	Compressor – Disassembly and Reassembly	P.55-29
Evaporator – Removal and Installation	P.55-25	Ventilators	P.55-36

