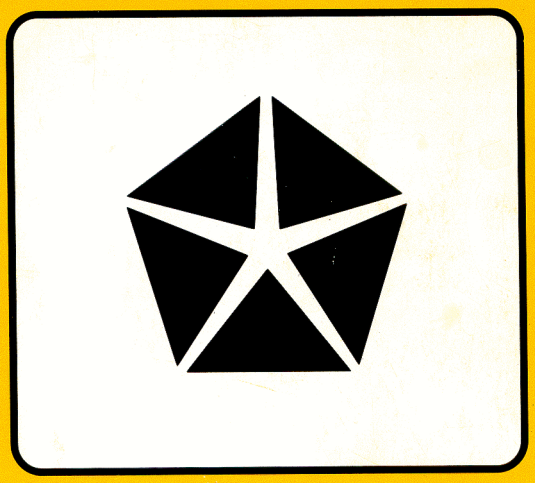
1994

IMPORT SERVICE MANUAL

STEALTH



ENGINE, CHASSIS & BODY

Volume – I

CHRYSLER CORPORATION

SAFETY NOTICE

CAUTION

ALL SERVICE AND REBUILDING INSTRUCTIONS CONTAINED HEREIN ARE APPLICABLE TO, AND FOR THE CONVENIENCE OF, THE AUTOMOTIVE TRADE ONLY. All test and repair procedures on components or assemblies in non-automotive applications should be repaired in accordance with instructions supplied by the manufacturer of the total product.

Proper service and repair is important to the safe, reliable, operation of all motor vehicles. The service procedures recommended and described in this publication were developed for professional service personnel and are effective methods for performing vehicle repair. Following these procedures will help assure efficient economical vehicle performance and service reliability. Some of these service procedures require the use of special tools designed for specific procedures. These special tools should be used when recommended throughout this publication.

Special attention should be exercised when working with spring or tension loaded fasteners and devices such as E-Clips, Circlips, Snap rings, etc., as careless removal may cause personal injury. Always wear safety goggles whenever working on vehicles or vehicle components.

It is important to note that this publication contains various **Cautions** and **Warnings.** These should be carefully read in order to minimize the risk of personal injury, or the possibility that improper service methods may damage the vehicle or render it unsafe. It is important to note that these **Cautions** and **Warnings** cover only the situations and procedures Chrysler Corporation has encountered and recommended. Chrysler Corporation could not possibly know, evaluate, and advise the service trade of all conceivable ways that service may be performed, or of the possible hazards of each. Consequently, Chrysler Corporation has not undertaken any such broad service review. Accordingly, anyone who uses a service procedure, or tool, that is not recommended in this publication must assure oneself thoroughly that neither personal safety, nor vehicle safety, be jeopardized by the service methods they select.

BackupServiceManual

Stealth

1994

Volume-1
Engine, Chassis
& Body

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.

CHRYSLER
CORPORATION

Printed in Japan

GROUP INDEX

NOTE:
For Electrical, refer to Volume-2 “Electrical”.

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

WARNING!

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

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

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

(4) CHRYSLER dealer personnel must thoroughly review this manual, and especially its GROUP 23B – Supplemental Restraint System (SRS) and GROUP 0 – Maintenance Service, before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

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

HOW TO USE THIS MANUAL

MAINTENANCE, REPAIR AND SERVICING EXPLANATIONS

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

SERVICE ADJUSTMENT PROCEDURES

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

SERVICE PROCEDURES

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

TROUBLESHOOTING

Troubleshootings are classified into master troubleshooting and group troubleshooting and located as follows:

The master troubleshooting is prepared when the trouble symptom relates to two or more groups and given in MASTER TROUBLESHOOTING.

The group troubleshooting guide is prepared for causes of problems related to that individual group only; a troubleshooting guide is prepared for each appropriate group.

DEFINITION OF TERMS

STANDARD VALUE

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

LIMIT

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

REFERENCE VALUE

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

CAUTION

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

INDICATION OF TIGHTENING TORQUE

The tightening torque shown in this manual is a basic value with a tolerance of ±10% except the following cases when the upper and lower limits of tightening torque are given.

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

SPECIAL TOOLS

Only Mitsubishi special tool numbers are called out in the repair section of this manual. Please refer to the special tool cross reference chart, located at the beginning of each group for a cross reference from Mitsubishi special tool numbers to Miller special tool numbers.

MODEL INDICATIONS

The following abbreviations are used in this manual for classification of model types.

M/T: Indicates the manual transaxle, or models equipped with the manual transaxle.
A/T: Indicates the automatic transaxle, or models equipped with the automatic transaxle.
MFI: Indicates the multiport fuel injection, or engines equipped with the multiport fuel injection.
SOHC: Indicates an engine with the single overhead camshaft, or a model equipped with such an engine.
DOHC: Indicates an engine with the double overhead camshaft, or a model equipped with such an engine.
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.
- a: 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

 : Sealant or adhesive

 : Brake fluid, automatic transmission fluid or air conditioner compressor oil

 : Engine oil or gear oil

 : Adhesive tape or butyl rubber tape

Indicates the page number.

Indicates the group title.

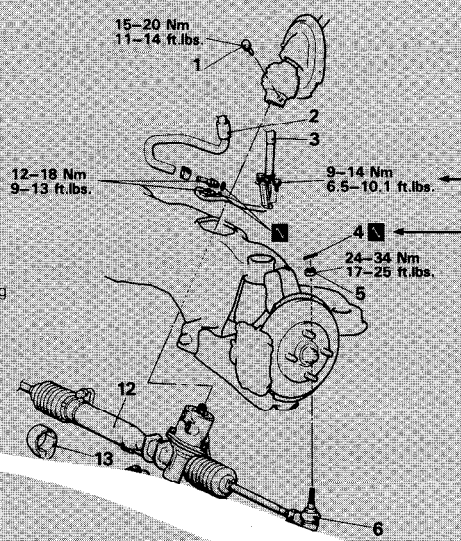
Indicates the section title.

19A-28 STEERING — Power Steering Gear Box

POWER STEERING GEAR BOX

N19PA-

REMOVAL AND INSTALLATION

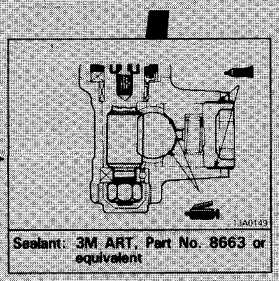


Denotes tightening torque.

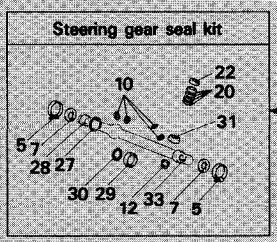
Denotes non-reusable part.

Pre-removal Operation
- Draining of the Power Steering Fluid

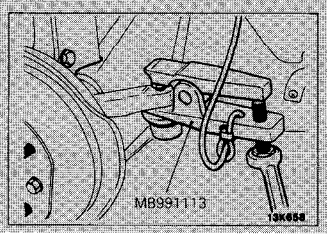
Removal steps
1. Joint assembly and gear box connecting bolt
2. Connection for return tube
3. Connection for pressure hose
4. Cotter pin
5. Tie-rod end and knuckle connecting
10. Center member rear mounting bolt
11. Front exhaust pipe
◆◆ ◆◆ 12. Gear box assembly
◆◆ 13. Mounting rubber



Sealant: 3M ART, Part No. 8663 or equivalent



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



SERVICE POINTS OF REMOVAL

N19PBAB

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.**

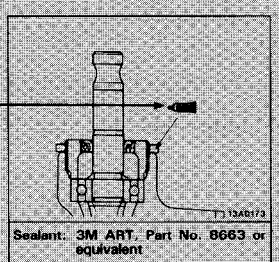
12. REMOVAL OF GEAR BOX ASSEMBLY

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

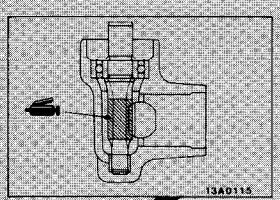
This number corresponds to the number appearing in "Removal steps", "Disassembly steps", "Installation steps" or "Reassembly steps".

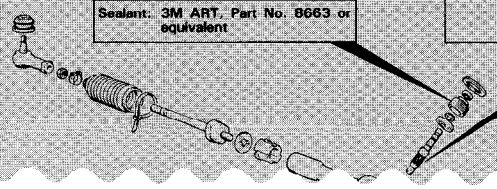
19A-24 STEERING — Manual Steering Gear Box

LUBRICATION AND SEALING POINTS



Sealant: 3M ART, Part No. 8663 or equivalent





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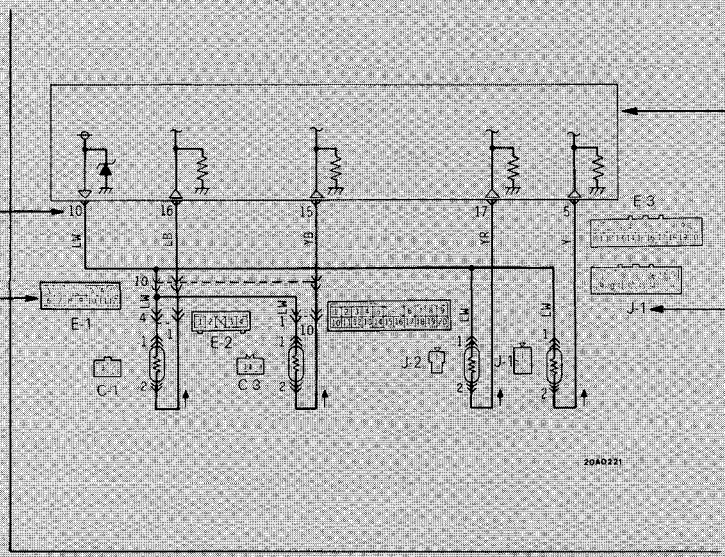
The title of the page (following the page on which the diagram of component parts is presented) indicating the locations of lubrication and sealing procedures.

EXPLANATION OF THE TROUBLESHOOTING GUIDE

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



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.

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).

Air conditioner control unit terminal voltage

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

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

Indicates connector's terminal number.

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

Provides the necessary description of circuit operation for basic understanding.

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

Indicates the on-board diagnostic output code No. and the system conditions during output.

Indicates the check to be made.

Indicates the terminals to be checked.

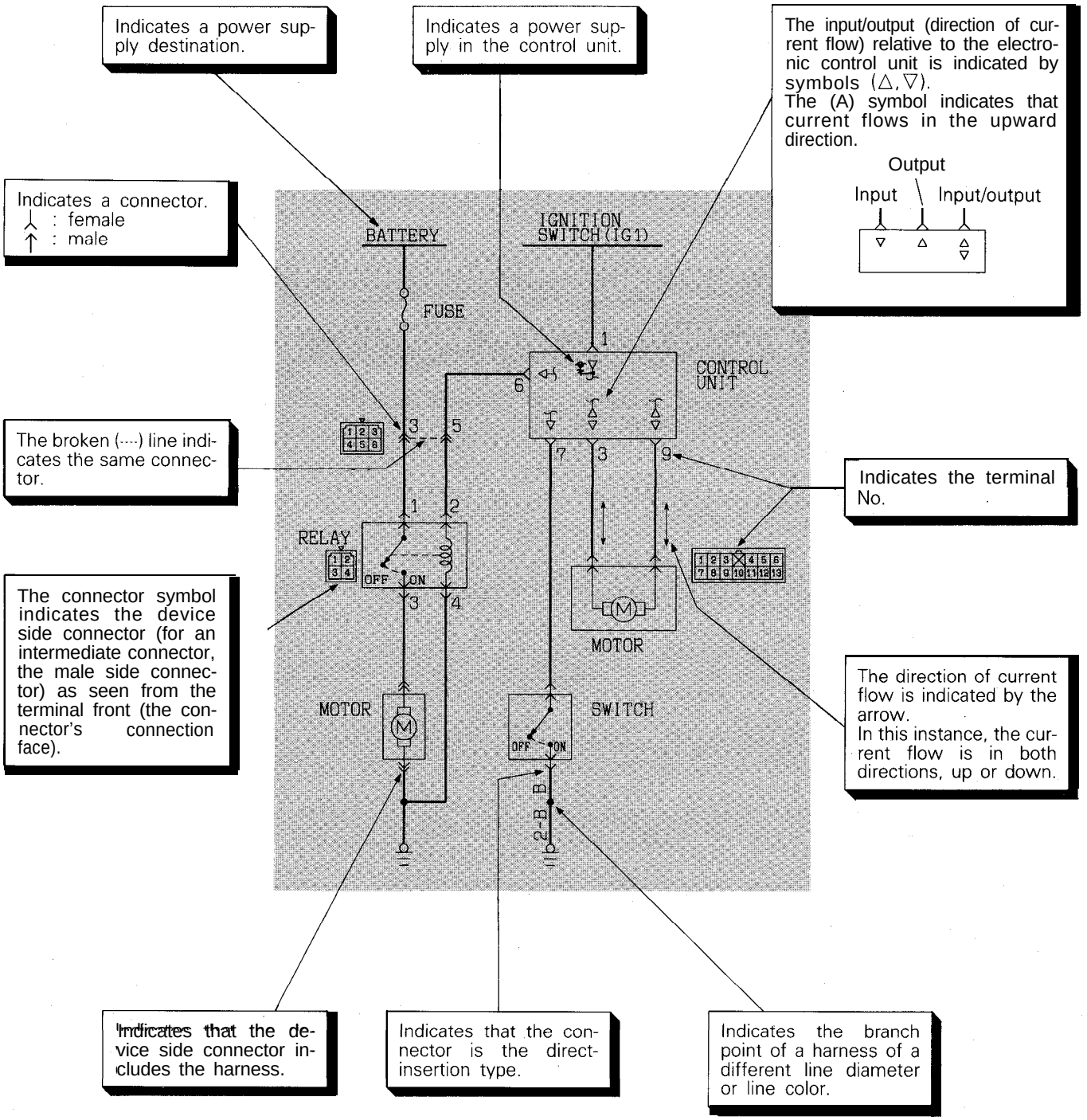
Indicates the conditions under which the check should be made.

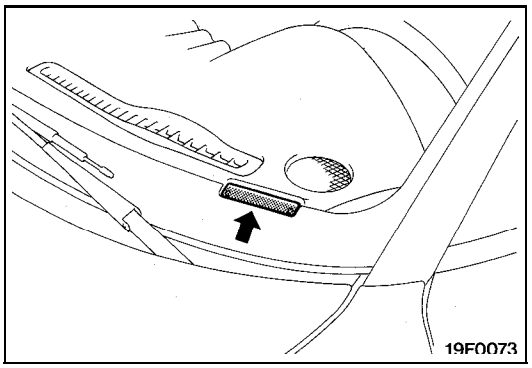
Indicates the specification to be used for judgement of the check results. If there is no particular mention of conditions in the "Conditions" column, the column shows the specification under normal conditions.

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 GROUP 8 – Wiring Harness.





VEHICLE IDENTIFICATION

VEHICLE IDENTIFICATION NUMBER LOCATION

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

VEHICLE IDENTIFICATION CODE CHART PLATE

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

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	B– Dodge	3– Passenger Car	A– Driver and Passenger Air Bag	M– Stealth FWD N– Stealth AWD	4– High 5– sports 6– Premium 7– Ultimate	4– 3-door Hatchback	J– 3.0 dm^3 (181 4 cu.in.) [DOHC-MFI] K– 3 . 0 dm^3 (181.4 cu.in.) [DOHC-MFI-Turbo] H– 3.0 dm^3 (181.4 cu.in.) [SOHC-MFI]	1 2 3 9 X	R– 1994 Year	Y– Nagoya-I Plant	000001 to 999999

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

VEHICLE IDENTIFICATION NUMBER LIST

VEHICLES FOR FEDERAL

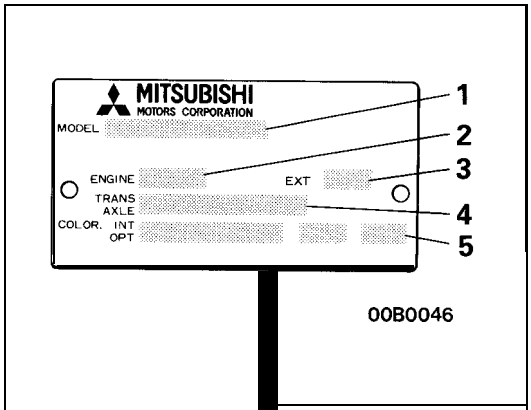
V.I.N. (except sequence number)	Brand	Engine displacement	Models code
JB3AM44H□RY	Dodge Stealth <FWD>	3.0 dm^3 (181.4 cu.in.) [SOHC-MFII	Z11AMNHEL2D Z11AMRHEL2D
JB3AM54J□RY		3.0 dm^3 (181.4 cu.in.) [DOHC-MFI]	Z11AMNXML2D Z11AMRXML2D
JB3AM64J□RY			Z11AMNPML2D Z11AMRPML2D
JB3AN74K□RY	Dodge Stealth <AWD>	3.0 dm^3 (181.4 cu.in.) [DOHC-MFI-Turbo]	Z16AMJGFL2D

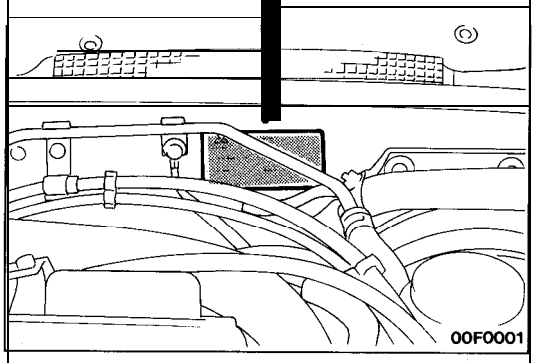
VEHICLES FOR CALIFORNIA

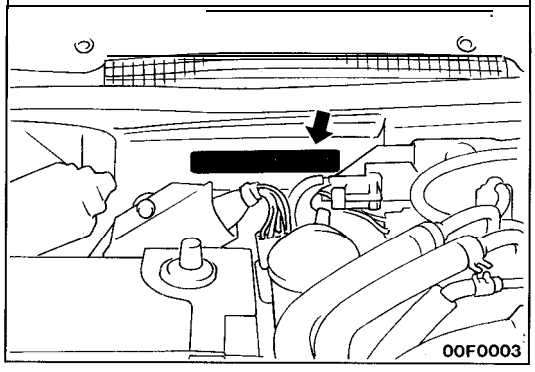
V.I.N. (except sequence number)	Brand	Engine displacement	Models code
JB3AM44H□RY	Dodge Stealth <FWD>	3.0 dm^3 (181.4 cu.in.) [SOHC-MFI]	Z11AMNHEL7D Z11AMRHEL7D
JB3AM54J□RY		3.0 dm^3 (181.4 cu.in.) [DOHC-MFI]	Z11AMNXML7D Z11AMRXML7D
JB3AM64J□RY			Z11AMNPML7D Z11AMRPML7D
JB3AN74K□RY	Dodge Stealth <AWD>	3.0 dm^3 (181.4 cu.in.) [DOHC-MFI-Turbo]	Z16AMJGFL7D

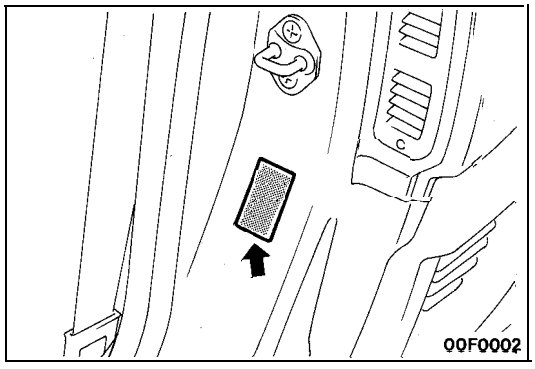
VEHICLES FOR CANADA

V.I.N. (except sequence number)	Brand	Engine displacement	Models code
JB3AM44H□RY	Dodge Stealth <FWD>	3.0 dm^3 (181.4 cu.in.) [SOHC-MFII	Z11AMNHEL3D Z11AMRHEL3D
JB3AM54J□RY		3.0 dm^3 (181.4 cu.in.) [DOHC-MFI]	Z11AMNXML3D Z11AMRXML3D
JB3AM64J□RY			Z11AMNPML3D Z11AMRPML3D
JB3AN74K□RY	Dodge Stealth <AWD>	3.0 dm^3 (181.4 cu.in.) [DOHC-MFI-Turbo]	Z16AMJGFL3D









VEHICLE INFORMATION CODE PLATE

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

1. MODEL **Z11AMNHEL2D**
   - Z11A: Vehicle model
   - MN: Model series
2. **ENGINE** **6G72**
   - 6G72: Engine model
3. **EXT** **CA6**
   - CA6: Exterior code
4. TRANSAXLE **F5M33**
   - F5M33: Transaxle model
5. **COLOR, INT OPT** **R2587V03V**
   - R25: Body color code
   - 87: Interior code
   - V03V: Equipment code

CHASSIS NUMBER

STAMPING LOCATION

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

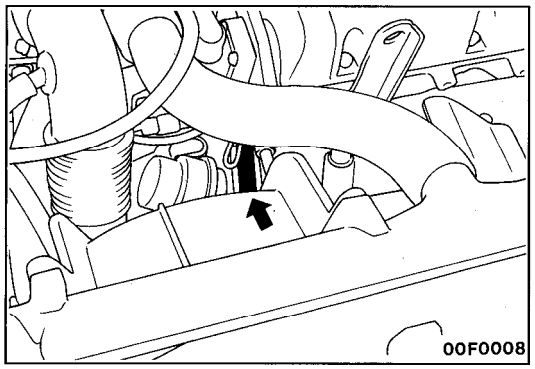
CHASSIS NUMBER CODE CHART

Z1□A RY□□□□□□□

- Z1□A: Indicates STEALTH-series.
- RY□□□□□□□: Refer to 10th thru 17th digits of V.I.N. plate.

VEHICLE SAFETY CERTIFICATION LABEL

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



ENGINE MODEL STAMPING

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

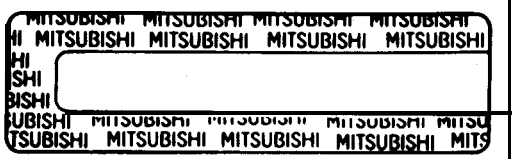
Engine model	Engine displacement
6G72	3.0 dm^3 (181.4 cu.in.)

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

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

heft protection label

For original parts



00K619

For replacement parts

00K621

THEFT PROTECTION

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

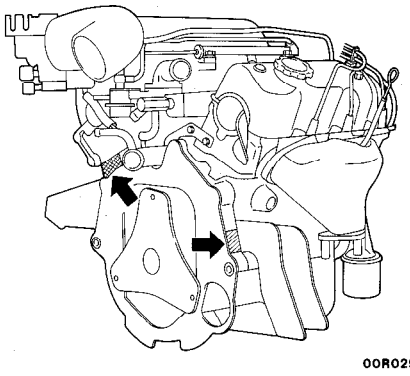
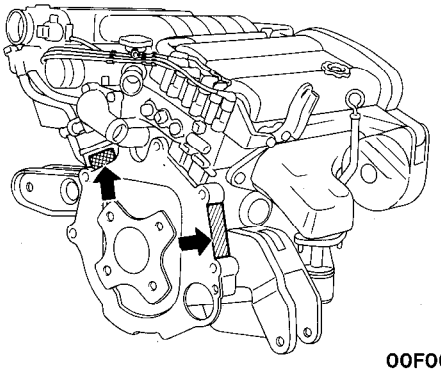
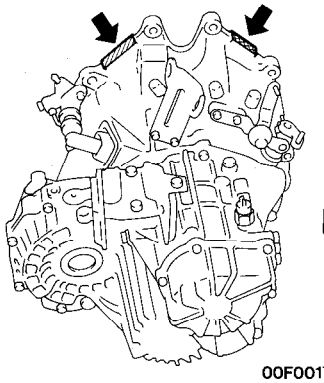
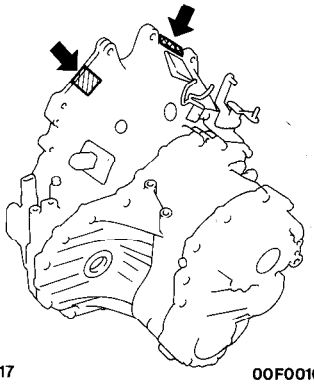
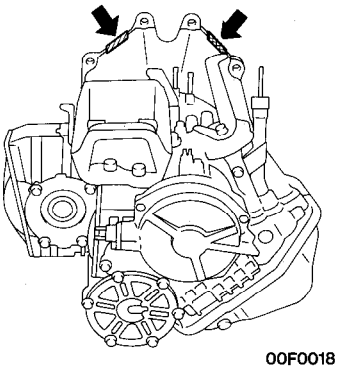
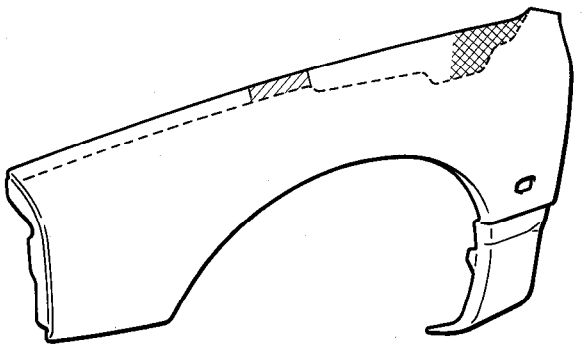
Engine cylinder block, Transaxle housing, Fender, Door, Quarter panel, Hood, Liftgate, Bumpers

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

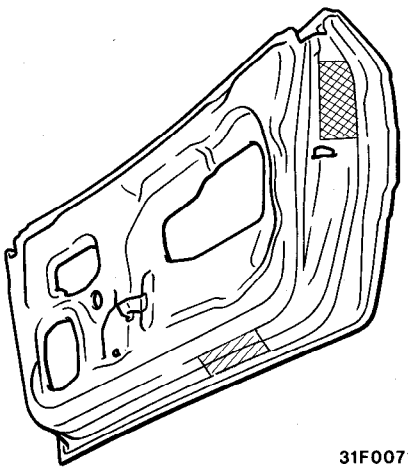
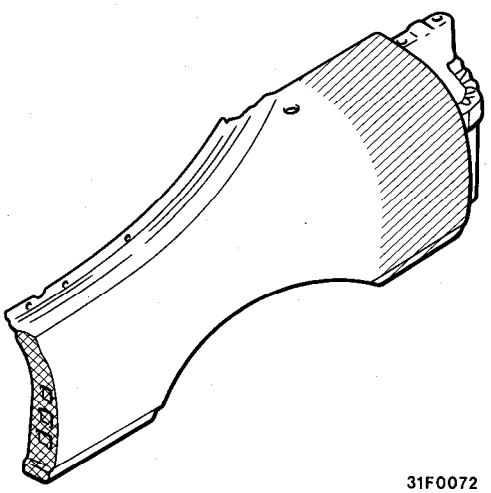
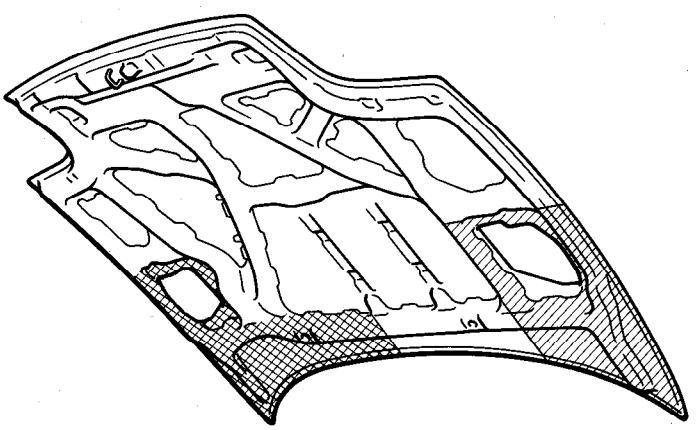
Cautions regarding panel repairs:

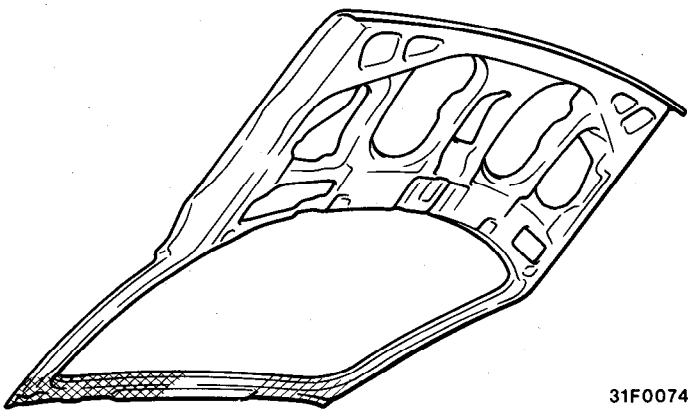
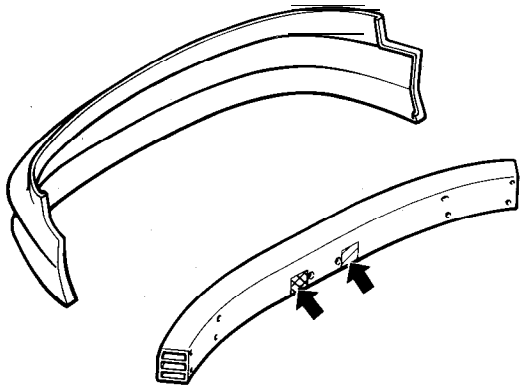
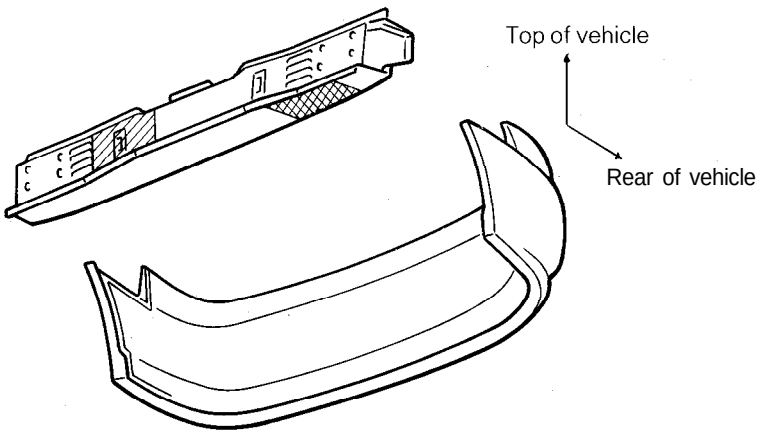
1. **When repainting original parts, do so after first masking the theft-protection label, and, after painting, be sure to peel off the masking tape.**
2. **The theft-protection label for replacement parts is covered by masking tape, so such parts can be painted as is. The masking tape should be removed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

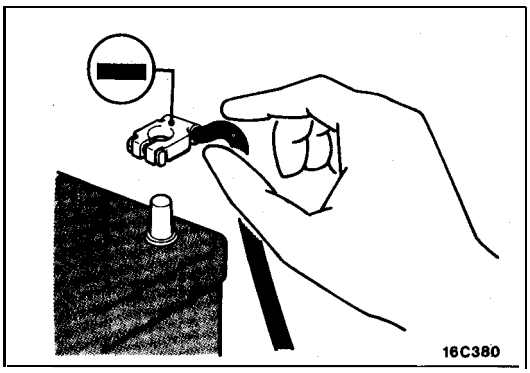
LOCATIONS

Part	Target area
Engine	SOHC  00R0295 DOHC  00F0033
Transaxle	Manual transaxle <F5M33>  00F0017 <W6MG1>  00F0016 Automatic transaxle <F4A33>  00F0018
Fender	 31F0070 The illustration indicates left hand side, outer. Right hand side is symmetrically opposite.

: for original equipment parts
: for replacement parts

Part	Target area : for original equipment parts : for replacement parts
Door	 31F0071 The illustration indicates right hand side, outer. Left hand side is symmetrically opposite.
Quarter panel	 31F0072 The replacement part label is attached to the inner side of the part shown in the illustration. The illustration indicates left hand side, outer. Right hand side is symmetrically opposite.
Hood	 31F0073

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



PRECAUTIONS BEFORE SERVICE

SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

1. Items to follow when servicing SRS
   (1) Be sure to read GROUP 23B – Supplemental Restraint System (SRS).
   For safe operations, please follow the directions and heed all warnings.
   (2) Always use the designated special tools and test equipment.
   (3) Wait at least 60 seconds after disconnecting the battery cable before doing any further work.
   The SRS system is designed to retain enough voltage to deploy the air bag even after the battery has been disconnected. Serious injury may result from unintended air bag deployment if work is done on the SRS system immediately after the battery cable is disconnected.
   (4) Never attempt to disassemble or repair the SRS components (front impact sensors, SRS diagnosis unit, air bag module and clock spring). If faulty, replace it.
   (5) Warning labels must be heeded when servicing or handling SRS components. Warning labels are located in the following locations.
   . Hood
   - Sun visor
   - Glove box
   - SRS diagnosis unit
   - Steering wheel
   - Air bag module
   - Colck spring
   - Steering gear and linkage clamp
   (6) Store components removed from the SRS in a clean and dry place.
   The air bag module should be stored on a flat surface and placed so that the pad surface is facing upward. Do not place anything on top of it.
   (7) Be sure to deploy the air bag before disposing of the air bag module or disposing of a vehicle equipped with an air bag. (Refer to GROUP 23B – Air Bag Module Disposal Procedures.)
   (8) Whenever you finish servicing the SRS, check the SRS warning light operation to make sure that the system functions properly.
2. Observe the following when carrying out operations on places where SRS components are installed, including operations not directly related to the SRS air bag.
   (1) When removing or installing parts do not allow any impact or shock to the SRS components.
   (2) SRS components should not be subjected to heat over 93°C (200°F). so remove the SRS components before drying or baking the vehicle after painting.
   After re-installing them, check the SRS warning light operation to make sure that the system functions properly.

SERVICING ELECTRICAL SYSTEM

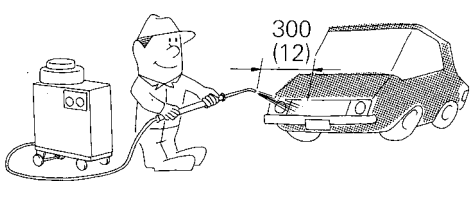
1. Note the following before proceeding with work on the electrical system.
   Note that the following must never be done:
   Unauthorized modifications of any electrical device or wiring, because such modifications might lead to a vehicle malfunction, over-capacity or short-circuit that could result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

Caution

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

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

Engine coolant temperature: 85 – 95°C (185 – 203°F)
Lights, electric fans, accessories: OFF
Transaxle: Neutral position
(A/T models: "N" or "P")
Steering wheel: neutral (center) position



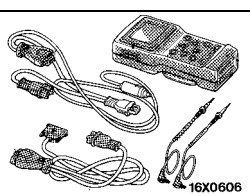
mm (in.)

S00059

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.).

Scan tool (MUT-II)



16X0606

ROM pack

16X0607

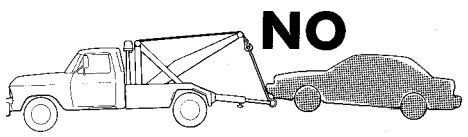
SCAN TOOL (MUT-II) <All models>

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

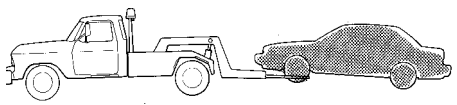
Caution

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

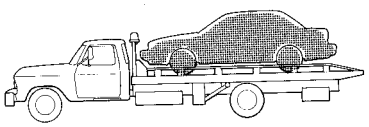
Sling type



Wheel lift type

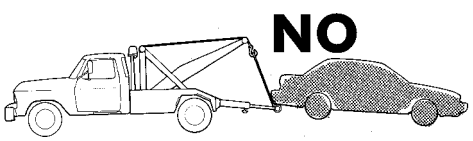


Flat bed type

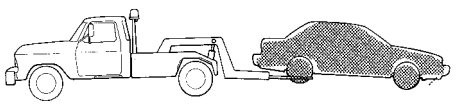


00F0027

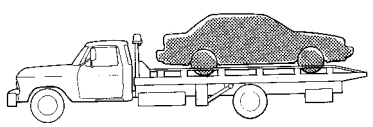
Sling type



Wheel lift type



Flat bed type



00F0026

TOWING AND HOISTING

WRECKER TOWING RECOMMENDATION

<FWD>

FRONT TOWING PICKUP

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

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

REAR TOWING PICKUP

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

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

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

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

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

TOWING WHEN KEYS ARE NOT AVAILABLE

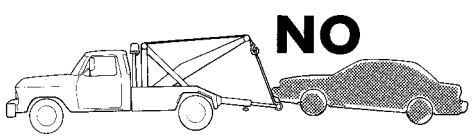
When a locked vehicle must be towed and keys are not available, the vehicle may be lifted and towed from the front, provided the parking brake is released. If not released, the rear wheels should be placed on a tow dolly.

SAFETY PRECAUTIONS

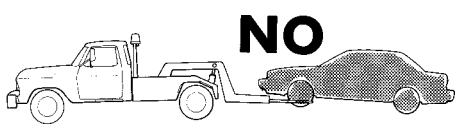
The following precautions should be taken when towing the vehicle.

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 or removed prior to moving the vehicle.
3. Operator should refrain from going under a vehicle while it is lifted by the towing equipment, unless the vehicle is adequately supported by safety stands.
4. Never allow passengers to ride in a towed vehicle.
5. State and local rules and regulations must be followed when towing a vehicle.

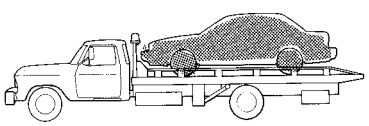
Sling type



Wheel lift type



Flat bed type



00F0027

<AWD>

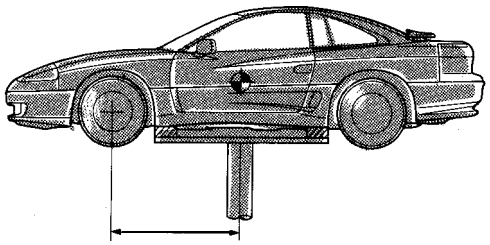
Caution

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.

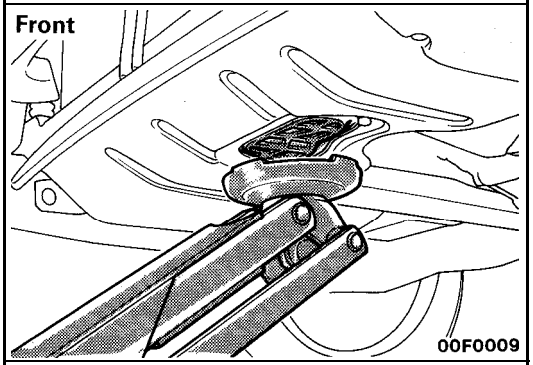
Frame contact support location



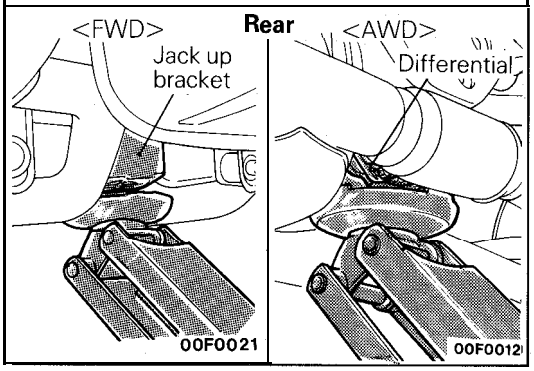
<FWD>: 1,070 mm (42.0 in.)
<AWD>: 1,130 mm (44.0 in.)

00F0032

Front



00F0009



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

Rear:

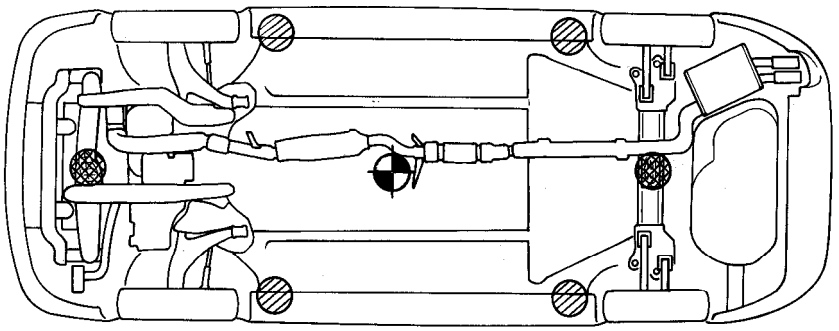
<FWD> Under the jack up bracket of crossmember
<AWD> Under the rear differential

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.**

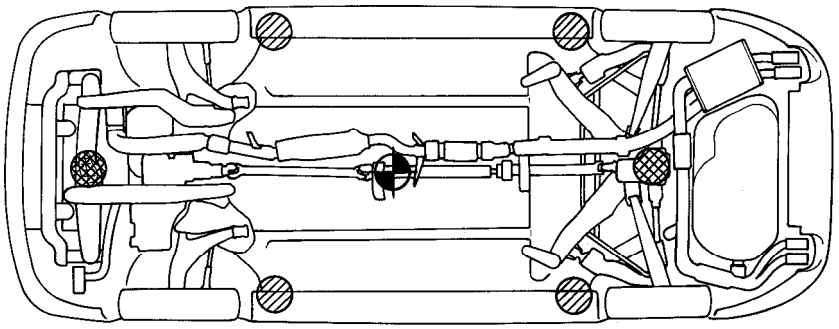
LIFTING, JACKING SUPPORT LOCATION

<FWD>



00F0020

<AWD>



00F0019

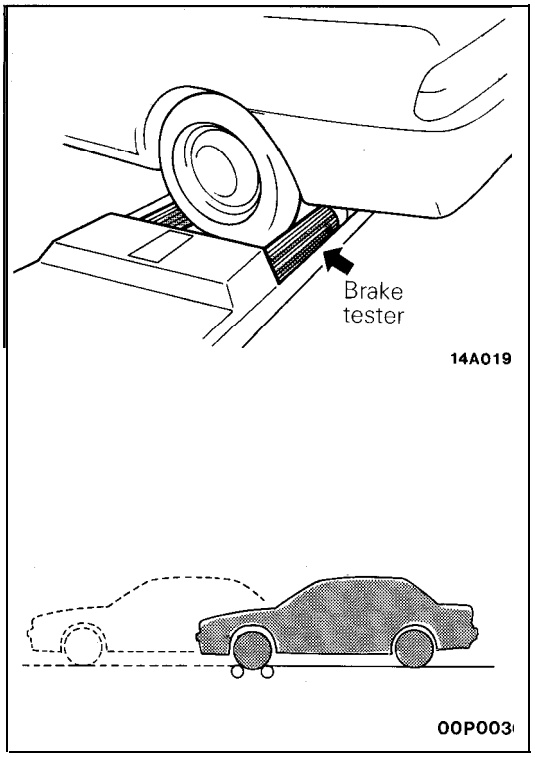
Floor jack locations

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

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.

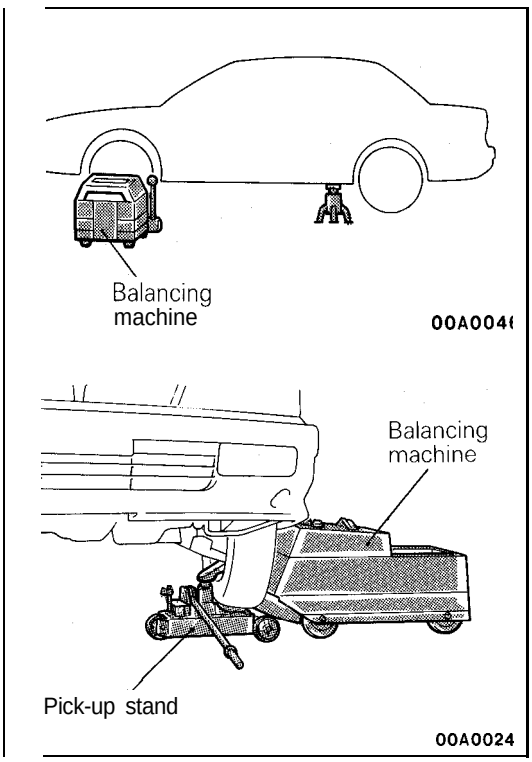
Caution
1. Set so that the front and rear of the vehicle are at the same height.
2. Release the parking brake.
3. Rotate each wheel manually and check to be sure that there is no dragging.

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

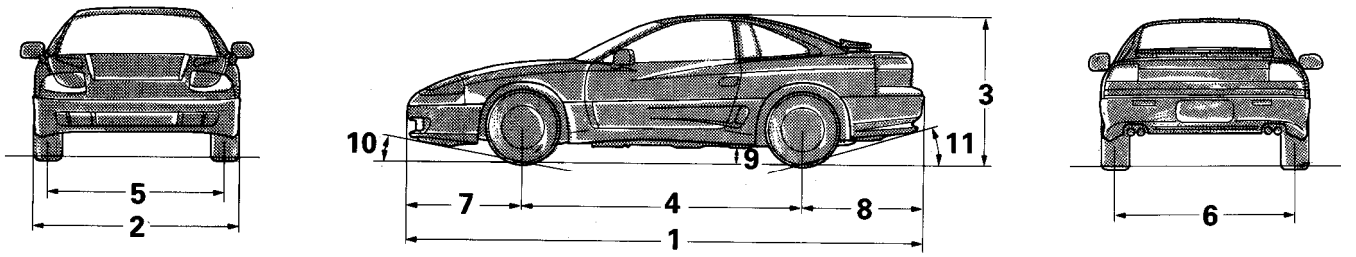
Caution
1. If an error is indicated in the state of engine drive, motor drive can be used concurrently.
2. Do not operate the clutch suddenly, or increase or reduce speed suddenly during the work.

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



00F0030

GENERAL SPECIFICATIONS

Items \ Models			STEALTH <SOHC>	STEALTH ES <DOHC> (Non-Turbo)	STEALTH R/T <DOHC> (Non-Turbo)	STEALTH R/T <DOHC> (Turbo)
Vehicle dimensions mm (in.)						
Overall length		1	4,560 (179.5)	4,565 (179.7)	4,565 (179.7)	4,565 (179.7)
Overall width		2	1,840 (72.4)	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)	1,285 (50.6)"'
Wheelbase		4	2,470 (97.2)	2,470 (97.2)	2,470 (97.2)	2,470 (97.2)
Tread	Front	5	1,560 (61.4)	1,560 (61.4)	1,560 (61.4)	1,560 (61.4)
	Rear	6	1,580 (62.2)	1,580 (62.2)	1,580 (62.2)	1,580 (62.2)
Overhang	Front	7	1,025 (40.4)	1,025 (40.4)	1,060 (41.7)	1,060 (41.7)
	Rear	8	1,050 (41.3)	1,050 (41.3)	1,050 (41.3)	1,050 (41.3)
Minimum running ground clearance		9	145 (5.7)	145 (5.7)	145 (5.7)	145 (5.7)
Angle of approach degrees		10	12.2"	12.2"	12.2"	12.2"
Angle of departure degrees		11	16.9"	16.9"	16.5"	16.5"
Vehicle weight kg (lbs.)						
Curb weights						
MIT			1,390 (3,064)	1,435 (3,164)	1,520 (3,351)	1,720 (3,792)*1
AA			1,430 (3,153)	1,475 (3,252)	1,560 (3,439)	—
Gross vehicle weight rating			1,840 (4,057)	1,925 (4,244)	1,925 (4,244)	2,055 (4,530)
Gross axle weight rating						
Front			1,100 (2,425)	1,100 (2,425)	1,100 (2,425)	1,120 (2,469)
Rear			850 (1,874)	850 (1,874)	850 (1,874)	935 (2,061)
Seating capacity			4	4	4	4
Engine						
Model No.			6G72-(SOHC)	6G72-(DOHC)	6G72-(DOHC)	6G72-(DOHC)
Piston displacement	cm^3 (cu.in.)		2,972 (181.4)	2,972 (181.4)	2,972 (181.4)	2,972 (181.4)

NOTE
*1: <4WS>

Items \ Models	STEALTH <SOHC>	STEALTH ES <DOHC> (Non-Turbo)	STEALTH R/T <DOHC> (Non-Turbo)	STEALTH R/T <DOHC> (Turbo)
Transaxle				
Model No. -Type				
Manual transaxle	F5M33 – 5-speed manual	F5M33 – 5-speed manual	F5M33 – 5-speed manual	W6MG1 – 6-speed manual
Automatic transaxle	F4A33 – 4-speed automatic	F4A33 – 4-speed automatic	F4A33 – 4-speed automatic	–
Fuel system				
Fuel supply system	Multiport fuel injection system <MFI system>	Multiport fuel injection system <MFI system>	Multiport fuel injection system <MFI system>	Multiport fuel injection system <MFI system>

ENGINE SPECIFICATIONS

Items	6G72	6G72 Non-Turbo	6G72 Turbo
Type	V60° SOHC Front Transverse	V60° DOHC Front Transverse	V60° DOHC Front Transverse
Number of cylinders	6	6	6
Bore mm (in.)	91.1 (3.59)	91.1 (3.59)	91.1 (3.59)
Stroke mm (in.)	76.0 (2.99)	76.0 (2.99)	76.0 (2.99)
Piston displacement cm^3 (cu.in.)	2,972 (181.4)	2,972 (181.4)	2,972 (181.4)
Compression ratio	8.9	10	8.0
Firing order	1-2-3-4-5-6	1-2-3-4-5-6	1-2-3-4-5-6

TRANSAXLE SPECIFICATIONS

Items		F5M33	W6MG1	F4A33
Type		5-speed M/T	6-speed MIT	4-speed A/T
Gear ratio	1st	3.090	3.266	2.551
	2nd	1.833	1.904	1.488
	3rd	1.217	1.241	1.000
	4th	0.888	0.918	0.685
	5th	0.741	0.733	–
	6th	–	0.589	–
	Reverse	3.166	3.153	2.176
Final reduction ratio	Transaxle	4.153	3.869	3.958
	Transfer	–	0.958	–

TIGHTENING TORQUE

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

(1) Bolts, nuts and washers are all mode 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 ⟨4⟩	Head mark ⟨7⟩	Head mark ⟨8⟩
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 ⟨4⟩	Head mark ⟨7⟩	Head mark ⟨8⟩
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 318	48 (35)	68 (49)

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

MASTER TROUBLESHOOTING

ENGINE OVERHEATS

Symptom	Probable cause	Reference page
Engine overheats	Cooling system faulty	7-3
	Incorrect ignition timing	9-l 8

ENGINE WILL NOT CRANK OR CRANKS SLOWLY

Symptom	Probable cause	Reference page
Engine will not crank or cranks slowly	Starting system faulty	8-l 87

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

Symptom	Probable cause	Reference page
Engine will not start or hard to start (Cranks OK)	No fuel supply to injector	14-25
	Injection system problems	14-25
	Ignition system problems	8-199
	Vacuum leaks • Purge control valve hose • Vacuum hoses • Intake manifold • Intake manifold plenum • Throttle body • EGR valve	25-3
	Compression too low	9-23

ROUGH IDLE OR ENGINE STALLS

Symptom	Probable cause	Reference page or remedy
Rough idle or engine stalls	Vacuum leaks • Purge control valve hose • Vacuum hoses • Intake manifold • Intake manifold plenum • Throttle body • EGR valve	25-3
	Ignition system problems	8-199
	Idle speed set too low	Check idle speed control system
	Idle mixture too lean or too rich	14–25
	Fuel injection system problems	14-25
	Exhaust gas recirculation (EGR) system problems	25-18
	Engine overheats	7-3
	Compression too low	9-23

ENGINE HESITATES OR POOR ACCELERATION

Symptom	Probable cause	Reference page
Engine hesitates or poor acceleration	Ignition system problem	8-199
	Vacuum leaks • Purge control valve hose • Vacuum hoses • Intake manifold • Intake manifold plenum • Throttle body • EGR valve	25–3
	Air cleaner clogged	
	Fuel line clogged	14-25
	Fuel injection system problem	14-25
	Emission control system problem • EGR system always on	25-18
	Engine overheats	7-3
	Compression too low	9–23

ENGINE DIESELING

Symptom	Probable cause	Reference page
Engine dieseling (runs after ignition switch is turned off)	Incorrect ignition timing	9-18

EXCESSIVE OIL CONSUMPTION

Symptom	Probable cause	Reference page or remedy
Excessive oil consumption	Oil leak	Repair as necessary
	Positive crankcase ventilation line clogged	25-9
	Valve stem seal worn or damaged	9-7 1
	Valve stem worn	9-7 1
	Piston ring worn or damaged	9-83

POOR FUEL MILEAGE

Symptom	Probable cause	Reference page or remedy
Poor fuel mileage	Fuel leak	Repair as necessary
	Air cleaner clogged	–
	Ignition system problems	8-I 99
	Fuel injection system problems	14–25
	Compression too low	9-23
	Tires improperly inflated	22-3
	Clutch slips	6-3
	Brakes drag	5-5

NOISE

Symptom	Probable cause	Reference page or remedy
Noise	Loose bolts and nuts	Retighten as necessary
	Engine noise	9-15

HARD STEERING

Symptom	Probable cause	Reference page or remedy
Hard steering	Loose power steering oil pump belt	19A–9
	Low fluid level	Replenish
	Air in power steering system	19A–11
	Low tire pressure	22-3
	Excessive turning resistance of lower arm ball joint	2A–3 1
	Excessively tightened steering gear box rack support cover	19A–20
	Improper front wheel alignment	2A–9
	Excessive turning resistance of tie-rod ball joint	19A–7
	Sticky flow control valve	19A–32
	Bent rack in steering gear box	19A–20

POOR RETURN OF STEERING WHEEL TO CENTER

Symptom	Probable cause	Reference page
Poor return of steering wheel to center	Improper front wheel alignment	2A–9
	Improper tire pressure	22-3
	Excessive tightened rack support cover	19A–20
	Damaged front wheel bearing	2A–16

POOR RIDING

Symptom	Probable cause	Reference page or remedy
Poor riding	Improper tire pressure	22-3
	Imbalanced wheels	Repair
	Improper front or rear wheel alignment	2A–9, 27 17–5, 13, 22, 30
	Malfunctioning shock absorber	
	Broken or worn stabilizer	2A–27, 32 17–13, 15, 30, 31
	Broken or worn coil spring	
	Loose suspension securing bolt(s)	Retighten
	Worn lower arm bushing	2A–30
	Worn suspension arm bushing	2A–30

ABNORMAL TIRE WEAR

Symptom	Probable cause	Reference page
Abnormal tire wear	Improper front or rear wheel alignment	2A–9, 17–5, 22
	Improper tire pressure	22-3
	Imbalanced wheels	
	Loose wheel bearings	17-6
	Malfunctioning shock absorber	2A–27, 17-I 3, 30

ROAD WANDER

Symptom	Probable cause	Reference page
Road wander	Improper front or rear wheel alignment	2A–9, 17–5, 22
	Excessive play of steering wheel	19A–6
	Poor turning resistance of lower arm ball joint	2A–31
	Improper tire pressure	22-3
	Loose or worn lower arm bushing	2A–16, 30
	Loose or worn wheel bearings	
	Loose rack support cover in steering gear box	19A–20

VEHICLE PULLS TO ONE SIDE

Symptom	Probable cause	Reference page or remedy
Vehicle pulls to one side	Improper front or rear wheel alignment	2A–9, 17-5.22
	Imbalanced or worn tires	22-3
	Uneven tire pressure	
	Excessive turning resistance of lower arm ball joint	2A–31
	Wheel bearing seizure	Replace
	Broken or worn coil spring ,	2A–27
	Bent front axle drive shaft	2A–18
	Deformed lower arm	2A–30

STEERING WHEEL SHIMMY

Symptom	Probable cause	Reference page or remedy
Steering wheel shimmy	Improper front or rear wheel alignment	2A–9, 17–5, 22
	Improper tire pressure	22–3
	Imbalanced wheels	Replace
	Poor turning resistance of lower arm ball joint	2A–31
	Excessive play of steering wheel	19A–6
	Broken or weak front stabilizer	2A–32
	Worn lower arm bushing	2A–30
	Malfunctioning shock absorber	2A–27, 17–13, 30
	Broken or weak coil spring	
	Wear, play, or seizure of wheel bearing	Replace
	Wear, play, or seizure of drive shaft ball joint	2A–18, 3–14

BOTTOMING

Symptom	Probable cause	Reference page or remedy
Bottoming	Overloaded vehicle	Correct
	Broken or weak coil spring	2A–27 17-I 3, 30
	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

CONTENTS

GENERAL INFORMATION

Maintenance and lubrication service recommendations have been compiled to provide maximum protection for the vehicle owner's investment against all reasonable types of driving conditions. Since these conditions vary with the individual vehicle owner's driving habits, the area in which the vehicle is operated and the type of driving to which the vehicle is subjected, it is necessary to prescribe lubrication and maintenance service on a time frequency as well as mileage interval basis.

Oils, lubricants and greases are classified and graded according to standards recommended by the Society of Automotive Engineers (SAE), the American Petroleum Institute (API) and the National Lubricating Grease Institute (NLGI).

MAINTENANCE SCHEDULES

Information for service maintenance is provided under "SCHEDULED MAINTENANCE TABLE".

Three schedules are provided; one for "Required Maintenance", one for "General Maintenance" and one for "Severe Usage Service".

Item numbers in the "SCHEDULED MAINTENANCE TABLE" correspond to the item numbers in the "MAINTENANCE SERVICE" section.

SEVERE SERVICE

Vehicles operating under severe service conditions will require more frequent service.

Component service information is included in appropriate units for vehicles operating under one or more of the following conditions:

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

ENGINE OIL

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 ECII" or "For Service SG/CD ECII", 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 with a viscosity of SAE 75W-90 are recommended for manual transaxle.

LUBRICANTS – GREASES

Semi-solid lubricants, bear the NLGI designation and are further classified as grades 0, 1, 2, 3 etc.

Whenever "Chassis Lubricant" is specified, Multi-Purpose Grease, NLGI grade 2, should be used. MOPAR Multi-Mileage Lubricant, Part Number 2525035 or equivalent, meets these requirement and is recommended.

FUEL USAGE STATEMENT

Your car must use unleaded gasoline only.

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

Caution

Using leaded gasoline in your car will damage the catalytic converter, and affect the warranty coverage validity.

All cars except those with DOHC engines

Your car is designed to operate on unleaded gasoline having a minimum octane rating of 87 or 91 RON (Research Octane Number).

Cars equipped with DOHC engines

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

Gasolines Containing Alcohol

Some gasolines sold at service stations contain alcohol, although they may not be so identified. Use of fuels containing aicohol is not recommended unless the nature of the blend can be determined as being satisfactory.
Gasohol – A mixture of 10% ethanol (grain alcohol) and 90% unleaded gasoline may be used in your car. If driveability problems are experienced as a result of using gasohol, it is recommended that the car be operated on gasoline.
Methanol – **Do not use gasolines containing methanol** (wood alcohol). Use of this type of alcohol can result in vehicle performance deterioration and damage critical parts in the fuel system components. Fuel system damage and performance problems, resulting from the use of gasolines containing methanol, may not be covered by the new car warranty.

Gasolines Containing MTBE (Methyl Tertiary Butyl Ether)

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

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.

SCHEDULED MAINTENANCE TABLE

SCHEDULED MAINTENANCE SERVICES FOR EMISSION CONTROL AND PROPER VEHICLE PERFORMANCE

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

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

NOTE
*: Except for Federal

GENERAL MAINTENANCE SERVICE FOR PROPER VEHICLE PERFORMANCE

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

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

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

NOTE
SRS: Supplemental Restraint System

SCHEDULED MAINTENANCE UNDER SEVERE USAGE CONDITIONS

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

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

Severe usage conditions

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

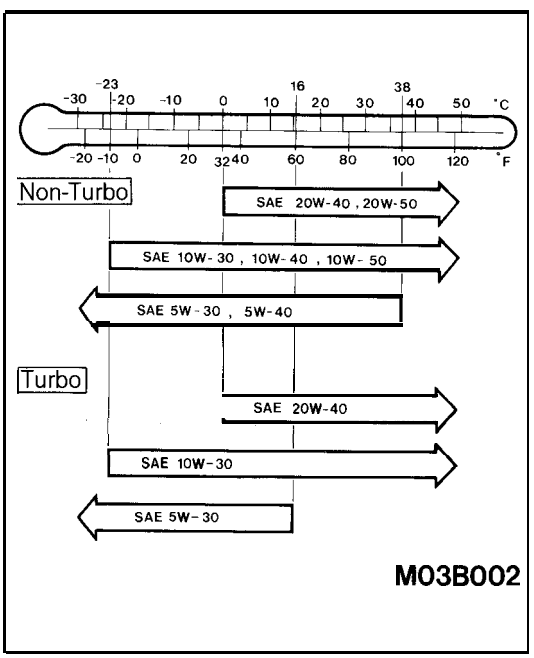
RECOMMENDED LUBRICANTS AND LUBRICANT CAPACITIES TABLE

RECOMMENDED LUBRICANTS

Items	Recommended lubricants
Engine oil	API classification SG ECII or SG/CD ECII (For further details, refer to SAE viscosity number)
Manual transaxle	MOPAR Hypoid Gear Oil/API classification GL-4, SAE 75W-90 or 75w – 85W
Transfer	
Automatic transaxle	MOPAR ATF PLUS (Automatic Transmission Fluid Type 7176) / Dia ATF SP or equivalent
Power steering	MOPAR ATF PLUS (Automatic Transmission Fluid Type 7176)/ Automatic transmission fluid "DEXRON" or "DEXRON II"
Rear axle <AWD>	Refer to P.0-8.
Brake and clutch	MOPAR Brake Fluid/Conforming to DOT 3 or DOT 4
Rear wheel bearings	MOPAR Front Wheel Bearing Grease or MOPAR Multi-Mileage Lubricant/Multipurpose grease NLGI Grade 2EP
Hood lock latch, door lock strikers, seat adjusters, liftgate lock, parking brake cable mechanism	MOPAR Lubriplate/Multipurpose grease NLGI Grade 2
Engine coolant	MOPAR Antifreeze Permanent-Type Coolant/High quality ethylene-glycol antifreeze coolant
Door hinges, liftgate hinges	Engine oil

LUBRICANT CAPACITIES TABLE

Description	Metric measure	U.S. measure
Engine oil		
Crankcase	4.0 dm^3	4.2 qts.
Oil filter	0.3 dm^3	1/2 qt.
Oil cooler (Turbo)	0.3 dm^3	1/2 qt.
Total		
<Non-Turbo>	4.3 dm^3	4.5 qts.
<Turbo>	4.6 dm^3	4.9 qts.
Cooling system (including heater and coolant reserve system)	8.0 dm^3	8.5 qts.
Manual transaxle		
<FWD>	2.3 dm^3	2.4 qts.
<AWD>	2.4 dm^3	2.5 qts.
Transfer <5M/T>	0.27 dm^3	.29 qt.
<6M/T>	0.30 dm^3	.32 qt.
Automatic transaxle	7.5 dm^3	7.9 qts.
Rear axle <AWD>	1.1 dm^3	1.16 qts.
Power steering		
<2WS>	0.9 dm^3	.95 qt.
<4WS>	1.45 dm^3	1.59 qts.
Fuel tank	75 dm^3	19.8 gals.



* 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

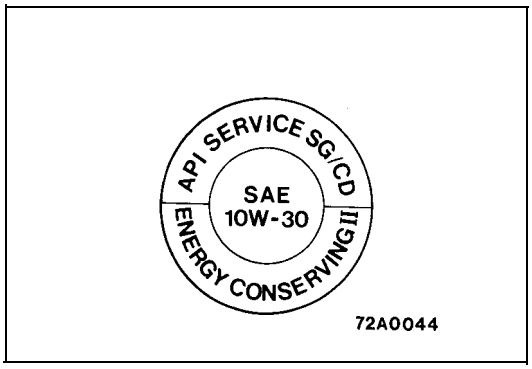
ENGINE OIL

Engine oil should be used which conform to the requirements of the API classification "For Service SG ECII" or "For Service SG/CD ECII", 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 district 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

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).

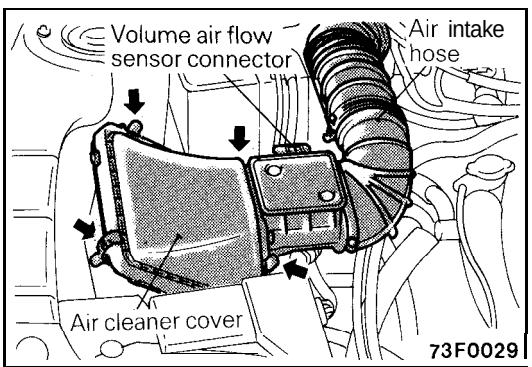
Caution

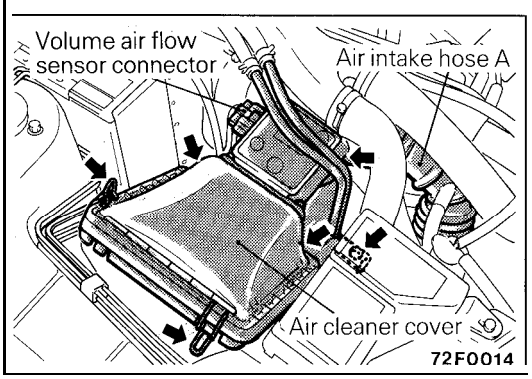
1. **If the concentration of the coolant is below 30%, the anti-corrosion property will be adversely affected. In addition, if the concentration is above 60%, both the anti-freeze and engine cooling properties will decrease, affecting the engine adversely. For these reasons, be sure to maintain the concentration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

MAINTENANCE SERVICE

1. FUEL SYSTEM (TANK, PIPE LINE, CONNECTIONS AND FUEL TANK FILLER TUBE CAP) (Check for leak) / 2. FUEL HOSES (Check condition)

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





2. AIR CLEANER ELEMENT (Replace)

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

<Non-Turbo>

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

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

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

<Turbo>

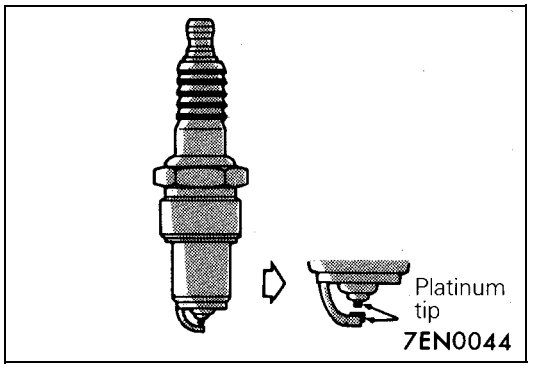
(1) Remove the clutch booster vacuum pipe mounting bolt.
(2) Disconnect the volume air flow sensor connector.
(3) Remove air intake hose A from the volume air flow sensor.
(4) Unclamp the air cleaner cover.
(5) Remove the air cleaner cover and volume air flow sensor.

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

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

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

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



5. SPARK PLUGS (Replace)

The spark plugs must fire properly to assure proper engine performance and emission-control.
Therefore, they should be replaced periodically with new ones.
(1) The new plugs should be checked for the proper gap.

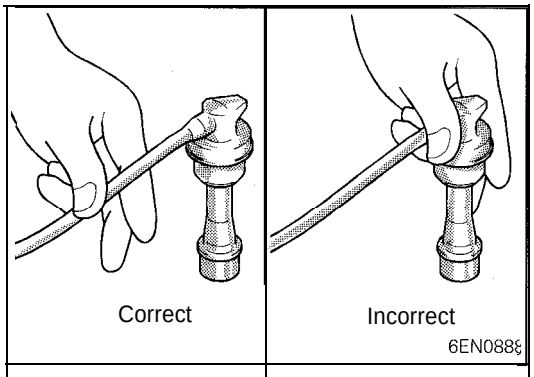
Spark plug gap: 1.0 – 1.1 mm (.039 – .043 in.)

NOTE
For the platinum plug, use care not to damage the platinum tip. Never try to adjust the plug gap.

Spark plug

	SOHC	DOHC
NGK	BPR5ES-11	PER6J-11
NIPPON DENSO	W16EPR11	PK20PR-P11

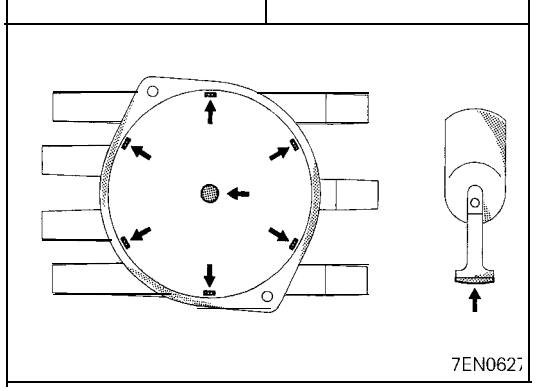
(2) Install the spark plug and tighten to 25 Nm (15 ft.lbs.)



6. IGNITION CABLES (Replace)

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

NOTE
When disconnecting an ignition cable alone, an open circuit might result.



7. DISTRIBUTOR CAP AND ROTOR (Check)

Check the distributor cap and rotor to maintain driveability and good exhaust gas.

DISTRIBUTOR CAP AND ROTOR INSPECTION

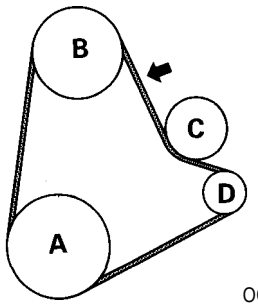
Inspect in accordance with the following procedure. Repair or replace as necessary.

- Check the cap for cracks.
- Check the cap and rotor electrodes for damage.
- Wipe clean the cap and rotor.

8. TIMING BELT (Replace)

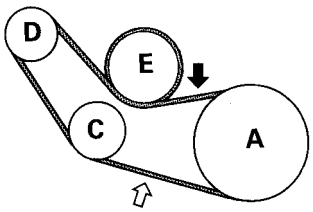
Replace the belt with a new one periodically to assure proper engine performance.
For removal and installation procedures, refer to GROUP 9 – Timing Belt.

<SOHC>



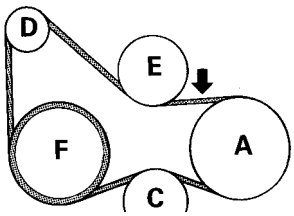
00F0005

<DOHC without air conditioning>



00F0006

<DOHC with air conditioning>



00F000

A: Crankshaft pulley
B: Power steering pump pulley
C: Tension pulley
D: Generator pulley
E: Idler pulley
F: Air conditioning compressor pulley

9. DRIVE BELT (For Generator) (Check condition)

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

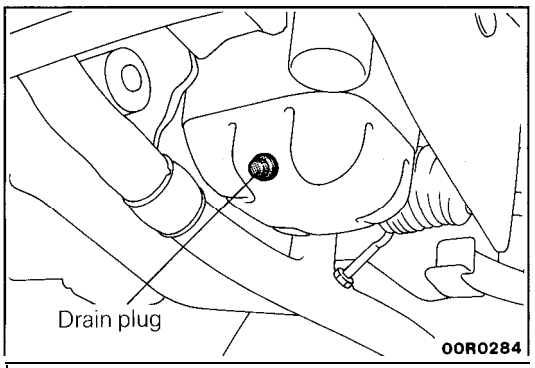
(1) Measure the deflection with a force of 100 N (22 lbs.) applied to belt mid-point between pulleys shown in the illustration. If the standard value is not obtained, make adjustment.

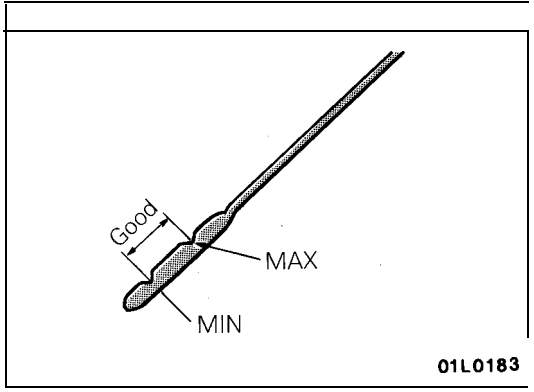
Standard value:

<SOHC>	**6.0 – 9.0 mm (.24 – .35 in.)**
<DOHC>	**4.0 – 5.5 mm (.16 – .22 in.)**

(2) On engines other than DOHC engines with air conditioning, use a tension gauge to check the belt tension. If the standard value is not obtained, make adjustment.
When tension gauge is used on SOHC engines, the tension may be measured between any two pulleys.
On DOHC engines without air conditioning, set a tension gauge at a position marked with ⇨ in the illustration to measure the belt tension.

Standard value: 350 – 600 N (77 – 132 lbs.)





10. ENGINE OIL (Change)

Always use lubricants which conform to the requirements of the API classification "For Service SG ECII" or "For Service SG/CD ECII" 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 generator with shop towel before filling oil to make sure that even if oil is spilt, it may not drop on the generator.**
2. **Use an oil mug or a funnel to fill oil.**

Engine oil total capacity:
(including oil filter and oil cooler)
<Non-Turbo> 4.3 dm³ (4.5 qts.)
<Turbo> 4.6 dm³ (4.9 qts.)

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

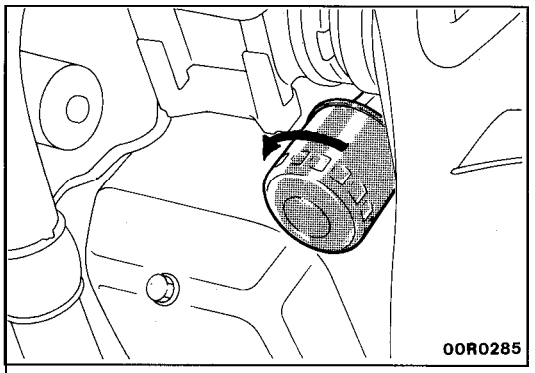
11. ENGINE OIL FILTER (Replace)

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

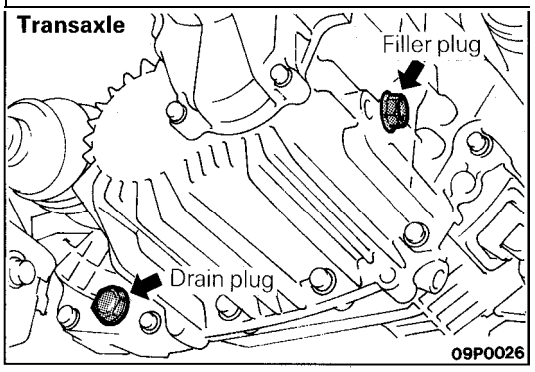
This vehicle is equipped with a full-flow, throw-away oil filter. The same type of replacement filter is recommended as a replacement filter for this vehicle. It is possible, particularly in cold weather, that this vehicle may develop high oil pressure for a short duration. You should be sure that any 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.



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

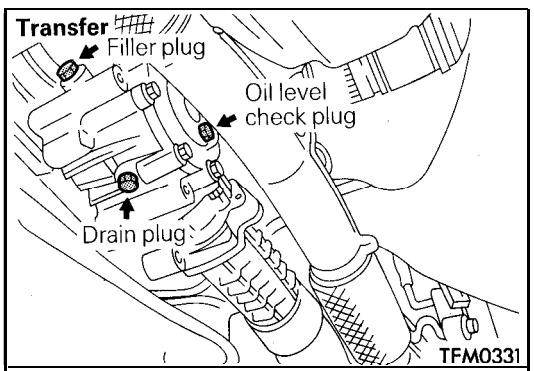
NOTE
The oil filter tightening torque is 14 Nm (11 ft.lbs.).

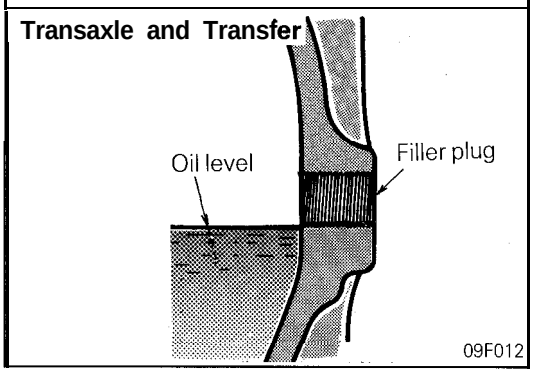
(5) Start and run engine and check for engine oil leaks.
(6) After stopping engine, check oil level and refill as necessary.



12. MANUAL TRANSAXLE (Inspect oil level)

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.

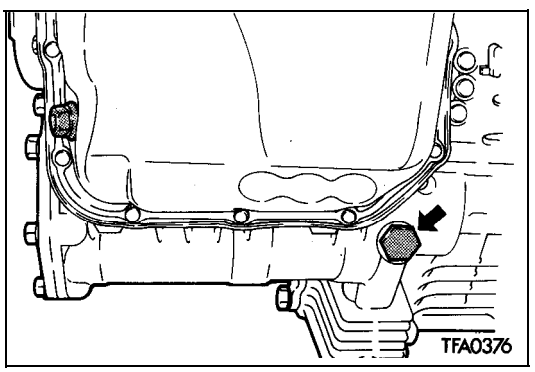




(2) Check that the transaxle oil level is at the lower portion of the filler plug hole. For AWD-vehicles, check that the transfer oil level is at the portion shown in the illustration.
(3) Check to be sure that the transmission oil is not noticeably dirty, and that it has a suitable viscosity.

13. AUTOMATIC TRANSAXLE (Inspect fluid level)

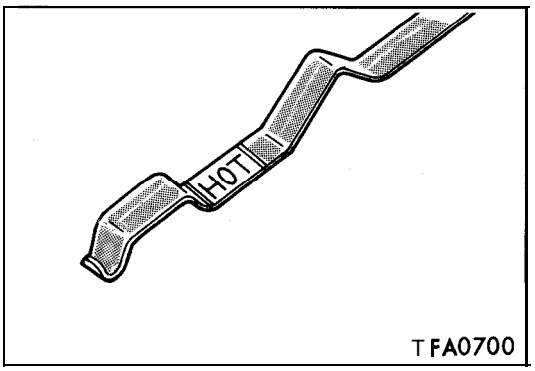
1. Drive until the fluid temperature reaches the usual temperature [70 – 80°C (160 – 180°F)].
2. Place vehicle on level floor.
3. Move selector lever sequentially to every position to fill torque converter and hydraulic circuit with fluid, then place lever in "N" Neutral position. This operation is necessary to be sure that fluid level check is accurate.
4. Before removing dipstick, wipe all dirt from area around dipstick. Then take out the dipstick and check the condition of the fluid.
   The transaxle should be overhauled under the following conditions.
   - If there is a "burning" odor.
   - If the fluid color has become noticeably blacker.
   - If there is a noticeably great amount of metal particles in the fluid.
5. Check to see if fluid level is in "HOT" range on dipstick. If fluid level is low, add ATF until level reaches "HOT" range. Low fluid level can cause a variety of conditions because it allows pump to take in air along with fluid. Air trapped in hydraulic circuit forms bubbles which make fluid spongy. Therefore, pressures will be erratic.
   Improper filling can also raise fluid level too high. When transaxle has too much fluid, gears churn up foam and cause same conditions which occur with low fluid level, resulting in accelerated deterioration of ATF transmission fluid.
   In either case, air bubbles can cause overheating, fluid oxidation, which can interfere with normal valve, clutch, and servo operation. Foaming can also result in fluid escaping from transaxle vent where it may be mistaken for a leak.
6. Be sure to examine fluid on dipstick closely.



(Change fluid)

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

(1) Remove drain plug at transaxle case bottom to let fluid drain.
(2) Place a drain container with large opening under the transaxle oil pan.
(3) Loosen oil pan bolts and tap pan at one corner to break it loose allowing fluid to drain, then remove oil pan.
(4) Check the oil filter for clogging and damage and replace if necessary.
(5) Clean drain plug and tighten drain plug with gasket 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 dm^3 (4.8 qts.) of specified ATF into case through dipstick hole. [Total quantity of ATF required is approx. 7.5 dm^3 (7.9 qts.). Actually however, approx. 4.5 dm^3 (4.8 qts.) of fluid can be replaced because rest of fluid remains in torque converter.]

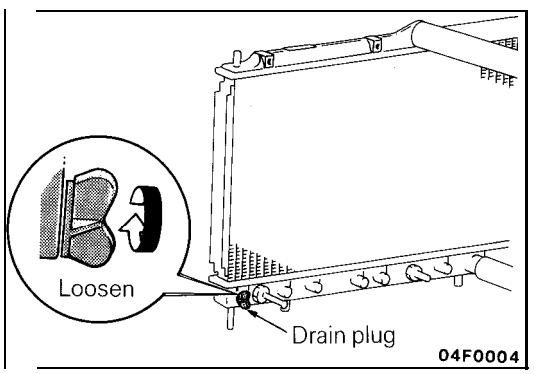
Specified fluid: MOPAR ATF PLUS (Automatic Transmission Fluid Type 7176) / Dia ATF SP or equivalent

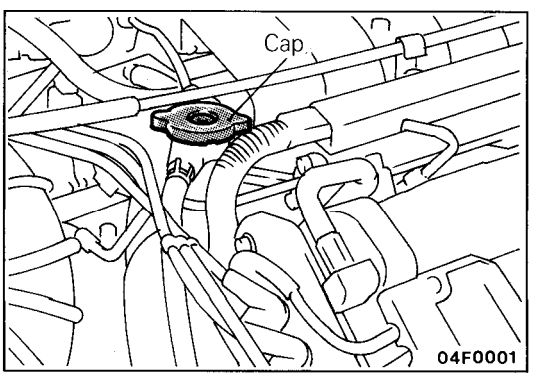
(9) Start engine and allow to idle for at least two minutes. Then, with parking brake on, move selector lever momentarily to each position, ending in "N" Neutral position.

(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.

14. ENGINE COOLANT (Change)

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





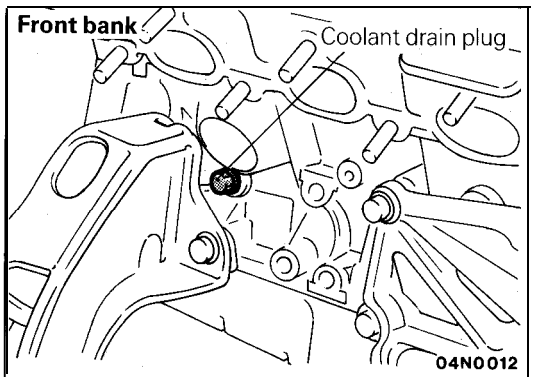
CHANGING COOLANT

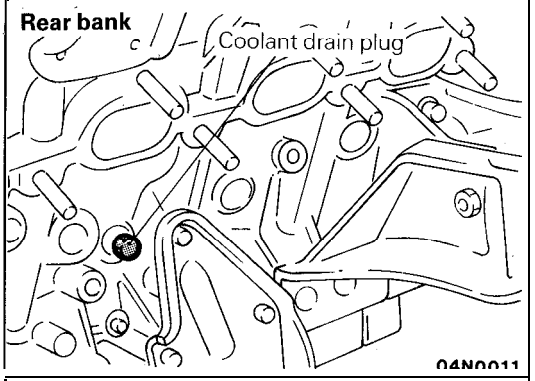
<Non-Turbo>

1. Remove te 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: MOPAR Part No. 4318034 or equivalent

   Tightening torque: 40 Nm (29 ft.lbs.)
6. Fit the radiator drain plug securely.
7. Mount the reserve tank.
8. Slowly pour coolant into the radiator to the brim and also into the reserve tank up to the FULL line.

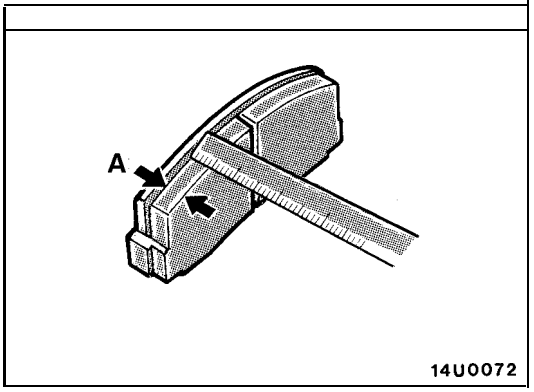




9. Install the radiator cap securely.
10. Start the engine and warm up until the thermostat opens.
11. Race the engine up to around 3,000 rpm several times, then stop the engine.
12. When the engine has cooled down, remove the radiator cap and add coolant up to the brim. Add coolant to the reserve tank up to the FULL line.

<Turbo>

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



15. DISC BRAKE PADS (Inspect for wear)

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

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

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

16. BRAKE HOSES (Check for deterioration or leaks)

Inspection of brake hoses and tubing should be included in all brake service operations.
The hoses should be checked for:

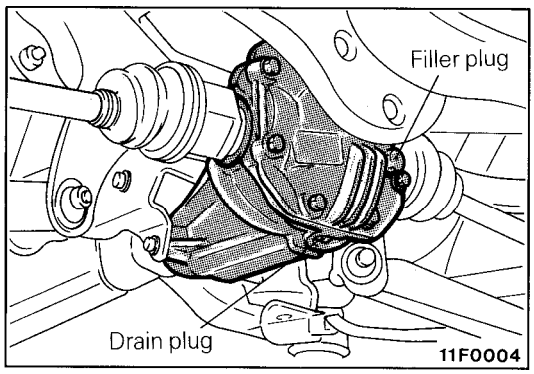
1. Correct length, severe surface cracking, pulling, scuffing or worn spots. (If the fabric casing of the hoses is exposed by cracks or abrasion in the rubber hose cover, the hoses should be replaced. Eventual deterioration of the hose may occur with possible bursting failure.)
2. Faulty installation,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

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

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

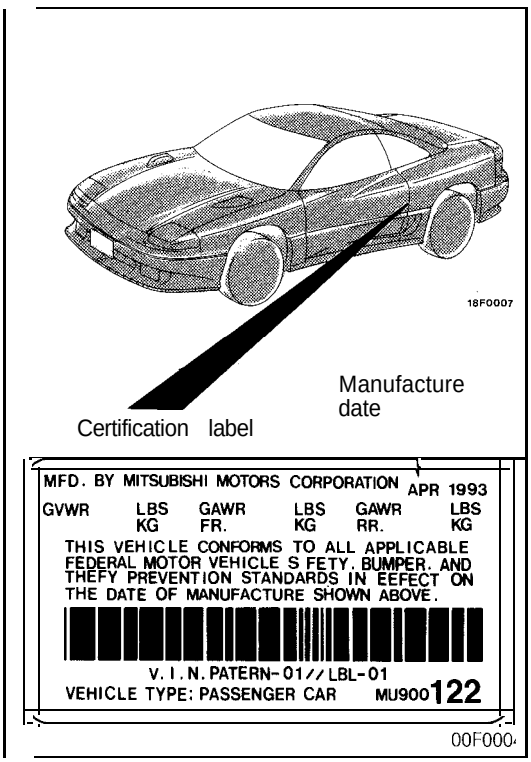
18. DRIVE SHAFT BOOTS (Inspect for grease leaks and damage)

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



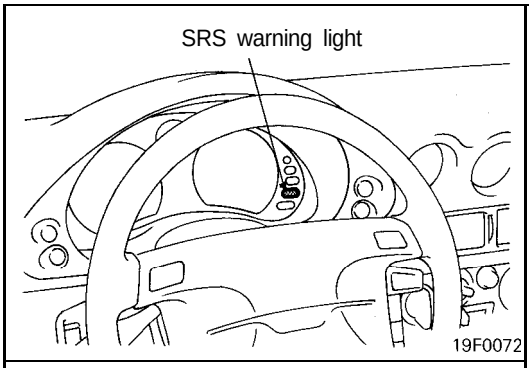
19. REAR AXLE (Oil change) – AWD

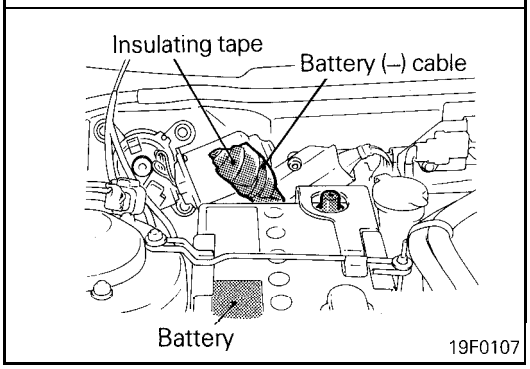
Before changing the rear axle oil, check to make sure that there is no oil leakage from the rear axle housing.
Remove the drain plug and drain out of the oil.
Put the oil plug back in place, and then pour new oil in through the filler hole.



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

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





Maintenance Items

1. "SRS" WARNING LIGHT CHECK

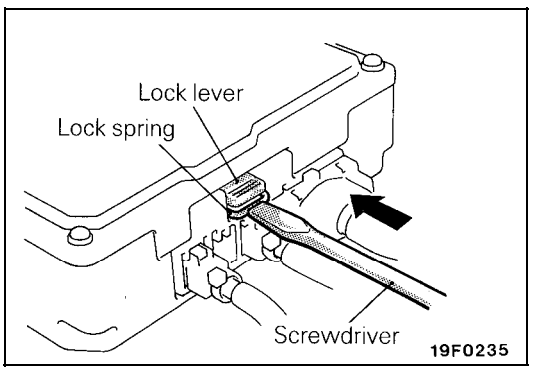
When the ignition key is turned to "ON" or engine started, the "SRS" warning light will illuminate for about 7 seconds and then turn off.
This means that the system is functioning properly.

2. SRS COMPONENTS VISUAL CHECK

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

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

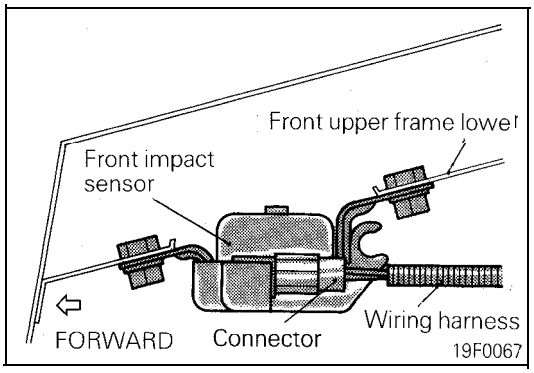
(2) Remove the rear console assembly. (Refer to GROUP 23A – Floor Console.)



(3) Apply a flat tip screwdriver to the lock spring (metallic portion) of the SDU connector lock lever as illustrated and push it horizontally toward the back of the unit.

Caution
1. Do not push up the lock lever (green) by force.
2. Never insert a screwdriver between the lock lever (green) and the lock spring (metallic portion).

(4) Disconnect the red 14-pin connector from the SRS diagnosis unit while pressing down the lock of the connector. (Refer to GROUP 23B – SRS Connector Construction.)



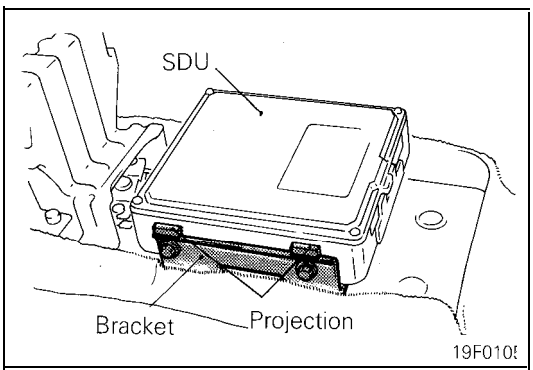
2-1 Front Impact Sensors

(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 and passenger.

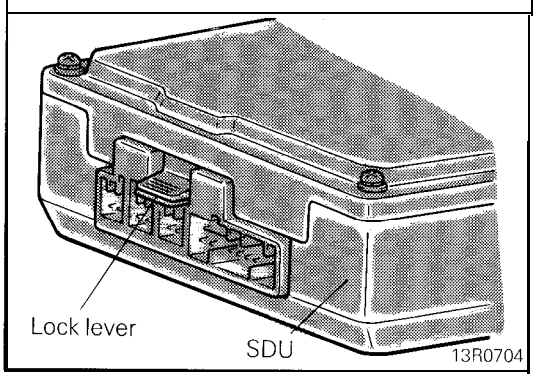
(3) Check wiring harness (for front impact sensor) for binds, connector for damage, and terminals for deformities.
Replace sensor and/or wiring harness if it fails visual check. (Refer to GROUP 23B – SRS Service Precautions and Front Impact Sensors.)



2-2 **SRS Diagnosis Unit (SDU)**

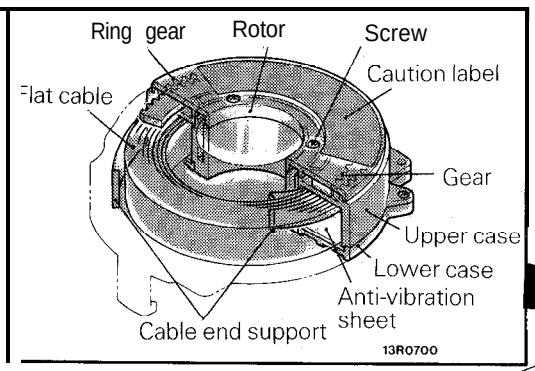
(1) Check SDU case and brackets for dents, cracks, deformities or rust.

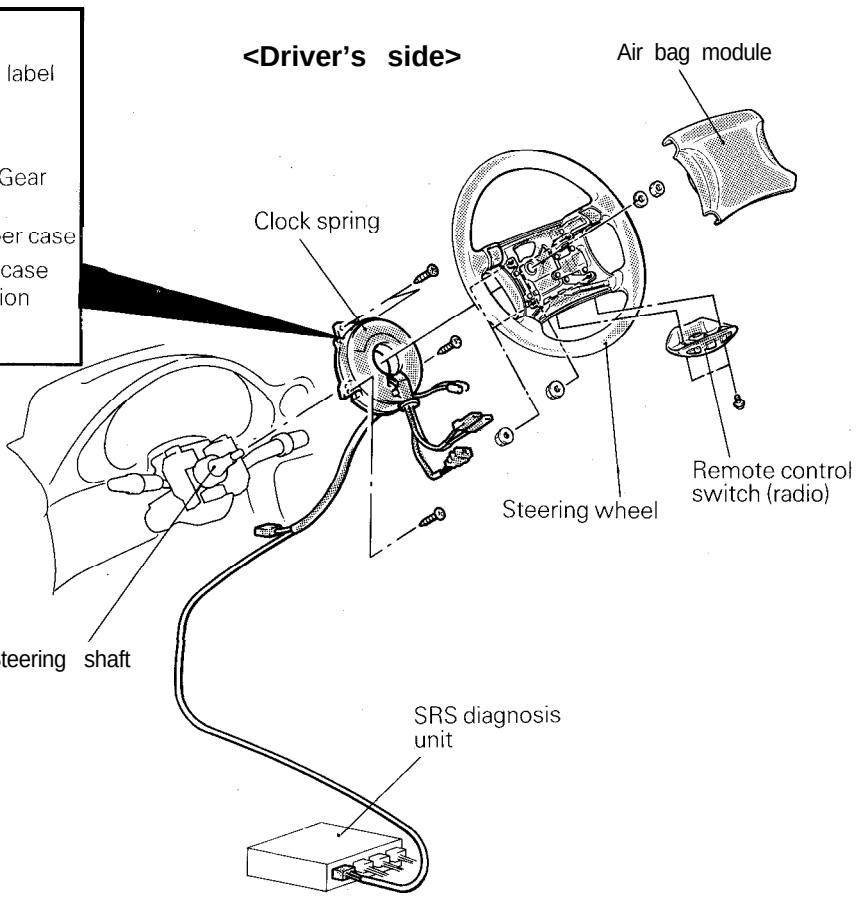
Caution
The SRS may not activate properly if SRS diagnosis unit is not installed properly, which could result in serious injury or death to the vehicle's driver and passenger.



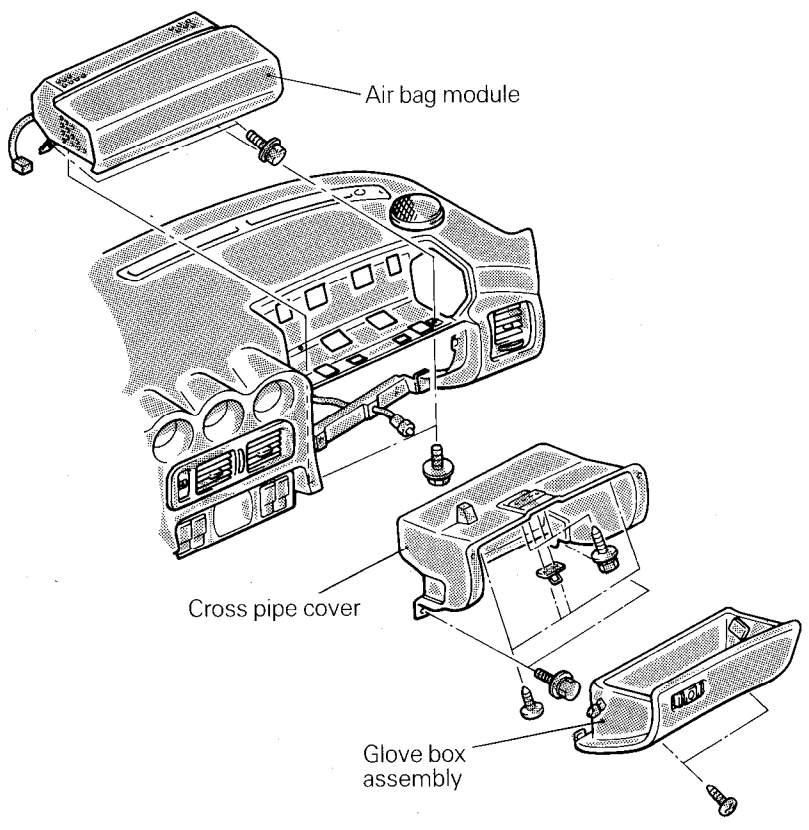
(2) Check connectors and lock lever for damage, and terminals for deformities or rust.
Replace SDU if it fails visual check. [Refer to GROUP 23B – SRS Diagnosis Unit (SDU).]

2-3 Air Bag Module, Clock Spring

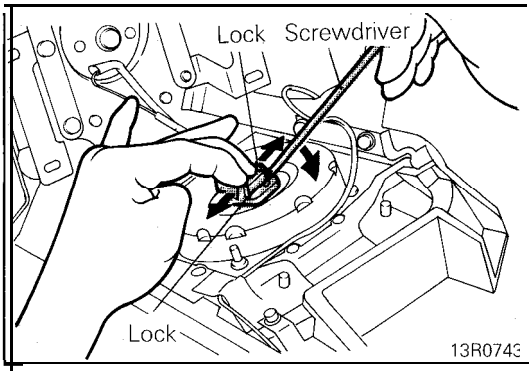




<Passenger's side>



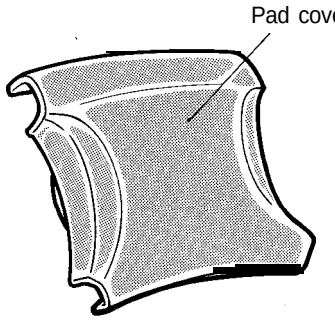
19F0246



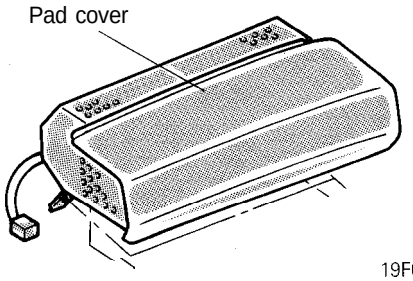
(1) Remove air bag module from steering wheel. (Refer to GROUP 23B – Air Bag Module and Clock Spring.)

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

<Driver's side>



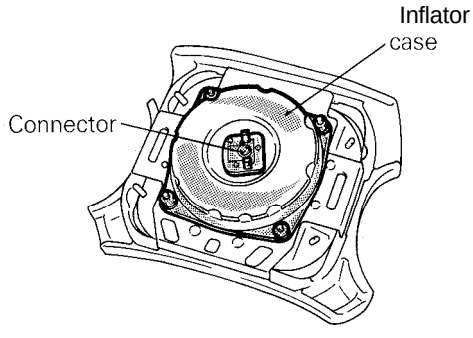
<Passenger's side>



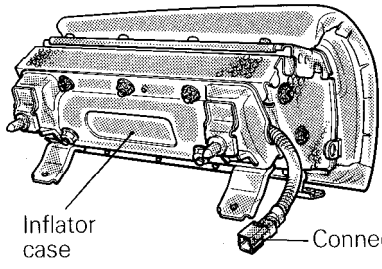
(2) Check pad cover for dents, cracks or deformities.

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

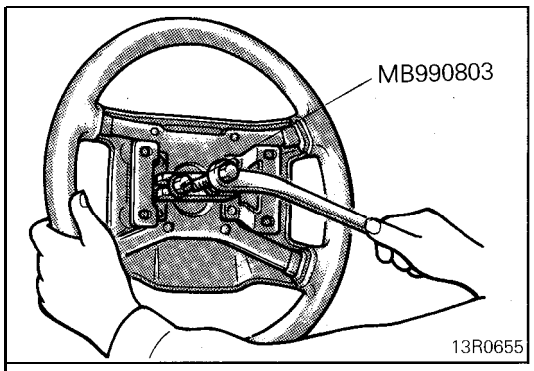
<Driver's side>



<Passenger's side>



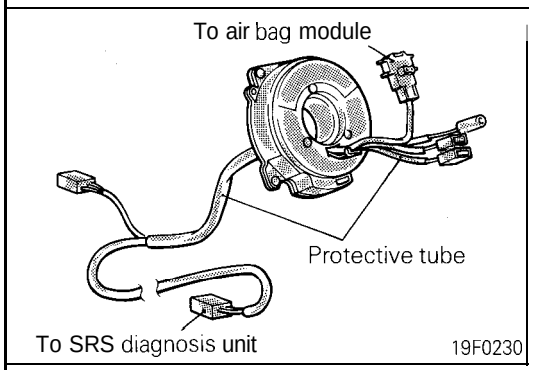
(3) Check connectors for damage, terminals deformities, and harness for binds.
(4) Check air bag inflator case for dents, cracks or deformities.
(5) Check harness (built into steering wheel) and connectors for damage, and terminals for deformities.



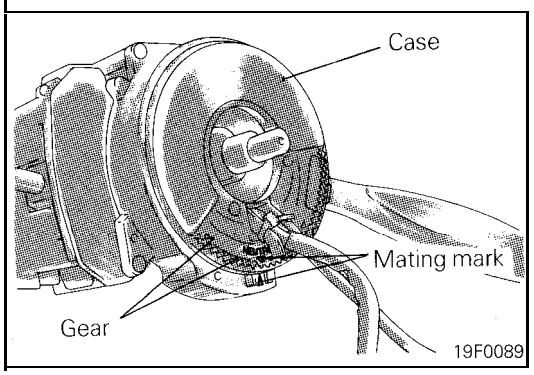
(6) Remove the steering wheel by using the special tool.

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

(7) Remove the steering column covers. (Refer to GROUP 23A Instrument Panel.)
(8) Remove the clock spring. (Refer to GROUP 23B – Air Bag Module and Clock Spring.)

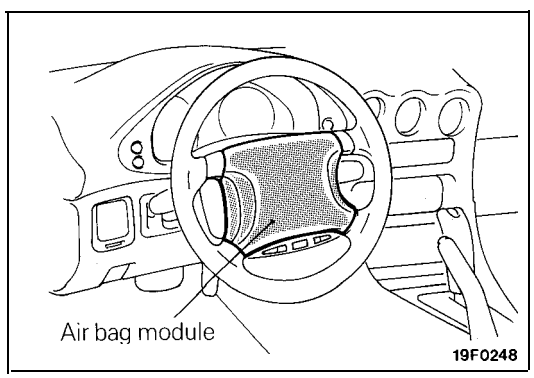


(9) Check clock spring connectors and protective tube for damage, and terminals for deformities.



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

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



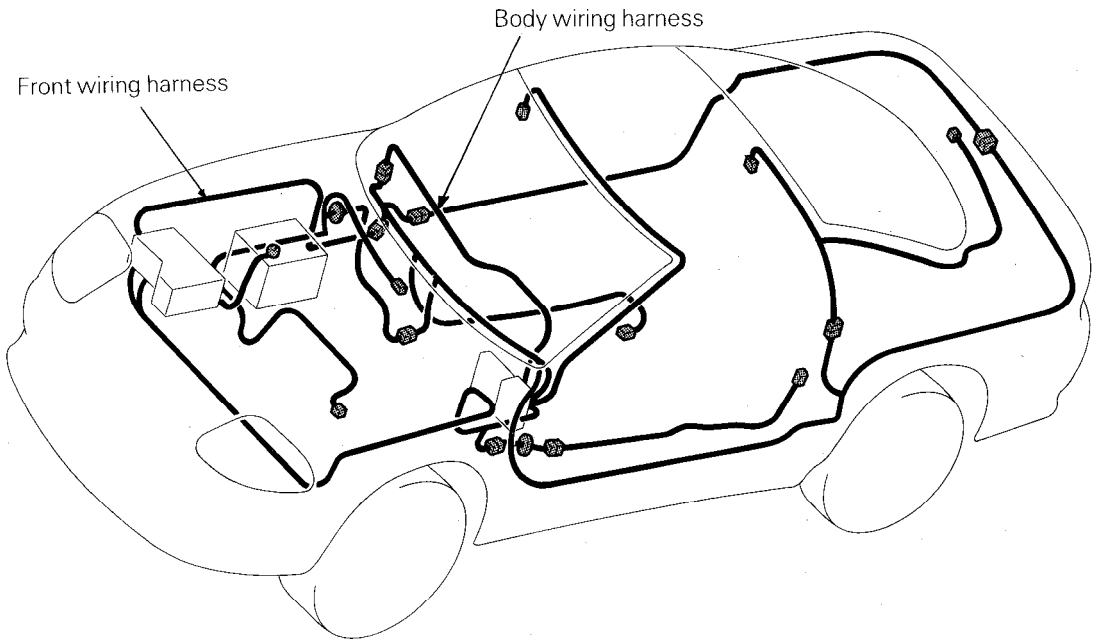
(12) Install the steering wheel, steering column covers and the air bag module.
(13) Check steering wheel for noise, binds or difficult operation.
(14) Check steering wheel for excessive free play.

REPLACE ANY VISUALLY INSPECTED PART IF IT FAILS THAT INSPECTION.

(Refer to GROUP 23B – Air Bag Module and Clock Spring.)

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

2-4 Front Wiring Harness and Body Wiring Harness



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

REPLACE ANY CONNECTORS OR HARNESS THAT FAIL THE VISUAL INSPECTION.

(Refer to GROUP 23B – SRS Service Precautions.)

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

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

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

FRONT SUSPENSION

CONTENTS

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

FRONT SUSPENSION

CONTENTS

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

WARNING!

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

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

(3) CHRYSLER dealer personnel must thoroughly review this manual, and especially its GROUP 23B – Supplemental Restraint System (SRS) and GROUP 0 – Maintenance Service, before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning light, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

SPECIFICATIONS

GENERAL SPECIFICATIONS

Items	FWD			AWD
	SOHC	DOHC		
		Vehicles without ECS	Vehicles with ECS	
Wheel bearing				
Type	Double-row angular-contact ball bearing			Unit ball bearing
O.D. x I.D. mm (in.)	84 x 45 (3.31 x 1.77)			–
Drive shaft				
Joint type				
Outer	B.J.	B.J.		B.J.
Inner	T.J.	T.J.		T.J.
Length mm (in.)				
L.H. shaft	419 (16.5)	417 (16.4)		419 (16.5)
R.H. shaft	407 (16.0) or 394 (15.5)"	405 (15.9) or 393 (15.5)"		391 (15.4)
Suspension system	McPherson strut with coil spring and compression rod type			
Coil spring				
Wire dia. x O.D. x free length mm (in.)	SOHC- M/T	14.2 x 170 x 316 (.56 x 6.69 x 12.4)		15.2 x 170 x 301.6 (.60 x 6.69 x 11.87
	SOHC-A/T, DOHC – M/T	14.4 x 170 x 322.7 (.57 x 6.69 x 12.70)		
	DOHC- A/T	14.5 x 170 x 329.3 (.57 x 6.69 x 12.96)		
Coil spring identification color	SOHC – M/T	Light blue x 1		Brown x 1
	SOHC-A/T, DOHC – M/T	Green x 1		
	DOHC-A/T	Green x 2		
Spring constant N/mm (lbs./in.)	29 (162)			38 (212)
Shock absorber				
Type	Hydraulic, cylindrical double acting type		Hydraulic, cylindrical double acting type	
Maximum length mm (in.)	485 (19.09)		485 (19.09)	
Compressed length mm (in.)	335 (13.19)		335 (13.19)	
Stroke mm (in.)	150 (5.91)		150 (5.91)	
Damping force [at 0.3 m/sec. (0.984 ft./sec.)]				
Expansion N (lbs.)	1,080 (238)		Hard : 2,530 (558) Medium : 1,580 (348) Soft : 620 (137)	
Contraction N (lbs.)	540 (119)		Hard : 1,190 (262) Medium : 1,120 (247) Soft : 970 (214)	

NOTE
*: <A/T>

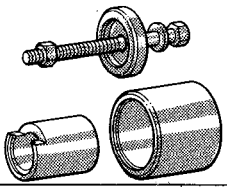
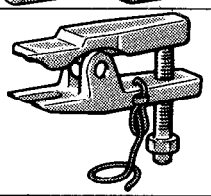
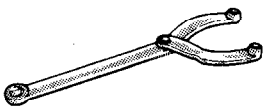
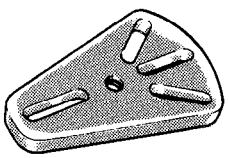
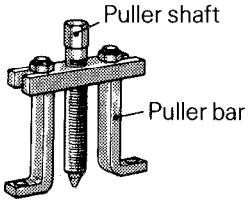
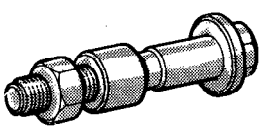
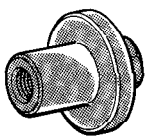
SERVICE SPECIFICATIONS

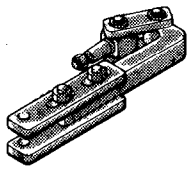
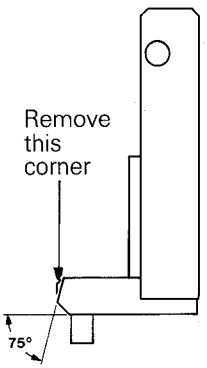
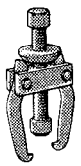
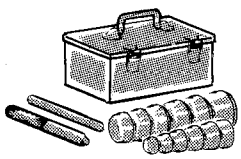
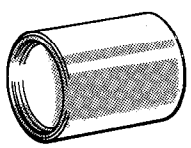
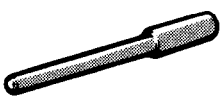
Items	Specifications
Standard value	
Setting of T.J. boot length mm (in.)	
L.H.	85 ± 3 (3.35 ± .12)
R.H.	85 ± 3 (3.35 ± .12)
No. 1 crossmember	
Bushing (B) projection mm (in.)	7.5 – 10.5 (.30 – .41)
Crossmember	
Bushing (A) projection mm (in.)	7.2 – 10.2 (.28 – .40)
Bushing (B) projection mm (in.)	6.5 – 9.5 (.26 – .37)
Camber	0" ± 30'
Caster	3°55' ± 30'
Toe-in mm (in.)	0 ± 3 (0 ± .12)
Lower arm ball joint breakaway torque Nm (in.lbs.)	10 – 22 (86 – 191)
Stabilizer link ball joint breakaway torque Nm (in.lbs.)	1.7 – 3.2 (15 – 28)
Steering angle	
Inner wheel	33°45'
Outer wheel	28°21'
Limit	
Hub end play mm (in.)	0.05 (.002)
Wheel bearing starting torque (Hub starting torque) Nm (in.lbs.)	1.8 (16) or less

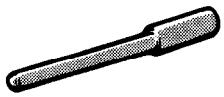
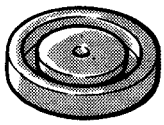
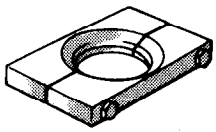
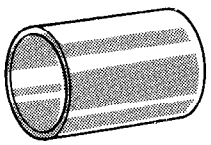
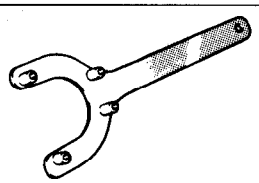
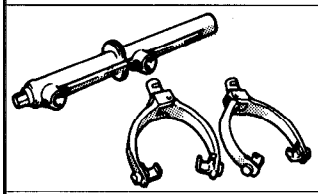
LUBRICANTS

Items	Specified lubricants	Quantity
T.J. boot grease <FWD-SOHC> <FWD-DOHC> <AWD>	Repair kit grease	 150 g (5.29 oz) 160 g (5.64 oz) 160 g (5.64 oz)
Dust seal inner Dust seal outer	MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent	14 – 20 g (.49 – .71 oz) 8 – 12 g (.28 – .42 oz)
Spider assembly Center bearing and inside of center bearing bracket Dust seal lip Inner shaft spline Wheel bearing and knuckle inside surface Oil seal lip Strut insulator bearing Lower arm ball joint Stabilizer link	MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent	As required

SPECIAL TOOLS

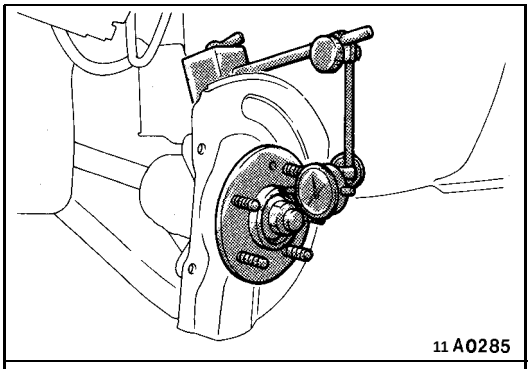
Tool number and tool name		Replaced by Miller tool number	Application
	MB991045 Bushing remover and installer	MB991045	Removal and installation of the crossmember bushing
	MB991113 Steering linkage puller	MB990635	Removal of the lower arm ball joint and knuckle Removal of the knuckle and tie rod end ball joint
	M B990767 End yoke holder	C-3281	Fixing the hub
	MB991354 Puller body	General service tool	Removal of drive shaft (Use in conjunction with MB991354, MB990242, MB990244)
	MB990241 Axle shaft puller MB990242 MB990244 Puller bar Puller shaft	CT-1003	
	MB990998 Front hub remover and installer	MB990998	Removal or press-in of the front hub <FWD> Measurement of front hub unit bearing rotation starting torque <AWD> Provisional holding of the wheel bearing Measurement of front wheel bearing <FWD>
	M B990326 Preload socket	General service tool	Measurement of the wheel bearing starting torque Measurement of the lower arm ball joint starting torque Measurement of the stabilizer link rotation-starting torque
	MB991004 Wheel alignment gauge attachment	Not used with U.S. alignment equipment	Measurement of the wheel alignment

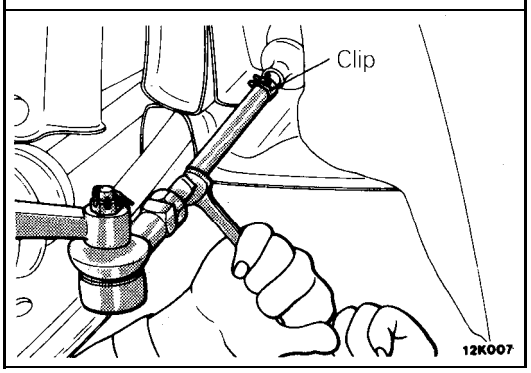
Tool number and tool name	Replaced by Miller tool number	Application
 MB991056 or MB991355 Knuckle arm bridge	MB991056A (Modification as shown below is required) 	Removal of the hub <FWD>
 MB990810 Side bearing puller	P-334	Removal of the wheel bearing inner race <FWD>
 MB990925 Bearing and oil seal installer set	General service tool (use universal driver set)	Removal of wheel bearing <FWD> MB990932 MB990938 (Use in conjunction with MB991355 or MB991056) Press-out of the center bearing MB990930 MB990938 Press-fitting of the center bearing MB990932 MB990938 Press-fitting of the dust seal outer MB990934 (Use in conjunction with MB990890)
 MB990890 Rear suspension bushing base	MB990985	Press-fitting of the dust seal inner Press-fitting of the wheel bearing Press-fitting of the oil-seal (drive shaft side)
 MB990883 Rear suspension arbor	C-4171	Press-fitting of the wheel bearing Press-fitting of the oil-seal (drive shaft side)

Tool number and tool name	Replaced by Miller tool number	Application
 MB990947 Lower arm bushing arbor	C-4171	Press-fitting of the oil seal (hub side)
 MB990955 Oil seal installer	C-3972-A	
 MB991248 or MD998801 Inner shaft remover	P-334	Press-out of the inner shaft and press-fitting seal plate
 MB991172 Adapter	General service tool	Press-fitting of the inner shaft
 MB991176 Spring seat holder	CT-1112	Disassembly/assembly of the strut assembly
 MB991237 MB991238 Spring compressor body Arm set	C-4838	Compression of the front coil spring
 MB990799 Ball joint remover & installer	MB990799	Installation of ball joint dust cover

TROUBLESHOOTING

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
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
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

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 5 – 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.

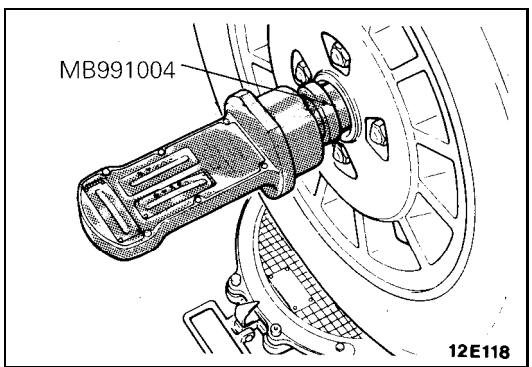
FRONT WHEEL ALIGNMENT

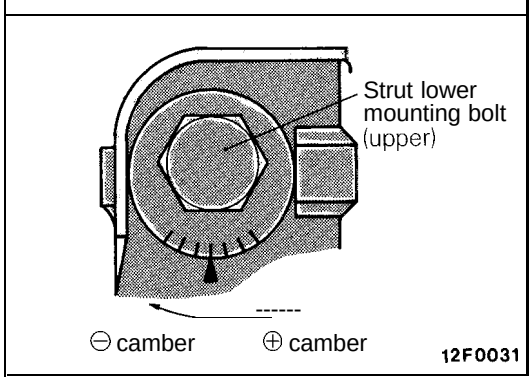
TOE-IN

Standard value: 0 ± 3 mm (0 ± .12 in.)

1. Adjust the toe-in by undoing the clips and turning the left and right tie rod turnbuckles by the same amount (in opposite directions).
2. After making the adjustments, use a turning radius gauge to confirm that the steering wheel turning angle is within the standard value range. (Refer to GROUP 19A – Service Adjustment Procedures.)

   Standard values:
   Inner wheel 33°45′
   Outer wheel 28°21′





CAMBER AND CASTER

Standard value:
Camber 0° ± 30′
Caster 3°55′ ± 30′

To adjust camber, turn the strut lower mounting bolt (upper). One graduation is equivalent to about 20′ in camber. Caster has been factory-adjusted to the standard value and requires no adjustment.

Caution
1. **One camber graduation changes toe by about 0.5 mm (.02 in.). Be sure to adjust toe after camber has been adjusted.**
2. **The difference in camber between right and left should be within 0°30′.**

WHEEL BEARING ADJUSTMENT

Bearing preload is pre-set to the specified value by design and therefore can not be adjusted.

RIGHT MEMBER, LEFT MEMBER AND CROSSMEMBER

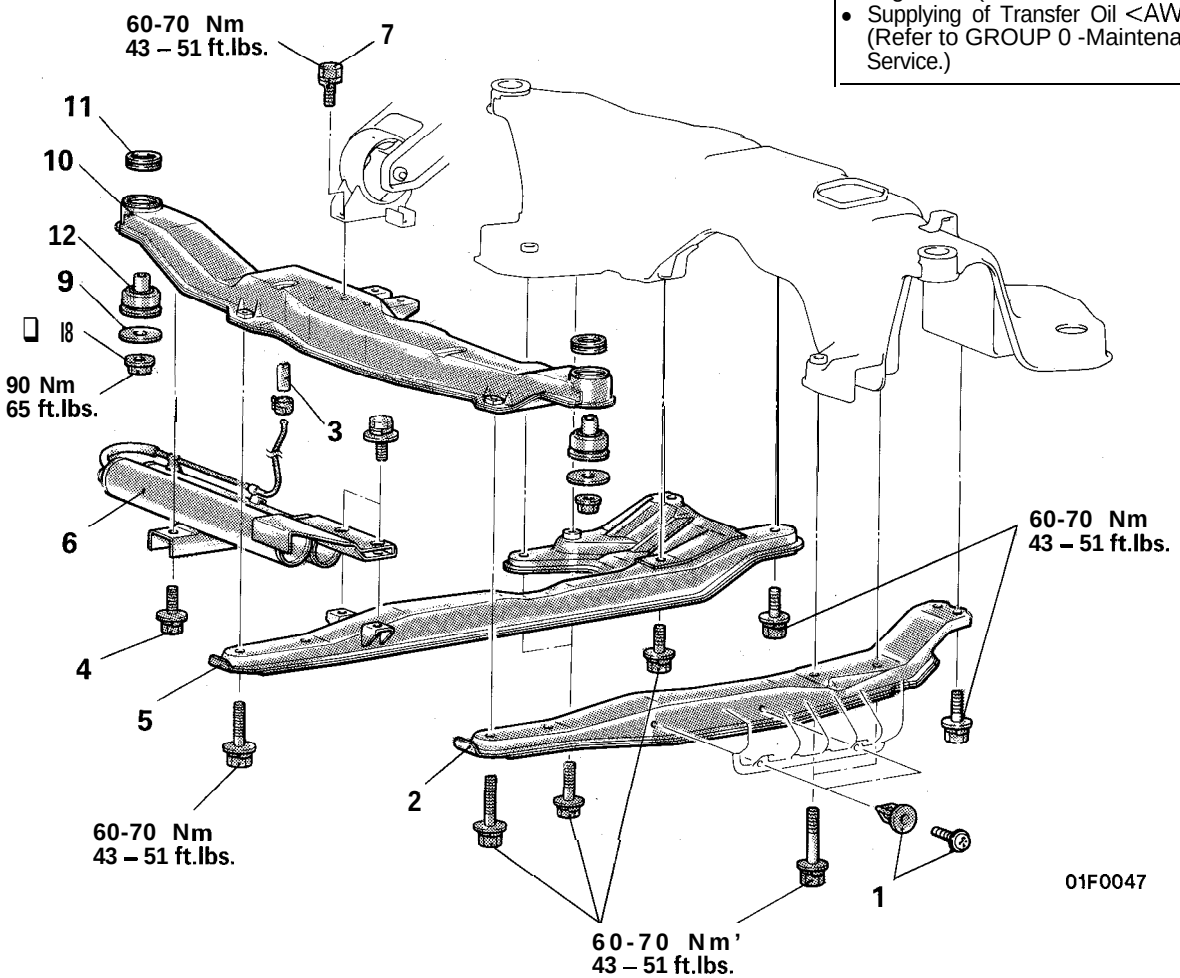
REMOVAL AND INSTALLATION

CAUTION: SRS
Before removal of steering gear box, refer to GROUP 23B – SRS, center front wheels and remove ignition key.
Failure to do so may damage SRS clock spring and render SRS system inoperative, risking serious driver injury.

Pre-removal Operation
- Removal of Under Cover

Post-installation Operation
- Installation of Under Cover
- Air Bleeding of the Power-steering Fluid (Refer to GROUP 19A – Service Adjustment Procedures.)
- Adjustment of the Front Wheel Alignment (Refer to P.2A-9.)
- Supplying of Transfer Oil <AWD> (Refer to GROUP 0 -Maintenance Service.)

No. 1 cross member, Left member, Right member



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 front exhaust pipe

Refer to GROUP 11 – Exhaust Pipe and Main Muffler.

Removal steps of transfer assembly <AWD>

Refer to GROUP 21 -Transfer.

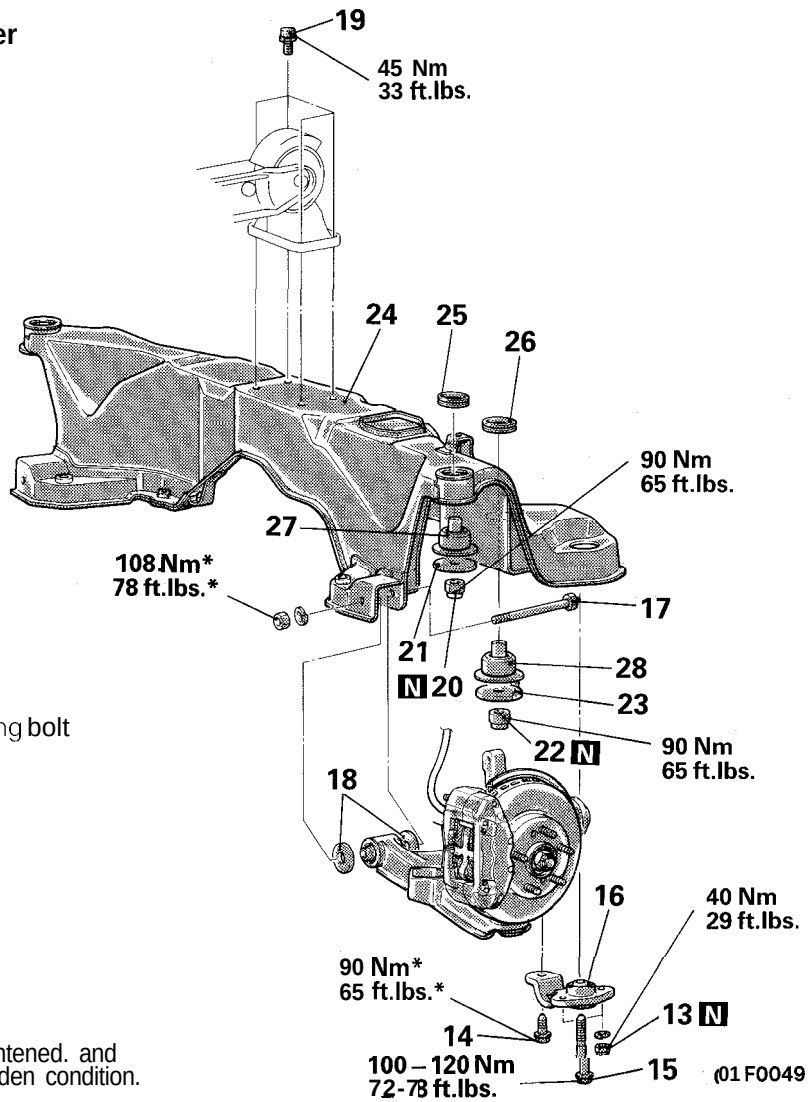
Removal steps of stabilizer bar

Refer to P.2A-32.

Removal steps of steering gear box assembly

Refer to GROUP 19A – Steering Gear Box.

Crossmember



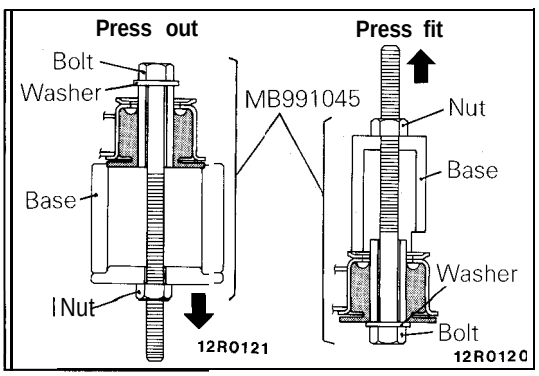
Removal steps of crossmember

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. Bushina B
28. Bushing A

NOTE
*: Indicates parts which should be temporarily tightened. and then fully tightened with the vehicle in the unladen condition.

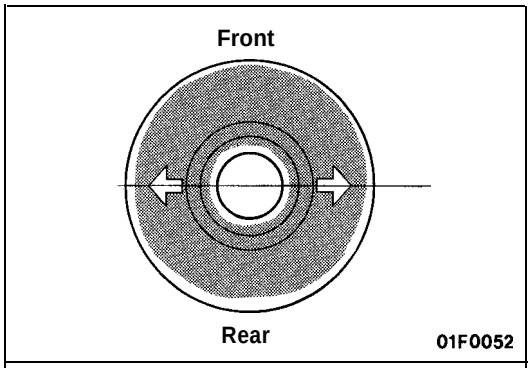
INSPECTION

- Check the crossmember for cracks or deformation.
- Check the bushings for cracks or deterioration.
- Check the right member for cracks or deformation.
- Check the left member for cracks or deformation.



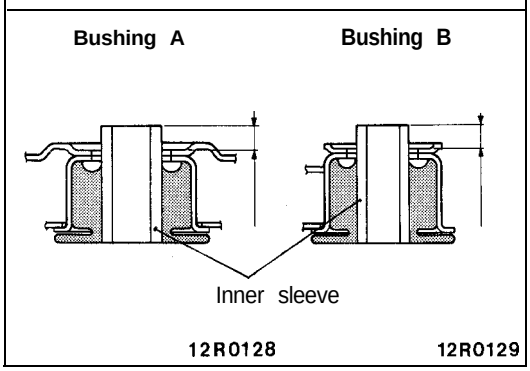
BUSHING A AND B REPLACEMENT

Use the special tool to remove and press in bushings A and B.



Press in bushings A and B so that the arrows on their bottom surfaces may be directed in the crosswise direction (except those on No. 1 crossmember of FWD vehicles).

Caution
Shifting of the arrow in the direction of rotation shall be within ±5° of the crosswise direction.



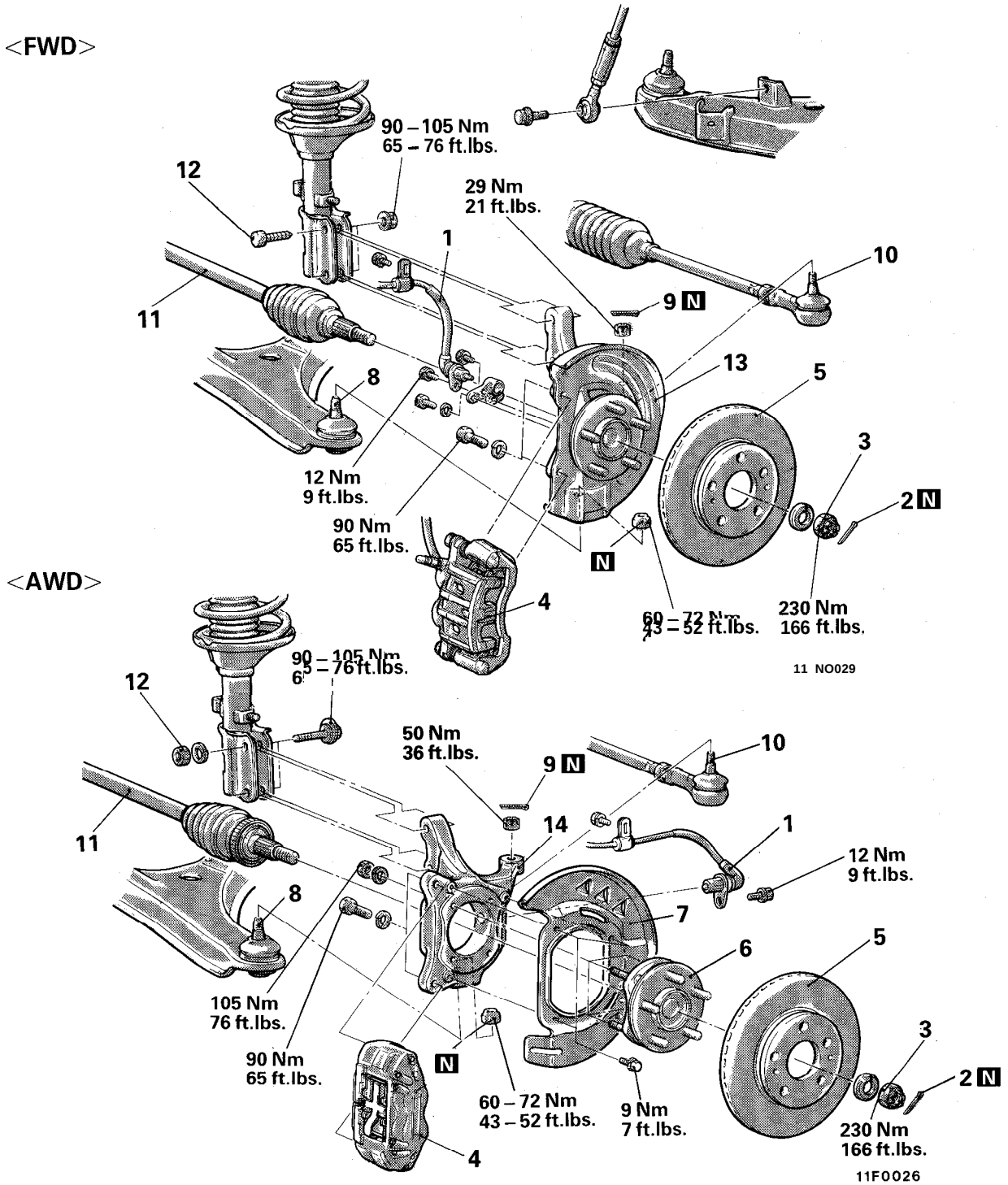
Press in bushings A and B so that the projecting amount of the inner sleeve agrees with the standard value.

Standard value:
No. 1 crossmember
Bushing B 7.5 – 10.5 mm (.30 – .41 in.)
Crossmember
Bushing A 7.2 – 10.2 mm (.28 – .40 in.)
Bushing B 6.5 – 9.5 mm (.26 – .37 in.)

Caution
When pressing in, apply a solution of soap and water to the sliding part of the bushings, and then press them in without stopping one after the other.
If there is a pause during the pressing operation, the frictional resistance will prevent installation.

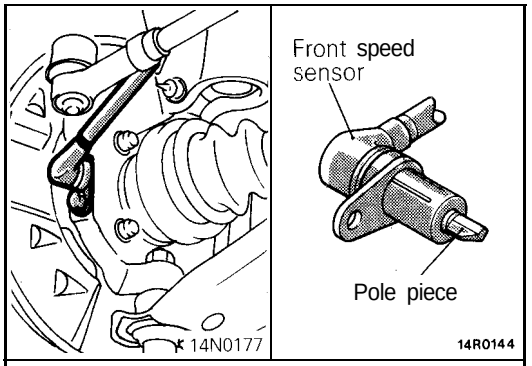
HUB AND KNUCKLE

REMOVAL AND INSTALLATION



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

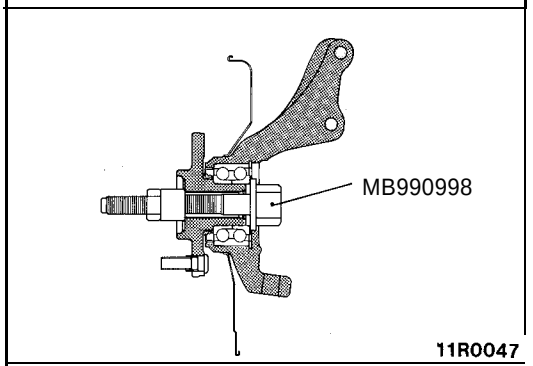


SERVICE POINTS OF REMOVAL

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.

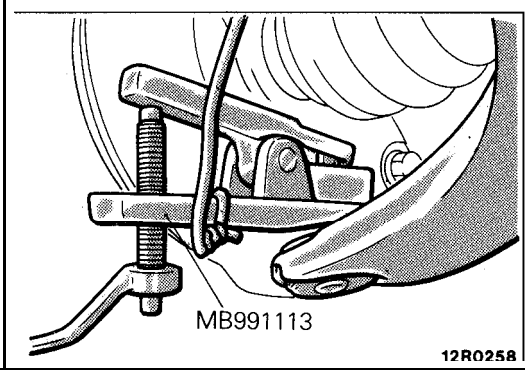
Caution
Be careful when handling the pole piece at the tip of the speed sensor and the toothed edge of the rotor so as not to damage them by striking against other parts.



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 loosing the drive shaft nut. If, however, vehicle load must be applied to the bearing in moving the vehicle, temporarily secure the wheel bearing by using the special tools, MB990998, etc.



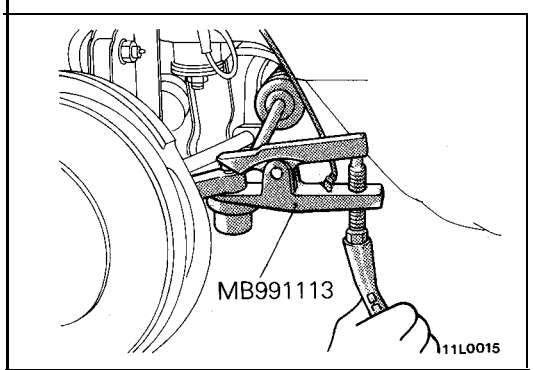
4. REMOVAL OF CALIPER ASSEMBLY

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.

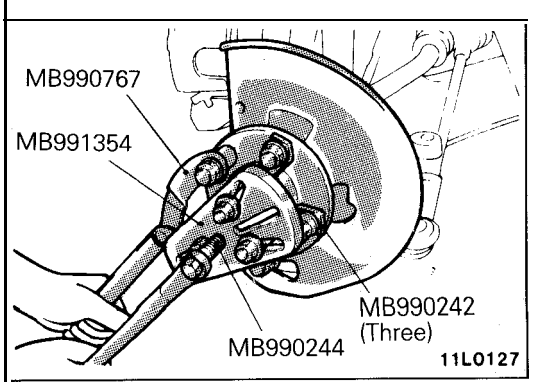
Caution
1. **Be sure to tie the cord of the special tool to the nearby part.**
2. **Loosen the nut but do not remove it.**



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.**



II. REMOVAL OF DRIVE SHAFT

Push out the drive shaft from the front hub.

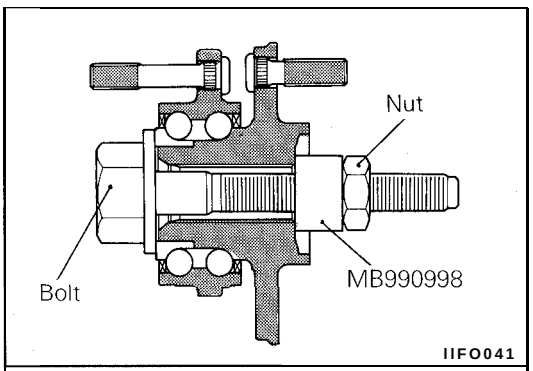
14. REMOVAL OF HUB

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

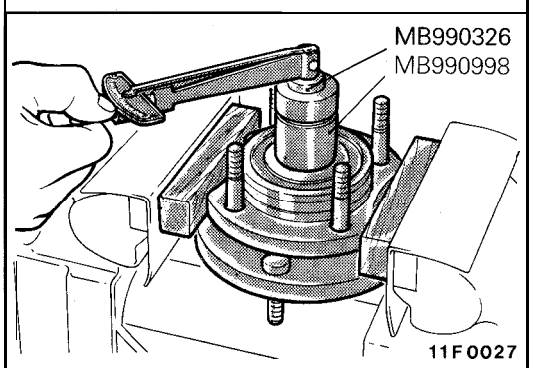
- Check the hub for cracks and spline for wear.
- Check the oil seal for damage.
- Check the knuckle for cracks.
- Check for defective bearing.

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

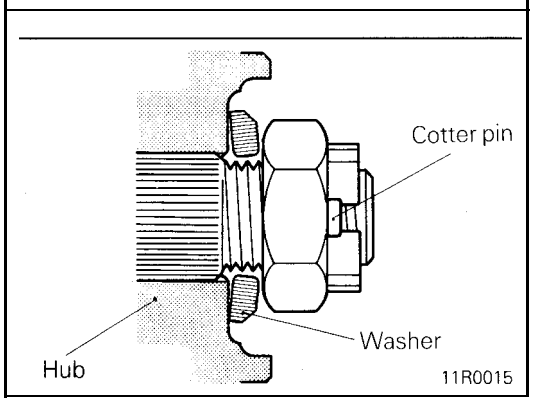
(1) Set the special tool to the front hub unit bearing.
(2) Holding the special tool (bolt), tighten its nut to 200 to 260 Nm (145 to 188 ft.lbs.).
(3) Turn the hub to cause grease to distribute evenly over the bearing.



(4) Using the special tool, measure the rotation starting torque of the hub.

Limit: 1.8 Nm (16 in.lbs.) or less

(5) The starting torque must be within the limit and, in addition, the bearing must not feel rough when rotated.



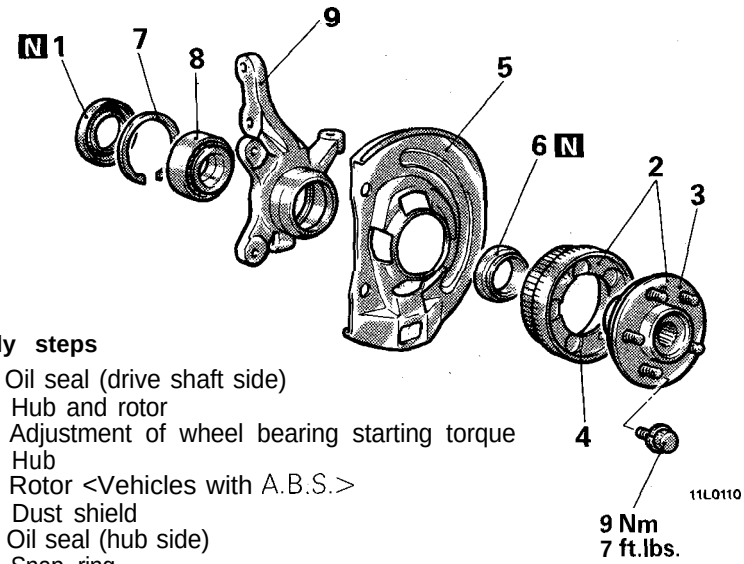
SERVICE POINT OF INSTALLATION

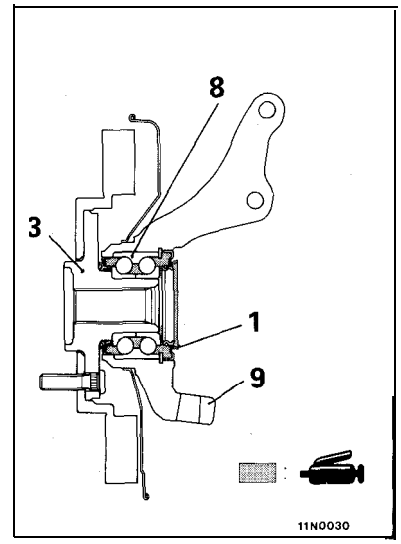
3. INSTALLATION OF DRIVE SHAFT NUT / 2. COTTER PIN

(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

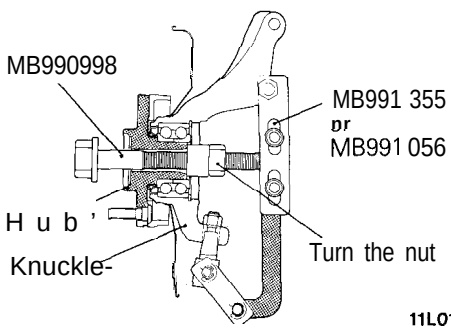
<FWD>

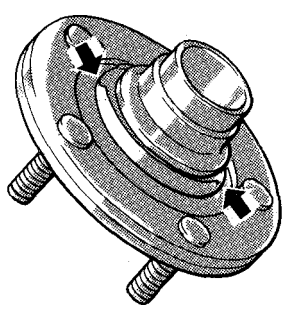


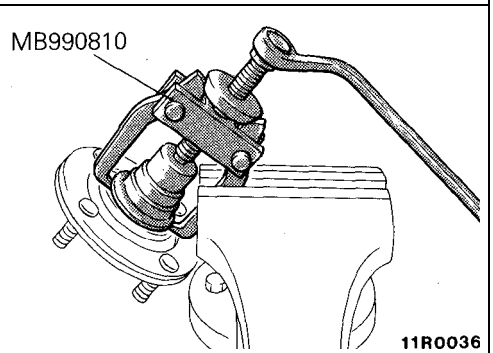


Disassembly steps

- ◆ + 1. Oil seal (drive shaft side)
- ◆◆ 2. Hub and rotor
- ◆ ▯ 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

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.

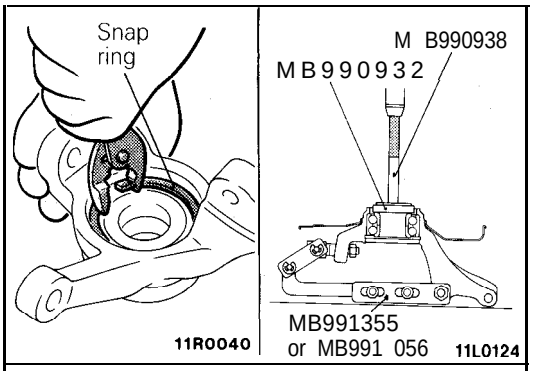
Caution
1. Be sure to use the special tools.
2. If the hub and knuckle are disassembled by striking them with a hammer, the bearing will be damaged.

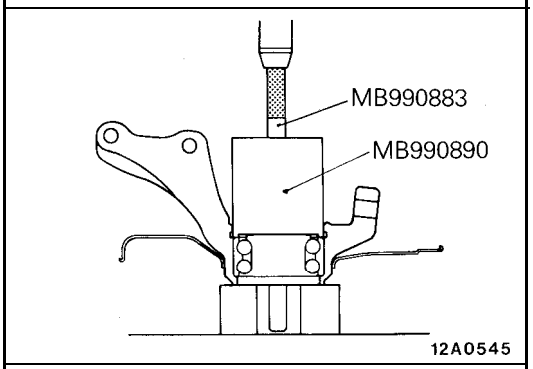
8. REMOVAL OF WHEEL BEARING

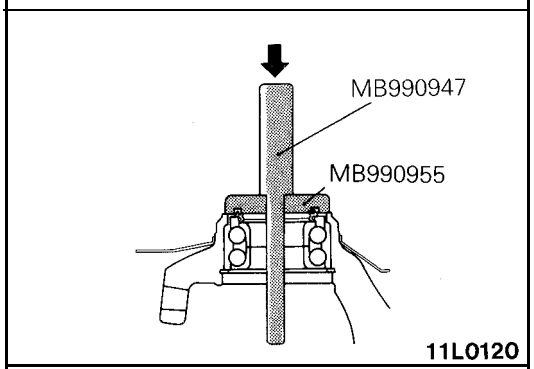
(1) Crush the oil seal in two places to that the tabs of the special tool will be caught on the wheel bearing inner race.

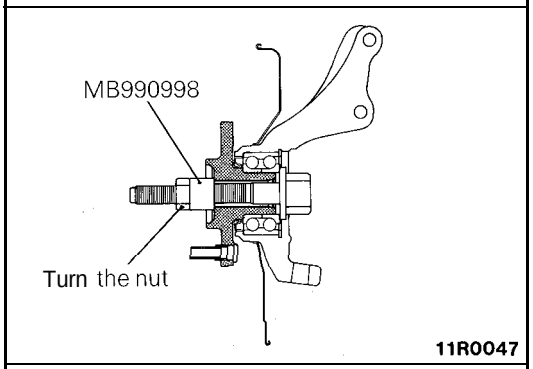
(2) By using the special tool, remove the wheel bearing inner race from the hub.

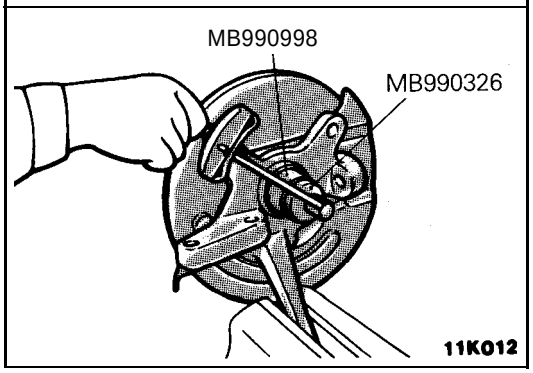
Caution
Be careful that the hub will not fall down as the wheel bearing inner race (outer side) is removed from the hub.











(3) Remove the snap ring from the knuckle.
(4) Remove the bearing by using the special tools.

'NOTE
Removal is easier if the outer side inner race removed from the hub is placed on the bearing and the wheel bearing is then removed.

INSPECTION

- Check the hub and brake disc mounting surfaces for galling and contamination.
- Check the knuckle inner surface for galling and cracks.
- Check for defective bearing.

SERVICE POINTS OF REASSEMBLY

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.

Grease: MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent

(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.

Grease: MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent

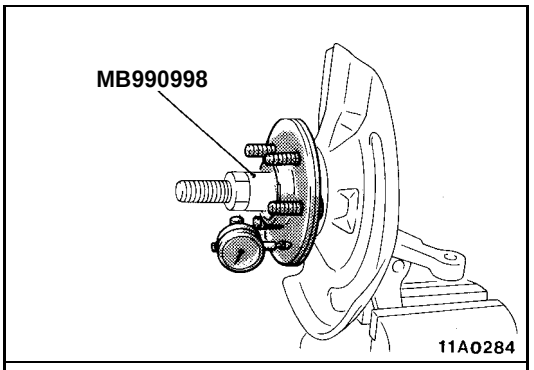
. ADJUSTMENT OF WHEEL BEARING STARTING TORQUE

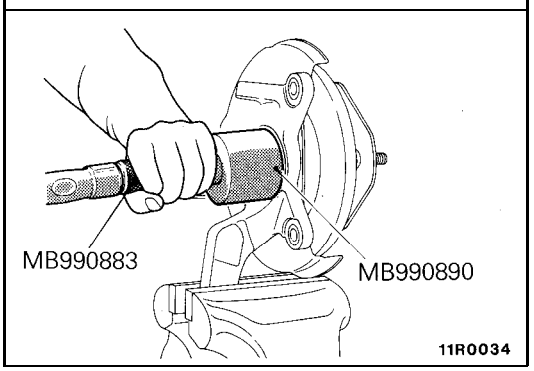
(1) Use the special tool to mount the hub assembly onto the knuckle.
(2) Tighten the nut of the special tool to 200 – 260 Nm (145 – 188 ft.lbs.).
(3) Rotate the hub assembly in order to seat the bearing.

(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 disassembly 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.

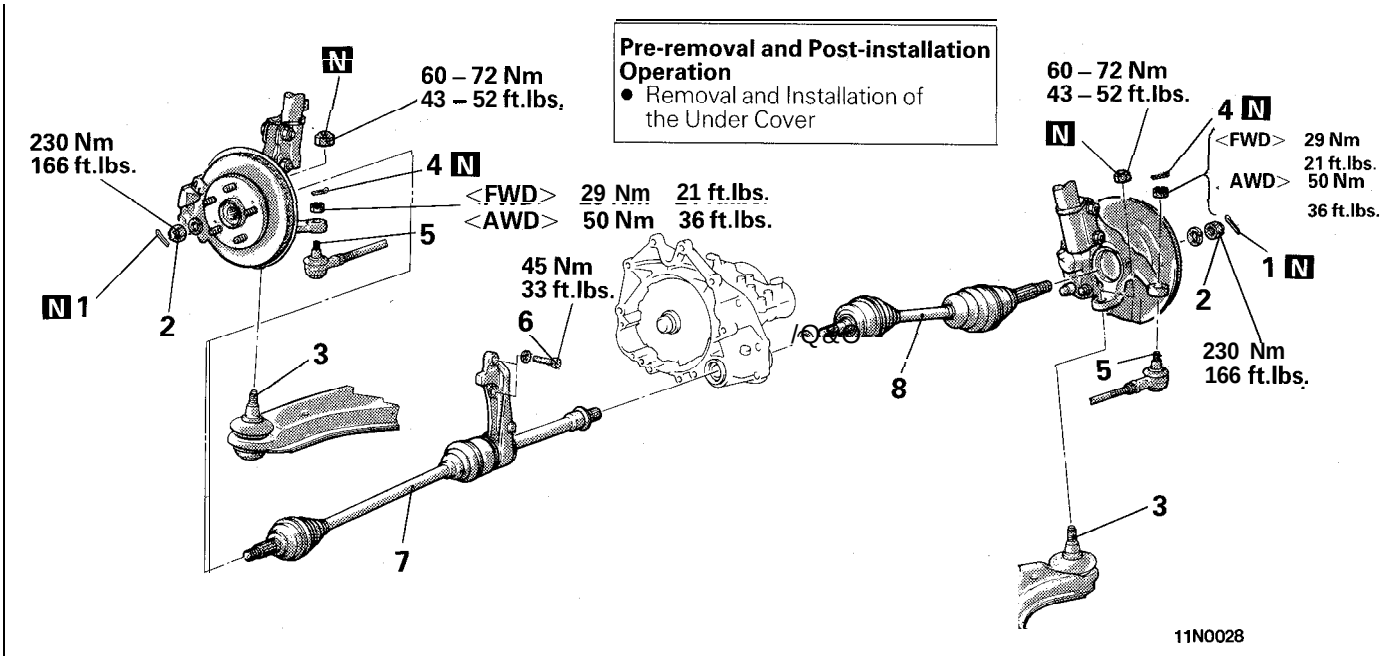
Apply multipurpose grease to the lip of the oil seal.

Grease: MOPAR Multi-mileage Lubricant
Part No. 2525035 or equivalent

DRIVE SHAFT

N02QA--

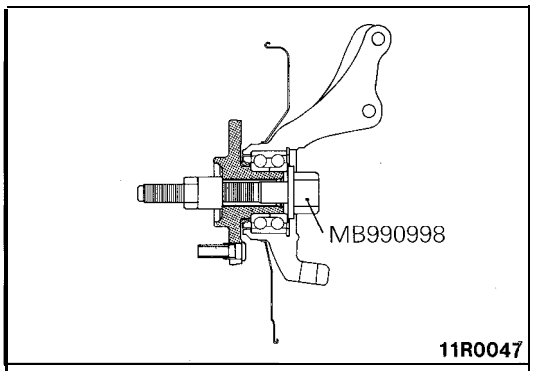
REMOVAL AND INSTALLATION

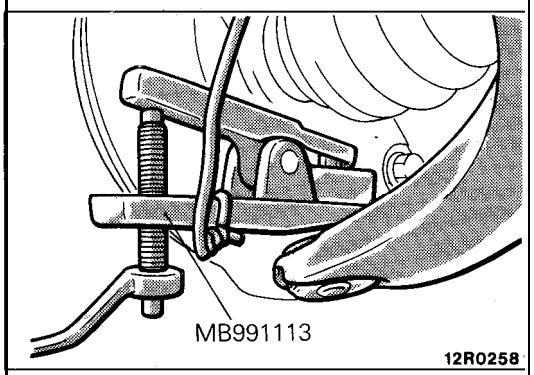


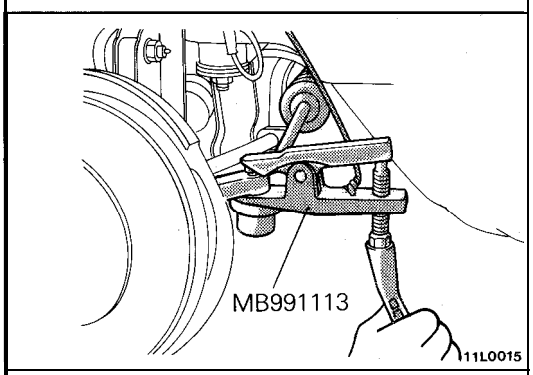
Removal steps

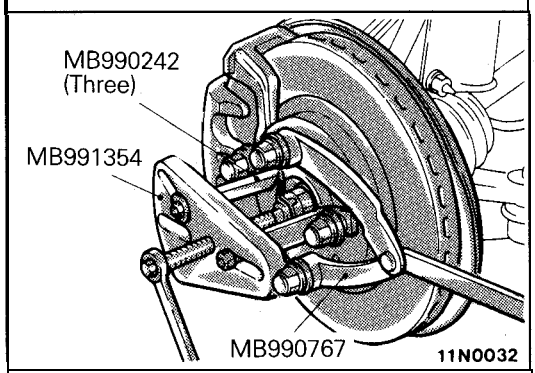
- 1. Cotter pin
- ● *● * 2. Drive shaft nut
- ◆◆ 3. Lower arm ball joint connection
- 4. Cotter pin
- ◆◆ 5. Tie rod end connection
- 6. Center bearing bracket installation bolt
- ◆◆ 7. Drive shaft and inner shaft assembly (L.H.)
- ◆◆ 8. Drive shaft (R.H.)
- 9. Circlip

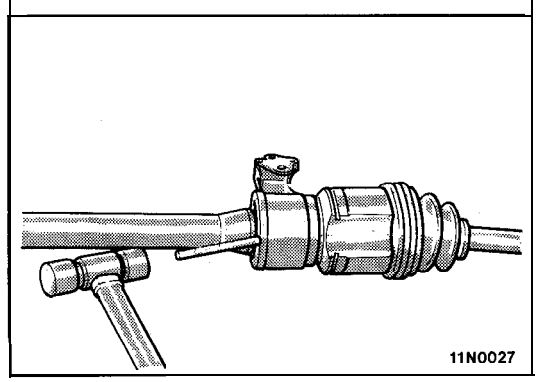
Caution
In the case of AWD-vehicles with A.B.S., take care not to damage the rotor for A.B.S. installed to the B.J. outer race.











SERVICE POINTS OF REMOVAL

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 loosing the drive shaft nut. If, however, vehicle load must be applied to the bearing in moving the vehicle, temporarily secure the wheel bearing by using the special tools, MB990998, etc.

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

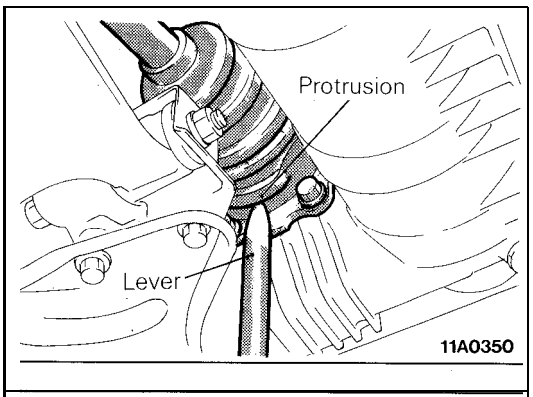
Using the special tool, disconnect the tie rod end from the knuckle.

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.)

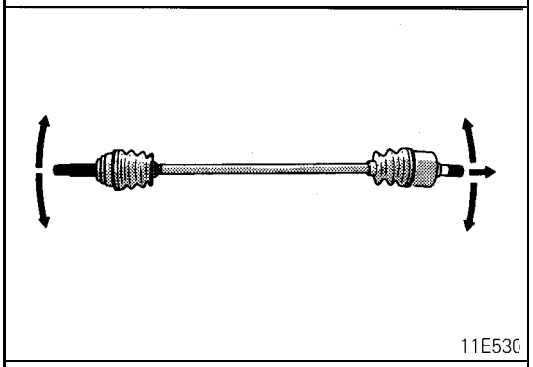
(1) Using the special tool, push out the drive shaft and inner shaft assembly (L.H.) or the drive shaft (R.H.) from the hub.

(2) If the inner shaft is hard to remove from the transaxle, strike the center bearing bracket lightly with a plastic hammer.



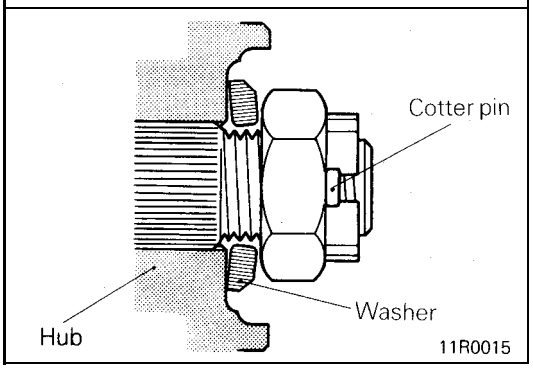
(3) To remove the drive shaft (R.H.) from the transaxle, pry off the shaft using a lever against the protrusion of the drive shaft.

Caution
Pulling the drive shaft can cause damage to the T.J. Be sure to use a lever.



INSPECTION

- 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.

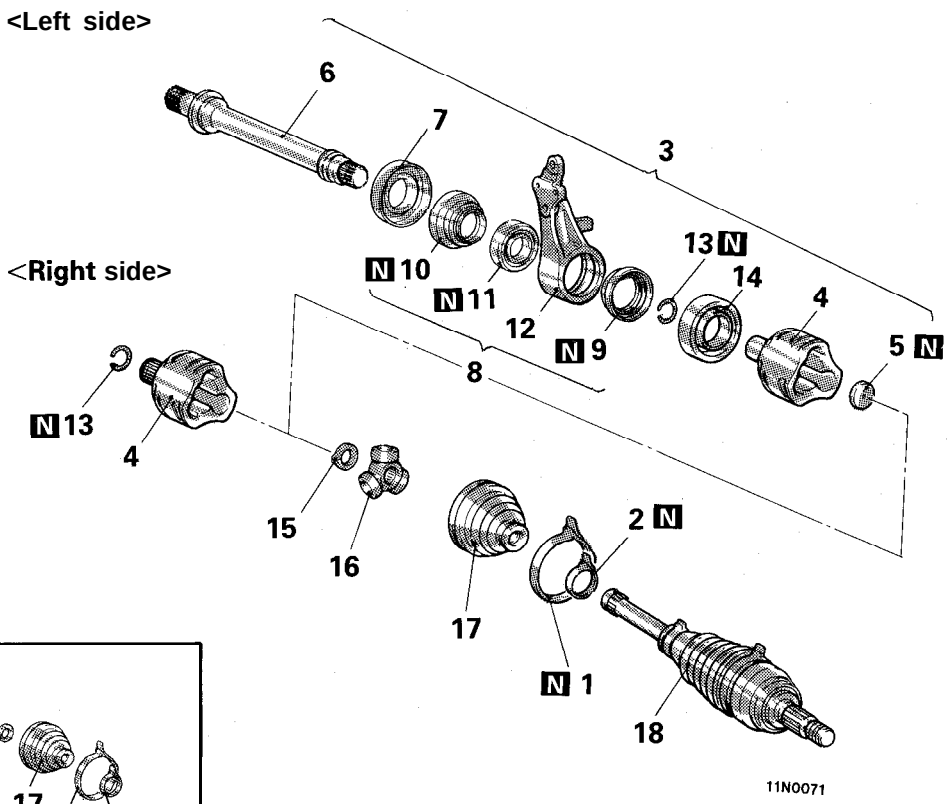


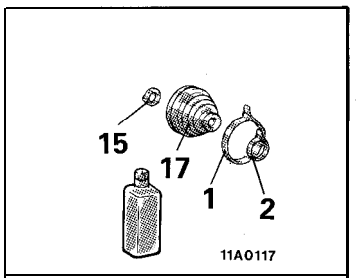
SERVICE POINT OF INSTALLATION

2. INSTALLATION OF DRIVE SHAFT NUT

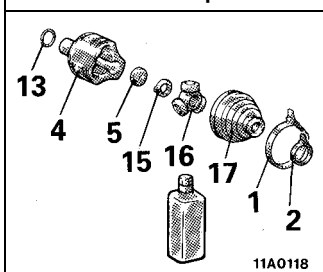
(1) Be sure to install the washer and wheel bearing nut in the specified direction.
(2) After installing the wheel, lower the vehicle to the ground and finally tighten the wheel bearing nut.
(3) If the position of the cotter pin holes does not match, tighten the nut up to 260 Nm (188 ft.lbs.) in maximum.
(4) Install the cotter pin in the first matching holes and bend it securely.

DISASSEMBLY AND REASSEMBLY

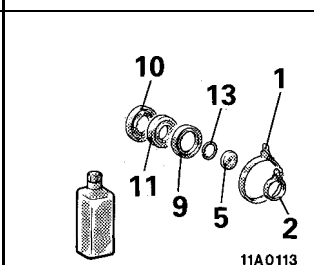




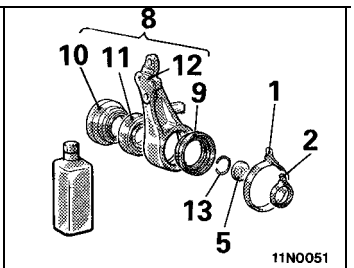
T.J. Boot Repair Kit



T.J. Repair Kit



Bearing Dust Seal Repair Kit



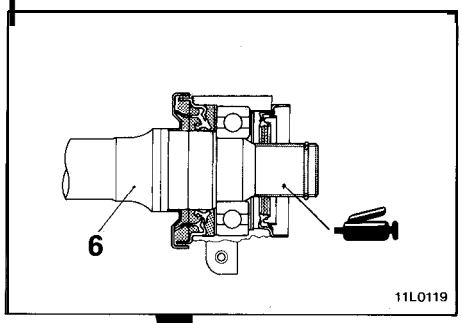
Bracket Assembly Repair Kit

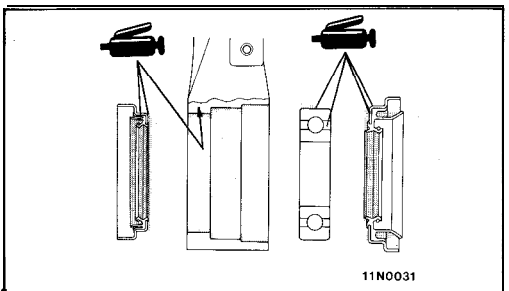
Disassembly steps

- ● 1. T.J. boot band (large)
- ♦ 4 2. T.J. boot band (small)
- ♦ C 3. T.J. case and inner shaft assembly
- **4.** T.J. case
- 5. Seal plate
- ◆◆ ● a 6. Innershatt
- 7. Dust shield
- 8. Bracket assembly
- ◆◆ 9. Dust seal outer
- ● 4 10. Dust seal inner
- ● * ● 11. Center bearing
- 12. Center bearing bracket
- 13. Circlip
- 14. Dust shield
- 15. Snap ring
- ● + 16. Spider assembly
- ◆◆ ● **C 17.** T.J. boot
- 18. B.J. assembly

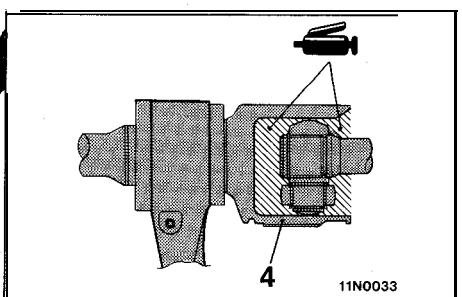
Caution
In the case of AWD-vehicles with A.B.S., take care not to damage the rotor installed to the B.J. outer race.

ubrication Points



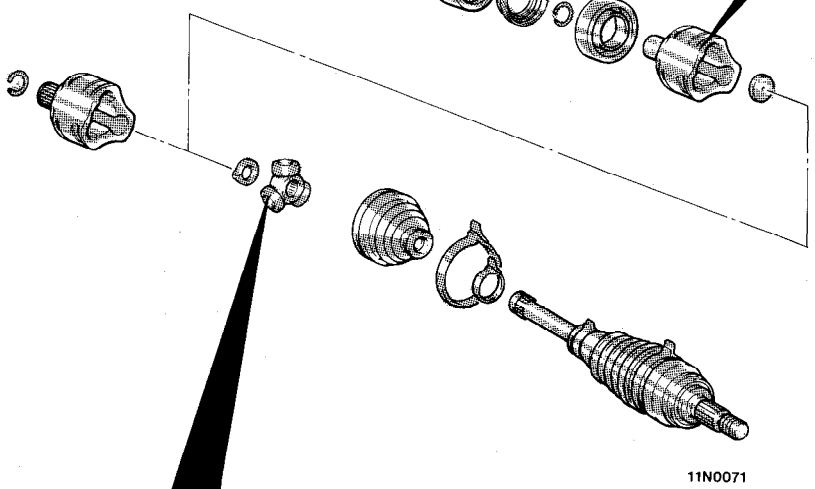


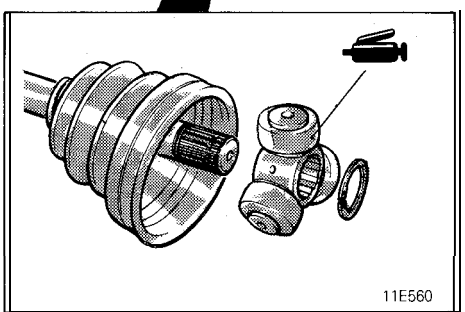
Grease: Multipurpose grease
Dust seal inner 14 – 20 g (.49 – .71 oz.)
Dust seal outer 8 – 12 g (.28 – .42 oz.)



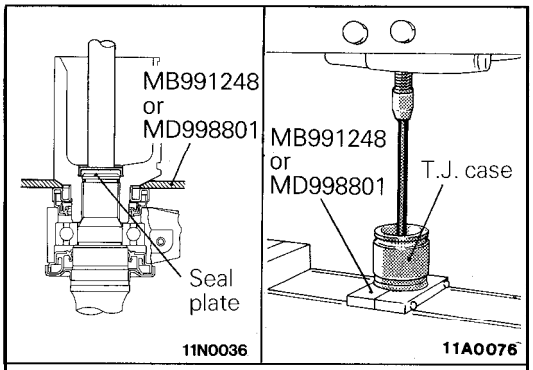
Grease: Repair kit grease
<FWD-SOHC> 150 g (5.29 oz.)
<FWD-DOHC> 160 g (5.64 oz.)
<AWD> 160 g (5.64 oz.)

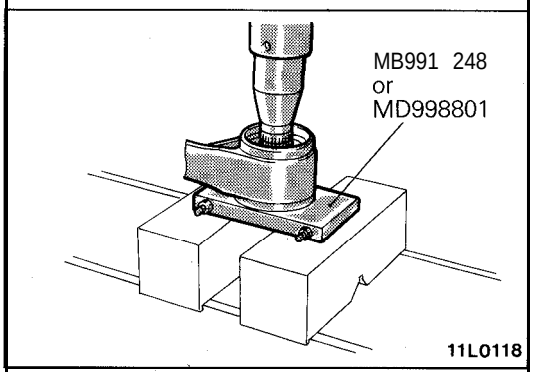
Caution
The grease in the repair kit should be divided in half for use, respectively, at the joint and inside the boot. Special grease is used to lubricate the joint. Do not mix old and new grease o different types of grease.

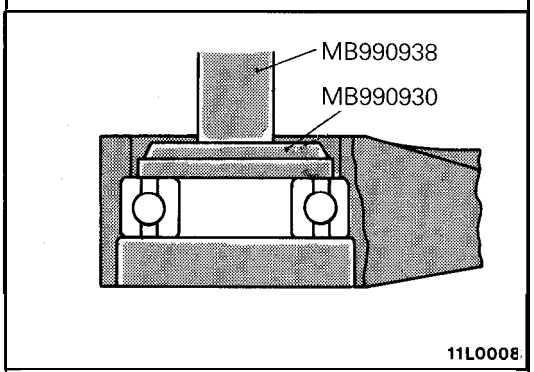


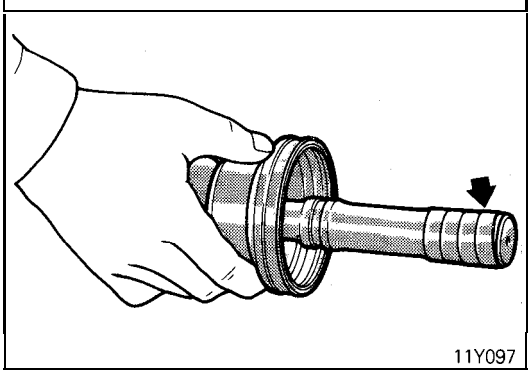


Grease: Repair kit grease









SERVICE POINTS OF DISASSEMBLY

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

Using the special tools to remove the center bearing from the center bearing bracket.

17. REMOVAL OF T.J. BOOT

(1) Wipe grease from the shaft spline.
(2) When the T.J. joint is to be reused, wrap tape around the shaft spline so as not to cause damage to the boot during its removal.

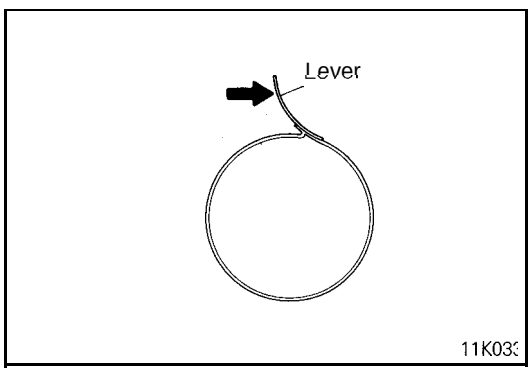
INSPECTION

- Check the drive shaft for damage, bending or corrosion.
- Check the inner shaft for damage, bending or corrosion.
- Check the drive shaft splines for wear or damage.
- Check the inner shaft splines for wear or damage.
- Check for entry of water and/or foreign material into B.J.
- Check the spider assembly for roller rotation, wear or corrosion.
- Check the groove inside T.J. case for wear of corrosion.
- Check the boots for deterioration, damage or cracking.
- Check the center bearing for seizure, discoloration or roughness of rolling surface.
- Check the dust cover for damage or deterioration.

SERVICE POINTS OF REASSEMBLY

17. INSTALLATION OF T.J. BOOT

(1) Wrap vinyl tape around the splines on the drive shaft, and then install the T.J. boots.

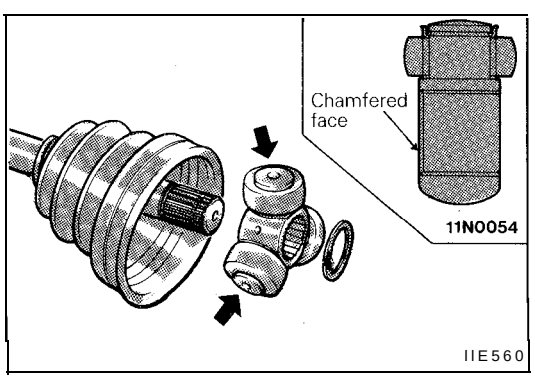


(2) Secure the boot bands.

Boot band \ Models		FWD		AWD
		SOHC	DOHC	
T.J. boot band	Large	20–75#BJ95	20–131#BJ100	20–131#BJ100
	Small	20–76#BJ95	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 T.J. boot band is identified by the identification number stamped on the lever. Take good care to install the correct one.**



16. INSTALLATION OF SPIDER ASSEMBLY

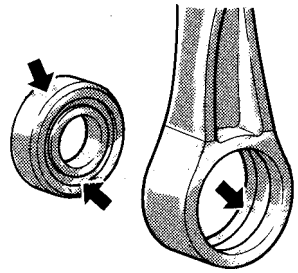
(1) Pack specified grease amply between the spider shaft and rollers of the spider assembly.

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.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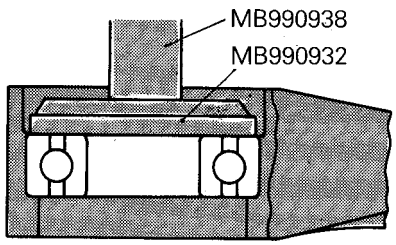
11. INSTALLATION OF CENTER BEARING

(1) Apply multipurpose grease to the center bearing and inside the center bearing bracket.

Grease: MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent



11L0010

(2) Use the special tools to press-fit the center bearing into the center bearing bracket.

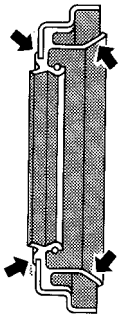
10.9. INSTALLATION OF DUST SEALS

(1) Apply multipurpose grease to the rear surfaces of all dust seals.

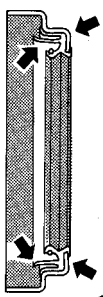
Grease: MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent

Dust seal inner: 14 – 20 g (.49 – .71 oz.)
Dust seal outer: 8 – 12 g (.28 – .42 oz.)

Dust seal inner


11L0091

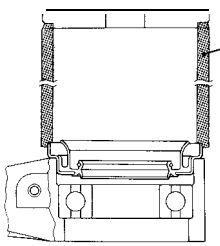
Dust seal outer


11L0090

(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.

Dust seal inner



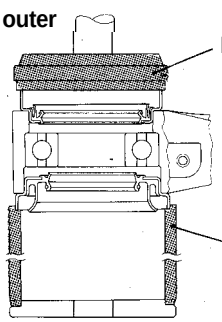
11L0093

(3) Apply multipurpose grease to the lip of each dust seal.

Grease: MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent

NOTE
When applying grease, make sure that it does not adhere to anything outside the lip.

Dust seal outer



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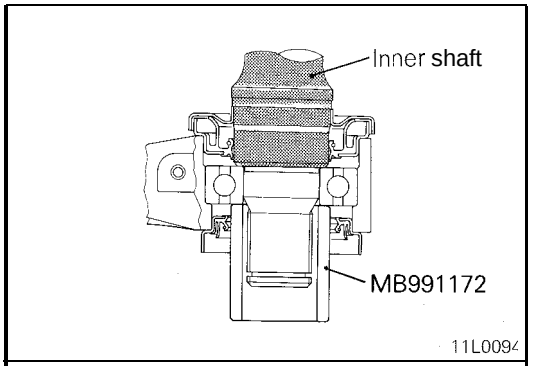
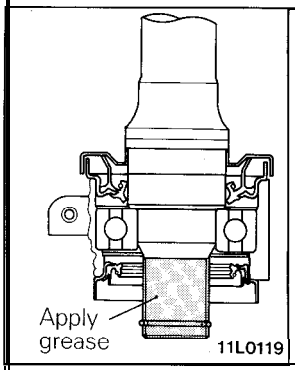
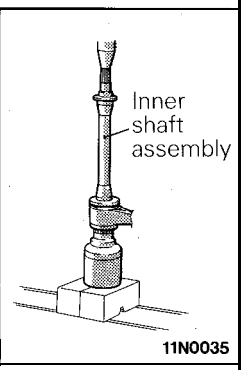


6. INSTALLATION OF INNER SHAFT

Use the special tool to hold the inner race of the center bearing and force the inner shaft into place.

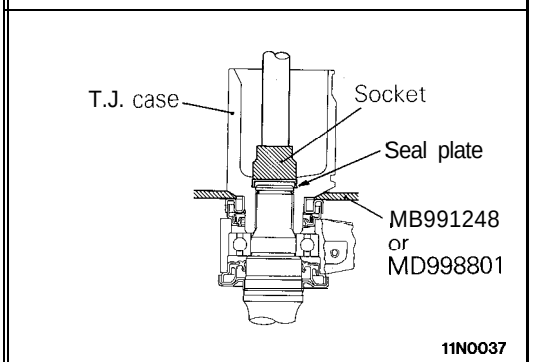




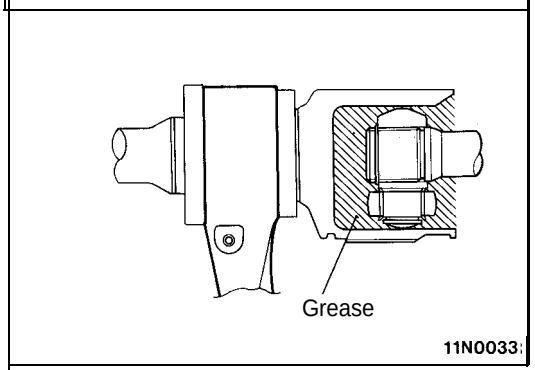
3. INSTALLATION OF T.J. CASE AND INNER SHAFT ASSEMBLY

(1) Apply multipurpose grease to the inner shaft spline, then press fit it into the T.J. case.

Grease: MOPAR Multi-mileage Lubricant
Part No. 2525035 or equivalent



(2) Using the special tool, press the seal plate into the T.J. case.



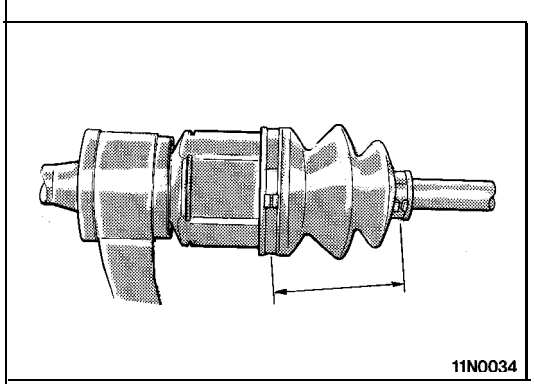
(3) Fill the specified grease furnished in the repair kit to the T.J. case.

Specified grease: Repair kit grease

<FWD-SOHC>	**150 g (5.29 oz.)**
<FWD-DOHC>	**160 g (5.64 oz.)**
<AWD>	**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

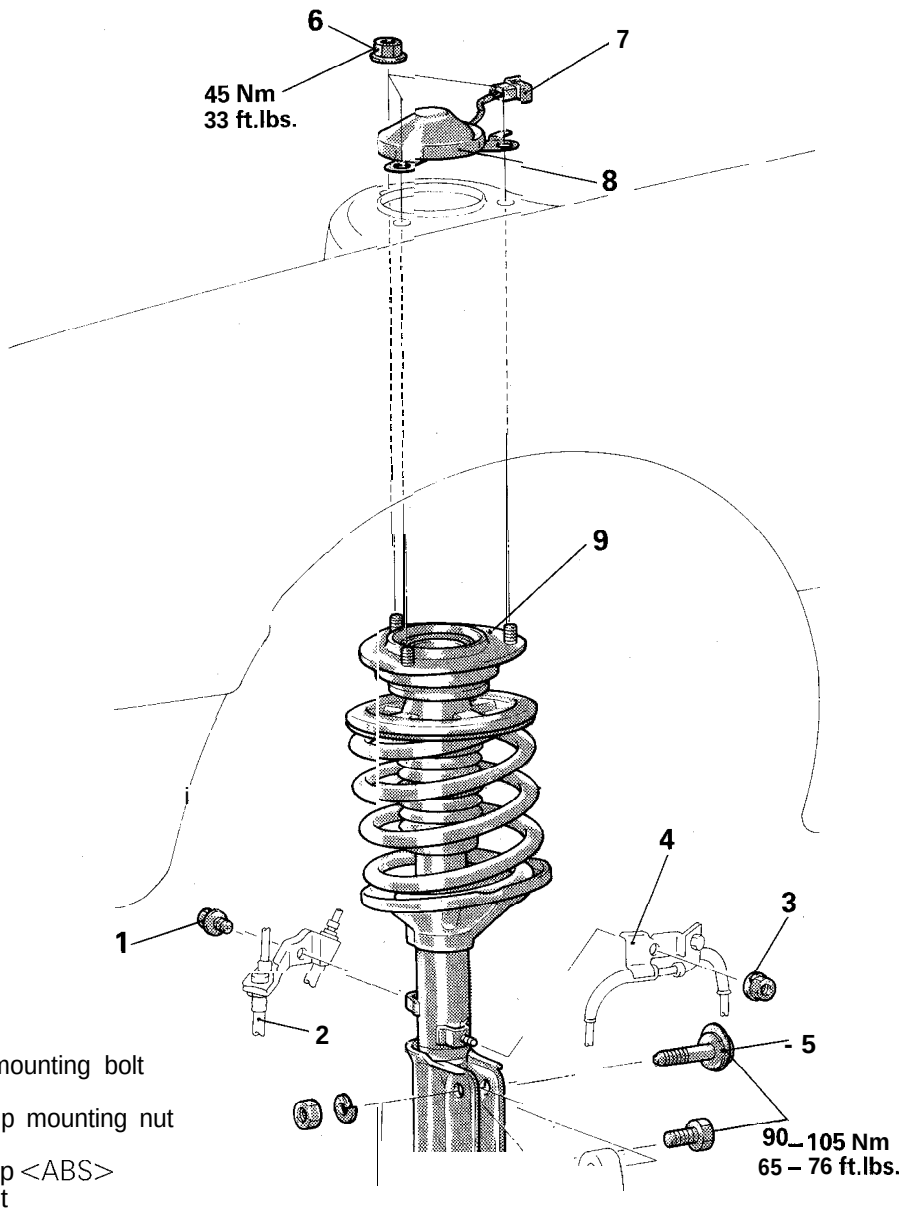
Set the T.J. boot bands at the specified distance in order to adjust the amount of air inside the T.J. boot, and then tighten the T.J. boot band securely.

Standard value: 85 ± 3 mm (3.35 ±.12 in.)

STRUT ASSEMBLY

REMOVAL AND INSTALLATION

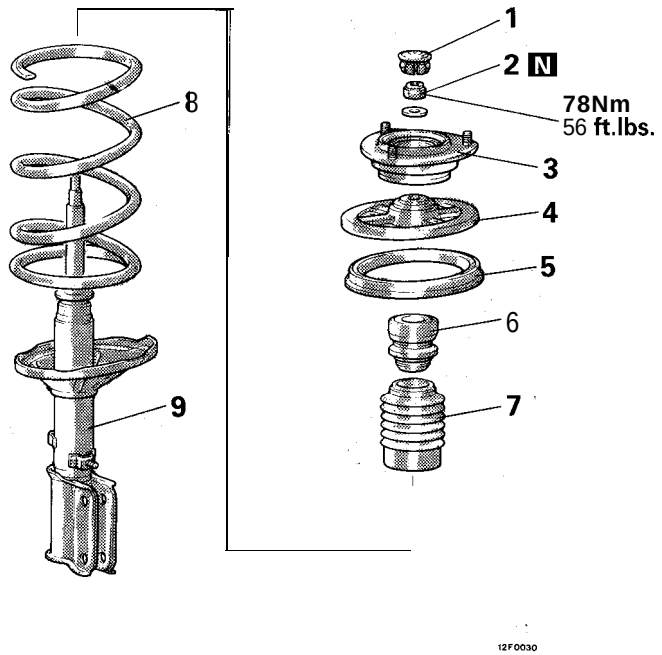
Post-installation Operation
- Adjustment of Wheel Alignment (Refer to P.2A-9.)

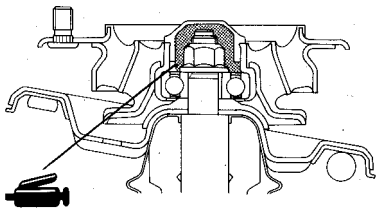


Removal steps

1. Brake hose tube clamp mounting bolt
2. Brake hose tube clamp
3. Front speed sensor clamp mounting nut
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

DISASSEMBLY AND REASSEMBLY



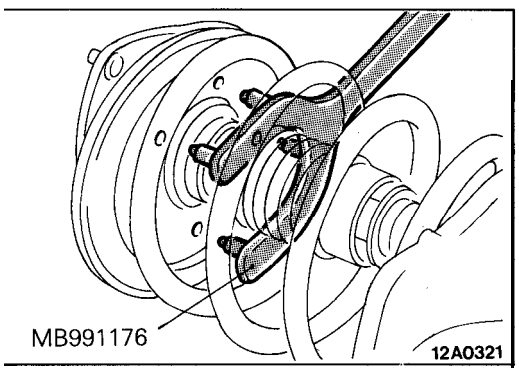


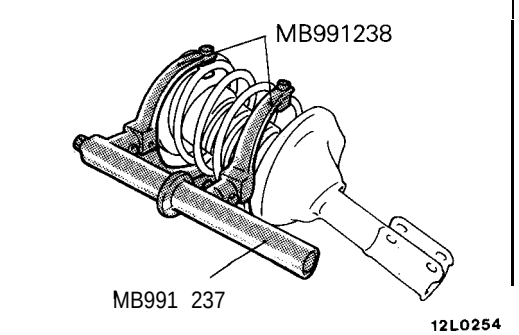
Grease: MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent

Caution
When applying the grease, take care that grease does not adhere to the insulator's rubber part.

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

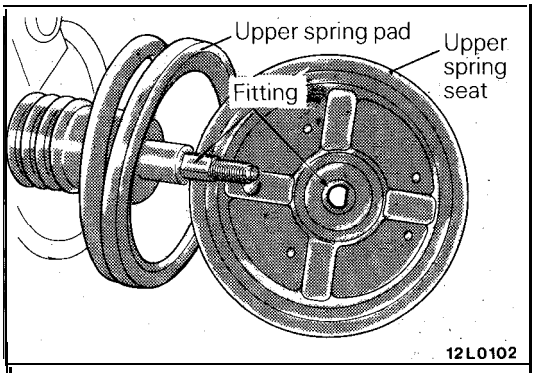
2. REMOVAL OF SELF-LOCKING NUT

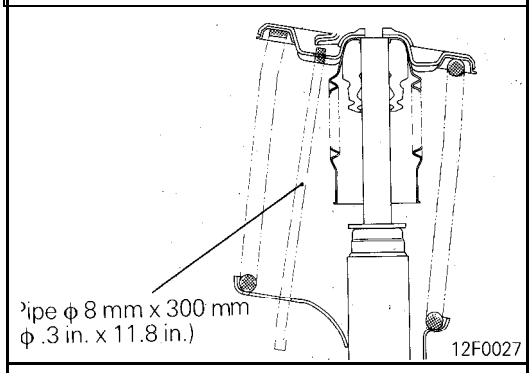
(1) Holding the spring upper seat with the special tool, loosen the self-locking nut.

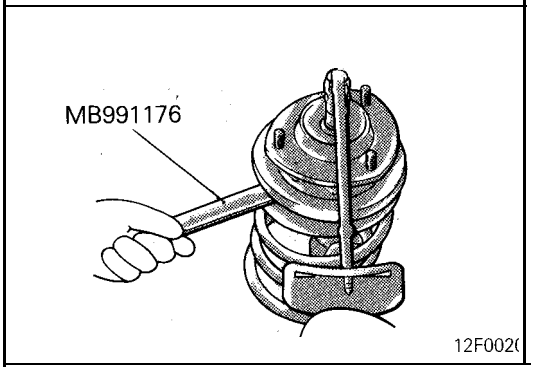
Caution
The self-locking nut should be loosened only, not renioved.

(2) Using the special tools, compress the coil spring, and then remove the self-locking nut.

Caution
1. Install the special tools evenly, and so that the maximum length will be attained within the installation range.
2. Do not use an air tool to tighten the bolt of the special tool and to remove the self-locking nut.







SERVICE POINTS OF REASSEMBLY

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) Using a pipe, line up the holes in the strut assembly spring lower seat with the hole in the spring upper seat.

NOTE'

The job is easily accomplished with a pipe [ϕ 8 mm x 300 mm (ϕ .3 in. x 11.8 in.)].

2. INSTALLATION OF SELF-LOCKING NUT

(1) With the coil spring held compressed by the special tools (MB991237, MB991238), provisionally tighten the self-locking nut.

Caution
Do not use an air tool to tighten the bolt of the special tool.

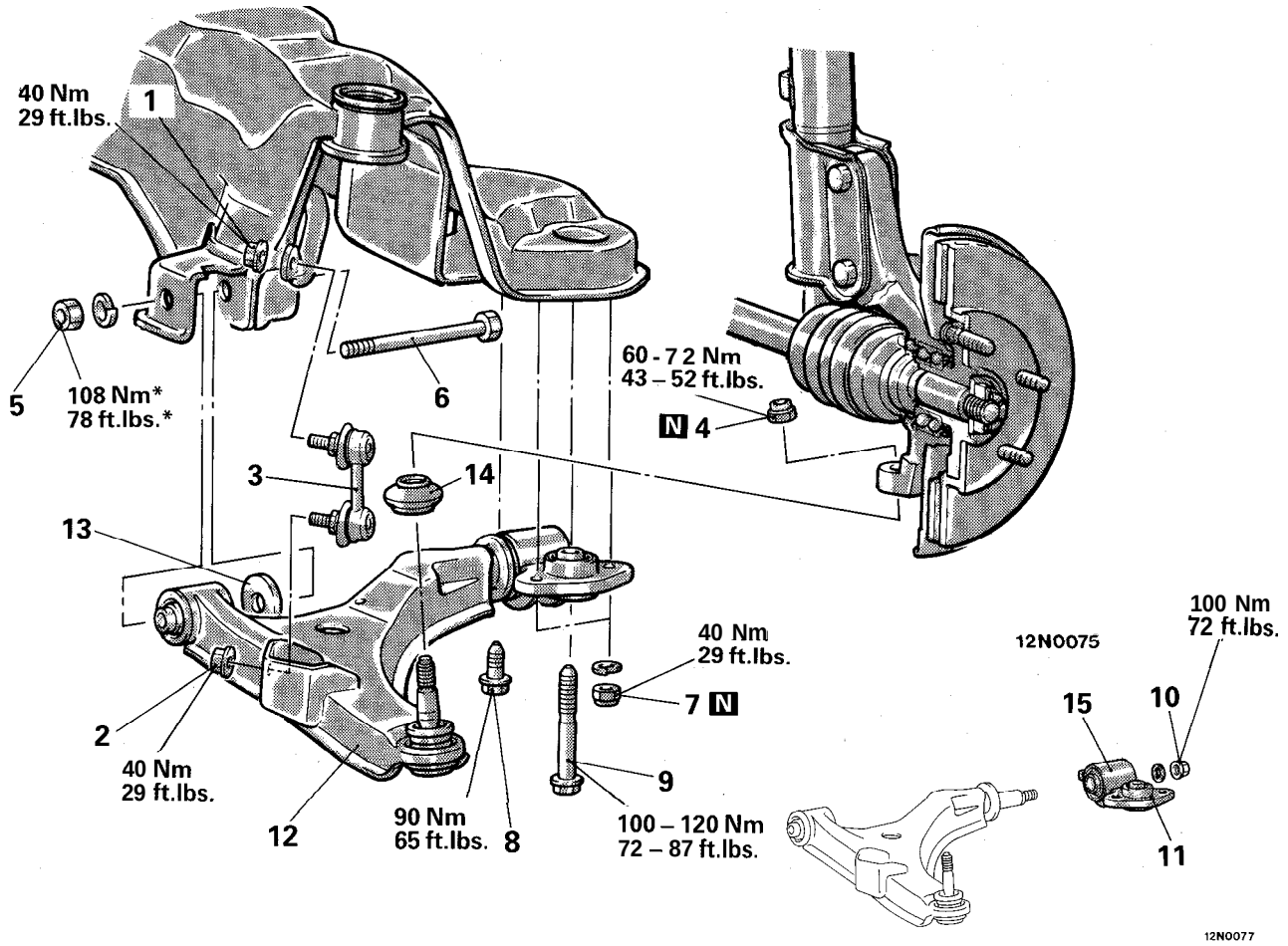
(2) Correctly align both ends of the coil spring with the grooves in the spring seat, and then loosen the special tools (MB991 237, MB991 238).

(3) Using the special tool, tighten the strut insulator at the specified torque.

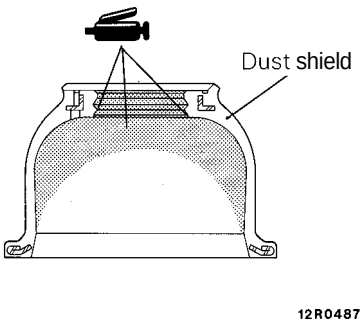
Caution
Do not use an air tool.

LOWER ARM

REMOVAL AND INSTALLATION



Post-installation Operation
- Adjustment of Wheel Alignment (Refer to P.2A-9.)

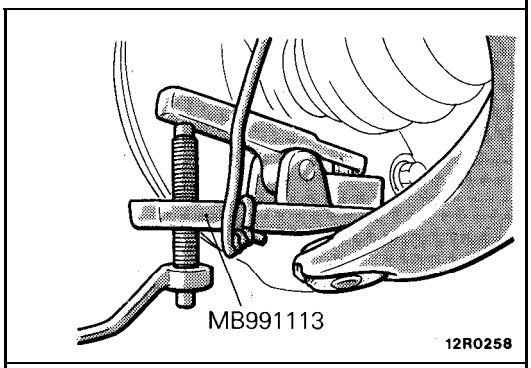


Grease: MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent

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.

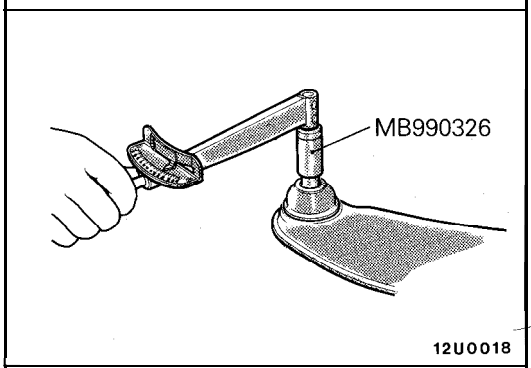


SERVICE POINT OF REMOVAL

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.



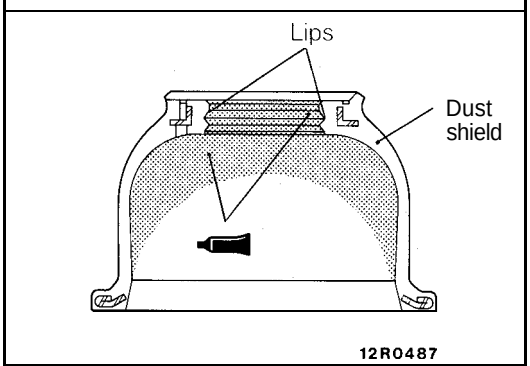
INSPECTION

- Check the bushing for wear and deterioration.
- Check the lower arm for bend or breakage.
- Check the clamp for deterioration or damage.
- Check the ball joint dust shield for cracks.
- Check all bolts for condition and straightness.

CHECKING BALL JOINT FOR BREAKAWAY TORQUE

Using the special tool, measure the ball joint breakaway torque.

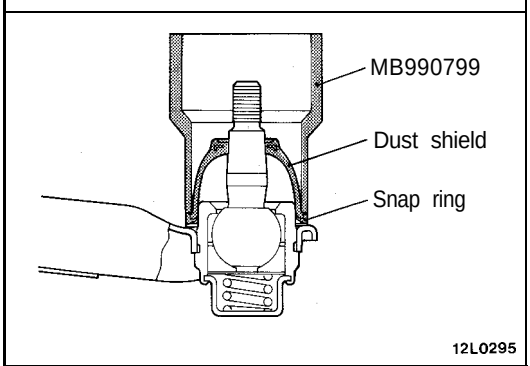
Standard value: 10 – 22 Nm (86 – 191 in.lbs.)



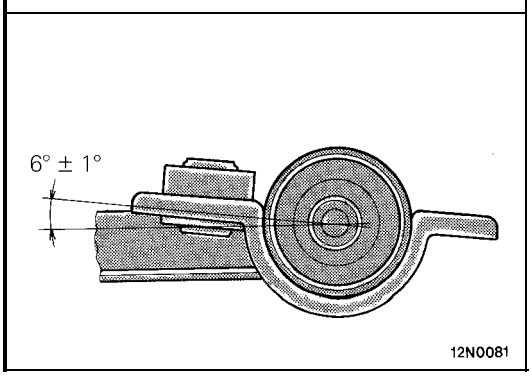
BALL JOINT DUST SHIELD REPLACEMENT

(1) Remove the dust shield.
(2) Apply multipurpose grease to the lip and inside of the dust shield.

Grease: MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent



(3) Drive in the dust shield with special tool until it is fully seated.



SERVICE POINT OF INSTALLATION

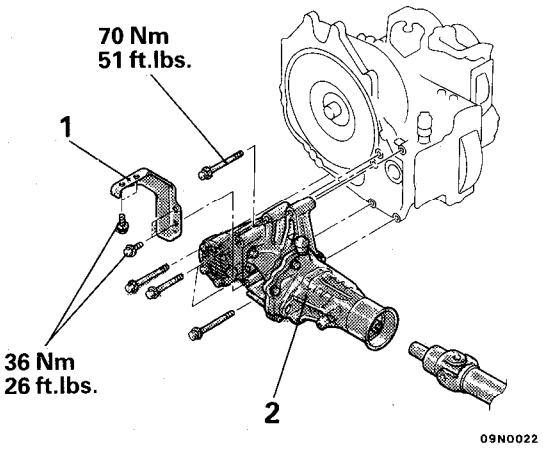
10. INSTALLATION OF LOWER ARM CLAMP MOUNTING SELF-LOCKING NUT

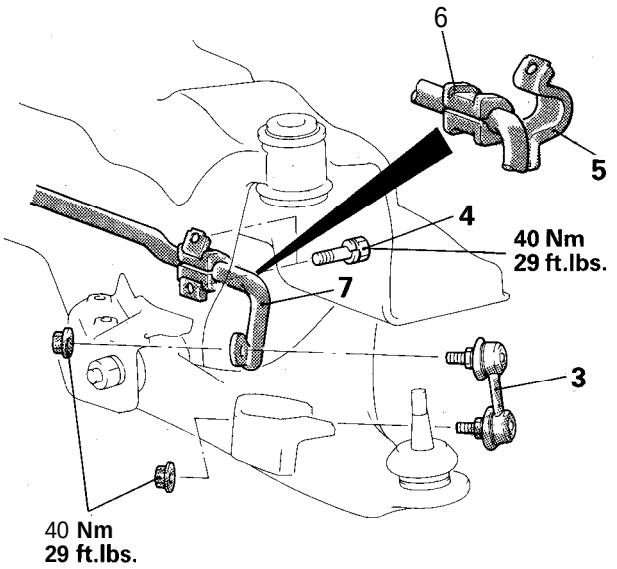
Place the lower arm bushing bracket so that its mounting surface tilts 6" ± 1" with respect to the bottom surface of the lower arm; then, mount the self-locking nut.

STABILIZER BAR

REMOVAL AND INSTALLATION

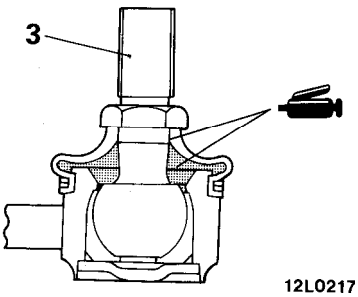
Pre-removal and Post-installation Operation
- Removal and Installation of the Front Exhaust Pipe (Refer to GROUP 11 – Exhaust Pipe and Main Muffler.)
- Removal and Installation of the Under Cover
- Removal and Installation of the Left Member and Right Member (Refer to P.2A-10.)





Removal steps

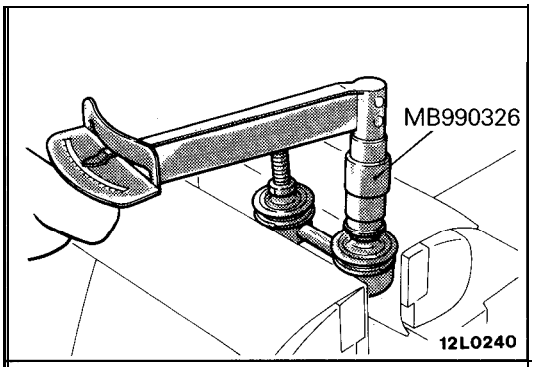
1. Transmission stay B <AWD vehicles with automatic transaxle>
◆◆ ● * 2. Transfer (AWD) (Refer to GROUP 21 -Transfer.)
3. Stabilizer link
4. Stabilizer bar bracket mounting bolt
● + 5. Stabilizer bar bracket
6. Bushing
7. Stabilizer bar



3rease: MOPAR Multi-mileage Lubricant Part Number 2525035 or equivalent

INSPECTION

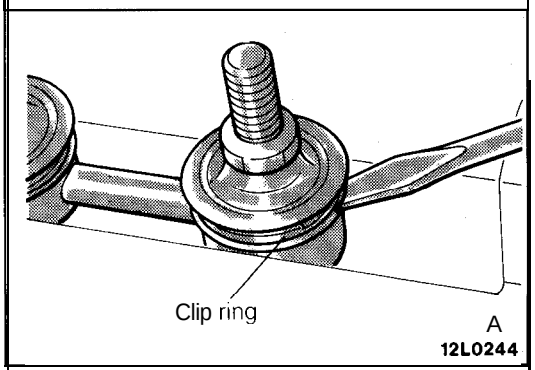
- Check the bushing for wear and deterioration.
- Check the stabilizer bar for deterioration or damage.
- Check the stabilizer link ball joint dust cover for cracks.
- Check all bolts for condition and straightness.



CHECKING STABILIZER LINK BALL JOINT BREAKAWAY TORQUE

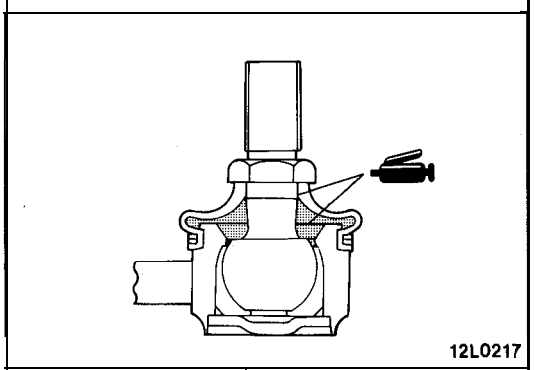
Install the nut to the stud, and use the special tool to measure the ball joint breakaway torque.

Standard value: 1.7 – 3.2 Nm (15 – 28 in.lbs.)



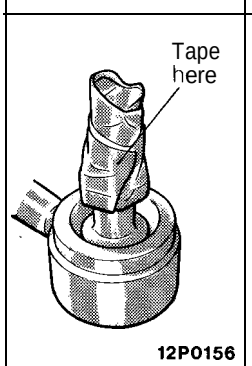
BALL JOINT DUST SHIELD REPLACEMENT

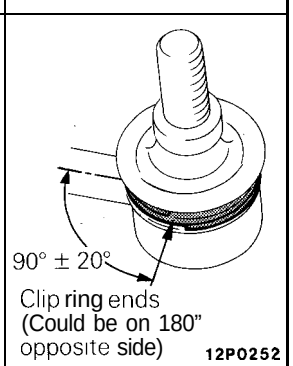
(1) Remove the clip ring and the dust shield.



(2) Apply multipurpose grease to the lip and inside of the dust shield.

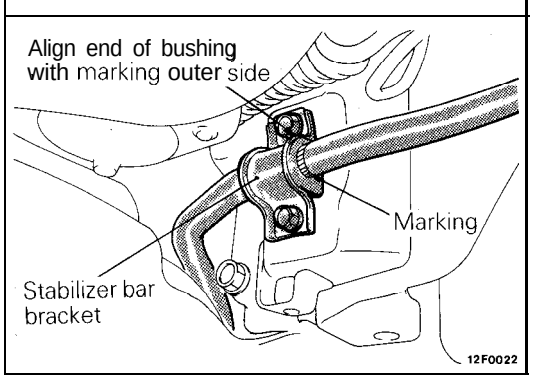
Grease: MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent





(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

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 (ECS)

CONTENTS

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

WARNING!

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

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

(3) CHRYSLER dealer personnel must thoroughly review this manual, and especially its GROUP 23B – Supplemental Restraint System (SRS) and GROUP 0 – Maintenance Service, before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning light, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

SPECIFICATIONS

GENERAL SPECIFICATIONS

FRONT SUSPENSION

Items	FWD				AWD
	SOHC		DOHC		
	M/T	A/T	MIT	A/T	MIT
Suspension system	McPherson strut type				
Coil spring					
Wire dia. x center dia. x free length mm (in.)	14.2 x 170 x 316 (.56 x 6.69 x 12.4)	14.4 x 170 x 322.7 (.57 x 6.69 x 12.70)	14.5 x 170 x 329.3 (.57 x 6.69 x 12.96)		15.2 x 170 x 301.6 (.60 x 6.69 x 11.87)
Coil spring identification color	Light blue x 1	Green x 1	Green x 2		Brown x 1
Spring constant N/mm (lbs./in.)	29 (162)	29 (162)	29 (162)		38 (212)
Shock absorber					
Type	Hydraulic, cylindrical double-acting type				
Max. length mm (in.)	485 (19.1)				
Min. length mm (in.)	335 (13.2)				
Stroke mm (in.)	150 (5.9)				
Damping force at 0.3 m/sec (.9 ft.)/sec N (lbs)					
Expansion					
Hard	2,530 (558)				
Medium	1,580 (348)				
Soft	620 (137)				
Contraction					
Hard	1,190 (262)				
Medium	1,120 (247)				
Soft	970 (214)				
Stabilizer bar					
Mounting method	Pillow ball type				
Outside dia. mm (in.)	20 (.78)		22 (.86)		23 (.91)

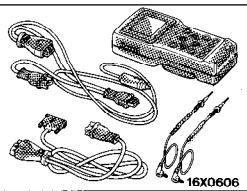
REAR SUSPENSION

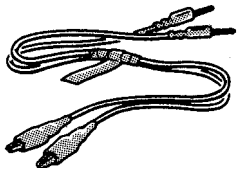
Items	FWD		AWD
	SOHC	DOHC	
Suspension system	Multi-link type		Double-wishbone type
Coil spring			
Wire dia. x center dia. x free length mm (in.)	11.6 x 105 x 350.0 (.46 x 4.13 x 13.78)		11.5 x 105 x 379.3 (.45 x 4.13 x 14.93)
Coil spring identification color	Green x 1		Brown
Spring constant N/mm (lbs./in.)	34 (190)		28 (156)
Shock absorber			
Type	Hydraulic, cylindrical double-acting type		
Max. length mm (in.)	515 (20.3)		610 (24.0)
Min. length mm (in.)	356 (14.0)		407 (16.0)
Stroke mm (in.)	159 (6.3)		203 (8.0)
Damping force at 0.3 m/sec (.9 ft.)/sec N (lbs)			
Expansion			
Hard	1,800 (397)		
Medium	1,200 (265)		
Soft	550 (121)		
Contraction			
Hard	950 (209)		
Medium	850 (187)		
Soft	850 (143)		
Stabilizer bar	–		
Mounting method		Pillow ball type	
Outside dia. mm (in.)		10 (.37)	22 (.86)

SERVICE SPECIFICATIONS

Items	Front suspension	Rear suspension	
		FWD	AWD
Standard value			
Camber	0° ± 30'	0° ± 30'	– 0°10' ± 30'
Caster	3°55' ± 30'		
Toe-in mm (in.)	0 ± 3 (0 ± .12)	.5 ± 2.5 (.02 ± .1)	.5 ± 2.5 (.02 ± .1)

SPECIAL TOOLS

Tool number and tool name	Replaced by Miller tool number	Application
 16X0606 MB991502 Scan tool (MUT-II)	DRB II Scan tool	Inspection of electronic control suspension system • Reading and erasing diagnostic trouble codes • Reading service data • Actuator test

Tool number and tool name	Replaced by Miller tool number	Application
 MB991 529 Diagnostic trouble code check harness	MB991 529	Inspection of electronic control suspension system using a voltmeter

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 diagnostic trouble code No. 11 is output. *1							○			○	P.2B-5
When diagnostic trouble code No. 21 is output. *2			0							○	P.2B-6
When diagnostic trouble code No. 24 is output. *3						0				○	P.2B-7
When diagnostic trouble code Nos. 61 through 64 are output.								○	○	○	P.2B-8
ECS indicator light does not switch when ECS switch is operated.	○	○								○	P.2B-9
Anti-roll control only stops. *2			○							○	P.2B-6
Anti-dive control only stops				○						○	P.2B-10
Anti-squat control only stops. *4					○					0	P.2B-11

TROUBLESHOOTING HINTS

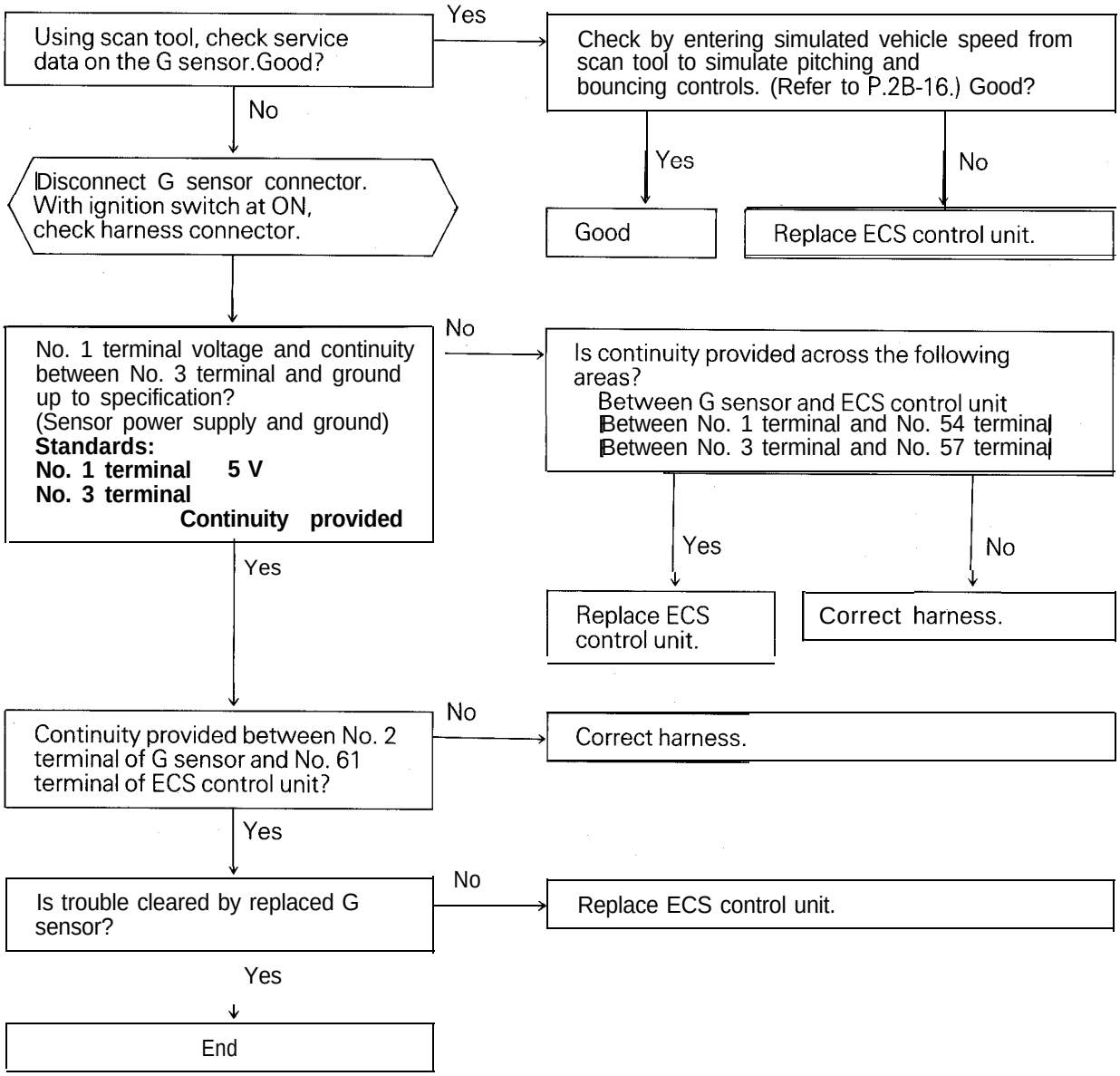
*1. The G sensor is a sensor associated with ride control (detecting pitching, bouncing and rough road). If it fails, therefore, ride control stops.

*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 diagnostic trouble code No. 21 is not on display, a short-circuited sensor output line or open-circuited sensor power line is suspected.

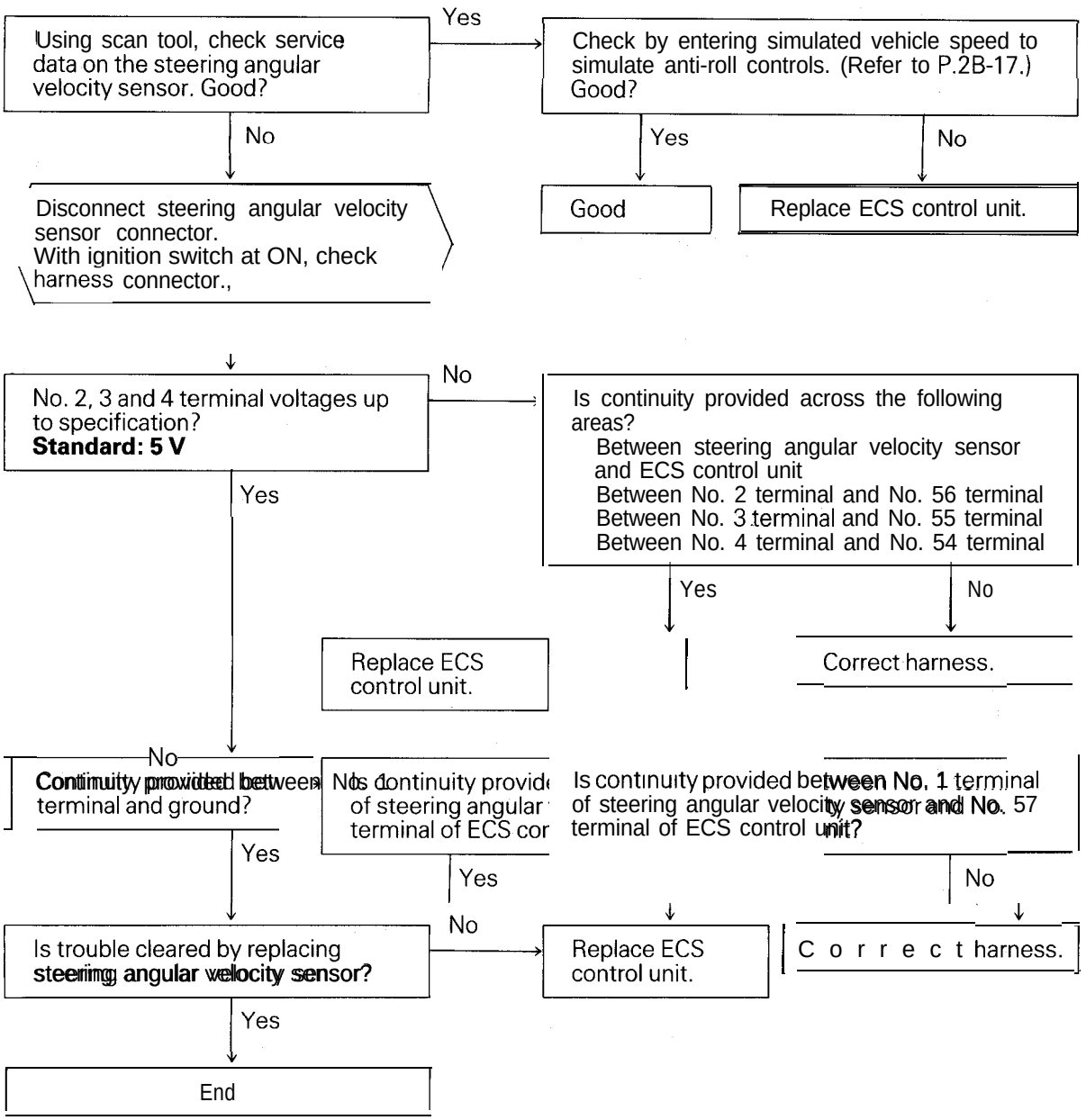
*3. The vehicle speed sensor is a sensor associated with attitude controls (anti-dive, anti-squat) and steering stability controls (anti-roll, high speed sensitive controls). If all these controls stop, therefore, trouble in the sensor is suspected. The vehicle speed sensor is also in use for operation of the speedometer and for the other electronics controlled systems for the engine, automatic transaxle, etc.

*4. The sensor associated with anti-squat control is the throttle position sensor. The sensor is also used for control of the engine and automatic transaxle. If the sensor fails, therefore, the check engine/malfunction indicator lamp in the combination meter will light, and engine diagnostic trouble code No. 14 will be output, In a situation where anti-squat control only stops, therefore, if the check engine/malfunction indicator lamp does not light, defective wiring is suspected between the ECS control unit and throttle position sensor.

1 When diagnostic trouble code No. 11 is output

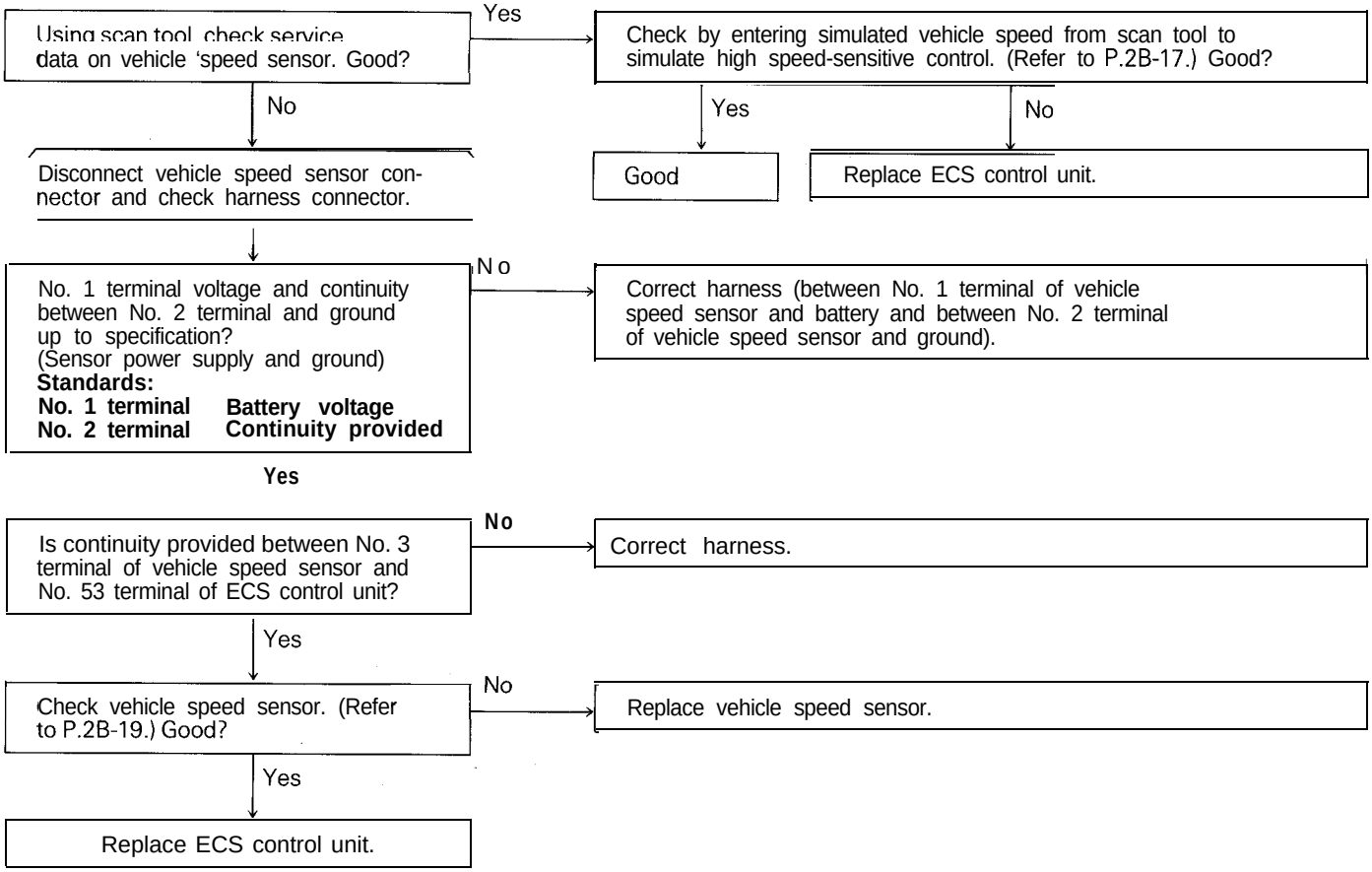


2 When diagnostic trouble code No. 21 is output, or when anti-roll control only stops.

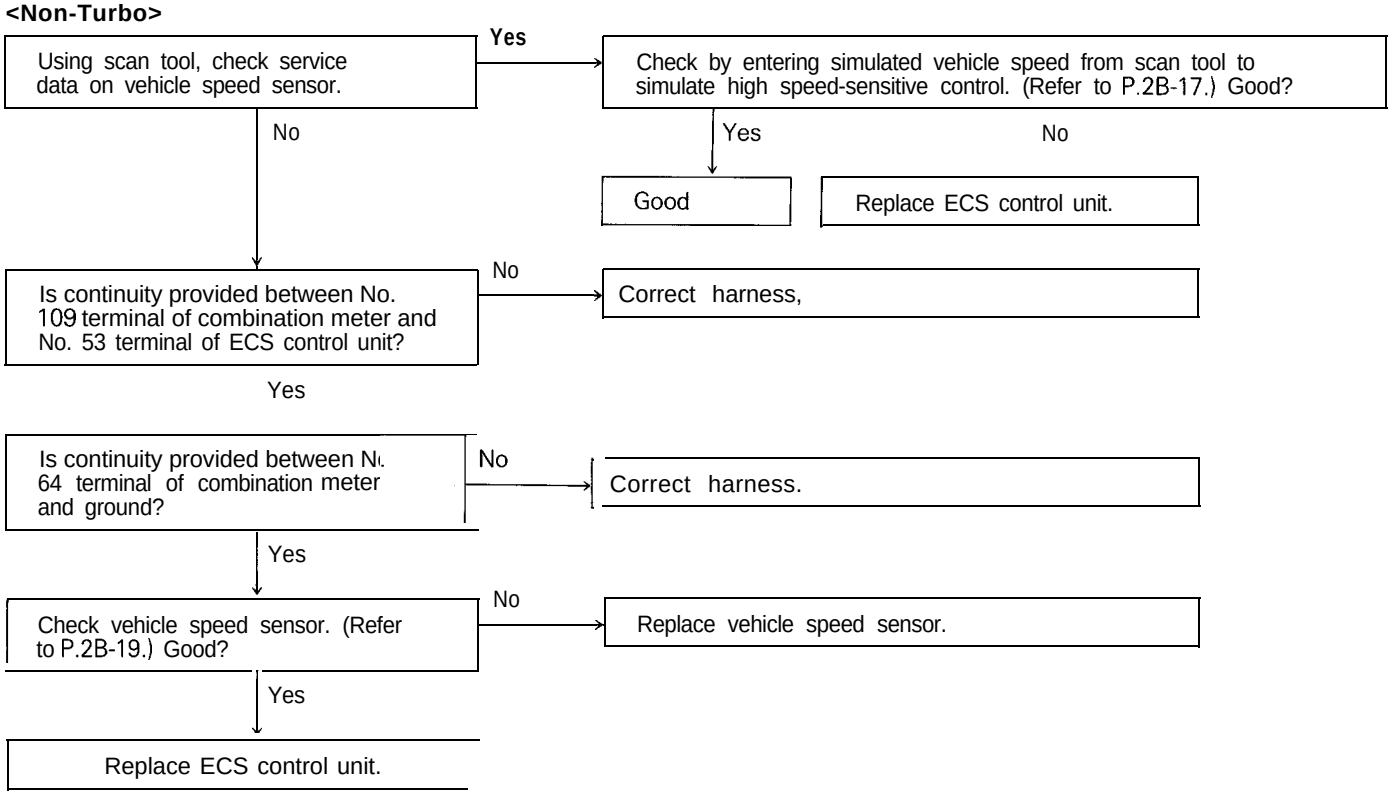


3 When diagnostic trouble code No. 24 is output

<Turbo>



<Non-Turbo>



4 When diagnostic trouble code Nos. 61, 62, 63 and 64 are output.

Using scan tool, check actuator. (Refer to P.2B-15.) Good?

Yes → Good

No ↓

Remove cap at top of shock absorber associated with diagnostic trouble code No., disconnect connector directly connected to shock absorber, and check harness connector with ignition switch at ON.

↓

No. 1 and 3 terminal voltages up to specification?
Standard: 5 V

No → Is continuity provided across the following areas of shock absorber associated with diagnostic trouble code No.?

Shock absorber terminal	ECS control unit terminal
FR No. 1	No. 7
FR No.3	No. 6
FL No. 1	No. 10
FL No.3	No. 9
RR No. 1	No. 13
RR No.3	No. 12
RL No. 1	No. 16
RL No.3	No. 15

Yes → Replace ECS control unit.

No → Correct harness.

Yes ↓

Is continuity provided between No. 2 and 4 terminals and ground?

No → Correct harness (between No. 2 and 4 terminals of shock absorber and ground).

Yes ↓

While measuring No. 5 terminal voltage, force-drive actuator by scan tool. Is terminal voltage up to specification?
Standard: 9 V during forced drive of actuator (for approx. 1 sec.)
0 V except during forced drive

No → Is continuity provided across the following areas of shock absorber associated with diagnostic trouble code No.?

Shock absorber terminal	ECS control unit terminal
FR No.5	No. 5
FL No.5	No. 8
RR No.5	No. 11
RL No.5	No. 14

Yes → Replace ECS control unit.

No → Correct harness.

Yes ↓

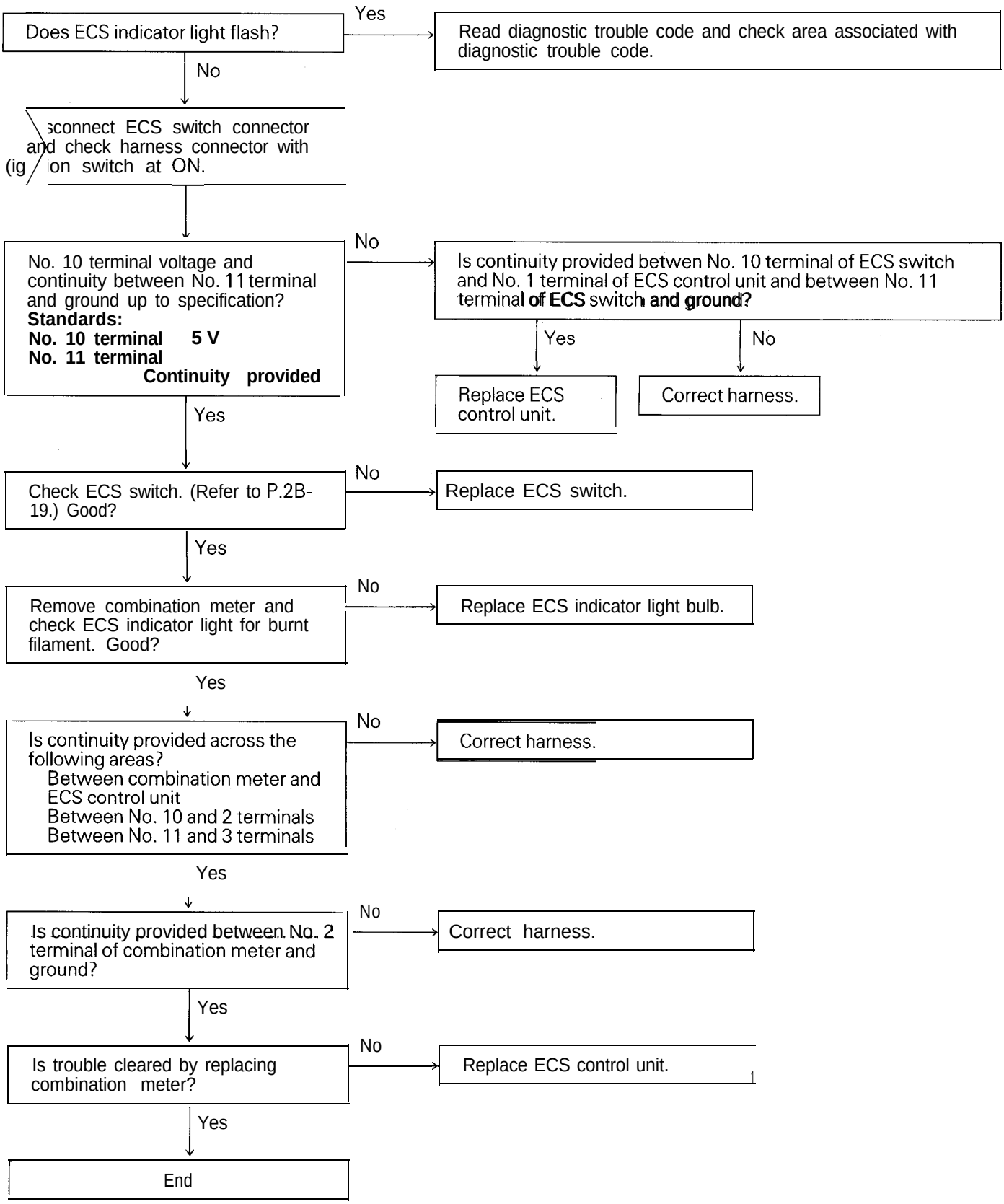
Is trouble corrected by replacing shock absorber (including damping force changeover actuator and position detection switch) associated with diagnostic trouble code No.?

No → Replace ECS control unit.

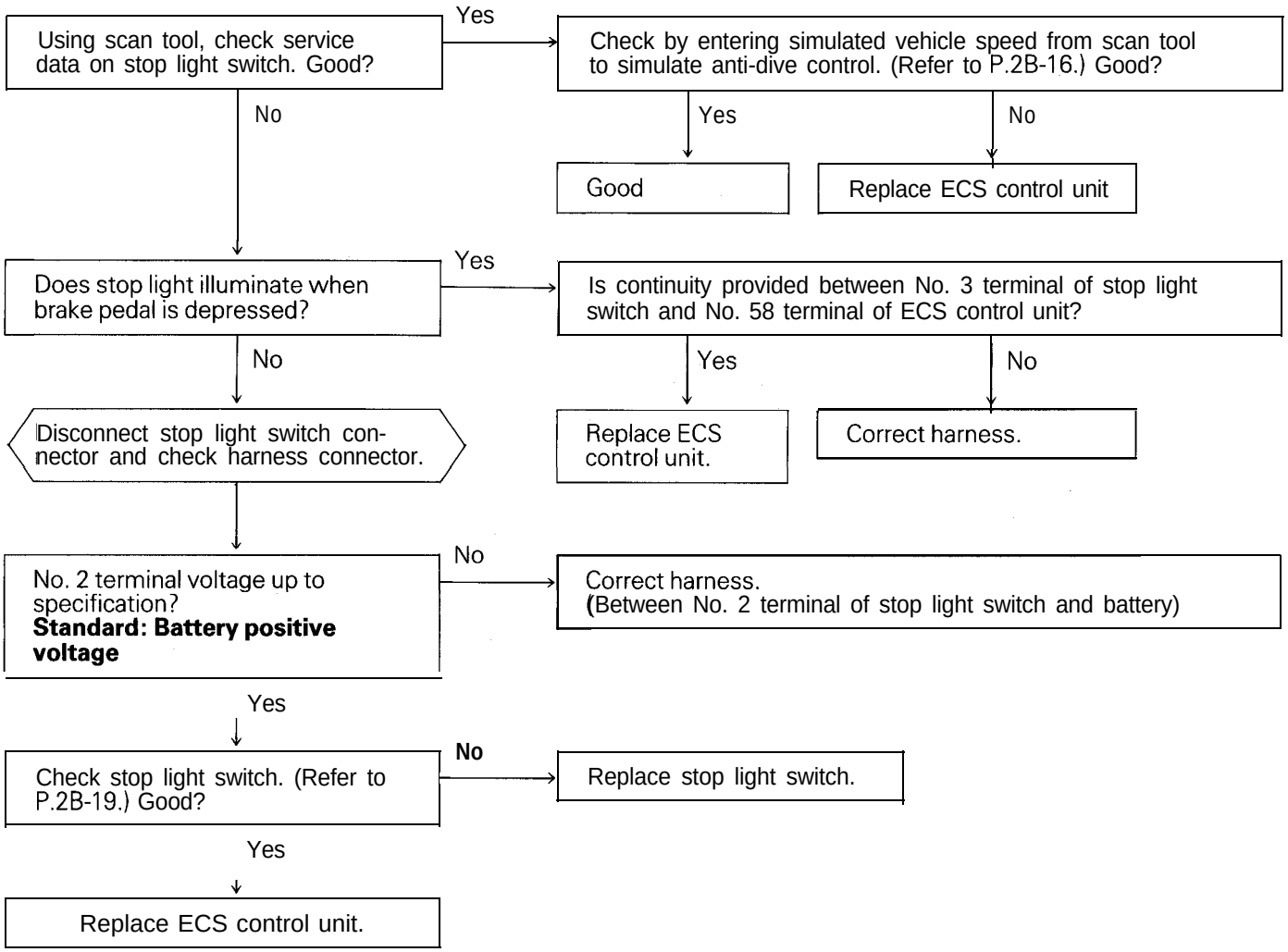
Yes ↓

End

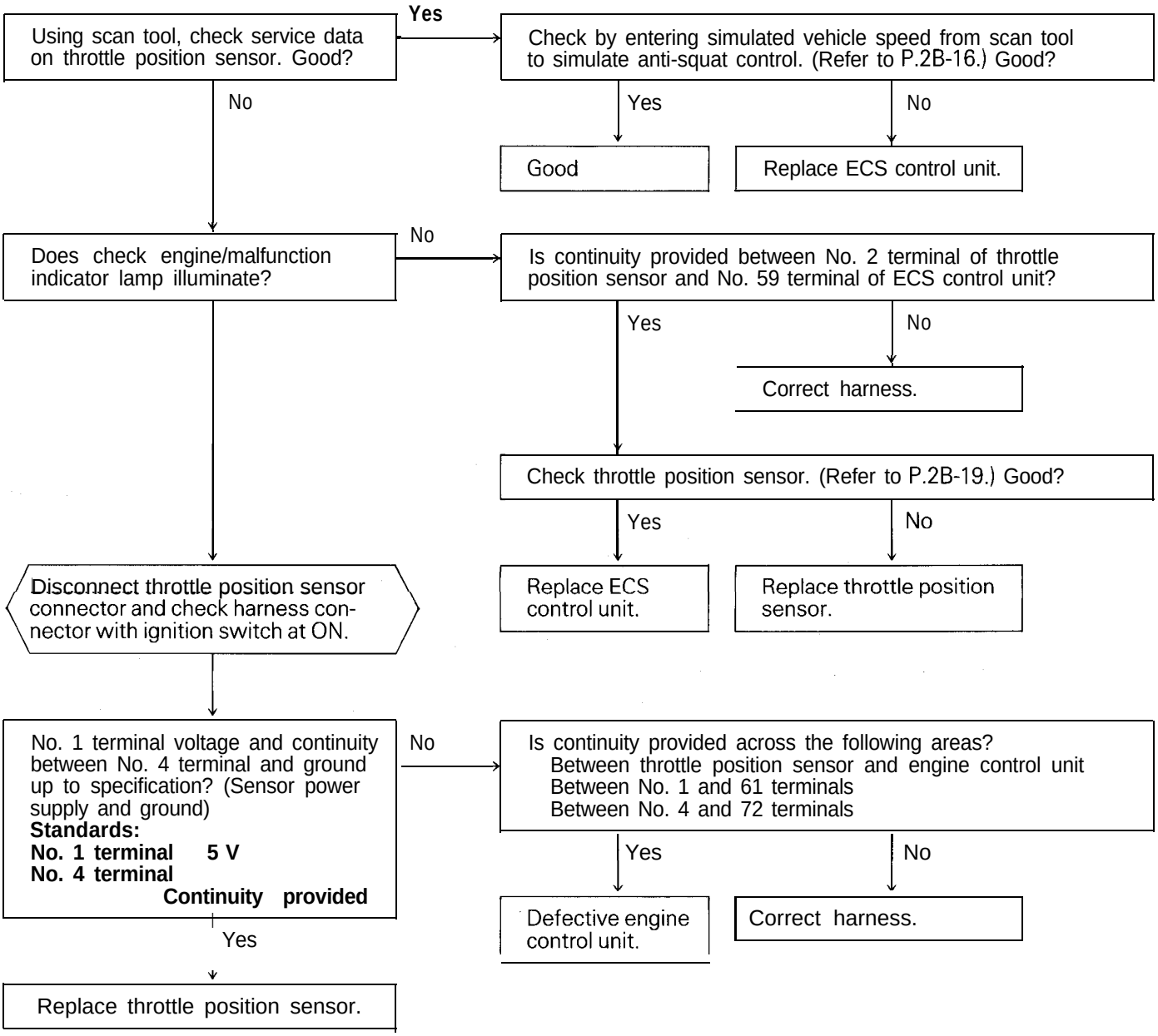
5 ECS indicator light does not switch when ECS switch is operated.

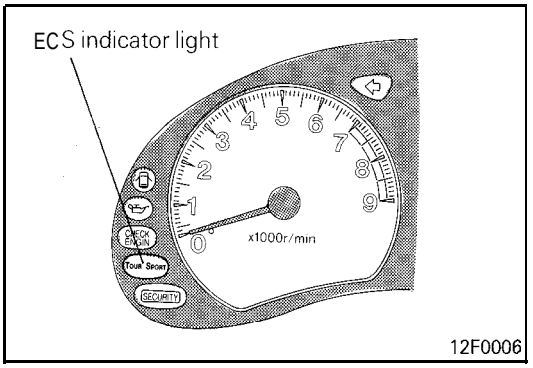


6 Anti-dive control only stops.



7	Anti-squat control only stops.





SERVICE ADJUSTMENT PROCEDURES

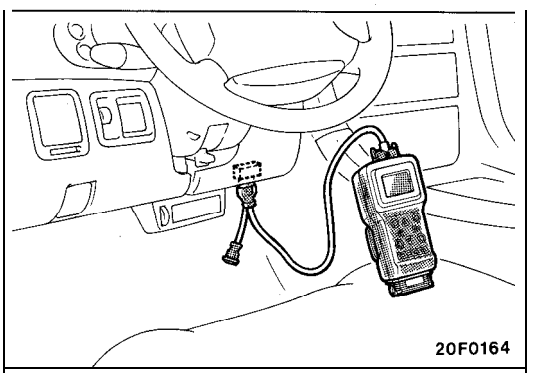
ON-VEHICLE INSPECTION

WARNING INDICATION BY ECS INDICATOR LIGHT

If a problem associated with the following items occurs, the ECS indicator light (Tour Sport) in the combination light flashes at intervals of 0.5 sec. At the same time, the diagnostic trouble code associated with the problem is output to the data link connector.

Warning Indication Items

- G sensor
- Steering angular velocity sensor
- Vehicle speed sensor
- Damping force changeover actuator (including position detection switch)

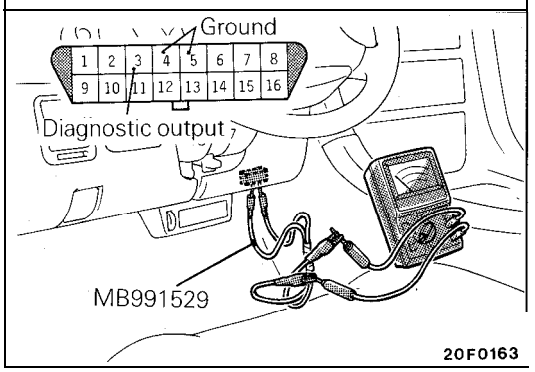


ON-BOARD DIAGNOSTIC OUTPUT CHECK

<When scan tool is used>

Connect the scan tool to the data link connector to read out the diagnostic trouble code.

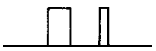
Caution
Turn off the ignition switch beforehand whenever the scan tool is connected or disconnected.



<When voltmeter is used>

Connect a voltmeter to the diagnostic output terminal and the ground terminal of the data link connector. Read out the diagnostic trouble code by observing the voltmeter pointer deflection.

Fail Safe and Diagnosis List

Output Code		Diagnostic Item	Fail Safe
Code No	Indication Pattern		
0		[Good]	[Good]
11		G sensor defective*	• Ride controls (pinching and bouncing control, bad road detection control) stop.
21		Steering angular velocity sensor open-circuited*	• Anti-roll control stops.
24		Vehicle speed sensor open-circuited*	• Steering stability controls (anti-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	• All ECS controls stop. • Normal shock absorber damping force fixed at HARD.
62		F.L. damping force changeover actuator defective	
63		R.R. damping force changeover actuator defective	
64		R. L. damping force changeover actuator defective	

NOTE
(1) Control stop, warning indication and fixed damping force return to normal when the ignition switch is set to OFF. When any of the problems marked* occurs, if no subsequent problem occurs (for example, when the problem is transient), normal operation will be restored even if the ignition switch is not set to OFF.
(2) Even if control stop, warning indication and fixed damping force return to normal as described above, the diagnostic trouble code is stored in the memory in the ECS control unit.
(3) The diagnostic trouble code can be force-cleared by use of the scan tool or by stopping the power supply to the ECS control unit. In addition, it is automatically cleared if the ON/OFF control of the ignition switch is repeated 60 times after the diagnostic trouble code has been output, provided that no new diagnostic trouble code is output during the period.

On-board Diagnostic Determination Conditions

Code No.	What is defective	On-board diagnostic determination conditions
11	G sensor defective	When sensor input of 0.5 or less or 4.5 V or more lasts for more than 10 seconds.
21	Steering angular velocity sensor open-circuited	Open circuit detected on the basis of difference in voltage level of sensor signal.
24	Vehicle speed sensor defective	When throttle opening of 30% (1.5 V) or more lasts for more than 60 seconds with the ignition switch at ON and if there is no input from the vehicle speed sensor during the period, it is regarded as a problem.
61 – 64	Damping force changeover actuator defective	If no damping force changeover is made in a second 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.

SERVICE DATA OUTPUT CHECK

Using the scan tool, check the service data.

Service Data Inspection List

Item No.	Check Point	Check Condition	Soundness Determination Value				
11	G sensor	Vehicle in stationary condition	2.0 – 3.0 V				
		Shake vehicle up and down	Indicated value increases or decreases from 2.5 V				
14	Throttle position sensor	Throttle fully closed	300 – 1,000 mV				
		(Slowly depress accelerator pedal.)	Smoothly increases.				
		Throttle fully opened	4,500 – 5,500 mV				
21	Steering angular velocity sensor	Slowly turn steering wheel counterclockwise	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 scan tool indication coincide.
26	stop light switch	Depress brake pedal.	ON
		Do not depress brake pedal.	OFF
61	F.R. actuator	Tour mode with vehicle stationary	SOFT
		Sport mode with vehicle stationary	HARD
62	F.L. actuator	Tour mode with vehicle stationary	SOFT
		Sport mode with vehicle stationary	HARD
63	R.R. actuator	Tour mode with vehicle stationary	SOFT
		Sport mode with vehicle stationary	HARD
64	R.L. actuator	Tour mode with vehicle stationary	SOFT
		Sport mode with vehicle stationary	HARD

ACTUATOR CHECK

(1) Using the scan tool, force-drive the actuator and fix the damping force changeover.
(2) Check service data (Item No. 61 through 64) to verify that the actuator has been force-driven.

NOTE

- All of the four actuators in the shock absorbers are simultaneously changed over by forced drive.
- The damping force changed over and fixed by forced drive is cleared by the following three conditions.
  1. Ignition switch OFF
  2. Vehicle speed 3 km/h (1.9 mph) or more
  3. Scan tool disconnected

Actuator Check List

Item No.	Check Point	Check Condition	Scan Tool Service Data Item No. 61 – 64 Indicated
01	Damping force SOFT	Vehicle in stationary condition	SOFT
03	Damping force MEDIUM		MEDIUM
04	Damping force HARD		HARD

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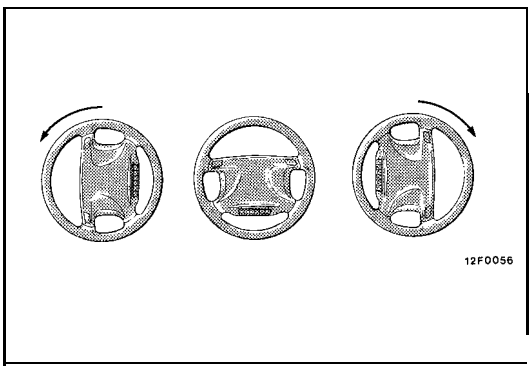
CONTROL FUNCTION SIMULATION CHECK

Using the scan tool, check all control functions during operation with the vehicle in stationary condition.

Anti-Roll Control Function Check

(1) Raise the front wheels on a jack and have them supported by rigid racks.
(2) Place the steering wheel in straight ahead position.
(3) Select the Tour mode by the ECS switch.
(4) Enter a simulated vehicle speed of 100 km/h (62 mph) from the scan tool.
(5) Using the scan tool, check the indications of service data items No. 61 through 64.

Scan tool indication: SOFT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(6) Turn the steering wheel clockwise or counterclockwise from the straight ahead position.
(7) Using the scan tool, check that the indications of service data items No. 61 through 64 change over.

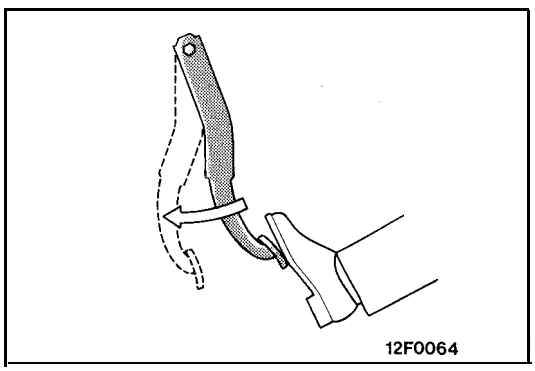
Steering turning speed	Scan tool indication
Approx. 0.3 seconds for 90° rotation	MEDIUM
Approx. 0.2 seconds for 90° rotation	HARD

(8) Check that the original damping force indication (SOFT) is restored a second later.

Anti-Dive Control Function Check

(1) Select the Tour mode by the ECS switch.
(2) Enter a simulated vehicle speed of 100 km/h (62 mph) from the scan tool.
(3) Using the scan tool, check the indications of service data items No. 61 through 64.

Scan tool indication: SOFT


12F0064

(4) Depress the brake pedal and simultaneously change the entered simulated vehicle speed by the scan tool. (Change the speed in 0.4 seconds after depressing the brake pedal.)
(5) Using the scan tool, check that the indications of service data items No. 61 through 64 change over.

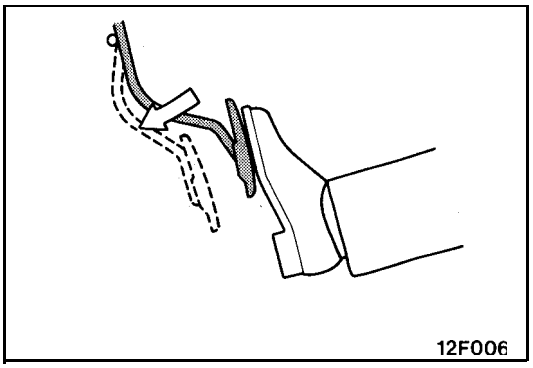
Changing entered simulated vehicle speed	Scan tool indication
100 km/h (62 mph) to 80 km/h (50 mph)	HARD

(6) Check that the original damping force indication (SOFT) is restored a second later.

Anti-Squat Control Function Check

(1) Select the Tour mode by the ECS switch.
(2) Enter a simulated vehicle speed of 30 km/h (19 mph) from the scan tool.
(3) Using the scan tool, check the indications of service data items No. 61 through 64.

Scan tool indication: SOFT



(4) Check that when the accelerator pedal is operated, the indications of service data items No. 61 through 64 on the scan tool change as shown in the following table.
(5) With the simulated vehicle speed at 60 km/h (37 mph) and 90 km/h (56 mph), similarly operate the accelerator pedal and check that the scan tool indications change over.

Entered simulated vehicle speed	Accelerator operating condition	
	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	MEDIJM

(6) Check that when the accelerator pedal is released, the original damping force (SOFT) is restored in less than a second.

High Speed Sensitive Control Function Check

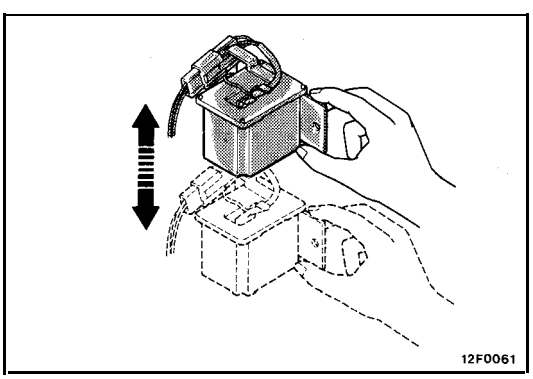
(1) Select the Tour mode by the ECS switch.
(2) Check that when the entered simulated vehicle speed is changed by the scan tool, the indications of service data items No. 61 through 64 change.
(If the simulated vehicle speed is continuously changed by the ⇧ and ⇩ keys of the scan tool, however, the indications of service data items No. 61 through 64 do not change during the period the ⇧ or ⇩ key is pressed.)

Changing entered simulated vehicle speed	Scan tool indication
Acceleration 129 km/h (80 mph) to 130 km/h (81 mph)	SOFT → MEDIUM
Deceleration 120 km/h (75 mph) to 119 km/h (74 mph)	MEDIUM → SOFT

Pitching and Bouncing Control Function Check

(1) Select the Tour mode by the ECS switch.
(2) Using the scan tool, check the indications of service data items No. 61 through 64.

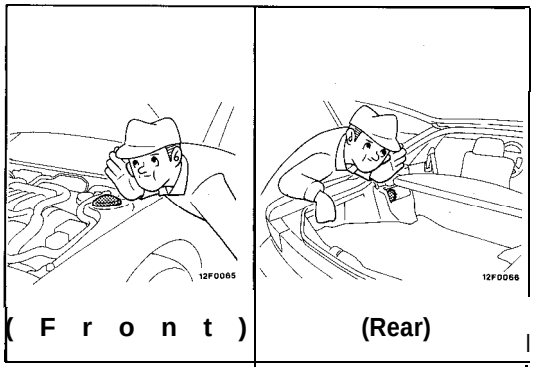
Scan tool indication: SOFT



(3) Remove the G sensor, slowly shake it up and down through a space of about 5 cm (1.9 in.) with the connector connected, and check that the indications of service data items No. 61 through 64 change.

G sensor status	Scan tool indication
Shake up and down at a speed of a round trip in a second.	HARD

(4) Check that when the G sensor is held stationary, the original damping force indication (SOFT) is restored.



ACTUATOR OPERATION CHECK

ACTUATOR OPERATING SOUND CHECK

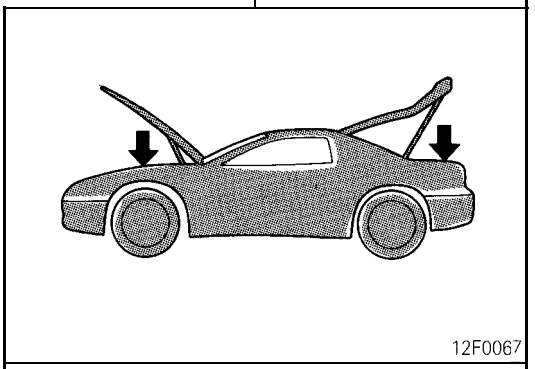
(1) Set the ignition switch to ON.
(2) Bring your ear near the top of the shock absorber.

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.

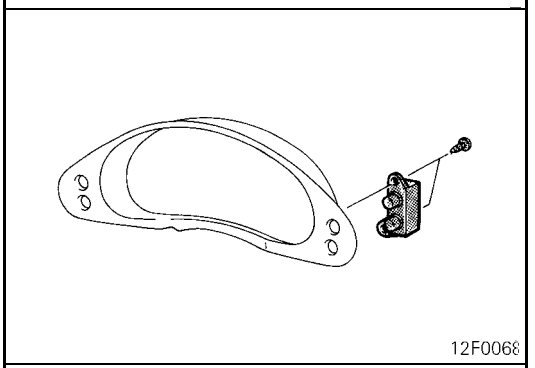
DAMPING FORCE CHECK

(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.



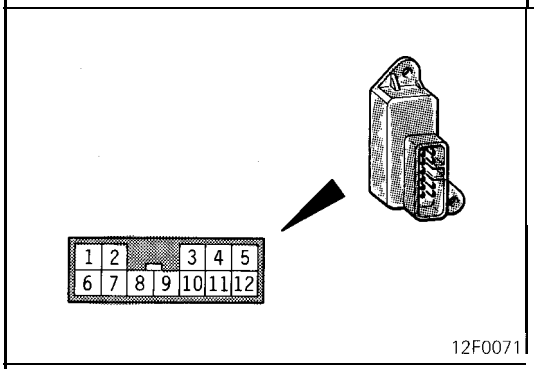
ECS SWITCH

To mount or remove the ECS switch, refer to the section on meters and gauges in GROUP 8 – Chassis Electrical. Remove the meter bezel before mounting or removing the ECS switch.



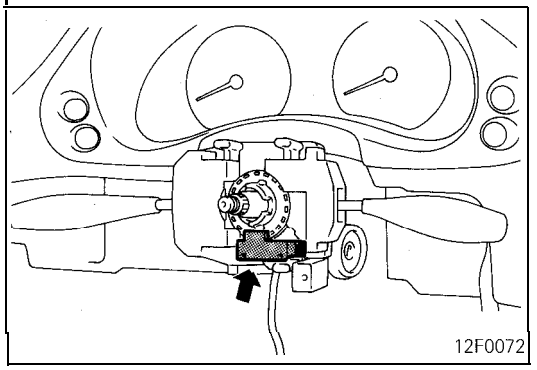
INSPECTION

Operate the switch to check for continuity between the individual terminals.



Switch position \ Terminal		3	4	10	11
ECS switch	ON	C-O	C-O	C-O	C-O
	OFF	C-O	C-O		

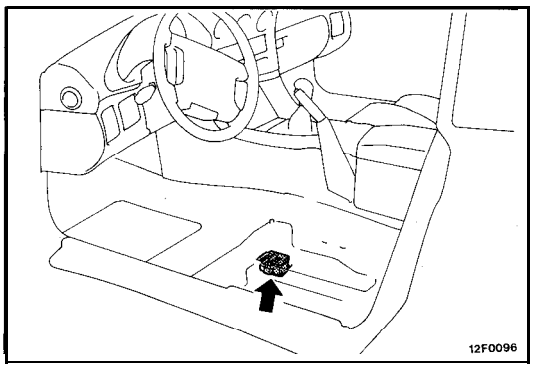
NOTE
C-O indicates that there is continuity between the terminals.



STEERING ANGULAR VELOCITY SENSOR

To mount or remove the steering angular velocity sensor, refer to the section on column switch in GROUP 8 – Chassis Electrical. Remove the steering wheel and clock spring before mounting or removing the sensor.

CAUTION: SRS
Before removal of air bag module, refer to GROUP 23B – SRS Service Precautions and Air Bag Module and Clock Spring.



G SENSOR

To mount or remove the G sensor, refer to the section on front seats in GROUP 23A – Body. Remove the front seat (L.H.) before removing or mounting the sensor.

VEHICLE SPEED SENSOR

To mount or remove the vehicle speed sensor, refer to the section on meters and gauges in GROUP 8 -Chassis Electrical.

INSPECTION

Refer to the section on meters and gauges in GROUP 8 – Chassis Electrical.

THROTTLE POSITION SENSOR

INSPECTION AND ADJUSTMENT

Refer to the section on fuel system in GROUP 14 – Fuel.

STOP LIGHT SWITCH

To remove or mount the stop light switch, refer to the section on brake pedal in GROUP 5 – Brakes.

INSPECTION

Refer to the section on brake pedal in GROUP 5 – Brakes.

POSITION DETECTION SWITCH and DAMPING FORCE CHANGEOVER ACTUATOR

To remove or mount the position detection switch and damping force changeover actuator, refer to the section on strut assembly in GROUP 2A – Front Suspension and the section on shock absorber assembly in GROUP 17 – Rear Suspension.

Caution

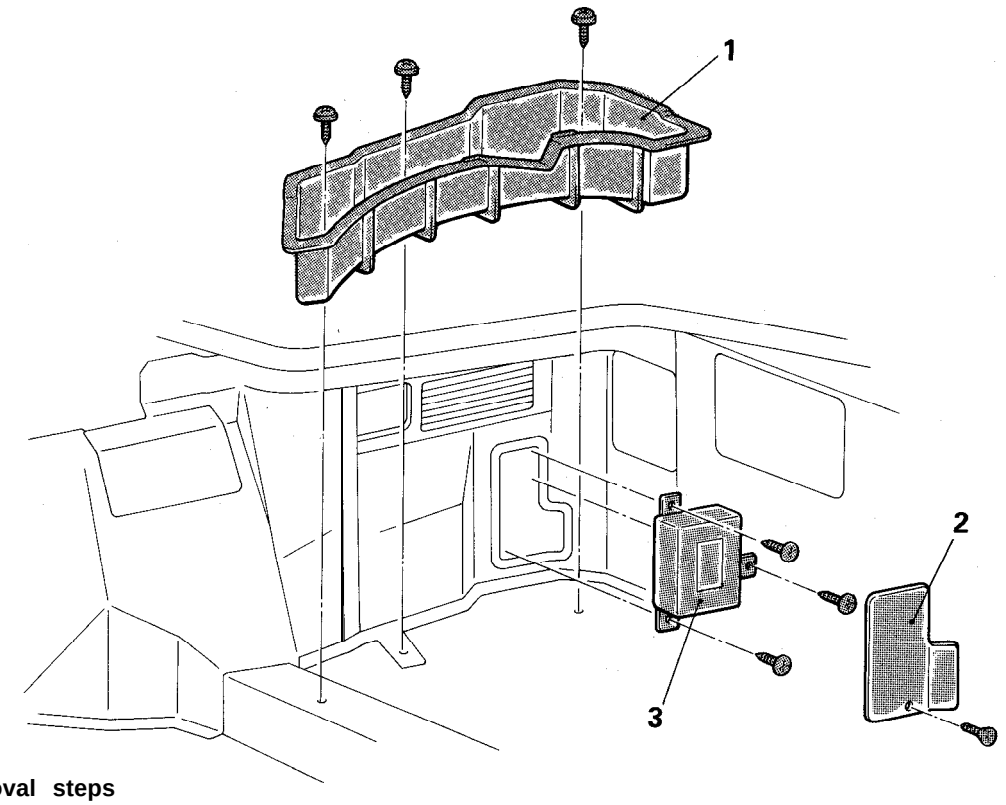
The position detection switch and damping force changeover actuator are built into the shock absorber assemblies of front and rear suspensions. Since they are of the non-disassembly type, remove or mount them in the form of a strut assembly or shock absorber assembly.

ECS INDICATOR LIGHT

To remove or mount the ECS indicator lights, refer to the section on meters and gauges in GROUP 8 – Chassis Electrical.

ECS CONTROL UNIT

REMOVAL AND INSTALLATION



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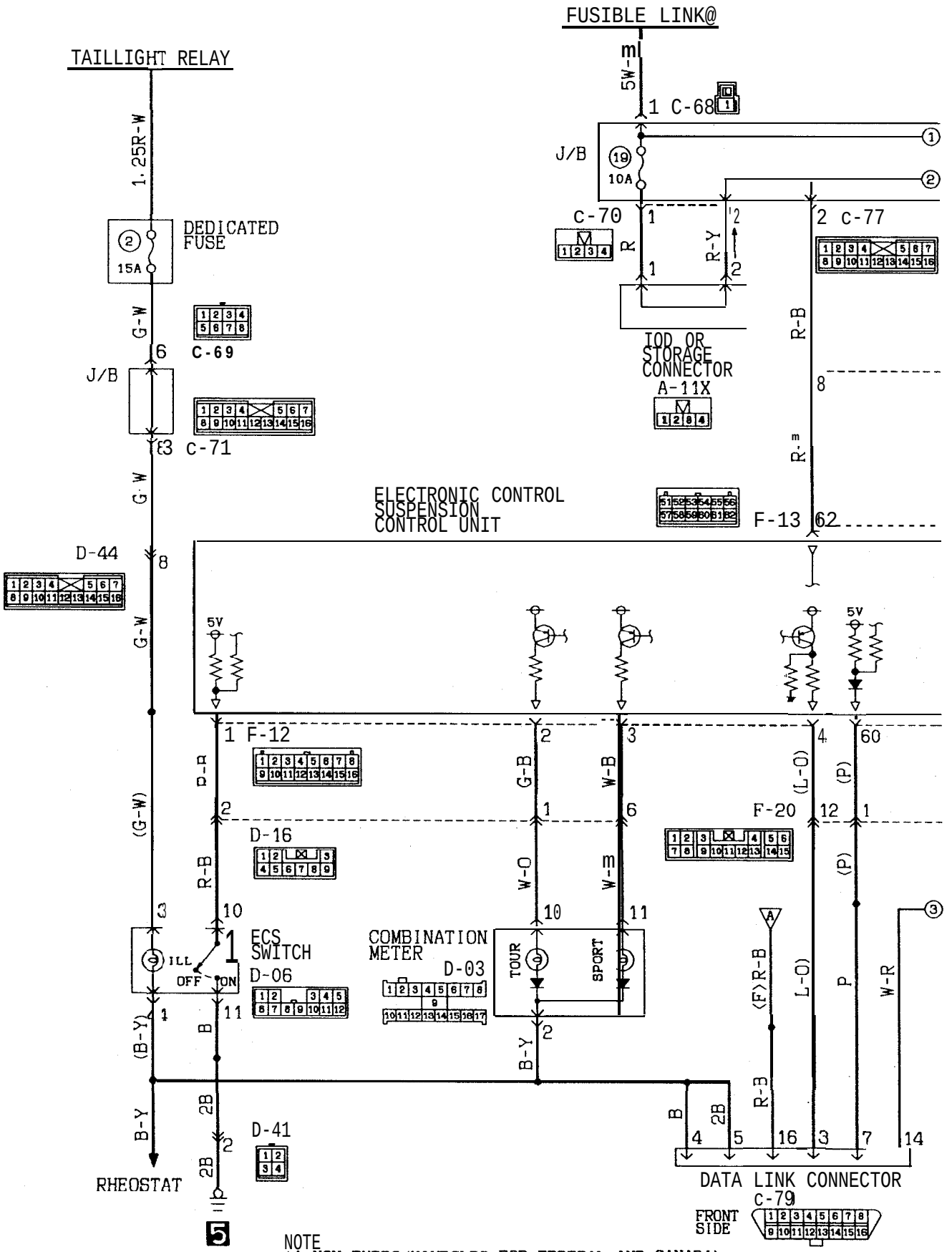
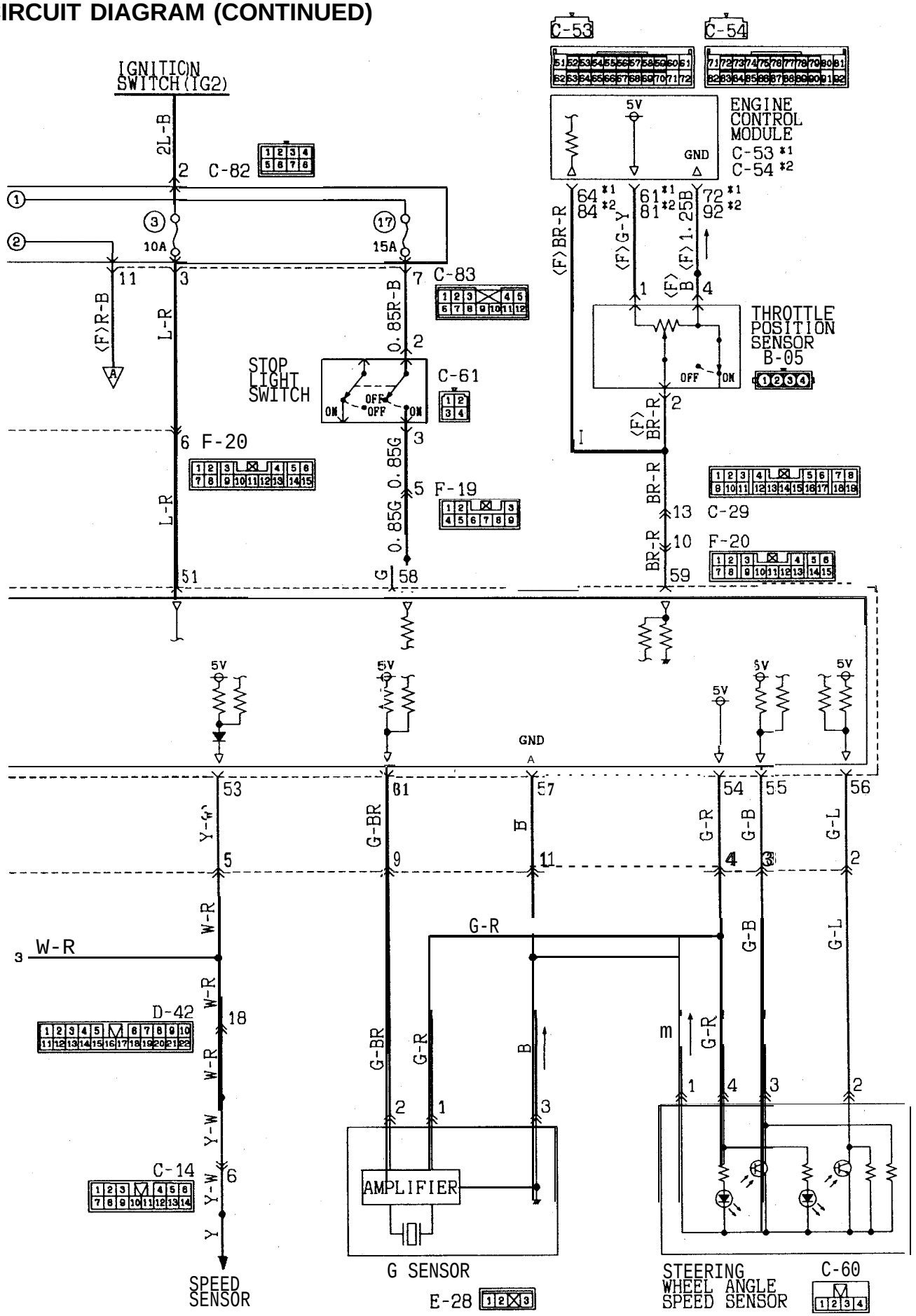
Removal steps

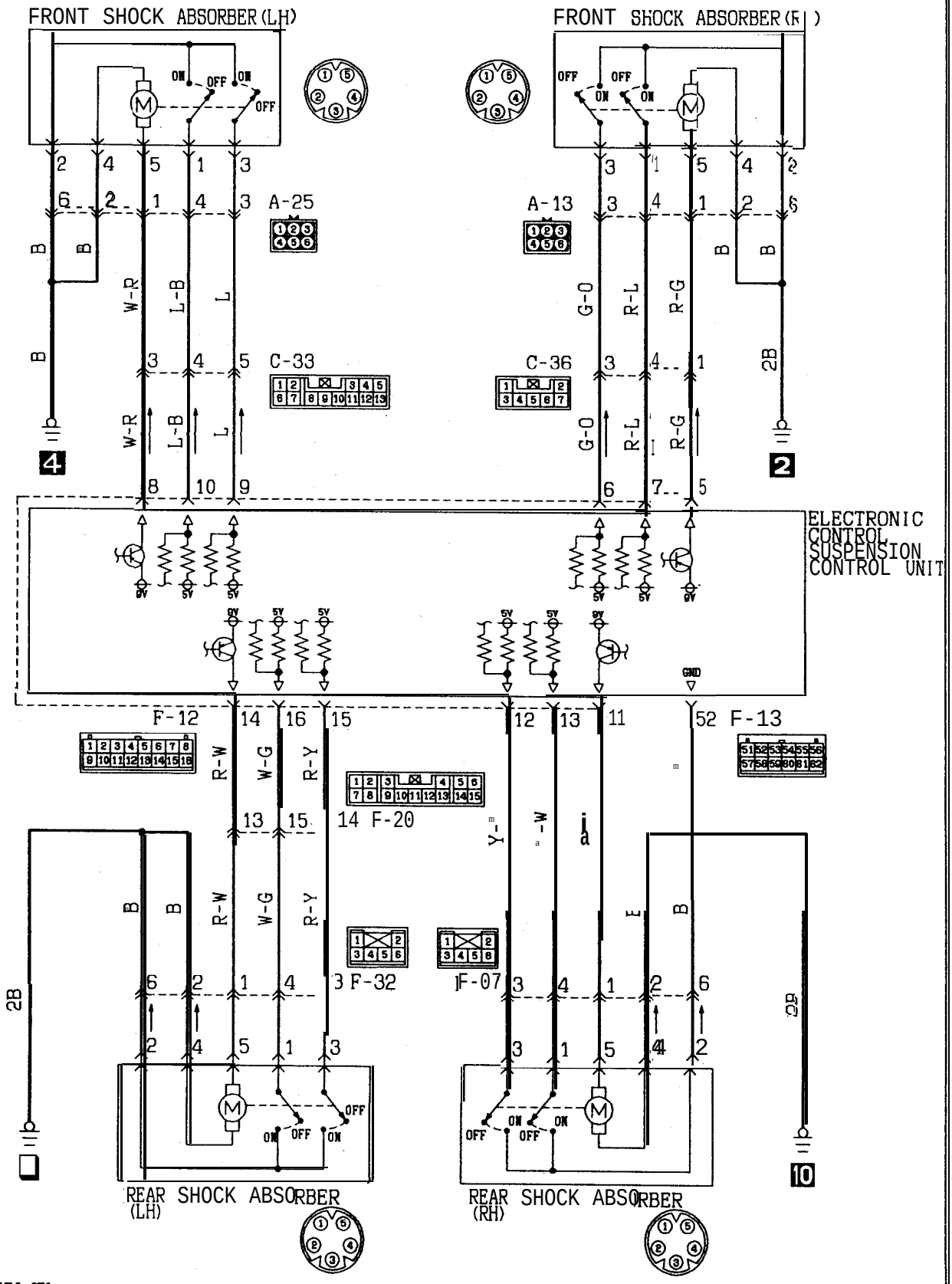
1. Cargo floor box (R.H.)
2. Lid
3. ECS control unit

CIRCUIT DIAGRAM



CIRCUIT DIAGRAM (CONTINUED)





KX35-AC-R1515A-NM

REAR AXLE

CONTENTS

SPECIFICATIONS

GENERAL SPECIFICATIONS

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	3.307
Differential gear type and configuration	
Side gear	Straight bevel gear x 2*
Pinion gear	Straight bevel gear x 4
Number of teeth	
Drive gear	43
Drive pinion	13
Side gear	16
Pinion gear	10
Bearing	
O.D. x I.D. mm (in.)	
Side	82.500 x 45.242 (3.25 x 1.78)
Front	68.263 x 30.163 (2.69 x 1.19)
Rear	76.200 x 36.513 (3.00 x 1.44)

NOTE
*: Denotes the gear (L.H.) which is in a single body with the viscous coupling
B.J.: Birfield Joint
T.J.: Tripod Joint

SERVICE SPECIFICATIONS

Items	Specifications
Standard value	
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 wheel bearing rotary-sliding resistance N (lbs.)	12 (2.6)
Rear axle total backlash mm (in.)	5 (.2)
Drive gear runout mm (in.)	0.05 (.002)
Rear wheel bearing end play mm (in.)	0.8 (.031)

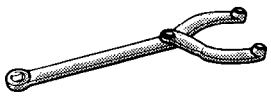
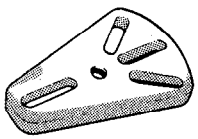
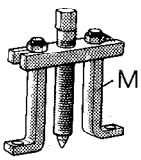
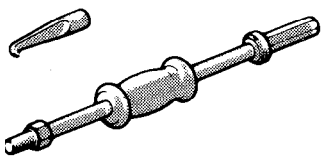
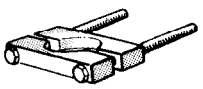
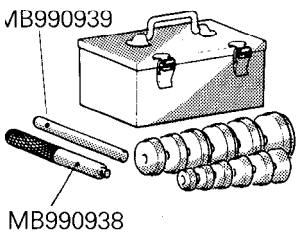
LUBRICANTS

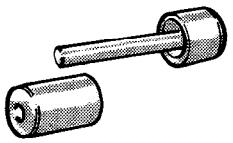
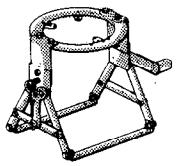
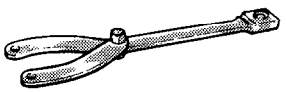
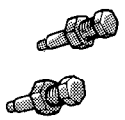
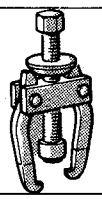
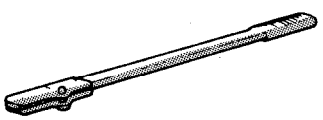
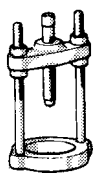
Items	Specified lubricants	Quantity
Rear axle gear oil	MOPAR Hypoid Gear Oil API classification GL-5 or higher Above -23°C (-10°F) SAE90, 85W-90, 80W-90 From -34°C (-30°F) to -23°C (-10°F) SAE 80W, 80W-90 Below -34°C (–30°F) SAE 75W	1.1dm³ (1.2 qts.)
B.J. boot grease T.J. boot grease	Repair kit grease	125 g (4.41 oz.) 135 g (4.76 oz.)
Oil seal lip Washer of special tool (MB990901) Companion flange contacting surface of the washer Outer bearing seal lip surface	MOPAR Multi-Mileage Lubricant Part No. 2525035 or equivalent	As required

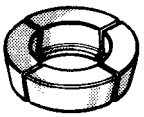
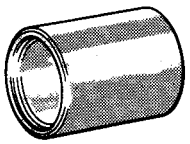
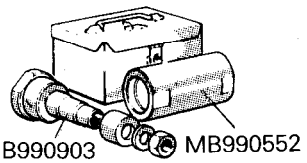
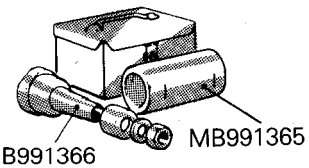
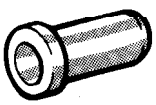
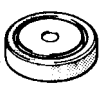
SEALANTS AND ADHESIVES

Items	Specified sealants and adhesives
Drive gear threaded hole	MOPAR Part No. 4318031 or 4318032 or equivalent

SPECIAL TOOLS

Tool number and tool name	Replaced by Miller tool number	Application
 MB990767 End yoke holder	C-3281	Holding of hub
 MB991354 Puller body	General service tool	Removal of the axle shaft *1: C-P-D Dealers *2: Eagle Dealers
 MB990242 MB990241 Rear axle shaft puller MB990242 Puller bar	CT-1003	
 MB990211 Sliding hammer and adapter	C-637*1 7420 and 7420-8*2	
 MB990560 Bearing remover	P334	Removal of the axle shaft dust shield, outer bearing and rear rotor Press-in the outer wheel bearing and rear rotor
 MB990939 MB990925 Bearing and oil seal installer set MB990938	General service tool (Use universal driver set)	Removal of axle shaft inner bearing MB990938, MB990928 Installation of axle shaft inner bearing MB990938, MB990931 Installation of drive pinion rear bearing outer race MB990938, MB990936 Installation of drive pinion front bearing outer race MB990938, MB990934 Installation of differential side oil seal MB990938 (Use in conjunction with MB991380) Removal of drive pinion front bearing and drive pinion rear bearing outer race MB990938 Adjustment of differential final gear tooth contact MB990938

Tool number and tool name	Replaced by Miller tool number	Application
 MB990641 Lower arm bushing installer and remover A	MB990641	Press-fitting of axle housing oil seal
 MB990799 Ball joint dust shield installer	MB990799	Press-fitting the axle shaft dust shield
 MB990909 Working base	General service tool	Disassembly and reassembly of differential carrier assembly (Use in conjunction with adapter MB991116)
 MB991116 Working base adapter	General service tool	
 MB991367 Special spanner	6568	Removal and installation of side bearing nut
 MB991385 Pin	MB991385	
 MB990810 Bearing puller	P-334	Removal of the side bearing inner race, drive pinion rear bearing inner race and companion flange
 MB990850 End yoke holder	C-3281	Removal and installation of companion flange
 M B990339	C-293PA	Removal of drive pinion rear bearing inner race

Tool number and tool name	Replaced by Miller tool number	Application
 MB990648	C-293-45	Removal of drive pinion rear bearing inner race
 MB990890 Rear suspension bushing base	MB990890	Press-fitting of drive gear
 MB990901 Drive pinion setting gauge set	C-4626	Drive pinion height adjustment MB990903 (Use in conjunction with MB991366)
 MB991378 Drive pinion setting gause set	MB991365-A	MB991365
 MB990326 Preload socket	General service tool	Measurement of the drive pinion preload
 MB991168 Oil seal installer	MB991168-A	Press-fitting of the drive pinion oil seal
 M B990728 Bearing installer	MD998909	Press-fitting of the drive pinion rear bearing inner race
	MD998911	Press-fitting of the side bearing inner race
 MB991380 Oil seal installer	MB991380-A	Press-fitting of differential oil seal
 MB991294 Side gear holding tool	MB991294	Inspection of differential gear backlash

TROUBLESHOOTING

Symptom	Probable cause	Remedy
AXLE 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	Replace
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
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,		
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
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,		

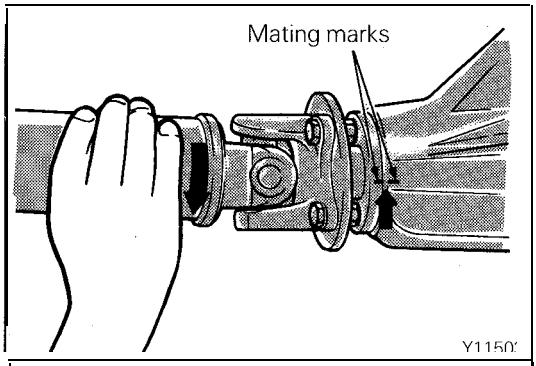
Symptom	Probable cause	Remedy
Gear oil leakage	Worn or damaged front oil seal, or an improperly installed oil seal Damaged gasket	Replace
	Loose companion flange self-locking nut	Retighten or replace
	Loose filler or drain plug	Retighten or apply adhesive
	Clogged or damaged vent plug	Clean or replace
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
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.		
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
NOTE In addition to disassembling and replacing the failed parts, be sure to check all components for irregularities and repair or replace as necessary.		
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

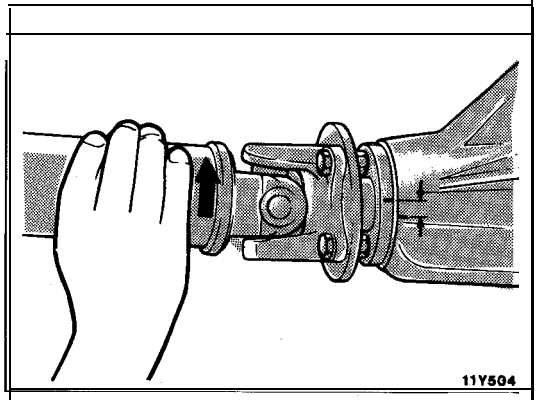
REAR AXLE TOTAL BACKLASH CHECK

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.)

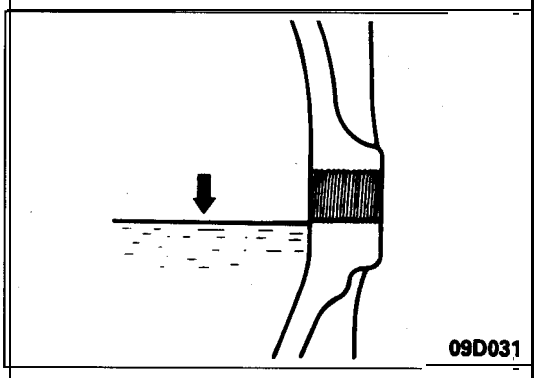
(4) If the backlash exceeds the limit, remove the differential carrier assembly and adjust the backlash. (Refer to P.3-22.)

GEAR OIL LEVEL CHECK

1. Remove the filler plug, and check the oil level.
2. The oil level is sufficient if it reaches the filler plug hole.

Specified gear oil:
MOPAR Hypoid Gear Oil API classification GL-5 or higher [1.1 dm³ (1.2 qts.)]

NOTE
Above -23°C (-10°F): SAE 90, 85W-90, 80W-90
From -34°C (–30°F) to -23°C (-10°F): SAE 80W, 80W-90
Below -34°C (-30°F): SAE 75W

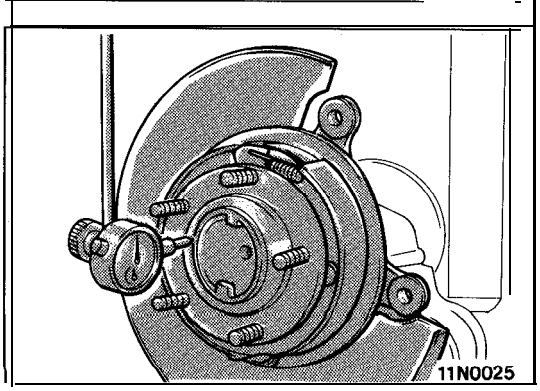


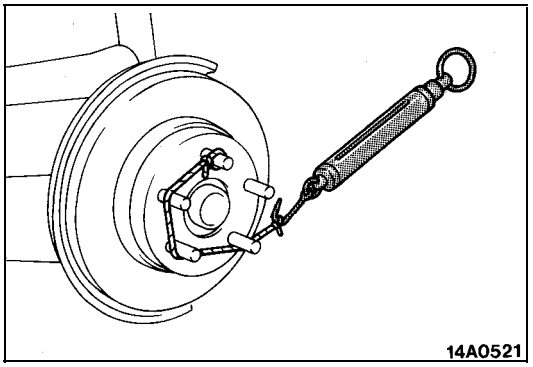
REAR WHEEL BEARING END PLAY CHECK

1. Support the vehicle on axle stands positioned at the specified locations and remove the rear wheel.
2. Separate the parking brake cable from the rear brake.
3. Remove the caliper assembly and brake disc.
4. Place a dial gauge as shown in the illustration, and then measure the play when the axle shaft is moved in the axial direction.

Limit: 0.8 mm (.031 in.)

5. If the play exceeds the limit, check the tightening torque of the companion flange of the axle shaft; if it is correct, replace the wheel bearing.

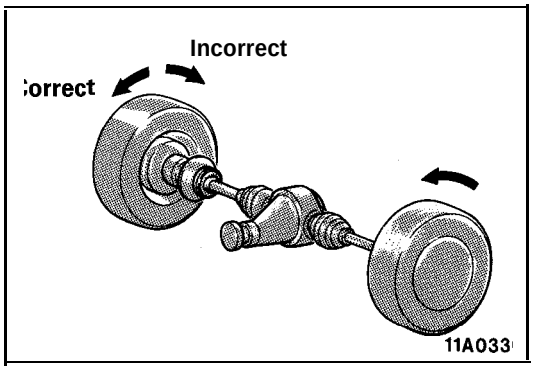




REAR WHEEL BEARING ROTARY-SLIDING RESISTANCE CHECK

1. Remove the drive shaft from the companion flange.
2. Remove the brake pad or caliper assembly.
3. Attach a spring balance to the hub bolt, then, pulling the balance at a right angle to the hub bolt, measure the rotary-sliding resistance to see whether it is within the limit value.

   Limit: 12 N (2.6 lbs.) or less
4. If the rotary-sliding resistance exceeds the limit value, check the tightening torque of the axle shaft companion flange. If it is normal, replace the bearing.

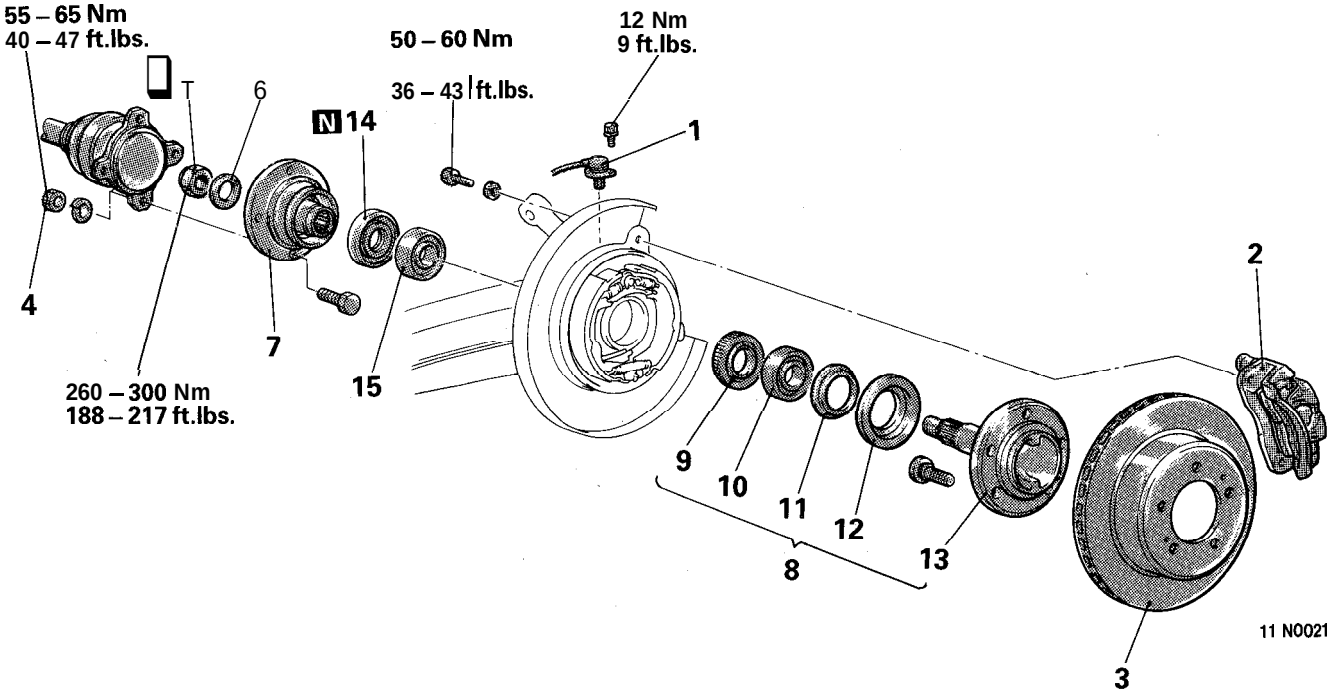


LIMITED-SLIP DIFFERENTIAL CHECK

1. Block the front wheels and move the shift lever to neutral.
2. Completely release the parking brake.
3. Jack up the rear wheels and place a rigid rack at the specified part of the side sill.
4. Disconnect the coupling of the differential and propeller shaft.
5. When one wheel is slowly rotated, check whether or not the wheel on the other side turns in the same direction.
6. If it turns in the opposite direction, replace the viscous unit.

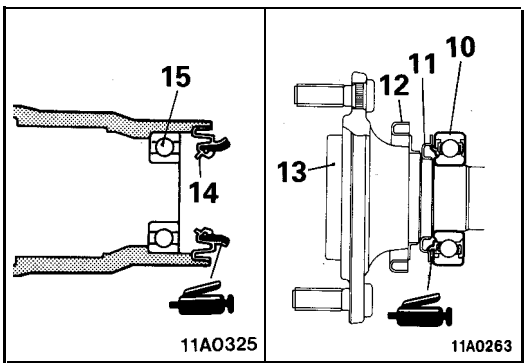
AXLE SHAFT

REMOVAL AND INSTALLATION

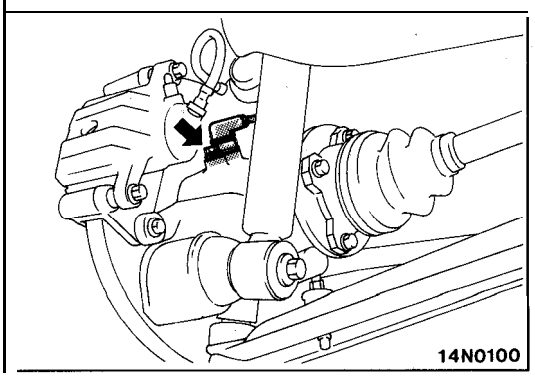


Removal steps

- ◆ ☒ 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
- ◆◆ ● C 9. Rear rotor <Vehicles with A.B.S.>
- ◆◆ ◆◆ 10. Outer bearing
- ◆◆ ● + 11. Dust shield
- ● C 12. Dust shield
- 13. Axle shaft
- ◆◆ ● 4 14. Oil seal
- ◆◆ ● C 15. Inner bearing



Grease: MOPAR Multi-Mileage Lubricant Part No. 2525035 or equivalent



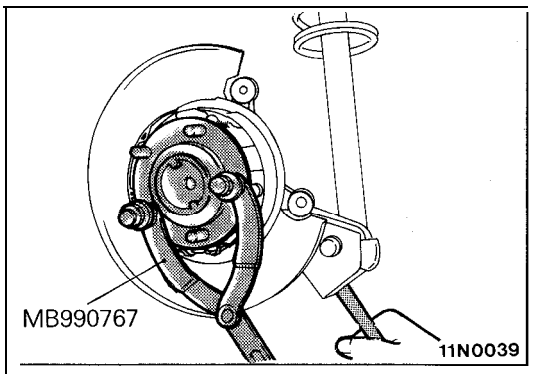
SERVICE POINTS OF REMOVAL

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.

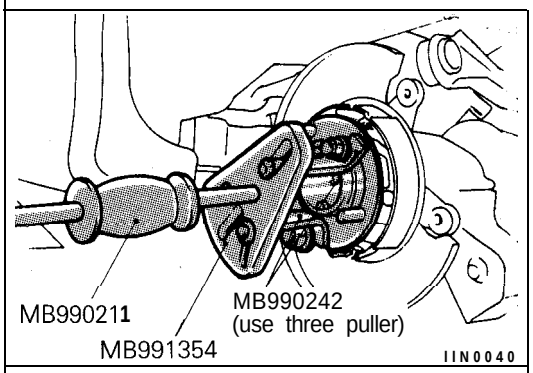
2. REMOVAL OF BRAKE CALIPER ASSEMBLY

Remove the brake caliper assembly and suspend it with a piece of wire.



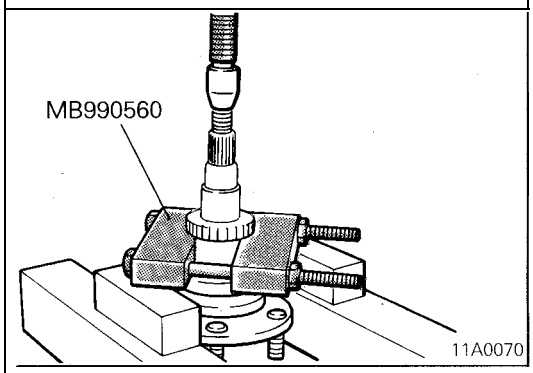
5. REMOVAL OF SELF-LOCKING NUT

With the special tool, secure the axle shaft and remove the companion flange self-locking nut.



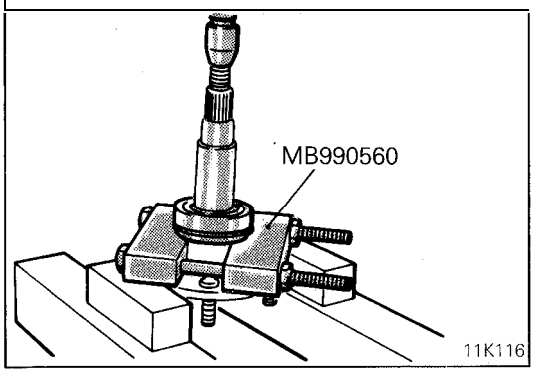
8. REMOVAL OF AXLE SHAFT ASSEMBLY

With the special tool, remove the axle shaft from the axle housing.



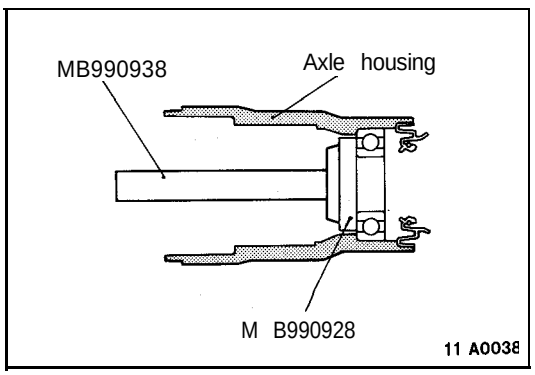
9. REMOVAL OF REAR ROTOR <VEHICLES WITH A.B.S.>

With the special tool, remove the rear rotor from the axle shaft.



10. REMOVAL OF OUTER BEARING / 11. DUST SHIELD

With the special tool, remove the outer bearing and dust shield concurrently from the axle shaft.

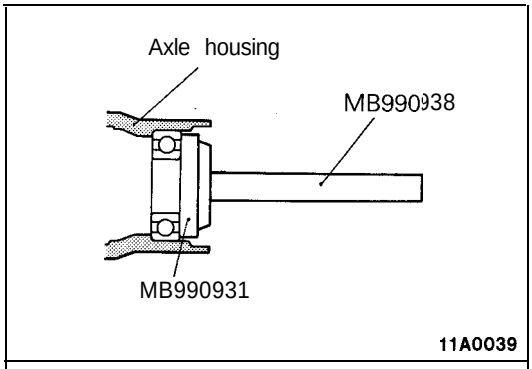


14. REMOVAL OF OIL SEAL / 15. INNER BEARING

With the special tool, remove the inner bearing and oil seal from the axle housing.

INSPECTION

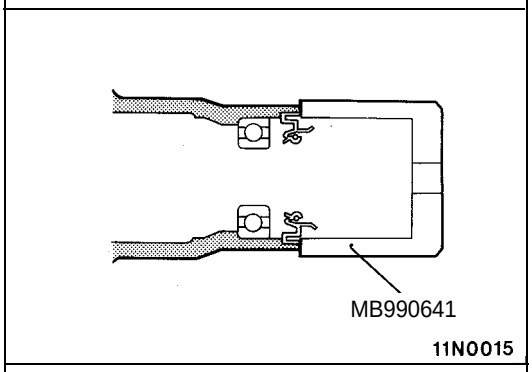
- Check the companion flange for wear or damage.
- Check the dust shield for deformation or damage.
- Check the wheel bearings for burning or discoloration.
- Check the wheel bearing for unsmooth rotation.
- Check the axle shaft for cracking, wear or damage.
- Check oil seal for cracking or damage.



SERVICE POINTS OF INSTALLATION

15. INSTALLATION OF INNER BEARING

With the tool, press fit the inner bearing onto the axle housing.



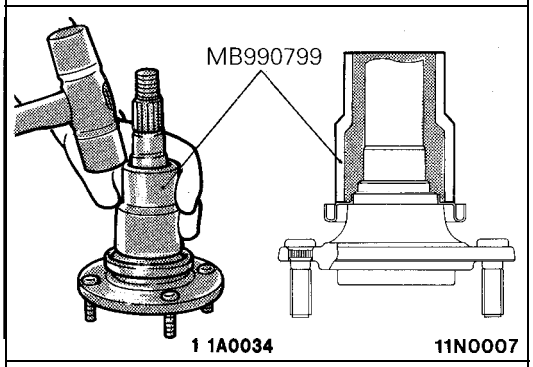
14. INSTALLATION OF OIL SEAL

(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.

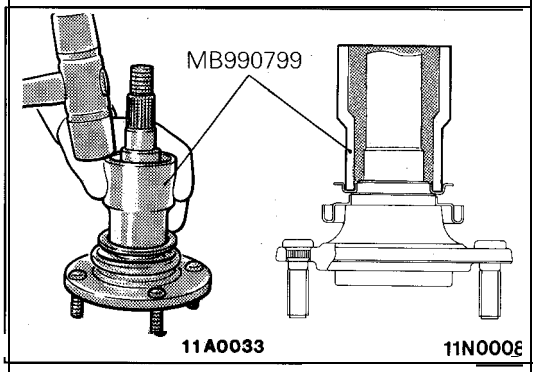
Specified grease: MOPAR Multi-Mileage Lubricant Part No. 2525035 or equivalent



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.

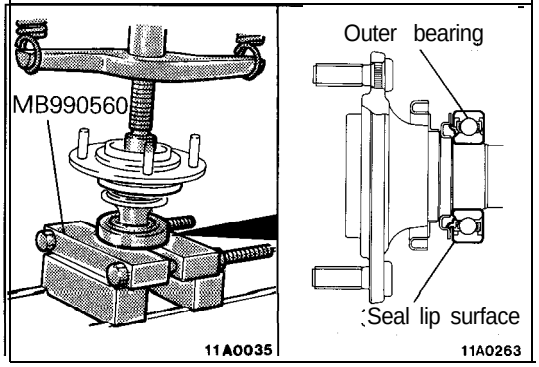
NOTE
When tapping the oil seal in, use a plastic hammer to lightly tap the top and circumference of the special tool, press fitting gradually and evenly.



11. 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.

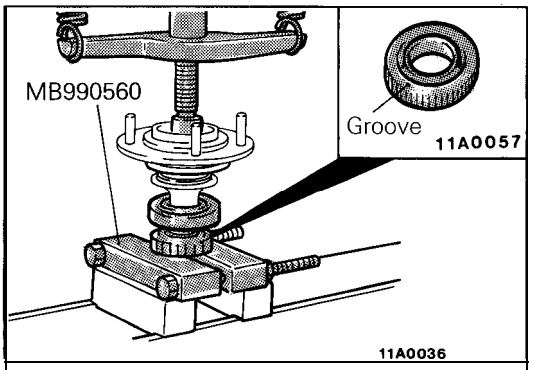


10. INSTALLATION OF OUTER BEARING

(1) Apply multipurpose grease around the entire circumference of the inner side of the outer bearing seal lip.

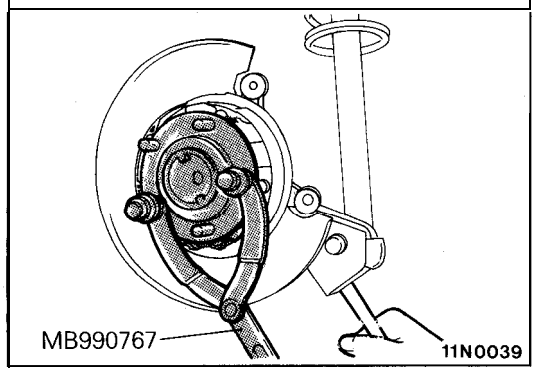
Specified grease: MOPAR Multi-Mileage Lubricant Part No. 2525035 or equivalent

(2) With the special tool, press fit the outer bearing to the axle shaft so that the bearing seal lip surface is facing towards the axle shaft flange.



9. INSTALLATION OF REAR ROTOR <VEHICLES WITH A.B.S.>

With the special tool, press fit the rear rotor to the axle shaft with the rear rotor groove surface toward the axle shaft flange.

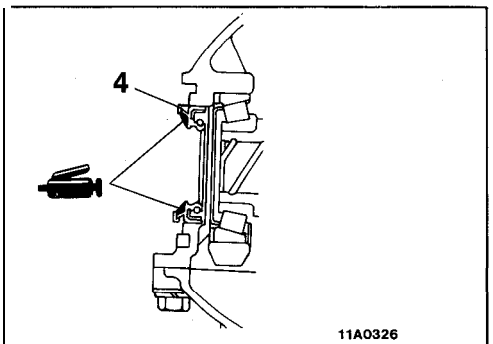


5. INSTALLATION OF SELF-LOCKING NUT

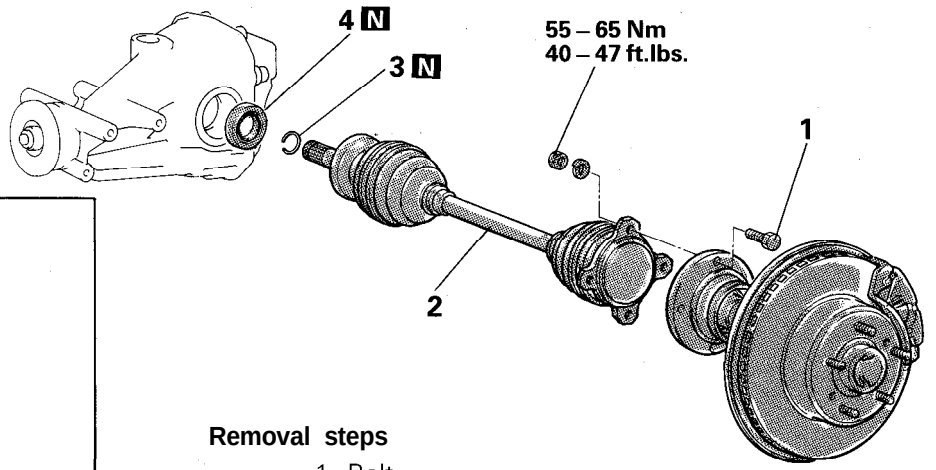
With the special tool, secure the axle shaft and tighten the companion flange self-locking nut.

DRIVE SHAFT

REMOVAL AND INSTALLATION

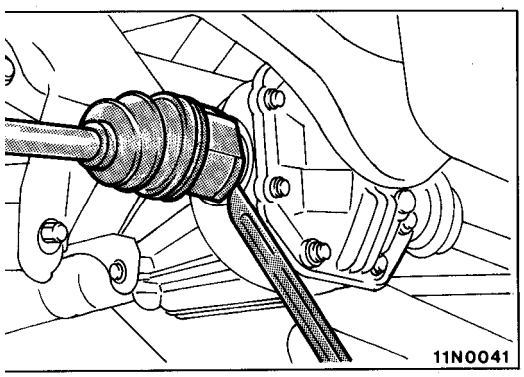


Grease: MOPAR Multi-Mileage Lubricant Part No. 2525035 or equivalent



Removal steps

1. Bolt
◆■▶◆■ 2. Drive shaft
3. Circlip
● * 4. Oil seal



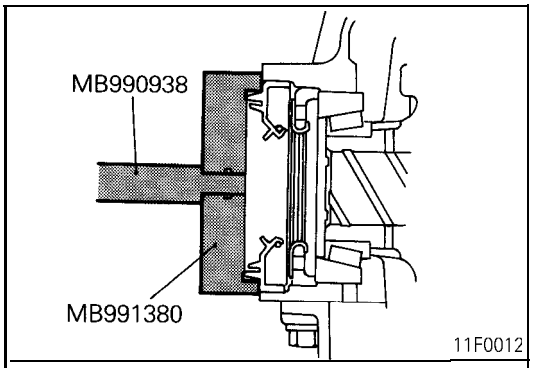
SERVICE POINT OF REMOVAL

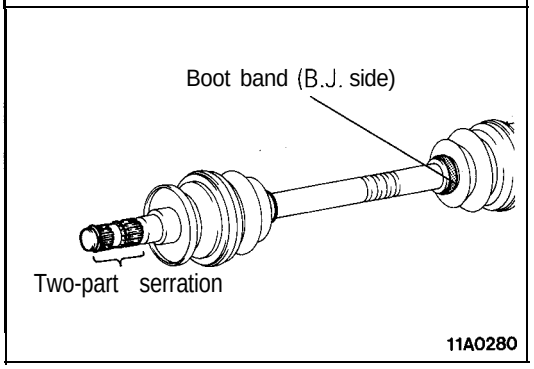
2. REMOVAL OF DRIVE SHAFT

Using a tire lever, etc. remove the drive shaft from the differential carrier.

INSPECTION

- Check the drive shaft boots for damage or deterioration.
- Check the ball joints for excessive play or check operation.
- Check the drive shaft spline for wear or damage.





SERVICE POINTS OF INSTALLATION

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.

Specified grease: MOPAR Multi-Mileage Lubricant Part No. 2525035 or equivalent

2. INSTALLATION OF DRIVE SHAFT

Caution

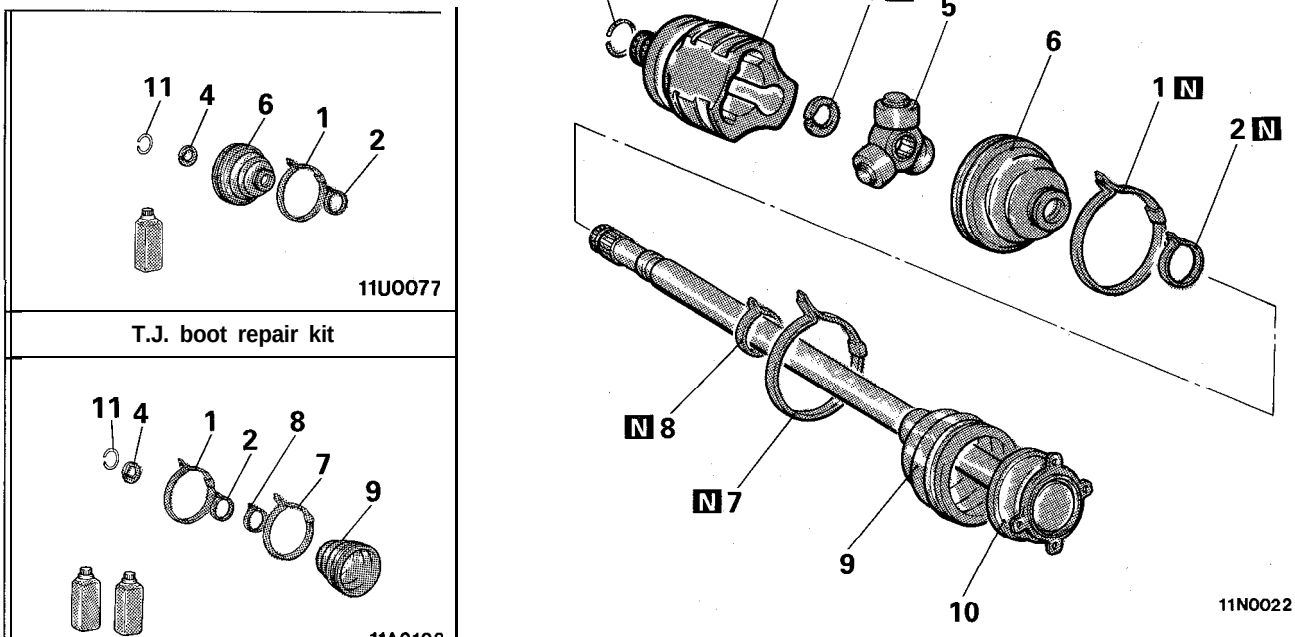
1. **Be cautious to ensure that the differential carrier oil seal is not damaged by the drive shaft spline.**
2. **The right drive shaft for models equipped with the LSD having a VCU has a two-part serration. Be very careful to install each one on the correct side.**

NOTE
The left and right drive shafts can also be distinguished from each other by the identification color of boot band (B.J. side).

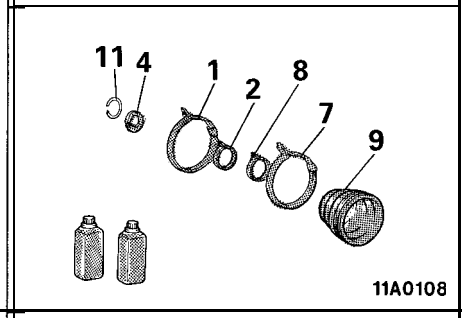
Item	Drive shaft	
	LH	RH
Boot band (B.J. side) identification color	White	Blue

3. **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.**

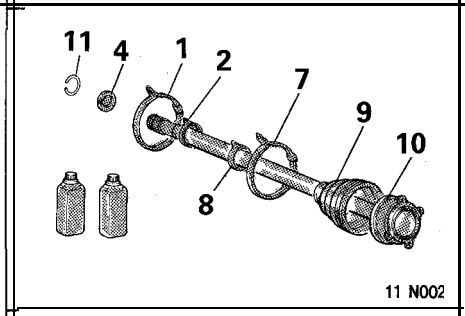
DISASSEMBLY AND REASSEMBLY



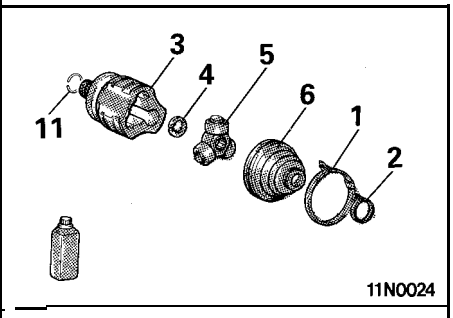
T.J. boot repair kit



B.J. boot repair kit



B.J. repair kit

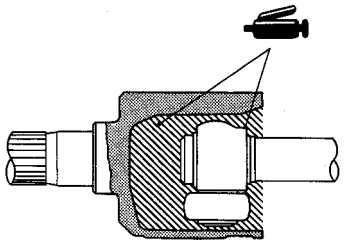


T.J. repair kit

Disassembly steps

- ◆◆ 1. T.J. boot band (large)
- ◆◆ 2. T.J. boot band (small)
- 3. T.J. case
- ◆◆ 4. Snap ring
- ◆◆ ● a 5. Spider assembly
- ● ● C 6. T.J. boot
- ● * 7. B.J. boot band (large)
- ● e 8. B.J. boot band (small)
- ● ☒ ● C 9. B.J. boot
- ◆◆ 10. B.J. assembly
- 11. Circlip

Lubrication Points



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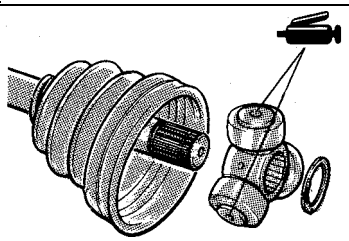
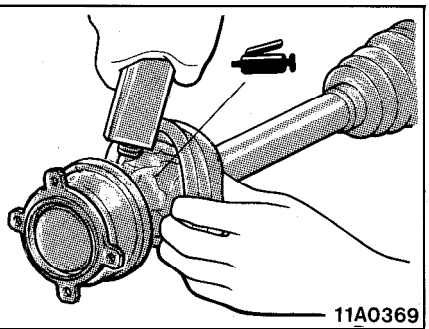


11E56C

Grease: Repair kit grease
Quantity to use: 135 g (4.76 oz.)

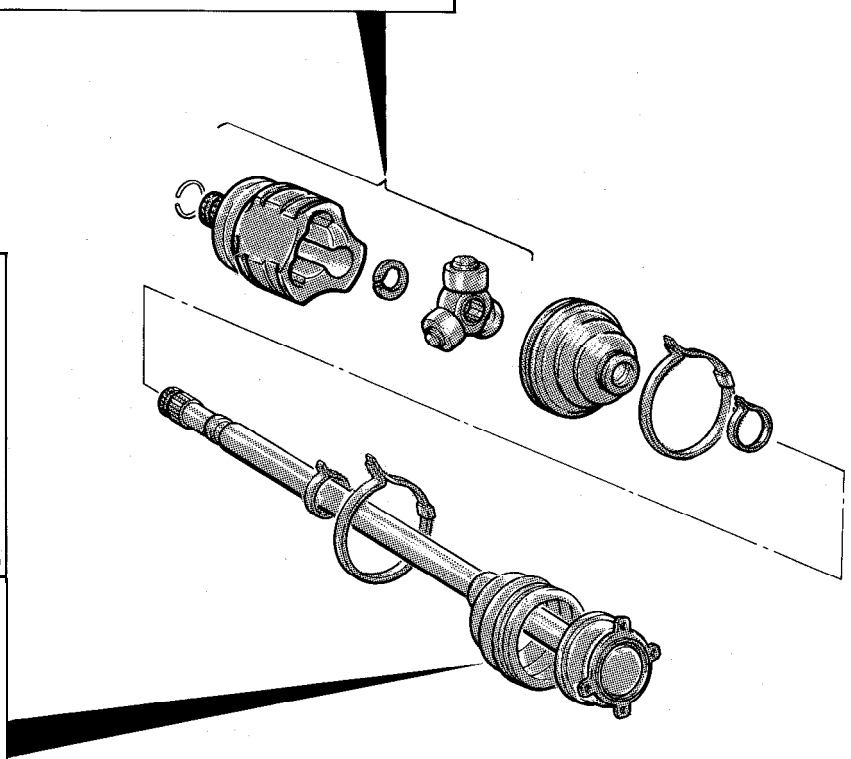
Caution
Apply all of the grease from the repair kit to the joint and boot, a half to each as a rule.
Special grease is used for the joint. Do not mix old grease with new or mix different types.



11A0369

Grease: Repair kit grease
Quantity to use: 125 g (4.41 oz.)

Caution
Apply all of the grease from the repair kit to the joint and boot, a half to each as a rule.
Special grease is used for the joint. Do not mix old grease with new or mix different types.



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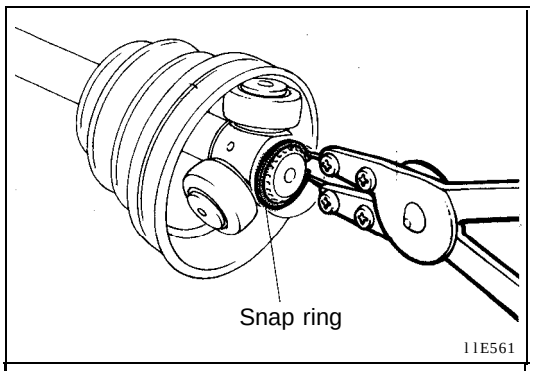
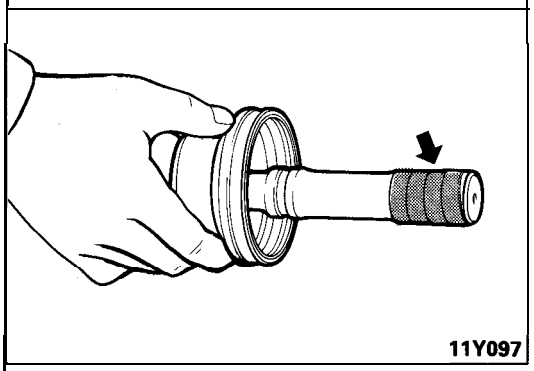
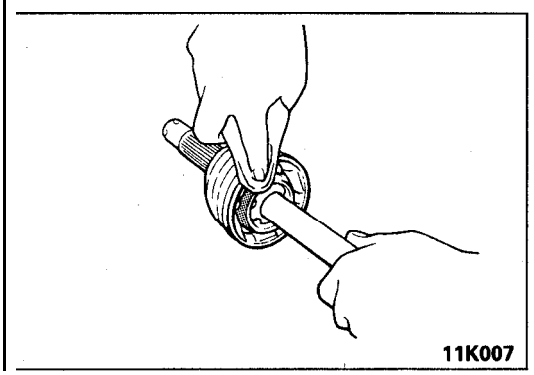






SERVICE POINTS OF DISASSEMBLY

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.

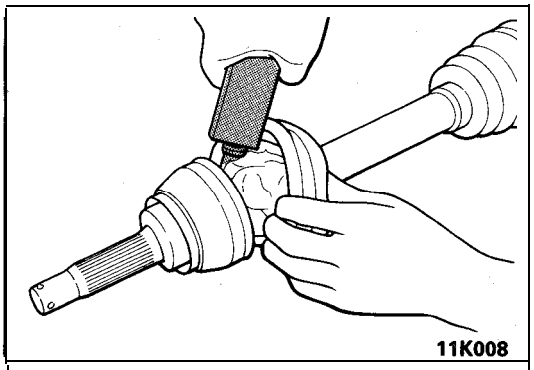
INSPECTION

- 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

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.


11K008

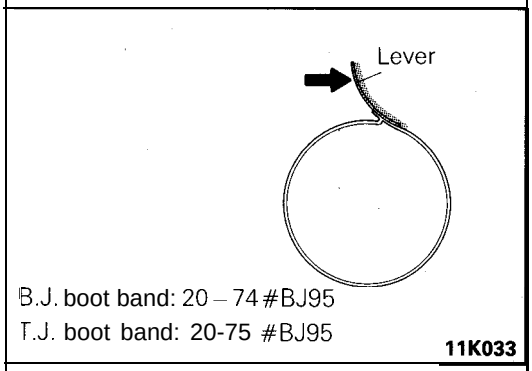
(3) Fill the inside of the B.J. and B.J. boot with the specified grease.

Specified grease: Repair kit grease 125 g (4.41oz.)

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.**



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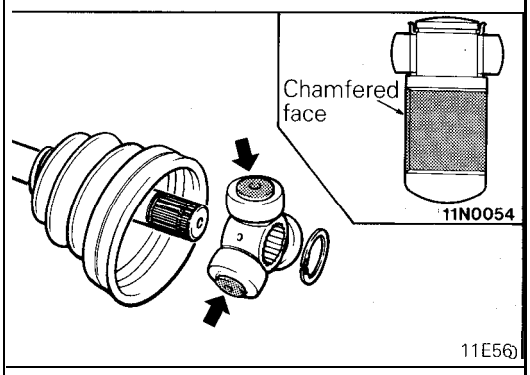
5. INSTALLATION OF SPIDER ASSEMBLY

(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.



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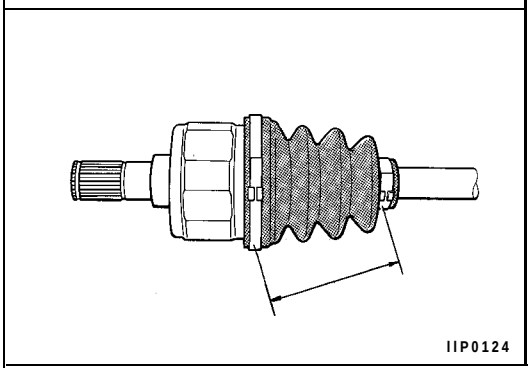
11E56

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.

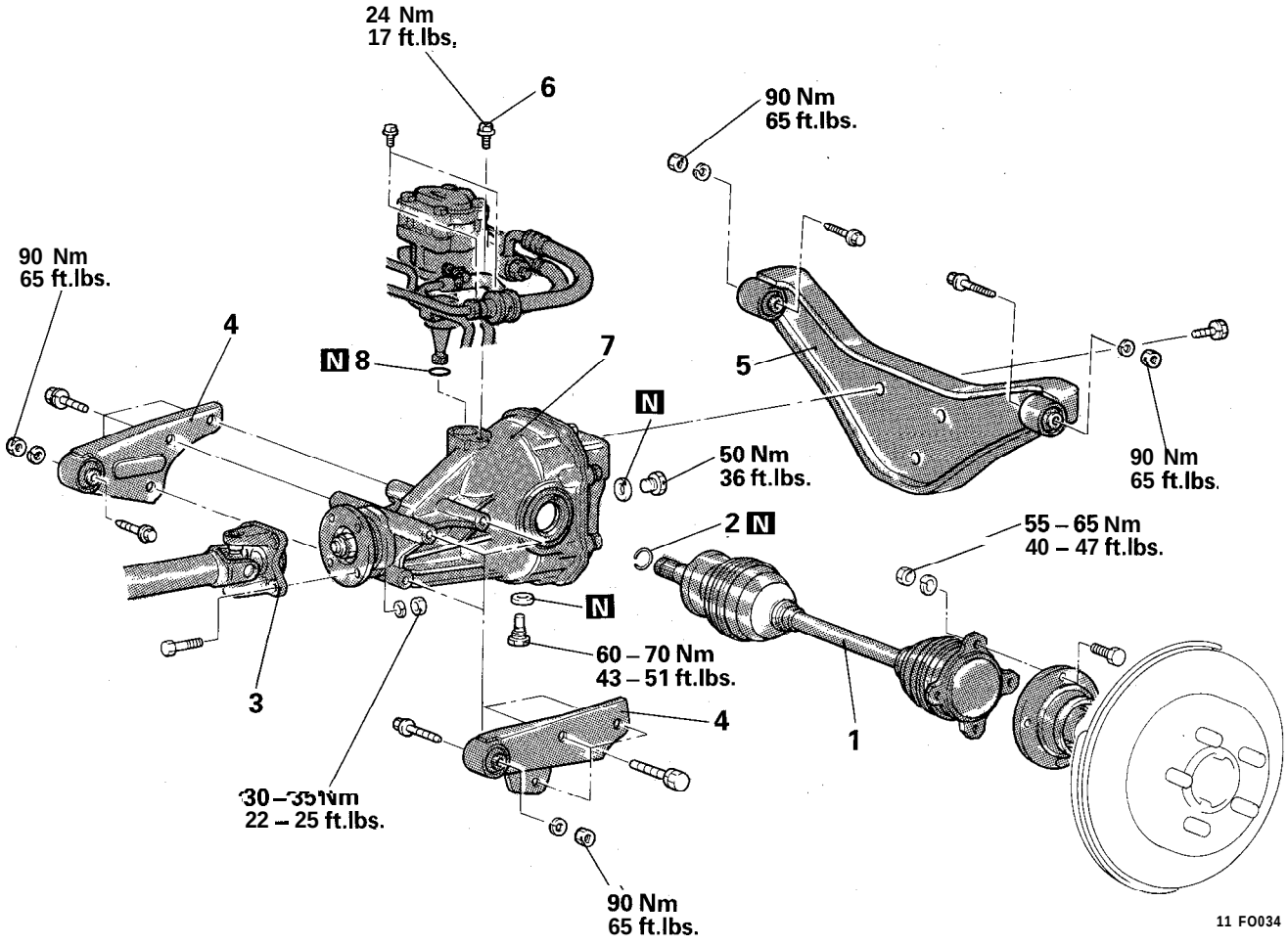
Standard value: 85 ± 3 mm (3.35 ± .12 in.)


IIP0124

DIFFERENTIAL CARRIER

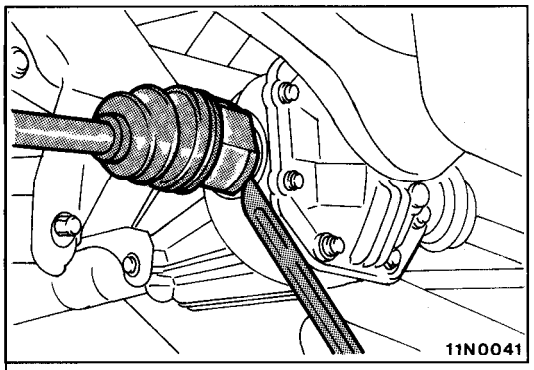
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Draining and Filling of Differential Gear Oil (Refer to Group 0 – Maintenance Service.)
- Removal and Installation of Main Muffler (Refer to Group 11 – Exhaust Pipe and Muffler.)



Removal steps

◆◆ 1. Drive shaft
2. Circlip
◆◆ ● + 3. Propeller shaft connection
4. Differential support assembly
5. Differential support member assembly
6. Rear wheel oil pump installation bolt
◆◆ ● + 7. Differential carrier
8. O-ring

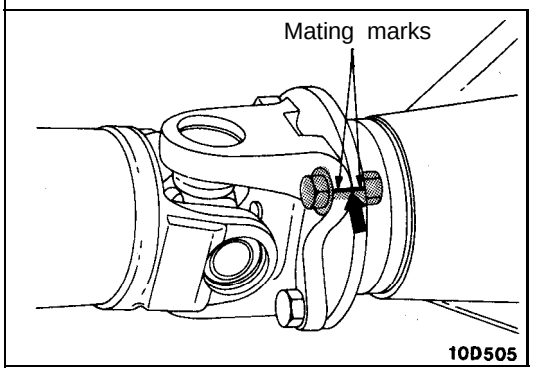


SERVICE POINTS OF REMOVAL

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.

SERVICE POINTS OF INSTALLATION

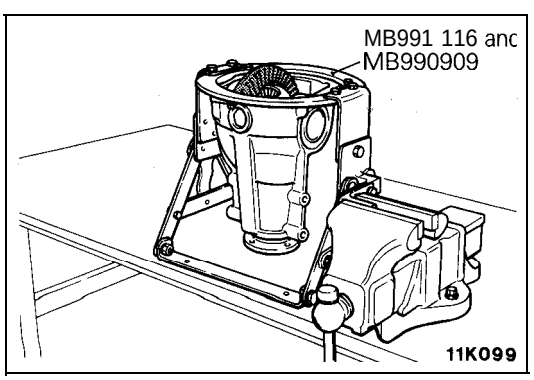
7. INSTALLATION OF DIFFERENTIAL CARRIER

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.

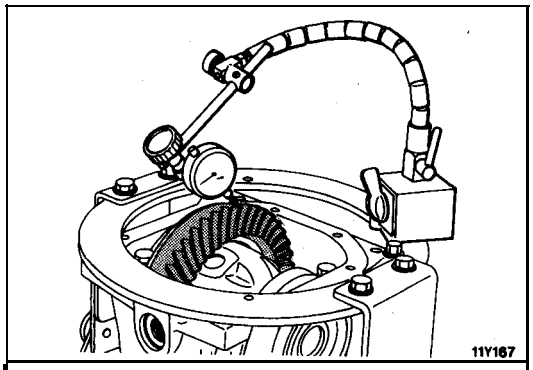
3. CONNECTION OF PROPELLER SHAFT

Align the mating marks on the flange yoke and the companion flange to install the propeller shaft.



INSPECTION BEFORE DISASSEMBLY

Hold the special tool in a vise and attach the differential carrier to the working base.

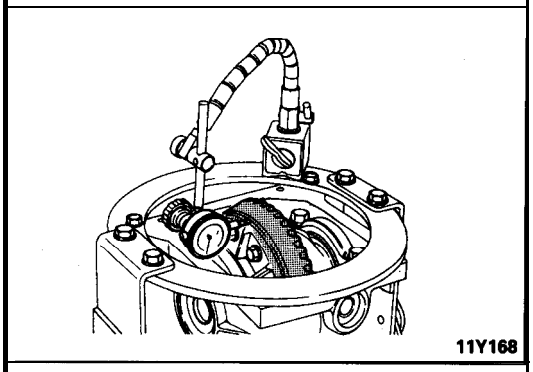


FINAL DRIVE GEAR BACKLASH

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.

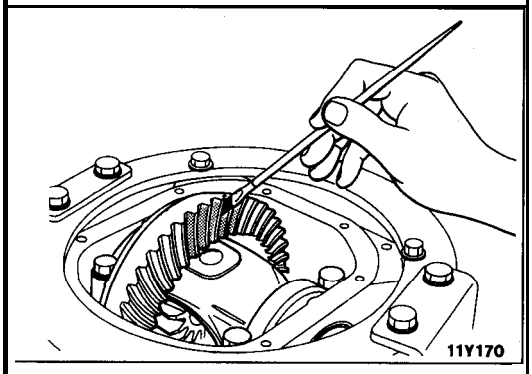
Standard value: 0.11 – 0.16 mm (.004 – .006 in.)



DRIVE GEAR RUNOUT

Measure the drive gear runout at the shoulder on the reverse side of the drive gear.

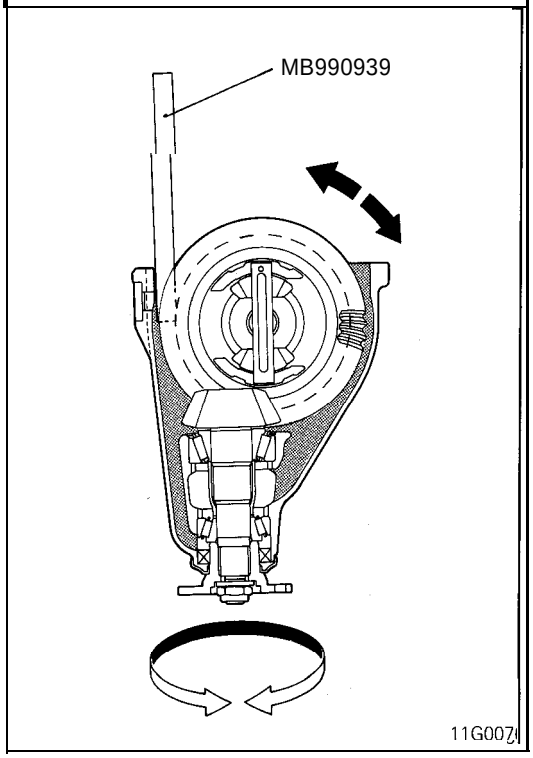
Limit: 0.05 mm (.002 in.)



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.



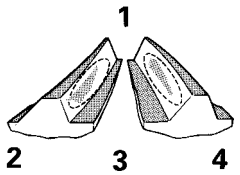
(2) Insert a special tool between the differential carrier and the differential case, and then rotate the companion flange by hand (once in the normal direction, and then once in the reverse direction) while applying a load to the drive gear, so that the revolution torque [approximately 2.5 – 3.0 Nm (28 – 33 in.lbs.)] is applied to the drive pinion.

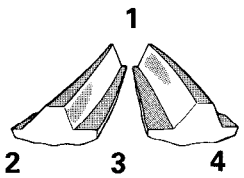
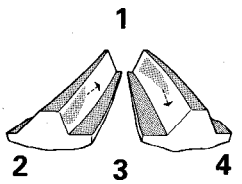
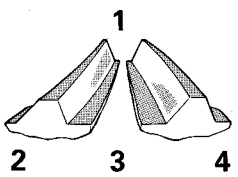
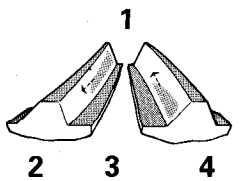
Caution
If the drive gear is rotated too much, the tooth contact pattern will become unclear and difficult to check.

(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.

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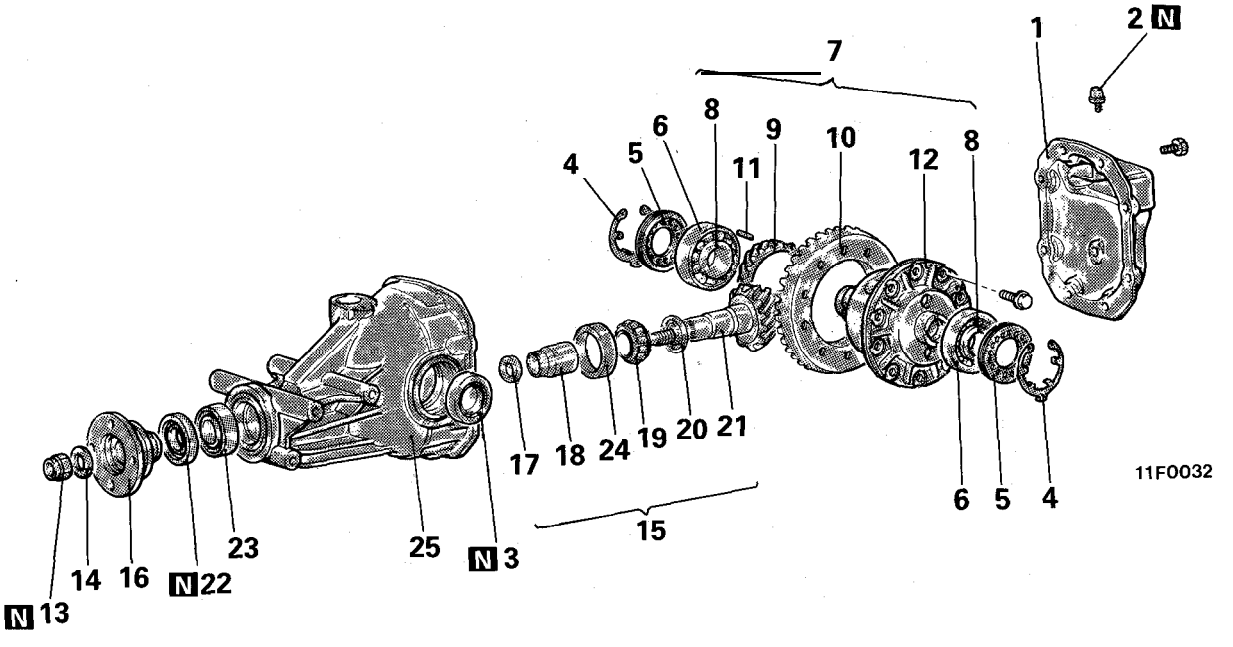
NOTE
(1) Tooth contact pattern is a method for judging the result of the adjustment of drive pinion height and final drive gear backlash. The adiustment of drive pinion heiaht and final drive gear backlash should be repeated until tooth contact patterns bear a *similarity to the 'standard tooth contact pattern.
(2) When adjustment is not able to obtain a correct pattern, it may be judged that the drive gear and drive pinion have exceeded their usage limits and both gears should be replaced as a set.

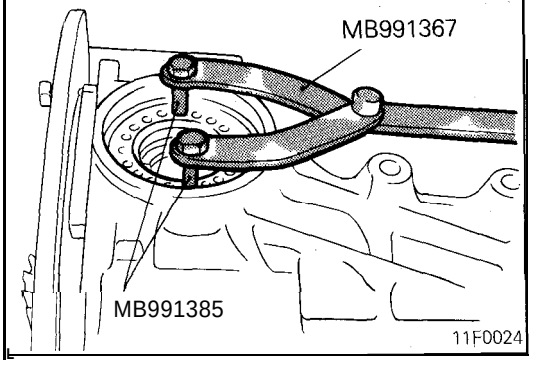
DISASSEMBLY

Inspection Before Disassembly
- Final Drive Gear Backlash (Refer to P.3-22.)
- Drive Gear Runout (Refer to P.3-22.)
- Final Drive Gear Tooth Contact (Refer to P.3-22.)



Disassembly steps

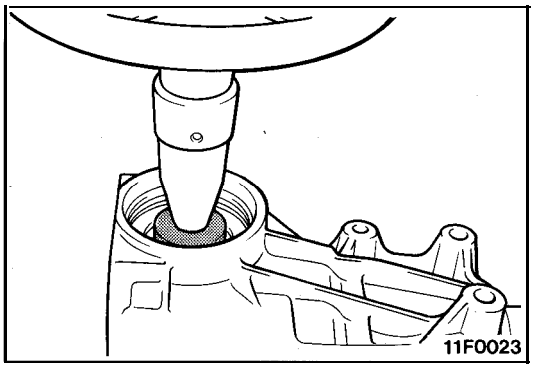
1. Differential cover assembly
2. Vent plug
3. Oil seal
4. Snap ring
5. Side bearing nut ◆◆
6. Side bearing outer race ◆◆
7. Differential case assembly
8. Side bearing inner race ◆◆
9. Drive gear ◆◆
10. Drive gear ◆◆
11. Spring pin
12. LSD case (refer to P.3-34.) ◆◆
13. Self-locking nut ◆◆
14. Washer
15. Drive pinion assembly ◆◆
16. Companion flange
17. Drive pinion front shim (for preload adjustment)
18. Drive pinion spacer
19. Drive pinion rear bearing inner race ◆◆
20. Drive pinion rear shim (for pinion height adjustment)
21. Drive pinion
22. Oil seal ◆◆
23. Drive pinion front bearing ◆◆
24. Drive pinion rear bearing outer race ◆◆
25. Differential carrier



SERVICE POINTS OF DISASSEMBLY

5. REMOVAL OF SIDE BEARING NUT

Using the special tool, remove the side bearing nut.

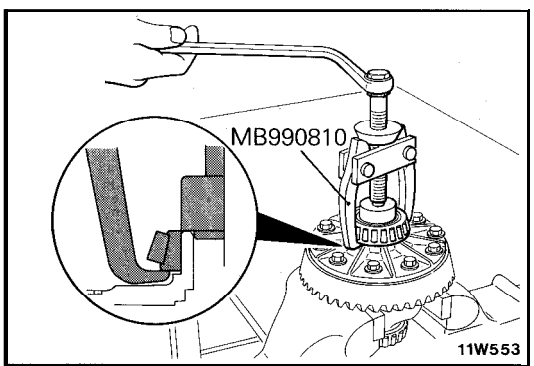


6. REMOVAL OF SIDE BEARING OUTER RACE

(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.

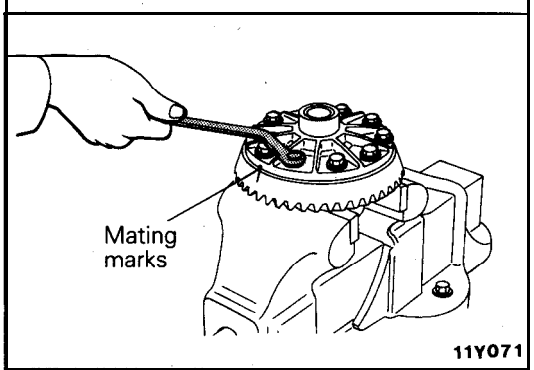
NOTE
(1) Identify the right- and left-hand side bearing outer races for correct reassembly.
(2) Use a spacer, approx. 30 mm (1 .18 in.) long, 10 mm (.39 in.) wide and 1 to 2 mm (.04 to .08 in.) high, made of copper sheet or the like to prevent damage to the bearing.



8. REMOVAL OF SIDE BEARING INNER RACES / 9. DRIVE GEAR (FOR 4WS)

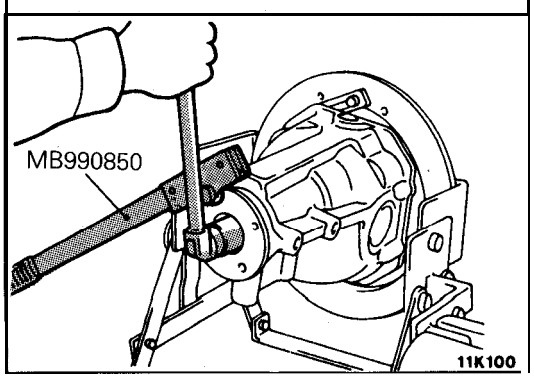
Pull out the side bearing inner races by using the special tool.

NOTE
(1) For 4WS, remove the side bearing inner race together with the rear wheel oil pump drive gear.
(2) Hook the pawl of the special tool to the side bearing inner race using the two notches on the differential case.



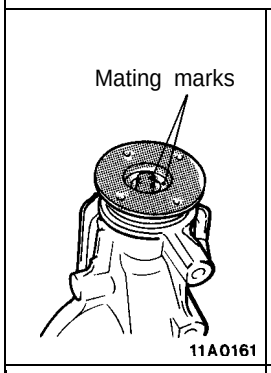
10. REMOVAL OF DRIVE GEAR

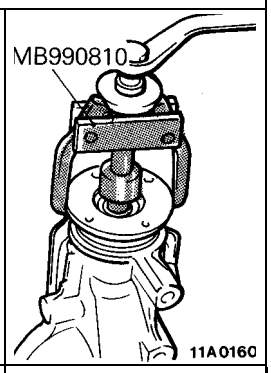
(1) Make the mating marks to the differential case and the drive gear.
(2) Loosen the drive gear attaching bolts in diagonal sequence to remove the drive gear.



13. REMOVAL OF SELF-LOCKING NUT

Use the special tools to hold the companion flange and remove the companion flange self-locking nut.



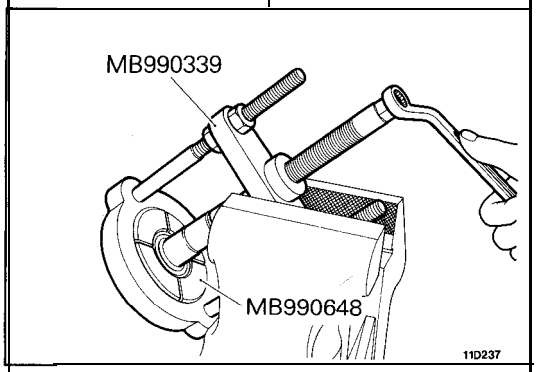


15. REMOVAL OF DRIVE PINION ASSEMBLY

(1) Make the mating marks to the drive pinion and companion flange.

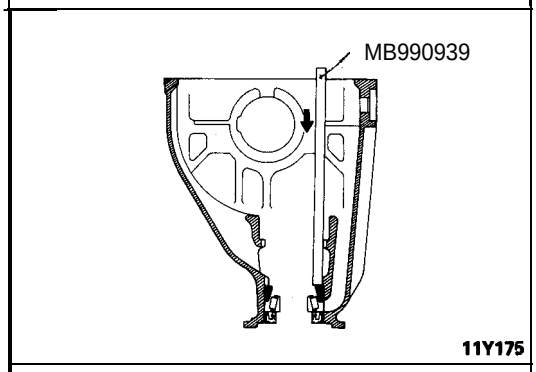
NOTE
Mating marks should not be made to the contact surfaces of companion flange and propeller shaft.

(2) Drive out the drive pinion together with the drive pinion spacer and drive pinion front shims.



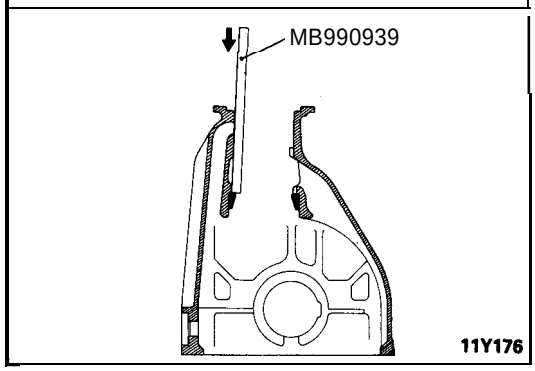
19. REMOVAL OF DRIVE PINION REAR BEARING INNER RACE

Pull out the drive pinion rear bearing inner race by using the special tools.



22. REMOVAL OF OIL SEAL / 23. DRIVE PINION FRONT BEARING

Using the special tool, drive out the drive pinion front bearing from the gear carrier.



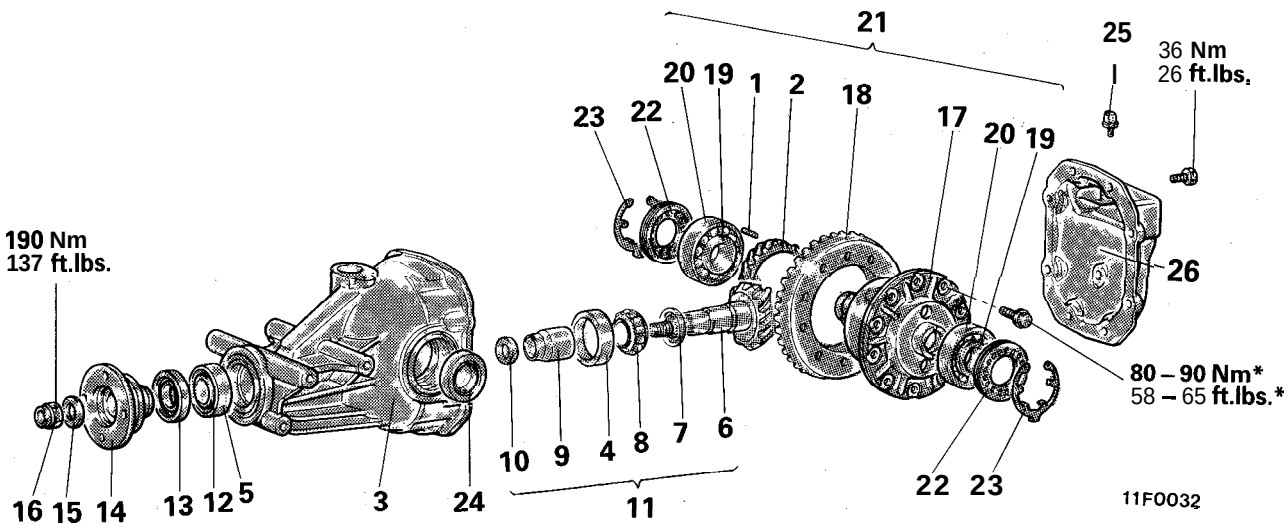
24. REMOVAL OF DRIVE PINION REAR BEARING OUTER RACE

Using the special tool, drive out the drive pinion rear bearing outer race from the gear carrier.

INSPECTION

- Check the companion flange for wear or damage.
- Check the oil seal for wear or deterioration.
- Check the bearings for wear or discoloration.
- Check the gear carrier for cracks.
- Check the drive pinion and drive gear for wear or cracks.
- Check the side gears, pinion gears and pinion shaft for wear or damage.
- Check the side gear spline for wear or damage.

REASSEMBLY

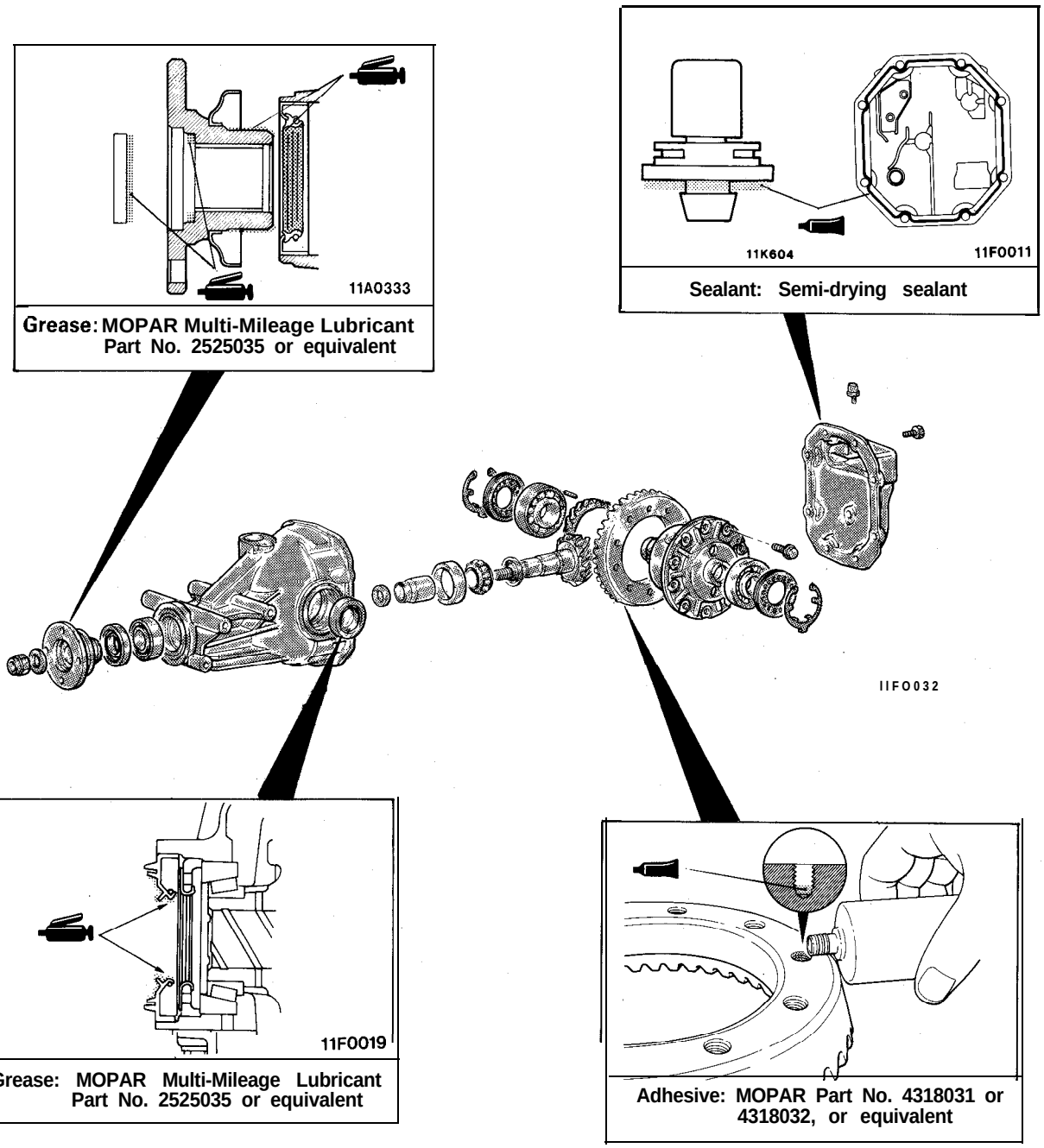


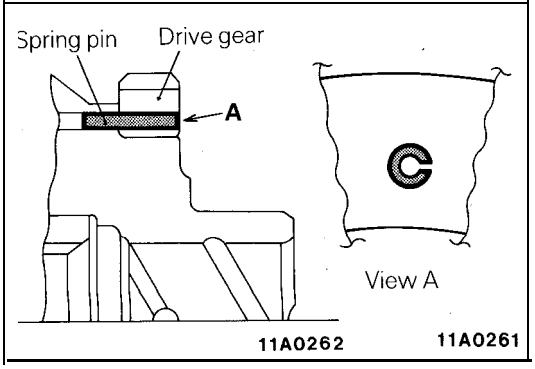
Reassembly steps

- 4 1. Spring pin
- + 2. Drivegear
- 3. Differential carrier
- 4. Drive pinion rear bearing outer race
- C 5. Drive pinion front bearing outer race
- Drive pinion height adjustment
- 6. Drive pinion
- 7. Drive pinion rear shim (for drive pinion height adjustment)
- 8. Drive pinion rear bearing inner race
- 9. Drive pinion spacer
- 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.3-34.)
- 18. Drive gear
- a 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
- 4 24. Oil seal
- 25. Vent plug
- 26. Differential cover assembly

NOTE
*: Tightening torque with oil applied

Lubrication, Sealing and Adhesion Points

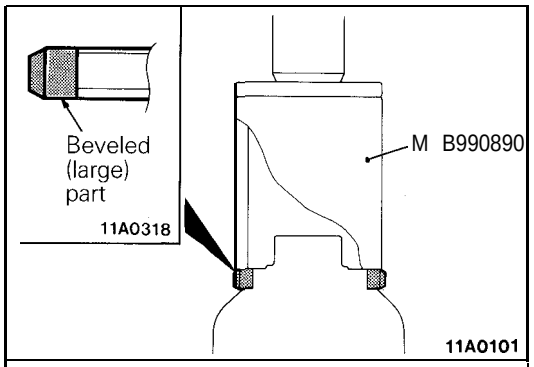




SERVICE POINTS OF REASSEMBLY

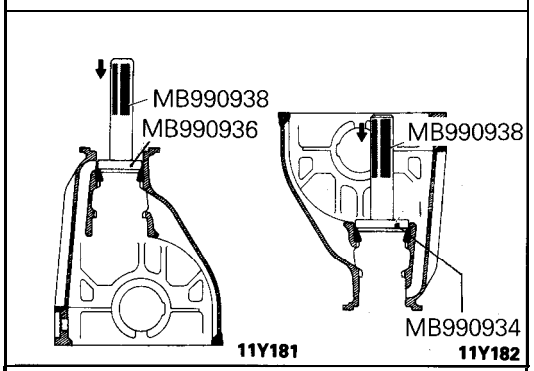
1. INSTALLATION OF SPRING PIN

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

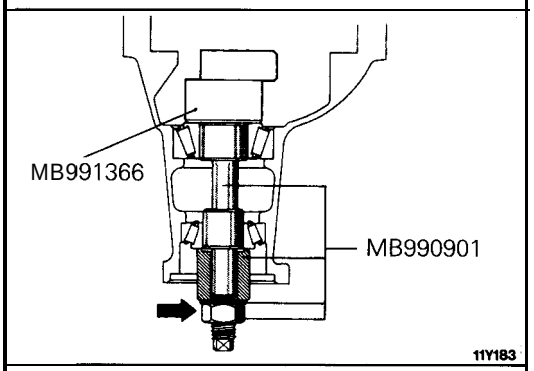
(1) With the beveled (large) part of the rear wheel oil pump drive gear at the inner side, press in the drive gear (by using the special tool) until the drive gear contacts the end surface of the differential case.
(2) Check to ensure that the drive gear and the spring pin are flush.



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.



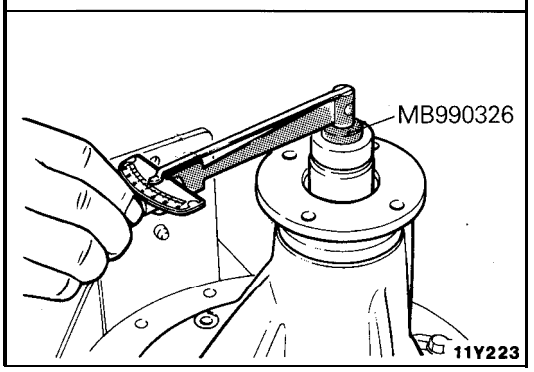
. DRIVE PINION HEIGHT ADJUSTMENT

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.

Specified grease: MOPAR Multi-Mileage Lubricant Part No. 2525035 or equivalent

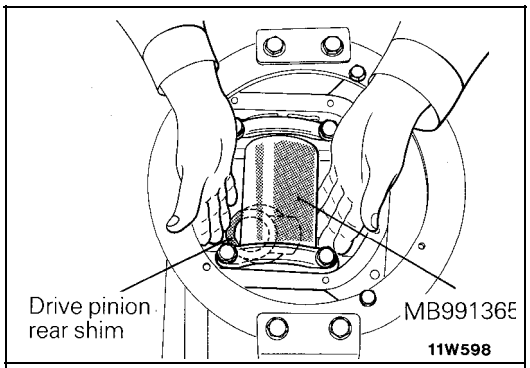
(2) Tighten special tool until the standard value of drive pinion rotation torque is obtained.
(3) Measure the drive pinion rotation torque (without the oil seal).



Standard value

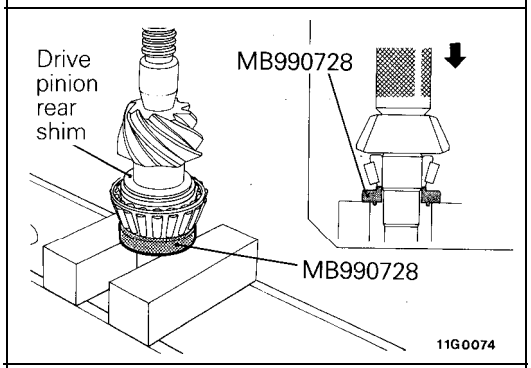
Bearing classification	Bearing lubrication	Rotation torque Nm (in.lbs.)
New	None (with rust-prevention oil)	0.3 – 0.5 (3 – 4)
New/reused	Gear oil application	0.15 – 0.25 (1 – 2)

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.

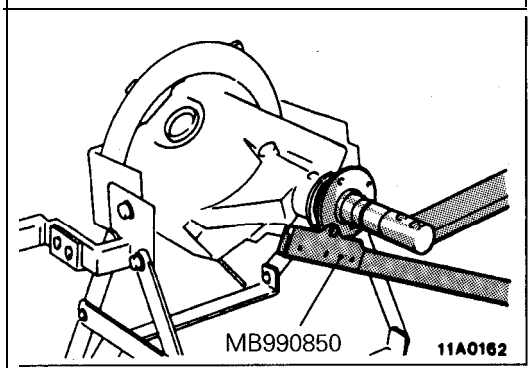


(4) Position the special tool in the side bearing seat of the gear carrier, and then select a drive pinion rear shim of a thickness which corresponds to the gap between the special tools.

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

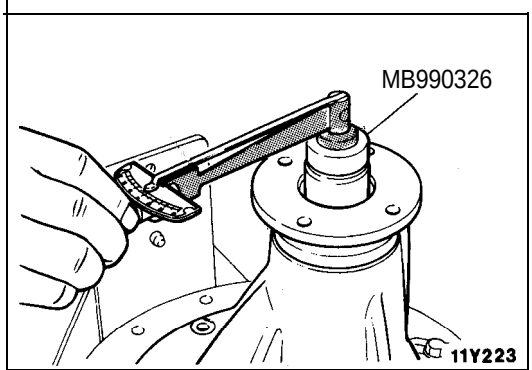
Adjust the drive pinion rotation torque by using the following procedures:

(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 special tools.

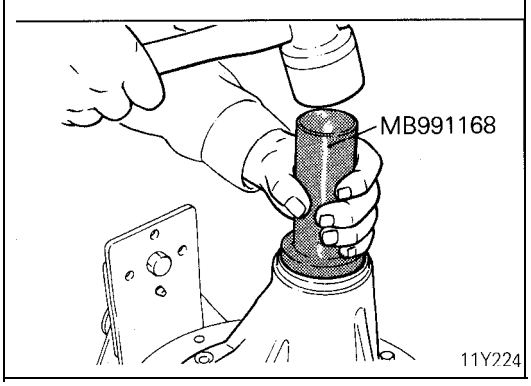
NOTE
Do not install the oil seal.

(3) Measure the drive pinion rotation torque (without the oil seal) by using the special tools.



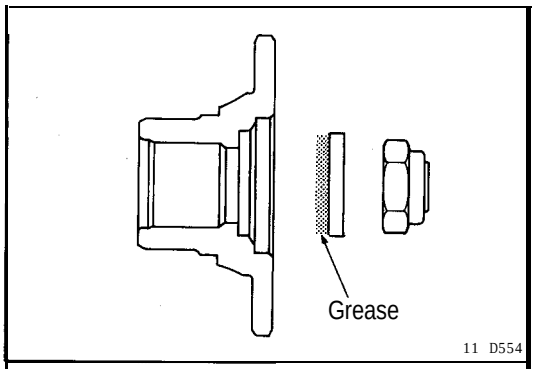
Standard value

Bearing classification	Bearing lubrication	Rotation torque Nm (in.lbs.)
New	None (with rust-prevention oil)	0.3 – 0.5 (3 – 4)
New/reused	Gear oil application	0.15 – 0.25 (1 – 2)



(4) If the drive pinion rotation torque is not within the range of the standard value, adjust the rotation torque by replacing the drive pinion front shim(s) or the drive pinion spacer.

NOTE
When selecting the drive pinion front shims, if, the number of shims is large, reduce the number of shims to a minimum by selecting the drive pinion' spacers.



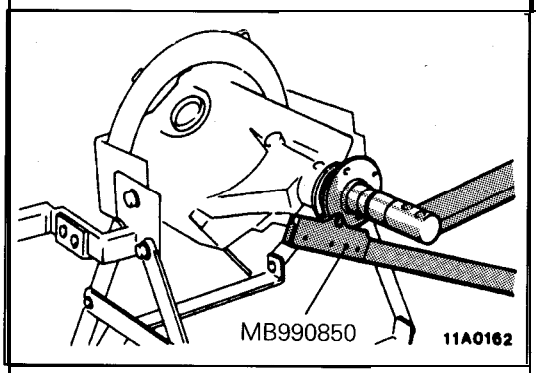
(5) Remove the companion flange and drive pinion once again.
Drive the oil seal into the gear carrier front lip by using the special tool.
Apply multipurpose grease to the oil seal lip.

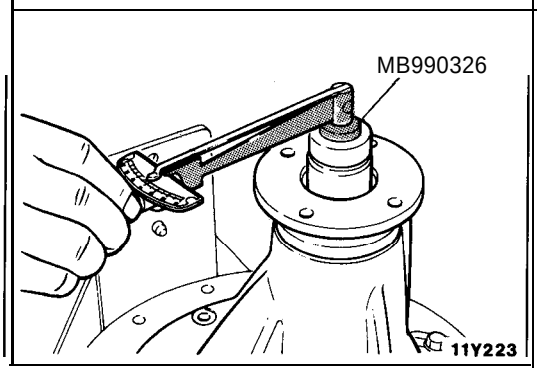
Specified grease: MOPAR Multi-Mileage Lubricant Part No. 2525035 or equivalent

(6) Apply a thin coat of multipurpose grease to the companion flange contacting surface of the washer before installing drive pinion assembly.

Specified grease: MOPAR Multi-Mileage Lubricant Part No. 2525035 or equivalent

(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.



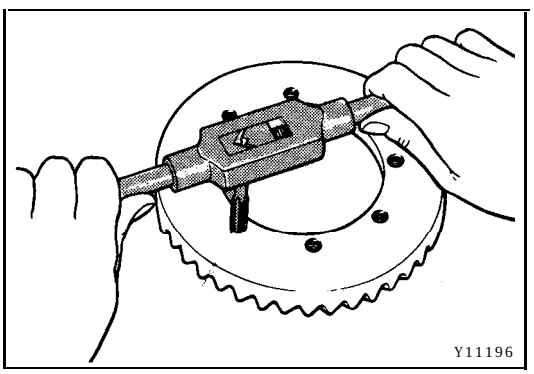


(8) Measure the drive pinion rotation torque (with oil seal) to verify that the drive pinion rotation torque complies with the standard value.

Standard value

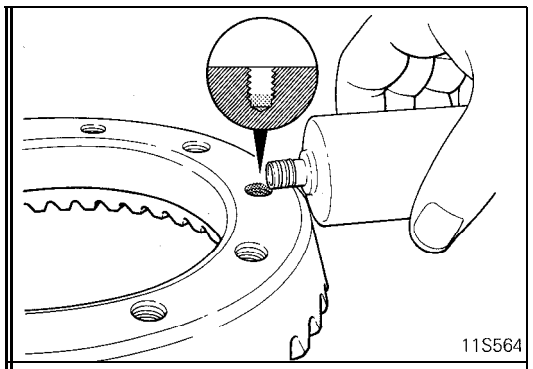
Bearing classification	Bearing lubrication	Rotation torque Nm (in.lbs.)
New	None (with rust-prevention oil)	0.5 – 0.7 (4 – 6)
New/reused	Gear oil application	0.35 – 0.45 (3 – 4)

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

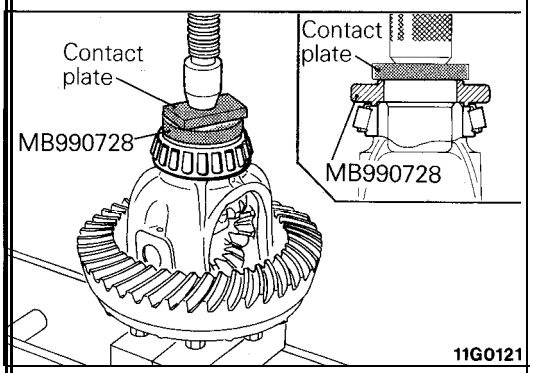
(1) Clean the drive gear attaching bolts.
(2) Use an Ml 0 x 1.25 tap to remove the adhesive adhering to the threaded holes of the drive gear, and then clean the threaded holes by applying compressed air.



(3) Apply multipurpose adhesive to the threaded holes of the drive gear.

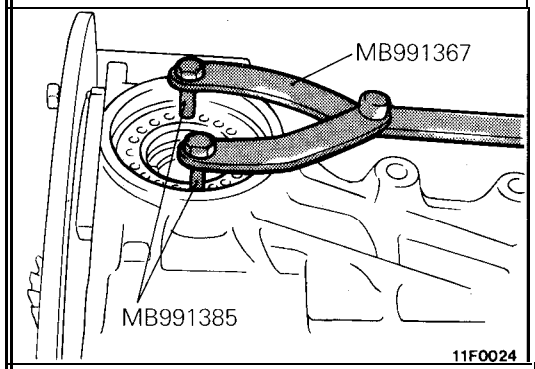
Specified adhesive: MOPAR Part No. 4318031 or 4318032, or equivalent

(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.



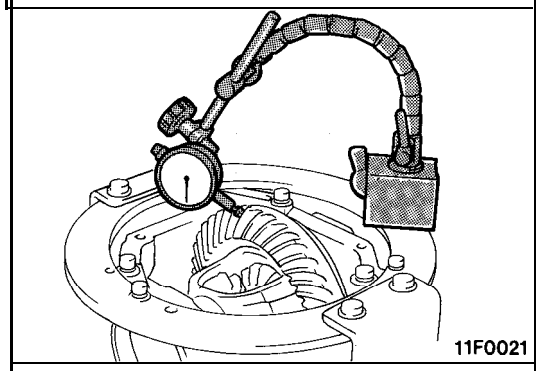
19. PRESS-FITTING OF SIDE BEARING INNER RACE

Press-fit the side bearing inner races to the differential case by using the special tool.



. FINAL DRIVE GEAR BACKLASH ADJUSTMENT

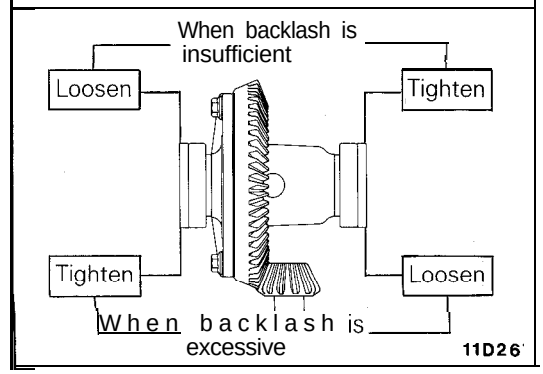
(1) Using the special tool, temporarily tighten the side bearing nut until it is in the state just before preloading of the side bearing.



(2) Measure the final drive gear backlash.

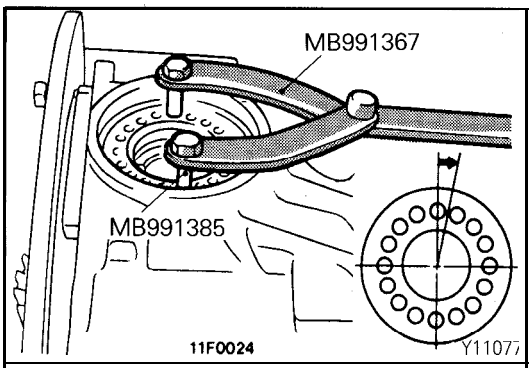
Standard value: 0.11 – 0.16 mm (.004 – .006 in.)

NOTE
Measure at four or more points around the drive gear circumference.

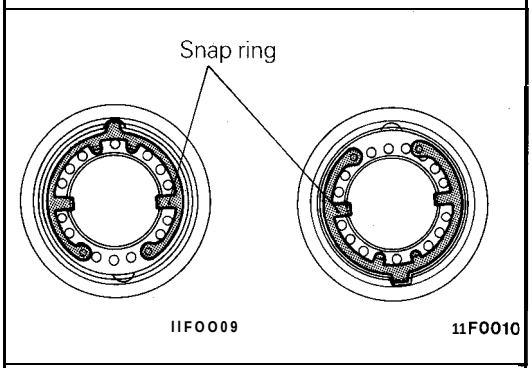


(3) Using the special tool (MB991367 and MB991385), adjust the backlash to standard value by moving the side bearing nut as shown.

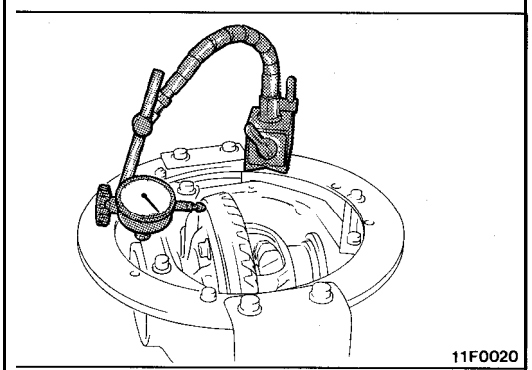
NOTE
First turn the side bearing nut for loosening, and then turn (by the same amount) the side bearing nut for tightening.



(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.



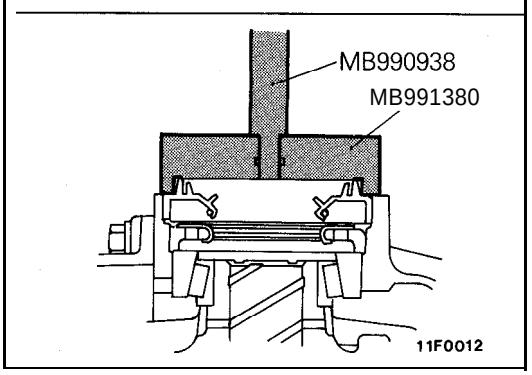
(5) Fit the snap ring at either position shown to lock the side bearing nut.
(6) Check the drive gear and drive pinion for tooth contact. If poor contact is evident, make adjustment. (Refer to P.3-24.)



(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.



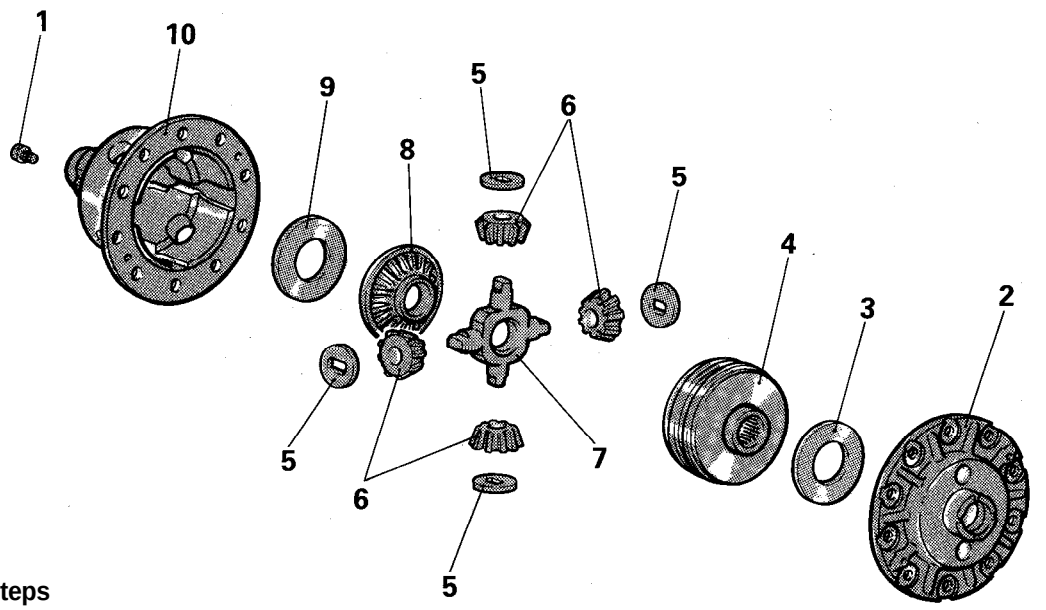
24. INSTALLATION OF OIL SEAL

(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.

Specified grease: MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent

LSD CASE ASSEMBLY

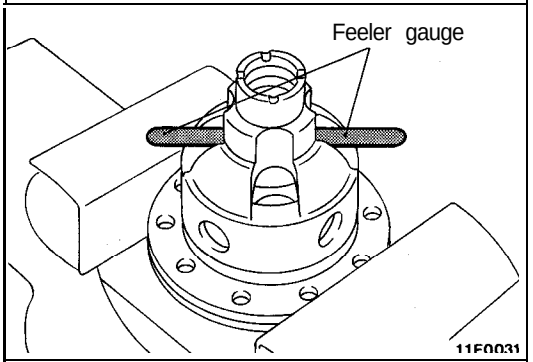
DISASSEMBLY AND REASSEMBLY

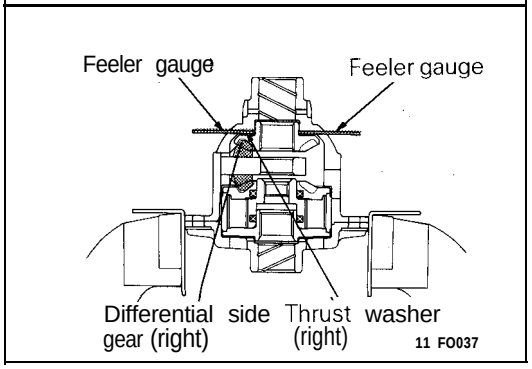


IIFO033

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





INSPECTION BEFORE DISASSEMBLY

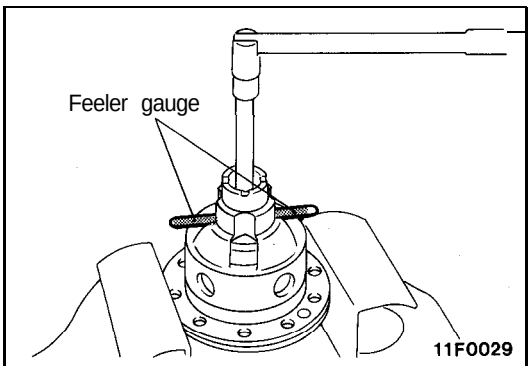
1. CHECKING THE DIFFERENTIAL GEAR BACKLASH

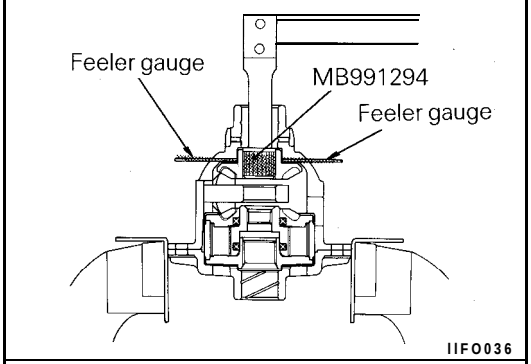
(1) Secure the differential case assembly in a vise so that the differential side gear (right) is facing upward.

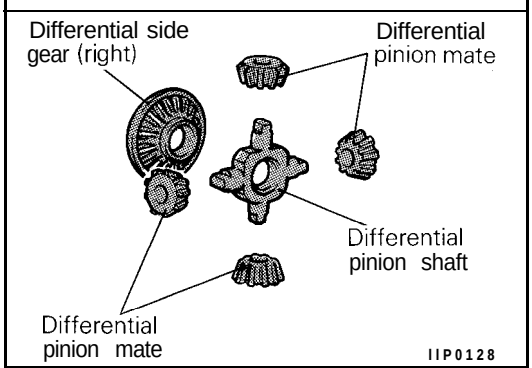
Caution
When securing the vise, be sure not to hold the differential case assembly too tightly.

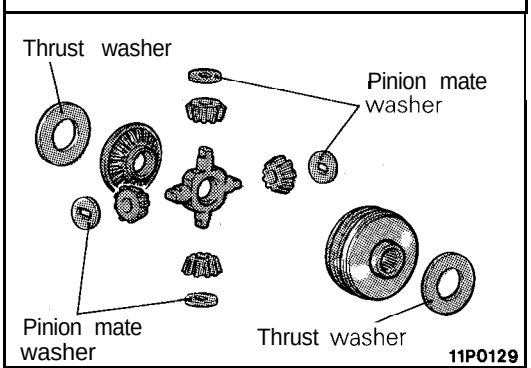
(2) Insert a 0.03 mm (.0012 in.) feeler gauge at two places (diagonally) between differential case B and the thrust washer (right).

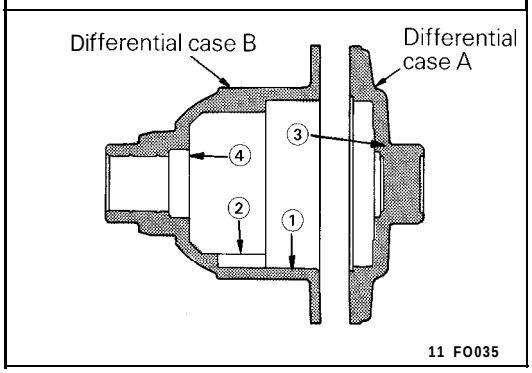
Caution
Do not insert a feeler gauge in the oil groove of differential case B.











(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

3. REMOVAL OF THE THRUST WASHER (LEFT) / 9. THRUST WASHER (RIGHT)

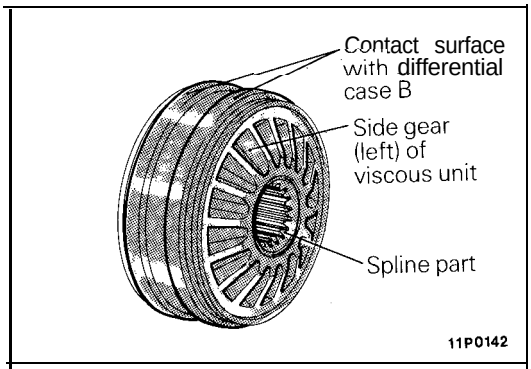
The thrust washers (left and right) are of different thickness, and so should be discriminated in some way for reference during installation.

INSPECTION

(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

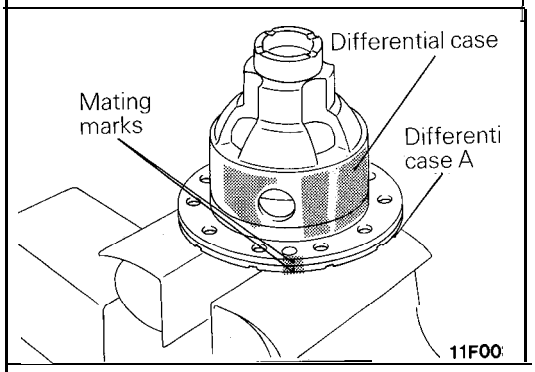


(5) Check the spline part of the viscous unit for stepped wear or damage, and check the contact surface with differential case B.
(6) Check the side gear (left) of the viscous unit for unusual wear or damage.

SERVICE POINTS OF REASSEMBLY

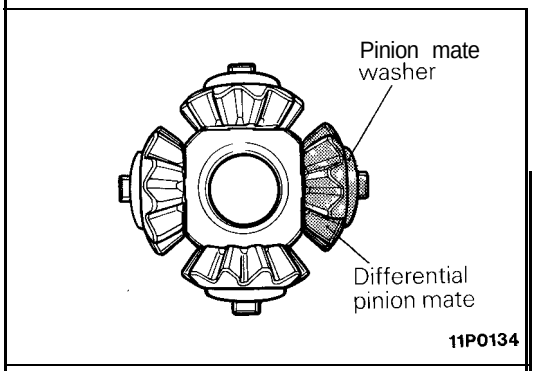
10. INSTALLATION OF THE DIFFERENTIAL CASE B / 2. DIFFERENTIAL CASE A

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)

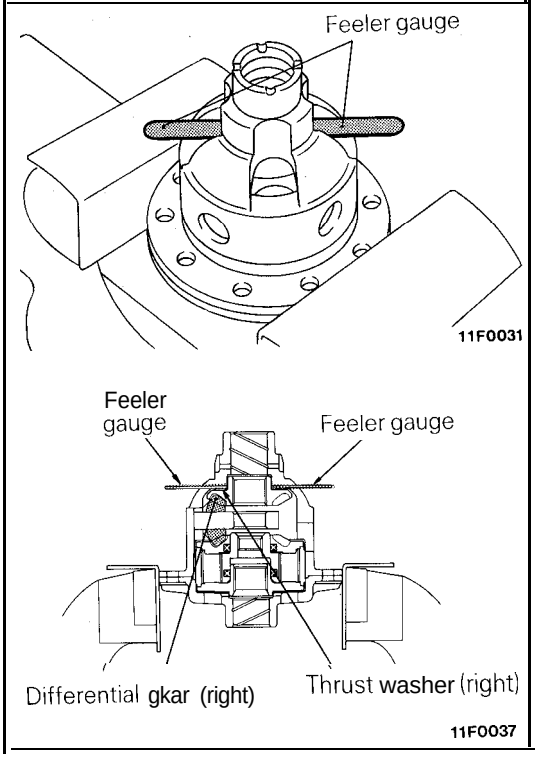
If the differential side gear and pinion mate gear have been replaced, select the thrust washer (left) by following the steps below.

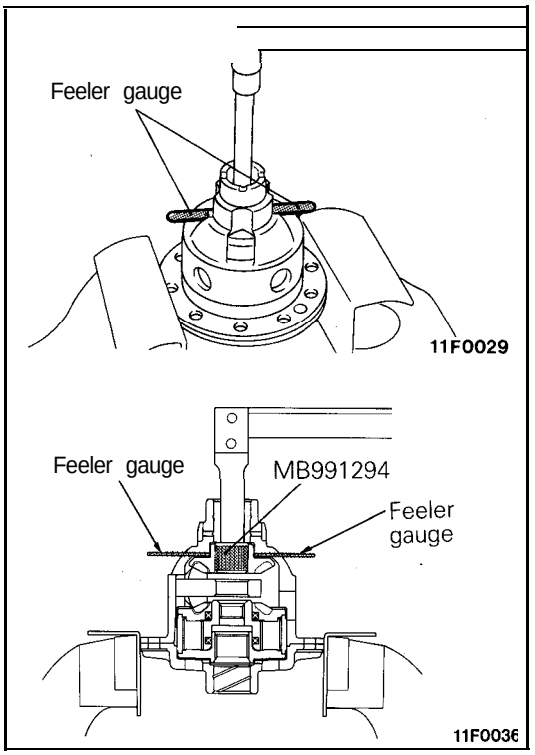
(1) Wash the differential side gear and pinion mate gear in unleaded gasoline to remove all oil, grease, etc.
(2) Install the previously used thrust washers (being careful the left and right ones are used at the correct side), together with the gears, viscous unit, pinion mate washer and pinion shaft, 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.)
MB837461	0.8 (.031)
	0.9 (.035)
	1.0 (.039)
	1.1 (.043)
	1.15 (.045)
	1.2 (.047)
	1.25 (.049)
	1.3 (.051)
	1.35 (.053)
	1.4 (.055)
	1.5 (.059)

Thrust washer (right) (reference)	
Part No.	Thickness mm (in.)
MB837522	0.8 (.031)

NOTE
Select one thrust washer (left) from the eleven types in the kit.

BRAKES
SERVICE AND PARKING

CONTENTS

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

WARNING!

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

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

(3) CHRYSLER dealer personnel must thoroughly review this manual, and especially its GROUP 23B – Supplemental Restraint System (SRS) and GROUP 0 – Maintenance Service, before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning light, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

SPECIFICATIONS

GENERAL SPECIFICATIONS

Items	FWD	AWD
Master cylinder		
Type	Tandem type (with level sensor)	Tandem type (with level sensor)
I.D. mm (in.)	25.4 (1) or 26.9 (1 1/16)*	26.9 (1 1/16)
Brake booster		
Type	Vacuum type, tandem	Vacuum type, tandem
Effective dia. of power cylinder mm (in.)	180 (7.0) + 205 (8.0) or 203 (8.0) + 230 (9.0)*	203 (8.0) + 230 (9.0)
Boosting ratio [Brake pedal depressing force]	6.0 [at 247 N (54 lbs.)] or 7.0 [at 261 N (58 lbs.)]*	7.0 [at 261 N (58 lbs.)]
Proportioning valve		
Split point M Pa (psi)	3.75 – 4.25 (533 – 604)	3.75 – 4.25 (533 – 604)
Decompression ratio	0.37	0.37
Front brakes		
Type	Floating caliper, 2-piston, ventilated disc (M-R57W)	Rigid caliper, 4-piston, ventilated disc (M-R76Z)
Disc effective dia. mm (in.)	227 (9.0)	271 (10.7)
Disc thickness mm (in.)	24 (.94)	30 (1.18)
Pad thickness mm (in.)	16 (.63)	15 (.59)
Wheel cylinder I.D. mm (in.)	42.8 (1 11/16) x 2	40.4 (1 19/32) x 2 + 42.8 (1 11/16) x 2
Clearance adjustment	Automatic	Automatic
Rear brakes		
Type	Floating caliper, I-piston, ventilated disc (M-R45V)	Rigid caliper, 2-piston, ventilated disc (M-R68X)
Disc effective dia. mm (in.)	228 (9.0)	250 (9.8)
Disc thickness mm (in.)	18 (.71)	20 (.79)
Pad thickness mm (in.)	15.5 (.61)	15 (.60)
Wheel cylinder I.D. mm (in.)	34.9 (1 3/8)	38.1 (1 1/2)
Clearance adjustment	Automatic	Automatic
Parking brakes		
Type	Mechanical brake acting on rear wheels	Mechanical brake acting on rear wheels
Brake lever type	Lever type	Lever type
Cable arrangement	V-type	V-type
Rotor teeth		
Front wheel side	47	47
Rear wheel side	47	47
Speed sensor	Magnet coil type	Magnet coil type

NOTE
* : ABS

SERVICE SPECIFICATIONS

Iterns	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
Speed sensor's (ABS) internal resistance kΩ		
Front	0.8 – 1.2	0.8 – 1.2
Rear	0.6 – 0.8	0.8-1.2
Solenoid valve (HU) resistance Ω	1.0 – 1.3	1.0-1.3
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)	–
Parking brake lever stroke	3 – 5 notches	3 – 5 notches
Brake lining thickness mm (in.)	2.8 (.11)	2.8 (.11)
Brake drum I.D. mm (in.)	168.0 (6.6)	168.0 (6.6)
Limit		
Left/right proportioning valve output pressure difference MPa (psi)	0.4 (57)	0.4 (57)
Front disc run-out mm (in.)	0.07 (.0028) 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)
Brake lining thickness mm (in.)	1.0 (.04)	1.0 (.04)
Brake drum I.D. mm (in.)	169.0 (6.7)	169.0 (6.7)

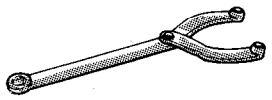
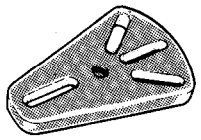
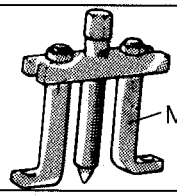
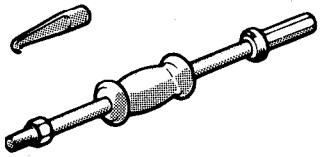
LUBRICANTS

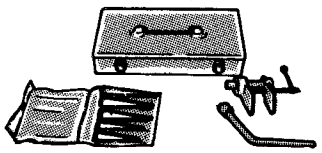
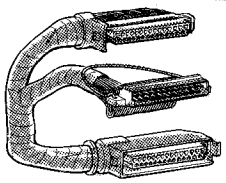
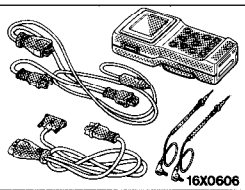
Items	Specified lubricant
Brake fluid	MOPAR Brake Fluid/Conforming to DOT3 or DOT4
Brake pedal bushing inner surface Clevis pin and washer	MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent
Inside of shim A and shim B, or inside of inner shim A, inner shim B, and outer shim	MOPAR Multi-Purpose Grease Part No. 2932524 or equivalent
Guide pin and lock pin sliding part Piston boot inner surface Pin boot inner surface	Repair kit grease
Parking brake lever sliding parts Bush inner surfaces 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	MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent

SEALANTS AND ADHESIVES

Items	Specified sealant
Shoe hold-down pin installation surface	MOPAR "STIC" Cement Part No. 2299314

SPECIAL TOOLS

Tool number and tool name	Replaced by Miller tool number	Application
 MB990767 End yoke holder	C-3281	Holding of rear axle shaft
 MB991354 Puller body	General service tool	Removal of the axle shaft *1: C-P-D Dealers *2: Eagle Dealers
 MB990242 MB990241 Rear axle shaft puller MB990242 Puller bar	CT-1003	
 MB990211 Sliding hammer and adapter	C-637*1 7420 and 7420-8*2	

Tool number and tool name		Replaced by Miller tool number	Application
	MB990964 MB990520 Brake tool set	General service tool	Compressing of disc brake piston
	MB991356 ABS check harness	–	For checking of ABS
	MB991502 Scan tool (MUT-II)	DRB II Scan tool	

TROUBLESHOOTING

Symptom	Probable cause	Remedy
Vehicle pulls to one side when brakes are applied	Grease or oil on pad or lining surface	Replace
	Inadequate contact of pad	Correct
	Auto adjuster malfunction	Adjust
Insufficient braking power	Low or deteriorated brake fluid	Add or refill
	Air in brake system	Bleed air from system
	Overheated brake rotor due to dragging of pad	Correct
	Grease or oil on pad surface	Replace
	Inadequate contact of pad	Correct
	Brake booster malfunction	Correct
	Auto adjuster malfunction	Adjust
	Clogged brake line	Correct
	Proportioning valve malfunction	Replace
Increased pedal stroke (Reduced pedal to floorboard clearance)	Air in brake system	Bleed air from system
	Worn pad	Replace
	Broken vacuum hose	Replace
	Brake fluid leaks	Correct
	Excessive push rod to master cylinder clearance	Adjust
	Faulty master cylinder	Replace

Symptom	Probable cause	Remedy
Brake drag	Incomplete release of parking brake	Correct
	Incorrect parking brake adjustment	Adjust
	Worn brake pedal return spring	Replace
	Incorrect push rod to master cylinder clearance	Adjust
	Defective master cylinder piston return spring	Replace
	Clogged master cylinder return port	Correct
Insufficient parking brake function	Worn brake pad	Replace
	Excessive parking brake lever stroke	Adjust the parking brake lever stroke or check the parking brake cable routing
	Grease or oil on pad surface	Replace
	Parking brake cable sticking	Replace
	Stuck caliper piston	Replace
Scraping or grinding noise when brakes are applied	Worn brake pads	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 brake parts	Retighten
	Improper positioning of pads in caliper	Correct
	Improper installation of support mounting to caliper body	Correct
	Poor return of brake booster or master cylinder	Replace
	Incorrect adjustment of brake pedal or booster push-rod setting	Adjust
Groaning, clicking or rattling noise when brakes are not applied	Stones or foreign material trapped inside wheel covers	Remove stones, etc.
	Loose wheel nuts	Retighten
	Disc brakes -failure of shim	Replace
	Disc brakes – loose installation bolt	Retighten
	Incorrect adjustment of brake pedal or booster push-rod setting	Adjust

ANTI-LOCK BRAKING SYSTEM TROUBLESHOOTING

'PARTICULAR PHENOMENA OF THE ANTI-LOCK BRAKING SYSTEM

Models equipped with the anti-lock braking system (ABS) may exhibit one or more of the following phenomena from time to time, but none of these are abnormal.

(1) A pulsing feeling in the brake pedal, or vibration of the body or the steering wheel, when the anti-lock braking system, is activated by sudden braking or by braking on a slippery road surface. Actually, this phenomenon is an indication that the anti-lock braking system is functioning normally.

(2) When the vehicle speed reaches approximately 6 km/h (4 mph) after the engine is started and the vehicle starts off (for the first time), a whining motor noise may be heard from the engine compartment if the vehicle is traveling in a quiet place, but this noise is simply the result of a self-check being made of the anti-lock braking system operation.

TROUBLESHOOTING METHODS

Problems related to the anti-lock braking system (ABS) can be classified into two general categories: problems in the electrical system and those in the hydraulic system.

For problems in the electrical system, the on-board diagnostic is built into the electronic control unit (E.C.U.) causing the ABS warning light to illuminate as a warning to the driver.

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.

HOW TO USE THE TROUBLESHOOTING FLOW CHART

(1) Using the flow chart, check the ABS warning light light-up sequence and check the condition of braking operation.

(2) Following the check chart listed in the remedy column, perform the checks. There are [Explanation] and [Hint] in each check chart. Refer to them when troubleshooting.

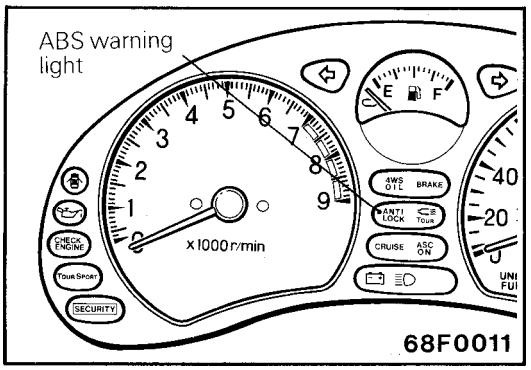
NOTE
ECU: Electronic control unit
HU: Hydraulic unit

TROUBLESHOOTING (ABS – FWD)

Confirm condition in the following way and diagnosis accordingly,

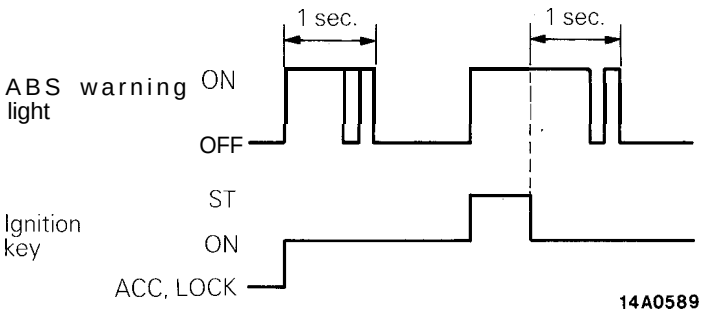
Does the ABS warning light illuminate as described below up to the time the engine starts?

(1) When the ignition key is turned to the "ON" position, the ABS ECU causes the ABS warning light to flash twice in about one second (during which the valve relay self check is made) and then causes it to go out.



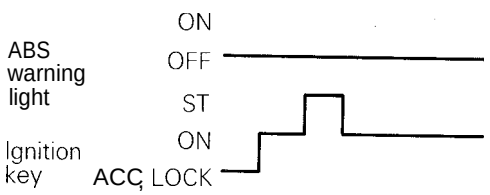
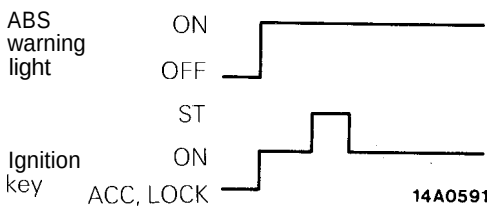
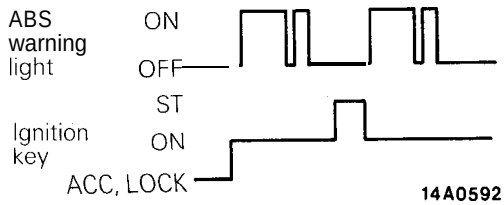
(2) With the ignition key in the "START" position, power to the ABS ECU is interrupted and the ABS warning light remains lit because the valve relay is OFF.

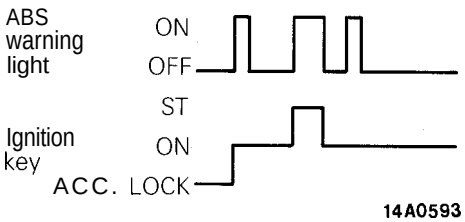
(3) When the ignition key is returned from the "START" position to "ON" position, the ABS warning light flashes twice in about a second (during which the valve relay self check is made again) and then goes out.



Yes → CONTINUED ON NEXT PAGE

No ↓

No.	Trouble condition	Major causes	Remedy
1	ABS warning light does not light up at all. 	• ABS warning light bulb is burnt out. • Open in ABS warning light electrical circuit (check for blown fuse)	Check, using flow chart A (Refer to P.5-13.)
2	When the ignition key is turned to the "ON" position, it remains lighted. 	• Fail safe is functioning due to ECU on-board diagnostic. • Short in ECU warning light drive circuit • Malfunction of ECU	Check, using flow chart B (Refer to P.5-16.)
3	Does not illuminate when ignition key is in "START" position. 	• Malfunction of valve relay • Break in harness between ABS warning light and HU • Break in harness between HU and body ground	Check, using flow chart C (Refer to P.5-18.)

No.	Trouble condition	Major causes	Remedy
4	After the ignition key is turned to the "ON" position, it blinks once and then illuminates when it is turned to the "START" position. When the key is returned to the "ON" position, the light blinks again. (Blinking with the ignition key in the "ON" position is synchronized with operation noise of the valve relay.) 	• Break in harness for ECU warning light drive circuit • Malfunction of ECU	Check, using flow chart D (Refer to P.5-19.)

CONTINUED FROM PREVIOUS PAGE

Does the ABS warning light illuminate when starting to drive the car?

Yes → Trouble with the motor relay, solenoid valve [due to self test at start-up or malfunction of wheel speed sensor] → Check, following trouble source check charts E-1 to E-6.

No

Is there one-sided braking, insufficient braking force or malfunction of ABS operation?

No → Normal

Yes

Trouble condition	Major causes	Remedy
One-sided braking Insufficient braking force	• Hydraulic line in HU is clogged. • Mechanical lock of HU solenoid valve	Check HU operation and, if necessary, replace HU. If HU is normal, check structural parts for normal braking.
Decline in ABS function	• Hydraulic line in HU is clogged. • Malfunction in HU solenoid valve operation	
ABS sometimes functions even when there is no sudden braking. (ABS operation vibration is transmitted.)	• Insufficient wheel speed sensor output voltage (sensor malfunction, too large a gap between sensor rotor, missing rotor teeth) • Malfunction of ABS ECU	Check wheel speed sensor (Refer to P.5-58.) and, if necessary, replace sensor, adjust gap or replace rotor. If tests indicate that there are no mechanical or electrical failures, replace the ECU.

CONTINUED FROM PREVIOUS PAGE

After a test drive*, use on-board diagnostic to check (Refer to P.5-13.).

NOTE
*: Drive at 19 mph or higher for more than 30 seconds.

No diagnostic trouble codes output and normal codes are displayed?

No No on-board diagnostic output

No Diagnostic trouble codes are output

Check and repair the harness between the ABS ECU serial/on-board diagnostic output terminals and the diagnosis check connector.

Yes

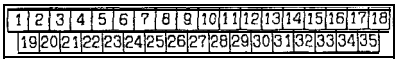
There was trouble in the past.
NOTE
Store diagnostic trouble codes in the memory.

Referring to the trouble code check chart E-1–E-6, make the diagnostic trouble code reoccur to discover the main cause of intermittent or other trouble.

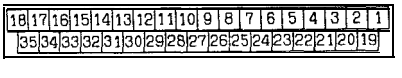
If trouble does not reappear, watch vehicle movements until it reappears. (Refer to P.5-14.)

All ABS functions are normal.
(Nor are there stored memory of past diagnostic trouble code.)

Connector terminal No. layout for troubleshooting



Terminal No. layout shown on the special tool connector



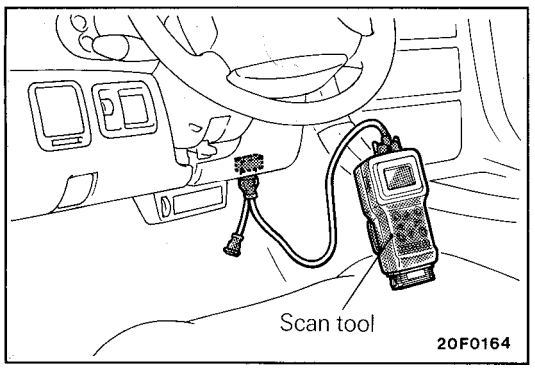
Caution

1. When carrying out inspecion of the ABS-ECU terminal voltage and resistance, the special tool (MB991356) should be used.

2. Because the ABS-ECU connector terminal No. layout for troubleshooting is different from the terminal No. layout shown on the special tool connector, when using the special tool for inspecting, take the readings from the special tool terminal Nos.

Example

ABS-ECU connector terminal No. for troubleshooting	Terminal No. shown on the special tool connector
18	1



CHECK USING ON-BOARD DIAGNOSTIC

(1) With the ignition switch OFF, connect the scan tool.

Caution
Turn off the ignition switch beforehand whenever the scan tool is connected or disconnected.

Turn the ignition ON and select the ABS system. (The ABS warning light lights up, it goes into the scan tool mode. **In the scan tool mode, ABS does not function.)**
If it does not go into the scan tool mode, check the ECU power circuit and the harness between the ECU and diagnosis check terminals.

(2) Read the on-board diagnostic output codes from the ECU memory.

(3) Clear the diagnostic trouble codes once from memory. (Refer to P.5-14.)
If the memory cannot be cleared, the ECU is currently detecting the trouble and the ABS ECU is in fail safe. If it can be cleared, the trouble is either temporary or appears only when driving.

(4) When the diagnostic trouble codes cannot be cleared, or when the ABS ECU goes into fail safe during another test drive and diagnostic trouble codes are output, check according to diagnostic trouble code check charts (E-I-E-6).

DIAGNOSTIC TROUBLE CODE CHART

Diagnostic trouble code		Check chart name or remedy	Reference page	Diagnostic trouble code		Check chart name or remedy	Reference page
No.	Scan tool display letters			No.	Scan tool display letters		
11	FL SNSR. OPEN	E-1	P.5-20	41	FL SOL. VALVE	E-4	P.5-23
12	FR SNSR. OPEN			42	FR SOL. VALVE		
13	RL SNSR. OPEN			43	REAR SOL. V.		
14	RR SNSR. OPEN			51	VALVE RELAY	E-5	P.5-24
15	VEH. SPD. SNSR.	E-2	P.5-20	52	MOTOR RELAY	E-6	P.5-25
22	STOP LAMP SW	E-3	P.5-22	55	CONT. UNIT	ECU replacement	

METHOD OF CLEARING DIAGNOSTIC TROUBLE CODE MEMORY

Caution

- **When servicing is finished, clear the diagnostic trouble code memory.**

Trouble codes cannot be cleared from memory when the ABS ECU system is in fail safe. Proceed to diagnosis and repair.

(1) Clear memory using scan tool.
(No. 7 "DIAG. ERASE" in the actuator test is selected to erase the diagnostic trouble code.)
(2) After clearing, recheck the diagnostic trouble codes, and check that memory is cleared.

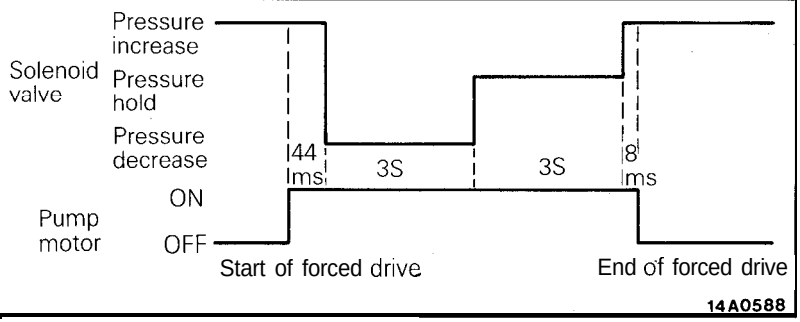
ACTUATOR TEST FUNCTION

The actuator can be forcibly driven in the following way by using the scan tool.

NOTE

- The actuator test cannot be carried out when the ABS ECU system is in fail safe.
- When using forced drive using the scan tool, the vehicle must be stopped.
- During forced drive using the scan tool, forced drive operation is stopped when any wheel speed reaches 10 km/h (6 mph).

Actuator test specifications

No.	Scan tool display	Drive solenoid valve and motor	Drive pattern
01	FR VALVE A	Not used	
02	FL VALVE A		
03	REAR VALVE A		
04	FR VALVE M	Solenoid valve and pump motor for each HU corresponding channel. <Manual pattern>	
05	FL VALVE M		
06	REAR VALVE M		

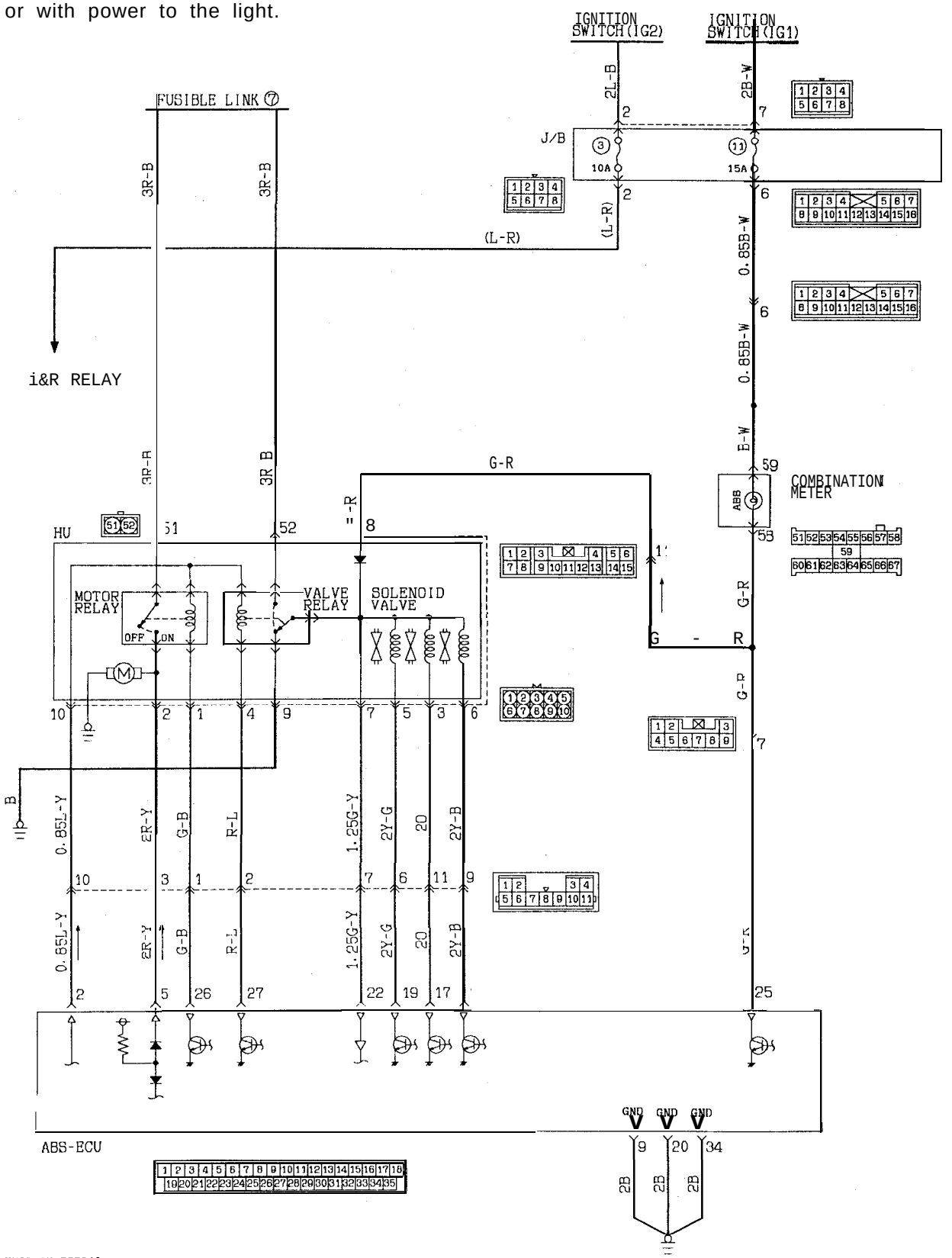
A	ABS warning light does not light at all.

[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.



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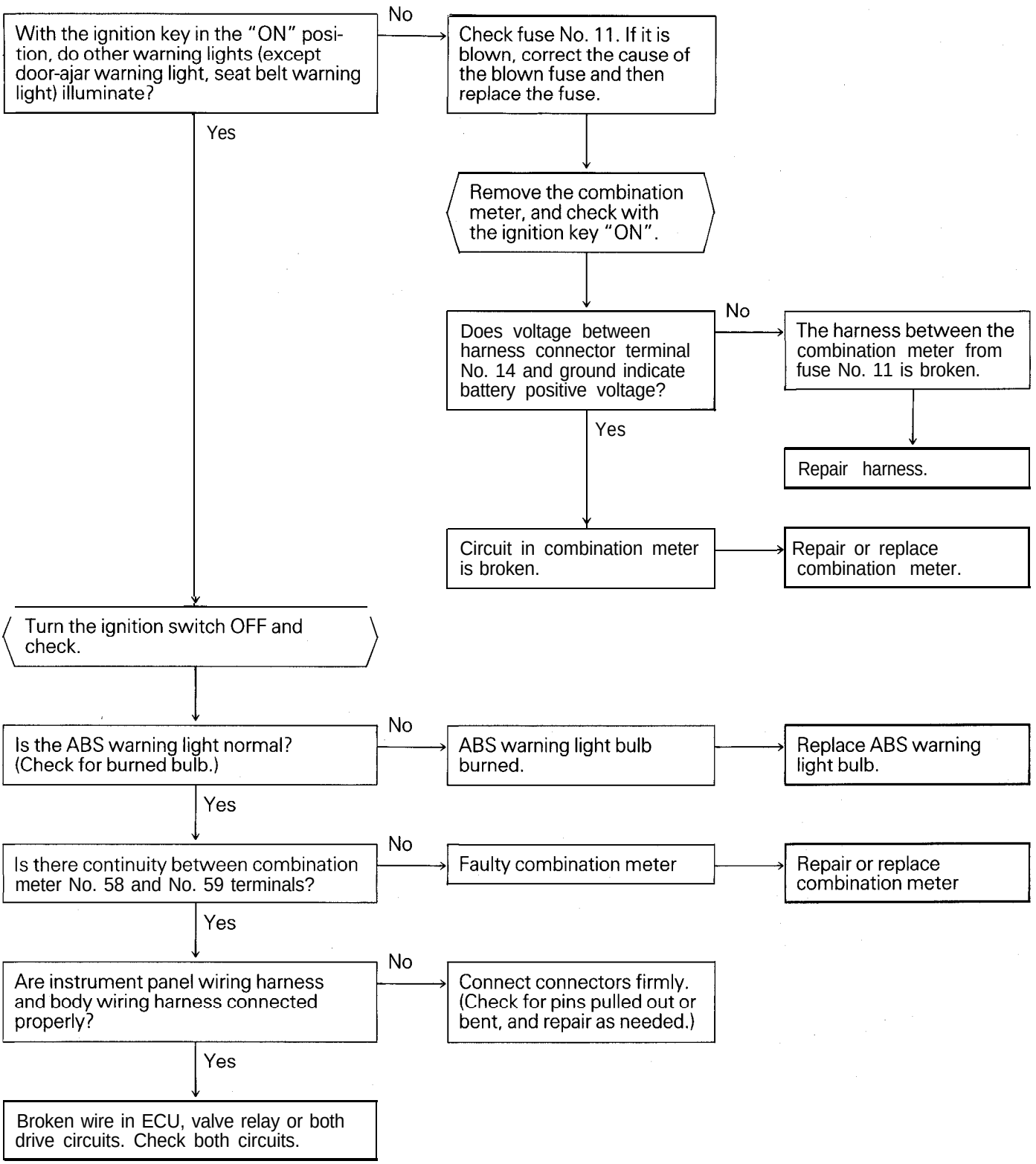
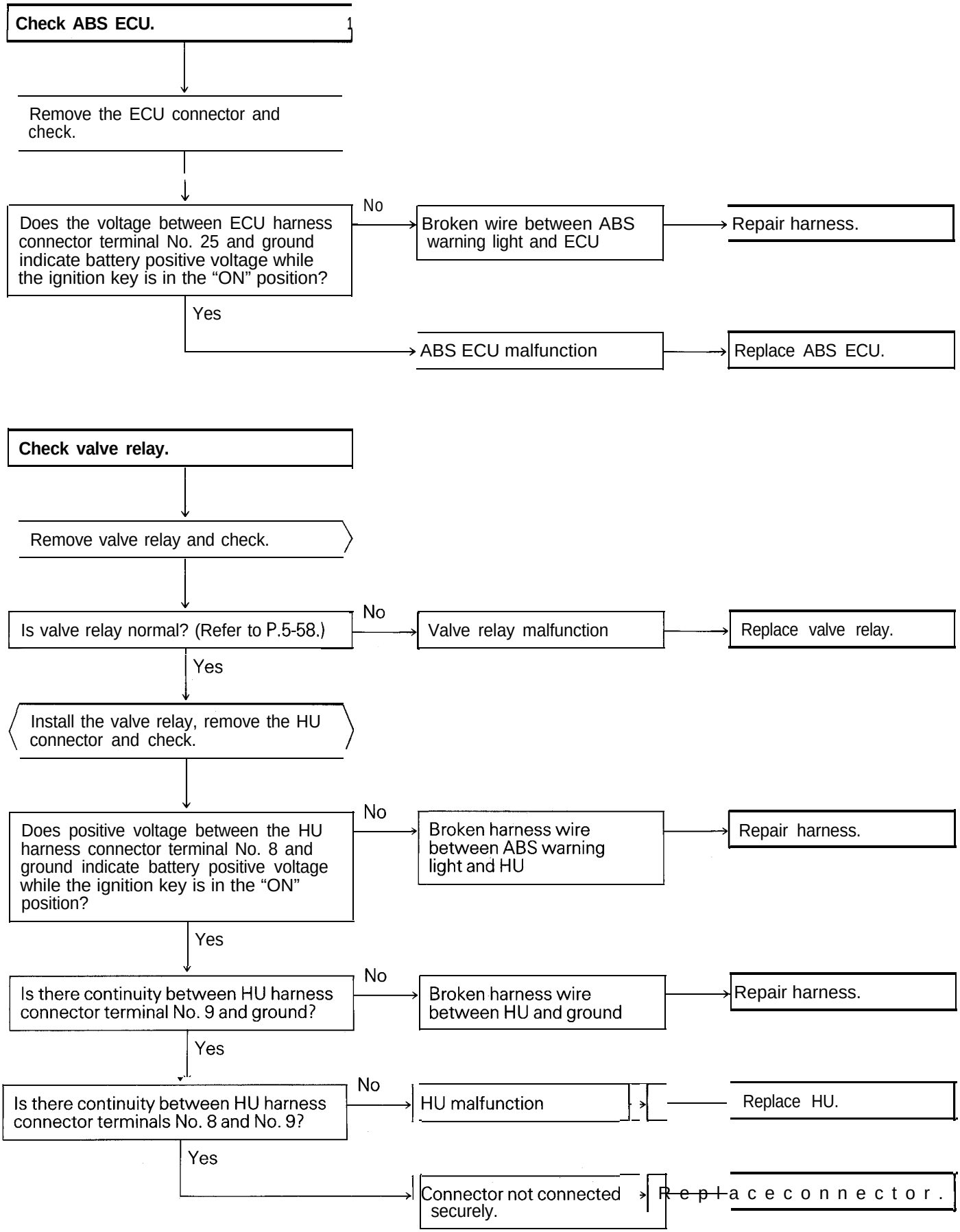
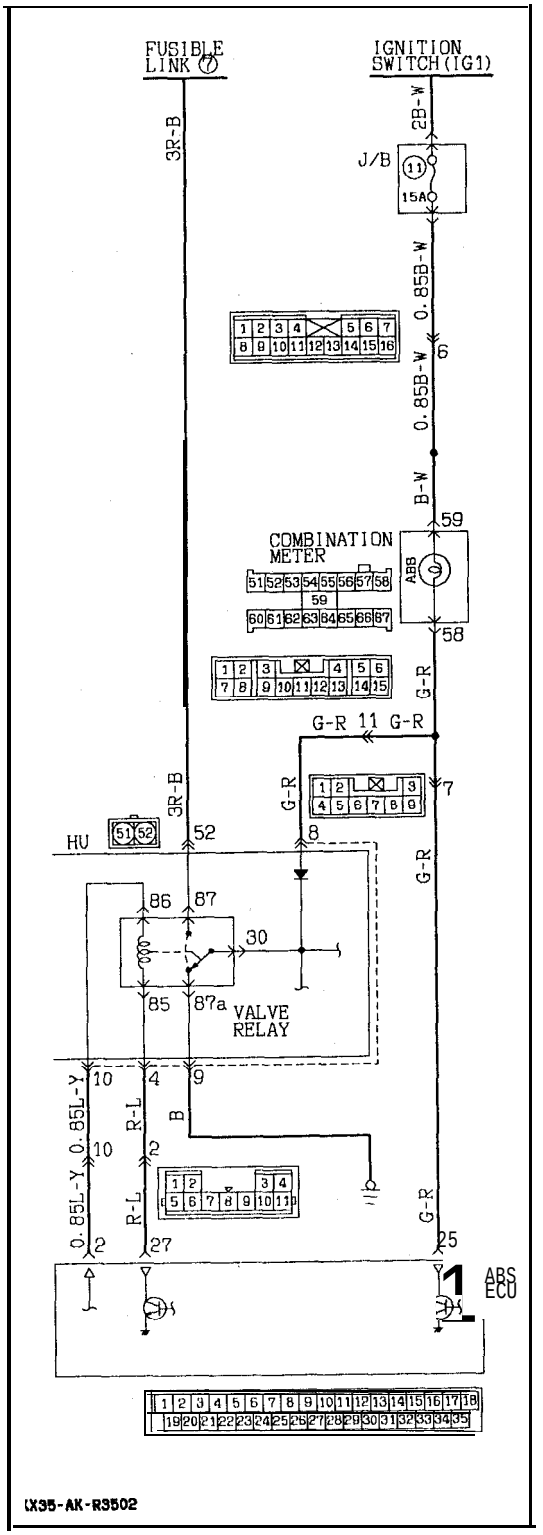

With the ignition key in the "ON" position, do other warning lights (except door-ajar warning light, seat belt warning light) illuminate?
No
Check fuse No. 11. If it is blown, correct the cause of the blown fuse and then replace the fuse.
Yes
Remove the combination meter, and check with the ignition key "ON".
Does voltage between harness connector terminal No. 14 and ground indicate battery positive voltage?
No
The harness between the combination meter from fuse No. 11 is broken.
Repair harness.
Yes
Circuit in combination meter is broken.
Repair or replace combination meter.
Turn the ignition switch OFF and check.
Is the ABS warning light normal? (Check for burned bulb.)
No
ABS warning light bulb burned.
Replace ABS warning light bulb.
Yes
Is there continuity between combination meter No. 58 and No. 59 terminals?
No
Faulty combination meter
Repair or replace combination meter
Yes
Are instrument panel wiring harness and body wiring harness connected properly?
No
Connect connectors firmly. (Check for pins pulled out or bent, and repair as needed.)
Yes
Broken wire in ECU, valve relay or both drive circuits. Check both circuits.


Check ABS ECU.
1
Remove the ECU connector and check.
Does the voltage between ECU harness connector terminal No. 25 and ground indicate battery positive 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.5-58.)
No
Valve relay malfunction
Replace valve relay.
Yes
Install the valve relay, remove the HU connector and check.
Does positive voltage between the HU harness connector terminal No. 8 and ground indicate battery positive voltage while the ignition key is in the "ON" position?
No
Broken harness wire between ABS warning light and HU
Repair harness.
Yes
Is there continuity between HU harness connector terminal No. 9 and ground?
No
Broken harness wire between HU and ground
Repair harness.
Yes
Is there continuity between HU harness connector terminals No. 8 and No. 9?
No
HU malfunction
Replace HU.
Yes
Connector not connected securely.
Replace connector.

B	ABS warning light stays on when the ignition key is in the "ON" position.

[Explanation]

This is the symptom when the ABS ECU does not power up due to broken ECU power circuit, etc., when the fail safe function operates and isolates the system or when the warning light drive circuit is short circuited.

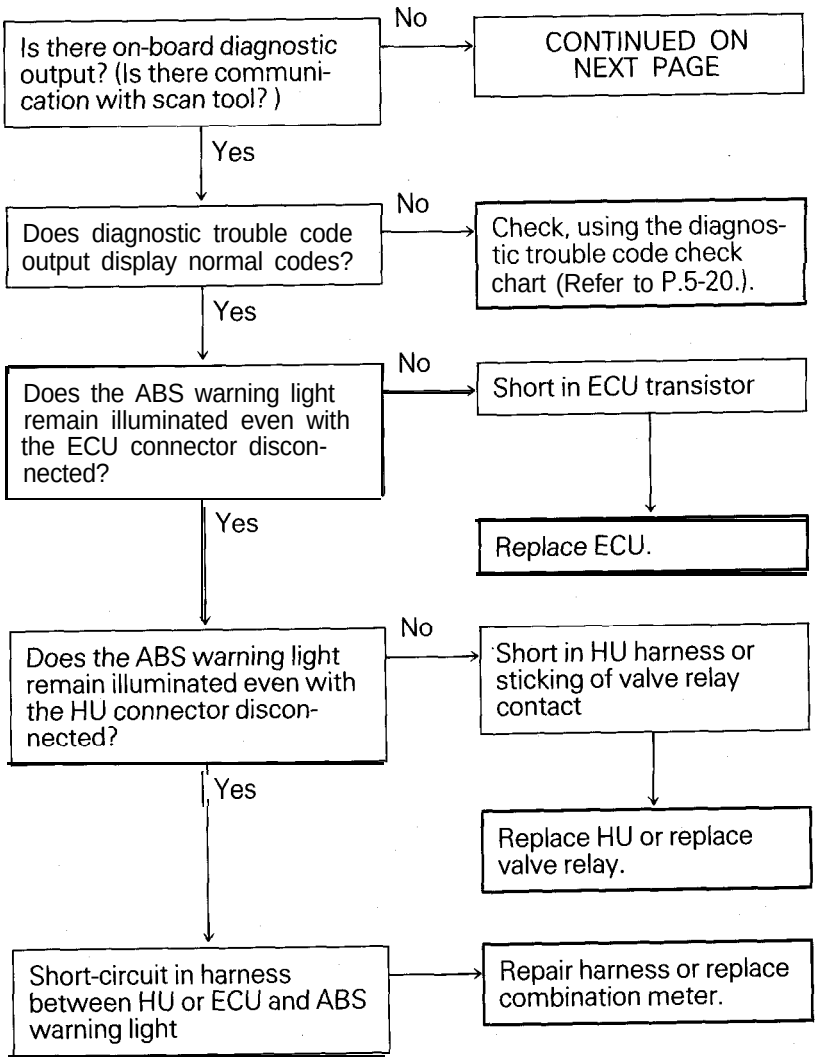


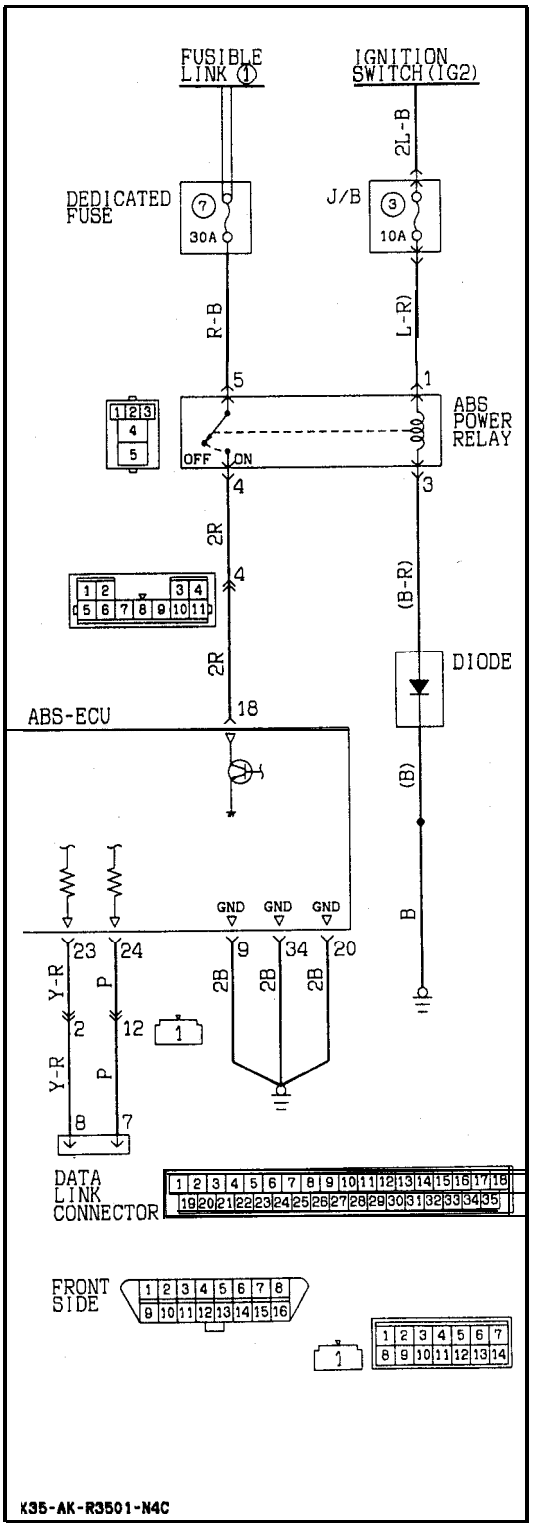
[Hint]

Check the on-board diagnostic output and if there is no output voltage or if the scan tool and ABS ECU cannot communicate, there is a good possibility that power is not flowing to the ECU.

Caution

- **If the diagnostic trouble code is output, the system can be in the fail safe mode. In such a case, erase the diagnostic trouble code and then restart the engine to check if the system is currently in a fault condition.**





CONTINUED FROM PREVIOUS PAGE

Can other electronic control systems communicate with scan tool?
- No → Scan tool related malfunction. Repair and recheck.
- Yes ↓

Is fuse No. 3 normal?
- No → Correct cause of blown fuse and replace fuse.
- Yes ↓

Is power relay normal? (Refer to P.5-69.)
- No → Power relay malfunction → Replace power relay.
- Yes ↓

Disconnect ECU connector and check harness connector

With the ignition key in the "ON" position, does voltage between ECU connector terminal No. 18 and ground indicate the battery positive voltage?
- No → Harness wire between power relay and ECU is broken → Repair harness.
- Yes ↓

Is there continuity between body harness terminals No. 9 and No. 34, and ground?
- No → ECU ground line broken → Repair harness.
- Yes ↓

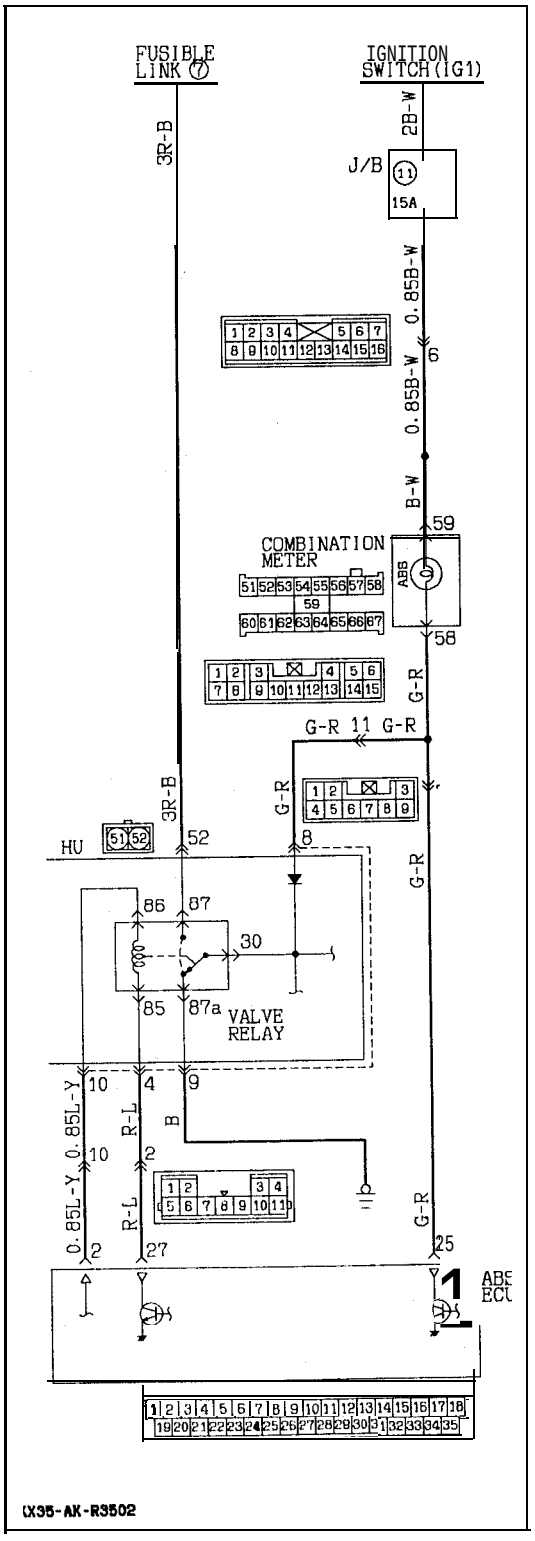
Is there continuity between body harness connector terminals No. 23 and No. 24, and diagnosis inspection terminals No. 4 & No. 1 O?
- No → Harness wire between diagnosis inspection terminal and ABS ECU is broken. → Repair harness.
- Yes ↓

Malfunction of ABS ECU → Replace ABS ECU.

C	ABS warning light does not illuminate when ignition key is in "START" position.

[Explanation]

The ABS ECU uses the IG_2 power source which is turned off in the "START" position. The ABS warning light uses the IG_1 power source which is not turned off even in the "START" position. Consequently, in the "START" position, power is off and the ECU turns the valve relay OFF. If the warning light does not illuminate at this time, there is trouble in the warning light circuit on the valve relay side.



Remove the No. 3 fuse from the junction box to turn off power to the ABS-ECU. Disconnect the hydraulic unit connector (A-64) and the ABS valve relay connector (A-65). Inspect the harness side of both connectors for damage to the terminal pins., Repair terminal pins as needed.

↓

With the ignition key in the "ON" position, does voltage between body connector terminal No. 8 and ground indicate the battery positive voltage?

- No → Harness wire between HU and warning light is broken.
- Yes ↓

Is there continuity between body connector terminal No. 9 and ground?

- No → Broken line between HU and body ground
- Yes ↓

Is there continuity between HU connector terminal No. 8 and terminal No. 9? *

- No → Valve relay malfunction or break in HU harness wire
- Yes ↓

Remove the valve relay. Is there continuity between terminal No. 87a and No. 30?

- No → Valve relay malfunction → Replace valve relay.
- Yes ↓

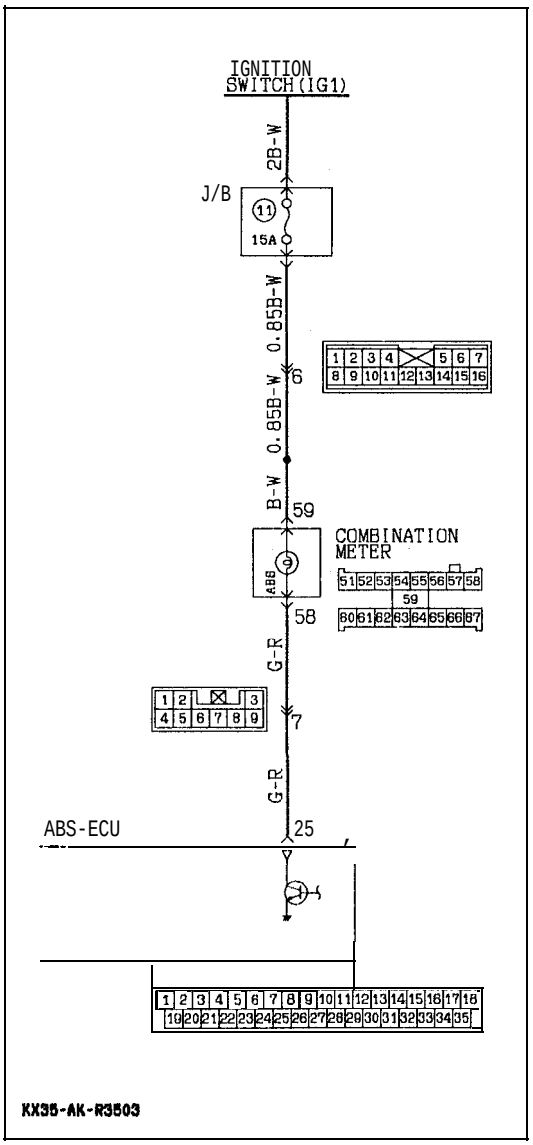
HU harness malfunction → Replace HU.

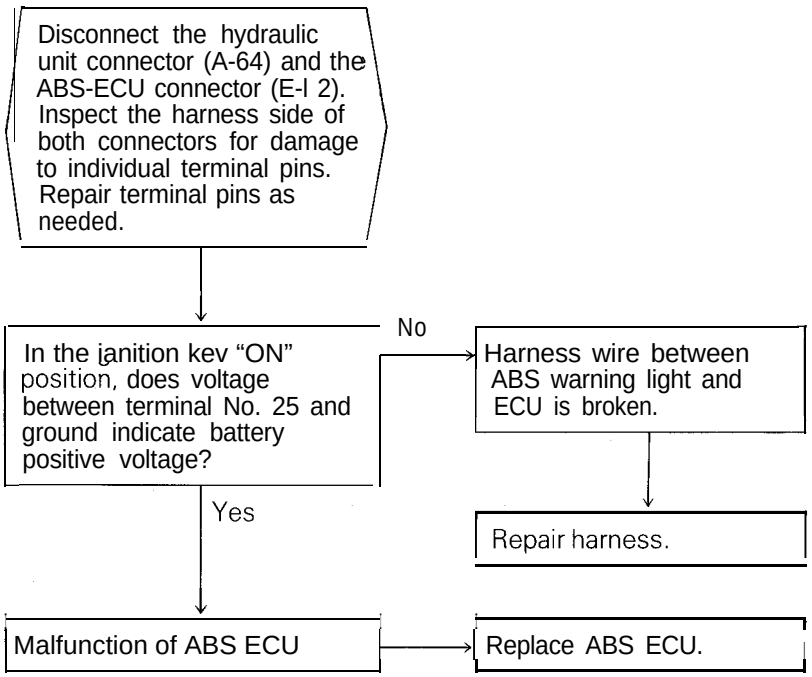
NOTE
When performing the check marked *, note polarity of the diode (refer to the circuit diagram).

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.





E-I	When the following diagnostic trouble codes are displayed “11 FL SNSR. OPEN” “12 FR SNSR. OPEN” “13 RL SNSR. OPEN” “14 RR SNSR. OPEN”

[Explanation]

The ABS ECU detects breaks in the wheel speed sensor wire. The warning light lights up if the wheel speed sensor signal is not input (or short circuited) or if its output is low when starting to drive or while driving.

[Hint]

In addition to a broken wire/short circuit in the wheel speed sensor, also check whether the sensor gap is too large, sensor harness wire is broken, or sensor harness and body connector are not properly connected.

E-2	When diagnostic trouble code “15 VEH. SPD. SNSR.” is displayed

[Explanation]

The warning light lights up 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.

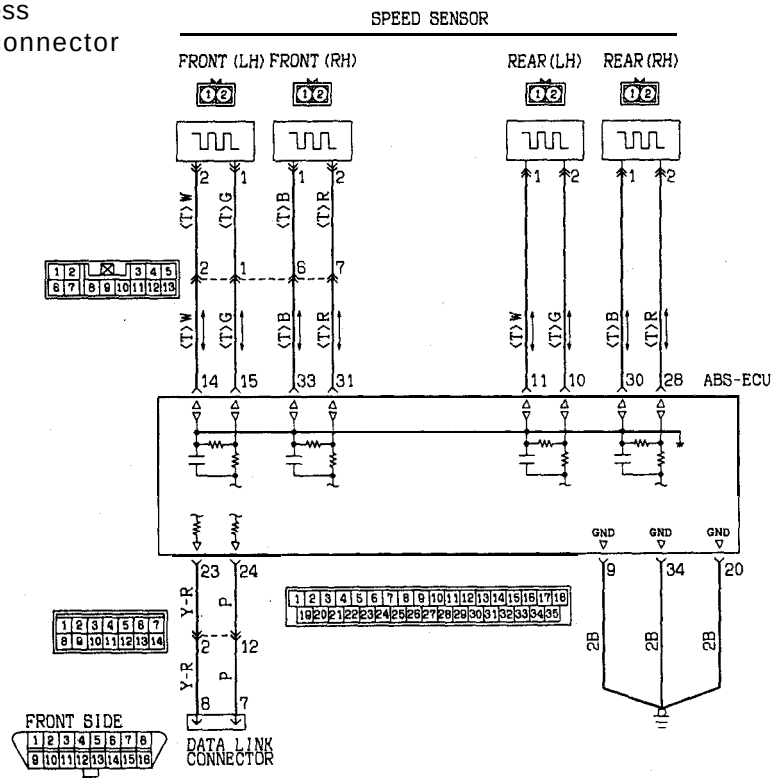
- Distortion of rotor, teeth missing
- Low frequency noise interference when sensor harness wire is broken
- Noise interference in sensor signal
- The sensor output signal is below the standard value or amplitude modulation is over the standard value. Using an oscilloscope to measure the wave shape of the wheel speed sensor output signal is very effective.
- Broken sensor harness
- Poor connection of connector

NOTE

(1) If contact is poor, check the sensor cable by bending and lightly stretching it.

(2) Except for the case where a fault condition exists in the system, but the inspection results are normal; if an abnormality cannot be found in the sensor circuit displayed as abnormal, erase the diagnostic trouble code and turn the ignition switch to OFF once, and then test-drive” again. If the same diagnostic trouble code is output, replace the ABS ECU. If the trouble does not occur anymore, the problem is likely to be with the ABS ECU.
(If the trouble is in the speed sensor circuit, but is difficult to recreate, it will recur even after the ABS ECU has been replaced.)

(3) *: Drive at 19 mph or higher for more than 30 seconds.



KX35-AK-R3505-N4C

Check flow connected with wheel speedsensor

NOTE
When checking with an oscilloscope, first measure voltage variations in the wheel speed sensor output. (Refer to P.5-58.)

Is the resistance value of the wheel speed sensor part normal?
Standard value:
Front 0.8 – 1.2 kΩ
Rear 0.6 – 0.8 kΩ

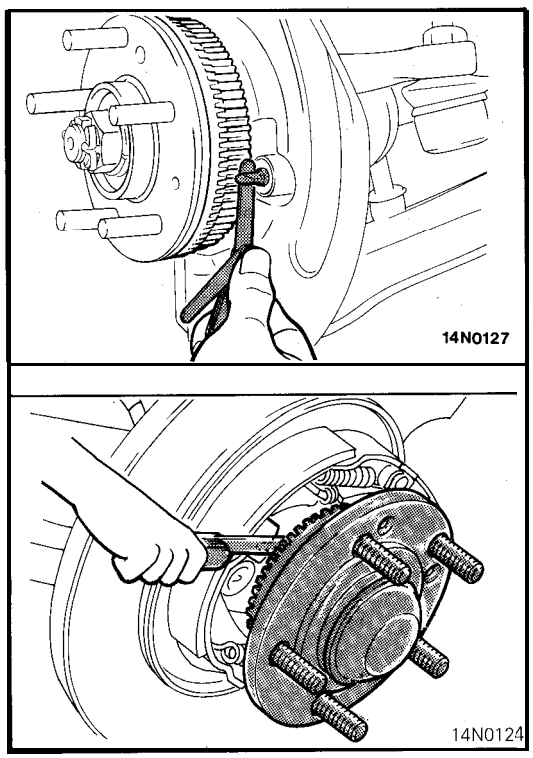
No → Malfunction of wheel speed sensor → Replace wheel speed sensor

Yes ↓

Is the resistance value with the ECU connector normal?
Standard value:
Front 0.8 – 1.2 kΩ
Rear 0.6 – 0.8 kΩ

No → Harness wire for wheel speed sensor circuit is broken → Repair harness.

Yes ↓



Is the standard value for the gap between the wheel speed sensor and rotor within the range?
Standard value:
Front 0.3 – 0.9 mm (.012 – .035 in.)
Rear 0.2 – 0.7 mm (.008 – .028 in.)

No → Adjust the gap between the wheel speed sensor and rotor.

Yes ↓

Is the wheel speed sensor rotor normal, with no missing or damaged teeth?

No → Replace rotor that has missing or damaged teeth.

Yes ↓

Check the output of each wheel speed sensor with an oscilloscope, including the waveform. (Refer to measurement of wheel speed sensor output voltage variations on P.5-58.)
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 ↓

Wheel speed sensor related things are normal.

E-3 When diagnostic trouble code "22 STOP LAMP SW" is displayed

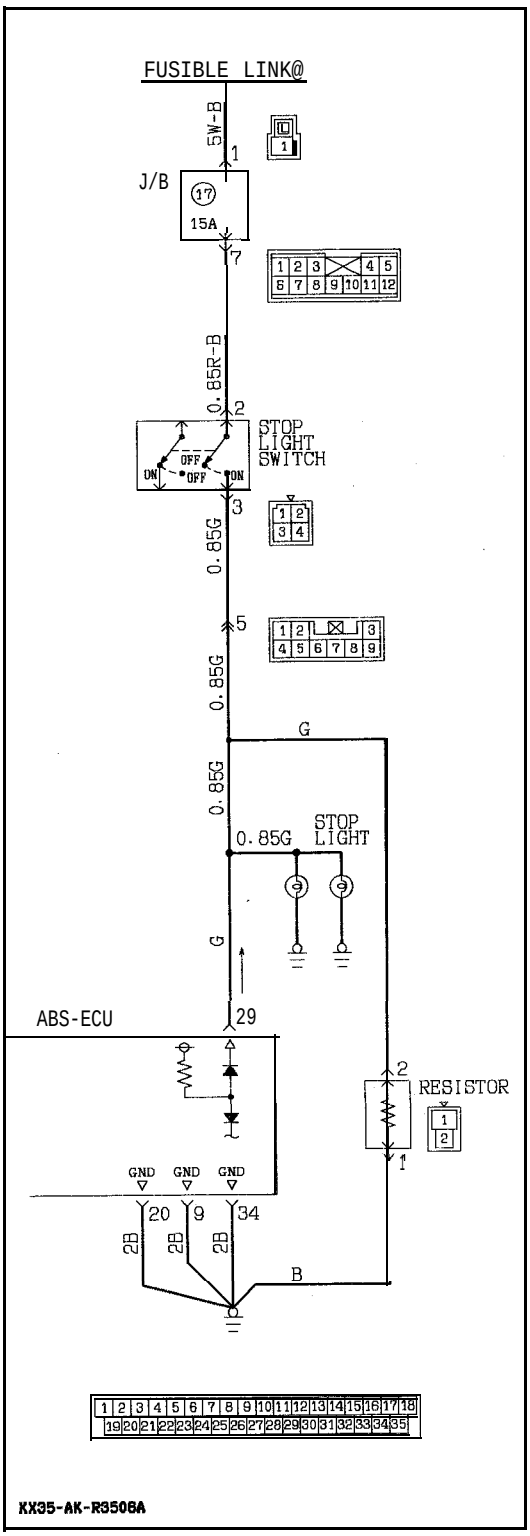
[Explanation]

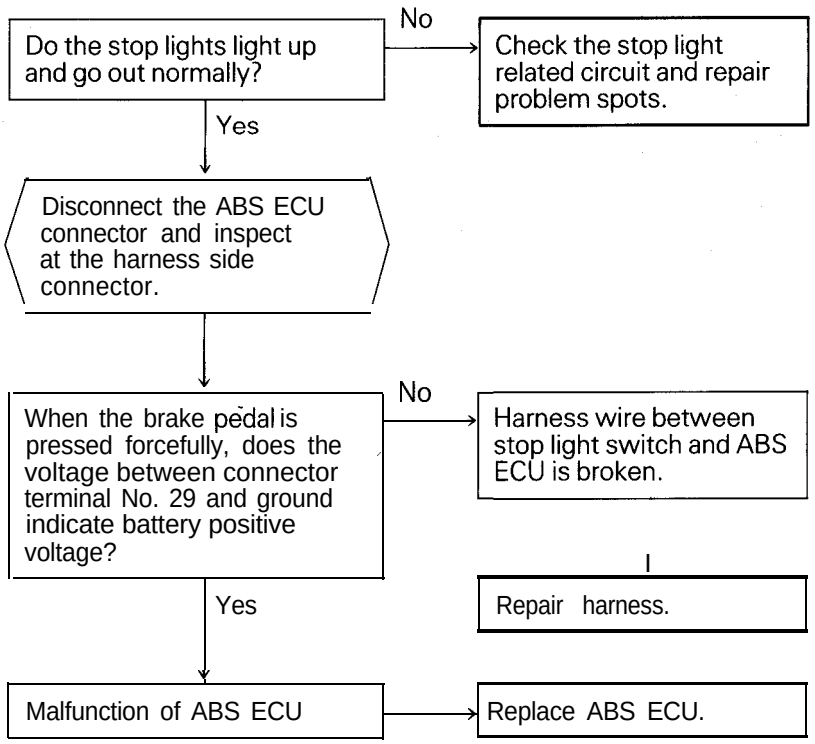
The ABS ECU outputs this diagnostic trouble code in the following cases.

- Stop light switch may remain on for more than 15 minutes without ABS operation.
- The harness wire for the stop light switch may be open.

[Hint]

If the stop light operates normal, the harness for the stop light switch input circuit is broken or there is a malfunction in the ABS ECU.

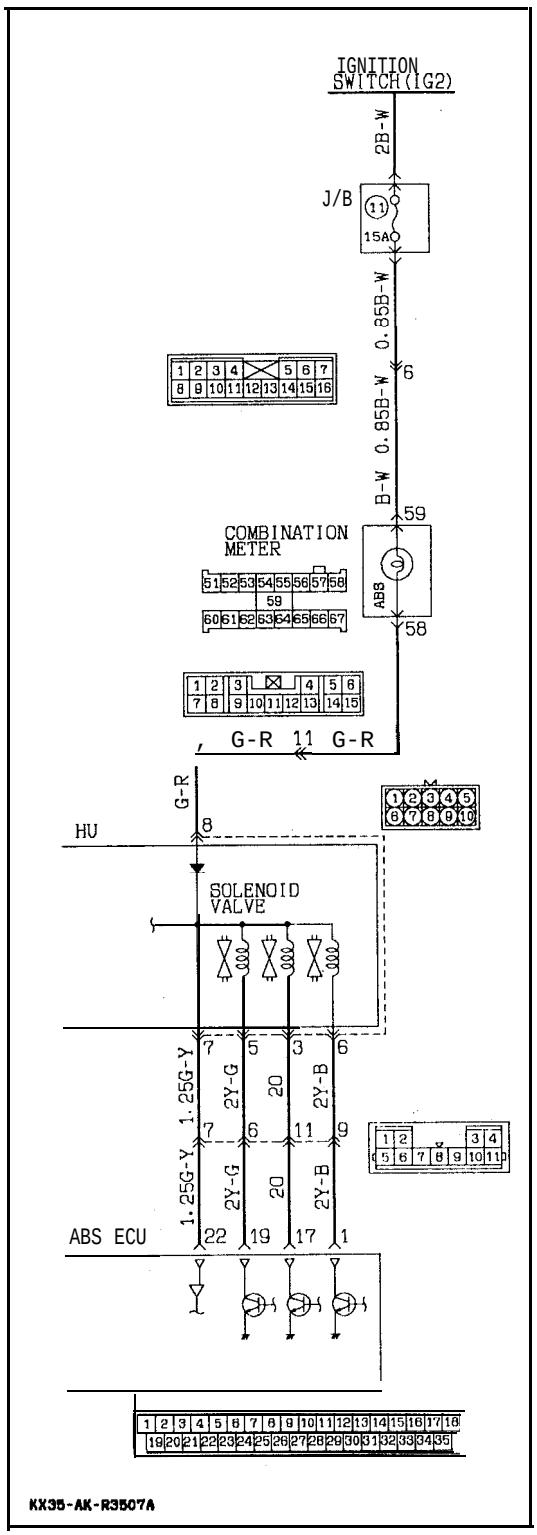


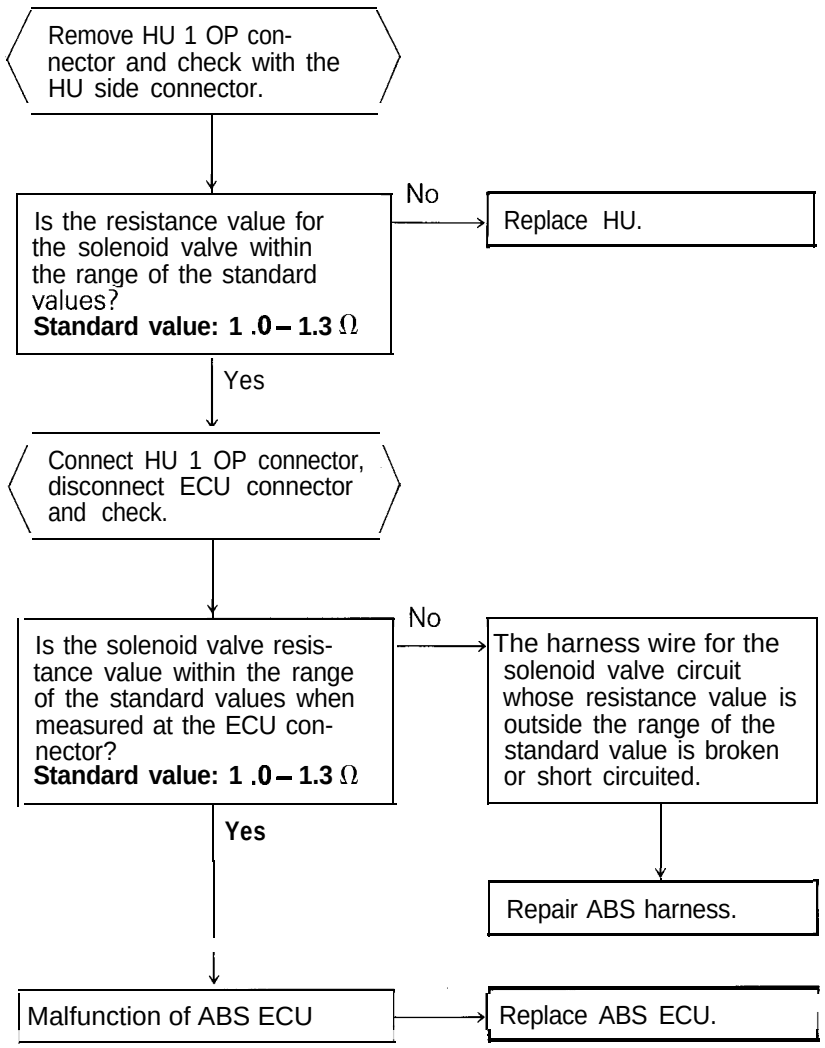


E-4	When diagnostic trouble codes "41 FL SOL. VALVE", "42 FR SOL. VALVE" or "43 REAR SOL. V." are displayed.

[Explanation]

The ABS ECU normally monitors the solenoid valve drive circuit.
If no current flows in the solenoid even if the ECU turns the solenoid ON or if it continues to flow even when turned OFF, the ECU determines the solenoid coil wire is broken/short-circuited or the harness is broken/short-circuited, and then these diagnostic trouble codes are output.

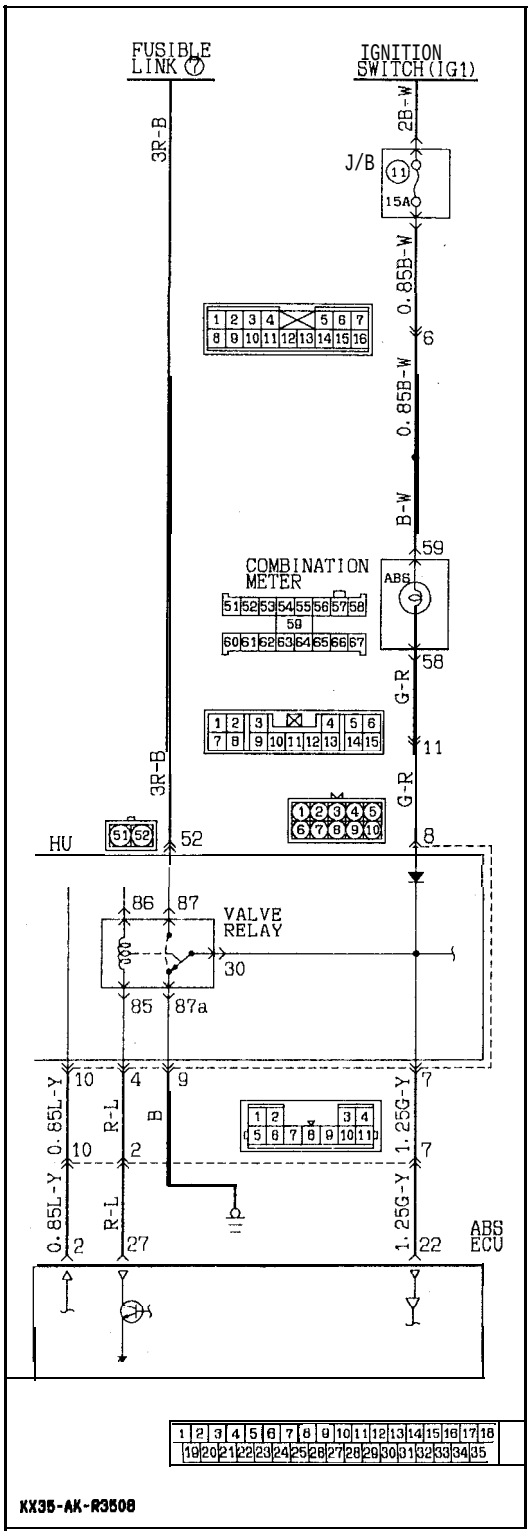


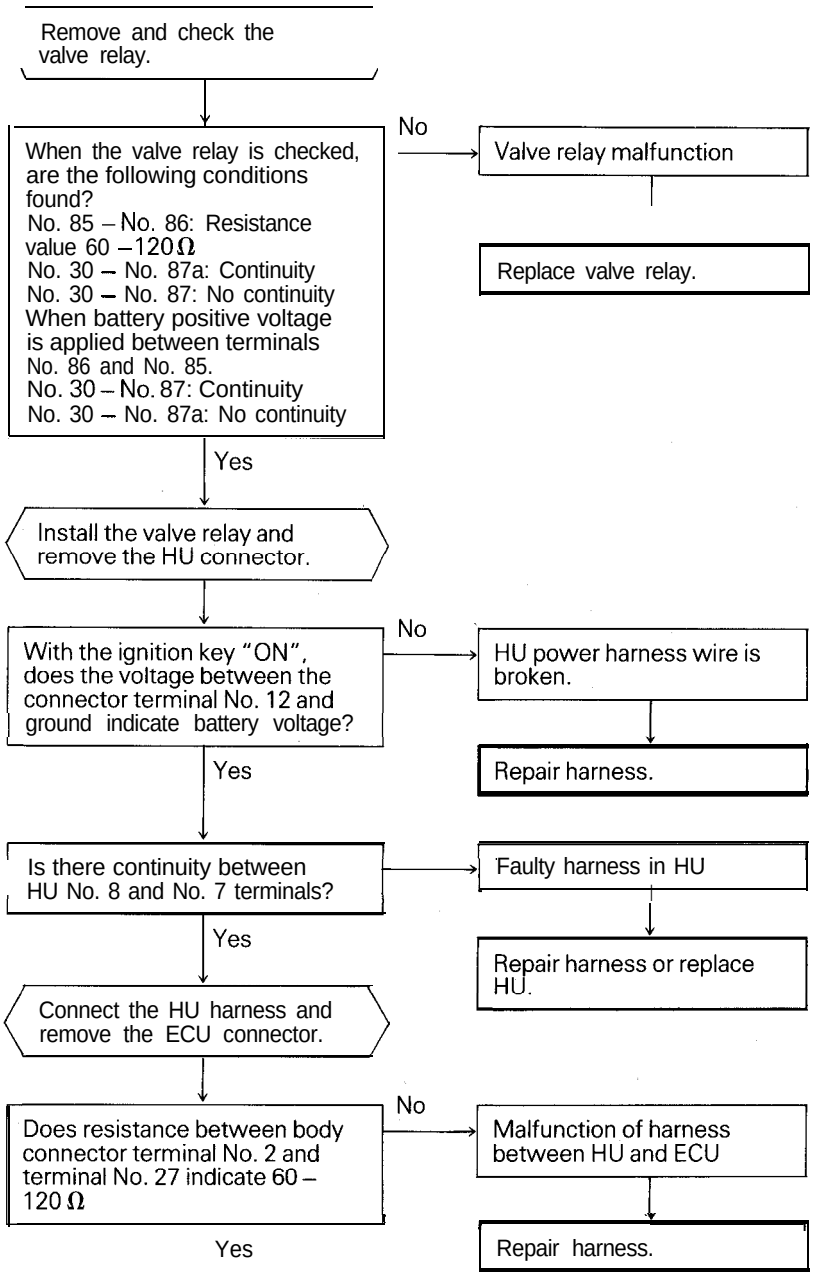


E-5 When diagnostic trouble code "51 VALVE RELAY" is displayed

[Explanation]

When the ignition switch is turned ON, the ABS ECU switches the valve relay OFF and ON for an initial check, compares the voltage of the signal to the valve relay and valve power monitor line voltage to check whether the valve relay operation is normal. In addition, normally it monitors whether or not there is power in the valve power monitor line since the valve relay is normally ON. Then, if the supply of power to the valve power monitor line is interrupted, this diagnostic trouble code will be output.





E-6	When diagnostic trouble code "52 MOTOR RELAY" is displayed

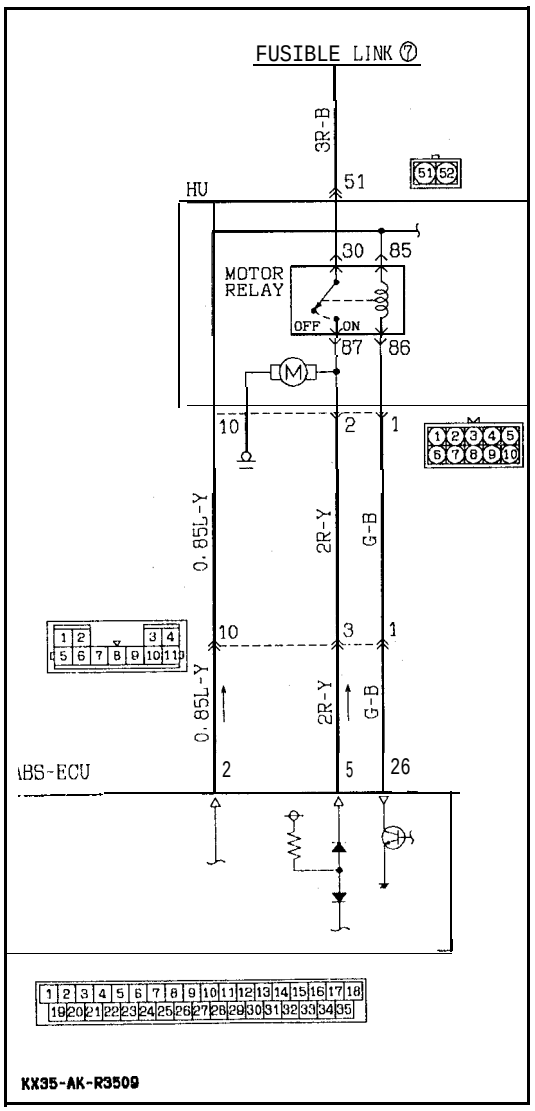
[Explanation]

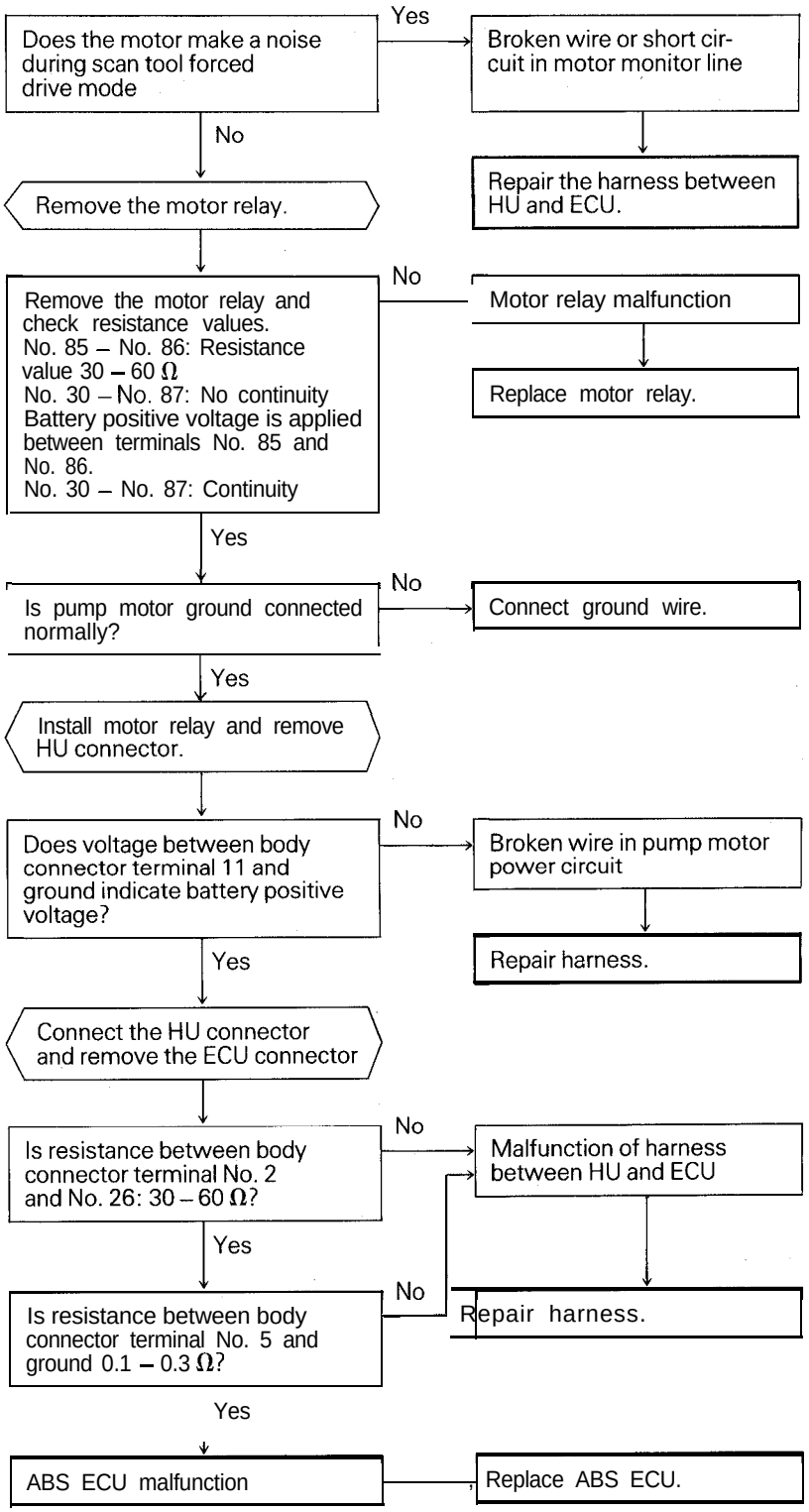
The ABS ECU outputs this diagnostic trouble code for the motor relay and motor in the following cases.

- When the motor relay does not function
- When there is trouble with the motor itself and it does not revolve
- When the motor ground line is disconnected and the motor does not revolve
- When the motor continues to revolve

[Hint]

If there is motor operation noise during scan tool forced drive mode, there is a broken or short circuited motor monitor wire.



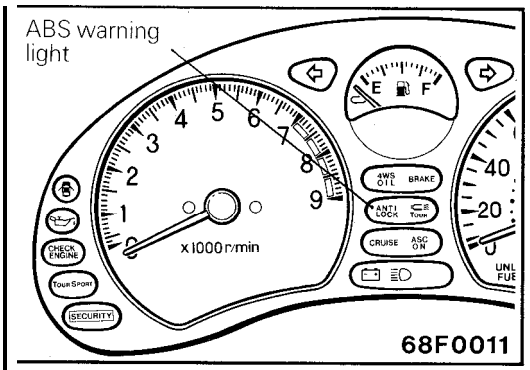


TROUBLESHOOTING (ABS – AWD)

Confirm condition in the following way and diagnosis accordingly.

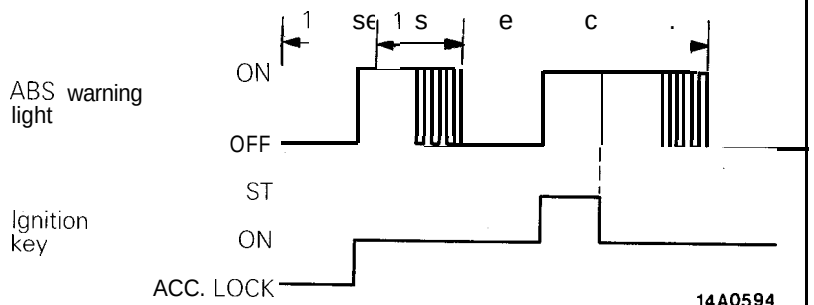
Does the ABS warning light illuminate as described below up to the time the engine starts?

(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.



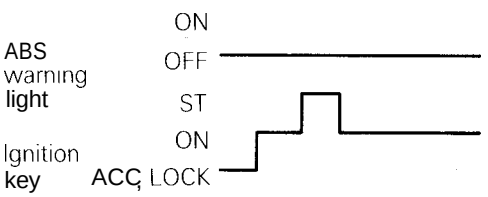
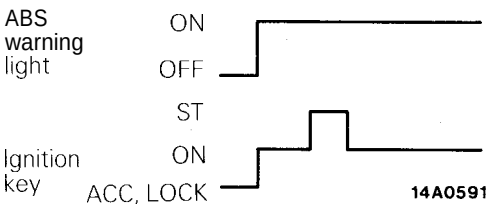
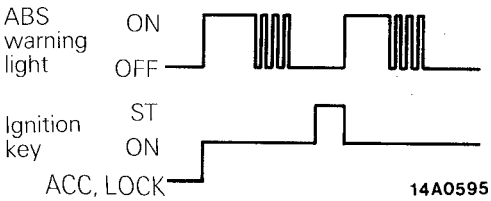
(2) With the ignition key in the "START" position, power to the ABS ECU is interrupted and the ABS warning light remains lit because the valve relay is OFF.

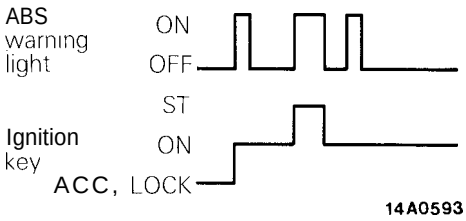
(3) When the ignition key is returned from the "START" position to "ON" position, the ABS warning light flashes four times in about a second (during which the valve relay self check is made again) and then goes out.



Yes → CONTINUED ON NEXT PAGE

No

No.	Trouble condition	Major causes	Remedy
1	ABS warning light does not light up at all. 	• ABS warning light bulb is burnt out. • Open in ABS warning light electrical circuit (check for blown fuse)	Check, using flow chart A (Refer to P.5-31.)
2	When the ignition key is turned to the "ON" position, it remains lighted. 	• Fail safe is functioning due to ECU self diagnosis. • Short in ECU warning light drive circuit • Malfunction of ECU	Check, using flow chart B (Refer to P.5-34.)
3	Does not illuminate when ignition key is in "START" position. 	• Malfunction of valve relay • Break in harness between ABS warning light and HU • Break in harness between HU and body ground	Check, using flow chart C (Refer to P.5-36.)

No.	Trouble condition	Major causes	Remedy
4	After the ignition key is turned to the "ON" position, it blinks once and then illuminates when it is turned to the "START" position. When the key is returned to the "ON" position, the light blinks again. (Blinking with the ignition key in the "ON" position is synchronized with operation noise of the valve relay.) 	• Break in harness for ECU warning light drive circuit • Malfunction of ECU	Check, using flow chart D (Refer to P.5-37.)

CONTINUED FROM PREVIOUS PAGE

Does the ABS warning light illuminate when starting to drive the car?

Yes → Trouble with the motor relay, solenoid valve [due to self test at start-up or malfunction of wheel speed sensor]

No

Is there one-sided braking, insufficient braking force or malfunction of ABS operation?

No → CONTINUED ON NEXT PAGE

Yes

Trouble condition	Major causes	Remedy
One-sided braking Insufficient braking force	• Hydraulic line in HU is clogged. • Mechanical lock of HU solenoid valve	Check HU operation and, if necessary, replace HU. If HU is normal, check structural parts for normal braking.
Decline in ABS function	• Hydraulic line in HU is clogged. • Malfunction in HU solenoid valve operation	
ABS sometimes functions even when there is no sudden braking. (ABS operation vibration is transmitted.)	• Insufficient wheel speed sensor output voltage (sensor malfunction, too large a gap between sensor rotor, missing rotor teeth) • Malfunction of ABS ECU	Check wheel speed sensor (Refer to P.5-58.) and, if necessary, replace sensor, adjust gap or replace rotor. If tests indicate that there are no mechanical or electrical failures,replace the ECU.

CONTINUED FROM PREVIOUS PAGE

After a test drive, use on-board diagnostic to check (Refer to P.5-33.).

No diagnostic trouble codes output and normal codes are displayed?

No No on-board diagnostic output

No Diagnostic trouble codes are output

Check and repair the harness between the ABS ECU serial/on-board diagnostic output terminals and the diagnosis check connector.

Yes

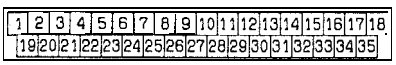
There was trouble in the past.
NOTE
Store diagnostic trouble codes in the memory.

Referring to the diagnostic trouble code check chart E-I-E-7, make the diagnostic trouble code reoccur to discover the main cause of intermittent or other trouble.

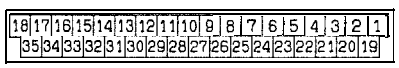
If trouble does not reappear, watch vehicle movements until it reappears (Refer to P.5-34.)

All ABS functions are normal.
(Nor are there stored memory of past diagnostic trouble code.)

Connector terminal No. layout for troubleshooting



Terminal No. layout shown on the special tool connector



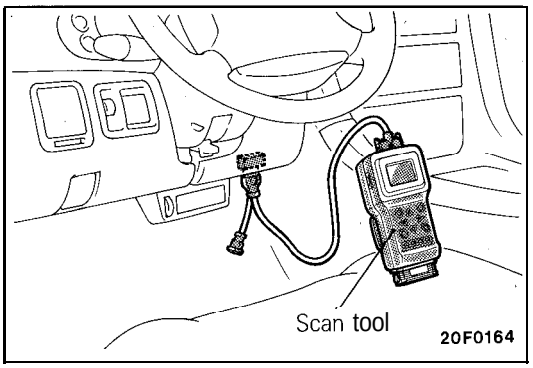
Caution

1. When carrying out inspecion of the ABS-ECU terminal voltage and resistance, the special tool (MB991356) should be used.

2. Because the ABS-ECU connector terminal No. layout for troubleshooting is different from the terminal No. layout shown on the special tool connector, when using the special tool for inspecting, take the readings from the special tool terminal Nos.

Example

ABS-ECU connector terminal No. for troubleshooting	Terminal No. shown on the special tool connector
18	1



CHECK USING ON-BOARD DIAGNOSTIC

(1) With the ignition switch OFF, connect the scan tool.

Caution
Turn off the ignition switch beforehand whenever the scan tool is connected or disconnected.

Turn the ignition ON and select the ABS system. (The ABS warning light lights up, it goes into the scan tool mode. **In the scan tool mode, ABS does not function.)**
If it does not go into the scan tool mode, check the ECU power circuit and the harness between the ECU and diagnosis check terminals.

(2) Read the on-board diagnostic output codes from the ECU memory.

(3) Clear the diagnostic trouble codes once from memory. (Refer to P.5-34.)
If the memory cannot be cleared, the ECU is currently detecting the trouble and the ABS ECU is in fail safe. If it can be cleared, the trouble is either temporary or appears only when driving.

(4) When the diagnostic trouble codes cannot be cleared, or when the ABS ECU goes into fail safe during another test drive and diagnostic trouble codes are output, check according to diagnostic trouble code check charts (E-I-E-7).

DIAGNOSTIC TROUBLE CODE CHART

Diagnostic trouble code		Check chart name or remedy	Reference page	Diagnostic trouble code		Check chart name or remedy	Reference page
No.	Scan tool display letters			No.	Scan tool display letters		
11	FL SNSR. OPEN	E-1	P.5-38	41	FL SOL. VALVE	E-5	P.5-42
12	FR SNSR. OPEN			42	FR SOL. VALVE		
13	RL SNSR. OPEN			43	VALVE DRIFT		
14	RR SNSR. OPEN			51	VALVE RELAY	E-6	P.5-43
15	VEH. SPD. SNSR.	E-2	P.5-38	52	MOTOR RELAY	E-7	P.5-44
21	G SNSR.	E-3	P.5-40	55	CONT. UNIT	ECU replacement	-
22	STOP LAMP SW	E-4	P.5-41				

METHOD OF CLEARING DIAGNOSTIC TROUBLE CODE MEMORY

Caution

- **When servicing is finished, clear the diagnostic trouble code memory**

Diagnostic trouble codes cannot be cleared from memory when the ABS-ECU system is in fail safe mode. Proceed to diagnosis and repair.

(1) Clear memory using scan tool.
(No. 7 "DIAG. ERASE" in the actuator test is selected to erase the diagnostic trouble code.)
(2) After clearing, recheck the diagnostic trouble codes, and check that memory is cleared.

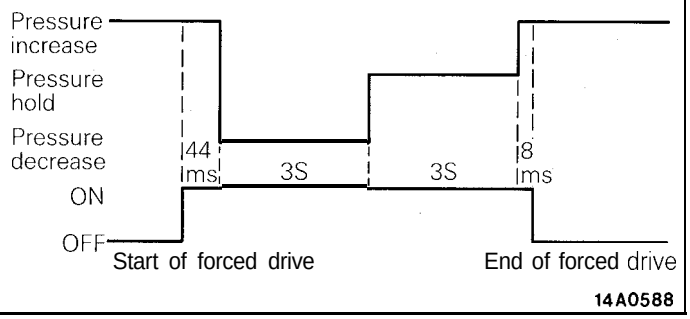
ACTUATOR TEST FUNCTION

The actuator can be forcibly driven in the following way by using the scan tool.

NOTE

- The actuator test cannot be carried out when the ABS ECU system is in fail safe mode.
- When using forced drive using the scan tool, the vehicle must be stopped.
- During forced drive using the scan tool, forced drive operation is stopped when any wheel speed reaches 10 km/h (6 mph).

Actuator test specifications

No.	Scan tool display	Drive solenoid valve and motor	Drive pattern
01	FR VALVE A	Not used	
02	FL VALVE A		
04	FR VALVE M	Solenoid valve and pump motor for each HU corresponding channel. <Manual pattern>	
05	FL VALVE M		

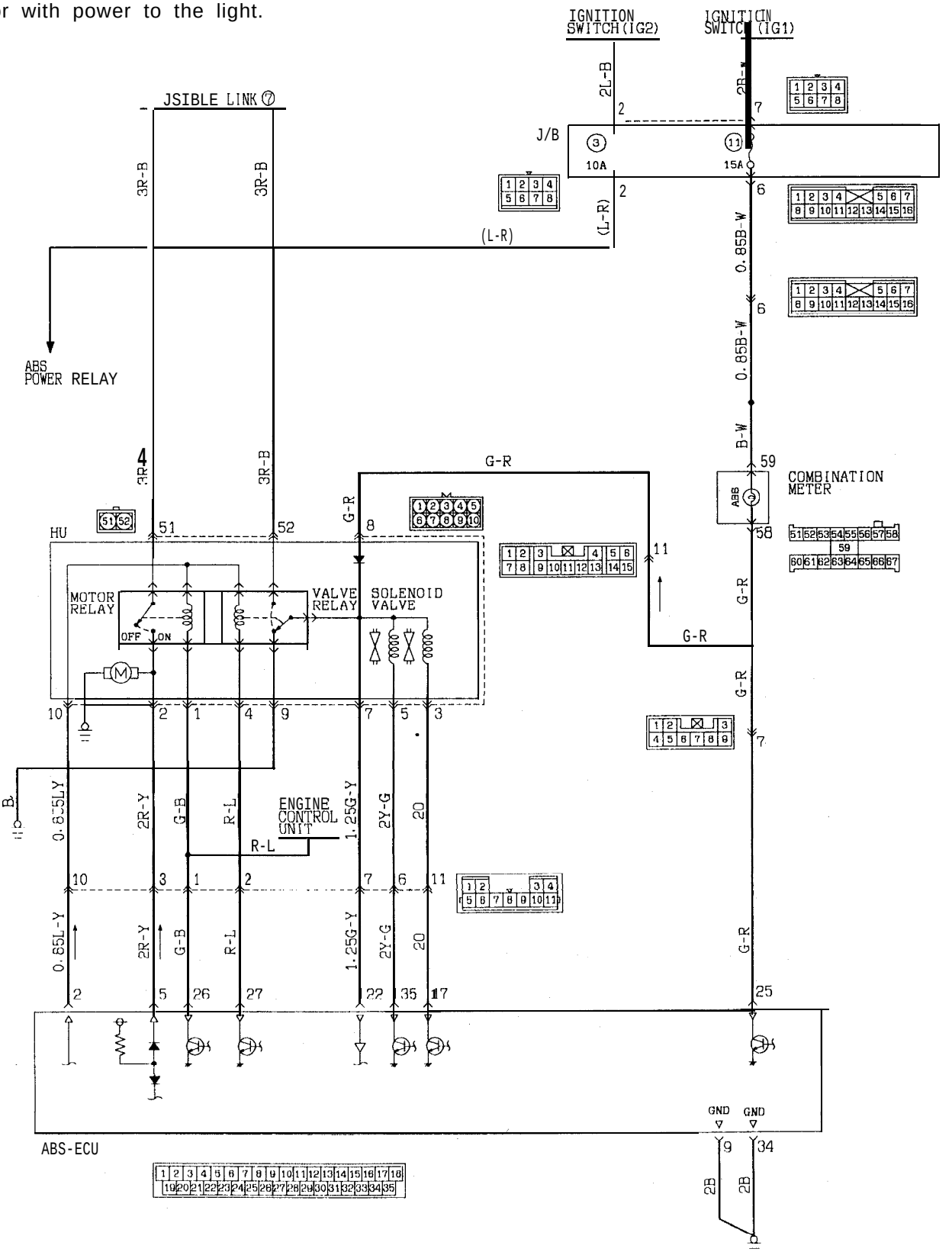
A	ABS warning light does not light at all.

[Explanation]

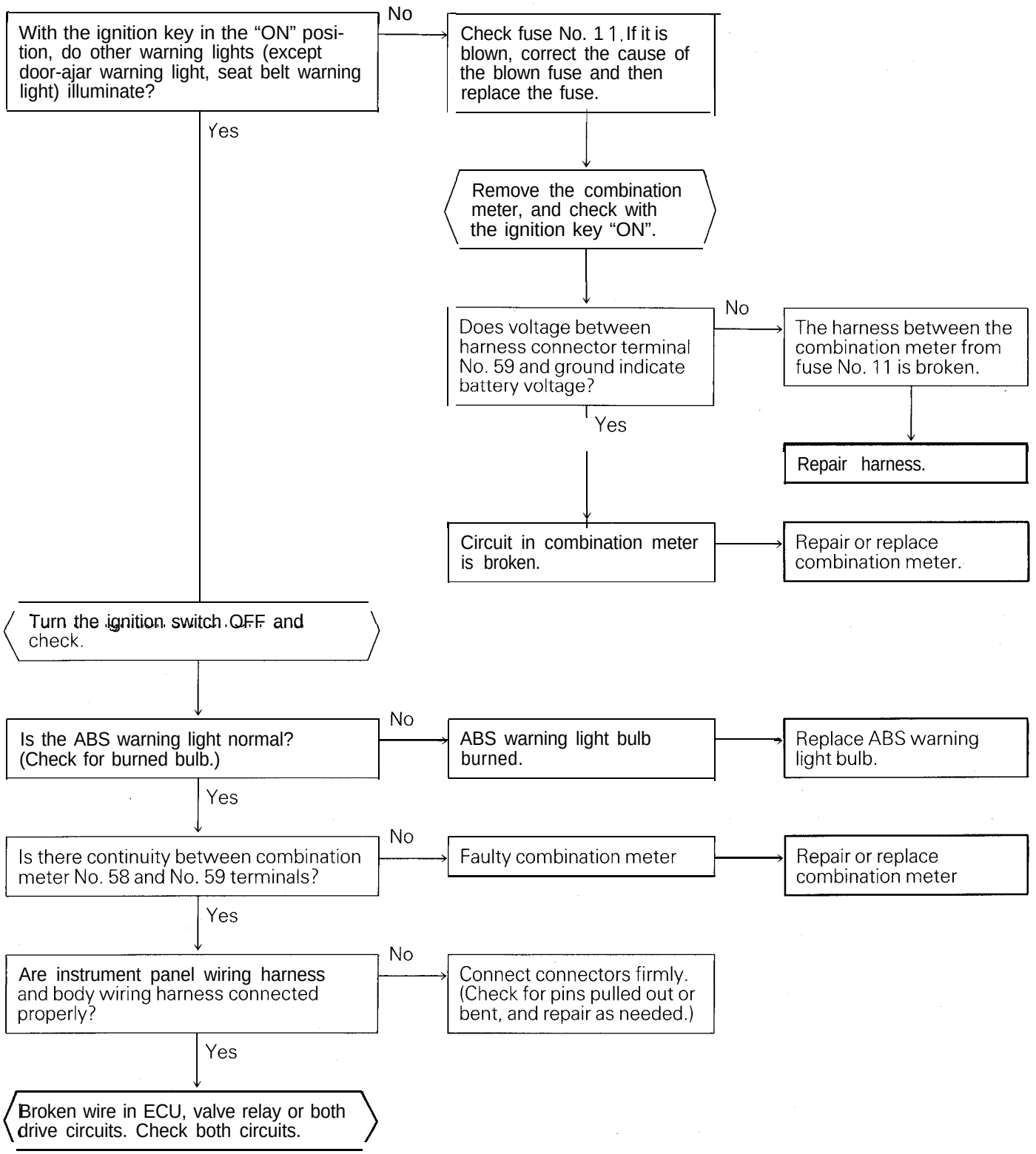
When it does not light up at all, there is a strong possibility that there is trouble with ABS warning light or with power to the light.

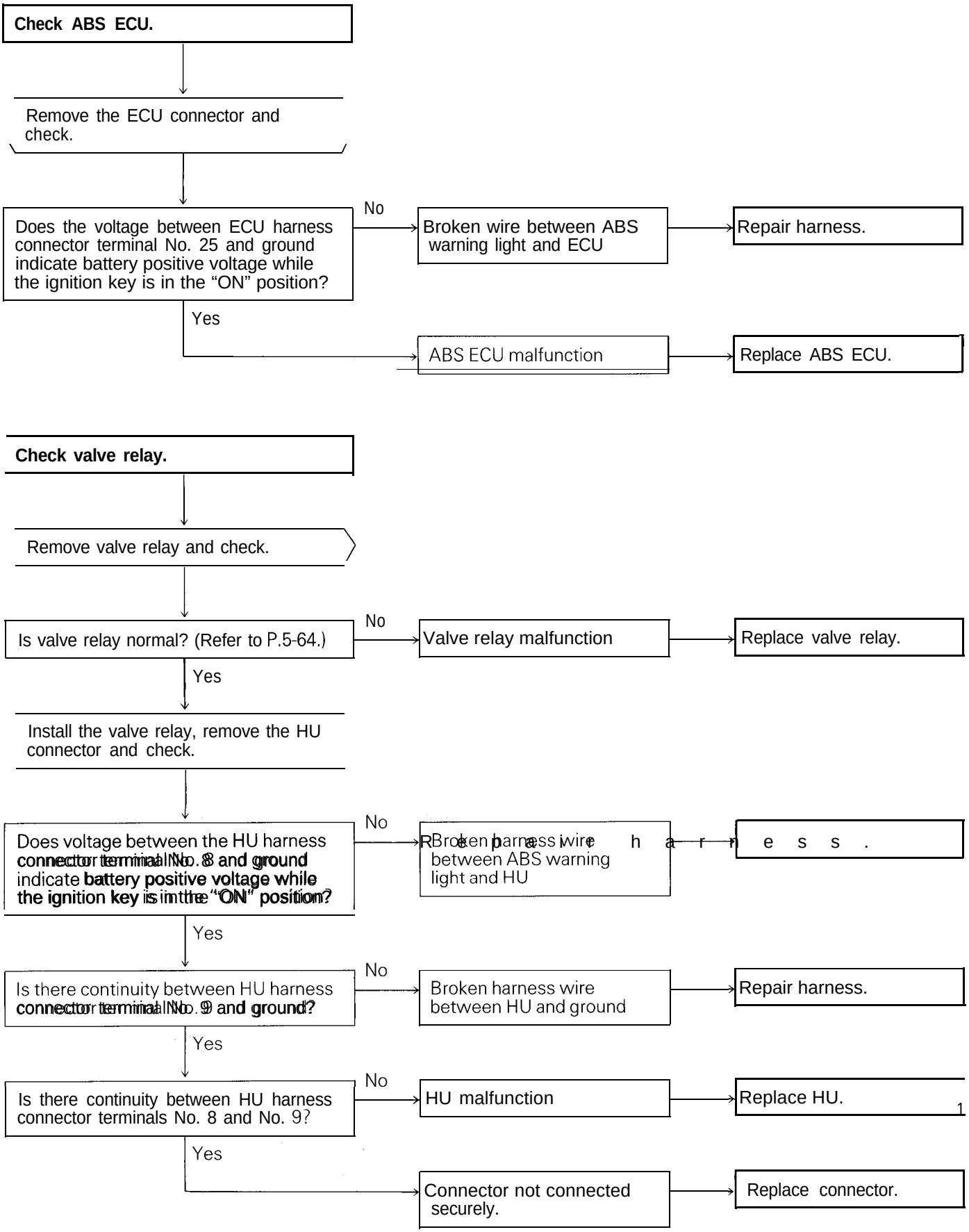
[Hint]

If other warning lights do not light up either, fuse is probably blown.



KX35-AK-R3501

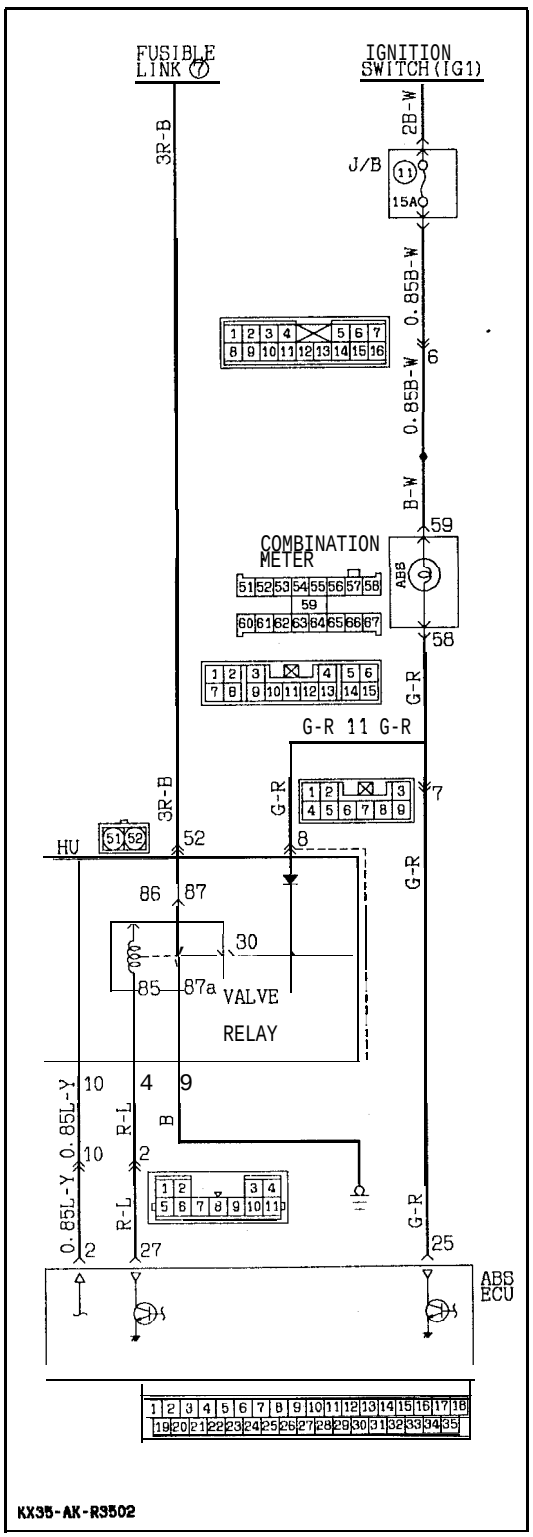

With the ignition key in the "ON" position, do other warning lights (except door-ajar warning light, seat belt warning light) illuminate?
No
Check fuse No. 11. If it is blown, correct the cause of the blown fuse and then replace the fuse.
Yes
Remove the combination meter, and check with the ignition key "ON".
Does voltage between harness connector terminal No. 59 and ground indicate battery voltage?
No
The harness between the combination meter from fuse No. 11 is broken.
Repair harness.
Yes
Circuit in combination meter is broken.
Repair or replace combination meter.
Turn the ignition switch OFF and check.
Is the ABS warning light normal? (Check for burned bulb.)
No
ABS warning light bulb burned.
Replace ABS warning light bulb.
Yes
Is there continuity between combination meter No. 58 and No. 59 terminals?
No
Faulty combination meter
Repair or replace combination meter
Yes
Are instrument panel wiring harness and body wiring harness connected properly?
No
Connect connectors firmly. (Check for pins pulled out or bent, and repair as needed.)
Yes
Broken wire in ECU, valve relay or both drive circuits. Check both circuits.


Check ABS ECU.
Remove the ECU connector and check.
Does the voltage between ECU harness connector terminal No. 25 and ground indicate battery positive voltage while the 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.5-64.)
No
Valve relay malfunction
Replace valve relay.
Yes
Install the valve relay, remove the HU connector and check.
Does voltage between the HU harness connector terminal No. 8 and ground indicate battery positive voltage while the ignition key is in the "ON" position?
No
Broken harness wire between ABS warning light and HU
Repair harness.
Yes
Is there continuity between HU harness connector terminal No. 9 and ground?
No
Broken harness wire between HU and ground
Repair harness.
Yes
Is there continuity between HU harness connector terminals No. 8 and No. 9?
No
HU malfunction
Replace HU.
Yes
Connector not connected securely.
Replace connector.

B	ABS warning light stays on when the ignition key in the "ON" position.

[Explanation]

This is the symptom when the ABS ECU does not power up due to broken ECU power circuit, etc., when the fail safe function operates and isolates the system or when the warning light drive circuit is short circuited.

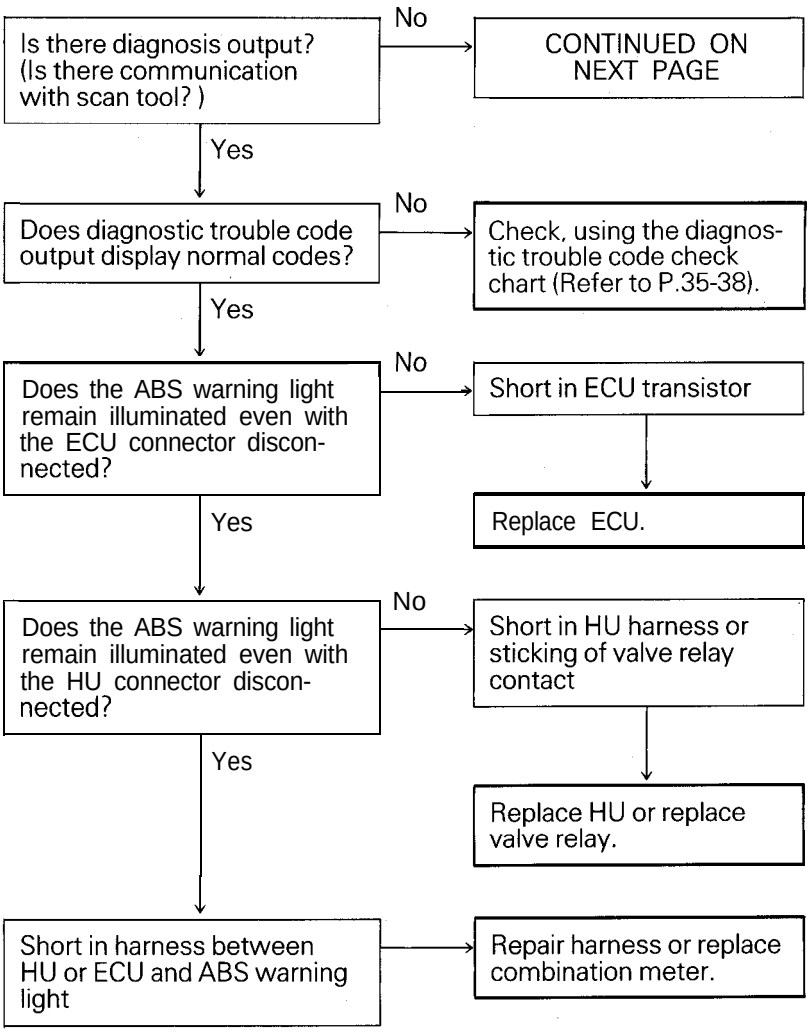


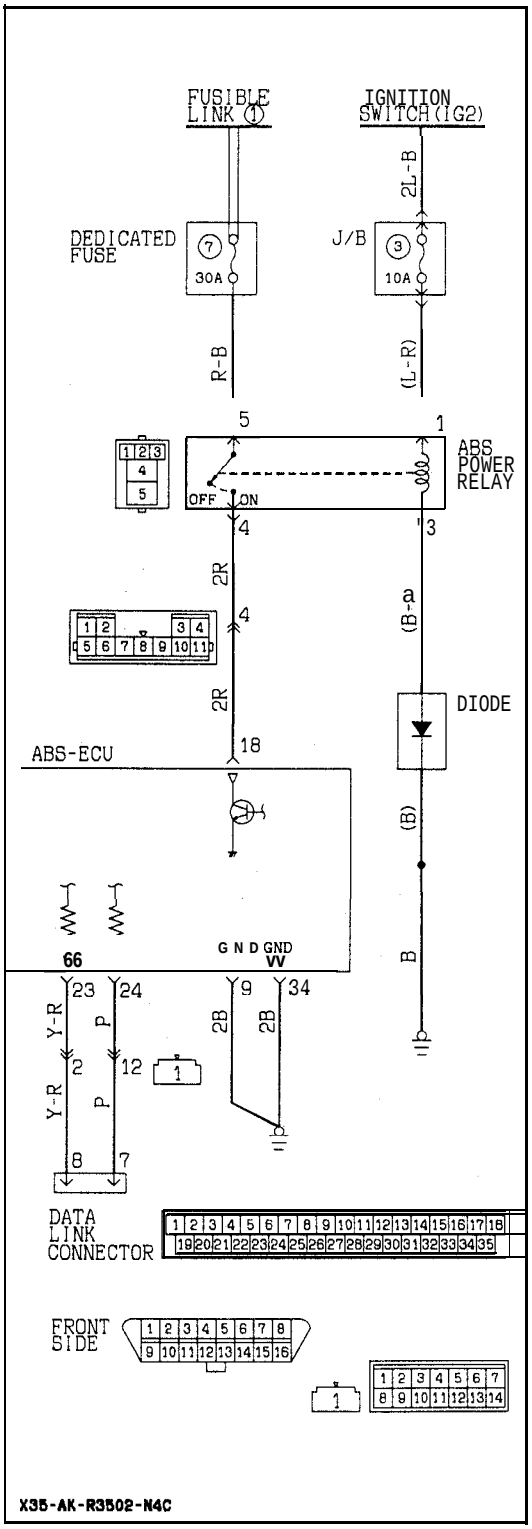
[Hint]

Check the on-board diagnostic output and if there is no output voltage or if the scan tool and ABS ECU cannot communicate, there is a good possibility that power is not flowing to the ECU.

Caution

- **If the diagnostic trouble code is output, the system can be in the fail safe mode. In such a case, erase the diagnostic trouble code and then restart the engine to check if the system is currently in a fault condition.**





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Can other electronic control systems communicate with scan tool?
- No → Scan tool related malfunction. Repair and recheck.
- Yes ↓

Is fuse No. 3 normal?
- No → Correct cause of blown fuse and replace fuse.
- Yes ↓

Is power relay normal? (Refer to P.35-63.)
- No → Power relay malfunction → Replace power relay.
- Yes ↓

Disconnect ECU connector and check harness connector

↓

With the ignition key in the "ON" position, does voltage between ECU connector terminal No. 18 and ground indicate the battery positive voltage?
- No → Harness wire between power relay, and ECU is broken → Repair harness.
- Yes ↓

Is there continuity between body harness terminals No. 9 and No. 34, and ground?
- No → ECU ground line broken → Repair harness.
- Yes ↓

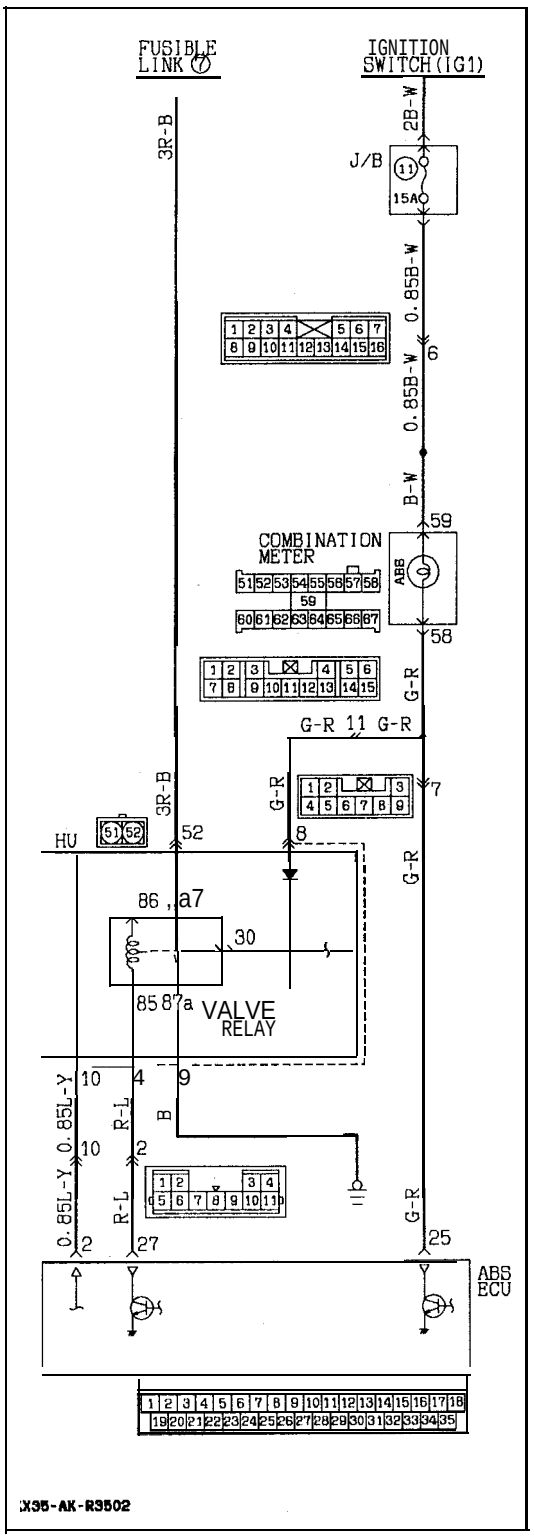
Is there continuity between body harness connector terminals No. 23 and No. 24, and diagnosis inspection terminals No. 4 & No. 1 O?
- No → Harness wire between diagnosis inspection terminal and ABS ECU is broken → Repair harness.
- Yes ↓

Malfunction of ABS ECU → Replace ABS ECU.

C	ABS warning light does not illuminate when ignition key is in "START" position.

[Explanation]

The ABS ECU uses the IG_2 power source which is turned off in the "START" position. The ABS warning light uses the IG_1 power source which is not turned off even in the "START" position. Consequently, in the "START" position, power is off and the ECU turns the valve relay OFF. If the warning light does not illuminate at this time, there is trouble in the warning light circuit on the valve relay side.



Remove the No. 3 fuse from the junction box to turn off power to the ABS-ECU. Disconnect the hydraulic unit connector (A-64) and the ABS valve relay connector (A-65). Inspect the harness side of both connectors for damage to the terminal pins. Repair terminal pins as needed.

↓

With the ignition key in the "ON" position, does voltage between body connector terminal No. 8 and ground indicate the battery positive voltage?

No → Harness wire between HU and warning light is broken.

↓ Yes

Is there continuity between body connector terminal No. 9 and ground?

No → Broken line between HU and body ground

↓ Yes

* Is there continuity between HU connector terminal No. 8 and terminal No. 9?

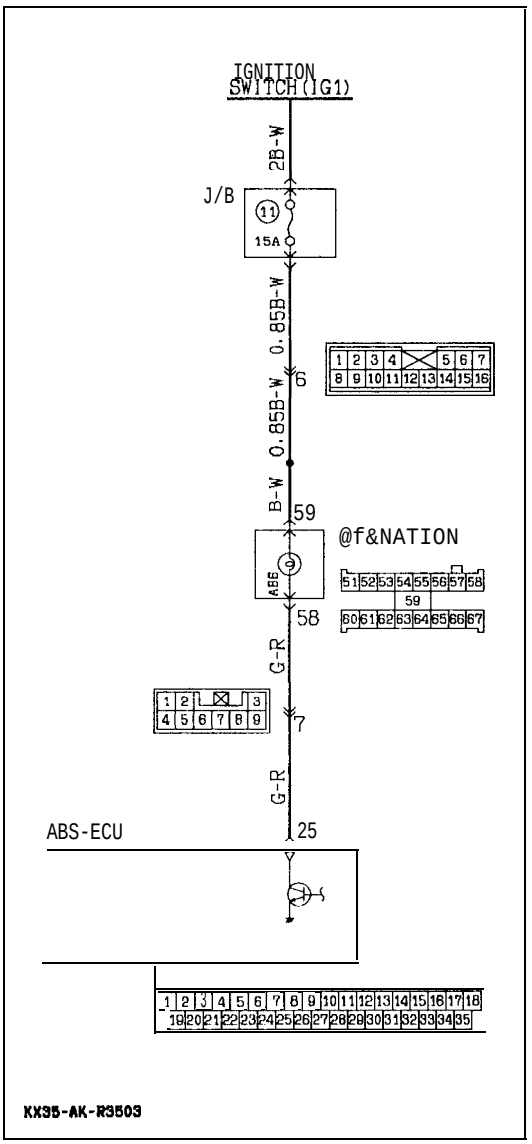
No → Valve relay malfunction or break in HU harness wire

↓ Yes

D	**ABS warning light blinks once after the ignition key is turned to the "ON" position. It illuminates in the "START" position and blinks once again when turned to the "ON" position.**

[Explanation]

When power flows, the ABS ECU turns on the warning light for approximately 1 sec. while it performs a valve relay test. If there is a break in the harness between the ECU and the warning light, the light illuminates only when the valve relay is off in the valve relay test, etc.



Disconnect the hydraulic unit connector (A-64) and the ABS-ECU connector (E-12). Inspect the harness side of both connectors for damage to individual terminal pins. Repair terminal pins as needed.

↓

In the ignition key "ON" position, does voltage betweenterminal No. 25 and ground indicate battery positive voltage?

No → Harness wire between ABS warning light and ECU is broken. → Repair harness.

Yes ↓

Malfunction of ABS ECU → Replace ABS ECU.

E-I	When the following diagnostic trouble codes are displayed "11 FL SNSR. OPEN" "12 FR SNSR. OPEN" "13 RL SNSR. OPEN" "14 RR SNSR. OPEN"

[Explanation]

The ABS ECU detects breaks in the wheel speed sensor wire. This diagnostic trouble code is output if the wheel speed sensor signal is not input (or short circuited) or if its output is low when starting to drive or while driving.

[Hint]

In addition to a broken wire/short circuit in the wheel speed sensor, also check whether the sensor gap is too large, sensor harness wire is broken, or sensor harness and body connector are not properly connected.

E-2	When diagnostic trouble code "15 VEH. SPD. SNSR." is displayed

[Explanation]

This diagnostic trouble code is output when there is an abnormality (other than broken wire or short circuit) in any of the wheel speed sensor output signals while driving.

[Hint]

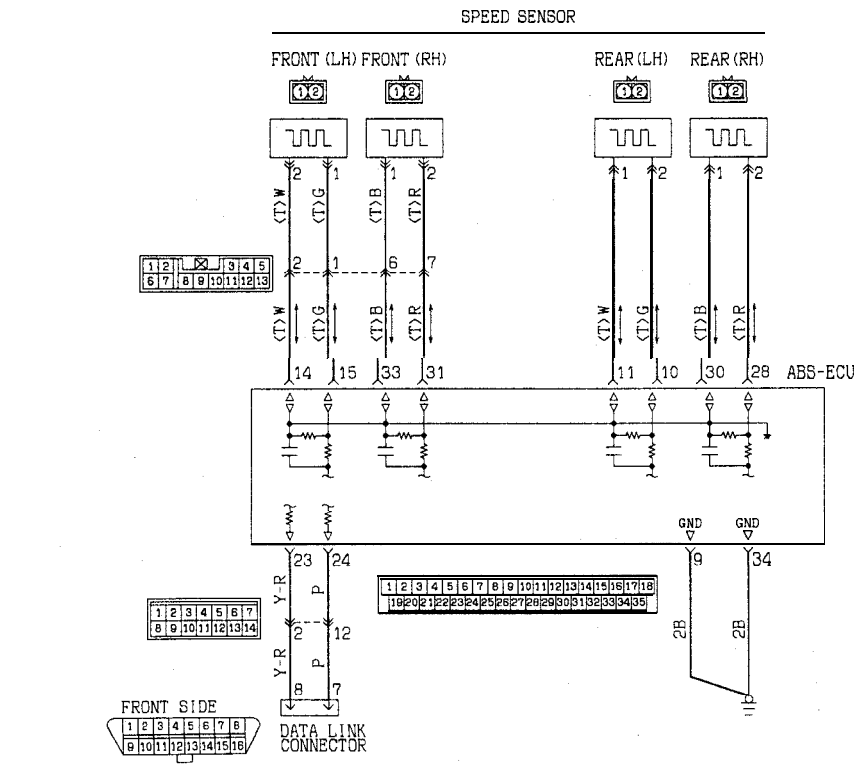
The following can be considered as the cause of the wheel speed sensor output abnormality.

- Distortion of rotor, teeth missing
- Low frequency noise interference when sensor harness wire is broken
- Noise interference in sensor signal
- The sensor output signal is below the standard value or amplitude modulation is over the standard value. Using an oscilloscope to measure the wave shape of the wheel speed sensor output signal is very effective.
- Broken sensor harness
- Poor connection of connector

NOTE

(1) If contact is poor, check the sensor cable by bending and lightly stretching it.

(2) Except for the case where a fault condition exists in the system, but the inspection results are normal; if an abnormality cannot be found in the sensor circuit displayed as abnormal, erase the diagnostic trouble code and turn the ignition switch to OFF once, and then test-drive again. If the same diagnostic trouble code is output, replace the ABS ECU. If the trouble does not occur anymore, the problem is likely to be with the ABS ECU.
(If the trouble is in the speed sensor circuit, but is difficult to recreate, it will recur even after the ABS ECU has been replaced.)



Check flow connected with wheel speed sensor

NOTE
When checking with an oscilloscope, first check the connections of the speed sensor harnesses and connectors.

Is the resistance value of the wheel speed sensor part normal?
Standard value: 0.8 – 1.2 kΩ

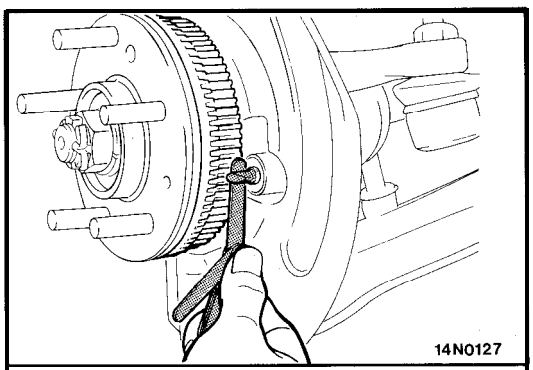
No → Malfunction of wheel speed sensor → Replace wheel speed sensor

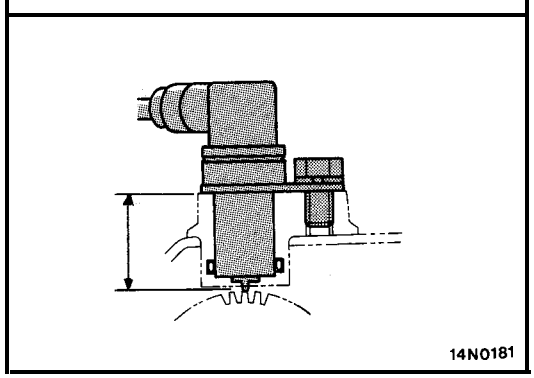
Yes

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 3 – 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.5-58.)
Is the output voltage for each wheel speed sensor over the standard value and is the waveform normal?

No → Recheck if below the standard value or if the sensor has a poor waveform. Replace sensor or rotor.

Yes

If the above checks are normal, there is a malfunction of ABS ECU when this diagnostic trouble code reoccurs often.

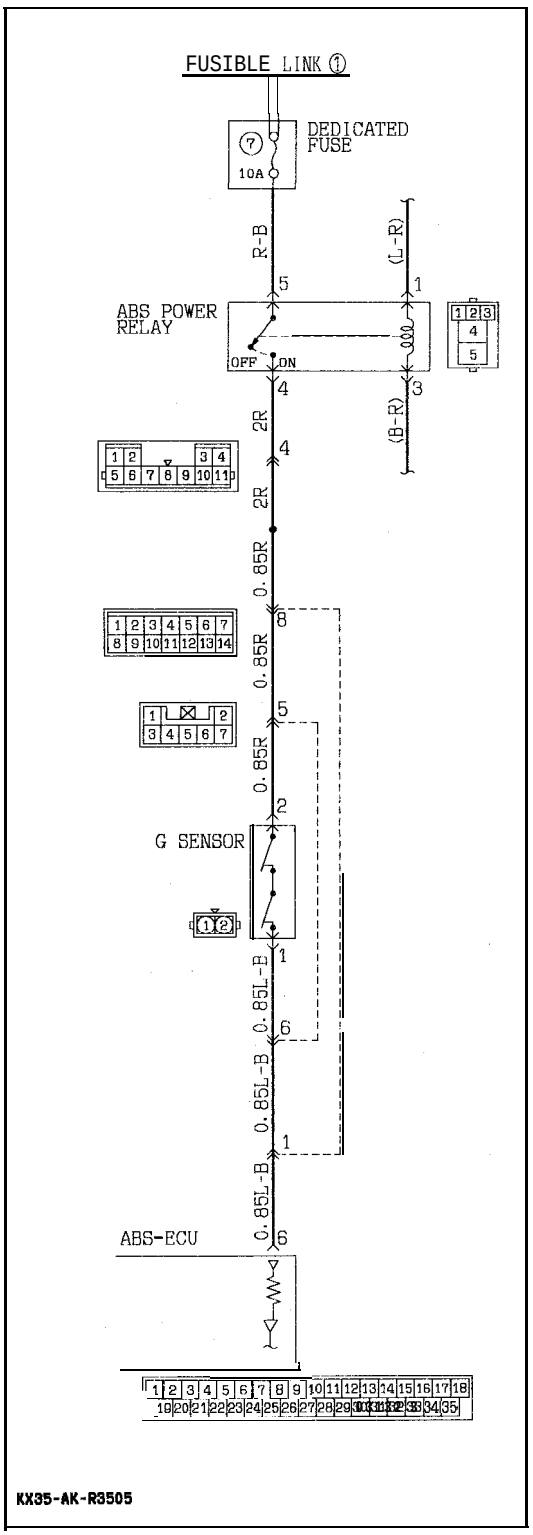
→ Replace the ABS ECU and check that the diagnostic trouble code does not reoccur.

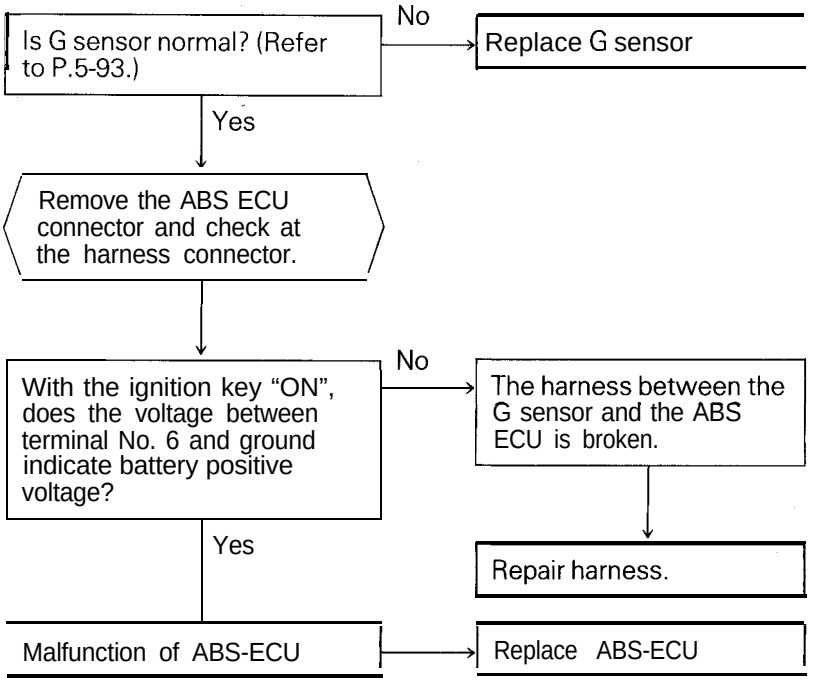
E-3	When diagnostic trouble code “21 G SNSR.” is displayed

[Explanation]

The ABS ECU outputs this diagnostic trouble code in the following cases.

- G sensor OFF trouble (It is judged that the G sensor continues to be OFF for more than approximately 13 seconds except when the vehicle is stopped or when there is stop light switch input.
- When there is a broken wire or short circuit in the harness for the G sensor system.





E-4	When diagnostic trouble code "22 STOP LAMP SW" is displayed

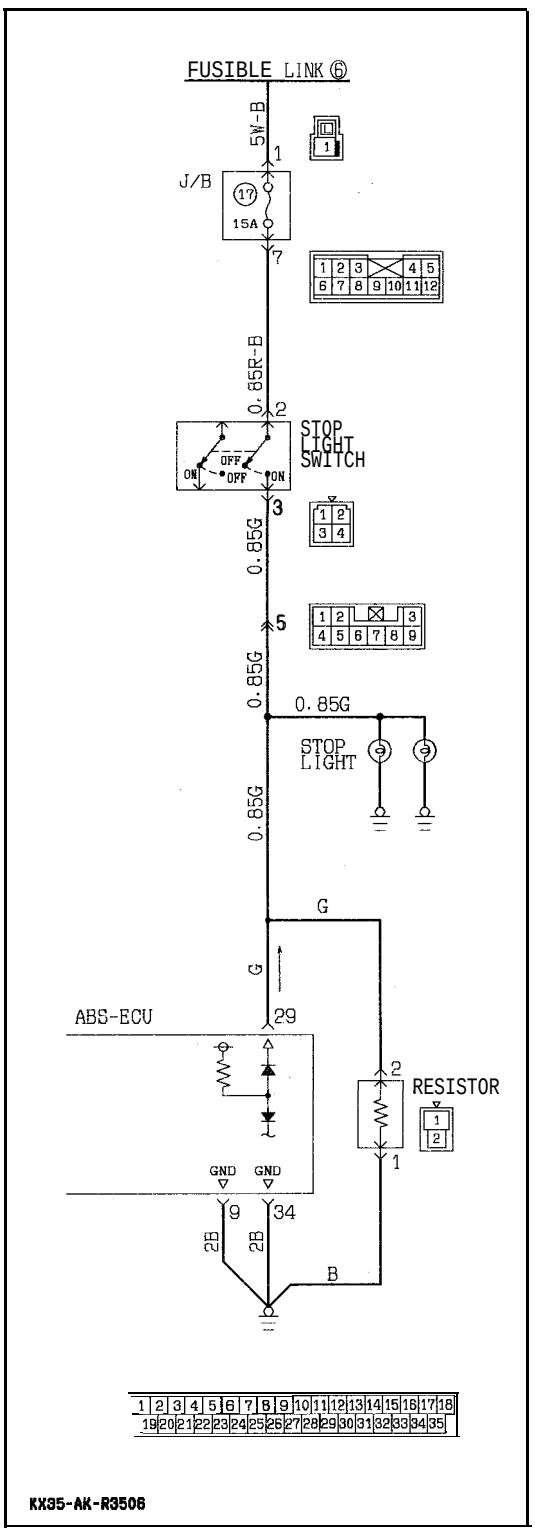
[Explanation]

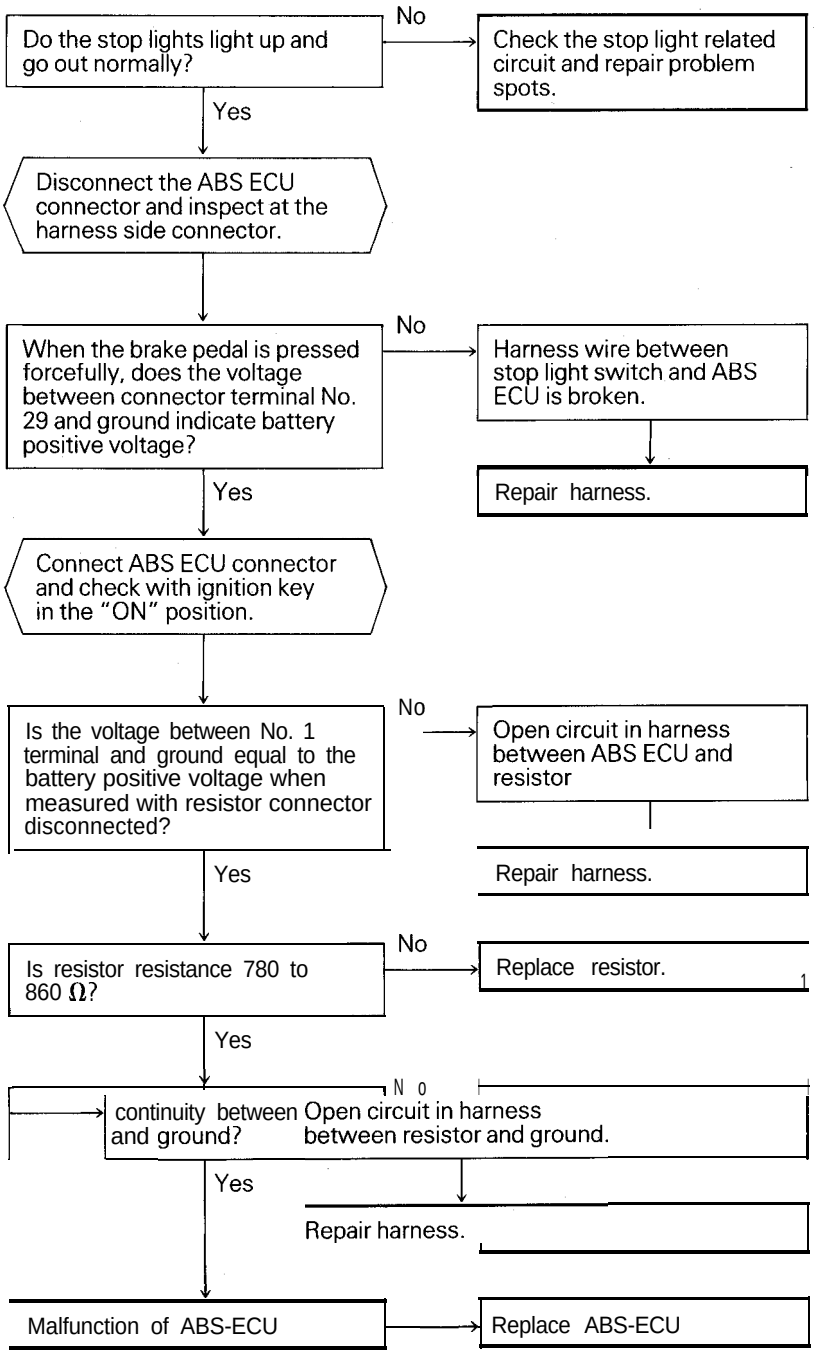
The ABS ECU outputs this diagnostic trouble code in the following cases.

- Stop light switch 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.

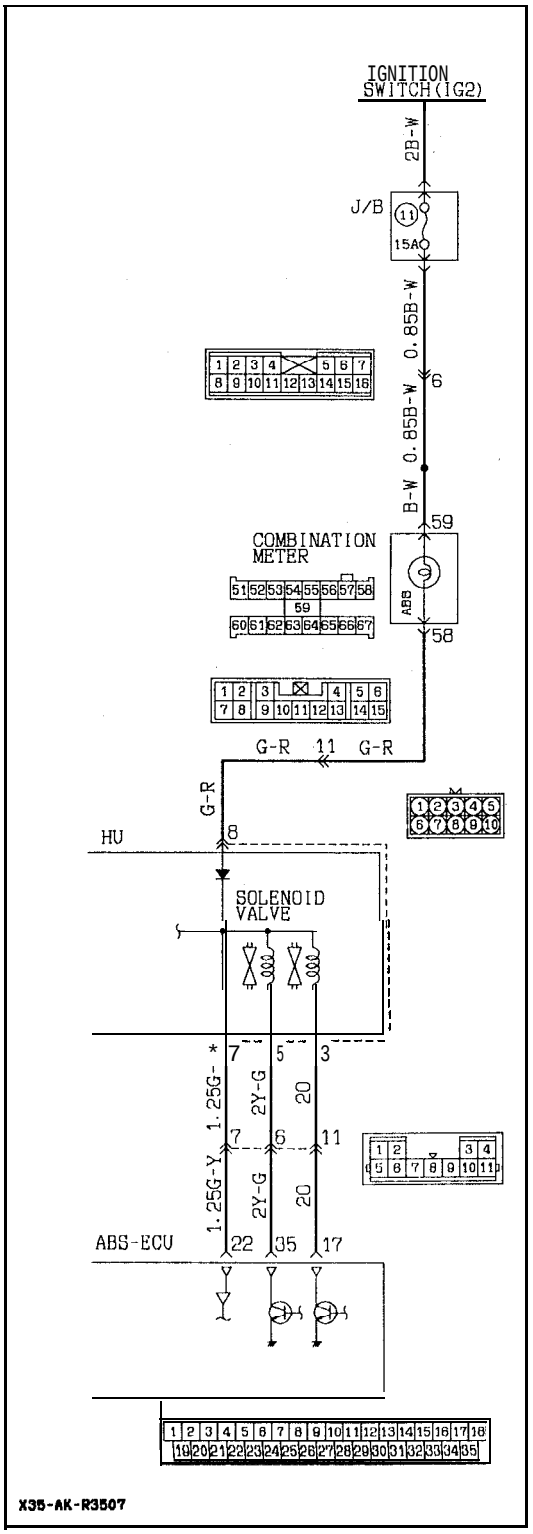




E-5	When diagnostic trouble codes "41 FL SOL. VALVE", "42 FR SOL. VALVE" or "43 VALVE DRIFT" are displayed.

[Explanation]

The ABS ECU normally monitors the solenoid valve drive circuit.
If no current flows in the solenoid even if the ECU turns the solenoid ON or if it continues to flow even when turned OFF, the ECU determines the solenoid coil wire is broken/short-circuited or the harness is broken/short-circuited, and then these diagnostic trouble codes are output. ABS ECU controls the solenoid valve current and if the current value of the solenoid valves differs from each other in the same mode, solenoid valve drift error is produced and the ABS ECU goes into the failsafe mode.



Remove HU 10P connector and check with the HU side connector.

↓

In the resistance value for the solenoid valve within the range of the standard values?
Standard value: 1 .0 – 1.3 Ω

No → Replace HU.

Yes ↓

Connect HU 1 OP connector, disconnect ECU connector and check.

↓

Is the solenoid valve resistance value within the range of the standard values when measured at the ECU connector?
Standard value: 1 .0 – 1.3 Ω

No → The harness wire for the solenoid valve circuit whose resistance value is outside the range of the standard value is broken or short circuited.

→ Repair harness.

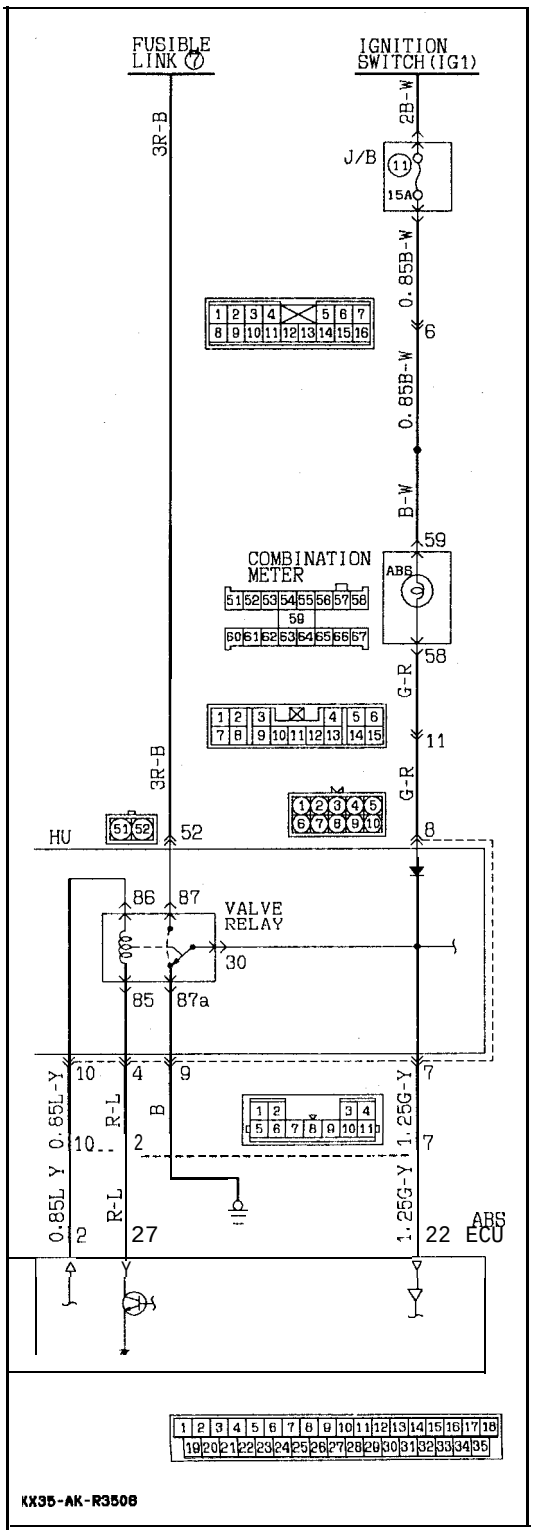
Yes ↓

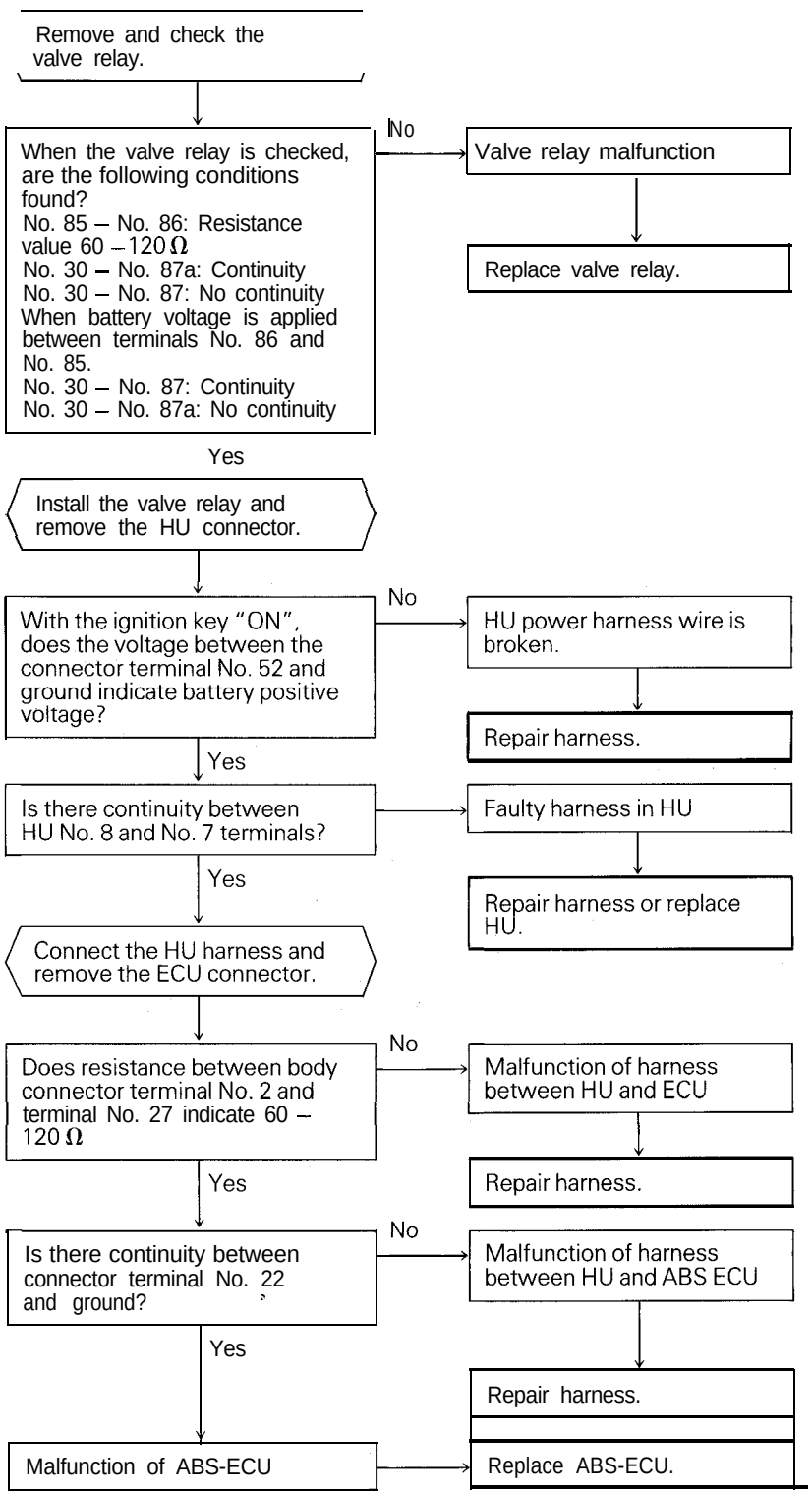
Malfunction of ABS-ECU → Replace ABS-ECU

E-6 When diagnostic trouble code "51 VALVE RELAY" is displayed

[Explanation]

When the ignition switch is turned ON, the ABS ECU switches the valve relay OFF and ON for an initial check, compares the voltage of the signal to the valve relay and valve power monitor line voltage to check whether the valve relay operation is normal. In addition, normally it monitors whether or not there is power in the valve power monitor line since the valve relay is normally ON. Then, if the supply of power to the valve power monitor line is interrupted, this diagnostic trouble code will be output.





E-7	When diagnostic trouble code "52 MOTOR RELAY" is displayed

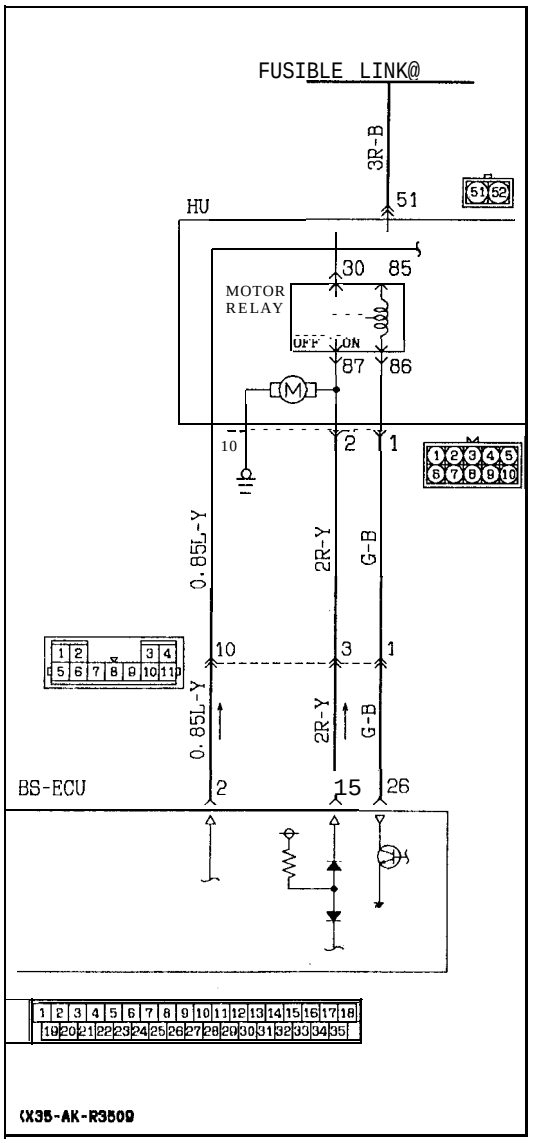
[Explanation]

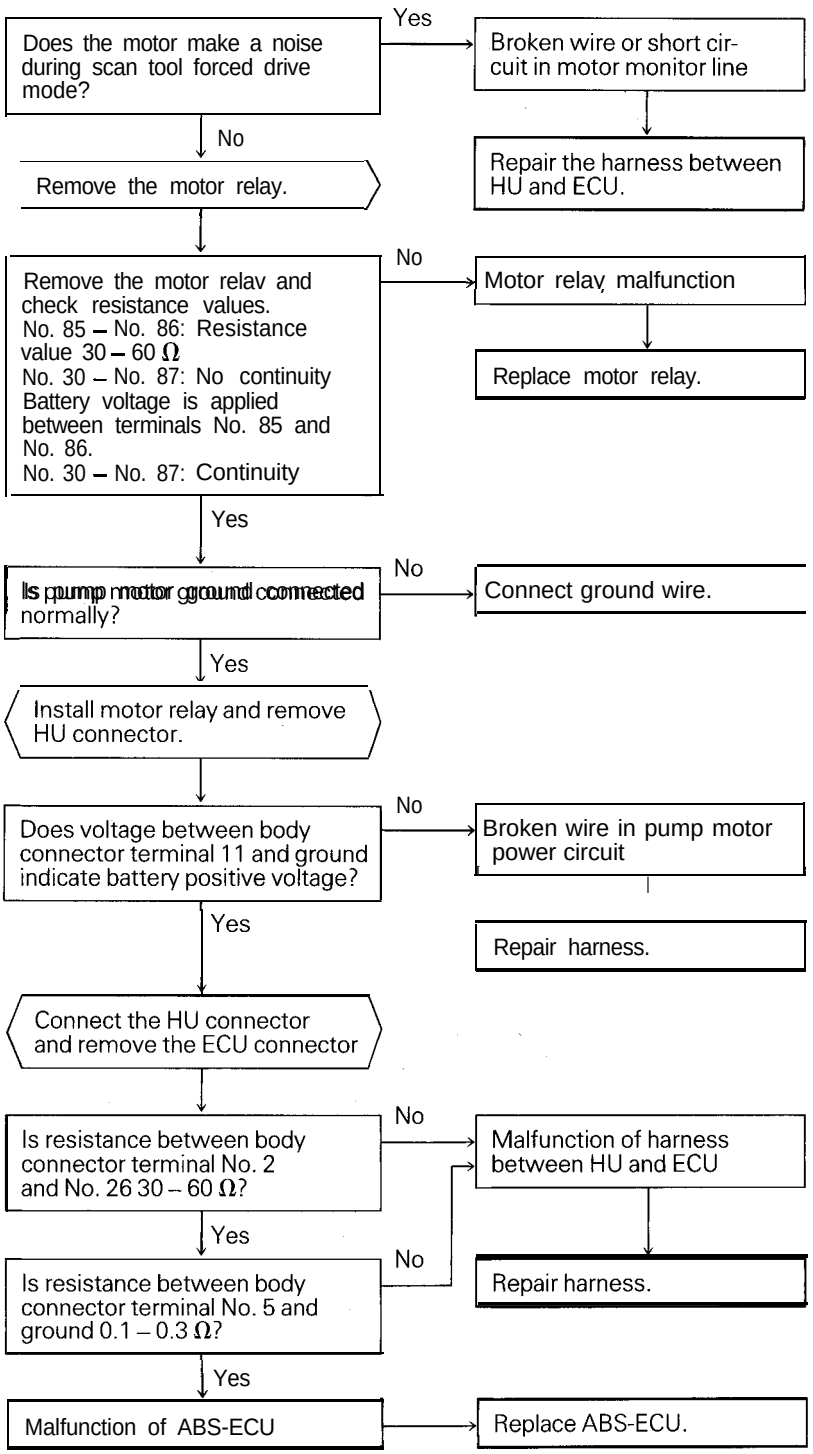
The ABS ECU outputs this diagnostic trouble code for the motor relay and motor in the following cases.

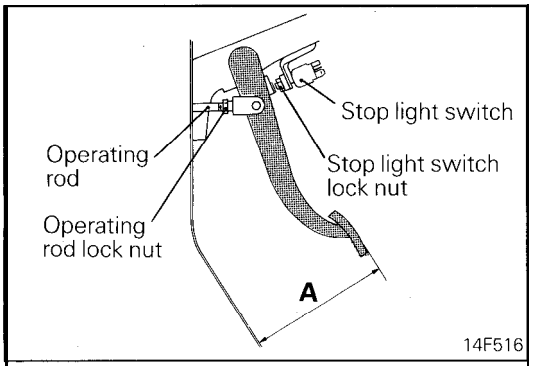
- When the motor relay does not function
- When there is trouble with the motor itself and it does not revolve
- When the motor ground line is disconnected and the motor does not revolve
- When the motor continues to revolve

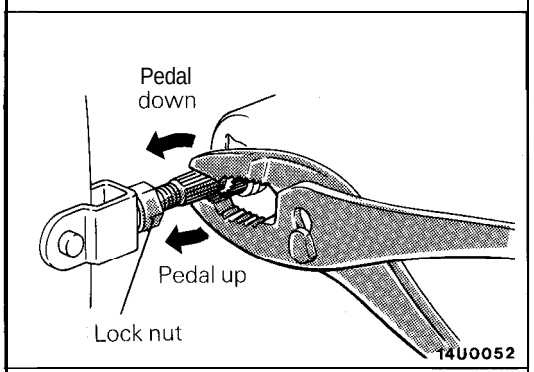
[Hint]

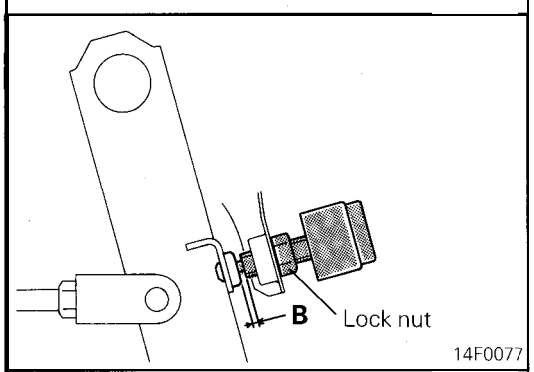
If there is motor operation noise during scan tool forced drive mode, there is a broken or short circuited motor monitor wire.

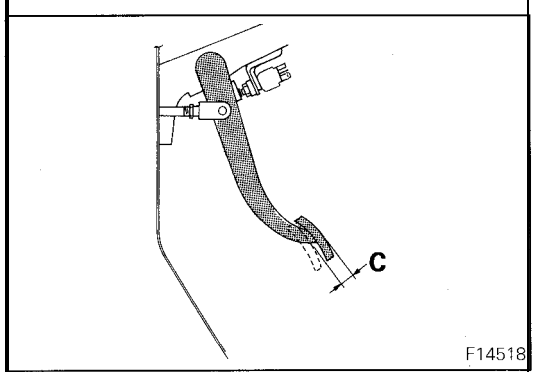


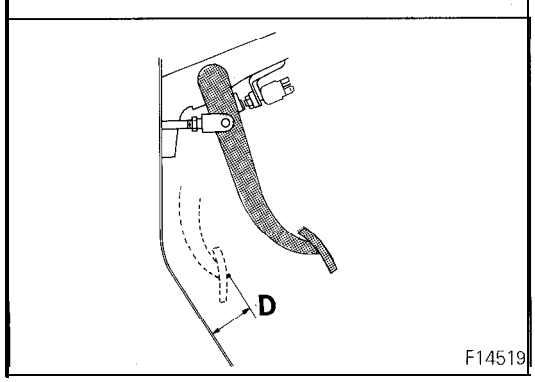












SERVICE ADJUSTMENT PROCEDURES

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.)

   (1) Disconnect the stop light switch connector, loosen the lock nut, and move the stop light switch to a position where it does not contact the brake pedal arm.
   (2) Adjust the brake pedal height by turning the operating rod with pliers (with the operating rod lock nut loosened), until the correct brake pedal height is obtained.
   (3) Screw in the stop light switch until it contacts the brake pedal stopper (just before the brake pedal is caused to move). Back off the stop light switch 1/2 to 1 turn and secure by tightening the lock nut.

   (4) Connect the connector of the stop light switch.
   (5) Check to be sure that the stop light is not illuminated with the brake pedal released.

   Reference value (B): 0.5 – 1.0 mm (.02 – .04 in.)

2. On vehicles with automatic transaxle, check the shift-lock mechanism. (Refer to GROUP 21 – Transaxle Control.)

3. With the engine stopped, press the brake pedal two or three times. After eliminating the vacuum in the power brake booster, press the pedal down by hand, and confirm that the amount of movement before feeling resistance is met (the free play) is within the standard value range.

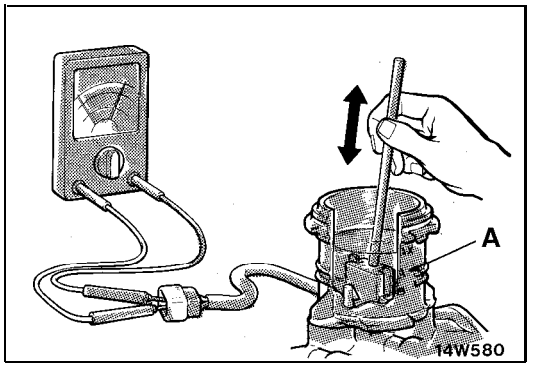
   Standard value (C): 3 – 8 mm (.1 – .3 in.)

   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

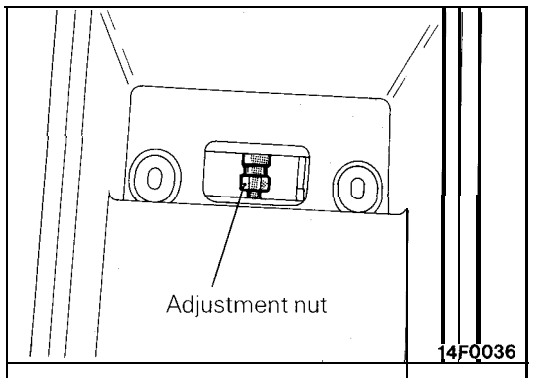
1. Connect a circuit tester to the brake fluid level sensor.
2. Move the float from top to bottom and check for continuity.
3. The brake fluid level sensor is in good condition if there is no continuity when the float surface is above "A", and if there is continuity when the float surface is below "A".

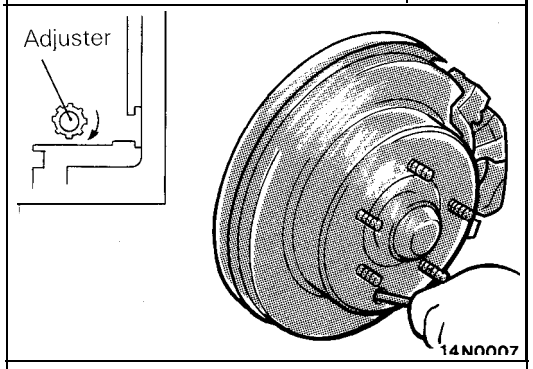
PARKING BRAKE LEVER STROKE CHECK

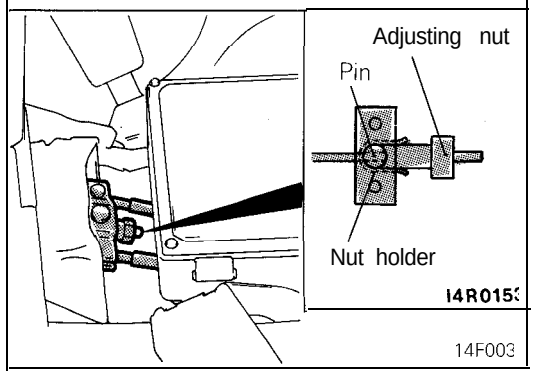
1. Pull the parking brake lever with a force of approx. 200 N (45 lbs.), and count the number of notches.

   Caution
   The 200 N (45 lbs.) force of the parking brake lever must be strictly observed.

   Standard value: 3 – 5 notches







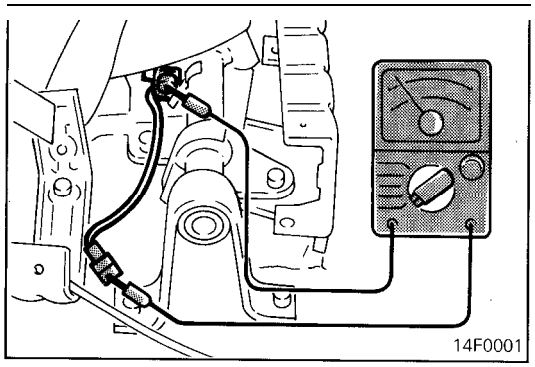
2. If the parking brake lever stroke is not the standard value, adjust as described below.
   (1) Remove the cup holder and plug and loosen the adjustment nut to the cable end so that the cable becomes free.
   (2) Repeat depressing the brake pedal until the pedal stroke becomes stable.

   NOTE
   When the brake pedal is repeatedly depressed, shoe clearance is adjusted properly.

   (3) Disengage the drive shaft and companion flange.
   (4) Remove the adjusting hole plug. Using a screwdriver, turn the adjuster in the direction of the arrow (to expand the shoe) until brake is lightly applied [where the disc cannot be turned with both hands: approx. 2.7 Nm (23 in.lbs.)]. Then, turn the adjuster five notches in the direction opposite the arrow.
   (Reference: Shoe clearance on one side 0.19 mm [.0075 in.])
   (5) Turn the adjusting nut to obtain specified parking brake lever stroke. After the adjustment, check that there is no play between the adjusting nut and pin.

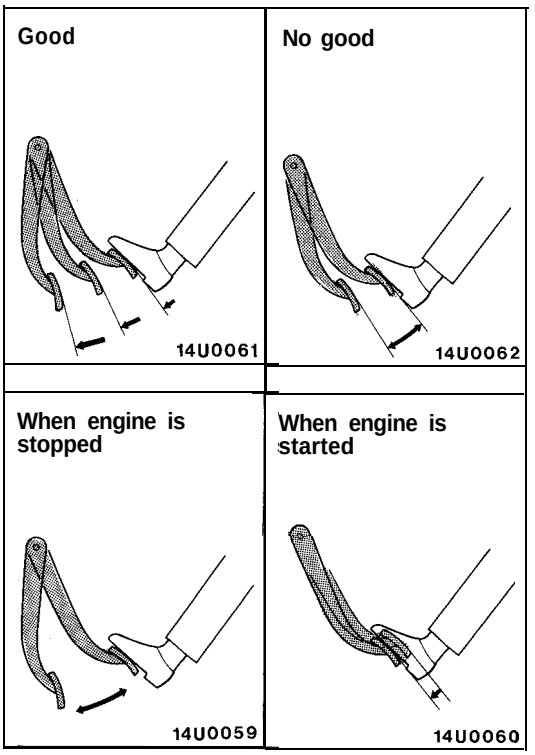
   Caution
   Do not adjust parking brake lever stroke too tight, less than the standard value, or brake drag could result.

   (6) After the parking brake lever stroke has been adjusted, jack up the rear part of the vehicle. Loosen the parking brake and turn the rear wheel to check that the parking brake does not drag.



PARKING BRAKE SWITCH CHECK

1. Disconnect the connector of the parking brake switch, and connect an ohmmeter to the parking brake switch and the switch installation bolt.
2. The parking brake switch is good if there is continuity when the parking brake lever is pulled and there is no continuity when it is returned.

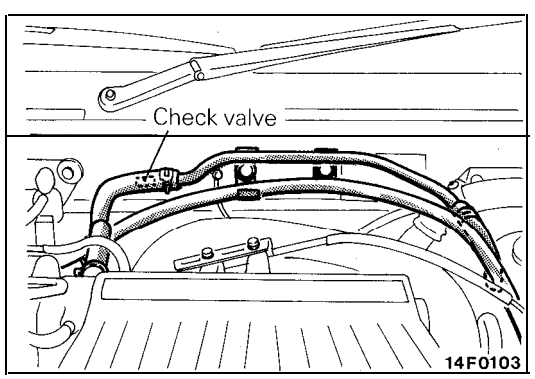


BRAKE BOOSTER OPERATING INSPECTION

For simple checking of brake booster operation, carry out the following tests.

1. Run the engine for one or two minutes, and then turn the engine off.
2. Step on the brake pedal several times with normal pressure.
   If the pedal depresses fully the first time but gradually becomes higher when depressed succeeding times, the booster is operating properly.
   If the pedal height remains unchanged, the booster is faulty.
3. With the engine stopped, step on the brake pedal several times with the same pressure to make sure that the pedal height will not change.
   Then step on the brake pedal and start the engine.
   If the pedal moves downward slightly, the booster is in good condition. If there is no change, the booster is faulty.
4. With the engine running, step on the brake pedal and then stop the engine.
   Hold the pedal depressed for 30 seconds. If the pedal height does not change, the booster is in good condition. If the pedal rises, the booster is defective.

Brake booster performance is satisfactory if it passes all three operating tests.
If the brake booster does not pass all three tests, there may be a fault in the check valve, vacuum hose or in the booster itself.

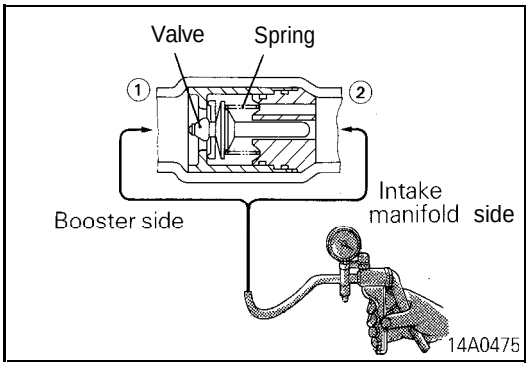


CHECK VALVE OPERATION CHECK

When checking the check valve, keep the check valve fit in the vacuum hose.

1. Remove the vacuum hose.

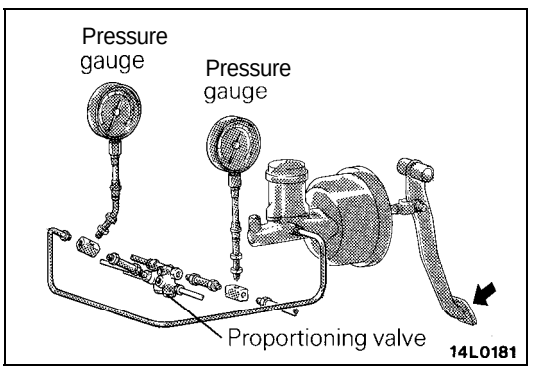
   Caution
   The check valve is press-fit inside the vacuum hose and do not remove the check valve from the vacuum hose.

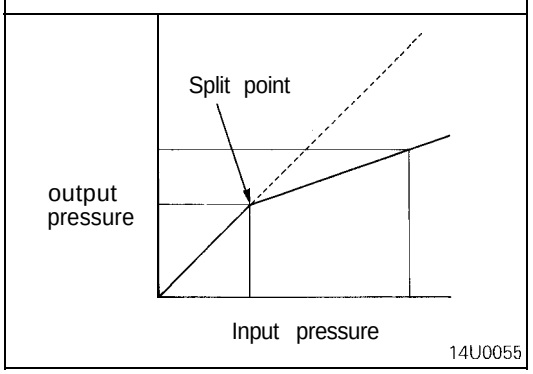


2. Check the operation of the check valve by using a vacuum pump.

Vacuum pump connection	Accept/reject criteria
Connection at the brake booster side ①	A negative pressure (vacuum) is created and held.
Connection at the intake manifold side ②	A negative pressure (vacuum) is not created.

Caution
If the check valve is defective, replace it as an assembly unit together with the vacuum hose.

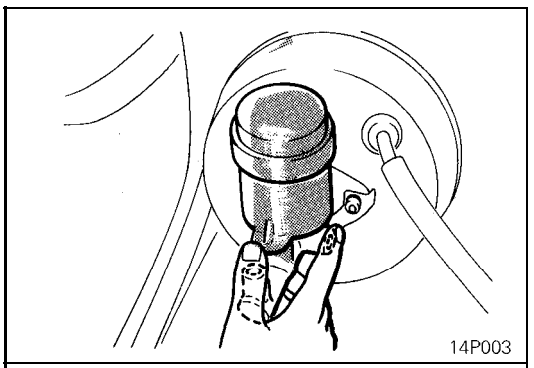




BLEEDING

Caution
Use the specified brake fluid. Don't use a mixture of the specified brake fluid and another non-specified fluid.

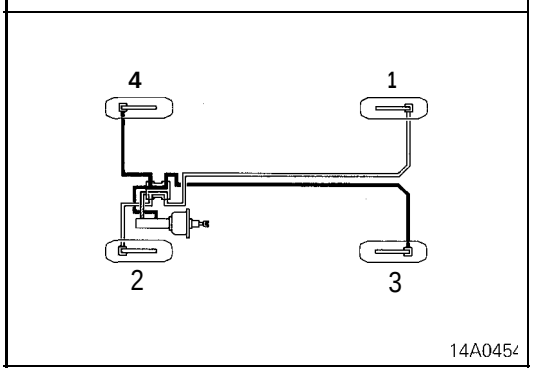
Specified brake fluid: MOPAR Brake Fluid/ Conforming to DOT3 or DOT4



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.



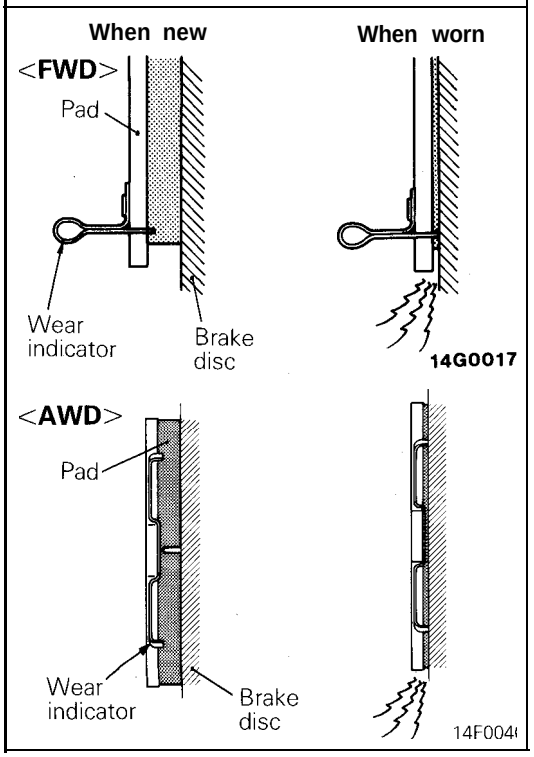
BLEEDING THE BRAKE PIPE LINE

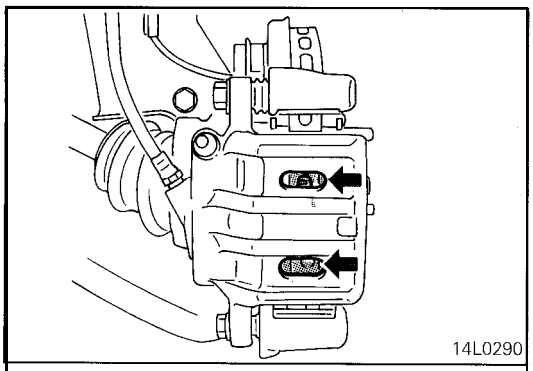
Start the engine and bleed the air in the sequence shown in the figure.

Caution
For vehicles with ABS, be sure to filter/strain the brake fluid being added to the master cylinder reservoir tank. Debris may damage the HU.

FRONT DISC BRAKE PAD CHECK AND REPLACEMENT

NOTE
The brake pads have wear indicators that contact the brake disc when the brake pad thickness becomes 2 mm (.079 in.). The wear indicators emit a squealing sound to warn the driver to have the pads replaced and to have the brake system checked.



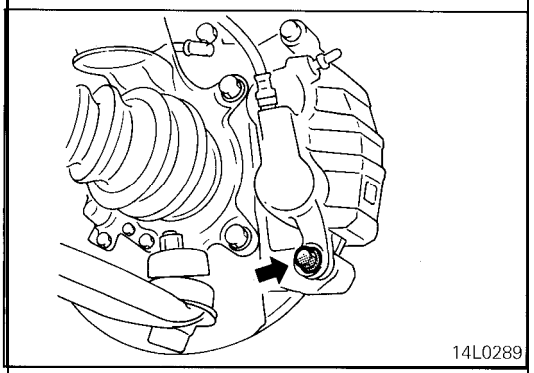

14L0290

<FWD>

1. Visually check the brake pad thickness through the inspection hole in the caliper body.

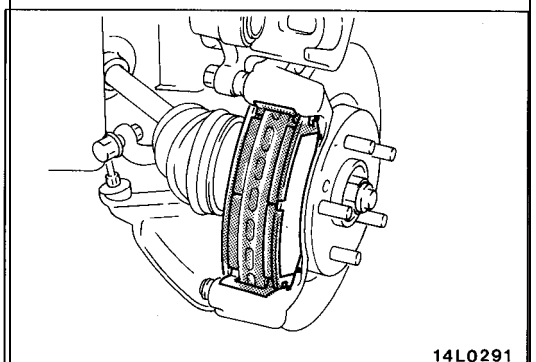
   Standard value: 10.0 mm (.39 in.)
   Limit: 2.0 mm (.08 in.)

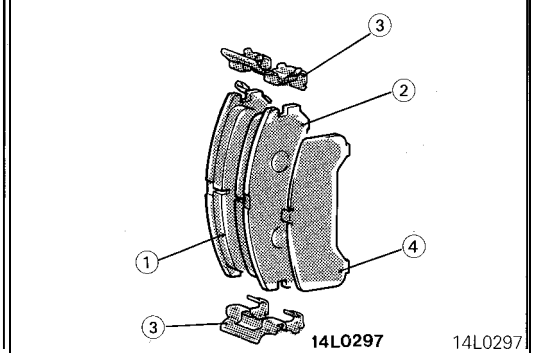
   Caution
   Replace the pad if worn beyond the limit. At this time, replace the pads on right and left wheels as a set.


14L0289

2. Remove the guide pin, lift caliper assembly, slide the assembly toward the inside of the wheel well until separated from the lock pin. Support it with a wire, etc.

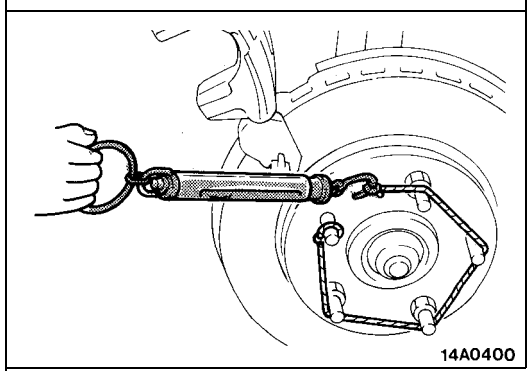
   Caution
   The guide pin has been coated with special grease. Do not wipe off the special grease on the lock pin, and do not contaminate the lock pin.


14L0291



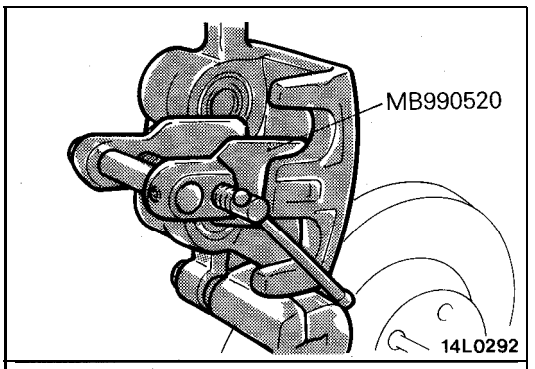
14L0297 14L0297

3. Remove the following parts from the caliper support.
   ① Pad and wear indicator assembly
   ② Pad assembly
   ③ Clip
   ④ Outer shim

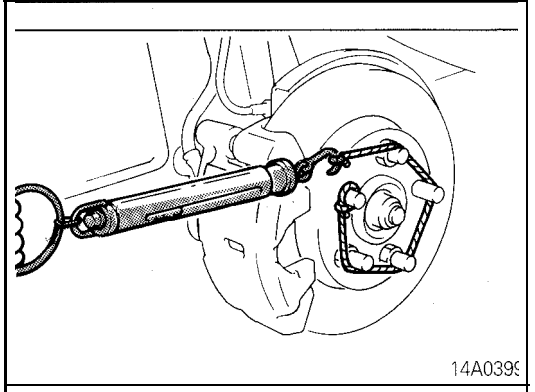

14A0400

Using the following method, measure the drag force of the disc brake after installation of the brake assembly.

4. With the brake assembly removed, use a spring scale to measure the rotary sliding resistance of the hub in the forward direction.
5. Install the pad clips to the caliper support in position.



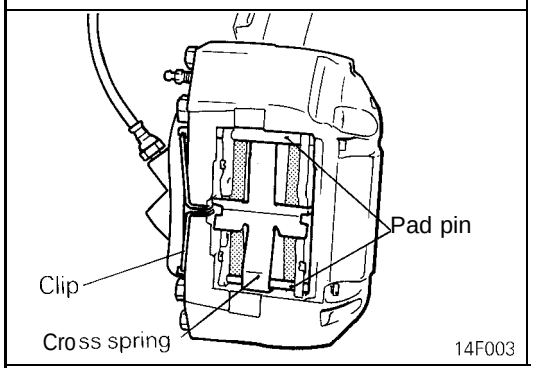
6. Clean the piston and, using the special tool, push the piston into the cylinder (caliper).
7. With care not to allow the piston boot to be wedged, lower the caliper assembly and fit the lock pin.
8. Start the engine, depress the brake pedal firmly two to three times and stop the engine.
9. Give the brake disc ten turns in the forward direction.



10. Using a spring scale, measure the rotary sliding resistance of the hub in the forward direction.
11. Obtain the drag force of the disc brake (the difference between the values measured in 10 and 4).

    Standard value: 70 N (15.4 lbs.) or less

12. If the drag force of the brake exceeds the standard value, disassemble the piston and check for dirty or corroded piston sliding surface and deteriorated piston seal.

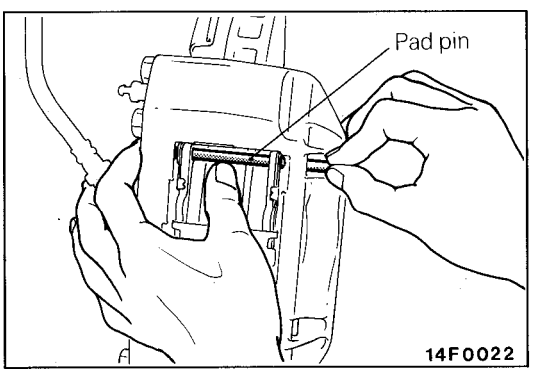


<AWD>

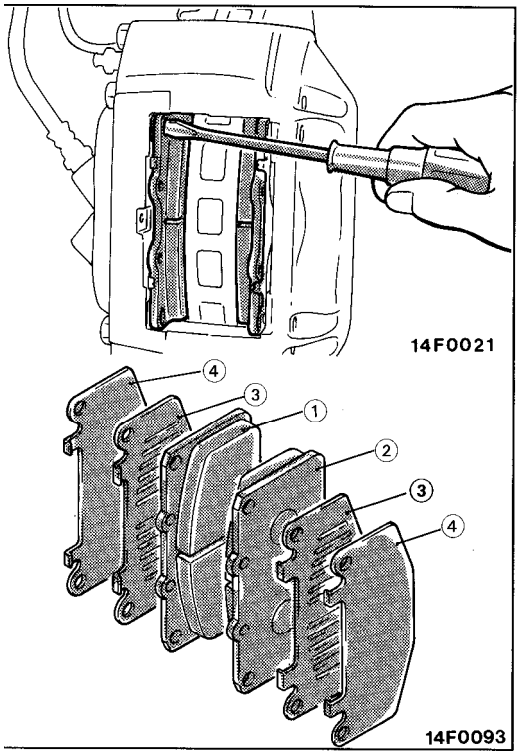
1. Visually check the brake pad thickness. Through the opening in the caliper body.

   Standard value: 10.0 mm (.39 in.)
   Limit: 2.0 mm (.08 in.)

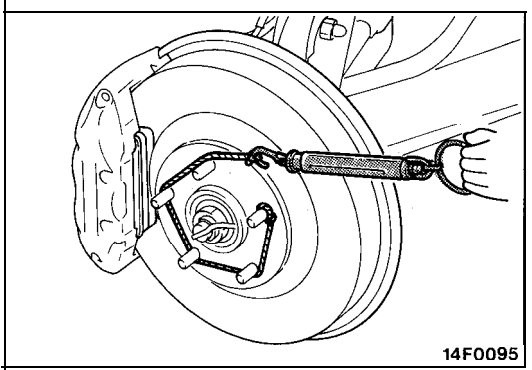
   Caution
   Replace the pad if worn beyond the limit. At this time, replace the pads on right and left wheels as a set.



2. Remove the clip and, holding the cross spring with hand, remove the pad pins.

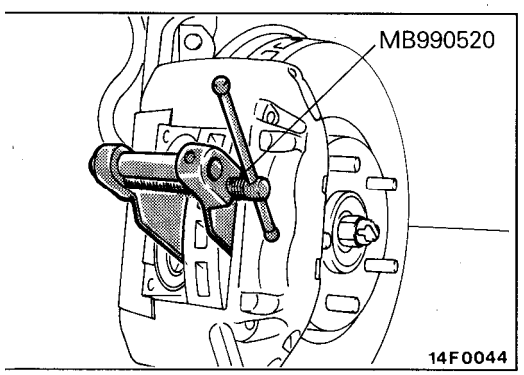


3. Using a screwdriver, remove the pads and shims.
   ① Inner pad (with wear indicator)
   ② Outer pad
   ③ Shim B
   ④ Shim A

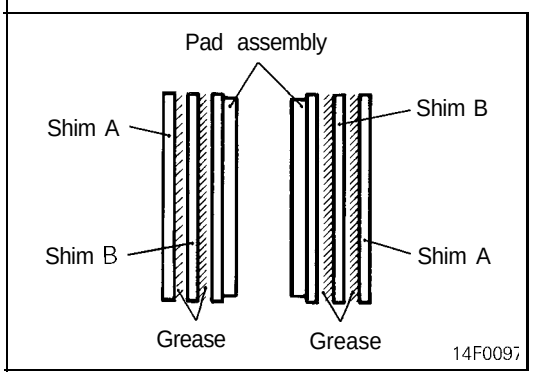


Using the following method, measure the drag force of the disc brake after installation of the brake assembly.

4. With the brake assembly removed, use a spring scale to measure the rotary sliding resistance of the hub in the forward direction.



5. Clean the piston and then using the special tool, push the piston into the cylinder (caliper).



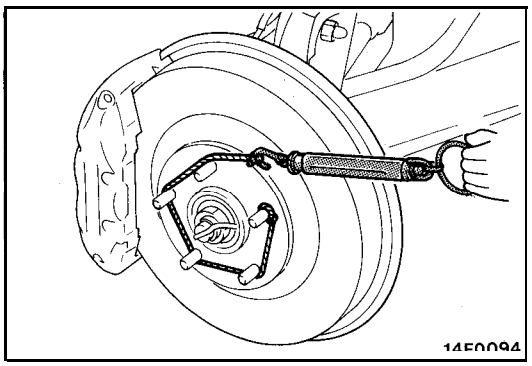
6. Apply repair kit grease to both sides of the inner shims.

Specified grease: MOPAR Multi-Purpose Grease Part No. 2932524 or equivalent

Caution

1. Make sure that the friction surfaces of pads and brake discs are free of grease and other contaminants.

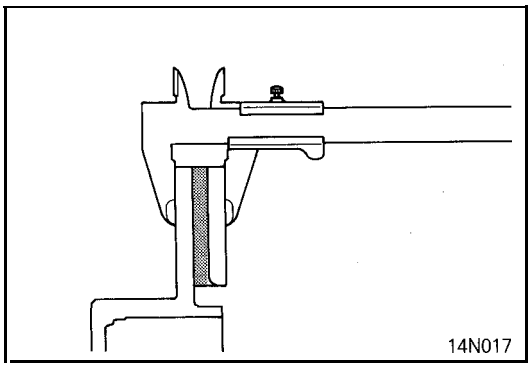
2. The grease should never squeeze out from around the shim.



7. Start the engine, depress the brake pedal firmly two to three times and stop the engine.
8. Give the brake disc ten turns in the forward direction.
9. Using a spring scale, measure the rotary sliding resistance of the hub in the forward direction.
10. Obtain the drag force of the disc brake (the difference between the values measured in 9 and 4).

Standard value: 70 N (15.4 lbs.) or less

11. If the drag force of the brake exceeds the standard value, disassemble the piston and check for dirty or corroded piston sliding surface and deteriorated piston seal.



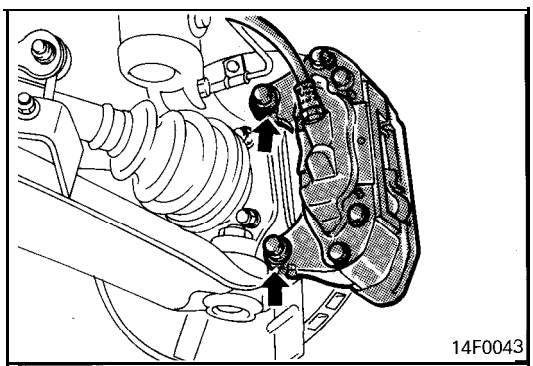
INSPECTION OF FRONT BRAKE DISC THICKNESS

1. Using a micrometer, measure disc thickness at eight positions, approximately 45" apart and 10 mm (.39 in.) in from the outer edge of the disc.

Standard value: <FWD> 24.0 mm (.94 in.)
<AWD> 30.0 mm (1.18 in.)
Limit: <FWD> 22.4 mm (.88 in.)
<AWD> 28.4 mm (1.12 in.)

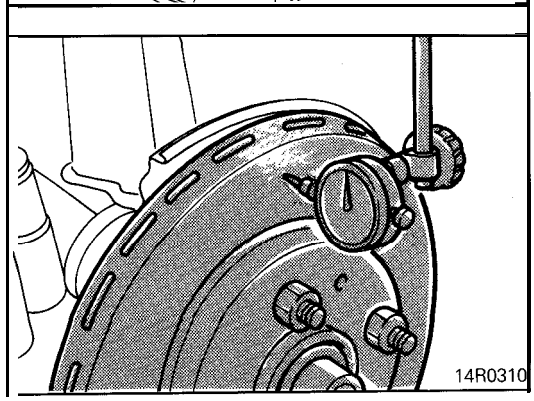
Thickness Variation (At least 8 positions)
The difference between any thickness measurements should not be more than .015 mm (.0006 in.).

2. If the disc is beyond the limits for thickness, remove it and install a new one.
If thickness variation exceeds the specification, replace the disc or turn rotor on the car type brake lathe ("MAD, DL-8700PF" or equivalent). Be sure to follow the exact brake lathe manufacturer instructions.



FRONT BRAKE DISC RUN-OUT CHECK N05FSAF

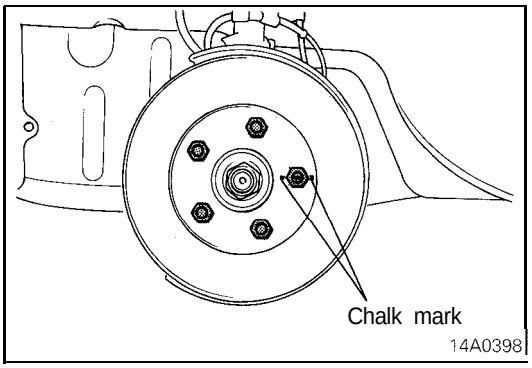
1. Remove the front brake assembly; and support it with a wire, etc.
2. Inspect the disc surface for grooves, cracks and rust. Clean the disc thoroughly and remove all rust.



3. Place a dial gauge approximately 5 mm (.2 in.) from the outer circumference of the brake disc, and measure the run-out of the disc.

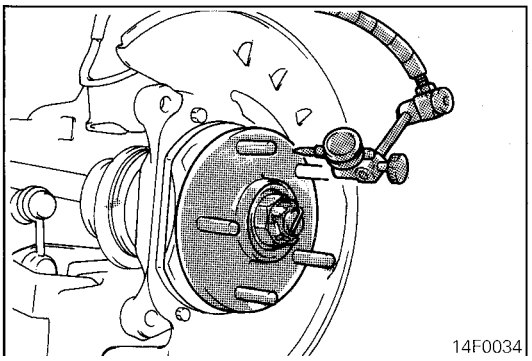
Limit: <FWD> 0.07 mm (.0028 in.) or less
<AWD> 0.10 mm (.004 in.) or less

NOTE
Secure the disc to the hub with wheel nuts.

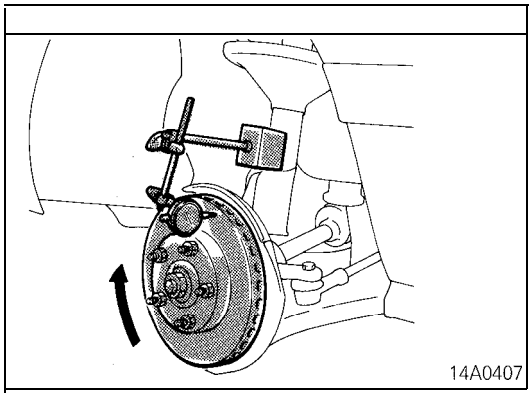


FRONT BRAKE DISC RUN-OUT CORRECTION

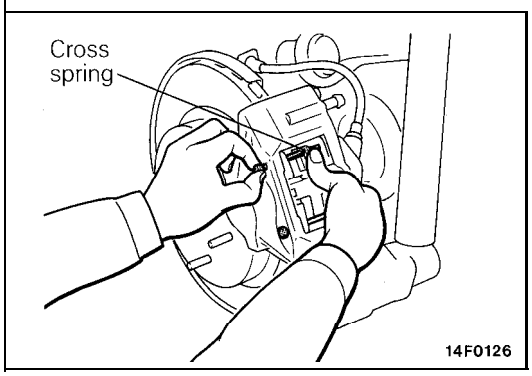
1. If the run-out of the brake disc is equivalent to or exceeds the limit specification, change the phase of the disc and hub, and then measure the run-out again.
   (1) Before removing the brake disc, chalk both sides of the wheel stud on the side at which run-out is greatest.



   (2) Remove the brake disc, and then place a dial gauge as shown in the illustration; then move the hub in the axial direction and measure the play.
   Limit: 0.05 mm (.002 in.)
   If the play is equivalent to or exceeds the limit, replace the front hub unit bearing.



   (3) If the play does not exceed the limit specification, and then check the run-out of the brake disc once again. Mount the brake disc on the position dislocated from the chalk mark.
2. If the run-out cannot be corrected by changing the phase of the brake disc, replace the disc or turn rotor on the car type brake lathe ("MAD, DL-8700PF" or equivalent).
   Be sure to follow the exact brake lathe manufacturer instructions. Rotors turned on the vehicle will often have a lower run-out than a new brake disc.



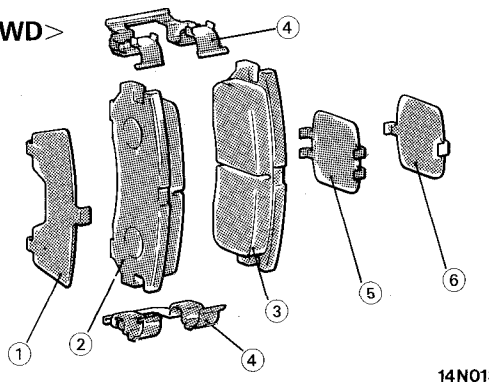
REAR DISC BRAKE PAD CHECK AND REPLACEMENT

1. Check brake pad thickness through caliper body check port.
   Standard value: 10.0 mm (.39 in.)
   Limit: 2.0 mm (.08 in.)
   Caution
   1. **When the limit is exceeded, the brake pads on both the left and right wheels must be replaced as a set.**
   2. **If there is a significant difference in the thicknesses of the pads on the left and right sides, check the sliding condition of the piston.**
2. Loosen the parking brake cable (from the vehicle interior), and disconnect the parking brake end installed on the rear brake assembly.
3. Remove the clip and pull out the pad pin while holding the cross spring by hand.

4. Remove the following parts from caliper support

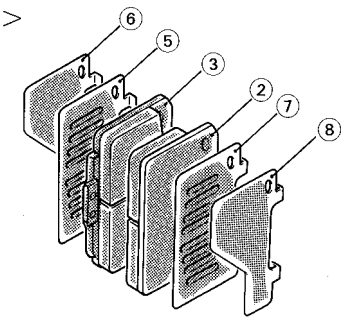
① Outer shim
② Pad assembly
③ Pad & wear indicator assembly
④ Clip
⑤ Inner shim A
⑥ Inner shim B
⑦ Outer shim A
⑧ Outer shim B

<FWD>

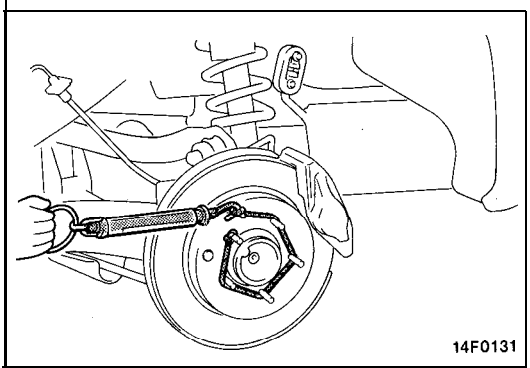


14N0137

<AWD>



14F0148



14F0131

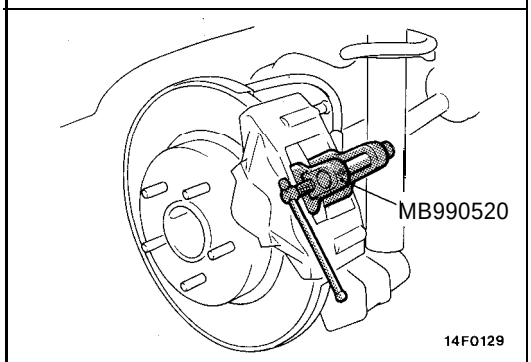
Using the following method, measure the drag force of the disc brake after installation of the brake assembly.

5. With the brake assembly removed, use a spring scale to measure the rotary sliding resistance of the hub in the forward direction. Disengage the drive shaft and companion flange.

   NOTE
   Secure the disc to the hub with wheel nuts.

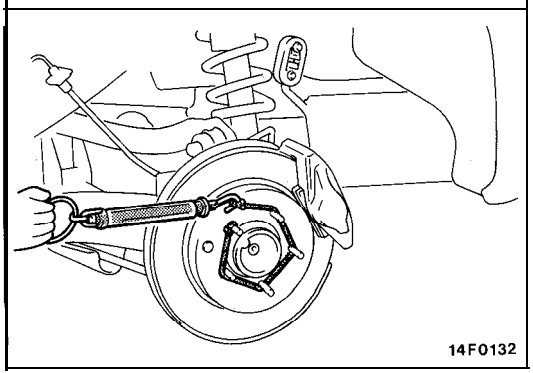
6. Securely attach the pad clip to the caliper support.

   Caution
   Do not deposit grease or other dirt on pad or brake disc friction surfaces.



14F0129

7. Clean the piston and then using the special tool, push the piston into the cylinder (caliper).
8. Start the engine, depress the brake pedal firmly two to three times and stop the engine.
9. Give the brake disc ten turns in the forward direction.

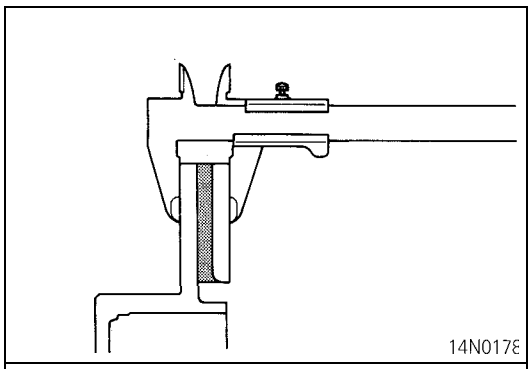


14F0132

10. Using a spring scale, measure the rotary sliding resistance of the hub in the forward direction.
11. Obtain the drag force of the disc brake (the difference between the values measured in 10 and 5).

    Standard value: 70 N (15.4 lbs.) or less

12. If the drag force of the brake exceeds the standard value, disassemble the piston and check for dirty or corroded piston sliding surface and deteriorated piston seal.

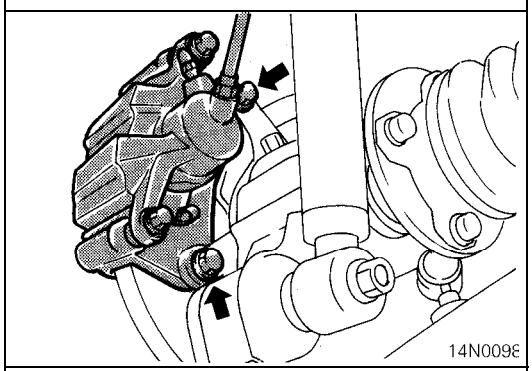


REAR BRAKE DISC THICKNESS CHECK

1. Remove dirt and rust from brake disc surface.
2. Measure disc thickness at 4 locations or more.

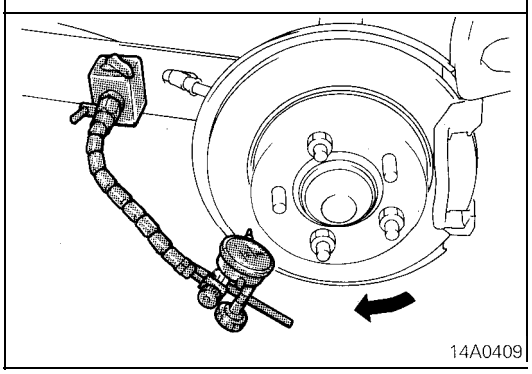
Standard value: <FWD> 18.0 mm (.71 in.)
<AWD> 20.0 mm (.79 in.)
Limit: <FWD> 16.4 mm (.65 in.)
<AWD> 18.4 mm (.72 in.)

Replace the discs and pad assembly for both sides left and right of the vehicle if they are worn beyond the specified limit.



REAR BRAKE DISC RUN-OUT CHECK

1. Remove the rear brake assembly, and support it by a wire, etc.



2. Place a dial gauge approximately 5 mm (.2 in.) from the outer circumference of the brake disc, and measure the run-out of the disc.

Limit: 0.08 mm (.0031 in.) or less

NOTE
Tighten nuts to secure the disc to the hub.

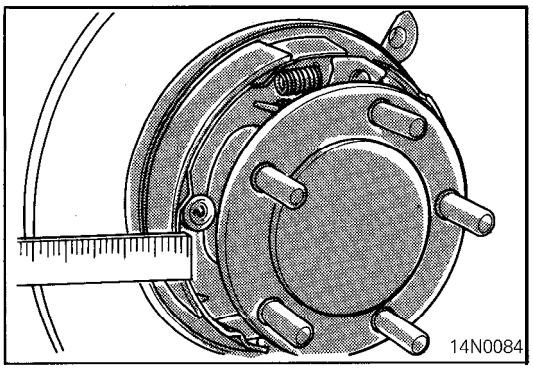
REAR BRAKE DISC RUN-OUT CORRECTION

1. If the run-out of the brake disc is equivalent to or exceeds the limit specification, change the phase of the disc and hub, and then measure the run-out again.

NOTE
The procedures for checking and changing the rear disc phase are the same as those for the front brake discs. Note, however, that the axial play (limit) in the hub differs. (Refer to P.5-54.)

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 or turn rotor using an on the car type brake lathe. Be sure to follow the exact brake lathe manufacturer instructions. Rotors turned on the vehicle will often have a lower run-out than a new brake disc.



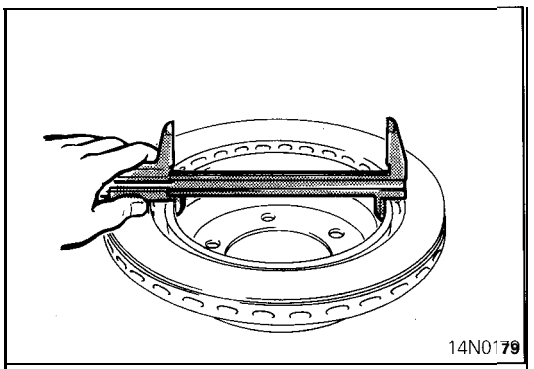
BRAKE LINING THICKNESS CHECK

1. Remove the rear brake assembly, and support it by a wire, etc.
2. Remove the brake disc.
3. Measure the wear of the brake lining at the place worn the most.

   Standard value: 2.8 mm (.11 in.)
   Limit: 1.0 mm (.04 in.)

   Replace the shoe and lining assembly if any location of the brake lining thickness is less than the limit.

   Caution
   Whenever the shoe and lining assembly is replaced, replace both RH and LH assemblies as a set to prevent car from pulling to one side when braking.

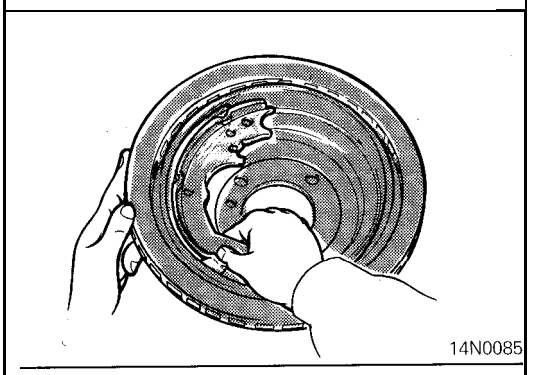


BRAKE DRUM INSIDE DIAMETER CHECK

1. Remove the rear brake assembly, and support it by a wire, etc.
2. Remove the brake disc.
3. Measure the inside diameter of the hub and drum at two or more locations.

   Standard value: 168.0 mm (6.6 in.)
   Limit: 169.0 mm (6.7 in.)

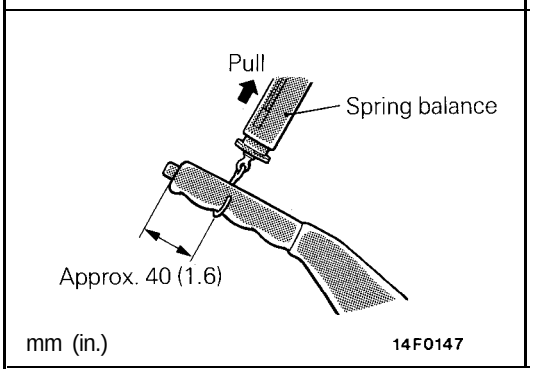
   Replace brake drums and shoe and lining assemblies when wear exceeds the limit value or is badly out of balance.



BRAKE LINING AND BRAKE DRUM CONNECTION CHECK

1. Remove the rear brake assembly, and support it by a wire, etc.
2. Remove the brake disc.
3. Remove the shoe and lining assembly.
4. Chalk inner surface of brake disc and rub with shoe and lining assembly.
5. Replace shoe and lining assembly or brake disc if very irregular contact area is observed.

   NOTE
   Clean off chalk after check.



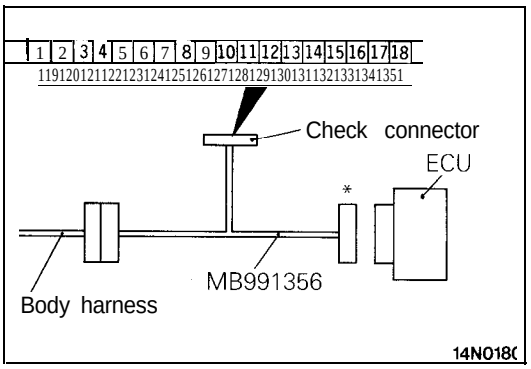
LINING RUNNING-IN

Carry out running-in by the following procedure when replacing the parking brake linings or the rear brake disc rotors, or when brake performance is insufficient.

1. Adjust the parking brake stroke to the specified value.
2. Hook a spring balance onto the center of the parking brake lever grip and pull it with a force of 98 – 147 N (22 – 32 lbs.) in a direction perpendicular to the handle.

3. Drive the vehicle at a constant speed of 35 – 50 km/h (22 – 31 mph) for 100 m (328 ft.)
4. Release the parking brake and let the brakes cool for 5 – 10 minutes.
5. Repeat the procedure in steps (2) to (4) 4 – 5 times.

Caution
Carry out running-in in a place with good visibility, and pay careful attention to safety.

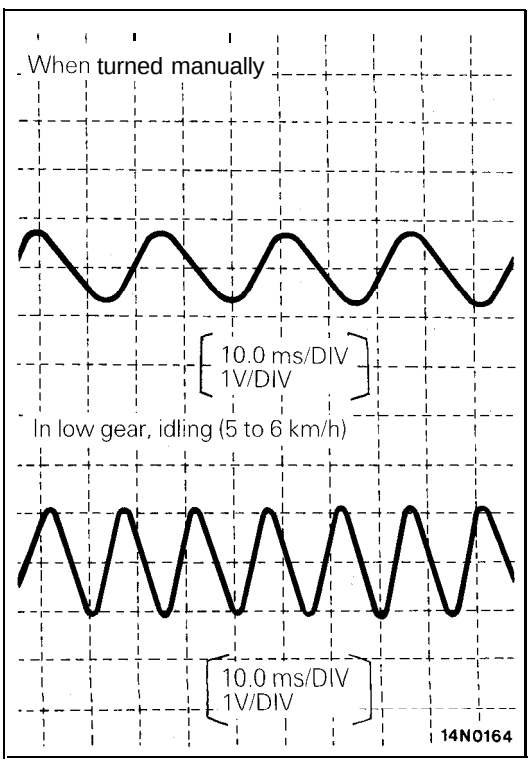


MEASUREMENT OF WHEEL SPEED SENSOR OUTPUT VOLTAGE

1. Lift up the vehicle and release the parking brake.
2. Disconnect the ECU harness connector and measure with the adapter harness (MB991356) connected to the harness side connector.

Caution
1. Never insert a probe, etc. into the connector as it may result in poor contact later.
2. Do not connect the connector (Special Tool) marked with "*" except when recording the waveform on a driving test. In such a case, connect the connector to the ECU.

Terminal No. (same for AWD and FWD)			
FL	RR	FR	RL
4	24	21	8
5	26	23	9



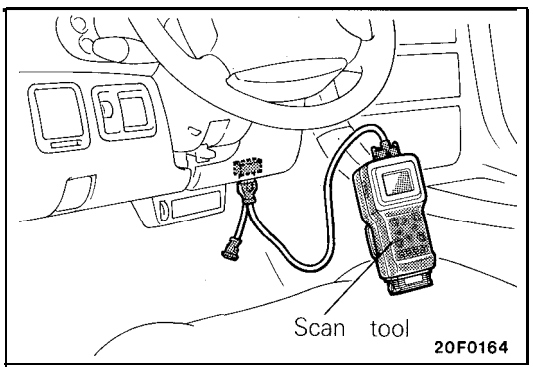
3. Manually turning the wheel to be measured by 1/2 to 1 turn/second, measure the output voltage with a circuit tester or oscilloscope.
   Output voltage:
   When measured with circuit tester: 70 mV or more
   When measured with oscilloscope (max. voltage): 100 mV or more
   Probable causes of low output voltage
   - Speed sensor pole piece-to-rotor clearance too large
   - Faulty speed sensor
4. Then, in order to observe the output state of the wheel speed sensors, shift into low gear (AWD vehicle) and drive the wheels, observe the output voltage waveform of each wheel speed sensor with an oscilloscope.
   In the case of the FWD vehicle, observe the waveform with an oscilloscope; for the front wheels, shift into low gear and drive the wheels; for the rear wheels, turn the wheels manually at a constant speed.

   NOTE
   1. Waveform may also be observed by actually driving the vehicle.
   2. The output voltage is low when the wheel speed is low and similarly it will be higher as the wheel speed increases.

POINTS IN WAVEFORM MEASUREMENT

Symptom	Probable causes	Remedy
Too small or zero waveform amplitude	Faulty wheel speed sensor	Replace sensor
	Incorrect pole piece-to-rotor clearance	Adjust clearance
Waveform amplitude fluctuates excessively (this is no problem if the minimum amplitude is 100 mV or more)	Axle hub eccentric or with large runout	Replace hub
Noisy or disturbed waveform	Open circuit in sensor	Replace sensor
	Open circuit in harness	Correct harness
	Incorrectly mounted wheel speed sensor	Mount correctly
	Rotor with missing or damaged teeth	Replace rotor

NOTE
The wheel speed sensor cable moves following motion of the front or rear suspension. Therefore, it is likely that it has an open circuit only when driving on rough roads and it functions normally on ordinary roads. It is, therefore, recommended to observe sensor output voltage waveform also under special conditions, such as rough road driving.



INSPECTION OF HYDRAULIC UNIT

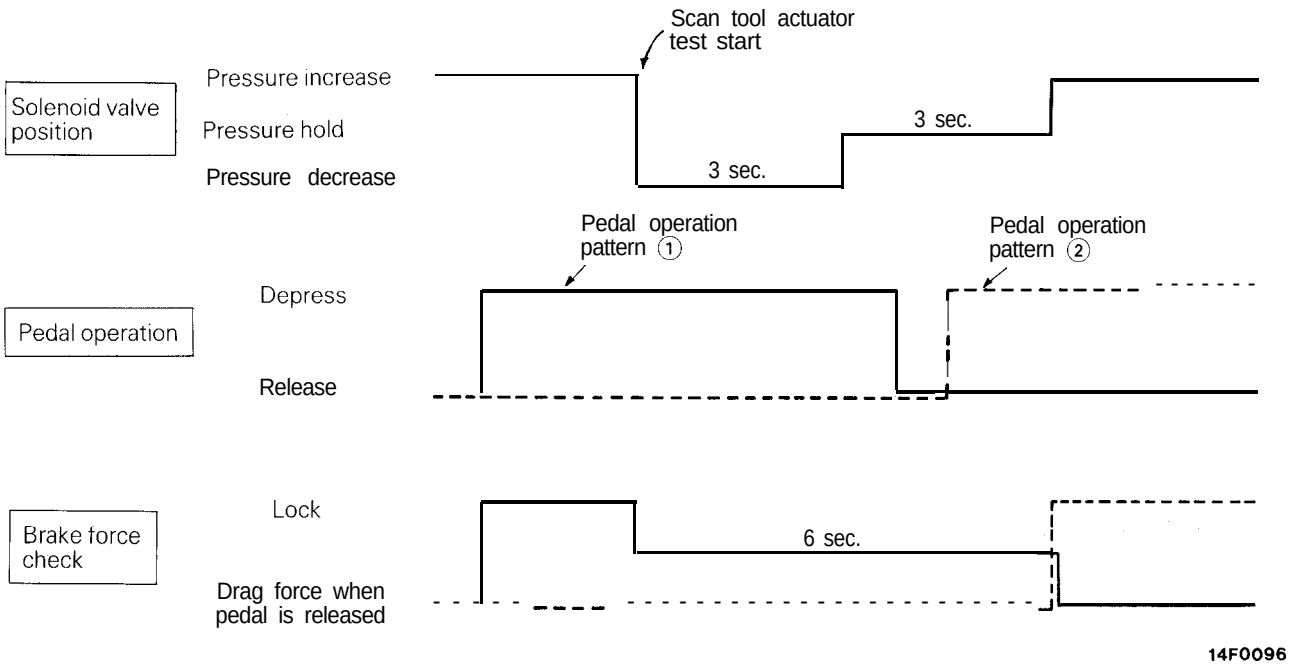
INSPECTION BY FEEL

(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 scan tool as illustrated.

Caution
Turn off the ignition switch beforehand whenever the scan tool is connected or disconnected.

(4) After confirming that the shift lever or selector lever is in the neutral position, start the engine.
The ABS warning light lights up, it goes into the scan tool mode. In the scan tool mode, ABS does not function.
(5) Operate the scan tool to force the actuator to operate (item No. 04, 05, 06).
(6) Turning the wheel manually, check the change of the braking force when the brake pedal is depressed.
The change should be as shown in the following illustration.

NOTE
While the ABS is in the fail safe mode, the scan tool actuator test cannot be made.



(7) If any abnormality is found in the check, take corrective action according to the following "Judgement in Inspection by Feel" table.

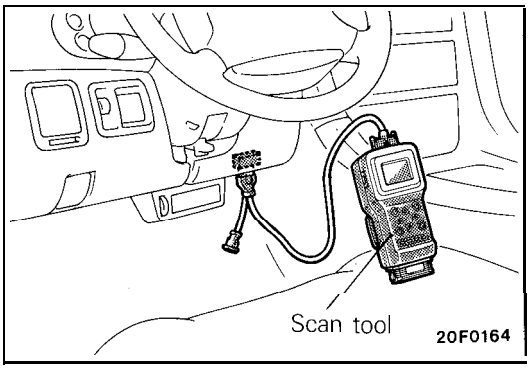
Judgement in Inspection by Feel

No.	Scan tool display	Operation	Judgement		Probable cause	Remedy
			Normal	Abnormal		
04	FR VALVE M	(1) Depress brake pedal to lock wheel. (2) Using the scan tool, select the wheel to be checked and force the actuator to operate. (3)Turn the selected wheel manually to check the change of brake force.	Brake force released for 6 seconds after locking.	Wheel does not lock when brake pedal is depressed.	Clogged brake line other than HU	Check and clean brake line
					Clogged hydraulic circuit in HU	Replace HU assembly
05	FL VALVE M			Brake force is not released	Incorrect HU brake tube connection	Connect correctly
06"	Rear VALVE M*				HU solenoid valve not functioning correctly	Replace HU assembly

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 scan tool as illustrated.

Caution
Turn off the ignition switch beforehand whenever the scan tool is connected or disconnected.

(3) After confirming that the shift lever or selector lever is in the neutral position, start the engine.
(The ABS warning light lights up, it goes into the scan tool mode. In the scan tool mode, ABS does not function.)
(4) Operate the brake force tester roller.
(5) Depress the brake pedal until the brake force tester indicates the following value and keep the brake force at this level during the test.

Front wheels: 1,000 N (220 lbs.)
Rear wheels: 650 N (143 lbs.)

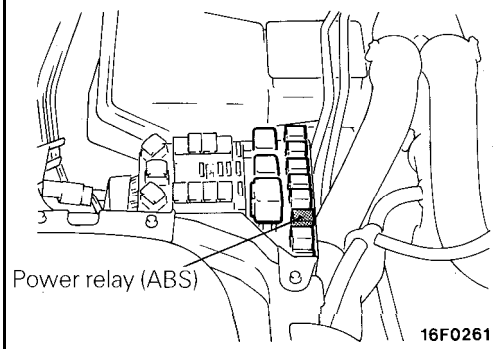
(6) Allow the brake tester indication to stabilize before operating the scan tool to perform actuator test (Item No. 01, 02, 03). Then, read change of tester indication.
Referring to the following "Judgement in Inspection by Using Brake Force Tester" table, judge and take corrective action if necessary.

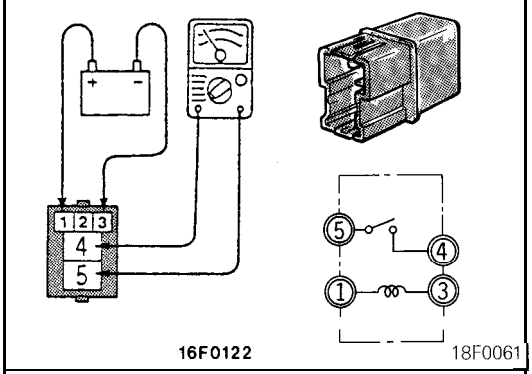
NOTE
While the ABS is in the fail safe mode, the scan tool actuator test cannot be made.

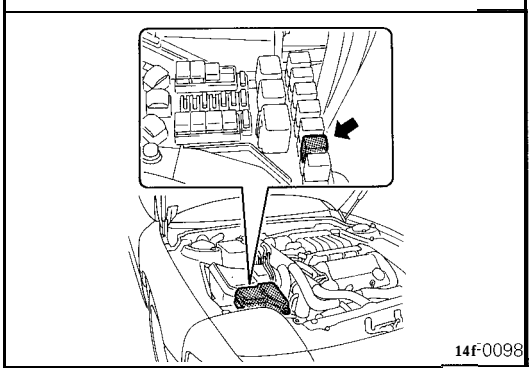
Judgement in Inspection by Using Brake Force Tester

No.	Scan tool display	Operation	Judgement (reading of brake force tester)		Probable cause	Remedy
			Normal	Abnormal		
04	FR VALVE M	After brake force tester indication has stabilized, operate scan tool to force the actuator to operate and check the change in brake force.	(1) When the actuator is driven by scan tool, brake force changes as shown below. Front wheels: N (lbs.) 1,000 (220) Step 1 FWD: 250±200 (55±44) AWD: 350±200 (77±44) Step 2 (In approx. 6 s) 1,000 ± 200 (220 ± 44) Rear wheels: 650 (143) Step 1 FWD: 150±150 (33±33) AWD: 300±150 (66±33) Step 2 (In approx. 6 s) 650 ±150 (143 ± 33)	Brake force in Step 1 shows very little or almost no decrease.	Incorrect HU brake tube connection	Connect correctly
					Faulty HU	Replace HU assembly
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 scan tool, forced drive operation is stopped when any wheel speed reaches 10 km/h (6 mph).
(2) Failure to keep the brake pedal depression force constant can result in misjudgement.
Even if the judgement has resulted in NG, it might be that the depression force was not kept constant. Therefore, repeat the same check again as necessary.
(3) The probable causes given above all assume that all the other brake parts are normal.







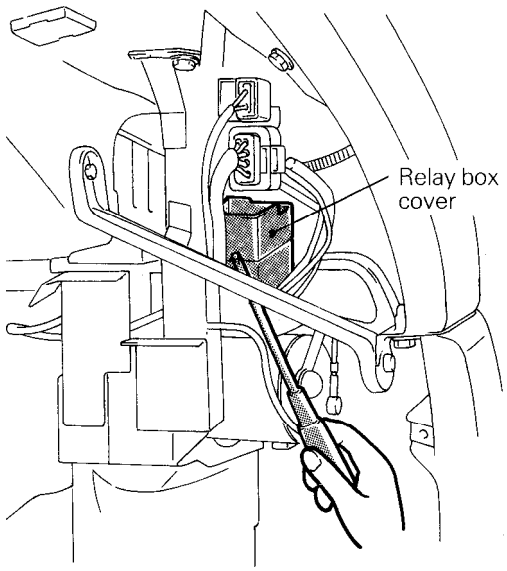
INSPECTION OF POWER RELAY

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 FOR A DISCHARGED BATTERY

If the engine is jump-started, because of a completely discharged battery, the vehicle may suffer misfiring and fail to start if an attempt is made to start without allowing the 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.



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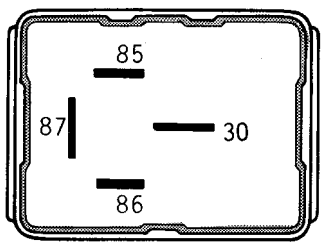

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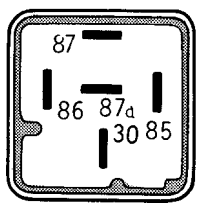


16R067C

INSPECTION OF VALVE RELAY AND MOTOR RELAY (ABS)

1. Remove the splash shield (FR) and remove the relay box cover by inserting a screwdriver between the hydraulic unit and cover to pry off the lock.
2. Remove the relays. The one closest to you (larger one) is the motor relay and the one farthest from you (smaller one) is the valve relay.

3. Check continuity of the relays both when they are energized and de-energized.

Motor Relay

When de-energized	Between terminals (85) and (86)	30 – 60 Ω
	Between terminals (30) and (87)	No continuity (∞Ω)
When energized between terminals @and@	Between terminals (30) and (87)	Continuity (approx. 0Ω)

Valve Relay

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 @and@	Between terminals @and (87a)	No continuity (∞Ω)
	Between terminals @and (87)	Continuity (approx. 0Ω)

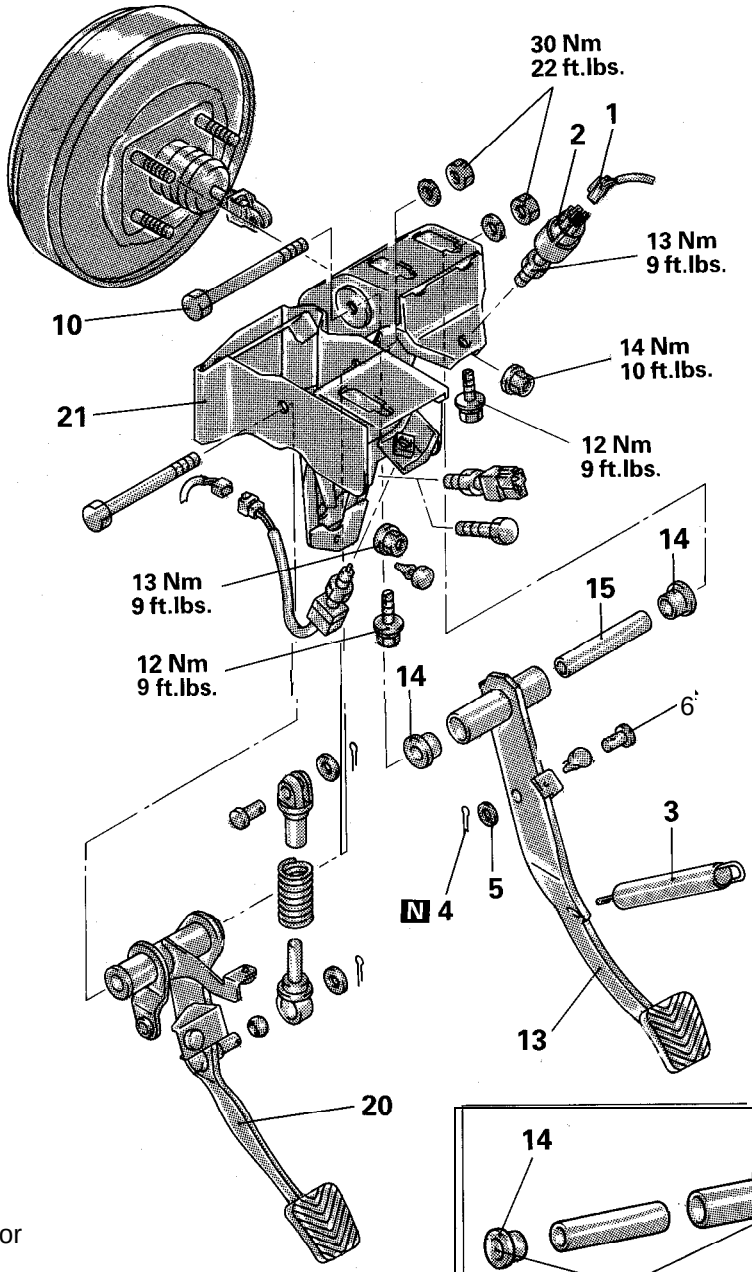
BRAKE PEDAL

REMOVAL AND INSTALLATION

<FWD-M/T>

Pre-removal Operation
- Removal of Steering Column Assembly
  (Refer to GROUP 19A – Steering Wheel and Shaft.)

Post-installation Operation
- Installation of Steering Column Assembly
  (Refer to GROUP 19A – Steering Wheel and Shaft.)
- Clutch Pedal Adjustment
  (Refer to GROUP 6 – Clutch Pedal.)
- Brake Pedal Adjustment
  (Refer to P.5-45.)



Stop light switch removal steps

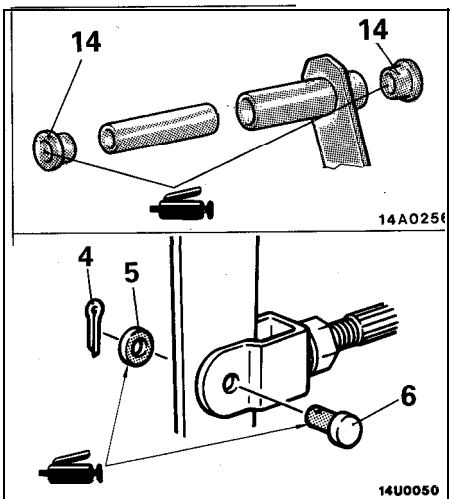
1. Stop light switch connector
2. Stop light switch

Brake pedal removal steps

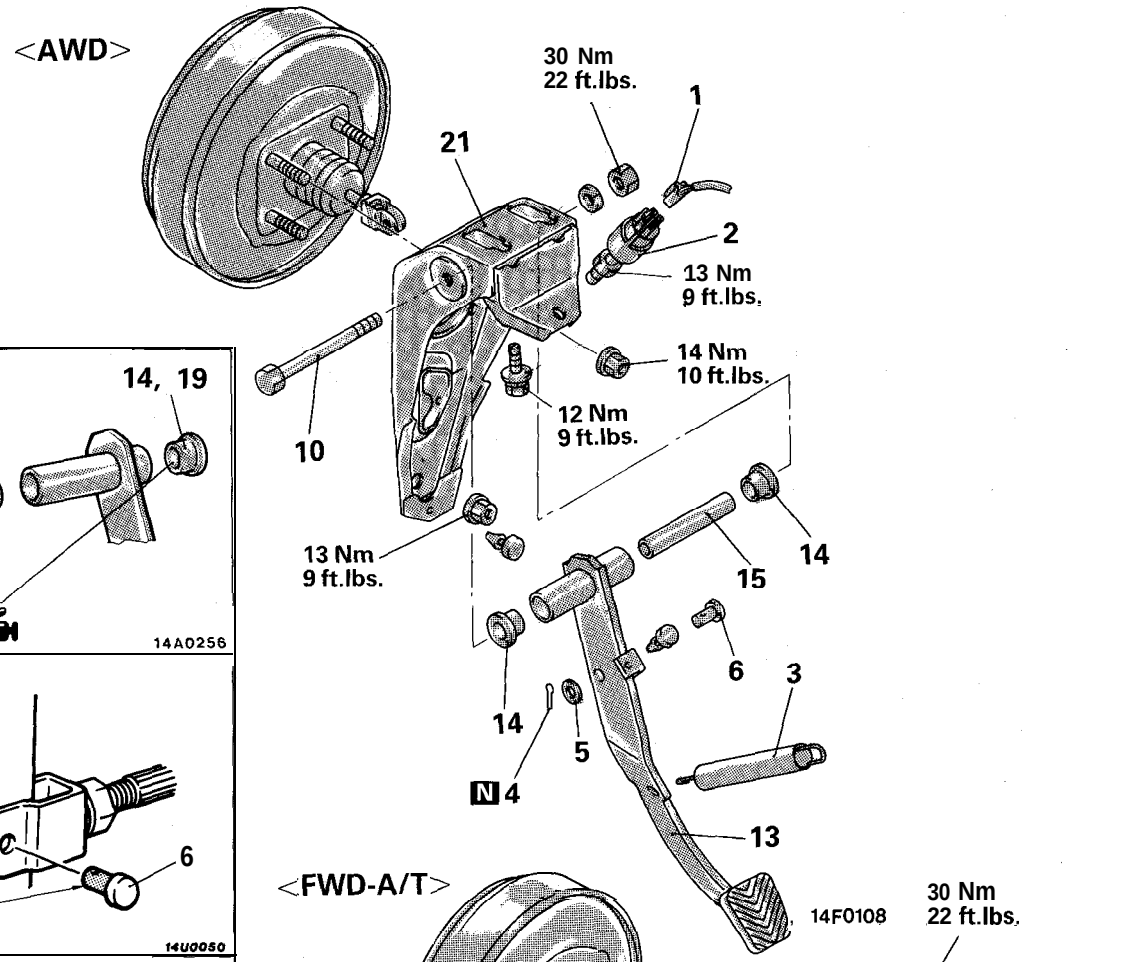
- * 3. Return spring
  4. Cotter pin
  5. Washer
  6. Clevis pin
  9. Brake pedal assembly
     (parts from step 10 to step 21)
  10. Brake pedal shaft bolt
  13. Brake pedal
  14. Bushings
  15. Spacer

◆◆◆◆ 20. Clutch pedal (Refer to Group 6 – Clutch Pedal.)

  21. Brake pedal support member



Grease: MOPAR Multi-Mileage Lubricant Part No. 2525035 or equivalent

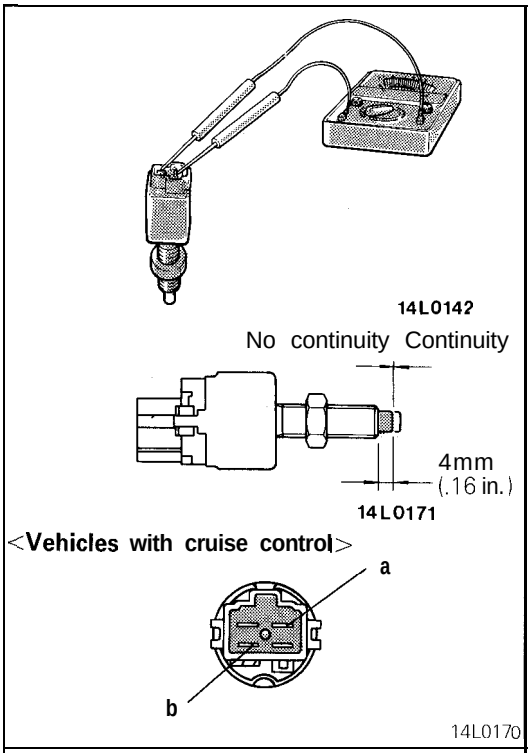


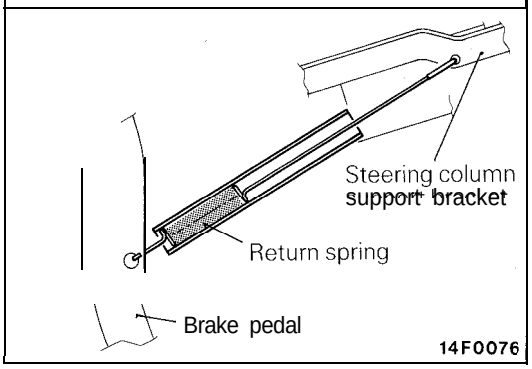
Stop light switch removal steps

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





INSPECTION

- Check the bushing for wear.
- Check the brake pedal for bend or twisting.
- Check the brake pedal return spring for damage.

STOP LIGHT SWITCH

(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.

SERVICE POINTS OF INSTALLATION

3. INSTALLATION OF RETURN SPRING

Install the return spring with the shorter hook on the brake pedal.

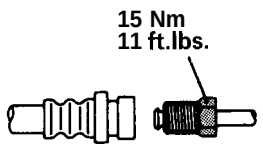
MASTER CYLINDER AND BRAKE BOOSTER

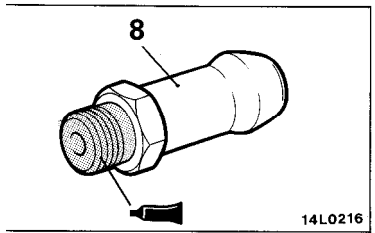
REMOVAL AND INSTALLATION

Pre-removal Operation
- Draining Brake Fluid

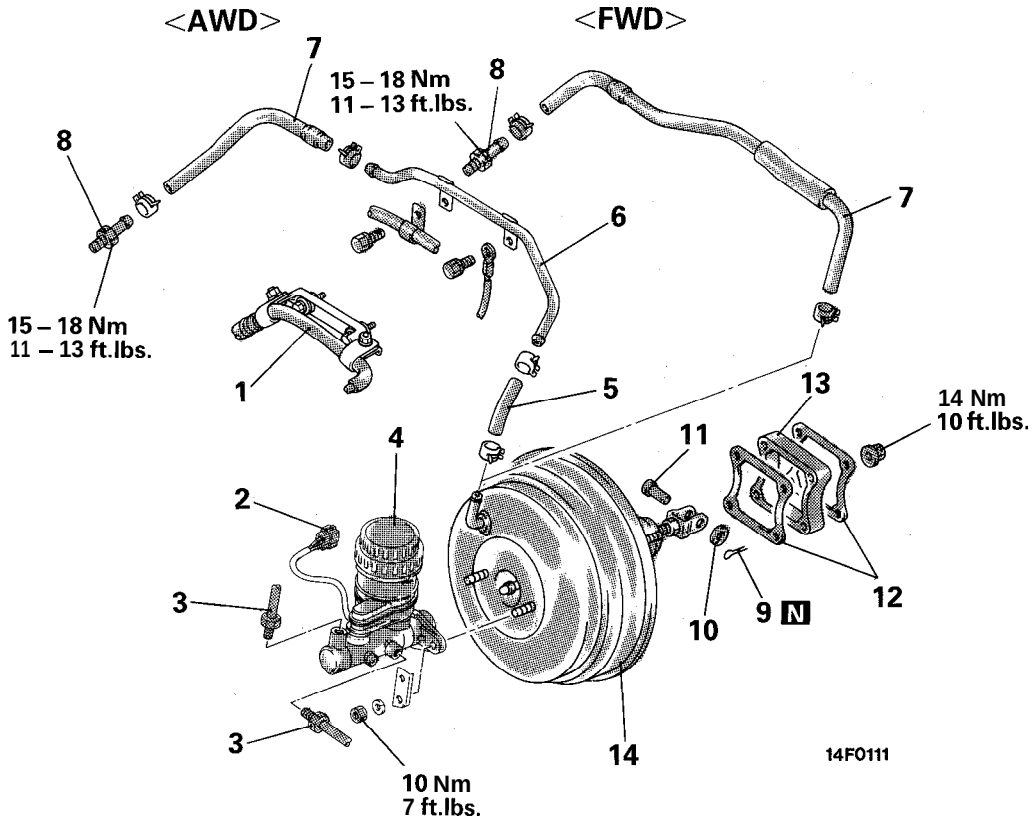
Post-installation Operation
- Supplying Brake Fluid
- Bleeding (Refer to P.5-49.)
- Adjustment of Brake Pedal (Refer to P.5-45.)

Brake tube flare nut





Sealant: Semi-drying sealant

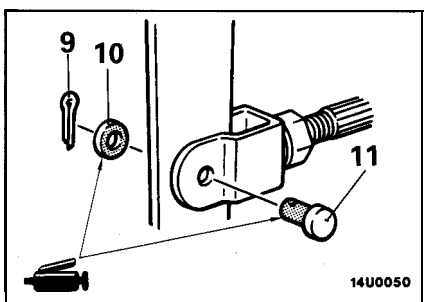


Master cylinder removal steps

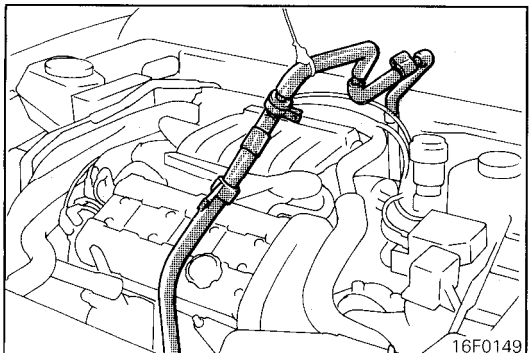
◀▶ 1. Low-pressure hose
2. Brake fluid level sensor connector
3. Brake tube connection
4. Master cylinder
● ▯ Adjustment of clearance between brake booster push rod and primary piston

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



Grease: MOPAR Multi-Mileage Lubricant Part No. 2525035 or equivalent

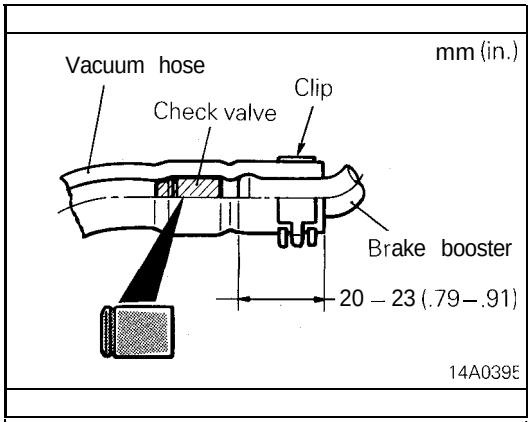

16F0149

SERVICE POINTS OF REMOVAL

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.



14A0395

SERVICE POINTS OF INSTALLATION

7. INSTALLATION OF VACUUM HOSE WITH CHECK VALVE

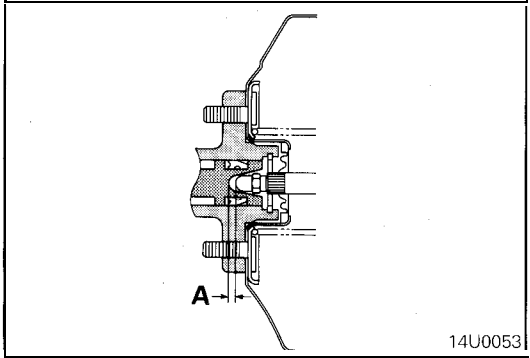
(1) In the case of AWD, install the vacuum hose to the brake booster nipple as shown in the figure. Secure the hose with the hose clip.

Caution
The check valve and the pipe part of the brake booster must not contact each other.

(2) Install the other end of the vacuum hose fully onto its port on the engine. Secure the hose using the hose clip.

. ADJUSTMENT OF CLEARANCE BETWEEN BRAKE BOOSTER PUSH ROD AND PRIMARY PISTON

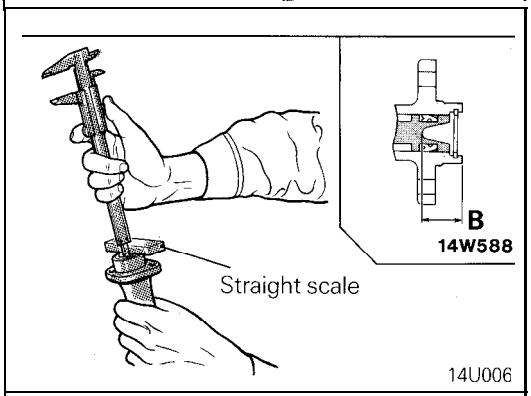
Adjust the clearance (A) between the brake booster push rod and primary piston as follows:



14U0053

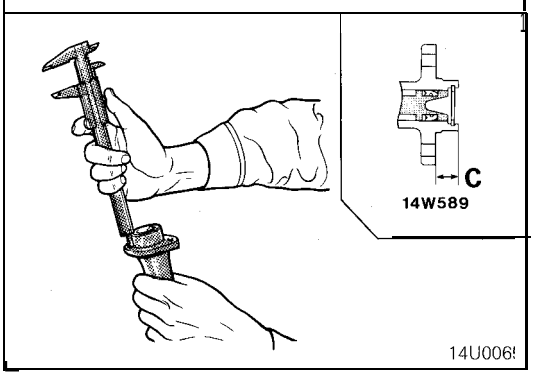
(1) Measure the dimension (B) between the master cylinder end face and piston.

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).

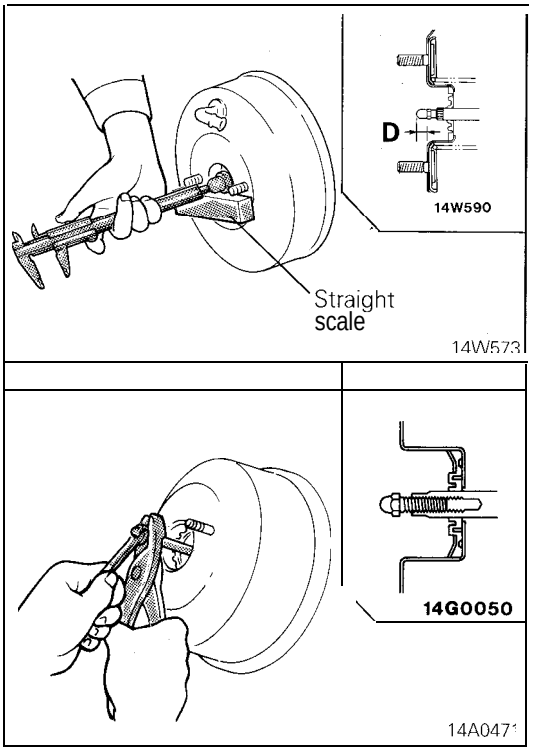


14U006

(2) Obtain the dimension (C) between the brake booster mounting surface on the master cylinder and the end face.



14U006



(3) Measure the dimension (D) between the master cylinder mounting surface on brake booster and the push rod end.

NOTE
To obtain (D), first take measurement with a square placed on the brake booster. Then, subtract the thickness of the square to arrive at (D).

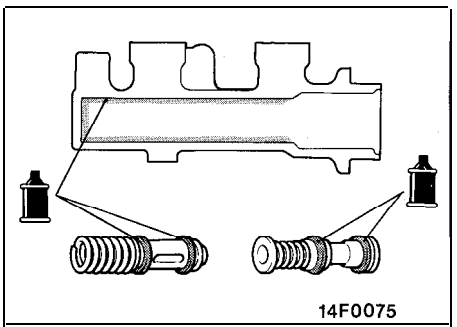
(4) Using the measured values obtained in (1) through (3), obtain the clearance (A) between the brake booster push rod and primary piston.

Standard value: A (A = B – C – D)
7 + 8 inch brake booster
0.55 – 0.75 mm (.022 – .030 in.)
8 + 9 inch brake booster
0.65 – 0.85 mm (.026 – .033 in.)

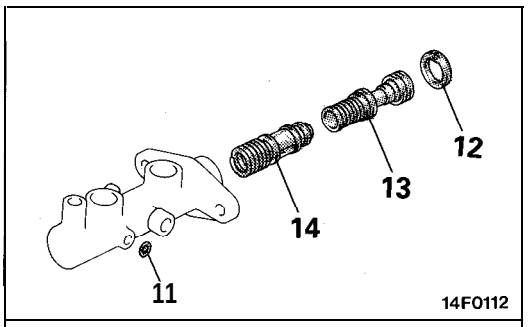
(5) If the clearance is not within the standard value range, turn the push rod screw to achieve desired length.

Caution
Improper clearance may cause excessive brake drag.

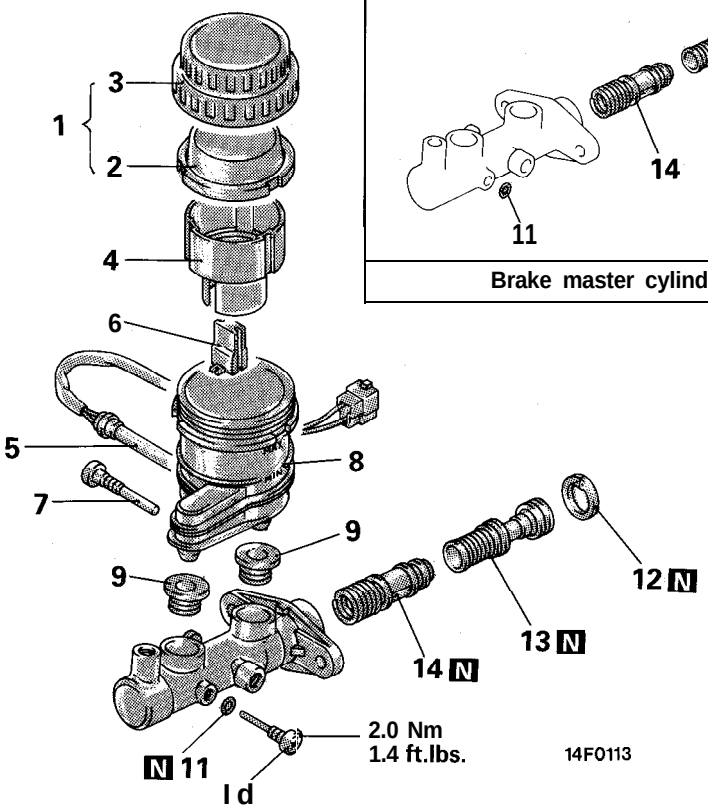
DISASSEMBLY AND REASSEMBLY



Brake fluid: MOPAR Brake Fluid/ Conforming to DOT3 or DOT4



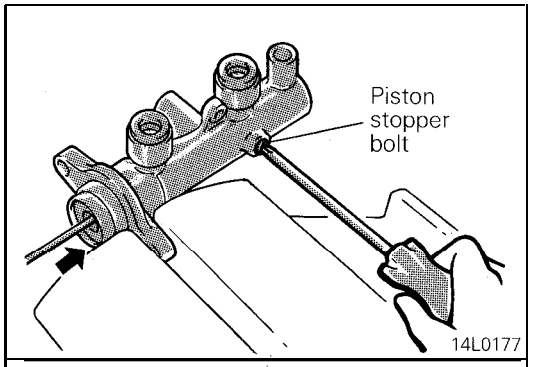
Brake master cylinder kit

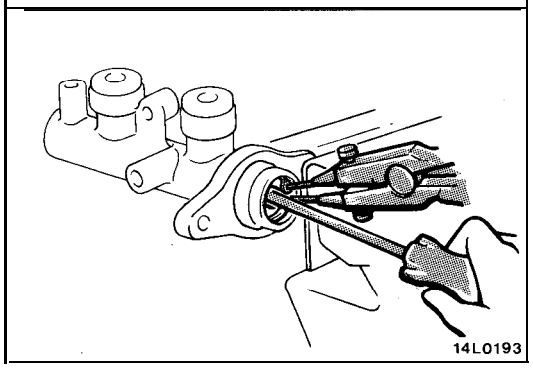


Disassembly steps

1. Reservoir cap assembly
2. Diaphragm
3. Reservoir cap
4. Filter <Vehicles with ABS>
5. Brake fluid level sensor
6. Float
7. Reservoir stopper bolt
8. Reservoir
9. Reservoir seal
10. Piston stopper bolt ◆◆
11. Gasket
12. Piston stopper ring ◆◆
13. Primary piston assembly
14. Secondary piston assembly ◆◆
15. Master cylinder body

Caution
Do not disassemble the primary and secondary piston assemblies.





SERVICE POINTS OF DISASSEMBLY

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

- Check the inner surface of master cylinder body for corrosion or pitting.
- Check the primary and secondary pistons for corrosion, scoring, wear, damage or wear.
- Check the diaphragm for cracks and wear.

BRAKE LINE

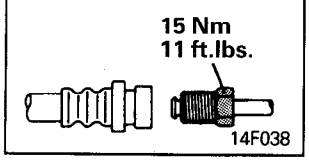
REMOVAL AND INSTALLATION

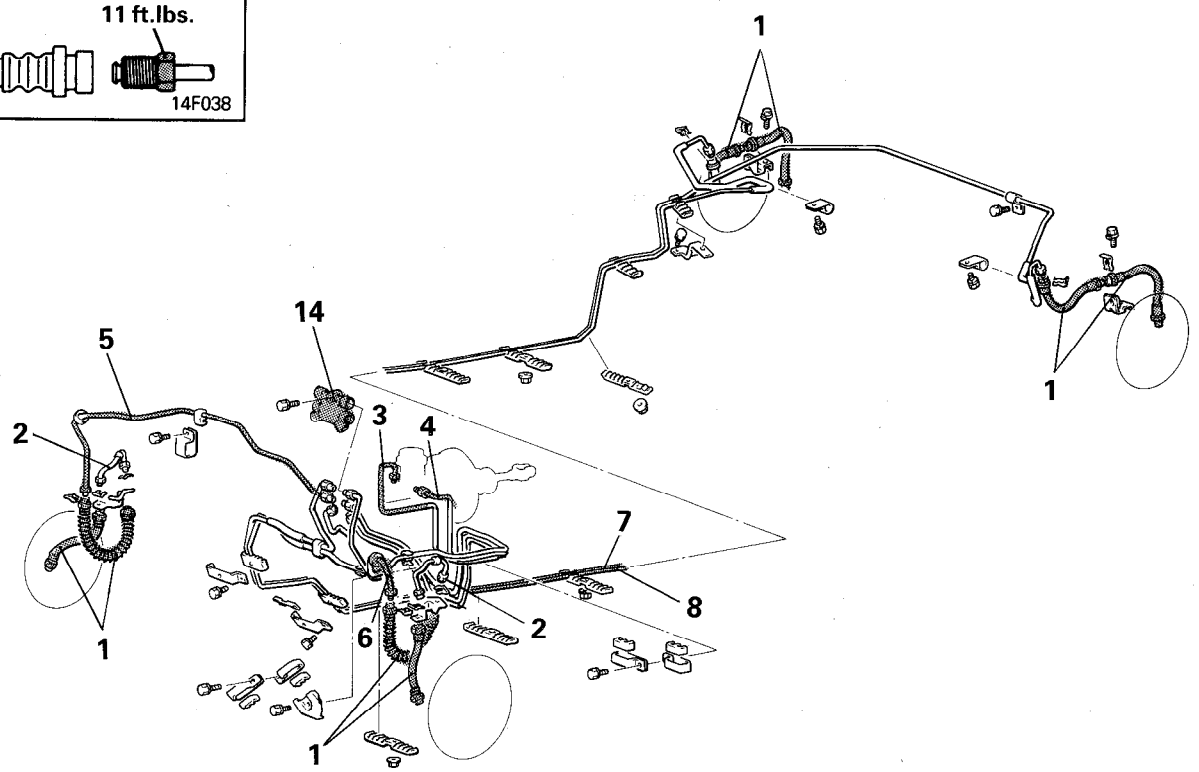
<Vehicles without ABS>

Pre-removal Operation
- Draining of Brake Fluid

Post-installation Operation
- Supplying Brake Fluid
- Bleeding (Refer to P.5-49.)

Flared brake line nuts





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.**

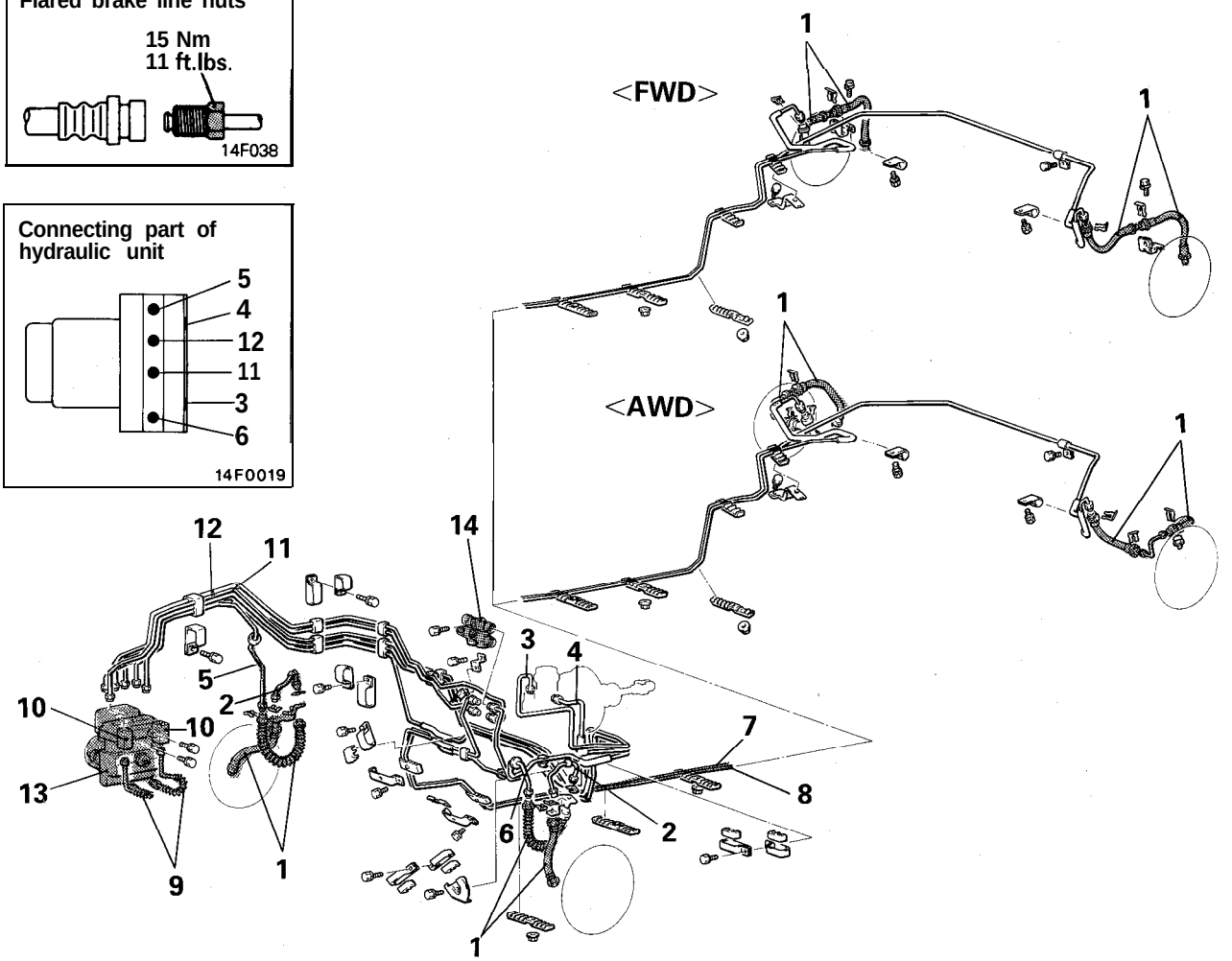
<Vehicles with ABS>

Pre-removal Operation
- Draining of Brake Fluid

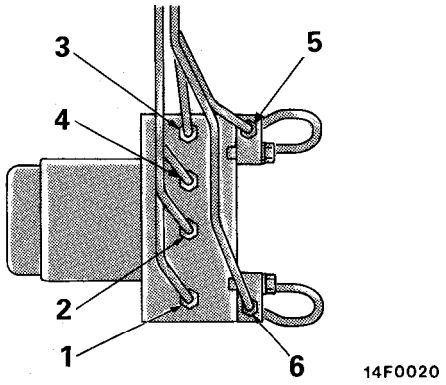
Post-installation Operation
- Supplying Brake Fluid
- Bleeding (Refer to P.5-49.)

Flared brake line nuts

Connecting part of hydraulic unit



1. Brake hose
2. Brake tube
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. 2-way connector
11. Brake tube (rear, R.H.)
12. Brake tube (rear, L.H.)
- * 13. Hydraulic unit
14. Proportioning valve



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

- 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

13. CONNECTION OF TUBE TO HYDRAULIC UNIT

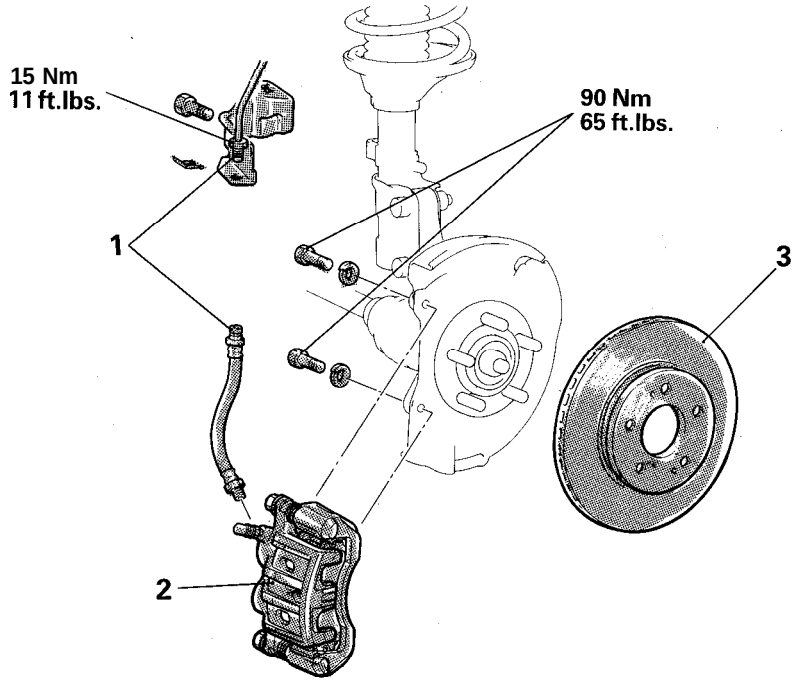
Connect the tubes to the hydraulic unit as shown in the illustration.

FRONT DISC BRAKE

REMOVAL AND INSTALLATION

Pre-removal Operation
- Draining of Brake Fluid

Post-installation Operation
- Supplying Brake Fluid
- Bleeding (Refer to P.5-49.)

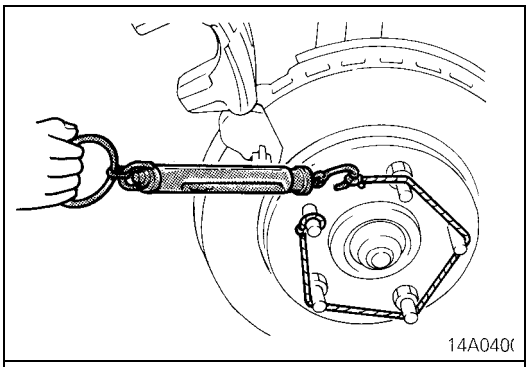


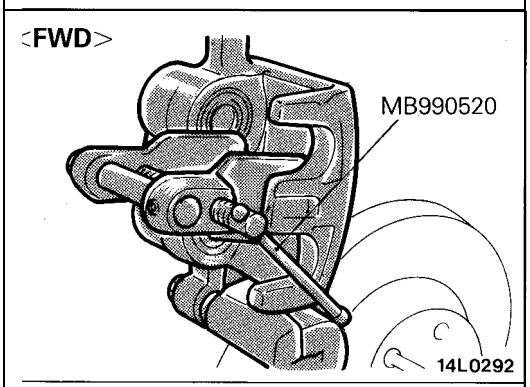
Removal steps

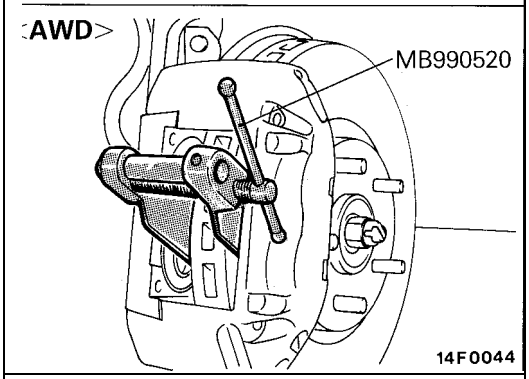
1. Connection for brake hose and the brake tube
◆◆ 2. Front brake assembly
3. Brake disc

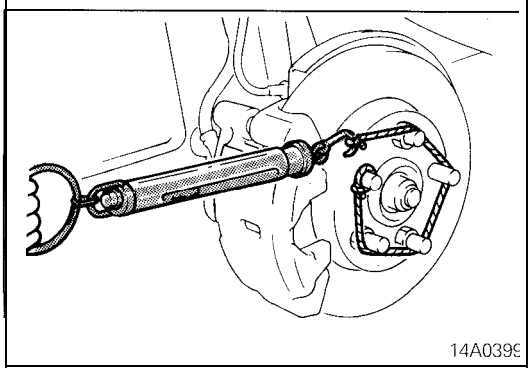
INSPECTION

- Check disc for wear. (Refer to P.5-53.)
- Check disc for runout. (Refer to P.5-53, 54.)
- Check disc for damage.









SERVICE POINTS OF INSTALLATION

2. INSTALLATION OF FRONT BRAKE ASSEMBLY

Using the following method, measure the drag force of the disc brake after installation of the brake assembly.

(1) With the brake assembly removed, use a spring scale to measure the rotary sliding resistance of the hub in the forward direction.

NOTE
Secure the disc to the hub with wheel nuts.

(2) After installing the caliper support to the knuckle, expand the piston by use of the special tool, and then install the caliper body.

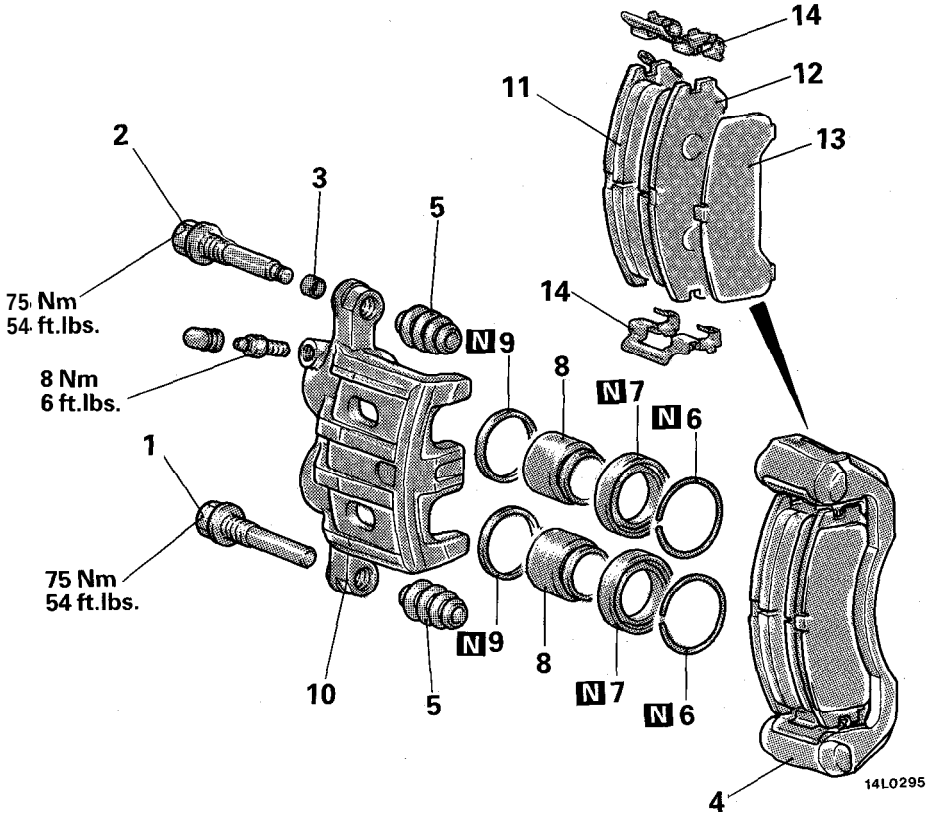
(3) Start the engine, depress the brake pedal firmly two to three times and stop the engine.
(4) Give the brake disc ten turns in the forward direction.
(5) Using a spring scale, measure the rotary sliding resistance of the hub in the forward direction.
(6) Obtain the drag force of the disc brake (the difference between the values measured in 5 and 1).

Standard value: 70 N (15.4 lbs.) or less

(7) If the drag force of the brake exceeds the standard value, disassemble the piston and check for dirty or corroded piston sliding surface and deteriorated piston seal.

DISASSEMBLY AND REASSEMBLY

<FWD>



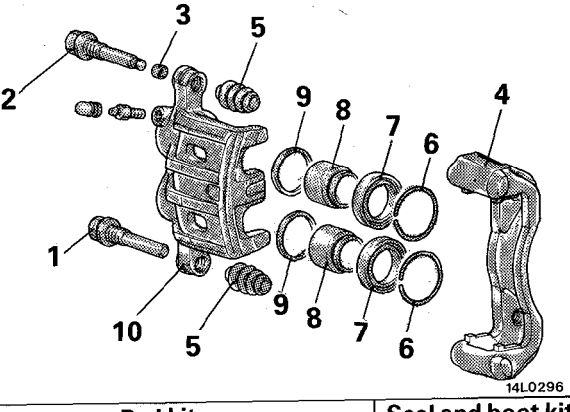
Caliper assembly disassembly steps

- ⬮ + 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

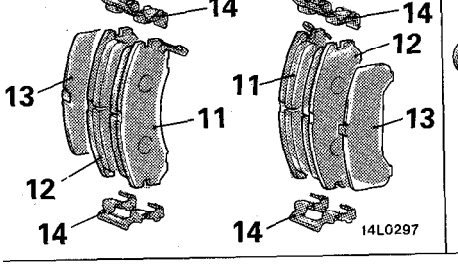
Pad assembly disassembly steps

- ⬮ + 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

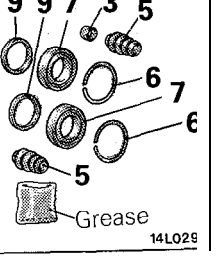
Brake caliper kit



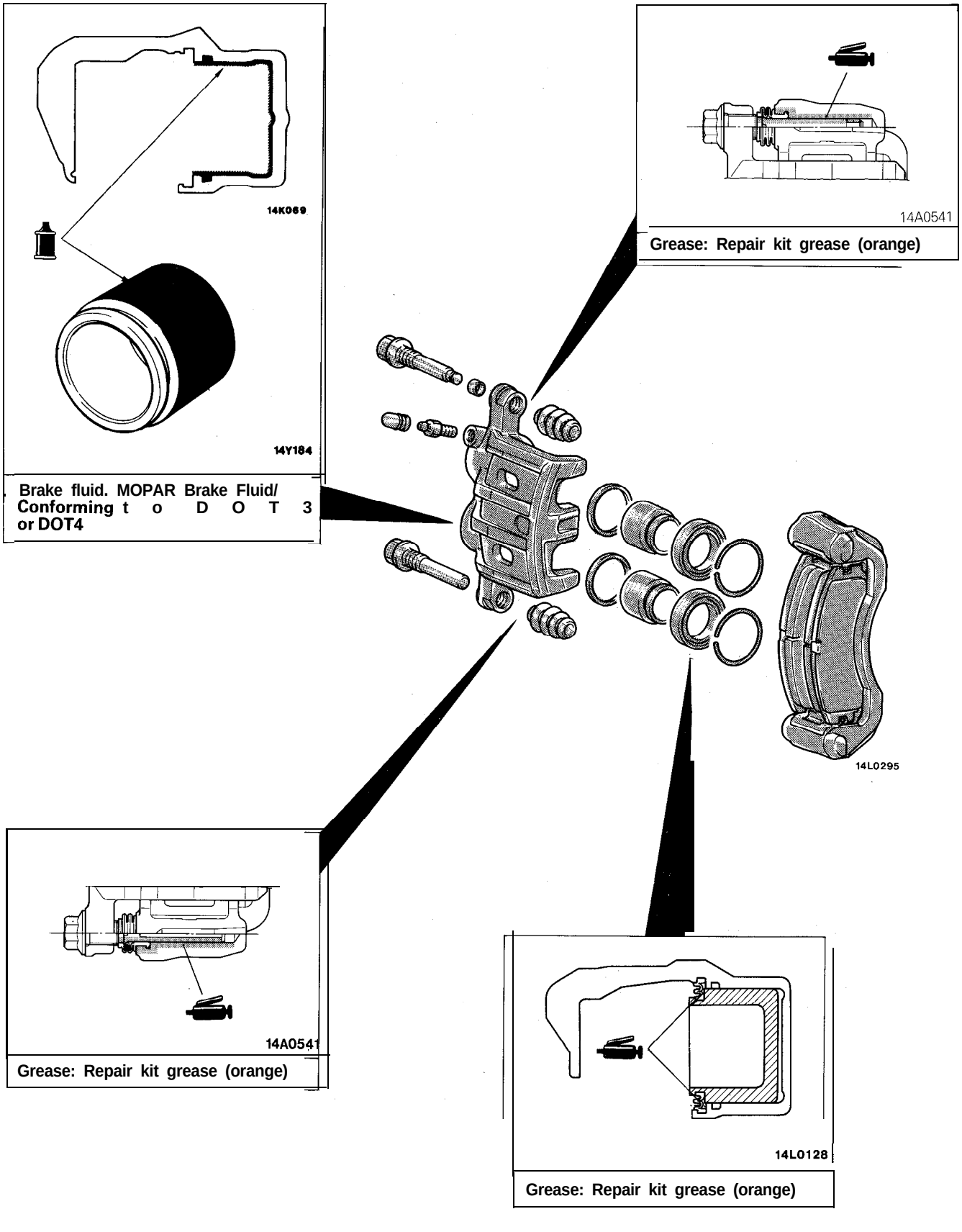
Pad kit

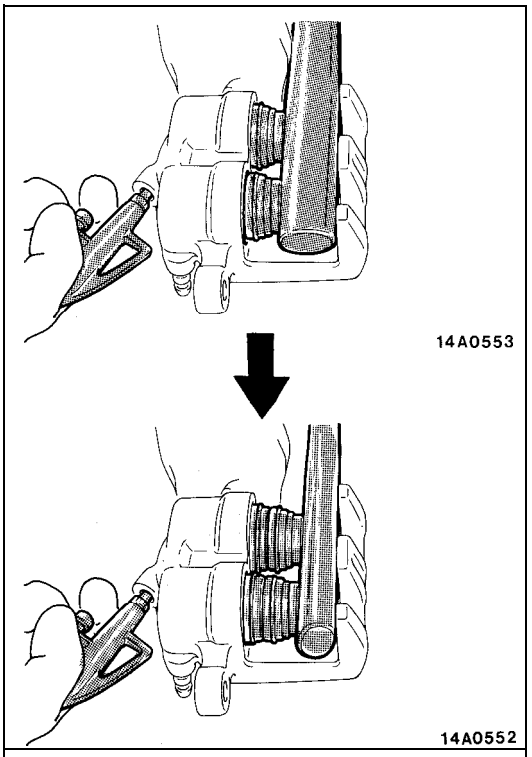


Seal and boot kit



Lubrication points





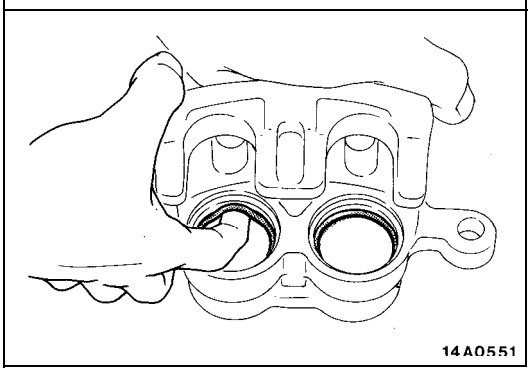
SERVICE POINTS OF DISASSEMBLY

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.

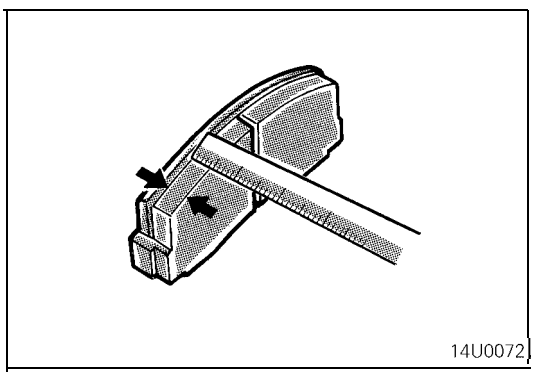
Caution
Do not damage the cylinder inner surface.

(2) Clean piston surface and inner cylinder with trichloroethylene, alcohol or specified brake fluid.

Specified brake fluid:
MOPAR Brake Fluid/Conforming to DOT3 or DOT4

INSPECTION

- Check cylinder for wear, damage or rust.
- Check piston surface for wear, damage or rust.
- Check caliper body or sleeve for wear.
- Check pad for damage or adhesion of grease, check backing metal for damage.

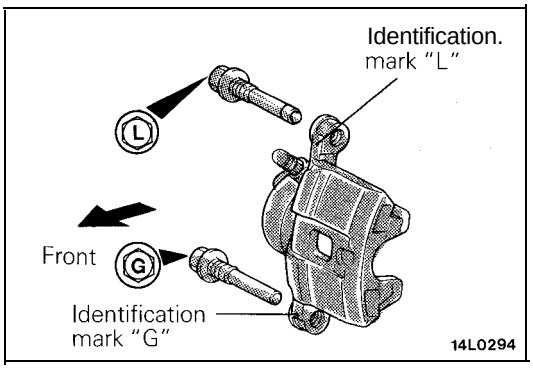


PAD WEAR CHECK

Measure thickness at the thinnest and worn area of the pad. Replace pad assembly when pad thickness is less than the limit value.

Standard value: 10.0 mm (.39 in.)
Limit value: 2.0 mm (.08 in.)

Caution
1. **When the limit is exceeded, the brake pads on both the left and right wheels must be replaced as a set.**
2. **If there is a large difference in thickness between the pads on the right and left wheels, check the sliding portions of the caliper.**



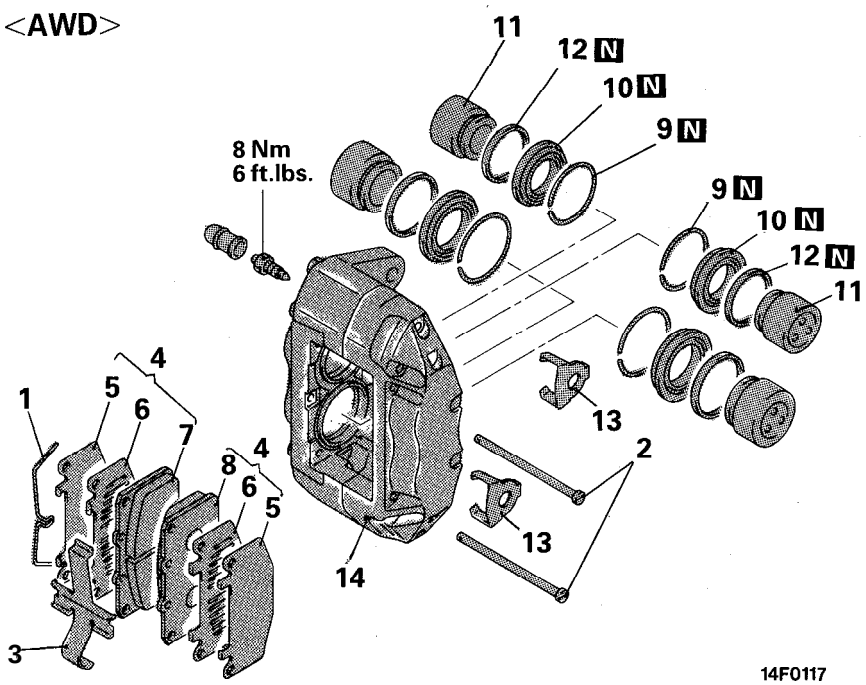
SERVICE POINTS OF REASSEMBLY

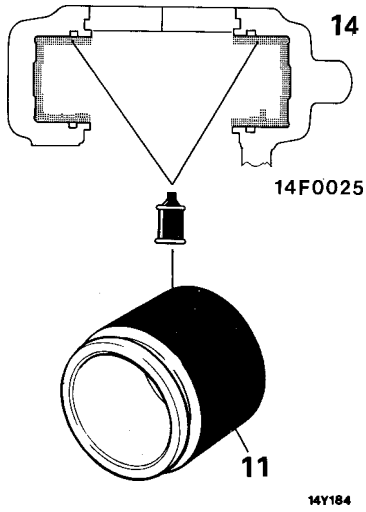
2. INSTALLATION OF LOCK PIN / 1. GUIDE PIN

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

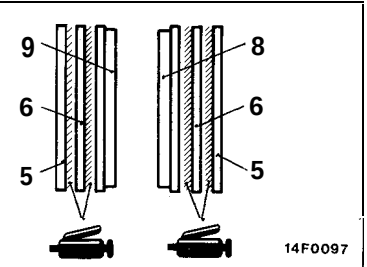
<AWD>



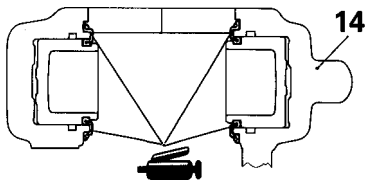


Caution
The piston seal contained in the seal and boot kit is coated with special grease.
Do not wipe off the grease.

Brake fluid: MOPAR Brake Fluid/ Conforming to DOT3 or DOT4

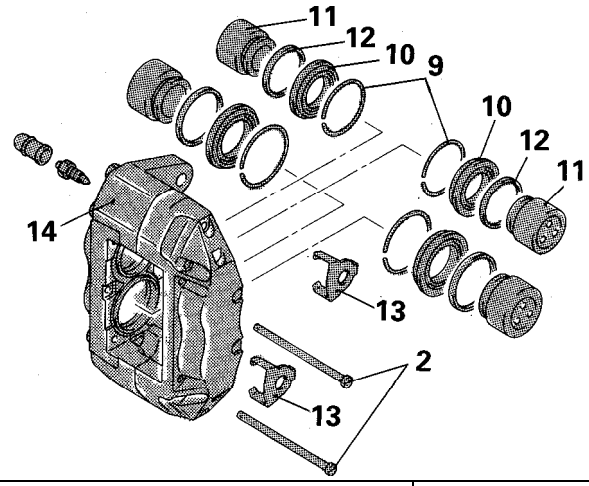


Grease: MOPAR Multi-Purpose Grease Part No. 2932524 or equivalent

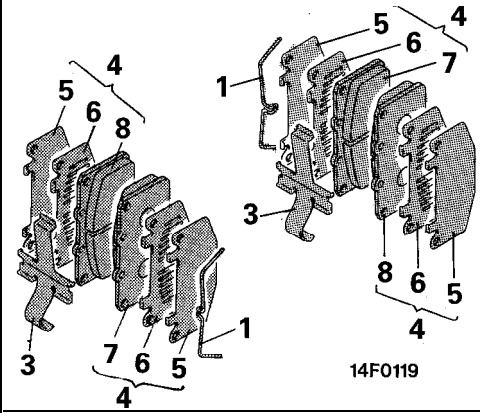


Grease: Repair kit grease (orange)

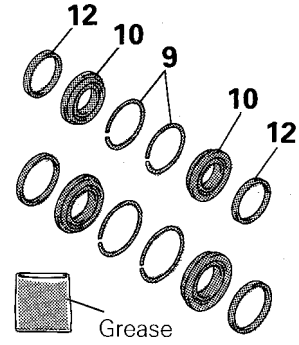
Brake caliper kit



Pad kit

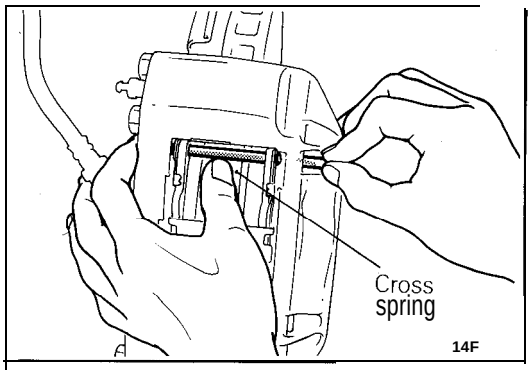


Seal-and-boot kit



Disassembly steps

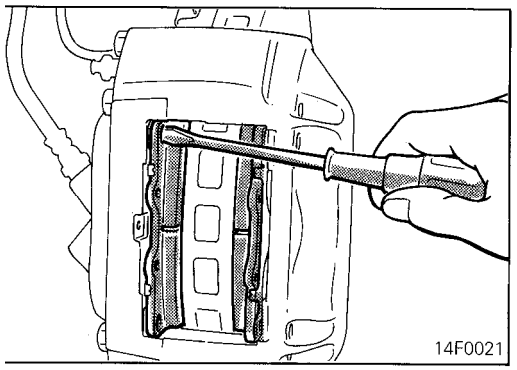
1. Clip
- ◆ ☒ 2. Pad pin
3. Cross spring
- ◆◆ 4. Pad assembly
5. Shim A
6. Shim B
7. Inner pad (with wear indicator)
8. Outer pad
9. Retaining ring
10. Piston boot
- ◆◆ 11. Piston
- ◆ ☒ 12. Piston seal
13. Washer
14. Caliper body



SERVICE POINTS OF DISASSEMBLY

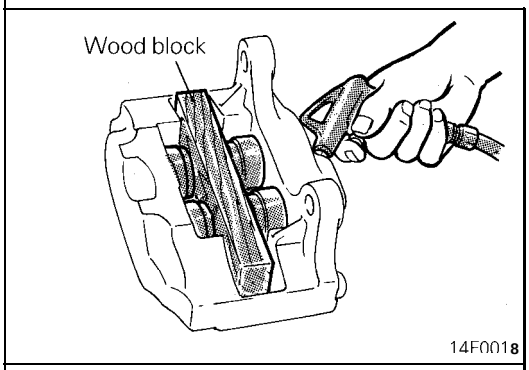
2. REMOVAL OF PAD PIN

Holding the cross spring with hand, remove the pad pin.



4. REMOVAL OF PAD ASSEMBLY

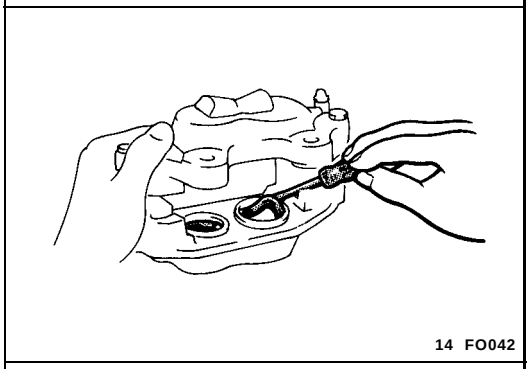
Using a screwdriver, remove the pad assembly



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.



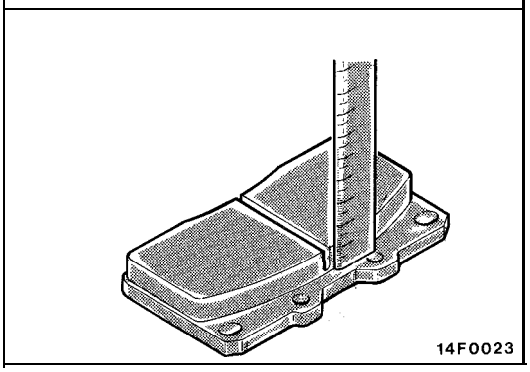
12. REMOVAL OF PISTON SEAL

(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:
MOPAR Brake Fluid/Conforming to DOT3 or DOT4



INSPECTION

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
When the limit is exceeded, the brake pads on both the left and right wheels must be replaced as a set.

REAR DISC BRAKE

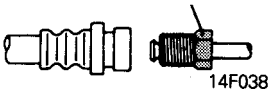
REMOVAL AND INSTALLATION

Pre-removal Operation
- Draining of Brake Fluid

Post-installation Operation
- Brake Fluid Filling
  Brake Line Bleeding
  (Refer to P.5-49.)

Flared brake line nuts

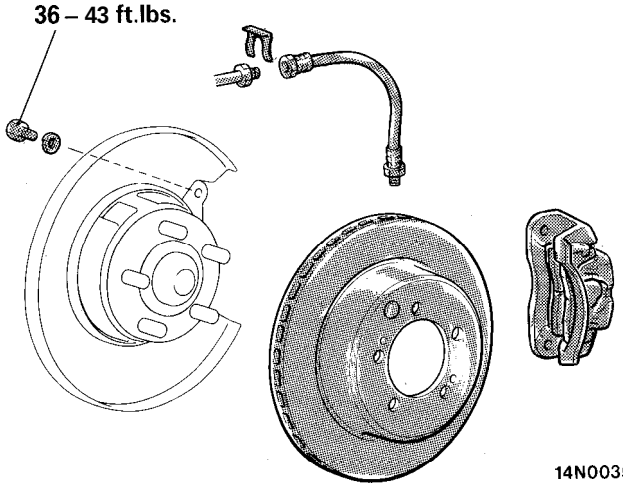
15 Nm
11 ft.lbs.



14F038

<FWD>

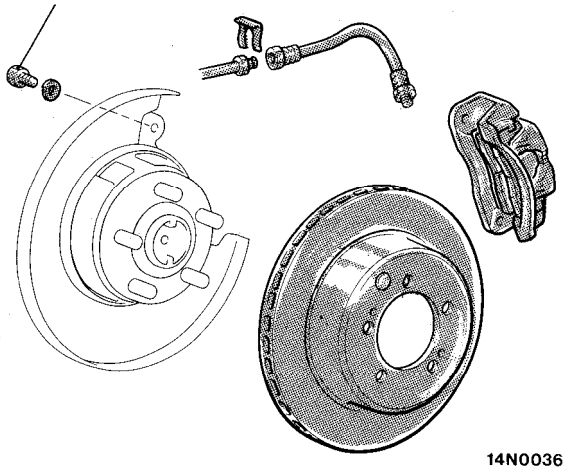
50-60 Nm
36 – 43 ft.lbs.



14N0035

<AWD>

50 – 60 Nm
36 – 43 ft.lbs.



14N0036

Removal steps

1. Brake hose
• 4 2. Rear brake assembly
3. Brake disc

INSPECTION

INSPECTING THE BRAKE DISC

- Check disc for wear. (Refer to P.5-56.)
- Check disc for runout. (Refer to P.5-56.)
- Check disc for damage.

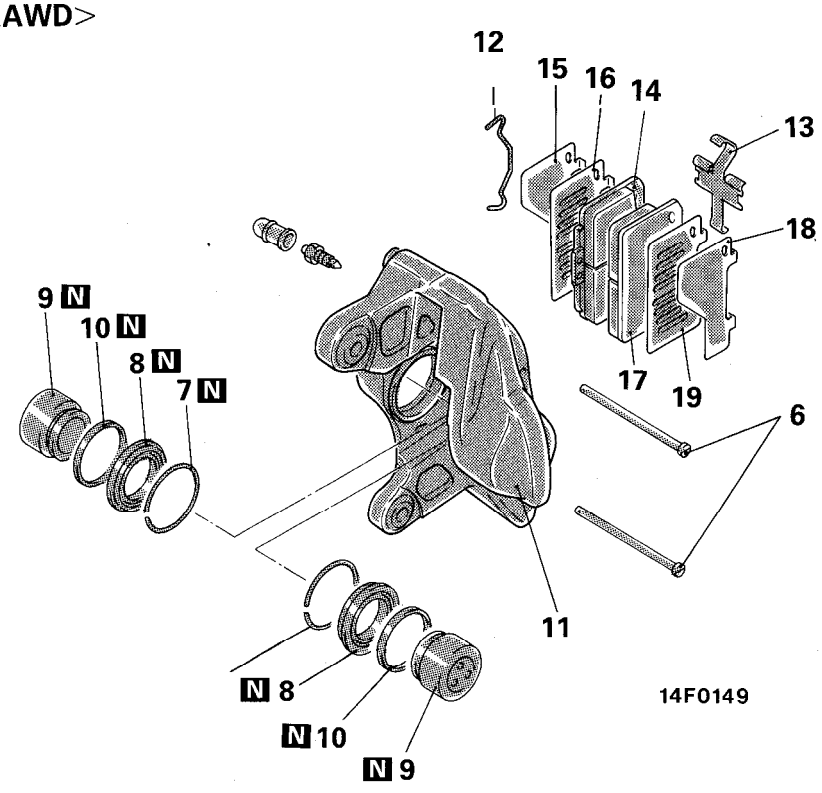
SERVICE POINTS OF INSTALLATION

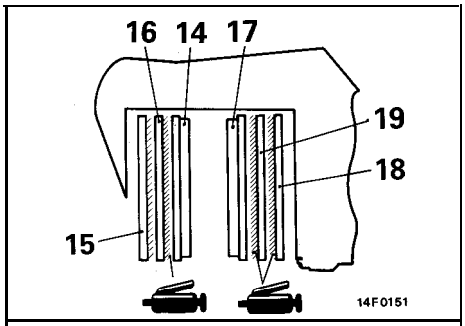
2. INSTALLATION OF THE REAR BRAKE ASSEMBLY

Install the rear brake assembly using the same procedure as that for the front brake assembly. (Refer to P.5-75.)

DISASSEMBLY AND REASSEMBLY

<AWD>





Grease: MOPAR Multi-Purpose Grease Part No. 2932524 or equivalent

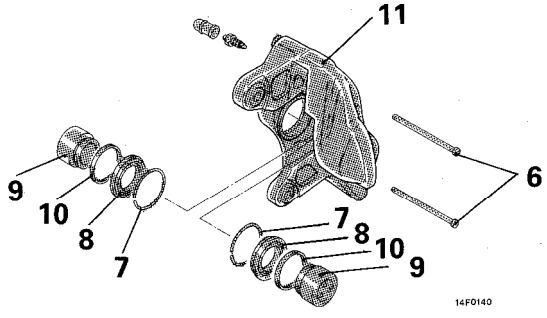
Caliper assembly disassembly steps

- 6. Pad pin
- 7. Retaining ring.
- ◆◆ 8. Piston boot
- ◆◆ 9. Piston
- ◆◆ 10. Piston seal
- 11. Caliper body

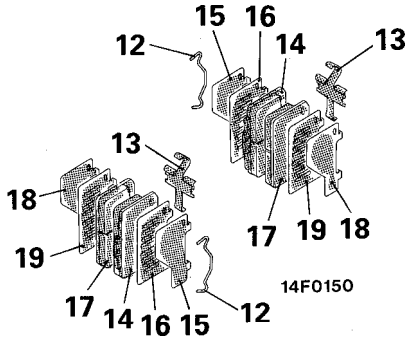
Pad assembly disassembly steps

- 6. Pad pin
- 12. Clip
- 13. Cross spring
- 14. Pad and wear indicator assembly
- 15. Inner shim B
- 16. Inner shim A
- 17. Pad assembly
- 18. Outer shim B
- 19. Outer shim A

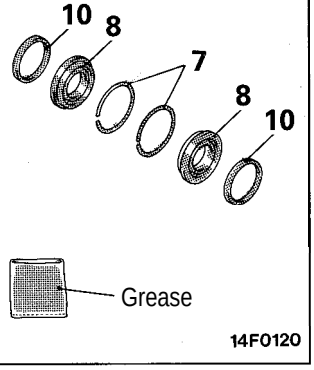
Brake caliper kit



Pad kit



Seal and boot kit



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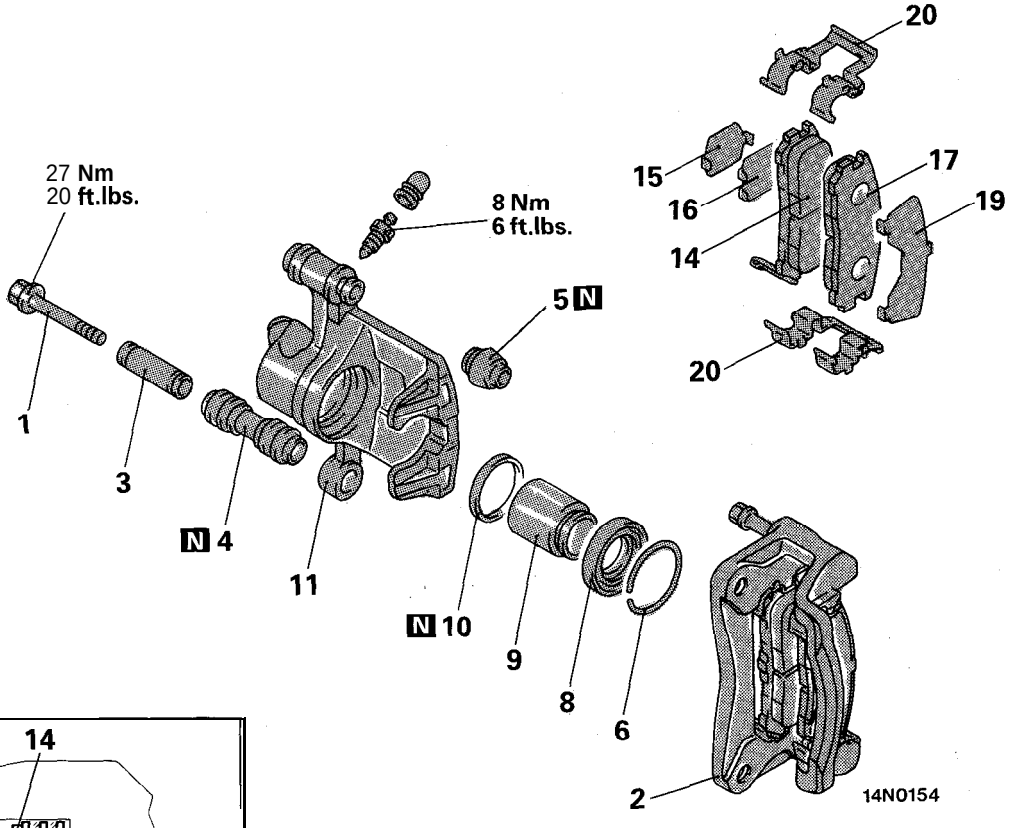
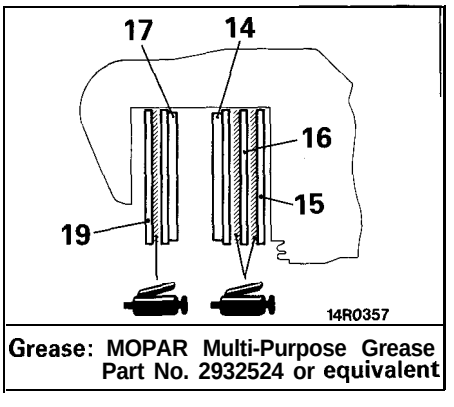




Grease: MOPAR Multi-Purpose Grease Part No. 2932524 or equivalent

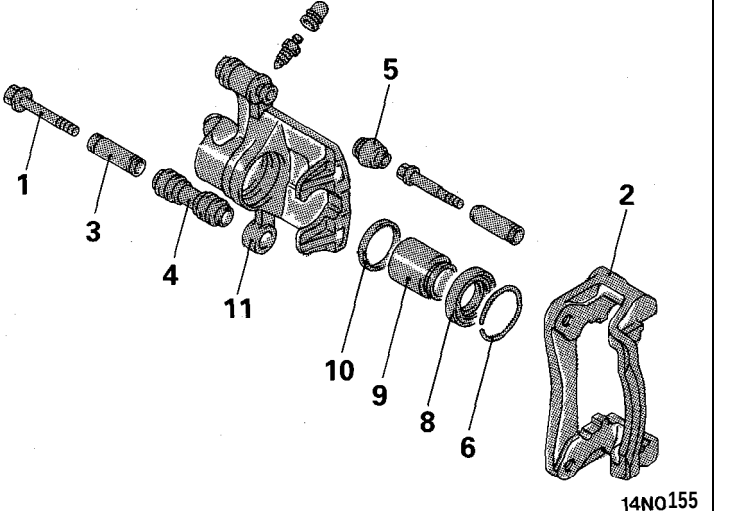
Caliper disassembly steps

1. Lock pin
2. Caliper support (pad, clip, shim)
3. Sleeve
4. Lock pin boot
5. Guide pin boot
6. Boot ring
- ◆◆ 8. Piston boot
- ◆◆ 9. Piston
- ◆◆ 10. Piston seal
11. Caliper body

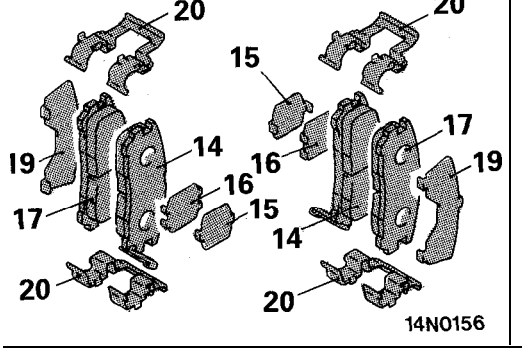
Pad assembly disassembly steps

1. Lock pin
2. Caliper support (pad, clip, shim)
14. Pad and wear indicator assembly
15. Inner shim B
16. Inner shim A
17. Pad assembly
19. Outer shim
20. Clip

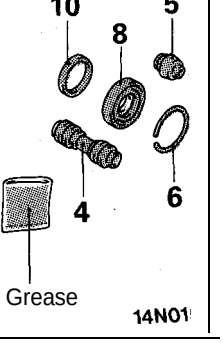
Brake caliper kit



Pad kit

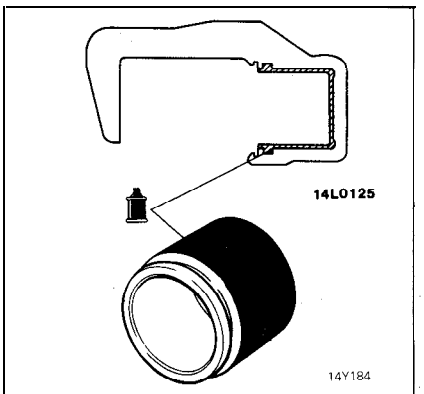


Seal and boot kit



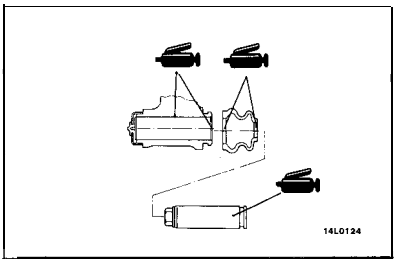
Lubrication Points

<FWD>

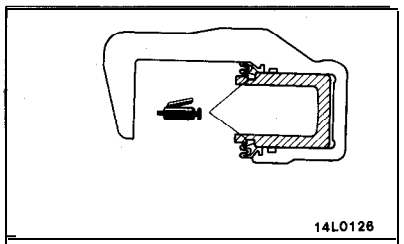


Caution
The piston seal contained in the seal and boot kit is coated with special grease. Do not wipe off the grease.

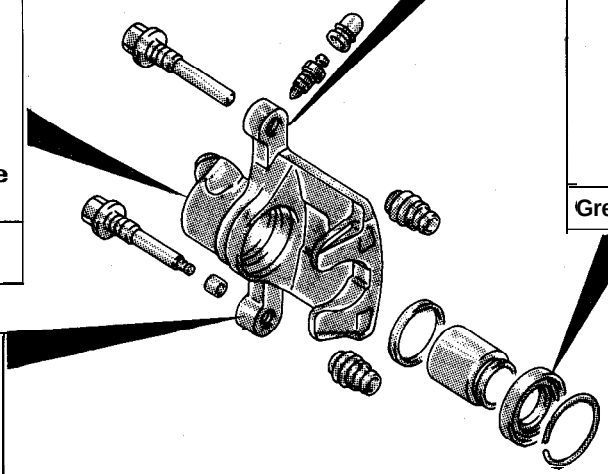
Brake fluid: Conforming to DOT3 or DOT4

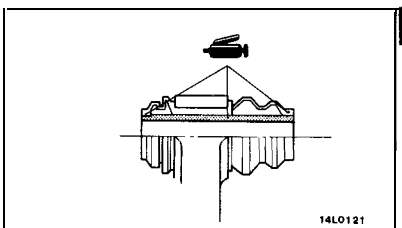


Grease: Repair kit grease (orange)



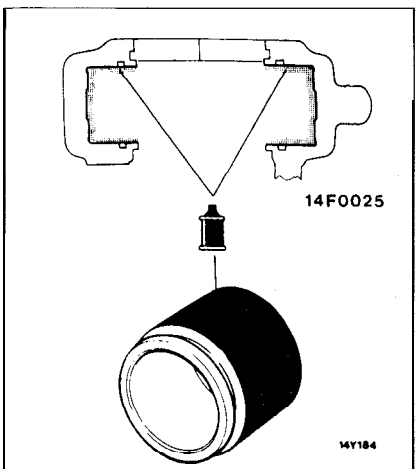
Grease: Repair kit grease (orange)





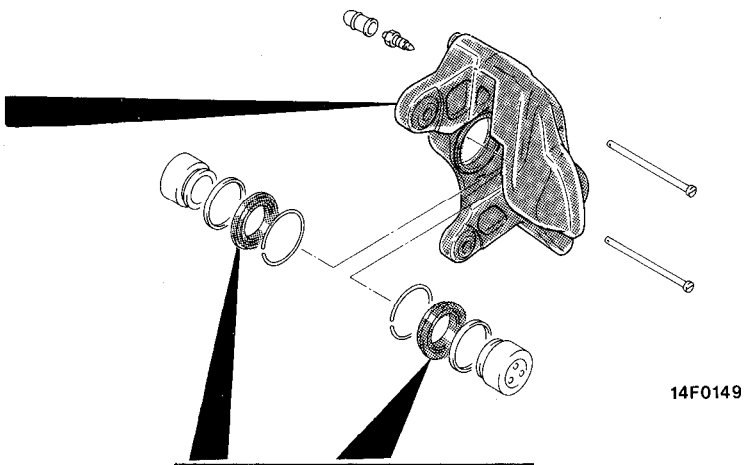
Grease: Repair kit grease (orange)

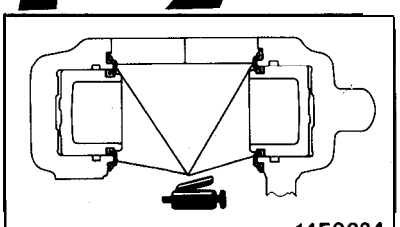
<AWD>



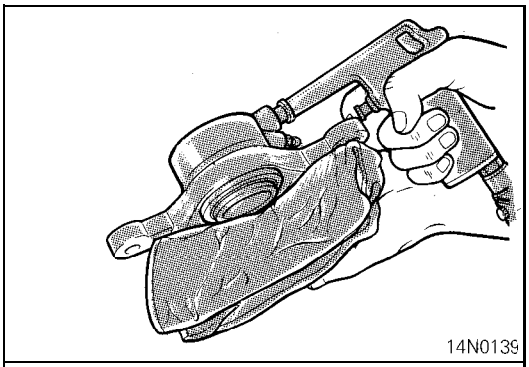
Caution
The piston seal contained in the seal and boot kit is coated with special grease. Do not wipe off the grease.

Brake fluid: Conforming to DOT3 or DOT4





Grease: Repair kit grease (orange)


14N0139

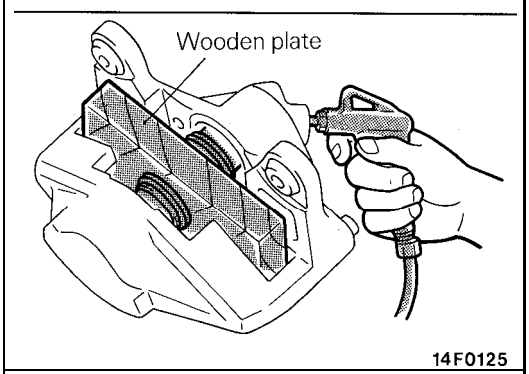
SERVICE POINTS OF DISASSEMBLY

8. REMOVAL OF PISTON BOOT / 9. PISTON

<FWD>

Protect caliper body with cloth. Blow compressed air through brake hose to remove piston boot and piston.

Caution
Blow compressed air gently.

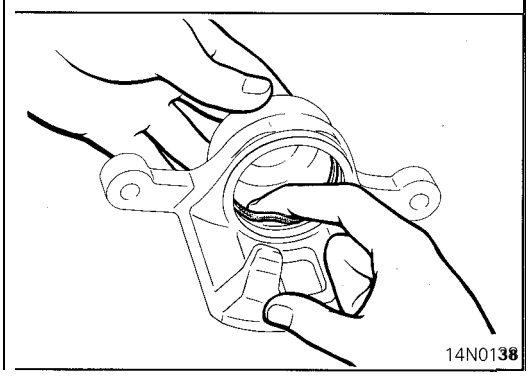


14F0125

<AWD>

Insert a piece of wooden plate as shown and blow compressed air through the brake hose connecting hole to remove the pistons.
Adjust the compressed air pressure as necessary so that both pistons are forced out evenly.

Caution
1. Be careful not to pinch your fingers.
2. Take care that the brake fluid is not splashed about.


14N0138

10. REMOVAL OF PISTON SEAL

(1) Remove piston seal with finger tip.

Caution
Do not damage the cylinder inner surface.

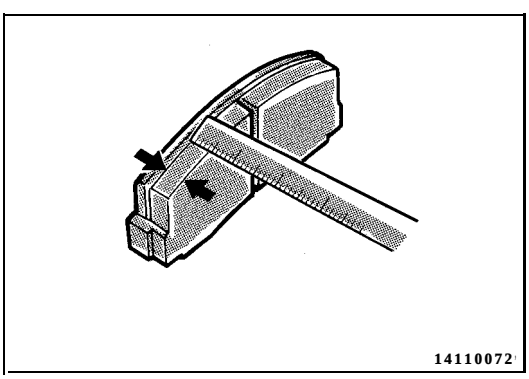
(2) Clean piston surface and inner cylinder with trichloroethylene, alcohol or specified brake fluid.

Specified brake fluid:
MOPAR Brake Fluid/Conforming to DOT3 or DOT4

INSPECTION

- Check cylinder for wear, damage or rust.
- Check piston surface for wear, damage or rust.
- Check caliper body.
- Check pad for damage or adhesion of grease, check backing metal for damage.
- Check wear indicator for damage.

PAD WEAR CHECK


14110072

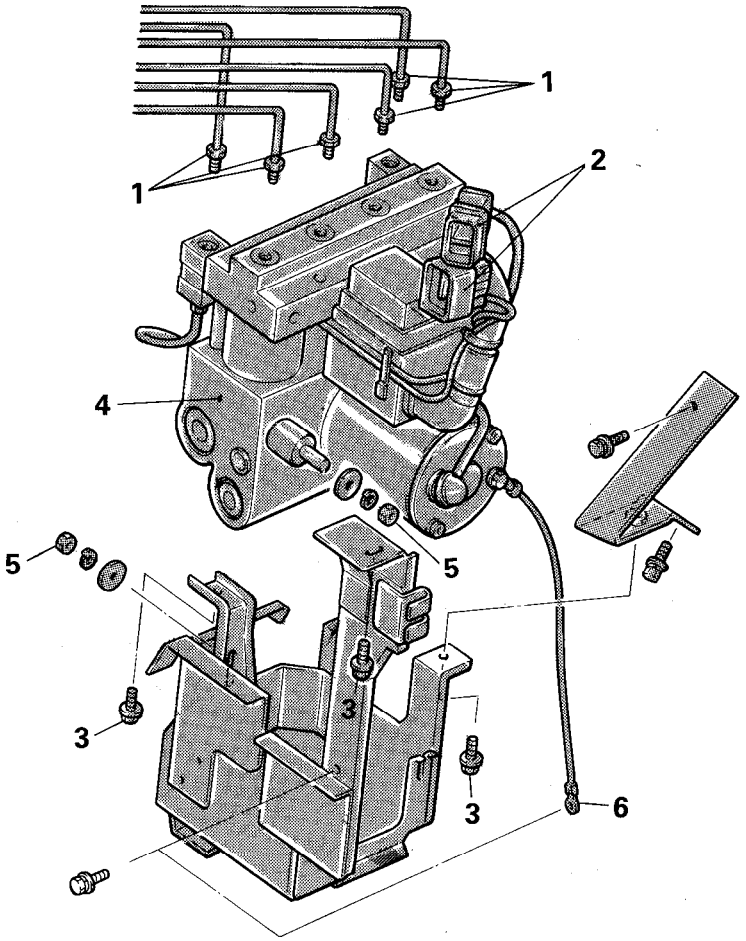
Measure the thickness at the thinnest worn area of the pad. Replace pad assembly when pad thickness is less than the limit value.

Standard value: 10.0 mm (.39 in.)
Limit: 2.0 mm (.08 in.)

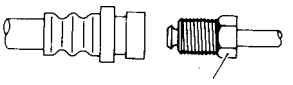
Caution
1. **When the limit is exceeded, the brake pads on both the left and right wheels must be replaced as a set.**
2. **If there is a large difference in thickness between the pads on the right and left wheels, check the sliding portions of the caliper.**

HYDRAULIC UNIT (ABS)

REMOVAL AND INSTALLATION



Flared brake line nuts



15 Nm
11 ft.lbs. 14F038

Removal steps

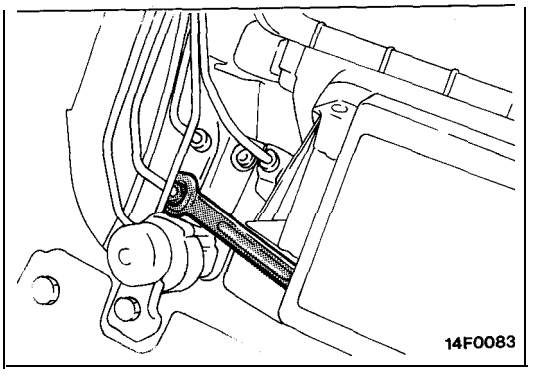
- ◆◆ 1. Brake line connection
- 2. Harness connector connection
- 3. Bracket bolt
- ● ☒ 4. Hydraulic unit (with bracket)
- 5. Hydraulic unit bolt
- 6. Grounding wire connection

Installation steps

- ● C 6. Grounding wire connection
- 5. Hydraulic unit bolt initial tightening
- 4. Hydraulic unit (with bracket)
- 3. Bracket bolt
- 2. Harness connector connection
- ● C 1. Brake line 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



SERVICE POINTS OF REMOVAL

1. REMOVAL OF BRAKE LINE

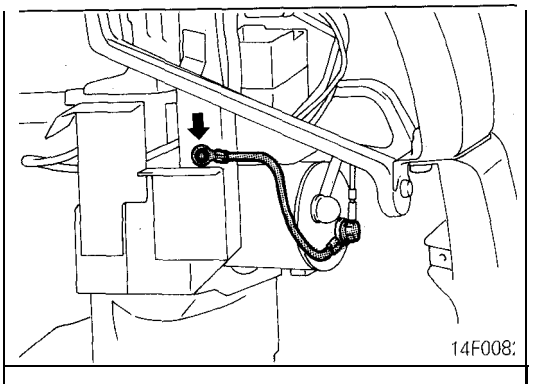
Pull up the relay box with harness attached and inserting a hand under the relay box, remove the brake tubes using the flare nut wrench.

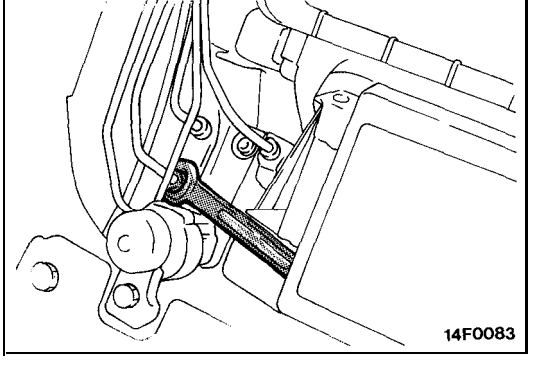
4. REMOVAL OF HYDRAULIC UNIT (HU)

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

6. CONNECTION OF GROUNDING WIRE

Connect the grounding wire at the point shown in the illustration.

1. INSTALLATION OF BRAKE LINE

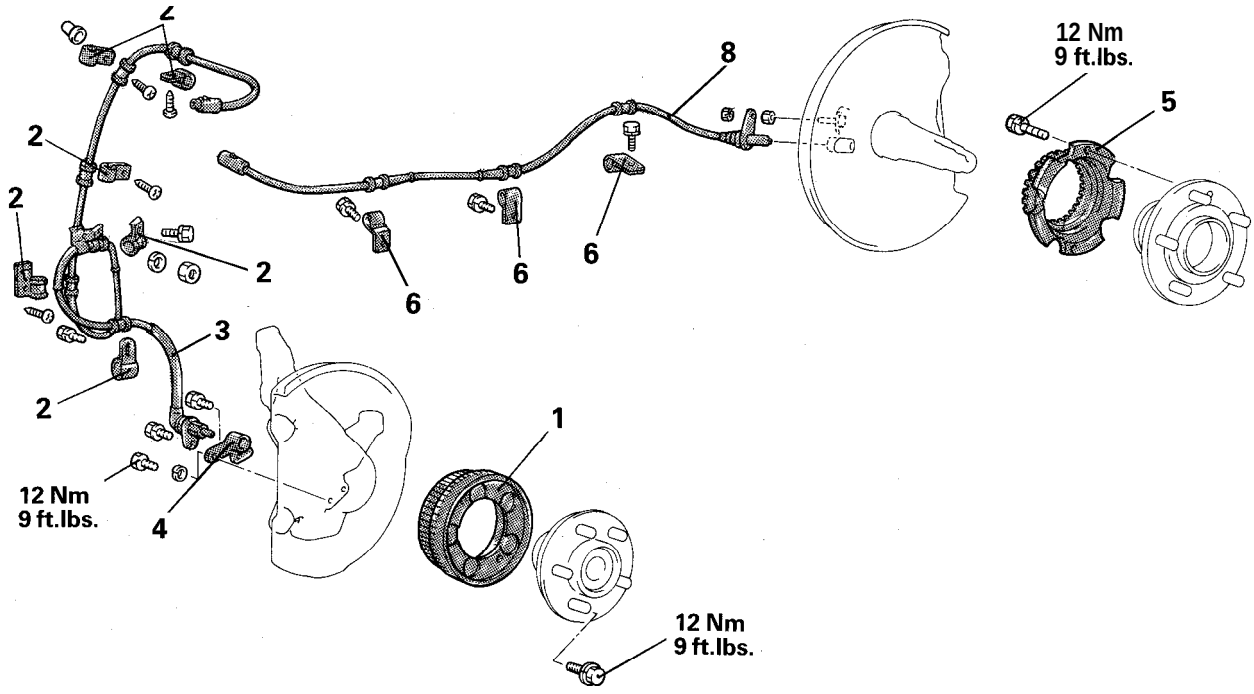
Pull up the relay box with harness attached and inserting a hand under the relay box, install the brake tubes using flare nut wrench.

Connect the tube and hose to the hydraulic unit correctly. (Refer to P.5-74.)

WHEEL SPEED SENSOR (ABS)

REMOVAL AND INSTALLATION

<FWD>



14F0078

◆◆ 1. Front rotor

Front speed sensor removal steps

2. Clip
◆◆ ● * 3. Front speed sensor
● + 4. Front speed sensor bracket
◆◆ 5. Rear rotor

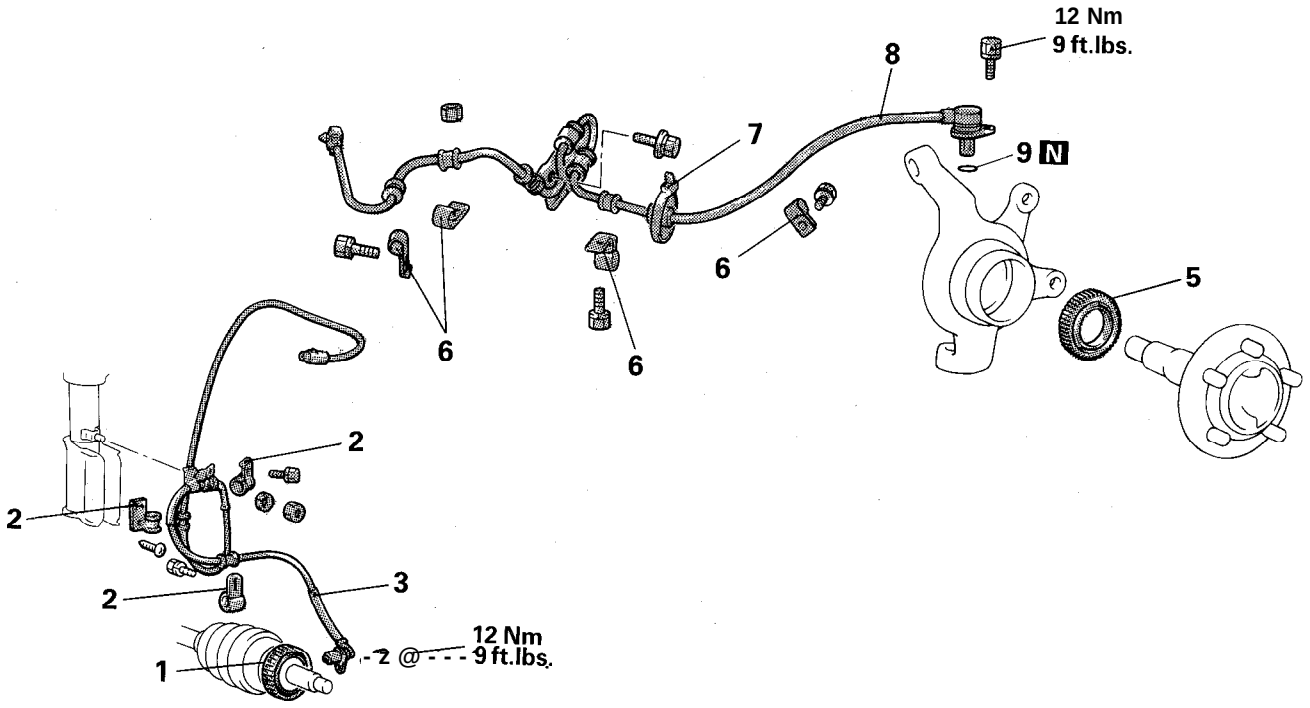
Rear speed sensor removal steps

6. Clip
◆◆ ● 4 **8.** Rear speed sensor

Pre-removal Operation
- Removal of Splash Shield
  (Refer to Group 23A – Fender.)

Post-installation Operation
- Installation of Splash Shield (Front Only)
  (Refer to Group 23A – Fender.)
- Inspection of A.B.S.
  (Refer to P.5-7.)

<AWD>



◆◆ 1. Front rotor

Front speed sensor removal steps

2. Clip.
◆◆ ● a 3. Front speed sensor
◆◆ 5. Rear rotor

Rear speed sensor removal steps

6. Clip
7. Cable band
◆◆ ● 4 **8.** Rear speed sensor
9. O-ring

Pre-removal Operation
- Removal of Splash Shield (Front Only) (Refer to Group 23A – Fender.)

Post-installation Operation
- Installation of Splash Shield (Front Only) (Refer to Group 23A – Fender.)
- Inspection of A.B.S. (Refer to P.5-7.)

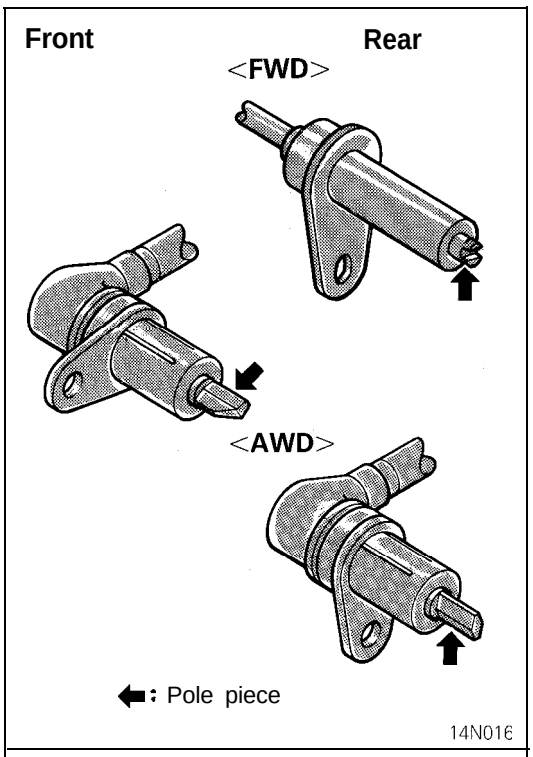
SERVICE POINTS OF REMOVAL

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.

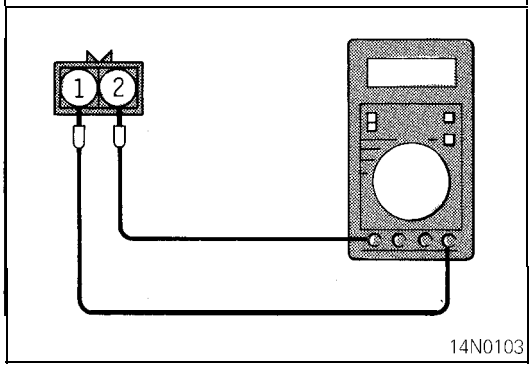


INSPECTION

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.

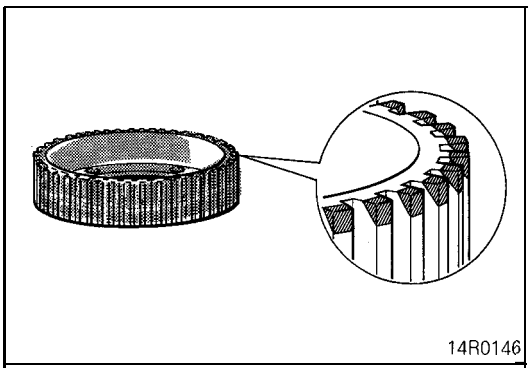
Standard value:

<FWD>	**Front**	**0.8 – 1.2 kΩ**
	Rear	**0.6 – 0.8 kΩ**
<AWD>		**0.8 – 1.2 kΩ**

If the internal resistance of the speed sensor is out of specification, replace with a new one.

(3) Check the speed sensor cable for open circuit and replace if faulty.

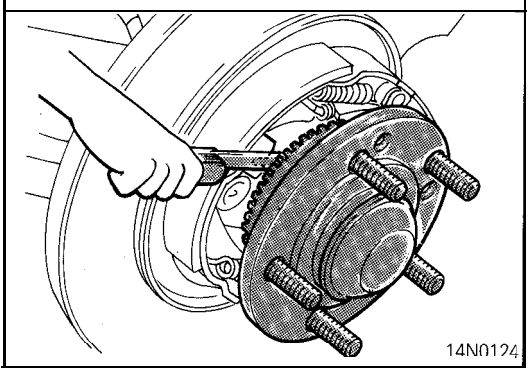
NOTE
Remove the cable clamp from the body and, while flexing the cable near the clamp, check for temporary open circuit. Also check connector connection and terminal insertion.


14R0146

INSPECTION OF ROTOR

Check the rotor for missing or worn teeth and replace if faulty.

SERVICE POINTS OF INSTALLATION


14N0124

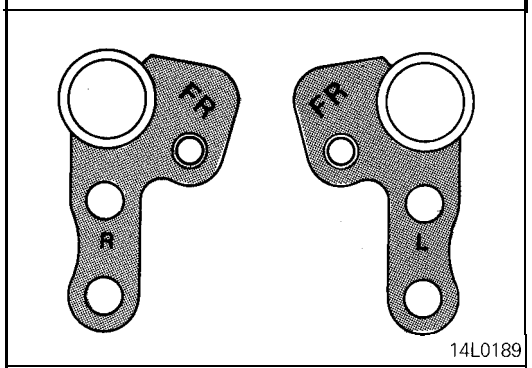
8. INSTALLATION OF REAR SPEED SENSOR <FWD>

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-@-rotor tooth surface clearance.

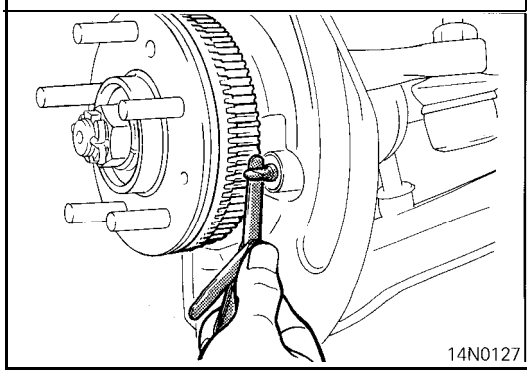
Standard value: 28.15 – 28.45 mm (1.11 – 1.12 in.)



14L0189

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.


14N0127

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.

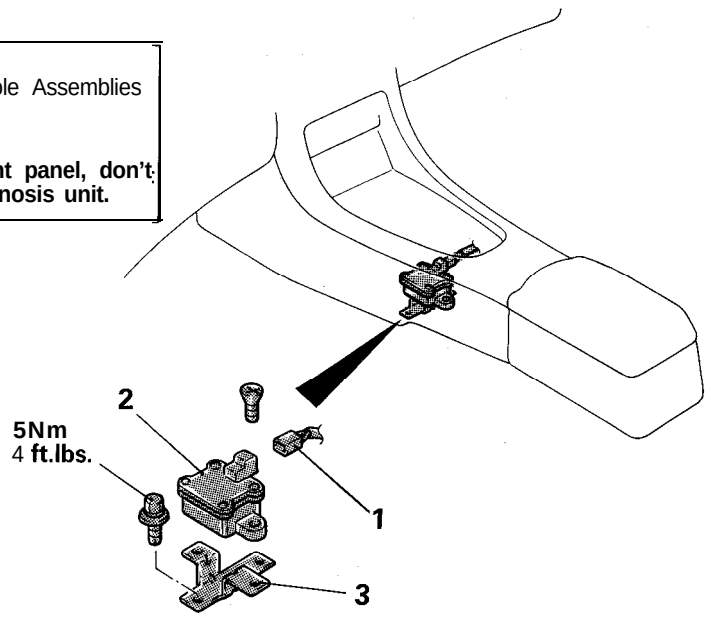
Standard value: 0.3 – 0.9 mm (.012 – .035 in.)

G SENSOR (AWD – ABS)

REMOVAL AND INSTALLATION

Pre-removal/Post-installation Operation
Removal/Installation of Front and Rear Console Assemblies (Refer to Group 23A – Console Box.)

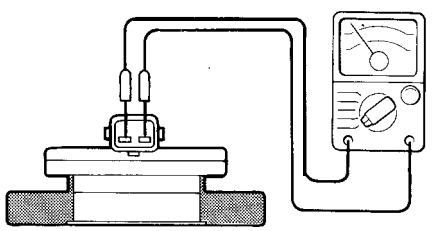
CAUTION: SRS
When installing or removing the instrument panel, don't allow any impact or shock to the SRS diagnosis unit.



14F0115

Removal steps

1. G sensor connector
2. G sensor
3. G sensor bracket

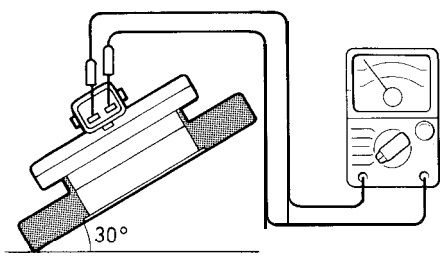


14A019

INSPECTION

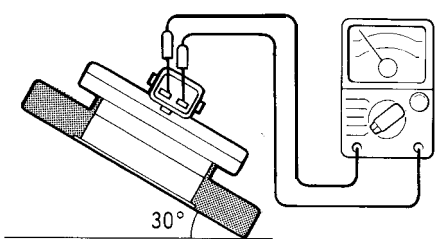
1. INSPECTION OF G SENSOR

(1) Lay the G sensor on a level surface and check for continuity between its terminals.



14A019

(2) Incline the G sensor toward the vehicle front gradually and check that continuity is lost at an angle of 30" or more.

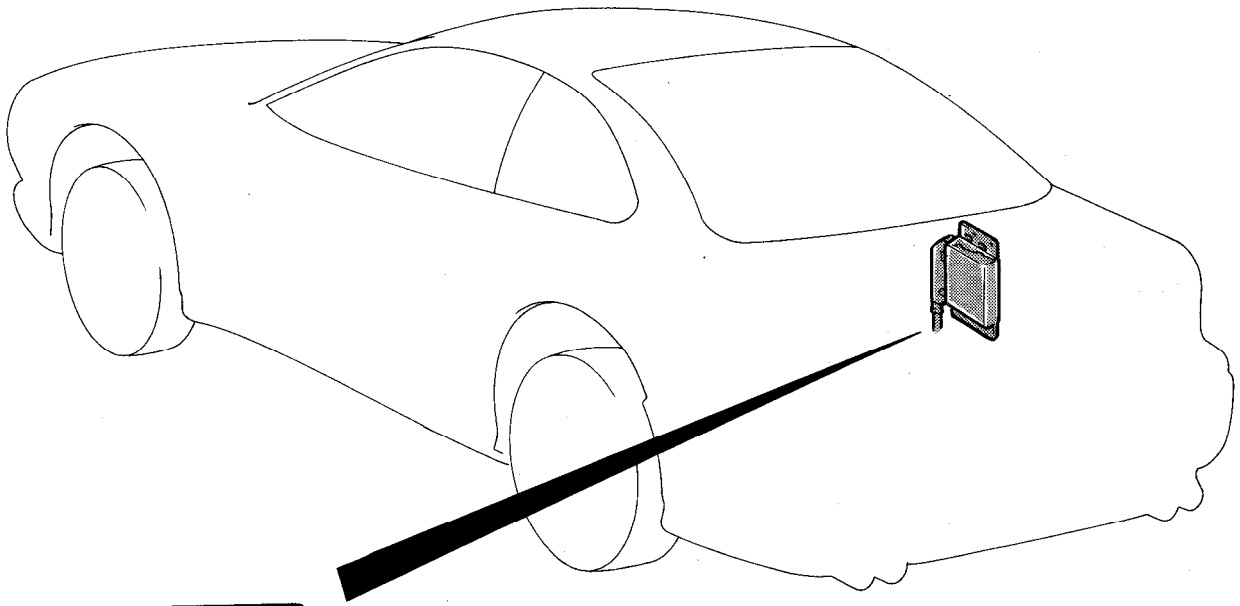


14A019

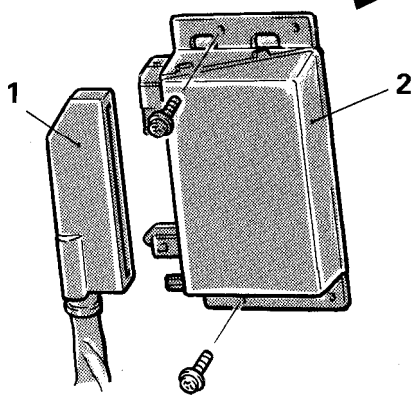
(3) Incline the G sensor toward the vehicle rear gradually and check that continuity is lost at an angle of 30° or more.

ELECTRONIC CONTROL UNIT (ABS)

REMOVAL AND INSTALLATION



14F0080



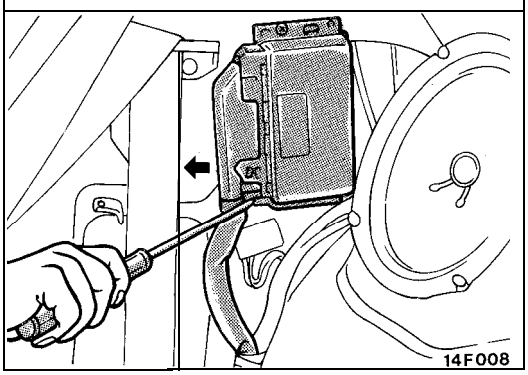
14F0079

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 ABS. (Refer to P.5-7.)

Removal steps

◆◆ 1. Control unit connector connection
2. Electronic control unit



14F008

SERVICE POINT OF REMOVAL

1. REMOVAL OF CONTROL UNIT CONNECTOR

Insert a screwdriver into the lock section as illustrated and pull out the connector from below.

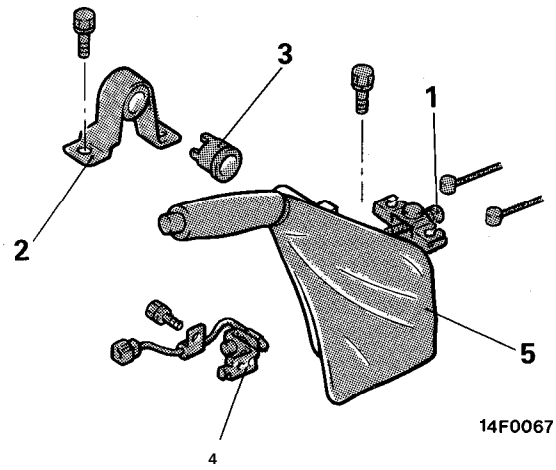
PARKING BRAKE LEVER AND PARKING BRAKE CABLE

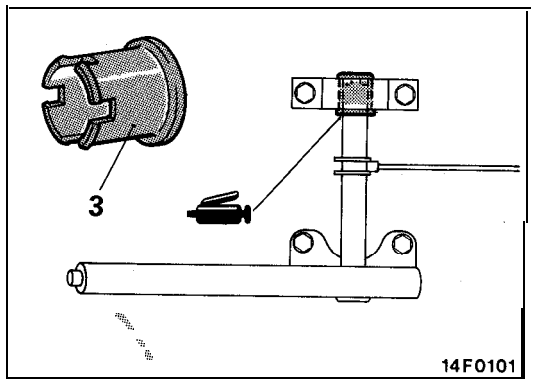
REMOVAL AND INSTALLATION

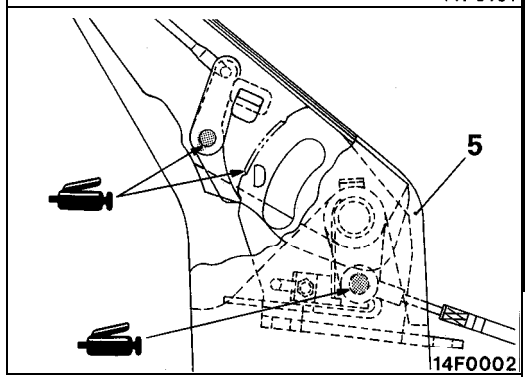
Pre-removal Operation
- Removal of Front and Rear Console (Refer to GROUP 23A – Console Box.)

CAUTION: SRS
When installing or removing the floor console, don't allow any impact or shock to the SRS diagnosis unit.

Post-installation Operation
- Parking Brake Lever Stroke Adjustment (Refer to P.5-46.)
- Installation of Front and Rear Console (Refer to GROUP 23A – Console Box,)

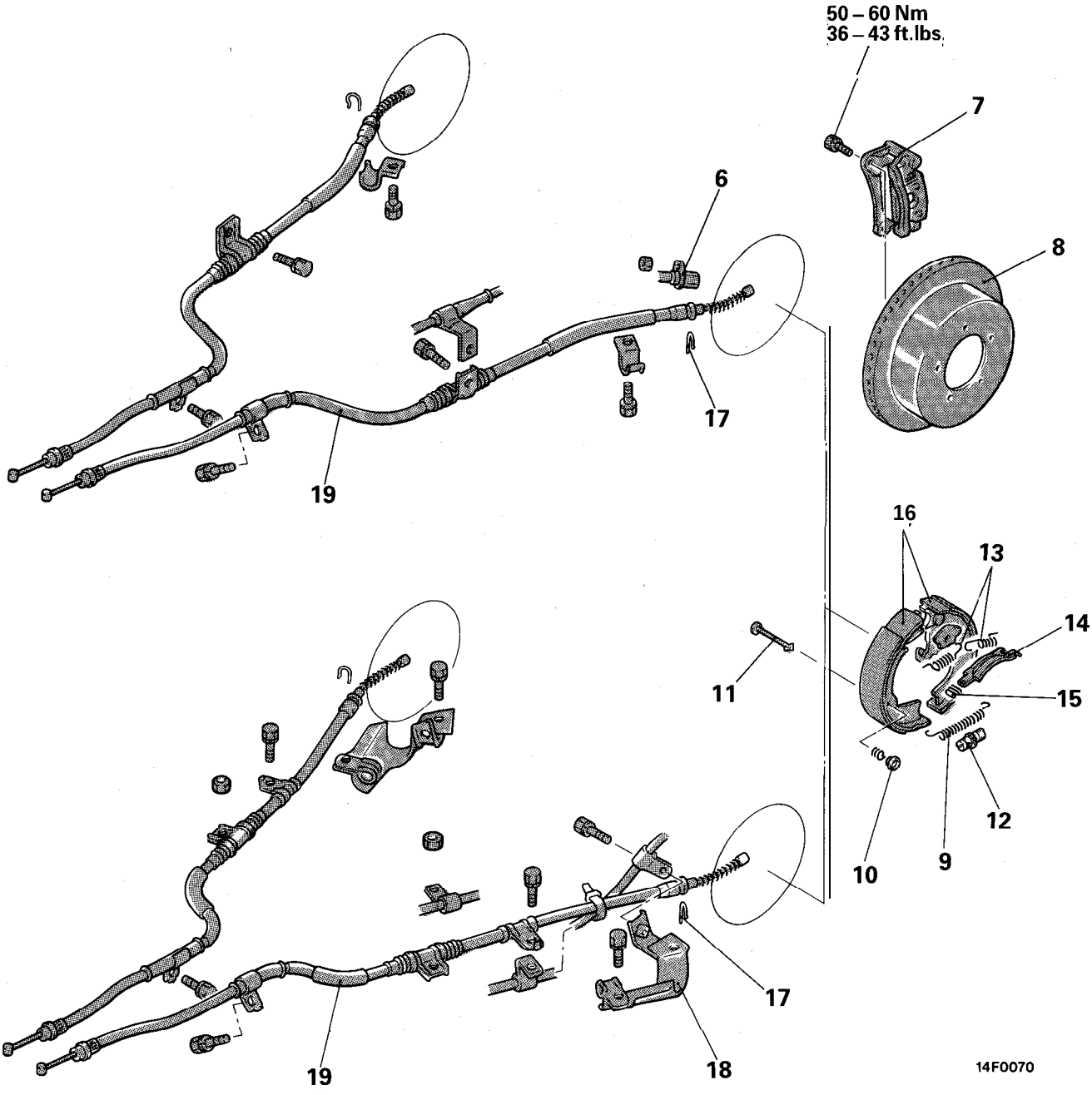






Parking brake lever removal steps

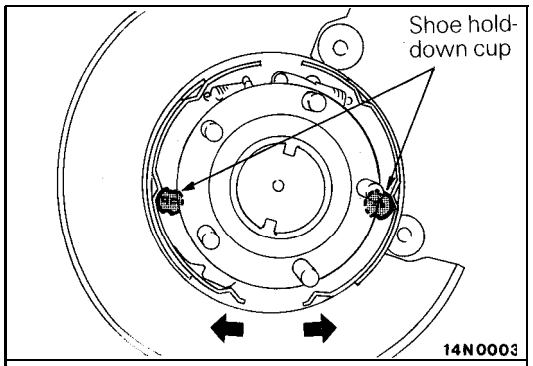
1. Cable adjuster
2. Parking brake stay
3. Bushing
4. Parking brake switch
5. Parking brake lever

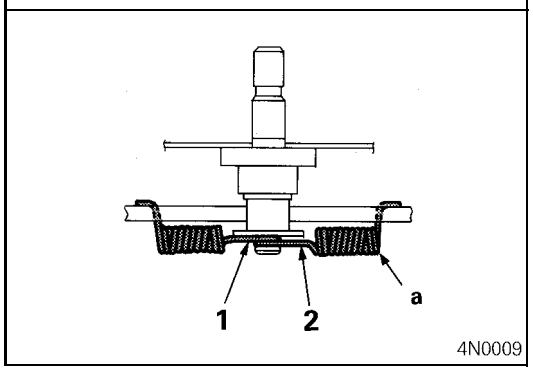


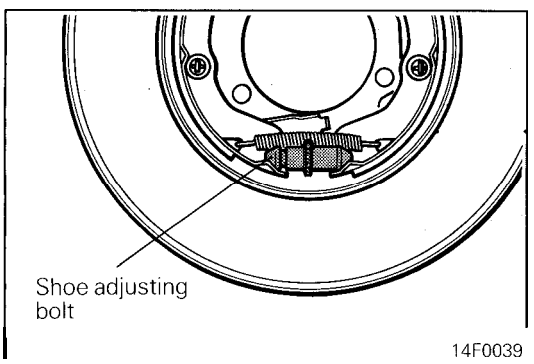
Parking brake cable removal steps

1. Cable adjuster
◆◆ ● + 6. Rear speed sensor (Refer to P.5-89.)
7. Rear brake assembly
8. Rear brake disc
9. Adjusting wheel spring
◆◆ 10. Shoe hold-down cup
11. Shoe hold-down pin
● + 12. Adjuster
◆◆ 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

14F0070







SERVICE POINTS OF REMOVAL

10. REMOVAL OF SHOE HOLD DOWN CUP

Expand the shoe & lining assembly and remove the shoe hold down cup.

SERVICE POINTS OF INSTALLATION

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 in symmetrical.

12. INSTALLATION OF ADJUSTER

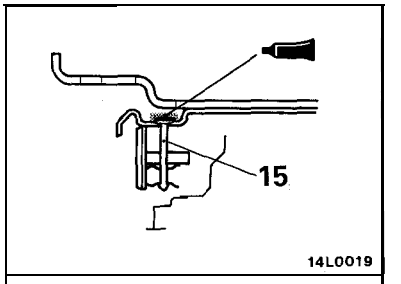
Install the adjuster facing the left adjusting bolt to the vehicle front and right adjusting bolt to the vehicle rear.

PARKING BRAKE

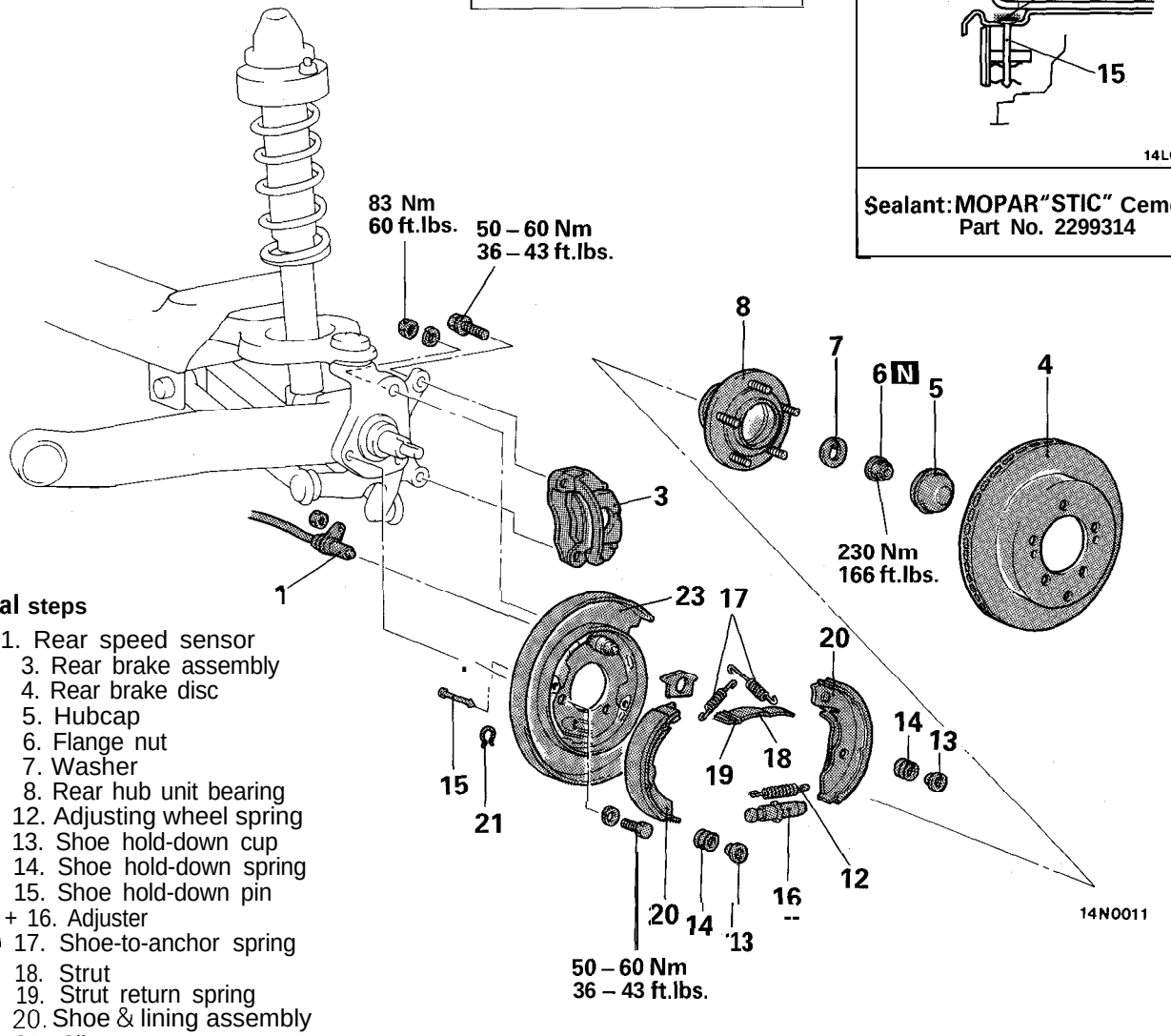
REMOVAL AND INSTALLATION

<FWD>

Post-installation Operation
- Parking Brake Lever Stroke Adjustment (Refer to P.5-46.)

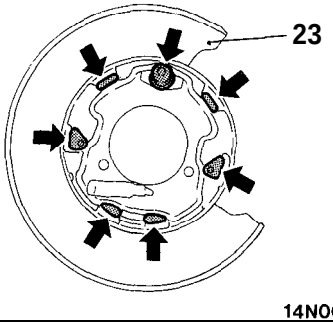


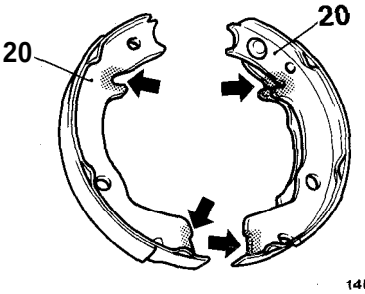
Sealant: MOPAR "STIC" Cement
Part No. 2299314

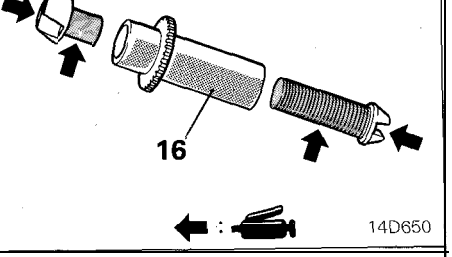


Removal steps

- ◆◆ 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
- ◆◆ 17. Shoe-to-anchor spring
- 18. Strut
- 19. Strut return spring
- 20. Shoe & lining assembly
- 21. Clip
- 23. Backing plate

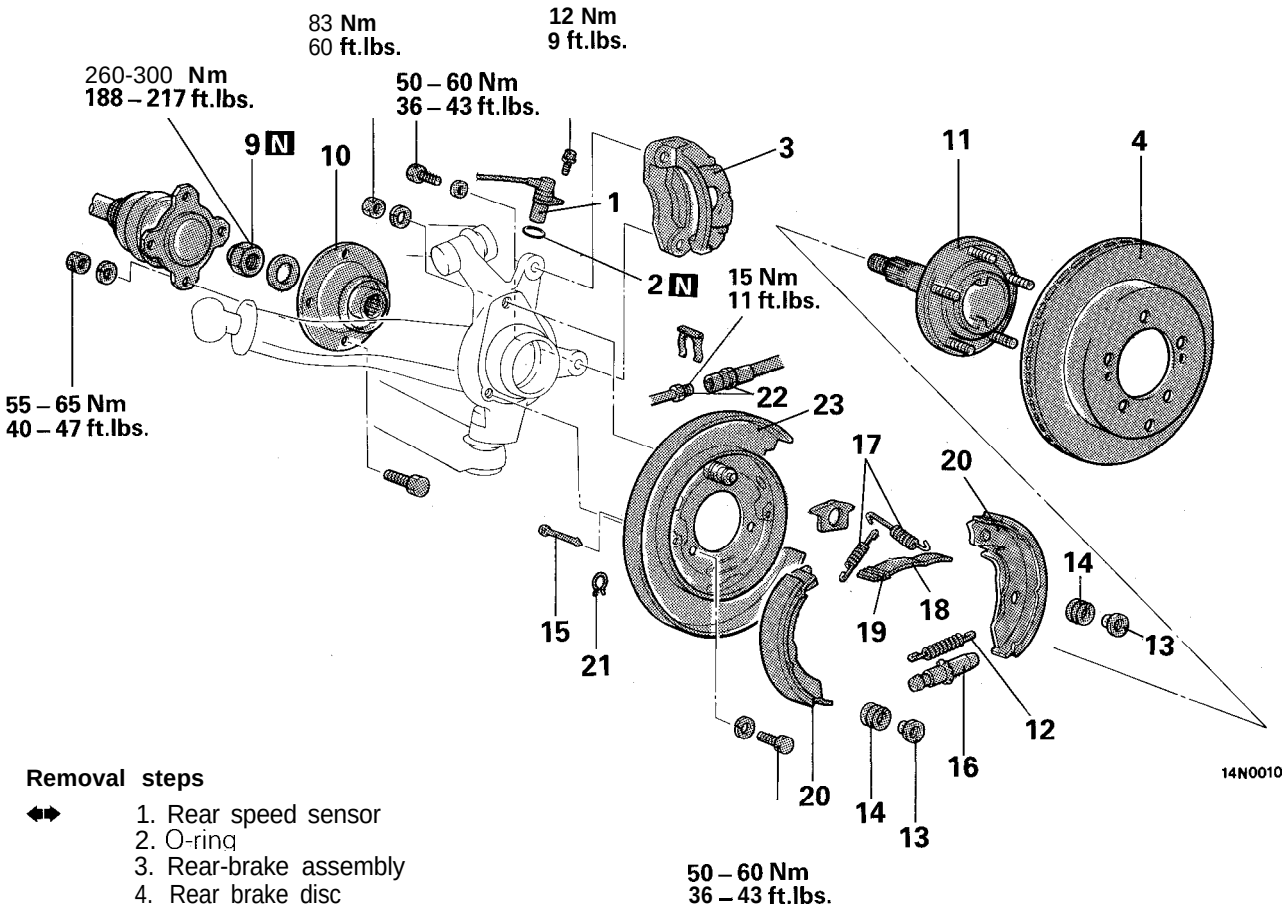






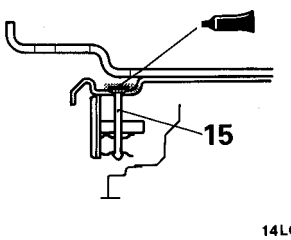
Grease: Brake grease SAE J310, NLGI No. 1

<AWD>

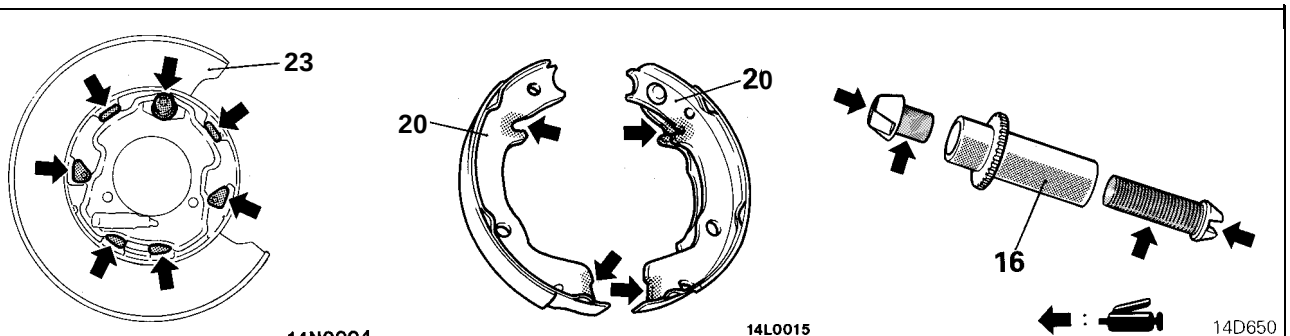


Removal steps

- ⇔ 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



Sealant: MOPAR "STIC" Cemenl Part No. 2299314

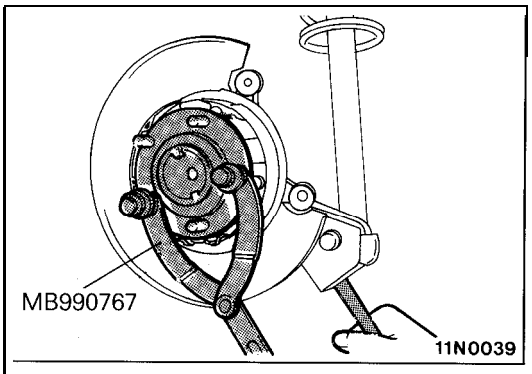


Grease: Brake grease SAE J310, NLGI No. 1

SERVICE POINTS OF REMOVAL

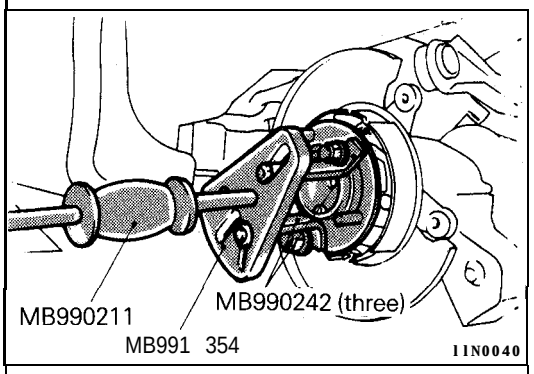
1. REMOVAL OF REAR SPEED SENSOR

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

Using the special tool, secure the axle shaft and remove the companion flange self-locking nut.



11. REMOVAL OF AXLE SHAFT ASSEMBLY

With the special tool, remove the axle shaft from the trailing arm.

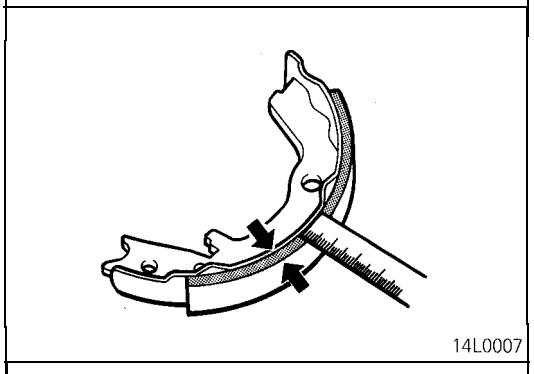
INSPECTION

CHECKING FOR UNUSUAL WEAR OF THE BRAKE LINING AND BRAKE DRUM

(1) Measure the thickness of the brake lining at several places.

Standard value: 2.8 mm (.110 in.)
Limit: 1.0 mm (.039 in.)

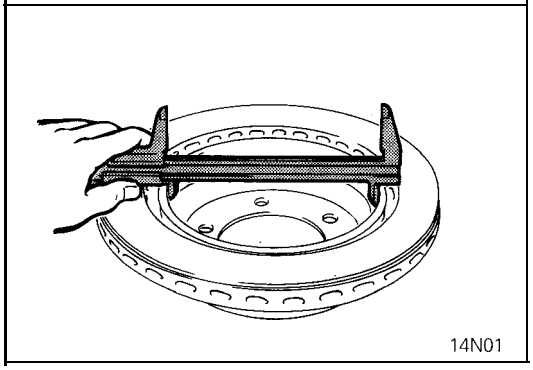
Caution
Replace the brake shoes if the thickness of the brake lining is the limit value or less.

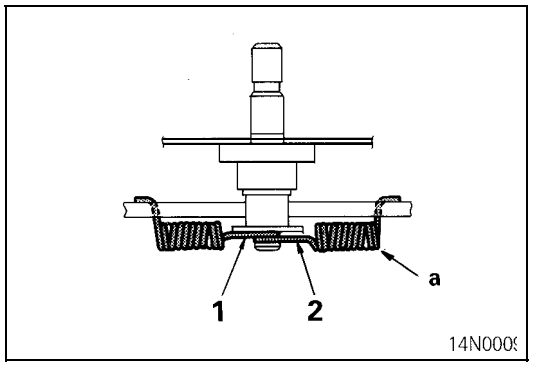


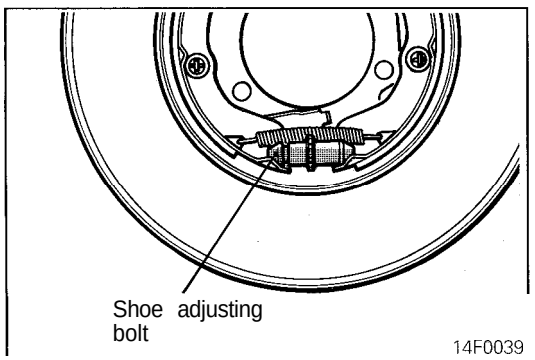
(2) Measure the brake disc drum inner diameter at two or more places.

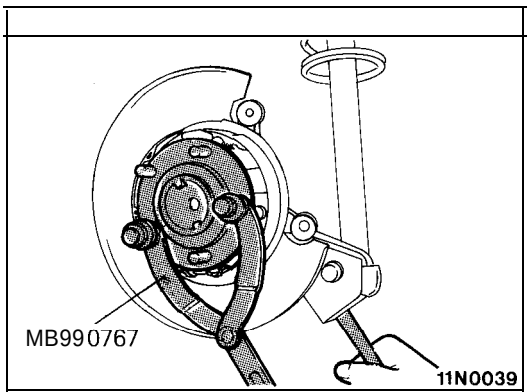
Standard value: 168.0 mm (6.6 in.)
Limit: 169.0 mm (6.7 in.)

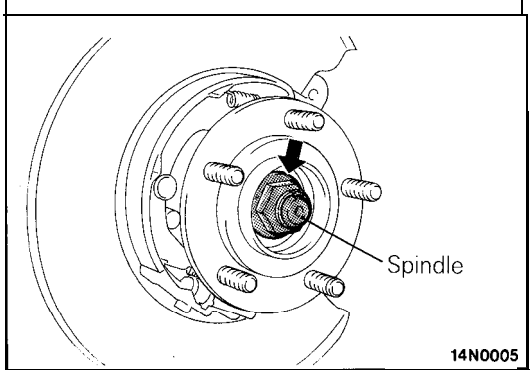
Caution
Replace if the brake disc drum inner diameter is the limit value or more.

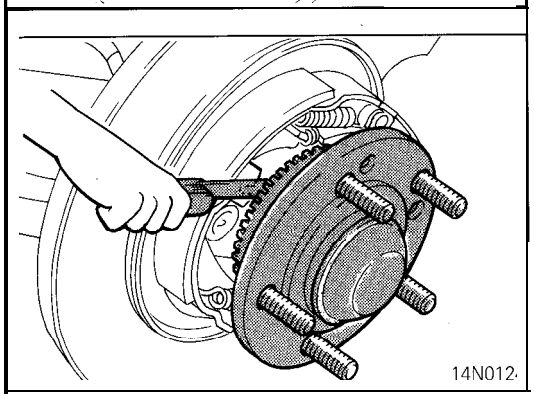












SERVICE POINTS OF INSTALLATION

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 in 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

Using 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.)

CLUTCH

CONTENTS

SPECIFICATIONS

GENERAL SPECIFICATIONS

Items	Specifications	
	FWD	AWD
Clutch operating method	Hydraulic type	Hydraulic type
Clutch disc Type Facing diameter O.D. x I.D. mm (in.)	 Single dry disc type 225 x 150 (8.9 x 5.9)	 Single dry disc type 250 x 160 (9.8 x 6.3)
Clutch cover assembly Type Setting load N (lbs.)	 Diaphragm spring strap drive type 6,300 (1,386)	 Diaphragm spring strap drive type 9,200 (2,024)
Clutch release cylinder I.D. mm (in.)	 19.05 (3/4)	 17.46 (1 1/16)
Clutch master cylinder I.D. mm (in.)	 15.87 (5/8)	 15.87 (5/8)
Clutch booster Type Effective dia. of power cylinder mm (in.) Boosting ratio [Clutch pedal depressing force]	 – – –	 Vacuum type 101 (4.0) 1.7 [at 110 N (24 lbs.)]

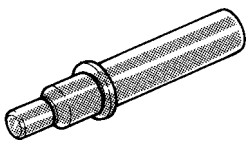
SERVICE SPECIFICATIONS

Items	Specifications
Standard value	
Clutch pedal height mm (in.)	
<FWD>	177-182 (6.97 – 7.17)
<AWD>	183-188 (6.97-7.17)
Clutch pedal clevis pin play mm (in.)	1-3 (.04 – .12)
Clutch pedal free play mm (in.)	
<FWD>	6-13 (.24-.51)
<AWD>	12 – 20 (.49 – .79)
Distance between the clutch pedal and the firewall when the clutch is disengaged mm (in.)	35 (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

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 Clutch pedal bushing Brake pedal bushing Lever assembly bushing Bush Rod A Rod B Clevis pin	MOPAR Multi-mileage Lubricant part No.2525035 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	MOPAR Brake Fluid/Conforming to DOT3 or DOT4

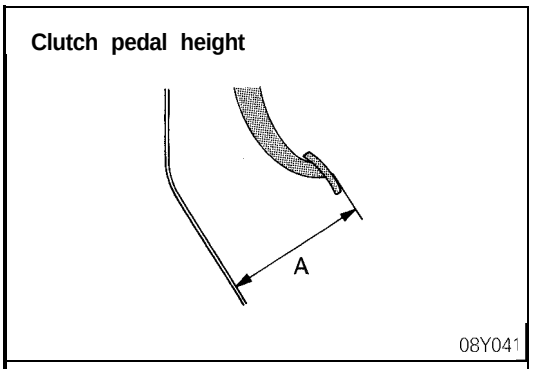
SPECIAL TOOL

Tool number and tool name	Replaced by Miller tool number	Application
 – Universal clutch disc aligner	General service tool	Clutch disc center hole alignment

TROUBLESHOOTING

Symptom	Probable cause	Remedy
Clutch slips	Clutch pedal play too small	Adjust
	Excessive wear of clutch disc facing	Replace
	Hardened clutch disc facing or oil on facing	Replace
	Clutch release fork not operating smoothly	Repair or replace
	Settled or damaged diaphragm spring	Replace
	Clogged hydraulic system	Repair or replace
	Poorly adjusted clutch booster push rod <AWD>	Adjust

Symptom	Probable cause	Remedy
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
Noisy clutch	Clutch pedal play too small	Adjust
	Incorrectly installed clutch cover assembly	Repair or replace
	Excessive wear of clutch disc facing	Replace
	Clutch release fork not operating smoothly	Repair or replace
	Worn clutch release bearing	Replace
	Settled or damaged torsion spring	Replace
	Damaged pilot bushing	Replace
	Poorly lubricated bearing sleeve sliding surface	Repair
Heavy clutch pedal	Poorly lubricated clutch pedal	Repair
	Poorly lubricated clutch disc splines	Repair
	Clutch release fork not operating smoothly	Repair or replace
	Poorly lubricated bearing sleeve sliding surface	Repair
	Defective clutch booster <AWD>	Replace
	Leaky or clogged vacuum system <AWD>	Repair
Clutch vibrates	Worn or damaged clutch disc facing	Replace
	Oil on clutch disc facing	Replace
	Uneven diaphragm spring height	Repair or replace
	Settled or damaged torsion spring	Replace
	Damaged pressure plate or flywheel	Replace
	Loose or damaged mounts	Tighten or replace



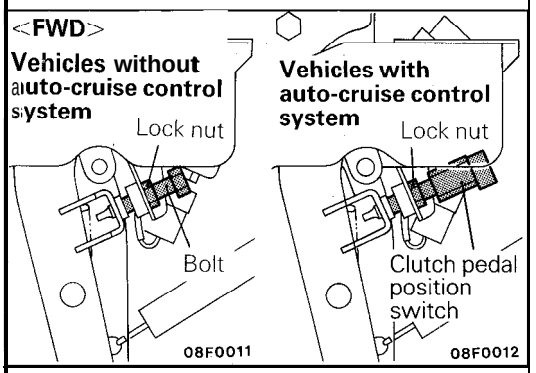
SERVICE ADJUSTMENT PROCEDURES

CLUTCH PEDAL INSPECTION AND ADJUSTMENT

1. Measure the clutch pedal height (from the face of the pedal pad to the firewall).

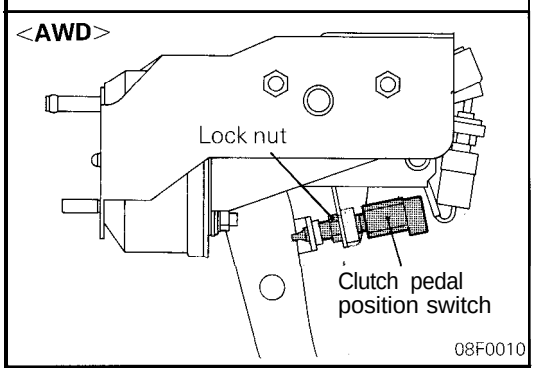
   Standard value (A):

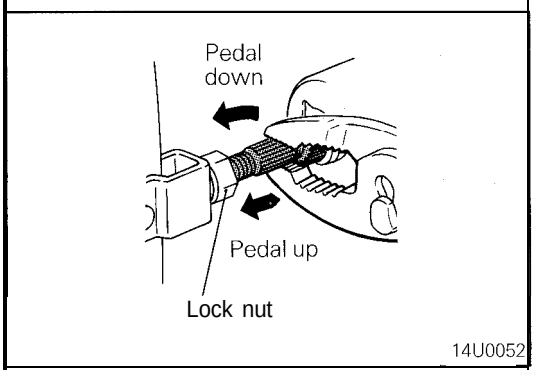
<FWD>	**177 – 182 mm (6.97 – 7.17 in.)**
<AWD>	**183 – 188 mm (7.20 – 7.40 in.)**



2. If either the clutch pedal height or the clutch pedal clevis pin play are not within the standard value range, adjust as follows:
   (1) 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.
   Vehicles with auto-cruise control system, disconnect the clutch pedal position switch connector and turn the switch for standard clutch pedal height. Then lock with the lock nut.

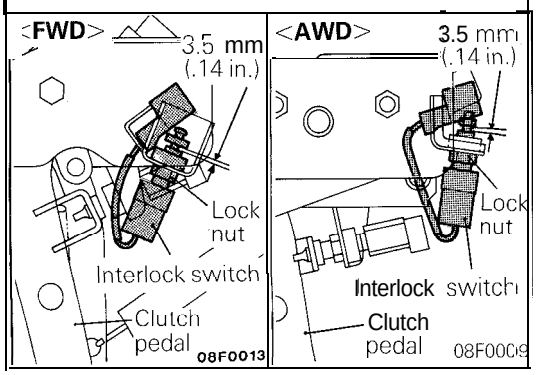
   NOTE
   When the pedal height is lower than the standard value, loosen the bolt or clutch pedal position switch, and then turn the push rod to make the adjustment. After making the adjustment, tighten the bolt or clutch pedal position switch to reach the pedal stopper, and then lock with the lock nut.





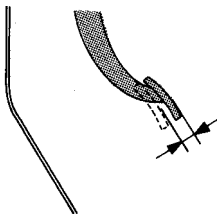
   (2) Turn the push rod to adjust the clutch pedal clevis pin play to agree with the standard value and then secure the push rod with the lock nut.

   Caution
   When adjusting the pedal height or the clutch pedal clevis pin play, be careful not to push the push rod toward the master cylinder.



3. Check to be sure that the interlock switch is as shown in the illustration when the clutch pedal is depressed its full stroke [160 mm (6.3 in.)]. If necessary, loosen the lock nut and adjust.

Clutch pedal free play



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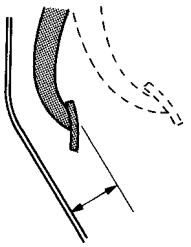
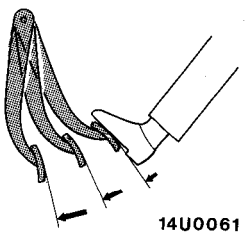
Distance between the clutch pedal and the firewall when the clutch is disengaged



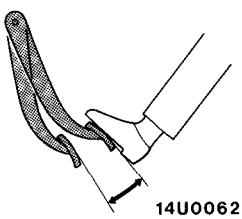
08N001

Good



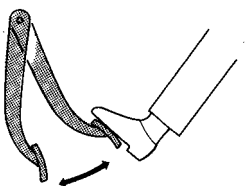
14U0061

No good



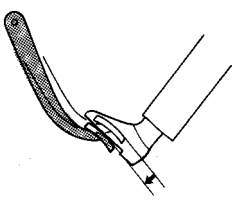
14U0062

When engine is stopped



14U0059

When engine is started



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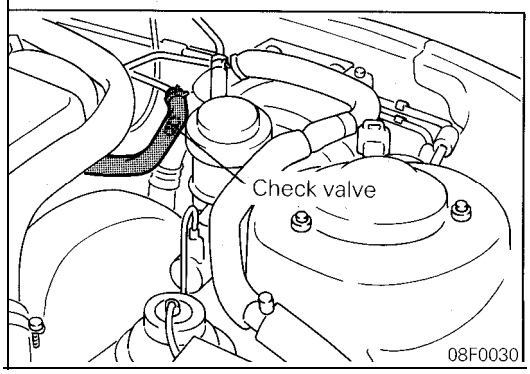

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4. Measure pedal play. In the case of AWD vehicles, depress the pedal 2 or 3 times to eliminate booster negative pressure with the engine stopped and then push the pedal with a finger to measure the play.

Clutch pedal play (including play of clevis pin)
Standard value:

<FWD>	**6 – 13 mm (.24 – .51 in.)**
<AWD>	**12 – 20 mm (.49 – .79 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>

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.

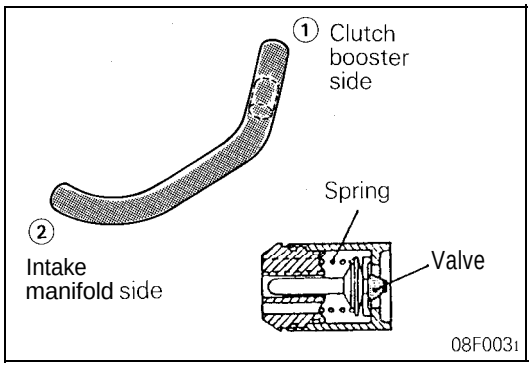
If one of the above three tests is not okay at last, the check valve, vacuum hose, or booster will be faulty.

CHECK VALVE OPERATION CHECK <AWD>

When checking the check valve, keep the check valve fit in the vacuum hose.

1. Remove the vacuum hose.

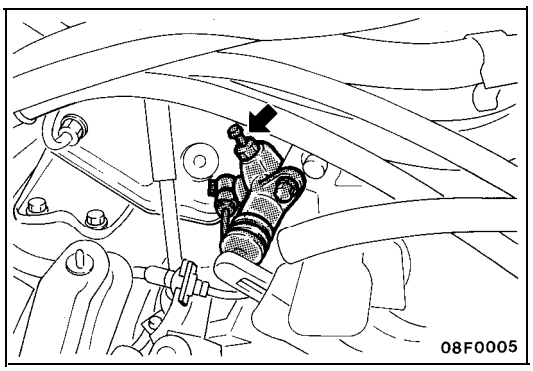
Caution
The check valve is press-fit inside the vacuum hose and do not remove the check valve from the vacuum hose.



2. Check the operation of the check valve by using a vacuum pump.

Vacuum pump connection	Accept/reject criteria
Connection at the clutch booster side ①	A negative pressure (vacuum) is created and held.
Connection at the intake manifold side ②	A negative pressure (vacuum) is not created.

Caution
If the check valve is defective, replace it as an assembly unit together with the vacuum hose.



BLEEDING

Whenever the clutch tube, the clutch hose, and/or the clutch master cylinder have been removed, or if the clutch pedal is spongy, bleed the system.

Specified fluid: MOPAR Brake Fluid/Conforming to DOT3 or DOT4

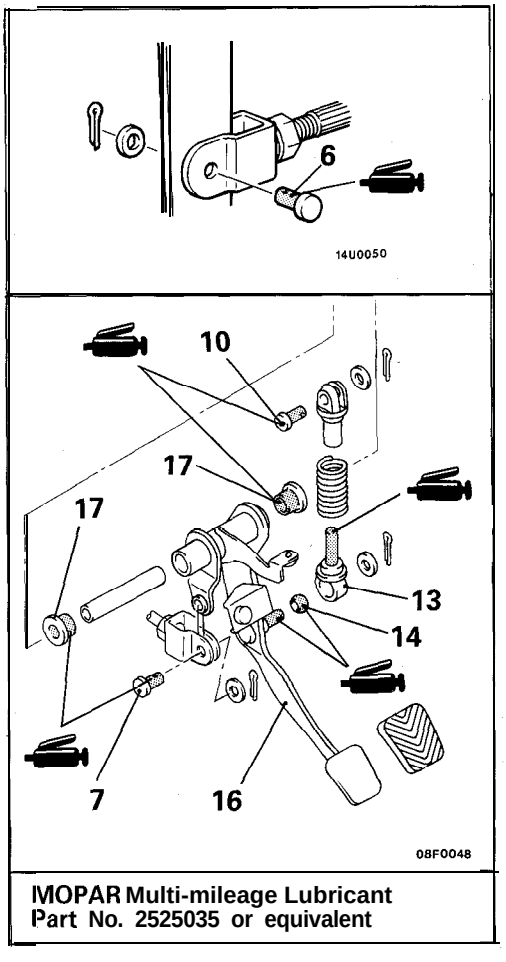
Caution
Use the specified fluid. Avoid using a mixture of the specified fluid and other fluid.

CLUTCH PEDAL

REMOVAL AND INSTALLATION

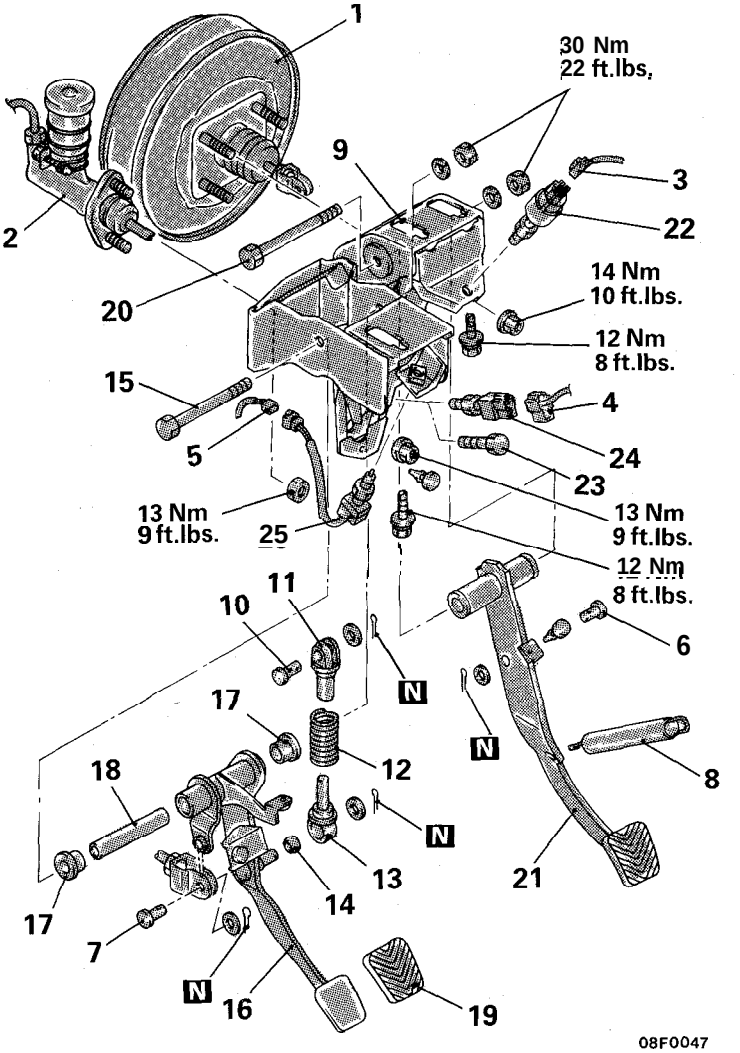
Pre-removal and Post-installation Operation
- Removal and Installation of Steering Column Assembly (Refer to GROUP 19A – Steering Wheel and Shaft.)

Adjustment
- Adjustment of Brake Pedal (Refer to GROUP 5 – Service Adjustment Procedures.)
- Adjustment of Clutch Pedal (Refer to P.6-5.)



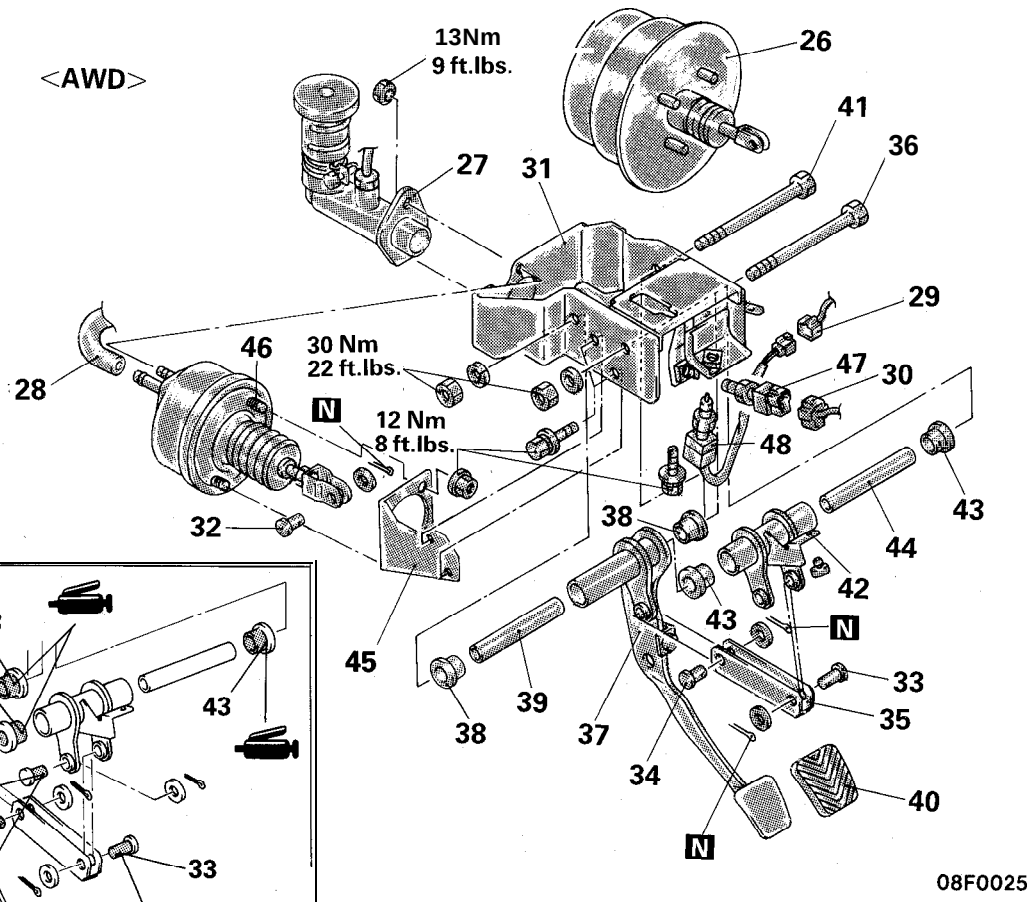
MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent

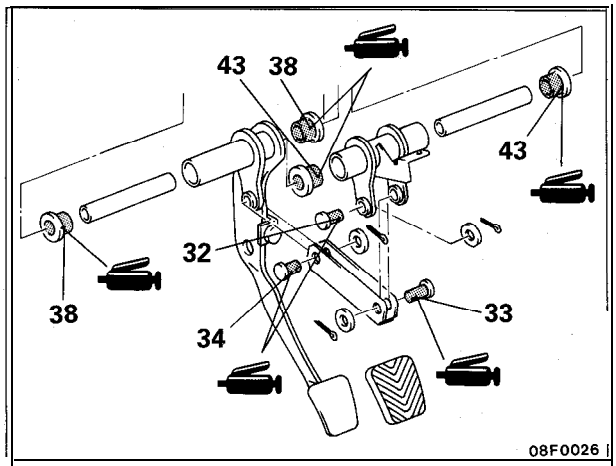
<FWD>



Removal steps

1. Brake booster (Refer to GROUP 5 – Brake Booster)
2. Connection of clutch master cylinder
3. Stop light switch connector
4. Clutch pedal position switch connector <Vehicles with auto-cruise control system>
5. Interlock switch connector
6. Clevis pin
7. Clevis pin
8. Return spring
9. Pedal support bracket
10. Clevis pin
11. Rod A
12. Turn over spring
13. Rod B
14. Bush
15. Clutch pedal shaft
16. Clutch pedal
17. Bushing
18. Spacer
19. Clutch pedal pad
20. Brake pedal shaft
21. Brake pedal
22. Stop light switch
23. Bolt <Vehicles without auto-cruise control system>
24. Clutch pedal position switch <Vehicles with auto-cruise control system>
25. Interlock switch

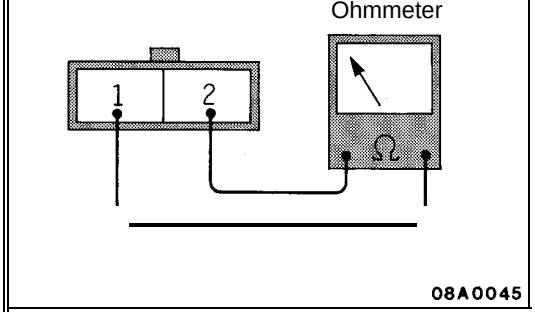




MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent

Removal steps

26. Brake booster
    (Refer to GROUP 5 – Brake Booster.)
27. Connection of clutch master cylinder
28. Connection for vacuum hose
29. Interlock switch connector
30. Clutch pedal position switch connector
31. Pedal support bracket
32. Clevis pin
33. Clevis pin
34. Clevis pin
35. Yoke
36. Clutch pedal shaft
37. Clutch pedal
38. Bushing
39. Spacer
40. Clutch pedal pad
41. Bolt
42. Lever assembly
43. Bushing
44. Spacer
45. Support bracket
46. Clutch booster
47. Clutch pedal position switch
48. Interlock switch



INSPECTION

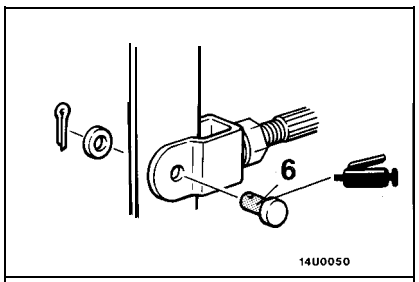
- Check the pedal shaft and bushing for wear.
- Check the clutch pedal for bend or torsion.
- Check the turn over spring for damage or deterioration. <FWD>
- Check the pedal pad for damage or wear.

INTERLOCK SWITCH INSPECTION

(1) Disconnect the connector.
(2) Check to be sure that there is continuity between connector terminals 1 and 2.

CLUTCH CONTROL

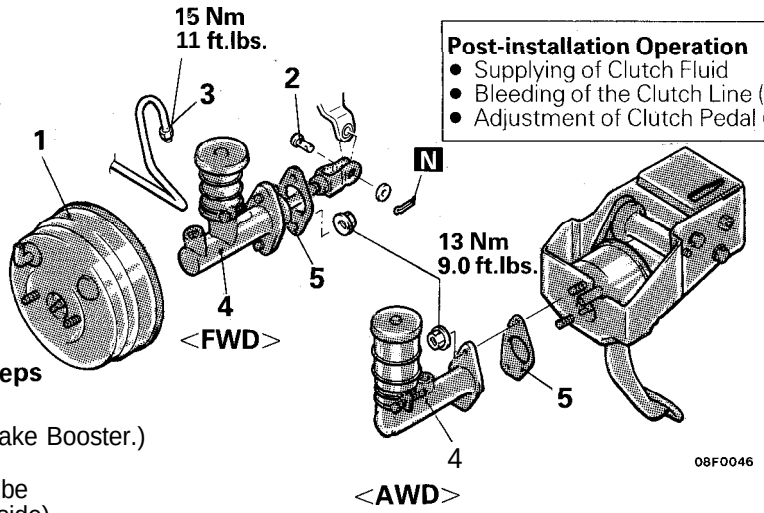
REMOVAL AND INSTALLATION



MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent

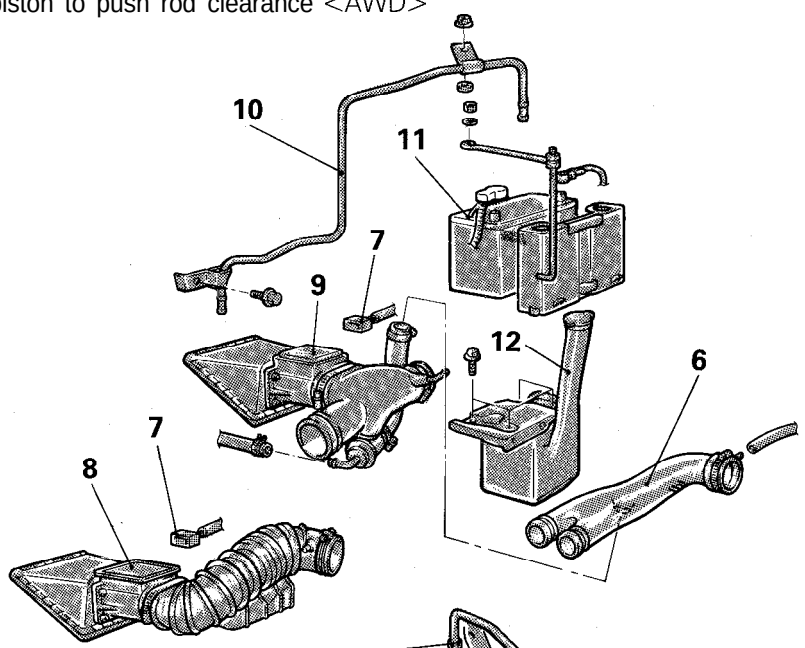
Pre-removal Operation
- Draining of the Clutch Fluid

Post-installation Operation
- Supplying of Clutch Fluid
- Bleeding of the Clutch Line (Refer to P.6-7.)
- Adjustment of Clutch Pedal (Refer to P.6-5.)



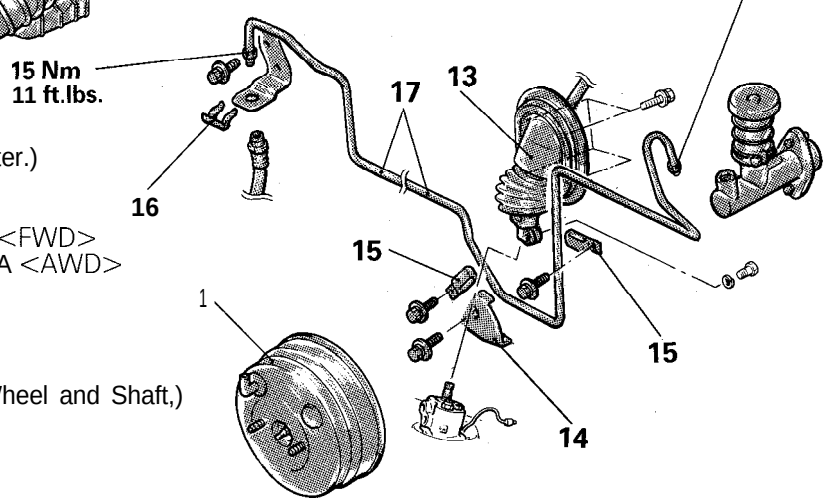
Clutch master cylinder removal steps

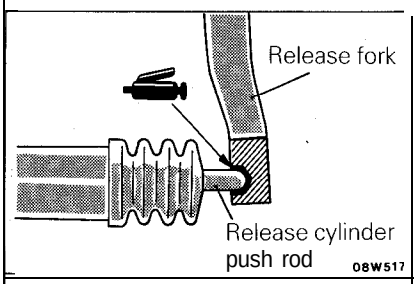
1. Brake booster
   (Refer to GROUP 5 – Brake Booster.)
2. Clevis pin <FWD>
3. Connection for clutch tube
   (Clutch master cylinder side)
4. Clutch master cylinder
   • Adjustment of piston to push rod clearance <AWD>
5. Sealer



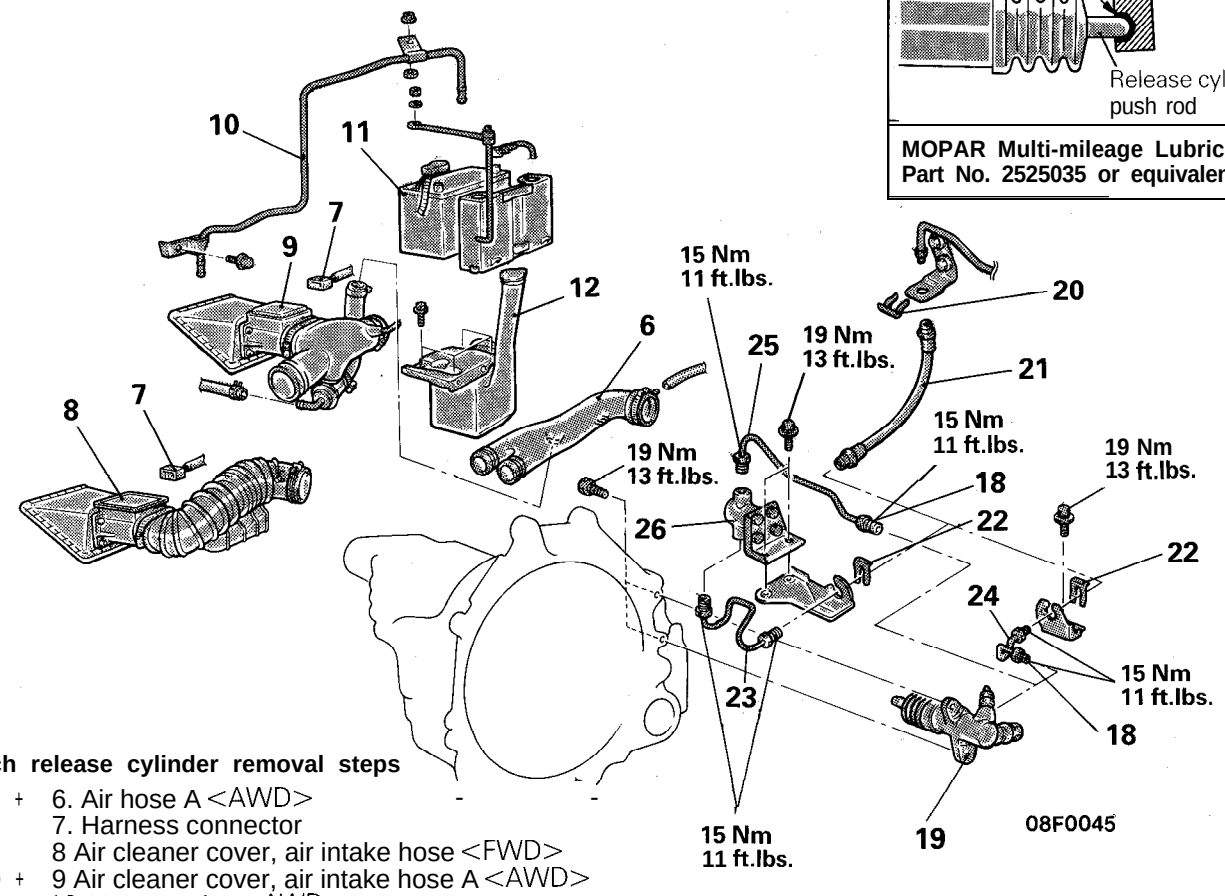
Cluch tube removal steps

1. Brake booster
   (Refer to GROUP 5 – Brake Booster.)
- 4 6. Air hose A <AWD>
7. Harness connector
8. Air cleaner cover, air intake hose <FWD>
- 9. Air cleaner cover, air intake hose A <AWD>
- 10. Vacuum pipe <AWD>
11. Battery
12. Battery seat, washer tank
13. Steering column assembly
    (Refer to GROUP 19 -Steering Wheel and Shaft,)
14. Protector
15. Clamp
16. Hose clip
- 17. Clutch tube





MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent



Clutch release cylinder removal steps

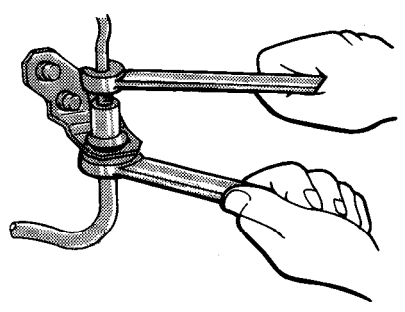
- ◖ + 6. Air hose A <AWD>
  7. Harness connector
  8 Air cleaner cover, air intake hose <FWD>
- ◖ + 9 Air cleaner cover, air intake hose A <AWD>
- ● +10. Vacuum pipe <AWD>
  11. Battery
  12. Battery seat, washer tank
  18. Connection for clutch tube (Clutch release cylinder side)
- ◆◆ ● + 19. Clutch release cylinder

Clutch hose removal steps

- ◖ 4 6. Air hose A <AWD>
  7. Harness connector
- ◖ + 8. Air cleaner cover, air intake hose <FWD>
  9. Air cleaner cover, air intake hose A <AWD>
- ◆◆10. Vacuum pipe <AWD>
  11. Battery
  12. Battery seat, washer tank
  20. Hose clip
- ◆◆ ● 21. Clutch hose

Clutch tube A, tube B, tube C, damper removal steps

- 6. Air hose A <AWD>
  7. Harness connector
  8. Air cleaner, air intake hose <FWD>
- ◖ + 9. Air cleaner cover, air intake hose A <AWD>
- ● +10. Vacuum pipe <AWD>
  11. Battery
  12. Battery seat, washer tank
  22. Hose clip
- ◆◆ ● * 23. Clutch tube A <FWD>
  24. Clutch tube B <AWD>
  25. Clutch tube C <FWD>
  26. Cluch damper <FWD>



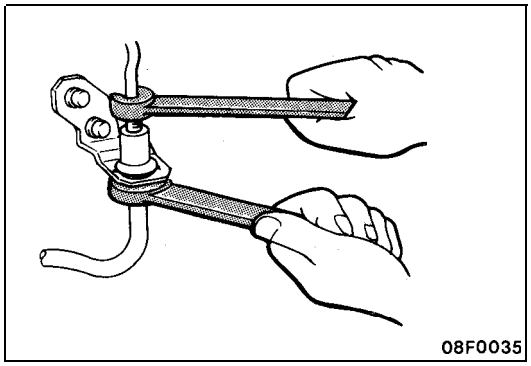
SERVICE POINTS OF REMOVAL

17. REMOVAL OF CLUTCH TUBE (CLUTCH HOSE SIDE)

While holding the clutch hose side nut, loosen the clutch tube flare nut.

19. REMOVAL OF CLUTCH RELEASE CYLINDER

On AWD-vehicles, use a flat type short box wrench to remove the clutch release cylinder mounting bolts.



21. 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.

23. REMOVAL OF CLUTCH TUBE A <FWD> (CLUTCH HOSE SIDE) / 24. CLUTCH TUBE B <AWD> (CLUTCH HOSE SIDE)

While holding the clutch hose side nut, loosen the clutch tube flare nut.

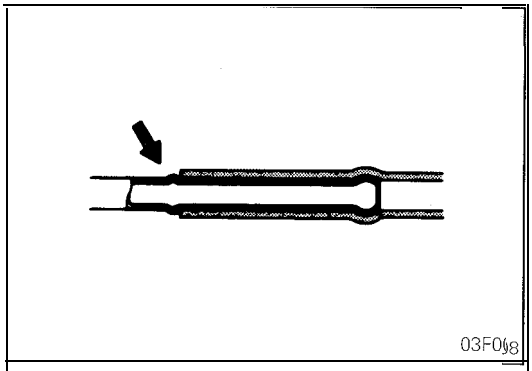
INSPECTION

- Check the clutch hose or tube for cracks or clogging.

SERVICE POINTS OF INSTALLATION

24. INSTALLATION OF CLUTCH TUBE B <AWD> / 23. CLUTCH TUBE A <FWD> / 21. CLUTCH HOSE / 17. CLUTCH TUBE

Be careful that the clutch hose does not become twisted.

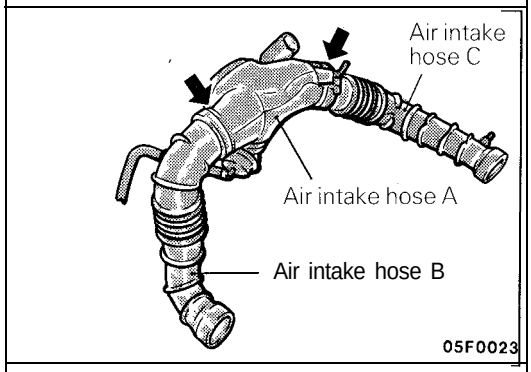


19. INSTALLATION OF CLUTCH RELEASE CYLINDER

On AWD-vehicles, use a flat type short box wrench to tighten the clutch release cylinder mounting bolts.

10. INSTALLATION OF VACUUM PIPE <AWD>

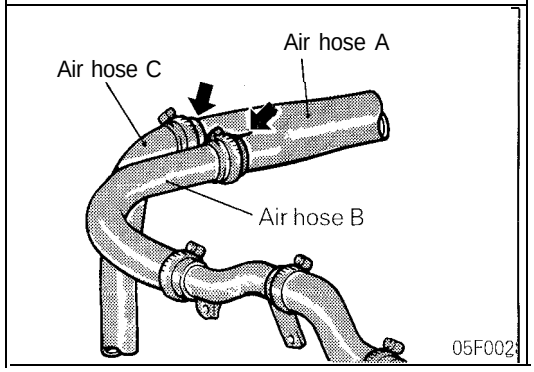
If the vacuum pipe has a stepped part, connect the vacuum hose to the pipe securely, up to the stepped part, as shown in the illustration.



9. INSTALLATION OF AIR CLEANER COVER, AIR INTAKE HOSE A

Align slots indicated by arrows in air intake hose A with △ markings on air intake hoses B and C; then, insert hoses B and C all the way into air intake hose A.

Insert air intake hoses B and C all the way up to the roots on the turbocharger end.



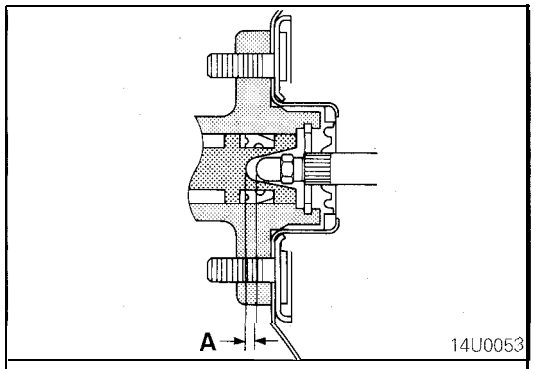
6. INSTALLATION OF AIR HOSE A

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.

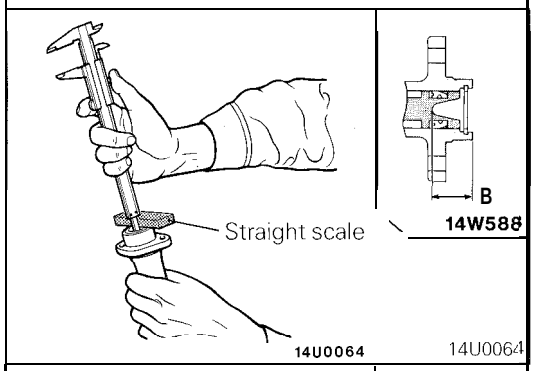
Caution

Be careful not to allow any foreign matter to get into the hoses, pipes, or the intercooler itself.



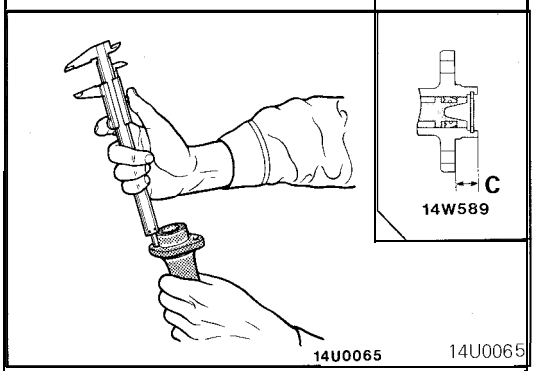
. ADJUSTMENT OF CLEARANCE BETWEEN CLUTCH BOOSTER PUSH ROD AND PISTON <AWD>

Adjust the clearance (A) between the clutch booster push rod and piston as follows:

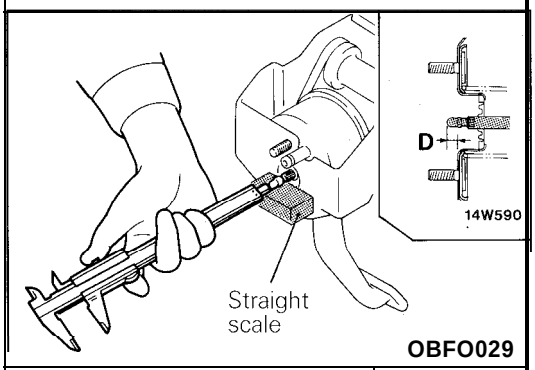


(1) Measure the dimension (B) between the master cylinder end face and piston.

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.



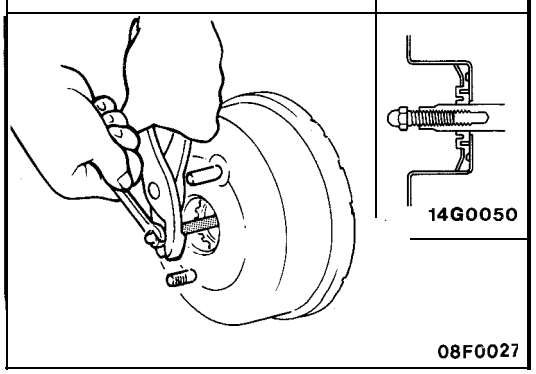
(3) Measure the ‘dimension (D) between the master cylinder mounting surface on clutch booster and the push rod end.

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.

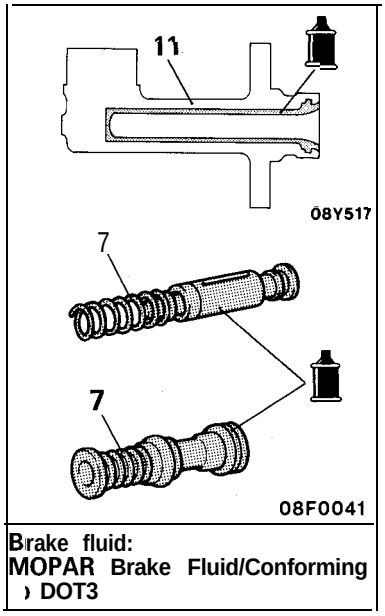
Caution
If there is no clearance, clutch slipping, seizure, etc. may be caused.

CLUTCH MASTER CYLINDER

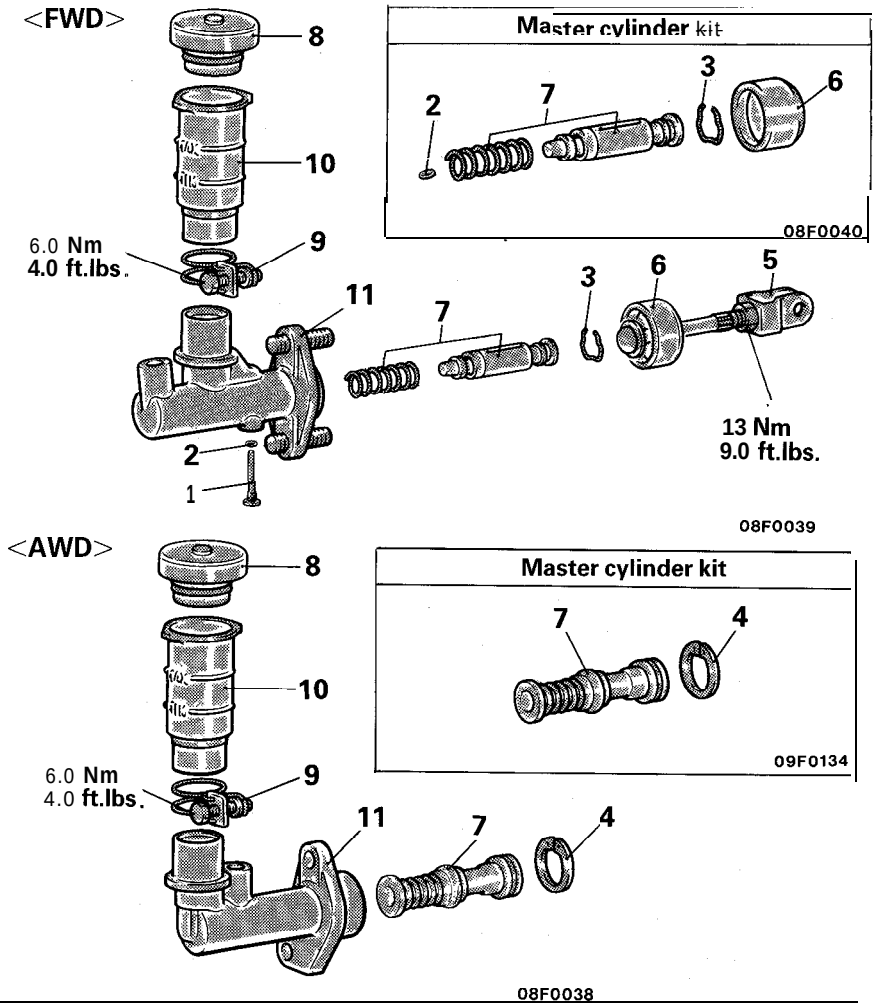
DISASSEMBLY AND REASSEMBLY

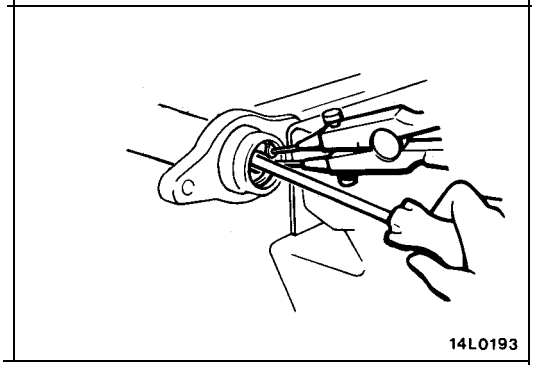
Disassembly steps

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:
MOPAR Brake Fluid/Conforming) DOT3





SERVICE POINTS OF DISASSEMBLY

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

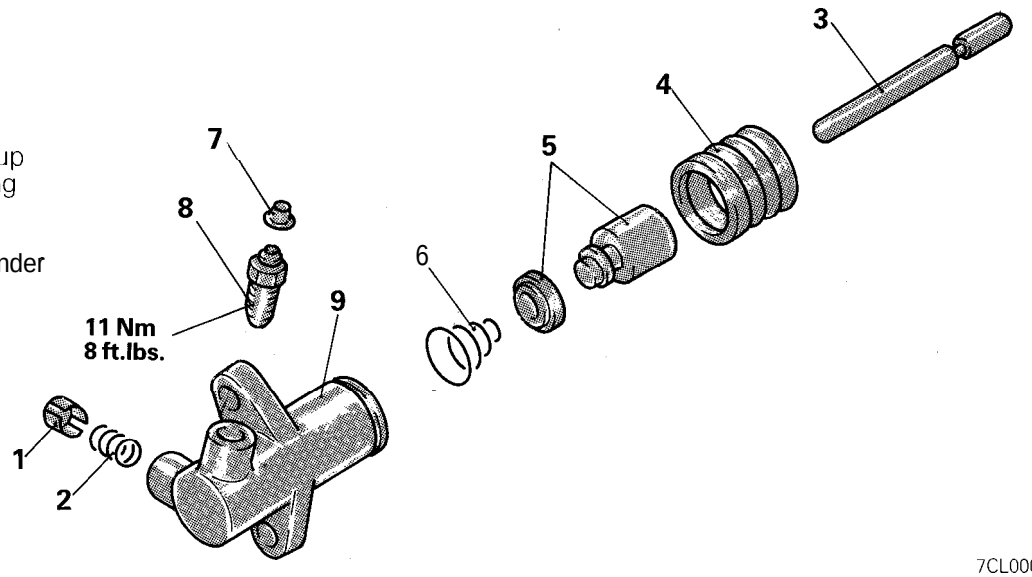
- Check the inside cylinder body for rust or scars.
- Check the piston cup for wear or deformation.
- Check the piston for rust or scars.
- Check the clutch tube connection part for clogging.

CLUTCH RELEASE CYLINDER

DISASSEMBLY AND REASSEMBLY

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



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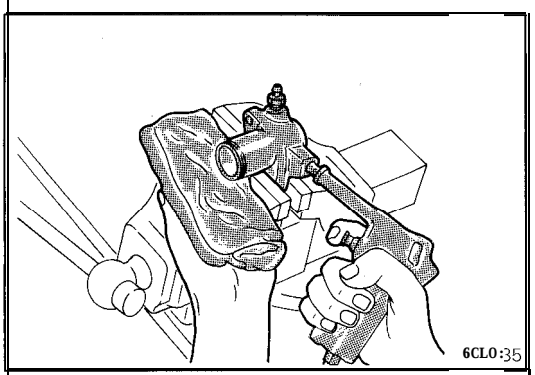

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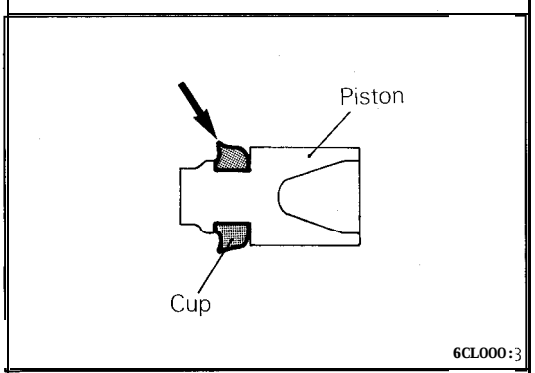
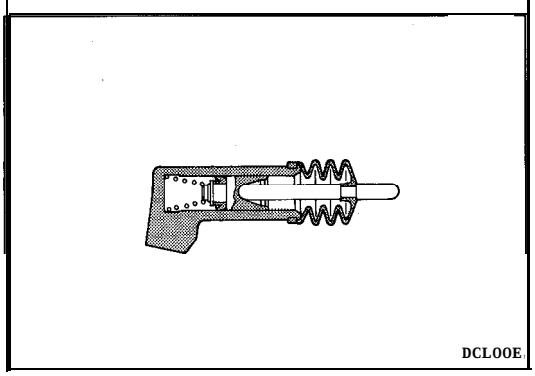


6CL000:3



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SERVICE POINTS OF DISASSEMBLY

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

(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

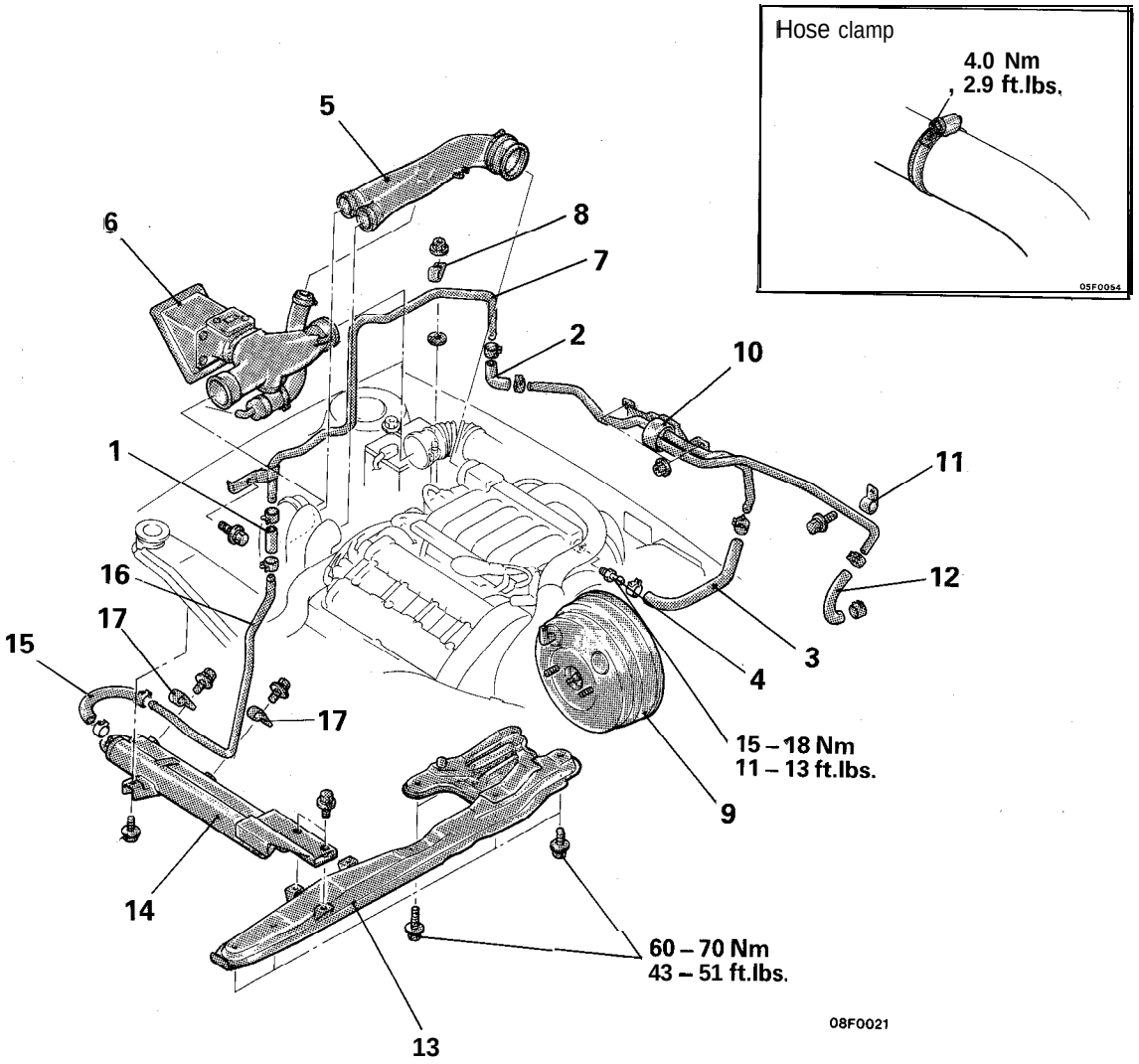
5. APPLICATION OF FLUID TO PISTON AND CUP

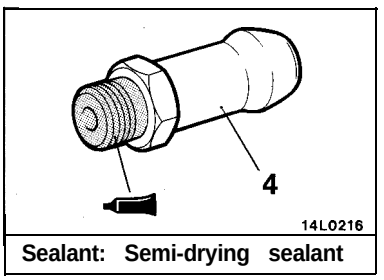
Apply specified brake fluid to the release cylinder inside and outer surface of the piston and piston cup and push the piston cup assembly in the cylinder.

Specified brake fluid: MOPAR Brake Fluid/Conforming to DOT3 or DOT4

CLUTCH VACUUM LINE, VACUUM TANK <AWD>

REMOVAL AND INSTALLATION





Sealant: Semi-drying sealant

➡◀ 1. Vacuum hose A
➡◀ 2. Vacuum hose B
◆➡ ● + 3. Vacuum hose C with check valve
4. Fitting

Vacuum pipe A removal steps

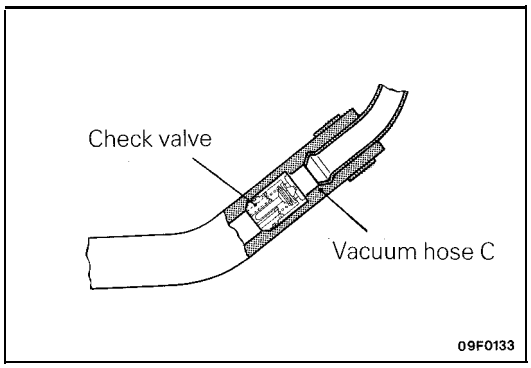
● + 5. Air hose A
6. Air cleaner cover, air intake hose A
7. Vacuum pipe A
8. Clamp

Vacuum pipe B, vacuum hose D removal steps

9. Brake booster
(Refer to GROUP 5 – Brake Booster.)
10. Vacuum pipe B
11. Clamp
➡◀ 12. Vacuum hose D

Vacuum tank assembly, vacuum hose E, vacuum pipe C removal steps

13. Right member
(Refer to GROUP 2 – Right Member, Left Member and Crossmember)
14. Vacuum tank assembly
● C 15. Vacuum hose E
16. Vacuum pipe C
17. Clamp



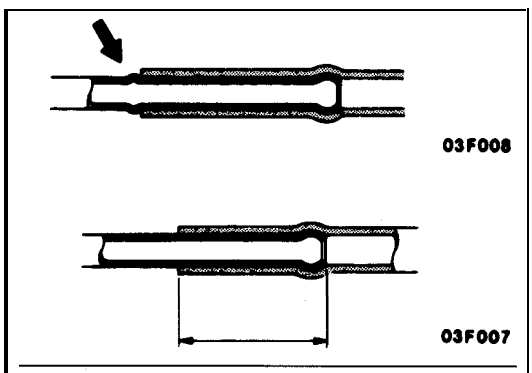
SERVICE POINTS OF REMOVAL

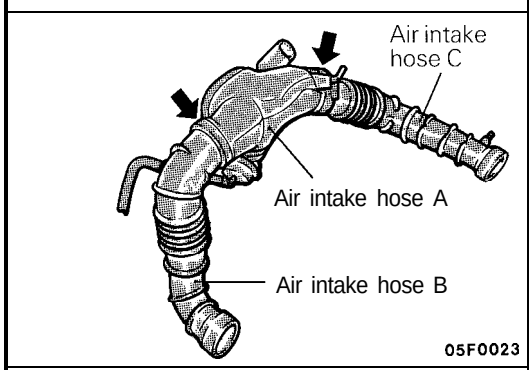
3. REMOVAL OF VACUUM HOSE C WITH CHECK VALVE

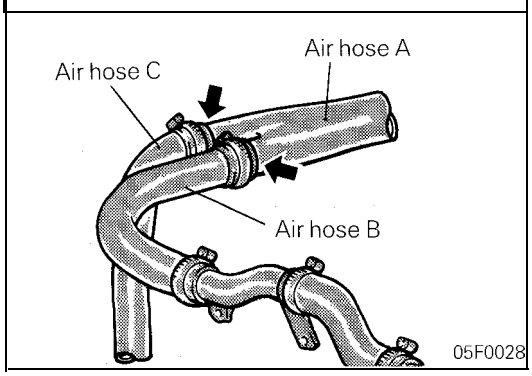
NOTE
Since the check valve is fit to the vacuum hose C, replace the check valve as an assembly unit together with the vacuum hose C if the check valve is defective.

INSPECTION

- Check the hose and pipes for cracks, bend, deformation and clogging.
- Check the vacuum tank for deformation or crack.







SERVICE POINTS OF INSTALLATION

15. INSTALLATION OF VACUUM HOSE E / 12. 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 △ 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 tha air hoses ensuring that alignment marks are aligned with projections.
Insert air hoses B and C into pipe all the way to its step.

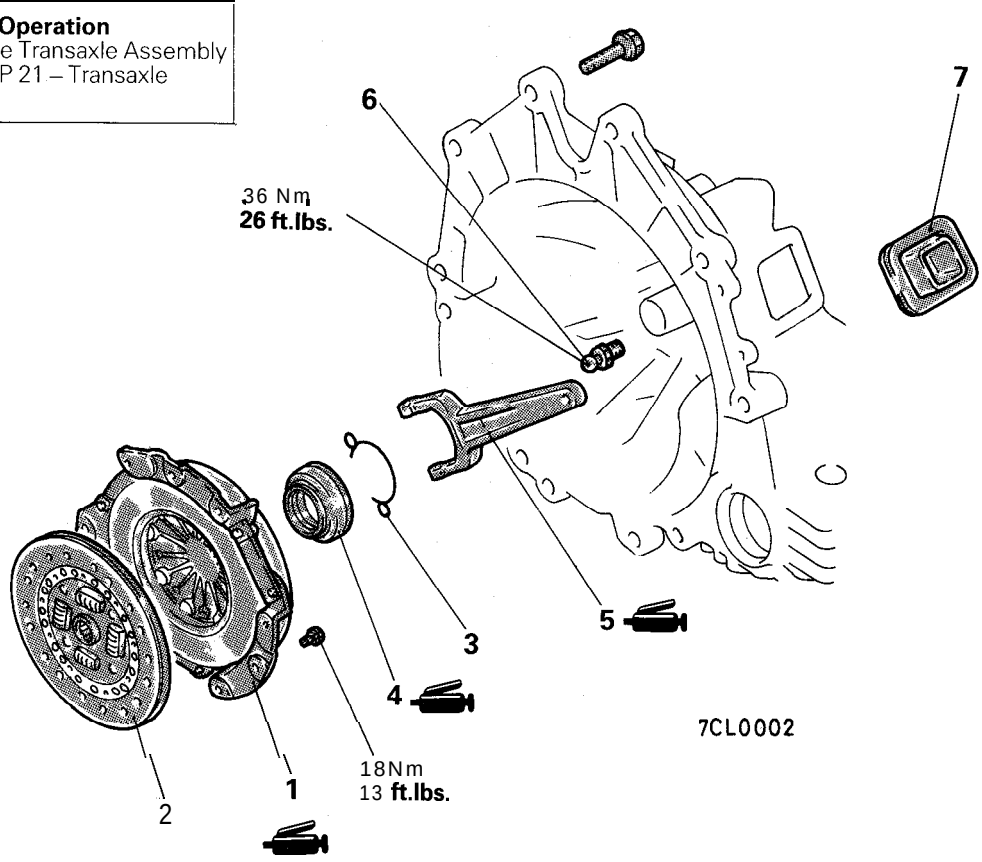
Caution
Be careful not to allow any foreign matter to get into the hoses, pipes, or the intercooler itself.

CLUTCH COVER AND DISC

REMOVAL AND INSTALLATION

Pre-removal Operation
- Removal of the Transaxle Assembly (Refer to GROUP 21 – Transaxle Assembly.)

Post-installation Operation
- Installation of the Transaxle Assembly (Refer to GROUP 21 – 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

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.

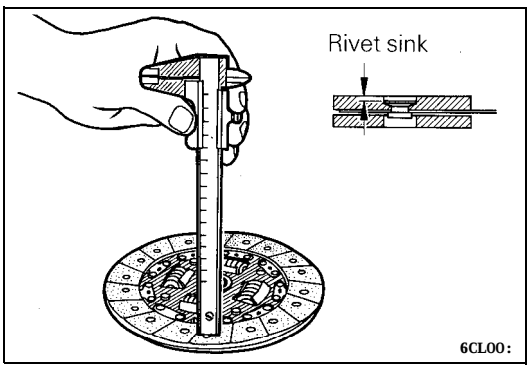
INSPECTION

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.

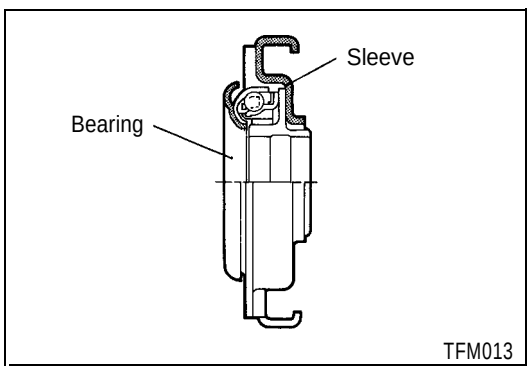


CLUTCH DISC

- 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

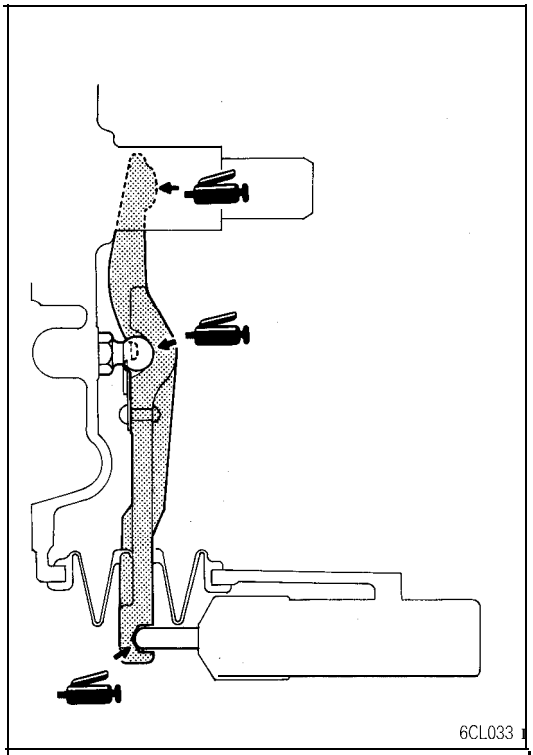
Caution

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.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SERVICE POINTS OF INSTALLATION

5. APPLICATION OF GREASE TO RELEASE FORK

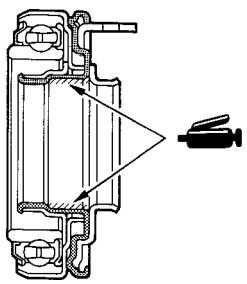
(1) Apply a coating of the specified grease to the point of contact with the fulcrum and the point of contact with the release bearing.

Specified grease: MOPAR Multi-mileage Lubricant Part No. 2525035 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: MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent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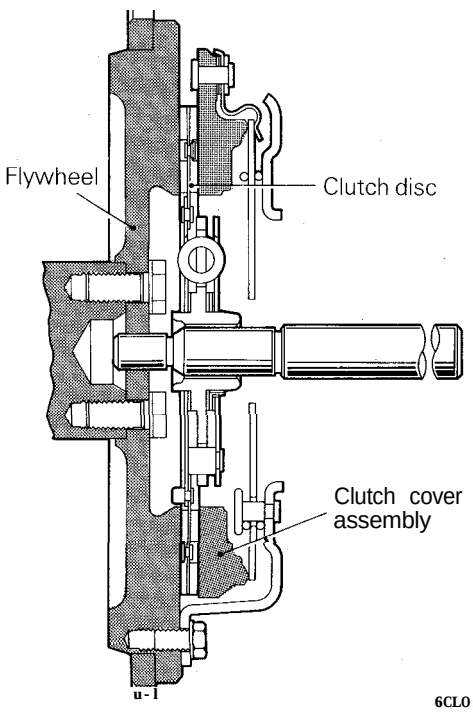
4. APPLICATION OF GREASE TO CLUTCH RELEASE BEARING (FWD)

Pack the inner surface of the clutch release bearing and the groove with the specified grease.

Specified grease: MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent



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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: MOPAR Multi-mileage Lubricant Part No. 2525035 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.

COOLING

CONTENTS

SPECIFICATIONS

GENERAL SPECIFICATIONS

Items	Specifications
Cooling method	Water-cooled, pressurized, forced circulation with electrical fan
Radiator	
Type	Pressurized corrugated fin type
Radiator fan motor	
Type	Direct current ferrite type
Water pump	
Type	Centrifugal impeller type
Thermostat	
Type	Wax type with jiggle valve
Identification mark <SOHC>	82 (Stamped on flange)
<DOHC>	76.5 (Stamped on flange)

SERVICE SPECIFICATIONS

Items			Specifications
Standard value			
Range of coolant antifreeze concentration	%		30-60
Thermostat			
Valve opening temperature of thermostat	°C (°F)	<SOHC>	82 (180)
		<DOHC>	76.5 (170)
Full-opening temperature of thermostat	°C (°F)	<SOHC>	95 (203) or more
		<DOHC>	90 (194) or more
Opening pressure of cap high pressure valve	kPa (psi)		75 – 105 (11 – 15)
Limit			
Opening pressure cap high pressure valve	kPa (psi)		65 (9.2)

LUBRICANT

Item	Specified lubricant	Quantity
Engine coolant dm^3 (qts.)	High quality ethylene glycol antifreeze coolant	8.0 (8.5)

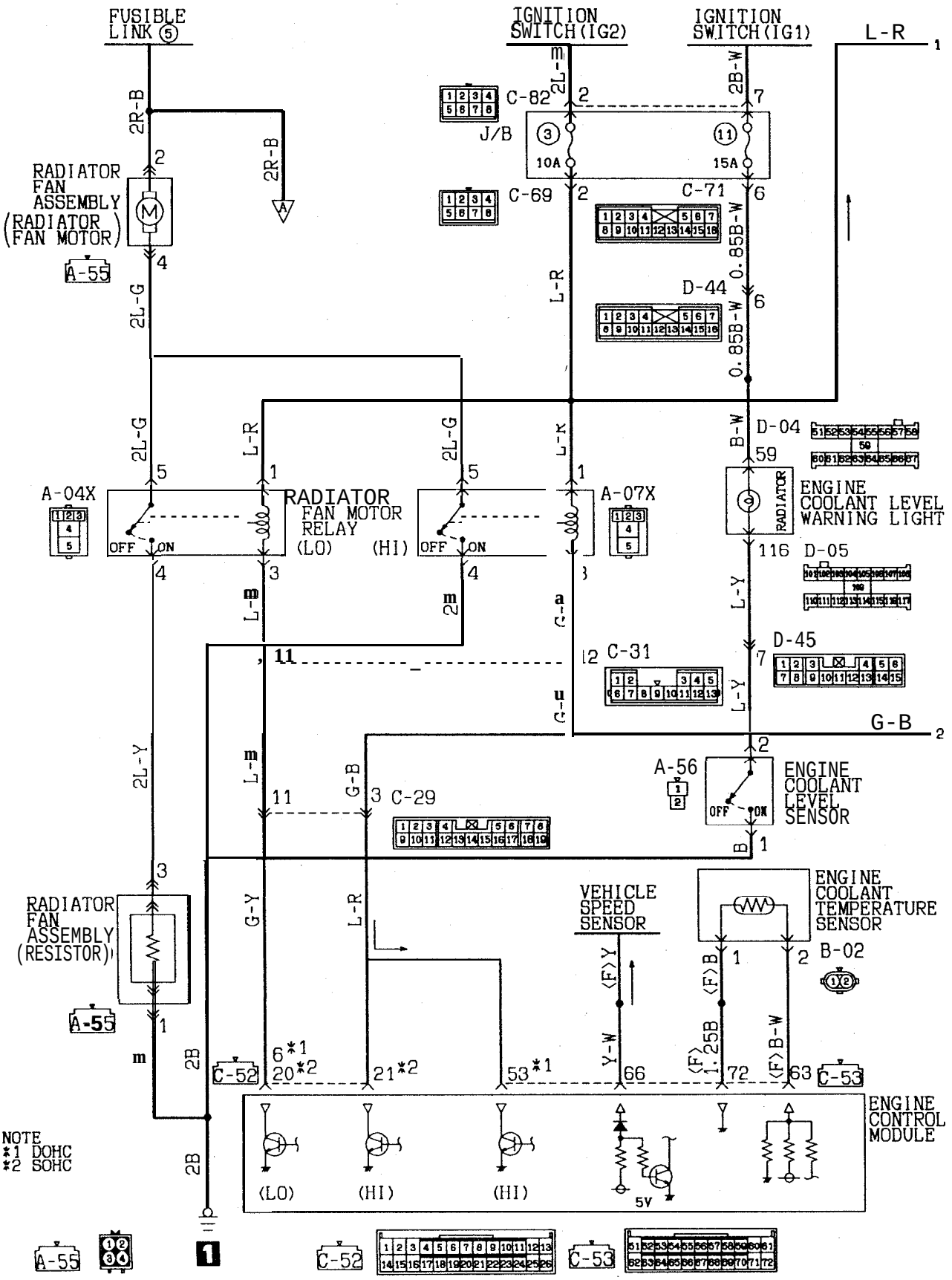
SEALANT AND ADHESIVE

Items	Specified sealants and adhesive
Engine coolant temperature gauge unit	MOPAR Part No. 4318034 or equivalent
Engine coolant temperature sensor (Engine control)	

TROUBLESHOOTING

Symptom	Probable cause	Remedy
Overheat	Insufficient engine coolant	Replenish
	Too high an anti-freeze concentration	Correct anti-freeze concentration
	Inoperative electric cooling fan Faulty engine coolant temperature sensor 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 intake manifold <SOHC> Cracked thermostat housing <DOHC>	Replace
	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	Correct or replace
	Loose intake manifold bolts or leaking from gasket <SOHC> Loose thermostat housing bolts or leaking from gasket <DOHC>	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	Replace

CIRCUIT DIAGRAM
<SOHC, DOHC NON-TURBO (FEDERAL AND CANADA)>



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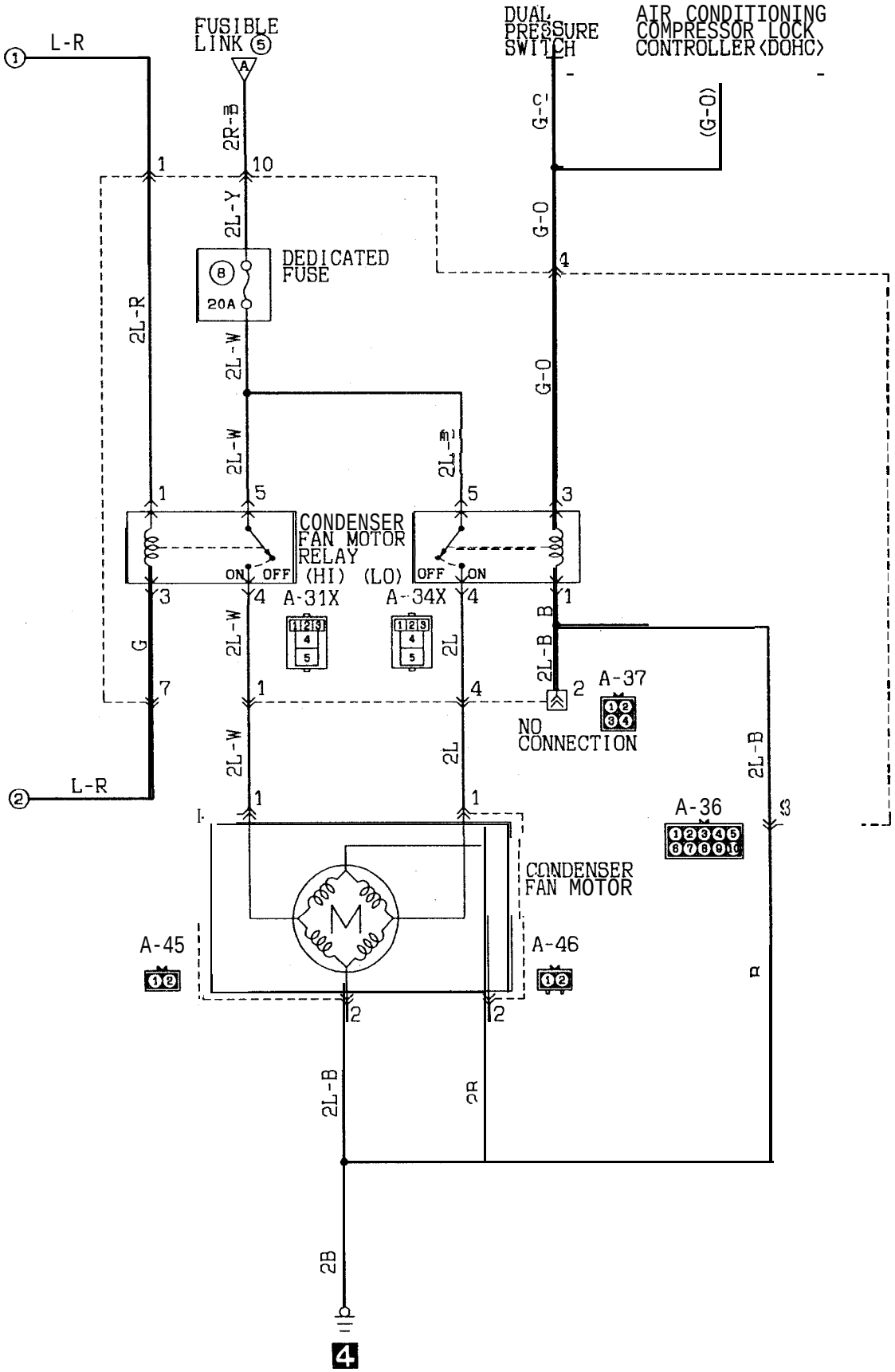
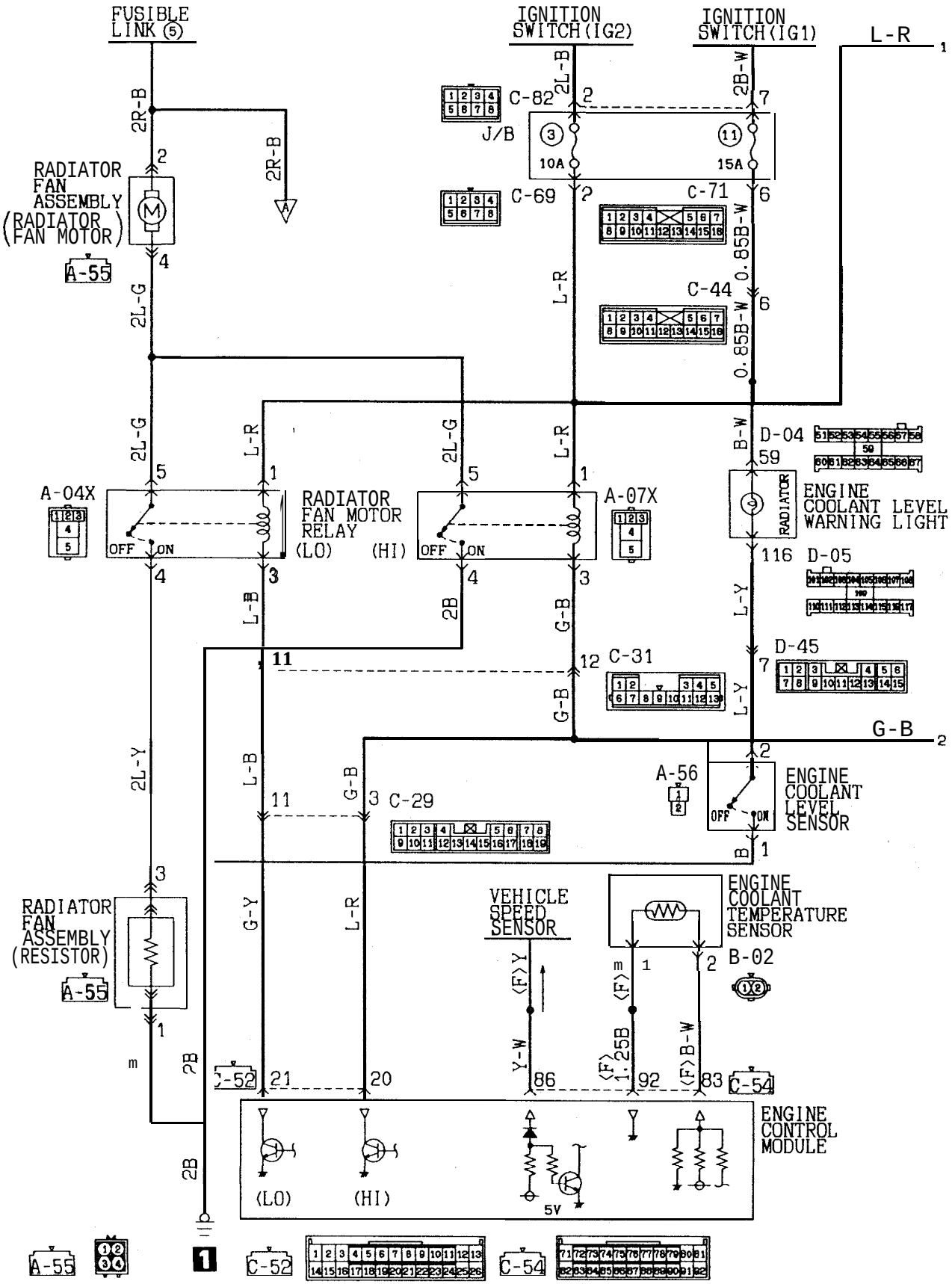

FUSIBLE LINK ⑤
DUAL PRESSURE SWITCH
AIR CONDITIONING COMPRESSOR LOCK CONTROLLER <DOHC>
L-R
2R-B
G-O
(G-O)
2L-Y
DEDICATED FUSE
20A
2L-R
2L-W
2L-B
CONDENSER FAN MOTOR RELAY
(HI)
(LO)
ON
OFF
A-31X
A-34X
G
2L
A-37
NO CONNECTION
A-36
CONDENSER FAN MOTOR
A-45
A-46
2B
2R
4

<DOHC (CALIFORNIA)>



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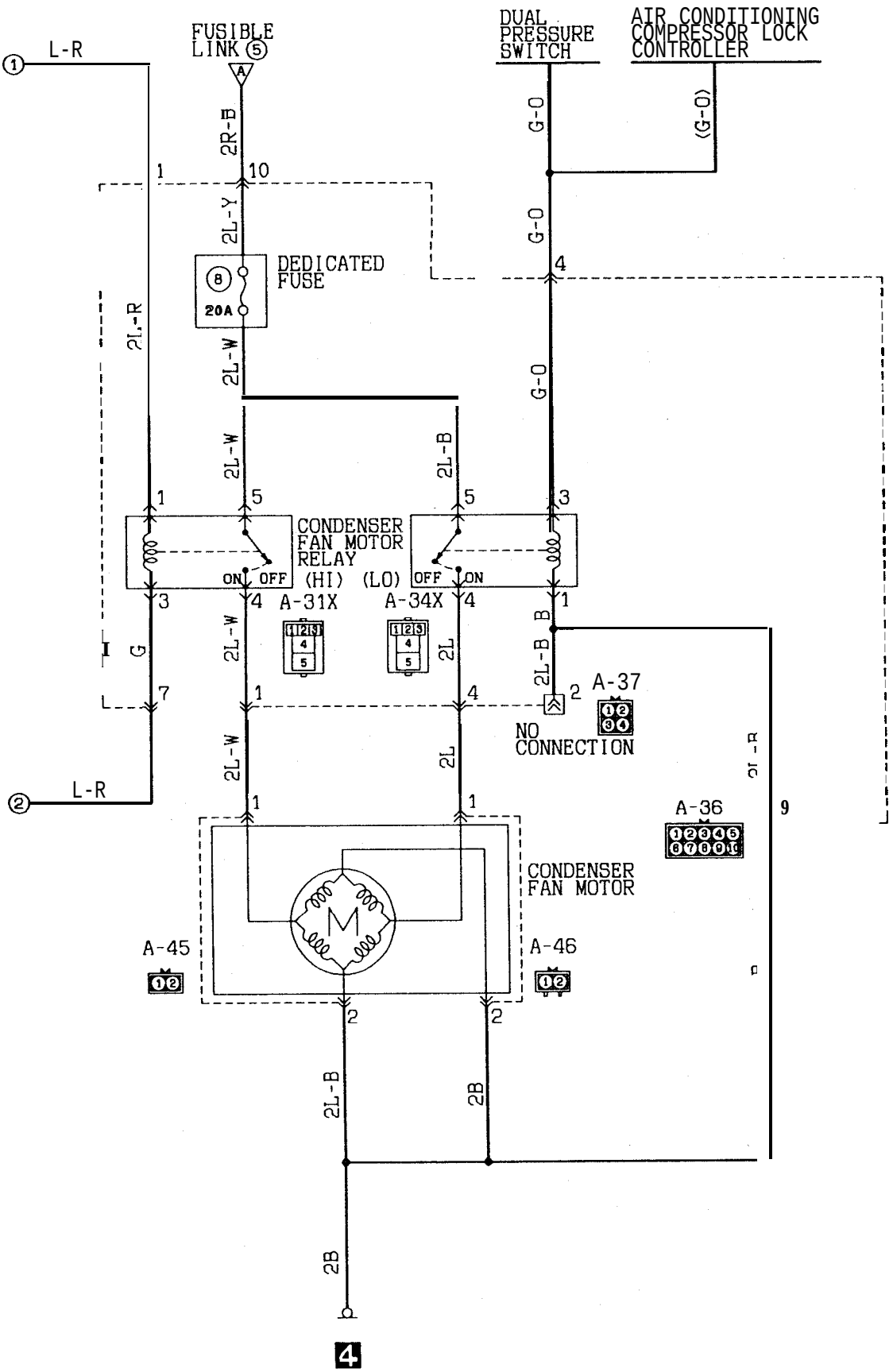
FUSIBLE LINK ⑤
DUAL PRESSURE SWITCH
AIR CONDITIONING COMPRESSOR LOCK CONTROLLER
L-R
2R-B
G-O
(G-O)
2L-Y
DEDICATED FUSE
20A
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2L-W
2L-B
CONDENSER FAN MOTOR RELAY
ON OFF (HI)
OFF ON (LO)
A-31X
A-34X
G
2L
A-37
NO CONNECTION
A-36
CONDENSER FAN MOTOR
A-45
A-46
2B
4

OPERATION

The engine control unit controls the power transistors (high speed and low speed) in the unit to provide radiator fan motor and condenser fan motor rotation controls in accordance with the engine coolant temperature and vehicle speed.

1. Radiator Fan (Low Speed Rotation)

- When the engine control unit turns on the power transistor (low speed) in the unit, the current flows from the ignition switch to the engine control unit through the radiator fan motor relay (LO) coil.
  If the current flows to the fan motor relay coil, the switch of the relay turns on to supply the motor driving power (for low speed rotation). This will cause the current to flow from the battery to the ground through the radiator fan motor, relay switch and resistor, rotating the radiator fan at low speeds.

2. Condenser Fan (Low Speed Rotation)

- The power from the A/C compressor lock controller turns on the condenser fan motor relay (LO) to rotate the condenser fan at low speeds.

3. Radiator Fan, Condenser Fan (High Speed Rotation)

- When the engine control unit turns on the power transistor (high speed) in the unit, the radiator fan motor relay (HI) and condenser fan motor relay (HI) will operate and the motor driving power (for high speed rotation) is sent to the radiator fan motor and condenser fan motor to rotate the radiator fan and condenser fan at high speeds.

NOTE
In the event of faulty water temperature sensor, the engine control unit commands the fan motors (for both radiator and condenser) to rotate at high speeds.

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 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 air conditioning compressor lock controller unit is available.

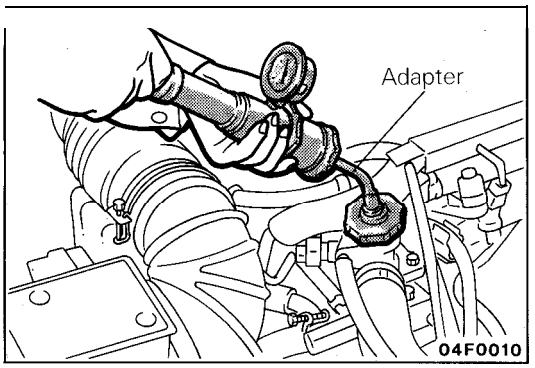
(2) The A/C compressor magnet clutch enters the “ON” state.
- Check the condenser fan motor relay (LO).

4. The radiator fan and condenser fan do not operate in the high speed mode, but operate otherwise.

- Check the engine control unit.

Fan Operating Mode

Switch condition					Fan operating condition	
A/C compressor lock controller output	Vehicle speed km/h [mph]	Engine coolant temperature °C [°F]	Transistor in engine control unit		Radiator fan	Condenser fan
			Low speed	High speed		
LO (0V)	80 or less [50 or less]	Approx. 95 [203] or less	OFF	OFF	OFF	OFF
		Approx. 95 [203] or more	ON	OFF	Low speed	OFF
		Approx. 105 [221] or more	ON	ON	High speed	High speed
	80 or more [50 or more]	Approx. 105 [221] or less	OFF	OFF	OFF	OFF
		Approx. 105 [221] or more	ON	ON	High speed	High speed
HI (12V)		Approx. 105 [221] or less	ON	OFF	Low speed	Low speed
		Approx. 105 [221] or more	ON	ON	High speed	High speed



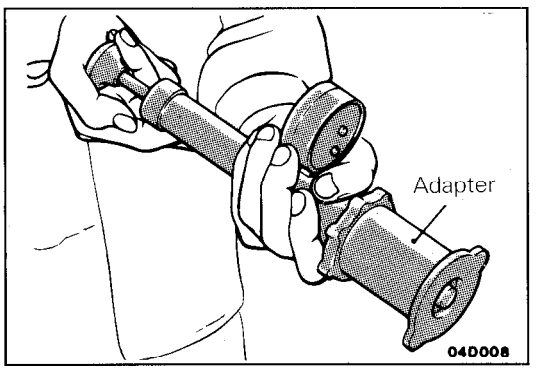
SERVICE ADJUSTMENT PROCEDURES

ENGINE COOLANT LEAK CHECK

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

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

Refer to GROUP 0 – Engine Coolant.

ENGINE COOLANT CONCENTRATION TEST

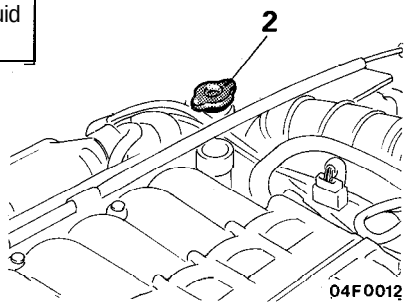
Refer to GROUP 0 – Selection of Coolant.

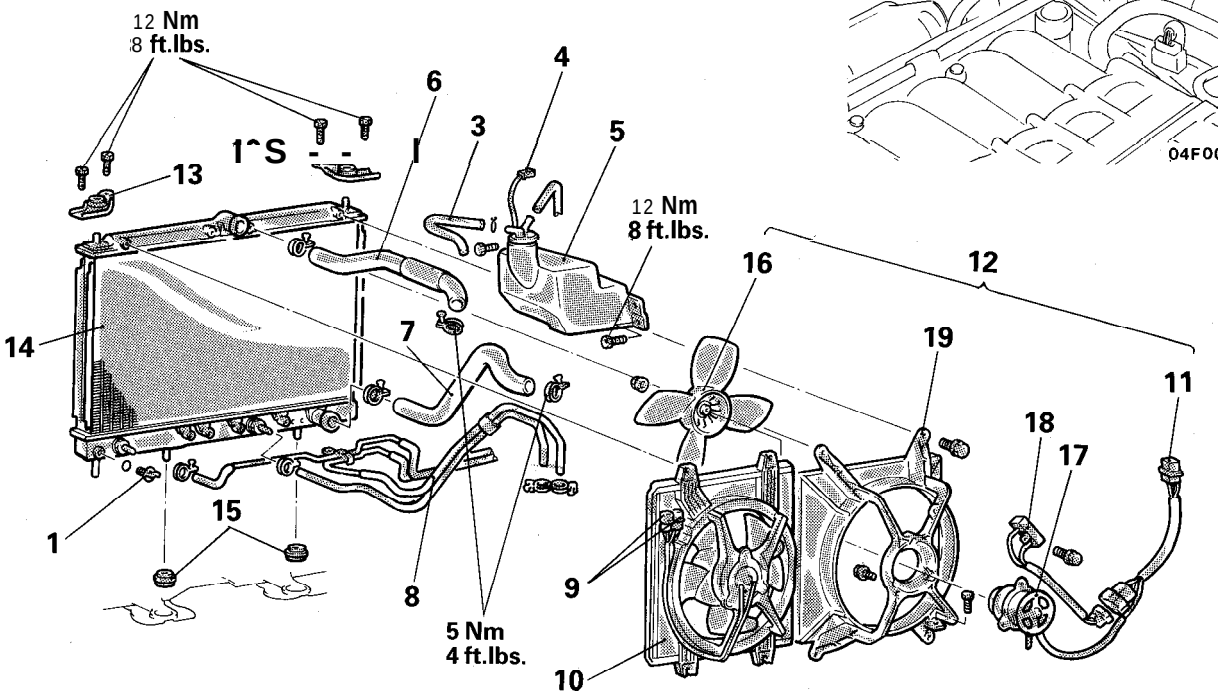
RADIATOR

REMOVAL AND INSTALLATION

Pre-removal Operation
- Draining of the Engine Coolant (Refer to GROUP 0 – Maintenance Service.)

Post-installation Operation
- Refilling of the Engine Coolant (Refer to GROUP 0 – Maintenance Service.)
- Checking Automatic Transaxle Fluid Level and Refilling If Necessary





04F0020

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 conditioning>
10. Condenser fan motor assembly <Vehicles with air conditioning>
11. ● Radiator fan motor connector
12. Radiator fan motor assembly
13. Upper insulator
14. Radiator assembly
15. Lower insulator
16. Fan
17. Radiator fan motor
18. Resistor
19. 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 conditioning>
10. Condenser fan motor assembly <Vehicles with air conditioning>
11. ● Radiator fan motor connector
12. Radiator fan motor assembly
16. Fan
17. Radiator fan motor
18. Resistor
19. Shroud

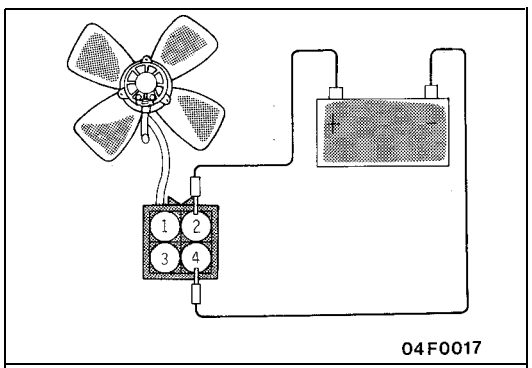
SERVICE POINT OF REMOVAL

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

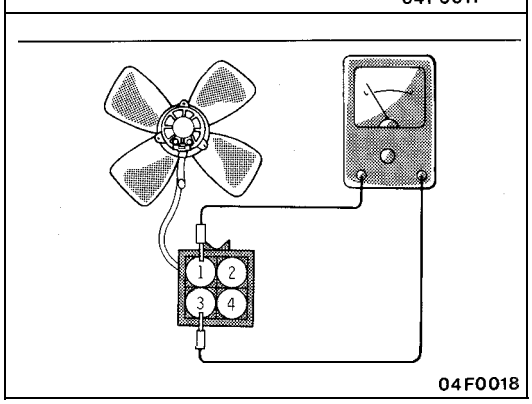
- Check for foreign material between radiator fins.
- Check the radiator fins for bent, or damage.
- Check the radiator for corrosion, damage rust or scale.
- Check the radiator hoses for cracks, damage or deterioration.
- Check the reserve tank for damage.
- Check the automatic transaxle oil cooler hoses for cracking, damage or deterioration.



04F0017

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.

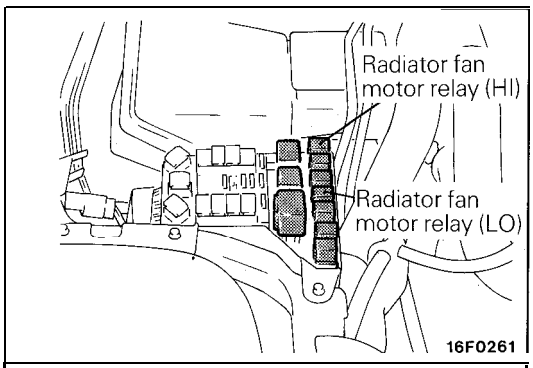


04F0018

INSPECTION OF RESISTOR

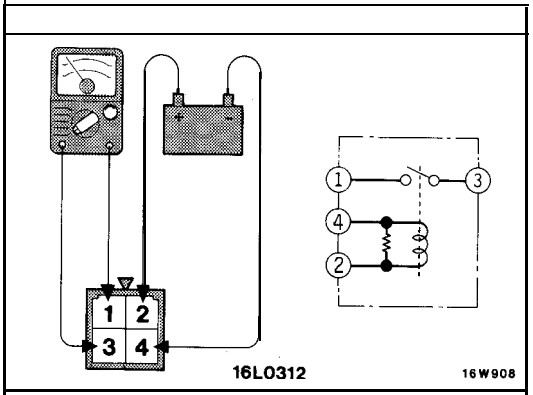
(1) Measure the resistance between connector terminals ① and ③ of the radiator fan motor.
(2) The resistor is normal if the resistance is within the following range.

Resistance: 0.29 – 0.35 Ω



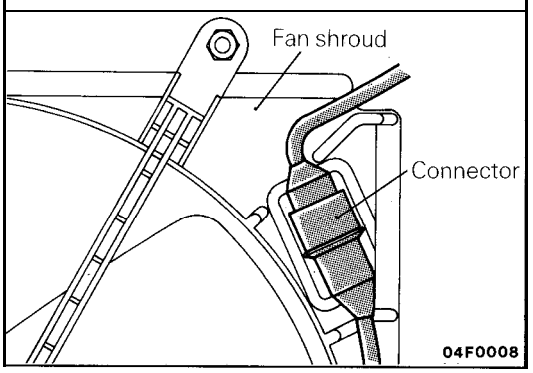
RADIATOR FAN MOTOR RELAY INSPECTION

(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

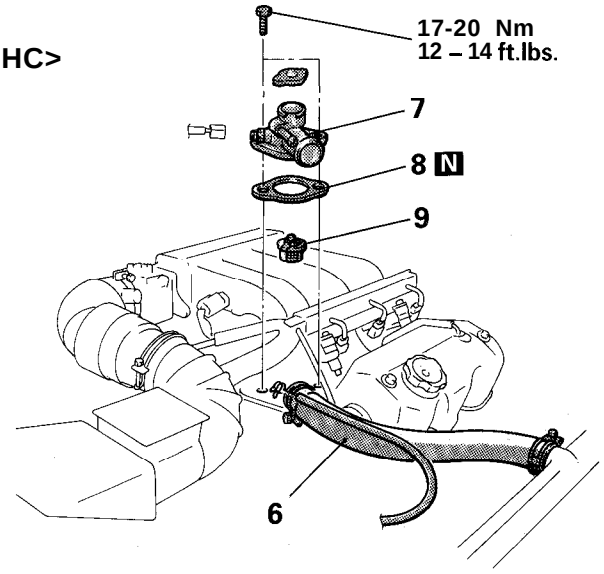
11. CONNECTION OF RADIATOR FAN MOTOR CONNECTOR

Connect the radiator fan motor connector to the body harness. Then, insert into the shroud hole and fix securely.

THERMOSTAT

REMOVAL AND INSTALLATION

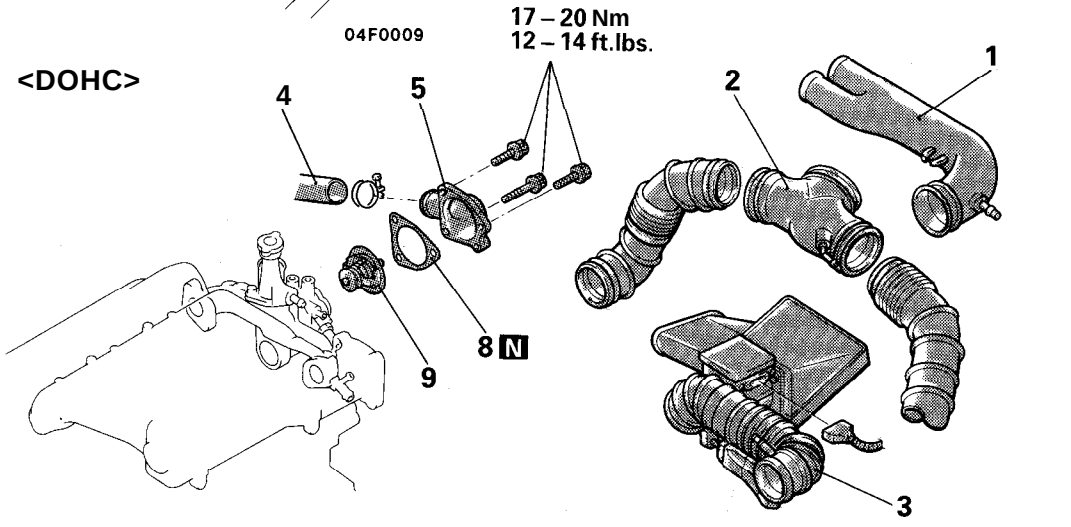
<SOHC>



04F0009

Pre-removal and Post-installation Operation
- Draining and Supplying of the Engine Coolant
  (Refer to GROUP 0 – Maintenance Service.)

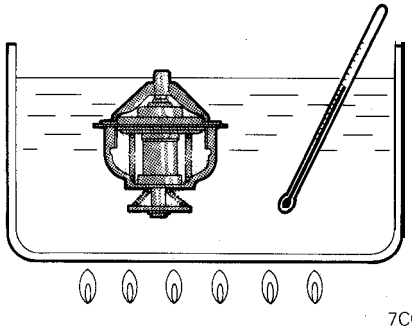
<DOHC>



01 F0037

Removal steps

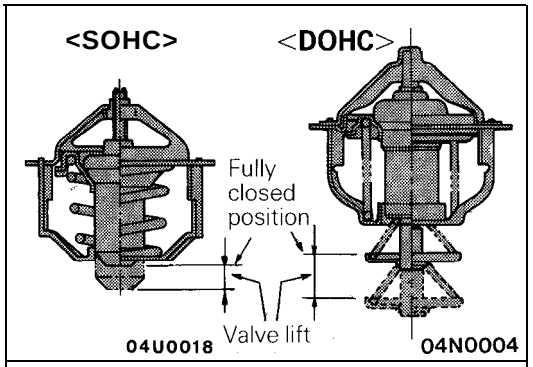
1. Air hose A <Turbo>
- + 2. Air intake hose A <Turbo>
3. Air intake hose <Non-Turbo>
4. Connection of radiator lower hose
5. Water inlet fitting
6. Connection of radiator upper hose
7. Water outlet fitting
8. Gasket
- + 9. Thermostat

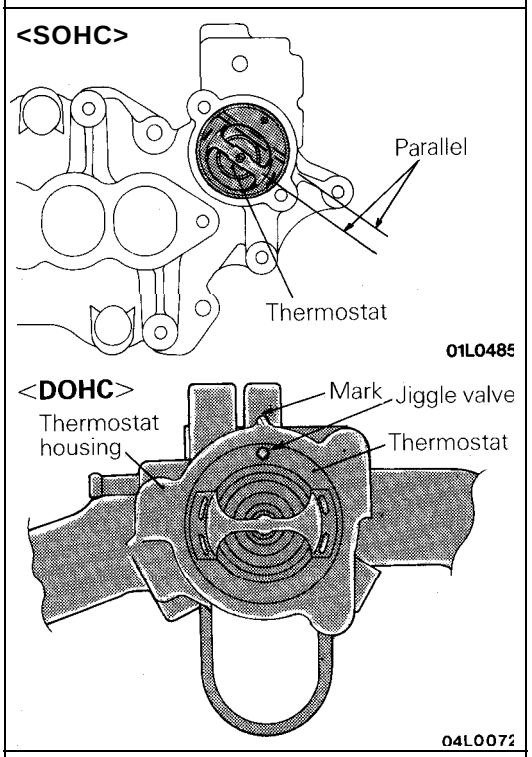


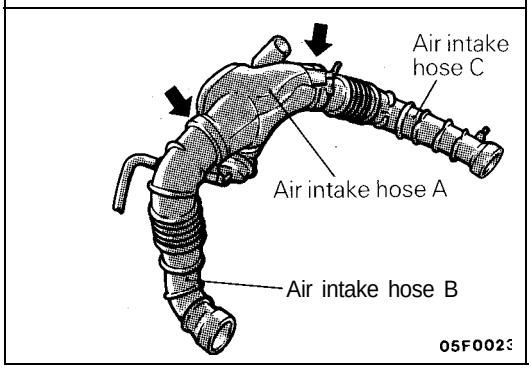
7CO0043

INSPECTION

- Check that valve closes tightly at room temperature.
- Check for defects or damage.
- Check for rust or encrustation on valve. Remove if any.
- Immerse thermostat in container of water. Stir to raise water temperature and check that thermostat valve opening temperature and the temperature with valve fully open [valve lift-over 8 mm (.31in.)] are at the standard value.







Standard value:

Opening valve temperature	
<SOHC>	**82°C (180°F)**
<DOHC>	**76.5°C (176°F)**
Full-open temperature	
<SOHC>	**95°C (203°F)**
<DOHC>	**90°C (194°F)**

NOTE
Measure valve height when fully closed. Calculate lift by measuring the height when fully open.

SERVICE POINTS OF INSTALLATION

9. INSTALLATION OF THERMOSTAT

<SOHC>

Install the thermostat to the intake manifold as illustrated.

Caution
Be careful not to install the thermostat obliquely by fitting the thermostat flange in the spot facing provided in the intake manifold.

<DOHC>

Install the thermostat with its jiggle valve lined up with the mark on the thermostat housing.

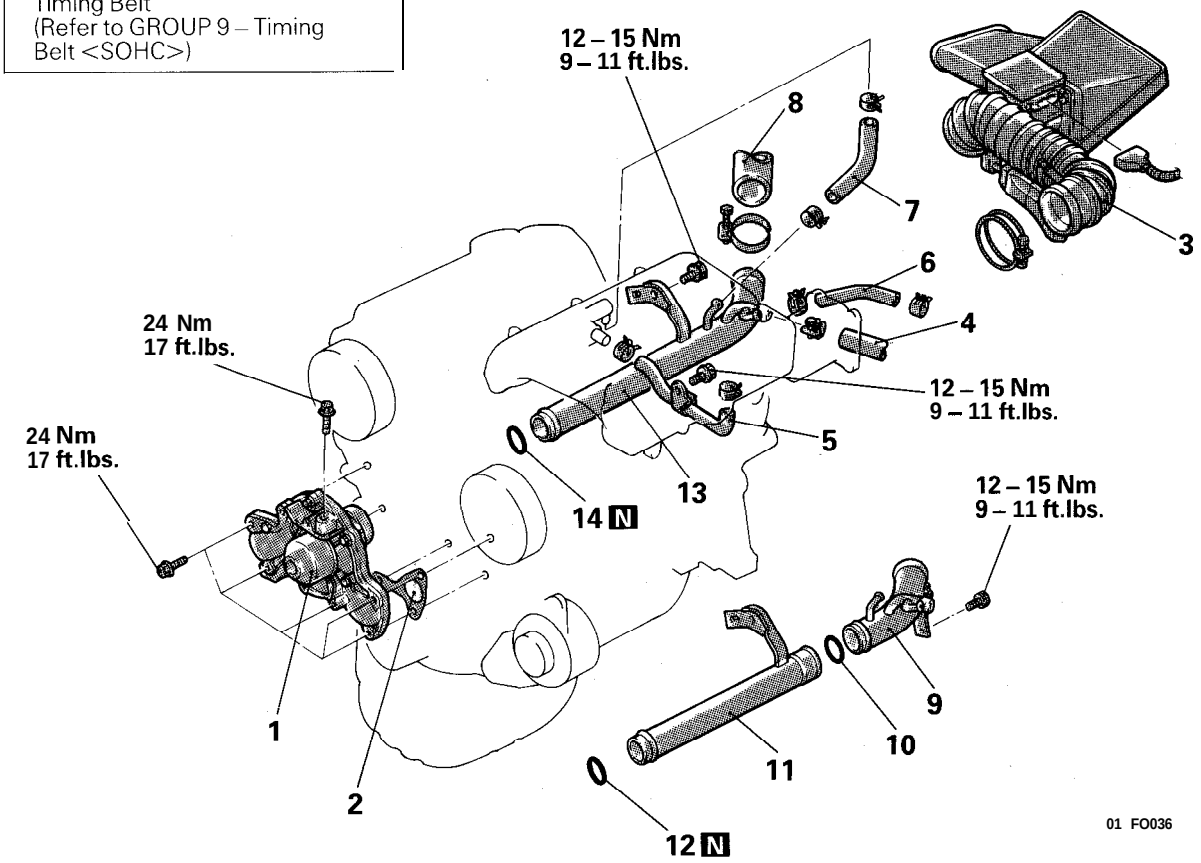
2. INSTALLATION OF AIR INTAKE HOSE A

Assemble the air intake hose A with its notches (arrow-marked) lined up with the △ 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 <SOHC>

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Draining and Supplying of the Engine Coolant (Refer to GROUP 0 – Maintenance Service.)
- Removal and Installation of Timing Belt (Refer to GROUP 9 – Timing Belt <SOHC>)

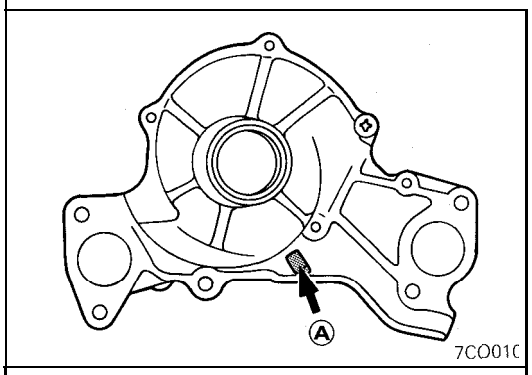


Removal steps

1. Water pump
2. Gasket
3. Air intake hose
4. Connection of the heater hose
5. Water hose A
6. Water hose B
7. By-pass water hose
8. Connection of the radiator lower hose
9. Inlet water pipe B <Vehicles with manual transaxle>
10. O-ring <Vehicles with manual transaxle>
11. Inlet water pipe A <Vehicles with manual transaxle>
12. O-ring <Vehicles with manual transaxle>
13. Inlet water pipe <Vehicles with automatic transaxle>
14. O-ring <Vehicles with automatic transaxle>

Installation steps

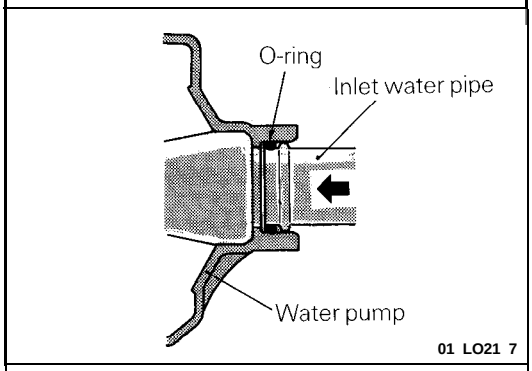
2. Gasket
1. Water pump
◆◆ 14. O-ring <Vehicles with automatic transaxle>
● * 13. Inlet water pipe <Vehicles with automatic transaxle>
● * 12. O-ring <Vehicles with manual transaxle>
● * 11. Inlet water pipe A <Vehicles with manual transaxle>
● + 10. O-ring <Vehicles with manual transaxle>
◆ + 9. Inlet water pipe B <Vehicles with manual transaxle>
8. Connection for the radiator lower hose
7. By-pass water hose
6. Water hose B
5. Water hose A
4. Connection for the heater hose
3. Air intake hose



INSPECTION

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 Ⓐ.

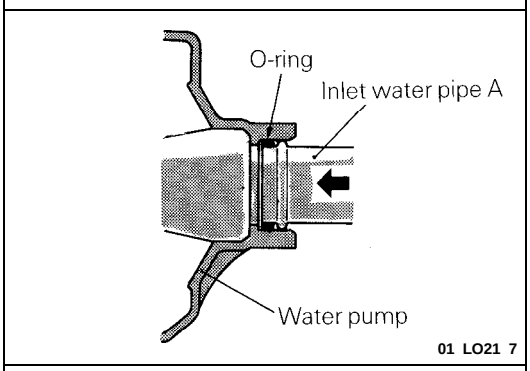


SERVICE POINTS OF INSTALLATION

14. INSTALLATION OF O-RING / 13. INLET WATER PIPE <VEHICLES WITH AUTOMATIC TRANSAXLE>

Insert the O-ring to the water inlet pipe, and coat the outer circumference of the O-ring with water.
By coating with water, the insertion to the water pump will become easier.

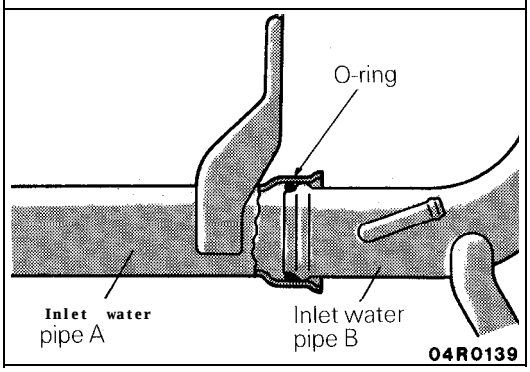
Caution
Care must be taken not to permit engine oil or other greases to adhere to the O-ring.



12. INSTALLATION OF O-RING / 11. INLET WATER PIPE A <VEHICLES WITH MANUAL TRANSAXLE>

Insert the O-ring to the water inlet pipe A, and coat the outer circumference of the O-ring with water.
By coating with water, the insertion to the water pump will become easier.

Caution
Care must be taken not to permit engine oil or other greases to adhere to the O-ring.



10. INSTALLATION OF O-RING / 9. INLET WATER PIPE B <VEHICLES WITH MANUAL TRANSAXLE>

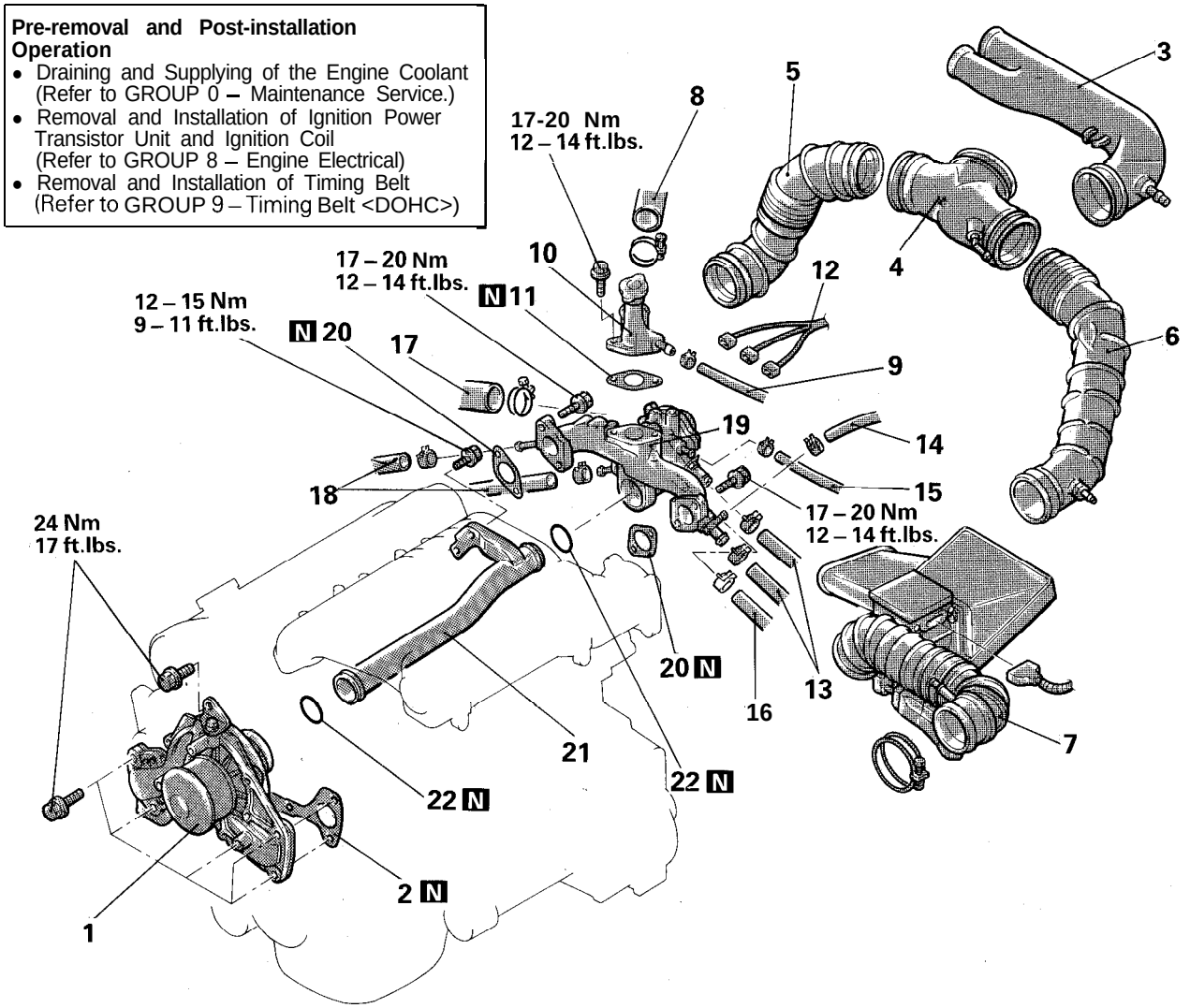
Insert the O-ring to the water inlet pipe B, and coat the outer circumference of the O-ring with water.
By coating with water, the insertion to the water pump will become easier.

Caution
Care must be taken not to permit engine oil or other greases to adhere to the O-ring.

WATER PUMP, WATER PIPE AND WATER HOSE <DOHC>

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Draining and Supplying of the Engine Coolant (Refer to GROUP 0 – Maintenance Service.)
- Removal and Installation of Ignition Power Transistor Unit and Ignition Coil (Refer to GROUP 8 – Engine Electrical)
- Removal and Installation of Timing Belt (Refer to GROUP 9 – Timing Belt <DOHC>)

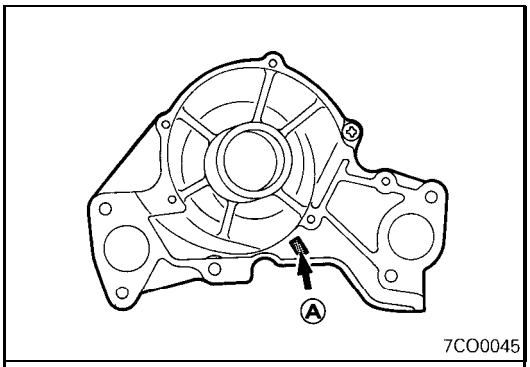


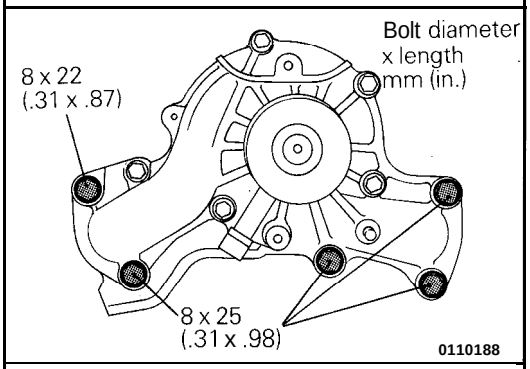
Removal steps

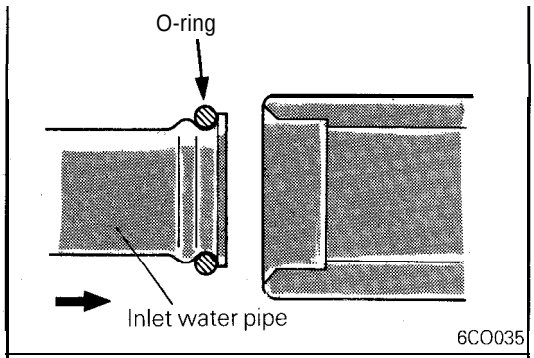
1. Water pump
2. Gasket
3. Air hose A <Turbo>
4. Air intake hose A <Turbo>
5. Air intake hose B <Turbo>
6. Air intake hose C <Turbo>
7. Air intake hose <Non-Turbo>
8. Connection of radiator upper hose
9. Connection of water hose <Turbo>
10. Water outlet fitting
11. Gasket
12. Connection of harness
13. 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

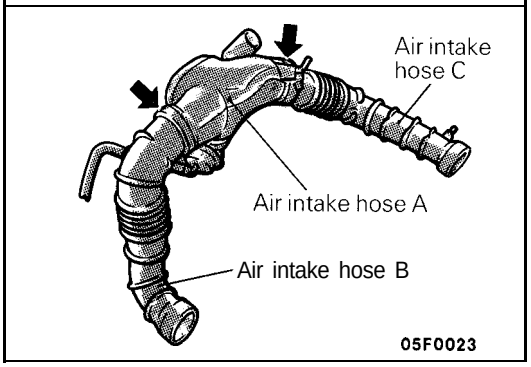
Installation steps

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>









INSPECTION

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 Ⓐ.

SERVICE POINTS OF INSTALLATION

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

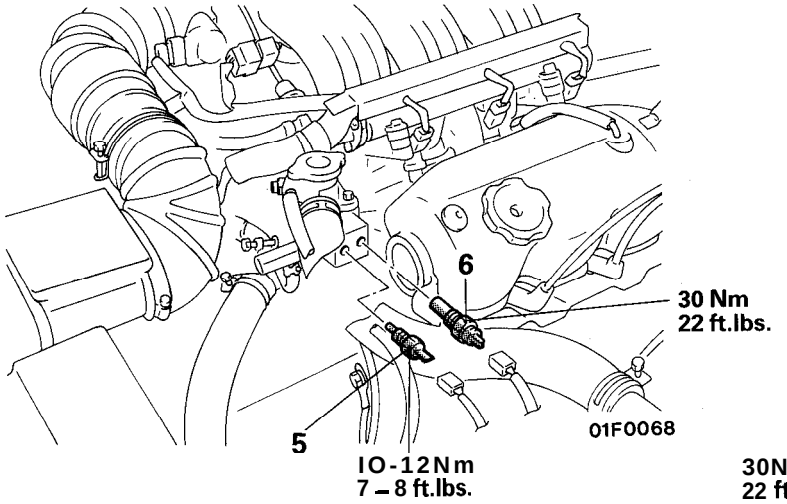
Assemble the air intake hose A with its notches (arrow-marked) lined up with the △ marks on the air intake hoses B and C. Insert the hoses into the air intake hose A until they are bottomed.
Insert the air intake hoses B and C on the turbocharger side until they are bottomed.

ENGINE COOLANT TEMPERATURE GAUGE UNIT AND ENGINE COOLANT TEMPERATURE SENSOR

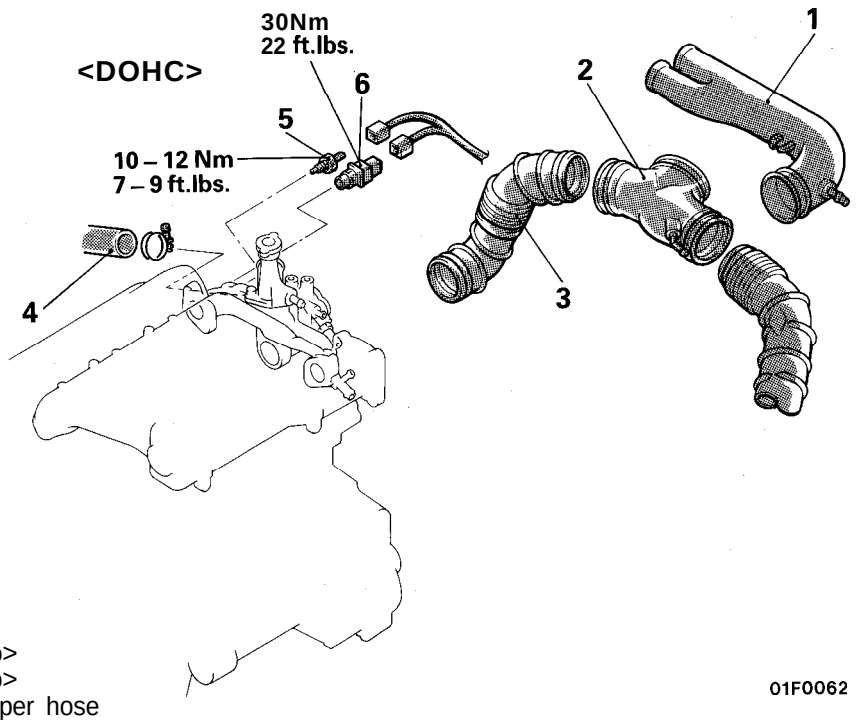
REMOVAL AND INSTALLATION

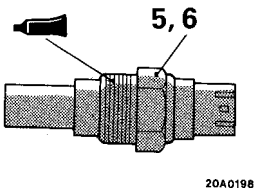
Pre-removal and Post-installation Operation
- Draining and Supplying of the Engine Coolant (Refer to GROUP 0- Maintenance Service.)

<SOHC>



<DOHC>





Sealant: MOPAR Part No. 4318034 or equivalent

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)

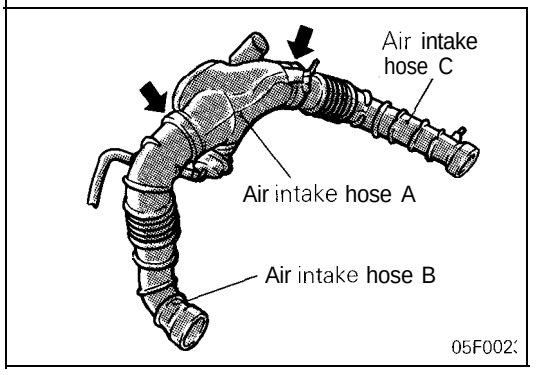
INSPECTION

ENGINE COOLANT TEMPERATURE GAUGE UNIT

Refer to GROUP 8 – Meters and Gauges.

ENGINE COOLANT TEMPERATURE SENSOR (Engine control)

Refer to GROUP 14 – MFI System Inspection.



SERVICE POINTS OF INSTALLATION

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 △ 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.

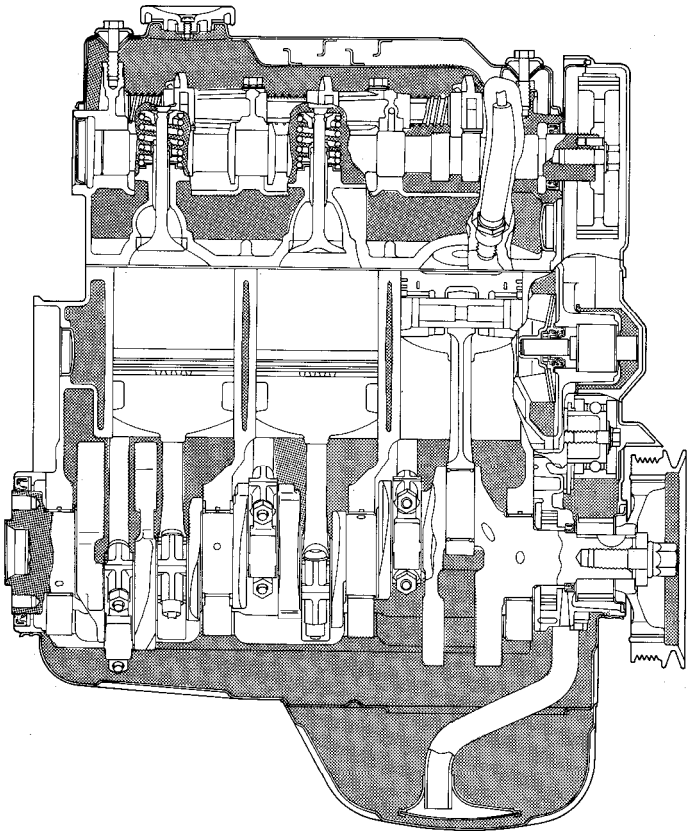
ENGINE

CONTENTS

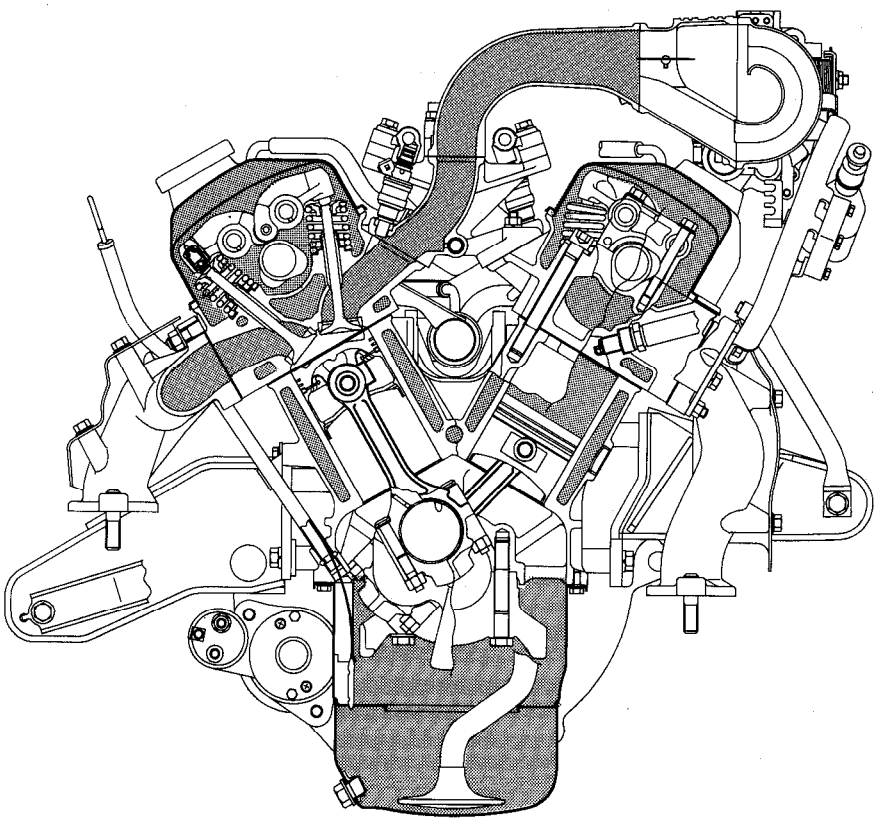
GENERAL INFORMATION

SECTIONAL VIEW

<SOHC>

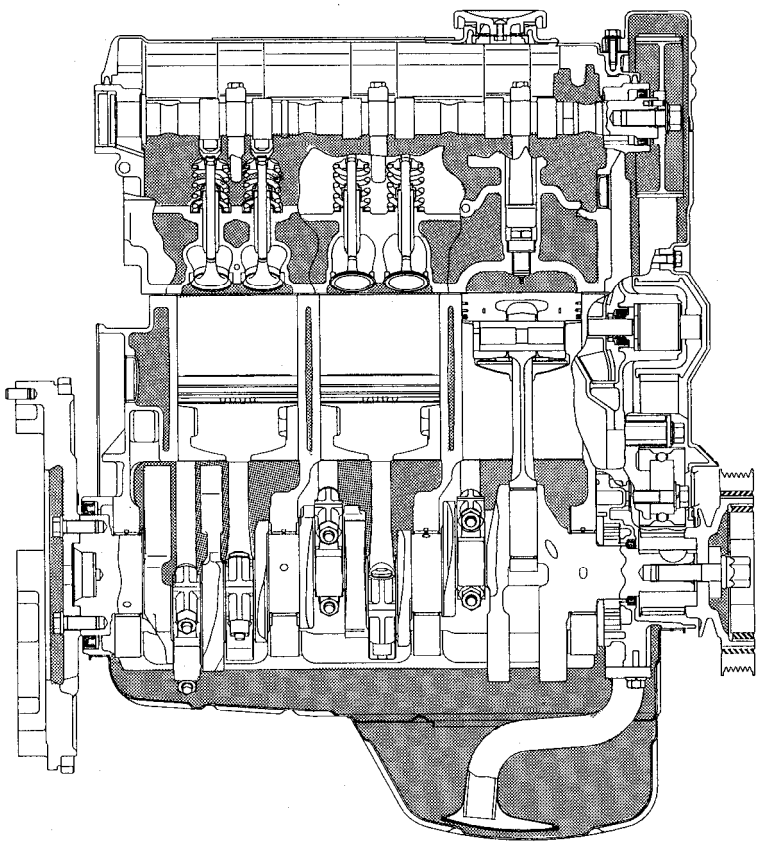


7EN0090



7EN0324

DOHC>



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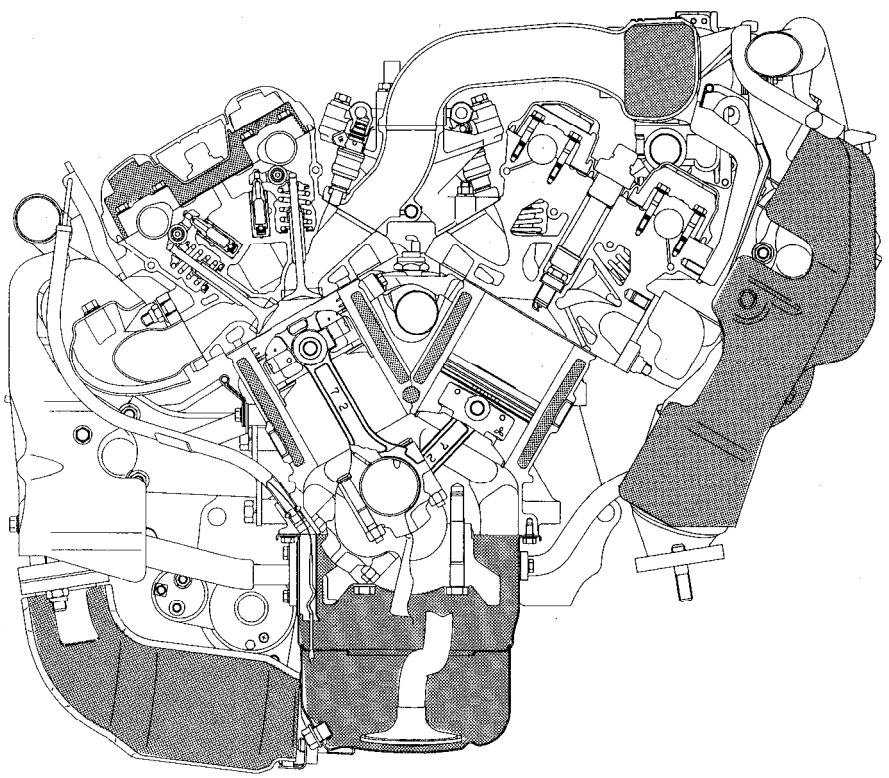
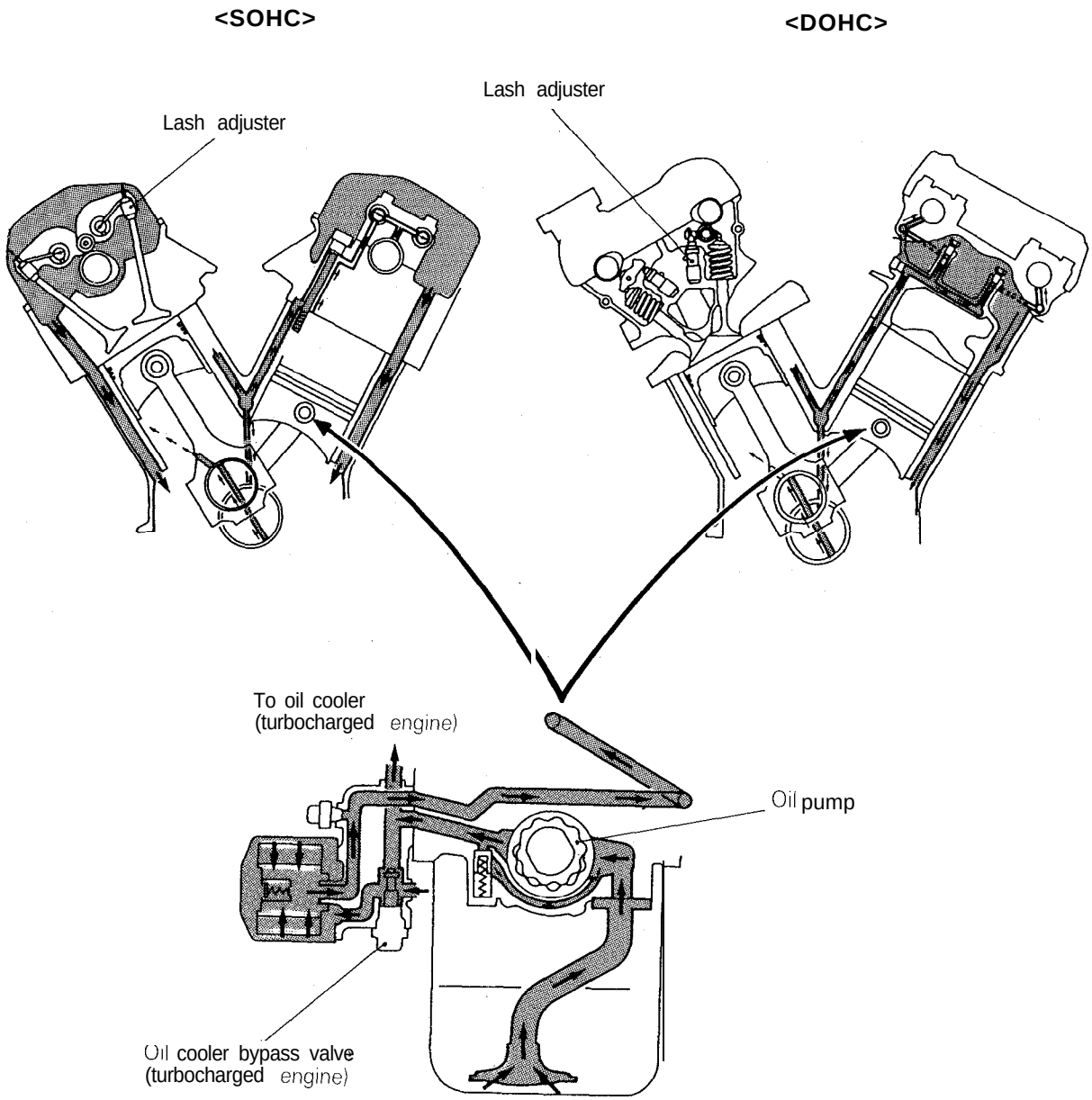


7EN0334

LUBRICATION SYSTEM



7LU0020

SPECIFICATIONS

GENERAL SPECIFICATIONS

Items	SOHC	DOHC – Non-Turbo	DOHC -Turbo
Type	V-type, SOHC	V-type, DOHC	V-type, DOHC
Number of cylinders	6	6	6
Bore mm (in.)	91 .1 (3.587)	91 .1 (3.587)	91 .1 (3.587)
Stroke mm (in.)	76.0 (2.992)	76.0 (2.992)	76.0 (2.992)
Piston displacement cm^3 (cu.in.)	2,972 (181.4)	2,972 (181.4)	2,972 (181.4)
Compression ratio	8.9	10.0	8.0
Firing order	1-2-3-4-5-6	1-2-3-4-5-6	1-2-3-4-5-6
Valve timing			
Intake valve			
Opens (BTDC)	19"	1 6	16"
Closes (ABDC)	59"	55"	55"
Exhaust valve			
Opens (BBDC)	59"	48"	50"
Closes (ATDC)	19"	15"	17"

SERVICE SPECIFICATIONS

Items	Standard value	Limit
Compression pressure kPa (psi)/rpm		
SOHC	1,200 (171)/250 – 400	min. 890 (127)/250 – 400
DOHC – Non-Turbo	1,300 (185)/250 – 400	min. 980 (139)/250 – 400
DOHC -Turbo	1,100 (156)/250 – 400	min. 810 (115)/250 – 400
Compression pressure difference of all cylinder kPa (psi)		max. 100 (14)
Manifold vacuum mmHg (in.Hg.)		min. 450 (18)
Basic ignition timing at curb idle speed		
BTDC SOHC	5" ± 2	
DOHC	5" ± 3	
Actual ignition timing at curb idle speed	Approx. 15"	
BTDC		
Curb idle speed rpm	700 ±100	
CO concentration %	0.5 or less	
HC concentration ppm	100 or less	

Items	Standard value	Limit
Cylinder head-SOHC		
Overall height mm (in.)	**84 (3.31)**	**-0.2** (–.008)*
Flatness of gasket surface mm (in.)	**max. 0.05** (.0019)	**0.2** (.008)
Oversize **rework dimension of valve seat hole mm (in.)**		
Intake 0.3 (.012) **O.S.**	44.300 – **44.325** (1.7440 – **1.7451**)	
0.6 (.024) **O.S.**	44.600 – **44.625 (1.7559 – 1.7569)**	
Exhaust 0.3 (.012) **O.S.**	38.300 – **38.325** (1.5079 – **1.5089**)	
0.6 (.024) **O.S.**	38.600 – **38.625 (1.5197 – 1.5207)**	
Oversize rework dimension of valve seat hole depth mm (in.)		
Intake 0.3 (.012) **O.S.**	**7.9-8.1** (.311–.319)	
0.6 (.024) **O.S.**	**8.2 – 8.4** (.323–.331)	
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)	
Cylinder head – DOHC		
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.	12.050 – 12.068 (.5138 – .5145)	
0.25 (.010) **O.S.**	12.250 – **12.268** (.5217 – .5224)	
0.50 (.020) O.S.	12.500 – 12.518 (.5315 – .5322)	

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

Items	Standard value	Limit
Camshaft – SOHC		
Cam height mm (in.)		
Intake	**41.25 (1.6240)**	**40.75 (1.6430)**
Exhaust	**41.25 (1.6240)**	**40.75 (1.6430)**
Journal O.D. mm (in.)	**34 (1.34)**	
Bearing oil clearance mm (in.)	**0.05 – 0.09** (.0020–.0035)	
Camshaft – DOHC		
Cam height mm (in.)		
Intake	**34.91 (1.3744)**	**34.41 (1.3547)**
Exhaust	**34.91 (1.3744)**	**34.41 (1.3547)**
Journal O.D. **mm (in.)**	**26 (1.02)**	
Bearing oil clearance mm (in.)	**0.05 – 0.09** (.0020–.0035)	
Rocker arm -SOHC		
I.D. mm (in.)	**18.9** (.744)	
Clearance (Rocker arm to shaft) mm (in.)	**0.01 – 0.04** (.0004–.0016)	**0.10** (.0039)
Rocker arm shaft – SOHC		
O.D. mm (in.)	**18.9** (.744)	
Valve – SOHC		
Valve length mm (in.)		
Intake	**103.0** (4.055)	
Exhaust	**102.7** (4.043)	
Stem O.D. mm (in.)		
Intake	**8.0** (.314)	
Exhaust	**8.0** (.314)	
Face angle	**45 – 45.5"**	
Thickness of valve head (Margin) mm (in.)		
Intake	**1.2** (.047)	**0.7** (.028)
Exhaust	**2.0** (.079)	**1.5** (.059)
Clearance (Valve **stem to guide)** mm (in.)		
Intake	**0.03 – 0.06** (.0012–.0024)	**0.10** (.0039)
Exhaust	**0.05 – 0.09** (.0020–.0035)	**0.15** (.0059)

Items	Standard value	Limit
Valve – DOHC		
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)
Valve guide – SOHC		
Length mm (in.)		
Intake	44 (1.73)	
Exhaust	48 (1.89)	
Service size mm (in.)	0.05 (.002), 0.25 (.010), 0.50 (.020) Oversize	
Valve guide – DOHC		
Length mm (in.)		
Intake	45.5 (1.791)	
Exhaust	50.5 (1.988)	
Service size mm (in.)	0.05 (.002), 0.25 (.010), 0.50 (.020) Oversize	
valve seat		
Width of seat contact mm (in.)	0.9 – 1.3 (.035–.051)	
Seat angle	44-44.5"	
Valve spring – SOHC		
Free length mm (in.)	49.8 (1.961)	48.8 (1.921)
Load N (lbs.)	329 (74) at installed height	
Installed height mm (in.)	40.4 (1.591)	41.4 (1.630)
Squareness	Less than 2"	4"
Valve spring – DOHC		
Free length mm (in.)	46.4 (1.827)	45.4 (1.787)
Load N (lbs.)	240 (53) at installed height	
Installed height mm (in.)	37.9 (1.492)	
Squareness	Less than 2"	4"
Cylinder block		
Cylinder bore mm (in.)	91.10 (3.5866)	
Out-of-roundness and taper of cylinder bore mm (in.)	Less than 0.02 (.0008)	
Flatness of gasket surface mm (in.)	Less than 0.05 (.0020)	0.10 (.0039)

Items	Standard value	Limit
Piston		
O.D mm (in.)	91.10 (3.5866)	
Clearance (Piston to cylinder) mm (in.)	0.03 – 0.05 (.0012–.0020)	
Ring groove width mm (in.)		
No. 1	1.2 (.047)	
No. 2	1.5 (.059)	
Oil	3.0 (.118)	
Service size mm (in.)	0.25 (.010), 0.50 (.020), 0.75 (.030), 1.00 (.039) Oversize	
Piston ring		
Side clearance mm (in.)		
No. 1	0.03 – 0.07 (.0012–.0028)	0.1 (.004)
No. 2	0.02 – 0.06 (.0008–.0024)	0.1 (.004)
End gap mm (in.)		
No. 1	0.30 – 0.45 (.0118–.0177)	0.8 (.031)
No. 2	0.45 – 0.60 (.0177 –.0236)	0.8 (.031)
Oil ring side rail mm (in.)	0.20 – 0.60 (.0079–.0236)	1.0(.039)
Service size mm (in.)	0.25 (.010), 0.50 (.020), 0.75 (.030), 1.00 (.039) Oversize	
Connecting rod		
Bend mm (in.)	0.05 (.0020) or less	
Twist mm (in.)	0.1 (0.004) or less	
Big end to thrust clearance mm (in.)	0.10 – 0.25 (.0039–.0098)	0.4 (.016)
Piston pin press-in load N (lbs.)	7,500 – 17,500 (1,686 – 3,934)	
Connecting rod bearing		
Oil clearance mm (in.)		
SOHC	0.016–0.046 (.0006–.0018)	0.1 (.004)
DOHC	0.022–0.048 (.0009–.0019)	0.1 (.004)
Crankshaft main bearing		
Oil clearance mm (in.)		
SOHC	0.020–0.048 (.0008–.0019)	0.1 (.004)
DOHC	0.018-0.036 (.0007–.0014)	0.1 (.004)

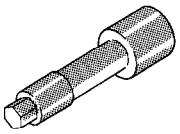
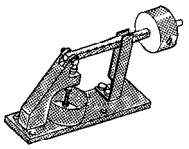
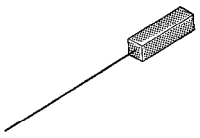
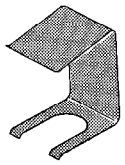
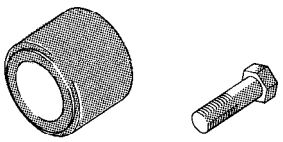
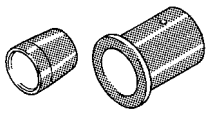
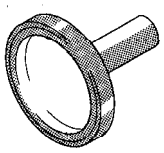
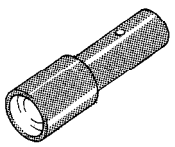
Items	Standard value	Limit
Crankshaft		
Pin O.D. mm (in.)	49.9 (1.965)	
Journal O.D. mm (in.)	59.9 (2.358)	
Out-of-roundness of journal and pin mm (in.)		
SOHC	Less than 0.005 (.0002)	
DOHC	Less than 0.003 (.00012)	
Taper of journal and pin mm (in.)	Less than 0.005 (.0002)	
End play mm (in.)	0.05 – 0.25 (.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		
Tip clearance	0.03 – 0.08 (.0012 – .0031)	
Side clearance	0.04 – 0.10 (.0016 – .0039)	
Body clearance	0.10 – 0.18 (.0040 – .0070)	
Relief spring		
Free length mm (in.)		
Non Turbo	43.8 (1.724)	
Turbo	46.3 (1.823)	
Load mm (in.)		
Non Turbo [37 N (8.3 lbs.)]	40.1 (1.579)	
Turbo [69 N (15.2 lbs.)]	39.1 (1.539)	
Drive belt <SOHC>		
For alternator and power steering oil pump		
Deflection mm (in.)		
Inspection	6.0 – 9.0 (.236 – .354)	
New belt	4.0 – 5.0 (.157 – .196)	
Used belt	6.0 – 8.0 (.236 – .315)	
Tension N (lbs.)		
Inspection	350 – 600 (77 – 132)	
New belt	700 – 900 (155 – 198)	
Used belt	450 – 600 (99 – 132)	
For air conditioning compressor		
Deflection mm (in.)		
Inspection	7.5 – 9.5 (.295 – .374)	
New belt	6.5 – 7.0 (.256 – .275)	
Used belt	7.5 – 8.5 (.295 – .335)	
Tension N (lbs.)		
Inspection	250 – 500 (55 – 110)	
New belt	500 – 600 (110 – 132)	
Used belt	320 – 400 (70 – 88)	
Timing belt tension <SOHC> N (lbs.)	210 – 310 (46.3 – 68.3)	

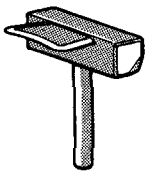
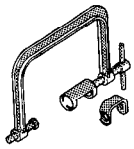
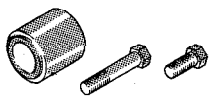
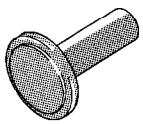
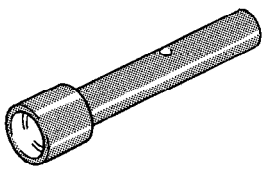
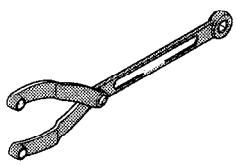
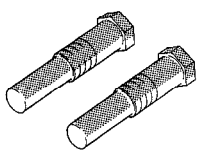
Items	Standard value	Limit
Drive belt <DOHC>		
For generator (Vehicle without air conditioning)		
Deflection mm (in.)		
Inspection	4.0 – 5.5 (.157 – .216)	
New belt	3.5 – 4.0 (.138 – .157)	
Used belt	4.0 – 5.0 (. 157 – .1 96)	
Tension N (lbs.)		
Inspection	350 – 600 (77 – 132)	
New belt	650 – 850 (143 – 198)	
Used belt	450 – 600 (99 – 132)	
For generator and air conditioning compressor		
Deflection mm (in.)		
Inspection	4.0 – 5.5 (.157 – .216)	
New belt	3.5-4.0 (.138 – .157)	
Used belt	4.0 – 5.0 (.157 – .196)	
For power steering pump		
Deflection mm (in.)		
Inspection	9.5 – 13.5 (.374 – .531)	
New belt	7.5 – 9.0 (.295 – .354)	
Used belt	10.5 – 12.5 (.413 – .492)	
Tension N (lbs.)		
Inspection	250 – 500 (55 – 110)	
New belt	500-700 (1 IO- 154)	
Used belt	350 – 400 (77 – 88)	
Timing belt <DOHC>		
Amount of projection of auto tensioner rod mm (in.) (distance between the tensioner arm and auto tensioner body)	3.8 – 4.5 (.149 – .177)	

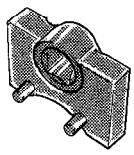
SEALANTS

Items	Recommended sealant
Oil pan Oil seal case	MITSUBISHI GENUINE Part No. MD9971 10 or equivalent
Oil pressure switch Oil pressure gauge unit	MOPAR Part No. 4318034 or equivalent
Rocker arm shaft assembly Rocker cover	MOPAR Part No. 4318034 or equivalent

SPECIAL TOOLS

Tool number and tool name	Replaced by Miller tool number	Application
 MD998051 Cylinder head bolt wrench	General service tool	Loosening and tightening of cylinder head bolt
 MD998440 **Leak-down tester**	MD998440	Leak-down test of lash adjuster
 MD998441 Lash adjuster retainer	MD998441	**Bleeding of air inside the adjuster For SOHC engine only**
 MD998442 **Air bleed wire**	MD998442	Air bleeding of auto lash adjuster
 MD998443 Lash adjuster holder (8)	MD998443	Supporting of the lash adjuster to prevent it from falling when rocker shaft assembly is removed or installed <SOHC>
 MD998713 **Camshaft oil seal** installer	MD998713	**Installation of camshaft oil seal <SOHC> Installation of circular packing <SOHC>**
 MD998717 **Crankshaft front oil seal installer**	MD998717	Installation of crankshaft front oil seal
 MD998718 **Crankshaft rear oil seal installer**	MD998718	Installation of crankshaft rear oil seal
 MD998729 **Valve stem seal** installer	MD998729	Installation of valve stem seal <SOHC>

Tool number and tool name	Replaced by Miller tool number	Application
 MD998727 Oil pan **remover**	General service tool (Use a scrapar and exercise care	Removal of the oil pan
 MD998735 Valve spring compressor	C-3422-B and 6526 or 7068 and 6527	Removal and installation of valve and related parts
 MD998761 **Camshaft oil seal** installer	MD998761	Installation camshaft oil seal <DOHC>
 MD998762 Circular packing installer	MD998762	Installation of circular packing <DOHC>
 MD998763 **Valve stem seal** installer	MD998763	Installation of valve stem seal <DOHC>
 MD998782 Valve lifter set	MD998782	Removal of rash adjuster <DOHC>
 MB990767 End yoke holder	C-3281	Supporting the sprocket and shaft pulley when attaching or detaching them **Supporting the crankshaft pulley when crankshaft bolt and pulley are removed or** reinstalled.
 MD998754 Crank pulley holder	MD998754	
 MB990998* Crankshaft wrench	MB990998	Used if the crankshaft needs to be rotated to attach the timing belt, etc. when the piston and connecting rod assembly is assembled. <SOHC> *: Use only th**e large nut included in** MB990998**, together with the crankshaft** pulley bolt.

Tool number and tool name	Replaced by Miller tool number	Application
 MD998767 Tensioner pulley socket wrench	MD998767	Adjustment of timing belt <DOHC>

TROUBLESHOOTING

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

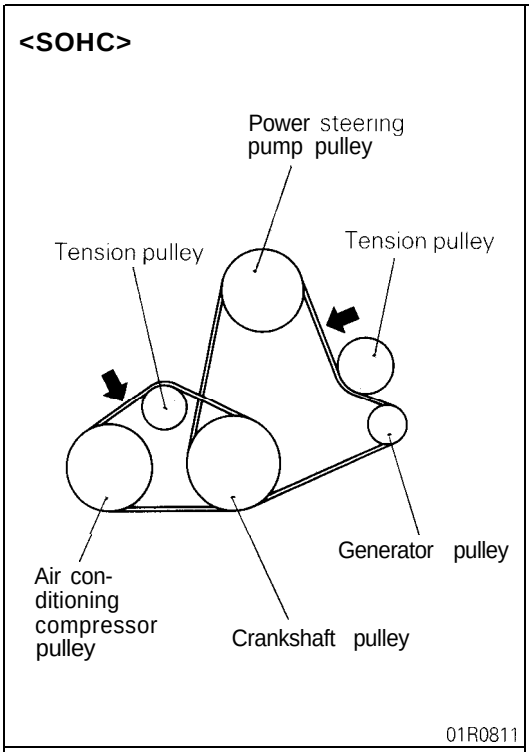
SERVICE ADJUSTMENT PROCEDURES

DRIVE BELTS TENSION ADJUSTMENT

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.

<SOHC>

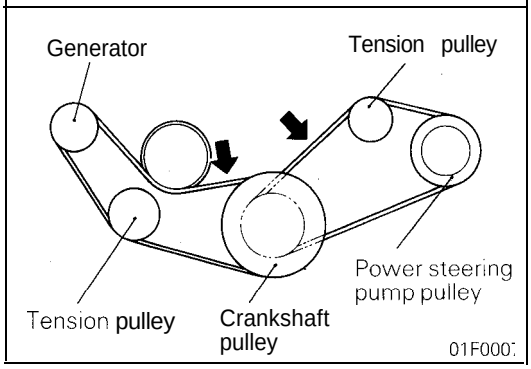
Standard value:



Items		Check value	Adjustment value	
			New belt	Used belt
For generator and P/S pump	Deflection mm (in.)	6.0 – 9.0 (.24 – .35)	4.0 – 5.0 (.16 – .20)	6.0 – 8.0 (.24 – .32)
	Tension N (lbs.)	350 – 600 (77 – 132)	700 – 900 (155 – 198)	450 – 600 (99 – 132)
For A/C compressor	Deflection mm (in.)	7.5 – 9.5 (.28 – .37)	6.5 – 7.0 (.26 – .28)	7.5 – 8.5 (.28 – .34)
	Tension N (lbs.)	250 – 500 (55 – 110)	500 – 600 (110 – 132)	320 – 400 (70 – 88)

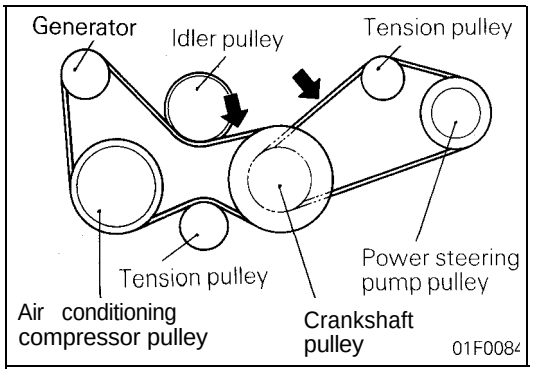
<DOHC>

Standard value: <Vehicle without air conditioning>

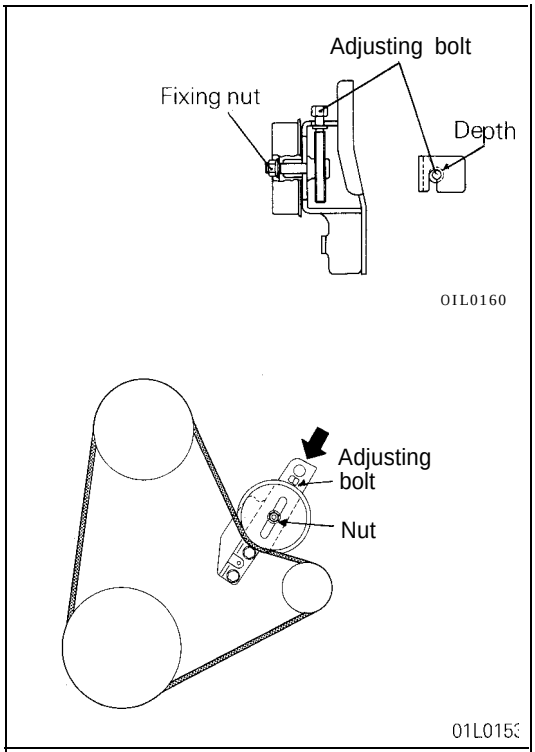


Items		Check value	Adjustment value	
			New belt	Used belt
For generator	Deflection mm (in.)	4.0 – 5.5 (.16 – .22)	3.5 – 4.0 (.14 – .16)	4.0 – 5.0 (.16 – .20)
	Tension N (lbs.)	350 – 600 (77 – 132)	650 – 850 (143 – 197)	450 – 600 (99 – 132)
For P/S pump	Deflection mm (in.)	9.5 – 13.5 (.37 – .53)	7.5 – 9.0 (.30 – .35)	10.5 – 12.5 (.41 – .49)
	Tension N (lbs.)	250 – 500 (55 – 110)	500 – 700 (110 – 154)	350 – 400 (77 – 88)

Standard value: <Vehicle with air conditioning>



Items		Check value	Adjustment value	
			New belt	Used belt
For generator and A/C compressor	Deflection mm (in.)	4.0 – 5.5 (.16 – .22)	3.5 – 4.0 (.14 – .16)	4.0 – 5.0 (.16 – .20)
For P/S pump	Deflection mm (in.)	9.5 – 13.5 (.37 – .53)	7.5 – 9.0 (.30 – .35)	10.5 – 12.5 (.41 – .49)
	Tension N (lbs.)	250 – 500 (55 – 110)	500 – 700 (110 – 154)	350 – 400 (77 – 88)



TENSION ADJUSTMENT OF THE GENERATOR AND POWER STEERING PUMP DRIVE BELT <SOHC>

(1) Loosen tension pulley fixing bolt.
(2) Adjust belt deflection with adjusting bolt.

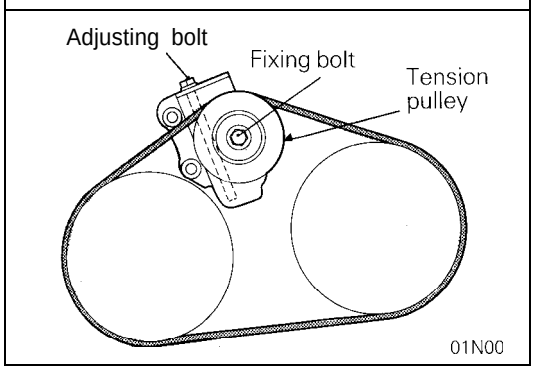
Caution
Put the adjusting bolt into the recess at the far depth of the elongated hole on the tension bracket.

(3) Tighten the fixing nut.

Tightening torque: 50 Nm (36 ft.lbs.)

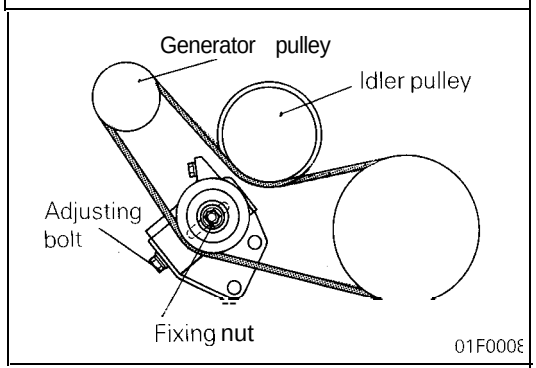
(4) Run the engine one time or more.
(5) Check the deflection or belt tension. Readjust, if necessary.

Caution
Before checking, turn the engine one time or more.



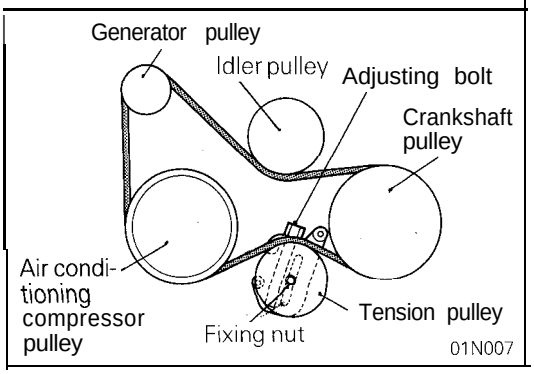
TENSION ADJUSTMENT OF THE AIR CONDITIONING COMPRESSOR DRIVE BELT <SOHC>

(1) Loosen tension pulley fixing bolt.
(2) Adjust belt deflection with adjusting bolt.
(3) Tighten fixing bolt.
(4) Run the engine one time or more.
(5) Check the belt tension. Readjust, if necessary.



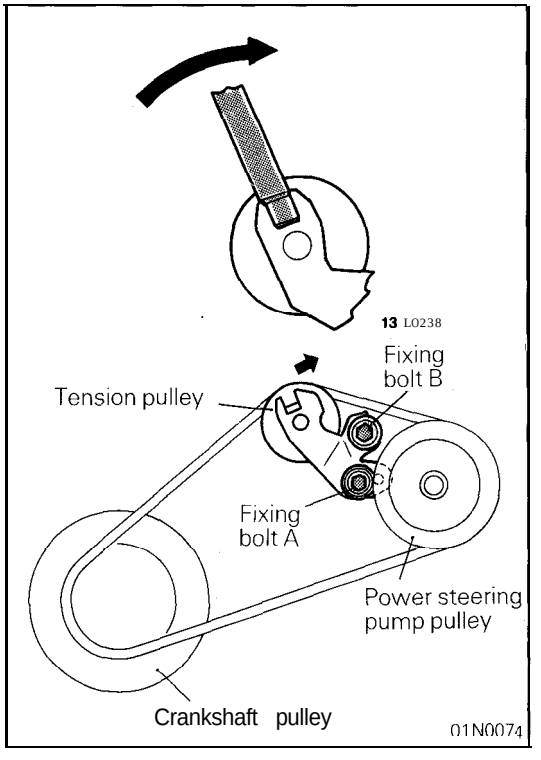
TENSION ADJUSTMENT OF THE GENERATOR DRIVE BELT <DOHC> <Vehicle without air conditioning>

(1) Remove under covers (front L.H., side L.H.).
(2) Loosen tension pulley fixing nut.
(3) Adjust belt deflection with adjusting bolt.
(4) Tighten fixing bolt.
(5) Run the engine one time or more.
(6) Check the belt tension. Readjust, if necessary.
(7) Install under covers.



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

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



DEFLECTION ADJUSTMENT OF POWER STEERING PUMP DRIVE BELT <DOHC>

(1) Remove the cruise control pump link assembly.
(2) Place the power steering hose under the oil reservoir.
(3) Insert an extension bar (insertion depth 12.7 mm), etc. into the opening at the end of the tension pulley bracket.
(4) Use straight handle box wrench to loosen the tension pulley fixing bolts in the order of A and B.
(5) Move the extension bar installed to the tension pulley in the direction of arrow to adjust the belt tension.
(6) Use straight handle box wrench to tighten the tension pulley fixing bolts in the order of A and B.

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

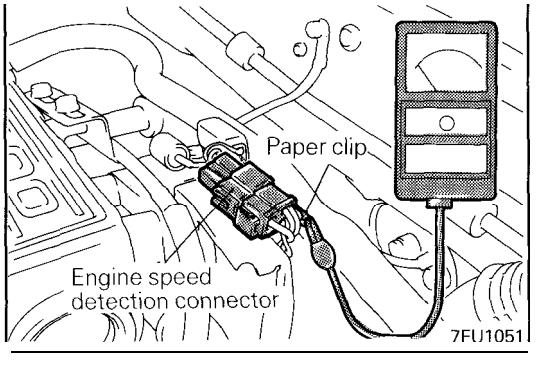
(7) Give the crankshaft one turn or more in normal direction (clockwise) to run in the belt.
(8) Check the belt deflection. Readjust, if necessary.
(9) Secure the return hose to the clamp of the oil reservoir positively.
(10) Install the cruise control pump link assembly.

IGNITION TIMING ADJUSTMENT <SOHC>

(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)

*: In the case of vehicles for Canada, the headlight, tail light, etc. will remain lit even when the lighting switch is turned OFF but this is no problem.



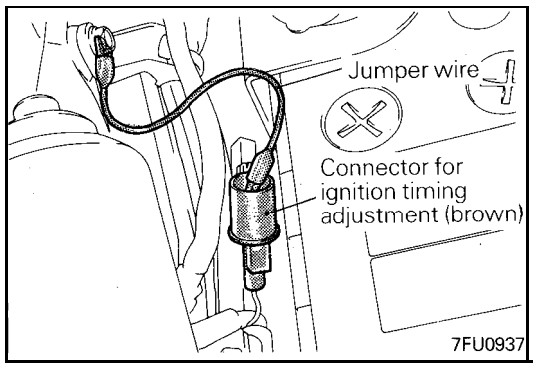
(2) Insert a paper clip to the engine speed detection connector (blue), and connect a tachometer to the paper clip.

NOTE
(1) The scan tool must be disconnected.
(2) Nothing can be connected to the diagnosis connector.
(3) Using the scan tool to read engine speed or ignition timing, will result in an incorrect basic ignition timing adjustment.

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

Curb idle speed: 700 ±100 rpm

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



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

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

(9) Start the engine and run at idle.
(1O)Check basic ignition timing.

Basic ignition timing: 5" BTDC ± 2"

(11)If not within the standard value range, loosen the distributor mounting nut and adjust by turning the distributor. Turning it to the counterclockwise retards timing, and to the clockwise advances it.
(12)After adjustment, tighten mounting nut taking care not to move the distributor.
(13)Turn OFF the ignition switch.
(14)Disconnect the jumper wire connected at step (8).
(15)Check to be sure that the idling ignition timing is the correct timing.

Actual ignition timing: Approx. 15°BTDC

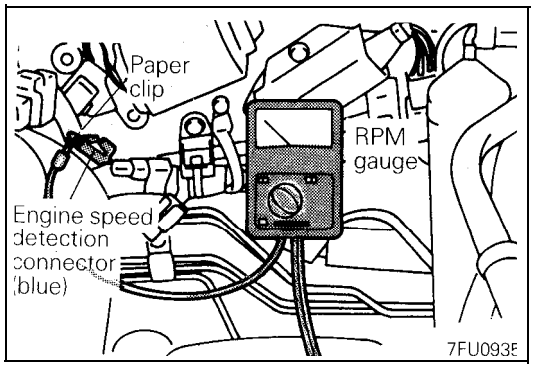
NOTE
(1) Ignition timing is variable within about ±7° even under normal operating.
(2) And it is automatically further advanced by about 5 from 15°BTDC at higher altitudes.

IGNITION TIMING INSPECTION <DOHC>

(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)

*: In the case of vehicles for Canada, the headlight, tail light, etc. will remain lit even when the lighting switch is turned OFF but this is no problem.



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

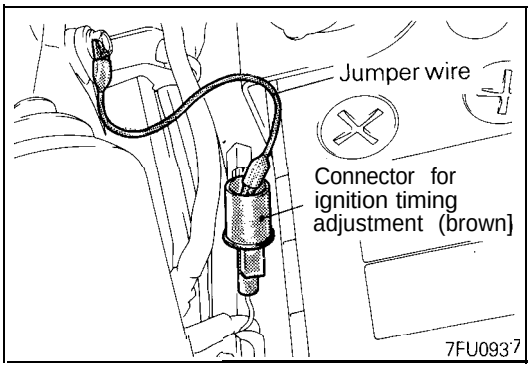
NOTE
Do not use the scan tool.
If tested with the scan tool connected to the data link connector, the ignition timing will not be the basic timing but be ordinary timing.

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

Curb idle' speed: 700 ± 100 rpm

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

(6) Turn OFF the ignition switch.
(7) Disconnect the waterproof female connector from the ignition timing adjusting connector (brown).



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

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

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

Basic ignition timing: 5°BTDC ± 3"

(11) If basic ignition timing is not within the standard range, check the crankshaft position sensor by reference to Group 14, On-vehicle Inspection of MFI components.
(12) Disconnect the jumper wire connected at step (8).
(13) Check to be sure that the idling ignition timing is the correct timing.

Actual ignition timing: Approx. 15°BTDC

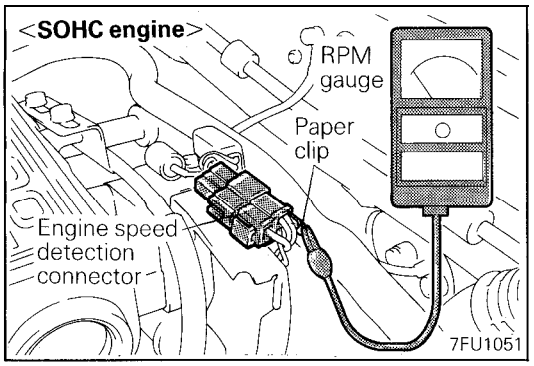
NOTE
(1) Ignition timing is variable within about ±7°, even under normal operating.
(2) And it is automatically further advanced by about 5 from 15°BTDC at higher altitudes.

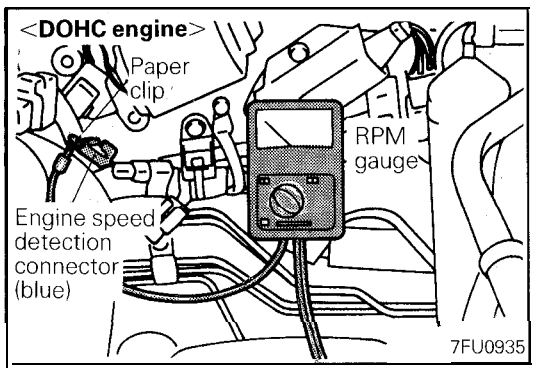
CURB IDLE SPEED INSPECTION

(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

*: In the case of vehicles for Canada, the headlight, tail light, etc. will remain lit even when the lighting switch is turned OFF but this is no problem.





(2) Connect a tachometer. (Refer to P.9-18)
(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:
<SOHC> 5" BTDC ± 2
<DOHC> 5" BTDC ± 3"

(7) Remove the jumper wire from the ignition timing adjusting terminal.
(8) Idle the engine for two minutes.
(9) Check the idle speed.

Curb idle speed: 700 ± 100 rpm

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

(lO)If there is a deviation from the standard value refer to Group 14 – chart "Classified by Problem Symptoms" and check the MFI components.

IDLE MIXTURE INSPECTION

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

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

Standard value:
<SOHC> 5" BTDC ± 2
<DOHC> 5" BTDC ± 3"

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

NOTE
For tachometer setting procedure, refer to P.9-18.

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

Standard value:
CO concentration 0,5% or less
HC concentration 100 ppm or less

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

- Leaks in EGR system and EGR valve
- Evaporative emission control system
- Compression pressure

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

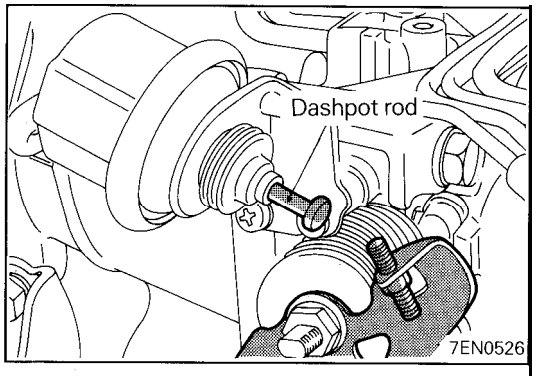
DASHPOT INSPECTION AND ADJUSTMENT <DOHC Turbo and Non Turbo M/T vehicles for California>

(1) Inspect the idle speed before inspection and adjustment of the dashpot.
(2) set the vehicle in the following conditions before dashpot inspection and adjustment.
- Engine coolant temperature: 80 – 95°C (176 – 205°F)
- Lights, electrical cooling fan and accessories: OFF
- Transaxle: neutral

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

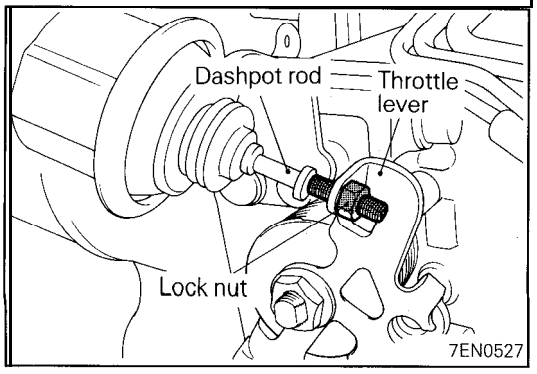
NOTE
For the tachometer setting procedure, refer to P.9-18.

(4) Start the engine.



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

Standard value: 2,200 ± 200 rpm



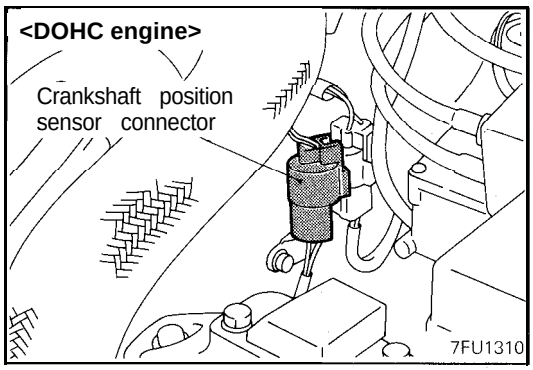
(8) If the engine speed is not within the specified limit, loosen the lock nut on the rod and turn the rod to make adjustment for proper dashpot starting engine speed.
(9) Release the throttle valve to make sure that the engine speed slowly drops to the idle speed.

COMPRESSION PRESSURE CHECK

(1) Prior to inspection, check to ensure that the engine oil, starter motor and battery are in proper condition. Place the vehicle in the following conditions.
- Engine coolant temperature: 80 – 95°C (176 – 205°F)
- Lights, electric cooling fan and accessories: OFF
- Transaxle: Neutral (P for A/T)

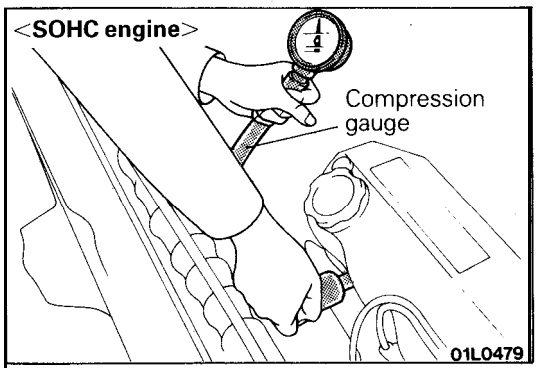
(2) Remove the spark plug cables.
(3) Remove all of the spark plugs.
(4) Disconnect the distributor (SOHC) or crankshaft position sensor (DOHC).

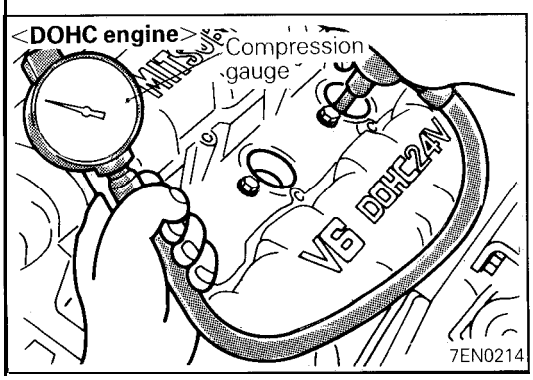
NOTE
By so doing the engine control module stops performing ignition and fuel injection.



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

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





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

Standard value:

<SOHC>	**1,200 kPa (171 psi)**
<DOHC – Non Turbo>	**1,300 kPa (185 psi)**
<DOHC-Turbo>	**1,100 kPa (156 psi)**

Limit:

<SOHC>	**890 kPa (127 psi)**
<DOHC – Non Turbo>	**980 kPa (139 psi)**
<DOHC-Turbo>	**810 kPa (115 psi)**

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

Limit: max. 100 kPa (14 psi)

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

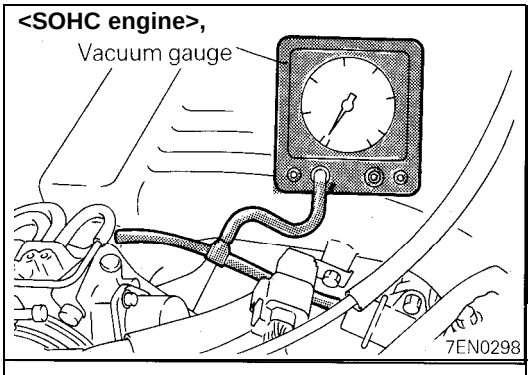
(10) Re-connect the distributor (SOHC) or crankshaft position sensor (DOHC) connector.

(11) Re-mount the spark plugs and spark plug cables.

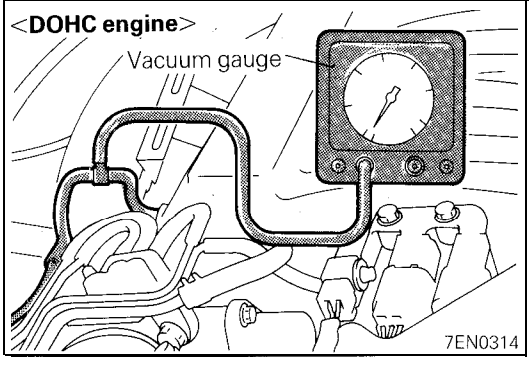
(12) Disconnect the negative (–) terminal of the battery, leave it disconnected for more than 10 seconds, and then re-connect it.

NOTE
When the crankshaft position sensor connector is disconnected, a trouble code is stored in memory. Performing this step clears the trouble code.

<SOHC engine>,



<DOHC engine>



MANIFOLD VACUUM INSPECTION

(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)

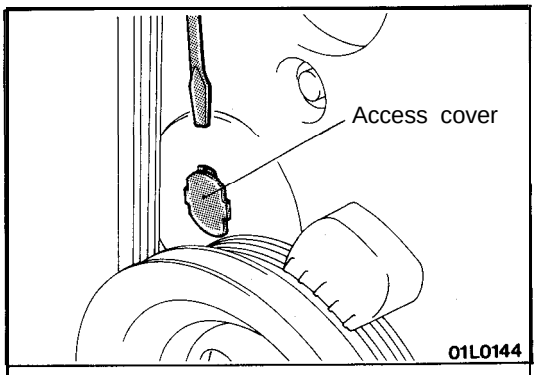
(2) Connect a tachometer. (Refer to P.9-18.)

(3) ① <SOHC, DOHC Non-Turbo>
Install a three-way joint to the vacuum hose connected between the air intake plenum and the fuel pressure regulator and connect a vacuum gauge to the joint.
② <DOHC-Turbo>
Install a three-way joint to the vacuum hose connected between the air intake plenum and the fuel pressure solenoid valve and connect a vacuum gauge.

(4) Start the engine and check that idle speed is within the standard value range.

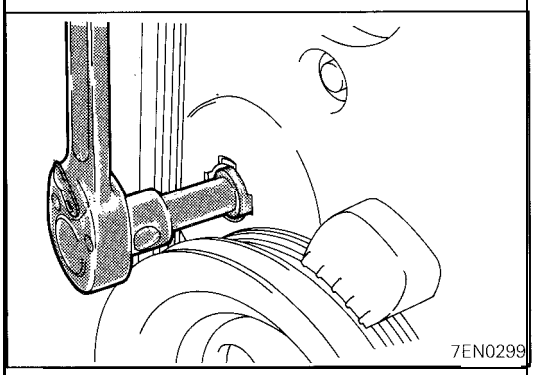
(5) Check the manifold vacuum.

Limit: 450 mmHg (18 in.Hg) min.

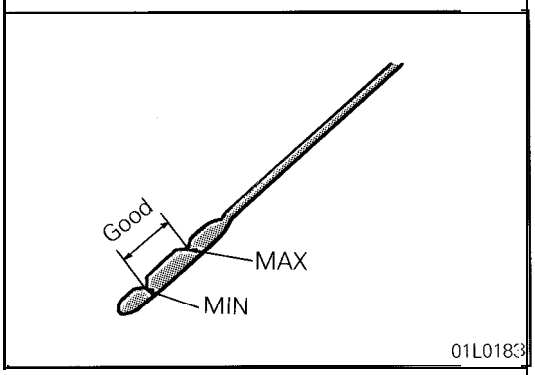


TIMING BELT TENSION ADJUSTMENT <SOHC>

(1) Remove the access cover.



(2) Loosen the timing belt tensioner mounting bolt 1 or 2 turns.
(3) Turn the crankshaft two turns in the clockwise direction.
(4) Tighten the timing belt tensioner mounting bolt.
(5) Attach the access cover.



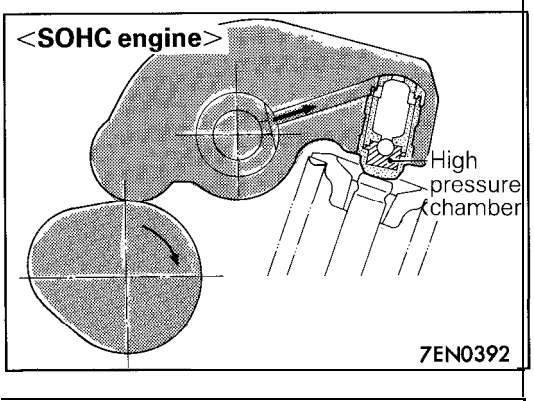
LASH ADJUSTER INSPECTION

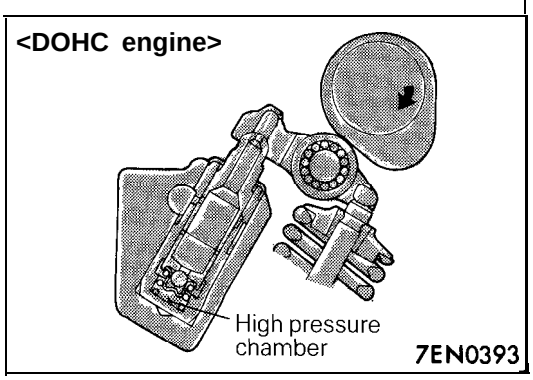
NOTE
Clanging noise that appears to be due to the lash adjuster may be produced immediately after the engine has started or during operation and may persist, In such a case, perform the following checks.

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

NOTE
(1) If the engine oil level is low, the air drawn in from the oil strainer will be trapped in the oil passage.
(2) If the engine oil level is higher than the specified level, agitation of the oil by the cranks could cause a large amount of air to enter the oil.
(3) A deteriorated oil contains a large amount of air, because the air, once trapped, is not readily separated from the oil.

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

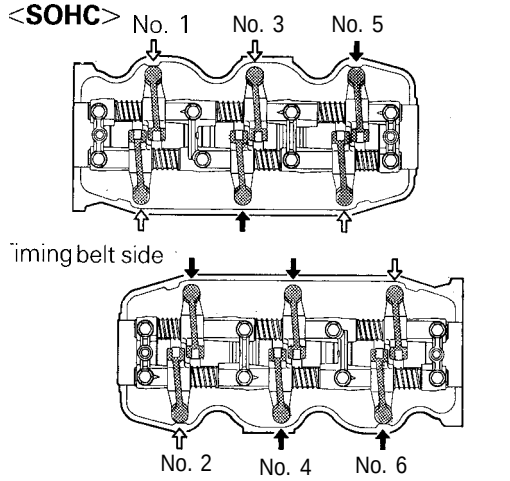




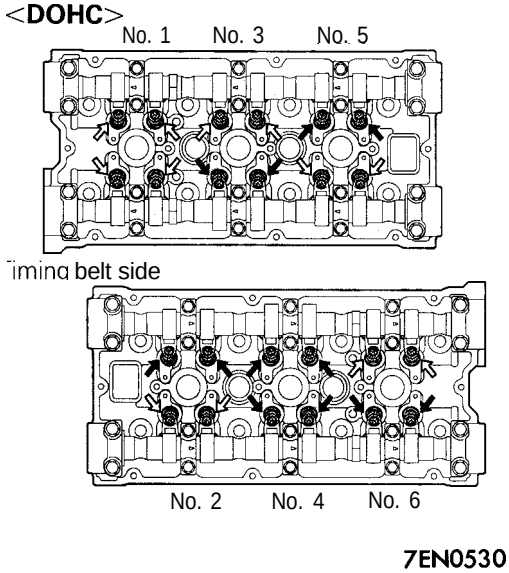
(2) Start the engine and race* it several times (less than 10 times) at moderate speeds.
If racing the engine causes the noise to die away, it means, that the air has escaped from the high pressure chamber of the lash adjuster and that the lash adjuster has regained its normal functions.

* Racing the engine refers to accelerating the engine from the idling speed to 3,000 rpm slowly (in 30 seconds) and then decelerating it to the idling speed slowly (in 30 seconds).

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

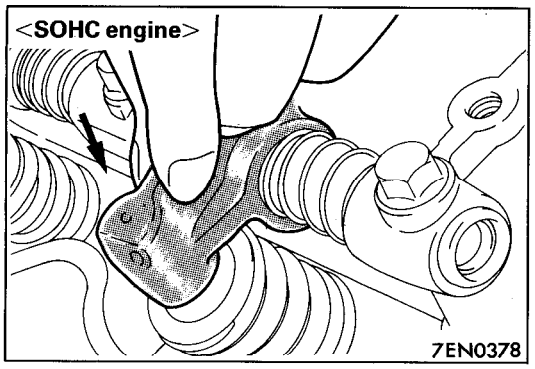
<SOHC>


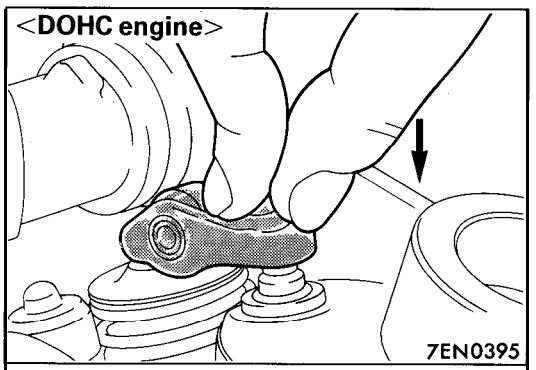
7EN0529

<DOHC>


7EN0530

(3) If racing the engine does not cause the noise to die away, check the lash adjuster by the following procedure.
① Stop the engine.
② Rotate the engine to set the No. 1 cylinder at the top dead center on the compression stroke.
③ Press the rocker arms at the positions indicated by the white arrow ⇩ to check whether the rocker arms go down.
④ Slowly rotate the crankshaft 360° in the clockwise direction.
⑤ Similarly check the rocker arms at the positions indicated by the black arrow by ⇩ the same procedure as in Step ③.

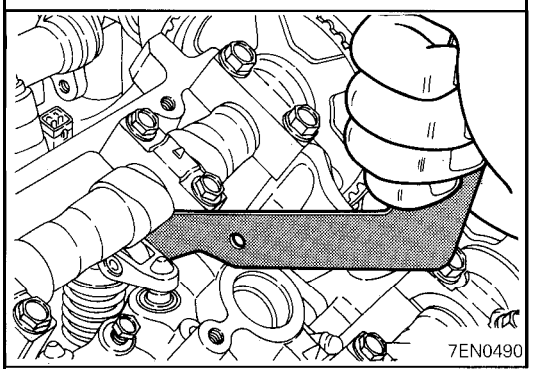




⑥ Push down the rocker arm at a portion located right above the lash adjuster. If the rocker arm goes down readily, the lash adjuster is defective. Replace it with a new one. On DOHC engines, replace in accordance with step (4). In addition, when replacing the lash adjuster, be sure to remove air positively from the lash adjuster before installation.
Then perform inspection in accordance with steps ① through ⑤ to make sure that there is no abnormality.

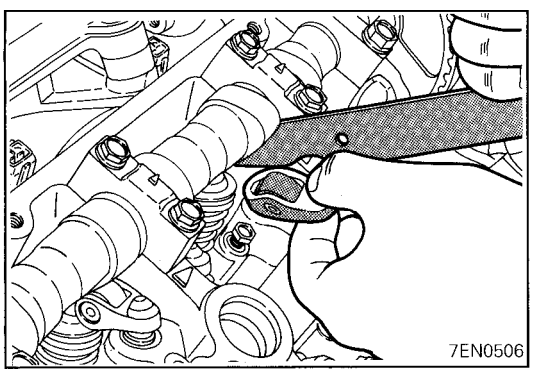
NOTE
(1) If the leak-down test is performed, the lash adjuster can be judged accurately to be defective or not.
(2) For the leak-down test procedure or the procedure for removing air from the lash adjuster, refer to P.9-63 (SOHC), P.9-68 (DOHC).

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



(4) Lash adjuster replacement procedure <DOHC>

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



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

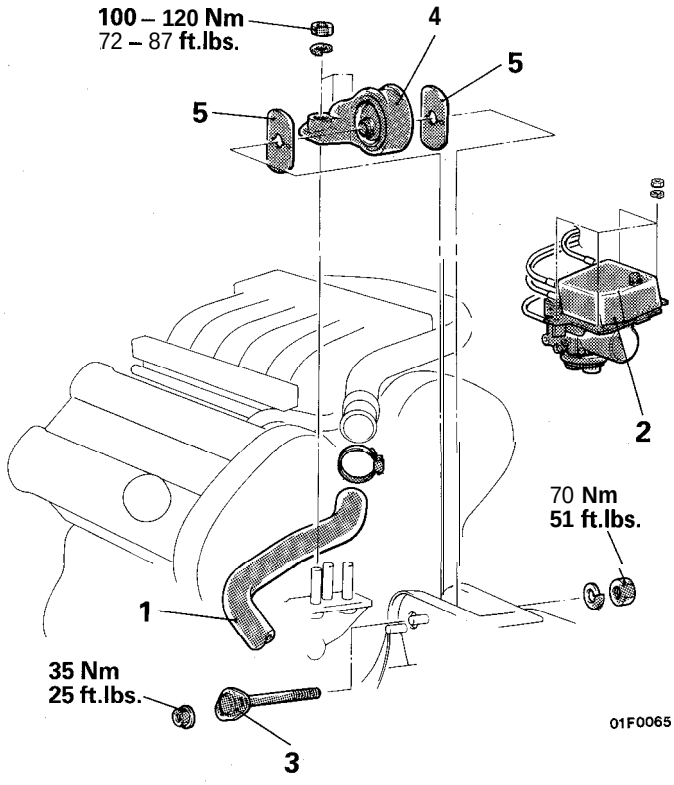
NOTE:
When the roller rocker arm is installed, place the pivot side of the rocker arm on the lash adjuster.
Then, push down the valve and place the slipper side of the rocker arm on the valve stem end.

ENGINE MOUNTING

REMOVAL AND INSTALLATION

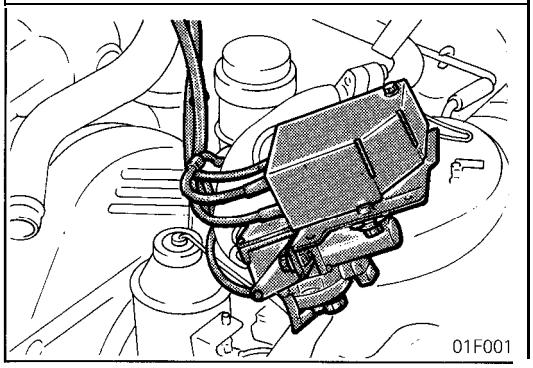
Pre-removal Operation
- Raise and Suspend the Engine to the Extent Force is not Applied to the Engine Mount

Post-installation Operation
- Lower the Engine.



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**



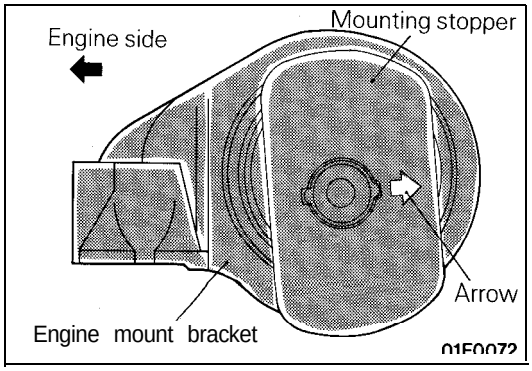
SERVICE POINT OF REMOVAL

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

- Check each insulator for cracks or damage.
- Check each bracket for deformation or damage.



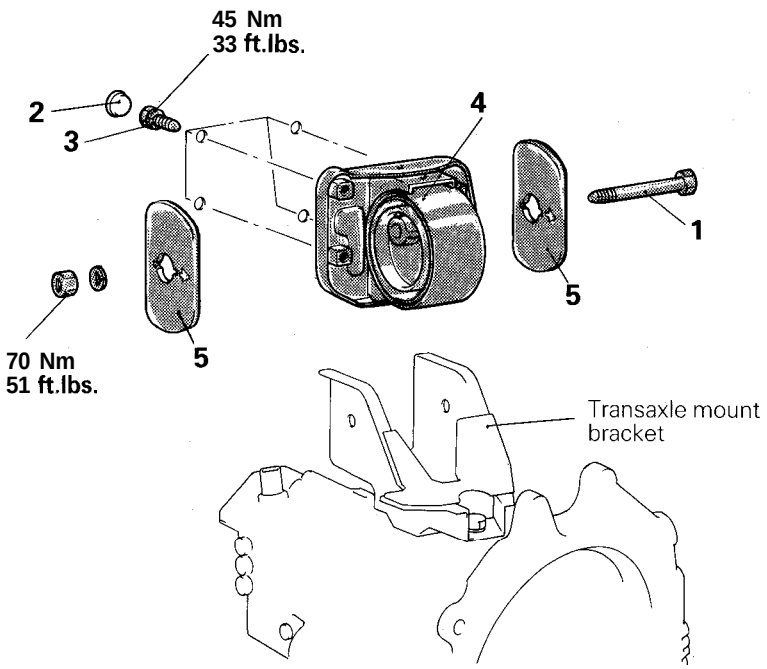
SERVICE POINT OF INSTALLATION

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.

TRANSAXLE MOUNTING

REMOVAL AND INSTALLATION



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 11 -Air Cleaner.)

Post-installation Operation
- Lower the Transaxle.
- Installation of Air Cleaner (Refer to GROUP 11 -Air Cleaner.)

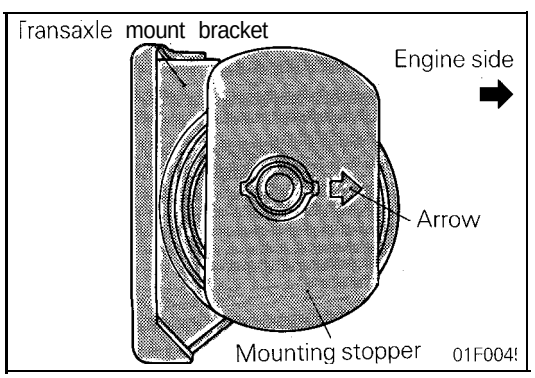
Removal steps

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

- Check each insulator for cracks or damage.
- Check each bracket for deformation or damage.



SERVICE POINT OF INSTALLATION

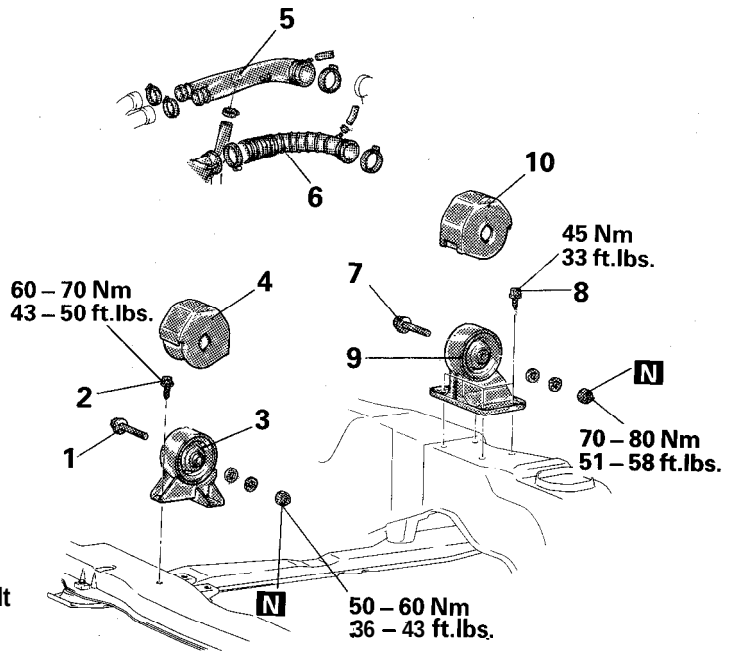
5. INSTALLATION OF MOUNTING STOPPER

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

Pre-removal and Post-installation Operation
- **Removal and Installation of Condenser Fan Motor Assembly <Turbo> (Refer to GROUP** 24 – Condenser **and Condenser Fan Motor.)**
- **Removal and Installation of Left Bank Warm Up Three-Way Catalytic Converter <Turbo> (Refer to GROUP 11 -Turbocharger (rear).)**



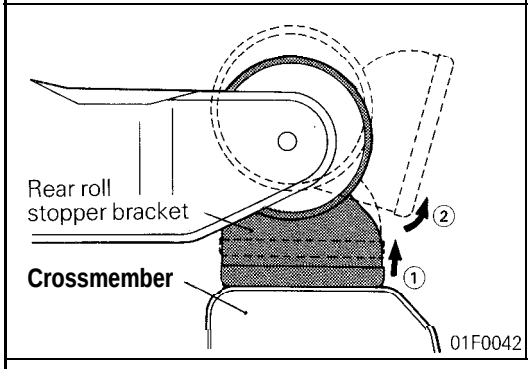
Front stopper bracket removal steps

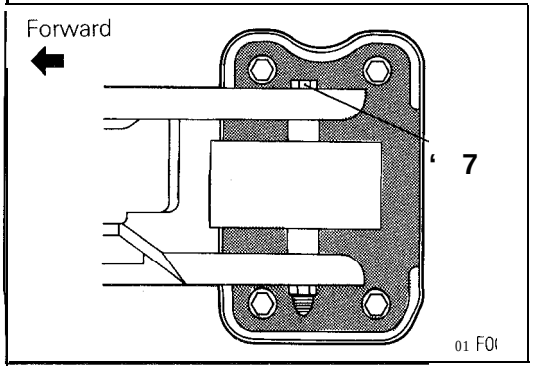
1. **Front roll stopper bracket and** engine connection **bolt**
2. **Front roll stopper bracket installation bolt**
3. **Front roll stopper bracket**
4. **Heat protector <Turbo>**

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

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

- Check each insulator for cracks or damage.
- Check each bracket for deformation or damage.

SERVICE POINT OF INSTALLATION

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

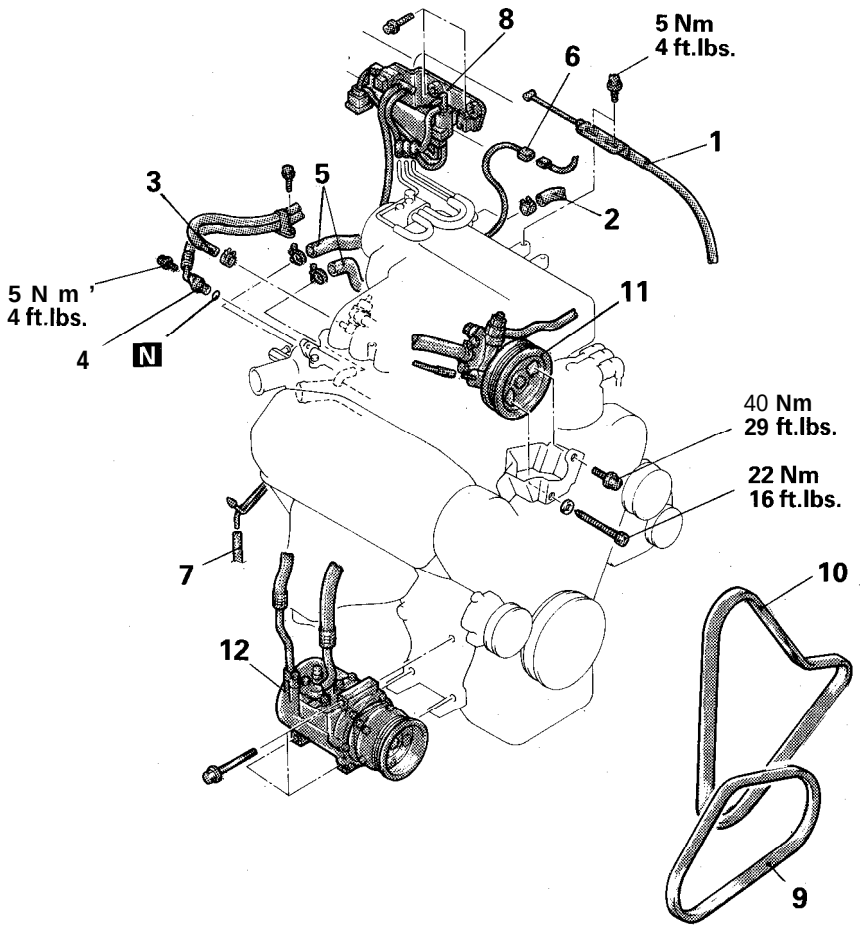
Install the bolt as shown in the illustration.

ENGINE ASSEMBLY <SOHC>

REMOVAL AND INSTALLATION

Pre-removal Operation
- Eliminating Fuel Pressure in Fuel Line (Refer to GROUP 14 – Service Adjustment Procedures.)
- Removal of Hood
- Removal of Cruise Control Pump and Link Assembly (Refer to GROUP 14 -Cruise Control,)
- Draining of Engine Coolant (Refer to GROUP 7 – Service Adjustment Procedures.)
- Removal of Front exhaust pipe (Refer to Exhaust Pipe and Main Muffler.)
- Removal of Transaxle Assembly (Refer to GROUP 21 -Transaxle Assembly.)
- Removal of Radiator (Refer to GROUP 7 – Radiator.)

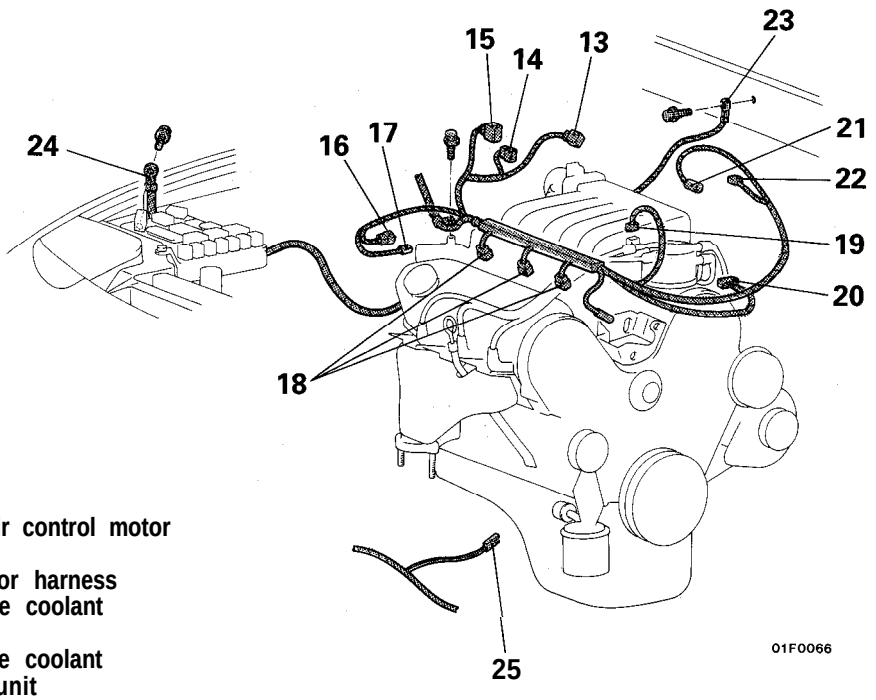
Post-installation Operation
- Installation of Radiator (Refer to GROUP 7 – Radiator.)
- Installation of Cruise Control Pump and Link Assembly (Refer to GROUP 14 – Cruise Control.)
- Installation of Transaxle Assembly (Refer to GROUP 21 -Transaxle Assembly.)
- Installation of Front Exhaust Pipe (Refer to GROUP 11 – Exhaust Pipe and Main Muffler.)
- Refilling Engine Coolant (Refer to GROUP 7 – Service Adjustment Procedures.)
- Installation of Hood (Refer to GROUP 23A – Hood.)
- Adjustment of the Accelerator Cable (Refer to GROUP 14 – Engine Control.)



01F0026

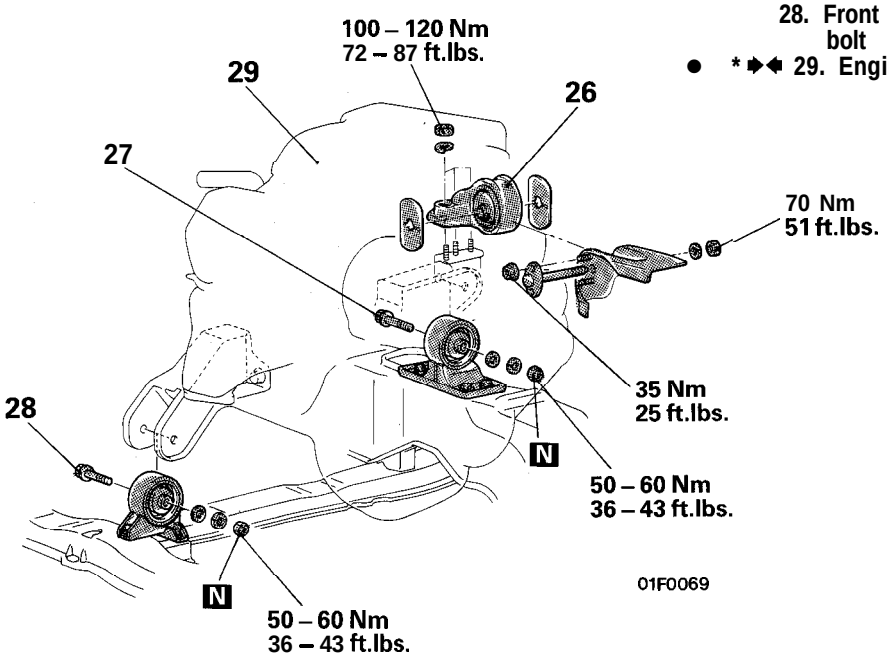
Removal steps

1. Connection of accelerator cable
2. Connection of brake booster vacuum hose
3. Connection of fuel return hose
4. Connection of fuel high pressure hose
5. Connection of heater hose
6. Connection of EGR temperature sensor **<Vehicles** for California>
7. **Connection of purge hose**
8. **Solenoid valve assembly**
9. **Drive belt (air conditioning)** (Refer to P.9-16.)
10. **Drive belt (generator and power steering) (Refer to** P.9-16.)
11. **Power steering oil pump**
12. **Air conditioning compressor**



13. Connection of idle air control motor
14. Connection of TPS
15. Connection of injector harness
16. Connection of engine coolant temperature sensor
17. Connection of engine coolant temperature gauge unit
18. Connection of fuel injectors
19. Connection of ignition power transistor
20. Connection of distributer
21. Connection of ignition coil
22. Connection of condenser
23. Connection of ground cable
◆◆ 24. Connection of relay box and engine control harness.
◆◆ 25. Connection of oil pressure gauge unit

◆◆ ● a 26. Engine mount bracket
27. Rear roll stopper bracket mount bolt
28. Front roll stopper bracket mount bolt
● *◆◆ 29. Engineassembly



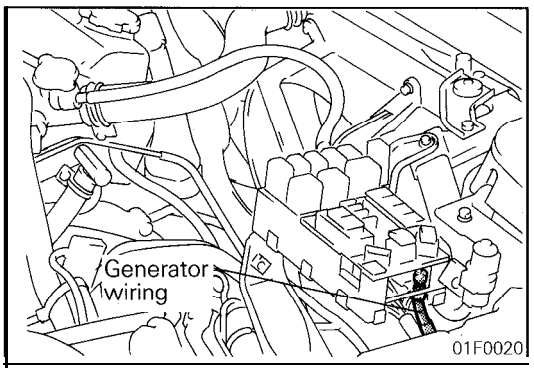
SERVICE POINTS OF REMOVAL

11. DISCONNECTION OF POWER STEERING OIL PUMP / 12. AIR CONDITIONING COMPRESSOR

Disconnect power steering oil pump and air conditioning compressor with hoses from the bracket.

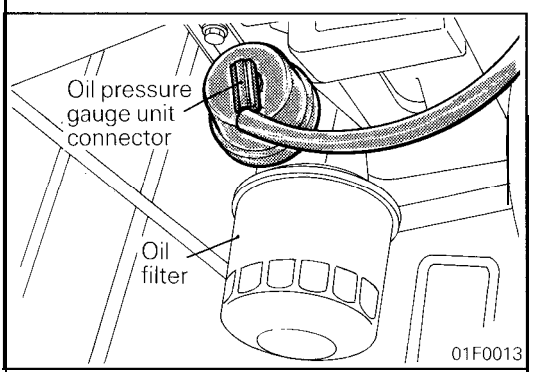
NOTE

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



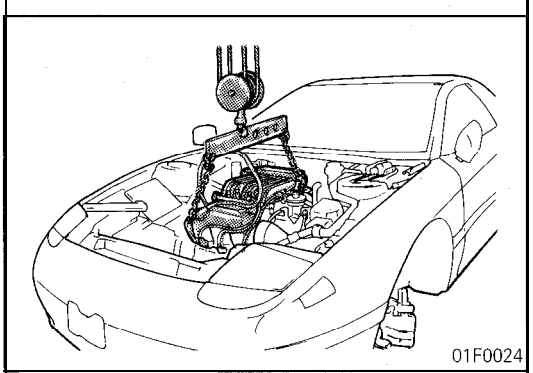
24. DISCONNECTION OF RELAY BOX AND ENGINE WIRING HARNESS

Open the cover of the relay box and disconnect the generator wiring.



25. DISCONNECTION OF OIL PRESSURE GAUGE UNIT

Disconnect the oil pressure gauge unit connector shown in the illustration.

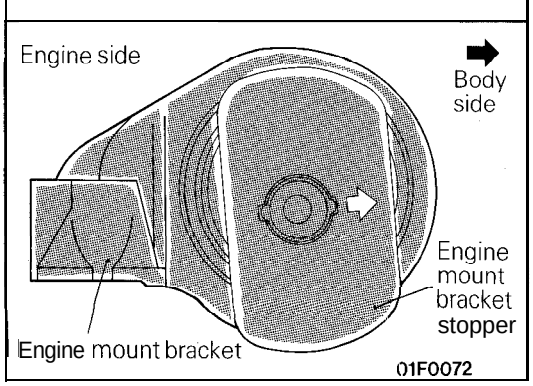


26. REMOVAL OF ENGINE MOUNT BRACKET

(1) Remove the distributor cap and attach wire to the engine hooks.
(2) Using a block and tackle or hoist, take up the wire slack.
(3) Remove the bolts and nuts that fasten the engine mount bracket to the body.

29. 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

29. 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.

26. INSTALLATION OF ENGINE MOUNT BRACKET

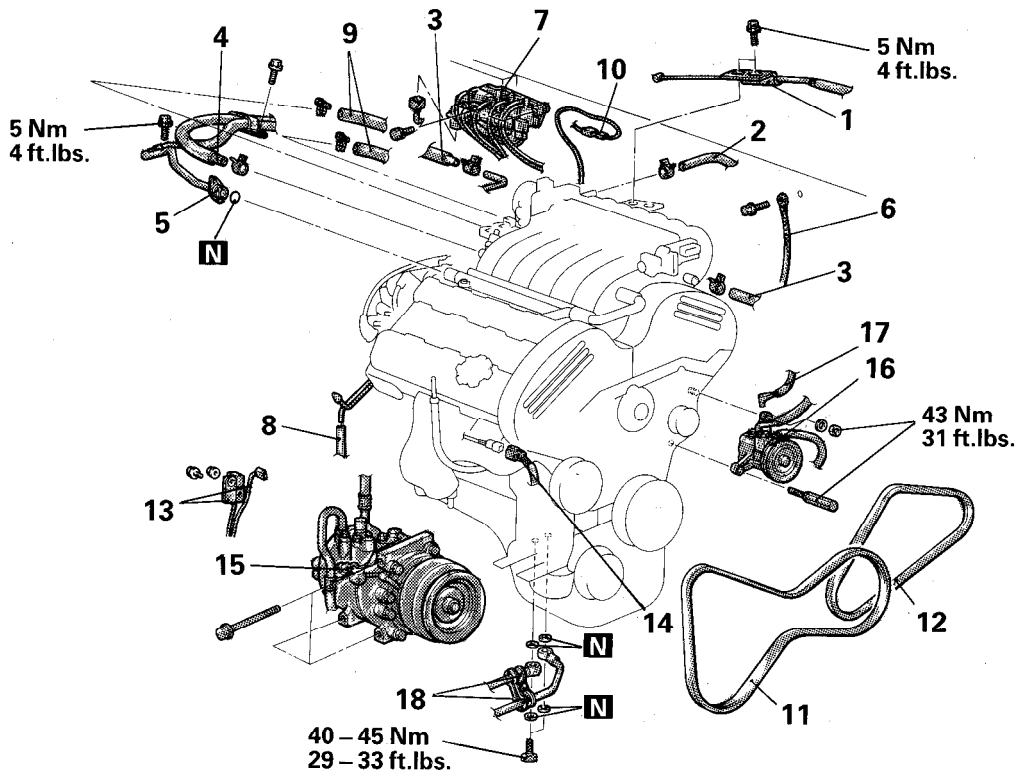
Attach the engine mounting bracket so that the arrow mark on the mounting stopper is in the direction as shown in the illustration.

ENGINE ASSEMBLY <DOHC>

REMOVAL AND INSTALLATION

Pre-removal Operation
- Release of Residual Pressure from High Pressure Fuel Hose (Refer to GROUP 14 – Service Adjustment Procedures.)
- Removal of Cruise Control Pump and Link Assembly (Refer to GROUP 14 – Cruise Control.)
- Removal of Hood (Refer to GROUP 23A – Hood.)
- Removal of Air Hose and Air Pipe <Turbo> (Refer to GROUP 11 -Charge Air Cooler.)
- Removal of Front Exhaust Pipe (Refer to GROUP 11 – Exhaust Pipe and Main Muffler.)
- Removal of Transaxle Assembly (Refer to GROUP 21 -Transaxle Assembly.)
- Removal of Radiator (Refer to GROUP 7 – Radiator.)

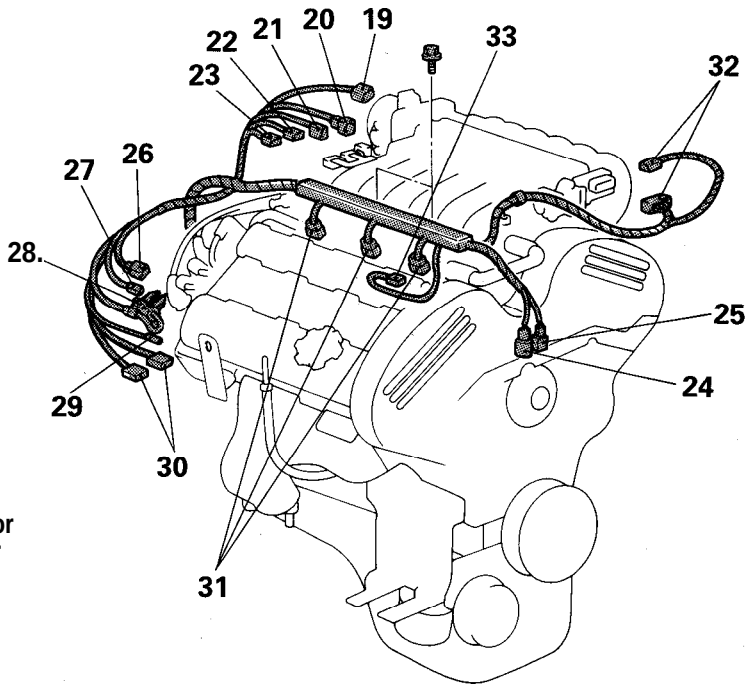
Post-installation Operation
- Installation of Radiator (Refer to GROUP 7 – Radiator.)
- Installation of Cruise Control Pump and Link Assembly (Refer to GROUP 14 – Cruise **Control.)**
- Installation of Transaxle Assembly **(Refer to GROUP 21 -Transaxle Assembly.)**
- Installation of Front Exhaust Pipe (Refer to GROUP 11 – Exhaust Pipe and Main Muffler.)
- **Installation of Air Hose and Air Pipe <Turbo>** (Refer to GROUP 7 – Charge Air Cooler.)
- Installation of Hood **(Refer to GROUP** 23A – **Hood.)**
- Supplying of Engine Oil (Refer to GROUP 0- Maintenance Service.)
- Adjustment of the Accelerator Cable **(Refer to GROUP** 14 – Engine **Control.)**



Removal steps

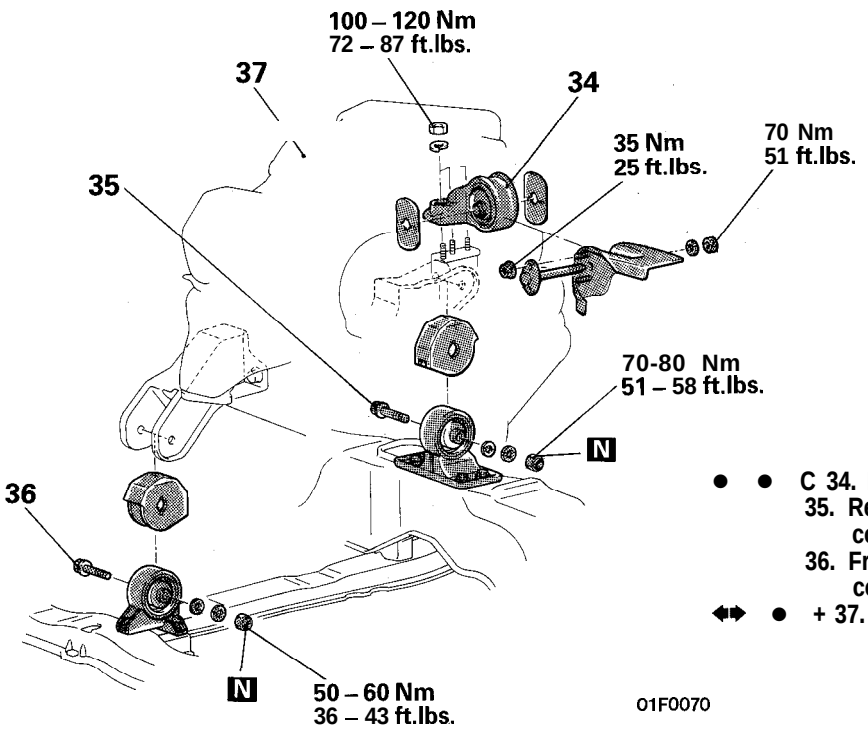
1. **Connection of accelerator cable**
2. **Connection of brake booster vacuum hose**
3. **Connection of booster vacuum hose <Turbo>**
4. **Connection of fuel return hose**
5. **Connection of fuel high pressure hose**
6. **Connection of ground cable**
7. **Solenoid valve assembly**
8. **Connection of vapor hose**
9. **Connection of heater hose**
10. **Connection of EGR temperature sensor <Vehicles for California>**
11. Drive **belt (Generator and air conditioning)** **(Refer to** P.9-16.)
12. Drive **belt (Power steering)** **(Refer to** P.9-16.)
13. **Connection of generator harness**
14. **Connection of heated oxygen sensor <Turbo>**
15. **Air conditioning compressor**
16. **Power steering oil pump**
17. Connection of oil pressure switch (Power **steering)**
18. Connection of oil cooler pipes <Turbo>

01F0043



01F0067

19. Connection of idle air control motor
20. Connection of TPS
21. Connection of oil pressure switch and oil pressure gauge unit
22. Connection of fuel injector harness
23. Connection of knock sensor
24. Connection of crankshaft position sensor
25. Connection of camshaft position sensor
26. Connection of engine coolant temperature sensor
27. Connection of engine coolant temperature gauge unit
28. Connection of ignition coil
29. Connection of condenser
30. Connection of power transistor
31. Connection of fuel injectors
32. Connection of variable induction motor <Non-Turbo>
33. Connection of heated oxygen sensor <Turbo>



01F0070

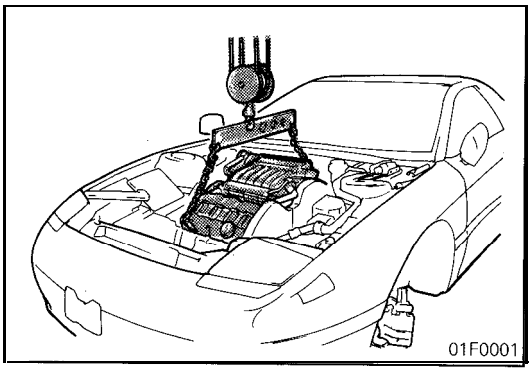
● ● C 34. Engine mounting bracket
35. Rear roll stopper bracket and engine connection bolt
36. Front roll stopper bracket and engine connection bolt
◆◆ ● + 37. Engineassembly

SERVICE POINTS OF REMOVAL

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

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

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



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).

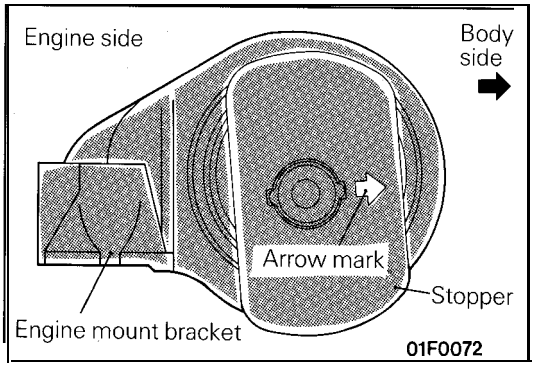
37. REMOVAL OF ENGINE ASSEMBLY

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

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.



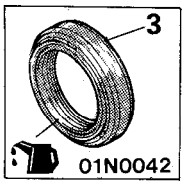
34. INSTALLATION OF ENGINE MOUNT BRACKET

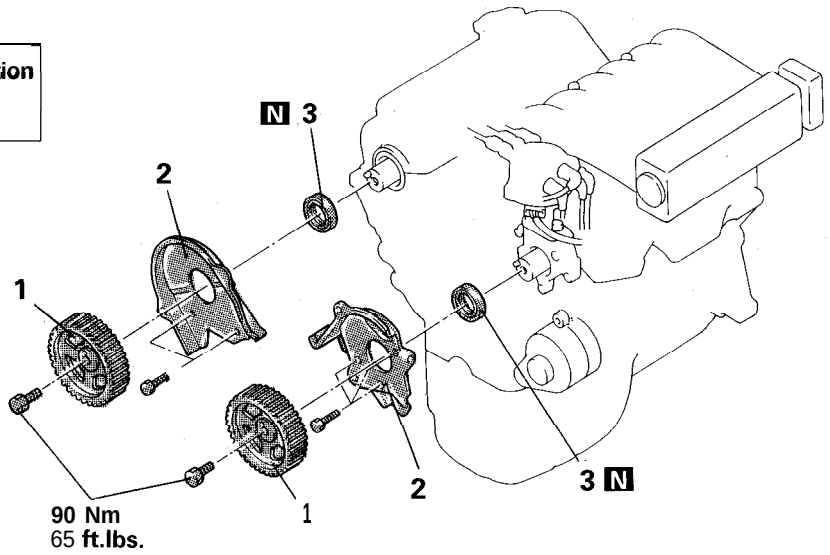
Attach the engine mounting bracket so that the arrow mark on the mounting stopper is in the direction as shown in the illustration.

CAMSHAFT OIL SEALS <SOHC>

REMOVAL AND INSTALLATION

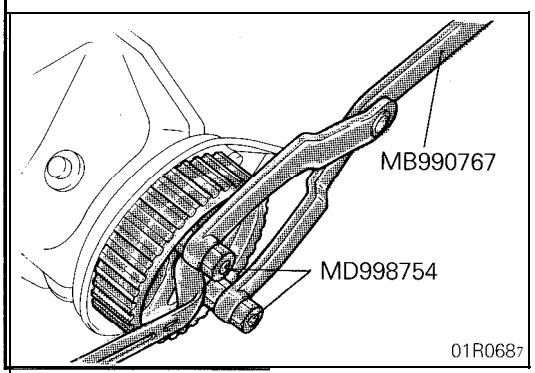
Pre-removal and Post-installation Operation
- Removal and Installation of Timing Belt (Refer to P.9-52.)





Removal steps
- ◆◆ 1. Camshaft sprocket
- 2. Timing belt rear cover
- ◆◆ ● + 3. Camshaft oil seals

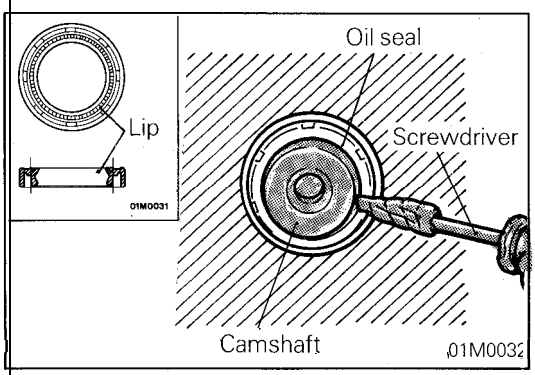
01F0029



SERVICE POINTS OF REMOVAL

1. REMOVAL OF CAMSHAFT SPROCKET

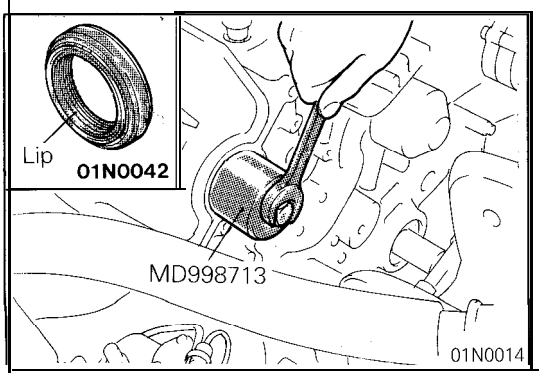
Using the special tools, lock the camshaft and remove the camshaft sprocket.



3. REMOVAL OF CAMSHAFT OIL SEAL

Remove the oil seals using a screwdriver or similar tool.

Caution
Take care not to damage front camshaft bearing cap and camshaft.



SERVICE POINT OF INSTALLATION

3. INSTALLATION OF CAMSHAFT OIL SEAL

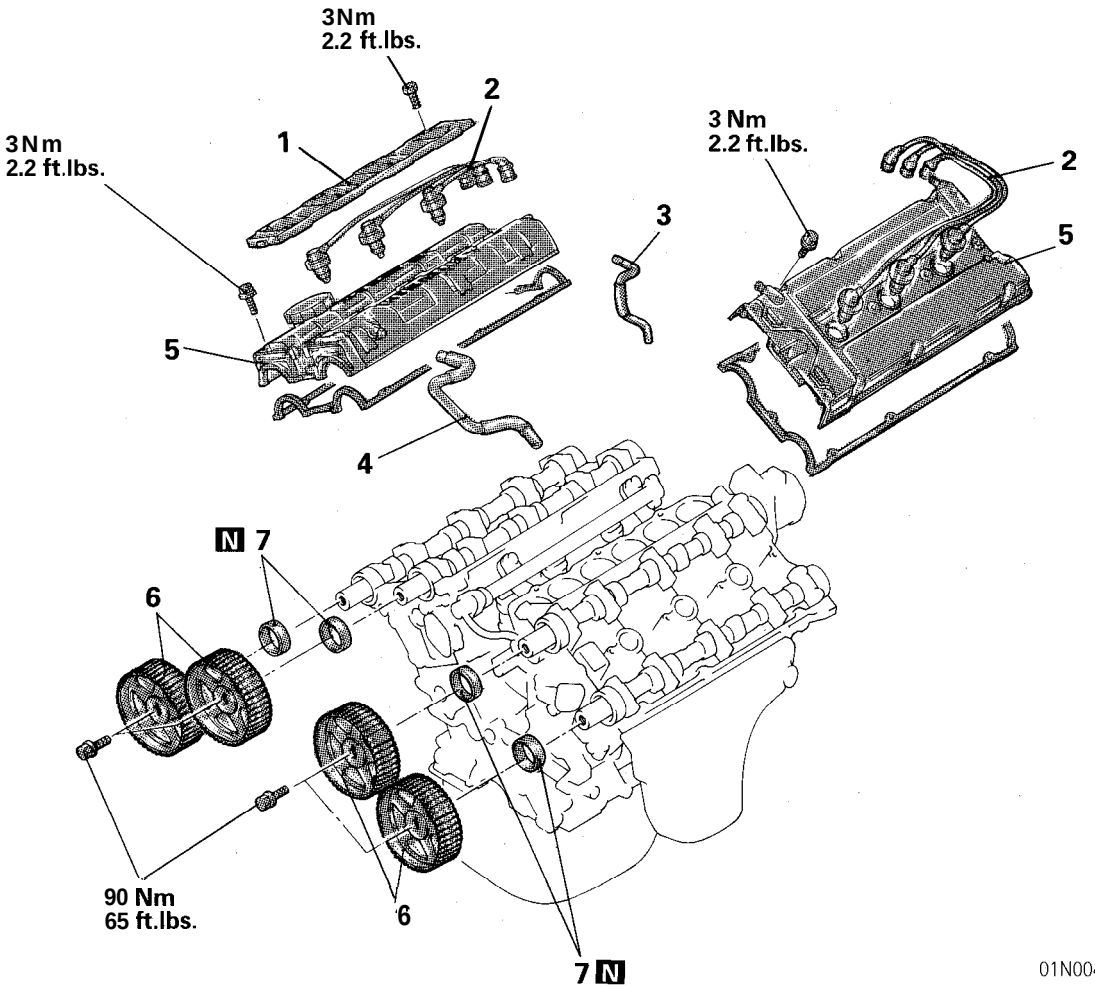
Using the special tool, insert the oil seal.

CAMSHAFT OIL SEALS <DOHC>

REMOVAL AND INSTALLATION

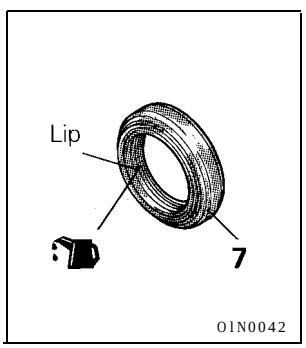
Pre-removal and Post-installation Operation
- Removal and Installation of Timing Belt (Refer to P.9-56.)
- Removal and Installation of Intake Manifold (Refer to GROUP 11 -Intake Manifold.)
- Removal of Camshaft Position Sensor (Refer to GROUP 8 -Camshaft Position Sensor and Crankshaft Position Sensor.)

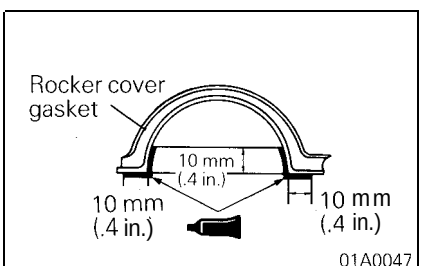
Adjustment
- Accelerater Cable (Refer to GROUP 14 – Engine Control.)
- Installation of Camshaft Position Sensor (Refer to GROUP 8 -Camshaft Position Sensor and Crankshaft Position Sensor.)



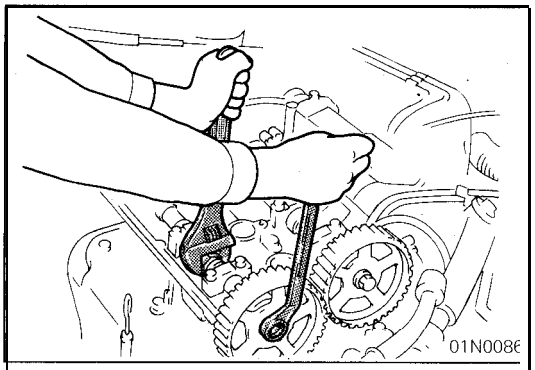
Removal steps

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





Sealant: MOPAR Part No. 4318034 or equivalent

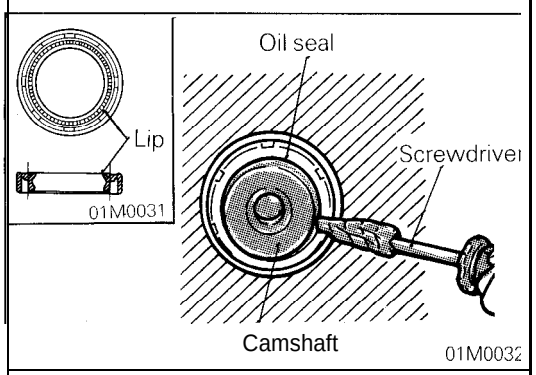


SERVICE POINTS OF REMOVAL

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

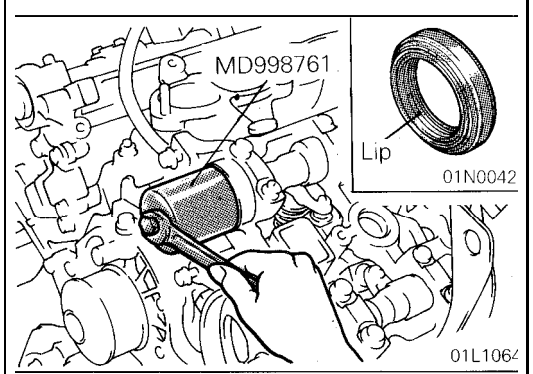
(1) Cut out a portion in the camshaft oil seal lip.
(2) Cover the tip of a screwdriver with a cloth and apply it to the cutout in the oil seal to pry off the oil seal.

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

SERVICE POINTS OF INSTALLATION

7. INSTALLATION OF CAMSHAFT OIL SEAL

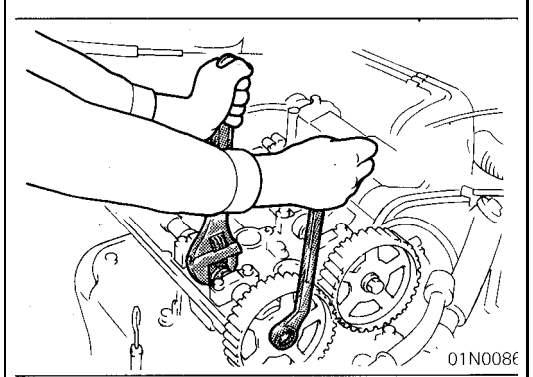
Using the special tool, insert the oil seal.



6. INSTALLATION OF CAMSHAFT SPROCKET

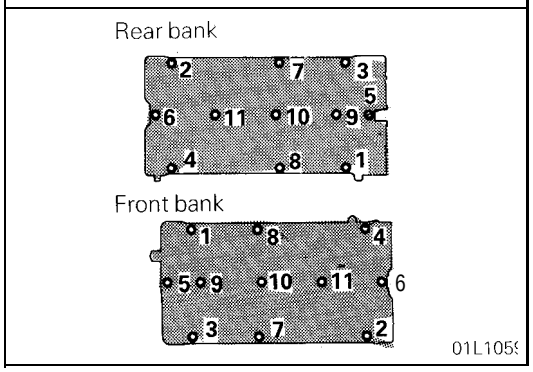
Using a wrench at the hexagonal part of the camshaft (to prevent the crankshaft from turning), tighten the camshaft sprocket bolt.

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.



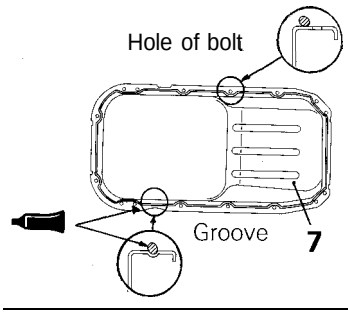
NOTE
(1) Only No. 5 bolt in the rear bank differs from other bolts in length.
Rear bank No. 5 bolt ..... 20 mm (.79 in.)
Except rear bank No. 5 bolt ..... 10 mm (.39 in.)
(2) Bolts are color-coded for the front and rear banks as follows:
Front bank ..... Black
Rear bank ..... Green
(3) When the rocker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

OIL PAN AND OIL SCREEN

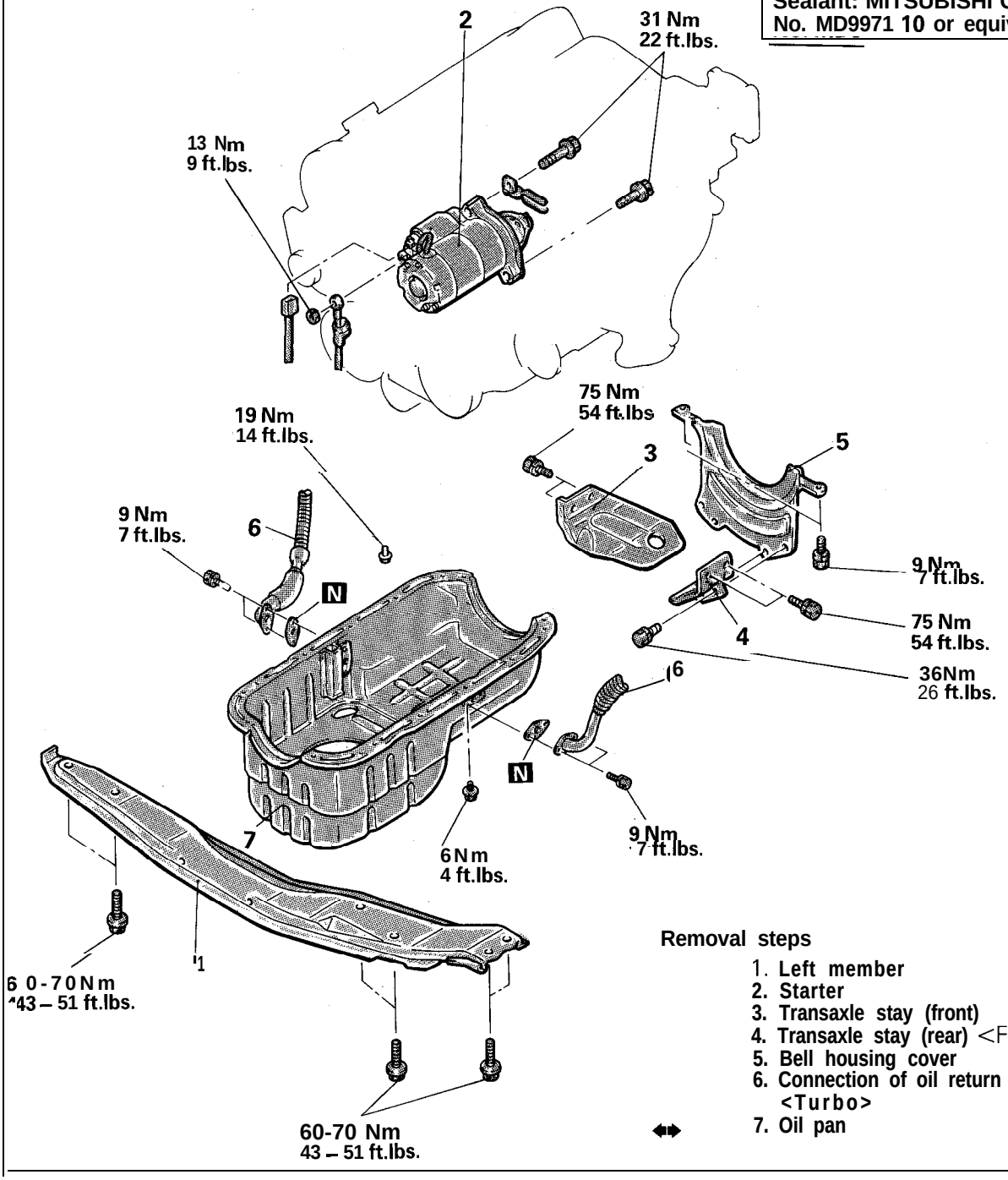
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
Draining and Refilling
- Engine Oil
  (Refer to GROUP 0 – Maintenance Service,)

Removal and Installation
- Under Cover
- Front Exhaust Pipe
  (Refer to GROUP 11 – Exhaust Pipe and Main Muffler.)
- Transfer Assembly <AWD>
  (Refer to GROUP 21 -Transfer Assembly.)



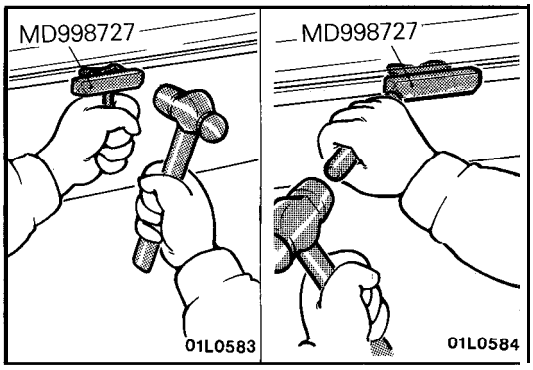
Sealant: MITSUBISHI GENUINE Part No. MD9971 10 or equivalent



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**

◆◆

01F0006



SERVICE POINT OF REMOVAL

7. REMOVAL OF OIL PAN

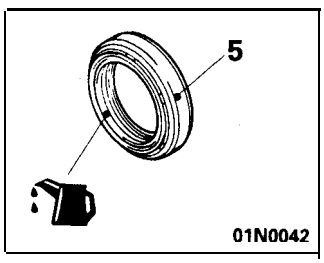
After removing the bolts, use the special tool and a brass bar to remove the oil pan from the cylinder block.

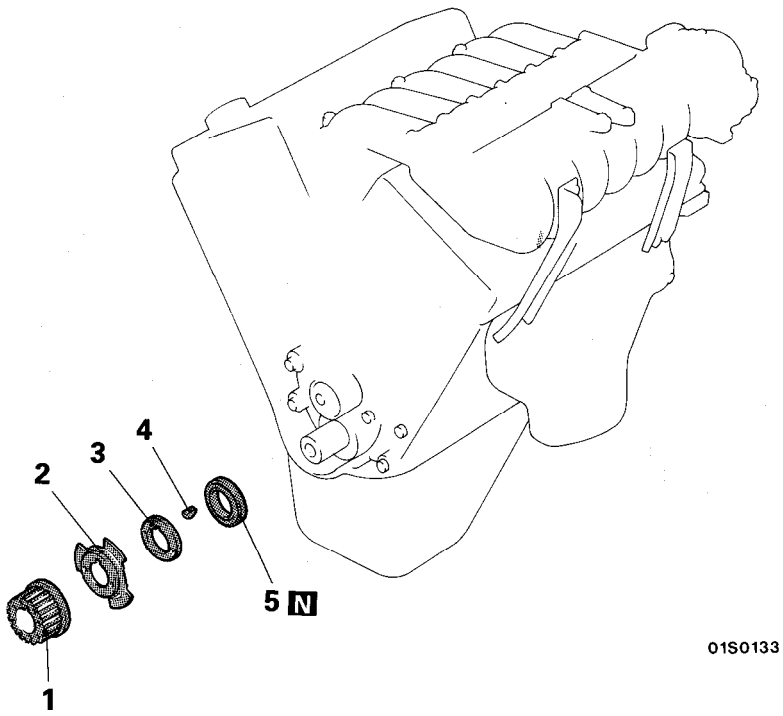
Caution
Remove the oil pan gradually since the flange of the oil pan is easy to deform.

CRANKSHAFT FRONT OIL SEAL

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Removal and Installation of Timing Belt (Refer to P.9-56.)
- Removal and Installation of Crankshaft Position Sensor (Refer to GROUP 16 – Camshaft Position Sensor and Crankshaft Position.)

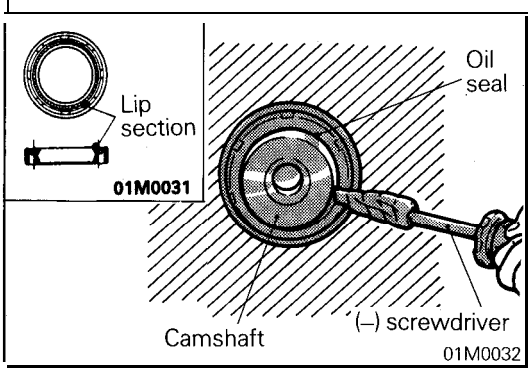


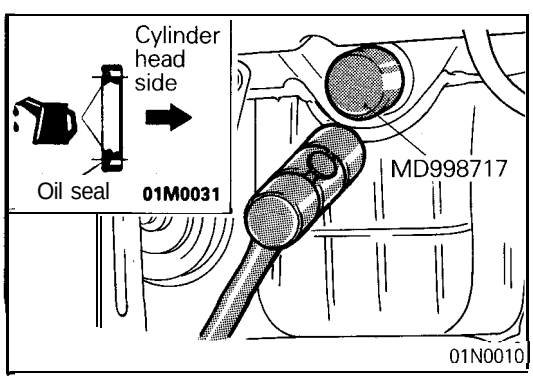


Removal steps

1. **Crankshaft sprocket**
2. **Crankshaft sensing blade**
3. **Crankshaft spacer**
4. **Key**

◆◆ ● ***5. Crankshaft front oil seal**





SERVICE POINTS OF REMOVAL

5. REMOVAL OF CRANKSHAFT FRONT OIL SEAL

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

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

SERVICE POINTS OF INSTALLATION

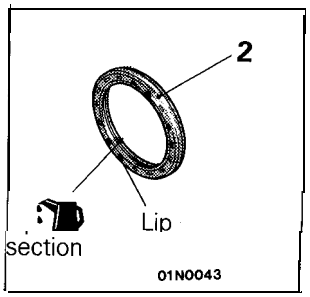
5. INSTALLATION OF CRANKSHAFT FRONT OIL SEAL

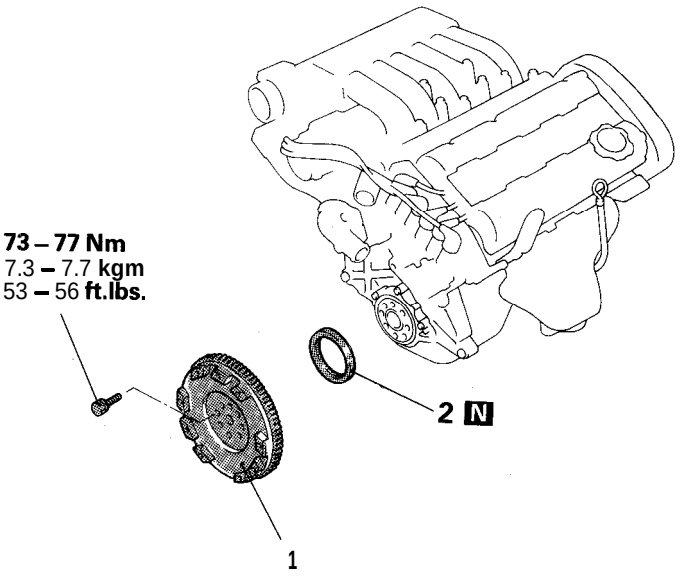
(1) Apply a small amount of engine oil to the oil seal lip and then insert.
(2) Tap the oil seal into the cylinder block.

CRANKSHAFT REAR OIL SEAL

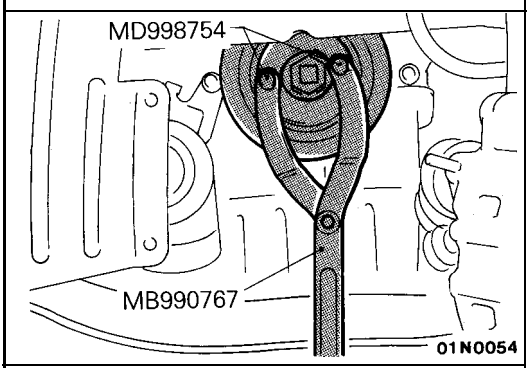
REMOVAL AND INSTALLATION

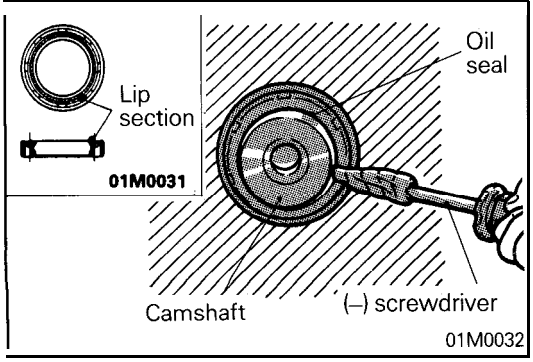
Pre-removal and Post-installation Operation
- Removal and Installation of Transaxle Assembly
  (Refer to GROUP 21 -Transaxle assembly.)
- Removal and Installation of Clutch Cover and Clutch Disc





Removal steps
- ◆◆ 1. Flywheel
- ◆◆ ◆◆ 2. Crankshaft rear oil seal





SERVICE POINTS OF REMOVAL

1. REMOVAL OF FLYWHEEL

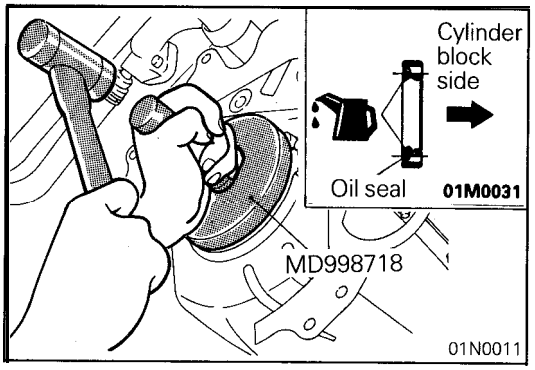
Stop the crankshaft pulley from turning, and remove the flywheel.

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

2. REMOVAL OF CRANKSHAFT REAR OIL SEAL

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

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



SERVICE POINTS OF INSTALLATION

2. INSTALLATION OF CRANKSHAFT REAR OIL SEAL

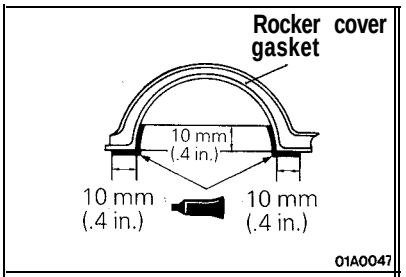
(1) Apply a small amount of engine oil to the oil seal lip and then insert.
(2) Tap the oil seal into the cylinder block.

CYLINDER HEAD GASKET <SOHC>

REMOVAL AND INSTALLATION

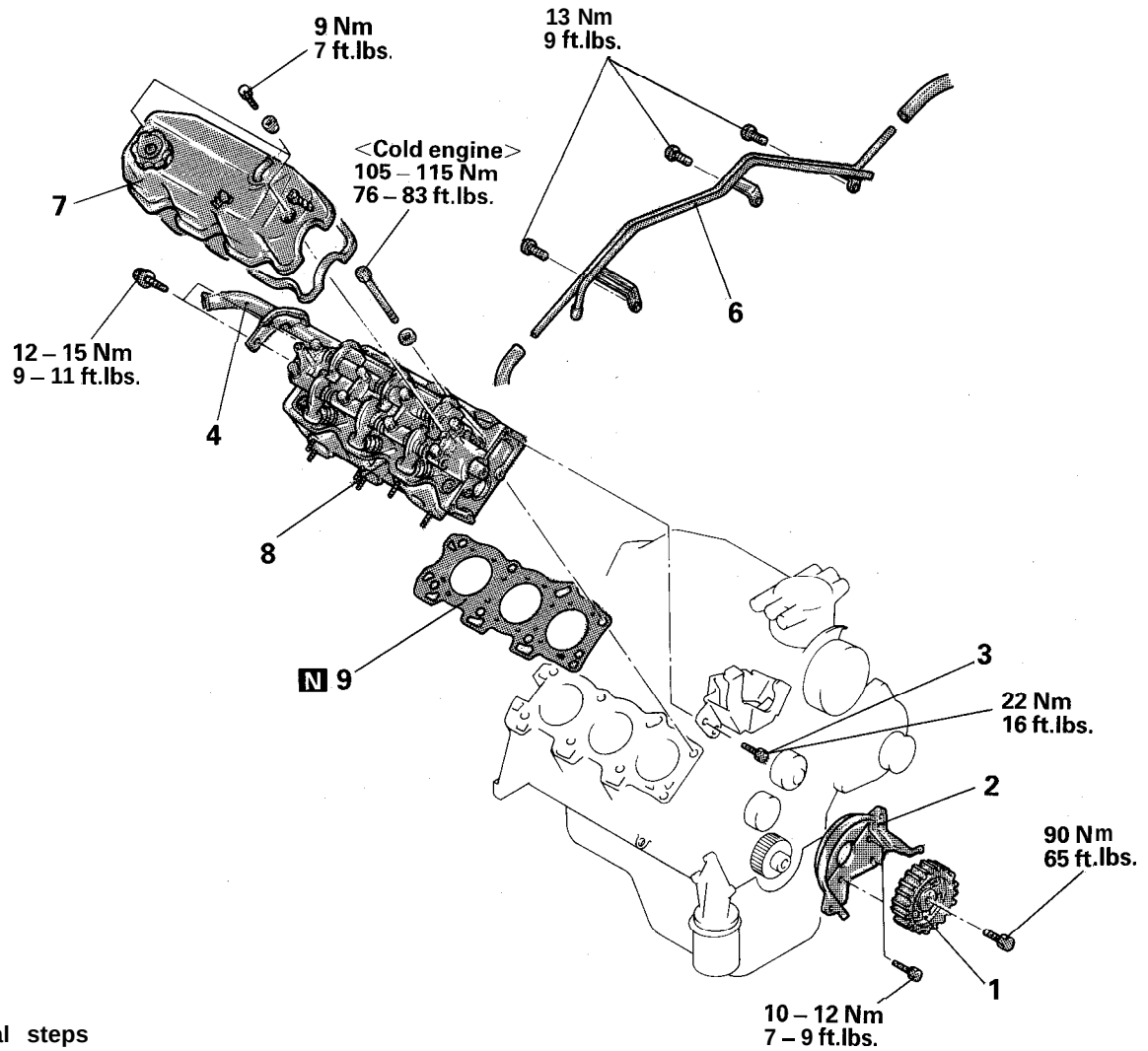
Pre-removal and Post-installation Operation
Removal and Installation
- Exhaust Manifold (Refer to GROUP 11 – Exhaust Manifold.)
- Air Intake Manifold (Refer to GROUP 11 -Air Intake Manifold.)
- Timing Belt (Refer to P.9-52.)

Adjustment
- Engine Adjustment (Refer to P.9-16.)



Sealant: MOPAR Part No. 4318034 or equivalent

Front bank

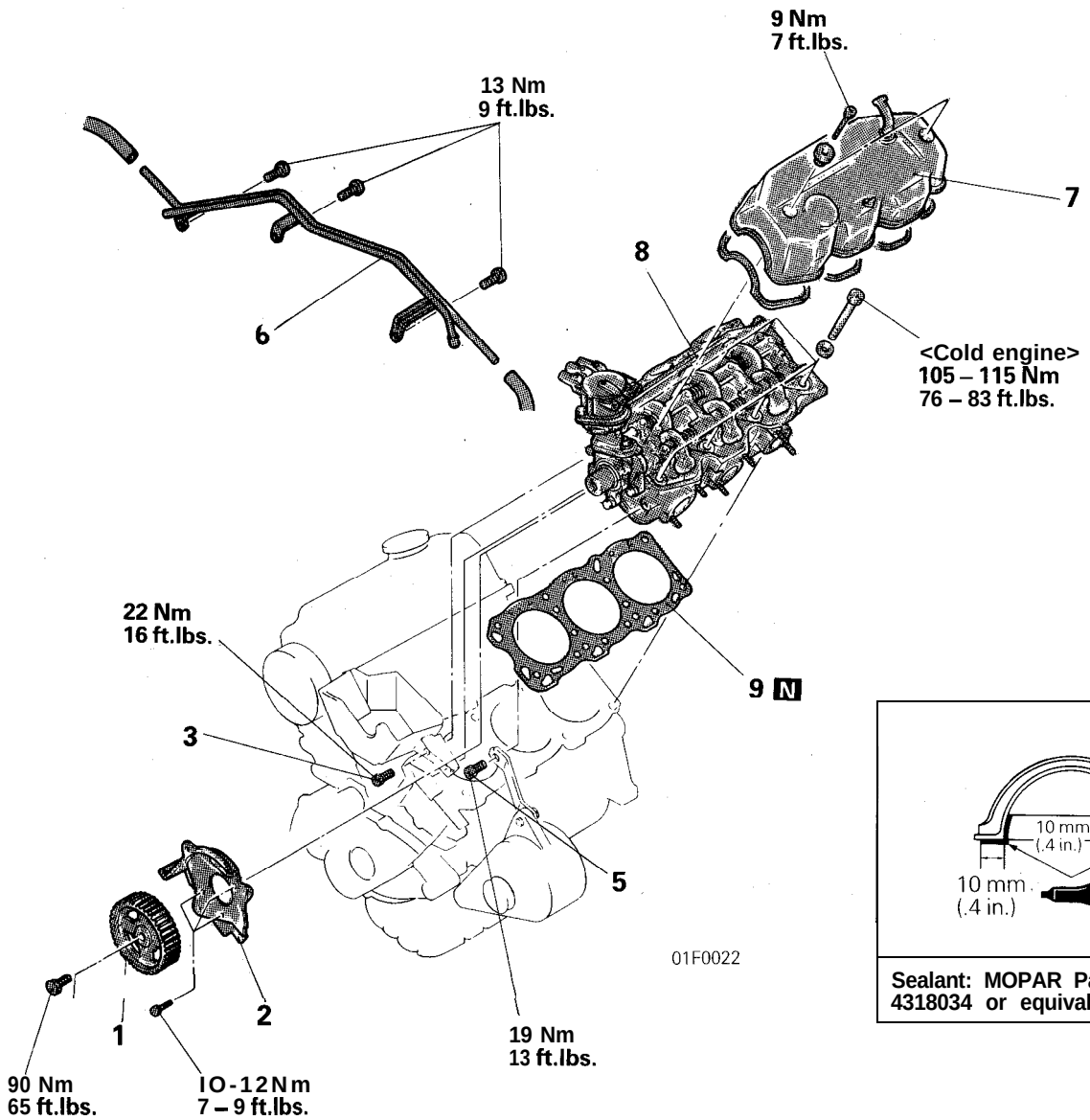


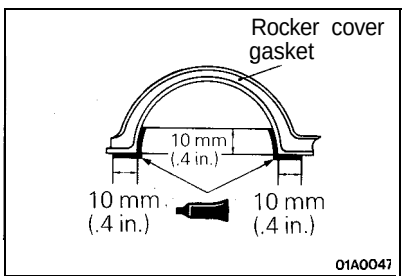
Removal steps

◆▶ ● * 1. Camshaft sprocket
2. Timing belt rear cover
3. Connection of power steering pump bracket
4. Connection of water inlet pipe
6. Purge pipe assembly
7. Rocker cover
◆▶▶◀ 8. Cylinder head assembly
● C 9. Cylinder head gasket

01F0023

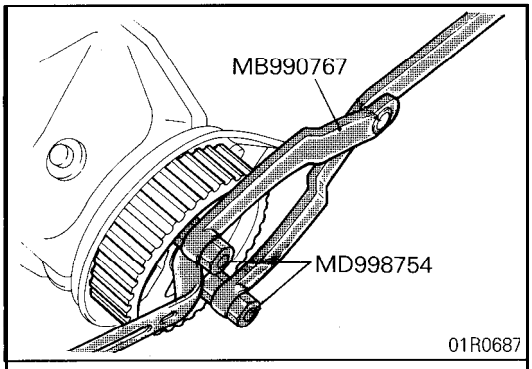
Rear bank





Sealant: MOPAR Part No. 4318034 or equivalent

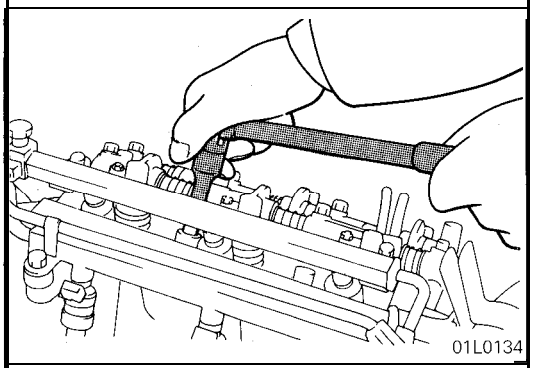
◆◆ ● 4 1. Camshaft sprocket
2. Timing belt rear cover
3. Connection of power steering pump bracket
5. Connection of generator brace
6. Purge pipe
7. Rocker cover
◆◆ ● * 8. Cylinder head assembly
● * 9. Cylinder head gasket



SERVICE POINTS OF REMOVAL

1. REMOVAL OF CAMSHAFT SPROCKET

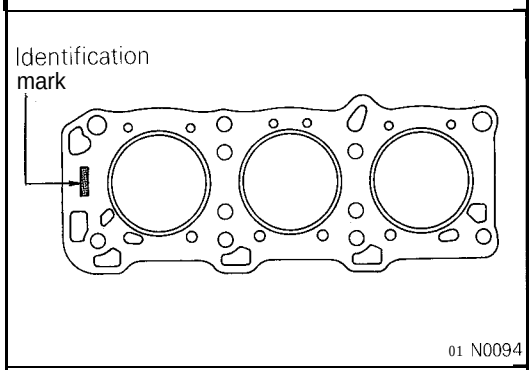
Using special tools, remove the camshaft sprocket from the camshaft.



8. REMOVAL OF CYLINDER HEAD ASSEMBLY

Using a 10 mm hex wrench, remove the cylinder head assembly.

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



SERVICE POINTS OF INSTALLATION

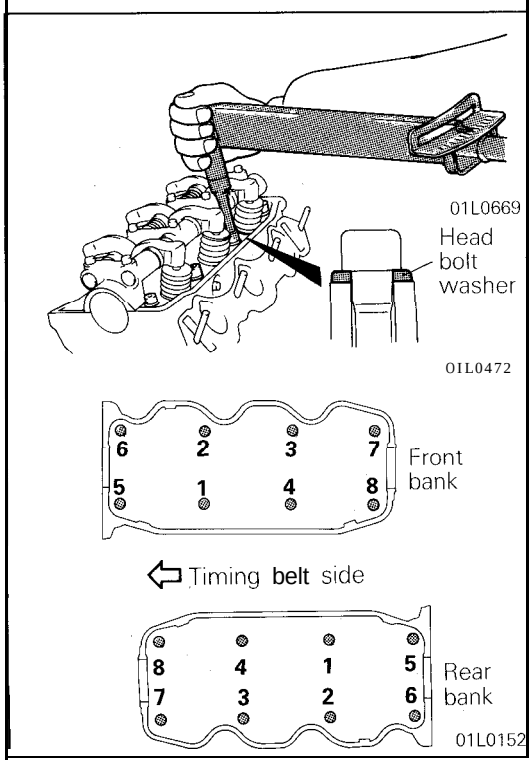
9. INSTALLATION OF CYLINDER HEAD GASKET

(1) Use a scraper to remove the cylinder head gasket from the cylinder block.

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

(2) Make sure that the gasket has the proper identification mark for the engine.

(3) Lay the cylinder head gasket on the cylinder block with the identification mark at the front top.



8. INSTALLATION OF 'CYLINDER HEAD ASSEMBLY

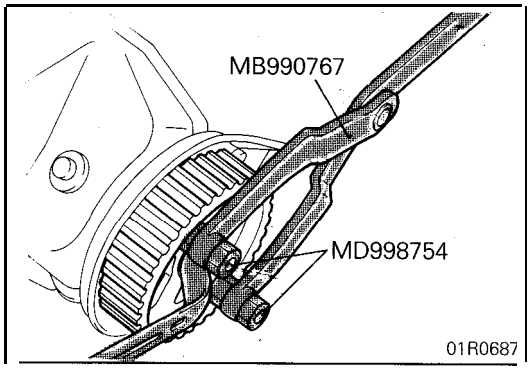
(1) Use a scraper to clean the gasket surface of the cylinder head assembly.

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

(2) Using a 10 mm hex wrench 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 as shown with shear droop upward.

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



1. INSTALLATION OF CAMSHAFT SPROCKET

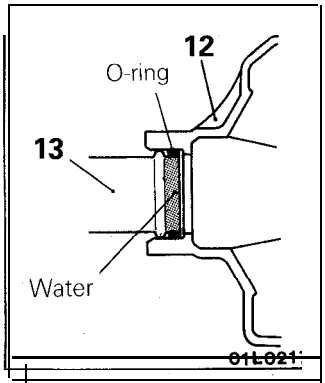
Using the special tool, attach the camshaft sprocket to the camshaft.

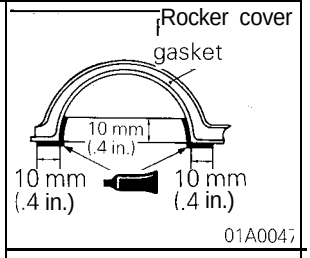
CYLINDER HEAD GASKET <DOHC>

REMOVAL AND INSTALLATION

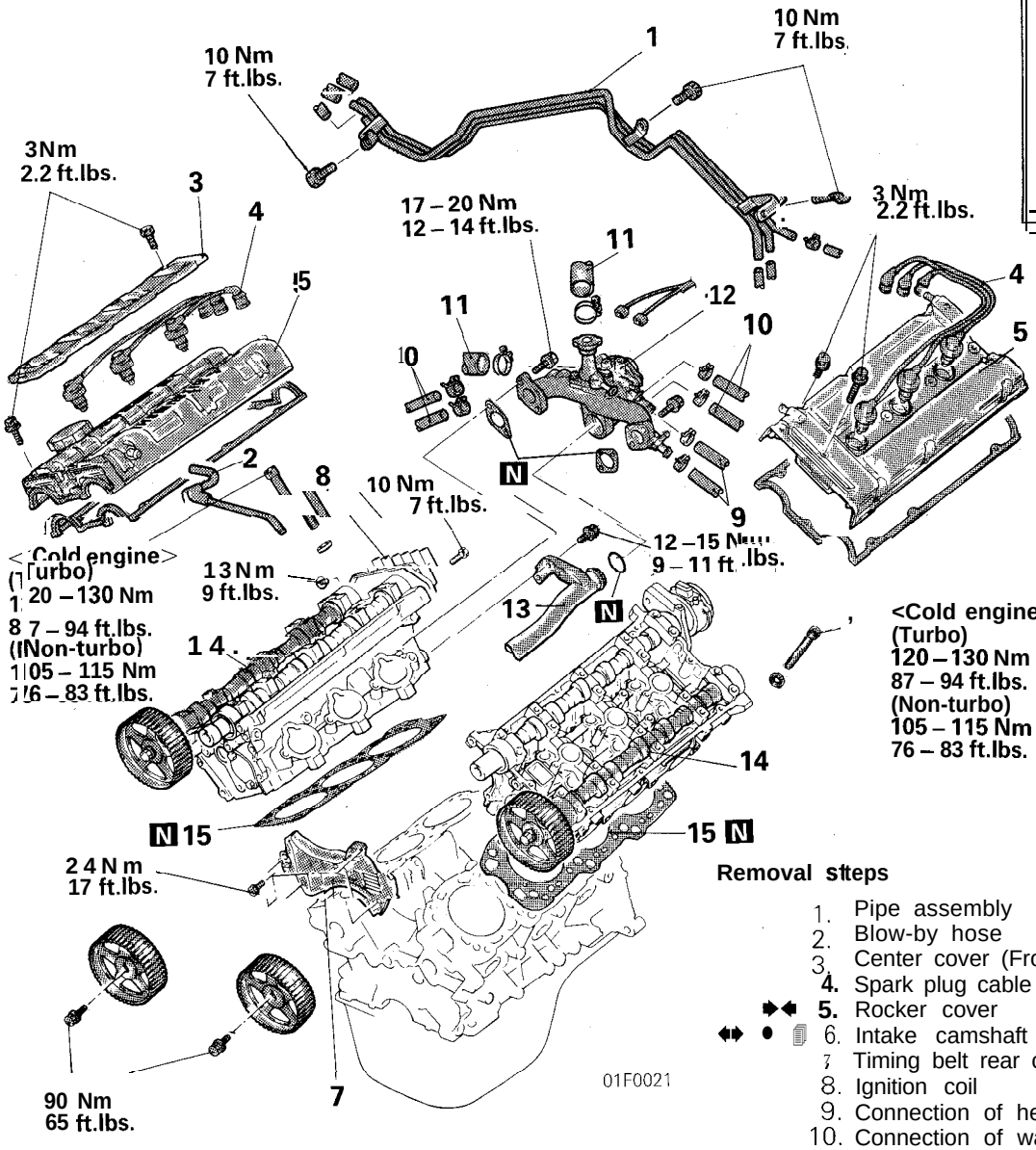
Pre-removal and Post-installation Operation
Draining and Supplying
- Engine Coolant
  (Refer to GROUP 0 – Maintenance Service.)
- Air Intake Manifold
  (Refer to GROUP 11 -Air Intake Manifold.)
- Turbocharger <Turbo>
  (Refer to GROUP 11 -Turbocharger.)
- Exhaust Manifold
  (Refer to GROUP 11 -Exhaust Manifold.)
- Timing Belt
  (Refer to P.9-56.)

Adjustment
- Accelerator Cable
  (Refer to GROUP 14 – Engine Control.)
- Engine Adjustment
  (Refer to P.9-16.)



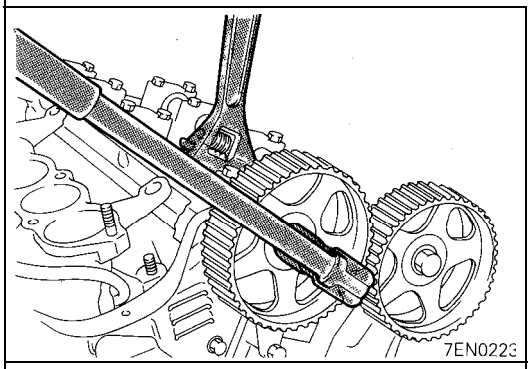


Sealant: MOPAR Part No 4318034 or equivalent



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



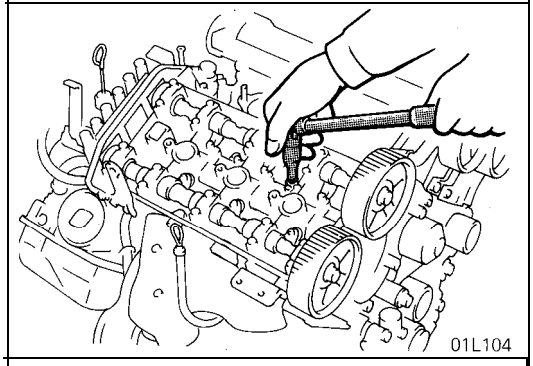
SERVICE POINTS OF REMOVAL

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

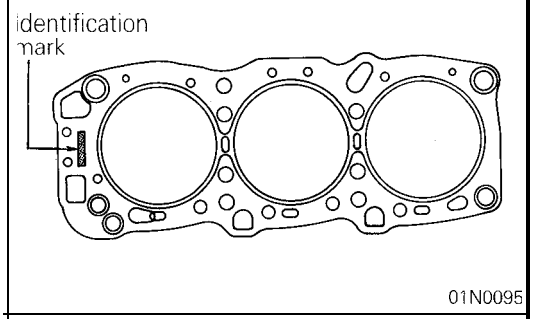
Using a 10 mm hex wrench, remove the cylinder head assembly.

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

SERVICE POINTS OF INSTALLATION

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.

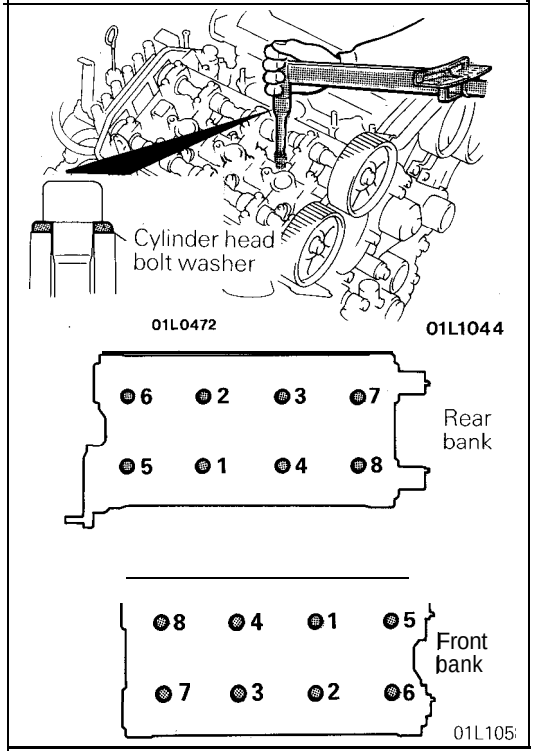
Caution
Take care that no foreign material gets into the cylinder, coolant passages or oil passages.

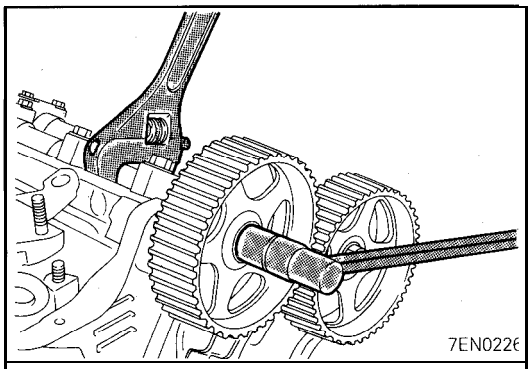
(2) Using a 10 mm hex wrench and a torque wrench, tighten the bolts to the specified torque in the order shown in the illustration. (in two or three cycles)

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

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

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

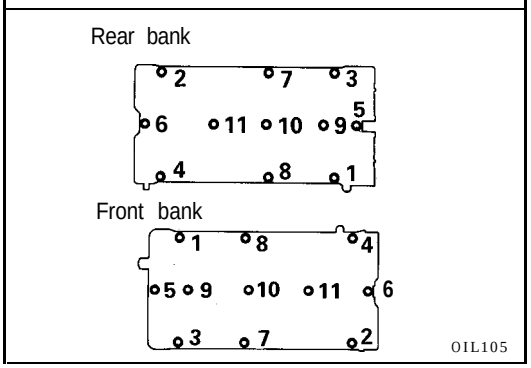




6. INSTALLATION OF INTAKE CAMSHAFT SPROCKET

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

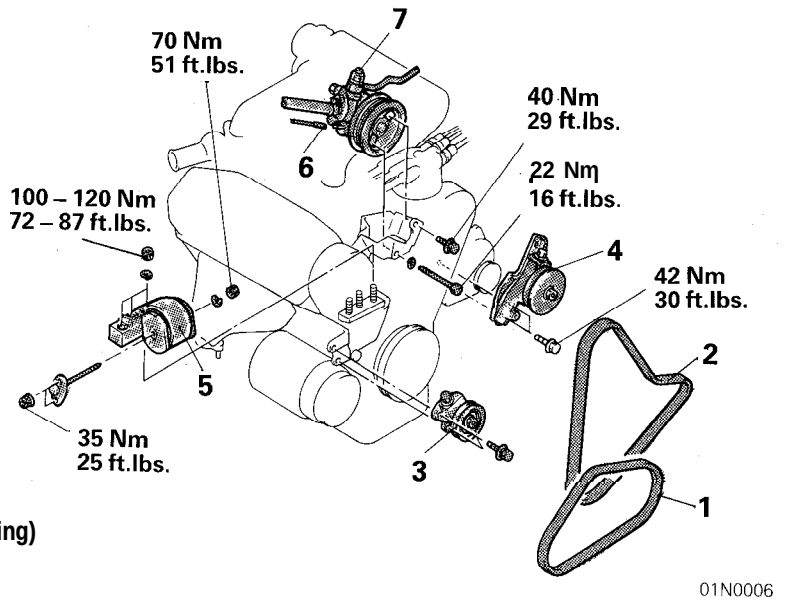
(3) When the rocker cover gasket has been replaced, tighten bolts in this order, and then retighten bolts 1 to 6 to 4 Nm (2.9 ft.lbs.).

TIMING BELT <SOHC>

REMOVAL AND INSTALLATION

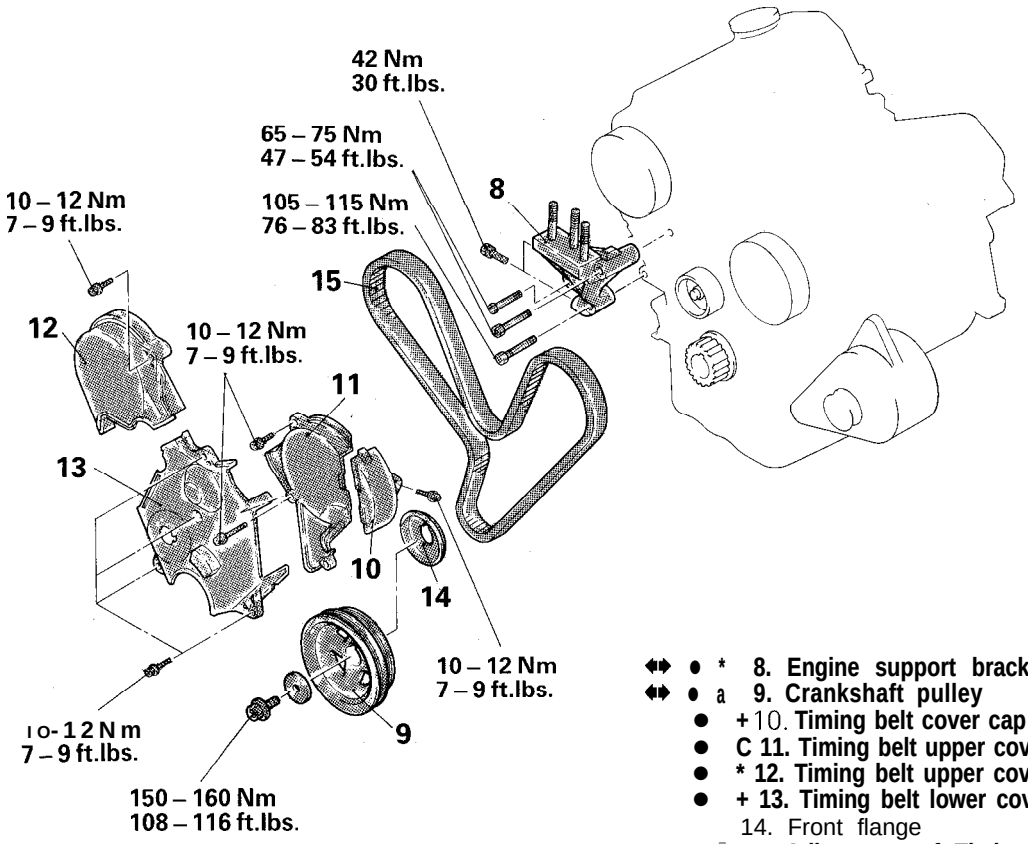
Pre-removal Operation
- Removal of the Under Cover (Front LH, Side LH)
- Removal of Cruise Control Actuator <Vehicle with Cruise Control> (Refer to GROUP 14 – Cruise Control.)
- Raise and Suspend the Engine to the Extent Force is not Applied to the Engine Mount

Post-installation Operation
- Installation of the Under Cover (Front LH, Side LH)
- Installation of Cruise Control Actuator <Vehicle with Cruise Control> (Refer to GROUP 14 -Cruise Control.)
- Adjustment of the Engine (Refer to P.9-16.)



Removal steps

1. Drive **belt (air conditioning) (Refer to** P.9-16.)
2. **Drive belt (power steering /generator) (Refer to** P.9-16.)
3. **Tension pulley assembly (air conditioning)**
4. **Tension pulley bracket**
5. **Engine mounting bracket**
6. **Connection for power steering pump pressure switch connector**
7. **Power steering oil pump**



- **8. Engine support bracket**
- **9. Crankshaft pulley**
- **10. Timing belt cover cap**
- **C 11. Timing belt upper cover** outer (A)
- *** 12. Timing belt upper cover outer (B)**
- **+ 13. Timing belt lower cover outer**
- 14. Front flange
- **Adiustment of Timing belt tension**
- *** 15. Timing belt**

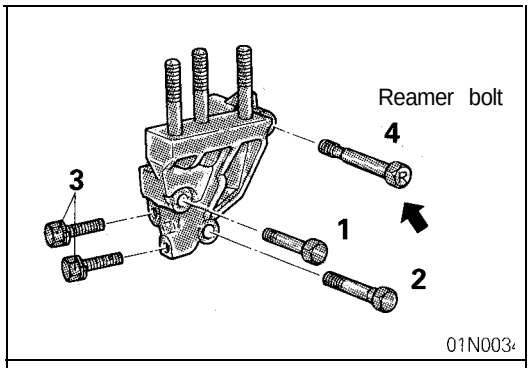
N0005

SERVICE POINTS OF REMOVAL

7. DISCONNECTION OF POWER STEERING OIL PUMP

Disconnect the oil pump (with the hose attached).

NOTE
Suspend the removed oil pump (by using wire or similar material) at a place where no damage will be caused during removal/installation of the engine assembly.

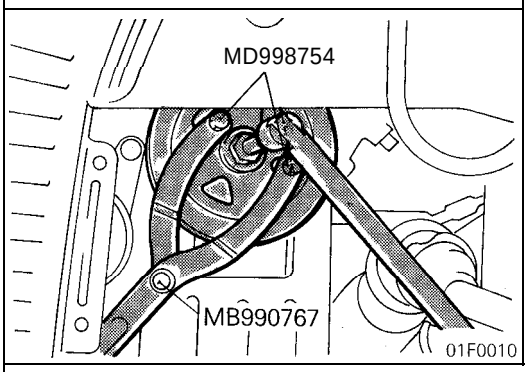


8. REMOVAL OF ENGINE SUPPORT BRACKET

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.

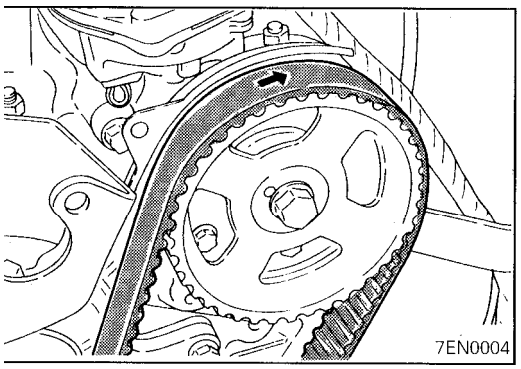
Caution
Keep in mind that the reamer bolt is sometimes heat seized on the engine support bracket.

NOTE
Slightly jack up the engine body to make work easier.



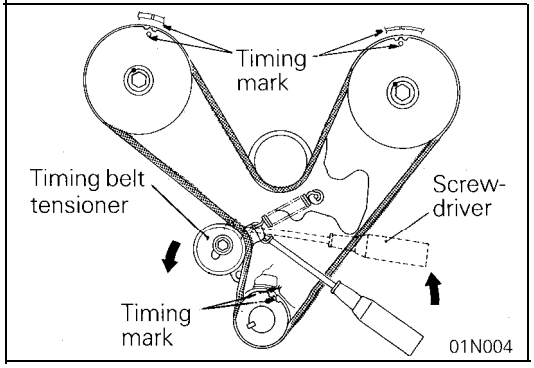
9. REMOVAL OF CRANKSHAFT PULLEY

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

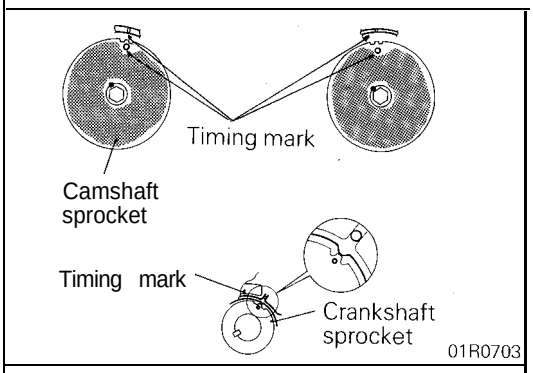


15. REMOVAL OF TIMING BELT

(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.



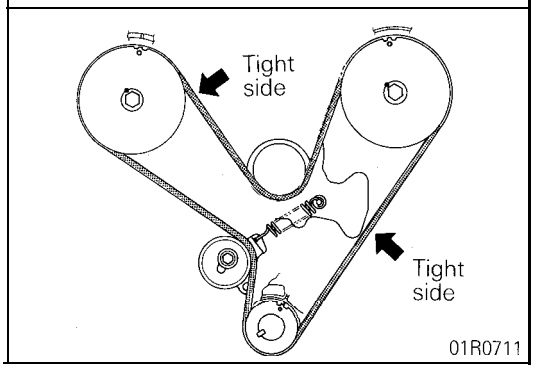
(3) Loosen the bolt of the timing belt tensioner.
(4) Using a screwdriver or the like, turn the timing belt tensioner counterclockwise and tighten the tensioner bolt.
(5) Remove the timing belt.



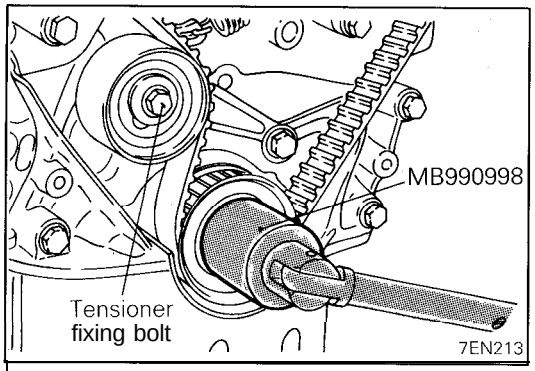
SERVICE POINT OF INSTALLATION

15. INSTALLATION OF TIMING BELT

(1) Align the timing marks of the camshaft sprockets (on the front and rear sides) and the crankshaft sprocket. (At the top dead point of the No. 1 cylinder compression stroke.)



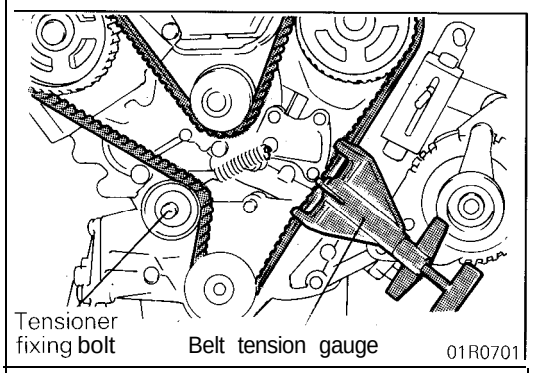
(2) First, route the timing belt on the crankshaft sprocket, then on the camshaft sprocket on the side without slackness in the tight side.
(3) Next, run the timing belt onto the water pump pulley, the camshaft sprocket on the front side, and the timing belt tensioner.
(4) Apply force counterclockwise to the camshaft sprocket on the rear side. When the tight side of the belt is fault, check that the timing marks are all aligned.



- **ADJUSTMENT OF TIMING BELT TENSION**

(1) Attach the flange.
(2) Back off the fixing bolts of the temporarily tightened tensioner one or two turns and tighten the timing belt with the tensioner spring force.
(3) Using the special tool together with the temporarily tightened crankshaft pulley bolt, turn the crankshaft two turns in the normal rotating direction (clockwise).

NOTE
Turn smoothly, but not in the opposite direction (counterclockwise).



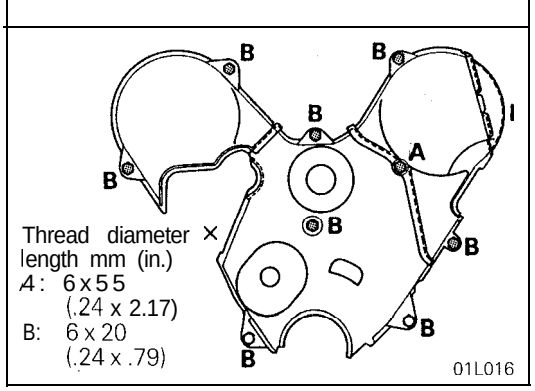
(4) Re-align the sprockets timing marks and tighten the tensioner fixing bolts.

Tightening torque: 22 – 30 Nm (16 – 22 ft.lbs.) (Tensioner fixing bolts)

(5) Measure belt tension with a belt tension gauge at the indicated plate.

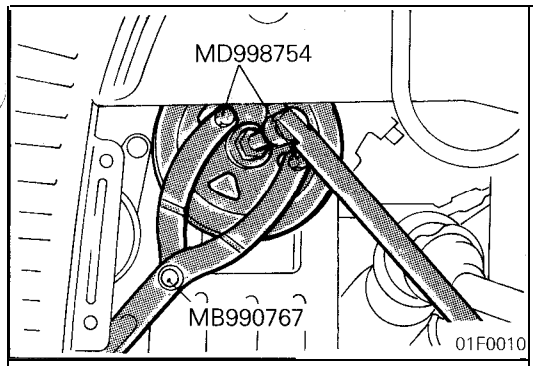
Standard value: 210 – 310 N (46.3 – 68.3 lbs.)

Caution
Contact the hooks to the tooth bottoms and the spindle to the back of the belt.



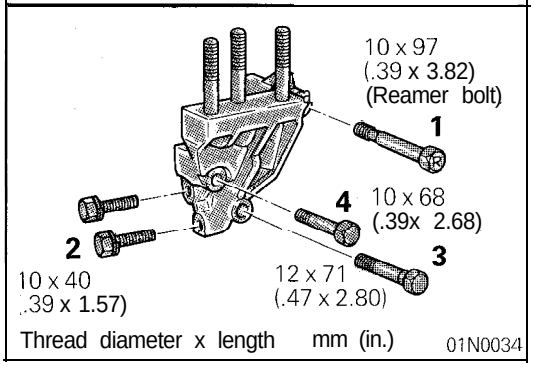
13. INSTALLATION OF TIMING BELT LOWER COVER OUTER / 12. TIMING BELT UPPER COVER OUTER (B) / 11. TIMING BELT UPPER COVER OUTER (A) / 10. TIMING BELT COVER CAP

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



9. INSTALLATION OF CRANKSHAFT PULLEY

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



8. INSTALLATION OF ENGINE SUPPORT BRACKET

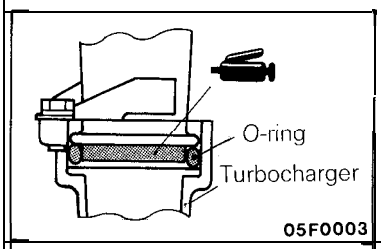
Since the mounting bolts of engine support bracket are different in size depending on location, insert them in numbered sequence.

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

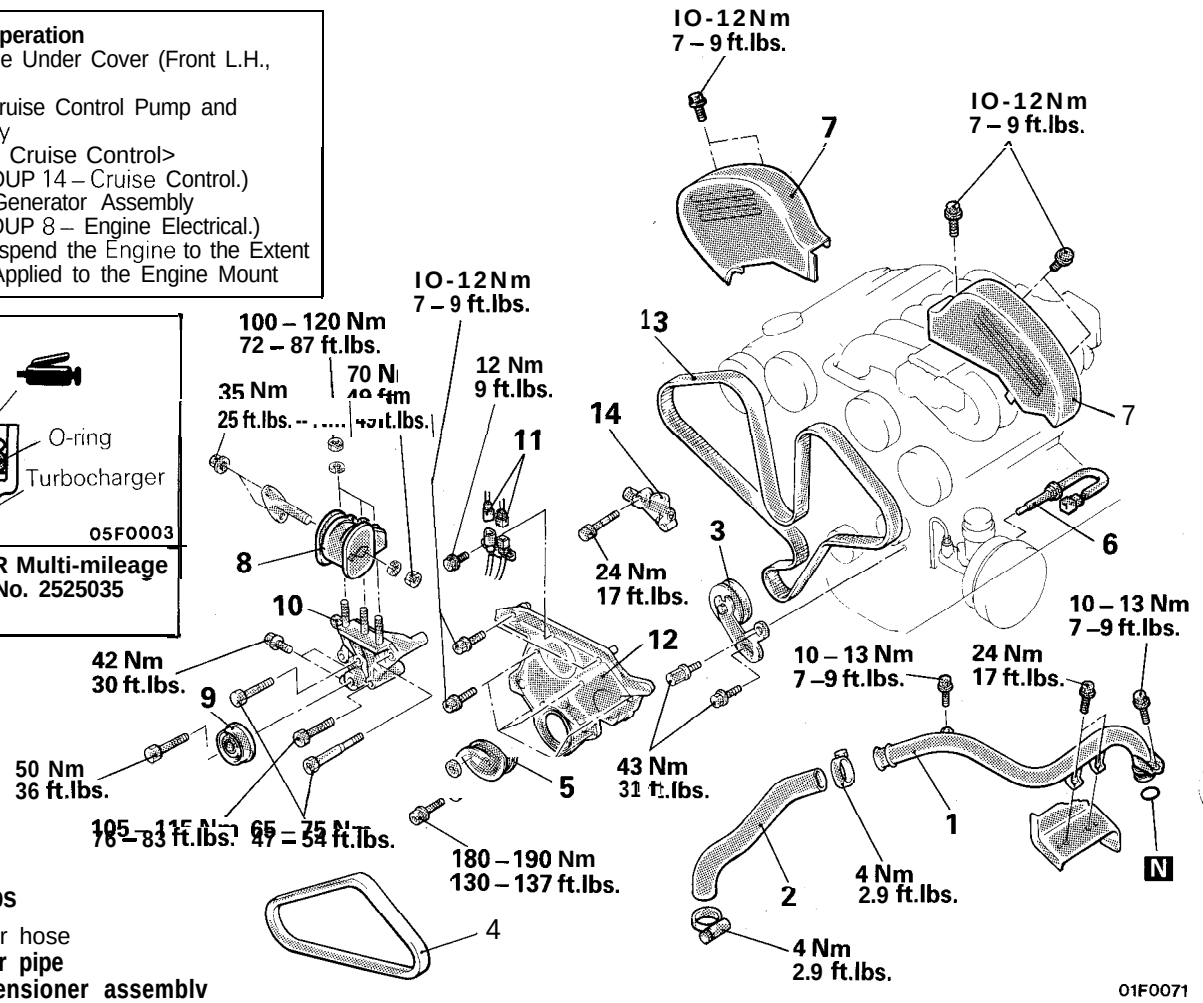
TIMING BELT <DOHC>

REMOVAL AND INSTALLATION

Pre-removal Operation
- Removal of the Under Cover (Front L.H., side L.H.)
- Removal of Cruise Control Pump and Link Assembly <Vehicle with Cruise Control> (Refer to GROUP 14 – Cruise Control.)
- Removal of Generator Assembly (Refer to GROUP 8 – Engine Electrical.)
- Raise and Suspend the Engine to the Extent Force is not Applied to the Engine Mount



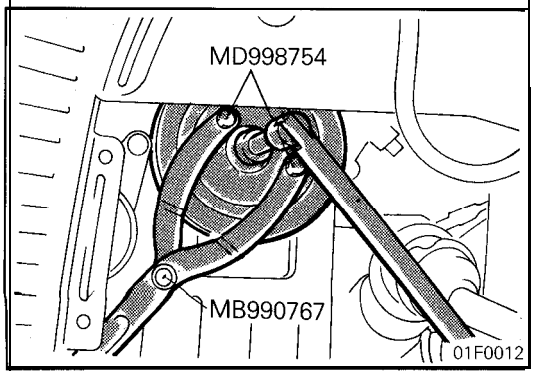
Grease: MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent



Removal steps

1. Air hose
2. **Air pipe**
3. **Tensioner assemblv**
4. **Drive belt (power steering) (Refer to P.9-16.)**
5. **Crankshaft pulley**
6. **Brake fluid level sensor**
7. **Timing belt upper cover**
8. **Engine mount bracket**
9. **Idler pulley (generator/air conditioning)**
10. **Engine support bracket**
11. **Camshaft position sensor and crankshaft position sensor connector**
12. **Timing belt lower cover**
    Adjustment of timing belt tension
13. **Timing belt**
14. **Auto tensioner**

Post-installation Operation
- Installation of Generator (Refer to GROUP 8 – Engine Electrical.)
- Installation of the Under Cover (Front L.H.. Side L.H.)
- Installation of Cruise Control Link assembly <Vehicle with Cruise Control> (Refer to GROUP 14 -Cruise Control.)
- Adjustment of the Engine (Refer to P.9-16.)



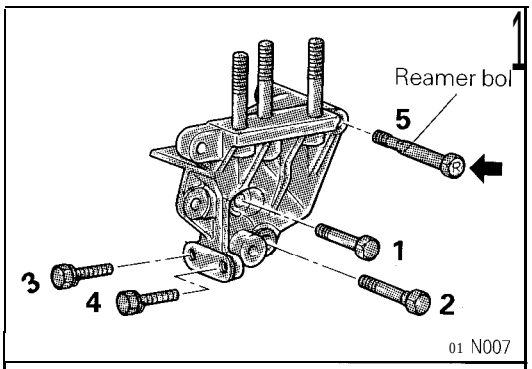
SERVICE POINTS OF REMOVAL

5. REMOVAL OF CRANKSHAFT PULLEY

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

Caution

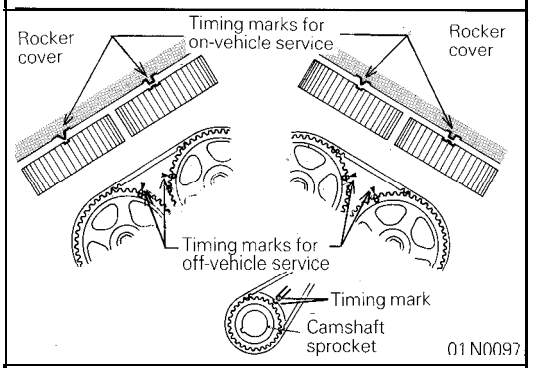
Use only the specified special tools, or a damaged pulley damper could result.



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.

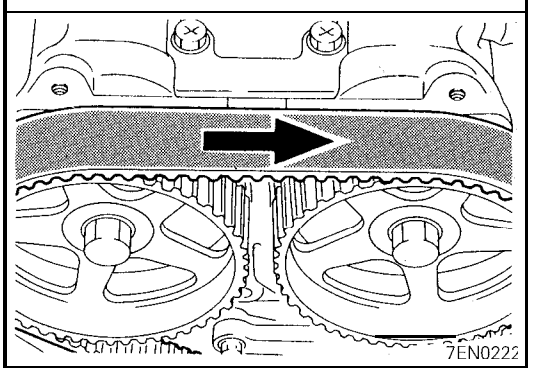


13. REMOVAL OF TIMING BELT

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



SERVICE POINTS OF INSTALLATION

14. INSTALLATION OF AUTO TENSIONER

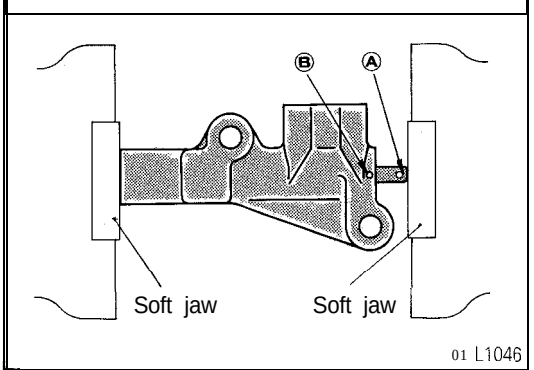
(1) If the auto tensioner rod is in its fully extended position, reset it as follows.
① Keep the auto tensioner level and, in that position, clamp it in the vise with soft jaws.
② Push in the rod little by little with the vise until the set hole Ⓐ in the rod is aligned with that Ⓑ in the cylinder.

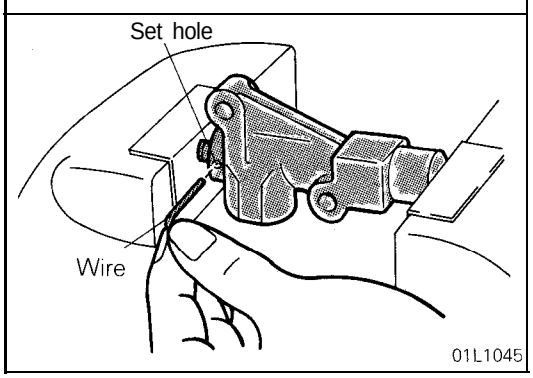
Caution
Push in the rod slowly to prevent the push rod from being damaged.'

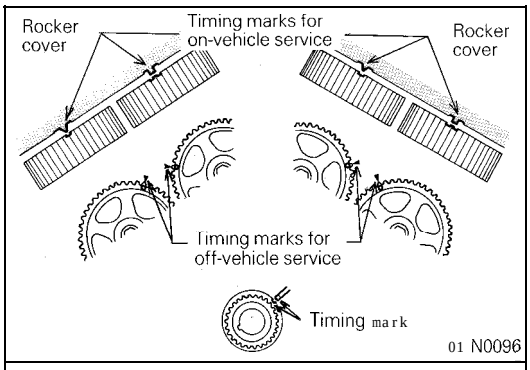
③ Insert a wire [I .4 mm (.055 in.) in diameter] into the set holes.
④ Unclamp the auto tensioner from the vise.

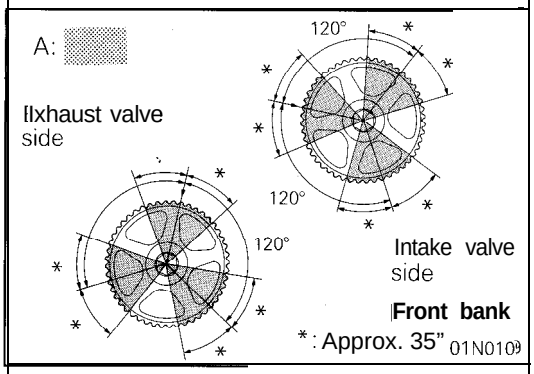
(2) Install the auto tensioner.

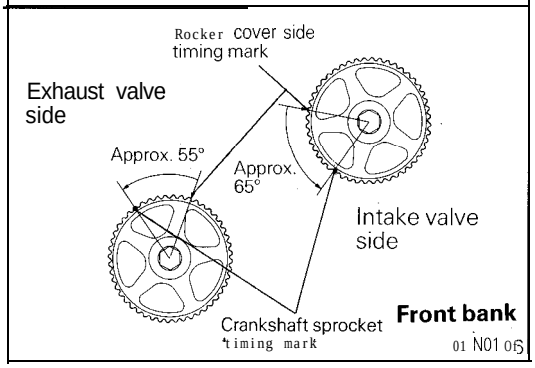
Caution
Leave the wire installed in the auto tensioner.











13. 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.

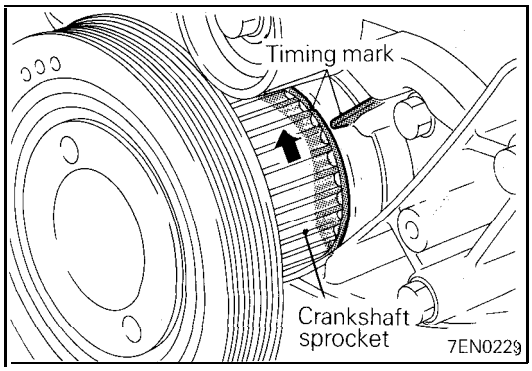
② Make sure that the timing marks on the camshaft sprockets for intake and exhaust valves are not within the range A in the illustration at left.
If the timing mark is within range A, turn the camshaft sprocket to move the timing mark to the area closest to the range A.

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 crankshaft to locate the timing mark as shown in the illustration at left.

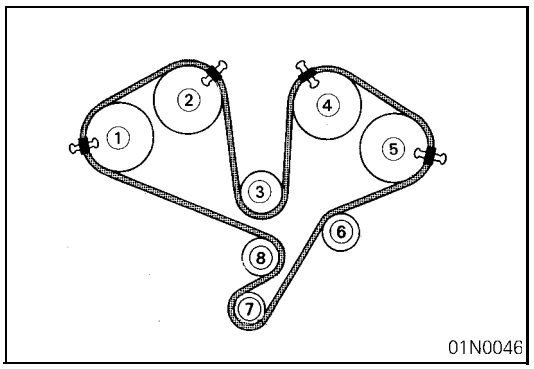
Caution
If the intake and exhaust valves of the same cylinder lift simultaneously, interference with each other may result. Therefore, turn the intake valve camshaft sprocket and the exhaust valve camshaft alternately.

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



⑤ Align the timing mark of the crankshaft sprocket.

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

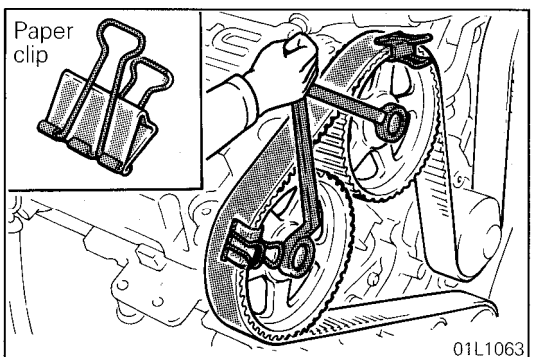


(2) Using paper clips, install the timing belt in the following order with care not to allow the belt to slack.

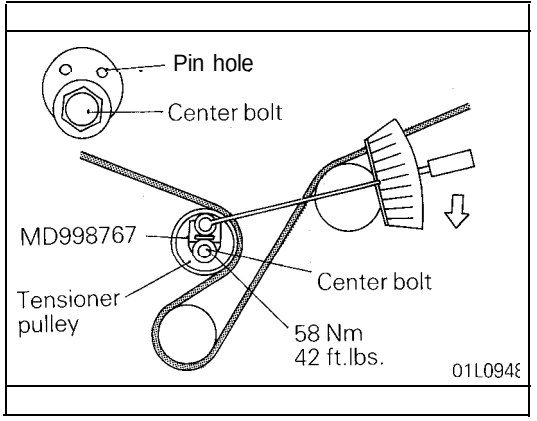
① Exhaust camshaft sprocket (front bank side) → ② Intake camshaft sprocket (front bank side) → ③ Water pump pulley → ④ Intake camshaft sprocket (rear bank side) → ⑤ Exhaust camshaft sprocket → ⑥ Idler pulley → ⑦ Crankshaft sprocket → ⑧ Tensioner pulley

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.

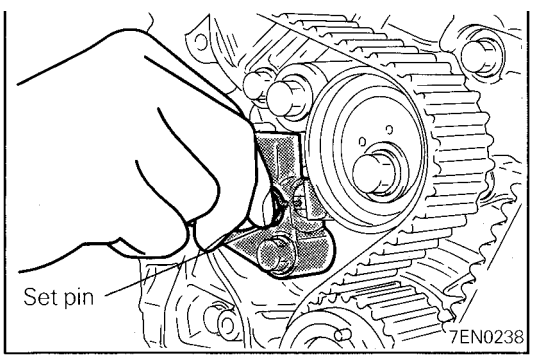


- **ADJUSTMENT OF TIMING BELT**

(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.

Reference value: 10 Nm (7.2 ft.lbs.)
(Timing belt tensioning torque)

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

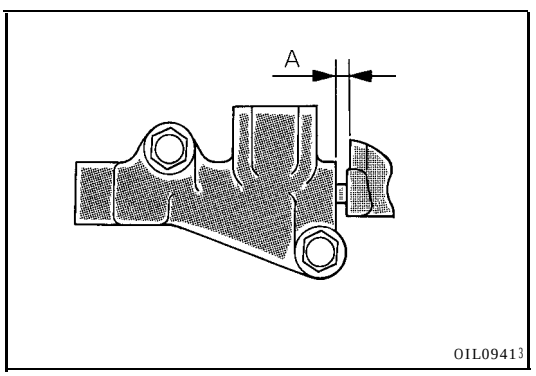


(3) Remove the set pin from the auto tensioner. At this time, make sure that the set pin can be easily removed.
(4) Rotate the crankshaft two turns clockwise and leave it as is for five minutes or more. Then, check again that the set pin can be easily removed from, and installed to, the auto tensioner.

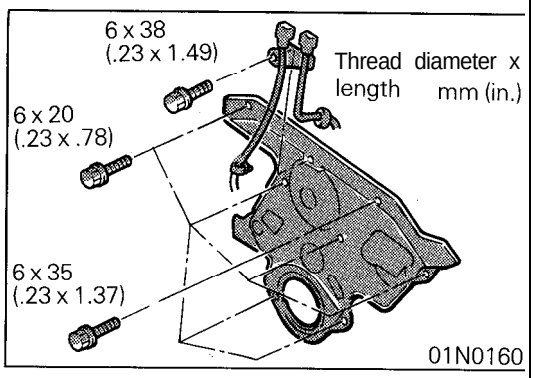
NOTE
Even if the set pin cannot be easily inserted, the auto tensioner is normal if its rod protrusion is within specification.

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

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

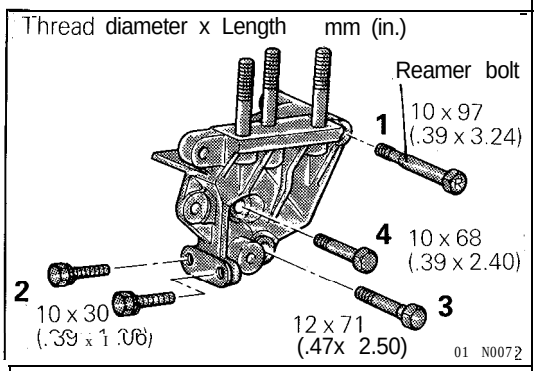


(5) Check again that timing marks on all sprockets are aligned properly.



12. INSTALLATION OF TIMING BELT FRONT COVER (LOWER)

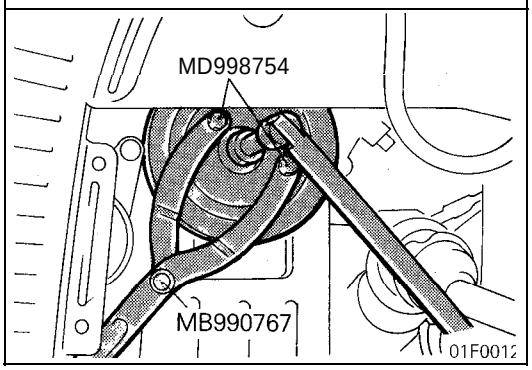
Since the mounting bolts of timing cover are different in size depending on location, insert them with care.



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.



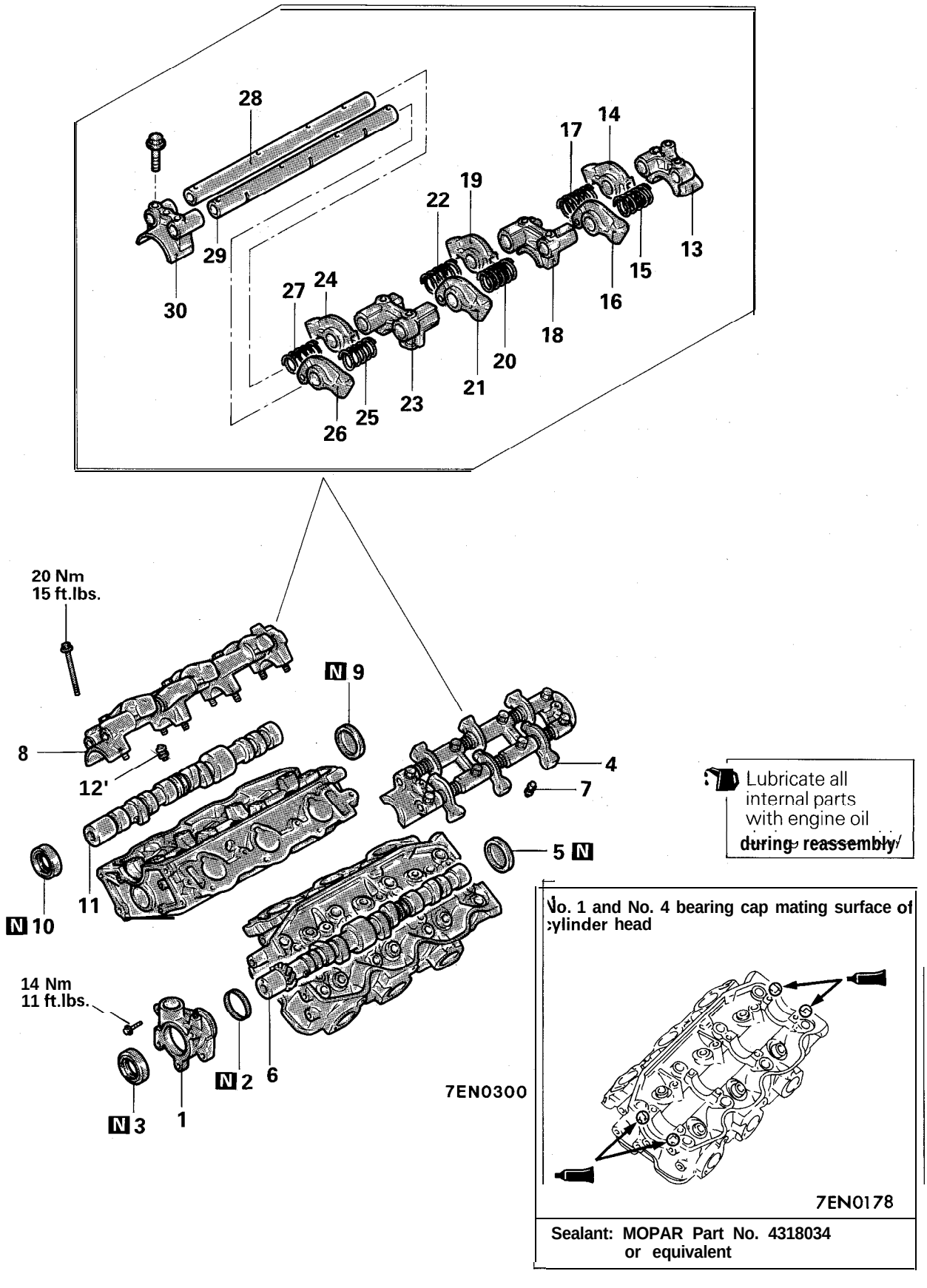
5. INSTALLATION OF CRANKSHAFT PULLEY

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.

CAMSHAFT <SOHC>

REMOVAL AND INSTALLATION



Removal steps

1. Distributor adaptor
2. O-ring
3. Camshaft oil seal
4. Rocker arm and shaft assembly (rear)
5. Circular packing
6. Camshaft (rear)
7. Lash adjuster
8. Rocker arm and shaft assembly (front)
9. Circular packing
10. Camshaft oil seal
11. Camshaft (front)
12. Lash adjuster
13. Bearing cap No. 4
14. Rocker arm (B)
15. Spring
16. Rocker arm (A)
17. Spring
18. Bearing cap No. 3
19. Rocker arm (B)
20. Spring
21. Rocker arm (A)
22. Spring
23. Bearing cap No. 2
24. Rocker arm (B)
25. Spring
26. Rocker arm (A)
27. Spring
28. Rocker arm shaft (B)
29. Rocker arm shaft (A)
30. Bearing cap No. 1

Installation steps

30. Bearing cap No. 1
- * 29. Rocker arm shaft (A)
- * 28. Rocker arm shaft (B)

27. Spring
26. Rocker arm (A)
25. Spring
24. Rocker arm (B)

- * 23. Bearing cap No. 2

22. Spring
21. Rocker arm (A)
20. Spring
19. Rocker arm (B)

- 18. Bearing cap No. 3

17. Spring
16. Rocker arm (A)
15. Spring
14. Rocker arm (B)

- * 13. Bearing cap No. 4

11. Camshaft (front)

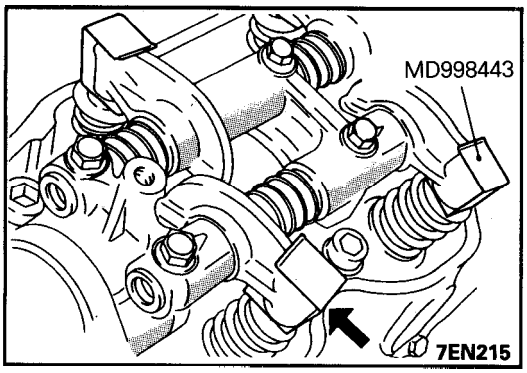
- + 12. Lash adjuster
- 8. Rocker arm and shaft assembly (front)
- 9. Circular packing
- *10. Camshaft oil seal

6. Camshaft (rear)

- * 7. Lash adjuster
- + 4. Rocker arm and shaft assembly (rear)
- * 5. Circular packing

2. O-ring
1. Distributor adaptor

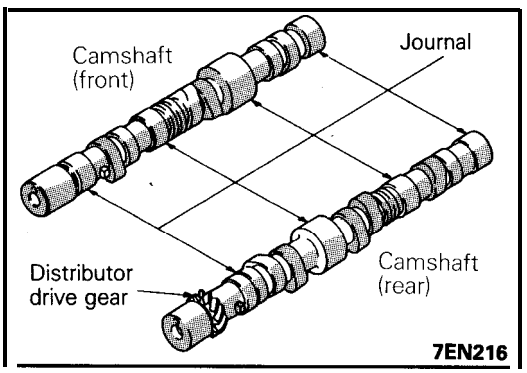
- 3. Camshaft oil seal



SERVICE POINTS OF REMOVAL

4. 8. REMOVAL OF ROCKER ARM AND SHAFT ASSEMBLY

Use the special tool to ensure that the lash adjuster doesn't fall out.



INSPECTION

CAMSHAFT

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

Standard value:

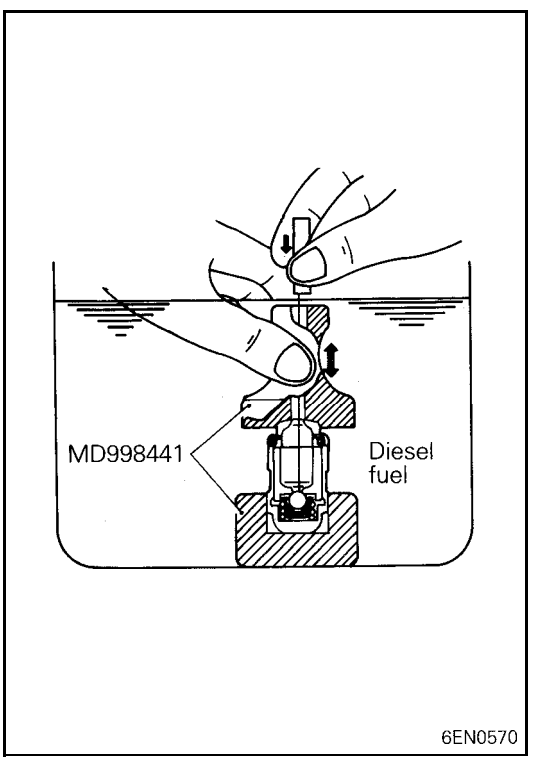
Intake side	41.25 **mm** (1.6240 **in.)**
Exhaust side	41.25 **mm (1.6240 in.)**

Limit: 40.75 mm (1.6043 in.)

LEAK DOWN TEST OF LASH ADJUSTER

Caution

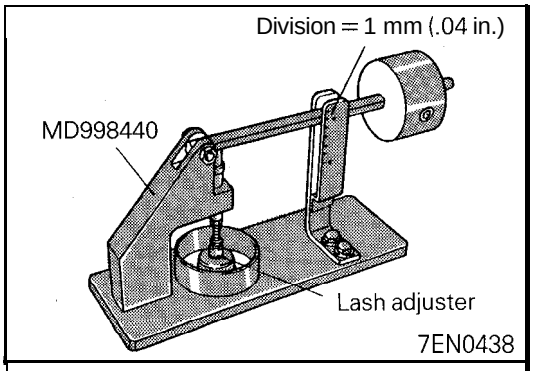
1. The lash adjuster is a precision part. Keep it free from dust and other foreign matters.
2. Do not disassemble lash adjuster.
3. When cleaning lash adjuster, use clean diesel fuel only.



(1) Immerse the lash adjuster in clean diesel fuel.
(2) While lightly pushing down inner steel ball using the small wire, move the plunger up and down four or five times to bleed air.
Use of the Retainer helps facilitate the air bleeding of the rocker arm mounted type lash adjuster.
(3) Remove the small wire and press the plunger. If the plunger is hard to be pushed in, the lash adjuster is normal. If the plunger can be pushed in all the way readily, bleed the lash adjuster again and test again. If the plunger is still loose, replace the lash adjuster.

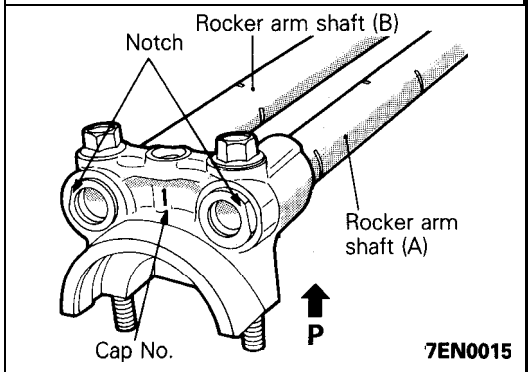
Caution

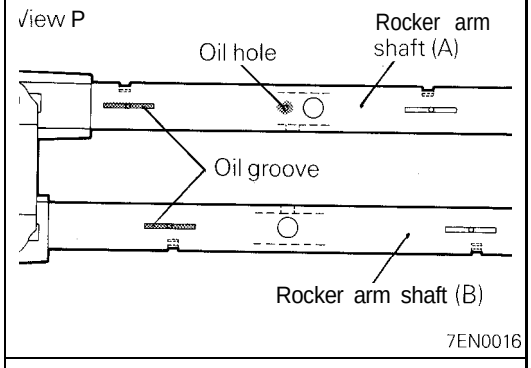
Upon completion of air bleeding, hold lash adjuster upright to prevent inside diesel fuel from spilling.



(4) After air bleeding, set lash adjuster on the special tool (Leak down tester M D998440).
(5) After plunger has gone down somewhat 0.2 – 0.5 mm (.008 – .020 in.), measure time taken for it to go down 1 mm (.04 in.). Replace if measured time is out of specification.

Standard value: 4 – 20 seconds / 1 mm (.04 in.) [Diesel fuel at 15 – 20°C (50 – 68°F)]



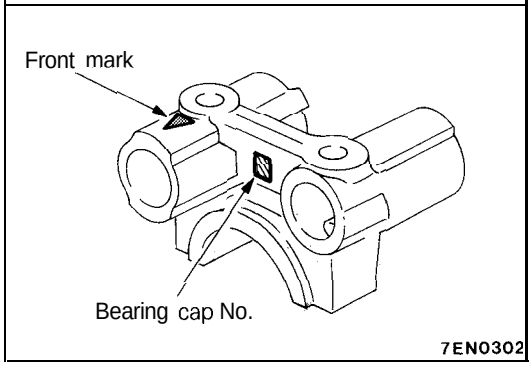


SERVICE POINTS OF INSTALLATION

29. INSTALLATION OF ROCKER ARM SHAFT (A) / 28. ROCKER ARM SHAFT (B)

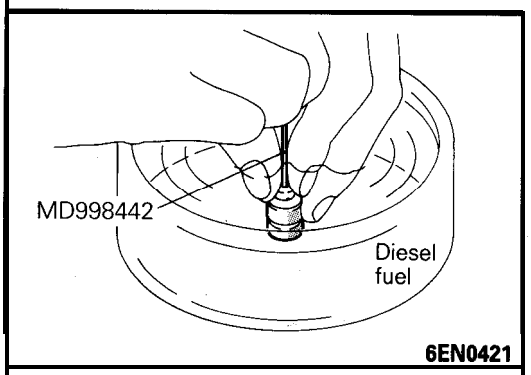
Insert bearing cap No.1 so that the notch on the end of the shaft faces in the direction shown in the illustration and insert the mounting bolt.

NOTE
Check that the oil groove faces downward as shown in the illustration and the oil port is located on the rocket shaft (A) side.



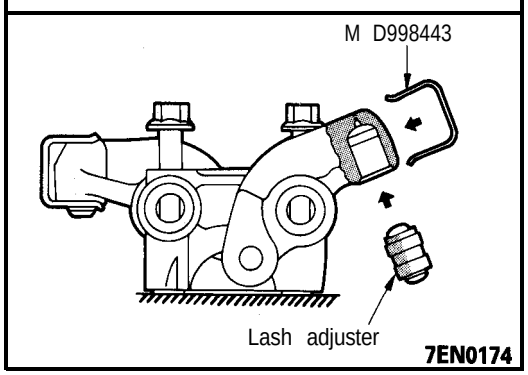
23.18. 13. INSTALLATION OF BEARING CAP

Install the bearing caps so that the arrow marks on the caps point in the same direction as the mark on the No.1 bearing cap.
No.2 and 3 bearing caps are very similar in shape. Check the stamped cap numbers for correct installation.



12.7. 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 on the check ball in order to bleed out the air.

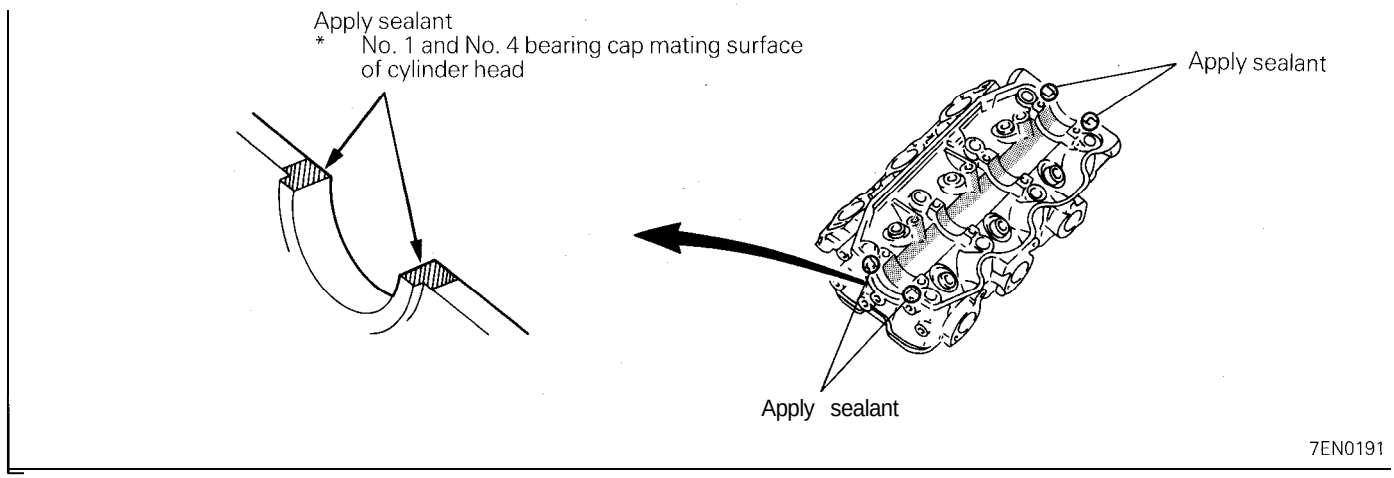


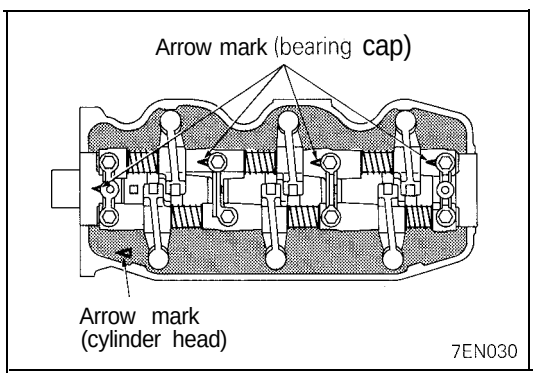
(3) Insert the lash adjuster to rocker arm, being careful not to spill the diesel fuel. Then use the special tool to prevent adjuster from falling while installing it.

8. 4. INSTALLATION OF ROCKER ARM AND SHAFT ASSEMBLY

(1) Apply a minimum amount of sealant on the four places (shown in the illustration).

Specified sealant: MOPAR Part No. 4318034 or equivalent

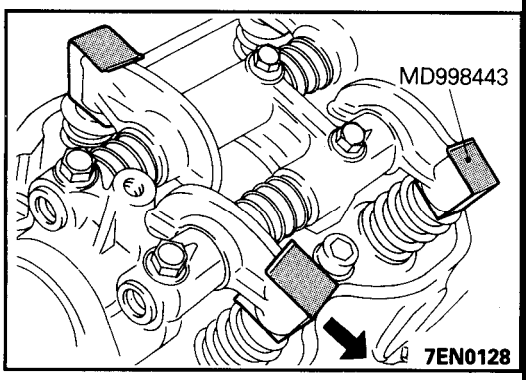




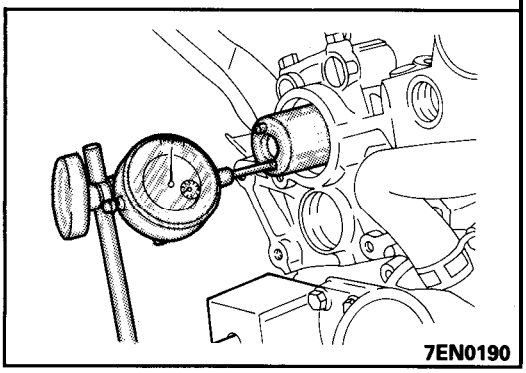
(2) Attach the rocker arm shaft assemblies (front) and (rear) such that the arrow mark on the bearing cap faces in the same direction as the arrow mark on the cylinder head.

NOTE
The arrow marks face each other on rocker arm shaft assemblies (front) and (rear).

(3) Tighten the bearing cap bolt to the specified torque.

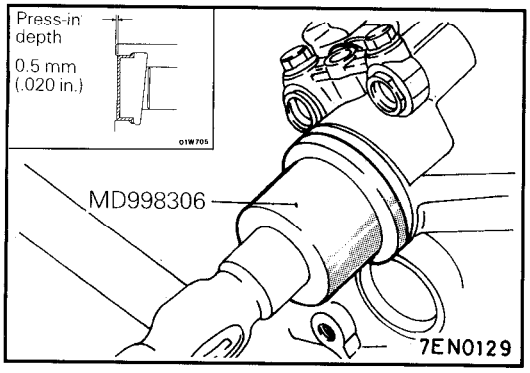


(4) Remove the special tool (lash adjuster holders).



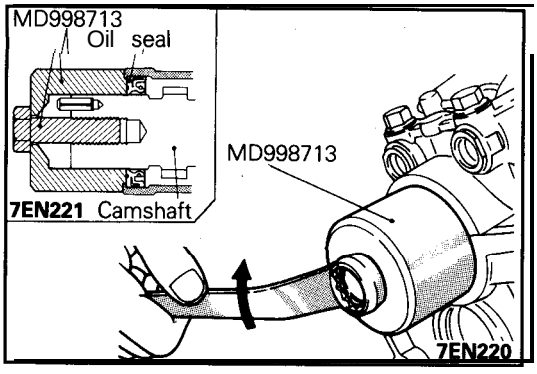
(5) Check the camshaft end play. If the end play is excessive, replace the camshaft and/or the cylinder head assembly.

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



9. 5. INSTALLATION OF CIRCULAR PACKING

Using the special tool, insert the circular packing

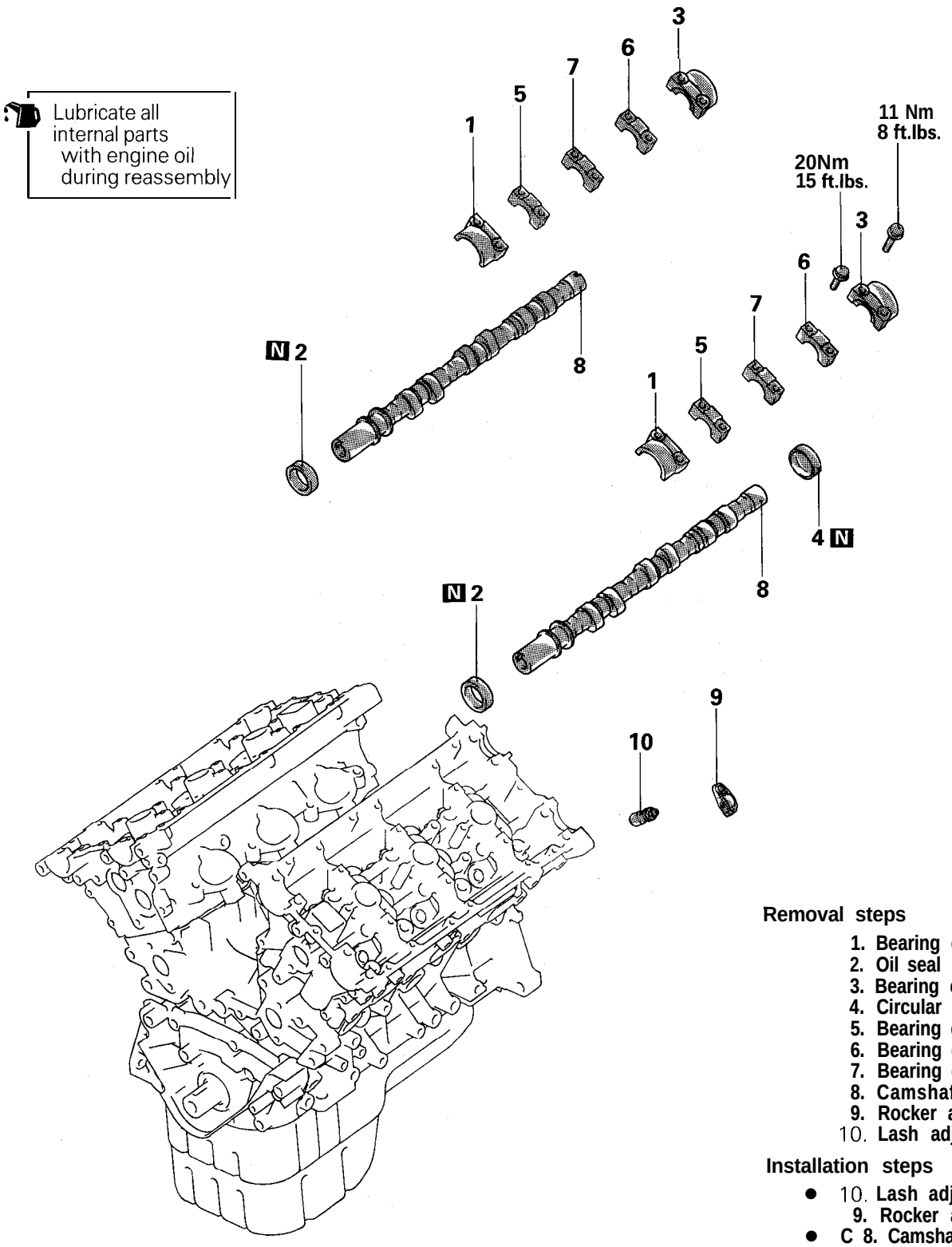


10.3. INSTALLATION OF CAMSHAFT OIL SEAL

(1) Apply a slight amount of engine oil all over the circumference of the camshaft oil seal lip section.
(2) Using the special tool, insert the oil seal.

CAMSHAFT <DOHC>

REMOVAL AND INSTALLATION

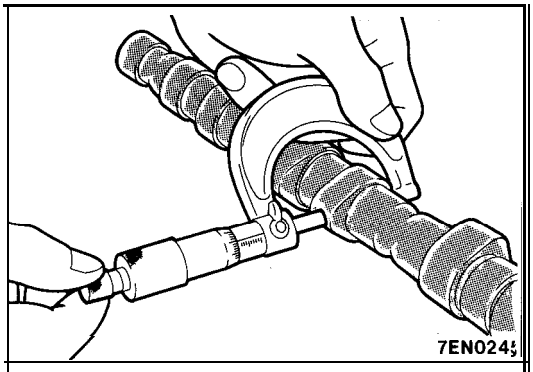


Removal steps

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

Installation steps

- ● 10. Lash adjuster
  9. Rocker arm
- ● C 8. Camshaft
- ● + 7. Bearing cap No. 3
- ● 6. Bearing cap No. 4
- ● a 5. Bearing cap No. 2
- ➡◀ 3. Bearing cap rear
- ➡◀ 1. Bearing cap front
- ➡◀ 4. Circular packing
- ● + 2. Oil seal



INSPECTION

CAMSHAFT

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

Standard value:

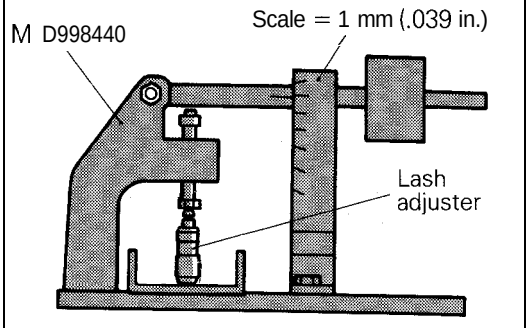
Intake side	**34.91 mm (1.3744 in.)**
Exhaust side	**34.91 mm (1.3744 in.)**

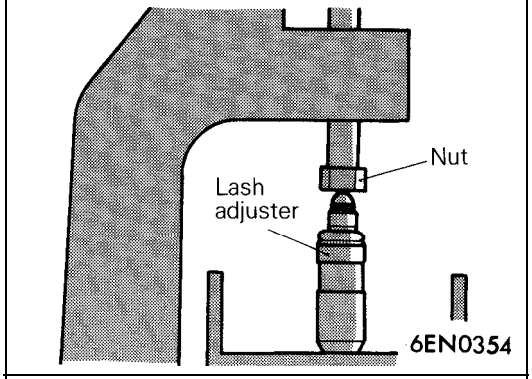
Limit:

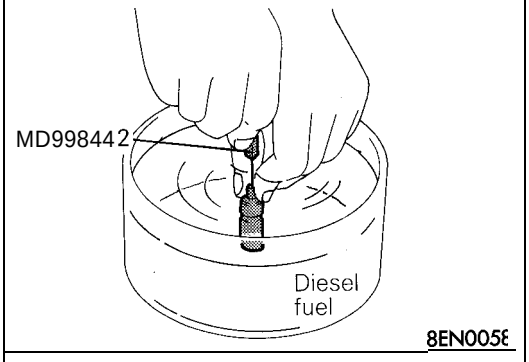
Intake side	**34.41 mm (1.3547 in.)**
Exhaust side	**34.41 mm (1.3547 in.)**

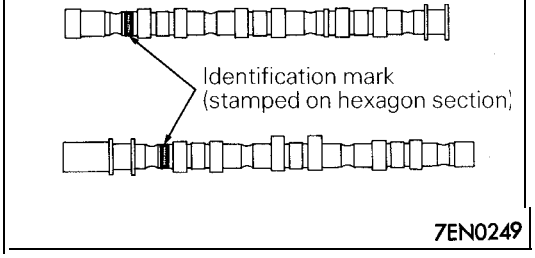
LEAK DOWN TEST OF LASH ADJUSTER

Refer to "LEAK DOWN TEST OF LASH ADJUSTER" on pages 9-63 and 9-64. Also note the following:
When the lash adjuster is set on a tester, remove the adjusting screw of the tester and adjust it to the height of the lash adjuster as shown in the illustration.









SERVICE POINTS OF INSTALLATION

10. 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.

8. 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 sectioned).

Identification mark:

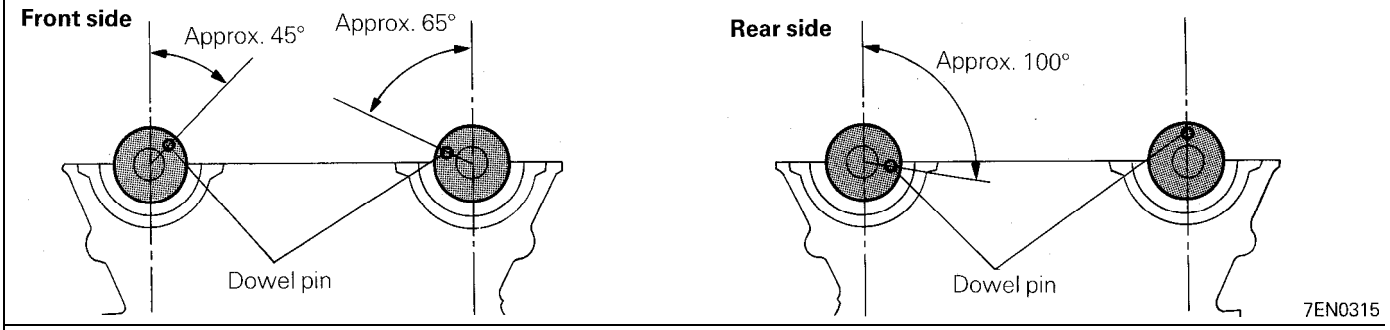
Turbo

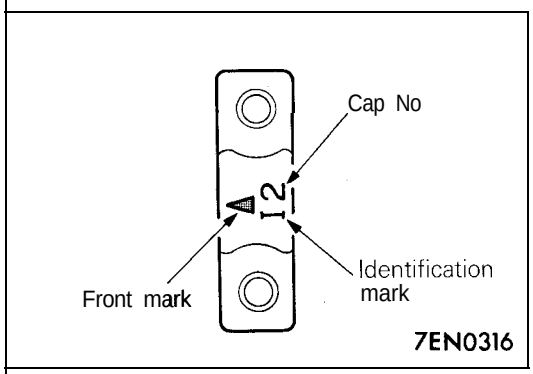
J ..... **Inlet**
N ..... **Exhaust**

Non Turbo

J ..... **Inlet**
K ..... **Exhaust**

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

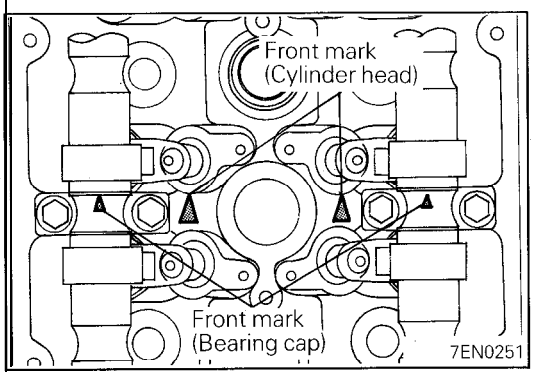




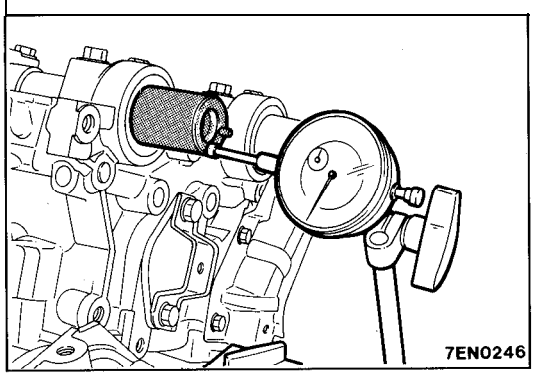
7. 6. 5. 3. 1. INSTALLATION OF BEARING CAPS

(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

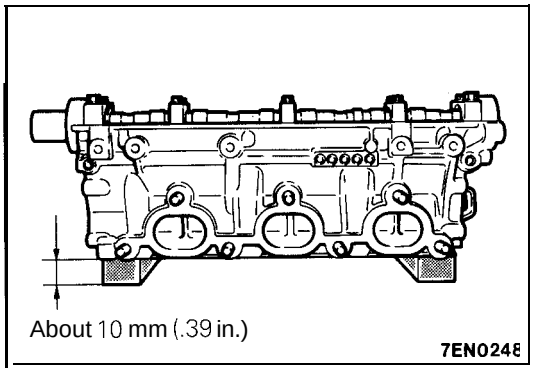


(2) Tighten gradually in two or three steps and finally tighten to specified torque.

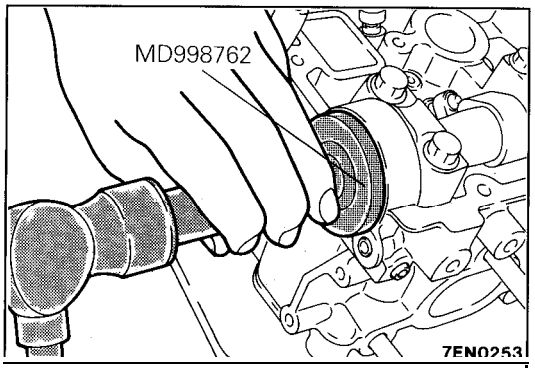


(3) Measure the camshaft end play. Replace if the limit is exceeded.

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

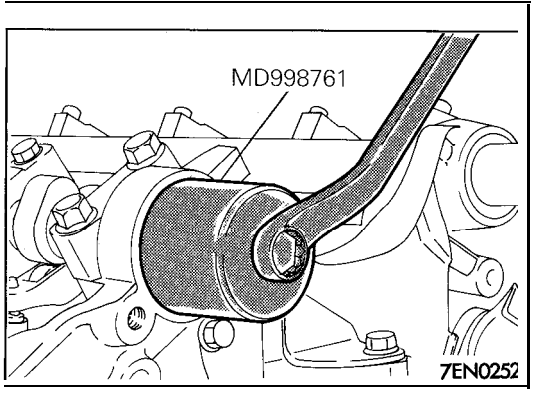


NOTE
If the bearing cap is installed with the cylinder cap removed, the valve will protrude. Install, therefore, with the cylinder head lifted by about 10 mm (.39 in.).



4. INSTALLATION OF CIRCULAR PACKING

Using the special tool, insert the circular packing.

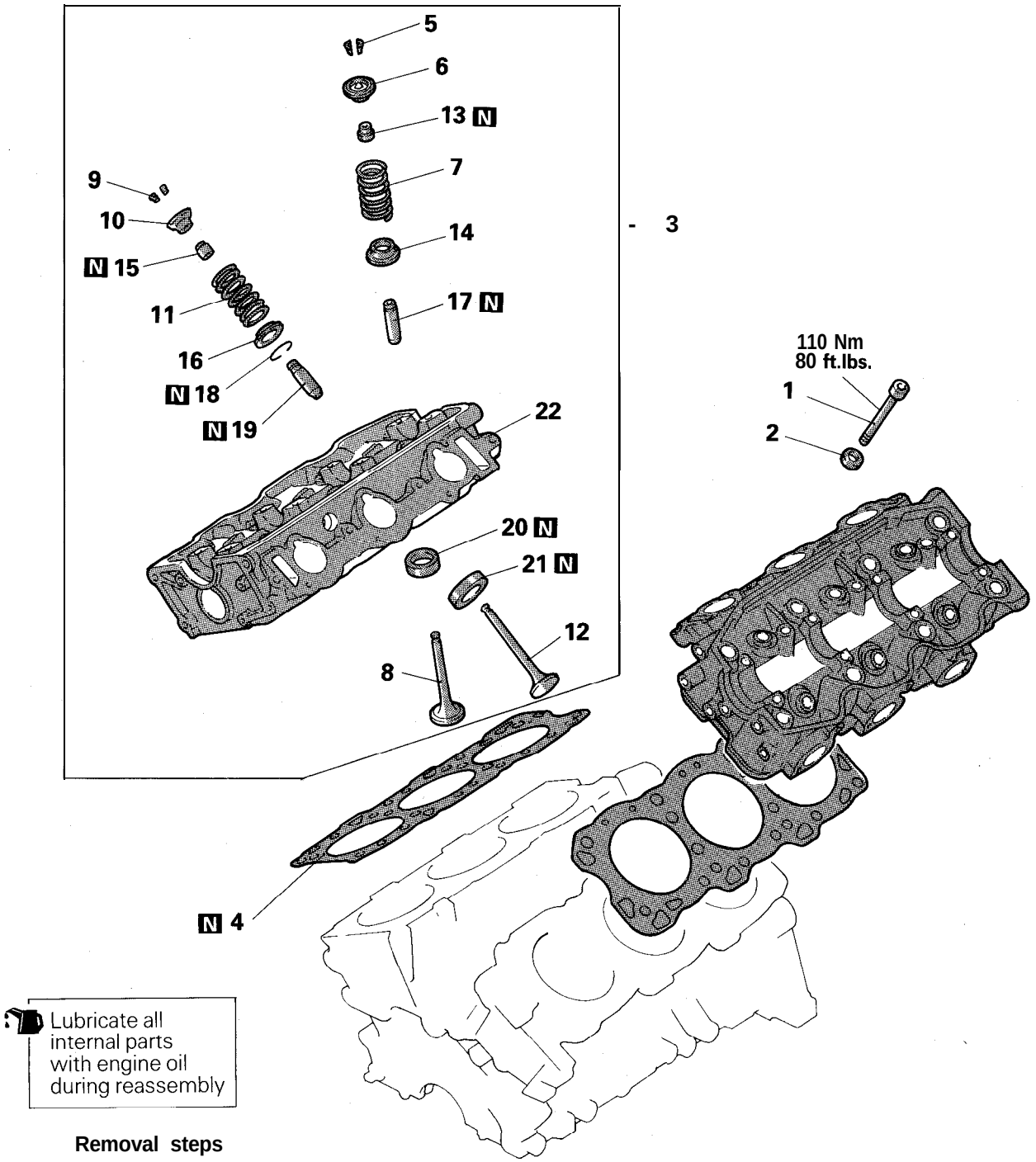


2. INSTALLATION OF OIL SEAL

Using the special tool, insert the oil seal.

CYLINDER HEAD AND VALVE

REMOVAL AND INSTALLATION – SOHC

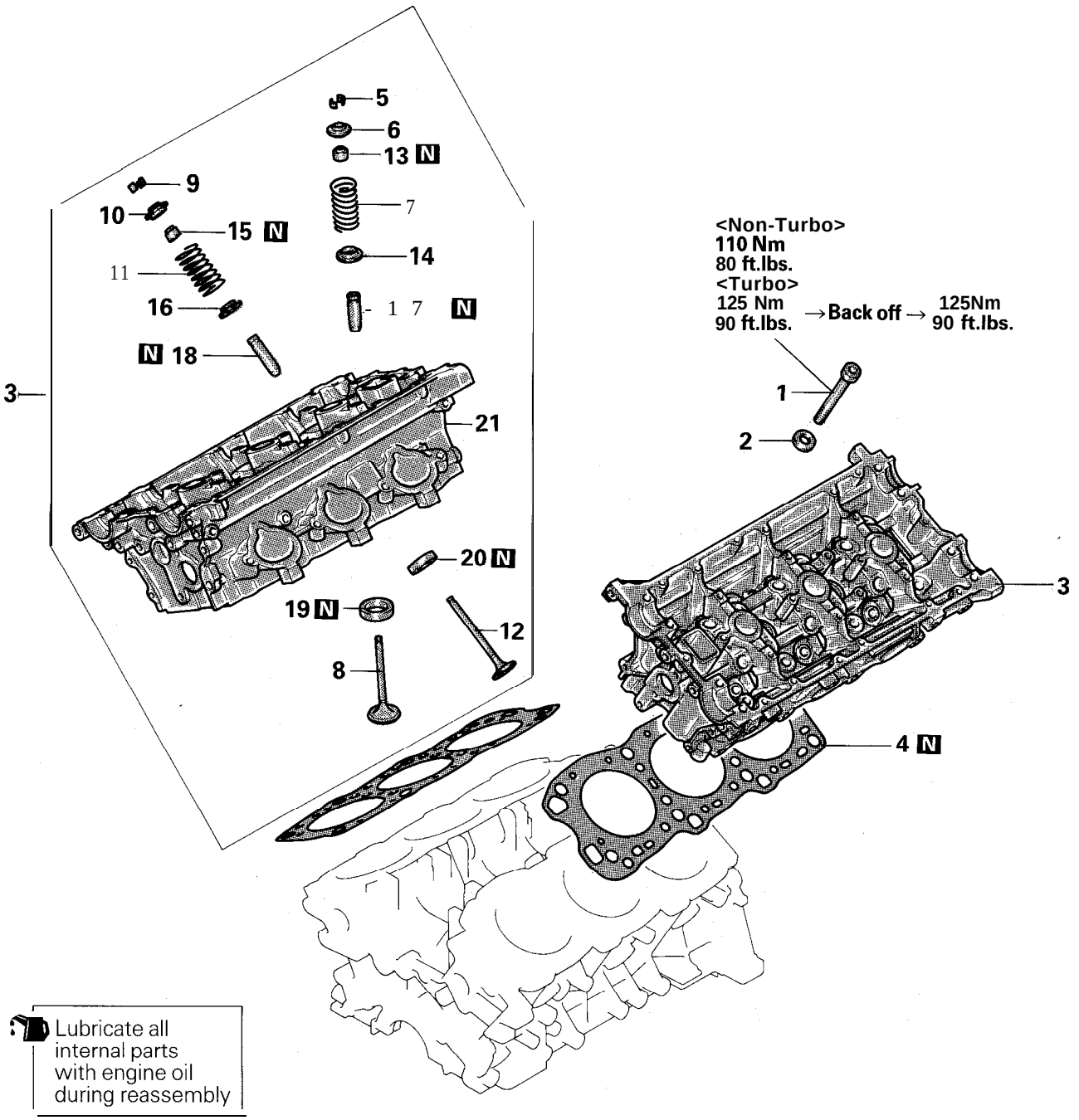


Removal steps

- ◆◆ ◆◆ 1. Cylinder head bolt
- 2. Washer
- 3. Cylinder head assembly
- ● 4. Cylinder head gasket
- ◆◆ ● +5. Retainer lock
- 6. Valve spring retainer
- ● a7. Valve spring
- 8. Inlet valve
- ◆◆ ◆◆ 9. Retainer lock
- 10. Valve spring retainer
- ● + 11. Valve spring
- 12. Exhaust valve
- ◆◆ 13. Valve stem seal
- 14. Valve spring seat
- ● C 15. Valve stem seal
- 16. Valve spring seat
- 17. Inlet valve guide
- 18. Snap ring
- 19. Exhaust valve guide
- 20. Inlet valve seat
- 21. Exhaust valve seat
- 22. Cylinder head

7EN0522

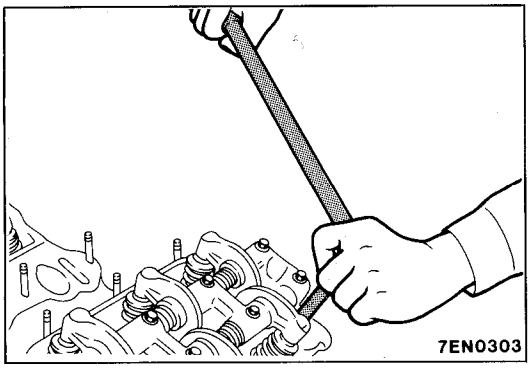
REMOVAL AND INSTALLATION – DOHC



7E NO254

Removal steps

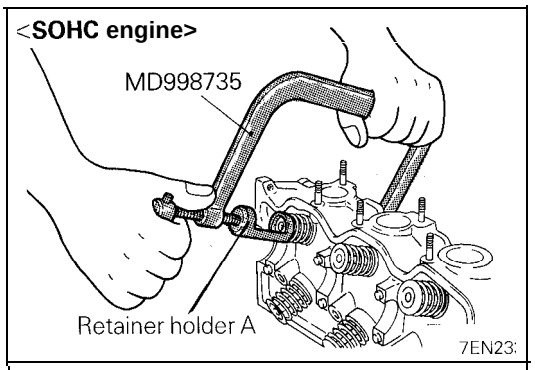
- ● *● + 1. Cylinder head bolt
  2. Washer
  3. Cylinder head assembly
- ● + 4. Cylinder head gasket
- ◆◆ ◆◆ 5. Retainer lock
  6. Valve spring retainer
- ● + 7. Valve spring
  8. Intake valve
- ◆◆ ● + 9. Retainer lock
  10. Valve spring retainer
- ● C 11. Valve spring
  12. Exhaust valve
- ◆◆ 13. Valve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



SERVICE POINTS OF REMOVAL

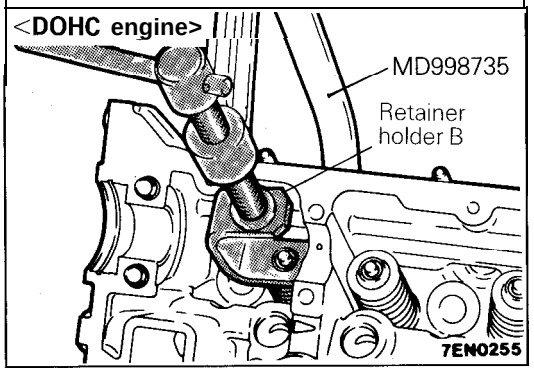
1. REMOVAL OF CYLINDER HEAD BOLT

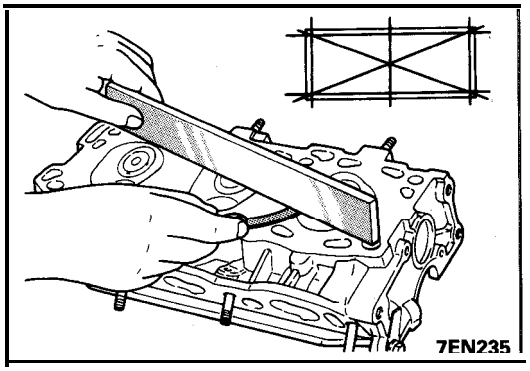
Remove the cylinder head bolts.



5. 9. REMOVAL OF RETAINER LOCK

Using the special tool, remove the retainer lock.





INSPECTION

CYLINDER HEAD

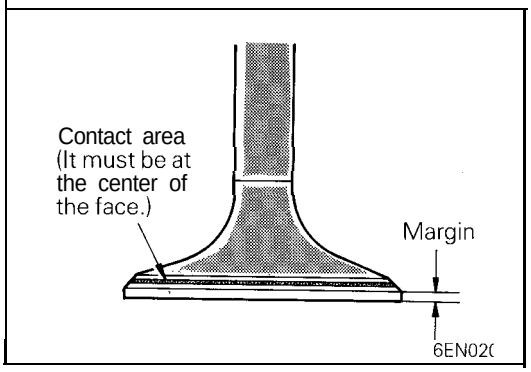
(1) Using a straight edge and feeler gauge, measure the flatness of the cylinder head gasket surface.

Standard value:
<SOHC> 0.05 mm (.0020 in.) or less
<DOHC> 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

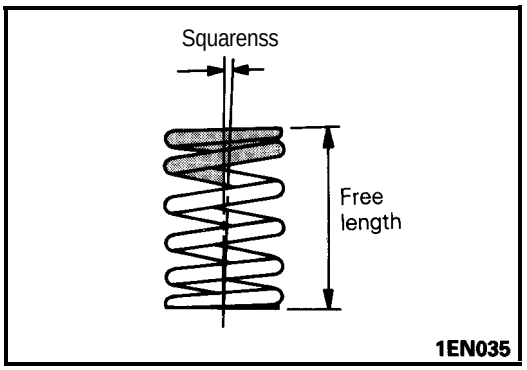
Replace the valve if the margin (thickness of the valve head) exceeds the limit.

Standard value:

<SOHC>	
Intake side	**1.2 mm (.047 in.)**
Exhaust side	**2.0 mm (.079 in.)**
<DOHC>	
Intake side	**1 .0 mm (.039 in.)**
Exhaust side	**1.5 mm (.059 in.)**

Limit:

<SOHC>	
Intake side	**0.7 mm (.028 in.)**
Exhaust side	**1.5 mm (.059 in.)**
<DOHC>	
Intake side	**0.5 mm (.019 in.)**
Exhaust side	**1.0 mm (.039 in.)**



VALVE SPRINGS

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

Standard value:

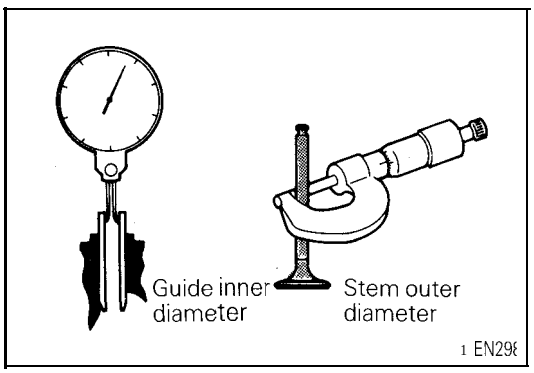
<SOHC>	**49.8 mm (1.961 in.)**
<DOHC>	**46.4 mm (1.827 in.)**

Limit:

<SOHC>	**48.8 mm (1.921 in.)**
<DOHC>	**45.4 mm (1.787 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”



VALVE GUIDES

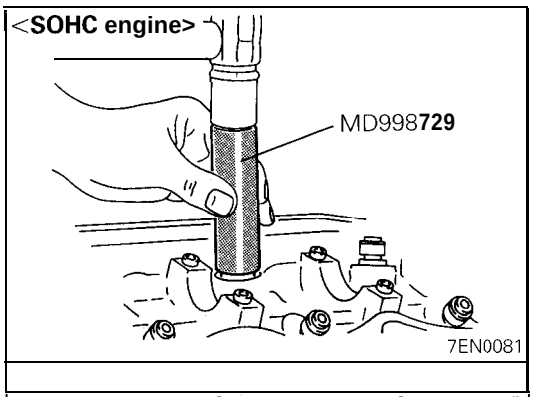
Check the valve stem-to-guide clearance. If the clearance exceeds the service limit, replace the valve guide with new oversize part.

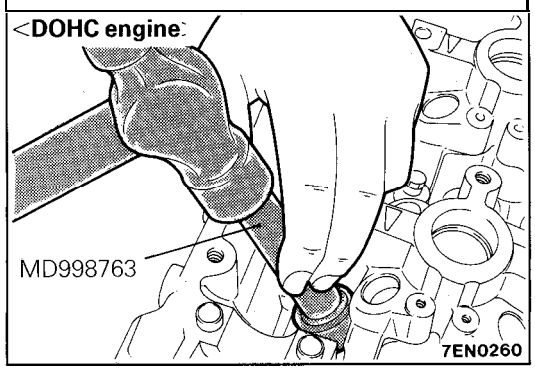
Standard value:

<SOHC>	
Intake	**0.03 – 0.06 mm (.0012 – .0024 in.)**
Exhaust	**0.05 – 0.09 mm (.0020 – .0035 in.)**
<DOHC>	
Intake	**0.02 – 0.05 mm (.0008 – .0020 in.)**
Exhaust	**0.05 – 0.09 mm (.0020 – .0035 in.)**

Limit:

<SOHC>	
Intake	**0.10 mm (.0039 in.)**
Exhaust	**0.15 mm (.0059 in.)**
<DOHC>	
Intake	**0.10 mm (.0039 in.)**
Exhaust	**0.12 mm (.0047 in.)**





SERVICE POINTS OF INSTALLATION

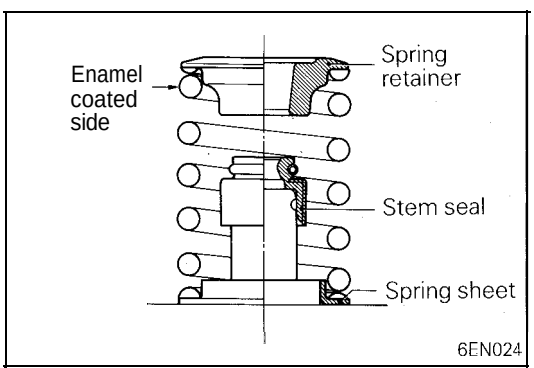
15.13. INSTALLATION OF VALVE STEM SEAL

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

Caution

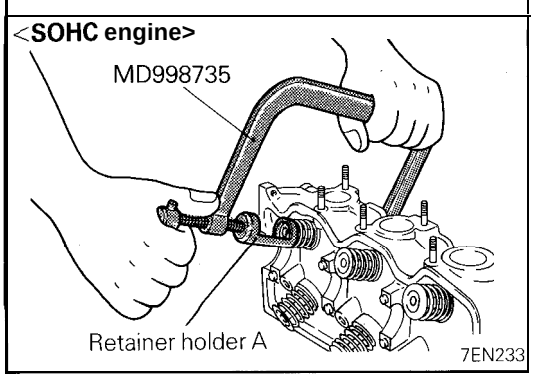
1. Incorrect installation of the seal without using the special tool will result in poor sealing and cause oil leakage down valve guide.

2. Do not reuse stem seal.



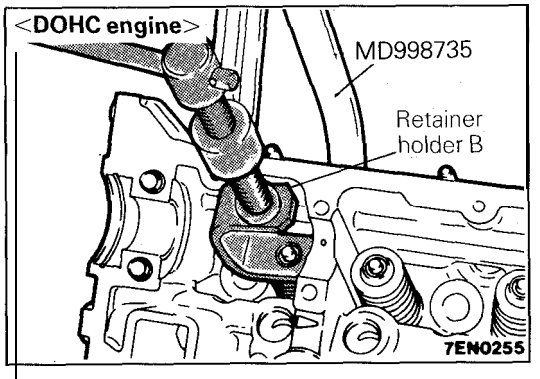
11.7. INSTALLATION OF VALVE SPRING

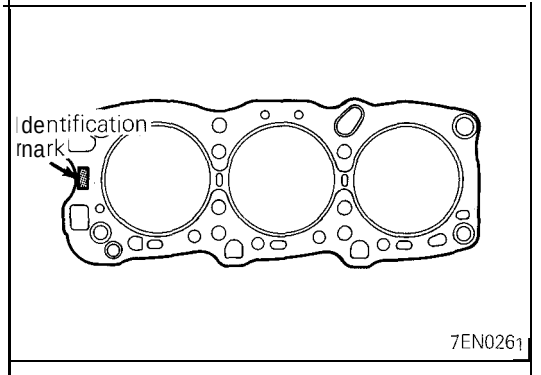
Valve springs should be installed with the enamel coated side toward the valve spring retainer.



9. 5. INSTALLATION OF RETAINER LOCK

Using the special tool, install the retainer lock.

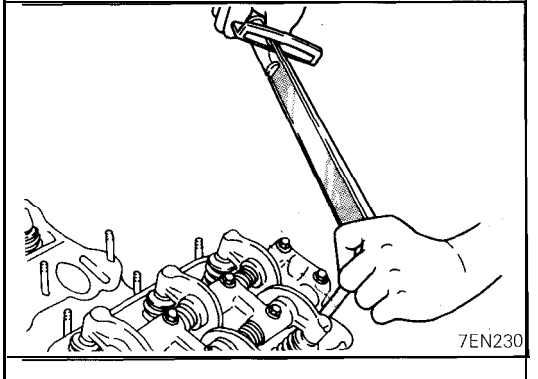




4. INSTALLATION OF CYLINDER HEAD GASKET

Identification mark:

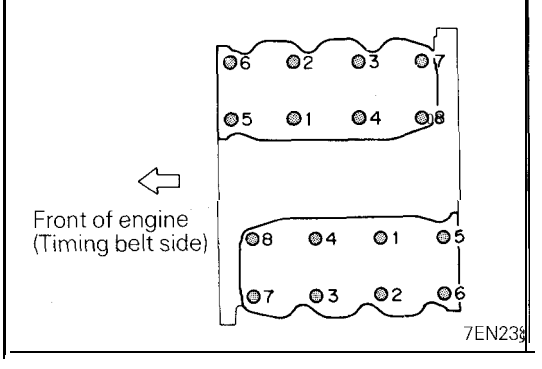
<SOHC>	72
<DOHC – Non-Turbo>	**2DN**
<DOHC-Turbo>	**2DT**



1. INSTALLATION OF CYLINDER HEAD BOLT

<Non-Turbo engine>

Tighten two-three times in illustrated sequence until snug finally tightened to the specified torque.



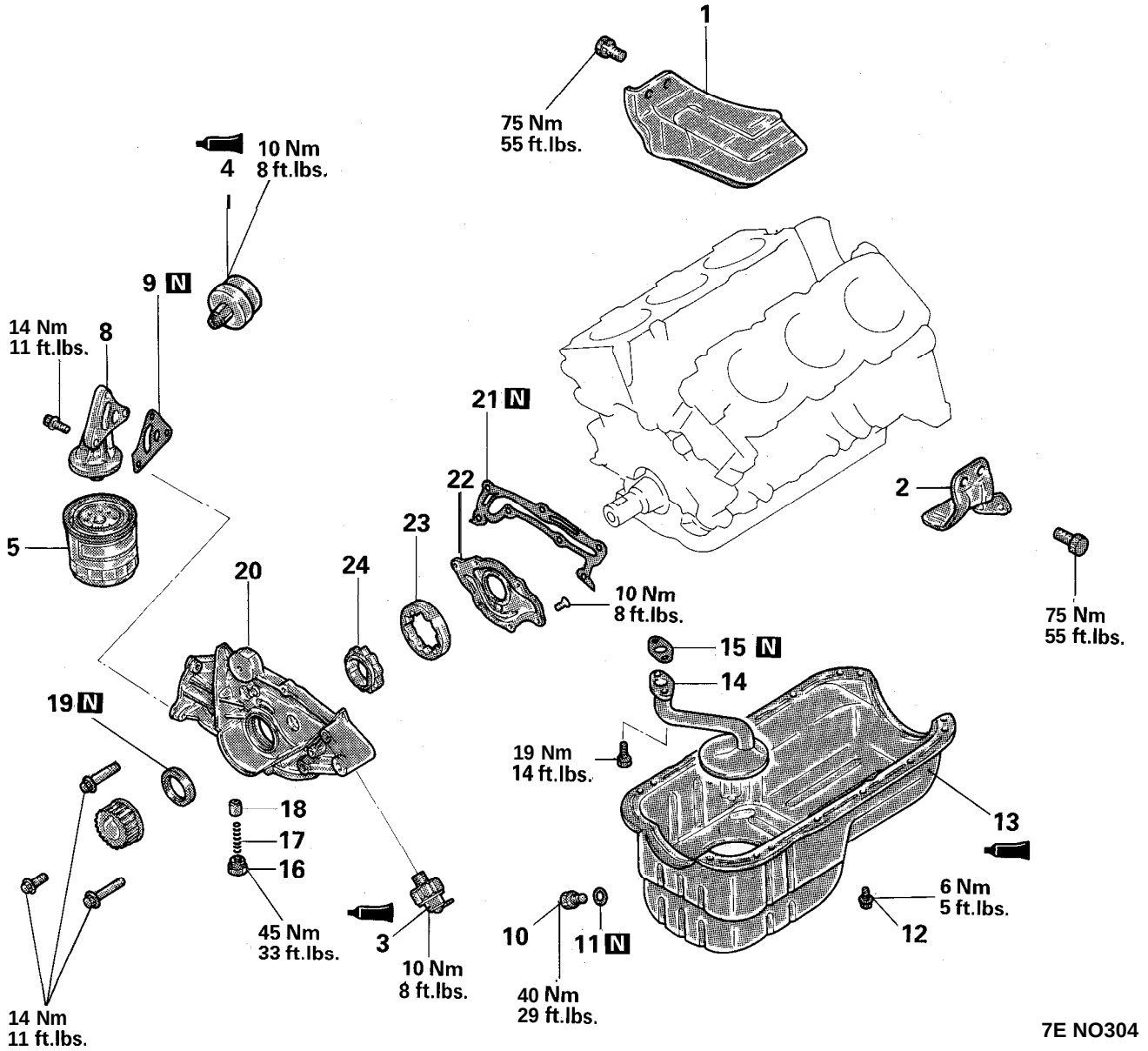
<Turbo engine>

(1) 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

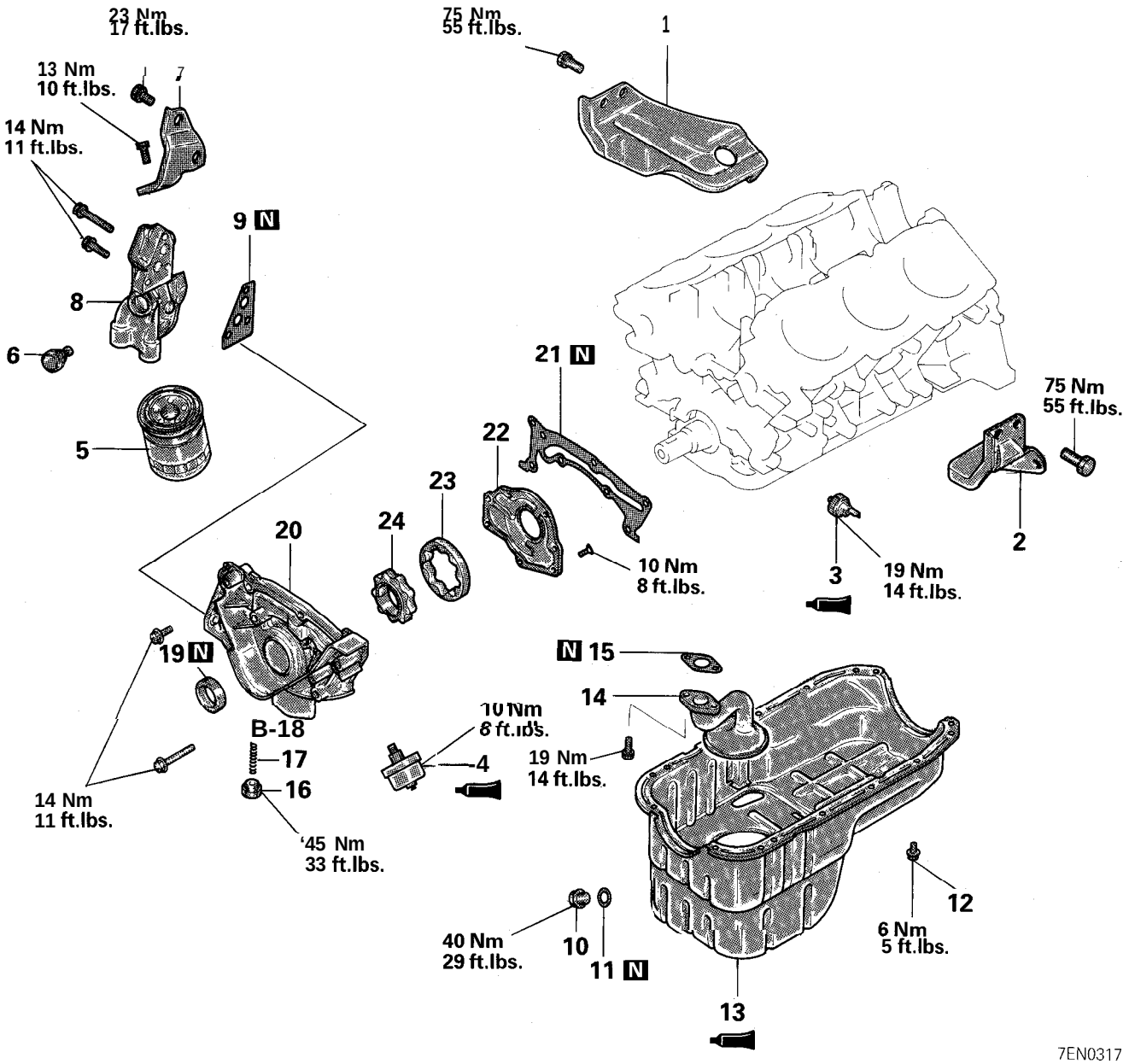
REMOVAL AND INSTALLATION

<SOHC>

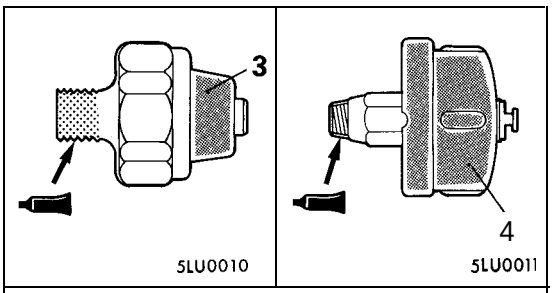


Lubricate all internal parts **with engine oil during reassembly**

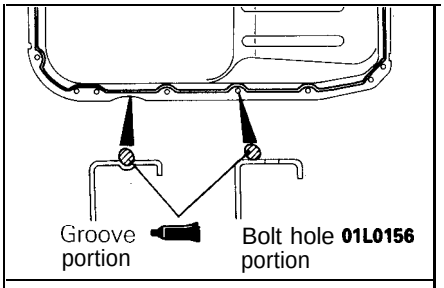
<DOHC>



Lubricate all internal parts with engine oil during reassembly



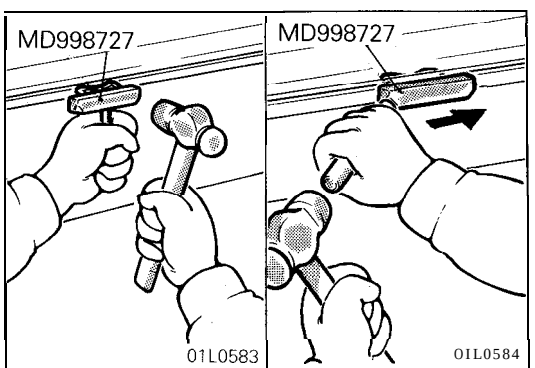
Sealant: MOPAR Part No. 4318034 or equivalent

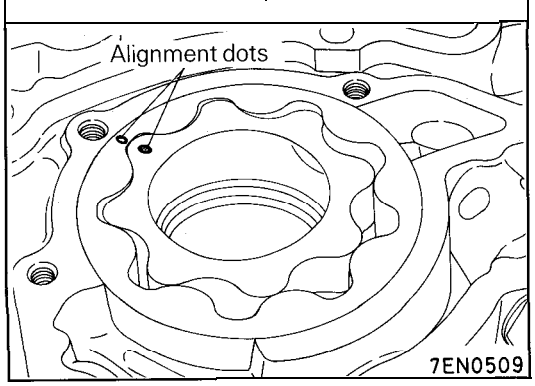


Sealant: MITSUBISHI GENUINE Part No. MD9971 10 or equivalent

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 <DOHC>
8. Oil filter bracket
9. Oil filter bracket gasket
10. Drain plug
11. Drain plug gasket
12. Oil pan bolt
- * a 13. Oil pan
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
- a 23. Oil pump outer rotor
- a 24. Oil pump inner rotor





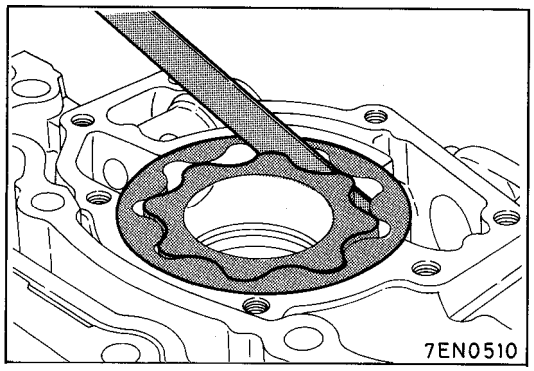
SERVICE POINT OF REMOVAL

13. REMOVAL OF OIL PAN

Using the special tool, remove the oil pan.

23. REMOVAL OF OUTER ROTOR / 24. INNER ROTOR

(1) Make alignment dots on the outer and inner rotors for reassembly.

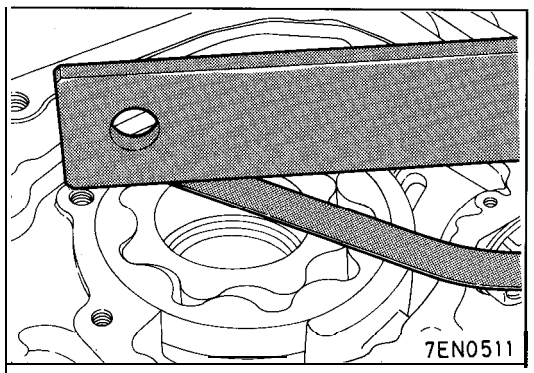


INSPECTION

OIL PUMP

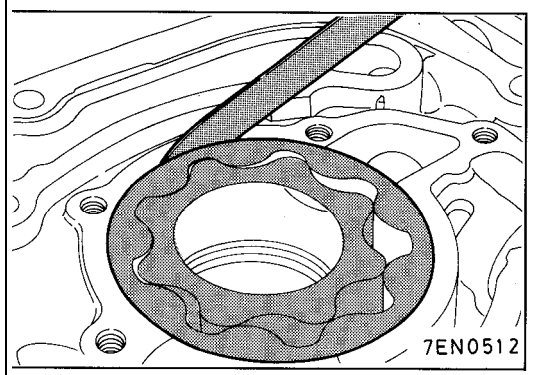
(1) Check the tip clearance.

Standard value: 0.03 – 0.08 mm (.0012 – .0031 in.)



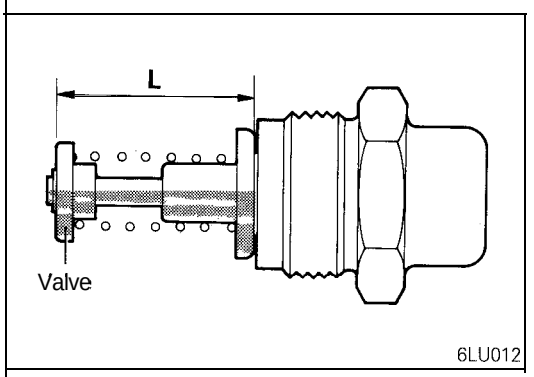
(2) Check the side clearance.

Standard value: 0.04 – 0.10 mm (.0016 – .0039 in.)



(3) Check the body clearance.

Standard value: 0.10 – 0.18 mm (.0040 – .0070 in.)
Limit: 0.35 mm (.0138 in.)



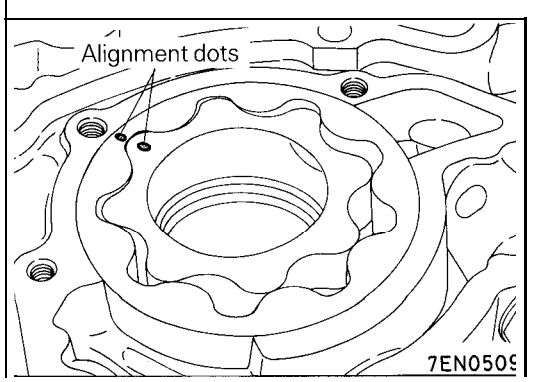
OIL COOLER BY-PASS VALVE <Turbo>

(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.

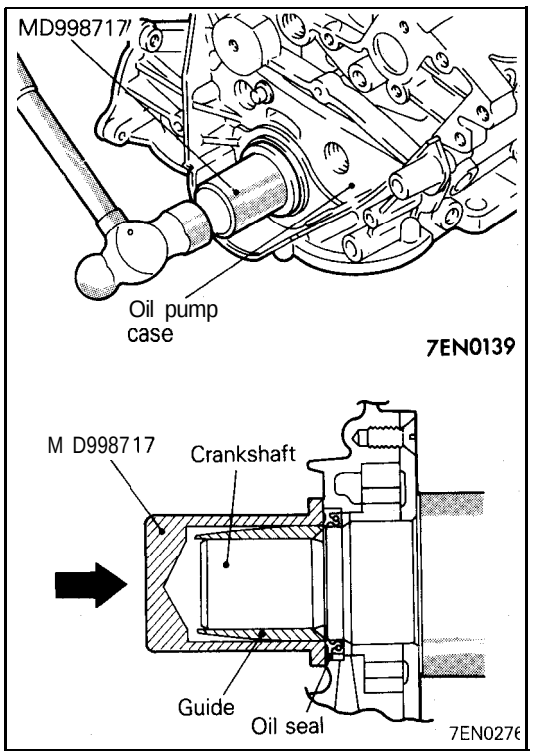
Dimension L: 40 mm (1.57 in.) or more



SERVICE POINTS OF INSTALLATION

23. INSTALLATION OF INNER ROTOR / 24. OUTER ROTOR

(1) Apply engine oil to the rotors. Then, install the rotors ensuring that the alignment dots made at disassembly are properly aligned.



19. INSTALLATION OF CRANKSHAFT FRONT OIL SEAL

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

NOTE

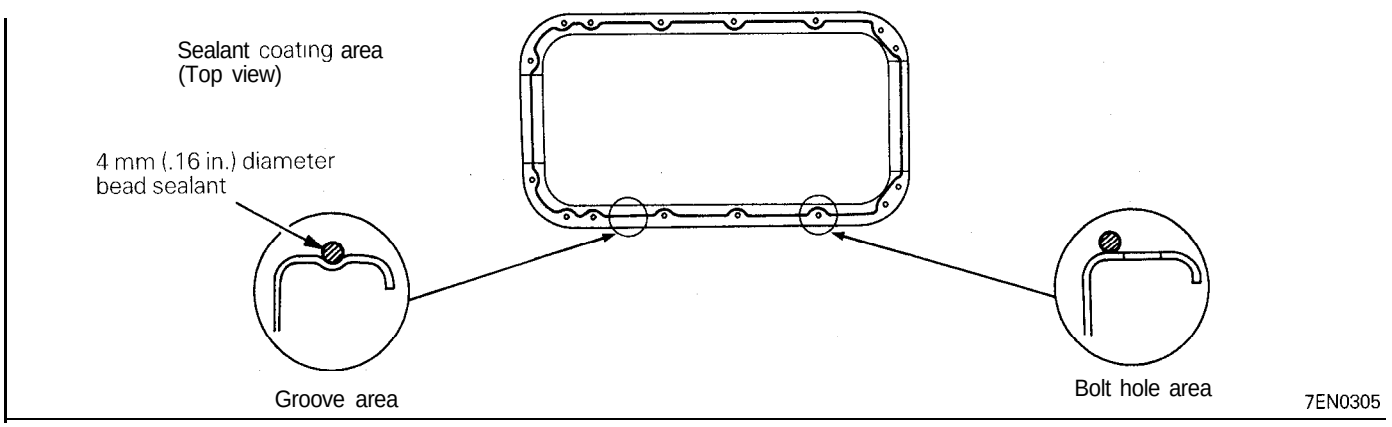
Knock it as far as the surface.

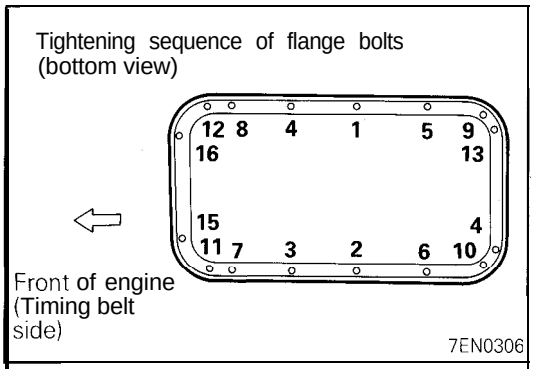
13. APPLICATION OF SEALANT TO OIL PAN

(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

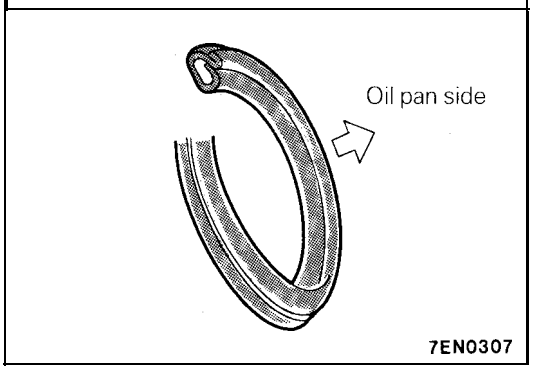
(2) Install the oil pan within 15 mins. after applying the liquid gasket.





12. TIGHTENING SEQUENCE OF OIL PAN BOLT

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

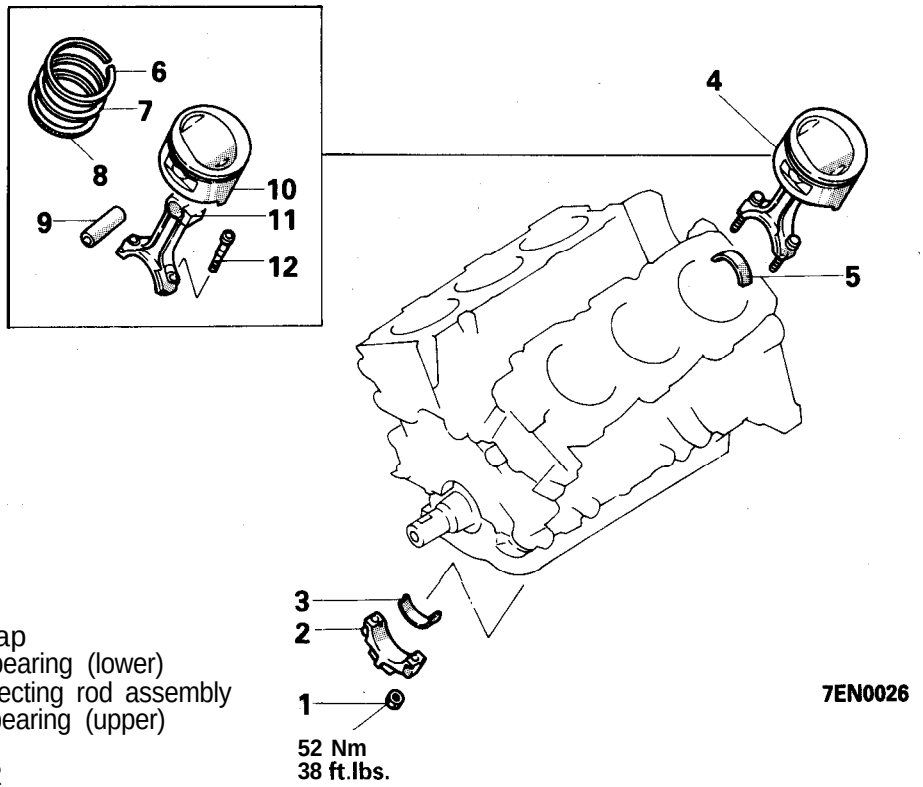


11. INSTALLATION OF DRAIN PLUG GASKET

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

PISTON AND CONNECTING ROD

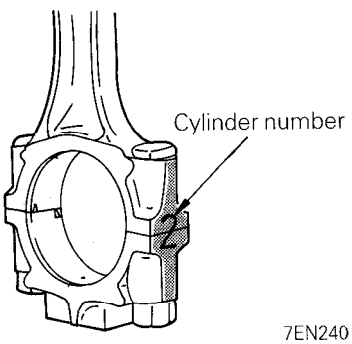
REMOVAL AND INSTALLATION

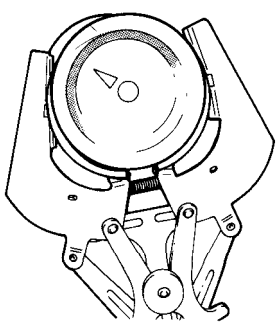


Lubricate all internal parts with engine oil during reassembly

Removal steps

1. Nut
◆◆ ◆◆ 2. Connecting rod cap
3. Connecting rod bearing (lower)
● a 4. Piston and connecting rod assembly
5. Connecting rod bearing (upper)
◆◆ ● + 6. Piston ring No. 1
◆◆ ◆◆ 7. Piston ring No. 2
◆◆ 8. Oil ring
9. Piston pin
10. Piston
11. Connecting rod
12. Bolt





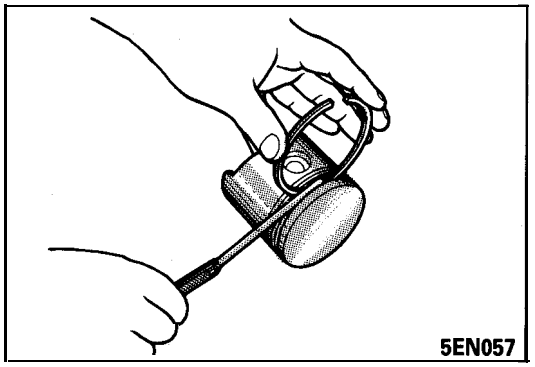
SERVICE POINTS OF REMOVAL

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. PISTION RING No. 2

Remove the piston rings with a piston ring expander.



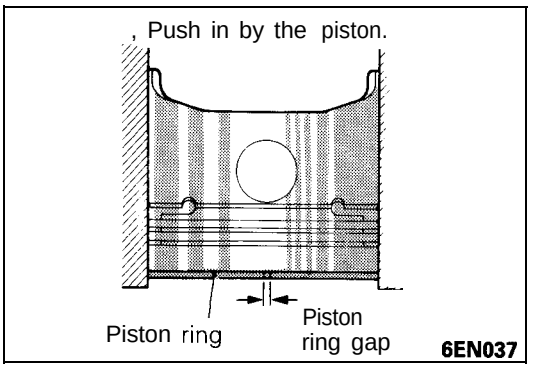
INSPECTION

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:

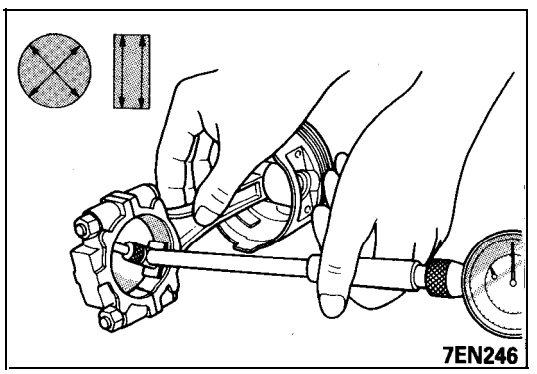
No.1	0.03 – 0.07 mm (.0012 – .0028 in.)
No.2	0.02 – 0.06 mm (.0008 – .0024 in.)
Limit: No.1	0.1 mm (.004 in.)
No.2	0.1 mm (.004 in.)



(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.)



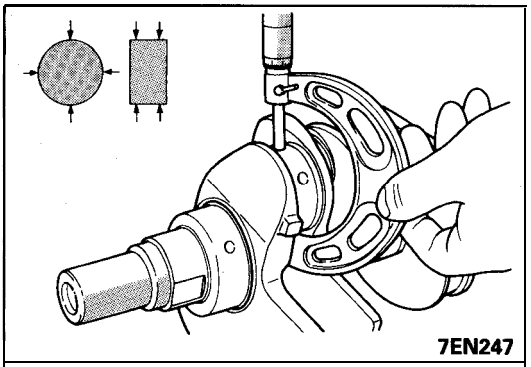
BEARING

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.

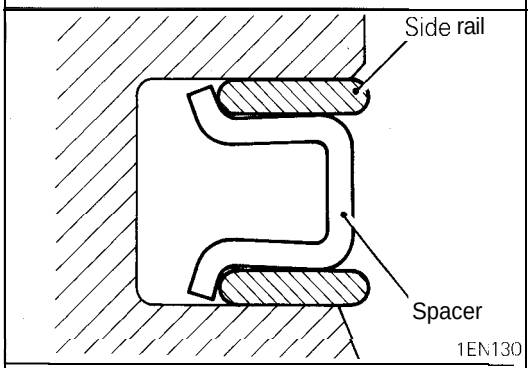
Standard value:

<SOHC>	0.016 – 0.046 mm (.0006 – .0018 in.)
<DOHC>	0.022 – 0.048 mm (.0009 – .0019 in.)

Limit: 0.1 mm (.004 in.)


7EN247

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



1EN130

SERVICE POINTS OF INSTALLATION

8. INSTALLATION OF OIL RING

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

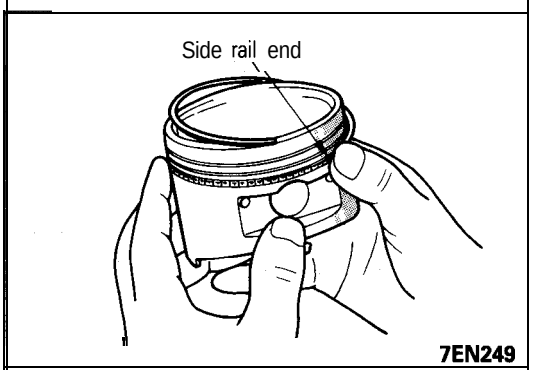
NOTE
On the side rail and the spacer, no difference exists between the upper and the lower surfaces.

(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.

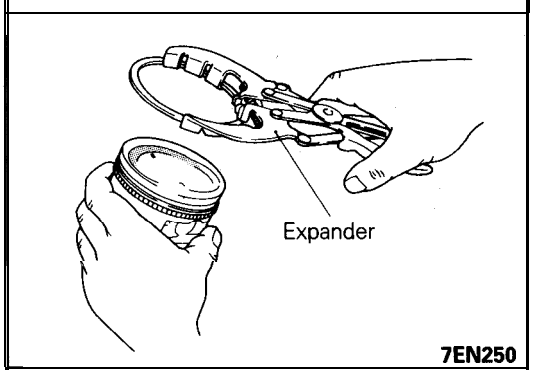
NOTE
The side rail may be broken like other piston rings if the gap is opened by the ring expander.

(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



7EN250

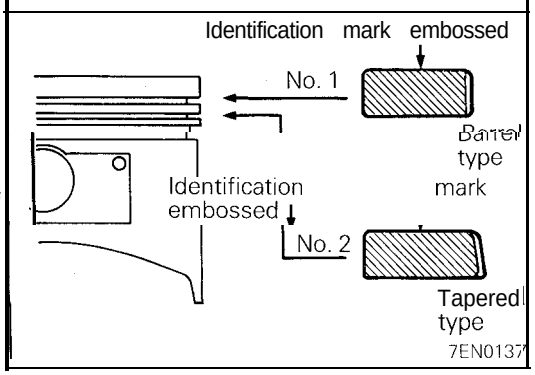
7. INSTALLATION OF PISTON RING No. 2 / 6. PISTON RING No.1

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

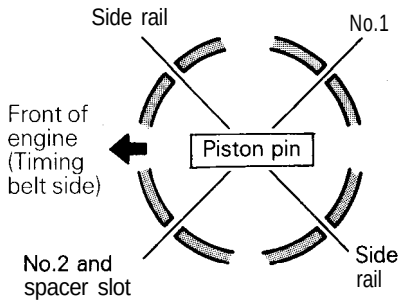
Identification mark:

<SOHC>
No.1 1R
No.2 2R
<DOHC>
No.1 T
No.2 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).



7EN0137

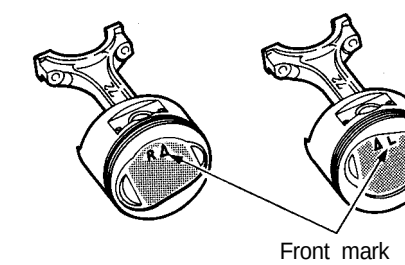


6EN041

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.

<SOHC engine>



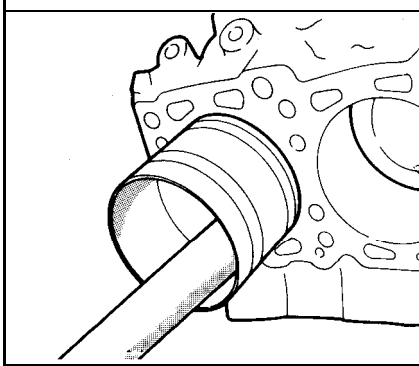
7EN0292

NOTE
The pistons for the SOHC engine include those for front bank and rear bank. They are identified by the marks as follows:

Identification mark R: For front bank
Identification mark L: For rear bank

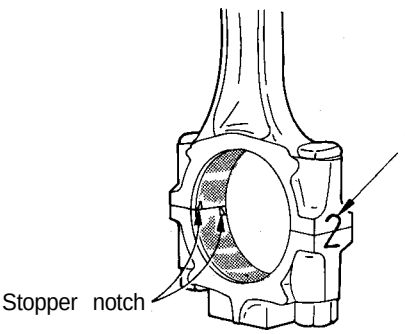
(3) Rotate crankshaft so that crank pin is on center of cylinder bore.
(4) Use suitable thread protectors on connecting rod bolts before inserting piston and connecting rod assembly into cylinder block. Care must be taken not to nick crank pin.
(5) Using a suitable piston ring compressor tool, install 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).


7EN0032

2. INSTALLATION OF CONNECTING ROD CAP

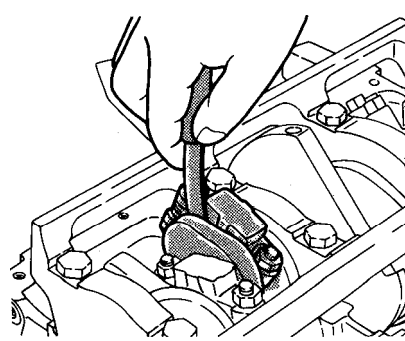
(1) Install the connecting rod, aligning it with the mark made or the connecting rod cap during disassembly. When the connecting rod being installed is new and has no alignment mark, install it so that the notches in the connecting rod and cap are on the same side, as illustrated.



7EN256

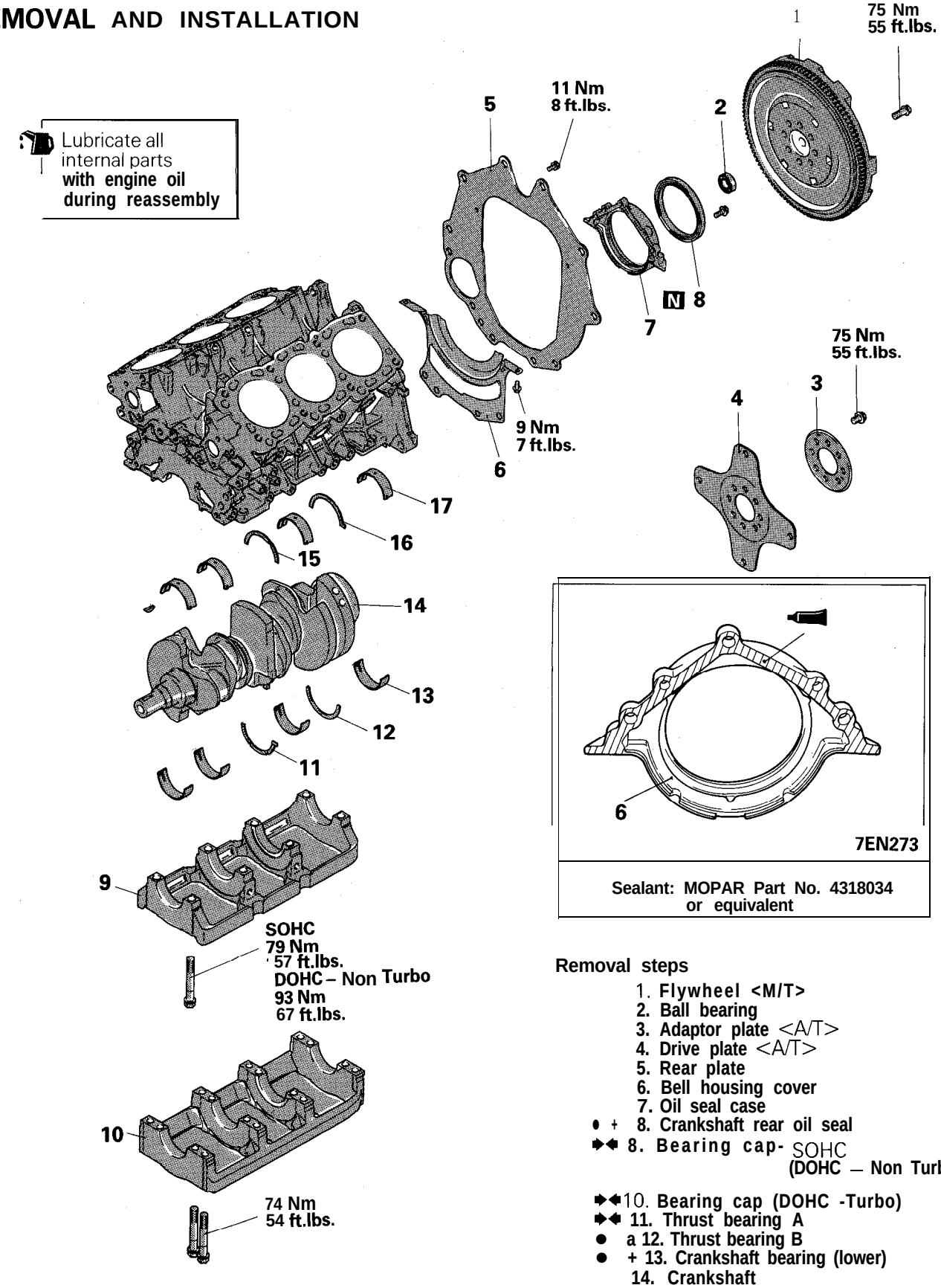
(2) Check the connecting rod big end thrust clearance.

Standard value: 0.10 – 0.25 mm (.0039 – .0098 in.)
Limit: 0.4 mm (.016 in.)


7EN257

CRANKSHAFT, FLYWHEEL AND DRIVE PLATE

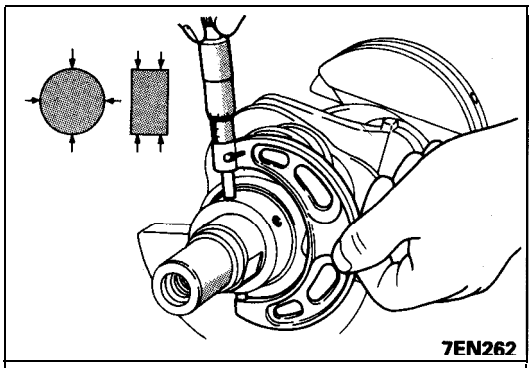
REMOVAL AND INSTALLATION

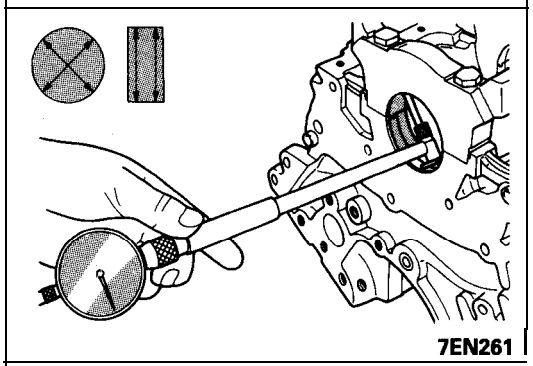


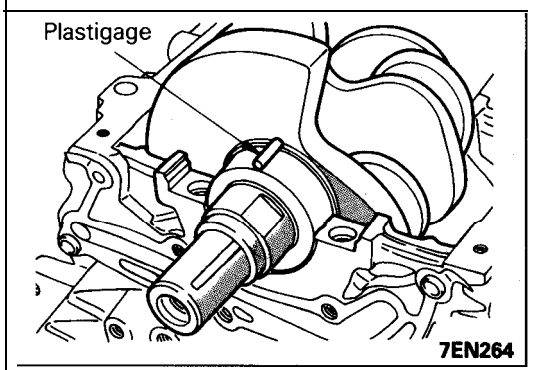
Removal steps

1. Flywheel <M/T>
2. Ball bearing
3. Adaptor plate <A/T>
4. Drive plate <A/T>
5. Rear plate
6. Bell housing cover
7. Oil seal case
- + 8. Crankshaft rear oil seal
- ◆◆ 8. Bearing cap- SOHC (DOHC – Non Turbo)
- ◆◆ 10. Bearing cap (DOHC -Turbo)
- ◆◆ 11. Thrust bearing A
- ● a 12. Thrust bearing B
- ● + 13. Crankshaft bearing (lower)
14. Crankshaft
- ◆◆ 15. Thrust bearing B
- ● + 16. Thrust bearing A
- ● + 17. Crankshaft bearing (upper)

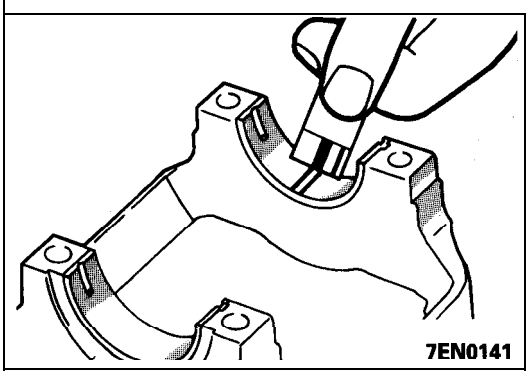
7EN0296


7EN262


7EN261



7EN264


7EN0141

INSPECTION

CRANKSHAFT

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

Limit:

Out-of-roundness of journal and pin:

<SOHC>	**0.005 mm (.00020 in.)**
<DOHC>	**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:

SOHC	**0.020 – 0.048 mm (.0008 – .0019 in..)**
DOHC	**0.018 – 0.036 mm (.0007 – .0014 in.)**

Limit: 0.1 mm (.004 in.)

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

PLASTIGAGE METHOD

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.

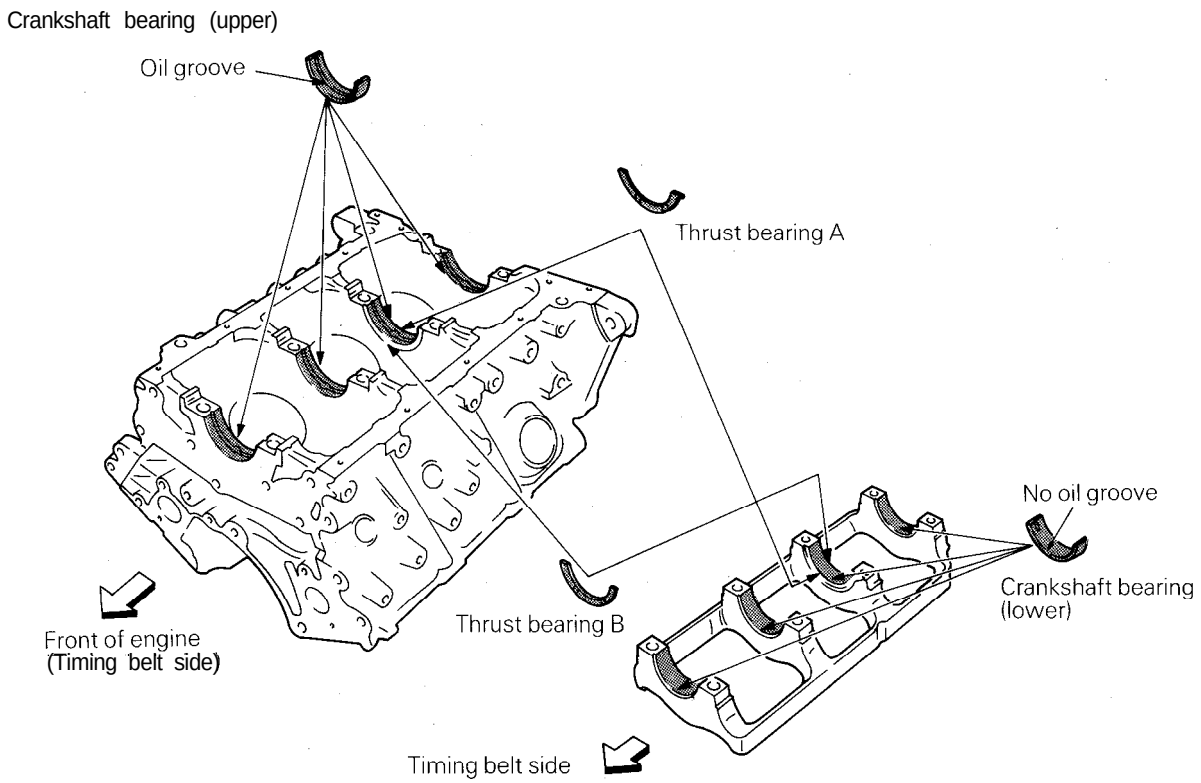
SERVICE POINTS OF INSTALLATION

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.

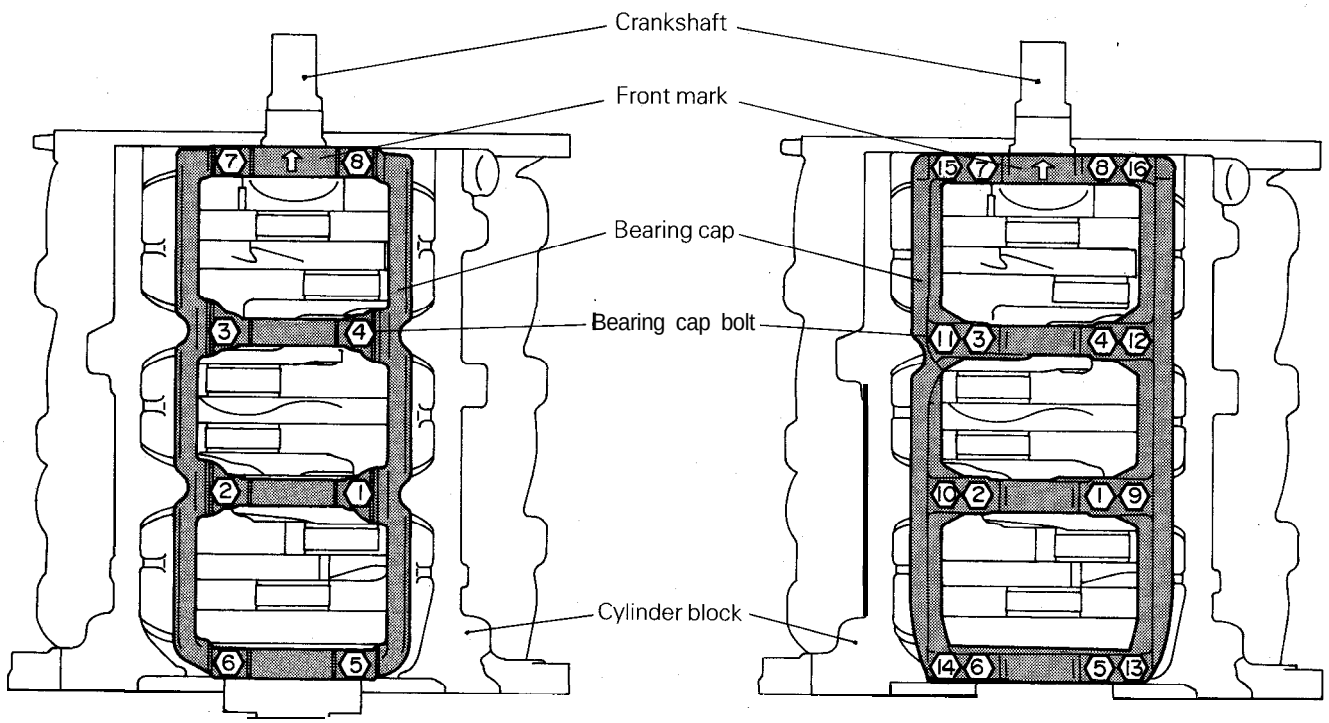
Caution
Install them with the groove side facing outward.



7EN269

8. 9. INSTALLATION OF BEARING CAP

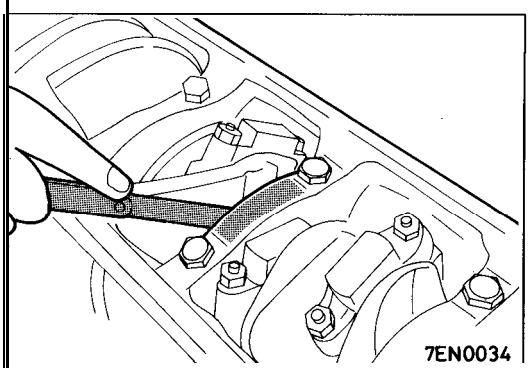
(1) Attach the bearing cap on the cylinder block as shown in the illustration.
(2) Tighten the bearing cap bolts to the specified torque in the sequence shown in the illustration.
(3) Check that the crankshaft rotates smoothly.



<SOHC, DOHC – Non Turbo>

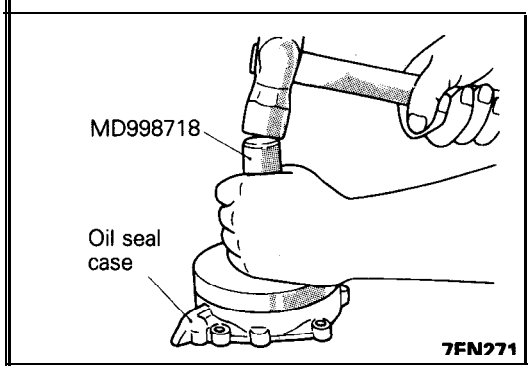
<DOHC-Turbo>

7E NO524



(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.)



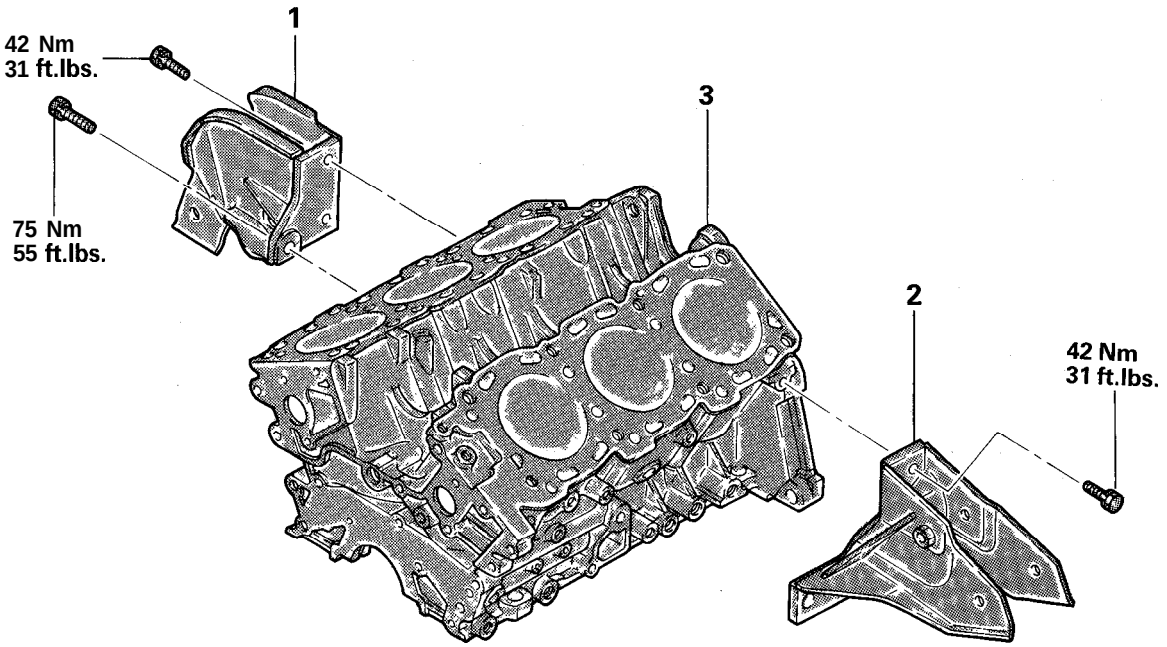
7. INSTALLATION OF CRANKSHAFT REAR OIL SEAL

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

CYLINDER BLOCK

REMOVAL AND INSTALLATION

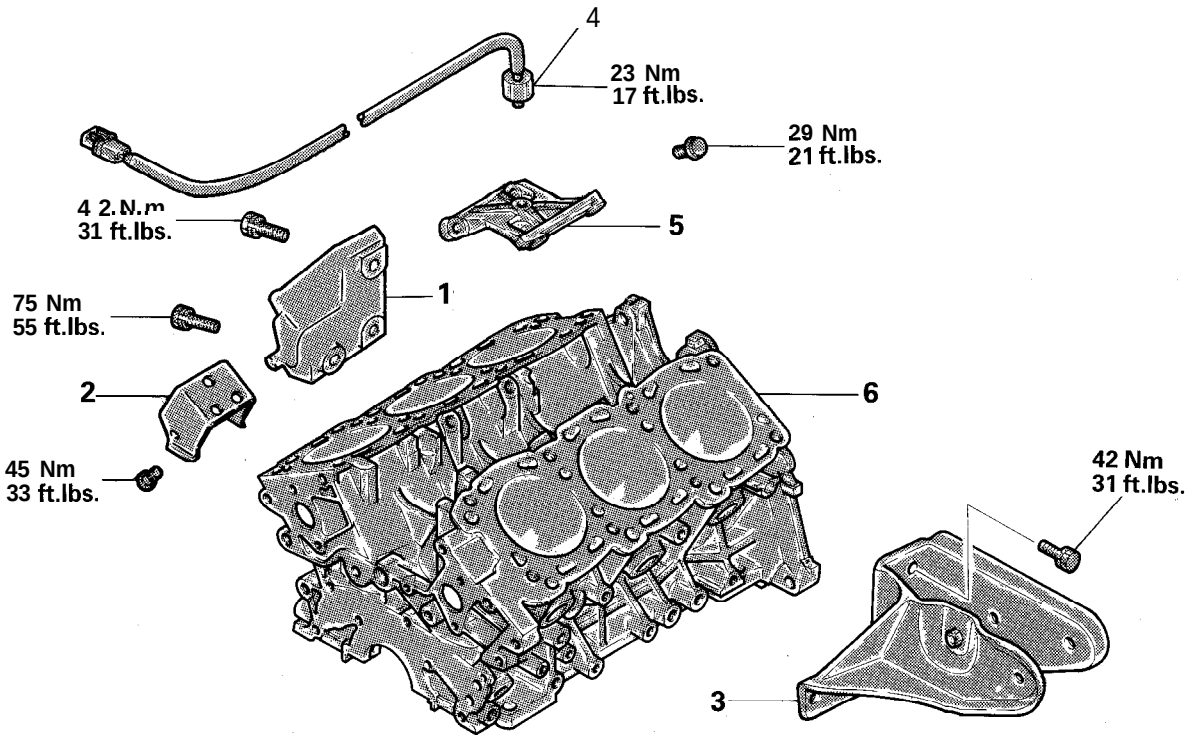
<SOHC>



1. Roll stopper bracket front
2. Roll stopper bracket rear
3. Cylinder block

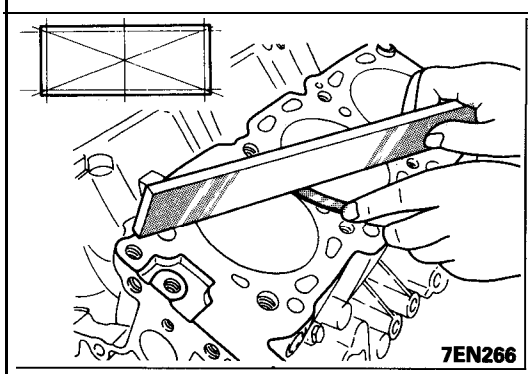
7EN0035

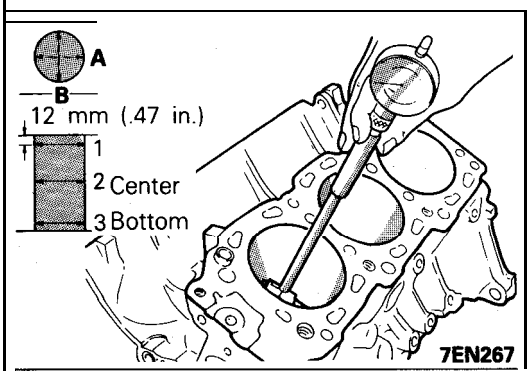
<DOHC>



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

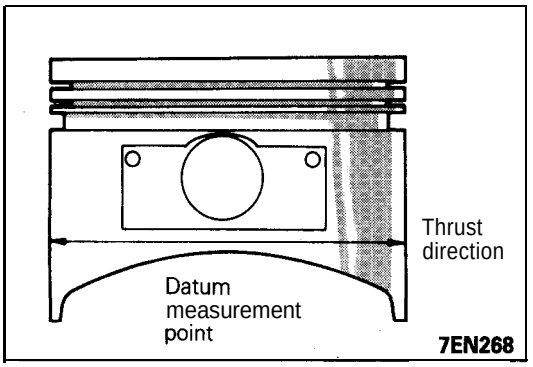
CYLINDER BLOCK

(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.

(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

(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)

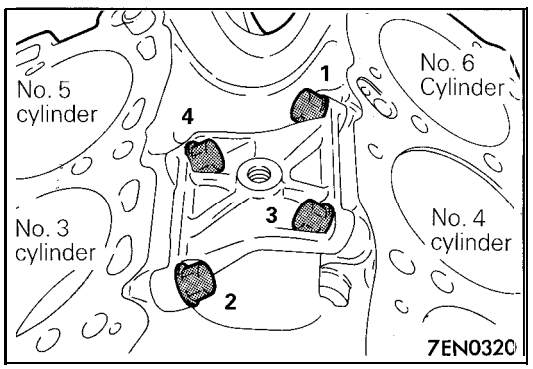
(4) Hone each of the cylinders to the calculated measurement.

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.)



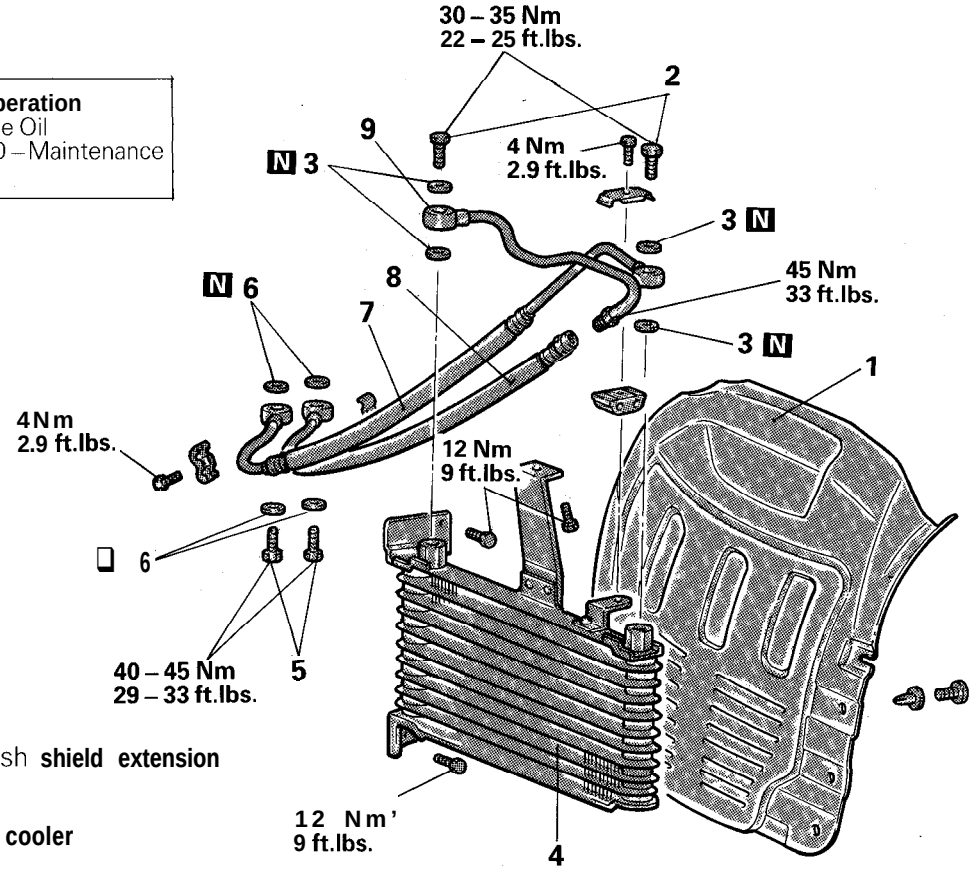
SERVICE POINT OF INSTALLATION

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

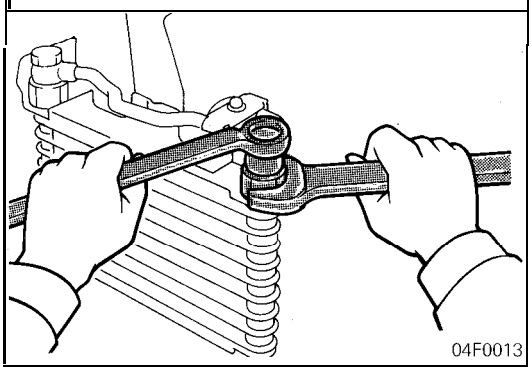
REMOVAL AND INSTALLATION



Post-installation Operation
- Supplying of Engine Oil
  (Refer to GROUP 0 – Maintenance Service.)

Removal steps

- ⊠ 1. Front splash shield extension
- ⊠ 2. Eye bolt
- 3. Gasket
- 4. Engine oil cooler
- 5. Eye bolt
- 6. Gasket
- 7. Engine oil feed hose
- 8. Engine oil return hose
- 9. Engine oil return tube



SERVICE POINT OF REMOVAL

2. EYE BOLT

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

INSPECTION

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

INTAKE AND EXHAUST

CONTENTS

SPECIFICATIONS

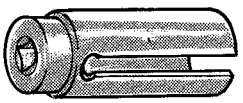
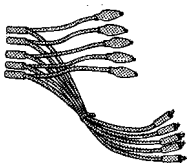
GENERAL SPECIFICATIONS

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	Turbocharger waste gate actuator and solenoid valve
Charge air cooler	
Type	Air cooled type

SERVICE SPECIFICATIONS

Items	Standard	Limit
Intake and exhaust manifolds		
Distortion of cylinder head contacting surface mm (in.)	Less than 0.15 (.0059)	0.2 (.008)
Turbocharger waste gate solenoid terminal resistance [at 20°C (68°F)] Ω	3 6 - 4 4	
Turbocharger		
Supercharging pressure kPa (psi)	Approx. 20 – 60 (2.9 – 8.7)	
Turbocharger waste gate valve opening pressure kPa (psi)	Approx. 48 (6.8)	

SPECIAL TOOLS

Tool number and tool name		Replaced by Miller tool number	Application
	M D998770 Oxygen sensor wrench or open end wrench	C-4709 or General service tool	Removal and installation of oxygen sensor <Non-Turbo>
		General service tool	Removal and installation of oxygen sensor <Turbo, front pipe>
		General service tool (Snap-on YA8875)	Removal and installation of oxygen sensor <Turbo, rear pipe>
	MB991348 Test harness set	MB991 348	Inspection of variable induction control system

TROUBLESHOOTING

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 pip body	Interference of pipe or muffler with vehicle	Correct
Broken pipe or mu f	f ler	Repair or replace

TROUBLESHOOTING (ACTIVE EXHAUST SYSTEM)

TROUBLESHOOTING PROCEDURE

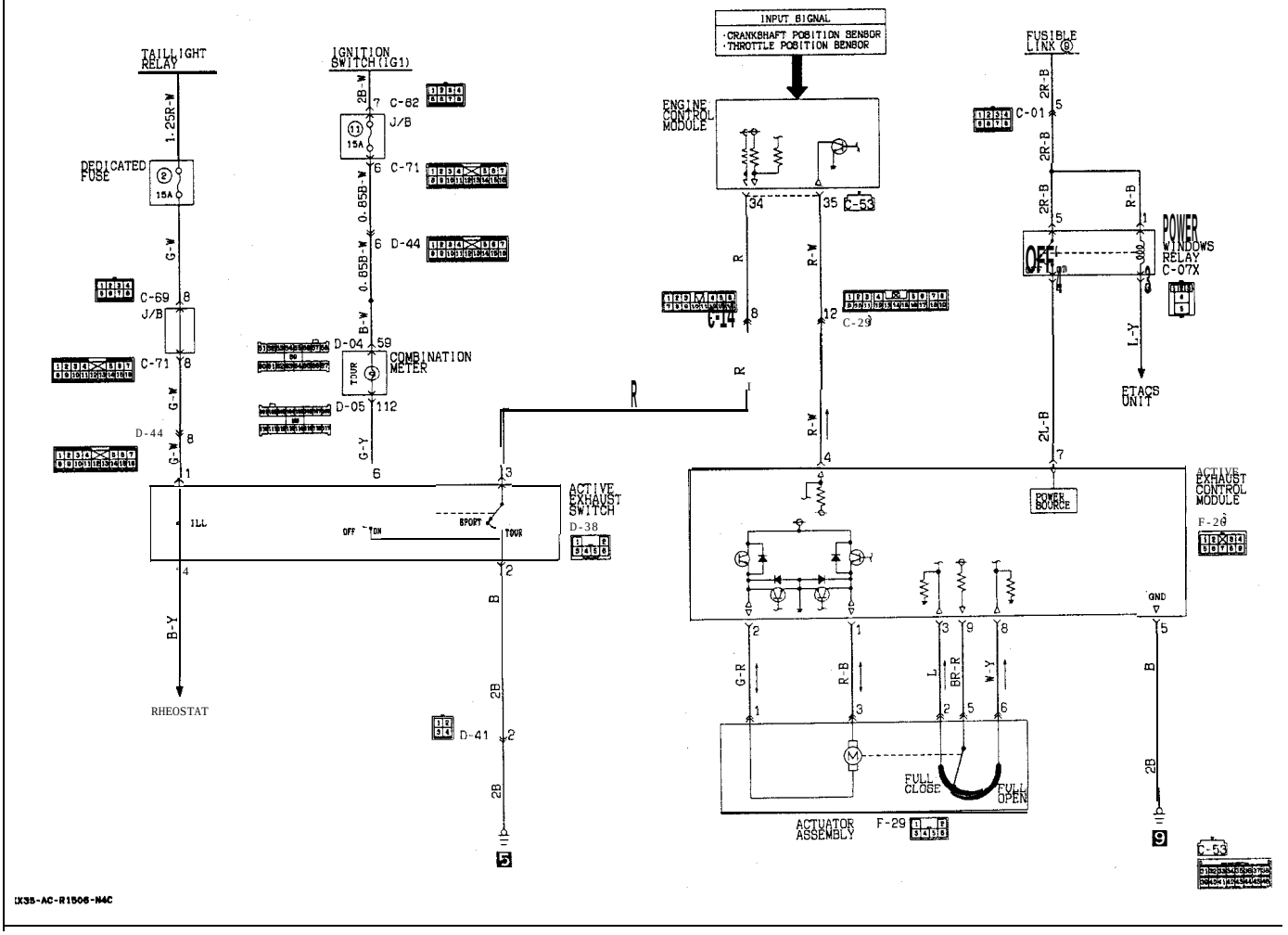
(1) Make sure that the valve operating cable is not dislocated.
(2) Make sure that the connectors of each component are positively connected and that no fuse has blown.
(3) Have an overall understanding of the substance and procedure of checking by reference to the Troubleshooting Quick-Reference Table and perform check in the proper sequence.
(4) Check each component with its connectors disconnected.

TROUBLESHOOTING QUICK-REFERENCE TABLE

If no abnormality is found in all parts by the check performed in the following sequence, the problem is probably caused by faulty active exhaust control unit and therefore the active exhaust control unit is replaced.

Sequence	Part to be checked	Checking procedure	Judgement		Probable cause	Remadv
			Normal	Abnormal		
1	Valve	Operate valve manually.	Operates freely.	Does not operate.	Valve sticking	Replace main muffler.
2	Active exhaust switch	Refer to P. 11-42			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 ① and ③ of relay, check continuity between terminals ④ and ⑤ of relay.				
4	Actuator assembly	Check continuity between terminals in SPORT mode.	No continuity preser 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 @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 preser between terminals @and ⑥.	Continuity present between terminals @and ⑥.		
		Apply battery voltage between terminals ① 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

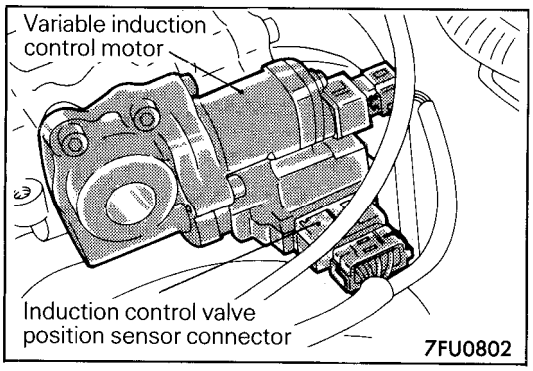
ACTIVE EXHAUST SYSTEM CIRCUIT CHECK

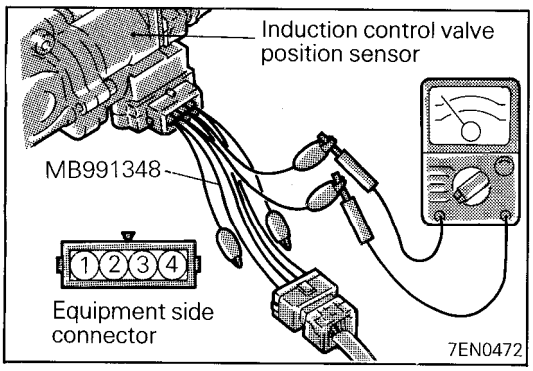


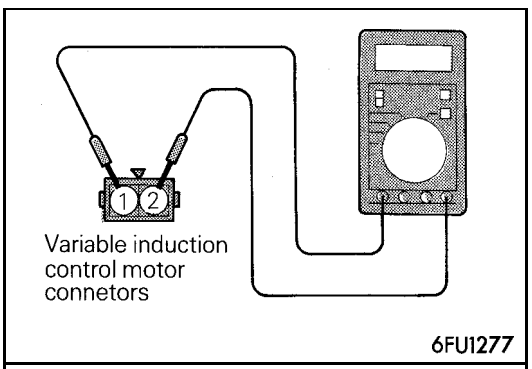
TROUBLESHOOTING HINTS

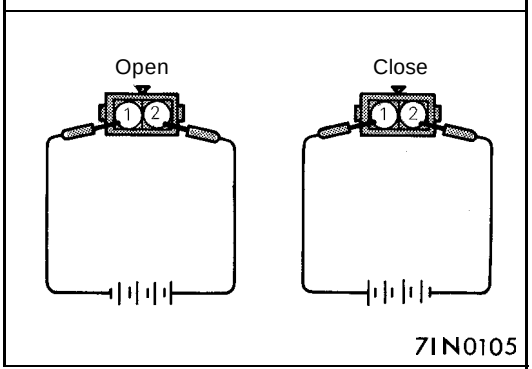
Checking Active Exhaust Control Module

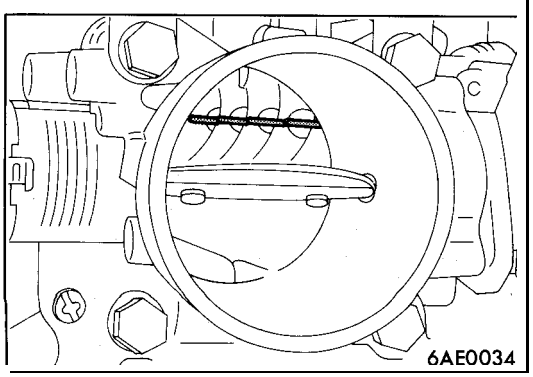
Terminal No.	Signal	Status	Terminal voltage
1	SPORT MODE signal	SPORT MODE	Not less than 10V
2	TOUR MODE signal	TOUR MODE	Not less than 10V
3 (8)	Full open position detection signal	SPORT MODE	OV (Not less than 5V)
4	Engine control module output signal	TOUR MODE, engine speed of not less than 3,500 rpm	Battery positive voltage
		TOUR MODE, idle	ov
		SPORT MODE	Battery positive voltage
5	Control unit ground	At all times	ov
7	Control unit ground	At all times	Battery positive voltage
8 (3)	Full close position detection signal	TOUR MODE	OV (Not less than 5V)
9	Intermediate position detection signal	At all times	Not less than 5V











SERVICE ADJUSTMENT PROCEDURES

VARIABLE INDUCTION CONTROL SYSTEM INSPECTION (DOHC – Non Turbo)

SYSTEM INSPECTION

(1) Disconnect the induction control valve position sensor connector.
(2) Connect the special tool (test harness set) between the disconnected connectors. (All terminals should be connected.)
(3) Connect a circuit tester between terminal ② and terminal ③ of the induction control valve position sensor and measure the voltage. In addtion, measure the voltage between terminal ③ and terminal ④ in the same way.

Standard value

Engine condition	Voltage [V]
Idle	0-1 or 4.5-5.5
Engine speed gradually increases to 5,000 rpm	1.5–4.0 (momentarily)
5,000 rpm	0-1 or 4.5-5.5

(4) If the voltages are outside the standard values, inspect the induction control valve position sensor, variable induction control motor and the related harnesses.

VARIABLE INDUCTION CONTROL MOTOR INSPECTION

(1) Disconnect the variable induction control motor connectors.
(2) Disconnect the air intake hose from the throttle body.
(3) Check the variable induction control motor coil for continuity.

Standard value

Measured terminal	Continuity
Between terminals ① and ②	Present [5 – 35 Ω: 20°C (68°F)]

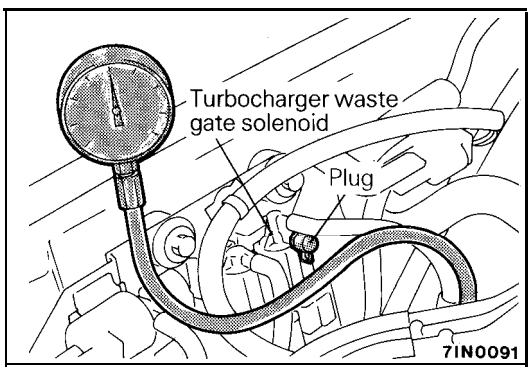
(4) Make sure that when DC 6V is applied to terminals ① and ② of the variable induction control motor connector, the induction control valve opens and closes smoothly.

Caution
Be sure to apply a voltage of not higher than DC 6V to the variable induction control motor connector terminals since application of high voltage may lock the servo gears.

(5) If outside the standard value, or if the variable induction valve does not open and close smoothly, replace the intake manifold plenum assembly.

TURBOCHARGER SUPERCHARGING PRESSURE INSPECTION (Turbo)

Caution
Perform running inspection with two passengers in the vehicle and where full throttle acceleration can be safely made.
The pressure gauge reading is taken by a front seat passenger.



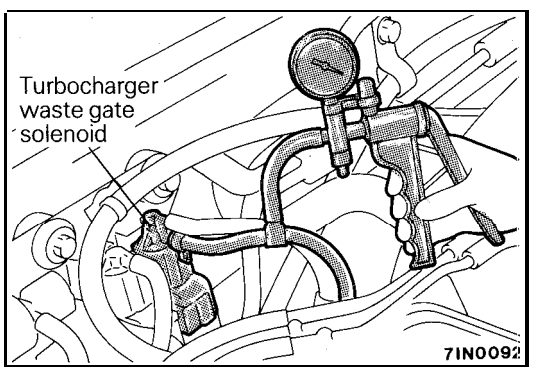
(1) Disconnect the hose (black) from the turbocharger waste gate solenoid, and connect the pressure gauge to the hose. Plug the nipple of the solenoid valve from which the hose (black) has been disconnected.
(2) Drive the vehicle with full throttle and accelerate the engine to a speed of more than 3,500 rpm at 2nd gear. Measure the supercharging pressure when the pointer is stabilized.

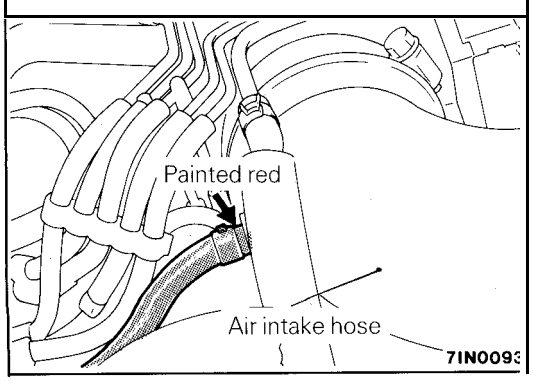
Standard value: 20 – 60 kPa (2.9 – 8.7 psi)

Caution
If the supercharging pressure deviates from the standard value, check the following items for possible causes.

When pressure is high:
Turbocharger waste gate actuator malfunction

When pressure is low:
Turbocharger waste gate actuator malfunction
Supercharging pressure leaks
Faulty turbocharger



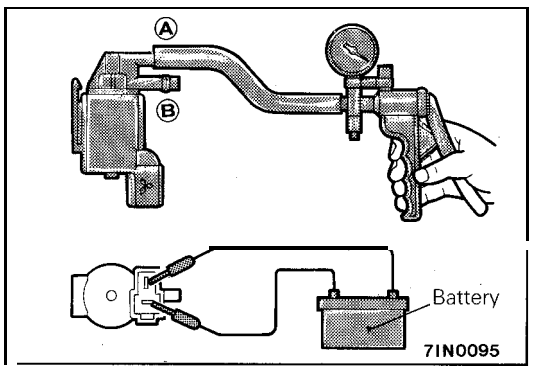


INTAKE CHARGE PRESSURE CONTROL SYSTEM INSPECTION (Turbo)

(1) After the diagnostic trouble code of MFI system is completely read, turn off the ignition switch.
(2) Disconnect the hose (black) from the turbocharger waste gate solenoid and connect a three-way joint between the hose and the solenoid.
(3) Conncet a hand vacuum pump to the three-way joint.
(4) Disconnect the hose (with its end painted red) from the turbocharger wastegate actuator control boost nipple and plug the nipple.
(5) Applying a negative pressure with the hand vacuum pump, check tightness both when the hose end (with its end painted red) is closed and when it is open.

Engine state	Hose (with its end painted red)	Normal state
stop (Ignition switch: ON)	Opened	Negative pressure leaks.
	Closed by finger	Negative pressure is maintained.
Idling (After warm-up)	Closed by finger	Negative pressure leaks.

NOTE
If this check indicates an abnormal condition, the turbocharger waste gate actuator, turbocharger waste gate solenoid or hose is broken.

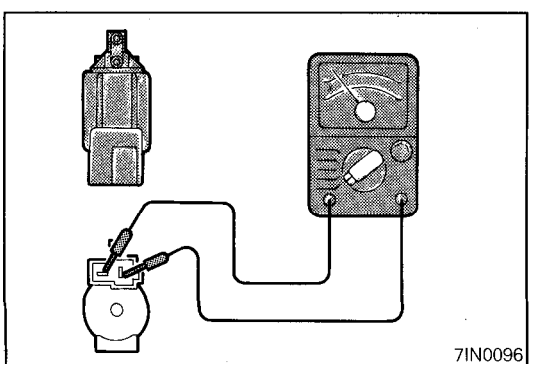


TURBOCHARGER WASTE GATE SOLENOID INSPECTION (Turbo)

OPERATION INSPECTION

(1) Connect a hand vacuum pump to the solenoid valve nipple Ⓐ (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.

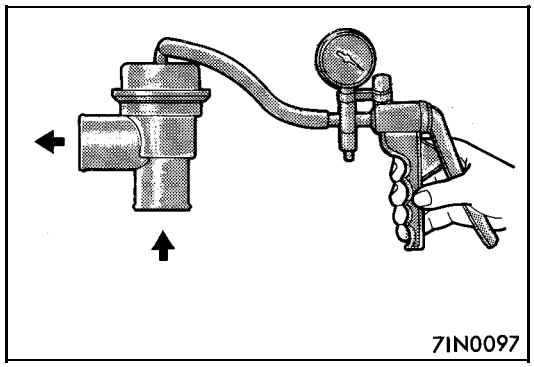
Jumper wire	Ⓑ nipple condition	Normal condition
Connected	Open	Negative pressure leaks.
	Close	Negative pressure is held.
Disconnected	**Open**	**Negative pressure is held.**



COIL RESISTANCE INSPECTION

Measure resistance between solenoid valve terminals.

Standard value: 36 – 44 Ω [at 20°C (68°F)]



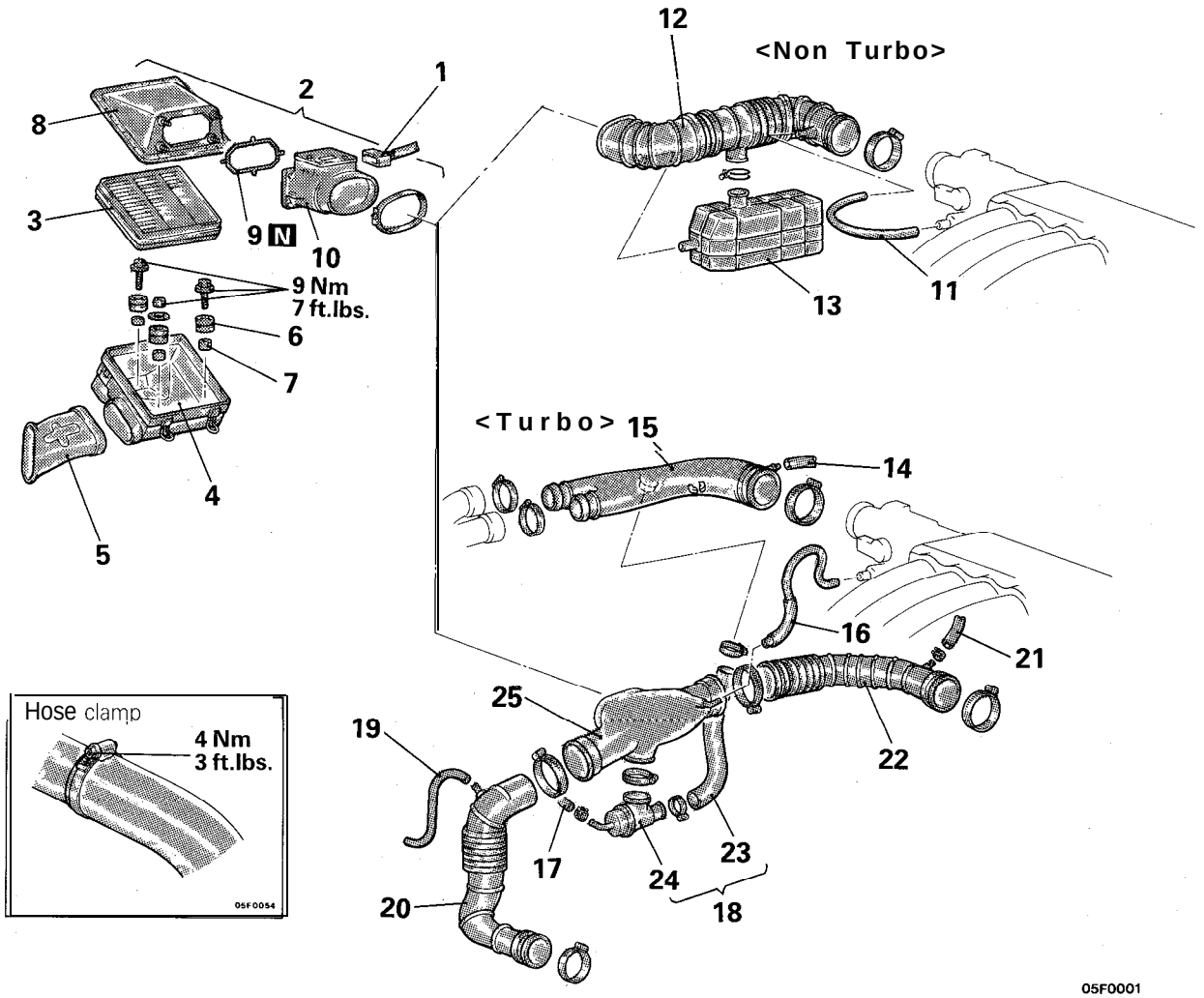
TURBOCHARGER BYPASS VALVE INSPECTION (Turbo)

(1) Remove the turbocharger bypass valve.
(2) Connect the hand vacuum pump to the nipple of the turbocharger bypass valve.
(3) Apply a negative pressure of approx. 400 mmHg (16 in.Hg), and check operation of the valve. Also check that air tightness is maintained.

Negative pressure	Valve operation
About 400 mmHg (16 in.Hg)	It starts opening

AIR CLEANER

REMOVAL AND INSTALLATION



Removal steps of air cleaner

1. Connection of volume air flow sensor connector
2. Air cleaner cover and volume air flow sensor assembly
3. Air cleaner element
4. Air cleaner body
5. Air duct
6. Insulator
7. Collar
8. Air cleaner cover
9. Volume air flow sensor gasket
10. Volume air flow sensor assembly

Removal steps of air intake hose

<Non-Turbo>

11. Breather hose
12. Air intake hose
13. Resonator

Removal steps of air intake hose

<Turbo>

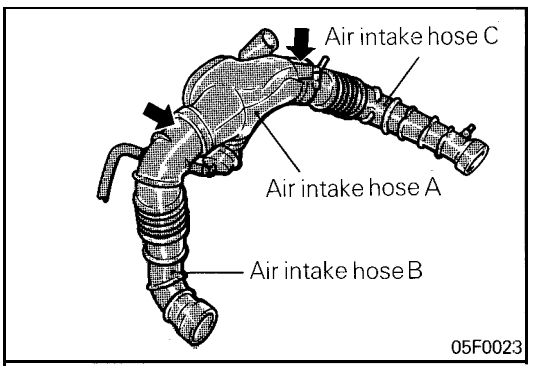
14. Connection of boost hose
15. Air hose A
16. Breather hose
17. Connection of vacuum hose
- C 18. Air intake hose A, turbocharger bypass valve and air bypass hose
19. Connection of purge hose
- 4 20. Air intake hose B
21. Connection of boost hose
- * 22. Air intake hose C
23. Air bypass hose
24. Turbocharger bypass valve
25. Air intake hose A

INSPECTION

- Check the air cleaner body, cover or packing for deformation, corrosion or damage.
- Check the air duct for damage.
- Check the air cleaner element for clogging, contamination or damage.
  If element is slightly clogged, remove dust by blowing air from inside of element.

VOLUME AIR FLOW SENSOR CHECK

For inspection of volume air flow sensor, refer to GROUP 14 – Volume Air Flow Sensor Check.



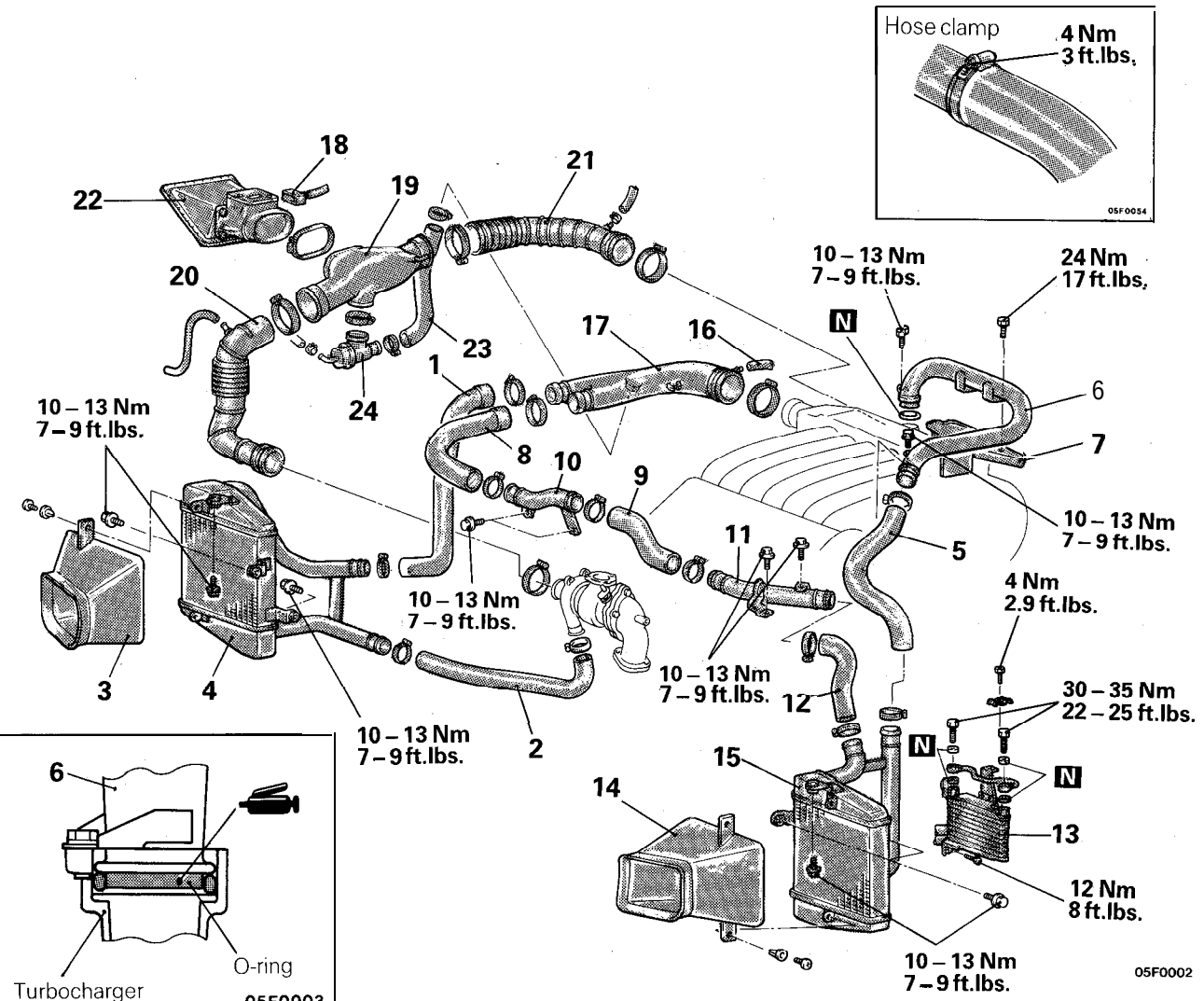
SERVICE POINTS OF INSTALLATION

22. INSTALLATION OF AIR INTAKE HOSE C / 20. AIR INTAKE HOSE B / 18. AIR INTAKE HOSE A, TURBOCHARGER BYPASS VALVE AND AIR BY-PASS HOSE

Engaging the notch with the △ 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.

CHARGE AIR COOLER

REMOVAL AND INSTALLATION



Grease: MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent

Pre-removal Operation
- Removal of Front Bumper (Refer to GROUP 23A – Front Bumper.)

Removal steps of charge air cooler right
- ◖ * 1. Air hose C
- ◖ + 2. Air hose D
- 3. Charge air cooler duct (RH)
- ◖ + 4. Charge air cooler right

Removal steps of charge air cooler 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. Charge air cooler duct (LH)
- ● + 15. Charge air cooler left

Post-installation Operation
- Supplying of Engine Oil (When equipped with charge air cooler left) (Refer to GROUP 0 – Maintenance Service.)
- Installation of Front Bumper (Refer to GROUP 23A – Front Bumper.)

Removal steps of air intake hose
- 16. Connection of boost hose
- 17. Air hose A
- 18. Connection of volume air flow sensor connector
- ◆◆ 19. Air intake hose A
- ● 20. Air intake hose B
- ● a 21. Air intake hose C
- 22. Air cleaner
- 23. Air bypass hose
- 24. Turbocharger bypass valve

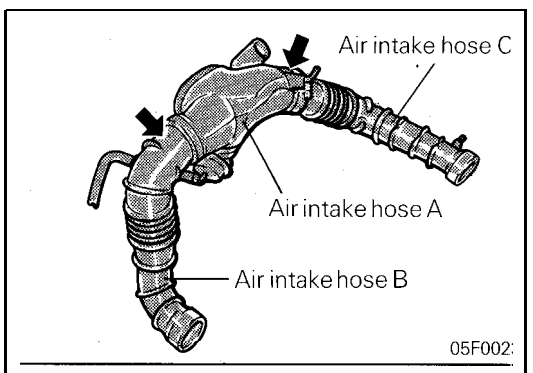
SERVICE POINT OF REMOVAL

13. REMOVAL OF ENGINE OIL COOLER

Disconnect the hose from the engine oil cooler and remove the engine oil cooler only.

INSPECTION

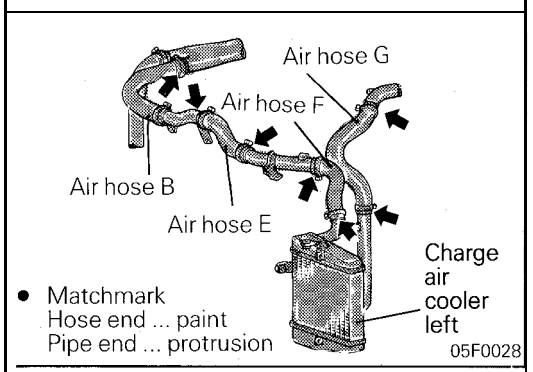
- Check the charge air cooler fins for bending, damage, or foreign matter.
- Check the charge air cooler hoses for cracking, damage, or wear.



SERVICE POINTS OF INSTALLATION

21. INSTALLATION OF AIR INTAKE HOSE C / 20. AIR INTAKE HOSE B / 19. AIR INTAKE HOSE A

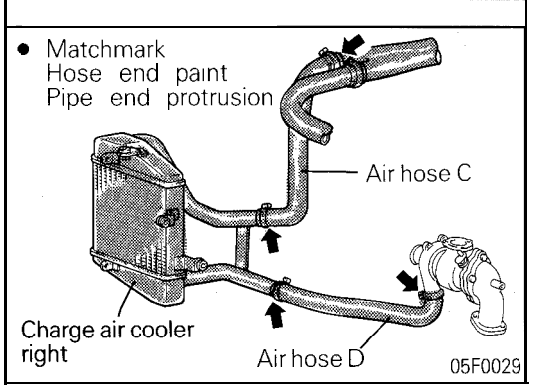
Engaging the notch with the △ mark at points indicated by the arrows, insert air intake hoses B and C until seated. Insert the turbocharger end of air intake hoses B and C completely.



15. INSTALLATION OF CHARGE AIR COOLER 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 charge air cooler itself.



4. INSTALLATION OF CHARGE AIR COOLER RIGHT / 2. AIR HOSE D / 1. AIR HOSE C

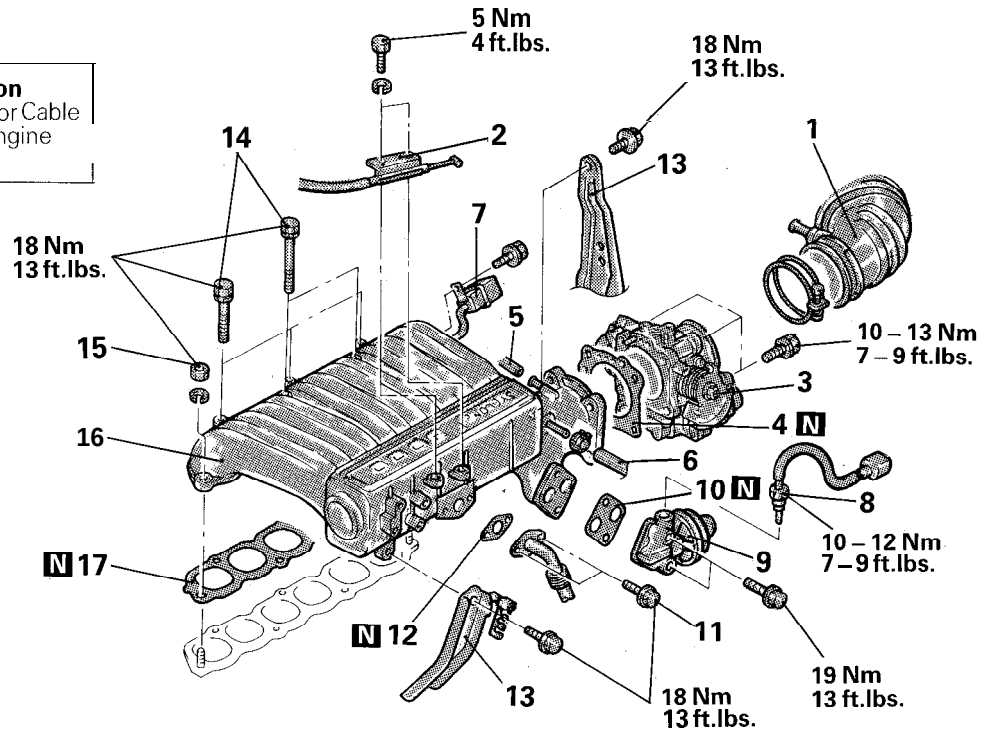
Aligning the marks at the points indicated by arrows, insert securely into the stepped portion of the pipe.

Caution
Be careful not to allow any foreign matter to get into the hoses, pipes, or the charge air cooler itself.

INTAKE MANIFOLD PLENUM <SOHC>

REMOVAL AND INSTALLATION

Post-installation Operation
• Adjustment of Accelerator Cable (Refer to GROUP 14 – Engine Control.)



Removal steps

1. Connection of air intake hose
2. Connection of accelerator cable
◆◆ 3. Throttle body assembly
● + 4. Throttle body gasket
5. Connection of vacuum hose
6. Connection of brake booster vacuum hose
7. Harness connector
8. EGR temperature sensor } <Vehicles for
9. EGR valve } California>
10. EGR valve gasket } <Vehicles for
11. EGR pipe installation bolts } California>
12. EGR pipe gasket
13. Connection of intake manifold plenum stay
14. Intake manifold plenum installation bolts
15. Intake manifold plenum installation nuts
16. Intake manifold plenum
17. Intake manifold plenum gasket

05F0026

SERVICE POINT OF REMOVAL

3. REMOVAL OF THROTTLE BODY ASSEMBLY

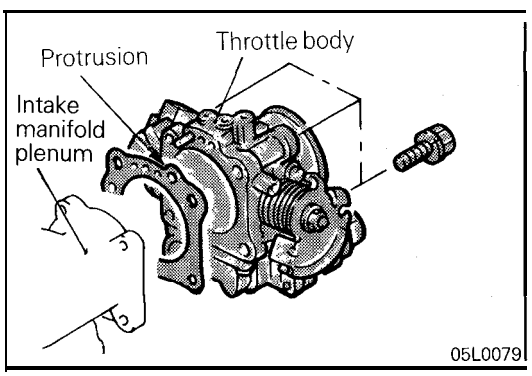
With the water hoses and vacuum hoses as fitted, remove from the intake manifold plenum.

INSPECTION

Check the following points; replace the part if a problem is found.

INTAKE MANIFOLD PLENUM

(1) Check intake manifold plenum for defect or cracks. Replace if defective or cracked.
(2) Check load (negative pressure) of drain port. Clean if required.



SERVICE POINT OF INSTALLATION

4. INSTALLATION OF THROTTLE BODY GASKET

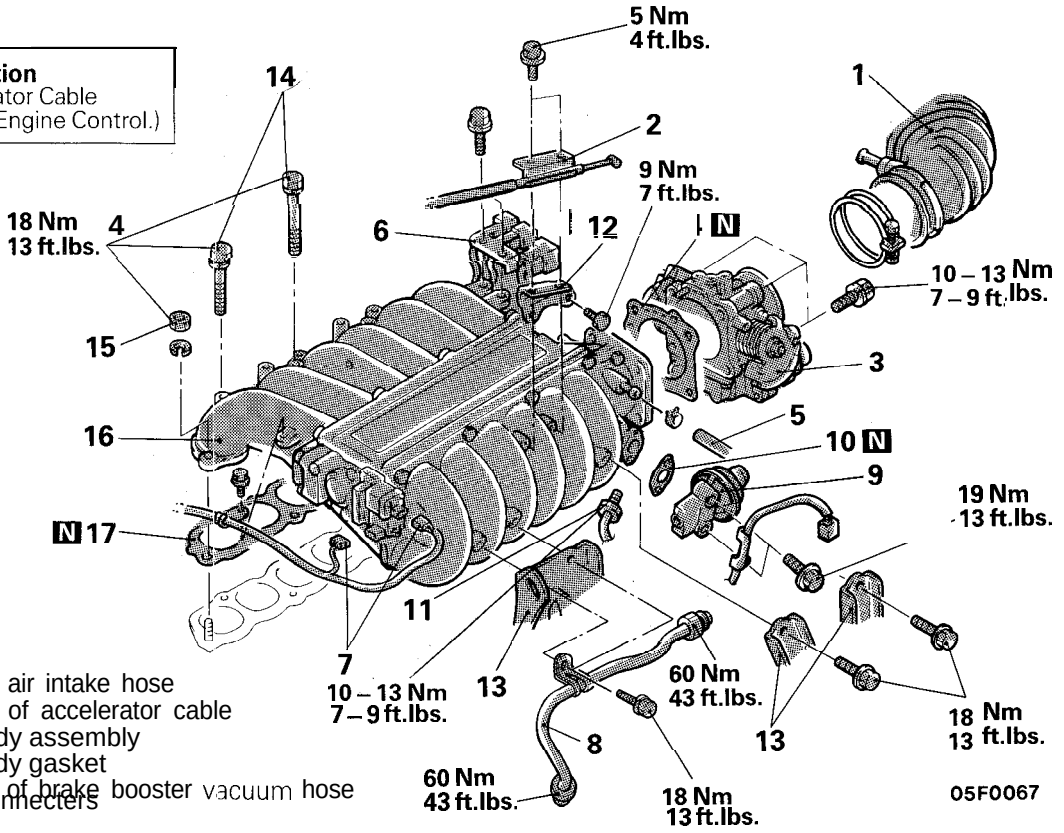
Install with the gasket protrusion positioned as shown.

Caution
If installed in an incorrect direction, idling failure or other problems may occur.

INTAKE MANIFOLD PLENUM <DOHC (Non Turbo)>

REMOVAL AND INSTALLATION

Post-installation Operation
- Adjustment of Accelerator Cable (Refer to GROUP 14 – 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 connecters
7. Connection of VIC 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 intake manifold plenum stay
14. Intake manifold plenum installation bolts
15. Intake manifold plenum installation nuts
16. Intake manifold plenum
17. Intake manifold plenum gasket

SERVICE POINTS OF REMOVAL

3. REMOVAL OF THROTTLE BODY ASSEMBLY

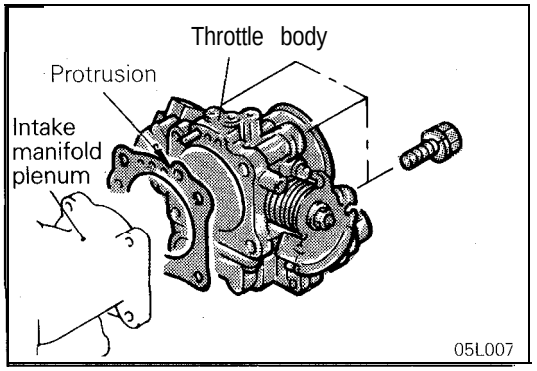
Leaving the water hoses and vacuum hoses in their installed positions, remove from the intake manifold plenum.

INSPECTION

Check the following points; replace the part if a problem is found.

INTAKE MANIFOLD PLENUM

(1) Check intake manifold plenum for defect or cracks. Replace if defective or cracked.
(2) Check load (negative pressure) of drain port. Clean if required.



SERVICE POINTS OF INSTALLATION

4. INSTALLATION OF THROTTLE BODY GASKET

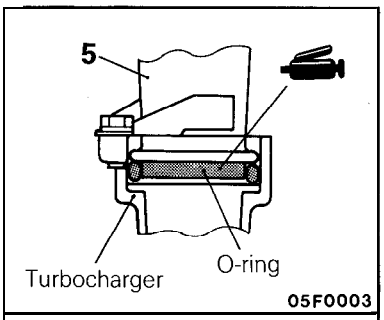
Install with the gasket protrusion positioned as shown.

Caution
If installed in an incorrect direction, idling failure or other problems may occur.

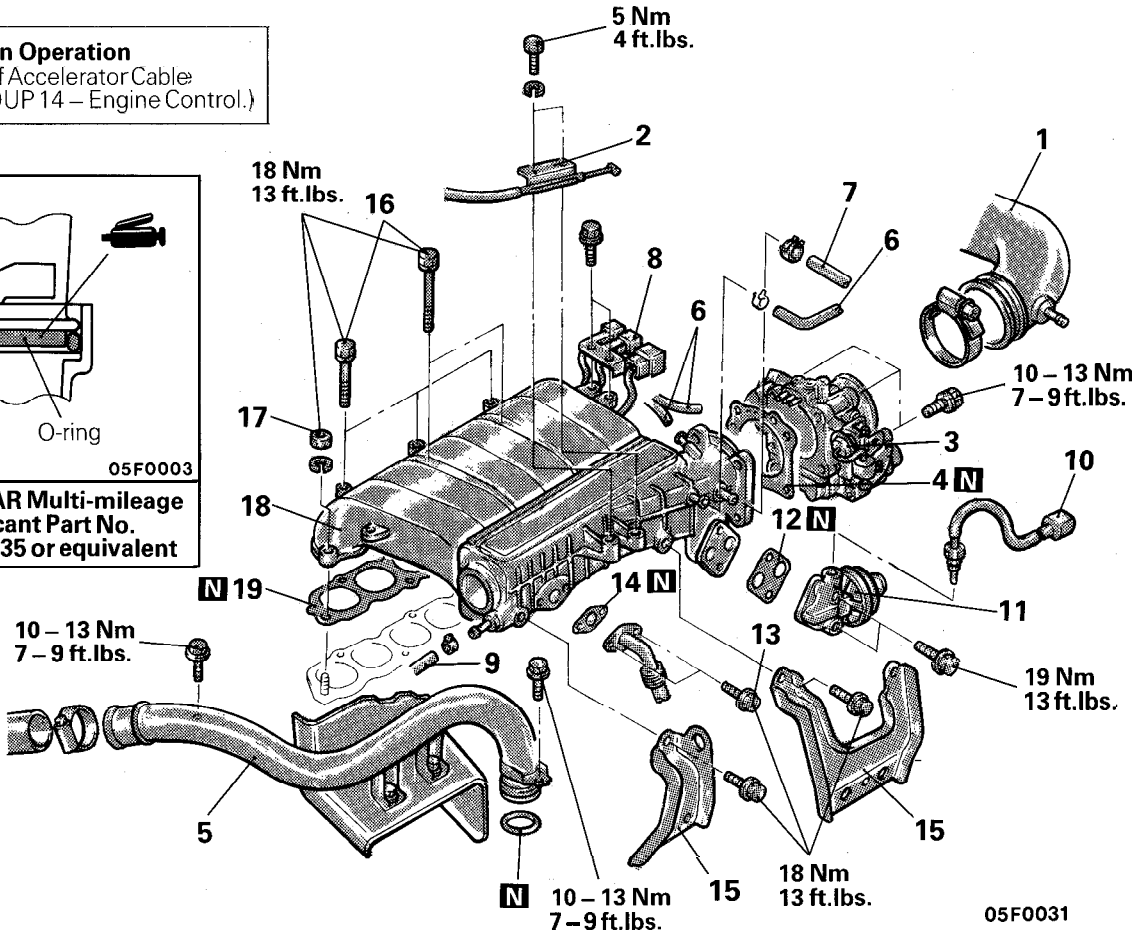
INTAKE MANIFOLD PLENUM <DOHC (Turbo)>

REMOVAL AND INSTALLATION

Post-installation Operation
- Adjustment of Accelerator Cable (Refer to GROUP 14 – Engine Control.)



Grease: MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent



Removal steps

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 connecter
9. Connection of clutch booster vacuum hose
10. EGR temperature sensor <Vehicles for California>
11. EGR valve
12. EGR valve gasket
13. EGR pipe installation bolts
14. EGR pipe gasket
15. Connection of intake manifold plenum stay
16. Intake manifold plenum installation bolts
17. Intake manifold plenum installation nuts
18. Intake manifold plenum
19. Intake manifold plenum gasket

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SERVICE POINTS OF REMOVAL

3. REMOVAL OF THROTTLE BODY ASSEMBLY

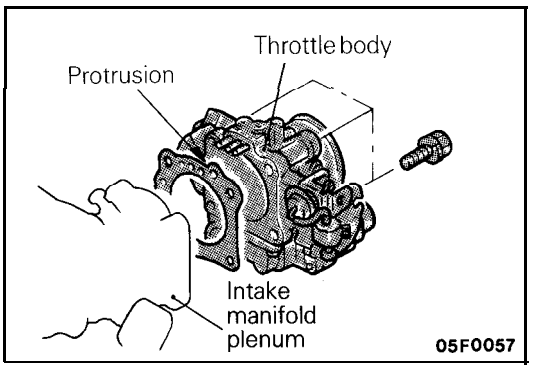
Leaving the water hoses and vacuum hoses in their installed positions, remove from the intake manifold plenum.

INSPECTION

Check the following points; replace the part if a problem is found.

INTAKE MANIFOLD PLENUM

(1) Check intake manifold plenum for defect or cracks. Replace if defective or cracked.
(2) Check load (negative pressure) of drain port. Clean if required.



SERVICE POINTS OF INSTALLATION

4. INSTALLATION OF THROTTLE BODY GASKET

Install with the gasket protrusion positioned as shown.

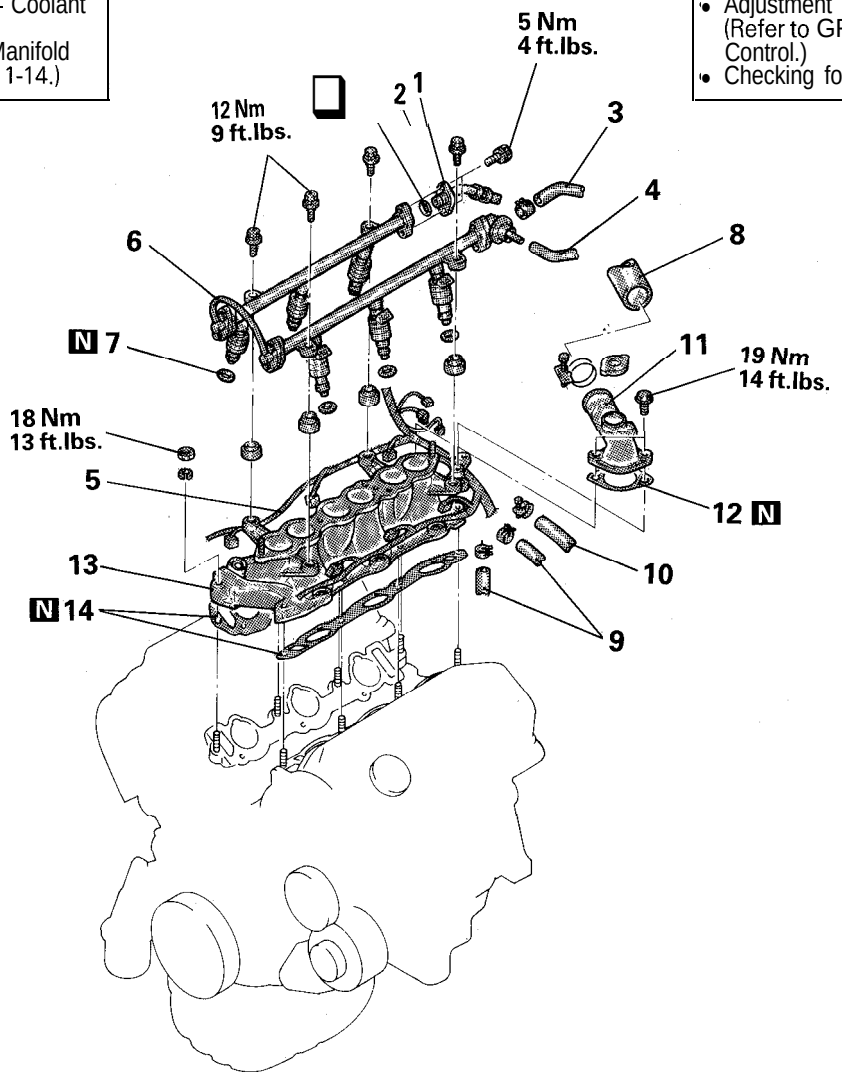
Caution
If installed in an incorrect direction, idling failure or other problems may occur.

INTAKE MANIFOLD <SOHC>

REMOVAL AND INSTALLATION

Pre-removal Operation
- Release of Residual Pressure from High Pressure Hose (Refer to GROUP 11 -Service Adjustment Procedure.)
- Draining of Engine Coolant (Refer to GROUP 0 – Coolant Replacement.)
- Removal of intake Manifold Plenum (Refer to P.11-14.)

Post-installation Operation
- Installation of Intake Manifold Plenum (Refer to P.11-14.)
- Filling of Engine Coolant (Refer to GROUP 0 – Coolant Replacement.)
- Adjustment of Accelerator Cable (Refer to GROUP 14 – Engine Control.)
- Checking for Fuel Leakage



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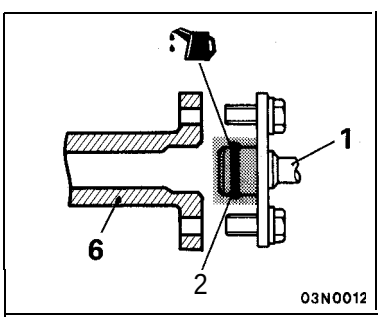
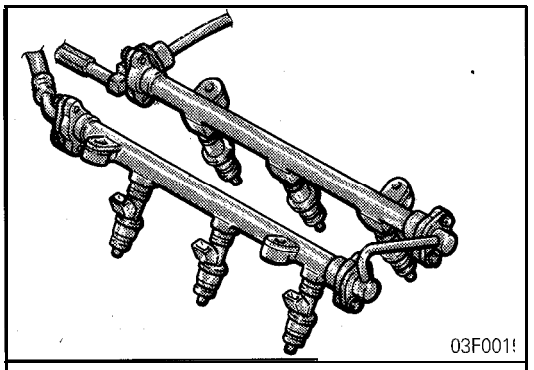
Removal steps

1. Connection for high-pressure fuel hose
2. O-ring
3. Connection for fuel return hose
4. Connection for vacuum hoses
5. Wiring harness connector
◆◆ 6. Fuel rail (with injectors)
7. Insulators
8. Connection for radiator upper hose
9. Connection for heater hose
10. Connection for water hose
11. Water outlet fitting
12. Water outlet fitting gasket
◆◆ 13. Intake manifold
◆◆ 14. Intake manifold gasket





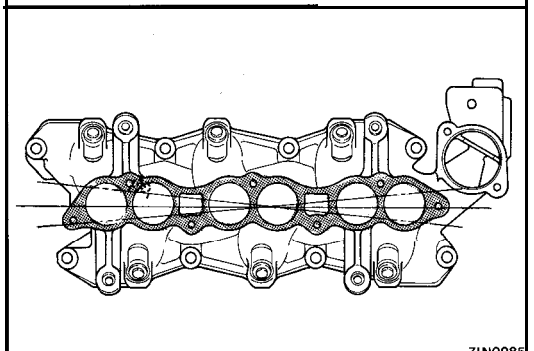
SERVICE POINTS OF REMOVAL

6. REMOVAL OF FUEL RAIL (WITH INJECTORS)

Disconnect the fuel rail with the injector attached to the fuel rail.

Caution

1. **Be careful not to drop the injector when removing the fuel rail.**
2. **Be aware that fuel will flow out when the injector is removed.**



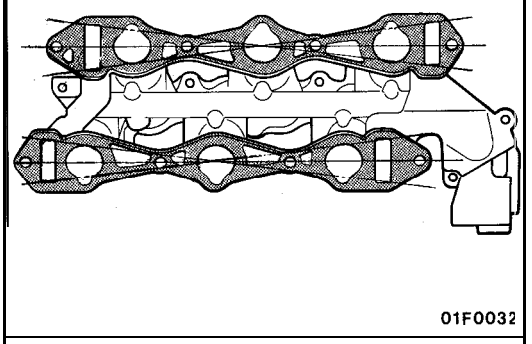
INSPECTION

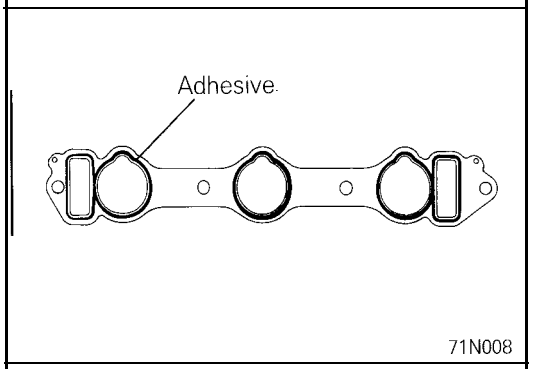
Check the following points; replace the part if a problem is found.

INTAKE MANIFOLD

(1) Check for damage or cracking of any part.
(2) Clogging of the negative pressure (vacuum) outlet port, or clogging of the water or 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.)

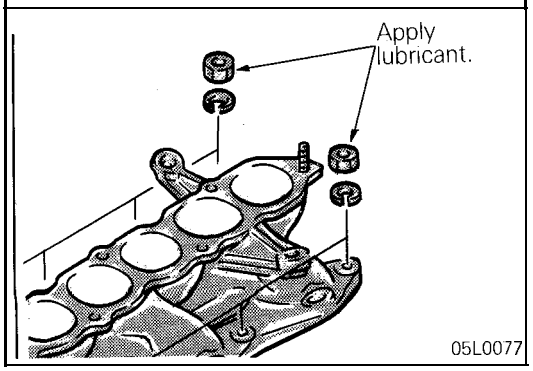




SERVICE POINTS OF INSTALLATION

14. INSTALLATION OF INTAKE MANIFOLD GASKET

Attach the gasket to the cylinder head, facing the adhesive coated side toward the intake manifold.



13. INSTALLATION OF INTAKE MANIFOLD

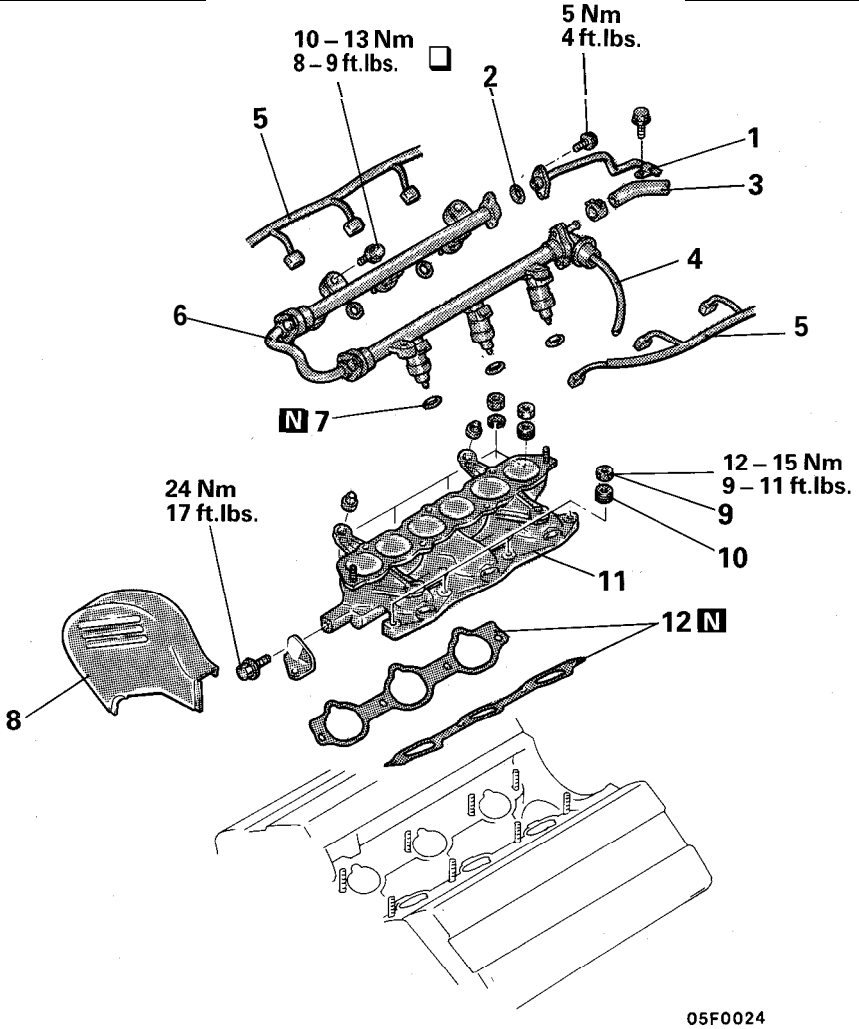
Apply lubricant sparingly to the intake manifold mounting nuts.

INTAKE MANIFOLD <DOHC>

REMOVAL AND INSTALLATION

Pre-removal Operation
- Release of Residual Pressure from High Pressure Fuel Hose (Refer to GROUP 14 – Service Adjustment Procedures.)
- Draining of Engine Coolant (Refer to GROUP 0 – Maintenance Service.)
- Removal of Intake Manifold Plenum (Refer to P.l 1-15, 16.)

Post-installation Operation
- Installation of intake Manifold Plenum (Refer to P.11-15, 16.)
- Filling of Engine Coolant (Refer to GROUP O-Maintenance Service.)
- Adjustment of Accelerator Cable (Refer to GROUP 14 – Engine Control.)
- Checking for Fuel Leakage



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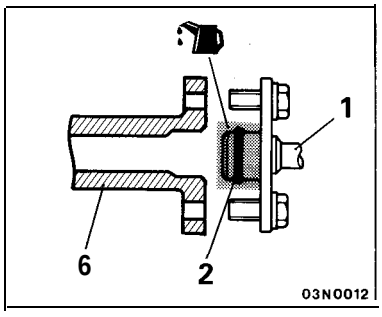
Removal steps

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. Fuel rail (with injectors)
7. Insulators
8. Timing belt upper cover
9. Intake manifold mounting nut <Turbo>
10. Cone disc spring <Turbo>
11. Intake manifold
12. intake manifold gasket



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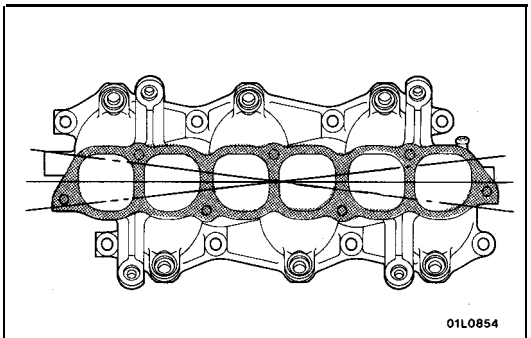
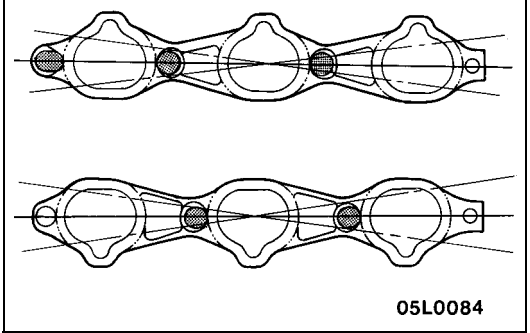




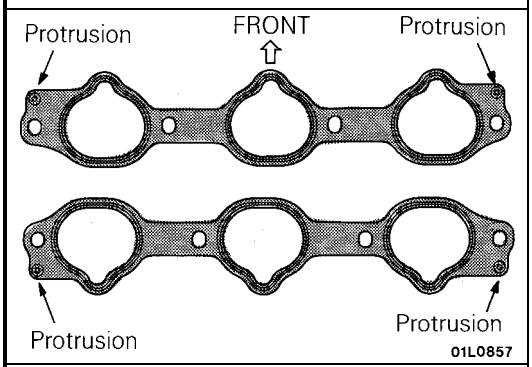
INSPECTION

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.

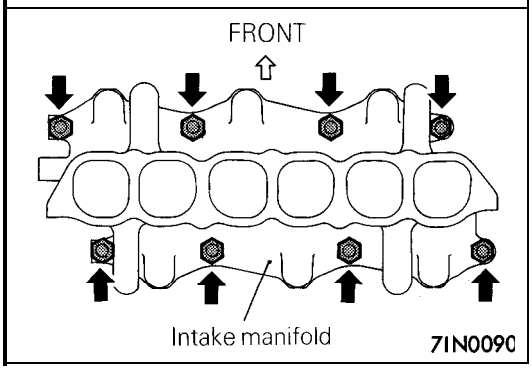
Standard value : 0.15 mm (.0059 in.) or less
Limit : 0.2 mm (.008 in.)



SERVICE POINTS OF INSTALLATION

12. INSTALLATION OF INTAKE MANIFOLD GASKET

Install with gasket protrusions in the position illustrated.



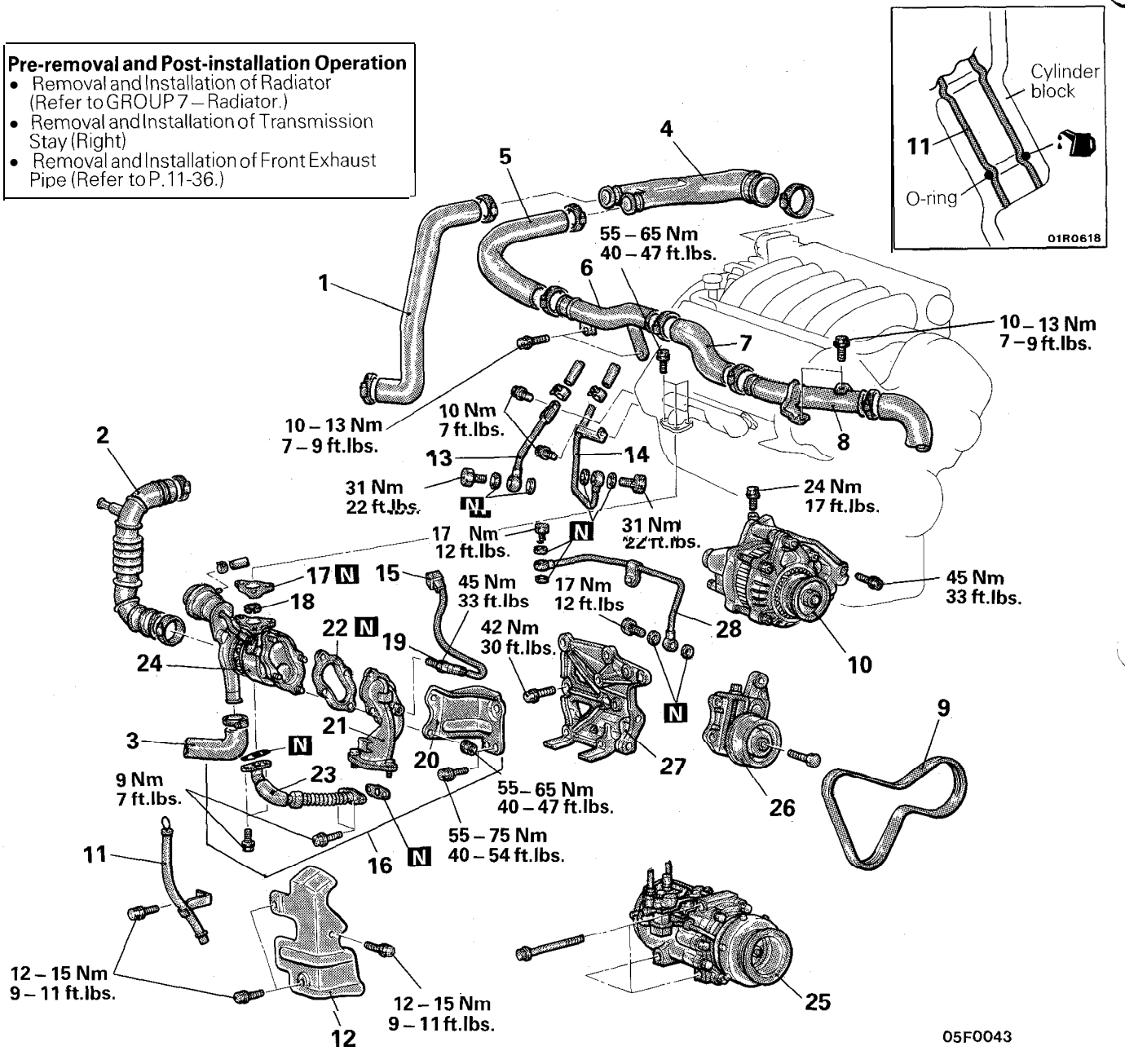
9. INSTALLATION OF INTAKE MANIFOLD MOUNTING NUT

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.

TURBOCHARGER (FRONT)

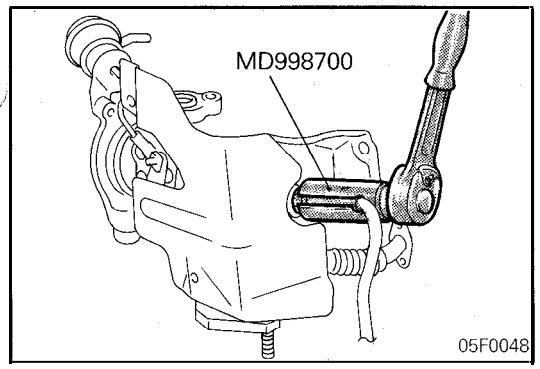
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Removal and Installation of Radiator (Refer to GROUP 7 – Radiator.)
- Removal and Installation of Transmission Stay (Right)
- Removal and Installation of Front Exhaust Pipe (Refer to P.11-36.)



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 9 – Service Adjustment Procedures.)
- 10. Generator assembly (Refer to GROUP 8 – Engine Electrical.)
- 11. Engine oil level gauge guide
- 12. Heat protector B
- 13. Water pipe A
- 14. Water pipe B
- 15. Connection of heated oxygen sensor
- 16. Turbocharger &fitting assembly
- 17. Gasket
- 18. Ring
- ◆◆ ◆◆ 19. Heated oxygen sensor
- 20. Turbocharger stay
- 21. Exhaust fitting
- 22. Gasket
- 23. Oil return pipe
- ◆◆ 24. Turbocharger assembly
- ◆◆ 25. Air conditioning compressor
- 26. Tension pulley bracket
- 27. Air conditioning compressor bracket
- 28. Oil pipe



SERVICE POINTS OF REMOVAL

19. REMOVAL OF HEATED OXYGEN SENSOR

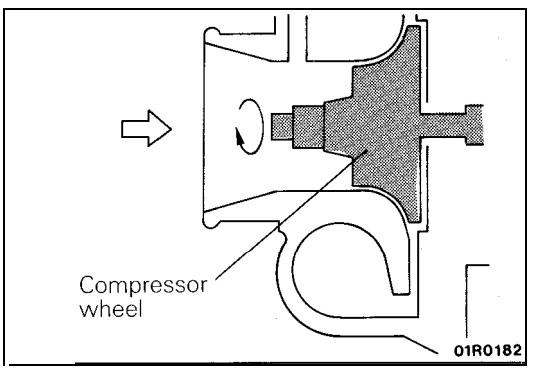
Disconnect the connector of the heated oxygen sensor, and install the special tool to the heated oxygen sensor.

25. DISCONNECTION OF AIR CONDITIONING COMPRESSOR

Disconnect air conditioning compressor with hoses from the bracket.

NOTE

The removed air conditioning compressor should be fastened (by using rope, etc.) in a position that will not interfere with the removal/installation of the turbocharger assembly.



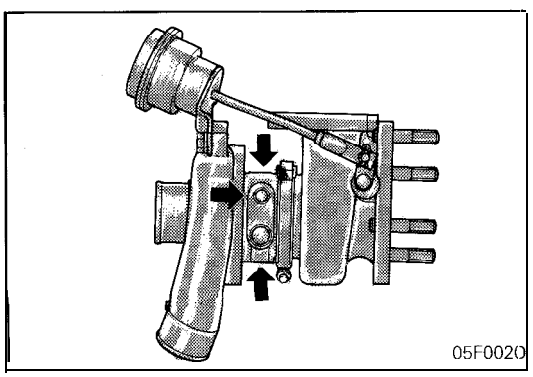
INSPECTION

TURBOCHARGER ASSEMBLY CHECK

- Visually check the turbine wheel and the compressor wheel for cracking or other damage.
- Check whether the turbine wheel and the compressor wheel can be easily turned by hand.
- Check for oil leakage from the turbocharger assembly.
- Check whether or not the turbocharger waste gate valve remains open. If any problem is found, replace the part after disassembly.

OIL PIPE AND OIL-RETURN PIPE CHECK

Check the oil pipe and oil-return pipe for clogging, bending, or other damage.
If there is clogging, clean it.



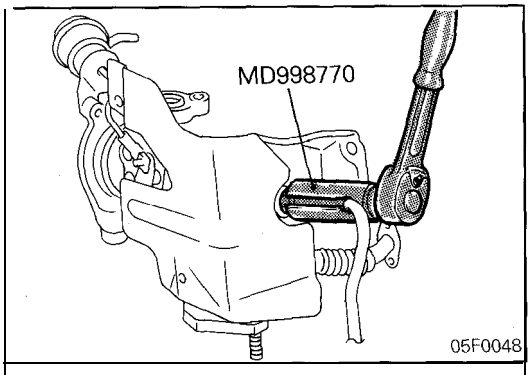
SERVICE POINTS OF INSTALLATION

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.

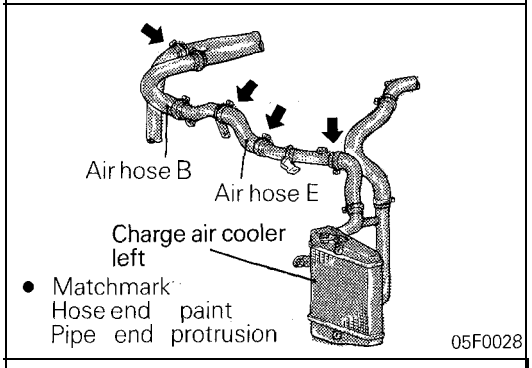
Caution

When cleaning, care must be taken so that a piece of the gasket does not enter the oil passage hole.



19. INSTALLATION OF HEATED OXYGEN SENSOR

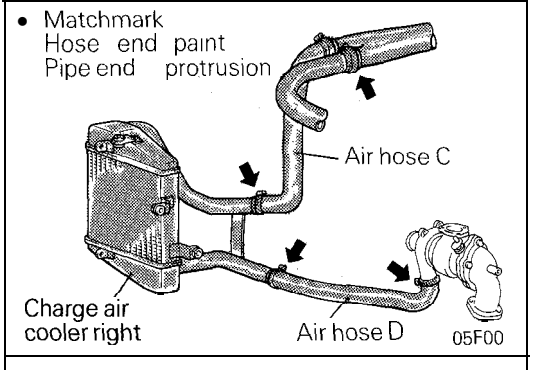
Use the special tool to install the heated oxygen sensor.



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.

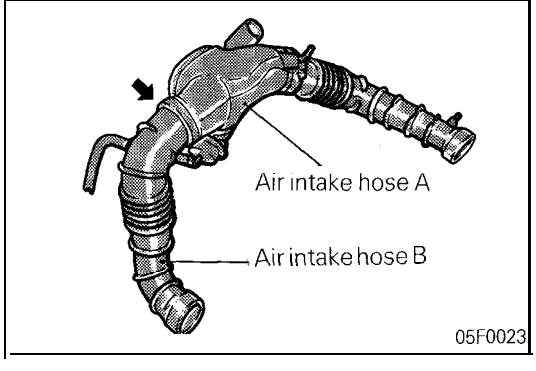
Caution
Be careful not to allow any foreign matter to get into the hoses or pipes.



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

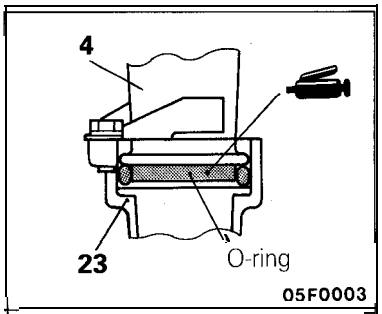
Engaging the notches with △ marks at the points indicated by the arrows, insert until seated.
Insert the turbocharger end of air intake hose B completely.

TURBOCHARGER (REAR)

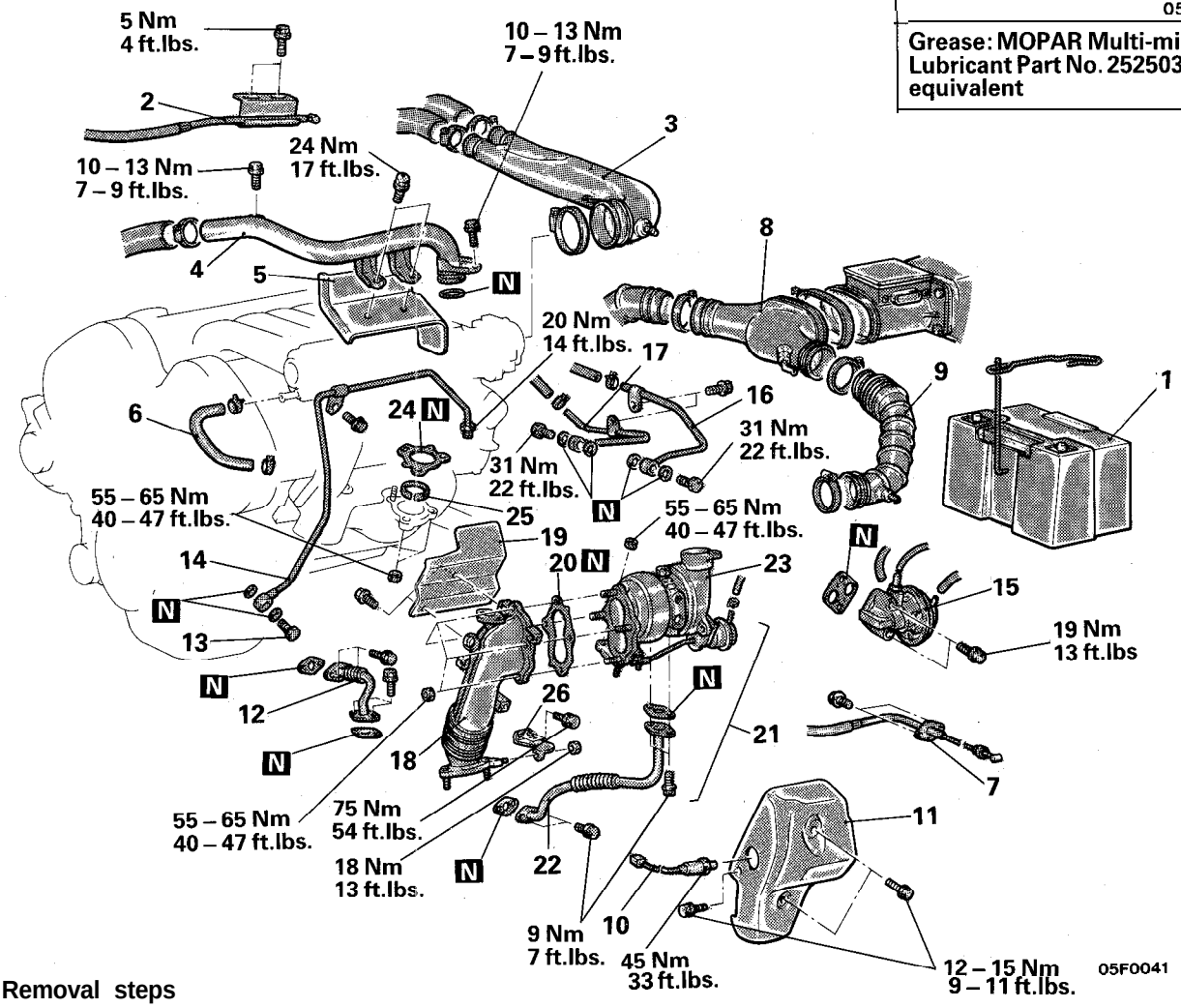
REMOVAL AND INSTALLATION

Pre-removal Operation
- Draining of the Engine Coolant (Refer to GROUP 0 – Maintenance Service.)
- Removal of Front Exhaust Pipe (Refer to P.11-36.)

Post-installation Operation
- Installation of Front Exhaust Pipe (Refer to P.11-36.)
- Refilling of the Engine Coolant (Refer to GROUP 0 – Maintenance Service.)
- Adjustment of Accelerator Cable (Refer to GROUP 14 – Engine Control.)

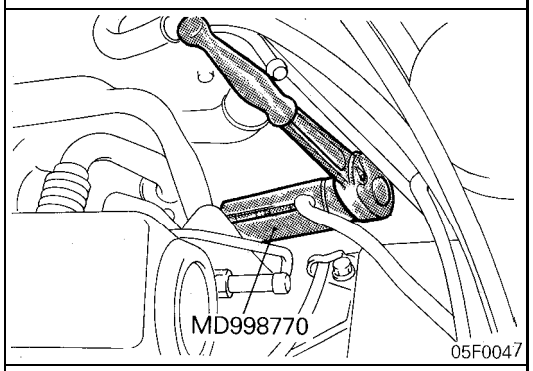


Grease: MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent



Removal steps

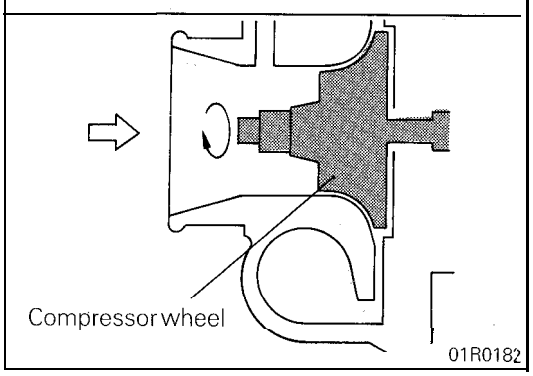
1. Battery
2. Connection of accelerator cable (engine side)
3. Air hose A
4. Air pipe A
5. Heat protector F
6. Clutch booster vacuum hose
7. Connection of accelerator cable (pedal side)
8. Air intake hose A
9. Air intake hose C
10. Heated oxygen sensor
11. Heat protector D
12. EGR pipe
13. Eye bolt
14. 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

10. REMOVAL OF HEATED OXYGEN SENSOR

Disconnect the connector of the heated oxygen sensor, and install the special tool to the heated oxygen sensor.



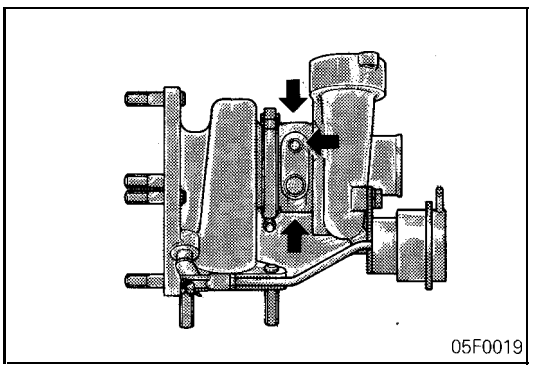
INSPECTION

TURBOCHARGER ASSEMBLY CHECK

- Visually check the turbine wheel and the compressor wheel for cracking or other damage.
- Check whether the turbine wheel and the compressor wheel can be easily turned by hand.
- Check for oil leakage from the turbocharger assembly.
- Check whether or not the turbocharger waste gate valve remains open. If any problem is found, replace the part after disassembly.

OIL PIPE AND OIL-RETURN PIPE CHECK

Check the oil pipe and oil-return pipe for clogging, bending, or other damage.
If there is clogging, clean it.



SERVICE POINTS OF INSTALLATION

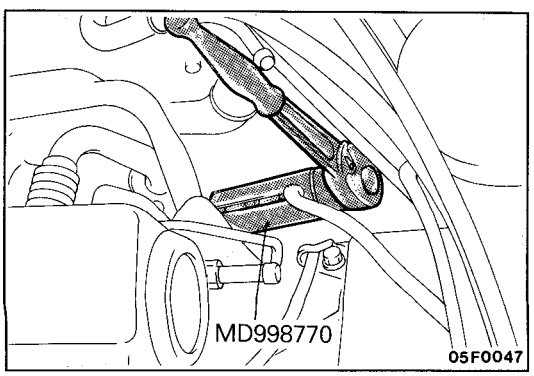
23. INSTALLATION OF TURBOCHARGER ASSEMBLY

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.

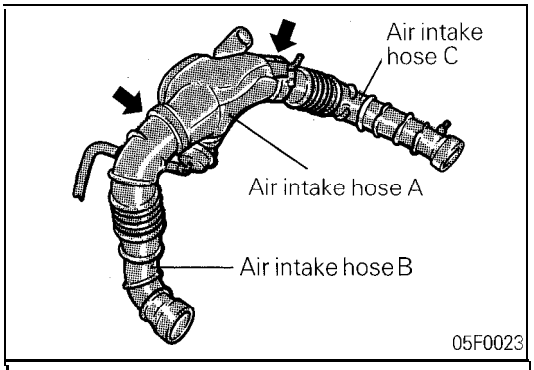
14. INSTALLATION OF OIL PIPE

Supply clean engine oil through the oil pipe installation hole of the turbocharger assembly.



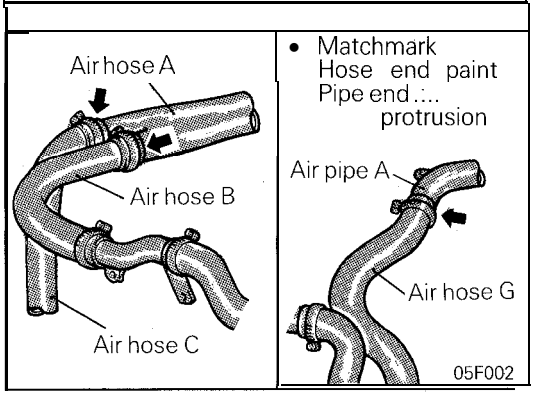
10. INSTALLATION OF HEATED OXYGEN SENSOR

Use the special tool to install the heated oxygen sensor.



9. INSTALLATION OF AIR INTAKE HOSE C / 8. AIR INTAKE HOSE A

Engaging the notches with △ marks at the points indicated by the arrows insert until seated.
Insert the turbocharger end of air intake hose C completely.



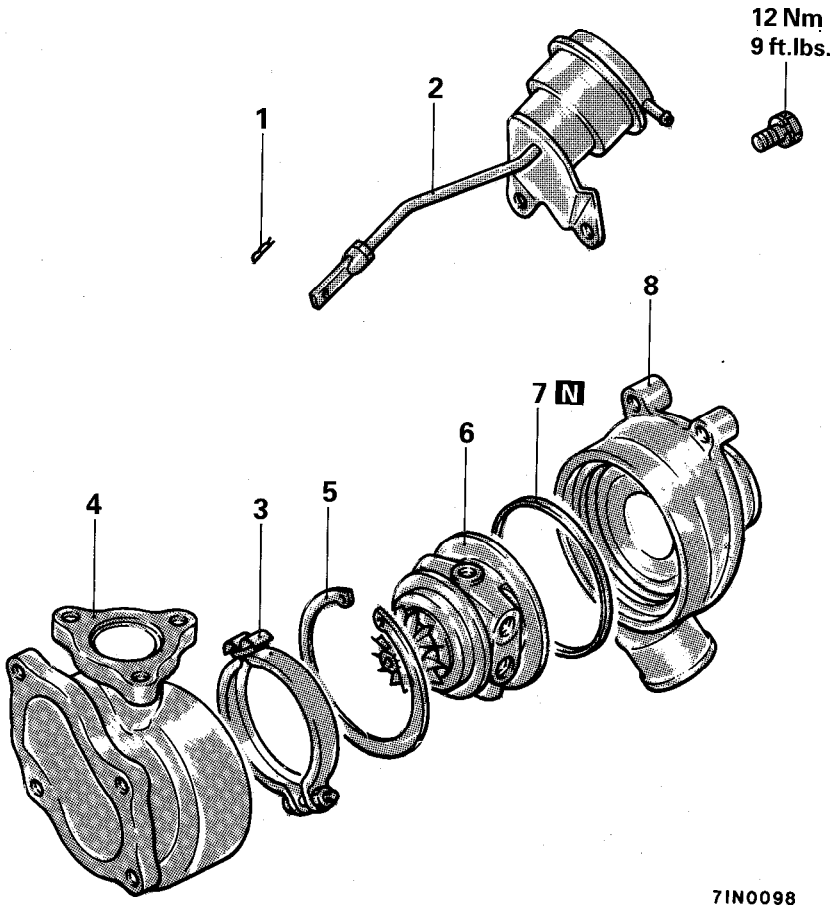
4. INSTALLATION OF AIR PIPE A / 3. AIR HOSE A

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.

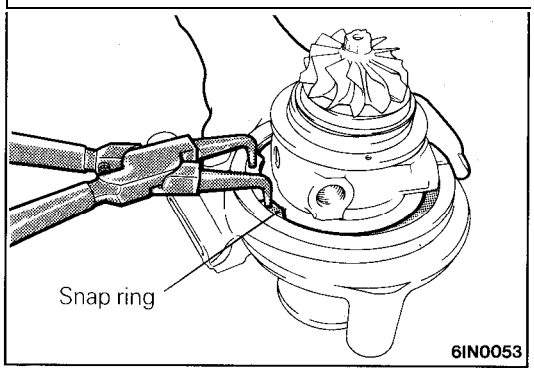
TURBOCHARGER

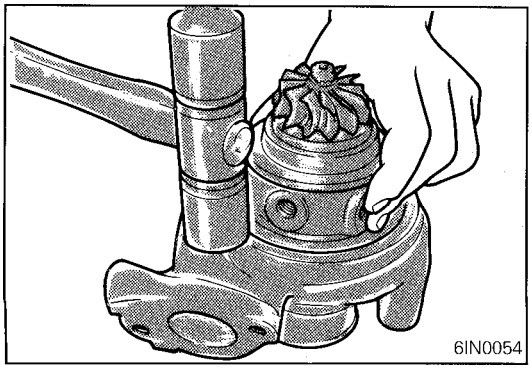
DISASSEMBLY AND REASSEMBLY



Disassembly steps

1. Snap pin
2. Turbocharger waste gate actuator
3. Coupling
- ◆◆ 4. Turbine housing
- ● * ◆◆ 5. Snap ring
- ● * ● + 6. Cartridge assembly
- ◆◆ 7. O-ring
8. Compressor cover





SERVICE POINTS OF DISASSEMBLY

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

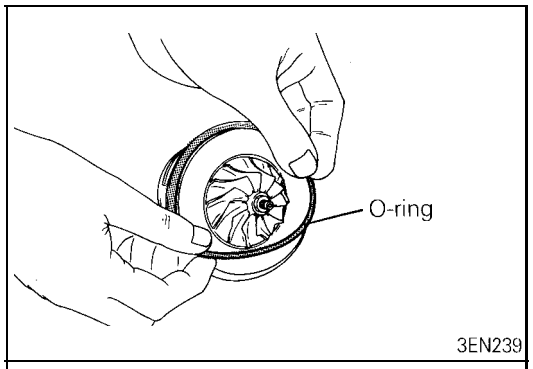
Remove the cartridge assembly by tapping the compressor cover with a soft hammer.

Caution
Some resistance will be experienced in the removal due to the O-ring on the cartridge assembly.

INSPECTION

TURBOCHARGER

(1) Manually open and close the turbocharger 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.

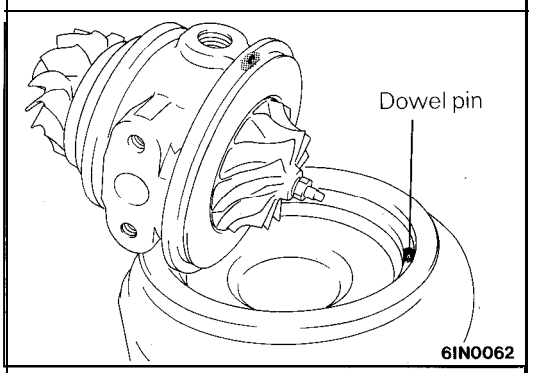


SERVICE POINTS OF REASSEMBLY

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.

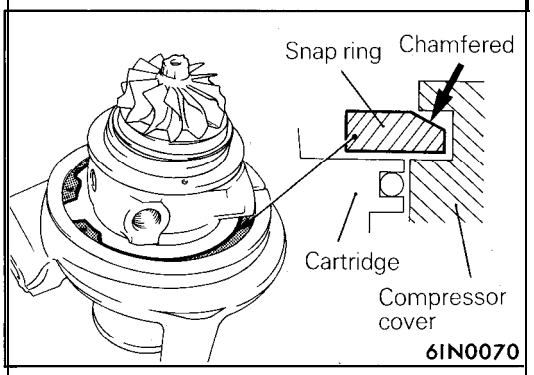
Caution
Be careful not to damage the O-ring while installing it as oil leakage could result.



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.

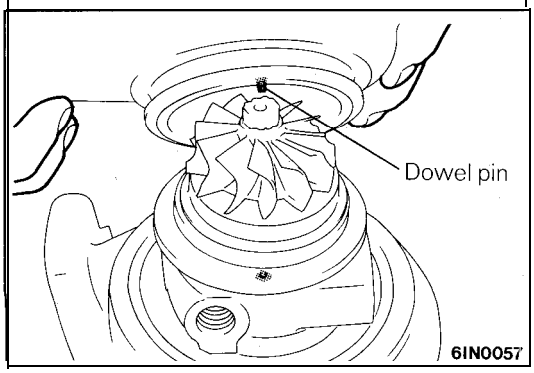
Caution
When installing the cartridge assembly on the compressor cover, be careful not to damage the compressor wheel blades.



5. INSTALLATION OF SNAP RING

Place the cartridge assembly with the compressor cover faced down and install the snap ring.

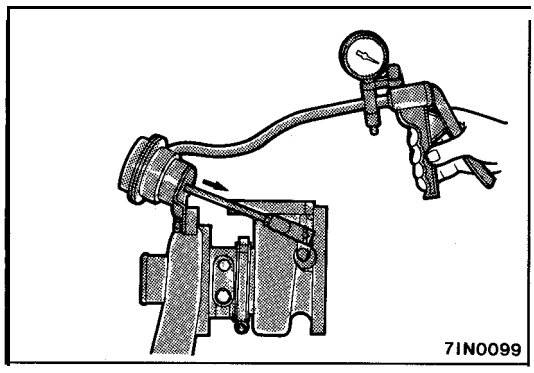
Caution
Install the snap ring with the tapered side of its outside diameter up.



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 TURBOCHARGER WASTE GATE ACTUATOR OPERATION

Using a tester, apply a pressure of approx. 48 kPa (6.8 psi) to the actuator and make sure that the rod moves.

Caution

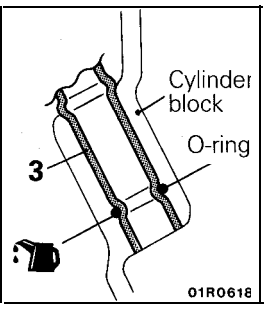
Do not apply a pressure of more than 61 kPa (8.7 psi) to the actuator. Otherwise, diaphragm may be damaged.

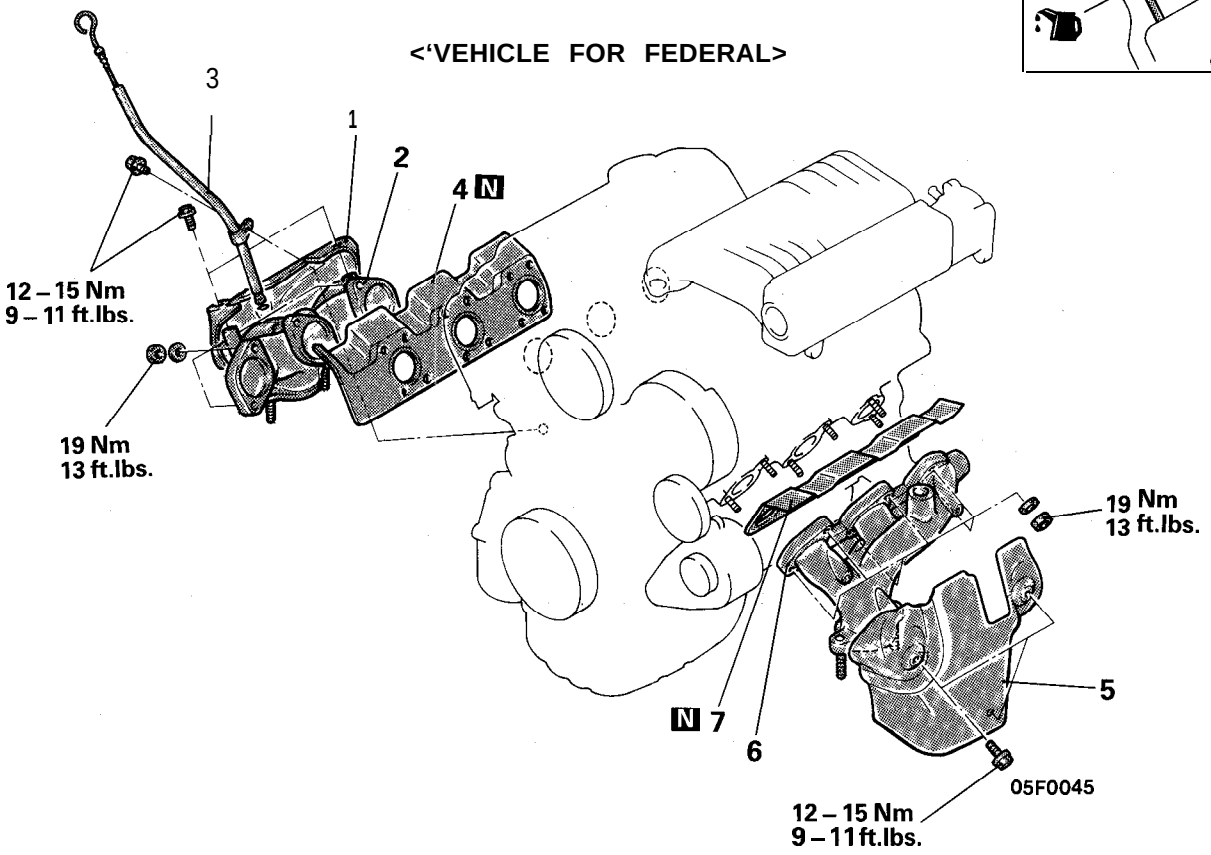
Never attempt to adjust the turbocharger waste gate valve.

EXHAUST MANIFOLD <SOHC>

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Removal and Installation of Front Exhaust Pipe (Refer to P.11-37.)





Removal steps of exhaust manifold (front)
1. Heat protector
2. Exhaust manifold (front)
3. Oil level gauge guide
4. Gasket

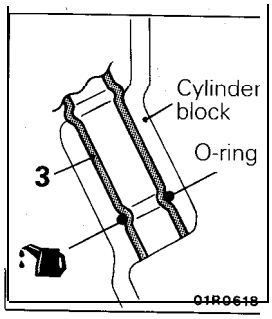
Removal steps of exhaust manifold (rear)
5. Heat protector
6. Exhaust manifold (rear)
7. Gasket

INSPECTION

Check the following points; replace the part if a problem is found.
- Check for damage of cracking of any part.

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Removal and Installation of Catalytic Converter (Front or Rear) (Refer to P.11-38)



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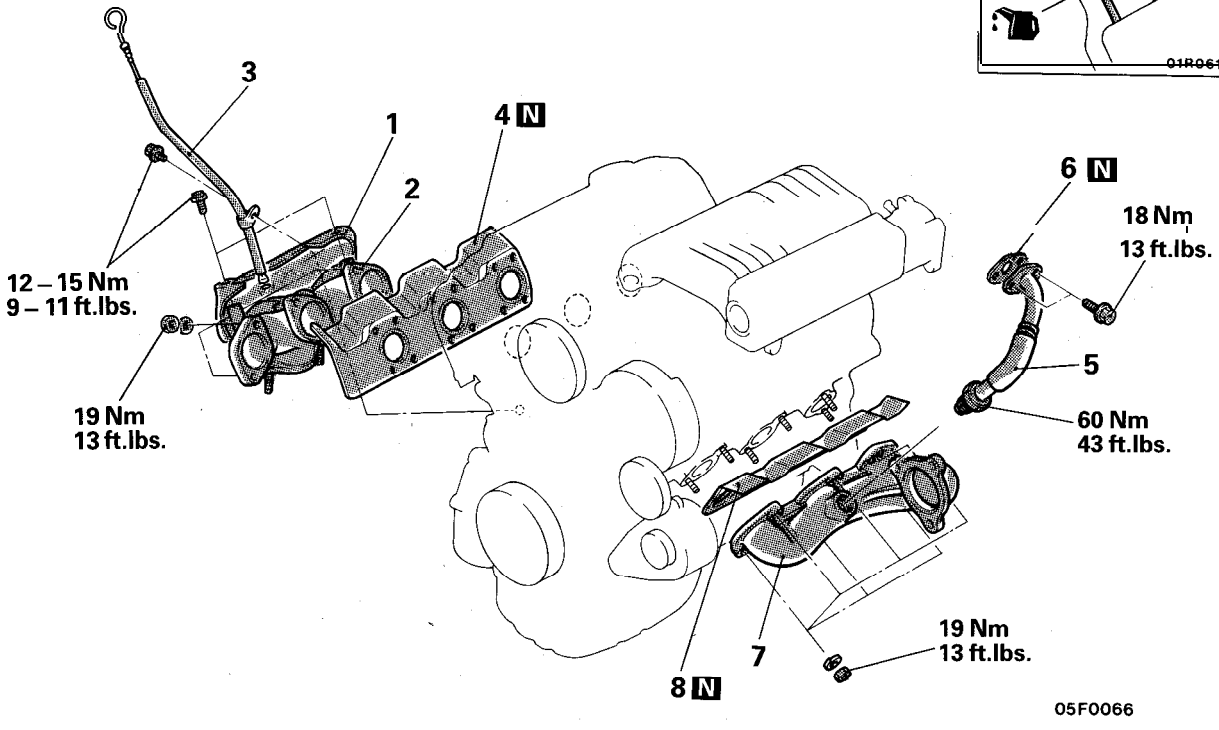


Removal steps of exhaust manifold (front)
1. Heat protector
2. Exhaust manifold (front)
3. Oil level gauge guide
4. Gasket

Removal steps of exhaust manifold (rear)
5. EGR pipe
6. EGR gasket
7. Exhaust manifold (rear)
8. Gasket

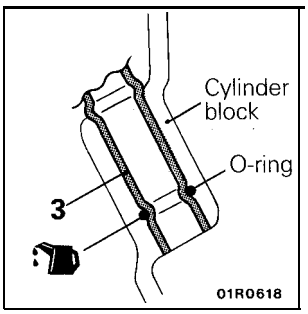
INSPECTION

Check the following points; replace the part if a problem is found.
- Check for damage of cracking of any part.

EXHAUST MANIFOLD <DOHC (Non Turbo)>

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Removal and Installation of Front Exhaust Pipe (Refer to P.11-37.)
- Removal and Installation of Condenser Fan Motor Assembly <Vehicles with Air Conditioning> (Refer to GROUP 7 – Radiator.)



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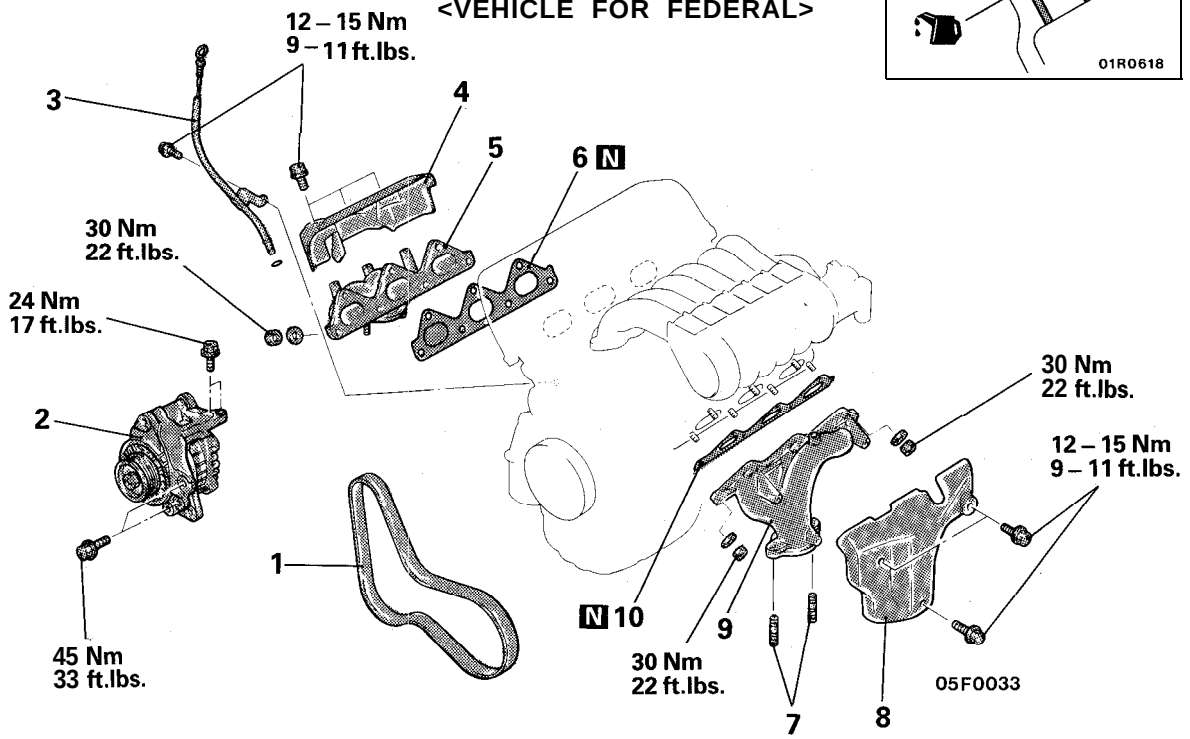


Removal steps of exhaust manifold (front)
1. Drive belt (Generator) (Refer to GROUP 9 – Service Adjustment procedures)
2. Generator assembly
3. Oil level gauge guide
4. Heat protector
5. Exhaust manifold (front)
6. Gasket

Removal steps of exhaust manifold (rear)
7. Stud
8. Heat protector
9. Exhaust manifold (rear)
10. Gasket

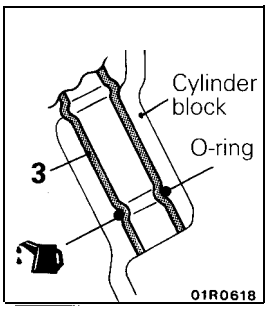
05F0033

INSPECTION

Check the following points; replace the part if a problem is found.
- Check for damage of cracking of any part.

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Removal and Installation of Catalitic Converter (Front or Rear) (Refer to P.11-38)
- Removal and Installation of Condenser Fan Motor Assembly <Vehicles with Air Conditioning> (Refer to GROUP 7 – Radiator.)



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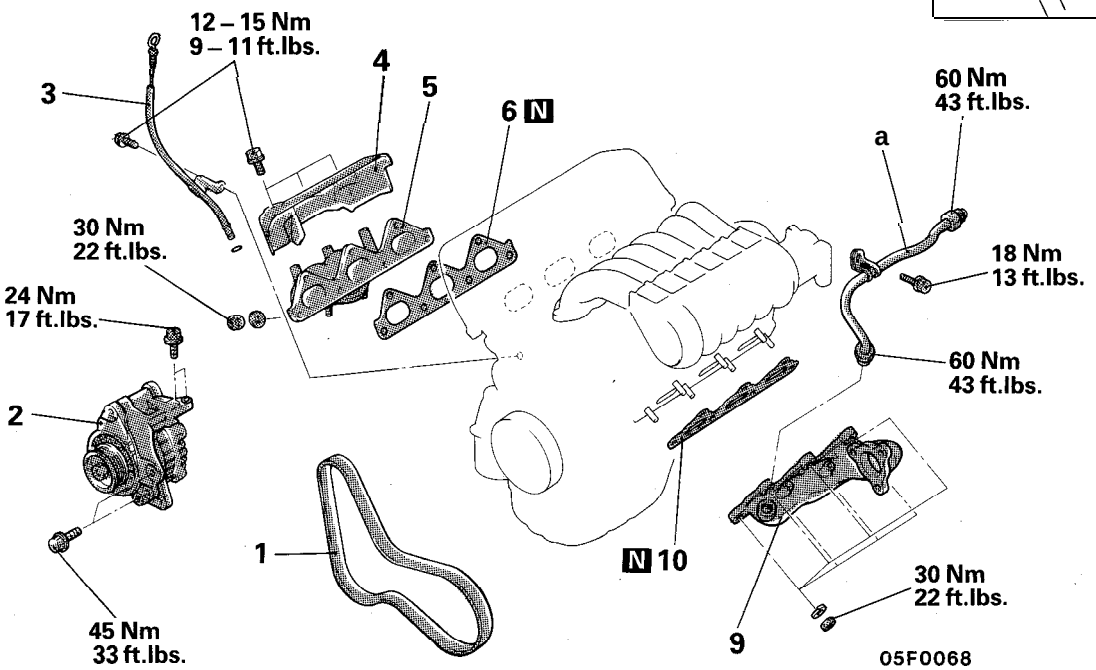


Removal steps of exhaust manifold (front)
1. Drive belt (Generator) (Refer to GROUP 9 – Service Adjustment procedures)
2. Generator assembly
3. Oil level gauge guide
4. Heat protector
5. Exhaust manifold (front)
6. Gasket

Removal steps of exhaust manifold (rear)
8. EGR pipe
9. Exhaust manifold (rear)
10. Gasket

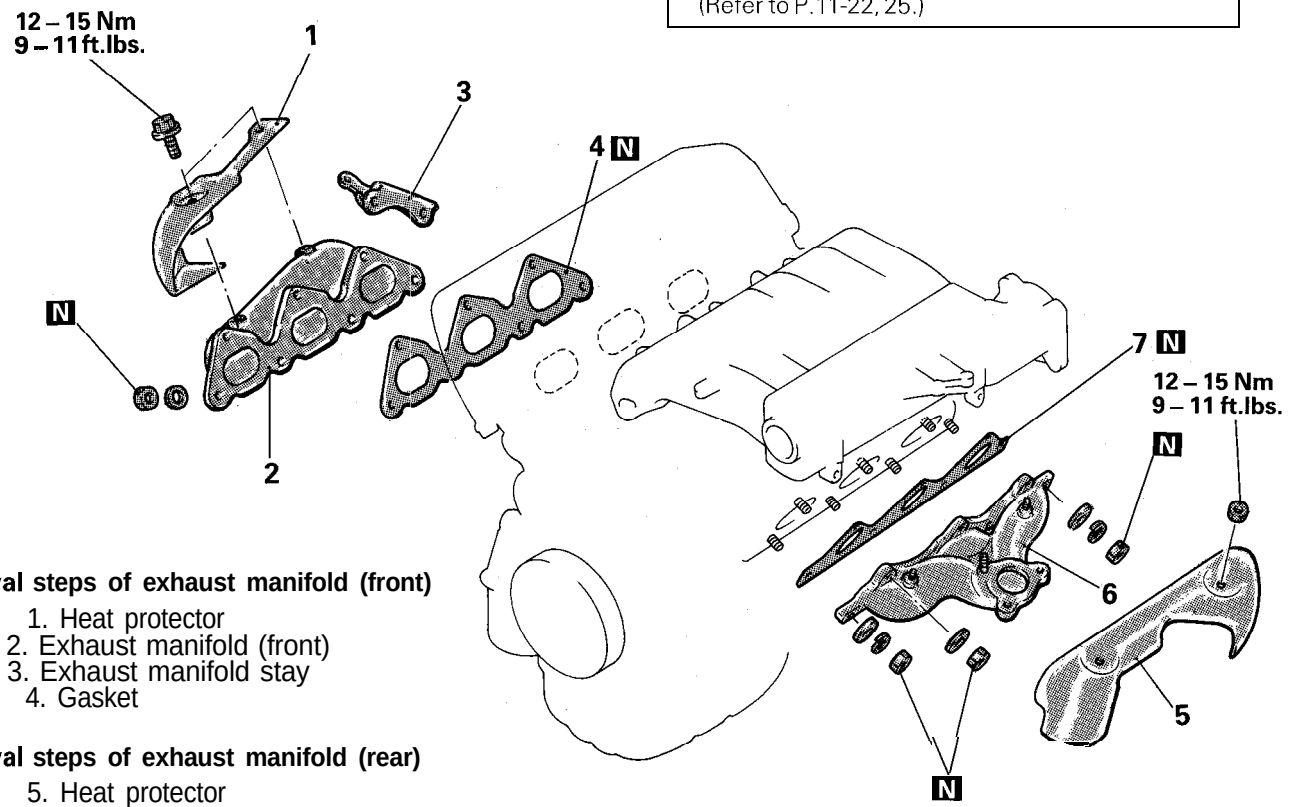
INSPECTION.

Check the following points; replace the part if a problem is found.
- Check for damage of cracking of any part.

EXHAUST MANIFOLD <DOHC (Turbo)>

REMOVAL AND INSTALLATION

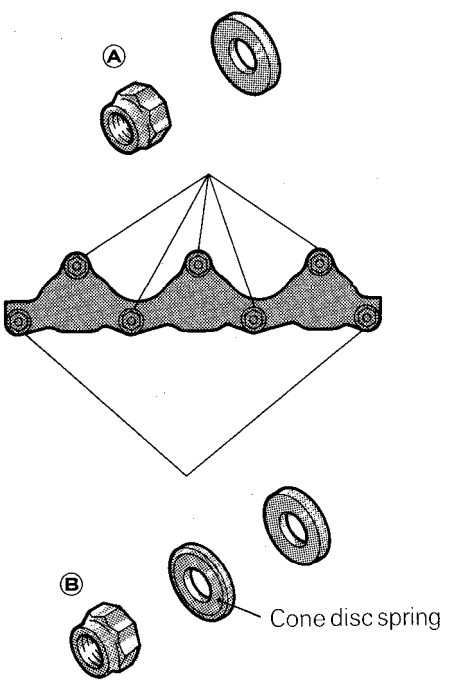
Pre-removal and Post-installation Operation
- Removal and Installation of Turbocharger Assembly (Refer to P.11-22, 25.)



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



7IN011

INSPECTION

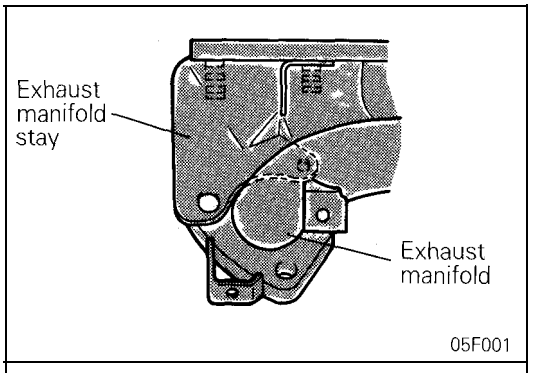
Check the following points; replace the part if a problem is found.
- Check for damage of cracking of any part.

SERVICE POINTS OF INSTALLATION

6. INSTALLATION OF EXHAUST MANIFOLD (REAR)

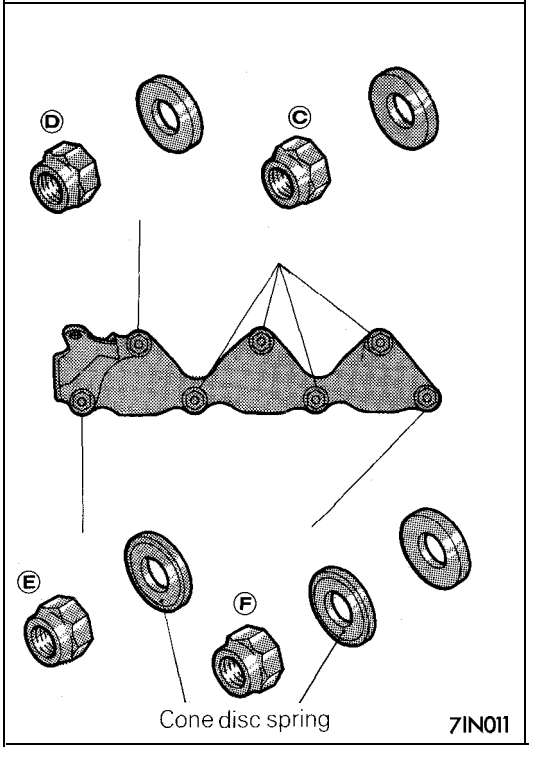
Tighten the nuts in the following order.
(1) Tighten five nuts Ⓐ to 30 Nm (22 ft.lbs.)
(2) Tighten nuts Ⓑ to 47 – 53 Nm (34 – 38 ft.lbs.).
(3) Back off nuts Ⓑ until torque value of 10 Nm (7 ft.lbs.) is achieved.
(4) Tighten nuts Ⓑ to 29 – 31 Nm (21 – 22 ft.lbs.)

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.



3. INSTALLATION OF EXHAUST MANIFOLD STAY

With the exhaust manifoid 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.

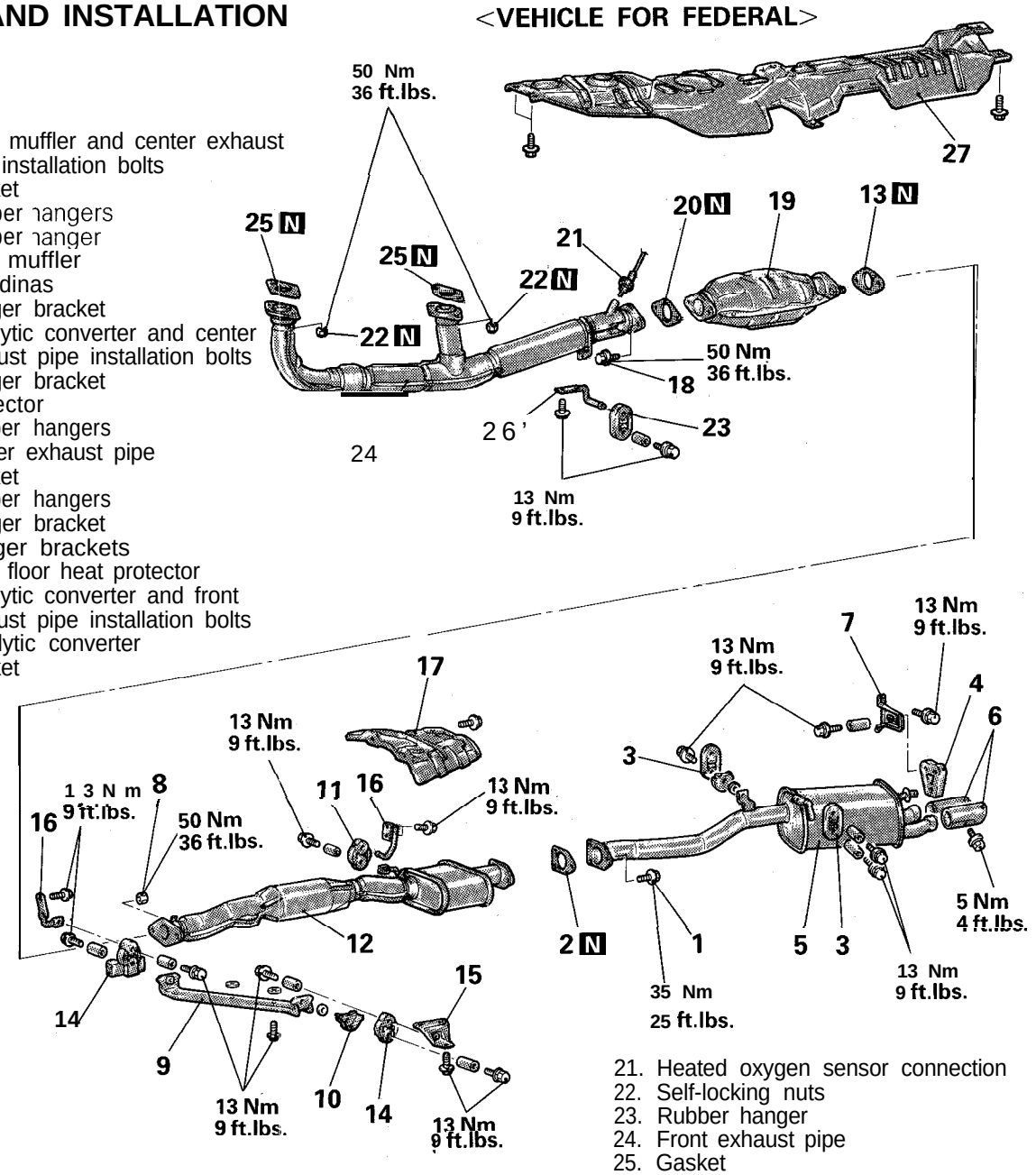
(1) Tighten four nuts Ⓒ to 30 Nm (22 ft.lbs.).
(2) Temporarily tighten the turbocharger to the exhaust manifold.
(3) Tighten nut Ⓓ to 30 Nm (22 ft.lbs.).
(4) Tighten nuts Ⓔ and Ⓕ to 47 – 53 Nm (34 – 38 ft.lbs.).
(5) Back off nuts Ⓔ and Ⓕ until torque value of 10 Nm (7 ft.lbs.) is achieved.
(6) Tighten nuts Ⓔ and Ⓕ 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.

EXHAUST PIPE, MAIN MUFFLER AND CATALYTIC CONVERTER <Non Turbo>

REMOVAL AND INSTALLATION

<VEHICLE FOR FEDERAL>



Removal steps

1. Main muffler and center exhaust pipe installation bolts
2. Gasket
3. Rubber hangers
4. Rubber hanger
5. Main muffler
6. Mouldinas
7. Hanger bracket
8. Catalytic converter and center exhaust pipe installation bolts
9. Hanger bracket
10. Protector
11. Rubber hangers
12. Center exhaust pipe
13. Gasket
14. Rubber hangers
15. Hanger bracket
16. Hanger brackets
17. Rear floor heat protector
18. Catalytic converter and front exhaust pipe installation bolts
19. Catalytic converter
20. Gasket
21. Heated oxygen sensor connection
22. Self-locking nuts
23. Rubber hanger
24. Front exhaust pipe
25. Gasket
26. Hanger bracket
27. Front floor heat protector

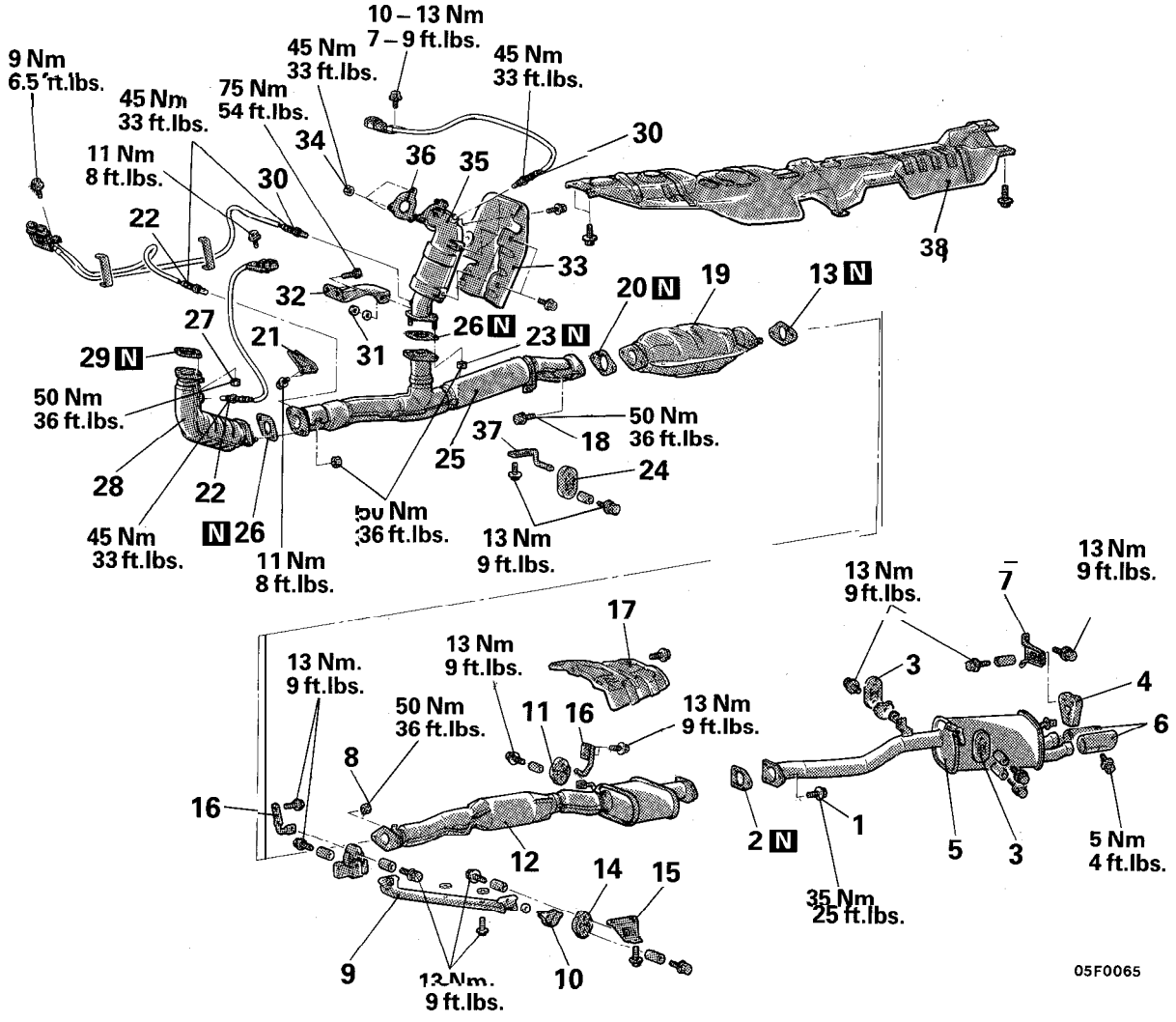
05F0038

INSPECTION

- Check the mufflers and pipes for corrosion or damage.
- Check the rubber hangers for deterioration or damage.
- Check for gas leakage from mufflers and pipes.

REMOVAL AND INSTALLATION

<VEHICLE FOR CALIFORNIA>



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 protector
22. Heated oxygen sensor connection
23. Self-locking nuts
24. Rubber hanger
25. Front exhaust pipe
26. Gasket
27. Self- locking nuts
28. Catalytic converter (front)
29. Gasket
30. Heated oxygen sensor connection
31. Catalitic converter (rear) and exhaust fitting stay installation nut
32. Exhaust fitting stay
33. Heat protector A
34. Exhaust manifold (rear) and catalytic converter (rear) installation nut
35. Catalytic converter (rear)
36. Gasket
37. Hanger bracket
38. Front floor heat protector

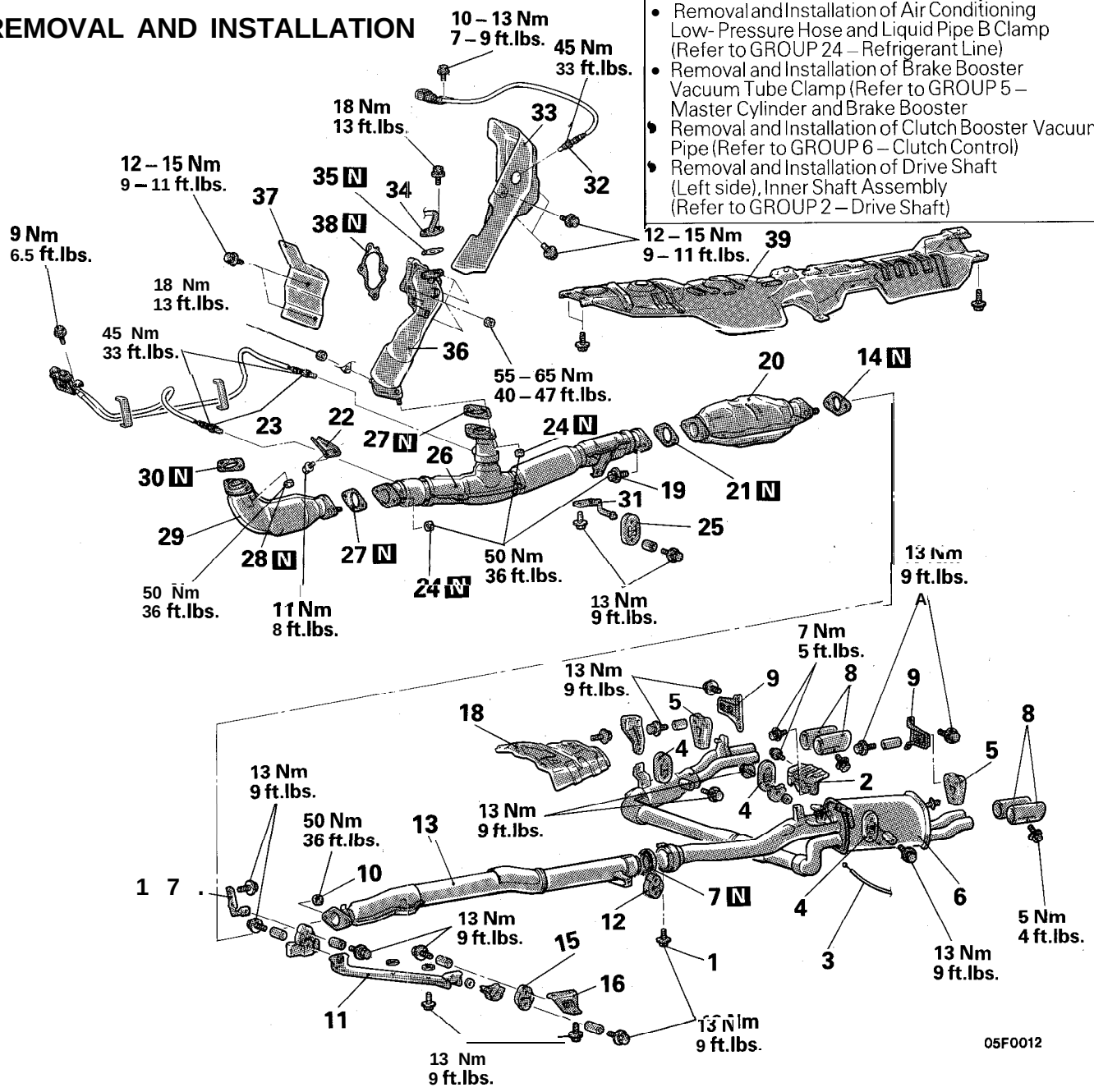
INSPECTION

- Check the mufflers and pipes for corrosion or damage.
- Check the rubber hangers for deterioration or damage.
- Check for gas leakage from mufflers and pipes.

EXHAUST PIPE, MAIN MUFFLER AND CATALYTIC CONVERTER <Turbo>

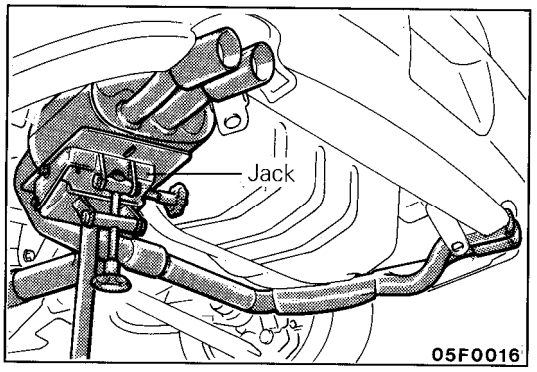
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Removal and Installation of Air Conditioning Low- Pressure Hose and Liquid Pipe B Clamp (Refer to GROUP 24 – Refrigerant Line)
- Removal and Installation of Brake Booster Vacuum Tube Clamp (Refer to GROUP 5 – Master Cylinder and Brake Booster
- Removal and Installation of Clutch Booster Vacuum Pipe (Refer to GROUP 6 – Clutch Control)
- Removal and Installation of Drive Shaft (Left side), Inner Shaft Assembly (Refer to GROUP 2 – Drive Shaft)



Removal steps

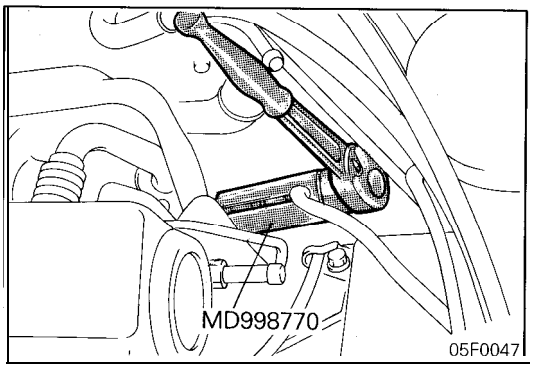
1. Main muffler and center exhaust pipe installation bolts
2. Protector
3. Connection of cable assembly
4. Rubber hangers
5. Rubber hangers
6. Main muffler
7. Gasket
8. Mouldings
9. Hanger brackets
10. Catalytic converter and center exhaust pipe installation nuts
11. Hangerbracket
12. Rubber hangers
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. Oxygen sensor protector
23. Heated oxygen sensor connection
24. Self-locking nuts
25. Rubber hanger
26. Front exhaust pipe
27. Gaskets
28. Self-locking nuts
29. Right bank warm up three-way catalytic converter
30. Gasket
31. Hanger bracket
32. Heated oxygen sensor connection
33. Heat protector D
34. EGR pipe connection
35. Gasket
36. Left bank warm up three-way catalytic converter
37. Heat protecttor E
38. Gasket
39. Front floor heat protector



SERVICE POINTS OF REMOVAL

4. 5. REMOVAL OF RUBBER HANGER / 6. MAIN MUFFLER

Support with a transmission jack, etc.

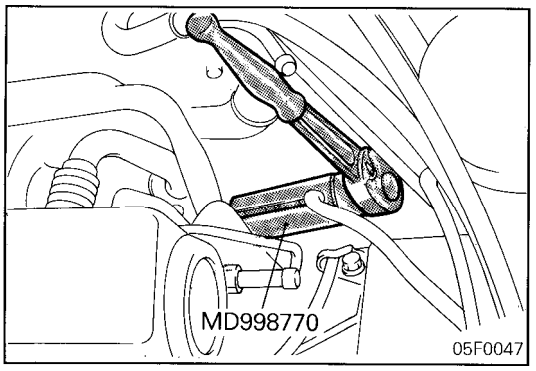


32. REMOVAL OF HEATED OXYGEN SENSOR

Disconnect the connector of the heated oxygen sensor, and install the special tool to the heated oxygen sensor.

INSPECTION

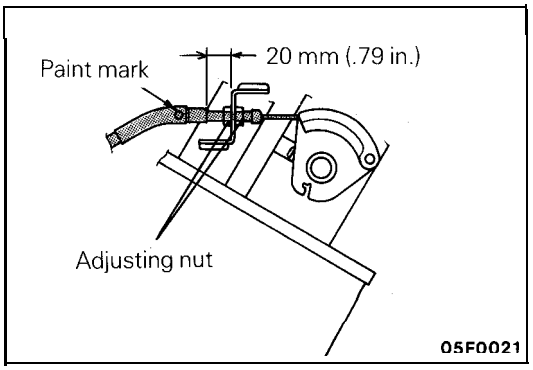
- Check the mufflers and pipes for corrosion or damage.
- Check the rubber hangers for deterioration or damage.
- Check for gas leakage from mufflers and pipes.
- Check if the main muffler active exhaust system valve can be moved smoothly by hand.



SERVICE POINTS OF INSTALLATION

32. INSTALLATION OF HEATED OXYGEN SENSOR

Use the special tool to install the heated oxygen sensor.



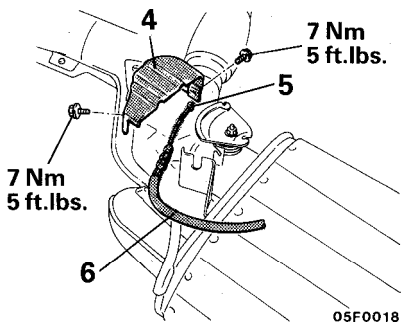
3. INSTALLATION OF CABLE ASSEMBLY

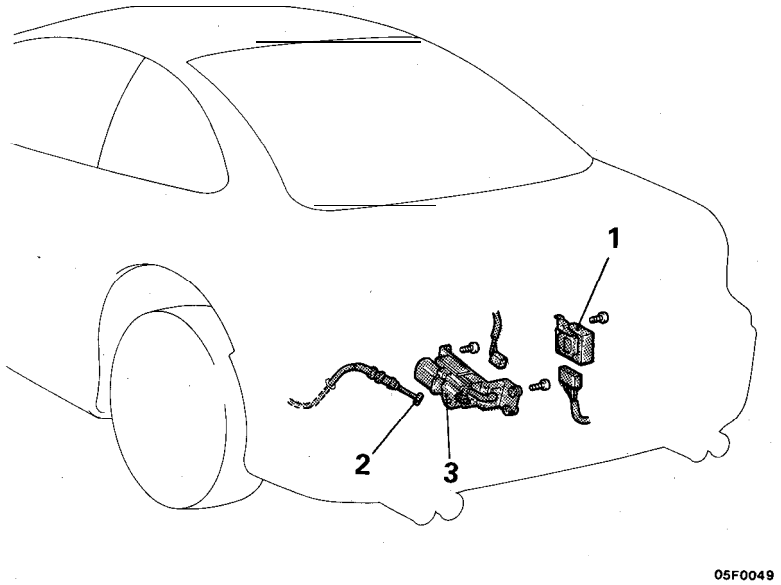
Install with the paint mark facing up and adjust the adjusting nut to obtain the illustrated dimension.

ACTIVE EXHAUST SYSTEM

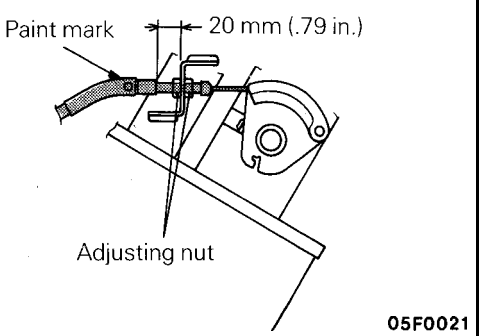
REMOVAL AND INSTALLATION

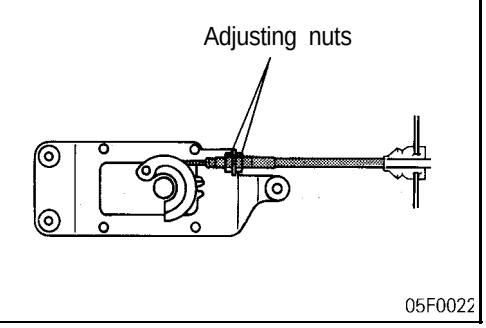
Pre-removal and Post-installation Operation
- Removal and Installation of Rear Side Trim (LH) (Refer to GROUP 23A – TRIMS.)





Removal steps
1. Active exhaust system control module
2. Connection of cable (Actuator side)
3. Actuator
4. Protector
5. * Connection of cable (Muffler side)
6. Cable





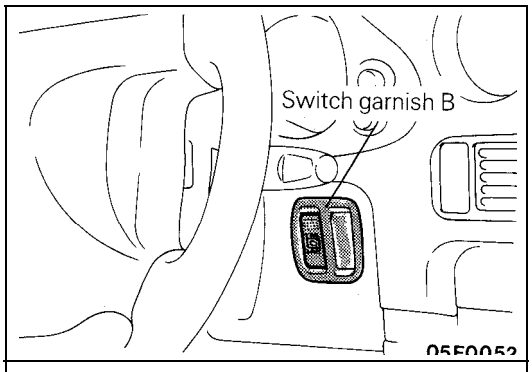
SERVICE POINTS OF INSTALLATION

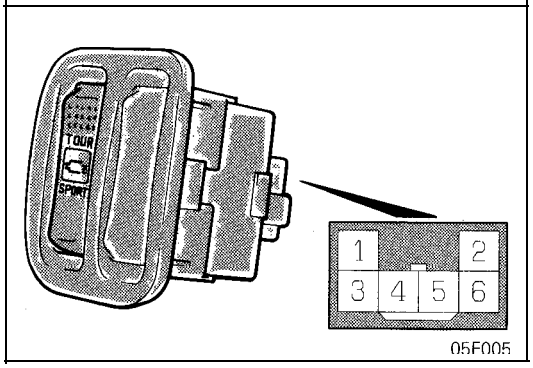
5. INSTALLATION OF CABLE (Muffler Side)

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

ACTIVE EXHAUST SWITCH

(1) Remove switch garnish B from the knee protector.

(2) Operate the switch and check the continuity between the terminals.

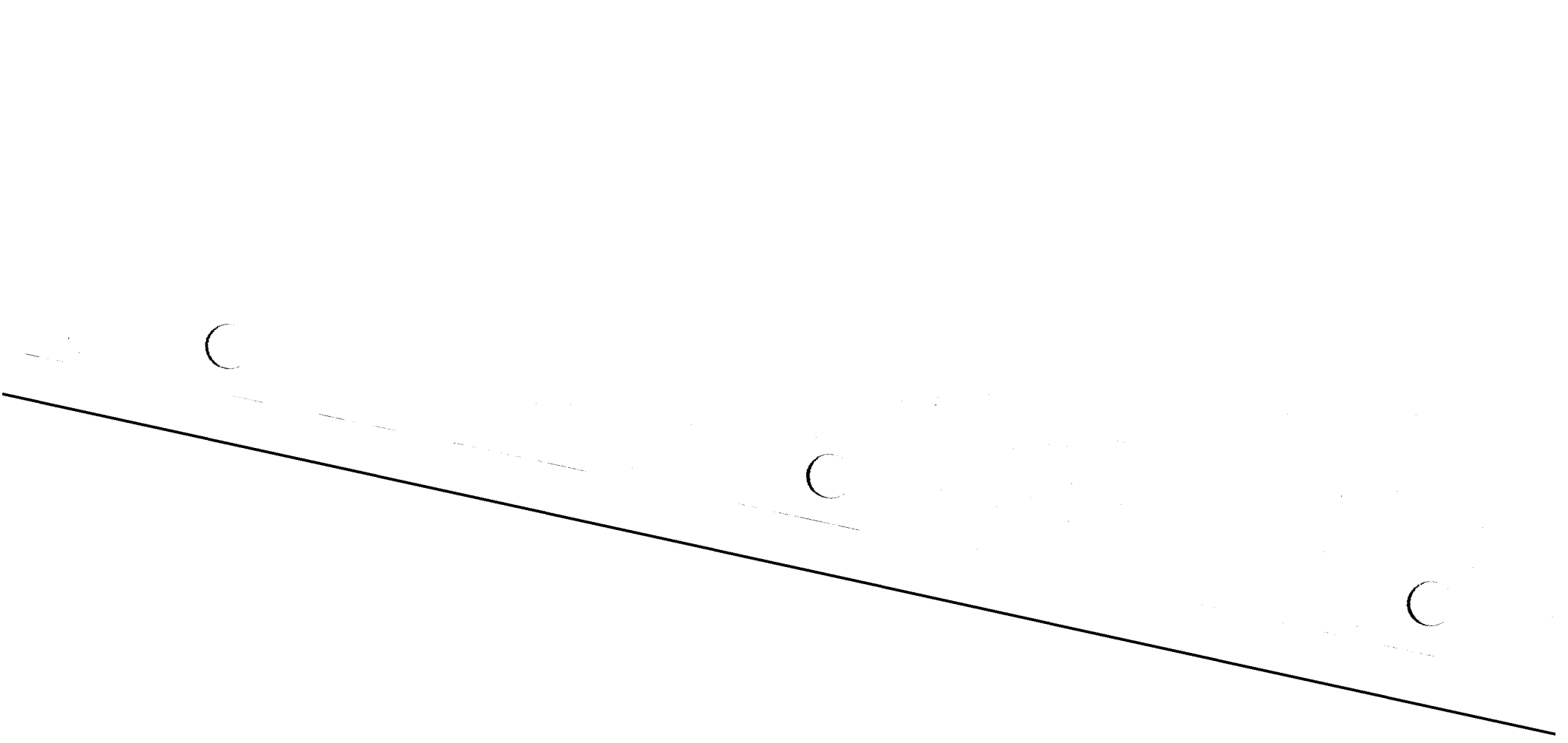
Switch position \ Terminal	2	3	5	6	1	4
TOUR	○	○		○	ILL	
SPORT						

NOTE
○–○ indicates that there is continuity between the terminals.

FUEL

CONTENTS

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



MULTIPORT FUEL INJECTION

CONTENTS

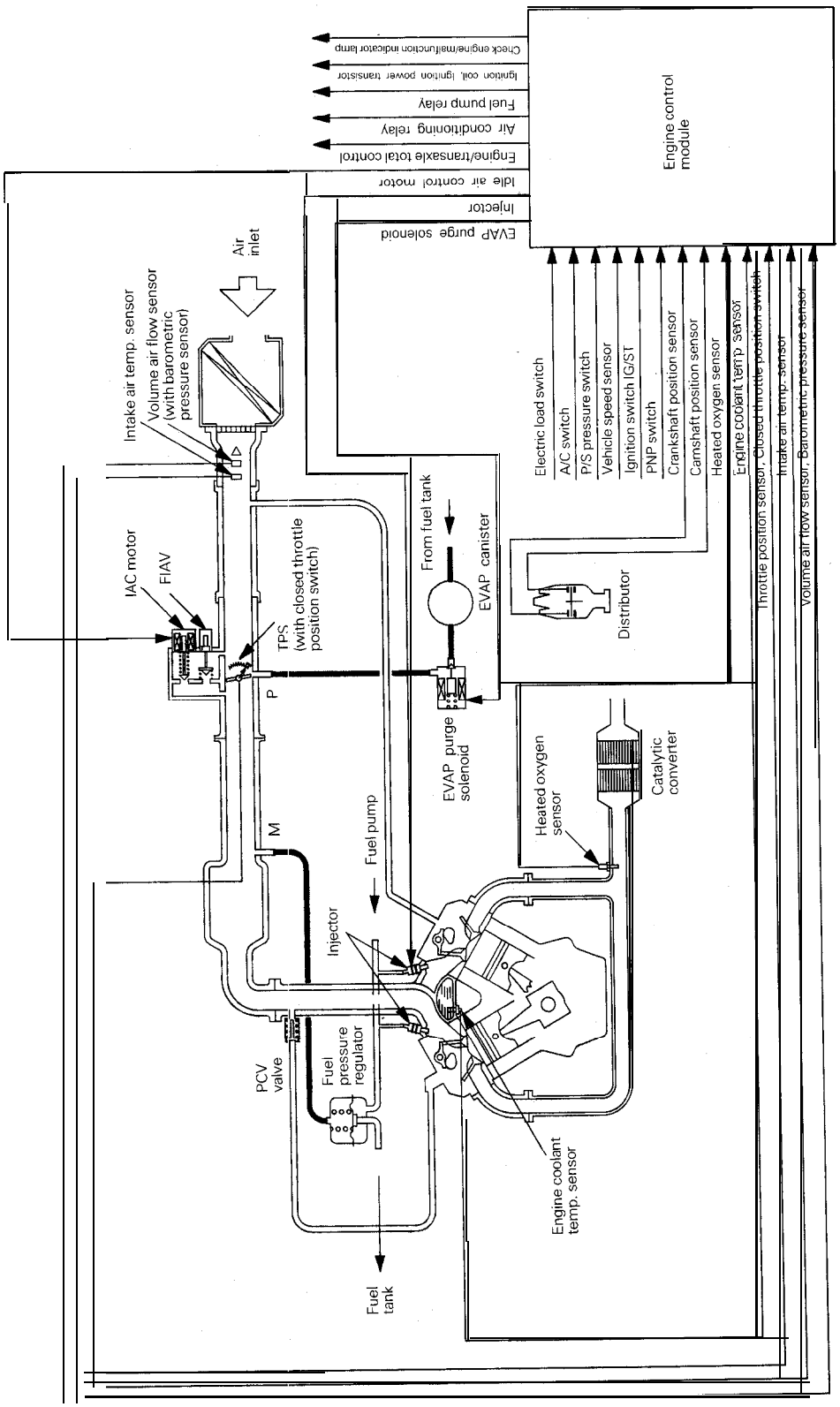
CONTINUED ON NEXT PAGE

GENERAL INFORMATION

MULTIPORT FUEL INJECTION (MFI) SYSTEM DIAGRAM

<Federal SOHC>

7FU1335



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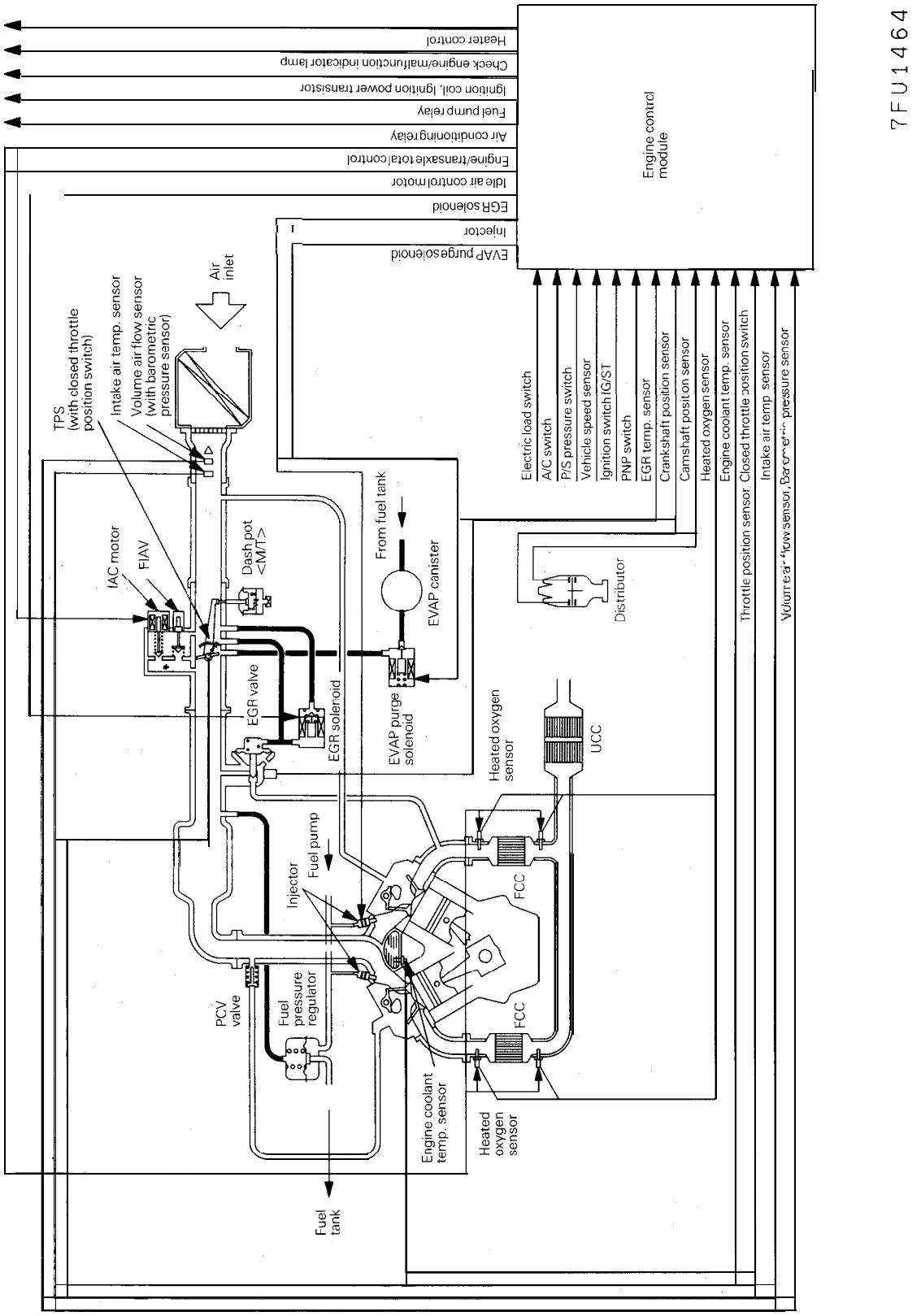

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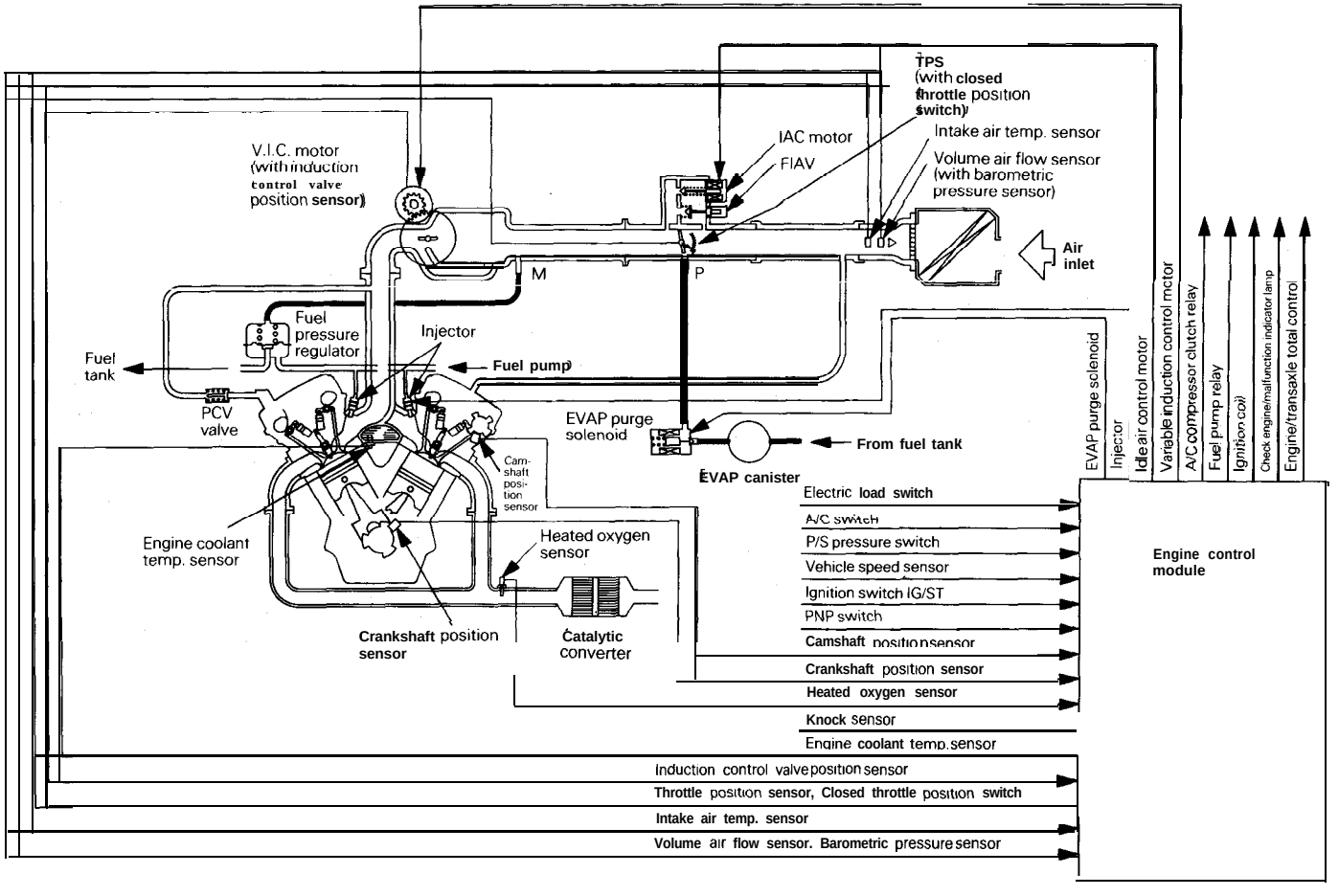

7FU1323

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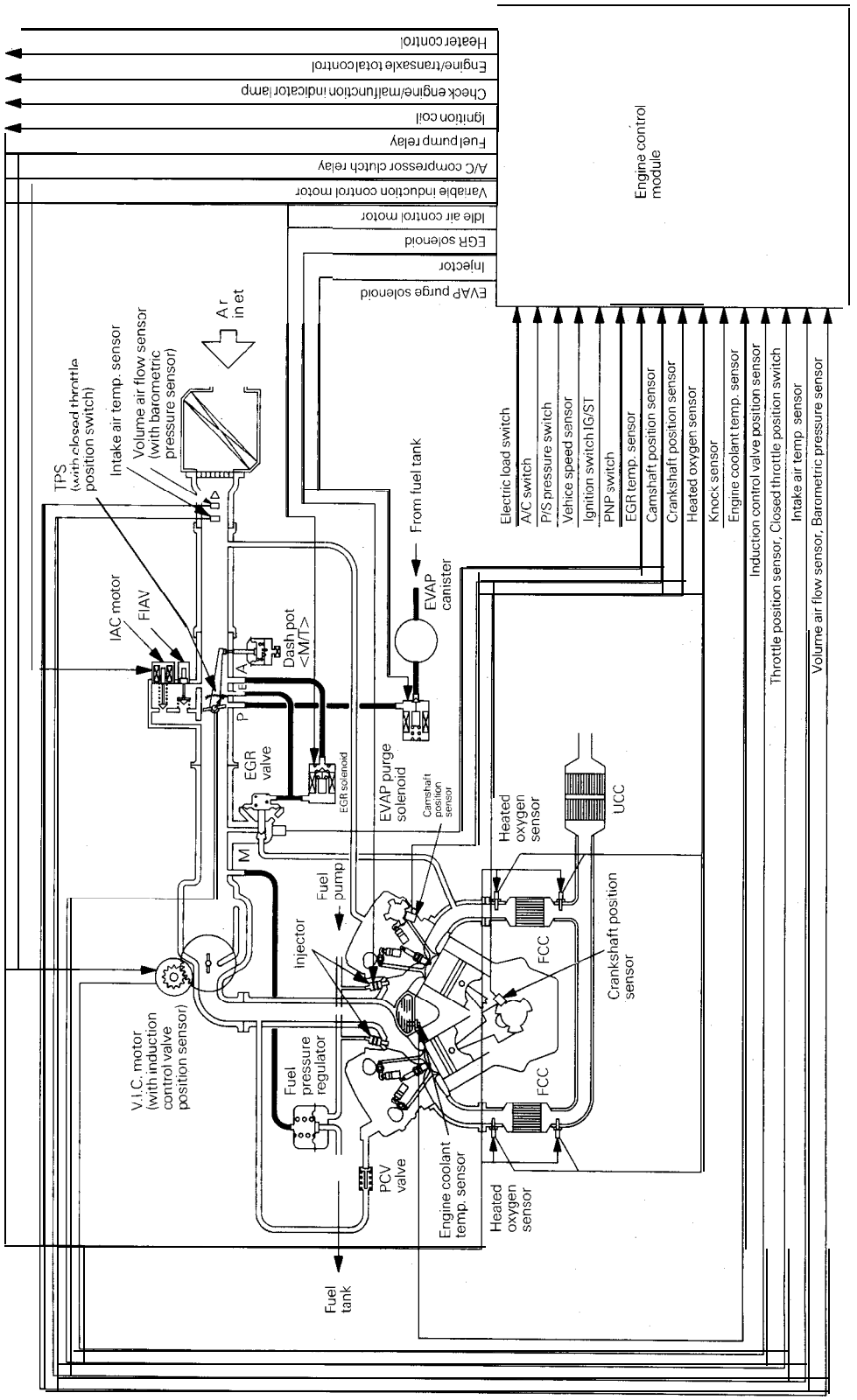

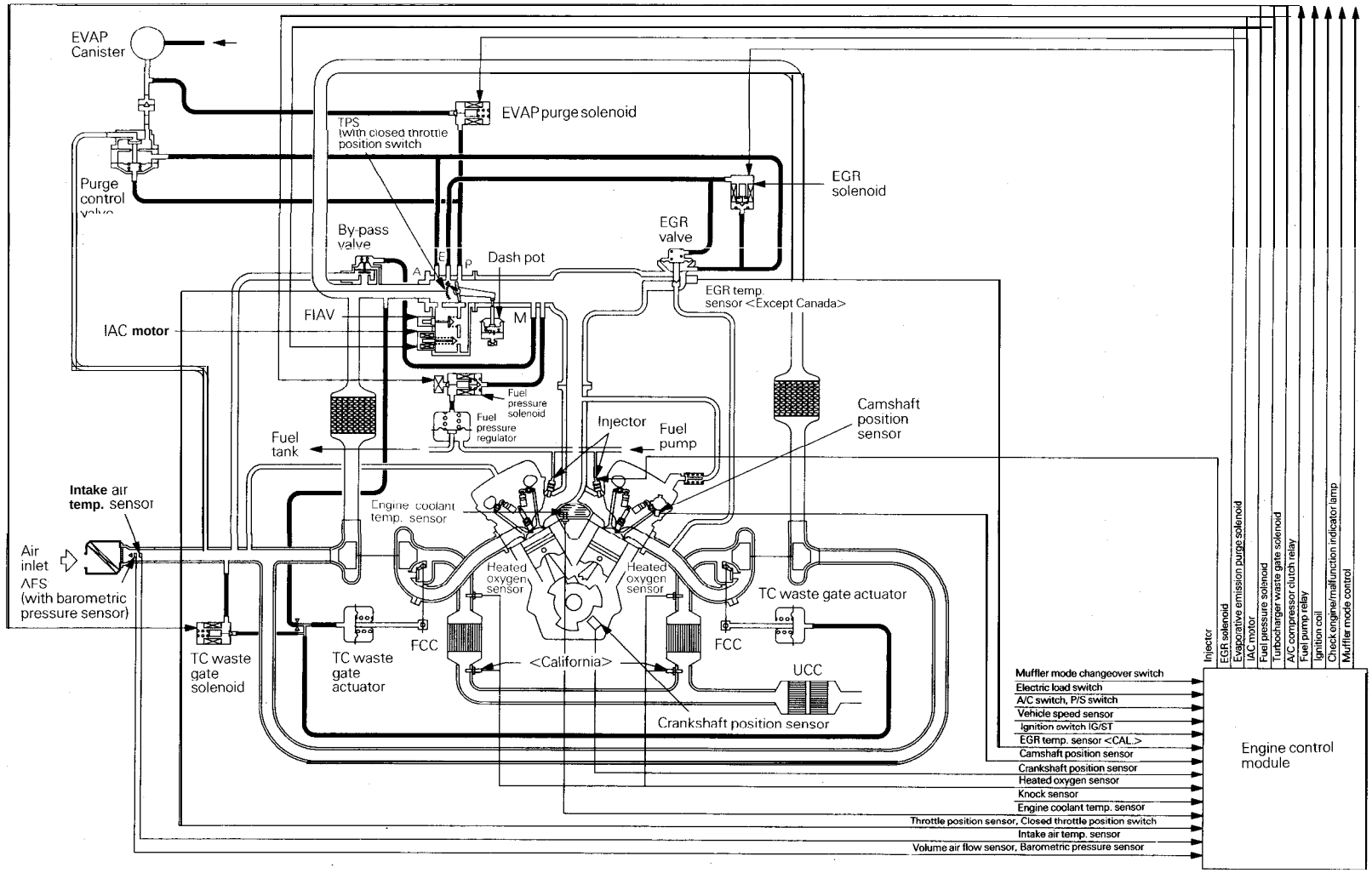
EVAP Canister
EVAP purge solenoid
TPS (with closed throttle position switch)
Purge control valve
EGR solenoid
By-pass valve
EGR valve
Dash pot
EGR temp. sensor <Except Canada>
IAC motor
FIAV
Fuel pressure solenoid
Fuel pressure regulator
Fuel tank
Injector
Fuel pump
Camshaft position sensor
Intake air temp. sensor
Engine coolant temp. sensor
Air inlet
AFS (with barometric pressure sensor)
Heated oxygen sensor
Heated oxygen sensor
TC waste gate actuator
TC waste gate solenoid
TC waste gate actuator
FCC
FCC
<California>
UCC
Crankshaft position sensor
Injector
EGR solenoid
Evaporative emission purge solenoid
IAC motor
Fuel pressure solenoid
Turbocharger waste gate solenoid
A/C compressor clutch relay
Fuel pump relay
Ignition coil
Check engine/malfunction indicator lamp
Muffler mode control
Muffler mode changeover switch
Electric load switch
A/C switch, P/S switch
Vehicle speed sensor
Ignition switch IG/ST
EGR temp. sensor <CAL.>
Camshaft position sensor
Crankshaft position sensor
Heated oxygen sensor
Knock sensor
Engine coolant temp. sensor
Throttle position sensor, Closed throttle position switch
Intake air temp. sensor
Volume air flow sensor, Barometric pressure sensor
Engine control module

7FU1463

SPECIFICATIONS

GENERAL SPECIFICATIONS

terns	Specifications
Throttle body	
Throttle bore mm (in.)	
<SOHC>	54 (2.13)
<DOHC>	60 (2.36)
Throttle position sensor	Variable resistor type
Idle air control motor	Stepper motor type Stepper motor type by-pass air control system with the first idle air valve
Closed throttle position switch	Rotary contact type
Engine control module	
Identification model No.	
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<DOHC – Non Turbo>	E2T35694
<DOHC -Turbo>	E2T61373
California <SOHC>	E2T35692
<DOHC – Non Turbo>	E2T61371
<DOHC-Turbo>	E2T61372
Canada <SOHC>	E2T35693
<DOHC – Non Turbo>	E2T35694
<DOHC-Turbo>	E2T61373
Sensors	
Volume air flow sensor	Karman vortex type
Barometric pressure sensor	Semiconductor type
Intake air temperature sensor	Thermistor type
Engine coolant temperature sensor	Thermistor type
Heated oxygen sensor	Zirconia type
Vehicle speed sensor	
<Non Turbo>	Reed switch type
<Turbo>	Magnetic reluctance element type
Knock sensor <DOHC>	Piezoelectric type
Camshaft position sensor	
<SOHC>	Photo interrupter type
<DOHC>	Hall element type
Crankshaft position sensor	
<SOHC>	Photo interrupter type
<DOHC>	Hall element type
Induction control valve position sensor <DOHC – Non Turbo>	Hall element type
EGR temperature sensor <California, Federal -Turbo>	Thermistor type
Power steering pressure switch	Contact switch type

Items	Specifications
Actuators	
Multiport fuel injection (MFI) relay type	Contact switch type
Injector type and number	Electromagnetic, 6
Injector identification mark <SOHC>	S21 OH
<DOHC – Non Turbo>	SDH210
<DOHC -Turbo>	BDL360
Variable induction control motor <DOHC – Non Turbo>	Direct current motor type
Evaporative emission purge solenoid	ON/OFF type solenoid valve
EGR solenoid <California-SOHC, DOHC – Non Turbo, Turbo>	Duty cycle type solenoid valve
Fuel pressure solenoid <DOHC -Turbo:>	ON/OFF type solenoid valve
Turbocharger waste gate solenoid <DOHC -Turbo>	Duty cycle type solenoid valve
Fuel pressure regulator	
Regulated pressure kPa (psi) <SOHC, DOHC – Non Turbo>	335 (47.6)
<DOHC -Turbo>	300 (43.5)

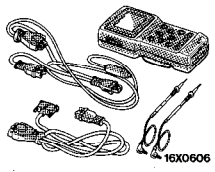
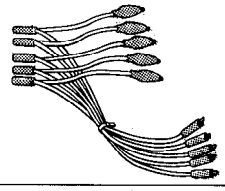
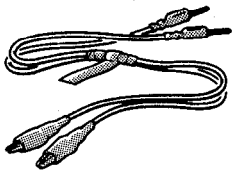
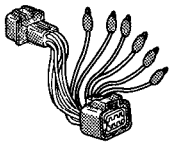
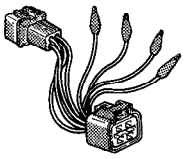
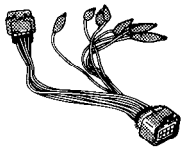
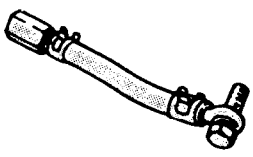
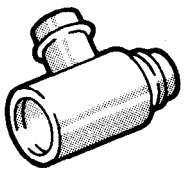
SERVICE SPECIFICATIONS

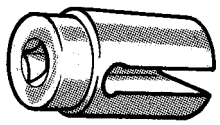
Items	Specifications
Basic ignition timing	5" ±2°BTDC at curb idle
Curb idle speed rpm	700 ±100
Idle speed when air conditioning is on rpm	
<M/T>	900 in neutral
<A/T>	650 in D range
Basic idle speed rpm	700 ± 50
Throttle position sensor adjusting voltage V	0.4 – 1.0
Throttle position sensor resistance kΩ	3.5 – 6.5
Idle air control motor (stepper motor) coil resistance Ω	28 – 33 [at 20°C (68°F)]
Intake air temperature sensor resistance kΩ	2.7 [at 20°C (68°F)]
Engine coolant temperature sensor resistance kΩ	
20°C (68°F)	2.4
80°C (176°F)	0.3
Fuel pressure kPa (psi)	
Vacuum hose disconnection <SOHC, DOHC – Non Turbo>	330 – 350 (47 – 50) at curb idle
<DOHC-Turbo>	295 – 315 (43 – 45) at curb idle
Vacuum hose connection <SOHC, DOHC- Non Turbo>	Approx. 270 (38) at curb idle
<DOHC -Turbo>	Approx. 235 (34) at curb idle
Injector coil resistance Ω <SOHC, DOHC – Non Turbo>	13 – 16 [at 20°C (68°F)]
<DOHC -Turbo>	2 – 3 [at 20°C (68°F)]

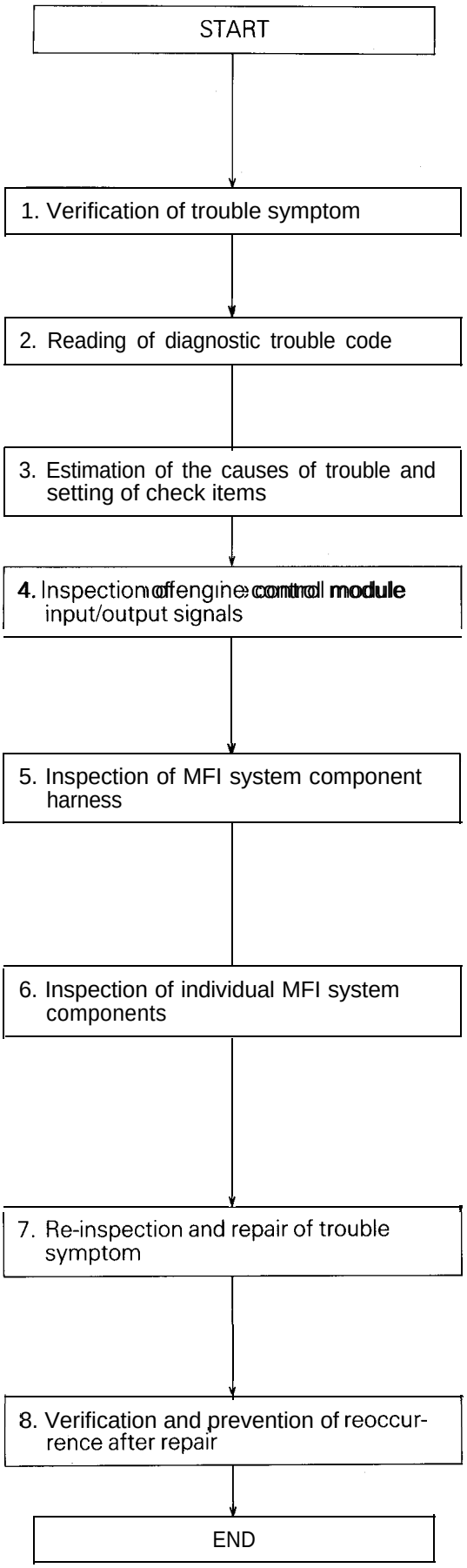
SEALANT

Items	Specified sealant
Engine coolant temperature sensor threaded portion	MOPAR Part No. 4318034 or equivalent

SPECIAL TOOLS

Tool number and tool name	Replaced by Miller tool number	Application
 MB991502 Scan tool (MUT-II)	DRB-II Scan tool	• Reading diagnostic trouble code
 MB991348 Test harness set	DRB-II Scan tool	• Adjustment of closed throttle position switch and throttle position sensor • Inspection by oscilloscope
 MB991529 Diagnostic trouble code check harness	Tool not necessary if scan tool (MUT-II) is available.	• Checking the diagnostic trouble code • Basic idle speed adjustment
 MD998463 Test harness (6 pin, square)	DRB-II Scan tool	• Idle air control motor inspection • Inspection by oscilloscope
 MD998464 Test harness (4 pin, square)	DRB-II Scan tool	• Heated oxygen sensor inspection <California-Non Turbo, Turbo> • Inspection by oscilloscope
 MD998474 Test harness (8 pin, square)	DRB-II Scan tool	• Inspection by oscilloscope
 MD998478 Test harness (3 pin, triangle)	DRB-II Scan tool	• Inspection by oscilloscope
 MD998709 Adapter hose	–	• Measurement of fuel pressure
 MD998742 Hose adapter	–	

Tool number and tool name	Replaced by Miller tool number	Application
 MD998773 Knock sensor wrench	–	• Removal/Installation of knock sensor

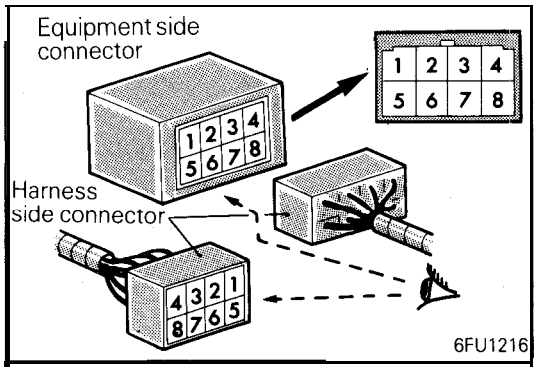


TROUBLESHOOTING

EXPLANATION OF TROUBLESHOOTING PROCEDURES

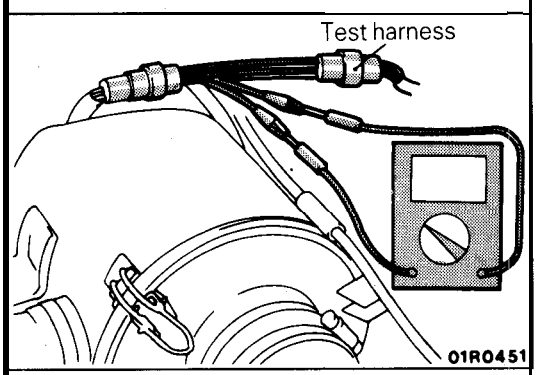
Effective troubleshooting procedures for MFI system problems are given below.

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

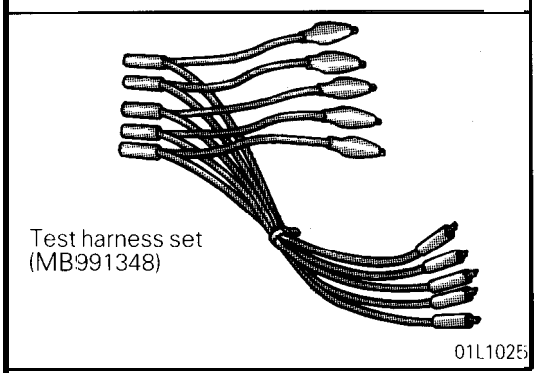


EXPLANATION AND CAUTIONS ABOUT HARNESS CHECK

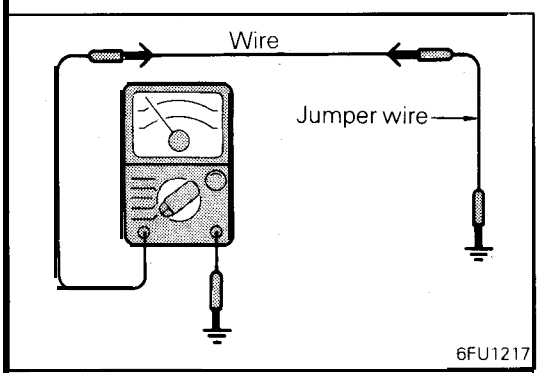
- The connector symbol shown is as viewed from the terminal end of the connector inside the vehicle.
- "SV" used as the standard value in voltage check stands for system voltage.



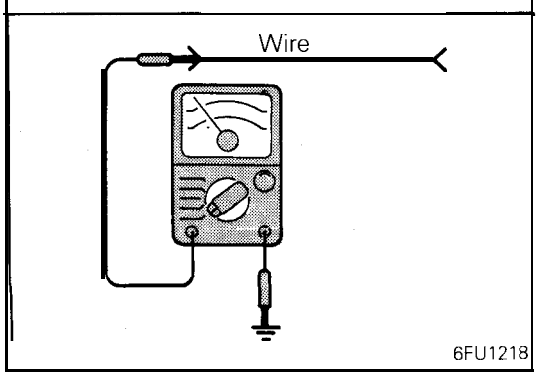
- When checking a waterproof connector for circuit continuity, be sure to use the special tool, Test Harness.
  Never insert the test probe from the harness side as this causes loss of waterproof characteristics and corrosion may result.
  There are various test harnesses and the appropriate one for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



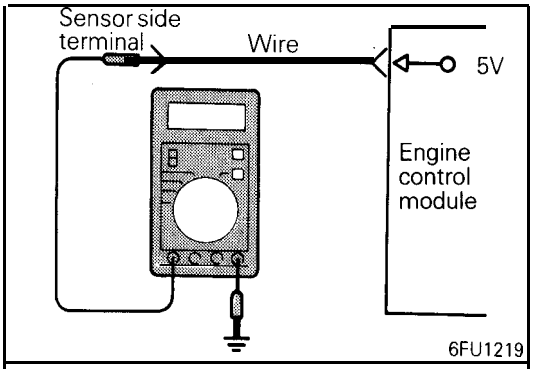
- If the appropriate test harness for the particular connector is not available, the use of the Test Harness Set (MB991348) which can be connected directly between the terminals is recommended.
- When checking the terminal voltage with the connector disconnected, do not insert the test probe if the check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



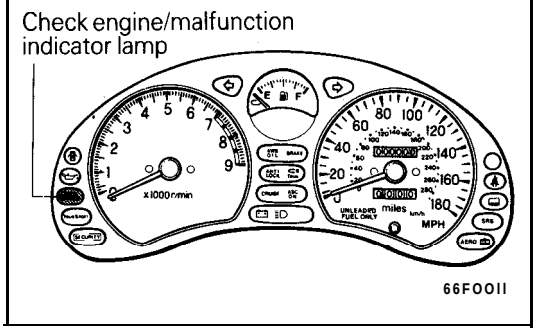
- When checking an open circuit of a wire with its ends physically separated, ground one end using a jumper wire and check the continuity between the other end and ground. Repair the wire if there is no continuity.



- 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 module and check again.
- To check the voltage, use a digital voltmeter (or circuit tester) as a rule.
  [However, use an analog voltmeter for checking the power transistor drive voltage.]



CHECK ENGINE/MALFUNCTION INDICATOR LAMP

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

ITEMS INDICATED BY THE CHECK ENGINE/ MALFUNCTION INDICATOR LAMP

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

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

CHECK ENGINE MALFUNCTION INDICATOR LAMP INSPECTION

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

ON-BOARD DIAGNOSTIC

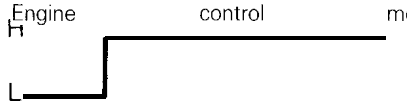
The engine control module monitors the input/output signals (some signals at all times and the others under specified conditions) of the engine control module.
When it is noticed that an irregularity has continued for a specified time or longer from when the irregular signal is initially monitored, passing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

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

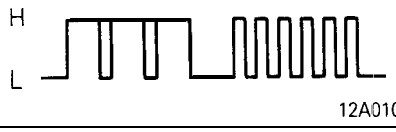
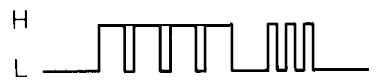
The 23 diagnostic items are provided as follows, and if plural items are activated, they are all indicated sequentially from the smallest code number.

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

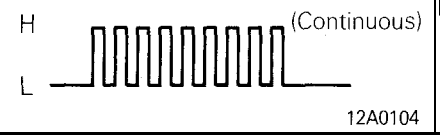
DIAGNOSTIC CHART (FAULT TREE)

Diagnostic trouble code		Diagnostic item	Check item (Remedy)	Memory
No.	Output signal pattern			
–	Engine control module  12A0104	ground	• Fuse • Harness and connector • Ground (Replace ECM if power + available)	
11	 12A0104	Heated oxygen sensor <Except California model> Left bank heated oxygen sensor (front) <California>	●Harness and connector ●Heated oxygen sensor ●Fuel pressure ● Injectors (Replace if defective.) ●Intake air leaks	Retained
12	 12A0104	Volume air flow sensor	●Harness and connector (If harness and connector are normal, replace volume air flow sensor assembly.)	Retained
13	 12A0104	Intake air temperature sensor	●Harness and connector ●Intake air temperature sensor	Retained
14	 12A0104	Throttle position sensor	● Harness and connector ● Throttle position sensor ●Closed throttle position switch	Retained
21	 12A0107	Engine coolant temperature sensor	●Harness and connector ●Engine coolant temperature sensor	Retained
22	 12A0107	Crankshaft position sensor	●Harness and connector (If harness and connector are normal, replace crankshaft position sensor assembly.)	Retained
23	 12A0107	Camshaft position sensor	●Harness and connector (If harness and connector are normal, replace camshaft position sensor.)	Retained
24	 12A0107	Vehicle speed sensor	●Harness and connector ● Vehicle speed sensor	Retained
25	 12A0107	Barometric pressure sensor	●Harness and connector (If harness and connector are normal, replace barometric pressure sensor assembly.)	nRetained 12A010
31	 12A0468	Knock sensor <DOHC>	● Harness and connector (If harness and connector are normal, replace knock sensor.)	Retained

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

Diagnostic trouble code		Diagnostic item	Check item (Remedy)	Memory
No.	Output signal pattern			
36	 12A0105	Ignition timing adjustment signal <DOHC>	•Harness and connector	–
39	 12A0105	Heated oxygen sensor <Turbo other than California model> Right bank heated oxygen sensor (front) <California>	• Harness and connector •Heated oxygen sensor •Fuel pressure •Injectors (Replace if defective) •Intake air leaks	Retained
41	 12A0105	Injector	•Harness and connector •Injector coil resistance	Retained
43	 12A0105	EGR <California – Non Turbo, Turbo>	•Harness and connector • EGR thermo-sensor • EGR valve • EGR solenoid • EGR valve control vacuum	Retained
44	 12A0105	Ignition coil, Ignition power transistor unit (No. 1–4 cylinder) <DOHC>	•Harness and connector •Ignition coil •Ignition power transistor unit	Retained
52	 12A0105	Ignition coil, Ignition power transistor unit (No. 2–5 cylinder) <DOHC>	•Harness and connector • Ignition coil •Ignition power transistor unit	Retained
53	 12A0105	Ignition coil, Ignition power transistor unit (No. 3–6 cylinder) <DOHC>	•Harness and connector •Ignition coil •Ignition power transistor unit	Retained
59	 12A0105	Left bank heated oxygen sensor (Rear) <California>	•Harness and connector •Heated oxygen sensor •Fuel pressure • Injectors (Replace if defective) •Intake air leaks	Retained
61	 12A0105	A cable from trans-axle control module, for transmission of torque reduction signal <A/T>	•Harness and connector (If harness and connector are normal, replace only transaxle control module.)	Retained
62	 12A0105	Induction control valve position sensor <Non Turbo> <DOHC>	•Harness and connector (If harness, connector and induction control valve are normal, replace air intake plenum assembly.)	Retained

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

Diagnostic trouble code		Diagnostic item	Check item (Remedy)	Memory
No.	Output signal pattern			
69		Right bank heated oxygen sensor (Rear) <California>	●Harness and connector ●Heated oxygen sensor ●Fuel pressure ● Injectors (Replace if defective) ●Intake air leaks	Retained
–		Normal state	–	–

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

TROUBLE DIAGNOSIS QUICK REFERENCE CHART

Diagnostic trouble code No.	Diagnostic item	Description	Major cause	Remarks (Symptoms, etc.)
–	Engine control module	Trouble in engine control module itself		• Engine stalls. • Engine cannot be started.
11	Heated oxygen sensor <Except California model> Left bank heated oxygen sensor (front) <California>	Despite air-fuel ratio feedback control (closed loop control), oxygen sensor signal voltage does not change (get lean/rich) for 30 seconds.	(1) Defective heated oxygen sensor (2) Open or short circuit in heated oxygen sensor circuit, or connector in loose contact	• Poor exhaust emission purifying performance
			(3) Improper fuel pressure (4) Defective injector (5) Air drawn in through gasket clearance, etc. (6) Defective engine control module	• Poor exhaust emission purifying performance • Poor startability • Unstable idling • Poor acceleration
12	Volume air flow sensor	Engine is running, but air flow sensor signal frequency is below 1 0Hz for 4 seconds.	(1) Defective volume air flow sensor (2) Open or short circuit in volume air flow sensor circuit, or connector in loose contact (3) Defective engine control module	• Poor acceleration* • Improper idling speed* • Unstable idling*
13	Intake air temperature sensor	(1) Intake air temperature sensor signal voltage is above 4.5V for 4 seconds. (2) Intake air temperature sensor signal voltage is below 0.27V for 4 seconds	(1) Defective intake air temperature sensor (2) Open or short circuit in intake air temperature sensor circuit, or connector in loose contact (3) Defective engine control module	@ Somewhat poor driveability" • At high temperature: (a) Poor startability" (b) Unstable idling*
14	Throttle position sensor	(1) Throttle position sensor signal voltage is below 0.2V for 4 seconds. (2) Idle switch is ON, but throttle position sensor signal voltage is above 2V.	(1) Throttle position sensor out of order or maladjusted (2) Open or short circuit in throttle position sensor circuit, or connector in poor contact	• Somewhat poor acceleration <M/T> • Poor driveability <A/T> • Engine stalls.
			(3) Closed throttle position switch ON failure (4) Short circuit in closed throttle position signal line (5) Defective engine control module	• Engine stalls. • Engine cannot be raced.
21	Engine coolant temperature sensor	(1) Engine coolant temperature sensor signal voltage is above 4.6V for 4 seconds. (2) Engine coolant temperature sensor signal voltage is below 0.1 1 V for 4 seconds. (3) During engine warm-up, engine coolant temperature sensor signal shows decrease in engine coolant temperature.	(1) Defective engine coolant temperature sensor (2) Open or short circuit in engine coolant temperature sensor circuit, or connector in poor contact (3) Defective engine control module	With engine cold • Poor startability* • Unstable idling* • Poor acceleration*

NOTE

*: **Failsafe/backup function is in operation**

Diagnostic trouble code No.	Diagnostic item	Description	Major cause	Remarks (Symptoms, etc.)
22	Crankshaft position sensor	(1) Cranking the engine for more than four seconds does not cause the crankshaft position sensor signal voltage to change (go high or low). (2) Abnormal crankshaft position sensor signal <DOHC>	(1) Defective crank angle sensor (2) Open or short circuit in crankshaft position sensor circuit, or connector in loose contact (3) Defective camshaft position sensor, or connector in loose contact (4) Defective engine control module	• Engine stalls. @ Engine cannot be started.
23	Camshaft position sensor	(1) Engine is running, but TDC sensor signal voltage does not change (get high/low) for 4 seconds. (2) TDC sensor signal pattern is abnormal. <DOHC>	(1) Defective camshaft position sensor (2) Open or short circuit in camshaft position sensor circuit, or connector in loose contact (3) Defective crankshaft position sensor, or connector in loose contact (4) Defective engine control module	• Engine stalls.*
24	Vehicle speed sensor	With the engine in accelerated operation at an engine speed of over 3,000 rpm, the vehicle speed sensor signal voltage does not change (go high or low).	(1) Defective vehicle speed sensor (2) Open or short circuit in vehicle speed sensor circuit, or connector in loose contact (3) Defective engine control module	When the vehicle is stopped with the engine in decelerated operation, the engine might stall.
25	Barometric pressure sensor	(1) Barometric pressure sensor signal voltage is above 4.5V for 4 seconds. (2) Barometric pressure sensor signal voltage is below 0.2V for 4 seconds.	(1) Defective barometric pressure sensor (2) Open or short circuit in barometric pressure sensor circuit, or connector in loose contact (3) Defective engine control module	• Unstable idling* • Poor acceleration* • Poor startability”
31	Knock sensor <DOHC>	Abnormal knock sensor signal voltage	(1) Defective knock sensor (2) Open or short circuit in knock sensor circuit, or connector in loose contact (3) Defective engine control module	• Poor acceleration*
36	Ignition timing adjustment signal <DOHC>	Ignition timing adjustment signal line short-circuited to ground	(1) Ignition timing adjustment signal line short-circuited to ground (2) Defective engine control module	• Poor acceleration • Overheated engine
39	Heated oxygen sensor <Turbo other than California model> Right bank heated oxygen sensor (front) <California>	Air-fuel ratio closed loop control is in effect but heated oxygen sensor signal voltage does not change (air-fuel mixture lean/rich).	(1) Defective heated oxygen sensor (2) Open or short circuit in heated oxygen sensor circuit, or connector in loose contact	• Poor exhaust emission purifying performance*
			(3) Improper fuel pressure (4) Defective injector (5) Air drawn in through gasket clearance, etc. (6) Defective engine control module	• Poor exhaust emission purifying performance* • Poor startability • Unstable idling • Poor acceleration
41	Injector	Injector is not driven for more than four consecutive seconds during engine cranking or idling operation.	(1) Defective injector (2) Open or short circuit in injector circuit, or connector in loose contact (3) Defective engine control module	• Poor idling • Poor acceleration • Poor startability

Diagnostic trouble code No.	Diagnostic item	Description	Major cause	Remarks (Symptoms, etc.)
43	EGR <California -Non Turbo, Turbo>	With the engine running after warmup, EGR amount too small (EGR temperature sensor signal voltage too high)	(1) EGR valve does not open. (2) EGR valve control negative pressure too low (3) Defective EGR control solenoid valve (4) Defective EGR temperature sensor (5) Open or short circuit in EGR temperature sensor circuit, or connector in loose contact (6) Defective engine control module	• Poor exhaust • emission purifying performance*
44	Ignition coil and ignition power transistor unit for 1-4 cylinders <DOHC>	With the engine running, no ignition signal is input (except in cases where no ignition signal is input to all the cylinders)	(1) Defective ignition coil (2) Open or short circuit in primary ignition circuit, or connector in loose contact (3) Defective ignition power transistor unit (4) Defective engine control module	• Unstable idling* • Poor acceleration* • Poor startability”
52	Ignition coil and ignition power transistor unit for 2-5 cylinders <DOHC>	With the engine running, no ignition signal is input (except in cases where no ignition signal is input to all the cylinders)	(1) Defective ignition coil (2) Open or short circuit in primary ignition circuit, or connector in loose contact (3) Defective ignition power transistor unit (4) Defective engine control module	• Unstable idling* • Poor acceleration* • Poor startability”
53	Ignition coil and ignition power transistor unit for 3-6 cylinders <DOHC>	With the engine running, no ignition signal is input (except in cases where no ignition signal is input to all the cylinders)	(1) Defective ignition coil (2) Open or short circuit in primary ignition circuit, or connector in loose contact (3) Defective ignition power transistor unit (4) Defective engine control module	• Unstable idling* • Poor acceleration* • Poor startability”
59	Left bank heated oxygen sensor (Rear) <California>	Engine warm-up has been completed, but oxygen sensor singal voltage does not rise above 0.1 V.	(1) Failure of oxygen sensor (2) A break or short in oxygen sensor circuit or poor contact of connectors (3) Failure of engine control module	• Decrease of exhaust gas purification performance*
61	A cable from transaxle control module, for transmission of torque reduction signal <A/T>	With the engine running, the “reduce torque” request signal voltage from the control module remains low for several seconds.	(1) “Reduce torque” request signal line short-circuited (2) Defective transmission control module (3) Defective engine control module	• Somewhat poor gearshift feeling*
62	Induction control valve position sensor <DOHC – Non Turbo>	Even if the variable induction control servo motor is driven several times, the induction control valve does not reach the target position (opening).	(1) Defective induction control valve position sensor (2) Open or short circuit in induction control valve position sensor circuit or connector in loose contact (3) Defective variable induction control motor (DC motor) (4) Open or short circuit in induction control motor (DC motor) circuit, or connector in loose contact (5) Defective engine control module	• Poor acceleration

Diagnostic trouble code No.	Diagnostic item	Description	Major cause	Remarks (Symptoms, etc.)
69	Right bank heated oxygen sensor (Rear) <California>	Engine warm-up has been completed, but oxygen sensor signal voltage does not rise above 0.1 V.	(1) Failure of oxygen sensor (2) A break or short in oxygen sensor circuit or poor contact of connectors (3) Failure of engine control module	• Decrease of exhaust gas purification performance*

LIST OF FAIL-SAFE/BACK-UP FUNCTIONS

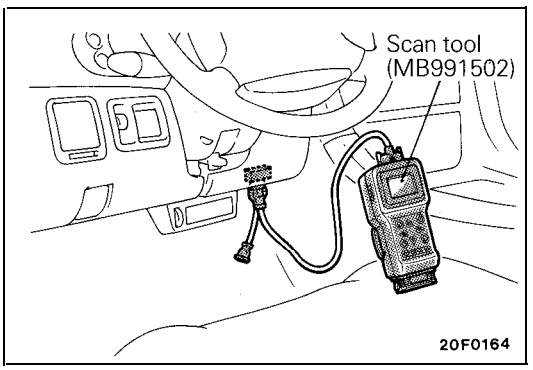
When the failure of a major sensor is detected by the on-board diagnostics, the preset control logic provides controls to assure safe operation of the vehicle.

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

READ OUT OF DIAGNOSTIC TROUBLE CODE

Precautions for Operation

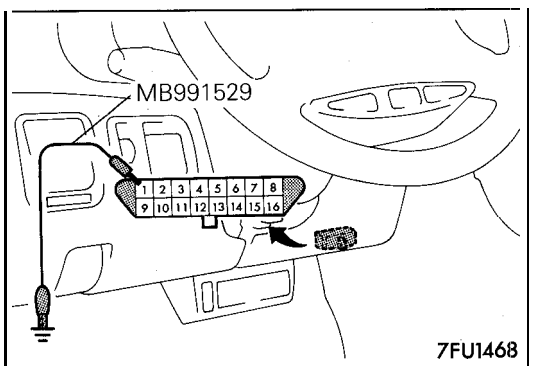
(1) When battery voltage is low, no detection of failure is possible. Be sure to check the battery for voltage and other conditions before starting the test.
(2) Diagnostic item is erased if the battery or the engine control module connector is disconnected. Do not disconnect the battery before the diagnostic result is completely read.
(3) Be sure to connect or disconnect the scan tool with the ignition switch turned off. If the scan tool is disconnected with the ignition switch placed in the ON position, ABS diagnostic trouble code may be stored and ABS warning lamp turned on.

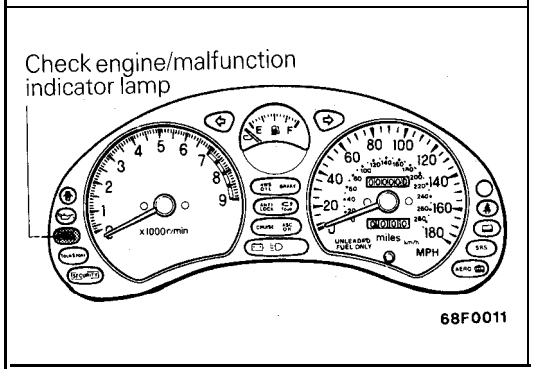


When using the scan tool

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

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

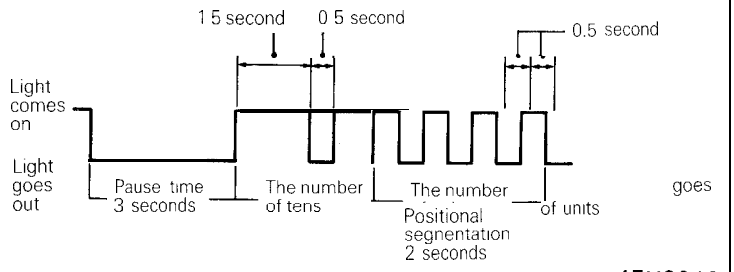
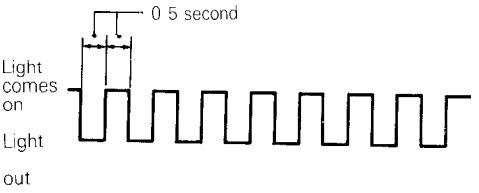




When using the check engine/malfunction indicator lamp

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

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

Typical blinking, made while diagnostic trouble code is output	Blinking when condition is normal
In case of diagnostic trouble code No.24  6FU2060	 6FU2061

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

Diagnosis by DIAGNOSTIC TEST MODE II (INCREASED SENSITIVITY)

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

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

(5) Erase the diagnostic trouble code.

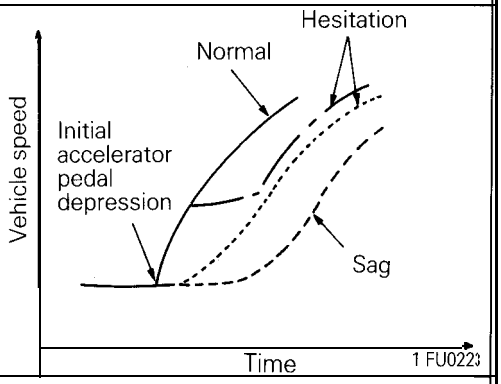
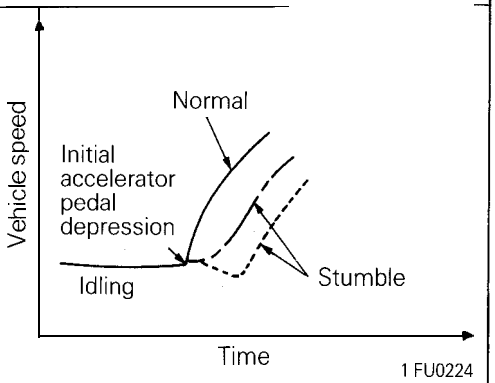
CHECK CHART CLASSIFIED BY PROBLEM SYMPTOMS

Problem symptoms / Check items	Starting		Idling stability			Driving						Stopping	Reference page (14A-)
	Will not start	Fires up and dies, Hard starting	Hunting, rough idle	Incorrect idle speed	Engine stall	Hesitation, Sag	Poor acceleration	Stumble	Shock	Surge	Knocking	Run-on (Dieseling)	
Power supply and ignition switch-IG	① 1												77*1, 174*2
Engine control module power ground	② 2												80*1, 177*2
Fuel pump	③ 3	① 1			① 1	① 1	① 1						81*1, 178*2
Volume air flow sensor					⑬ 11	⑫ 12		⑤ 5	⑤ 5		④ 4		84*1, 183*2
Intake air temperature sensor			⑤			⑧ 8	⑨ 9				② 2		87*1, 186*2
Barometric pressure sensor			⑦			⑪ 11	⑪ 11				③ 3		90*1, 188*2
Engine coolant temperature sensor		3	⑥ 5	① 1	⑤ 5	⑩ 10	⑩ 10	④ 4		③ 3			92*1, 190*2
Throttle position sensor						⑨ 9		③ 3	④ 4				95*1, 192*2
Closed throttle position switch			③ 3	② 2	④ 4								98*1, 194*2
Camshaft position sensor	⑤ 5	⑦ 7			⑧ 7				② 2				100*1, 196*2
Crankshaft position sensor	⑥ 6	⑧ 8			⑨ 8				③ 3				88*1, 198*2
Ignition switch-ST <M/T>	④ 4	③ 4											109*1, 201*2
Ignition switch-ST and Park/Neutral position switch <A/T>	④ 4	③ 4		⑦									110*1, 202*2
Vehicle speed sensor					⑥				⑥				112*1, 204*2
Power steering pressure switch				③									114*1, 208*2
Air conditioning switch and compressor clutch relay				④									116*1, 209*2
Knock sensor <DOHC>											① 1		118*1, 210*2
Electrical load switch <DOHC>				⑤									120*1, 212*2
Fan motor relay				⑥	⑪ 10								122*1, 213*2
Induction control valve position sensor <DOHC – Non Turbo>						④ 4	⑥ 6						124*1, 216*2
Heated oxygen sensor			⑩										128*1, 220*2
Injectors	⑧ 8	② 2	② 2		③ 3	② 2	② 2	① 1		① 1		①	136*1, 227*2
Idle air control motor ((stepper motor type)		④ 5	① 1	⑧ 3	② 2				⑨ 7				141*1, 232*2
Ignition coil and ignition power transistor	⑦ 7				⑩ 9		⑫ 12		① 1		⑤ 5		146*1, 233*2
Evaporative emission purge solenoid			⑧										153*1, 237*2
EGR solenoid <California – Non Turbo, Turbo>						⑦ 7		⑥ 6		④ 4			155*1, 238*2
Fuel pressure solenoid <Turbo>		⑥	⑨		⑫		④ 4						239*2
Turbocharger waste gate control solenoid <Turbo>							⑤ 5						243*2
Active exhaust control unit <Turbo>						⑥ 6	⑧ 8						245*2
Variable induction control motor (DC motor) <DOHC – Non Turbo>						⑤ 5	⑦ 7						157*1, 246*2
Anti-lock braking signal <Turbo>									⑦				247*2
Engine and transaxle total control signal <A/T>									⑧ 6	⑤ 5			159*1, 248*2
Fuel pressure		⑤ 6	④ 4		⑦ 6	③ 3	③ 3	② 2		② 2			162*1, 251*2

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

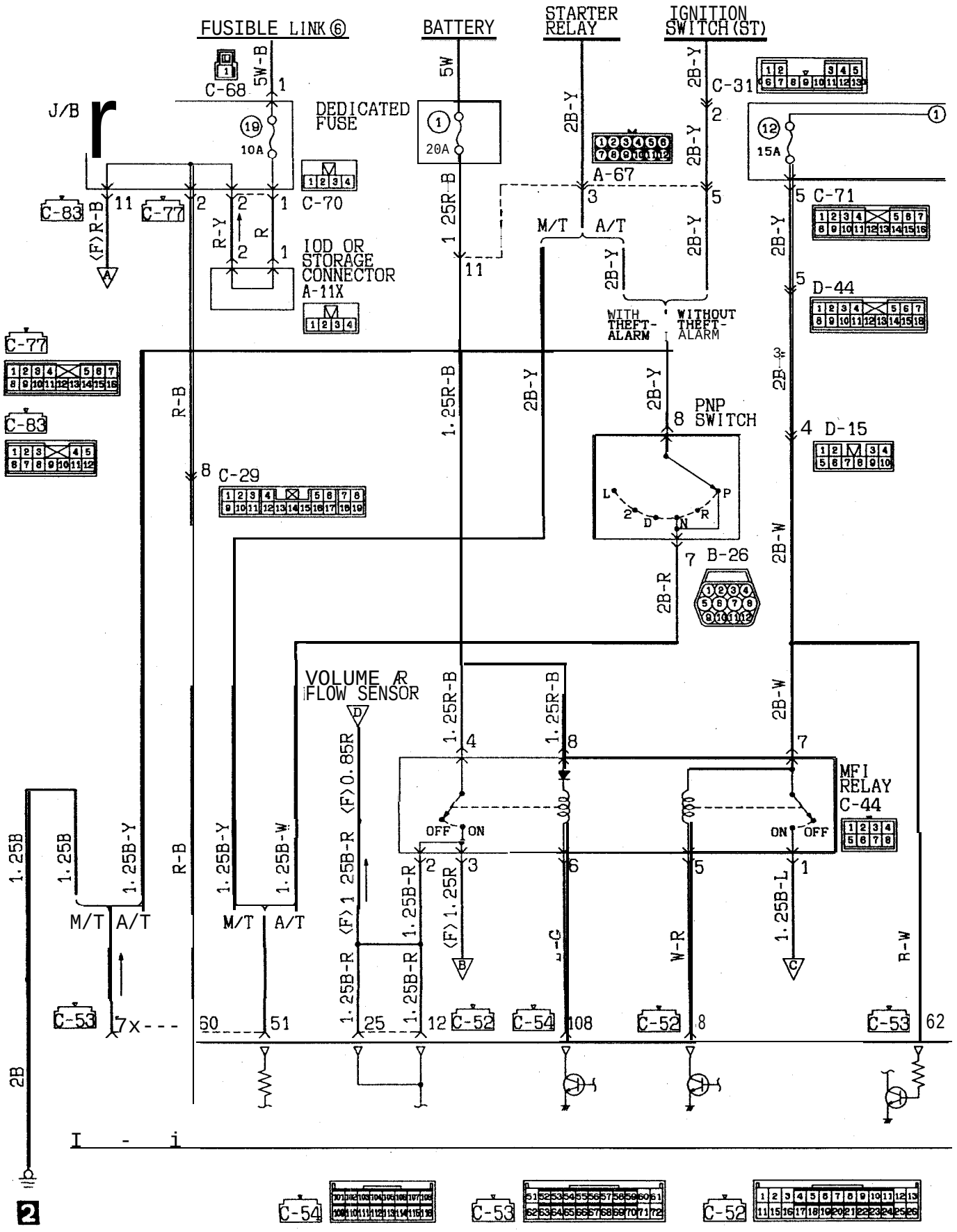
*1: SOHC, Federal – Non Turbo, Canada – Non Turbo
*2: California – DOHC Non Turbo, Turbo

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.
	Fires up and dies	There is combustion within the cylinders, but then the engine soon stalls.
	Hard starting	Engine starts after cranking awhile
Idling stability	Hunting	Engine speed doesn't remain constant; changes at idling.
	Rough idle	Usually, a judgement can be based upon the movement of the tachometer pointer, and the vibration transmitted to the steering wheel, shift lever, body, etc. This is called rough idling.
	Incorrect idle speed	The engine doesn't idle at the usual correct speed.
	Engine stall Die out Pass out	Die out The engine stalls when the foot is taken from the accelerator pedal, regardless of whether the vehicle is moving or not. Pass out The engine stalls when the accelerator pedal is depressed or while it is being used.
Driving	Hesitation Sag	"Hesitation" is the delay in response of the vehicle speed (engine 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". 
	Poor acceleration	Poor acceleration is inability to obtain an acceleration corresponding to the degree of throttle opening, even though acceleration is smooth, or the inability to reach maximum speed.
	Stumble	Engine rpm increase is delayed when the accelerator pedal is initially depressed for acceleration from the stopped condition. 
	Shock	The feeling of a comparatively large impact or vibration when the engine is accelerated or decelerated.
	Surge	This is slight acceleration and deceleration feel usually at steady light throttle cruise must notable under hight loads.
	Knocking	A sharp sound like a hammer striking the cylinder walls during driving and which adversely affects driving.
Stopping	Run-on (Dieseling)	Also called dieseling, this is a continued operation of the engine after the ignition switch is turned off.

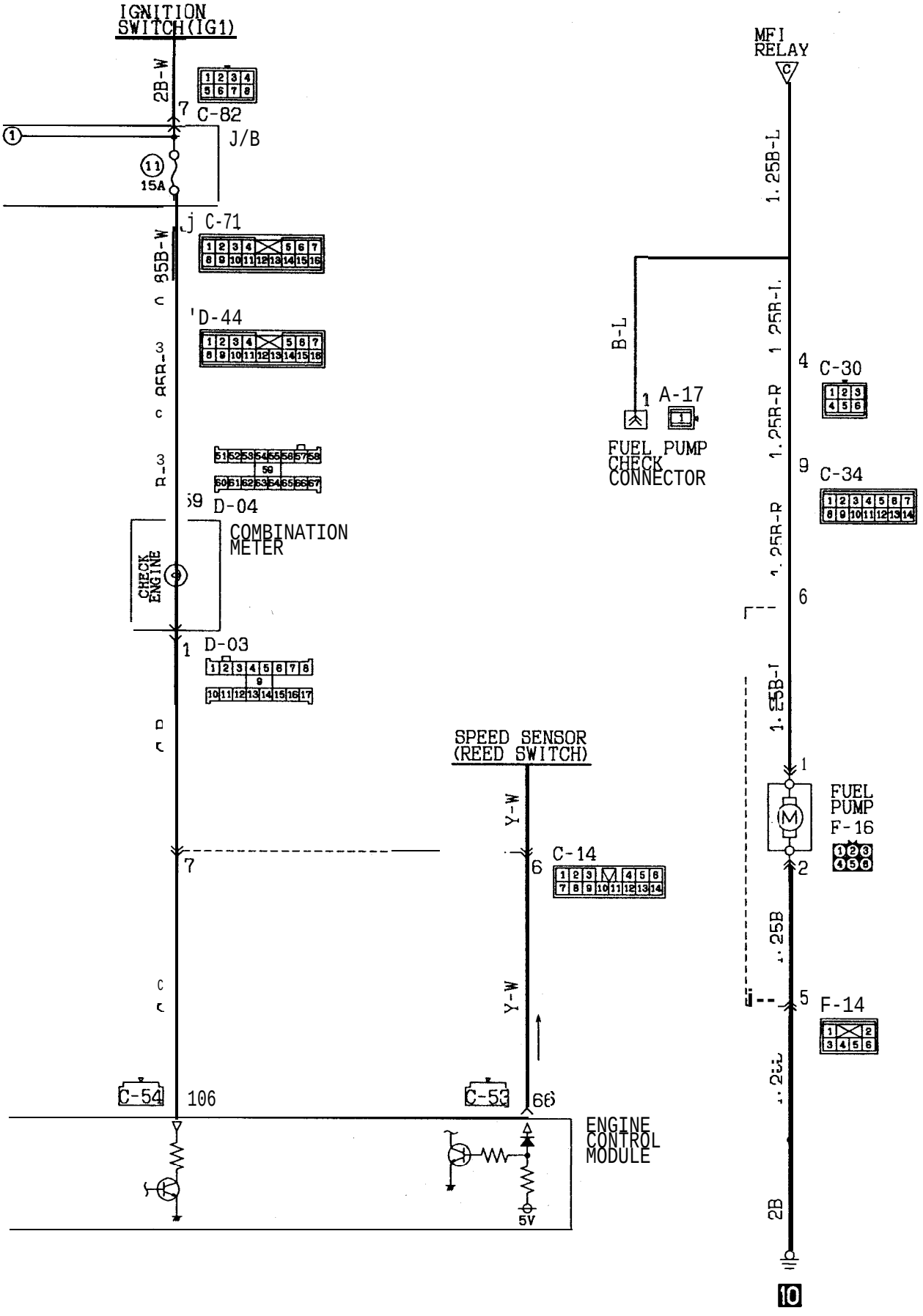
CIRCUIT DIAGRAM <SOHC>

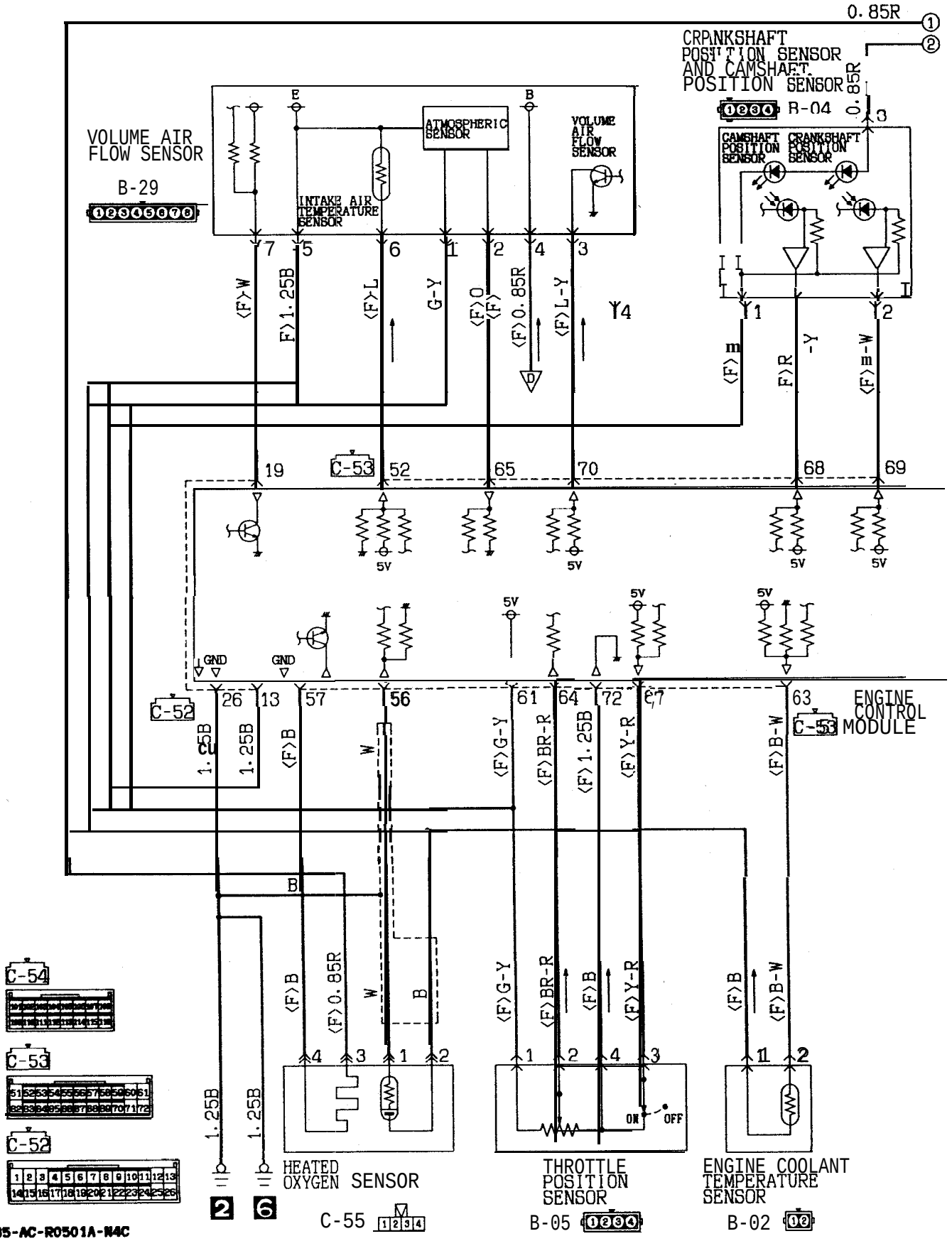
(FEDERAL AND CANADA)



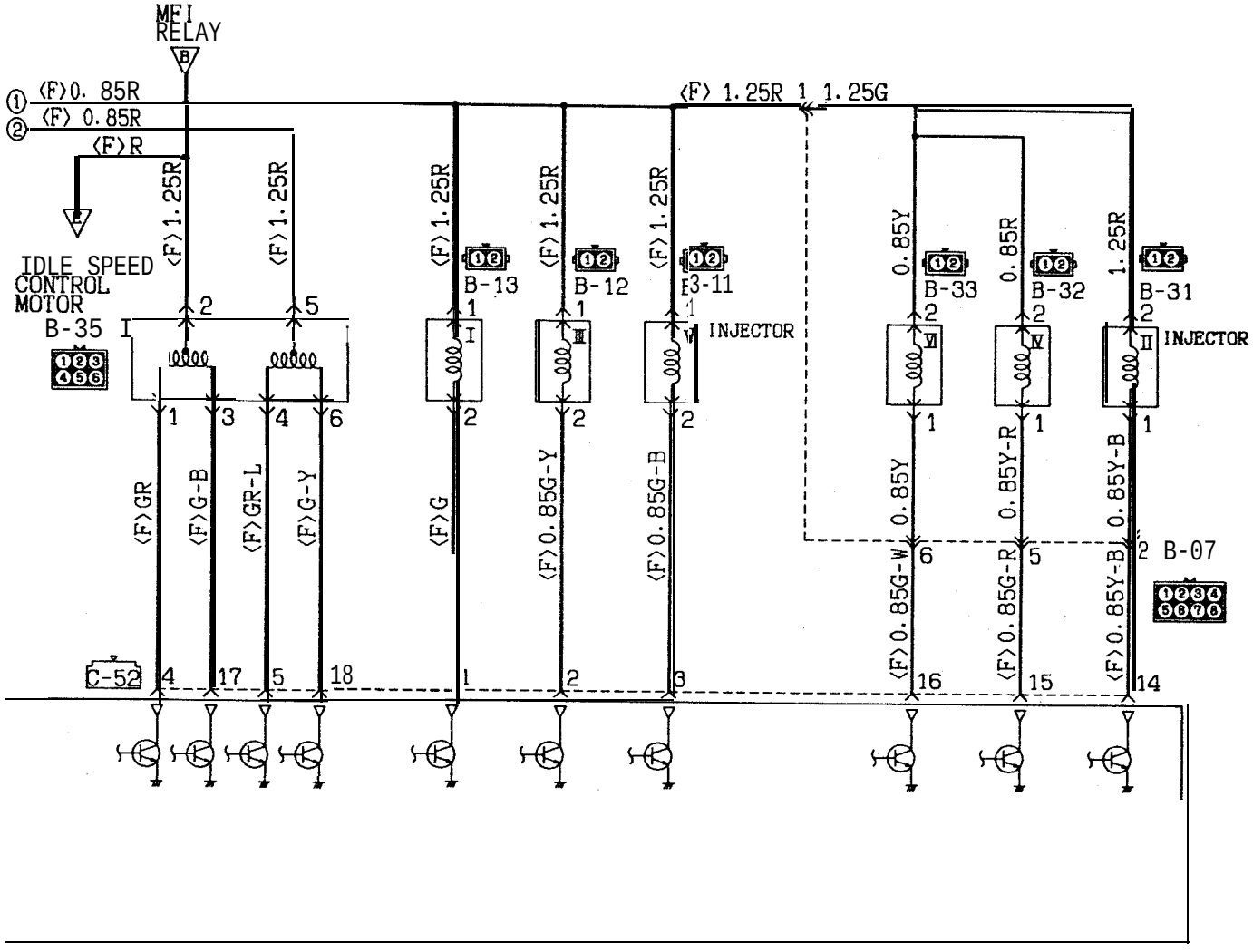
IX35-AC-R0501-N4C

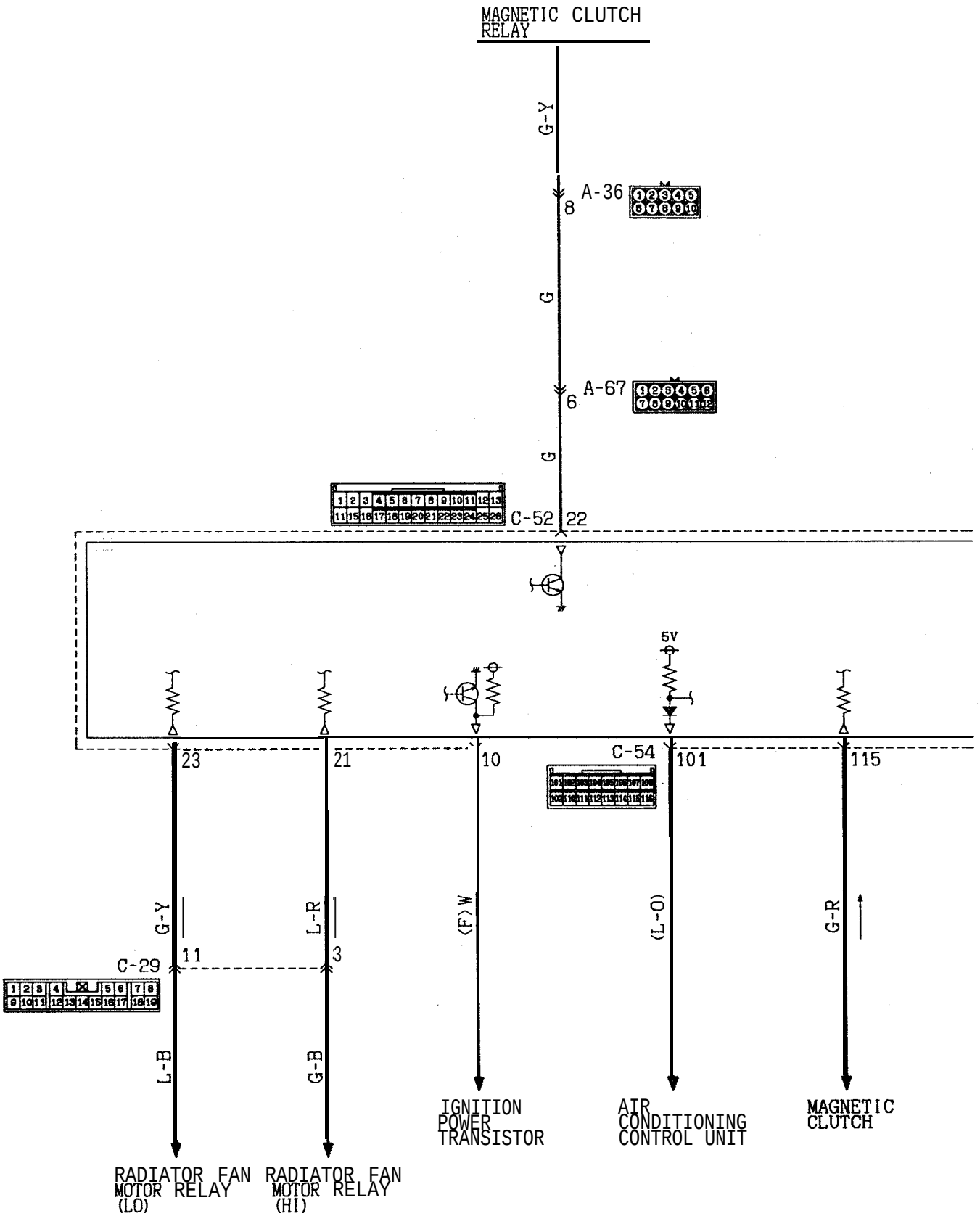
CIRCUIT DIAGRAM <SOHC> (CONTINUED)



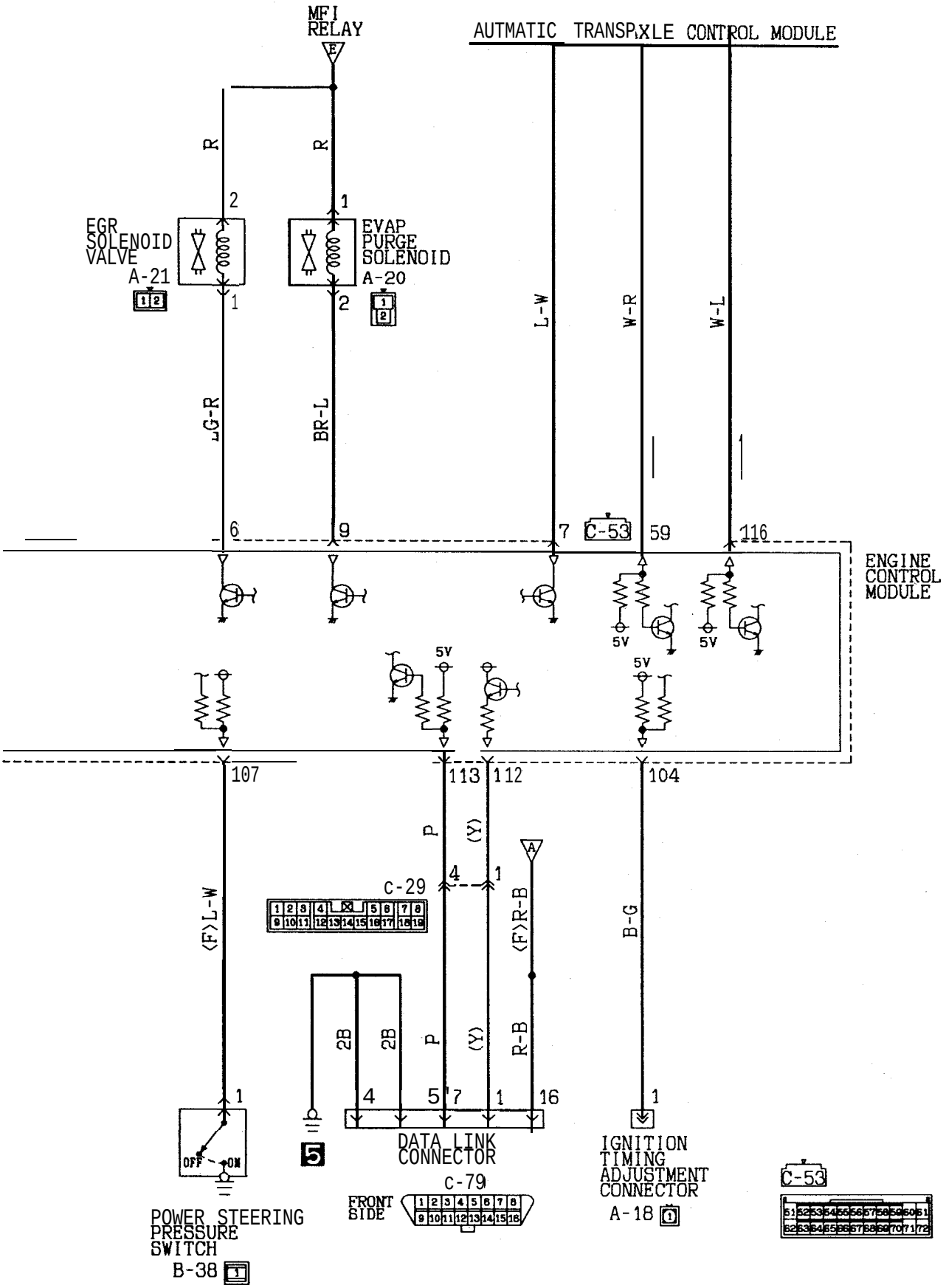

0.85R
CRANKSHAFT POSITION SENSOR AND CAMSHAFT POSITION SENSOR
B-04
CAMSHAFT POSITION SENSOR
CRANKSHAFT POSITION SENSOR
VOLUME AIR FLOW SENSOR
B-29
ATMOSPHERIC SENSOR
INTAKE AIR TEMPERATURE SENSOR
VOLUME AIR FLOW SENSOR
C-53
C-52
C-54
ENGINE CONTROL MODULE
5V
GND
HEATED OXYGEN SENSOR
C-55
THROTTLE POSITION SENSOR
B-05
ENGINE COOLANT TEMPERATURE SENSOR
B-02
ON
OFF
KX35-AC-R0501A-N4C

CIRCUIT DIAGRAM <SOHC> (CONTINUED)



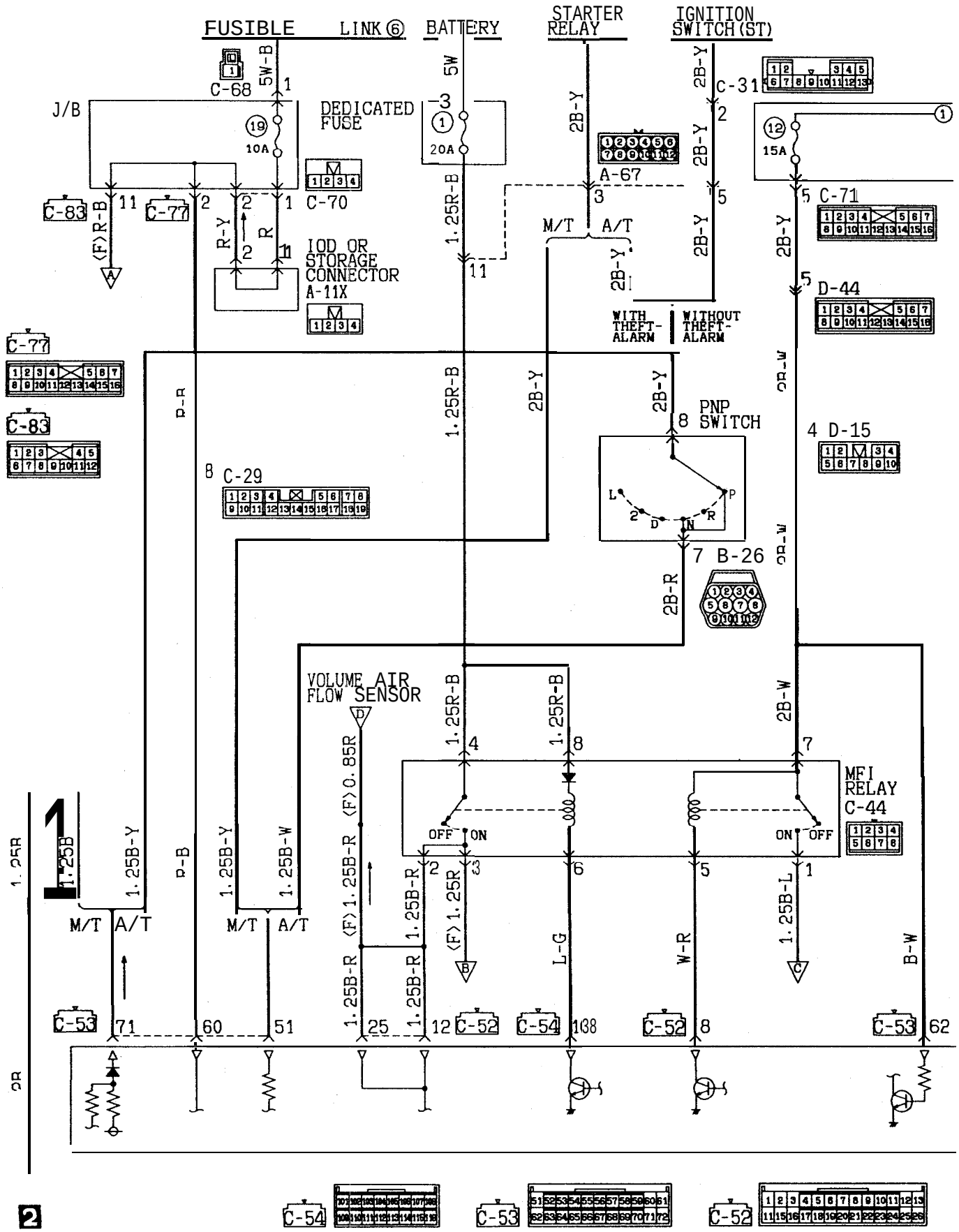

MAGNETIC CLUTCH RELAY
G-Y
A-36
8
G
A-67
6
G
C-52
22
5V
23
21
10
C-54
101
115
G-Y
L-R
(F) W
(L-O)
G-R
C-29
11
3
L-B
G-B
IGNITION POWER TRANSISTOR
AIR CONDITIONING CONTROL UNIT
MAGNETIC CLUTCH
RADIATOR FAN MOTOR RELAY (LO)
RADIATOR FAN MOTOR RELAY (HI)

CIRCUIT DIAGRAM <SOHC> (CONTINUED)



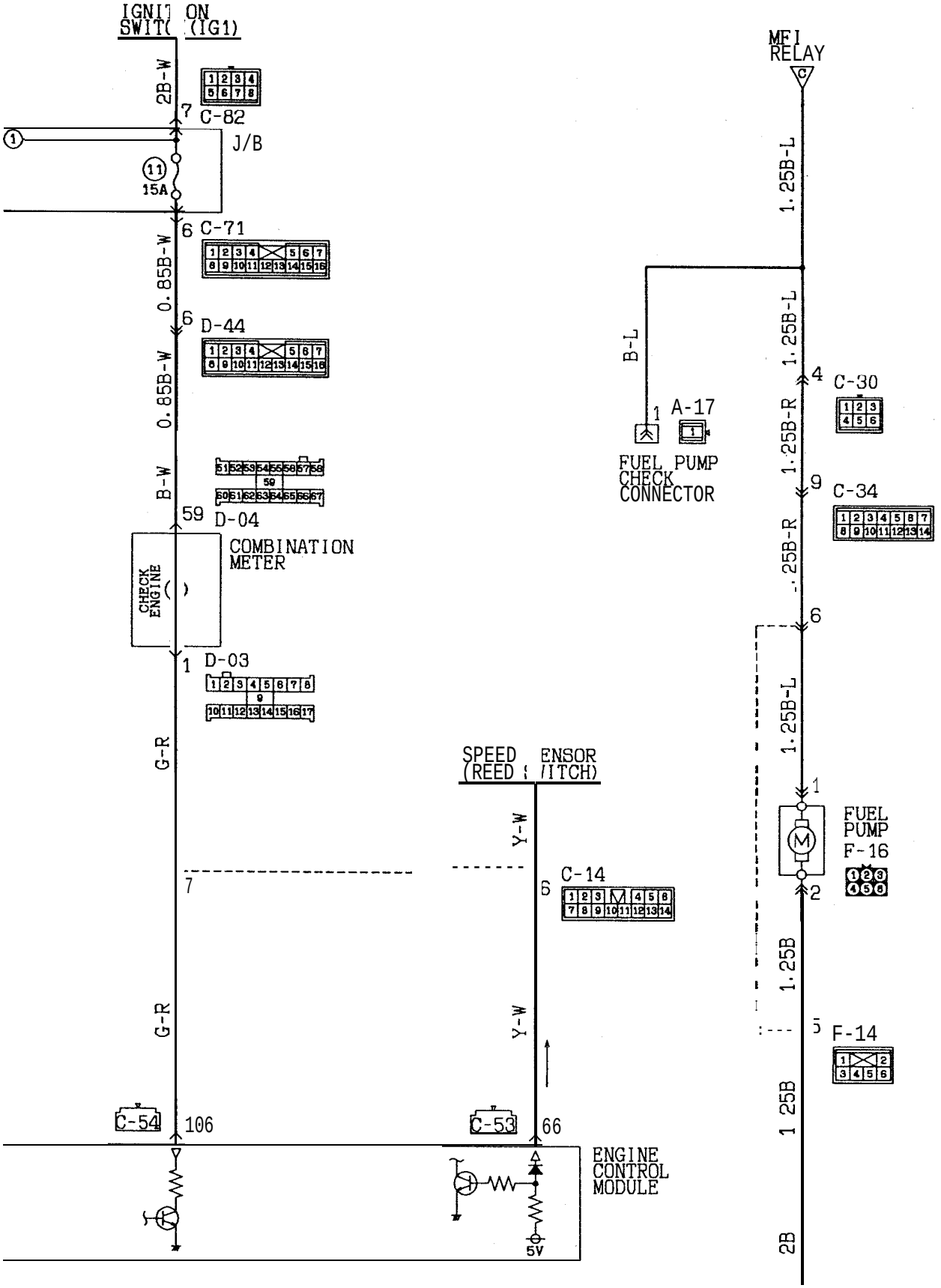
CIRCUIT DIAGRAM <SOHC>

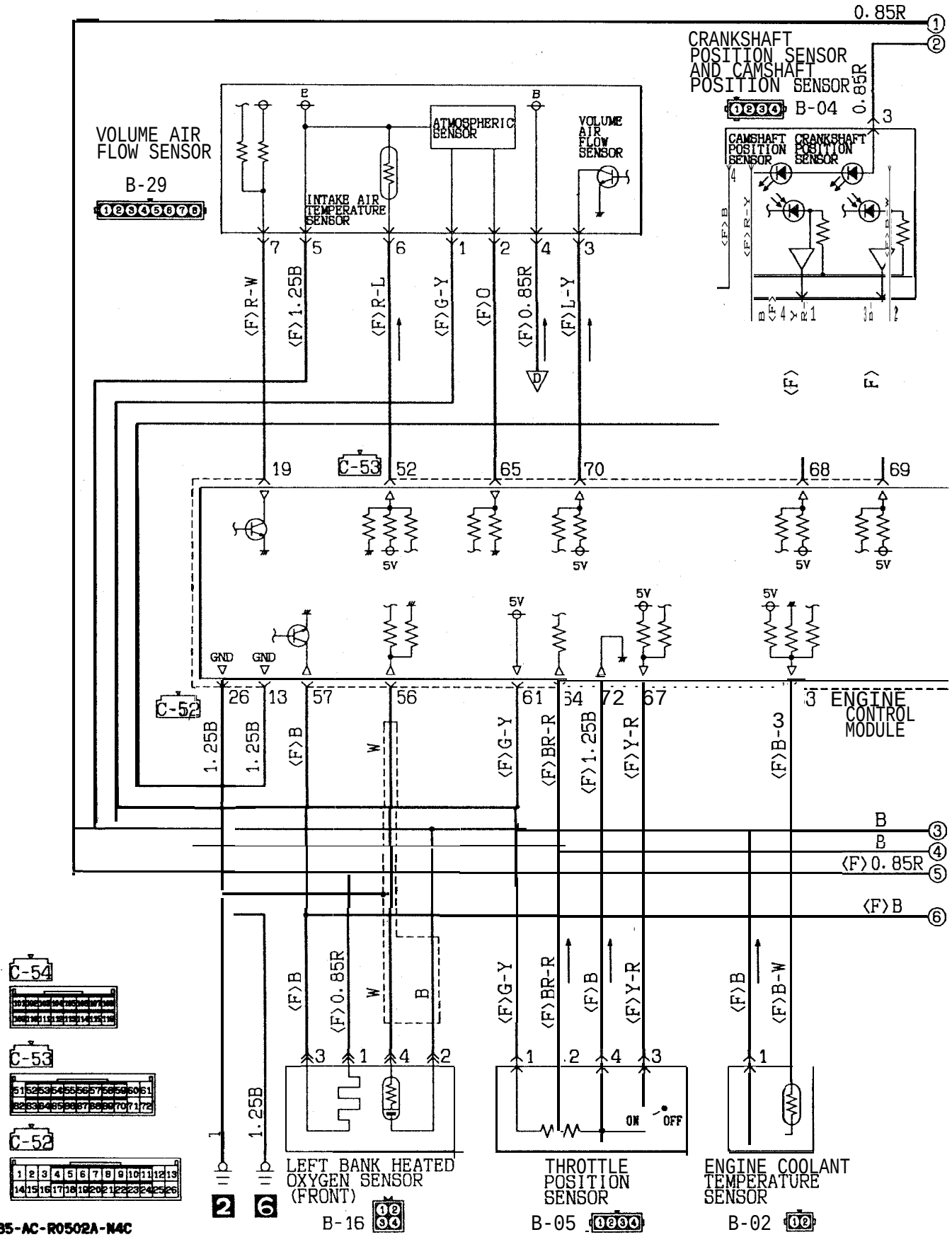
(CALIFORNIA)



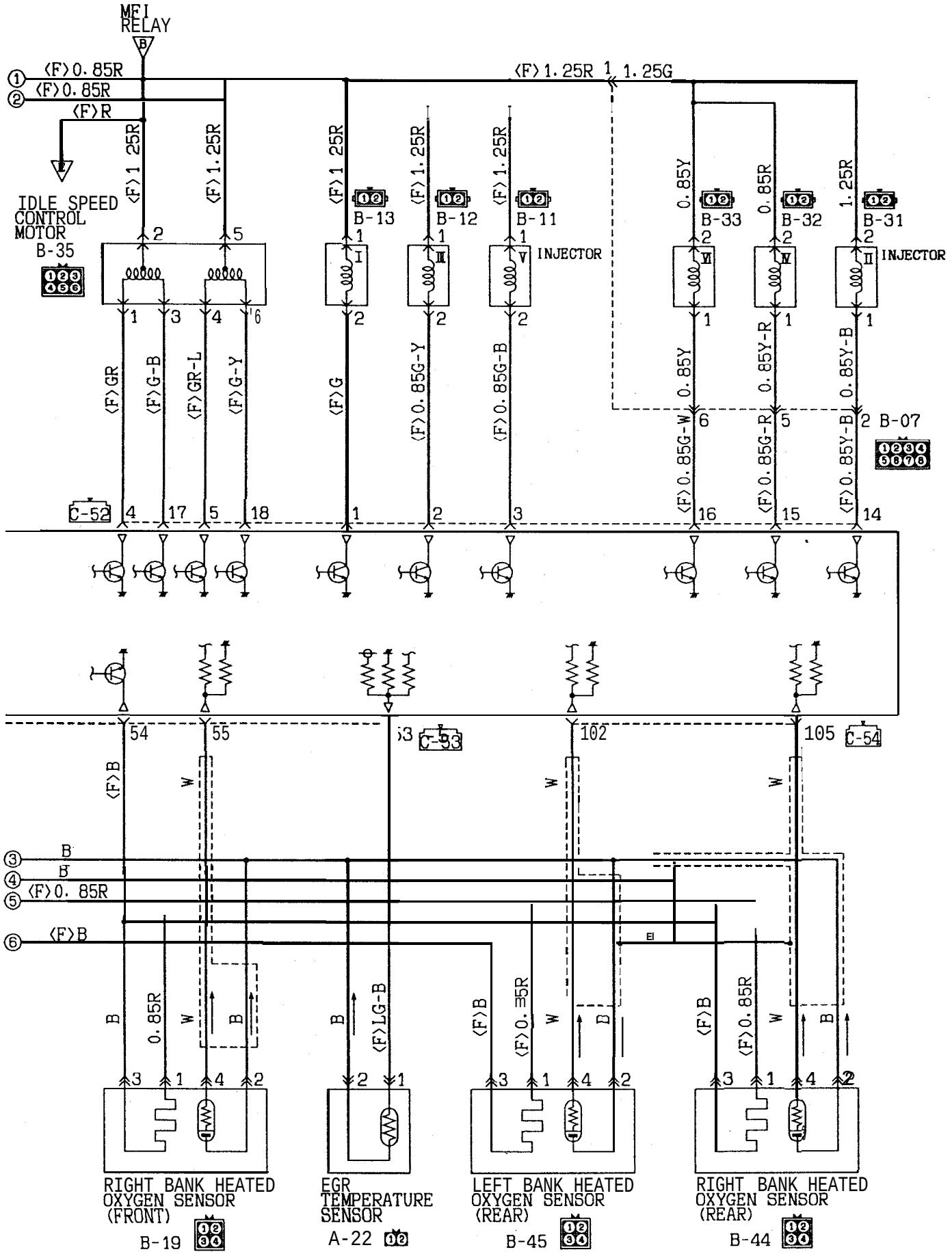
KX35-AC-R0502-N4C

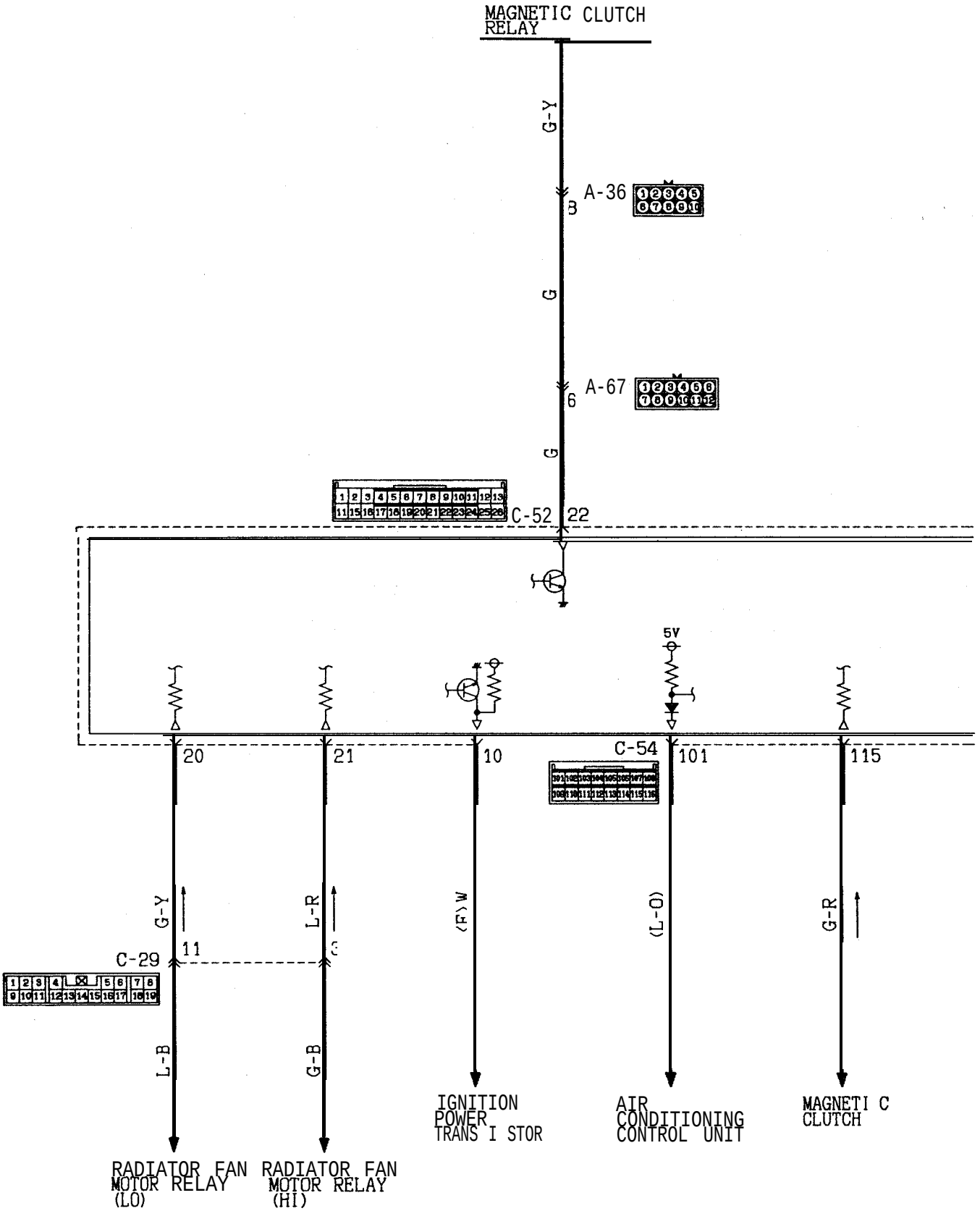
CIRCUIT DIAGRAM <SOHC> (CONTINUED)



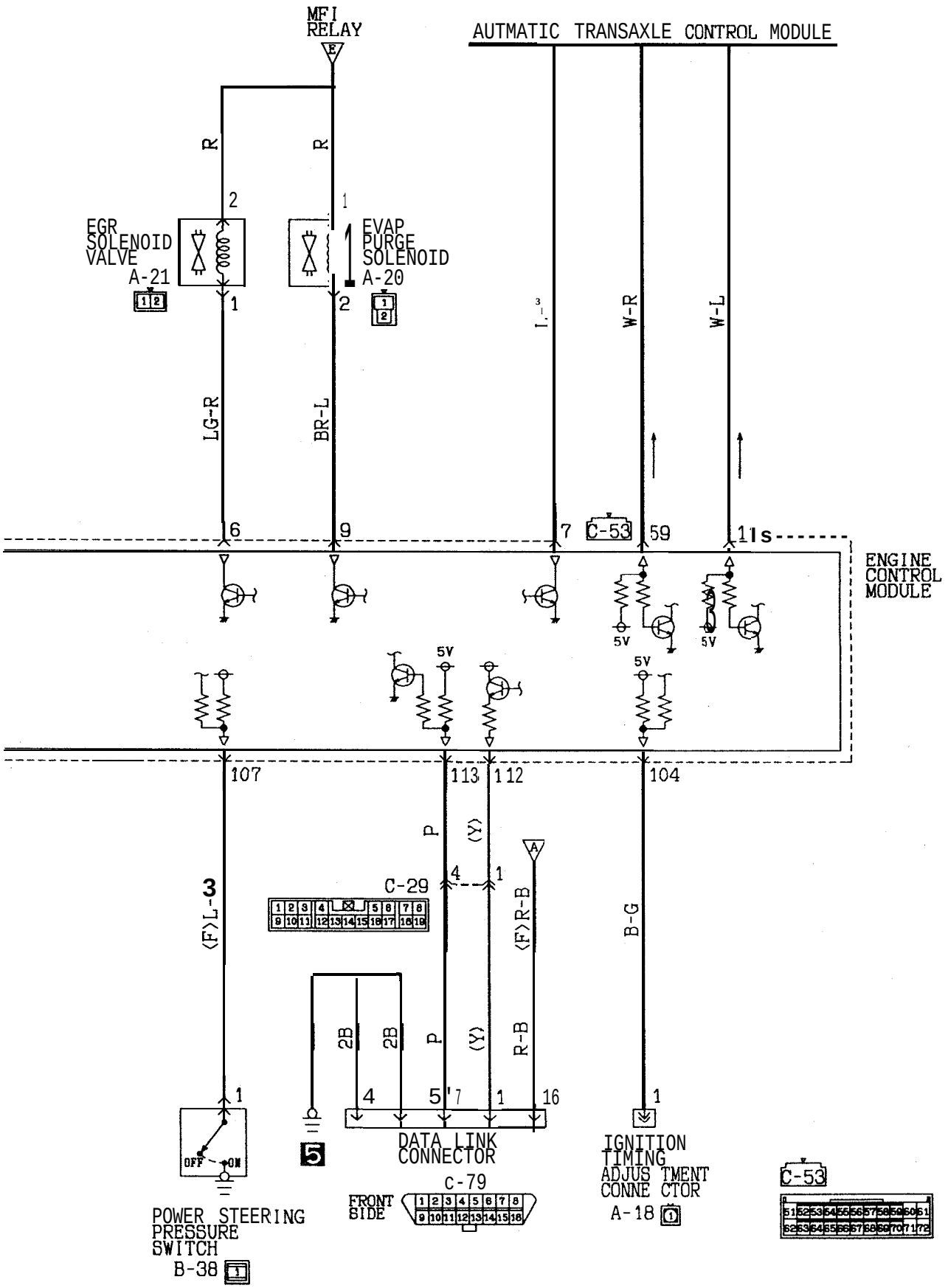

0.85R
CRANKSHAFT POSITION SENSOR AND CAMSHAFT POSITION SENSOR
B-04
VOLUME AIR FLOW SENSOR
B-29
ATMOSPHERIC SENSOR
INTAKE AIR TEMPERATURE SENSOR
VOLUME AIR FLOW SENSOR
CAMSHAFT POSITION SENSOR
CRANKSHAFT POSITION SENSOR
<F>R-W
<F>1.25B
<F>R-L
<F>G-Y
<F>O
<F>0.85R
<F>L-Y
C-53
C-52
5V
GND
<F>B
W
<F>BR-R
<F>Y-R
<F>B-3
ENGINE CONTROL MODULE
B
<F>0.85R
<F>B
B
1.25B
LEFT BANK HEATED OXYGEN SENSOR (FRONT)
B-16
THROTTLE POSITION SENSOR
B-05
ON
OFF
ENGINE COOLANT TEMPERATURE SENSOR
B-02
C-54
C-53
C-52
KX35-AC-R0502A-N4C

CIRCUIT DIAGRAM <SOHC> (CONTINUED)



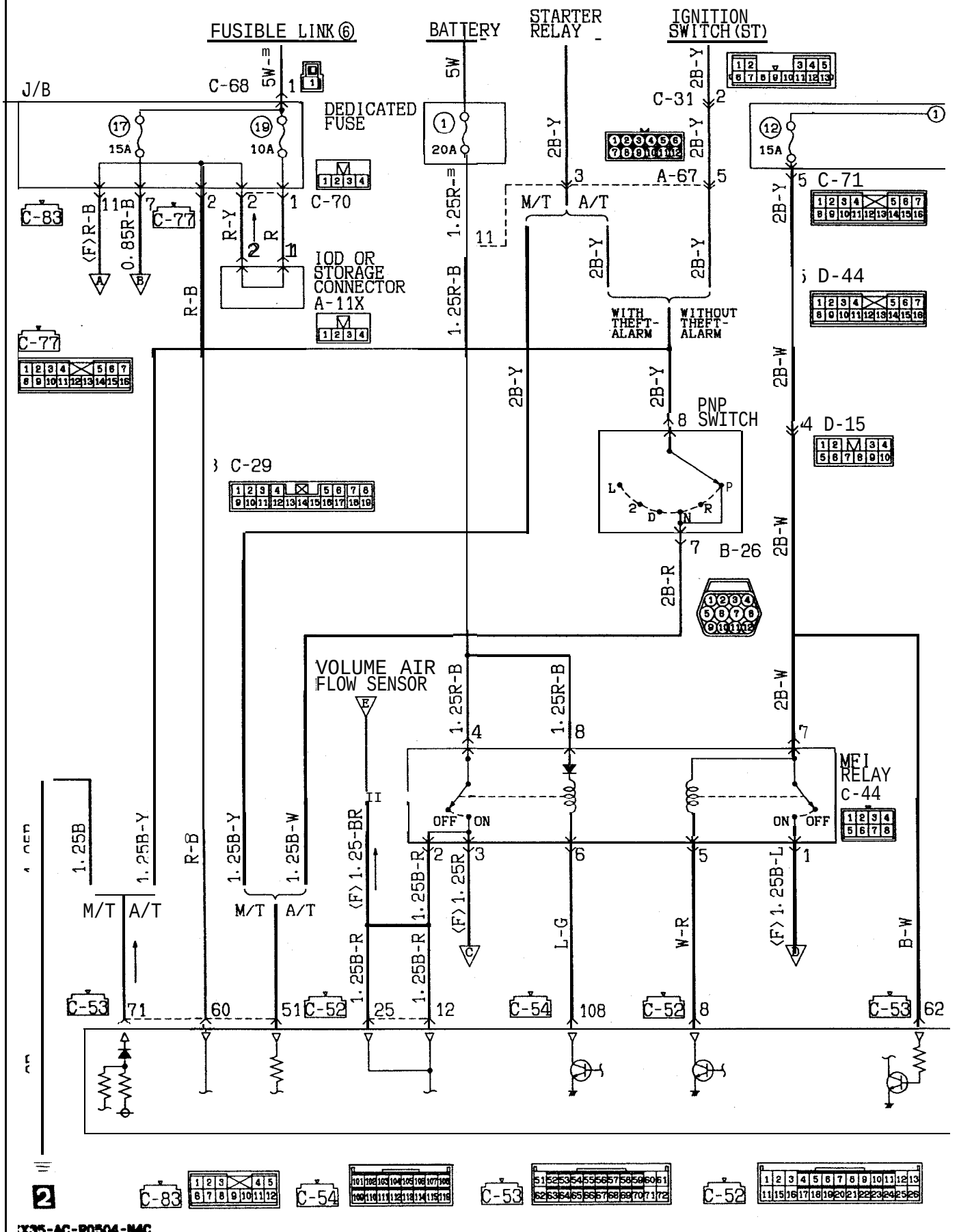

MAGNETIC CLUTCH RELAY
G-Y
A-36
3
G
A-67
6
G
C-52
22
5V
20
21
10
C-54
101
115
C-29
11
G-Y
L-R
(F)W
(L-O)
G-R
L-B
G-B
IGNITION POWER TRANS I STOR
AIR CONDITIONING CONTROL UNIT
MAGNETI C CLUTCH
RADIATOR FAN MOTOR RELAY (LO)
RADIATOR FAN MOTOR RELAY (HI)

CIRCUIT DIAGRAM <SOHC> (CONTINUED)



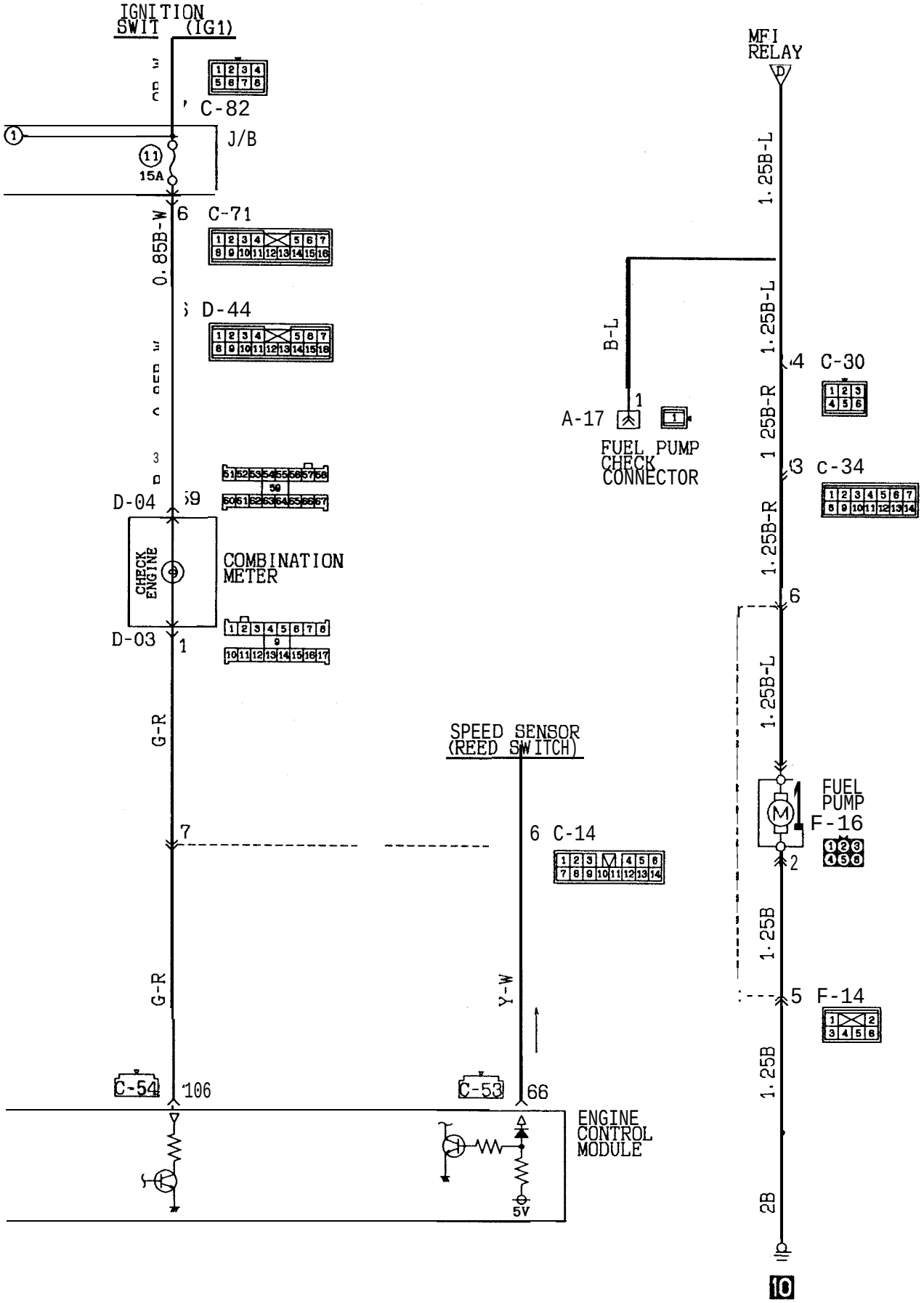
CIRCUIT DIAGRAM <Non-Turbo>

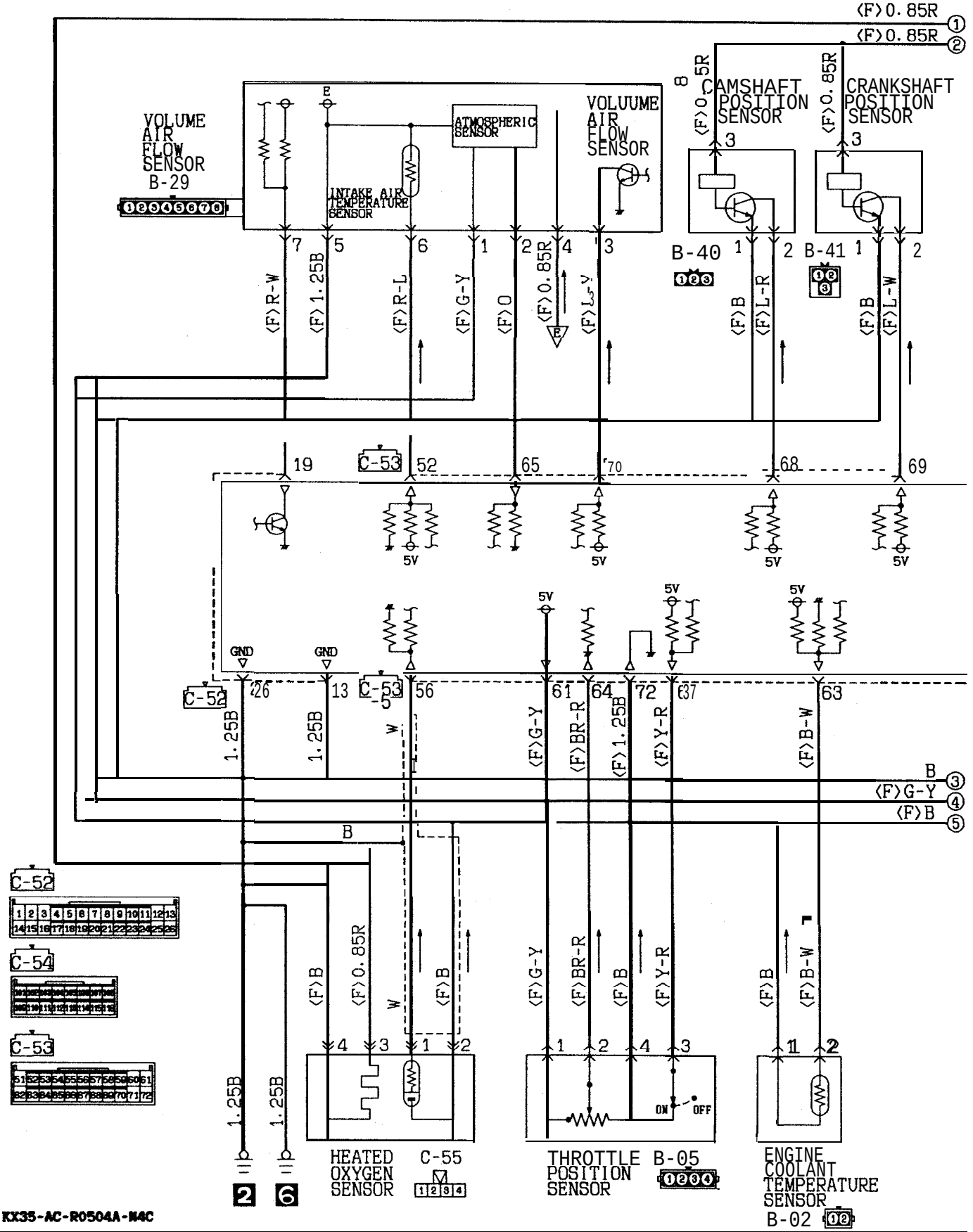
(FEDERAL AND CANADA)



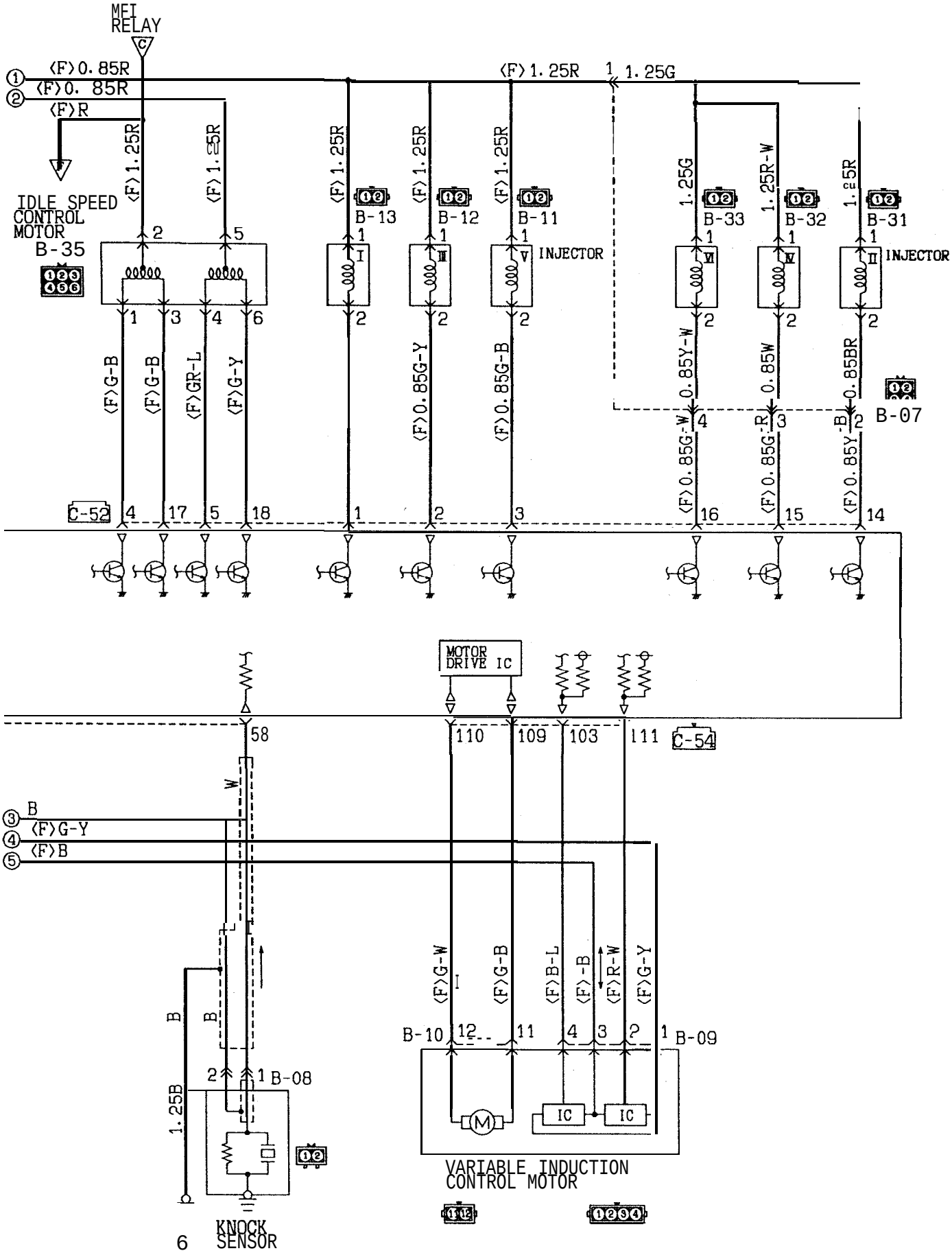
EX35-AC-R0504-N4C

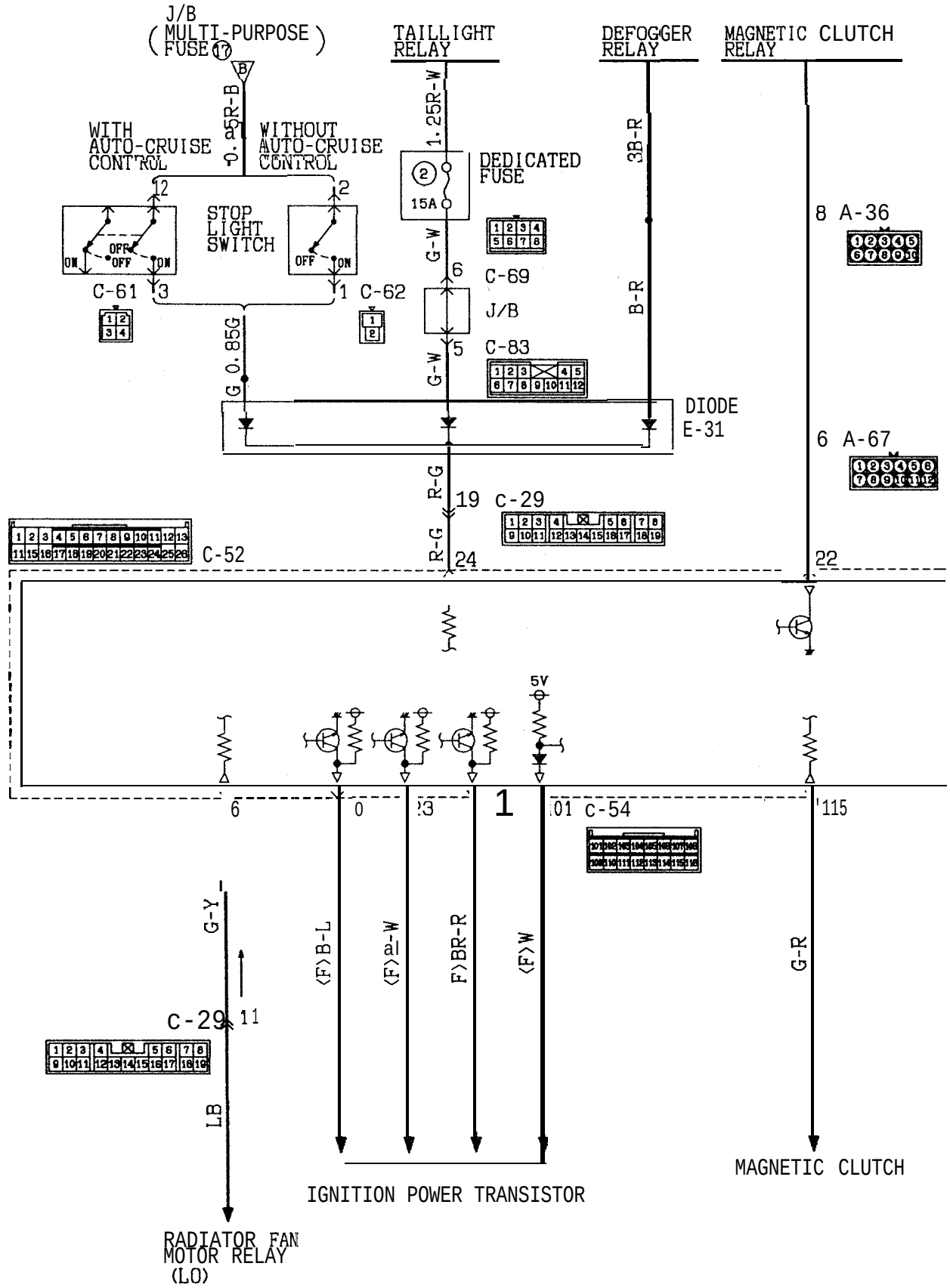
CIRCUIT DIAGRAM <Non-Turbo> (CONTINUED)



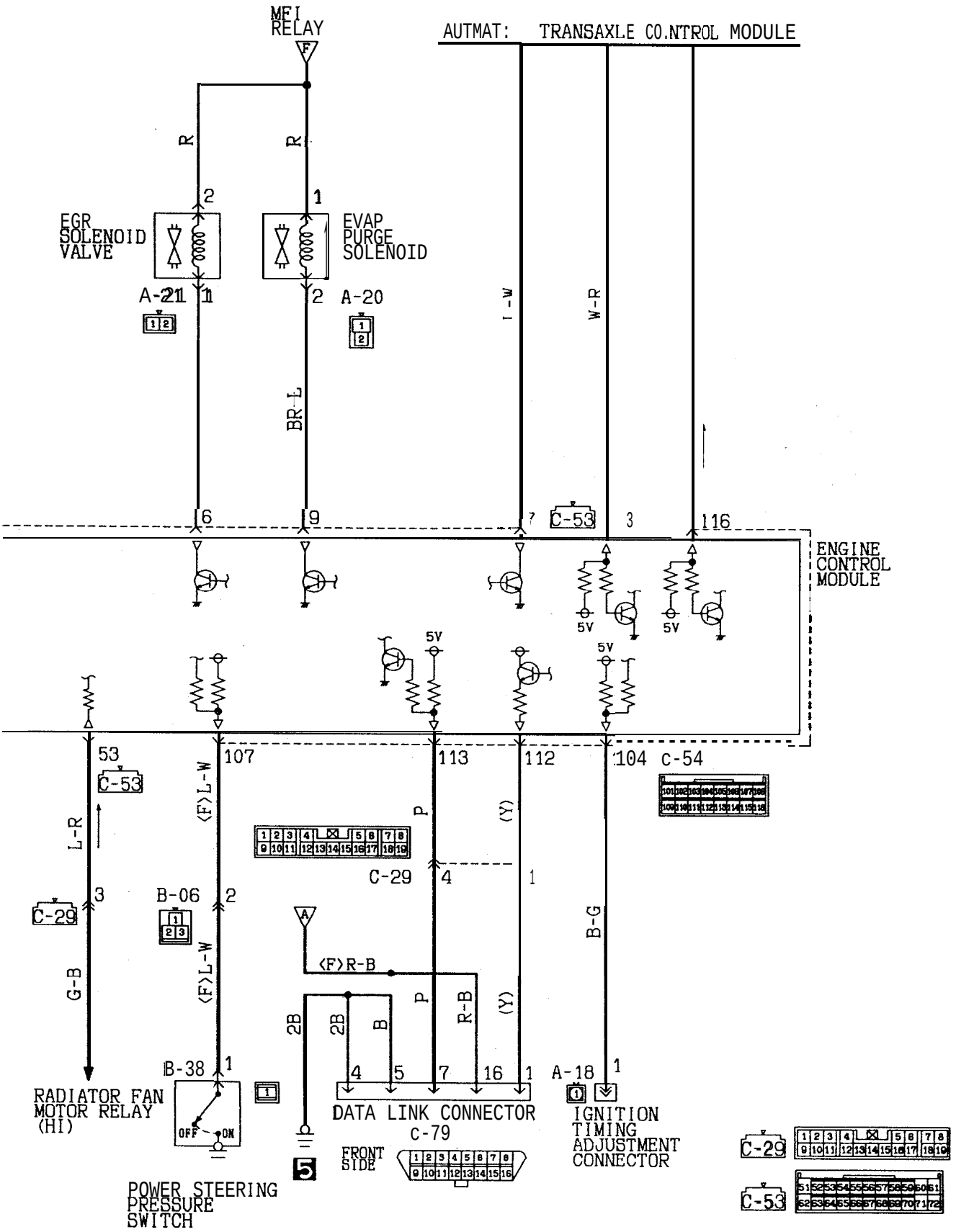

VOLUME AIR FLOW SENSOR B-29
INTAKE AIR TEMPERATURE SENSOR
ATMOSPHERIC SENSOR
VOLUUME AIR FLOW SENSOR
CAMSHAFT POSITION SENSOR
CRANKSHAFT POSITION SENSOR
B-40
B-41
C-53
C-52
C-54
C-55
B-05
B-02
HEATED OXYGEN SENSOR
THROTTLE POSITION SENSOR
ENGINE COOLANT TEMPERATURE SENSOR
5V
GND
ON
OFF

CIRCUIT DIAGRAM <Non-Turbo> (CONTINUED)



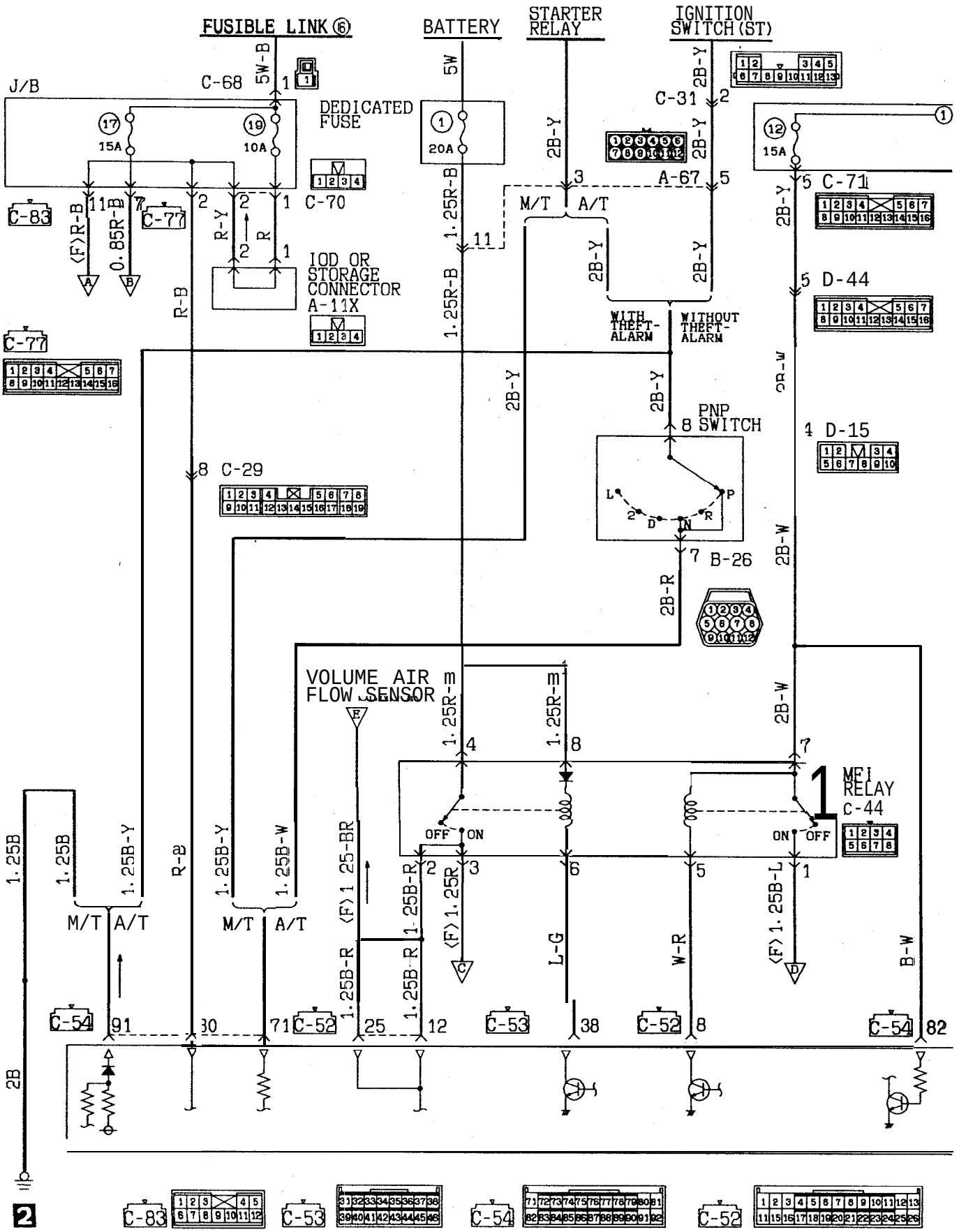

J/B
(MULTI-PURPOSE FUSE 17)
TAILLIGHT RELAY
DEFOGGER RELAY
MAGNETIC CLUTCH RELAY
B
0.85R-B
WITH AUTO-CRUISE CONTROL
WITHOUT AUTO-CRUISE CONTROL
1.25R-W
DEDICATED FUSE
15A
3B-R
8 A-36
STOP LIGHT SWITCH
OFF
ON
C-61
C-62
G-W
6
C-69
J/B
5
C-83
B-R
G 0.85G
DIODE E-31
6 A-67
R-G
19
c-29
C-52
24
22
5V
6
0
23
1
01
c-54
115
G-Y
11
c-29
LB
(F)B-L
(F)al-W
F)BR-R
(F)W
G-R
IGNITION POWER TRANSISTOR
MAGNETIC CLUTCH
RADIATOR FAN MOTOR RELAY (LO)

CIRCUIT DIAGRAM <Non-Turbo> (CONTINUED)

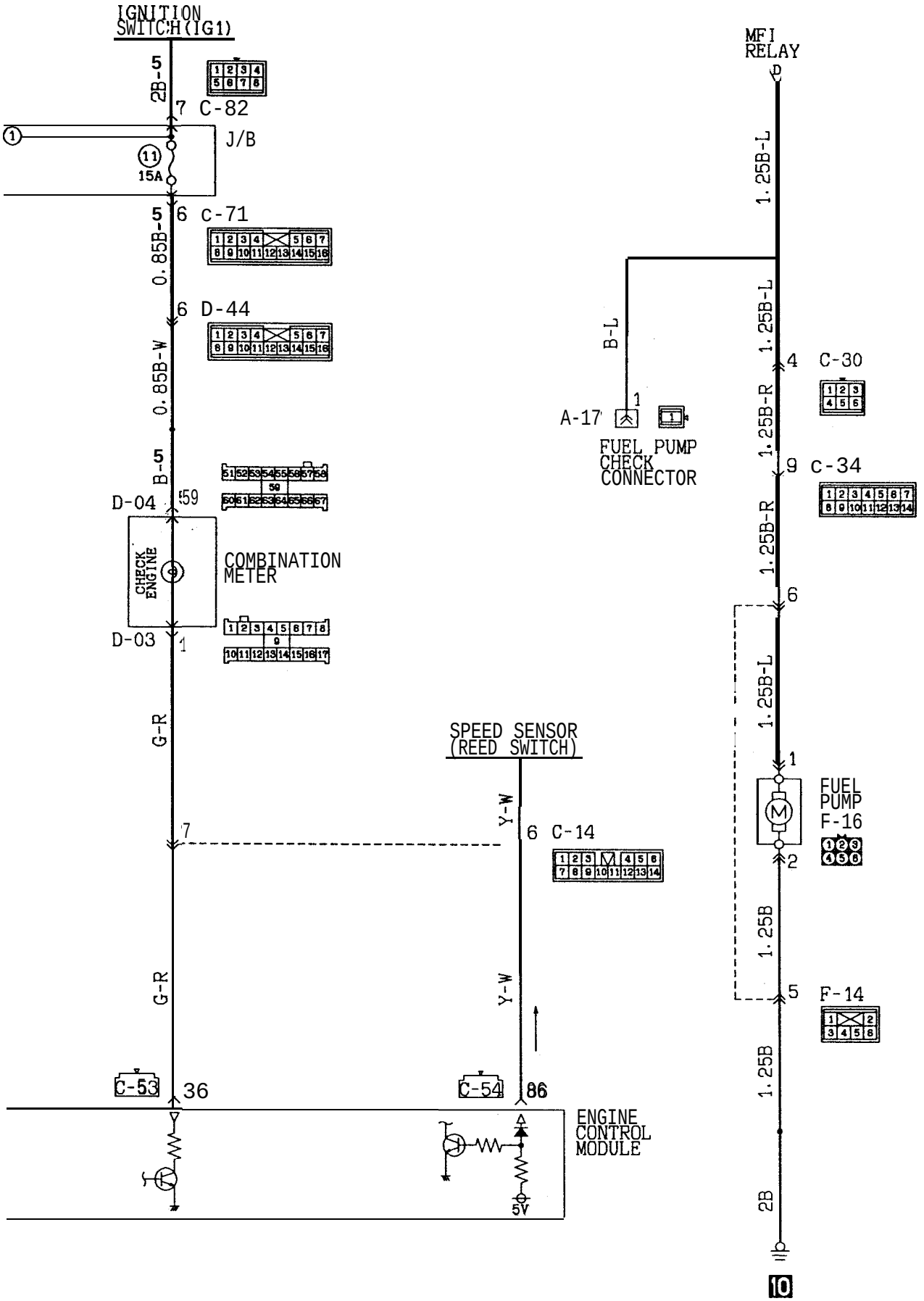


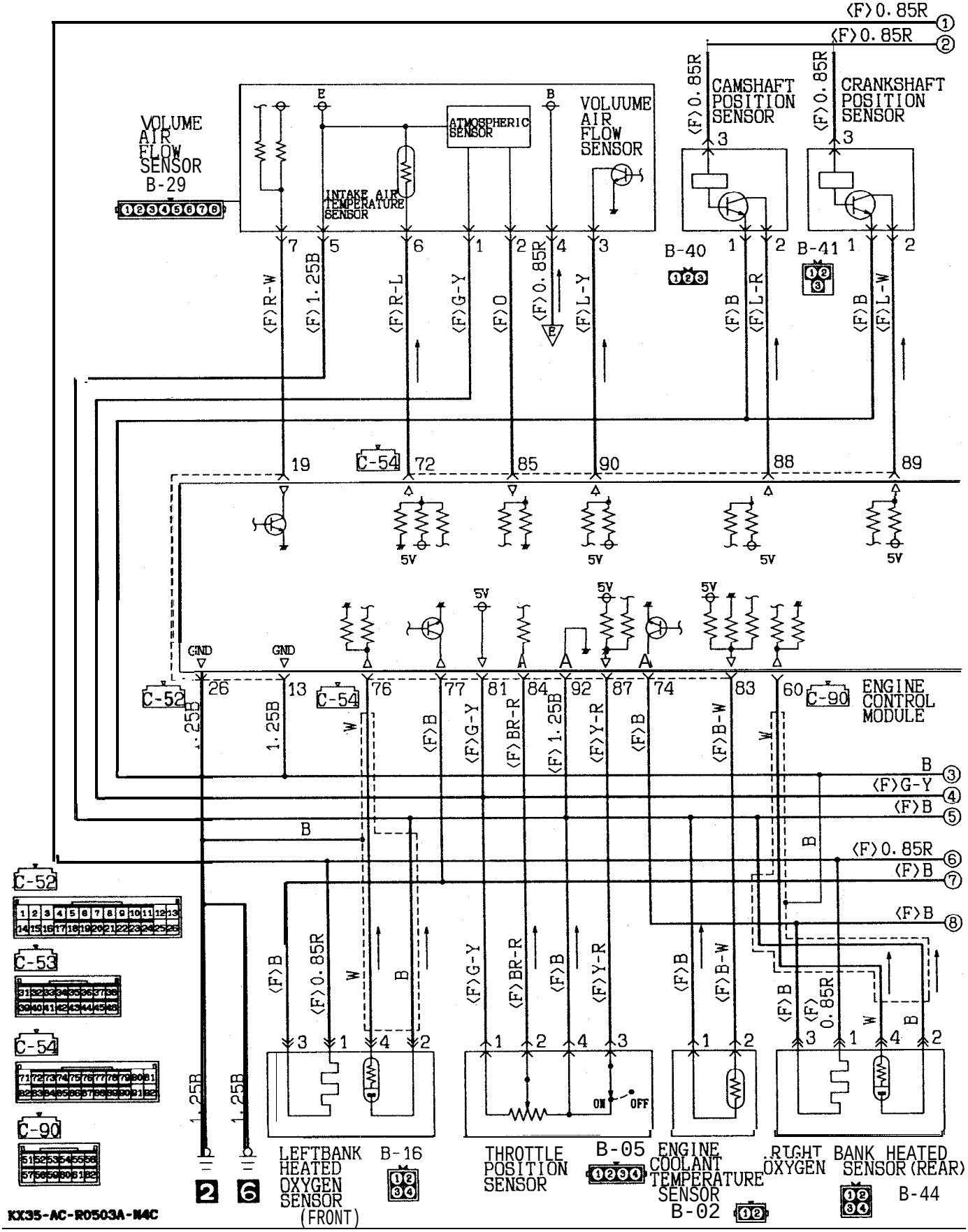
CIRCUIT DIAGRAM <Non-Turbo>

(CALIFORNIA)

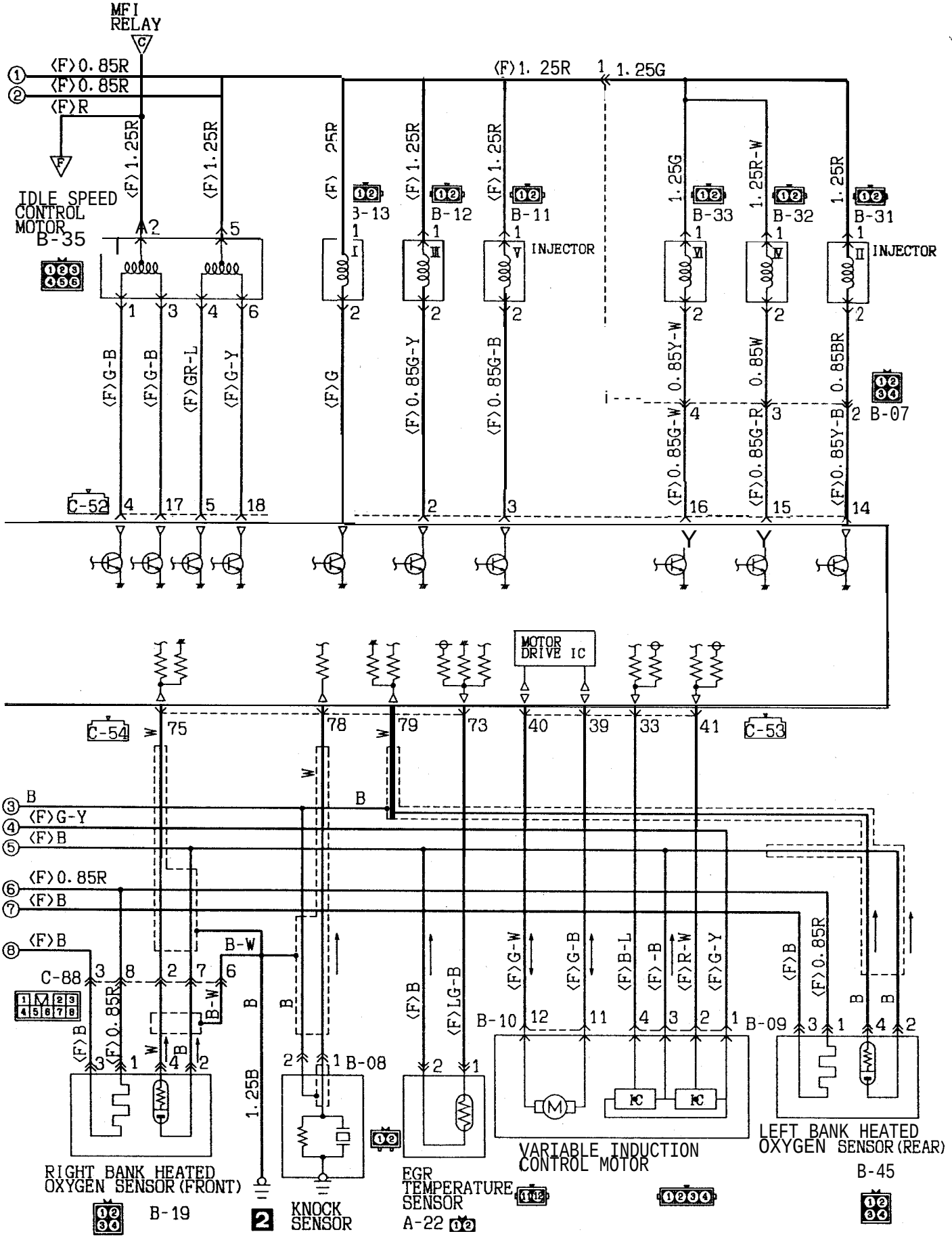


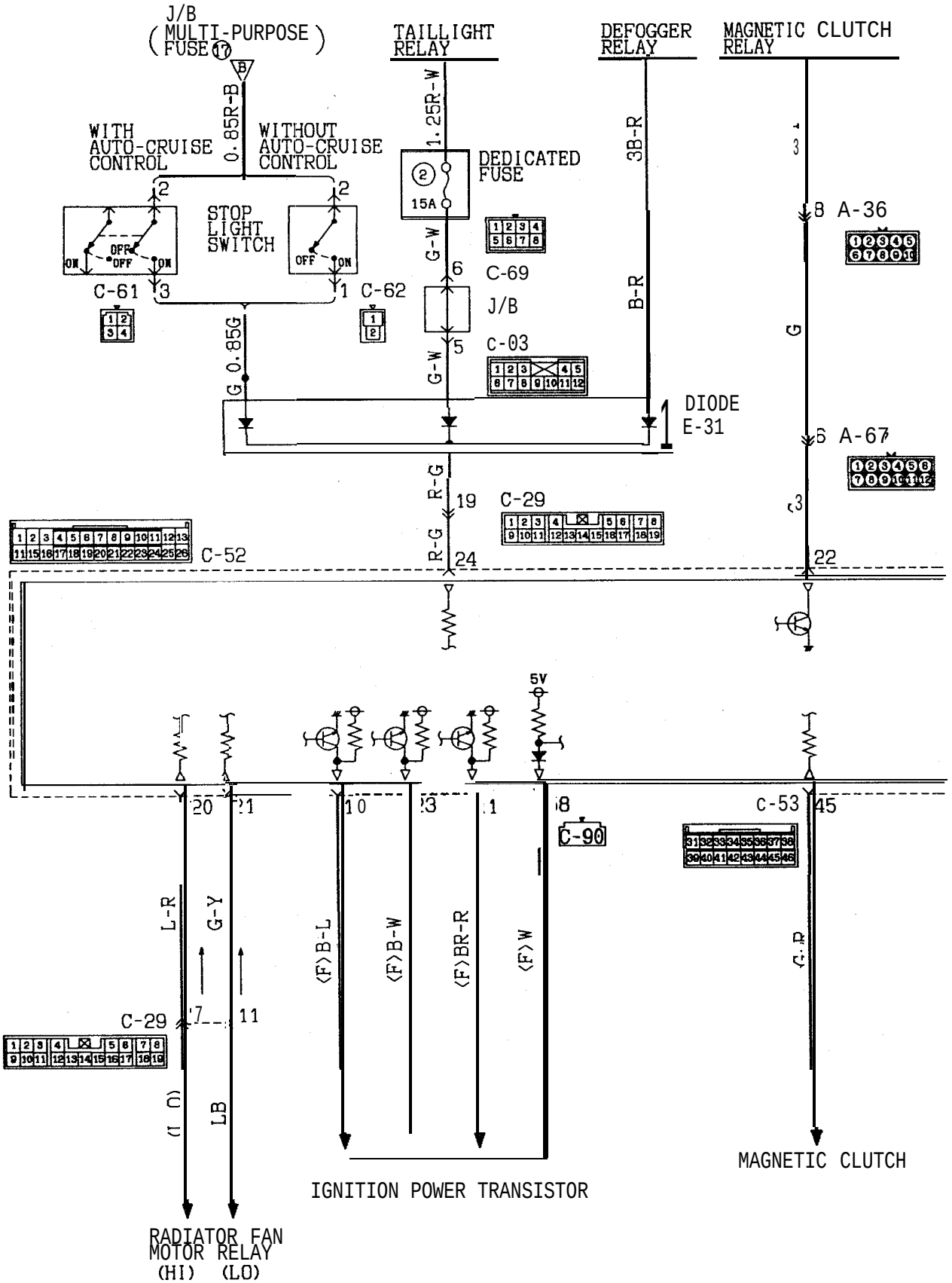
CIRCUIT DIAGRAM <Non-Turbo> (CONTINUED)



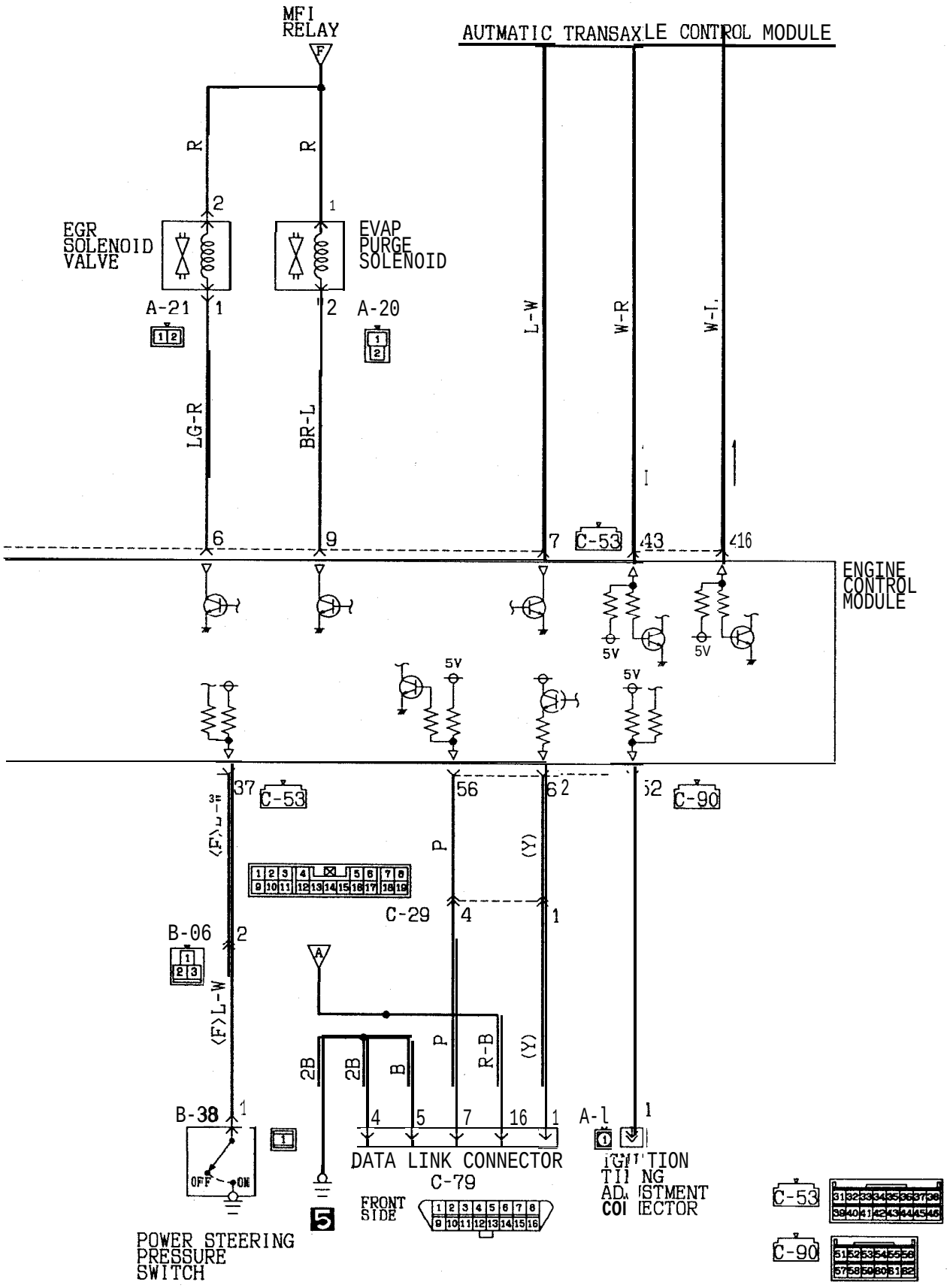

VOLUME AIR FLOW SENSOR B-29
INTAKE AIR TEMPERATURE SENSOR
ATMOSPHERIC SENSOR
VOLUUME AIR FLOW SENSOR
CAMSHAFT POSITION SENSOR
CRANKSHAFT POSITION SENSOR
B-40
B-41
C-54
C-52
C-90
ENGINE CONTROL MODULE
C-53
LEFTBANK HEATED OXYGEN SENSOR (FRONT) B-16
THROTTLE POSITION SENSOR B-05
ENGINE COOLANT TEMPERATURE SENSOR B-02
RIGHT BANK HEATED OXYGEN SENSOR (REAR) B-44
5V
GND
ON
OFF
KX35-AC-R0503A-N4C

CIRCUIT DIAGRAM <Non-Turbo> (CONTINUED)



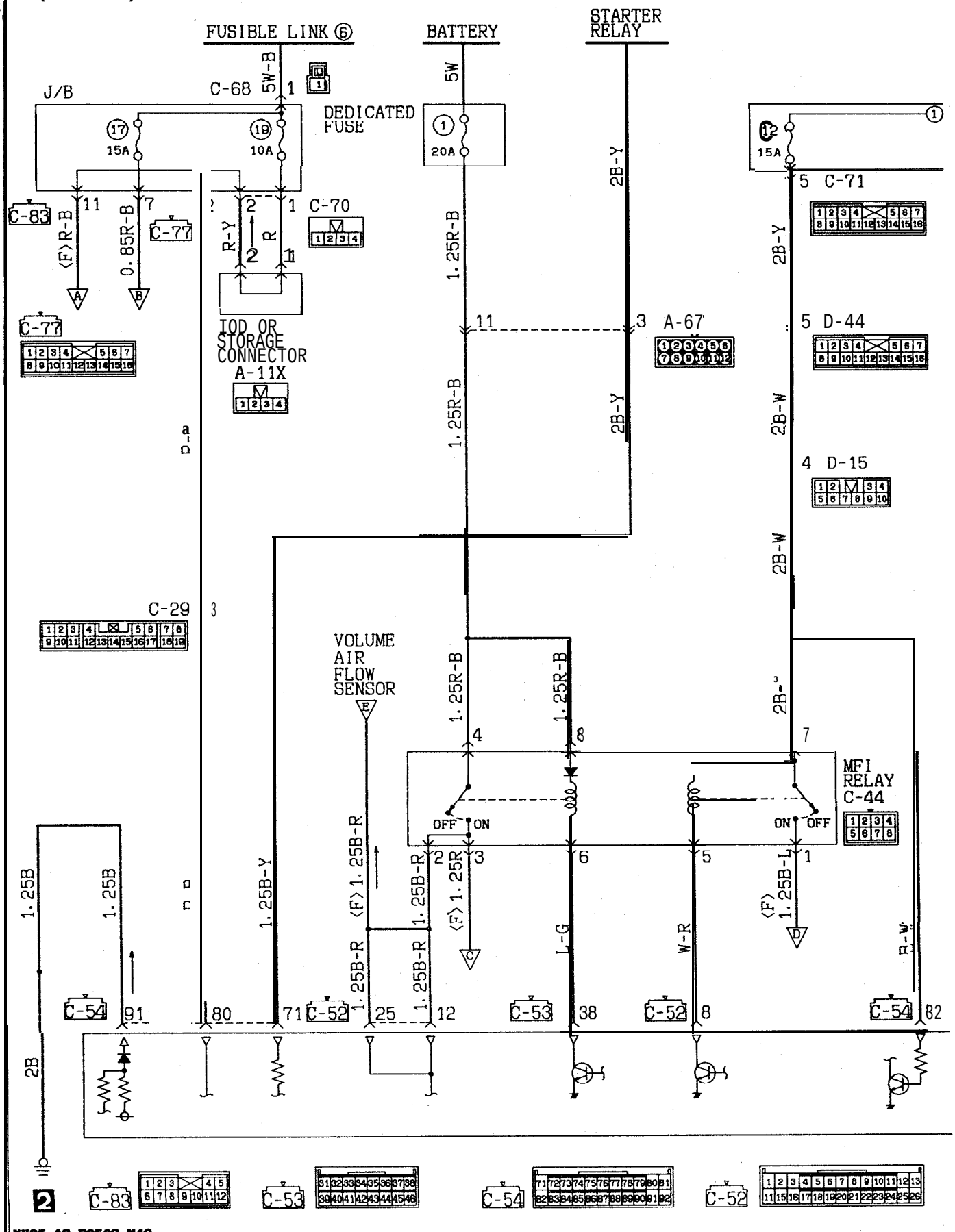

J/B
(MULTI-PURPOSE FUSE 17)
TAILLIGHT RELAY
DEFOGGER RELAY
MAGNETIC CLUTCH RELAY
WITH AUTO-CRUISE CONTROL
WITHOUT AUTO-CRUISE CONTROL
0.85R-B
1.25R-W
DEDICATED FUSE
15A
STOP LIGHT SWITCH
C-61
C-62
C-69
J/B
C-03
G 0.85G
G-W
3B-R
B-R
G
DIODE E-31
B A-36
B A-67
R-G
C-29
C-52
5V
C-90
C-53
L-R
G-Y
(F)B-L
(F)B-W
(F)BR-R
(F)W
LB
IGNITION POWER TRANSISTOR
MAGNETIC CLUTCH
RADIATOR FAN MOTOR RELAY
(HI) (LO)

CIRCUIT DIAGRAM <Non-Turbo> (CONTINUED)



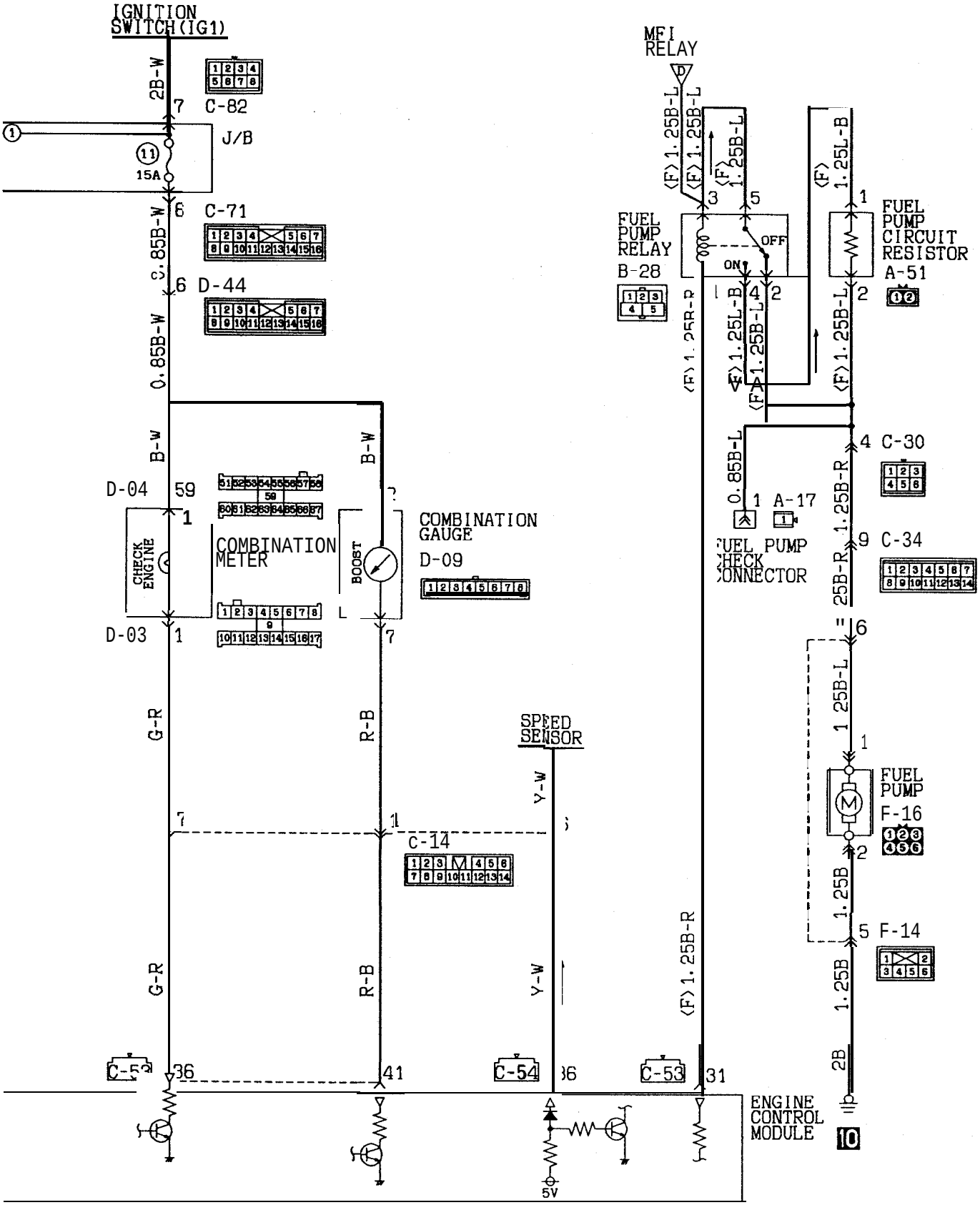
CIRCUIT DIAGRAM <Turbo>

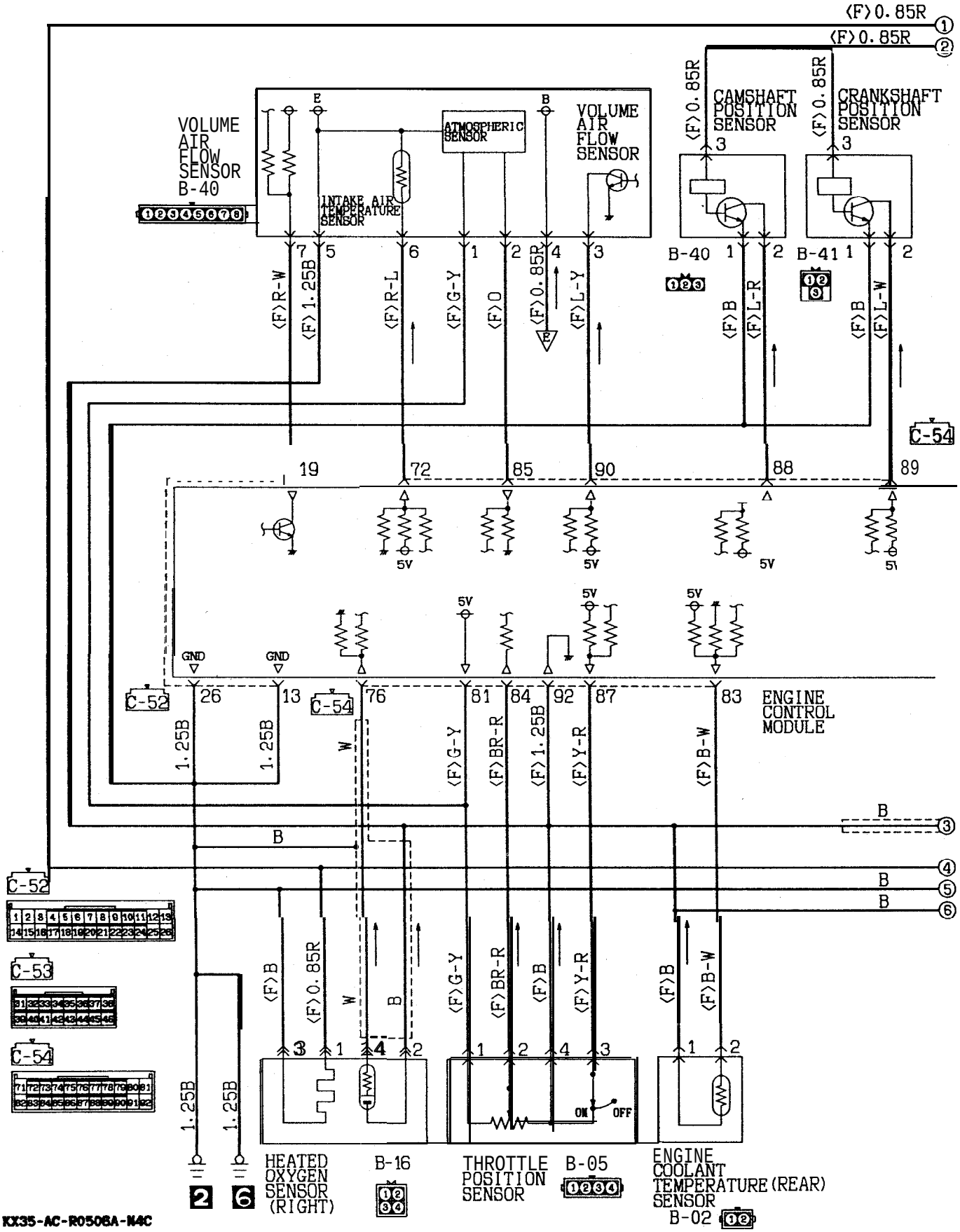
(FEDERAL)



KX35-AC-R0506-N4C

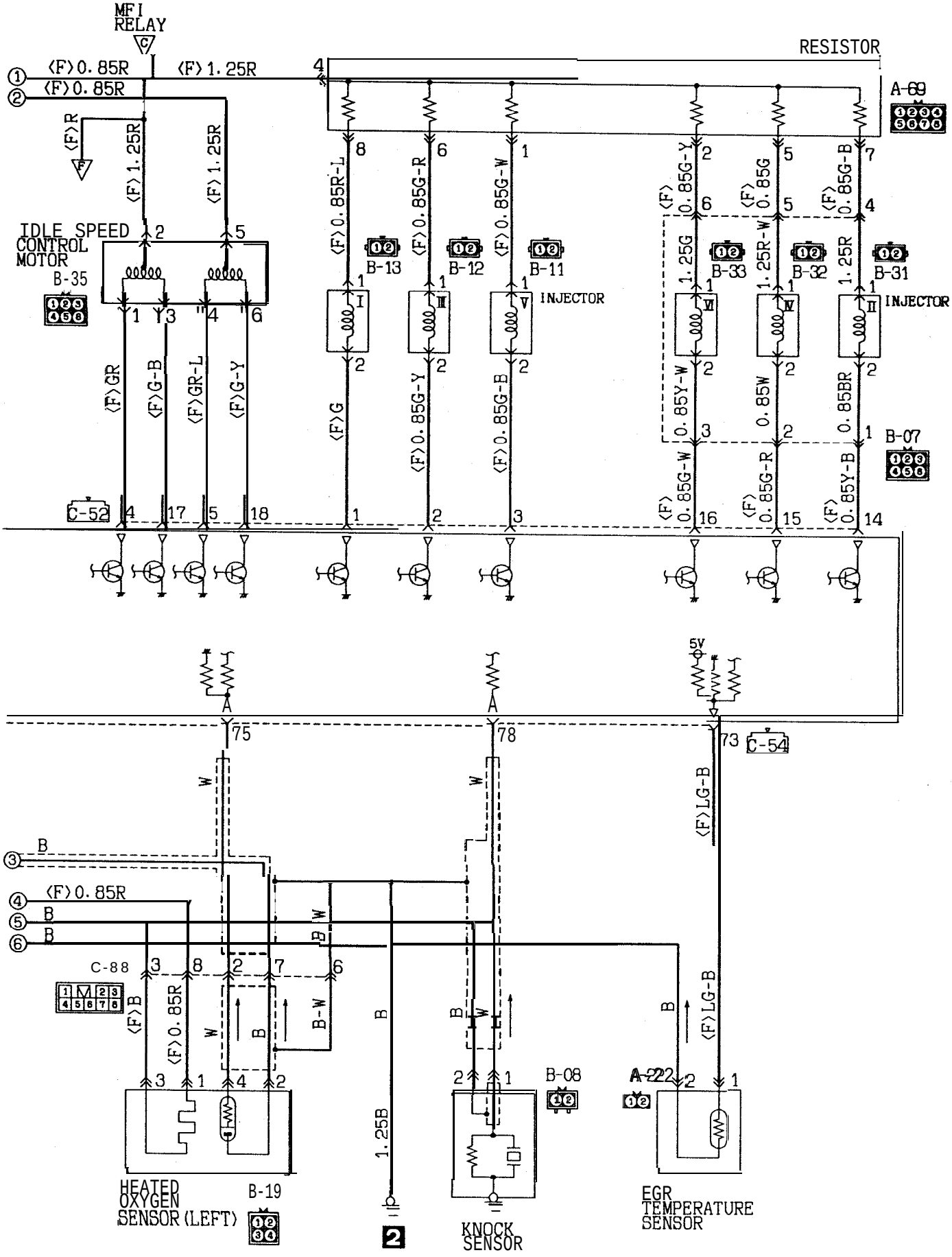
CIRCUIT DIAGRAM <Turbo> (CONTINUED)

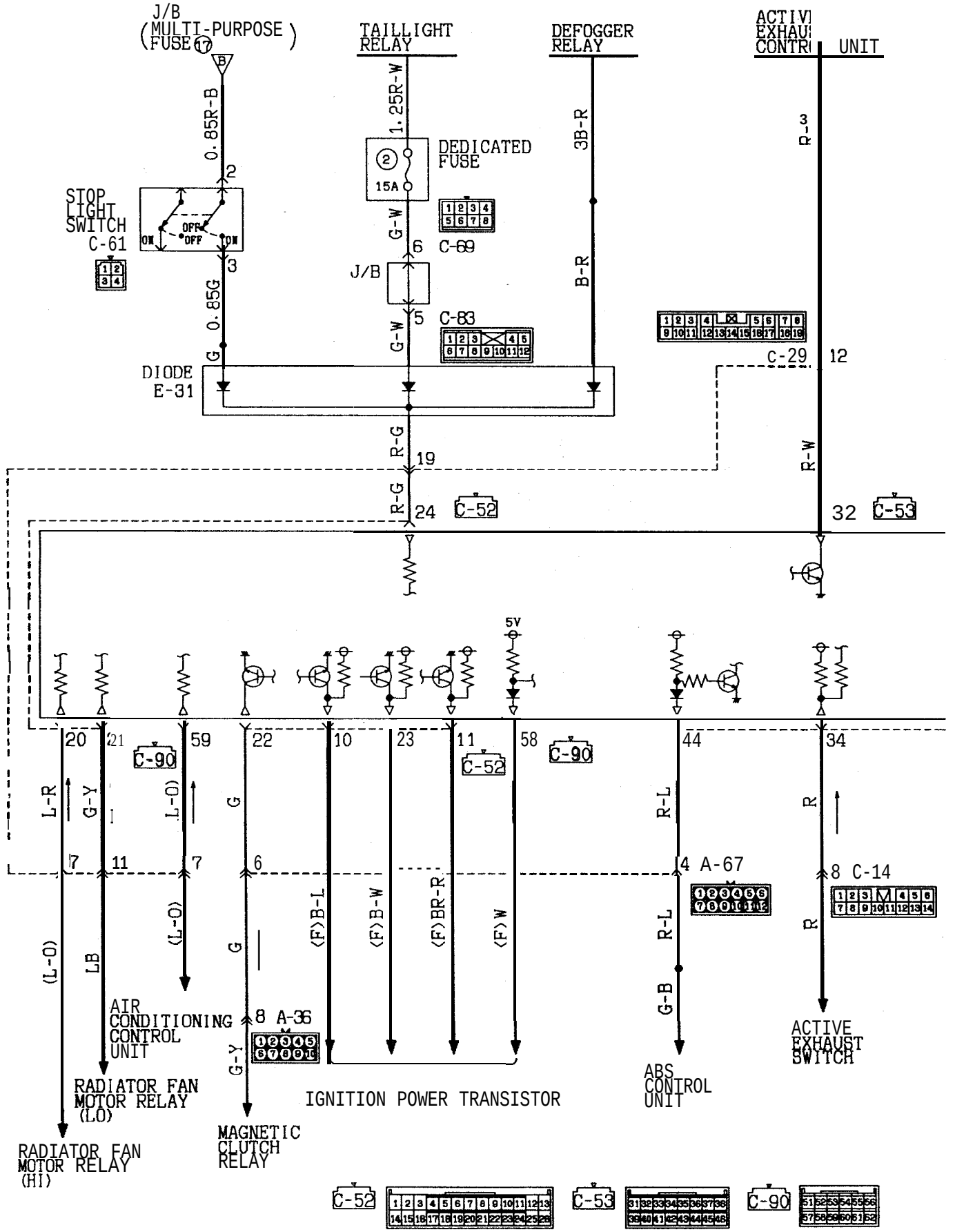




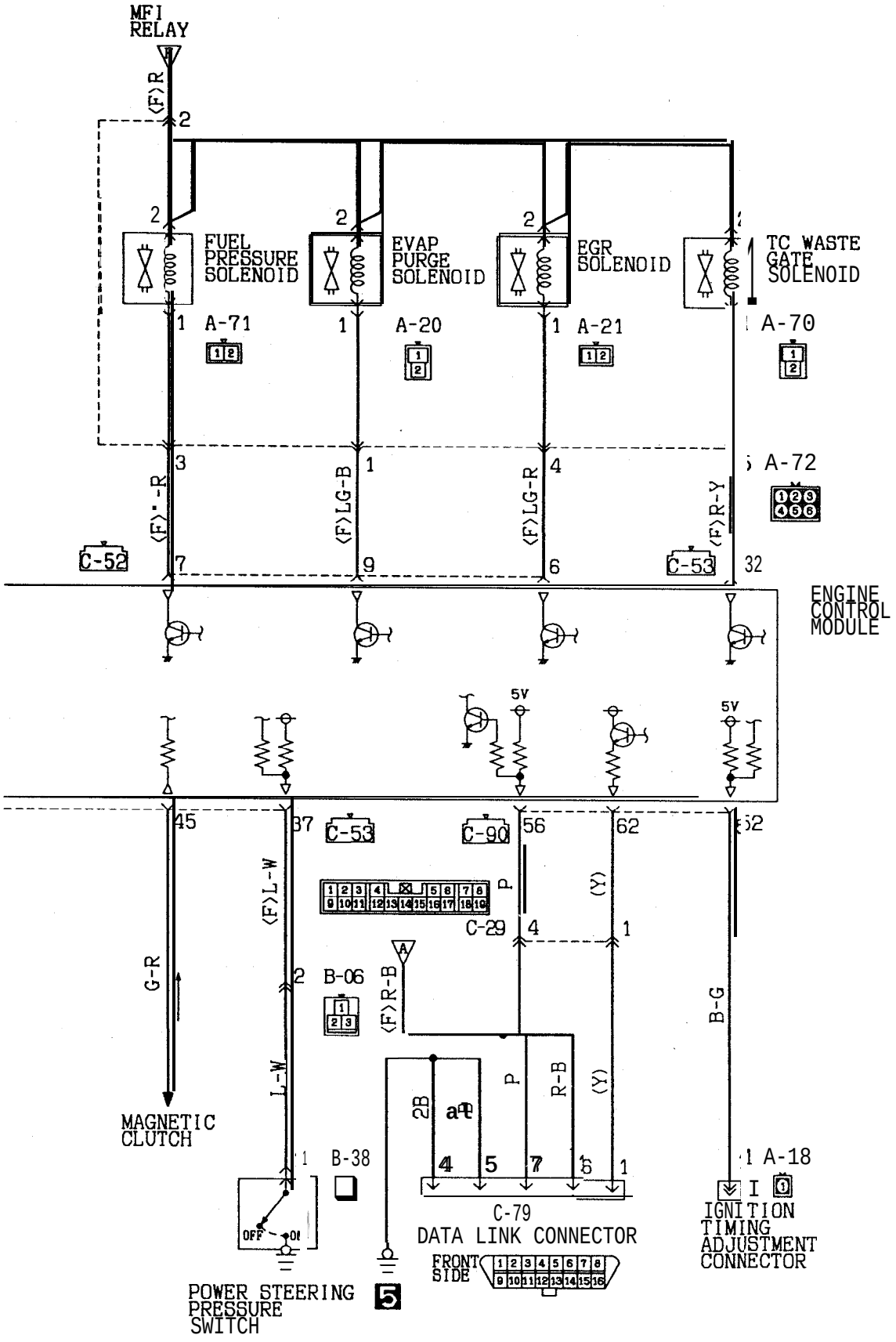
KX35-AC-R0506A-N4C

CIRCUIT DIAGRAM <Turbo> (CONTINUED)



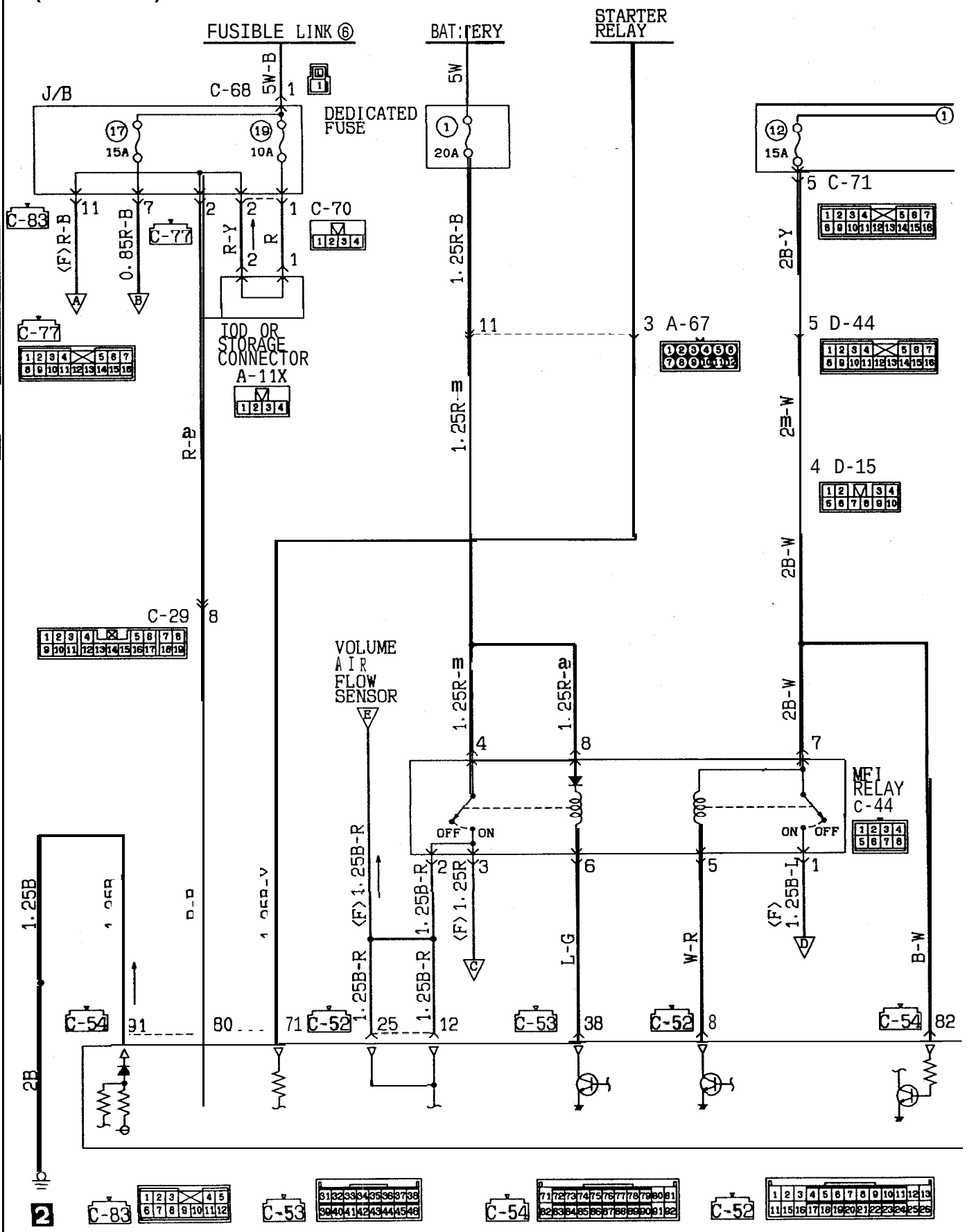

J/B
(MULTI-PURPOSE FUSE 17)
TAILLIGHT RELAY
DEFOGGER RELAY
ACTIV EXHAU CONTR UNIT
0.85R-B
1.25R-W
3B-R
R-3
DEDICATED FUSE
15A
STOP LIGHT SWITCH C-61
OFF
ON
G-W
C-69
J/B
B-R
0.85G
G-W
C-83
C-29
12
DIODE E-31
R-G
19
R-W
R-G
24
C-52
32
C-53
5V
20
21
C-90
59
22
10
23
11
C-52
58
C-90
44
34
L-R
G-Y
L-O
G
R-L
R
7
11
7
6
4 A-67
8 C-14
(L-O)
LB
(L-O)
G
(F)B-L
(F)B-W
(F)BR-R
(F)W
R-L
R
G-B
AIR CONDITIONING CONTROL UNIT
8 A-36
G-Y
RADIATOR FAN MOTOR RELAY (LO)
IGNITION POWER TRANSISTOR
ABS CONTROL UNIT
ACTIVE EXHAUST SWITCH
RADIATOR FAN MOTOR RELAY (HI)
MAGNETIC CLUTCH RELAY
C-52
C-53
C-90

CIRCUIT DIAGRAM <Turbo> (CONTINUED)



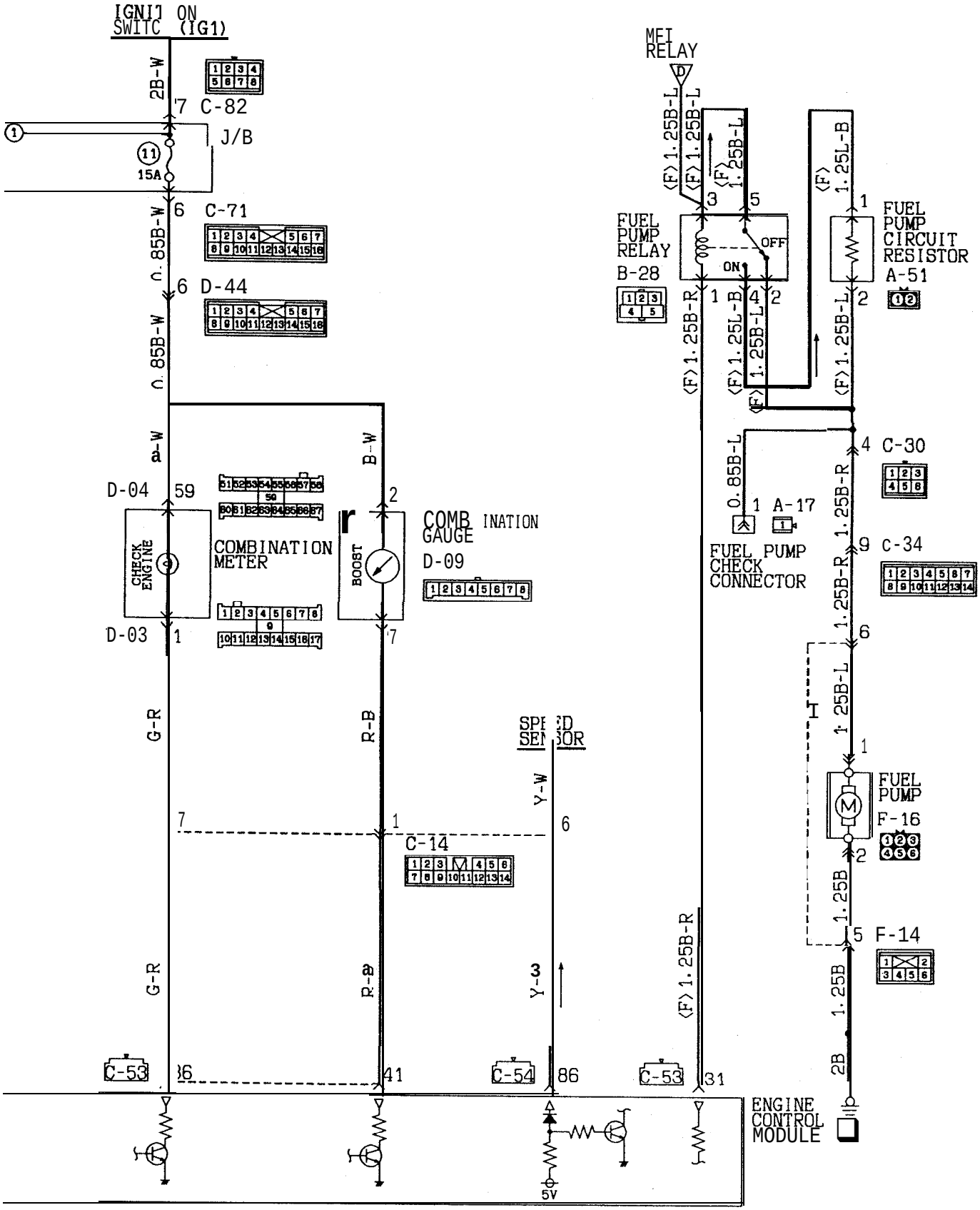
CIRCUIT DIAGRAM <Turbo>

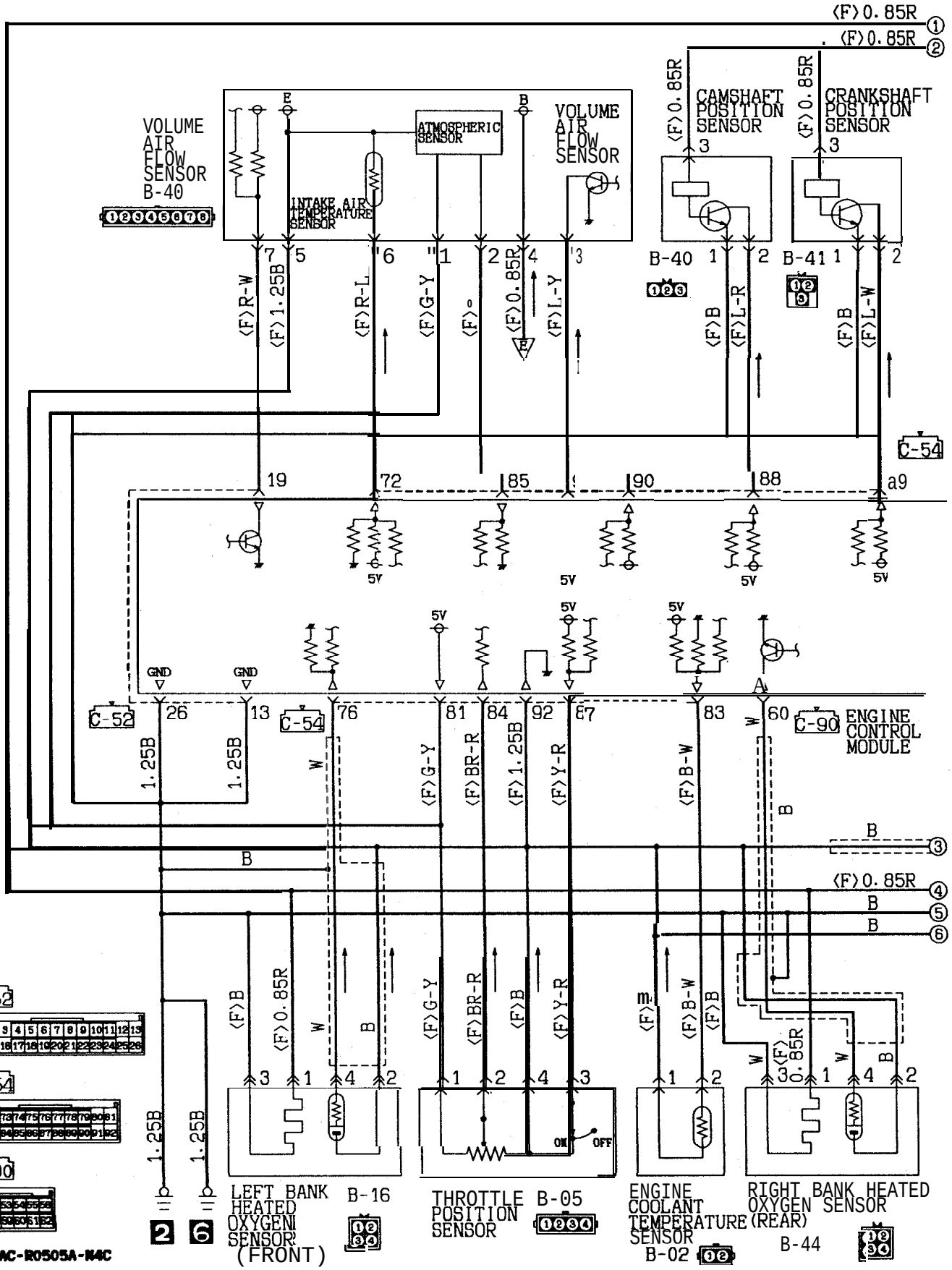
(CALIFORNIA)



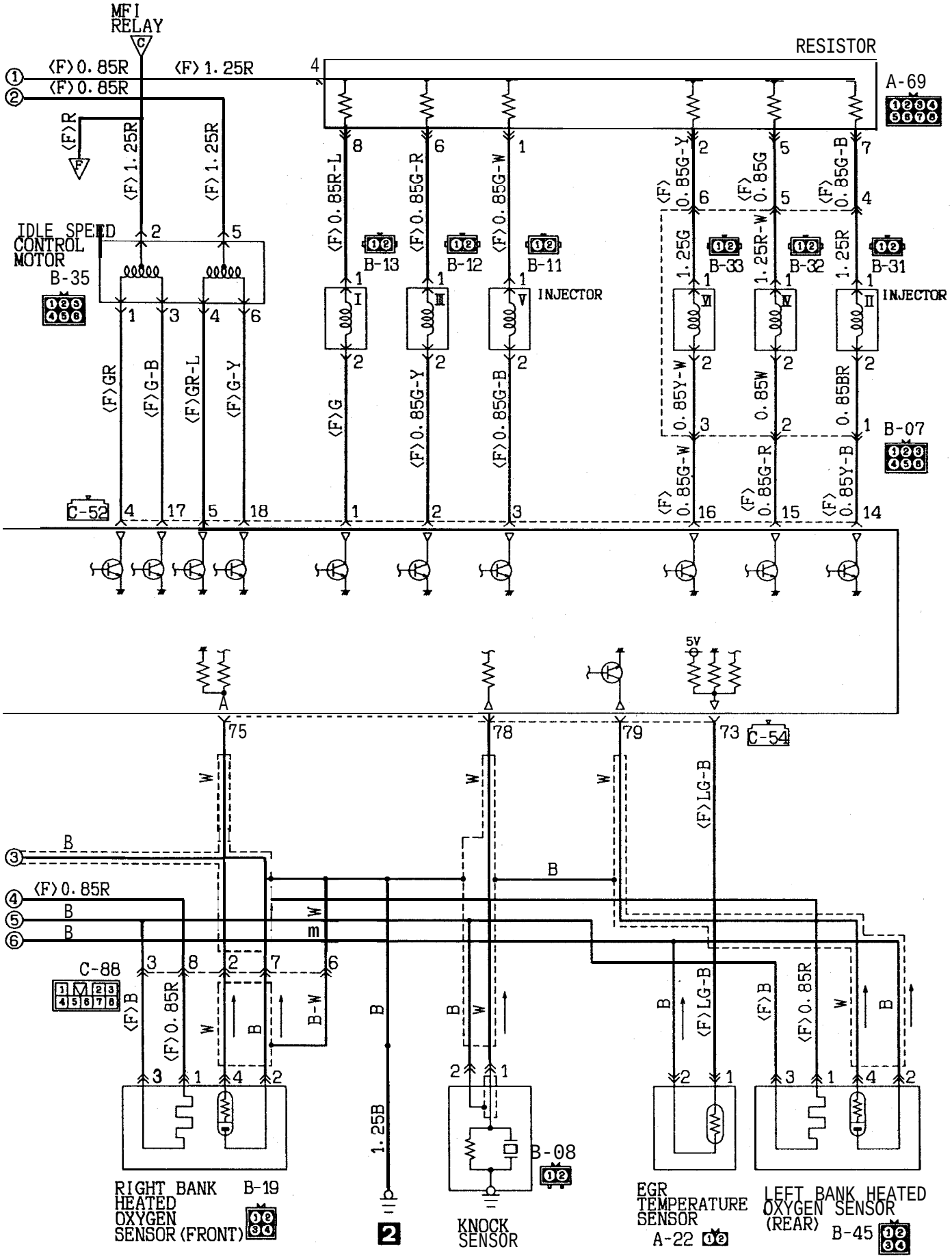
KX35-AC-R0505-N4C

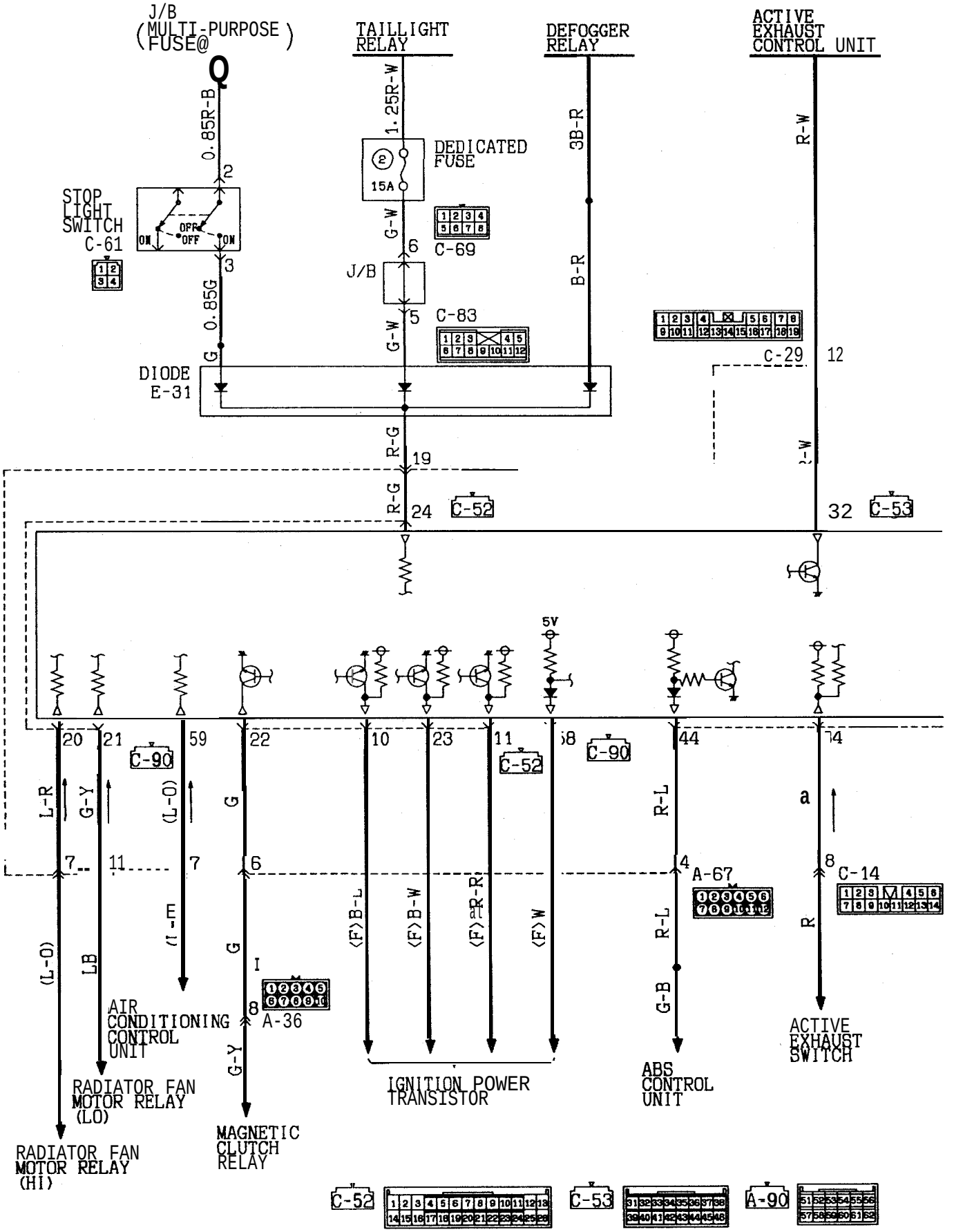
CIRCUIT DIAGRAM <Turbo> (CONTINUED)



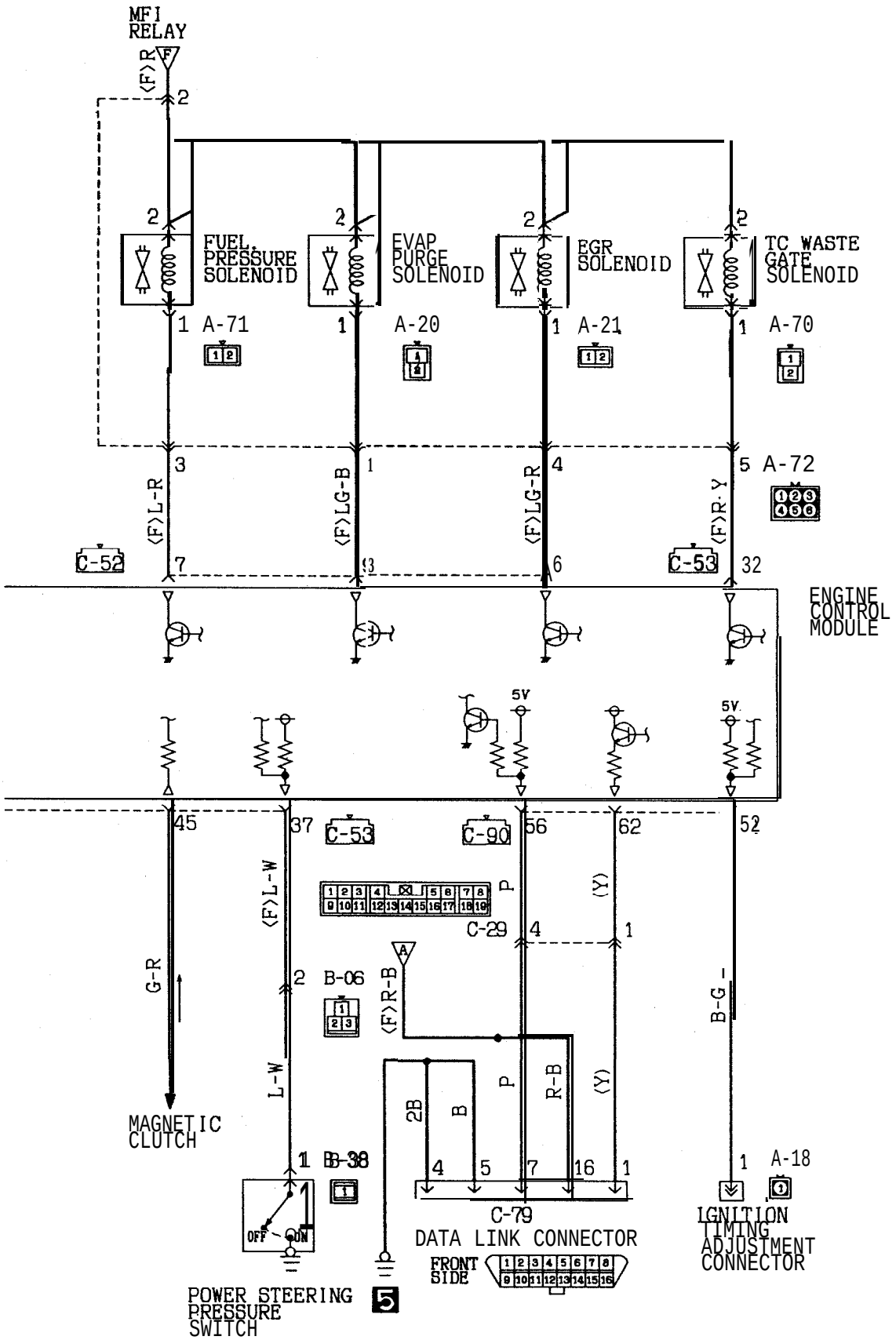

VOLUME AIR FLOW SENSOR B-40
ATMOSPHERIC SENSOR
INTAKE AIR TEMPERATURE SENSOR
VOLUME AIR FLOW SENSOR
CAMSHAFT POSITION SENSOR
CRANKSHAFT POSITION SENSOR
B-40
B-41
C-54
C-52
C-90
ENGINE CONTROL MODULE
LEFT BANK HEATED OXYGEN SENSOR (FRONT) B-16
THROTTLE POSITION SENSOR B-05
ENGINE COOLANT TEMPERATURE SENSOR B-02
RIGHT BANK HEATED OXYGEN SENSOR (REAR) B-44
5V
GND
ON
OFF
KX35-AC-R0505A-N4C

CIRCUIT DIAGRAM <Turbo> (CONTINUED)




J/B
(MULTI-PURPOSE FUSE@)
TAILLIGHT RELAY
DEFOGGER RELAY
ACTIVE EXHAUST CONTROL UNIT
0.85R-B
1.25R-W
3B-R
R-W
DEDICATED FUSE
15A
STOP LIGHT SWITCH C-61
OFF
ON
G-W
C-69
J/B
B-R
0.85G
C-83
C-29
12
DIODE E-31
R-G
19
24
C-52
32
C-53
5V
20
21
C-90
59
22
10
23
11
C-52
8
C-90
44
4
L-R
G-Y
(L-O)
G
R-L
a
7
11
7
6
4
A-67
8
C-14
(L-O)
LB
(L-G)
G
(F)B-L
(F)B-W
(F)R-R
(F)W
R-L
R
I
G-B
8
A-36
AIR CONDITIONING CONTROL UNIT
G-Y
RADIATOR FAN MOTOR RELAY (LO)
MAGNETIC CLUTCH RELAY
IGNITION POWER TRANSISTOR
ABS CONTROL UNIT
ACTIVE EXHAUST SWITCH
RADIATOR FAN MOTOR RELAY (HI)
C-52
C-53
A-90

CIRCUIT DIAGRAM <Turbo> (CONTINUED)



SERVICE ADJUSTMENT PROCEDURES

BASIC IDLE SPEED ADJUSTMENT

NOTE

(1) The basic idle speed has been factory-adjusted with the engine speed adjusting screw and does not normally require adjustment.

(2) If adjustment has been disturbed, or if the idle speed is too high or it drops owing to application of air conditioning load to the engine, perform the following step to make adjustment.

(3) If the adjustment is required, first check that the ignition plug, injector, idle air control motor, and compression pressure are normal.

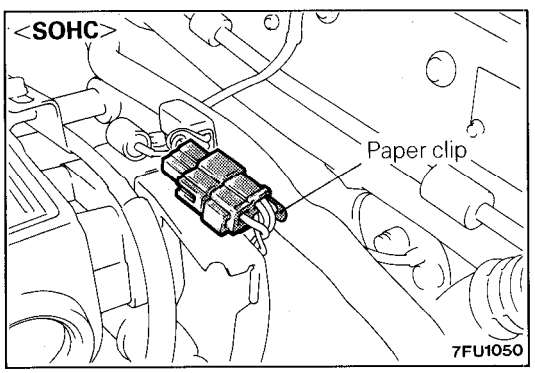
(1) Before starting the inspection and adjustment procedures, set the vehicle in the following conditions:

- Engine coolant temperature: 80 to 95°C (176 to 205°F)
- Lights, electric cooling fan, accessories: OFF
- Transaxle: Neutral (P range on vehicles with automatic transaxle)
- Steering wheel: Straightforward position

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

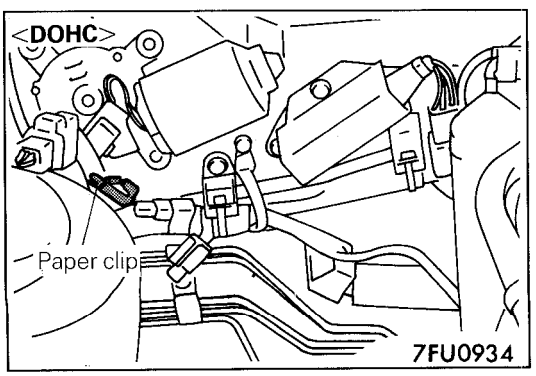
NOTE

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



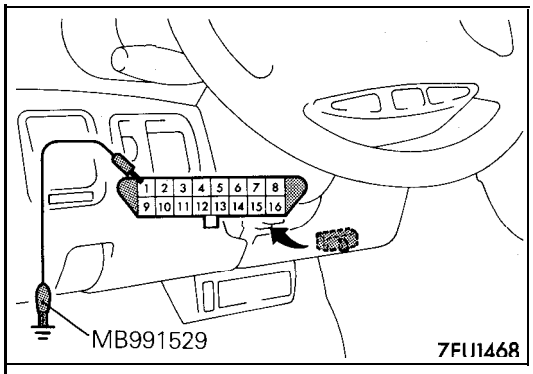
(3) If not using the scan tool, proceed as follows:

① Install a paper clip to the 3-pin connector from the harness side as shown in the illustration. Do not disconnect the connector. <SOHC>

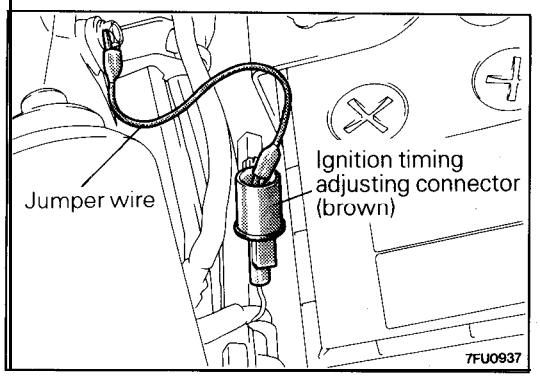


① Insert a paper clip into the l-pin blue connector as shown in the illustration. <DOHC>

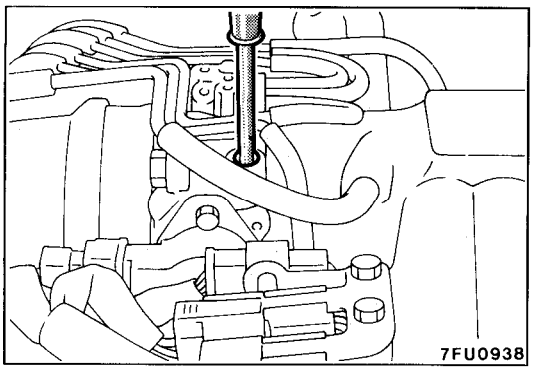
② Connect a primary-voltage-detecting tachometer to the paper clip.



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



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



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

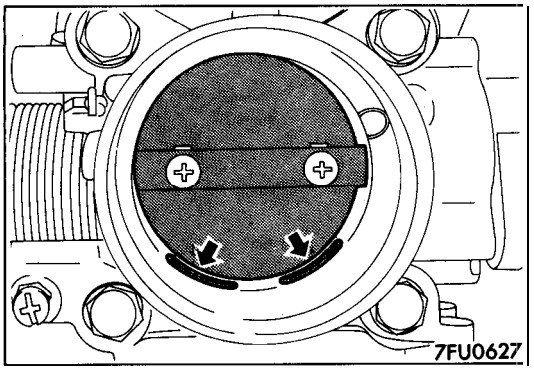
Basic idle speed: 700 ± 50 rpm

NOTE
1. The engine speed may be low by 20 to 100 rpm while the vehicle is new [distance driven approx. 500 km (300 miles) or less], but no adjustment is necessary.
2. If the engine stalls or speed is low despite a sufficient distance driven [approx. 500 km (300 miles) or morel, it is probably due to deposits on the throttle valve. In this case, clean the throttle valve. (Refer to P.14A-65.)
3. The tachometer should read 1/3 of the actual engine speed. This means that the actual engine speed is the tachometer reading multiplied by 3.

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

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

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



THROTTLE BODY (THROTTLE VALVE AREA) CLEANING

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

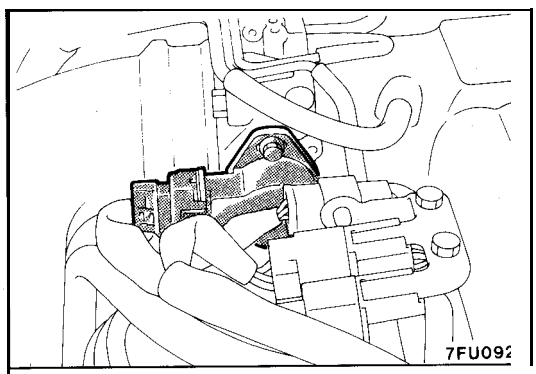
Caution
Never allow cleaning agent to flow into the bypass passage.

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

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

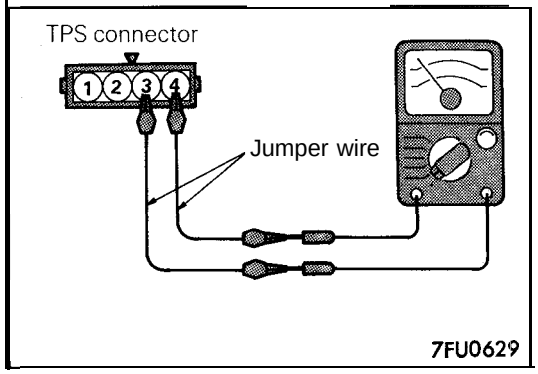
(6) If the deposit cannot be removed from the throttle valve, repeat steps (4) and (5).
(7) Disconnect the plug from the inlet of the bypass passage.
(8) Install the air intake hose.
(9) Use a scan tool. to erase the diagnostic trouble code or disconnect the battery ground cable for more than 10 seconds and then connect it again.
(lO)Adjust the basic idle speed (speed adjusting screw). (Refer to P. 14A-63.)

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

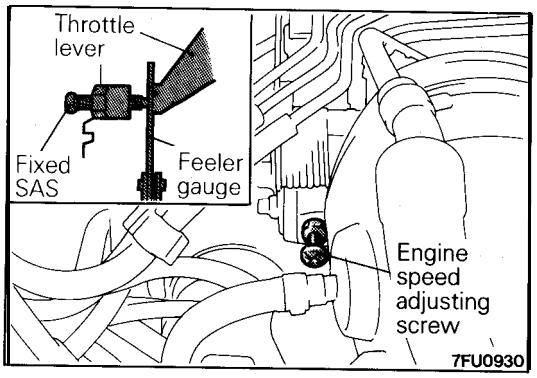


ADJUSTMENT OF CLOSED THROTTLE POSITION SWITCH AND THROTTLE POSITION SENSOR (TPS)

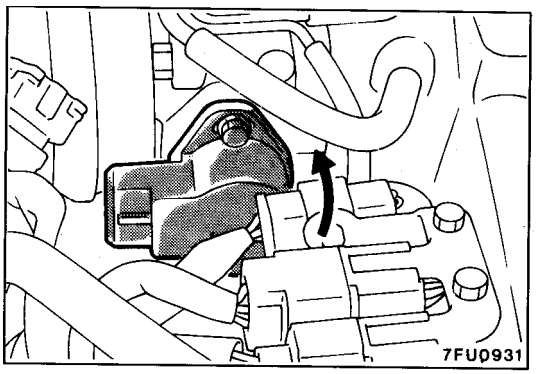
(1) Disconnect the throttle position sensor connector.



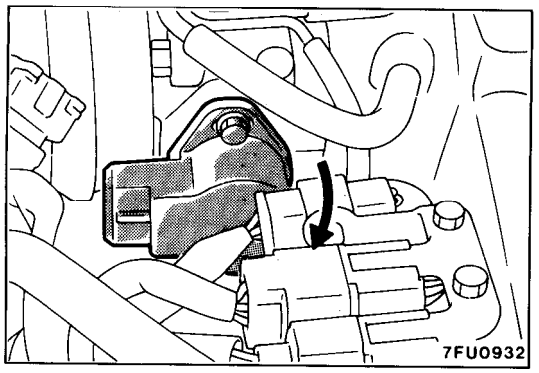
(2) Using jumper wires, connect an ohmmeter across terminal ③ (closed throttle position switch) and terminal ④ (sensor ground) of the throttle position sensor.



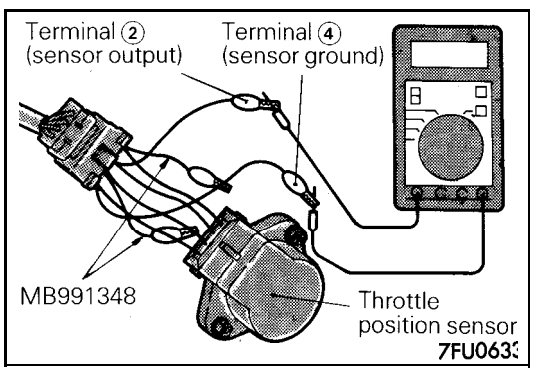
(3) Insert a 0.65-mm (.025 in.)-thick feeler gauge between the fixed SAS and throttle lever.



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



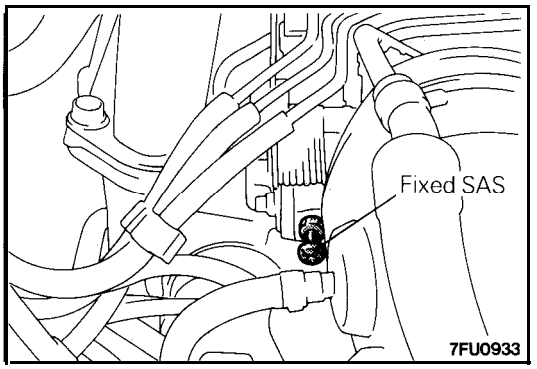
(6) Slowly turn the throttle position sensor clockwise until you find a point at which there is no continuity across terminals ③ and ④. Then, tighten the throttle position sensor mounting bolt securely.
(7) Connect the throttle position sensor connector.



(8) Connect the scan tool to the data link connector (white).
(9) If not using the scan tool, 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 teminal ④ (sensor ground).
(10) Turn the ignition switch ON (but do not start the engine).
(11) Check 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

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.14F-3.)
(7) Adjust the basic idle speed. (Refer to P.14A-63.)
(8) Adjust the closed throttle position switch and throttle position sensor (TPS). (Refer to P.14A-65.)

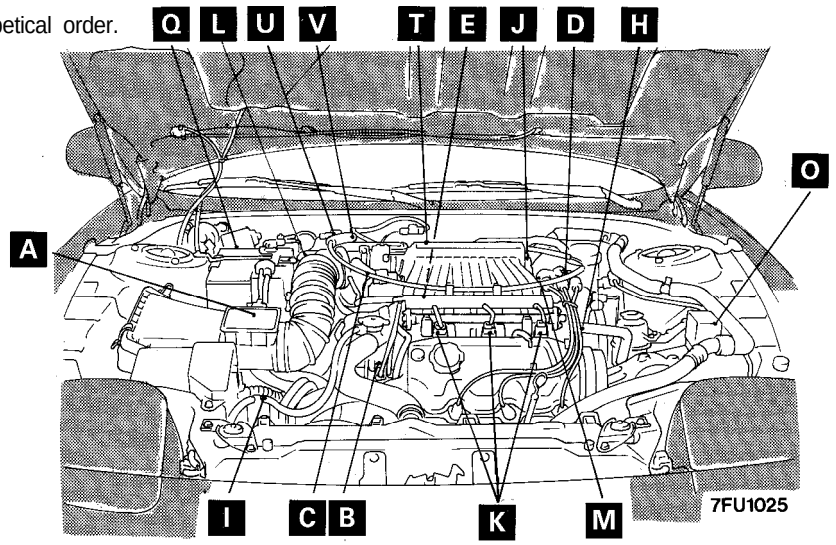
ON-VEHICLE INSPECTION OF MFI COMPONENTS <SOHC, Federal-Non Turbo, Canada-Non Turbo>

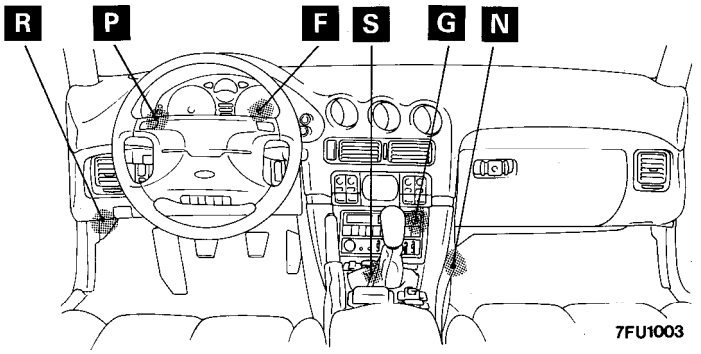
COMPONENT LOCATION

<SOHC>

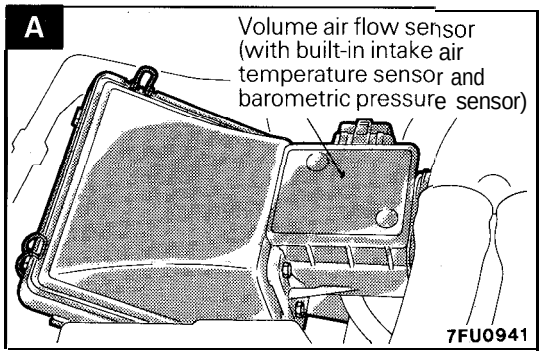
Name	Symbol	Name	Symbol
Air conditioning relay	O	Ignition coil (ignition power transistor)	M
Air conditioning switch	G	Ignition timing adjusting terminal	Q
Camshaft position sensor and crankshaft position sensor	D	Injector	K
Check engine/malfunction indicator lamp	P	Multiport fuel injection (MFI) relay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

NOTE
The "Name" column is in alphabetical order.





A



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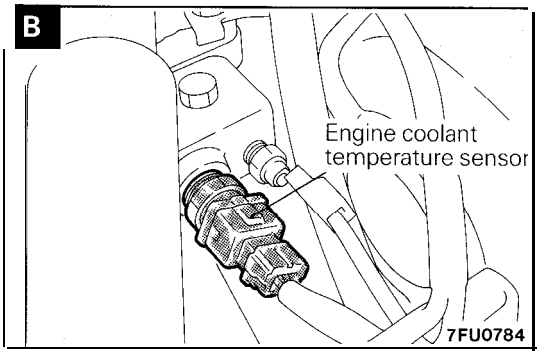

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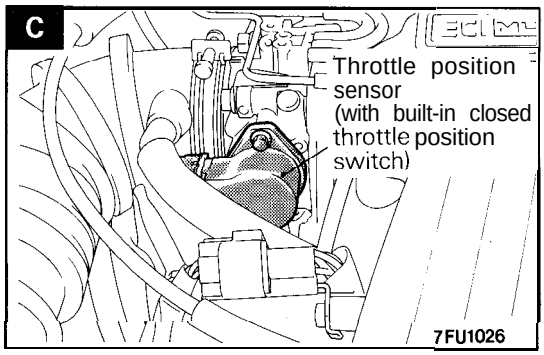

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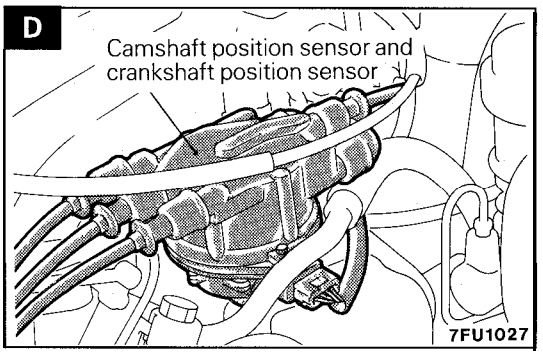
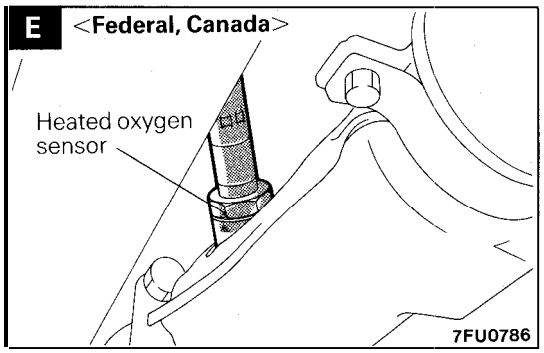
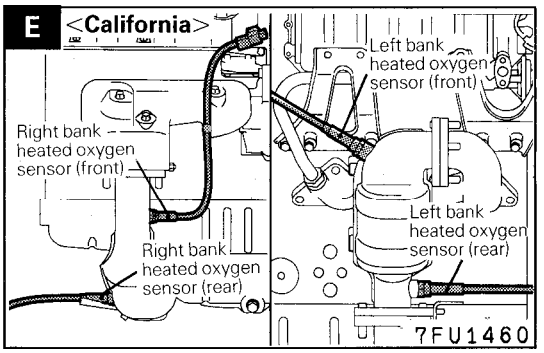


E <Federal, Canada>



E <California>



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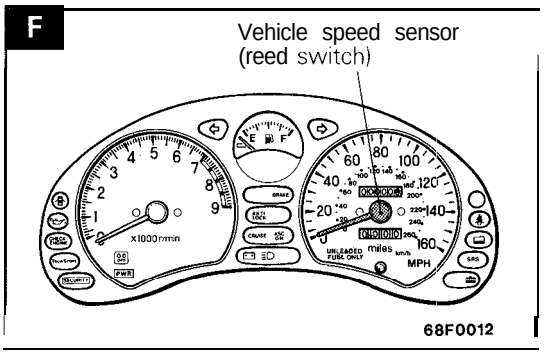

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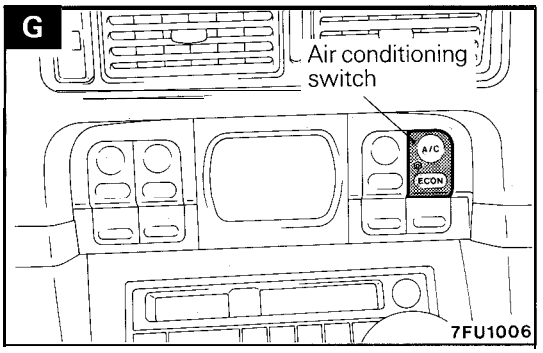

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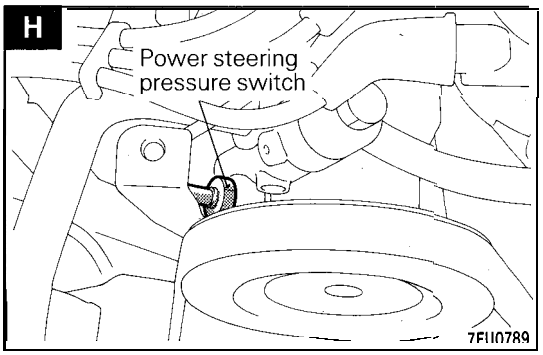

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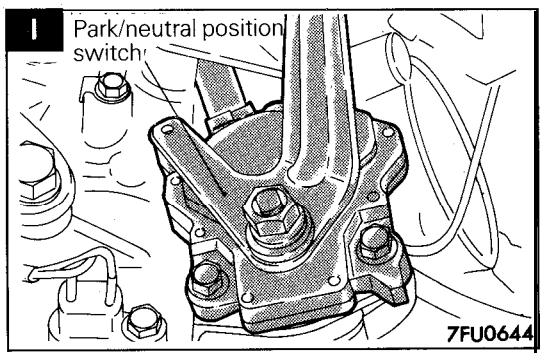

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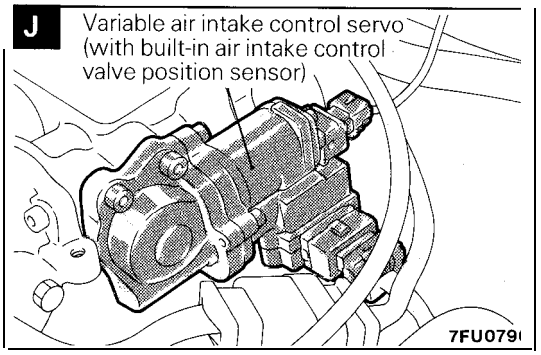
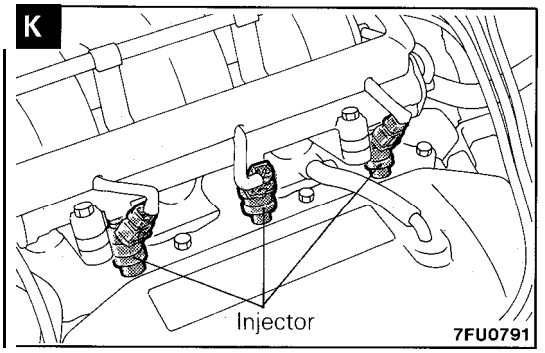
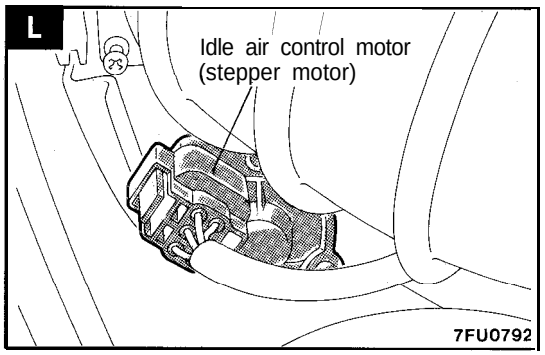

Variable air intake control servo
(with built-in air intake control
valve position sensor)
7FU079(

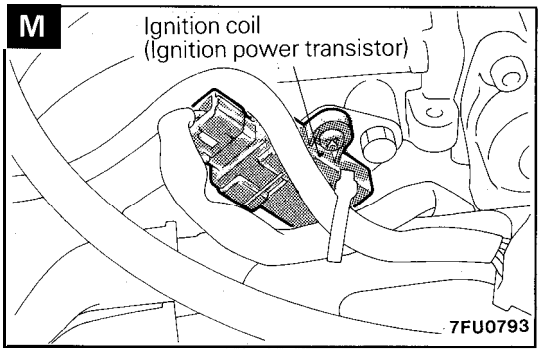
K


Injector
7FU0791

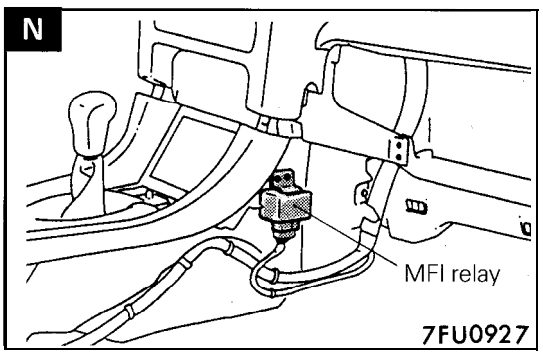
L


Idle air control motor
(stepper motor)
7FU0792

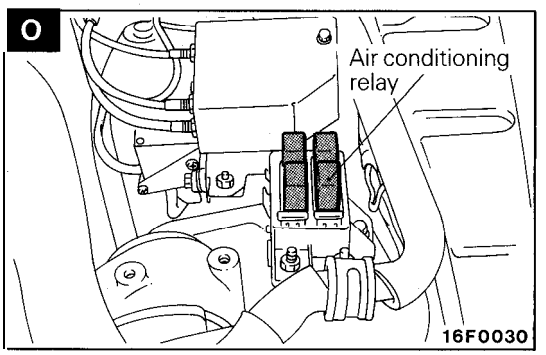
M


Ignition coil
(Ignition power transistor)
7FU0793

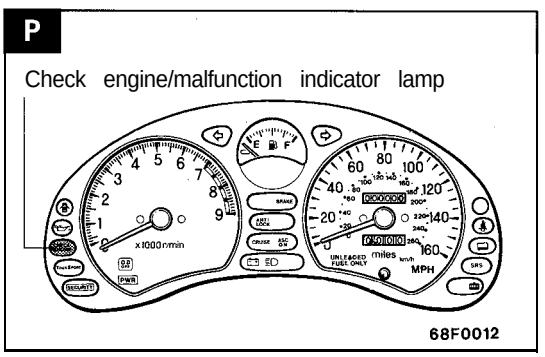
N


MFI relay
7FU0927

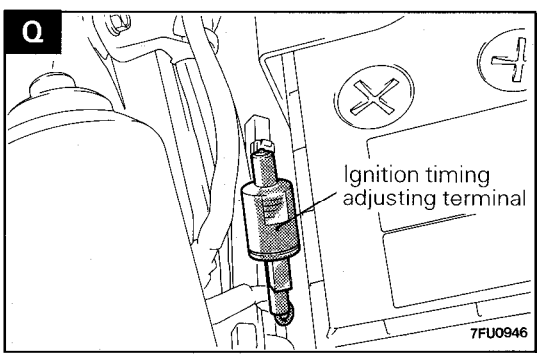
O


Air conditioning
relay
16F0030

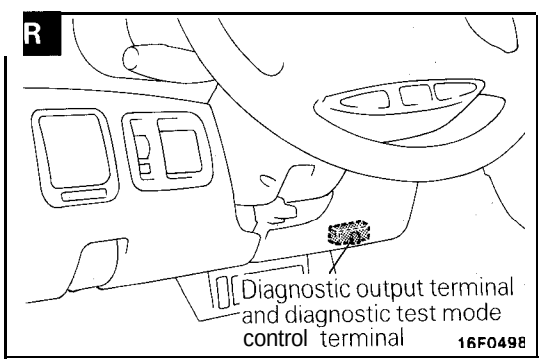
P


Check engine/malfunction indicator lamp
68F0012

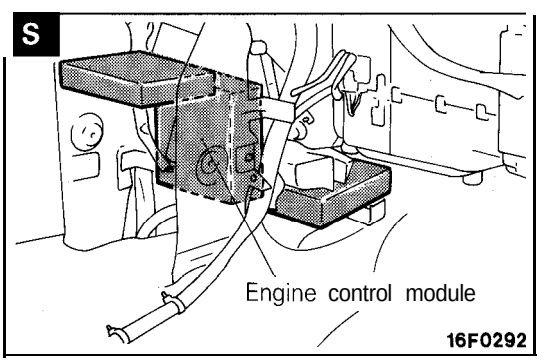
Q


Ignition timing
adjusting terminal
7FU0946

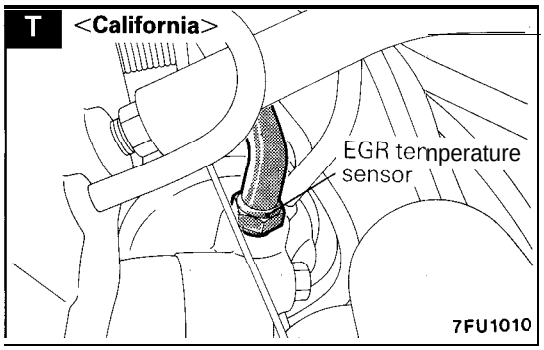
R


Diagnostic output terminal
and diagnostic test mode
control terminal
16F0498

S


Engine control module
16F0292

T <California>



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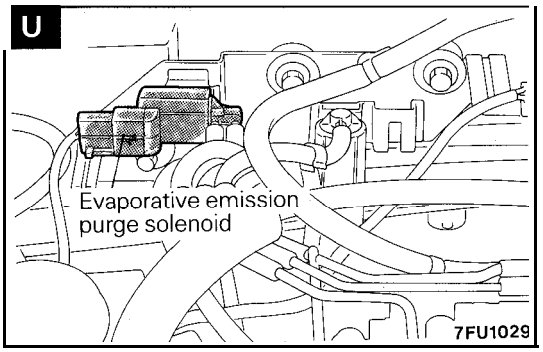
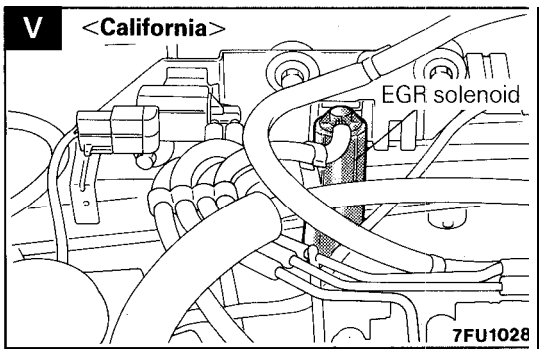


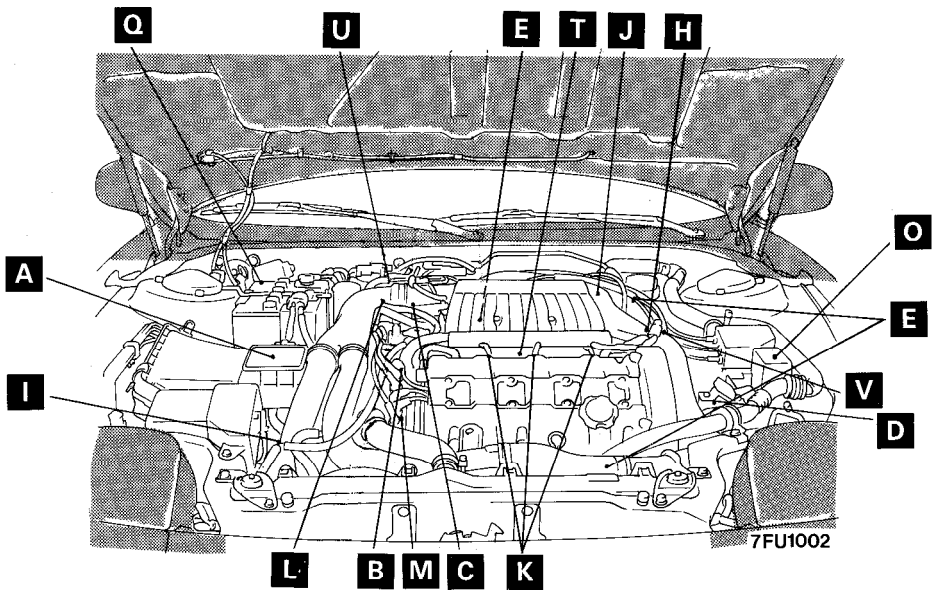
V <California>

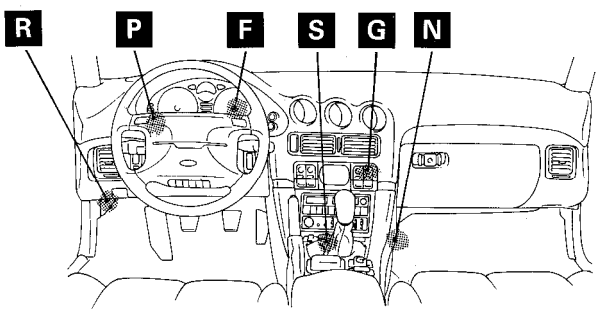


<DOHC>

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

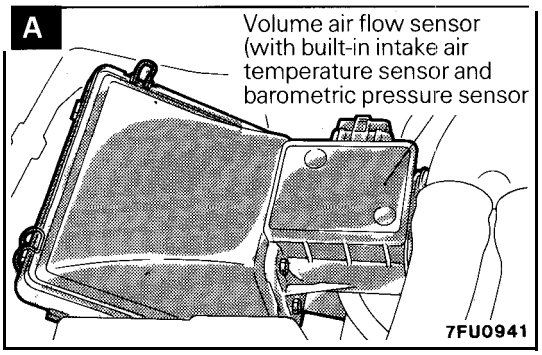
NOTE
The "Name" column is in alphabetical order



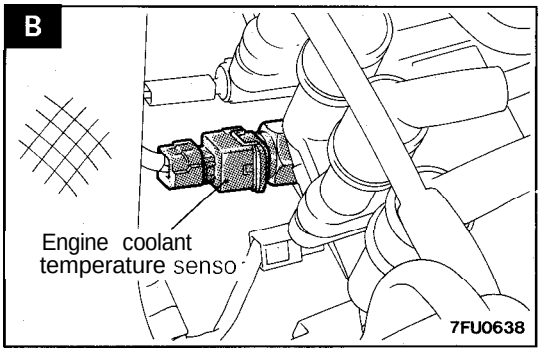


7FU1003

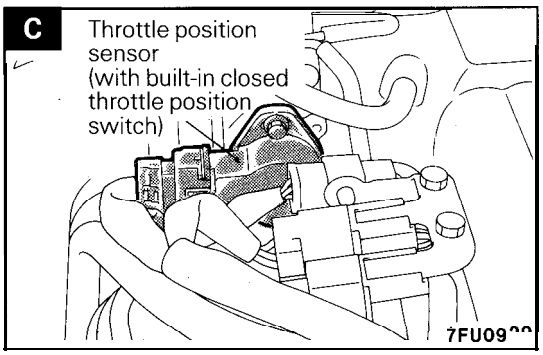
A


Volume air flow sensor
(with built-in intake air
temperature sensor and
barometric pressure sensor
7FU0941

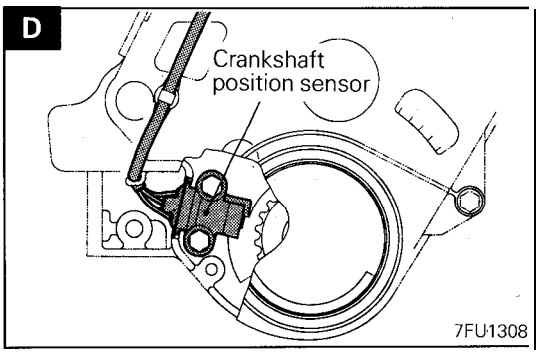
B


Engine coolant
temperature senso
7FU0638

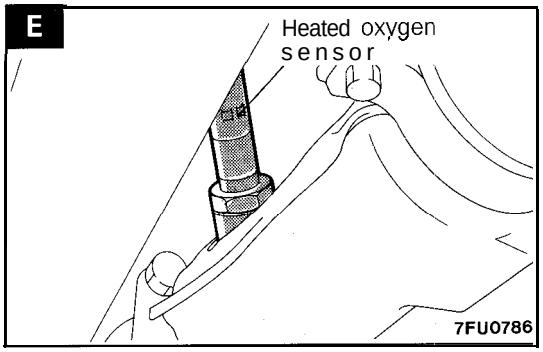
C


Throttle position
sensor
(with built-in closed
throttle position
switch)
7FU09

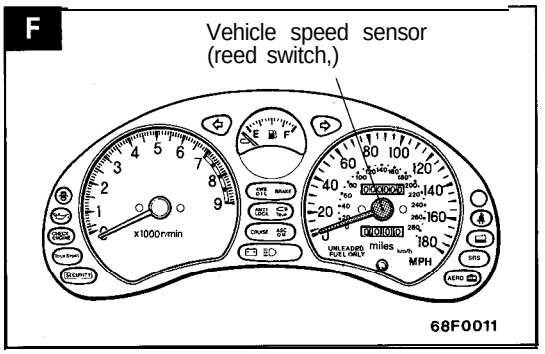
D


Crankshaft
position sensor
7FU1308

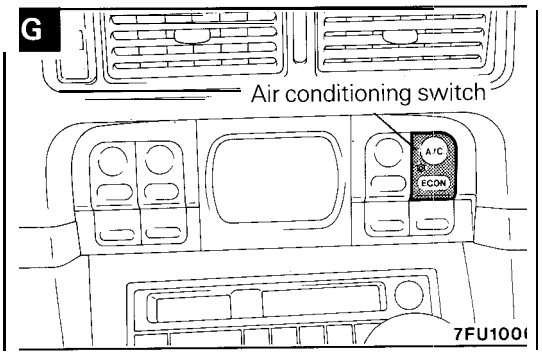
E


Heated oxygen
sensor
7FU0786

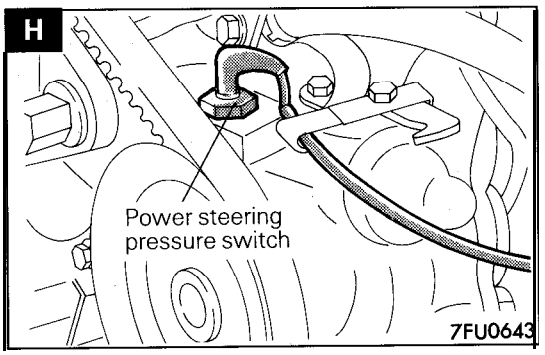
F


Vehicle speed sensor
(reed switch,)
x1000r/min
miles
MPH
68F0011

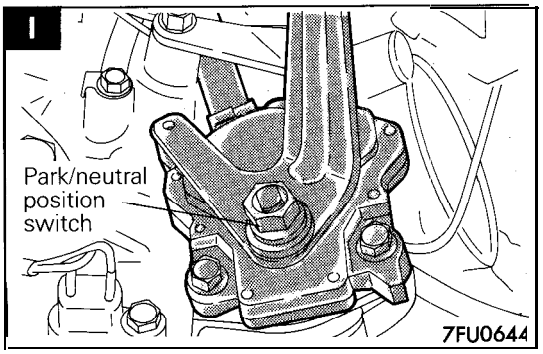
G


Air conditioning switch
A/C
ECON
7FU100

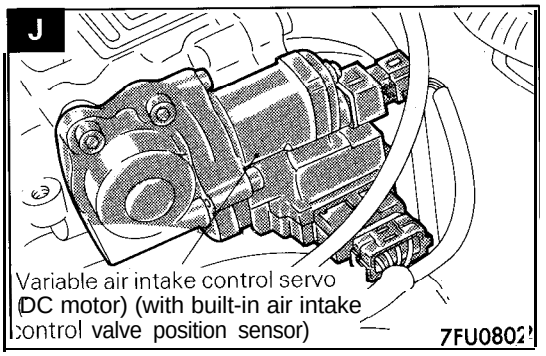
H


Power steering
pressure switch
7FU0643

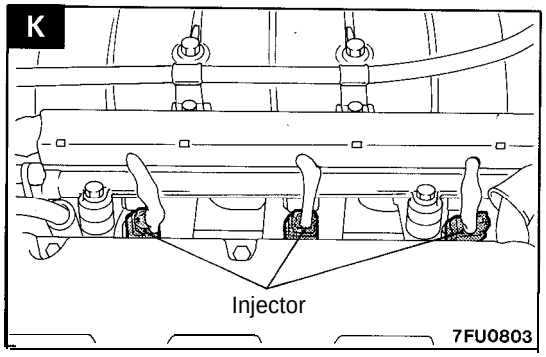
I


Park/neutral
position
switch
7FU0644

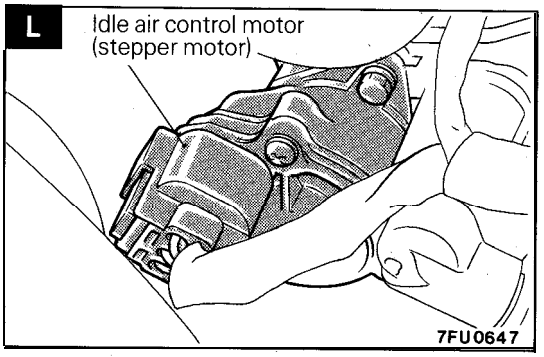
J


Variable air intake control servo
(DC motor) (with built-in air intake
control valve position sensor)
7FU0802

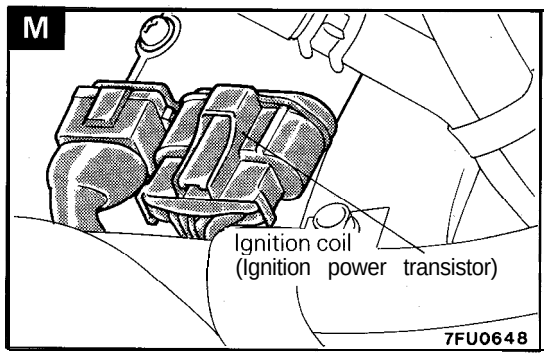
K


Injector
7FU0803

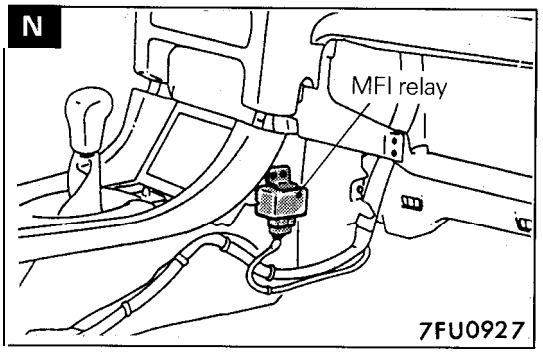
L


Idle air control motor
(stepper motor)
7FU0647

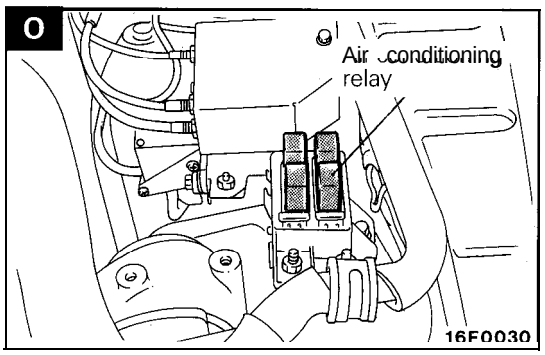
M


Ignition coil
(Ignition power transistor)
7FU0648

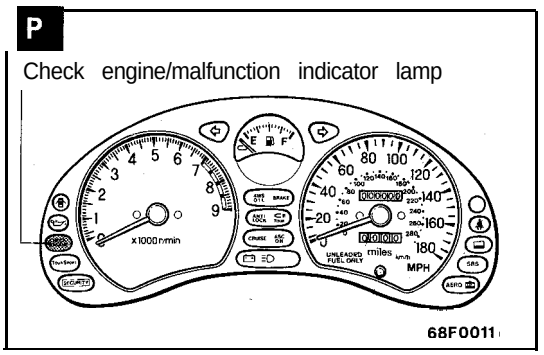
N


MFI relay
7FU0927

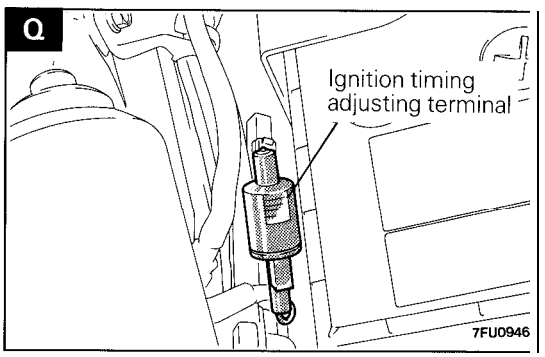
O


Air conditioning
relay
16F0030

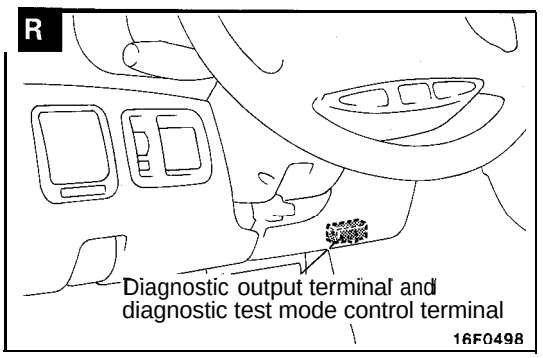
P


Check engine/malfunction indicator lamp
68F0011

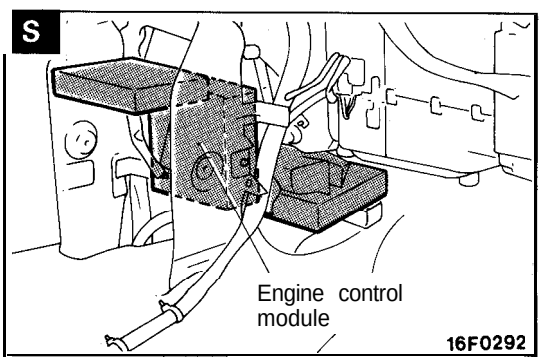
Q


Ignition timing
adjusting terminal
7FU0946

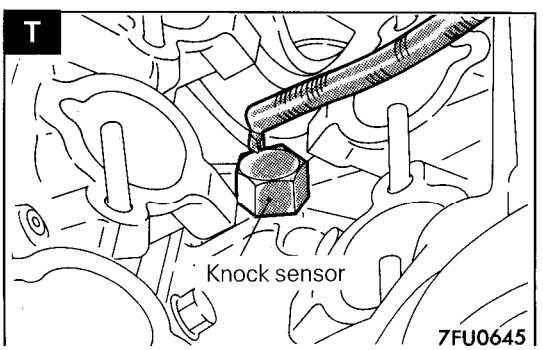
R


Diagnostic output terminal and
diagnostic test mode control terminal
16F0498

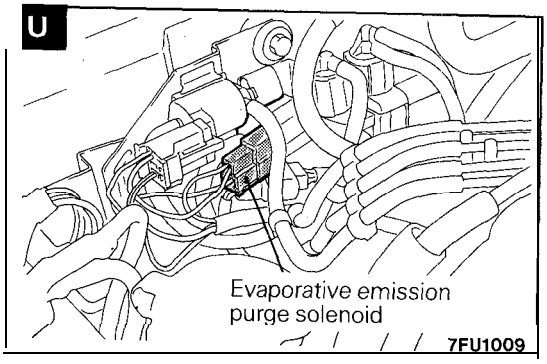
S


Engine control
module
16F0292

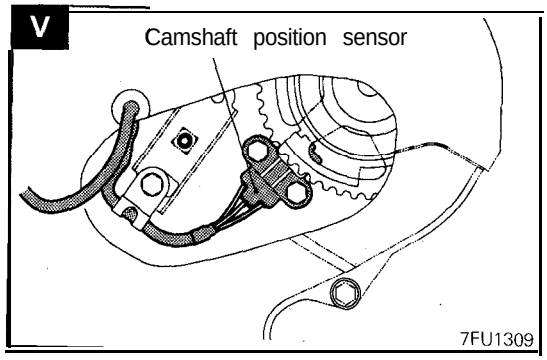
T

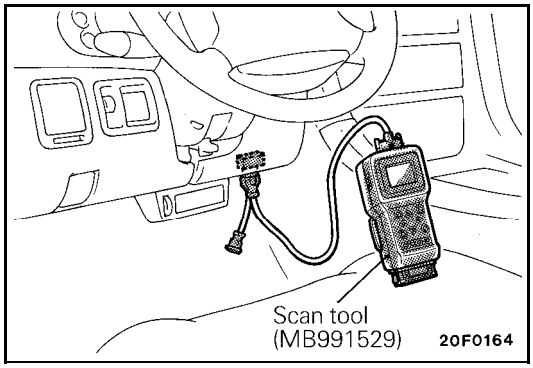

Knock sensor
7FU0645

U


Evaporative emission
purge solenoid
7FU1009

V


Camshaft position sensor
7FU1309

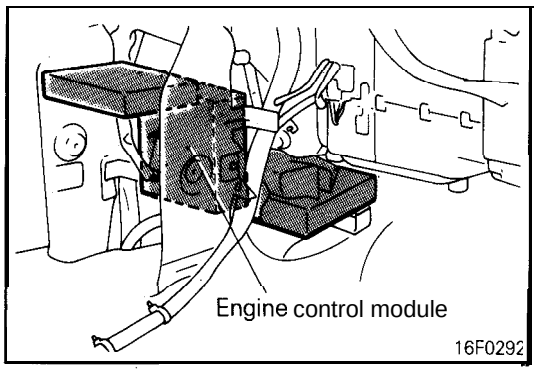


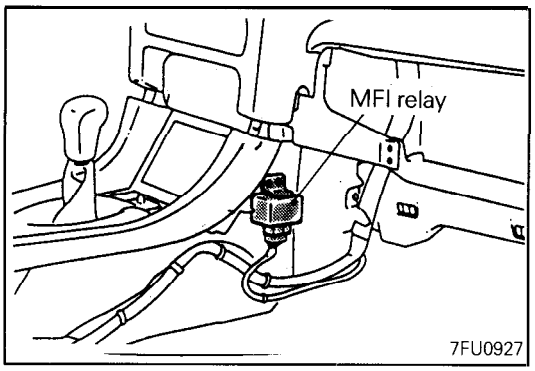
COMPONENTS INSPECTION PROCEDURE

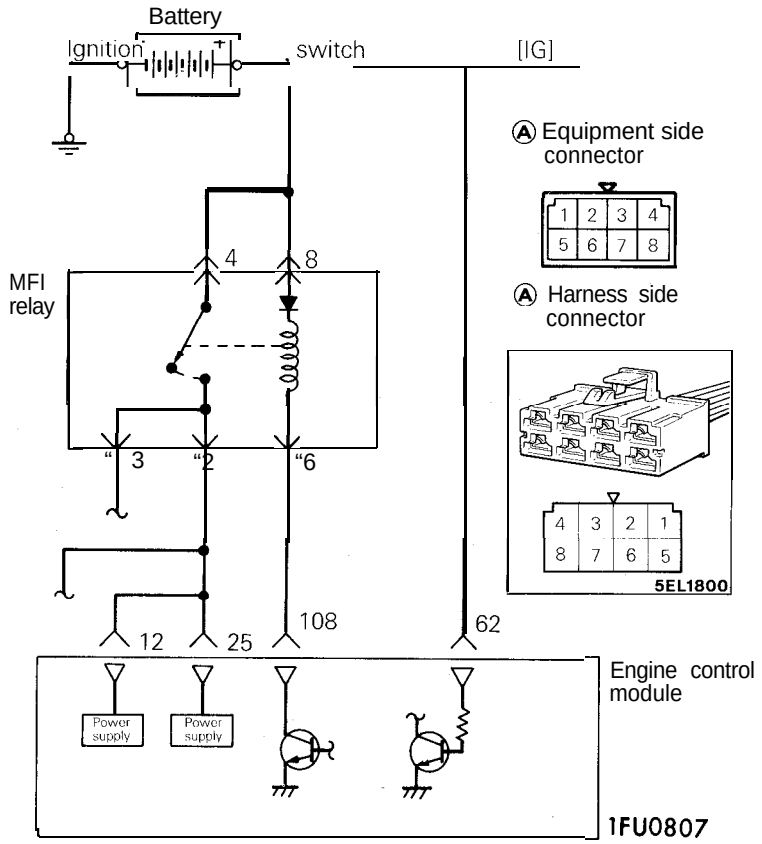
USING SCAN TOOL

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

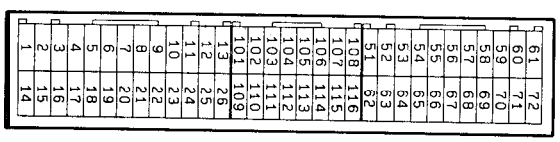
POWER SUPPLY (MFI relay) AND IGNITION SWITCH-IG







Engine control module connector



7FU0653

OPERATION

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

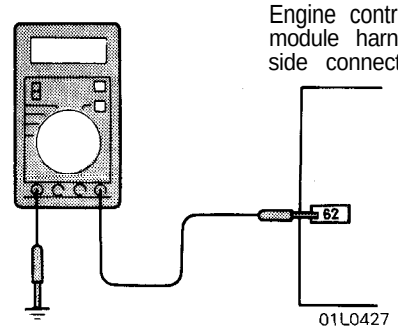
INSPECTION

Using Scan Tool

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

HARNESS INSPECTION

1



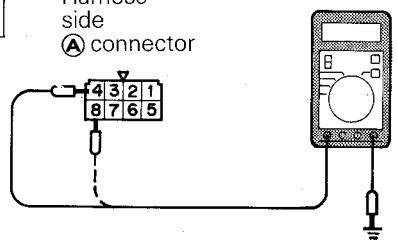
Measure the ignition switch (IG) terminal input voltage.
- Engine control module connector: Disconnected

Ignition switch	Voltage (V)
OFF	0 – 1
ON	B+

OK → 2

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

2



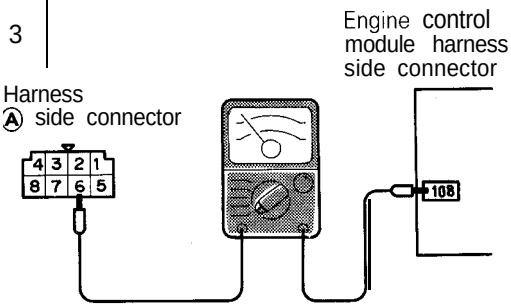
Measure the power supply voltage of the MFI relay.
- Ignition switch: OFF
- MFI relay connector: Disconnected

Voltage (V)
B+

OK → 3

NG → Repair the harness. (Battery – Ⓐ 4, Ⓐ 8)

3

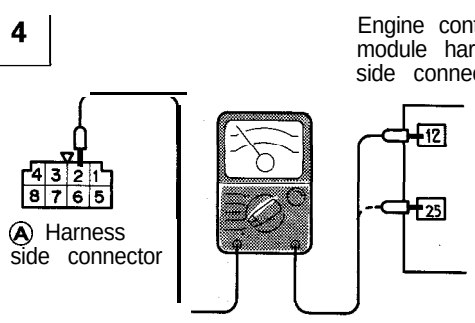


Check for an open-circuit, or a short-circuit to ground, between the engine control module and the MFI relay.
- Engine control module connector: Disconnected
- MFI relay connector: Disconnected

OK → 4

NG → Repair the harness. (Ⓐ 6 – 108)

4

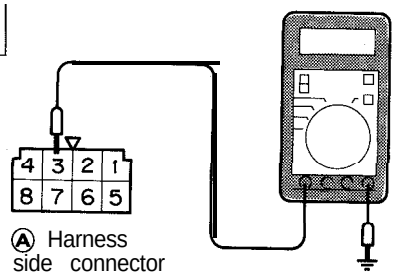


Check for an open-circuit, or a short-circuit to ground between the engine control module and the MFI relay.
- MFI relay connector: Disconnected
- Engine control module connector: Disconnected

OK → E I

NG → Repair the harness. (Ⓐ 2 – 12,

5

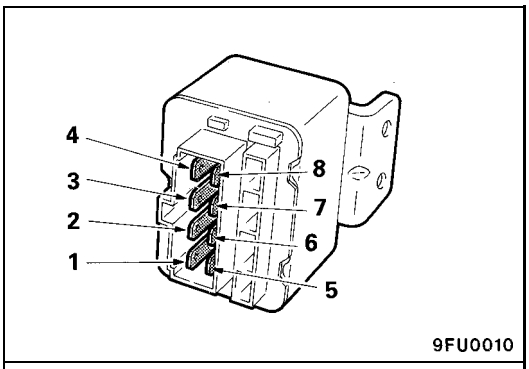


Measure power voltage to the actuator.
- MFI relay connector: Connected
- Engine control module connector: Connected

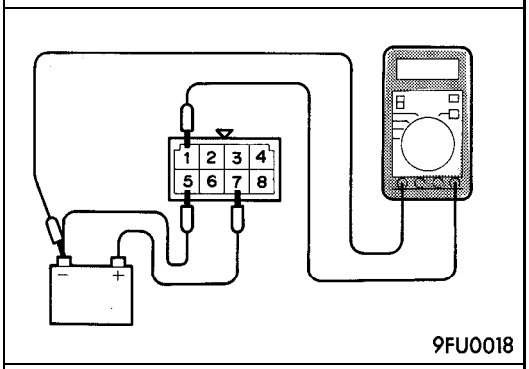
Engine	Voltage (V)
Cranking	8V or higher
Racing	B+

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

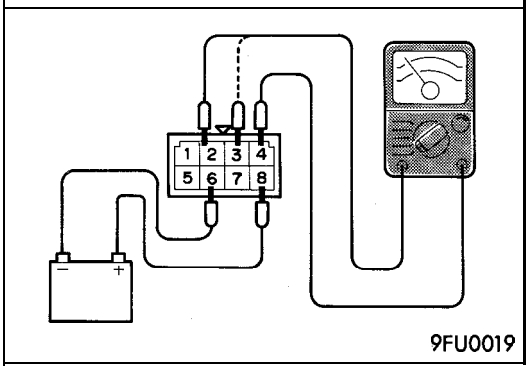
NG →



9FU0010



9FU0018



9FU0019

MFI RELAY INSPECTION

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

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

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

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

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

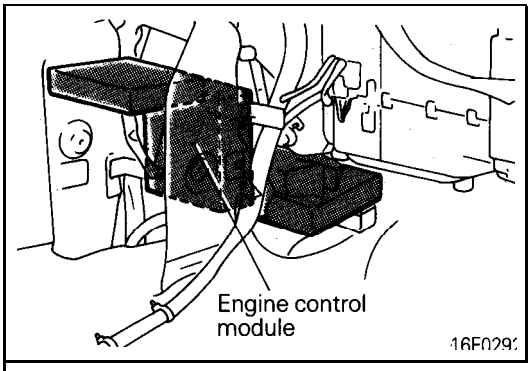
Jumper wire	Voltage
Connected	B+
Disconnected	0V

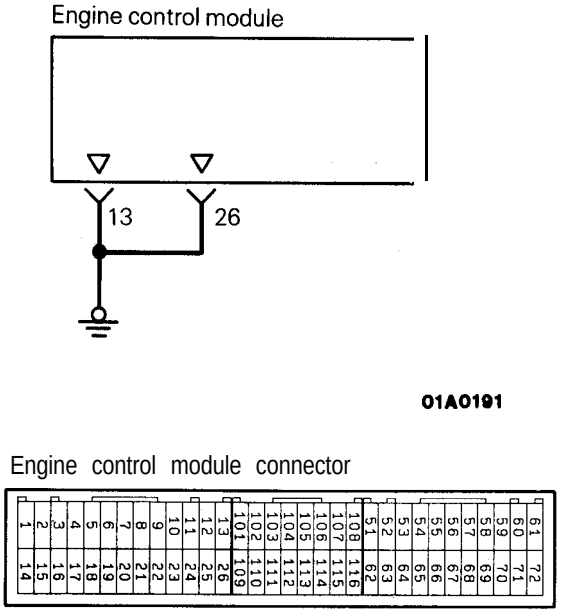
(5) Using jumper wires, connect terminal ⑧ of MFI relay to battery ⊕ terminal and terminal ⑥ of MFI relay to battery ⊖ terminal.
(6) Connecting and disconnecting the jumper wire to battery ⊖ terminal, check the continuity across terminals @and ④ (or ③ and ④) of the MFI relay.

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

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

ENGINE CONTROL MODULE POWER GROUND





7FU0653

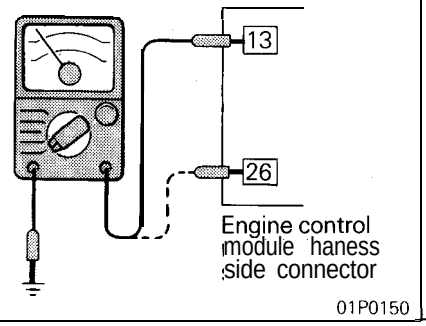
OPERATION

Grounds the engine control module

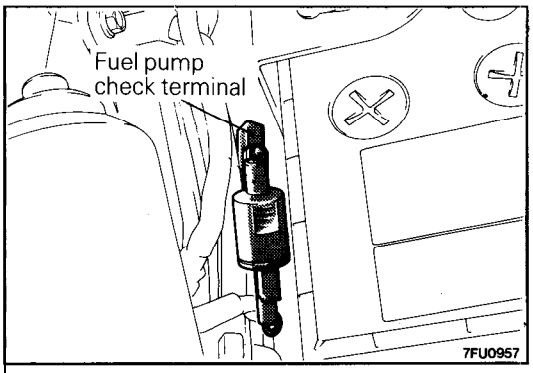
TROUBLESHOOTING HINTS

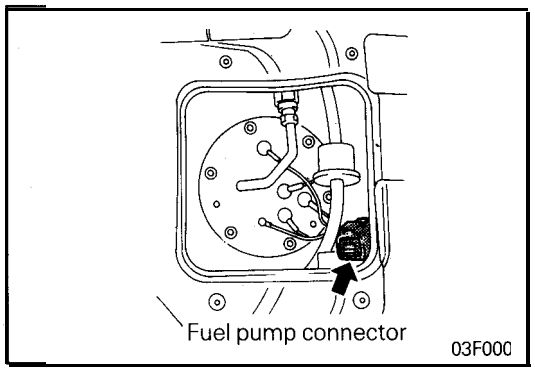
If the ground wire of the engine control module is not connected securely to ground, the module will not operate correctly.

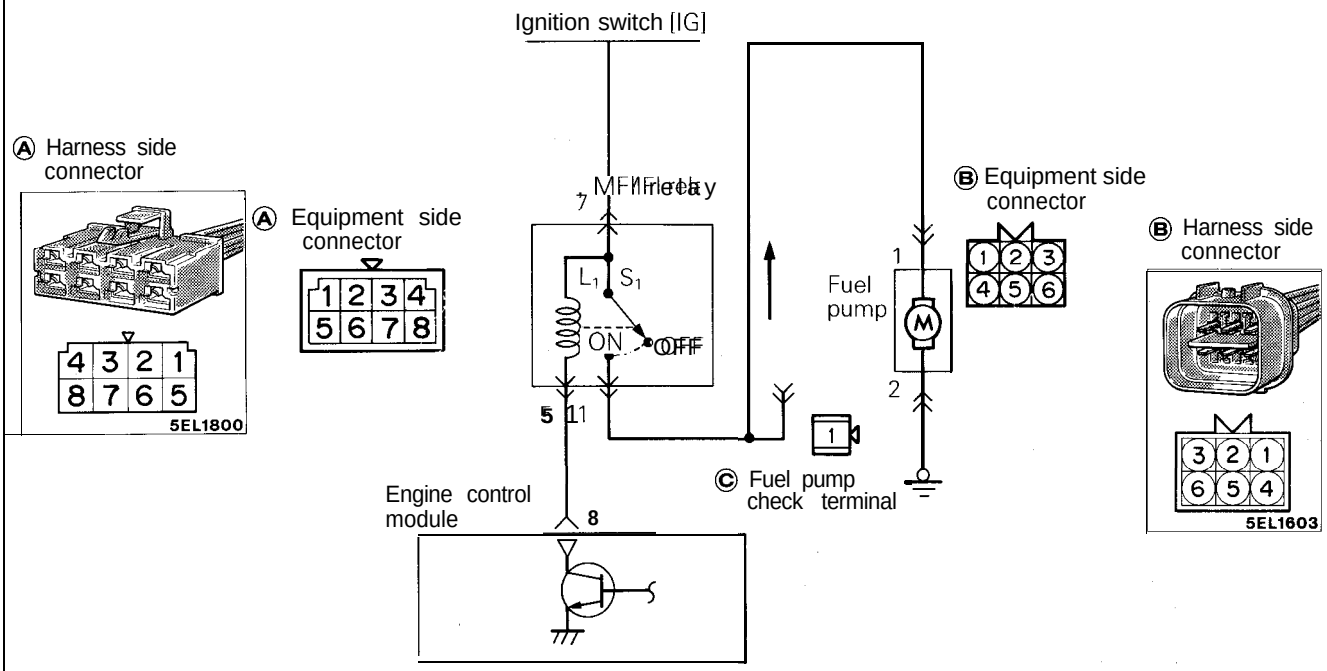
HARNESS INSPECTION

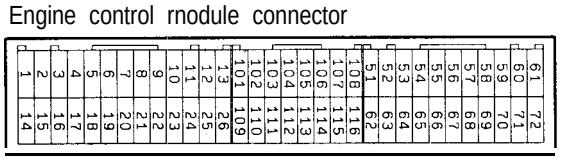
1		Check for continuity of the ground circuit. • Engine control module connector: Disconnected	OK → STOP NG → Repair the harness. (13 – Ground; (26 – Ground)

FUEL PUMP









OPERATION

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

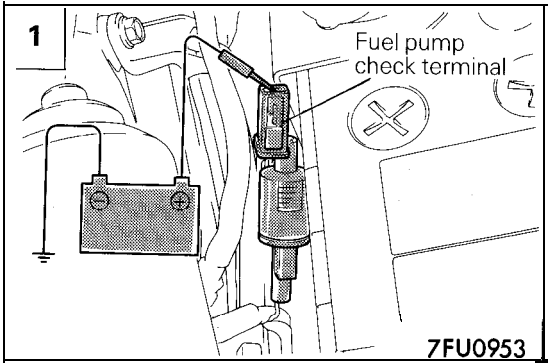
INSPECTION

Using Scan Tool

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

HARNESS INSPECTION

1

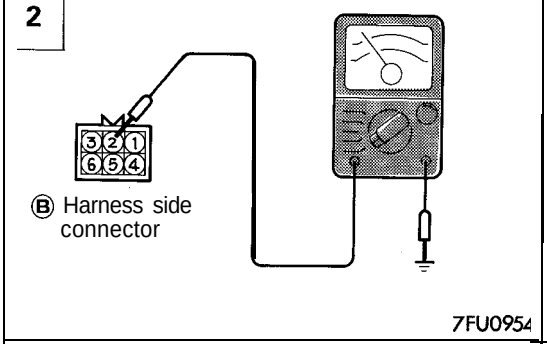


Check the fuel pump.
- Apply battery voltage to the checking terminal and operate the pump.

OK → 4

NO → 2

2

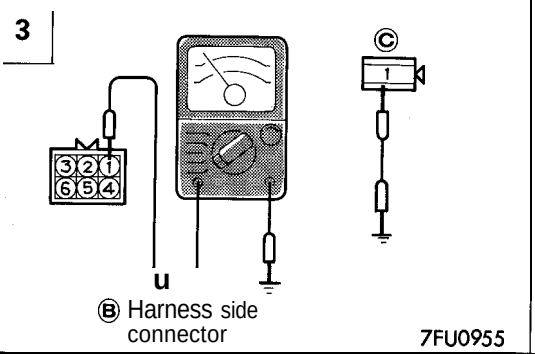


Check the ground circuit of the fuel pump.
- Fuel pump connector: Disconnected

OK → 3

NO → Repair the harness. (Ⓑ2 – Ground)

3

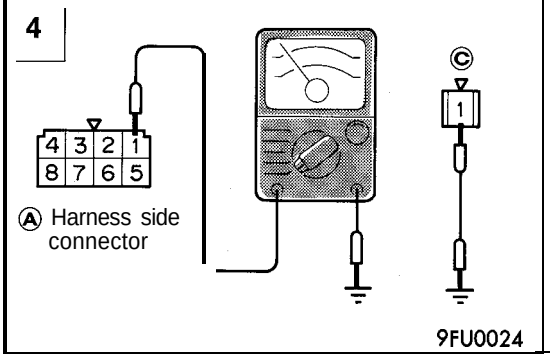


Check for continuity between the fuel pump and the checking terminal.
- Connector: Disconnected

OK → 4

NO → Repair the harness. (Ⓑ1 – Ⓒ1)

4

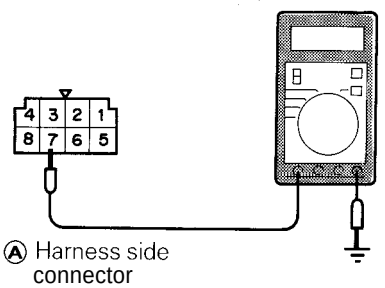


Check for continuity between the fuel pump checking terminal and the MFI relay terminals,
- MFI relay connector: Disconnected
- Fuel pump connector: Disconnected

OK → 5

NO → Repair the harness. (Ⓐ1 – Ⓒ1)

5



Measure the power supply voltage of the MFI relay.

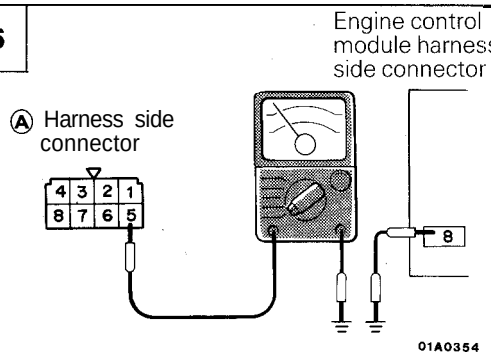
- Control relay connector: Disconnected

Ignition switch	Voltage (V)
OFF	0 – 1
ON	B+

OK → 6 Repair the harness. (Ignition switch – Ⓐ7) or check the ignition switch.

NG →

6



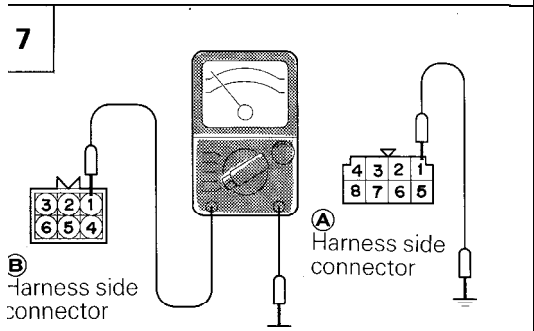
Check for an open-circuit, or a short-circuit to ground between the MFI relay and the engine control module.

- MFI relay connector: Disconnected
- Engine control module connector: Disconnected

OK → 7

NG → Repair the harness. (Ⓐ5 – 8)

7



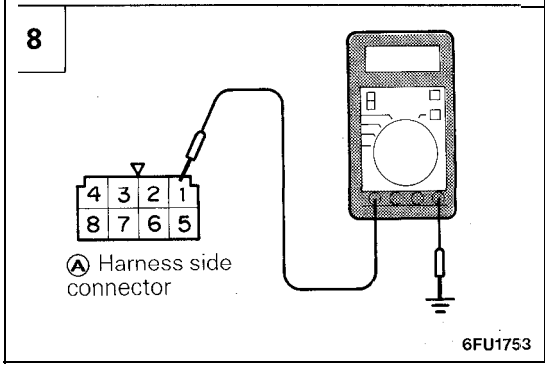
Check for an open-circuit, or a short-circuit to ground, between the MFI relay (for fuel pump) and the fuel pump.

- MFI relay (for fuel pump) connector: Disconnected
- Fuel pump connector; Disconnected

OK → 8

NG → Repair the harness. (Ⓐ1 – Ⓑ1)

8



Measure the power supply voltage of the fuel pump.

- MFI relay connector: Connected
- Engine control unit connector: Connected

Engine	Voltage [V]
Cranking	8V or more
Racing	B+

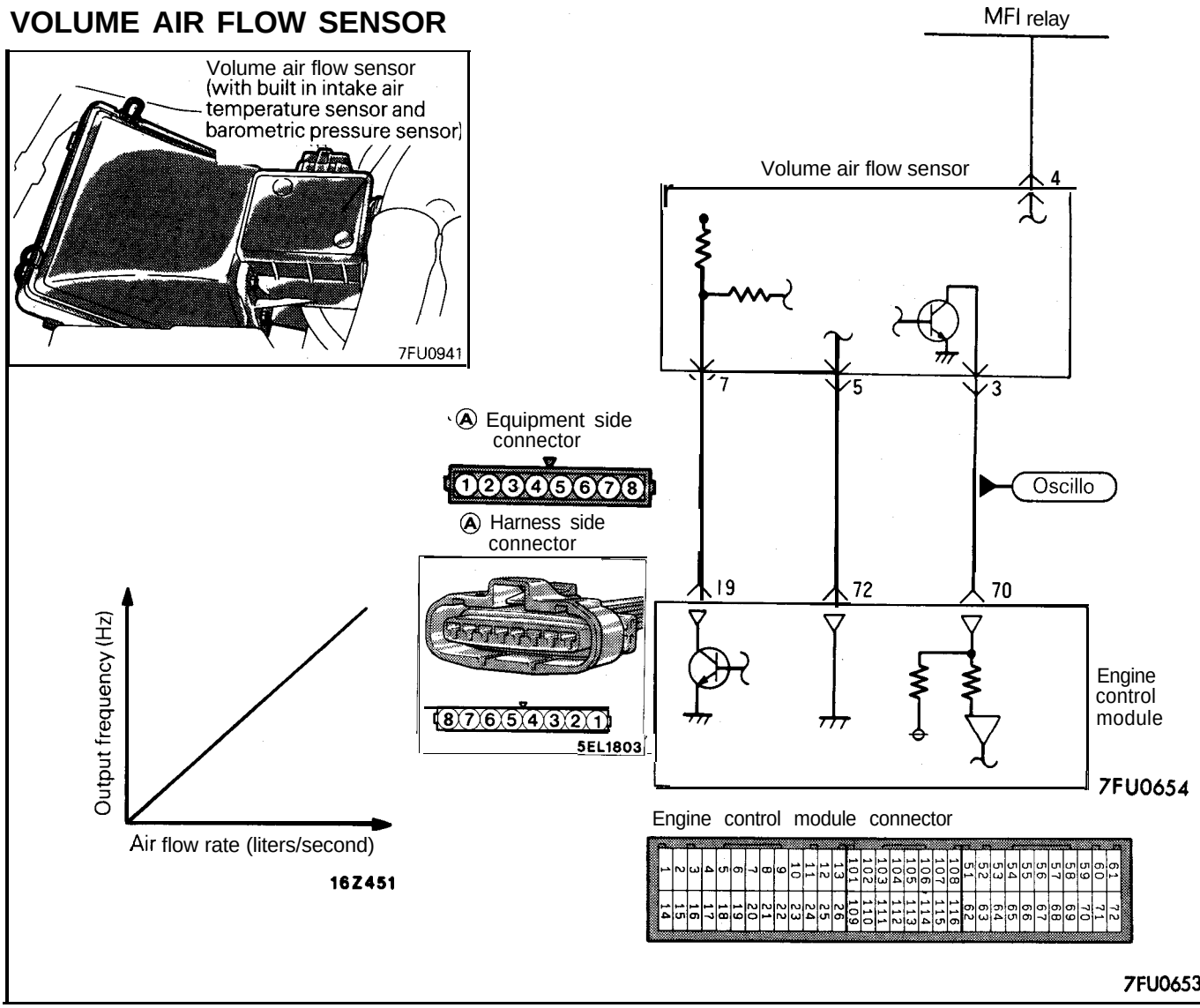
OK → STOP

NG → MFI relay or engine control module is defective.

MFI RELAY INSPECTION

Refer to P.14A-79

VOLUME AIR FLOW SENSOR



OPERATION

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

TROUBLESHOOTING HINTS

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

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

Hint 3: If the engine can be run idle even though the volume air flow sensor output frequency is out of specification, troubles are often found in other than the volume air flow sensor itself.

[Examples]

(1) Disturbed volume air flow in the air flow sensor
(Disconnected air duct, clogged air cleaner element)

(2) Poor combustion in the cylinder
(Faulty ignition plug, ignition coil, injector, incorrect compression pressure, etc.)

(3) Air leaking into the intake manifold through gap of gasket, etc.

(4) Loose EGR valve seat

INSPECTION

Using Scan Tool

<Volume Air Flow Sensor>

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	12	Sensor air volume frequency)	• Engine coolant temperature: 80 to 95°C (176 to 205°F) • Lights and accessories: OFF • Transaxle: Neutral (P range for vehicle with A/T) • Steering wheel: Neutral	700 rpm (Idle)	21-47 Hz <SOHC> 22-48 Hz <DOHC>
				2,000 rpm	57 – 97 Hz <SOHC> 50 – 90 Hz <DOHC>
				Racing	Frequency increases with racing

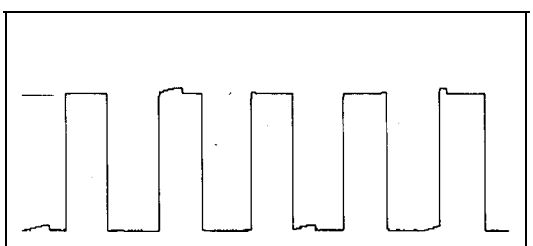
NOTE
When the vehicle is new [within initial operation of about 500 km (300 miles)], the volume air flow sensor output frequency may be about 10% higher.

<Volume Air Flow Sensor Reset Signal>

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

<Volumetric Efficiency>

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data list	37	Volumetric efficiency	• Engine coolant temperature: 80 to 95°C (176 to 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)	15535%
				2,000 rpm	15-35 %
				Racing	Frequency increases with racing



Regular waveform

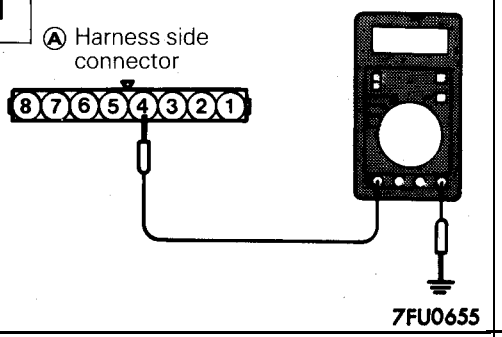
03A0203

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

1

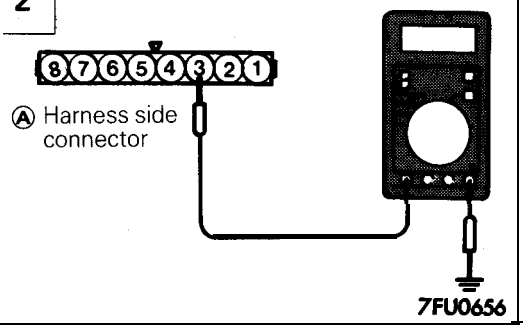


Measure the power supply voltage.

OK → 2

NG → Repair the harness (Ⓐ 4 – Control relay) or check the control relay.

2



Measure the terminal voltage.

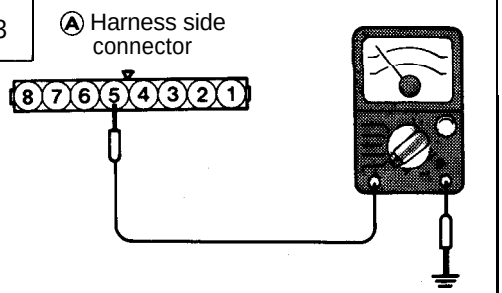
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
4.8 – 5.2

OK → 3

NG → Repair the harness (Ⓐ 3 – 70)

3



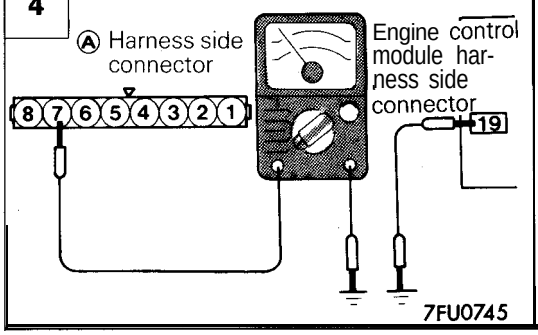
Check for continuity of the ground circuit.

- Connector: Disconnected

OK → STOP

NG → Repair the harness. (Ⓐ 5 – 72)

4



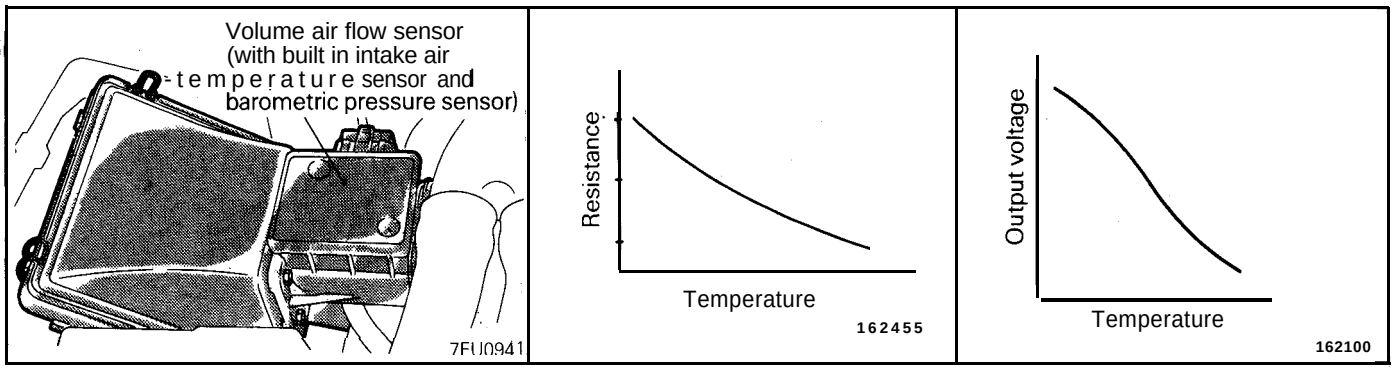
Check for continuity between the volume air flow sensor and the engine control unit.

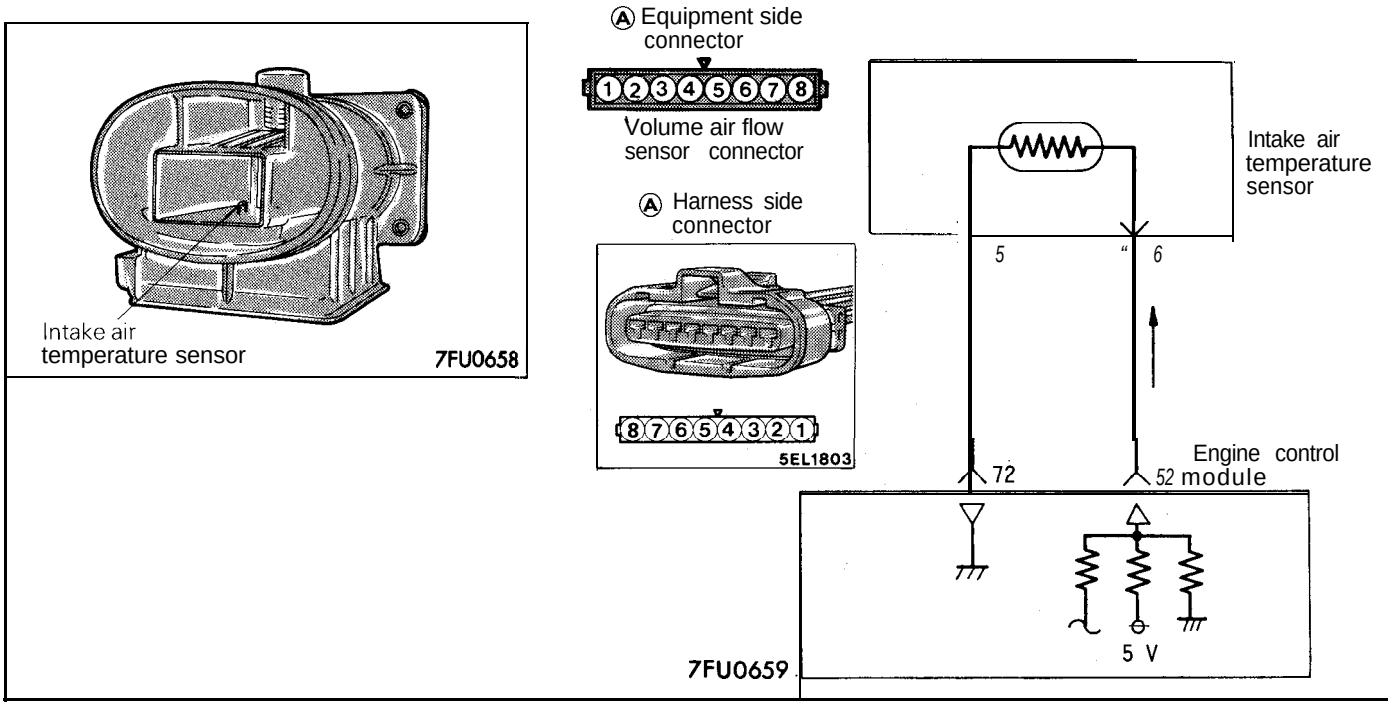
- Volume air flow sensor connector: Disconnected
- Engine control module connector: Disconnected

OK → STOP

NG → Repair the harness. (Ⓐ 7 – 19)

INTAKE AIR TEMPERATURE SENSOR





OPERATION

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

TROUBLESHOOTING HINTS

The intake air temperature sensor senses the intake air temperature in the air cleaner so that it may indicate a temperature different from outside temperature depending on engine operating state.

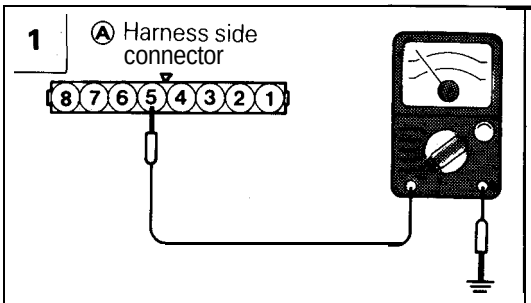
INSPECTION

1) Using Scan Tool

Function	Item No.	Data display	Check condition	Intake air temperature	Standard value
Data reading	13	Sensor temperature	Ignition switch: ON or engine running	At -20°C (-4°F)	-20°C
				At 0°C (32°F)	0°C
				At 20°C (68°F)	20°C
				(At 40°C (104°F)	40°C
				At 80°C (176°F)	80°C

HARNESS INSPECTION

1



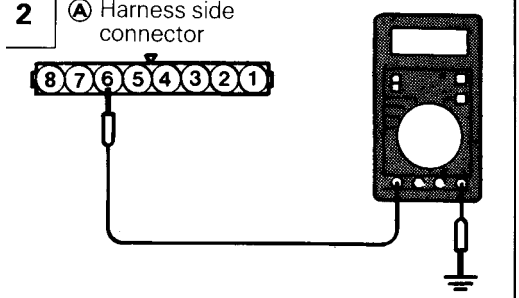
Check for continuity of the ground circuit.

- Connector: Disconnected

OK → 2

OK → Repair the harness. (Ⓐ 5 – 72)

2



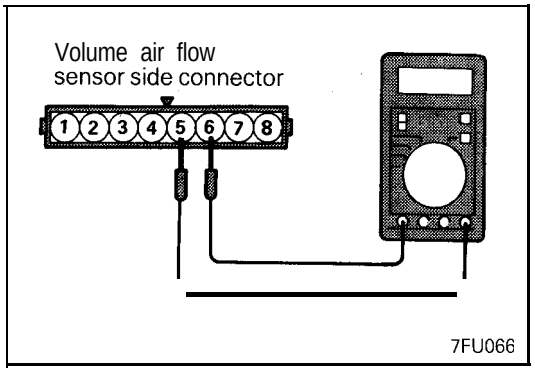
Measure the power supply voltage.

- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
4.5 – 4.9

OK → STOP

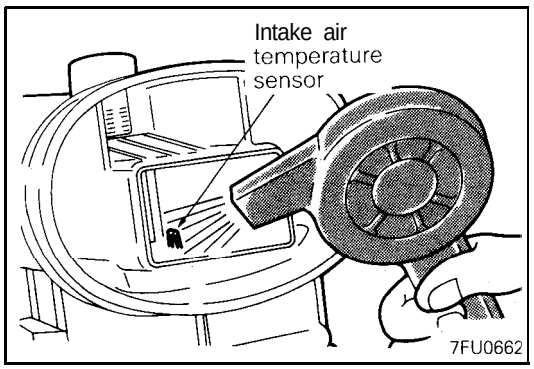
OK → Repair the harness. (Ⓐ 6 – 52)



SENSOR INSPECTION

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

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

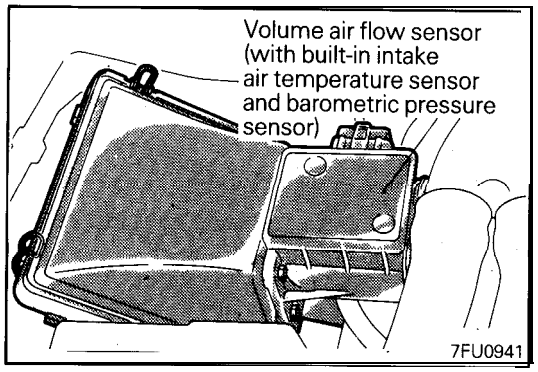


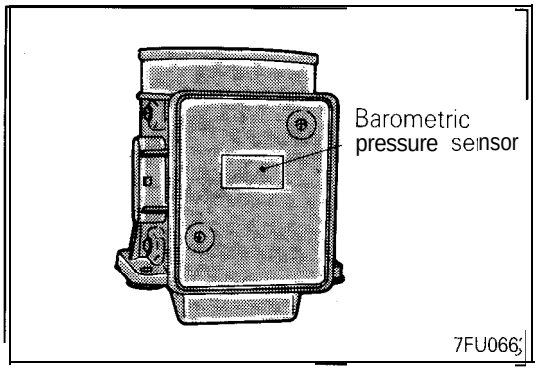
(3) Measure resistance while heating the sensor using a hair drier.

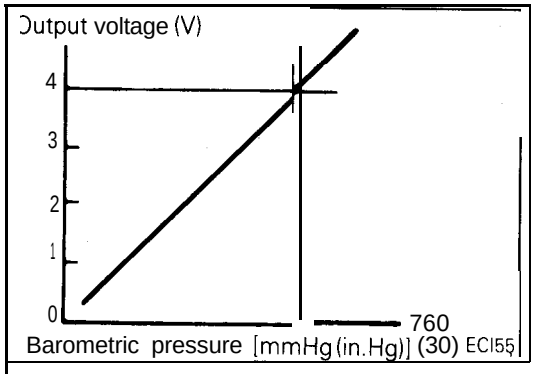
Temperature [°C (°F)]	Resistance (kΩ)
Higher	Smaller

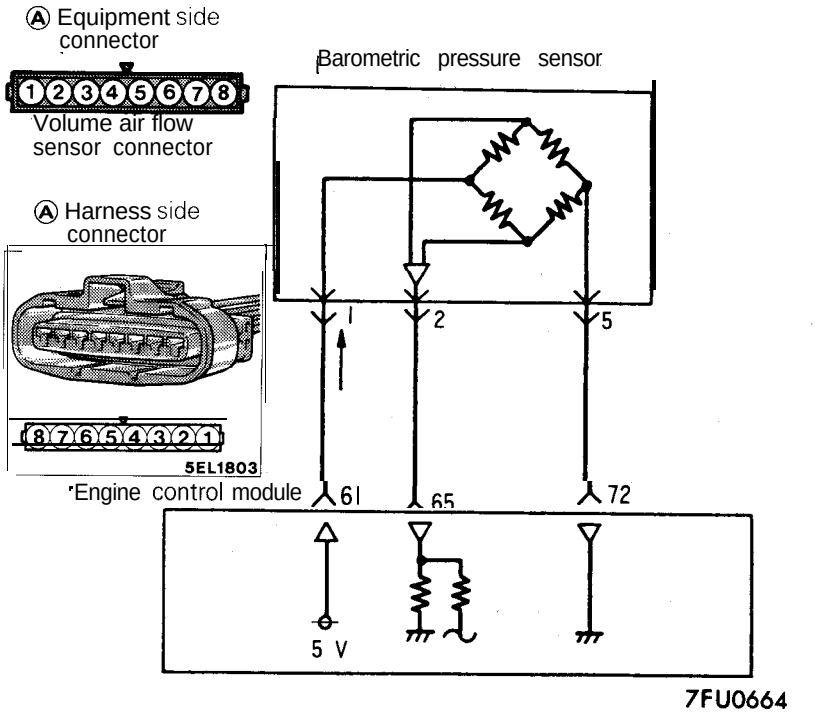
(4) If resistance does not decrease as heat increases or the resistance remains unchanged, replace the volume air flow sensor assembly.

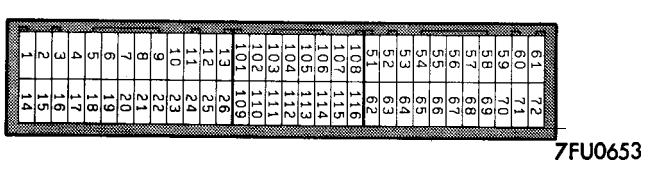
BAROMETRIC PRESSURE SENSOR











OPERATION

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

TROUBLESHOOTING HINTS

Hint 1 : If the barometric pressure sensor is faulty, poor driveability is caused at high altitude, in particular.
Hint 2: If the pressure indication of the barometric pressure sensor drops significantly during high speed driving, check the air cleaner for clogging.

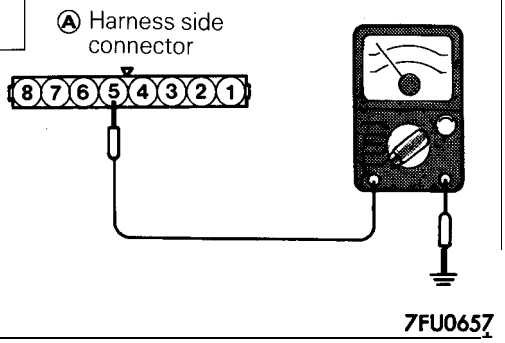
INSPECTION

Using Scan Tool

Function	Item No.	Data display	Check condition	Altitude	Standard value
Data reading	25	Sensor pressure	Ignition switch: ON	At 0 m (0 ft.)	101kPa (760 mmHg)
				At 600 m (1,969 ft.)	95 kPa (710 mmHg)
				At 1,200 m (3,937 ft.)	88 kPa (660 mmHg)
				At 1,800 m (5,906 ft.)	81 kPa (610 mmHg)

HARNESS INSPECTION

1

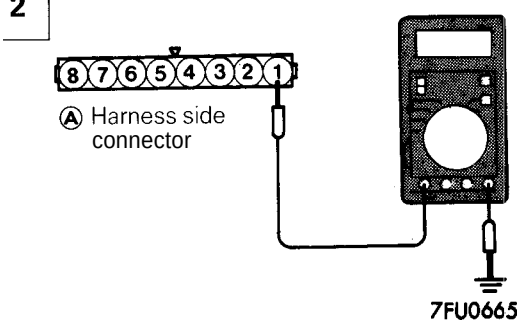


Check for continuity of the ground circuit.
- Connector: Disconnected

OK → 2

NG → Repair the harness. Ⓐ5 - ⏚

2



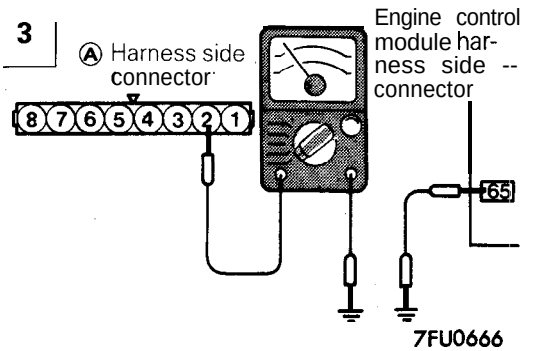
Measure the power supply voltage of the barometric pressure sensor.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
4.8 – 5.2

OK → 3

NG → Repair the harness. Ⓐ1 - ⏚

3

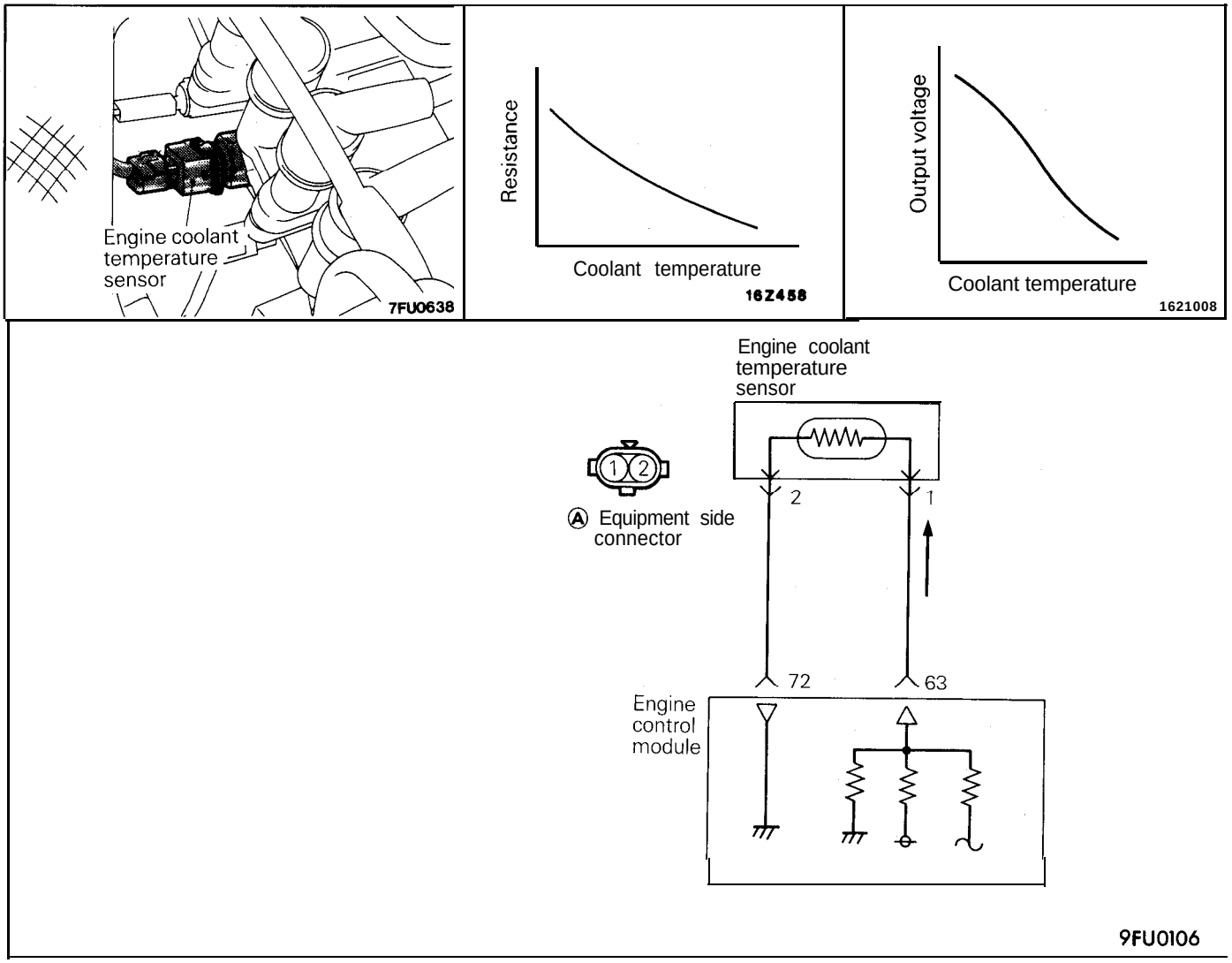


Check for an open-circuit, or a short-circuit to ground between the engine control module and the barometric pressure sensor.
- Volume air flow sensor connector: Disconnected
- Engine control module connector: Disconnected

OK → STOP

NG → Repair the harness. (Ⓐ2 – 65)

ENGINE COOLANT TEMPERATURE SENSOR



OPERATION

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

TROUBLESHOOTING HINTS

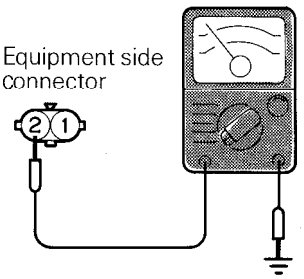
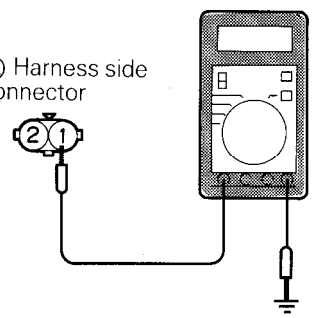
If the fast idle speed is inadequate or the engine emits dark smoke during engine warm up operation, the engine coolant temperature sensor is often faulty.

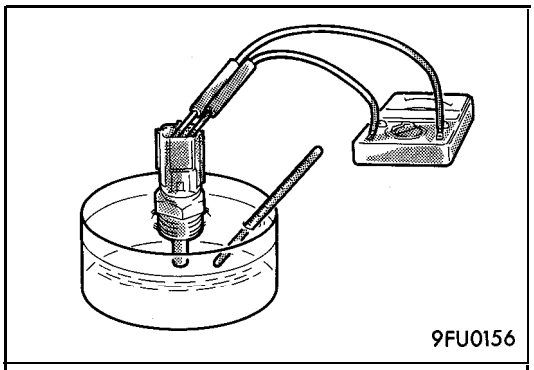
INSPECTION

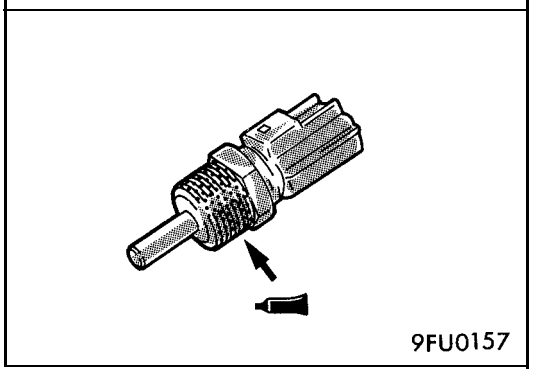
Using Scan Tool

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

HARNESS INSPECTION

1	Ⓐ Equipment side connector  9FU0112	Check for continuity of the ground circuit. • Connector: Disconnected	OK → 2 NG → Repair the harness. (Ⓐ2 – 72)
2	Ⓐ Harness side connector  9FU0114	Measure the power supply voltage. • Connector: Disconnected • Ignition switch: ON Voltage (V): 4.5 – 4.9	OK → STOP NG → Repair the harness. (Ⓐ1 – 63)


9FU0156


9FU0157

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)	'b.3

(3) If the resistance deviates from the standard value greatly, replace the sensor.

INSTALLATION

(1) Apply sealant to threaded portion.

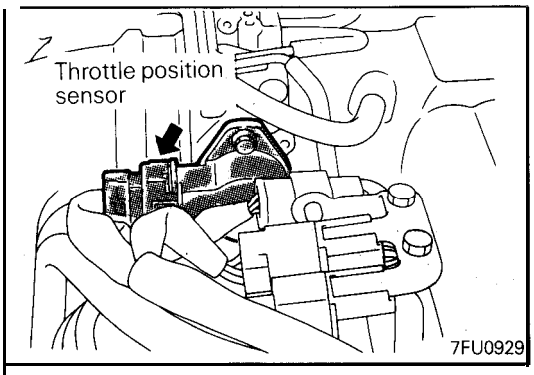
Specified sealant: MOPAR Part No. 4318034 or equivalent

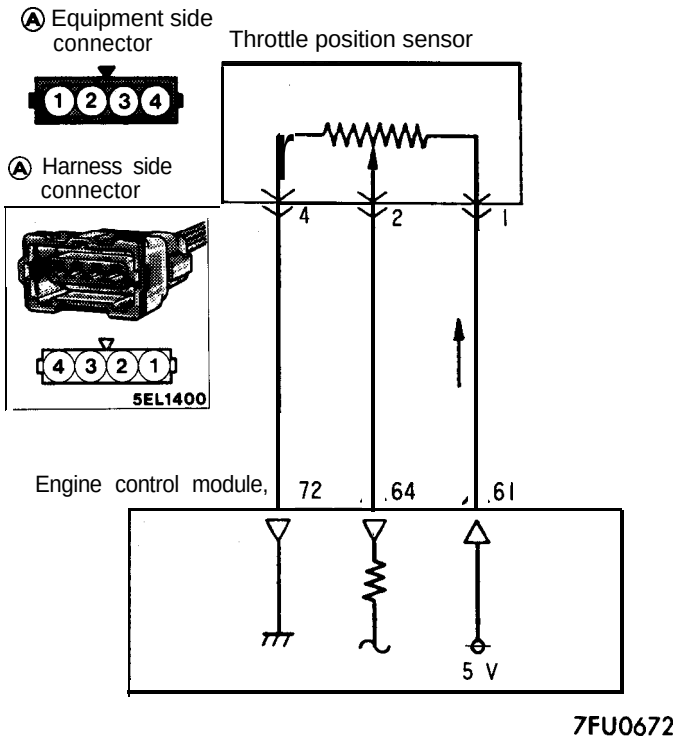
(2) Install engine coolant temperature sensor and tighten it to specified torque.

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

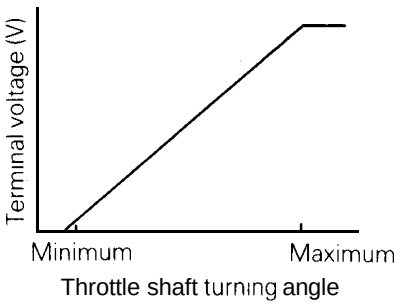
(3) Fasten harness connectors securely.

THROTTLE POSITION SENSOR



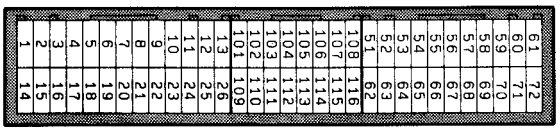


7FU0672



16Z461

Engine control module connector



7FU0653

OPERATION

- The throttle position sensor converts the throttle position opening into a voltage and inputs it to the engine control module, which then controls the fuel injection based on the input signal.
- The 5 V power in the engine control module is supplied to the throttle position sensor. Through the resistor in the sensor, it is grounded in the engine control module.
- As the throttle valve shaft rotates from the idle position to wide open position, the resistance between the variable resistor terminal of the throttle position sensor and the ground terminal increases. As a result, the voltage at the throttle position sensor variable resistance terminal also increases.

TROUBLESHOOTING HINTS

Hint 1 : The throttle position sensor signal is more important in the control of automatic transaxle than in the engine control. Shifting shock and other troubles will be caused if this sensor is faulty.

Hint 2: If the output voltage of the throttle position sensor is out of specification, adjust the sensor and check the voltage again. If there is an evidence of disturbed fixed SAS setting, adjust the fixed SAS.

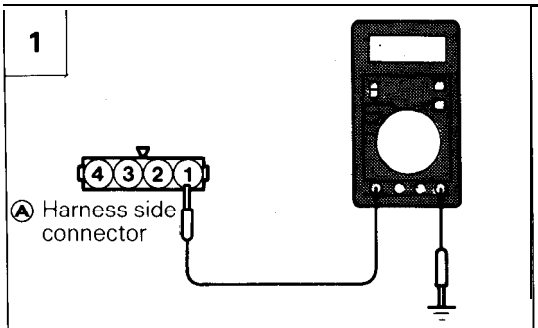
INSPECTION

Using Scan Tool

Function	Item No.	Data display	Check condition	Throttle valve	Standard value
Data reading	14	Sensor voltage	Ignition switch: left ON for 15 seconds or more	At idle position	300 – 1,000 mV
				Open slowly	Increases with valve opening
				Open widely	4,500 – 5,500 mV

HARNESS INSPECTION

1



6FU1241

Measure the power supply voltage of the throttle position sensor.

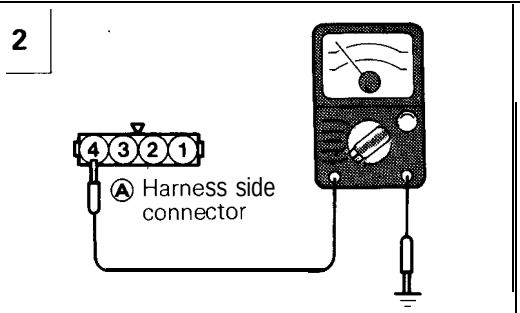
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
4.8 – 5.2

OK → 2

NG → Repair the harness. (Ⓐ1 – 61)

2



6FU1242

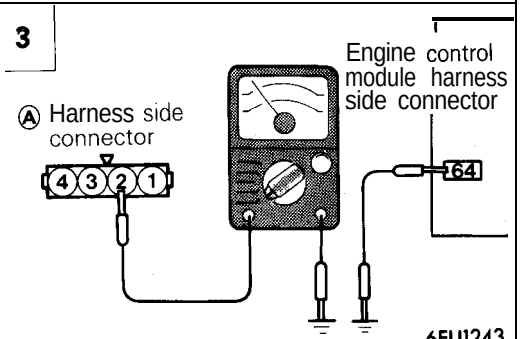
Check for continuity of the ground circuit.

- Connector: Disconnected

OK → 3

NG → Repair the harness. (Ⓐ4 – 72)

3



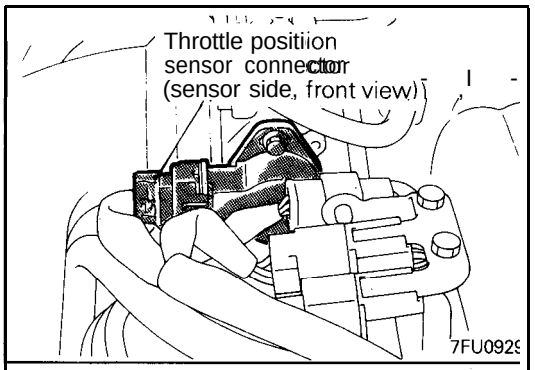
6FU1243

Check for an open-circuit, or a short-circuit to ground between the engine control module and the throttle position sensor.

- Throttle oosition sensor connector: Disconnected
- Engine control module connector: Disconnected
- Connector of any control module which uses TPS output signals like ECM: Disconnected

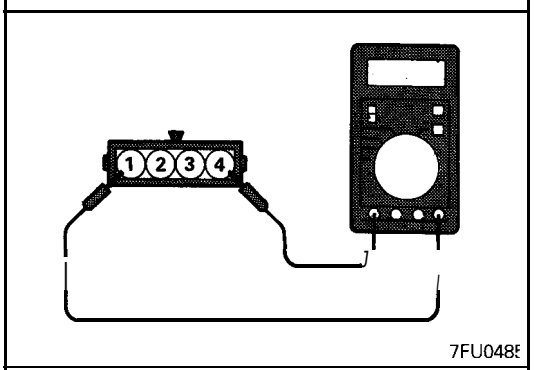
OK → STOP

NG → Repair the harness. (Ⓐ2 – 64)



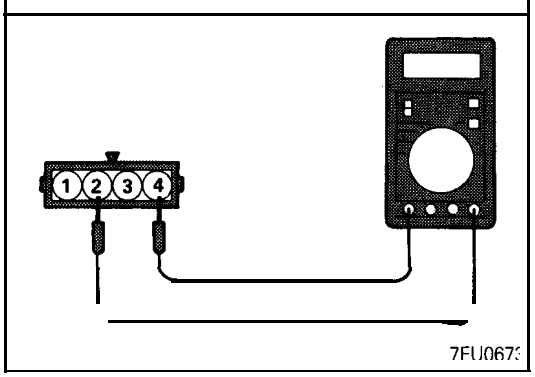
SENSOR INSPECTION

(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

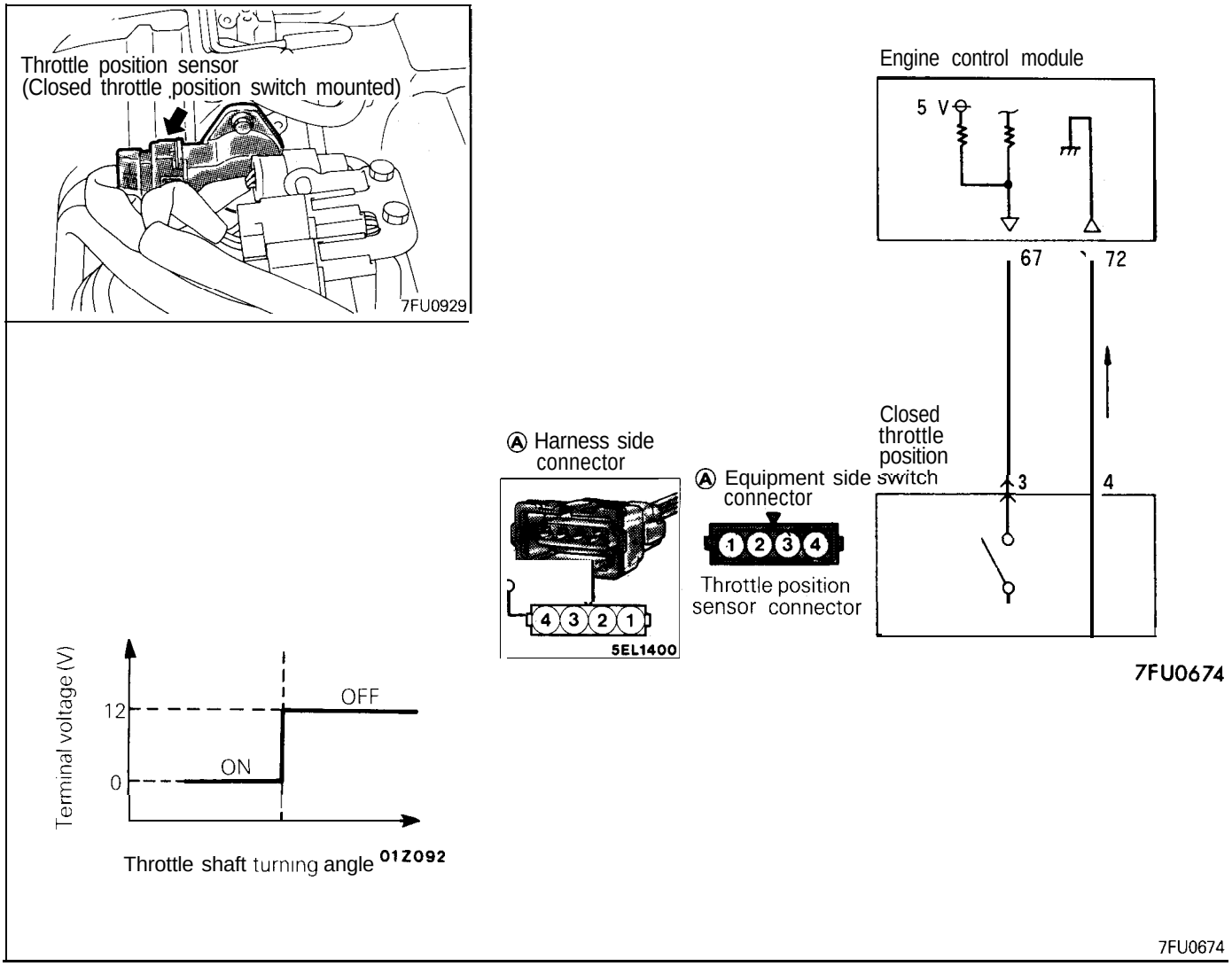


(3) Connect a pointer type ohmmeter between terminal ④ (sensor ground) and terminal ② (sensor output).
(4) Operate the throttle valve slowly from the idle position to the full open position and check that the resistance changes smoothly in proportion with the throttle valve opening angle.
(5) If the 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. 14A-65.

CLOSED THROTTLE POSITION SWITCH



OPERATION

- The closed throttle position switch senses whether the accelerator pedal is depressed or not, converts it into high/low voltage and inputs the voltage to the engine control module, which then controls the idle air control motor based on the input signal.
- The voltage in the engine control module is applied to the closed throttle position switch through a resistor. When the accelerator pedal is released, the closed throttle position switch is turned on to conduct the voltage to ground. This causes the closed throttle position switch terminal voltage to go low from high.

TROUBLESHOOTING HINTS

If the closed throttle position switch harness and individual part check results are normal but the closed throttle position switch output is abnormal, the following troubles are suspected.
(1) Poorly adjusted accelerator cable or auto-cruise control cable
(2) Poorly adjusted fixed SAS

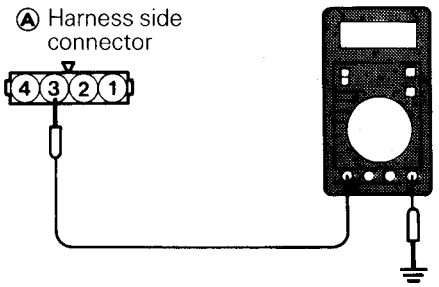
INSPECTION

Using Scan Tool

Function	Item No.	Data display	Check condition	Throttle valve	Normal indication
Data reading	26	Switch state	Ignition switch: ON (check by operating accelerator pedal repeatedly)	At idle position	ON
				Open a little	OFF

HARNESS INSPECTION

1



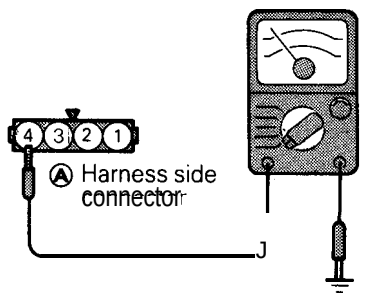
Measure the power supply voltage of the closed throttle position switch.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
4 or more

OK → 2

NO → Repair the harness. (Ⓐ3 – 67)

2



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

OK → STOP

NO → Repair the harness. (Ⓐ4 – 72)

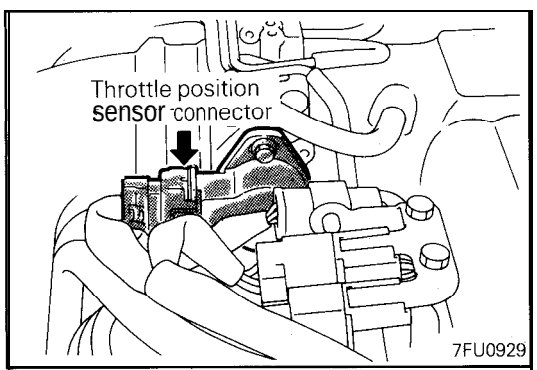
SENSOR INSPECTION

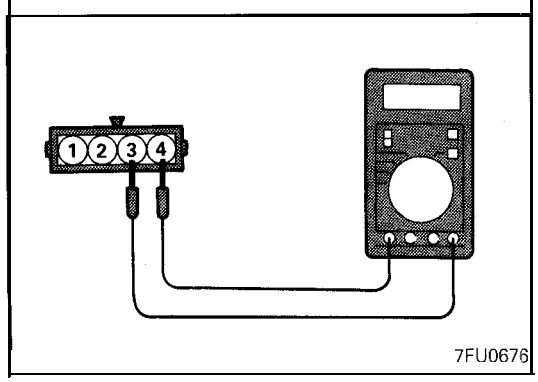
(1) With the accelerator pedal released, check to be sure that the throttle valve lever or the fixed SAS is pushed.

NOTE
If it is not pushed, adjust the fixed SAS (Refer to P.14A-67.)

(2) Disconnect the throttle position sensor connector.

(3) Check the continuity across the throttle position sensor connector terminal ④ (Sensor ground) and ③ (Closed throttle position switch).





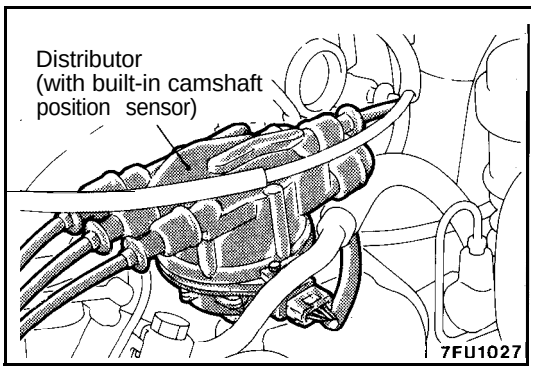
Accelerator pedal	Continuity
Depressed	Non-conductive (∞ Ω)
Released	Conductive (0 Ω)

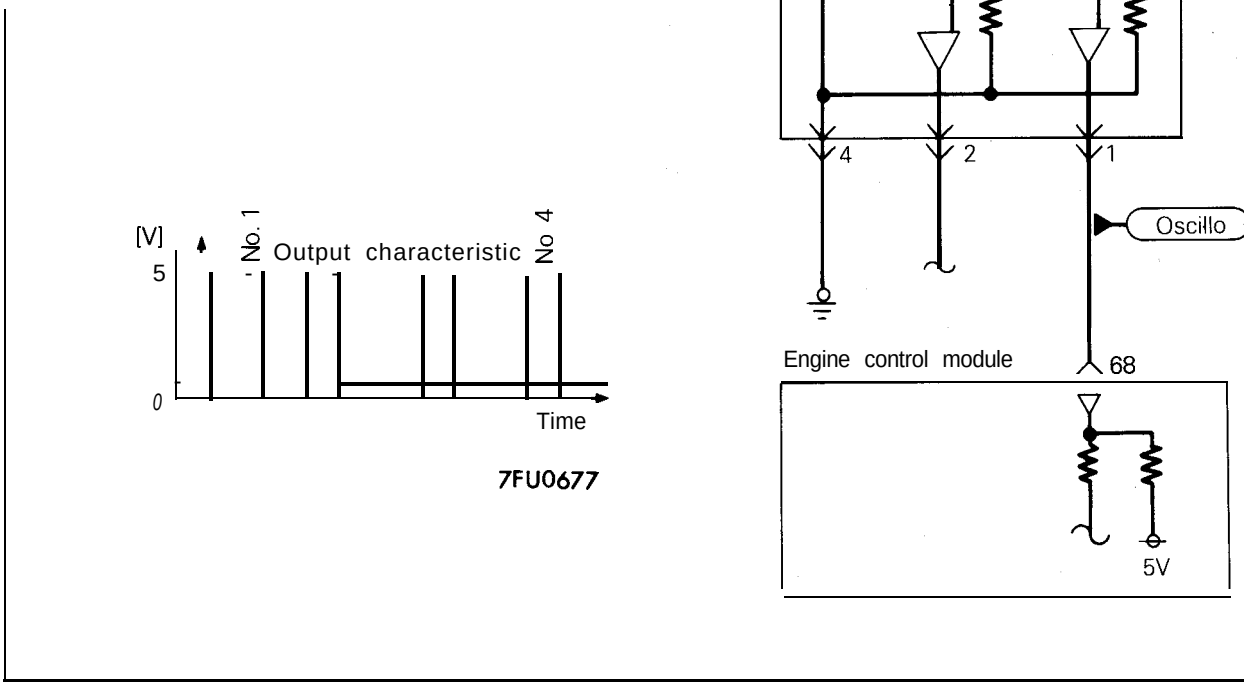
NOTE
If there is no continuity when the accelerator pedal is returned, loosen the throttle-position sensor installation screw; then, after turning all the way in the counterclockwise direction, check again.

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

NOTE
For the closed throttle position switch and throttle position sensor adjusting procedure, refer to P.14A-65.

CAMSHAFT POSITION SENSOR <SOHC>





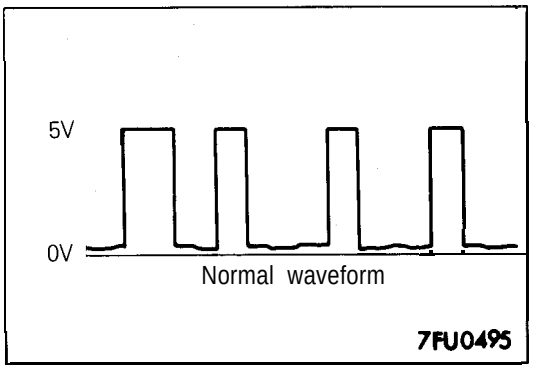
OPERATION

- The camshaft position sensor senses the top dead center on compression stroke of the No. 1, converts it into a pulse signal and inputs it to the engine control module, which then controls the fuel injection sequence, etc. based on the input signal.
- Power to the camshaft position sensor is supplied from the MFI relay and is grounded to the body. The camshaft position sensor generates a pulse signal as it repeatedly connects and disconnects between 5 V voltage supplied from the engine control module and ground.

TROUBLESHOOTING HINTS

Hint 1 : If the camshaft position sensor does not function correctly, correct sequential injection is not made so that the engine may stall, run irregularly at idle or fail to accelerate normally.

Hint 2: If the sensor outputs a pulse signal when the ignition switch is turned ON (with the engine not running), a faulty camshaft position sensor or engine control module is suspected.



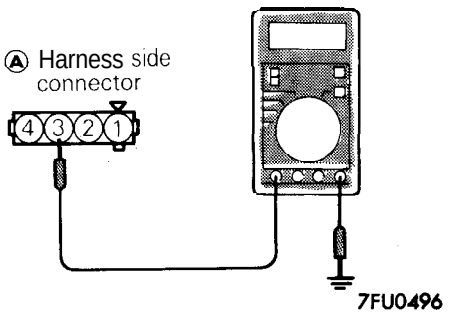
INSPECTION

Using Oscilloscope

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

HARNESS INSPECTION

1



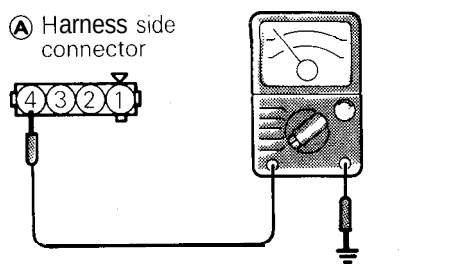
Measure the power supply voltage.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
B+

OK → 2

NG → Repair the harness. (Ⓐ3 – MFI relay)

2

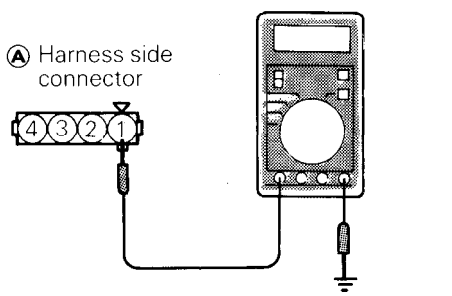


Check for continuity of the ground circuit.
- Connector: Disconnected

OK → 3

NG → Repair the harness. (Ⓐ4 – Ground)

3



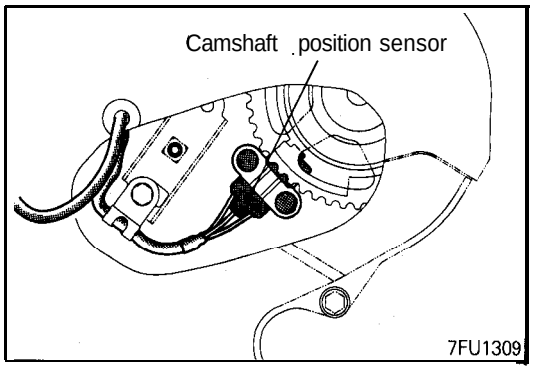
Check the voltage of the output circuit.
- Connector: Disconnected
- Ignition switch: ON

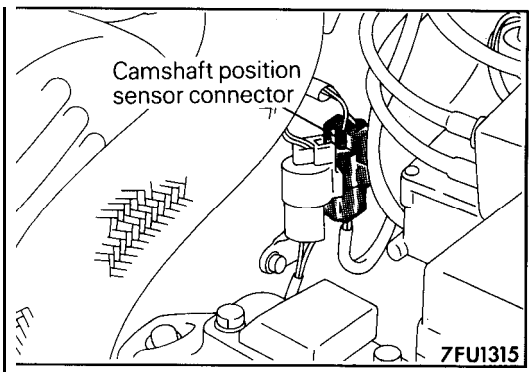
Voltaae (V)
4.8 – 5.2

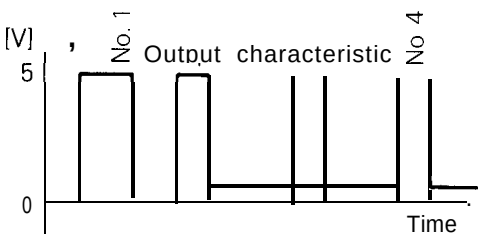
OK → STOP

NG → Repair the harness. (Ⓐ1 – 68)

CAMSHAFT POSITION SENSOR <DOHC>

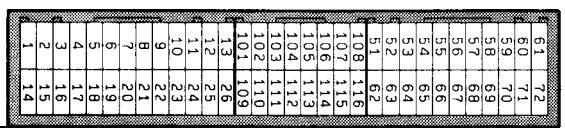


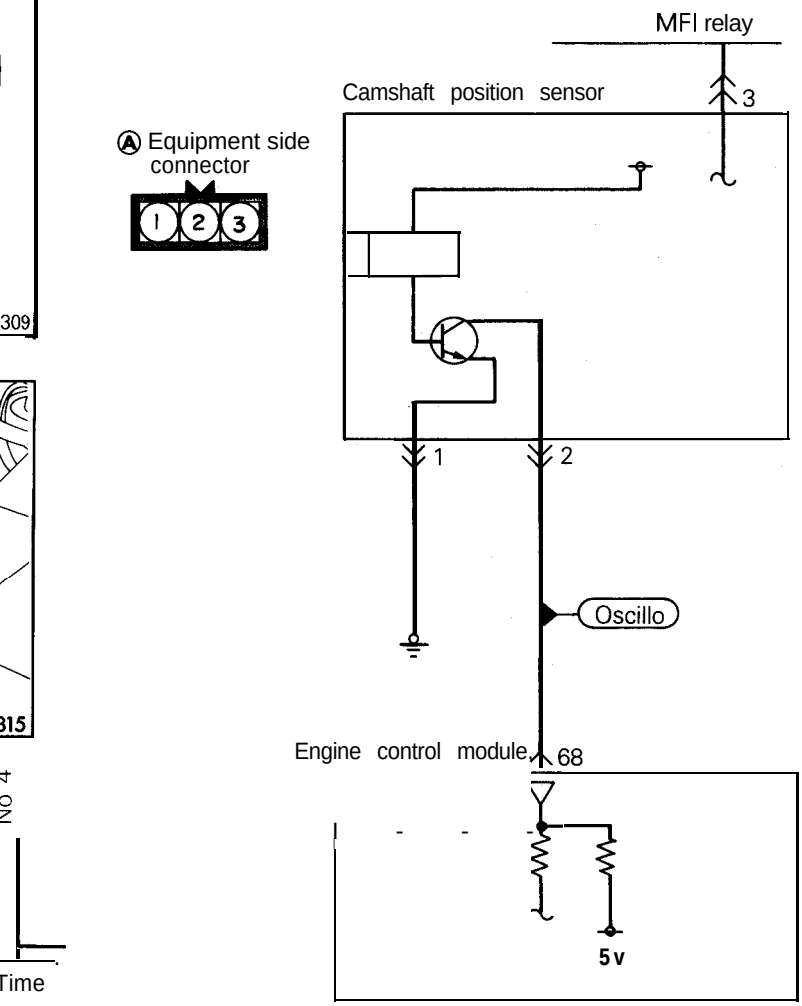




7FU0677

Engine control module connector





6AF0054

7FU0653

OPERATION

- The camshaft position sensor senses the top dead center on compression stroke, converts it into a pulse signal and inputs it to the engine control module, which then controls the fuel injection sequence, etc. based on the input signal.
- Power to the camshaft position sensor is supplied from the MFI relay and is grounded to the body. The camshaft position sensor generates a pulse signal as it repeatedly connects and disconnects between 5 V voltage supplied from the engine control module and ground.

TROUBLESHOOTING HINTS

Hint 1 : If the camshaft position sensor does not function correctly, correct sequential injection is not made so that the engine may stall, run irregularly at idle or fail to accelerate normally.

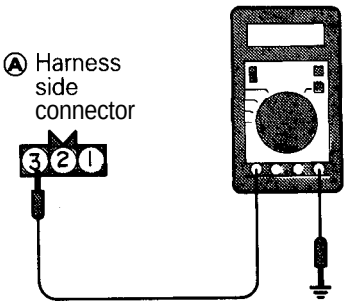
Hint 2: If the sensor outputs a pulse signal when the ignition switch is turned ON (with the engine not running), a faulty camshaft position sensor or engine control module is suspected.

INSPECTION

Refer to P.14A-101.

HARNESS INSPECTION

1



7FU1330

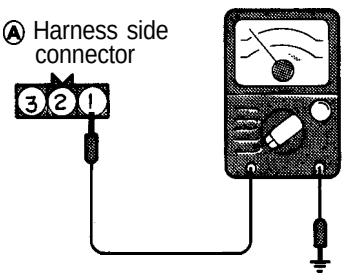
Measure the power supply voltage.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
B+

OK → 2

OK → Repair the harness. (Ⓐ3 – MFI relay)

2



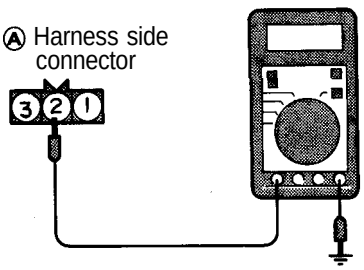
6AF0057

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

OK → 3

OK → Repair the harness. (Ⓐ1 – Ground)

3



6AF0059

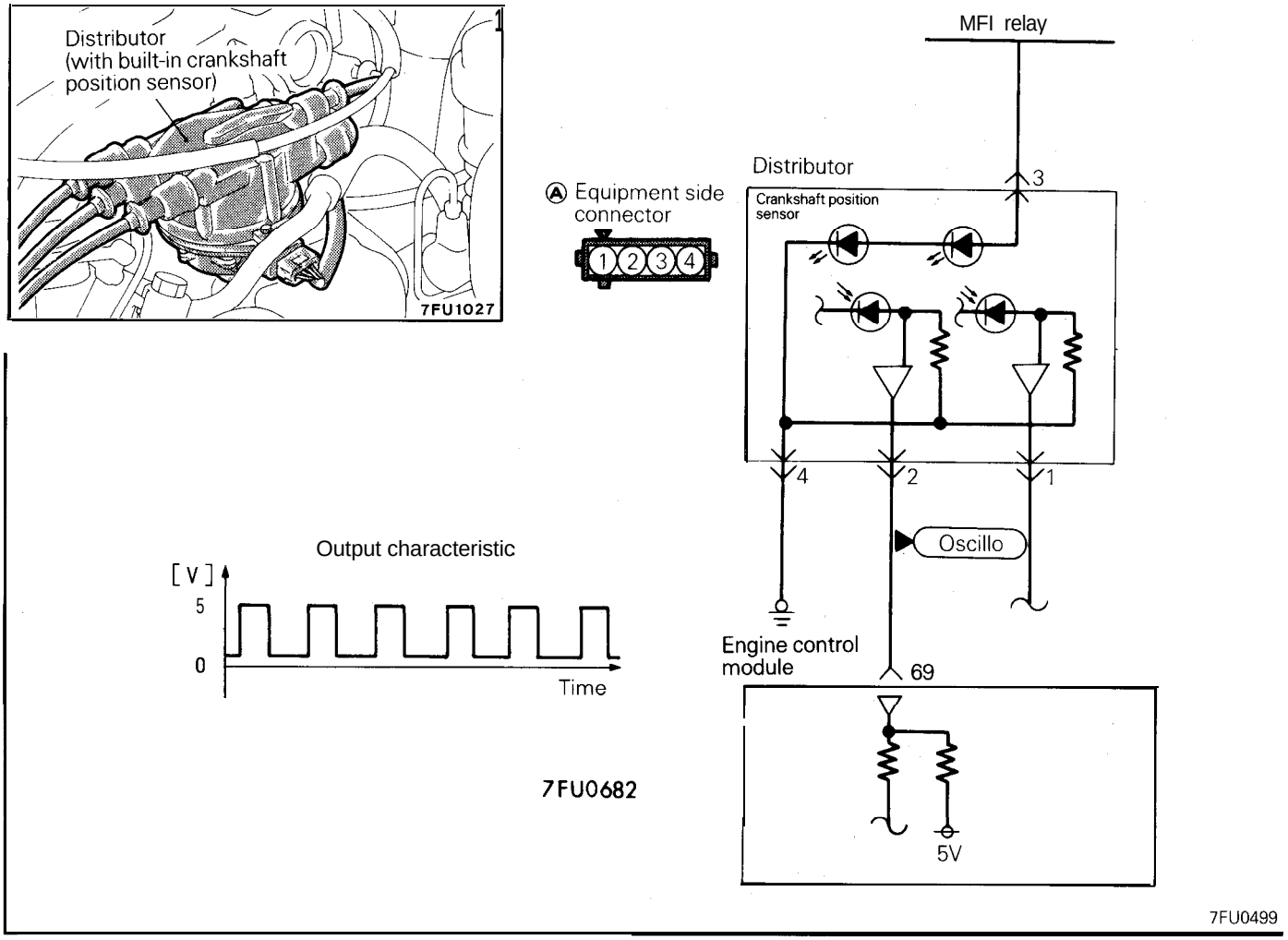
Measure the impressed voltage.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
4.8 – 5.2

OK → STOP

OK → Repair the harness. (Ⓐ2 – 68)

CRANKSHAFT POSITION SENSOR <SOHC>



OPERATION

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

TROUBLESHOOTING HINTS

Hint 1: If unexpected shocks are felt during driving or the engine stalls suddenly during idling, shake the crankshaft position sensor harness. If this causes the engine to stall, poor contact of the sensor connector is suspected.

Hint 2: If the crankshaft position sensor outputs a pulse signal when the ignition switch is turned ON (with the engine not running), a faulty crankshaft position sensor or engine control module is suspected.

Hint 3: If the tachometer reads 0 rpm when the engine that has failed to start is cranked, faulty crankshaft position sensor or broken timing belt is suspected.

Hint 4: If the tachometer reads 0 rpm when the engine that has failed to start is cranked, the primary current of the ignition coil is not turned on and off. Therefore, troubles in the ignition circuit and ignition coil or faulty ignition power transistor is suspected.

Hint 5: If the engine can be run at idle even though the crankshaft position sensor reading is out of specification, troubles are often in other than the crankshaft position sensor.

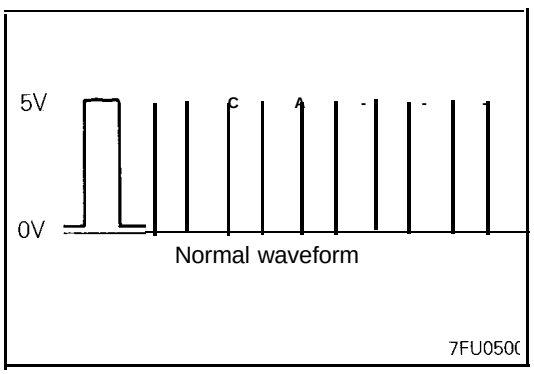
[Examples]
(1) Faulty engine coolant temperature sensor
(2) Faulty idle air control motor
(3) Poorly adjusted reference idle speed

INSPECTION

Using Scan Tool

Function	Item No.	Data display	Check condition	Check content	Normal state
Data reading	22	Cranking speed	• Engine cranking • Tachometer connected (check on and off of primary current of ignition coil by tachometer)	Compare cranking speed and scan tool reading	Indicated speed to agree

Function	Item No.	Data display	Check condition	Coolant temperature	Standard value
Data reading	22	Idle speed	• Engine: Running at idle • Closed throttle position switch: ON	At –20°C (-4°F)	1,275 – 1,475 rpm
				At 0°C (32°F)	1,225 – 1,425 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

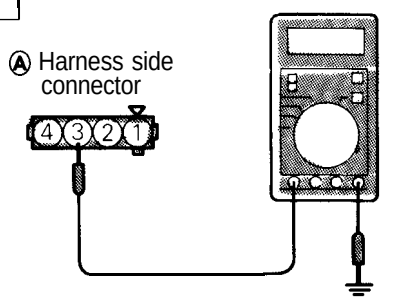


Using Oscilloscope

(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

1



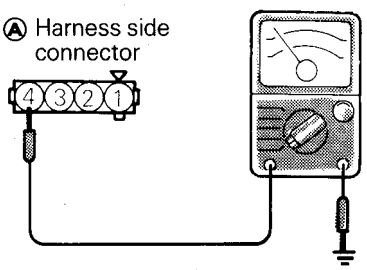
Measure the power supply voltage.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
B+

OK → 2

NO → Repair the harness. (Ⓐ3 – MFI relay)

2

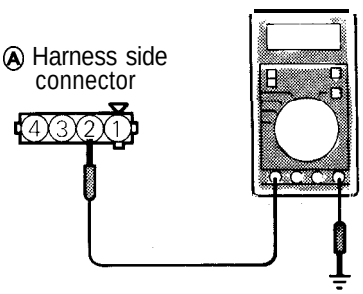


Check for continuity of the ground circuit.
- Connector: Disconnected

OK → 3

NO → Repair the harness. (Ⓐ4 – Ground)

3



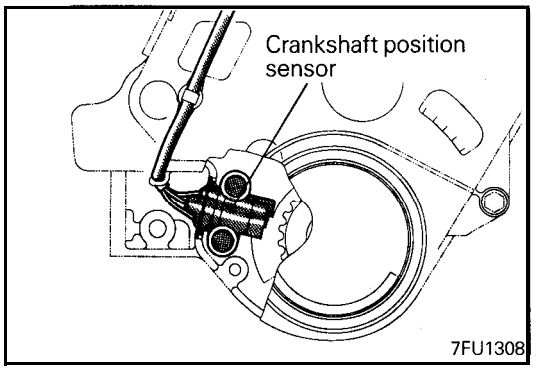
Check the voltage of the output circuit.
- Connector: Disconnected
- Ignition switch: ON

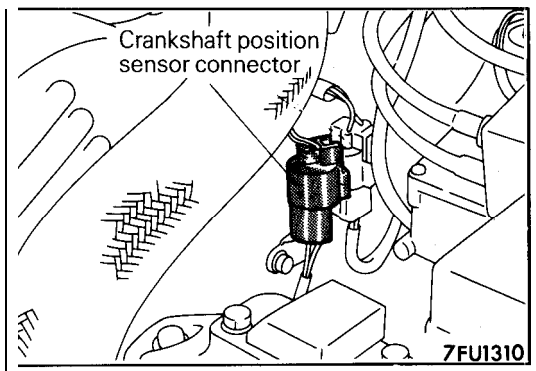
Voltage (V)
4.8 – 5.2

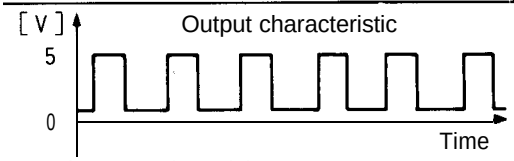
OK → STOP

NO → Repair the harness. (Ⓐ2 – 69)

CRANKSHAFT POSITION SENSOR <DOHC>

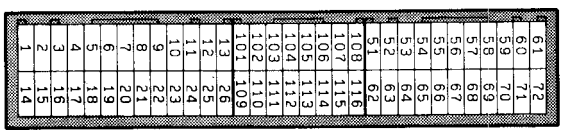






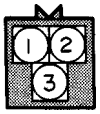
7FU0682

Engine control module connector

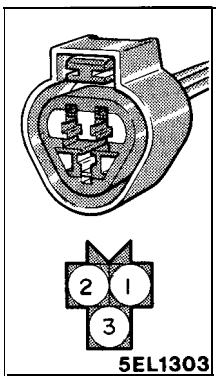


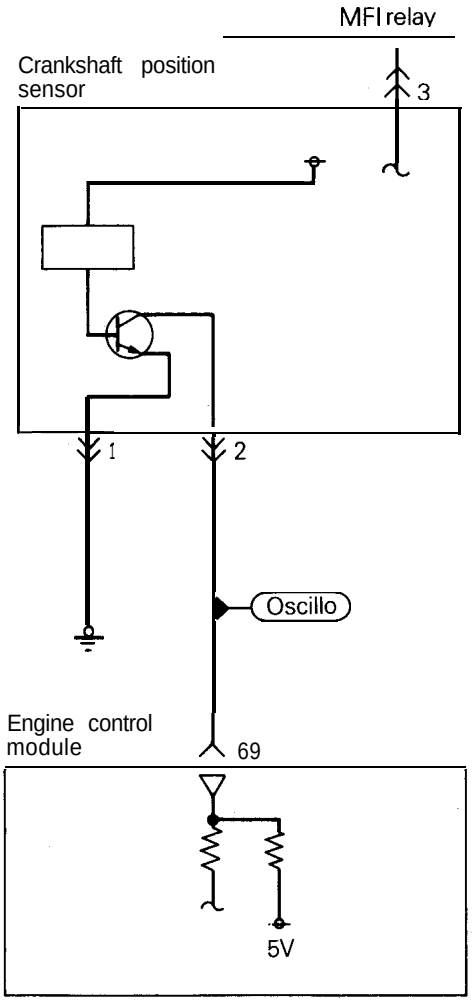
7FU0653

Ⓐ Equipment side connector



Ⓐ Harness side connector





6AF0060

OPERATION

Refer to P.14A-104

TROUBLESHOOTING HINTS

Refer to P.14A-104

INSPECTION

Using Scan Tool

Function	Item No.	Data display	Check condition	Check content	Normal state
Data reading	22	Cranking speed	• Engine cranking • Tachometer connected	Compare cranking speed and scan tool reading	Indicated speed to agree

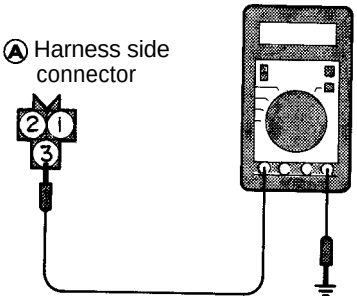
NOTE
(1) The tachometer indicates a third of the actual engine speed. Therefore, 3 times the tachometer indication is the actual engine speed.
(2) When the tachometer is set to the 2-cylinder range, it indicates actual engine speed.

Function	Item No.	Data display	Check condition	Coolant temperature	Standard value
Data reading	22	Idle speed	• Engine: Running at idle • Closed throttle position switch: ON	At –20°C (–4°F)	1,275 – 1,475 rpm
				At 0°C (32°F)	1,225 – 1,425 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

HARNESS INSPECTION

1

Ⓐ Harness side connector



7FU1331

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

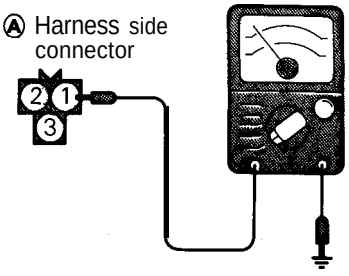
Voltage (V)
B+

OK → 2

NO → Repair the harness. (Ⓐ 3 – MFI relay)

2

Ⓐ Harness side connector



6AF0062

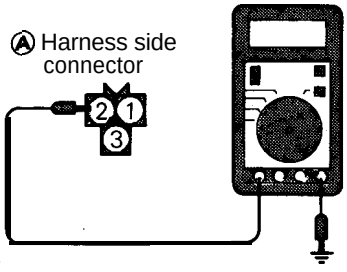
Check for continuity of the ground circuit.
- Connector: Disconnected

OK → 3

NO → Repair the harness. (Ⓐ 1 – Ground)

3

Ⓐ Harness side connector



6AF0064

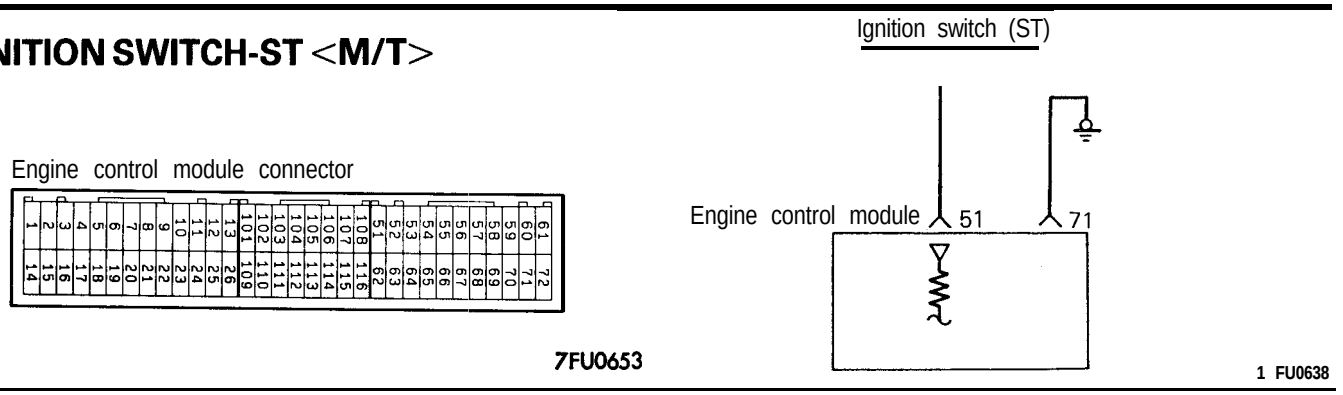
Measure the impressed voltage.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
4.8 – 5.2

OK → STOP

NO → Repair the harness. (Ⓐ 2 – 69)

IGNITION SWITCH-ST <M/T>



OPERATION

- The ignition switch-ST inputs a high signal to the engine control module while the engine is cranking. The engine control module provides fuel injection control, etc., at engine startup based on this signal.
- When the ignition switch is set to START, the battery voltage at cranking is applied through the ignition switch to the engine control module, which detects that the engine is cranking.

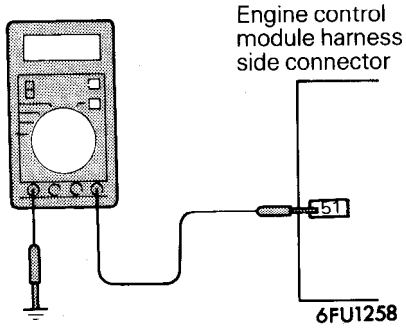
INSPECTION

Using Scan Tool

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

HARNESS INSPECTION

1



Measure the input voltage to the engine control module.

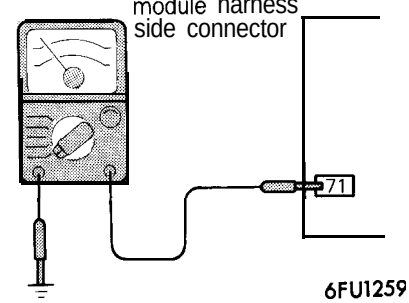
- Engine control module connector: Disconnected
- Ignition switch: START

Voltage (V)
8 or more

OK → 2

NG → Repair the harness. (51 – Ignition switch)

2



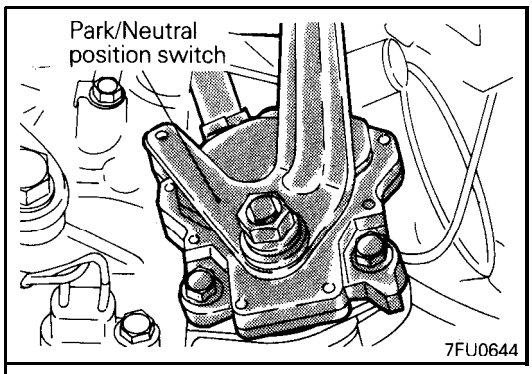
Check for continuity of the ground circuit.

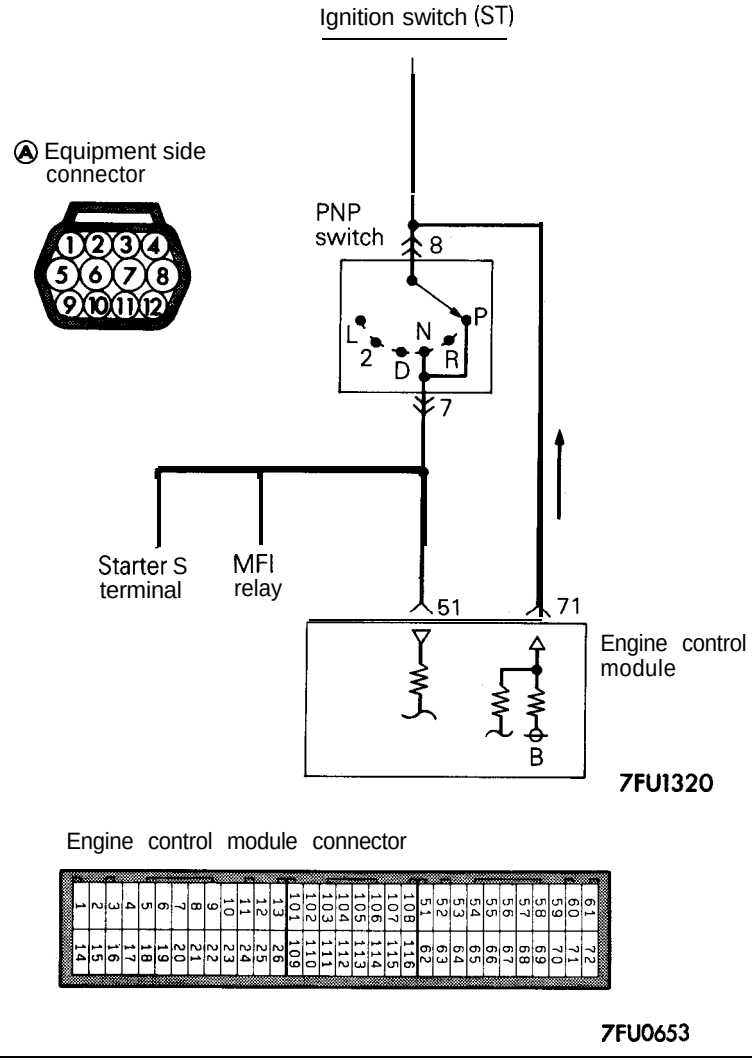
- Engine control module connector: Disconnected

OK → STOP

NG → Repair the harness. *(m-Ground)

IGNITION SWITCH-ST AND PARK/NEUTRAL POSITION SWITCH (PNP SWITCH) <A/T>





OPERATION

- The ignition switch-ST inputs a high signal to the engine control module while the engine is cranking. The engine control module provides fuel injection control, etc., at engine startup based on this signal.
- When the ignition switch is set to START, the battery voltage at cranking is applied through the ignition switch and park/neutral position switch to the engine control module, which detects that the engine is cranking.
  In case the selector lever is in a position other than the P/N range, the battery voltage is not applied to the engine control module.
- The park/neutral position switch converts the selector lever position (whether it is at the P/N range or at others) into high/low voltage and inputs it to the engine control module, which then controls the idle air control motor based on this signal.
- The battery voltage in the engine control module is applied through a resistor to the park/neutral position switch. When the selector lever is set to the P/N range, continuity is produced between the park/neutral position switch terminal of the engine control module and ground through the starter motor, thereby making the terminal voltage go low.

TROUBLESHOOTING HINTS

If the park/neutral position switch harness and individual part checked good but the park/neutral position switch output is abnormal, poorly adjusted control cable is suspected.

INSPECTION

Using Scan Tool

IGNITION SWITCH-ST

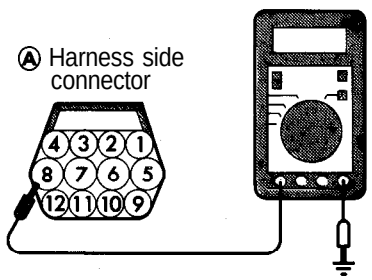
Normal condition	Item No.	Data display	Check condition	Engine condition
OFF	18	Switch state	Ignition switch: ON	Stop
ON				Cranking

PARK/NEUTRAL POSITION SWITCH

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

HARNESS INSPECTION

1



9FU0268

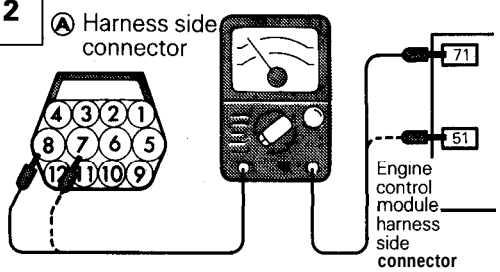
Measure the power supply voltage.
- Engine control module connector: Disconnected
- PNP switch connector: Disconnected
- Ignition switch: START

Voltage (V)
B+

OK → 2

NG → Check the power supply circuit.

2



9FU0269

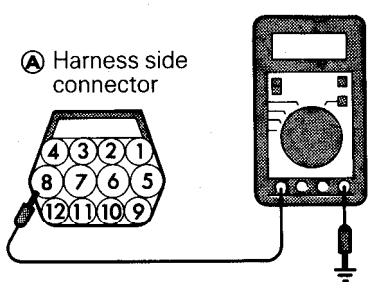
Check for continuity between the PNP switch and engine control module.
- Engine control module connector: Disconnected
- PNP switch connector: Disconnected

NOTE
Insert the probes of the circuit tester into both ends of the harness.

OK → 3

NG → Repair the harness. (Ⓐ 8 – 71) (Ⓐ 7 – 51)

3



9FU0268

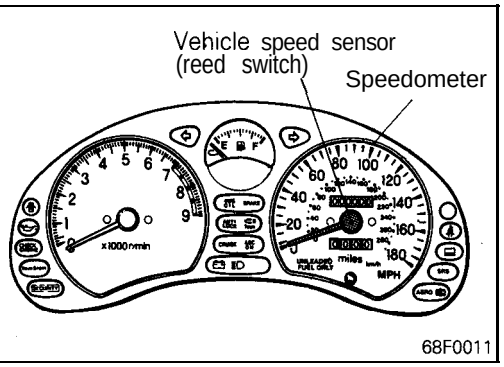
Measure the impressed voltage to the PNP switch.
- Engine control module connector: Connected
- PNP switch connector: Disconnected
- Ignition switch: ON

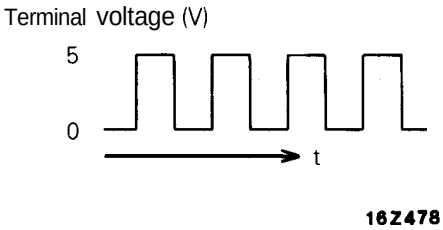
Voltage (V)
B+

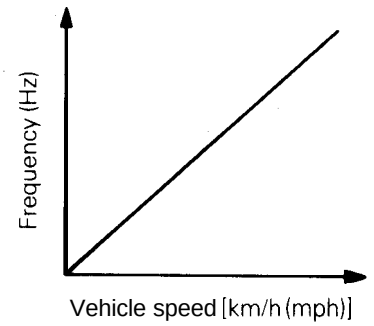
OK → STOP

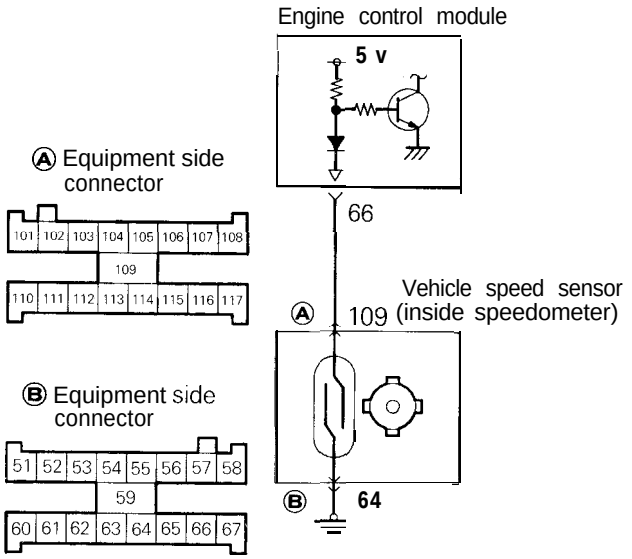
NG → Replace the engine control module.

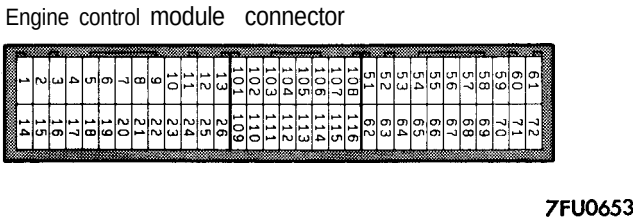
VEHICLE SPEED SENSOR











OPERATION

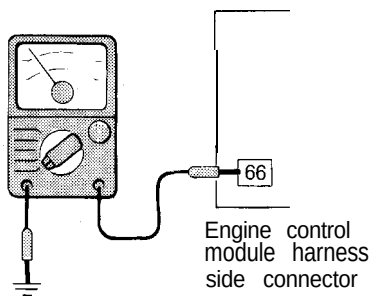
- The vehicle speed sensor which is located in the speedometer converts the vehicle speed into a pulse signal and inputs it to the engine control module, which then provides the idle speed control, etc. based on this signal.
- The vehicle speed sensor generates the vehicle speed signal by repeatedly opening and closing between the voltage of about 5 V applied from the engine control module and ground using a reed switch.

TROUBLESHOOTING HINTS

If there is an open or short circuit in the vehicle speed sensor signal circuit, the engine may stall when the vehicle is decelerated to stop.

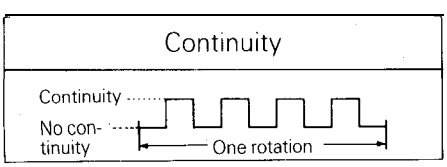
HARNESS INSPECTION

1



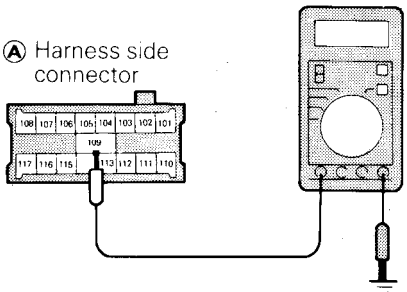
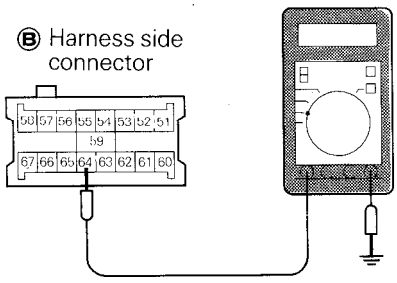
Check the vehicle speed sensor output circuit for continuity.

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



OK → STOP

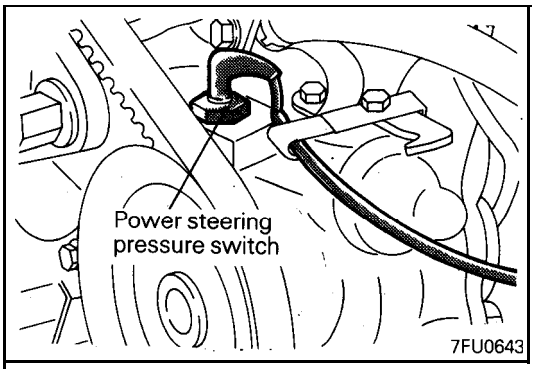
OK → 2

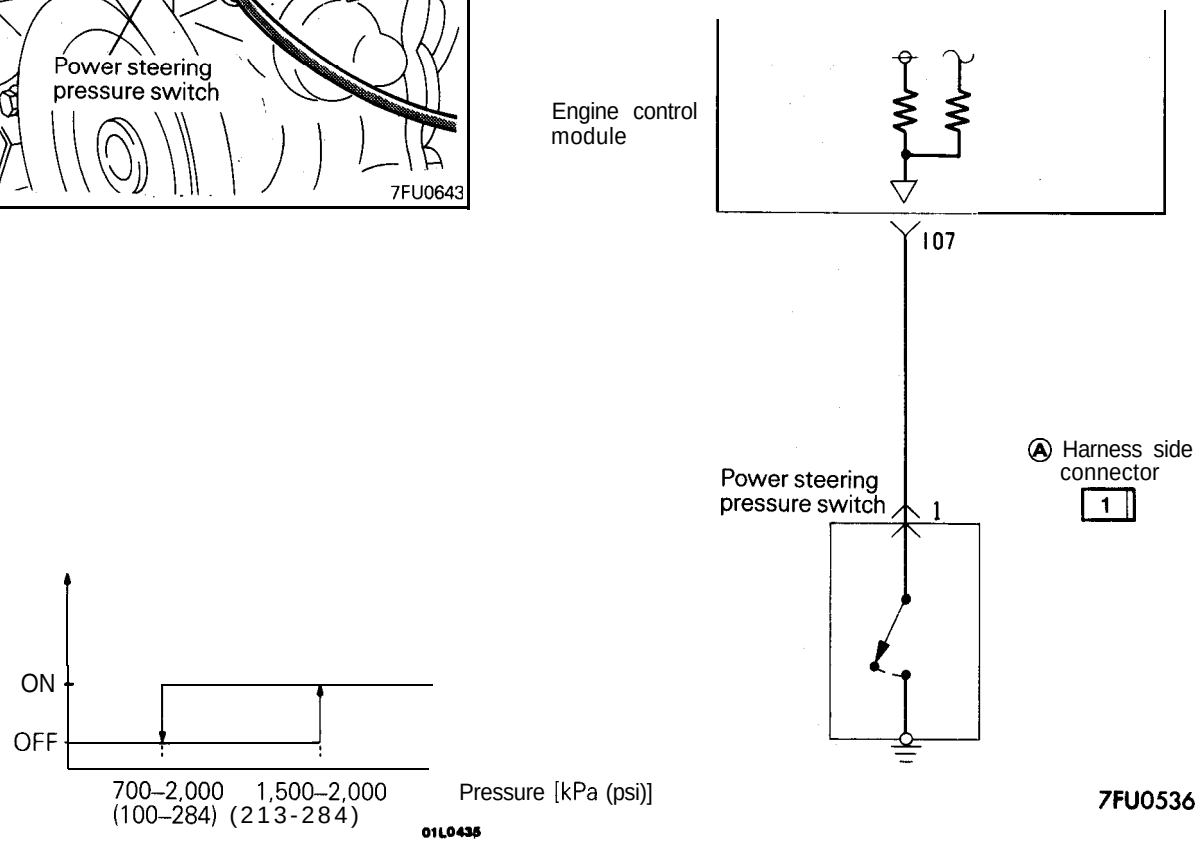
2	Ⓐ Harness side connector  6FU1265	Measure the power supply voltage of the vehicle speed sensor. • Connector: Disconnected • Ignition switch: ON Voltage (V): 4.5 – 4.9	OK → 3 NG → Repair the harness. (Ⓐ 109 – 66)
3	Ⓑ Harness side connector  7FU1438	Check for continuity of the ground circuit. • Connector: Disconnected	OK → STOP NG → Repair the harness. (Ⓑ 64 – Ground)

SENSOR INSPECTION

Refer to GROUP 8 – Meters and Gauges.

POWER STEERING PRESSURE SWITCH





OPERATION

- The power steering pressure switch converts presence/absence of power steering load into low/high voltage and inputs it to the engine control module, which then controls the idle air control motor based on this signal.
- The battery voltage in the engine control module is applied through a resistor to the power steering pressure switch. Steering operation causes the power steering oil pressure to increase, turning the switch on. As a result, continuity is produced between the battery voltage applied and ground. This causes the power steering pressure terminal voltage to go from high to low.

INSPECTION

Using Scan Tool

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

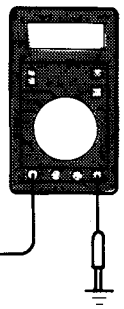
Checking Oil Pressure

Steering wheel	Oil pump delivery pressure (ref. value)
Straight forward	700 – 1,200 kPa (100 – 171 psi)
Turned	1,500 – 2,000 kPa (213 – 284 psi)

HARNESS INSPECTION

1

Ⓐ Harness side connector



7FU0505

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

Voltage (V)
B+

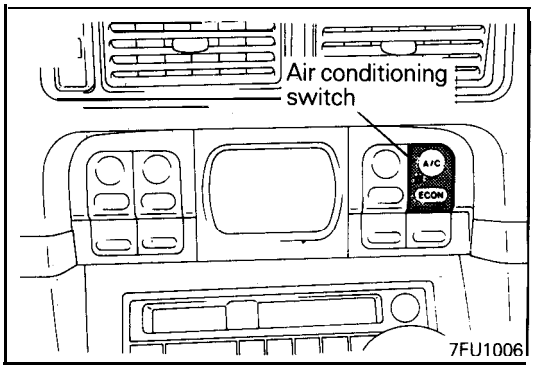
OK → STOP

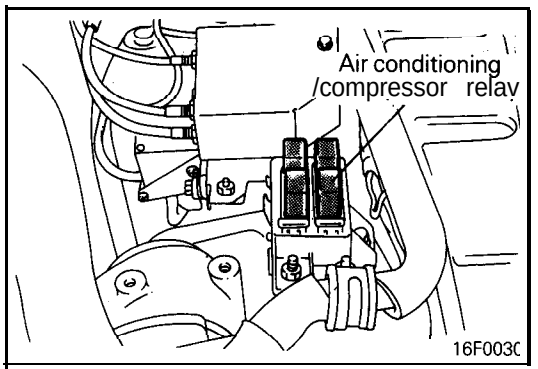
OK → Repair the harness. (Ⓐ1 – 107)

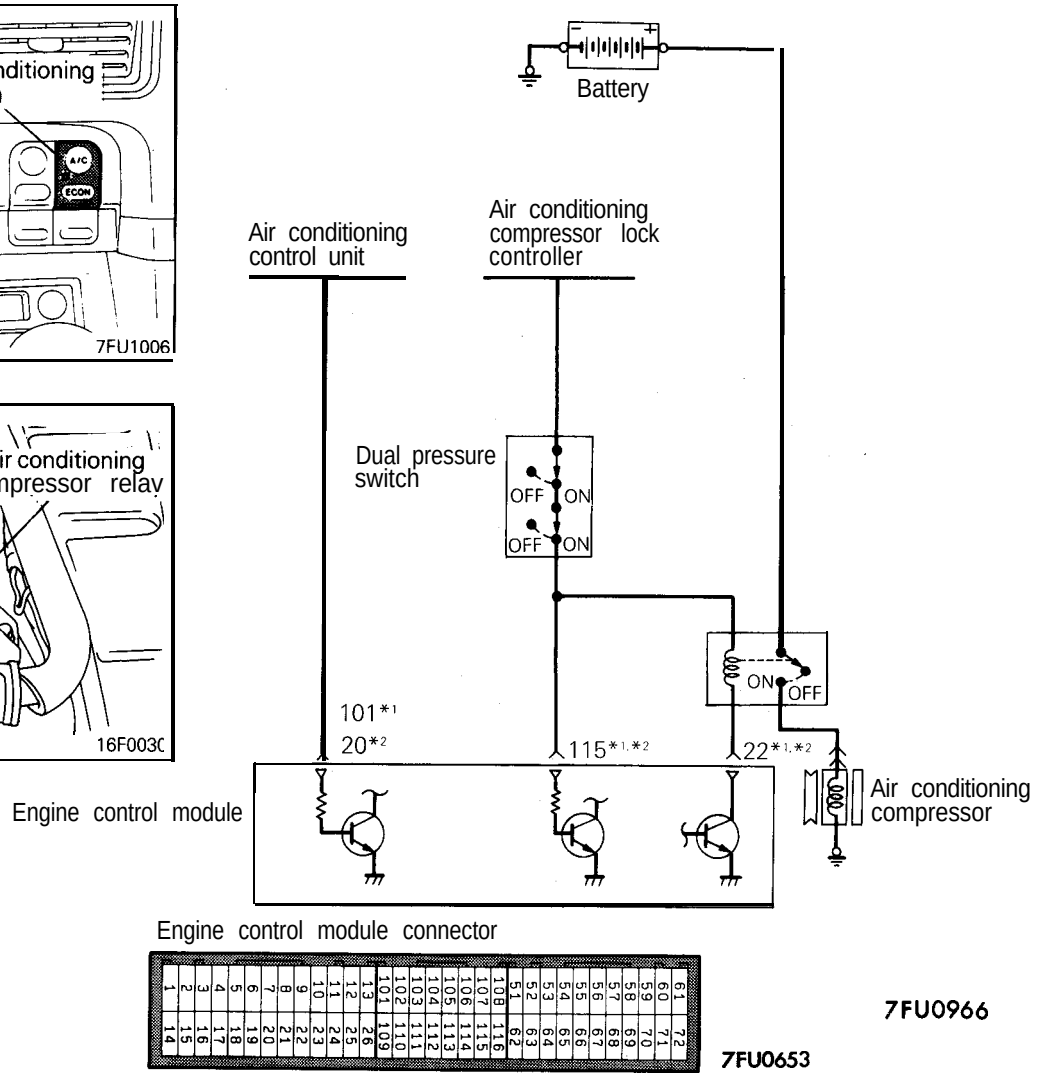
SENSOR INSPECTION

Refer to GROUP 19 – Service Adjustment Procedures.

AIR CONDITIONING SWITCH AND COMPRESSER CLUTCH RELAY







NOTE
*1: SOHC
*2: DOHC

OPERATION

- The air conditioning switch applies the battery voltage to the engine control module when the air conditioning is turned on.
- When the air conditioning ON signal is input, the engine control module drives the idle air control motor and turns ON the power transistor. As a result, the air conditioning power relay coil is energized to turn on the relay switch, which activates the air compressor magnetic clutch.

TROUBLESHOOTING HINTS

If the air compressor magnet clutch is not activated when the air conditioning switch is turned on during idling, faulty air conditioning control system is suspected.

INSPECTION

Using Scan Tool

AIR CONDITIONING SWITCH

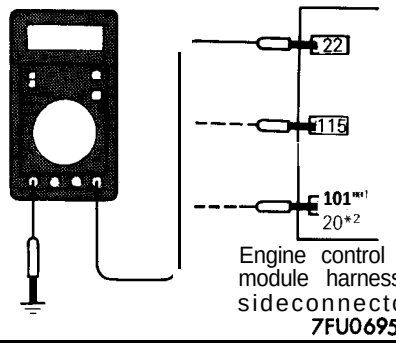
Function	Item No.	Data display	Check condition	Air conditioning switch	Normal indication
Data reading	28	Switch state	Engine: Idling (air compressor to be running when air conditioning switch is ON)	OFF	OFF
				ON	ON

AIR CONDITIONING POWER RELAY

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

HARNESS INSPECTION

1



Measure the power supply voltage of the air conditioning circuit.

- Air conditioning switch: ON
- Engine control module connector: Disconnected
- Ignition switch: ON
- Dual air conditioning switch: ON

Voltage (V)
B+

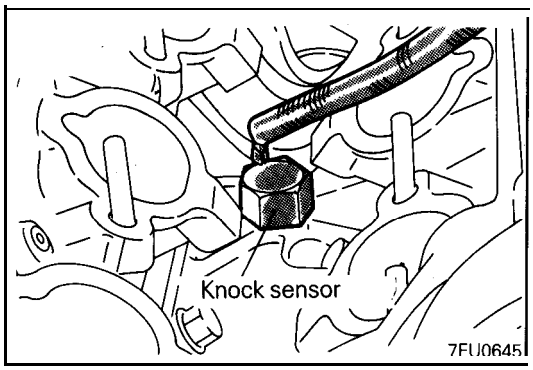
OK → STOP

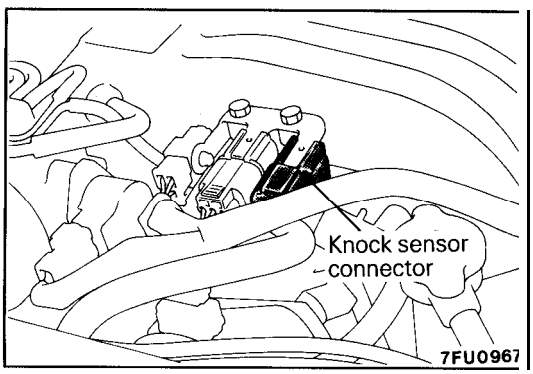
OK → Check the air conditioning circuit.

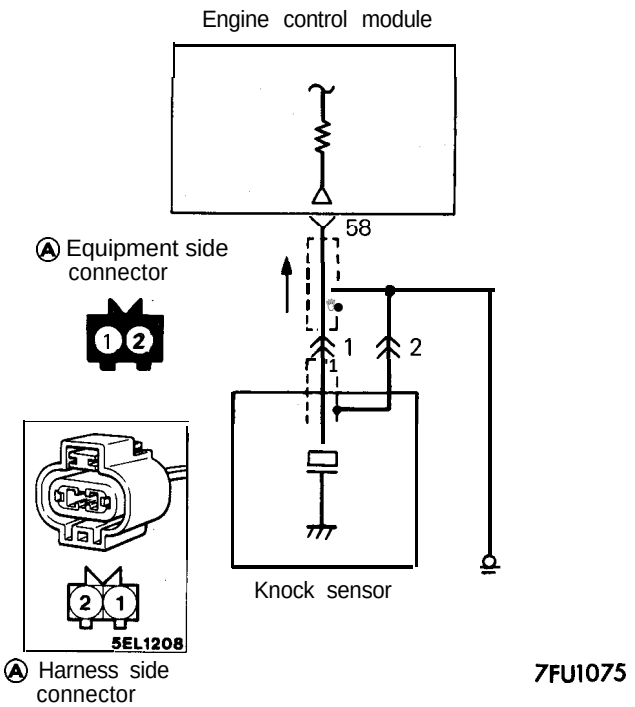
AIR CONDITIONING INSPECTION

Refer to GROUP 24 – Service Adjustment Procedures.

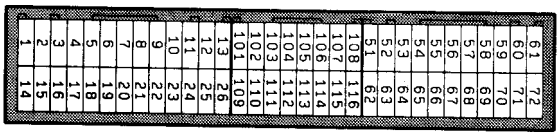
KNOCK SENSOR <DOHC>







Engine control module connector



7FU0653

OPERATION

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

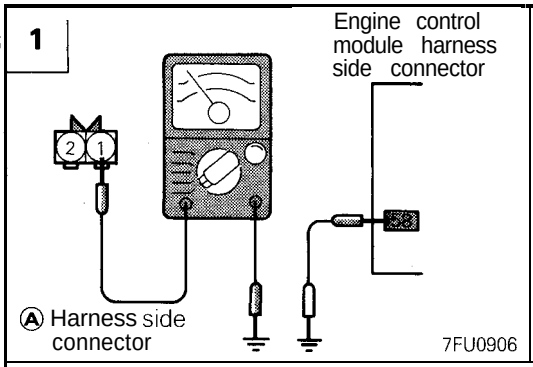
TROUBLESHOOTING HINTS

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

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

HARNESS INSPECTION

1



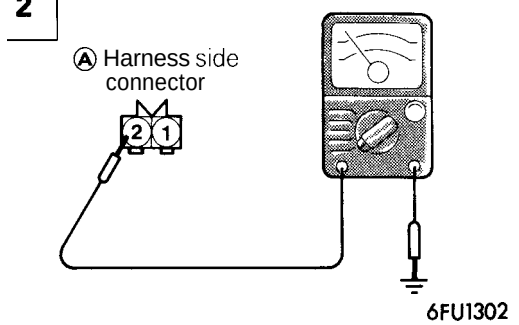
Check for an open-circuit or a short-circuit to ground, between the engine control module and knock sensor.

- Knock sensor connector: Disconnected
- Engine control module connector: Disconnected

OK → 2

NO → Repair the harness. (Ⓐ1 – 58)

2



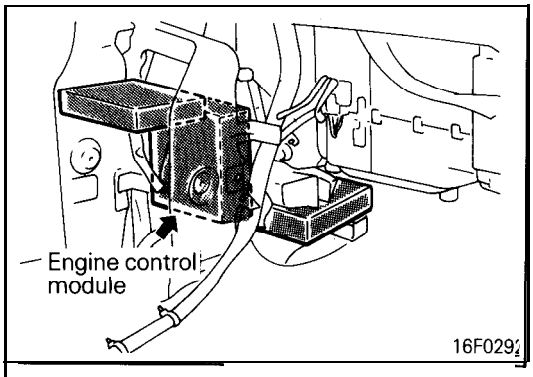
Check for continuity of the ground circuit.

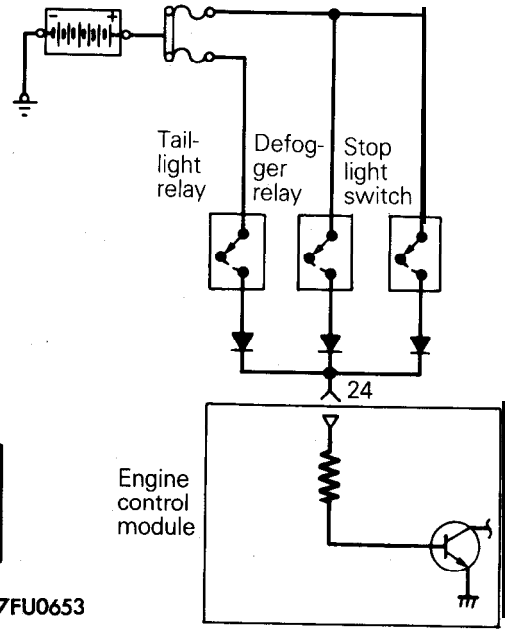
- Connector: Disconnected

OK → STOP

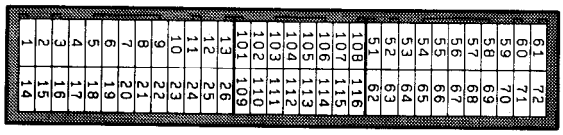
NO → Repair the harness. (Ⓐ2 – Ground)

ELECTRICAL LOAD SWITCH <DOHC>





Engine control module 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 module. Based on this signal, the engine control module controls the idle air control motor.
- When the switch of equipment with a large electrical load is turned ON, the battery voltage is applied to the engine control module to indicate that the equipment switch is turned ON.

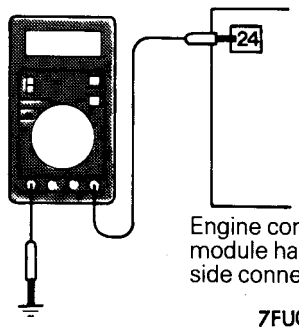
INSPECTION

Using Scan Tool

Function	Item No.	Data display	Check condition	Equipment state	Normal display
Data reading	33	Switch state	Operation of equipment: OFF	Lighting switch only: OFF → ON	OFF → ON
				Rear defogger switch only: OFF → ON	OFF → ON
				Brake pedal only: depressed → Released	ON → OFF

HARNESS INSPECTION

1



Measure the input voltage of engine control module.

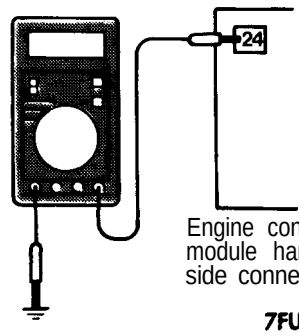
- Engine control module connector: Disconnected
- Lighting switch: ON (Tail light relay ON)

Voltage (V)
B+

OK → 2

NG → Check circuit related to tail light relay

2



Measure the input voltage of engine control module.

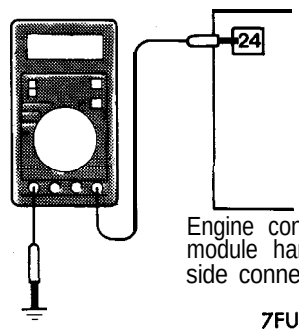
- Engine control module connector: Disconnected
- Defogger switch: ON (Defogger relay ON)

Voltage (V)
B+

OK → 3

NG → Check circuit related to defogger relay

3



Measure the input voltage of engine control module.

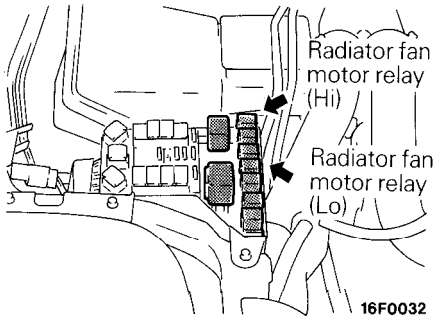
- Engine control module connector: Disconnected
- Brake pedal: Depressed (Stop light switch ON)

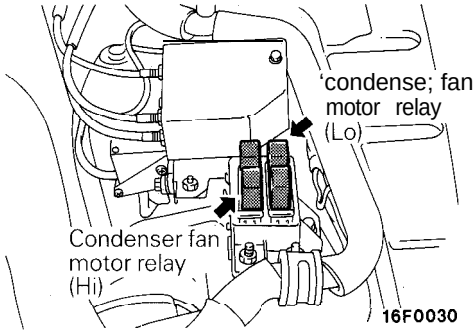
Voltage (V)
B+

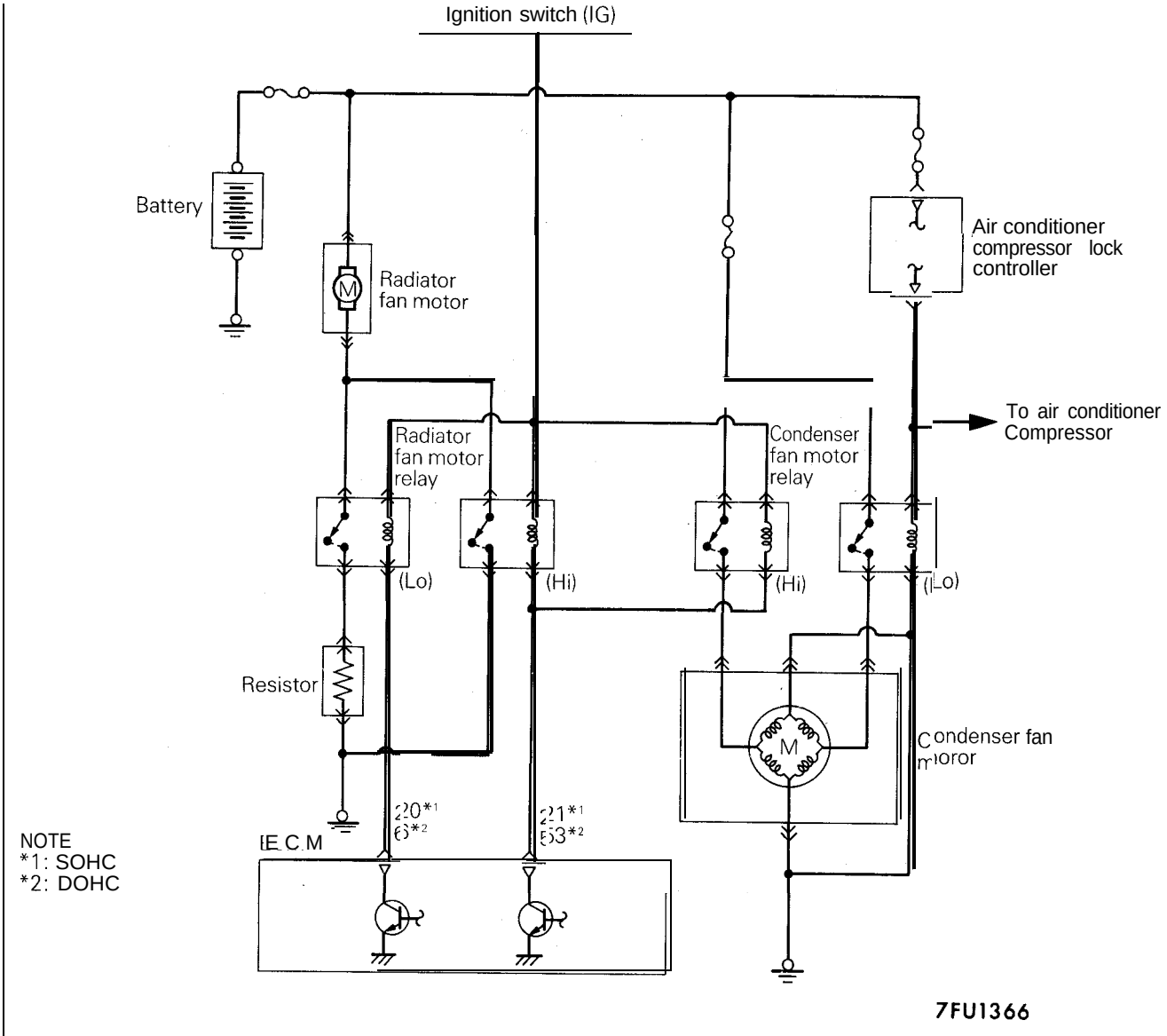
OK → STOP

NG → Check circuit related to stop light relay

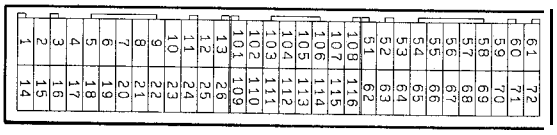
FAN MOTOR RELAY (RADIATOR, AIR CONDITIONING CONDENSER)







Engine control module connector



7FU0653

OPERATION

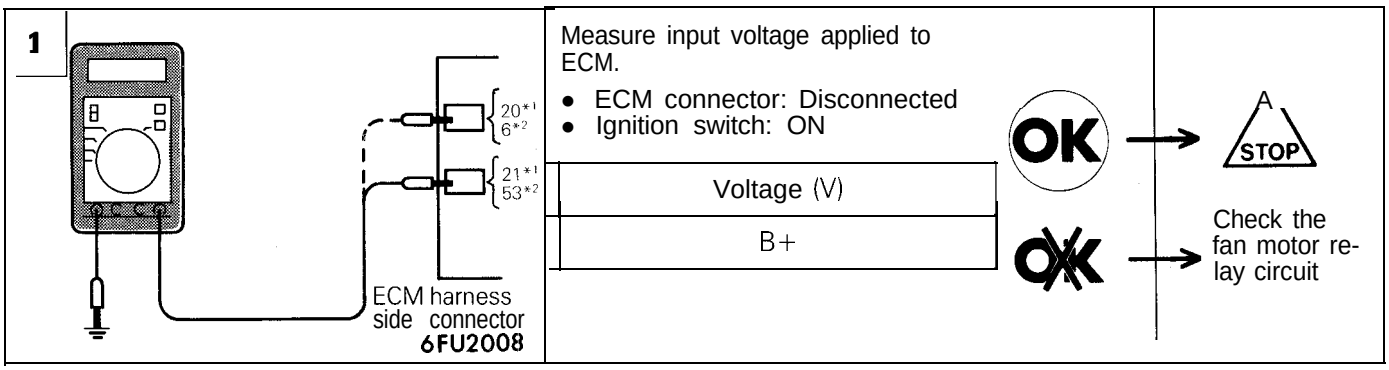
- The engine control module controls the radiator fan motor and condenser fan motor according to the engine coolant temperature and vehicle speed via the power transistors (low speed side and high speed side) in the module.
- If the engine control unit turns ON the low speed side power transistor inside the module, the radiator fan motor relay (Lo) coil operates to send driving power supply (for low speed rotation) from the battery to the radiator fan motor.
  If the air conditioner compressor lock controller outputs the air conditioner compressor driving power supply, the current flows to the condenser fan motor relay (Lo).
  The condenser fan motor relay (Lo) will operate to send driving power supply (for low speed rotation) from the battery to the condenser fan motor.
  If the engine control module turns ON the high speed side power transistor inside the unit, the radiator fan motor relay (Hi) and condenser fan motor relay (Hi) will operate to send the driving power supply (for high speed rotation) to the radiator fan motor and condenser fan motor.

INSPECTION

Using Scan Tool

Function	Item No.	Drive content	Check condition	Normal state
Actuator test	20	Radiator fan motor and condenser fan motor are driven at high speeds.	Ignition switch: ON	Radiator fan motor and condenser fan motor rotate at high speeds.
	21	Radiator fan motor and condenser fan motor are driven at low speeds.	Ignition switch: ON	Radiator fan motor and condenser fan motor rotate at low speeds.

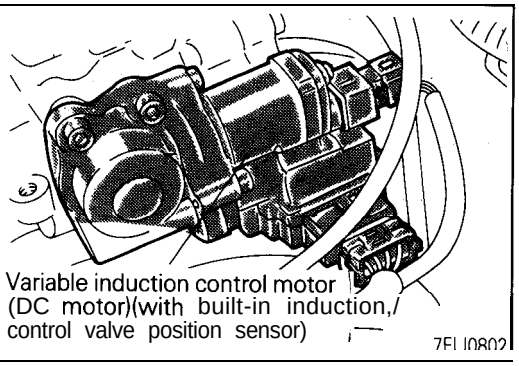
HARNESS INSPECTION

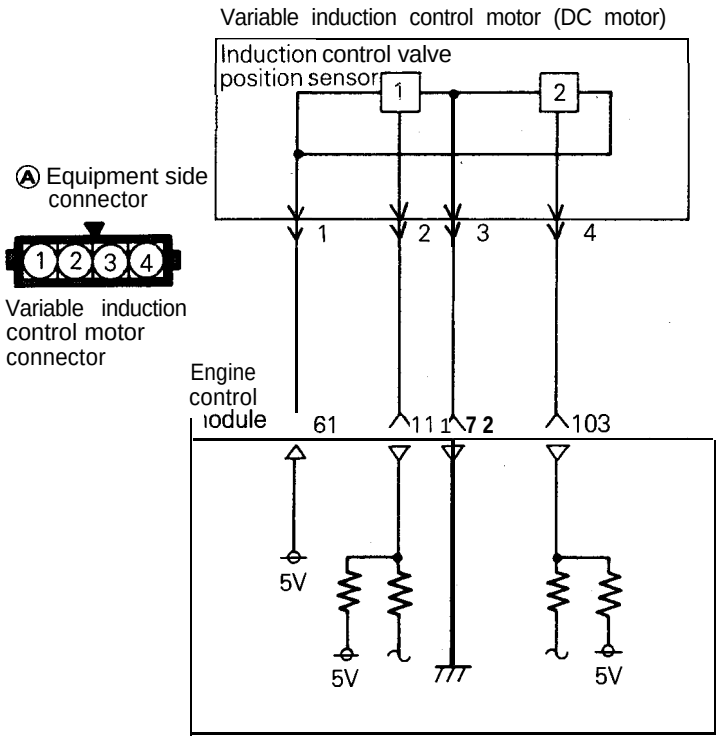


FAN MOTOR RELAY INSPECTION

Refer to Radiator Check in GROUP 7 and Power Relay Check in GROUP 24.

INDUCTION CONTROL VALVE POSITION SENSOR <DOHC>



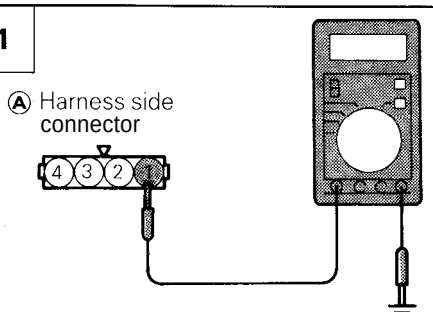


OPERATION

- The induction control valve position sensor detects the induction control valve opening degree and converts it into a pulse signal to be input into the engine control module, which provides valve opening and closing control based on this signal.
- The induction control valve position sensor is supplied with 5 V power from the engine control module and is grounded to the engine control module. A voltage of 5 V from the engine control module is impressed to the two output terminals of the induction control valve position sensor. By opening and closing the circuit between the output terminal and ground, the induction control valve position sensor generates the pulse signal.

HARNESS INSPECTION

1



6FU1241

Measure the power supply voltage of the air intake control valve position sensor.

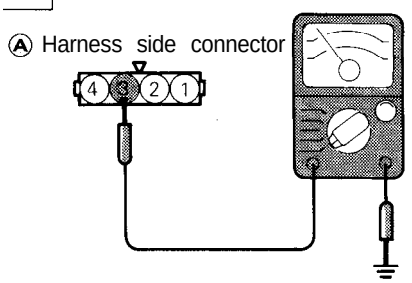
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
4.8 – 5.2

OK → 2

OK → Repair the harness. (Ⓐ 1 – 61)

2



7FU0824

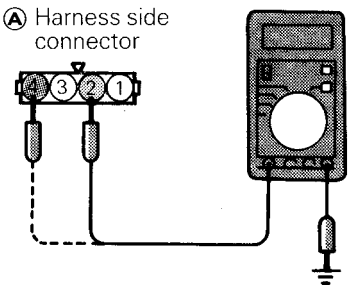
Check for continuity of the ground circuit.

- Connector: Disconnected

OK → 3

OK → Repair the harness. (Ⓐ 3 – 72)

3



7FU0825

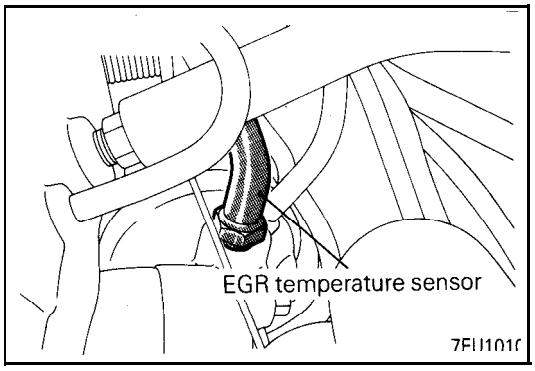
Measure the terminal voltage.

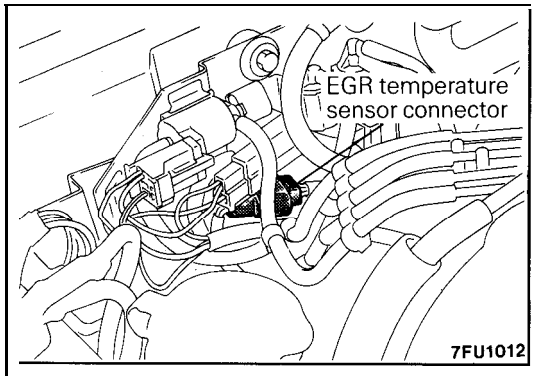
- Connector: Disconnected
- Ignition switch: ON

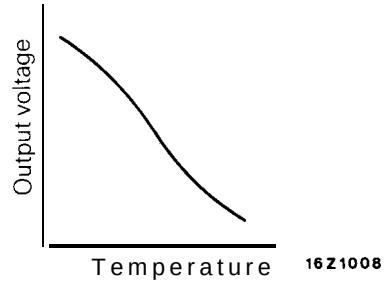
OK → STOP

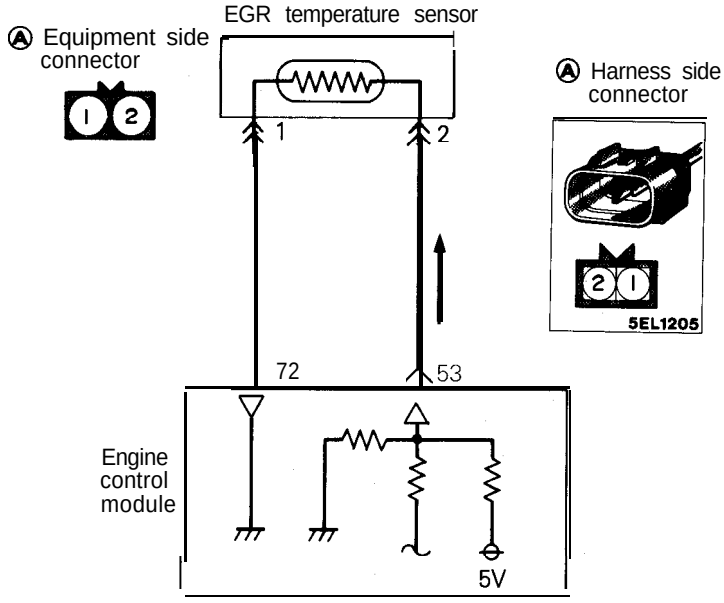
OK → Repair the harness. (Ⓐ 2 – 111) (Ⓐ 4 – 103)

EGR TEMPERATURE SENSOR <California>









OPERATION

- The EGR temperature sensor converts the temperature of EGR gas downstream from the EGR valve to voltage and inputs it to the engine control module. The engine control module judges the condition of the EGR by this signal. If there is abnormal condition, the check engine/malfunction indicator lamp is turned on to notify the driver.
- Five volt power supply in the engine control module is applied to the EGR temperature sensor through the resistance in the module. This power supply further passes through the EGR temperature sensor, which is a kind of resistor, and is grounded at the engine control module. The resistance of the EGR temperature sensor is characterized by a decrease in resistance with an increase of EGR temperature due to increase in quantity of EGR.
- EGR temperature sensor terminal voltage increases or decreases with EGR temperature sensor resistance. Therefore, EGR temperature sensor terminal voltage changes with EGR gas temperature. The higher the EGR gas temperature, the lower the EGR temperature sensor terminal voltage.

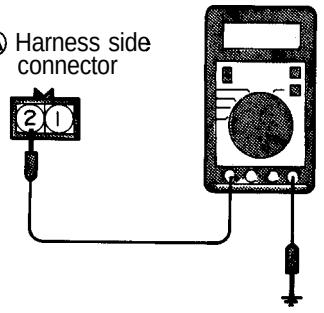
INSPECTION

Using Scan Tool

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	43	Sensor temperature	Engine: Warmed up Engine is maintained in a constant state for 2 minutes or more Disconnect vacuum hose (green stripe) from EGR solenoid and install blind caps to removed vacuum hose end and solenoid nipple.	700 rpm (Idle)	100°C (212°F) or less
				3,500 rpm	120°C (248°F) or more

HARNESS INSPECTION

1



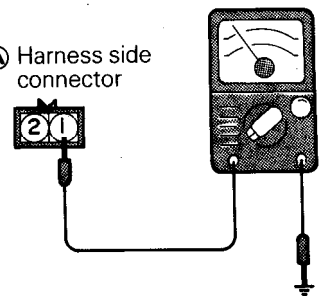
Measure the power supply voltage.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
4.3 – 4.7

OK → 2

NG → Repair the harness. (Ⓐ2 – 53)

2



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

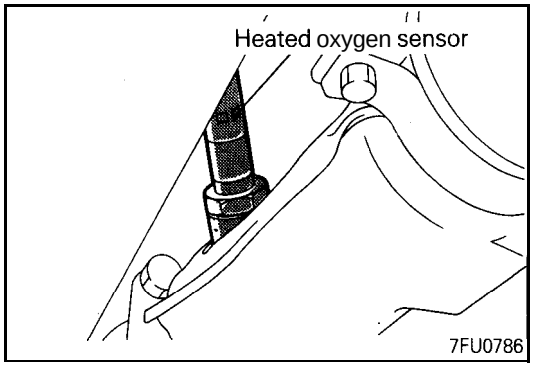
OK → STOP

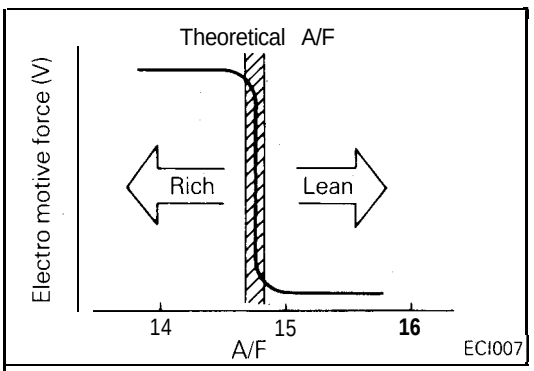
NG → Repair the harness. (Ⓐ1 – 72)

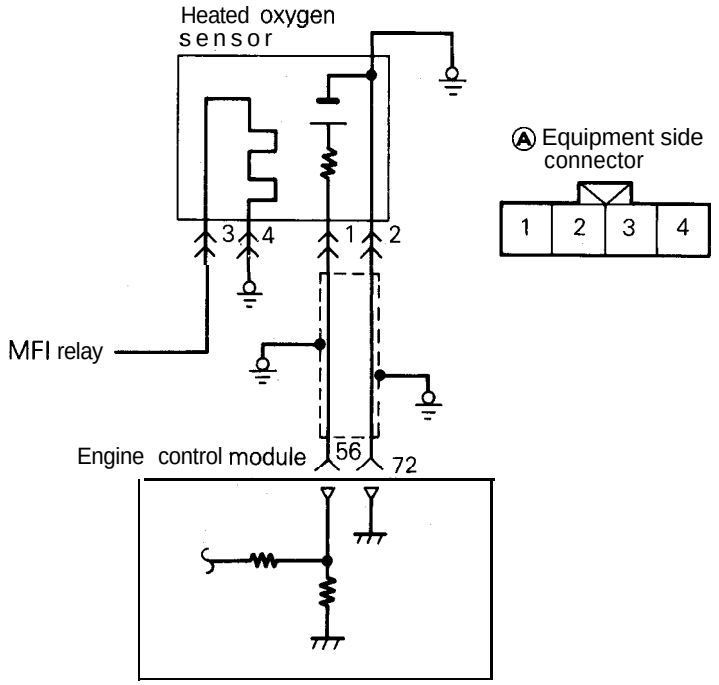
SENSOR INSPECTION

Refer to GROUP 25 – Exhaust Gas Recirculation (EGR) System.

HEATED OXYGEN SENSOR <Except California – SOHC>

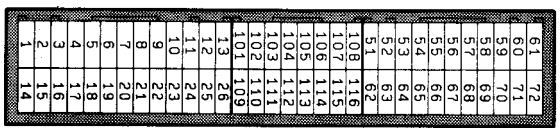






7FU0969

Engine control module connector



7FU0653

OPERATION

- The heated oxygen sensor senses the oxygen concentration in exhaust gas, converts it into a voltage and inputs it to the engine control module.
- The heated oxygen sensor outputs about 1 V when the air-fuel ratio is richer than the theoretical ratio and outputs about 0 V when the ratio is leaner (higher oxygen concentration in exhaust gas).
- The engine control module controls the fuel injection ratio based on this signal so that the air-fuel ratio may be kept at the theoretical ratio.
- The battery voltage is supplied to the heated oxygen sensor through the MFI relay. Therefore, the sensor element is heated by the heater so that the heated oxygen sensor remains responsive even when the exhaust temperature is low.

TROUBLESHOOTING HINTS

Hint 1: Poor cleaning of exhaust gas will result if the heated oxygen sensor fails.
Hint 2: If the heated oxygen sensor checked good but the sensor output voltage is out of specification, troubles of parts related to air-fuel ratio control system are suspected.

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

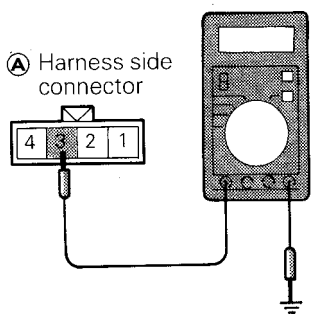
INSPECTION

Using Scan Tool

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	11	Sensor voltage	Engine: Warm-up (make the mixture lean by engine speed reduction, and rich by racing)	When sudden deceleration from 4,000 rpm	200 mV or lower
				When engine is suddenly raced	600 – 1,000 mV
			Engine: Warm-up (using the heated oxygen sensor signal, check the air/fuel mixture ratio, and also check the condition of control by the engine control module)	700 rpm (Idle)	400 mV or lower ↕ (changes) 600 – 1,000 mV
				2,000 rpm	

HARNESS INSPECTION

1



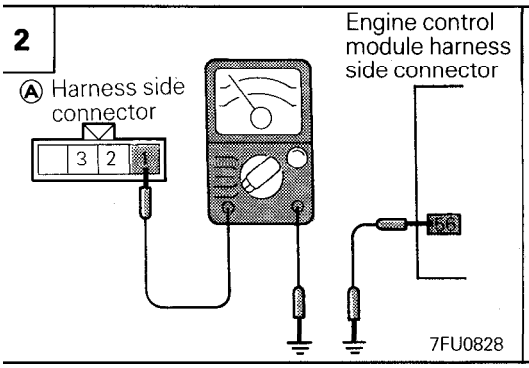
Measure the power supply voltage of the heated oxygen sensor.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
B+

OK → 2

NO → Repair the harness. (Ⓐ3 – MFI relay)

2

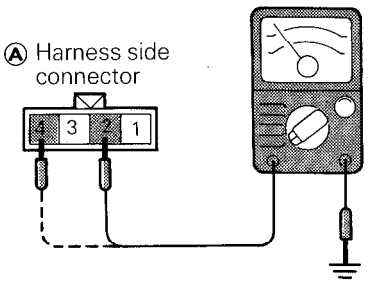


Check for an open-circuit, or a short-circuit to ground between the engine control module and the heated oxygen sensor.
- Heated oxygen sensor connector: Disconnected
- Engine control module connector: Disconnected

OK → 3

NO → Repair the harness. (Ⓐ1 – 56)

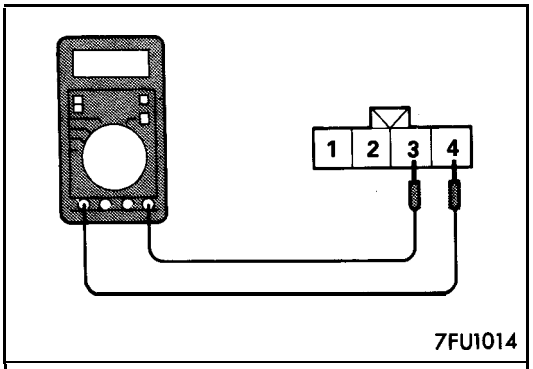
3



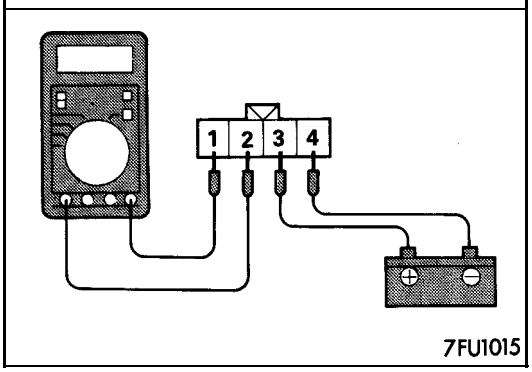
Check for continuity of the ground circuit.
- Connector: Disconnected

OK → STOP

NO → Repair the harness. (Ⓐ2 – 72) (Ⓐ4 – Ground)



7FU1014



7FU1015

SENSOR INSPECTION

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

(4) Warm up the engine until the engine coolant temperature becomes 80°C (176°F) or higher.
(5) Using jumper wires, connect terminals ③ and ④ of the heated oxygen sensor connector to battery ⊕ and ⊖ terminals respectively.

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

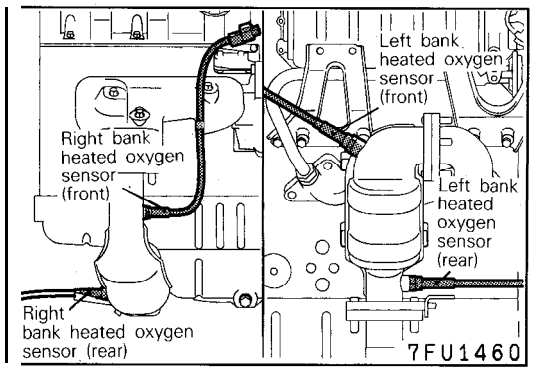
(6) Connect a digital voltmeter across terminals ① and ②.

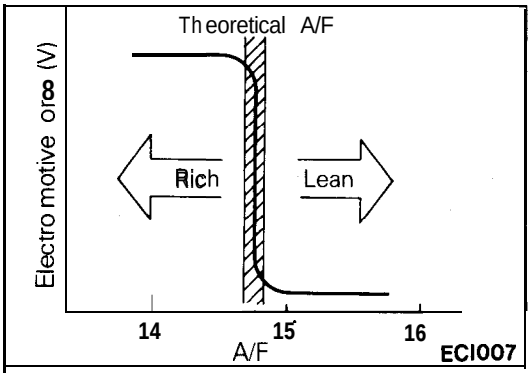
(7) Racing the engine repeatedly and measure the output voltage of the heated oxygen sensor.

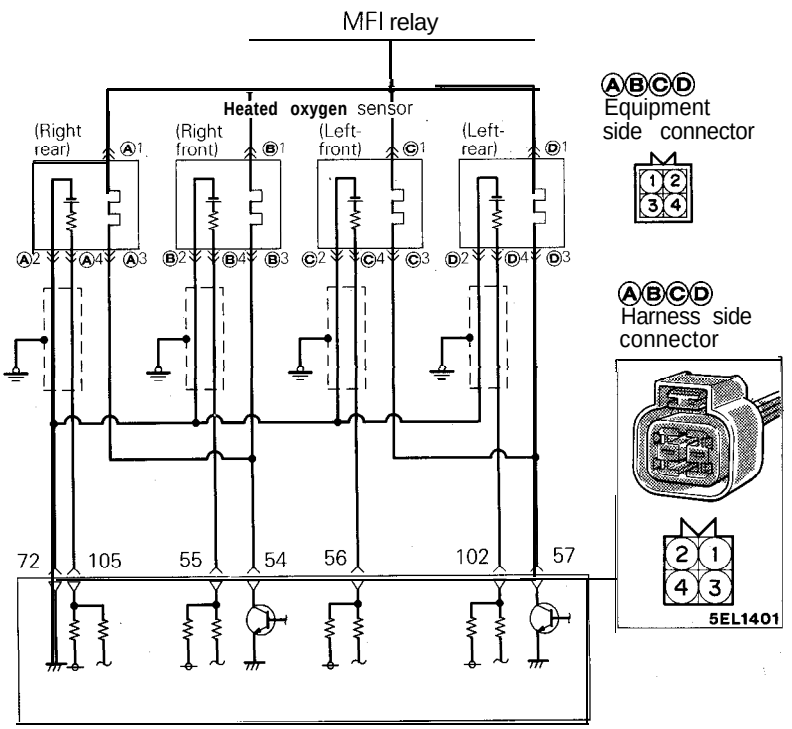
Engine	Heated oxygen sensor output voltage	Remarks
When engine is raced	0.6 – 1.0 V	When the air-fuel mixture becomes richer as a result of repeated racing, the heated oxygen sensor should output a voltage of 0.6 – 1.0 V.

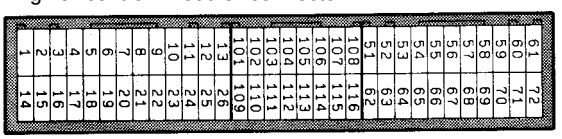
NOTE
For removal and installation of the heated oxygen sensor, refer to GROUP 11 – Exhaust Manifold.

HEATED OXYGEN SENSOR <California – SOHC>









OPERATION

Refer to P.14A-128.

TROUBLESHOOTING

Refer to P.14A-129.

INSPECTION

Using Scan Tool

<Heated oxygen sensor (front)>

Function	tern No.	Data display	Check condition	Engine condition	Standard value
Data reading	11 39	Sensor detection voltage	Engine: Warm-up (Make the mixture lean by engine speed reduction, and rich by racing)	When sudden deceleration from 4,000 rpm	200 mV or lower
				When engine is suddenly raced	600 – 1,000 mV
			Engine: Warm-up (Using the heated oxygen sensor signal, check the air/fuel mixture ratio, and also check the condition of control by the engine control module)	700 rpm (Idling)	400 mV or lower ↕ (Changes) 600 – 1,000 mV
				2,000 rpm	

<Heated oxygen sensor (rear)>

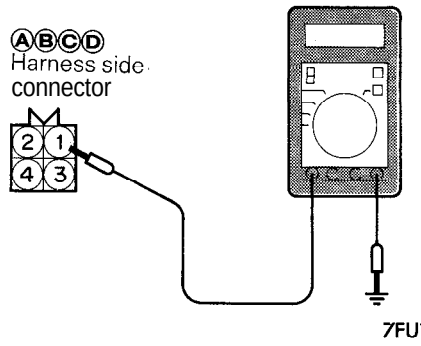
Function	Item No.	Data display	Check condition	Engine condition	Standard value
Data reading	59 69	Sensor voltage	• Transaxle: 2nd gear <M/T>, L range <A/T> • Drive with wide open throttle	3,500 rpm	600 – 1,000 mV

<Heated oxygen sensor (front, rear:)>

Function	Item No.	Data display	Check condition	Engine condition	Normal indication
Data reading	48	Heater condition	Engine: Warm-up	750 rpm (Idle)	ON
				5,000 rpm	OFF

HARNESS INSPECTION

1



Measure the power supply voltage of the heated oxygen sensor.

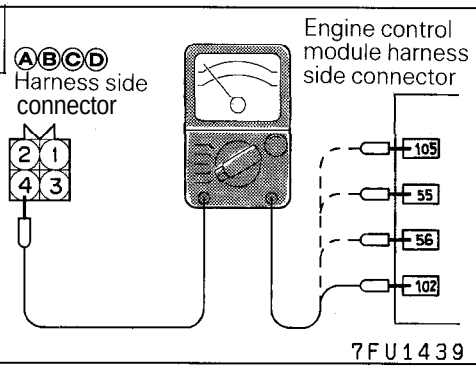
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
B+

OK → 2

NG → Repair the harness. (A-1, B-1, C-1, D-1 – MFI relay)

2



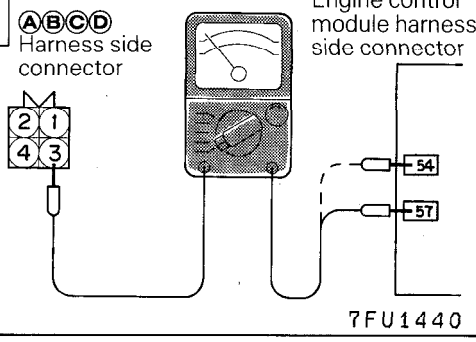
Check for an open-circuit, or a short-circuit to ground, between the engine control module and the heated oxygen sensor.

- Heated oxygen sensor connector: Disconnected
- Engine control module connector: Disconnected

OK → 3

NG → Repair the harness. (A-4 – 105) (B-4 – 55) (C-4 – 56) (D-4 – 102)

3



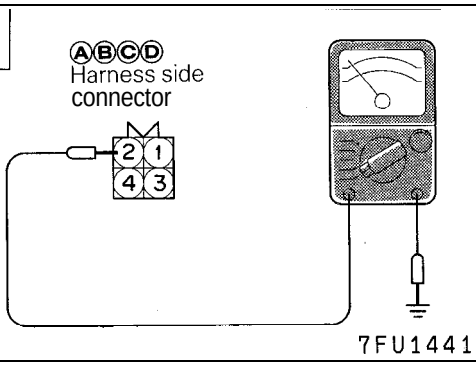
Check for an open-circuit, or a short-circuit to ground, between the engine control module and the heated oxygen sensor.

- * Heated oxygen sensor connector; Disconnected
- Engine control module connector; Disconnected

OK → 4

NG → Repair the harness. (A-3, B-3 – 54) (C-3, D-3 – 57)

4

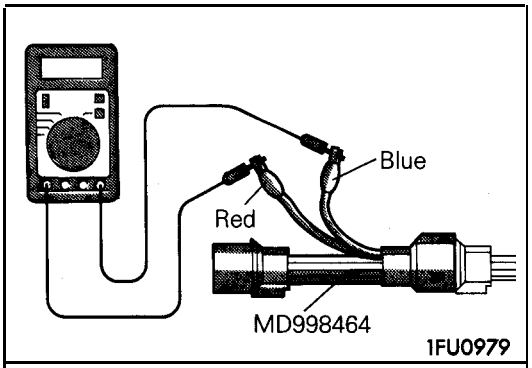


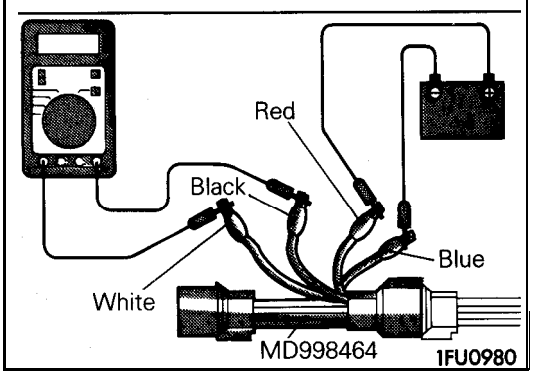
Check for continuity of the ground circuit.

- Connector: Disconnected

OK → STOP

NG → Repair the harness. (A-2, B-2, C-2, D-2 –





SENSOR INSPECTION

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

(4) Warm up the engine until the engine coolant temperature becomes 80°C (176°F) or higher.
(5) Using jumper wires, connect terminals ① (red clip of the special tool) and ③ (blue clip) of the heated oxygen sensor connector to battery ⊕ and ⊖ terminals respectively.

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

(6) Connect a digital voltmeter across terminals ② (black clip of the special tool) and ④ (white clip).
(7) Race the engine repeatedly and measure the output voltage of the heated oxygen sensor.

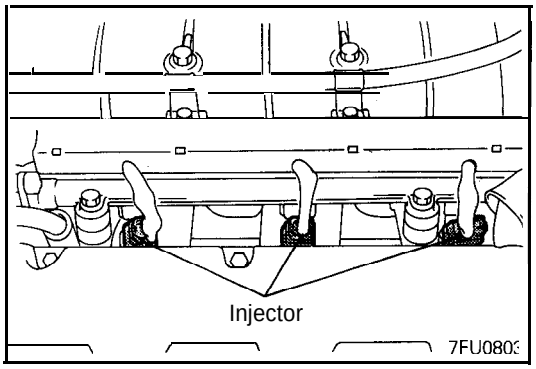
Engine	Heated oxygen sensor output voltage	Remarks
When engine is raced	0.6 – 1.0 V	When the air-fuel mixture becomes richer as a result of repeated racing, the heated oxygen sensor shoul output a voltage of 0.6 – 1.0 V.

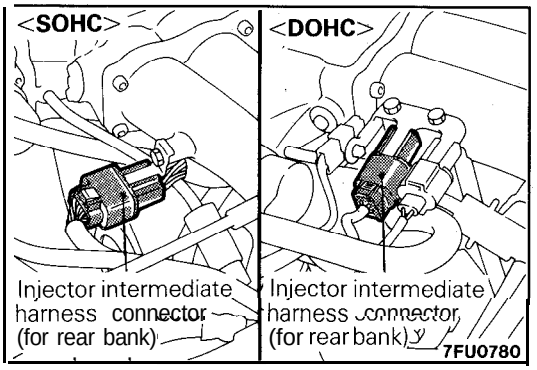
(8) If the measurements are not as specified, defective heated oxygen sensor is suspected.

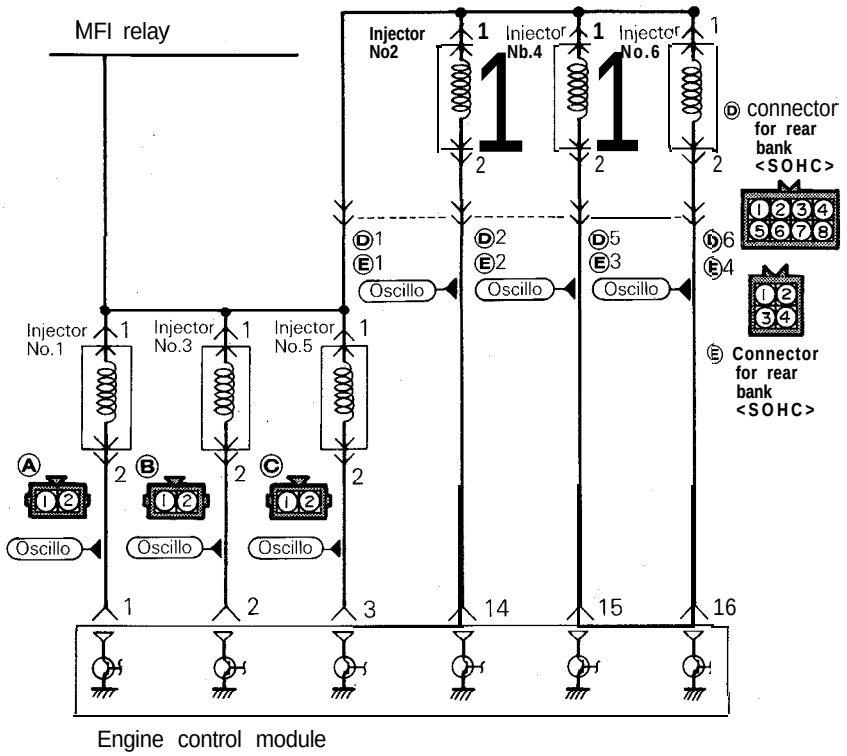
INSTALLATION

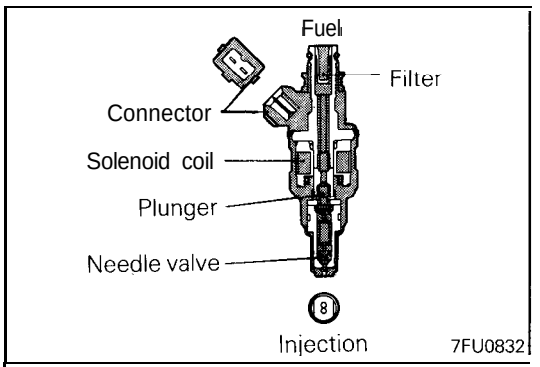
(1) For removal and installation of heated oxygen sensor, refer to GROUP 11 – Exhaust Manifold.
(2) Tighten the heated oxygen sensor to specified torque.

INJECTORS

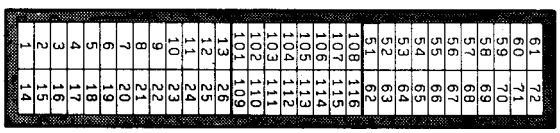








Engine control module connector



OPERATION

- The injector is an injection nozzle with a solenoid valve which injects fuel according to the injection signal coming from the engine control module.
- The injector has a fixed nozzle opening area and the fuel pressure against manifold inside pressure is regulated to a fixed level. Therefore, the volume of fuel injected by the injector is determined by the time during which the needle valve is open, namely, by the time during which the solenoid coil is energized.
- The battery voltage is applied through the MFI relay to this injector. When the engine control module turns on the power transistor in the module, the solenoid coil is energized to open the injector valve, which then injects fuel.

TROUBLESHOOTING HINTS

Hint 1 : If the engine is hard to start when hot, check fuel pressure and check the injector for leaks.
Hint 2: If the injector does not operate when the engine that is hard to start is cranked, the following as well as the injector itself may be responsible.
(1) Faulty power supply circuit to the engine control unit, faulty ground circuit
(2) Faulty MFI relay
(3) Faulty crankshaft position sensor, camshaft position sensor
Hint 3: If there is any cylinder whose idle state remains unchanged when the fuel injection of injectors is cut one after another during idling, make following checks about such cylinder.
(1) Injector and harness check
(2) Ignition plug and high tension cable check
(3) Compression pressure check
Hint 4: If the injector harness and individual part checked good but the injector drive time is out of specification, the following troubles are suspected.
(1) Poor combustion in the cylinder (faulty ignition plug, ignition coil, compression pressure, etc.)
(2) Loose EGR valve seating
(3) High engine resistance

INSPECTION

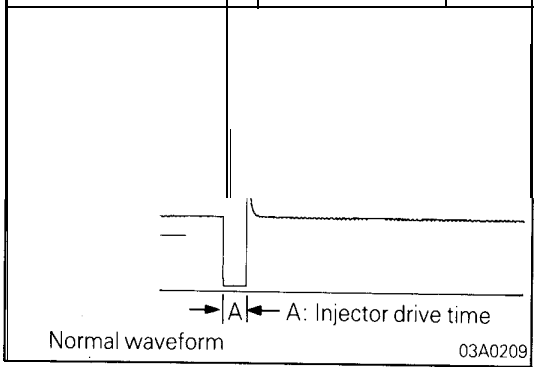
Using Scan Tool

Function	Item No.	Data display	Check condition	Coolant temperature	Standard value
Data reading	41	Drive time*1	Engine: Cranking	0°C (32°F)*2	13.8 – 16.8 ms
				20°C (68°F)	40 – 48.8 ms
				80°C (176°F)	8.6 – 10.6 ms

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	41	Drive time*3	• Engine coolant temperature: 80 to 95°C (176 to 205°F) • Lights, electric cooling fan, accessory units: All OFF • Transaxle: Neutral (P range for vehicle with A/T) • Steering wheel: Neutral	700 rpm (Idle)	2.3 – 3.5 ms
				2,000 rpm	2.1 – 3.3 ms <SOHC> 2.0 – 3.2 ms <DOHC>
				When sharp racing is made	To increase

NOTE
*1: The injector drive time refers to when the supply voltage is 11 V and the cranking speed is less than 250 rpm.
*2: When coolant temperature is lower than 0°C (32°F), injection is made by 6 cylinders simultaneously.
*3: When the vehicle is new [within initial operation of about 500 km (300 miles)], the injector drive time may be about 10% longer.

Function	Item No.	Drive content	Check condition	Normal state
Actuator test	01	No. 1 injector shut off	Engine: Idling after warm-up (Shut off the injectors in sequence during idling after engine warm-up, check the idling condition)	Idle state to change further (becoming less stable or stalling)
	02	No. 2 injector shut off		
	03	No. 3 injector shut off		
	04	No. 4 injector shut off		
	05	No. 5 injector shut off		
	06	No. 6 injector shut off		

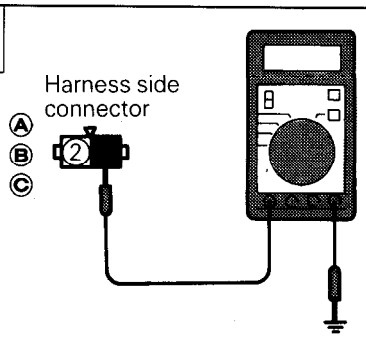


Using Oscilloscope

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

HARNESS INSPECTION

1



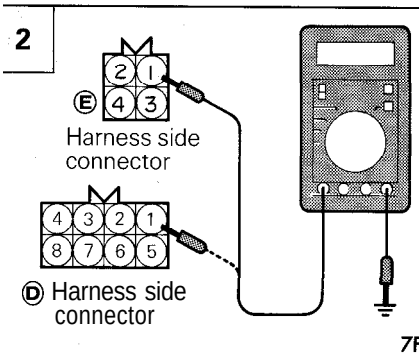
Measure the power supply voltage of the front bank injector.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
B+

OK → 2

NG → Repair the harness. (ABC1 – MFI relay)

2



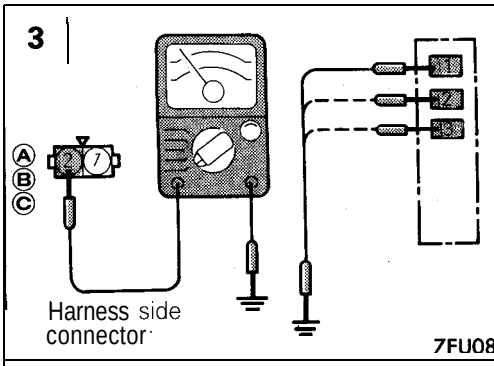
Measure the power supply voltage of the rear bank injector.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
B+

OK → 3

NG → Repair the harness. (D1 – MFI relay) (E1 – MFI relay)

3



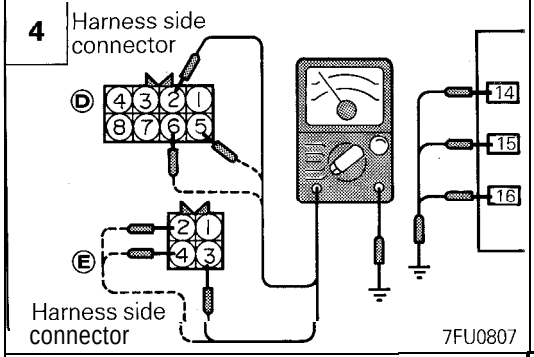
Check for an open-circuit, or a short-circuit between the front bank injector and the engine control module.

- Injector connector: Disconnected
- Engine control module connector: Disconnected

OK → 4

NG → Repair the harness. (ABC 2 – 1 2 3)

4

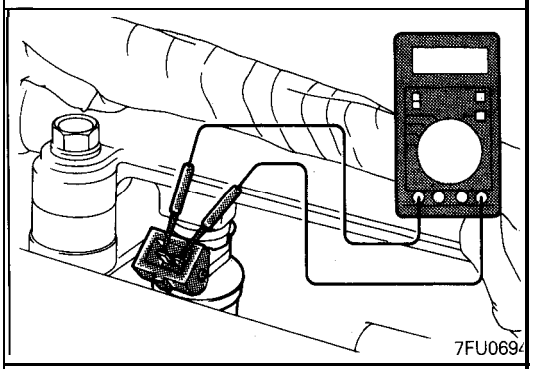


Check for an open-circuit, or a short-circuit between the rear bank injector and the engine control module.

- Connector: Disconnected
- Engine control module connector: Disconnected

OK → STOP

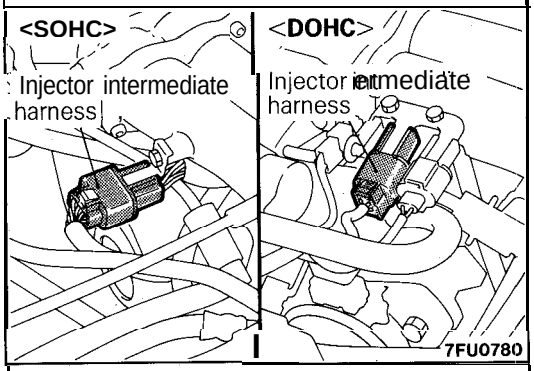
NG → Repair the harness. (D 2 5 6 – 14 15 16) (E 2 3 4 – 14 15 16)



ACTUATOR INSPECTION

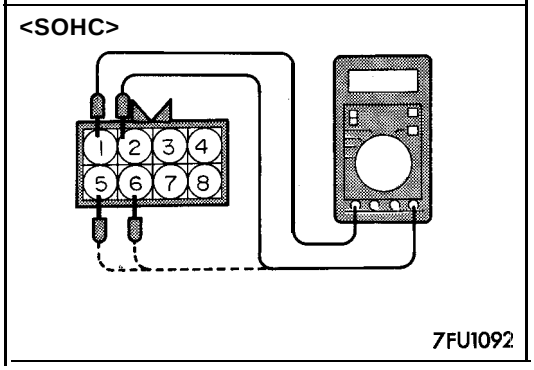
Measurement of Resistance between Front Bank Terminals

(1) Disconnect 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) Disconnect the injector intermediate connector.

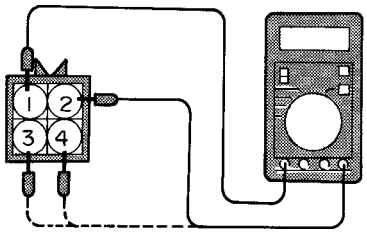


(2) Measure resistance between terminals

<SOHC>

Injector No.	Measuring terminals	Resistance
No. 2 No. 4 No. 6	1 - 2 1 - 5	13 – 16 Ω [At 20°C (68°F)]

<DOHC>



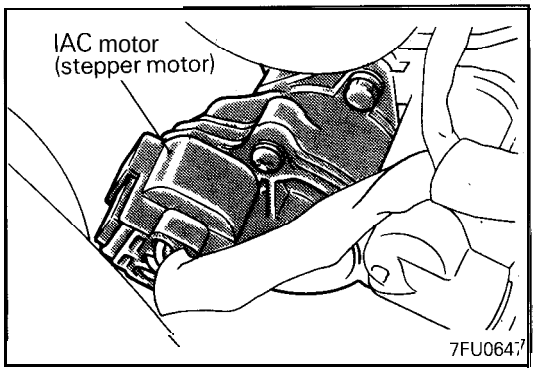
7FU1144

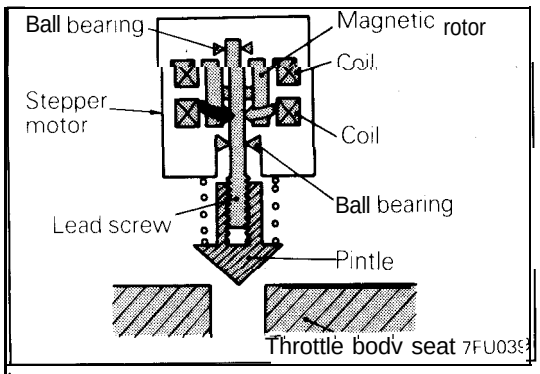
<DOHC>

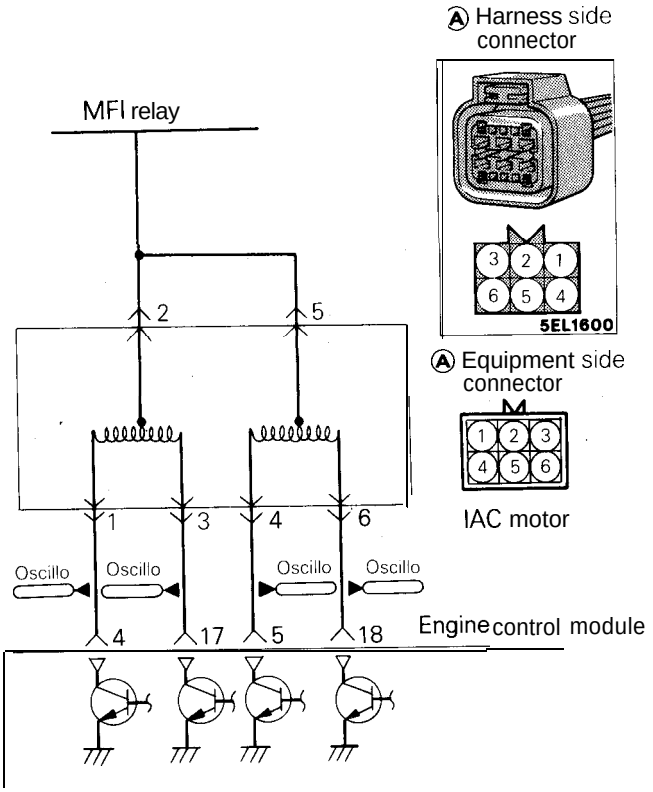
Injector No.	Measuring terminals	Resistance
No. 2 No. 4 No. 6	1 - 2 1 - 3	13 – 16 Ω [At 20°C (68°F)]

(3) Connect the injector intermediate connector.

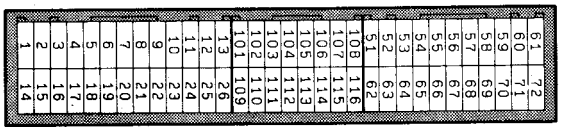
IDLE AIR CONTROL MOTOR (STEPPER MOTOR TYPE)







Engine control module connector



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 MFI relay. As the engine control module turns on power transistors in the module one after another, the stepper motor coil is energized and the motor rotates in normal or reverse direction.

TROUBLESHOOTING HINTS

Hint 1: If the stepper motor step increases to 100 to 120 steps or decreases to 0 step, faulty stepper motor or open circuit in the harness is suspected.

Hint 2: If the idle air control motor harness and individual part checked good but the stepper motor steps are out of specification, the following faults are suspected.

(1) Poorly adjusted reference idle speed
(2) Deposit on the throttle valve
(3) Air leaking into the intake manifold through gasket gap
(4) Loose EGR valve seat
(5) Poor combustion in the cylinder (faulty ignition plug, ignition coil, injector, low compression pressure, etc.)

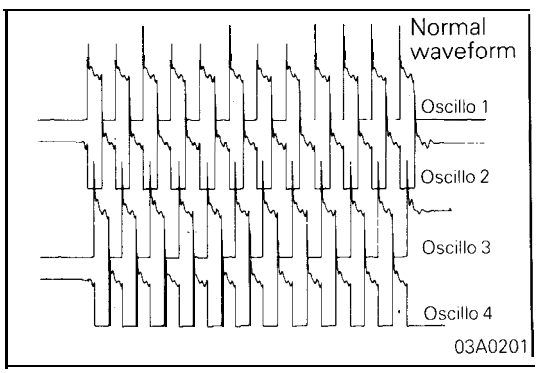
INSPECTION

Using Scan Tool

Function	Item No.	Data display	Check condition	Load state	Standard value
Data reading	45	Stepper motor steps	• Engine coolant temperature: 80 to 95°C (176 to 205°F) . Lights, electric cooling fan, accessory units: All OFF • Transaxle: Neutral (P range for vehicle with A/T) • Steering wheel: Neutral • Idle position switch: ON (compressor clutch to be ON if air conditioning switch is ON) • Engine: Idling	Air conditioning switch: OFF	**2 – 25** step
				Air conditioning switch: ON	Increase by 10 – **70** step
				• Air conditioning switch: ON • Selector lever: Shift to D range	Increase by 5 – **50** step

NOTE
When the vehicle is new [within initial operation of about 500 km (300 miles)], the stepper motor steps may be about 30 steps more than standard.

Caution
When the selector lever is shifted to the "D" range, the brakes must be used to prevent the vehicle from moving forward.



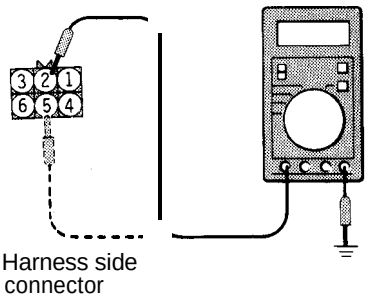
Using Oscilloscope

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

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

HARNESS INSPECTION

1



Measure the power supply voltage of idle air control motor.

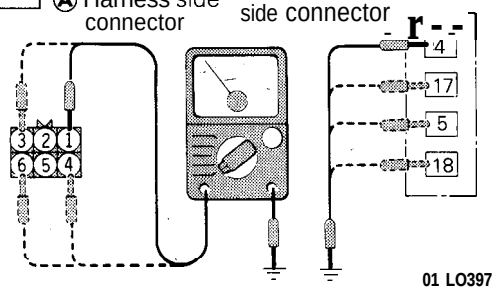
- Idle air control motor connector: Disconnected
- Ignition switch: ON

Voltage (V)
B+

OK → 2

NG → Repair the harness. (MFI relay – Ⓐ 2) (MFI relay – Ⓐ 5)

2

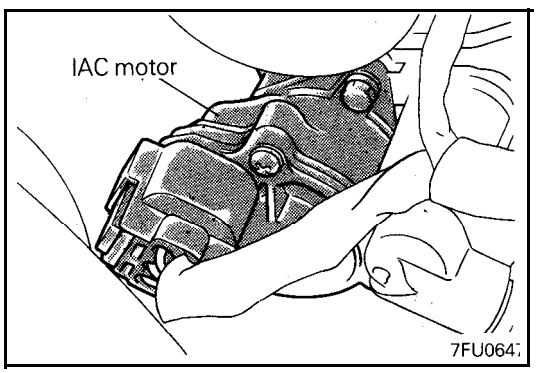


Check for an open-circuit, or a short-circuit to ground between the engine control module and the idle air control motor.

- Engine control module connector: Disconnected
- Idle air control motor connector: Disconnected

OK → A STOP

NG → Repair the harness. (Ⓐ 1 – 4) (Ⓐ 3 – 17) (Ⓐ 4 – 5) (Ⓐ 6 – 18)

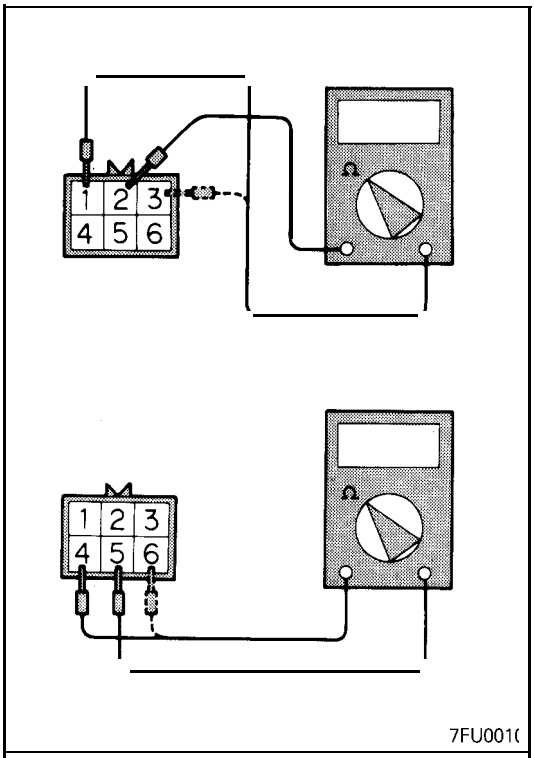


ACTUATOR INSPECTION

Checking the Operation Sound

(1) Check that the operation sound of the stepper motor can be -heard after the ignition is switched ON (but without starting the motor).

(2) If the operation sound cannot be heard, check the stepper motor's activation circuit.
If the circuit is normal, it is probable that there is a malfunction of the stepper motor or of the engine control module'.



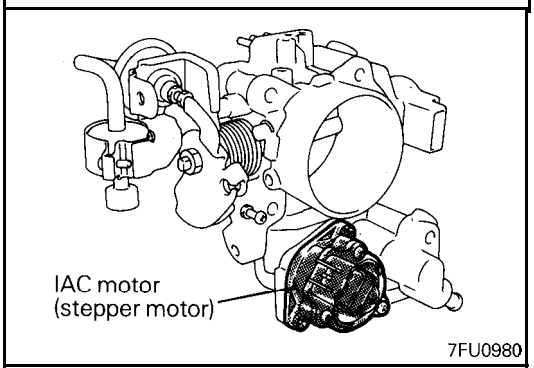
Checking the Coil Resistance

(1) Disconnect the idle air control motor connector and connect the special tool (test harness).
(2) Measure the resistance between terminal ② (white clip of the special tool) and either terminal ① (red clip) or terminal ③ (blue clip) of the connector at the idle air control motor side.

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

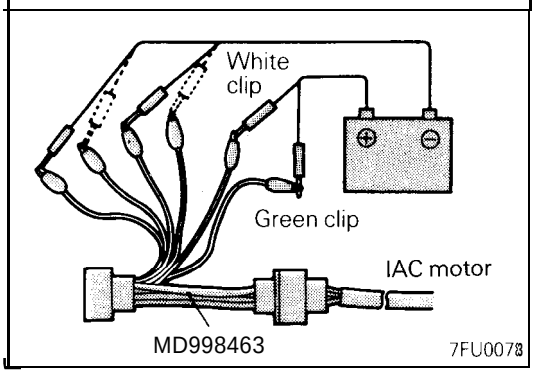
(3) Measure the resistance between terminal ⑤ (green clip of the special tool) and either terminal ⑥ (yellow clip) or terminal ④ (black clip) of the connector at the idle air control motor side.

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

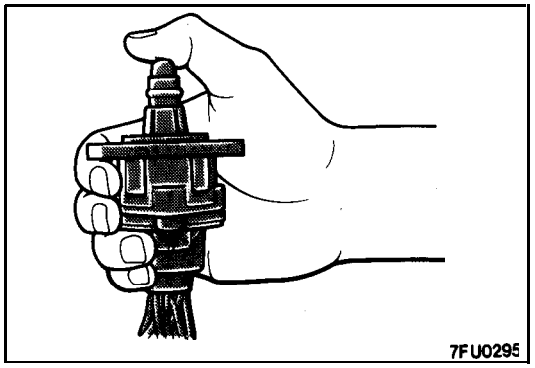


Operational Check

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



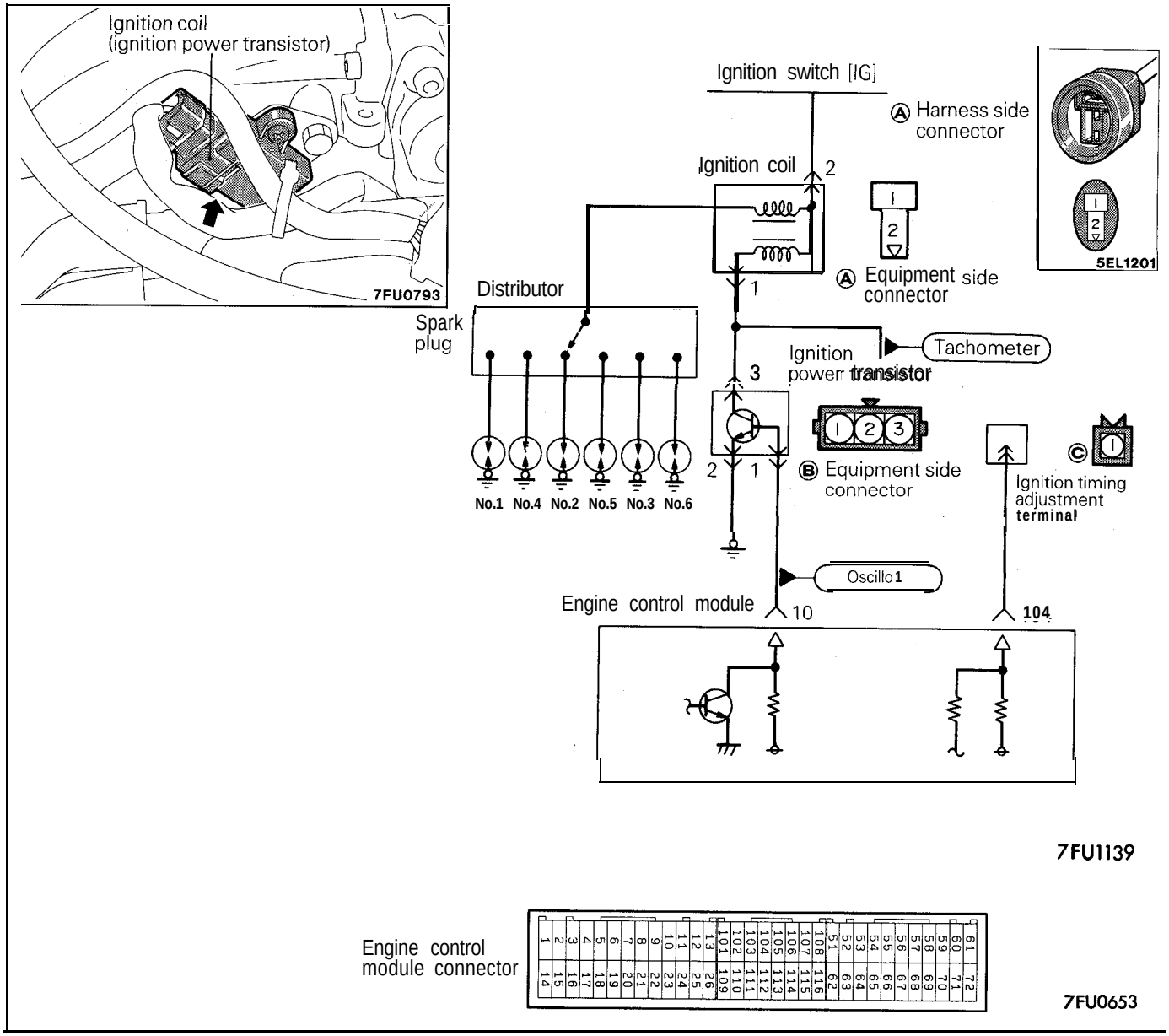
(3) Connect the special tool (test harness) to the idle air control motor connector.
(4) Connect the positive ⊕ terminal of a power supply (approx. 6 V) to the white clip and the green clip.



(5) With the idle air control motor as shown in the illustration, connect the negative ⊖ terminal of the power supply to each clip as described in the following steps, and check whether or not a vibrating feeling (a feeling of very slight vibration of the stepper motor) is generated as a result of the activation of the stepper motor.
   ① Connect the negative ⊖ terminal of the power supply to the red and black clip.
   ② Connect the negative ⊖ terminal of the power supply to the blue and black clip.
   ③ Connect the negative ⊖ terminal of the power supply to the blue and yellow clip.
   ④ Connect the negative ⊖ terminal of the power supply to the red and yellow clip.
   ⑤ Connect the negative ⊖ terminal of the power supply to the red and black clip.
   ⑥ Repeat the tests in sequence from ⑤ to ①.

(6) If, as a result of these tests, vibration is detected, the stepper motor can be considered to be normal.

IGNITION COIL AND IGNITION POWER TRANSISTOR <SOHC>



OPERATION

- When the ignition power transistor unit is switched ON by the signals from the engine control module, the primary current of the ignition coil will flow. When the ignition power transistor unit is switched OFF, the primary current flow is interrupted, and high voltage is produced at the secondary coil.
- When the engine control module switches OFF the transistor within the unit, the battery voltage within the module is applied to the ignition power transistor unit, and the ignition power transistor unit is switched ON. In addition, the ignition power transistor unit is switched OFF when the engine control module switches ON the transistor within the module.

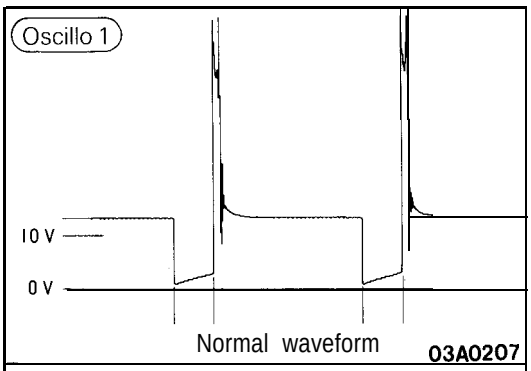
INSPECTION

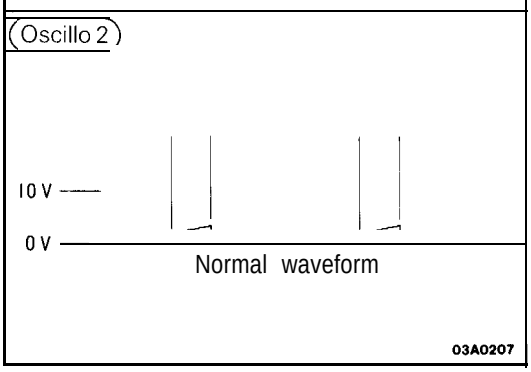
Using Scan Tool

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	44	Ignition advance	• Engine: Warm up • Timing light: Set (Use the timing light to check actual ignition timing)	700 rpm (Idling)	7 – 23°BTDC
				2,000 rpm	13 – 39°BTDC

<Ignition timing adjustment mode>

Function	Item No.	Data display	Check condition	Engine state	Normal display
Data list	36	Existence of continuity to ground if ignition timing adjustment terminal	Engine: Idling	Ground ignition timing adjustment terminal.	ON
				Remove ground from ignition timing adjustment terminal.	OFF





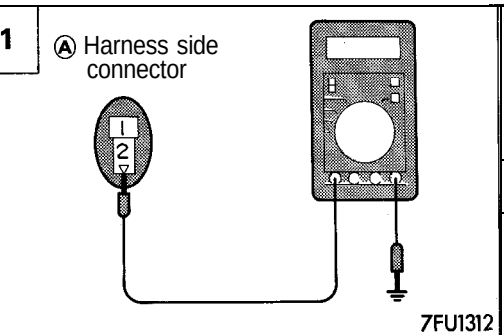
Using Oscilloscope

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

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

HARNESS INSPECTION

1



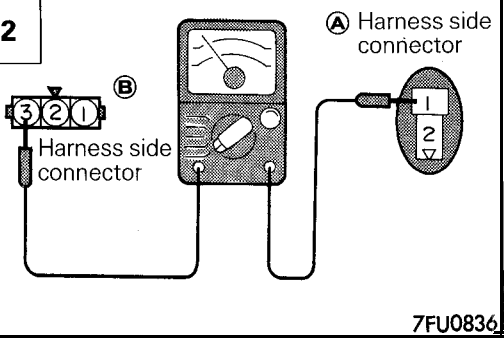
Measure the power supply voltage of the ignition coil.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
B+

OK → 2

NG → Repair the harness. (Ⓐ 2 – Ignition switch)

2

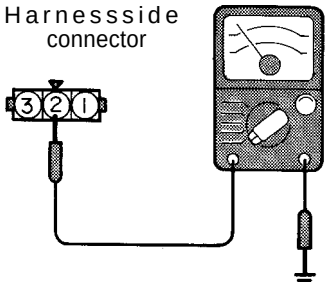


Check for continuity between the ignition power transistor unit and ignition coil.
- Ignition coil connector: Disconnected
- Ignition power transistor connector: Disconnected

OK → 3

NG → Repair the harness. (Ⓑ 3 – Ⓐ 1)

3 Ⓑ Harnessside connector



7FU0837

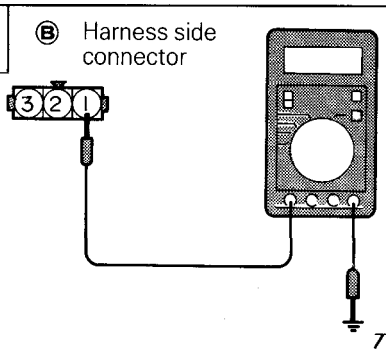
Check for continuity of the ground circuit of the ignition power transistor.

- Ignition power transistor connector: Disconnected
- Engine control module connector: Disconnected

OK → 4

NO → Repair the harness. (Ⓑ2 – Ground)

4 Ⓑ Harness side connector



7FU1247

Measure the control signal voltage of the ignition power transistor.

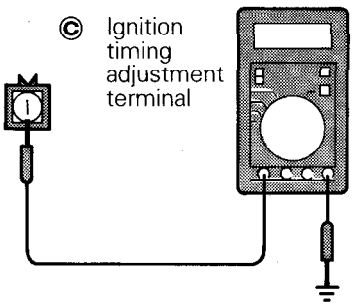
- Ignition power transistor connector: Disconnected
- Ignition switch: START

Voltage (V)
2.0 – 6.0

OK → 5

NO → Repair the harness. (Ⓑ1 – 10)

5 Ⓒ Ignition timing adjustment terminal



7FU1060

Measure the voltage of the ignition timing adjusting terminal.

- Ignition switch: ON

Voltage (V)
4.0 – 5.2

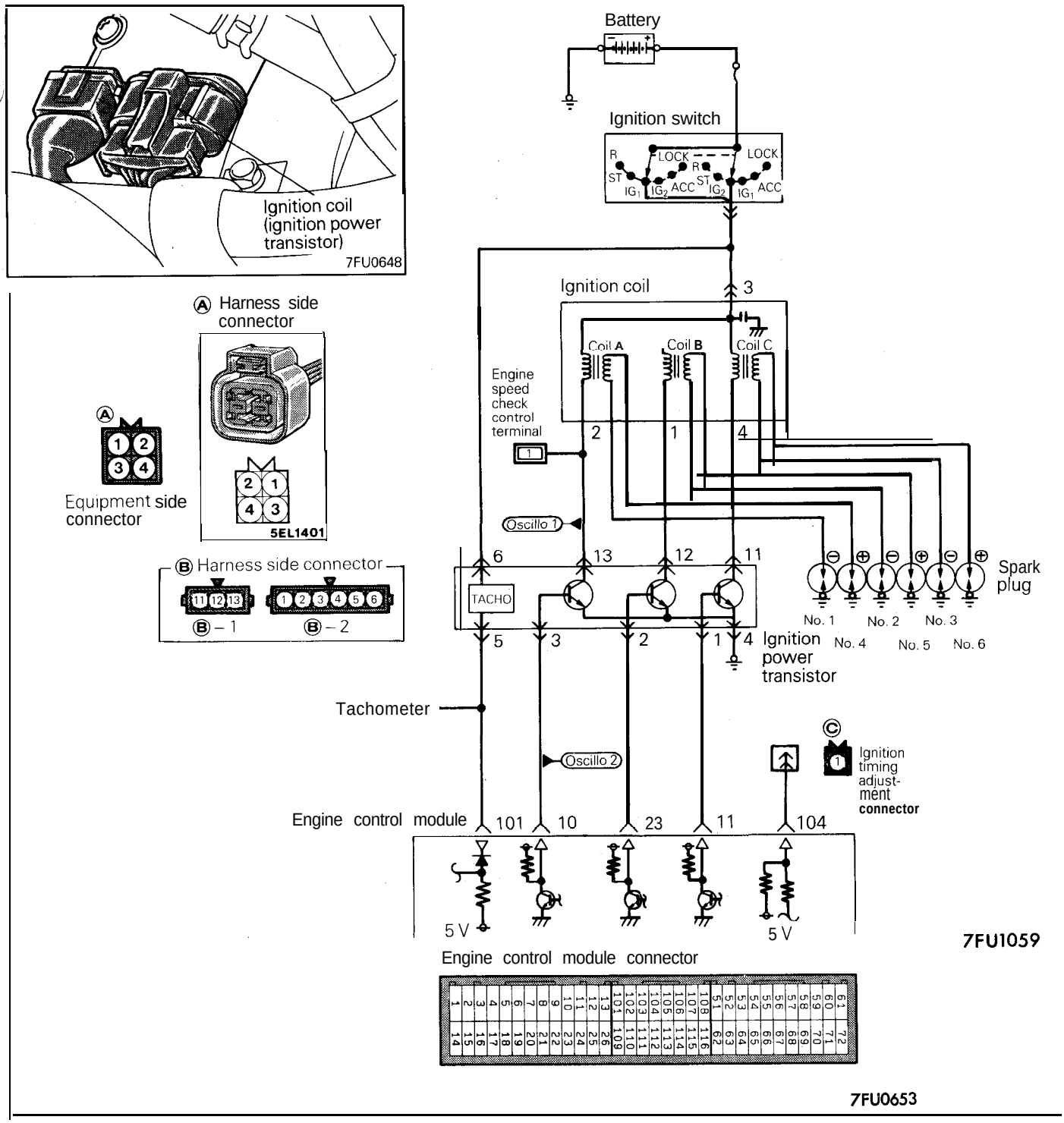
OK → STOP

NO → Repair the harness. (Ⓒ1 – 104)

ACTUATOR INSPECTION

Refer to Group 8 – Ignition System

IGNITION COIL AND IGNITION POWER TRANSISTOR <DOHC>



OPERATION

- When the ignition power transistor unit A is turned on by the signal from the engine control module, primary current flows to the ignition coil A. When the ignition power transistor unit A is turned off, the primary current is shut off and a high voltage is induced in the secondary coil A, causing the ignition plugs of No. 1 and No. 4 cylinders to spark. When the ignition power transistor unit B is turned off, the ignition plugs of No. 2 and No. 5 cylinders spark. In addition, when the ignition power transister unit C is turned off, the ignition plugs of No. 3 and No. 6 cylinders spark.
- When the engine control module turns off the transistor in the module, the battery voltage in the module is applied to the ignition power transistor unit to turn it on. When the engine control module turns on the transistor in the module, the ignition power transistor unit is turned off.

INSPECTION

Using Scan Tool

<Spark Advance>

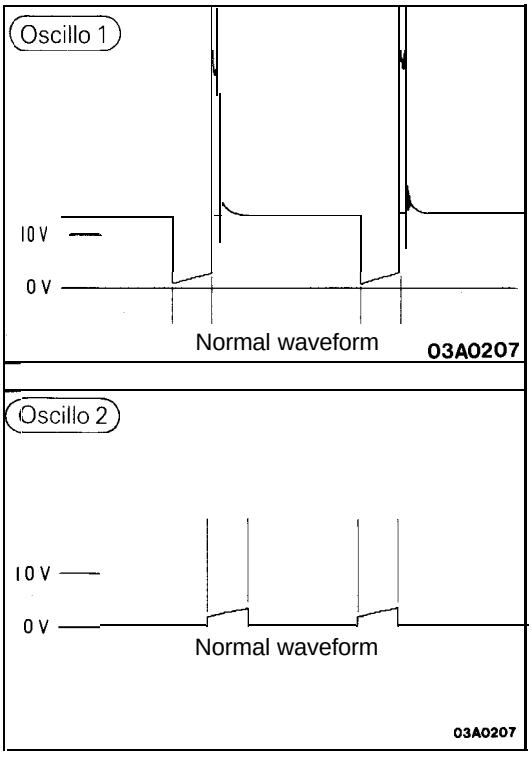
Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	44	Ignition advance	• Engine: Warming up • Timing light: Set (set timing light to check actual ignition timing)	700 rpm (Idle)	7 – 23°BTDC
				2,000 rpm	30 – 50°BTDC

<Ignition Timing Adjustment Mode>

Function	Item No.	Data display	Check condition	Terminal condition	Standard value
Data list	36	Continuity present or not present between ignition timing adjustment terminal and ground	• Engine: Idling	Ignition timing adjustment terminal is grounded	ON
				Ignition timing adjustment terminal is disconnected from ground	OFF

<Standard Ignition Timing>

Function	Item No.	Drive	Check condition	Normal condition
Actuator test	17	Set to ignition timing adjustment mode	• Engine: idling • Timing light: set	5°BTDC



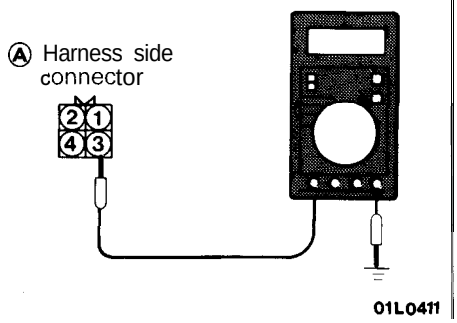
Using Oscilloscope

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

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

HARNESS INSPECTION

1



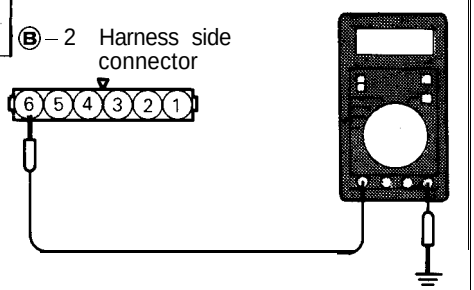
Measure the power supply voltage of the ignition coil.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
B+

OK → 2

NO → Repair the harness. (Ⓐ 3 – Ignition switch)

2



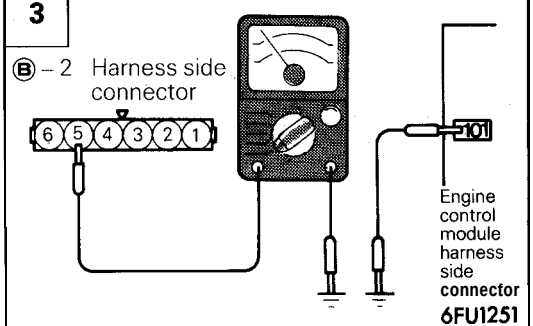
Measure the power supply voltage of the ignition coil.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
B+

OK → 3

NO → Repair the harness. (Ⓑ 6 – Ignition switch)

3

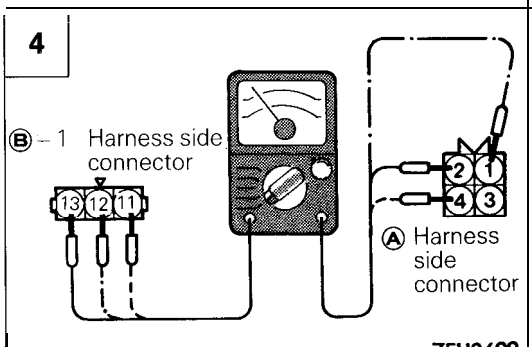


Check for an open-circuit, or a short-circuit to ground between the engine control unit and the ignition power transistor.
- Engine control module connector: Disconnected
- Ignition power transistor connector: Disconnected

OK → 4

NO → Repair the harness. (Ⓑ 5 – 101)

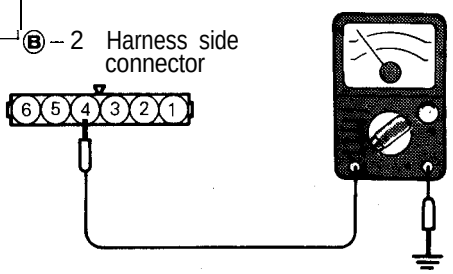
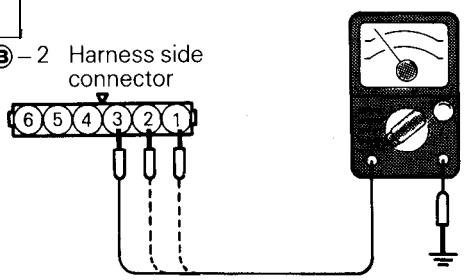
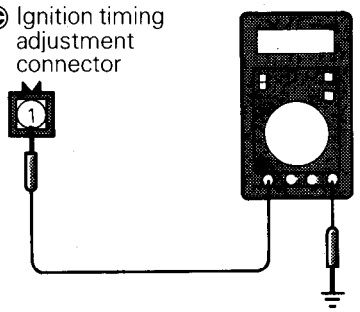
4



Check for an open-circuit, or a short-circuit to ground between the ignition power transistor and the ignition coil.
- Ignition coil connector: Disconnected
- Ignition power transistor connector: Disconnected

OK → 5

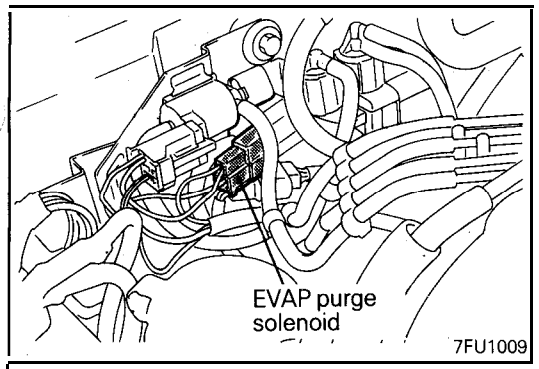
NO → Repair the harness.
(Ⓐ 2 – Ⓑ 13)
(Ⓐ 1 – Ⓑ 12)
(Ⓐ 4 – Ⓑ 11)

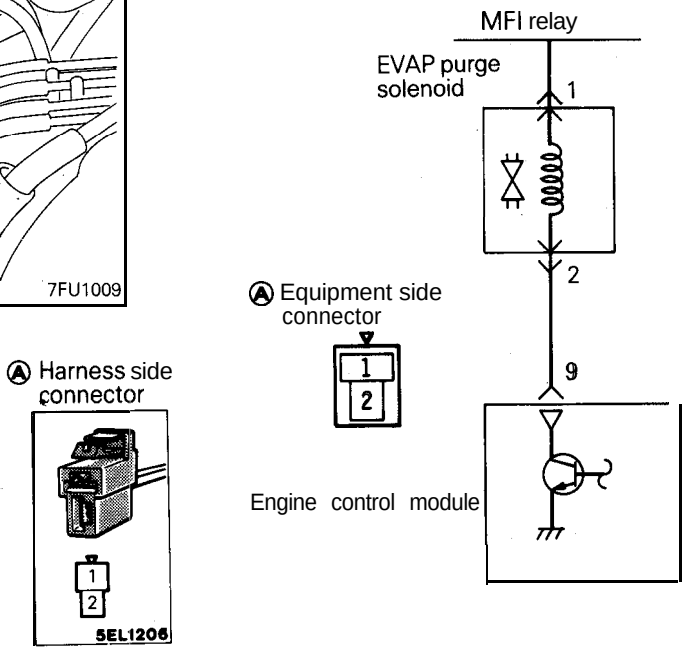
5 Ⓑ – 2 Harness side connector  7FU0700	Check for continuity of the ground circuit. • Connector: Disconnected	OK →	6
		NG →	Repair the harness. (Ⓑ 4 – Ground)
6 Ⓑ – 2 Harness side connector  7FU0701	Measure the voltage of the control signal circuit of the ignition power transistor. • Connector: Disconnected • Ignition switch: START Voltage (V): 0.5 – 4.0	OK →	7
		NG →	Repair the harness. (Ⓑ 3 – 10) (Ⓑ 2 – 23) (Ⓑ 1 – 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
		NG →	Repair the harness. (Ⓒ 1 – 104)

ACTUATOR INSPECTION

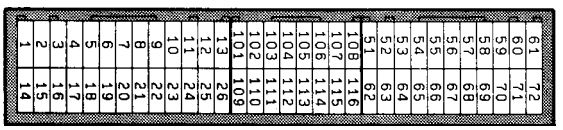
Refer to GROUP 8 – Ignition System.

EVAPORATIVE EMISSION PURGE SOLENOID





Engine control module connector



7FU0653

OPERATION

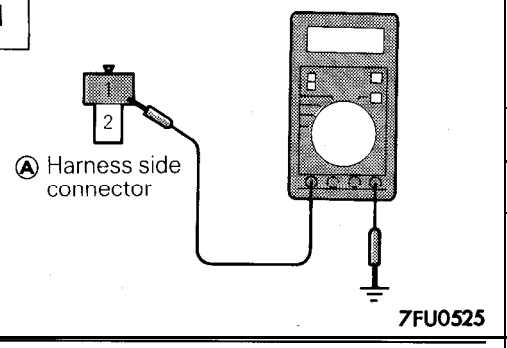
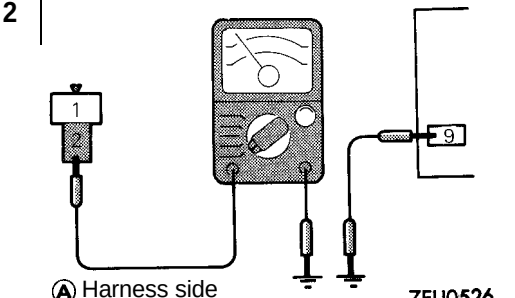
- The evaporative emission purge solenoid is an ON-OFF type one which controls introduction of purge air from the canister into the intake air plenum.
- The battery power is supplied to the evaporative emission purge solenoid through the MFI relay. When the engine control module turns ON the power transistor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

INSPECTION

Using Scan Tool

Function	Item No.	Drive content	Check condition	Normal state
Actuator test	08	Solenoid valve from OFF to ON	Ignition switch: ON	Operating sound is heard when driven

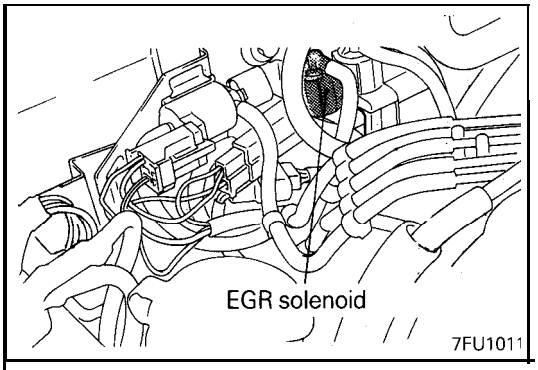
HARNESS INSPECTION

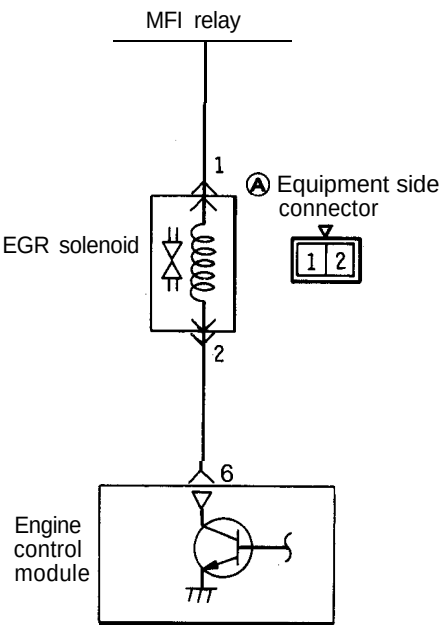
1 	Measure the power supply voltage. • Connector: Disconnected • Ignition switch: ON Voltage (V): B+	OK →	2
		NG →	Repair the harness. (MFI relay – Ⓐ1)
2 	Check for an open-circuit, or a short-circuit to ground between the evaporative emission purge solenoid and the engine control module. • Engine control module connector: Disconnected • Evaporative emission purge solenoid connector: Disconnected	OK →	STOP
		NG →	Repair the harness. (Ⓐ2 – 9)

ACTUATOR INSPECTION

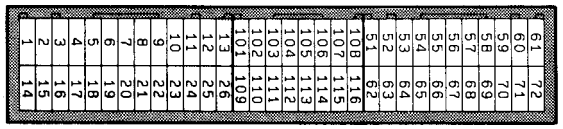
Refer to GROUP 25 – Evaporative Emission Control System.

EGR SOLENOID <California>





Engine control module connector



7FU0653

OPERATION

- The EGR solenoid is a duty control type solenoid valve. It makes control by leaking EGR valve operating negative pressure to the throttle body A port.
- Power supply from the battery is sent through the MFI relay to the EGR solenoid. When the engine control module turns off the power transistor inside the module, current no more flows through the coil and EGR valve operating negative pressure leaks.

TROUBLESHOOTING HINT

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

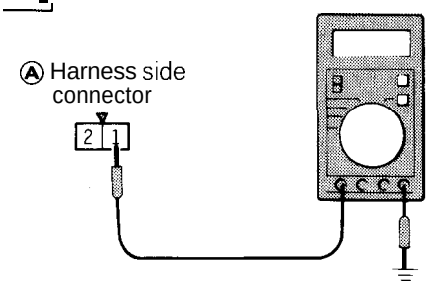
INSPECTION

Using Scan tool

Function	Item No.	Drive content	Check condition	Normal state
Actuator test	10	Change solenoid valve from OFF to ON state	Ignition switch: ON	Operating sound is heard when driven

HARNESS INSPECTION

1



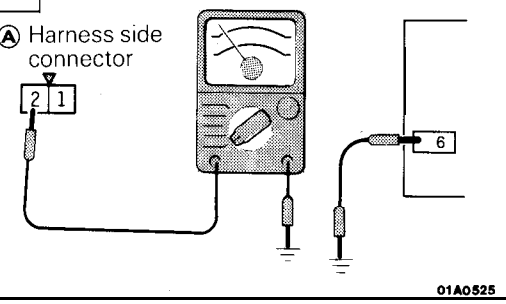
Measure the power supply voltage.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
B+

OK → 2

NG → Repair the harness. (Ⓐ1 – MFI relay)

2



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

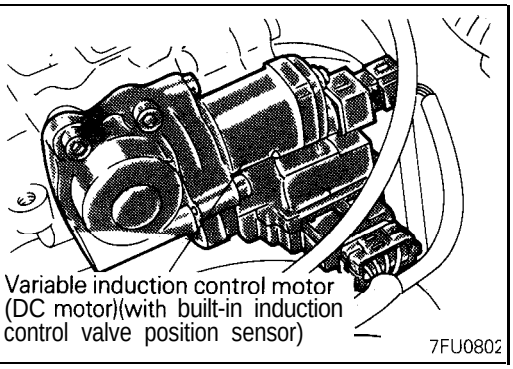
OK → STOP

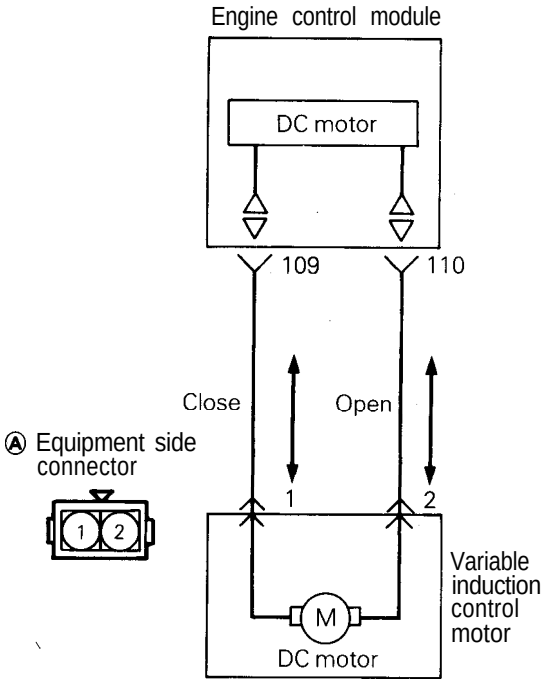
NG → Repair the harness. (Ⓐ2 – 6)

ACTUATOR INSPECTION

Refer to GROUP 25 – Exhaust Gas Recirculation (EGR) System.

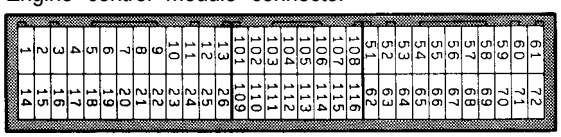
VARIABLE INDUCTION CONTROL MOTOR (DC MOTOR) <DOHC>





1FU0646

Engine control module connector



7FU0653

OPERATION

- As the DC motor is driven clockwise or counterclockwise by the signal from the engine control module, the variable induction valve opens or closes.
- The DC motor is driven clockwise or counterclockwise as the direction of current flow is changed by the motor drive IC in the engine control module.

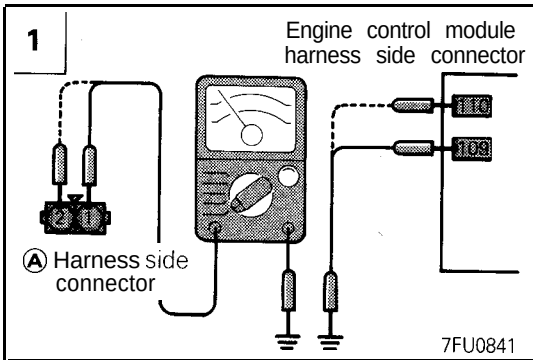
INSPECTION

Using Scan Tool

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

HARNESS INSPECTION

1



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

- Variable induction control motor connector: Disconnected
- Engine control module connector: Disconnected

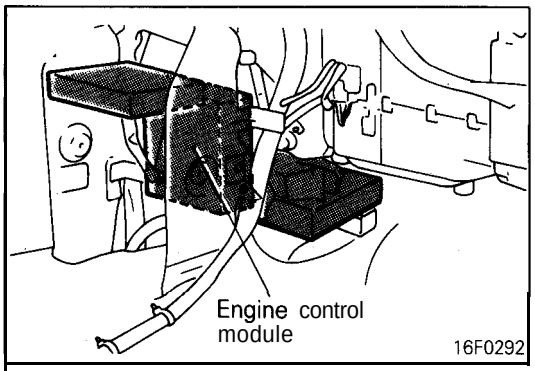
OK → STOP

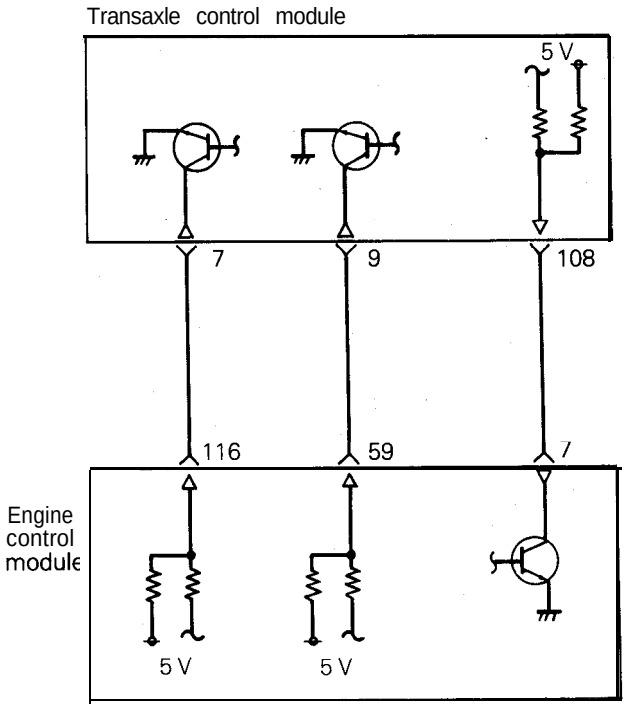
NG → Repair the harness. (Ⓐ1 – 109) (Ⓐ2 – 110)

ACTUATOR INSPECTION

Refer to GROUP 11.

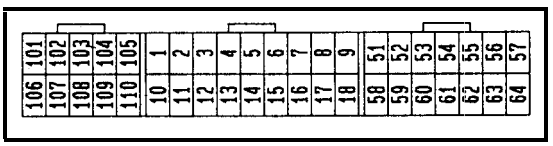
ENGINE AND TRANSAXLE TOTAL CONTROL SIGNAL <A/T>





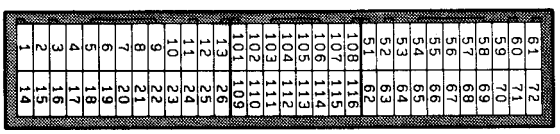
7FU0843

Ⓐ Transaxle control module connector



7FU0903

Engine control module connector

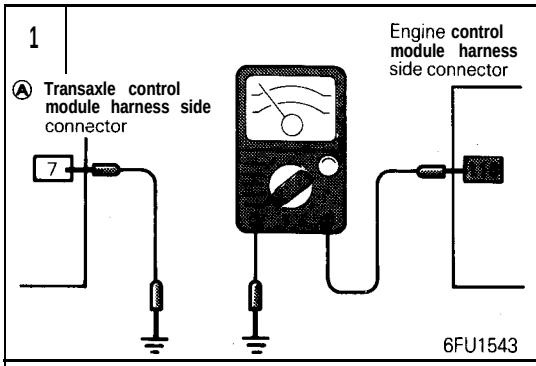
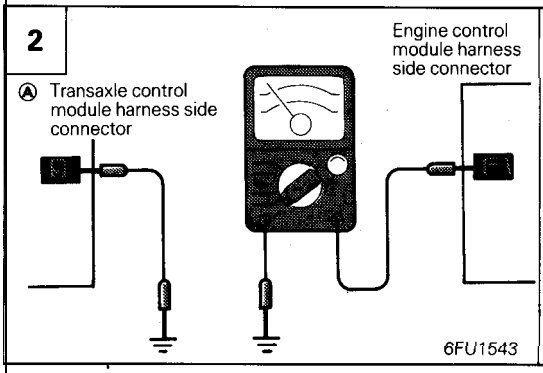
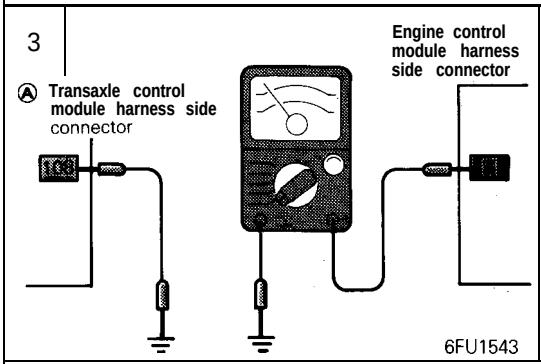


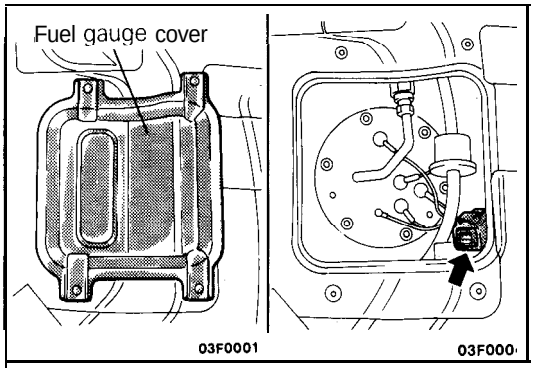
7FU0653

OPERATION

- Three communication lines are connected between the engine control module and the transaxle control module to send and receive the engine and transaxle total control signal.
- If the transistor inside the engine control module changes from OFF to ON by the command of the engine control module, the terminal having a voltage of 5 V applied to it from the transaxle control module is grounded in the engine control module.
  This will change the terminal voltage of the transaxle control module from HIGH to LOW.
  If the transistor fitted inside the engine control module changes from ON to OFF, the terminal, having applied to it a voltage of 5 V from the transaxle control module and grounded in the engine control module, is released and the terminal voltage of the transaxle control module changes from LOW to HIGH.
  In this way, the terminal voltage of the transaxle control module is controlled by ON/OFF operation of the transistor inside the engine control module in order to send signal.
  On the other hand, the transaxle control module also controls the terminal voltage of the engine control module by the ON/OFF operation of the transistor fitted inside the transaxle control module in order to send signal. In this way, the engine and transaxle send control signal to each other.

HARNESS INSPECTION

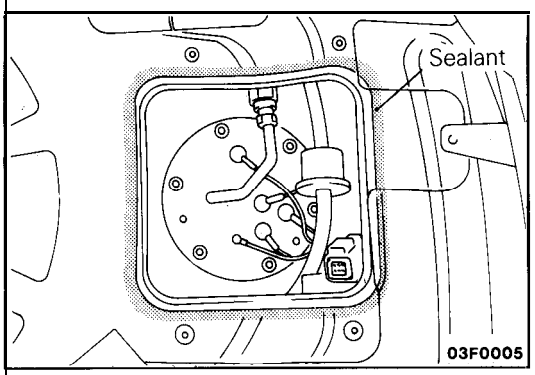
1 	Check for an open-circuit, or a short-circuit to ground between the trans-'axle control module and the engine control module. • Transaxle control module connector: Disconnected • Engine control module connector: Disconnected	OK →	2
		NG →	Repair the harness. (Ⓐ 7 – 116)
2 	Check for an open-circuit, or a short-circuit to ground between the trans-axle control module and the engine control module. • Transaxle control module connector: Disconnected • Engine control module connector: Disconnected	OK →	3
		NG →	Repair the harness. (Ⓐ 9 – 59)
3 	Check for an open-circuit, or a short-circuit to ground between the trans-axle control module and the engine control module. • Transaxle control module connector: Disconnected • Engine control module connector: Disconnected	OK →	STOP
		NG →	Repair the harness. (Ⓐ 108 – 7)



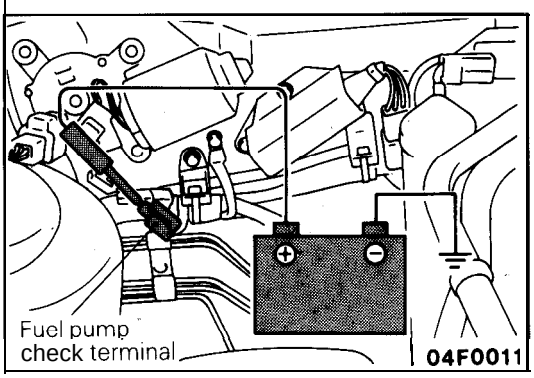
RELEASE OF RESIDUAL PRESSURE FROM HIGH PRESSURE FUEL HOSE

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

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



(5) Apply the specified sealant to the rear floor pan.
Specified sealant: 3M ATD Part No. 8509 or equivalent
(6) Install the fuel gauge cover.

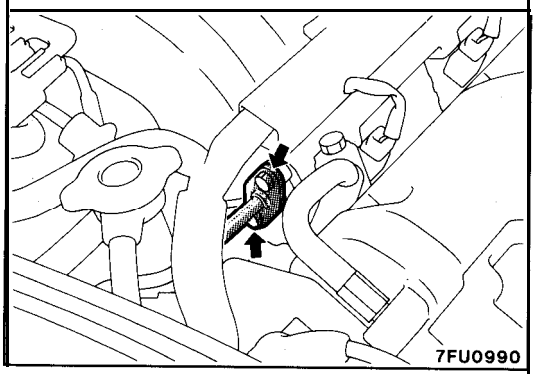


FUEL PUMP OPERATION CHECK

(1) Set the ignition switch at OFF.
(2) Check that when the battery voltage is directly applied to the fuel pump check terminal (black), the operating sound of the pump can be heard.

NOTE
Since the fuel pump is installed in the fuel tank, its operating sound cannot be readily heard. Remove the fuel tank cap and listen to the operating sound through the filter port.

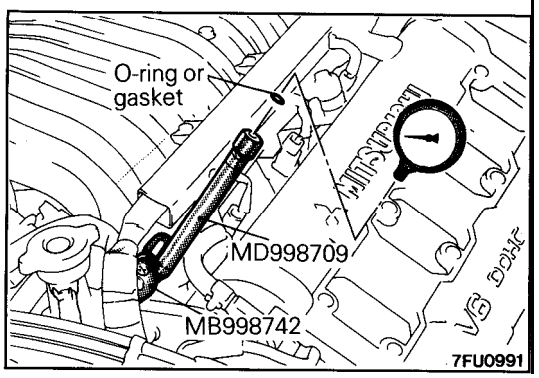
(3) Hold the high pressure fuel hose between your fingers and check that the fuel pressure can be felt.



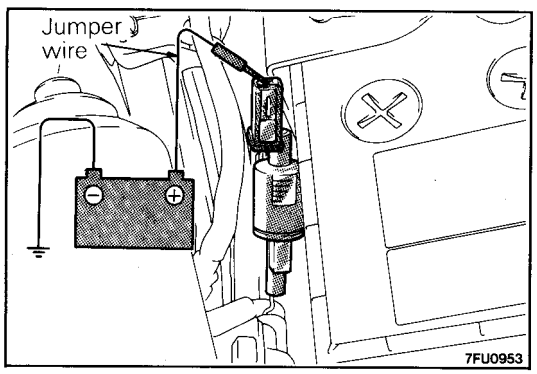
FUEL PRESSURE TEST

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

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

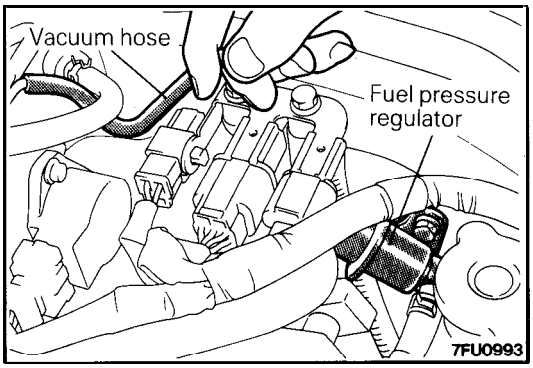


(3) Set a fuel pressure gauge on the special tool, placing an adequate O-ring or gasket between the gauge and special tool prevent fuel leaks.
(4) Attach the special tool set in step (3) to the fuel rail between high pressure hoses.



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

(8) Measure the fuel pressure during idling.
Standard value: Approx. 270 kPa (38 psi) at curb idle



(9) Disconnect the vacuum hose from the fuel pressure regulator, and then measure the fuel pressure while using a finger to plug the end of the hose.

Standard value: 330 – 350 kPa (47 – 50 psi) at curb idle

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

(11) Use a finger to gently press the fuel return hose while repeatedly racing the engine, and check to be sure that there is fuel pressure in the return hose also.

NOTE
There will be no fuel pressure in the return hose if there is insufficient fuel flow.

(12) If the fuel pressure measured in steps (8) to (11) deviates from the standard value range, check for the probable cause by referring to the table below, and then make the appropriate repair.

Condition	Probable cause	Remedy
• Fuel pressure is too low. • Fuel pressure drops during racing. • No fuel pressure in fuel return hose.	Fuel filter is clogged.	Replace the fuel filter.
	Malfunction of the valve seat within the fuel pressure regulator, or fuel leakage to return side caused by spring deterioration.	Replace the fuel pressure regulator.
	Fuel pump low discharge pressure.	Replace the fuel pump.
Fuel pressure is too high.	The valve within the fuel pressure regulator is sticking.	Replace the fuel pressure regulator.
	Clogging of the fuel return hose and/or the pipe.	Clean or replace the hose and/or pipe.
No change of the fuel pressure when the vacuum hose is connected and when not connected.	Damaged vacuum hose or nipple clogging.	Replace the vacuum hose, or clean the nipple.

(13)Stop the engine and check for a change of the value indicated by the fuel pressure gauge. The condition is normal if there is no decrease of the indicated value within two minutes.
If there is a decrease of the indicated value, monitor the speed of the decrease, and, referring to the table below, determine the cause of the problem and make the appropriate repair.

Condition	Probable cause	Remedy
After the engine is stopped, the fuel pressure drops gradually.	Injector leakage.	Replace the injector.
	Leakage at the fuel pressure regulator valve seat.	Replace the fuel pressure regulator.
There is a sudden sharp drop of the fuel pressure immediately after the engine is stopped.	The check valve (within the fuel pump) is not closed.	Replace the fuel pump.

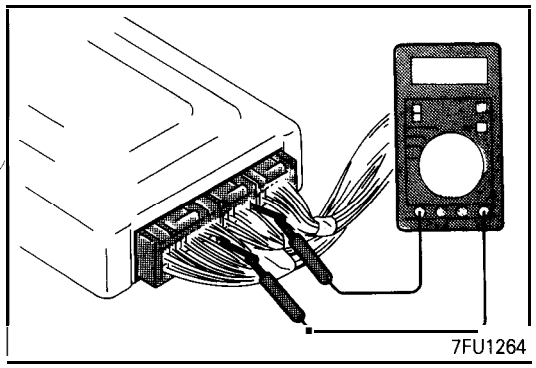
(14)Reduce the internal pressure of the fuel pipes and hoses.
(15)Disconnect the fuel pressure gauge and the special tools from the delivery pipe.

Caution
Because there will be some residual pressure in the fuel pipe line, use a shop towel to cover so that fuel doesn't splatter.

(16)Replace the O-ring at the end of the fuel high-pressure hose with a new one.
(17)After connecting the fuel high-pressure hose to the fuel rail, tighten the installation bolt at the specified torque.

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

(18)Check to be sure that there is no fuel leakage.
① Apply battery voltage to the terminal for activation of the fuel pump so as to activate the fuel pump.
② With fuel pressure applied, check for leakage of the fuel line.


7FU1264

ENGINE CONTROL MODULE (ECM) TERMINAL VOLTAGES INSPECTION

(1) Connect a very thin wire probe (such as a paper clip) to the probe of the voltmeter.
(2) Insert the very thin probe from the wire side into contact with each of the terminals of the ECM connector and check the voltage, while referring to the check chart.

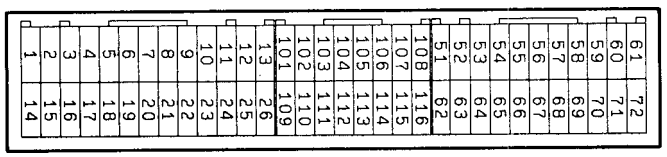
NOTE
1. Measure a voltage with the ECM connector connected.
2. Measure the voltage between each terminal and the No. 26 terminal (ground terminal).
3. Withdraw the ECM for easier access to the connector terminals.
4. The inspection need not be performed in the order of the chart.

Caution
Short-circuiting the positive (+) probe between a connector terminal and ground could cause damage to the vehicle wiring, sensors or ECM, or all of them. Use care to prevent it!

(3) If the voltmeter shows any deviation from the standard value, check the corresponding sensor, actuator and related electrical wiring, then repair or replace.
(4) After repair or replacement, recheck with the voltmeter to confirm that the problem has cleared completely.

TERMINAL VOLTAGE CHECK CHART

Engine Control Module Connector Terminal Configuration



7FU0653

Terminal No.	Check point	Check conditions (Engine conditions)	Standard value	Remarks
60	Back-up power supply	Ignition switch: OFF	B+	
12	Power supply	Ignition switch: ON	B+	
25				
62	Ignition switch IG	Ignition switch: ON	B+	
108	MFI relay (power supply)	Ignition switch: OFF	B+	
		Ignition switch: ON	o - 3 v	
8	MFI relay (fuel pump)	Ignition switch: ON	B+	
		Engine: Idle	o - 3 v	
61	Sensor impressed voltage	Ignition switch: ON	4.5 – 5.5V	

Terminal No.	Check point	Check conditions (Engine conditions)		Standard value	Remarks
70	Volume air flow sensor	Engine: Idle		2.2 – 3.2V	
		Engine: 2,000 rpm			
19	Volume air flow sensor reset signal	Engine: idle		O - I V	
		Engine: 3,000 rpm		6 – 9V	
52	Intake air temperature sensor	Ignition switch: ON	When intake temperature is 0°C (32°F)	3.2 – 3.8V	
			When intake temperature is 20°C (68°F)	2.3 – 2.9V	
			When intake temperature is 40°C (104°F)	1.5 – 2.1V	
			When intake temperature is 80°C (176°F)	0.4 – 1.0V	
65	Barometric pressure sensor	Ignition switch: ON	When altitude is 0 m (0 ft.)	3.7 – 4.3V	
			When altitude is 1,200 m (3,937 ft.)	3.2 – 3.8V	
63	Water temperature sensor	Ignition switch: ON	When water temperature is 0°C (32°F)	3.2 – 3.8V	
			When water temperature is 20°C (68°F)	2.3 – 2.9V	
			When water temperature is 40°C (104°F)	1.3 – 1.9V	
			When water temperature is 80°C (176°F)	0.3 – 0.9V	
64	Throttle position sensor	Ignition switch: Kept in ON state for more than 15 seconds	Idle	0.3 – 1.0V	
			Wide open throttle	4.5 – 5.5V	
67	Closed throttle position switch	Ignition switch: ON	Throttle valve placed in idle position	0 – IV	
			Throttle valve placed in slightly opened position	4V or more	
68	Camshaft position sensor	Engine: Cranked		0.2 – 3.0V	
		Engine: Idle			
69	Crankshaft position sensor	Engine: Cranked		0.2 – 3.0V	
		Engine: Idle			
51	Ignition switch – ST	Engine: Cranked		8V or more	M/T
71	Park/Neutral position switch	Ignition switch: ON	Selector lever set to P or N	o - 3 v	A/T
			Selector lever set to D, 2, L or R	8 – 14V	

Terminal No.	Check point	Check conditions (Engine conditions)		Standard value	Remarks
66	Vehicle speed sensor	• Ignition switch: ON • Move the vehicle slowly forward		0 ↔ 5V (Changes repeated)	
107	Power steering pressure switch	Engine: Idle, warm	Steering wheel placed in neutral (straight ahead) position	B+	
			Steering wheel turned half a turn	0 – 3V	
115	Air conditioning switch 1	Engine: Idle	Air conditioning switch set to OFF	0 – 3V	
			Air conditioning switch set to ON (Air conditioning compressor in driven state)	B+	
101 <SOHC> 20 <DOHC>	Air conditioning switch 2	Engine: Running at idle	Air conditioning switch set to OFF	0 – 3V	
			• Air conditioning switch set to ON • Indoor set temperature brought closer to atmospheric temperature	B+	
22	Air conditioning relay	• Engine: Idle • Air conditioning switch: OFF → ON (Air compressor in driven state)		B+ or 6V or more for a moment → 0 – 3V	
20 <SOHC> 6 <DOHC>	Fan motor relay (Lo)	Radiator fan not operating [Coolant temperature: below 90°C (194°F)]		B+	
		Radiator fan operating at low speeds [Coolant temperature: 95 – 105°C (203 – 221 °F)]		o - 3 v	
21 <SOHC> 53 <DOHC>	Fan motor relay (Hi)	Radiator fan not operating [Coolant temperature: below 90°C (194°F)]		B+	
		Radiator fan operating at high speeds [Coolant temperature: above 105°C (221 °F)]		o - 3 v	
24	Electric load switch	Engine: Running at idle	Lighting switch set to OFF	o - 3 v	DOHC
			Lighting switch set to ON	B+	
55 56	Heated oxygen sensor (front)	Engine: warm, 2,000 rpm (Check using a digital type voltmeter.)		0 ↔ 0.8V (Changes repeatedly)	All models (For Federal and Canada terminal 56 only)
102 105	Heated oxygen sensor (rear)	• Transaxle: 2nd gear <M/T>, L range <A/T> • Drive with wide open throttle • Engine: 3,500 rpm or more		0.6 – 1.0V	California
1	No. 1 injector	Engine: Running at idle after warmup, and accelerated abruptly by depressing accelerator pedal		Falls temporarily a little from 11 – 14V.	
14	No. 2 injector				
2	No. 3 injector				
15	No. 4 injector				
3	No. 5 injector				
16	No. 6 injector				

Terminal No.	Check point	Check conditions (Engine conditions)		Standard value	Remarks
4	Stepper motor coil <A1>	Engine: warm Check immediately after hot restart.		B+ ↑ ↓ 0 – 3V (Changed repeated)	
17	Stepper motor coil <A2>				
5	Stepper motor coil <B1>				
18	Stepper motor coil <B2>				
10	Ignition power transistor unit A	Engine: 3,000 rpm		0.3 – 3v	
23	Ignition power transistor unit B				DOHC
11	Ignition power transistor unit C				
9	Evaporative emission purge solenoid	Ignition switch: ON		B+	California
		Engine: warm, 3,000 rpm		o - 3 v	
101	Engine ignition signal	Engine: 3,000 rpm		0.3 – 3v	DOHC
104	Ignition timing adjustment terminal	Ignition switch: ON	Ignition timing adjustment terminal connected to ground	O - I V	
			Ignition timing adjustment terminal disconnected from ground	4.0 – 5.5V	
106	Check engine/malfunction indicator lamp	Ignition switch: OFF → ON		0 – 3V ↓ 9 – 13V (Several seconds later)	
6	EGR solenoid	Ignition switch: ON		B+	California
		Engine: Idle Suddenly depress the acceleration pedal.		Falls temporarily from B+.	
53	EGR temperature sensor	Ignition switch: ON	When sensor temperature is 50°C (122°F)	3.6 – 4.4V	California
			When sensor temperature is 100°C (2 12°F)	2.2 – 3.0V	
54 57	Oxygen sensor heater	Engine: Idle, warm		o - 3 v	California
		Engine speed: 5,000 rpm		B+	
111	Induction control valve position sensor No. 1	Ignition switch: ON		0 - 1V or 4.5 – 5.5V	DOHC
		Engine: Slowly accelerated from idling speed to 5,000 rpm		0 – 1V or 4.5 – 5.5V ↓ 1.5 – 4V (for a moment)	

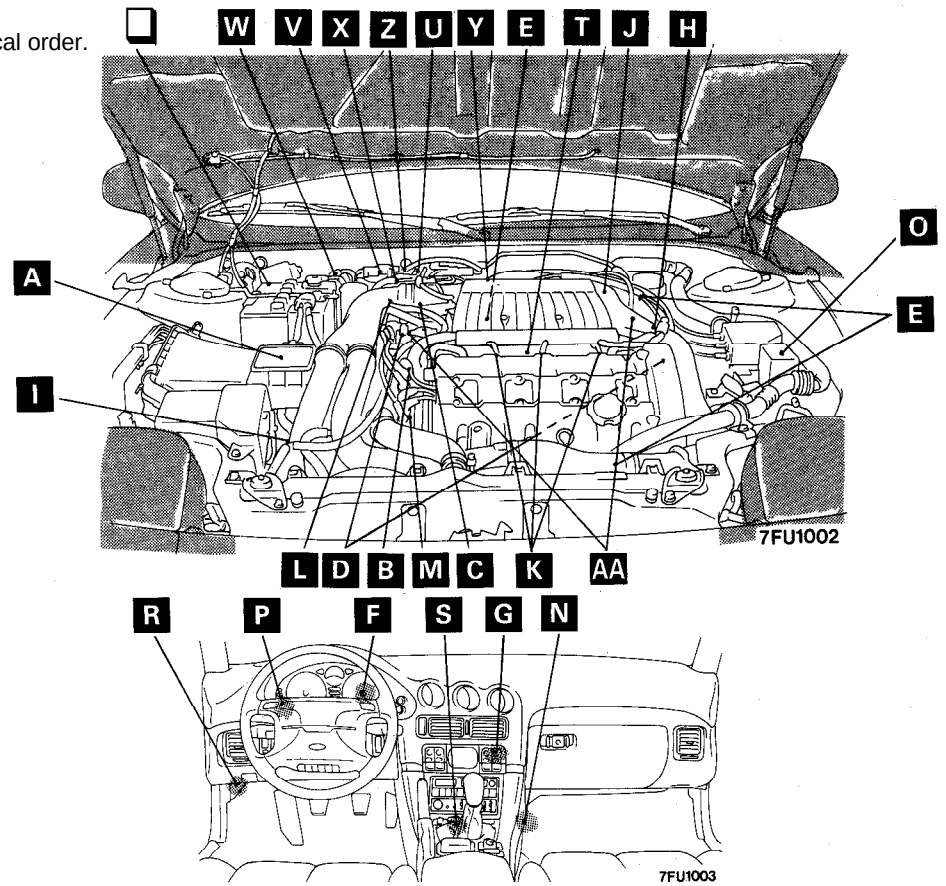
Terminal No.	Check point	Check conditions (Engine conditions)	Standard value	Remarks
103	Induction control valve position sensor No. 2	Ignition switch: ON	0 – 1V or 4.5 – 5.5V	DOHC
		Engine: Slowly accelerated from idling speed to 5,000 rpm	0 - 1V or 4.5 – 5.5V ↓ 1.5 – 4V (for a moment)	
110	Induction control valve (Opened)	Engine: Slowly accelerated from idling speed to 5,000 rpm	O - I V ↓ 4V or more (for a moment)	DOHC
109	Induction control valve (Closed)	Engine: Slowly decelerated from 5,000 rpm to idling speed		
116	Total control “Reduce torque” request signal 1	Engine: Idle	4.5 – 5.5V	A/T
		Engine: Running at idle after warmup and changing speeds	O - I V	
59	Total control “Reduce torque” request signal 2	Engine: Idle	O - I V	A/T
		Engine: Running at idle after warmup and changing speeds	1 – 5.5V	
7	Total control “Reduce torque” execution signal	Engine: Running at idle with coolant temperature at 50°C (122°F) or lower	0 – IV	A/T
		Engine: Idle, warm	1 – 4V	

ON-VEHICLE INSPECTION OF MFI COMPONENTS <California – DOHC Non Turbo, Turbo>

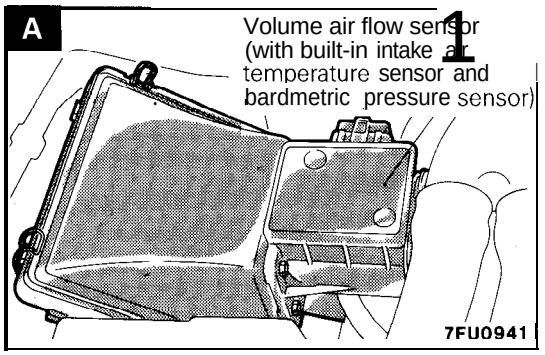
COMPONENT LOCATION

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

NOTE
The "Name" column is in alphabetical order.



A



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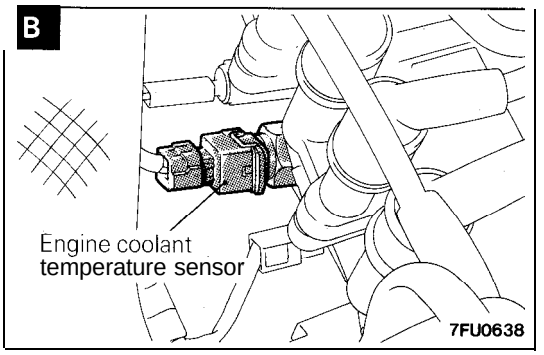

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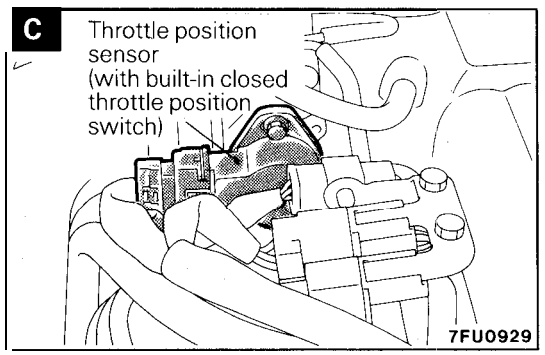

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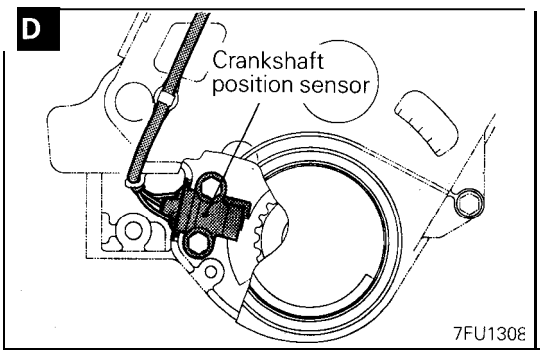
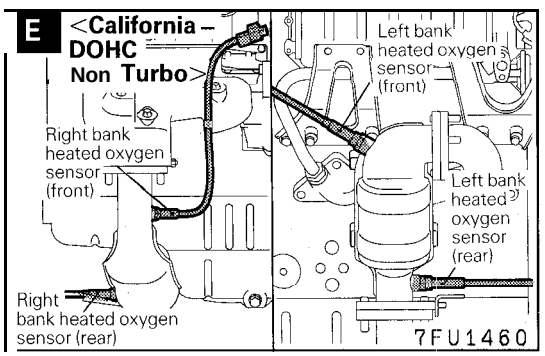
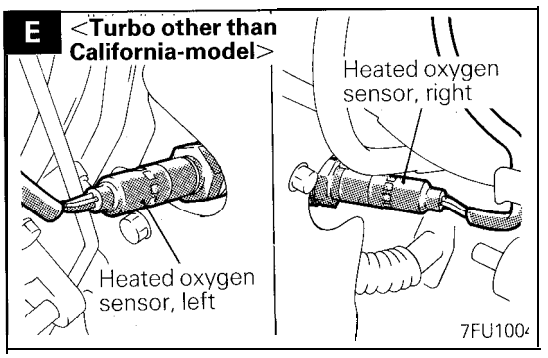


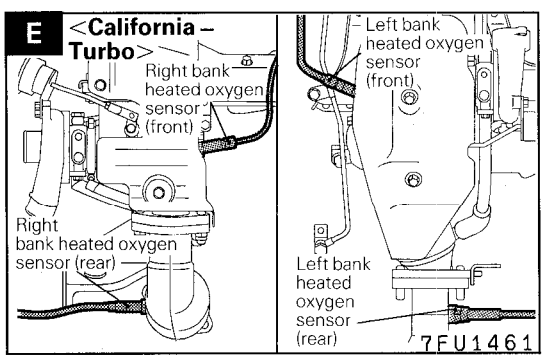
E <California – DOHC Non Turbo>



E <Turbo other than California-model>



E <California – Turbo>



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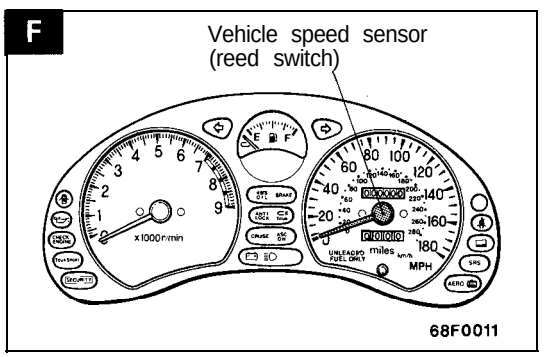

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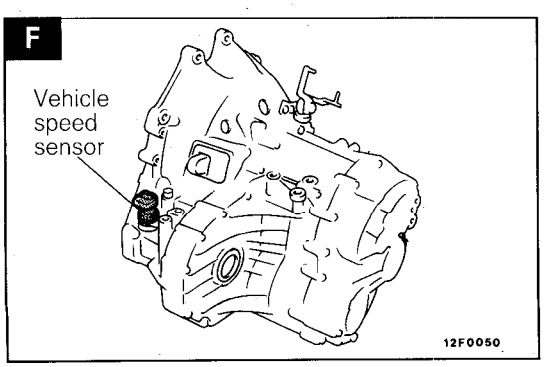

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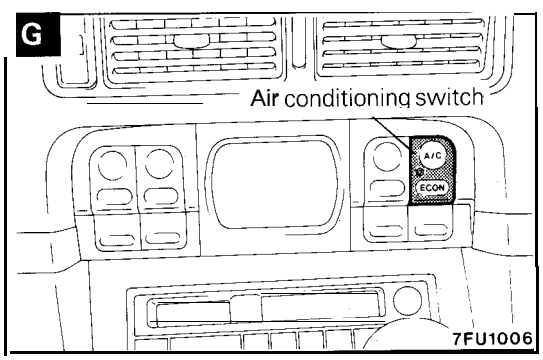

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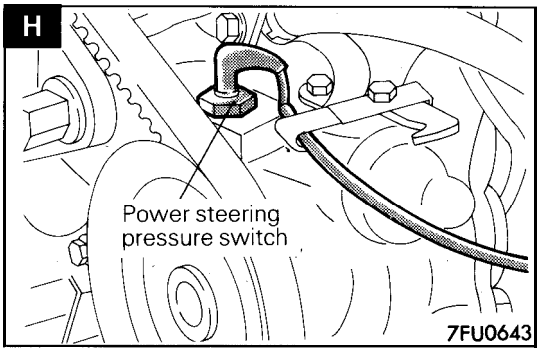

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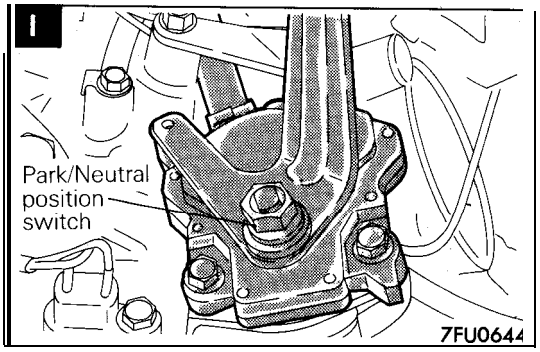
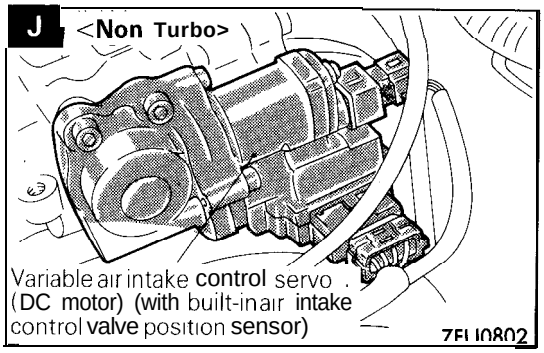


J <Non Turbo>



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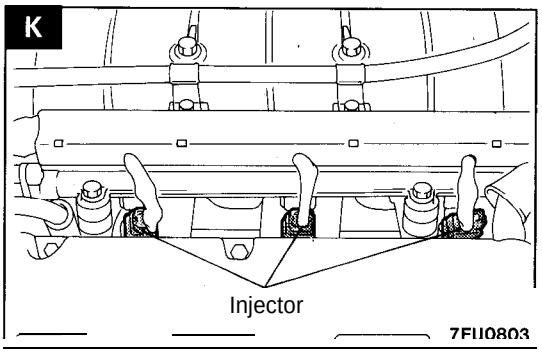

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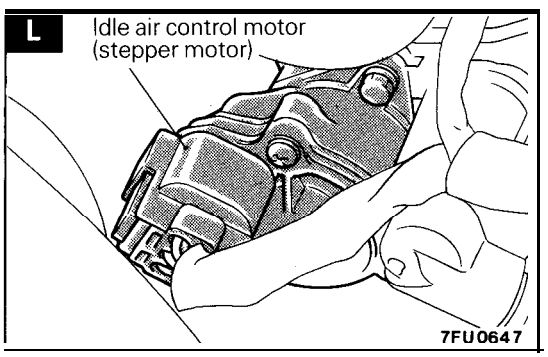

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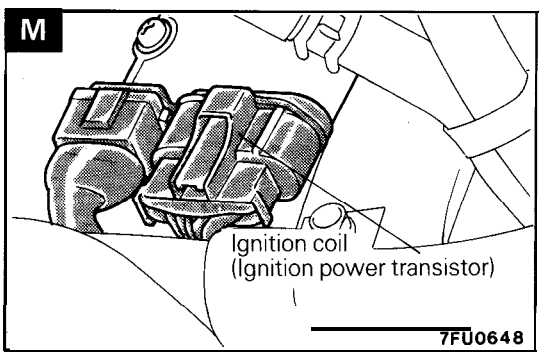

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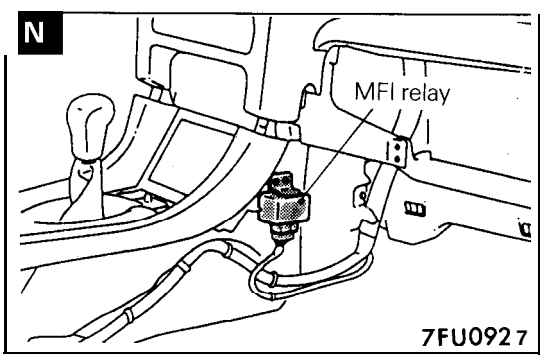

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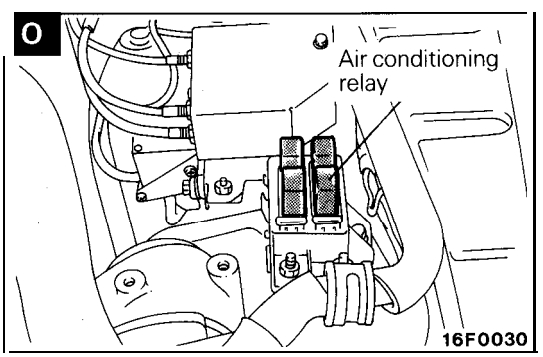
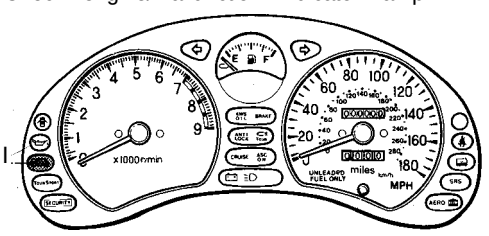


P

Check engine/malfunction indicator lamp



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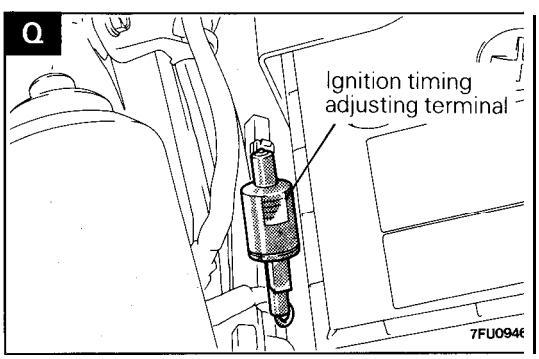

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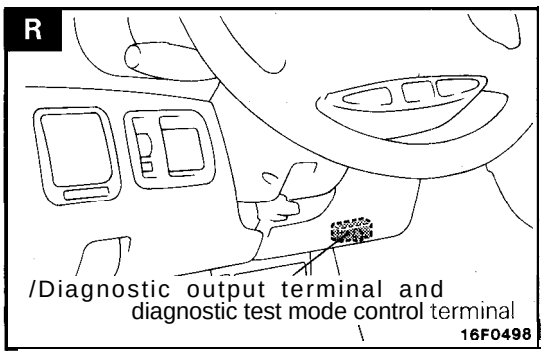

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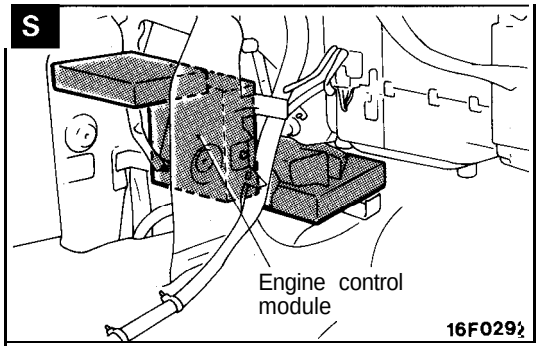

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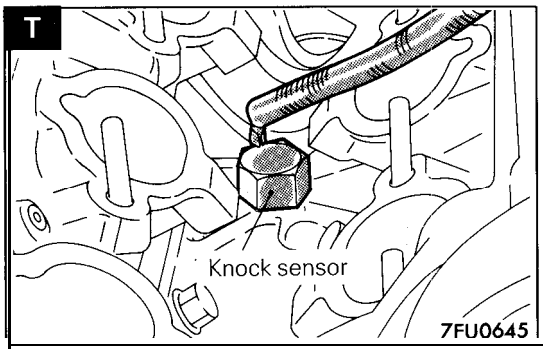
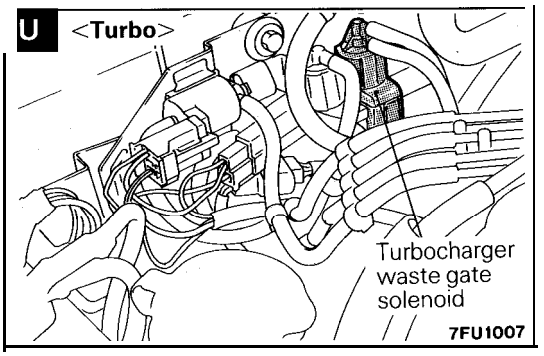


U <Turbo>



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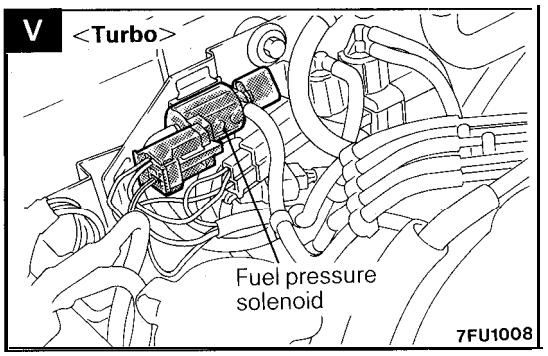

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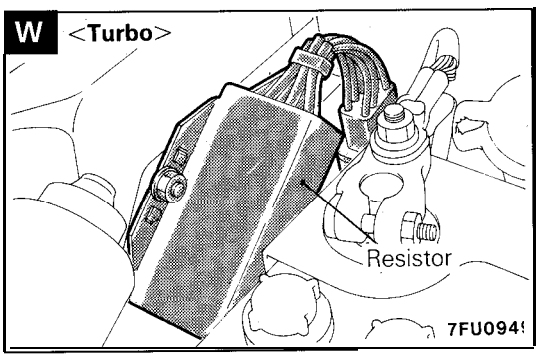

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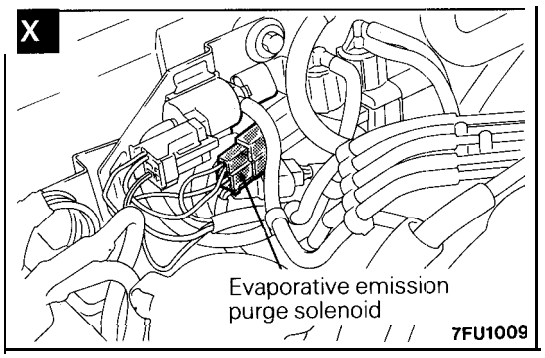

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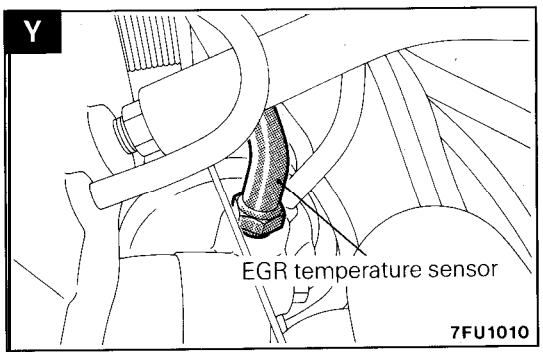

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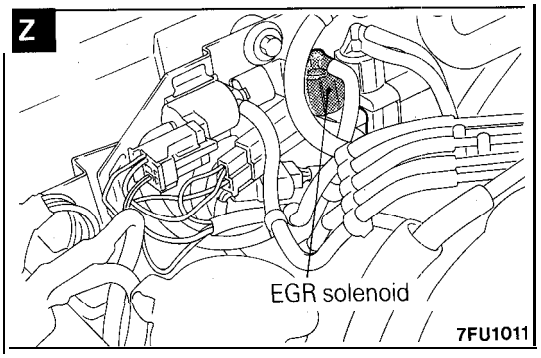
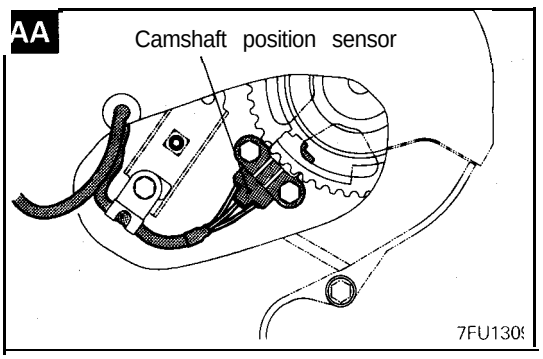


AA

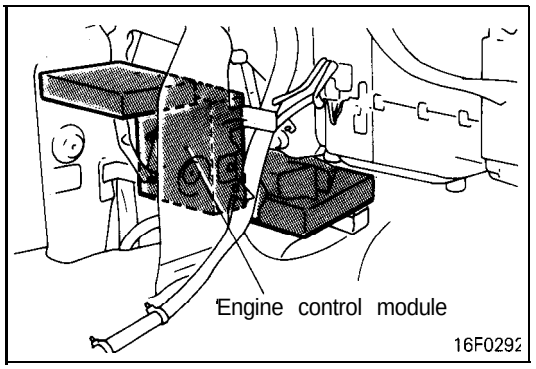


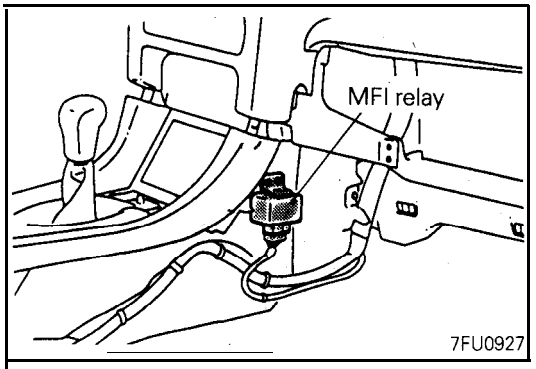
COMPONENTS INSPECTION PROCEDURE

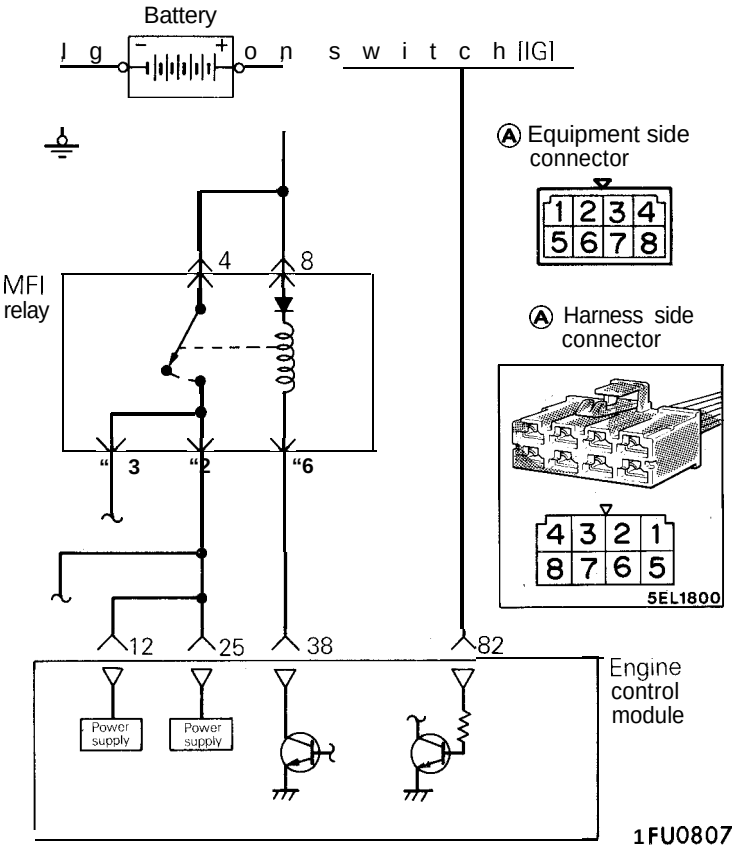
USING SCAN TOOL

. Refer to P.14A-76.

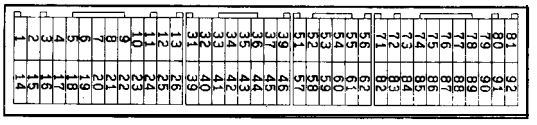
POWER SUPPLY (MFI RELAY) AND IGNITION SWITCH-IG







Enqine control module connector



OPERATION

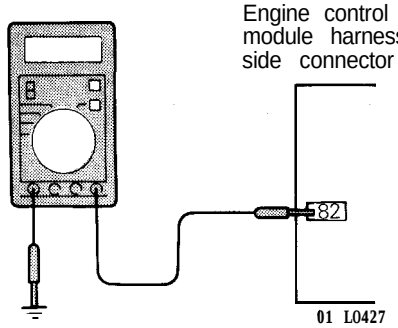
Refer to P.14A-77.

INSPECTION

Refer to P.14A-77.

HARNESS INSPECTION

1



Measure the ignition switch (IG) terminal input voltage.

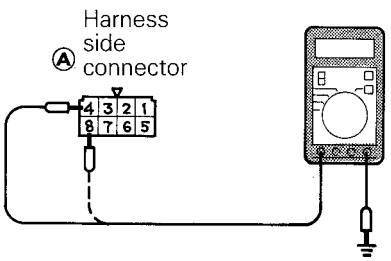
- Engine control module connector: Disconnected

Ignition switch	Voltage (V)
OFF	0 – 1
ON	B+

OK → 2

NO → Repair the harness. (Ignition switch – 82) or check the ignition switch

2



Measure the power supply voltage of the MFI relay.

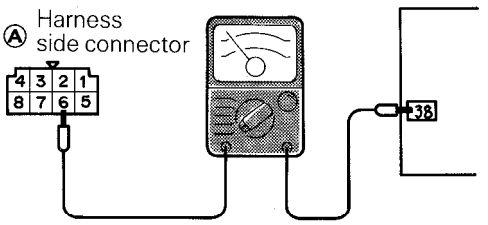
- Ignition switch: OFF
- MFI relay connector: Disconnected

Voltage (V)
B+

OK → 3

NO → Repair the harness. (Battery – Ⓐ4, Ⓐ8)

3



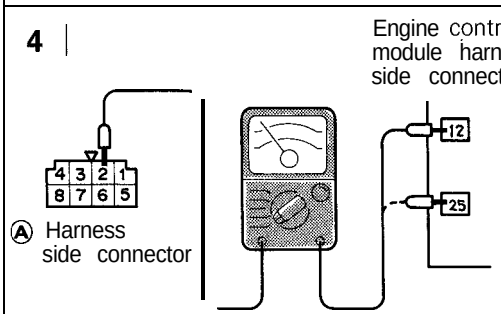
Check for an open-circuit, or a short-circuit to ground, between the engine control module and the MFI relay.

- Engine control module connector: Disconnected
- MFI relay connector: Disconnected

OK → 4

NO → Repair the harness. (Ⓐ6 –)

4

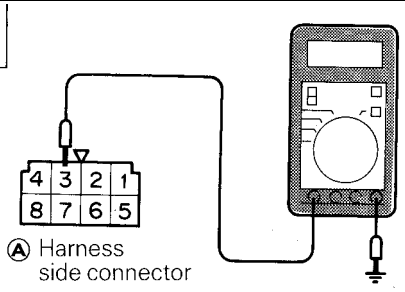


Check for an open-circuit, or a short-circuit to earth between the engine control module and the MFI relay.

- MFI relay connector: Disconnected
- Engine control module connector: Disconnected

OK → 5

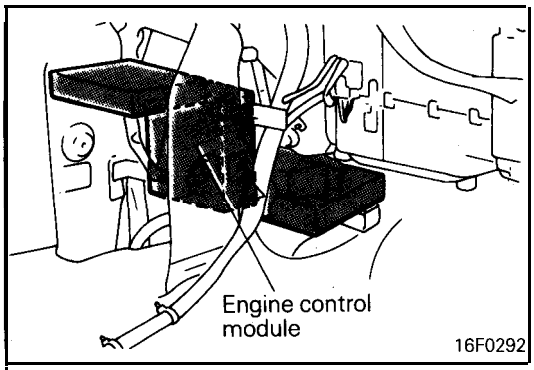
NO → Repair the harness. (Ⓐ2 – 12,)

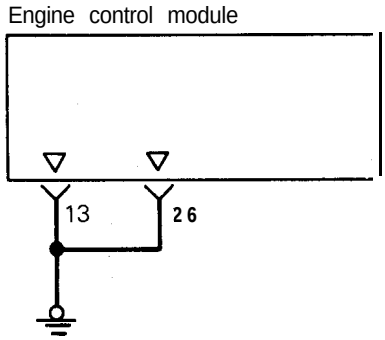
5	 6AF0051	Measure power voltage to the actuator. • MFI relay connector: Connected • Engine control module connector: Connected Engine / Voltage (V) Cranking / 8V or higher Racing / B+	OK → STOP Replace the MFI relay OK → or defective engine control module

MFI RELAY INSPECTION

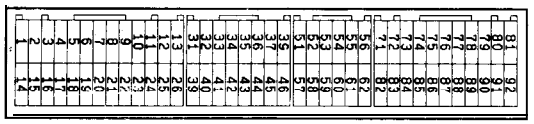
Refer to P.14A-79

ENGINE CONTROL MODULE POWER GROUND





Engine control module connector



9FU0393

OPERATION

Refer to 14A-80.

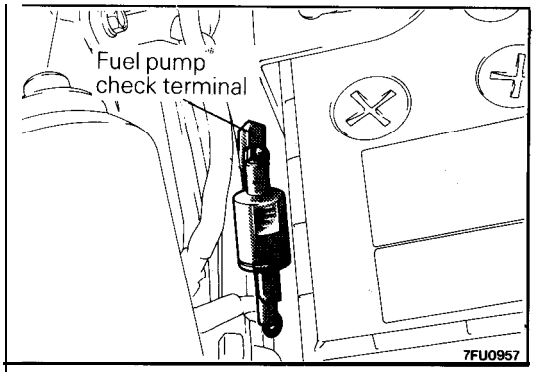
TROUBLESHOOTING HINTS

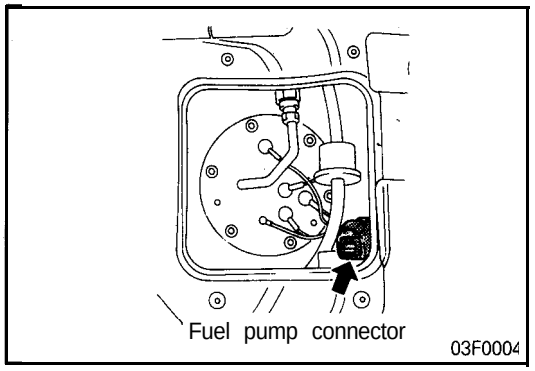
Refer to 14A-80.

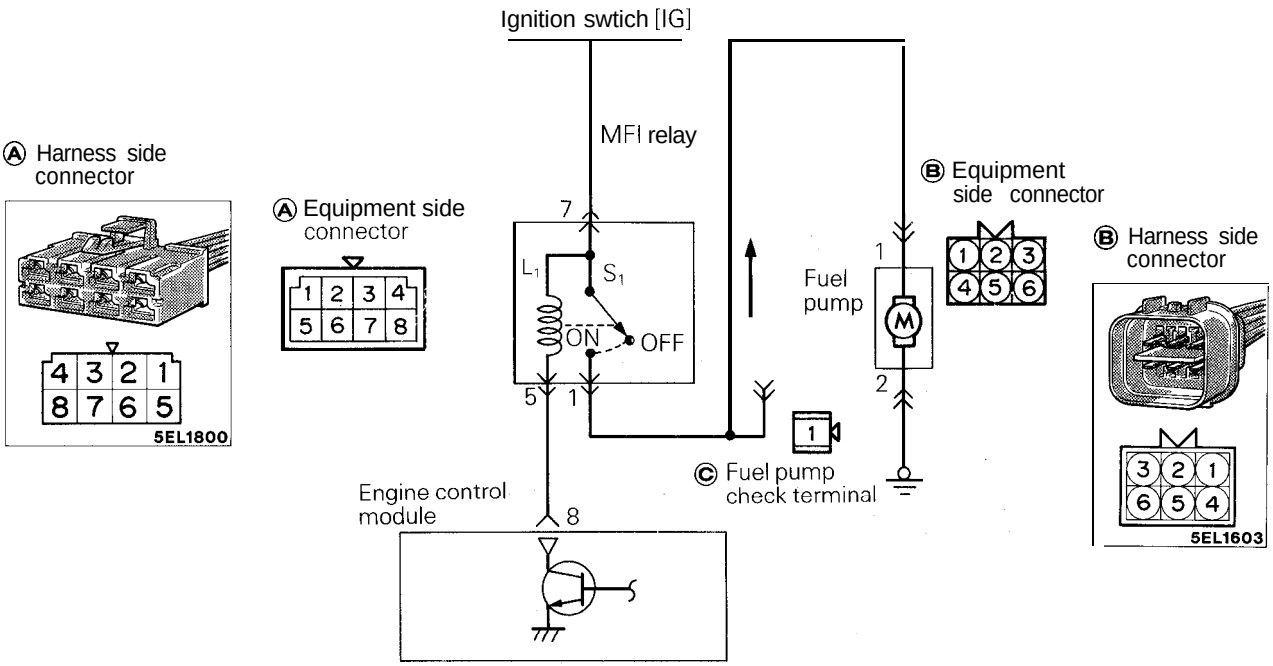
HARNESS INSPECTION

Refer to 14A-80.

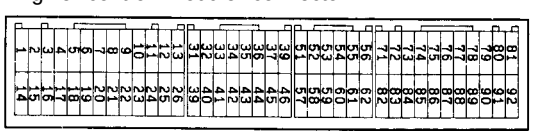
FUEL PUMP <Non Turbo>







Engine control module connector



7FU1360

OPERATION

Refer to 14A-81.

INSPECTION

Refer to 14A-82.

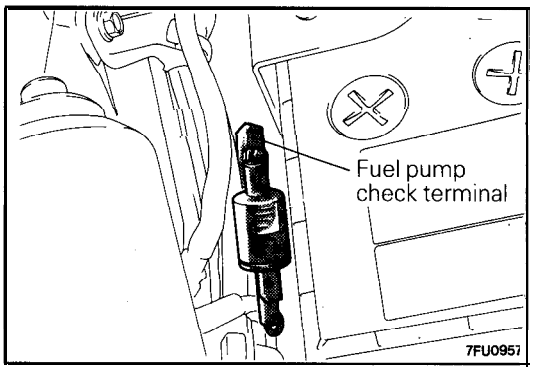
HARNESS INSPECTION

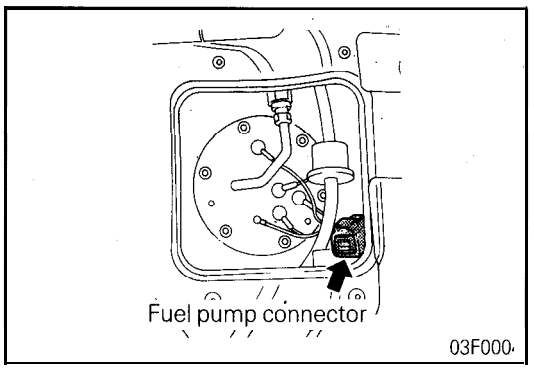
Refer to 14A-82.

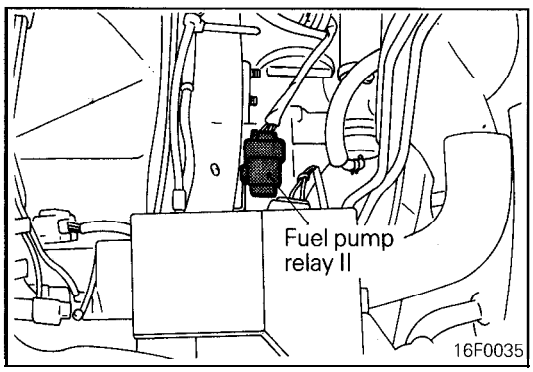
MFI RELAY INSPECTION

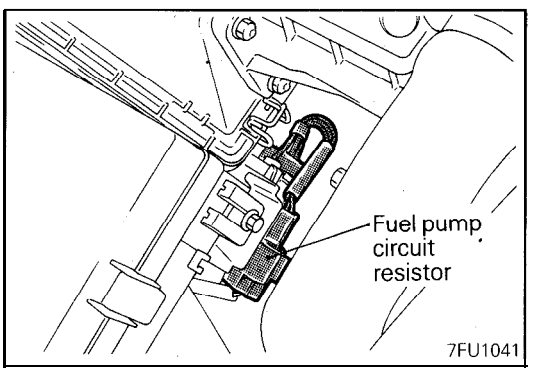
Refer to 14A-79.

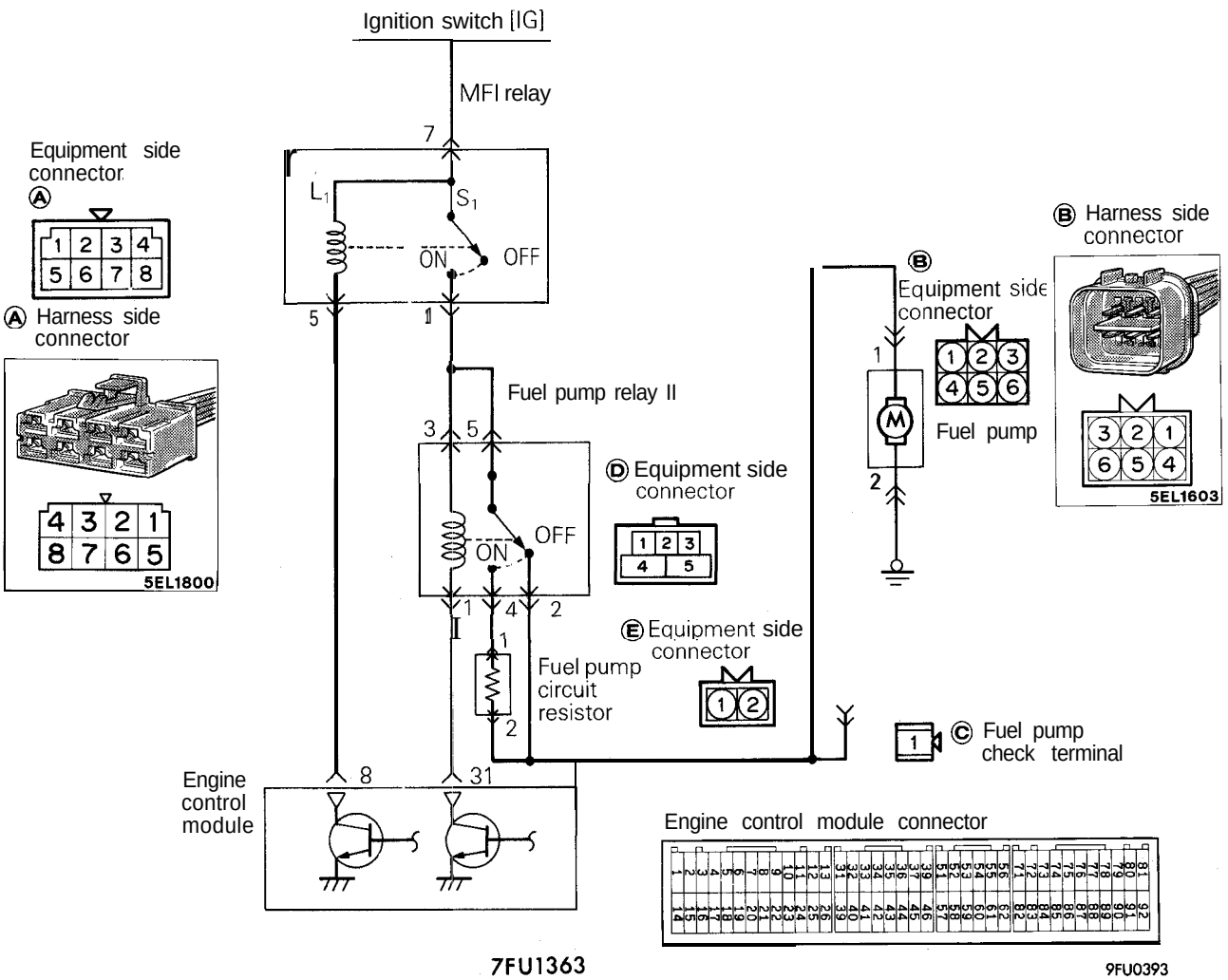
FUEL PUMP <Turbo>











OPERATION

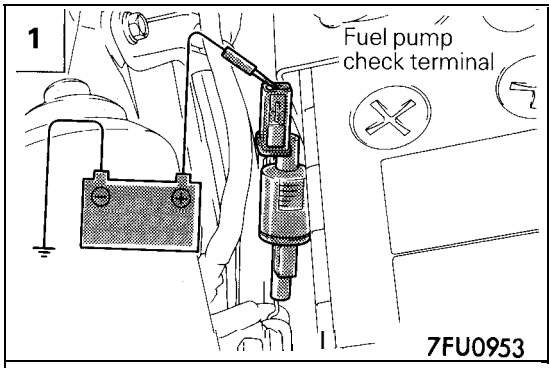
Refer to 14A-81.

INSPECTION

Refer to 14A-82.

HARNESS INSPECTION

1



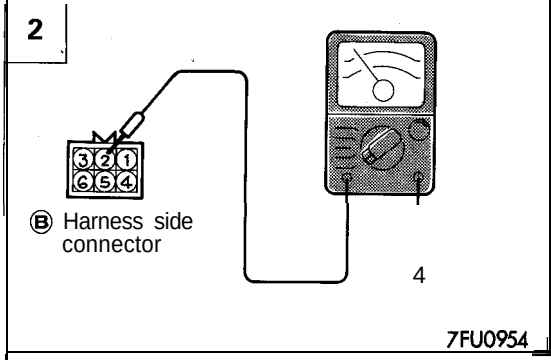
Check the fuel pump.

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

OK → 4

NO → 2

2



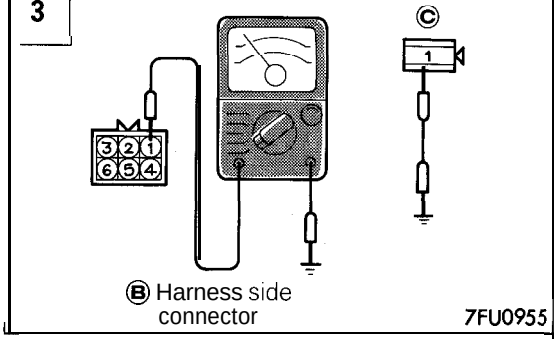
Check the ground circuit of the fuel pump.

- Fuel pump connector: Disconnected

OK → 3

NO → Repair the harness. (Ⓑ2 – Ground)

3



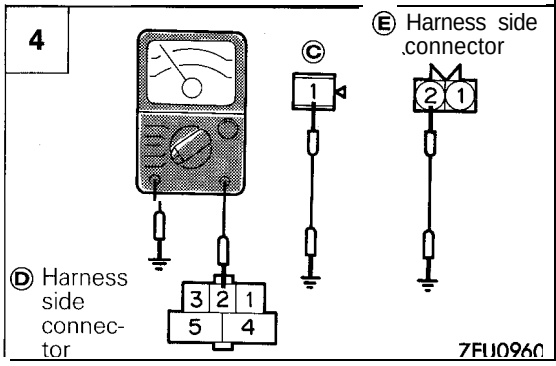
Check for continuity between the fuel pump and the checking terminal.

- Fuel pump connector: Disconnected

OK → 4

NO → Repair the harness. (Ⓑ1 – Ⓒ1)

4



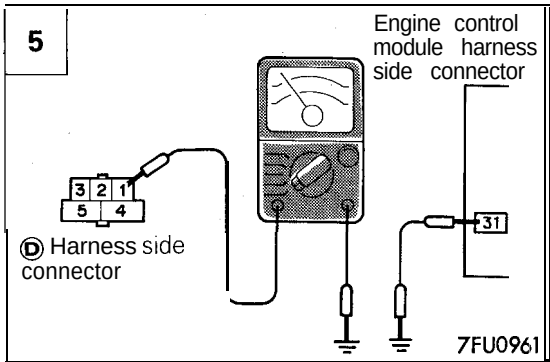
Check for continuity between the checking terminal and the fuel pump relay II, and between the resistor (for fuel pump).

- Fuel pump relay II connector: Disconnected
- Resistor (for fuel pump) connector: Disconnected
- Fuel pump connector: Disconnected

OK → 5

NO → Repair the *harness. (Ⓒ1 – Ⓓ2) (Ⓓ2 – Ⓔ2)

5



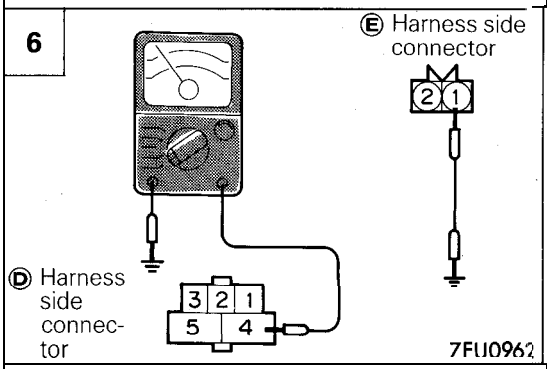
Check for an open-circuit, or a short-circuit to ground, between the fuel pump relay II and the engine control module.

- Fuel pump relay II connector: Disconnected
- Engine control module connector: Disconnected

OK → 6

NO → Repair the harness. (Ⓓ1 – 31)

6



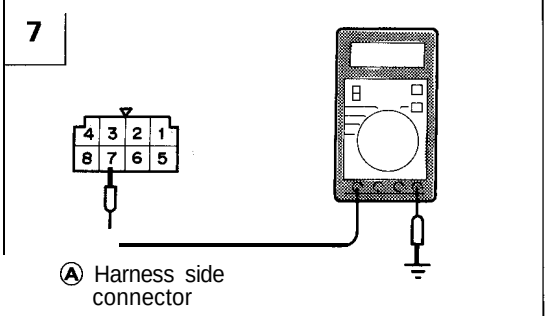
Check for continuity between the fuel pump relay II and the resistor (for fuel pump).

- Fuel pump relay II connector: Disconnected
- Resistor (for fuel pump) connector: Disconnected

OK → 7

NO → Repair the harness. (Ⓓ4 – Ⓔ1)

7



Measure the power supply voltage of the MFI relay.

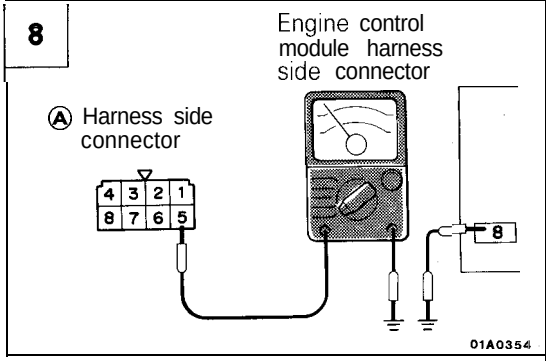
- MFI relay connector: Disconnected

Ignition switch	Voltage (V)
OFF	0
ON	B+

OK → 8

NO → Repair the harness. (Ignition switch [IG] – Ⓐ3) (Ignition switch [ST] – Ⓐ9)

8



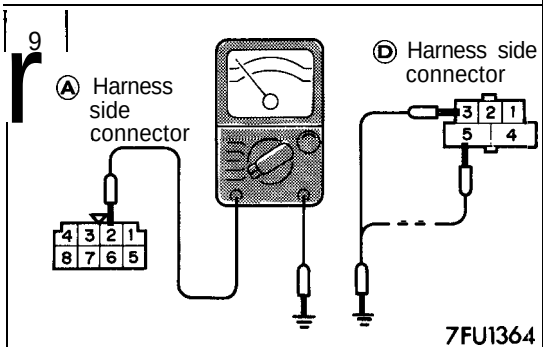
Check for an open-circuit, or a short-circuit to ground, between the MFI relay and the engine control module.

- MFI relay connector: Disconnected
- Engine control module connector: Disconnected

OK → 9

NO → Repair the harness. (Ⓐ5 –)

9

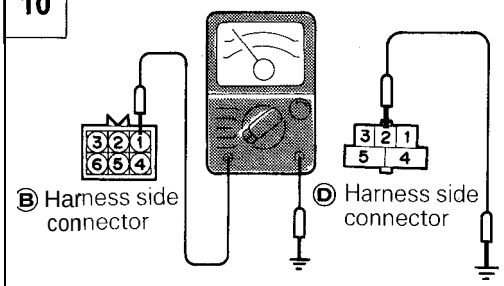


Check for continuity between the MFI relay and the fuel pump relay II.

- MFI relay connector: Disconnected
- Fuel pump relay II connector: Disconnected

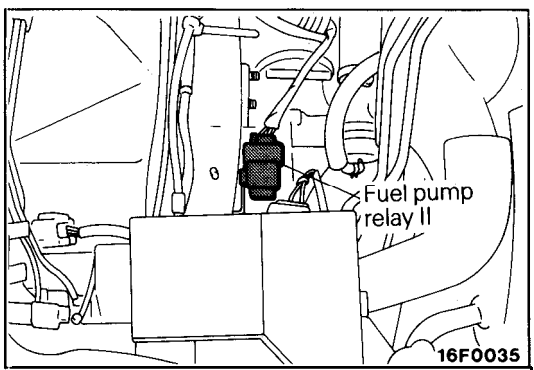
OK → 10

NO → Repair the harness. (Ⓐ – Ⓓ) (Ⓐ – Ⓓ)

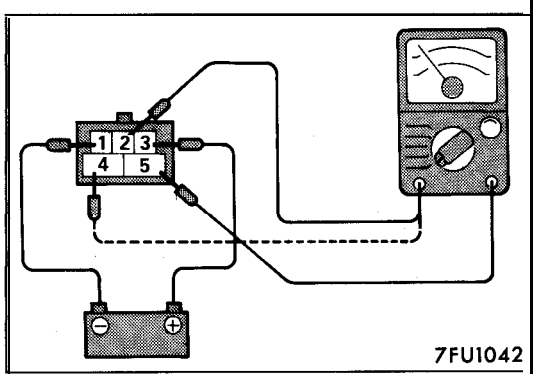
10  7FU0964	Check for an open-circuit, or a short-circuit to ground, between the fuel pump relay II and the fuel pump. • Fuel pump relay II connector: Disconnected • Fuel pump connector: Disconnected	OK →	STOP
		NG →	Repair the harness. (Ⓑ1 – Ⓓ2)

MFI RELAY INSPECTION

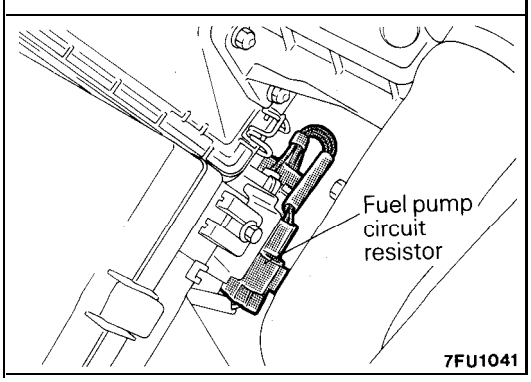
Refer to P.14A-79.



16F0035



7FU1042



7FU1041

FUEL PUMP RELAY II

INSPECTION

(1) Remove fuel pump relay II.

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

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

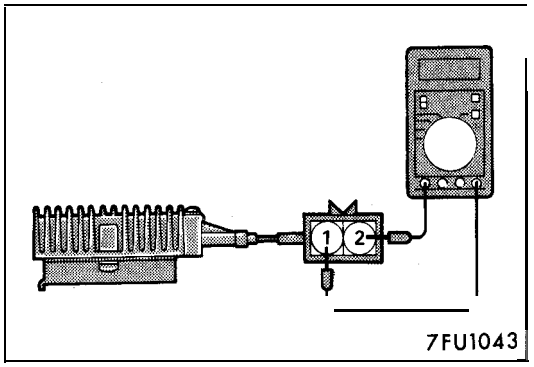
Jumper wire	Continuity between terminals 2 and 5	Continuity between terminals 4 and 5
Connected	No continuity	Continuity present
Disconnected	Continuity present	No continuity

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

FUEL PUMP CIRCUIT RESISTOR

INSPECTION

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

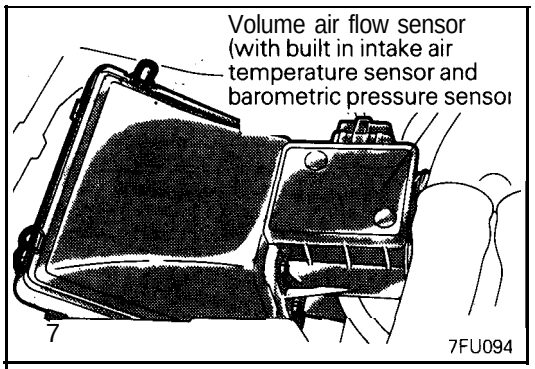


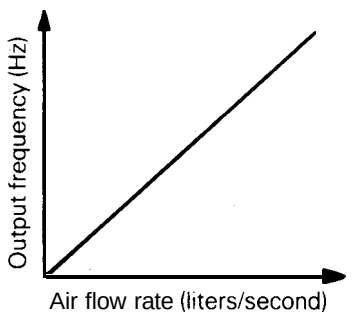
(2) Measure the resistance between the terminals.

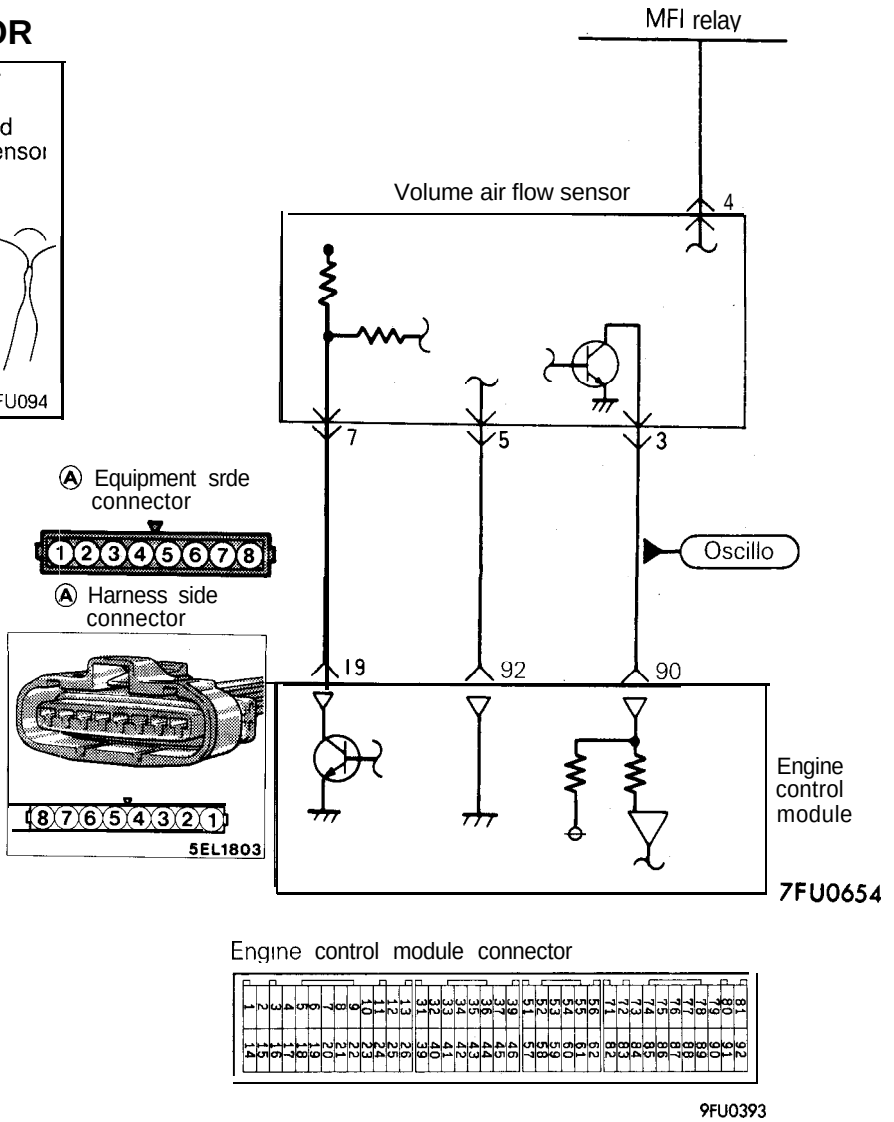
Standard value: 0.6 – 0.9 Ω

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

VOLUME AIR FLOW SENSOR







Engine control module connector

OPERATION

Refer to P.14A-84.

TROUBLESHOOTING HINTS

Refer to P.14A-84.

INSPECTION

Using Scan Tool

<Volume Air Flow Sensor>

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	12	Sensor air volume [frequency)	• Engine coolant temperature: 80 to 95°C (176 to 205°F) • Lights and accessories: OFF • Transaxle: Neutral (P range for vehicle with A/T) • Steering wheel: Neutral	700 rpm (Idle)	22-48 Hz
				2,000 rpm	50 – 90 <Non turbo> 68 – 108 <Turbo>
				Racing	Frequency increases with racing

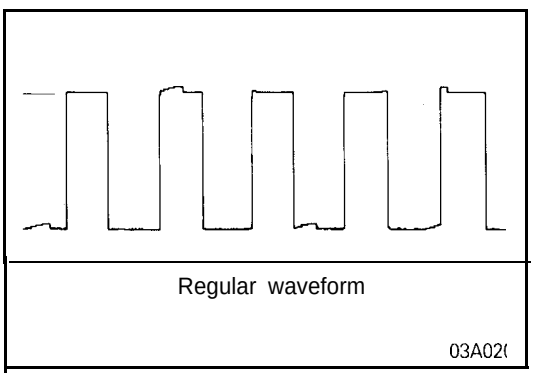
NOTE
When the vehicle is new [within initial operation of about 500 km (300 miles)], the volume air flow sensor output frequency may be about 10% higher.

<Volume Air Flow Sensor Reset Signal>

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

<Volumetric Efficiency>

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data list	37	Volumetric efficiency	• Engine coolant temperature: 80 to 95°C (176 to 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)	15-35 %
				2,000 rpm	15-35 %
				Racing	Frequency increases with racing



Regular waveform

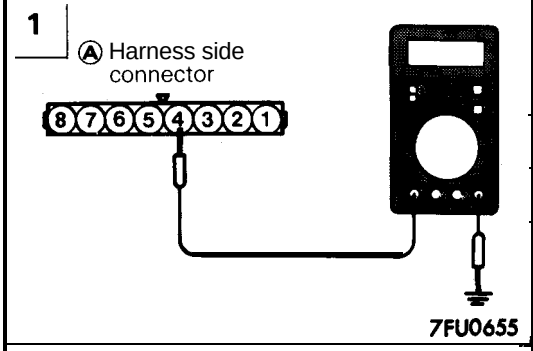
03A02(

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

1



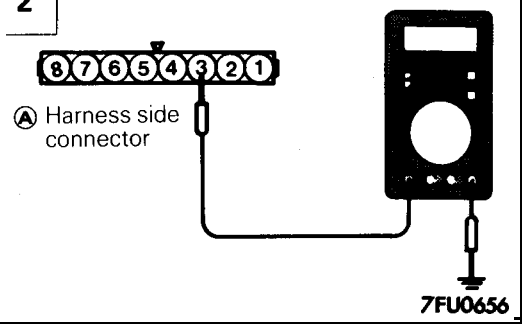
Measure the power supply voltage.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
B+

OK → 2

NG → Repair the harness (Ⓐ 4 – Control relay) or check the control relay.

2



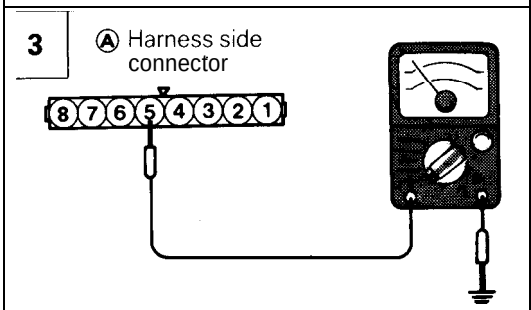
Measure the terminal voltage.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
4.8 – 5.2

OK → 3

NG → Repair the harness (Ⓐ 3 – 90)

3

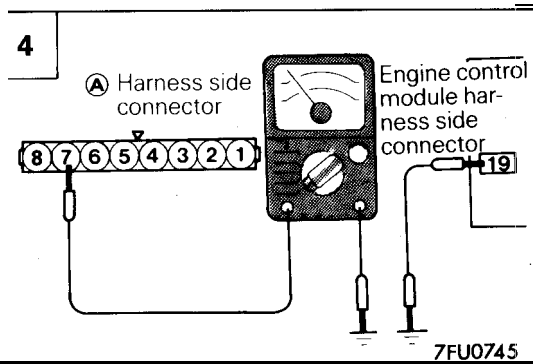


Check for continuity of the ground circuit.
- Connector: Disconnected

OK → STOP

NG → Repair the harness. (Ⓐ 5 – 92)

4

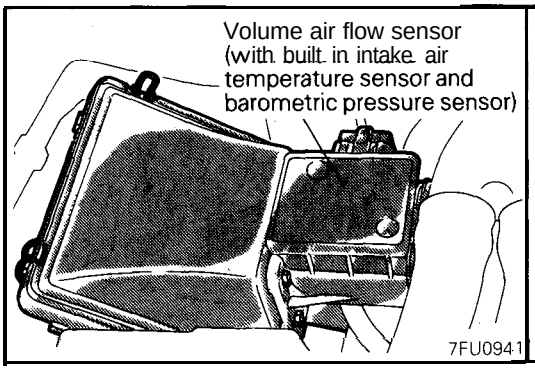


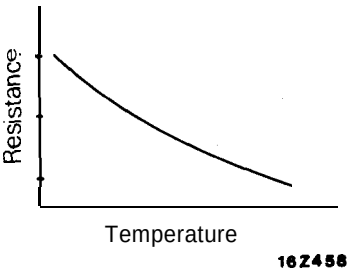
Check for continuity between the volume air flow sensor and the engine control unit.
- Volume air flow sensor connector: Disconnected
- Engine control module connector: Disconnected

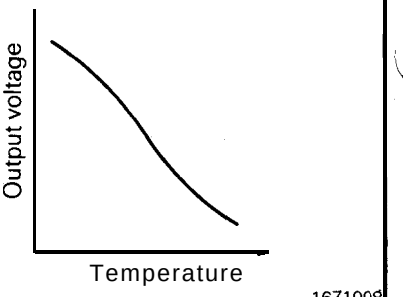
OK → STOP

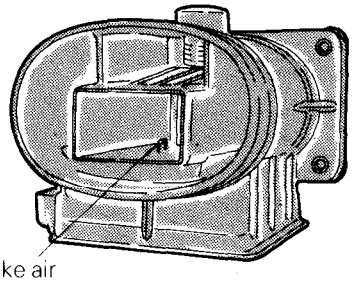
NG → Repair the harness. (Ⓐ 7 – ❑)

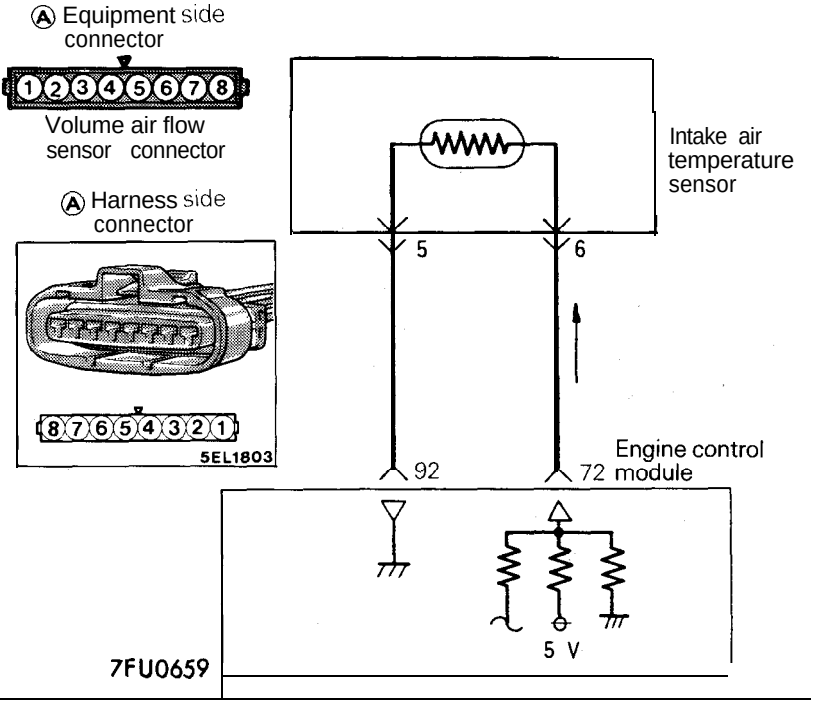
INTAKE AIR TEMPERATURE SENSOR











OPERATION

Refer to P.14A-87.

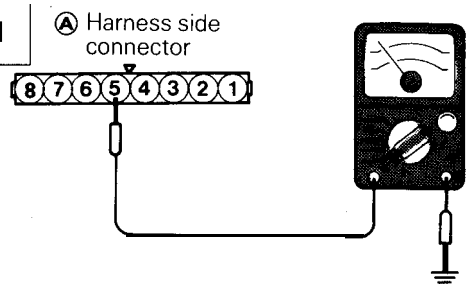
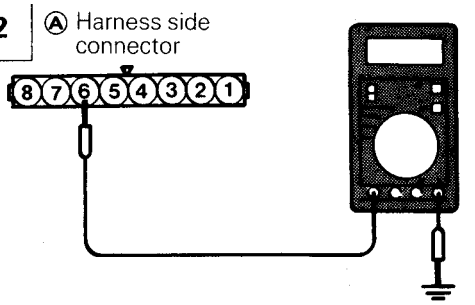
TROUBLESHOOTING HINTS

Refer to P.14A-87.

INSPECTION

Refer to P.14A-88.

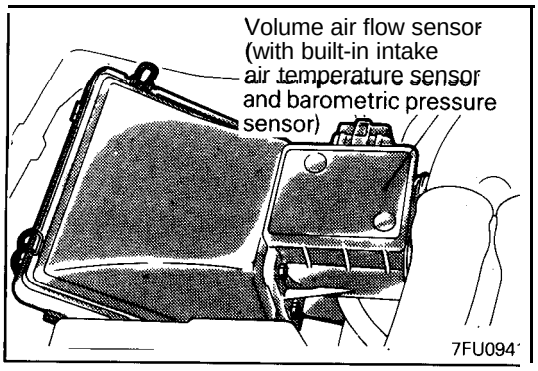
HARNESS INSPECTION

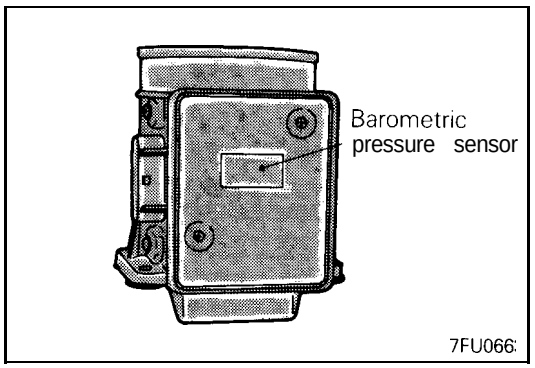
1 Ⓐ Harness side connector  7FU0657	Check for continuity of the ground circuit. • Connector: Disconnected	OK → 2 NG → Repair the harness. (Ⓐ 5 – 92)
2 Ⓐ Harness side connector  7FU0660	Measure the power supply voltage. • Connector: Disconnected • Ignition switch: ON Voltage (V): 4.5 – 4.9	OK → STOP NG → Repair the harness. (Ⓐ 6 – 72)

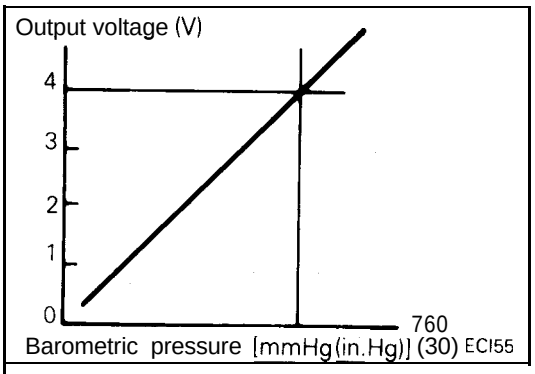
SENSOR INSPECTION

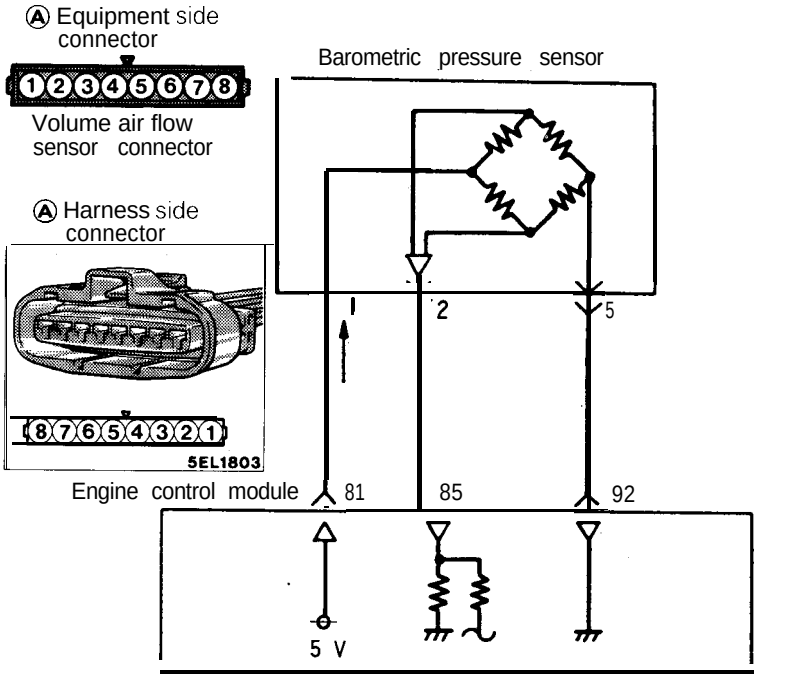
Refer to P.14A-88.

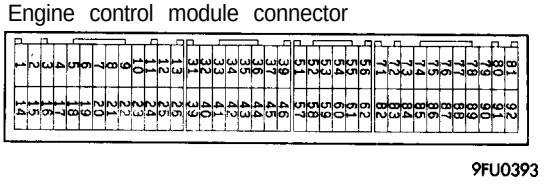
BAROMETRIC PRESSURE SENSOR











OPERATION

Refer to P.14A-90.

TROUBLESHOOTING HINTS

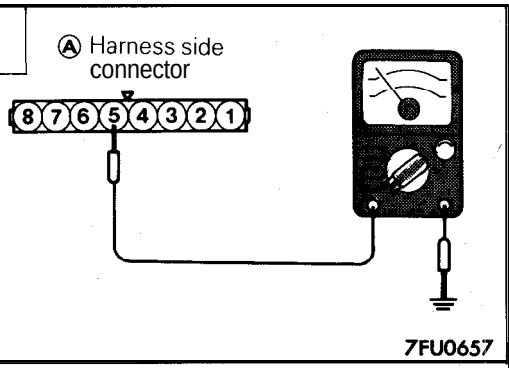
Refer to P.14A-91.

INSPECTION

Refer to P.14A-91.

HARNESS INSPECTION

1



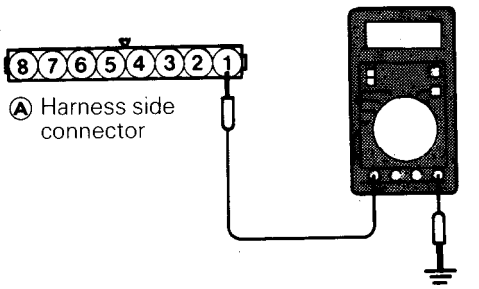
Check for continuity of the ground circuit.

- Connector: Disconnected

OK → 2

NG → Repair the harness. (Ⓐ5 – ❑)

2



Measure the power supply voltage of the barometric pressure sensor.

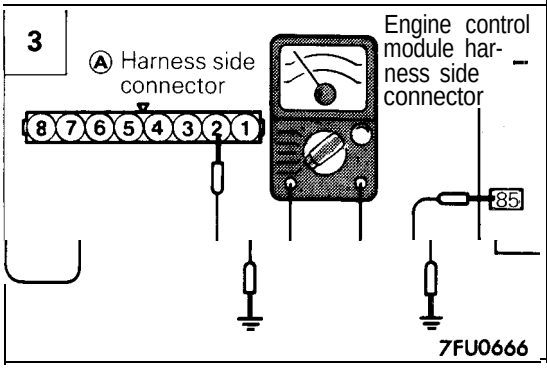
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
4.8 – 5.2

OK → 3

NG → Repair the harness. (Ⓐ1 – 81)

3



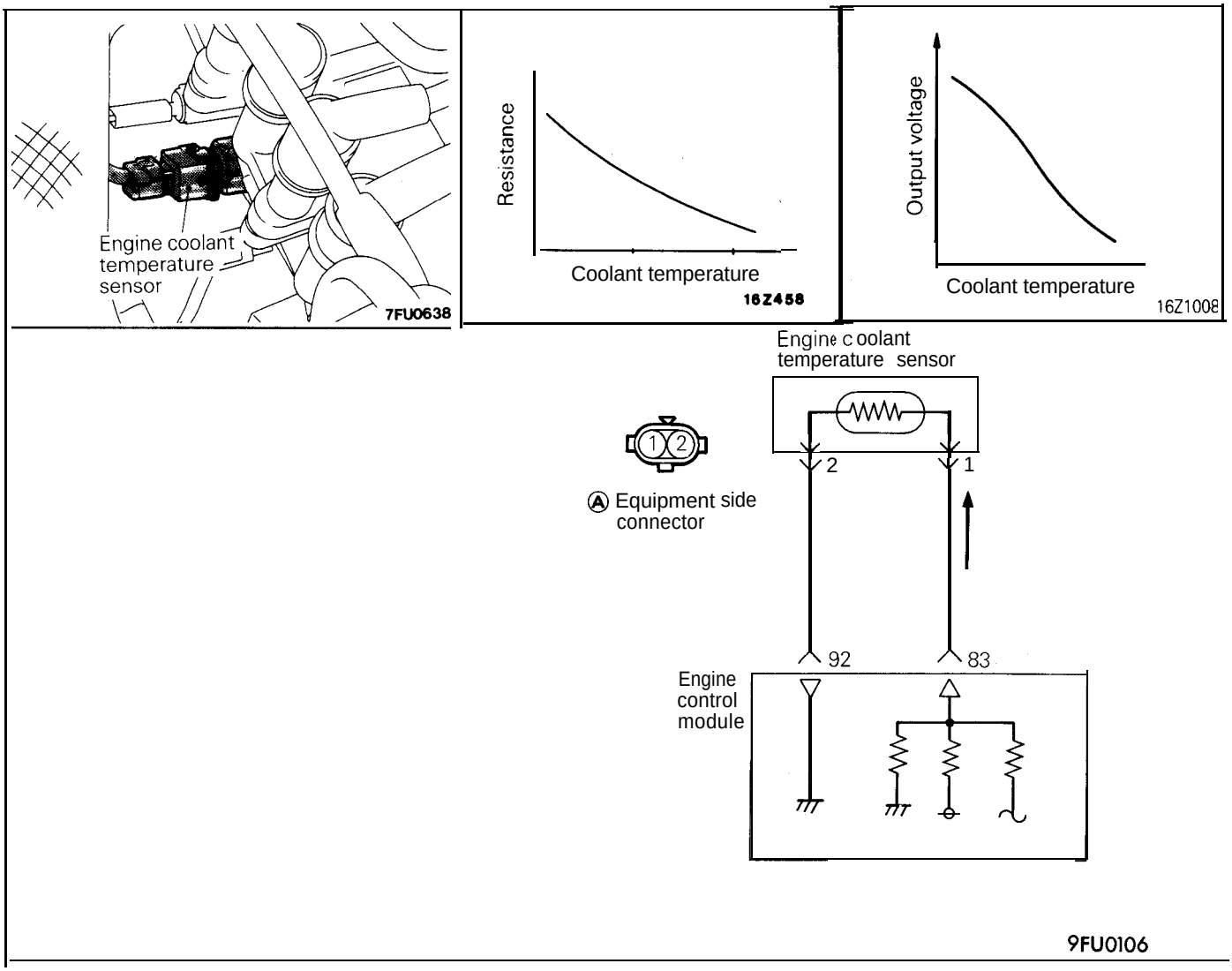
Check for an open-circuit, or a short-circuit to ground between the engine control module and the barometric pressure sensor.

- Volume air flow sensor connector: Disconnected
- Engine control module connector: Disconnected

OK → A STOP

NG → Repair the harness. (Ⓐ2 – 85)

ENGINE COOLANT TEMPERATURE SENSOR



OPERATION

Refer to P.14A-92.

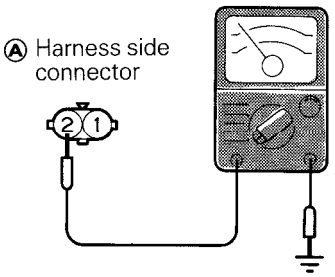
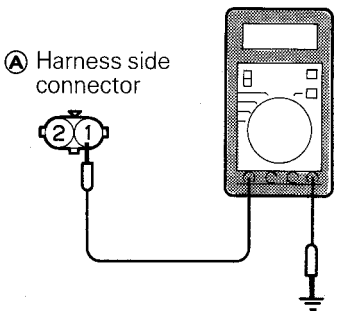
TROUBLESHOOTING HINTS

Refer to P.14A-92.

INSPECTION

Refer to P.14A-93.

HARNESS INSPECTION

1  9FU0112	Check for continuity of the ground circuit. • Engine coolant temperature sensor connector: Disconnected	OK →	2
		NG →	Repair the harness. (Ⓐ2 – 92)
2  9FU0114	Measure the impressed voltage. • Engine coolant temperature sensor connector: Disconnected • Engine control module connector: Connected • Ignition switch: ON Voltage (V): 4.5 – 4.9	OK →	STOP
		NG →	Repair the harness. Ⓐ1 -

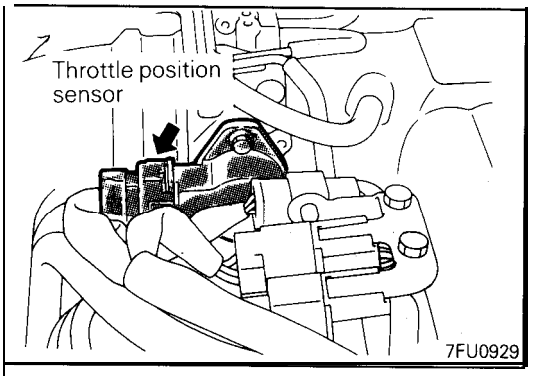
SENSOR INSPECTION

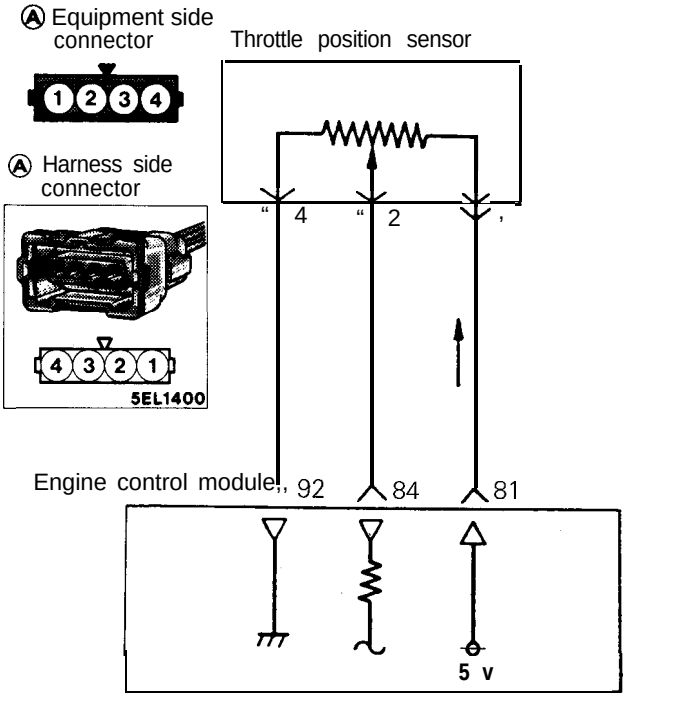
Refer to P.14A-94.

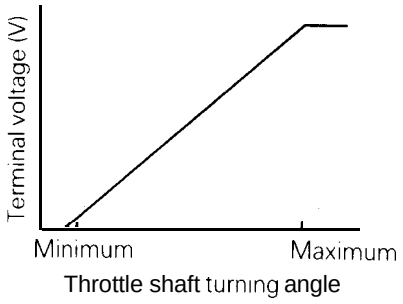
INSTALLATION

Refer to P.14A-94.

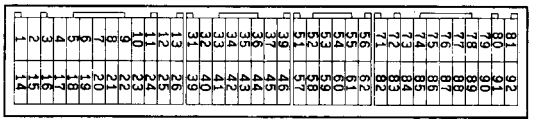
THROTTLE POSITION SENSOR







Engine control module connector



OPERATION

Refer to P.14A-95.

TROUBLESHOOTING HINTS

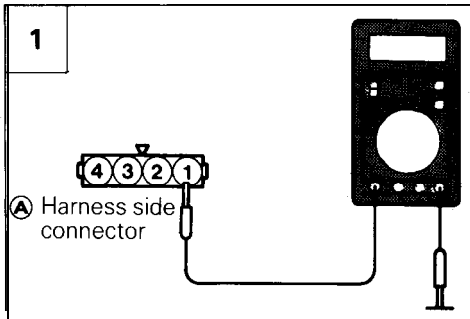
Refer to P.14A-95.

INSPECTION

Refer to P.14A-96.

HARNESS INSPECTION

1



6FU1241

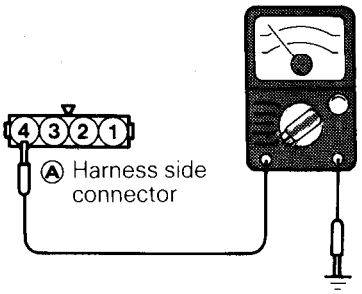
Measure the power supply voltage of the throttle position sensor.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
4.8 – 5.2

OK → 2

NG → Repair the harness. (Ⓐ1 – 81)

2



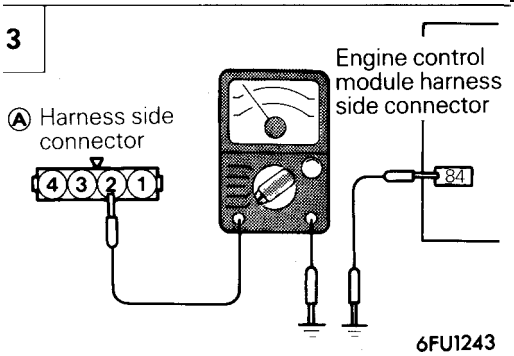
6FU1242

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

OK → 3

NG → Repair the harness. (Ⓐ4 – 92)

3



6FU1243

Check for an open-circuit, or a short-circuit to ground between the engine control module and the throttle position sensor.
- Throttle position sensor connector: Disconnected
- Engine control module connector: Disconnected
- Connector of any control module which uses TPS output signals like ECM: Disconnected

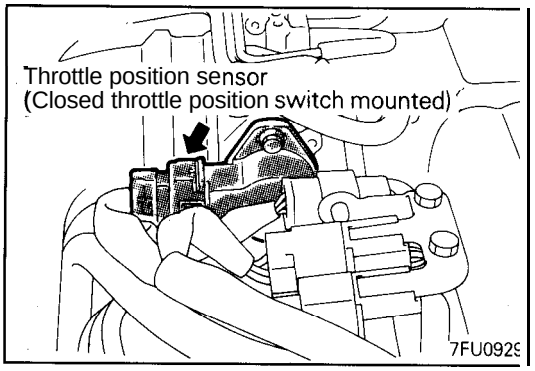
OK → STOP

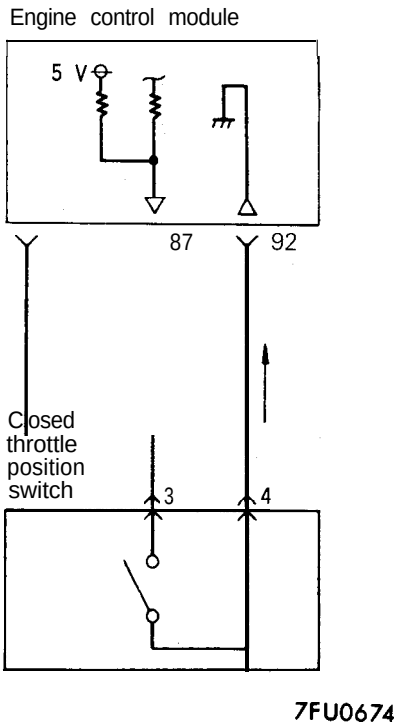
NG → Repair the harness. (Ⓐ2 – 84)

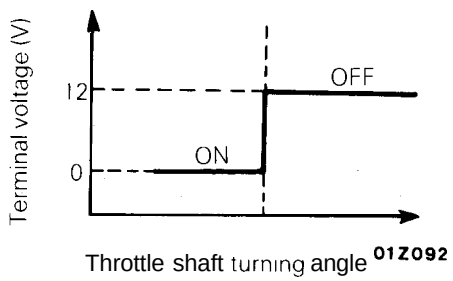
SENSOR INSPECTION

Refer to P.14A-97.

CLOSED THROTTLE POSITION SWITCH







OPERATION

Refer to P.14A-98.

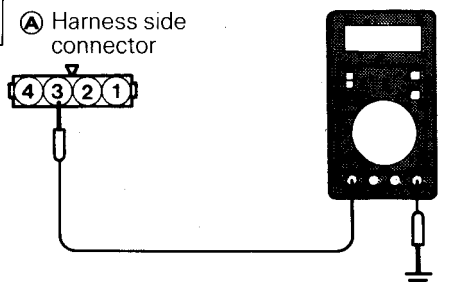
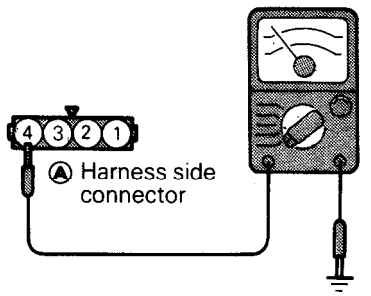
TROUBLESHOOTING HINTS

Refer to P.14A-98.

INSPECTION

Refer to P.14A-98.

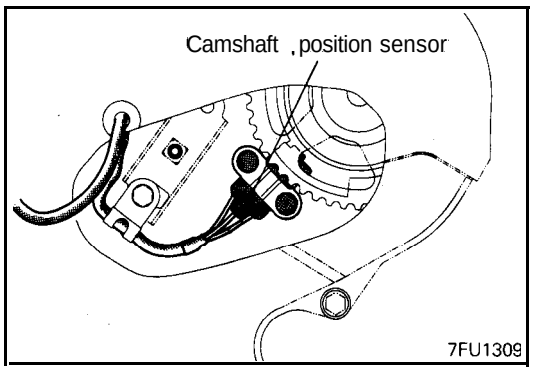
HARNESS INSPECTION

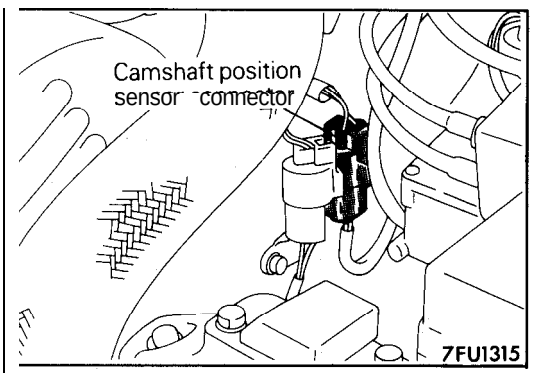
1  7FU0675	Measure the power supply voltage of the closed throttle position switch. • Connector: Disconnected • Ignition switch: ON Voltage (V): 4 or more OK → 2 NG → Repair the harness. (Ⓐ3 – 87)	
2  6FU1242	Check for continuity of the ground circuit. • Connector: Disconnected OK → STOP NG → Repair the harness. (Ⓐ4 – 92)	

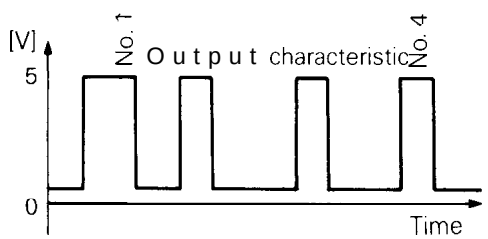
SENSOR INSPECTION

Refer to P.14A-99.

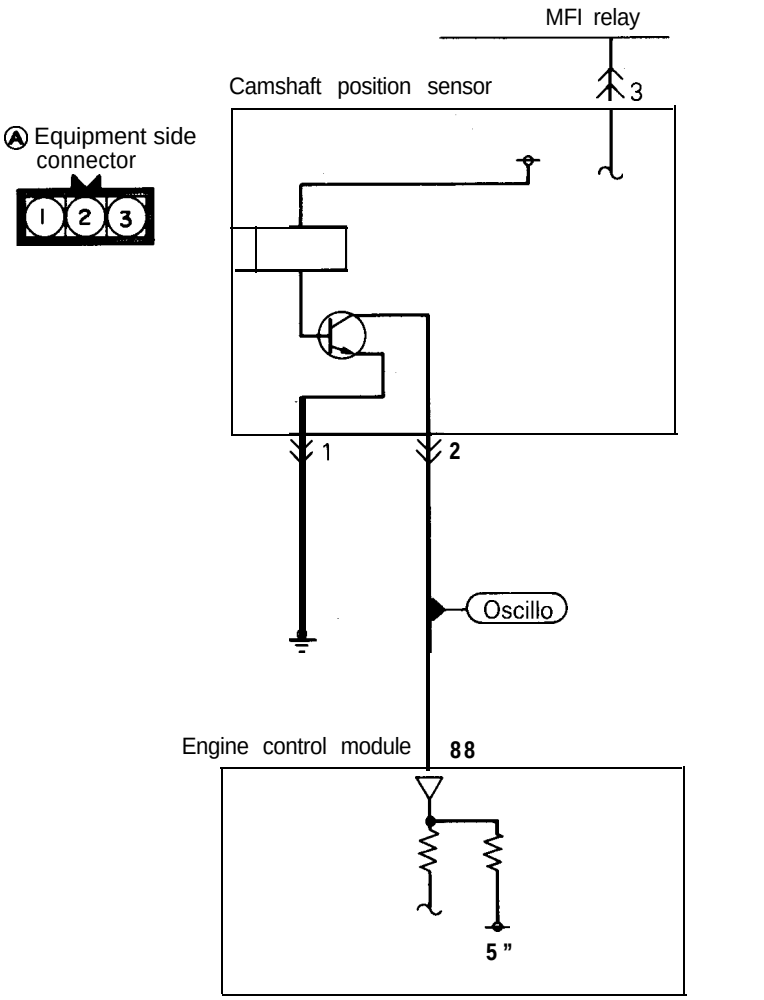
CAMSHAFT POSITION SENSOR





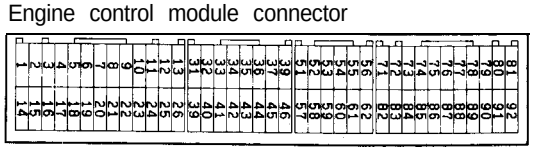


7FU0677



6AF0054

Engine control module connector



9FU0393

OPERATION

Refer to P.14A-100.

TROUBLESHOOTING HINTS

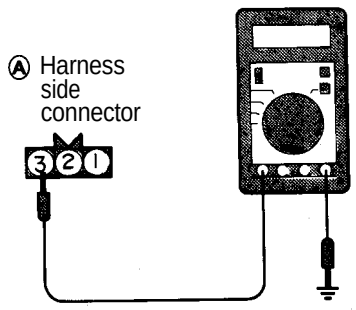
Refer to P.14A-100.

INSPECTION

Refer to P.14A-101

HARNESS INSPECTION

1



7FU1330

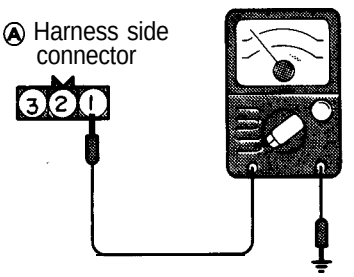
Measure the power supply voltage.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
B+

OK → 2

NG → Repair the harness. (Ⓐ3 – MFI relay)

2



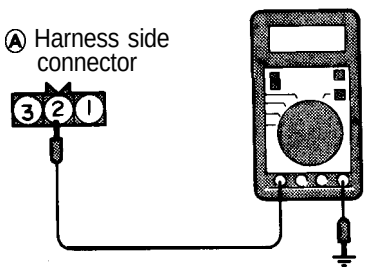
6AF0057

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

OK → 3

NG → Repair the harness. (Ⓐ1 – Ground)

3



6AF0059

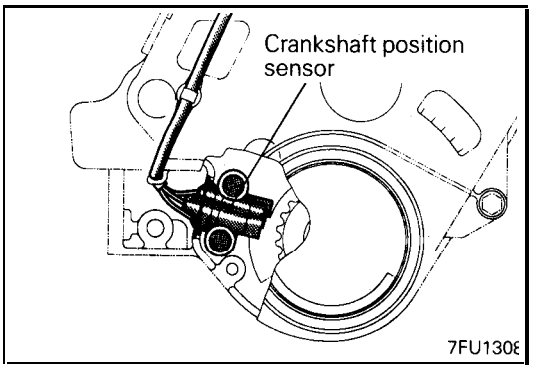
Measure the impressed voltage.
- Connector: Disconnected
- Ignition switch: ON

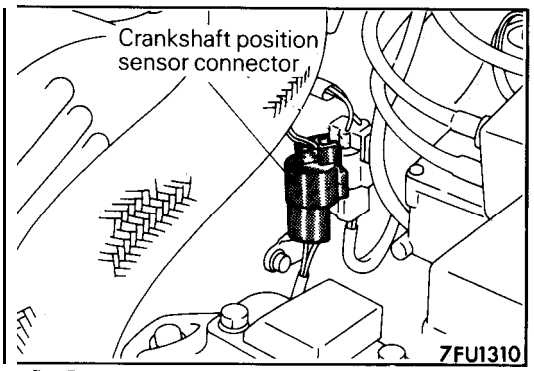
Voltage (V)
4.8 – 5.2

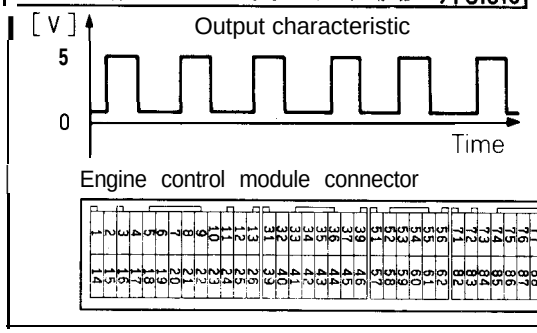
OK → STOP

NG → Repair the harness. (Ⓐ2 – 88)

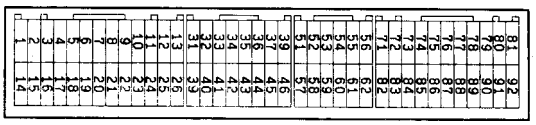
CRANKSHAFT POSITION SENSOR



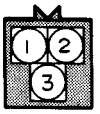




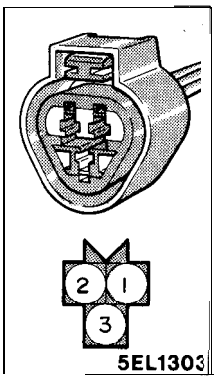
Engine control module connector

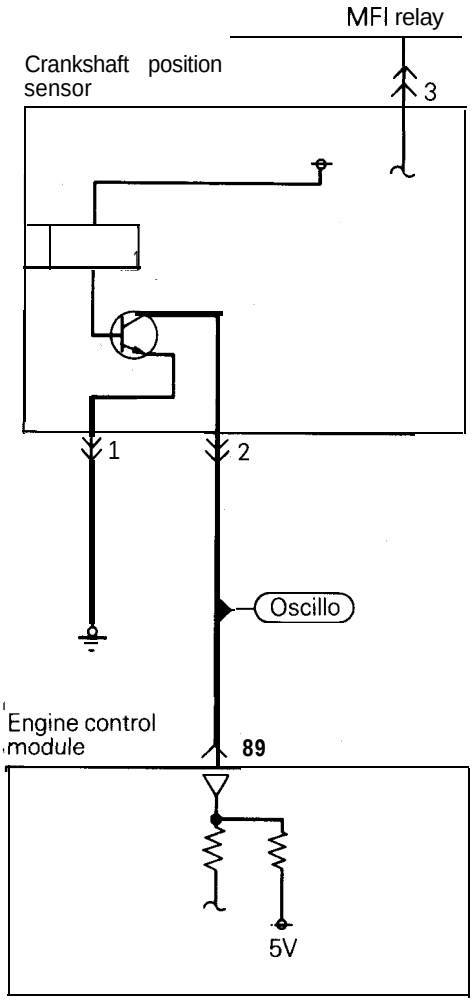


Ⓐ Equipment side connector



Ⓐ Harness side connector





OPERATION

Refer to P.14A-104.

TROUBLESHOOTING HINTS

Refer to P.14A-104.

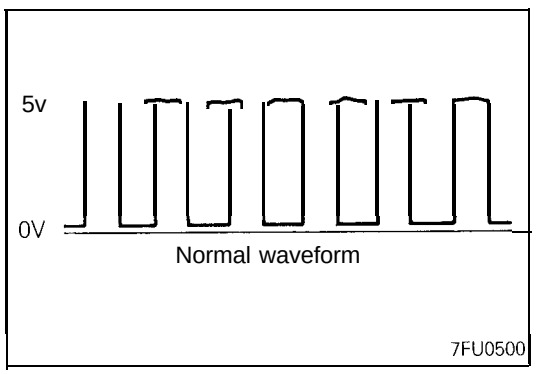
INSPECTION

Using Scan Tool

Function	Item No.	Data display	Check condition	Check content	Normal state
Data reading	22	Cranking speed	● Engine cranking ● Tachometer connected (check on and off of primary current of ignition coil by tachometer)	Compare cranking speed and scan tool reading	Indicated speed to agree

NOTE
(1) The tachometer indicates a third of the actual engine speed. Therefore, 3 times the tachometer indication is the actual engine speed.
(2) When the tachometer is set to the 2-cylinder range, it indicates actual engine speed.

Function	Item No.	Data display	Check condition	Coolant temperature	Standard value
Data reading	22	Idle speed	● Engine: Running at idle ● Closed throttle position switch: ON	At -20°C (-4°F)	1,275 – 1,475 rpm
				At 0°C (32°F)	1,225 – 1,425 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



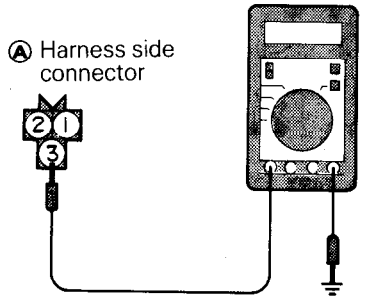
Normal waveform

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

1



7FU1331

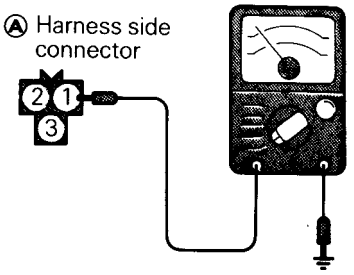
Measure the power supply voltage.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
B+

OK → 2

OK → Repair the harness. (Ⓐ3 – MFI relay)

2



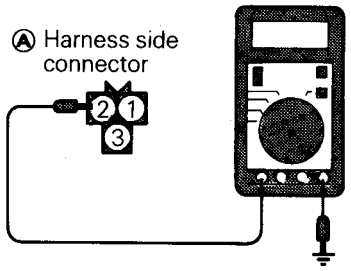
6AF0062

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

OK → 3

OK → Repair the harness. (Ⓐ1 – Ground)

3



6AF0064

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

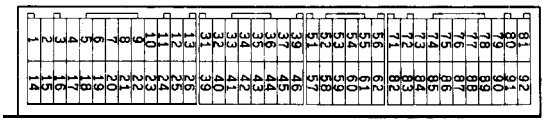
Voltage (V)
4.8 – 5.2

OK → STOP

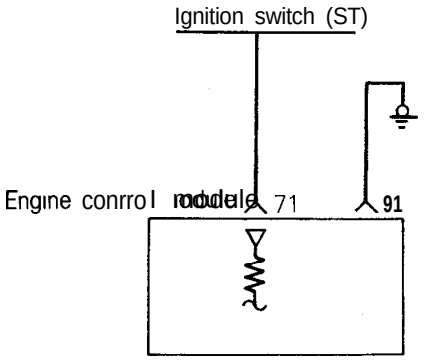
OK → Repair the harness. (Ⓐ2 – 89)

IGNITION SWITCH-ST <M/T>

Engine control module connector



9FU0393



1 FU0638

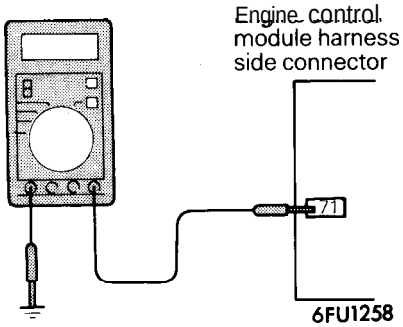
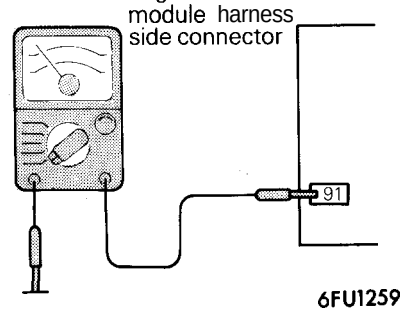
OPERATION

Refer to P.14A-109.

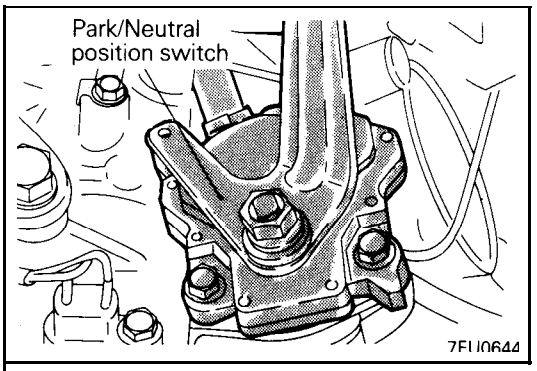
INSPECTION

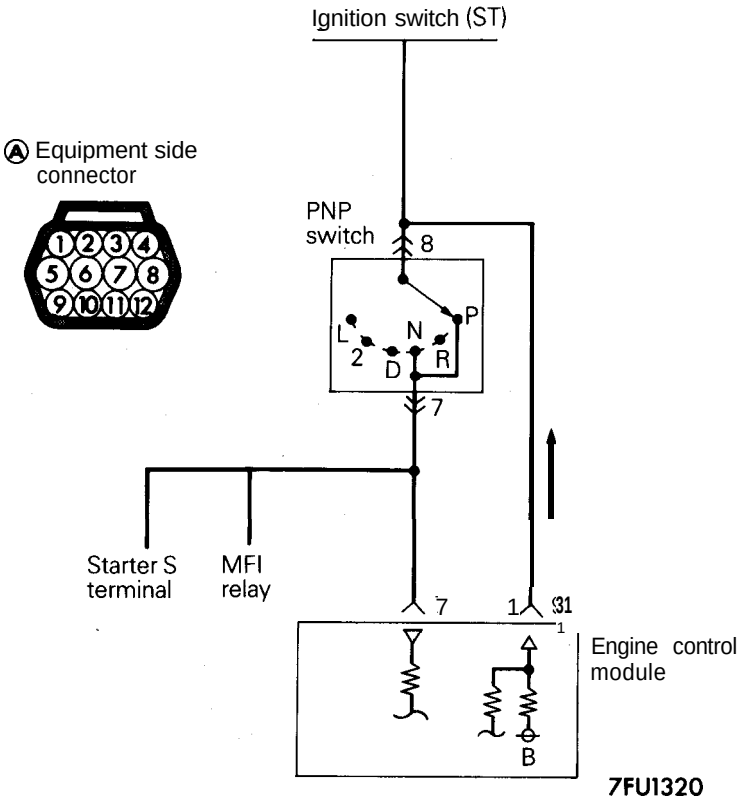
Refer to P.14A-109.

HARNESS INSPECTION

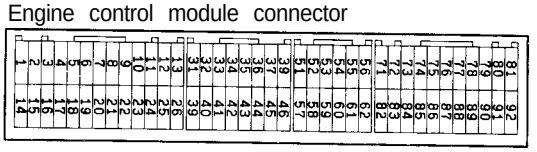
1	 6FU1258	Measure the input voltage to the engine control module. • Engine control module connector: Disconnected • Ignition switch: START Voltage (V): 8 or more	OK → 2 NO → Repair the harness. (71 – Ignition switch)
2	 6FU1259	Check for continuity of the ground circuit. • Engine control module connector: Disconnected	OK → STOP NO → Repair the harness. (91 – Ground)

IGNITION SWITCH-ST AND PARK/NEUTRAL POSITION SWITCH (PNP SWITCH) <A/T>





Engine control module connector



9FU0393

OPERATION

Refer to P.14A-110.

TROUBLESHOOTING HINTS

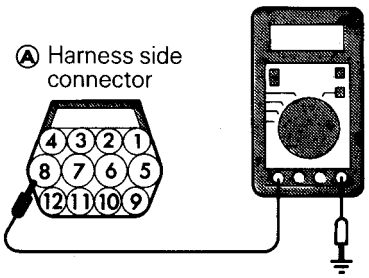
Refer to P.14A-110.

INSPECTION

Refer to P.14A-111.

HARNESS INSPECTION

1



9FU0268

Measure the power supply voltage.

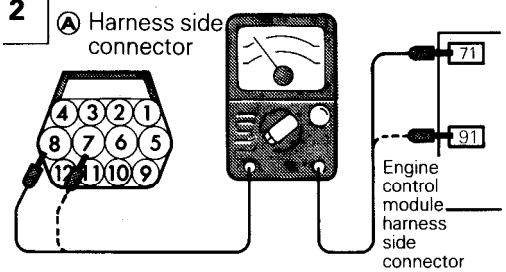
- Engine control module connector: Disconnected
- PNP switch connector: Disconnected
- Ignition switch: START

Voltage (V)
B+

OK → 2

NG → Check the power supply circuit.

2



9FU0269

Check for continuity between the PNP switch and engine control module.

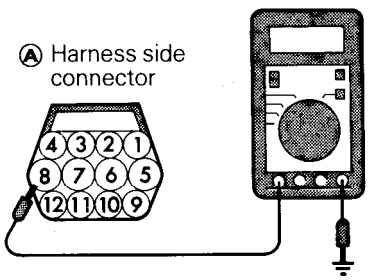
- Engine control module connector: Disconnected
- PNP switch connector: Disconnected

NOTE
Insert the probes of the circuit tester into both ends of the harness.

OK → 3

NG → Repair the harness. (Ⓐ 8 – 91) (Ⓐ 7 – 71)

3



9FU0268

Measure the impressed voltage to the PNP switch.

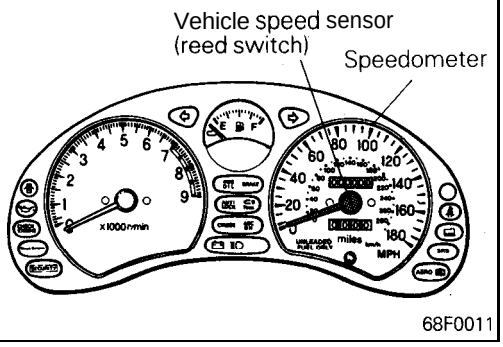
- Engine control module connector: Connected
- PNP switch connector: Disconnected
- Ignition switch: ON

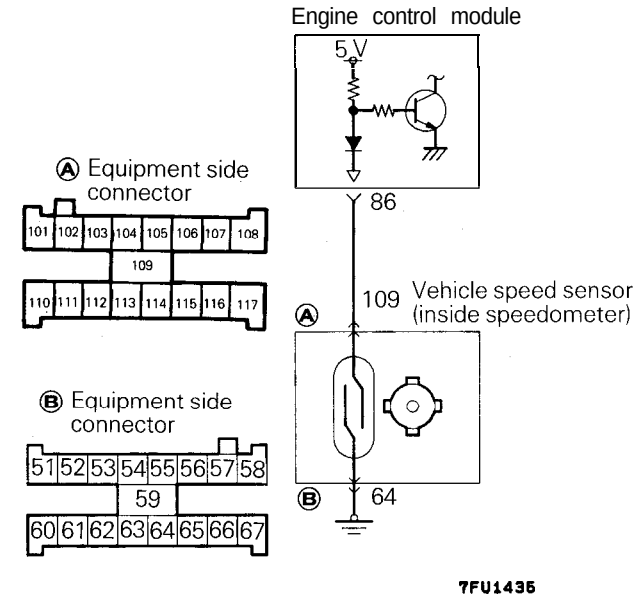
Voltage (V)
B+

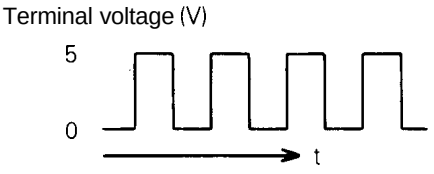
OK → STOP

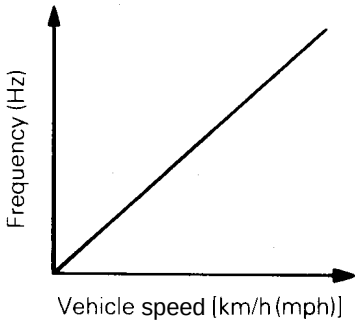
NG → Replace the engine control module.

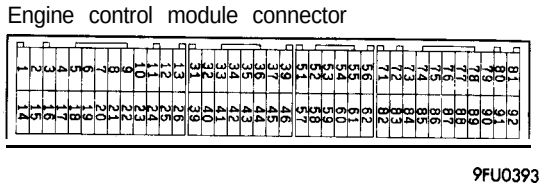
VEHICLE SPEED SENSOR <Non Turbo>











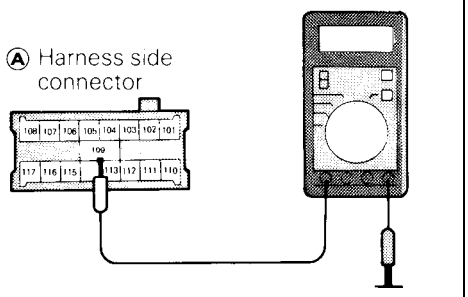
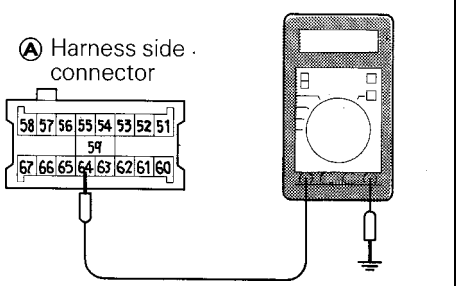
OPERATION

Refer to P.14A-112.

TROUBLESHOOTING HINTS

Refer to P.14A-112.

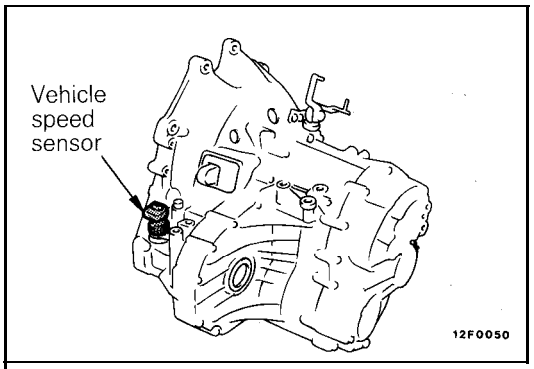
HARNESS INSPECTION

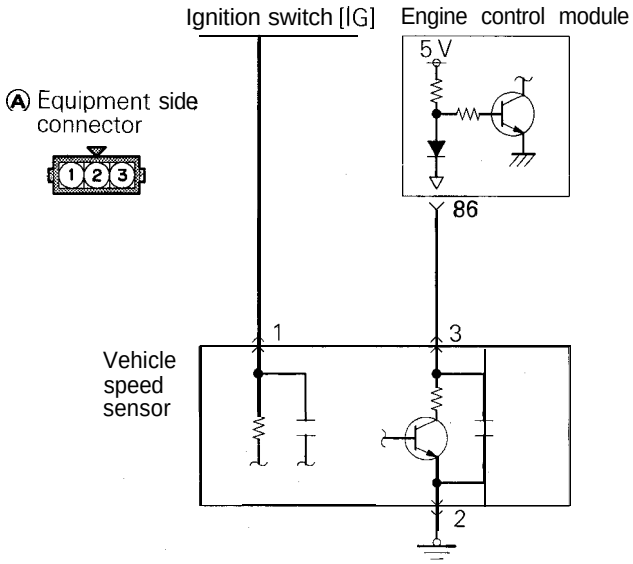
2  6FU1265	Measure the power supply voltage of the vehicle speed sensor. • Connector: Disconnected • Ignition switch: ON OK → Voltage (V): 4.5 – 4.9 NG →	OK → 3 NG → Repair the harness. (Ⓐ109 – 86)
3  7FU1438	Check for continuity of the ground circuit. • Connector: Disconnec OK → STOP NG →	—— NG → Repair the harness. (Ⓑ64 – Ground)

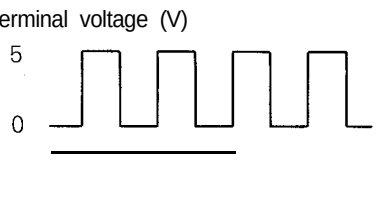
SENSOR INSPECTION

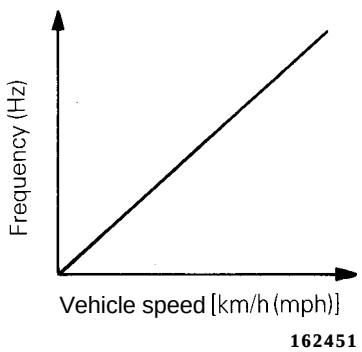
Refer to GROUP 8 – Meters and Gauges.

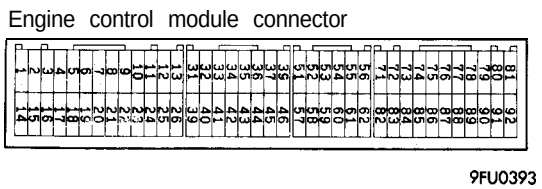
VEHICLE SPEED SENSOR <Turbo>











OPERATION

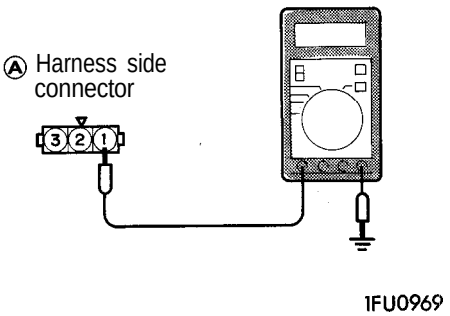
- The vehicle speed sensor is directly attached to the speedometer driven gear in the transmission. It detects the vehicle speed and sends it to the engine control module after converting to pulse signals, based on which the engine control module controls the idle speed control motor.
- The output terminal of the vehicle speed sensor has a voltage of approx. 5 V applied from the control module. The vehicle speed sensor generates pulse signals by turning on and off the power transistor.

TROUBLESHOOTING HINTS

Refer to P.14A-112.

HARNESS INSPECTION

1



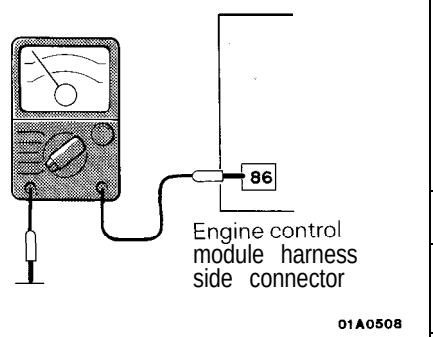
Measure line voltage applied to vehicle speed sensor.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
B+

OK → 2

NG → Repair the harness. (Ⓐ1 – Ignition switch)

2



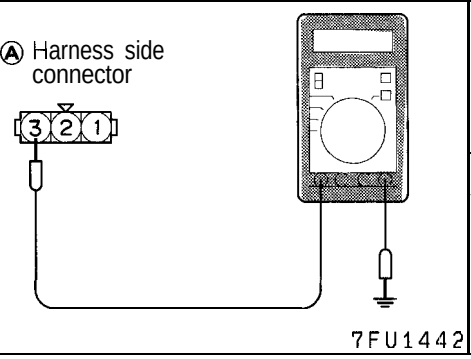
Check the vehicle speed sensor output circuit for continuity.
- Engine control module connector: Disconnected
- Ignition switch: ON
- Move the vehicle

Continuity
Continuity ..... / No continuity ..... One rotation

OK → STOP

NG → 3

3



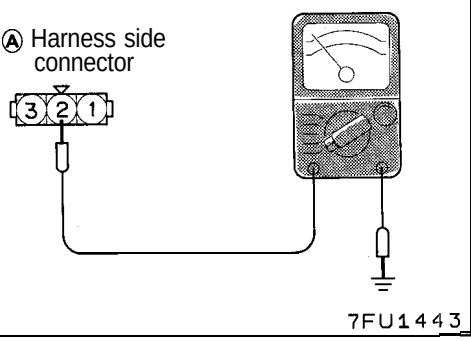
Measure the power supply voltage of the vehicle speed sensor.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
4.5 – 4.9

OK → 4

NG → Repair the harness. (Ⓐ3 – 86)

4



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

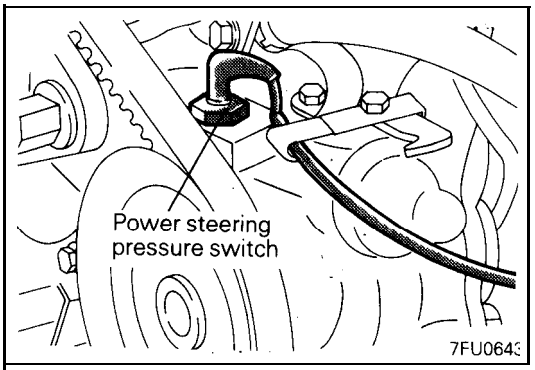
OK → STOP

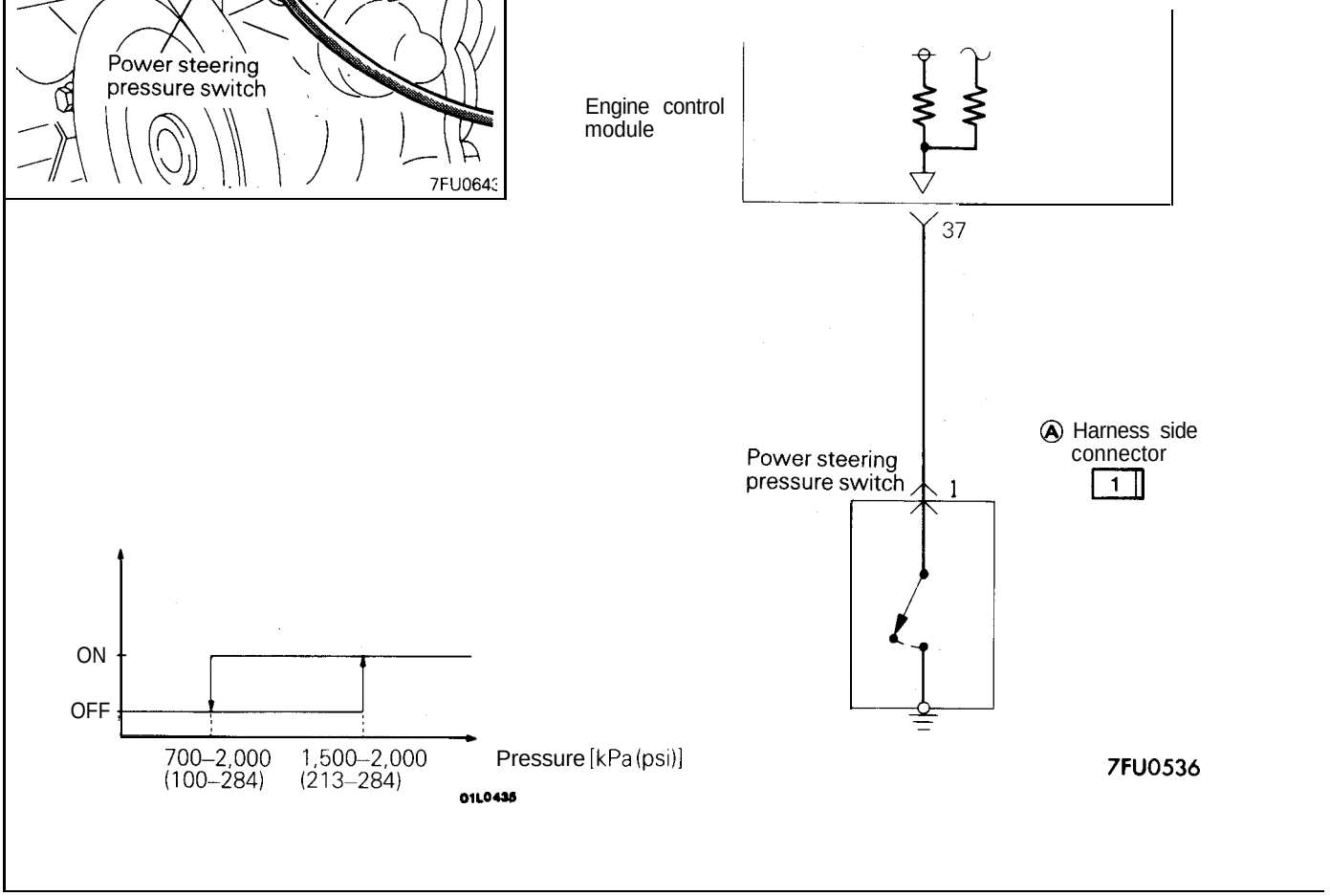
NG → Repair the harness. (Ⓐ2 – Ground)

SENSOR INSPECTION

Refer to GROUP 8 – Meters and gauges

POWER STEERING PRESSURE SWITCH





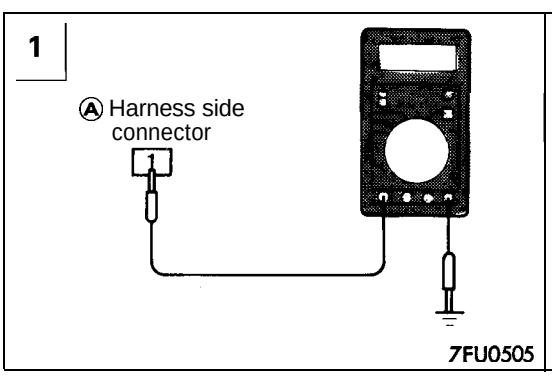
OPERATION

Refer to P.14A-114.

INSPECTION

Refer to P.14A-115

HARNESS INSPECTION



Measure the power supply voltage.

- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
B+

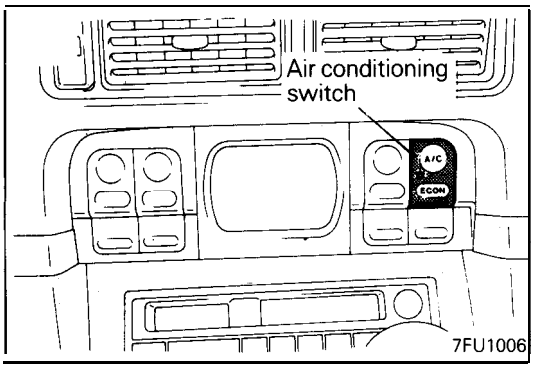
OK → STOP

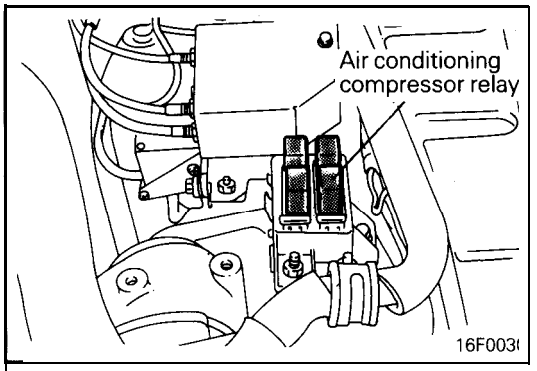
OK → Repair the harness. (Ⓐ1 – 37)

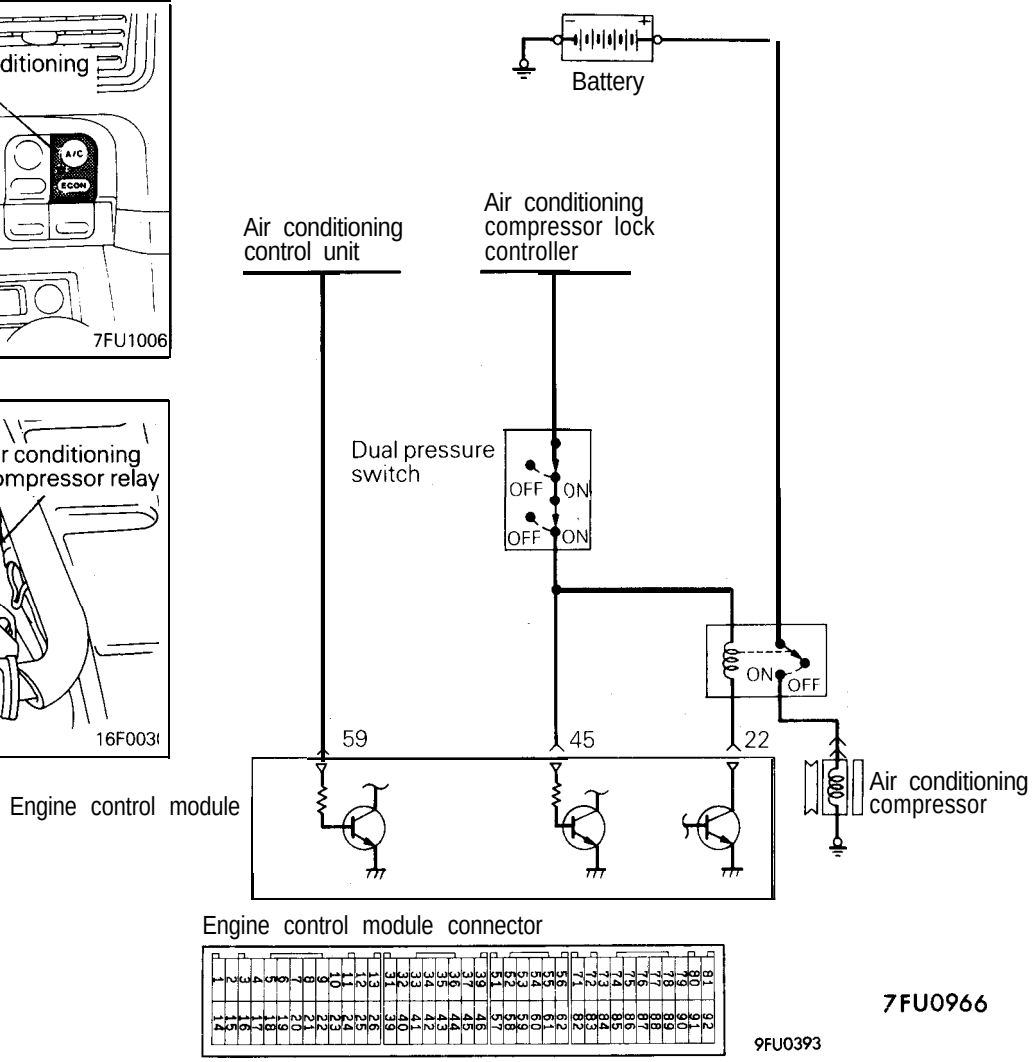
SENSOR INSPECTION

Refer to GROUP 19 – Service Adjustment Procedures.

AIR CONDITIONING SWITCH AND COMPRESSER CLUTCH RELAY







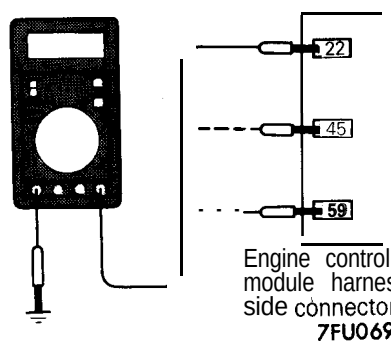
OPERATION
Refer to P.14A-116.

TROUBLESHOOTING HINTS
Refer to P.14A-116.

INSPECTION
Refer to P.14A-1 16.

HARNESS INSPECTION

1



Measure the power supply voltage of the air conditioning circuit.
- Air conditioning switch: ON
- Engine control module connector: Disconnected
- Ignition switch: ON
- Dual air conditioning switch: ☒

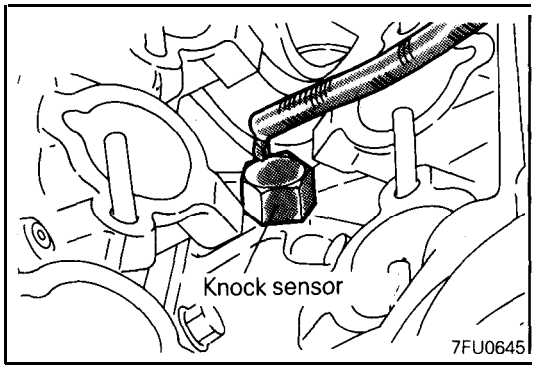
Voltage (V)
B+

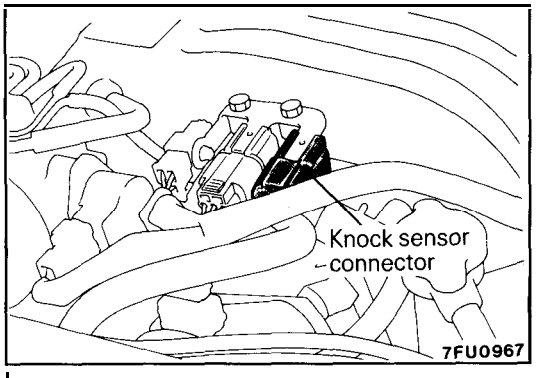
OK → STOP

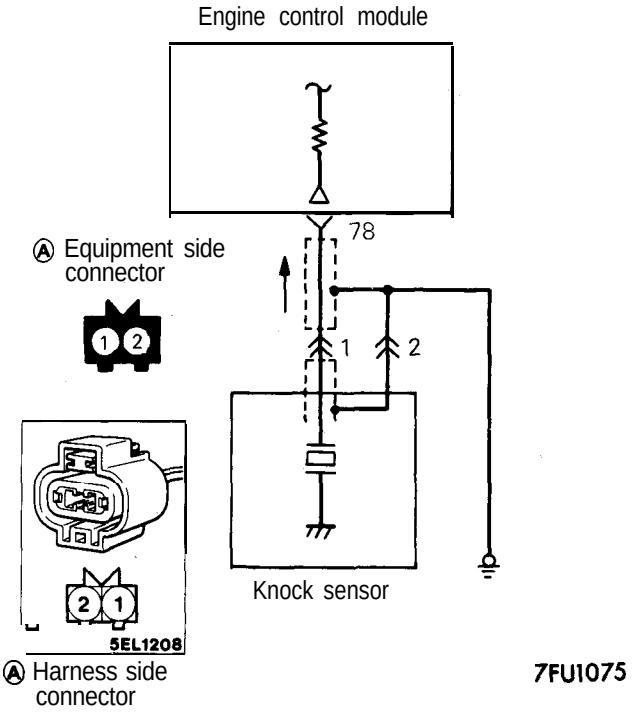
NG → Check the air conditioning circuit.

AIR CONDITIONING INSPECTION
Refer to GROUP 24 – Service Adjustment Procedures

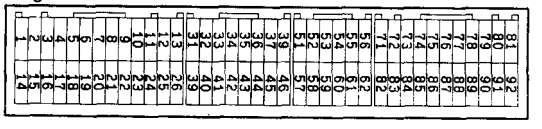
KNOCK SENSOR







Engine control module connector



9FU0393

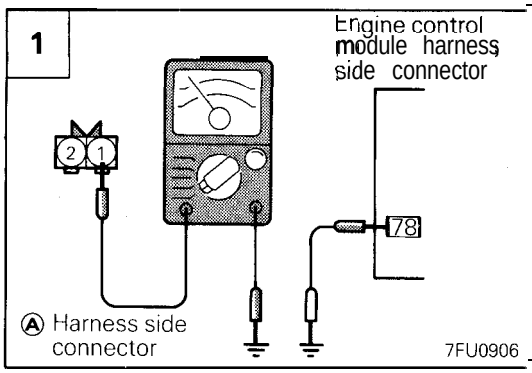
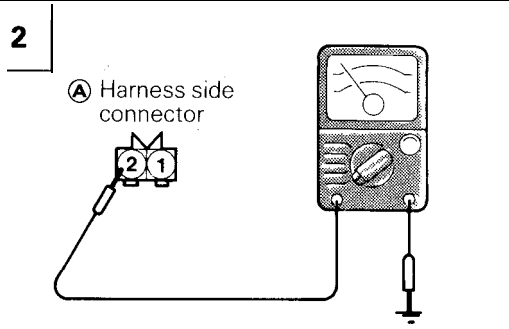
OPERATION

Refer to P.14A-118.

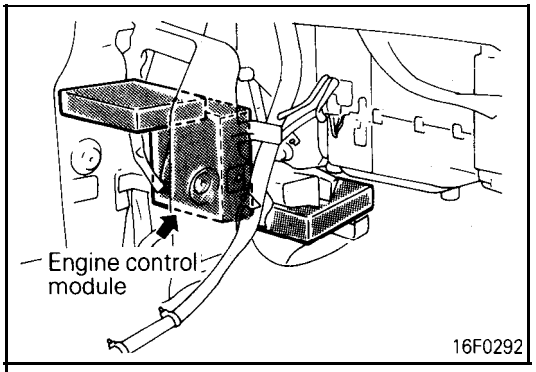
TROUBLESHOOTING HINTS

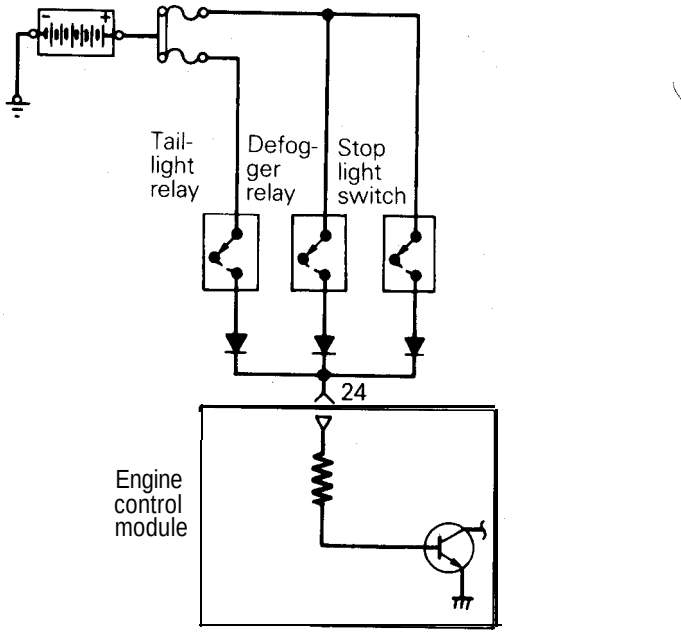
Refer to P.14A-118.

HARNESS INSPECTION

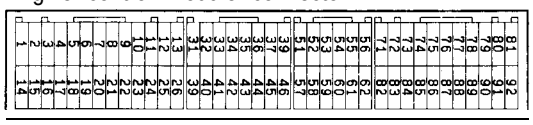
1 	Check for an open-circuit or a short-circuit to ground, between the engine control module and knock sensor. • Knock sensor connector: Disconnected • Engine control module connector: Disconnected	OK →	2
		NG →	Repair the harness. (Ⓐ1 – 78)
2 	Check for continuity of the ground circuit. • Connector: Disconnected	OK →	STOP
		NG →	Repair the harness. (Ⓐ2 – Ground)

ELECTRICAL LOAD SWITCH





Engine control module connector



OPERATION

Refer to P.14A-120.

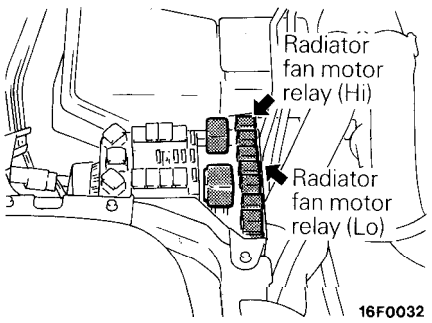
INSPECTION

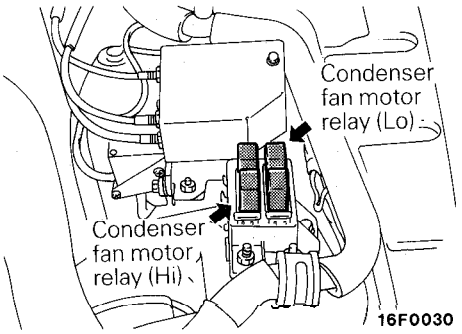
Refer to P.14A-120.

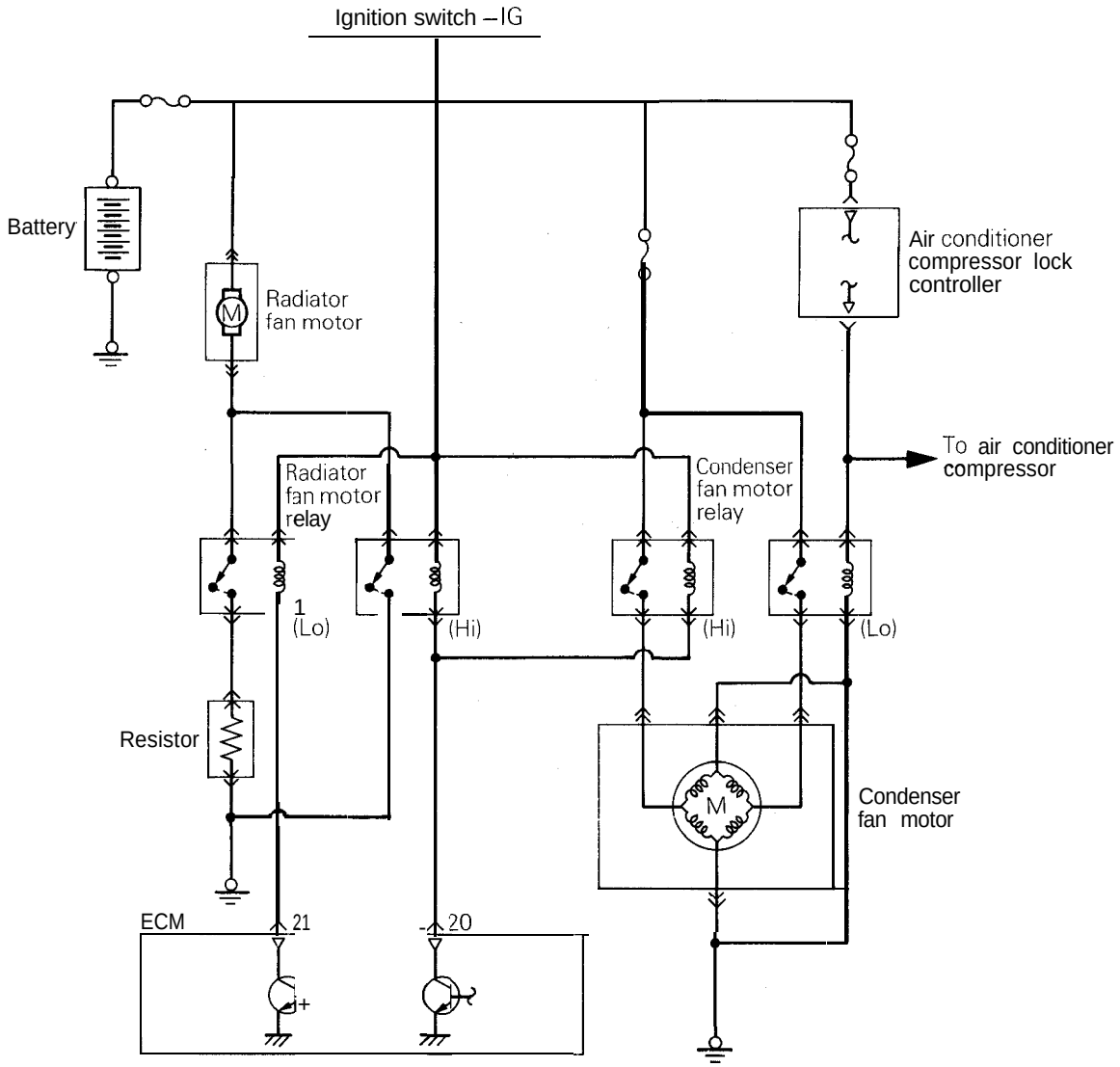
HARNESS INSPECTION

Refer to P.14A-121.

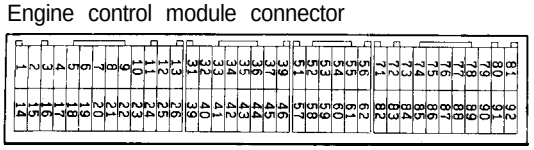
FAN MOTOR RELAY (RADIATOR, AIR CONDITIONER CONDENSER)







Engine control module connector



9FU0393

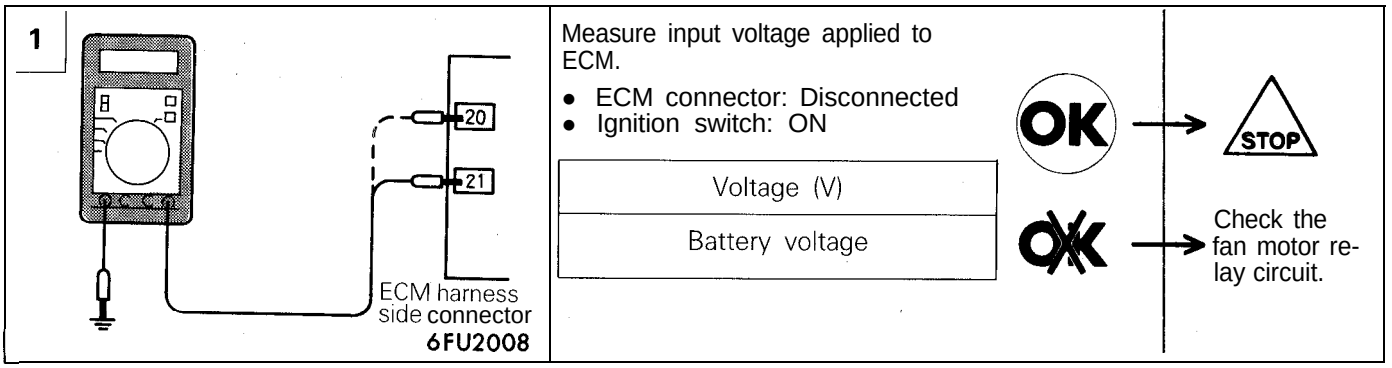
OPERATION

Refer to P.14A-123.

INSPECTION

Refer to P.14A-123.

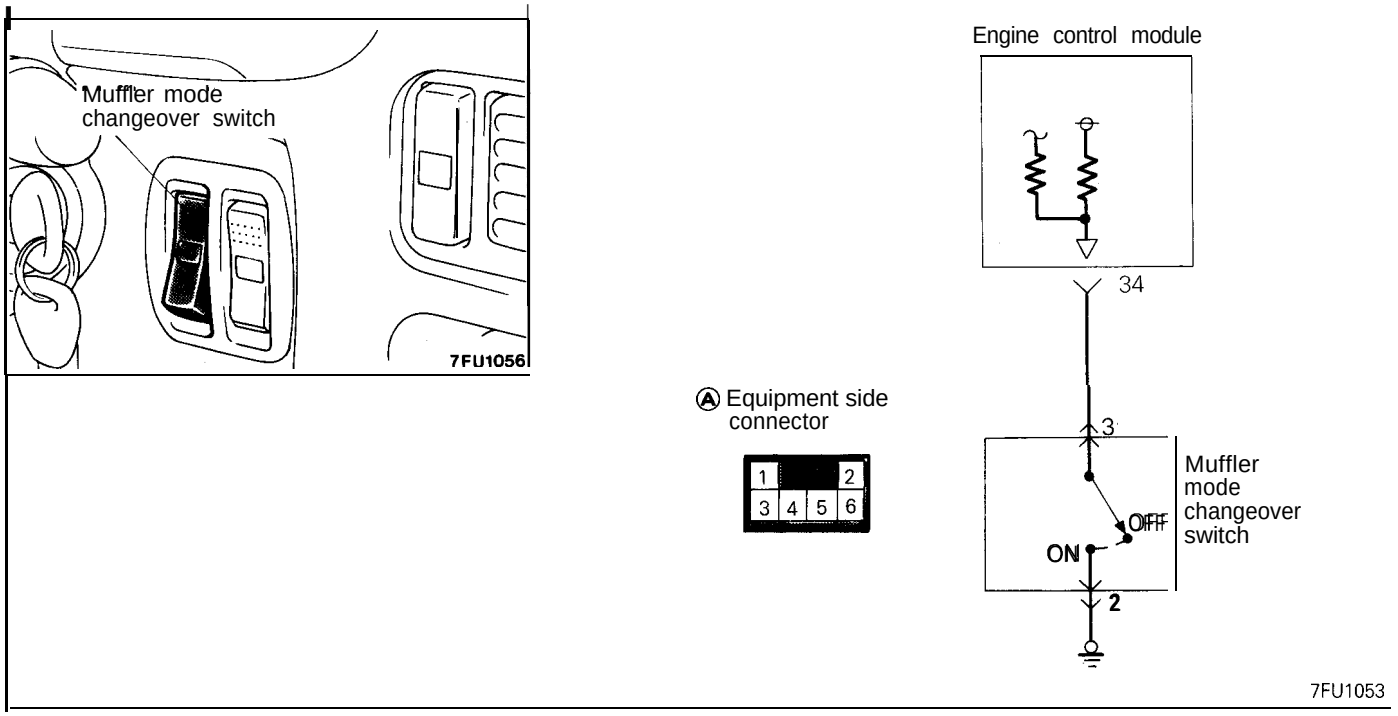
HARNESS INSPECTION



FAN MOTOR RELAY INSPECTION

Refer to Radiator Check in GROUP 7 and Power Relay Check in GROUP 24.

MUFFLER MODE CHANGEOVER SWITCH <Turbo>



OPERATION

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

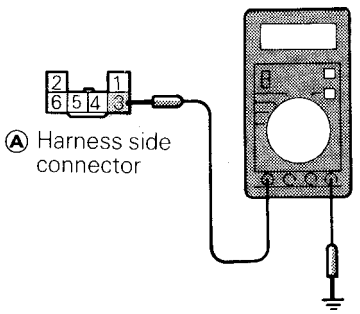
INSPECTION

Using Scan Tool

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

HARNESS INSPECTION

1



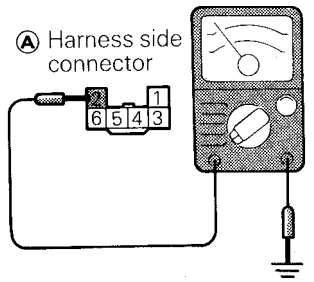
Measure the power supply voltage.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
B+

OK → 2

NG → Repair the harness. (Ⓐ3 -)

2

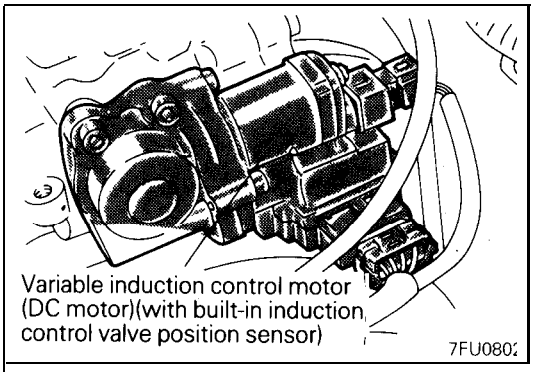


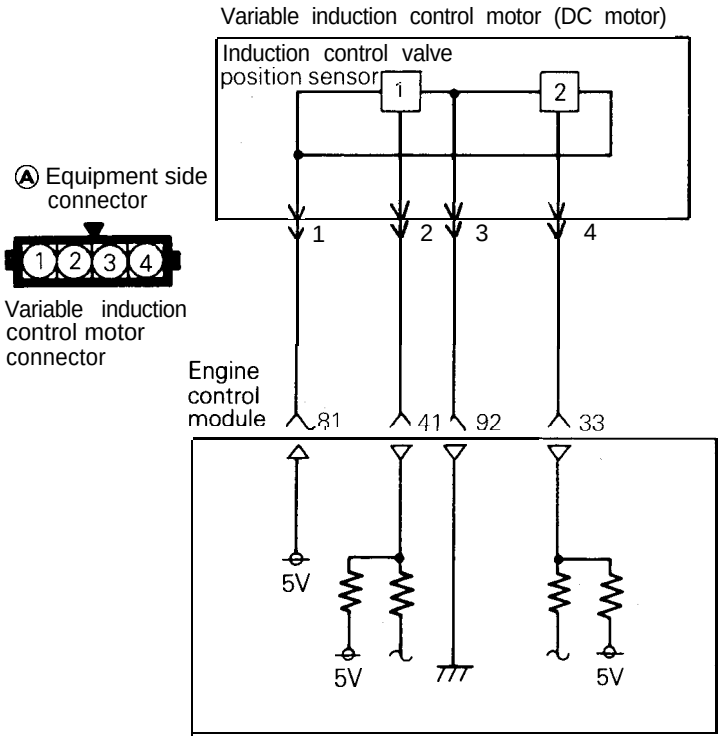
Check for continuity of the ground circuit.
- Connector: Disconnected

OK → STOP

NG → Repair the harness. (Ⓐ2 – Ground)

INDUCTION CONTROL VALVE POSITION SENSOR <Non Turbo>



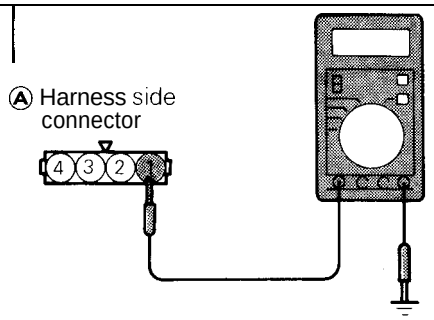


OPERATION

Refer to P.14A-124.

HARNESS INSPECTION

1



6FU1241

Measure the power supply voltage of the air intake control valve position sensor.

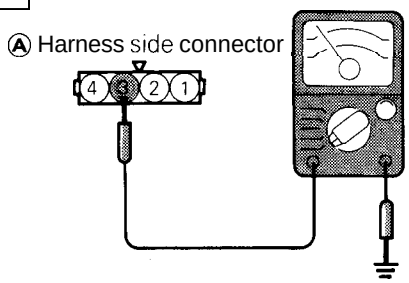
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
4.8 – 5.2

OK → 2

NG → Repair the harness. (Ⓐ1 – 81)

2



7FU0824

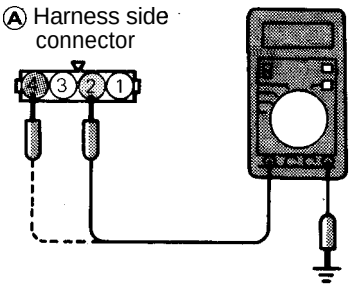
Check for continuity of the ground circuit.

- Connector: Disconnected

OK → 3

NG → Repair the harness. (Ⓐ3 –)

3



7FU0825

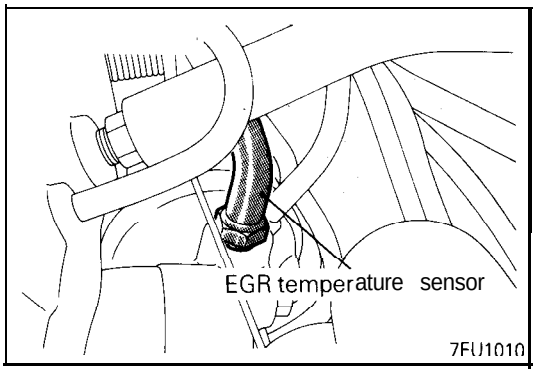
Measure the terminal voltage.

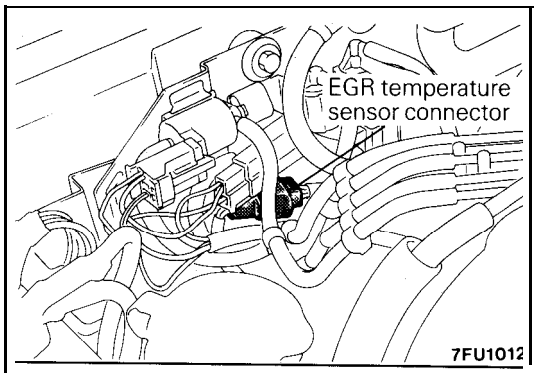
- Connector: Disconnected
- Ignition switch: ON

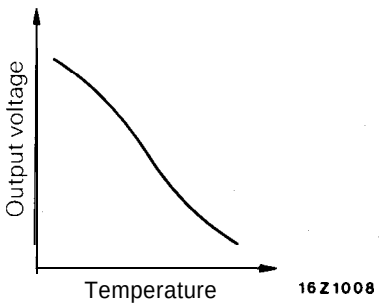
OK → STOP

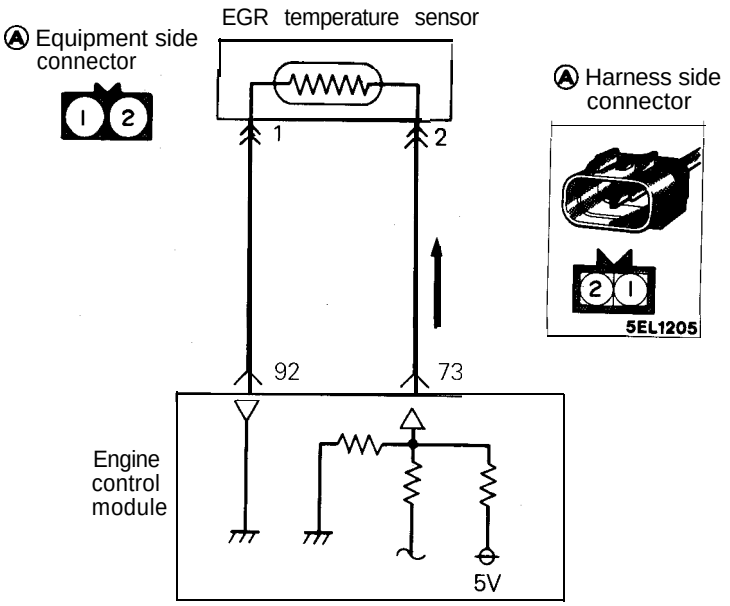
NG → Repair the harness. (Ⓐ2 – 41) (Ⓐ4 – 33)

EGR TEMPERATURE SENSOR









OPERATION

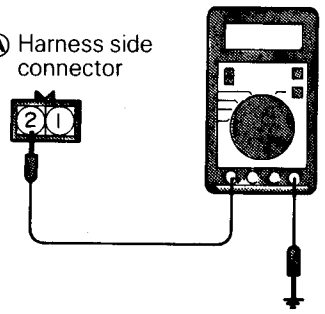
Refer to P.14A-126.

INSPECTION

Refer to P.14A-127.

HARNESS INSPECTION

1



7FU1259

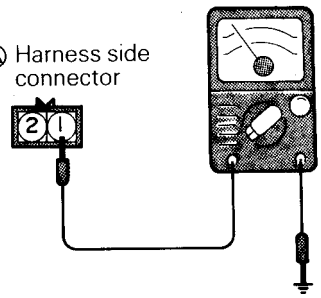
Measure the power supply voltage.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
4.3 – 4.7

OK → 2

NG → Repair the harness. (Ⓐ 2 – 92)

2



7FU1257

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

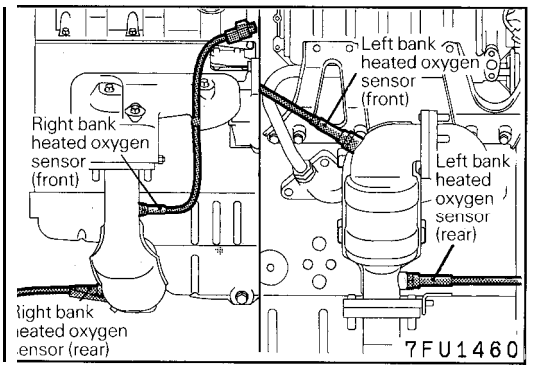
OK → STOP

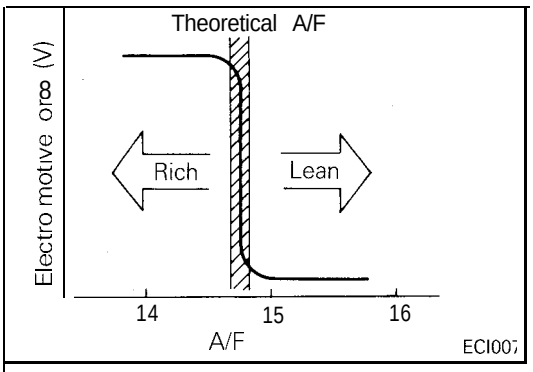
NG → Repair the harness. (Ⓐ 1 – 73)

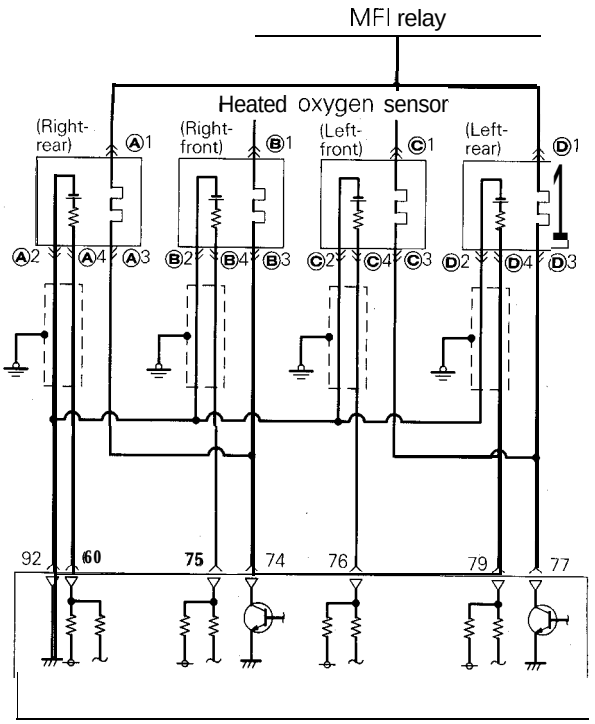
SENSOR INSPECTION

Refer to GROUP 25 – Exhaust Gas Recirculation (EGR) System.

HEATED OXYGEN SENSOR <California – Non Turbo>

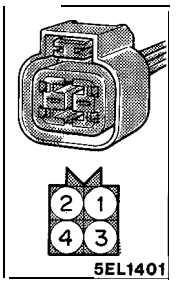






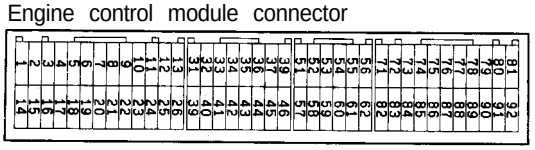
ⒶⒷⒸⒹ Equipment side 'connector

Harness side connector



7FU1431

Engine control module connector



9FU0393

OPERATION

Refer to P.14A-128.

TROUBLESHOOTING

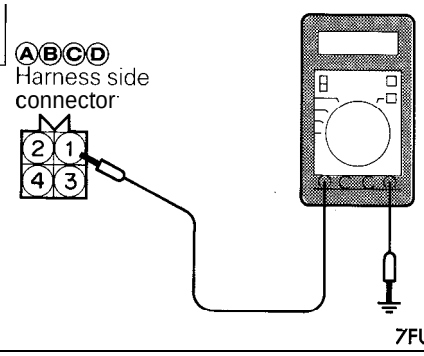
Refer to P.14A-129.

INSPECTION

Refer to P.14A-129.

HARNESS INSPECTION

1



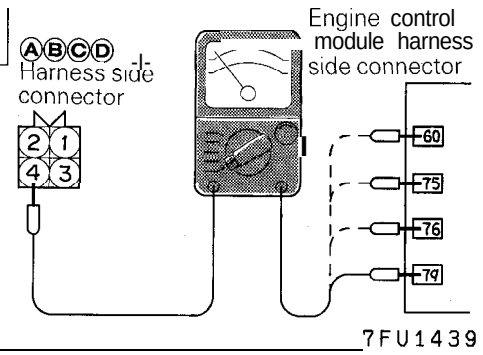
Measure the power supply voltage of the heated oxygen sensor.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
B+

OK → 2

OK → Repair the harness. (A-1, B-1, C-1, D-1 – MFI relay)

2

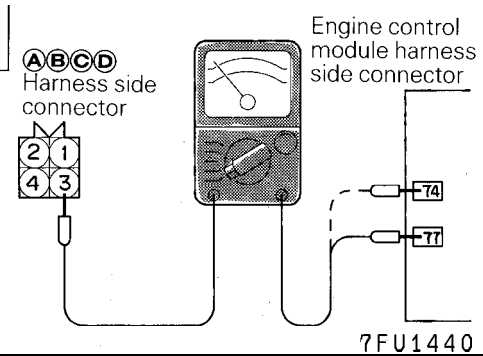


Check for an open-circuit, or a short-circuit to ground, between the engine control module and the heated oxygen sensor.
- Heated oxygen sensor connector: Disconnected
- Engine control module connector: Disconnected

OK → 3

OK → Repair the harness. (A-4, B-4, C-4 – 76, D-4 – 79)

3

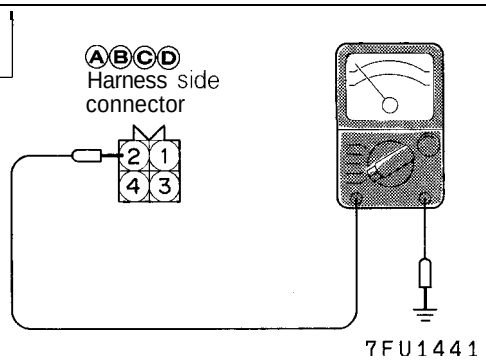


Check for an open-circuit, or a short-circuit to ground, between the engine control module and the heated oxygen sensor.
- Heated oxygen sensor connector: Disconnected
- Engine control module connector: Disconnected

OK → 4

OK → Repair the harness. (A-3, B-3 – 74, C-3, D-3 – 77)

4



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

OK → STOP

OK → Repair the harness. (A-2, B-2, C-2, D-2 – 92)

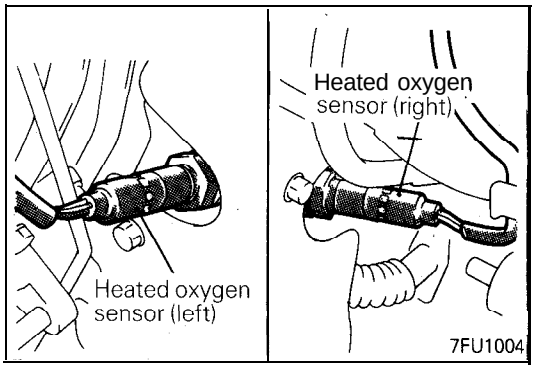
SENSOR INSPECTION

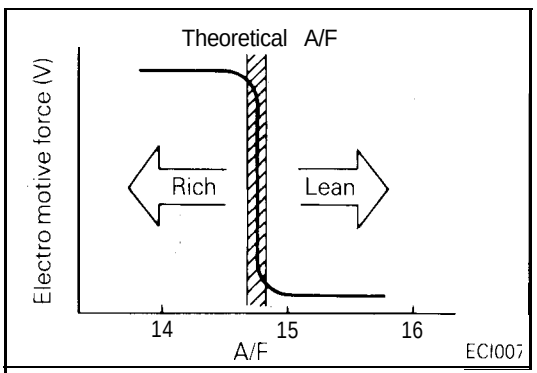
Refer to P.14A-135.

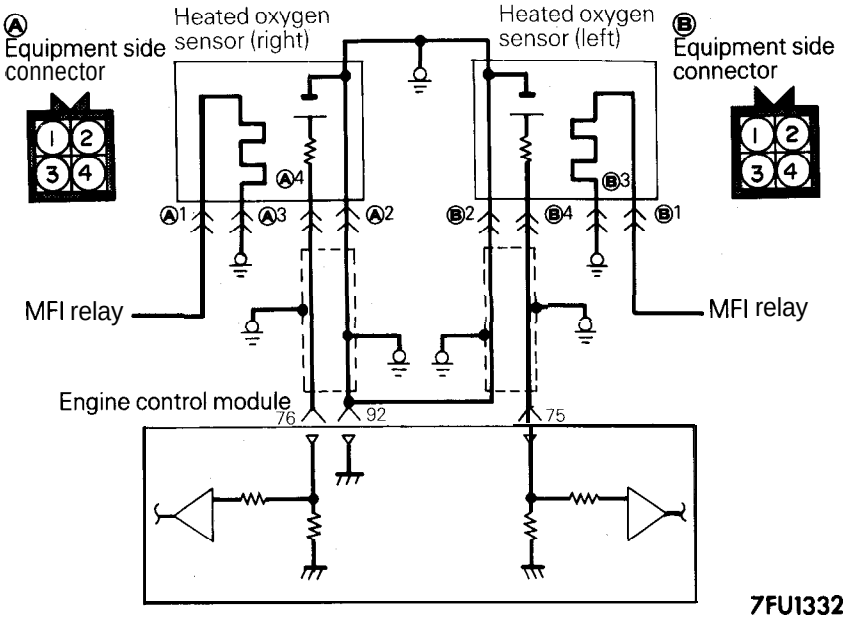
INSTALLATION

Refer to P. 14A-135.

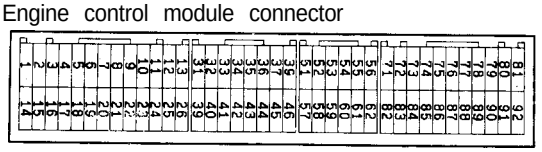
HEATED OXYGEN SENSOR <Turbo except for California>







Engine control module connector

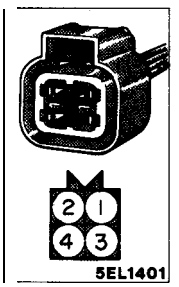


9FU0393

Ⓐ Harness side connector

5EL1401

Ⓑ Harness side connector



5EL1401

OPERATION

Refer to P.14A-128.

TROUBLESHOOTING

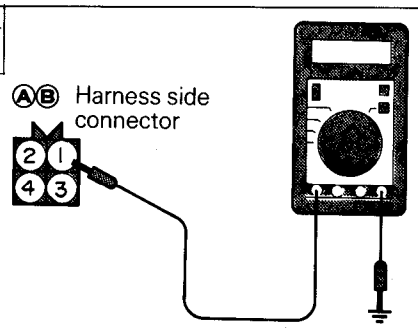
Refer to P.14A-129.

INSPECTION

Refer to P.14A-129.

HARNESS INSPECTION

1



7FU1333

Measure the power supply voltage of the heated oxygen sensor.

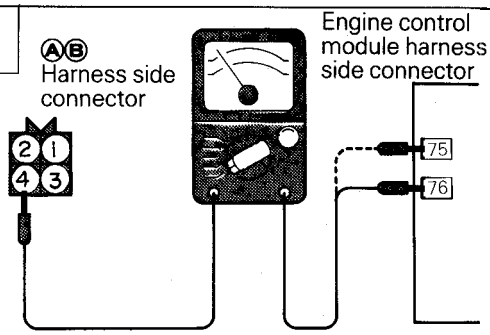
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
B+

OK → 2

NO → Repair the harness. (A1, B1 – MFI relay)

2



7FU1334

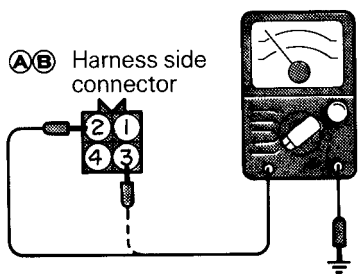
Check for an open-circuit, or a short-circuit to ground, between the engine control module and the heated oxygen sensor.

- Heated oxygen sensor connector: Disconnected
- Engine control module connector: Disconnected

OK → 3

NO → Repair the harness. (A4 – 75, B4 – 75)

3



6AF0079

Check for continuity of the ground circuit.

- Connector: Disconnected

OK → STOP

NO → Repair the harness. (A2, B2 – 92) (A3, B3 – Ground)

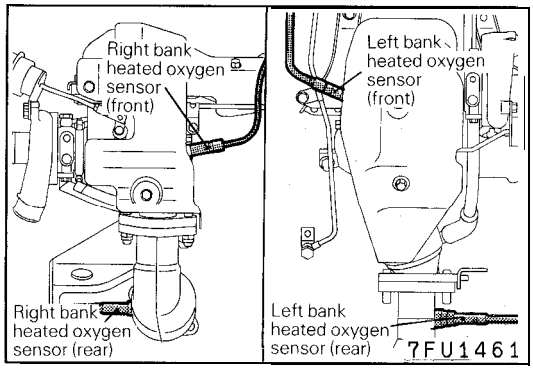
SENSOR INSPECTION

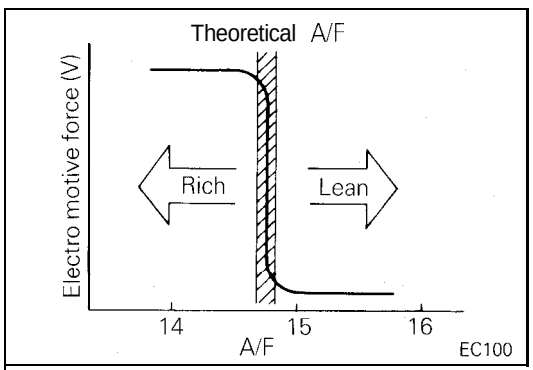
Refer to P.14A-135.

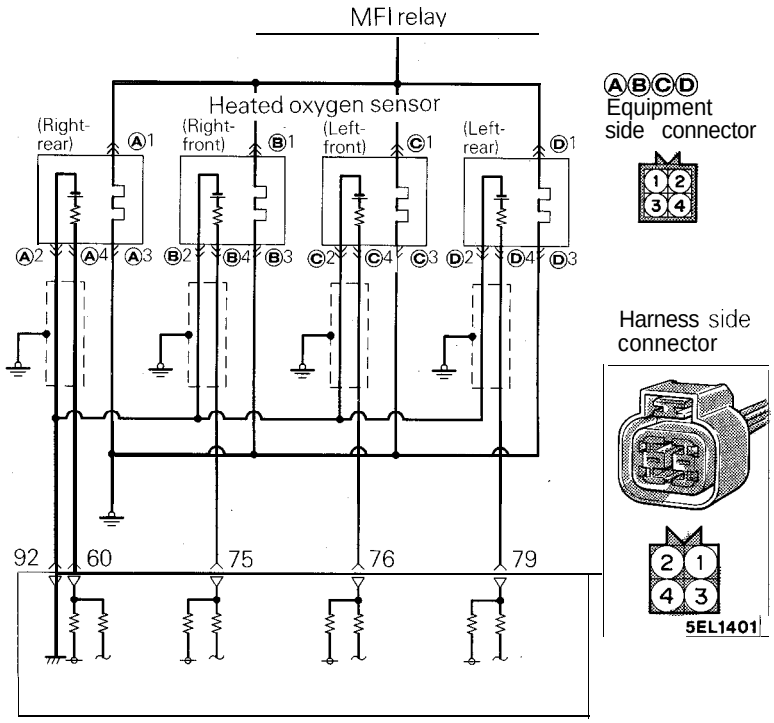
INSTALLATION

Refer to P.14A-135.

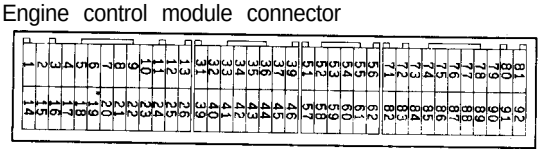
HEATED OXYGEN SENSOR <California – Turbo>







Engine control module connector



9FU0393

OPERATION

Refer to P.14A-128.

TROUBLESHOOTING

Refer to P.14A-129.

INSPECTION

Using Scan Tool

<Heated Oxygen Sensor (front)>

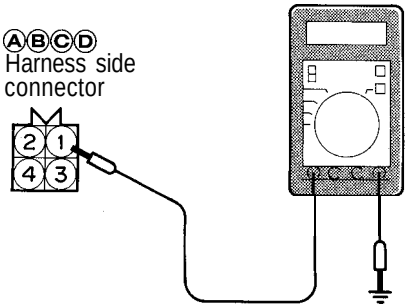
Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	11 39	Sensor detection voltage	Engine: Warm-up (Make the mixture lean by engine speed reduction, and rich by racing)	When sudden deceleration from 4,000 rpm	200 mV or lower
				When engine is suddenly raced	600 – 1,000 mV
			Engine: Warm-up (Using the heated oxygen sensor signal, check the air/fuel mixture ratio, and also check the condition of control by the engine control module)	700 rpm (Idling)	400 mV or lower ↕ (changes) 600 – 1,000 mV
				2,000 rpm	

<Heated Oxygen Sensor (rear)>

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	59 69	Sensor voltage	• Transaxle: 2nd gear • Drive with wide open throttle	3,500 rpm	600 – 1,000 mV

HARNESS INSPECTION

1



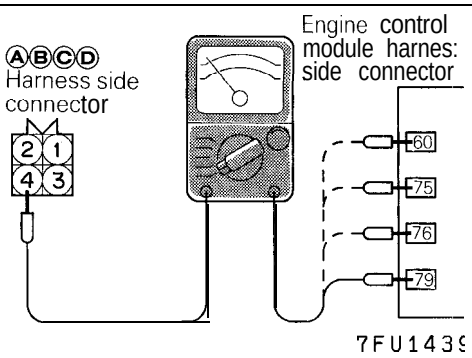
Measure the power supply voltage of the heated oxygen sensor.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
B+

OK → 2

NG → Repair the harness. (A-1, B-1, C-1, D-1 – MFI relay)

2

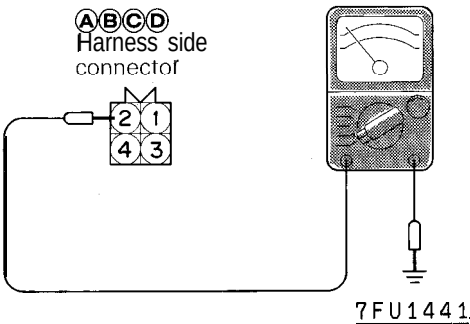


Check for an open-circuit, or a short-circuit to ground, between the engine control module and the heated oxygen sensor.
- Heated oxygen sensor connector: Disconnected
- Engine control module connector: Disconnected

OK → 3

NG → Repair the harness. (A-4 – 60, B-4 – 75, C-4 – , D-4 – 79)

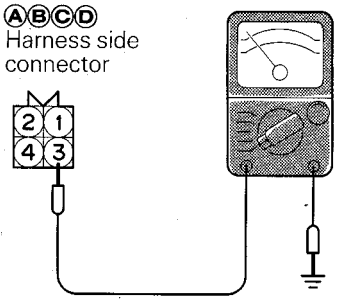
3



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

OK → 4

NG → Repair the harness. (A-2, B-2, C-2, D-2 – 92)

4	ⒶⒷⒸⒹ Harness side connector  7FU1508	Check for continuity of the ground circuit. • Connector: Disconnected	OK → NG → Repair the harness. (Ⓐ3, Ⓑ3, Ⓒ3, Ⓓ3 – Ground)

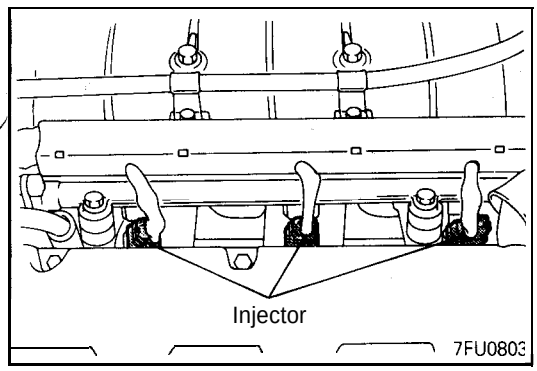
SENSOR INSPECTION

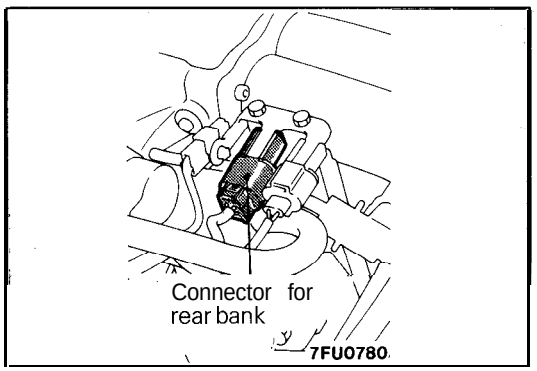
Refer to P.14A-135.

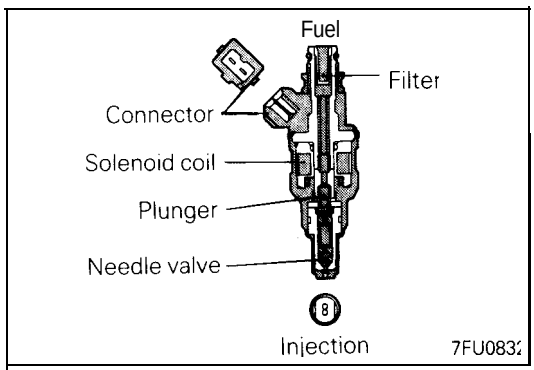
INSTALLATION

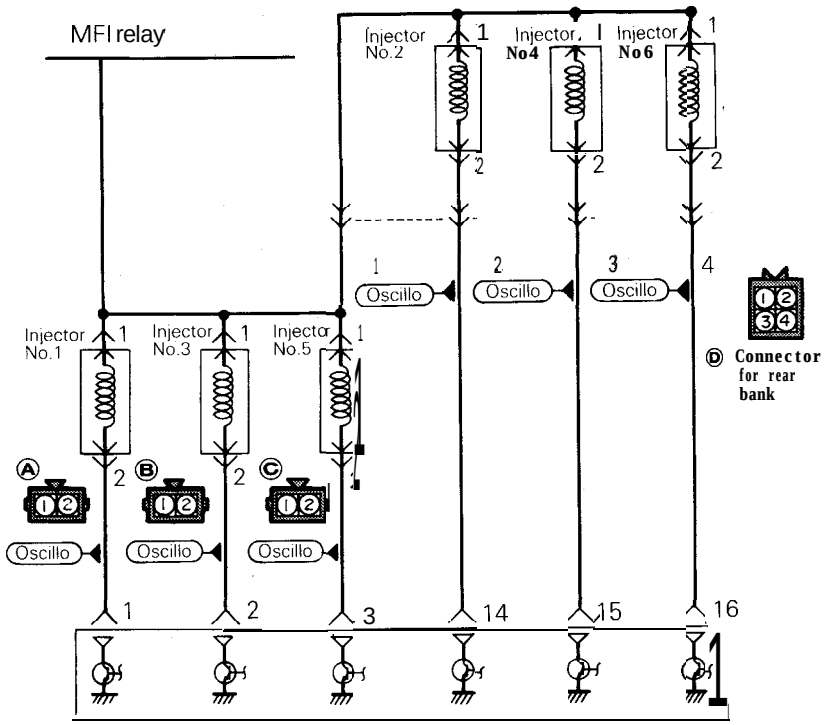
Refer to P.14A-135.

INJECTORS <Non Turbo>

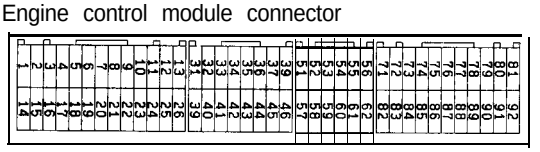








Engine control module connector



OPERATION

Refer to P.14A-136.

TROUBLESHOOTING HINTS

Refer to P.14A-137.

INSPECTION

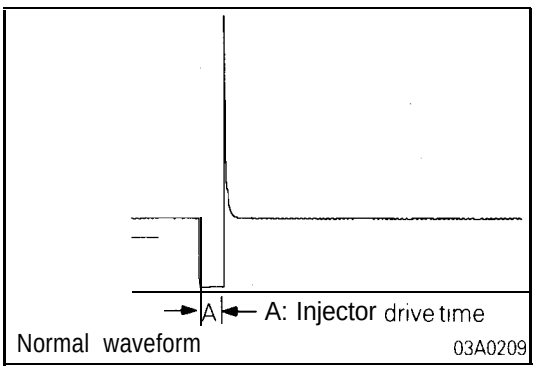
Using Scan Tool

Function	Item No.	Data display	Check condition	Coolant temperature	Standard value
Data reading	41	Drive time*1	Engine: Cranking	0°C (32°F)*2	13.8 – 16.8 ms
				20°C (68°F)	40 – 48.8 ms
				80°C (176°F)	8.6 – 10.6 ms

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	41	Drive time*3	• Engine coolant temperature: 80 to 95°C (176 to 205°F) • Lights, electric cooling fan, accessory units: All OFF • Transaxle: Neutral (P range for vehicle with A/T) • Steering wheel: Neutral	700 rpm (Idle)	2.3 – 3.5 ms
				2,000 rpm	2.0 – 3.2 ms
				When sharp racing is made	To increase

NOTE
*1: The injector drive time refers to when the supply voltage is 11 V and the cranking speed is less than 250 rpm.
"2: When coolant temperature is lower than 0°C (32°F). injection is made by 6 cylinders simultaneously.
"3: When the vehicle is new [within initial operation of about 500 km (300 miles)], the injector drive time may be about 10% longer.

Function	Item No.	Drive content	Check condition	Normal state
Actuator test	01	No. 1 injector shut off	Engine: Idling after warm-up (Shut off the injectors in sequence during idling after engine warm-up, check the idling condition)	dle state to change further (becoming less stable or stalling)
	02	No. 2 injector shut off		
	03	No. 3 injector shut off		
	04	No. 4 injector shut off		
	05	No. 5 injector shut off		
	06	No. 6 injector shut off		



Normal waveform 03A0209

Using Oscilloscope

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

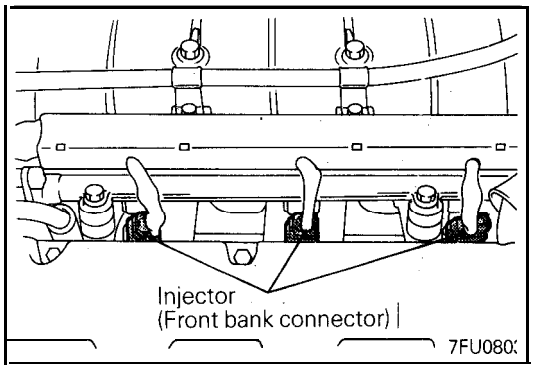
HARNESS INSPECTION

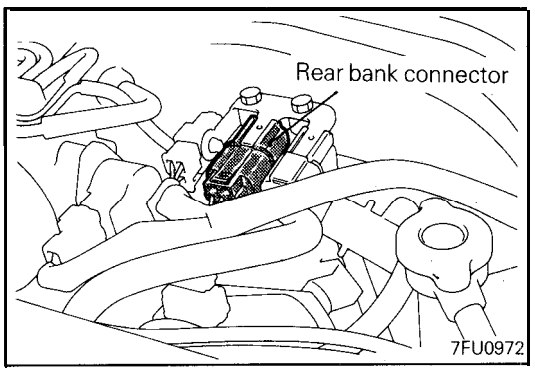
Refer to P.14A-138.

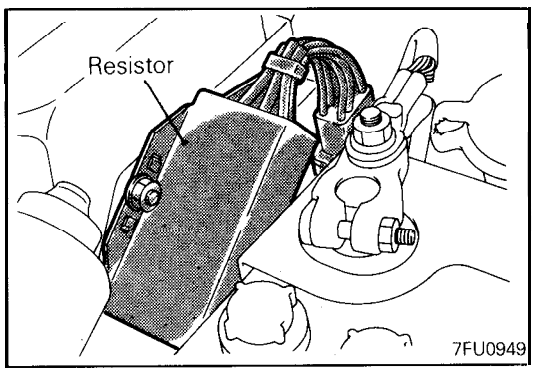
ACTUATOR INSPECTION

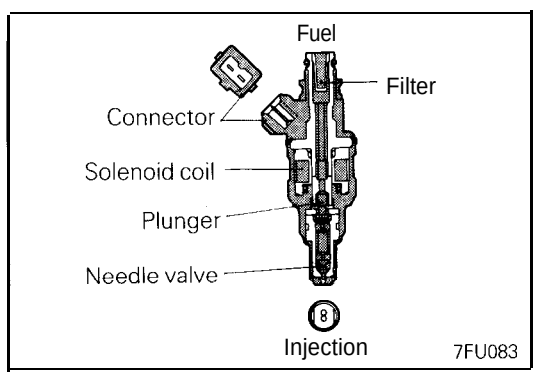
Refer to P.14A-139.

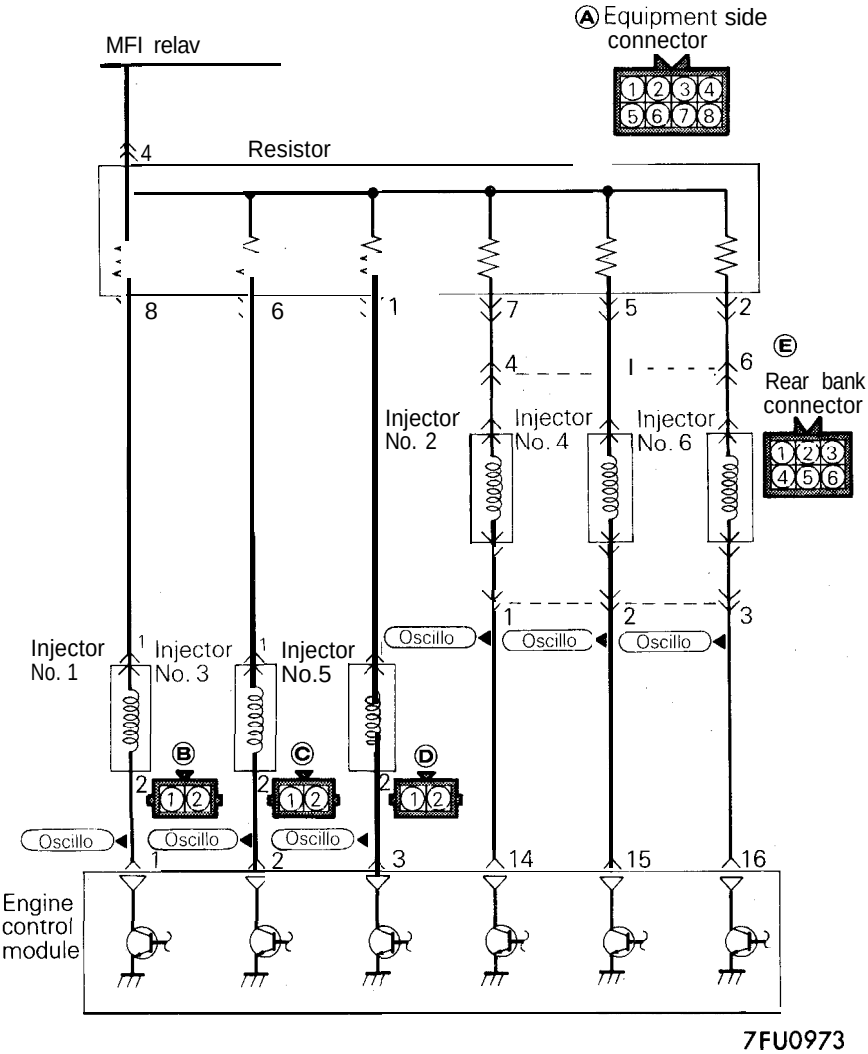
INJECTORS <Turbo>



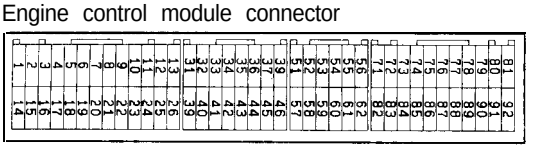








Engine control module connector



9FU0393

OPERATION

Refer to P.14A-136.

TROUBLESHOOTING HINTS

Refer to P.14A-137.

INSPECTION

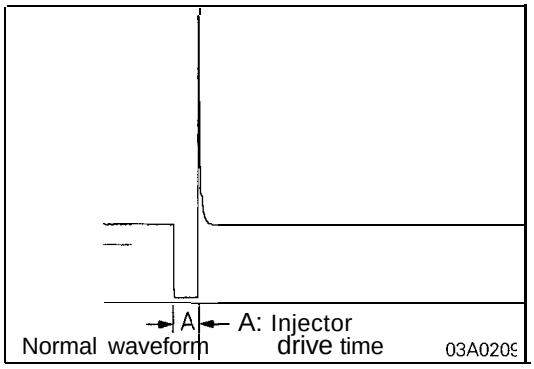
Using Scan Tool

Function	Item No.	Data display	Check condition	Coolant temperature	Standard value
Data reading	41 (Rear bank) 47 (Front bank)	Drive time*1	Engine: Cranking	0°C (32°F)*2	8.8 – 10.8 ms
				20°C (68°F)	25.6-31.2 ms
				80°C (176°F)	5.5 – 6.7 ms

Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	41 (Rear bank) 47 (Front bank)	Drive time*3	• Engine coolant temperature: 80 to 95°C (176 to 205°F) • Lamps, electric cooling fan, accessory units: All OFF • Transaxle: Neutral • Steering wheel: Neutral	700 rpm (Idle)	1.6-2.8 ms
				2,000 rpm	1.4-2.6 ms
				When sharp racing is made	To increase

NOTE
*1: The injector drive time refers to when the supply voltage is 11 V and the cranking speed is less than 250 rpm.
*2: When coolant temperature is lower than 0°C (32°F), injection is made by 6 cylinders simultaneously.
*3: When the vehicle is new [within initial operation of about 500 km (300 miles)], the injector drive time may be about 10% longer.

Function	Item No.	Drive content	Check condition	Normal state
Actuator test	01	No. 1 injector shut off	Engine: Idling after warm-up (Shut off the injectors in sequence during idling after engine warm-up, check the idling condition)	Idle state to change further (becoming less stable or stalling)
	02	No. 2 injector shut off		
	03	No. 3 injector shut off		
	04	No. 4 injector shut off		
	05	No. 5 injector shut off		
	06	No. 6 injector shut off		

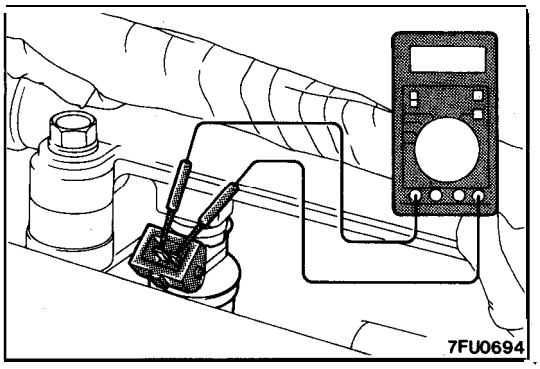


Using Oscilloscope

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

HARNESS INSPECTION

Refer to P.14A-138.



ACTUATOR INSPECTION

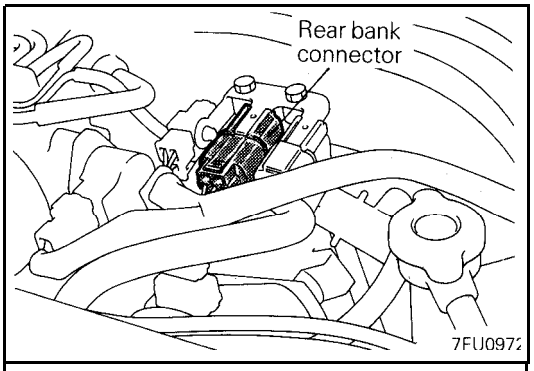
INJECTORS

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.

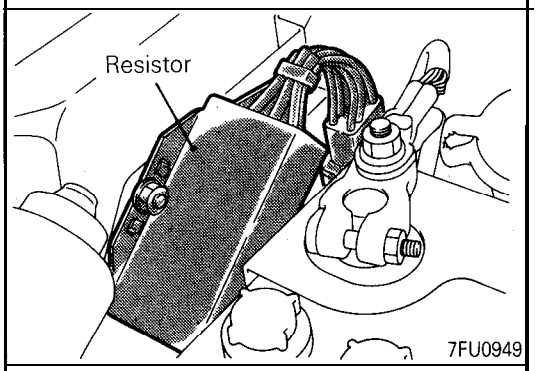


Measurement of Resistance between Rear Bank Terminals

(1) Disconnect the injector connector.
(2) Measure the resistance between terminals.

Standard value: 2 – 3 Ω [at 20°C (68°F)]

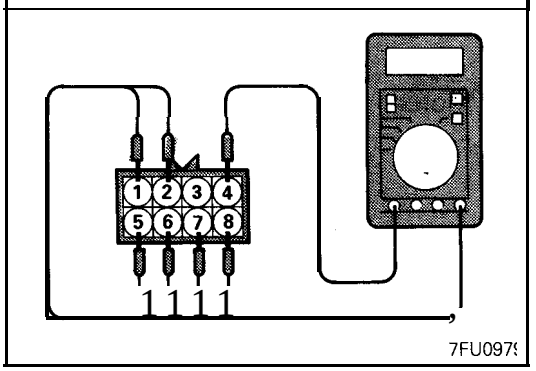
(3) Reconnect the injector connector.



RESISTOR

Measurement of Resistance between Terminals

(1) Disconnect the resistor connector.

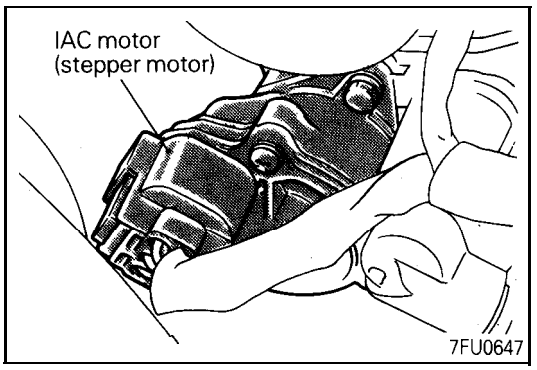


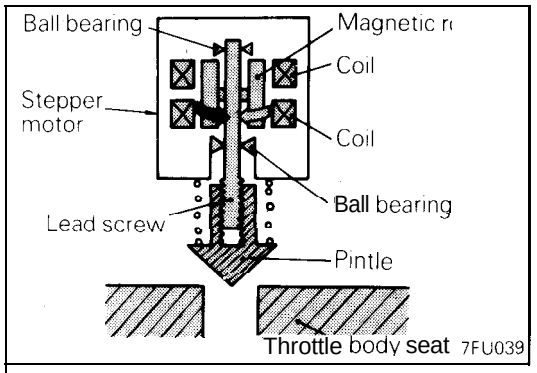
(2) Measure the resistance between terminals.

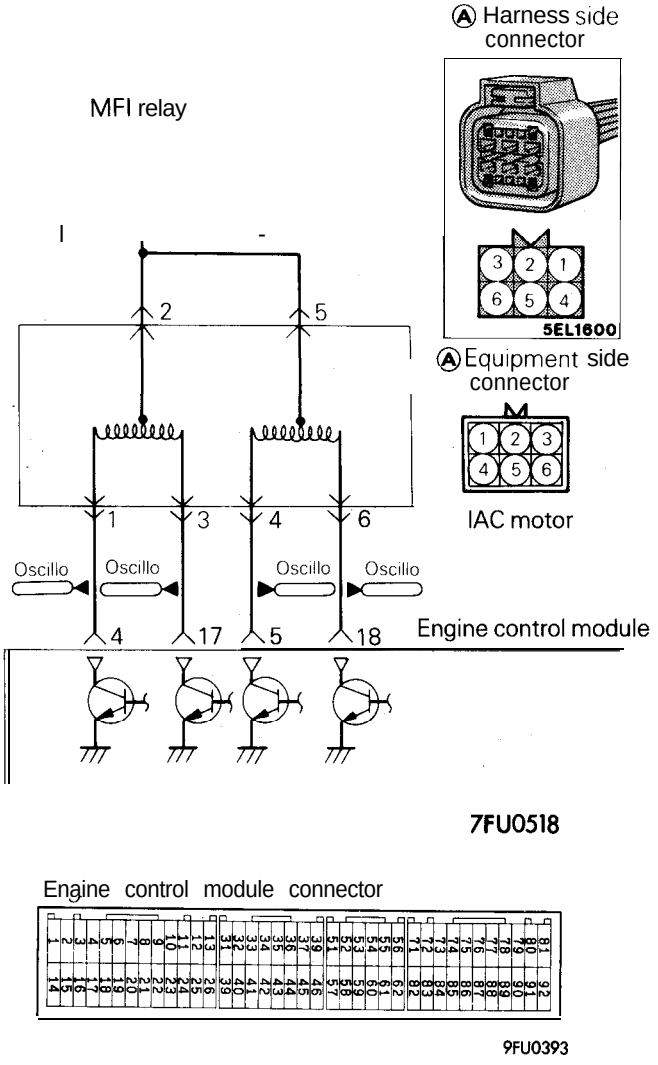
Measuring terminals	Resistance
1–4 2-4 5-4 6-4 7-4 8–4	5.5 – 6.5 Ω [At 20°C (68°F)]

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

IDLE AIR CONTROL MOTOR (STEPPER MOTOR TYPE)







Engine control module connector

OPERATION

Refer to P.14A-141.

TROUBLESHOOTING HINTS

Refer to P.14A-141.

INSPECTION

Refer to P.14A-142

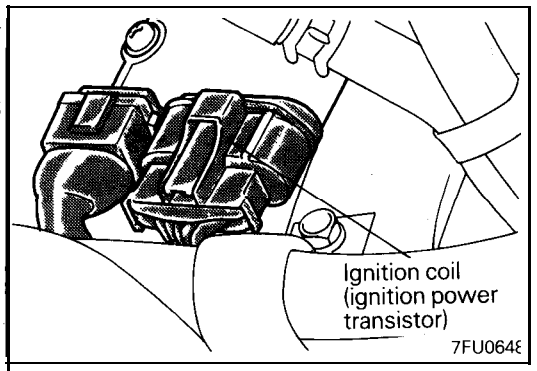
HARNESS INSPECTION

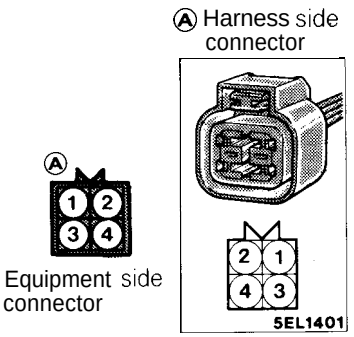
Refer to P.14A-143.

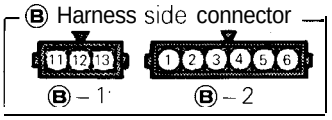
ACTUATOR INSPECTION

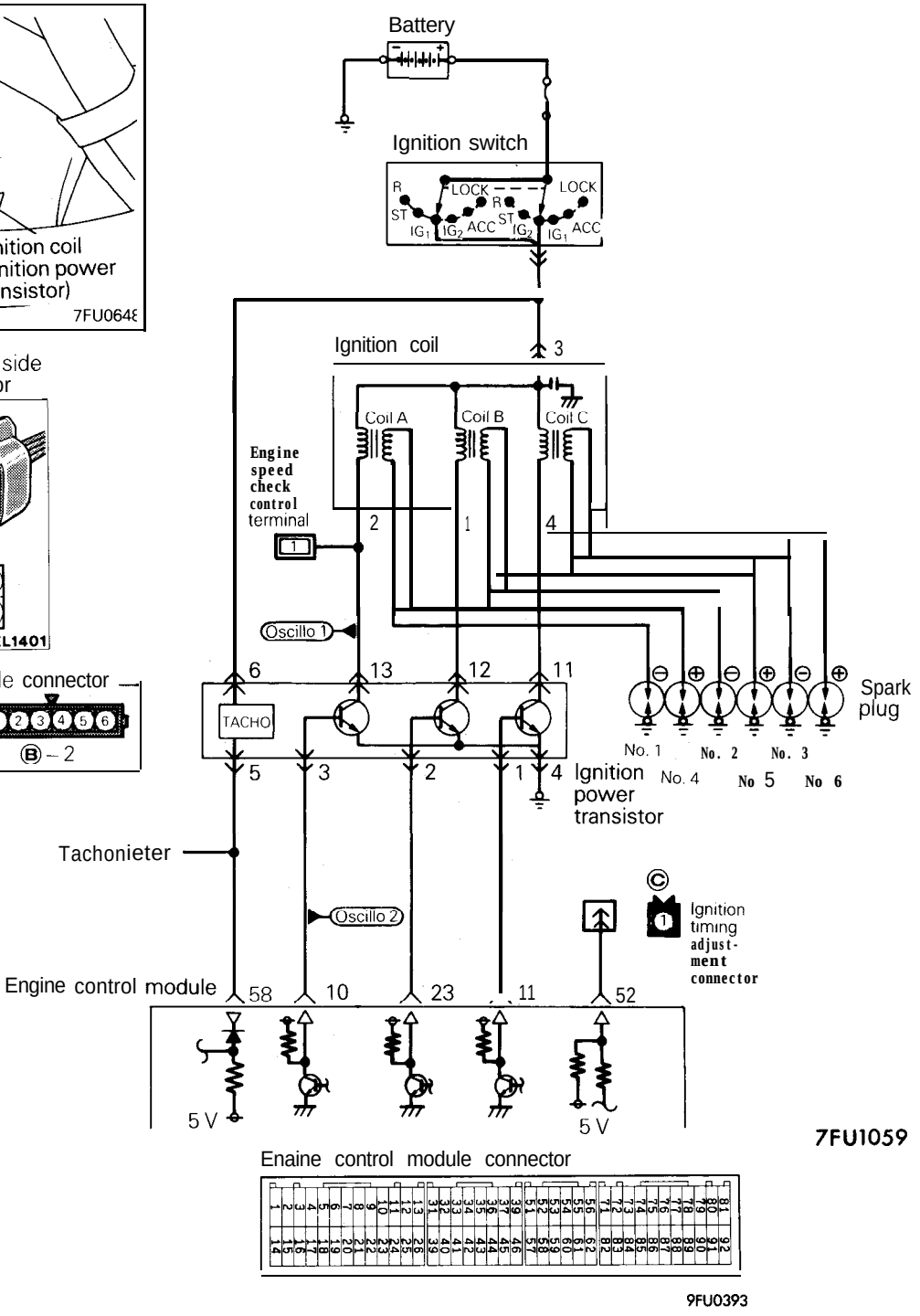
Refer to P.14A-143.

IGNITION COIL AND IGNITION POWER TRANSISTOR









OPERATION

Refer to P.14A-149.

INSPECTION

Using Scan Tool

<Spark Advance>

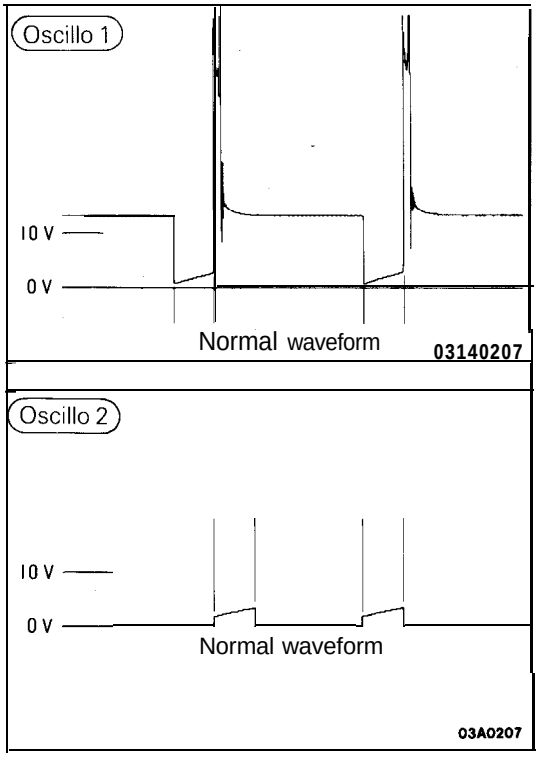
Function	Item No.	Data display	Check condition	Engine state	Standard value
Data reading	44	Ignition advance	• Engine: Warming up • Timing light: Set (set timing light to check actual ignition timing)	700 rpm (Idle)	7 – 23°BTDC
				2,000 rpm	30 – 50°BTDC <Non Turbo> 23 – 43°BTDC <Turbo>

<Ignition Timing Adjustment Mode>

Function	Item No.	Data display	Check condition	Terminal condition	Standard value
Data list	36	Continuity present or not present between ignition timing adjustment terminal and ground	• Engine: Idling	Ignition timing adjustment terminal is grounded	ON
				Ignition timing adjustment terminal is disconnected from ground	OFF

<Standard Ignition Timing>

Function	Item No.	Drive	Check condition	Normal condition
Actuator test	17	Set to ignition timing adjustment mode	• Engine: idling • Timing light: set	5°BTDC



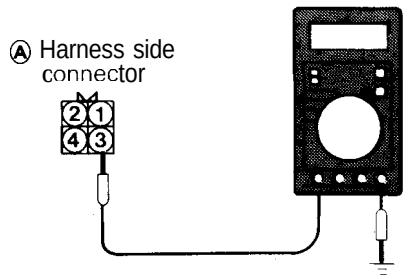
Using Oscilloscope

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

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

HARNESS INSPECTION

1



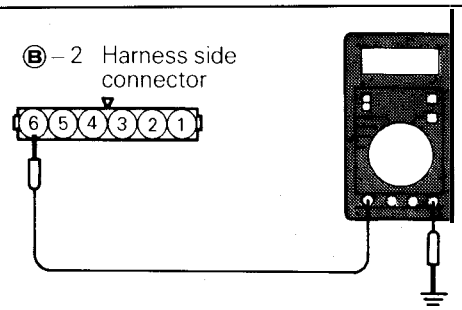
Measure the power supply voltage of the ignition coil.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
B+

OK → **2**

NG → Repair the harness. (Ⓐ3 – Ignition switch)

2



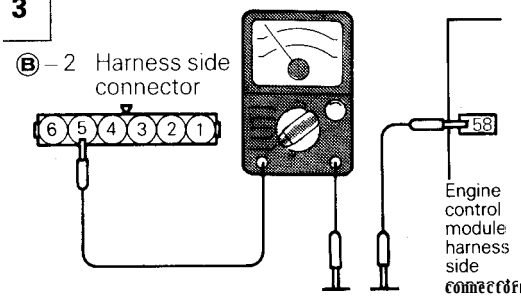
Measure the power supply voltage of the ignition coil.
- Connector: Disconnected
- Ignition switch: ON

Voltage (V)
B+

OK → **3**

NG → Repair the harness. (Ⓑ6 – Ignition switch)

3

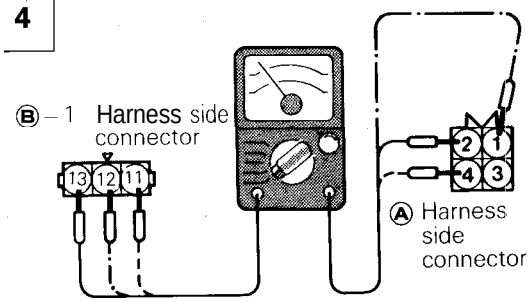


Check for an open-circuit, or a short-circuit to ground between the engine control unit and the ignition power transistor.
- Engine control module connector: Disconnected
- Ignition power transistor connector: Disconnected

OK → **4**

NG → Repair the harness. (Ⓑ5 – [illegible])

4



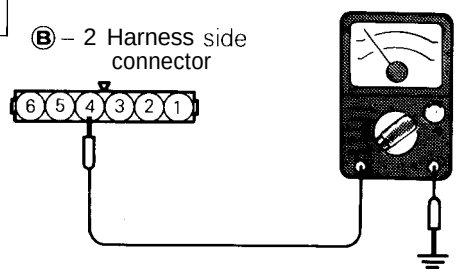
Check for an open-circuit, or a short-circuit to ground between the ignition power transistor and the ignition coil.
- Ignition coil connector: Disconnected
- Ignition power transistor connector: Disconnected

OK → **5**

NG → Repair the harness.
(Ⓐ2 – Ⓑ13)
(Ⓐ1 – Ⓑ12)
(Ⓐ4 – Ⓑ11)

5

Ⓑ – 2 Harness side connector



7FU0700

Check for continuity of the ground circuit,

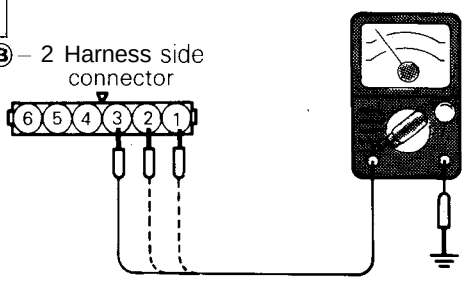
- Connector: Disconnected

OK → 6

NG → Repair the harness. (Ⓑ 4 – Ground)

6

Ⓑ – 2 Harness side connector



7FU0701

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

- Connector: Disconnected
- Ignition switch: START

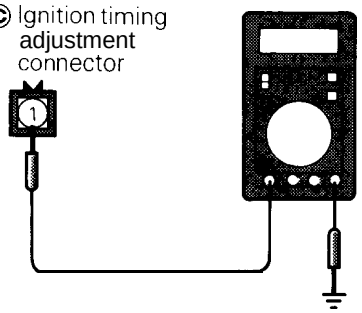
Voltage (V)
0.5 – 4.0

OK → 7

NG → Repair the harness. (Ⓑ 3 – 10) (Ⓑ 2 – 23) (Ⓑ 1 – 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

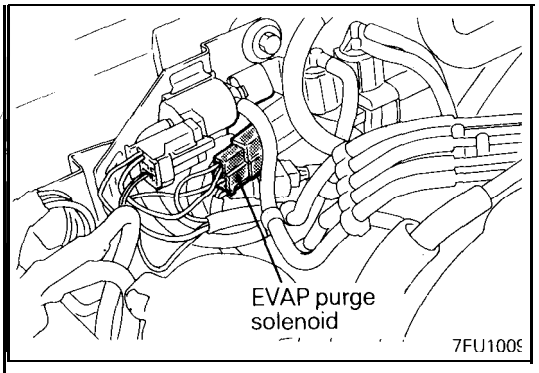
OK → STOP

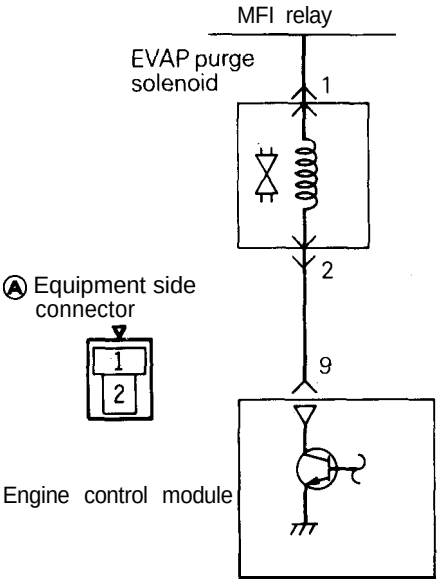
NG → Repair the harness. (Ⓒ 1 – 52)

ACTUATOR INSPECTION

Refer to GROUP 8 – Ignition System

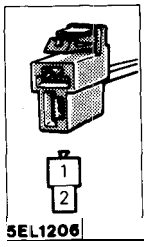
EVAPORATIVE EMISSION PURGE SOLENOID



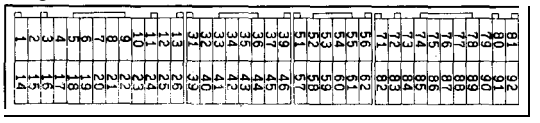


01A0324

Ⓐ Harness side Connector



Engine control module connector



9FU0393

OPERATION

Refer to P.14A-153.

INSPECTION

Refer to P.14A-153.

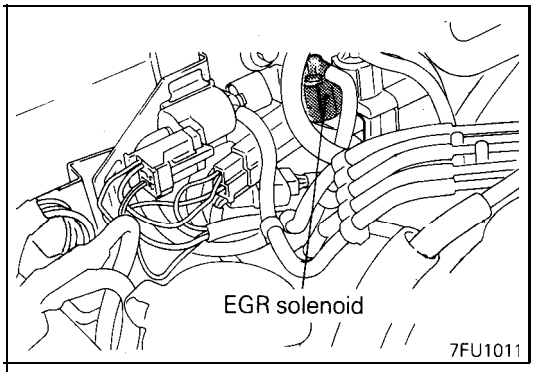
HARNESS INSPECTION

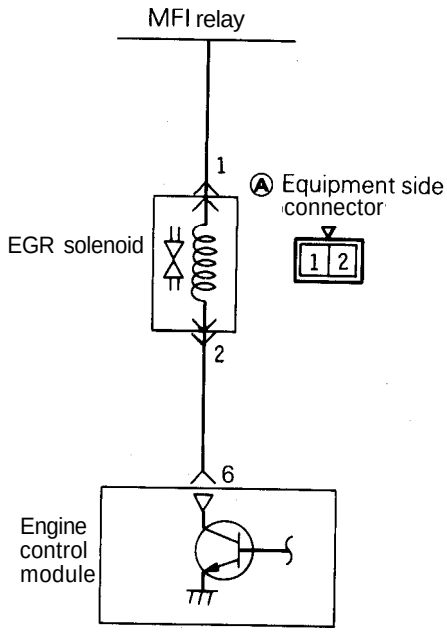
Refer to P.14A-154.

ACTUATOR INSPECTION

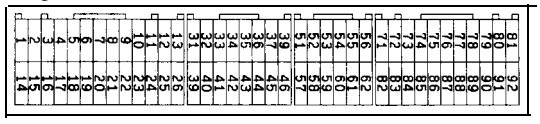
Refer to GROUP 25 – Evaporative Emission Control System.

EGR SOLENOID





Engine control module connector



9FU0393

OPERATION

Refer to P.14A-155.

TROUBLESHOOTING HINT

Refer to P.14A-155.

INSPECTION

Refer to P.14A-156.

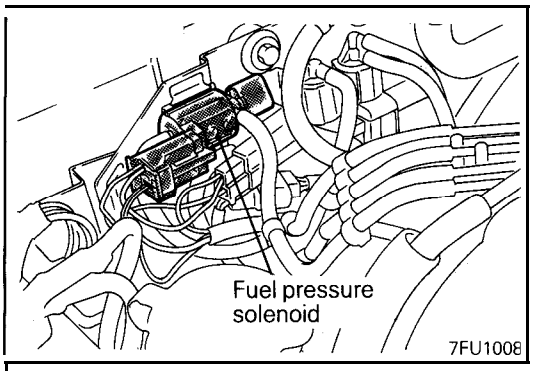
HARNESS INSPECTION

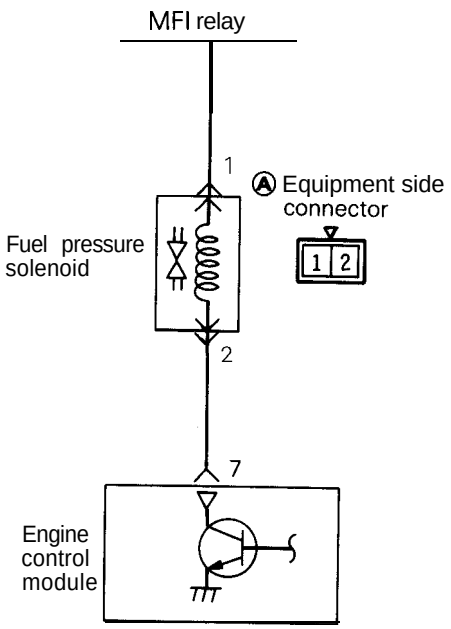
Refer to P.14A-156.

ACTUATOR INSPECTION

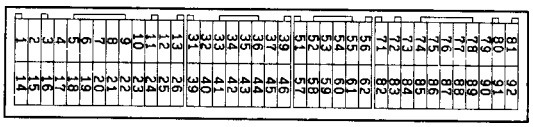
Refer to GROUP 25 – Exhaust Gas Recirculation (EGR) System.

FUEL PRESSURE SOLENOID <Turbo>





Engine control module connector



OPERATION

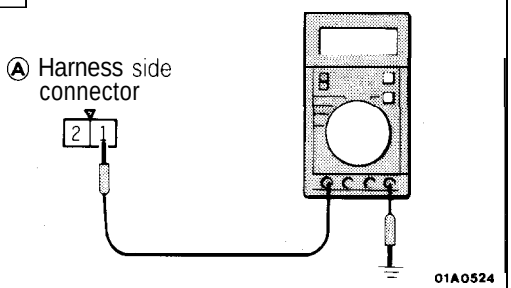
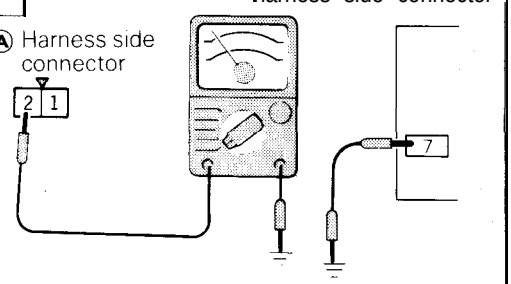
- The fuel pressure solenoid is an ON-OFF type solenoid valve that switches the pressure introduced to the fuel pressure regulator between either intake manifold pressure or barometric pressure.
- Battery power is supplied to this valve via the MFI relay. When the engine control module turns ON the internal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

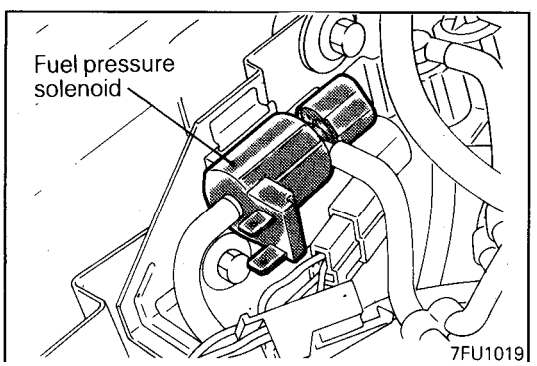
INSPECTION

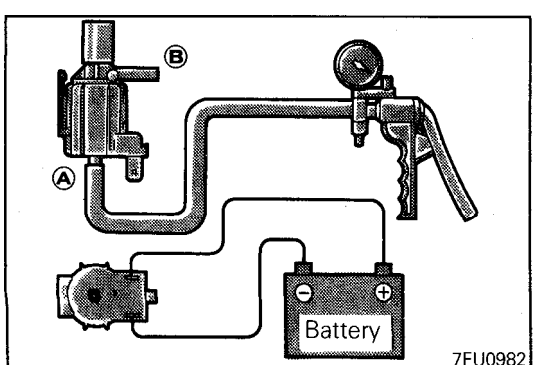
Using Scan Tool

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

1  	Measure the power supply voltage. • Connector: Disconnected • Ignition switch: ON Voltage (V): B+ OK → 2 NG → Repair the harness. (Ⓐ2 – MFI relay)	
2  	Check for an open-circuit, or a short-circuit to ground, between the fuel pressure solenoid and the engine control module. • Engine control module connector: Disconnected • Fuel pressure solenoid connector: Disconnected OK → STOP NG → Repair the harness. (Ⓐ1 – 7)	





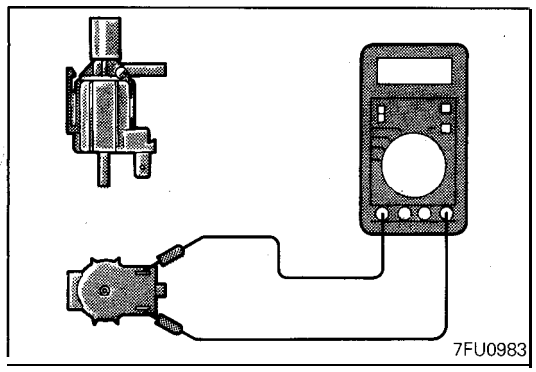
ACTUATOR INSPECTION

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

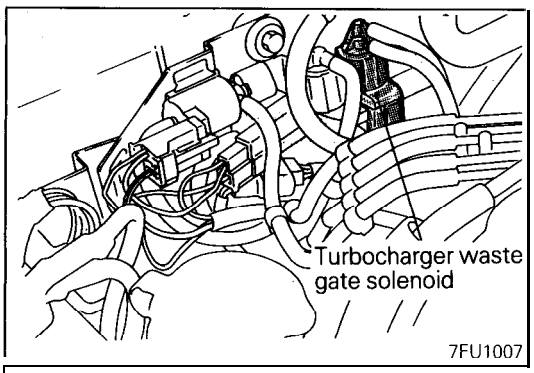


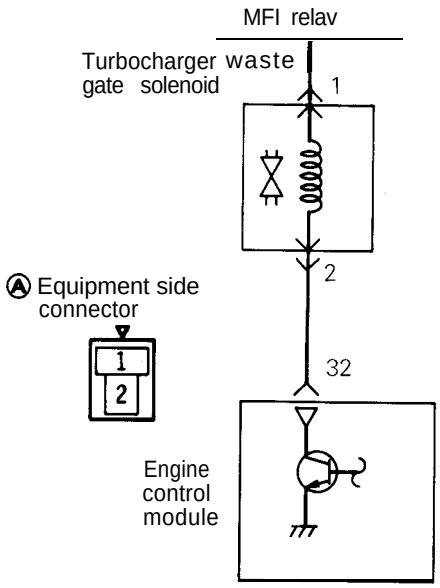
Coil Resistance Check

(1) Measure the coil resistance with a circuit tester

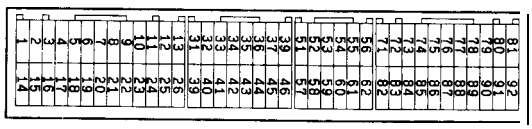
Standard value: 36 – 46 Ω [at 20°C (68°F)]

TURBOCHARGER WASTE GATE SOLENOID <Turbo>





Engine control module connector



OPERATION

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

TROUBLESHOOTING HINTS

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

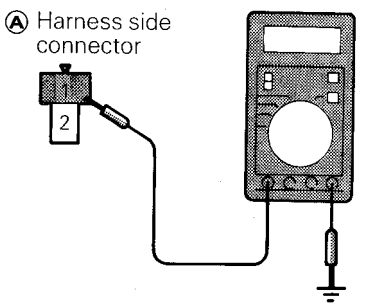
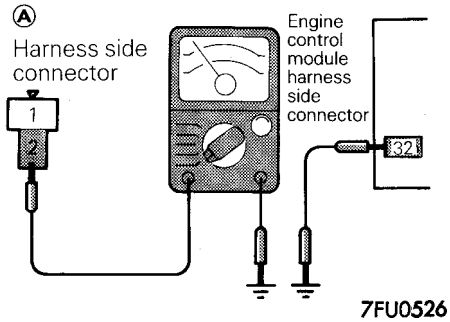
(1) Faulty boost pressure control system
(2) Poor connection of intake air hose
(3) Faulty turbocharger or turbocharger waste gate actuator
(4) Clogged exhaust system

INSPECTION

Using Scan Tool

Function	Item No.	Drive content	Check condition	Normal state
Actuator test	12	Turn solenoid valve from OFF to ON	Ignition switch: ON	Click heard when driven

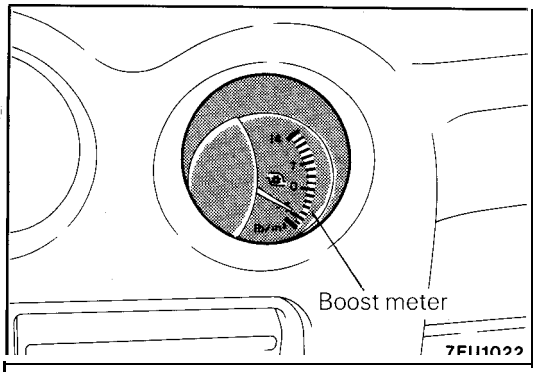
HARNESS INSPECTION

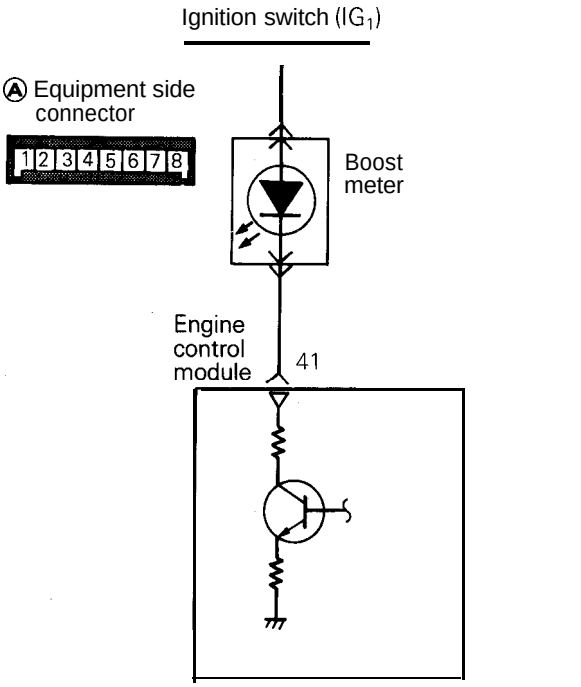
1		Measure the power supply voltage. • Connector: Disconnected • Ignition switch: ON Voltage (V): B+ OK → 2 NG → Repair the harness. (Ⓐ 1 – MFI relay)	
2		Check for an open-circuit, or a short-circuit to ground, between the turbocharger waste gate solenoid and the engine control module. • Turbocharger waste gate solenoid connector: Disconnected • Engine control module connector: Disconnected OK → STOP NG → Repair the harness. (Ⓐ 2 –)	

ACTUATOR INSPECTION

Refer to GROUP 11.

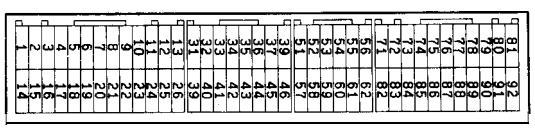
BOOST METER <Turbo>





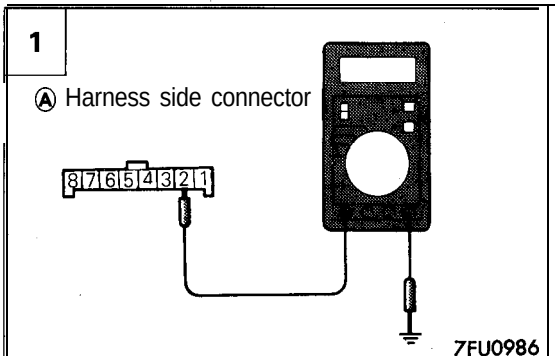
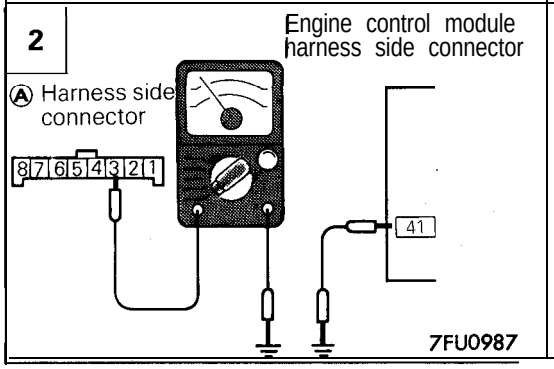
7FU0985

Engine control module connector



9FU0393

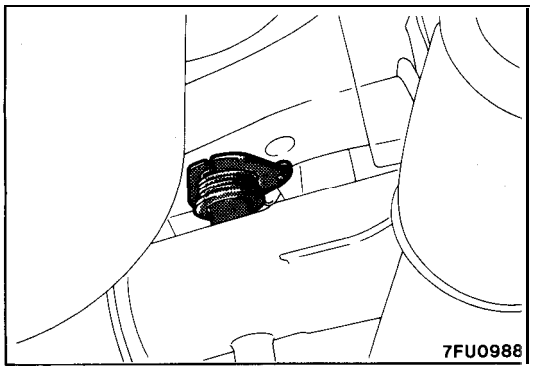
HARNESS INSPECTION

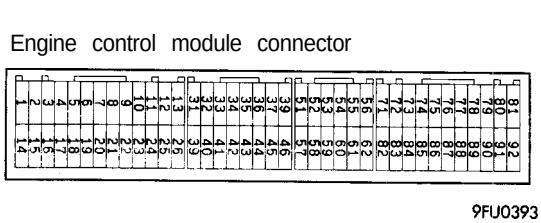
1  	Measure the power supply voltage. • Connector: Disconnected • Ignition switch: ON Voltage (V): B+	OK →	2
		NG →	Repair the harness. (Ⓐ 2 – Ignition coil [IG])
2  	Check for an open-circuit or a short-circuit to ground, between the engine control module and the boost meter. • Boost meter connector: Disconnected • Engine control module connector: Disconnected	OK →	STOP
		NG →	Repair the harness. (Ⓐ 3 –)

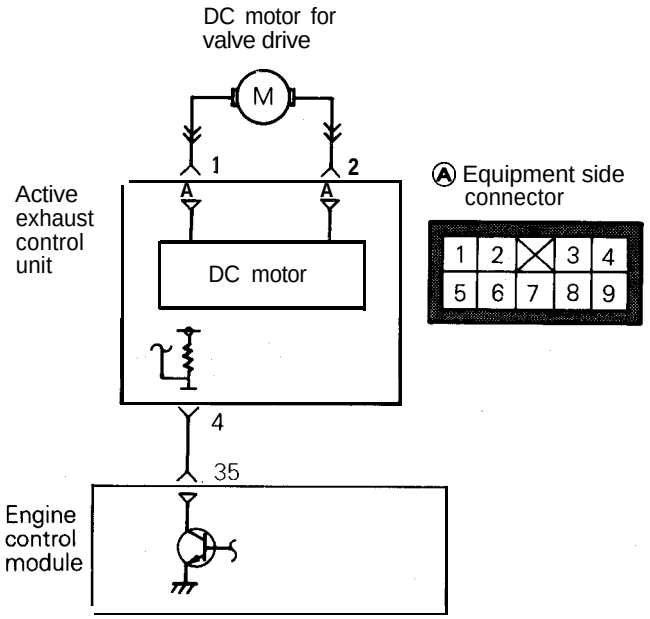
ACTUATOR INSPECTION

Refer to GROUP 8.

ACTIVE EXHAUST CONTROL UNIT <Turbo>







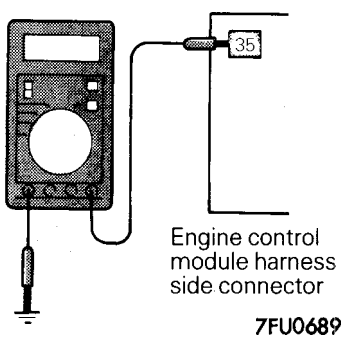
7FU0989

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 module opens and closes the valve when it receives the signal produced by the engine control unit.

HARNESS INSPECTION

1



Measure the input voltage of engine control module.

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

Voltage (V)
B+

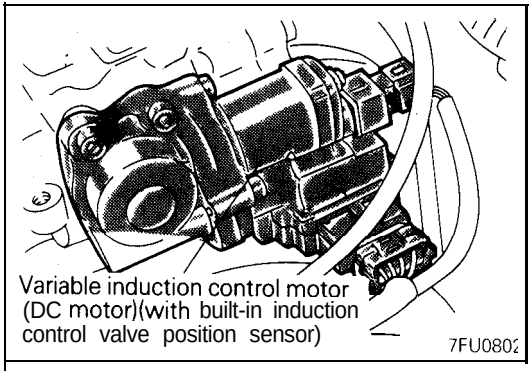
OK → STOP

NG → Repair the harness. (Ⓐ4 – 35)

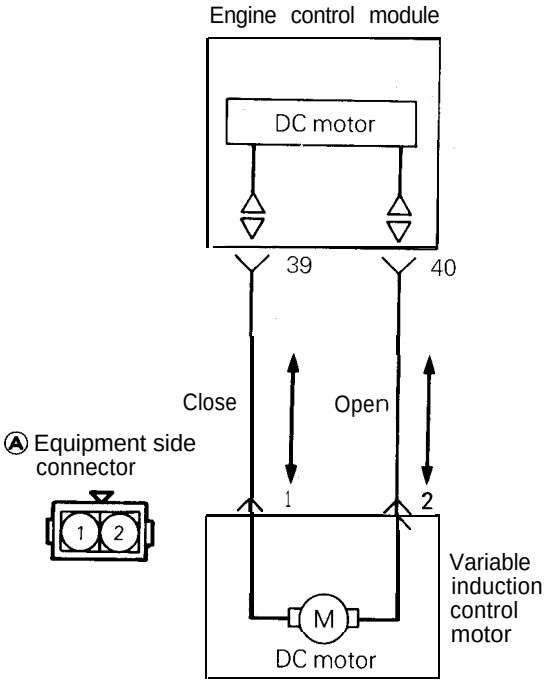
ACTUATOR INSPECTION

Refer to GROUP 11.

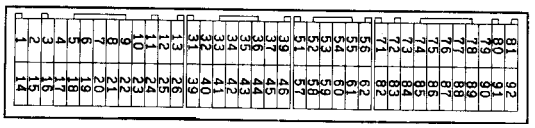
VARIABLE INDUCTION CONTROL MOTOR (DC MOTOR) <Non Turbo>


Variable induction control motor (DC motor)(with built-in induction control valve position sensor)

7FU0802



1FU0646



9FU0393

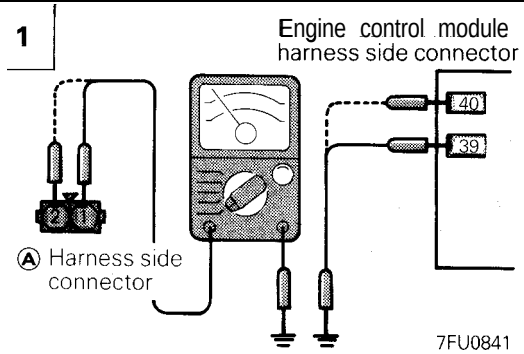
OPERATION

Refer to P.14A-157.

INSPECTION

Refer to P.14A-157.

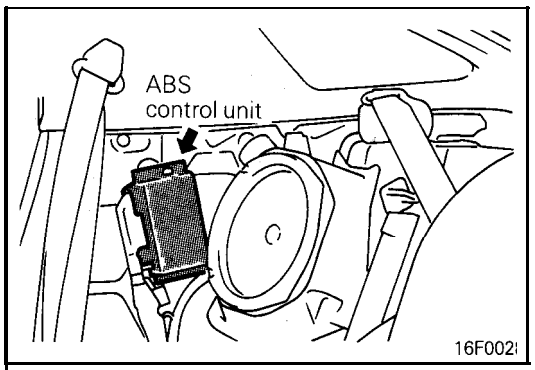
HARNESS INSPECTION

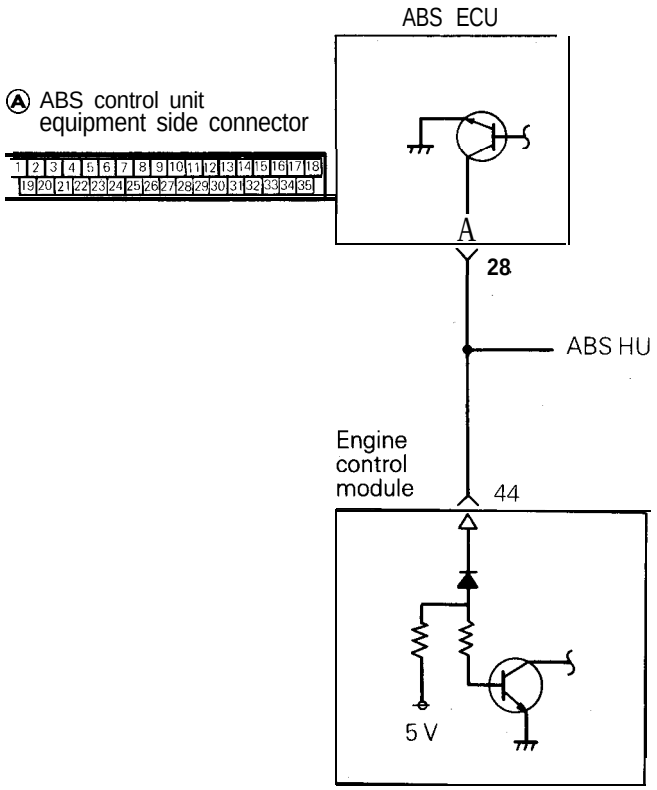
1  7FU0841	Check for an open-circuit or a short-circuit to ground, between the engine control module and the variable induction control motor connector. • Variable induction control motor connector: Disconnected • Engine control module connector: Disconnected	OK →	STOP
		NG →	Repair the harness. (Ⓐ 1 – 39) (Ⓐ 2 – 40)

ACTUATOR INSPECTION

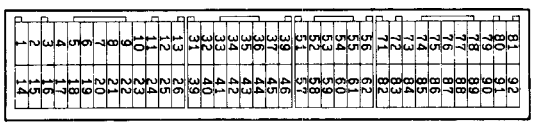
Refer to GROUP 11.

ANTI-LOCK BRAKING SIGNAL <Turbo>





Engine control module connector



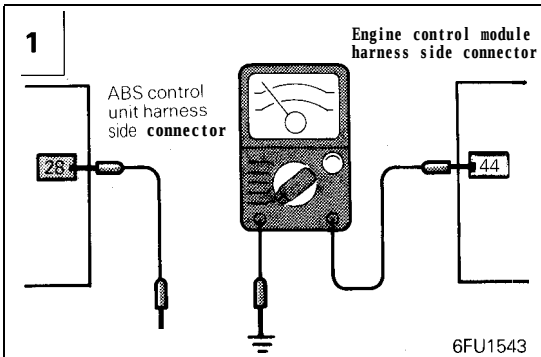
9FU0393

6FU1542

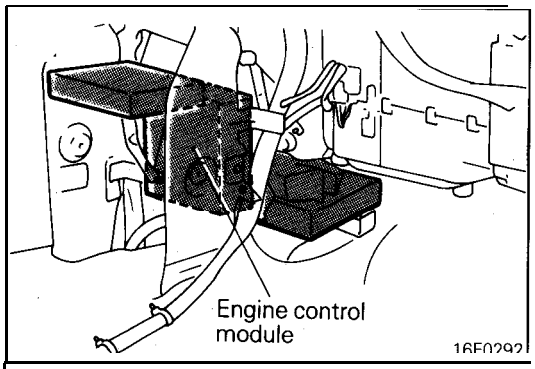
OPERATION

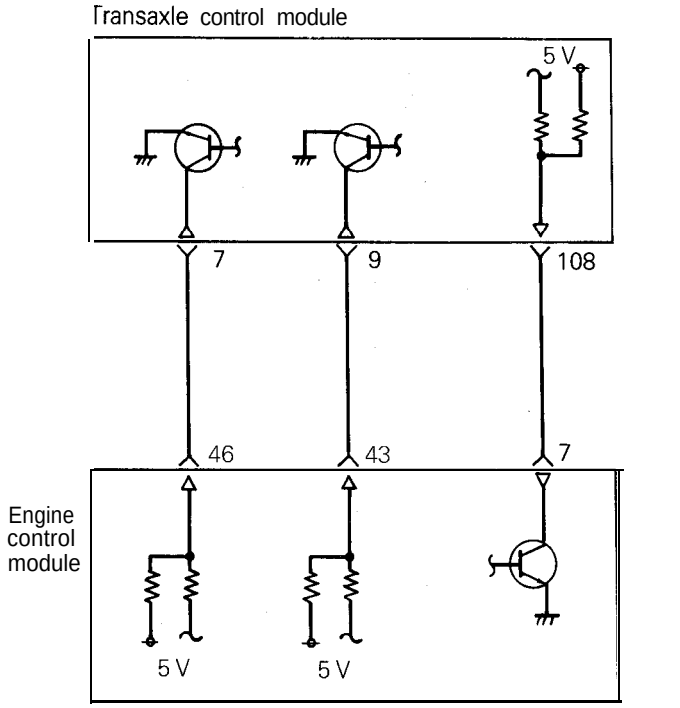
- The anti-lock braking signal is input to the engine control module from the anti-lock braking system (ABS) control module as a signal to indicate whether or not the motor relay is activated. Based on this signal, the engine control module controls the idle air control motor to secure effective anti-lock braking.
- When the motor relay is activated, the ABS control unit turns ON the power transistor, short-circuiting the terminal to ground. This causes the anti-lock braking signal to go from high to low.

HARNESS INSPECTION

1  6FU1543	Check for an open-circuit or a short-circuit to ground, between the ABS control unit and the engine control module. • ABS control unit connector: Disconnected • Engine control module connector: Disconnected	OK → STOP NG → Repair the harness. (Ⓐ28 – 44)

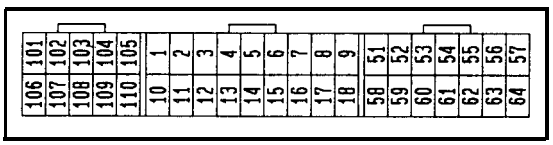
ENGINE AND TRANSAXLE TOTAL CONTROL SIGNAL <A/T>





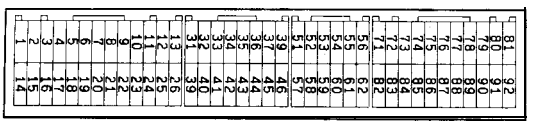
7FU0843

Ⓐ Transaxle control module connector



7FU0903

'Engine control module connector

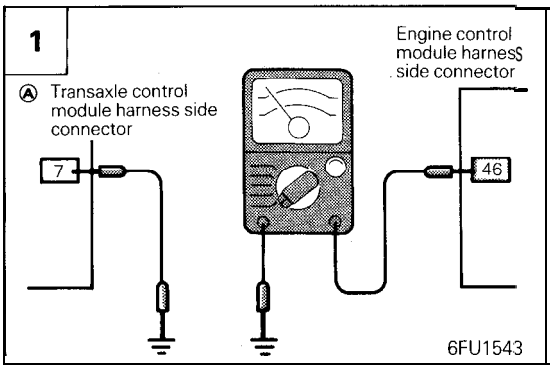
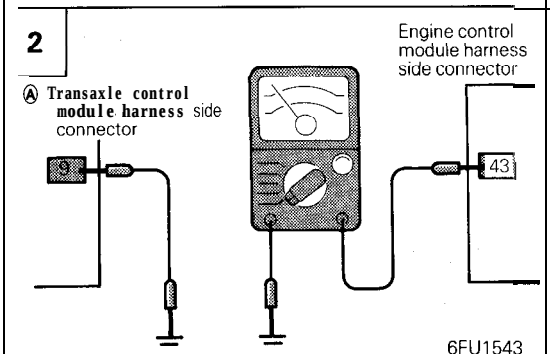
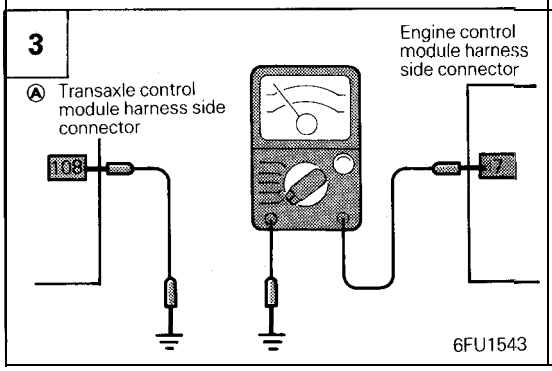


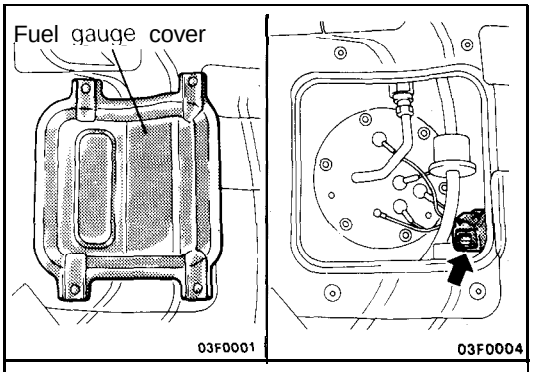
9FU0393

OPERATION

- Three communication lines are connected between the engine control module and the transaxle control module to send and receive the engine and transaxle total control signal.
- If the transistor inside the engine control module changes from OFF to ON by the command of the engine control module, the terminal having a voltage of 5 V applied to it from the transaxle control module is grounded in the engine control module.
  This will change the terminal voltage of the transaxle control module from HIGH to LOW.
  If the transistor fitted inside the engine control module changes from ON to OFF, the terminal, having applied to it a voltage of 5 V from the transaxle control module and grounded in the engine control module, is released and the terminal voltage of the transaxle control module changes from LOW to HIGH.
  In this way, the terminal voltage of the transaxle control module is controlled by ON/OFF operation of the transistor inside the engine control module in order to send signal.
  On the other hand, the transaxle control module also controls the terminal voltage of the engine control module by the ON/OFF operation of the transistor fitted inside the transaxle control module in order to send signal. In this way, the engine and transaxle send control signal to each other.

HARNESS INSPECTION

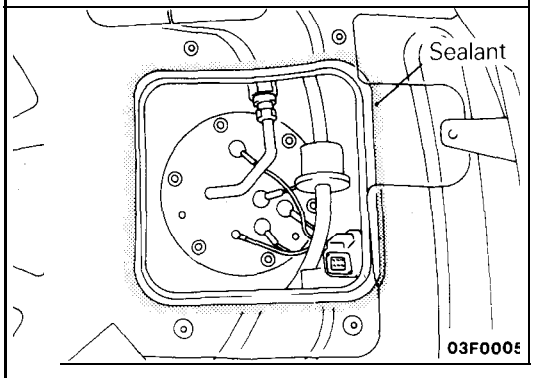
1 	Check for an open-circuit, or a short-circuit to ground between the transaxle control module and the engine control module. • Transaxle control module connector: Disconnected • Engine control module connector: Disconnected	OK →	2
		NG →	Repair the harness. (Ⓐ7 -)
2 	Check for an open-circuit, or a short-circuit to ground between the transaxle control module and the engine control module. • Transaxle control module connector: Disconnected • Engine control module connector: Disconnected	OK →	3
		NG →	Repair the harness. (Ⓐ9 – 43)
3 	Check for an open-circuit, or a short-circuit to ground between the transaxle control module and the engine control module. • Transaxle control module connector: Disconnected • Engine control module connector: Disconnected	OK →	STOP
		NG →	Repair the harness. (Ⓐ108 – 7)



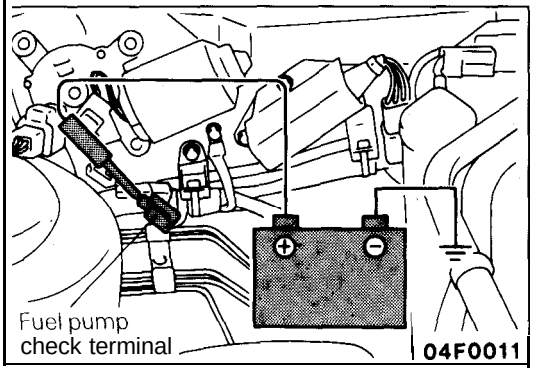
RELEASE OF RESIDUAL PRESSURE FROM HIGH PRESSURE FUEL HOSE

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

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



(5) Apply the specified sealant to the rear floor pan.
Specified sealant: 3M ATD Part No. 8509 or equivalent
(6) Install the fuel gauge cover.

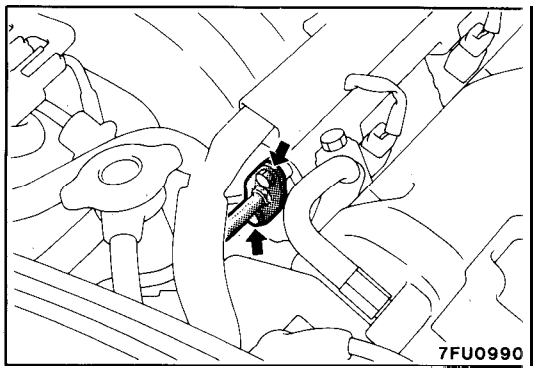


FUEL PUMP OPERATION CHECK

(1) Set the ignition switch at OFF.
(2) Check that when the battery voltage is directly applied to the fuel pump check terminal (black), the operating sound of the pump can be heard.

NOTE
Since the fuel pump is installed in the fuel tank, its operating sound cannot be readily heard. Remove the fuel tank cap and listen to the operating sound through the filter port.

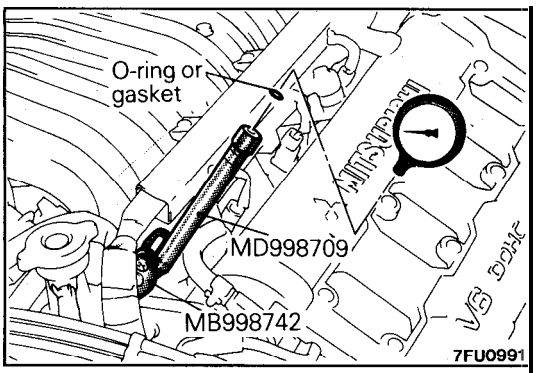
(3) Hold the high pressure fuel hose between your fingers and check that the fuel pressure can be felt.



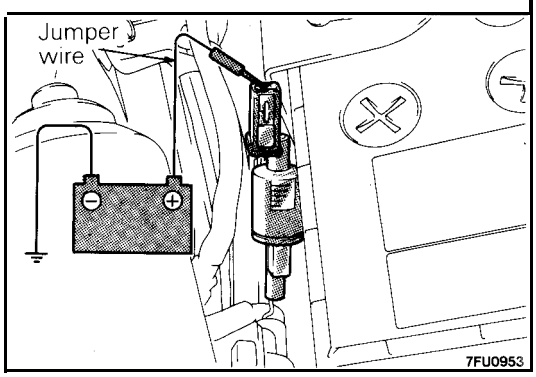
FUEL PRESSURE TEST

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

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



(3) Set a fuel pressure gauge on the special tool, placing an adequate O-ring or gasket between the gauge and special tool prevent fuel leaks.
(4) Attach the special tool set in step (3) to the fuel rail between high pressure hoses.

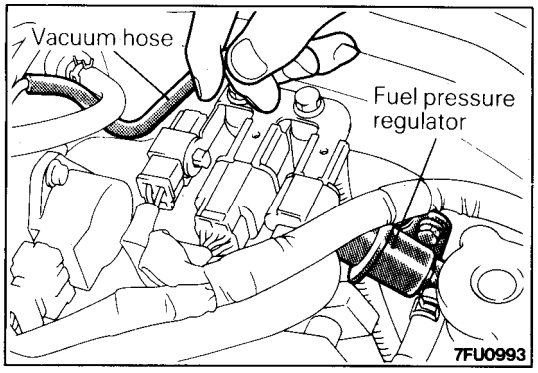


(5) Connect a jumper wire to the terminal for activation of the fuel pump and to the positive ⊕ terminal of the battery to activate the fuel pump. With fuel pressure applied, check to be sure that there is no fuel leakage from the fuel pressure gauge and the special tool connection part.
(6) Disconnect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

(8) Measure the fuel pressure during idling..

Standard value:

<Non Turbo>	**Approx. 270 kPa (38 psi) at curb idle**
<Turbo>	**Approx. 235 kPa (34 psi) at curb idle**



(9) Disconnect the vacuum hose from the fuel pressure regulator, and then measure the fuel pressure while using a finger to plug the end of the hose.

Standard value:
<Non Turbo> 330 – 350 kPa (47 – 50 psi) at curb idle
<Turbo> 295 – 315 kPa (43 – 45 psi) at curb idle

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

(11) Use a finger to gently press the fuel return hose while repeatedly racing the engine, and check to be sure that there is fuel pressure in the return hose also.

NOTE
There will be no fuel pressure in the return hose if there is insufficient fuel flow.

(12) If the fuel pressure measured in steps (8) to (11) deviates from the standard value range, check for the probable cause by referring to the table below, and then make the appropriate repair.

Condition	Probable cause	Remedy
• Fuel pressure is too low. • Fuel pressure drops during racing. • No fuel pressure in fuel return hose.	Fuel filter is clogged.	Replace the fuel filter.
	Malfunction of the valve seat within the fuel pressure regulator, or fuel leakage to return side caused by spring deterioration.	Replace the fuel pressure regulator.
	Fuel pump low discharge pressure.	Replace the fuel pump.
Fuel pressure is too high.	The valve within the fuel pressure regulator is sticking.	Replace the fuel pressure regulator.
	Clogging of the fuel return hose and/or the pipe.	Clean or replace the hose and/or pipe.
No change of the fuel pressure when the vacuum hose is connected and when not connected.	Damaged vacuum hose or nipple clogging.	Replace the vacuum hose, or clean the nipple.
	Malfunction of the fuel pressure control system <Turbo>	Checking the fuel pressure control system <Turbo>

(13)Stop the engine and check for a change of the value indicated by the fuel pressure gauge. The condition is normal if there is no decrease of the indicated value within two minutes.
If there is a decrease of the indicated value, monitor the speed of the decrease, and, referring to the table below, determine the cause of the problem and make the appropriate repair.

Condition	Probable cause	Remedy
After the engine is stopped, the fuel pressure drops gradually.	Injector leakage.	Replace the injector.
	Leakage at the fuel pressure regulator valve seat.	Replace the fuel pressure regulator.
There is a sudden sharp drop of the fuel pressure immediately after the engine is stopped.	The check valve (within the fuel pump) is not closed.	Replace the fuel pump.

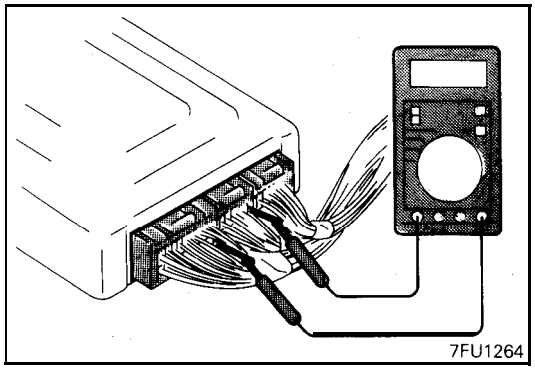
(14)Reduce the internal pressure of the fuel pipes and hoses.
(15)Disconnect the fuel pressure gauge and the special tools from the delivery pipe.

Caution
Because there will be some residual pressure in the fuel pipe line, use a shop towel to cover so that fuel doesn't splatter.

(16)Replace the O-ring at the end of the fuel high-pressure hose with a new one.
(17)After connecting the fuel high-pressure hose to the fuel rail, tighten the installation bolt at the specified torque.

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

(18)Check to be sure that there is no fuel leakage.
① Apply battery voltage to the terminal for activation of the fuel pump so as to activate the fuel pump.
② With fuel pressure applied, check for leakage of the fuel line.



ENGINE CONTROL MODULE (ECM) TERMINAL VOLTAGES INSPECTION

(1) Connect a very thin wire probe (such as a paper clip) to the probe of the voltmeter.
(2) Insert the very thin probe from the wire side into contact with each of the terminals of the ECM connector and check the voltage, while referring to the check chart.

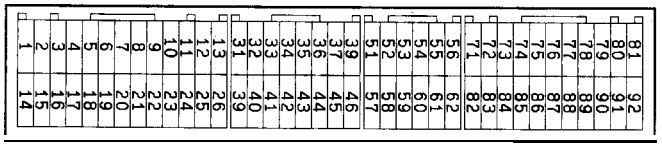
NOTE
1. Measure a voltage with the ECM connector connected.
2. Measure the voltage between each terminal and the No. 26 terminal (ground terminal).
3. Withdraw the ECM for easier access to the connector terminals.
4. The inspection need not be performed in the order of the chart.

Caution
Short-circuiting the positive (+) probe between a connector terminal and ground could cause damage to the vehicle wiring, sensors or ECM, or all of them. Use care to prevent it!

(3) If the voltmeter shows any deviation from the standard value, check the corresponding sensor, actuator and related electrical wiring, then repair or replace.
(4) After repair or replacement, recheck with the voltmeter to confirm that the problem has cleared completely.

TERMINAL VOLTAGE CHECK CHART

Engine Control Module Connector Terminal Configuration



9FU0393

Terminal No.	Check point	Check conditions (Engine conditions)	Standard value	Remarks
80	Back-up power supply	Ignition switch: OFF	B+	
12	Power supply	Ignition switch: ON	B+	
25				
82	Ignition switch IG	Ignition switch: ON	B+	
38	MFI relay (power supply)	Ignition switch: OFF	B+	
		Ignition switch: ON	0 – 3V	
8	MFI relay (fuel pump)	Ignition switch: ON	B+	
		Engine: Idle	0 – 3V	
81	Sensor impressed voltage	Ignition switch: ON	4.5 – 5.5V	

Terminal No.	Check point	Check conditions (Engine conditions)		Standard value	Remarks
90	Volume air flow sensor	Engine: Idle		2.2 – 3.2V	
		Engine: 2,000 rpm			
19	Volume air flow sensor reset signal	Engine: Idle		0 – 1V	
		Engine: 3,000 rpm		6 – 9V	
72	Intake air temperature sensor	Ignition switch: ON	When intake temperature is 0°C (32°F)	3.2 – 3.8V	
			When intake temperature is 20°C (68°F)	2.3 – 2.9V	
			When intake temperature is 40°C (104°F)	1.5 – 2.1V	
			When intake temperature is 80°C (176°F)	0.4 – 1.0V	
85	Barometric pressure sensor	Ignition switch: ON	When altitude is 0 m (0 ft.)	3.7 – 4.3V	
			When altitude is 1,200 m (3,937 ft.)	3.2 – 3.8V	
83	Water temperature sensor	Ignition switch: ON	When water temperature is 0°C (32°F)	3.2 – 3.8V	
			When water temperature is 20°C (68°F)	2.3 – 2.9V	
			When water temperature is 40°C (104°F)	1.3 – 1.9V	
			When water temperature is 80°C (176°F)	0.3 – 0.9V	
84	Throttle position sensor	Ignition switch: Kept in ON state for more than 15 seconds	Idle	0.3 – 1.0V	
			Wide open throttle	4.5 – 5.5V	
87	Closed throttle position switch	Ignition switch: ON	Throttle valve placed in idle position	0 – 1V	
			Throttle valve placed in slightly opened position	4V or more	
88	Camshaft position sensor	Engine: Cranked		0.2 – 3.0V	
		Engine: Idle			
89	Crankshaft position sensor	Engine: Cranked		0.2 – 3.0V	
		Engine: Idle			
71	Ignition switch-ST	Engine: Cranked		8V or more	M/T
91	Park/Neutral position switch	Ignition switch: ON	Selector lever set to P or N	o - 3 v	A/T
			Selector lever set to D, 2, L or R	8 – 14V	

Terminal No.	Check point	Check conditions (Engine conditions)		Standard value	Remarks
86	Vehicle speed sensor	• Ignition switch: ON • Move the vehicle slowly forward		0 ↔ 5V (Changes repeated)	
37	Power steering pressure switch	Engine: Idle, warm	Steering wheel placed in neutral (straight ahead) position	B+	
			Steering wheel turned half a turn	0 – 3V	
45	Air conditioning switch 1	Engine: Idle	Air conditioning switch set to OFF	0 – 3V	
			Air conditioning switch set to ON (Air conditioning compressor in driven state)	B+	
59	Air conditioning switch 2	Engine: Idle	Air conditioning switch set to OFF	0 – 3V	
			• Air conditioning switch set to ON • Indoor set temperature brought closer to atmospheric temperature	B+	
22	Air conditioning relay	• Engine: Idle • Air conditioning switch: OFF → ON (Air compressor in driven state)		B+ or 6V or more for a moment → 0 – 3V	
21	Fan motor relay (Lo)	Radiator fan not operating [Coolant temperature: below 90°C (194°F)]		B+	
		Radiator fan operating at low speeds [Coolant temperature: 95 – 105°C (203 – 221 °F)]		0 – 3V	
20	Fan motor relay (Hi)	Radiator fan not operating [Coolant temperature: below 90°C (194°F)]		B+	
		Radiator fan operating at high speeds [Coolant temperature: above 105°C (221 °F)]		o - 3 v	
24	Electric load switch	Engine: Running at idle	Lighting switch set to OFF	0 – 3V	
			Lighting switch set to ON	B+	
75 76	Heated oxygen sensor (front)	Engine: Warm, 2,000 rpm (Check using a digital type voltmeter.)		0 ↔ 0.8V (Changes repeatedly)	<All models>
60 79	Heated oxygen sensor (rear)	• Transaxle: 2nd gear <M/T>, L range <A/T> • Drive with wide open throttle • Engine 3,500 rpm or more		0.6 – 1.0 V	<California>
1	No. 1 injector	Engine: Running at idle after warmup, and accelerated abruptly by depressing accelerator pedal		Falls temporarily a little from 11 – 14V.	
14	No. 2 injector				
2	No. 3 injector				
15	No. 4 injector				
3	No. 5 injector				
16	No. 6 injector				

Terminal No.	Check point	Check conditions (Engine conditions)		Standard value	Remarks
4	Stepper motor coil <A1>	Engine: Warm Check immediately after hot restart.		B+ ↑ ↓ 0 – 3V (Changed repeated)	
17	Stepper motor coil <A2>				
5	Stepper motor coil <B1>				
18	Stepper motor coil <B2>				
10	Ignition power transistor unit A	Engine speed: 3,000 rpm		0.3 – 3V	
23	Ignition power transistor unit B				
11	ignition power transistor unit C				
9	Evaporative emission purge solenoid	Ignition switch: ON		B+	
		Engine: Warm, 3,000 rpm		o - 3 v	
7	Fuel pressure solenoid	Ignition switch: ON		B+	Turbo
		Engine: From cranking to idling (within approx. 2 minutes)		o - 3 v ↓ B+	
32	Turbocharger waste gate solenoid	Ignition switch: ON		B+	Turbo
		Engine: Idle (when the premium gasoline is used)		o - 3 v	
41	Turbo meter	Ignition switch: ON		4 – 13v	Turbo
		Engine: Depress the accelerator pedal abruptly while the engine is idling		Falls temporarily from B+	
31	Fuel pump relay 2	Engine: Depress the accelerator pedal abruptly while the engine is idling		Rises temporarily from 0 – 3V	Turbo
58	Engine ignition signal	Engine: 3,000 rpm		0.3 – 3V	
35	Valve opened or closed indication signal	Muffler mode changeover switch: ON	Engine: Idle	o - 3 v	Turbo
			Engine: 4,500 rpm	B+	
34	Muffler mode changeover switch	Ignition switch: ON	Changeover switch set to ON (TOUR)	o - 3 v	Turbo
			Changeover switch set to OFF (SPORT)	B+	
52	Ignition timing adjustment terminal	Ignition switch: ON	Ignition timing adjustment terminal connected to ground	0 – 1V	
			Ignition timing adjustment terminal disconnected from ground	4.0 – 5.5V	

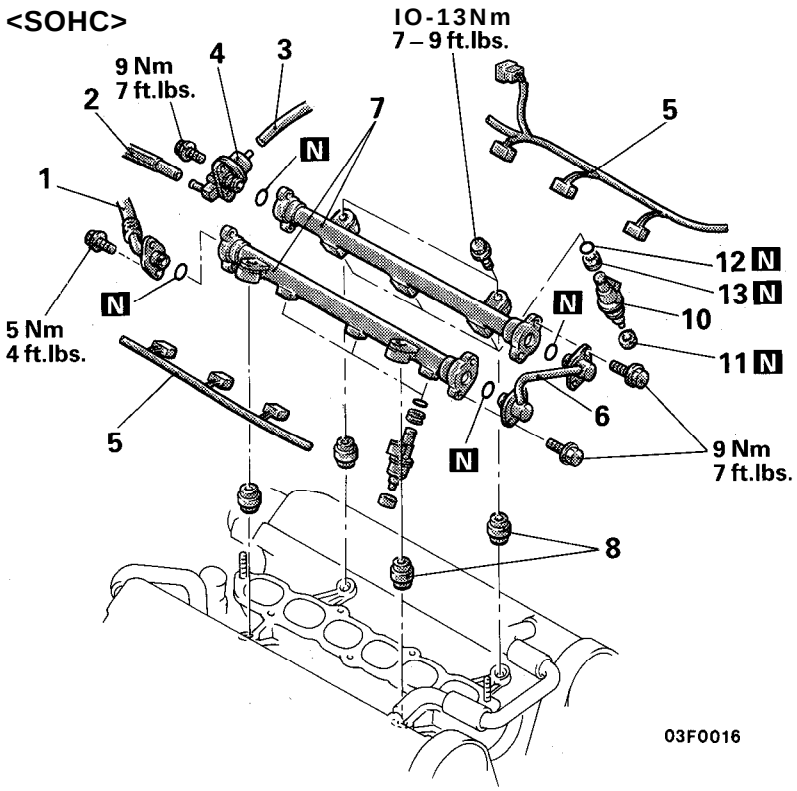
Terminal No.	Check point	Check conditions (Engine conditions)		Standard value	Remarks
36	Check engine/malfunction indicator lamp	Ignition switch: OFF → ON		o - 3 v ↓ 9 – 13V (Several seconds later)	
6	EGR solenoid	Ignition switch: ON		B+	
		Engine: Idle. Suddenly depress the accelerator pedal		Falls temporarily from B+.	
73	EGR temperature sensor	Ignition switch: ON	When sensor temperature is 50°C (122°F)	3.6 – 4.4V	
			When sensor temperature is 100°C (212°F)	2.2 – 3.0V	
74 77	Oxygen sensor heater	Engine: Idle, warm		o - 3 v	<California Non Turbo>
		Engine: 5,000 rpm		B+	
41	Induction control valve position sensor No. 1	Ignition switch: ON		0 – 1V or 4.5 – 5.5V	Non Turbo
		Engine: Slowly accelerated from idling speed to 5,000 rpm		0 – 1V or 4.5 – 5.5V ↓ 1.5 – 4V (for a moment)	
33	Induction control valve position sensor No. 2	Ignition switch: ON		0 - 1V or 4.5 – 5.5V	Non-Turbo
		Engine: Slowly accelerated from idling speed to 5,000 rpm		0 – 1V or 4.5 – 5.5V ↓ 1.5 – 4V (for a moment)	
40	Induction control valve (Opened)	Engine: Slowly accelerated from idling speed to 5,000 rpm		O - I V ↓ 4V or more (for a moment)	Non Turbo
39	Induction control valve (Closed)	Engine: Slowly decelerated from 5,000 rpm to idling speed			
44	Anti-lock braking signal	Engine: Idle		B+	Turbo
		• When vehicle is put in motion for the first time after the ignition switch was placed in ON position • Vehicle speed: 0 → 10 km/h (0 → 0.6 mph)		B+ ↓ 0 – 3V (for a moment)	
46	Total control "Reduce torque" request signal 1	Engine: Idle		4.5 – 5.5V	A/T
		Engine: Running at idle after warmup and changing speeds		O - I V	

Terminal No.	Check point	Check conditions (Engine conditions)	Standard value	Remarks
43	Total control "Reduce torque" request signal 2	Engine: Idle	O - I V	A/T
		Engine: Running at idle after warmup and changing speeds	1 – 5.5V	
7	Total control "Reduce torque" execution signal	Engine: Running at idle with coolant temperature at 50°C (122°F) or lower	0 – IV	AA
		Engine: Idle, warm	I - 4 v	

INJECTOR

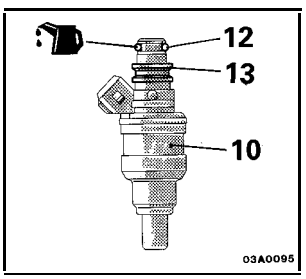
REMOVAL AND INSTALLATION

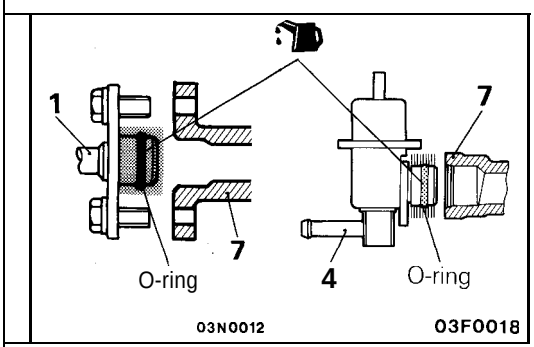
<SOHC>



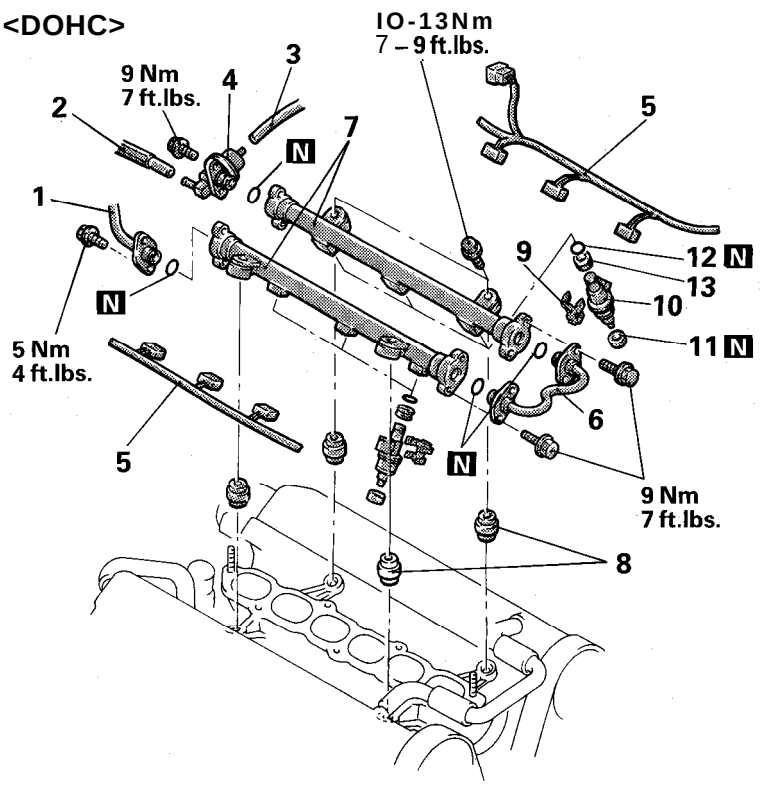
Pre-removal Operation
- Draining of the Coolant
  (Refer to GROUP 0 – Maintenance Service.)
- Removal of Air Intake Manifold Plenum
  (Refer to GROUP 11 – Intake Manifold Plenum.)
- Release of Residual Pressure from High Pressure Hose.
  (Refer to P.14A-161.)

Post-installation Operation
- Supplying of Coolant
  (Refer to GROUP 0- Maintenance Service.)
- Installation of Intake Manifold Plenum
  (Refer to GROUP 11 – Intake Manifold Plenum.)
- Checking for Fuel Leakage





<DOHC>



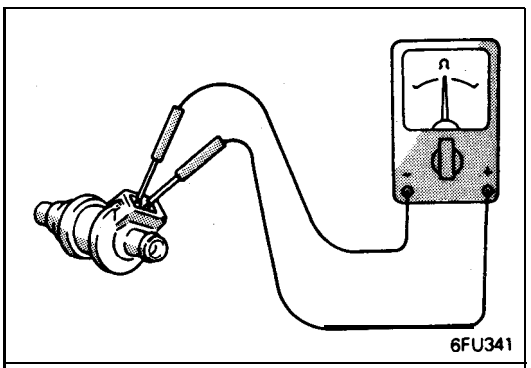
Removal steps
- ●*●* 1. Connection of high pressure fuel hose
  2. Connection of fuel return hose
  3. Connection of vacuum hose
- ●+ 4. Fuel pressure regulator
  5. Connection of control harness
  6. Fuel pipe
  7. Fuel rail
  8. Insulator
  9. Injector support
- ●+ 10. Injector
  11. Insulator
- ●+ 12. O-ring
- ● C 13. Grommet

SERVICE POINT OF REMOVAL

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

INJECTORS

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

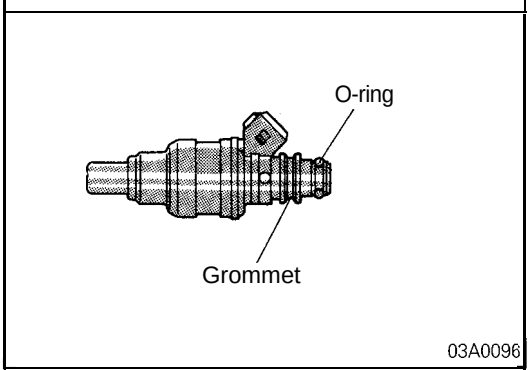
Standard value:
13 – 16 Ω [at 20°C (68°F)] <Non Turbo>
2 – 3 Ω [at 20°C (68°F)] <Turbo>

(2) If the resistance is out of specification, replace the injector.

SERVICE POINTS OF INSTALLATION

13. INSTALLATION OF GROMMET / 12. O-RING

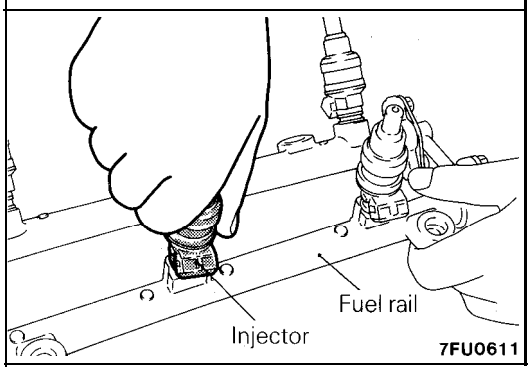
(1) After installation of the grommet and O-ring (in that sequence) to the injector, apply oil to the O-ring.



10. INSTALLATION OF INJECTOR

While turning the injector to the left and right, install it to the fuel rail.
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 fuel rail and check once again.



4. INSTALLATION OF FUEL PRESSURE REGULATOR

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

1. CONNECTION OF HIGH PRESSURE FUEL HOSE

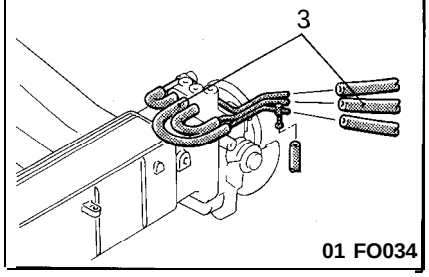
When connecting the high pressure fuel hose to the fuel rail, apply gasoline to the hose union, and then insert, being careful not to damage the O-ring.

THROTTLE BODY

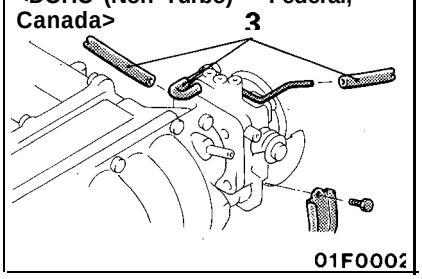
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Draining and Supplying of Engine Coolant (Refer to GROUP 0 – Maintenance Service.)

<SOHC-California>



<DOHC (Non Turbo) – Federal, Canada>



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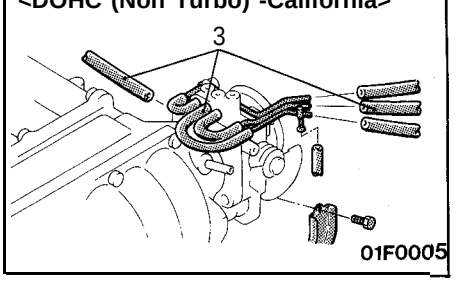
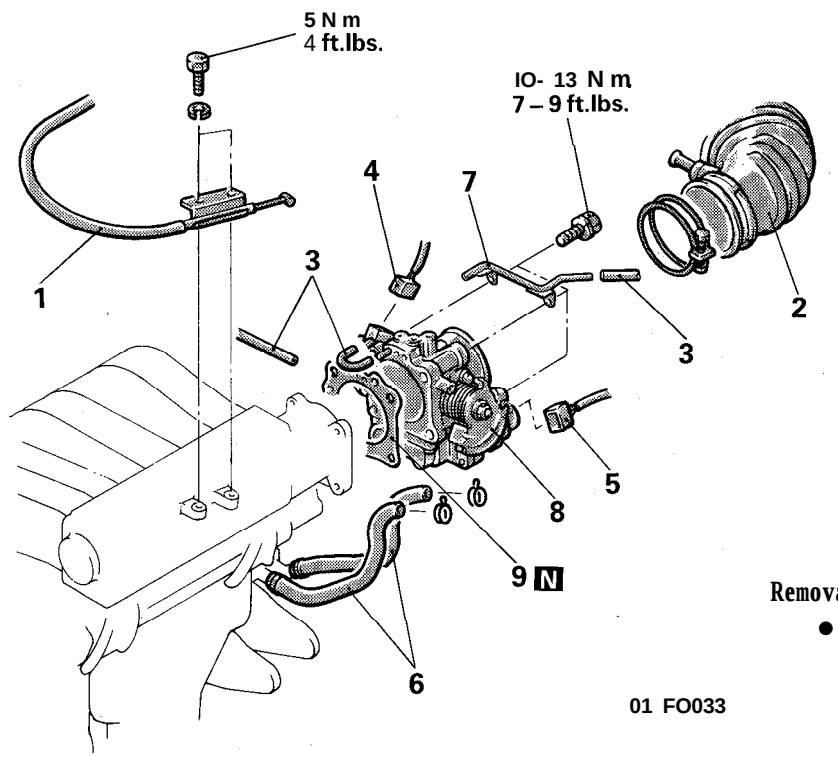
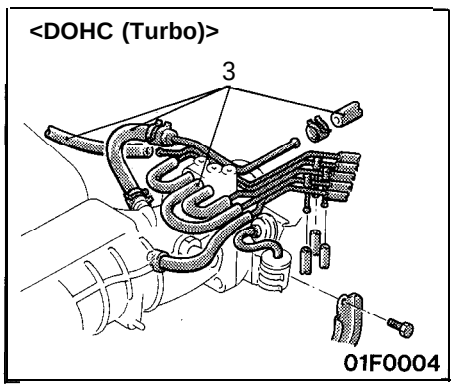


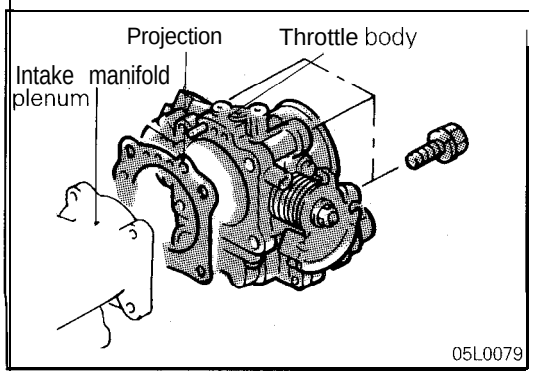


<DOHC (Turbo)>



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

NOTE
The layout of vacuum hoses (No. 3) of the construction drawing is for the SOHC – Federal, Canada.



SERVICE POINTS OF INSTALLATION

9. INSTALLATION OF GASKET

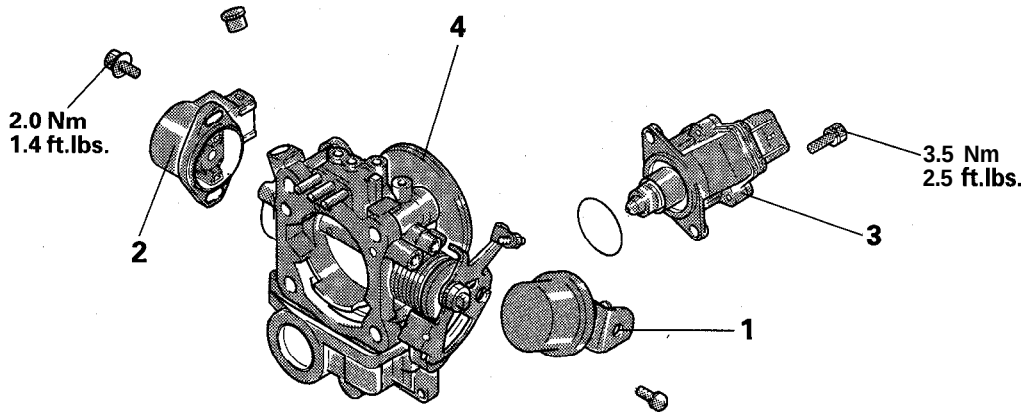
Install the gasket so that the projection is where shown in the illustration.

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.14F-3.

DISASSEMBLY AND REASSEMBLY



Disassembly steps

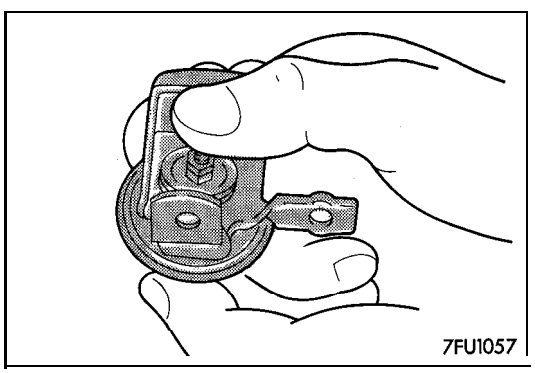
1. Dash pot <Turbo only>
• a 2. Throttle position sensor (within closed throttle position switch)
3. Idle air control motor assembly
4. Throttle body

7FU1338

SERVICE POINTS OF DISASSEMBLY

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 air control motor mounting screws, as adhesive has been applied to these screws.**



INSPECTION

(1) Push dash pot rod in lightly and confirm resistance.

NOTE

1. Resistance increases as the rod is pushed harder.
2. If the rod can be pushed in with no resistance, either the diaphragm or check valve is faulty.

(2) Release finger and confirm rod returns to its original position quickly.

NOTE

If rod returns slowly, the check valve is faulty.

CLEANING THROTTLE BODY PARTS

(1) Clean all throttle body parts.
Do not use solvent to clean the following parts:

- Throttle position sensor (closed throttle position switch)
- Idle air control motor

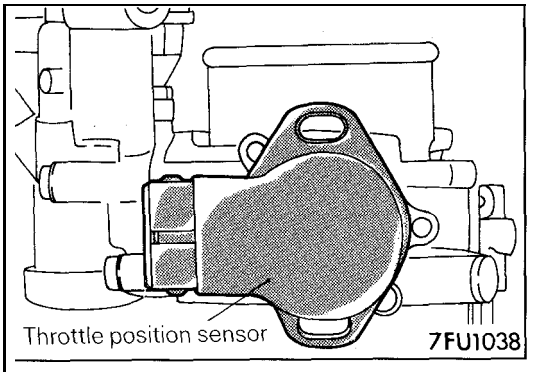
If these parts are immersed in solvent, their insulation will deteriorate.
Wipe them with cloth only.

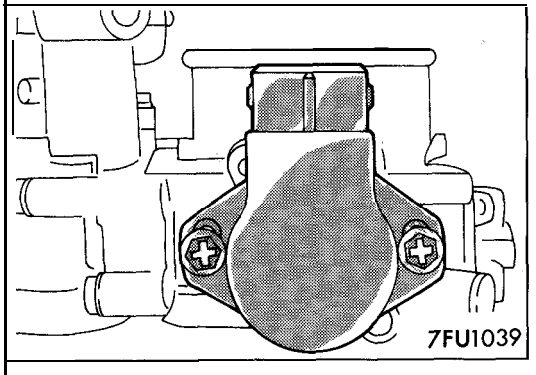
(2) Check if the vacuum port or passage is clogged. Use compressed air to clean the vacuum passage.

SERVICE POINT OF REASSEMBLY

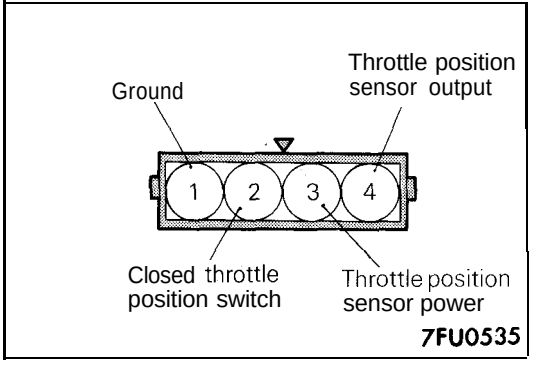
4. INSTALLATION OF THROTTLE POSITION SENSOR

(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 (closed throttle 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

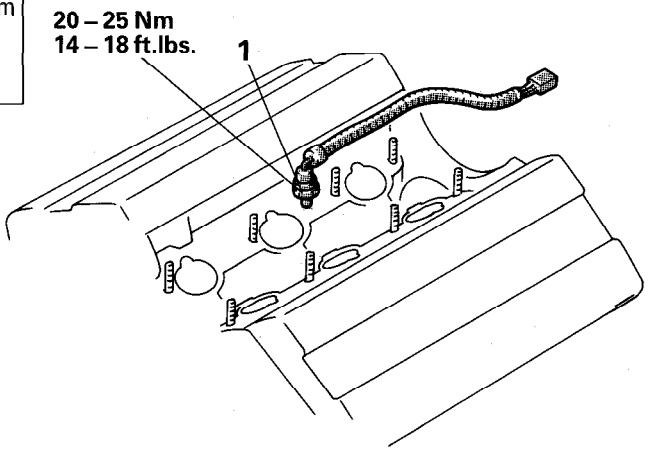
If there is not continuity with the throttle valve fully closed, turn the sensor in the counterclockwise direction, and then check again.

(5) If the above specifications are not met, replace the closed throttle position switch.

KNOCK SENSOR

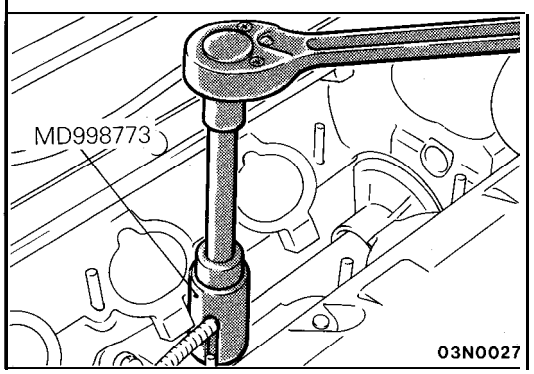
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Removal and installation of the Intake Manifold Plenum (Refer to GROUP 11 – Intake Manifold Plenum.)
- Removal and installation of the Intake Manifold (Refer to GROUP 11 – Intake Manifold.)



Removal steps

◆◆ • 4 1. Knock sensor



SERVICE POINT OF REMOVAL

1. REMOVAL OF KNOCK SENSOR

SERVICE POINT OF INSTALLATION

1. INSTALLATION OF KNOCK SENSOR

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

FUEL SUPPLY AND ENGINE CONTROL

CONTENTS

SPECIFICATIONS

GENERAL SPECIFICATIONS

Items	Specifications
Fuel	
Tank capacity dm³ (gal.)	75 (19.8)
Return system	Equipped
Filter	High pressure type

SERVICE SPECIFICATIONS

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

SEALANT

Items	Specified sealant
Accelerator arm and return spring	MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent
Fuel tank hole cover	MOPAR Rope Caulk Sealer 3/16 x 80" roll Part No. 4026044 or equivalent

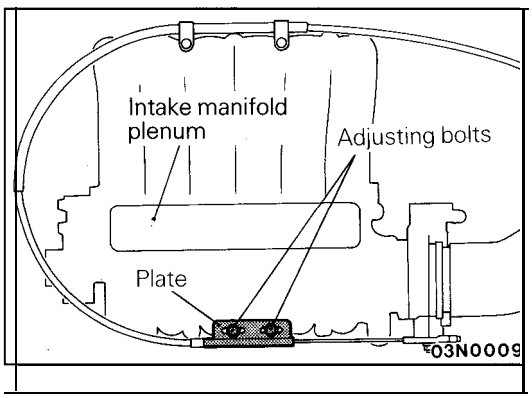
TROUBLESHOOTING

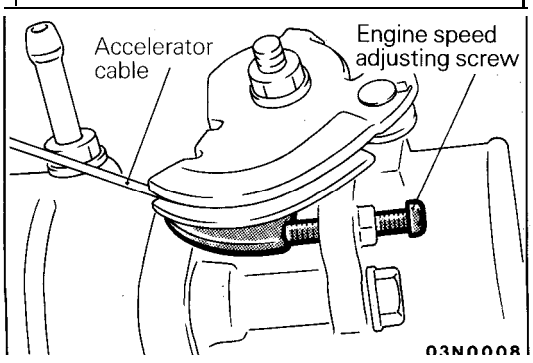
ACCELERATOR CABLE AND ACCELERATOR PEDAL

Symptom	Probable cause	Remedy
Throttle valve will not fully open or close	Misadjusted accelerator cable	Adjust
	Misadjusted automatic speed-control cable	Adjust
	Broken return spring	Replace
	Throttle lever malfunction	Replace
Accelerator pedal operation not smooth (over acceleration)	Accelerator pedal wrongly tightened	Repair
	Misinstalled accelerator cable	Repair
	Accelerator cable requires lubrication	Lubricate or replace

FUEL TANK AND FUEL LINE

Symptom	Probable cause	Remedy
Engine malfunctions due to insufficient fuel supply	Bent or kinked fuel pipe or hose	Repair or replace
	Clogged fuel pipe or hose	Clean or replace
	Clogged fuel filter or in-tank fuel filter	Replace
	Water in fuel filter	Replace the fuel filter or clean the fuel tank and fuel line
	Dirty or rusted fuel tank interior	Clean or replace
	Malfunctioning fuel pump (Clogged filter in the pump)	Replace
Evaporative emission control system malfunctions (When tank cap is removed, pressure releasing noise is heard)	Mispiping of vapor line	Correct
	Disconnected vapor line piping joint	Correct
	Folded, bent, cracked or clogged vapor line	Replace
	Faulty fuel tank filler tube cap	Replace
	Malfunctioning fuel tank pressure control valve	Replace





SERVICE ADJUSTMENT PROCEDURES

ACCELERATOR CABLE INSPECTION AND ADJUSTMENT

For models equipped with the cruise control system, refer to P. 14G-22.

(1) Check the accelerator cable for sharp bends.
(2) Check to ensure that the throttle lever is in contact with the engine speed adjusting screw.
(3) Check to ensure that the inner cable play is within the standard limits.

Standard value:

<M/T>	**1 – 2 mm (.04 – .08 in.)**
<A/T>	**3 – 5 mm (.12 – .20 in.)**

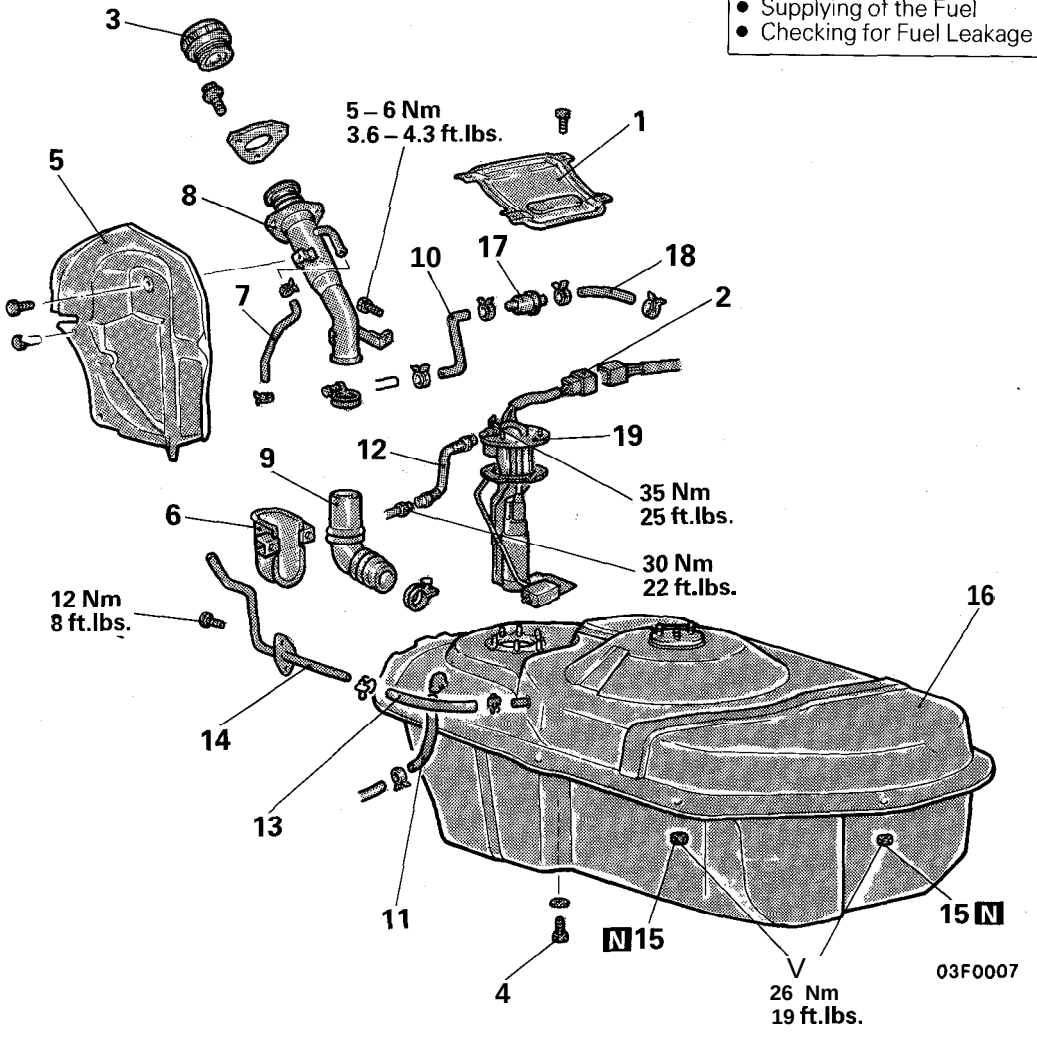
(4) If the play is out of the standard limits, loosen the adjusting bolts, slide the plate so that the inner cable play will fall within the standard limits, and then retighten the adjusting bolts.

FUEL TANK

REMOVAL AND INSTALLATION

Pre-removal Operation
- Draining of the Fuel
- Release of Residual Pressure from High Pressure Hose. (Refer to P.14A-161.)

Post-installation Operation
- Supplying of the Fuel
- Checking for Fuel Leakage



Removal steps

- ◆a 1. Fuel gauge cover
  2. Fuel pump and fuel gauge unit assembly connector
  3. Fuel tank cap
  4. Drain plug
  5. Splash shield
  6. Fuel tank filler tube protector
- ◆+ 7. Vapor hose
  8. Fuel tank filler tube
  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. Fuel tank pressure control valve
- ◆◆ 18. Vapor hose
- ◆◆ 19. Fuel pump and fuel gauge unit assembly

SERVICE POINT OF REMOVAL

12. DISCONNECTION OF HIGH PRESSURE FUEL HOSE

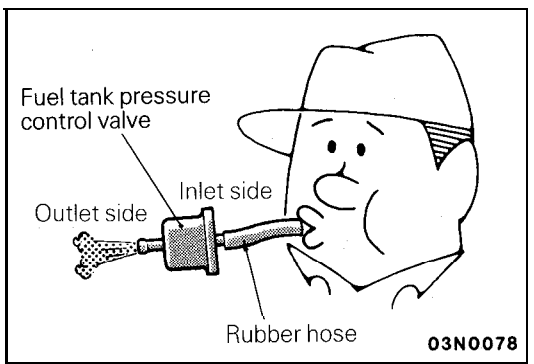
Disconnect the hose from body main pipe first and then from fuel pump.

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

- Check the hoses and the pipes for crack or damage.
- Check the fuel tank filler tube cap for malfunction.
- Check the fuel tank for deformation, corrosion or crack.
- Check the fuel tank for dust or foreign material.

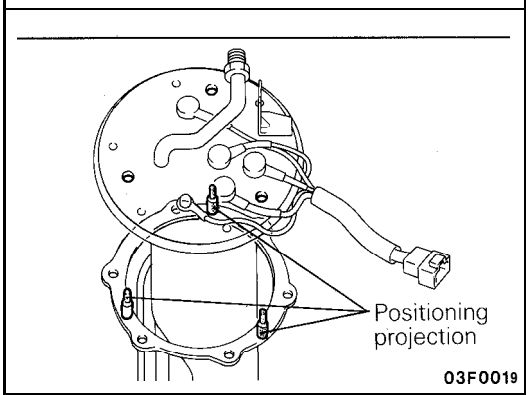
NOTE
If the inside of the fuel tank is to be cleaned, use any one of the following:
(1) Kerosene
(2) Trichloroethylene
(3) A neutral emulsion type detergent



FUEL TANK PRESSURE CONTROL VALVE REPLACEMENT

Connect a clean rubber hose to the fuel tank pressure control valve and check for operation.

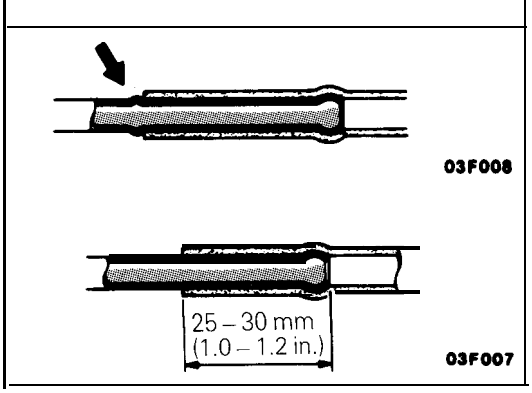
Inspection procedure	Normal condition
Lightly blow from the inlet (fuel tank) side	Air passes through after a slight resistance
Lightly blow from the outlet (canister) side	Air passes through



SERVICE POINTS OF INSTALLATION

19. INSTALLATION OF FUEL PUMP AND FUEL GAUGE UNIT ASSEMBLY

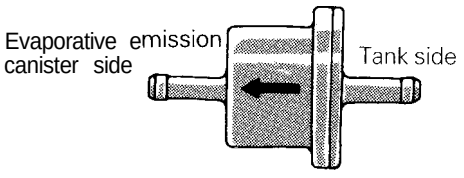
Align the three positioning projections of the packing with the holes in the fuel pump and fuel gauge unit assembly.



18.13. 10. 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.

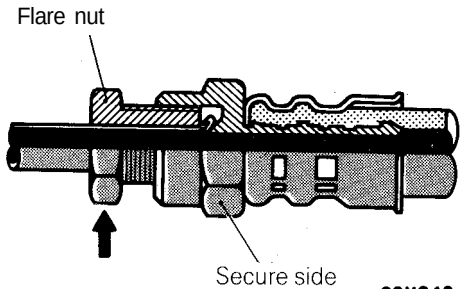
Standard value: 25 – 30 mm (1.0 – 1.2 in.)



DO3041

17. INSTALLATION OF FUEL TANK PRESSURE CONTROL VALVE

Install so that the fuel tank pressure control valve is facing in the direction shown in the illustration.

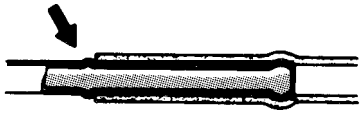


03Y043

12. CONNECTION OF HIGH PRESSURE FUEL HOSE

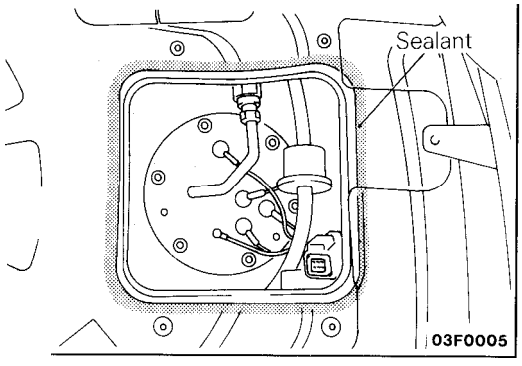
Temporarily tighten the flare nut by hand, and then tighten it to the specified torque, being careful that the high pressure fuel hose does not become twisted.

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


03F008

11. CONNECTION OF RETURN HOSE

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



03F0005

1. INSTALLATION OF FUEL GAUGE COVER

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

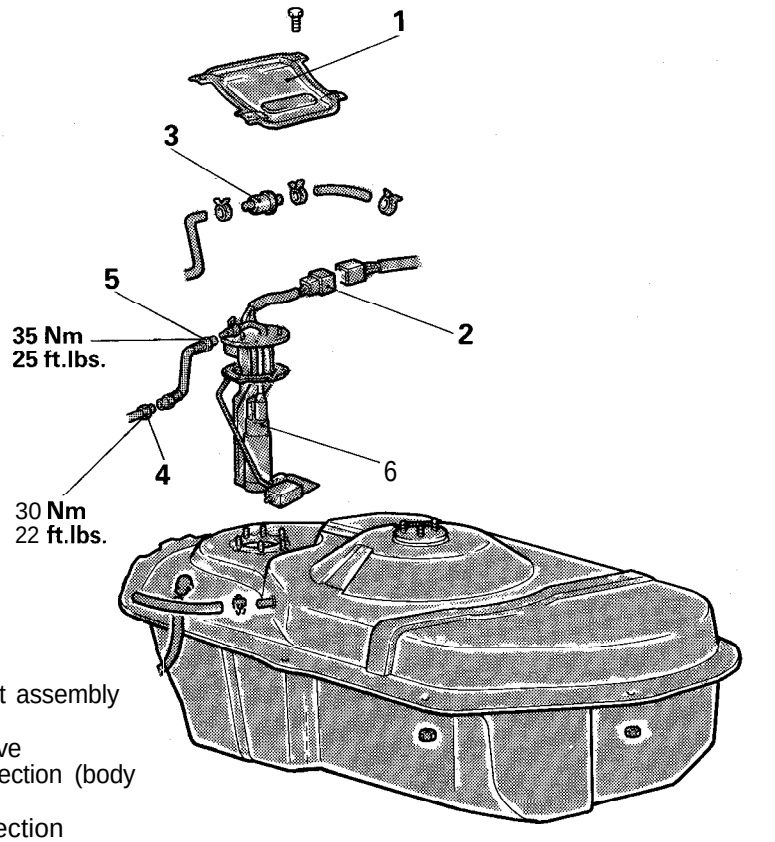
Specified sealant: MOPAR Rope Caulk Sealer 3/16 x80″ roll Part No. 4026044 or equivalent

FUEL PUMP AND FUEL GAUGE UNIT ASSEMBLY AND FUEL TANK PRESSURE CONTROL VALVE

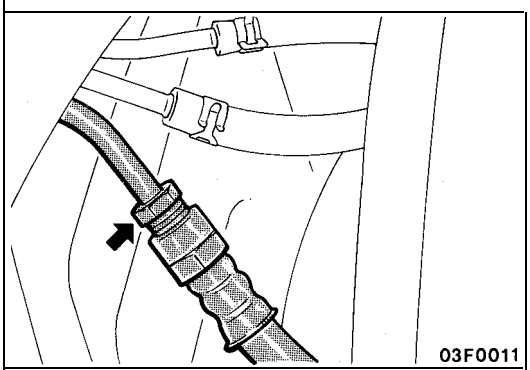
REMOVAL AND INSTALLATION

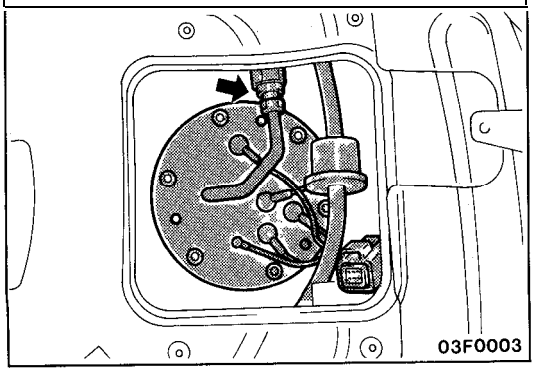
Pre-removal Operation
- Draining of the Fuel
- Release of Residual Pressure from High Pressure Hose (Refer to P.14A-161.)

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 pressure control valve
- ⧫ W◆◆ 4. High pressure fuel hose connection (body side)
- ◆◆ ◆◆ 5. High pressure fuel hose connection (fuel pump side)
- ⧫ a 6. Fuel pump and fuel gauge unit assembly





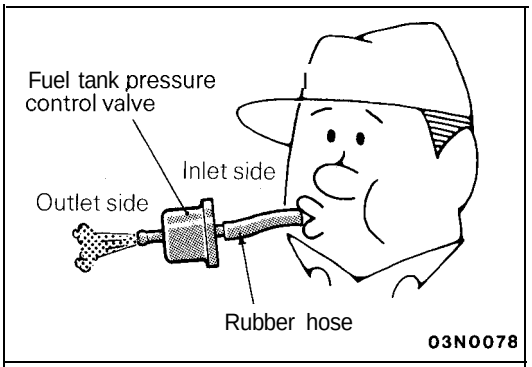
SERVICE POINTS OF REMOVAL

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.

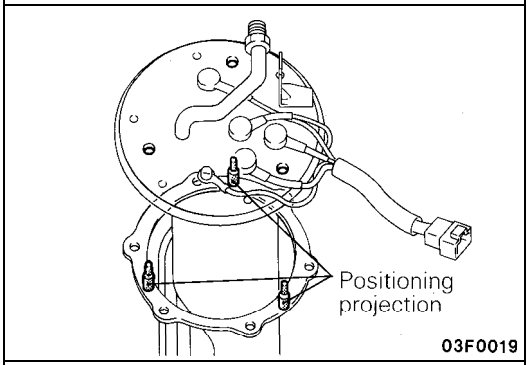


FUEL TANK PRESSURE CONTROL VALVE REPLACEMENT

Connect a clean rubber hose to the fuel tank pressure control valve and check for operation.

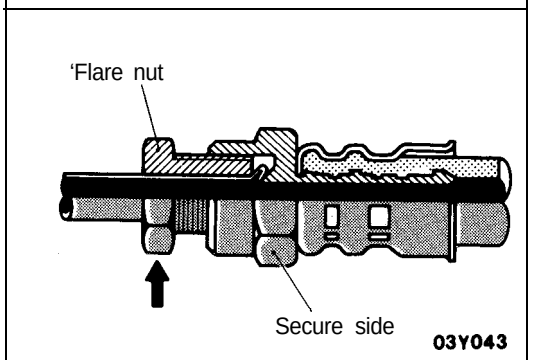
Inspection procedure	Normal condition
Lightly blow from the inlet (fuel tank) side	Air passes through after a slight resistance
Lightly blow from the outlet (canister) side	Air passes through

SERVICE POINTS OF INSTALLATION



6. INSTALLATION OF FUEL PUMP AND FUEL GAUGE UNIT ASSEMBLY

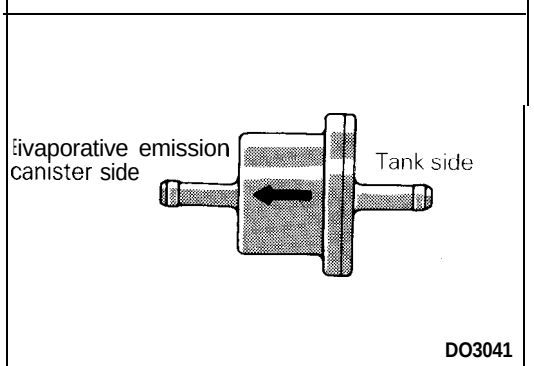
Align the three positioning projections of the packing with the holes in the fuel pump and fuel gauge unit assembly.



5. 4. CONNECTION OF HIGH PRESSURE FUEL HOSE

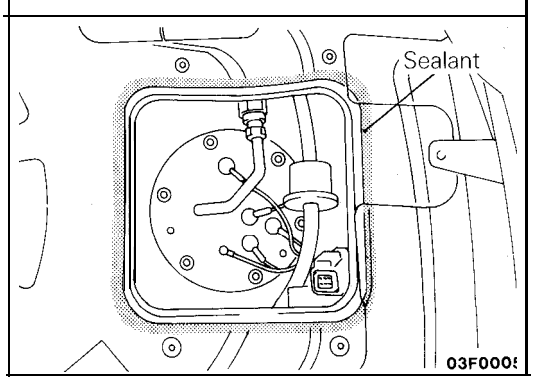
Temporarily tighten the flare nut by hand, and then tighten it to the specified torque, being careful that the high pressure fuel hose does not become twisted.

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



3. INSTALLATION OF FUEL TANK PRESSURE CONTROL VALVE

Install so that the fuel tank pressure control valve 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.

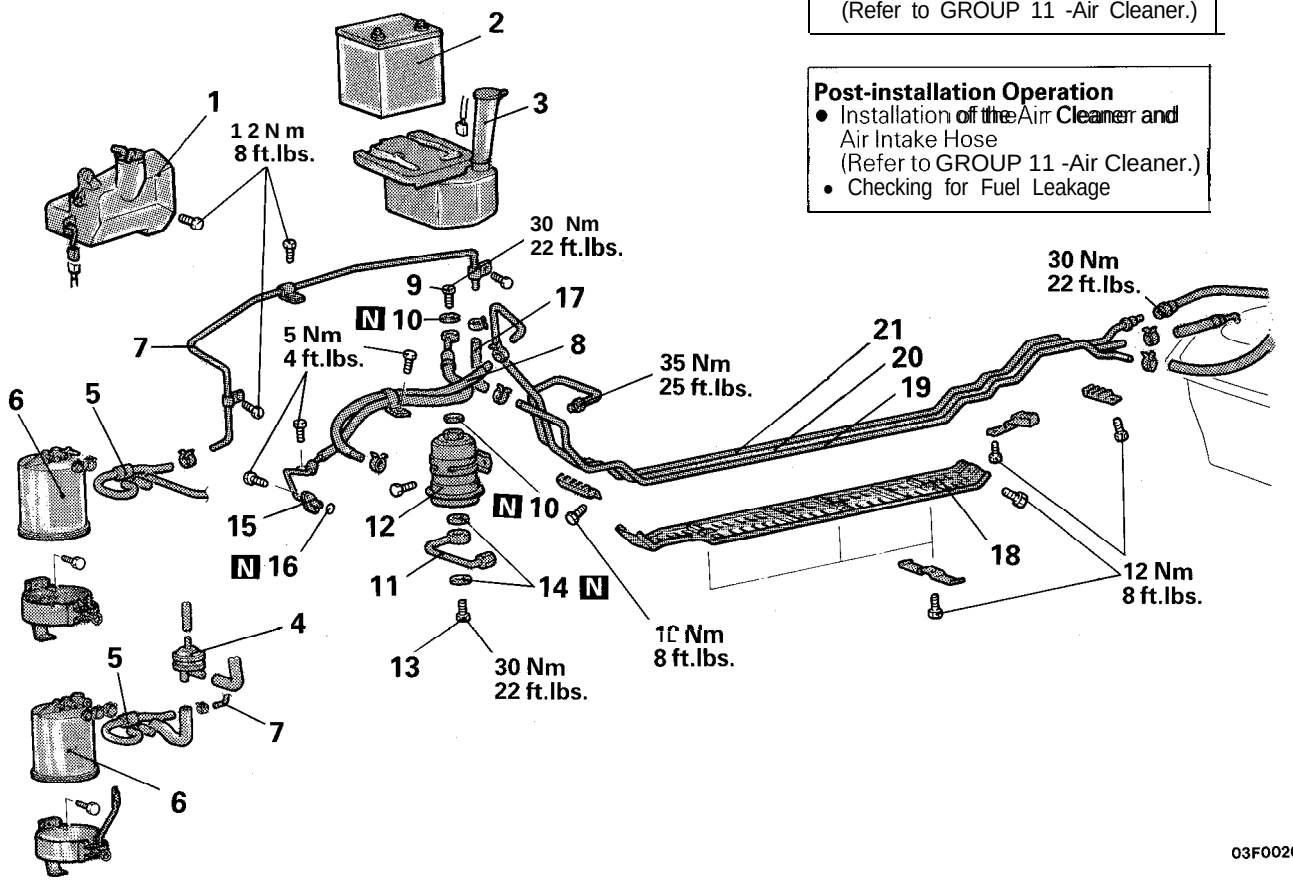
Specified sealant: MOPAR Rope Caulk Sealer 3/16 x 80" roll Part No. 4026044 or equivalent

FUEL LINE AND VAPOR LINE

REMOVAL AND INSTALLATION

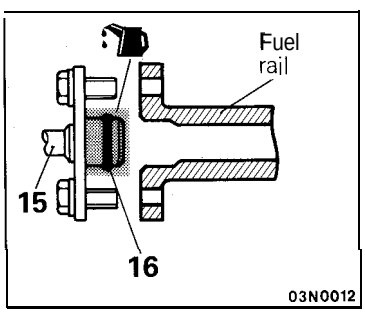
Pre-removal Operation
- Release of Residual Pressure from High Pressure Hose. (Refer to P.14A-161.)
- Removal of the Air Cleaner and Air Intake Hose (Refer to GROUP 11 -Air Cleaner.)

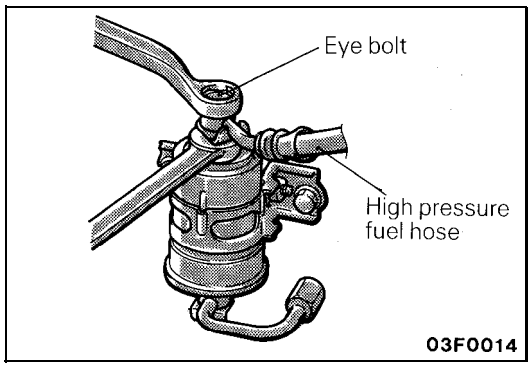
Post-installation Operation
- Installation of the Air Cleaner and Air Intake Hose (Refer to GROUP 11 -Air Cleaner.)
- Checking for Fuel Leakage



Removal steps

1. Reserve tank
2. Battery
3. Battery tray with washer tank assembly
4. Purge control valve
- ◆◆ 5. Fuelvapor hose
6. Evaporative emission canister
7. Vapor pipe assembly
- ● * 8. Fuel return hose
- ◆◆ 9. Eye bolt
10. Gasket
11. High pressure fuel pipe
- ● + 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





SERVICE POINTS OF REMOVAL

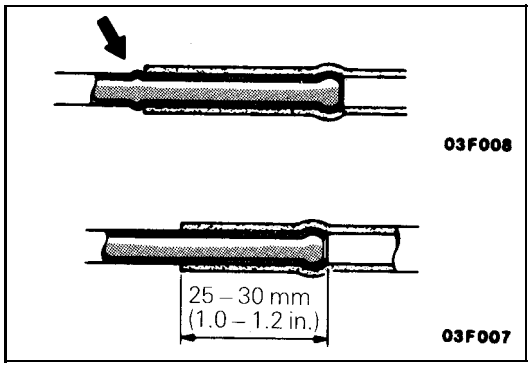
9. 13. REMOVAL OF EYE BOLT

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

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



SERVICE POINTS OF INSTALLATION

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

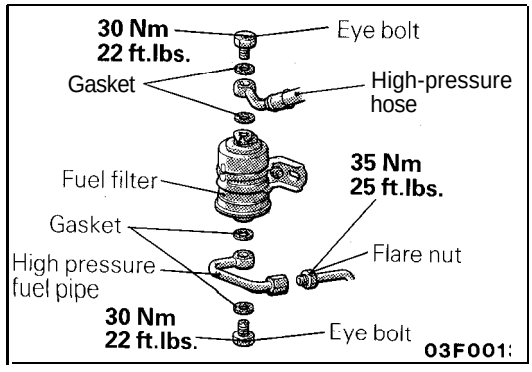
(1) If the fuel pipe has a stepped part, connect the fuel hose to the pipe securely, up to the stepped part, as shown in the illustration.
(2) If the fuel pipe does not have a stepped part, connect the fuel hose to the pipe securely, so that it is the standard value.

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

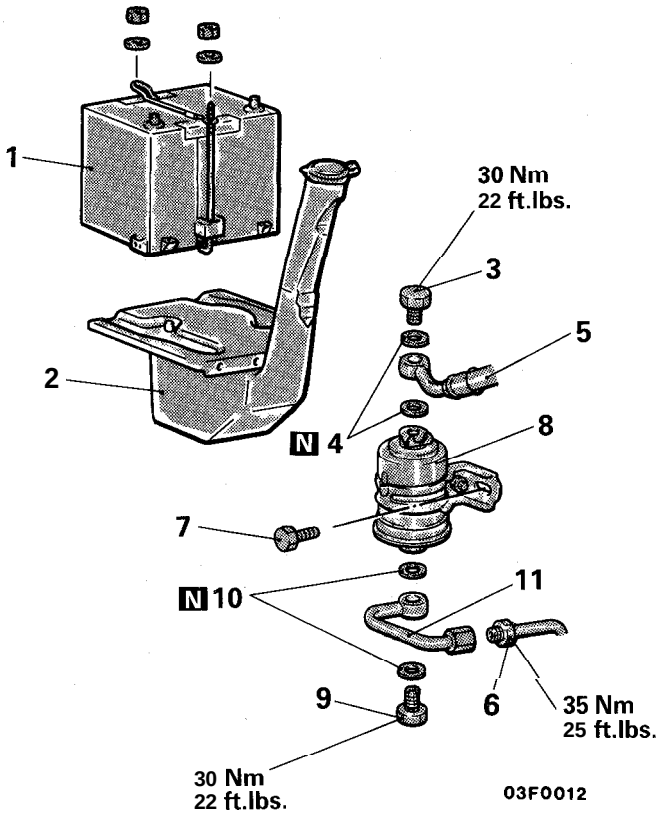
(1) When installing the fuel filter, first temporarily install the filter to the filter bracket; then insert the main pipe at the connector part of the high pressure fuel pipe, and manually screw in the main pipe's flare nut.
(2) Holding the fuel filter nut, tighten the fuel main pipe's flare nut and eye bolt at the specified torque. Then tighten the filter to the bracket.

FUEL FILTER

REMOVAL AND INSTALLATION

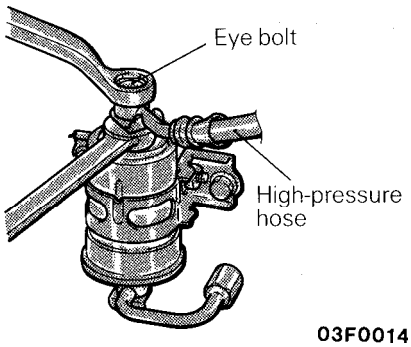
Pre-removal Operation
- Release of Residual Pressure from High Pressure Hose. (Refer to P.14A-161.)

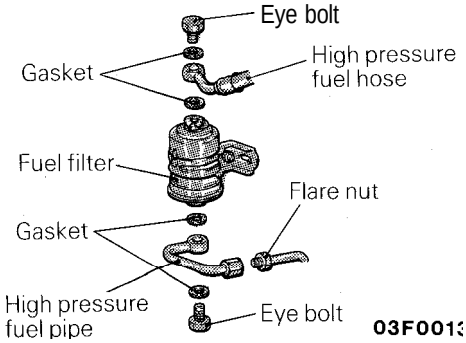
Post-installation Operation
- Checking for Fuel Leakage



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

securely.

Caution
Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure

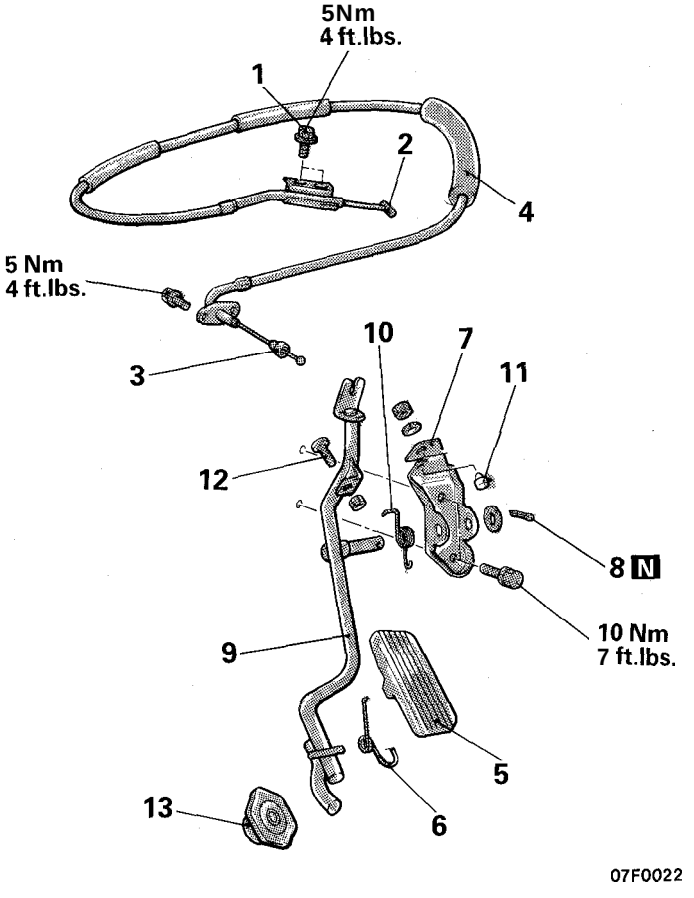
SERVICE POINTS OF INSTALLATION

8. INSTALLATION OF FUEL FILTER

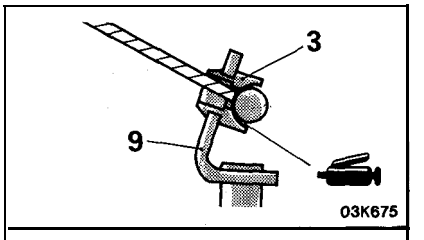
(1) When installing the fuel filter, first temporarily install the

ENGINE CONTROL

REMOVAL AND INSTALLATION



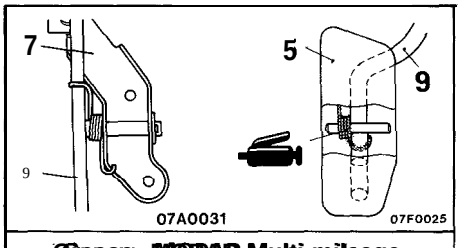
Post-installation Operation
- Accelerator Cable Adjustment (Refer to P.14F-3.)



Grease: MOPAR Multi-mileage Lubricant Pat-t No. 2525035 or equivalent

Removal steps

1. Adjusting bolt
2. Connection of throttle body side inner cable
3. Bushing
4. Accelerator cable
5. Accelerator pedal
6. Spring
7. Accelerator arm bracket
8. Split pin
9. Accelerator arm
10. Return spring
11. Accelerator arm stopper
12. Bolt <A/T>
13. Stopper



Grease: MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent

INSPECTION

- Check the inner and outer cable for damage.
- Check the cable for smooth movement.
- Check the accelerator arm for bending.
- Check the return spring for deterioration.
- Check the connection of bushing to end metal fitting.

CRUISE CONTROL SYSTEM

CONTENTS

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

WARNING!

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

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

(3) CHRYSLER dealer personnel must thoroughly review this manual, and especially its GROUP 23B – Supplemental Restraint System (SRS) and GROUP 0 – Maintenance Service, before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning light, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

SPECIFICATIONS

GENERAL SPECIFICATIONS

Items	Specifications
Main switch	
Rated load A	1.2
Voltage drop V	0.1 or less
Auto-cruise control switch	
Rated load mA	
SET	3
RESUME	6
CANCEL	10
Stop light switch (for cruise control)	
Rated load A	0.1 -0.9
Voltage drop (at rated load) V	0.15 or less
Clutch switch	
Rated load A	0.1 – 1.5
Voltage drop (at rated load) V	0.15 or less
Auto-cruise control unit	
Range of speed control km/h (mph)	40 – 200 (25 – 124)
Vacuum pump assembly	
Vacuum pump	
Type	Diaphragm type
Rated load A	3.0 or less
Control valve, release valve	
Rated load A	0.4 or less
Actuator	
Drive system	Vacuum type
Stroke mm (in.)	38 – 42 (1.5 – 1.7)

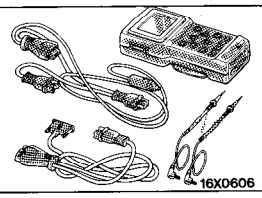
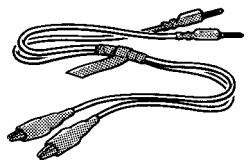
SERVICE SPECIFICATIONS

Items	Specifications
Accelerator cable play mm (in.)	
<M/T>	0 – 1 (0 – .04)
<A/T>	2 – 3 (.08 – .12)
Throttle cable mm (in.)	1 – 2 (.04 – .08)
Cruise control cable mm (in.)	1 – 2 (.04 – .08)
Resistance between terminals for control valve and relief valve in vacuum pump Ω	50-60

LUBRICANTS

Items	Specified lubricants	Quantity
Pedal side of accelerator cable	MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent	As required

SPECIAL TOOL

Tool number and tool name		Replaced by Miller tool number	Application
	MB991502 Scan tool (MUT-II)	DRB-II Scan tool	Checking of the diagnostic output
	MB991 529 Diagnostic trouble code check harness	MB99 1529	Inspection of cruise control system using a voltmeter

TROUBLESHOOTING

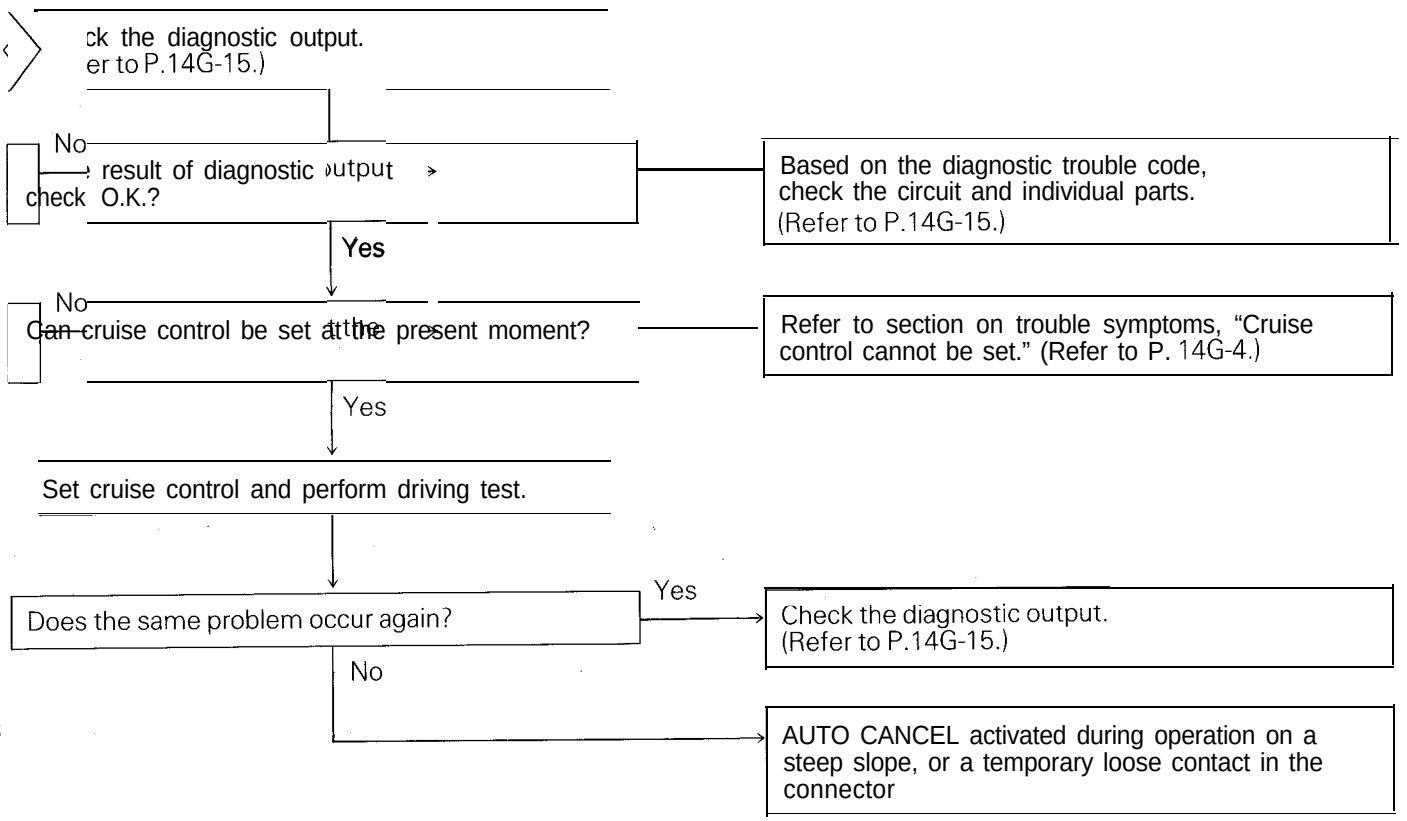
PRELIMINARY INSPECTION

Check the following points and repair defective points, if any, before troubleshooting.

(1) Check that the vacuum pump assembly, link assembly, actuator and all cables and vacuum hoses are properly installed and that the cables and vacuum hoses are correctly routed.
(2) Check that the link assembly and all cables move smoothly.
(3) Check each of the cables for excessive play or tension.

TROUBLESHOOTING QUICK REFERENCE CHART

Cruise control system is canceled when cancellation not wanted.
Or, the cruise control system cannot be set after an automatic cancellation.



Cruise control system cannot be set.

NOTE
This chart contains troubleshooting procedures to perform when a problem cannot be detected by on-board diagnostic.

Check input. (Refer to P.14G-16.)

↓

Is the result of input check O.K.?

Yes → Check vacuum pump assembly circuit. (Refer to P.14G-11.)

No ↓

NOTE
If the results of checks on the vacuum pump assembly circuit and actuator parts (refer to P.14G-24.) 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.14G-7
	Open circuit in control switch circuit	Replace control switch or repair harness.	P.14G-8
	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.14G-8
Even when RESUME switch is set to OFF, code No. 22 does not go away.	RESUME switch ON malfunction	Replace control switch.	P.14G-8
Even when CANCEL switch is set to OFF, code No. 27 does not go away.	CANCEL switch ON malfunction	Replace control switch.	P.14G-8
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.14G-12
Even when brake pedal is released, code No. 23 does not go away.			
Even when clutch pedal is released, code No. 26 does not go away. <M/T>	Defective clutch pedal position switch circuit	Replace clutch pedal position switch or repair harness.	P.14G-12
Even when select lever is placed in any position other than "N" and "P", code No. 26 does not go away. <A/T>	Defective park/neutral position switch circuit	Replace park/neutral position switch or repair harness.	P.14G-13
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.14G-10
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.			

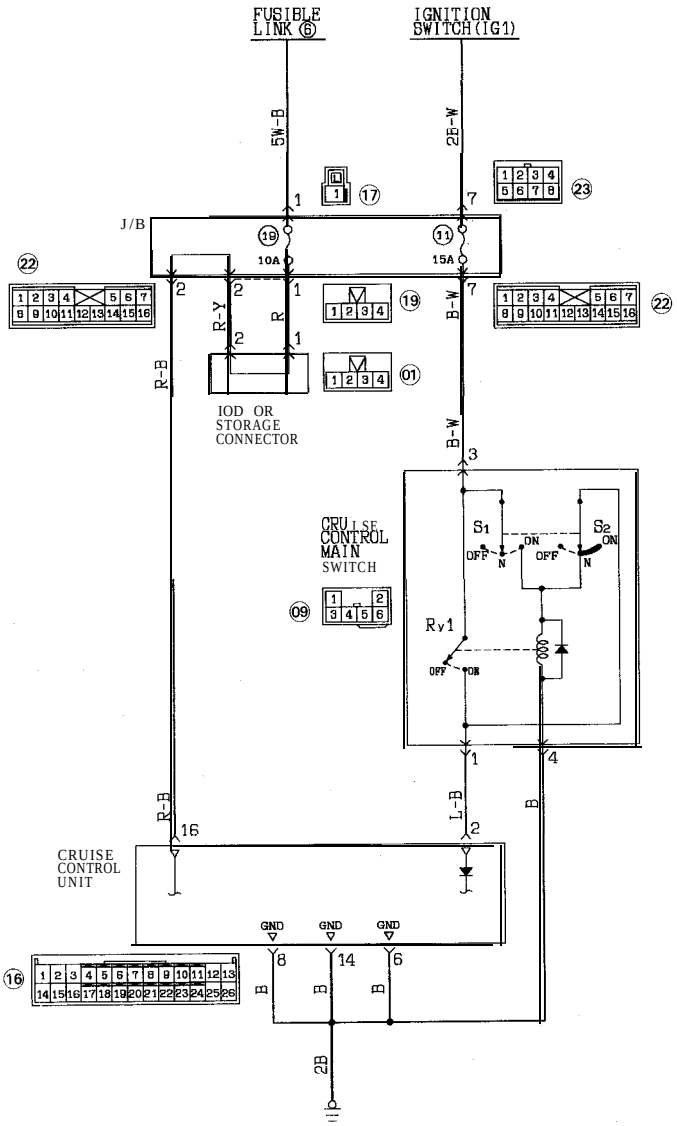
Trouble symptom	Probable cause	Check chart No.	Remedy
• The set vehicle speed varies greatly upward or downward. • "Hunting" (repeated alternating acceleration and deceleration) occurs after setting is made.	Malfunction of the vehicle speed sensor circuit	No. 4	Repair the vehicle speed sensor system, or replace
	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 pedal position switch input circuit	If the input check code No. 26 indicates a malfunction. No. 7	Repair the harness, or repair or replace the clutch pedal position switch.
	Clutch switch improper installation (won't switch ON)		
	Malfunction of the ECU	–	Replace the ECU.
The cruise control system is not canceled when the shift lever is moved to the "N" position. <A/T> (It is canceled, however, when the brake pedal is depressed.)	Damaged or disconnected wiring of park/neutral position switch input circuit	If the input check code No. 26 indicates a malfunction. No. 8	Repair the harness, or repair or replace the park/neutral position switch.
	Improper adjustment of park/neutral position switch		
	Malfunction of the ECU	–	Replace the ECU.
Cannot decelerate by using the SET switch.	Temporary damaged or disconnected wiring of control switch input circuit	No. 2	Repair the harness or replace the control switch
	Vacuum pump assembly circuit poor contact	No. 5	Repair the harness or replace the vacuum pump assembly.
	Malfunction of the vacuum pump assembly		
	Malfunction of the ECU	–	Replace the ECU.

NOTE
ECU: Electronic control unit

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 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		
Overdrive is not canceled during fixed speed driving <A/T>	Malfunction of circuit related to overdrive cancellation, or malfunction of ECU	No. 10	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**



KX35-AK-R1301

DESCRIPTION OF OPERATION

The power is supplied through the ignition switch (IG_1) and cruise control main switch to the control unit.

1. When the cruise control main switch is set to ON with the ignition switch at ON, the current from switch S_1 flows through relay Ry_1 in the switch. Accordingly, the contact of relay Ry_1 is closed and the power is supplied to the control unit.
2. When the main switch is released, it automatically returns to the neutral position. Since the current from switch S_2 flows to relay Ry_1, the contact of relay Ry_1 remains closed.
3. When the main switch is set to OFF, current to relay Ry_1 is interrupted. This opens the contact of relay Ry_1 to stop the power supply to the control unit. When the switch is released, it automatically returns to the neutral position, but relay Ry_1 stays in the OFF state.
4. When the ignition switch is set to OFF while relay Ry_1 in the main switch is ON, relay Ry_1 is forced to the OFF state just like when the main switch is set to OFF. Even if the ignition switch is set to ON again, relay Ry_1 stays in the OFF state until the main switch is set to ON.

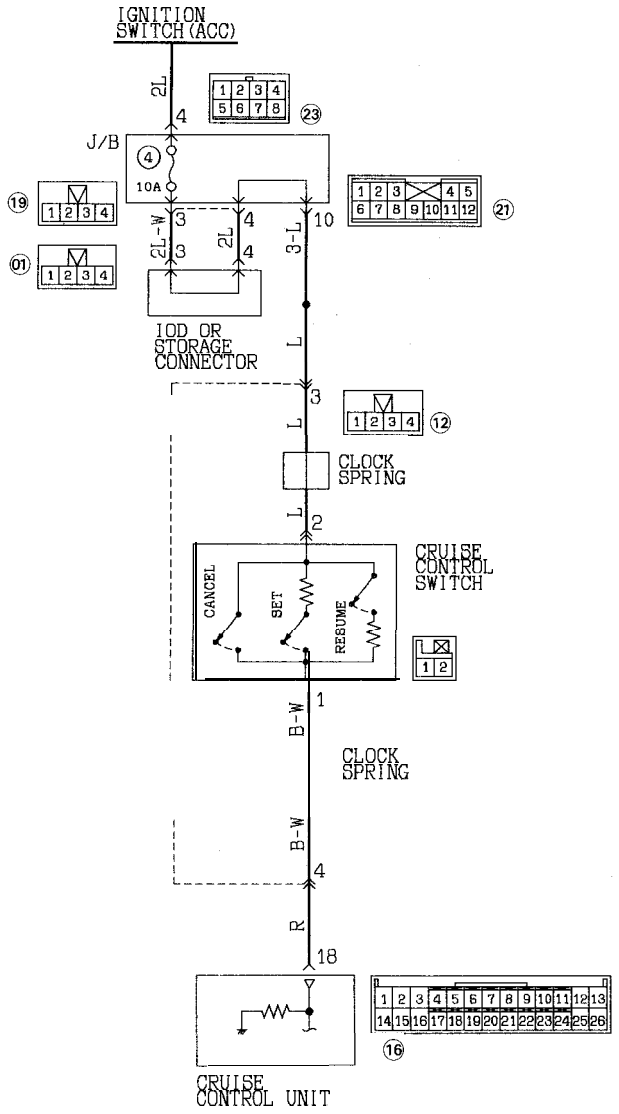
NOTE
The numbers beside each connector correspond to those in the section (P.14G-19) "HARNESS AND COMPONENTS LAYOUT".

TROUBLESHOOTING HINTS

ECU terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
2	Control unit power supply	Main switch ON and neutral position thereafter	Battery positive 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	Battery positive voltage

2	Inspection of control switch circuit



KX35-AK-R1302

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 200 km/h (25 to 124 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 200 km/h (124 mph), the vehicle cruises at approximately 200 km/h (124 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.

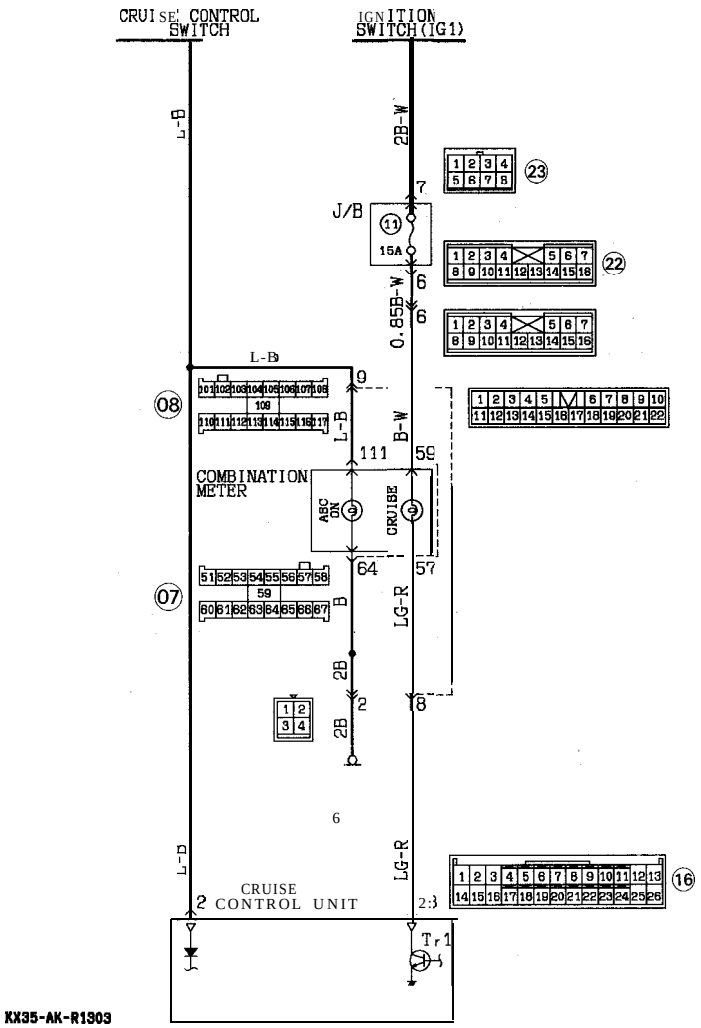
TROUBLESHOOTING HINTS

Diagnosis No.15 (Automatically canceled)

ECU terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
18	Control switch	When all switches are OFF	ov
		When SET switch is ON	3V
		When RESUME switch is ON	6V
		When CANCEL switch is ON	Battery positive voltage

3	Inspection of indicator light circuit



DESCRIPTION OF OPERATION

1. Cruise control ON (ASC ON) indicator light

Located in the combination meter, it lights as soon as the main switch is set to ON.

2. Cruise control (CRUISE) indicator light

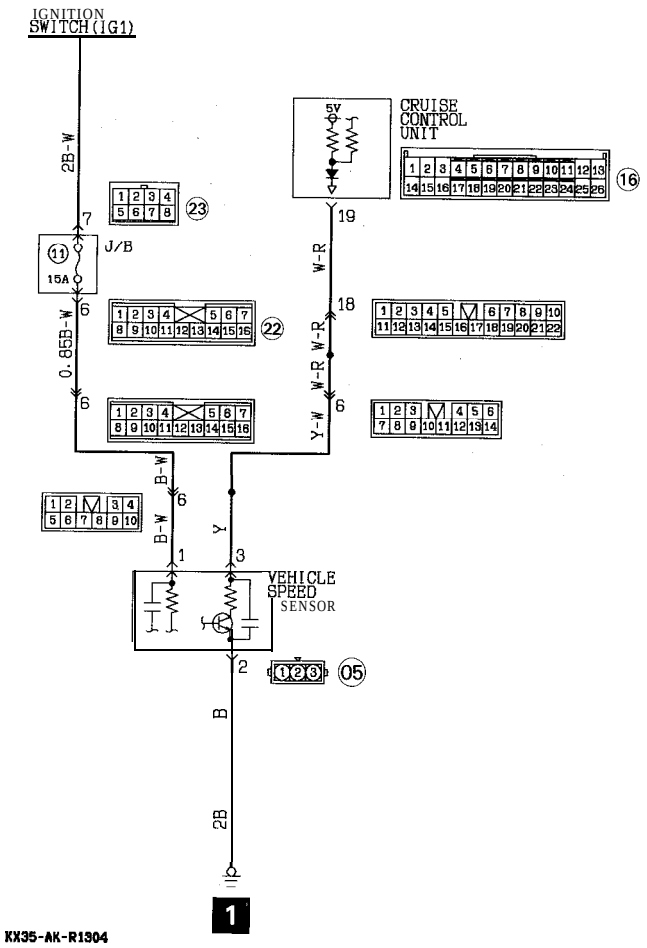
During cruise control operation, transistor Tr_1 in the control unit is kept in the ON state to keep the indicator light on.

TROUBLESHOOTING HINTS

ECU terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
23	Cruise control (CRUISE) indicator light	When cruise control is active	ov
		When cruise control is inactive	Battery positive voltage

4 Inspection of vehicle speed sensor circuit



DESCRIPTION OF OPERATION

The vehicle speed sensor, mounted in the transmission, delivers pulse signals proportional to the rotational speed of the transmission output gear (vehicle speed) to the control unit. (Four pulse signals generated per rotation of the output gear) Since the vehicle speed sensor is of the electronic type, the power is supplied through the ignition switch (IG_1).

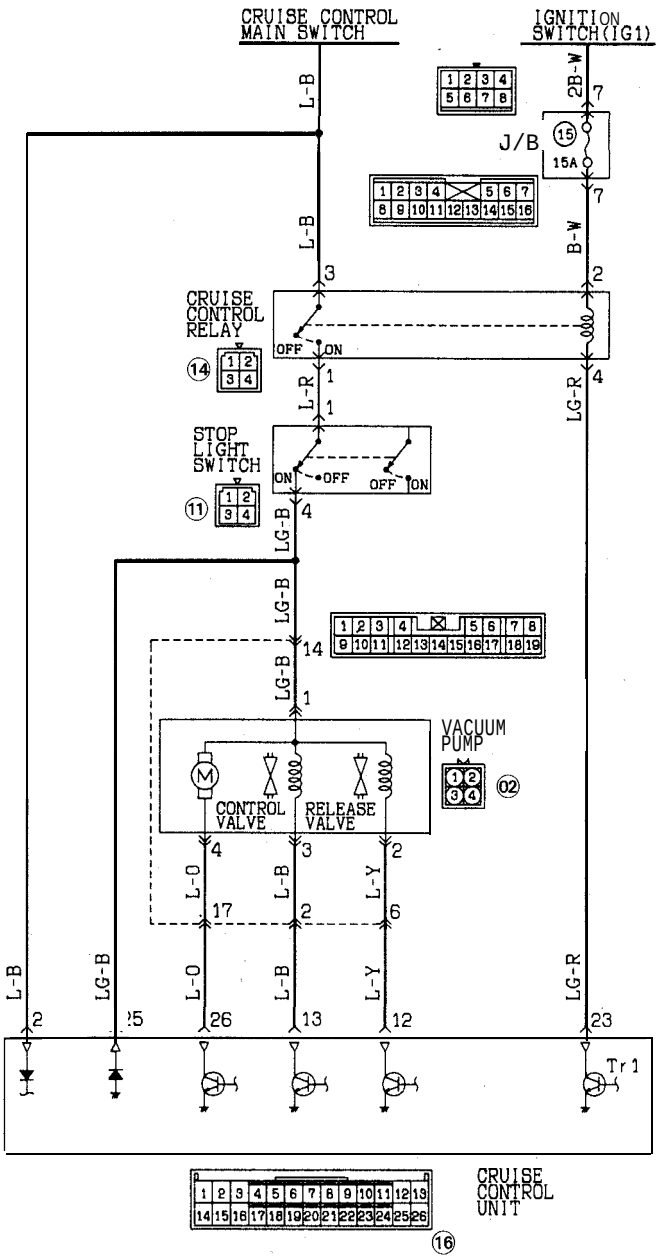
TROUBLESHOOTING HINTS

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-AX-R1303-M4C

DESCRIPTION OF OPERATION

The input signal from the control switch causes transistor Tr_1 to be ON. Accordingly, the cruise control relay is placed in the ON state to supply power to the vacuum pump assembly.

The vacuum pump assembly consists of a diaphragm type negative pressure pump that is driven by a DC motor, and two solenoid valves (control valve and relief valve) and is controlled by the control unit as shown in the following table.
When the brake pedal is depressed during cruise control operation, the power supply to the vacuum pump assembly is cut off.

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

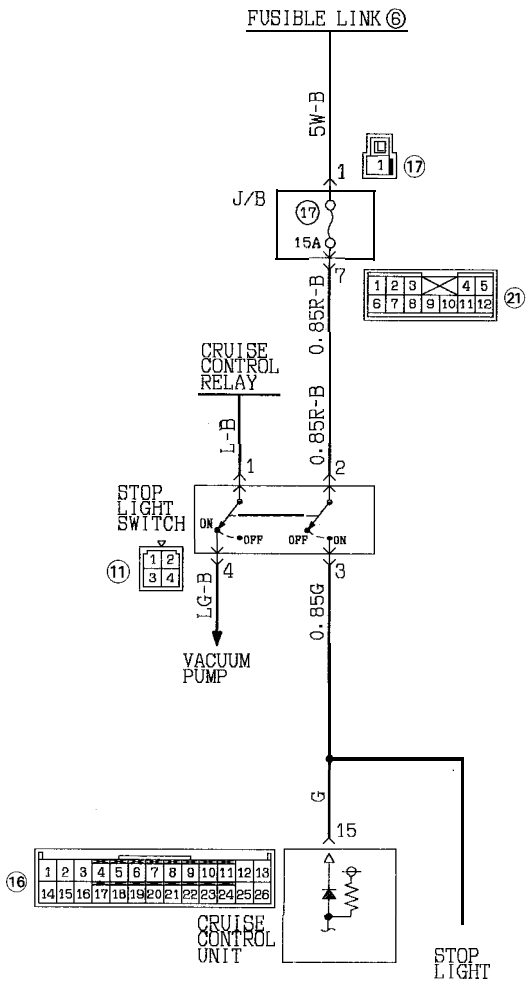
TROUBLESHOOTING HINTS

Diagnosis No. 11 (Automatically canceled)

ECU terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
12	Relief valve drive signal	When relief valve is ON	0V
		When relief valve is OFF	Battery positive voltage
13	Control valve drive signal	When control valve is ON	0V
		When control valve is OFF	Battery positive voltage
26	DC motor drive signal	When DC motor is running	0V
		When DC motor is stationary	Battery positive voltage
25	Surge absorption circuit terminal	When main switch is ON	Battery positive voltage

6 Inspection of stop light switch circuit



KX35-AK-R1306

DESCRIPTION OF OPERATION

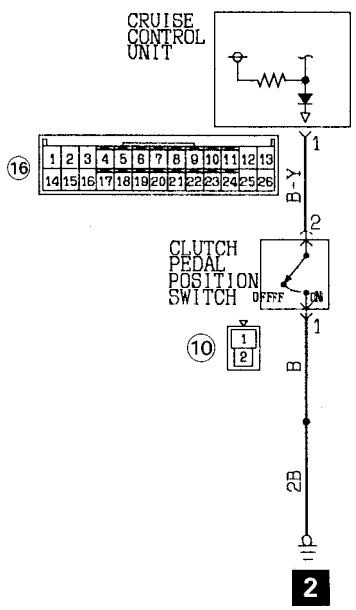
When the brake pedal is depressed during vehicle speed control, the cruise control (NC) contact of the stop light switch is opened to interrupt the power supply to the vacuum pump assembly for cancellation of vehicle speed control. (Refer to P.14G-11.) At the same time, the stop light (NO) contact is 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	Battery positive voltage
		When brake pedal is not depressed	0V

7 Inspection of clutch pedal position switch circuit <M/T>



KX35-AK-R1307A

DESCRIPTION OF OPERATION

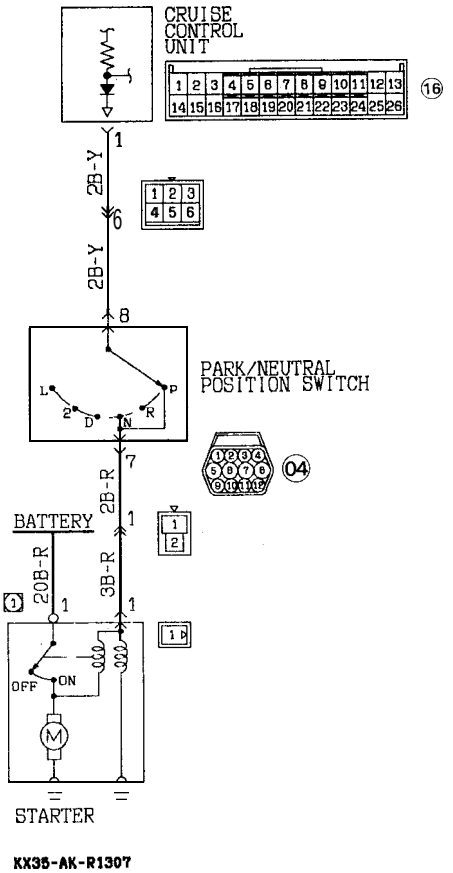
When the clutch pedal is depressed during vehicle speed control, the contact of the clutch pedal position switch is closed. As a result, a cancel signal is input to the control unit which internally interrupts the power supply to the vacuum pump assembly drive circuit for cancellation of vehicle speed control.

TROUBLESHOOTING HINTS

ECU terminal voltage

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

8 Inspection of park/neutral position switch circuit <A/T>



KX35-AK-R1307

DESCRIPTION OF OPERATION

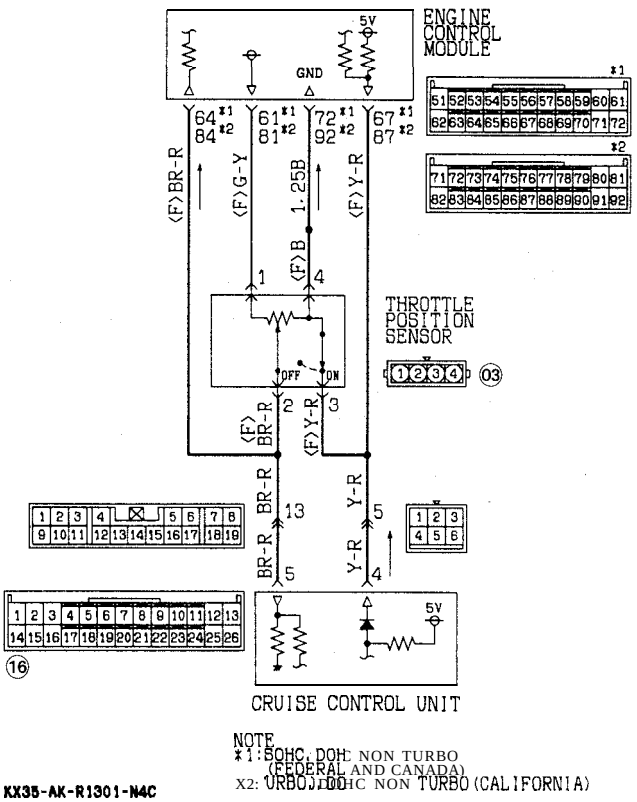
The park/neutral position switch is interlocked with the starter switch.When the gear selector lever is placed in the "N" position during vehicle speed control, a cancel signal is input to the control unit which internally interrupts the power supply to the vacuum pump assembly drive circuit for cancellation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

TROUBLESHOOTING HINTS

ECU terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
1	Park/neutral position switch	Park/neutral position switch in "N" or "P" position	ov
		Park/neutral position switch in "D", "2", "L" or "R"position	Battery positive voltage

9 Inspection of throttle position sensor circuit



NOTE
*1: SOHC, DOHC NON TURBO (FEDERAL AND CANADA)
*2: DOHC NON TURBO (CALIFORNIA)

KX35-AK-R1301-N4C

DESCRIPTION OF OPERATION

The throttle position sensor (with built-in closed throttle position switch) is used for engine control as well as cruise control.
The throttle position sensor sends data to the control unit, regarding the opening of the accelerator. The closed throttle position switch inputs the data to the control unit on whether or not the accelerator pedal is operated.

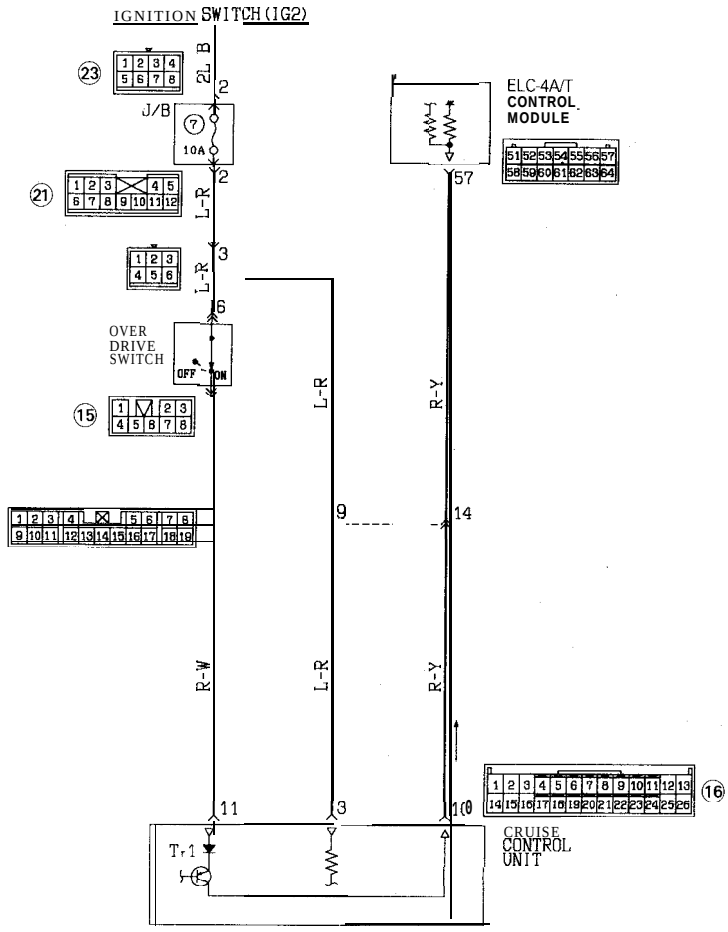
TROUBLESHOOTING HINTS

Diagnosis No. 17 (Not automatically canceled)

ECU terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
4	Closed throttle position switch	When accelerator pedal is depressed	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 circuits associated with overdrive cancel <A/T>



KX35-AK-R1310

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 module.

When the vehicle speed control is in the overdrive mode, if the actual vehicle speed falls more than about 7 km/h (4 mph) below the set vehicle speed or the RESUME switch is turned ON, the cruise control unit forces transistor Tr_1 into the OFF state. This cancels the overdrive mode because no OD switch ON signal is input to the ELC-4A/T control module.

TROUBLESHOOTING HINTS

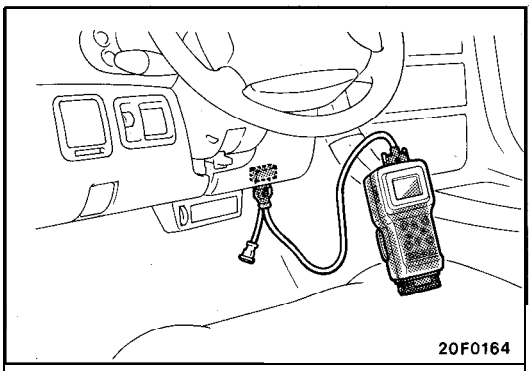
ECU terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
3	OD signal control power supply	When ignition switch is ON	Battery positive voltage
10	ELC-4A/T control module	When overdrive mode is active	Battery positive voltage
		When overdrive mode is inactive	ov
11	OD switch	When OD switch is ON	Battery positive voltage
		When OD switch is OFF	ov

ON-BOARD DIAGNOSTIC CHECKING

On-board diagnostic checking is performed when there has been an automatic cancellation, without cancel switch operation.

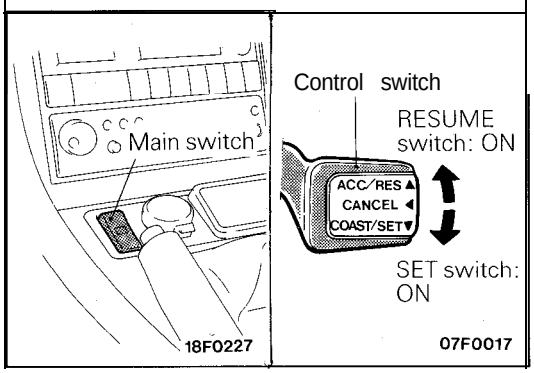
NOTE
Even when the ignition key is placed in the OFF position, all diagnostic trouble codes are stored and retained, until the battery cable is disconnected, to make sure that the problems encountered in the past can be checked.


20F0164

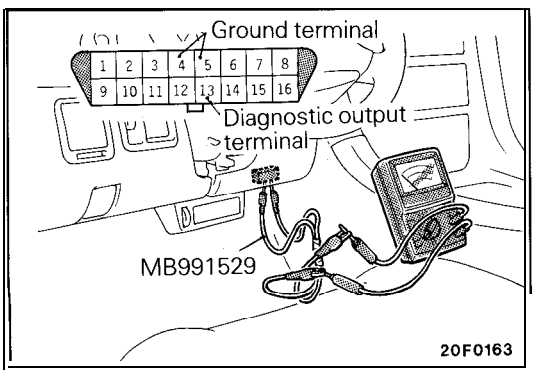
WHEN USING THE SCAN TOOL

(1) Connect the scan tool to the data-link connector to read out the diagnostic trouble codes.

Caution
Turn off the ignition switch beforehand whenever the scan tool is connected or disconnected.



(2) Clear the diagnostic trouble codes by the following procedure.
① Place the ignition switch in the ON position.
② With the SET switch in the ON state, set the main switch to ON. In less than 1 .0 second thereafter, set the RESUME switch to ON.
③ With the SET switch in the ON state again, keep the stop light switch in the ON state for more than 5 seconds.
④ Temporarily place the main switch in the OFF position to let the control unit escape from the input check mode. Then place the main switch in the ON position again.
⑤ Check the diagnostic trouble code to verify that a normal code is output.

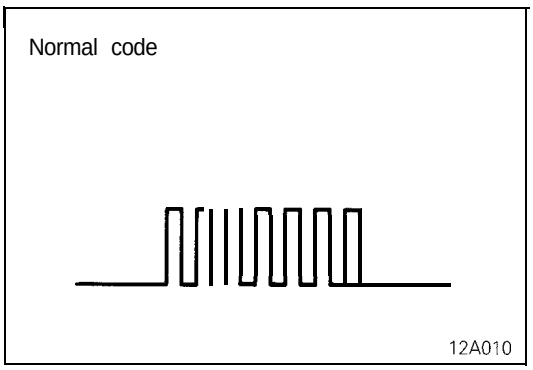


WHEN USING THE VOLTMETER

Connect a voltmeter to the diagnostic output terminal and the ground terminal of the data-link connector using the special tool. Observe the voltmeter pointer deflection to read out the diagnostic trouble codes.

DIAGNOSIS DISPLAY PATTERNS AND CODES

Code No.	Display patterns (output codes) (Use with voltmeter)	Probable cause	Check chart No.
11	 The same pattern repeatedly displayed	Vacuum pump assembly drive output system out of order	5
12		Vehicle speed signal system out of order	4
15		Control switch out of order (When SET or RESUME switch is kept in ON state continuously for more than 60 seconds)	2
16		Control unit out of order	–
17*		Throttle position sensor or closed throttle position switch out of order	9



NOTE
1. When two or more problems occur simultaneously, the three latest code numbers are displayed in the order of lowest code number first.
2. Even if the problem represented by the code number marked * occurs during cruise control operation, the cruise control mode will not be canceled.
3. When the system is normal, the diagnostic trouble code is displayed as described below.
   ① If a scan tool is used:
   "No abnormality" will be displayed.
   ② If a voltmeter is used:
   Continuous ON/OFF signals will be displayed at 0.5 second intervals. (Refer to the illustration at the left.)

INPUT CHECKING

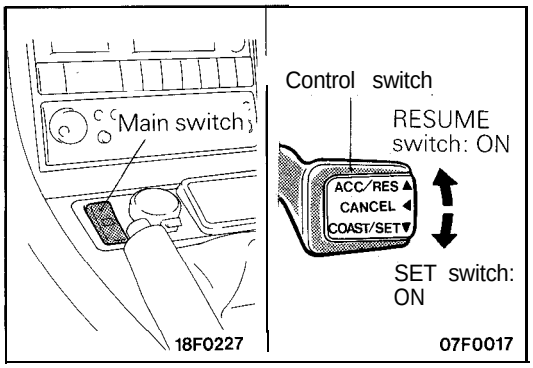
Input checks should be made when the cruise control system cannot be set and when it is necessary to check (when a malfunction related to the cruise control system occurs) whether or not the input signals are normal.

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

Perform checks using the following procedures.

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

NOTE
Connect a voltmeter using the same procedure as for inspection of diagnostic output.



(2) Calling up a code

① Set the ignition switch to ON.
② With the SET switch in the ON state, set the main switch to ON. In less than 1 .0 second thereafter, set the RESUME switch to ON. Then the input check results can be displayed.

(3) Reading a code

① Perform the individual input operations according to the input check table and read the codes.

NOTE

1. When two or more input operations are performed simultaneously, all the associated code numbers are output in ascending order.
2. If no code is output by performing any of the input operations, the control unit power supply circuit or SET and RESUME switches are probably defective. Check the check tables 1 and 2 (P.14G-7, 8).

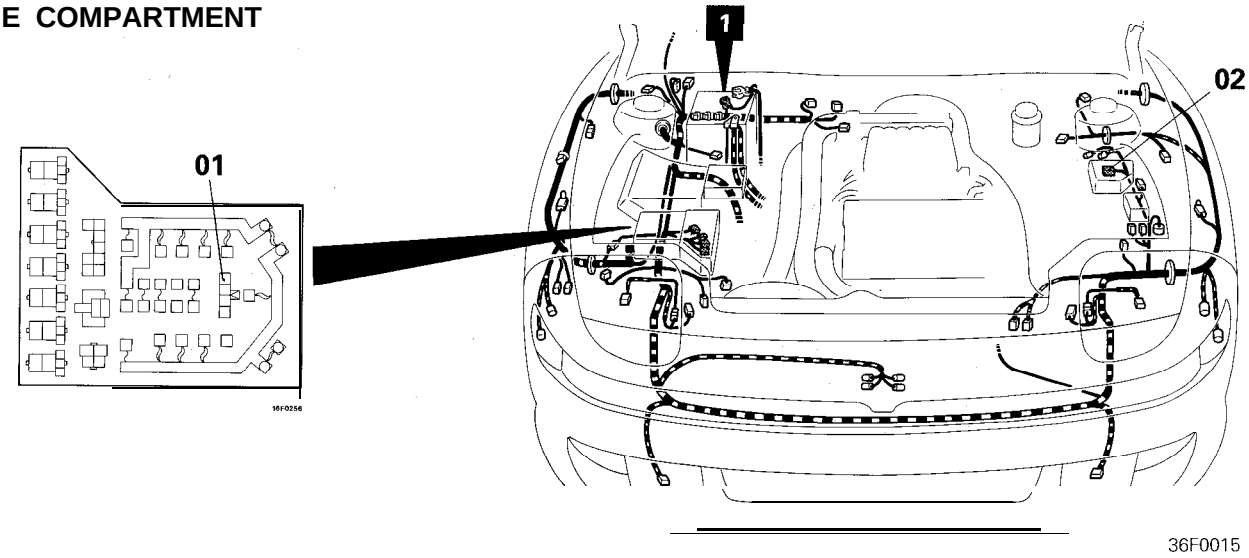
INPUT CHECK TABLE

Code No.	Display patterns (output codes) (use with voltmeter)	Input operation		Check results
21		SET switch ON		SET switch circuit normal
22		RESUME switch ON		RESUME switch normal
23		Stop light switch ON (brake pedal depressed)		Stop light switch circuit normal
24		Vehicle speed more than approx. 40 km/h (25 mph)		Vehicle speed sensor circuit normal if code Nos. 24 and 25 are displayed
25		Vehicle speed less than approx. 40 km/h (25 mph)		
26		M/T	Clutch pedal position switch ON (clutch pedal depressed)	Clutch pedal position switch circuit normal
			Park/neutral position switch ON (SELECT lever placed in “N” position)	Park/neutral position switch circuit normal
27		CANCEL switch ON		CANCEL switch circuit normal
28		TPS output voltage 1.5 V or more (Accelerator pedal depressed more than half the way)		Throttle position sensor circuit normal
29		Closed throttle position switch OFF (Accelerator pedal depressed)		Closed throttle position switch circuit normal

② **Set** main switch to **OFF.**

HARNESS AND COMPONENT LAYOUT

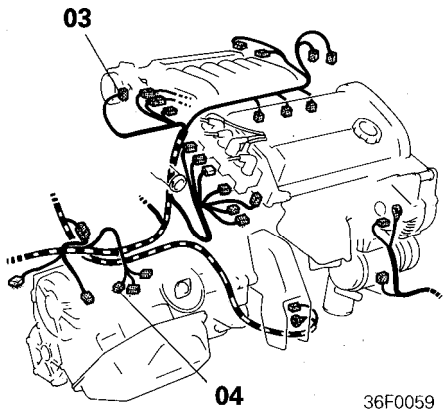
ENGINE COMPARTMENT



36F0015

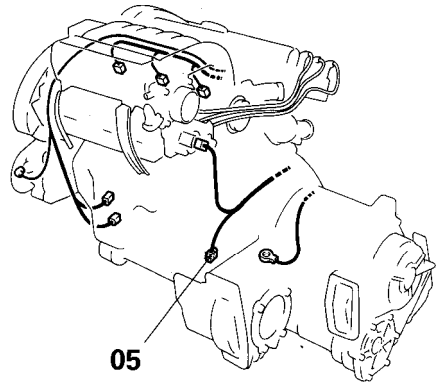
01 Jumper connector
02 Vacuum pump
03 Throttle position sensor
04 Park/neutral position switch <A/T>
05 Vehicle speed sensor

Engine front view



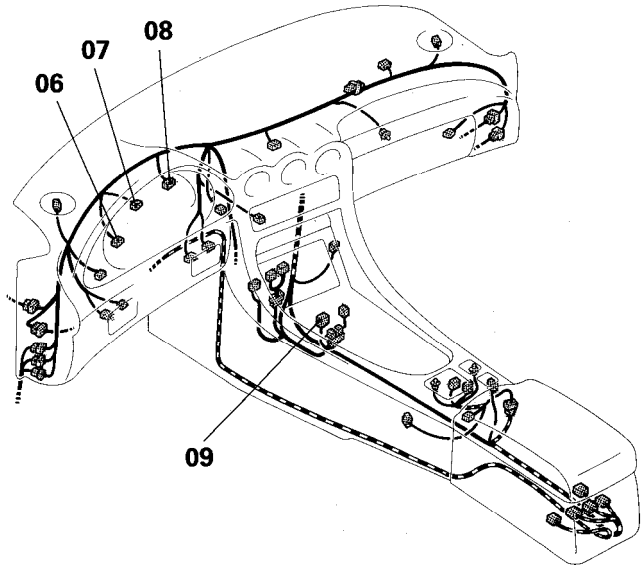
36F0059

Engine rear view



16F0175

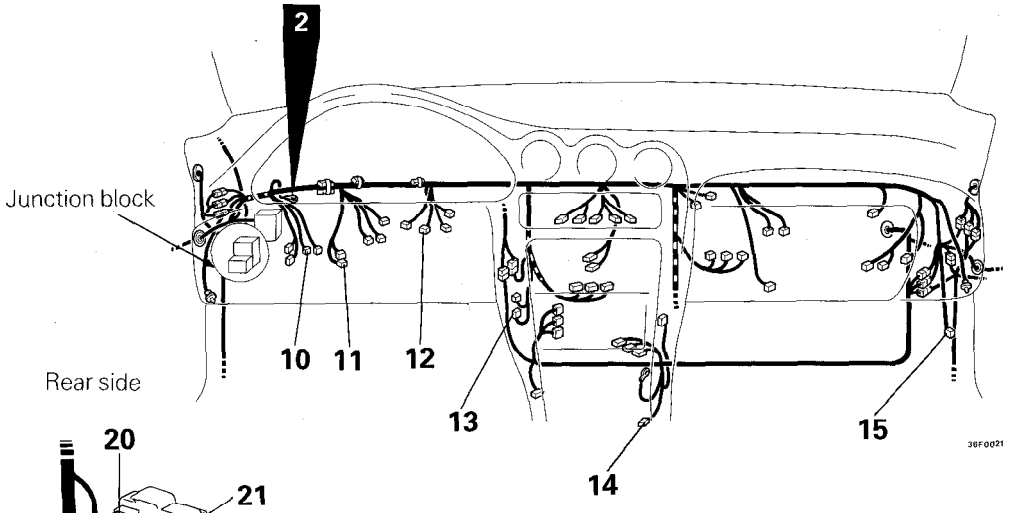
INSTRUMENT PANEL AND FLOOR CONSOLE



36F0062

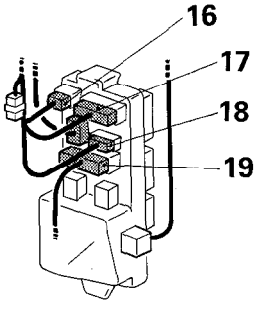
06, 07, 08 } Combination meter
09 Main switch

DASH PANEL

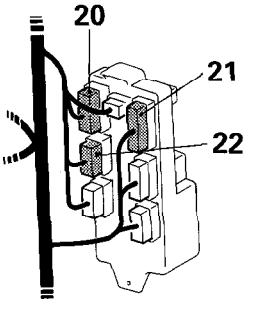


JUNCTION BLOCK

Front side

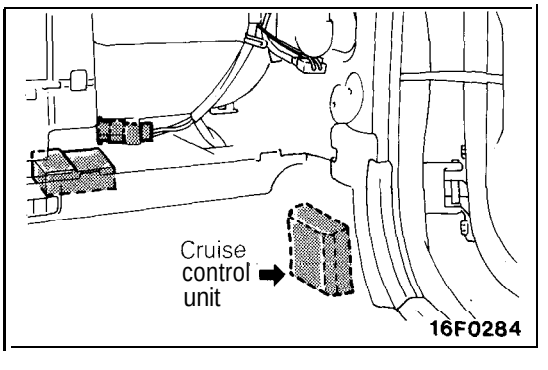


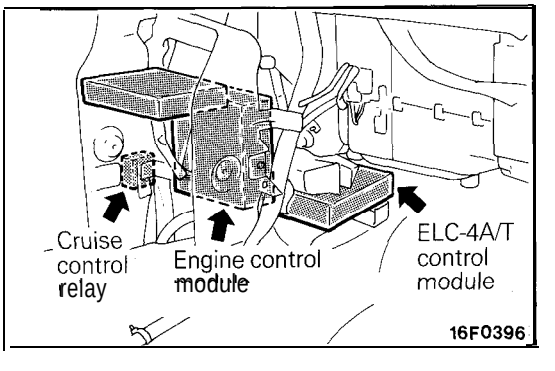
Rear side



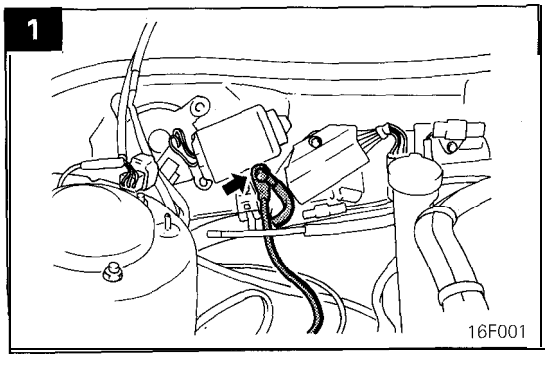
10 Clutch pedal position switch <M/T>
11 Stop light switch
12 Clock spring
13 Cruise control relay
14 Over drive switch <A/T>
15 Cruise control unit
16, 17, 18 } Front wiring harness and junction block combination
19 Adapter wiring harness and junction block combination
20, 21, 22 } Body wiring harness (LH) and junction block combination

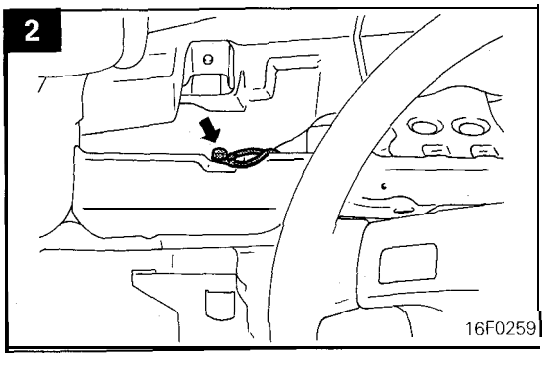
LOCATION OF CONTROL UNIT AND RELAY





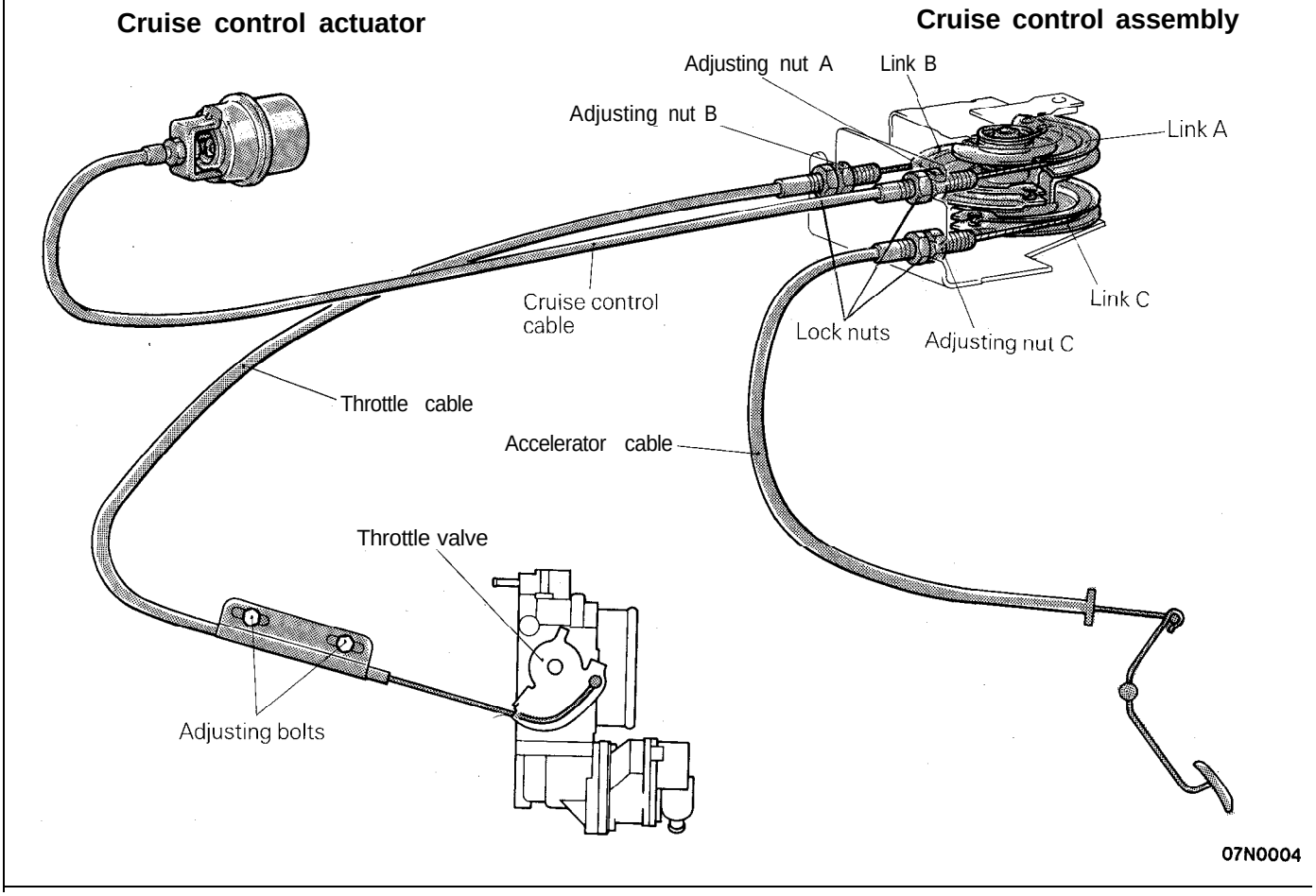
GROUND POINT



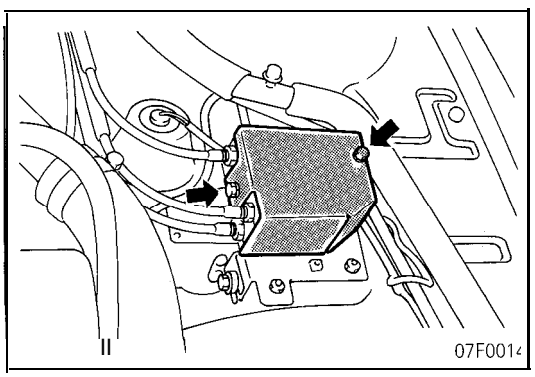


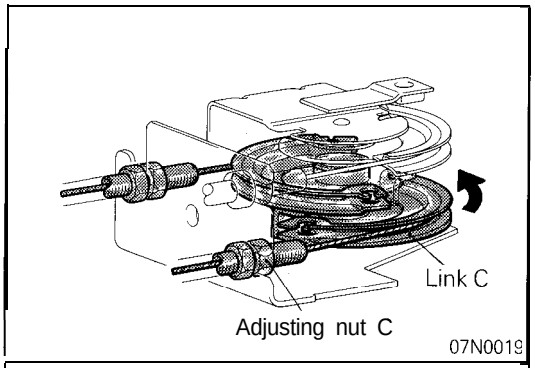
SERVICE ADJUSTMENT PROCEDURES

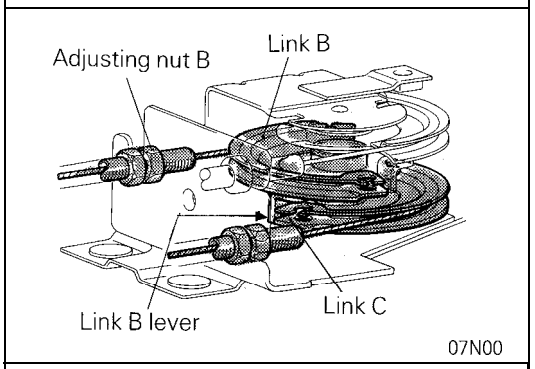
CRUISE CONTROL CABLES INSPECTION AND ADJUSTMENT

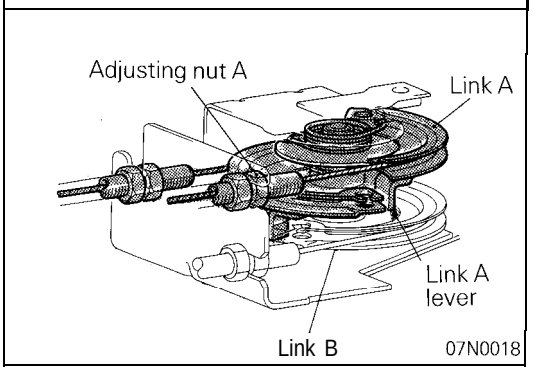


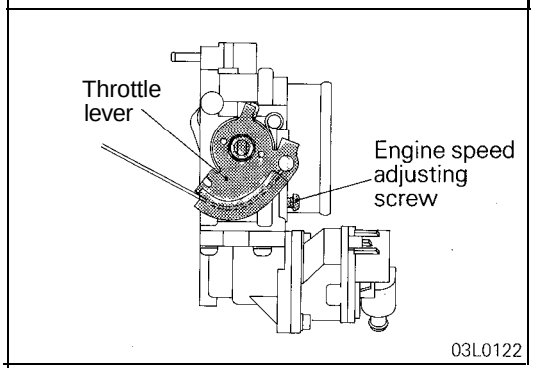
(1) Set the air conditioning, lights and other switches to OFF for inspection at no load.
(2) Let the engine warm up until it runs at idle.
(3) Check that the idle speed is within the specified range.
(4) Stop the engine and set the ignition switch to OFF.
(5) Check that the accelerator cable, cruise control cable and throttle cable are routed without sharp bends.
(6) Depress the accelerator pedal to check that the throttle lever moves smoothly from the fully-closed to fully-opened position.
(7) Check the free travel state of the inner cables of the accelerator cable, cruise control cable and throttle cable.
(8) If the inner cables are too loose or have no free travel at all, check using the following procedure.
① Remove the link protector.
② Loosen the adjusting and lock nuts of the throttle lever and intermediate links A, B and C to place the throttle lever and intermediate links A, B and C in the free state.

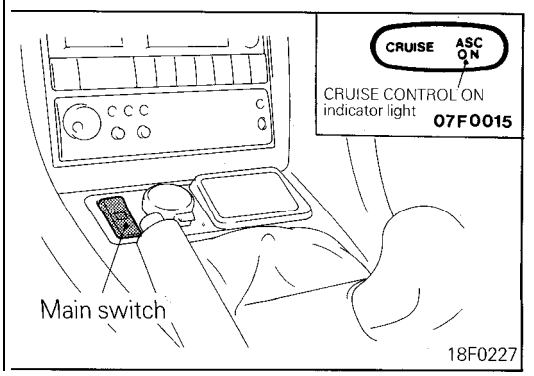












③ Set the ignition switch to ON (do not start the engine).
④ Rotate intermediate link C in the direction shown until it is blocked by the stopper, turn down adjusting nut C in the direction that the free travel of the inner cable is reduced, and back off adjusting nut C the specified number of turns 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 intake manifold plenum.
⑨ Turn down adjusting nut A in the direction that the free travel of the inner cable of the cruise control cable is reduced. At the position where the lever of intermediate link A is brought into contact with intermediate link B, back off adjusting nut A the specified number of turns.

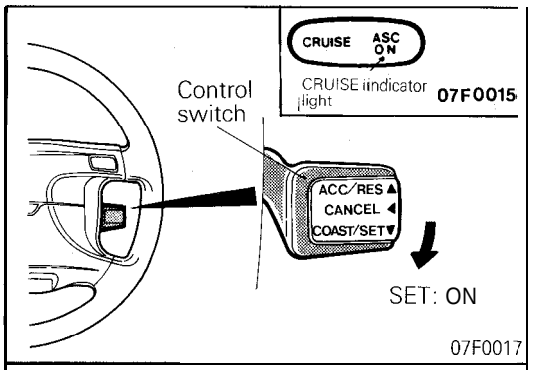
Amount adjusting nut A is to be backed off:
About one turn [inner cable free travel 1 to 2 mm (.04 to .08 in.)]

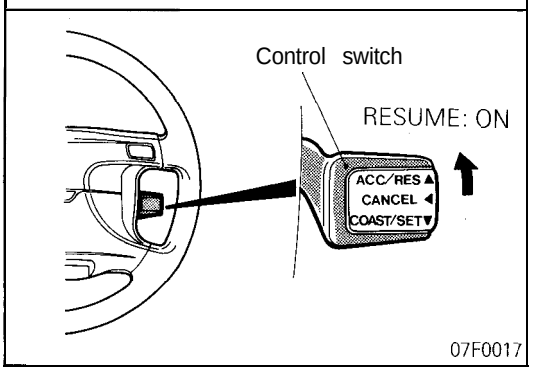
⑩ Secure the cruise control cable with the lock nut.
⑪ After adjustment, check to see that the end of the engine speed adjusting screw is in contact with the stopper of the throttle lever.

CRUISE CONTROL SYSTEM INSPECTION

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

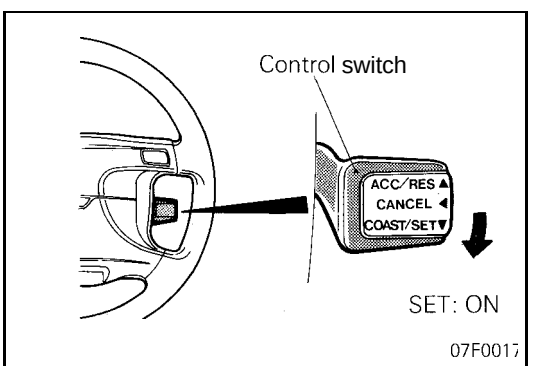
(1) Switch ON the main switch.
(2) Drive at the desired speed within the range of approximately 40 – 200 km/h (25 – 124 mph).
(3) Operate the control switch downward. (SET switch: ON)
(4) Check to be sure that the speed is the desired constant speed when the switch is released, and also check to be sure that the CRUISE indicator light (within the combination meter) illuminates.

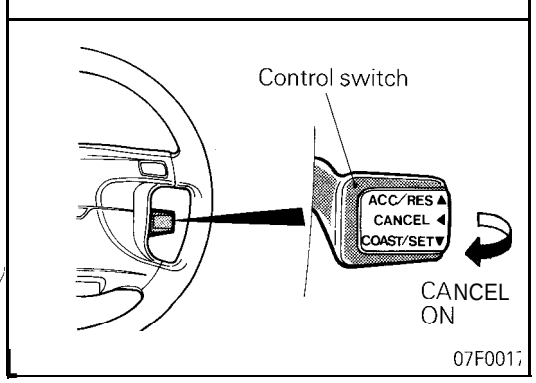
NOTE
If the vehicle speed decreases to approximately 15 km/h (9 mph) below the set speed, because of climbing a hill for example, the cruise control will be cancelled.

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 held, and that when it is released the constant speed at the time when it was released becomes the driving speed.

NOTE
Even if, during acceleration, the vehicle speed reaches or exceeds the high limit [approximately 200 km/h (124 mph)], acceleration will continue, however, when the switch is released, the set speed ("memorized speed") will become the high limit of the vehicle speed.





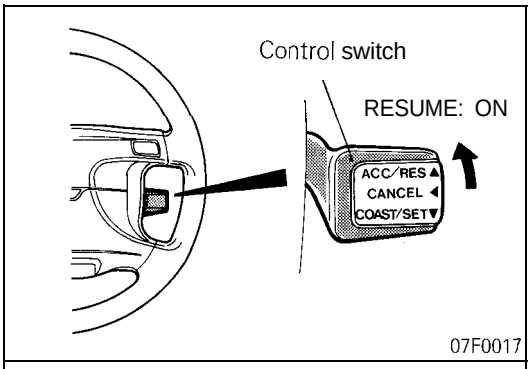
SPEED REDUCTION SETTING CHECK

(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.

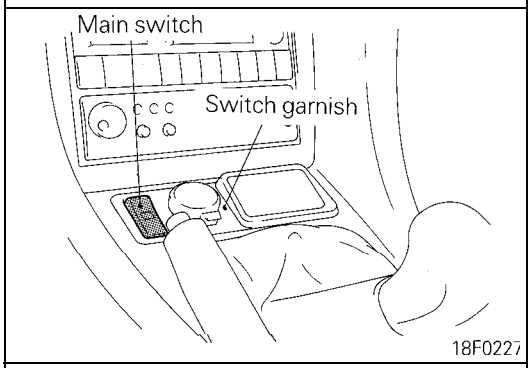
NOTE
When the vehicle speed reaches the low limit [approximately 40 km/h (25 mph)] during deceleration, the cruise control will be cancelled.

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. <A/T>



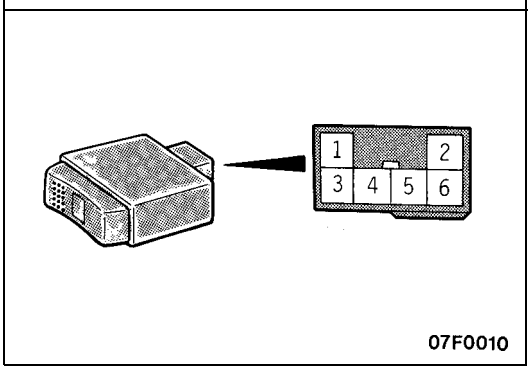
(3) With the vehicle at a speed of more than about 40 km/h (25 mph), check that when the control switch is moved upward (RESUME switch: ON), the vehicle resumes cruising at the speed held before cancellation of the cruise control mode.
(4) In the cruise control mode, check that when the main switch is set to OFF, the normal drive mode is restored and the vehicle coasts smoothly.



INDIVIDUAL PARTS INSPECTION

CRUISE CONTROL MAIN SWITCH INSPECTION

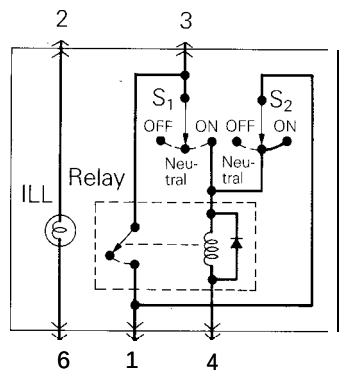
(1) Remove the main switch together with the switch garnish.
(2) Remove the main switch from the switch garnish.



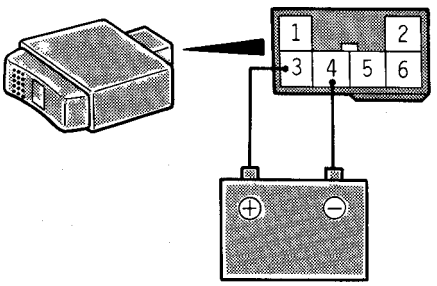
(3) Operate the main switch and check for continuity across the individual terminals.

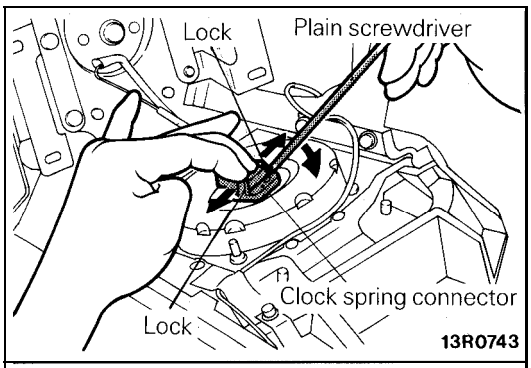
Terminal No. / Switch state	6	ILL	2	3	4	1
Press OFF.	○	⊚	○			
Neutral position	○	⊚	○		○	○
Press ON.	○	⊚	○	○	○	○

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 ④ and check that battery voltage is available across terminal ① and the ground during the period the ON side of the main switch is pressed and during the period before the OFF side is pressed thereafter.
Check that when the OFF side of the main switch is pressed thereafter, the battery voltage available across terminal ① and the ground is reduced to 0 V.





CRUISE CONTROL SWITCH INSPECTION

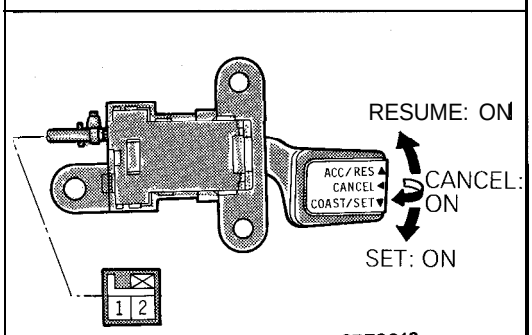
(1) Remove the air bag module using the following procedure.

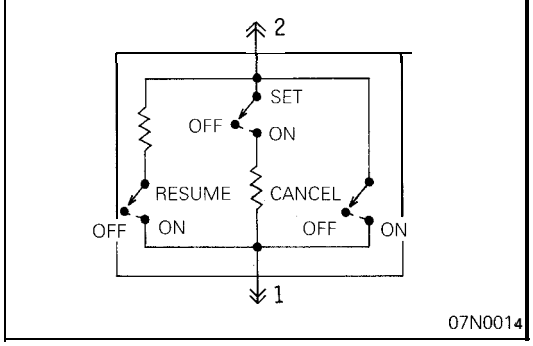
① Remove the negative terminal of the battery and wait for more than 60 seconds.

Caution
The capacitor in the SRS diagnosis unit retains enough voltage to deploy the air bag for a given period even after disconnection of the battery. If an operation is performed during that given period, unintended deployment of the air bag could result and cause serious injury.

② Remove the air bag module. To remove the clock spring connector (squib connector) from the air bag module, force the lock outward and pry it with a plain screwdriver as shown at left so that no undue force will be exerted on the connector when it is removed.

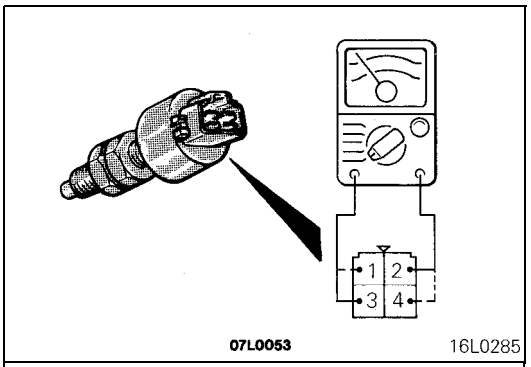
③ The removed air bag module should be stored in a clean, dry, flat place with the pad side up.





(2) Disconnect the connector of the control switch and operate the control switch to measure the resistance between the individual terminals.
If the readings are as shown below, the control switch may be considered good.

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

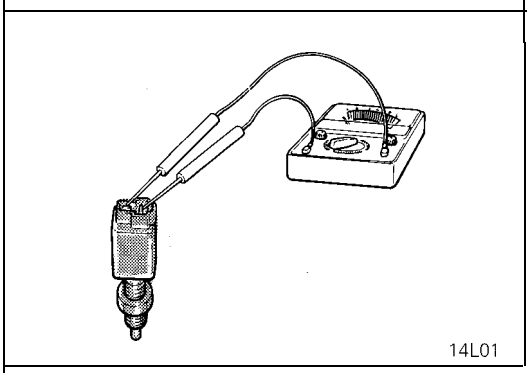


STOP LIGHT SWITCH/BRAKE SWITCH INSPECTION

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

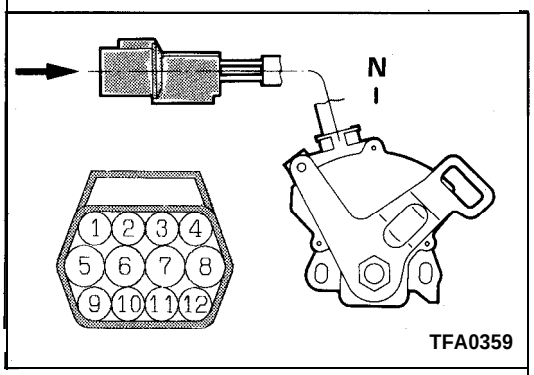
O-O: Continuity

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



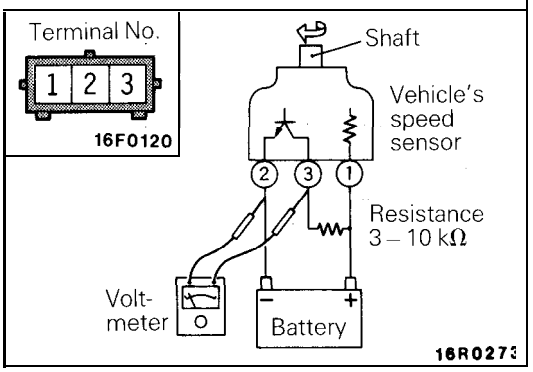
CLUTCH PEDAL POSITION SWITCH INSPECTION <M/T>

(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.



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

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



VEHICLE SPEED SENSOR INSPECTION

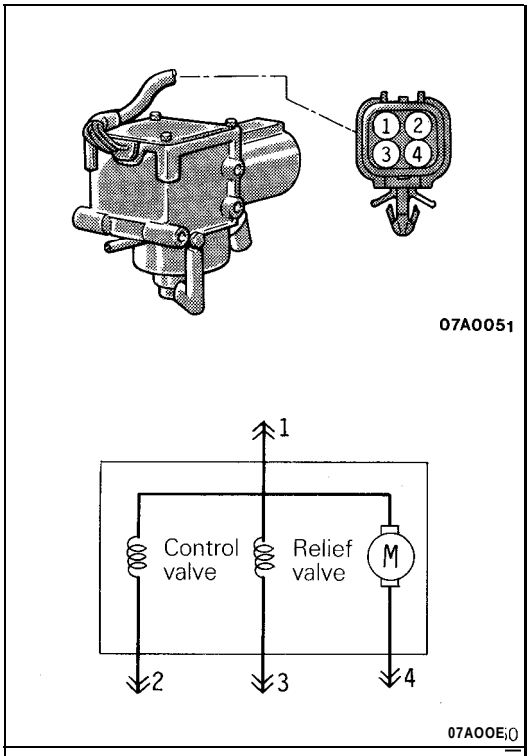
(1) Remove the vehicle's speed sensor and connect as shown in the illustration, using a 3 – 10 kΩ resistance.
(2) Use a voltmeter to check for voltage at terminals ② and ③ when the pulse generator shaft is turning. (One revolution is four pulses.)

THROTTLE POSITION SENSOR INSPECTION

For inspection, refer to P.14A-95.

CLOSED THROTTLE POSITION SWITCH INSPECTION

For inspection, refer to P.14A-98.



VACUUM PUMP INSPECTION

Inspection of Solenoid Valves (Control and Relief Valves)

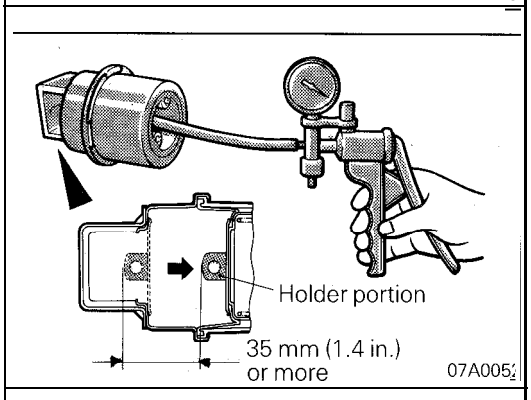
(1) Disconnect the connector of the vacuum pump assembly.
(2) Measure the resistance values across terminals ① and ② and across terminals ① and ③.

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.

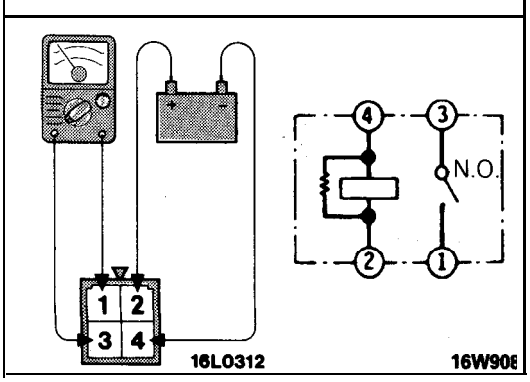


ACTUATOR INSPECTION

(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.14G-21.)

CRUISE CONTROL RELAY INSPECTION

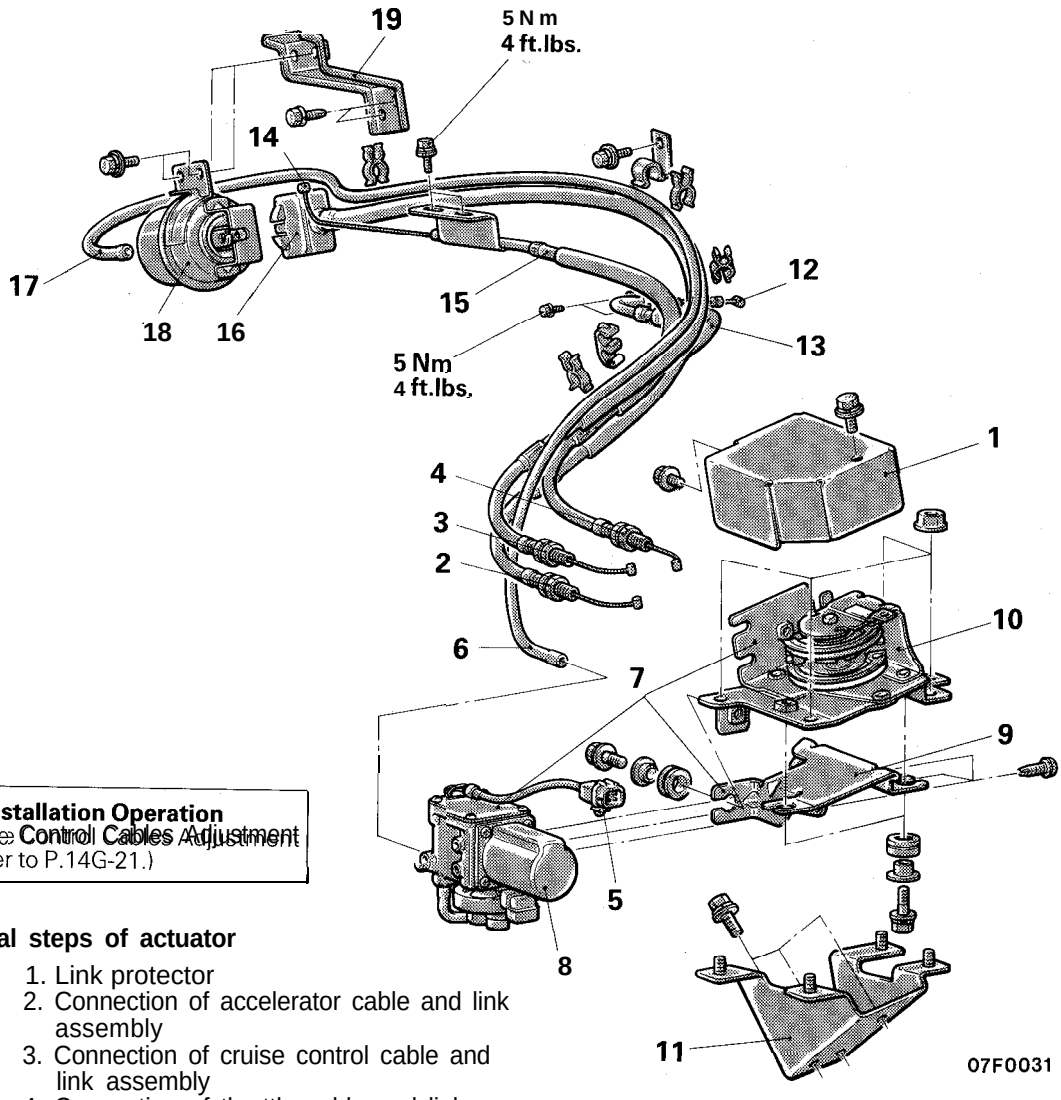
(1) Remove the cruise control relay.
(2) Apply battery power to terminal 2 and connect terminal 4 to the ground. Check for continuity across the terminals.



When power is supplied	Across terminals 1-3	Continuity provided
When no power is supplied	Across terminals 1-3	No continuity provided
	Across terminals 2-4	Continuity provided

CRUISE CONTROL SYSTEM

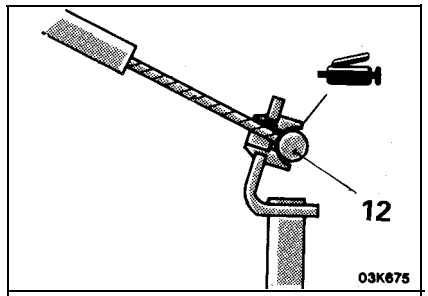
REMOVAL AND INSTALLATION



Post-installation Operation
- Cruise Control Cables Adjustment (Refer to P.14G-21.)

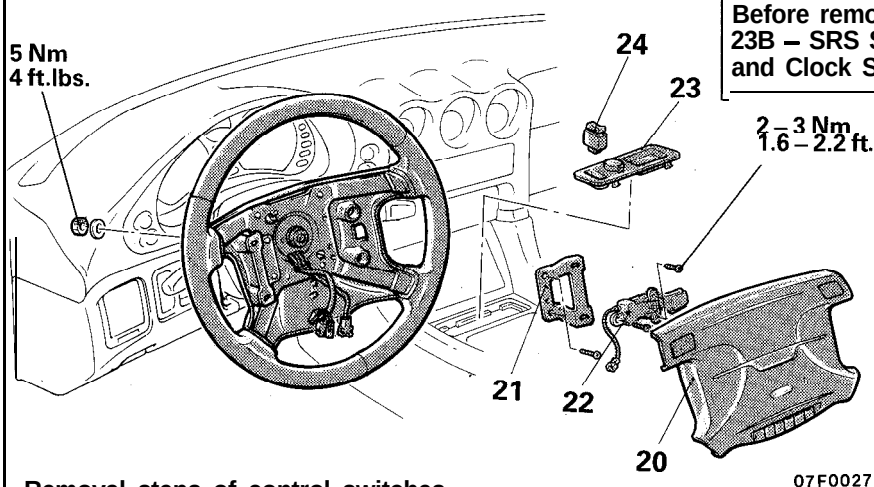
Removal steps of actuator

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



Grease: MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent

CAUTION: SRS
Before removal of air bag module, refer to GROUP 23B – SRS Service Precautions and Air Bag Module and Clock Spring.

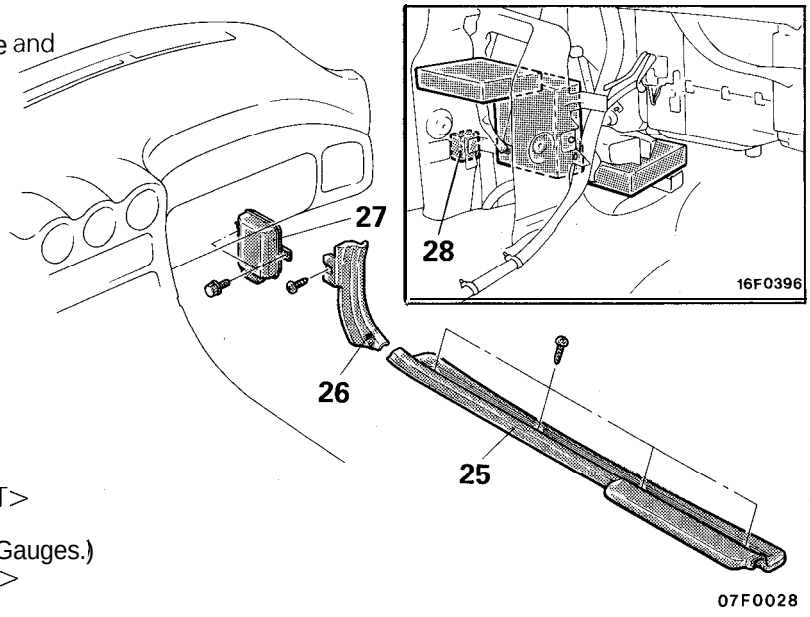


Removal steps of control switches

20. Air bag module
    (Refer to GROUP 23B -Air Bag Module and Clock Spring.)
21. Air bag module bracket
22. Cruise control switch
23. Switch garnish
24. Main switch

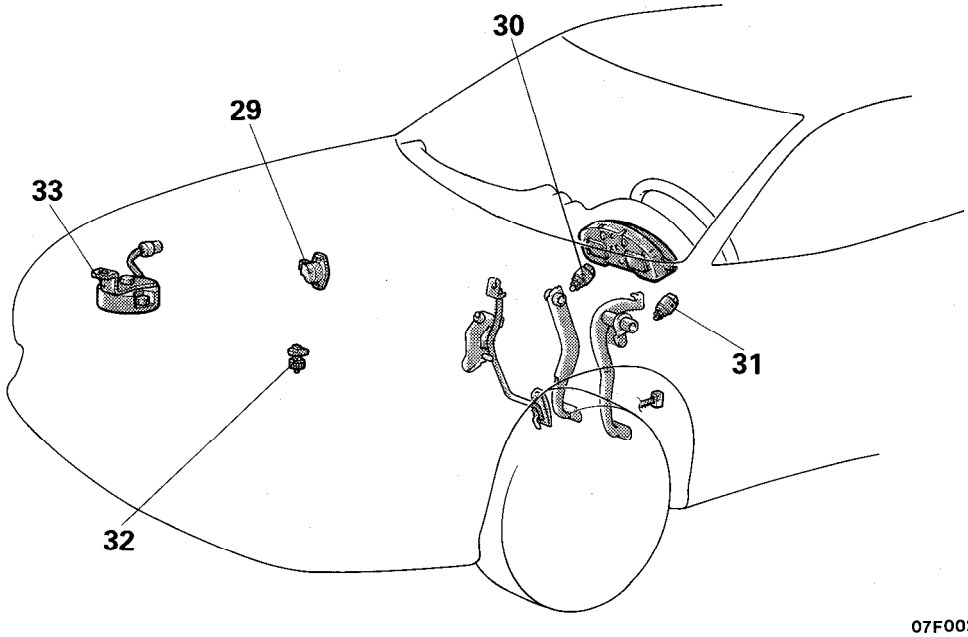
Removal steps of control unit and relay

25. Scuff plate (R.H.)
26. Cowl side trim (R.H.)
27. Cruise control unit
28. Cruise control relay



Removal steps of sensors and switches

29. Throttle position sensor
30. Stop light switch
31. Clutch pedal position switch <M/T>
◆◆ 32. Vehicle speed sensor
    (Refer to GROUP 8 – Meters and Gauges.)
33. Park/neutral position switch <A/T>

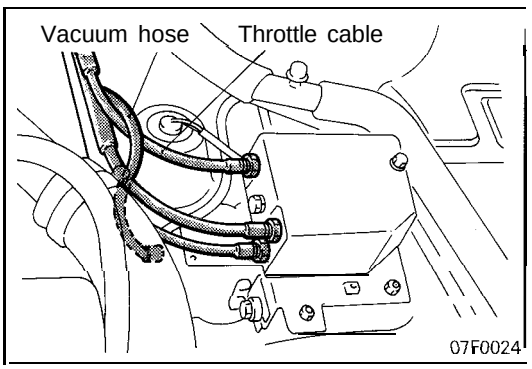


INSPECTION

- Check the inner and outer cable for damage.
- Check the cable for smooth movement.
- Check the link protector for damage.

INSPECTION OF INDIVIDUAL PARTS

Refer to Service Adjustment Procedures – Individual Parts Inspection (P.14G-24).



SERVICE POINT OF INSTALLATION

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.

PROPELLER SHAFT AND UNIVERSAL JOINTS

CONTENTS

SPECIFICATIONS

GENERAL SPECIFICATIONS

Items	Specifications
Propeller shaft	
Type	4 joint propeller shaft
Length x O.D. mm (in.)	
Front	698.5 x 65 (27.50 x 2.56)
Center	662.5 x 65 (26.08 x 2.56)
Rear	555.5 x 65 (21.87 x 2.56)
Universal joint	
Type	
No. 1 (front)	Cross type
No. 2 (center front)	Cross type
No. 3 (center rear) [Lobro joint]	Constant velocity type
No. 4 (rear)	Cross type
Lubrication	Pre-packed type
Size mm (in.)	
Cross type joint journal O.D.	16 (.63)
Constant velocity joint O.D.	99.73 (3.93)

NOTE
Propeller shaft length indicates the length between the center points of each joint.

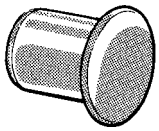
SERVICE SPECIFICATIONS

Items	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

Items	Specified lubricant	Quantity
Sleeve yoke surface	MOPAR Hypoid Gear Oil/API classification GL-4, SAE 75W – 90 or 75W – 85W	As required
Lobro joint assembly		
Outer and inner races ball grooves	Repair kit grease	As required
Lobro joint assembly inner part	Repair kit grease	45 – 55 g (1.59 – 1.94 oz.)

SPECIAL TOOL

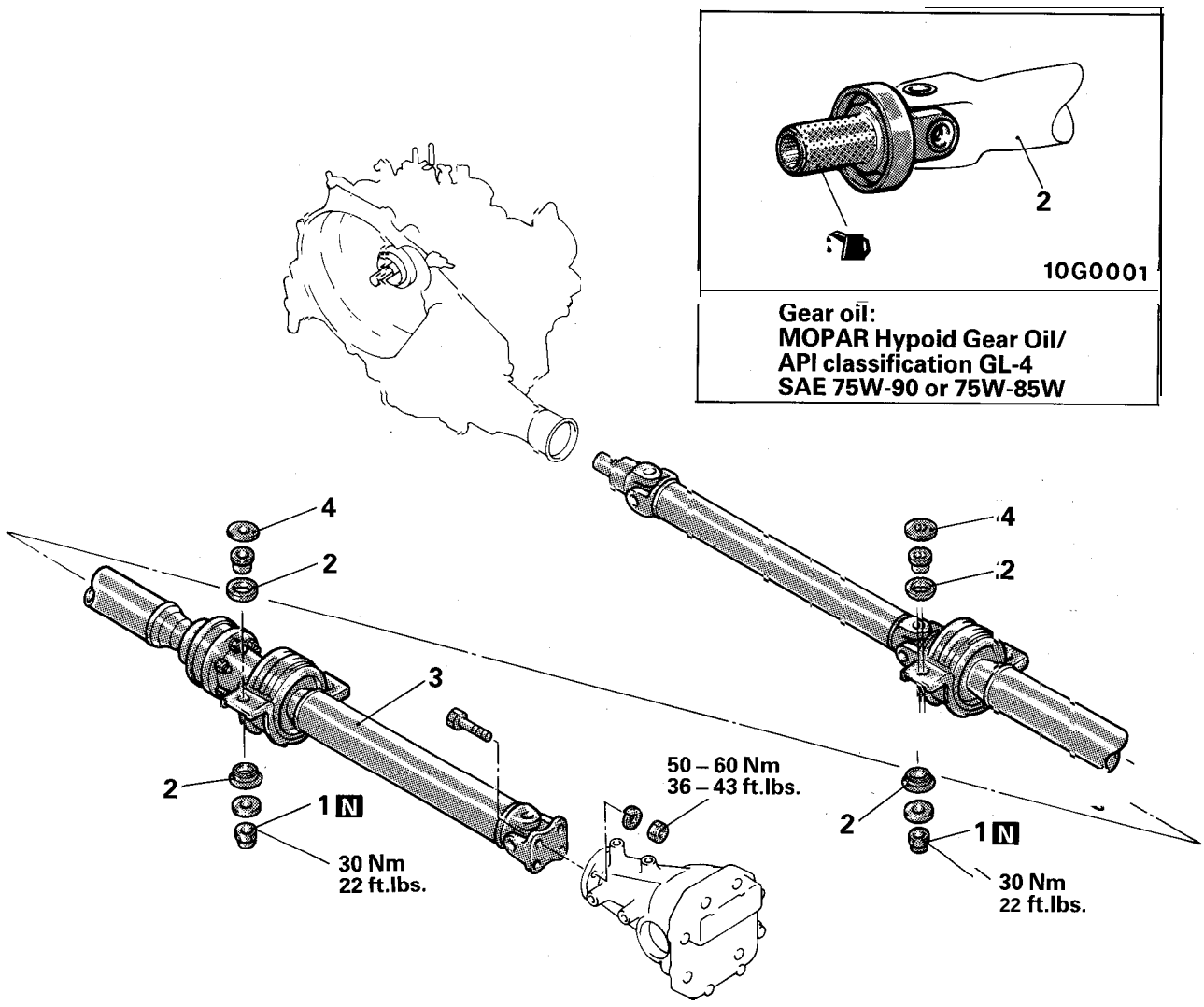
Tool number and tool name	Replaced by Miller tool number	Application
 MB991 193 Plug	General service tool	Prevention of entry of foreign objects into the transaxle and transfer

TROUBLESHOOTING

Symptom	Probable cause	Remedy
Noise at start	Worn journal bearing Worn sleeve yoke spline	Replace
	Loose propeller shaft installation	Retighten
Noise and vibration at high speed	Unbalanced propeller shaft	Replace
	Worn journal bearing	Replace

PROPELLER SHAFT

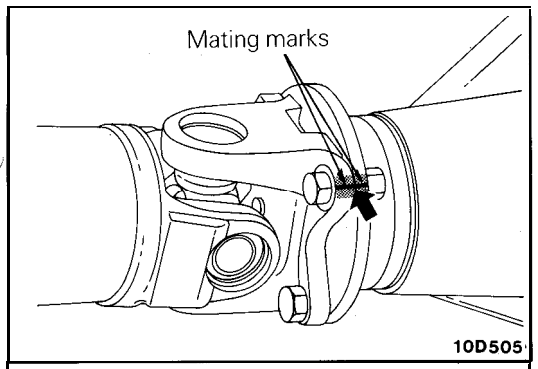
REMOVAL AND INSTALLATION



Removal steps

1. Self-locking nut
2. Insulator
3. Propeller shaft
4. Spacer

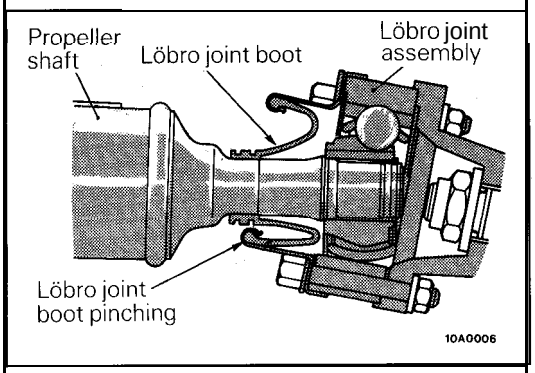
ION0013



SERVICE POINTS OF REMOVAL

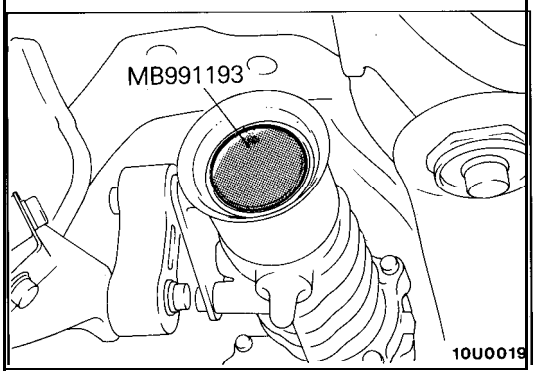
3. REMOVAL OF PROPELLER SHAFT

(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.



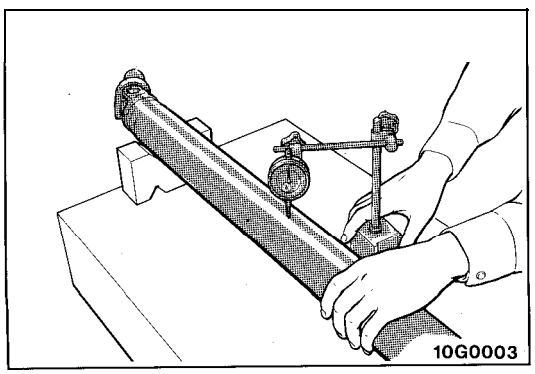
(2) Use the special tool provided as a cover to prevent the entry of foreign objects into the transfer.

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

- 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.

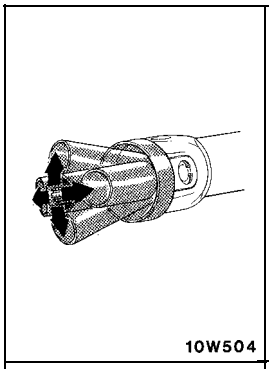


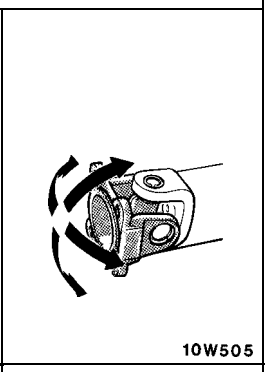
- Measure the propeller shaft runout with a dial indicator.

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.

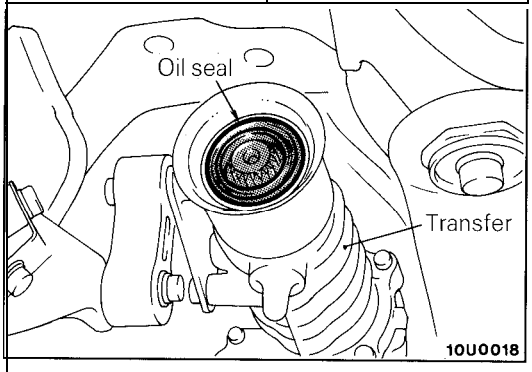

10W504


10W505

- 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.

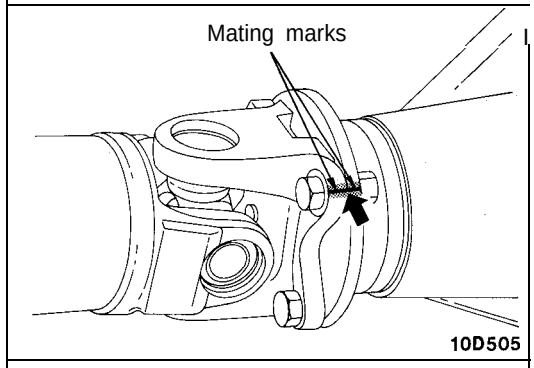
SERVICE POINTS OF INSTALLATION

3. INSTALLATION OF PROPELLER SHAFT



10U0018

(1) **Caution**
Be cautious to avoid damage to the oil seal lip of the transfer.

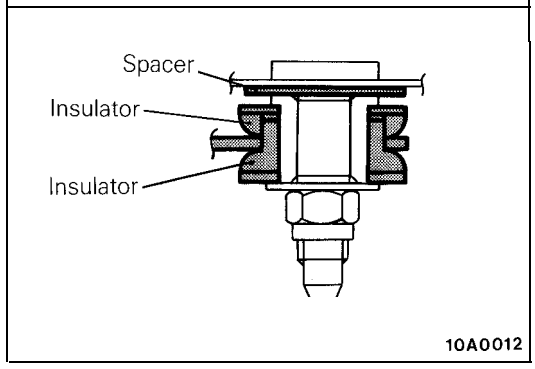


10D505

(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

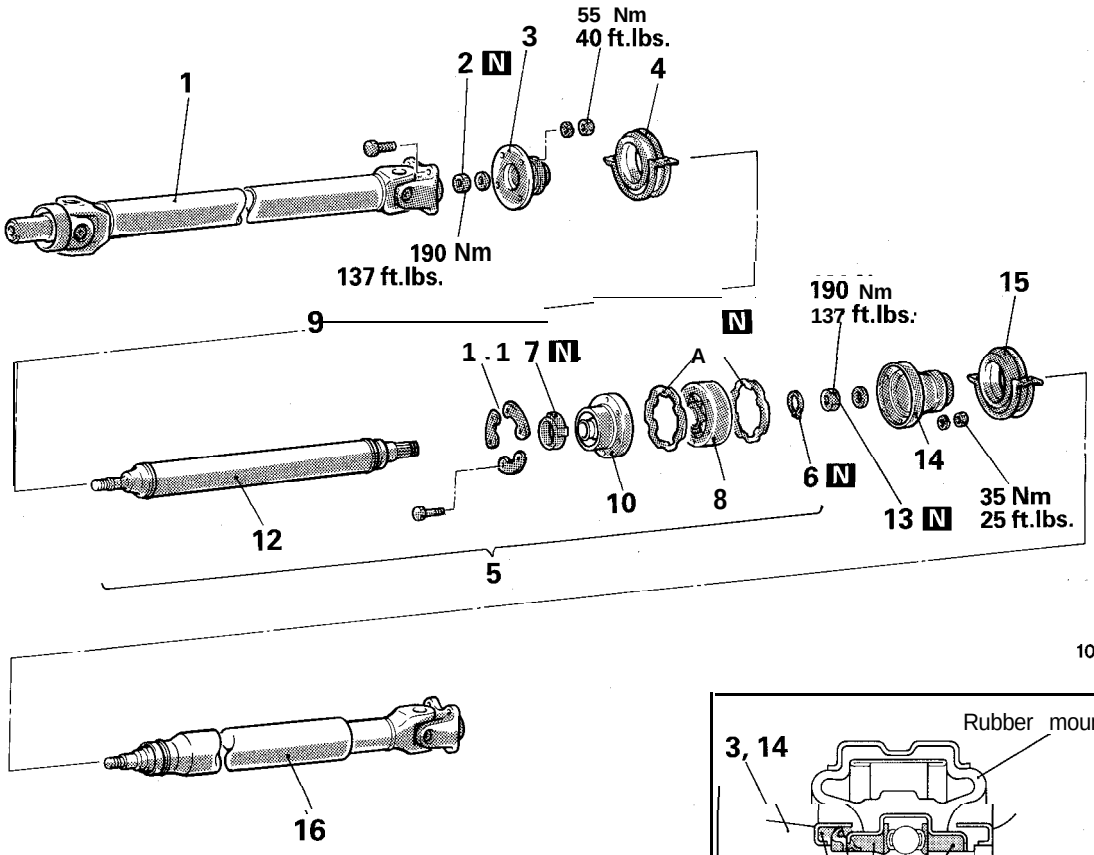


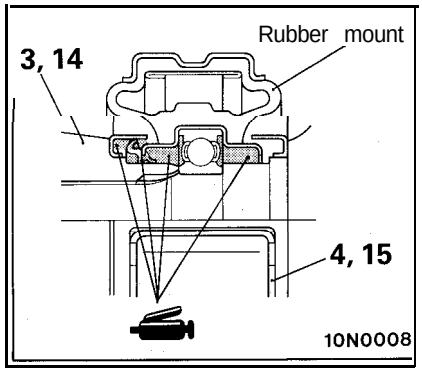
10A0012

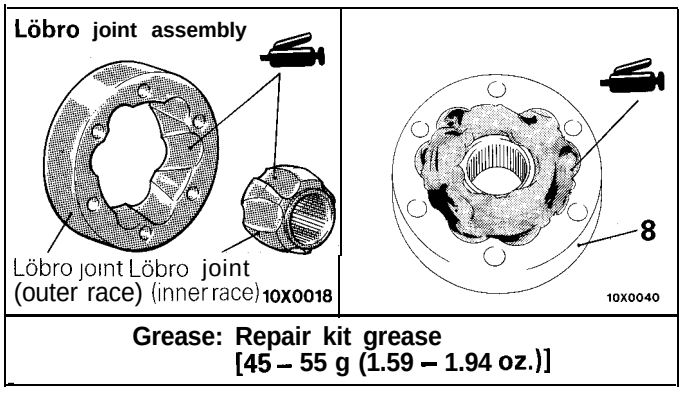
Install spacers and insulators as indicated in the illustration.

Caution
When installing the center bearing, assemble the same spacers as removed from it (or new spacers of equal thickness).

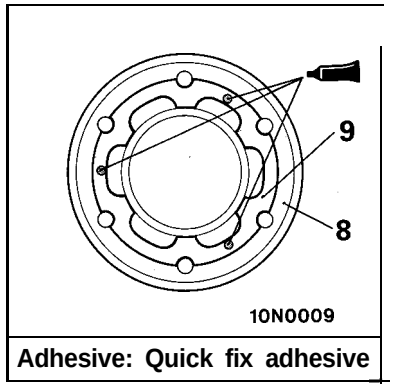
DISASSEMBLY AND REASSEMBLY







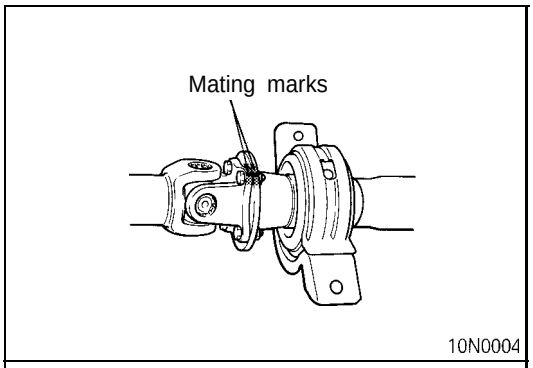
Grease: Repair kit grease [45 – 55 g (1.59 – 1.94 oz.)]



Adhesive: Quick fix adhesive

Disassembly steps

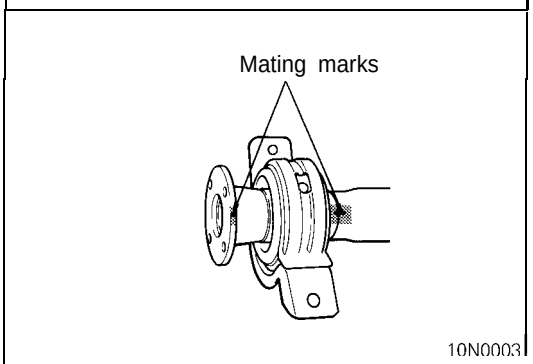
- ◆◆ 1. Front propeller shaft assembly
- ● +
- ◆◆ ● + 3. Companion flange
- ◆◆ ● 4. Center bearing assembly
- ◆◆ ● 5. Center propeller shaft assembly
- 6. Snap ring
- ● + 7. Boot band
- ◆◆ ● C 8. Lobrojointassembly
- 9. Rubber packing
- ◆◆ ▶◀ 10. Lobro joint boot
- 11. Washer
- 12. Center propeller shaft
- ▶◀ 13. Self-locking nut
- ◆◆ ● * 14. Companion flange
- ◆◆ ● C 15. Center bearing assembly
- 16. Rear propeller shaft



SERVICE POINTS OF DISASSEMBLY

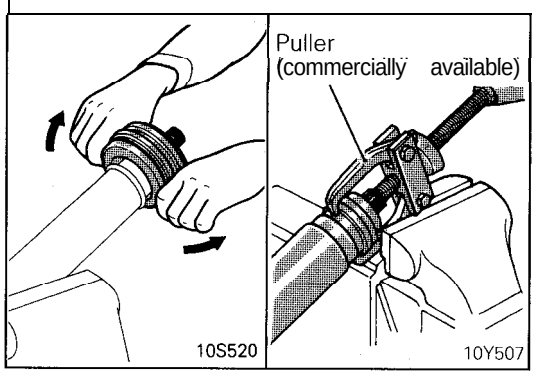
1. REMOVAL OF FRONT PROPELLER SHAFT ASSEMBLY

Put mating marks on the front propeller shaft flange yoke and the companion flange before removing the front propeller shaft assembly.



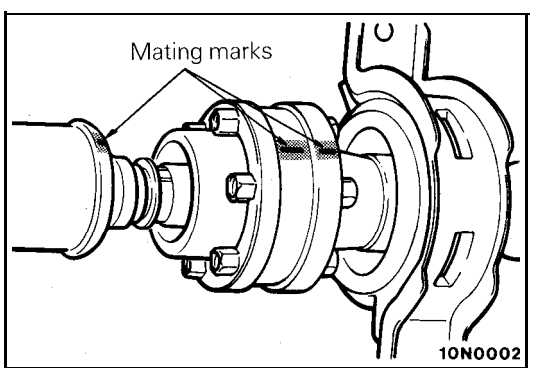
3. REMOVAL OF COMPANION FLANGE

Put mating marks on the companion flange and the center propeller shaft before removing the companion flange.



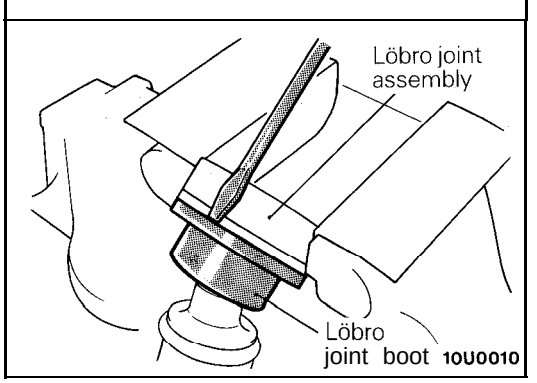
4. REMOVAL OF CENTER BEARING ASSEMBLY

First remove the center bearing bracket and then remove the center bearing using a puller (commercially available).



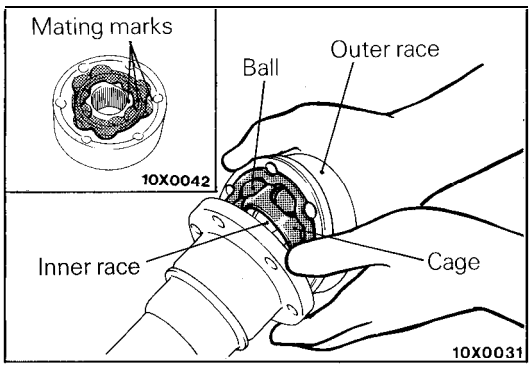
5. REMOVAL OF CENTER PROPELLER SHAFT ASSEMBLY

Put mating marks on the center propeller shaft, the Lobro joint assembly and the companion flange before removing the center propeller shaft assembly.



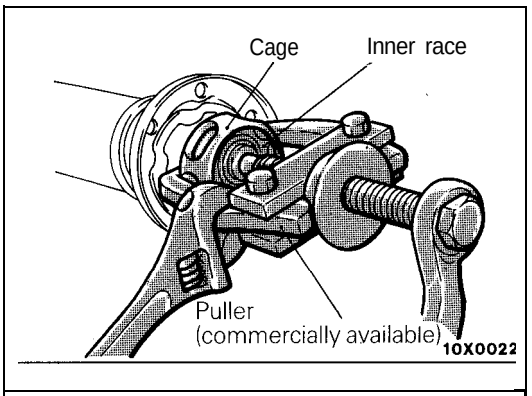
8. REMOVAL OF LÖBRO JOINT ASSEMBLY

(1) Remove the Lobro joint boot from the Lobro joint assembly.



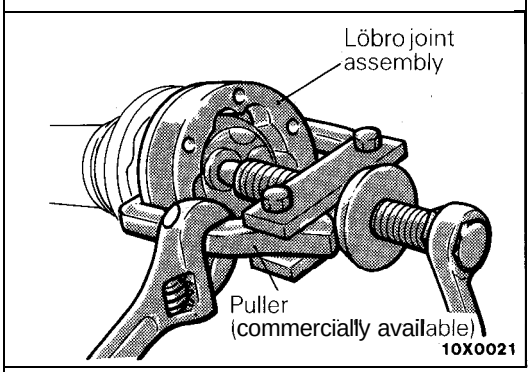
(2) Put mating marks on the outer race, cage and inner race with a scriber before removing the outer race and balls.

Caution
Note the positions of balls so that they can be reinstalled in their original positions.

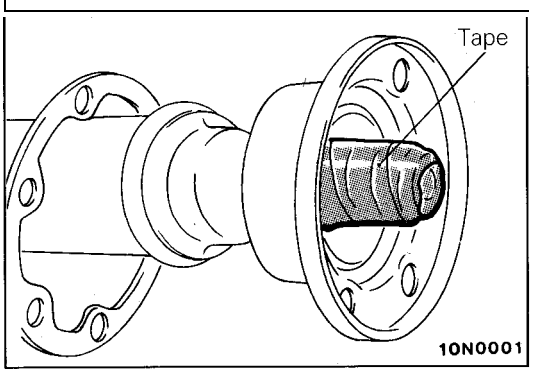


(3) Remove the inner race with cage from the center propeller shaft by using a puller (commercially available).

NOTE
When changing the grease on the Lobro joint assembly, wipe off the grease and clean the outer and inner races, cage and balls.

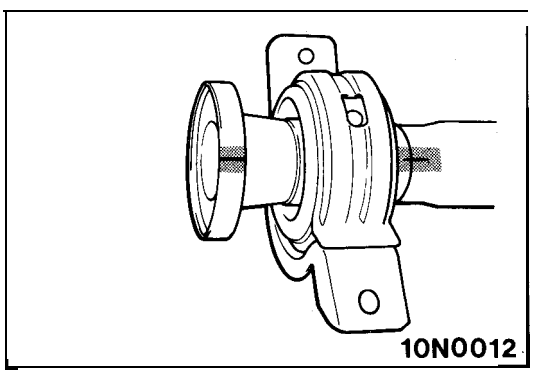


(4) If the outer race cannot be removed, remove the complete Lobro joint assembly from the center propeller shaft by using a puller (commercially available).



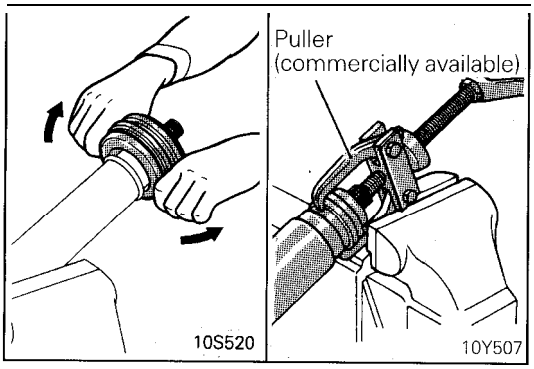
10. REMOVAL OF LÖBRO JOINT BOOT

Tape the serration of the center propeller shaft and then remove the Lobro joint boot.



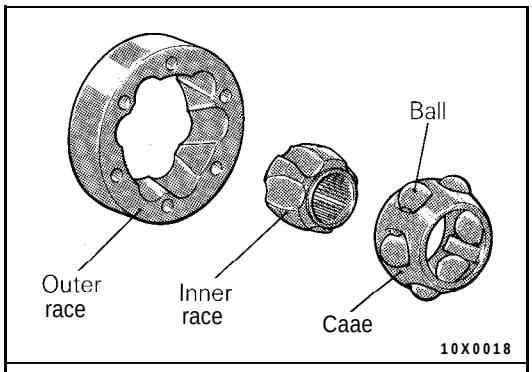
14. REMOVAL OF COMPANION FLANGE

Put mating marks on the companion flange and the rear propeller shaft before removing the companion flange.



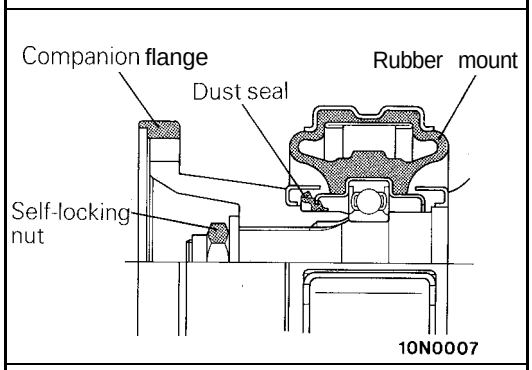
15. REMOVAL OF CENTER BEARING ASSEMBLY

First remove the center bearing bracket and then remove the center bearing using a puller (commercially available).



INSPECTION

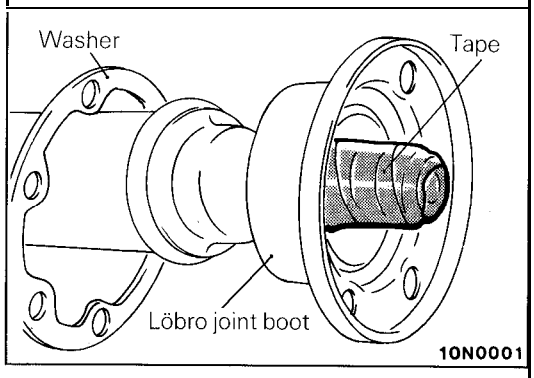
- Check the propeller shaft splines for wear or damage.
- Check the ball grooves in inner or outer race for uneven wear, damage or rust.
- Check ball surface for rust, wear or other damage.
- Check the cage for rust or damage.



SERVICE POINTS OF REASSEMBLY

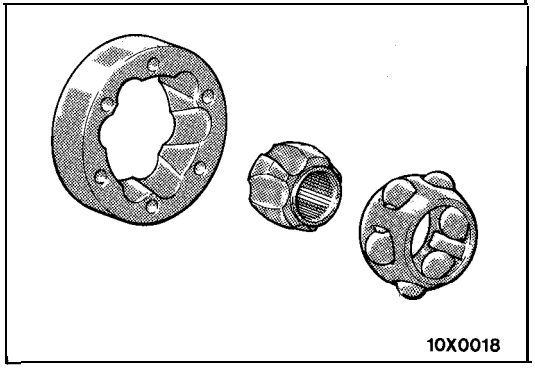
15. INSTALLATION OF CENTER BEARING ASSEMBLY / 14. COMPANION FLANGE / 13. SELF-LOCKING NUT

(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

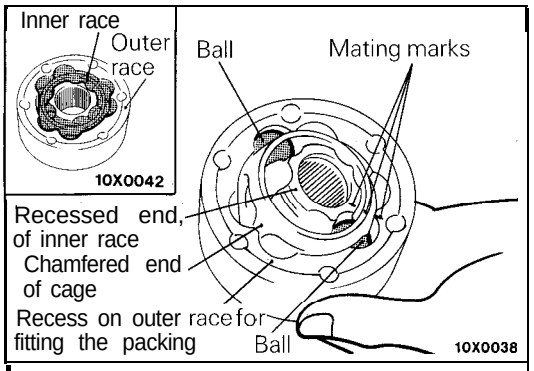
Tape the serration of the center propeller shaft and then install the Lobro joint boot.



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.

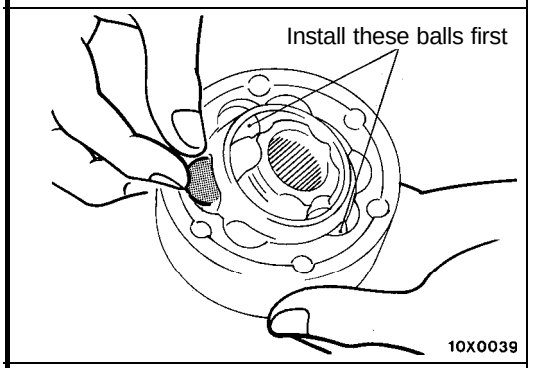
Specified grease: Repair kit grease



(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.

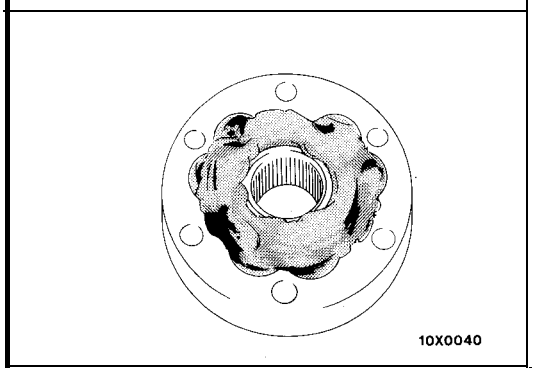
(3) Assemble the inner race and cage in the outer race with their mating marks aligned.

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.

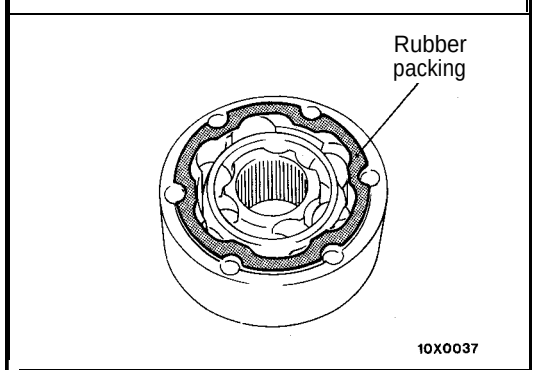


(4) Install the remaining balls in their original positions.

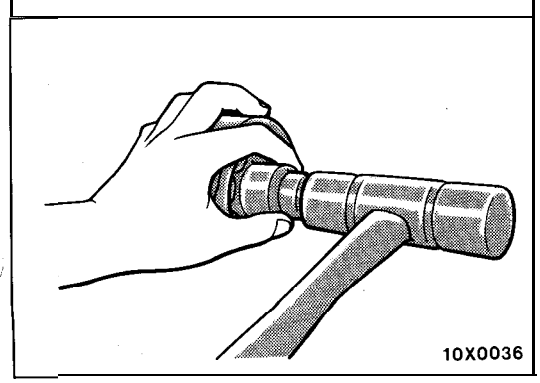
(5) Check that the outer race rotates on the inner race smoothly.



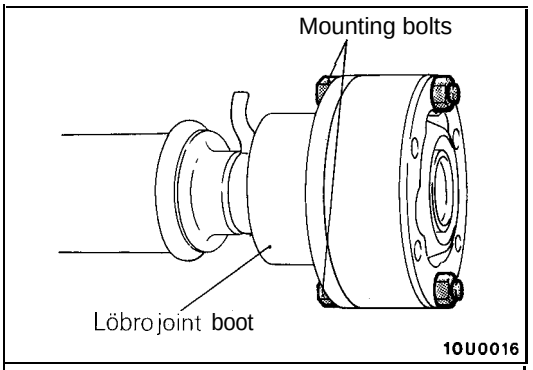
(6) Apply specified grease to the Lobro joint assembly.
Specified grease: Repair kit grease [45 – 55 g (1.59 – 0.94 **oz.)]**



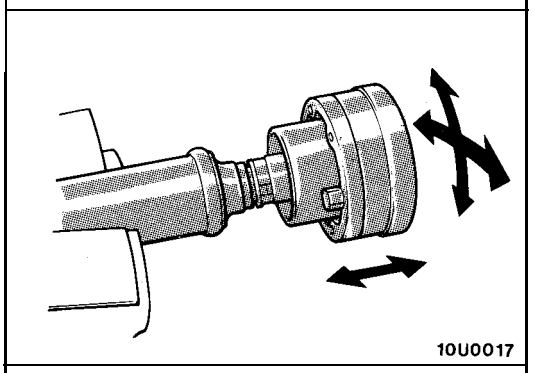
(7) Apply quick fix adhesive at three locations illustrated to prevent displacement of the rubber packing and fix it to the Lobro joint assembly temporarily.



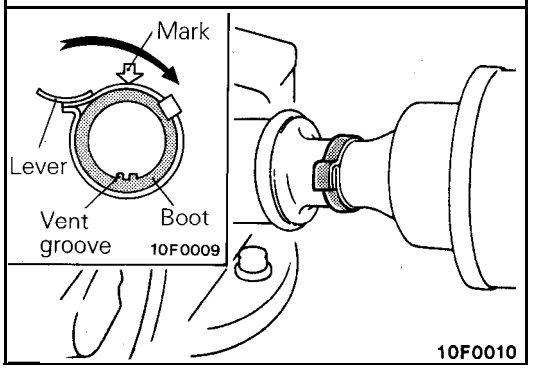
(8) Lining up the mating marks on the Lobro joint assembly and the center propeller shaft and applying the socket to the inner race of the Lobro joint assembly, install the Lobro joint assembly to the center propeller shaft.



(9) Using the center propeller shaft bolt, align the bolt holes of the Löbro joint boot and the Löbro joint assembly and install the Löbro joint boot to the Löbro joint assembly.



(10) Check that the Löbro joint assembly moves smoothly.

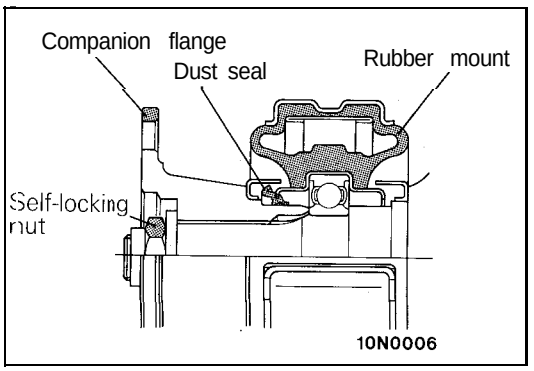


7. INSTALLATION OF BOOT BAND

Caution
Clamp the boot band by folding down the lever at a position nearly opposite to the vent groove of the Löbro joint (⇨ marked position). 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 Löbro 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.

REAR SUSPENSION

CONTENTS

SPECIFICATIONS <FWD>

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.)	11.3 x 95 x 350 (.44 x 3.74 x 13.78)	11.6 x 105 x 350 (.46 x 4.13 x 13.78)
Coil spring identification color	Pink x 2	Green x 1
Spring constant N/mm (lbs./in.)	34 (190)	34 (190)
Shock absorber		
Type	Hydraulic cylindrical double-acting type	Hydraulic cylindrical double-acting type
Max. length mm (in.)	515 (20.2)	515 (20.2)
Min. length mm (in.)	356 (14.0)	356 (14.0)
Stroke mm (in.)	159 (6.3)	159 (6.3)
Damping force [at 0.3 m/sec.(.9 ft./sec.)]		
Expansion N (lbs.)	1,000 (220)	Hard: 1,710 (377) Medium: 1,160 (256) Soft: 560 (123)
Contraction N (lbs.)	550 (121)	Hard: 1 ,010 (223) Medium: 880 (194) Soft: 670 (148)
Wheel bearing		
Type	Unit ball bearing	

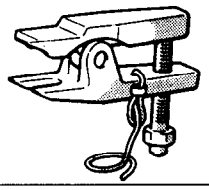
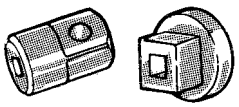
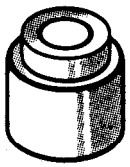
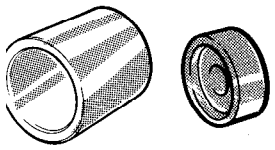
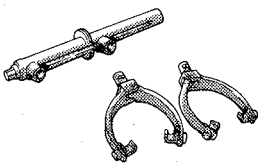
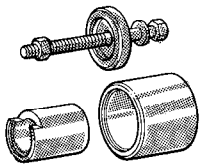
SERVICE SPECIFICATIONS

Items	Specifications
Standard value	
Toe-in (Left-right difference) mm (in.)	0.5 ± 2.5 (.01±.09)
Camber	0" ± 30'
Stabilizer link ball joint breakaway torque Nm (in.lbs.)	1.7 – 3.2 (15 – 28)
Ball joint breakaway torque Nm (in.lbs.)	2 – 9 (17 – 78)
Stabilizer link protrusion mm (in.)	5 - 7 (.197 – .276)
Crossmember bushing projection mm (in.)	8.5 – 9.5 (.33 – .37)
Limit	
Wheel bearing end play mm (in.)	0.05 (.002) or less
Rear hub rotary-sliding resistance N (lbs.)	31 (7) or less

LUBRICANT

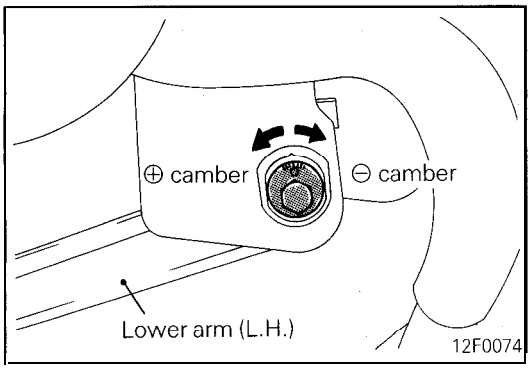
Items	Specified lubricant
Lip and inside of the dust cover (upper and lower arm, assist link, stabilizer link)	MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent

SPECIAL TOOLS

Tool number and tool name		Replaced by Miller tool number	Application
	MB991113 Steering linkage puller	MB990635	Removal of the ball joint
	MB990326 Preload socket	General service tool	Measurement of the ball joint breakaway torque
	MB990800 Ball joint remover and installer	MB990800	Installation of the dust cover
	MB991071 MB991072 MB991073 Bushing remover and installer Arbor Base	MB991071 MB991072-A MB991073	Removal and installation of bushing from/to upper arm, lower arm, and assist link
	MB991237 Spring compressor body MB991239 Arm set	C-4838	Compression of the coil spring
	MB991045 Bushing remover and installer	MB991045	Removal and installation of the crossmember bushing

TROUBLESHOOTING

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

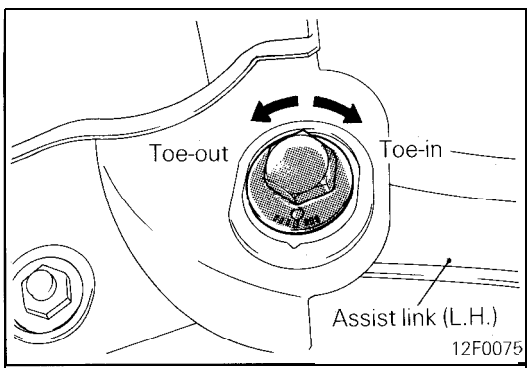
REAR WHEEL ALIGNMENT INSPECTION

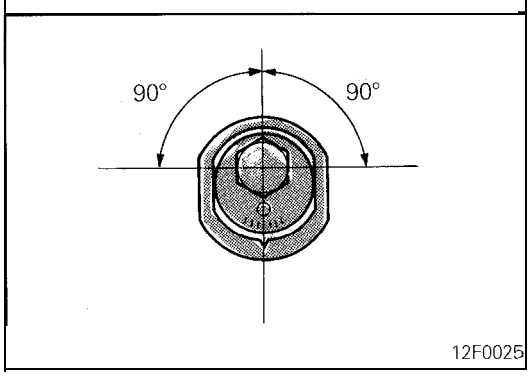
CAMBER

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'.





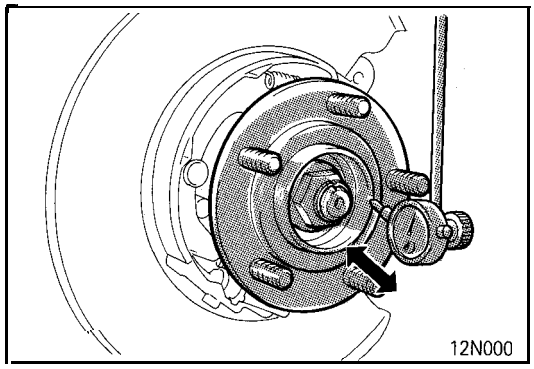
TOE-IN

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.

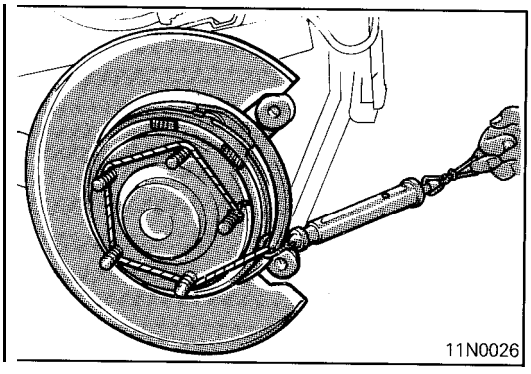


WHEEL BEARING END PLAY INSPECTION

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 INSPECTION

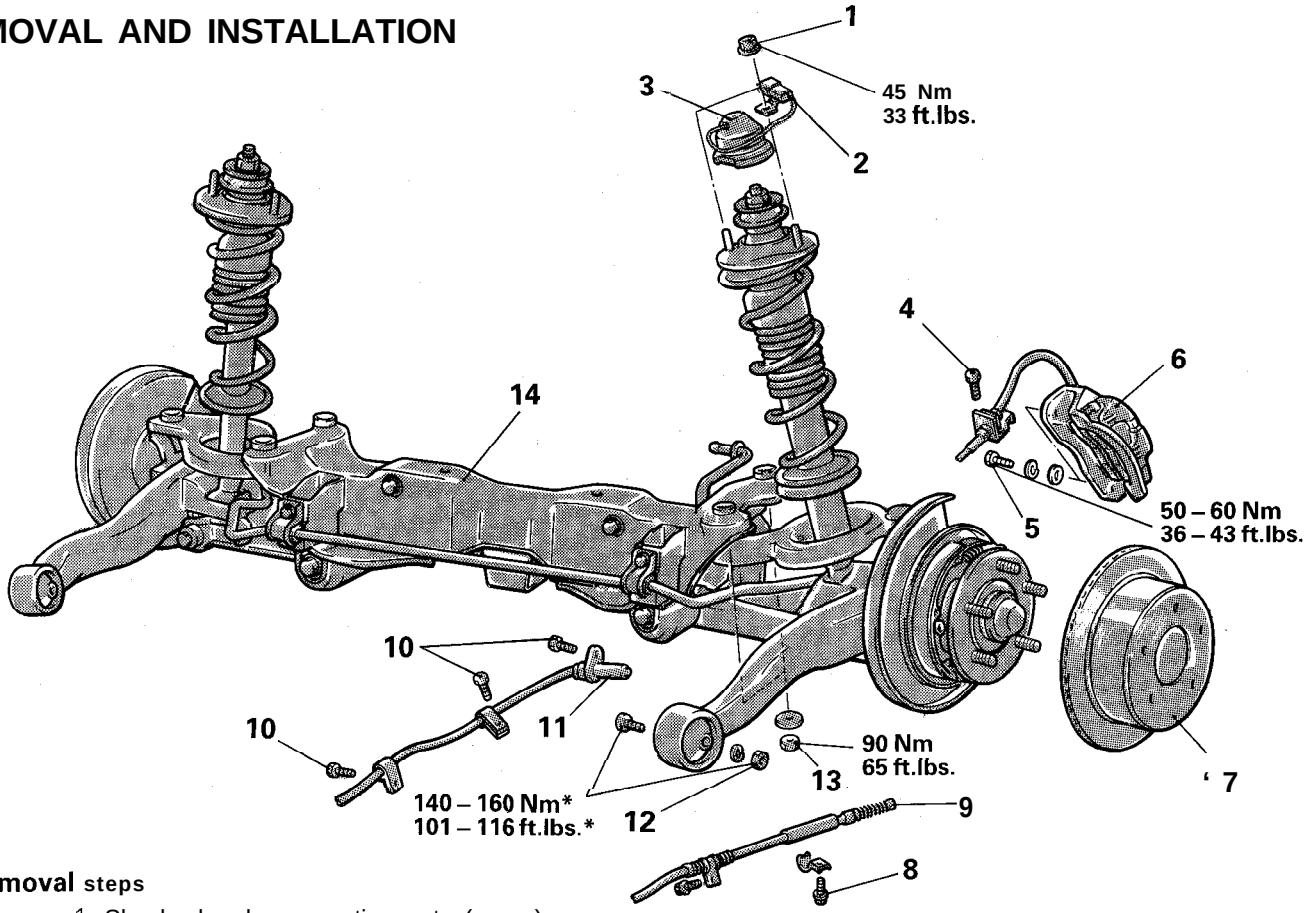
1. Inspect the play of the bearings while the vehicle is jacked up and resting on floor jack.
2. Release the parking brake.
3. Remove the caliper assembly and the brake disc.



4. After turning the hub a few times to seat the bearing, attach a spring balance to the hub bolt, and, pulling at a 90" angle from the hub bolt, measure to determine whether or not the rotary-sliding resistance of the rear hub is the limit value.
   Limit: 31 N (7 lbs.) or less
   NOTE
   If the limit value is exceeded, loosen the nut and then tighten it to the specified torque, and check the rear hub rotary-sliding torque again.
5. Replace the rear hub unit bearing if an adjustment cannot be made to within the limit.

REAR SUSPENSION ASSEMBLY

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 5 – 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 23A – Trims.)
- Removal of the Main Muffler (Refer to GROUP 11 – Exhaust Pipe and Main Muffler.)

Post-installation Operation
- Installation of the Main Muffler (Refer to GROUP 11 – Exhaust Pipe and Main Muffler.)
- Check of Wheel Alignment (Refer to P.17-5.)
- Check of Parking Brake Lever Stroke (Refer to GROUP 5 – Service Adjustment Procedures.)
- Installation of the Absorber Lid to Rear Side Trin (Refer to GROUP 23A – Trims.)

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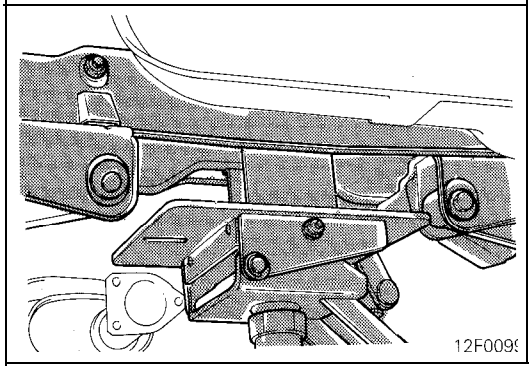


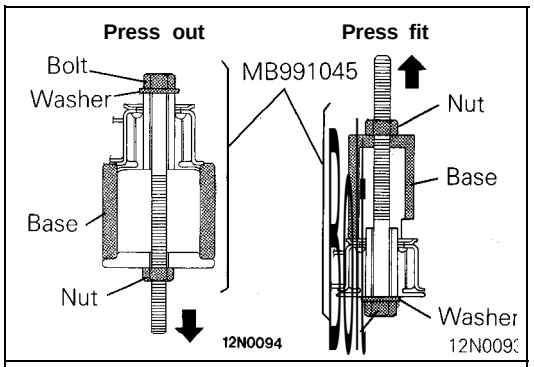
SERVICE POINTS OF REMOVAL

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.

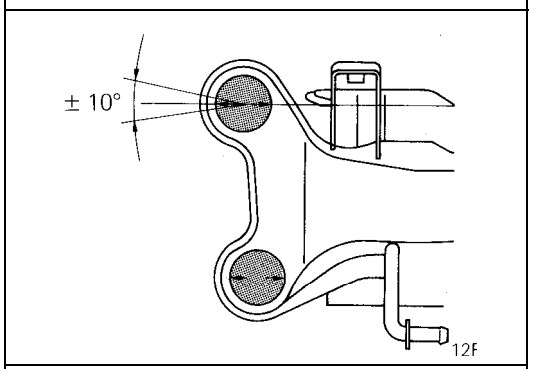
INSPECTION

- Check the crossmember for cracks or deformation.
- Check the bushings for cracks or deterioration.

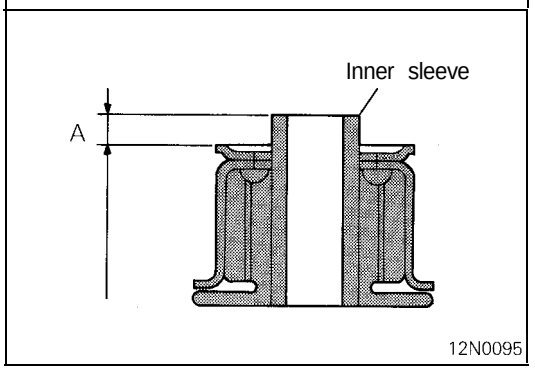


CROSSMEMBER BUSHING REPLACEMENT

(1) Using the special tool, remove and press-fit the bushing



(2) When press-fitting the bushing, apply soapsuds to it and position the arrows as shown.

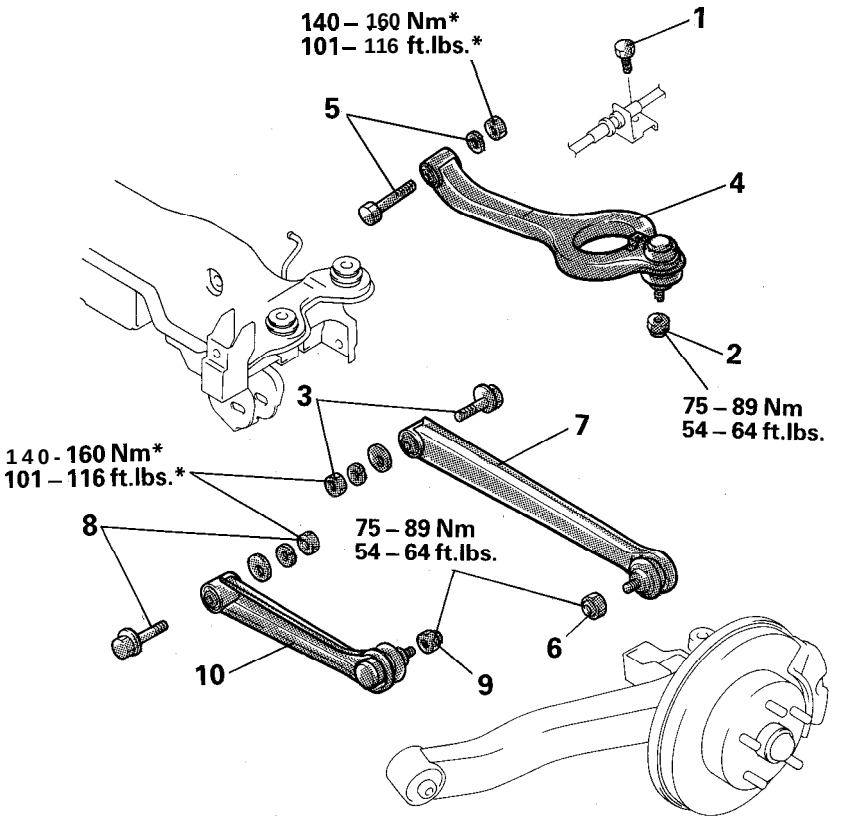


(3) Make sure that the protrusion (dimension A) of the inner sleeve is up to specification.

Standard value: 8.5 – 9.5 mm (.33 – .37 in.)

UPPER ARM, LOWER ARM AND ASSIST LINK

REMOVAL AND INSTALLATION



Pre-removal Operation
0 Removal of the Shock Absorber (Refer to P.17-13.)

Post-installation Operation
- Check of Wheel Alignment (Refer to P. 17-5.)
- Installation of the Shock Absorber (Refer to P.17-13.)

Upper arm removal steps

1. Brake line clamp bolt
- ☒ 2. Self-locking nut
3. Upper arm mounting bolt and nut
4. Upper arm

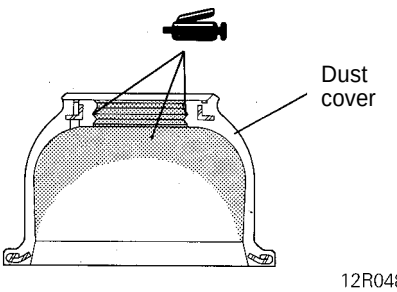
Lower arm removal steps

5. Lower arm mounting bolt and nut
- ☒ 6. Self-locking nut
7. Lower arm

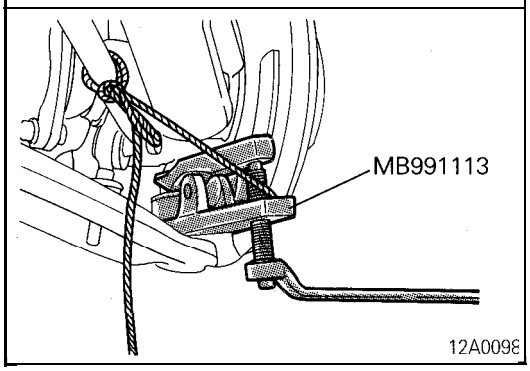
Assist link removal steps

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.



Grease: MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent



SERVICE POINTS OF REMOVAL

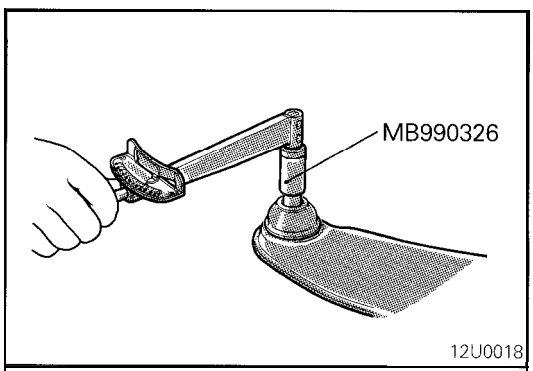
2. 6. 9. REMOVAL OF SELF-LOCKING NUT

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

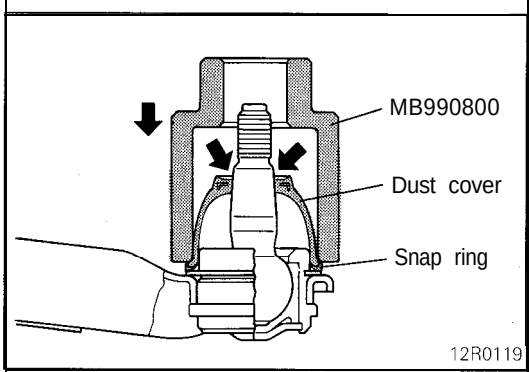
- Check the bushing for wear and deterioration.
- Check the upper arm, lower arm or assist link for bend or breakage.
- Check the ball joint dust cover for cracks.
- Check all bolts for condition and straightness.



CHECKING OF BALL JOINT FOR BREAKAWAY TORQUE

Using the special tool, measure the ball joint breakaway torque.

Standard value: 2 – 9 Nm (17 – 78 in.lbs.)

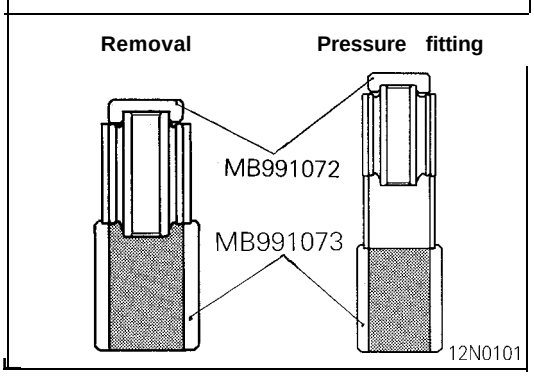


BALL JOINT DUST COVER REPLACEMENT

(1) Remove the dust cover.
(2) Apply multipurpose grease to the lip and inside of the dust cover.

Grease: MOPAR Multi-mileage Lubricant
Part No. 2525035 or equivalent

(3) Drive in the dust cover with special tool until it is fully seated.

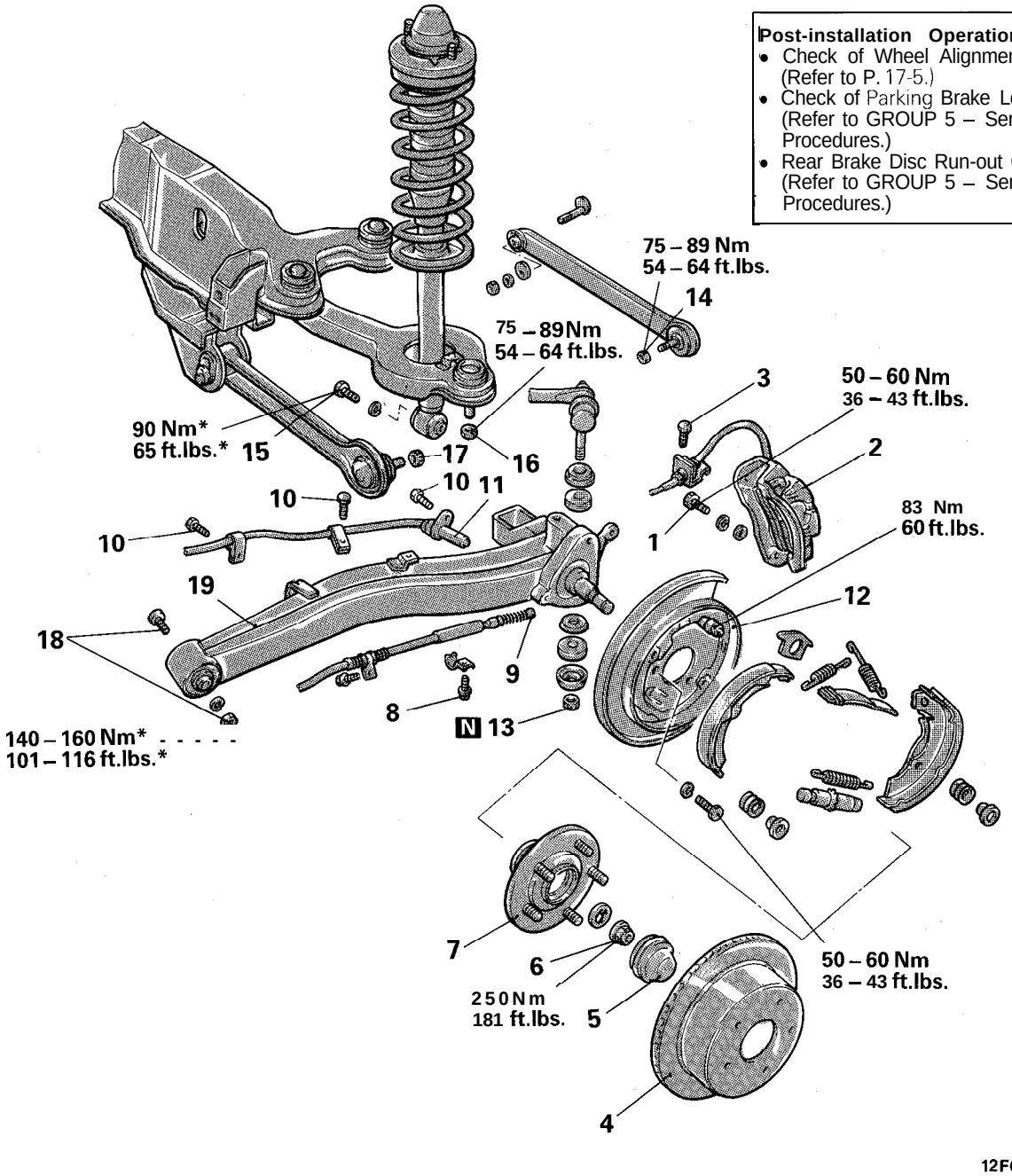


LOWER ARM, UPPER ARM, ASSIST LINK BUSHING REPLACEMENT

Use the special tool to remove and press-fit the bushing.

TRAILING ARM

REMOVAL AND INSTALLATION



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 5 – Parking Brake.)

10. **Rear speed sensor clamp bolt** (ABS)
11. ABS speed **sensor** (ABS)
12. Backing plate

◆◆ 13. Stabilizer link mounting nut

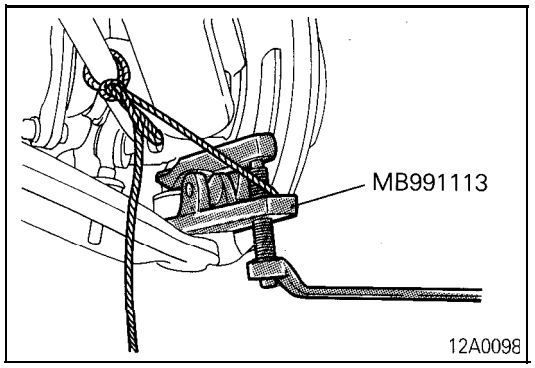
◆◆ 14. Self-locking nut
15. Shock absorber mounting bolt (upper)

◆◆ 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.



SERVICE POINTS OF REMOVAL

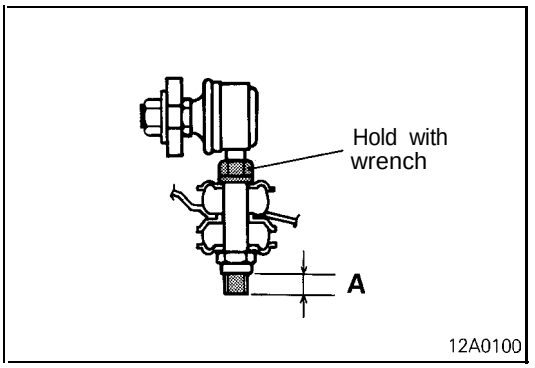
14.16. 17. REMOVAL OF SELF-LOCKING NUT

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

- Check trailing arm for cracks and deformation.
- Check bushing for cracks, deterioration and wear.



SERVICE POINT OF INSTALLATION

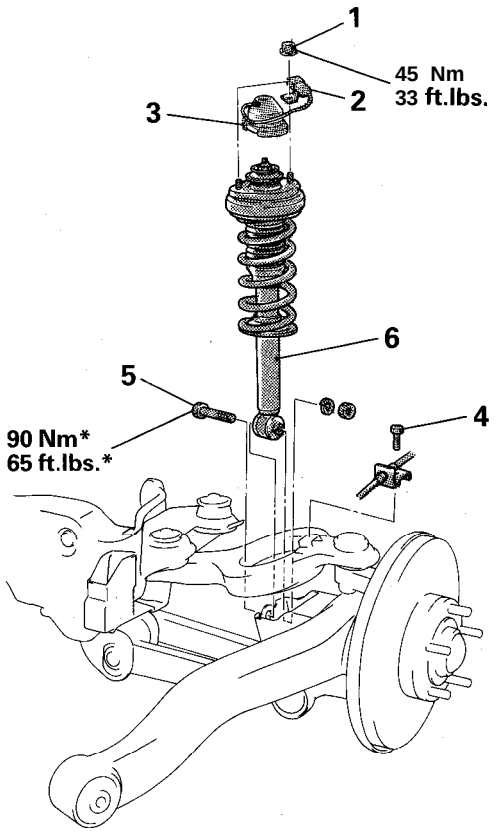
13. INSTALLATION OF STABILIZER LINK MOUNTING NUT

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

REMOVAL AND INSTALLATION



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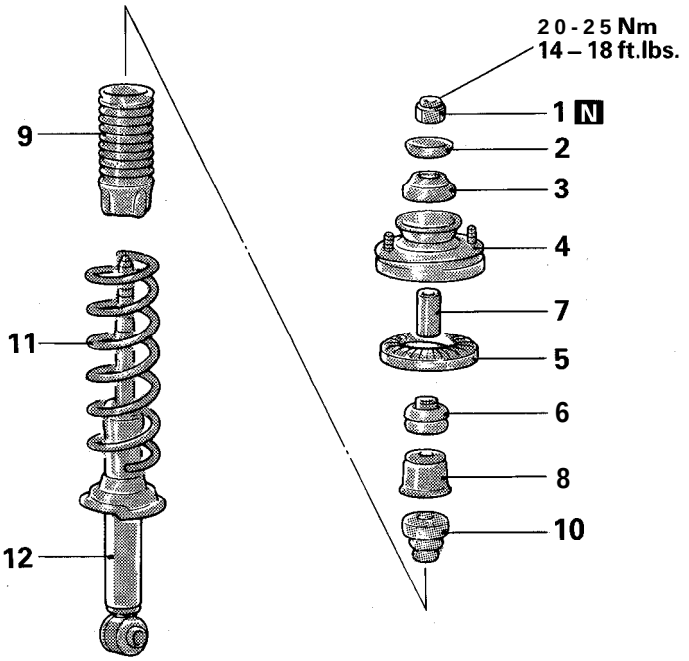
Pre-removal and Post-installation Operation
- Removal and Installation of the Rear Side Trim Absorber Lid
  (Refer to GROUP 23A – Trims.)

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.

DISASSEMBLY AND REASSEMBLY



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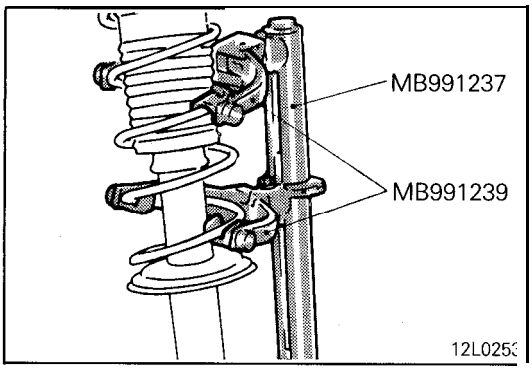
Disassembly steps

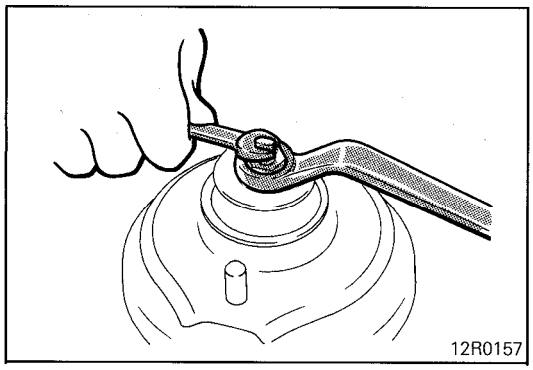
- *◆ 1. Piston rod tightening nut
  2. Washer
  3. Upper bushing (A)
- * 4. Bracket assembly
  5. Upper spring pad
  6. Upper bushing (B)
  7. Collar
  8. Cup assembly
  9. Dust cover
  10. Bump rubber
- ◆ 11. Coil spring
  12. Shock absorber



SERVICE POINT OF DISASSEMBLY

1. REMOVAL OF PISTON ROD TIGHTENING NUT

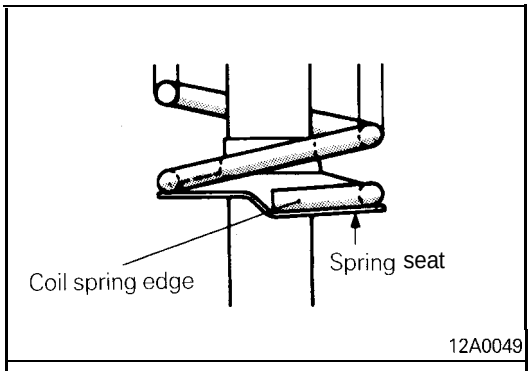
(1) Before removing the piston rod tightening nut, compress the coil spring using the special tool.



(2) While holding the piston rod, remove the piston rod tightening nut.

INSPECTION

- Check the rubber parts for damage.
- Check the coil springs for crack, damage or deterioration.

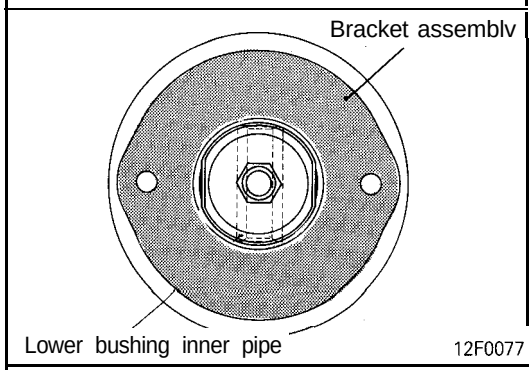


SERVICE POINTS OF REASSEMBLY

11. INSTALLATION OF COIL SPRING

(1) Use the special tools (MB991237, MB991239) to compress the coil spring and insert it in the shock absorber.

(2) Align the edge of the coil spring to the position of the shock absorber spring seat as shown.



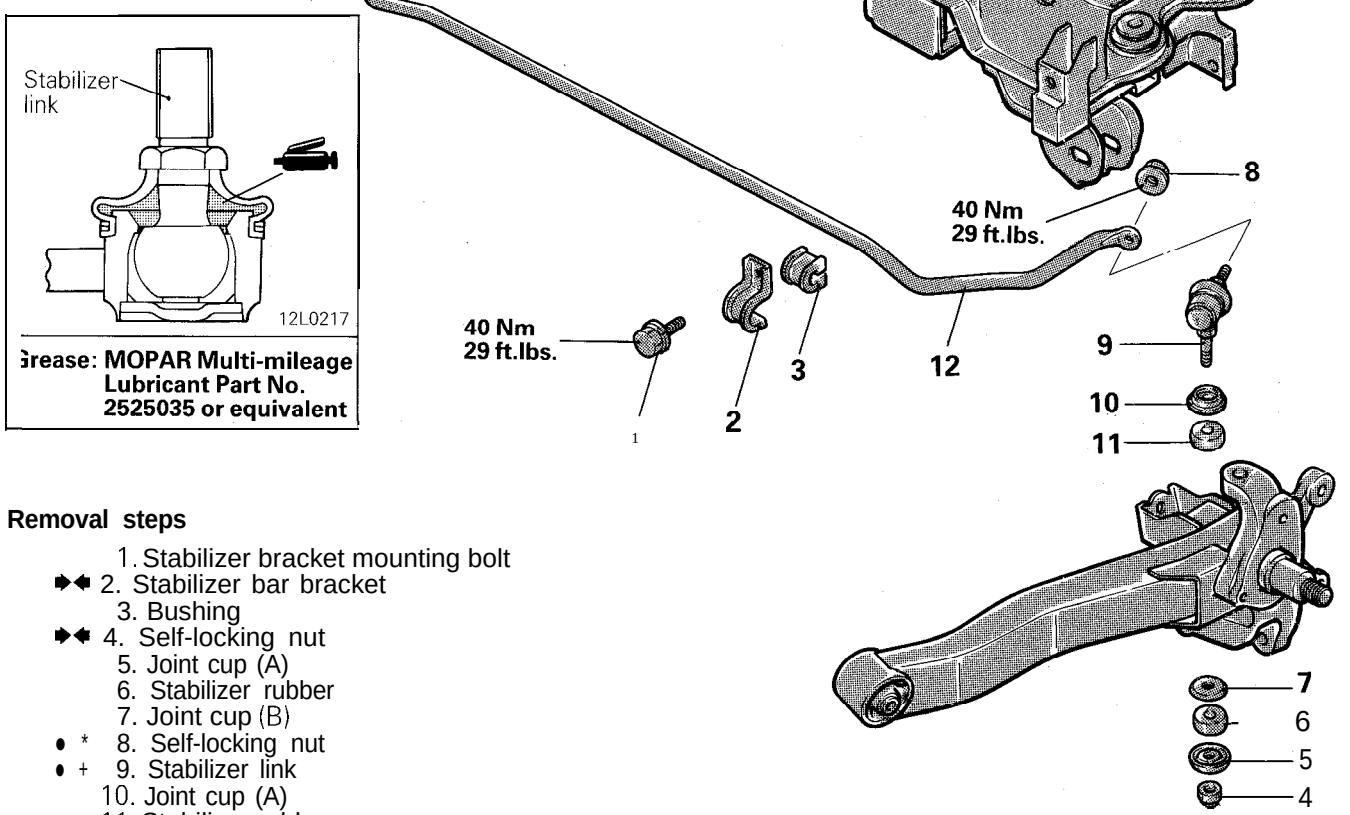
4. INSTALLATION OF BRACKET ASSEMBLY / 1. PISTON ROD TIGHTENING NUT

(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 tools (MB991 237, MB991 239).

STABILIZER BAR

REMOVAL AND INSTALLATION



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

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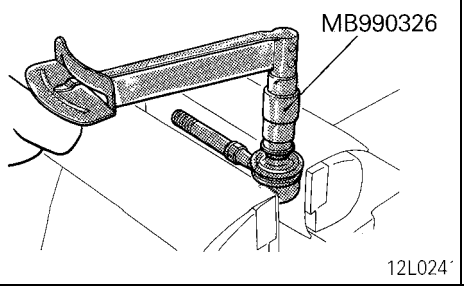


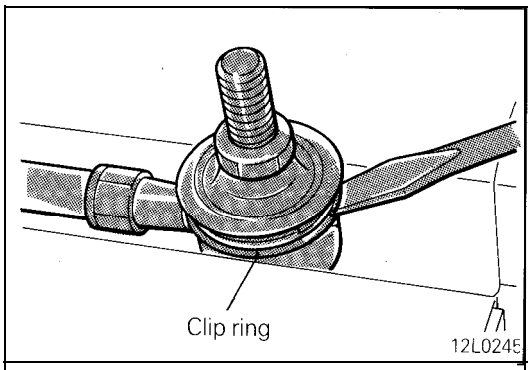
INSPECTION

- Check the bushing for wear and deterioration.
- Check the stabilizer bar for deterioration or damage.
- Check the stabilizer link ball joint dust cover for cracks.
- Check all bolts for condition and straightness.

CHECKING OF STABILIZER LINK BALL JOINT FOR BREAK-AWAY TORQUE

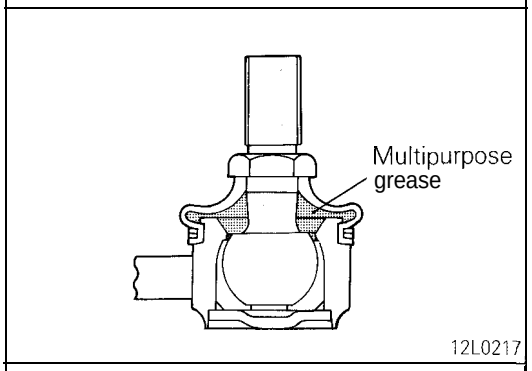
Using the special tool, measure the ball joint breakaway torque.

Standard value: 1.7 – 3.2 Nm (15 – 28 in.lbs.)



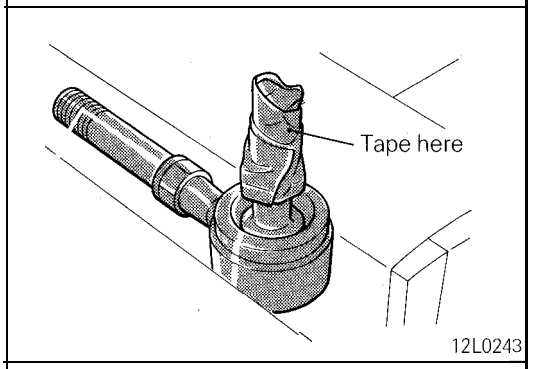
BALL JOINT DUST COVER REPLACEMENT

(1) Remove the clip ring and the dust cover.

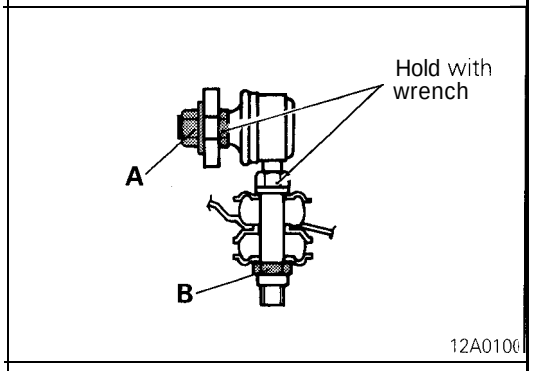


(2) Apply multipurpose grease to the lip and inside of the dust cover.

Grease : MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent



(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.

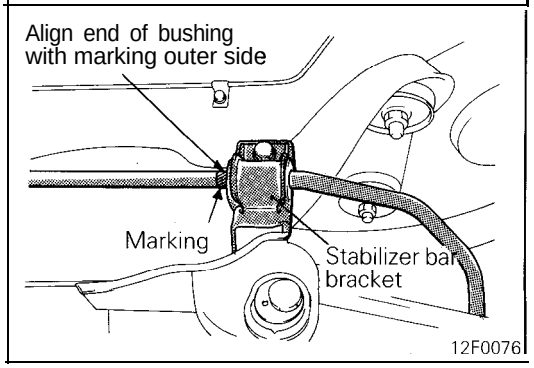


SERVICE POINTS OF INSTALLATION

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.)

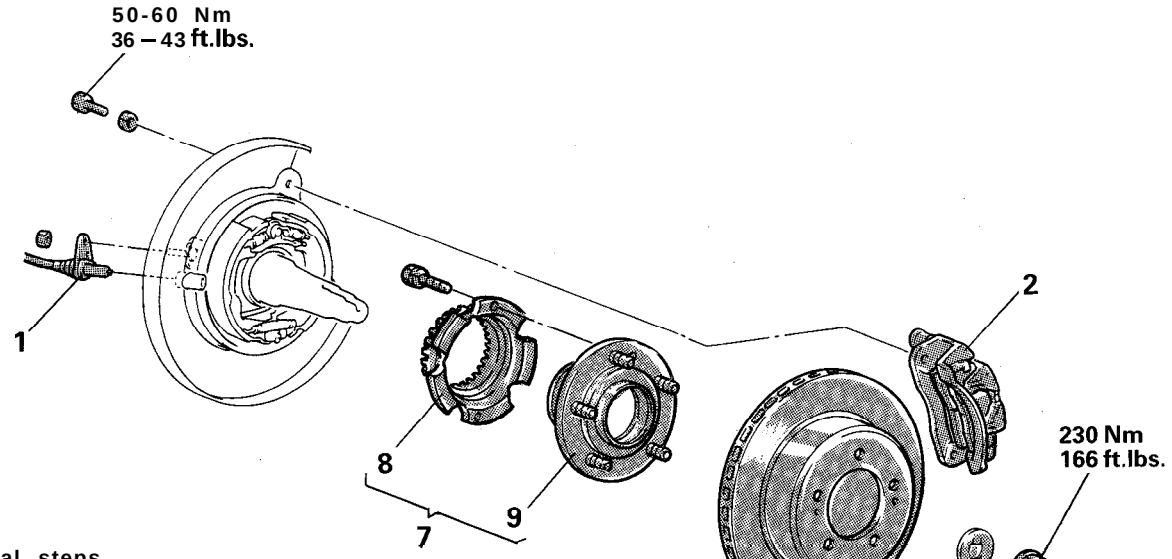


2. INSTALLATION OF STABILIZER BAR BRACKET

(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 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

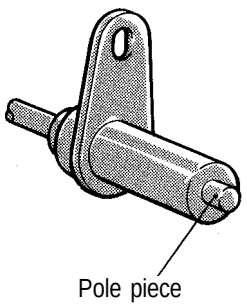


Removal steps

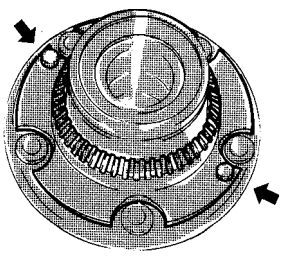
- ⧫ ☒ 1. Rear speed sensor <Vehicles with ABS>
- ◆◆ 2. Caliper assembly
- 3. Brake disc
- 4. Hubcap
- ⧫ + 5. Wheel bearing nut
- 6. Tongued washer
- 7. Rear hub assembly
- ⧫ ☒ 8. Rear rotor <Vehicles with ABS>
- 9. Rear hub unit bearing

Caution
Rear hub unit bearing cannot be disassembled.

11N0018



14N0107



14N009

SERVICE POINTS OF REMOVAL

1. REMOVAL OF REAR SPEED SENSOR <VEHICLES WITH ABS>

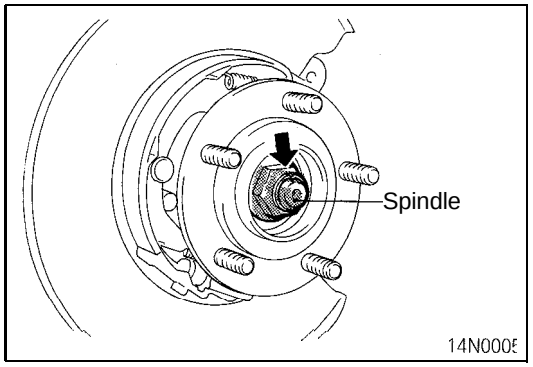
Caution
Be careful when handling the pole piece at the tip of the speed sensor and the toothed edge of the rotor so as not to damage them by striking against other parts.

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.



SERVICE POINT OF INSTALLATION

5. INSTALLATION OF WHEEL BEARING NUT

After tightening the wheel bearing nut, align with the spindle's indentation and crimp.

SPECIFICATIONS <AWD>

GENERAL SPECIFICATIONS

Items	Specifications
Suspension system	Double wishbone suspension type
Coil spring	
Wire dia. x O.D. x free length mm (in.)	11.5x 105 x 379.3 (.45 x4.13x 14.93)
Coil spring identification color	Light brown x 2
Spring constant N/mm (lbs./in.)	28.0 (157)
Shock absorber	
Type	Hydraulic, cylindrical, double-acting type
Max. length mm (in.)	610 (24.0)
Min. length mm (in.)	407 (16.0)
Stroke mm (in.)	203 (8.0)
Damping force [at 0.3 m/sec. (0.9 ft./sec.)]	
Expansion N (lbs.)	Hard: 1,710 (377)
	Medium: 1,160 (256)
	Soft: 560 (123)
Contraction N (tbs.)	Hard: 1 ,010 (223)
	Medium: 880 (194)
	Soft: 670 (148)

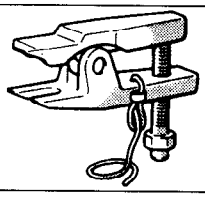
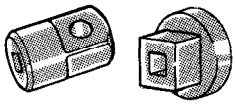
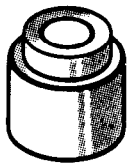
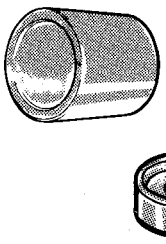
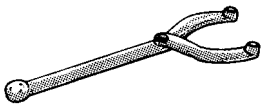
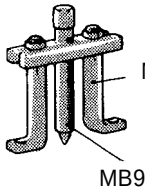
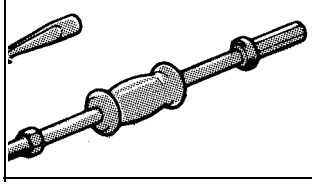
SERVICE SPECIFICATIONS

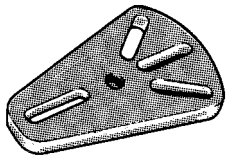
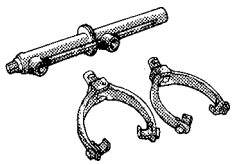
Items	Specifications
Standard value	
Toe-in mm (in.)	0.5 ± 2.5 (.01± .09)
Camber	– 0°10' ± 30'
Protruding length of stabilizer bar mounting bolt mm (in.)	5 - 7 (.197 – .276)
Lower arm ball joint breakaway torque Nm (in.lbs.)	2.0 – 9.0 (17 – 78)
Stabilizer link ball joint breakaway torque Nm (in.lbs.)	1.7 – 3.2 (15 – 28)
Crossmember support bushing projection mm (in.)	
Upper part	15.5 (.59)
Lower part	2.1 – 3.7 (.08 – .15)
Differential support bushing projection mm (in.)	6.7 – 7.3 (.26 – .29)

LUBRICANT

Items	Specified lubricant
Lip and inside of the dust cover (upper and lower arm, stabilizer link)	MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent

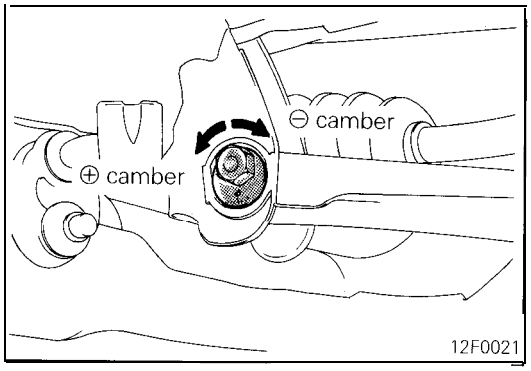
SPECIAL TOOLS

Tool number and tool name	Replaced by Miller tool number	Application
 MB990958 Arbor	MB990975 (Part of MB990958)	Removal and installation of the crossmember bushing
 MB991113 Steering linkage puller	MB990635	Removal of the ball joint
 MB990326 Preload socket	General service tool	Measurement of the ball joint breakaway torque
 MB990800 Ball joint remover and installer	MB990800	Installation of the dust cover
 MB991071 MB991072 MB991073 Bushing remover and installer Arbor Base	MB991071 MB991072-A MB991073	Removal and installation of bushing from/to upper arm, lower arm, and assist link
 M B990767 End yoke holder	C-3281	To stop axle shaft turning
 MB990242 MB990244 MB990241 Axle shaft puller MB990242 Puller bar MB990244 Puller shaft	CT-1 003	For removal of the axle shaft
 MB99021 1 Sliding hammer	C-637	

Tool number and tool name		Replace by Miller tool number	Application
	MB991354 Puller body	CT-1 003	For removal of the axle shaft
	MB991 237 Spring compressor body MB991 239 Arm set	C-4838	Compression of the coil spring

TROUBLESHOOTING

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

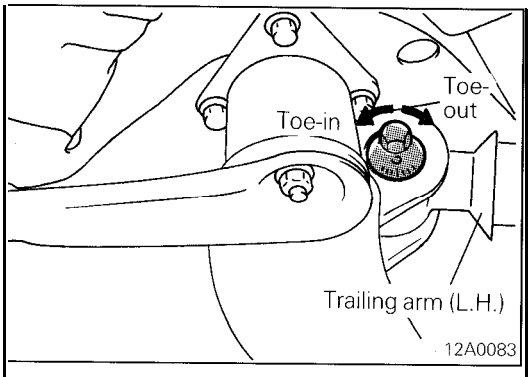
REAR WHEEL ALIGNMENT INSPECTION

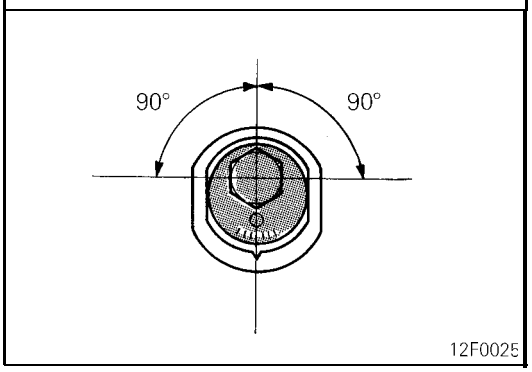
CAMBER

Standard value: –0°10′ ± 30’

To adjust camber, turn the lower arm mounting bolt on the crossmember side.

NOTE
Left wheel: Clockwise (⊖ camber)
Right wheel: Clockwise (⊕ camber)
The difference between the right and left wheels should be 30’ or less.
One graduation changes camber by about 12’.





TOE-IN

Standard value: 0.5 ± 2.5 mm (.01 ± .09 in.)

To adjust toe, turn the trailing arm mounting bolts on the crossmember side on both sides the same amount.

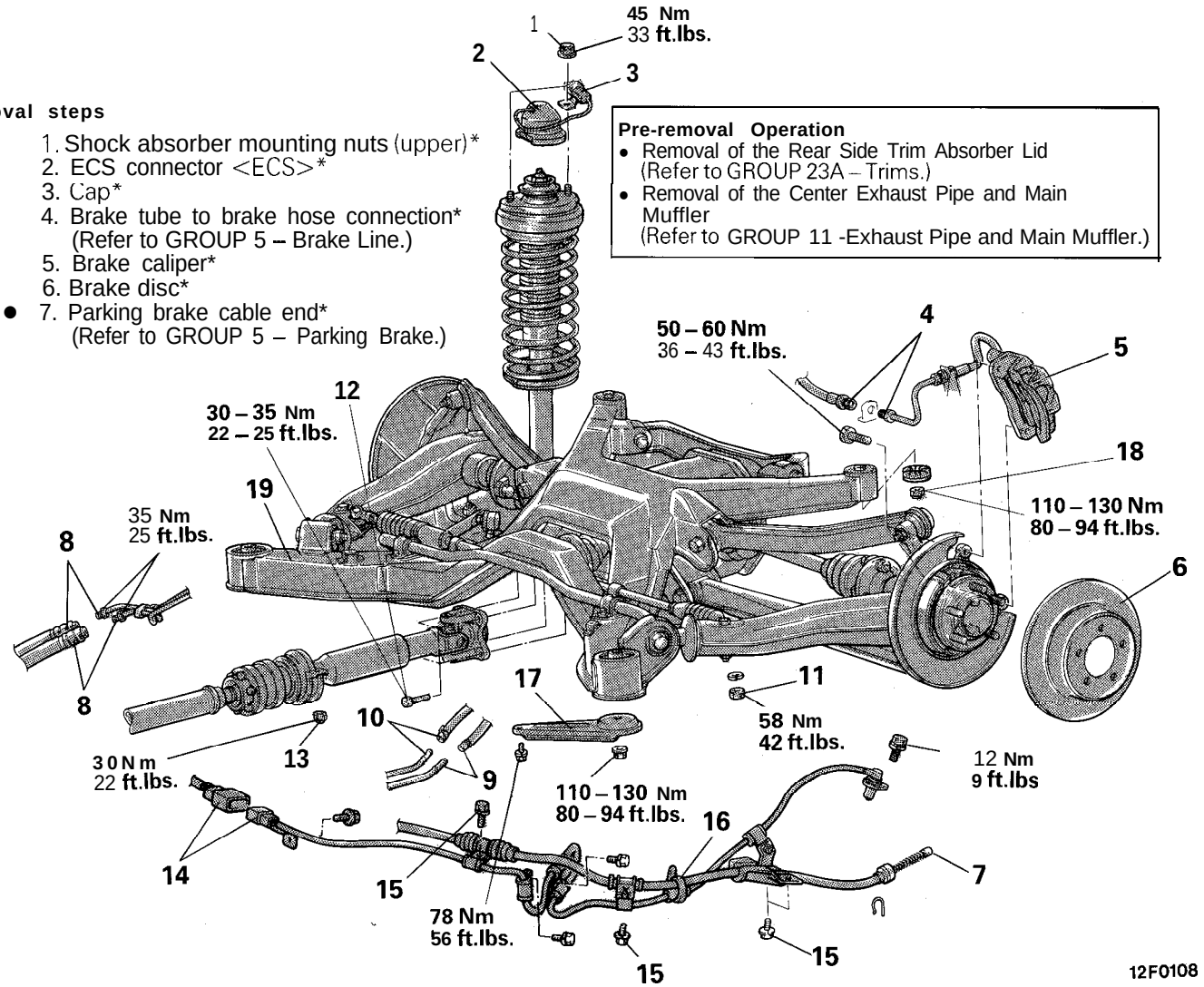
NOTE
Left wheel: Clockwise (toe-out)
Right wheel: Clockwise (toe-in)
The difference between right and left wheels should be 3 mm (.12 in.) or less.
One graduation changes toe by about 2 mm (.08 in.).

Caution

1. **Adjust the eccentric cam bolt within 90” from the central position.**
2. **Adjust camber and toe, in that order, and, if camber is adjusted, be sure to adjust toe also.**
3. **Make the adjustments with the 4WS tie rod end disconnected from the trailing arm.**

REAR SUSPENSION ASSEMBLY

REMOVAL AND INSTALLATION



Removal steps

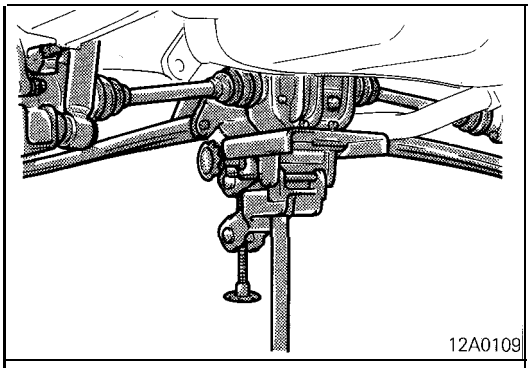
1. Shock absorber mounting nuts (upper)*
2. ECS connector <ECS>*
3. Cap*
4. ◆◆ Brake tube to brake hose connection* (Refer to GROUP 5 – Brake Line.)
5. Brake caliper*
6. Brake disc*
7. ◆◆ ●● Parking brake cable end* (Refer to GROUP 5 – Parking Brake.)

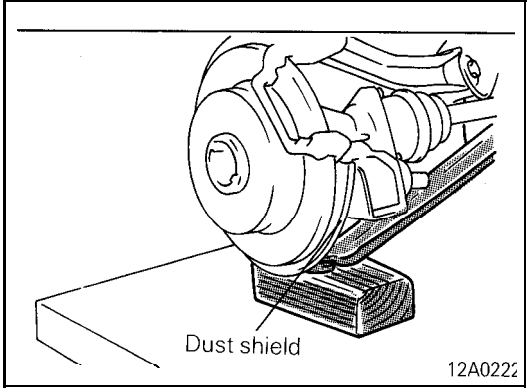
Pre-removal Operation
- Removal of the Rear Side Trim Absorber Lid (Refer to GROUP 23A – Trims.)
- Removal of the Center Exhaust Pipe and Main Muffler (Refer to GROUP 11 -Exhaust Pipe and Main Muffler.)

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

NOTE
Parts marked with * are symmetrical

Post-installation Operation
- Installation of the Center Exhaust Pipe and Main Muffler (Refer to GROUP 11 – Exhaust Pipe and Main Muffler.)
- Installation of the Rear Side Trim Absorber Lid (Refer to GROUP 23A – Trims.)
- Refilling and Bleeding of the Power Steering System (Refer to GROUP 19A – On-vehicle Inspection.)
- Checking Wheel Alignment (Refer to GROUP 17 -On-vehicle Inspection.)
- Bleeding of 4WS System (Refer to GROUP 19B – On-vehicle Inspection.)
- Operation Inspection of the 4WS System (Refer to GROUP 19B – On-vehicle Inspection.)
- Checking the Parking Brake Lever Stroke (Refer to GROUP 5 – On-vehicle Inspection.)


12A0109



12A0222

SERVICE POINTS OF REMOVAL

17. REMOVAL OF CROSSMEMBER BRACKET / 18. CROSSMEMBER MOUNTING NUT (ON DIFFERENTIAL SIDE) / 19. REAR SUSPENSION ASSEMBLY

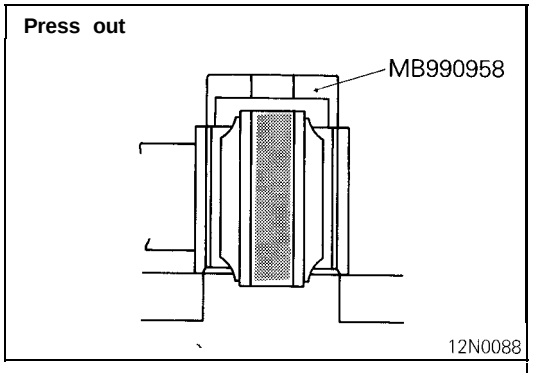
(1) Before removing the crossmember bracket, support the differential case with the transmission jack.
(2) Remove the crossmember mounting bolt and nut.

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.

INSPECTION

- Check the crossmember for cracks or deformation.
- Check the bushings for cracks or deterioration.



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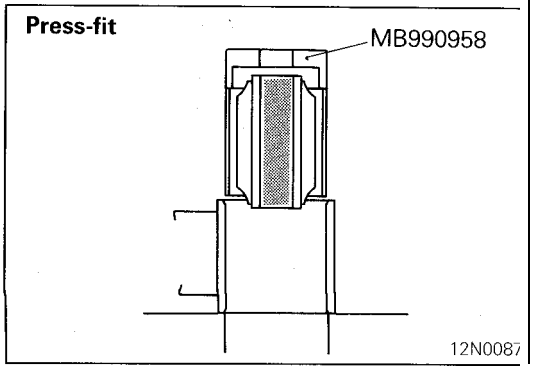
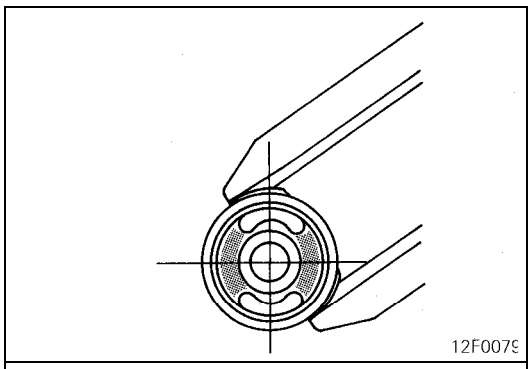


12N0087

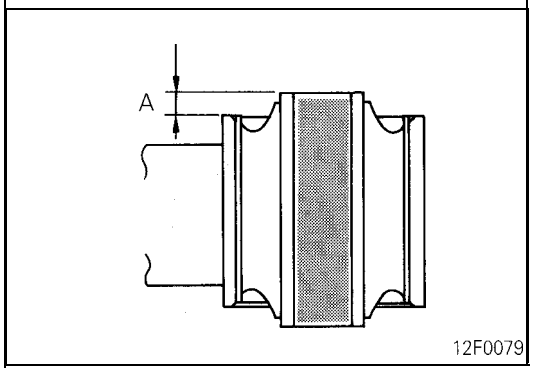
CROSSMEMBER BUSHING (REAR) REPLACEMENT

(1) Using the special tool, remove and press-fit the bushing.



(2) When press-fitting, position the bushing as shown.

NOTE
Ensure that the shift in rotating direction is within ± 5".

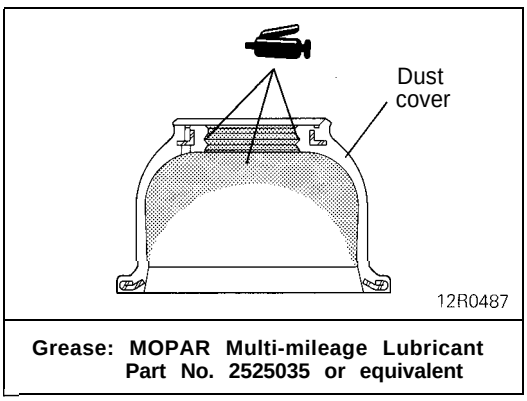


(3) Make sure that the protrusion of the inner sleeve (dimension A) is up to specification.

Standard value: 6.7 – 7.3 mm (.26 – .29 in.)

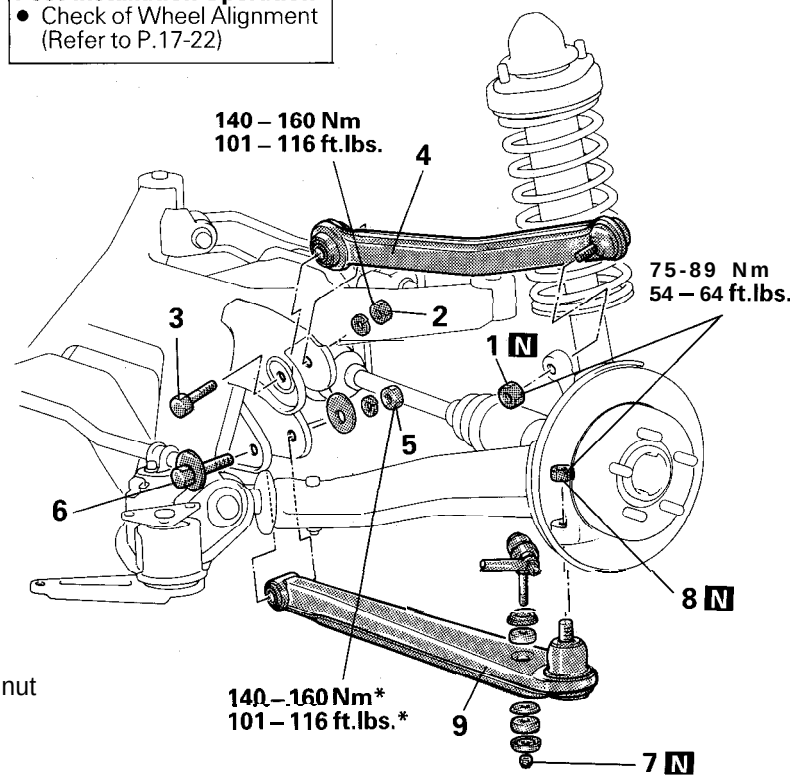
UPPER AND LOWER ARM

REMOVAL AND INSTALLATION



Grease: MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent

Post-installation Operation
- Check of Wheel Alignment (Refer to P.17-22)



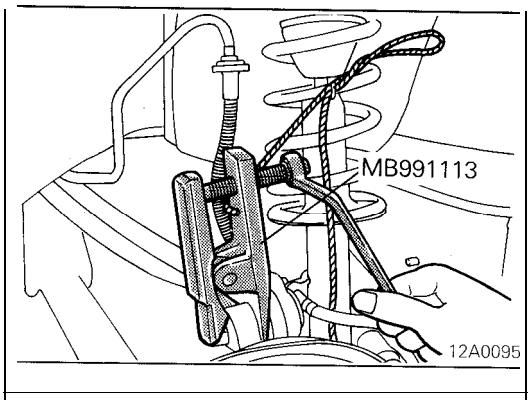
Upper arm removal steps

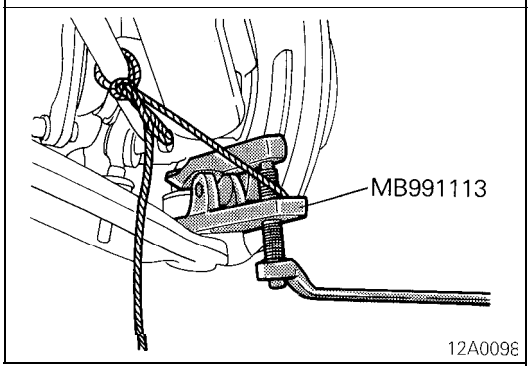
◆◆ 1. Self-locking nut
2. Upper arm mounting nut
3. Upper arm mounting bolt
4. Upper arm

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

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.

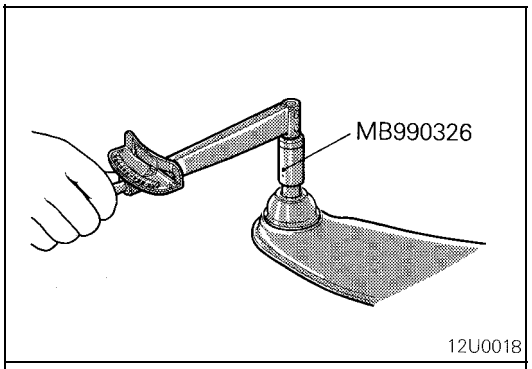
8. REMOVAL OF SELF-LOCKING NUT

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 too! with a rope to prevent it from dropping.

INSPECTION

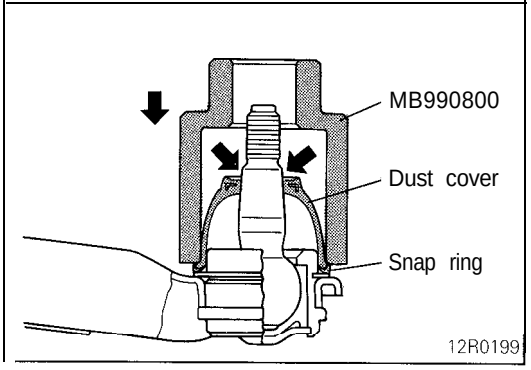
- Check the bushing for wear and deterioration.
- Check the upper arm or lower arm for bend or breakage.
- Check the ball joint dust cover for cracks.
- Check all bolts for condition and straightness.



CHECKING OF BALL JOINT FOR BREAKAWAY TORQUE

Using the special tool, measure the ball joint breakaway torque.

Standard value: 2 – 9 Nm (17 – 78 in.lbs.)



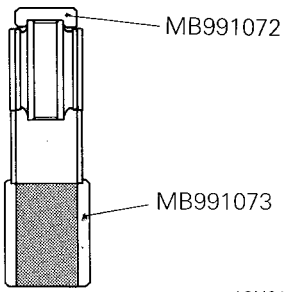
BALL JOINT DUST COVER REPLACEMENT

(1) Remove the dust cover.
(2) Apply multipurpose grease to the lip and inside of the dust cover.

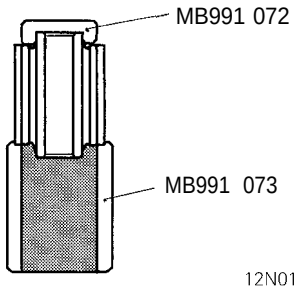
Grease: MOPAR Multi-mileage Lubricant
Part No. 2525035 or equivalent

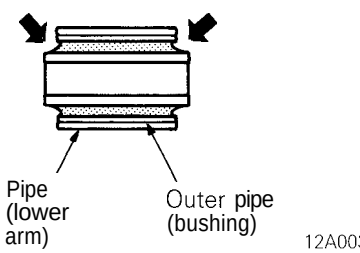
(3) Drive in the dust cover with special tool until it is fully seated.

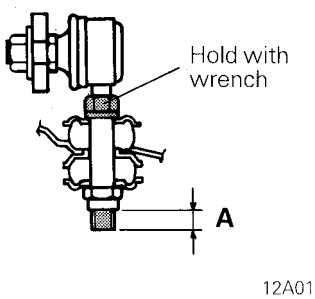
Removal



Press-fit







LOWER ARM BUSHING REPLACEMENT

(1) Use the special tool to remove and press-fit the bushing.

(2) Press-fit the lower arm bushing until the bushing outer pipe edge is flush with the lower arm pipe edge.

SERVICE POINT OF INSTALLATION

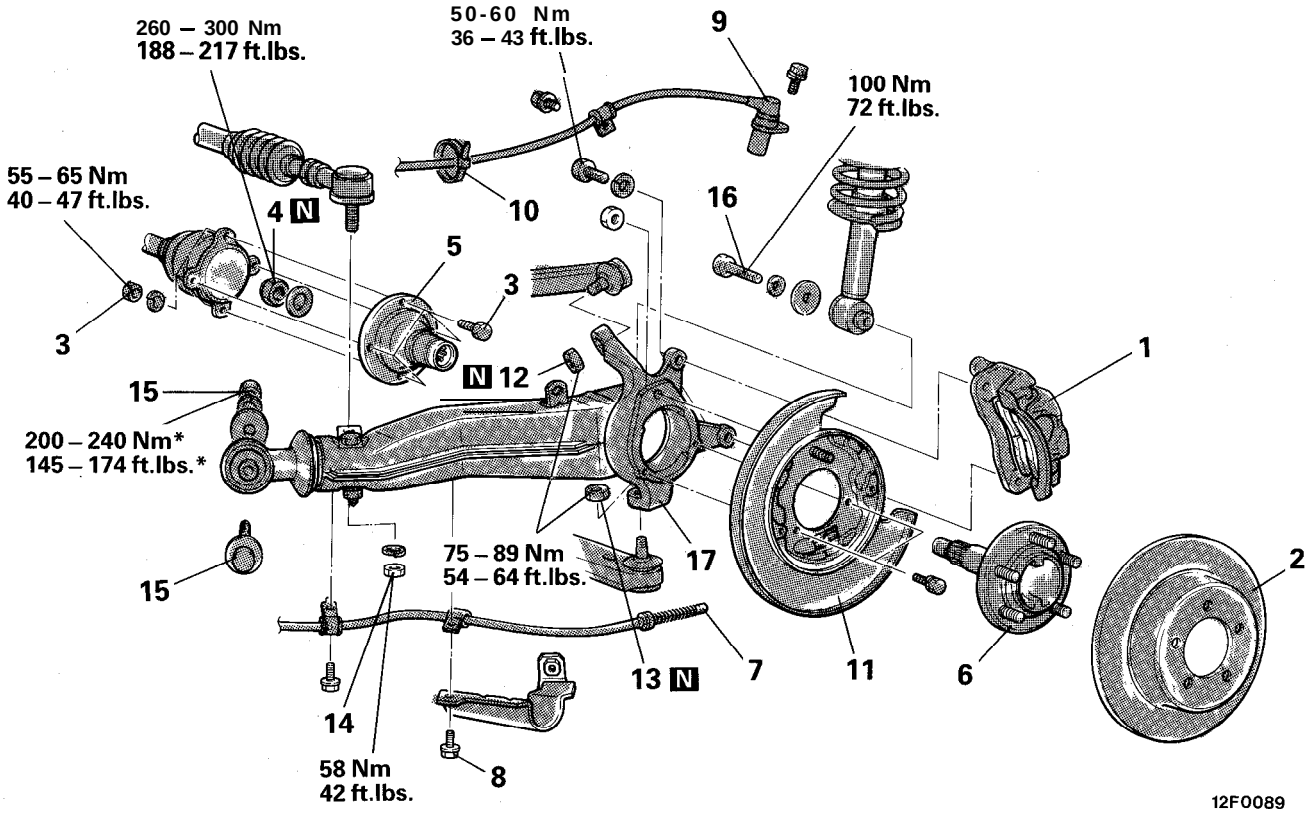
7. INSTALLATION OF STABILIZER LINK TO LOWER ARM COUPLING NUT

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



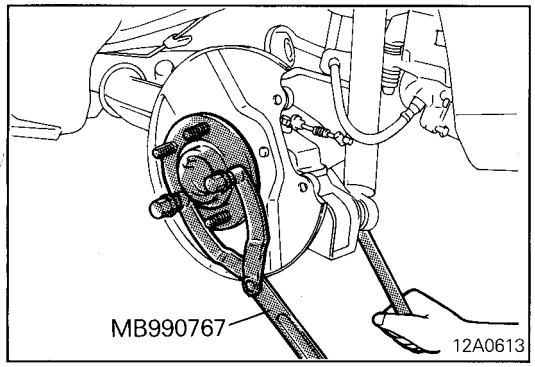
Removal steps

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.17-22)
- Check of Parking Brake Lever Stroke (Refer to GROUP 5 – Service Adjustment Procedures.)
- Rear Brake Disc Run-out Check (Refer to GROUP 5 – Service Adjustment Procedures.)

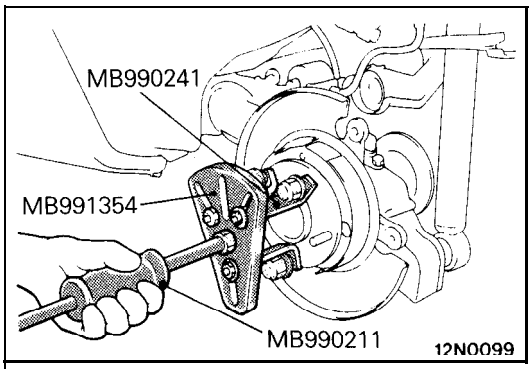
NOTE
For tightening points marked with *, first temporarily tighten and then ground the vehicle to torque to specification where the vehicle is empty.



SERVICE POINTS OF REMOVAL

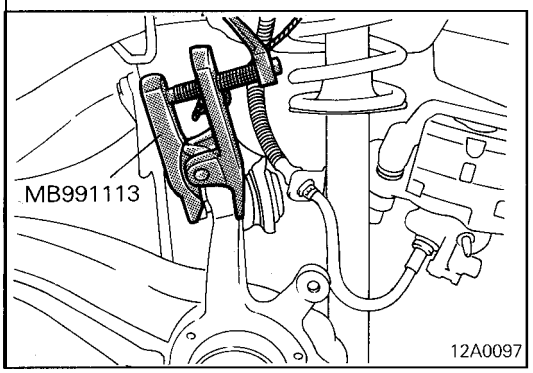
4. REMOVAL OF SELF-LOCKING NUT

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.

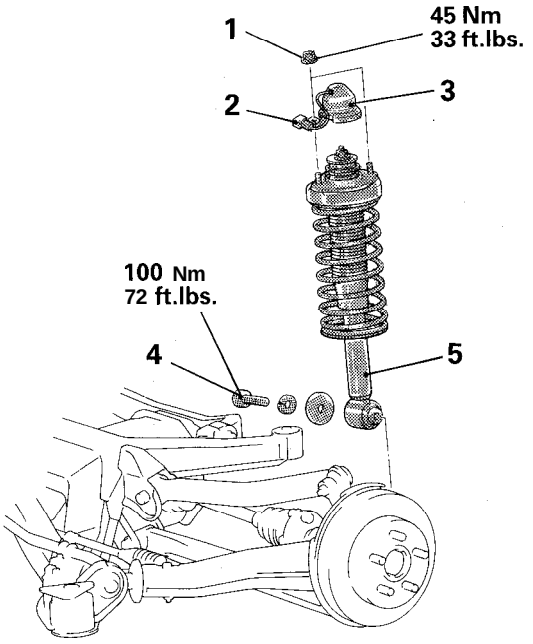
(2) Suspend the special tool with a rope to prevent it from dropping.

INSPECTION

- Check trailing arm for cracks and deformation.
- Check bushing for cracks, deterioration and wear.

SHOCK ABSORBER ASSEMBLY

REMOVAL AND INSTALLATION



Pre-removal and Post-installation Operation
- Removal and Installation of the Rear Side Trim Absorber Lid
  (Refer to GROUP 23A – 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

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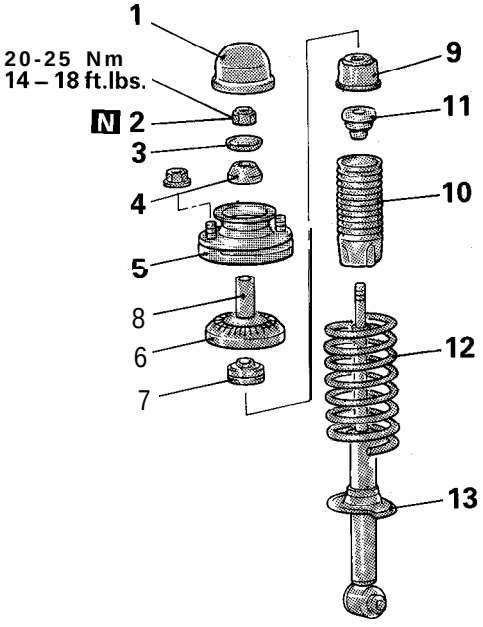
DISASSEMBLY AND REASSEMBLY



Disassembly steps

1. Cap
2. Piston rod tightening nut
   (Refer to P.17-14.)
3. Washer
4. Upper bushing (A)
5. Bracket assembly (Refer to P.17-14.)
6. Spring pad
7. Upper bushing (B)
8. Collar
9. Cup assembly
10. Dust cover
11. Bump rubber
12. Coil spring (Refer to P.17-14.)
13. Shock absorber

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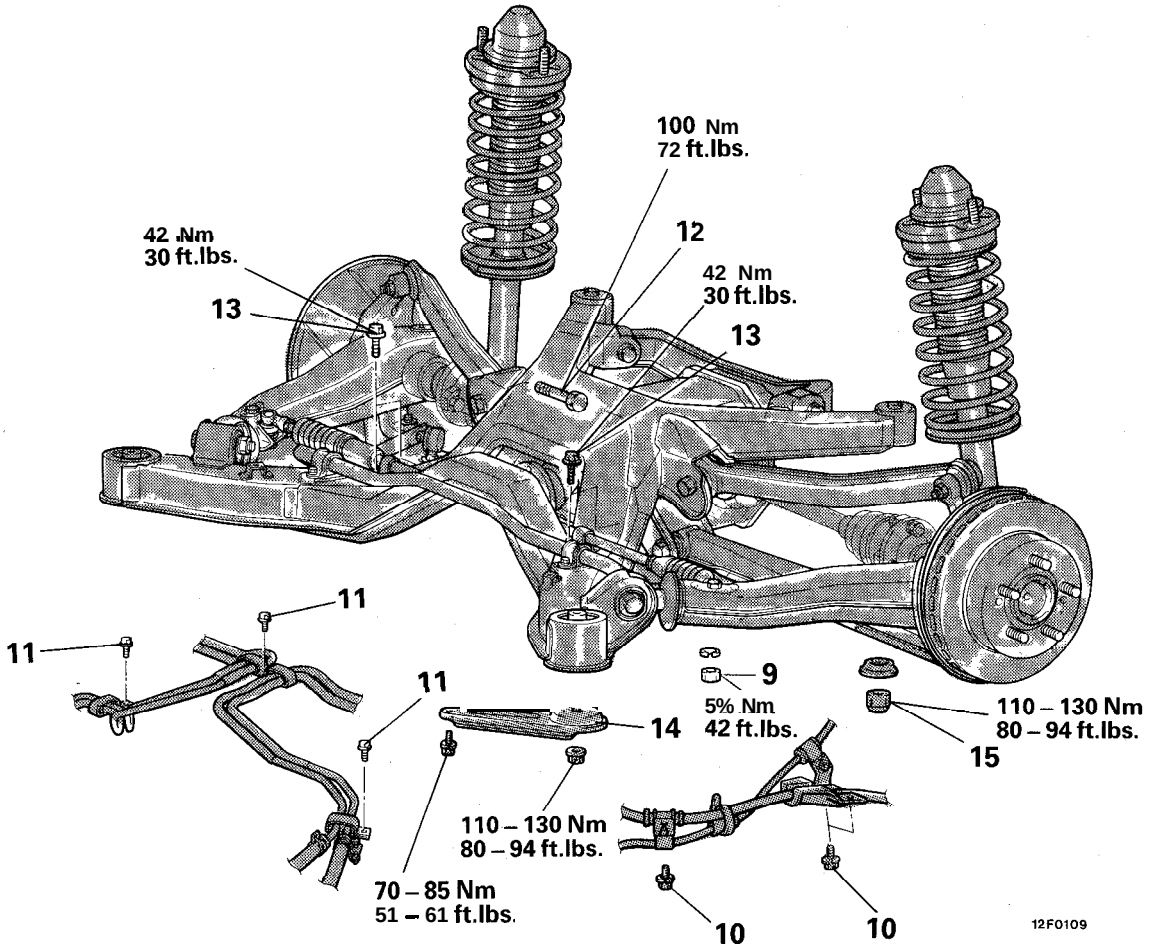
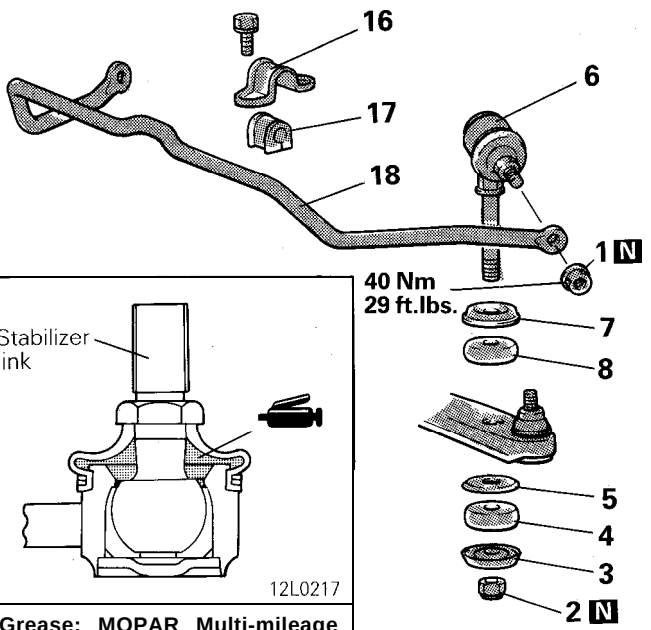
INSPECTION

- Check the rubber parts for damage.
- Check the coil springs for crack, damage or deterioration.

STABILIZER BAR

REMOVAL AND INSTALLATION





Removal steps

- ◆◆ 1. Self-locking nut*
- ● * 2. Self-locking nut*
- 3. Joint cup A*
- 4. Stabilizer rubber*
- 5. Joint cup B*
- ● a 6. Stabilizer link*
- 7. Joint cup A*
- 8. Stabilizer rubber*
- 9. Tie rod end mounting nut*
- 10. Parking brake cable bracket mounting bolt*
- 11. 4WS piping fixing bolt <4WS>
- 12. Rear shock absorber mounting bolt
- 13. Power cylinder mounting bolt <4WS>
- ◆◆ 14. Crossmember bracket*
- ◆◆ 15. Crossmember mounting nut*
- 16. Stabilizer bracket*
- 17. Bushing*
- ◆◆ 18. Stabilizer bar

NOTE
Parts marked with * are symmetrical

Grease: MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent

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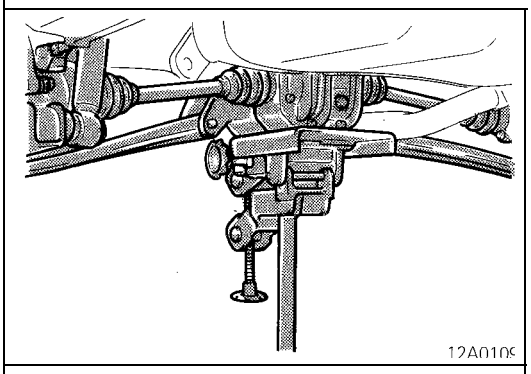
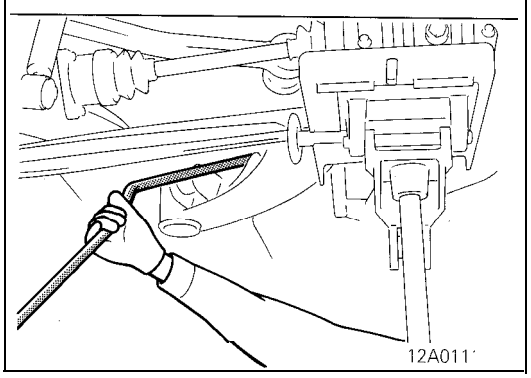


SERVICE POINTS OF REMOVAL

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.

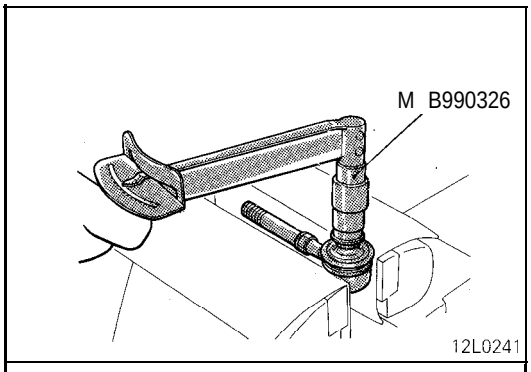


18. REMOVAL OF STABILIZER BAR

(1) Lower the transmission jack a little to obtain a gap between the rear suspension and body.
(2) Remove the stabilizer bar.

INSPECTION

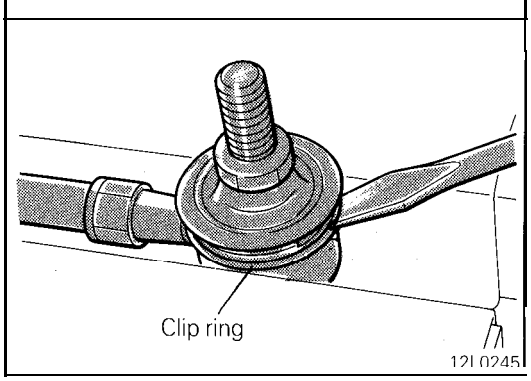
- Check the bushing for wear and deterioration.
- Check the stabilizer bar for deterioration or damage.
- Check the stabilizer link ball joint dust cover for cracks.
- Check all bolts for condition and straightness.



CHECKING OF STABILIZER LINK BALL JOINT FOR BREAKAWAY TORQUE

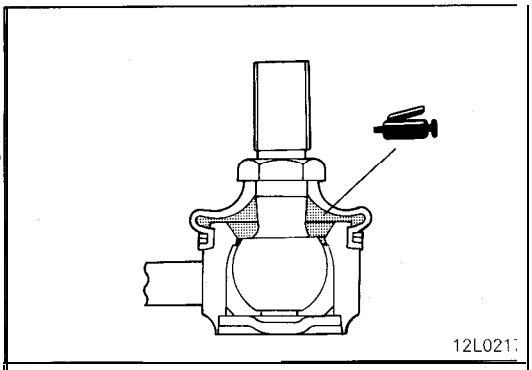
Using the special tool, measure the ball joint breakaway torque.

Standard value: 1.7 – 3.2 Nm (15 – 28 in.lbs.)



BALL JOINT DUST COVER REPLACEMENT

(1) Remove the clip ring and the dust cover.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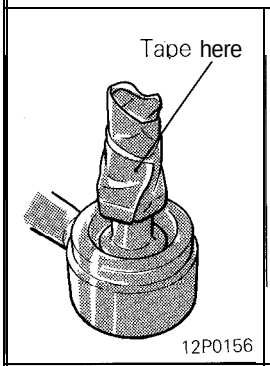
(2) Apply multipurpose grease to the lip and inside of the dust cover.

Grease: MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent



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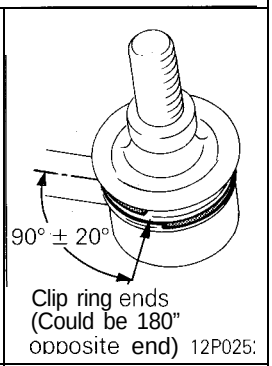


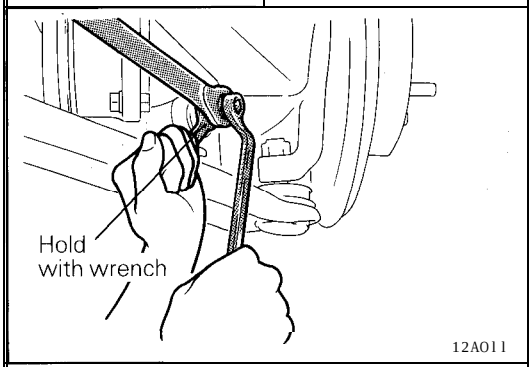
12P025

(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

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.



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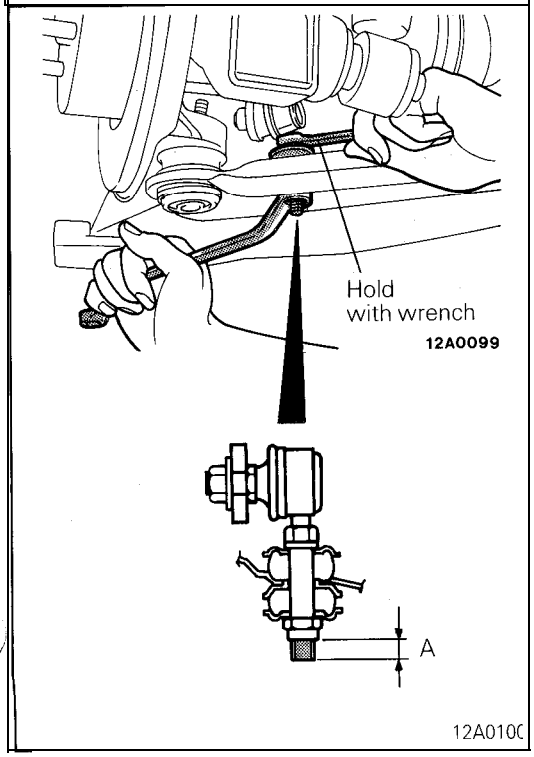
(2) Hold the stabilizer link with a wrench so that its protrusion on the lower arm side (dimension A) is up to specification, then mount the self-locking nut.

Standard value: 5 – 7 mm (.197 – .276 in.)



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STEERING

CONTENTS

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

STEERING

CONTENTS

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

WARNING!

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

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

(3) CHRYSLER dealer personnel must thoroughly review this manual, and especially its GROUP 23B – Supplemental Restraint System (SRS) and GROUP 0 – Maintenance Service, before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning light, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

SPECIFICATIONS

GENERAL SPECIFICATIONS

Items	Specifications
Steering wheel	
Steering wheel O.D. mm (in.)	386 (15.2)
Gear box	
Steering gear type	Rack and pinion
Power steering oil pump	
Oil pump type	Vane type
Displacement cm^3/rev. (cu.in./rev.)	9.6 (.59)
Relief set pressure MPa (psi)	8 (1,138)

SERVICE SPECIFICATIONS

Items	Specifications
Standard value	
Steering wheel free play (with engine stopped) mm (in.)	11 (.43)
Steering angle	
FWD	
Inner wheel	33°45′ ± 2"
Outer wheel	28°21′
AWD	
Inner wheel	31°45′ ± 2"
Outer wheel	27°10′
Tie rod end ball joint starting torque Nm (in.lbs.)	
FWD	0.5 – 3.0 (4 – 26)
AWD	1.0 – 3.0 (9 – 26)
Stationary steering effort N (lbs.)	35 (8) or less
Drive belt deflection mm (in.)	
SOHC engine	
When belt tension is inspected	6 – 9 (.24 – .35)
When belt tension is readjusted	7 (.28)
When new belt is installed	4 – 5 (.16 – .20)
DOHC engine	
When belt tension is inspected	9.5 – 13.5 (.37 – .53)
When belt tension is readjusted	10.5 – 12.5 (.41 – .49)
When new belt is installed	7.5 -9.0 (.30 – .35)
Oil pump pressure M Pa (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 M Pa (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)

Items	Specifications
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 M Pa (psi)	1.5 (213)
Space between vane and rotor mm (in.)	0.06 (.0024)

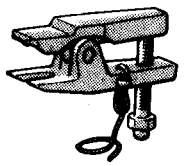
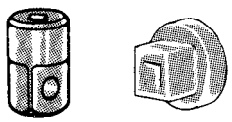
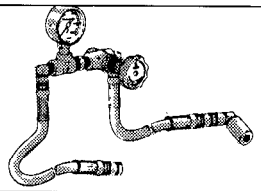
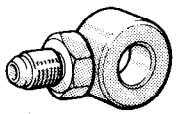
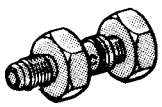
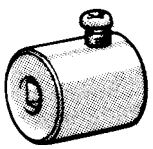
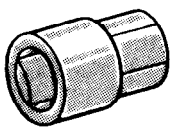
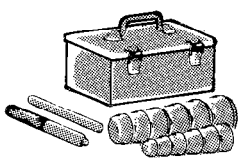
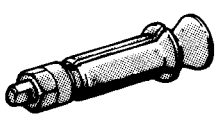
LUBRICANTS

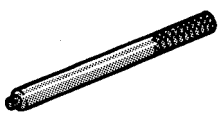
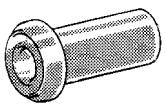
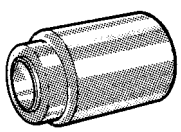
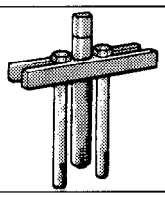
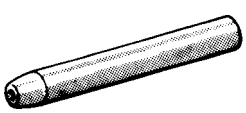
Items		Specified lubricant	Quantity
Steering column and shaft	The surfaces of the bearing spacer	MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent	As required
Gear box	Bearing O-ring Oil seal Special tool (MB991213) Pinion and valve assembly seal ring part	MOPAR ATF PLUS (Automatic transmission fluid type 7176)/Automatic Transmission Fluid "DEXRON" or "DEXRON II"	As required
	Pinion and valve assembly pinion gear part Coating of the rack teeth face Rack support surface in contact with the rack bar Tie rod end dust cover	MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent	As required
	Bellows	Silicone grease	As required
Oil pump	Power steering fluid	MOPAR ATF PLUS (Automatic transmission fluid type 7176)/Automatic Transmission Fluid "DEXRON" or "DEXRON II"	0.9 dm^3 (.95 qt.)
	Flow control valve Friction surface of rotor vane, cam ring and pump cover O-ring	MOPAR ATF PLUS (Automatic transmission fluid type 7176)/Automatic Transmission Fluid "DEXRON" or "DEXRON II"	As required

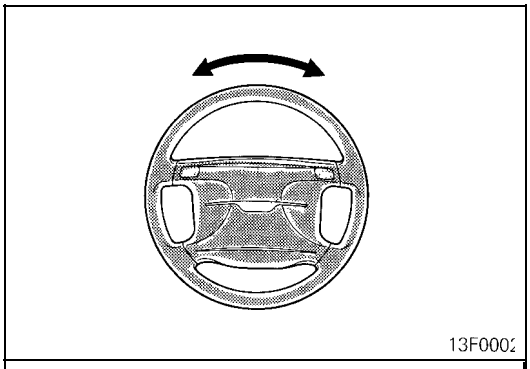
SEALANT AND ADHESIVES

Items	Specified sealant and adhesive
Power steering gear box End plug screw Power steering rack support cover screw Dust cover	3M ART Part No. 8663 or equivalent

SPECIAL TOOLS

Tool number and tool name	Replaced by Miller tool number	Application
 MB990635 Steering linkage puller	MB990635	Disconnection of tie-rod end
 MB990326 Preload socket	General service tool	Measurement of the ball joint starting torque
 MB990662 Power steering oil pressure gauge	C-3309-E C-4535	Measurement of oil pressure
 13E113 MB990993 Power steering oil pressure gauge adapter (pump side)	MB991217-A	
 MB990994 Power steering oil pressure gauge adapter (hose side)	MB990994	
 MB991006 Preload socket	CT-1108	Measurement of the pinion shaft preload
 MB991204 Torque wrench socket	S6161 (Snap-on tool)	Removal and installation of the rack support cover
 MB990925 Bearing and oil seal installer set	General service tool (Use universal driver set)	Installation of oil seal and bearing MB990927 MB990938 MB990939
 MB991120 Needle bearing puller	General service tool (Use brass punch or other suitable means)	Removal of rack housing needle bearing

Tool number and tool name	Replaced by Miller tool number	Application
 MB991 199 Oil seal installer	General service tool	To press in the oil seal for the rack
 MB991 197 Bar (long type)	General service tool	To press in the oil seal for the rack
 MB991 202 Oil seal and bearing installer	General servie tool	Press-fitting of rack housing bearing
 MB990941 Torque tube bearing installer	General service tool	Installation of valve housing oil seal
 MB991 203 Oil seal and bearing installer	General service tool	Installation of valve housing oil seal and housing
 M B990776 Front axle base	MB990776-A	Installation of the dust cover
 MB990803 Steering wheel puller	DT-1 00 1 -A 7591	Removal of steering wheel
 MB991213 Rack installer	General service tool (Use vinyl tape to protect seal)	Rack installation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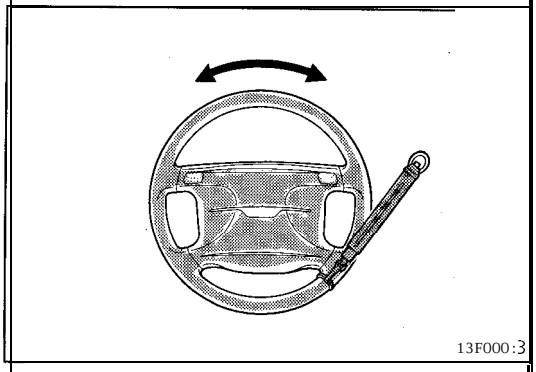
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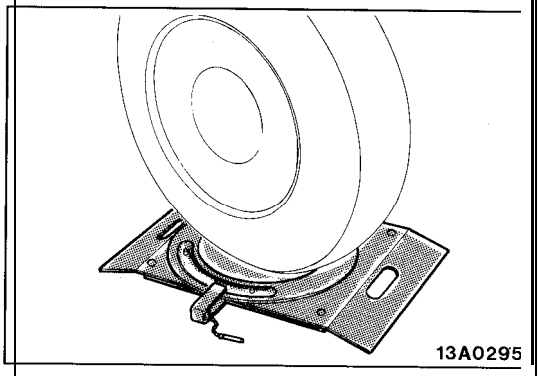
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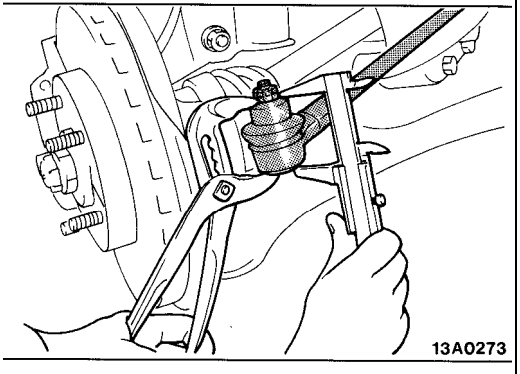
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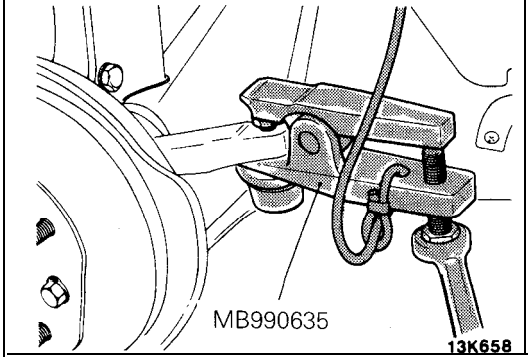


13K658

SERVICE ADJUSTMENT PROCEDURES

STEERING WHEEL FREE PLAY CHECK

1. With engine running (hydraulic operation), set front wheels straight ahead.
2. Measure the play on steering wheel circumference before wheels start to move when slightly moving steering wheel in both directions.

   Limit: 30 mm (1.2 in.)
3. When the play exceeds the limit, check for play on steering shaft connection and steering linkage. Correct or replace.
4. If the free play still exceeds the limit value set steering wheel straight ahead with engine stopped. Load 5 N (1 lb.) towards steering wheel circumference and check play.

   Standard values (steering wheel play with engine stopped): 11 mm (.43 in.)

   If the play exceeds the standard value, remove steering gear box and check total pinion torque.

STEERING ANGLE CHECK

1. Set front wheels on turning radius gauge and measure steering angle.

   Standard values:

   <FWD>

Inner wheel	**33°45′ ± 2”**
Outer wheel	**28°21′**

   <AWD>

Inner wheel	**31°45′ ± 2”**
Outer wheel	**27°10′**
2. When not within the standard value, it is probably a toe problem. Adjust toe (refer to GROUP 2 – Service Adjustment Procedures) and recheck.

TIE ROD END BALL JOINT VARIATION CHECK (SHAFT DIRECTION)

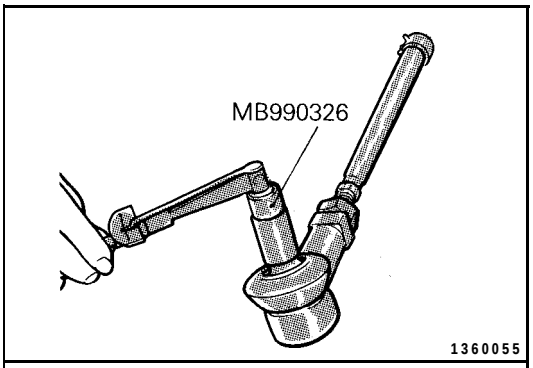
1. Hold the ball joint with pliers.
2. Set a caliper gauge as illustrated and measure the displacement with the ball stud compressed.

   Limit: 1.5 mm (.059 in.)
3. If the measured displacement exceeds the limit, replace the tie-rod end.

   Caution
   Even if the variation is within the limit, check ball joint starting torque.

TIE ROD END BALL JOINT STARTING TORQUE CHECK

1. Disconnect tie rod and knuckle with special tool.



2. Move ball joint stud several times and install nut on stud. Use the special tool to measure ball joint starting torque.

Standard value:

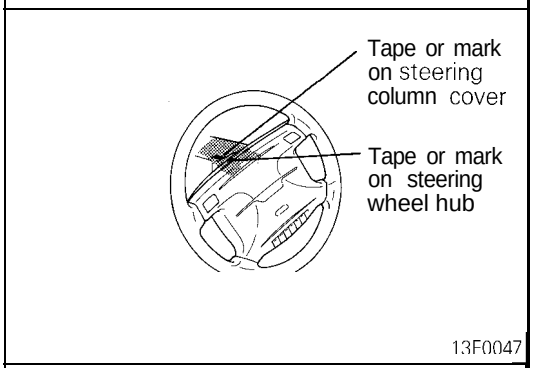
<FWD>	**0.5 – 3.0 Nm (4 – 26 in.lbs.)**
<AWD>	**1.0 – 3.0 Nm (9 – 26 in.lbs.)**

3. When starting torque exceeds the standard value, replace tie rod end.
4. When the starting torque is under the standard value, check for play or ratcheting in ball joint. If none of these, it is still serviceable.

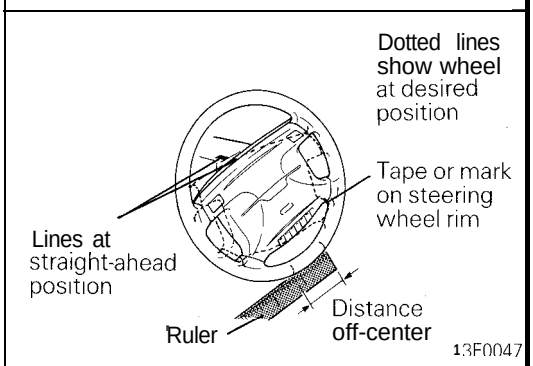
STEERING WHEEL CENTERING

SIMPLIFIED STEERING WHEEL CENTERING

Determining Steering Wheel's Off Center



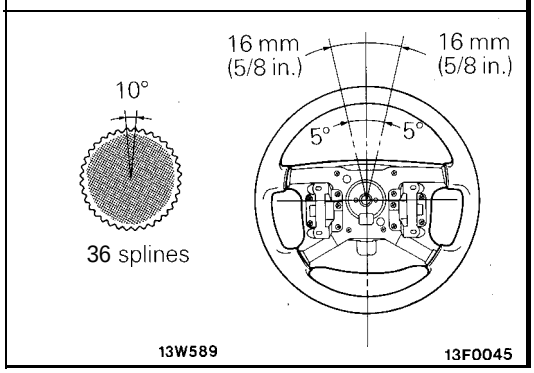
1. For the road test, take along chalk or tape and a ruler.
2. Drive straight ahead on an uncambered level surface.
3. When the vehicle's wheels are pointing straight ahead, mark the steering wheel hub and column cover with a chalk or tape line.
4. Stop the vehicle and line up the marks on the hub and column cover.
5. Place a tape strip or mark on the steering wheel rim.
6. Hold a ruler next to the rim as shown in the illustration, and then steer the steering wheel until it is in the desired centered position.
7. Record the distance the strip or mark on the rim has moved. This is how far the steering wheel is off center. If it is more than 16 mm (5/8 in.) off center, it can be centered by indexing it ten degrees towards the center.

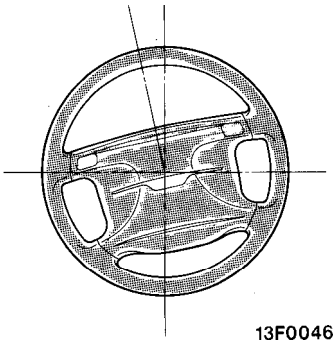


Indexing Steering Wheel to Center It

The steering wheel shaft has 36 splines, 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.





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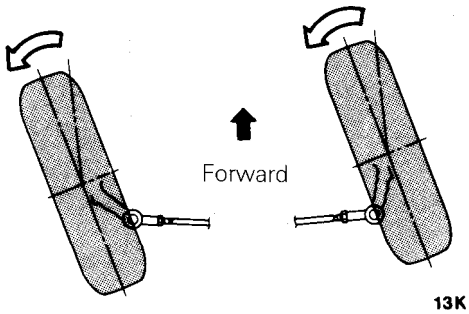
Steering wheel off center left



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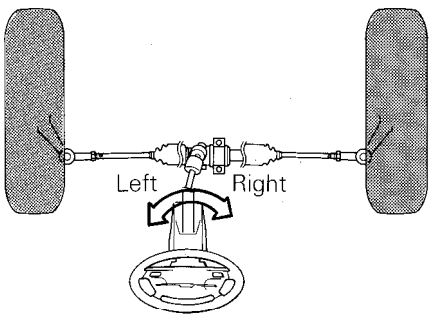

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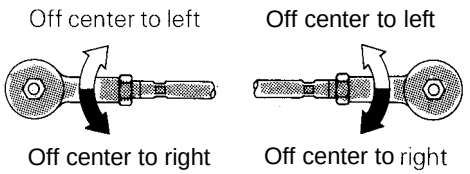

Turn both tie rods in the same direction.

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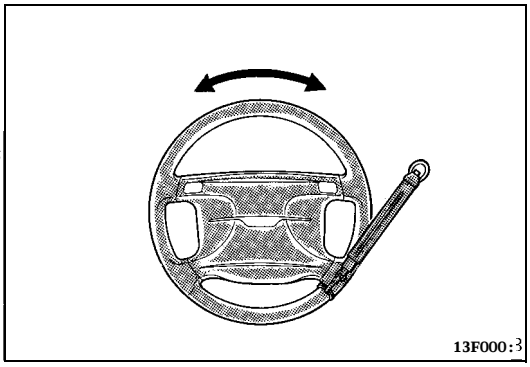
PRECISION STEERING WHEEL CENTERING

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.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STATIONARY STEERING EFFORT CHECK

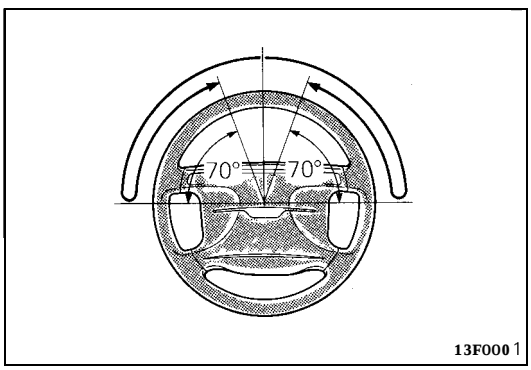
1. With the vehicle stopped on a flat, paved surface, turn the steering wheel to the straight ahead position.
2. Start the engine and set it to 1,000 ±100 rpm.

Caution
After checking the engine speed, there must be a return to the standard idling speed.

3. Attach a spring balance to the outer circumference of the steering wheel and measure the steering force required to turn the steering wheel from the straight ahead position to the left and right (within a range of 1.5 turns).
   Also check to be sure that there is no significant fluctuation of the required steering force.

Standard value:

Steering effort	35 N (8 **lbs.) or less**
Fluctuation allowance	6 N **(1.3 lbs.) or less**



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STEERING WHEEL RETURN TO CENTER CHECK

To make this test, conduct a road test and check as follows.

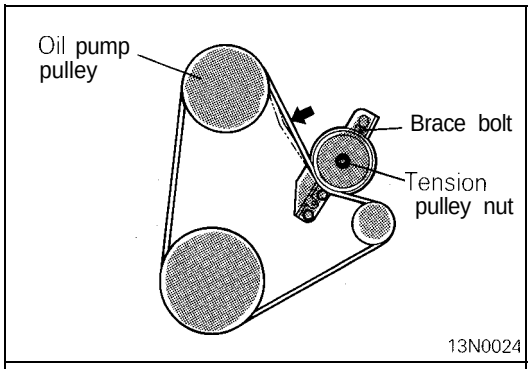
1. Make both gradual and sudden turns and check the steering "feeling" to be sure that there is no difference in the steering force required and the wheel return between left and right turns.
2. At a speed of 35 km/h (22 mph), turn the steering wheel 90". and release the steering wheel after 1 or 2 seconds. If the steering wheel then returns 70" or more, the return can be judged to the satisfactory.

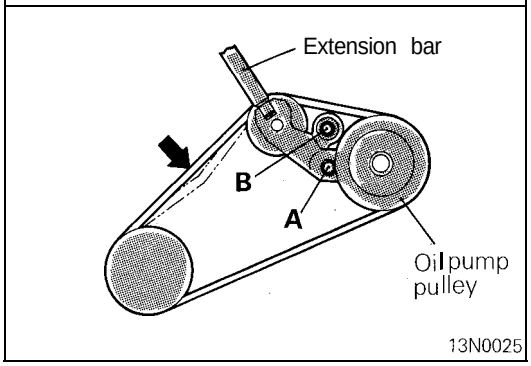
NOTE
There will be a momentary feeling of "heaviness" when the wheel is turned quickly, but this is not abnormal. (This is because the oil pump discharge amount is especially apt to be insufficient during idling.)

DRIVE BELT TENSION CHECK

Check to be sure that the belt is not damaged and that the drive 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.





<SOHC Engine>

1. Press in drive belt at the illustrated position with about 100 N (22 lbs.) and measure deflection.

Standard value

When belt tension is inspected	6.0 – 9.0 mm (.24 – .35 in.)
When belt tesion is readjusted	7.0 mm (.28 in.)
When new belt is installed	4.0 – 5.0 mm (.16 – .20 in.)

2. If the deflection is out of the standard values, loosen the tension pulley nut and adjust the belt tension with brace bolt.

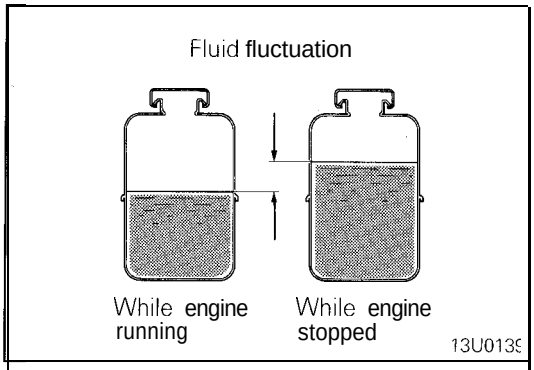
<DOHC Engine>

1. Press in drive belt at the illustrated position with about 100 N (22 lbs.) and measure deflection.

Standard value

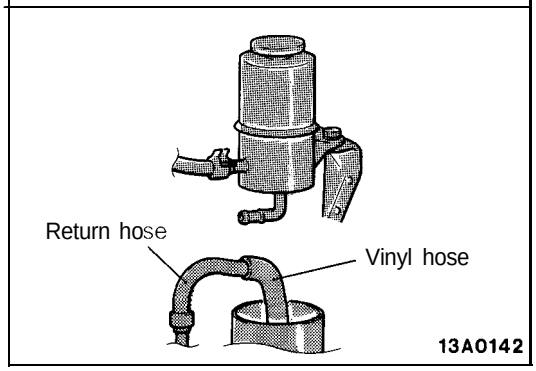
When belt tension is inspected	9.5 – 13.5 mm (.37 – .53 in.)
When belt tension is readjusted	10.5 – 12.5 mm (.41 – .49 in.)
When new belt is installed	7.5 – 9.0 mm (.30 – .35 in.)

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 drive belt with the extension bar, retighten the tension pulley's securing bolts A and B in the order mentioned.



FLUID LEVEL CHECK

1. Park the vehicle on a flat, level surface, start the engine, and then turn the steering wheel several times to raise the temperature of the fluid to approximately 50 – 60°C (122 – 140°F).
2. With the engine running, turn the wheel all the way to the left and right several times.
3. Check the fluid in the oil reservoir for foaming or milkiness. Check the difference of the fluid level when the engine is stopped, and while it is running. If the fluid level changes considerably, air bleeding should be done.



FLUID REPLACEMENT

1. Raise the front wheels on a jack, and then support them with rigid racks.
2. Disconnect the return hose connection.
3. Connect a vinyl hose to the return hose, and drain the oil into a container.

4. Disconnect the high-tension cable, and then while operating the starting motor intermittently, turn the steering wheel all the way to the left and right several times to drain all of the fluid.

Caution
Be careful not to position the high-tension cable near the carburetor or the delivery pipe.

5. Connect the return hoses securely, and then secure it with the clip.
6. Fill the oil reservoir with the specified fluid up to the lower position of the filter, and then bleed the air.

Specified fluid: MOPAR ATF PLUS (Automatic transmission fluid type 7176)/Automatic Transmission Fluid "DEXRON" or "DEXRON II"

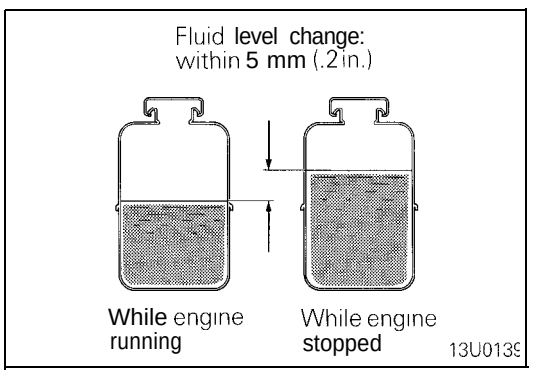
BLEEDING

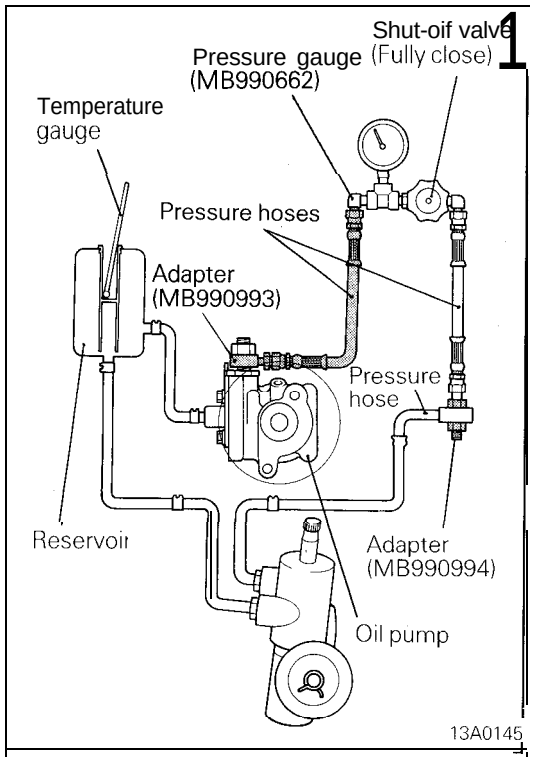
1. Jack up the front wheels and support them by using a floor stand.
2. Manually turn the oil pump pulley a few times.
3. Turn the steering wheel all the way to the left and to the right several times.
4. Disconnect the high-tension cable, and then, while operating the starting motor intermittently, turn the steering wheel all the way to the left and right several times (for 15 to 20 seconds).

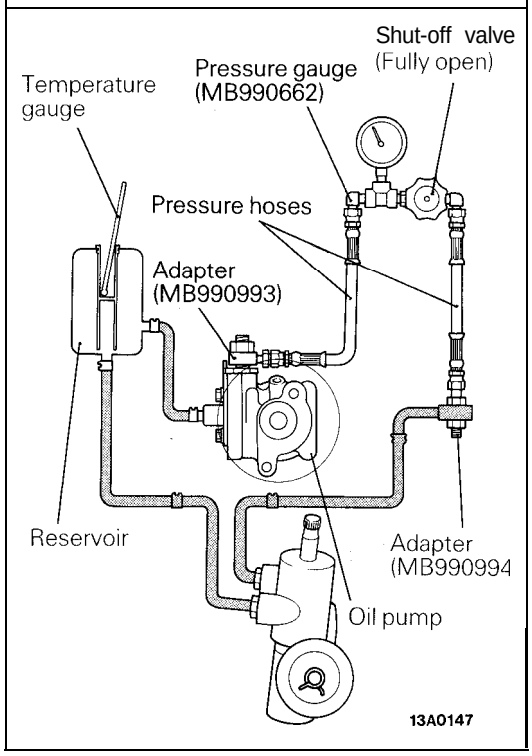
Caution
1. During air bleeding, replenish the fluid supply so that the level never falls below the lower position of the filter.
2. If air bleeding is done while engine is running, the air will be broken up and absorbed into the fluid; be sure to do the bleeding only while cranking.

5. Connect the ignition cable, and then start the engine (idling).
6. Turn the steering wheel to the left and right until there are no air bubbles in the oil reservoir.
7. Confirm that the fluid is not milky, and that the level is up to the specified position on the level gauge.
8. Confirm that there is very little change in the fluid level when the steering wheel is turned left and right.
9. Check whether or not the change in the fluid level is within 5 mm (.2 in.) when the engine is stopped and when it is running.

Caution
1. If the change of the fluid level is 5 mm (.2 in.) or more, the air has not been completely bled from the system, and thus must be bled completely.
2. If the fluid level rises suddenly after the engine is stopped, the air has not been completely bled.
3. If air bleeding is not complete, there will be abnormal noises from the pump and the flow-control valve, and this condition could cause a lessening of the life of the pump, etc.







OIL PUMP PRESSURE TEST

CHECKING THE OIL PUMP RELIEF PRESSURE

1. Disconnect the pressure hose from the oil pump, and then connect the special tools.
2. Bleed the air, and then turn the steering wheel several times while the vehicle is not moving so that the temperature of the fluid rises to approximately 50 – 60°C (122 – 140°F).
3. Start the engine and idle it at 1,000 ±100 rpm.
4. Fully close the shut-off valve of the pressure gauge and measure the oil pump relief pressure to confirm that it is within the standard value range.

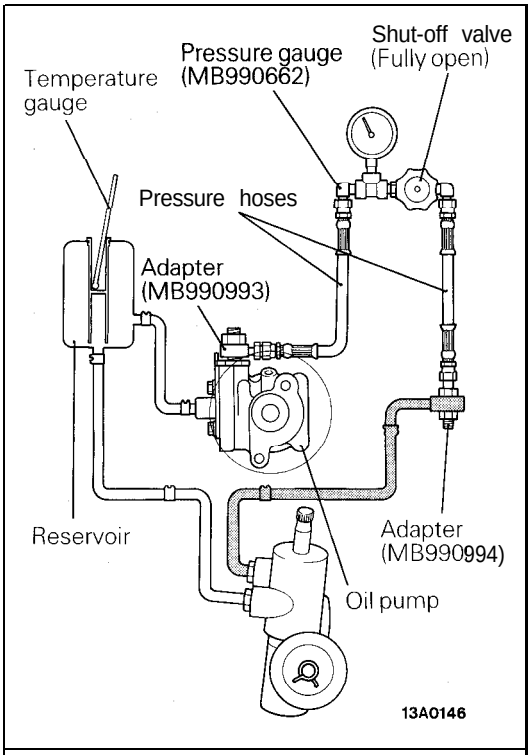
   Standard value: 7.5 – 8.2 MPa (1,067 – 1,166 psi)

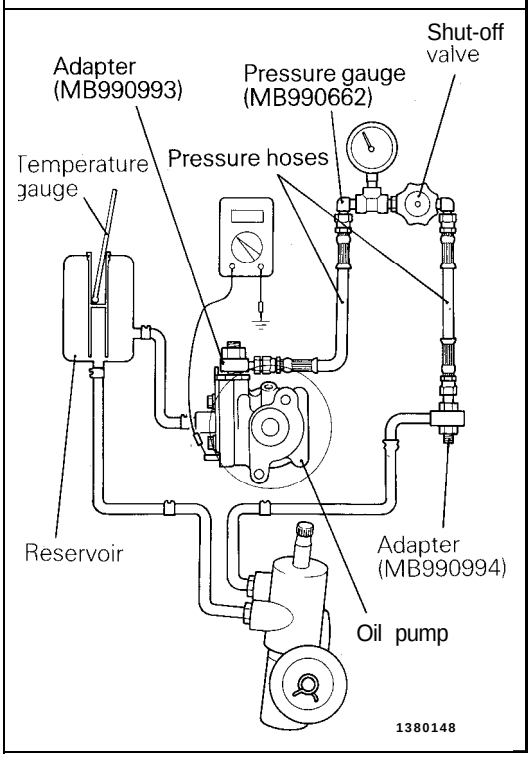
   Caution
   Pressure gauge shut off valve must not remain closed for more than 10 seconds.
5. If it is not within the standard value, overhaul the oil pump.
6. Remove the special tools, and then tighten the pressure hose to the specified torque.
7. Bleed the system.

CHECKING THE PRESSURE UNDER NO-LOAD CONDITIONS

1. Disconnect the pressure hose from the oil pump, and then connect the special tool.
2. Bleed the air, and then turn the steering wheel several times while the vehicle is not moving so that the temperature of the fluid rises to approximately 50 – 60°C (122 – 140°F).
3. Start the engine and idle it at 1,000 ±100 rpm.
4. Check whether or not the hydraulic pressure is the standard value when no-load conditions are created by fully opening the shut-off valve of the pressure gauge.

   Standard value: 0.8 – 1.0 MPa (114 – 142 psi)
   Limit: 1.5 MPa (213 psi)
5. If it is not within the standard value, the probable cause is a malfunction of the oil line or steering gear box, so check these parts and repair as necessary.
6. Remove the special tools, and then tighten the pressure hose to the specified torque.
7. Bleed the system.





CHECKING THE STEERING GEAR RETENTION HYDRAULIC PRESSURE

1. Disconnect the pressure hose from the oil pump, and then connect the special tools.
2. Bleed the air, and then turn the steering wheel several times while the vehicle is not moving so that the temperature of the fluid rises to approximately 50 – 60°C (122 – 140°F).
3. Start the engine and idle it at 1,000 ±100 rpm.
4. Fully 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

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.

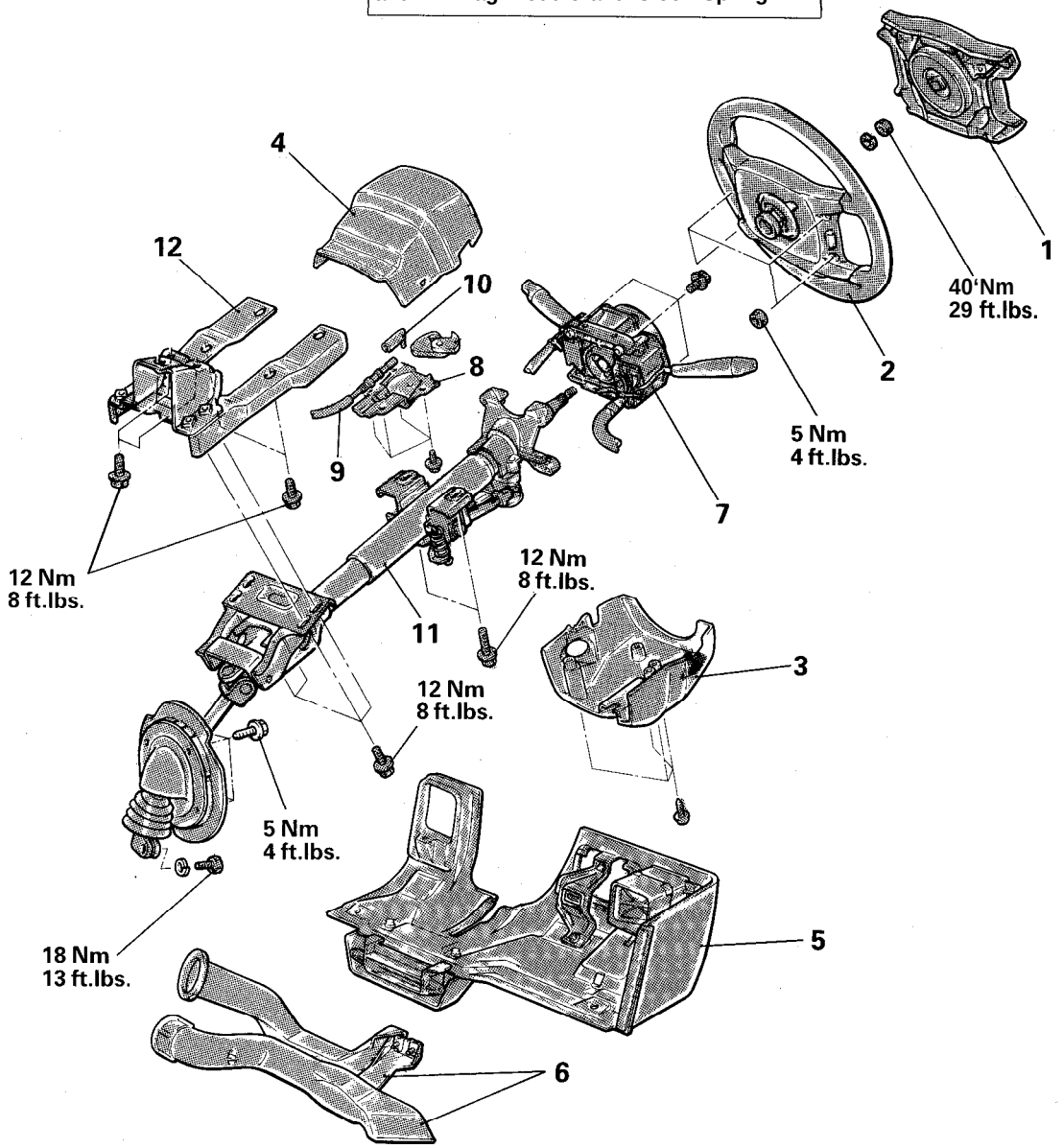
   Standard value: 0.7 – 1.2 MPa (100 – 171 psi)
7. Remove the special tools, and then tighten the pressure hose to the specified torque.
8. Bleed the system.

STEERING WHEEL AND SHAFT

REMOVAL AND INSTALLATION

Post-installation Operation
- Checking of Steering Wheel Position with Wheels Straight Ahead

CAUTION: SRS
Before removal of air bag module, refer to GROUP 23B – SRS Service Precautions and Air Bag Module and Clock Spring.



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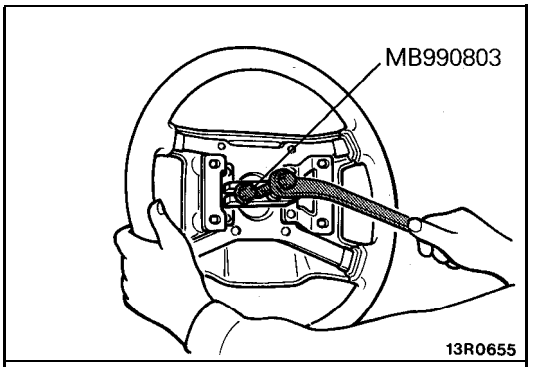
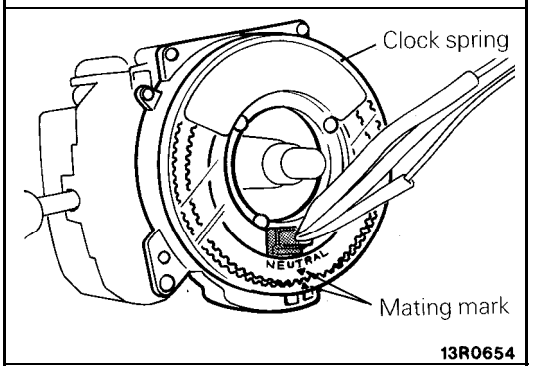
Removal steps

1. Air bag module
   (Refer to GROUP 23B -Air Bag Module and Clock Spring.)
◆◆▶◆ 2. Steering wheel
3. Lower column cover
4. Upper column cover
5. Knee protector
   (Refer to GROUP 23A – Instrument Panel.)
6. Lap cooler duct and foot shower duct
7. Column switch assembly
8. Cover
9. Key interlock cable
10. Slide lever
   <Automatic transaxle vehicles> (Refer to **GROUP** 21– transaxle control.)
11. Steering column assembly
12. Column support assembly





SERVICE POINTS OF REMOVAL

2. REMOVAL OF STEERING WHEEL

Remove the steering wheel by using the special tool.

Caution

Do not hammer on the steering wheel to remove it; doing so may damage the collapsible mechanism.

SERVICE POINT OF INSTALLATION

2. INSTALLATION OF STEERING WHEEL

Line up the “NEUTRAL” mark of the clock spring with the mating mark before installing the steering wheel.

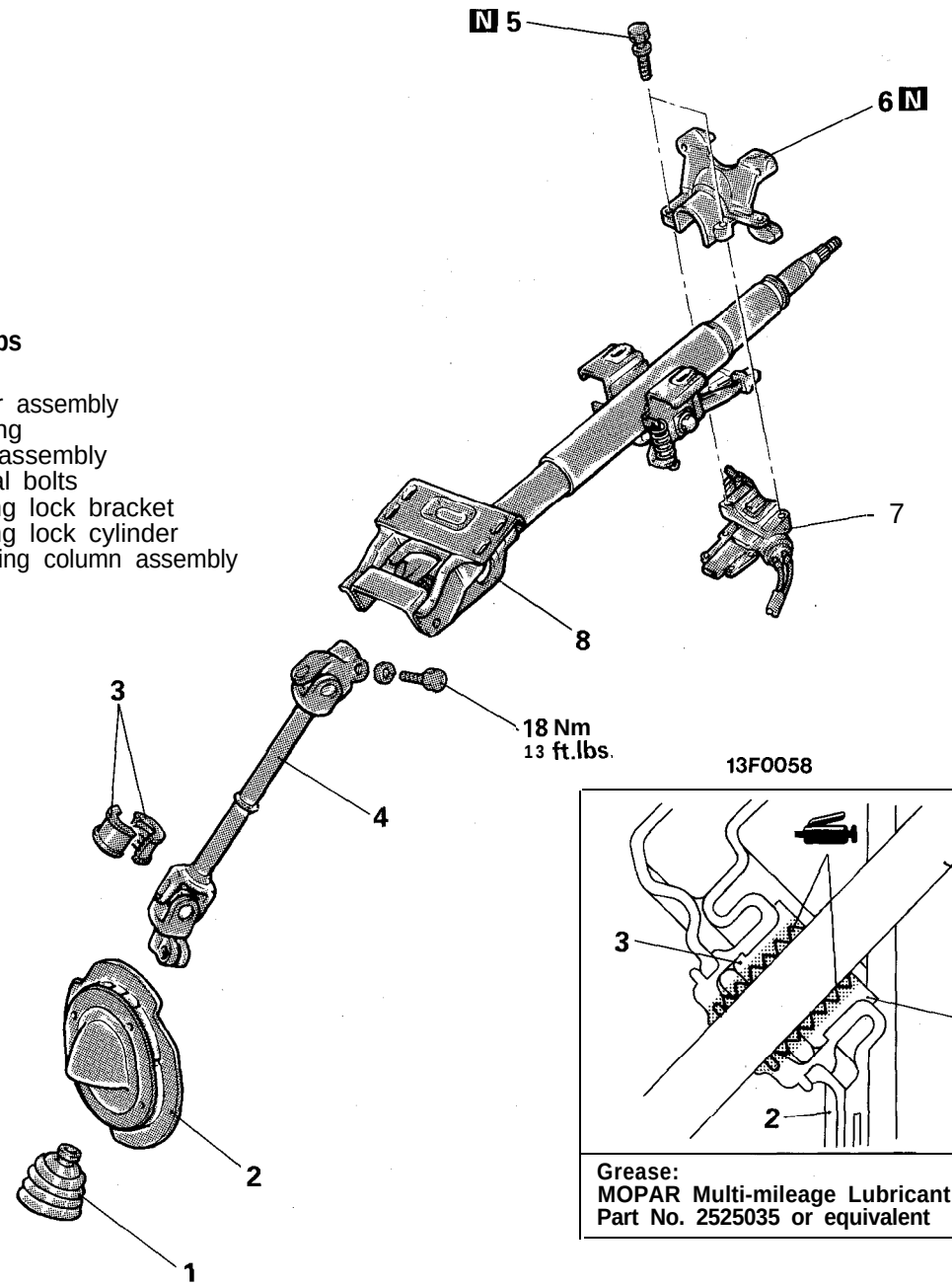
Caution

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

Disassembly steps

1. Boot
2. Cover assembly
3. Bearing
4. Joint assembly
5. Special bolts
6. Steering lock bracket
7. Steering lock cylinder
8. Steering column assembly



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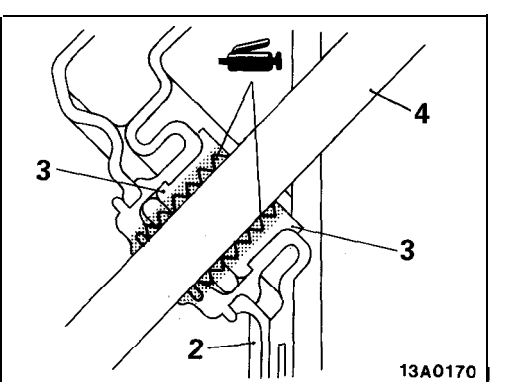
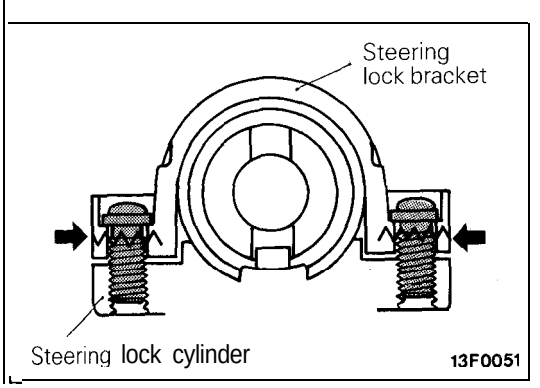


Grease:
MOPAR Multi-mileage Lubricant
Part No. 2525035 or equivalent



SERVICE POINTS OF DISASSEMBLY

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.

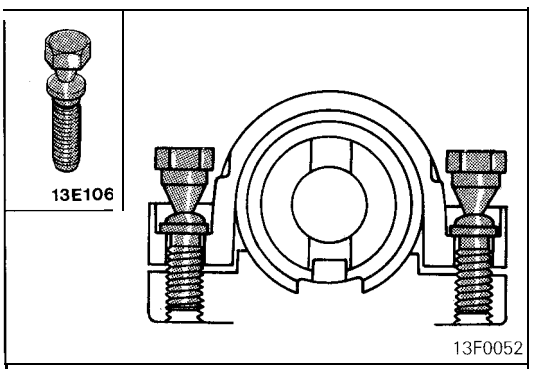
INSPECTION

- Check the steering shaft for play and round movement.
- Check the joints for play, damage, or rough movement.
- Check the joint bearing for wear and damage.
- Check the dust shield for damage.

SERVICE POINTS OF REASSEMBLY

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.

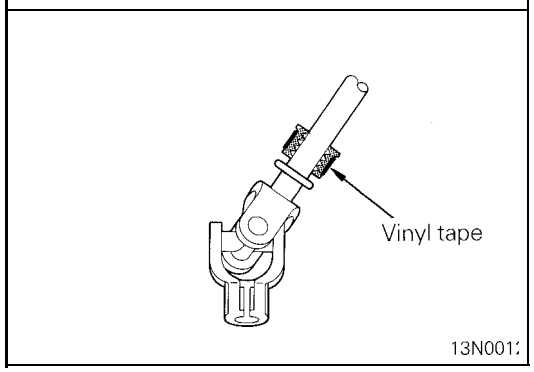
Caution
The steering lock bracket and bolts must be replaced with new ones when the steering lock cylinder is installed.

3. INSTALLATION OF BEARING

(1) Fill the inside of the bearing with multipurpose grease.

Grease: MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent

(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.



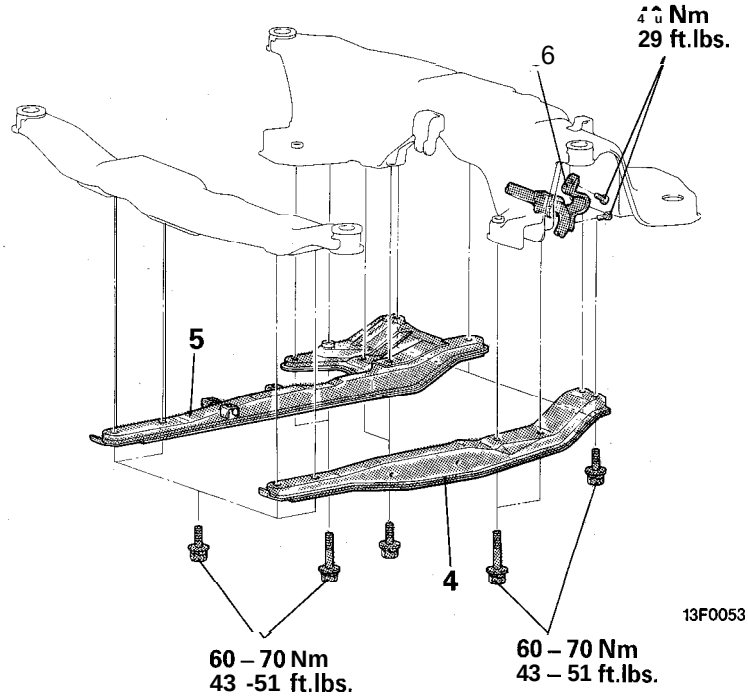
POWER STEERING GEAR BOX

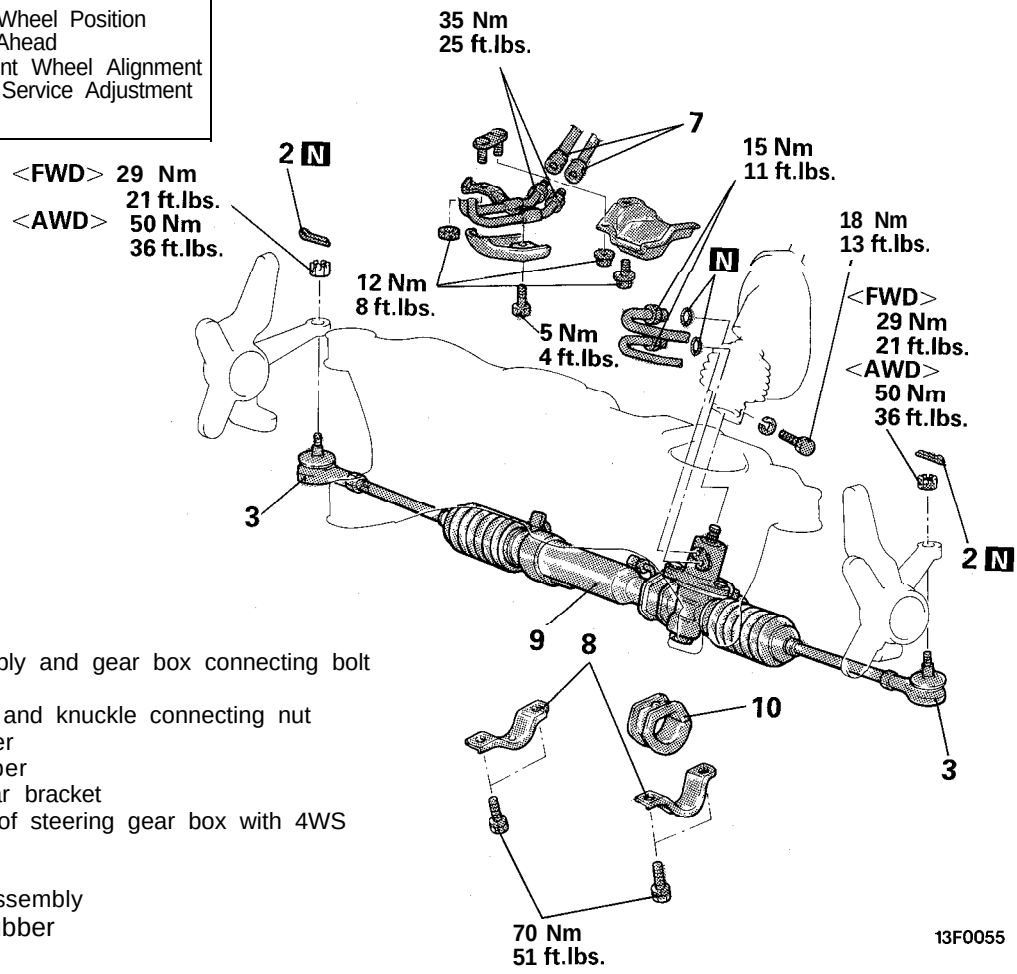
REMOVAL AND INSTALLATION

CAUTION: SRS
Before removal of steering gear box, refer to GROUP 23B – SRS, center front wheels and remove ignition key. Failure to do so may damage SRS clock spring and render SRS system inoperative, risking serious driver injury.

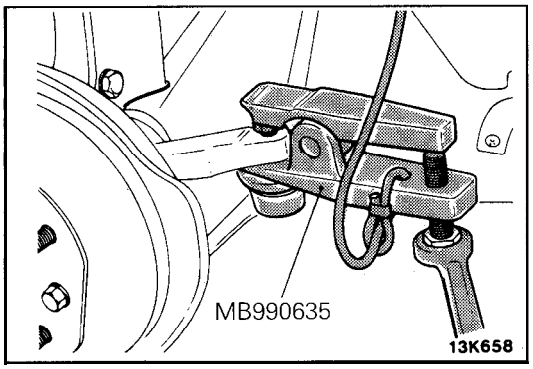
Pre-removal Operation
- Draining of the Power Steering Fluid (Refer to p. 19A-10.)
- Removal of Front Exhaust Pipe (Refer to GROUP 11 – Exhaust Pipe and Main Muffler.)
- Removal of Transfer Assembly (Refer to GROUP 21 -Transfer.)

Post-installation Operation
- Installation of Transfer Assembly (Refer to GROUP 21 -Transfer.)
- Installation of Front Exhaust Pipe (Refer to GROUP 11 – Exhaust Pipe and Main Muffler.)
- Supplying of the Power Steering Fluid (Refer to p.19A-10.)
- Bleeding of the Power Steering Fluid Line (Refer to P.19A-11.)
- Checking of Steering Wheel Position with Wheels Straight Ahead
- Adjustment of the Front Wheel Alignment (Refer to GROUP 2 – 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 boxassembly
10. Mounting rubber



SERVICE POINTS OF REMOVAL

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

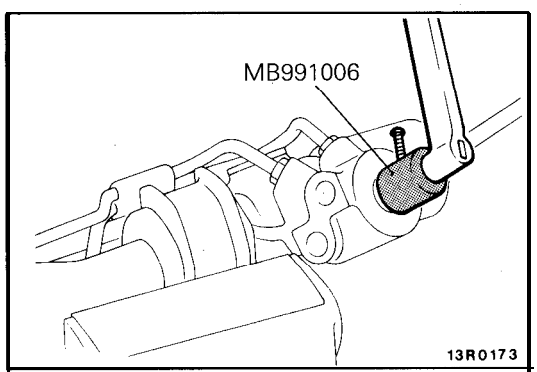
GEAR BOX FOR TOTAL PINION TORQUE

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.



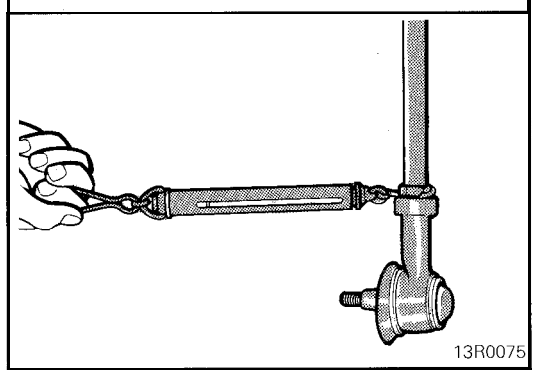
CHECK THE TIE ROD FOR SWING RESISTANCE

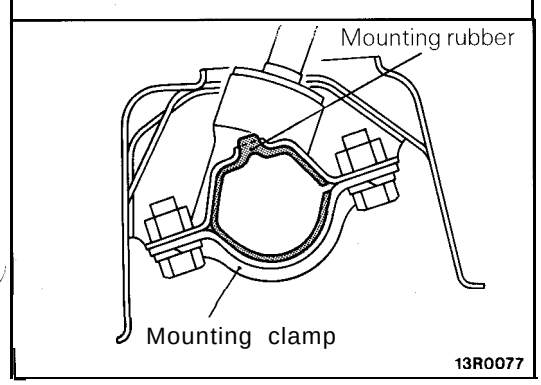
(1) Give 10 hard swings to the tie rod.
(2) Measure the tie rod swing resistance with a spring balance.

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.



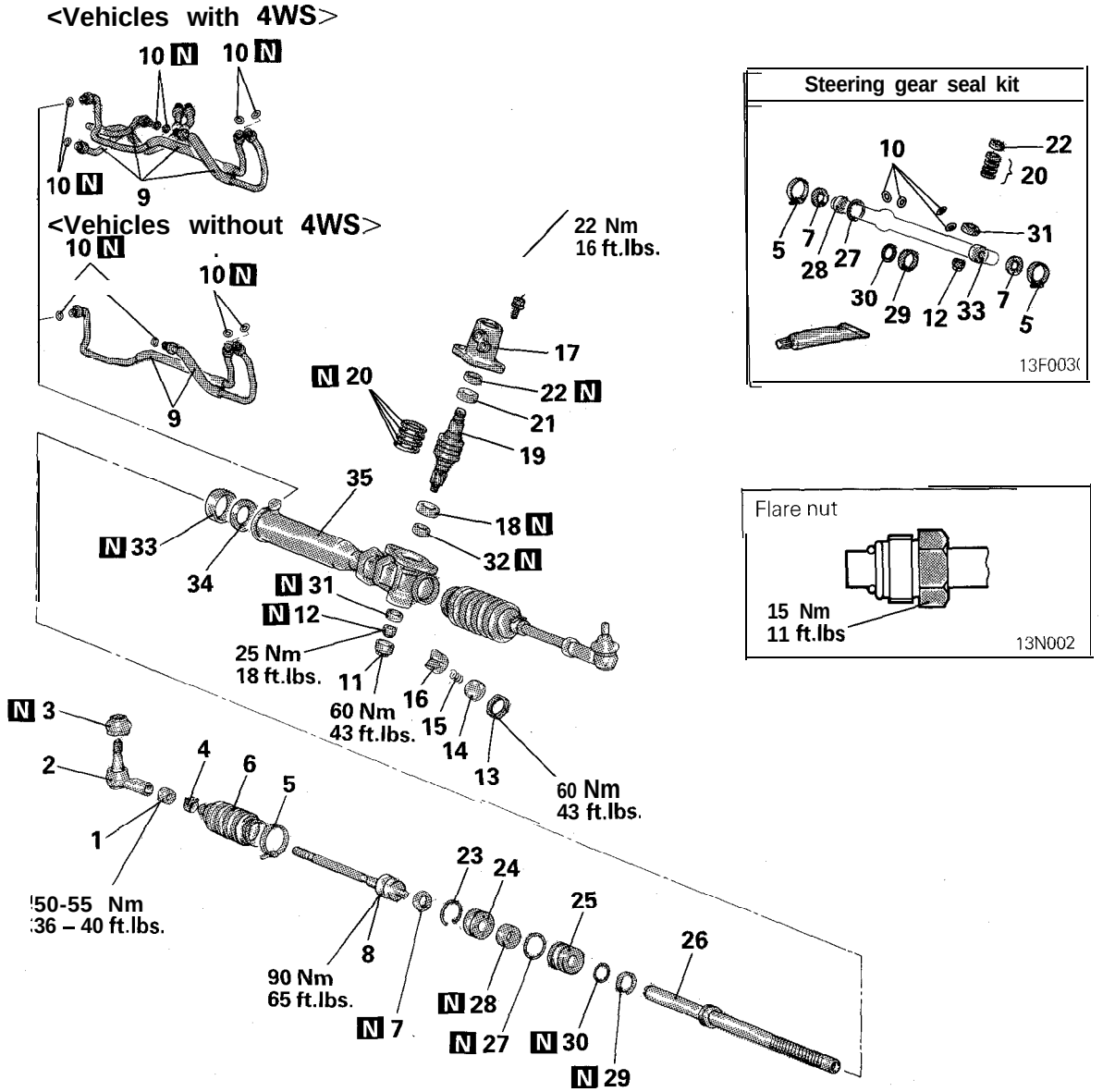


SERVICE POINTS OF INSTALLATION

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



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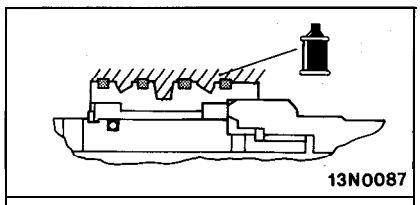
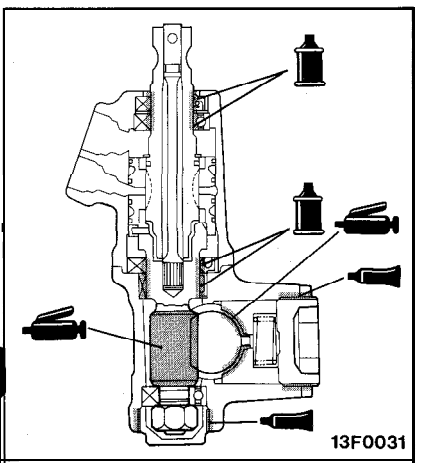
Disassembly steps

- 1. Tie rod end locking nuts
- ◆◆ 2. Tie rod ends
- ◆◆ • C 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
- • * ◆◆ 18. Oil seal
- ◆◆ 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



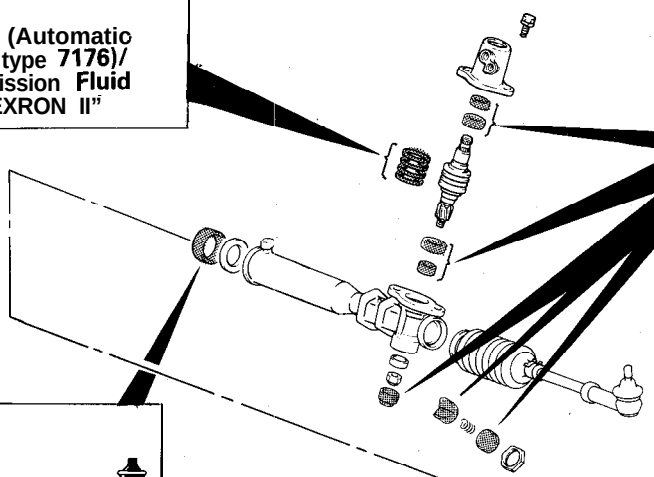
Fluid:
MOPAR ATF PLUS (Automatic transmission fluid type 7176)/ Automatic Transmission Fluid "DEXRON" or "DEXRON II"

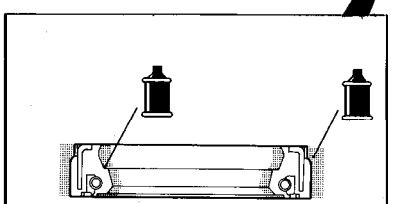


Grease:
MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent

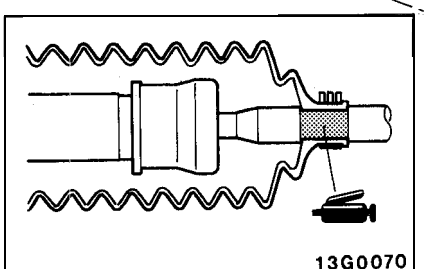
Fluid:
MOPAR ATF PLUS (Automatic transmission fluid type 7176)/ Automatic Transmission Fluid "DEXRON" or "DEXRON II"

Sealant:
3M ART, Part No. 8663 or equivalent

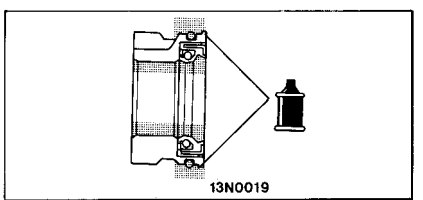




Fluid:
MOPAR ATF PLUS (Automatic transmission fluid type 7176)/ Automatic Transmission Fluid "DEXRON" or "DEXRON II"



Grease: Silicone grease



Fluid:
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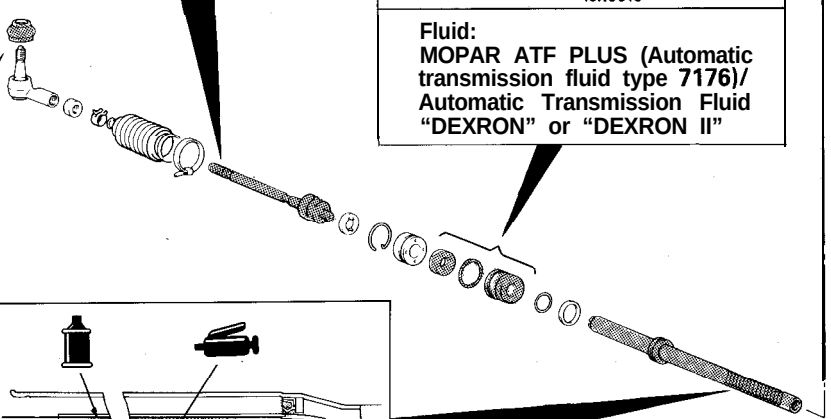
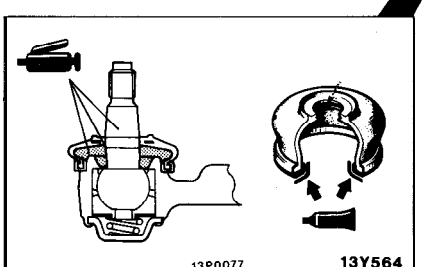
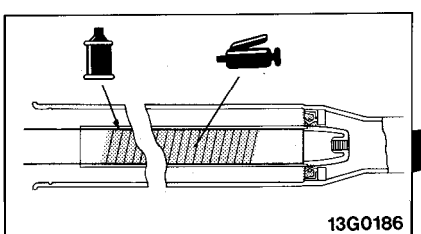




Grease:
MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent

Sealant:
3M ART, Part No. 8663 or equivalent



Grease:
MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent

Fluid:
MOPAR ATF PLUS (Automatic transmission fluid type 7176)/ Automatic Transmission Fluid "DEXRON" or "DEXRON II"

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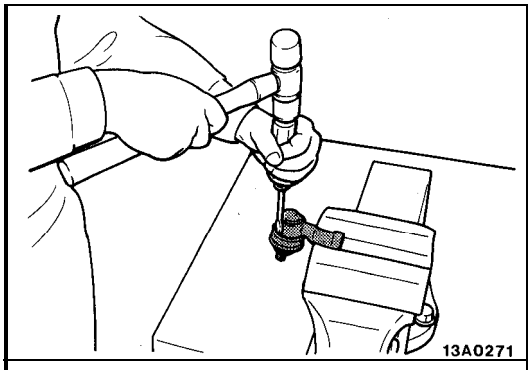
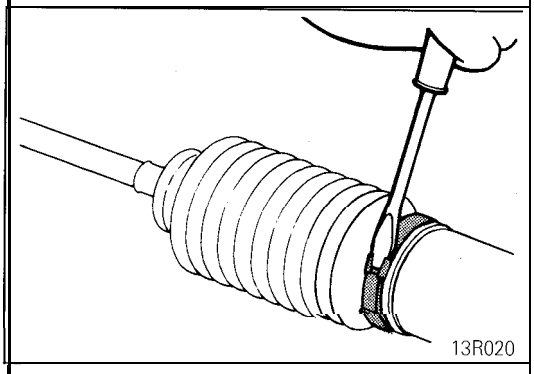


SERVICE POINTS OF DISASSEMBLY

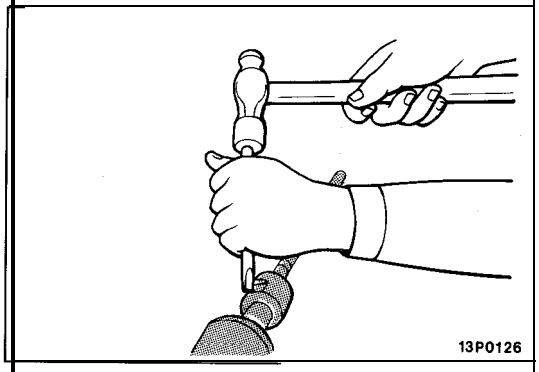
3. REMOVAL OF DUST SHIELD

Remove the dust shield from the tie rod end.



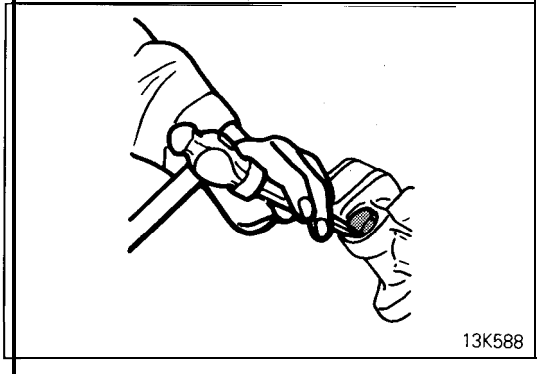
5. REMOVAL OF BELLOWS BANDS

Using a screwdriver or similar tool, loosen and then remove the boot retaining band.



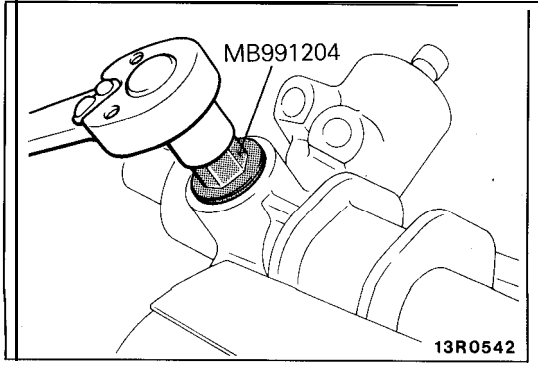
7. REMOVAL OF TAB WASHER

Unstake the tab washer which fixes the tie rod and rack with a chisel.



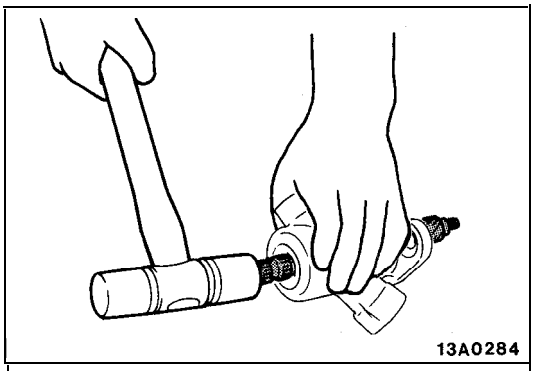
11. REMOVAL OF END PLUG

Disconnect end plug caulking and remove end plug.



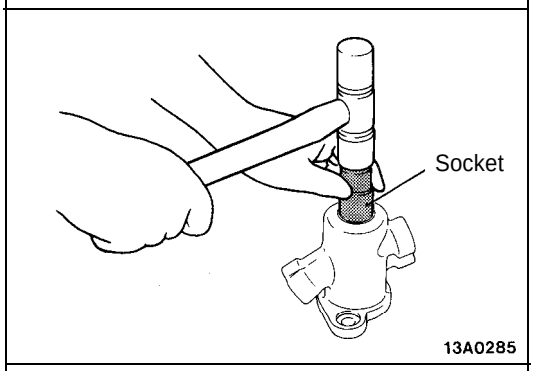
14. REMOVAL OF RACK SUPPORT COVER

Using the special tool, remove the rack support cover from the gear box.



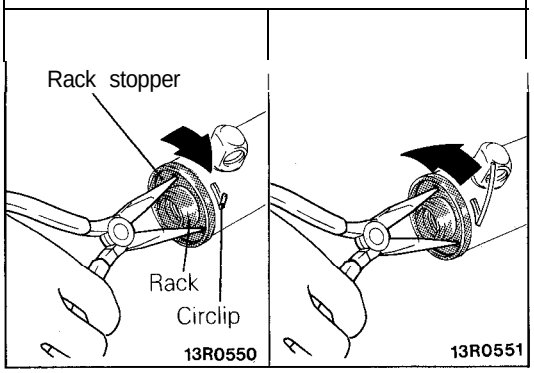
18. REMOVAL OF OIL SEAL

Using a plastic hammer, gently tap the pinion to remove it.



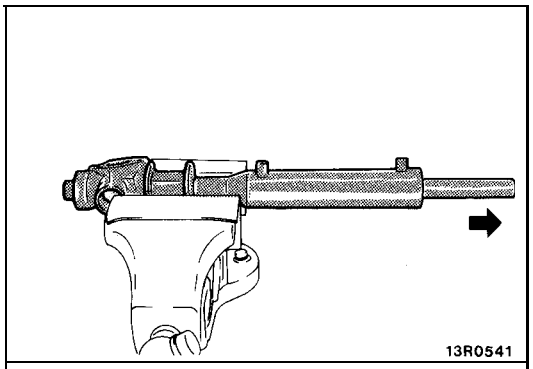
21. REMOVAL OF BALL BEARING / 22. OIL SEAL

Using a socket, remove the oil seal and the ball bearing from the valve housing simultaneously.



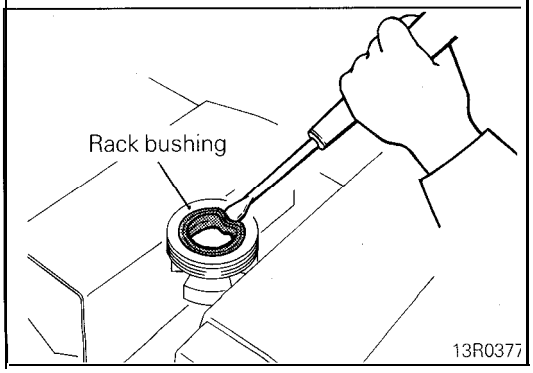
23. REMOVAL OF CIRCLIP

(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.



26. REMOVAL OF RACK

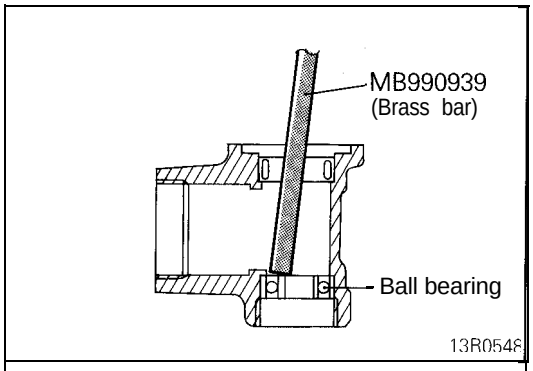
Pull out the rack slowly.
At this time also take out the rack stopper and the rack bushing simultaneously.



28. REMOVAL OF OIL SEAL

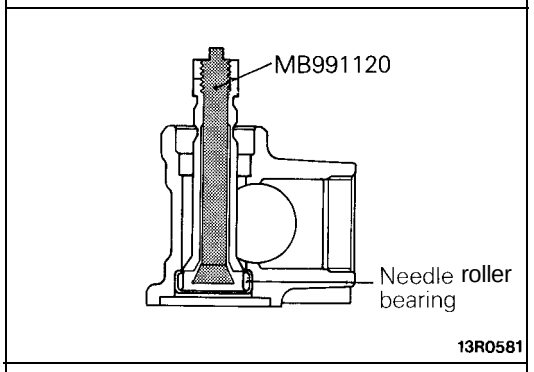
Partially bend oil seal and remove from rack bushing.

Caution
Do not damage oil seal press fitting surface.



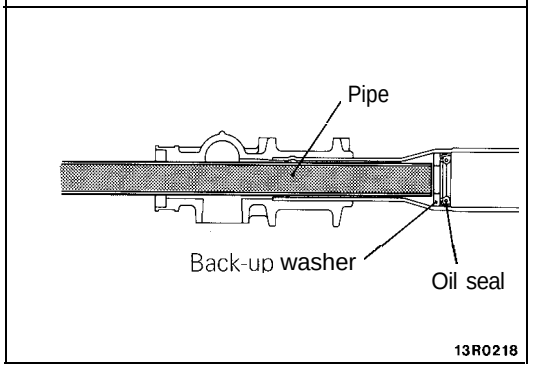
31. REMOVAL OF BALL BEARING

Use the spacial tool to remove the ball bearing from the gear housing.



32. REMOVAL OF NEEDLE ROLLER BEARING

Using the special tool, remove the needle roller bearing from the rack housing.



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

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

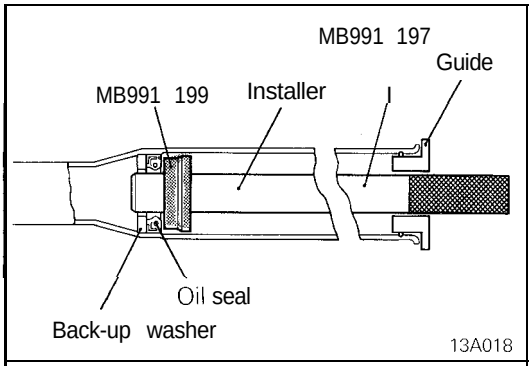
- Check the pinion gear tooth surfaces for damage or wear.
- Check for worn or defective seal ring.

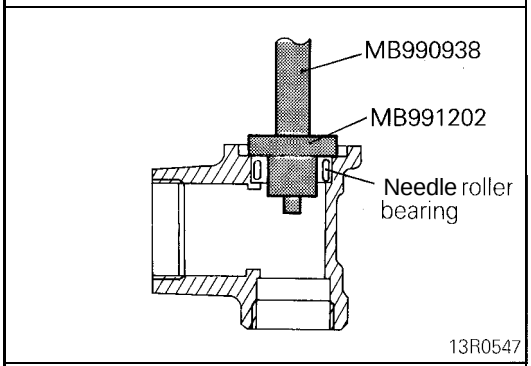
BEARING

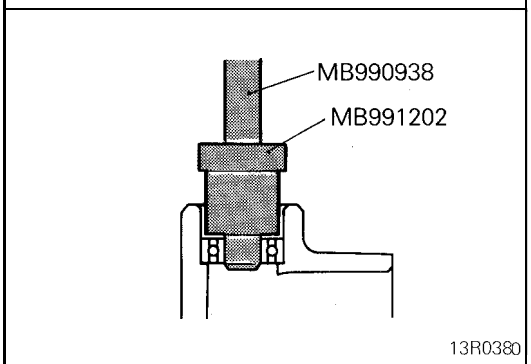
- Check for roughness or abnormal noise during bearing operation.
- 'Check the bearing for play.
- Check the needle roller bearings for roller slip-off.

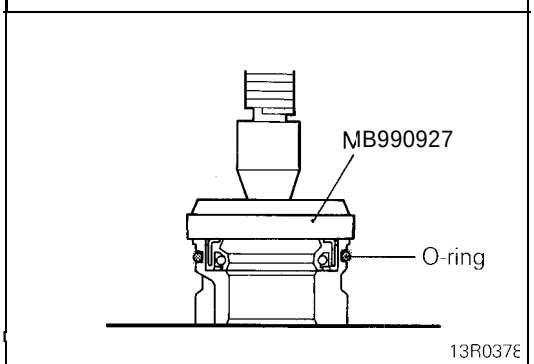
OTHERS

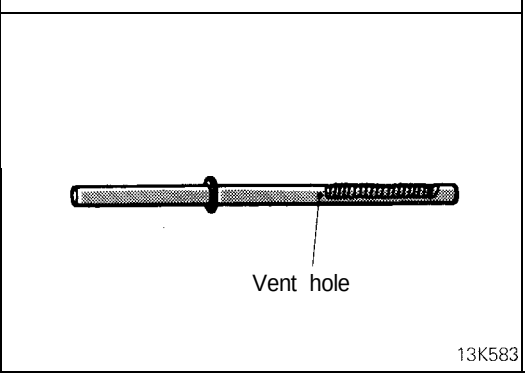
- Check the cylinder inner surface of the rack housing for damage.
- Check the boots for damage, cracking or deterioration.
- Check the rack support for uneven wear or dents.
- Check the rack bushing for uneven wear or damage.











SERVICE POINTS OF REASSEMBLY

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: MOPAR ATF PLUS (Automatic transmission fluid type 7176)/ Automatic Transmission Fluid "DEXRON" or "DEXRON II"

(2) Using the special tool, press the back-up washer and the oil seal into the rack housing to the specified position (where the upper surface of the press-in guide coincides with the stepped part of the press-in tool).

32. INSTALLATION OF NEEDLE ROLLER BEARING

(1) Apply specified fluid to housing, bearing and oil seal press fitting surface.

Specified fluid: MOPAR ATF PLUS (Automatic transmission fluid type 7176)/ Automatic Transmission Fluid "DEXRON" or "DEXRON II"

(2) Using the special tool, press fit needle roller bearing.

Caution
Press fit straight as valve housing is aluminium.

31. INSTALLATION OF BALL BEARING

Use the special tools to 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: MOPAR ATF PLUS (Automatic transmission fluid type 7176)/ Automatic Transmission Fluid "DEXRON" or "DEXRON II"

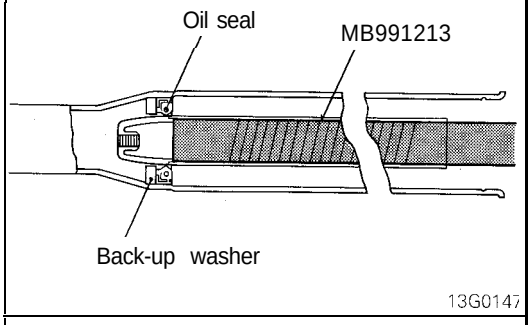
(2) Using the special tool, press fit oil seal until it touches rack bush end.

26. INSTALLATION OF RACK

(1) Apply a coating of multipurpose grease to the rack teeth face.

Grease: MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent

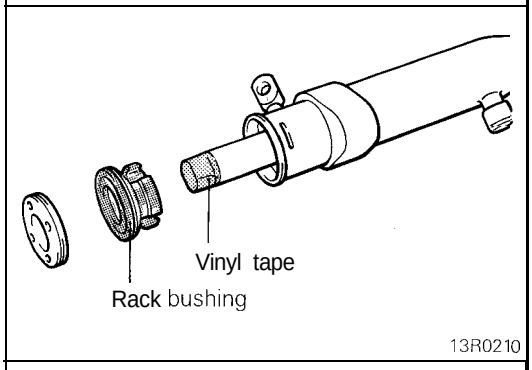
Caution
Do not close the vent hole in the rack with grease.



(2) Cover rack serrations with special tool.
(3) Apply specified fluid on special tool.

Specified fluid: MOPAR ATF PLUS (Automatic transmission fluid type 7176)/ 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.

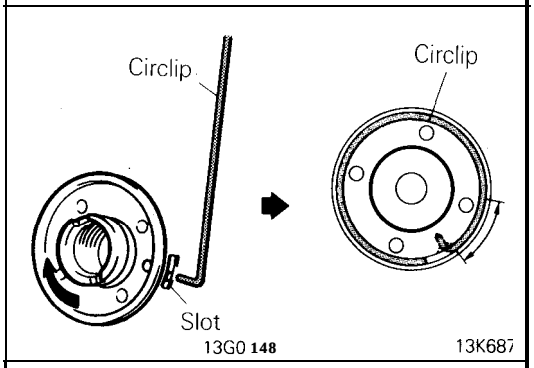


25. INSTALLATION OF RACK BUSHING

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: MOPAR ATF PLUS (Automatic transmission fluid type 7176)/Automatic Transmission Fluid "DEXRON" or "DEXRON II"

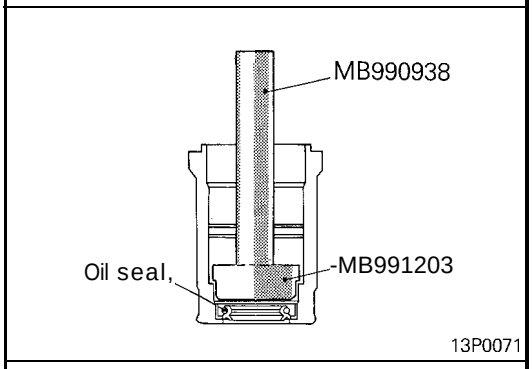
Caution
Do not allow oil seal retainer spring to slip out.



23. INSTALLATION OF CIRCLIP

Insert circlip to rack stopper hole through cylinder hole. Turn rack stopper clockwise and insert circlip firmly.

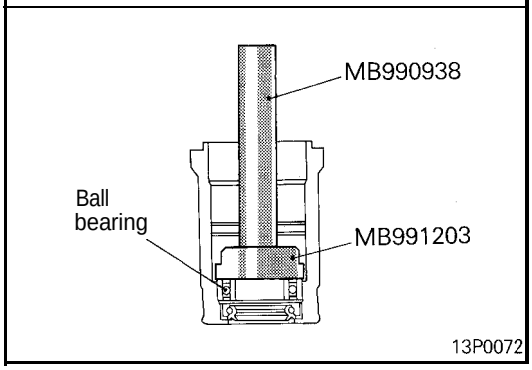
Caution
Insert circlip to rack stopper hole while turning rack stopper clockwise.



22. INSTALLATION OF OIL SEAL

Apply a coating of the specified fluid to the outside of the oil seal. Using the special tools, press the oil seal into the valve housing.

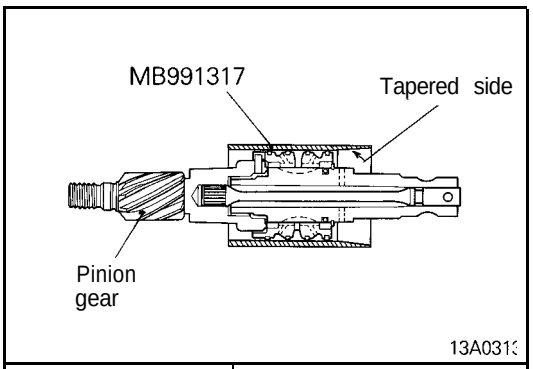
Specified fluid: MOPAR ATF PLUS (Automatic transmission fluid type 7176)/Automatic transmission Fluid DEXRON or DEXRON II



21. INSTALLATION OF BALL BEARING

Apply a coating of the specified fluid to the outside of the ball bearing. Using the special tools, press the ball bearing into the valve housing.

Specified fluid: MOPAR ATF PLUS (Automatic transmission fluid type 7176)/Automatic transmission Fluid DEXRON or DEXRON II

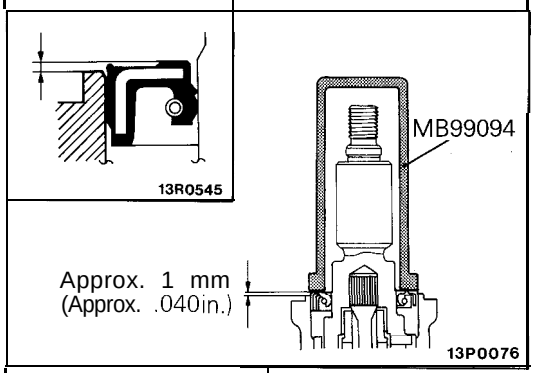


20. INSTALLATION OF SEAL RING

(1) Kneed the seal ring to soften it.
(2) Apply the specified fluid to the seal ring, and install to the rack groove.

Specified fluid: MOPAR ATF PLUS (Automatic transmission fluid type 7176)/ Automatic transmission Fluid DEXRON or DEXRON II

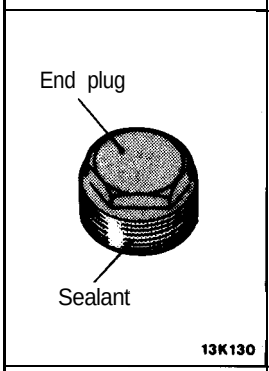
(3) Insert the tapered side of the special tool from the pinion gear side, and compress the seal ring.

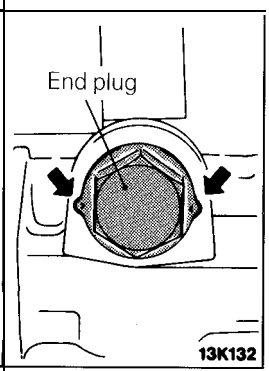


18. INSTALLATION OF OIL SEAL

Using the special tool, press the oil seal into the valve housing.

Caution
In order to eliminate a seal malfunction at the valve housing alignment surface, the upper surface of the oil seal should project outward approximately 1 mm (.040 in.) from the housing edge surface.



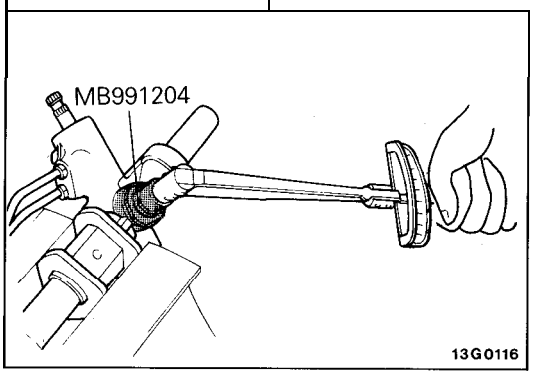


11. INSTALLATION OF END PLUG

(1) Apply the semi-drying sealant to the threaded part of the end plug.

Specified sealant: 3M ART Part No. 8663 or equivalent

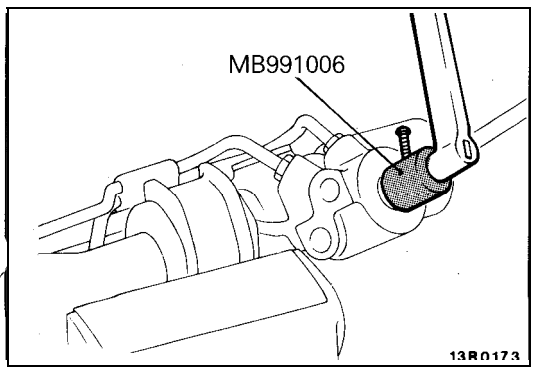
(2) Secure the threaded portion of the end plug at two places by using a punch.



. ADJUSTMENT OF TOTAL PINION TORQUE

(1) Position rack at its center. Using the 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.

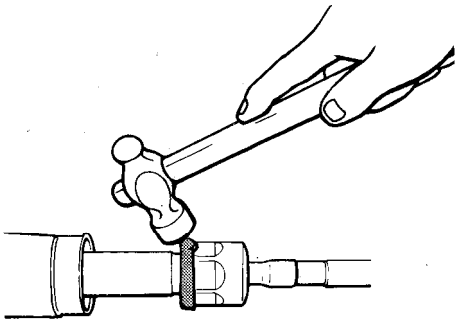
Standard value: 0.6 – 1.3 Nm (5 – 11 in.lbs.)

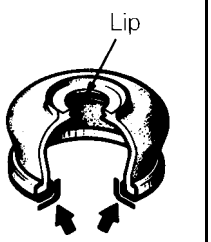


Caution
1. When adjusting, set the standard value at its highest value.
2. Assure no ratcheting or catching when operating rack towards the shaft direction.

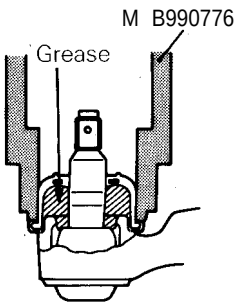
NOTE
When it cannot be adjusted within the specified return angle, check rack support cover components or replace.

(3) After adjusting, lock rack support cover with lock nut.


13A0175



13Y564



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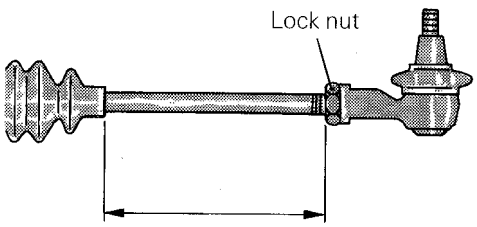


<FWD> 190.6 – 192.6 mm (7.504 – 7.583 in.)
<AWD> 193.6 – 195.6 mm (7.622 – 7.701 in.)
13R0073

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.

Grease: MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent

(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.

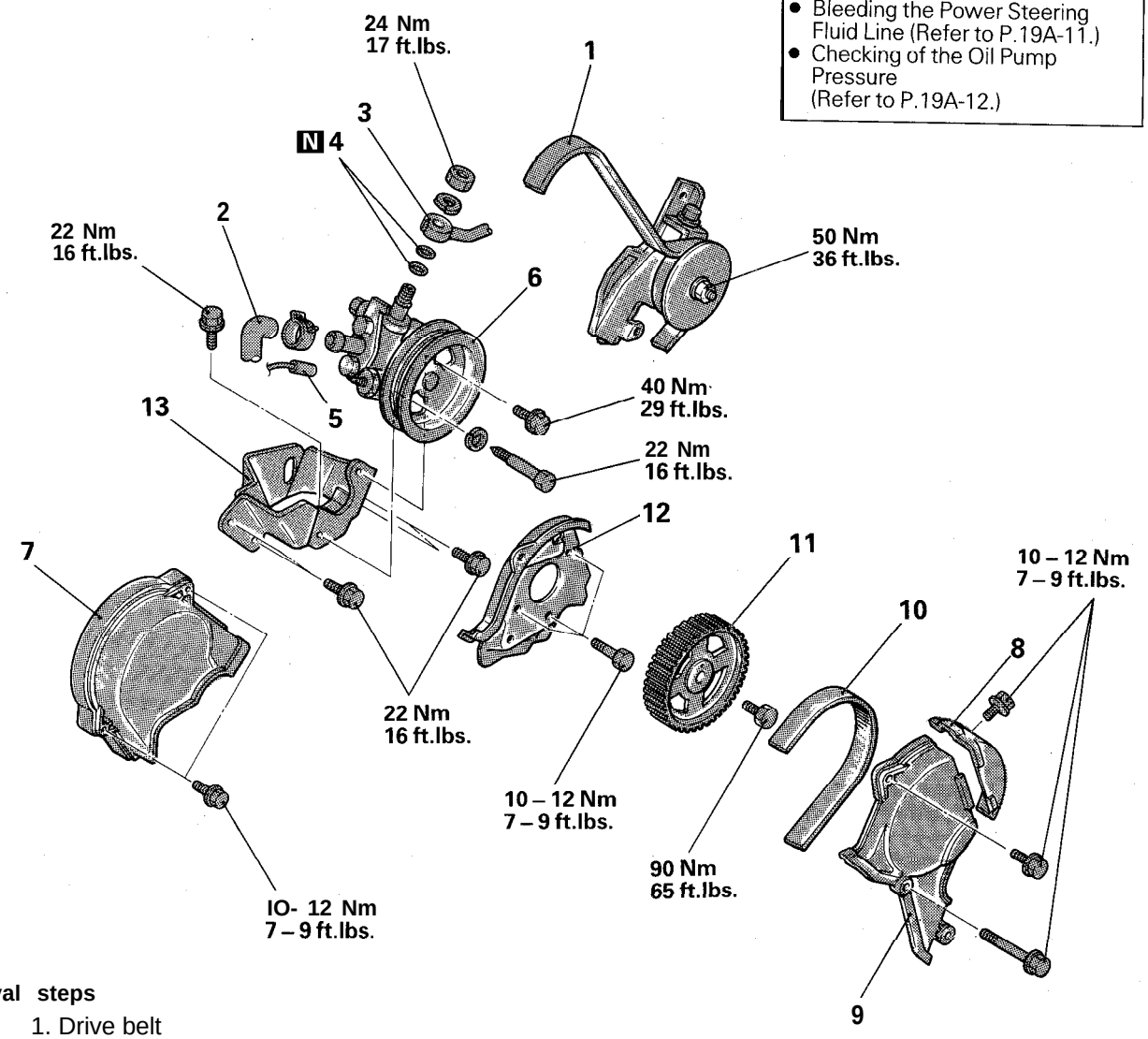
POWER STEERING OIL PUMP

REMOVAL AND INSTALLATION

<SOHC Engine>

Pre-removal Operation
- Draining the Power Steering Fluid

Post-installation Operation
- Supplying of the Power Steering Fluid
- Adjusting Drive Belt Tension (Refer to P.19A-9.)
- Bleeding the Power Steering Fluid Line (Refer to P.19A-11.)
- Checking of the Oil Pump Pressure (Refer to P.19A-12.)

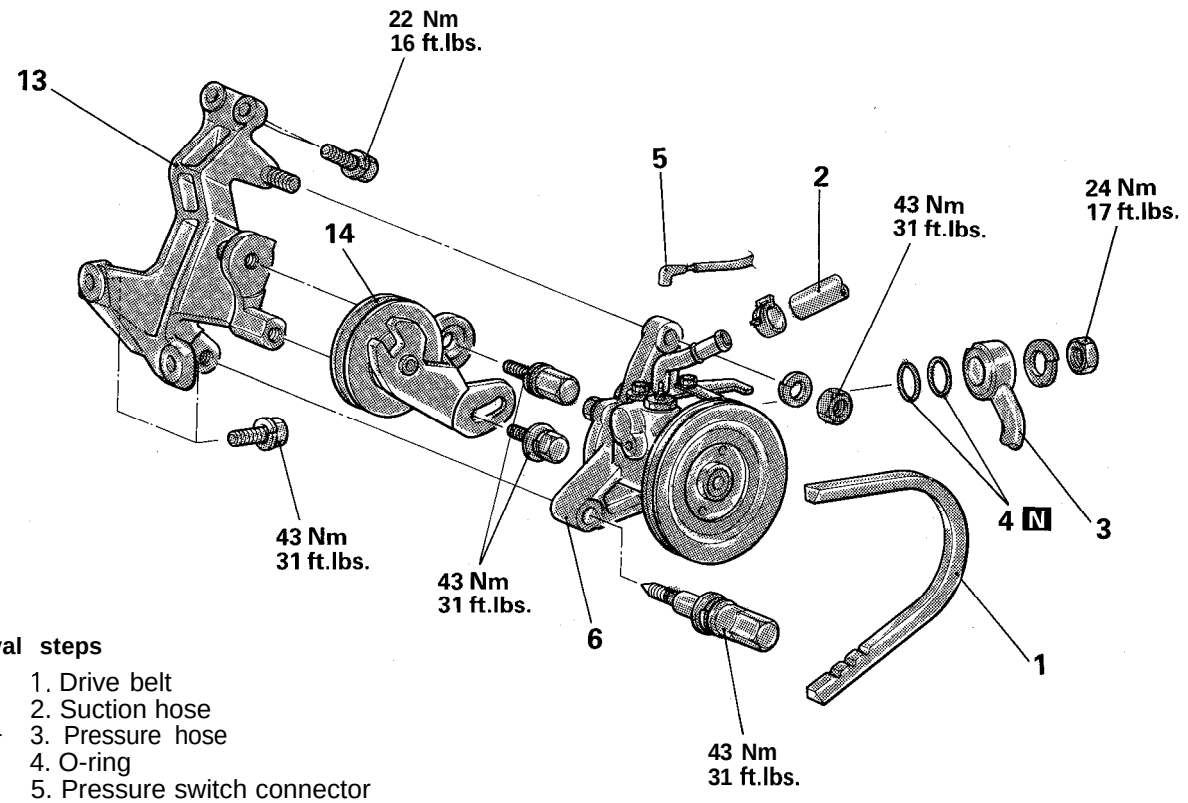


Removal steps

- 1. Drive belt
- 2. Suction hose
- ⬮ + 3. Pressure hose
- 4. O-ring
- 5. Pressure switch connector
- ◆◆ 6. Oil pump
- 7. Front timing belt cover, right
- 8. Timing belt cover cap
- 9. Front timing belt cover, left
- 10. Timing belt
- 11. Camshaft sprocket
- 12. Rear timing belt cover, left
- 13. Oil pump bracket

(Refer to GROUP 9 – Timing belt.)

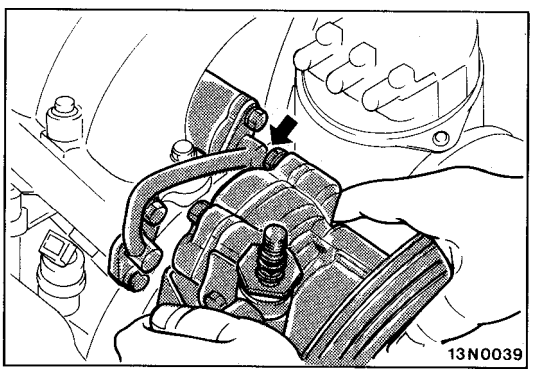
<DOHC Engine>

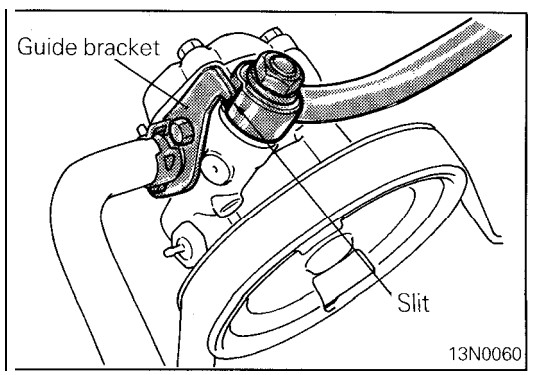


Removal steps

1. Drive belt
2. Suction hose
- + 3. Pressure hose
4. O-ring
5. Pressure switch connector
6. Oil pump
13. Oil pump bracket
14. Tensioner pulley

13N0029





SERVICE POINT OF REMOVAL

6. REMOVAL OF OIL PUMP <SOHC Engine>

(1) Raise the connector of the oil pressure hose upright and lift it upward.

fuel pipe, as illustrated, and remove the oil pump.

INSPECTION

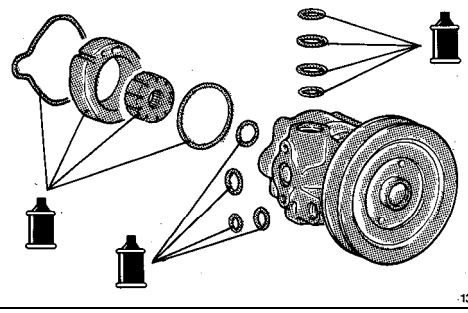
- Check the drive belt for cracks.
- Check the pulley assembly for uneven rotation.

SERVICE POINT OF INSTALLATION

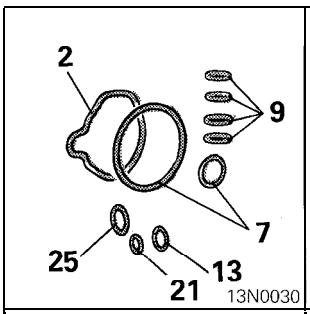
3. INSTALLATION OF PRESSURE HOSE

Connect the pressure hose so that its slit part contacts the oil pump's guide bracket.

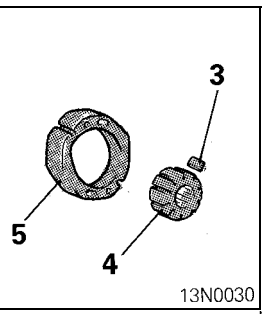
DISASSEMBLY AND REASSEMBLY



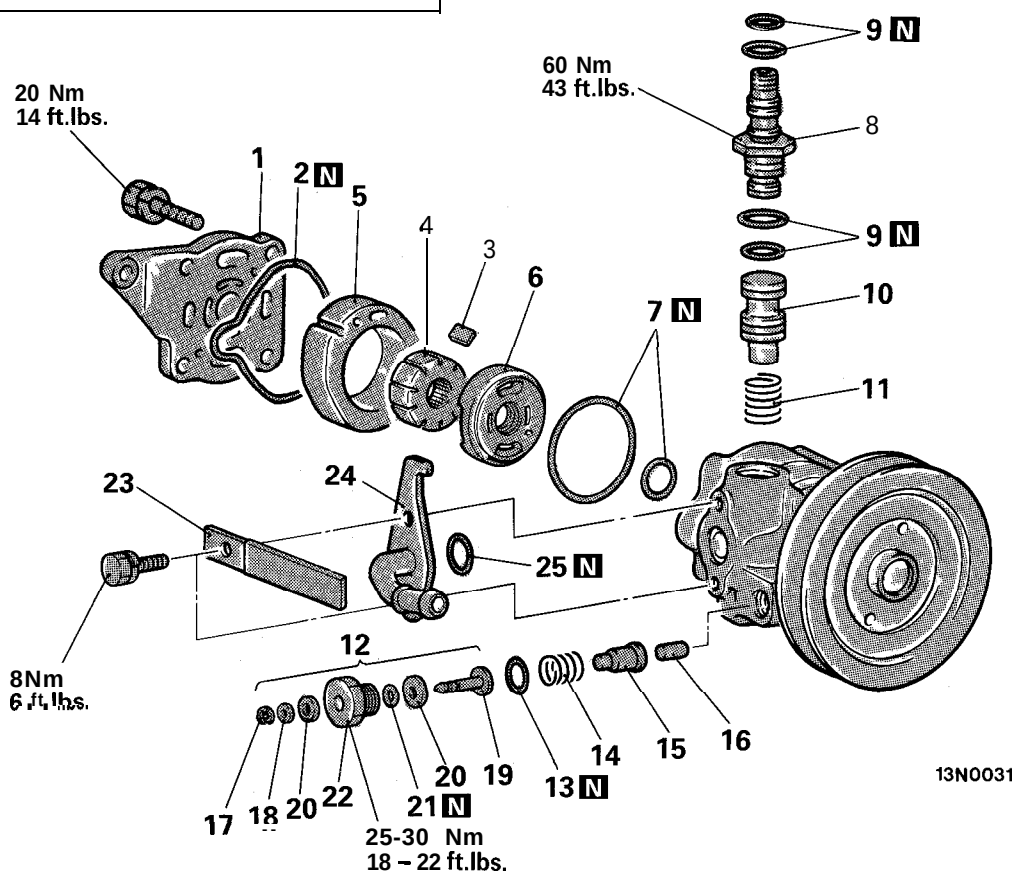
Fluid:
MOPAR ATF PLUS (Automatic transmission fluid type 7176)/Automatic Transmission Fluid "DEXRON" or "DEXRON II"



Oil pump seal kit



Oil pump cartridge kit



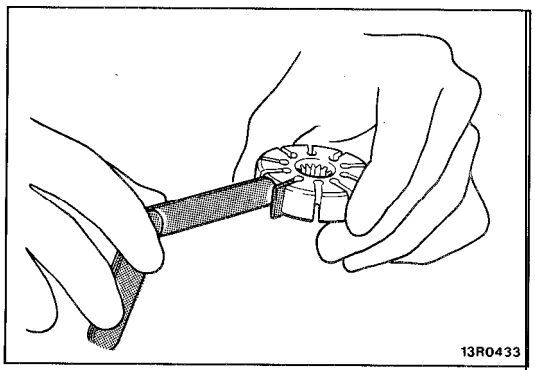
Disassembly steps

1. Pump cover
2. O-ring
3. Vanes
4. Rotor
5. Cam ring
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

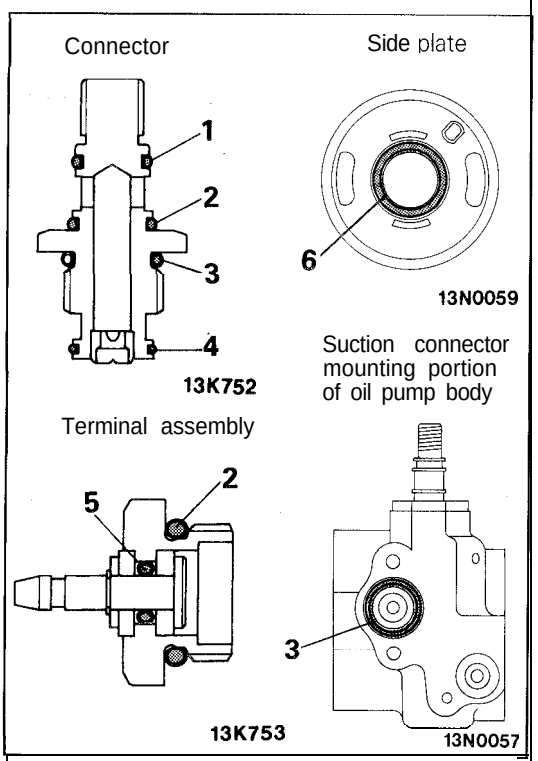
- Check the flow control spring for wear.
- Check the shaft of the pulley for play and round movement.
- Check the groove of rotor vane for "stepped" wear.
- Check the contact surface of cam ring and vanes for "stepped" wear.
- Check the vanes for breakage.



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.)

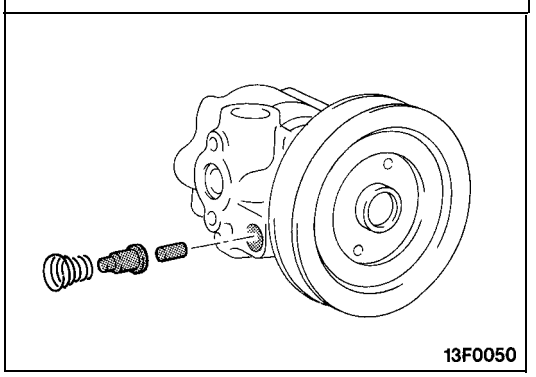


SERVICE POINTS OF REASSEMBLY

25. 21. 13. 9. 7. INSTALLATION OF O-RINGS

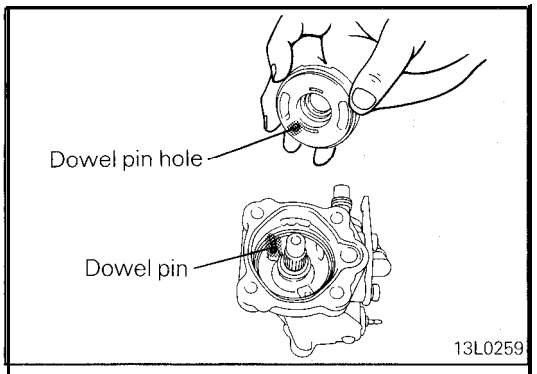
Apply specified fluid on O-rings to install.

No.	I.D. x Width	mm (in.)
1	11 xI.9	(.433 x .075)
2	13x1.9	(.512x .075)
3	17.8 x 2.4	(.701 x .094)
4	13.5x 1.5	(.531 x .059)
5	3.8 x 1.9	(.150 x ,075)
6	16.8 x 2.4	(.661 x .094)



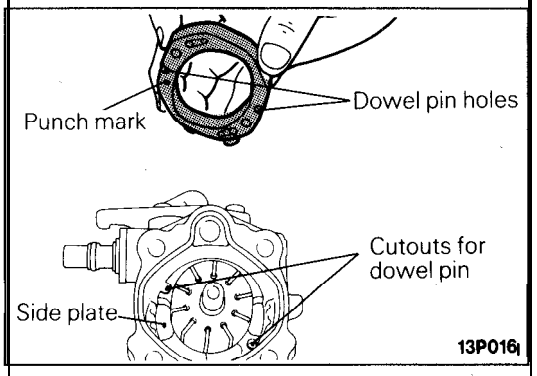
14. INSTALLATION OF SPRING

Fit the spring to the oil pump body with the larger-diameter end at the terminal assembly side.



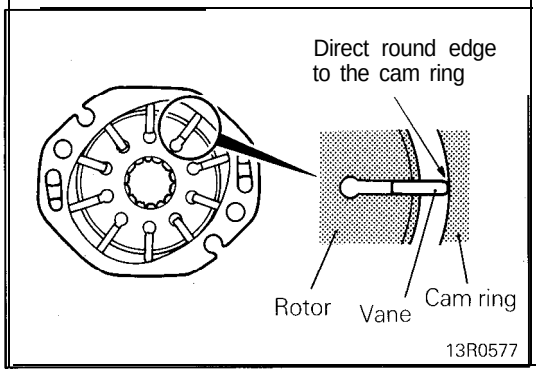
6. INSTALLATION OF SIDE PLATE

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

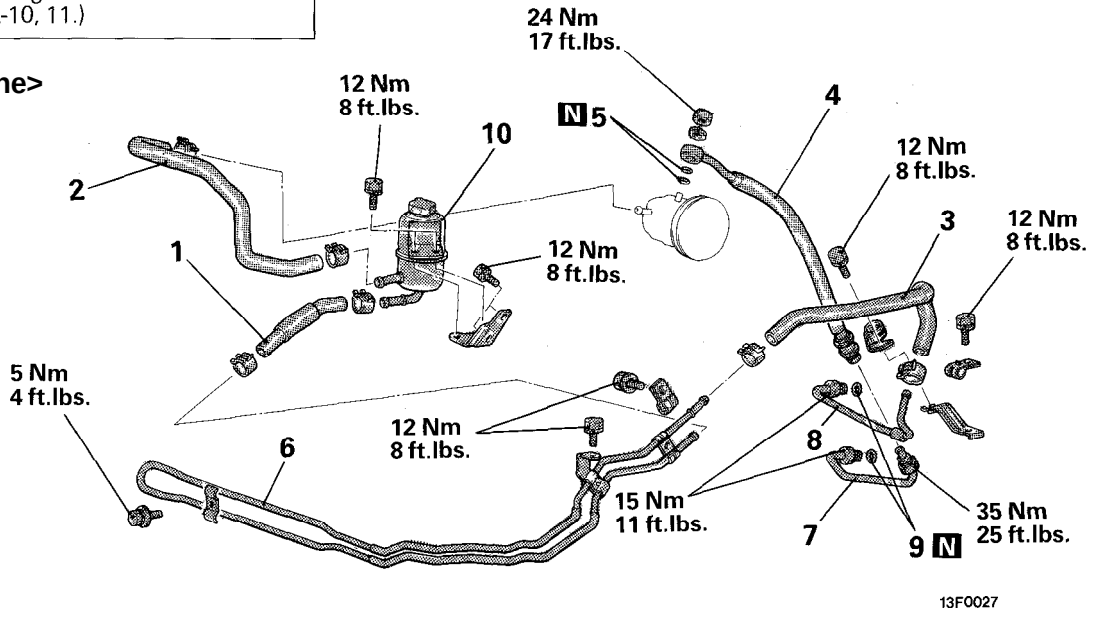
Install the vanes on the rotor, paying close attention to the installation direction.

POWER STEERING HOSES

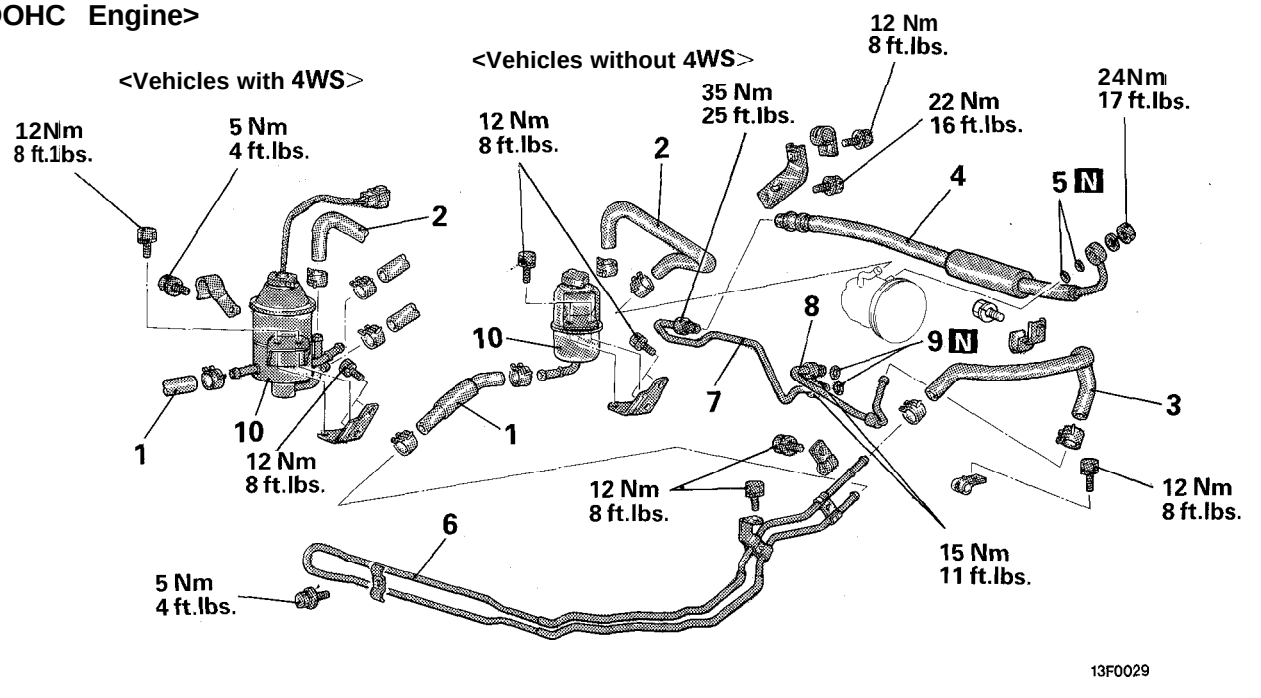
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Draining, Supplying, and Bleeding of the Power Steering Fluid (Refer to P.19A-10, 11.)

<SOHC Engine>

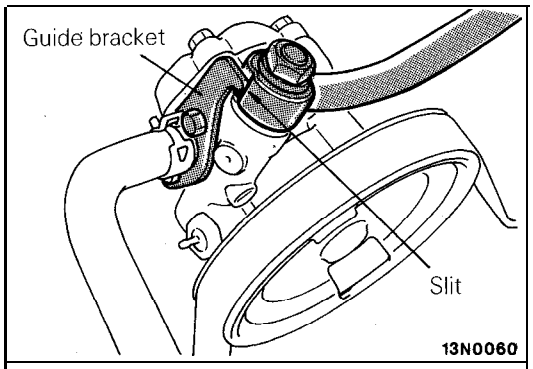


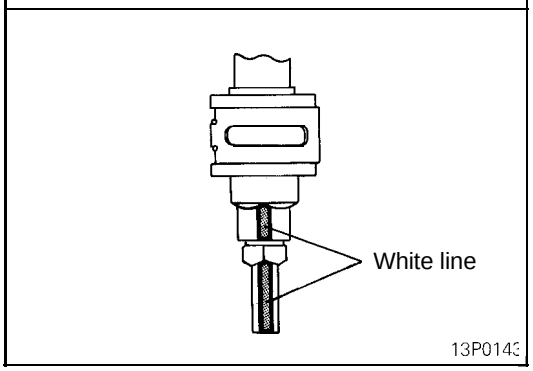
<DOHC Engine>



Removal steps

1. Return hose
2. Suction hose
3. Return hose
- 4. Pressure hose
5. O-ring
6. Cooler tube
7. Pressure tube
8. Return tube
9. O-ring
10. Oil reservoir





SERVICE POINT OF INSTALLATION

4. INSTALLATION OF PRESSURE HOSE

(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.

4-WHEEL STEERING SYSTEM (4WS)

CONTENTS

SPECIFICATIONS

GENERAL SPECIFICATIONS

Items	Specifications
Power steering gear box	
Type	Rack and pinion
Oil pump	
Type	Vane type
Displacement cm³/rev. (cu.in./rev.)	9.6 (0.59)
Relief set pressure MPa (psi)	8 (1,138)
Rear oil pump	
Type	Vane type
Displacement cm³/rev. (cu.in./rev.)	3.3 (0.20)
Relief set pressure MPa (psi)	4 (569)
Power cylinder	
Type	Hydraulic double action type
Stroke mm (in.)	20.2 (.8) [one side 10.1(.39)]

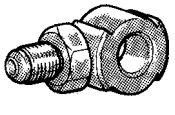
SERVICE SPECIFICATIONS

Items	Specifications
Standard value	
Rear oil pump displacement [at speedometer reading of 31 mph (50 km/h) for 30 seconds] dm³ (qts.)	Approx. 1 .0(1.06)
Power cylinder ball joint rotation starting torque Nm (in.lbs.)	0.5 (4) or less
Power cylinder tie rod swing torque N (lbs.) [Nm (in.lbs.)]	9 – 55 (2 – 12) [0.5 – 3.0 (4 – 26)]
Power cylinder slide resistance N (lbs.)	67 (15) or less

LUBRICANTS

Items	Specified lubricant	Quantity
Power steering fluid	MOPAR ATF PLUS (Automatic Transmission Fluid Type 7176)/Automatic transmission fluid "DEXRON" or "DEXRON II"	1.45 dm³ (1.53 qts.)
Dust cover	Silicone grease	As required

SPECIAL TOOL

Tool number and tool name	Replaced by Miller tool number	Application
 M B990993 Power steering oil pressure gauge adapter	MB991 217-A	Measurement of fluid flow volume

TROUBLESHOOTING

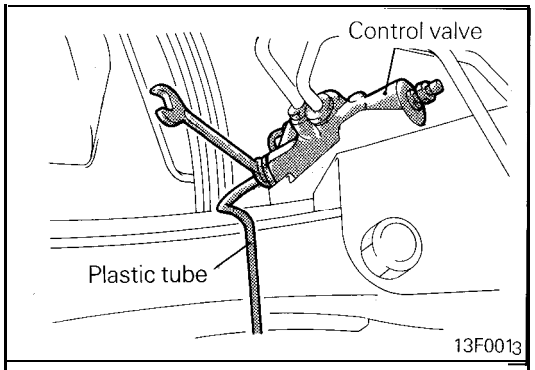
Before inspecting, check the following items:
- Ensure that the suspension has not been modified
- Tire and wheel size, specifications, air pressure, balance and amount of wear
- Steering wheel type
- Wheel alignment
- Oil pump drive belt tension
- Power steering fluid level, and air in the system
- Engine idle speed and even idle
- Oil leakaae

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

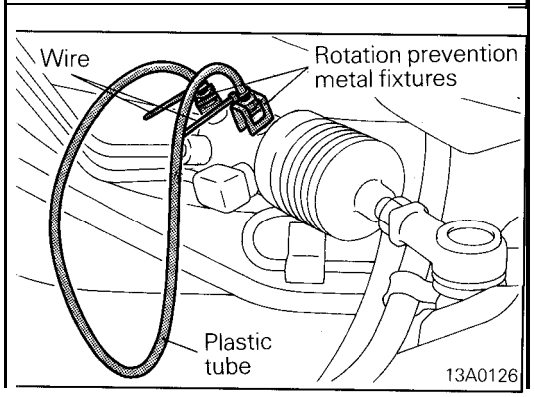
SERVICE ADJUSTMENT PROCEDURES

BLEEDING

(1) Bleed air from power steering system (Refer to GROUP 19A – 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 a plastic tube 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 to three times to make sure that there is no more air in the system. Tighten the bleeder screw and remove the plastic tube.
(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 a plastic tube to the bleeder screw.

Caution
Loosen the bleeder screw about 30 to 45 degrees, and secure it with the special tool (rotation prevention metal fixtures) so as not to be loosened more.

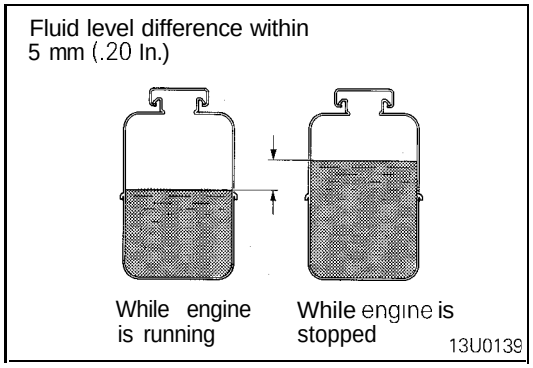
(9) Start the engine and keep the front wheels in a straight ahead position.. Increase the engine speed once to a speedometer reading of 70 – 80 km/h (43 – 50 mph) to operate the oil pump for the rear wheels.

Caution
Pay particular attention to all four wheels that rotate.

NOTE
When the engine speed is increased, the fluid circulates through the oil pump but it does not circulate through the plastic tube.

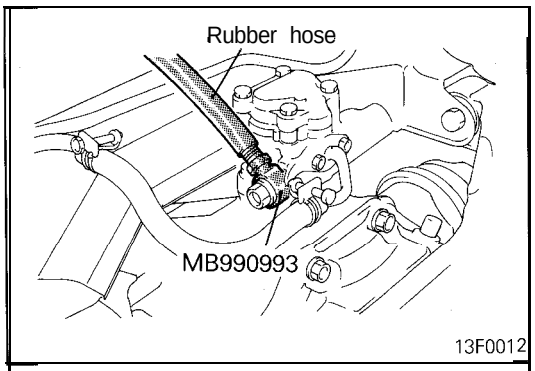
(IO)With a 30 – 40 km/h (19 – 25 mph) speedometer reading maintained, turn the steering wheel all the way clockwise and counter-clockwise to ensure that pressure rises, causing air to circulates through the plastic tube and to be discharged from the reserve tank.
(1 l)Repeat step (10) several times to make sure that there is no more air in the system. Tighten the bleeder screw and remove the plastic tube.
(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.



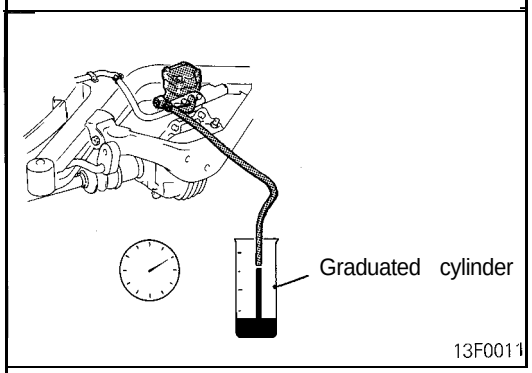
FUNCTION CHECK

(1) Raise the vehicle so that all four wheels may turn freely.
(2) Start the engine, running the vehicle at an indicated speed of about 80 km/h (50 mph).
(3) Turn the steering wheel all the way to left and right and turn it swiftly, checking to ensure that the rear wheels steer to the same directions as the front wheels.



REAR OIL PUMP DISCHARGE FLOW VOLUME CHECK

(1) Disconnect the pressure hose from the rear oil pump and install the special tool with a rubber hose.
(2) Place the other end of the rubber hose in a container which permits measurement of flow rate (2-liter graduated cylinder).

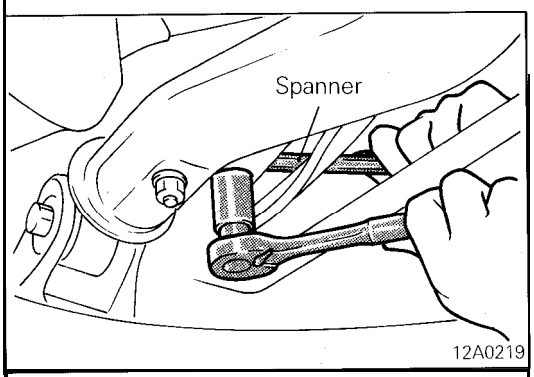


(3) Start the engine. Increase speed slowly, then hold the indicated speed of 50 km/h (31 mph), measuring discharge flow volume for 30 seconds.

Caution
While performing this work, continuously add fluid into the oil reservoir.

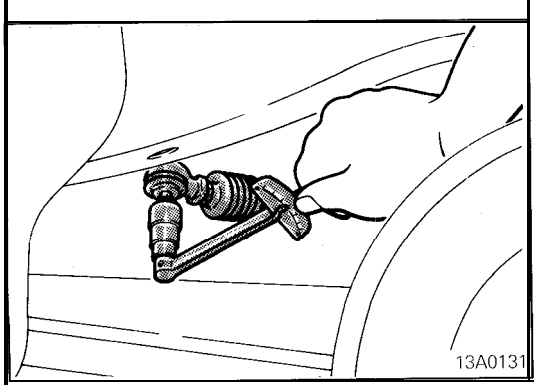
Standard value: Approximately 1.0 dm^3 (1.06 qts.)

(4) If the discharge flow volume is extremely high or low, the rear oil pump should be replaced.



BALL JOINT ROTATION STARTING TORQUE CHECK

(1) Holding the power cylinder tie rod with a spanner, disconnect the tie rod and trailing arm.



(2) After swinging the ball joint stud several times, install the stud nut, then measure the ball joint rotation starting torque with the special tool.

Standard value: 0.5 Nm (4 in.lbs.) or less

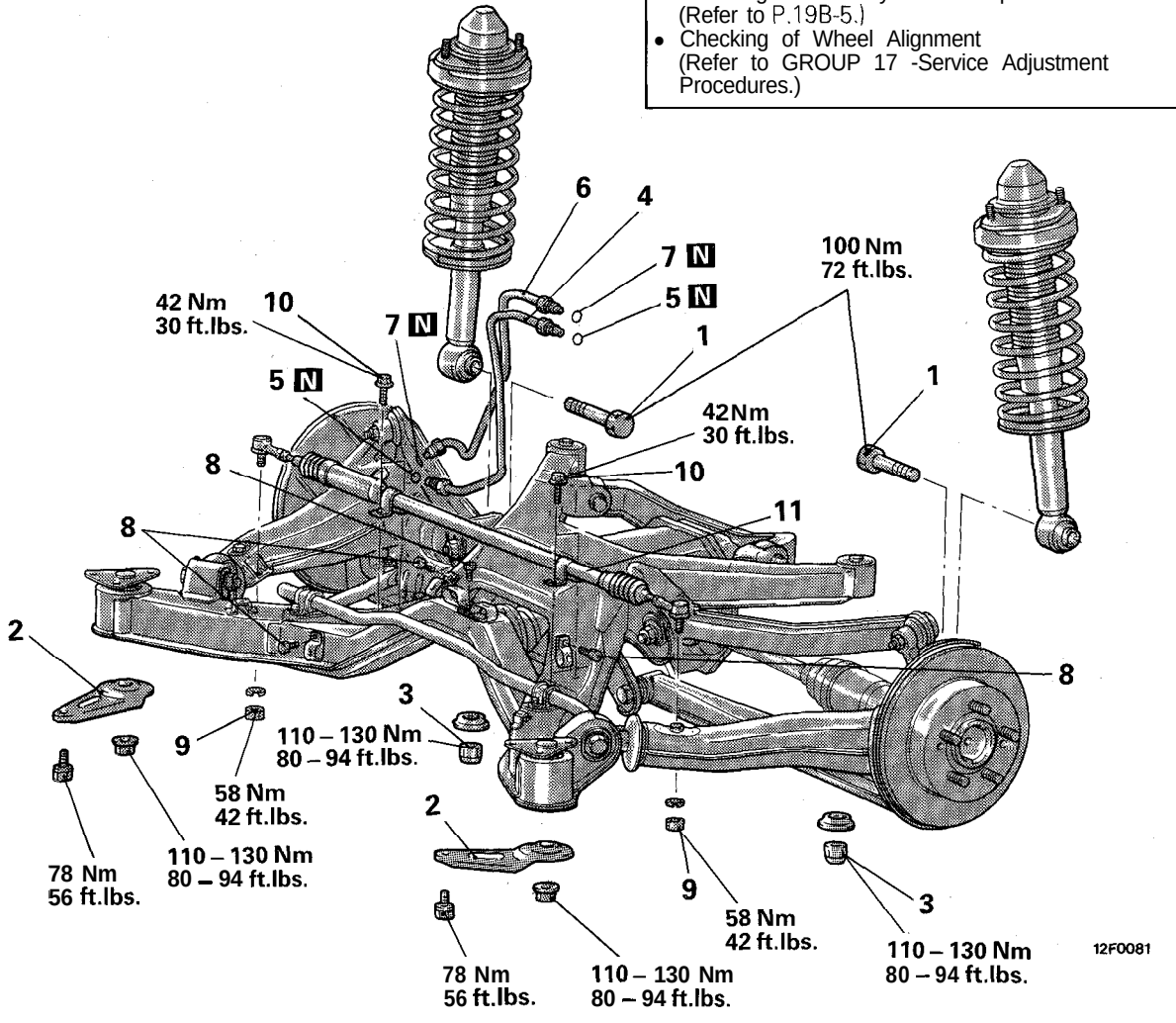
(3) If the rotation starting torque exceeds the standard value, replace the tie rod end.
(4) If the rotation starting torque is less than the standard value, check that the ball joint is not loose and operates smoothly. If not, it may be reused.

POWER CYLINDER

REMOVAL AND INSTALLATION

Pre-removal Operation
- Cleaning of Pipings with Steam
- Draining of Power Steering Fluid (Refer to GROUP 19A – Service Adjustment Procedures.)
- Removal of Main Muffler Assembly (Refer to GROUP 11 – Exhaust Pipe and Muffler.)

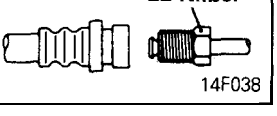
Post-installation Operation
- Installation of Main Muffler Assembly (Refer to GROUP 11 -Exhaust Pipe and Muffler.)
- Refilling and Bleeding of Power Steering System (Refer to GROUP 19A – Service Adjustment Procedures.)
- Bleeding of 4WS System (Refer to P.19B-4.)
- Checking of 4WS System for Operation (Refer to P.19B-5.)
- Checking of Wheel Alignment (Refer to GROUP 17 -Service Adjustment Procedures.)

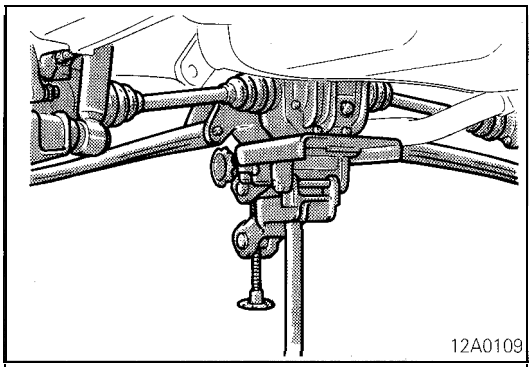


Removal steps

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

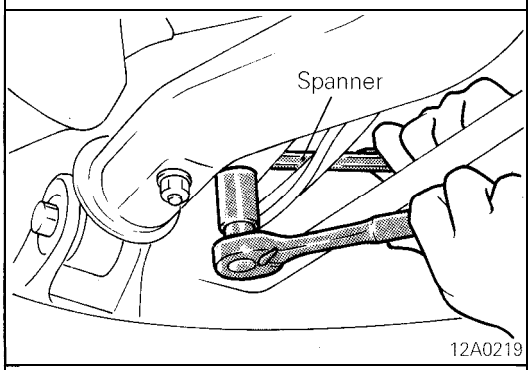




SERVICE POINTS OF REMOVAL

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.

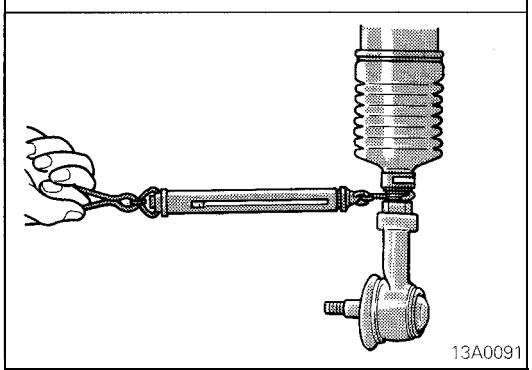
INSPECTION

TIR 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.

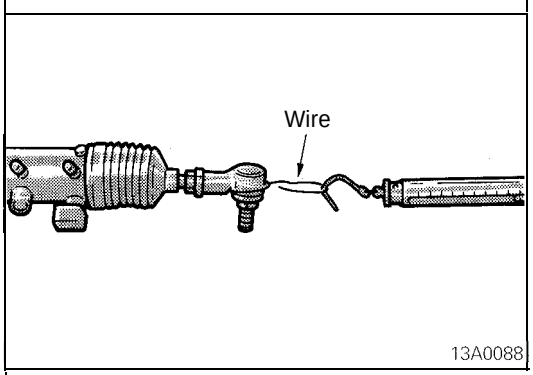


POWER CYLINDER SLIDE RESISTANCE CHECK

(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

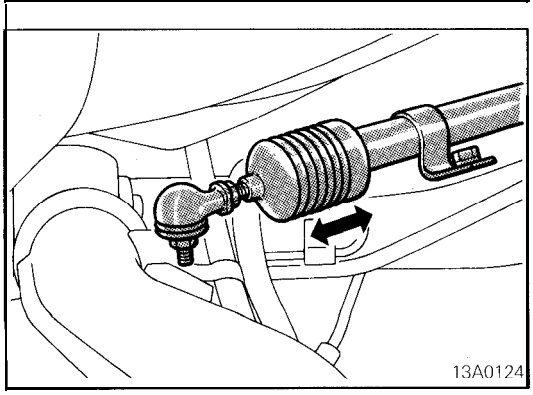
(3) If the slide resistance exceeds the standard value, replace the power cylinder.
(4) If the slide resistance is less than the standard value, the power cylinder may be reused as long as it is not loose and slides smoothly.

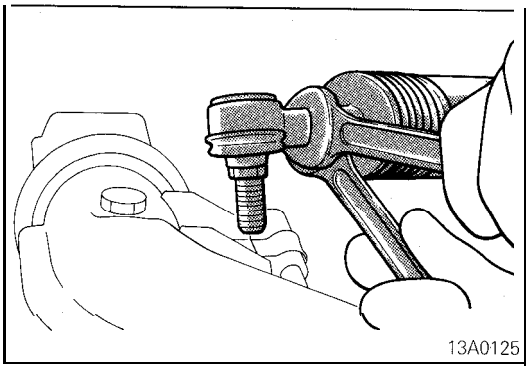


SERVICE POINTS OF INSTALLATION

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.

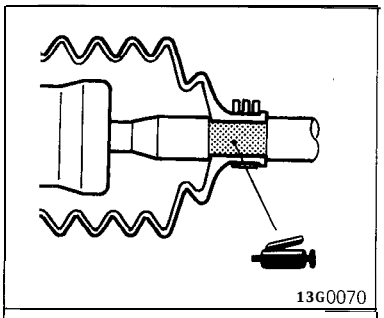




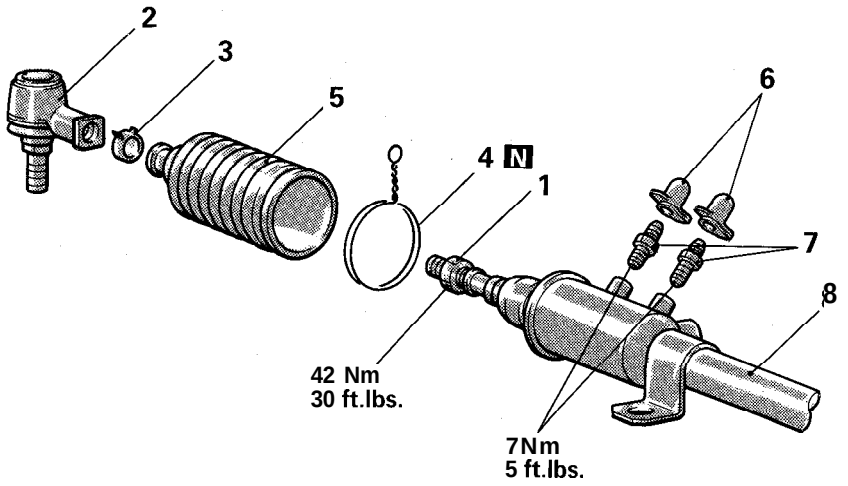
(4) When the tie rod ends and the installation holes at the trailing arm do not meet, loosen the tie rod end securing nut, then adjust the length. The dust cover fastener clip should be removed for this.
(5) The difference between the lengths of the left and right tie rods should be less than 1 mm (.039 in.).

NOTE
The threads of the tie rod ends may be used as a guide for this.

DISASSEMBLY AND REASSEMBLY



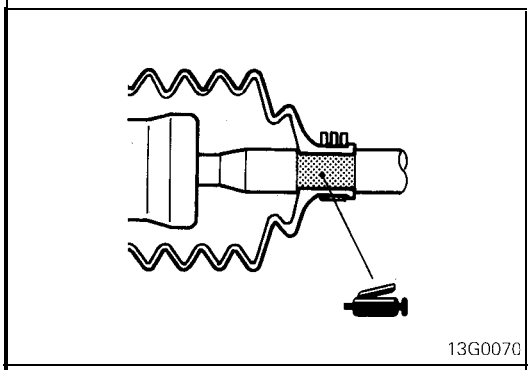
Grease: Silicone grease



13A0128

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

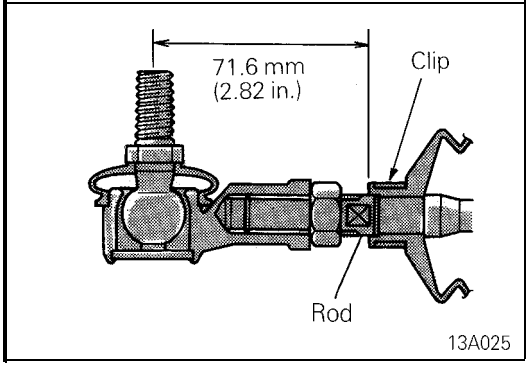


SERVICE POINTS OF REASSEMBLY

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



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.

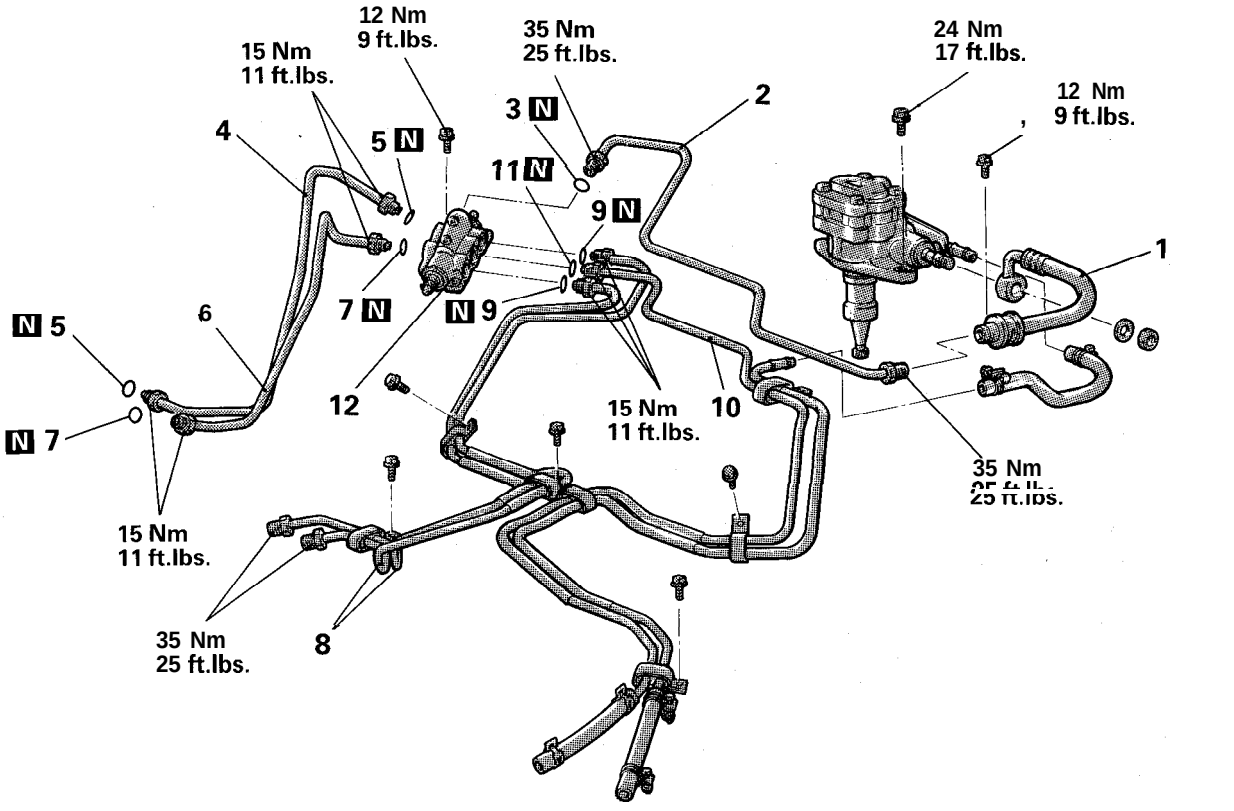
NOTE
To adjust the assembly dimensions of the tie rod end assembly, remove the dust cover clip and rotate the rod.

CONTROL VALVE

REMOVAL AND INSTALLATION

Pre-removal Operation
- Cleaning of Pipings with Steam
- Draining of Power Steering Fluid (Refer to GROUP 19A – Service Adjustment Procedures.)
- Removal of Rear Suspension Assembly (Refer to GROUP 17 -Rear Suspension Assembly.)

Post-installation Operation
- Installation of Rear Suspension Assembly (Refer to GROUP 17 – Rear Suspension Assembly.)
- Refilling and Bleeding of Power Steering System (Refer to GROUP 19A – Service Adjustment Procedures.)
- Bleeding of 4WS System (Refer to P. 19B-4.)
- Checking of 4WS System for Operation (Refer to P.19B-5.)



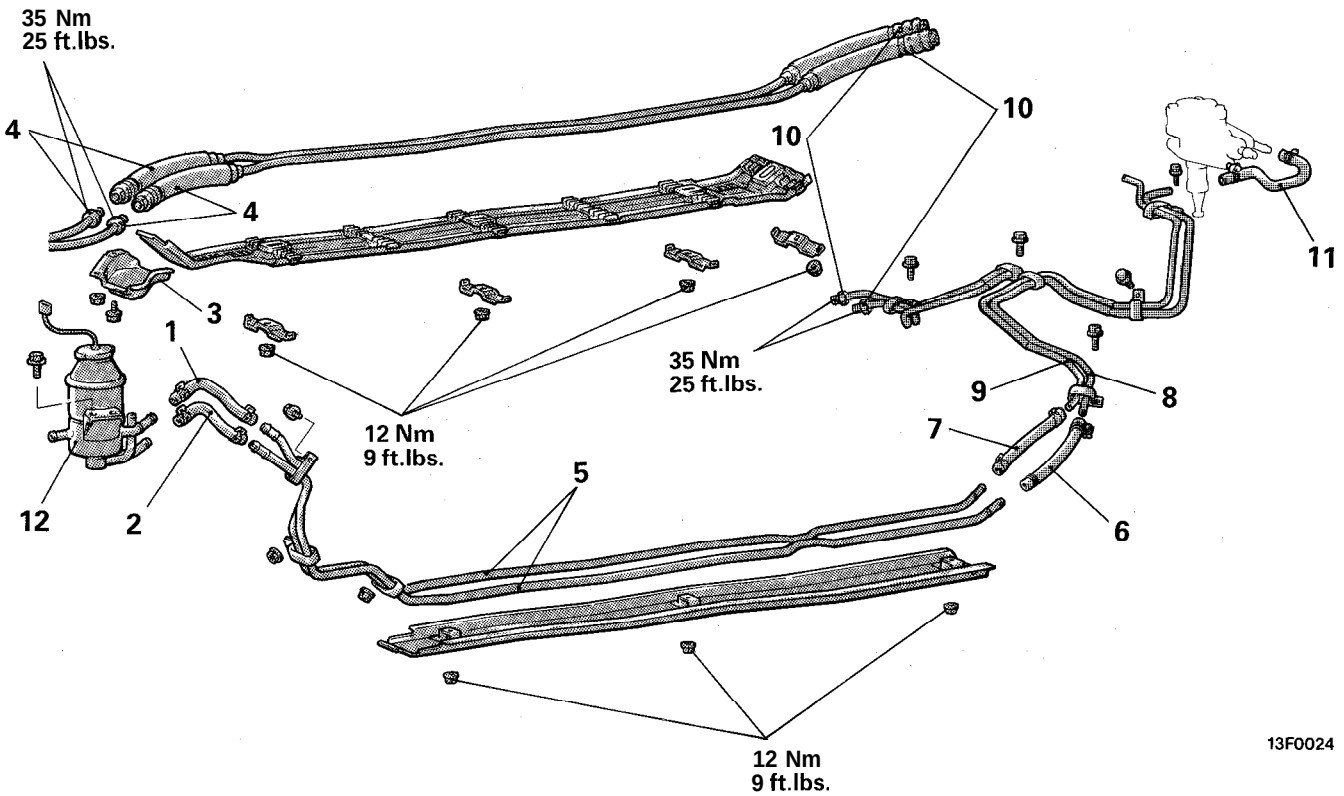
13F0025

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

REAR OIL LINE

REMOVAL AND INSTALLATION



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 Pipings with Steam
- Draining of Power Steering Fluid (Refer to GROUP 19A – Service Adjustment Procedures.)

Post-installation Operation
- Refilling and Bleeding of Power Steering System (Refer to GROUP 19A – Service Adjustment Procedures.)
- Bleeding of 4WS System (Refer to P.19B-4.)
- Checking of 4WS System for Operation (Refer to P.19B-5.)

INSPECTION

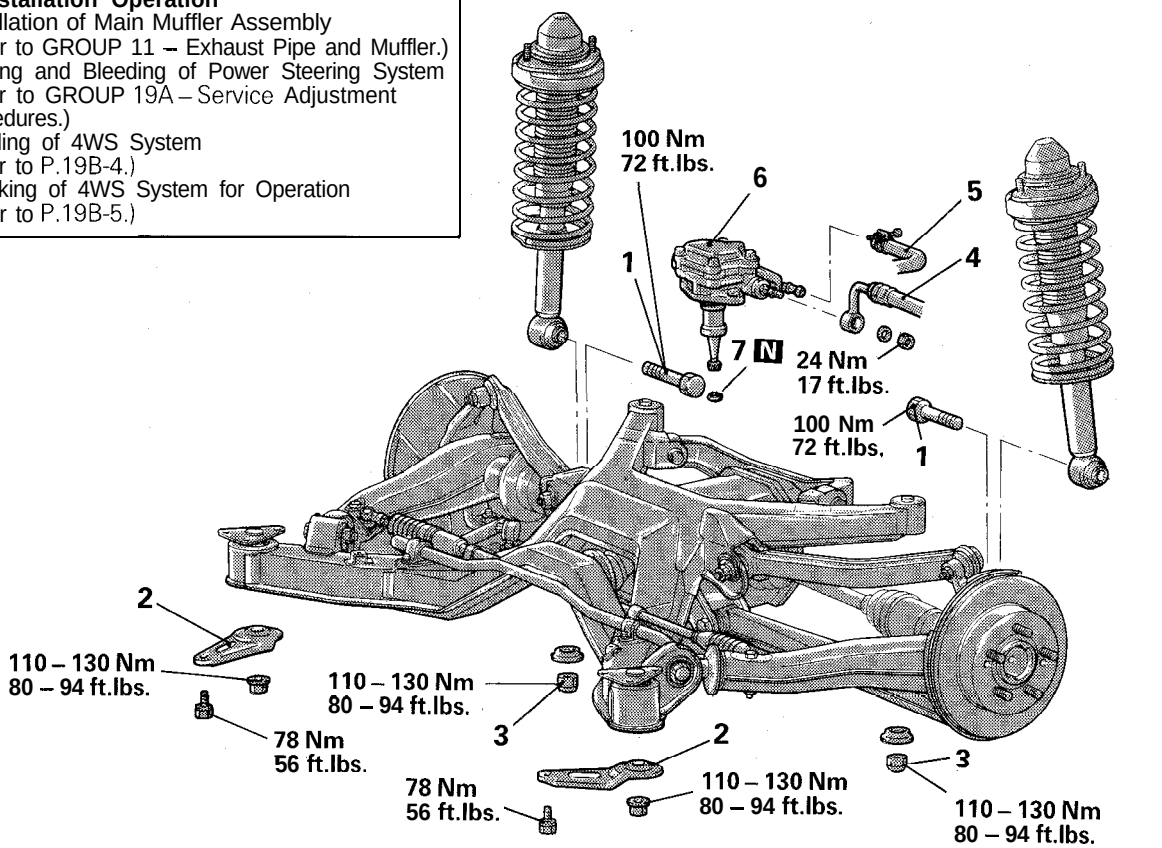
- Check tubes and pipes for cracking, damage or corrosion.
- Check hoses for cracking, damage, leakage or fluid seepage.
- Check flare nuts for damage.

REAR OIL PUMP

REMOVAL AND INSTALLATION

Pre-removal Operation
- Draining of Power Steering Fluid (Refer to GROUP 19A – Service Adjustment Procedures.)
- Removal of Main Muffler Assembly (Refer to GROUP 11 – Exhaust Pipe and Muffler.)

Post-installation Operation
- Installation of Main Muffler Assembly (Refer to GROUP 11 – Exhaust Pipe and Muffler.)
- Refilling and Bleeding of Power Steering System (Refer to GROUP 19A – Service Adjustment Procedures.)
- Bleeding of 4WS System (Refer to P.19B-4.)
- Checking of 4WS System for Operation (Refer to P.19B-5.)

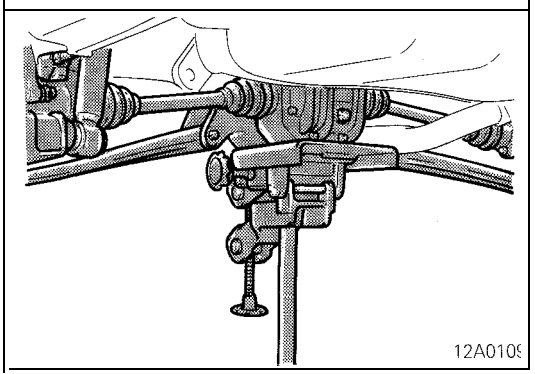


13F0023

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

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.

TRANSAXLE
MANUAL AND AUTOMATIC

CONTENTS

CONTINUED ON NEXT PAGE

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

WARNING!

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

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

(3) CHRYSLER dealer personnel must thoroughly review this manual, and especially its GROUP 23B – Supplemental Restraint System (SRS) and GROUP 0 – Maintenance Service, before beginning any service or maintenance of any component of the SRS or any SRS-related component.

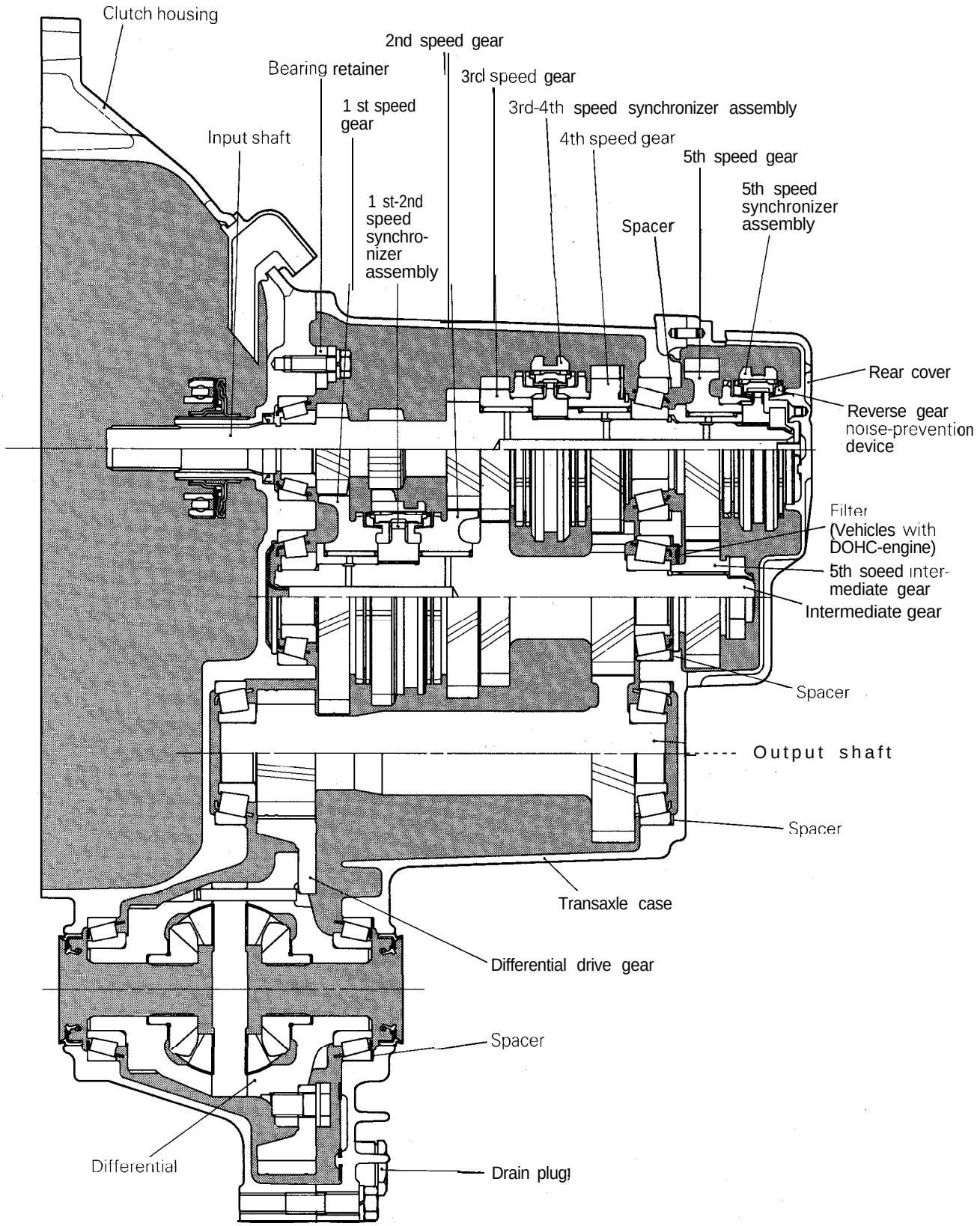
NOTE

The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning light, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

MANUAL TRANSAXLE <FWD>

GENERAL INFORMATION

F5M33



SPECIFICATIONS

GENERAL SPECIFICATIONS

Items	Specifications	
Model	F5M33-2-SNPR	F5M33-2-SNQR
Applicable engine	6G72-SOHC MPI	6G72-DOHC MPI
Type	5-speed transaxle floor shift	5-speed transaxle floor shift
Gear ratio		
1 st	3.090	3.090
2nd	1.833	1.833
3rd	1.217	1.217
4th	0.888	0.888
5th	0.741	0.741
Reverse	3.166	3.166
Final reduction ratio	4.153	4.153
Speedometer gear ratio (driven/drive)	28/36	28/36
Oil quantity dm^3 (qts.)	2.0 (2.1)	2.0 (2.1)

SERVICE SPECIFICATIONS

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

Part name	Thickness mm (in.)	Identification symbol	Part No.
Snap ring (For adjustment of input shaft rear bearing end play)	1.40 (.0551)	Blue	M D723276
	1.45 (.0571)	Purple	M D730889
	1.50 (.0591)	Red	M D723277
	1.55 (.0610)	White	M D730890
	1.60 (.0630)	Yellow	M D723278
	1.65 (.0650)	Brown	MD730891
	1.70 (.0670)	Green	M D723279
	1.75 (.0689)	Orange	M D730892
Spacer (For adjustment of input shaft end play)	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	MD71 0455
	1.19 (.0468)	L	MD71 0456
	1.22 (0.480)	G	MD700271
	1.25 (.0492)	M	MD71 0457
	1.28 (.0504)	N	MD710458
	1.31 (.0516)	E	M D706574
	1.34 (.0527)	0	MD710459
	1.37 (.0539)	P	MD71 0460
	1.40 (.0551)	–	M D706573
	1.43 (.0563)	Q	MD71 0461
	1.46 (.0575)	R	MD710462
Snap ring (For adjustment of intermediate gear front bearing end play)	1.4 (.0551)	None	M D703779
	1.5 (.0591)	Brown	M D703780
	1.6 (.0630)	Blue	MD703781
Spacer (For adjustment of intermediate gear preload)	0.62 (.0244)	62	MD736754
	0.65 (.0256)	65	MD736755
	0.68 (.0268)	68	MD735659
	0.71 (.0280)	71	MD735660
	0.74 (.0291)	74	MD735661
	0.77 (.0303)	77	MD735662
	0.80 (.0315)	80	M D724142
	0.83 (.0327)	83	M D724143
	0.86 (.0338)	86	MD7241 44
	0.89 (.0350)	89	MD7241 45

Part name	Thickness mm (in.)	Identification symbol	Part No.
Spacer (For adjustment of intermediate gear preload)	0.92 (.0362)	92	MD7241 46
	0.95 (.0374)	95	MD7241 47
	0.98 (.0386)	98	MD7241 48
	1.01(.0398)	01	MD7241 49
	1.04 (.0409)	04	MD7241 50
	1.07 (.0421)	07	MD7241 51
	1.10 (.0433)	10	MD7241 52
	1.13(.0445)	13	M D724153
	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	M D724158
	1.31 (.0516)	31	MD7241 59
	1.34 (.0527)	34	MD7241 60
	1.37 (.0539)	37	MD7241 61
Spacer (For adjustment of output shaft preload)	0.83 (.0327)	83	MD720937
	0.86 (.0338)	86	M D720938
	0.89 (.0350)	89	MD720939
	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	M D720944
	1.07 (.0421)	07	MD720945
	1.10 (.0433)	J	MD710454
	1.13(.0445)	D	M D700270
	1.16(.0457)	K	M D710455
	1.19 (.0468)	L	MD710456
	1.22 (.0480)	G	MD700271
	1.25 (.0492)	M	M D710457
	1.28 (.0504)	N	MD710458
	1.31 (.0516)	E	M D706574
	1.34 (.0527)	0	MD71 0459
Spacer (For adjustment of differential case preload)	0.80 (.0315)	80	MD727661
	0.83 (.0327)	83	M D720937
	0.86 (.0338)	86	MD720938
	0.89 (.0350)	89	MD720939
	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

Part name	Thickness mm (in.)	Identification symbol	Part No.
Spacer (For adjustment of differential case preload)	1.10 (.0433)	J	M D7 10454
	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
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

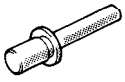
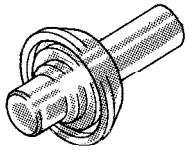
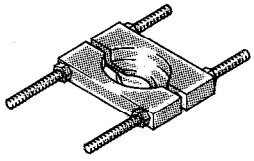
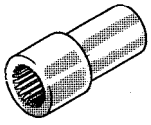
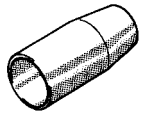
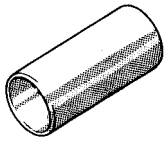
LUBRICANTS

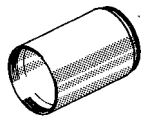
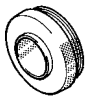
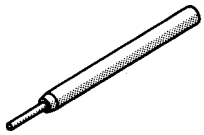
Items	Specified lubricant	Quantity dm^3 (qts)
Manual transmission oil	MOPAR Hypoid gear oil or equivalent API classification GL-4, SAE 75W-90 or 75W-85W	2.0 (2.1)
Drive shaft oil seal lip		As required
Shift lever assembly Shift lever bushing, Return spring	MOPAR Front Wheel Bearing Grease Part No. 3837794 or equivalent	As required

SEALANTS AND ADHESIVES

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	MOPAR part No. 4318031 or MOPAR part No. 4318032 or equivalent
Air breather	MOPAR part No. 4318025 or equivalent

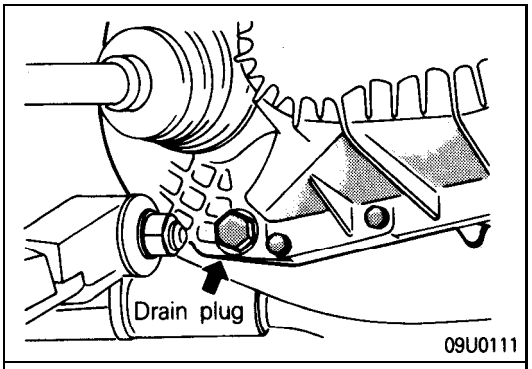
SPECIAL TOOLS

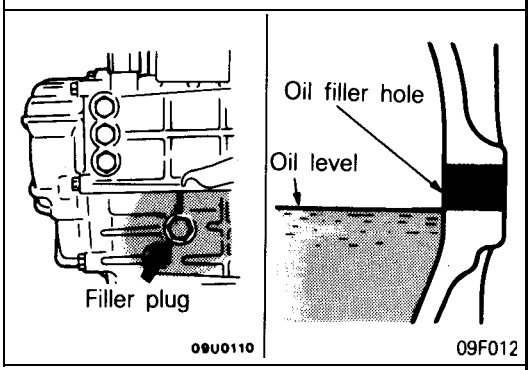
Tool number and tool name	Replaced by Miller tool numer	Application
 MB990635 Steering linkage puller	MB990635	• Disconnection of the coupling of the knuckle and lower arm ball joint • Disconnection of the coupling of the knuckle and tie-rod end ball joint
 MD998245 Lock pin installer	MD998245	Installation of spring pin and lock pin
 MD998321 Oil seal installer	MD998321	Installation of input shaft oil seal
 MD998325 Differential oil seal installer	MD998325	Installation of differential oil seal
 MD998801 Bearing remover	P-334	Removal of gears and bearings of input shaft, intermediate shaft, output shaft and differential assembly
 MD998802 Input shaft holder	MD998802	Installation and removal of input shaft and intermediate shaft lock nut
 MD998808 Snap ring installer 	MD998808-1 MD998323	Installation of input shaft rear snap ring
 MD998812 Installer cap	–	Use with installer and installer adapter

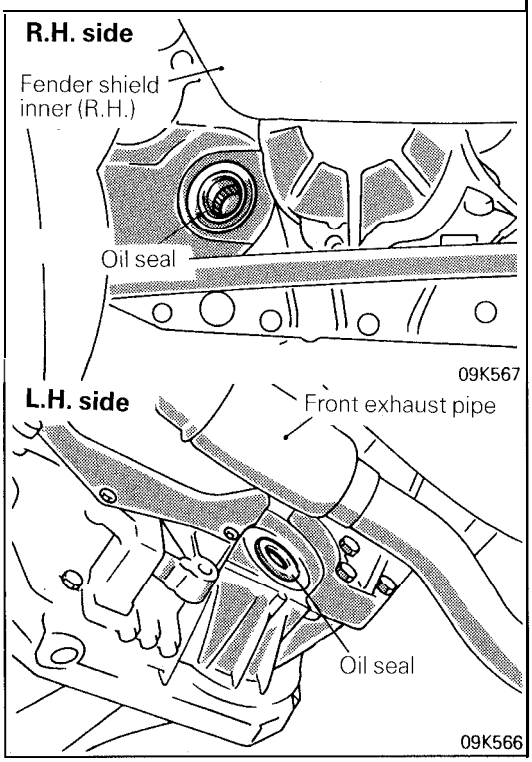
Tool number and tool name	Replaced by Miller tool numer	Application
 MD998813 Installer-l 00	—	Use with installer cap and installer adapter
 M D998816 Installer adapter (30)	L-4965	Installation of input shaft front bearing
 MD99881 7 Installer adapter (34)	L-441 1	Installation of input shaft bearing sleeve
 MD99881 8 Installer adaper (38)	c-371 7, L-441 1	Installation of gears, bearing and bearing sleeve of input shaft and intermediate shaft
 M D998822 Installer adapter (46)	MD998306	Installation of differential case bearings
 General service tool Universal punch	General service tool	Removal of spring pin and lock pin

TROUBLESHOOTING

Symptom	Probable cause	Remedy
Vibration, noise	a. Loose or damaged transaxle and engine mounts	a. Tighten or replace mounts
	b. Inadequate shaft end play	b. Correct end play
	c. Worn of damaged gears	c. Replace gears
	d. Use of inadequate grade of oil	d. Replace with specified oil
	e. Low oil level	e. Replenish
	f. Inadequate engine idle speed	f. Adjust idle speed
Oil leakage	a. Broken or damaged, oil seal or O-ring	a. Replace oil seal or O-ring
Hard shift	a. Faulty control cable	a. Replace control cable
	b. Poor contact or wear of synchronizer ring and gear cone	b. Correct or replace
	c. Weakened synchronizer spring	c. Replace synchronizer spring
	d. Use of inadequate grade of oil	d. Replace with specified oil
Jumps out of gear	a. Worn gear shift fork or broken poppet spring	a. Replace shift fork or poppet spring
	b. Synchronizer hub to sleeve spline clearance too large	b. Replace synchronizer hub and sleeve







SERVICE ADJUSTMENT PROCEDURES

TRANSMISSION OIL LEVEL INSPECTION

Refer to GROUP 0 – Maintenance Service.

TRANSMISSION OIL REPLACEMENT

(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.

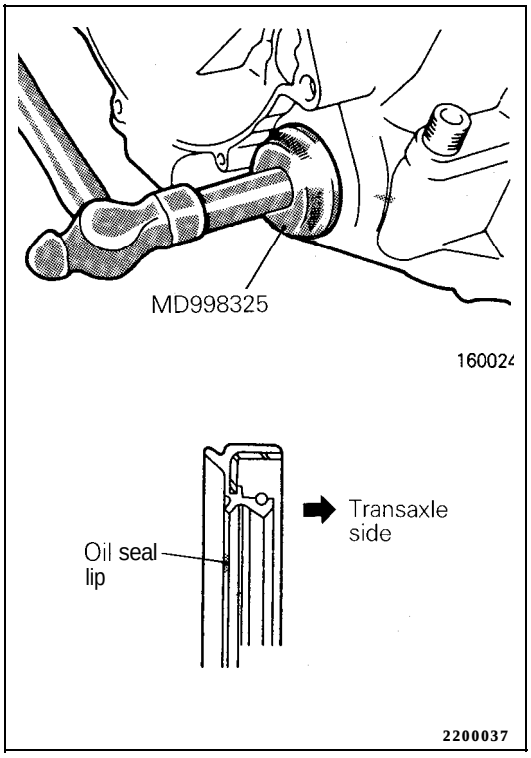
Transmission oil: MOPAR Hypoid gear oil or equivalent, API classification GL-4, SAE 75W-90 or 75W-85W [2.0 dm³ (2.1 qts.)]

(4) Tighten the filler plug at specified torque.

Specified torque: 30 – 35 Nm (22 – 25 ft.lbs.)

DRIVE SHAFT OIL SEALS REPLACEMENT

(1) Disconnect the drive shaft from the transaxle. (Refer to GROUP 2A – 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.

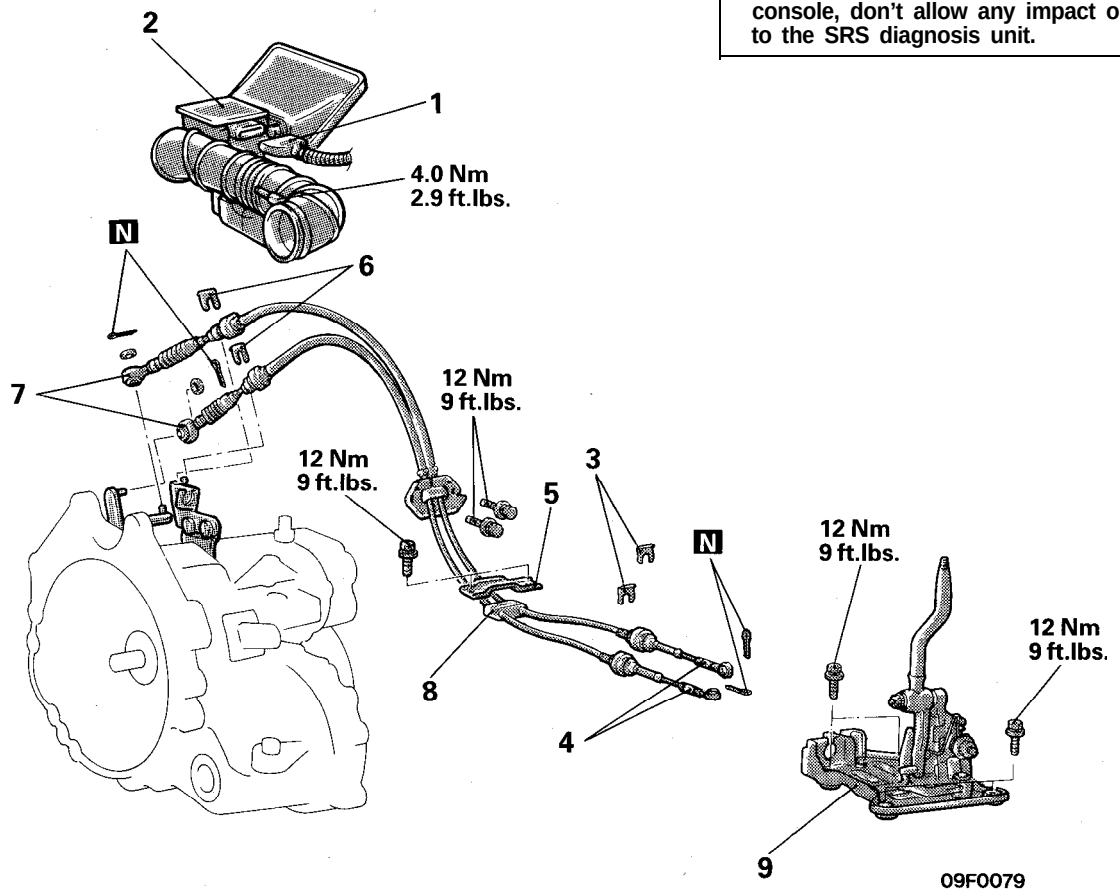
(4) Apply a coating of the transmission oil to the lip of the oil seal.

Transmission oil: MOPAR Hypoid gear oil or equivalent, API classification GL-4, SAE 75W-90 or 75W-85W

TRANSAXLE CONTROL

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Removal and Installation of Front Console Assembly
  (Refer to GROUP 23A – Floor Console.)
  CAUTION: SRS
  When installing or removing the front console, don't allow any impact or shock to the SRS diagnosis unit.



Transaxle control cable assembly removal steps

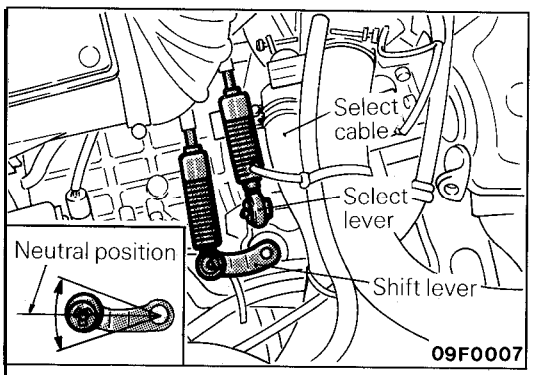
1. Harness connector
2. Air cleaner, Air intake hose
3. Clip
- * 4. Connection for transaxle control cable assembly (Shift lever assembly side)
5. Retainer
6. Clip
7. Connection for transaxle control cable assembly (Transaxle side)
8. Transaxle control cable assembly

Shift lever assembly removal steps

1. Harness connector
2. Air cleaner. Air intake hose
3. Clip
- + 4. Connection for transaxle control cable assembly (Shift lever assembly side)
9. Shift lever assembly

INSPECTION

- Check the transaxle control cable assembly for function and for damage.
- Check the boot for damage.
- Check each bushing for wear or abrasion, sticking, impeded action, and damage.

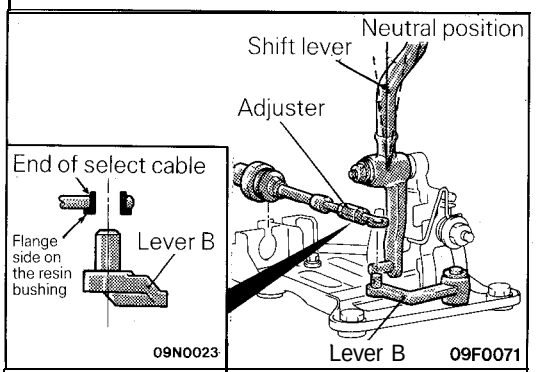


SERVICE POINTS OF INSTALLATION

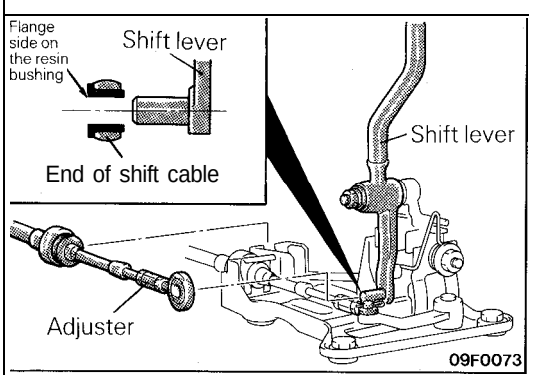
4. CONNECTION OF TRANSAXLE CONTROL CABLE ASSEMBLY (SHIFT LEVER ASSEMBLY SIDE)

(1) Move the transaxle shift lever to the neutral position.

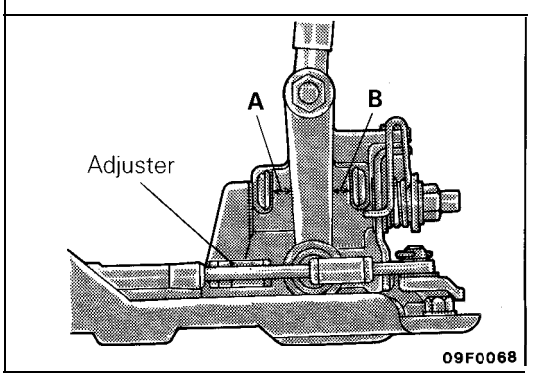
NOTE
The select lever will be set to the neutral position when the transaxle shift lever is moved to the neutral position.



(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.



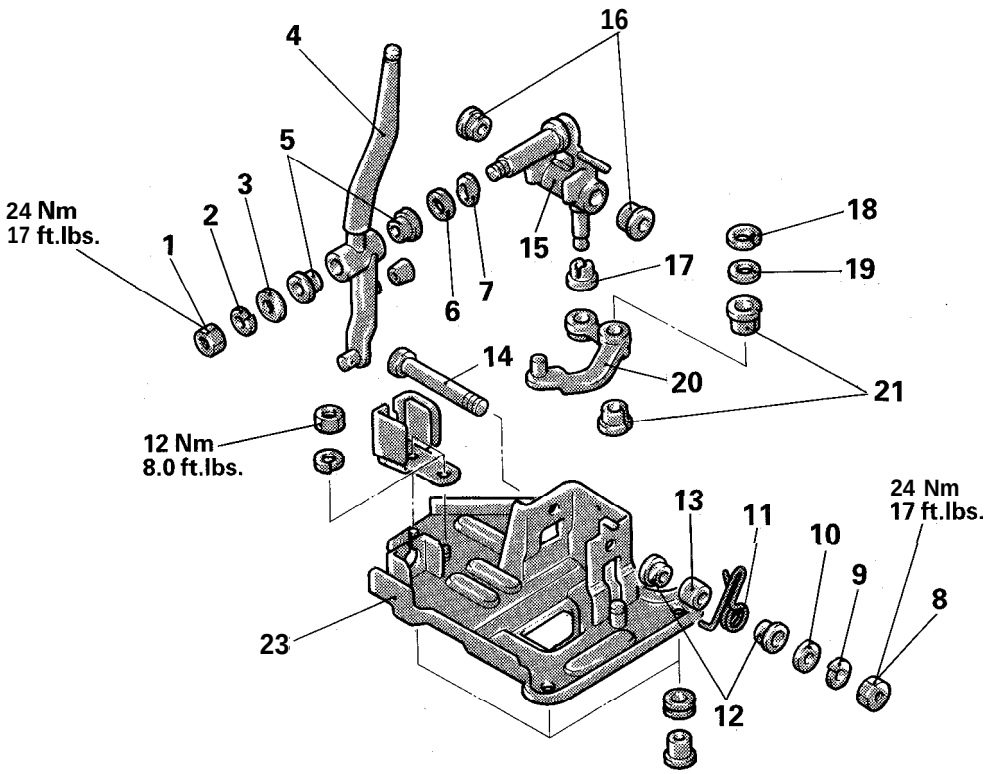
(4) Turn adjuster on shift cable so that shift cable end is positioned as shown with reference to shift lever on the passenger compartment side.
(5) Install the shift cable so that the flange side of the plastic bushing at the end of shift cable is on the split pin side.



(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.

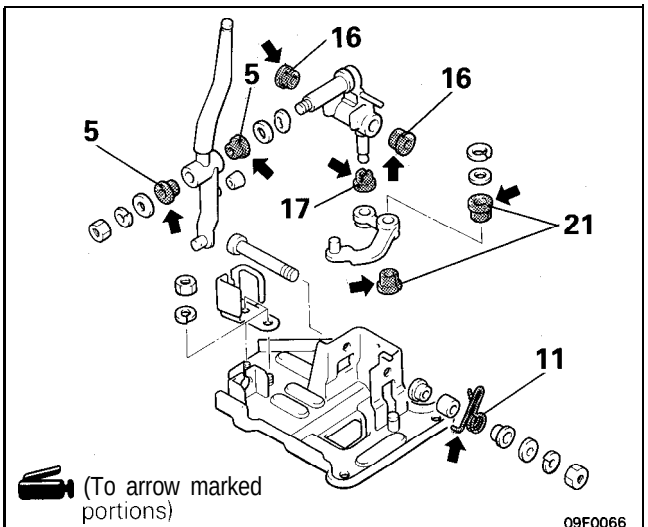
SHIFT LEVER ASSEMBLY

DISASSEMBLY AND REASSEMBLY



Disassembly steps

1. Nut
2. Spring washer
3. Plain washer
4. Shift lever
5. Bushing
6. Plain washer
7. Wave washer
8. Nut
9. Spring washer
10. Plain washer
11. Return spring
12. Bushing
13. Pipe
14. Bolt
15. Lever (A)
16. Bushing
17. Bushing
18. Snap ring
19. Washer
20. Lever (B)
21. Bushing
22. Cable bracket
23. Bracket assembly

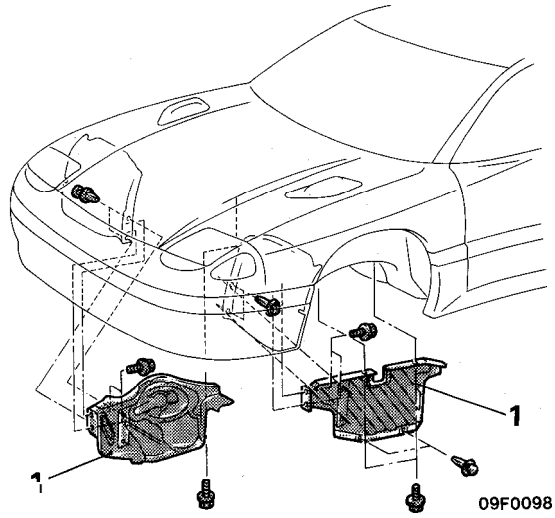


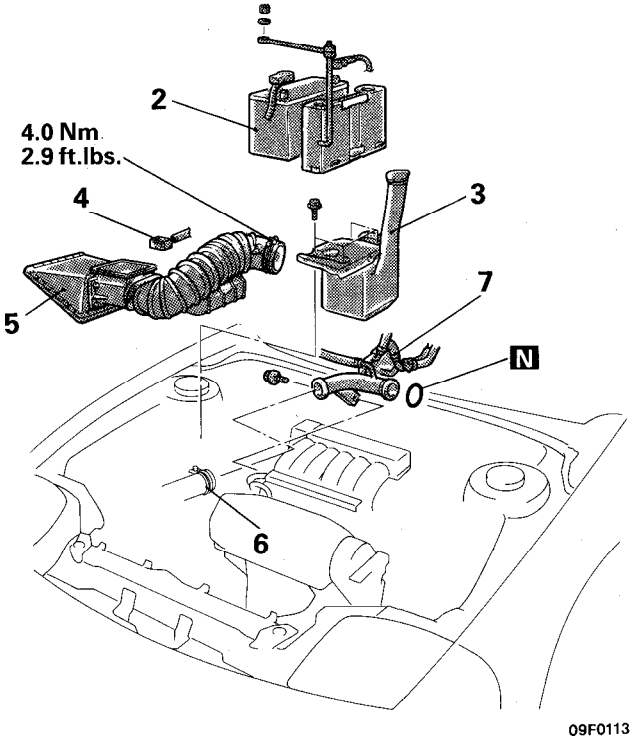
MOPAR Front Wheel Bearing Grease Part No. 3837794 or equivalent

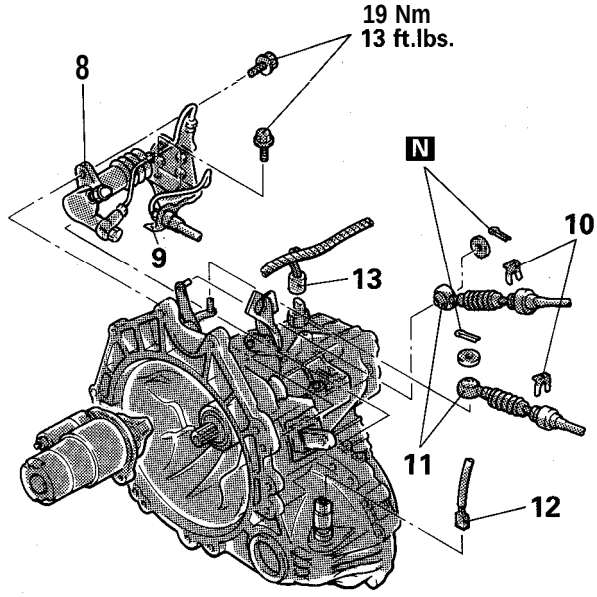
TRANSAXLE ASSEMBLY

REMOVAL AND INSTALLATION

Pre-removal Operation
- Draining of the Transmission Oil (Refer to P.21-11.)
- Removal of Front Under Cover (Refer to GROUP 23A – Front Bumper.)
- Draining of Engine Coolant <SOHC> (Refer to GROUP 7 -Service Adjustment Procedures.)



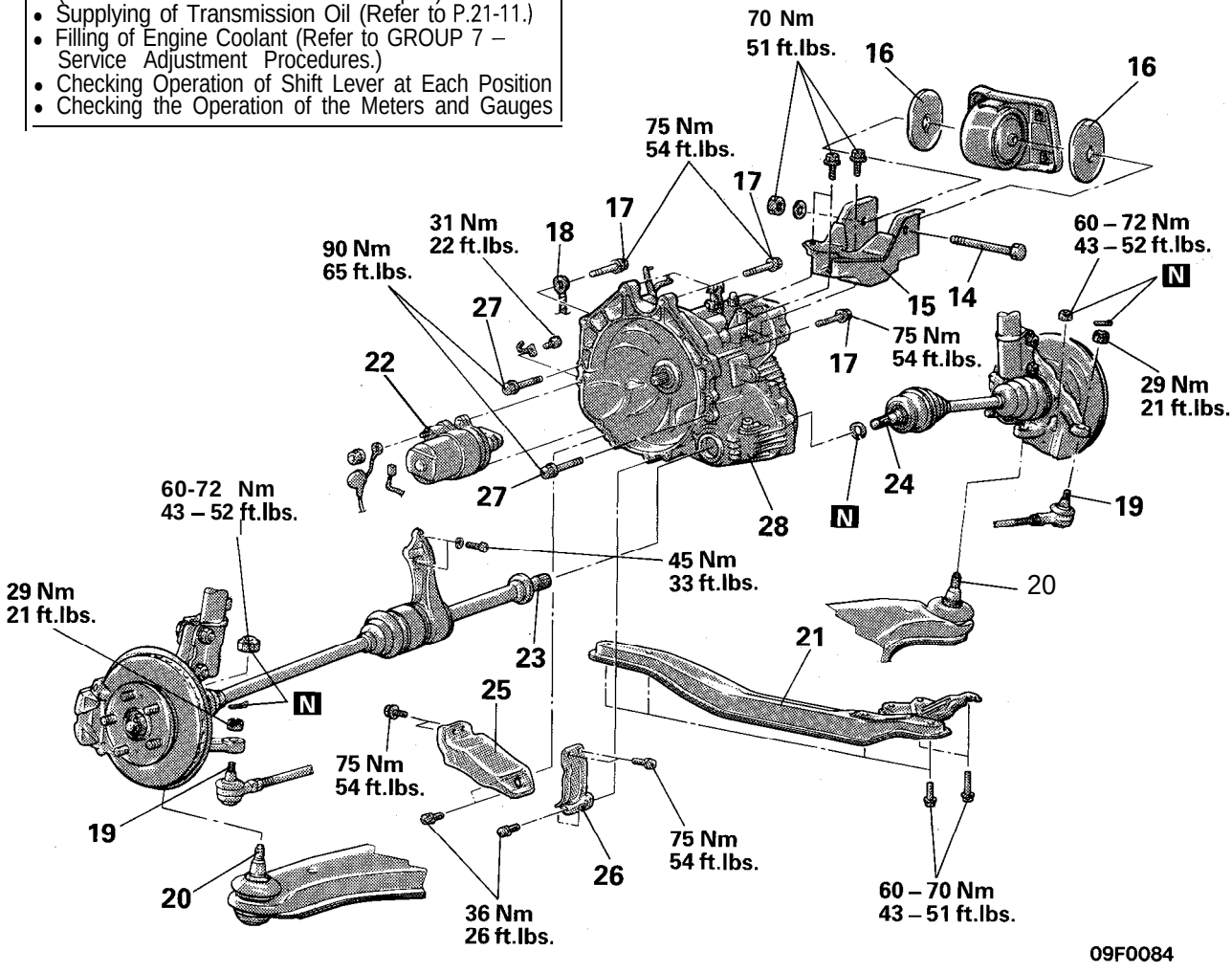




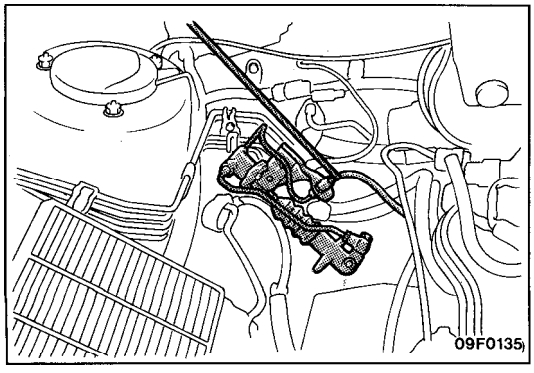
Removal steps

1. Side under cover
2. Battery
3. Battery seat, Washer tank
4. Volume air flow sensor connector
5. Air cleaner cover, Air intake hose
6. Connection for radiator lower hose <SOHC>
- 0 7. Connection for water inlet pipe B <SOHC>
- ☒ 8. Connection for clutch release cylinder
- ☒ 9. Connection for clutch tube bracket and clutch damper assembly
10. Clip
11. Connection for transaxle control cable
12. Connection for speedometer connector
13. Back-up light switch connector

Post-installation Operation
- Installation of Front Under Cover (Refer to GROUP 23A – Front Bumper.)
- Supplying of Transmission Oil (Refer to P.21-11.)
- Filling of Engine Coolant (Refer to GROUP 7 – Service Adjustment Procedures.)
- Checking Operation of Shift Lever at Each Position
- Checking the Operation of the Meters and Gauges



◆◆ 14. Connection for transaxle mount
15. Transaxle mount bracket
● + 16. Mounting stopper
17. Transaxle assembly upper part coupling bolt
18. Connection for transaxle ground cable
◆◆ 19. Connection for tie rod end
◆◆ 20. Connection for lower arm ball joint
21. Right member
22. Starter
◆◆ 23. Drive shaft (Left side), Inner shaft assembly
● I) ◆◆ 24. Drive shaft (Right side)
25. Transaxle stay (Front bank side)
26. Transaxle stay (Rear bank side)
◆◆ 27. Transaxle assembly lower part coupling bolt
◆◆ 28. Transaxle assembly



SERVICE POINTS OF REMOVAL

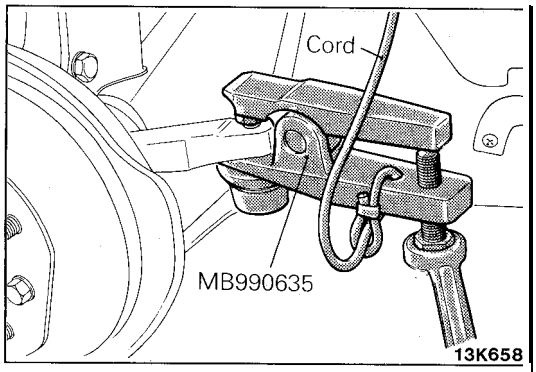
9. DISCONNECTION OF THE CLUTCH TUBE BRACKET AND CLUTCH DAMPER ASSEMBLY

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.

14. 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.

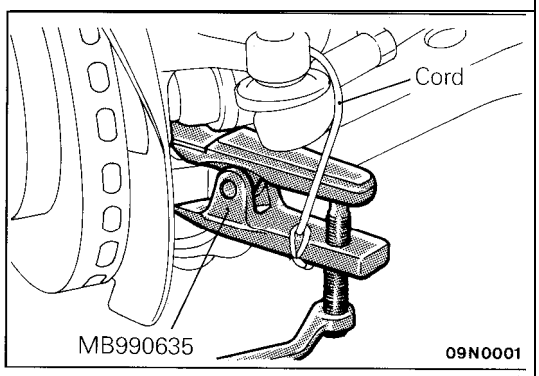
Caution
Support the transaxle assembly with the jack so that no localized force is applied to the assembly.



19. DISCONNECTION OF TIE ROD END

Using the special tool, disconnect the tie rod end from the knuckle.

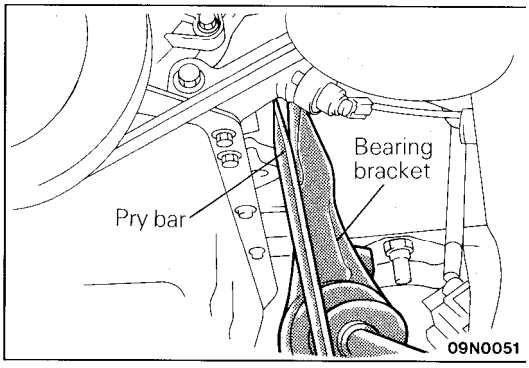
Caution
1. Be sure to tie the cord of the special tool to the nearby part.
2. Loosen the nut but do not remove it.



20. DISCONNECTION OF LOWER ARM BALL JOINT

Using the special tool, disconnect the lower arm ball joint from the knuckle.

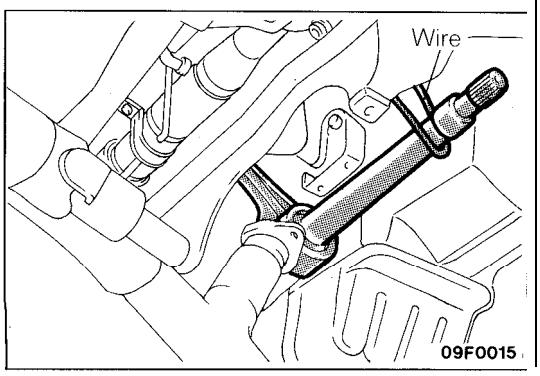
Caution
1. Be sure to tie the cord of the special tool to the nearby part.
2. Loosen the nut but do not remove it.



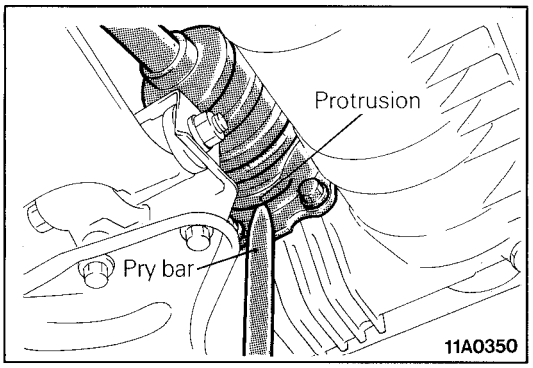
23. REMOVAL OF DRIVE SHAFT (LEFT SIDE), INNER SHAFT ASSEMBLY

(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.

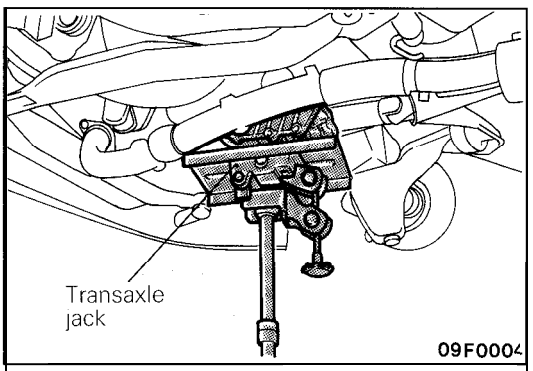


24. REMOVAL OF DRIVE SHAFT (RIGHT SIDE)

(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.

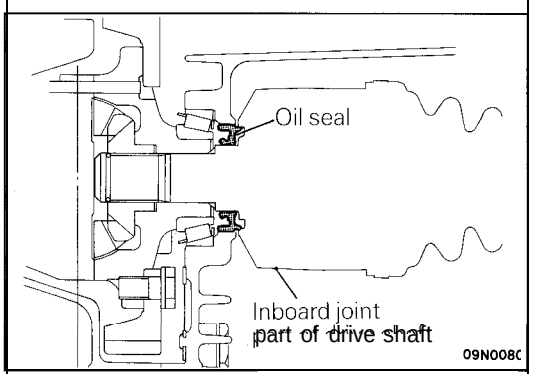
(2) Suspend the removed drive shaft (right side) with wire or something similar to prevent it from sharply bending or turning at each joint.



27. REMOVAL OF TRANSAXLE ASSEMBLY LOWER PART COUPLING BOLT / 28. TRANSAXLE ASSEMBLY

Support transaxle assembly with a transaxle jack and remove transaxle assembly lower part coupling bolt; then, lower transaxle assembly.

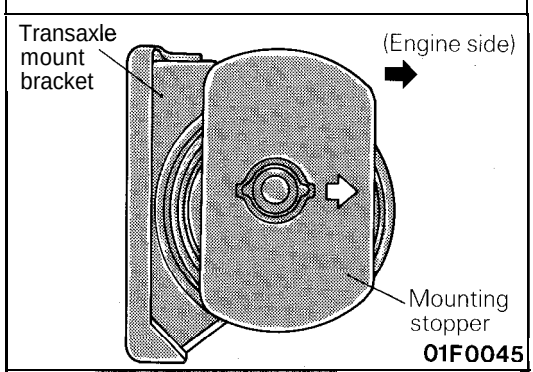
SERVICE POINTS OF INSTALLATION



24. INSTALLATION OF DRIVE SHAFT (RIGHT SIDE)

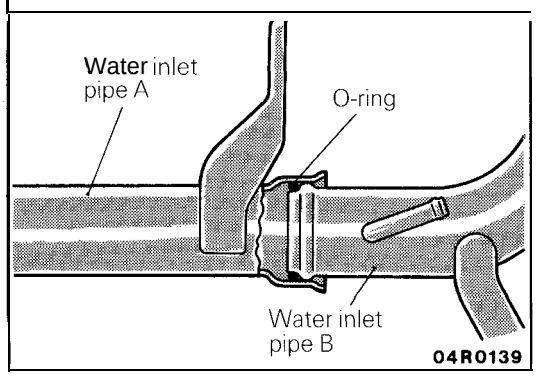
Provisionally install the drive shaft (right side) so that the inboard joint part of the drive shaft (right side) is straight, and not bent relative to the transaxle.

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).



16. INSTALLATION OF MOUNTING STOPPER

Install mounting stopper in the direction shown.



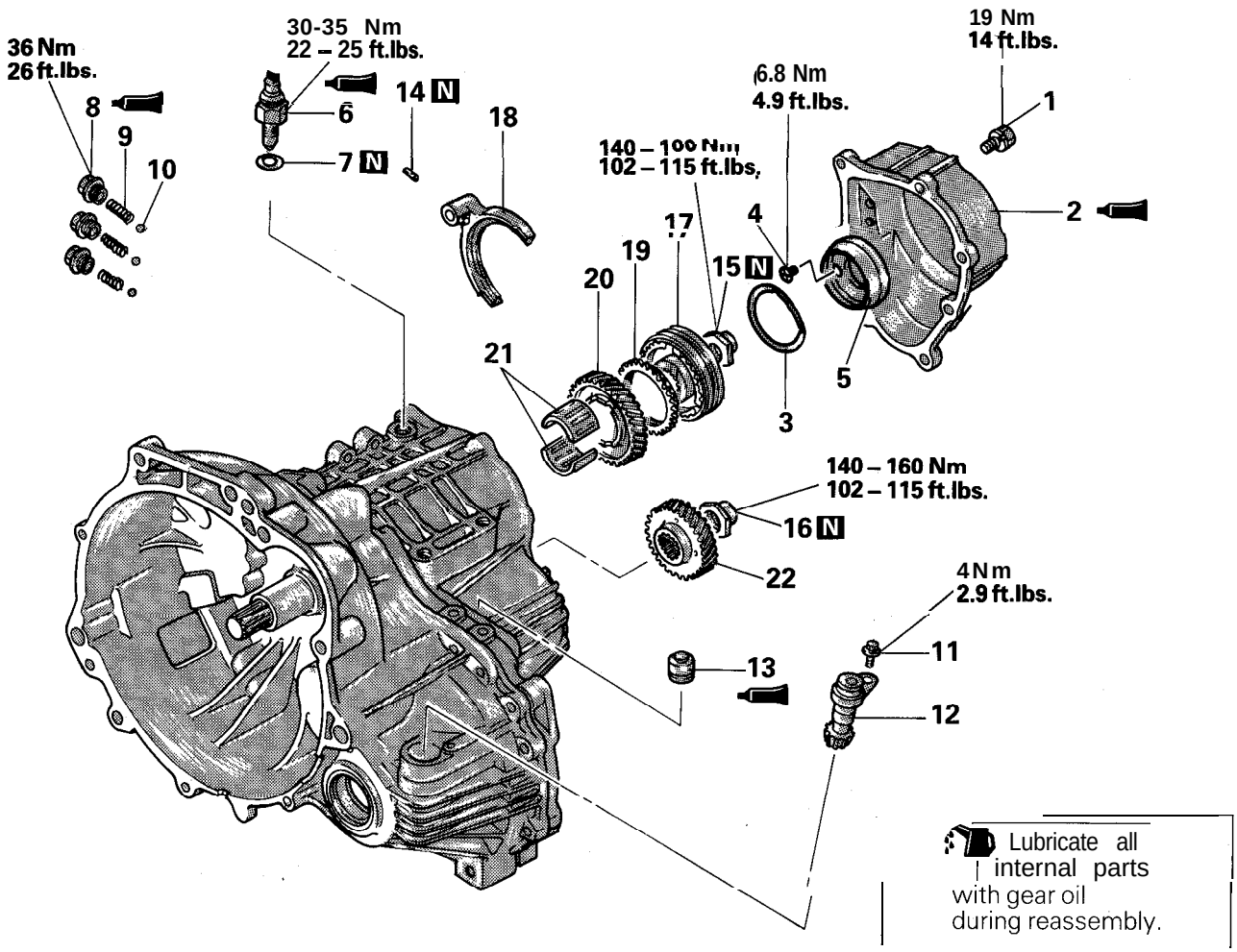
7. CONNECTION OF WATER INLET PIPE B <SOHC>

Install the O-ring to the water inlet pipe B, apply water to the outer circumference of the O-ring and connect the pipe B to the water inlet pipe A.

Caution
Take care not to smear the O-ring with the engine oil or the like.

TRANSAXLE ASSEMBLY

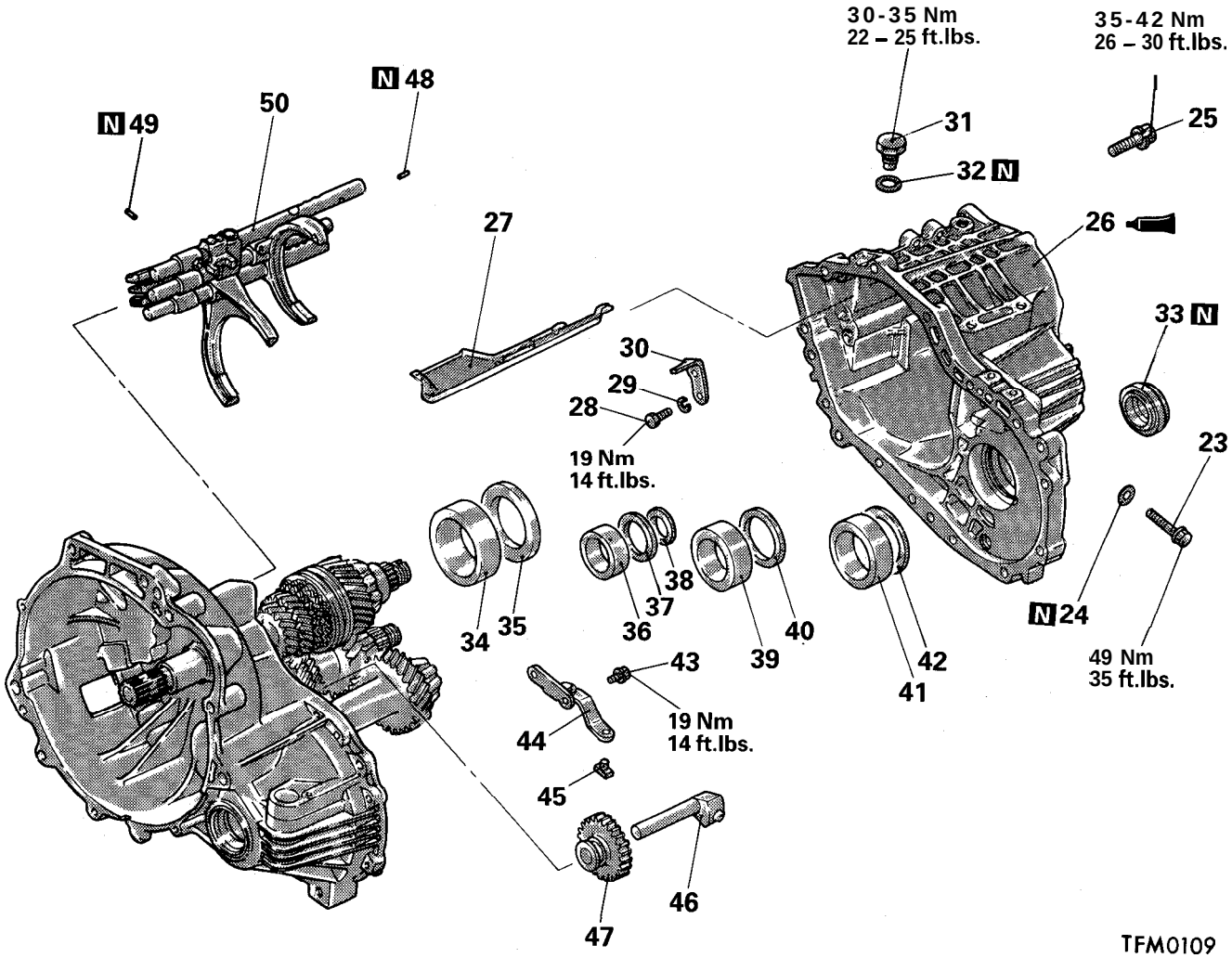
DISASSEMBLY AND REASSEMBLY



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

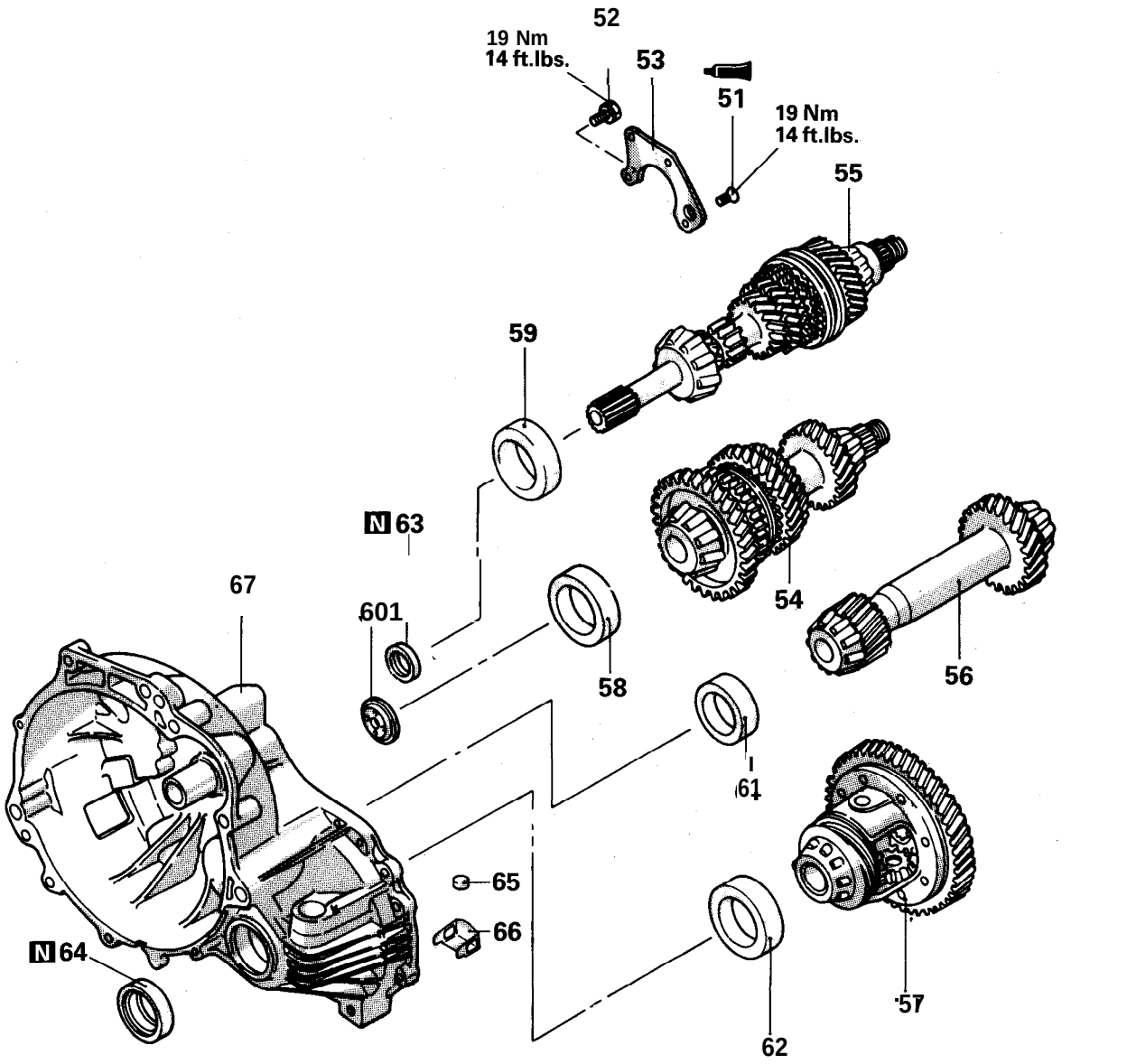
TFM0078



Lubricate all internal parts with gear oil during reassembly.

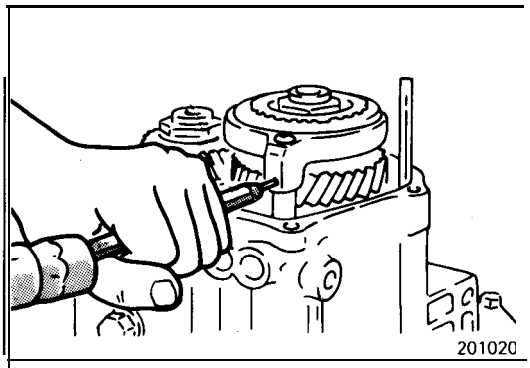
Disassembly steps

- 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
- ● + 35. Spacer
- 36. Bearing outer race
- ● * 37. Spacer
- 38. Filter (DOHC only)
- 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



- *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
- * 64. Oil seal
  65. Magnet
  66. Magnet holder
  67. Clutch housing assembly

Lubricate all internal parts with gear oil during reassembly.

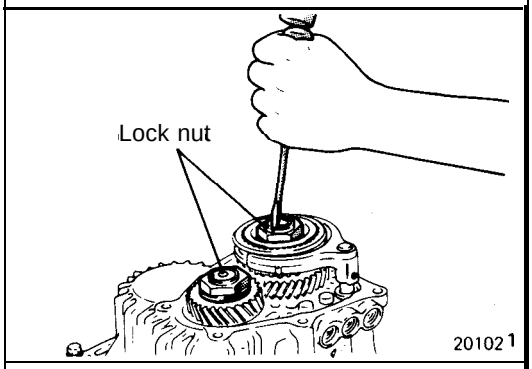


SERVICE POINTS OF DISASSEMBLY

14. REMOVAL OF SPRING PIN

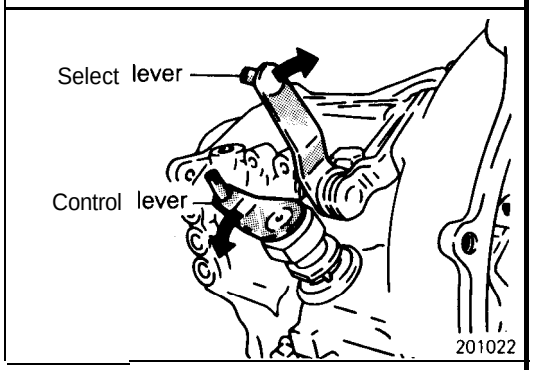
Remove the spring pin.

NOTE
If the spring pin interferes with the synchronizer ring or cone gear, rotate the gear for dislocation and remove the spring pin.

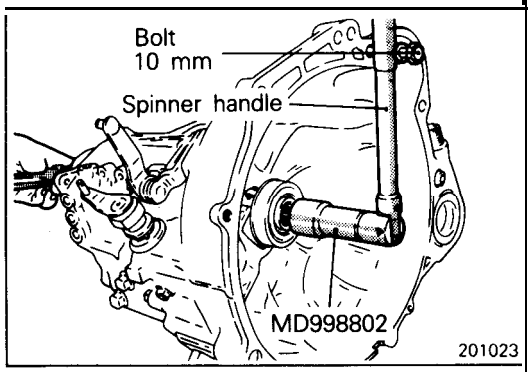


15.16. REMOVAL OF LOCK NUTS

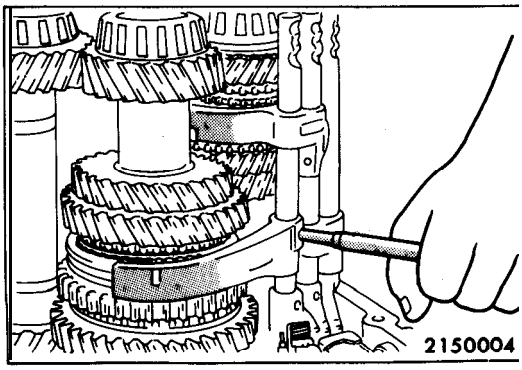
(1) Unstake lock nuts of the input shaft and intermediate gear.



(2) Shift the transaxle in reverse using the control lever and select lever.

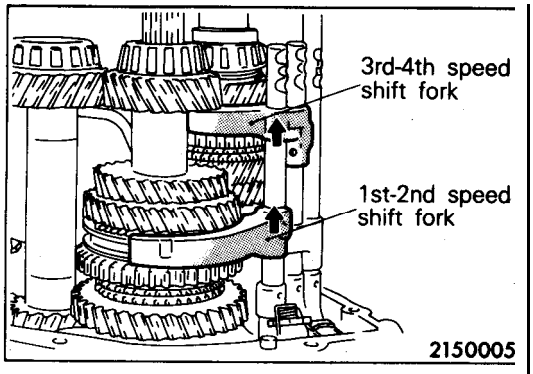


(3) Install the special tool onto the input shaft.
(4) Screw a bolt [IO mm] into the hole on the periphery of clutch housing and attach a spinner handle to the special tool.
(5) Remove the lock nut, while using the bolt as a spinner handle stopper.



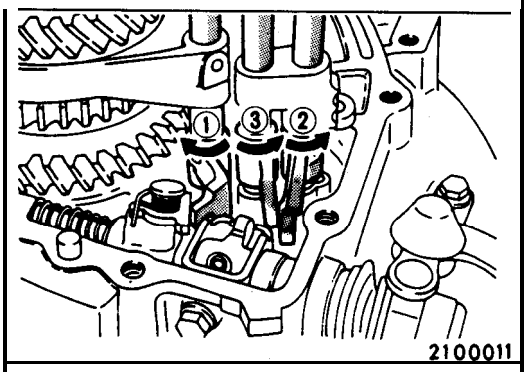
48. 49. REMOVAL OF SPRING PINS

Remove the spring pins for 1 st-2nd and 3rd-4th speed shift forks.



50. REMOVAL OF SHIFT RAIL ASSEMBLY

(1) Shift the Ist-2nd speed shift fork to the 2nd speed.
(2) Shift the 3rd-4th speed shift fork to the 4th speed.

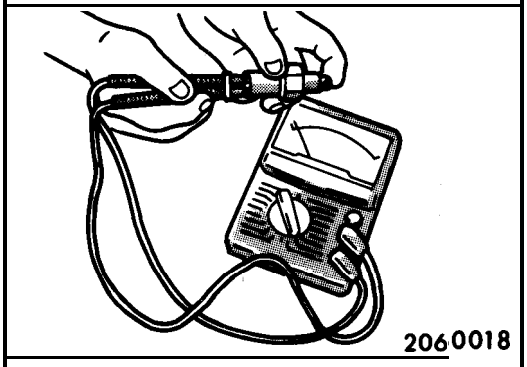


(3) Remove the shift rail assembly.

INSPECTION

BACKUP LIGHT SWITCH

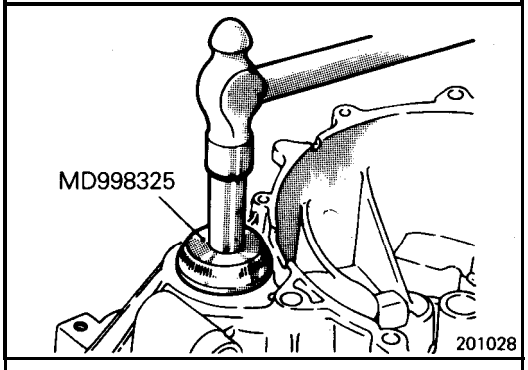
Operate the backup light switch to check continuity with a circuit tester.
If without continuity, replace the switch.

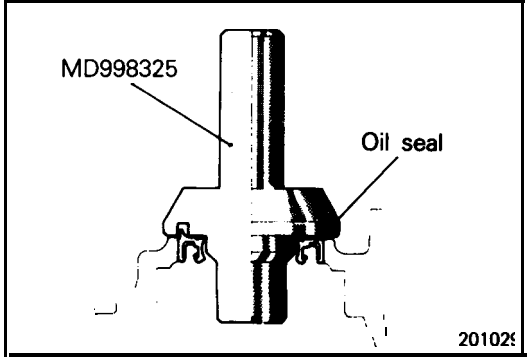


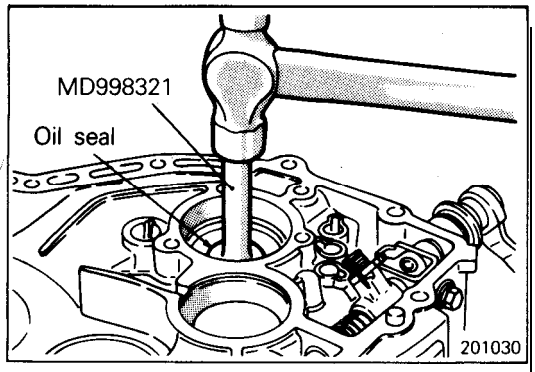
SERVICE POINTS OF REASSEMBLY

64. INSTALLATION OF OIL SEAL

Install the drive shaft oil seal using the special tool

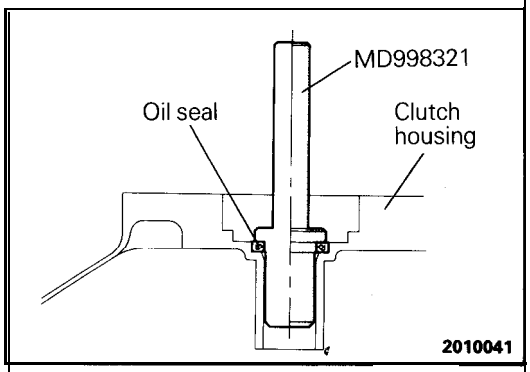


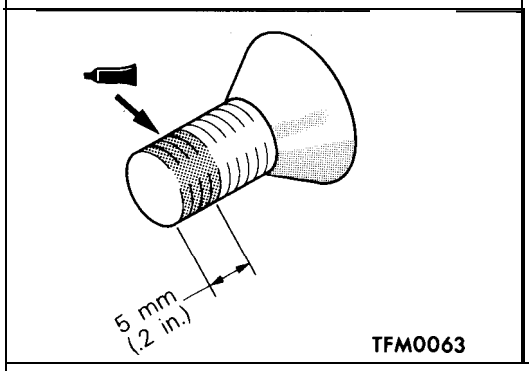




63. INSTALLATION OF OIL SEAL

Install the input shaft front oil seal using the special tool.



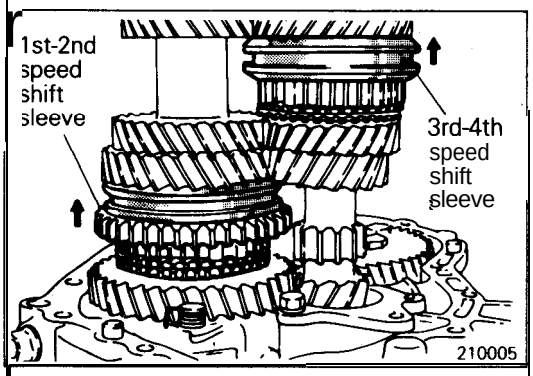


51. APPLICATION OF ADHESIVE TO BOLT

Apply specified adhesive to the bolt threads.

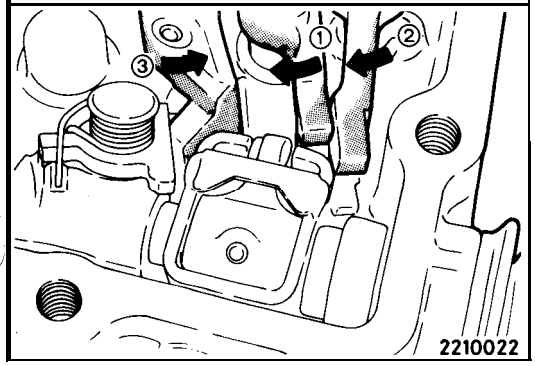
Caution
Do not apply to the bolt head.

Specified adhesive: MOPAR part No. 4318031 or MOPAR part No. 4318032 or equivalent

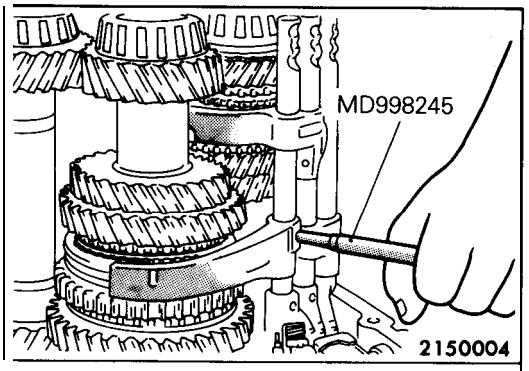


50. INSTALLATION OF SHIFT RAIL ASSEMBLY

(1) Set the 1st-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.



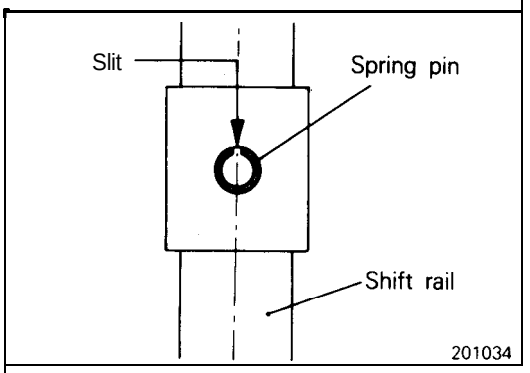
(4) Insert the shift rails into the shift rail holes of clutch housing.
(5) Turn the shift rails in the directions indicated by the arrows in the order shown in the illustration, and engage the shift lugs to control finger and the interlock plate.



48.49. INSTALLATION OF SPRING PINS

(1) Install the spring pins using the special tool or a pin punch.

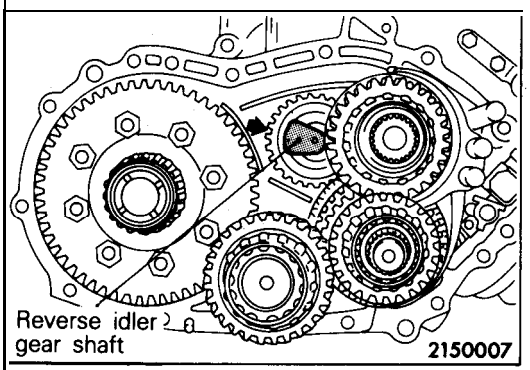
Caution
Do not reuse the spring pins.



(2) When installing, make sure that the slit of the spring pin is aligned with the shift rail center line.

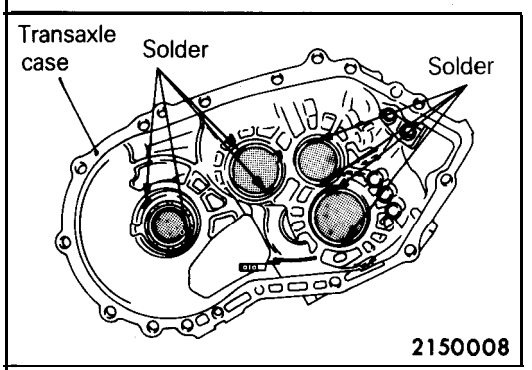
46. INSTALLATION OF REVERSE IDLER GEAR SHAFT

Install in the direction illustrated.



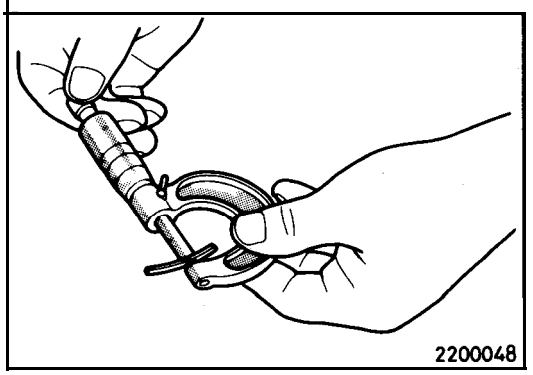
35.37. 40. 42. INSTALLATION OF SPACERS

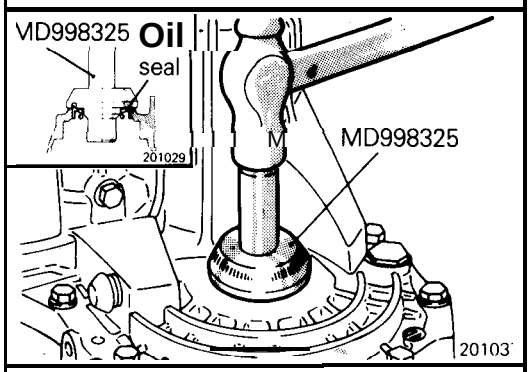
(1) Place two pieces of solder measuring about 10 mm (.4 in.) in length and 1.6 mm (.06 in.) in diameter as illustrated and install the outer races.
(2) Install the transaxle case and tighten the bolts to specified torque.
(3) Remove the transaxle case.
(4) Remove the outer races and remove the solder.
(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.

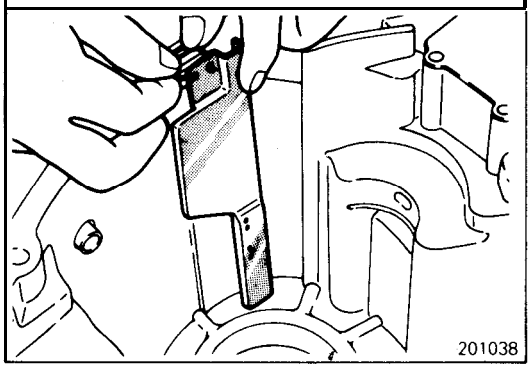
Standard value:
Input shaft end play
0 – 0.05 **mm (0 – .002 in.)**
Intermediate gear preload
0.05 – **0.10 mm (.002 – .004 in.)**
Output shaft preload
0.05 – **0.10 mm (.002 – .004 in.)**
Differential case preload
0.05 – **0.10 mm (.002 – .004 in.)**





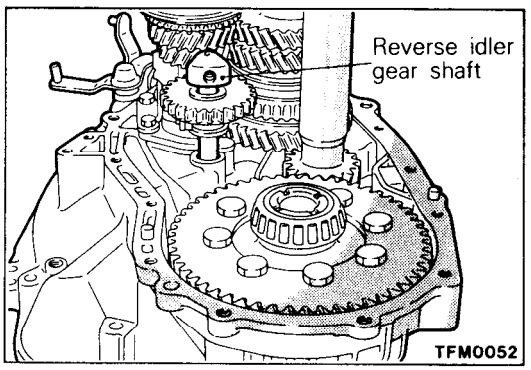
33. INSTALLATION OF OIL SEAL

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

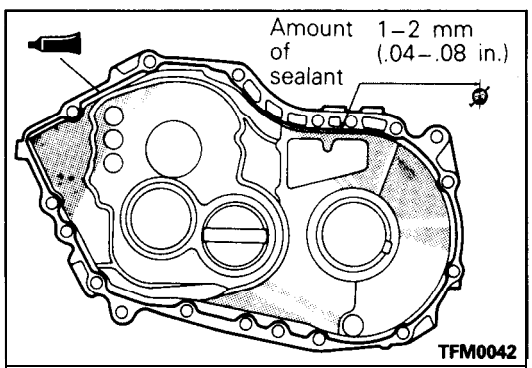
If there is a great deviation in the direction in which the threaded hole is facing, it will be impossible to align the threaded hole and the hole in the case after the transaxle case is installed.

(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.



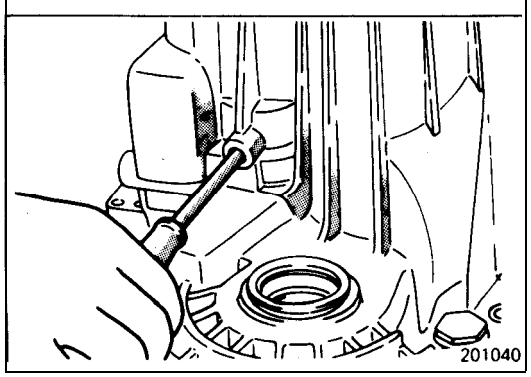
(4) Install the transaxle case onto the clutch housing.

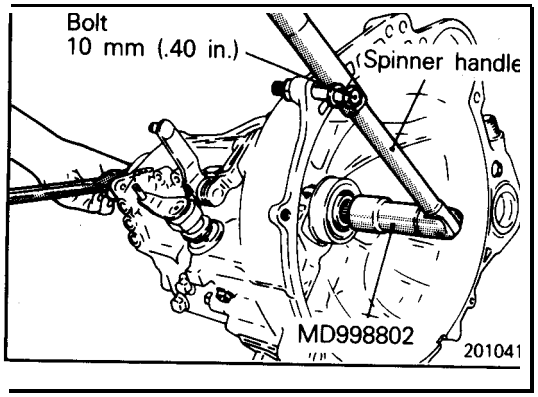
(5) Insert a Phillips screwdriver [8 mm (.32 in.) shaft diameter] into the bolt hole in the case, as shown in the figure, and use it to align the threaded hole of the reverse idler gear shaft with the bolt hole in the transaxle case.

(6) Install the reverse idler gear shaft bolt and tighten the bolt by fingers.

(7) Tighten the all transaxle tightening bolts to specified torque.

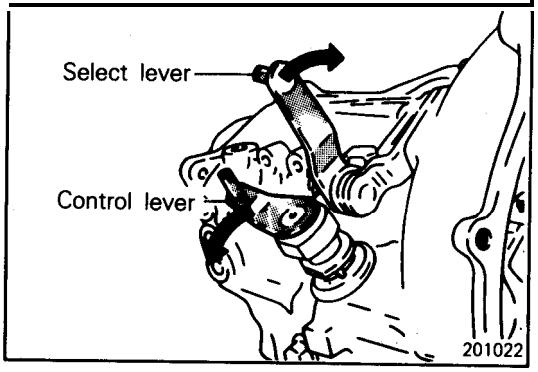
(8) Tighten the reverse idler gear shaft bolt to specified torque.



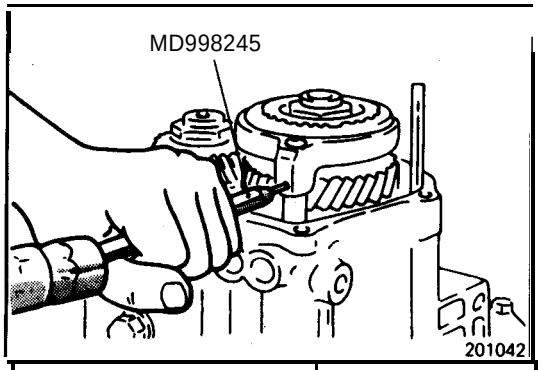


16. 15. INSTALLATION OF LOCK NUTS

(1) Install the special tool to the splined end of input shaft.
(2) Screw a bolt [IO mm (.40 in.)] into the hole on the periphery of clutch housing and attach a spinner handle to the special tool.



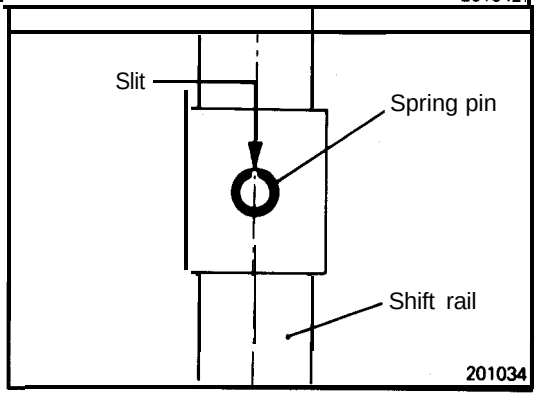
(3) Shift the transaxle in reverse using control lever and select lever.
(4) Tighten the lock nut to specified torque, while using the bolt attached in the above step as a spinner handle stopper.
(5) Loosen the lock nuts.
(6) Retighten the lock nuts to the specified torque.
(7) Stake the lock nut.



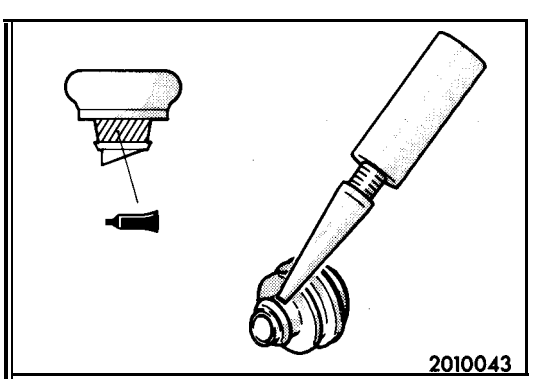
14. INSTALLATION OF SPRING PIN

(1) Install the spring pin using the special tool or a pin punch.

Caution
Do not reuse the spring pins.



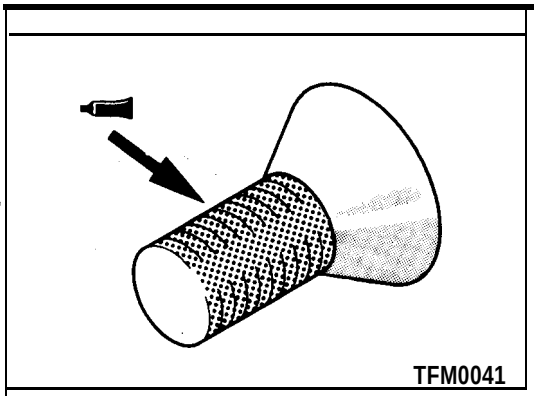
(2) When installing, make sure that the slit of the spring pin is aligned with the shift rail center line.



13. APPLICATION OF SEALANT TO AIR BREATHER

Apply specified sealant to air breather mounting portion and install to the clutch housing.

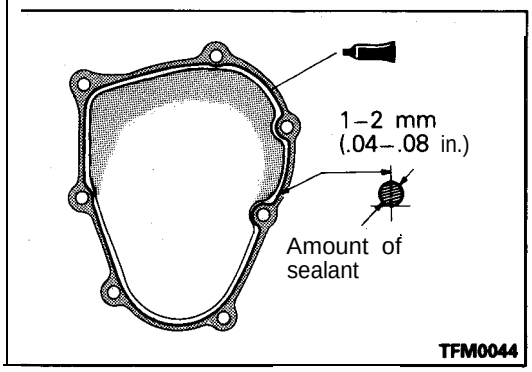
Specified sealant: MOPAR Part No. 4318025 or equivalent


TFM0041

4. INSTALLATION OF SCREW BOLTS

Apply specified adhesive to screw bolts mounting portion.

Specified adhesive: MOPAR Part No. 4318031 or MOPAR Part No. 4318032 or equivalent



TFM0044

2. APPLICATION OF SEALANT TO THE REAR COVER

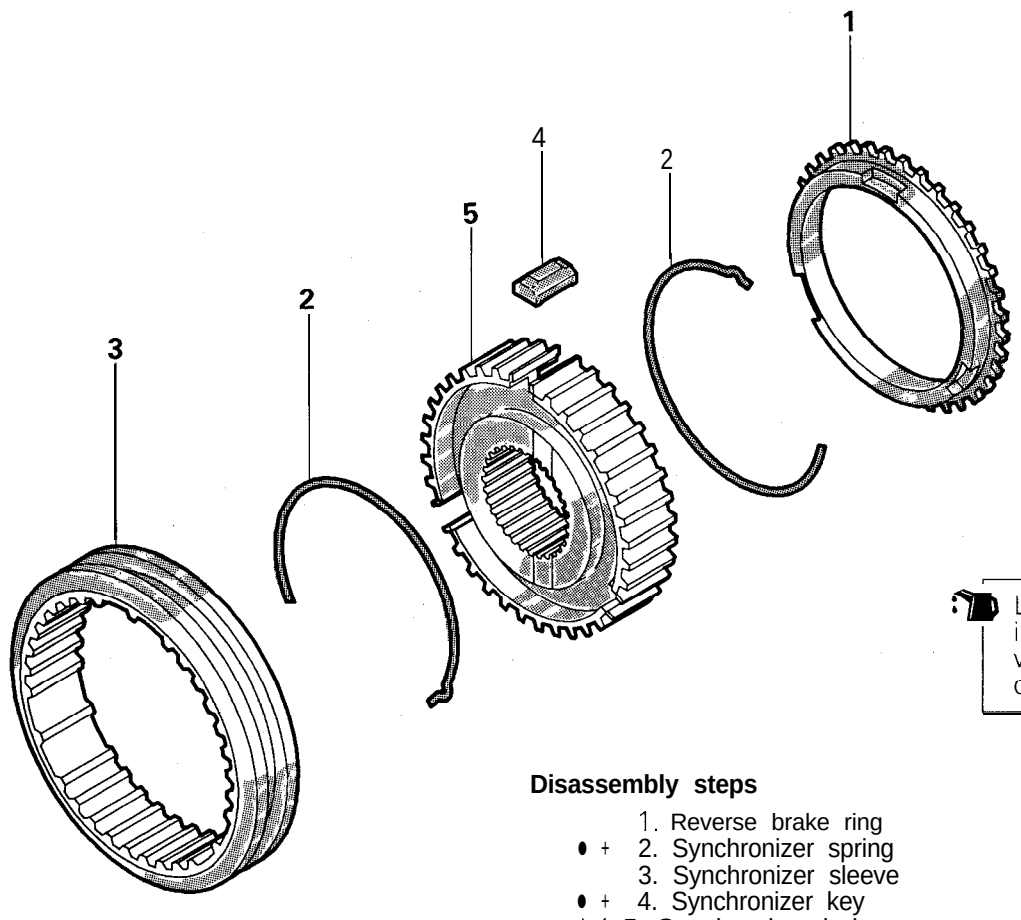
Apply specified sealant to the rear cover.

Specified sealant: MITSUBISHI genuine Part No. MD997740 or equivalent

Caution
Squeeze out sealant from the tube uniformly without excess or discontinuity.

5TH SPEED SYNCHRONIZER ASSEMBLY

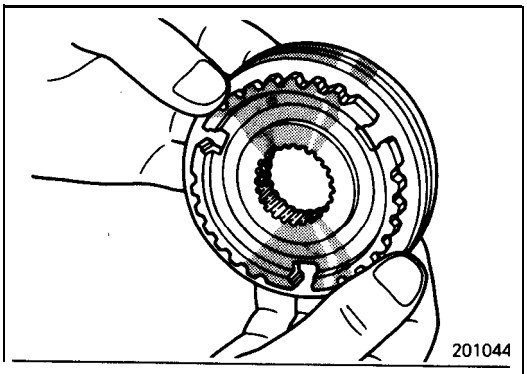
DISASSEMBLY AND REASSEMBLY



Disassembly steps

1. Reverse brake ring
- + 2. Synchronizer spring
3. Synchronizer sleeve
- + 4. Synchronizer key
- ◆◆ 5. Synchronizer hub

TFM0278

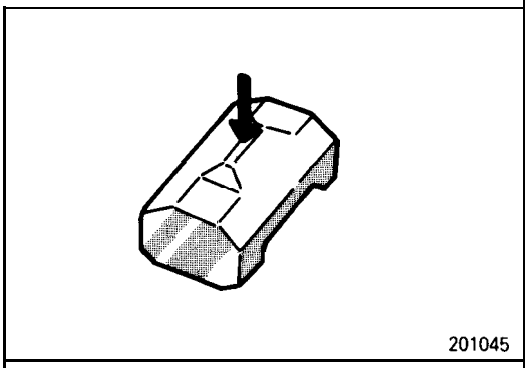

201044

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.


201045

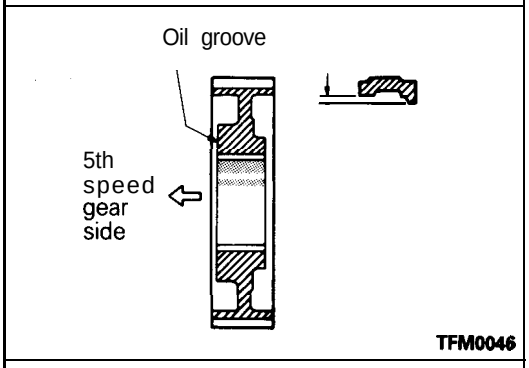
SYNCHRONIZER KEY AND SPRING

- Check for wear of the synchronizer key center protrusion.
- Check the spring for weakness, deformation and breakage.

SERVICE POINTS OF REASSEMBLY

5. INSTALLATION OF SYNCHRONIZER HUB / 4. SYNCHRONIZER KEY / 2. SYNCHRONIZER SPRING

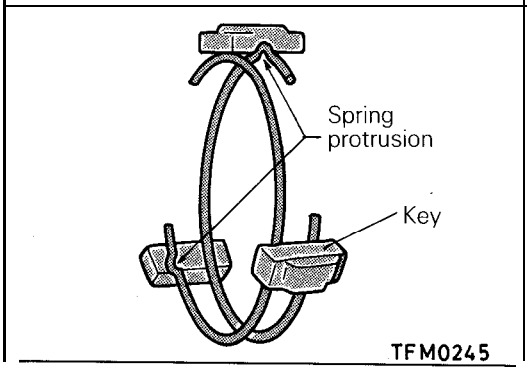
(1) Assemble the synchronizer hub, and key noting their direction.



TFM0046

(2) Assemble the synchronizer spring so that its projection may be engaged in the groove of the synchronizer key.

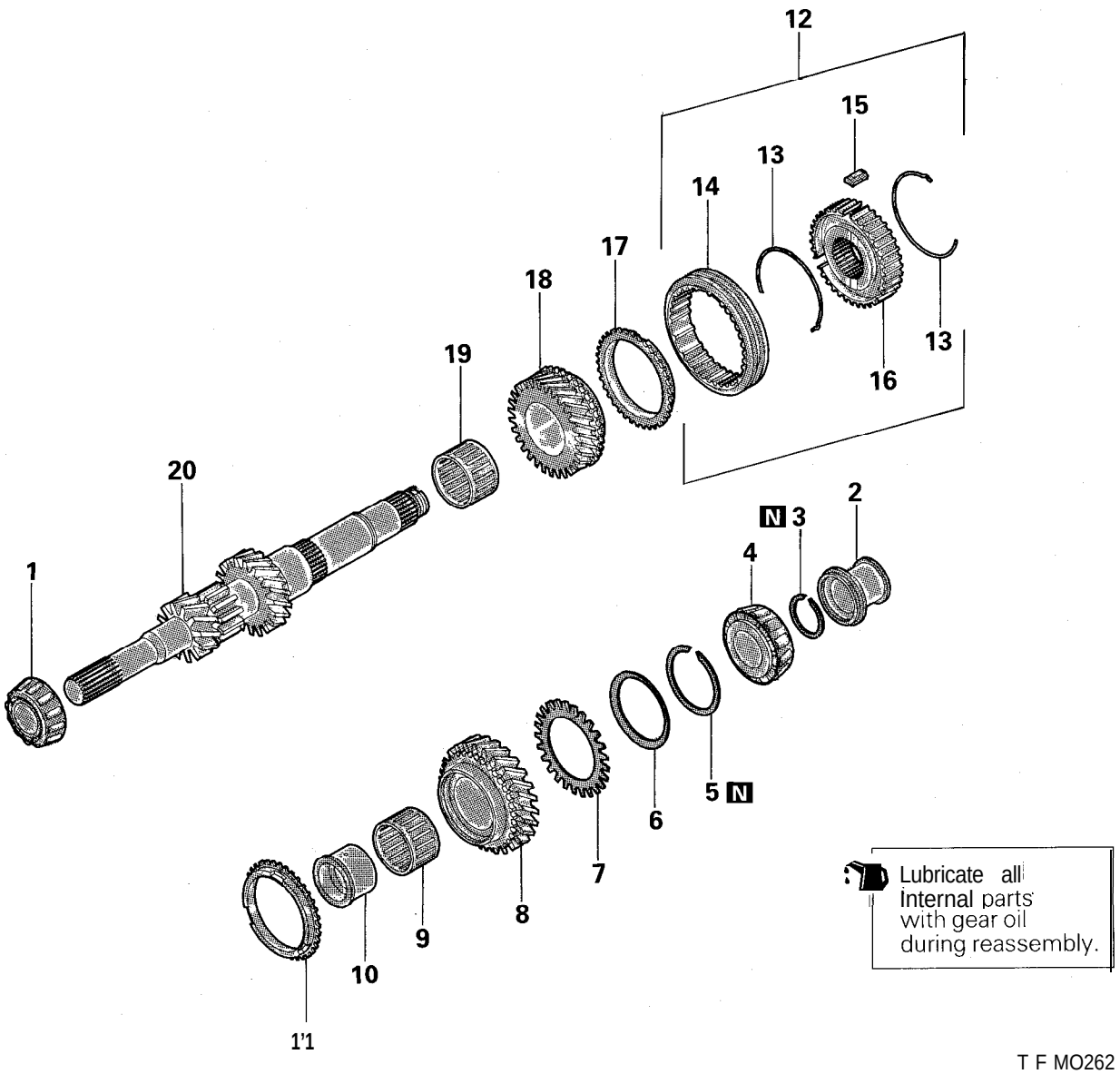
NOTE
Take care to prevent the projections of the front and rear spring from sitting in the groove of the same key:



TFM0245

INPUT SHAFT ASSEMBLY

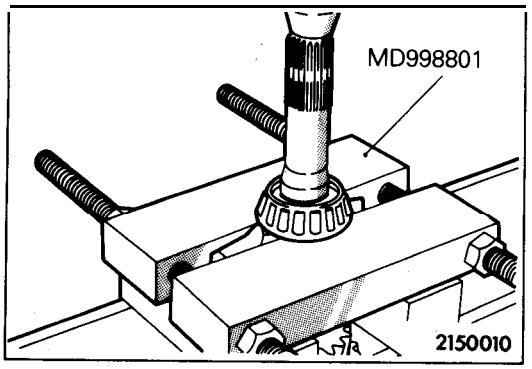
DISASSEMBLY AND REASSEMBLY



T F MO262

Disassembly steps

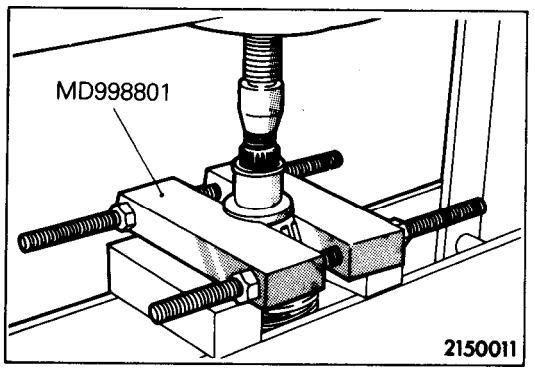
◆◆ ▶◀ 1. Taper roller bearing
◆◆ ● 2. Bearing sleeve
▶◀ 3. Snap ring
◆◆ ⬮ + 4. Taper roller bearing
▶◀ 5. Snap ring
⬮ + 6. Cone spring
● + 7. Sub gear
8. 4th speed gear
9. Needle bearing
● *10. Bearing sleeve
11. Synchronizer ring
▶◀ 12. 3rd-4th speed synchronizer assembly
▶◀ 13. Synchronizer spring
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

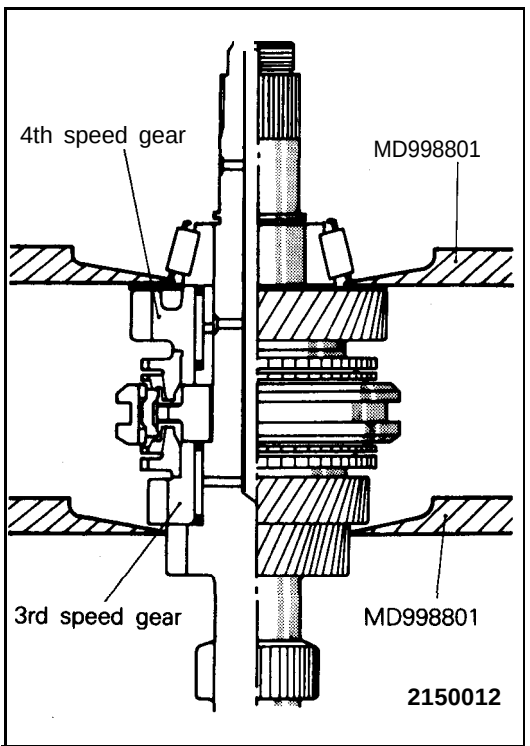
1. REMOVAL OF TAPER ROLLER BEARING

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.

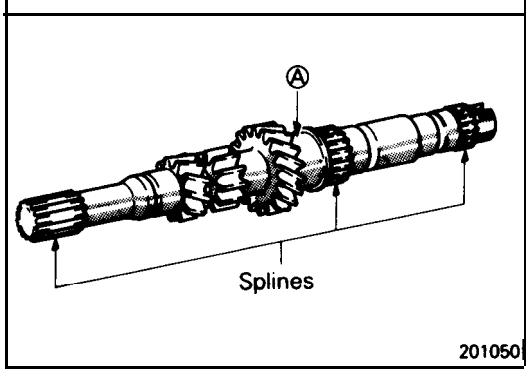


4. REMOVAL OF TAPER ROLLER BEARING

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.



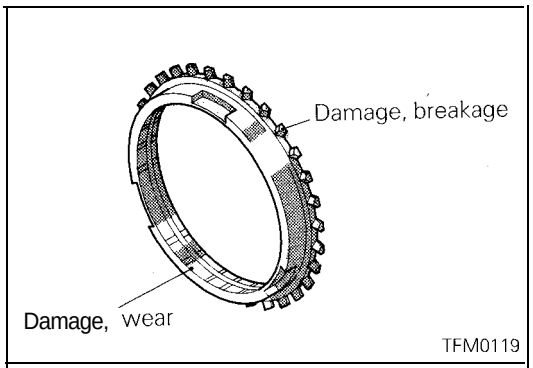
INSPECTION

INPUT SHAFT

- Check the outer surface of the input shaft where the needle bearing is mounted for damage, abnormal wear and seizure [portion Ⓐ].
- Check the splines for damage and wear.

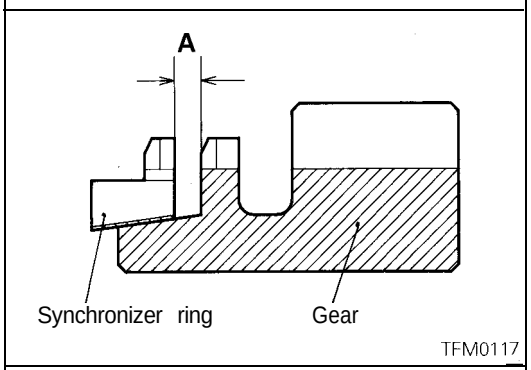
NEEDLE BEARING

- 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.



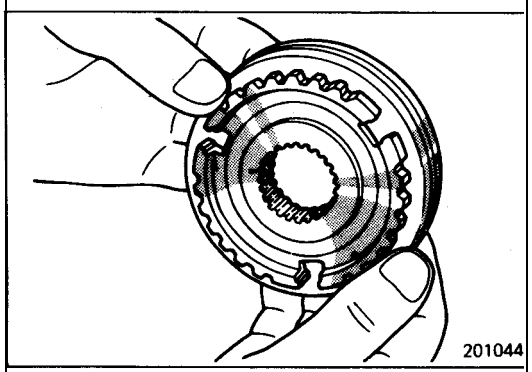
SYNCHRONIZER RING

- 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.

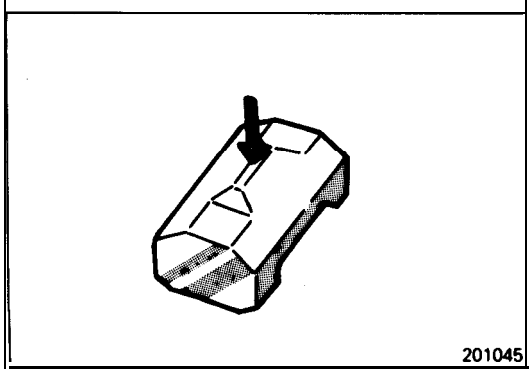
  Limit: 0.5 mm (.02 in.)



SYNCHRONIZER SLEEVE AND HUB

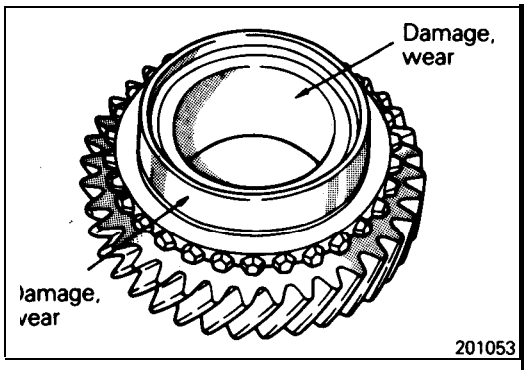
- Combine the synchronizer sleeve and hub and check that they slide smoothly.
- Check that the sleeve is free from damage at its inside front and rear ends.
- Check for wear of the hub end surfaces (in contact with each speed gear).

  Caution
  When replacing, replace the synchronizer hub and sleeve as a set.



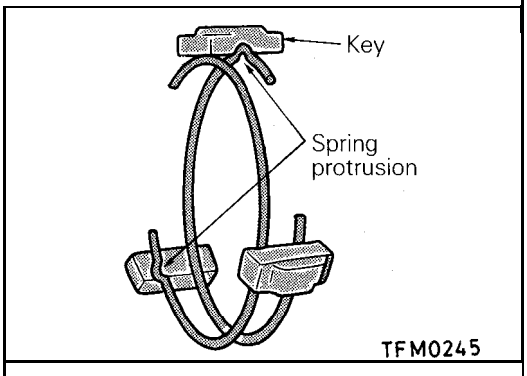
SYNCHRONIZER KEY AND SPRING

- Check for wear of the synchronizer key center protrusion.
- Check the spring for deterioration, deformation and breakage.



SPEED GEARS

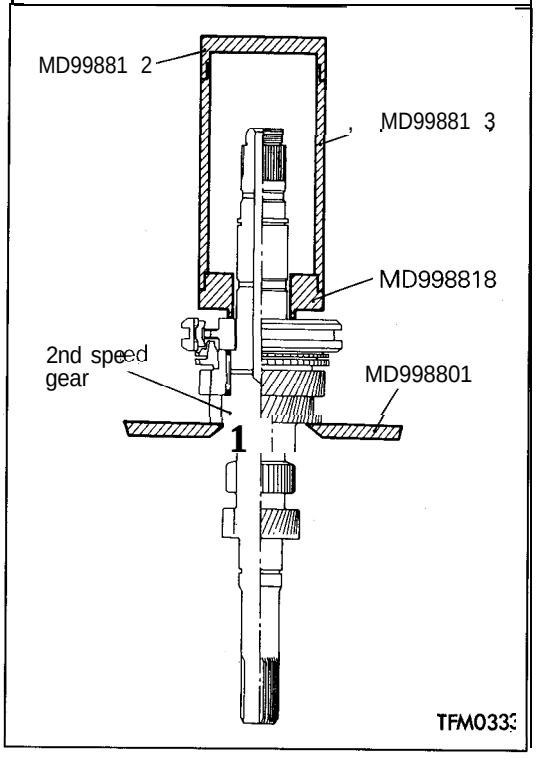
- Check the bevel gear and clutch gear teeth for damage and wear.
- Check the synchronizer cone for rough surface, damage and wear.
- Check the gear bore and front and rear ends for damage and wear.



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

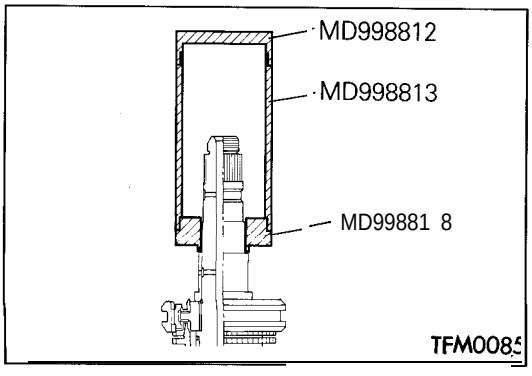
(1) Install the synchronizer assembly so that the part that has the small round indentation is in the oil groove at the hub end.

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.

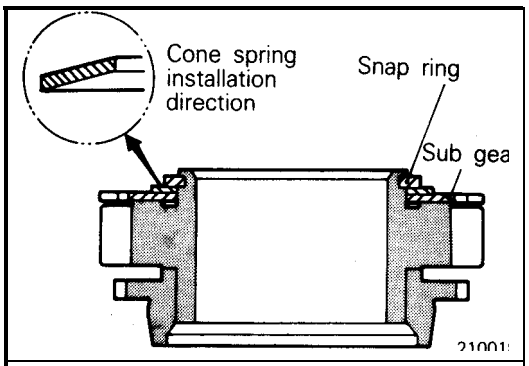
Caution
When installing the synchronizer assembly, make sure that three synchronizer keys are seated correctly in respective grooves of the synchronizer ring.

(3) Check the 3rd speed gear rotates smoothly.



10. INSTALLATION OF BEARING SLEEVE

Use the special tool as illustrated.

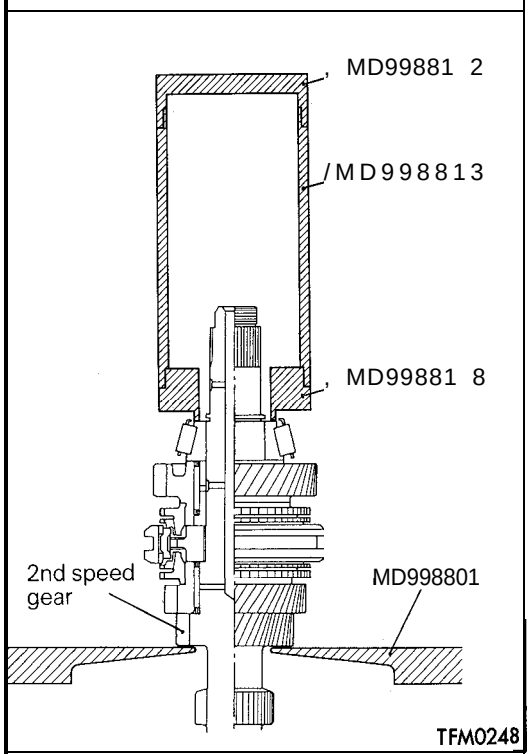


7. INSTALLATION OF SUB GEAR / 6. CONE SPRING / 5. SNAP RING

Install the sub gear and cone spring to 4th gear, and then install the snap ring.

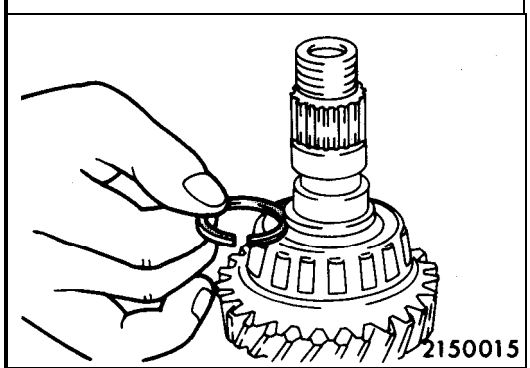
NOTE

Be sure that the cone spring is installed so that it is facing in the correct direction.



4. INSTALLATION OF TAPER ROLLER BEARING

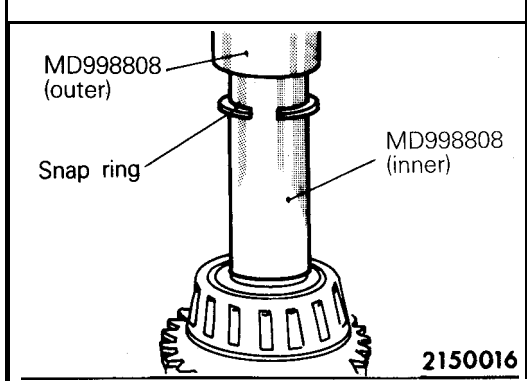
Install the taper roller bearing over the input shaft using the special tool.



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.)

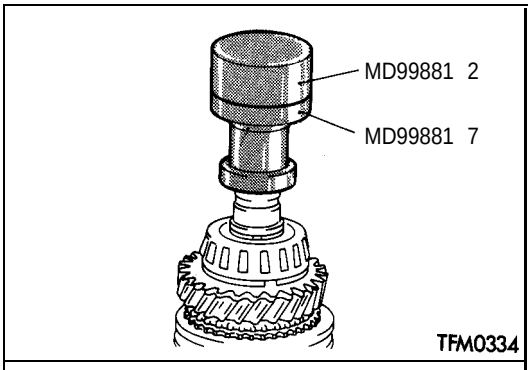


(2) Using a special tool, attach the snap ring to the input shaft.

Caution

1. Don't reuse the old snap ring.

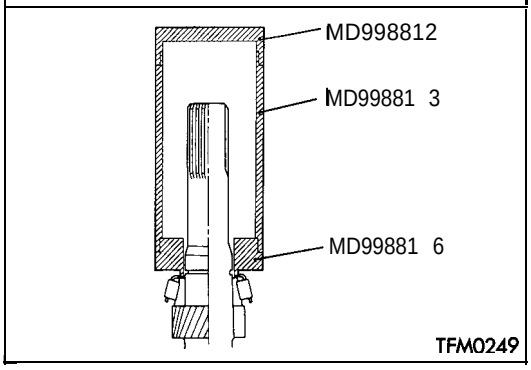
2. If snap ring pliers are used, the snap ring may sometimes be expanded excessively. This will prevent proper mounting of the sleeve.



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.

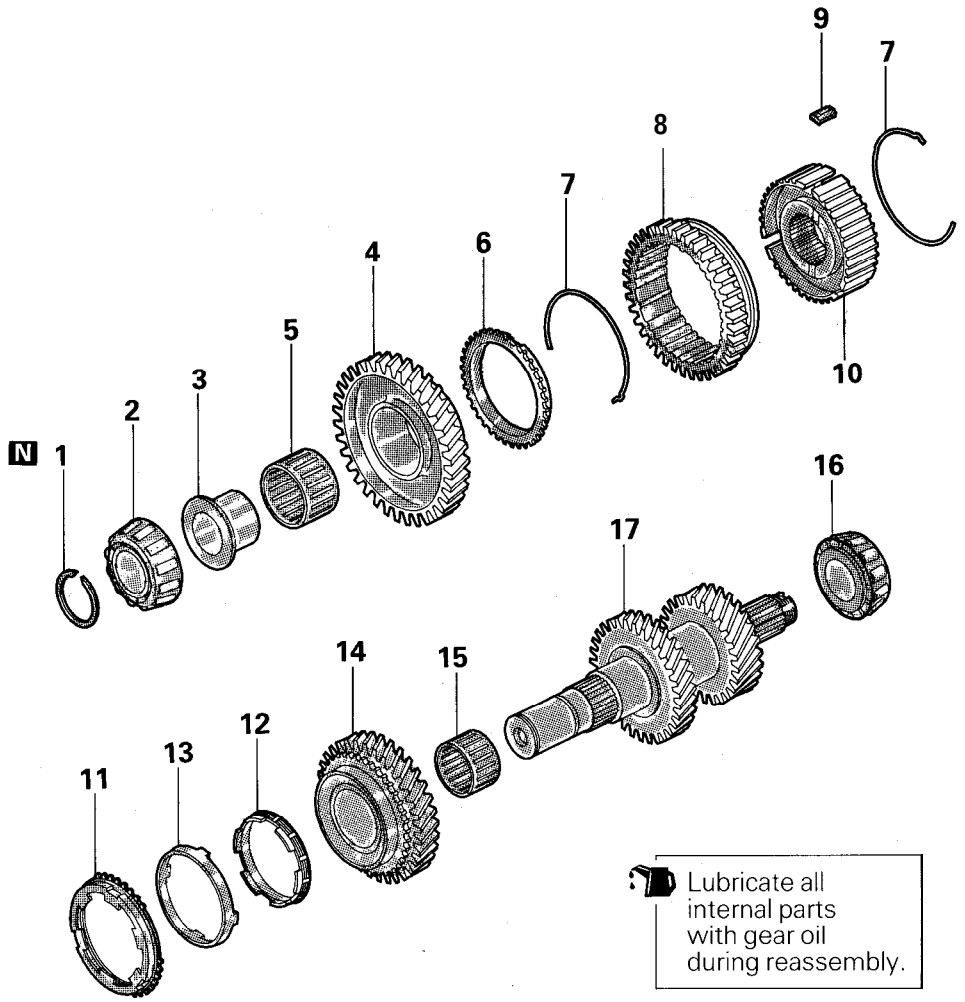


1. INSTALLATION OF TAPER ROLLER BEARING

Install the taper roller bearing over the input shaft using the special tool.

INTERMEDIATE GEAR ASSEMBLY

DISASSEMBLY AND REASSEMBLY



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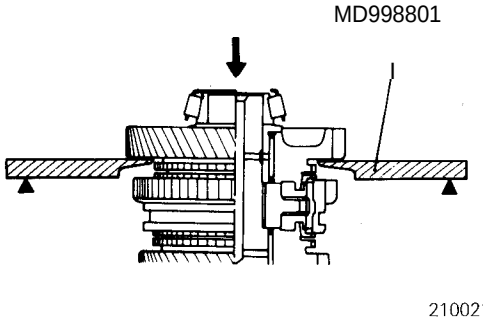
Disassembly steps

- ◆ a 1. Snap ring
- ◆◆◆ 2. Taper roller bearing
- ◆ 4 3. Bearing sleeve
- ◆ ☒ 4. 1st speed gear
- 5. Needle bearing
- 6. Synchronizer ring
- ◆ 4 7. Synchronizer spring
- ◆◆ 8. 1st-2nd speed synchronizer sleeve
- ◆ * 9. Synchronizer key
- ◆◆ ● a 10. 1st-2nd speed synchronizer hub
- 11. Synchronizer outer ring
- 12. Synchronizer inner ring
- 13. Synchronizer cone
- ◆◆ 14. 2nd speed gear
- 15. Needle bearing
- ◆◆ ◆◆ 16. Taper roller bearing
- 17. Intermediate gear



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SERVICE POINTS OF DISASSEMBLY

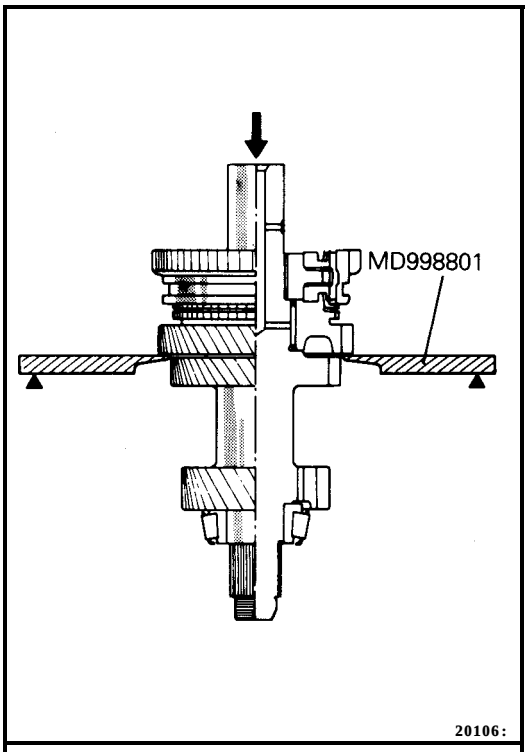
2. REMOVAL OF TAPER ROLLER BEARING / 4. 1ST SPEED GEAR

Remove the taper roller bearing, 1st speed gear and bearing sleeve using the special tool as illustrated.

Caution

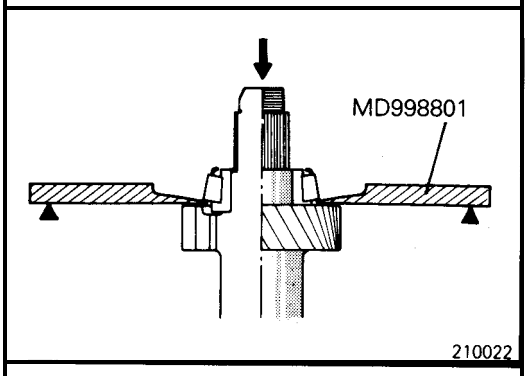
1. Do not reuse the bearing removed from the shaft.

2. Replace the inner and outer races of the taper roller bearing as a set.



10. REMOVAL OF 1ST-2ND SPEED SYNCHRONIZER HUB / 14. 2ND SPEED GEAR

Remove the 1 st-2nd speed synchronizer assembly and 2nd speed gear together using the special tool as illustrated.

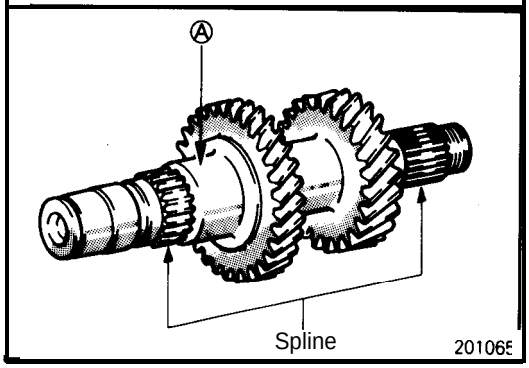


16. REMOVAL OF TAPER ROLLER BEARING

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.



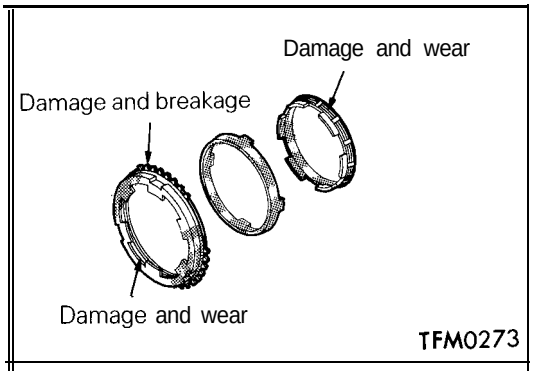
INSPECTION

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.

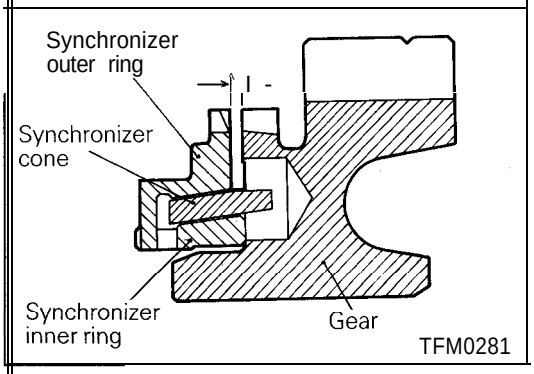
NEEDLE BEARING

- 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.



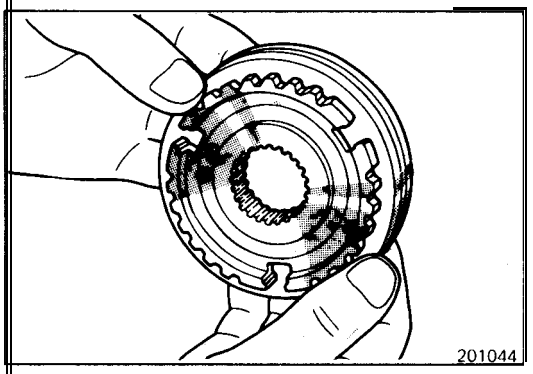
SYNCHRONIZER RING

- Check the clutch gear teeth for damage and breakage.
- Check paper lining on synchronizer outer ring I.D. and synchronizer inner ring O.D. for damage, wear, and flaking.



- Force the synchronizer outer ring toward the clutch gear and check clearance "A". Replace if it is out of specification.

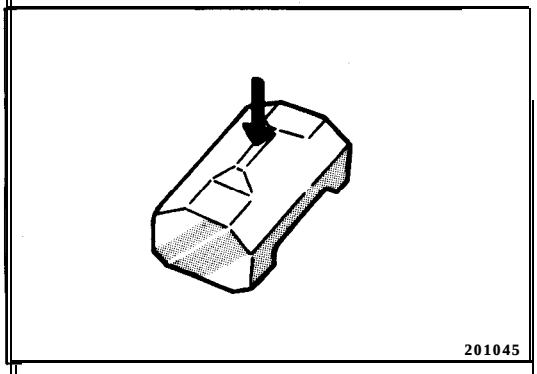
  Limit: 0.5 mm (.02 in.)



SYNCHRONIZER SLEEVE AND HUB

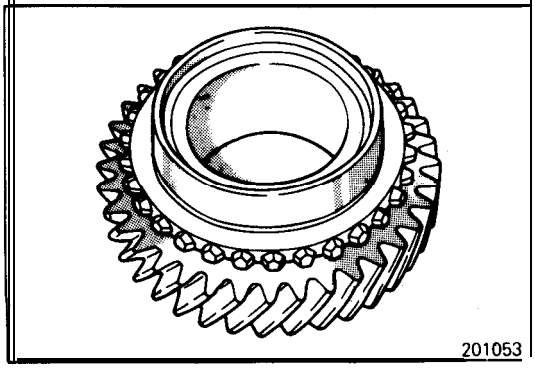
- Combine the synchronizer sleeve and hub and check that they slide smoothly.
- Check that the sleeve is free from damage at its inside front and rear ends.
- Check for wear of the hub end surfaces (in contact with each speed gear).

  Caution
  When replacing, replace the synchronizer hub and sleeve as a set.



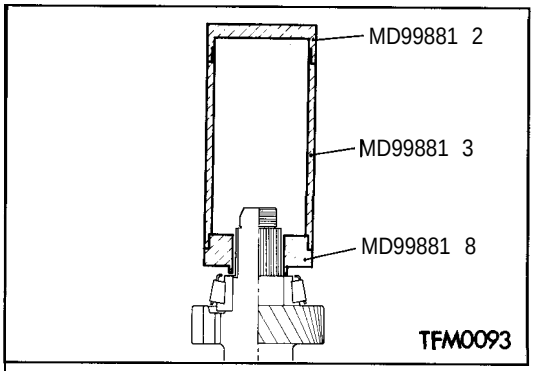
SYNCHRONIZER KEY AND SPRING

- Check for wear of the synchronizer key center protrusion.
- Check the spring for weakness, deformation and breakage.



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.

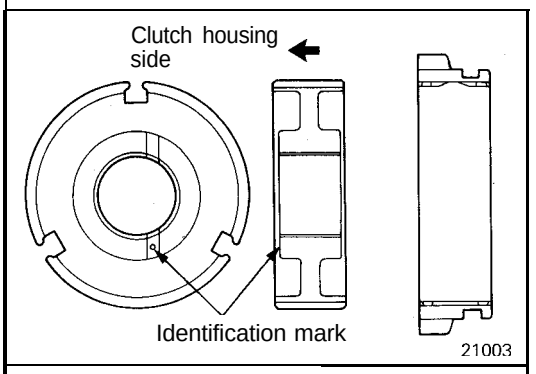


SERVICE POINTS OF REASSEMBLY

16. INSTALLATION OF TAPER ROLLER BEARING

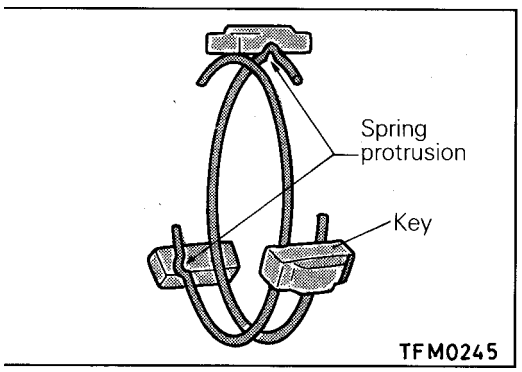
Install the taper roller bearing over the intermediate gear using the special tool.

Caution
When installing the bearing, push the inner race only.



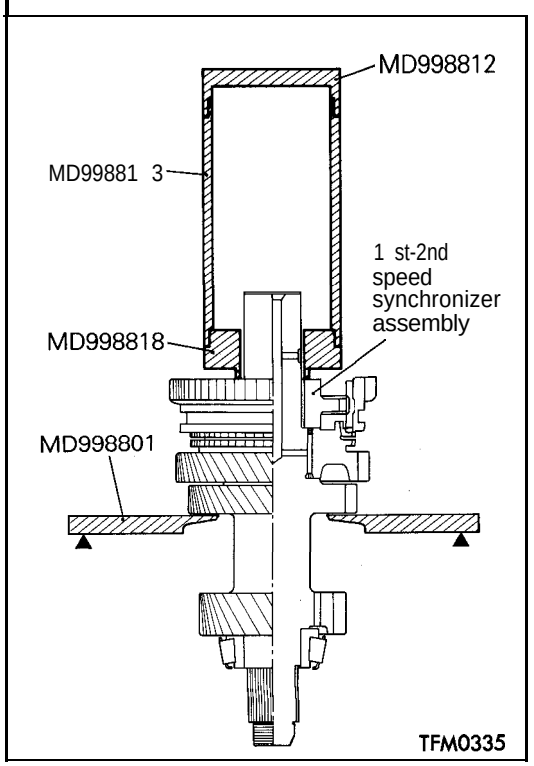
10. INSTALLATION OF 1ST-2ND SPEED SYNCHRONIZER HUB / 9. SYNCHRONIZER KEY / 8. 1ST-2ND SPEED SYNCHRONIZER SLEEVE / 7. SYNCHRONIZER SPRING

(1) Combine the Ist-2nd speed synchronizer hub and sleeve as illustrated.



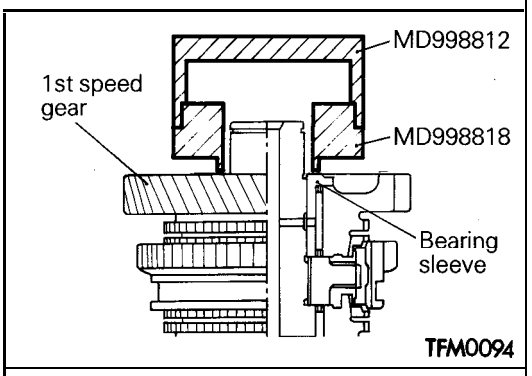
(2) Assemble the synchronizer spring so that its projection may be engaged in the groove of the synchronizer key. Take care to prevent the projections of the front and rear spring from sitting in the groove of the same key.

NOTE
A synchronizer spring of a different shape from what is shown may be installed; however, there is no difference in installation procedure.



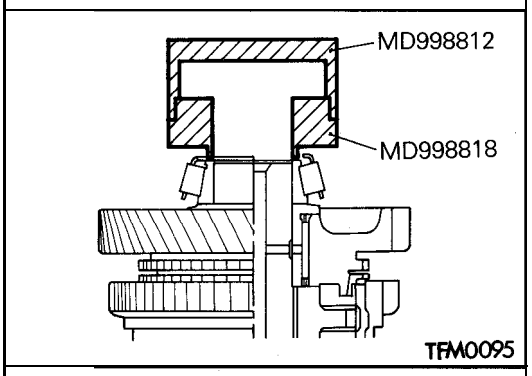
(3) Install the Ist-2nd speed synchronizer assembly over the intermediate gear using the special tool.

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

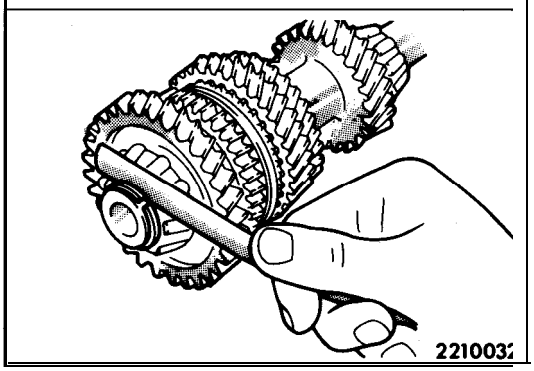
Install the 1st speed gear and bearing sleeve together over the intermediate gear using the special tool.



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.



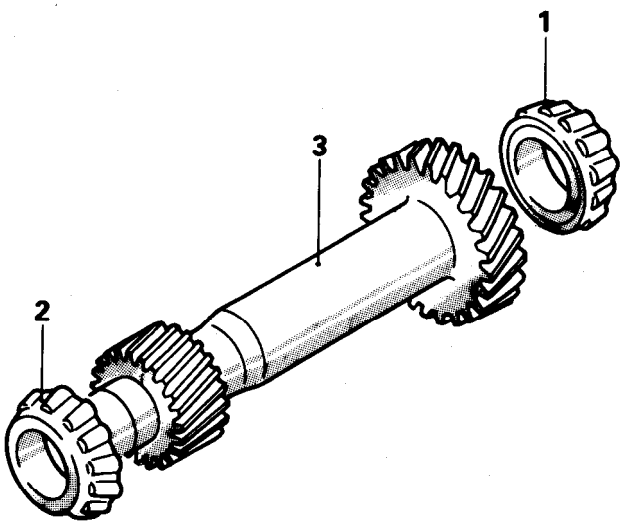
1. INSTALLATION OF SNAP RING

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



Disassembly steps

◆▶ • a 1. Taper roller bearing
◆▶ ▶◀ 2. Taper roller bearing
3. Output shaft

Lubricate all internal parts with gear oil during reassembly.

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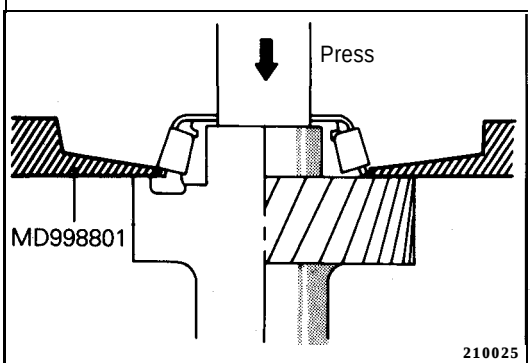
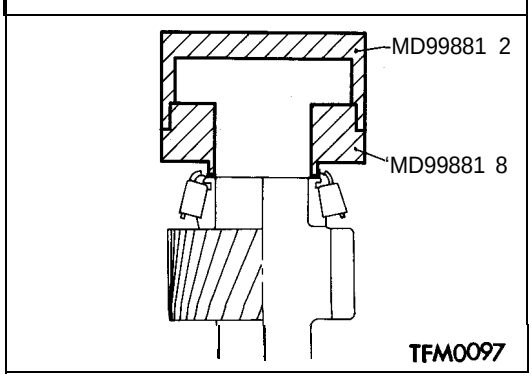




SERVICE POINTS OF DISASSEMBLY

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

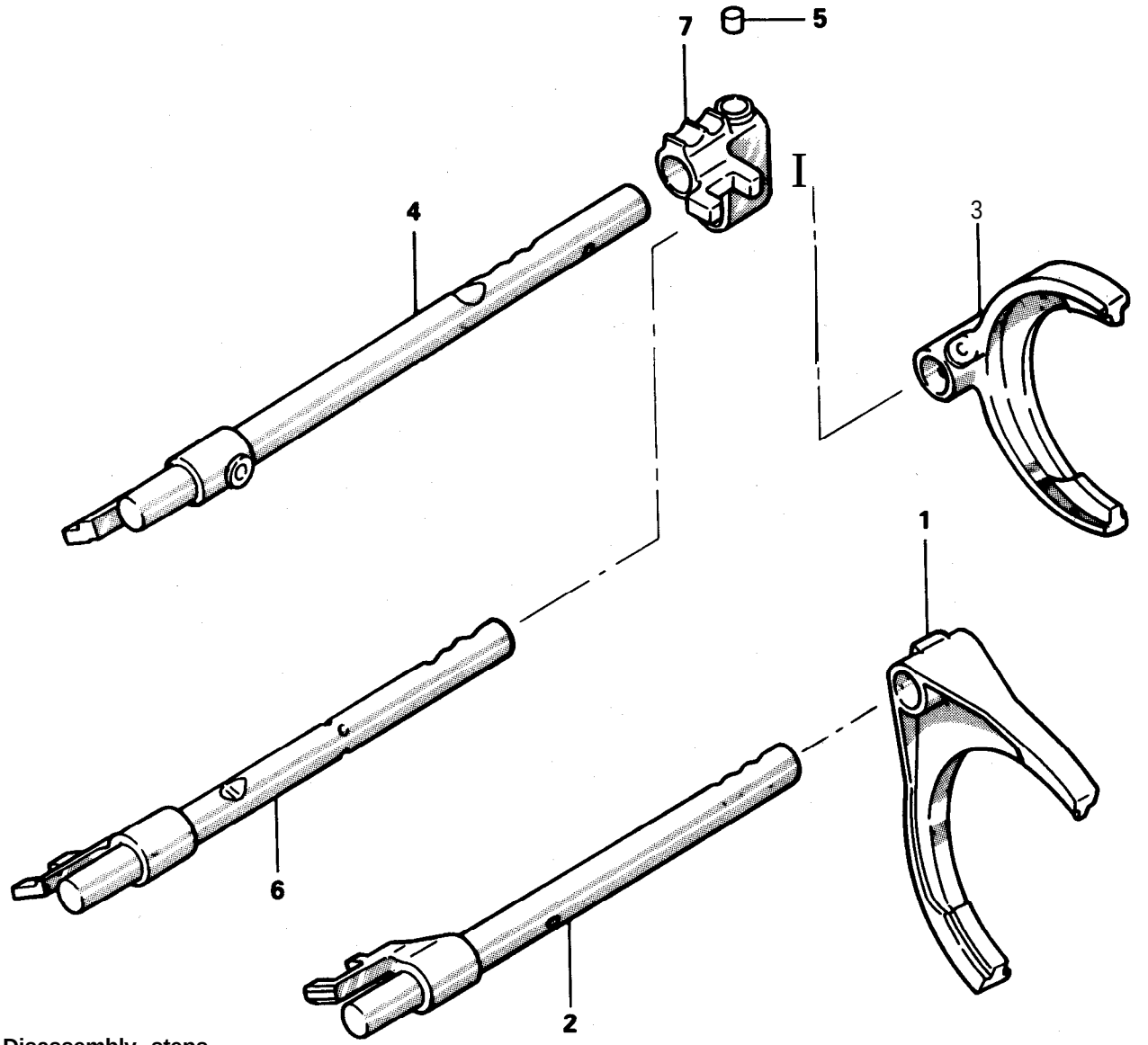
Install the taper roller bearing using the special tool.

Caution

When installing the bearing, push the inner race only.

SHIFT RAILS AND FORKS

DISASSEMBLY AND REASSEMBLY

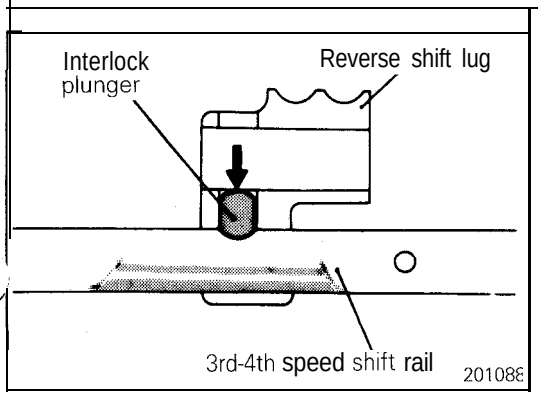


Disassembly steps

1. 1st-2nd speed shift fork
2. 1st-2nd speed shift rail
3. 3rd-4th speed shift fork
4. 5th-reverse speed shift rail
- C 5. Interlock plunger
6. 3rd-4th speed shift rail
7. Reverse shift lug

Lubricate all internal parts with gear oil during reassembly.

201073



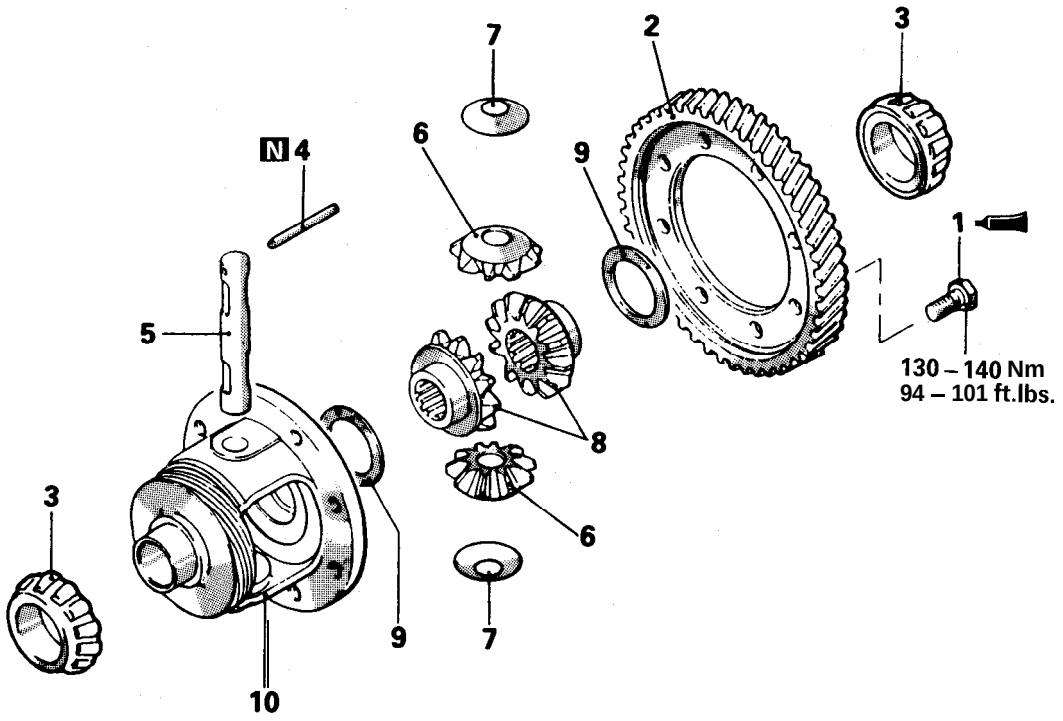
SERVICE POINT OF REASSEMBLY

5. INSTALLATION OF INTERLOCK PLUNGER

Insert the interlock plunger at illustrated position of the 3rd-4th speed shift rail.

DIFFERENTIAL ASSEMBLY

DISASSEMBLY AND REASSEMBLY

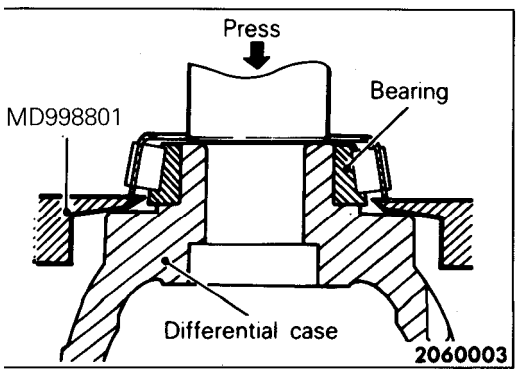


Disassembly steps

- ● + 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

Lubricate all internal parts with gear oil during reassembly.

163025



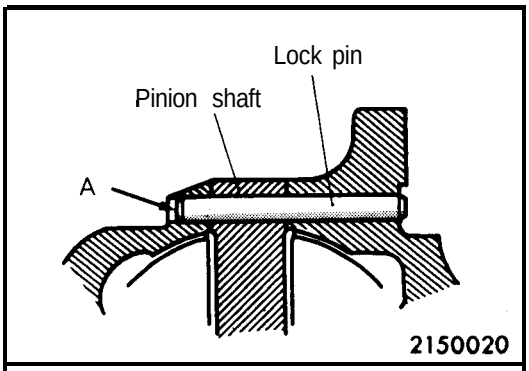
SERVICE POINTS OF DISASSEMBLY

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

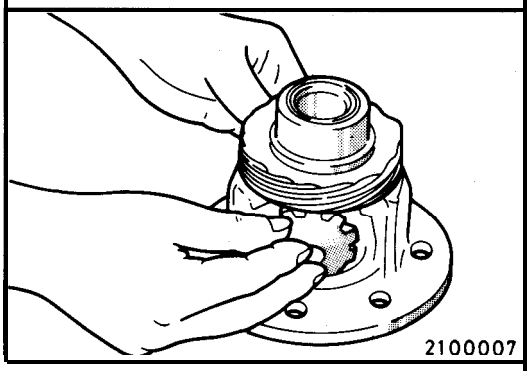
Drive out the lock pin from the hole A using a punch.

SERVICE POINTS OF REASSEMBLY

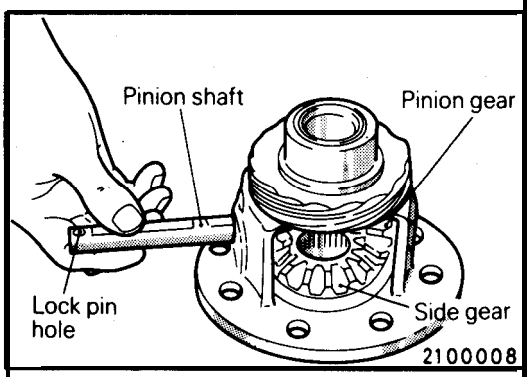
9. INSTALLATION OF SPACER / 8. SIDE GEAR / 7. WASHER / 6. PINION / 5. PINION SHAFT

(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.

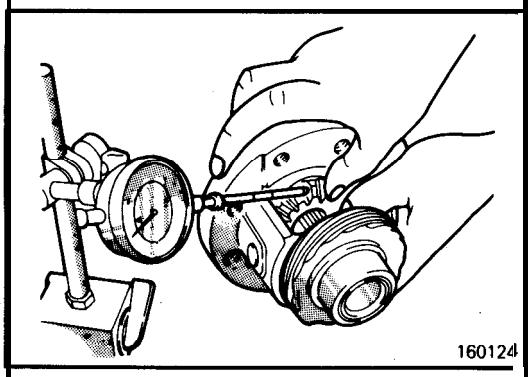


(4) Measure the backlash between the side gears and pinions.

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.

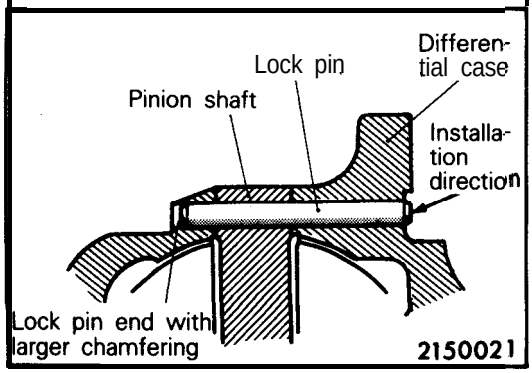
Caution
Adjust for same backlash of both side gears.

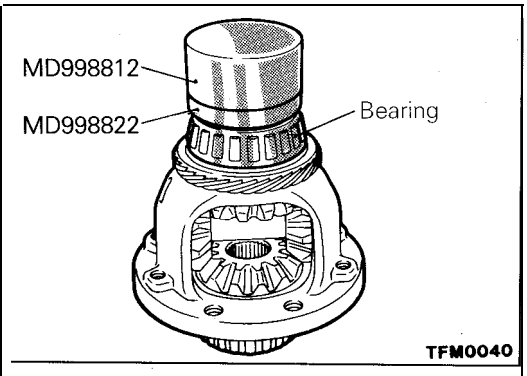


4. INSTALLATION OF LOCK PIN

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.

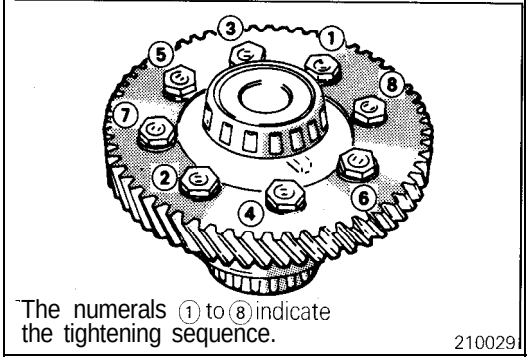




3. INSTALLATION OF TAPER ROLLER BEARING

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.

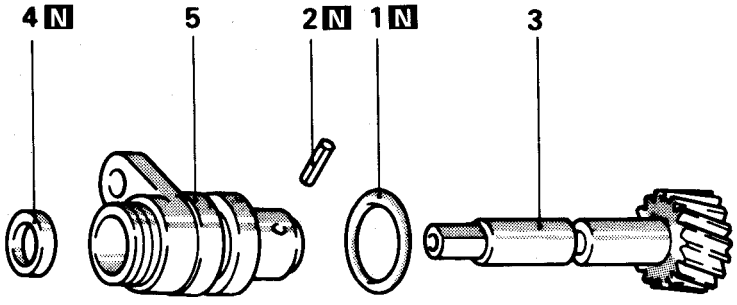
Specified adhesive: MOPAR Part No. 4318031 or MOPAR Part No. 4318032 or equivalent

Caution
If a bolt is reused, remove traces of oil adhesive completely from the threads.

SPEEDOMETER DRIVEN GEAR ASSEMBLY

DISASSEMBLY AND REASSEMBLY

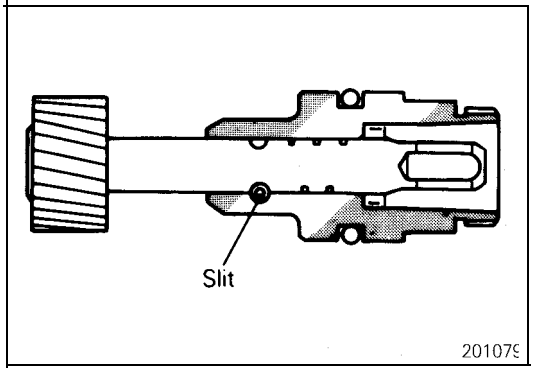
Lubricate all internal parts with gear oil during reassembly.



Disassembly steps

1. O-ring
- * 2. Spring pin
- 4 3. Speedometer driven gear
4. Oil seal
5. Sleeve

201078



SERVICE POINTS OF REASSEMBLY

3. INSTALLATION OF SPEEDOMETER DRIVEN GEAR

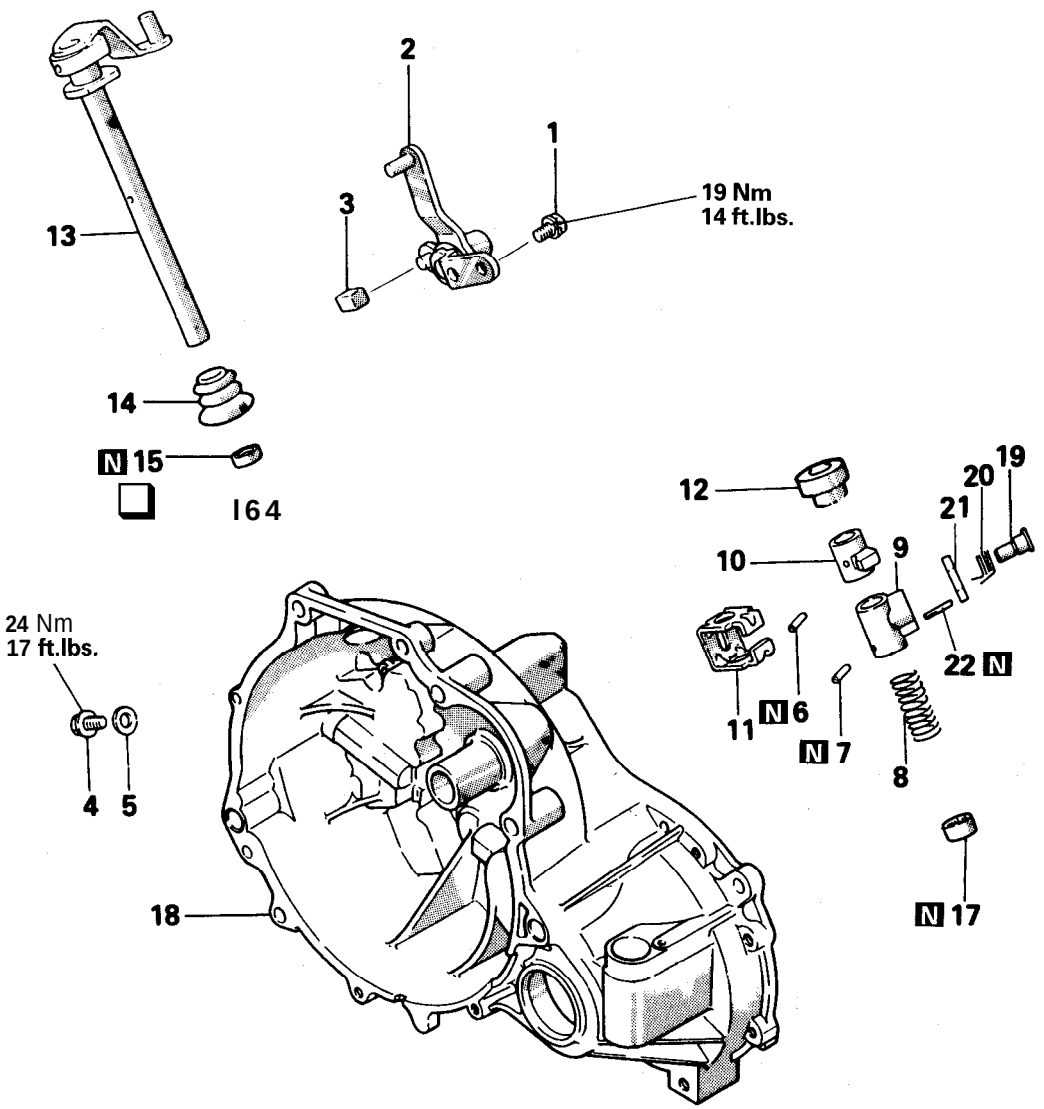
Apply gear oil sparingly to the speedometer driven gear shaft and insert the shaft.

2. INSTALLATION OF SPRING PIN

Install the spring pin in such a way that its slit does not face the gear shaft.

CLUTCH HOUSING ASSEMBLY

DISASSEMBLY AND REASSEMBLY

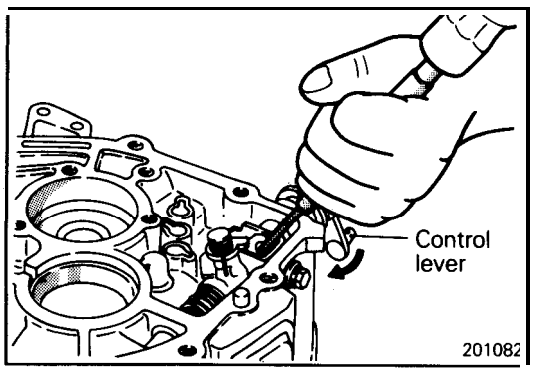


2100019

Disassembly steps

1. Bolt
2. Select lever assembly
3. Select lever shoe
4. Interlock plate bolt
5. Gasket
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

Lubricate all internal parts with gear oil during reassembly.

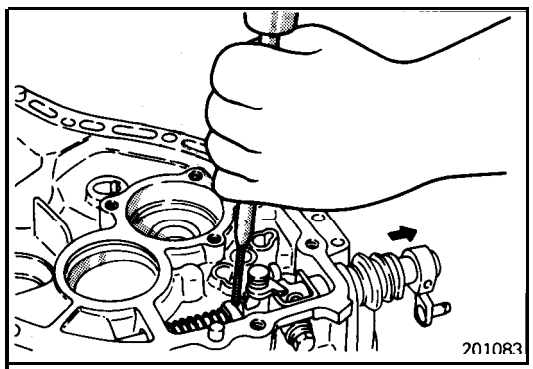


SERVICE POINTS OF DISASSEMBLY

6. REMOVAL OF LOCK PIN

Drive out the lock pin from the control finger.

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

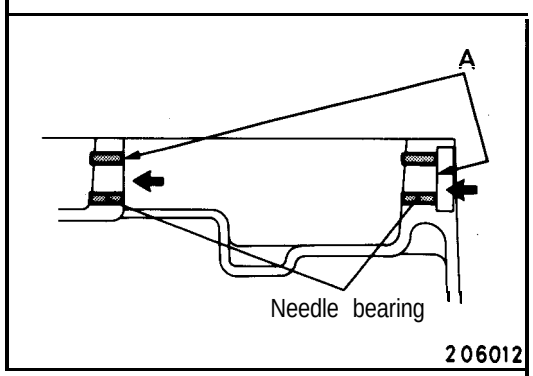
Drive out the spring pin from the stopper body.

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

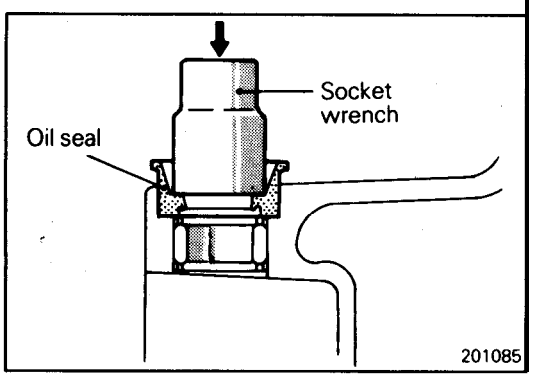
17.16. INSTALLATION OF NEEDLE BEARINGS

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

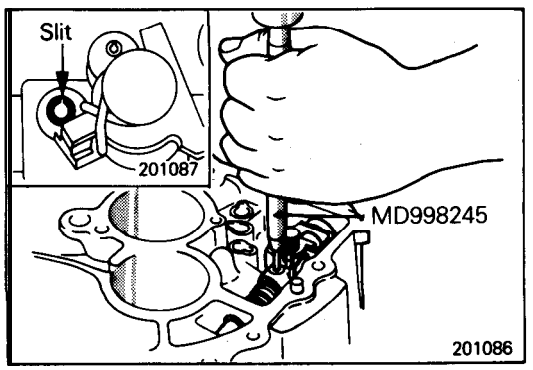


7. INSTALLATION OF SPRING PIN / 6. LOCK PIN

(1) Install new spring pin and lock pin using the special tool.

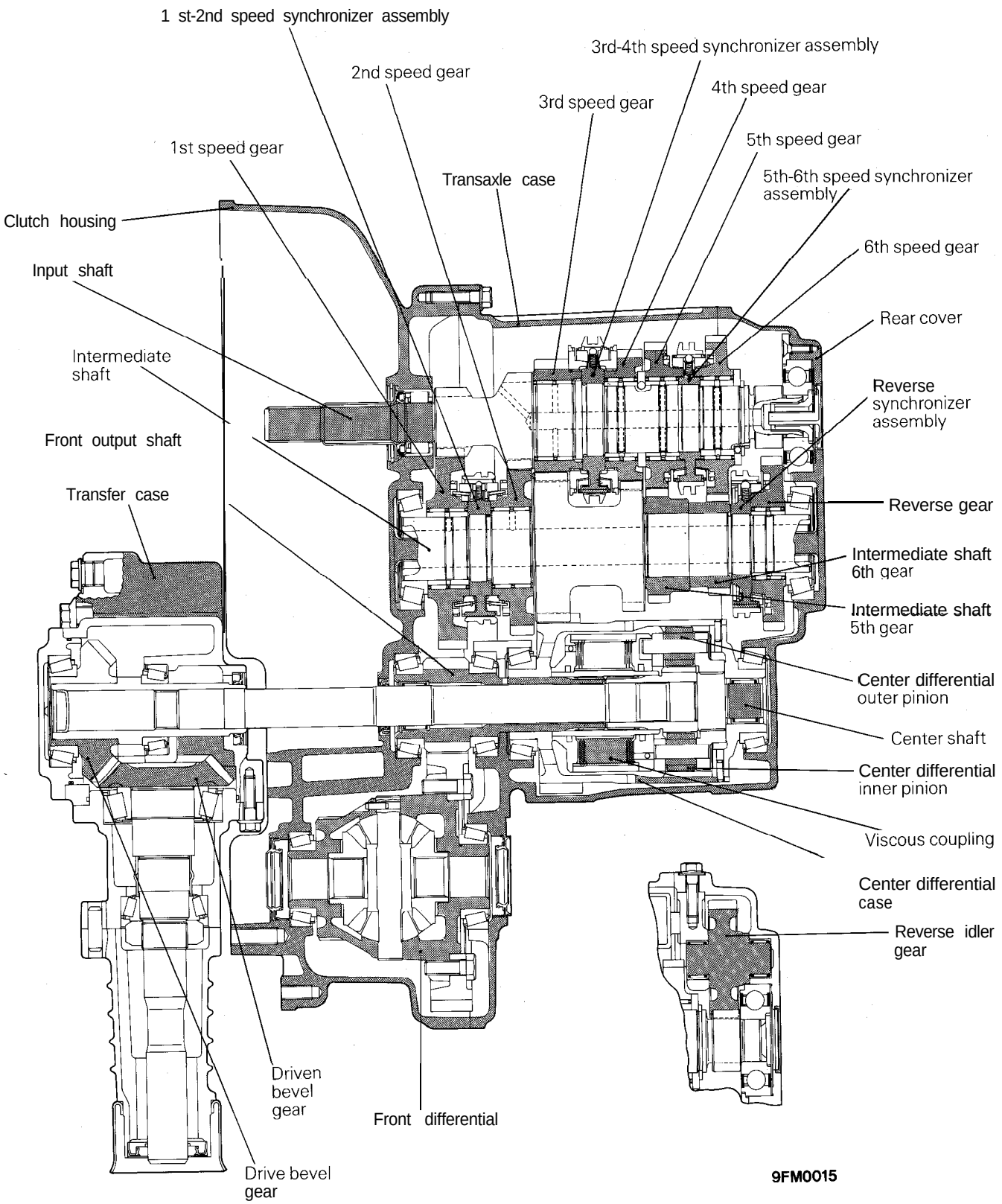
Caution
Do not reuse the spring pin and lock pin.

(2) Install the spring pin with its slit at right angle to the control shaft center.



MANUAL TRANSAXLE <AWD>

GENERAL INFORMATION



SPECIFICATIONS

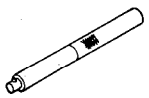
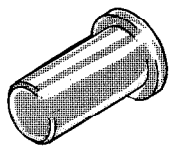
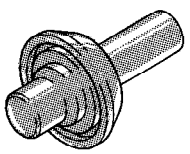
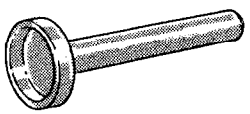
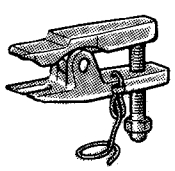
GENERAL SPECIFICATIONS

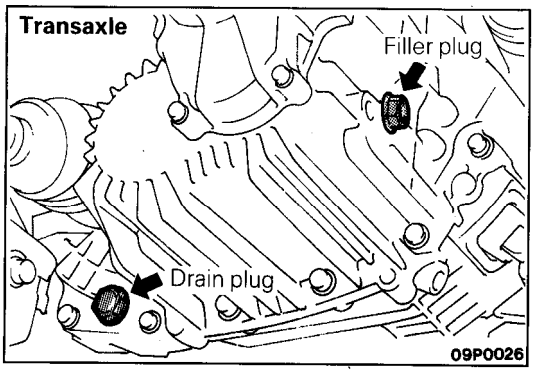
Items	Specifications
Model	W6MG1-0-FNBR
Applicable engine	6G72-DOHC (Turbo)
Type	6-speed transaxle floor shift
Gear ratio	
1 st	3.266
2nd	1.904
3rd	1.241
4th	0.918
5th	0.733
6th	0.589
Reverse	3.153
Reduction ratio	
Primary	1.222
Front differential	3.166
Transfer	0.958
Speedometer gear ratio (driven/drive)	28136
Oil quantity dm^3 (qts.)	
Transaxle	2.4 (2.5)
Transfer	0.6 (.63)

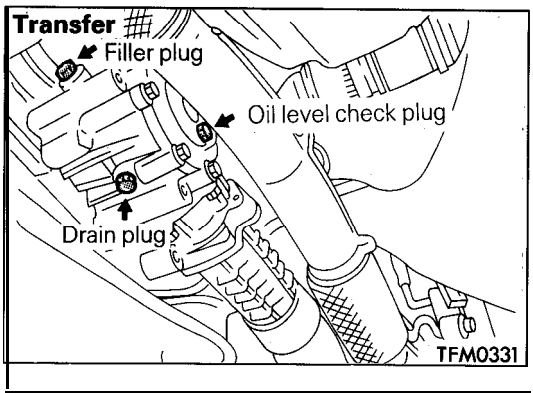
LUBRICANTS

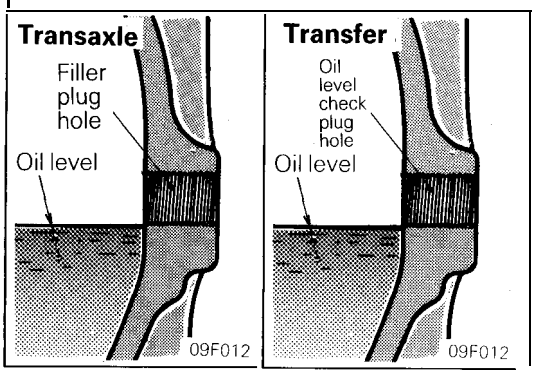
Items	Specified lubricants	Quantity dm^3 (qts.)
Transmission oil	MOPAR Hypoid gear oil or equivalent, API classification GL-4, SAE 75W-90 or 75W-85W	2.4 (2.5)
Transfer oil		0.6 (.63)
Drive shaft oil seal lip		As required
Transfer oil seal lip		
Sleeve, yoke		
Shift lever assembly	MOPAR Front Wheel Bearing Grease Part No. 3837794 or equivalent	As required
Shift lever bushing, Return spring		
Transfer oil seal		

SPECIAL TOOLS

Tool number and tool name	Replaced by Miller tool number	Application
 MB990930 Installer adapter	–	Installation of input shaft rear seal cap
 MB990938 Installer bar	–	Use with MB990930
 MD998304 Oil seal installer	MB990805	Installation of transfer extention housing oil seal
 MD998325 Differential oil seal installer	MD998325	Installation of differential oil seal
 M D998803 Differential oil seal installer	MD998803	Installation of differential oil seal
 MD998812 Installer cap	–	Use with installer adapter
 M D998824 Installer adapter (50)	MD998909	Installation of transfer case oil seal
 MB990635 Steering linkage puller	MB990635	• 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







SERVICE ADJUSTMENT PROCEDURES

TRANSMISSION OIL LEVEL INSPECTION

Refer to GROUP 0 – Maintenance Service.

TRANSMISSION OIL REPLACEMENT

(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: MOPAR Hypoid gear oil or equivalent, API classification GL-4, SAE 75W-90 or 75W-85W

Transaxle: 2.4 dm^3 (2.5 qts.)

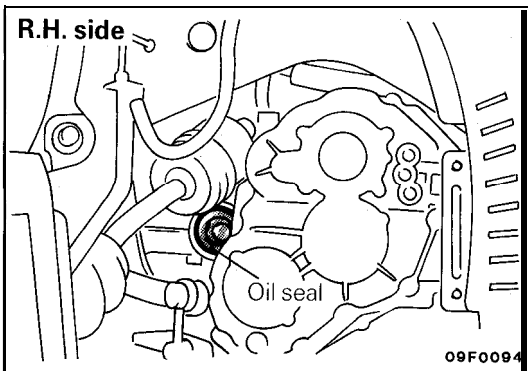
Transfer: 0.6 dm^3 (.63 qts.)

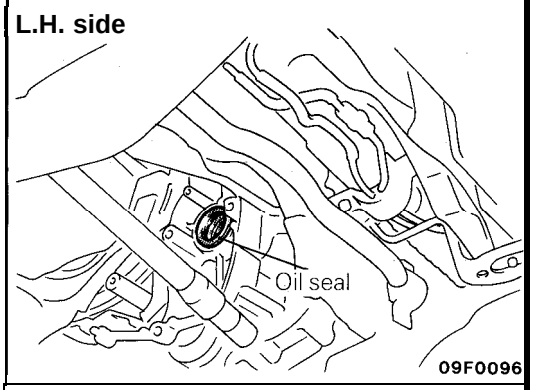
(3) After checking to be sure that the oil level is the specified level, tighten the filler plug at the specified torque.

Specified torque:

25-30 Nm (18 – 22 ft.lbs.) ..... Filler plug

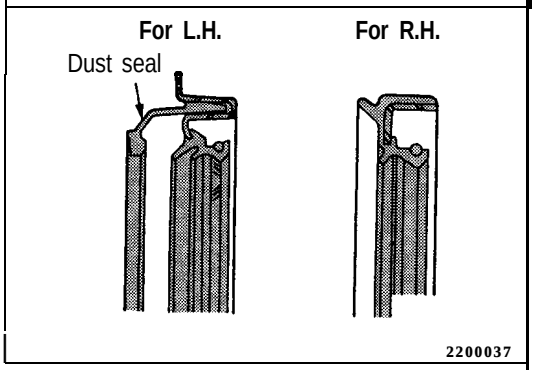
7.5 Nm (5.4 ft.lbs) ..... Oil level check plug





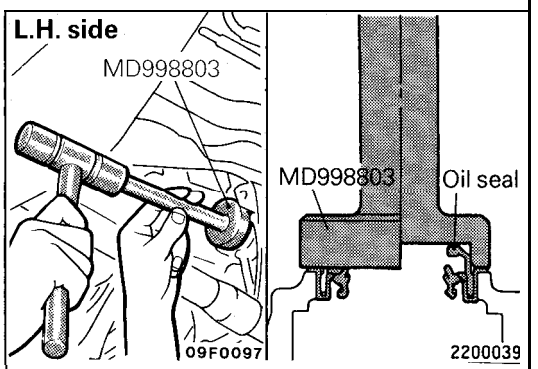
DRIVE SHAFT OIL SEALS REPLACEMENT

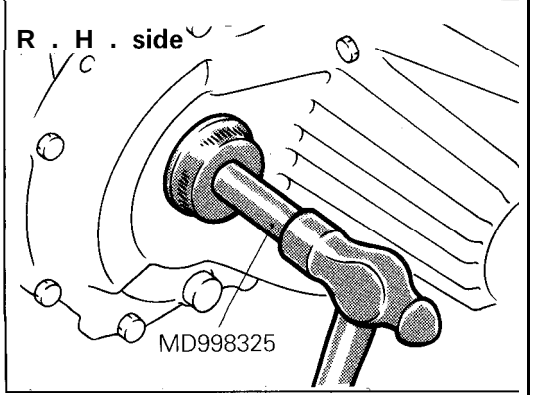
(1) Disconnect the drive shaft from the transaxle. (Refer to GROUP 2A – Drive Shaft.)
(2) Remove the transfer assembly.
(3) Using a flat-tip (–) screwdriver, remove the oil seal.

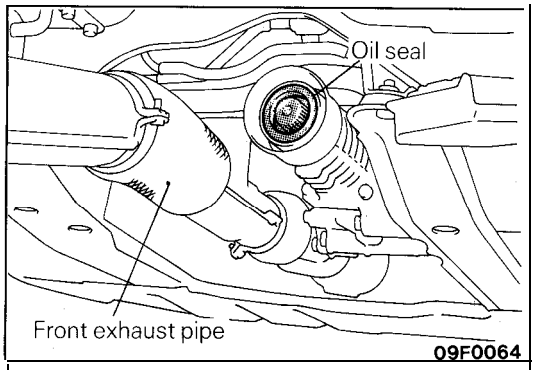


(4) Install the oil seals using the following procedure:
Using the special tool, tap the oil seal into the transaxle.
Note that there are two types of oil seals, one for R.H. and the other for L.H., and the shape of each type is different, as shown.
Drive shaft oil seal must be installed in the direction shown.
(5) Apply a coating of the transmission oil to the lip of the oil seal.

Transmission oil: MOPAR Hypoid gear oil or equivalent, API classification GL-4, SAE 75W-90 or 75W-85W

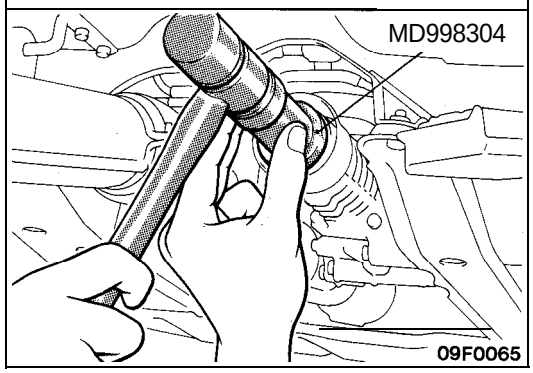






TRANSFER OIL SEAL REPLACEMENT

(1) Pull out the propeller shaft from the transfer. (Refer to GROUP 16 – 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: MOPAR Hypoid gear oil or equivalent, API classification GL-4, SAE 75W-90 or 75W-85W

SHIFT LEVER ASSEMBLY

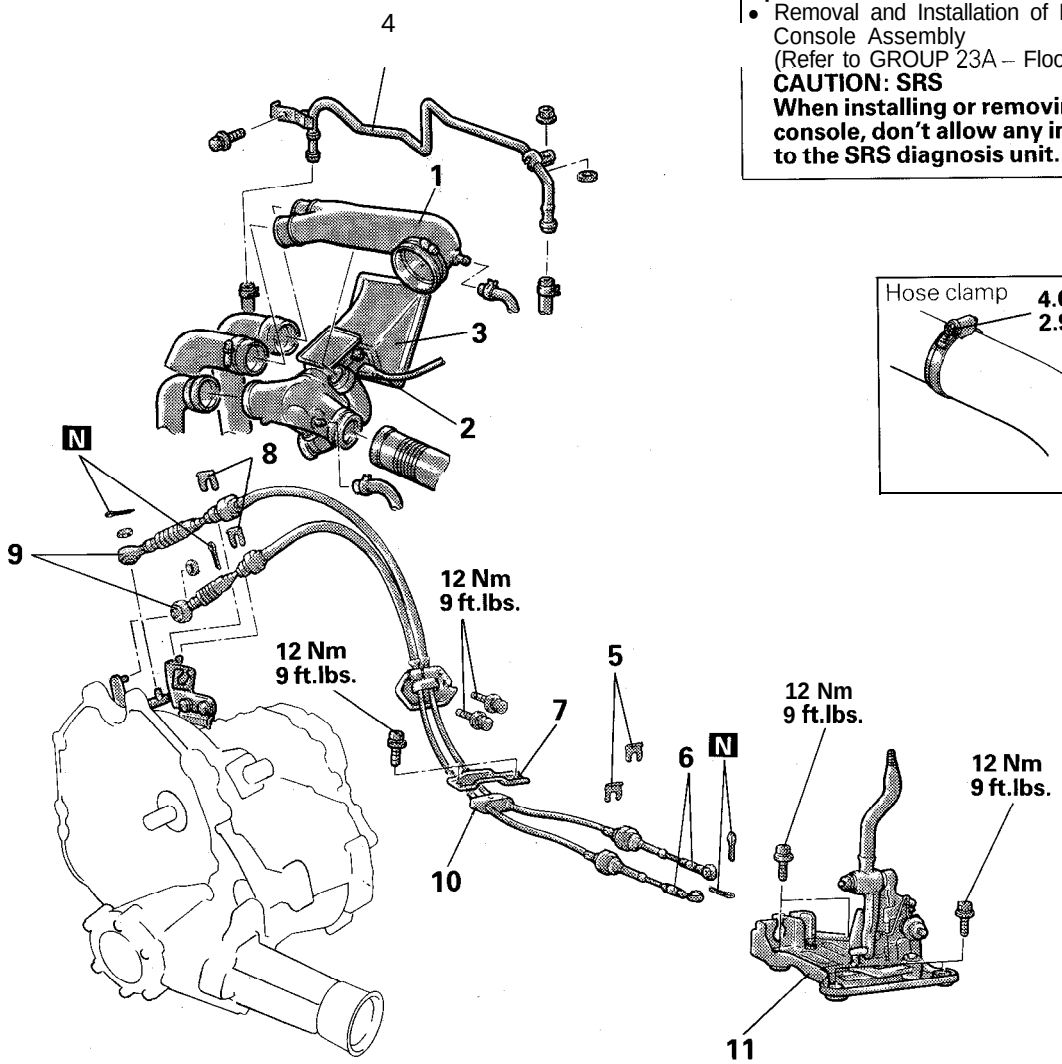
Refer to P.21-15.

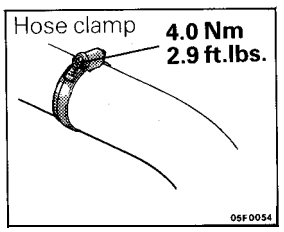
TRANSAXLE CONTROL

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Removal and Installation of Front Console Assembly
  (Refer to GROUP 23A – Floor Console.)

CAUTION: SRS
When installing or removing the front console, don't allow any impact or shock to the SRS diagnosis unit.



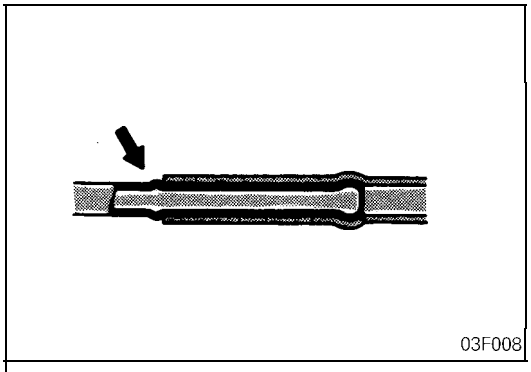


Transaxle control cable assembly removal steps
- ➡◀ 1. Air hose A
- 2. Harness connector
- ● + 3. Air cleaner cover, Air intake hose A
- ● 4 4. Vacuum pipe
- 5. Clip
- ● a 6. Connection for transaxle control cable assembly (Shift lever assembly side)
- 7. Retainer
- 8. Clip
- 9. Connection for transaxle control cable assembly (Transaxle side)
- 10. Transaxle control cable assembly

Shift lever assembly removal steps
- ● + 1. Air hose A
- 2. Harness connector
- ➡◀ 3. Air cleaner cover, Air intake hose A
- ➡◀ 4. Vacuum pipe
- 5. Clip
- ● + 6. Connection for transaxle control cable assembly (Shift lever assembly side)
- 11. Shift lever assembly

INSPECTION

- Check the transaxle control cable assembly for function and for damage.
- Check the boot for damage.
- Check each bushing for wear or abrasion, sticking, impeded action, and damage.



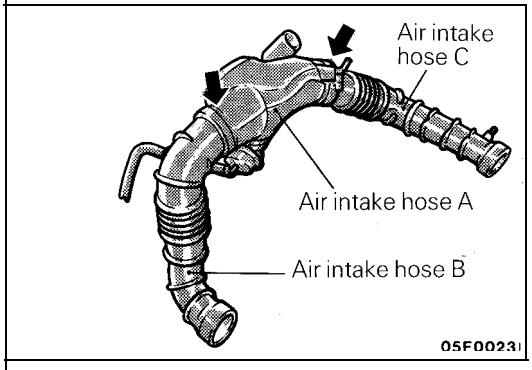
SERVICE POINTS OF INSTALLATION

6. CONNECTION OF TRANSAXLE CONTROL CABLE ASSEMBLY (SHIFT LEVER ASSEMBLY SIDE)

Refer to P.21-14.

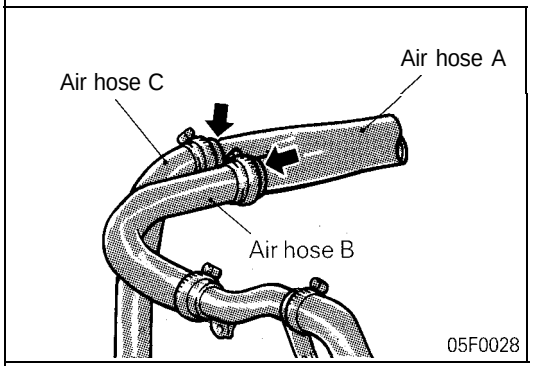
4. INSTALLATION OF VACUUM PIPE

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. CONNECTION OF AIR CLEANER COVER, AIR INTAKE HOSE A

Align slots indicated by arrows in air intake hose A with △ markings on air intake hoses B and C; then, insert hoses B and C all the way into air intake hose A.



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

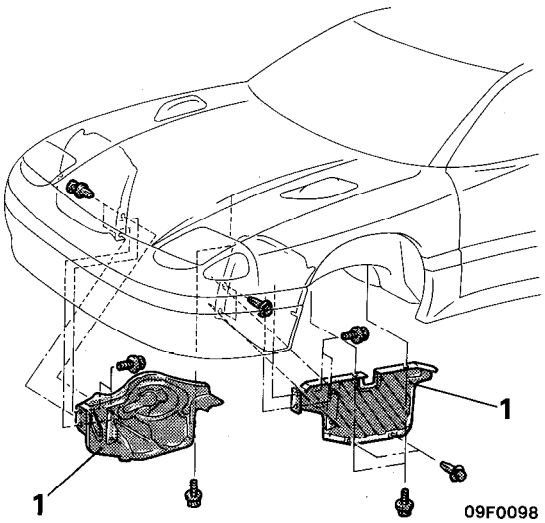
Be careful not to allow any foreign matter to get into the hoses, pipes, or the intercooler itself.

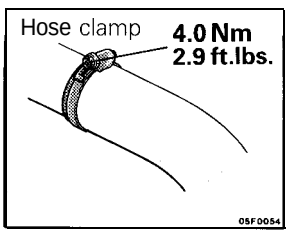
TRANSAXLE ASSEMBLY

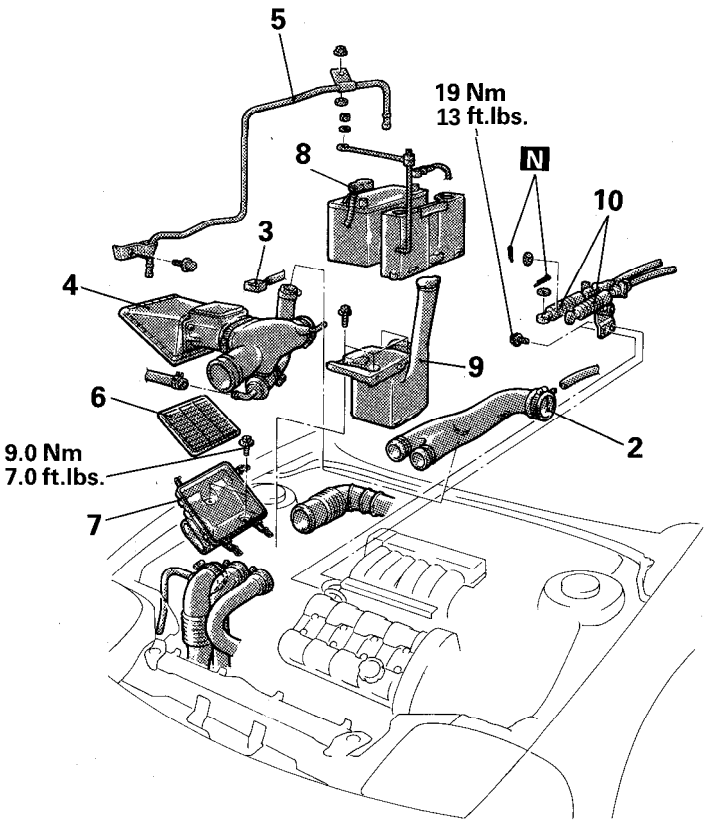
REMOVAL AND INSTALLATION

Pre-removal Operation
- Draining of Transmission Oil (Refer to P.21-52.)
- Removal of Transfer Assembly (Refer to P.21-60.)

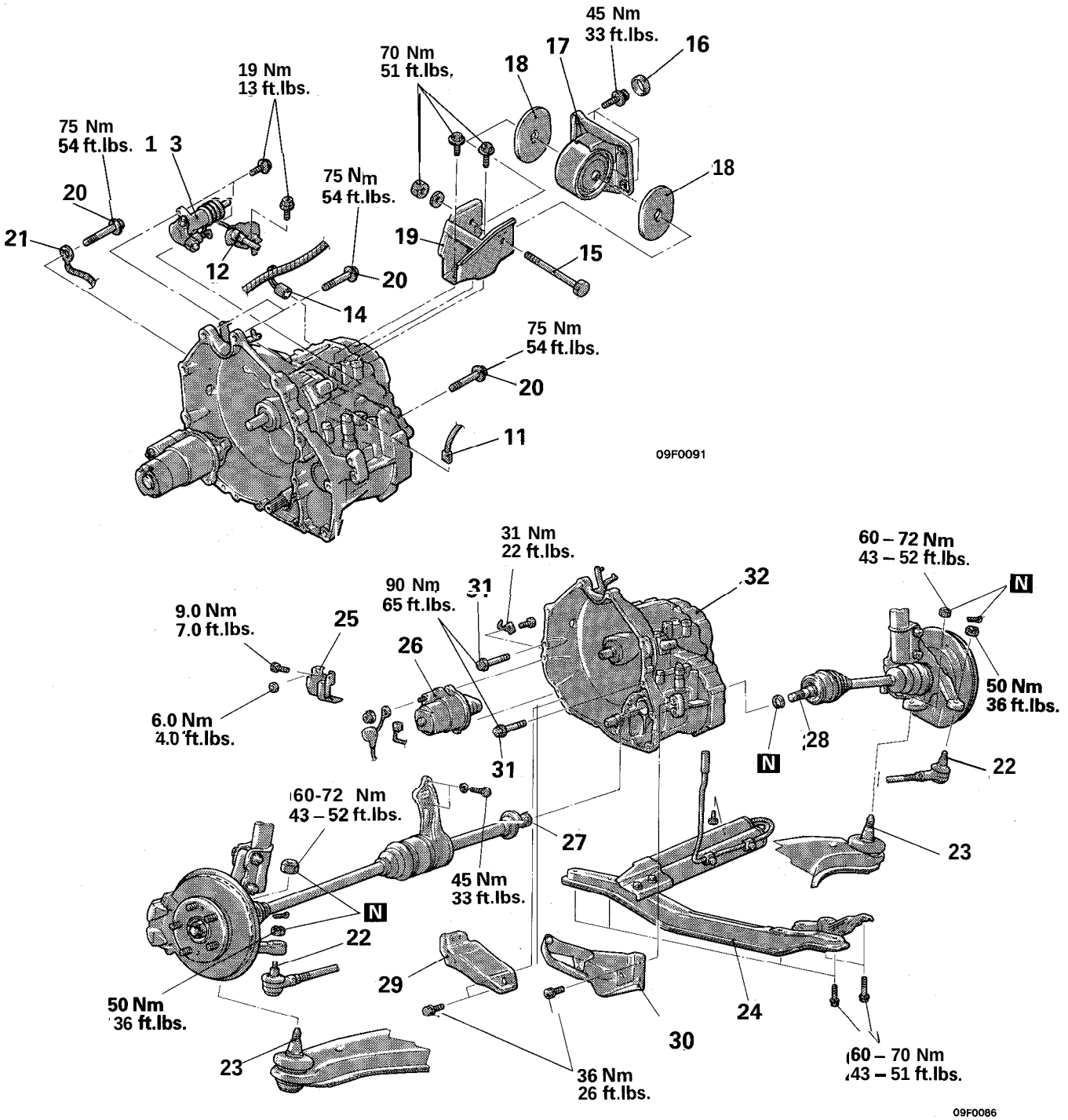
Post-installation Operation
- Installation of Transfer Assembly (Refer to P.21-60.)
- Supplying of Transmission Oil (Refer to P.21-52.)
- Checking Operation of Shift Lever at Each Position
- Checking the Operation of Meters and Gauges







1. Side under cover
2. Air hose A
3. Volume air flow sensor connector
4. Air cleaner cover, Air intake hose A
5. Vacuum pipe
6. Air cleaner element
7. Air cleaner body
8. Battery
9. Battery seat, Washer tank
10. Connection for transaxle control cable



11. Connection for speedometer connector
12. Connection for clutch tube bracket
13. Connection for clutch release cylinder
14. Connection for backup light switch connector
15. Connection for transaxle mount
16. Plug
17. Transaxle mount bracket (Body side)
18. Mounting stopper
19. Transaxle mount bracket (Transaxle side)
20. Transaxle assembly lower part coupling bolt
21. Connection for transaxle ground cable
22. Connection for tie rod end
23. Connection for lower arm ball joint
24. Right member
25. Starter cover
26. Starter
27. Drive shaft (Left side), Inner shaft assembly
* 28. Drive shaft (Right side)
29. Connection for transaxle stay (Front bank side)
30. Connection for transaxle stay (Rear bank side)
31. Transaxle assembly lower part coupling bolt
32. Transaxle assembly

SERVICE POINTS OF REMOVAL

13. REMOVAL OF CLUTCH RELEASE CYLINDER / 15. CONNECTION OF TRANSAXLE MOUNT

Refer to P.21-16.

22. DISCONNECTION OF TIE ROD END / 23. LOWER ARM BALL JOINT

Refer to P.21-17.

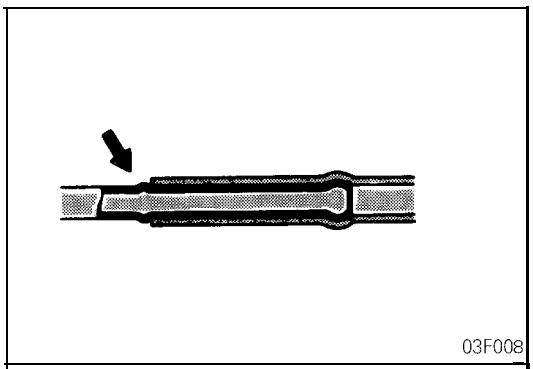
27. REMOVAL OF DRIVE SHAFT (LEFT SIDE), INNER SHAFT ASSEMBLY / 28. DRIVE SHAFT (RIGHT SIDE) / 31. TRANSAXLE ASSEMBLY LOWER COUPLING BOLT / 32. TRANSAXLE ASSEMBLY

Refer to P.21-17.

SERVICE POINTS OF INSTALLATION

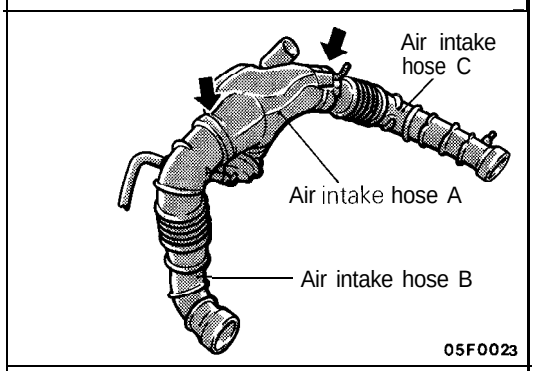
28. INSTALLATION OF DRIVE SHAFT (RIGHT SIDE) / 18. MOUNTING STOPPER

Refer to P.21-17.



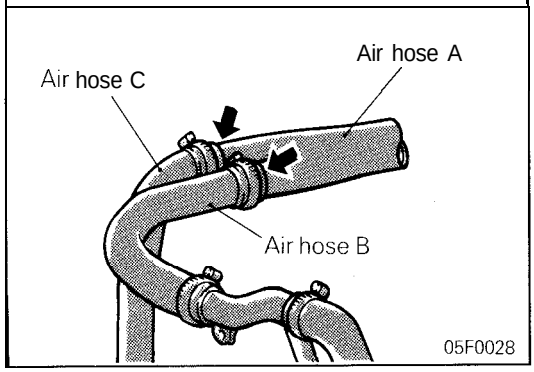
5. INSTALLATION OF VACUUM PIPE

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.



4. INSTALLATION OF AIR CLEANER COVER, AIR INTAKE HOSE A

Align slots indicated by arrows in air intake hose A with △ markings on air intake hoses B and C; then, insert hoses B and C all the way into air intake hose A.
Insert air intake hoses B and C all the way up to the roots on the turbocharger end.



2. INSTALLATION OF AIR HOSE A

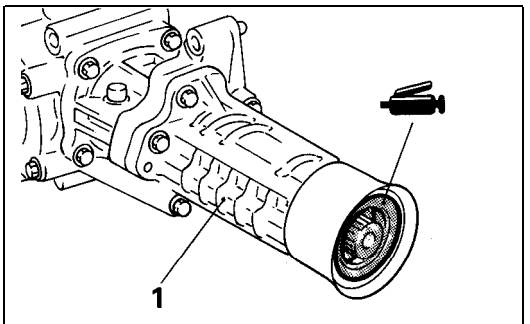
Connect the air hoses ensuring that alignment marks are aligned with projections.
Insert air hoses B and C into pipe all the way to its step.

Caution
Be careful not to allow any foreign matter to get into the hoses, pipes, or the intercooler itself.

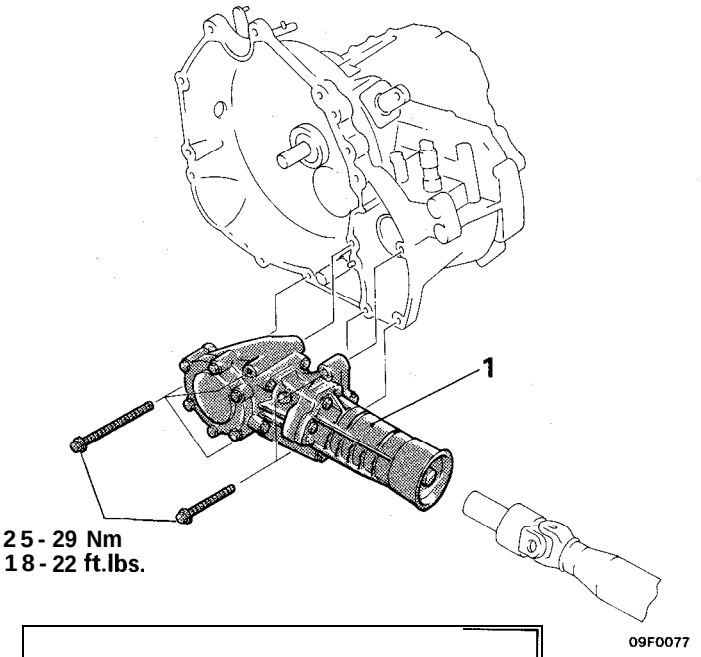
TRANSFER ASSEMBLY

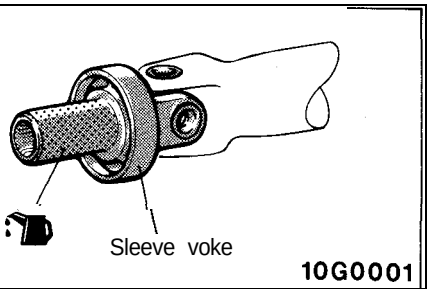
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Draining and Supplying of Transfer Oil (Refer to P.21-52.)
- Removal and installation of Active Front Venturi Skirt (Refer to GROUP 23A – Front Bumper.)
- Removal and Installation of Front Exhaust Pipe (Refer to GROUP 11 – Exhaust Pipe and Main Muffler.)



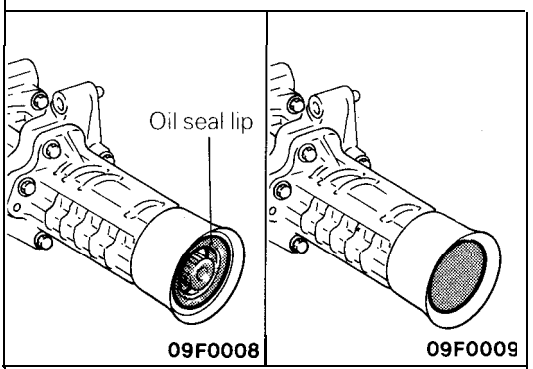
MOPAR Front Wheel Bearing Grease Part No. 3837794 or equivalent

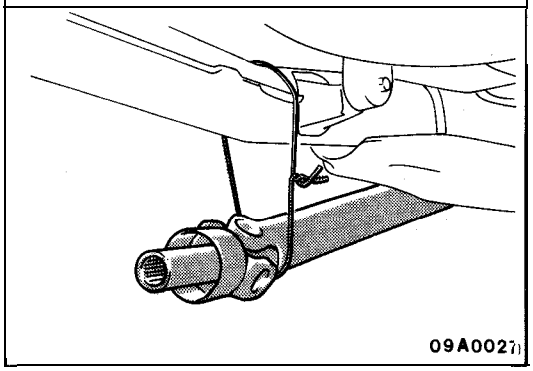




Gear oil: MOPAR Hypoid gear oil API classification GL-4, SAE 75W-90 or 75W-85W

◆◆ 1. Transfer assembly





SERVICE POINT OF REMOVAL

1. REMOVAL OF TRANSFER ASSEMBLY

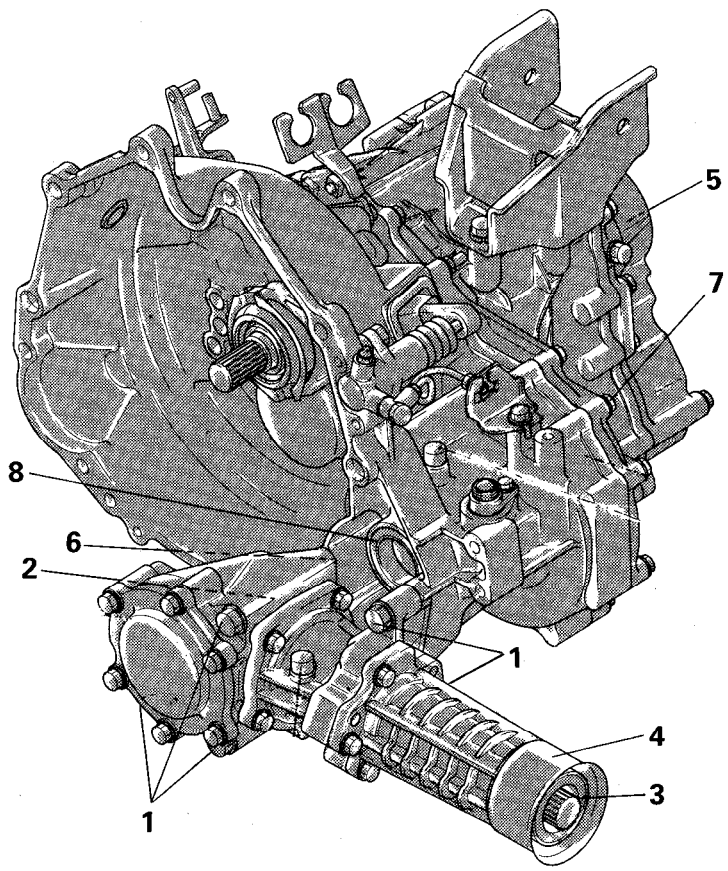
Caution

1. **Be cautious to avoid damaging the transfer oil seal lip.**
2. **Cover the transfer opening 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

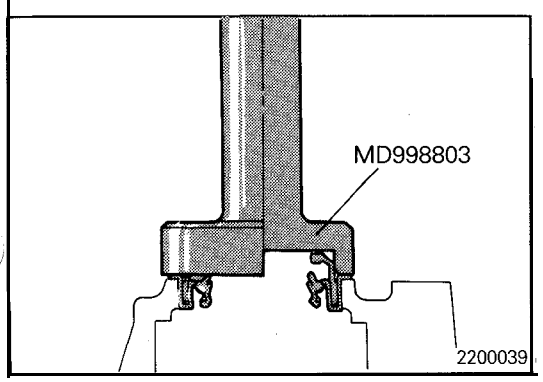
The W5MG1 transaxle cannot be disassembled.
If any parts other than describes below are defective, replace the transaxle assembly.

REPLACEABLE PART



1. Transfer mounting bolts
2. ♦♦ Transfer case oil seal
3. ♦♦ Transfer extension housing oil seal
4. Transfer oil seal guide
5. ♦♦ Input shaft rear seal cap
6. ♦♦ Center shaft oil seal
7. ♦♦ Drive shaft oil seal
8. ♦♦ Drive shaft oil seal

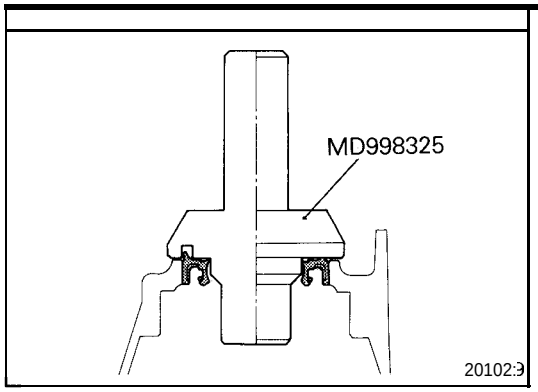
TFM0157



SERVICE POINTS OF INSTALLATION

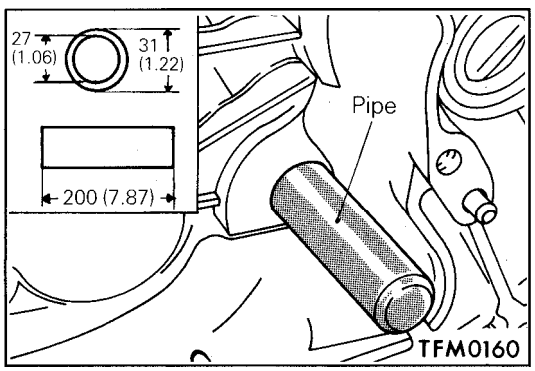
8. INSTALLATION OF DRIVE SHAFT OIL SEAL

Using the special tool, install drive shaft oil seal.



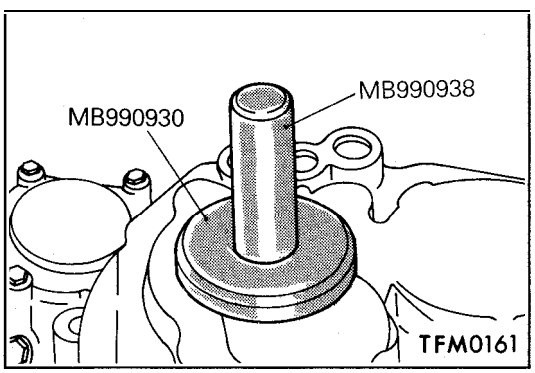
7. INSTALLATION OF DRIVE SHAFT OIL SEAL

Using the special tool, install the drive shaft oil seal.



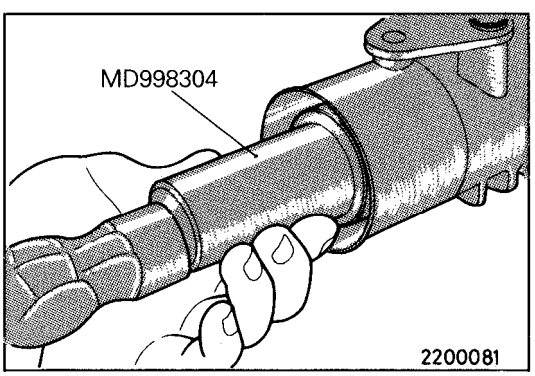
6. INSTALLATION OF CENTER SHAFT OIL SEAL

Using a pipe shown in the illustration, drive the oil seal until it is flush with the case. Do not drive the oil seal more than necessary.



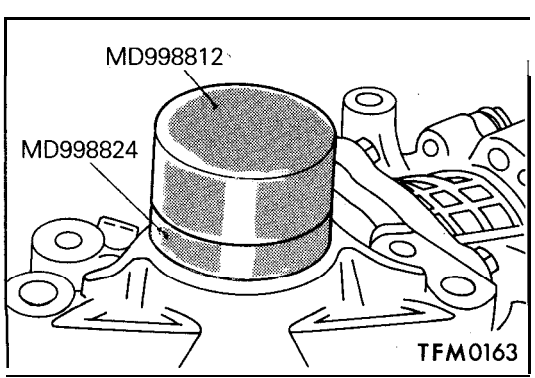
5. INSTALLATION OF INPUT SHAFT REAR SEAL CAP

Using the special tool, install the input shaft rear seal cap.



3. INSTALLATION OF TRANSFER EXTENSION HOUSING OIL SEAL

Using the special tool, install the transfer extension housing oil seal.



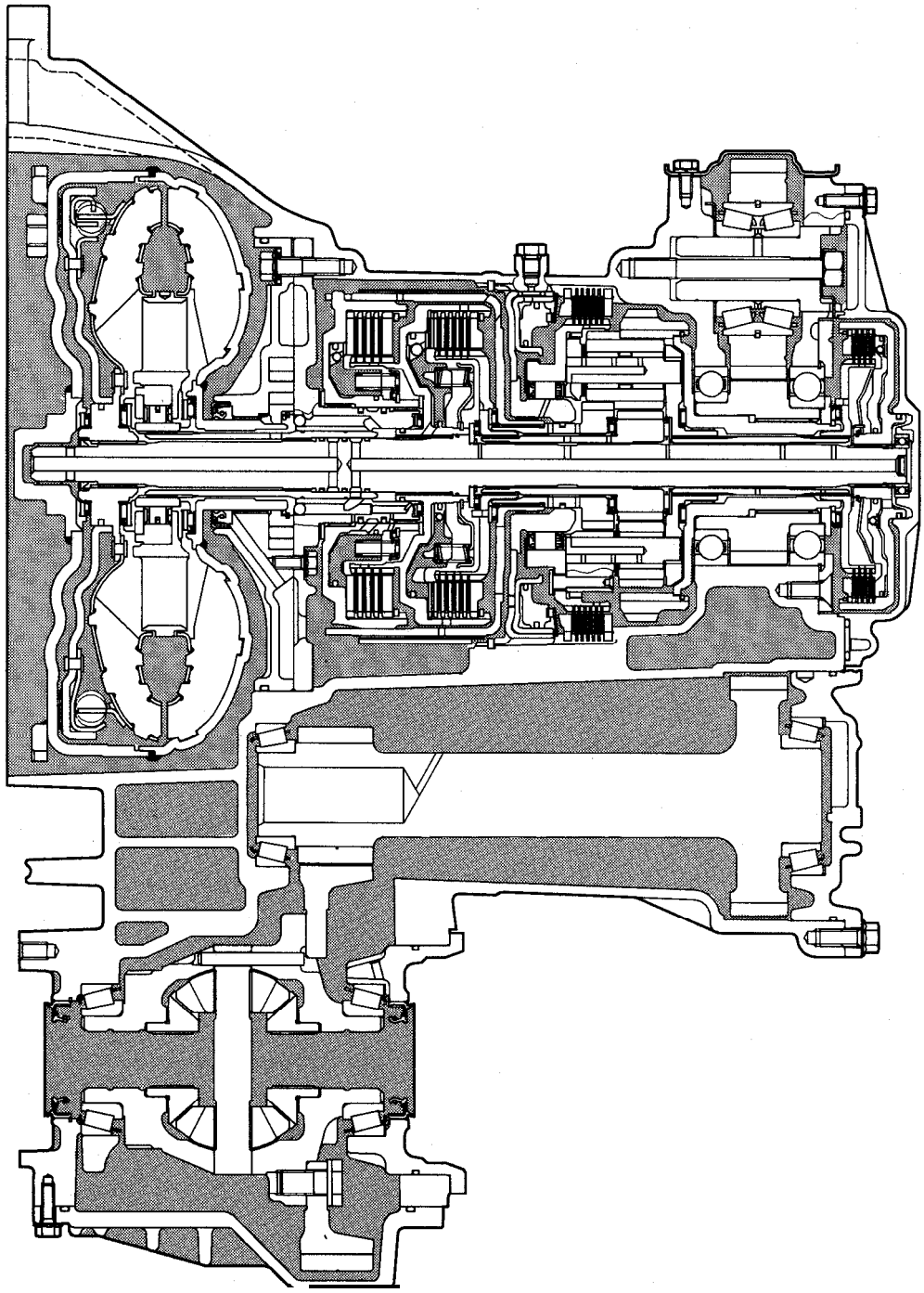
2. INSTALLATION OF TRANSFER CASE OIL SEAL

Using the special tool, install the transfer case oil seal.

AUTOMATIC TRANSAXLE

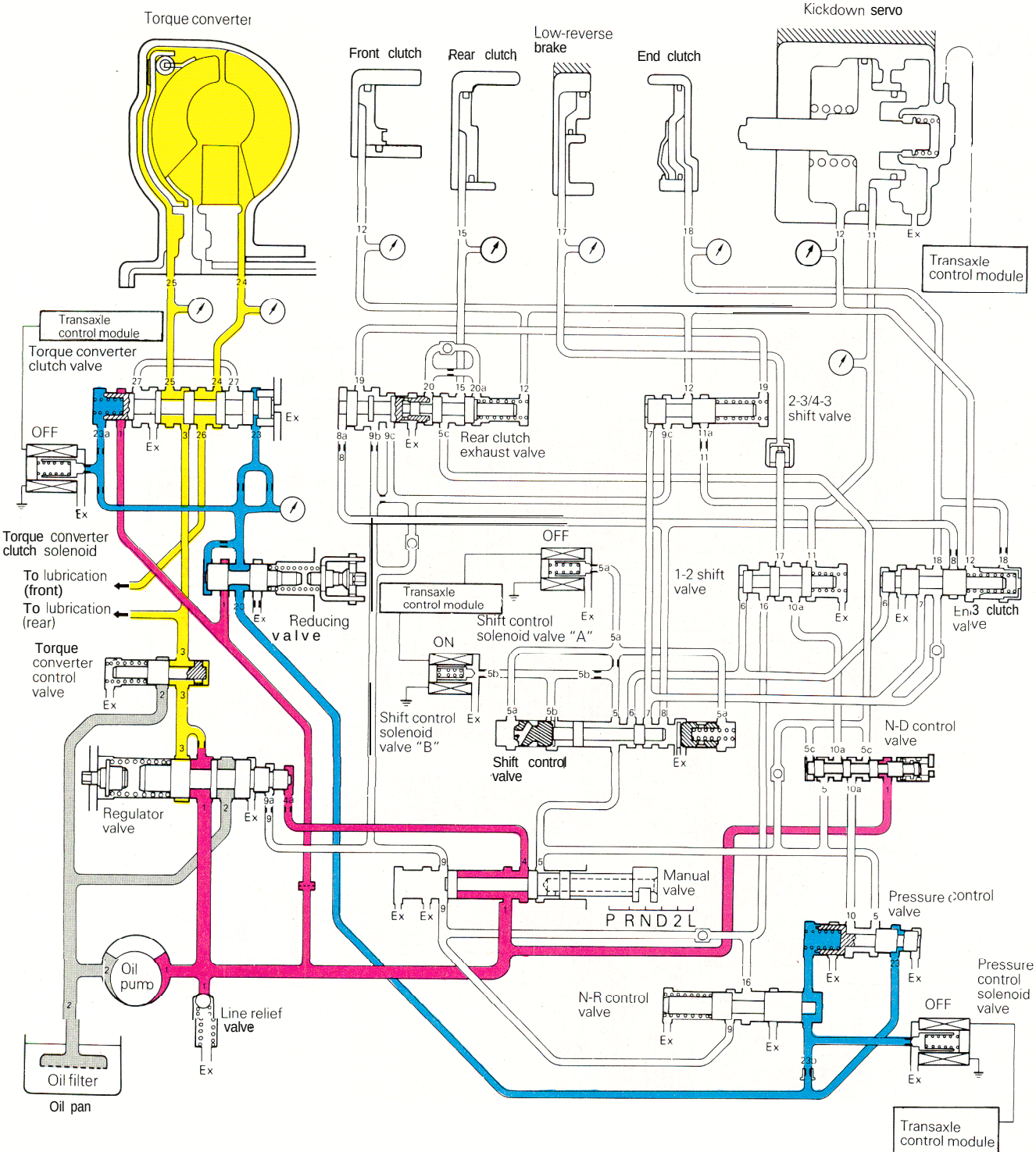
GENERAL INFORMATION

CROSS-SECTIONAL VIEW

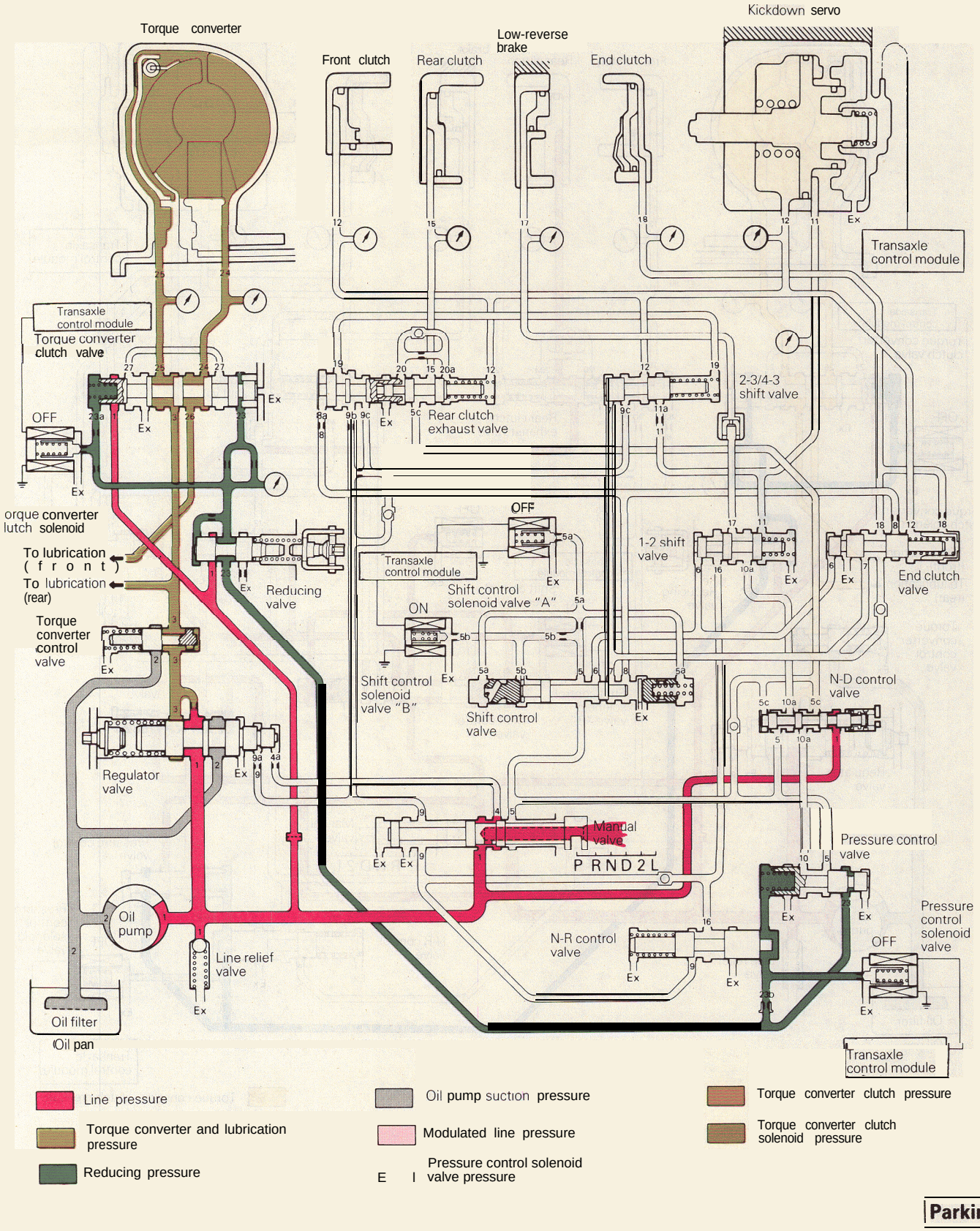


TFA0540

HYDRAULIC CONTROL SYSTEM

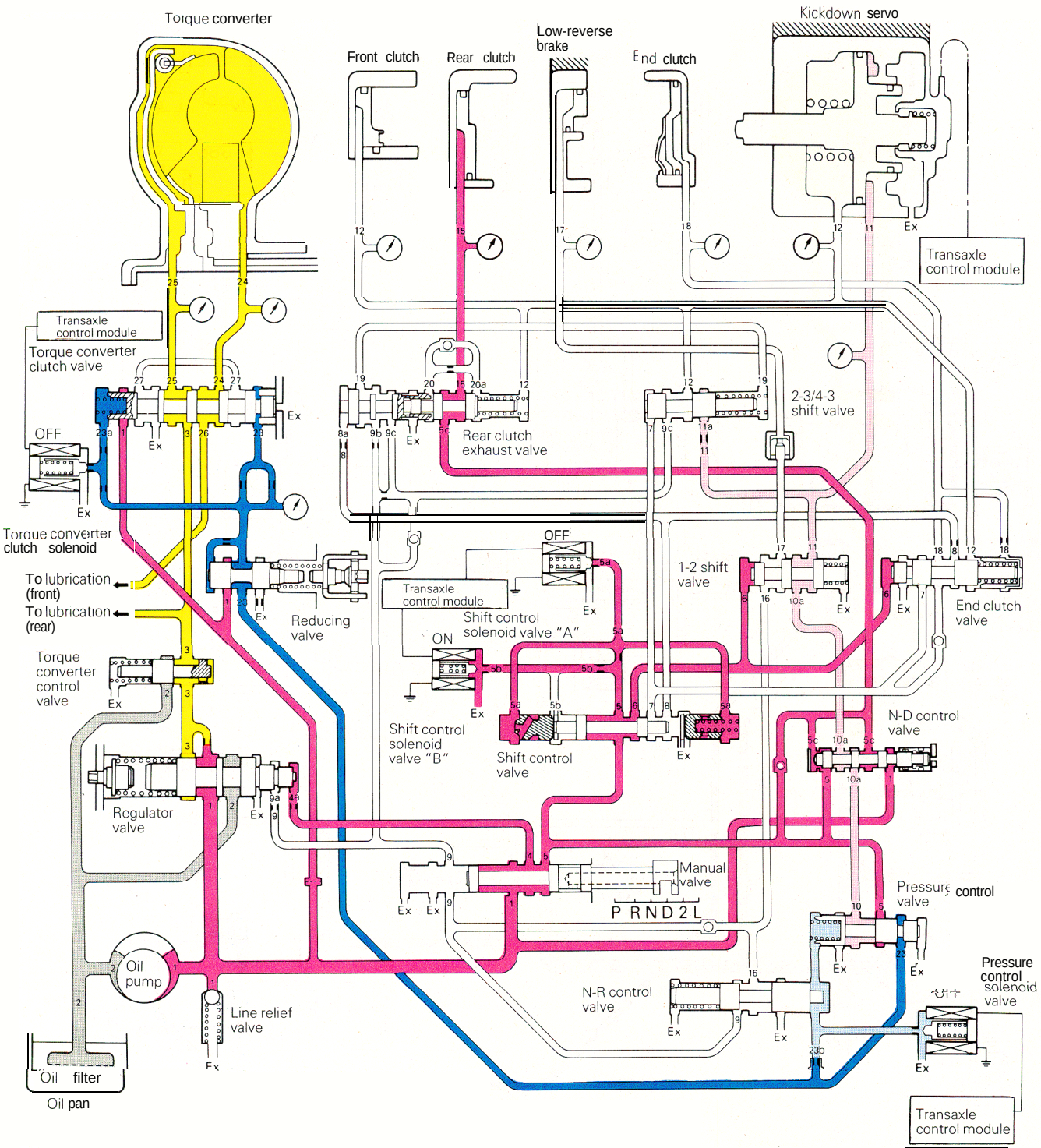


TFA0070



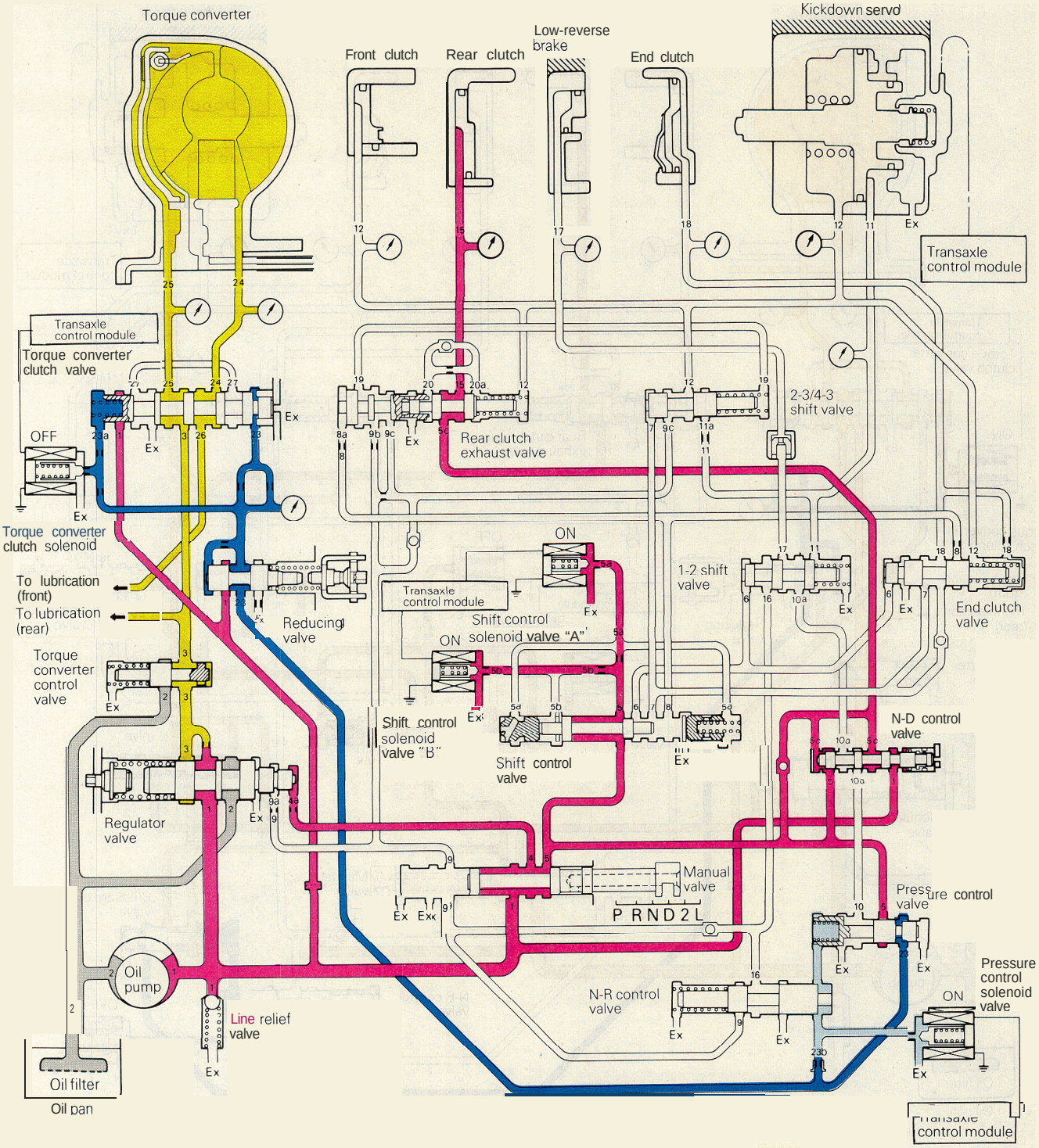
Parking

TFA0071



Drive (Stop)

TFA0242



Line pressure

Torque converter and lubrication pressure

Reducing pressure

Oil pump suction pressure

Modulated line pressure

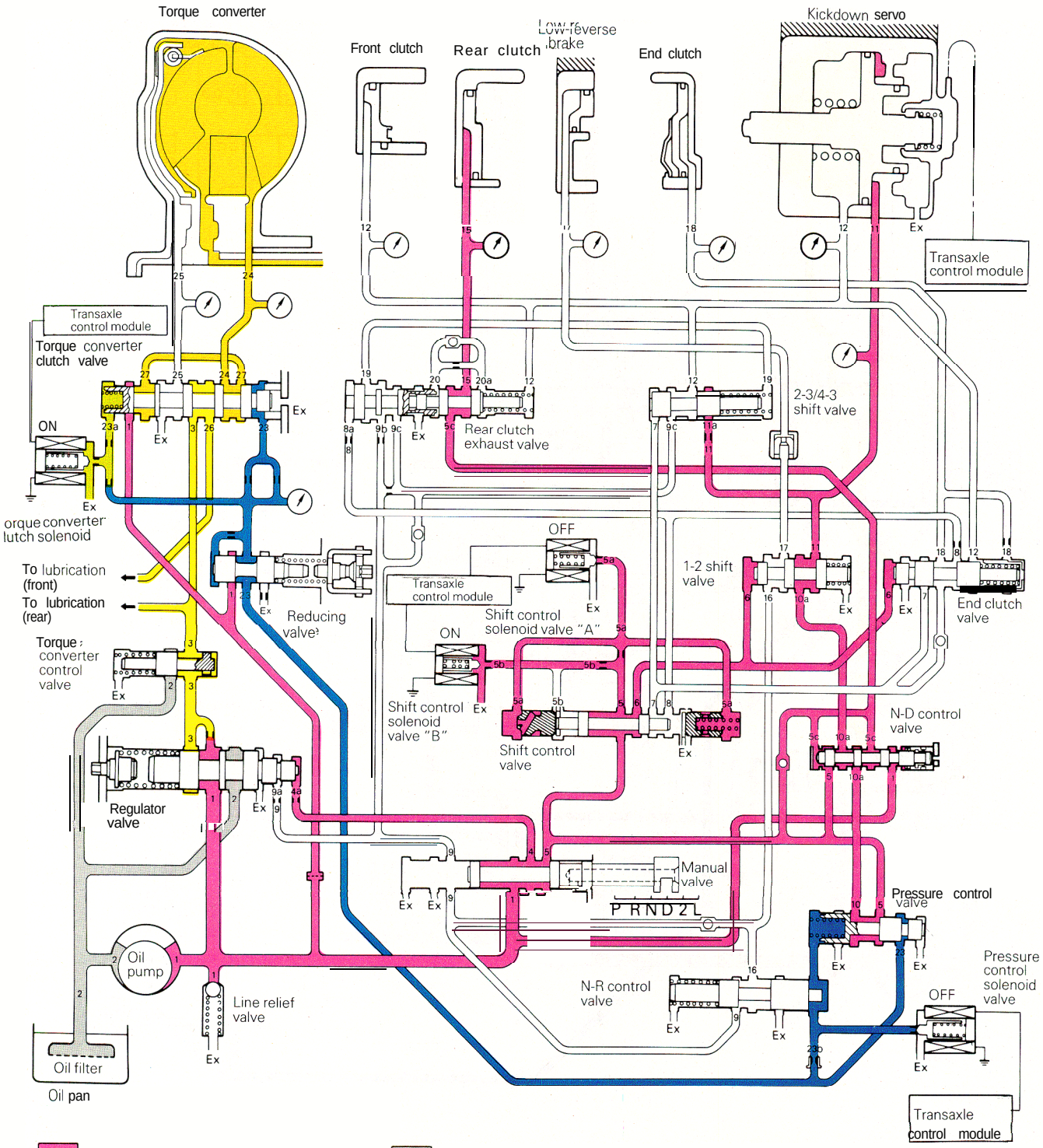
n Pressure control solenoid valve pressure

Torque converter clutch pressure

Torque converter clutch solenoid pressure

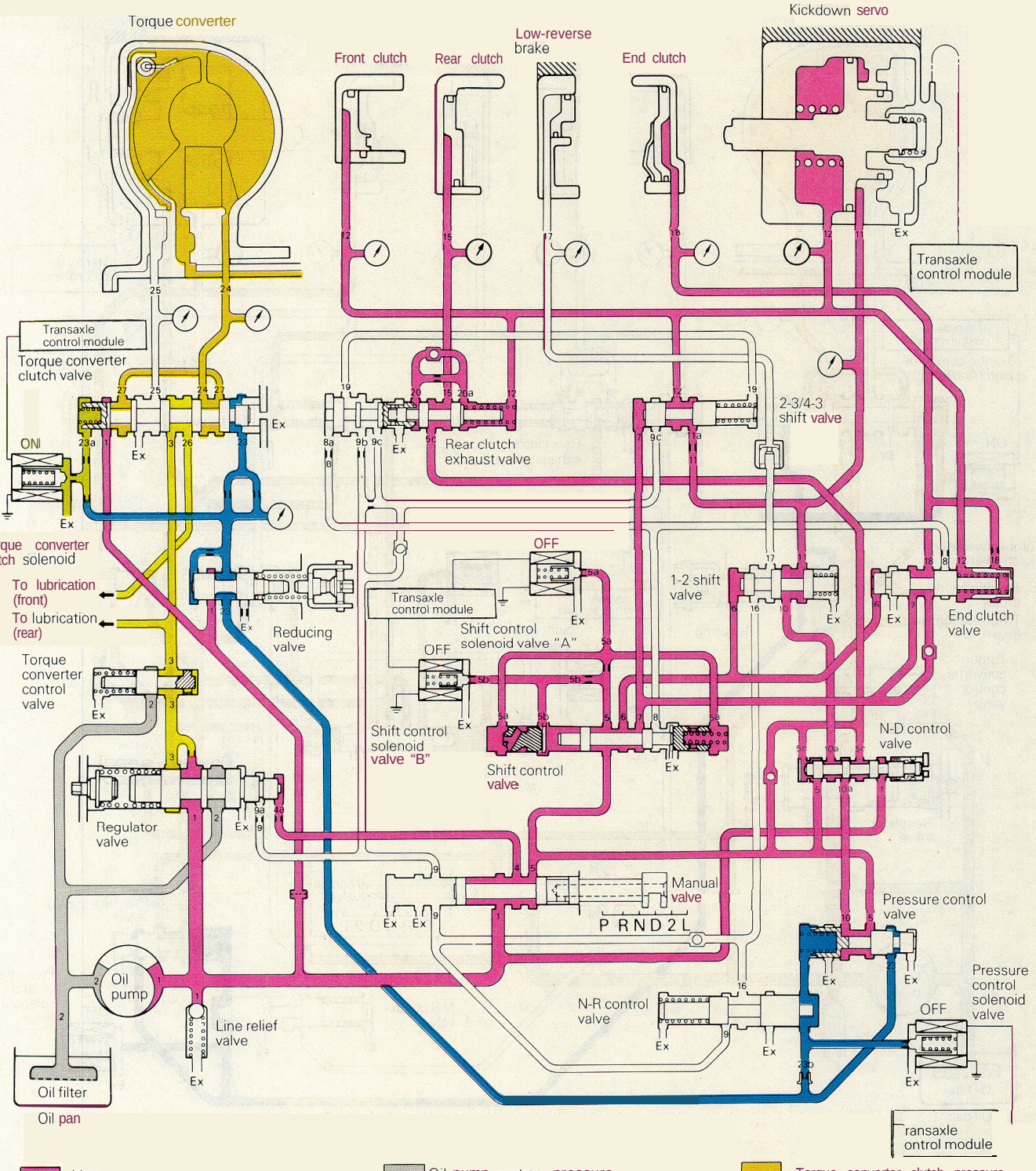
Drive (First)

TFA0072



Drive (Second)

TFA0073



Line pressure

Torque converter and lubrication pressure

Reducing pressure

Oil pump suction pressure

Modulated line pressure

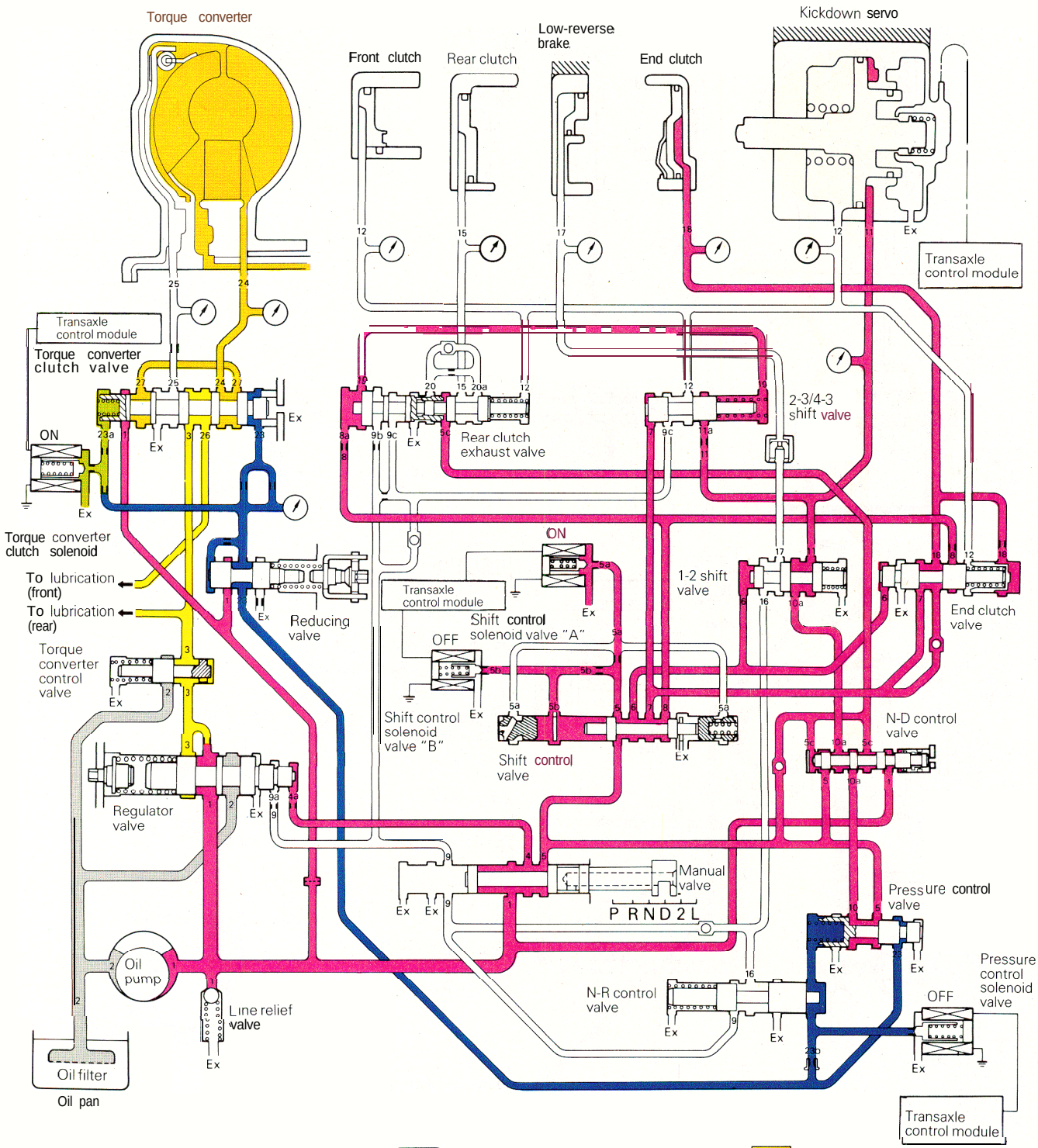
Pressure control solenoid valve pressure

Torque converter clutch pressure

Torque converter clutch solenoid pressure

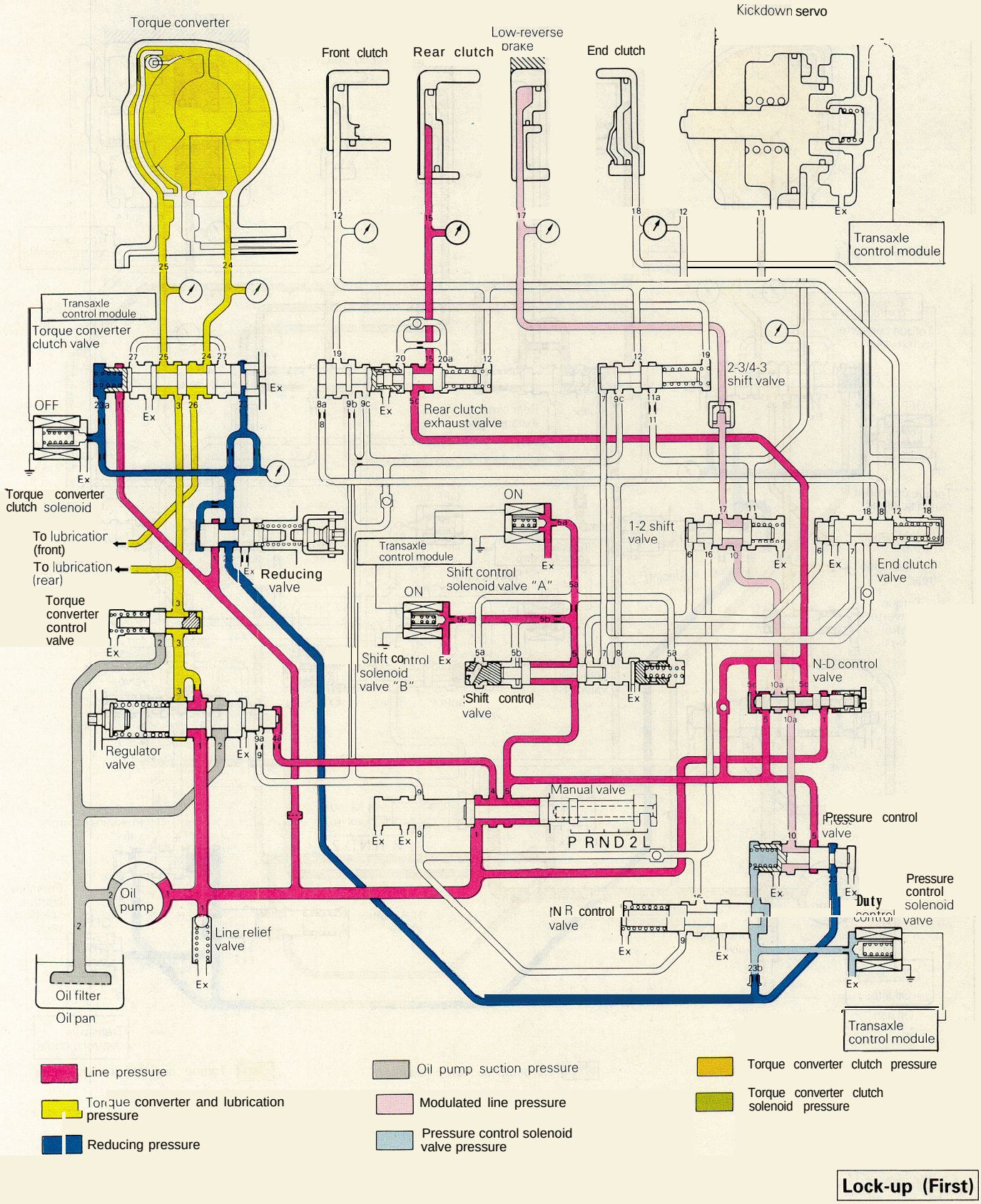
(Third)

TFA0074



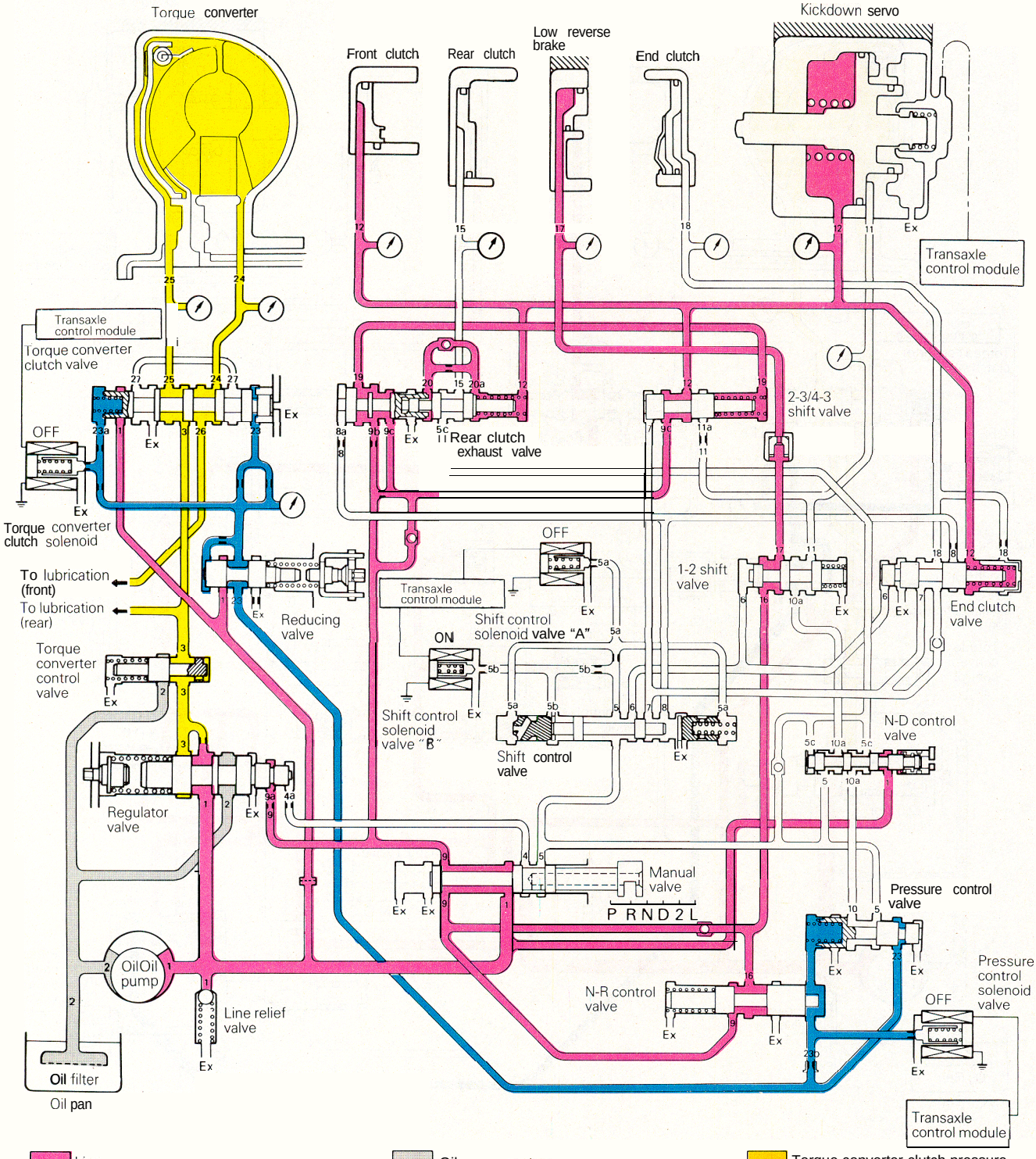
Drive (Fourth)

TFA0075



Lock-up (First)

TFA0076


Torque converter
Front clutch
Rear clutch
Low reverse brake
End clutch
Kickdown servo
Transaxle control module
Torque converter clutch valve
OFF
Torque converter clutch solenoid
Rear clutch exhaust valve
2-3/4-3 shift valve
To lubrication (front)
To lubrication (rear)
Reducing valve
Torque converter control valve
Shift control solenoid valve "A"
ON
Shift control solenoid valve "B"
Shift control valve
1-2 shift valve
End clutch valve
N-D control valve
Regulator valve
Manual valve
P R N D 2 L
Pressure control valve
Pressure control solenoid valve
N-R control valve
Oil pump
Line relief valve
Oil filter
Oil pan
Line pressure
Oil pump suction pressure
Torque converter clutch pressure
Torque converter and lubrication pressure
Modulated line pressure
Torque, converter clutch solenoid pressure
Reducing pressure
Pressure control solenoid valve pressure
Reverse
TFA0077

SPECIFICATIONS

GENERAL SPECIFICATIONS

Items	SOHC engine	DOHC engine
Model	F4A33-1-MNQ1	F4A33-1-MNQ2
Type	Full automatic 4 speed transaxle	Full automatic 4 speed transaxle
Torque converter		
Type	3 element with torque converter clutch	3 element with torque converter clutch
Engine stall speed	1,800 – 2,800 rpm	2,200 – 3,200 rpm
Stall torque ratio	2.00	1.80
Transaxle		
Type	Electronically controlled 4-speed full-automatic	Electronically controlled 4-speed full-automatic
Gear ratio		
First	2.551	2.551
Second	1.488	1.488
Third	1.000	1.000
Fourth	0.685	0.685
Reverse	2.176	2.176
Final gear ratio	3.958	3.958
Speedometer gear ratio (Drive/Driven)	36/28	36/28

SERVICE SPECIFICATIONS

mm (in.)

Items	Specifications
Standard value	
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

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
1-2 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	0.8 (.031)	9.4 (.370)	33.9 (1.335)	12
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
Torque converter clutch control valve spring	0.7 (.028)	6.2 (.244)	14.2 (.559)	9.5

SPACER AND SNAP RING

Part name	Thickness mm (in.)	Identification symbol	Part No.
Spacer (for adjustment of transfer driven gear preload)	0.62 (.0244)	62	MD740866
	0.65 (.0256)	65	M D740867
	0.68 (.0268)	68	M D740868
	0.71 (.0280)	71	M D740869
	0.74 (.0291)	74	MD740870
	0.77 (.0303)	77	M D74087 1
	0.80 (.0315)	80	MD740872
	0.83 (.0327)	83	MD740873
	0.86 (.0339)	86	MD740874
	0.89 (.0350)	89	MD740875
	0.92 (.0362)	92	MD740876
	0.95 (.0374)	95	M D740877
	0.98 (.0386)	98	MD740878
	1.01 (.0398)	01	MD740879
	1.04 (.0409)	04	M D740880
	1.07 (.0421)	07	MD740881
	1.10 (.0433)	10	M D740882
	1.13 (.0445)	13	M D740883
	1.16 (.0457)	16	M D740884
	1.19 (.0469)	19	M D740885
	1.22 (.0480)	22	MD740886
	1.25 (.0492)	25	M D740887
	1.28 (.0504)	28	M D740888
	1.31 (.0516)	31	M D740889

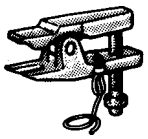
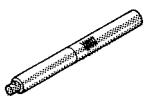
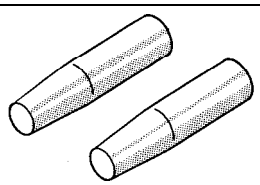
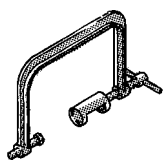
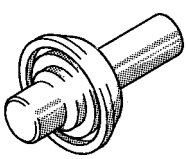
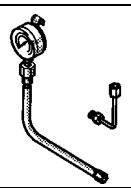
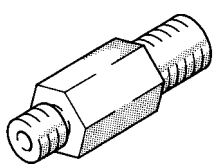
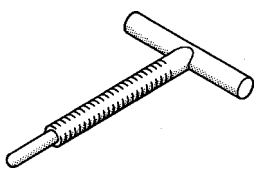
'art name	Thickness mm (in.)	Identification symbol	Part No.
Pressure plate (for adjustment of low-reverse brake end play)	5.9 (.232)	A	MD731 736
	6.0 (.236)	0	MD731 737
	6.1 (.240)	1	MD731 738
	6.2 (.244)	2	MD731 739
	6.3 (.248)	3	MD731 740
	6.4 (.252)	4	MD731 588
	6.5 (.256)	5	MD731741
	6.6 (.260)	6	MD731 742
	6.7 (.264)	7	MD731 743
	6.8 (.268)	8	MD731 744
	6.9 (.272)	9	MD731745
Spacer (for adjustment of differential case preload)	0.71 (.0280)	71	M D754446
	0.74 (.0291)	74	M D754447
	0.77 (.0303)	77	M D754448
	0.80 (.0315)	80	M D754449
	0.83 (.0327)	83	M D740846
	0.86 (.0339)	86	M D740847
	0.89 (.0350)	89	M D740848
	0.92 (.0362)	92	M D740849
	0.95 (.0374)	95	M D740850
	0.98 (.0386)	98	MD740851
	1.01(.0398)	01	MD740852
	1.04 (.0409)	04	M D740853
	1.07 (.0421)	07	M D740854
	1.10(.0433)	10	MD740855
	1.13(.0445)	13	M D740856
	1.16 (.0457)	16	M D740857
	1.19(.0469)	19	M D740858
	1.22 (.0480)	22	M D740859
	1.25 (.0492)	25	M D740860
	1.28 (.0504)	28	MD740861
	1.31 (.0516)	31	MD740862
	1.34 (.0528)	34	M D740863
	1.37 (.0539)	37	M D740864
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	MD721014
	1.94 (.0764)	Brown	MD721 015
	2.00 (.0787)	None	MD721016
	2.06 (.0811)	Blue	MD721017
	2.12 (.0835)	Brown	MD722539
	2.18 (.0858)	None	MD733315

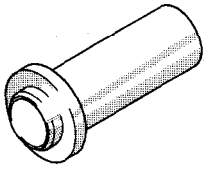
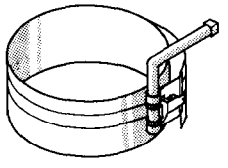
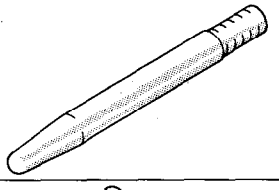
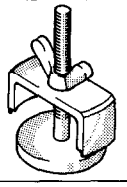
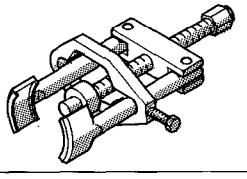
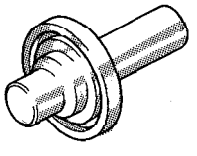
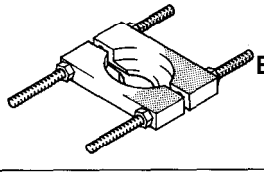
Part name	Thickness mm (in.)	Identification symbol	Part No.
Spacer (for adjustment of differential gear and pinion backlash)	0.75 – 0.82 (.0295 – .0323)	–	MD722986
	0.83 – 0.92 (.0327 – .0362)	–	MD722985
	0.93 – 1.00 (.0366 – .0394)	–	MD722984
	1.01–1.08 (.0398 – .0425)	–	M D722982
	1.09-1.16 (.0429 – .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	MD731749
	1.6 (.063)	None	MD731 750
	1.7 (.067)	Blue	MD731 751
	1.8 (.071)	Brown	MD731 752
	1.9 (.075)	None	MD731 753
	2.0 (.079)	Blue	MD731 754
	2.1 (.083)	Brown	MD731755
	2.2 (.087)	None	MD731 756
	2.3 (.091)	Blue	MD731 757
	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

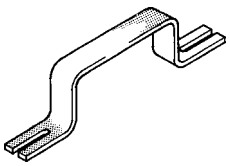
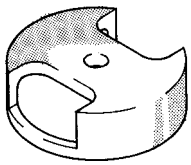
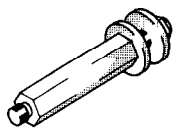
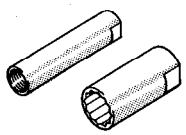
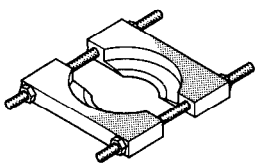
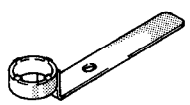
LUBRICANTS

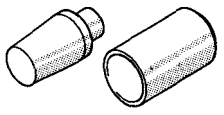
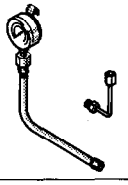
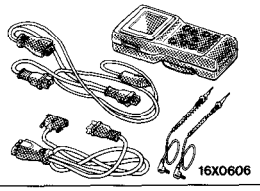
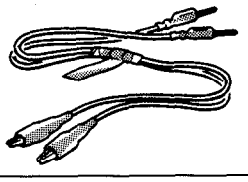
Items	Specified lubricants	Quantity
Transaxle fluid dm³ (qts.)	MOPAR ATF PLUS (Automatic transmission fluid type 7176) or Dia ATF SP or equivalent	7.5 (7.9)
Drive shaft oil seal lip		As required
Transaxle control Slide lever, Cam lever Selector lever assembly Bracket assembly, bushing, lever assembly, sleeve, spring, pushbutton	MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent	As required

SPECIAL TOOLS

Tool number and tool name	Replaced by Miller tool number	Application
 MB990635 Steering linkage puller	MB990635	• 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
 M 8990934 Installer adapter	–	Installation of transaxle case outer race
 MB990938 Installer bar	–	Use with MB990934
 M D998266 Guide pin	M D998266	Alignment of intermediate plate and valve body
 'MD998303 Valve spring compressor	–	Removal of installation of kickdown servo
 MD998325 Differential oil seal installer	M D998325	Installation of differential oil seal
 M D998330 Oil pressure gauge 3,000 kPa (400 psi)	E-3293	Measuring oil pressure
 MD998332 Adapter	M D998332	Connection of the oil pressure gauge
 M D998333 Oil pump remover	M D998333	Removal and installation of oil pump

Tool number and tool name	Replaced by Miller tool number	Application
 MD998334 **Oil seal installer**	MD998334	Installation of oil pump oil seal
 MD998335 Oil pump band	General service tool	**Reassembly of oil pump**
 MD998336 Guide pin	MD998336	Removal and installation of oil pump assembly
 MD998337 Spring compressor	MD998337	Disassembly and reassembly of front clutch and rear clutch
 MD998348 Bearing and gear puller	MD998056-A	Removal of transfer shaft bearing
 MD998800 **Oil seal installer**	–	Installation of drive shaft oil seal
 MD998801 **Bearing remover**	P-334	Removal of bearing
 MD998812 Installer cap	–	• Use with installer adapter • Removal and installation of kick down servo
 MD998822 Installer adapter (46)	–	**Installation of each bearing**

Tool number and tool name	Replaced by Miller tool number	Application
 MD998825 Installer adapter (52)	–	Installation of each bearing
 MD998829 Installer adapter (60)	–	Installation of each bearing
 M D998830 Installer adapter (66)	–	• Installation of each bearing • Removal and installation of kick down servo
 M D998905 Handle	M D998905	Removal and installation of low/reverse brake piston
 M D998907 Spring compressor	MD998907	Disassembly and reassembly of front clutch and rear clutch
 MD99891 5 Kickdown servo adjust wrench set	MD99891 5-A	Adjustment of kickdown servo
 MD998916 Kickdown servo adjust wrench set	MD998916	
 MD998917 Bearing remover	P-334	Disassembly and reassembly of output flange
 MD998918 Kickdown servo wrench	MD998918	Adjustment of kickdown servo

Tool number and tool name		Replaced by Miller tool number	Application
	MD998919 **Snap ring installer**	MD998919	Reassembly of end clutch
	MD999563 Oil pressure gauge 1,000 kPa (140 psi)	C-3292	Measuring oil pressure
	MB991502 Scan tool (MUT-II)	DRB-II Scan tool	Checking of the diagnostic trouble code
	MB991529 Diagnostic trouble code check harness	MB991529	Reading out of diagnostic trouble code by using a voltmeter

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 voltmeter.

↓

When the abnormal system is discovered, check each element (sensors, etc.) one by one, and make repairs as necessary.

When the abnormal condition is presumed to be in the hydraulic-pressure-control system, check by making an hydraulic-pressure test.

↓

When the result of the oil-pressure test does not satisfy the specified pressure, check each system at places related to the valve body, check the hydraulic-pressure 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

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

Presumed cause		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
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 convertor		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					
Hydraul -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 park/neutral position 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	TCC solenoid damaged or disconnecting wiring (valve closed)						X						
	32	TCC solenoid short-circuit or sticking (valve open)					⊗							
	33	Malfunction of overdrive control switch												
	34	Malfunction of oil-temperature sensor												
	35	Malfunction of lead switch												
	36	Poor contact of ignition switch	X											
	37	Malfunction of transaxle control module												X

NOTE: ⊗ indicates items of priority during inspection,
PSCV = Pressure control solenoid valve

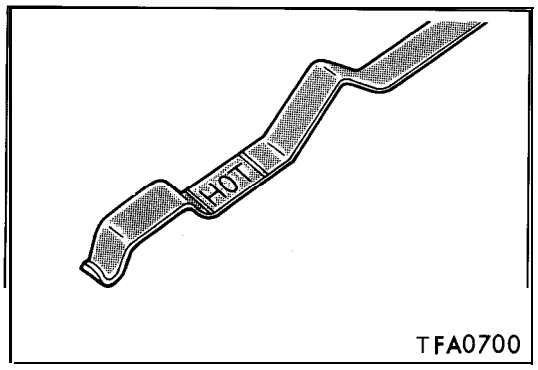
Abbreviations: TPS = Throttle position sensor
TCC solenoid = Torque converter clutch solenoid

SCSV = Shift control solenoid valve
OD = Overdrive

	Transaxle malfunction or shift-shock (after start-off)																Abnormal noise, other			
	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 vibrato-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)	Torque converter clutch won't function	Abnormal vibration in high-load region in low gear (approx. 1 Hz)	Abnormal noise from convertor housing togetherwith engine rpm	Mechanical noise (clatter noise) from convertor 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											X	X					X			
6																				
7																			X	
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	X				
14	X							X	X		X									
15																				
16							X			X		X								
17							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
30											X	X								
31															X					
32																X				X
33		X	X																	
34														X	X	X				
35																				X
36																				X
37	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X			X

DIAGNOSIS AND TEST

FLUID LEVEL AND CONDITION

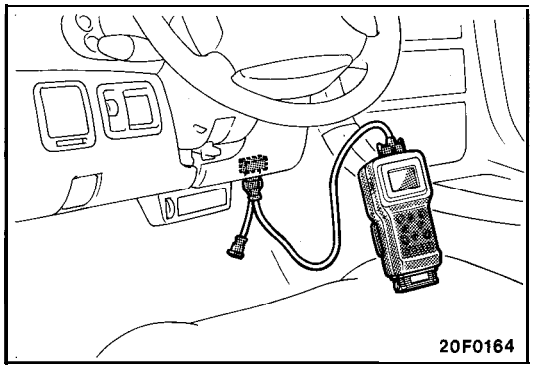


1. Drive until the fluid temperature reaches the usual temperature [70 – 80°C (158 – 176°F)].
2. Place vehicle on level floor.
3. Move selector lever sequentially to every position to fill torque converter and hydraulic circuit with fluid, then place lever in "N" Neutral position. This operation is necessary to be sure that fluid level check is accurate.
4. Before removing dipstick, wipe all dirt from area around dipstick. Then take out the dipstick and check the condition of the fluid.
   The transaxle should be overhauled under the following conditions.
   - If there is a "burning" odor.
   - If the fluid color has become noticeably blacker.
   - If there is a noticeably great amount of metal particles in the fluid.
5. Check to see if fluid level is in "HOT" range on dipstick. If fluid level is low, add automatic transmission fluid until level reaches "HOT" range.
   Low fluid level can cause a variety of conditions because it allows pump to take in air along with fluid. Air trapped in hydraulic circuit forms bubbles which make fluid spongy. Therefore, pressures will be erratic,
   Improper filling can also raise fluid level too high. When transaxle has too much fluid, gears churn up foam and cause same conditions which occur with low fluid level, resulting in accelerated deterioration of automatic transmission fluid.
   In either case, air bubbles can cause overheating, fluid oxidation, which can interfere with normal valve, clutch, and servo operation. Foaming can also result in fluid escaping from transaxle vent where it may be mistaken for a leak.
6. Be sure to examine fluid on dipstick closely.

CONTROL CABLE

Whether control cable is properly adjusted can be confirmed by checking whether park/neutral position switch is performing well.

1. Apply parking brakes and service brakes securely.
2. Place selector lever to "R" range.
3. Set ignition key to "ST" position.
4. Slowly move the selector lever upward until it clicks as it fits in notch of "P" range. If starter motor operates when lever makes a click, "P" position is correct.
5. Then slowly move selector lever to "N" range by the same procedure as in foregoing paragraph. If starter motor operates when selector lever fits in "N", "N" position is correct.
6. Also check to be sure the vehicle doesn't begin to move and the lever doesn't stop between P-R-N-D.
7. The control cable is properly adjusted if, as described above, the starter motor starts at both the "P" range and the "N" range.



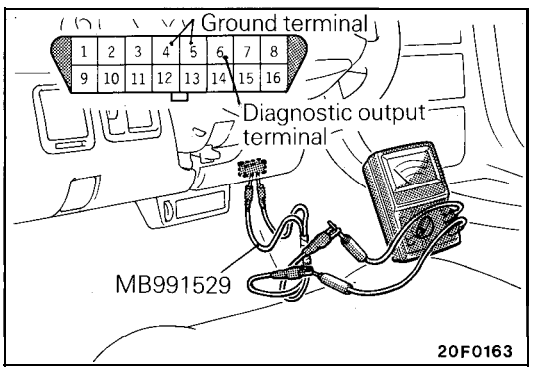
DIAGNOSIS FUNCTION

METHOD OF READING THE DIAGNOSTIC TROUBLE CODES

When using the scan tool

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

(1) Connect the scan tool to the data link connector.
(2) Take a reading of the diagnostic output.
(3) Repair the problem location, referring to the diagnostic chart.
(4) After turning the ignition switch once to OFF, turn it back to ON.



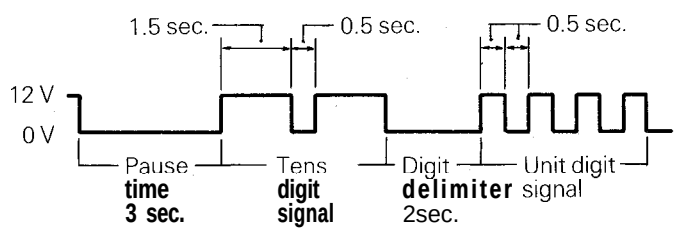
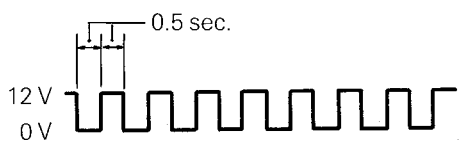
When using the voltmeter

(1) Connect an analog voltmeter to the diagnostic output terminal (No. 6 terminal) and the ground terminal (No. 4 or 5 terminal) of the data link connector.

Caution
When connecting the voltmeter to the ground terminal (No. 4 or 5 terminal), use the special tool (diagnostic trouble code check harness).

(2) Observe the voltmeter pointer deflection to read out the diagnostic trouble codes.
(3) Repair the problem location, referring to the diagnostic chart

Diagnostic result indication by voltmeter

Example of diagnostic trouble code output voltage waveform	Waveform when normal
Waveform for diagnostic trouble code No. 24 	

NOTE
Other diagnostic items are also indicated by the voltage waveforms corresponding to the code numbers obtained when using a scan tool.

METHOD OF ERASE THE DIAGNOSTIC TROUBLE CODES

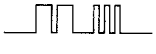
When using the scan tool

(1) Turn the ignition switch to OFF and then back to ON again.
(2) Erase the diagnostic trouble codes.
(3) Check to be sure that no diagnostic trouble codes exist.

When using the voltmeter

(1) Turn the ignition switch to the OFF.
(2) After disconnecting the battery cable from the battery (–) terminal for 10 seconds or more, reconnect the cable.
(3) Turn the ignition switch to the ON, read of the diagnostic trouble codes and check that a normal code is output.

FAULT CODE DESCRIPTION

Code No.	Display Pattern	Item	Remedial Action
11		Excessively large throttle position sensor output	• Check throttle position sensor connector. • Check throttle position sensor on bench. • Adjust throttle position sensor.
12		Excessively small throttle position sensor output	
13		Defective or improperly adjusted throttle position sensor	
14		Improperly adjusted throttle position sensor	
15		Open-circuited oil-temperature sensor	• Check oil temperature sensor connector. • Check oil temperature sensor on bench.
21		Open-circuited kickdown servo switch	• Check kickdown servo switch connector. • Check kickdown servo switch on bench.
22		Short-circuited kickdown servo switch	
23		Open-circuited ignition pulse pickup cable	• Check ignition pulse signal line.
31		Open-circuited pulse generator A	• Check pulse generator A or B on bench. • Check vehicle-speed reed switch (chattering).
3 2		Open-circuited pulse generator B	
41		Open-circuited shift control solenoid valve A	• Check solenoid valve connector. • Check shift control solenoid valve A on bench.
42		Short-circuited shift control solenoid valve A	

12A0104
12A0107

Code No.	Display Pattern	Item	Remedial Action
43		Open-circuited shift control solenoid valve B	• Check solenoid valve connector. • Check shift control solenoid valve B on bench.
44		Short-circuited shift control solenoid valve B	
45		Open-circuited pressure control solenoid valve	• Check solenoid valve connector. • Check pressure control solenoid valve on bench.
46		Short-circuited pressure control solenoid valve	
47		Open-circuited torque converter clutch solenoid	• Check solenoid valve connector. • Check torque converter clutch solenoid on bench.
4%		Short-circuited torque converter clutch solenoid	
49		Defective torque converter clutch system	• Check torque converter clutch hydraulic circuit. • Check torque converter clutch solenoid on bench. • Replace control unit.
51		1 st gear incorrect ratio	• Check connectors of pulse generators A and B. • Check pulse generators A and B on bench. • Rear clutch slipping
52		2nd gear incorrect ratio	• Check connectors of pulse generators A and B. • Check pulse generators A and B on bench. • Rear clutch slipping • Kickdown brake slipping
53		3rd gear incorrect ratio	• Check connectors of pulse generators A and B. • Check pulse generators A and B on bench. • Front clutch slipping • Rear clutch slipping
54		4th gear incorrect ratio	• Check connectors of pulse generators A and B. • Check pulse generators A and B on bench. • End clutch slipping • Kickdown brake slipping

12A0107
12A0105

Code No.	Display Pattern	Item	Remedial Action
59		Occurrence of abnormal vibration	• Check connector of pulse generator A. • Check generator A on bench. • Replace automatic transmission fluid
61		Short-circuited torque reduction request signal line or open-circuited torque reduction execution signal line	• Check torque reduction request signal line. • Check torque reduction execution signal line.
62		Open-circuited torque reduction request signal line	• Check torque reduction request signal line.
63		Short-circuited torque reduction execution signal line	• Check torque reduction execution signal line.

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
83		Open- or short-circuitec shift control solenoid valve A	Fixed at 3rd	41, 42
84		Open- or short-circuitec shift control solenoid valve B	Fixed at 3rd	43, 44
85		Open- or short-circuitec pressure control solenoid valve	Fixed at 3rd (D) or 2nd (2, L)	45, 46
86		Incorrect gear ratio	Fixed at 3rd (D) or 2nd (2, L)	51, 52 53.54

12L0296

INSPECTION OF CONTROL SYSTEM

Check the control system by using the scan tool and following the procedure given below.

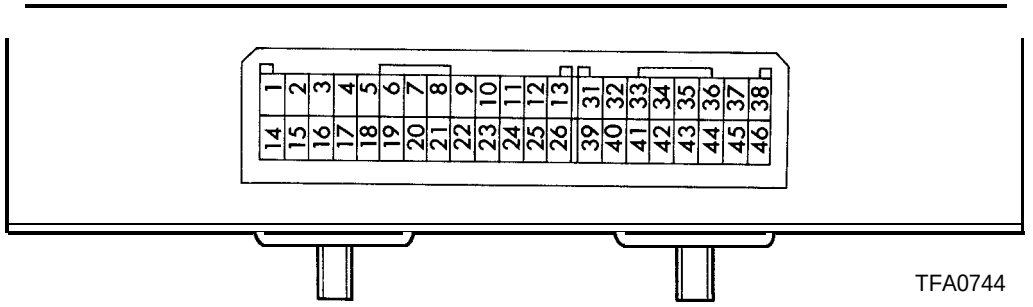
CONTROL SYSTEM INSPECTION TABLE

Check Item	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	• TPS is improperly adjusted if voltage is high when accelerator pedal is fully depressed or released. • TPS or circuit harness is defective if there is no change. • TPS or accelerator pedal cable is defective if change is not smooth.
	Accelerator pedal slowly depressed	Varies with throttle opening degree	
	Accelerator pedal fully depressed	4.5 – 5.0 V	
Oil temperature sensor • Data list • Item No. 15	Cold engine (before start)	Equivalent to outside temperature	• Defective oil temperature sensor or circuit harness
	Engine warming up	Gradually increases	
	After engine warming up	80 – 110°C	
Kickdown servo switch • Data list • Item No. 21	L range, idle	ON	• Improperly adjusted kickdown servo • Defective kickdown servo switch or circuit harness • Defective kickdown servo
	D range, 1st or 3rd speed	ON	
	D range, 2nd or 4th speed	OFF	
Ignition signal line • Data list • Item No. 23	N range, idle	650 – 900 rpm	• Defective ignition system • Defective ignition signal pickup circuit harness
	N range, 2,500 rpm (tachometer reading)	2,400 – 2,600 rpm	
Closed throttle position switch • Data list • Item No. 25	Accelerator pedal fully released	ON	• Improperly adjusted TPS • Defective TPS or circuit harness
	Accelerator pedal slightly depressed	OFF	
Air conditioning compressor clutch relay signal • Data list • Item No. 26	D range, air conditioning idle-up	ON	• Defective air-conditioning compressor clutch power relay ON signal detection circuit harness
	D range, air conditioning idle OFF	OFF	
Transaxle gear position • Data list • Item No. 27	D range, idle	C	• Defective TCM • Defective accelerator pedal switch circuit • Defective park/neutral position switch circuit • Defective TPS circuit
	L range, idle	1ST	
	2 range, 2nd speed	2ND	
	D range, O/D OFF, 3rd speed	3RD	
	D range, O/D, 4th speed	4TH	
Pulse generator A • Data list • Item No. 31	D range, stop	0 rpm	• Defective pulse generator A or circuit harness • Defective pulse generator A shielded wire • External noise interference
	D range, 3rd speed, driven at 50 km/h (31 mph)	1,600 – 2,000 rpm	
	D range, 4th speed, driven at 50 km/h (31 mph)	1,100 – 1,400 rpm	

Check Item	Description		Possible Cause of Trouble (or Remedy)
	Condition	Criteria	
Pulse generator B • Data list • Item No. 32	D range, stop	0 rpm	• Defective pulse generator B or circuit harness • Defective pulse generator B shielded wire • External noise interference
	D range, 3rd speed, driven at 50 km/h (31 mph)	1,600 – 2,000 rpm	
	D range, 4th speed, driven at 50 km/h (31 mph)	1,600 – 2,000 rpm	
Overdrive switch • Data list • Item No. 35	Overdrive switch in ON position	OD	• Defective overdrive switch or circuit harness
	Overdrive switch in OFF position	OD-OFF	
Power/economy select switch • Data list • Item No. 36	Power pattern selected (including economy pattern control with low oil temperature)	Power	• Defective power/economy select switch or circuit harness
	Economy pattern selected	Economy	
Park/neutral position switch • Data list • Item No. 37	Shifted to P range	P	• Improperly adjusted park/neutral position switch • Defective 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)	• Vehicle-speed reed switch is defective if a high-speed signal is output where vehicle is stationary. • Otherwise, vehicle-speed reed switch or circuit harness is defective.
	Driven at 30 km/h (19 mph)	30 km/h (19 mph)	
	Driven at 50 km/h (31 mph)	50 km/h (31 mph)	
PCSV duty • Data list • Item No. 45	D range, idle	50 – 70%	• Duty should become 100% when accelerator pedal is depressed even a little from D range idle conditions. • Defective TCM • Defective TPS circuit • Defective accelerator pedal switch circuit
	D range, 1st speed	100%	
	D range, gear being shifted	Depends on conditions	
Torque converter clutch slip • Data list • Item No. 47	D range, 3rd speed, 1,500 rpm (tachometer reading)	100 – 300 rpm	• Defective torque converter clutch • Defective ignition signal line or pulse generator B circuit • Incorrect transmission fluid pressure • Defective TCC solenoid
	D range, 3rd speed, 3,500 rpm (tachometer reading)	0 rpm	
TCC solenoid duty • Data list • Item No. 49	D range, 3rd speed, 1,500 rpm (tachometer reading)	0%	• Defective TCM • Defective TPS circuit • Defective pulse generator B circuit
	D range, 3rd speed, 3,500 rpm (tachometer reading)	Depends on loads	

TRANSAXLE CONTROL UNIT

The connector has 42 pins to accommodate the increased number of sensor inputs. Here are the pin assignments



1. **Torque converter clutch solenoid**
2. **Shift control solenoid valve A (SCSV-A)**
3.
4. **Engine communication signal**
5. –
6.
7. Kickdown **servo switch**
8. **Air conditioning relay signal**
9. **On-board diagnostic output terminal**
10. **Pulse generator B (PG-B) output**
11. **Diagnostic test mode control terminal**
12. **Power source**
13. **Ground**
14. **Pressure control solenoid valve (PCSV)**
15. **Shift control solenoid valve B** (SCSV-B)
16.
17. **Engine communication signal**
18. **Engine communication signal**
19.
20. **Closed throttle position switch**
21. **Throttle position sensor** (TPS)
22. –
23. **Oil temperature sensor**
24. **Sensor ground**
25. **Power source**
26. **Ground**

31. **Park/neutral position switch** (P)
32. **Park/neutral position switch** (R)
33. **Park/neutral position switch** (N)
34. **Park/neutral position switch** (D)
35. **Park/neutral position switch (2)**
36. **Park/neutral position switch** (L)
37. **Overdrive switch**
38. **Power mode signal**
39. **Power source (back up)**
40. **Vehicle-speed reed switch**
41. **Pulse generator B** (PG-B)
42. **Pulse generator B (PG-B)**
43. **Pulse generator A (PG-A)**
44. **Pulse generator A** (PG-A)
45. **Ground**
46. **Ignition pulse**

ELEMENT IN USE AT EACH POSITION OF SELECTOR LEVER

Selector lever position	Overdrive control switch	Shifting gear	Gear ratio	Engine start	Parking mechanism	Clutch				Brake	
						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**	**1 st**	**2.551**				•		•		
		2nd	**1.488**				•			•	
		3rd	1.000			•	•	•			
2		**1 st**	**2.551**				•		•		
		2nd	**1.488**				•			•	
L	–	**1 st**	**2.551**				•				•

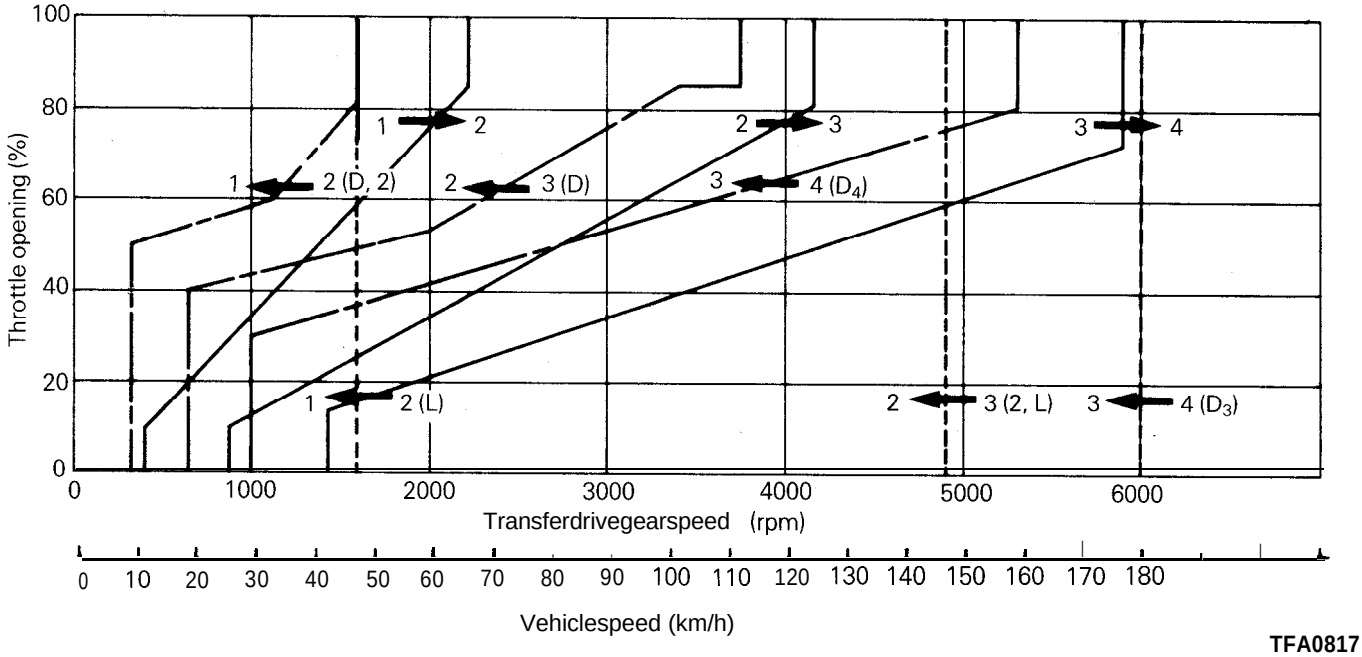
NOTE
Cl ... Front clutch
C2 Rear clutch
C3 End clutch
B1... **Low reverse brake**
B 2 Kickdown **brake**
OWC One way clutch

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 up-shifts and for down-shifts is so that up-shifts and down-shifts will not occur frequently when driving at a speed in the vicinity of the shift point.
When the vehicle is stopped, there is a shift to 2nd gear in order to obtain a suitable “creeping”, but when the accelerator pedal is then depressed the vehicle starts off in 1st gear.

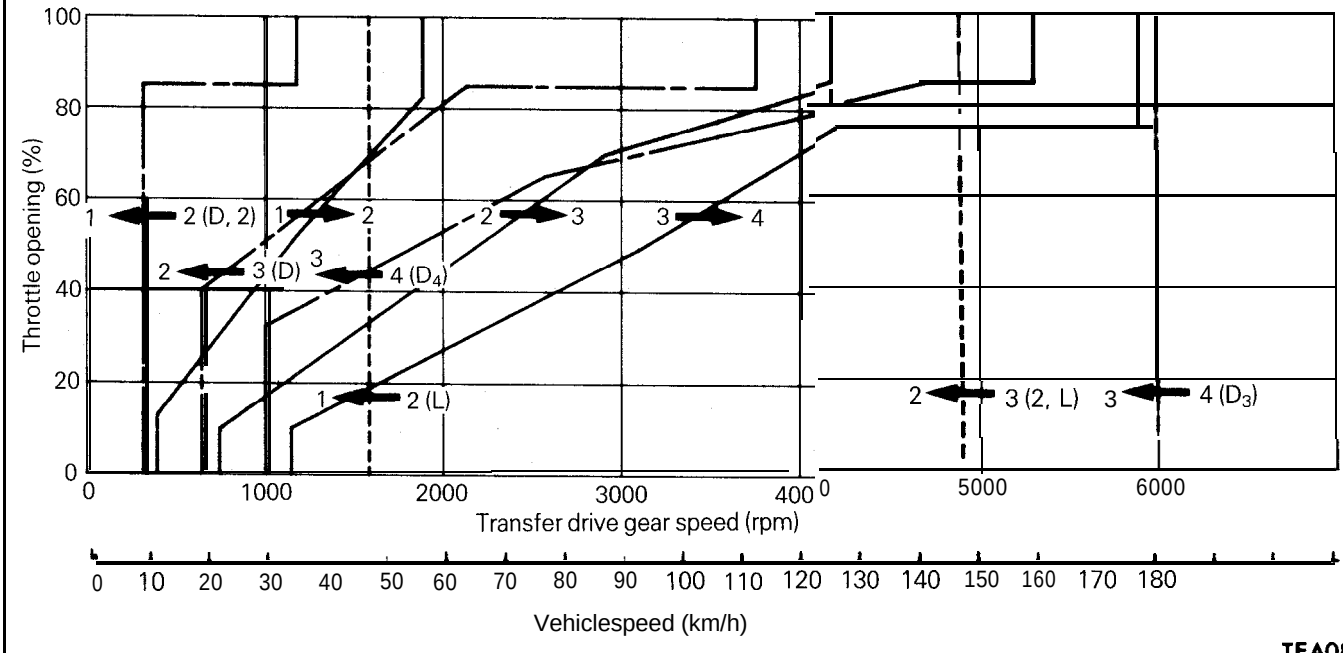
<Vehicles with DOHC engine>

P range



TFA0817

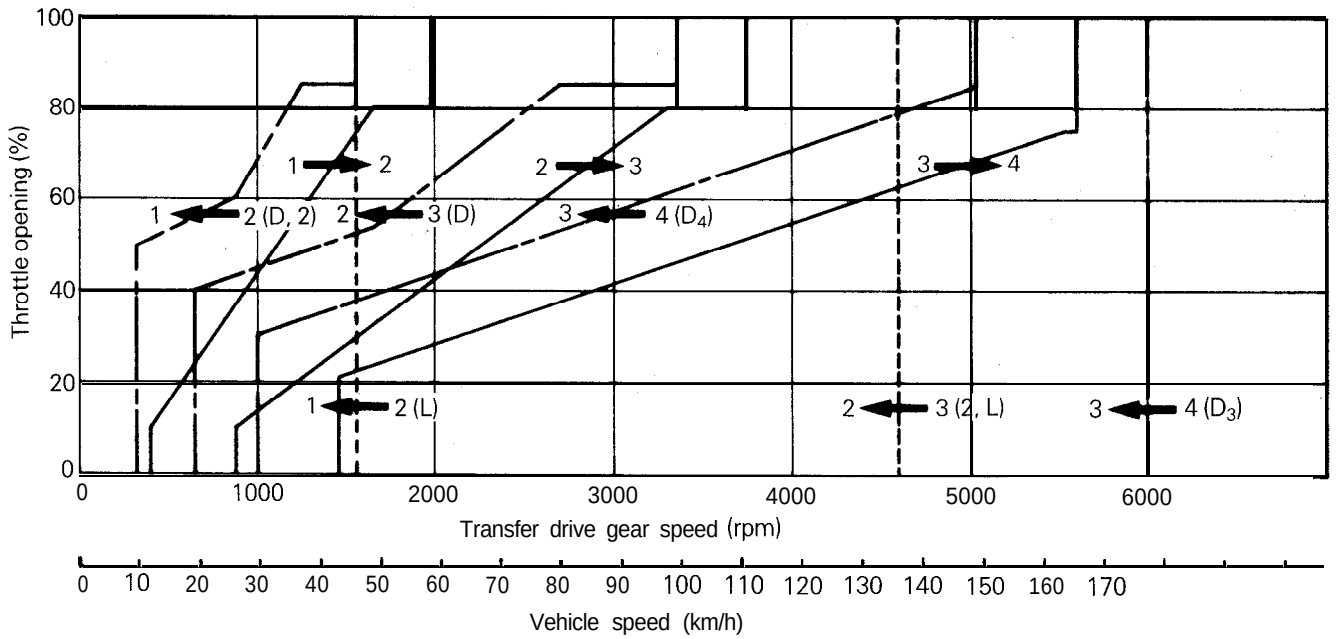
E range



TFA0818

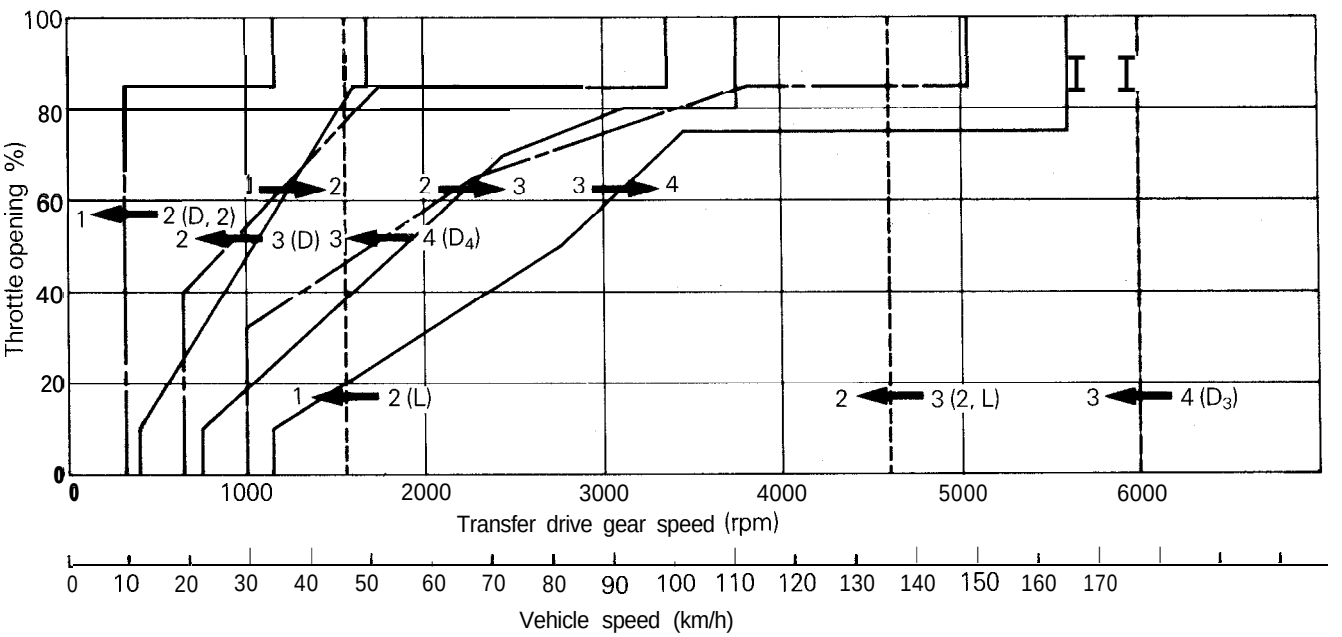
<Vehicles with SOHC engine>

P range



TFA0819

E range



TFA0820

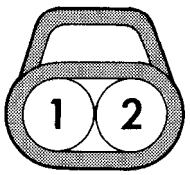
INSPECTION OF ELECTRONIC CONTROL SYSTEM COMPONENTS

1. Wiring

Based on the wiring diagram, check whether the continuity and grounding of each harness is OK.

- No continuity → Improper connection of connector, damaged or disconnected harness, or incorrect wiring connection. → Reconnect the connector; repair or replace the harness.
- Continuity → Normal

2. Oil-temperature sensor



1: Oil temperature sensor
2: Ground

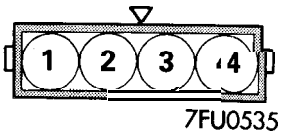
TFA0821

Vary the thermo-sensitive part temperature and check the resistance between the terminals ① and ②.

- No continuity (resistance: ∞) → Damaged or disconnected wiring → Replace the oil-temperature sensor
- Changes of the resistance continuous and smooth. → Normal

3. Throttle-position sensor (TPS)

TPS terminal



7FU0535

1. Ground
2. Closed throttle position switch
3. Output
4. Power

Check the resistance between terminals 1 and 4 of the TPS.

- Resistance: high or infinite → Damaged or disconnected wiring → Replace the TPS.
- 3.5 – 6.5 kΩ/20°C (66°F)

Check the resistance between terminals 4 and 2 with the engine idling after throttle-valve opening warm-up.

- Resistance: more or less than 0.4 kΩ/20°C (68°F) → Improper adjustment → Readjust the TPS installation.
- Resistance: approx. 0.4 kΩ/20°C (68°F)

Check for changes of the resistance between terminals 4 and 2 when the throttle valve is operated from the idling position to the fully open position.

- Changes of the resistance are not continuous. → Poor contact → Replace the TPS.
- Changes of the resistance continuous and smooth. → Normal

4. Pulse generator A or B

Check the resistance between terminals 1 and 2 or 3 and 4.

Resistance: too low or too high → Short-circuit, or damaged or disconnected wiring → Replace the pulse generator.

215-275 Ω/20°C (68°F) → Normal

Pulse generator terminals
1-2: pulse generator A
3-4 pulse generator B

1750338

5. Pulse generator A or B (checking by an oscilloscope)

Connect the pulse generator and body harness, and connect an oscilloscope. Check with the chassis on a dynamo or with the front wheels raised.

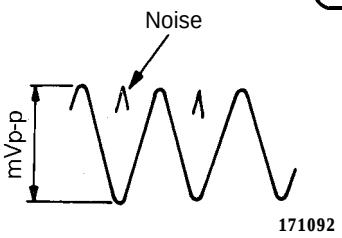
With the selector lever at the "L" position and the engine running at 1,000 rpm, check the voltage waveform between terminals 1 and 2.

Very low voltage → Incorrect installation of the pulse generator, or malfunction of the pulse generator. → Correct the installation condition, or replace the pulse generator.

Noise in the waveform → Improper grounding of the pulse generator circuit's shielded wiring. → Replace the pulse generator.

1,000 mVp-p or higher

Oscilloscope waveform



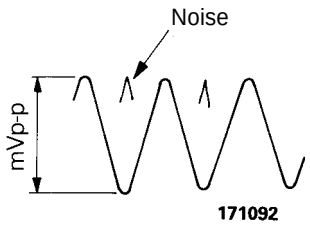
171092

With the selector lever at the "L" position and the engine running at 1,000 rpm. check the voltage waveform between terminals 3 and 4.

Very low voltage → Incorrect installation of the pulse generator, or malfunction of the pulse generator. → Correct the installation condition, or replace the pulse generator.

Noise in the waveform → Improper grounding of the pulse generator circuit's shielded wiring. → Replace the pulse generator.

500 mVp-p or higher



171092

Normal

6. Pressure-control solenoid valve (PCSV)

Check the resistance between terminal 1 of the solenoid valve connector and the transaxle case.

- Resistance: too low or too high → Short-circuit, or damaged or disconnected wiring → Replace the PCSV.
- 2.9 ±0.3Ω/20°C (68°F)

Connect 12V between the transaxle case and terminal 1; switch ON and OFF and check for operation noise.

- No operation noise. (stroke: 0.3 mm (.012 in.) or less) → Foreign material caught between the valve and guide → Replace the PCSV.
- Noise exists.
- Normal

Solenoid valve connector terminals

1 : PCSV
2: TCC solenoid
3: SCSV-A
4: SCSV-B

1750338

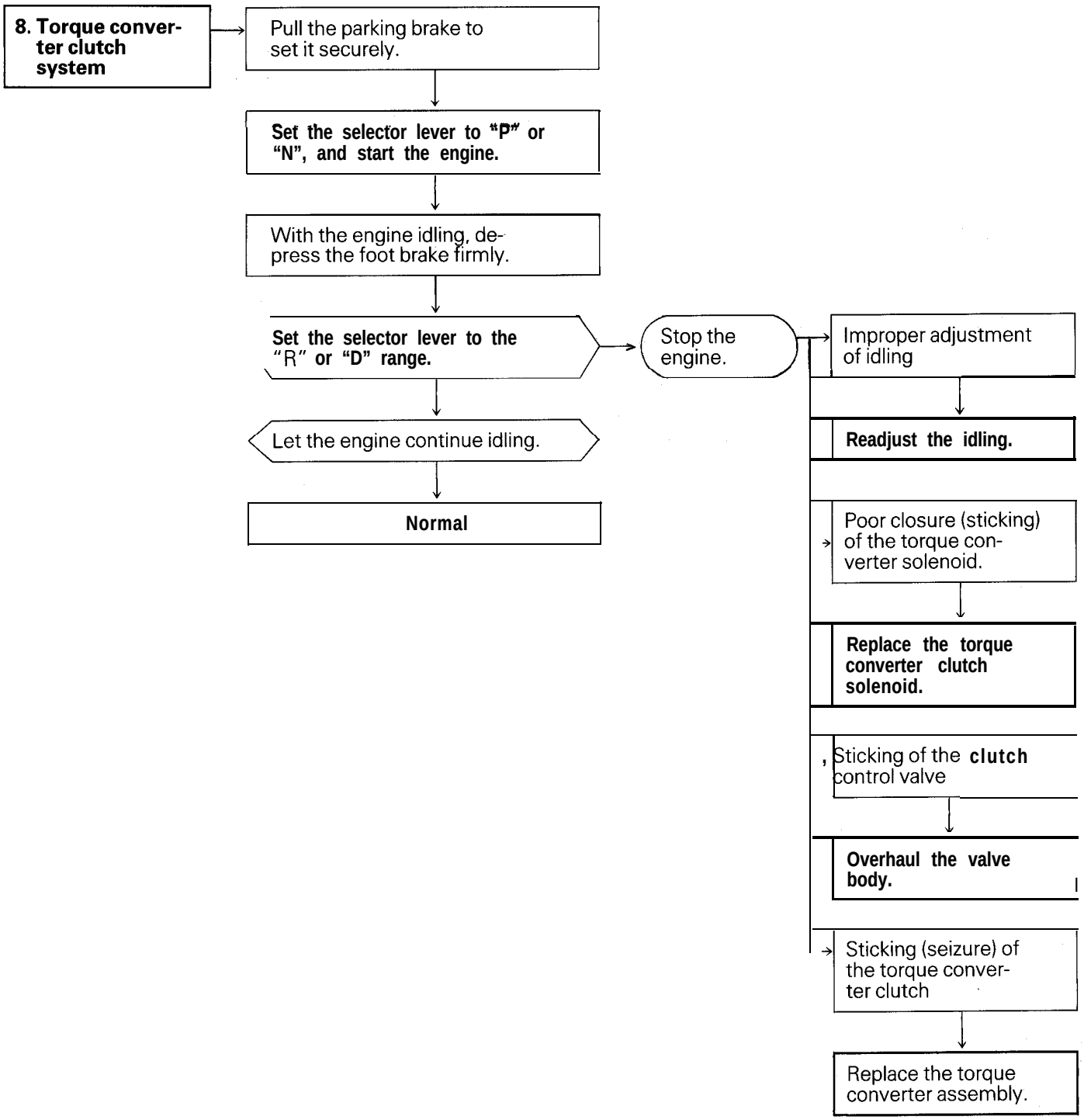
7. Shift-control solenoid valve (SCSV) A or B

Check the resistance between terminal 3 or 4 of the solenoid valve connector and the transaxle case.

- Resistance: too low or too high → Short-circuit, or damaged or disconnected wiring → Replace the SCSV.
- 22.3 ±1.5Ω/20°C (68°F)

Connect 12V between the transaxle case and terminal 3 or 4; switch ON and OFF and check for operation noise of the solenoid valve, and check the valve stroke.

- No operation noise. (stroke: 0.25 mm (.010 in.) or less) → Residue accumulated in valve and core. → Replace the SCSV.
- Noise exists.
- Normal


8. Torque converter clutch system
Pull the parking brake to set it securely.
Set the selector lever to "P" or "N", and start the engine.
With the engine idling, depress the foot brake firmly.
Set the selector lever to the "R" or "D" range.
Stop the engine.
Improper adjustment of idling
Readjust the idling.
Let the engine continue idling.
Normal
Poor closure (sticking) of the torque converter solenoid.
Replace the torque converter clutch solenoid.
Sticking of the clutch control valve
Overhaul the valve body.
Sticking (seizure) of the torque converter clutch
Replace the torque converter assembly.

9. Torque converter solenoid (TCC solenoid)

Solenoid valve connector terminals

1: PCSV
2: TCC solenoid
3: scsu-A
4: SCSU-B

1750338

Check the resistance between terminal 2 of the solenoid valve connector and the transaxle case.

- **Resistance: too low or too high** → Short-circuit, or damaged or disconnected wiring. → Replace the TCC solenoid.
- **Standard value: 13 Ω/20°C(68°F)**

Connect 12 V between the transmission case and terminal 2; switch ON and OFF and check for operation noise.

- **No operation noise. Check for sticking. * (Valve stroke: 0.3 mm (.012 in.) or less)** → Foreign terminal caught between the valve and guide → Replace the TCC solenoid.

***Sticking is usually at the release side.**

- Noise exists.

Normal

10. Park/neutral position switch

TFA0802

In the "P" range, check for continuity between terminals 3 and 4, and terminals 7 and 8.

↓

Continuity exists

↓

In the "R" range, check for continuity between terminals 2 and 3, and terminals 5 and 6.

↓

Continuity exists

↓

In the "N" range, check for continuity between terminals 3 and 12, and terminals 7 and 8.

↓

Continuity exists

↓

In the "D" range, check for continuity between terminals 3 and 10.

↓

Continuity exists

↓

In the "2" range, check for continuity between terminals 3 and 11.

↓

Continuity exists

↓

In the "L" range, check for continuity between terminals 3 and 9.

↓

Continuity exists

↓

Normal

No continuity → Poor contact, or damaged or disconnected wiring.

↓

Replace the park/neutral position switch.

11. Kickdown (K/D) servo switch

TF A0809

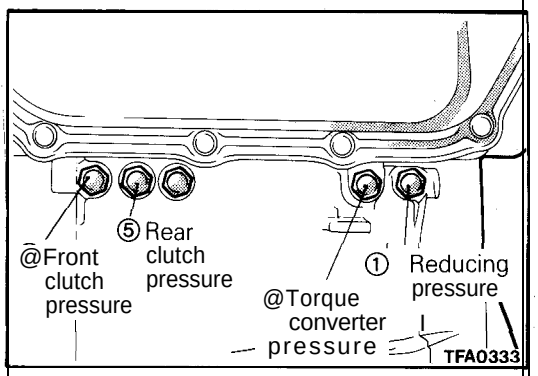
Check for continuity between the kickdown **servo switch terminal** and the transaxle case.

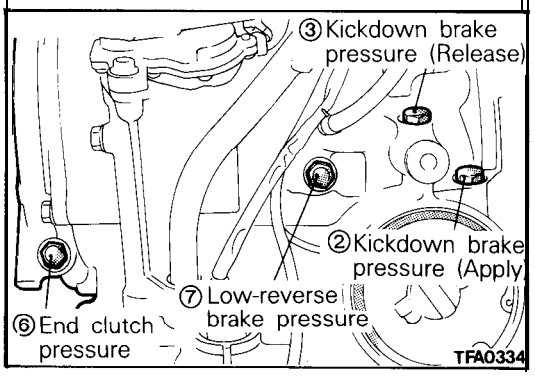
- No continuity → Poor contact, or damaged or disconnected wiring. → Replace the K/D servo switch.
- Continuity exists → **Start the engine, set to the "D" range, and let the engine idle; check for continuity between the** kickdown **servo switch terminal and the transaxle case. NOTE: Be sure the brakes are applied during this check.**
  - Continuity exists → Poor contact (sticking) → Replace the K/D servo switch.
  - **No continuity** → **Normal**

12. Transaxle control module (TCM)

Disconnect the harness (both A and B connectors) from the vehicle's **TCM. Then connect, via an intermediate harness for checking, a new TCM to this harness and make a road test.**

- The problem does not occur. → Malfunction of the original TCM → Install a new TCM.
- **Consider the original TCM to be** normal, and again check the sensors, wiring, etc. → **Same problem (as before TCM exchange) occurs.**





HYDRAULIC PRESSURE TESTS

1. Completely warm up the transaxle.
2. Raise the vehicle by using a jack so that the front wheels can be rotated.
3. Connect an engine tachometer and place it in a position where it's easy to see.
4. Attach the special oil-pressure gauge (MD998330 or MD999563) and the adaptor (MD998332) to each oil-pressure outlet port.
   When the reverse position pressure is to be tested, the 3,000 kPa (400 psi) type of gauge should be used.
5. Measure the hydraulic pressure under various conditions, and check to be sure that the measured results are within the standard value range shown in the "Standard oil pressure table" below.
   If the oil pressure is not within the specified range, check and repair as described in the section "Remedial action to take for inadequate hydraulic pressure" on the next page.

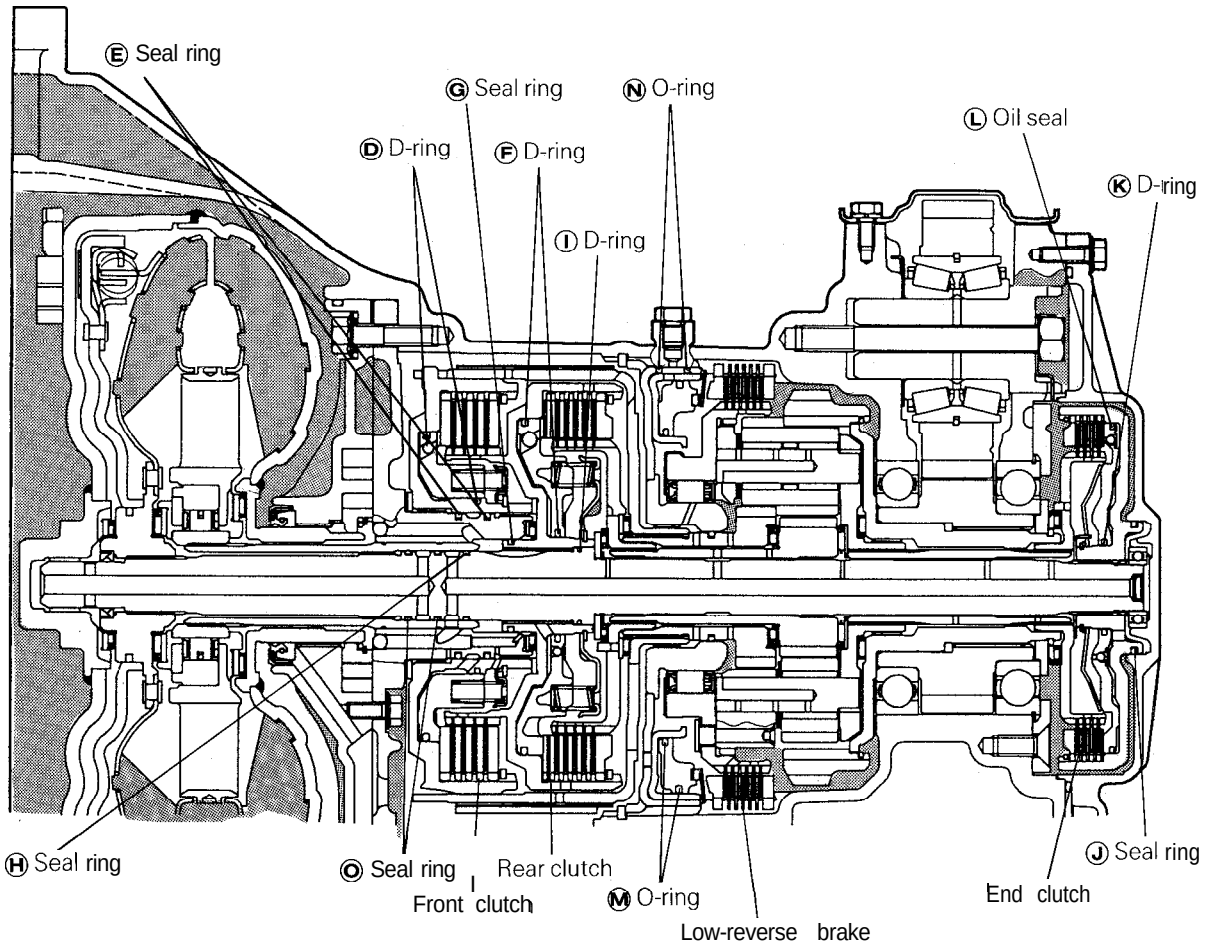
STANDARD HYDRAULIC PRESSURE TABLE

No.	Conditions			Standard oil pressure kPa (psi)							
	Select lever position	Engine speed rpm	Gear position	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)	–		a
3	D (SW-ON)	Approx. 2,500	4th	360 – 480 (51 – 68)	830 – 900 (118 – 128)	–	–	–	830 – 900 (118 – 128)	–	450 – 650 (64 – 92)
4	D (SW-OFF)	Approx. 2,500	3rd	360 – 480 (51 – 68)	830 – 900 (118 – 128)	830 – 900 (118 – 128)	830 – 900 (118 – 128)	830 – 900 (118 – 128)	830 – 900 (118 – 128)	–	450 – 650 (64 – 92)
5	2	Approx. 2,500	2nd	360 – 480 (51 – 68)	830 – 900 (118 – 128)	–	–	830 – 900 (118 – 128)	–	–	450 – 650 (64 – 92)
6	L	Approx. 1,000	1st	360 – 480 (51 – 68)	–	–	–	830 – 900 (118 – 128)	–	300 – 450 (43 – 64)	☆
7	R	Approx. 2,500	Reverse	360 – 480 (51 – 68)		1,640 – 2,240 (233 – 319)	1,640 – 2,240 (233 – 319)	–	–	1,640 – 2,240 (233 – 319)	450 – 650 (64 – 92)
		Approx. 1,000	Reverse	360 – 480 (51 – 68)	–	1,000 (142) or more	1,000 (142) or more	–	–	1,000 (142) or more	450 – 650 (64 – 92)

NOTE
(1) –: Indicates pressure is below 10kPa (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 HYDRAULIC PRESSURE

Symptom	Possible cause	Remedy
1. All line pressures are low (or high). Remarks: Line pressures are ②, ③, ④, ⑤, ⑥ and ⑦ shown on the Standard Hydraulic 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 (K/D 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 @and D-ring Ⓑ of K/D servo piston and seal ring Ⓒ 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 @and D-ring Ⓑ of K/D servo piston and seal ring Ⓒ 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 Ⓑ of K/D servo piston and seal ring Ⓒ of sleeve b. Defective valve body assembly c. Worn front clutch piston and retainer or defective D-ring Ⓓ or seal ring Ⓔ	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.
6. Improper rear clutch pressure	a. Defective D-ring Ⓕ of piston, seal ring Ⓖ of retainer, and seal ring @and D-ring Ⓘ 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 Ⓙ, D-ring Ⓚ, and oil seal Ⓛ 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.
3. Improper low-reverse brake pressure	a. Damaged O-ring between valve body and transmission b. Defective valve body assembly c. Defective D-ring Ⓜ of piston or O-ring Ⓝ 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
9. Improper torque converter pressure	a. Sticking torque converter clutch solenoid (TCC solenoid) or torque converter clutch control valve b. Plugged or leaky oil cooler and pipings c. Damaged seal ring Ⓞ of input shaft d. Defective torque converter	a. Check torque converter clutch system and TCC solenoid 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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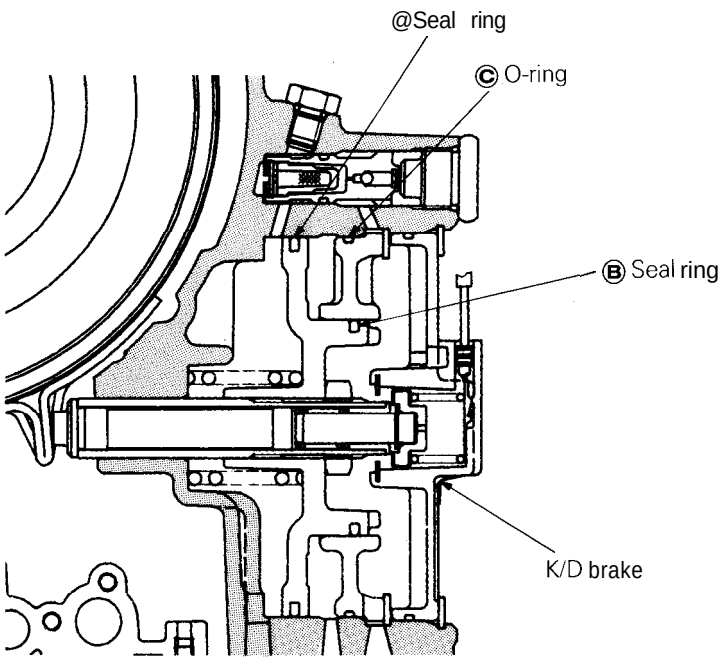

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CONVERTER STALL TEST

Stall test consist of determining maximum engine speed obtained at full throttle in "D" and "R" positions. This test checks torque converter stator overrunning clutch operation, and holding ability of transaxle clutches and low-reverse brake.

Caution
During this test, make sure that no one stand in front of or behind vehicle.

1. Check transmission fluid level. Fluid should be at normal operating temperature [70 – 80°C (158 – 176°F)]. Engine coolant should also be at normal operating temperature [80 – 90°C (176 – 194°F)].
2. Apply chocks to both rear wheels.
3. Attach engine tachometer.
4. Apply parking and service brakes fully.
5. Start engine.
6. With selector lever in "D" position, depress accelerator pedal fully to read engine maximum rpm. Do not hold throttle wide open any longer than is necessary to obtain maximum engine rpm reading, and never longer than 5 seconds at a time. If more than one stall test is required, operate engine at approximately 1,000 rpm in neutral for 2 minutes to cool transaxle fluid between tests.

   Stall speed: 1,800 – 2,800 rpm (SOHC)
   2,200 – 3,200 rpm (DOHC)

7. Place selector lever to "R" position and perform stall test by the same procedure as in foregoing item.

Stall Speed Above Specification in "D"

If stall speed is higher than specification, rear clutch or overrunning clutch of transaxle is slipping. In this case, perform hydraulic test to locate cause of slippage.

Stall Speed Above Specification in "R"

If stall speed is higher than specification, front clutch of transaxle or low-reverse brake is slipping. In this case, perform hydraulic test to locate cause of slippage.

Stall Speed Below Specification in "D" and "R"

If stall speed is lower than specification, insufficient engine output or faulty torque converter is suspected. Check for engine misfiring, ignition timing, valve clearance, etc. If these are good, torque converter is faulty.

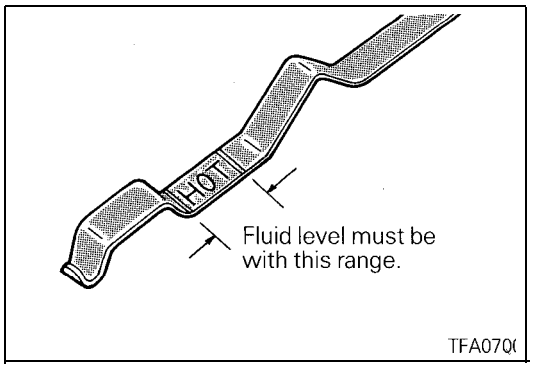
TRANSAXLE CONTROL

Symptom	Probable cause	Remedy
Selector lever operation is stiff	**Incorrect adjustment of sleeve**	**Adjust**
	Incorrect adjustment of control cable	**Adjust**
	Excessive wear of detent plate	**Replace**
	Worn contact surfaces of pushbutton **and sleeve**	**Replace**
Starter motor does not operate with the selector lever in the "N" or "P" position	**Malfunction in park/neutral position switch**	**Replace**
	Incorrect adjustment of control cable	**Adjust**
	Malfunction of starter relay	**Replace**
Will not shift to 4-speed	**Malfunction of OD switch**	**Replace**

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.	21-120
	Improperly adjusted shift lock cable, broken inner cable, loose or off connections	Check, adjust or replace the shift lock cable.	21-118
	Broken or sagging outer cable (shift lock cable) return spring	Check and replace shift lock cable.	21-117
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.	21-116
	Sticking shift lock cable, key interlock cable, and transaxle control cable	Check and replace shift lock cable, key interlock cable, and transaxle control cable.	21-116
	Foreign matter wedged in lock cams A and B	Check and adjust lock cams A and B.	21-120
	Improperly adjusted shift lock cable, elongated inner cable	Check, adjust, and replace shift lock cable.	21-117
	Sticking slide lever and cam lever inside key cylinder	Check and adjust slide lever and cam lever.	21-117
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.	21-120
	Broken or disconnected key interlock cable	Check and replace key interlock cable.	21-117
	Damaged slide lever and cam lever inside key cylinder	Check and replace slide lever and cam lever.	21-117
Selector lever operation from P to R is not smooth.	Improperly adjusted key interlock cable	Check and adjust key interlock cable.	21-119
	Improperly adjusted shift lock cable, elongated inner cable	Check, adjust, and replace shift lock cable.	21-117
	Binding lock cams A and B (in rotation)	Check rotating parts of lock cams A and B.	21-120
	Defective selector lever assembly	Check and replace selector lever assembly.	21-116
	Binding slide lever inside key cylinder	Check slide lever and cam lever.	21-117

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.	21-117
	Improperly adjusted transaxle control cable	Adjust transaxle control cable.	21-118
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.	21-120
	Improperly adjusted key interlock cable, sticking inner cable	Check, adjust, and replace key interlock cable.	21-117
	Binding slide lever inside key cylinder	Check slide lever.	21-117
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.	21-120
	Loose key cylinder cover	Check and retighten cover.	21-117
	Broken key interlock cable, loose connections, elongated inner cable	Check and replace key interlock cable.	21-117
	Damaged cam lever inside key cylinder	Check and replace cam lever.	21-117
Buzzer does not sound even when selector **lever is placed in** R position.	Defective buzzer	Check and replace buzzer.	21-117
	Open-circuited buzzer circuit harness	Check or correct harness.	–
	Defective park/neutral position switch	Check and replace park/neutral position switch.	21-101, 21-127
	Improperly adjusted transaxle control cable	Adjust transaxle control cable.	21-114



SERVICE ADJUSTMENT PROCEDURES

TRANSMISSION FLUID LEVEL INSPECTION

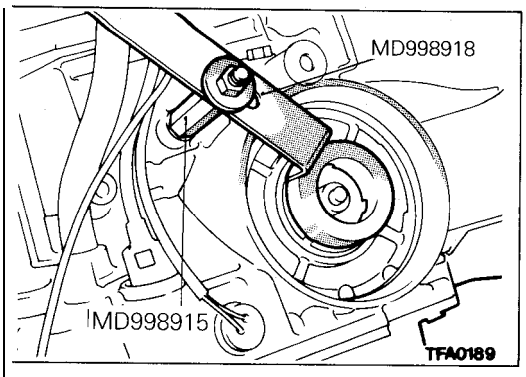
1. Drive until the fluid temperature reaches the usual temperature [70 – 80°C (158 – 176°F)].
2. Place vehicle on level floor.
3. Move selector lever sequentially to every position to fill torque converter and hydraulic circuit with fluid, then place lever in "N" Neutral position.
4. Before removing 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: MOPAR ATF PLUS (Automatic transmission fluid type 7176) or Dia ATF SP or equivalent

   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 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.

TRANSMISSION FLUID REPLACEMENT

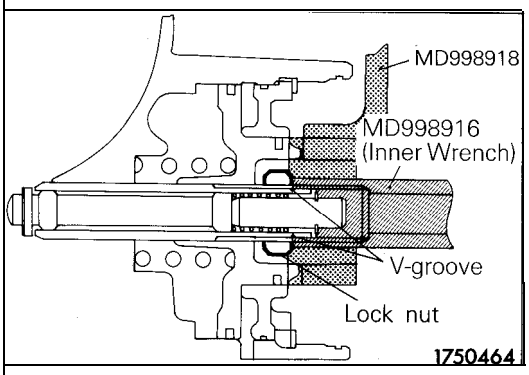
Refer to GROUP 0 – Maintenance Service.



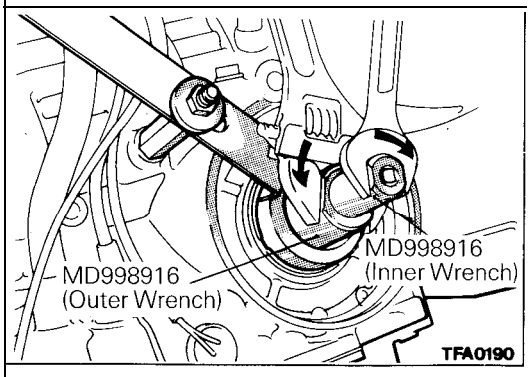
KICKDOWN SERVO ADJUSTMENT

(1) Remove dust, dirt, and other contaminants completely from kickdown (K/D) servo cover and surrounding areas.
(2) Snap off the snap ring and remove K/D servo switch.
(3) Fit claw of special tool into cutout in piston to prevent piston from turning and use adapter to fix the piston into position.

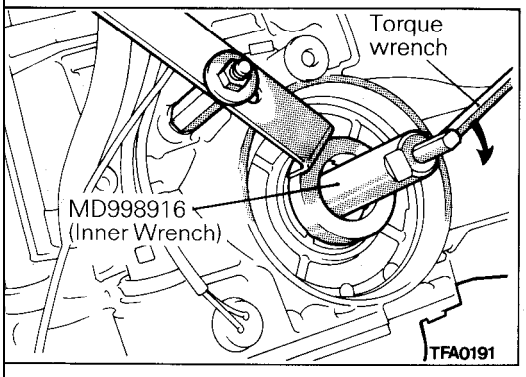
Caution
1. Do not push piston with the special tool.
2. Secure adapter only hand-tight to L/R brake pressure take-up port and do not apply excessive torque.



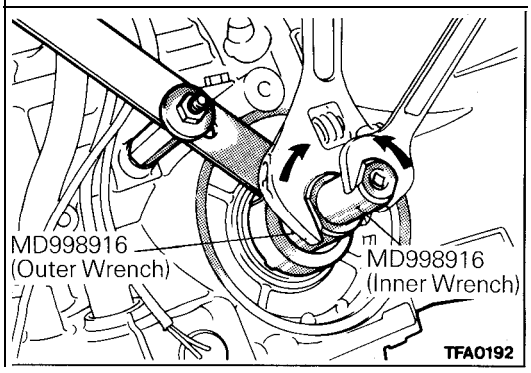
(4) Loosen lock nut to immediately before V-groove in adjust rod (see illustration on left) and tighten special tool (Inner Wrench) until it contacts lock nut.



(5) Fit special tool (Outer Wrench) over the lock nut. Turn Outer Wrench counterclockwise and turn inner cylinder clockwise to lock the lock nut and special tool (Inner Wrench).

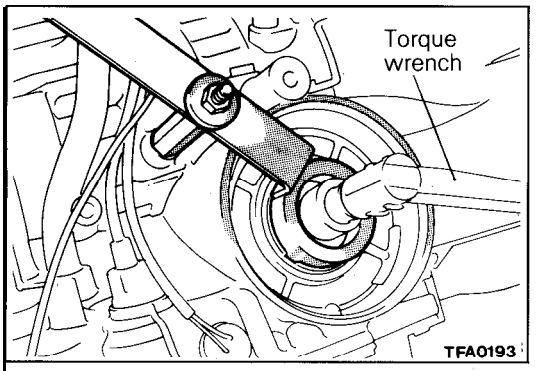


(6) Fit torque wrench to special tool (Inner Wrench) and repeat tightening and loosening cycle two times with a torque of 10 Nm (7.2 ft.lbs.). Then, torque to 5 Nm (3.6 ft.lbs). Next, back off special tool (Inner Wrench) 2 to 2¼ turns.



(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.

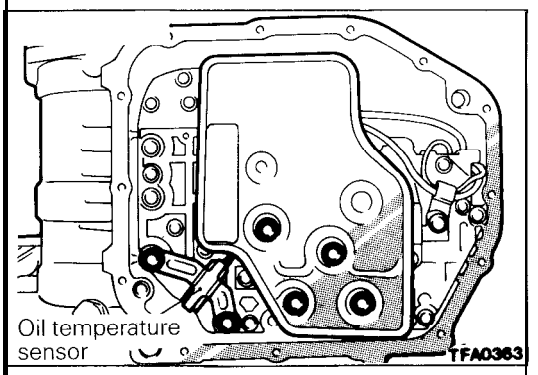
Lock nut: 29 Nm (21 ft.lbs.)

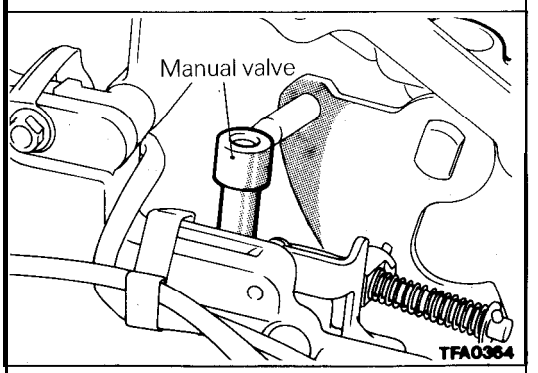
Caution
Use of socket wrench or torque wrench could result in lock nut being turned with adjust rod.

(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

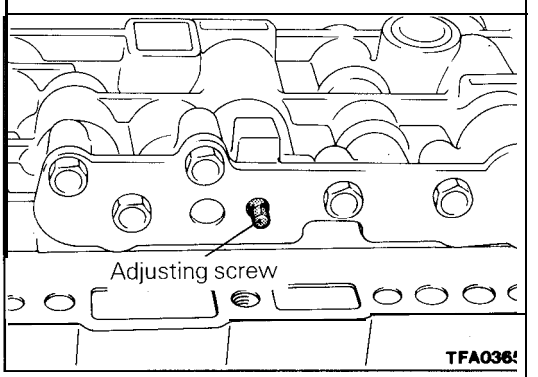
(1) Discharge ATF.
(2) Remove oil pan.
(3) Remove oil filter.
(4) Remove oil temperature sensor.





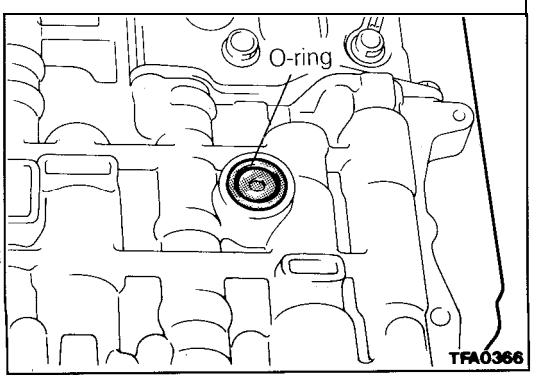
(5) Press solenoid valve harness grommet catch to push in grommet; then, remove valve body assembly.

Caution
Do not let manual valve fall.

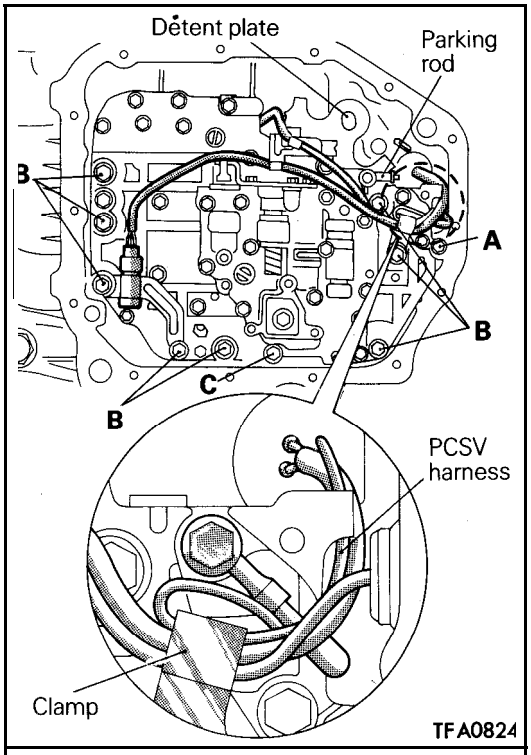


(6) Turn adjusting screw of regulator valve to obtain the specified line pressure (K/D brake pressure).

Standard value: 870 – 890 kPa (124 – 127 psi)
Oil pressure change for each turn of adjustment screw: 38 kPa (5.4 psi)



(7) Check that an O-ring is fitted at the location shown on top of valve body.
(8) Replace O-ring of solenoid valve intermediate grommet with a new one and then fit the O-ring into case.

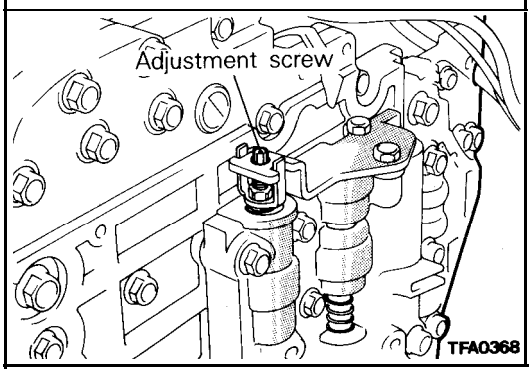


(9) Install valve body and oil temperature sensor.

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. Especially the pressure control solenoid valve (PCSV) harness must be routed and clamped as shown in the illustration, since it is separated from other harnesses. Failure to secure the harness results in its contact with the detent plate or parking rod.

(10) Install oil filter.
(11) Install new oil pan gasket and oil pan.
(12) Add the specified amount of ATF.
(13) Carry out hydraulic test.
Readjust as necessary.



REDUCING PRESSURE ADJUSTMENT

When the scan tool is not used

(1) Following the same steps as those in line pressure adjustment, remove parts up to oil filter.
There is no need to remove valve body.
(2) Turn adjusting screw of lower valve body to obtain the specified reducing pressure. Turn it counterclockwise to increase the pressure.

Standard value: 425 ± 10 kPa (60 ± 1 psi)
Oil pressure change for
each turn of adjusting screw: 45 kPa (6 psi)

(3) In the same way as in line pressure adjustment, install oil filter and oil pan.
(4) Perform hydraulic test.
Adjust as necessary.

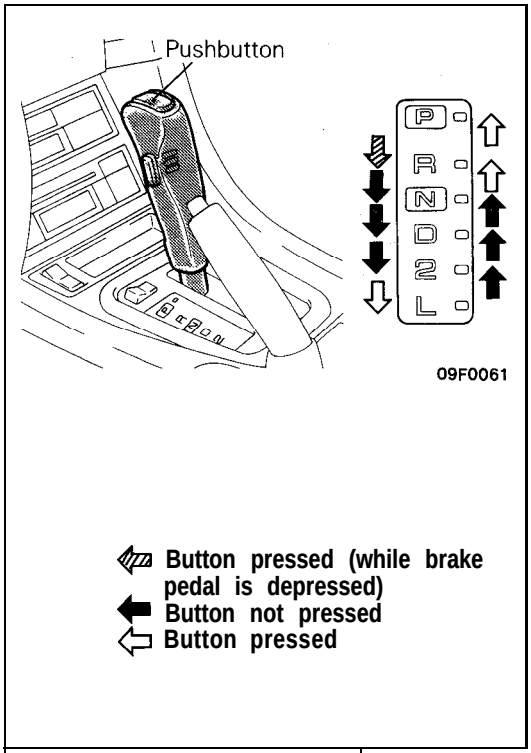
When scan tool is used

(1) Use scan tool to measure the K/D brake apply pressure when the pressure control solenoid valve is force-driven at 50% duty. If the K/D brake apply pressure is not within the specified limit, make readjustment by using the reducing pressure adjustment screw.

Standard value: 275 kPa (39 psi)
Oil pressure change for
each turn of adjusting screw: 22 kPa (3 psi)

(2) After adjustment has been made, check that the reducing pressure is in the range 360 – 480 kPa (51 – 68 psi).

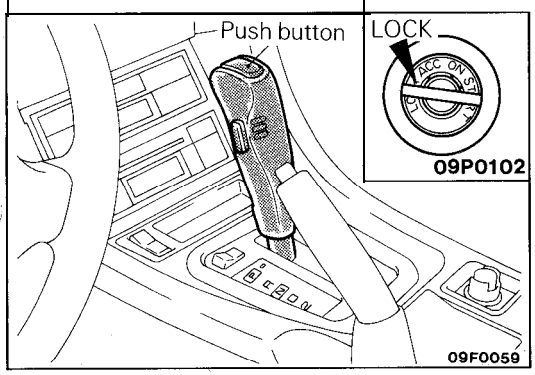
Caution
This adjustment should be made with oil temperature 70 – 80°C (158 – 176°F).
The adjustment made with high oil temperature could result in improper adjustment due to a line pressure drop at idle.



SELECTOR LEVER OPERATION CHECK

1. Shift selector lever to each range and check that lever moves smoothly and clicks into position. Check that position indicator is correct.
2. Check to be sure the selector lever can be shifted to each position (by button operation as shown in the illustration).
3. Start the engine and check if the vehicle moves forward when the selector lever is shifted from N to D, and moves backward when shifted to R.
4. When the shift lever malfunctions, adjust control cable and selector lever sleeve. Check for worn shift lever assembly sliding parts.

NOTE
To move the selector lever from the "P" position to any other position, first turn the ignition key to any position other than "LOCK" and depress the brake pedal.

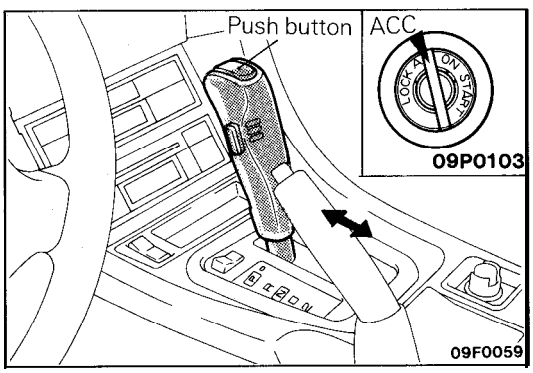


KEY INTERLOCK MECHANISM CHECK

Completely stop the vehicle and switch OFF the engine before making the check

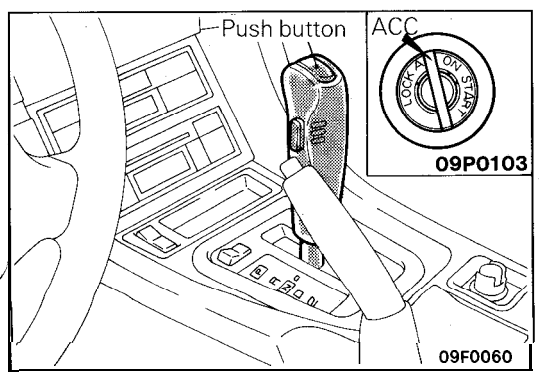
1. Check to be sure that, under the following conditions, the selector lever cannot be moved from the "P" position to any other position.
   Also check, at the same time, that the button cannot be pressed.

   Ignition key position: "LOCK" or removed
   Brake pedal: Depressed

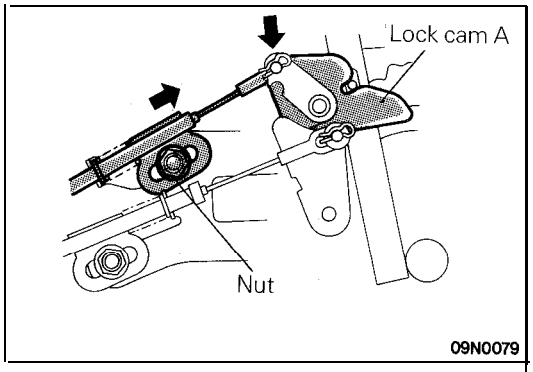


2. Check to be sure that, under the following conditions, the selector lever can be moved from the "P" position to any other position.
   Press the button a few times and check to be sure that the selector lever moves smoothly.

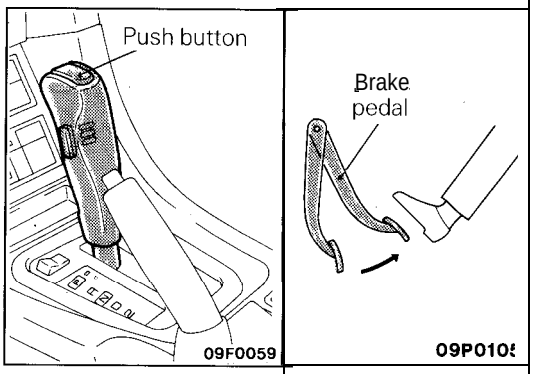
   Ignition key position: "ACC"
   Brake pedal: Depressed
   Button : Pressed



3. Check to be sure that, at all positions of the selector lever (other than **"P"),** the ignition key cannot be turned to the "LOCK" position.
   Check to be sure that the ignition key smoothly turns to the "LOCK" position when the selector lever is then set to the "P" position and the button is released.
4. If above are not checked okay, adjust key interlock cable mechanism as follows.
   (1) Remove front console assembly.
   (2) Place selector lever into "P" position.
   (3) Turn ignition key to the "LOCK" position.



(4) Loosen nut that secure key interlock cable.
(5) Lightly pressing lock cam A in the direction of arrow, lightly push key interlock cable to take up slack and tighten nut to secure key interlock cable.
(6) Reinstall front console assembly.



SHIFT LOCK MECHANISM CHECK

1. Check to be sure that, under the following conditions, the selector lever cannot be moved from the “P” position to any other position.

   Ignition key position: “ACC”
   Brake pedal: Not depressed
   Button: Pressed

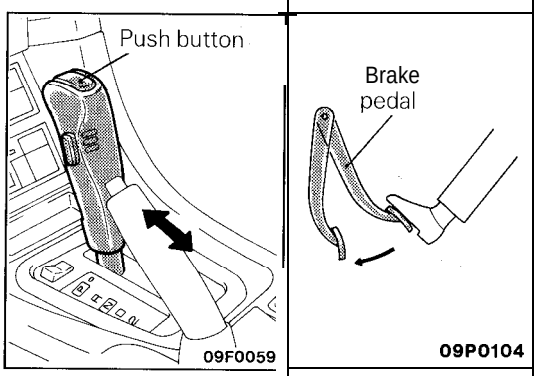
2 Check to be sure that, under the following conditions, the selector lever can be moved smoothly from the “P” position to any other position.

   Ignition key position: “ACC”
   Brake pedal: Depressed
   Button: Pressed

3. Check to be sure that, under the following conditions, the selector lever can be moved smoothly from the “R” position to the “P” position.

   ignition key position: “ACC”
   Brake pedal: Released
   Button : Pressed

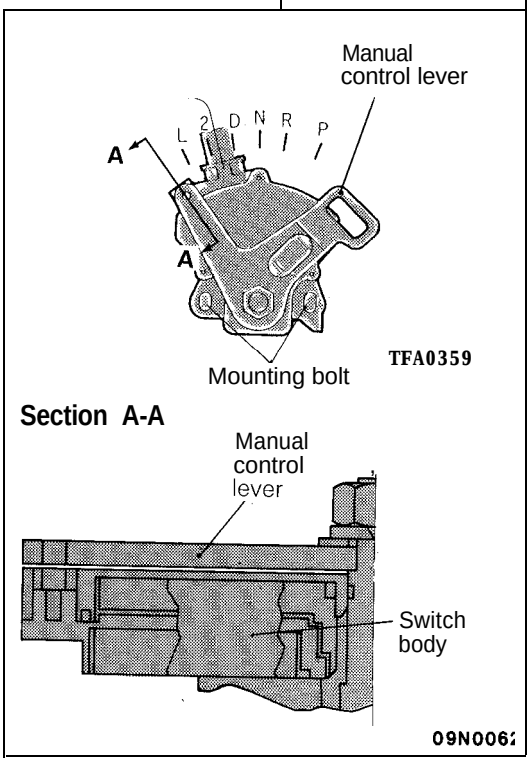
4. If a malfunction is discovered when following the above checking procedures, either adjust or check the shift lock cable mechanism. (Refer to P.21-118.)

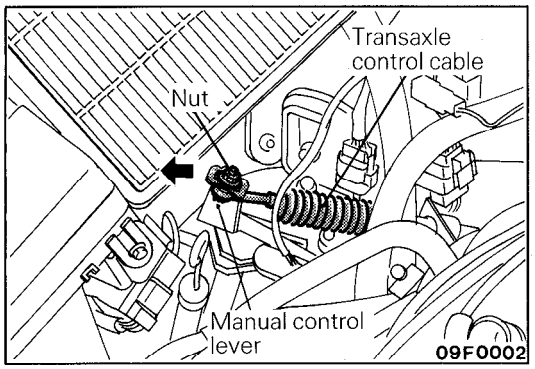


PARK/NEUTRAL POSITION SWITCH AND CONTROL CABLE ADJUSTMENT

1. Place selector lever in “N” (Neutral) position.
2. Place manual control lever in “N” (Neutral) position.
3. For adjustment, turn park/neutral position switch body so that the end (section A-A in illustration on left) of manual control lever is aligned with the hole in park/neutral position switch body flange.
4. Tighten the mounting bolts of the park/neutral position 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.)





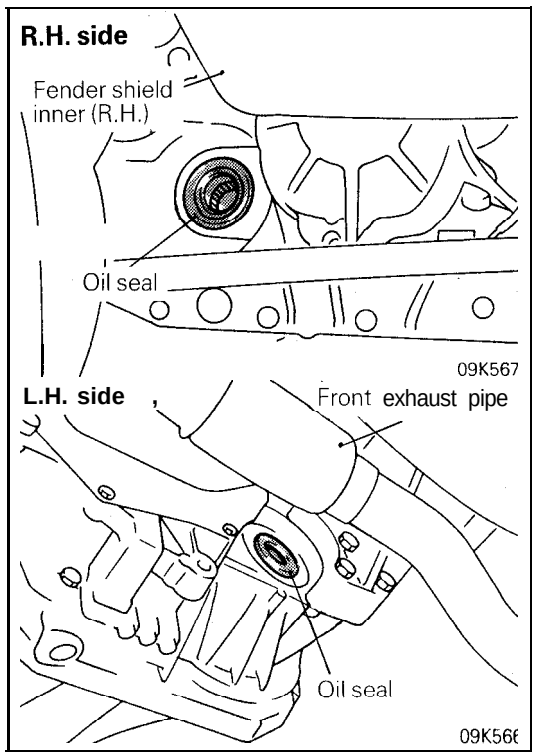
5. Loosen the nut shown in the figure, and lightly pull the end of the transaxle control cable in the direction of arrow by hand.
6. Tighten the nut to the specified torque.

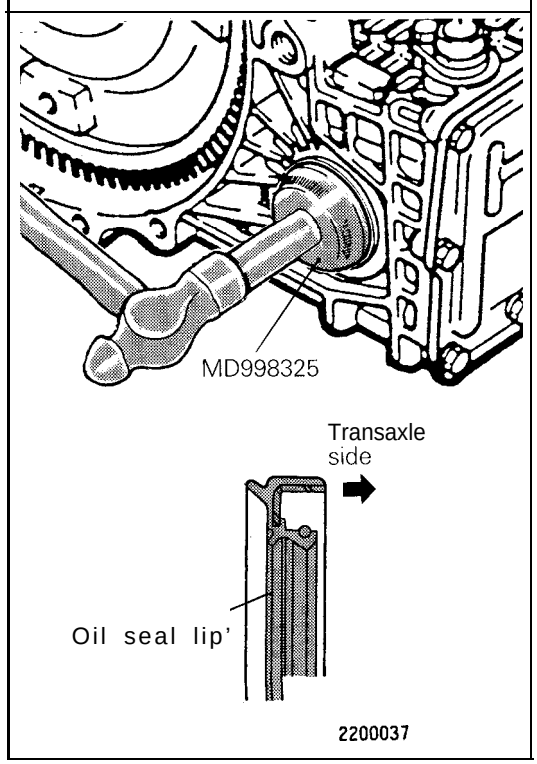
   Specified torque: 13 Nm (9.0 ft.lbs.)

7. Check that the selector lever is in "N" position.
8. Check that it securely operates and functions on the transaxle side in the range which corresponds to each position of the selector lever.

DRIVE SHAFT OIL SEALS REPLACEMENT

(1) Disconnect the drive shaft from the transaxle. (Refer to GROUP 2A – Drive Shaft.)
(2) Using a flat-tip (–) screwdriver, remove the oil seal.





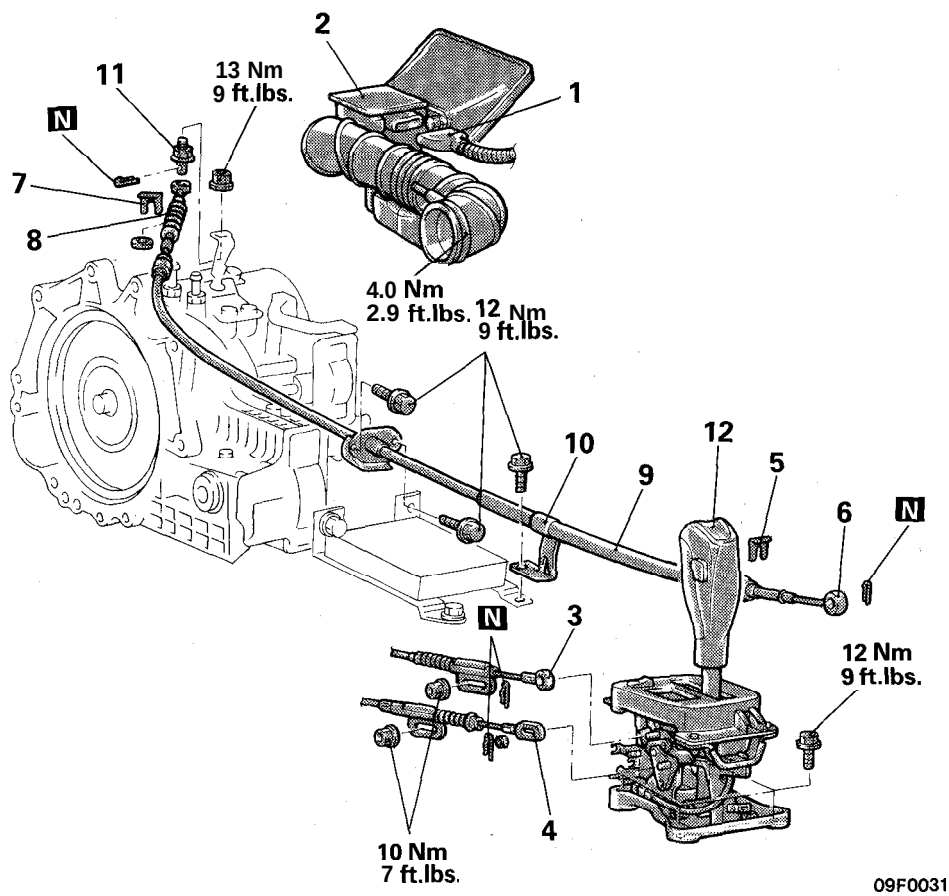
(3) Using the special tool, tap the drive shaft oil seal into the transaxle.
   Note in illustration the direction of installation of drive shaft oil seal.
(4) Apply a coating of the transaxle fluid to the lip of the oil seal.

   Transaxle fluid: MOPAR ATF PLUS (Automatic transmission Fluid Type 7176) or Dia ATF SP or equivalent

TRANSAXLE CONTROL

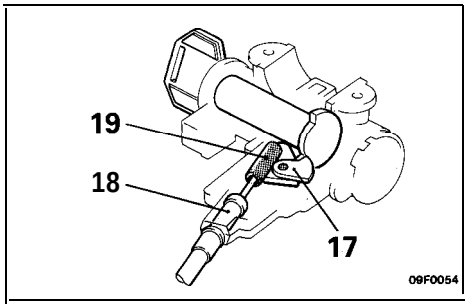
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- **Removal and Installation of Front Console Assembly**
  (Refer to **GROUP** 23A – Floor **Console.)**
  CAUTION: SRS
  When installing or removing the front console, don't allow any impact or shock to the SRS diagnosis unit.

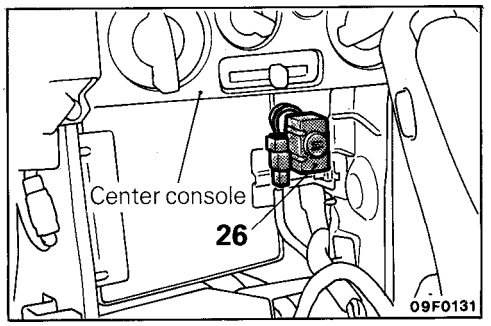


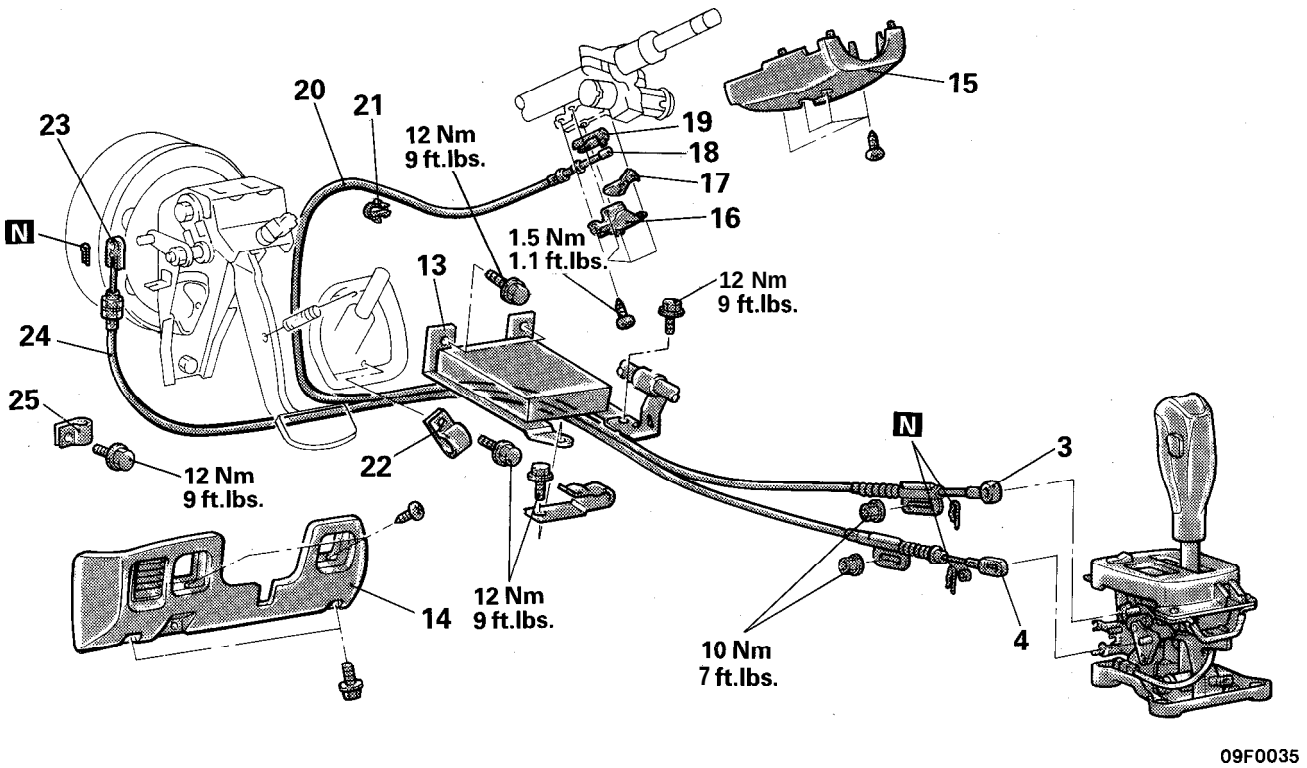
Transaxle control cable removal steps
1. Harness connector
2. Air cleaner cover, Air intake hose
5. Clip
6. Connection for transaxle control cable assembly (Select lever assembly side)
7. Clip
8. Connection for transaxle control cable assembly (Transaxle side)
9. Transaxle control cable assembly
10. Clamp
11. Adjuster

Selector lever assembly removal steps
1. Harness connector
2. Air cleaner cover, Air intake hose
- + 3. Connection for key-interlock cable (Selector lever assembly side)
- C 4. Connection for shift-lock cable (Selector lever assembly side)
5. Clip
- + 6. Connection for transaxle control cable (Selector lever assembly side)
12. Selector lever assembly



MOPAR Multi-mileage Lubricant
Part No. 2525035 or equivalent





Key-interlock cable removal steps

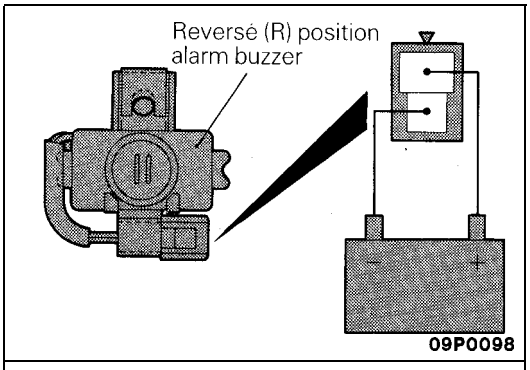
- 3. Connection for key-interlock cable (Selector lever assembly side)
- 13. Connection for transaxle control module
- 14. Knee protector (Refer to GROUP 23A – Instrument Panel)
- 15. Column cover lower
- 16. Cover
- ☒ 17. Cam lever
- ➡◀ 18. Connection for key-interlock cable (Steering lock assembly side)
- 4 19. Slide lever
- 20. Key-interlock cable
- 21. Cable guide
- 22. Clamp

Shift-lock cable removal steps

- ➡ + 4. Connection for shift-lock cable (Selector lever assembly side)
- 13. Connection for transaxle control module
- + 23. Connection for shift-lock cable (Brake pedal assembly side)
- 24. Shift-lock cable
- 25. Clamp

Reverse (R) position alarm buzzer removal

- 26. Reverse (R) position alarm buzzer

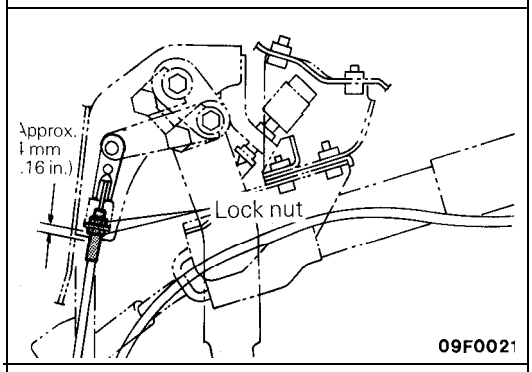


INSPECTION

- Check the control cable for function and for damage.
- Check the outer cable (key interlock cable, shift lock cable) for damage and spring for breakage and tension.
- Check the inner cable (key interlock cable, shift lock cable) for extension.

REVERSE (R) POSITION ALARM BUZZER

Check that the buzzer sounds when battery voltage is applied across terminals.

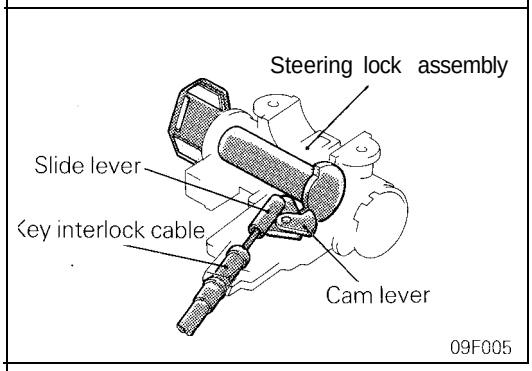


SERVICE POINTS OF INSTALLATION

23. CONNECTION OF SHIFT LOCK CABLE (BRAKE PEDAL SIDE)

Connect the shift lock cable so that its threads measure about 4 mm (.16 in.).

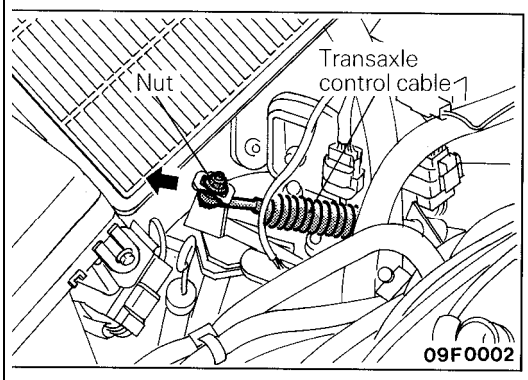
Caution
Do not change the routing of shift lock cable to the selector lever assembly.



19. INSTALLATION OF SLIDE LEVER / 18. KEY INTERLOCK CABLE (STEERING LOCK ASSEMBLY SIDE) / 17. CAM LEVER

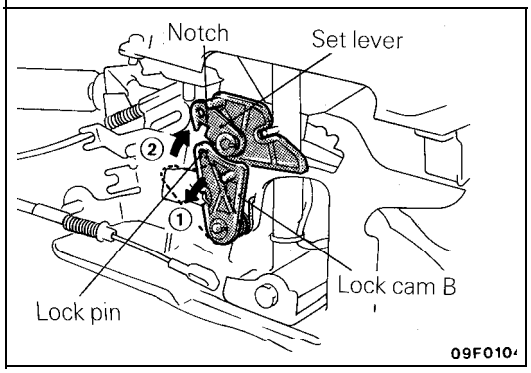
(1) Place the ignition key at the "LOCK" position or keep it removed.
(2) Install the slide lever, key interlock cable, and cam lever to the steering lock assembly as shown.

Caution
Do not change the routing of key interlock cable to the selector lever assembly.



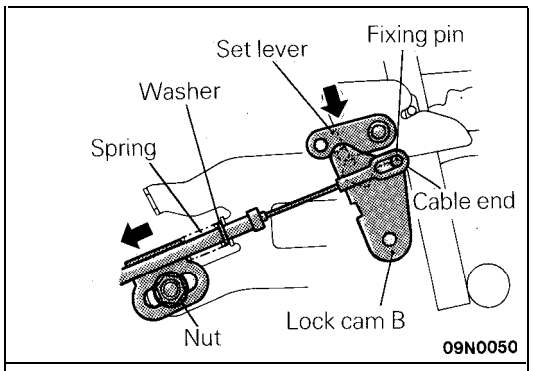
6. CONNECTION OF TRANSAXLE CONTROL CABLE (SELECTOR LEVER ASSEMBLY SIDE)

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)

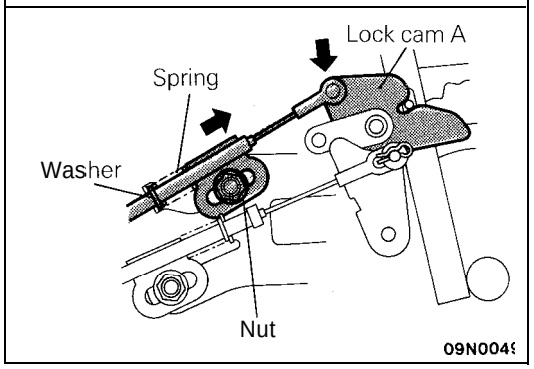
(1) Place the selector lever in "P" position.
(2) Disconnect the key interlock cable from the selector lever assembly side.
(3) Turn the lock cam B counterclockwise (arrow ①) to move the set lever upward (arrow ②).
(4) Fit the cutout in set lever to the lock pin of lock cam B.



(5) Connect the shift lock cable to lock cam B and temporarily tighten the nut.
At this time, install the spring and washer, which have been fitted to the shift lock cable, as shown.

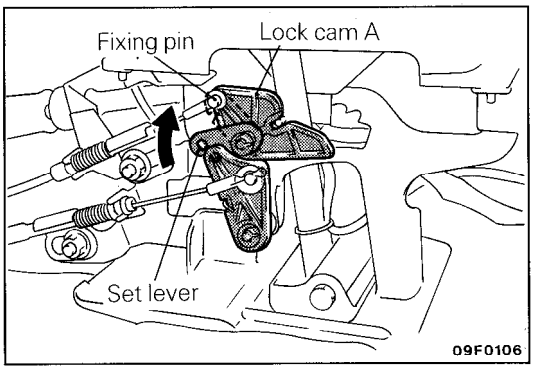
(6) Pressing the set lever to prevent lock cam B from moving, lightly pull the shift lock cable to take up slack and tighten the nut to secure the shift lock cable into position.

NOTE
Make sure that the shift lock cable end is in contact with the fixing pin of lock cam B as shown, then install the washer and snap pin.



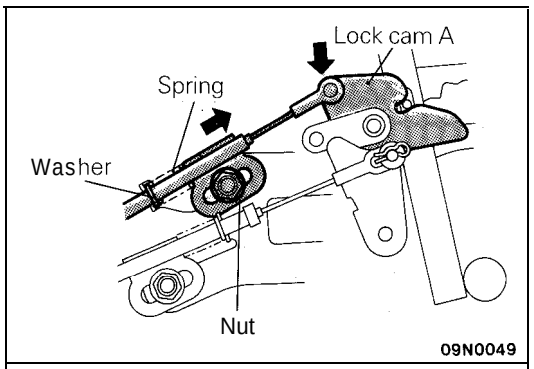
(7) Connect the key interlock cable to lock cam A and temporarily tighten the nut.
At this time, install the spring and washer, which have been fitted to the key interlock cable, as shown.

(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.

(lO)After the key interlock cable has been connected, check the shift lock and key interlock mechanism. (See P. 21-113.)

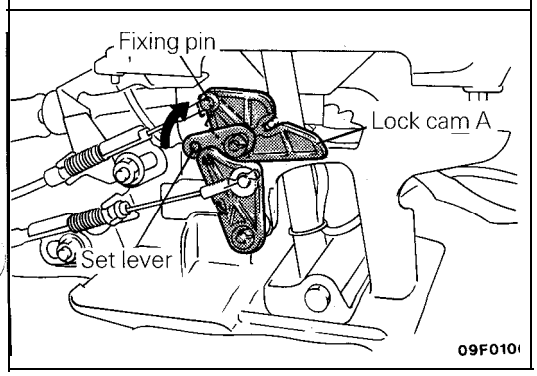


3. CONNECTION OF KEY INTERLOCK CABLE (SELECTOR LEVER ASSEMBLY SIDE)

(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.

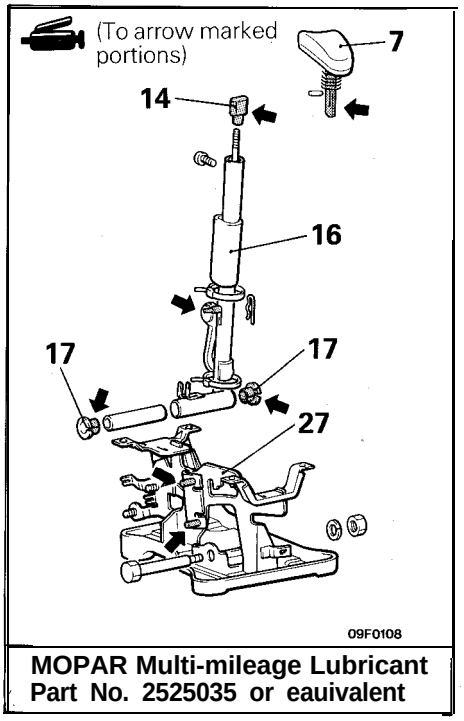


(4) Turn the set lever and fit it onto the fixing pin on lock cam A, then install the snap pin.

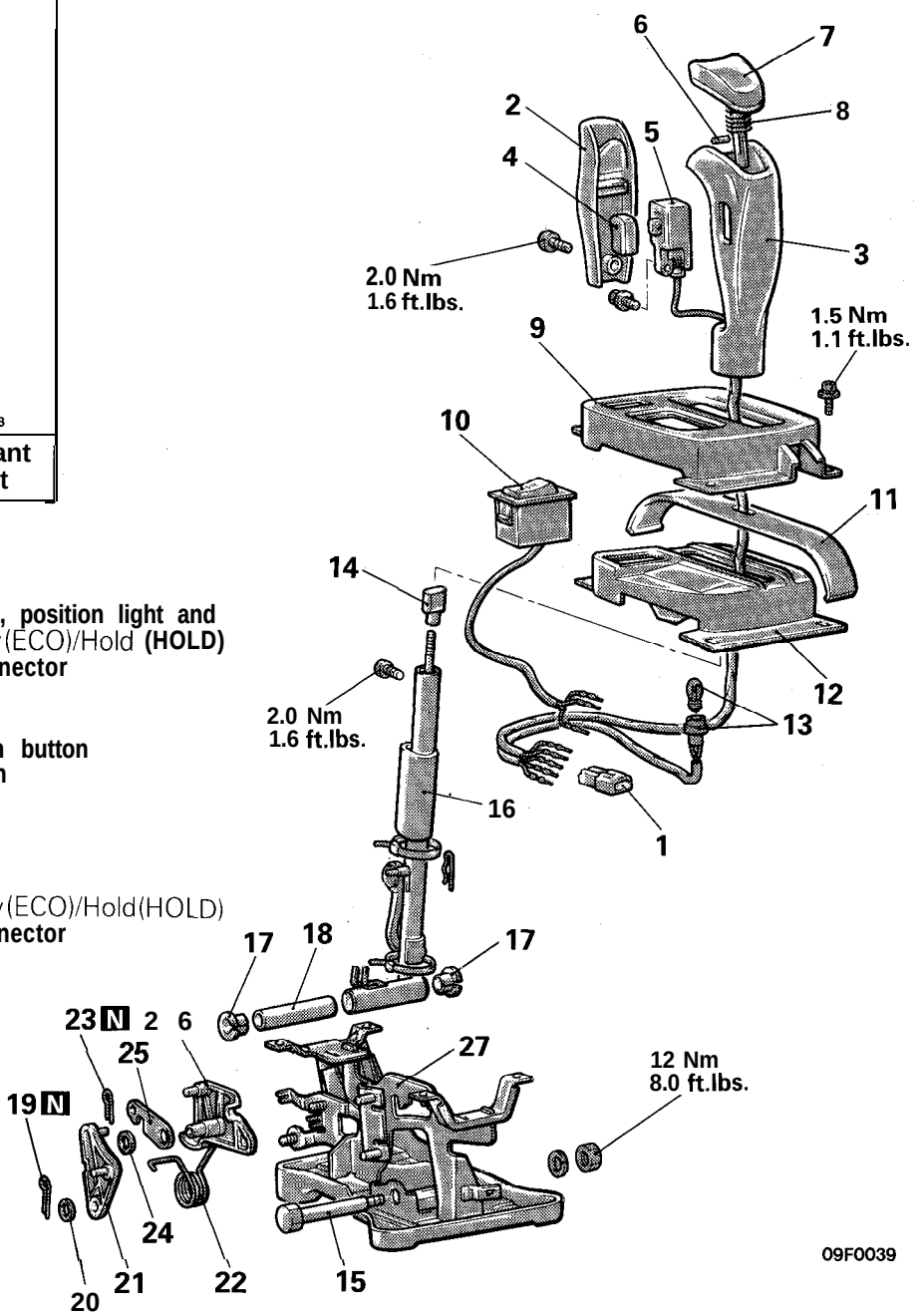
(5) After the key interlock cable has been connected, check the key interlock mechanism. (See P. 21-113.)

SELECTOR LEVER ASSEMBLY

DISASSEMBLY AND REASSEMBLY

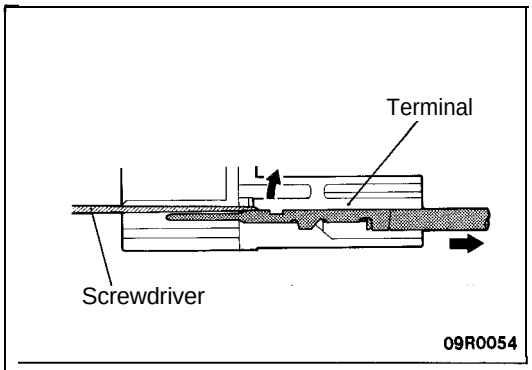


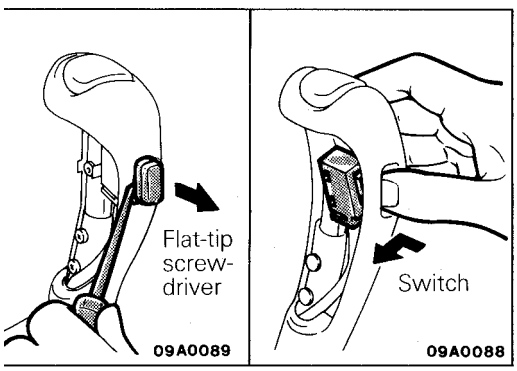
MOPAR Multi-mileage Lubricant Part No. 2525035 or eauivalent

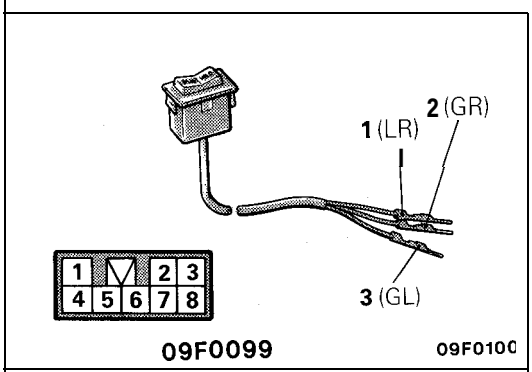


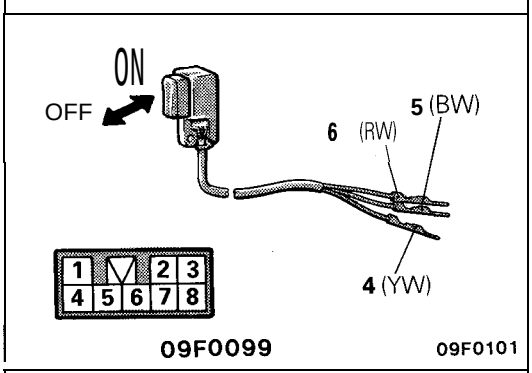
Disassembly steps

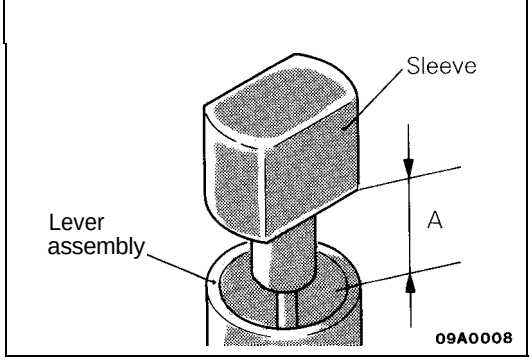
- ◆◆ 1. Overdrive control switch, position light and Power (PWR)/Economy(ECO)/Hold (HOLD) changeover switch connector
- 2. Cover
- 3. Selector knob
- ◆◆ 4. Overdrive control switch button
- ◆◆ 5. Overdrive control switch
- 6. Pin
- 7. Pushbutton
- 8. Spring
- 9. Indicator panel
- 10. Power (PWR)/Economy(ECO)/Hold(HOLD) changeover switch connector
- 11. Slider
- 12. Indicator panel lower
- 13. Socket assembly
- ● 4 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

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

- 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.

Switch position \ Terminal	1	2	3
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.

Switch position \ Terminal	6	5	4
ON (Overdrive activation)	0	0	
OFF (Overdrive non-activation)	0		0

NOTE
O-O indicates that there is continuity between the terminals.

SERVICE POINT OF REASSEMBLY

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.

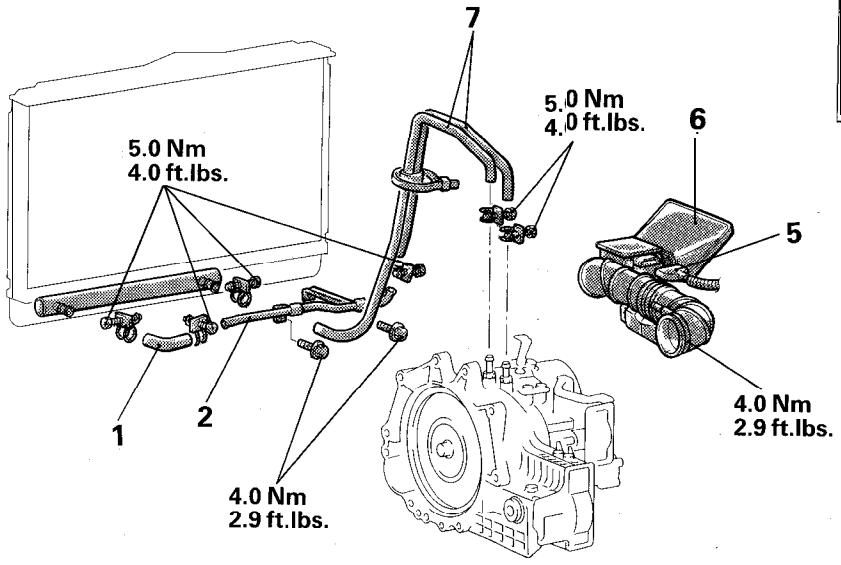
Standard value (A): 15.2 – 15.9 mm (.598 – .625 in.)

TRANSAXLE OIL COOLER, HOSES, TUBES

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Drainage and Filling of Automatic Transaxle Fluid (Refer to GROUP 0 -Maintenance Service.)
- Removal and Installation of Front Under Cover (Refer to GROUP 23A – Front Bumper.)

<Vehicles without oil cooler>



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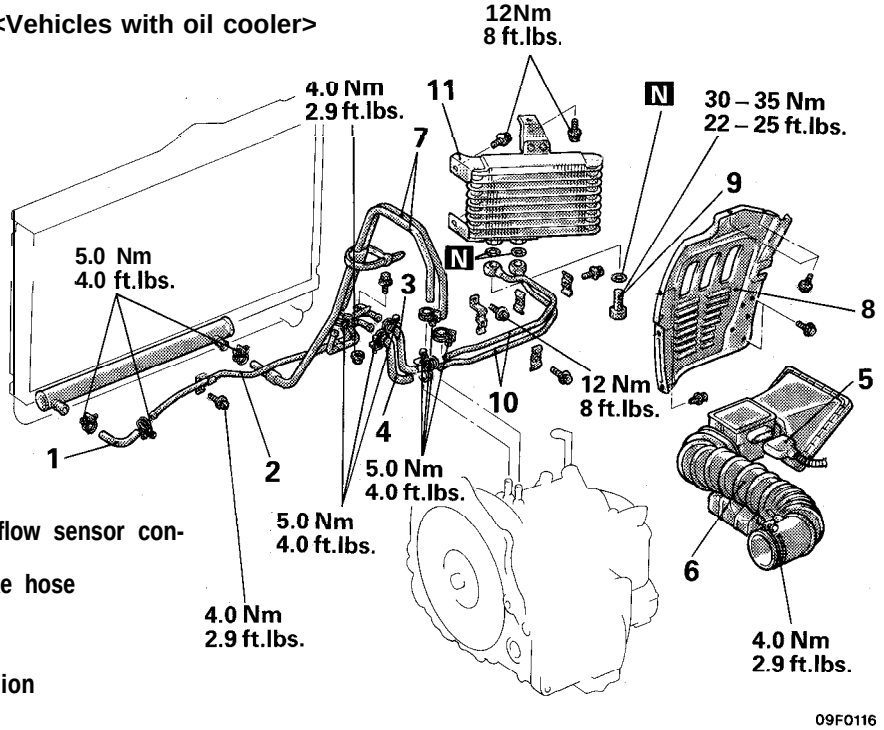
<Vehicles with oil cooler>



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◆◆ 1. Hose
◆◆ 2. Tube assembly
◆◆ 3. Feed hose
◆◆ 4. Return hose

Hose assembly removal steps

5. Connection of volume air flow sensor connector
6. Air cleaner cover, Air intake hose
◆◆ 7. Hose assembly

Tube assembly removal steps

8. Front splash shield extension (right side)
● *◆◆ 9. Eye bolt
10. Tube assembly

Transaxle oil cooler removal steps

8. Front splash shield extension (right side)
◆◆◆◆ 9. Eye bolt
11. Transaxle oil cooler

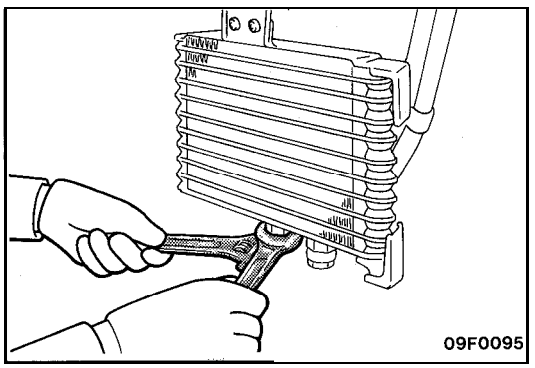
SERVICE POINTS OF REMOVAL

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.

7. 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.**

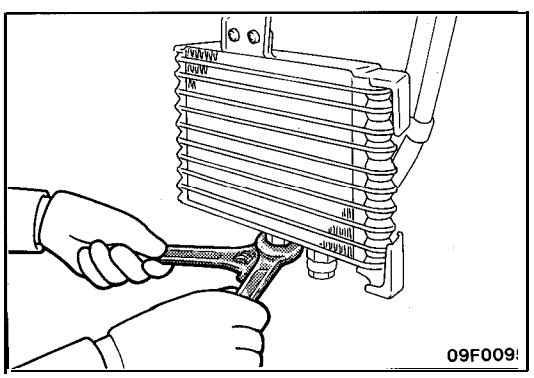


9. REMOVAL OF EYE BOLT

(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

- 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

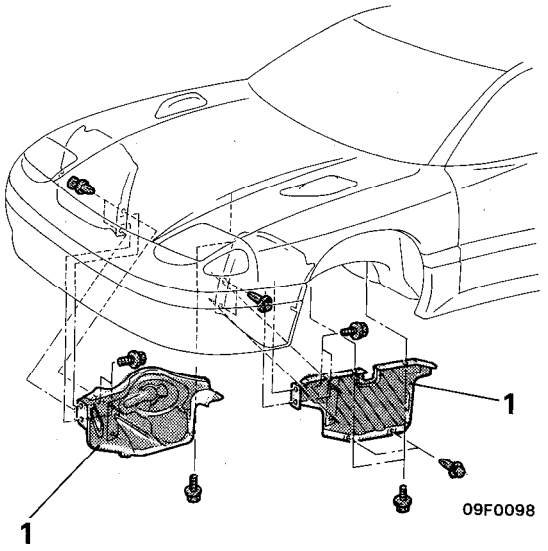
9. INSTALLATION OF EYE BOLT

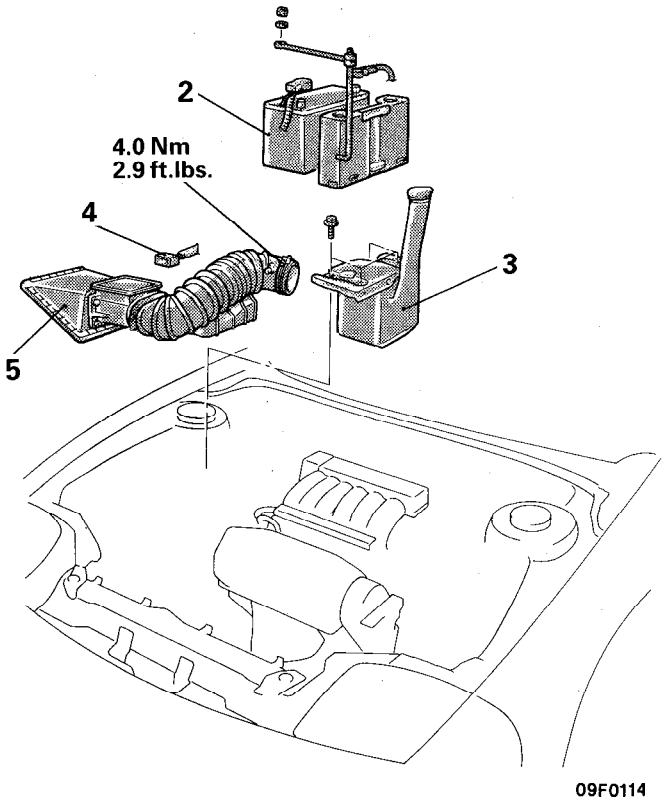
(1) Wipe the connection threads and tightly contacting surfaces clean of dust and dirt.
(2) Secure the oil cooler connector with a spanner to prevent excessive force from being applied to it, then tighten the eye bolt.

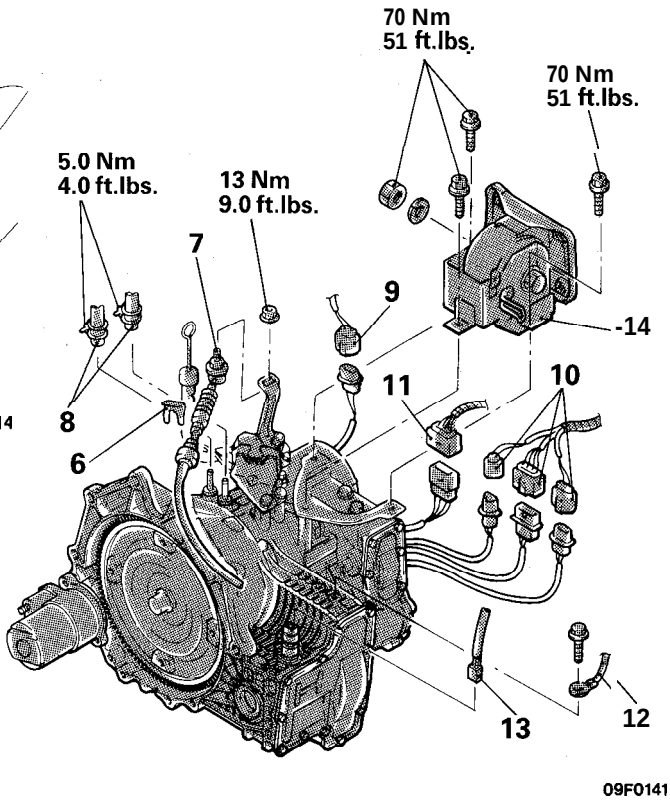
TRANSAXLE ASSEMBLY

REMOVAL AND INSTALLATION

Pre-removal Operation
- Place Selector Lever in "N" Position and Stop the Engine.
- Draining of Transaxle Fluid (Refer to GROUP 0- Maintenance Service.)
- Removal of Front Under Cover (Refer to GROUP 23A – Front Bumper.)

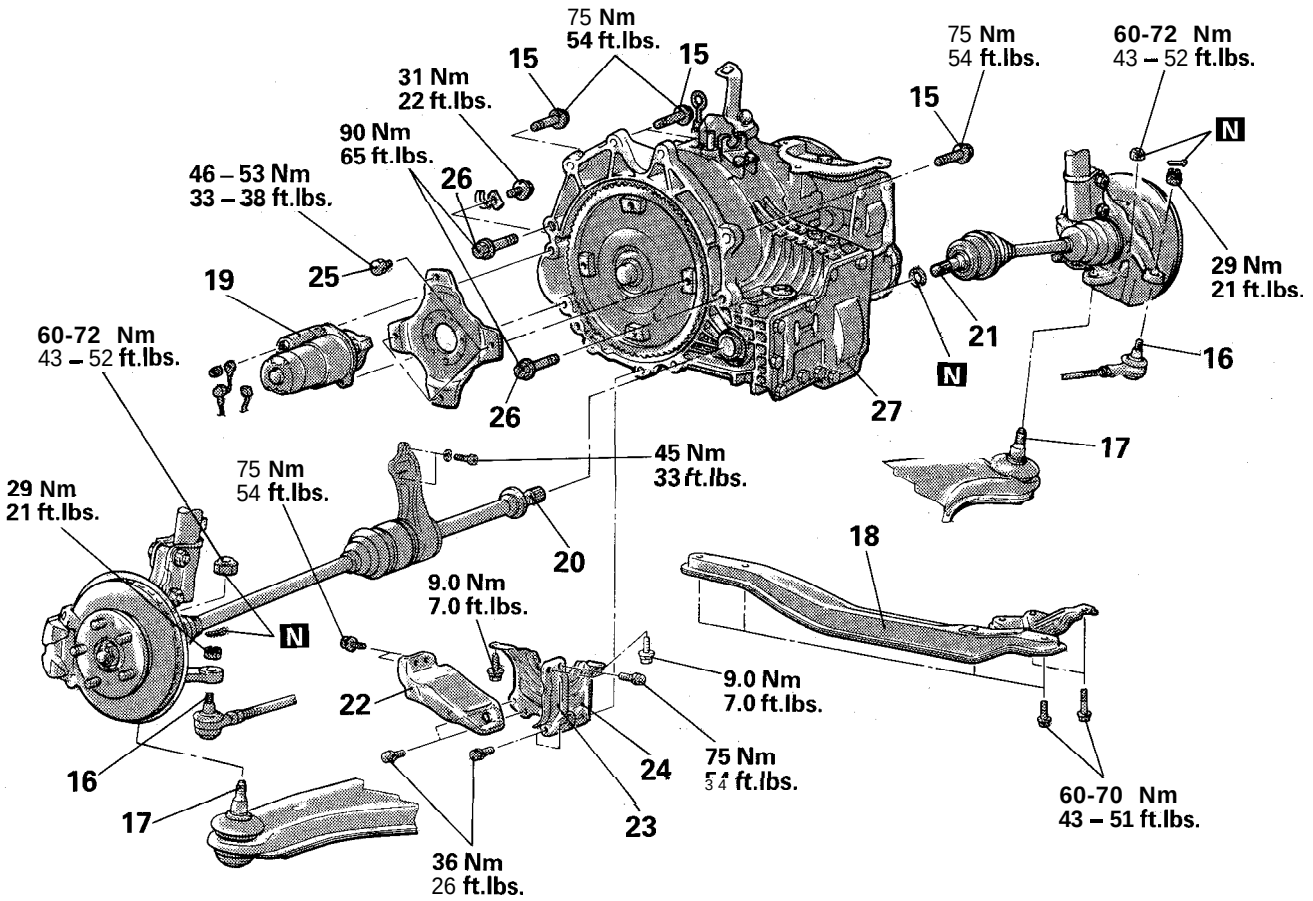






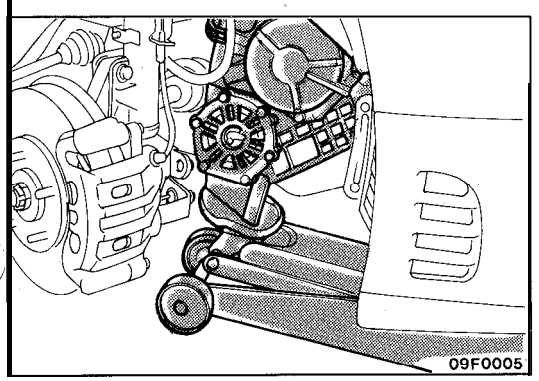
Removal steps

1. Side under cover
2. Battery
3. Battery seat, Washer tank
4. Volume air flow sensor connector
5. Air cleaner cover, Air intake hose
6. Clip
- ◻ 7. Connection for transaxle control cable
8. Connection for oil cooler hose
9. Park/neutral position switch connector
10. Kickdown servo switch connector, pulse generator connector and oil temperature sensor connector
11. Shift control solenoid valve connector
12. Connection for transaxle ground cable
13. Connection for speedometer connector
- ⊠ 14. Connection for transaxle mount bracket



15. Transaxle assembly upper part coupling bolt
◆◆ 16. Connection for tie rod end
◆◆ 17. Connection for lower arm ball joint
18. Right member
19. Starter
◆◆ 20. Drive shaft (left side), Inner shaft assembly
◆◆ ● + 21. Drive shaft (right side)
22. Transaxle stay (front bank side)
23. Transaxle stay (rear bank side)
24. Bell housing cover
◆◆ 25. Torque converter connecting bolt
◆◆ 26. Transaxle assembly lower part coupling bolt
◆◆▶◀ 27. Transaxle assembly

Post-installation Operation
- Installation of Front Under Cover (Refer to GROUP 23A – Front Bumper.)
- Supplying of Transaxle Fluid (Refer to GROUP 0 – Maintenance Service.)
- Checking the Operation of Selector Lever
- Checking the Operation of Speedometer

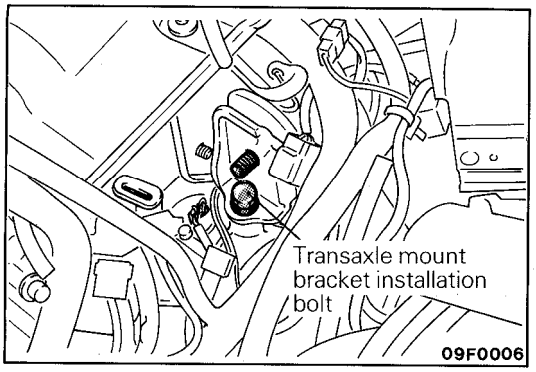


SERVICE POINTS OF REMOVAL

14. 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.



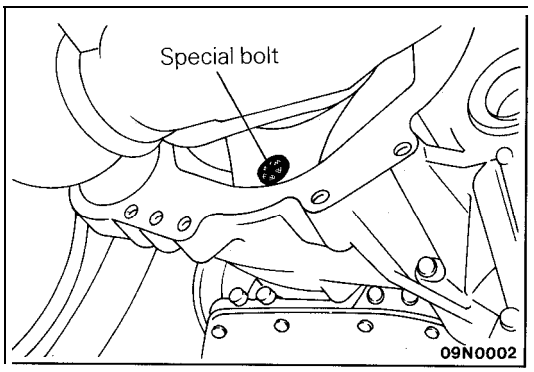
(2) Remove the nut and move the bolt so that a spanner can be applied to the transaxle mount bracket mounting bolt; then, remove the transaxle mount bracket mounting bolt.

16. DISCONNECTION OF TIE ROD END / 17. LOWER ARM BALL JOINT

Refer to P.21-18.

20. REMOVAL OF DRIVE SHAFT (LEFT SIDE) AND INNER SHAFT ASSEMBLY / 21. DRIVE SHAFT (RIGHT SIDE)

Refer to P.21-18.



25. REMOVAL OF SPECIAL BOLTS / 26. TRANSAXLE ASSEMBLY LOWER PART COUPLING BOLT / 27. TRANSAXLE ASSEMBLY

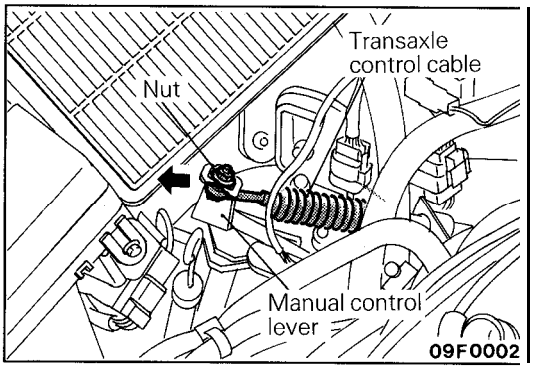
(1) Support the transaxle assembly with the transaxle jack.
(2) Rotating the crankshaft, remove the special bolts at four places.
(3) After removing the special bolts, push the torque converter toward transaxle so that it does not remain on the engine side.
(4) Remove coupling bolt at the bottom of transaxle assembly and lower the transaxle assembly.

SERVICE POINTS OF INSTALLATION

27. 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.



21. INSTALLATION OF DRIVE SHAFT (RIGHT SIDE)

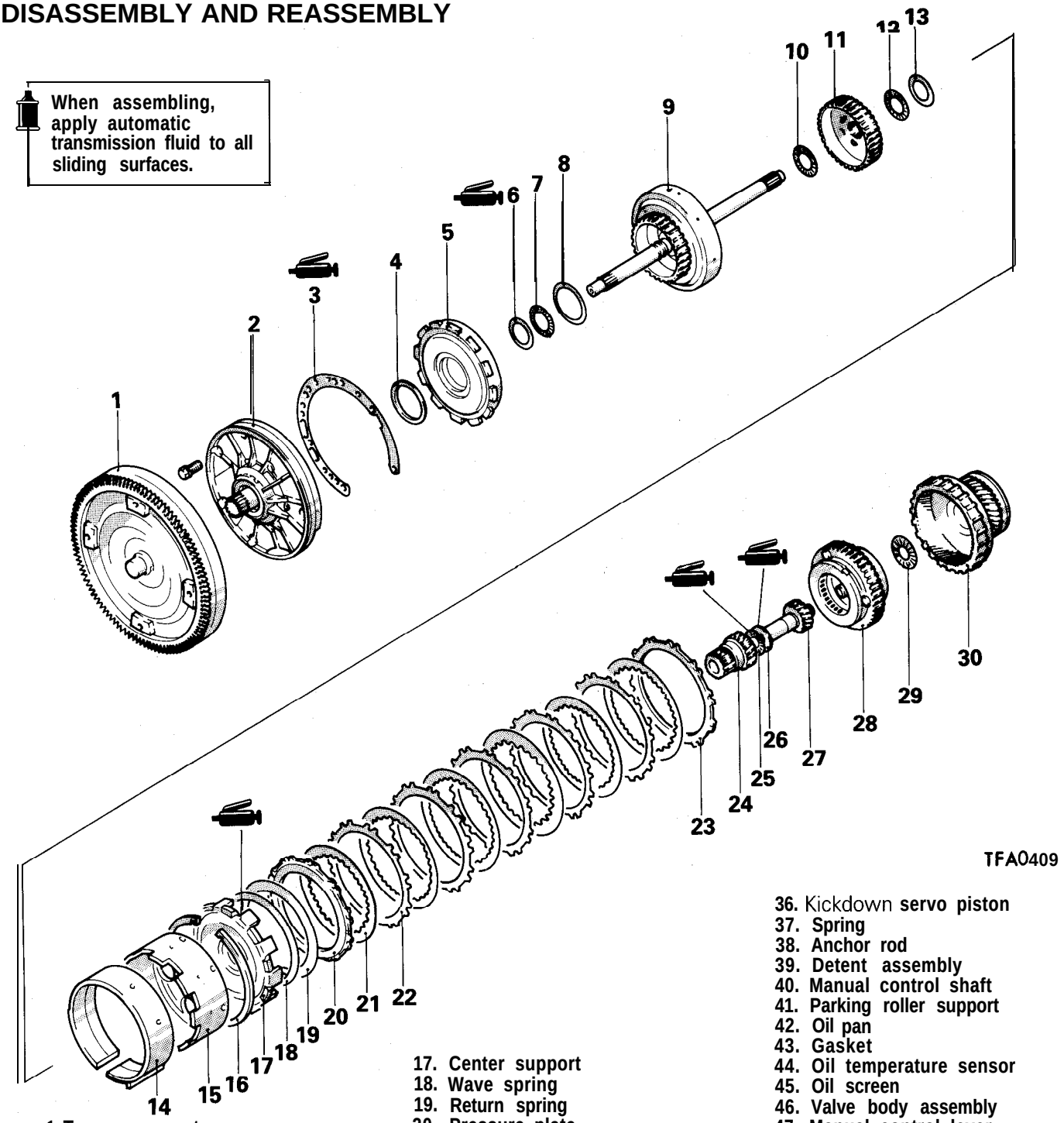
Refer to P.21-19.

7. CONNECTION OF TRANSAXLE CONTROL CABLE

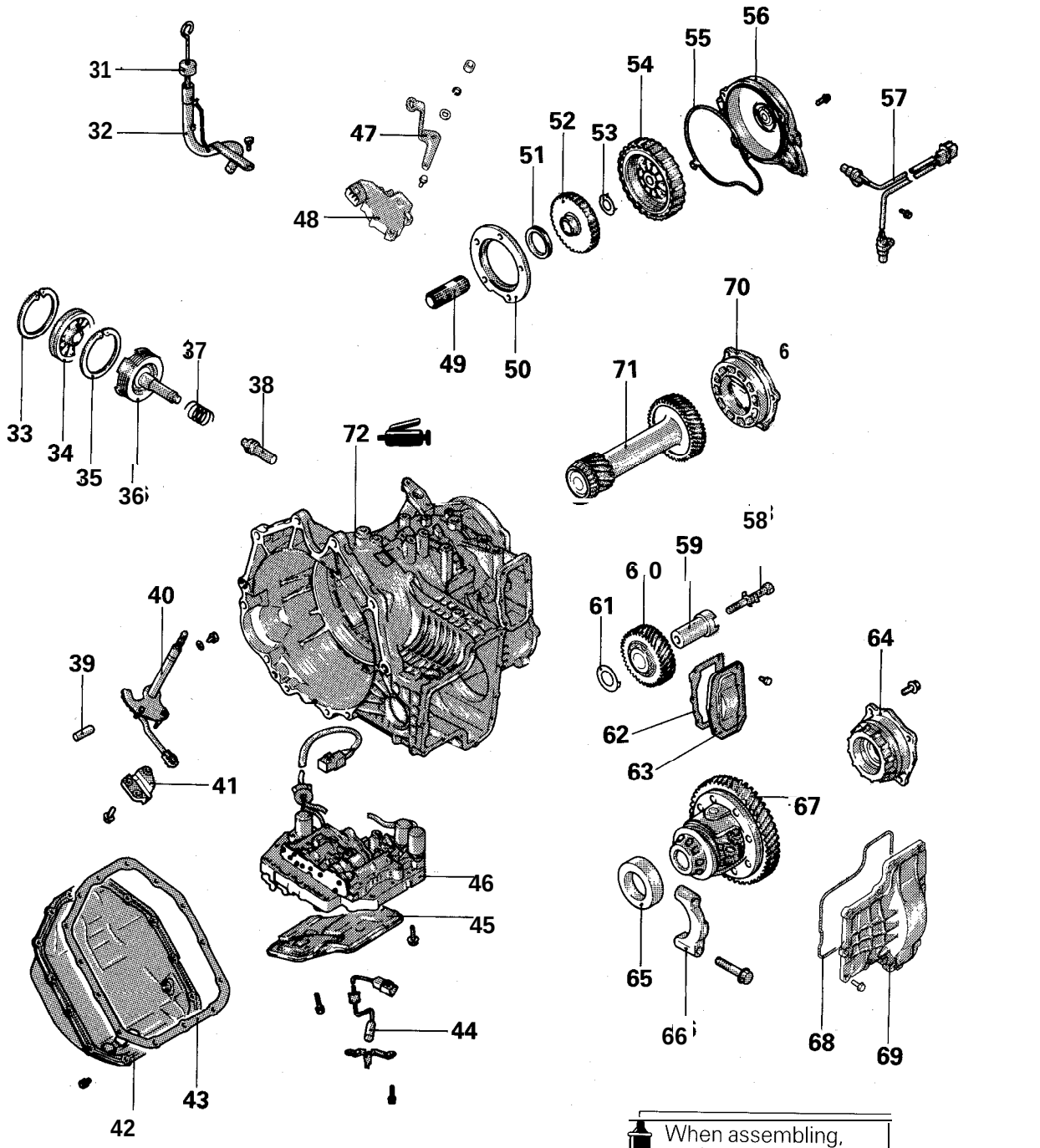
(1) Connect the transaxle control cable to the manual control lever and tighten the nut temporarily.
(2) Loosen the nut, pull the transaxle control cable lightly in the arrow direction and retighten the nut.

DISASSEMBLY AND REASSEMBLY

When assembling, apply automatic transmission fluid to all sliding surfaces.



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
35. Snap ring
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. Park/neutral position 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

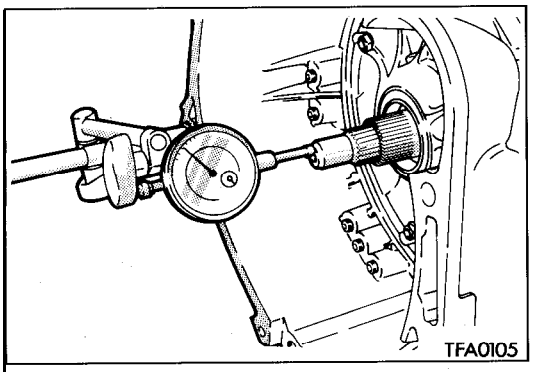


63. Idler gear cover
64. Differential bearing retainer
65. Outer race
66. Differential front bearing cap
67. Differential assembly
68. Gasket
69. Differential cover
70. Output bearing retainer
71. Transfer shaft
72. Transaxle case

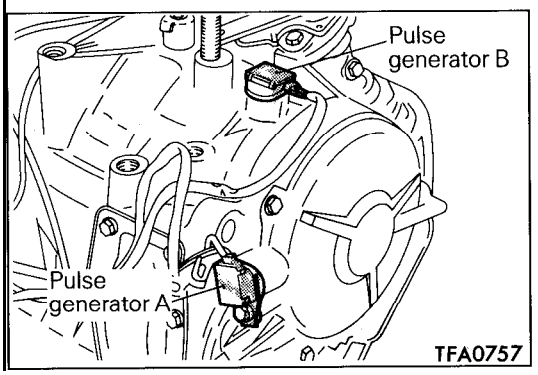
DISASSEMBLY

Caution

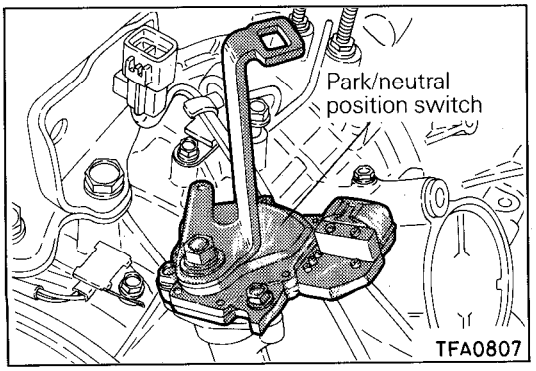
1. **The automatic transaxle consists of high-precision parts and utmost care must be exercised during disassembly and reassembly to prevent damage to the parts.**
2. **Place a rubber mat on the workbench and keep it clean at all times.**
3. **Do not use cotton work gloves or waste cloth for the disassembly 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.**



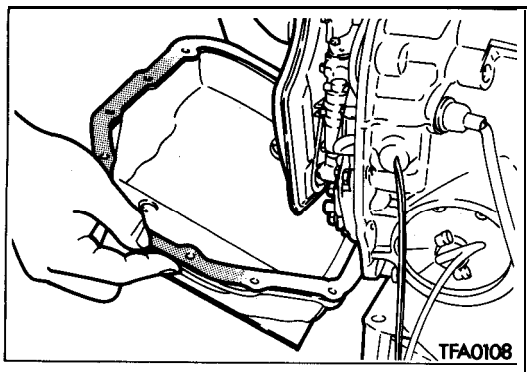
(1) Remove the torque converter.
(2) Install the dial indicator to the transaxle case and measure the end play in the input shaft.
(3) Remove brackets.
(4) Remove the oil level gauge and oil level gauge guide.



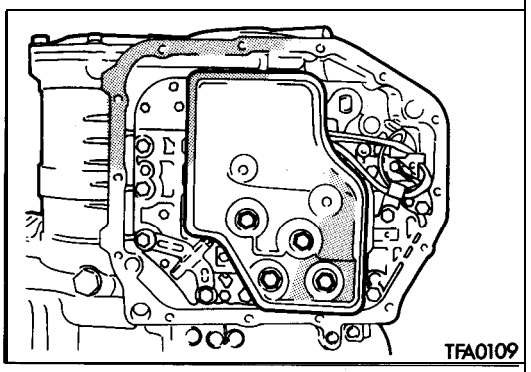
(5) Remove pulse generators A and B



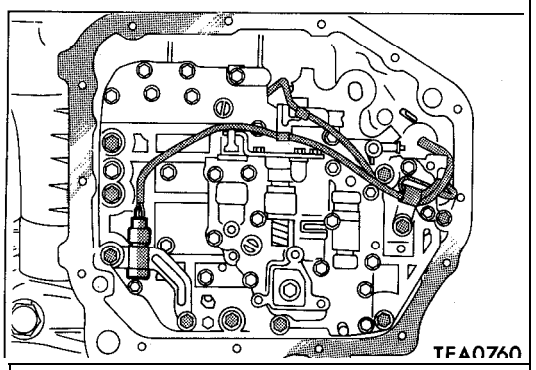
(6) Remove the manual control lever and then remove the park/neutral position switch.
(7) Remove the speedometer drive gear assembly.



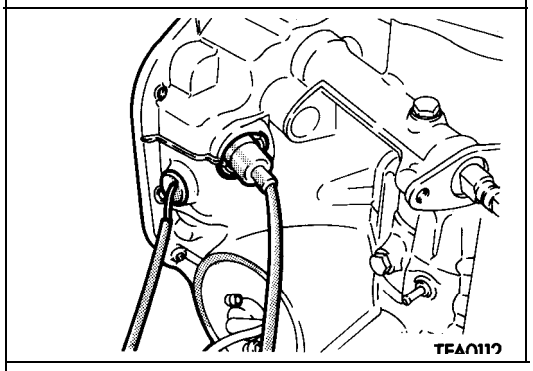
(8) Remove the oil pan, magnet, and gasket.



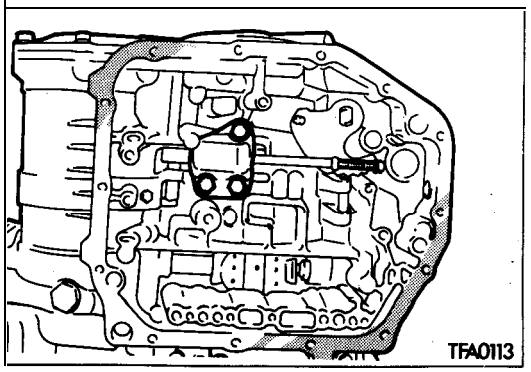
(9) Remove the oil screen.



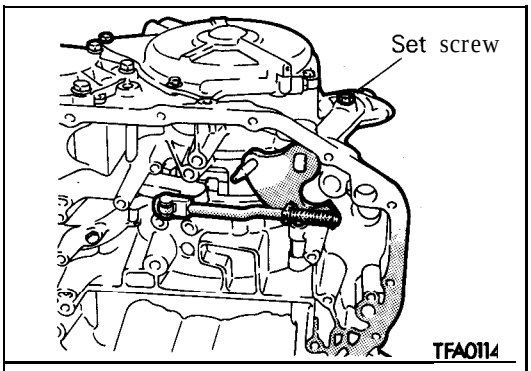
(10) Remove the ten valve body mounting bolts.
(11) Remove the oil temperature sensor holder and remove the oil temperature sensor harness from the clamp.



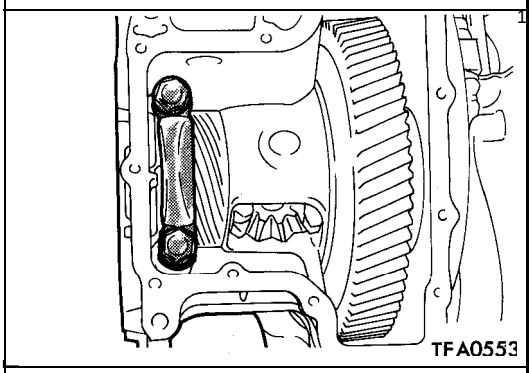
(12) Press the solenoid valve harness grommet claw to push the grommet into the case; then, remove the valve body assembly.
(13) Pull off the oil temperature sensor.



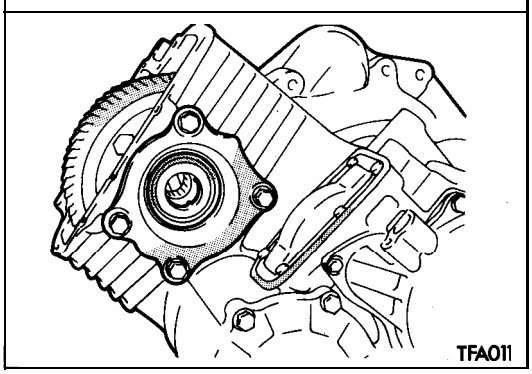
(14) Remove the parking roller support.



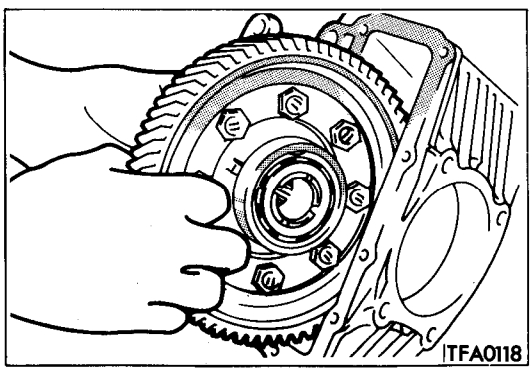
(15)Remove the set screw from the manual control shaft and remove the manual control shaft assembly.
(16)Remove the detent assembly.



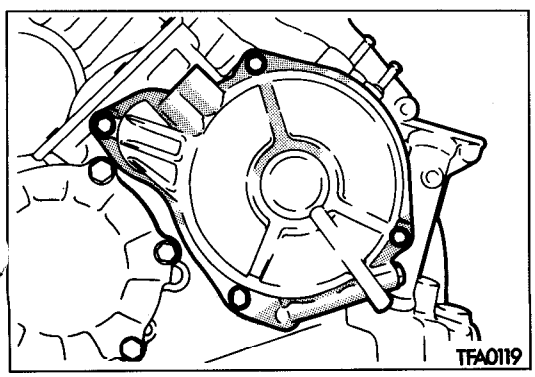
(17)Remove the differential cover and gasket.
(18)Remove the differential front bearing cap.



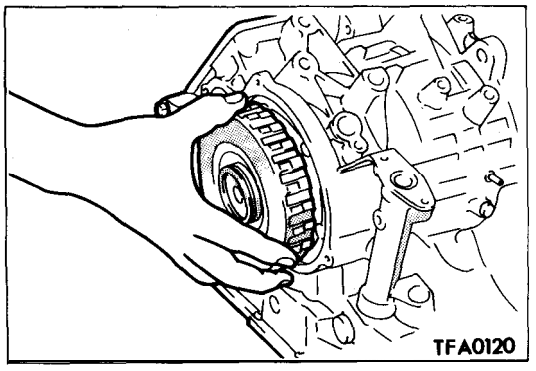
(19)Remove the differential bearing retainer, spacer and outer race.



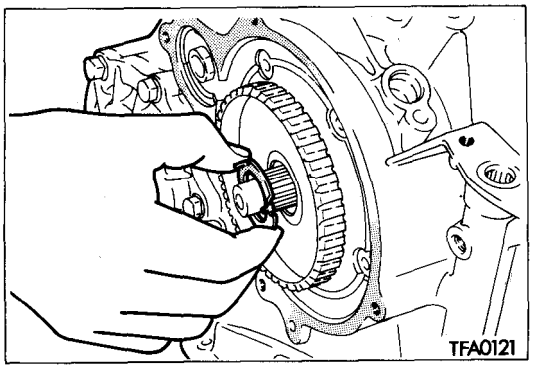
(20)Remove the differential assembly.



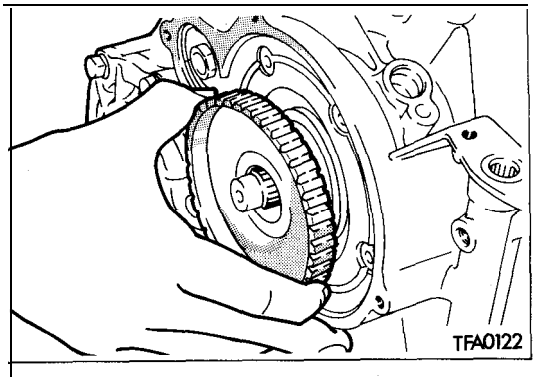
(21)Remove the end clutch cover mounting bolts and remove the end clutch cover.



(22)Remove the end clutch assembly.

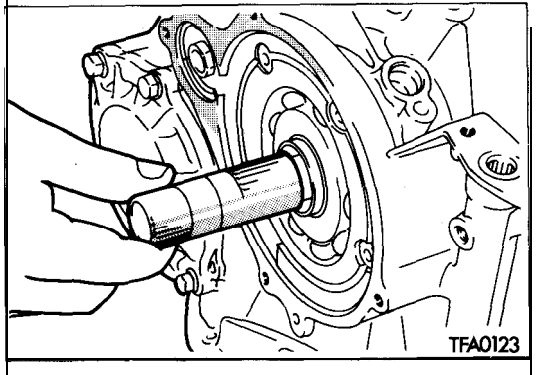


(23)Remove the thrust plate.

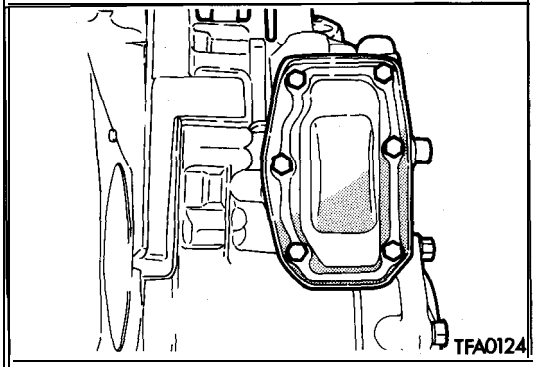


(24)Remove the end clutch hub.
(25)Remove the thrust bearing.

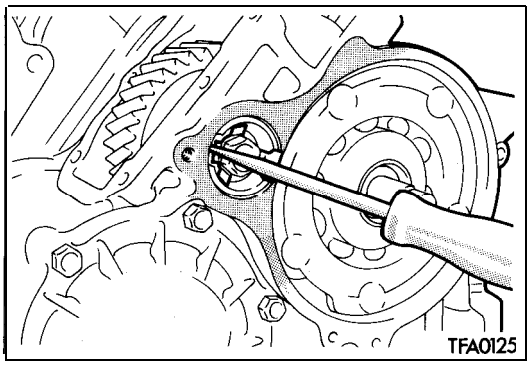
NOTE
The bearing may be adhering to the end clutch hub.



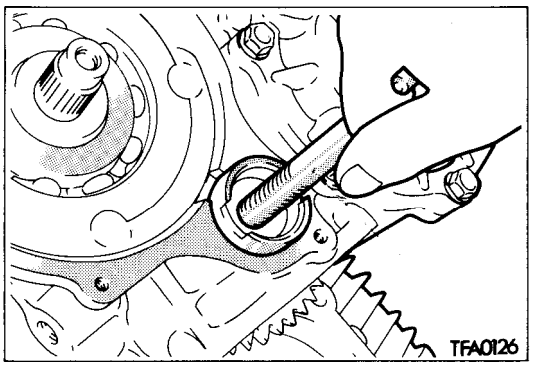
(26)Pull out the end clutch shaft.



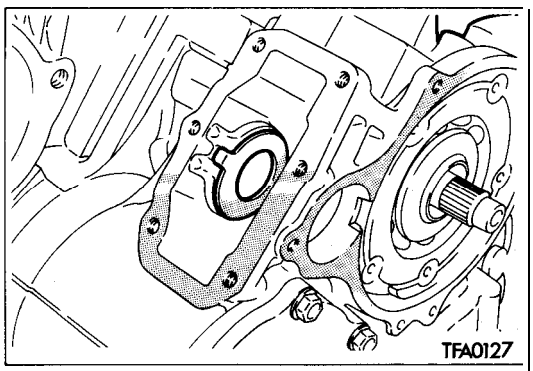
(27)Remove the idler gear cover mounting bolts and remove the idler gear cover and gasket.



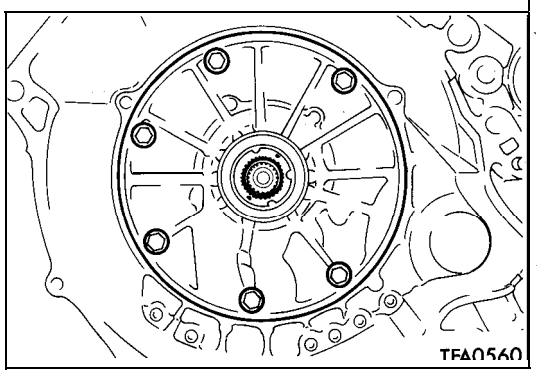
(28)Straighten the lock where it forms over the bolt and remove the bolt.



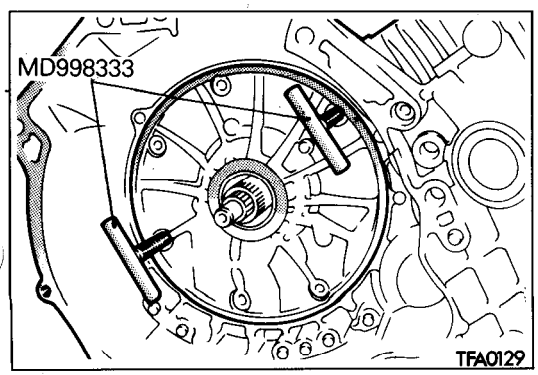
(29)Pull off the idler shaft and remove the idler gear and bearing inner race.



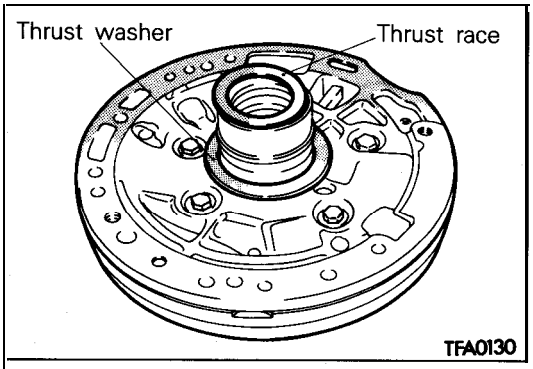
(30)Remove the spacer



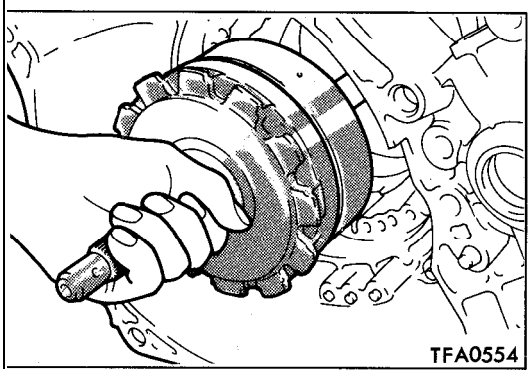
(31)Remove the oil pump bolts.



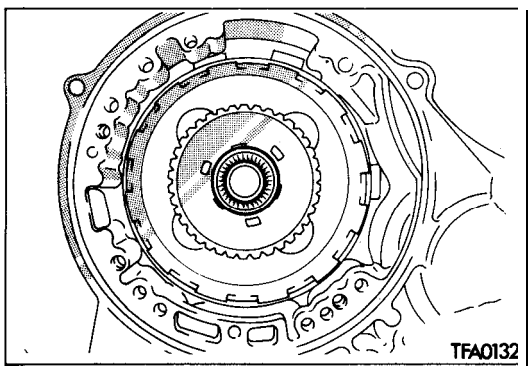
(32)Using the special tool, remove the oil pump.



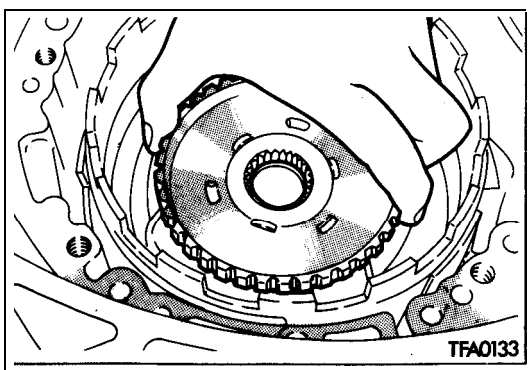
(33)Remove the thrust washer and thrust race



(34)Holding onto the input shaft, remove the front clutch assembly and rear clutch assembly together.

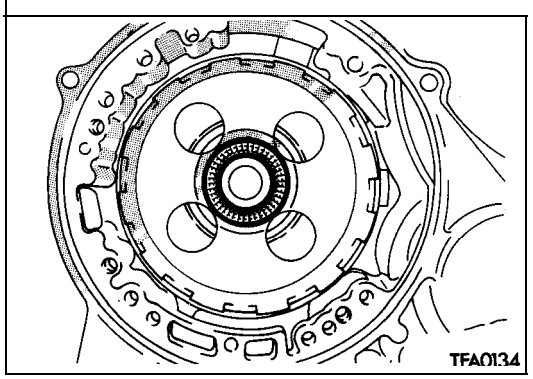


(35)Remove the thrust bearing.

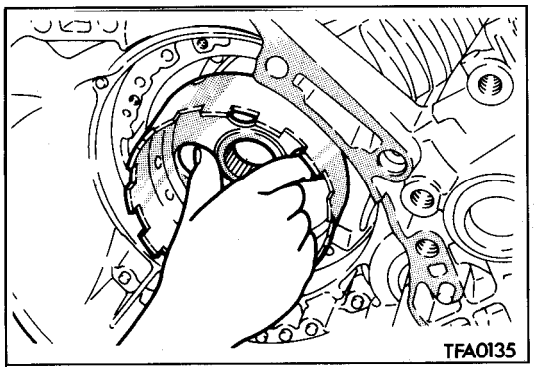


(36)Remove the rear clutch hub.

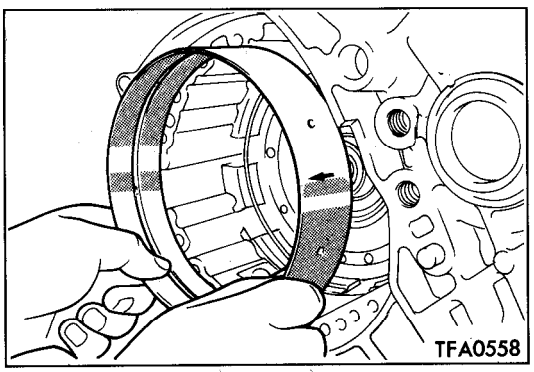
NOTE
The thrust race may be sticking to the clutch hub.



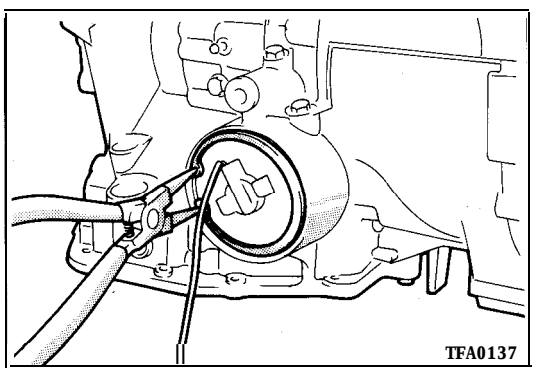
(37)Remove the thrust bearing.



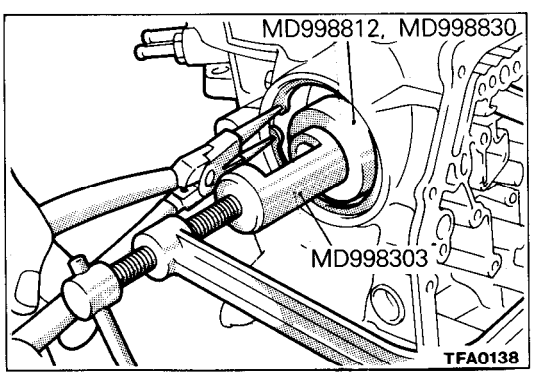
(38)Remove the kickdown drum.



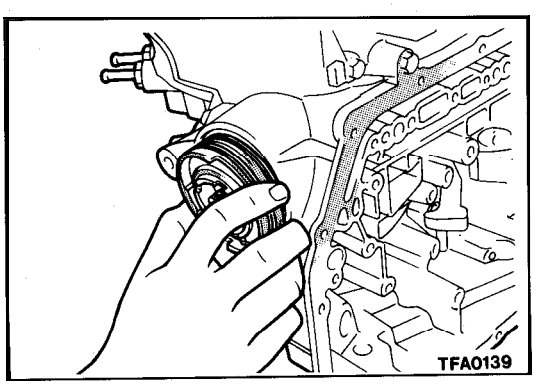
(39)Remove the kickdown band.



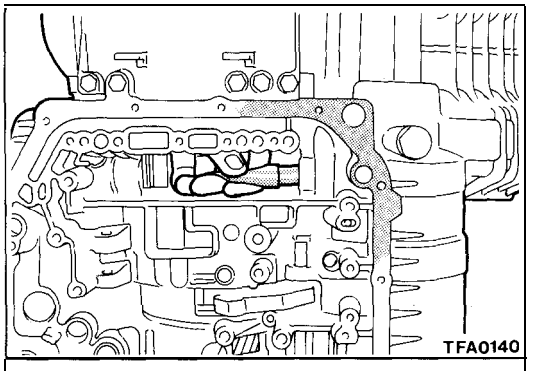
(40)Snap off the snap ring and remove the kickdown servo switch.



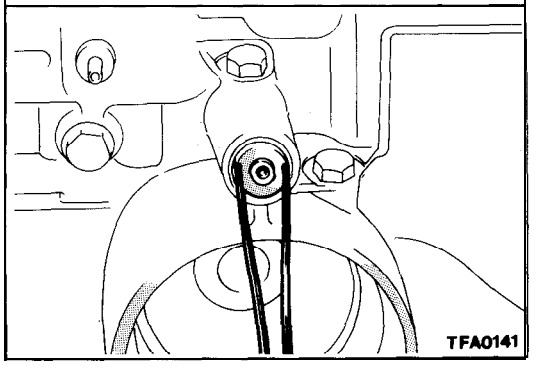
(41)Using previously released drivers or deep well socket, push in the kickdown servo piston to snap off the snap ring.

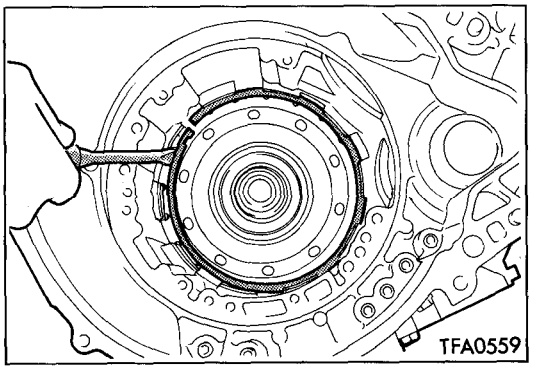


(42)Remove the kickdown servo piston.

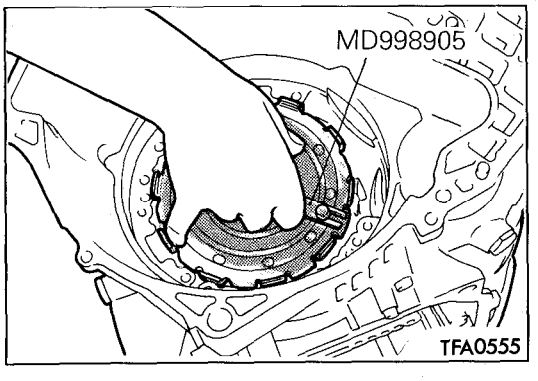


(43)Remove the anchor rod.

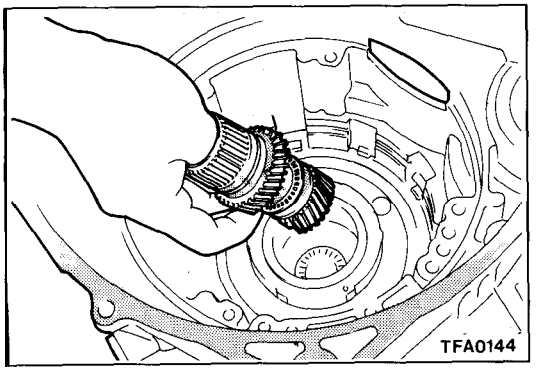




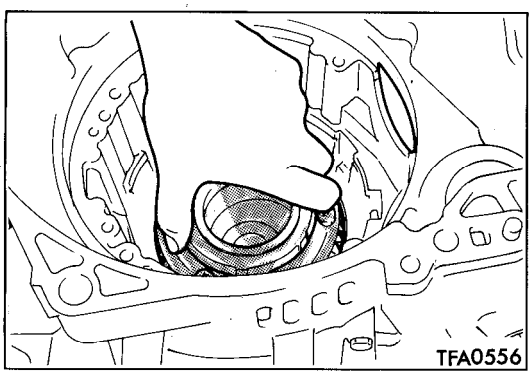
(45)Remove the snap ring.



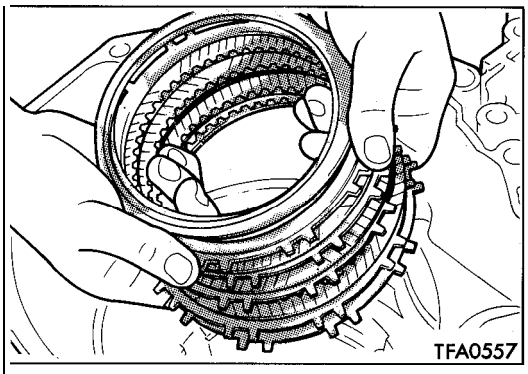
(46)Using the special tool, remove the center support.



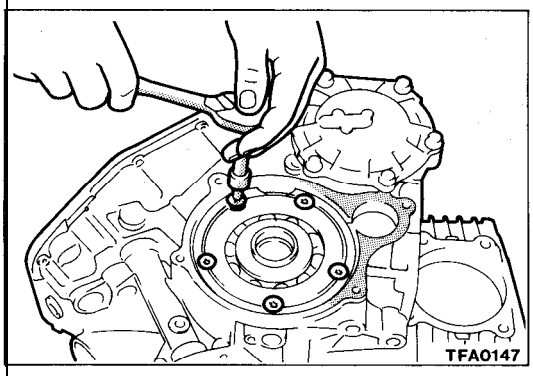
(47)Remove the reverse sun gear and forward sun gear.



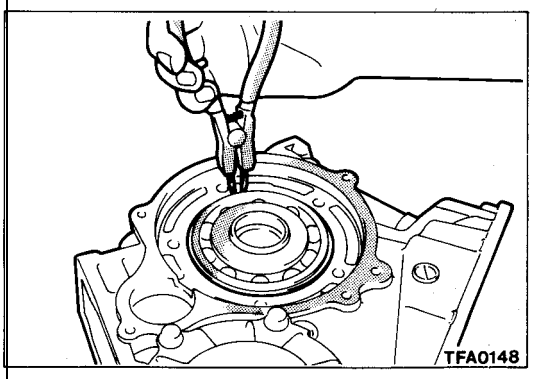
(48)Remove the planetary carrier assembly.



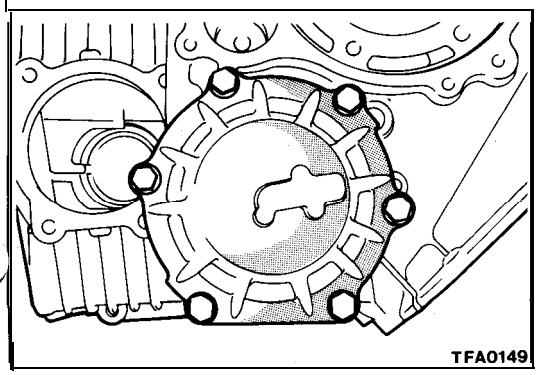
(49)Remove the wave spring, return spring, reaction plate, brake disc, and brake plate.



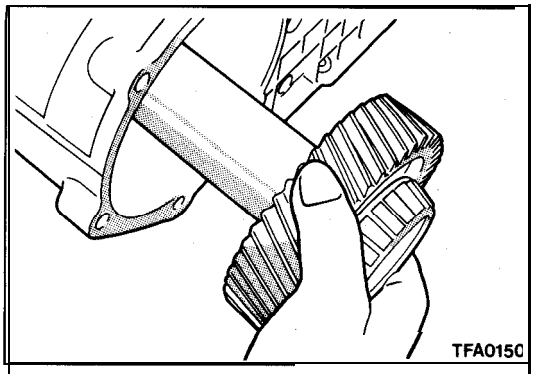
(50)Remove the screw and remove the rear bearing retainer.



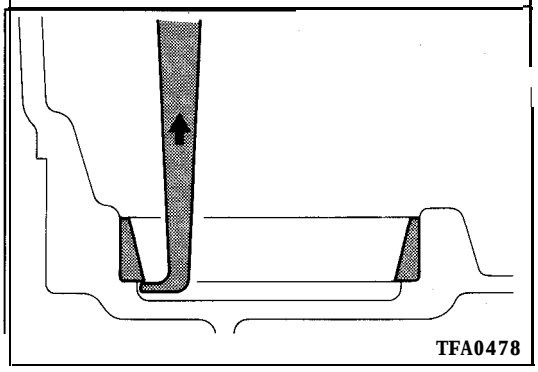
(51)Snap off the snap ring and remove the output flange assembly.



(52)Remove the output bearing retainer mounting bolts and remove the' output bearing retainer and outer race.


TFA0150

(53)Remove the transfer shaft.

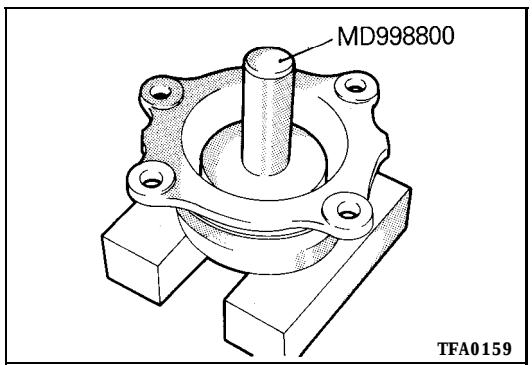

TFA0478

(54)Using a sliding hammer, remove the outer race.
(55)Remove oil seals.

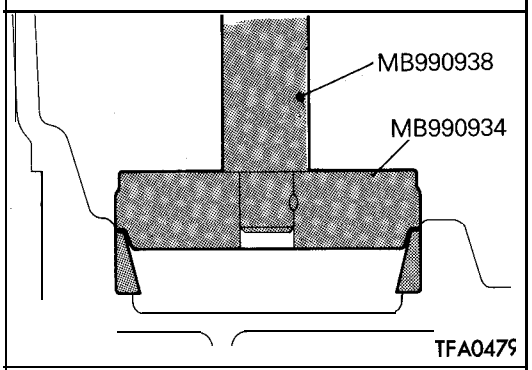
REASSEMBLY

Caution

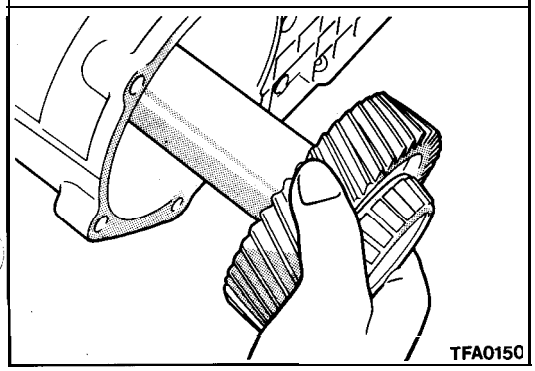
1. **The gasket, O-ring, and oil seal should never be reused. Whenever they have been removed, they must be replaced with new ones. (Note: The rubber used in the oil level gauge does not require replacement.)**
2. **Never use grease other than petrolatum.**
3. **Be sure to apply ATF to the friction elements 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.**



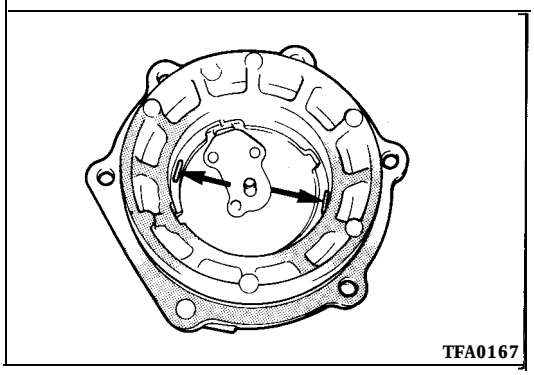
(1) Using the special tool, press-fit the drive shaft oil seal into position.



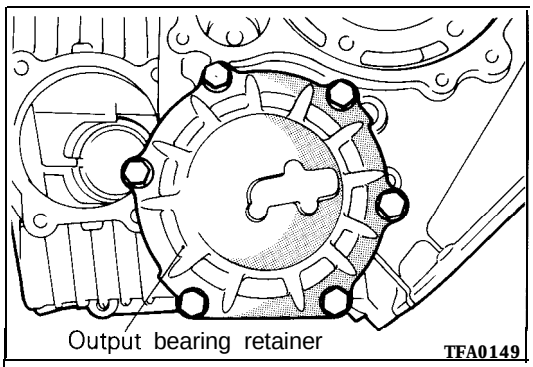
(2) Using the special tool, press-fit the outer race into the transaxle case.



(3) Install the transfer shaft.

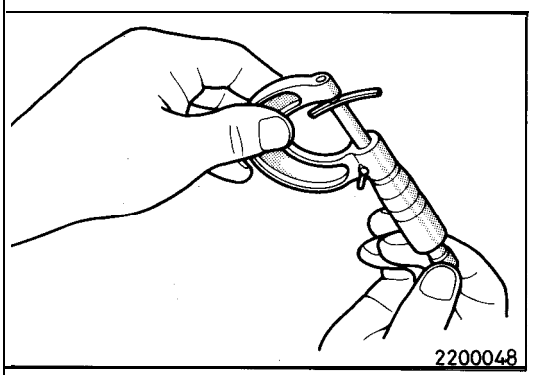

TFA0167

(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.



TFA0149

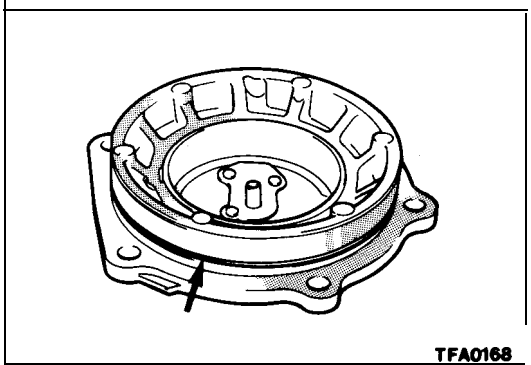
(5) Install the output bearing retainer and tighten bolts to specification.
(6) Loosen the bolts and remove the output bearing retainer.


2200048

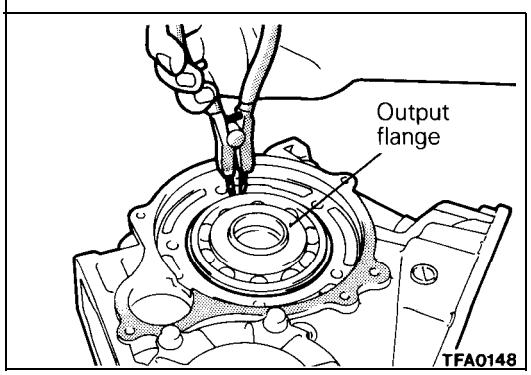
(7) Remove the outer race from the output bearing retainer and remove the solders. If the solders are not crushed, use larger dia. (3 mm or .12 in.) solders to repeat steps (4) to (6). Measure the thickness of the solders crushed with a micrometer and select a spacer to obtain the specified preload.

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.

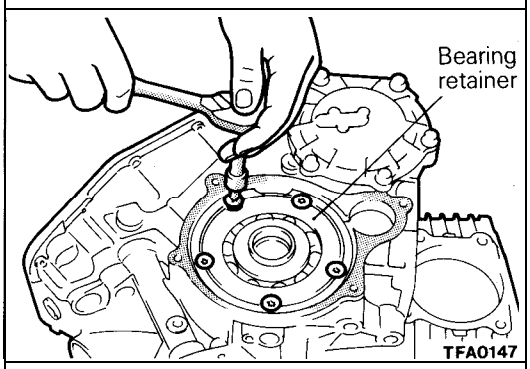

TFA0168

(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.

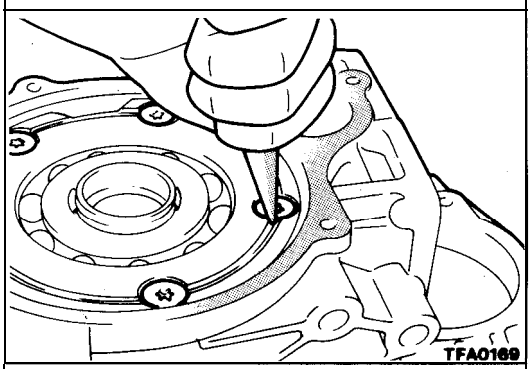


TFA0148

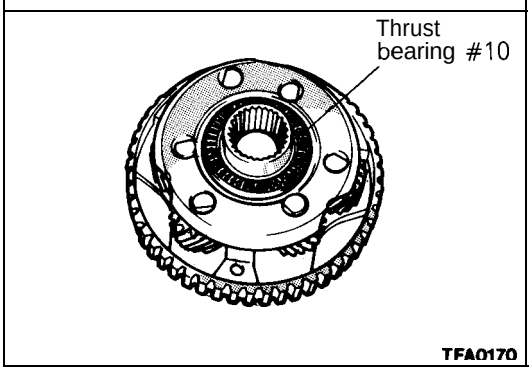
(11) Insert the output flange into the case and fit the snap ring over the periphery of the bearing.



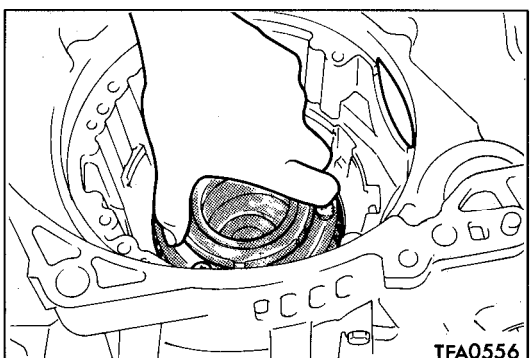
(12)Install the bearing retainer with new bolts.



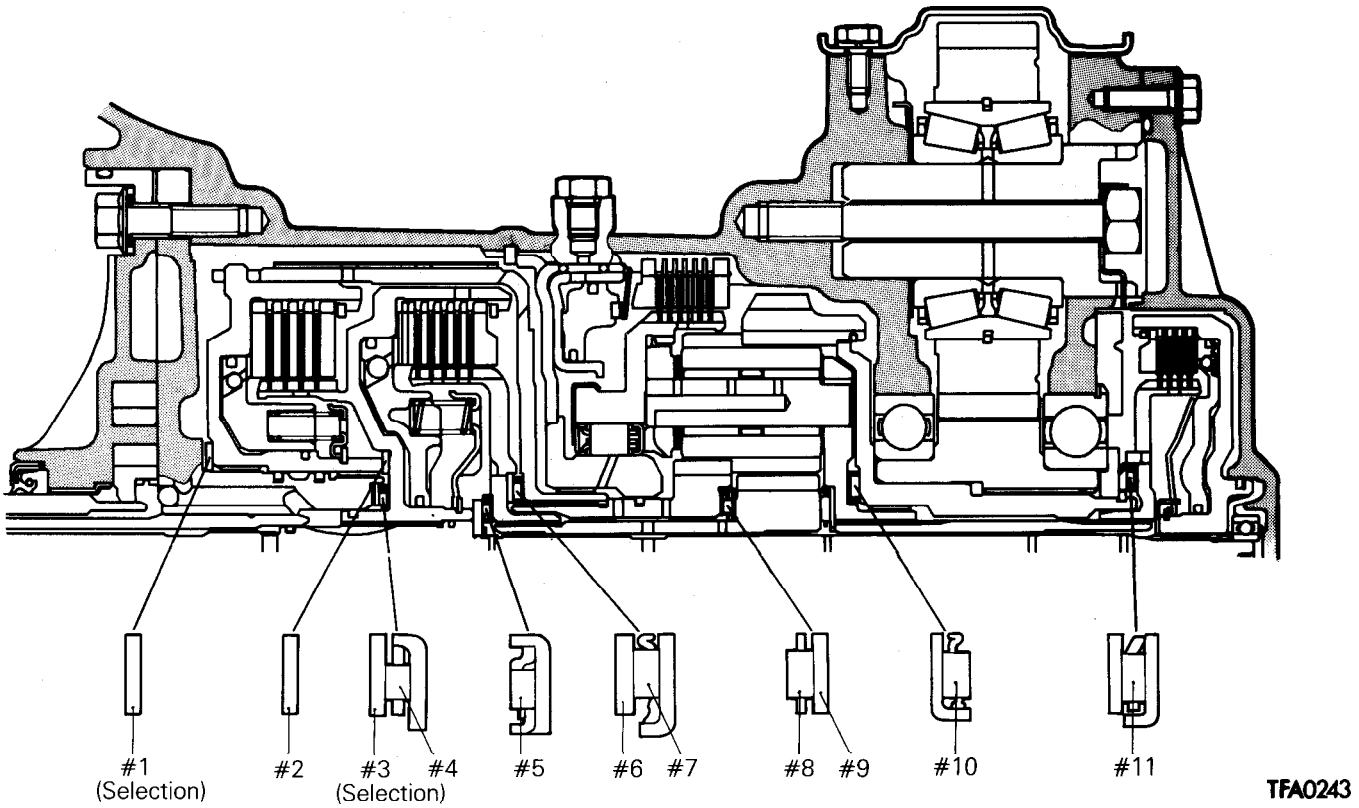
(13)Stake the heads of the bolts.



(14)Coat thrust bearing #10 with petrolatum and affix the bearing to the planetary carrier.



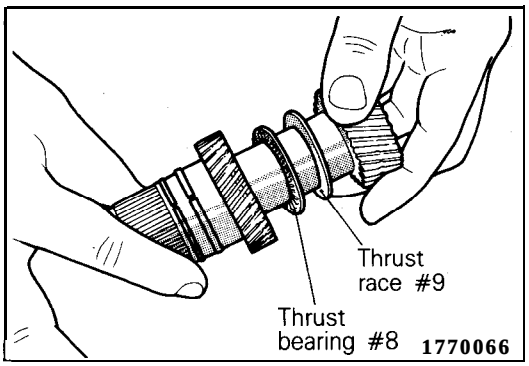
(15)Install the planetary carrier.



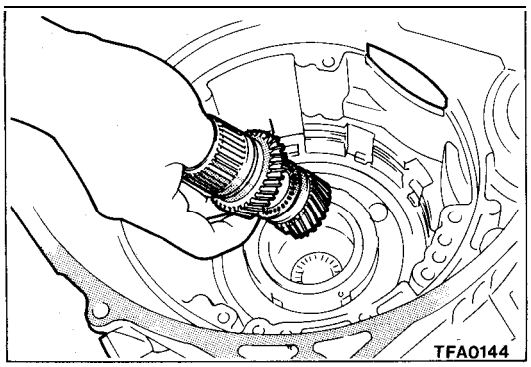
IDENTIFICATION OF THRUST BEARINGS, THRUST RACES AND THRUST WASHERS LOCATION

mm (in.)

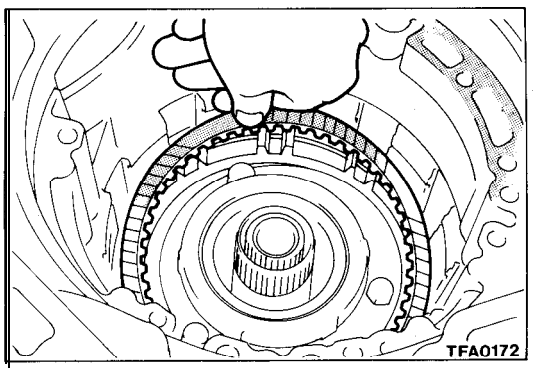
O.D.	I.D.	Thickness	Part No.	Code	O.D.	I.D.	Thickness	Part No.	Code
70 (2.76)	55.7 (2.193)	1.4 (.055)	*1	#1	48.9 (1.925)	37 (1.46)	2.2 (.087)	MD997852 (included *4)	#3
70 (2.76)	55.7 (2.193)	1.8 (.071)	*2		48.9 (1.925)	37 (1.46)	2.4 (.094)	MD997853 (included *4)	
70 (2.76)	55.7 (2.193)	2.2 (.087)	*3		48.1 (1.874)	34.4 (1.354)		MD707271	#4
70 (2.76)	55.7 (2.193)	2.6 (.102)	*4		42.6 (1.677)	28 (1.10)	–	MD720753	#5
66 (2.60)	54 (2.13)	1.8 (.071)	MD731212	#2	54 (2.13)	38.7 (1.524)	1.6 (.063)	MD704936	#6
48.9 (1.925)	37 (1.46)	1.0 (.039)	MD997854 (included *1)	#3	52 (2.05)	36.4 (1.433)	–	MD720010	#7
48.9 (1.925)	37 (1.46)	1.2 (.047)	MD997847 (included *1)		45 (1.77)	28 (1.10)	–	MD735062	#8
48.9 (1.925)	37 (1.46)	1.4 (.055)	MD997848 (included *2)		46 (1.81)	31 (1.22)	0.8 (.031)	MD735063	#9
48.9 (1.925)	37 (1.46)	1.6 (.063)	MD997849 (included *2)		52 (2.05)	36.4 (1.453)	–	MD720010	#10
48.9 (1.925)	37 (1.46)	1.8 (.071)	MD997850 (included *3)		58 (2.28)	44 (1.73)		MD724206	#11
48.9 (1.925)	37 (1.46)	**2.0** (.079)	MD997851 (included *3)						



(16)Assemble the forward sun gear, thrust race #9, thrust bearing #8, and reverse sun gear.

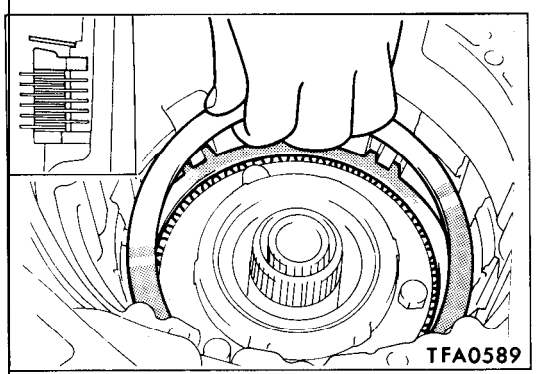


(17)Install the two sun gears assembled in the preceding step into the planetary carrier.



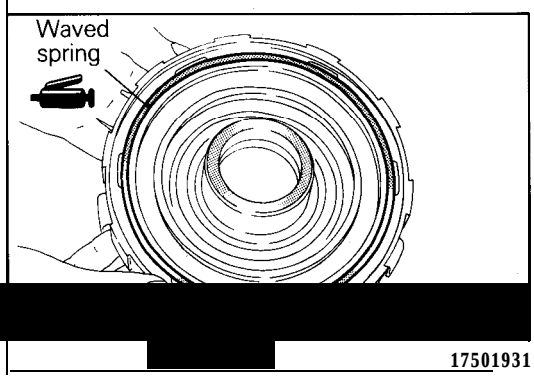
(18)Install the reaction plate, brake disc, and brake plate.

Caution
If a new brake disc is to be used, it should be dipped in ATF for more than two hours.

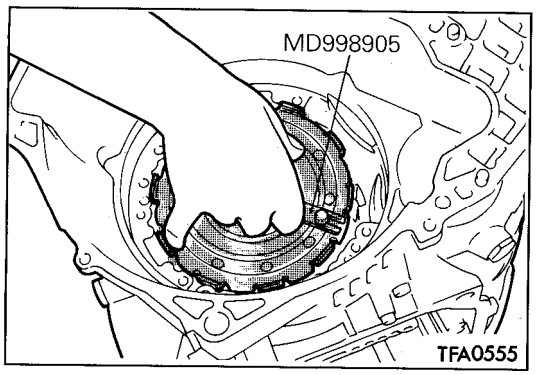


(19)Install the pressure plate disassembled and return spring.

Caution
Make sure the return spring is installed in the correct direction.

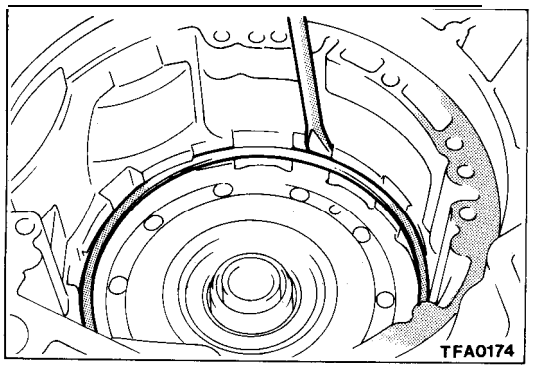


(20)Coat the wave spring with petrolatum and affix it to the center support.

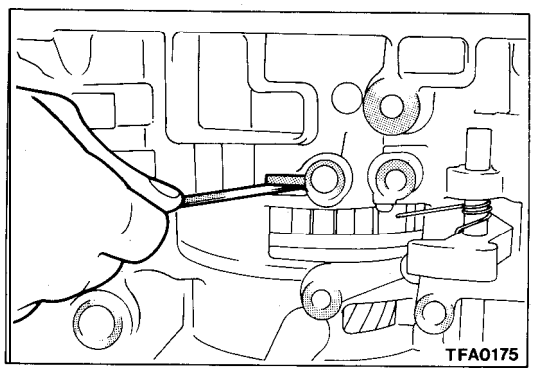


(21)Install the special tool to the center support, fit new O-rings (at two places), and press the center support into the transaxle case.

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.

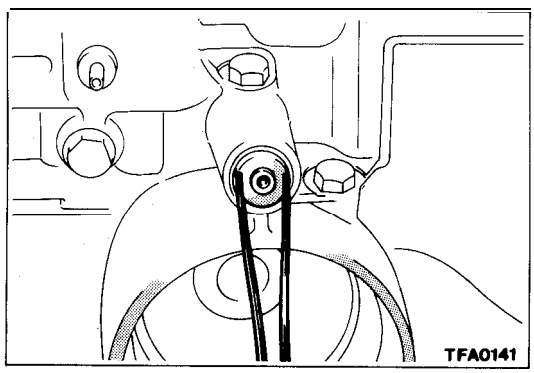


(22)Fit the snap ring.

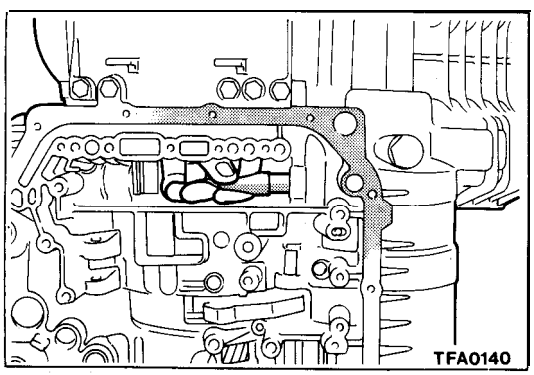


(23)Using a feeler gauge, measure the end play in low-reverse brake. Select a pressure plate to obtain the specified end play.

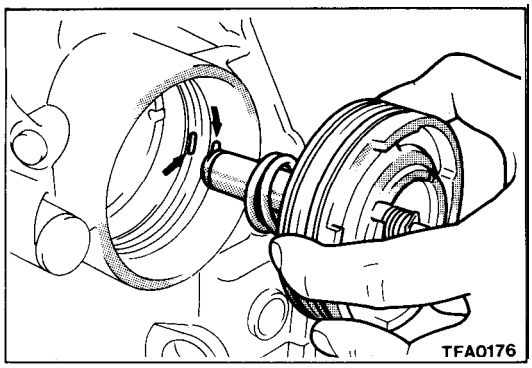
Standard value: 1.0 – 1.2 mm (.039 – .047 in.)



(24)Install the air exhaust plug and mount the plug.

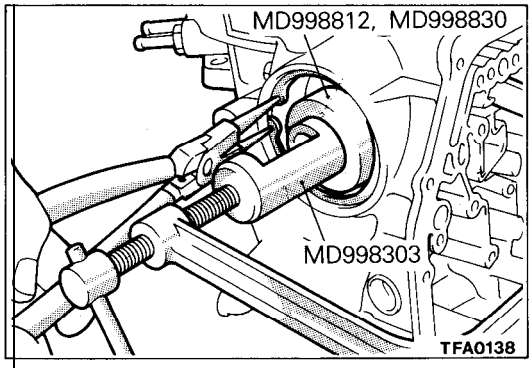


(25)Install the anchor rod.

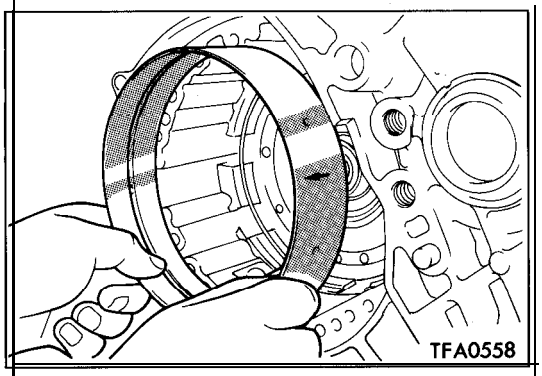


(26)Install the kickdown servo spring, piston, and sleeve.

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).

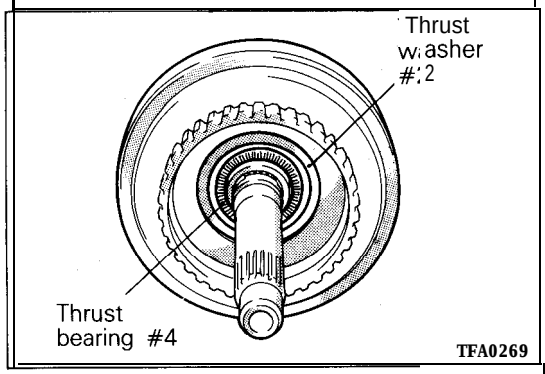


(27)Using previously released drivers or deep well socket, press the kickdown servo piston and sleeve into position and fit the snap ring.

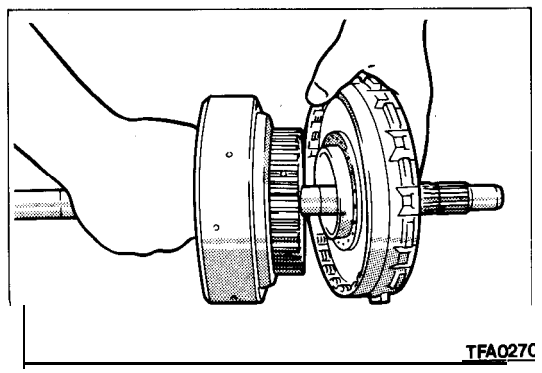


(28)Fit the kickdown band.

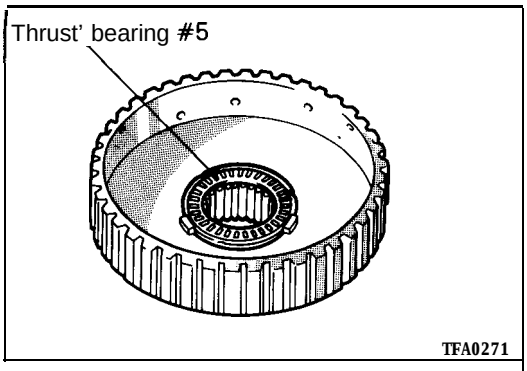
Caution
Install so that the arrow points to the front.



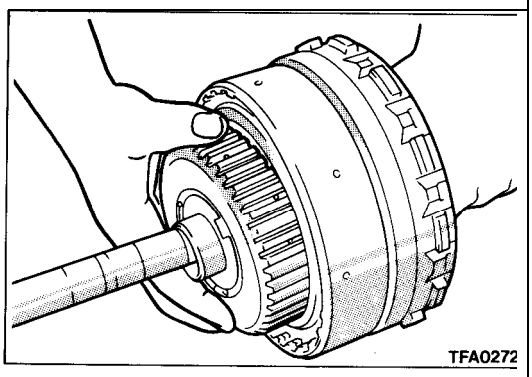
(29)Install thrust bearing #4 and thrust washer #2 to the rear clutch.



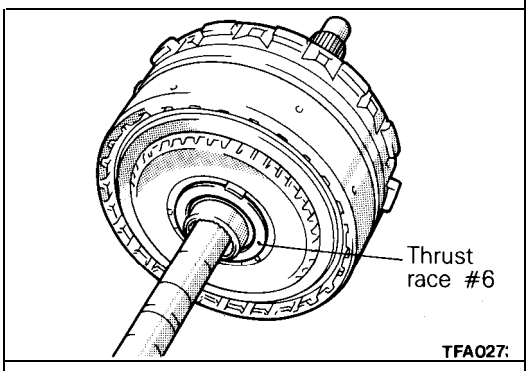
(30)Mate the rear clutch with the front clutch.



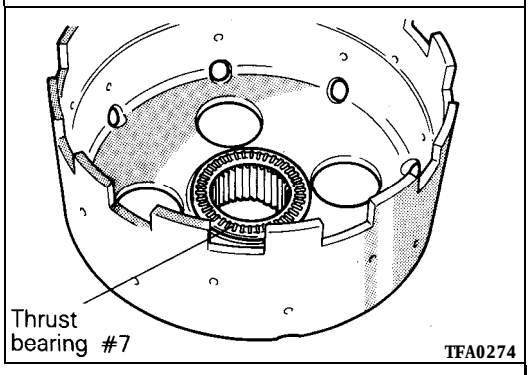
(31)Mount thrust bearing #5 to the rear clutch hub.



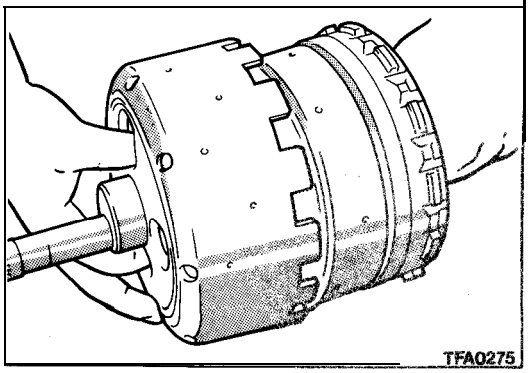
(32)Assemble the rear clutch hub to rear clutch.



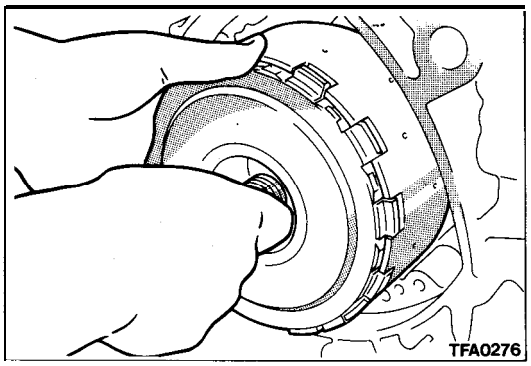
(33)Install thrust race #6 to the rear clutch hub end face.



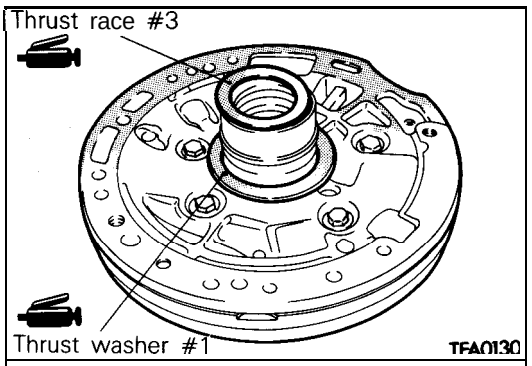
(34)Install thrust bearing #7 to the kickdown drum.



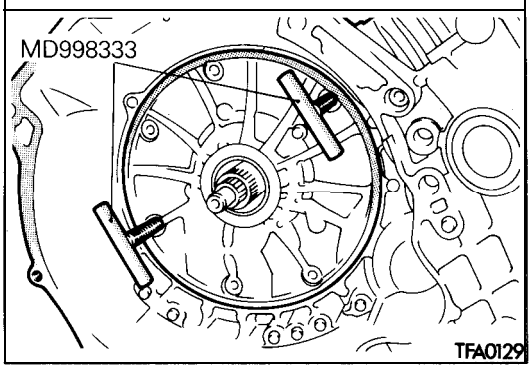
(35)Assemble the clutch assembly to kickdown drum.



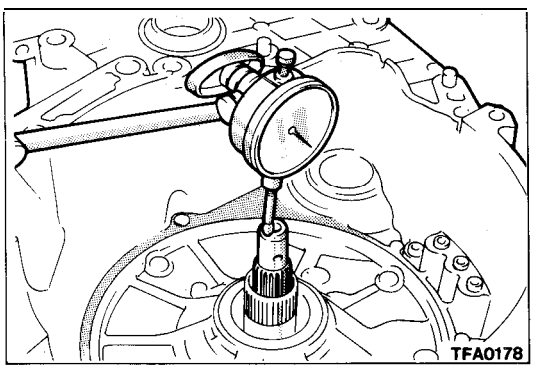
(36)Install the clutch assembly and kickdown drum to the transaxle case at the same time.



(37)Using petrolatum, affix thrust race #3 and thrust washer #1 to the rear end face of oil pump.

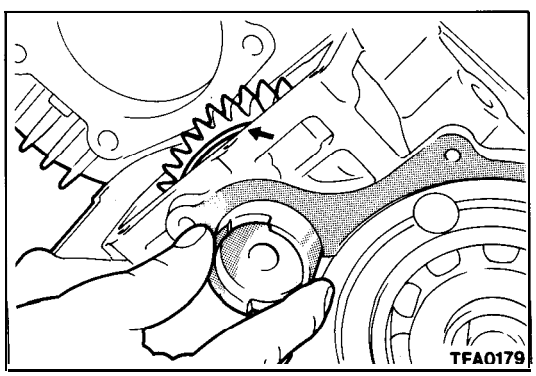


(38)Using the special tool, install a new oil pump gasket and oil pump assembly.



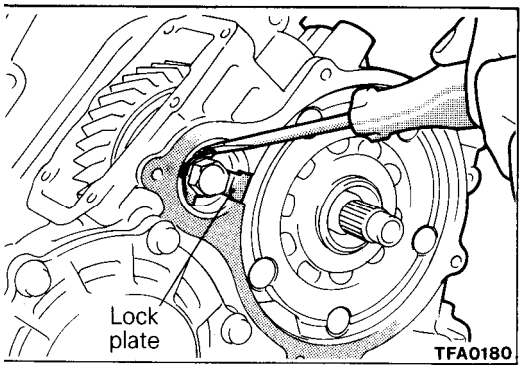
(39)Measure the end play in input shaft. If the measurement is out of specification, replace thrust race #3 and thrust washer #1 to obtain the specified end play.

Standard value: 0.3 – 1.0 mm (.012 – .039 in.)

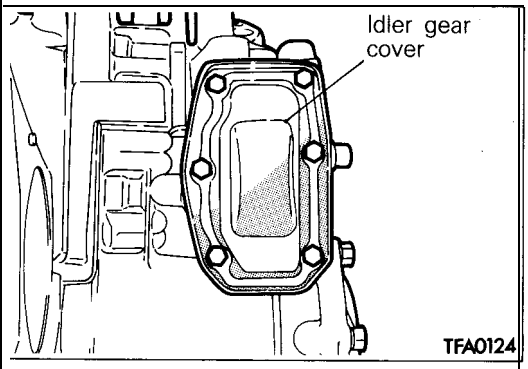


(40)Install the spacer, idler gear, and bearing and insert the idler shaft.

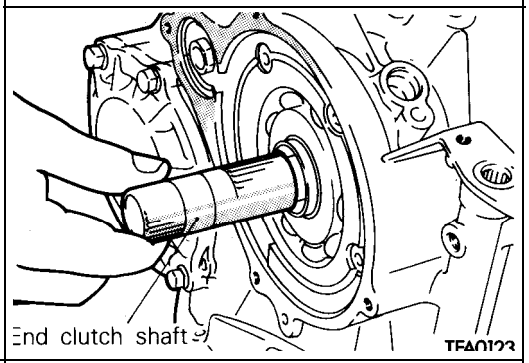
Caution
Install so that the identification groove in the idler gear end face is on the rear face side.



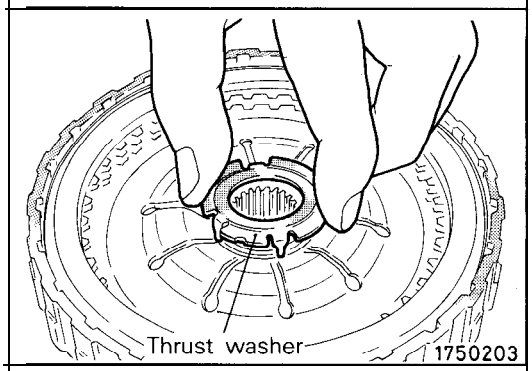
(41)Tighten the idler shaft lock bolt to specification and raise the new lock plate for locking.



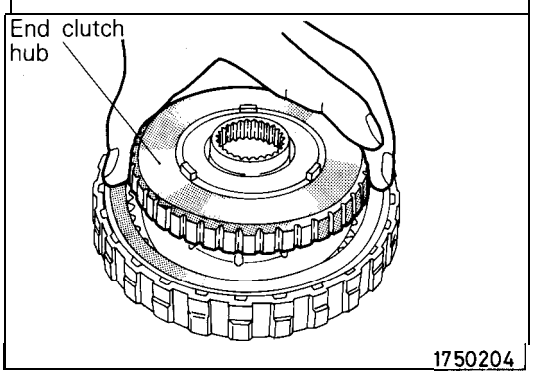
(42)Install the idler gear cover and new gasket.



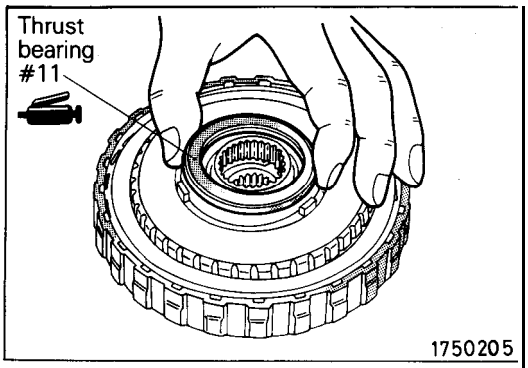
(43)Insert the end clutch shaft with its longer splines facing front.



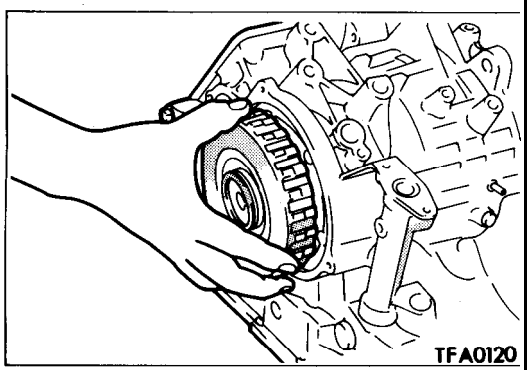
(44)Fit the thrust washer onto the end clutch return spring.



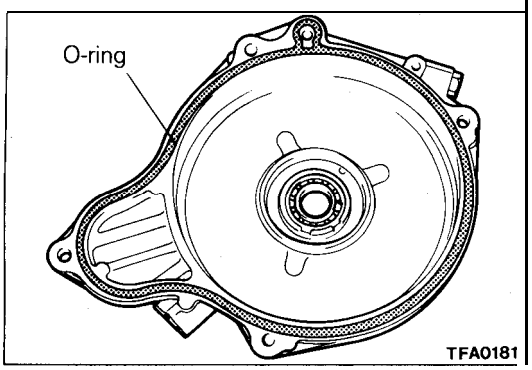
(45)Install the end clutch hub to the end clutch assembly.



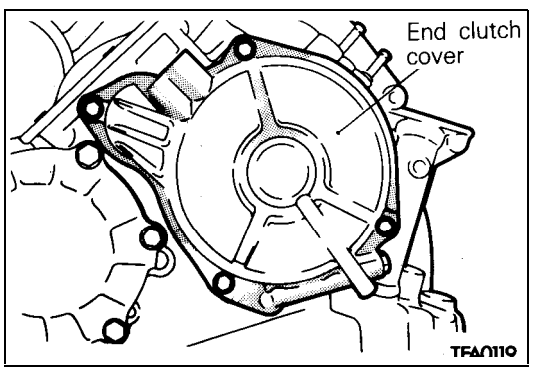
(46)Using petrolatum, affix the thrust bearing to the end clutch hub.



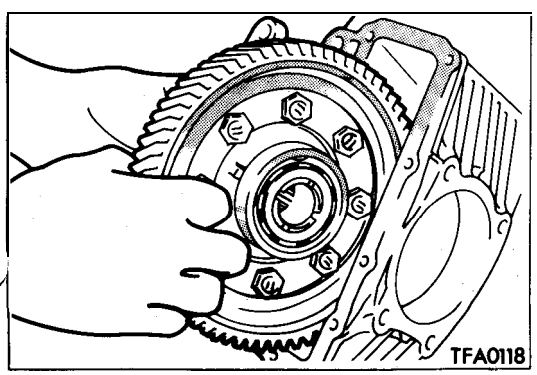
(47)Install the end clutch assembly.



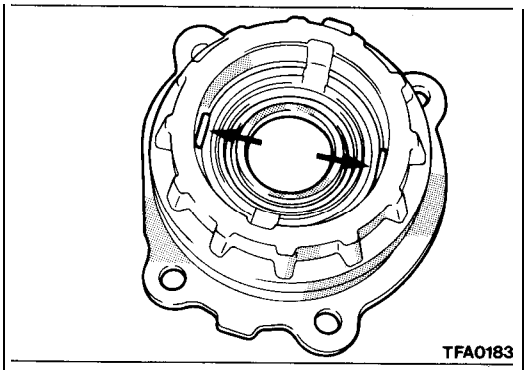
(48)Mount a new O-ring onto the end clutch cover.



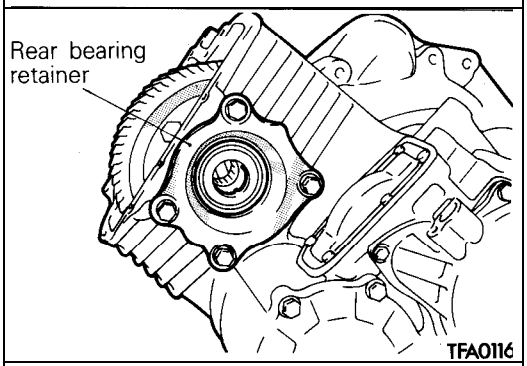
(49)Install the end clutch cover and tighten bolts to specification.



(50)Install the differential assembly.

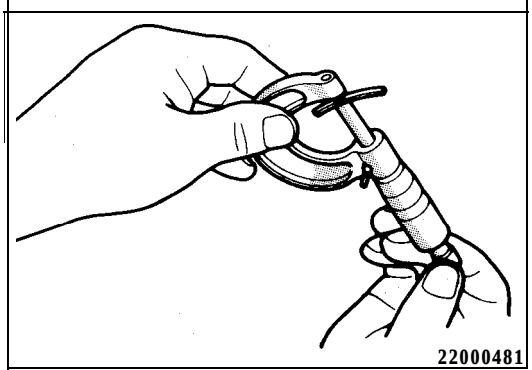

TFA0183

(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.



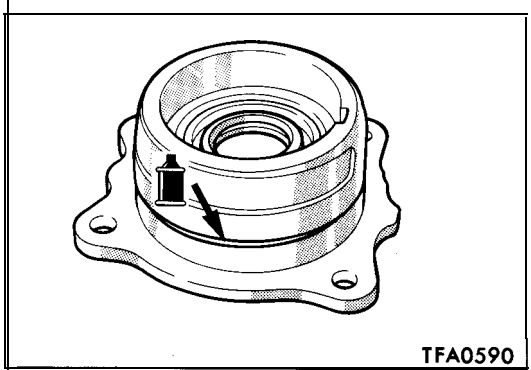
TFA0116

(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 or .12 in.) solders to repeat steps (51) to (53).

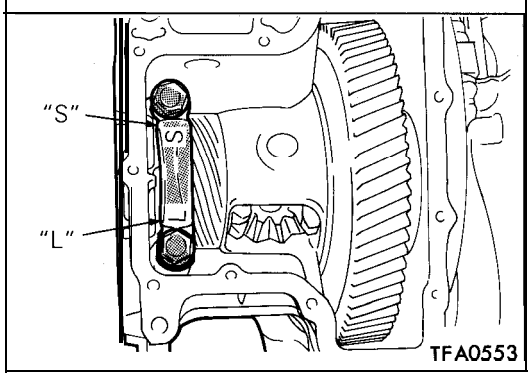

22000481

(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.)

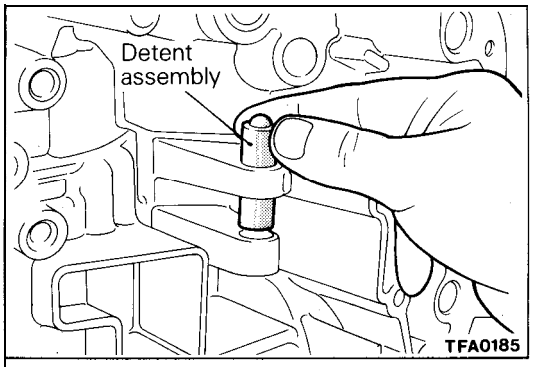

TFA0590

(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.

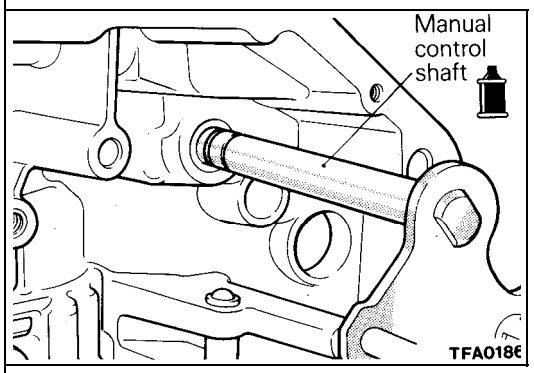


TFA0553

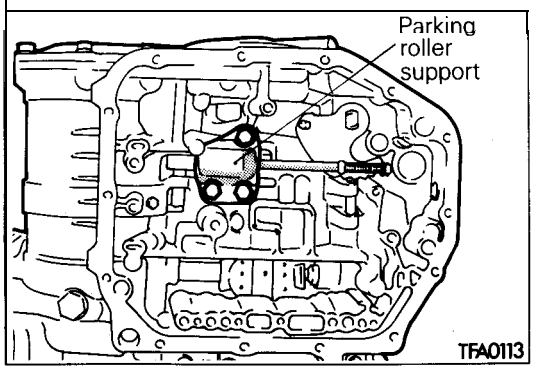
(56)Mount the front bearing cap and tighten bolts to specification. Be sure to install the short bolt to the side marked "S" of the bearing cap and the long bolt to the side marked "L".
(57)Install the differential cover and new gasket.



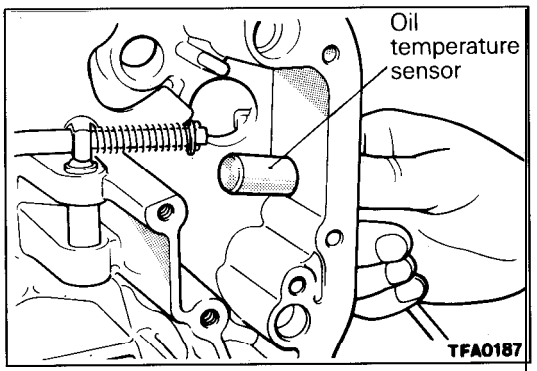
(58)Install the detent assembly.



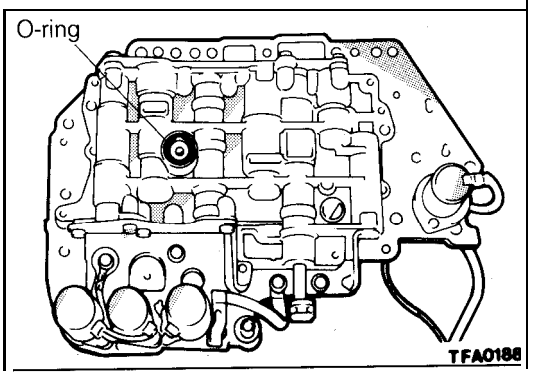
(59)Fit a new O-ring to the manual control shaft assembly, apply ATF, and insert it into the transaxle case.
(60)Align the groove in manual control shaft with the set screw hole and install the set screw.



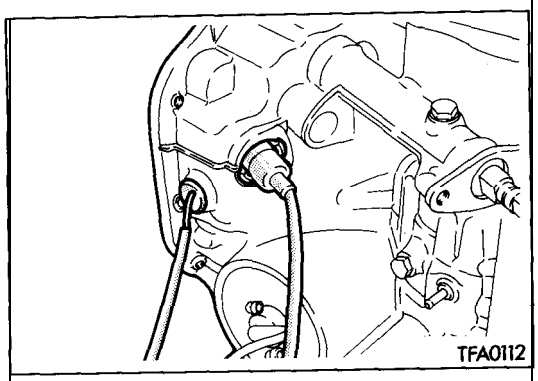
(61)Mount the parking roller support.



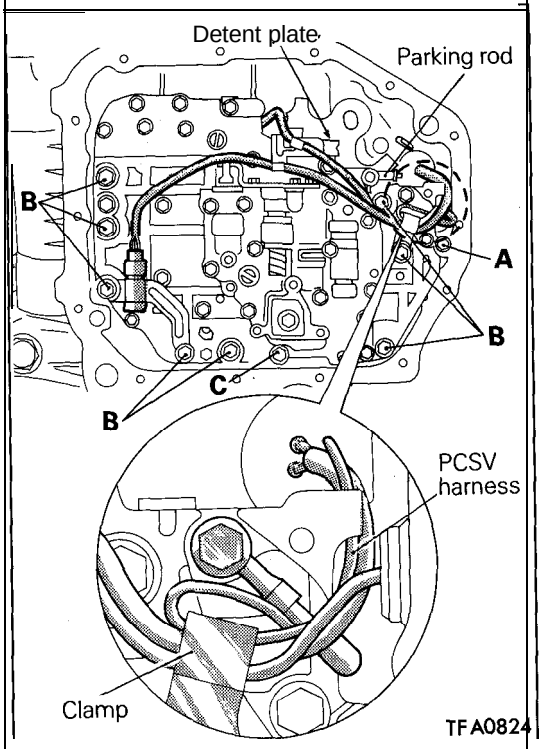
(62)Install the oil temperature sensor into the case.



(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.

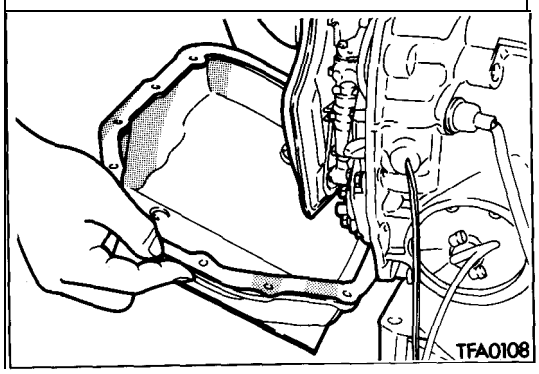


(67)Fitting the detent plate pin into the groove in manual valve, temporarily secure the valve body. Then, install the oil temperature sensor and holder and tighten bolts to specification.

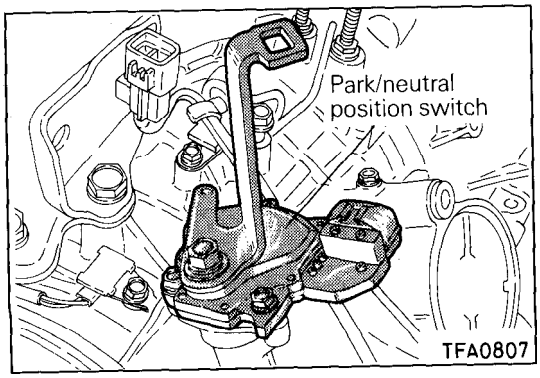
Bolt A = 18 mm (.71 in.)
Bolt B = 25 mm (.98 in.)
Bolt C = 40 mm (1.57 in.)

Caution
Secure the solenoid valve and oil temperature sensor harnesses as shown. Especially the pressure control solenoid valve (PCSV) harness must be routed and clamped as shown in the illustration, since it is separated from other harnesses. Failure to secure the harness results in its contact with the detent plate or parking rod.

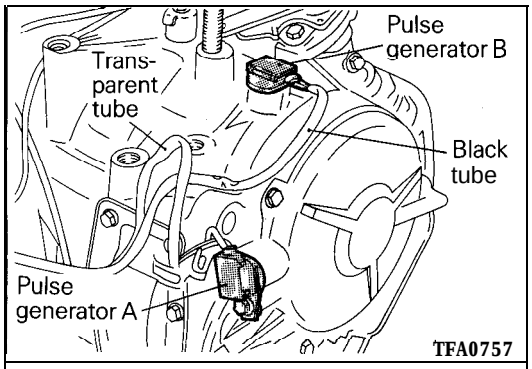
(68)Install the oil screen.



(69)Mount the magnet to oil pan and install the oil pan.



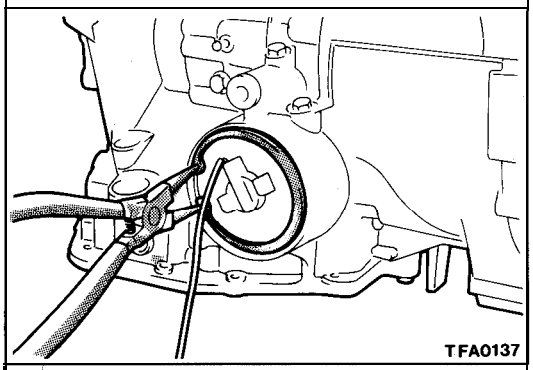
(70)Install the park/neutral position switch and manual control lever.
(71)Install the speedometer gear assembly.



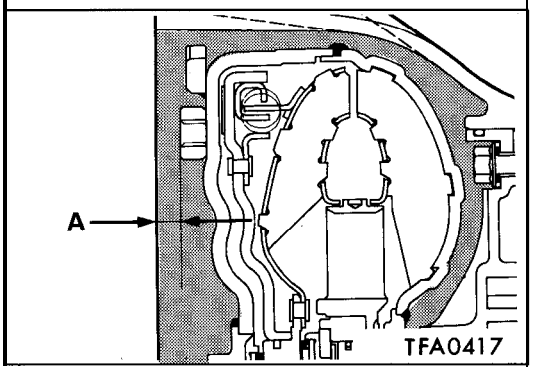
(72)Install pulse generator A and B.

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

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

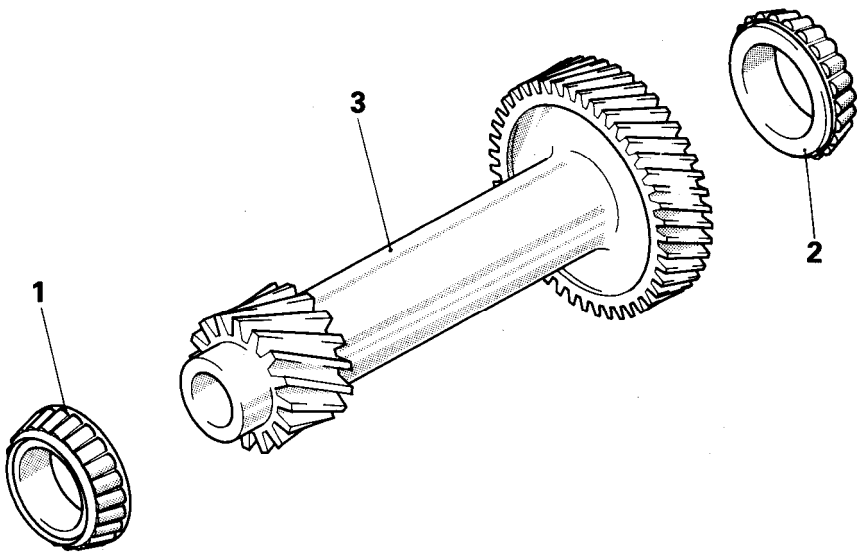
(1) Keep parts after cleaning in good order to ensure correct inspection, repair, and reinstallation.
(2) When disassembling the valve body, keep each valve with the mating spring.
(3) Keep the new brake disc and clutch disc for replacement dipped in ATF for more than two hours.

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

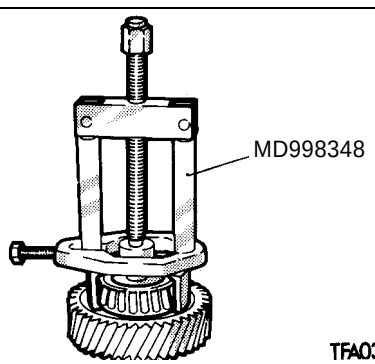


Disassembly steps

- ◆ *◆ C 1. Bearing
  2. Transfer shaft
- ◆ *◆ * 3. Bearing

Lubricate all internal parts with automatic transmission fluid during reassembly.

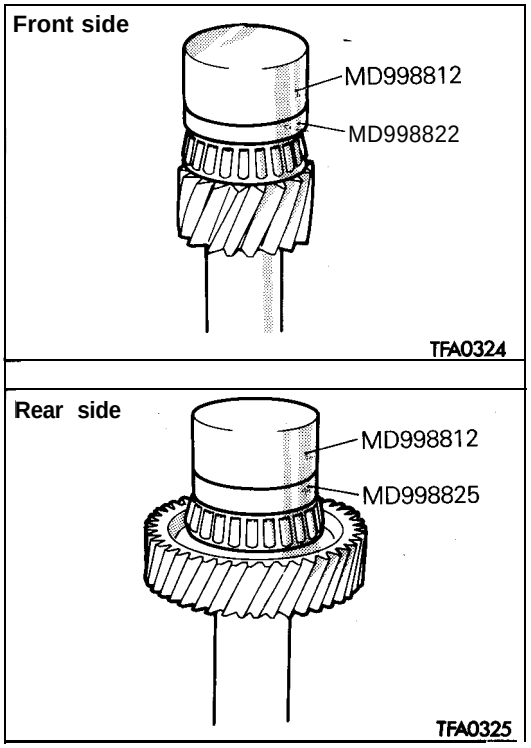
TFA0322



SERVICE POINTS OF DISASSEMBLY

1. 3. REMOVAL OF BEARING

Using the special tool, remove bearings from both ends of the transfer shaft.



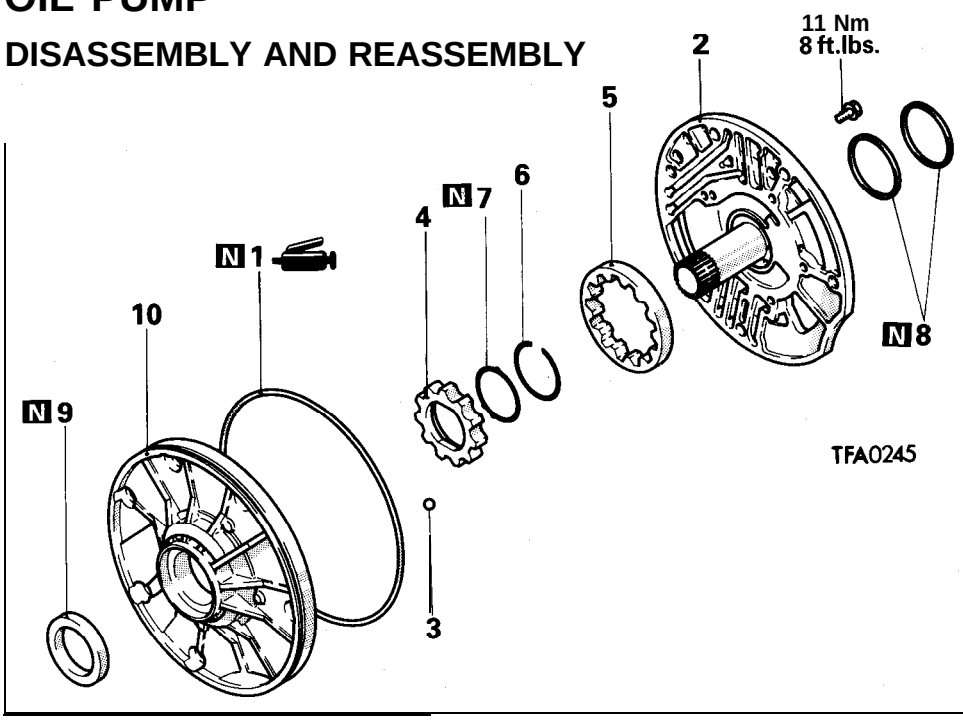
SERVICE POINTS OF REASSEMBLY

1. 3. INSTALLATION OF BEARING

Using previously released drivers or deep well socket, install the bearings to the transfer shaft.

OIL PUMP

DISASSEMBLY AND REASSEMBLY



Lubricate all internal parts with automatic transmission fluid during reassembly.

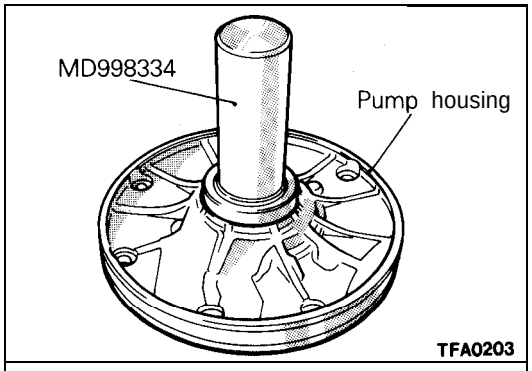
Disassembly steps

- ● + 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
- ➡◀ 9. Oil seal
- 10. Oil pump housing

SERVICE POINTS OF DISASSEMBLY

4. REMOVAL OF DRIVE GEAR / 5. DRIVEN GEAR

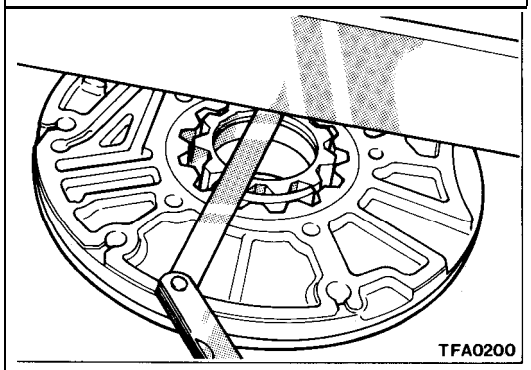
Make reassembly alignment marks on the drive and driven gears.



SERVICE POINTS OF REASSEMBLY

9. INSTALLATION OF OIL SEAL

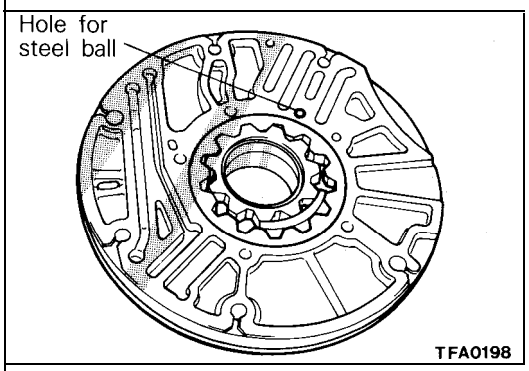
Using the special tool, install the oil seal to the pump housing.



5. MEASUREMENT SIDE CLEARANCE OF DRIVEN GEAR / 4. DRIVE GEAR

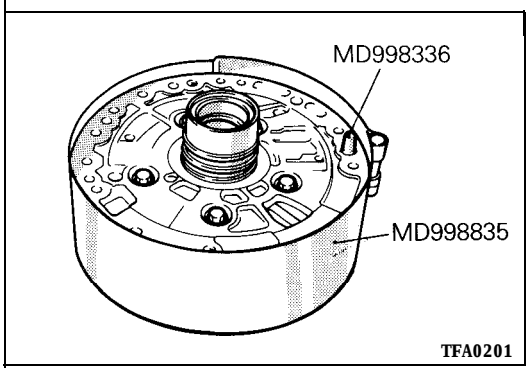
Measure the side clearance of the oil pump gear and, if the specification is exceeded, replace the gear or oil pump assembly.

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

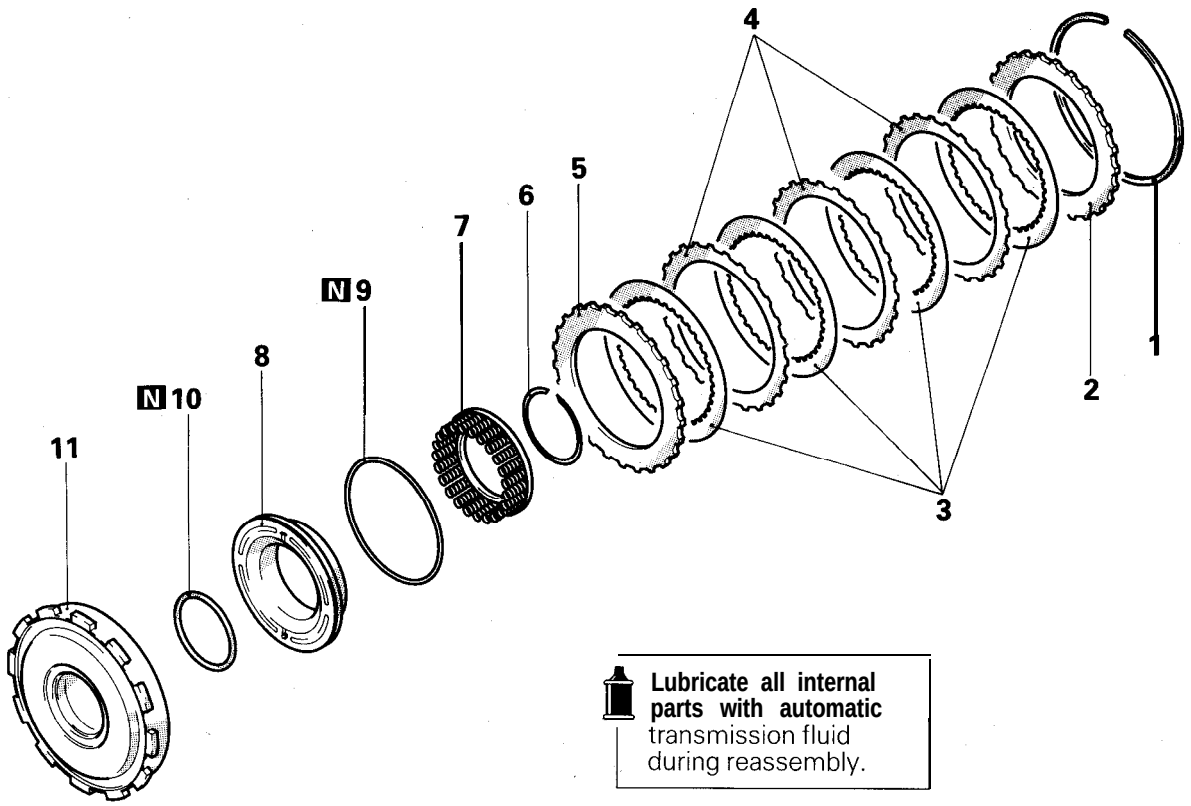
(1) Assemble the reaction shaft support and the pump housing, and tighten the bolts by fingers.
(2) Insert the special tool (Guide Pin, MD998336) into the oil pump mounting bolt hole and clamp the periphery with oil pump band to position the support and housing.
(3) Tighten the five bolts to the specified torque.
(4) Make sure that the oil pump gear turns freely.

1. INSTALLATION OF O-RING

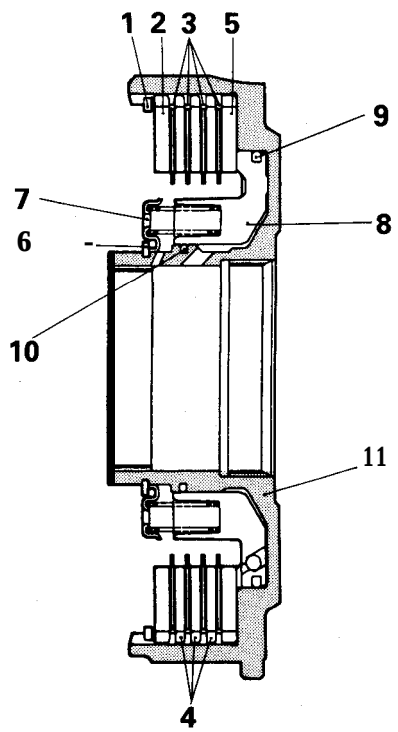
Install a new O-ring in the groove of the pump housing and apply petrolatum jelly to the O-ring.

FRONT CLUTCH ASSEMBLY

DISASSEMBLY AND REASSEMBLY

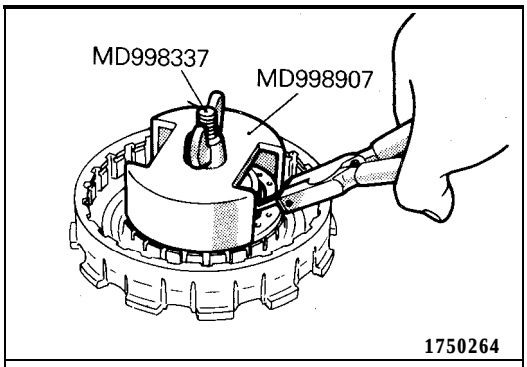


TFA0422



- ⧫ ⊠ Snap ring
- ⧫ a 2. Clutch reaction plate
- ⧫◆ 3. Clutch plate
- 4. Clutch disc
- ⧫ ⊟ Clutch pressure plate
- ● ⊠ ⧫◆ 6. Snap ring
- 7. Return spring
- 8. Front clutch piston
- 9. D-ring
- 10. D-ring
- 11. Front clutch retainer

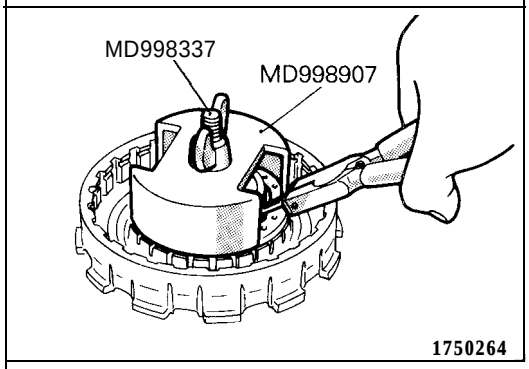
TFA0423



SERVICE POINT OF DISASSEMBLY

6. REMOVAL OF SNAP RING

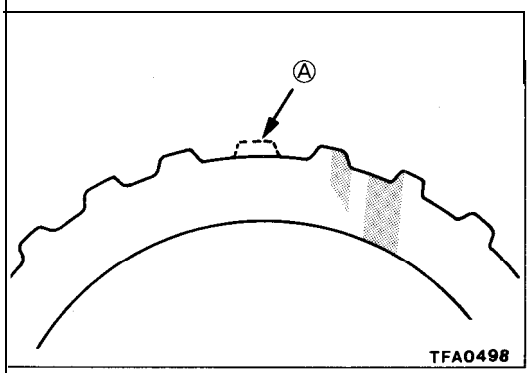
(1) Compress the return spring with the special tool.
(2) Remove the snap ring.



SERVICE POINTS OF REASSEMBLY

6. INSTALLATION OF SNAP RING

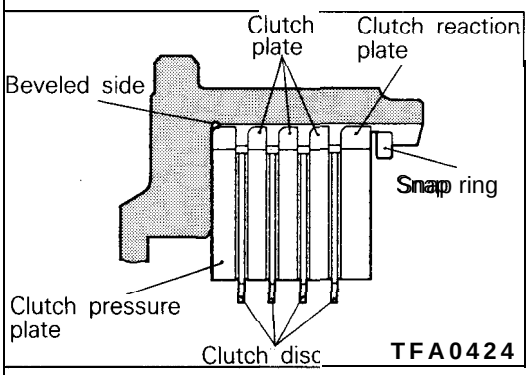
(1) Compress the return spring with the special tool.
(2) Install the snap ring.



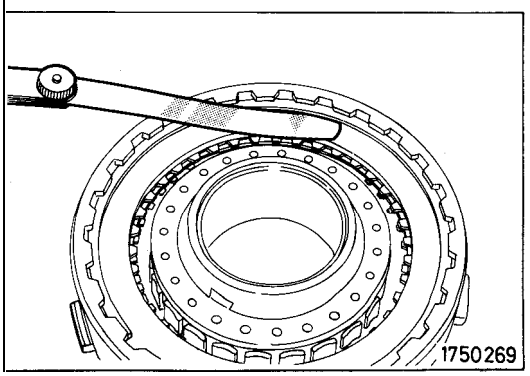
5. INSTALLATION OF CLUTCH PRESSURE PLATE / 3. CLUTCH PLATE / 2. CLUTCH REACTION PLATE

(1) When installing the clutch pressure plate, clutch plate, and clutch reaction plate, align the areas where one tooth is missing [indicated by Ⓐ].

NOTE
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.



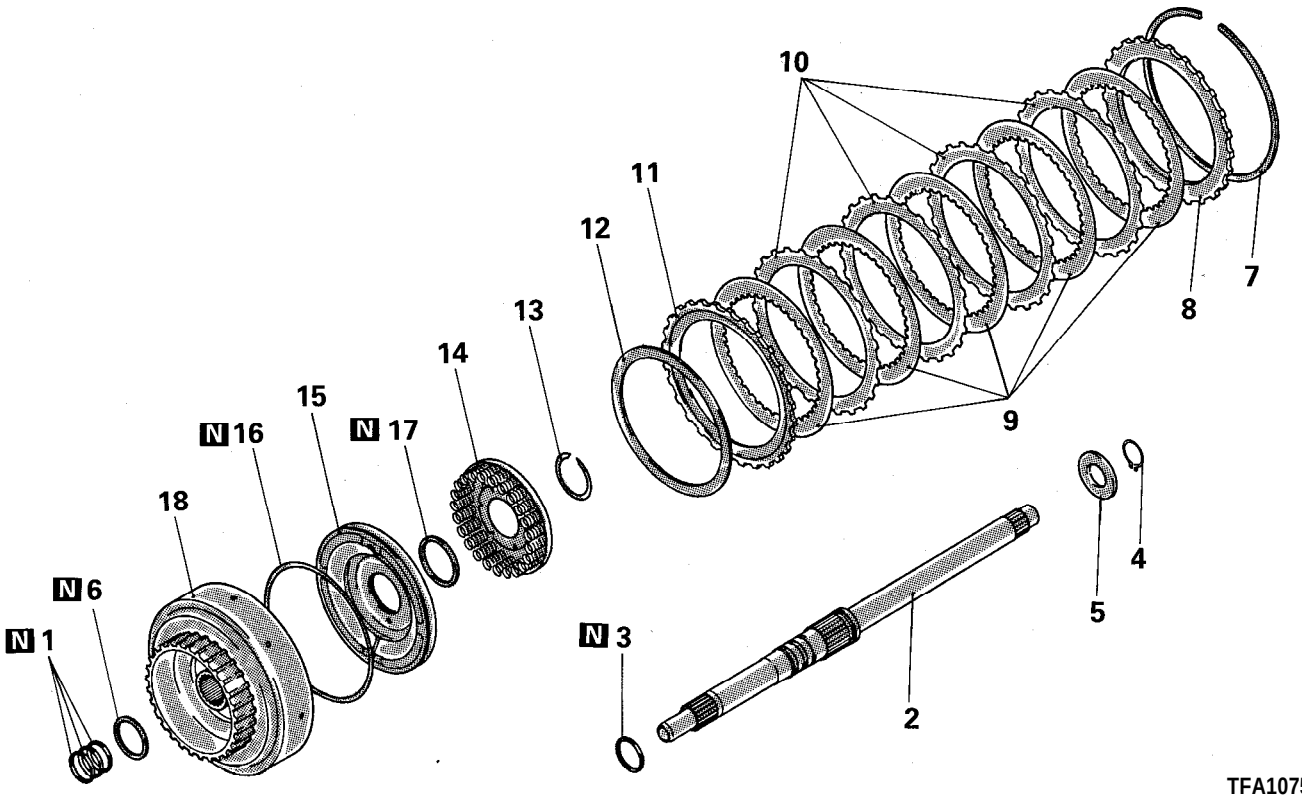
1. SELECTION OF SNAP RING

(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 (1 1 lbs.) force. If clearance is out of standard value, select a snap ring to obtain the standard value.

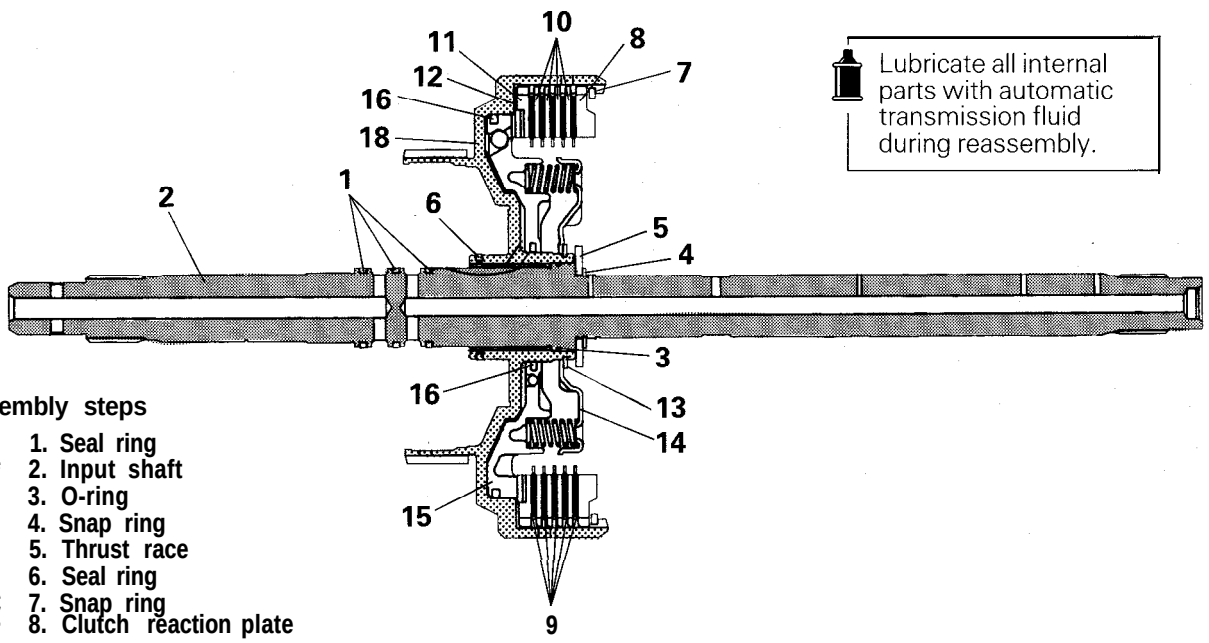
Standard value: 0.8 – 1.0 mm (.032 – .039 in.)

REAR CLUTCH ASSEMBLY

DISASSEMBLY AND REASSEMBLY



TFA1075

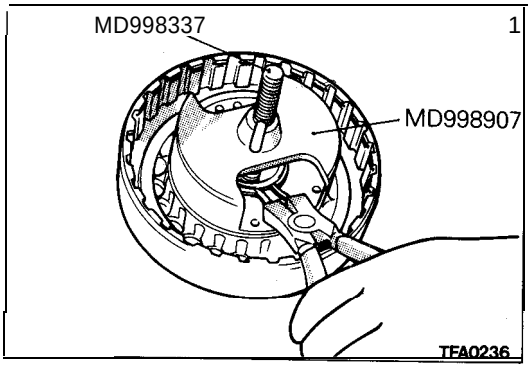


Lubricate all internal parts with automatic transmission fluid during reassembly.

Disassembly steps

- 1. Seal ring
- ● * 2. Input shaft
- 3. O-ring
- 4. Snap ring
- 5. Thrust race
- 6. Seal ring
- ● C 7. Snap ring
- ● + 8. Clutch reaction plate
- 9. Clutch disc
- ➡◀ 10. Clutch plate
- 11. Clutch pressure plate
- 12. Wave spring
- ◀➡ ● + 13. Snap ring
- 14. Return spring
- 15. Rear clutch piston
- 16. D-ring
- 17. D-ring
- 18. Rear clutch retainer

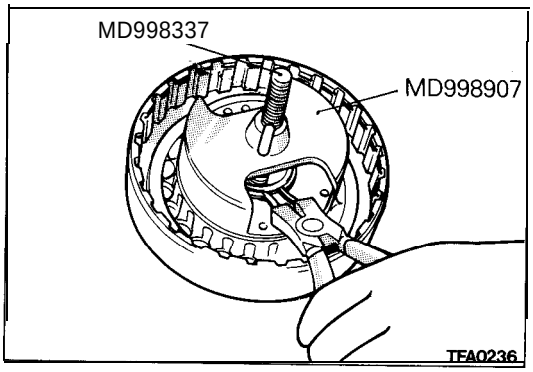
TFA1076



SERVICE POINT OF DISASSEMBLY

12. REMOVAL OF SNAP RING

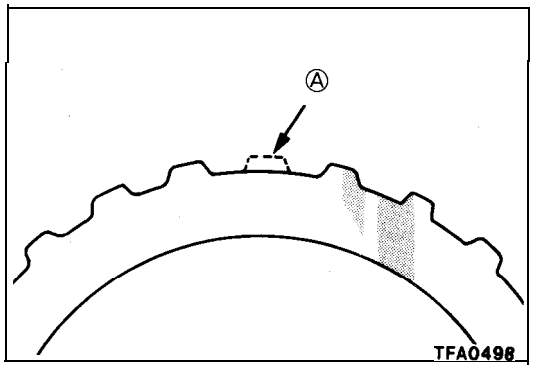
(1) Using the special tool, compress the return spring.
(2) Using the snap ring pliers, remove the snap ring.



SERVICE POINTS OF REASSEMBLY

12. INSTALLATION OF SNAP RING

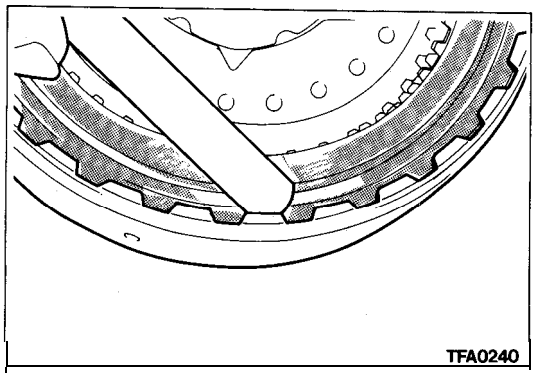
(1) Using the special tool, compress the return spring.
(2) Using the snap ring pliers, install the snap ring.



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 Ⓐ] are aligned with each other.

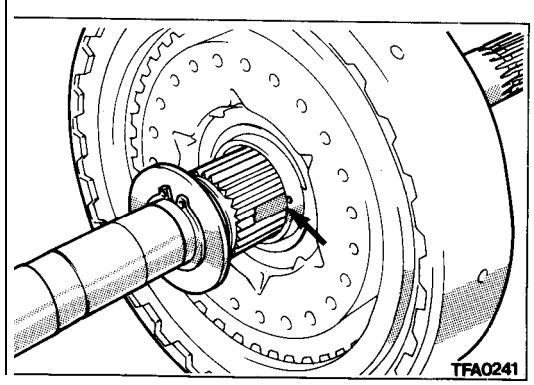
NOTE
This ensures that the automatic transmission fluid escapes well and the plate and disc are cooled efficiently.



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.)

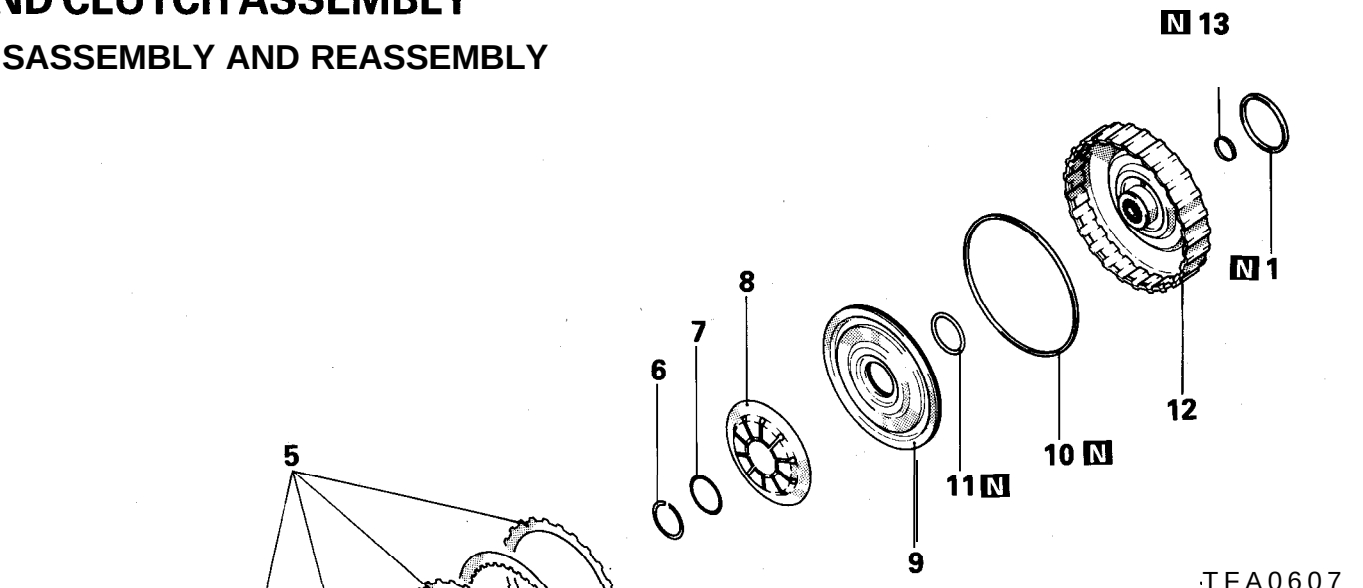


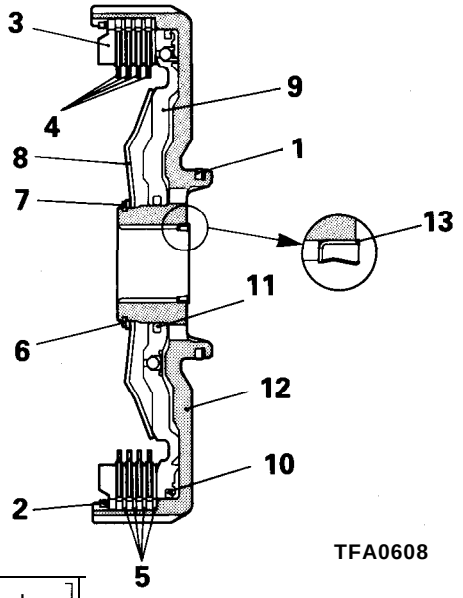
2. INSTALLATION OF INPUT SHAFT

Align the oil groove in the input shaft with the alignment mark on the rear clutch retainer.

END CLUTCH ASSEMBLY

DISASSEMBLY AND REASSEMBLY

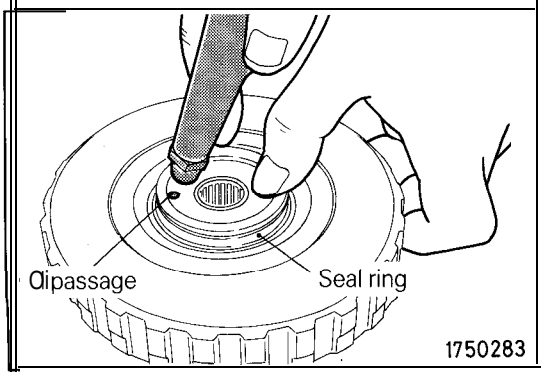




Disassembly steps

- 1. Seal ring
- ◆ a 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

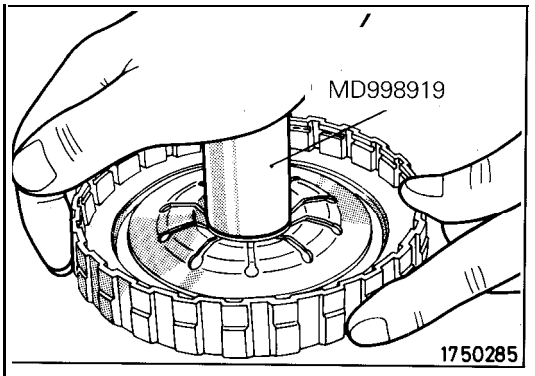
Lubricate all internal parts with automatic transmission fluid during reassembly.



SERVICE POINT OF DISASSEMBLY

9. REMOVAL OF END CLUTCH PISTON

Remove the piston. If it is hard to remove, place the retainer on the workbench with piston side down and blow air through the oil passage in the back of retainer.

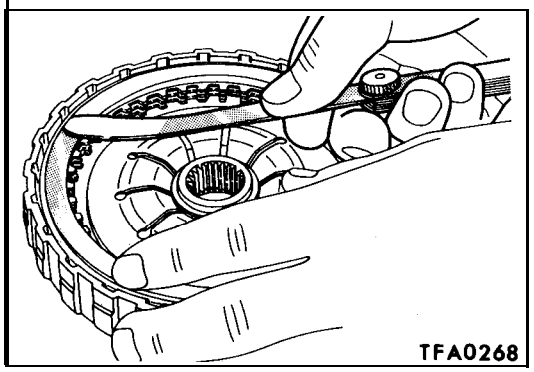


SERVICE POINTS OF REASSEMBLY

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

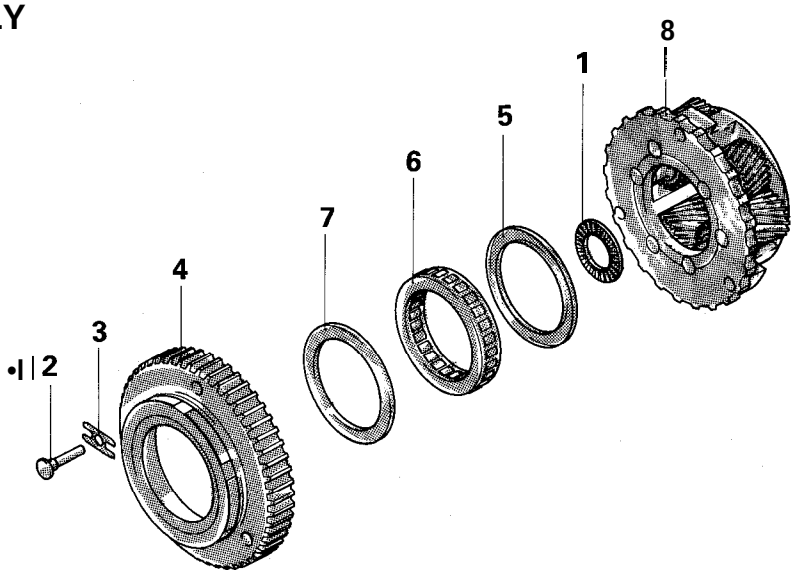
After the snap ring has been installed, check to see if the clearance between the snap ring and clutch reaction plate is up to specification. When measuring the clearance, press the entire periphery of the clutch reaction plate with a force of 50 N (11 lbs.). If the clearance is out of specification, reselect the snap ring to obtain the specified clearance.

Standard value: 0.6 – 0.85 mm (.024 – .033 in.)

PLANETARY GEAR

DISASSEMBLY AND REASSEMBLY

Lubricate all internal parts with automatic transmission fluid during reassembly.



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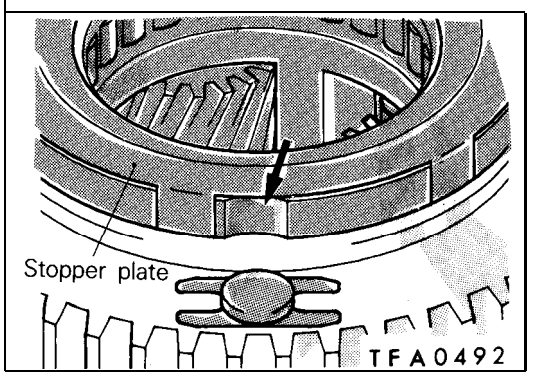
Disassembly steps

1. Thrust bearing
- *● C 2. Rivet
- ● a 3. Waved washer
4. One-way clutch outer race
5. End plate
- ● C 6. One-way clutch
7. End plate
8. Planet carrier

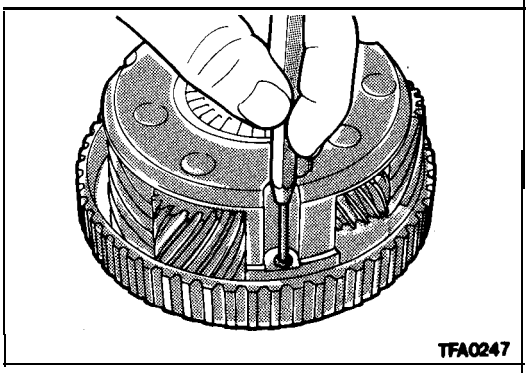


SERVICE POINT OF DISASSEMBLY

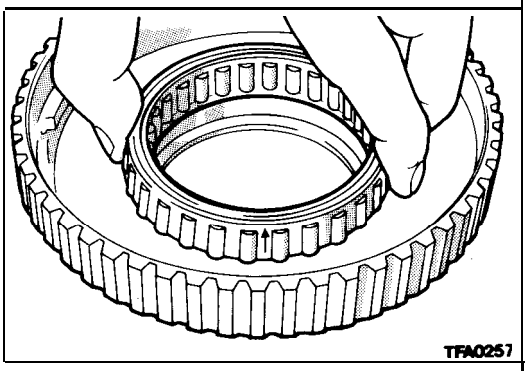
2. REMOVAL OF RIVET

(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.



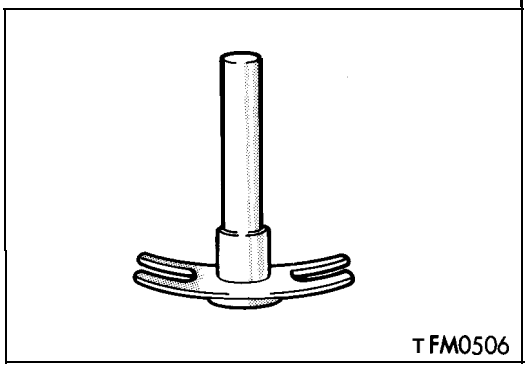
(2) Using a pin punch, drive out the rivet.



SERVICE POINTS OF REASSEMBLY

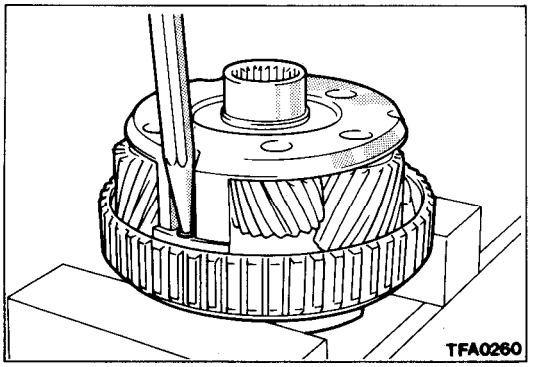
6. INSTALLATION OF ONE-WAY CLUTCH

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.

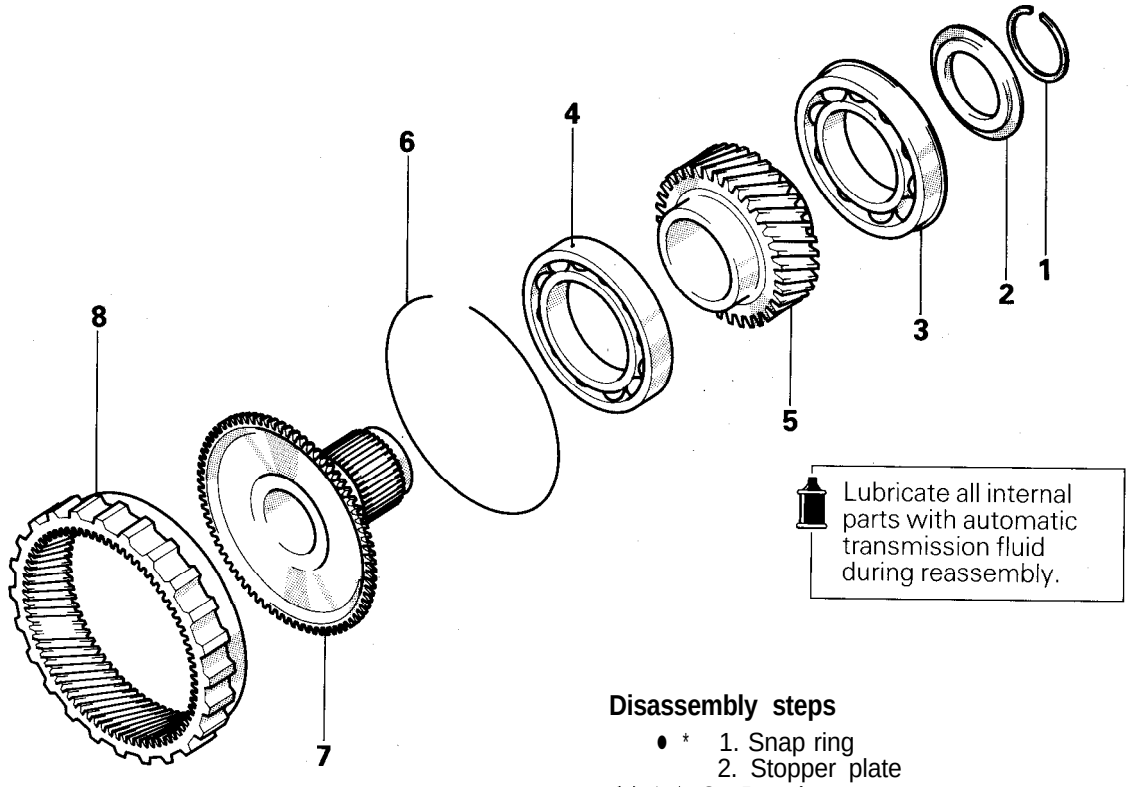
NOTE

(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.).

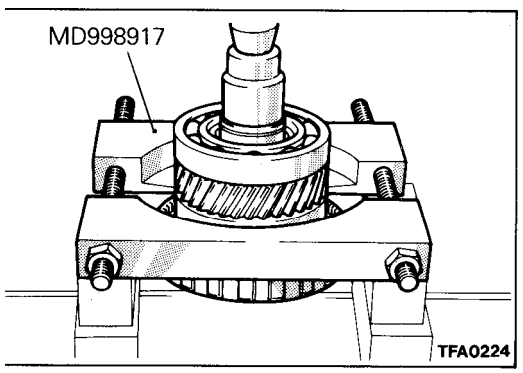
ANNULUS GEAR AND TRANSFER DRIVE GEAR SET

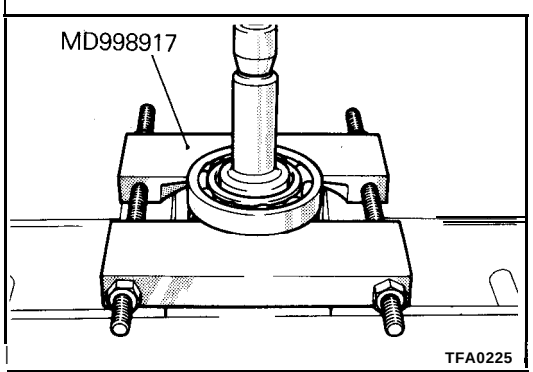
DISASSEMBLY AND REASSEMBLY



Disassembly steps

- ● * 1. Snap ring
- 2. Stopper plate
- ◆◆◆ 3. Bearing
- ◆◆ ● * 4. Bearing
- ◆◆ ● + 5. Transferdrivegear
- 6. Snap ring
- 7. Output flange
- 8. Annulus gear





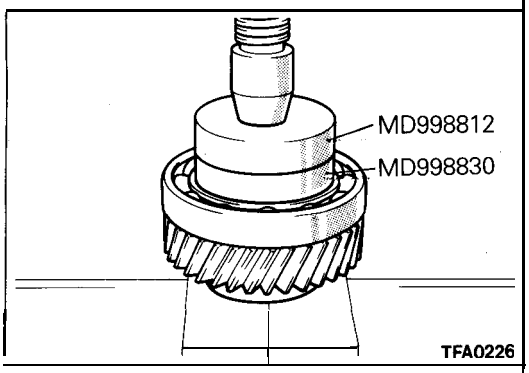
SERVICE POINTS OF DISASSEMBLY

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.

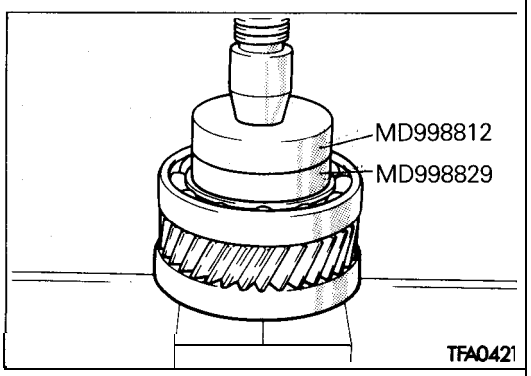
(2) Using the special tool, remove the bearings from both sides of the transfer drive gear.

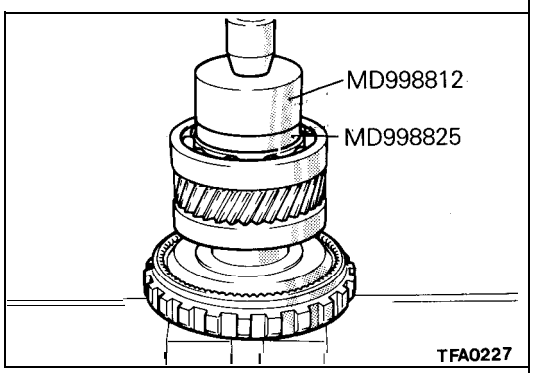


SERVICE POINTS OF REASSEMBLY

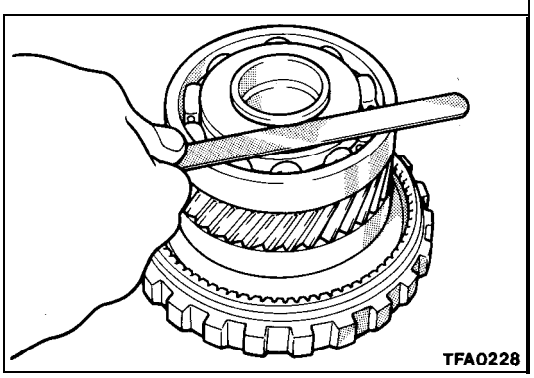
5. INSTALLATION OF TRANSFER DRIVE GEAR / 4. 3. BEARING

(1) Using previously released drivers or deep well socket, press-fit the bearings into both sides of the transfer drive gear.





(2) Using previously released drivers or deep well socket, install the transfer drive gear to the output flange.



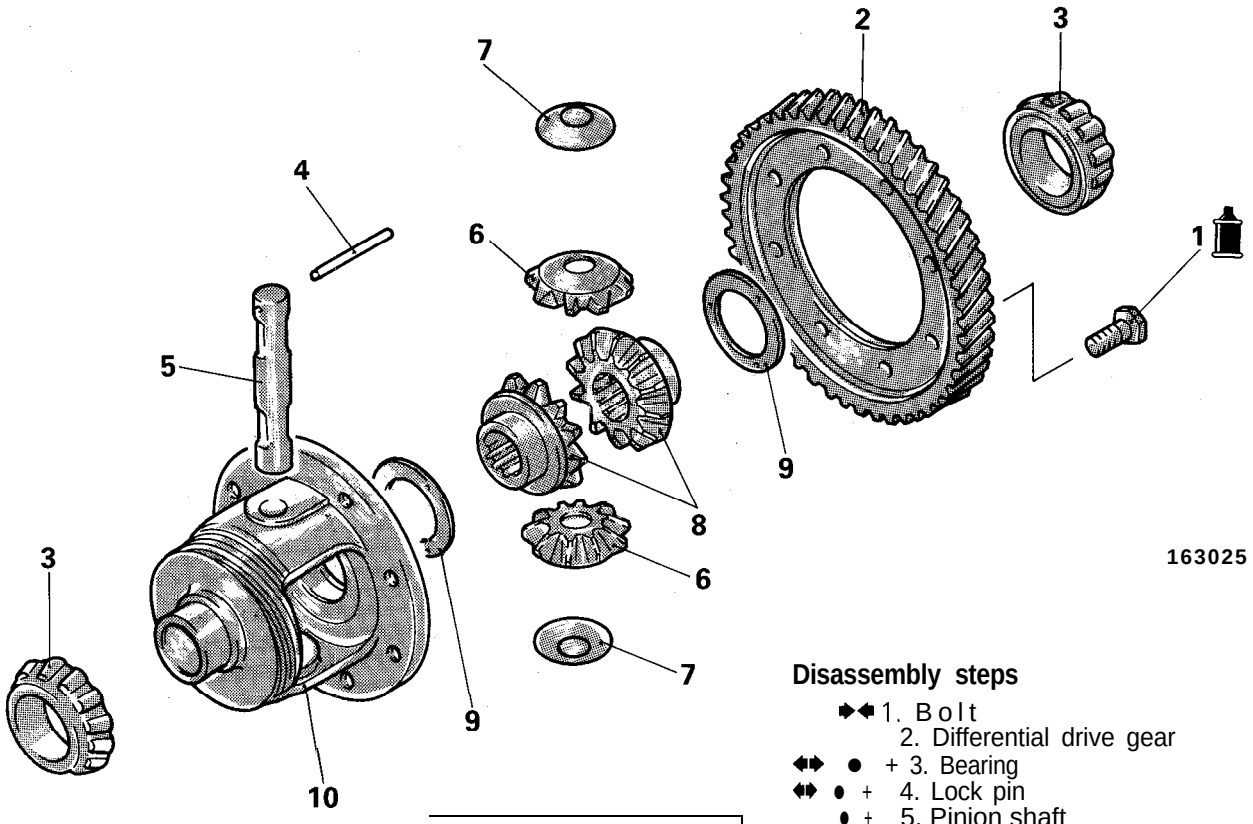
1. SELECTION OF SNAP RING

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

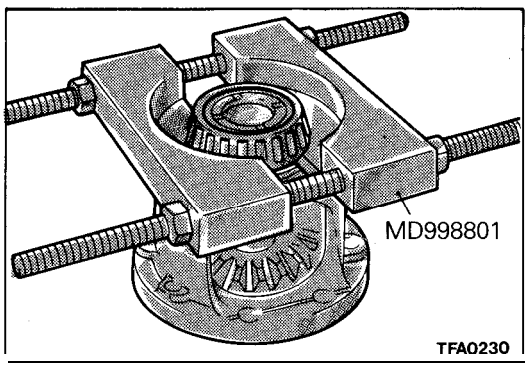
DISASSEMBLY AND REASSEMBLY



Lubricate all internal parts with automatic transmission fluid during reassembly.

Disassembly steps

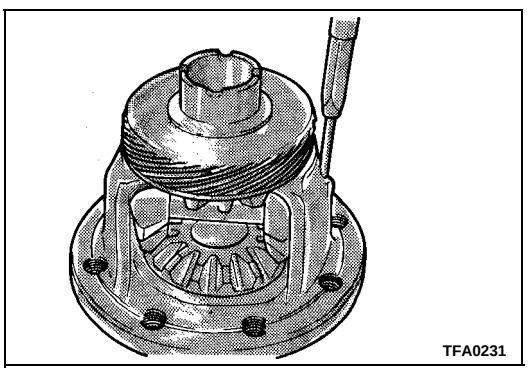
- ◆◆ 1. Bolt
- 2. Differential drive gear
- ◆◆ ● + 3. Bearing
- ◆◆ ● + 4. Lock pin
- ● + 5. Pinion shaft
- ● + 6. Pinion
- ● C 7. Washer
- ● * 8. Side gear
- ● * 9. Spacer
- 10. Differential case



SERVICE POINTS OF DISASSEMBLY

3. REMOVAL OF BEARING

Using the special tool, remove the bearing.

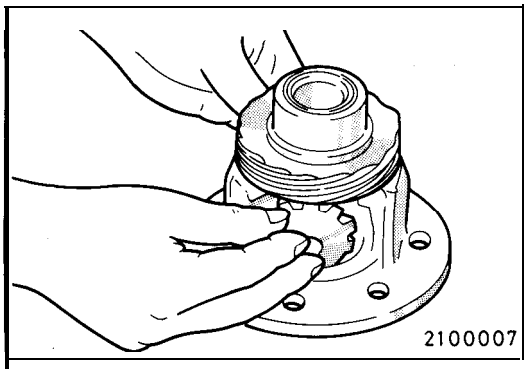


4. REMOVAL OF LOCK PIN

Using a pin punch, drive out the lock pin.

NOTE

The lock pin can be easily driven out.

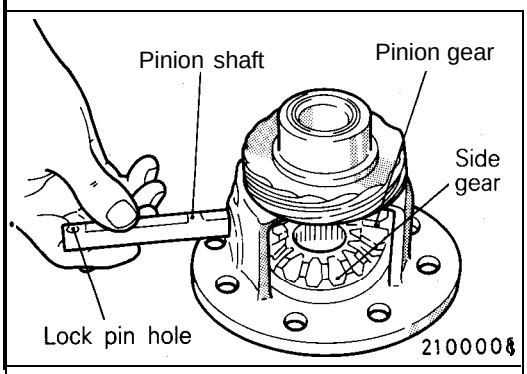


SERVICE POINTS OF DISASSEMBLY

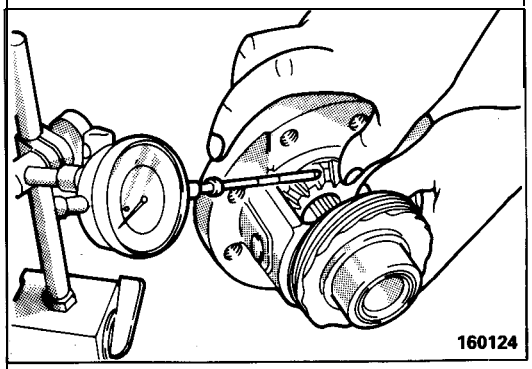
9. INSTALLATION OF SPACER / 8. SIDE GEAR / 7. WASHER / 6. PINION / 5. PINION SHAFT

(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.

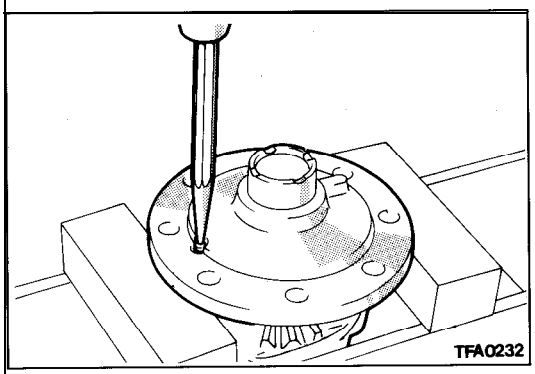


(4) Measure the backlash between the side gear and pinion.

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.

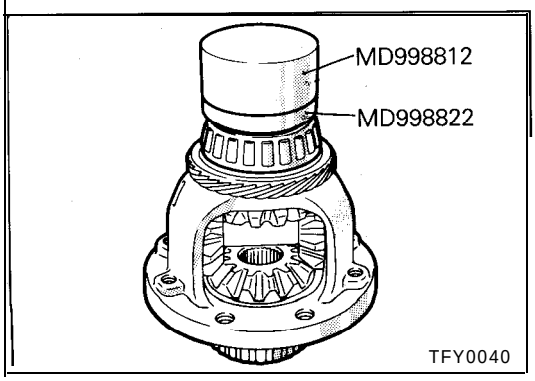
NOTE
Adjust so that the backlash in both side gears equals.



4. INSTALLATION OF LOCK PIN

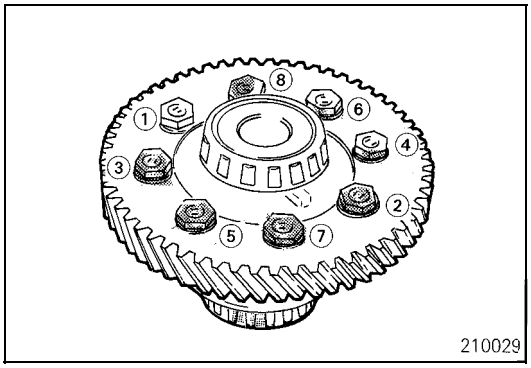
Align the lock pin hole in pinion shaft with that in the case and install the lock pin.

Caution
The lock pin should be lower than the differential case flange surface.



3. INSTALLATION OF BEARING

Using previously released drivers or deep well socket, press-fit the bearings into both sides of the differential case.

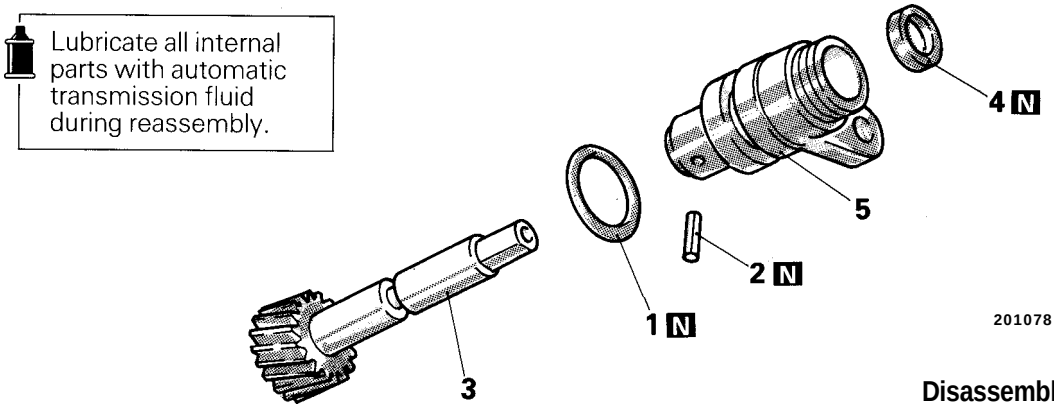


1. INSTALLATION OF BOLTS

Coat the differential drive gear bolts with ATF and tighten them to specification in the numerical order shown.

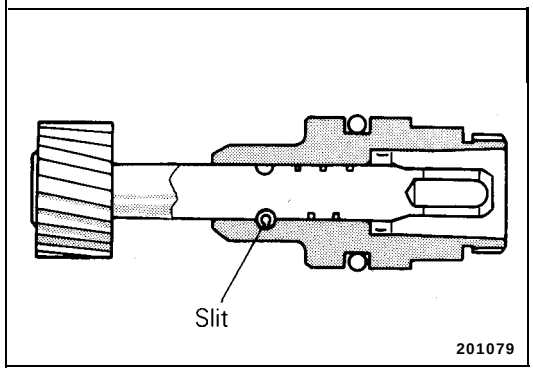
SPEEDOMETER DRIVEN GEAR ASSEMBLY

DISASSEMBLY AND REASSEMBLY



Disassembly steps

1. O-ring
2. Spring pin
3. Speedometer driven gear
4. Oil seal
5. Sleeve



SERVICE POINTS OF REASSEMBLY

3. INSTALLATION OF SPEEDOMETER DRIVEN GEAR

Apply gear oil sparingly to the speedometer driven gear shaft and insert the shaft.

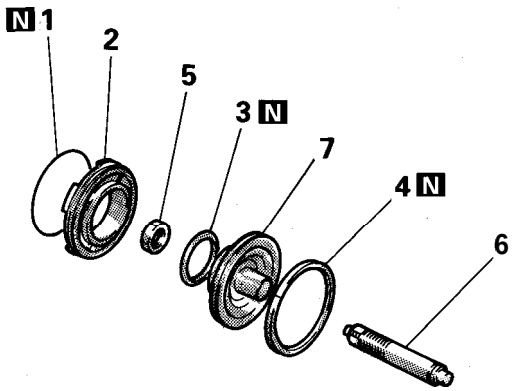
2. INSTALLATION OF SPRING PIN

Install the spring pin in such a way that its slit does not face the gear shaft.

KICKDOWN SERVO

DISASSEMBLY AND REASSEMBLY

Lubricate all internal parts with automatic transmission fluid during reassembly.



Disassembly steps

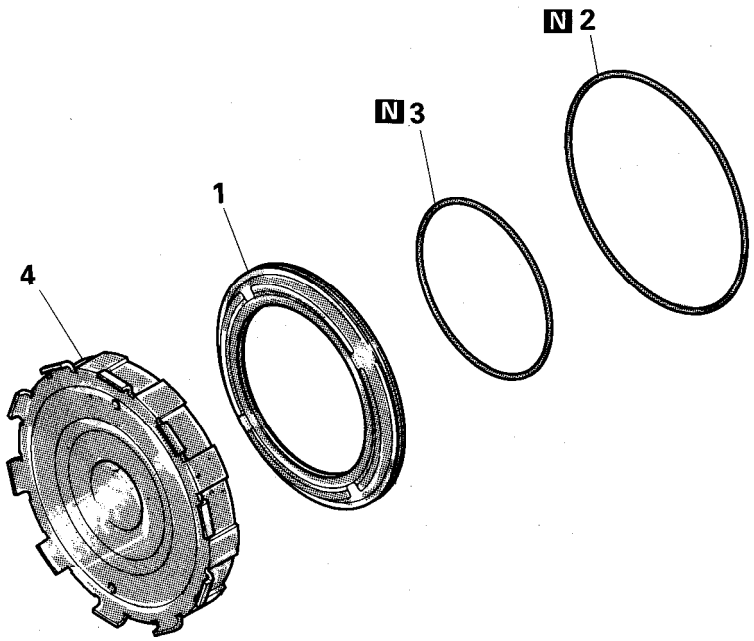
1. O-ring
2. Kickdown servo
3. D-ring
4. Seal ring
5. Locknut
6. Kickdown servo rod
7. Kickdown servo piston

1750299

LOW-REVERSE BRAKE

DISASSEMBLY AND REASSEMBLY

Lubricate all internal parts with automatic transmission fluid during reassembly.



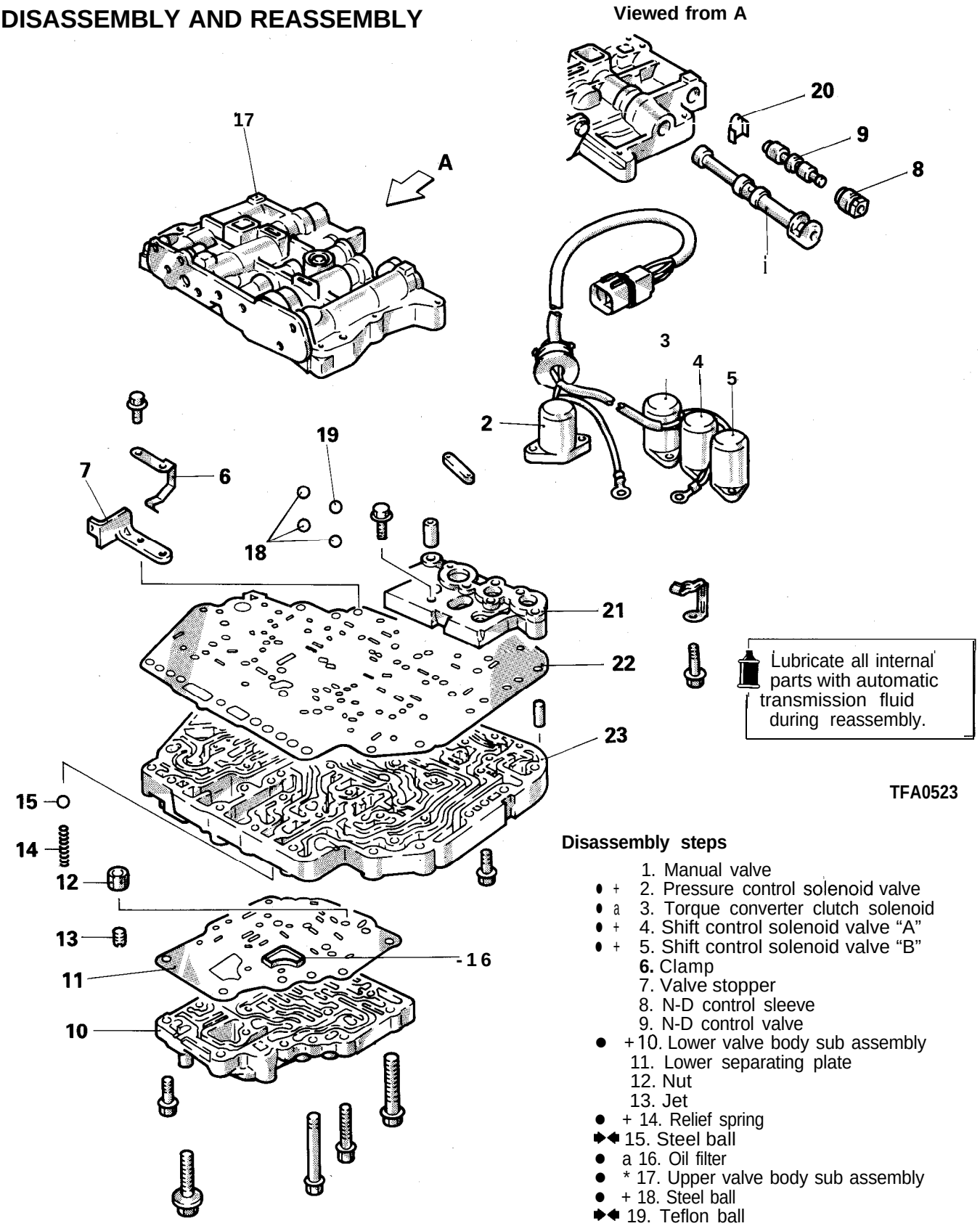
Disassembly steps

1. Low-reverse brake piston
2. D-ring
3. D-ring
4. Center support

TFA0386

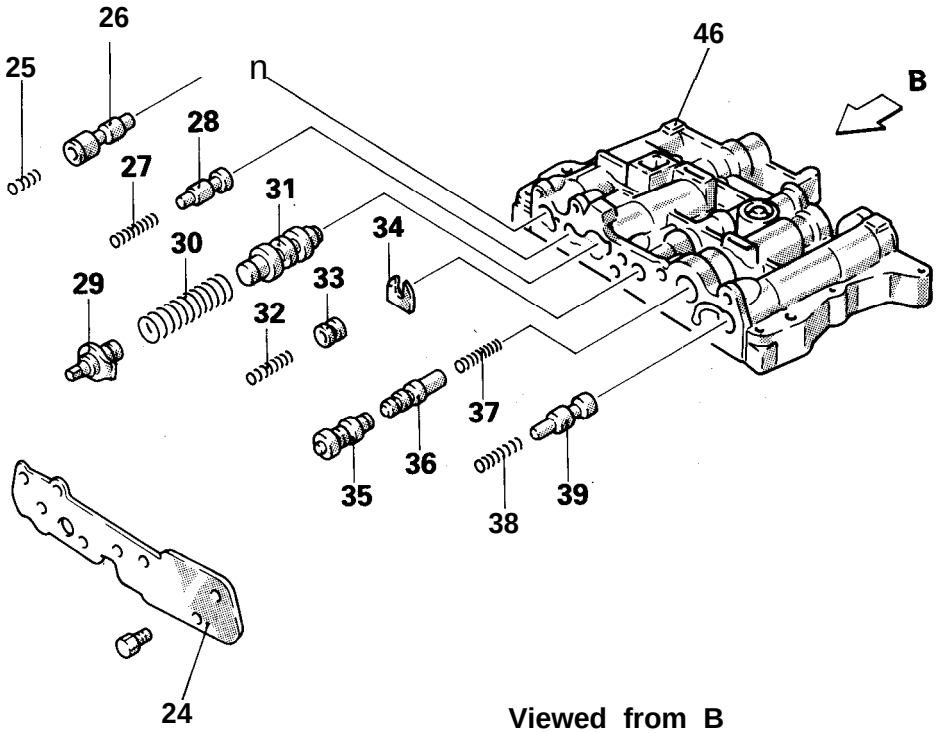
VALVE BODY

DISASSEMBLY AND REASSEMBLY

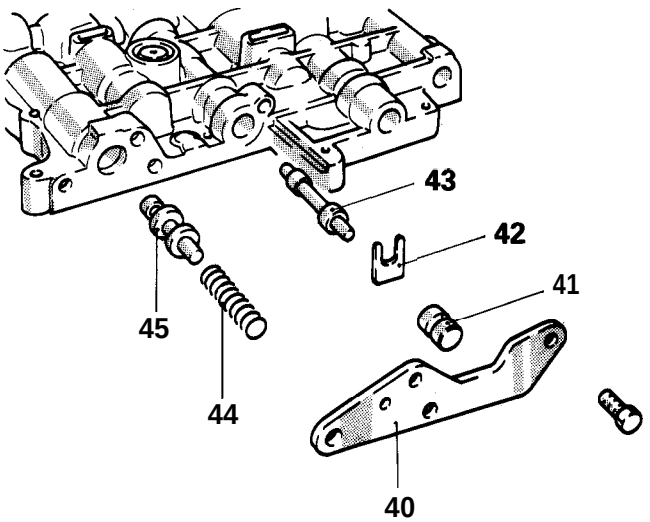


Disassembly steps

1. Manual valve
- + 2. Pressure control solenoid valve
- a 3. Torque converter clutch solenoid
- + 4. Shift control solenoid valve "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
- a 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



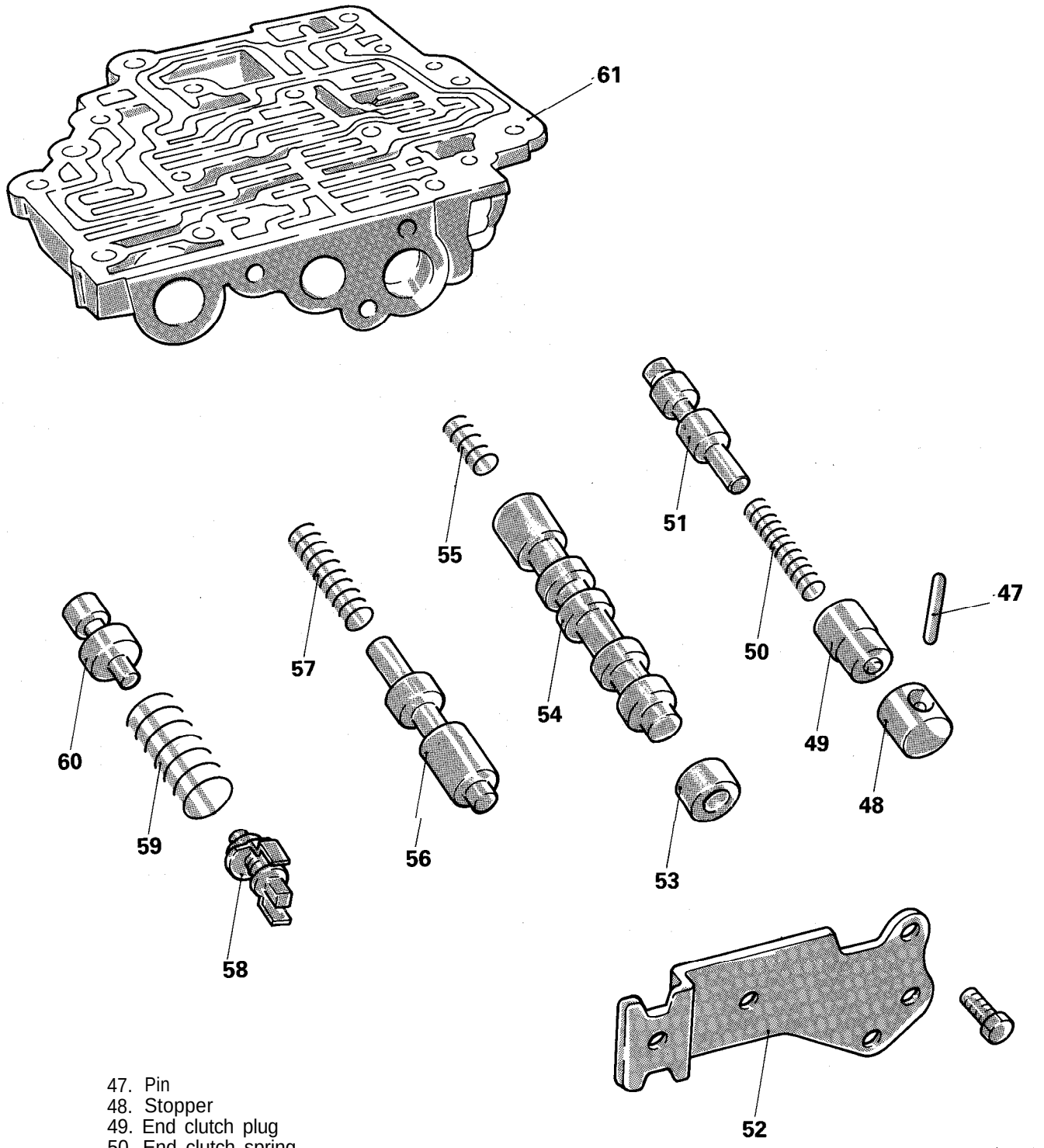
Viewed from B



Lubricate all internal parts with automatic transmission fluid during reassembly.

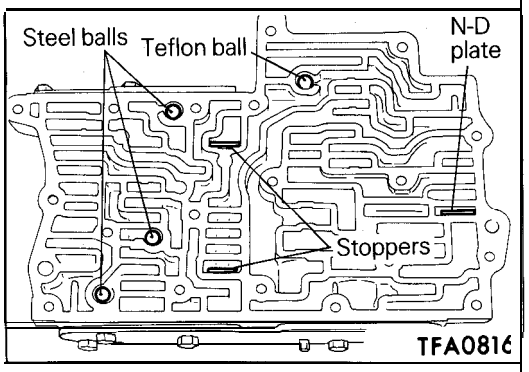
TFA0518

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. I-2 shift valve
46. Upper valve body



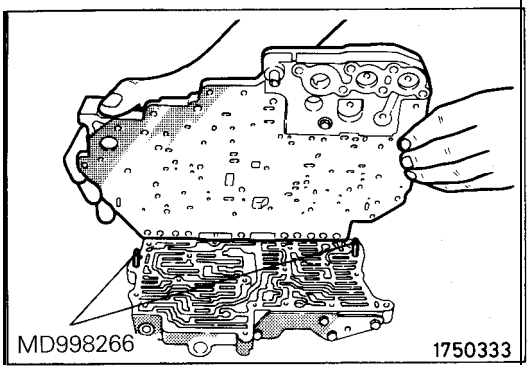
47. Pin
48. Stopper
49. End clutch plug
50. End clutch spring
51. End clutch valve
52. End cover
53. Torque converter clutch control sleeve
54. Torque converter clutch control valve
55. Torque converter clutch control spring
56. N-R control valve
57. N-R control spring
58. Adjusting screw
59. Reducing spring
60. Reducing valve
61. Lower valve body

Lubricate all internal parts with automatic transmission fluid during reassembly.



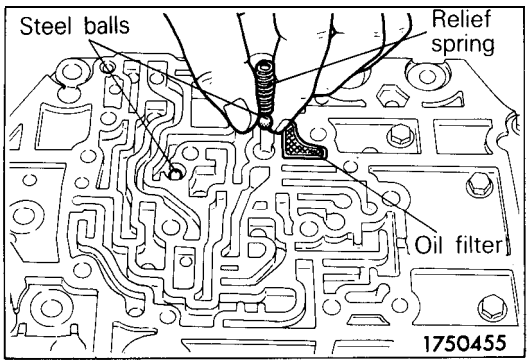
42.33. LOCATION OF STOPPER PLATE / 20. N-D PLATE / 19. TEFLON BALL / 18. STEEL BALL

Install the stopper plates, N-D plate, teflon ball, and steel balls into the upper valve body as shown.



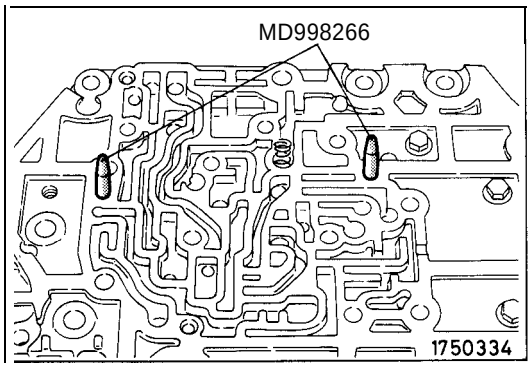
17. INSTALLATION OF UPPER VALVE BODY SUB ASSEMBLY

Install the special tool and secure the upper separating plate and intermediate plate with eight mounting bolts. Then, remove the special tool.



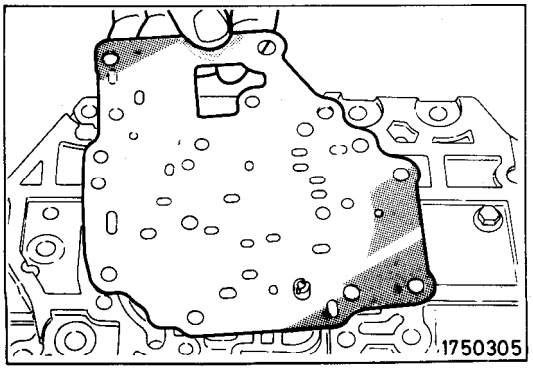
16. INSTALLATION OF OIL FILTER / 15. STEEL BALL / 14. RELIEF SPRING

Install the oil filter, two steel balls, and spring to the intermediate plate.

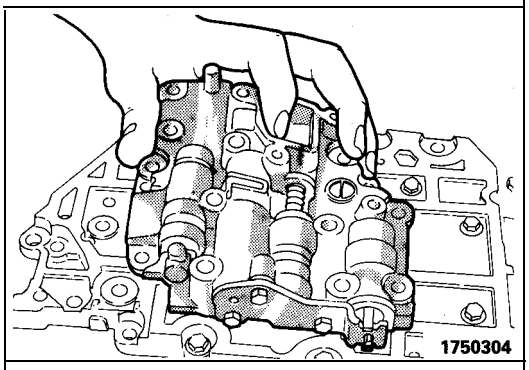


10. INSTALLATION OF LOWER VALVE BODY SUB ASSEMBLY

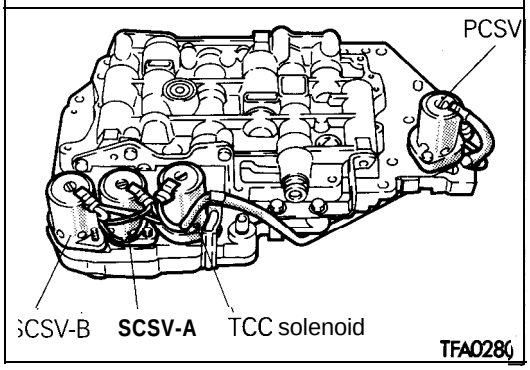
(1) Mount the special tool to the intermediate plate.



(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
Torque converter clutch solenoid	Red/Black
Pressure control solenoid valve	Blue

WHEELS AND TIRES

CONTENTS

SPECIFICATIONS

GENERAL SPECIFICATIONS

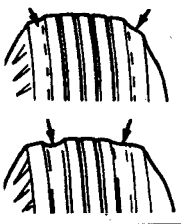
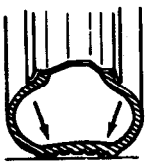
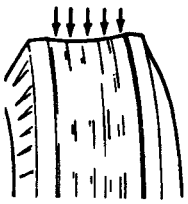
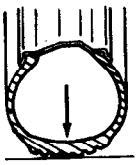
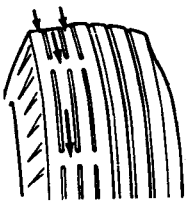
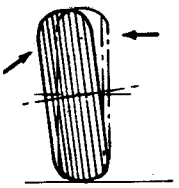
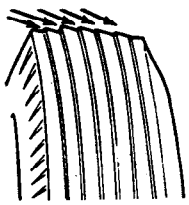
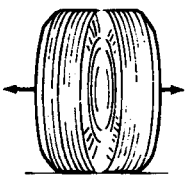
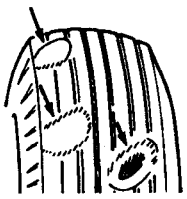
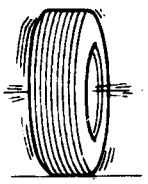
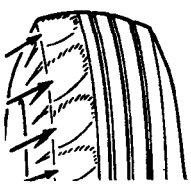
Items		SOHC	DOHC <Non-Turbo>	DOHC <Turbo>
Wheel				
Tire size		205/65R 15 94H	225/55R16 93V	245/45ZR 17
Wheel type		Polycast steel type, Aluminum type*	Aluminum type	Aluminum type
Wheel size		15 x 6JJ, 15 x 6.5JJ*	16 x 8JJ	17 x 8.5J
Amount of wheel offset	mm (in.)	46 (1.8)	46 (1.8)	46 (1.8)
Tire inflation pressure	kPa (psi)			
Front		200 (29)	220 (32)	220 (32)
Rear		180 (26)	200 (29)	200 (29)
Spare wheel				
Tire size		T125/90D16	T125/90D16	T135/80D17
Wheel size		16 x 4T	16 x 4T	17 x 4T
Amount of wheel offset	mm (in.)	46 (1.8)	46 (1.8)	46 (1.8)
Tire inflation pressure	kPa (psi)	420 (60)	420 (60)	420 (60)

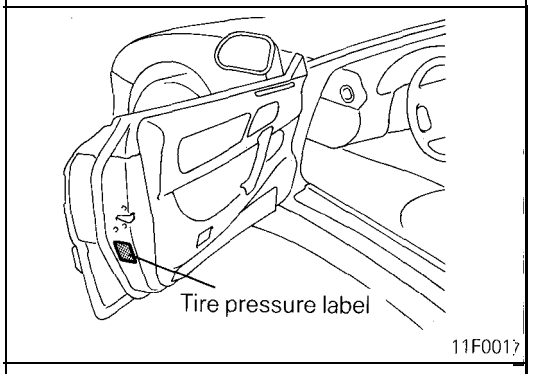
NOTE
*: Option

SERVICE SPECIFICATIONS

Items	Specifications
Limit	
Wheel runout	
Radial mm (in.)	1.0 or less (.04 or less)
Lateral mm (in.)	1.0 or less (.04 or less)
Tread depth of tire mm (in.)	1.6 (.06)

TROUBLESHOOTING

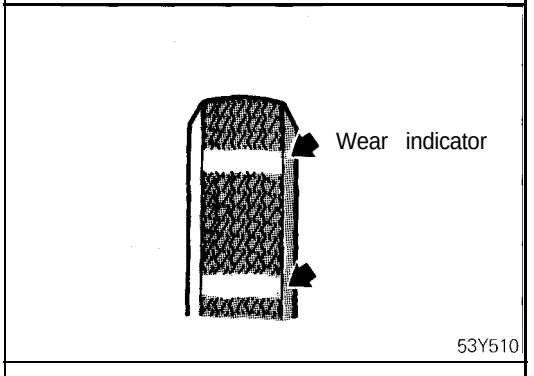
Symptom	Probable cause	Remedy
Rapid wear at shoulders 	Under-inflation or lack of rotation 	Adjust the tire pressure
Rapid wear at center 	Over-inflation or lack of rotation 	
Cracked treads 	Under-inflation	
Wear on one side 	Excessive camber 	Inspect the camber
Feathered edge 	Incorrect toe-in 	Adjust 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

Check the inflation pressure of the tires. If it is not within the standard value, make the necessary adjustment.



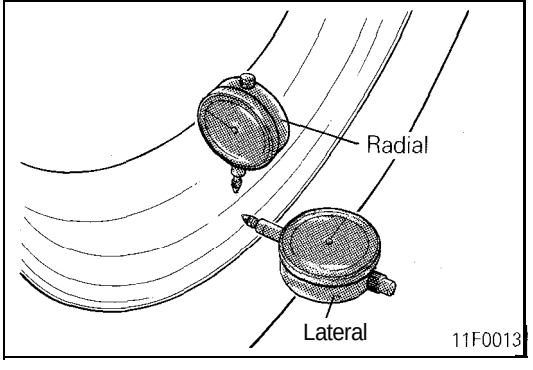
TIRE WEAR CHECK

Measure the tread depth of tires.

Limit: 1.6 mm (.06 in.)

If the remaining tread depth is less than the limit, replace the tire.

NOTE
When the tread depth of tire is reduced to 1.6 mm (.06 in.) or less, wear indicator will appear.



WHEEL RUNOUT CHECK

Jack up the vehicle so that the wheels are clear of the floor. While slowly turning the wheel, measure wheel runout with a dial indicator.

Limit:

Radial	**1.0 mm or less (.04 in. or less)**
Lateral	**1.0 mm or less (.04 in. or less)**

If wheel runout exceeds the limit, replace the wheel.

WHEEL AND TIRE

SERVICE POINTS OF INSTALLATION

Tighten the wheel nut to the specified torque.

Tightening torque: 120 – 140 Nm (87 – 101 ft.lbs.)

BODY AND SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

CONTENTS

BODY

CONTENTS

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

WARNING!

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

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

(3) CHRYSLER dealer personnel must thoroughly review this manual, and especially its GROUP 23B – Supplemental Restraint System (SRS) and GROUP 0 – Maintenance Service, before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning light, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

SPECIFICATIONS

GENERAL SPECIFICATIONS

Items	Specifications
Hood	
Type	Rear hinged, front opening type (with gas damper)
Door	
Construction	Front-hinged, sashless
Regulator system	Wire type
Locking system	Pin-fork type
Liftgate	
Type	Inner-hinged, with gas damper
Glass installation method	
Windshield glass	Adhesive type
Quarter window glass	Adhesive type
Liftgate window glass	Adhesive type
Glass thickness mm (in.)	
Windshield glass	5.3 (.21)
Liftgate window glass	3.5 (.14)
Door glass	5.0 (.20)
Quarter window glass	3.5 (.14)
Power window motor	
Type	Permanent magnet type (Built-in circuit breaker)
Revolutions under no load rpm	75 or more
Revolutions under load rpm	
At 1 Nm (.72 ft.lbs.)	45-75
At 2 Nm (1.45 ft.lbs.)	50-80
Bound current A	34 or less
Direction of rotation	Clockwise and counter-clockwise
Power window main switch	
Type	Automatic reset type
Rated load current A	
Lock switch	10
Power window switch	10
Power window sub switch	
Type	Automatic reset type
Rated load current A	10
Power window relay	
Maximum contact current A	20
Rated coil current A	Max. 0.2
Voltage drop between terminals V (At 12 V and the rated load current)	0.2 or less

Item	Specifications
Door lock power relay	
Range of voltage used V	8816
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
Door mirror	
Printed heater lines	
Working voltage V	10 – 15
Operating current A	3.5 or less
Resistance Ω	7.7 – 10.2

NOTE
*: Tripping time is the time consumed until current reaches 0.5 A after power connection

SERVICE SPECIFICATIONS

Items			Standard value
Play of door inside handle mm (in.)	A (play)		7 (.28)
	B (OPEN)		46 ± 9 (1.81 ± .35)
	C (FULL)		69 (2.72)
Clearance of window glass to weatherstrip holder mm (in.)	Adjustment of glass inclination amount	Front pillar	11.7 ± 1.0 (.46 ± .04)
		Roof	11.8 ± 1.0 (.46 ± .04)
		Quarter pillar	20.5 ± 1.0 (.80 ± .04)
	Adjustment of glass longitudinal inclination	Front pillar	7.0 ± 1.0 (.28 ± .04)
		Roof	7.7 ± 1.0 (.30 ± .04)
		Quarter pillar	12.0 ± 1.0 (.47 ± .04)

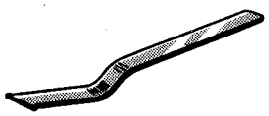
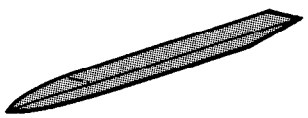
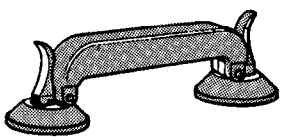
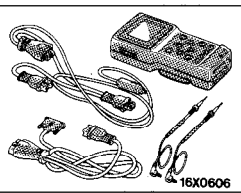
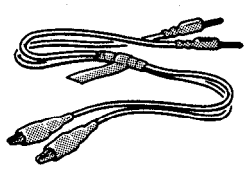
LUBRICANTS

Items	Specified lubricant	Quantity
The sliding portions of the following parts: Hood latch, hood lock release handle, hood hinge, liftgate latch, liftgate lock release handle, liftgate hinge, fuel filler door, fuel filler door lock release handle, door check strap, door hinge, door window regulator, door outside handle, door latch, door inside handle	MOPAR Multipurpose Grease Part No. 2932524 or equivalent	As required

SEALANTS AND ADHESIVES

Items	Specified sealant
Front fender panel	MOPAR Silicone Rubber Sealer Part No. 4026070 or equivalent
Splash shield	MOPAR Silicone Rubber Sealer Part No. 4026070 or Auto Glass Adhesive and sealer Part No. 2298825, or equivalent
Waterproof film	MOPAR Rope Caulk Sealer 3/16 x 80" roll Part No. 4026044 or equivalent
Windshield Quarter window glass Liftgate glass	3M SUPER FAST URETHAN 8609 or equivalent and 3M SUPER FAST URETHAN PRIMER 8608 or equivalent
Side protect moulding Side air dam	3M ATD Part No. 8609 SUPER FAST URETHAN or equivalent 3M ATD Part No. 6382 or equivalent
Side garnish	3M ATD Part No. 6382 or equivalent
Power seat adjuster assembly mounting bolt	MOPAR Part No. 431803 or 4318032 or equivalent

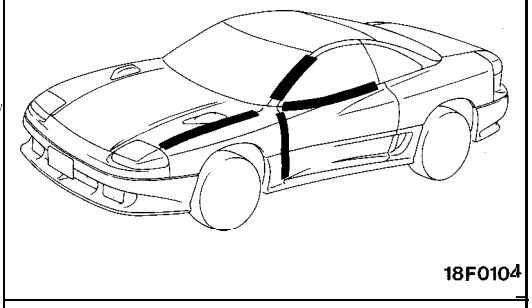
SPECIAL TOOLS

Tool number and tool name		Replaced by Miller tool number	Application
	MB990834 Door adjusting wrench	General service tool	Adjustment of door fit
	MB990449 Window moulding remover	General service tool	Removal of window moulding
	MB990784 Ornament remover	General service tool	Removal of mouldings and switches
	MB990480 Window glass holder	General service tool	Removal and installation of window glass
	MB991502 Scan tool (MUT-II)	DRB-II Scan tool	Checking the power-windows system and the central door-locking system (ETACS input check)
	MB991529 Diagnostic trouble code check harness	MB991529	Checking the power-windows system and the central door-locking system (ETACS input check)

TROUBLESHOOTING

HOOD, LIFTGATE, GLASS AND DOORS

Symptom		Probable cause	Remedy
Hood/ Liftgate	Improper closure	Striker and latch not properly aligned	Adjust the alignment
	Difficult locking and unlocking	Striker and latch not properly aligned	Adjust the alignment
	Uneven body clearance	Incorrectly installed hood or liftgate	Adjust the installation of hood, deck lid or liftgate
	Uneven height	Incorrect hood bumper height	Adjust the hood bumper, deck lid bumper or liftgate bumper height
Window glass	Water leak through windshield	Defective seal	Fill sealant
		Defective body flange	Correct
	Water leak through door window glass	Incorrect window glass installation	Adjust position
		Gap at upper window glass	Adjust position
	Water leak through liftgate window	Defective seal	Fill sealant
		Defective body flange	Correct
Doors	Door window malfunction	Incorrect window glass installation	Adjust position
		Damaged or faulty regulator	Correct or replace
	Water leak through door edge	Cracked or faulty weatherstrip	Replace
	Water leak from door center	Drain hole clogged	Remove foreign objects
		Inadequate waterproof film contact or damage	Correct or replace
	Door hard to open	Incorrect latch or striker adjustment	Adjust
	Door does not open or close completely	Incorrect door installation	Adjust position
		Defective door check strap	Correct or replace
		-Door check strap and hinge required grease	Apply grease
	Uneven gap between body	Incorrect door installation	Adjust position
	Wind noise around door	Weatherstrip not holding firmly	Adjust fit of door
		Improperly installed weatherstrip or setting of weatherstrip	Repair or replace
		Improperly closed door	Adjust
		Improperly fit door	Adjust
		Improper clearance between door glass and door weatherstrip holder	Adjust
		Deformed door	Repair or replace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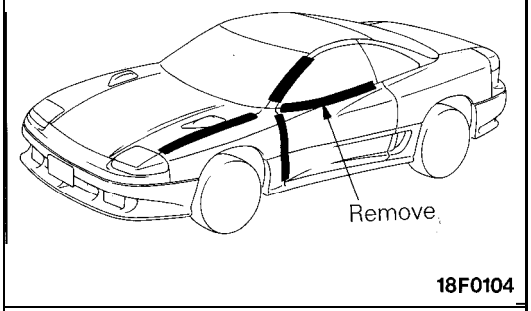
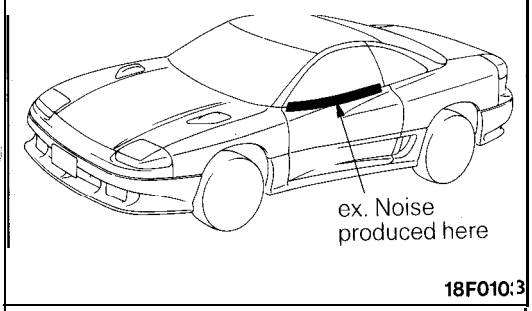
HOW TO LOCATE WIND NOISES

(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.



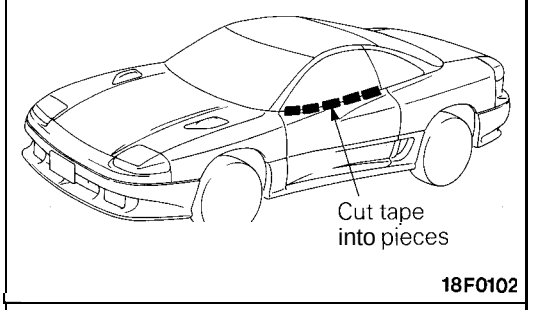
18F0104

(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.



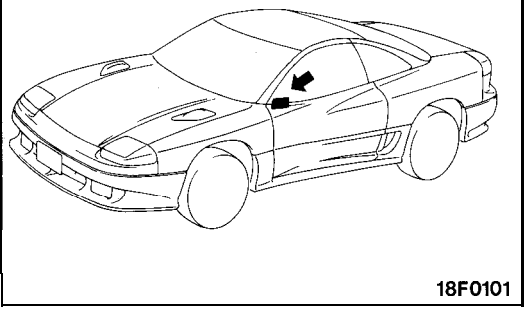
18F0103

(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.



18F0102

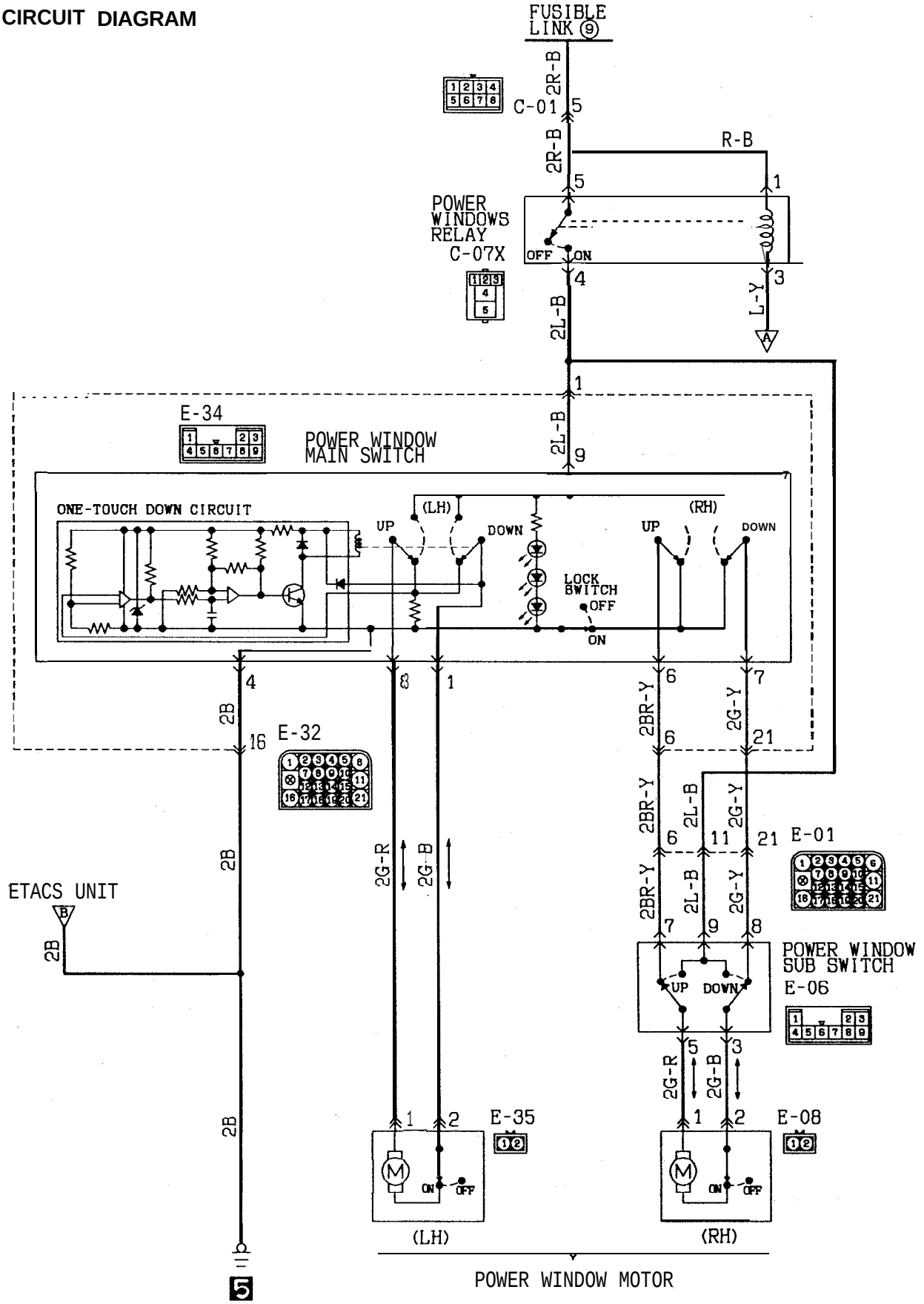
(6) Cut the remaining piece of tape into smaller pieces, attach it again as it was before, and then remove the pieces one by one in the same way so as to narrow down the source.


18F0101

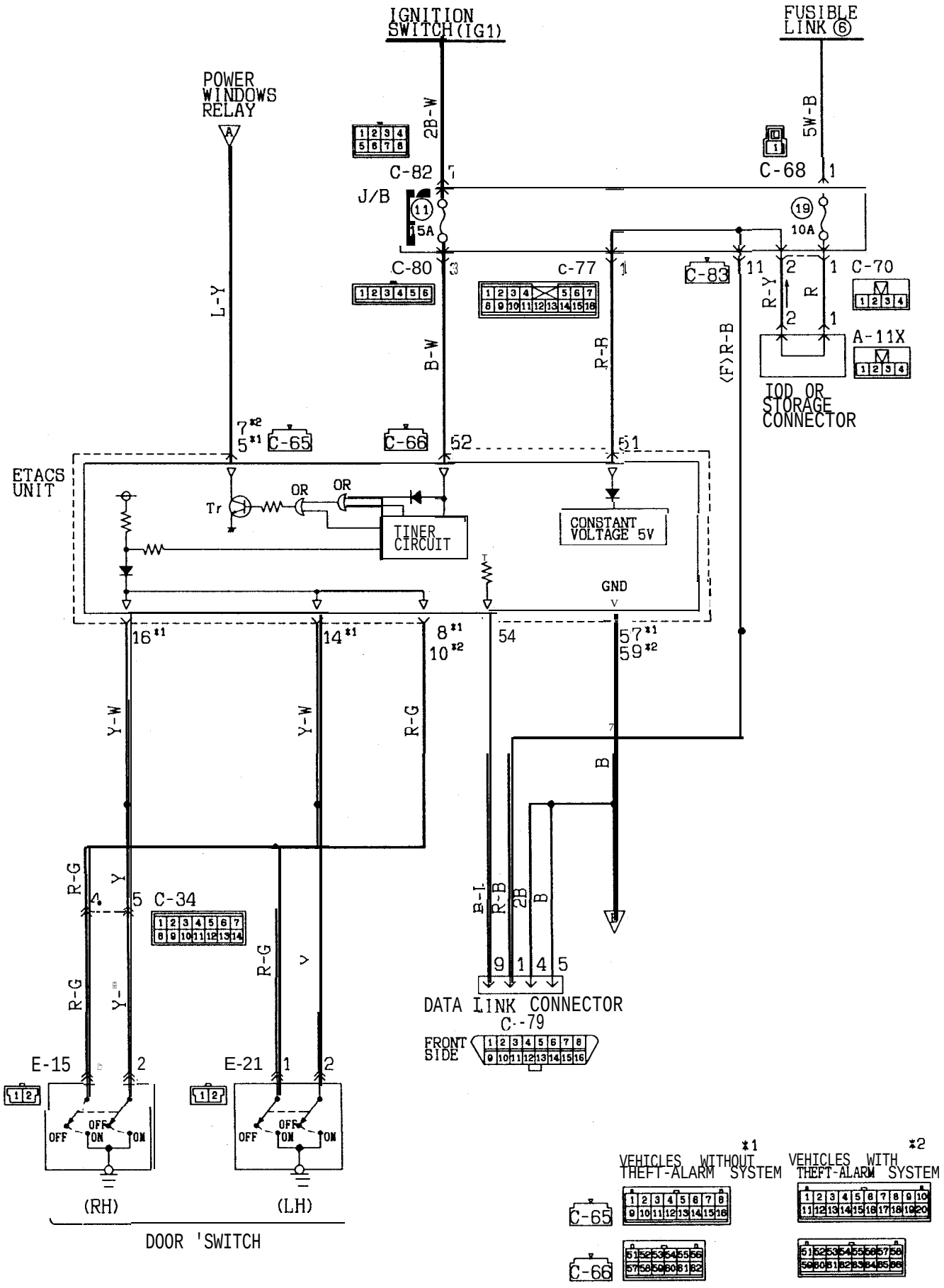
(7) Check to confirm that wind noise occurs when the last remaining tape is removed, and that noise does not occur when it is re-attached.
(8) When the source(s) of the wind noise is finally located, attach butyl tape, body sealer or similar material to obstruct this source as much as possible.

POWER WINDOW

CIRCUIT DIAGRAM



KX35-AC-R1101-N4C

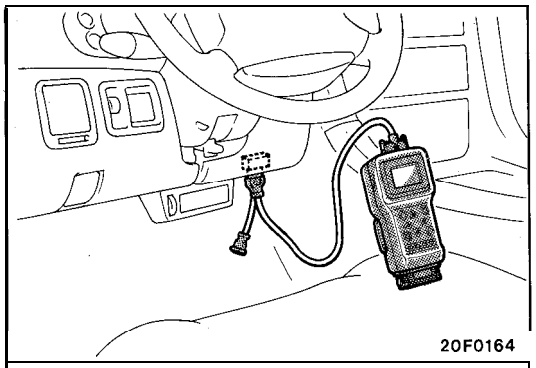

IGNITION SWITCH(IG1)
FUSIBLE LINK ⑥
POWER WINDOWS RELAY
2B-W
5W-B
C-82
C-68
J/B
15A
10A
C-80
C-77
C-83
C-70
A-11X
L-Y
B-W
R-R
R-Y
R
(F)R-B
IOD OR STORAGE CONNECTOR
C-65
C-66
ETACS UNIT
Tr
OR
TINER CIRCUIT
CONSTANT VOLTAGE 5V
GND
Y-W
R-G
B
B-L
R-B
2B
C-34
DATA LINK CONNECTOR
C-79
FRONT SIDE
E-15
E-21
OFF
ON
(RH)
(LH)
DOOR 'SWITCH
*1 VEHICLES WITHOUT THEFT-ALARM SYSTEM
*2 VEHICLES WITH THEFT-ALARM SYSTEM

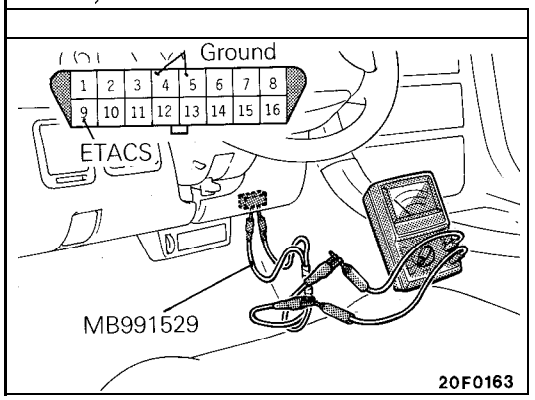
OPERATION

- Turn on the ignition switch, and the transistor Tr will be turned on by the timer circuit. This will turn on the power window relay allowing the power window to be opened and closed.
- Turn the ignition switch from on to off, and the timer circuit will be activated to keep transistor Tr on for 30 seconds allowing the power window to be opened and closed.
  Moreover, if the front door is opened, the timer circuit will stop to turn off the transistor Tr. This will prevent the window from being opened and closed.

TROUBLESHOOTING HINTS

Phenomenon		Inspection method
All door windows cannot be opened or closed.		• Check fusible link No. 9. • Check the power-window relay. • Check the power-window main switch.
One of the door windows cannot be opened or closed.	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.
	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.
The one-touch down switch function only does not operate.		• Replace the power-window main switch.
The power windows do not operate when the ignition switch is at the “ON” position.		• Check the ignition switch input signal. (Refer to P.23A-11.) • Check the ignition switch. (Refer to GROUP 8 – Ignition Switch.) • Check the power window relay. (Refer to P.23A-70.)
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.		• Check the front door switch input signal. (Refer to P.23A-11.) • Check the front door switch. (Refer to P.23A-68.)
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.		• Check the power window relay. (Refer to P.23A-70.)





INPUT SIGNAL

Using the scan tool or voltmeter, check whether or not the input signals from each switch are being input to the ETACS unit.

When using the scan tool

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

NOTE ,
Be sure to set the ignition switch to the OFF position before connectiong or disconnecting the scan tool.

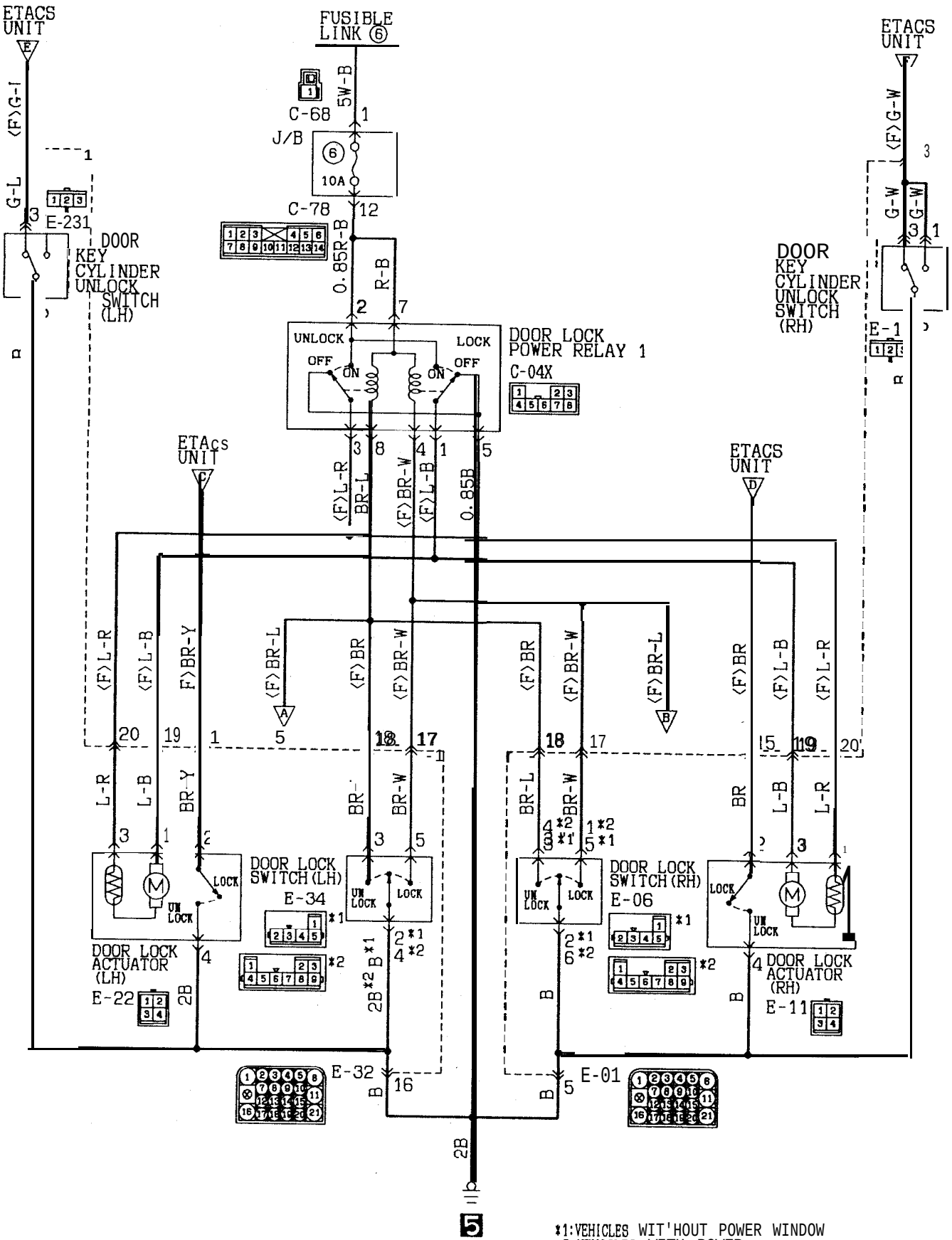
(2) Perform ON/OFF operation of each switch. If the buzzer of the scan tool sounds once, the ECU input signal sent from the corresponding switch circuit system is normal.

When using a voltmeter

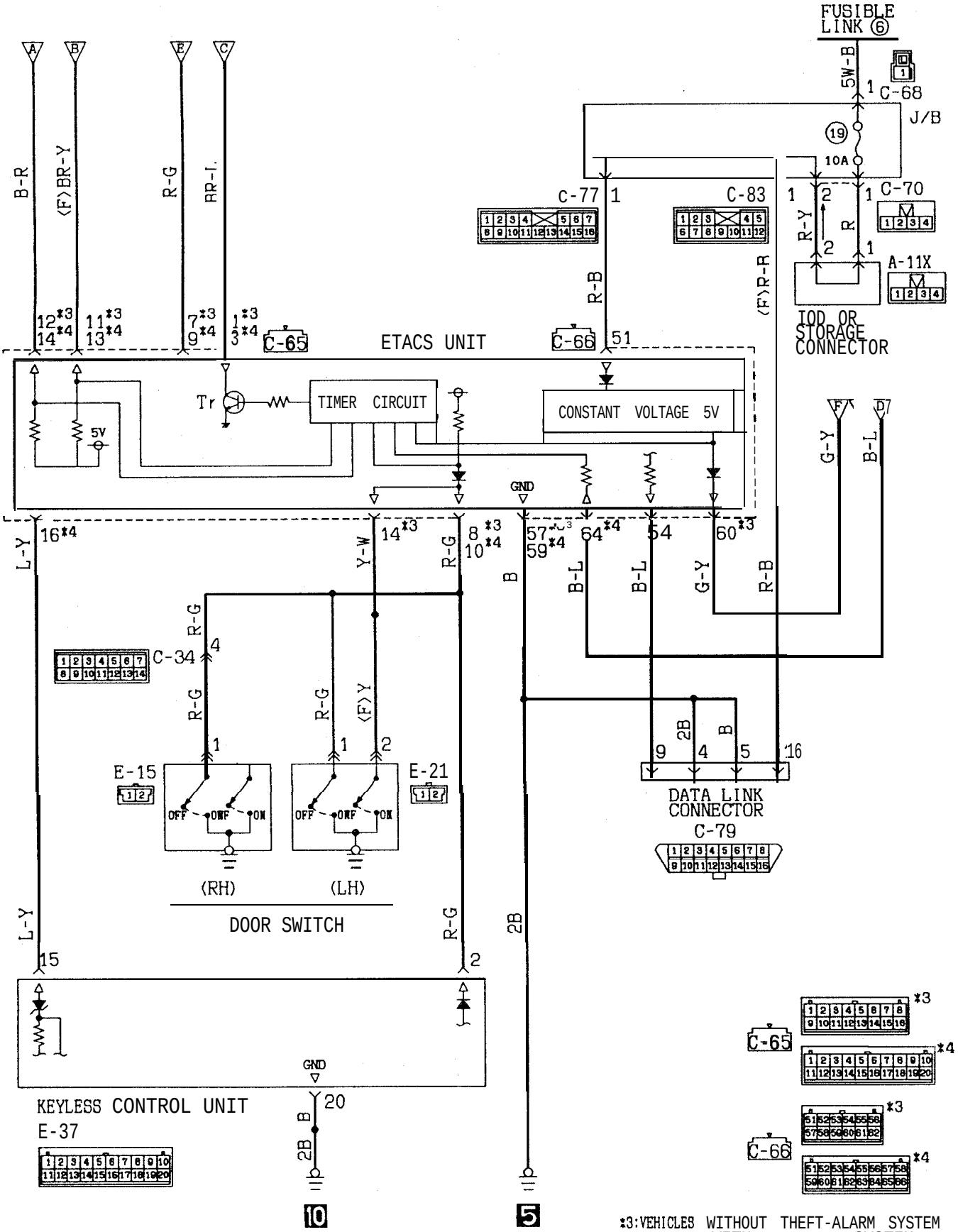
(1) Use the special tool to connect a voltmeter to the ETACS terminal and ground terminal of the data link connector.
(2) Perform ON/OFF operation of each switch. If the pointer of the voltmeter moves once, the ECU input signal sent from the corresponding switch circuit system is normal.

CENTRAL DOOR LOCKING SYSTEM (VEHICLE WITHOUT KEYLESS ENTRY SYSTEM)

CIRCUIT DIAGRAM



*1:VEHICLES WIT'HOUT POWER WINDOW
*2:VEHICLES WITH POWER WINDOW

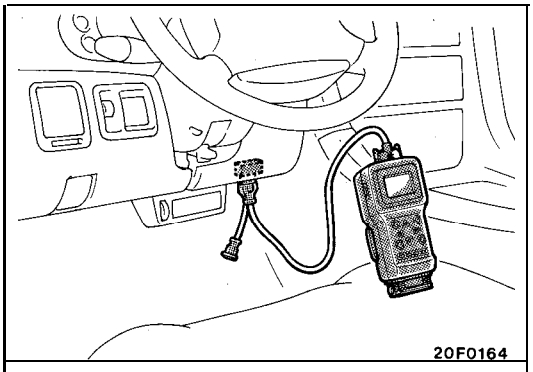

FUSIBLE LINK ⑥
5W-B
C-68
J/B
19
10A
C-77
C-83
C-70
R-Y
R
A-11X
IOD OR STORAGE CONNECTOR
(F)R-R
R-B
B-R
(F)BR-Y
R-G
RR-I.
C-65
ETACS UNIT
C-66
51
Tr
TIMER CIRCUIT
CONSTANT VOLTAGE 5V
5V
GND
G-Y
B-L
L-Y
Y-W
B
B-L
G-Y
R-B
C-34
E-15
E-21
OFF
ON
(RH)
(LH)
DOOR SWITCH
2B
DATA LINK CONNECTOR
C-79
KEYLESS CONTROL UNIT
E-37
20
10
5
*3:VEHICLES WITHOUT THEFT-ALARM SYSTEM
*4:VEHICLES WITH THEFT-ALARM SYSTEM

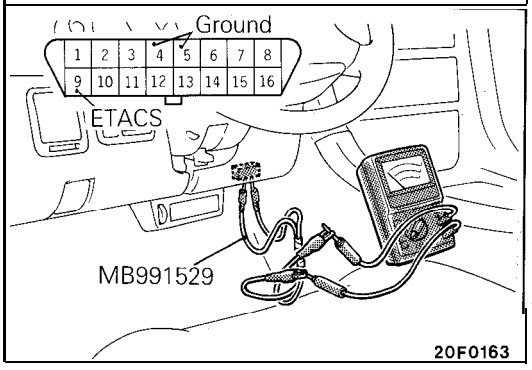
OPERATION

- 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.

TROUBLESHOOTING HINTS

Phenomenon	Inspection method
One of the door lock actuators fails to operate.	• Check the door actuator which fails to operate.
No unlock operation can be made by pressing door lock knob after fulfilment of following conditions. @Insertion of key in ignition switch (key reminder switch OFF) *Opening of door (door switch ON)	• Check the key reminder switch input signal. • Check the key reminder switch. (Refer to GROUP 8 – Ignition Switch.) • Check the front door switch input signal. • Check the front door switch. (Refer to P.23A-68.)


20F0164



20F0163

INPUT SIGNAL

Using the scan tool or voltmeter, check whether or not the input signals from each switch are being input to the ETACS unit.

When using the scan tool

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

NOTE
Be sure to set the ignition switch to the OFF position before connectiong or disconnecting the scan tool.

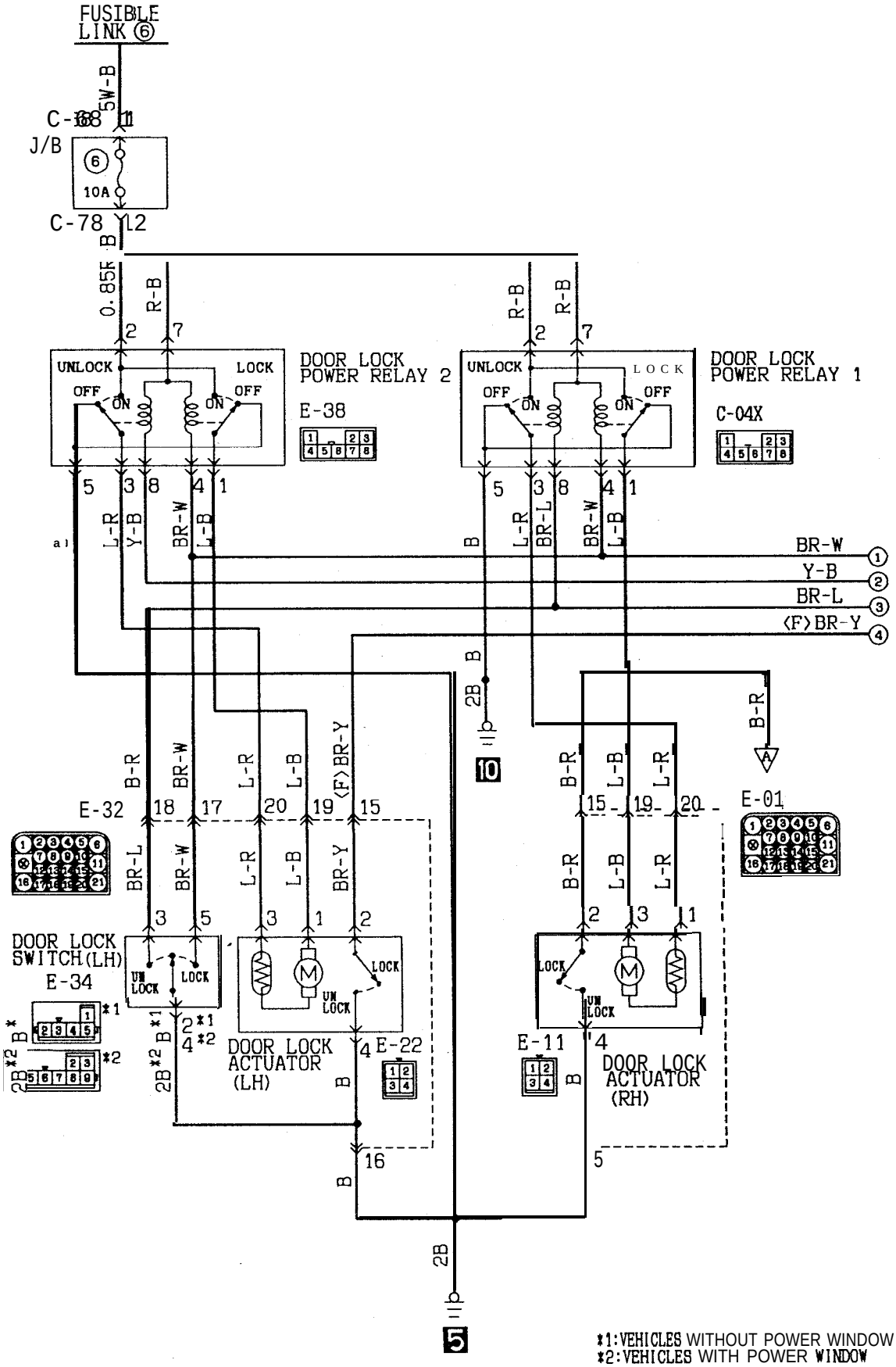
(2) Perform ON/OFF operation of each switch. If the buzzer of the scan tool sounds once, the ECU input signal sent from the corresponding switch circuit system is normal.

When using a voltmeter

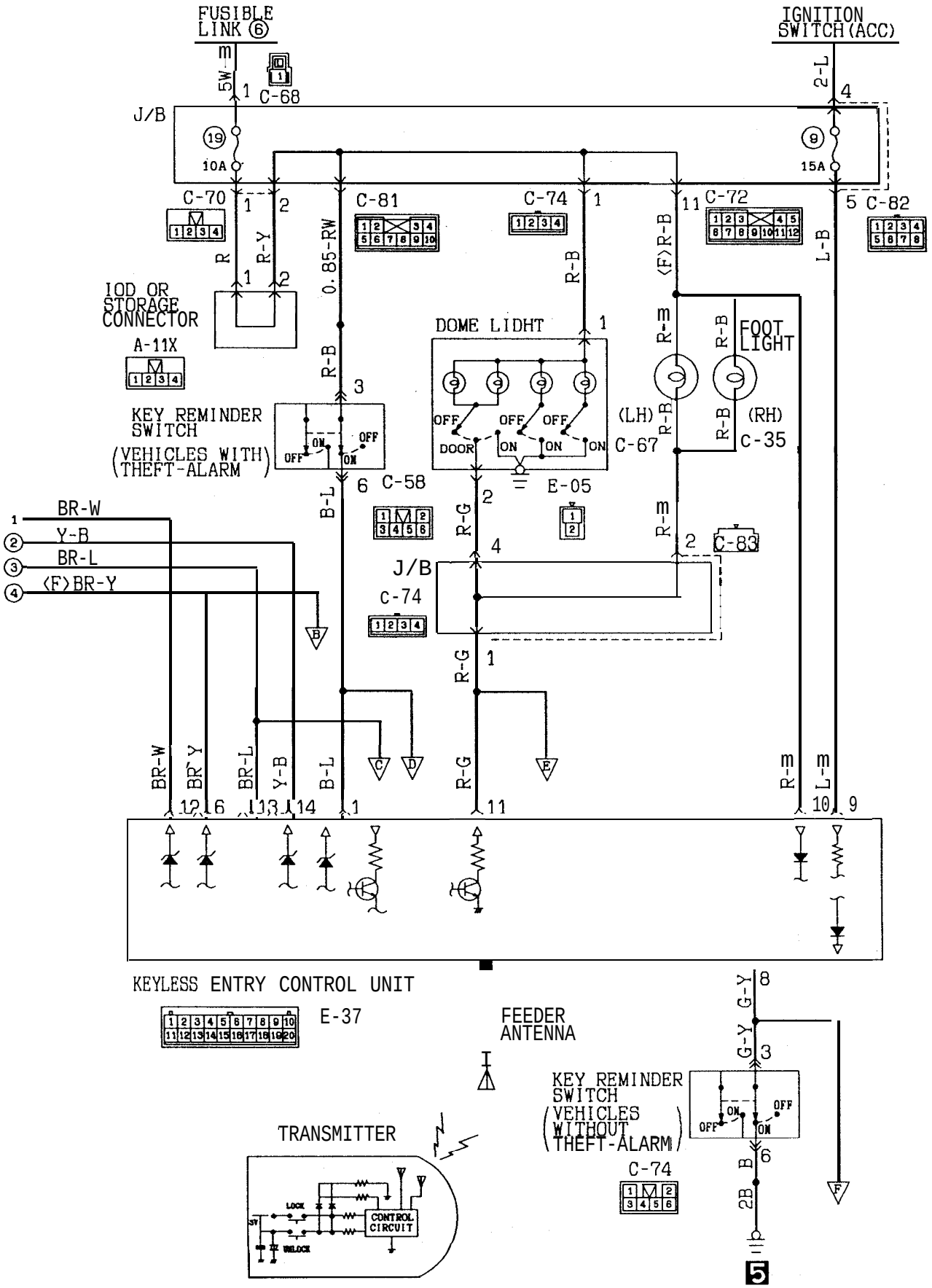
(1) Use the special tool to connect a voltmeter to the ETACS terminal and ground terminal of the data link connector.
(2) Perform ON/OFF operation of each switch. If the pointer of the voltmeter moves once, the ECU input signal sent from the corresponding switch circuit system is normal.

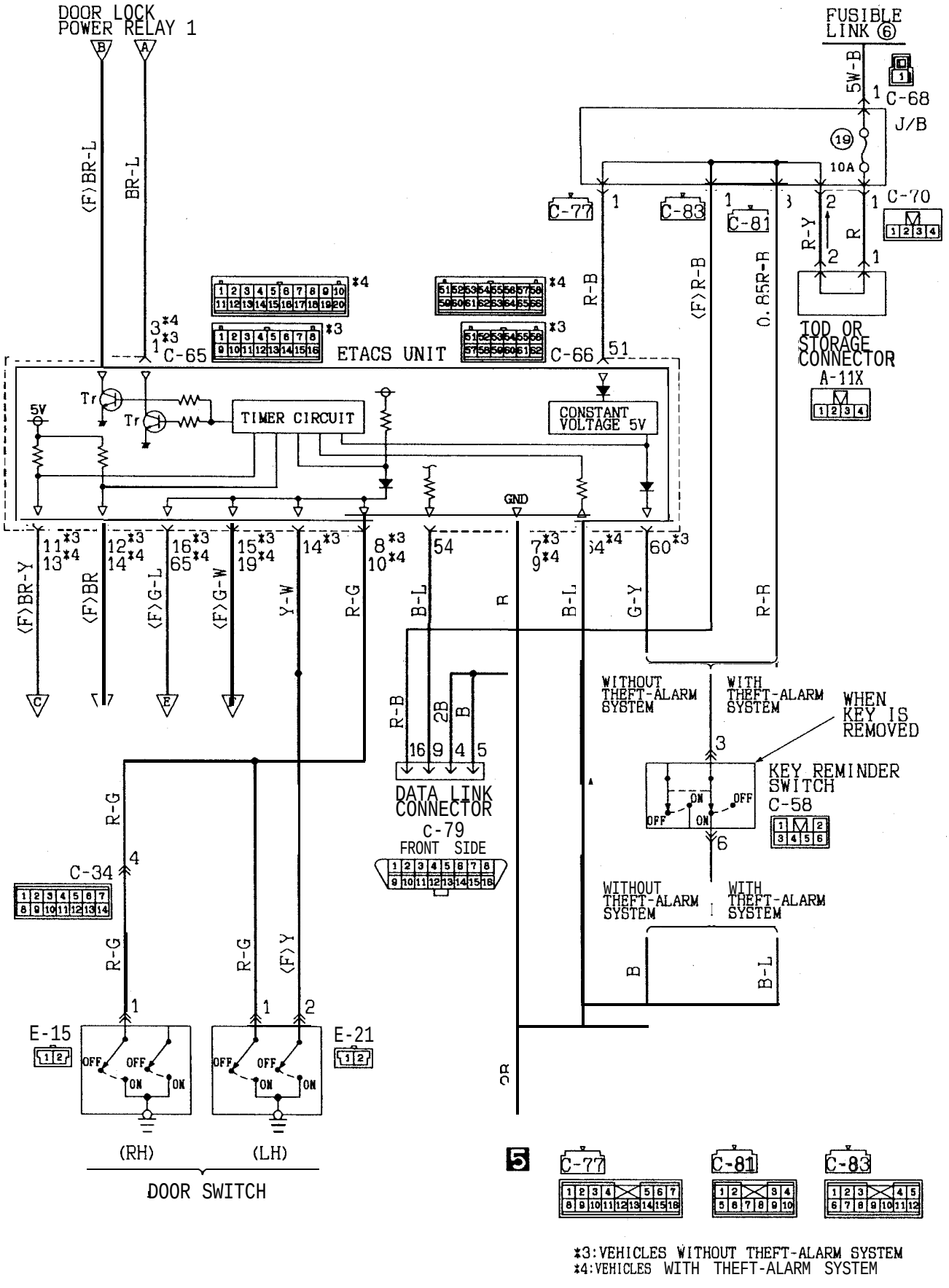
CENTRAL DOOR LOCKING SYSTEM (VEHICLE WITH KEYLESS ENTRY SYSTEM)

CIRCUIT DIAGRAM



CIRCUIT DIAGRAM (CONTINUED)




DOOR LOCK POWER RELAY 1
FUSIBLE LINK ⑥
5W-B
C-68
J/B
10A
C-77
C-83
C-81
C-70
R-Y
R
R-B
⟨F⟩R-B
0.85R-R
TOD OR STORAGE CONNECTOR
A-11X
⟨F⟩BR-L
BR-L
C-65
ETACS UNIT
C-66
TIMER CIRCUIT
CONSTANT VOLTAGE 5V
5V
Tr
GND
⟨F⟩BR-Y
⟨F⟩BR
⟨F⟩G-L
⟨F⟩G-W
Y-W
R-G
B-L
R
G-Y
R-R
WITHOUT THEFT-ALARM SYSTEM
WITH THEFT-ALARM SYSTEM
WHEN KEY IS REMOVED
KEY REMINDER SWITCH
C-58
DATA LINK CONNECTOR
C-79
FRONT SIDE
C-34
E-15
E-21
ON
OFF
(RH)
(LH)
DOOR SWITCH
⟨F⟩Y
B
2B
5
C-77
C-81
C-83
*3:VEHICLES WITHOUT THEFT-ALARM SYSTEM
*4:VEHICLES WITH THEFT-ALARM SYSTEM

OPERATION

- With the driver's and front passenger's doors unlocked, press the LOCK switch of the transmitter, and the door lock signal output (0 V) will be sent from the keyless entry control unit terminal No. ⑫ closing the door lock power relays 1 and 2 to lock the driver's and front passenger's doors.
- While the R.H. and L.H. doors are in the locked state, press the UNLOCK switch of the transmitter once, and the DOOR UNLOCK switch signal (0 V) will be sent from the keyless entry control unit terminal No. ⑭ closing the door lock power relay 2 to unlock the driver's door.
- Under the above-mentioned conditions, further press the UNLOCK switch of the transmitter, and the DOOR UNLOCK signal output (0 V) will be sent from the keyless entry control unit terminal No. ⑬ closing the door lock power relay 1 to lock the front passenger's door.
- When the keyless entry system is operated to turn the driver's door lock switch from the UNLOCK position to the LOCK position, the dome light/foot light blinking signal output (system voltage) will be sent twice from the keyless entry control unit terminal No. ⑪.
  When the door lock switch is turned from the LOCK position to the UNLOCK position, the lighting signal output (0 V) will be provided for approx. 3 seconds.

NOTE
The dome light winks or comes on when the dome light switch is in the DOOR interlock position. However, the dome light does not wink while it is ON for 6 seconds after closing the door by ETACS function.

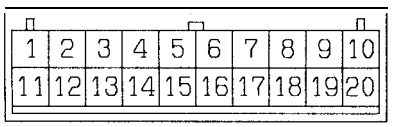
Besides the above-mentioned operations, the keyless entry control unit has the following functions.

- If any door is not opened or closed within 30 seconds from unlocking the door by means of the keyless entry system, the door is automatically locked. In addition, if the cryptographic code other than the code stored in the receiver memory is received 30 times in one minute continuously, operation of the unit is suspended for 10 minutes.
- Operation is also suspended if the ignition key remains inserted (key reminder switch: OFF) and either door is left open (door switch: ON).

TROUBLESHOOTING HINTS

- The indicator does not blink after pressing the transmission switch of the transmitter.
  1) Check or replace the battery. (P.23A-78)
  2) Replace the transmitter.
- Transmitted wave is being sent from the transmitter (indicator is blinking), but the system does not operate.
  1) Check the cryptographic code registering method* (P.23A-78)
  2) Check the keyless entry control unit terminal voltage. (P.23A-19)
  3) Check the coaxial cable of antenna and the ground wire for connection.
- Only R.H. or L.H. door can be locked or unlocked.
  1) Check the door lock power relay 1 (for front passenger's door) or door lock power relay 2 (for driver's door). (P.23A-76, 78)
  2) Check the keyless entry control unit terminal voltage. (P.23A-19)
- R.H. and L.H. doors can be locked and unlocked by the transmitter but the dome light and foot light do not blink or come on. (Interlocked lighting of the dome light and foot light by means of the dome light switch or door opening and closing is normal).
  1) Check the keyless entry control unit terminal voltage. (P.23A-19)
  2) Check the harness.

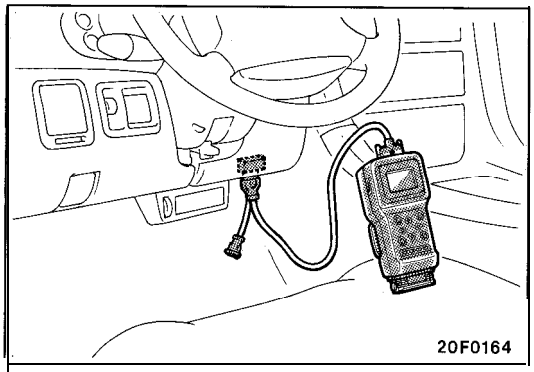
NOTE
*: Perform this check when replacement of the transmitter and/or keyless entry control unit or faulty storage of cryptographic code has been made.

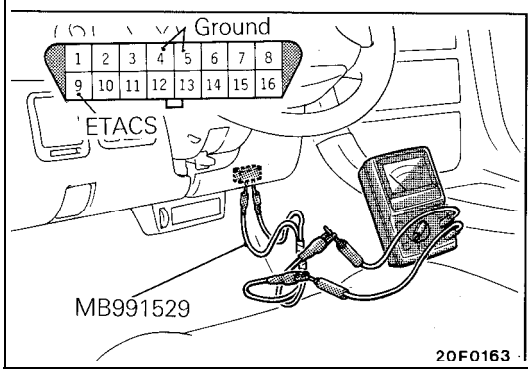


Inspection of Keyless Control Unit

Disconnect the amplifier and inspect the connector on the wire harness side as shown in the chart below.

Terminal No.	Signal	Conditions		Terminal voltage
1	Key reminder switch (vehicles with theft alarm)	ON (Key removed)		Battery positive voltage
		OFF (Key installed)		o v
2	Door switch	All doors close (Door switch: OFF)		o v
		One of doors open (Door switch: ON)		5 V
6	Door lock actuator (L.H.)	LOCK		5 V
		UNLOCK		o v
9	Keyless entry control unit power source	Ignition switch (ACC or ON)		Battery positive voltage
		Ignition switch (OFF)		o v
10	Keyless entry control unit power source	Always		Battery positive voltage
11	Dome light	All doors close (Door switch: OFF)	Dome light switch: OFF or ON	o v
			Dome light switch: DOOR	Battery positive voltage
12	Door lock output	To operate		o v
		Not to operate		Battery positive voltage
13	Door unlock output	To operate		o v
		Not to operate		Battery positive voltage
14	Drivers door unlock output	To operate		o v
		Not to operate		Battery positive voltage
20	Ground	Always		o v





INPUT SIGNAL

Using the scan tool or voltmeter, check whether or not the input signals from each switch are being input to the ETACS unit.

When using the scan tool

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

NOTE
Be sure to set the ignition switch to the OFF position before connectiong or disconnecting the scan tool.

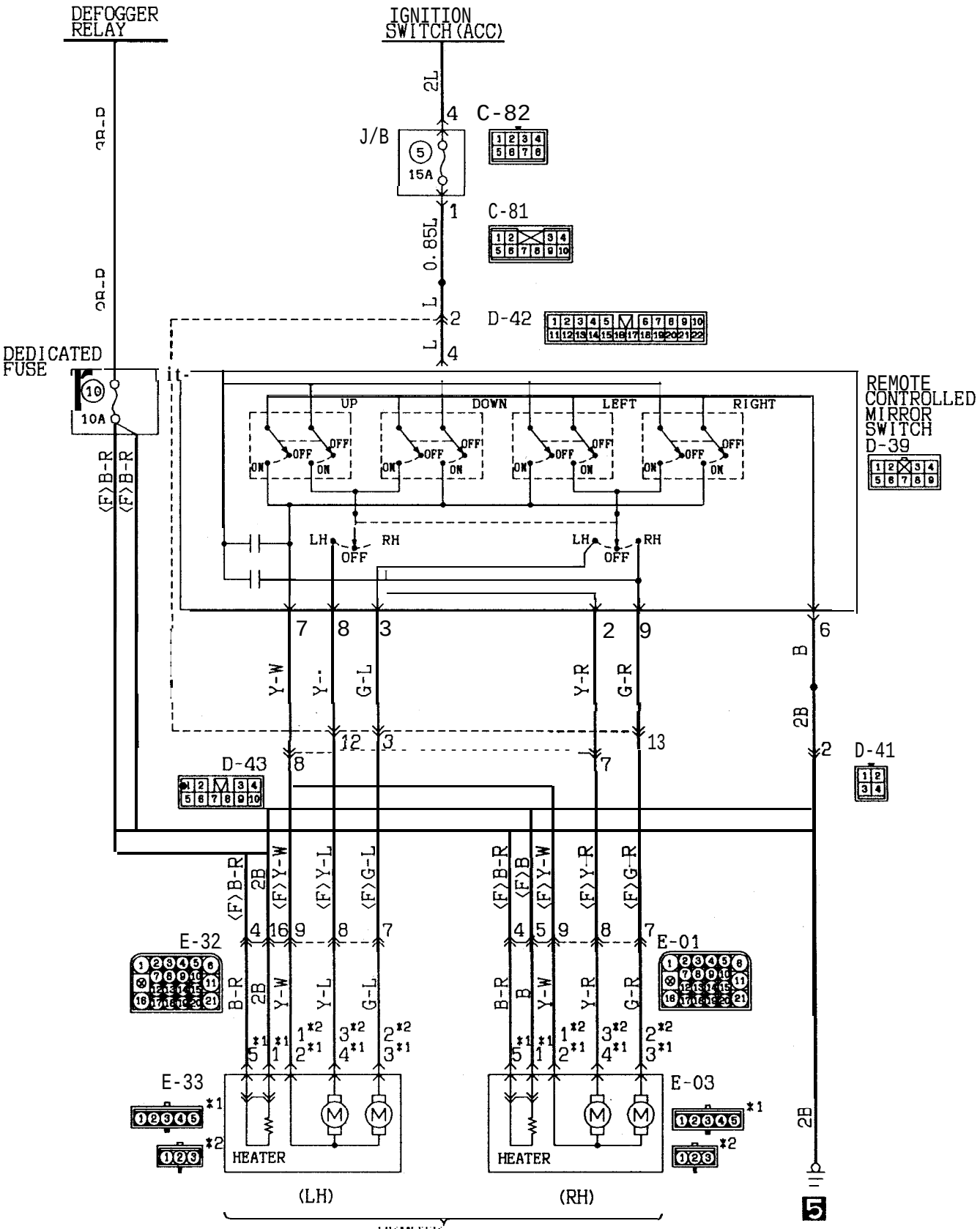
(2) Perform ON/OFF operation of each switch. If the buzzer of the scan tool sounds once, the ECU input signal sent from the corresponding switch circuit system is normal.

When using a voltmeter

(1) Use the special tool to connect a voltmeter to the ETACS terminal and ground terminal of the data link connector.
(2) Perform ON/OFF operation of each switch. If the pointer of the voltmeter moves once, the ECU input signal sent from the corresponding switch circuit system is normal.

ELECTRIC REMOTE CONTROLLED MIRROR

CIRCUIT DIAGRAM



KX35-AC-R1307-N3C

*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.

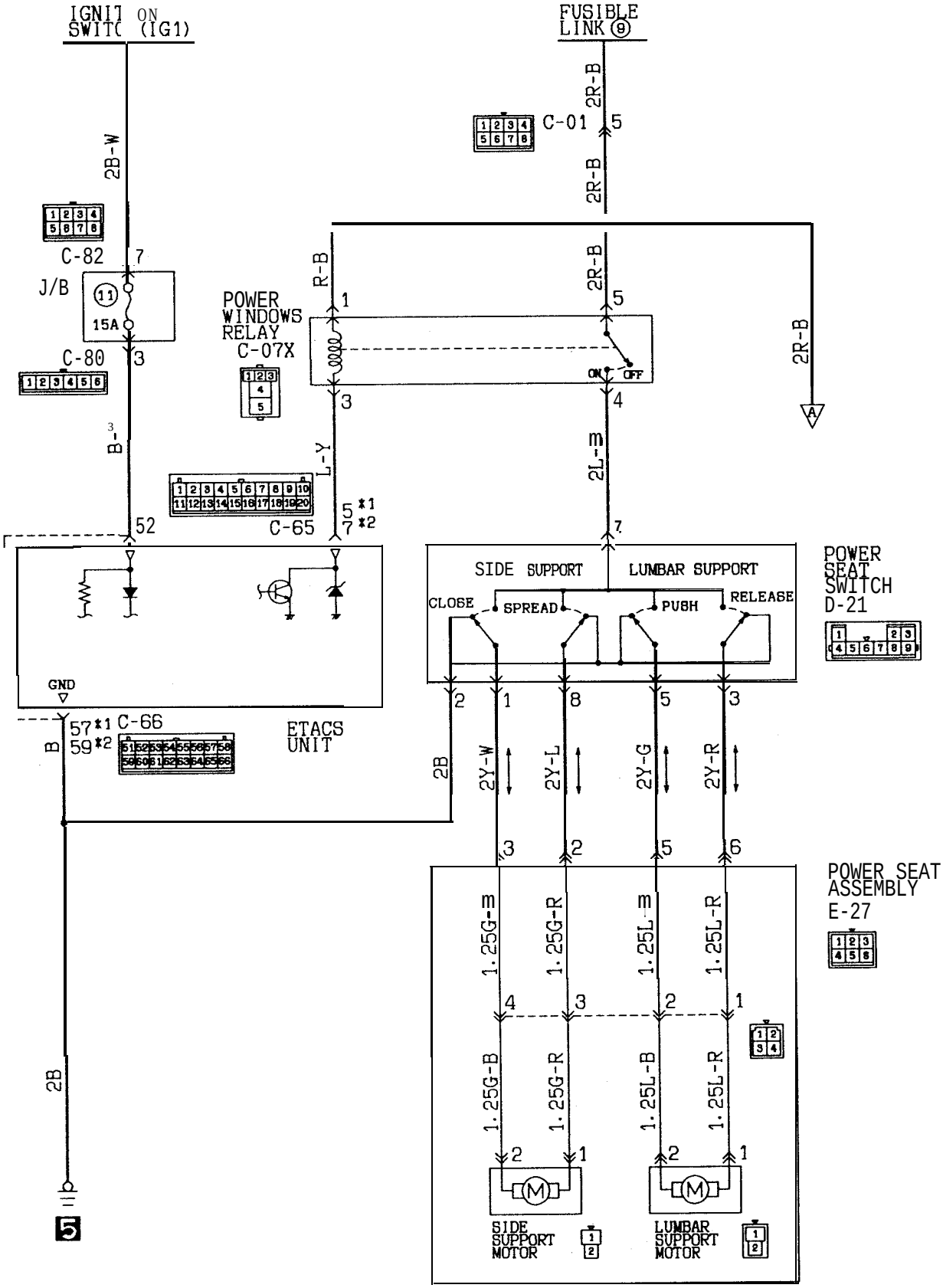
TROUBLESHOOTING HINTS

Neither right nor left mirror operates

1) Also cigarette lighter does not operate
   - Check multi-purpose fuse No. ⑤.
2) Cigarette lighter operates
   - Check remote controlled mirror switch.

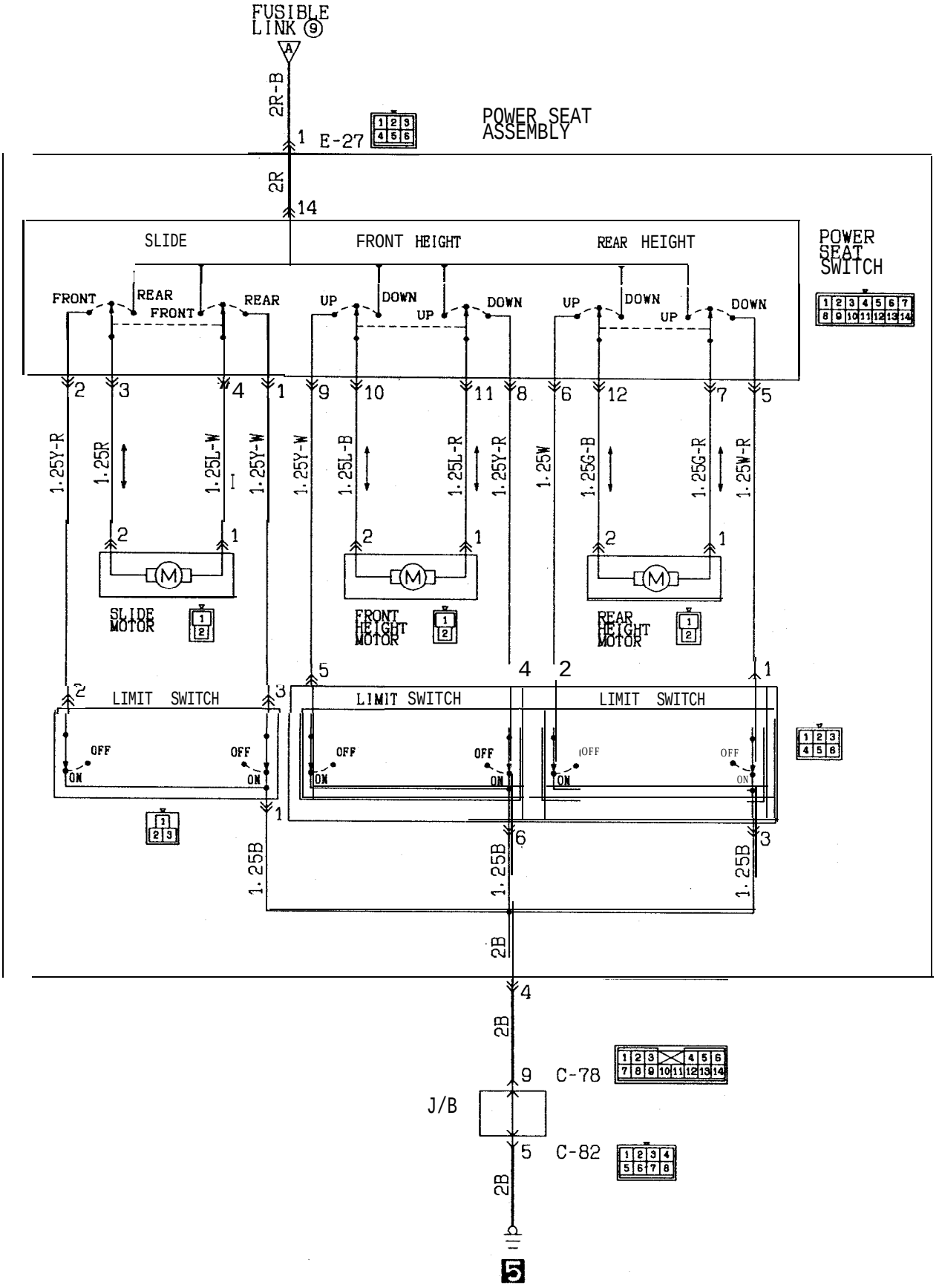
POWER SEAT

CIRCUIT DIAGRAM



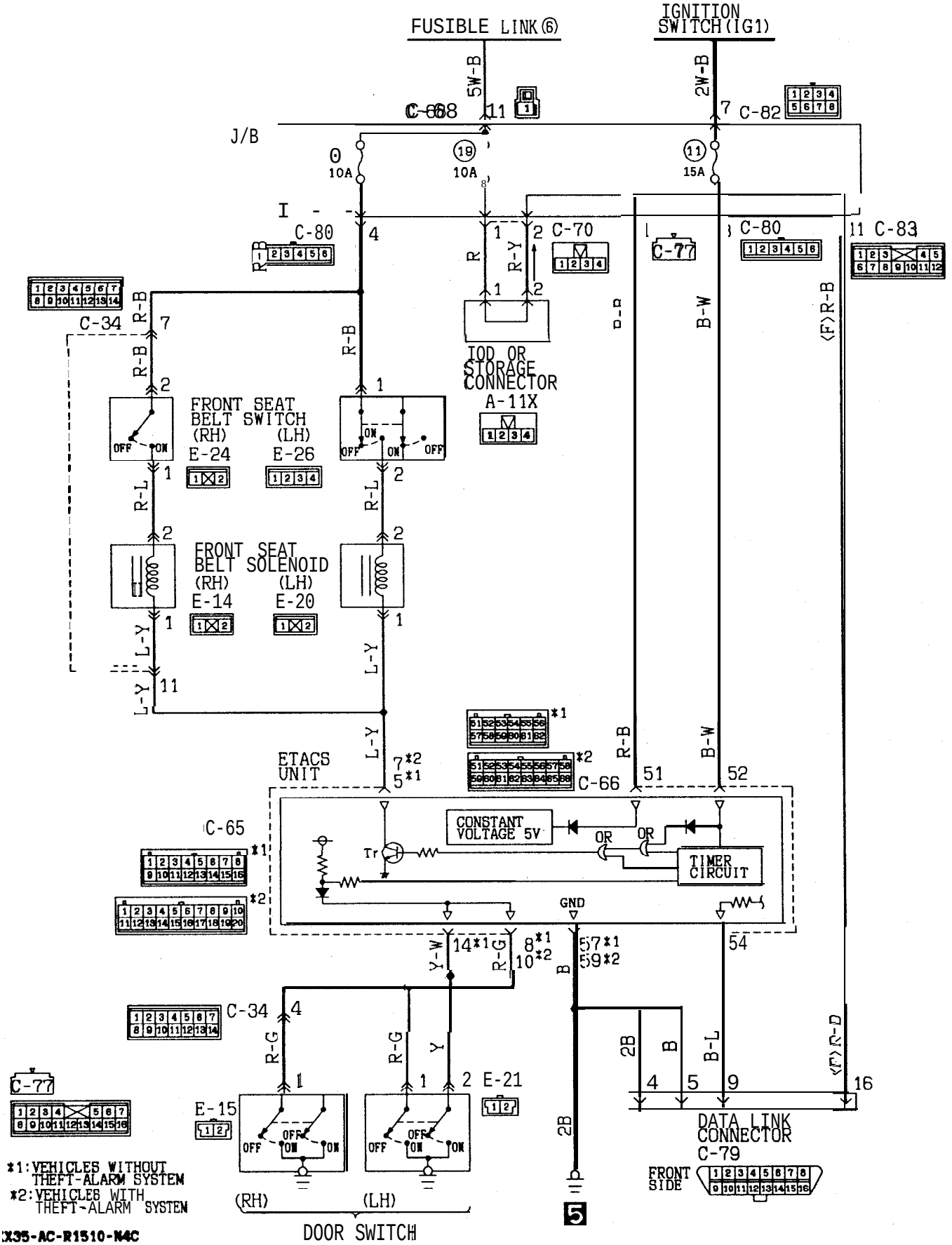
NOTE
*1:VEHICLES WITHOUT THEFT ALARM SYSTEM
*2:VEHICLES WITH THEFT ALARM SYSTEM

CIRCUIT DIAGRAM (CONTINUED)



TENSION-REDUCER TYPE SEAT BELT

CIRCUIT DIAGRAM

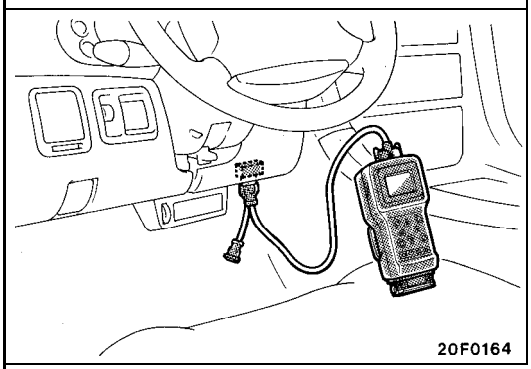


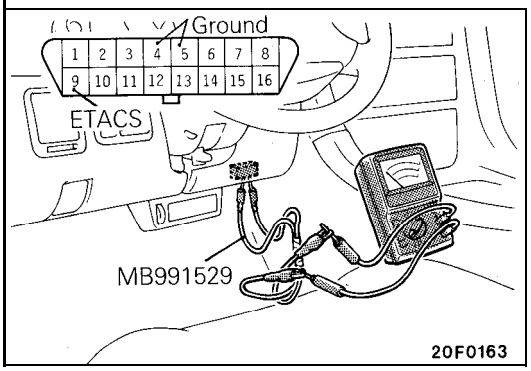
OPERATION

- 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

Phenomenon	Inspection method
Some of the tension-reducers do not operates.	• Check dedicated fuse No. 1 and 19. • Check the inoperative seat belt switch. • Check the inoperative seat belt solenoid.
With the ignition switch in the ON position, the tension-reducer does not operate.	• Check the ignition switch input signal. • Check the ignition switch. (Refer to GROUP 8 – Ignition Switch.)
Immediately after turning off the ignition switch, the tension-reducer is in operation. But opening the door within 30 seconds does not stop the tension-reducer operation.	• Check the door switch input signal. • Check the door switch. (Refer to P.23A-68.)


20F0164



20F0163

INPUT SIGNAL

Using the scan tool or voltmeter, check whether or not the input signals from each switch are being input to the ETACS unit.

When using the scan tool

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

NOTE
Be sure to set the ignition switch to the OFF position before connectiong or disconnecting the scan tool.

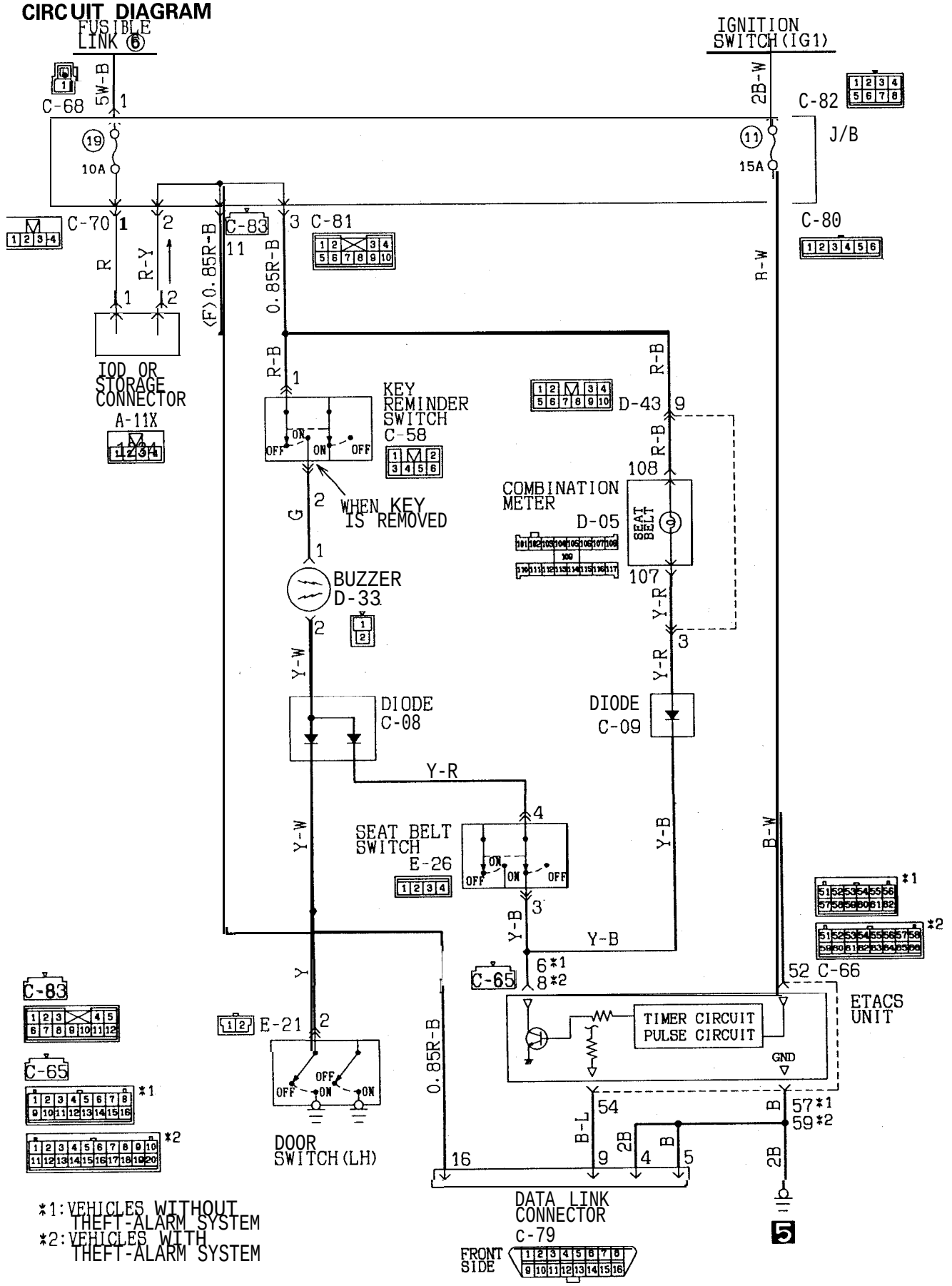
(2) Perform ON/OFF operation of each switch. If the buzzer of the scan tool sounds once, the ECU input signal sent from the corresponding switch circuit system is normal.

When using a voltmeter

(1) Use the special tool to connect a voltmeter to the ETACS terminal and ground terminal of the data link connector.
(2) Perform ON/OFF operation of each switch. If the pointer of the voltmeter moves once, the ECU input signal sent from the corresponding switch circuit system is normal.

BUZZER

CIRCUIT DIAGRAM



EX35-AC-R0903-N4C

OPERATION

<Key-reminder warning>

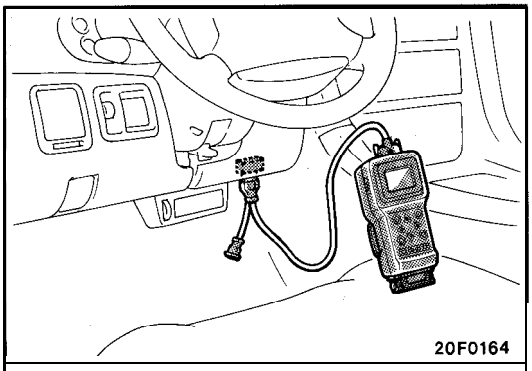
- Battery voltage is continuously applied to the key-reminder switch.
- If the driver's door is opened (door switch ON) with the key inserted in the ignition switch (key-reminder switch ON), the buzzer sounds to warn that the key has been left in the switch.

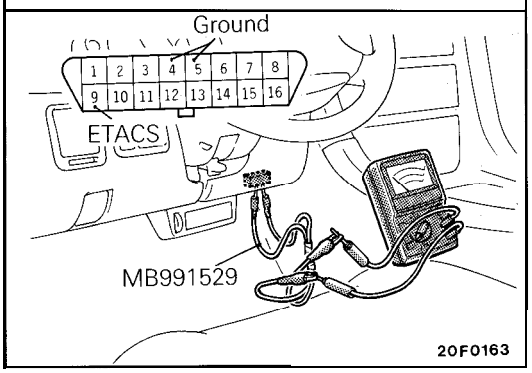
<Seat belt warning>

- When the ignition switch is turned on, the timer circuit and pulse circuit will flicker the seat belt warning light for approx. 6 seconds with the buzzer intermittently sounding.
- If the seat belt is fastened for the while, the seat belt switch will be turned off and the buzzer will stop.

TROUBLESHOOTING HINTS

Problem		Check method
The key-reminder warning doesn't sound.	The seat belt warning function is OK.	• Check the door switch. (Refer to P.23A-68.)
	The seat belt warning also doesn't function.	• Check the buzzer. (Refer to P.23A-104.)
The seat belt warning doesn't function.	The seat belt warning light flashes.	• Check the seat belt switch. (Refer to P.23A-104.)
	The seat belt warning light also does not function (and the key-reminder warning also does not function).	• Check the key-reminder switch. (Refer to GROUP 8 – Ignition Switch.)
The buzzer doesn't stop even though the driver's seat belt has been buckled.		• Check the seat belt switch. (Refer to P.23A-104.)
The seat belt warning light doesn't flash (but the buzzer sounds).		• Check the light bulb. • Check the key-reminder switch. (Refer to GROUP 8 – Ignition Switch.) • Check the seat belt switch. (Refer to P.23A-104.)
The warning light does not flash and the warning buzzer also does not sound.		• Check the ignition switch input signal. (Refer to P.23A-29.) • Check the key-reminder switch. (Refer to GROUP 8 – Ignition Switch.) • Check the seat belt switch. (Refer to P.23A-104.)
The warning light flashes, but the warning buzzer does not sound.		• Check the key-reminder switch. (Refer to GROUP 8 – Ignition Switch.) • Check the seat belt switch. (Refer to P.23A-104.)





INPUT SIGNAL

Using the scan tool or voltmeter, check whether or not the input signals from each switch are being input to the ETACS unit.

When using the scan tool

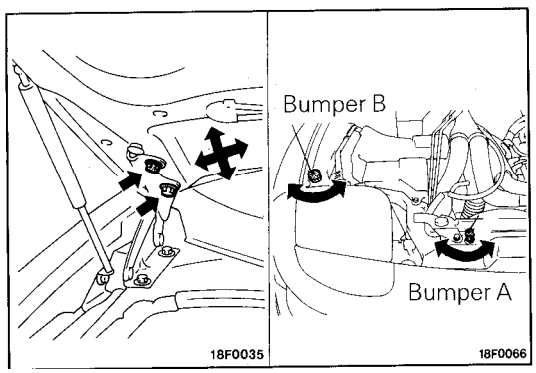
(1) Connect the scan tool to the data link connector.

NOTE
Be sure to set the ignition switch to the OFF position before connectiong or disconnecting the scan tool.

(2) Perform ON/OFF operation of each switch. If the buzzer of the scan tool sounds once, the ECU input signal sent from the corresponding switch circuit system is normal.

When using a voltmeter

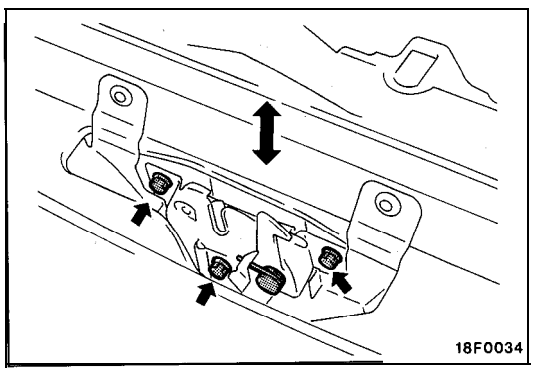
(1) Use the special tool to connect a voltmeter to the ETACS terminal and ground terminal of the data link connector.
(2) Perform ON/OFF operation of each switch. If the pointer of the voltmeter moves once, the ECU input signal sent from the corresponding switch circuit system is normal.



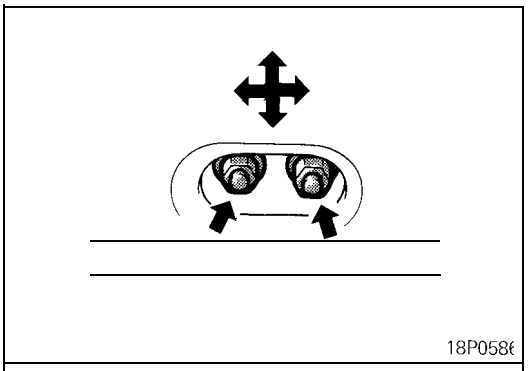
SERVICE ADJUSTMENT PROCEDURES

HOOD ADJUSTMENT

1. Loosen the hood mounting bolts, and then adjust the hood by moving it so that the clearance is equal on all sides.
2. Turn the bumpers A and B, adjust the height of the hood.

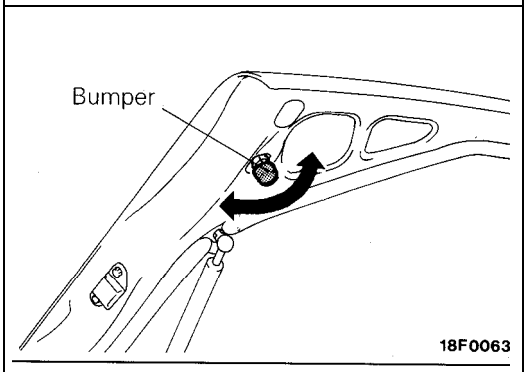


3. Loosen the hood latch mounting bolts, and move the hood latch to adjust the attachment between the hood latch and hood striker.


18P058(

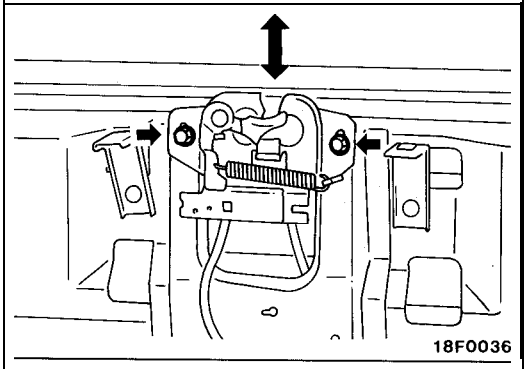
LIFTGATE ADJUSTMENT

1. Loosen the liftgate hinges mounting bolts, and then adjust the liftgate by moving it so that the clearance is equal on all sides.



18F0063

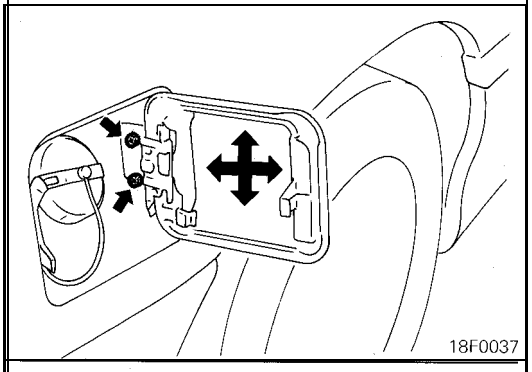
2. Turn the bumper to adjust the liftgate height.


18F0036

3. Loosen the liftgate latch mounting bolts, and move the liftgate latch to adjust the attachment between the liftgate latch and liftgate striker.

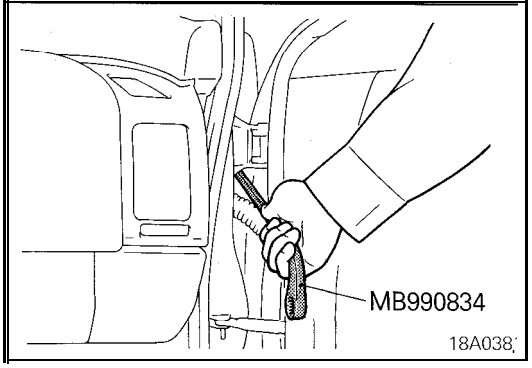
FUEL FILLER DOOR ADJUSTMENT

Loosen the fuel filler door mounting screw and adjust the fuel filler door so that the clearance around the fuel filler door is even without any height differences.


18F0037

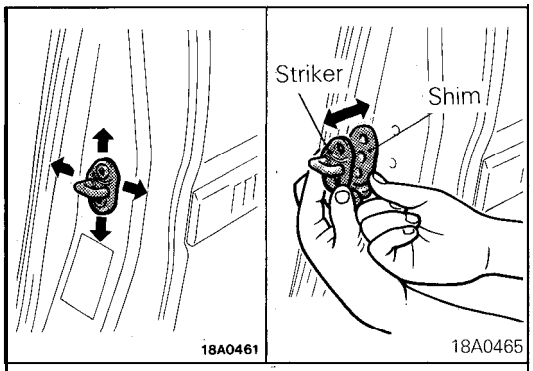
DOOR ADJUSTMENT

1. Use the special tool to loosen the hinge mounting bolts on the body side, and then adjust the clearance around the door so that it is uniform on all sides.
2. If the door is not flush with the body, remove the spring pin from the door check, use the special tool to loosen the bolts for mounting the door hinges to the door. Move the door to adjust the door position along the body surface.

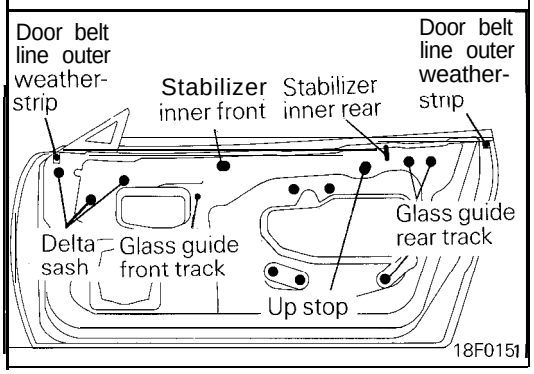


18A038

Caution
Attach protection tape to the fender edges where the hinge is installed.



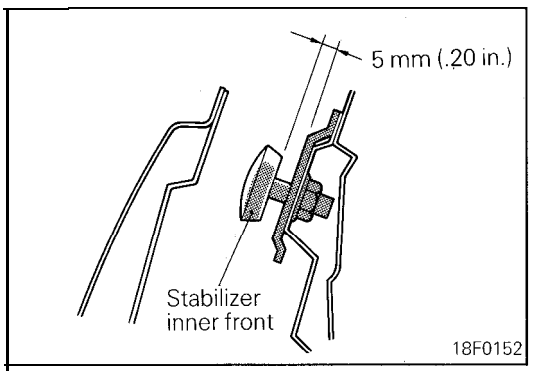
3. If the door does not open freely, adjust the engagement of the striker with the door latch by means of the striker mounting shim and move the striker up and down or from side to side.



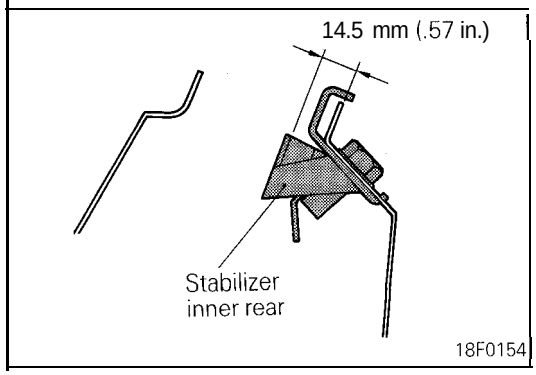
DOOR WINDOW GLASS ADJUSTMENT

1. Remove the door trim and waterproof film. (Refer to P.23A-68.)
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.



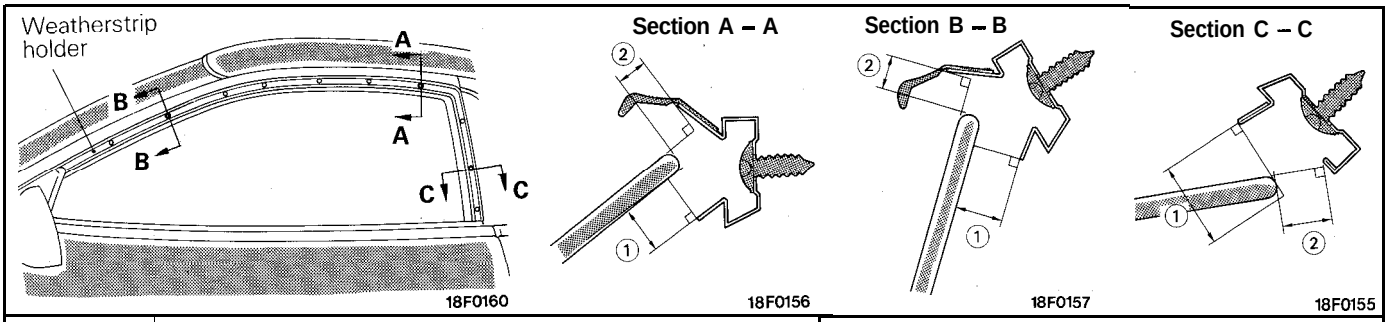
5. Remove the stabilizer inner front and adjust the adjusting bolt for the dimension shown here.

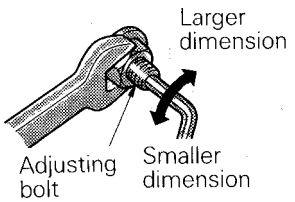
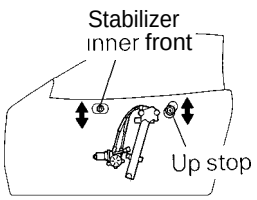


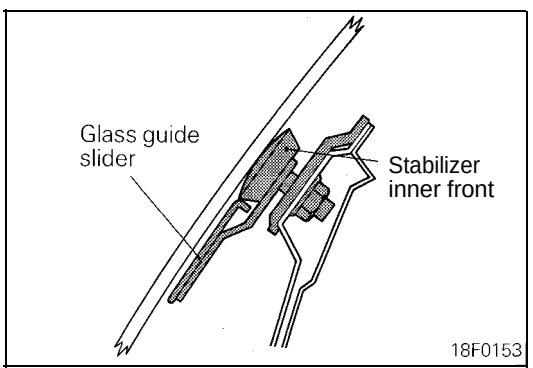
6. Adjust the adjusting bolt for the stabilizer inner rear dimension shown here.
7. Raise door window glass. Push glass against the outer stabilizer of the door belt line outer weatherstrip and insert cloth or the like between the door inner panel and glass.

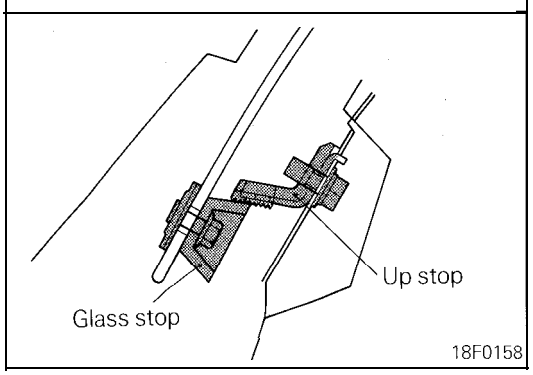
8. Adjust glass to have standard clearance between the weatherstrip holder and window glass.

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 ①	Section A-A ②	Section B-B ①	Section B-B ②	Section C-C ①	Section C-C ②
1	Adjustment of inward tilt of glass	Adjust by turning the adjusting bolts of the glass guide front track and glass guide rear track. **Caution** **Turn the two adjusting bolts of the glass guide rear track same amount.** 	11.7 ± 1.0 (.46 ± .04)		11.8 ± 1.0 (.46 ± .04)	–	20.5 ± 1.0 (.80 ± .04)	–
2	Adjustment of forward or backward tilt of glass	Move the stabilizer inner front and up stop up and down to adjust the forward or rearward tilt of glass when glass is fully closed. **Caution** **Do not turn the stabilizer inner front adjusting bolt.** 		7.0 ± 1.0 (.28 ± .04)	–	7.7 ± 1.0 (.30 ± .04)	–	12.0 ± 1.0 (.47 ± .04)



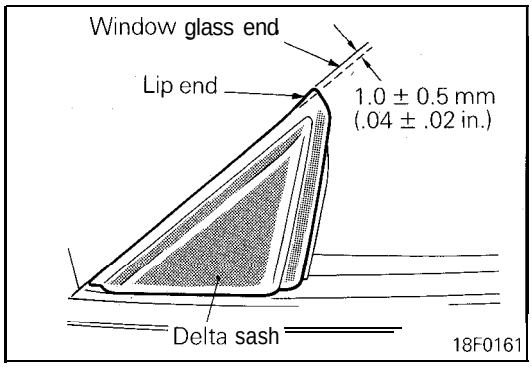


NOTE
Adjust both inward tilt and forward or backward tilt of glass at the same time.

9. Force the stabilizer inner front onto the glass guide slider of the window glass assembly and tighten in position.

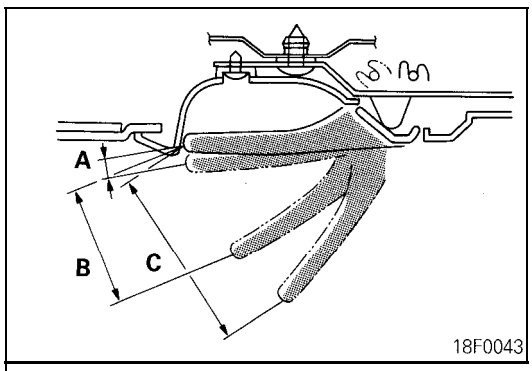
10. Force the up stop onto the glass stop of the window glass assembly and tighten in position.
11. Tighten the glass guide front and rear tracks.

Caution
Do not turn the adjusting bolts of guide tracks.



12. Adjust the delta sash so that the window glass end and the delta sash lip end are positioned as illustrated and tighten in position.

13. Install the drip line weatherstrip.
14. Install the front pillar trim.
15. Install the door trim and the waterproof film. (Refer to P.23A-68.)
16. Open and close the door and move up and down the window glass to check fitting of the door.

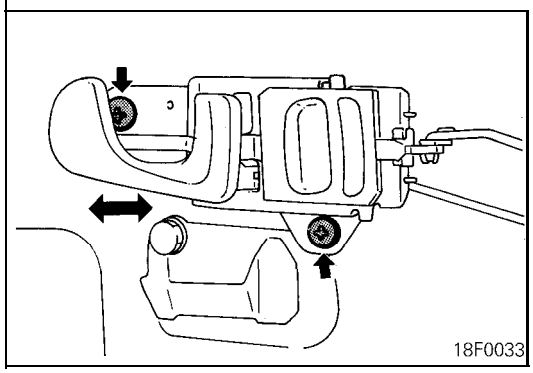


DOOR INSIDE HANDLE PLAY CHECK

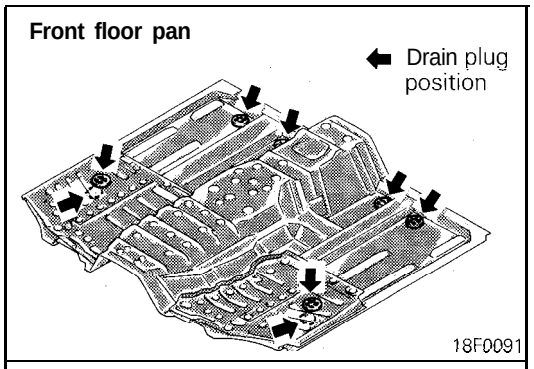
1. Check that the door inside handle play is as specified.

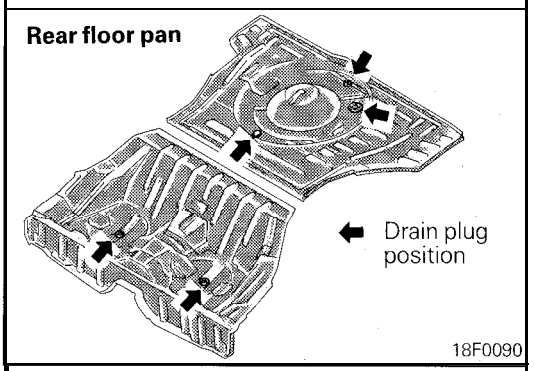
Standard value

A (play): 7 mm (.28 in.)
B (OPEN): 46 ± 9 mm (1.81 ± .35 in.)
C (FULL): 69 mm (2.72 in.)



2. If out of specifications, adjust as described below.
   ① Remove the door trim. (Refer to P.23A-60.)
   ② Loosen the screw attaching the inside handle and slide the inside handle back and forth to adjust the inside handle play.



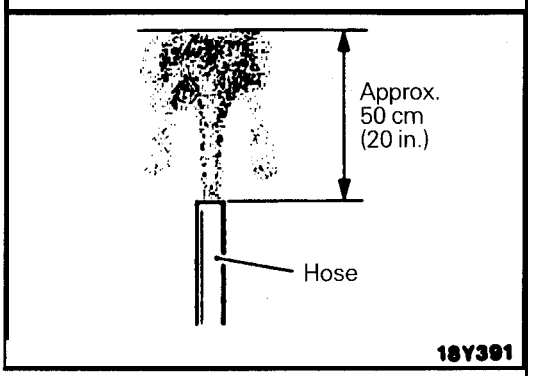


FLOOR PAN INSPECTION

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.

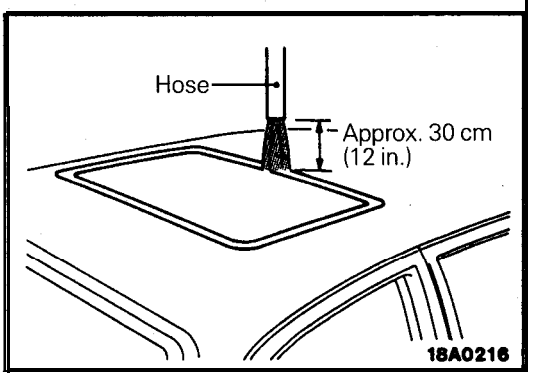
Since a soaked mat should be removed for drying, it's a good way to start your check. Of course, mat removal means you'll have to take off door sill plates and pull out seats or seat cushion. But, this gives you a clear field for action so you can check body seam sealing and the plugs in the floor pan.

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.



WATER TEST

1. Close roof lid tightly.
2. Hold hose upward and adjust water fountain to about 50 cm (20 in.) high.

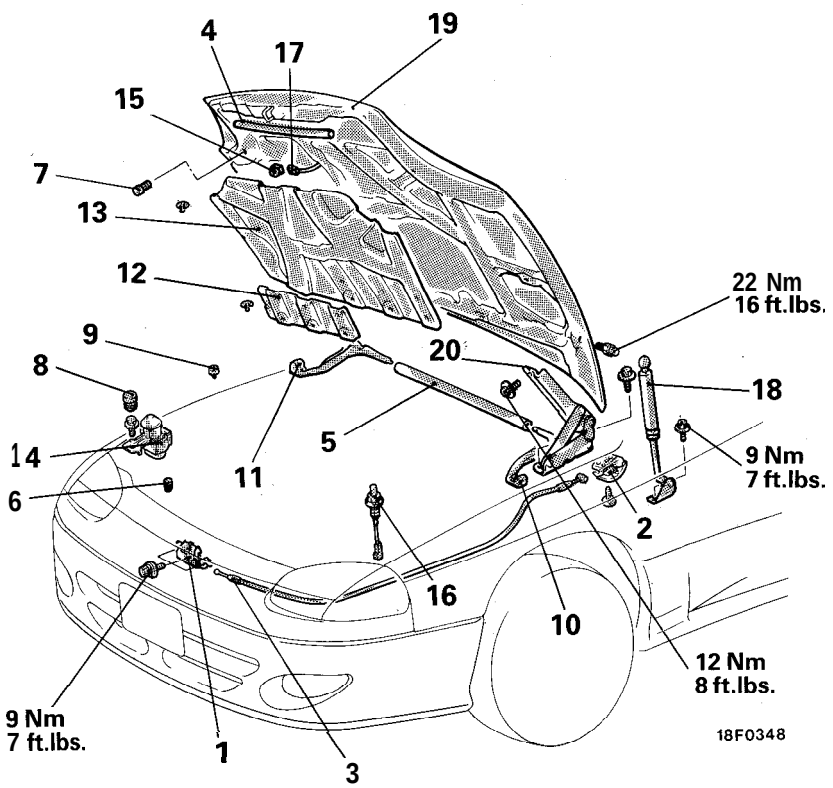


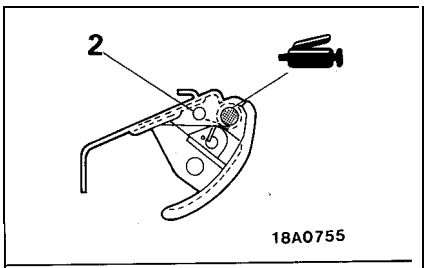
3. Pour water over the roof from about 30 cm (12 in.) above roof for more than 5 minutes.
4. While pouring water, check for leak around roof lid.
5. In the event of leakage, check drain pipe, weatherstrip contact and others.

ENGINE HOOD

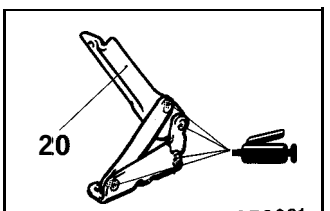
REMOVAL AND INSTALLATION

Adjustment
- Hood Adjustment (Refer to P.23A-29.)

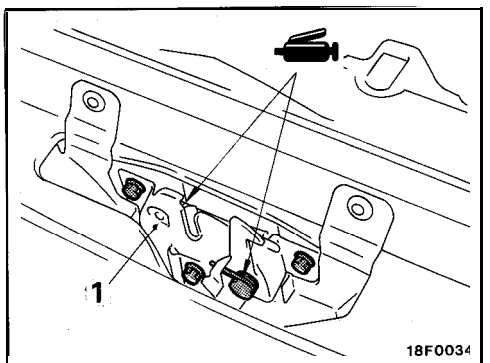




Grease:
MOPAR Multi-purpose Grease Part No. 2932524 or equivalent



Grease:
MOPAR Multi-purpose Grease Part No. 2932524 or equivalent



Grease:
MOPAR Multi-purpose Grease Part No. 2932524 or equivalent

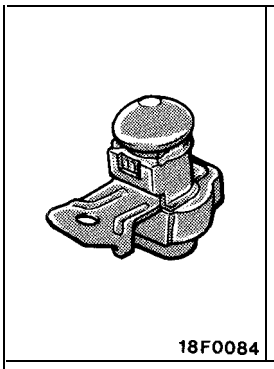
1. Hood latch
2. Hood lock release handle
3. Hood lock release cable
4. Hood weatherstrip (Front)
5. Hood weatherstrip (Rear)
- ◆◆ 6. Bumper A (Body side)
- ● * 7. Bumper A (Hood side)
- ● C 8. Bumper B
9. Bumper
10. Hood side weatherstrip (LH)
11. Hood side weatherstrip (RH)
12. Heat protector panel <Vehicles with T/C>
13. Heat protector
14. Hood switch (Vehicles with theft-alarm system)
15. Engine room inspection light
16. Inspection light switch

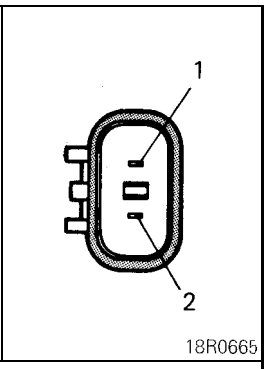
Hood hinge removal steps

Washer tube (Refer to GROUP 8 -Wiper and Washer System.)

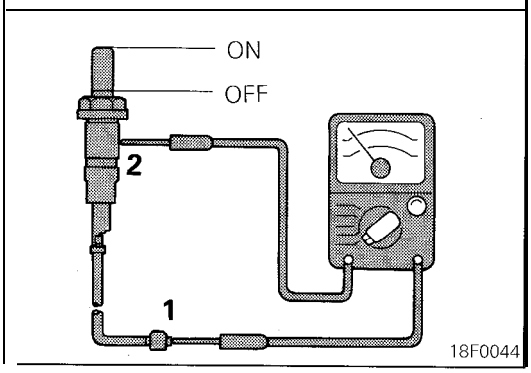
17. Inspection light wiring harness
18. Hood gas spring
19. Hood
20. Hood hinge

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.**


18F0084



18R0665



18F0044

INSPECTION

HOOD SWITCH

Check the continuity between the terminal.

Terminal	1	2
Lid switch unpressed	○	○
Lid switch depressed		

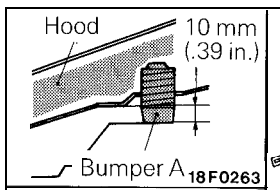
NOTE
O-O indicates that there is continuity between the terminals

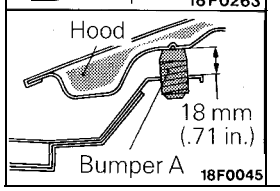
INSPECTION LIGHT SWITCH

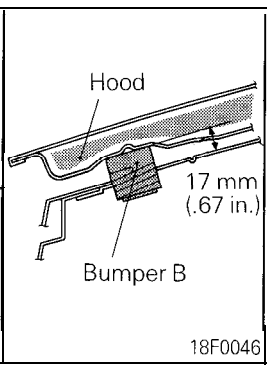
Turn the switch ON/OFF and check continuity between terminals (between the connector terminal and the switch body).

Switch position \ Terminal	1 (Connector terminal)	2 (Switch body)
ON	**0**	○
OFF		

NOTE
O-O indicates that there is continuity between the terminals







18F0046

SERVICE POINTS OF INSTALLATION

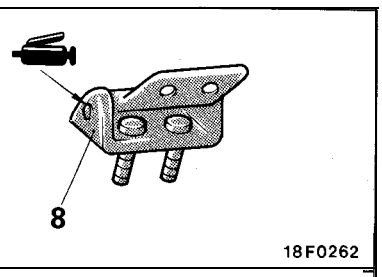
8. 7. 6. INSTALLATION OF BUMPER B, A

Install the bumpers as illustrated.

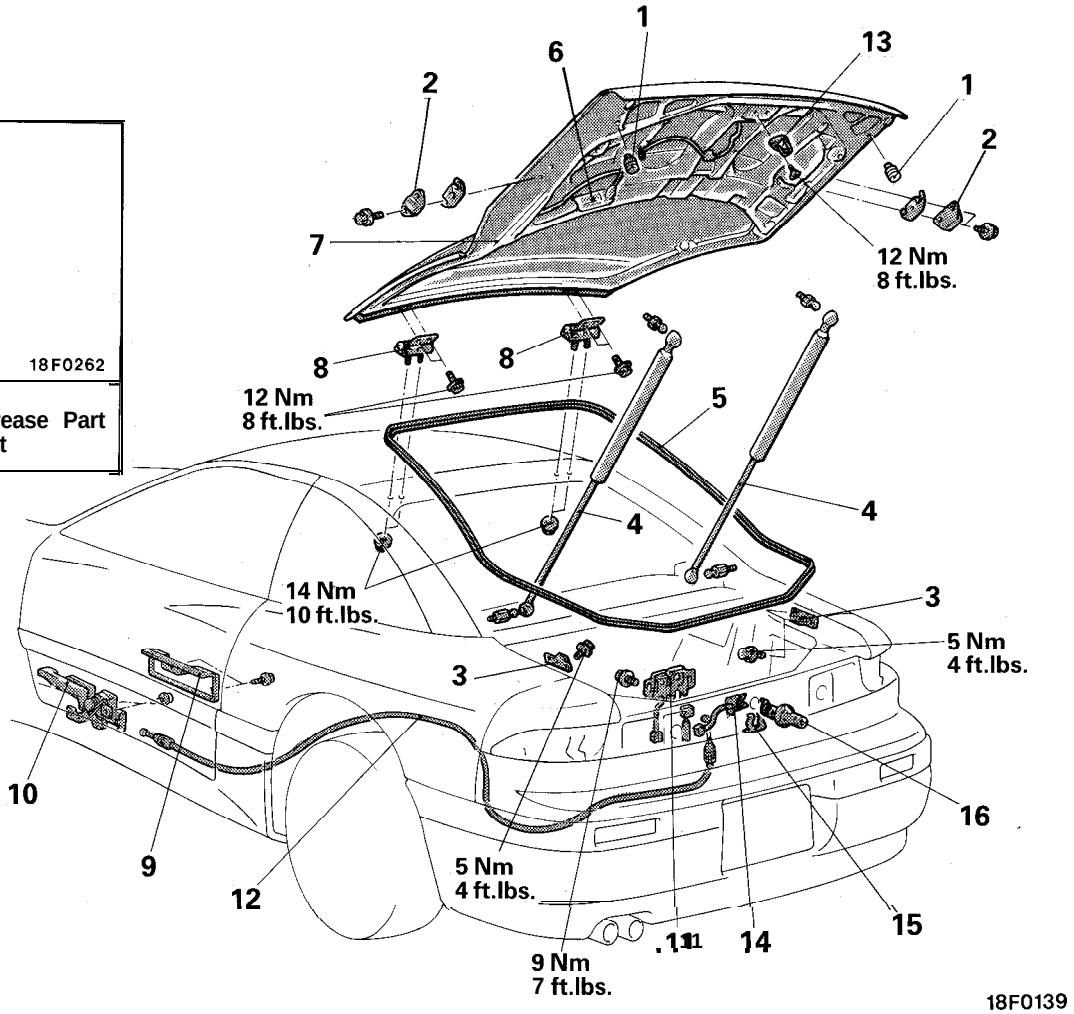
LIFTGATE

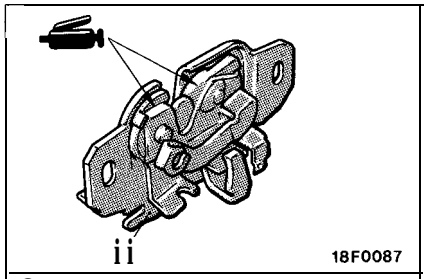
REMOVAL AND INSTALLATION

Adjustment
- Liftgate Adjustment (Refer to P.23A-31.)

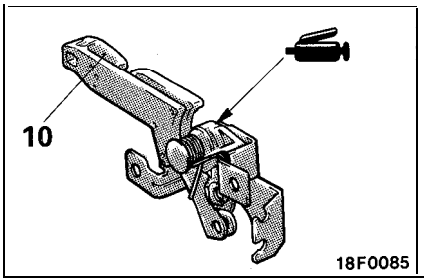


Grease:
MOPAR Multi-purpose Grease Part No. 2932524 or equivalent





Grease:
MOPAR Multi-purpose Grease Part No. 2932524 or equivalent



Grease:
MOPAR Multi-purpose Grease Part No. 2932524 or equivalent

◆◆ 1. Bumper
2. Liftgate damper (upper)
3. Liftgate damper (lower)

Liftgate gas spring and liftgate opening weatherstrip removal steps

Liftgate trim
Rear side trim } (Refer to P.23A-90.)

4. Liftgate gas spring
5. Liftgate opening weatherstrip

Liftgate and liftgate hinge removal steps

Washer tube (Refer to GROUP 8 -Wiper and Washer System.)
Liftgate trim
Liftgate side trim (LH)
Rear side trim } (Refer to P.23A-90.)

4. Liftgate gas spring
6. Connection for liftgate wiring harness
7. Liftgate
Headlining (Refer to P.23A-95.)
8. Liftgate hinge

Liftgate lock release cable and handle removal steps

Scuff plate (driver's side) (Refer to P.23A-90.)
9. Release handle cover
10. Liftgate lock release handle
Quarter trim, Rear side trim, Rear end trim } (Refer to P.23A-90.)
11. Liftgate latch
12. Liftgate lock release cable

Liftgate latch removal steps

Rear end trim (Refer to P.23A-90.)
11. Liftgate latch

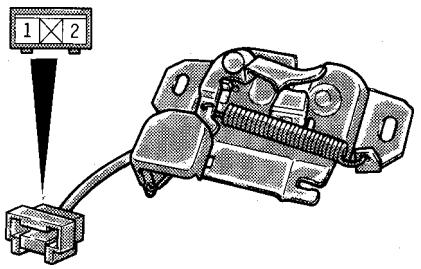
Liftgate striker removal steps

Liftgate trim (Refer to P.23A-90.)
13. Liftgate striker

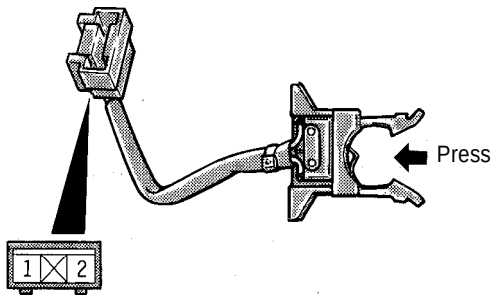
Liftgate lock cylinder removal steps

Rear end trim (Refer to P.23A-90.)
Rear combination light, Rear panel garnish } (Refer to P.23A-46.)
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.**



18F0089



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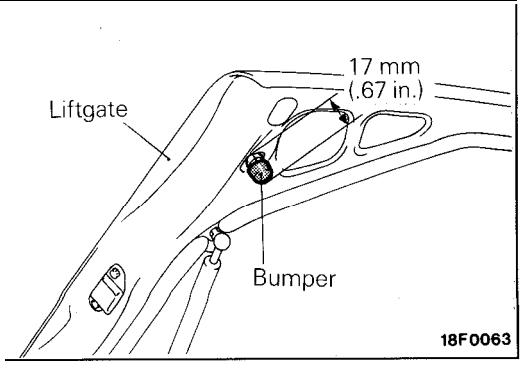


18F0063

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
○–○ 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

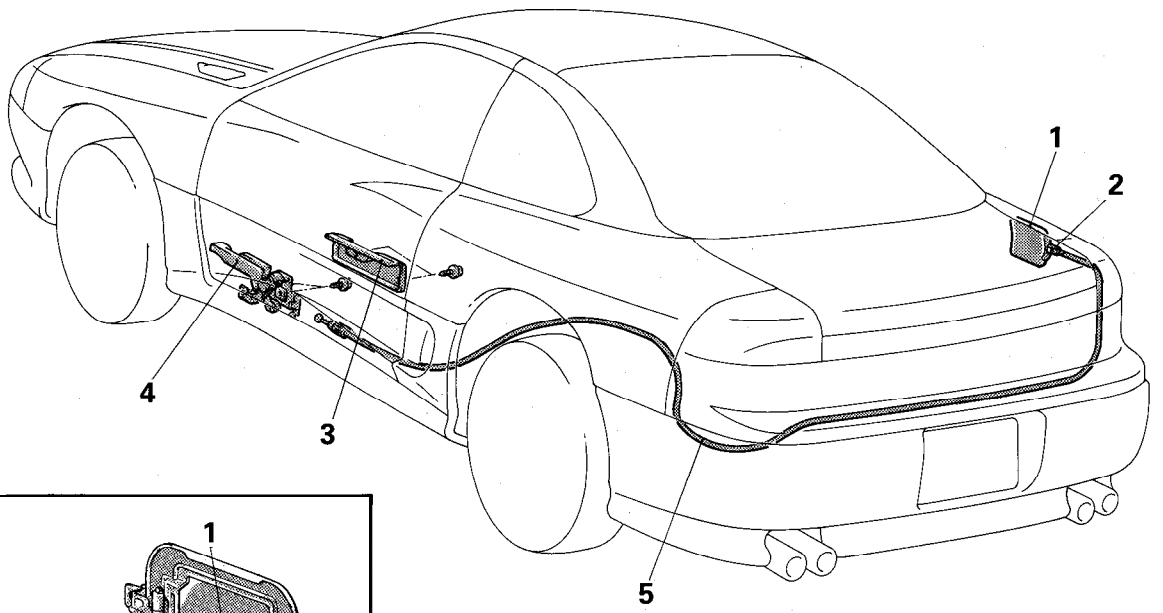
Install the bumper so that the amount of projection from the liftgate is as shown in the illustration.

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 P.23A-90.)

Adjustment
- Fuel Filler Door Adjustment (Refer to P.23A-30.)



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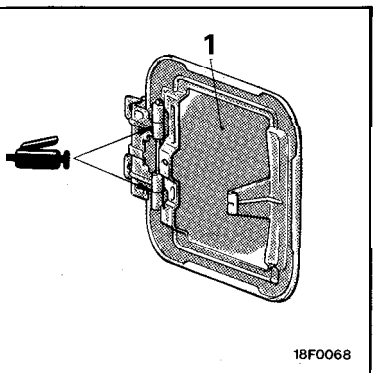
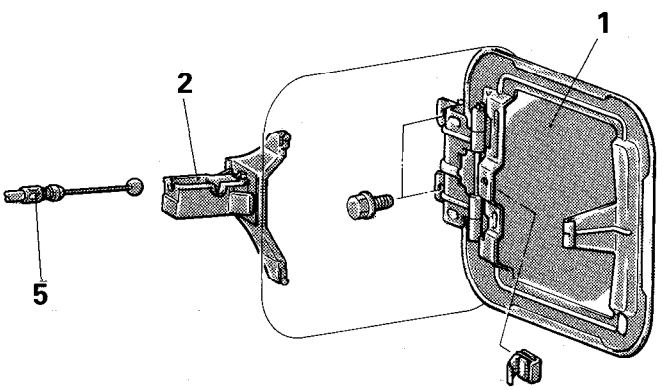


18F0068

Grease:
MOPAR Multi-purpose Grease Part No. 2932524 or equivalent



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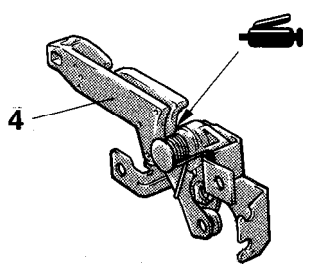
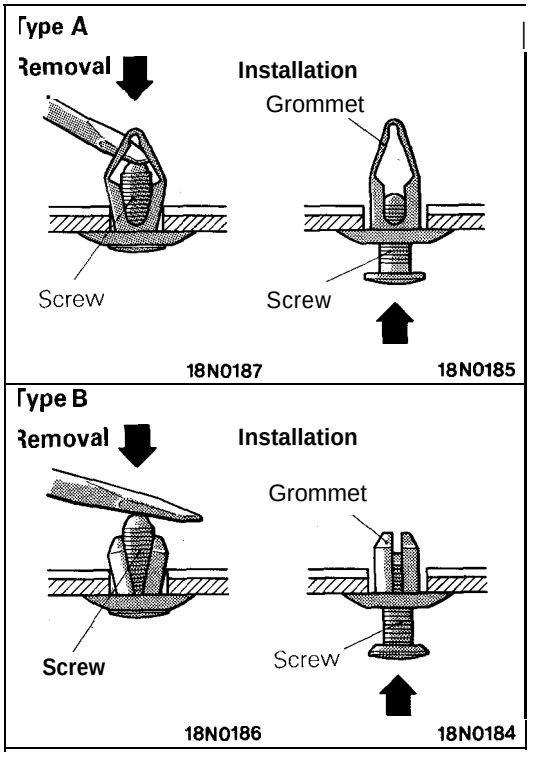


18F0085

Grease:
MOPAR Multi-purpose Grease Part No. 2932524 or equivalent

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



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

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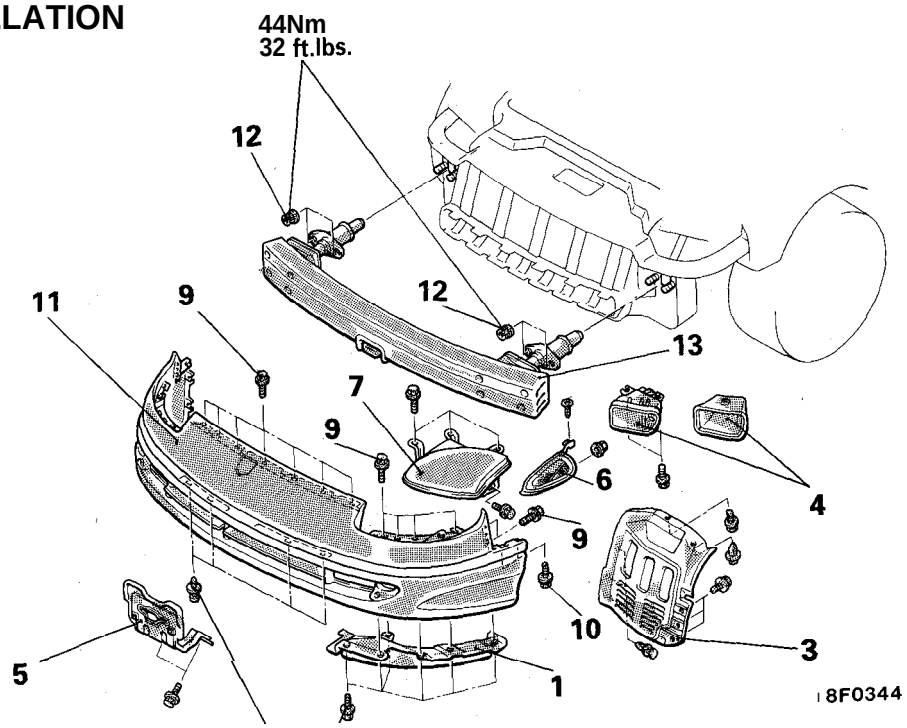

V8

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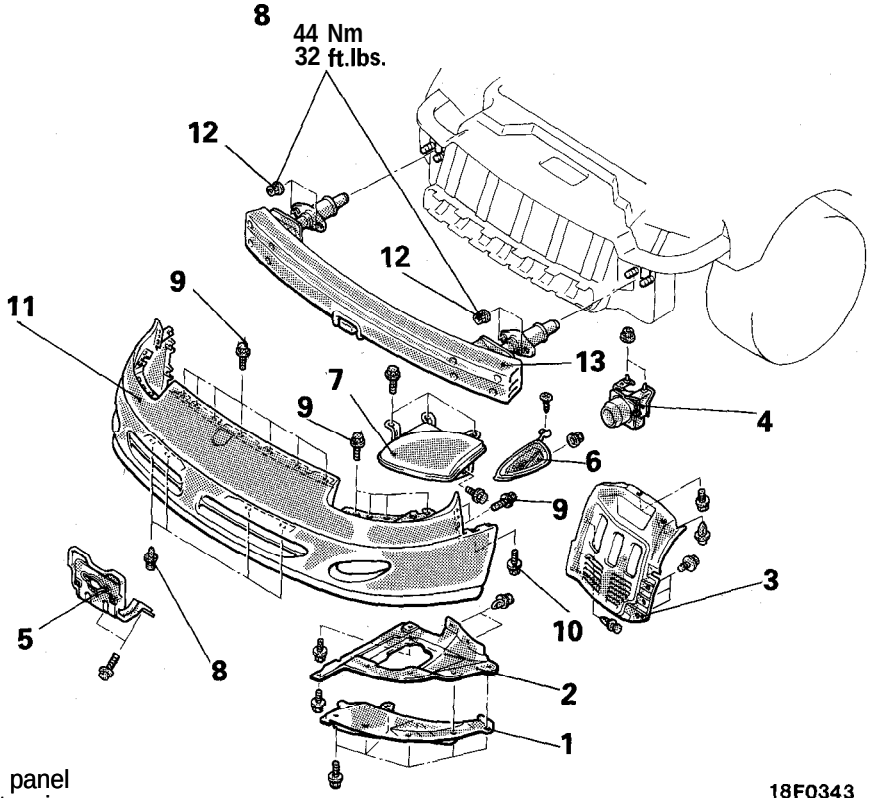

Removal steps

1. Front air side spoiler
2. Front under cover side panel
3. Front splash shield extension
4. Fog light or cover
5. License plate bracket
6. Front combination light
7. Headlight
8. Clips with screws
9. Bolts
10. Tapping screws
12. Bumper face assembly
13. Nuts
14. Bumper reinforcement assembly

DISASSEMBLY AND REASSEMBLY

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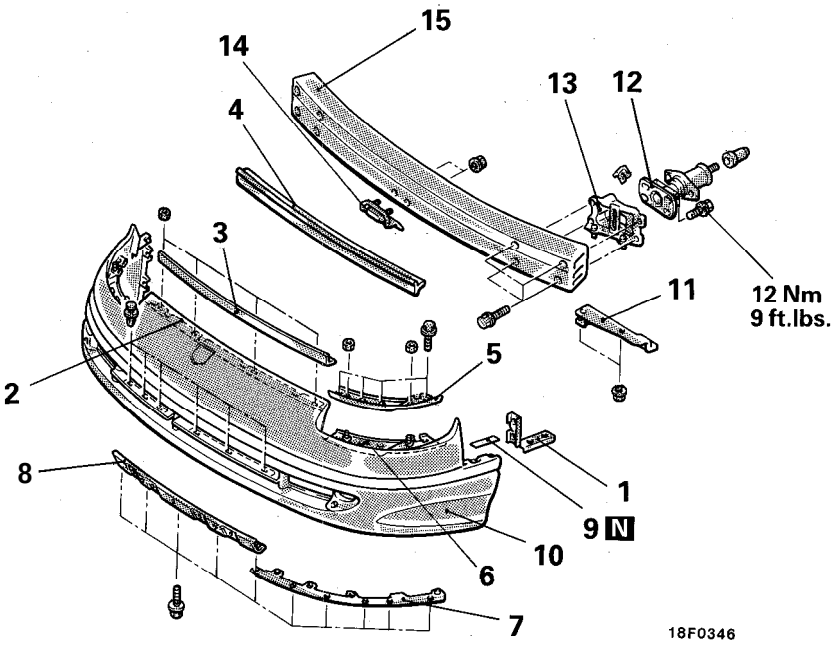

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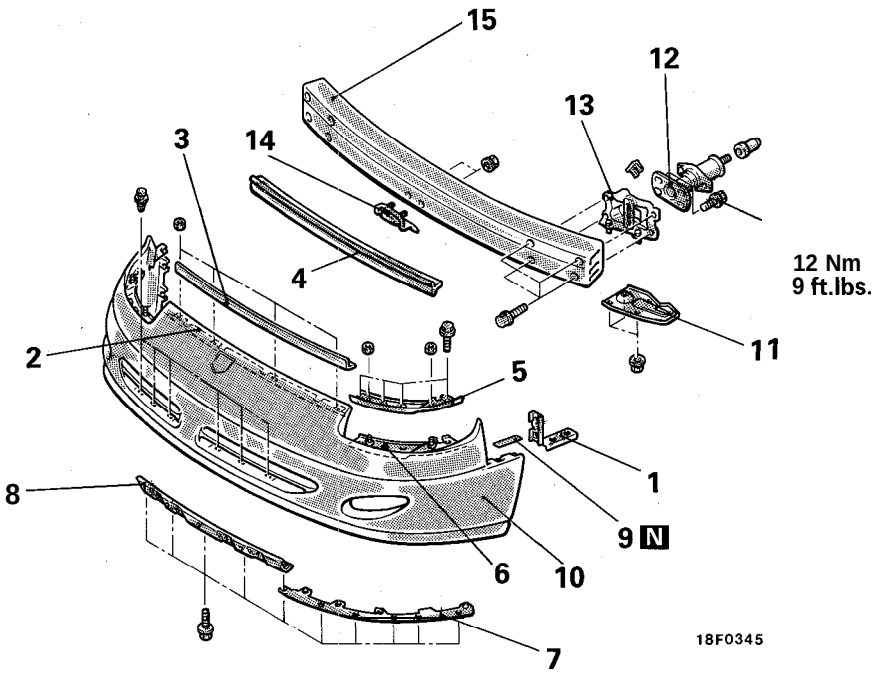
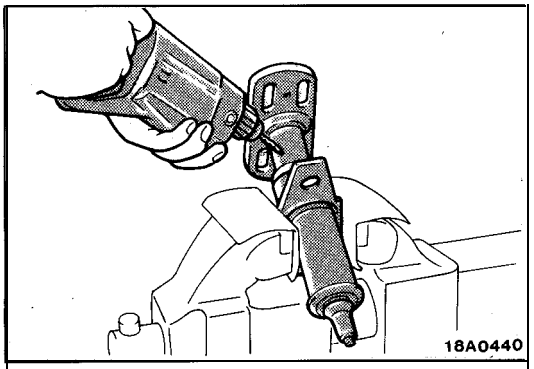


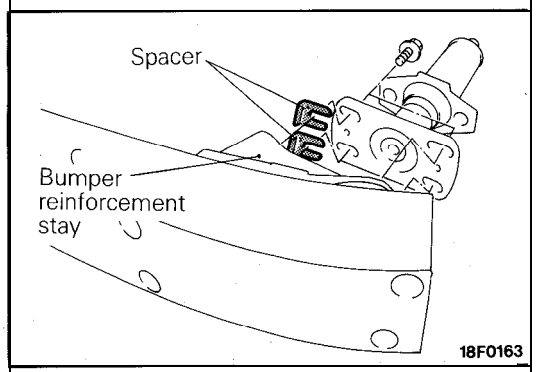
Bumper face disassembly steps

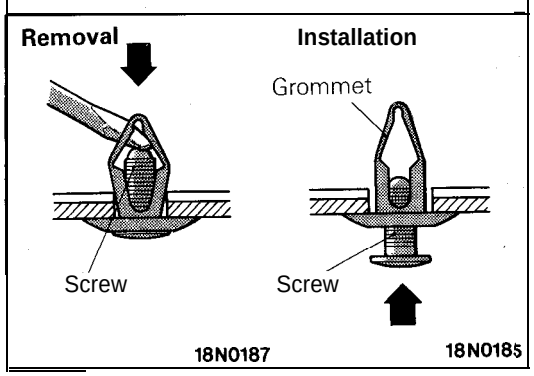
1. Bumper face side plate
2. Bumper face upper front plate
3. Bumper face upper center plate
4. Bumper face protector
5. Side outer upper plate
6. Side inner upper plate
7. Side lower plate
8. Center lower plate
- ● + 9. Pad
10. Bumper face

Bumper reinforcement disassembly steps

11. Fog light bracket
- ◆◆ ● * 12. Bumper absorber
13. Bumper reinforcement stay
14. License plate bracket support
15. Bumper reinforcement







SERVICE POINT OF DISASSEMBLY,

12. 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.**

SERVICE POINT OF REASSEMBLY

12. 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

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

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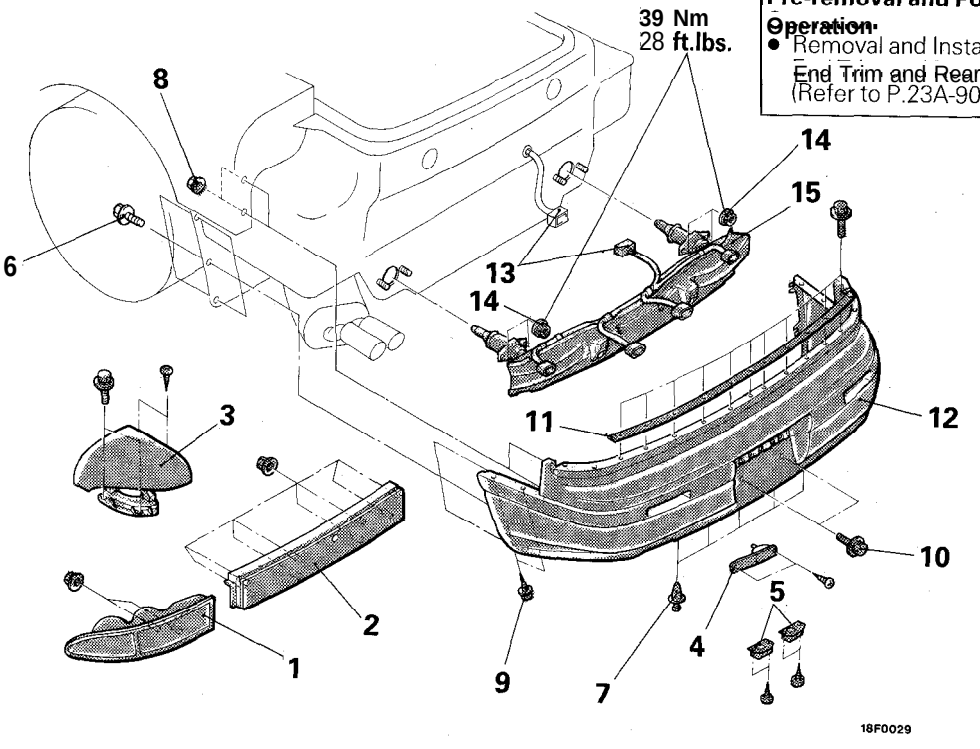

Pre-removal and Post-installation Operation
- Removal and Installation of Rear End Trim and Rear Side Trim (Refer to P.23A-90.)

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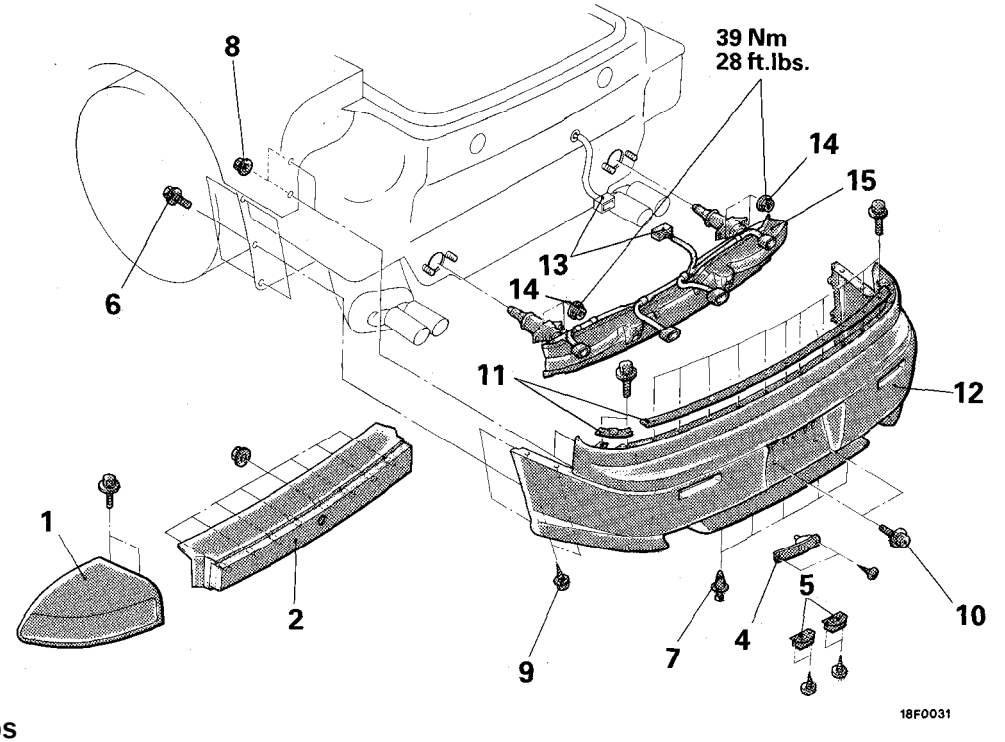
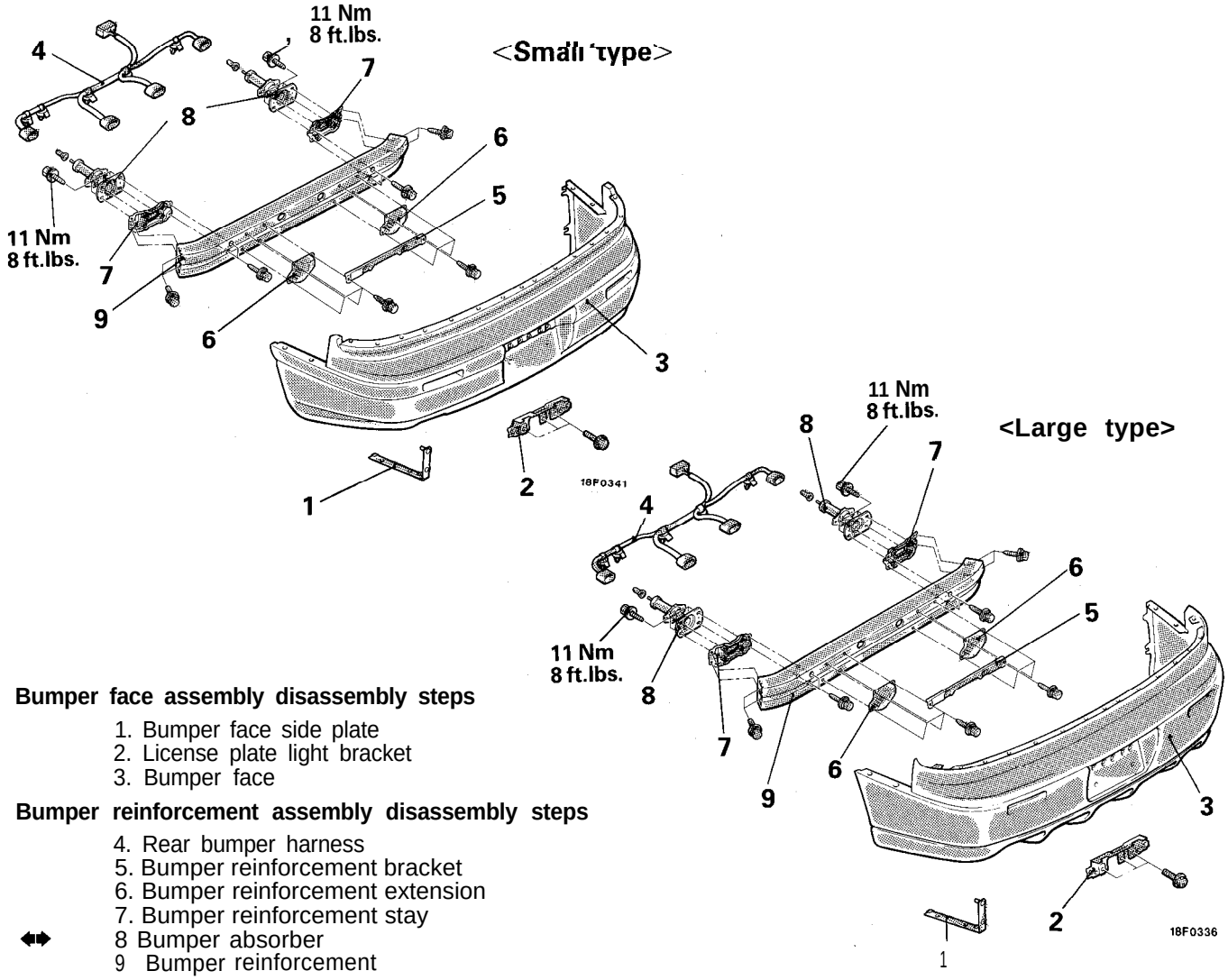


Removal steps

ECS control unit (Refer to GROUP 2B – ECS Control Unit.)

1. Rear combination light
2. Rear panel garnish
3. Rear bumper upper extension
4. Back up light
5. License plate light
6. Bolts
7. Clips with screw
8. Nuts
9. Tapping screws
10. Bolts
11. Bumper face upper plate
12. Bumper face assembly
13. Rear bumper harness connector
14. Nuts
15. Bumper reinforcement assembly

DISASSEMBLY AND REASSEMBLY



Bumper face assembly disassembly steps

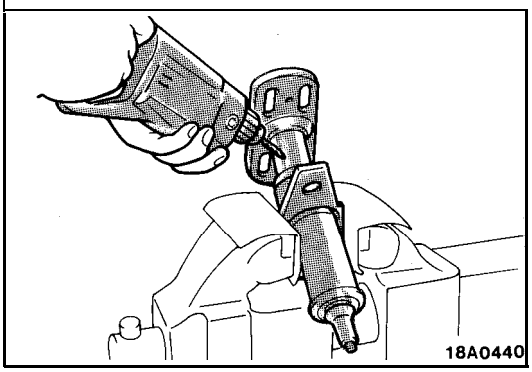
1. Bumper face side plate
2. License plate light bracket
3. Bumper face

Bumper reinforcement assembly disassembly steps

4. Rear bumper harness
5. Bumper reinforcement bracket
6. Bumper reinforcement extension
7. Bumper reinforcement stay

◆◆ 8 Bumper absorber

9 Bumper reinforcement



SERVICE POINT OF DISASSEMBLY

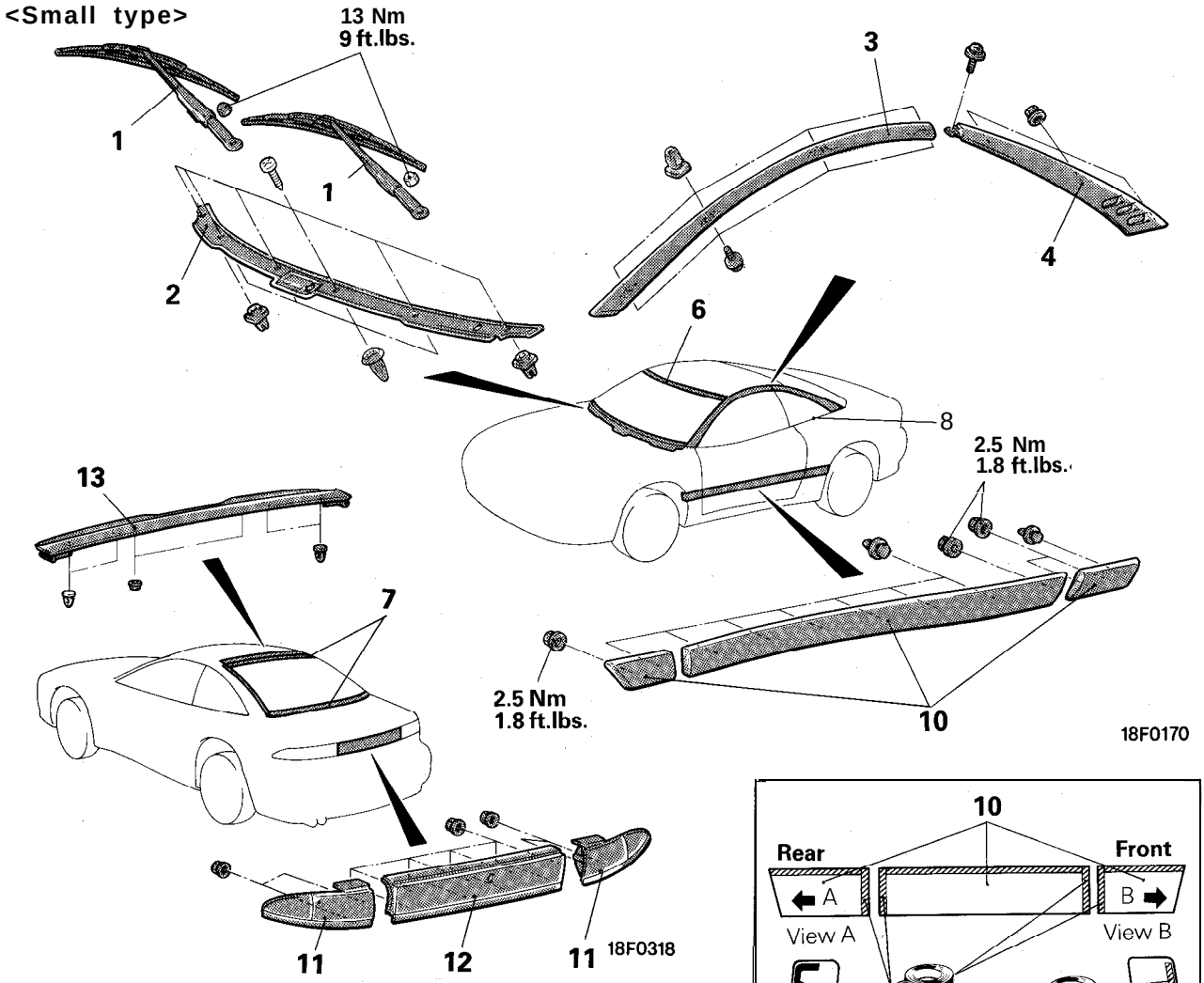
8. REMOVAL OF BUMPER ABSORBER

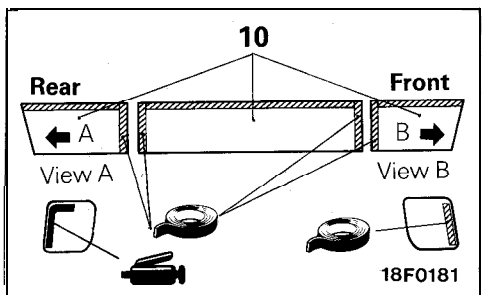
Caution

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

REMOVAL AND INSTALLATION





▨ **Adhesive tape:**
3M ATD Part No. 6382 or equivalent

■ **Adhesive:**
3M ATD Part No. 8609 SUPER FAST URETHAN or equivalent

Front deck garnish removal steps

1. Wiper arm assembly
2. Front deck garnish

Drip moulding and center pillar garnish removal steps

Drip line weatherstrip
Door weatherstrip holder } (Refer to P.23A-81.)

3. Drip moulding
   Quarter upper trim (Refer to P.23A-91.)
4. Rear pillar garnish

Windshield moulding removal steps

3. Drip moulding
6. Windshield moulding (Refer to P.23A-56.)

Liftgate moulding removal

7. Liftgate moulding (Refer to P.23A-64.)

Quarter window moulding and glass removal steps

4. Rear pillar garnish
8. Quarter window moulding and glass (Refer to P.23A-60.)

Side protect moulding removal steps

Front splash shield (Refer to P.23A-51.)
Quarter trim (Refer to P.23A-92.)

◆◆ ● *10. Side protect moulding

Rear panel garnish removal steps

Rear end trim
Rear side trim } (Refer to P.23A-93.)

11. Rear combination light
12. Rear panel garnish

Rear roof extension removal steps <vehicles with sunroof>

Headlining (Refer to P.23A-95.)

13. Rear roof extension

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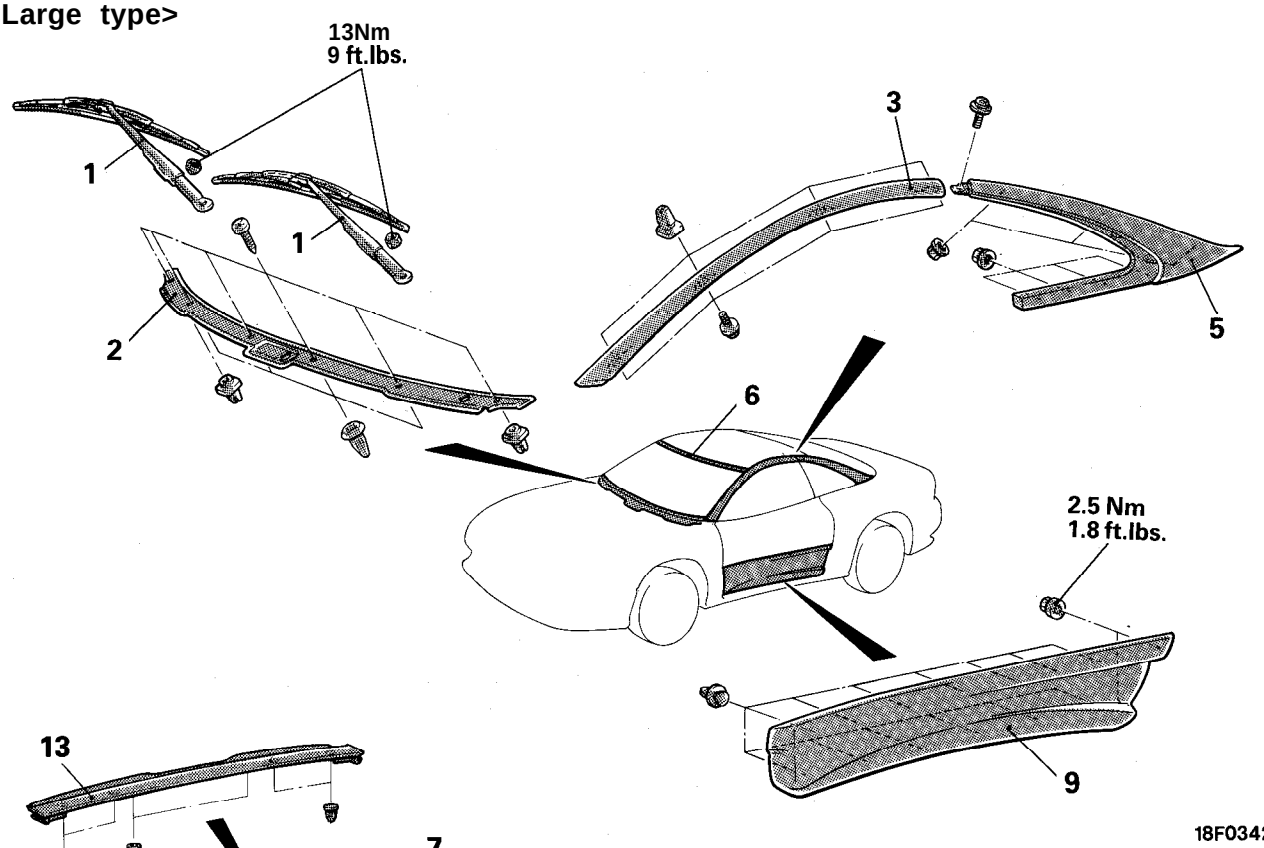
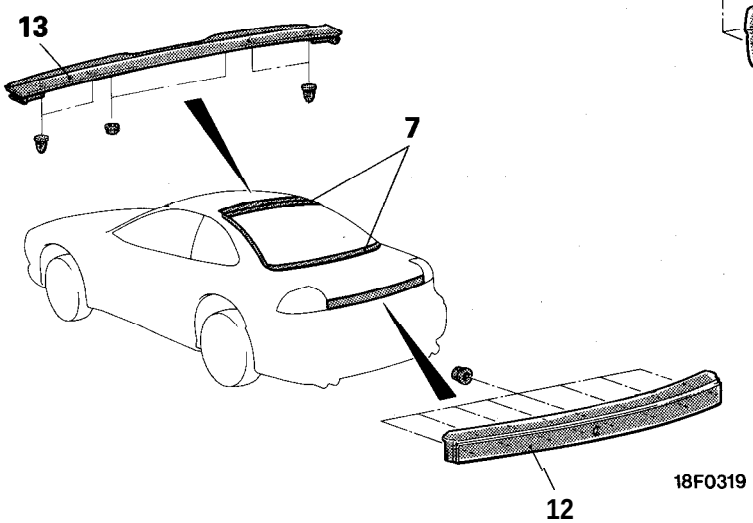
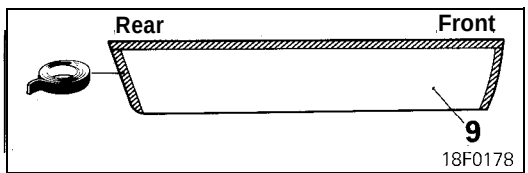






Adhesive tape:
3M ATD Part No. 6382 or equivalent

Front deck garnish removal steps

1. Wiper arm assembly
2. Front deck garnish

Drip moulding and flow through garnish removal steps

Drip line weatherstrip, Door weatherstrip holder } (Refer to P.23A-81.)

3. Drip moulding
   Quarter upper trim (Refer to P.23A-91.)
5. Flow through garnish

Windshield moulding removal steps

3. Drip moulding
6. Windshield moulding (Refer to P.23A-56.)

Liftgate moulding removal

7. Liftgate moulding (Refer to P.23A-64.)

Side garnish removal

⇔ ● + 9. Side garnish

Rear panel garnish removal steps

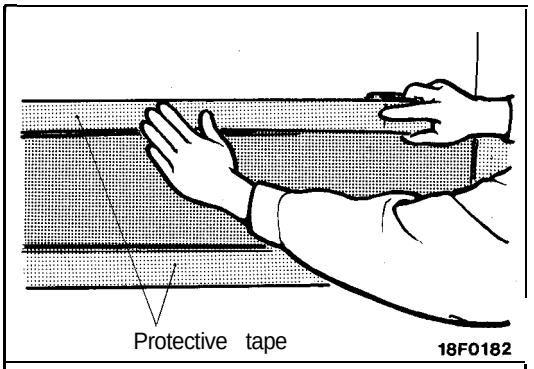
Rear end trim, Rear side trim } (Refer to P.23A-93.)

12. Rear panel garnish

Rear roof extension removal steps <vehicles with sunroof>

Headlining (Refer to P.23A-95.)

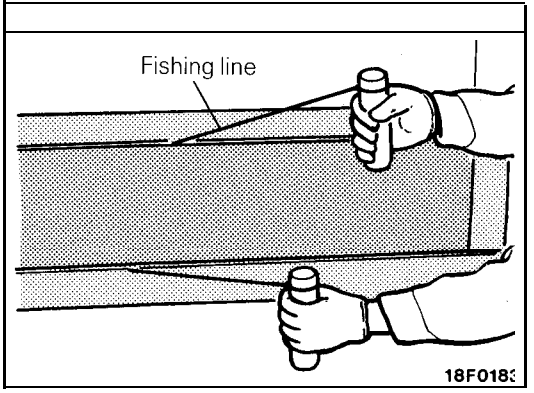
13. Rear roof extension



SERVICE POINTS OF REMOVAL

9. REMOVAL OF SIDE GARNISH

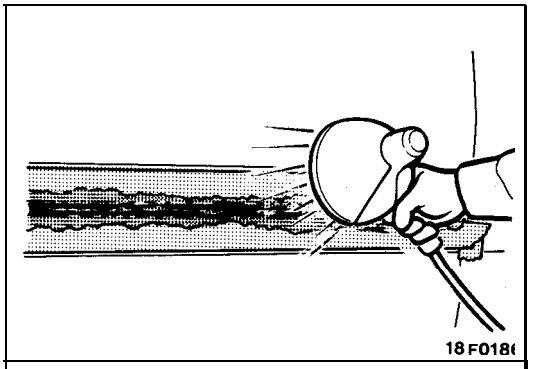
(1) Remove the side garnish mounting nuts.
(2) Affix protective tape to the periphery of the side garnish.



(3) Insert a fishing line [ϕ0.8 mm (.03 in.)] between the body and the side garnish and grip each end of the fishing line. Cut through adhesive material by pulling wire in a sawing motion and remove the side garnish.

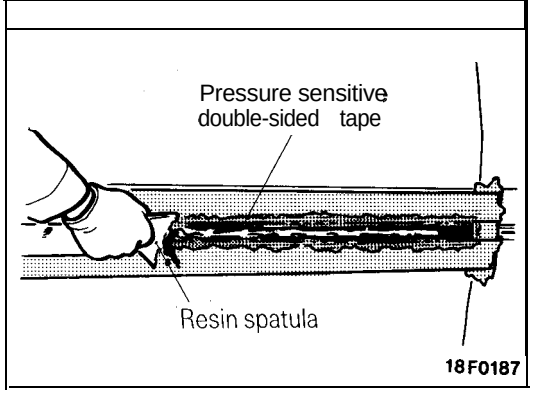
(4) When the side garnish is fastened with a clip or bolt, pull the side garnish toward you to remove the clip or the bolt.

Caution
1. To reuse the side garnish, remove it by pulling the fishing line along the body so as not to damage the edges of the side garnish.
2. If it is hard to cut through adhesive material, heat it to approx. 40°C (104°F).

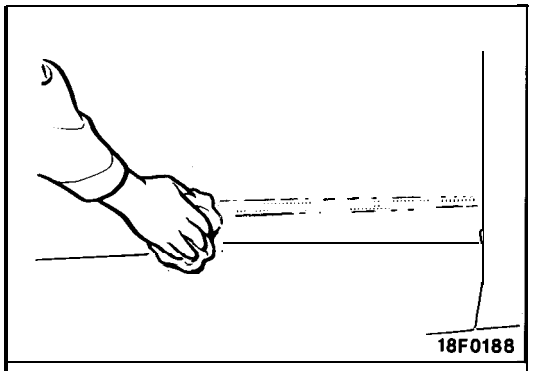


(5) Use an infrared lamp or the like to heat the pressure sensitive double-sided tape remaining on the body to 40 to 60°C (104 to 140°F) for 5 to 10 minutes.

Caution
Do not overheat the tape until its surface dries to turn white.



(6) Use a resin spatula to scrape off the pressure sensitive adhesive double coated tape.

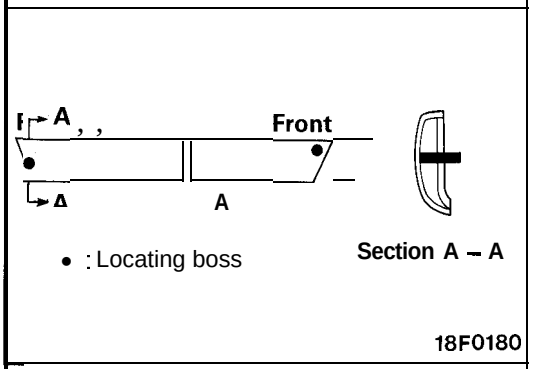


(7) Wipe off application surface of body with clean cloth dampened with degreaser (MOPAR SUPER KLEEN or equivalent).

NOTE
After wiping surface, leave surface as it is to volatilize degreaser.

10. REMOVAL OF SIDE PROTECT MOULDING

Remove the moulding by the same procedure as the side garnish. (Refer to P.23A-48.)
Disconnect the locating boss at the illustrated position by pulling the side garnish toward you.



SERVICE POINTS OF INSTALLATION

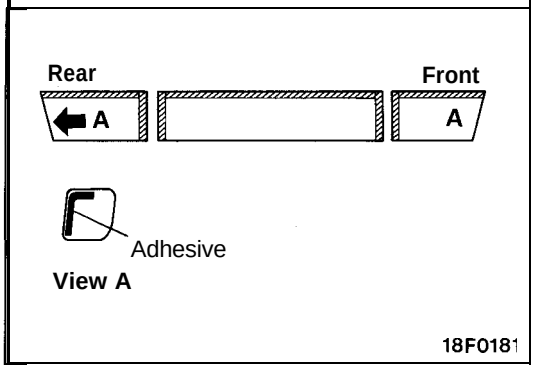
10. INSTALLATION OF SIDE PROTECT MOULDING

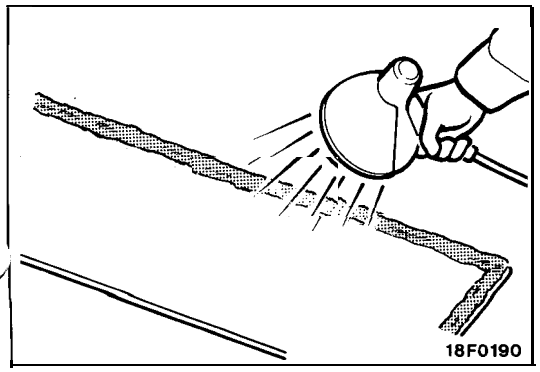
Install the moulding by the same procedure as the side garnish provided that the specified adhesive is applied.

Specified adhesive: 3M ATD Part No. 8609 SUPER FAST URETHAN or equivalent

NOTE
When the side protect moulding is reused, scrape old adhesive slightly and apply new adhesive on it.

Caution
Do not apply adhesive to the tape application surface.



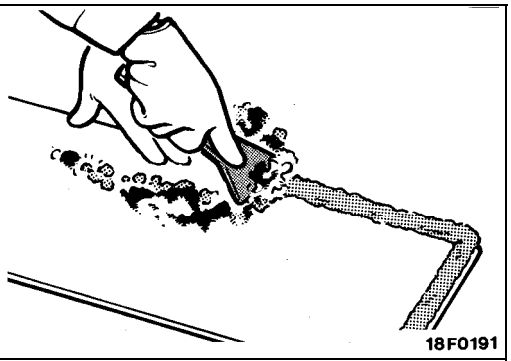


9. INSTALLATION OF SIDE GARNISH

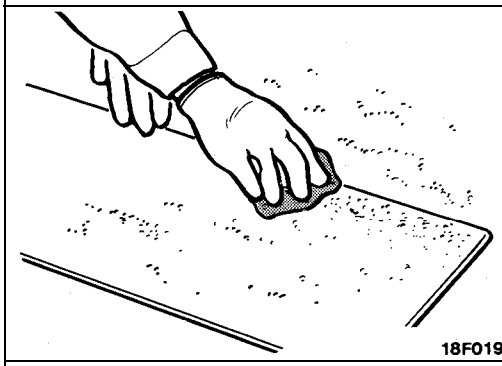
Adhesion of Pressure Sensitive Double-sided Tape to Side Garnish (For Reuse)

(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.

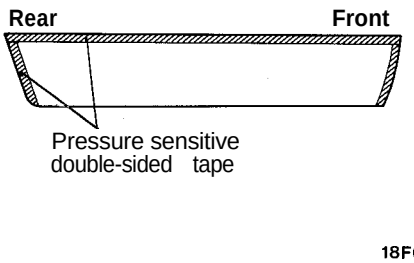

18F0191

(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).


18F0192

(4) Use cloth moistened with degreaser (MOPAR SUPER KLEEN or equivalent) to wipe the side garnish clean.
(5) Scrape old adhesive slightly.

Caution
Do not scrape off all old adhesive.



18F0178

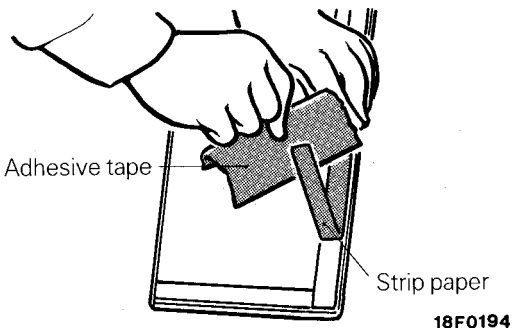
(6) Affix specified pressure sensitive double-sided tape to the side garnish.

Specified adhesive tape: 3M ATD Part No. 6382 or equivalent

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.

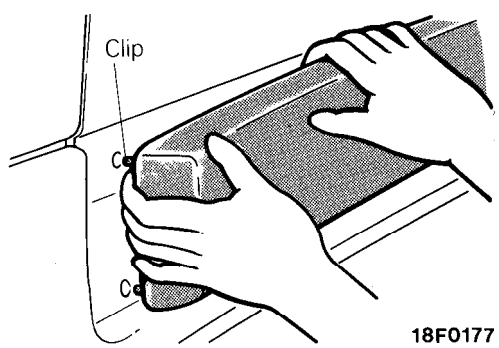


18F0194

(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)



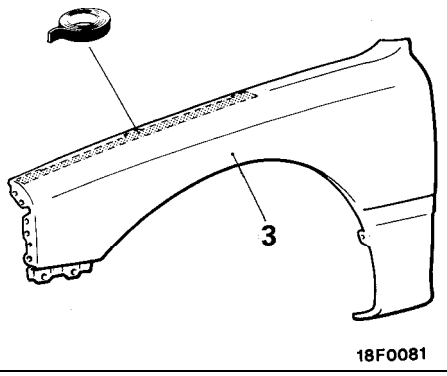
18F0177

(3) Apply pressure fully to the side garnish.

FENDER

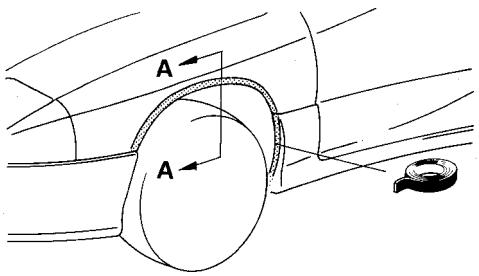
REMOVAL AND INSTALLATION

CAUTION: SRS
When removing or installing the front fender panel, do not impose shock on the front impact sensor.



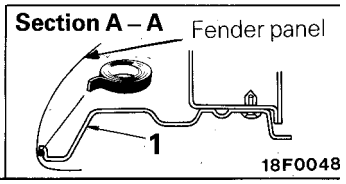
18F0081

Sealant:
MOPAR Silicon Rubber Sealer Part No. 4026070 or equivalent



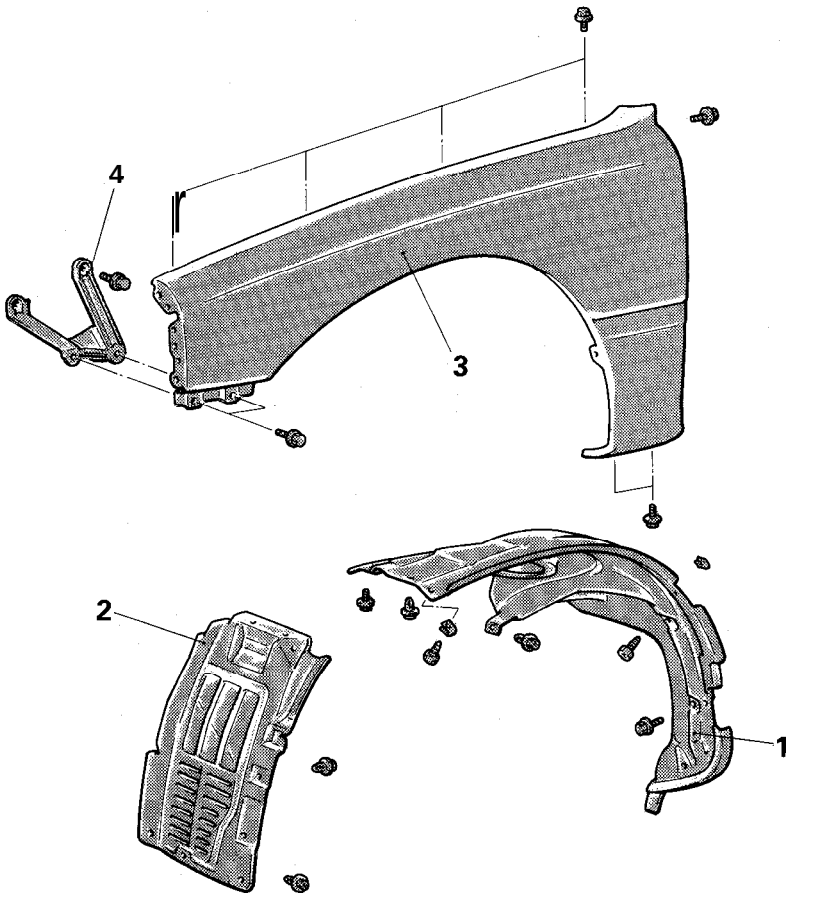
18F0062

Section A – A



18F0048

Sealant:
MOPAR Silicon Rubber Sealer Part No. 4026070 or Auto Glass Adhesive and sealer Part No. 2298825 or equivalent



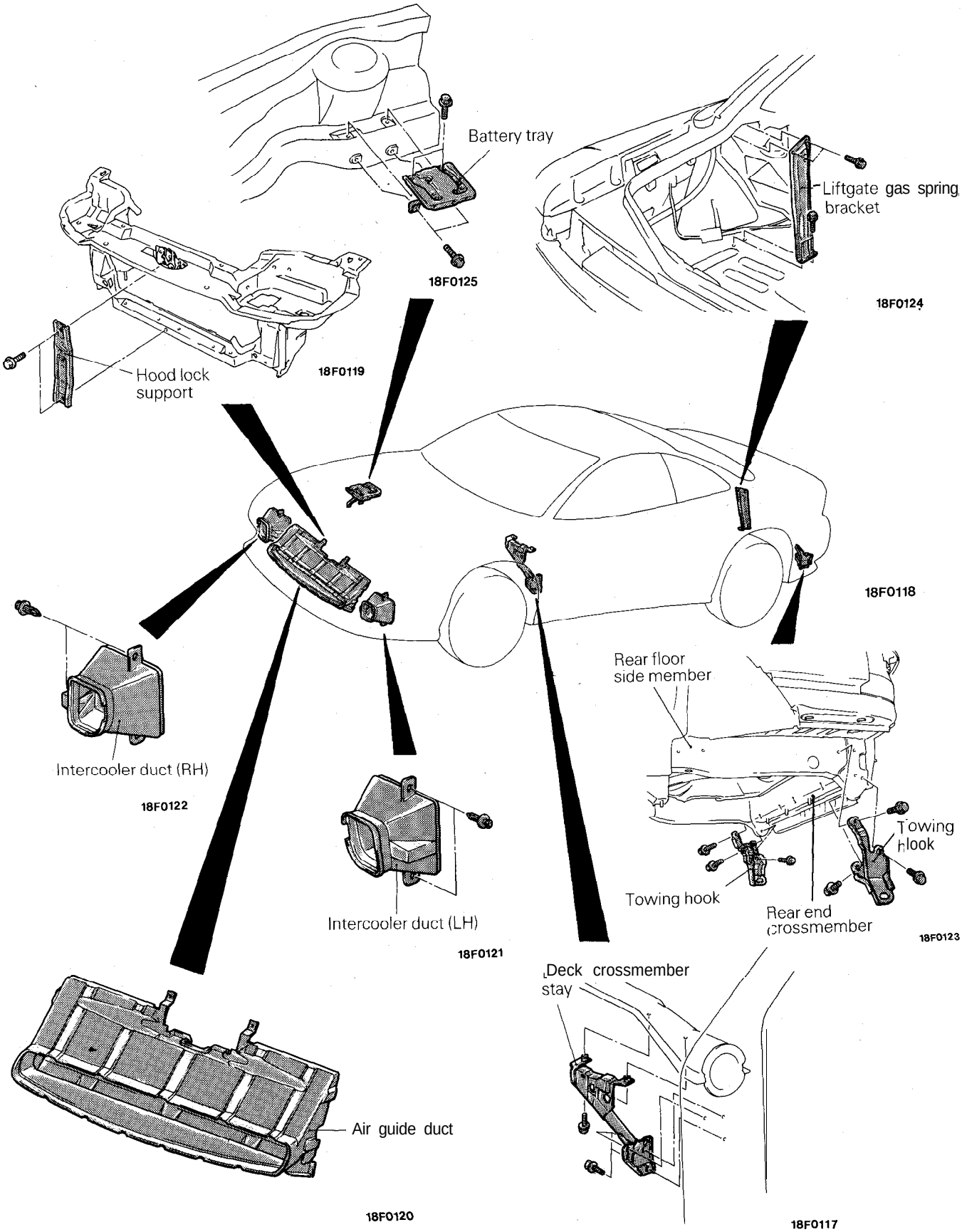
18F0126

Removal steps

1. Front splash shield
   Side airdam (Refer to P.23A-85.)
2. Front splash shield
   Front bumper (Refer to P.23A-40.)
3. Front fender panel
4. Front fender bracket

LOOSE PANEL

REMOVAL AND INSTALLATION



WINDOW GLASS

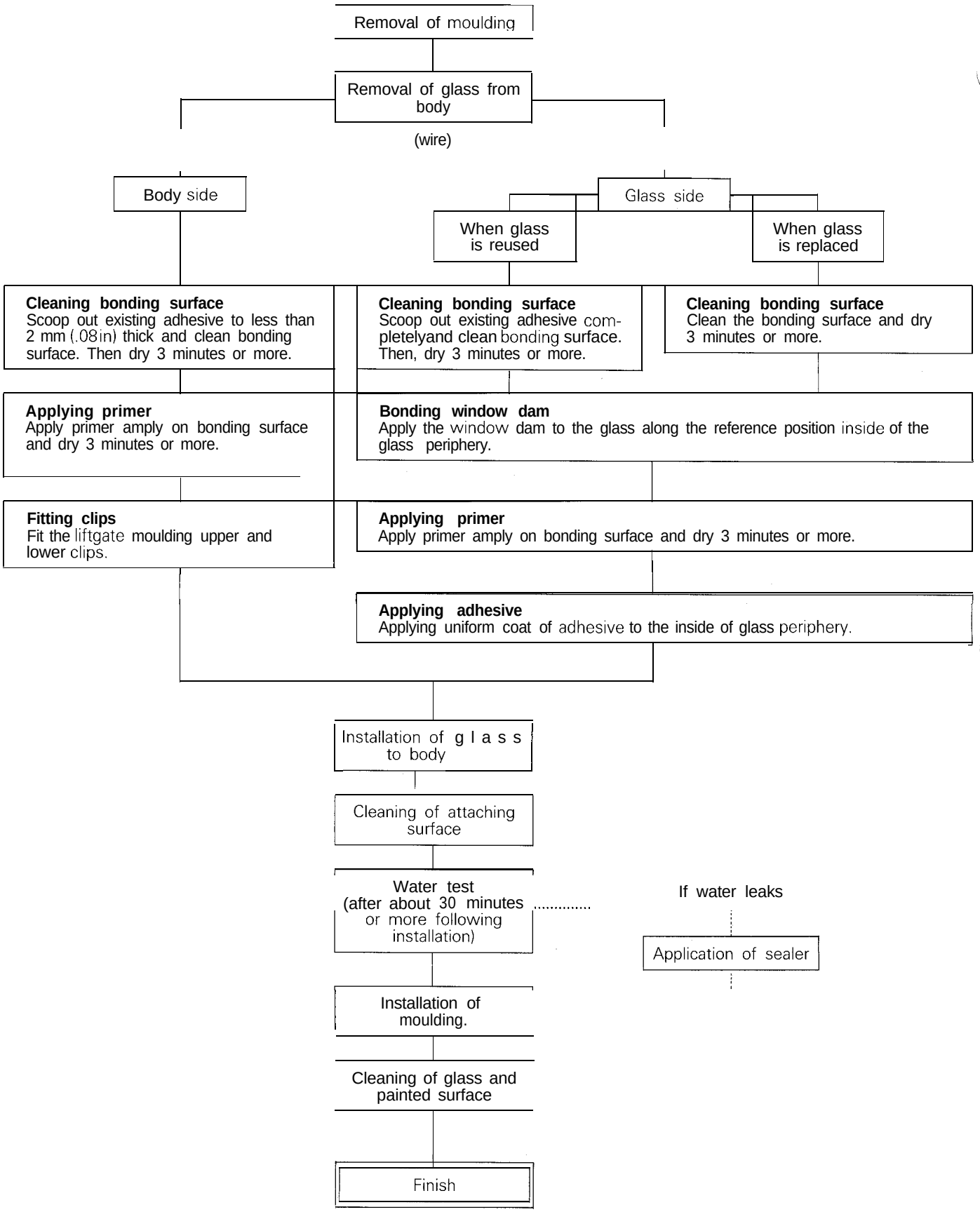
GENERAL

For bonding of the windshield and liftgate glass, a single-liquid urethane adhesive is used.

ADHESIVE AND RESERVE ITEMS

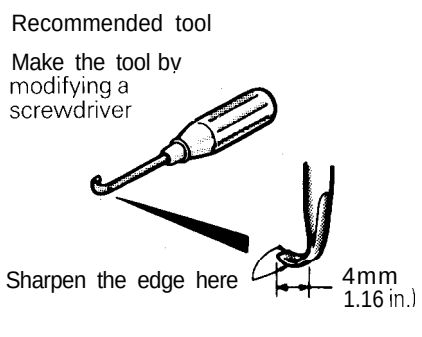
Adhesive and Reserve Items	Applications	Quantity
Adhesive		
3M SUPER FAST URETHAN 8609		One cartridge
3M SUPER FAST URETHAN PRIMER 8608		As required
Reserve items		
Wire (dia. x length)	for cutting adhesive	Five pieces of wire **0.6** mm x 1 m (.02 in. x 3.3 ft.)
Adhesive gun	for adhesive application	One
MOPAR SUPER KLEEN	for cleaning jointing surfaces	As required
Wiping rags		As required
Sealer	for prevention of water leaks and gathering after adhesive application	As required
Glass holder		Two
Windshield moulding (Service Part)		One
Window dam (Service Part)		As required

WINDSHIELD AND LIFTGATE GLASS INSTALLATION PROCEDURE



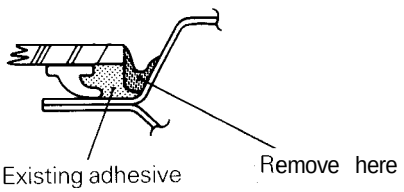
REPLACEMENT OF MOULDING (BONDING TYPE)

1. Remove the mouldings.
2. To cut the existing adhesive, make a tool such as the one shown.



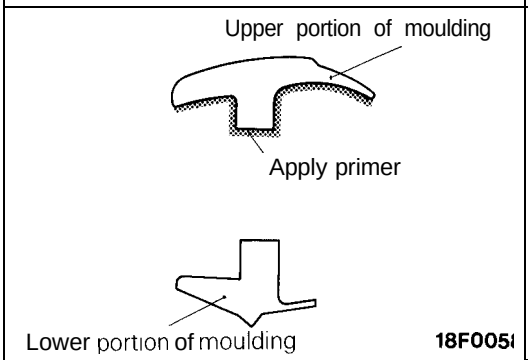
3. Using the tool, scoop out the existing adhesive.

Caution
1. Do not remove existing adhesive more than necessary.
Use care not to damage the coated surface.
2. If the coated surface is damaged, apply paint.

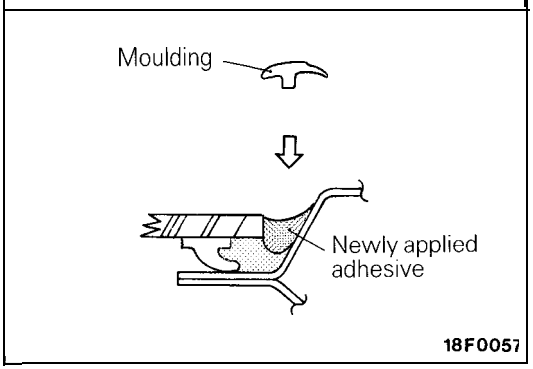


4. Cut off the lower portion of a new moulding and install the moulding temporarily to check that it is seated securely.
5. Apply primer to the moulding.

Caution
Never touch the primer coated surface.



6. Apply adhesive to the illustrated area and install the moulding before it hardens.

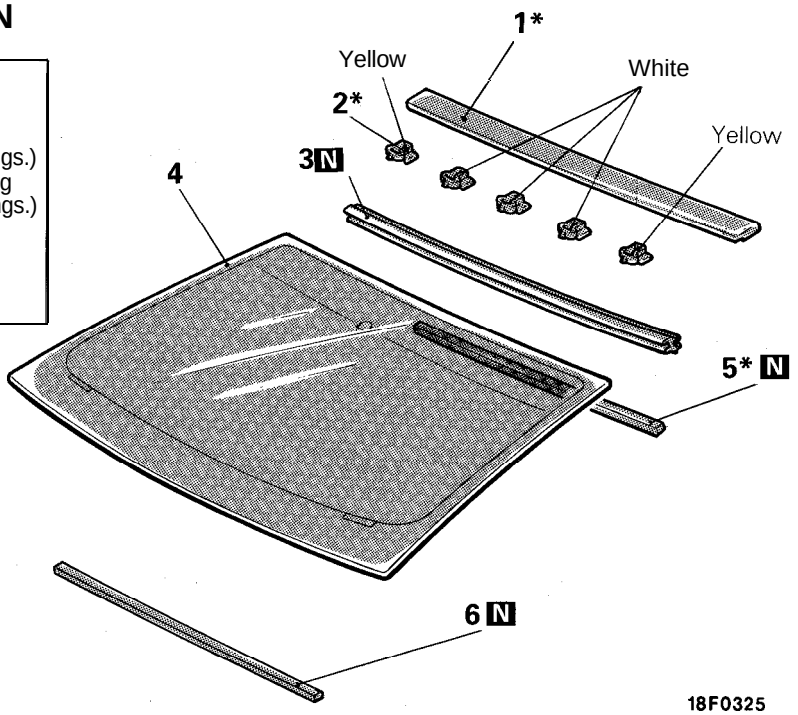


7. Scrape away excessive sealant forced out during installation of the moulding from the glass or body and wipe the surfaces clean with MOPAR SUPER KLEEN or equivalent.
8. After the work, leave the vehicle as it is until the adhesive hardens.

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.)

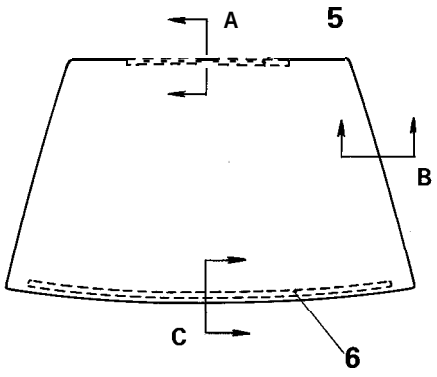


Removal steps

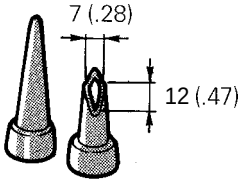
<Vehicles without sun roof>
- ◆◆ 3. Windshield moulding
- ◆◆ ● * 4. Windshield glass
- ◆◆ 6. Window spacer (lower)

<Vehicles with sun roof>
1. Windshield moulding
2. Moulding clip
- ● + 4. Windshield glass
- ◆◆ 5. Window spacer (upper)
- ● + 6. Window spacer (lower)

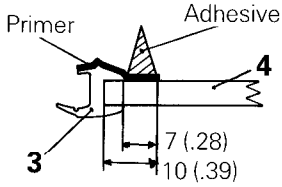
NOTE
* Vehicles with sun roof



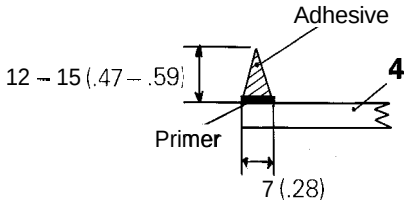
Cut off nozzle end



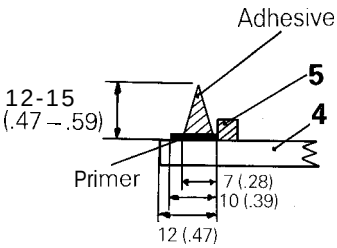
Section A
<Vehicles without sun roof>



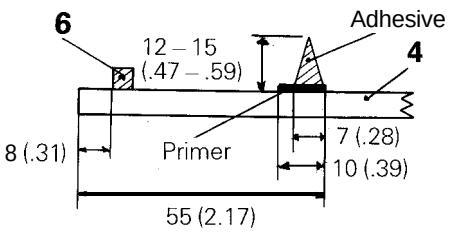
Section B



Section A
<Vehicles with sun roof>

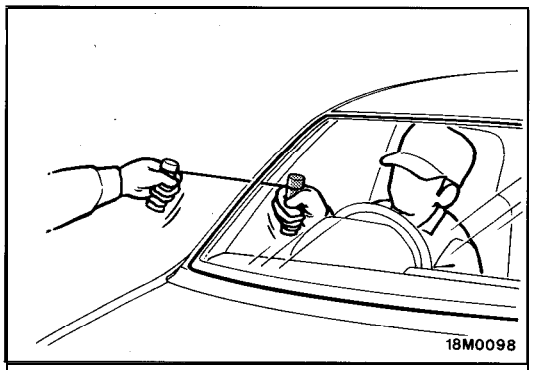


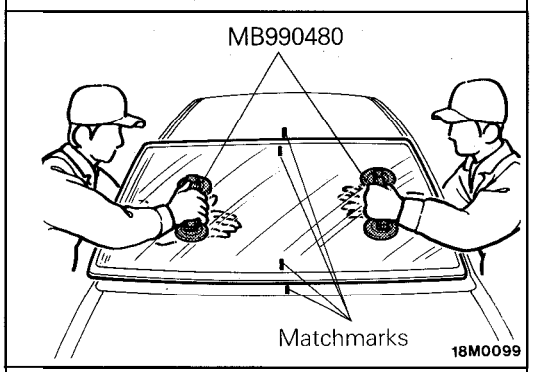
Section C

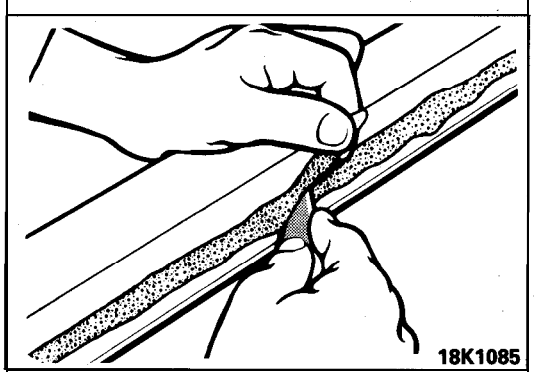


mm (in.) 18F0060 18F0307

Adhesive:
3M SUPER FAST URETHAN 8609 or equivalent
Primer:
3M SUPER FAST URETHAN PRIMER 8608 or equivalent







SERVICE POINTS OF REMOVAL

4. 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.

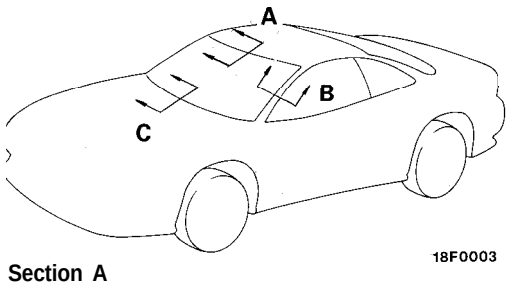
(5) Put matchmarks on the body and the glass.
(6) Using the special tool, remove the windshield glass.

(7) Using a sharp knife, scoop out existing adhesive from the body flange to 2 mm (.08 in.) or less thickness all around the window opening.
(8) Finish smooth the flange surfaces.

Caution
1. Do not remove the adhesive more than necessary.
2. Use care not to damage the coated surface of the body with the knife. If it is damaged, apply retouch paint of anti-corrosive.

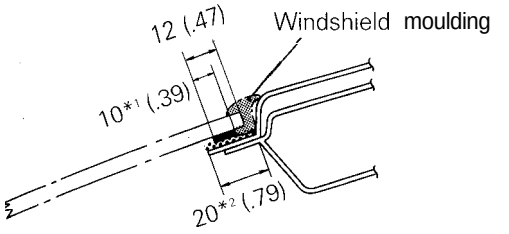
(9) If the glass is reused, scoop out existing adhesive and fragments of the window dam completely from the glass and degrease with MOPAR SUPER KLEEN or equivalent.
(lO)Degrease the body same way.

Caution
After degreasing, allow three minutes or more to dry well before next work. Do not touch the degreased surface.



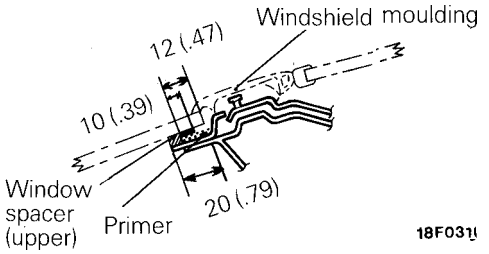
18F0003

Section A
<Vehicles without sun roof>



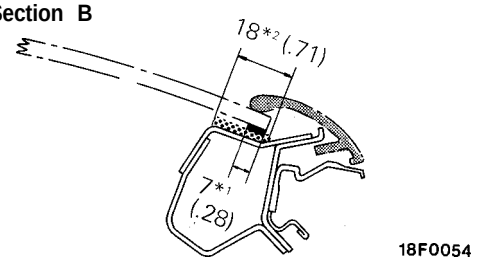
18F0055

<Vehicles with sun roof>



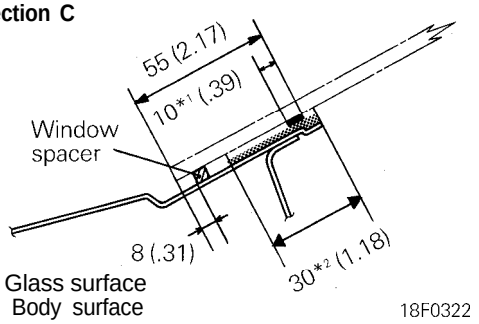
18F0311

Section B

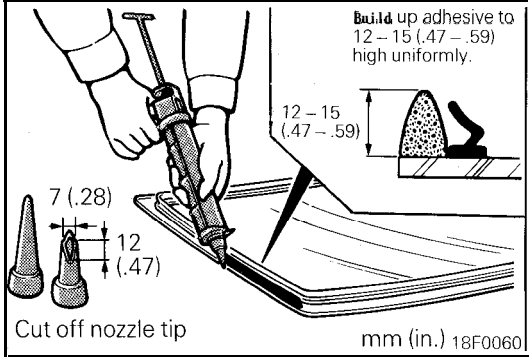


18F0054

Section C



1: Glass surface
2: Body surface
18F0322



mm (in.) 18F0060

SERVICE POINTS OF INSTALLATION

6. **INSTALLATION OF WINDOW SPACER (LOWER) / 5. WINDOW SPACER (UPPER) / 4. WINDSHIELD GLASS / 3. WINDSHIELD MOULDING**

(1) <On vehicles without sun roof>
Install the windshield moulding to the windshield.

(2) <On vehicles with sun roof>
Affix the window spacer (lower) to the specified area of the windshield.

(3) When replacing glass, fit a new glass once to the body and put matchmarks on the body and glass.

(4) Apply a uniform coat of primer to the illustrated areas of the body and glass making sure it is applied without breaks or thin spots.

Adhesive: 3M SUPER FAST URETHAN PRIMER 8608 or equivalent

Caution
1. The primer is used to strengthen bonding power. Make sure that it covers the surfaces completely. Note that the primer if applied to thick can cause loss of bonding power.
2. Never touch the primer coated surface.

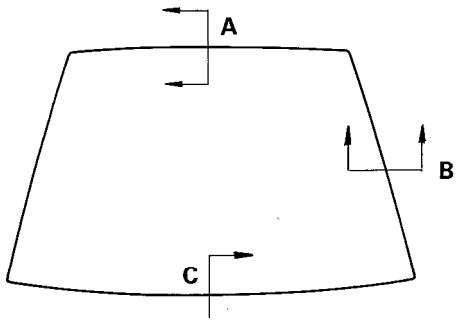
(5) Allow 3 to 30 minutes to dry the primer.

(4) Within 30 minutes of primer application, apply the adhesive all around the windshield glass uniformly.

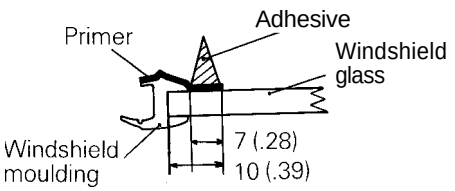
Adhesive: 3M SUPER FAST URETHAN 8609 or equivalent

NOTE
Cutting the nozzle tip of the sealant gun to a V-shape will help application.

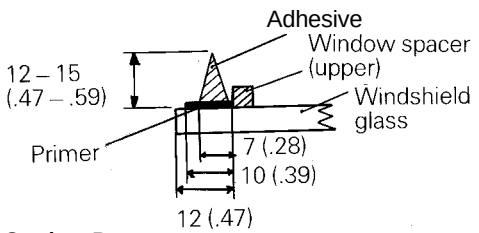
(5) Install the windshield moulding.



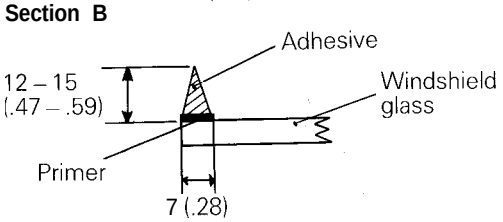
Section A
<Vehicles without sun roof>



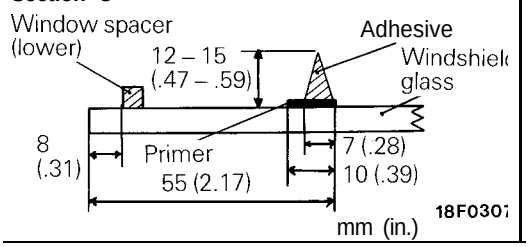
<Vehicles with sun roof>



Section B



Section C



(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.

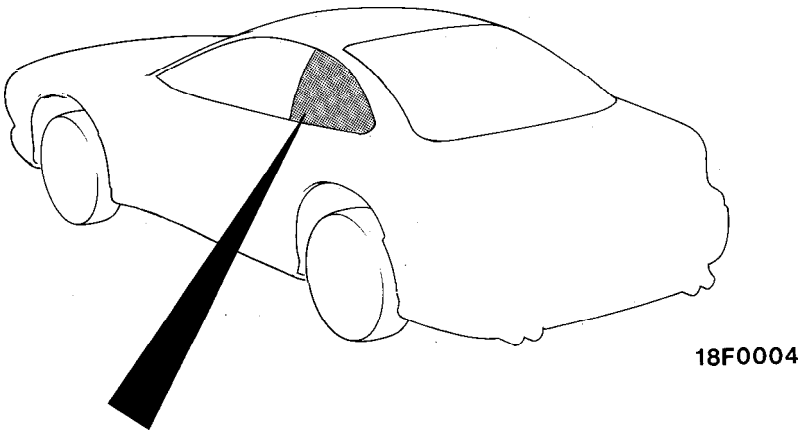
(9) After about 30 minutes or more following bonding of the windshield glass to the body, check for water leaks.

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.

QUARTER WINDOW GLASS

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Removal and Installation of Quarter Upper Trim (Refer to P.23A-91.)
- Removal and Installation of Quarter Trim (Refer to P.23A-91.)
- Removal and Installation of Rear Pillar Garnish (Refer to P.23A-46.)
- Removal and installation of Flow Through Garnish (Refer to P.23A-46.)


18F0004

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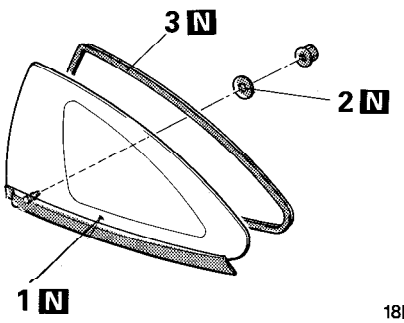

18F0129

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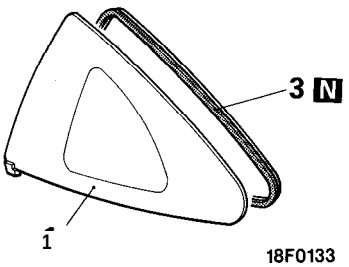
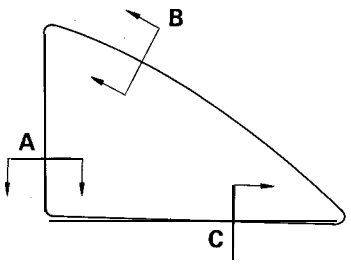


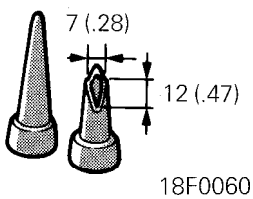
18F0133

Removal steps

● *● + 1. Quarter window moulding and glass <Type 1> or Quarter window glass <Type 2>
2. Packing <Type 1>
3. Window dam

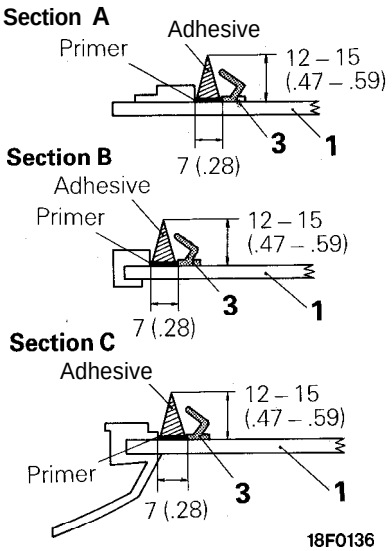


Cut off nozzle tip



mm (in.) 18F0060

<Type 1>



18F0136

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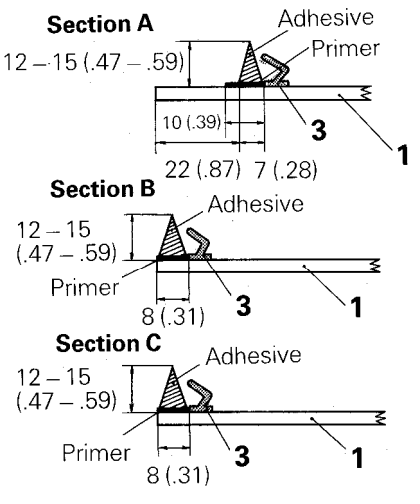
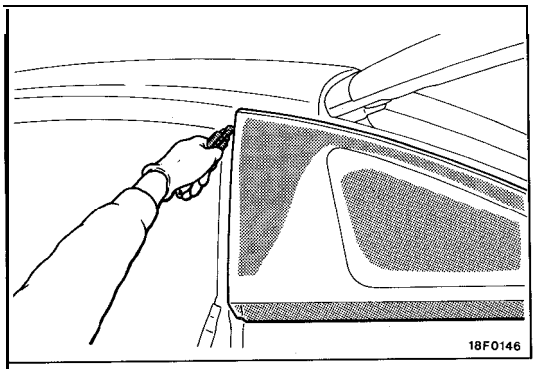


18F0135

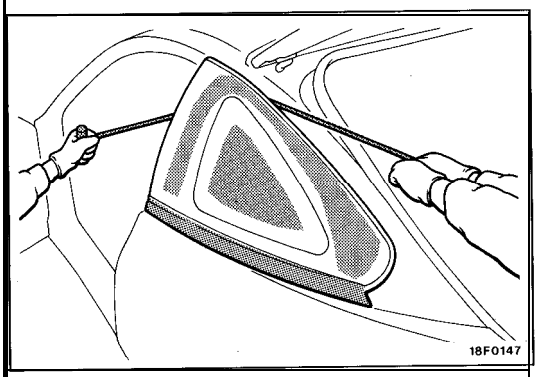
Adhesive:
3M SUPER FAST URETHAN 8609 or equivalent
Primer:
3M SUPER FAST URETHAN PRIMER 8608 or equivalent



SERVICE POINTS OF REMOVAL

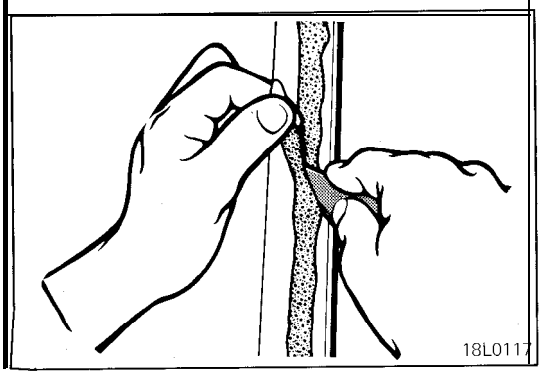
1. REMOVAL OF QUARTER WINDOW MOULDING AND GLASS <TYPE 1>

(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.

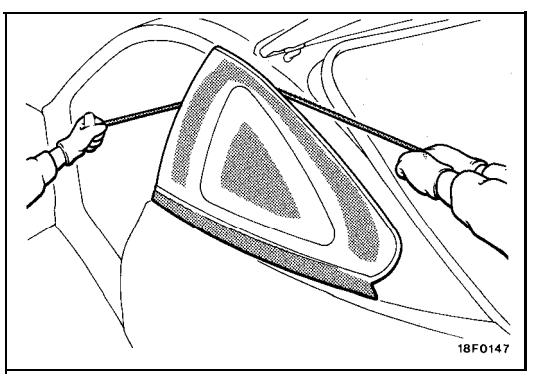


(4) Using a sharp knife, scoop out existing adhesive from the body flange to 2 mm (.08 in.) or less thickness all around the window opening.
(5) Finish smooth the flange surface.

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 MOPAR SUPER KLEEN or equivalent.

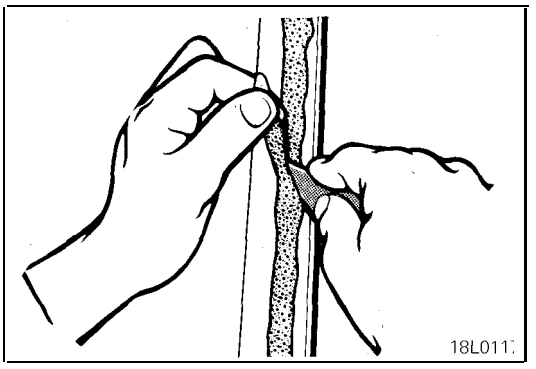
Caution
After degreasing, allow three minutes or more to dry well before next work. Do not touch the degreased surface.



1. REMOVAL OF QUARTER WINDOW GLASS <TYPE 2>

(1) 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.

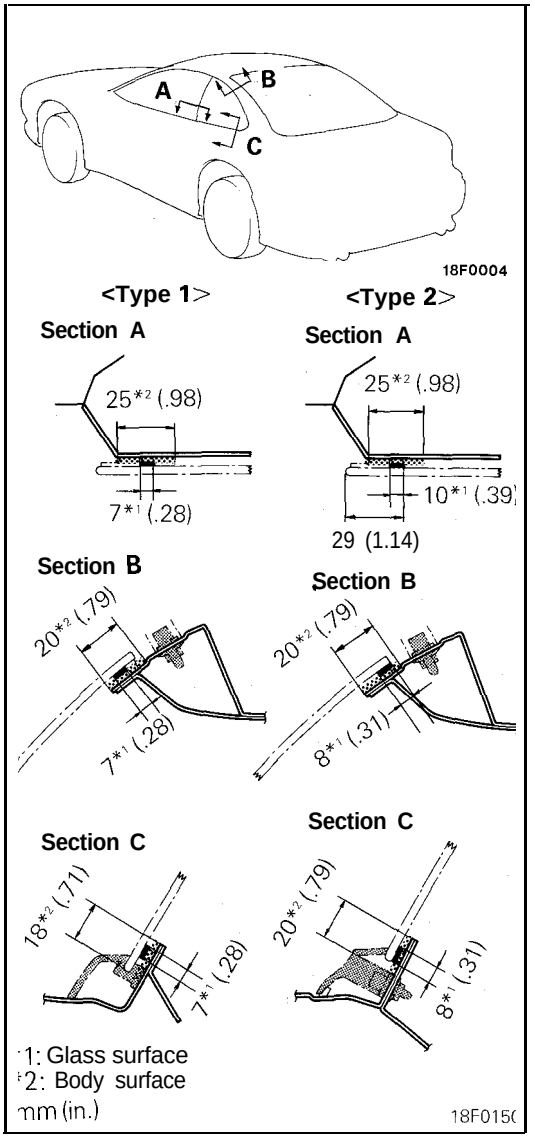


(2) Using a sharp knife, scoop out existing adhesive from the body flange to 2 mm (.08 in.) or less thickness all around the window opening.
(3) Finish smooth the flange surfaces.

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 or anti-corrosive.

(4) Degrease using MOPAR SUPER KLEEN or equivalent.

Caution
After degreasing, allow three minutes or more to dry well before next work. Do not touch the degreased surface.



SERVICE POINTS OF INSTALLATION

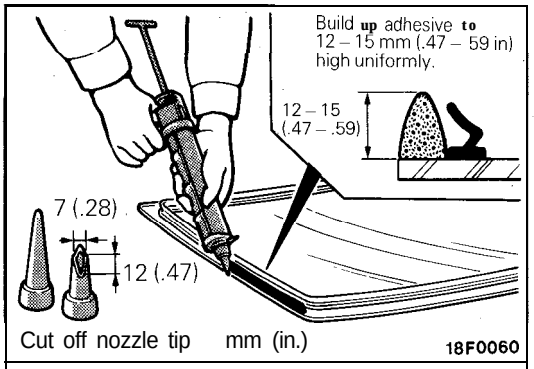
1. INSTALLATION OF QUARTER WINDOW MOULDING AND GLASS <TYPE 1> OR QUARTER WINDOW GLASS <TYPE 2>

(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 windshield glass uniformly.

Adhesive: 3M SUPER FAST URETHAN 8609 or equivalent

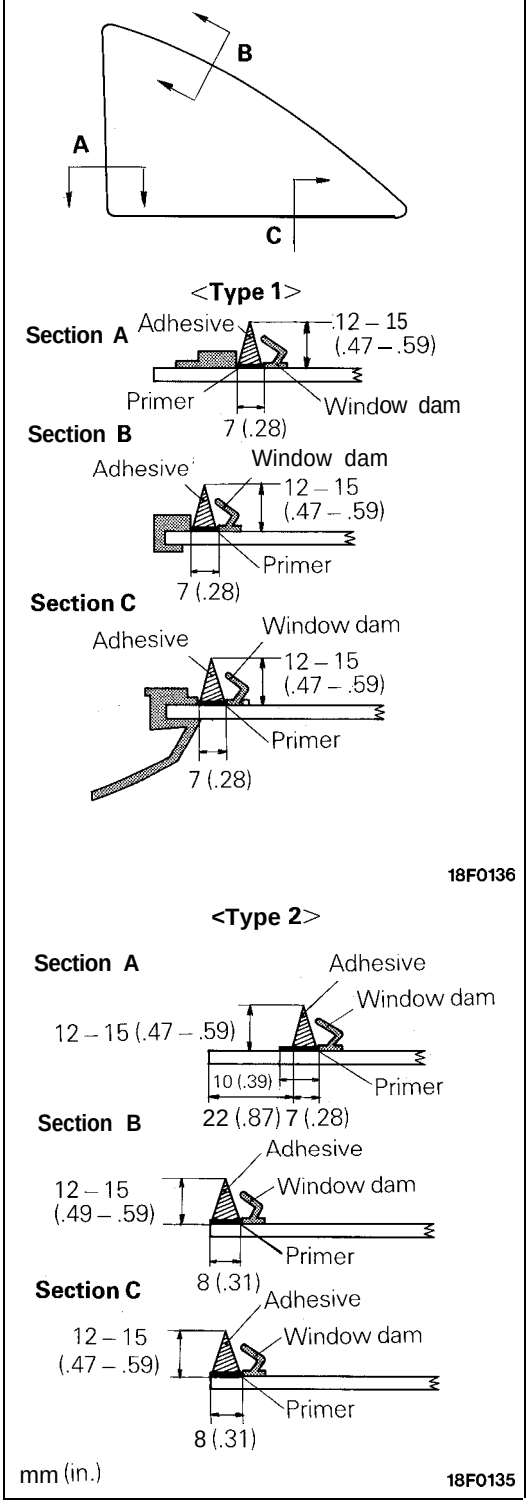
NOTE
Cutting the nozzle tip of the sealant gun to a V-shape will help application.

(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.

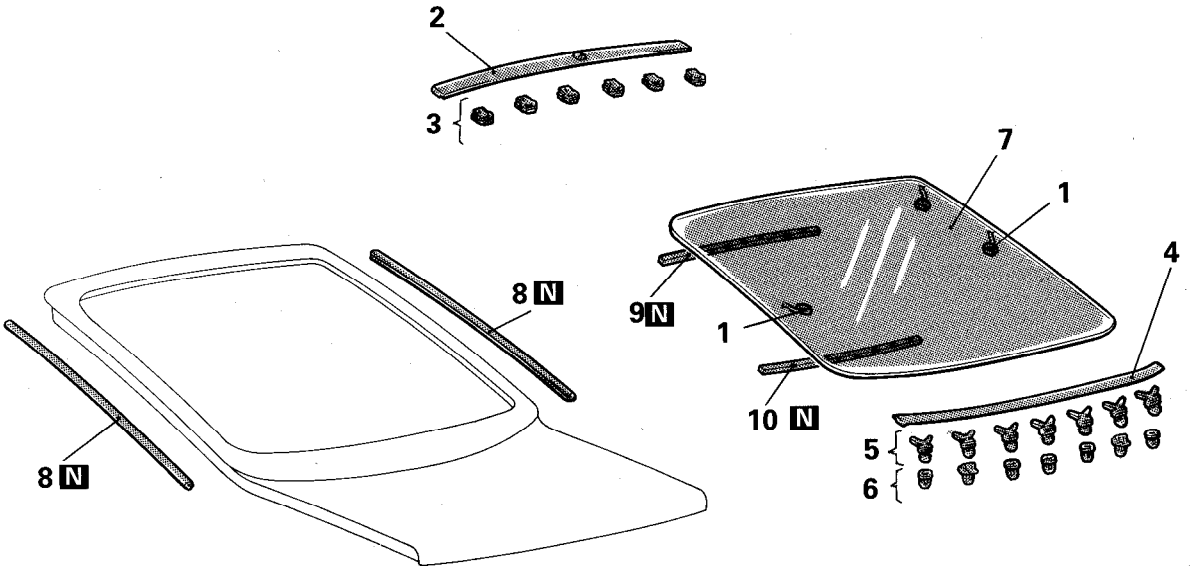
(7) After about 30 minutes or more following bonding of the windshield glass to the body, check for water leaks.

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

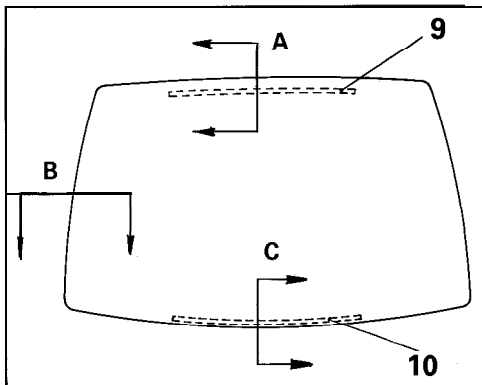


18F0323

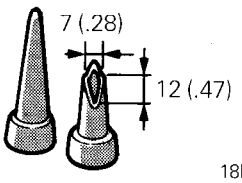
Removal steps

1. Defogger connector
- ◻ 2. Liftgate moulding upper
3. Liftgate moulding upper clip
- ◻ 4. Liftgate moulding lower
5. Liftgate moulding lower clip
6. Clip grommet
- *● 4 7. Lift gate glass
8. Liftgate moulding side
9. Window spacer (upper)
10. Window spacer (lower)

Pre-removal and Post-installation Operation
- Removal and Installation of Rear Wiper Arm (Refer to GROUP 8 – Wiper and Washer System.)
- Removal and Installation of Liftgate Upper Trim (Refer to P.23A-94.)
- Removal and Installation of Liftgate Trim (Refer to P.23A-94.)
- Removal and Installation of Liftgate Side Trim (Refer to P.23A-94.)



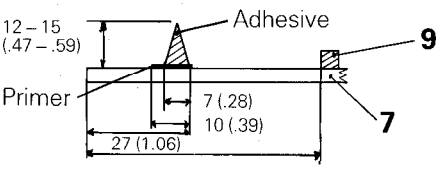
Cut off nozzle tip



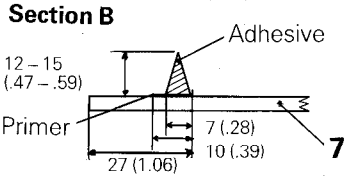
mm (in.)

18F0060

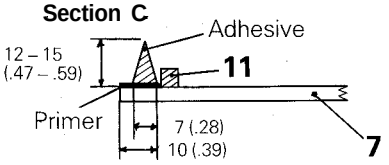
Section A



Section B

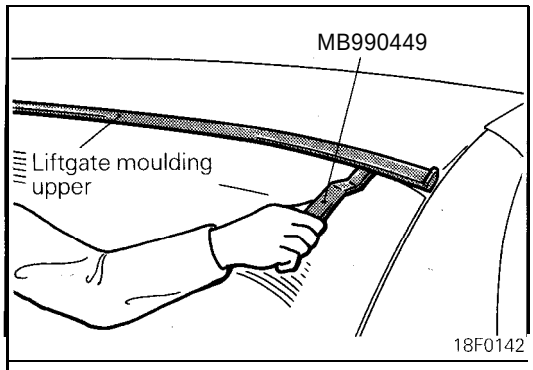


Section C



18F0308

Adhesive:
3M SUPER FAST URETHAN 8609 or equivalent
Primer:
3M SUPER FAST URETHAN PRIMER 8608 or equivalent



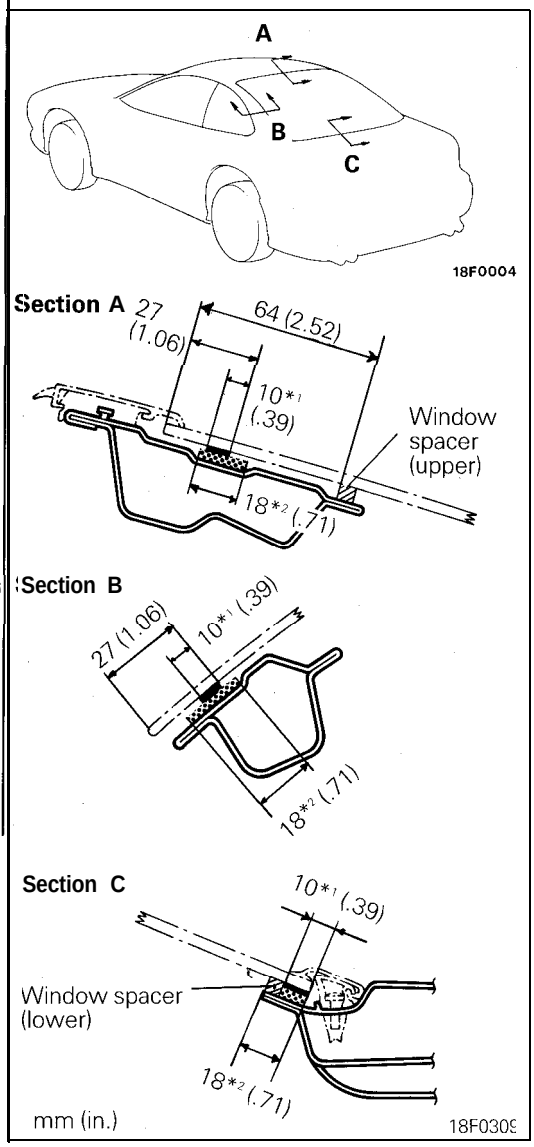
SERVICE POINTS OF REMOVAL

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.23A-57.)



SERVICE POINTS OF INSTALLATION

7. INSTALLATION OF LIFTGATE GLASS

(1) Affix the window spacer to the specified area of the liftgate glass.

(2) To replace the liftgate glass with a new one, fit the new liftgate glass to the body and put match marks to the body and the liftgate glass.

(3) Apply a uniform coat of primer to the illustrated areas of the body and glass making sure it is applied without breaks or thin spots.

Adhesive: 3M SUPER FAST URETHAN PRIMER 8608 or equivalent

Caution

1. The primer is used to strengthen bonding power. Make sure that it covers the surfaces completely. Note that the primer if applied to thick can cause loss of bonding power.

2. Never touch the primer coated surface.

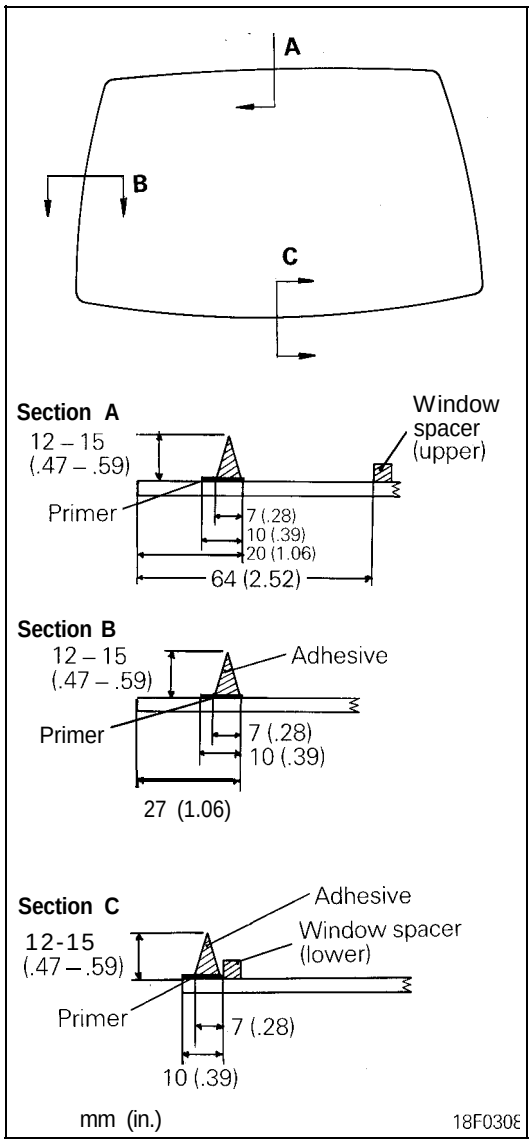
(4) Allow 3 to 30 minutes to dry the primer

(5) Within 30 minutes of primer application, apply the adhesive all around the liftgate glass uniformly.

Adhesive: 3M SUPER FAST URETHAN 8609 or equivalent

NOTE

Cutting the nozzle tip of the sealant gun to a V-shape will help application.



(6) After application of the adhesive, line up the match-marks on the glass and liftgate and force the glass lightly and evenly for complete fitting.

(7) Remove adhesive from around and on the glass and body surfaces using a spatula and wipe the surfaces clean.

(8) After the work (installation of the glass), allow to stand until the adhesive hardens.

Caution

If an infrared lamp or other means are used for quicker hardening, keep the surface temperature 60°C (140°F) or lower.

(9) After about 30 minutes or more following bonding of the liftgate glass to the tail gate, check for water leaks.

Caution

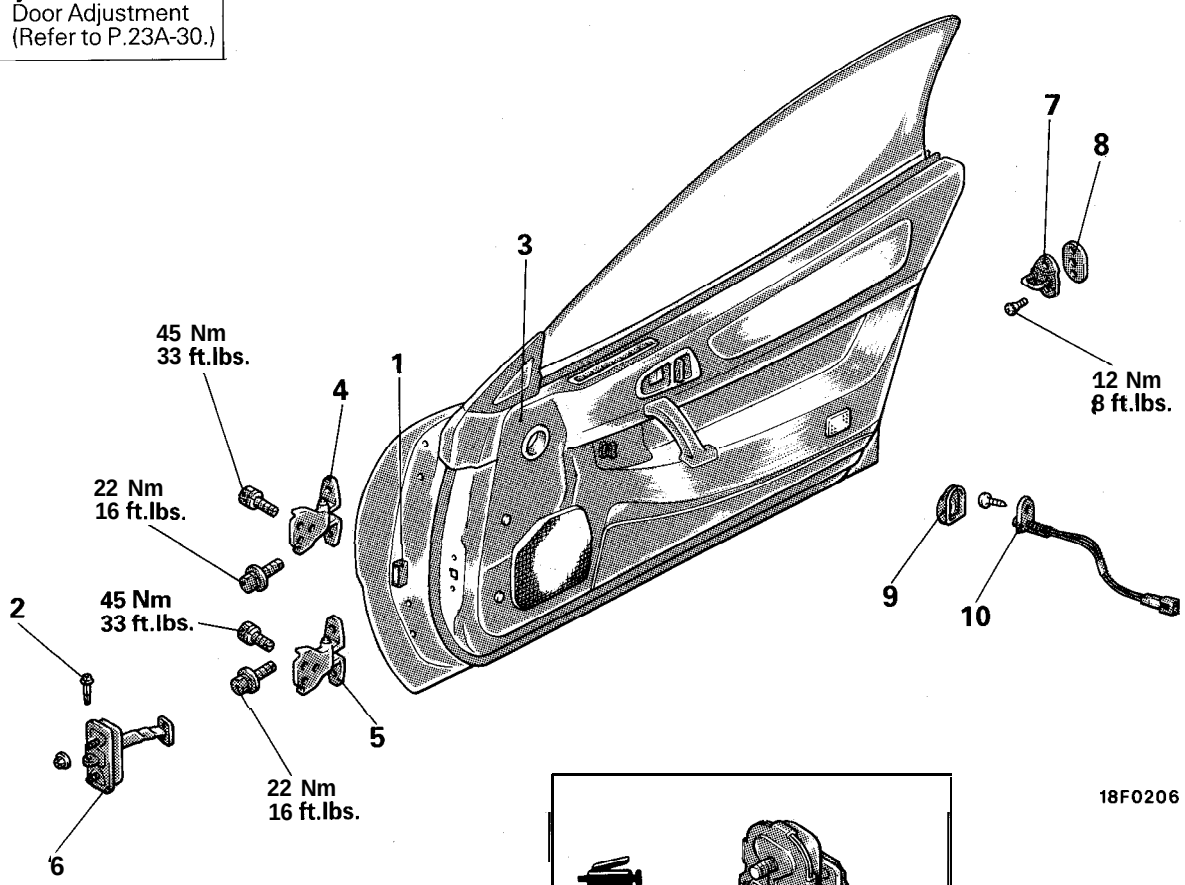
1. If the vehicle is to be moved, do so gently.

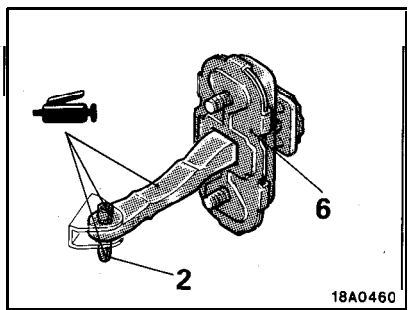
2. When checking for water leaks, do not squeeze the hose end.

DOOR ASSEMBLY

REMOVAL AND INSTALLATION

Adjustment
- Door Adjustment (Refer to P.23A-30.)





Grease:
MOPAR Multi-purpose Grease Part No. 2932524 or equivalent

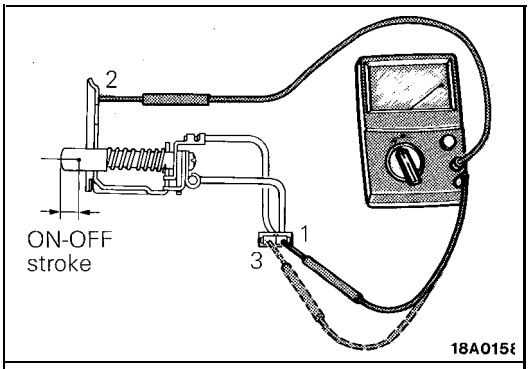
Door assembly removal steps
1. Connection for door wiring harness connector
2. Spring pin
3. Door assembly
4. Upper hinge
5. Lower hinge

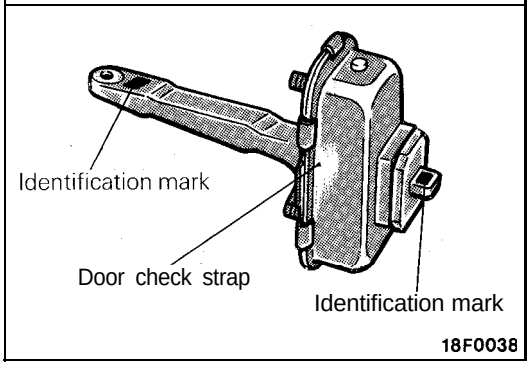
Door check strap removal steps

Door trim (Refer to P.23A-68.)
Waterproof film (Refer to P.23A-68.)
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





INSPECTION

DOOR SWITCH

Operate the switch, and check the continuity between the terminals.

Switch position		Terminal 1	2	3
Switch	Open (ON)	O	A	O
	Depressed (OFF)			

NOTE
O-O indicates that there is continuity between the terminals.

SERVICE POINT OF INSTALLATION

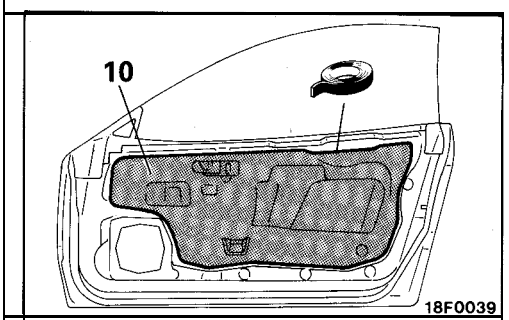
6. INSTALLATION OF DOOR CHECK STRAP

Install the door check strap with the identification mark facing up.

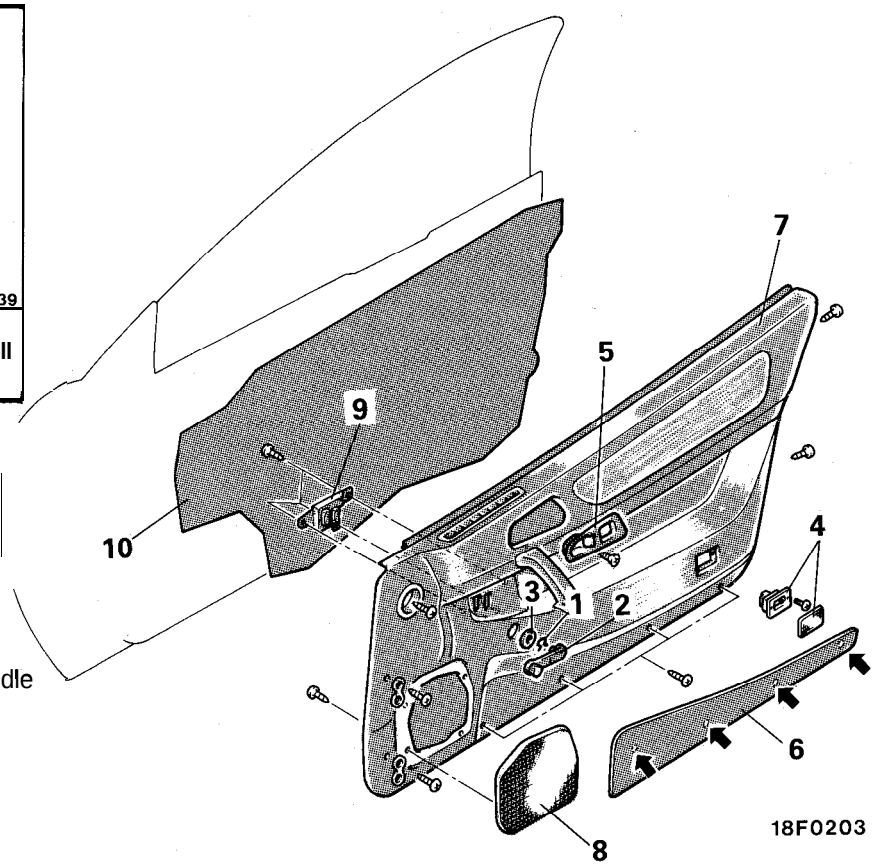
Position	Identification mark	
Door (LH)	WL	L
Door (RH)	WR	R

DOOR TRIM AND WATERPROOF FILM

REMOVAL AND INSTALLATION



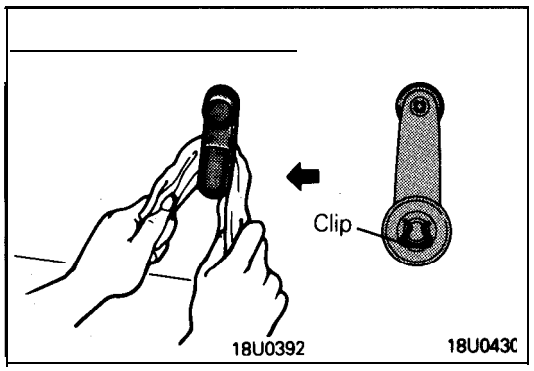
Sealant:
MOPAR Rope Caulk Sealer 3/16 x 80" roll
Part No. 4026044 or equivalent



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

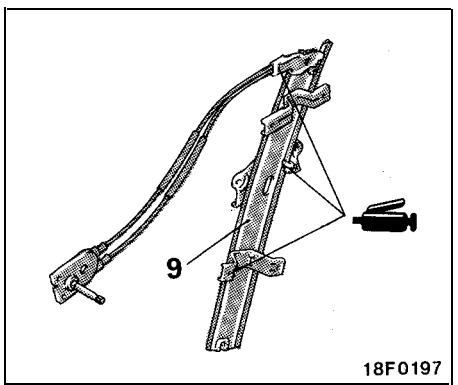
1. REMOVAL OF CLIP

Use a shop towel to remove the clip; and remove door window regulator handle.

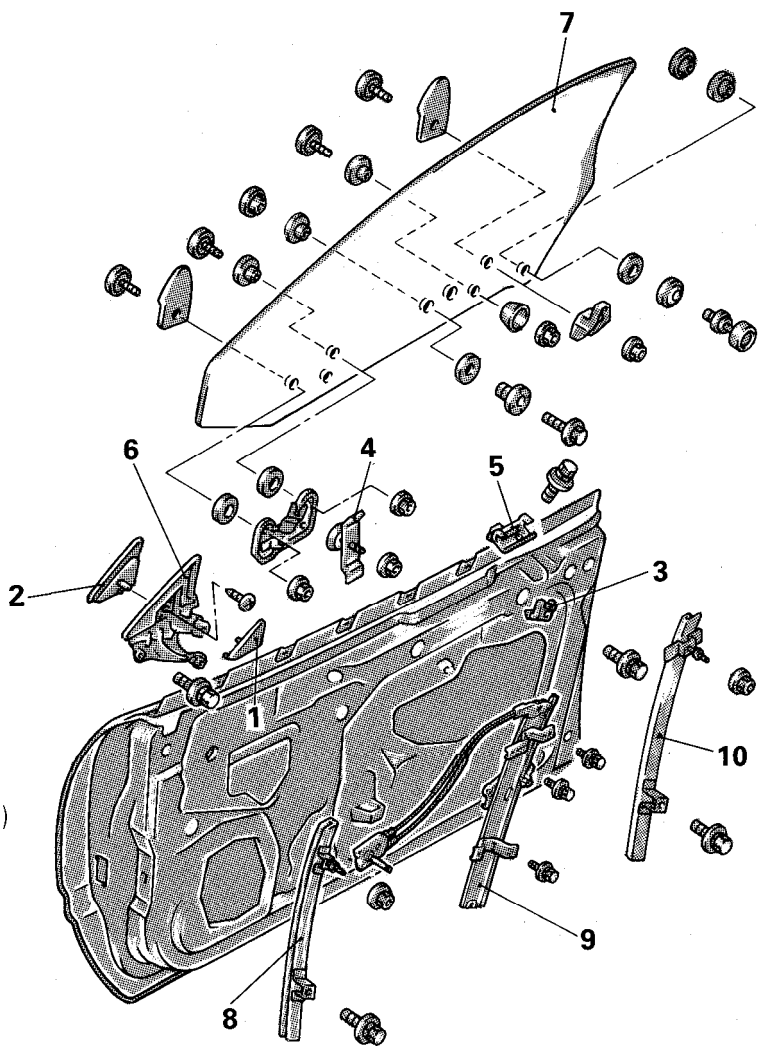
DOOR GLASS AND REGULATOR

REMOVAL AND INSTALLATION

Adjustment
- Door Window Glass Adjustment (Refer to P.23A-31.)



Grease:
MOPAR Multi-purpose Grease Part No. 2932524 or equivalent



Removal steps

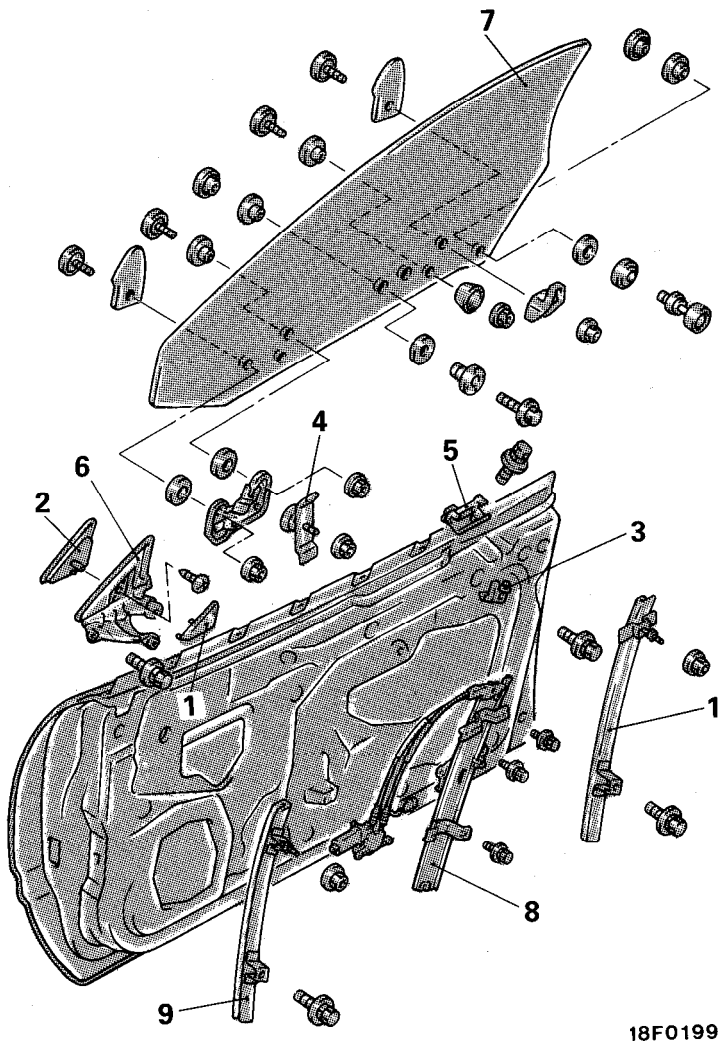
Door trim (Refer to P.23A-68.)
Waterproof film (Refer to P.23A-68.)

1. Delta cover inner
2. Delta cover outer
   Door belt line outer weatherstrip (Refer to p.23A-81.)
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

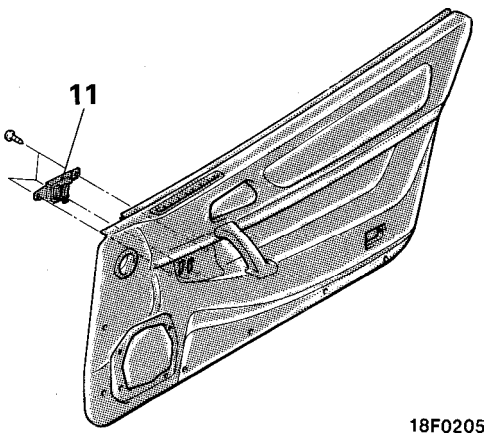
POWER WINDOW

REMOVAL AND INSTALLATION

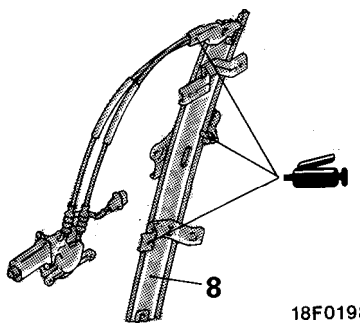
Adjustment
- Door Window Glass Adjustment (Refer to P.23A-31.)



18F0199



18F0205



18F0198

Grease:
MOPAR Multi-purpose Grease
Part No. 2932524 or equivalent

Door window regulator assembly removal steps

Door trim (Refer to P.23A-68.)
Waterproof film (Refer to P.23A-68.)

1. Delta cover inner
2. Delta cover outer

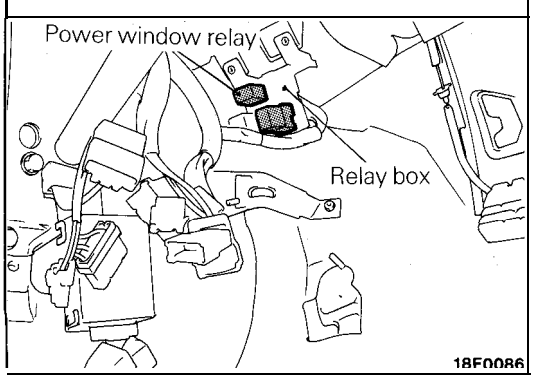
Door belt line outer weatherstrip (Refer to P.23A-81.)

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.23A-68.)

11. Power window switch assembly

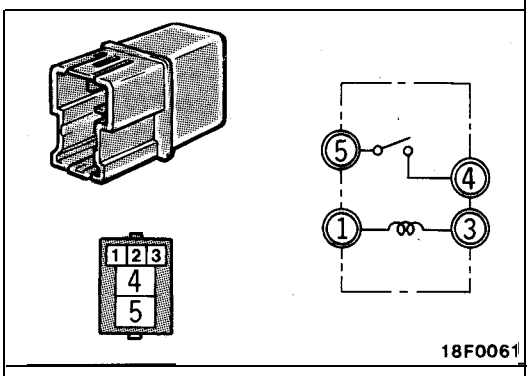


18F0086

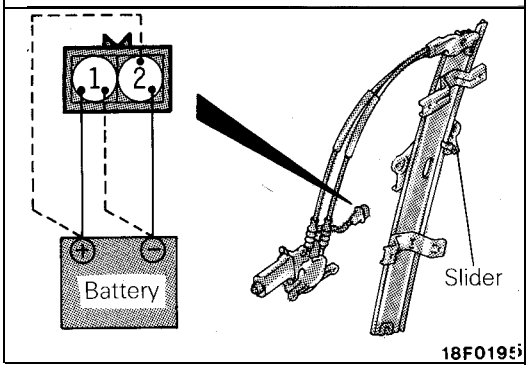
INSPECTION

POWER WINDOW RELAY

(1) Remove the knee protector assembly. (Refer to P.23A-87.)
(2) Remove the power window relay from indoor relay box.



18F0061



18F0195

(3) Apply battery voltage to terminal 1, and check for continuity when terminal 3 is grounded.

Battery voltage \ Terminal	1	3	4	5
Continuity no voltage	O	O		
Continuity with voltage			O	O

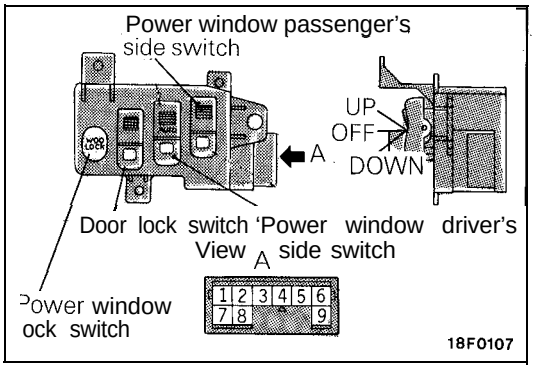
NOTE
O-O indicates that there is continuity between the terminals.

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.

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.

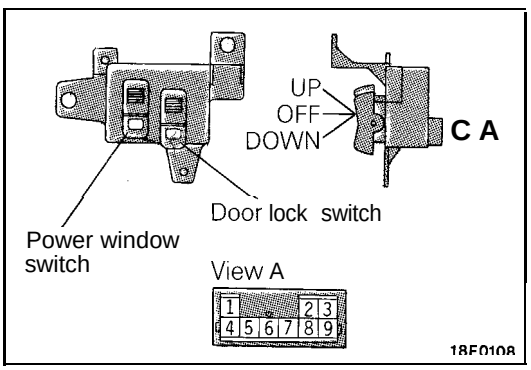


POWER WINDOW MAIN SWITCH

Check for continuity in accordance to the following connection table.

Switch position / Terminal		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

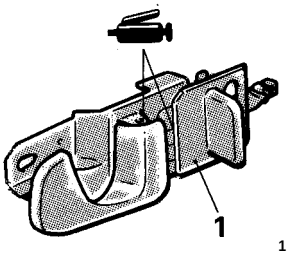
Check for continuity in accordance to the following connection table.

Switch position / Terminal		Sub switch		
		UP	OFF	DOWN
Sub switch	9	○		○
	5	○	○	○
	7		○	○
	3	○	○	○
	8	○	○	

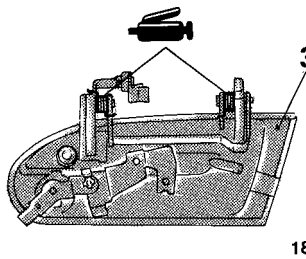
NOTE
O-O indicates that there is continuity between the terminals.

DOOR HANDLE AND LATCH

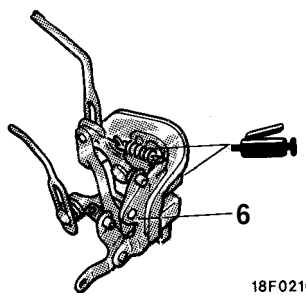
REMOVAL AND INSTALLATION



Grease:
MOPAR Multi-purpose Grease
Part No. 2932524 or equivalent

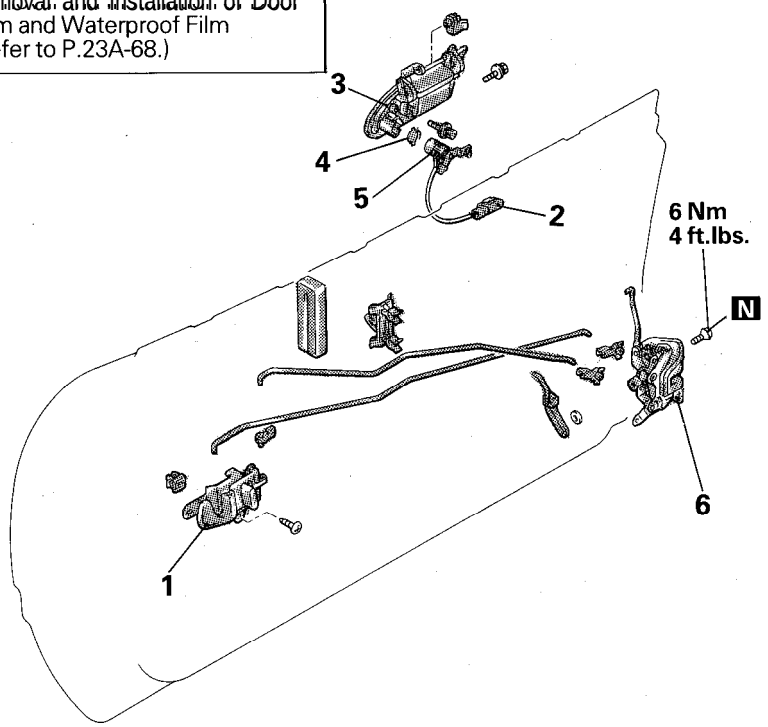


Grease:
MOPAR Multi-purpose Grease
Part No. 2932524 or equivalent



Grease:
MOPAR Multi-purpose Grease
Part No. 2932524 or equivalent

Pre-removal and Post-installation Operation
- Removal and Installation of Door Trim and Waterproof Film (Refer to P.23A-68.)



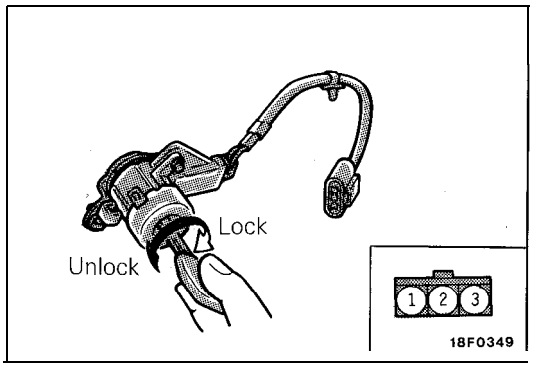
Door inside handle removal

Door Inside Handle Play Check (Refer to P.23A-33.)

1. Door inside handle

Door outside handle and latch removal steps

2. Door key cylinder unlock switch connector (Vehicles with central door locking or theft-alarm system)
3. Door outside handle
4. Ring
5. Door lock key cylinder
6. Door latch assembly



INSPECTION

DOOR KEY CYLINDER UNLOCK SWITCH

Insert the key and turn it to the LOCK or UNLOCK position to check for continuity as follows:

<Vehicles with central door locking system> or <Vehicles with central door locking system and theft-alarm system>

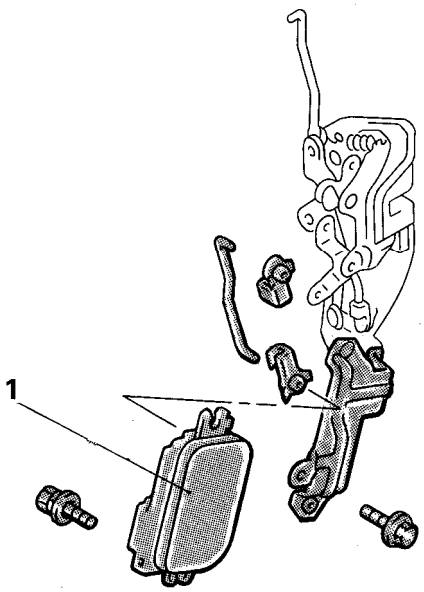
Switch position			Terminal No. 1	2	3
Door key cylinder unlock switch	L.H. side	LOCK		○—○	
		Neutral			
		UNLOCK	○—○		
	R.H. side	LOCK	○—○		
		Neutral			
		UNLOCK		○—○	

<Vehicles with theft-alarm system only>

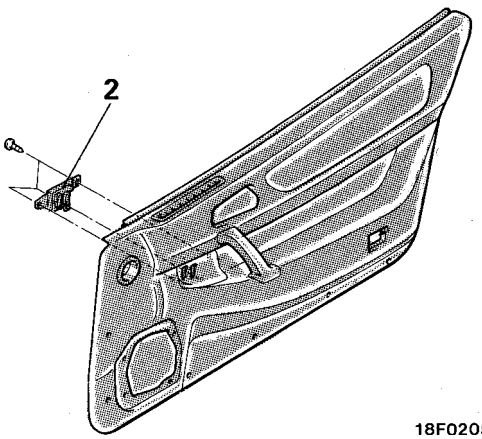
Switch position			Terminal No. 1	2	3
Door key cylinder unlock switch	L.H. side	LOCK		0—○	
		Neutral			
		UNLOCK		0—0	
	R.H. side	LOCK		0—0	
		Neutral			
		UNLOCK		0—0	

CENTRAL DOOR LOCKING SYSTEM

REMOVAL AND INSTALLATION



18F0196



18F0205

Door lock actuator removal

Door trim and waterproof film (Refer to P.23A-68.)
Door latch assembly (Refer to P.23A-73.)

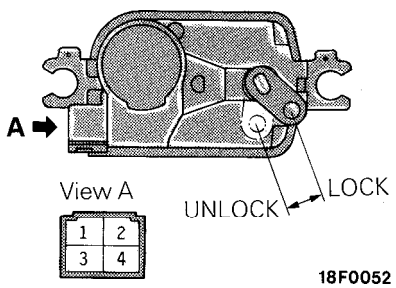
1. Door lock actuator

Door lock switch removal

Door trim (Refer to P.23A-68.)

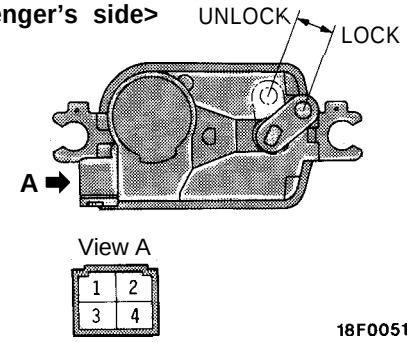
2. Door lock switch

<Driver's side>



18F0052

<Passenger's side>



18F0051

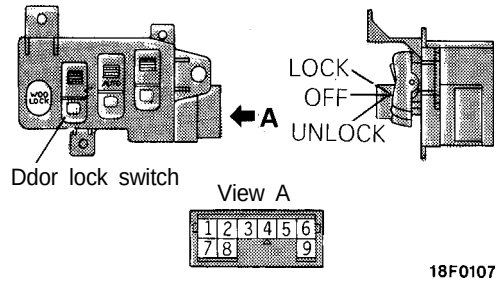
INSPECTION

DOOR LOCK ACTUATOR

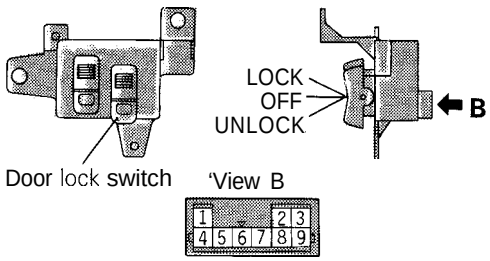
(1) Place the rod in the LOCK position, apply the battery power to the terminal [(3) for driver's side or (1) for passenger's side] and check to see that when the terminal [(I) for driver's side or (3) for passenger's side] is grounded, the rod moves to the UNLOCK position.
(2) Then place the rod in the UNLOCK position, apply the battery power to the terminal [(I) 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.

<Vehicles with power window>

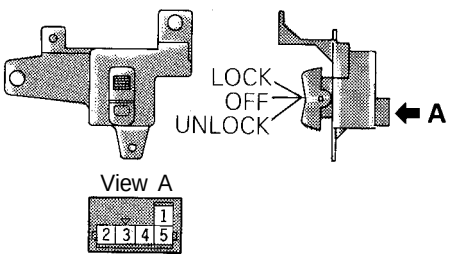
Power window main switch side



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

Switch position \ Terminal	7	6	5
LOCK	○	○	
OFF			
UNLOCK		○	○

NOTE
○–○ indicates that there is continuity between the terminals

Power window sub switch side

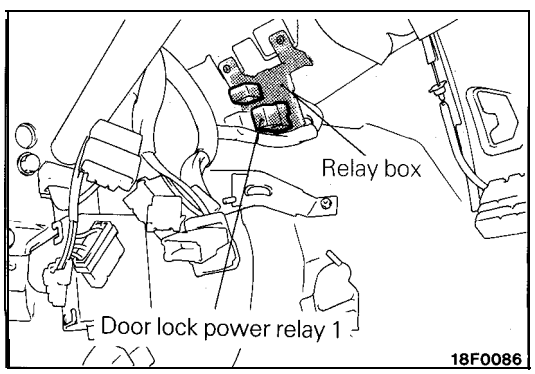
Switch position \ Terminal	4	6	1
LOCK	○	○	
OFF			
UNLOCK		○	○

NOTE
O-O indicates that there is continuity between the terminals.

<Vehicles without power window>

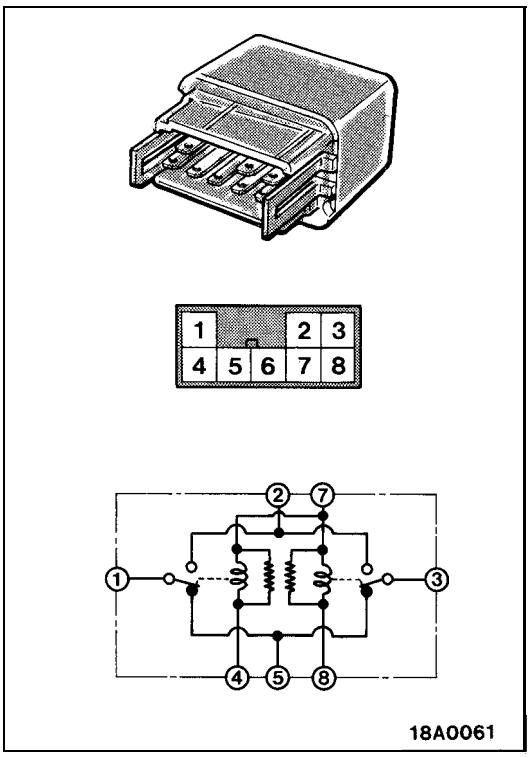
Switch position \ Terminal	3	2	5
LOCK	0	0	
OFF			
UNLOCK		0	○

NOTE
O-O indicates that there is continuity between the terminals.



DOOR LOCK POWER RELAY 1

(1) Remove the knee protector assembly.
(Refer to P.23A-87.)
(2) Remove the door lock power relay 1 from indoor relay box.



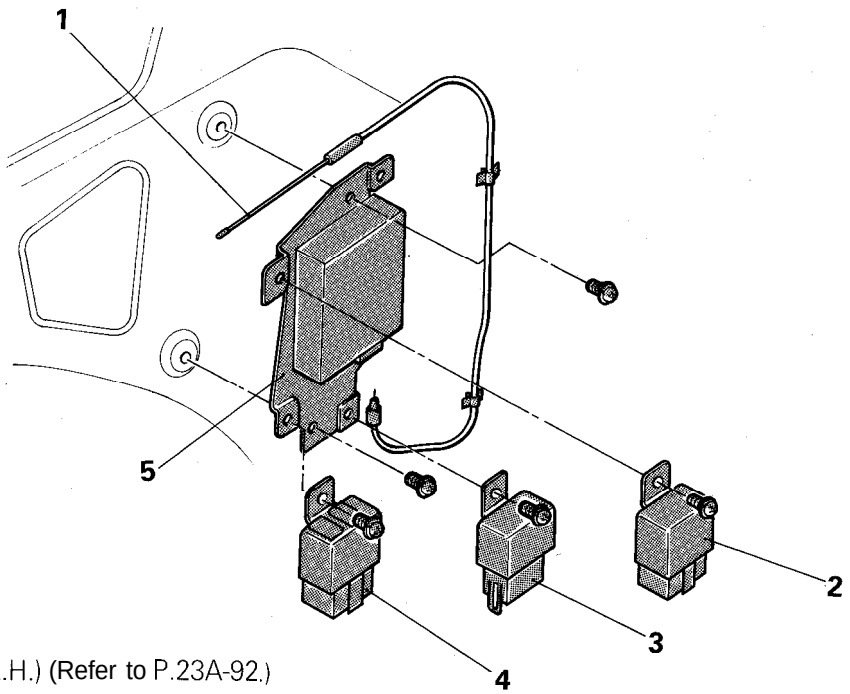
(3) Check for continuity between terminals under the conditions described below.

Terminal / Battery voltage	1	2	3	4	5	7	8
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.

KEYLESS ENTRY SYSTEM

REMOVAL AND INSTALLATION

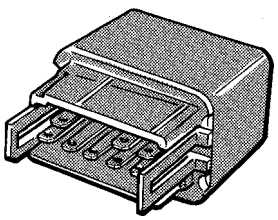


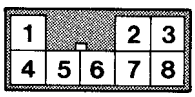
18F0317

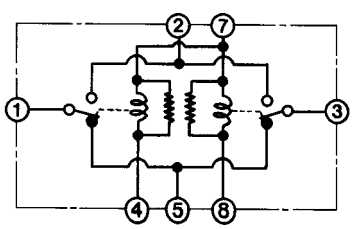
Removal steps

Quarter trim (L.H.) (Refer to P.23A-92.)

1. Antenna
2. Light automatic shut-off unit
3. Rear intermittent wiper relay
4. Door lock power relay 2 (for keyless entry system)
5. Receiver assembly







18A0061

INSPECTION

DOOR LOCK POWER RELAY 2 (FOR KEYLESS ENTRY SYSTEM)

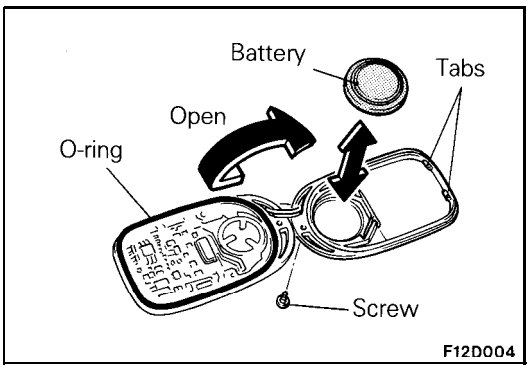
(1) Check for continuity between terminals under the conditions described below.

Terminal / Battery voltage	1	2	3	4	5	7	8
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.



BATTERY REPLACEMENT

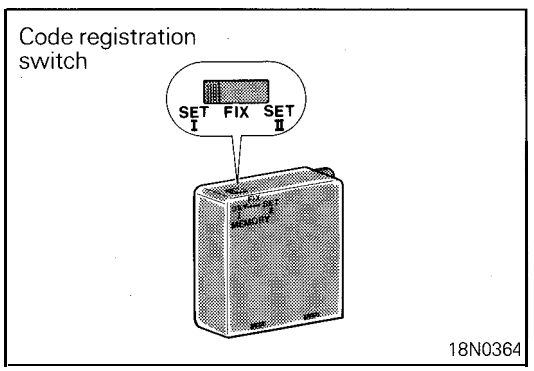
(1) Remove the mounting screw and take the battery out of the transmitter.
(2) Install a new battery with its positive side down.

Replacement battery: Coin type battery CR2032

(3) Insert the tabs first. Then, using care not to shift the O-ring, assemble the transmitter.
(4) Make sure that the keyless entry system operates properly.

NOTE

(1) When the transmitter is opened, be careful not to allow water, dust, etc. to stick to the inside of the transmitter. In addition, do not touch the precision electronic device.
(2) If the O-ring is shifted while assembling the transmitter, water, dust, etc. may enter the transmitter, resulting in transmitter troubles.

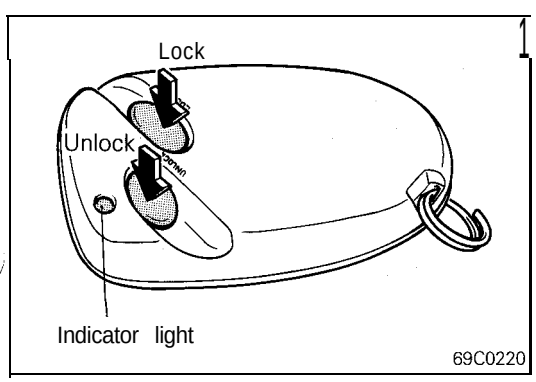


METHOD OF REGISTERING A CRYPTOGRAPHIC CODE

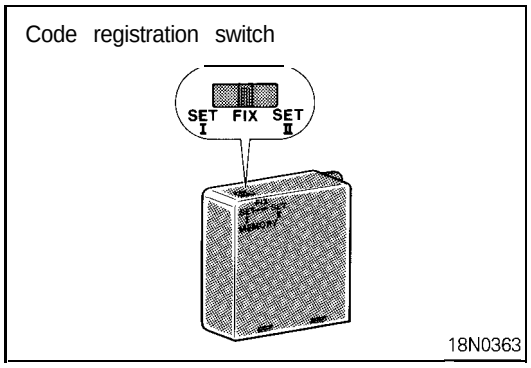
The transmitter has each individual cryptographic code stored in memory. When, therefore, the transmitter or receiver is replaced or the trouble is presumed to be caused by the faulty registration of the cryptographic code, it is necessary to register the cryptographic code on EEPROM inside the receiver.

Since two different cryptographic code at the most can be placed in the storage space of EEPROM, the old code will no longer be usable if the undermentioned registration operation is repeated twice. Meanwhile, before registering the code, it should be confirmed that an ordinary door lock function can be performed by key operation.

(1) Place the code registration switch to the SET 1 position (registration mode).



(2) Press the LOCK or UNLOCK switch of the transmitter

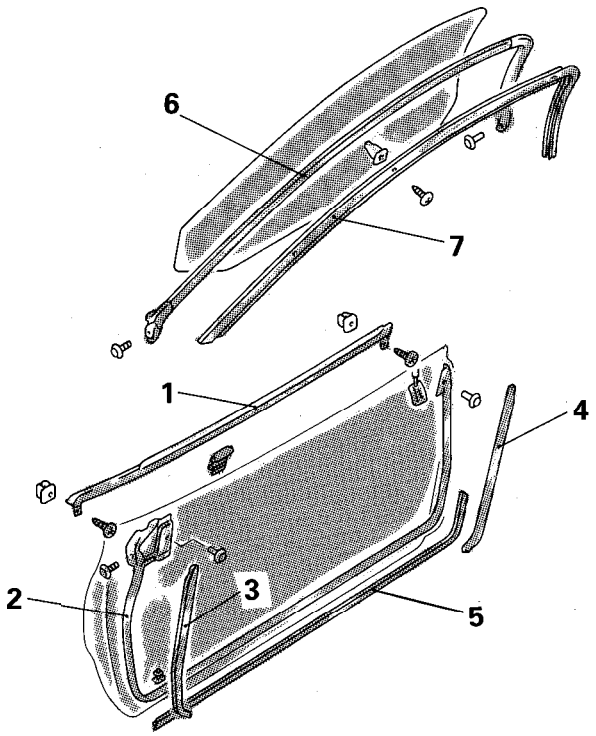


(3) Set the code registration switch of the receiver to the FIX position (operation mode).
(4) Confirm that the keyless entry system operates normally. The registration is completed if the system operate normally. If not, repeat the steps (1) through (3).

NOTE
(1) In case there are two transmitters, register the code on the SET II side in the same manner as the SET I side. Even if there is only one transmitter, register the code on the SET I as well as on the SET II to prevent malfunction.
(2) Make sure that after a code has been registered, the registration switch is set to the FIX position positively.

DRIP LINE WEATHERSTRIP

REMOVAL AND INSTALLATION



Removal steps

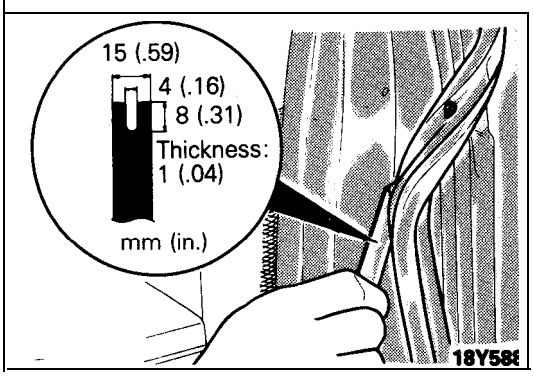
Delta cover inner } (Refer to
Delta cover outer } P.23A-69, 70.)
Door trim (Refer to P.23A-68.)

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

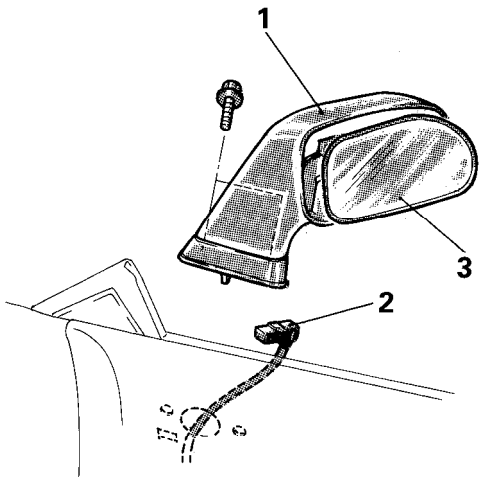
2. INSTALLATION OF DOOR OUTER OPENING WEATHERSTRIP

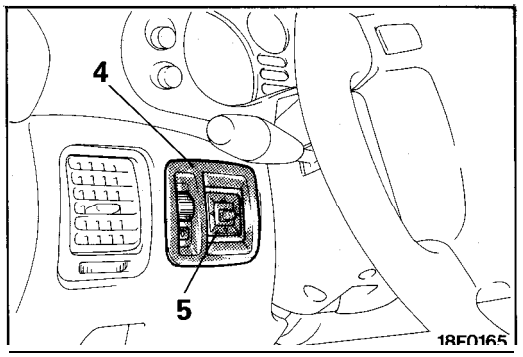
The clip color identifies the left and right weatherstrips, so be sure to use the colors so as to install correctly.

Identification color	Applicable side
White	Left door
Orange	Right door

DOOR MIRROR

REMOVAL AND INSTALLATION





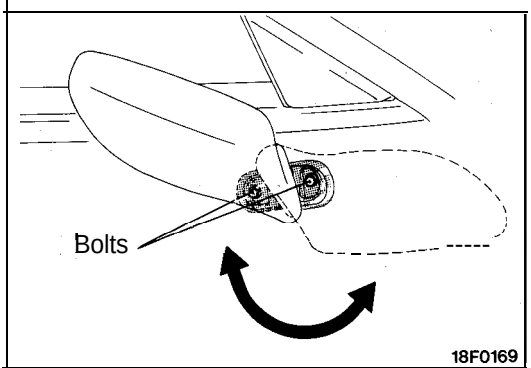
18F0166

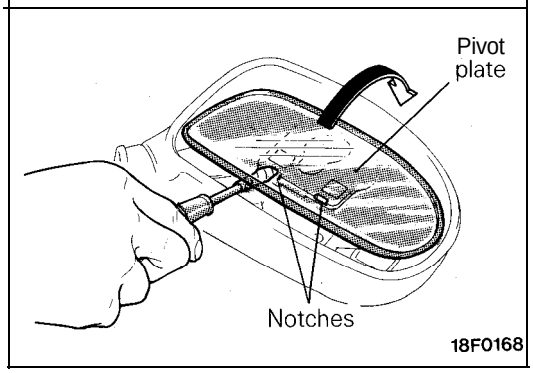
Door mirror removal steps

- ◆◆ 1. Door mirror
- 2. Harness connector
- ◆◆ 3. Mirror

Electric remote controlled mirror switch removal

- 4. Instrument panel switch
- 5. Electric remote controlled mirror switch





SERVICE POINTS OF REMOVAL

1. REMOVAL OF DOOR MIRROR

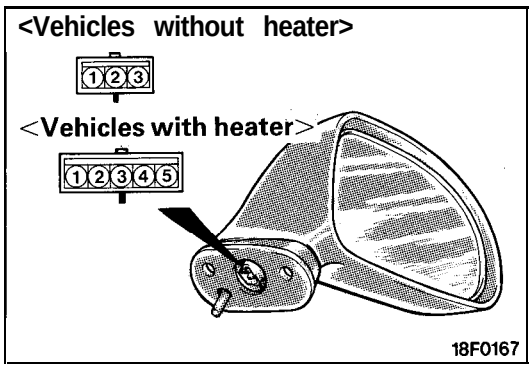
Tilt the door mirror backward and forward to remove the attaching bolts.

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.



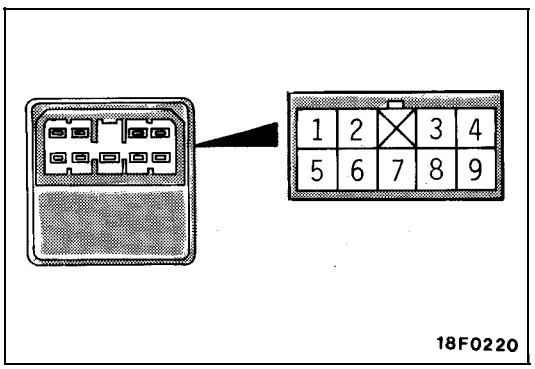
INSPECTION

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 (+)	Battery (–) 2 (1)*	3 (2)*	4 (3)*	1	5
UP	○			○		
DOWN	0	0		○		
RIGHT	0		0			
LEFT		0	0			

NOTE
(1) ○–○ indicates that each terminal is connected to the battery.
(2) * indicates door mirror terminal on vehicles without heater.



ELECTRIC REMOTE CONTROL MIRROR SWITCH

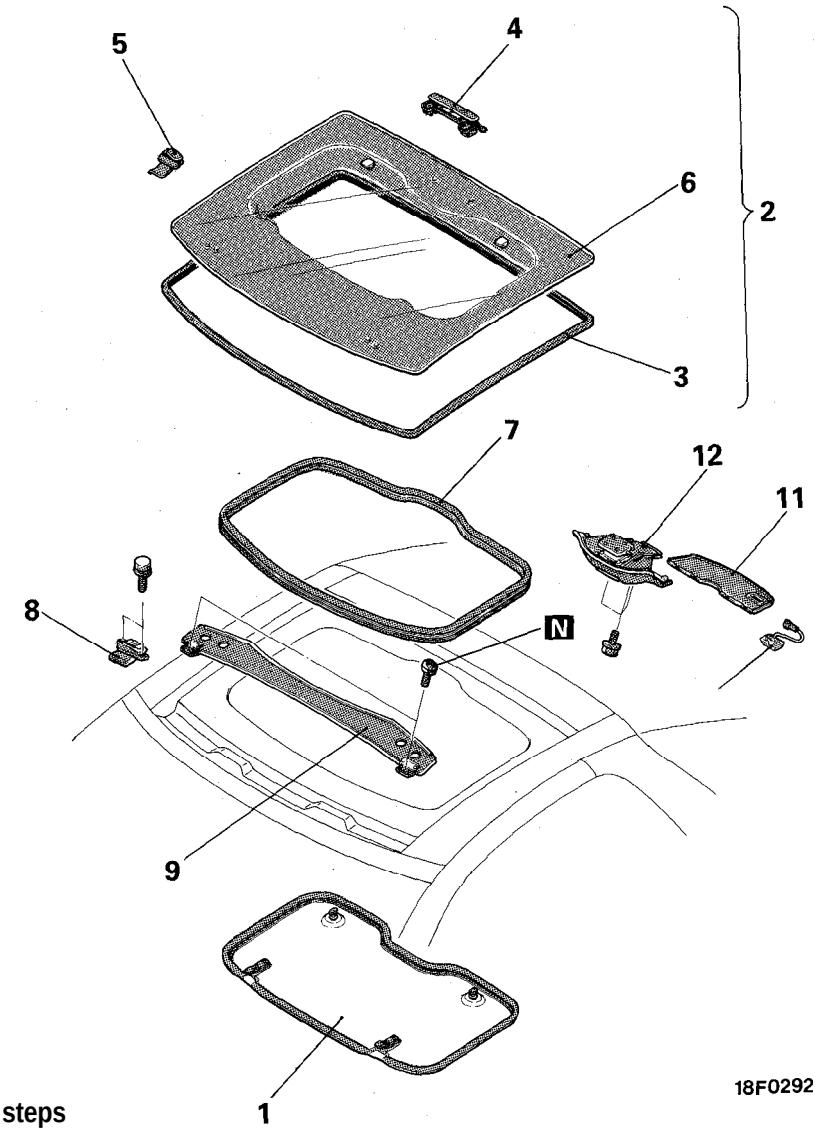
Operate switches and check for continuity between terminals.

Terminal / Direction	Left side 3	4	6	7	8	Right side 2	4	6	7	9
UP		○	○		○	○	○	○	○	
DOWN		○	○	○	○	○	○	○	○	
LEFT	0	0	0	0			0	0	0	0
RIGHT		○		○			0		○	0

SUNROOF

REMOVAL AND INSTALLATION

Post-installation Operation
- Water Test (Refer to P.23A-34.)

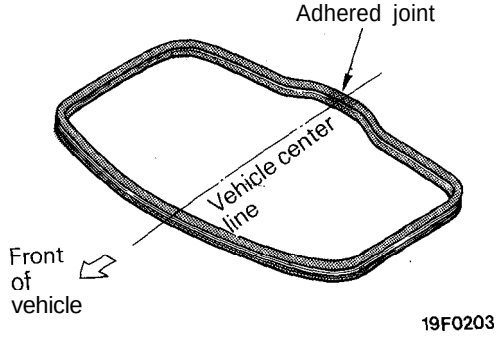


Roof lid glass removal steps

1. Sunroof trim assembly
2. Roof lid glass assembly
3. Weatherstrip
4. Slide lock latch assembly
5. Roof lid male hinge
6. Roof lid glass
- ◆◆ 7. Roof weatherstrip, inner
8. Roof lid female hinge
9. Deflector

Roof lid regulator assembly removal steps

1. Sunroof trim assembly
2. Roof lid glass assembly
10. Interior temperature sensor
11. Regulator cover
12. Roof lid regulator assembly



SERVICE POINTS OF INSTALLATION

7. INSTALLATION OF ROOF WEATHERSTRIP, INNER

Install the roof weatherstrip with its adhered joint located on the center line of the vehicle (toward the rear of the vehicle).

AERO PARTS

REMOVAL AND INSTALLATION

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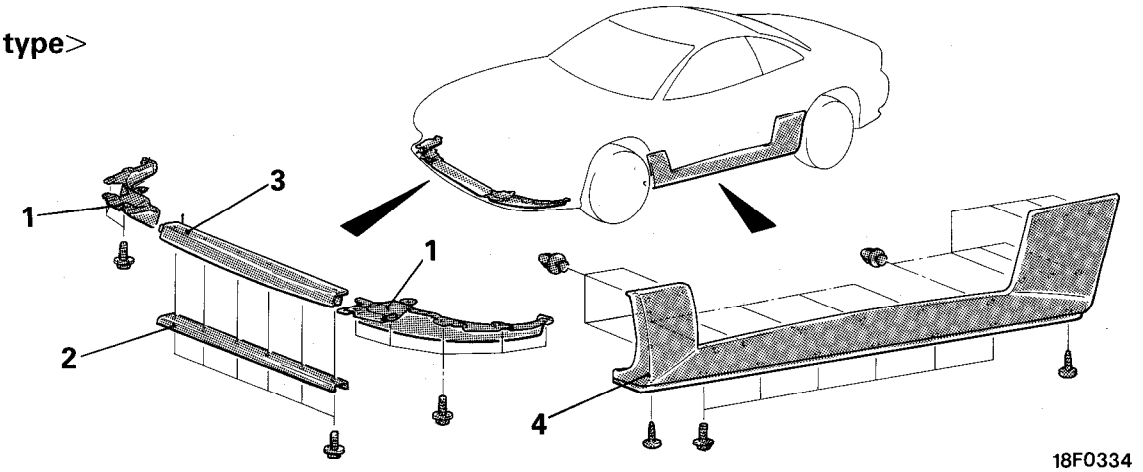

18F0334

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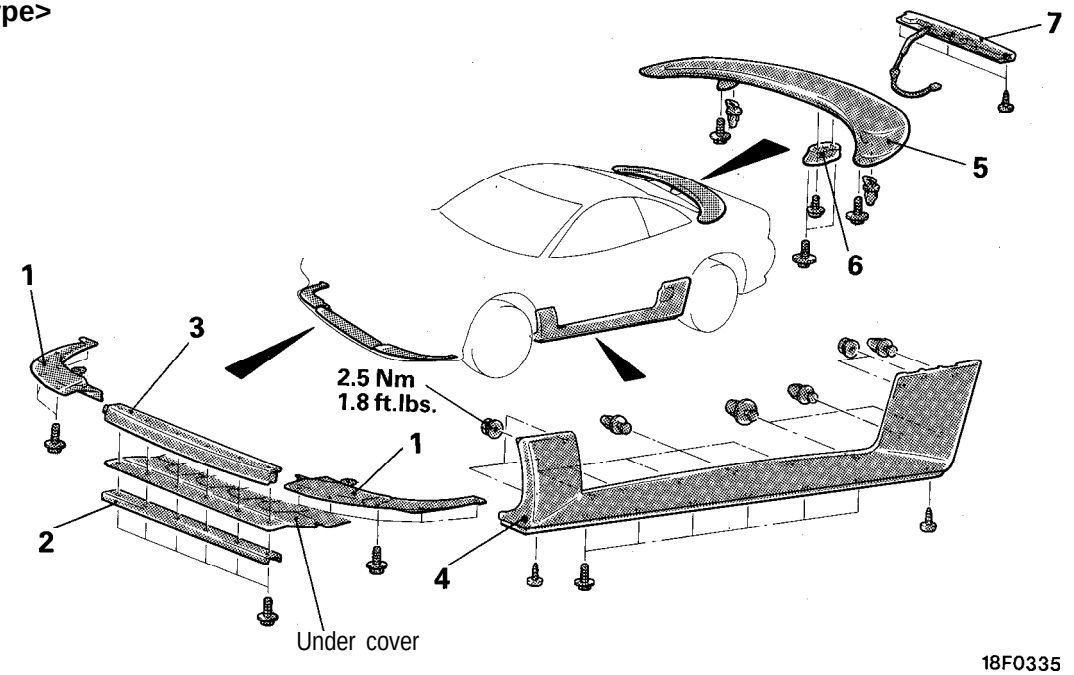
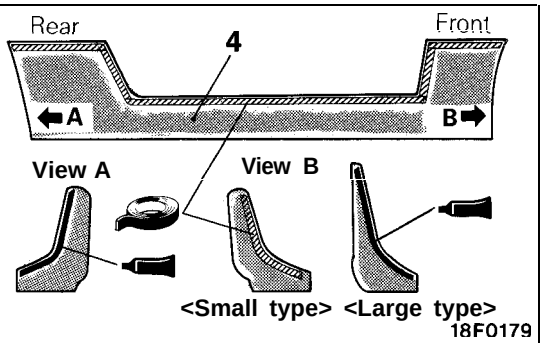


18F0335



Adhesive tape:
3M ATD Part No. 6382 or equivalent

Adhesive:
3M ATD Part No. 8609 SUPER FAST URETHAN or equivalent

Front spoiler removal steps

1. Side spoiler
2. Front spoiler plate
3. Front spoiler

Side air dam removal steps

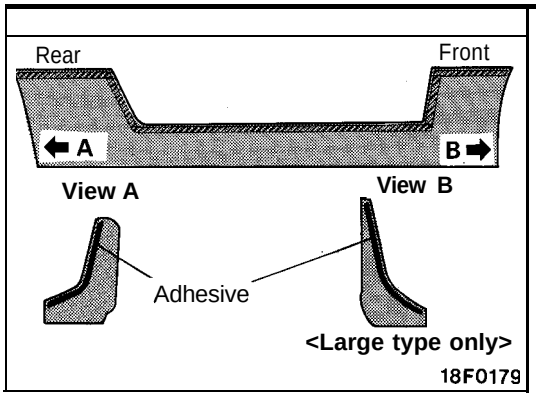
Front splash shield (Refer to P.23A-51.)
Quarter trim (Refer to P.23A-92.)

◆◆ ◆◆ 4. Side air dam

Rear spoiler removal steps

Liftgate lower trim (Refer to P.23A-94.)

5. Rear spoiler
6. Center stay
7. High mounted stop light



SERVICE POINT OF REMOVAL

4. REMOVAL OF SIDE AIR DAM

Remove the side air dam by the same procedure as the side garnish. (Refer to P.23A-48.)

SERVICE POINT OF INSTALLATION

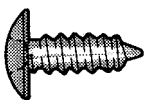
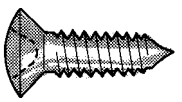
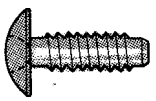
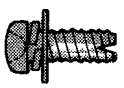
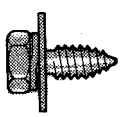
4. INSTALLATION OF SIDE AIR DAM

Install the side air dam by the same procedure as the side garnish (refer to P.23A-49), provided that specified adhesive is used.

Specified adhesive: 3M ATD Part No. 8609 SUPER FAST URETHAN or equivalent

INSTRUMENT PANEL

For installation of the instrument panel, the bolts and screws described below are used. They are indicated by symbols in the illustration.

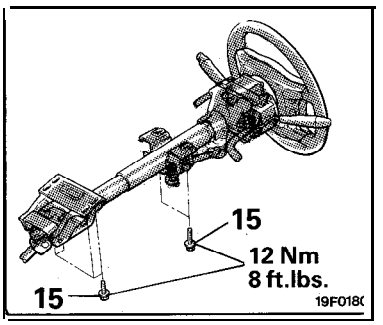
Name	Symbol	Size mm (in.) (D x L)	Color	Shape
Tapping screw	A	5 x 16 (.20 x .63)		
	B	5 x 30 (.20 x 1.2)		
	C	4 x 12 (.16 x .47)	Black	
	D	5 x 16 (.20 x .63)	Black	
	E	4 x 16 (.16 x .63)	–	
Nasher assembled screw	F	5 x 16 (.20 x .63)	–	
	G	4 x 12 (.16 x .47)	–	
Washer assembled bolt	H	6 x 16 (.24 x .63)		
	I	6 x 16 (.24 x .63)		 19N0001
	J	6 x 20 (.24 x .79)		
	K	6 x 20 (.24 x .79)	Black	
	L	6 x 25 (.24 x .98)	Black	

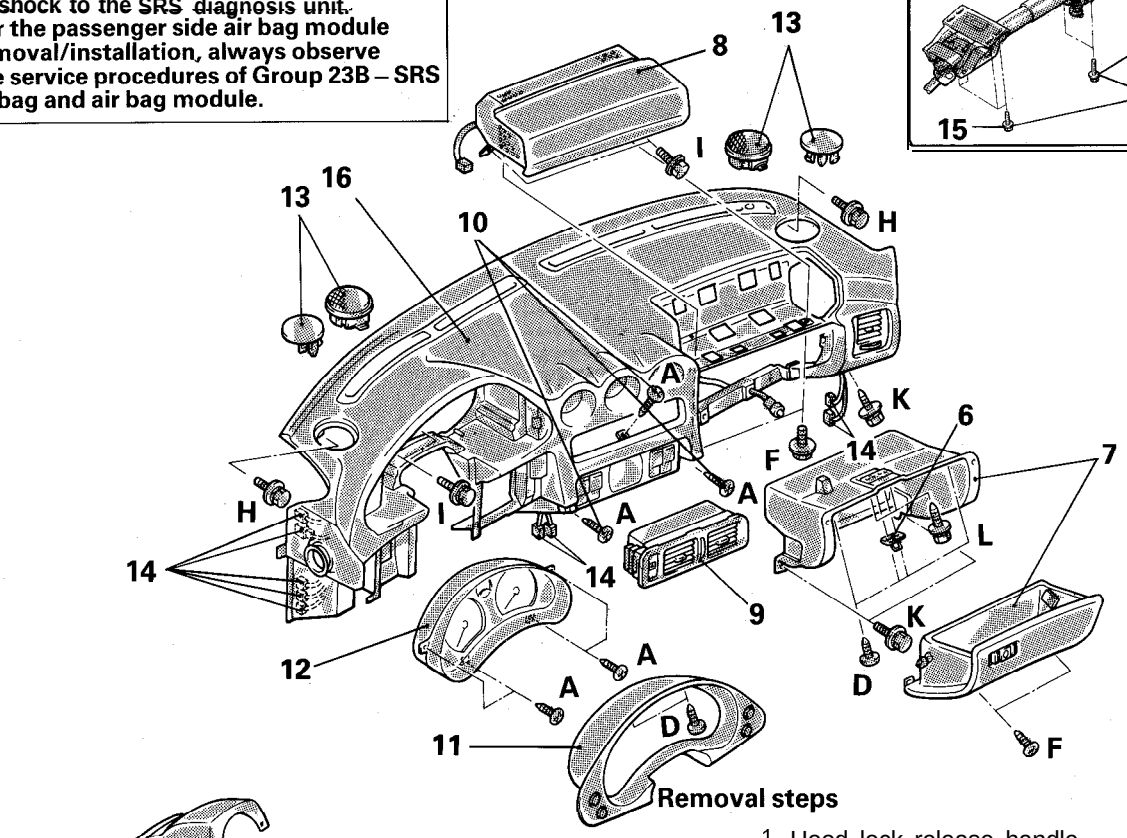
NOTE
D = Thread diameter
L = Effective thread length

REMOVAL AND INSTALLATION

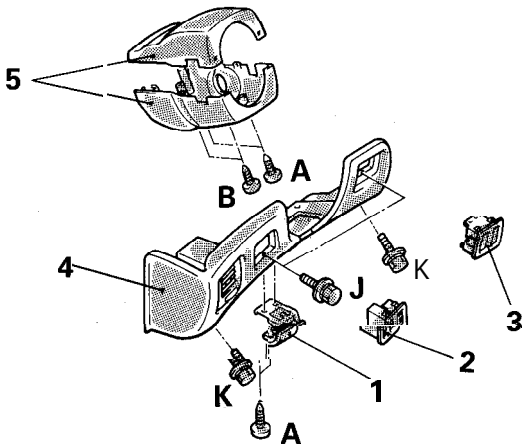
Pre-removal and Post-installation Operation
- Removal and Installation of Floor Console (Refer to P.23A-89.)

CAUTION: SRS
(1) When removing and installing the floor console assembly, don't allow any impact or shock to the SRS diagnosis unit.
(2) For the passenger side air bag module removal/installation, always observe the service procedures of Group 23B – SRS airbag and air bag module.



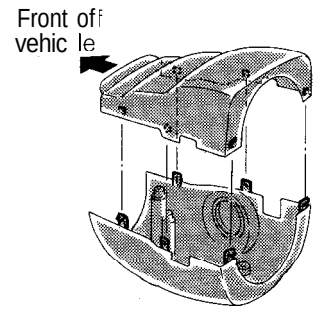


Removal steps



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. Passenger's seat air bag module (Refer to GROUP 23B -Air Bag Module and Clock Spring)
9. Center air outlet assembly ◆◆
10. Heater control assembly installation screws
11. 12. Combination Meter bezel meter
13. Speaker or plug
14. Harness connector
15. Steering shaft mounting bolts
16. Instrument panel assembly

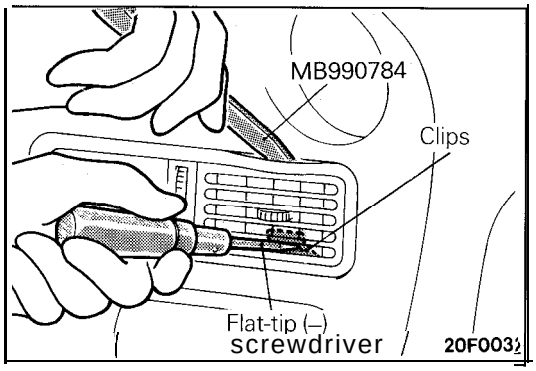
19F0244



SERVICE POINTS OF REMOVAL

5. REMOVAL OF COLUMN COVER

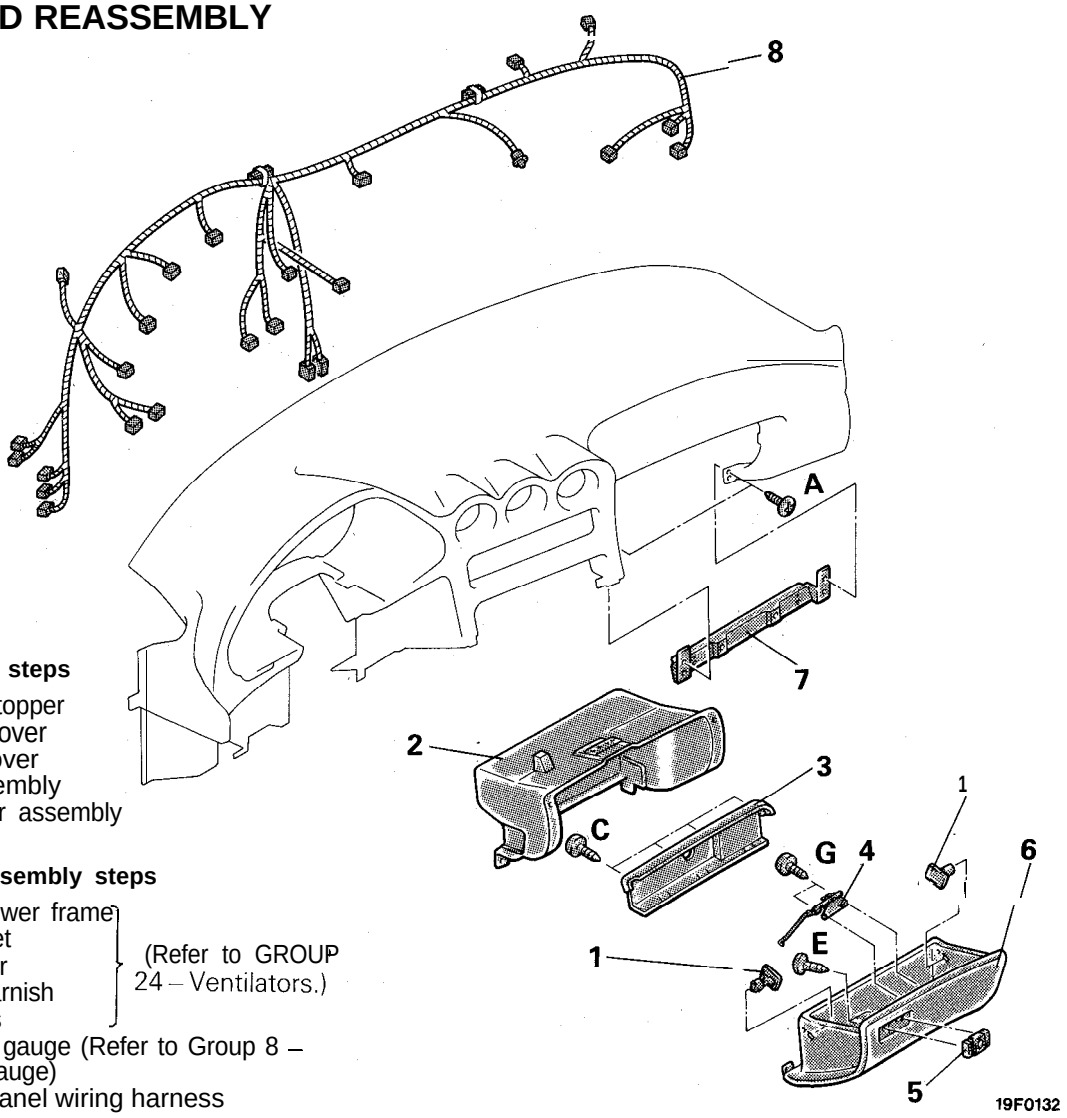
Remove the screws and remove the column cover while using care not to break the claws.



9. 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 special tool.

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

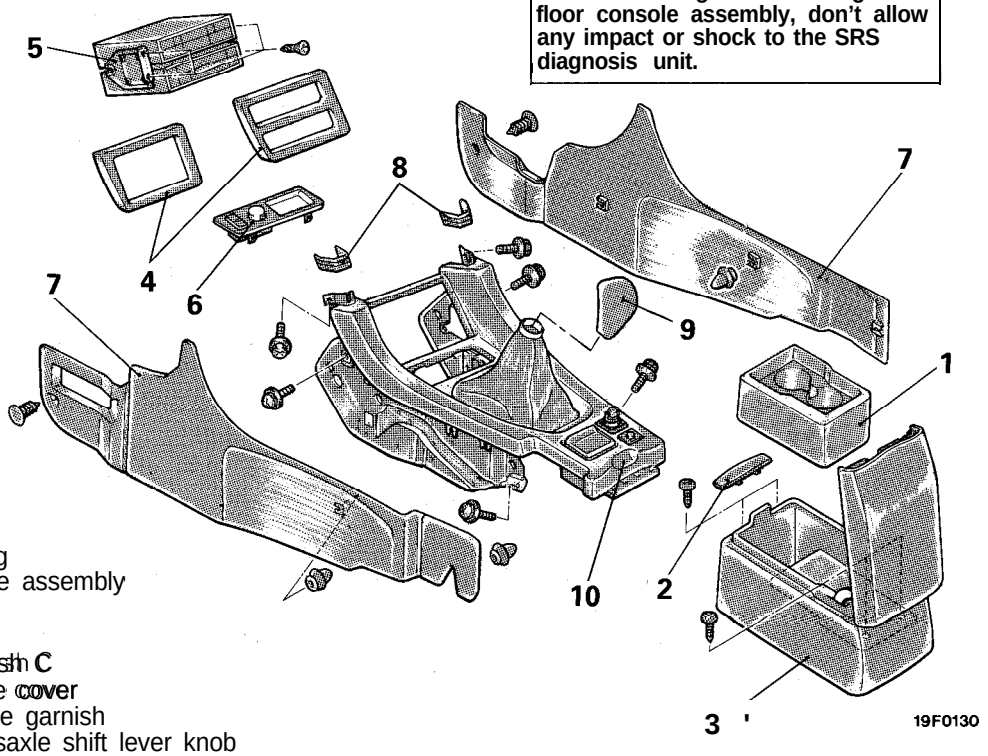
Instrument panel disassembly steps

7. Glove box lower frame
   Side air outlet
   Photo sensor
   Defroster garnish
   Heater ducts
   (Refer to GROUP 24 – Ventilators.)
   Combination gauge (Refer to Group 8 – Meter and gauge)
8. Instrument panel wiring harness

FLOOR CONSOLE

REMOVAL AND INSTALLATION

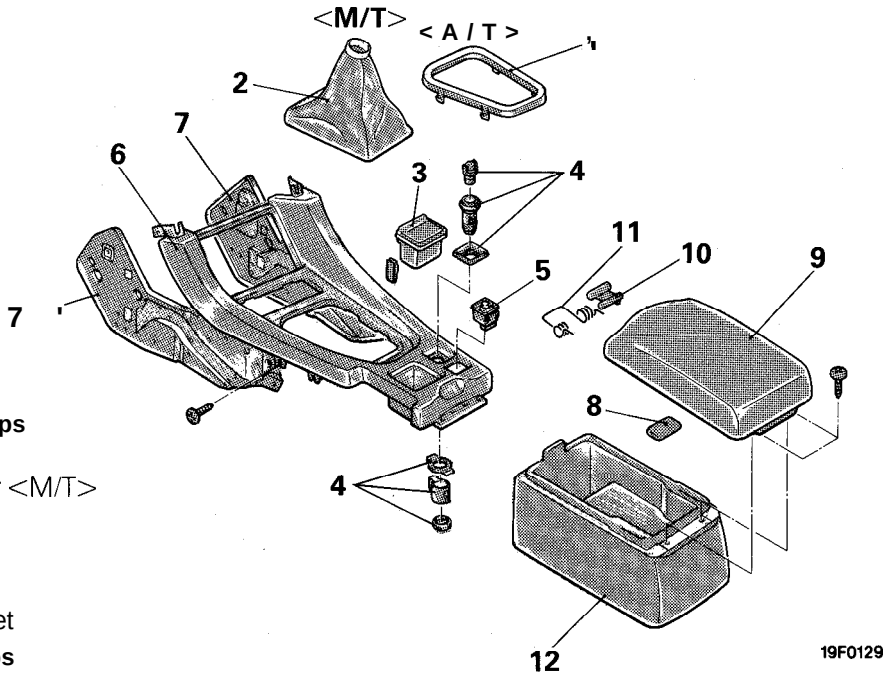
! CAUTION : SRS
When removing and installing the floor console assembly, don't allow any impact or shock to the SRS diagnosis unit.



Removal steps

1. Cup holder
2. Console plug
3. Rear console assembly
4. Radio panel
5. Radio
6. Switch garnish
7. Console side cover
8. Front console garnish
9. Manual transaxle shift lever knob
10. Front console assembly

DISASSEMBLY AND REASSEMBLY

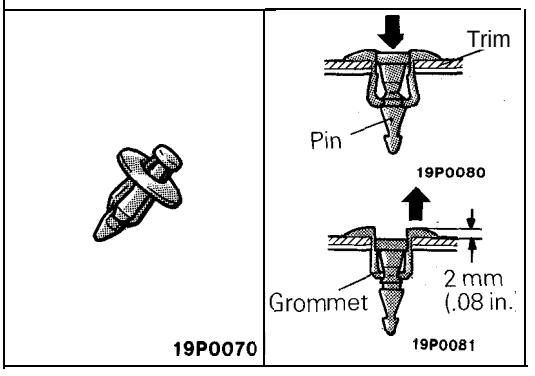


Front console disassembly steps

1. A/T garnish <A/T>
2. M/T shift lever cover <M/T>
3. Ashtrav
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



TRIMS

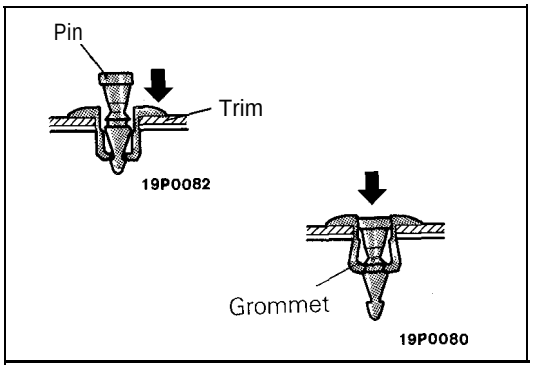
TRIM CLIP REMOVAL/INSTALLATION PROCEDURES

The type of clip shown in the illustration, which is used for the installation of instrument panel, should be removed and installed by the following procedures described below.

REMOVAL

(1) Use a cross-tip (+) screwdriver to push inward the pin (at the center of the trim clip) to a depth of about 2 mm (.08 in.).
(2) Pull the trim clip outward to remove it.

Caution
Do not push the pin inward more than necessary because it may damage the grommet, or the pin may fall in, if pushed too far.

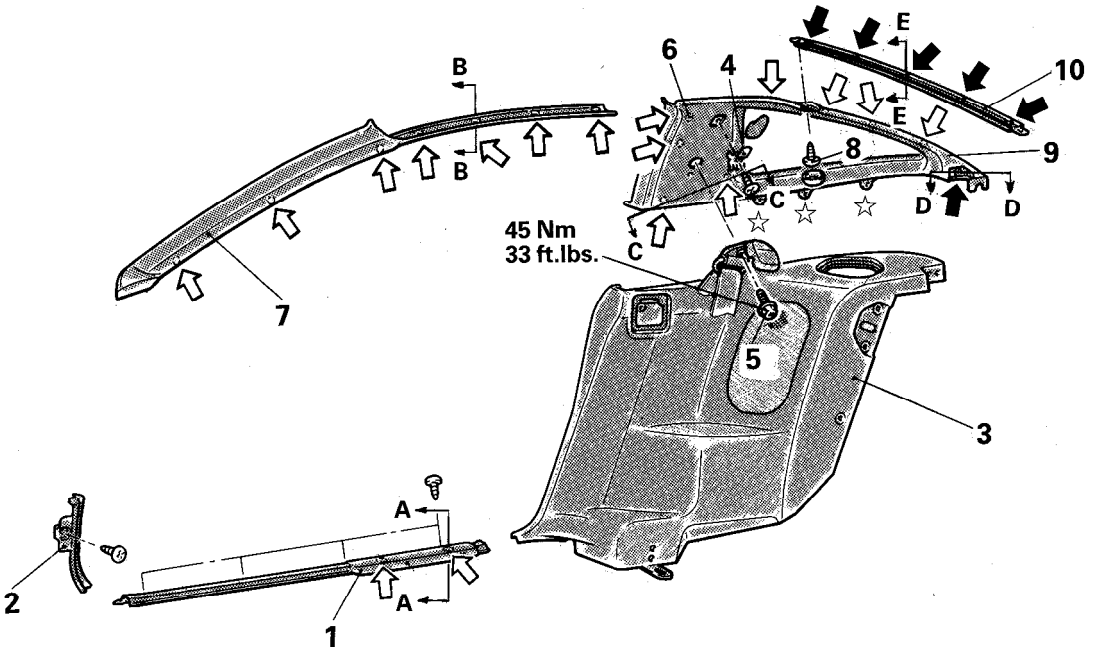


INSTALLATION

(1) With the pin pulled out, insert the trim clip into the hole in the trim.
(2) Push the pin inward until the pin's head is flush with the grommet.
(3) Check whether the trim is secure.

REMOVAL AND INSTALLATION

<Interior>



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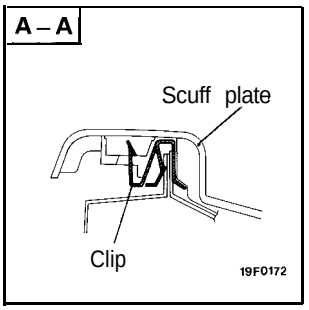
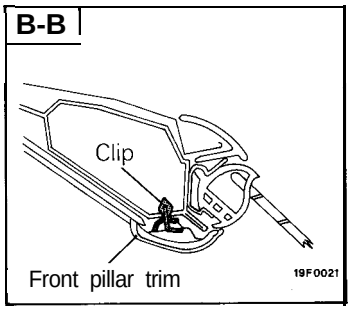
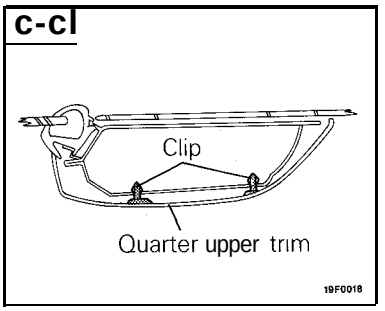
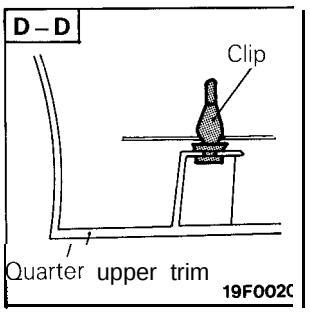
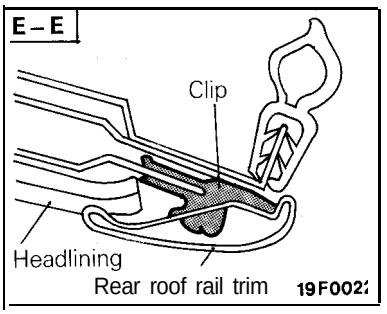










Cowl side trim removal steps

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

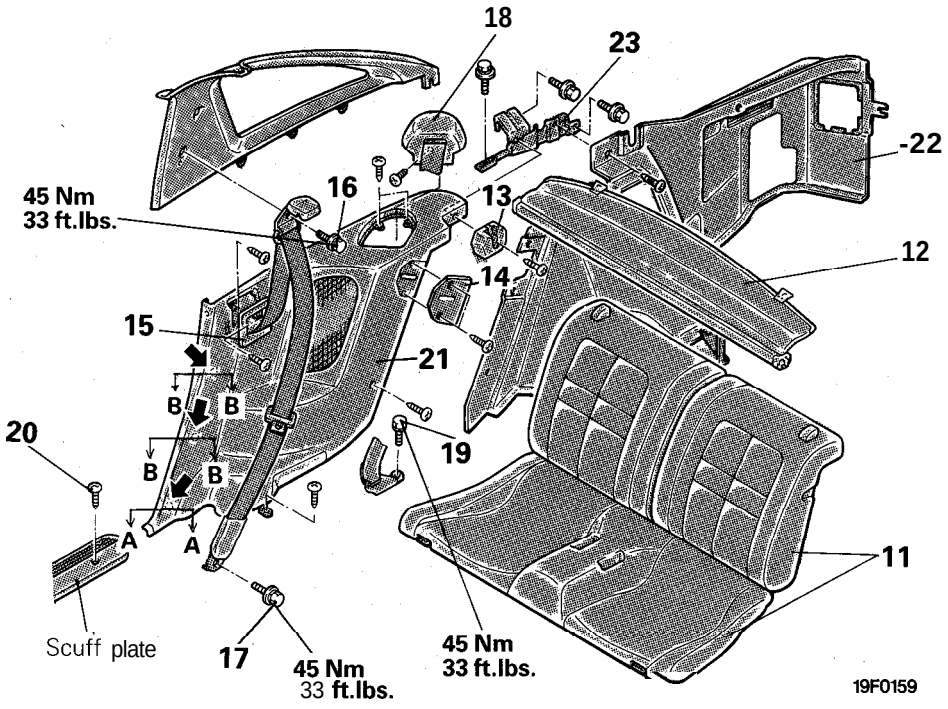
Quarter upper trim removal steps

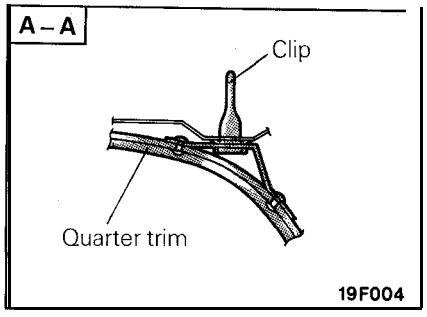
3. Quarter trim (Refer to P.23A-92.)
4. Coat hanger
8. Screw
9. Quarter upper trim

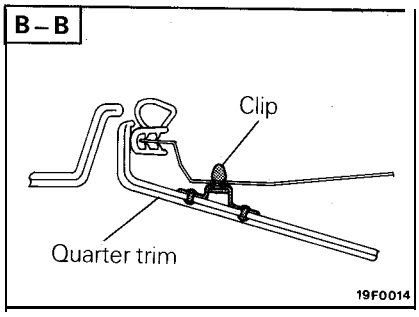
Rear roof rail trim removal steps

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.23A-90.)
(4) For door trim, refer to P.23A-68.



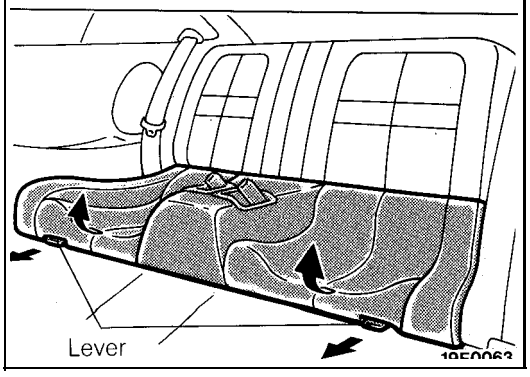




Quarter trim removal steps

◆◆ ◆◆ 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.23A-93.)
23. Quarter trim bracket

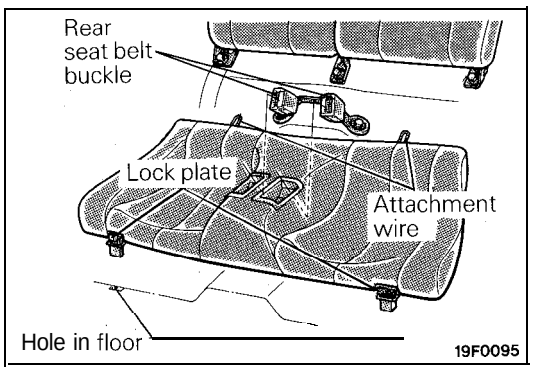
NOTE
◆: Location of resin clip



SERVICE POINT OF REMOVAL

11. REMOVAL OF REAR SEAT

With the lever pulled forward, raise the seat cushion to remove it.

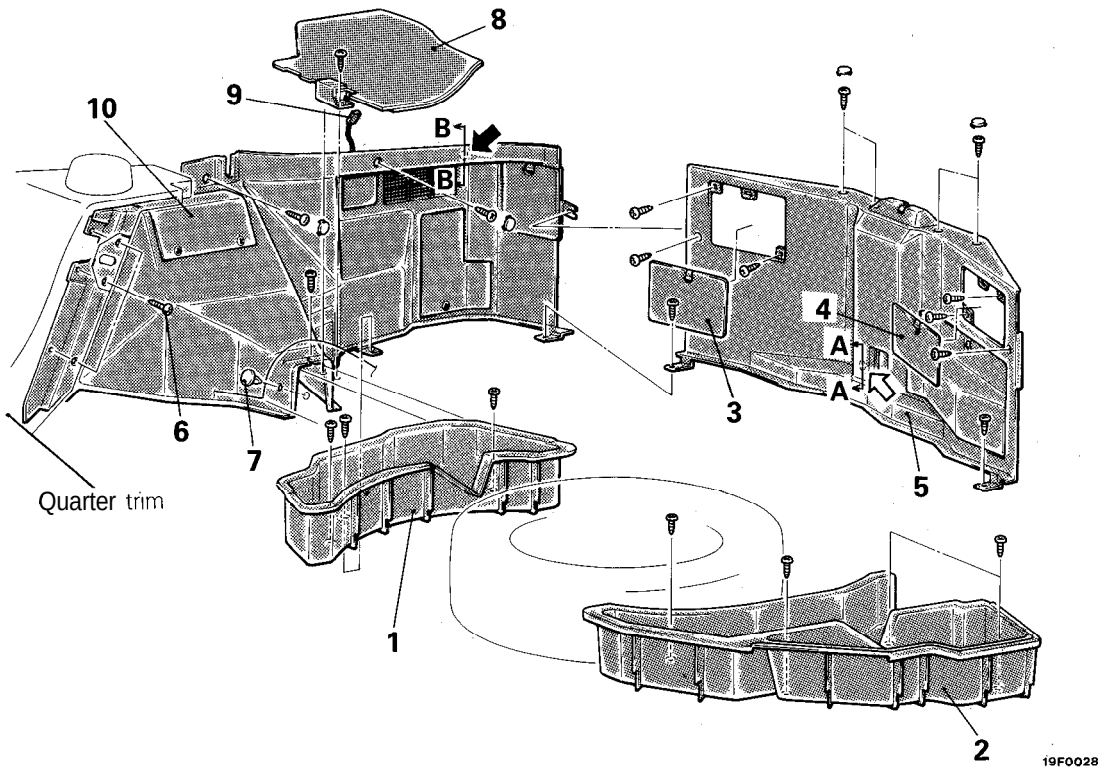


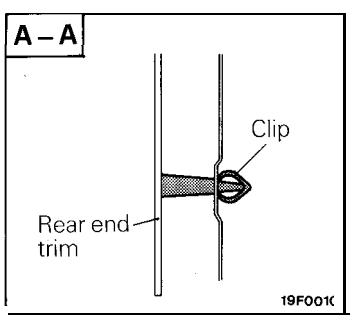
SERVICE POINT OF INSTALLATION

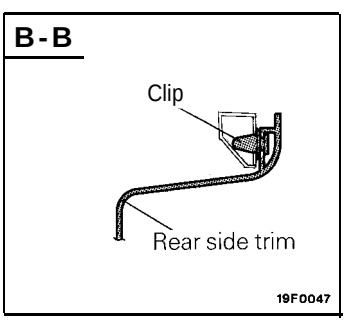
11. INSTALLATION OF REAR SEAT

(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>





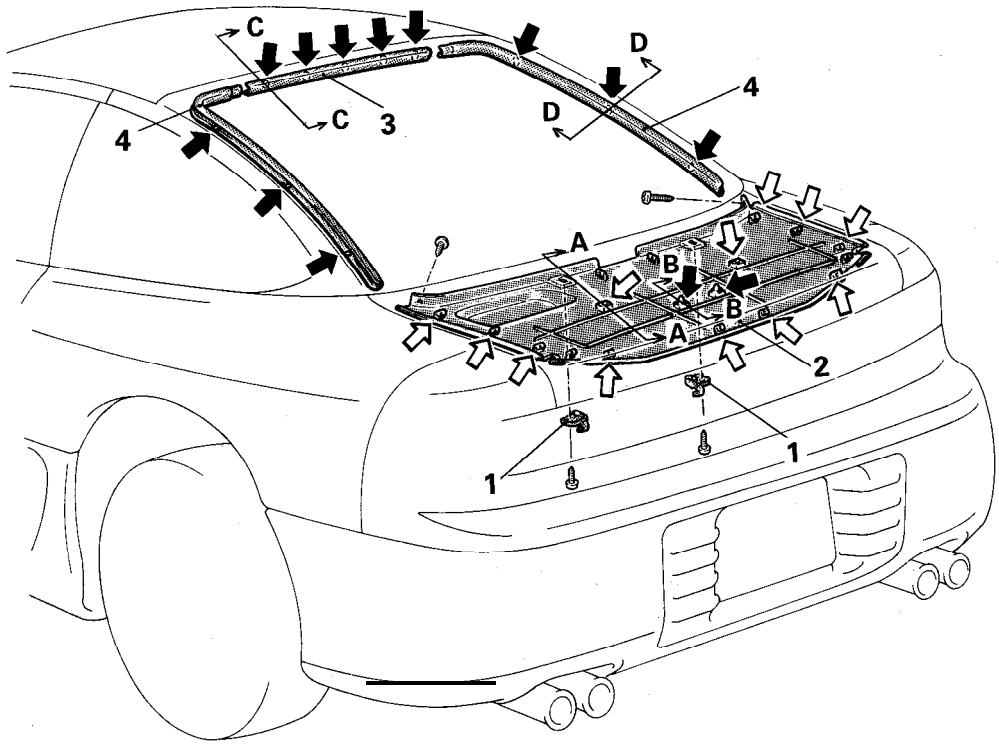


Rear side trim, rear end trim removal steps

1. Luggage compartment floor box (R.H.)
2. Luggage compartment floor box (L.H.)
3. Lid (R.H.)
4. Lid (L.H.)
5. Rear end trim
6. Screws
7. Floor mat mounting clip
8. High floor center board
9. Luggage compartment light connector connection
10. Rear side trim

NOTE
(1) ⇦: Location of metallic clip
(2) ⬅: Location of resin clip

<Liftgate>



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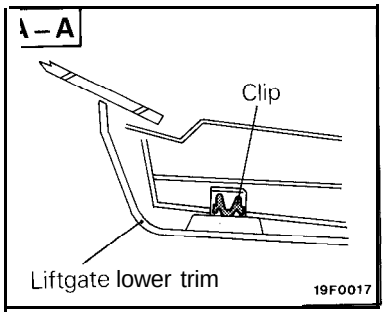
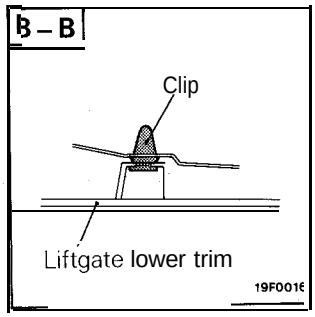
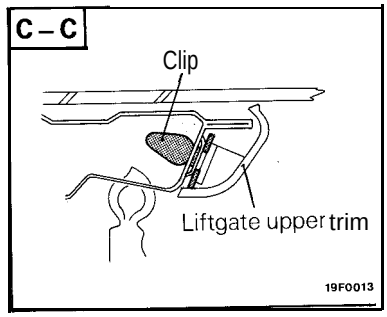
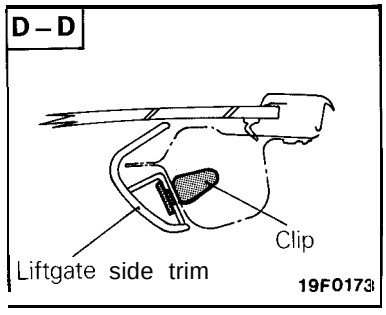








Liftgate trim removal steps

1. Shelf hook
2. Liftgate lower trim
3. Liftgate upper trim
4. Liftgate side trim

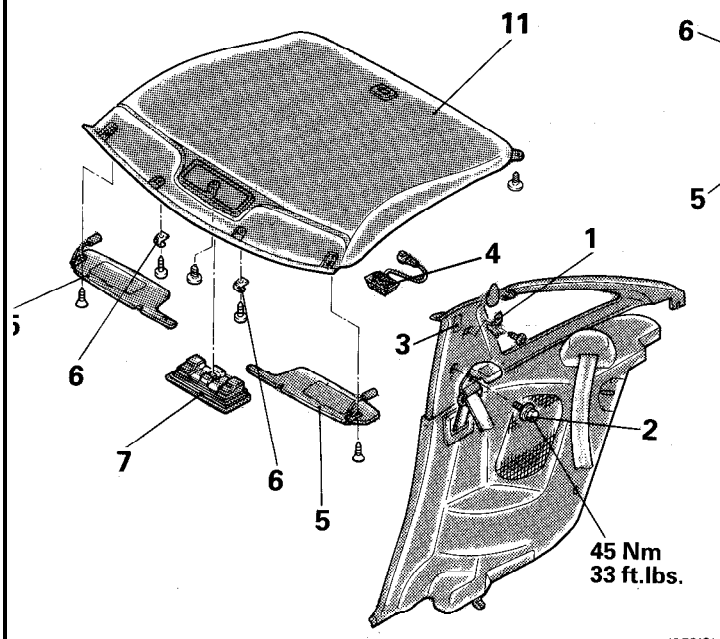
NOTE
(1) ⇦ : Location of metallic clip
(2) ⬅ : Location of resin clip

HEADLINING

REMOVAL AND INSTALLATION

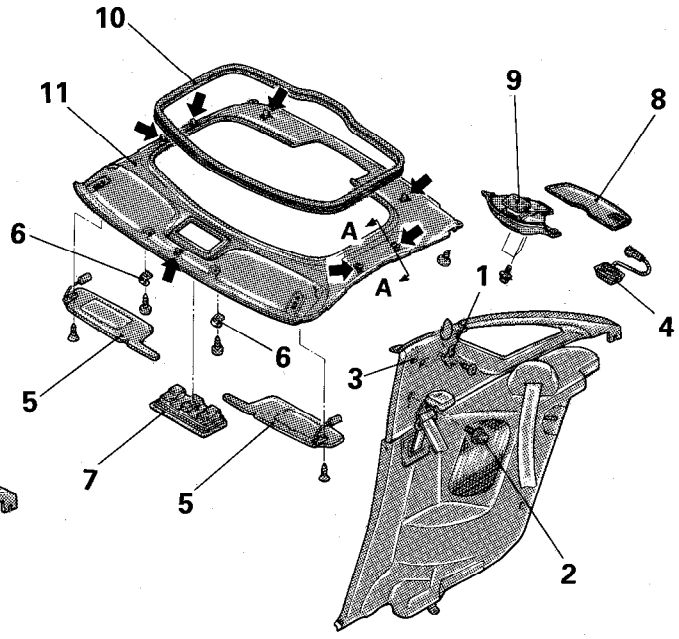
Pre-removal and Post-installation Operation
- Removal and Installation of Rear Roof Rail Trim (Refer to P.23A-91.)
- Removal and Installation of Front Pillar Trim (Refer to P.23A-91.)

<Vehicles without sunroof>

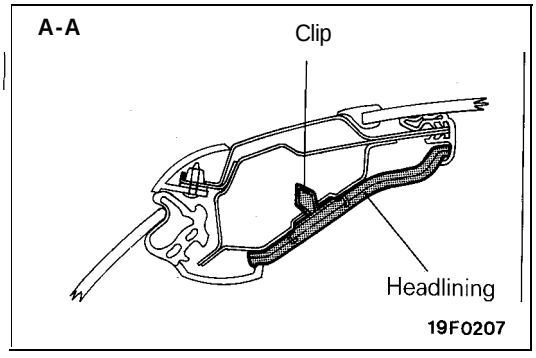


19F0161

<Vehicles with sunroof>



19F0202

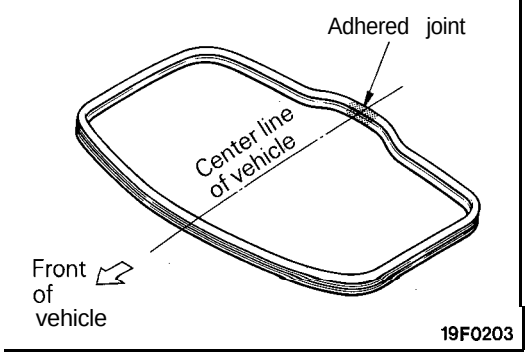


19F0207

Removal steps

1. Hanger bracket
2. Sash guide cover mounting bolt
3. Clip
4. Passenger compartment temperature sensor (Vehicles with full automatic air conditioning)
5. Sunvisor assembly
6. Sunvisor holder
7. Room light assembly
8. Regulator cover
9. Roof lid regulator assembly
10. ◆◆ Roof weatherstrip, inner
11. Headlining

NOTE
● : Location of resin clip



19F0203

SERVICE POINTS OF INSTALLATION

10. INSTALLATION OF THE SUNROOF INNER WEATHERSTRIP

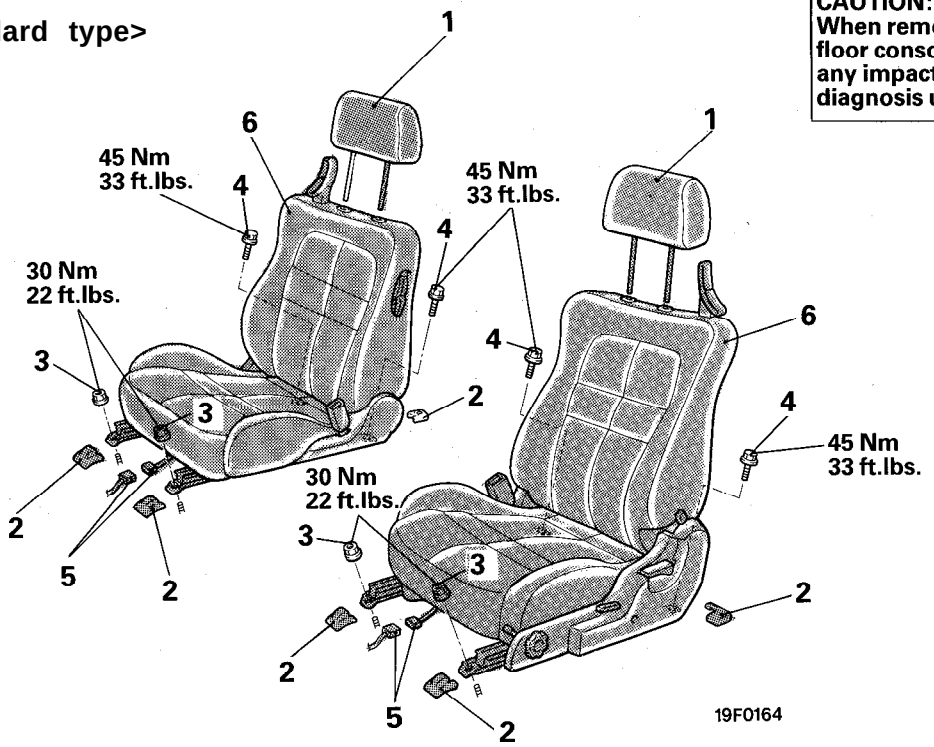
Install the sunroof inner weatherstrip with its adhered joint located toward the rear of the vehicle and on its center line.

FRONT SEAT

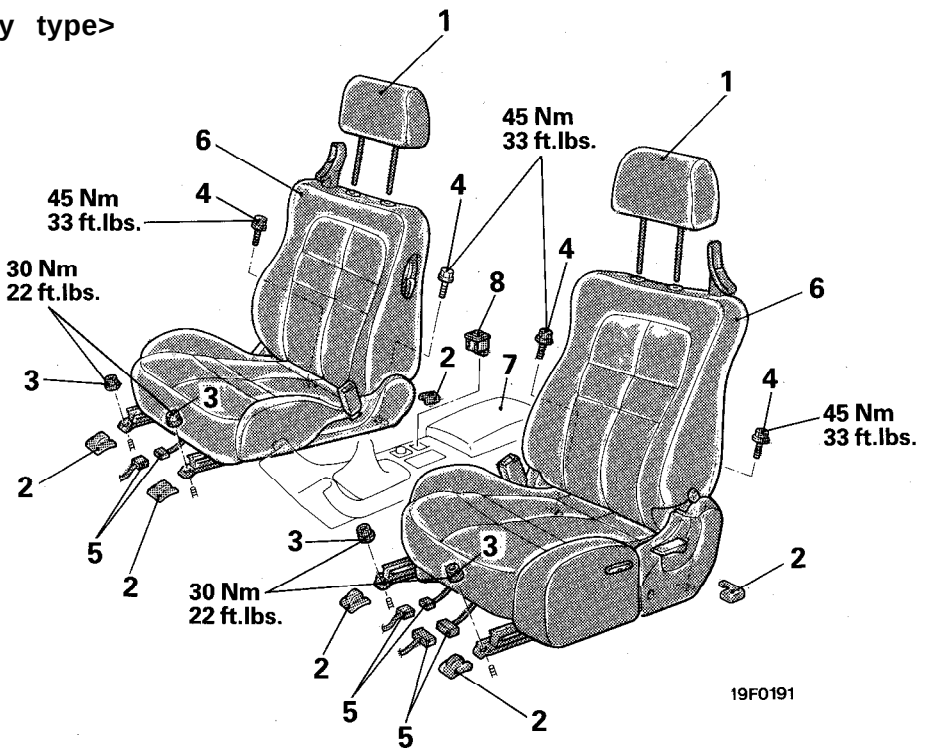
REMOVAL AND INSTALLATION

CAUTION: SRS
When removing and installing the floor console assembly, don't allow any impact or shock to the SRS diagnosis unit.

<Standard type>



<Sporty type>



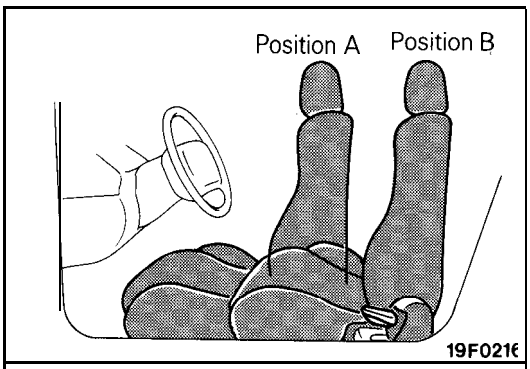
1. Head restraint

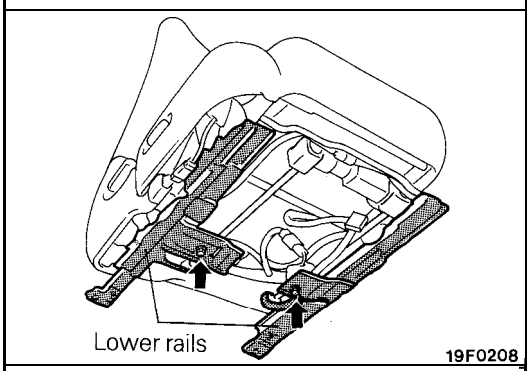
Front seat removal steps

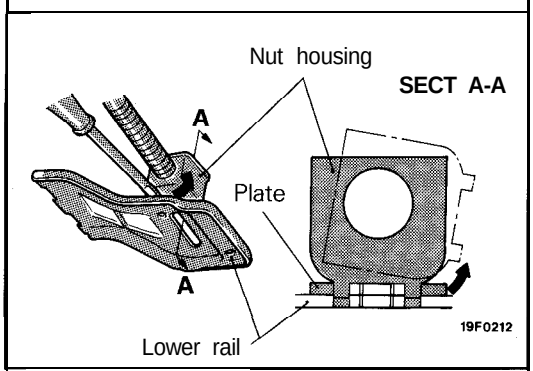
- ◆◆ 2. Seat anchor covers
- 3. Seat mounting nut
- 4. Seat mounting bolt
- 5. Harness connector
- ● C 6. Front seat assembly

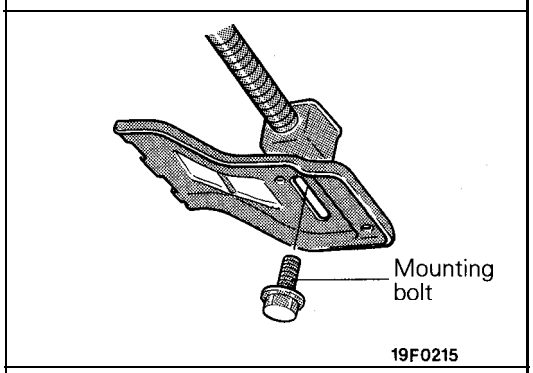
Power seat switch removal steps

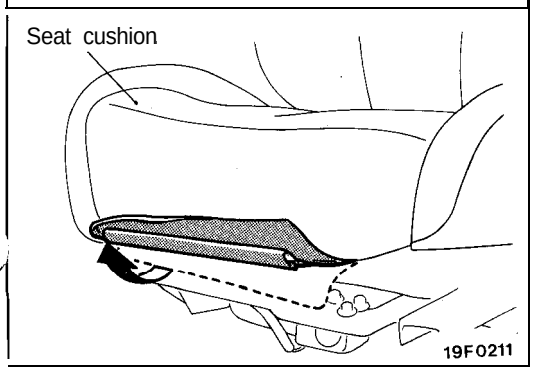
- 7. Front console assembly (Refer to P.23A-89.)
- 8. Power seat switch A











REMOVAL AND INSTALLATION POINTS OF FRONT SEAT ASSEMBLY WHEN THERE IS A MALFUNCTION IN THE POWER SEAT SLIDE MECHANISM

If removal of the seat mounting nut and bolt is impossible when there is a malfunction in the slide motor or the slide switch and the seat cannot slide, remove and install the front seat assembly by the following procedure.
In addition, two removal and installation procedures are established depending on the seat positions.

- Position A shown in the illustration – Refer to procedure 1
- Position B shown in the illustration – Refer to procedure 2

1. Procedure for Removal and Installation of Seat Stopped at Forward Position

   (1) Working from behind the seat, remove the bolts from under the seat cushion as illustrated.

   (2) Insert a flat tip screwdriver between the plate and the nut housing, pry the pawl of the nut housing from the hole of the plate and rotate the housing.
   (3) Slide the seat and remove the seat mounting nuts and bolts.

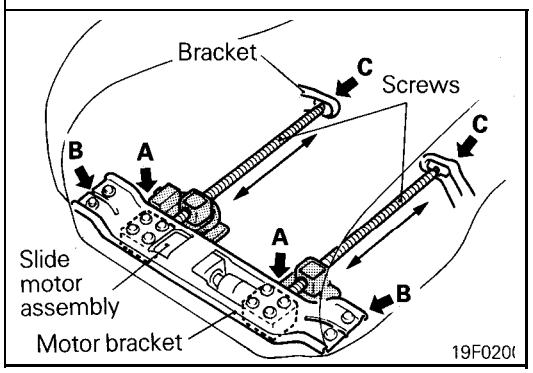
   (4) When the power seat adjuster assembly is reused, apply specified adhesive to the mounting bolts before tightening them.

   Specified adhesive: MOPAR Part No. 431803 or 4318032 or equivalent

   Caution
   Be sure that the right and left nut housings are in alignment.

2. Procedure for Removal and Installation of Seat Stopped at Rearward Position

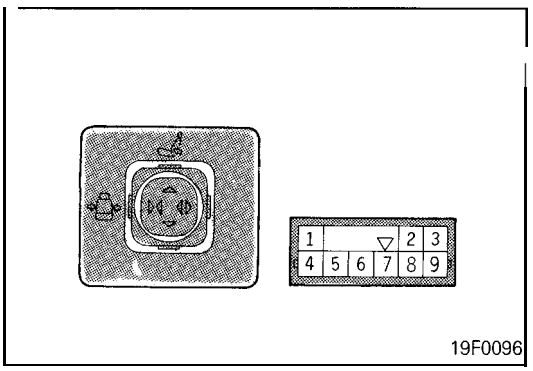
   (1) Take off the seat cover from the front end of the seat cushion.



(2) Remove the slide motor mounting bolts (eight bolts at A in the illustration).
Slightly pull the slide motor assembly forward to disconnect the screws from the respective brackets at C in the illustration.
Removing only bolts at A in the illustration may not allow the slide motor to be pulled out, depending on the seat position. In that case, further remove the motor bracket mounting nuts (four nuts at B in the illustration).

(3) Slide the seat and remove the seat mounting nuts and bolts.

NOTE
If the seat does not move far enough to remove the seat mounting nuts and bolts, slide the seat forward as much as possible and remove the seat in accordance with procedure 1.



INSPECTION

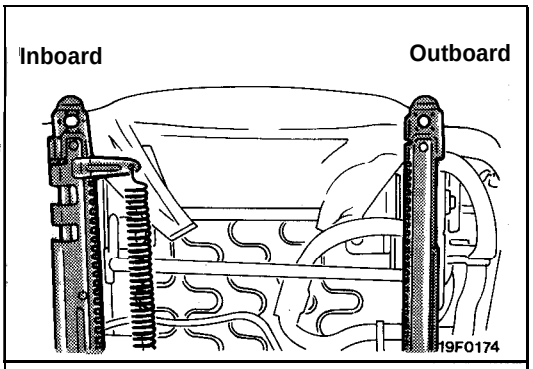
POWER SEAT SWITCH A INSPECTION

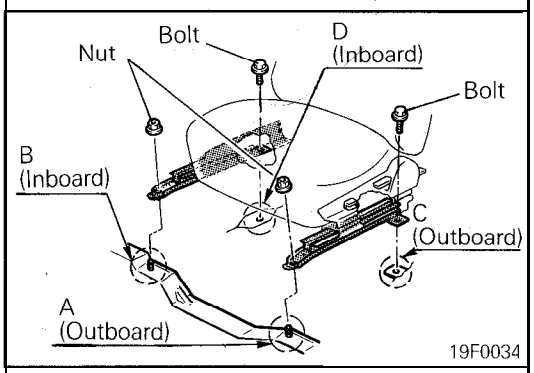
Operate the power seat switch A to check for continuity.

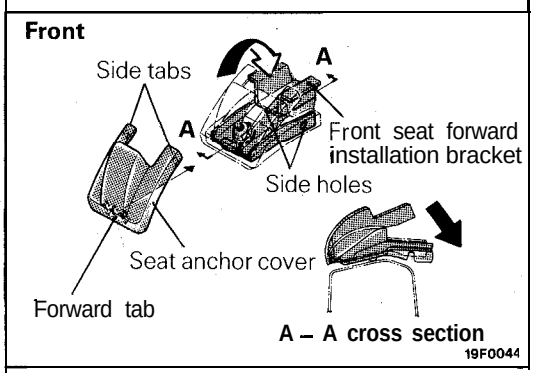
Lumbar support				
Terminal No. / Switch position	2	3	5	7
PUSH (△)	○—○		○—○	
OFF	○—○		○	
RELEASE(V)	**0**	0	**0**	0

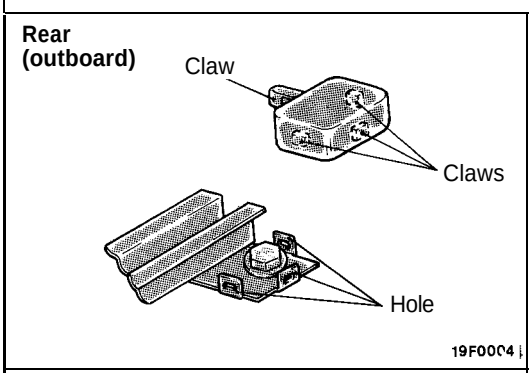
Side support				
Terminal No. / Switch position	1	2	7	8
SPREAD (◁▷)	○—○		○—○	
OFF	○—○			○
CLOSE (▷◁)	**0**	0		0

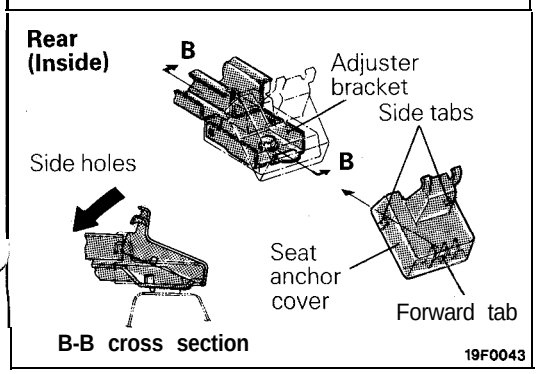
NOTE
○–○ indicates that there is continuity between the terminals.











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 (except power seat).

Caution
Note that when the slide is pulled, the inboard slide rail is unlocked, causing the slide rail to be pulled back by spring force.

(2) After checking that the seat adjuster is locked at both sides, provisionally tighten (in the A, B, C and D sequence) the seat installation nuts and the seat installation bolts; then fully tighten at the specified torque.

2. INSTALLATION OF SEAT ANCHOR COVERS

(1) Install the for-ward 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.

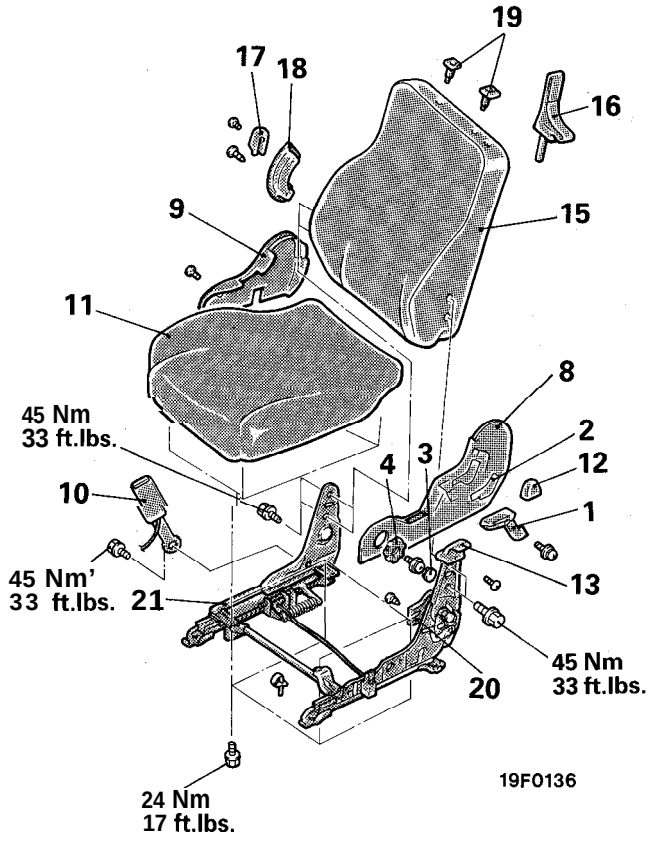
(2) Insert the rear side seat anchor cover (outer side) to the front seat rearward installation bracket, and then attach each tab of the seat anchor cover to the hole of the bracket.

(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.

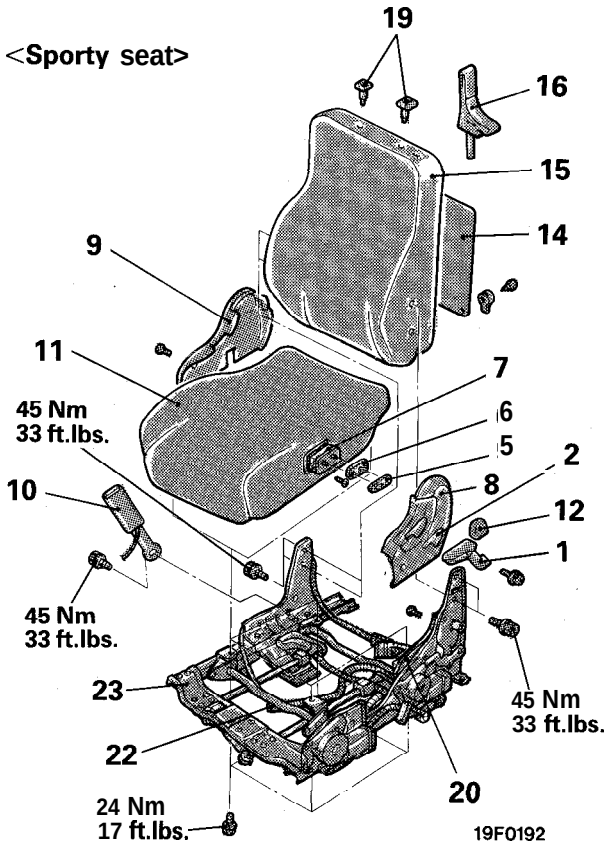
DISASSEMBLY AND REASSEMBLY

DRIVER SEAT

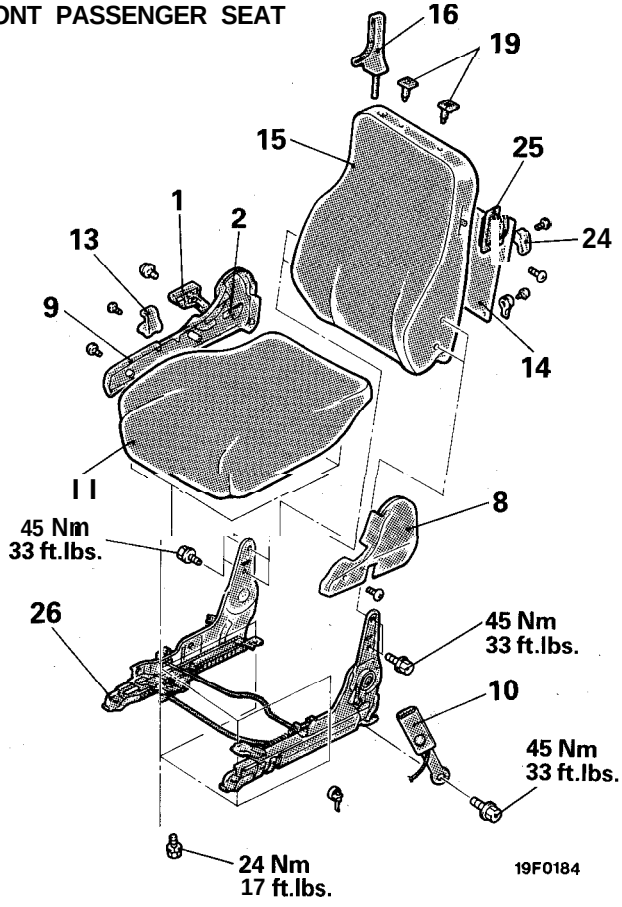
<Standard seat>



<Sporty seat>

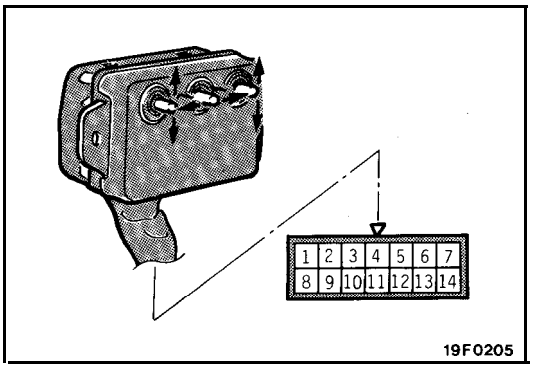


FRONT PASSENGER SEAT



Removal steps

1. Reclining adjuster knob
2. Plug
3. Cap } (Standard driver seat)
4. Height adjuster lever
5. Power seat adjuster lever (Sporty driver seat)
6. Garnish (Sporty driver seat)
7. Power seat switch B (Sporty driver seat)
8. Side shield cover (L.H.)
9. Side shield cover (R.H.)
- *10. Inner seat belt
11. Seat cushion assembly
12. Memory reclining knob (Driver seat)
13. Sliding adjuster knob
14. Seat back panel (Except standard driver seat)
15. Seat back assembly
16. Seat belt guide
17. Lumbar support knob } (Sporty driver seat)
18. Lumbar support garnish
19. Head restraint guide
20. Reclining adjuster lower cover (Driver seat)
21. Height adjuster (Standard driver seat)
22. Power seat harness } (Sporty driver seat)
23. Power seat adjuster
24. Walk-in knob } (Front passenger seat)
25. Walk-in knob garnish
26. Slide adjuster



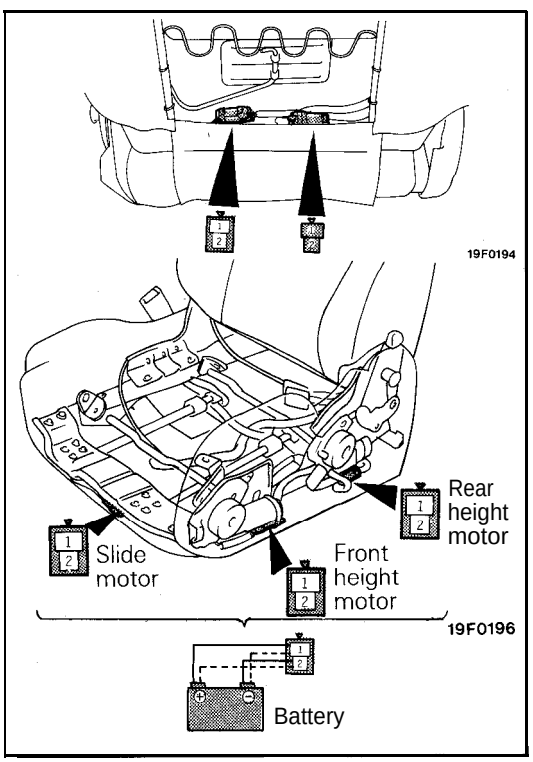
INSPECTION

POWER SEAT SWITCH B INSPECTION

Operate the power seat switch to check for continuity.

Switch position		Terminal No. 1	2	3	4	5	6	7	8	9	10	11	12	13	14
Slide switch	Forward		o -	- o											
					0										0
	Backward	0			0										
				○											○
Front height switch	Up									o -	- o				
												0			0
	Down								○			○			
											o	- -	-	- -	o
Rear height switch	Up						0						0		
								0							0
	Down					0		0							
													0		○
All switches	OFF														

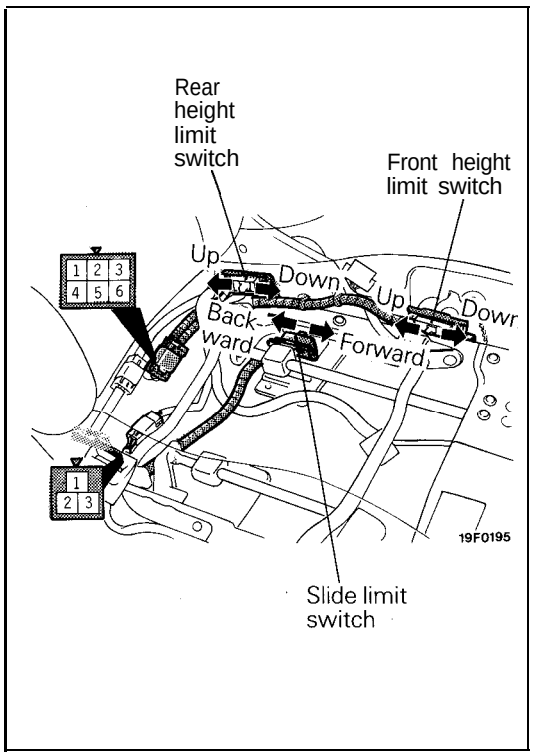
NOTE
○–○ indicates that there is continuity between the terminals.



POWER SEAT MOTOR INSPECTION

(1) Disconnect the connector from each motor. To disconnect the lumbar support and side support motors, remove the seatback panel in advance.
(2) Check each motor to see that when the battery is directly connected to the terminals of the motor, the motor turns freely and each adjusting mechanism operates in the directions shown in the following table.
(3) If there is abnormality, replace the power seat adjuster assembly or seatback assembly.

Name of motor	Direction of operation	Terminal No. 1	Terminal No. 2	Stop position
Lumbar support	Push	⊖	⊕	Stops within the limit of operation range
	Release	⊕	⊖	
Side support	Close	⊖	⊕	
	Spread	⊕	⊖	
Front height, Rear height	Up	⊕	⊖	Stops when limit switch is turned off
	Down	⊖	⊕	
Slide	Forward	⊕	⊖	
	Backward	⊖	⊕	



LIMIT SWITCH INSPECTION

(1) Disconnect the connector from each limit switch, and connect a circuit tester between the terminals.
(2) Operate each switch to check for continuity between the terminals.
(3) If there is abnormality, replace the power seat adjuster assembly.

<Slide limit switch>

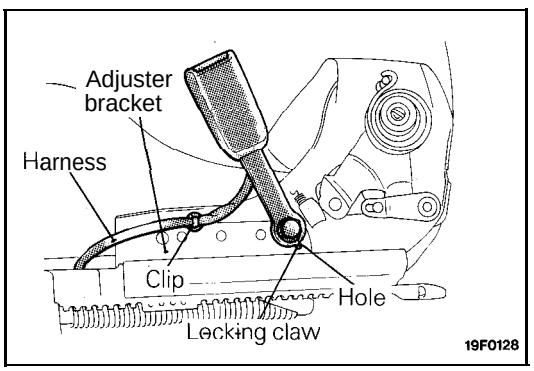
Switch position \ Terminal No.	1	2	3
Forward	0		0
Backward	0	0	
Middle (ON)	○	○	○

<Front and rear height limit switch>

Switch position \ Terminal No.	Front height			Rear height		
	1	2	3	4	5	6
Up	0		○	0		0
Down						
Middle (ON)	○	○	○	○	○	○

NOTE

is continuity between the terminals.



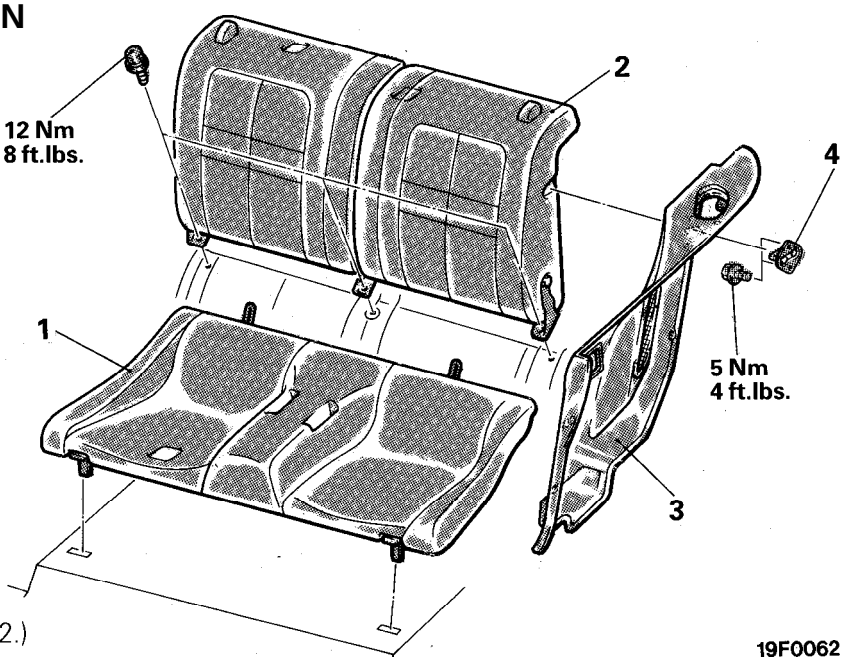
SERVICE POINT OF REASSEMBLY

IO. 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.

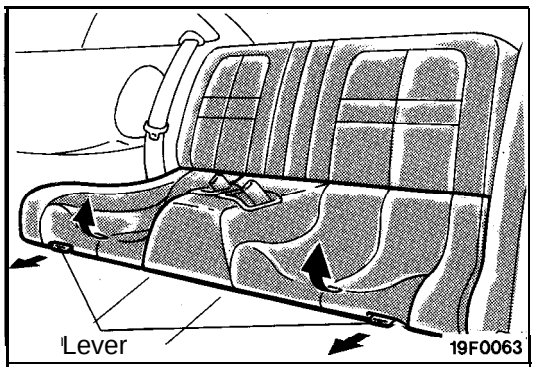
REAR SEAT

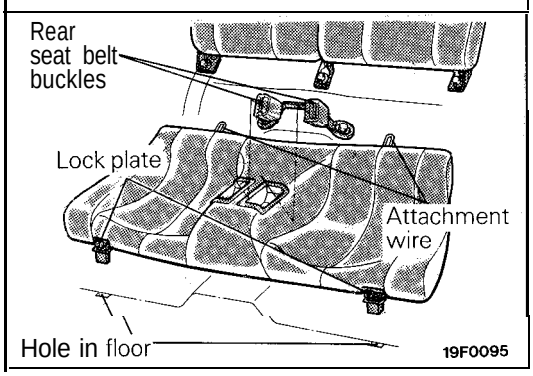
REMOVAL AND INSTALLATION



Striker removal steps

3. Quarter trim (Refer to P.23A-92.)
4. Striker





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

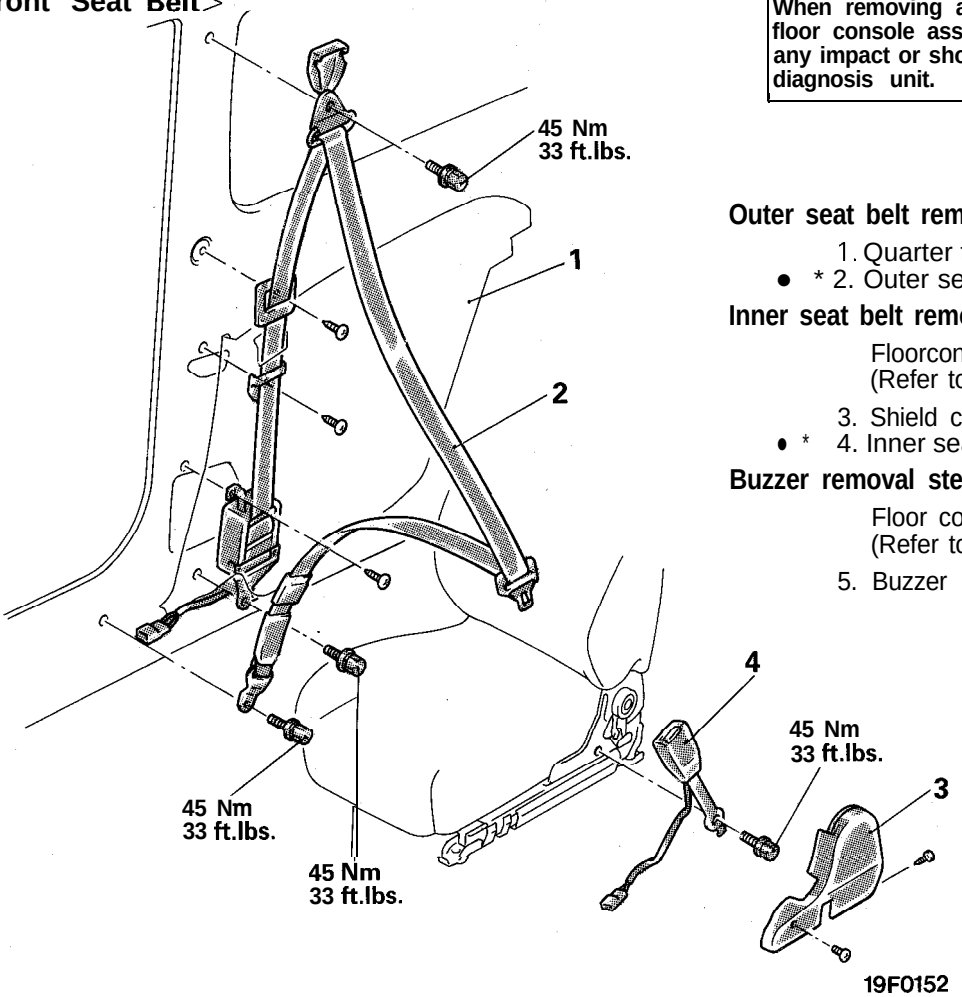
(1) Fit the attachment wire of the seat cushion under the seatback positively.
(2) Pass the rear seat belt buckle through the seat cushion.
(3) Insert the lock plate of the seat cushion in the respective holes provided in the floor.

SEAT BELT

REMOVAL AND INSTALLATION

CAUTION: SRS
When removing and installing the floor console assembly, don't allow any impact or shock to the SRS diagnosis unit.

<Front Seat Belt>

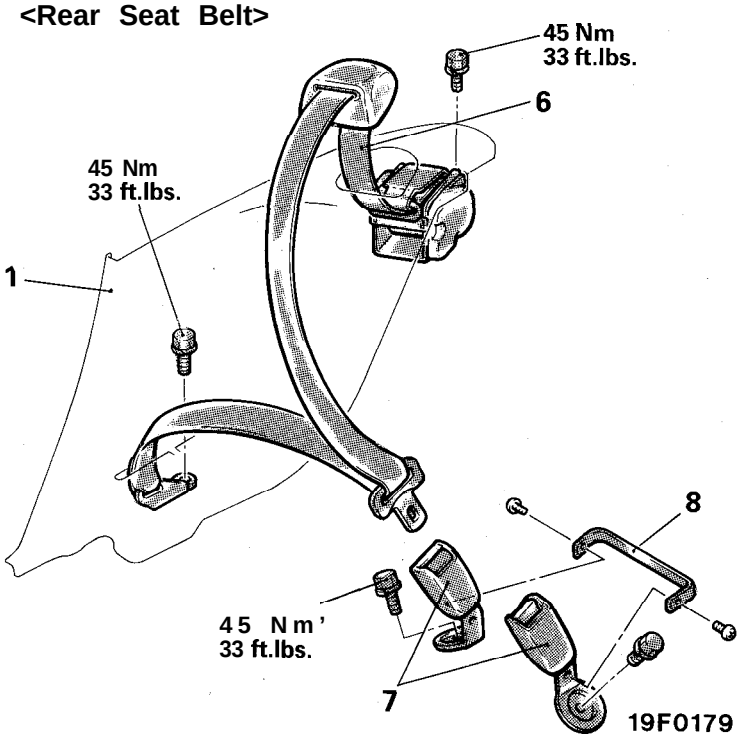


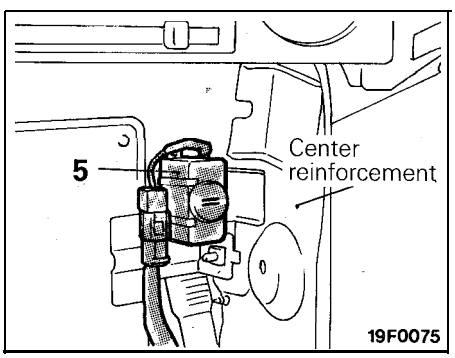
Outer seat belt removal steps
1. Quarter trim (Refer to P.23A-92.)
- * 2. Outer seat belt

Inner seat belt removal steps
Floorconsole assembly (Refer to P.23A-89.)
3. Shield cover
- * 4. Inner seat belt

Buzzer removal steps
Floor console assembly (Refer to P.23A-89.)
5. Buzzer

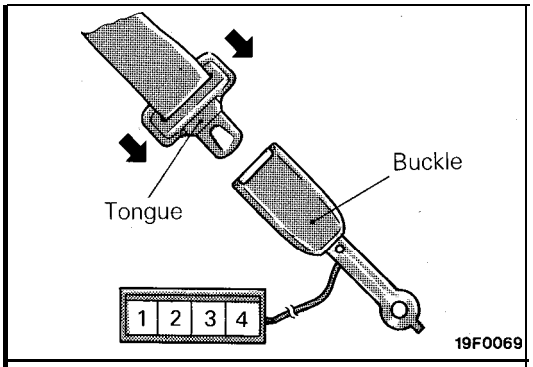
<Rear Seat Belt>





Outer seat belt removal steps
1. Quarter trim (Refer to P.23A-92.)
- * 6. Outer seat belt

Inner seat belt removal steps
Rear seat cushion (Refer to P.23A-103.)
7. Inner seat belt
8. Inner seat belt bracket



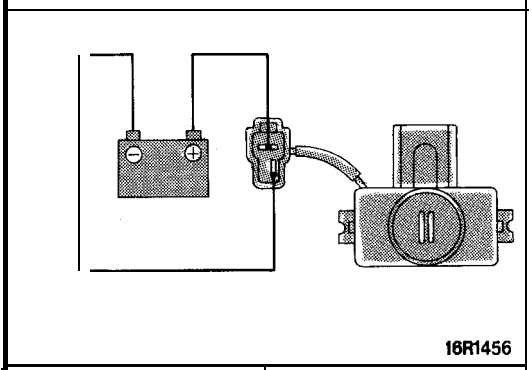
INSPECTION

BUCKLE SWITCH

(1) Disconnect the buckle switch connector.
(2) Check the continuity between the terminals.

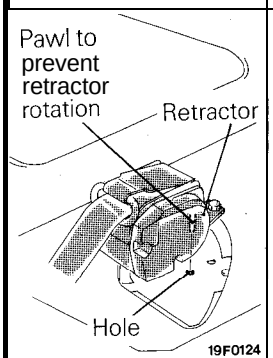
Terminal	1	2	3	4
Buckle unlock			0	0
Buckle lock	0	0		

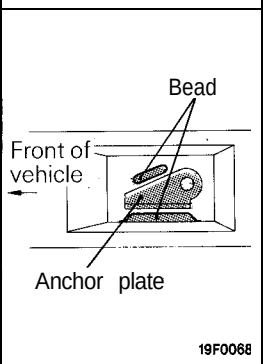
NOTE
O–O indicates that there is continuity between the terminals.



BUZZER ,

Check that buzzer sounds when battery voltage is applied to the buzzer terminal.

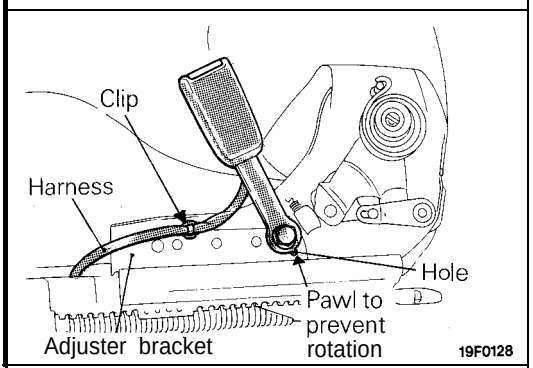




SERVICE POINTS OF INSTALLATION

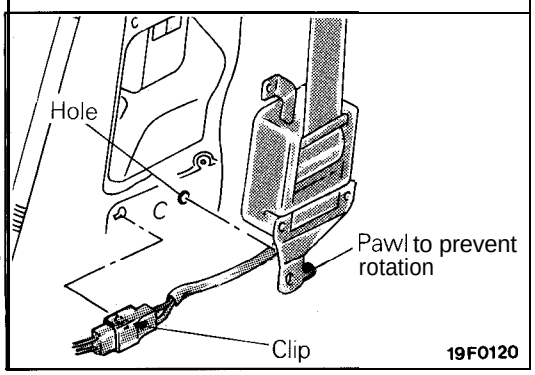
6. INSTALLATION OF OUTER SEAT BELT

(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.



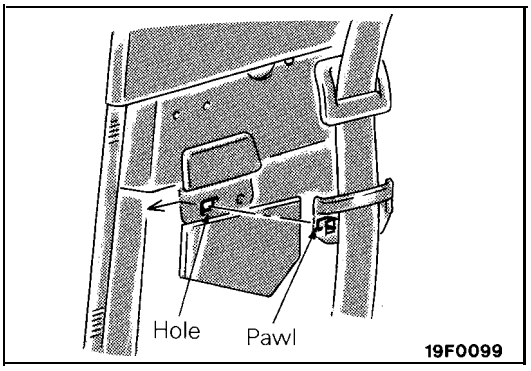
4. INSTALLATION OF INNER SEAT BELT

(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.
(4) When the final anchor of the front seat belt is installed, twist the belt through 180" at a section between the sash guide and the final anchor to direct the tip of the tongue toward the front of the vehicle.

SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

CONTENTS

CAUTION
- **Carefully read and observe the information in the SERVICE PRECAUTIONS (P.23B-14) prior to any service.**
- **For information concerning maintenance, always observe the procedures in the SRS Maintenance (GROUP 0 – MAINTENANCE SERVICE) sections, respectively.**
- **If any SRS components are removed or replaced in connection with any service procedures, be sure to follow the procedures in the COMPONENT SERVICE section (P.23B-48) for the components involved.**

GENERAL INFORMATION

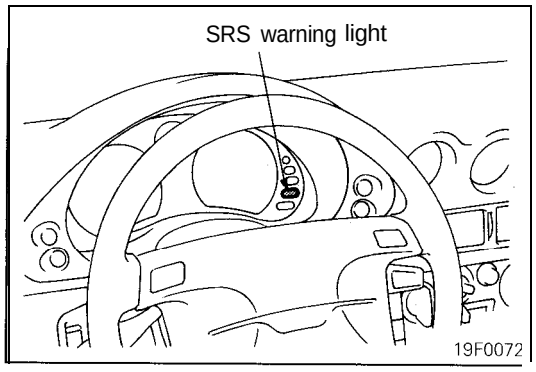
INTRODUCTION

SRS is designed to supplement the front seat belts to help reduce the risk or severity of injury to the frontseat occupants by activating and deploying two air bags during certain frontal collisions.

The SRS consists of: left front and right front impact sensors (located on the right and left front upper frame lowers); air bag modules for the driver (located in the center of the steering wheel) and for the frontr seat passenger (located above the glove box). Each module contains a folded air bag and an inflator unit. The SRS also contains: an SRS Diagnosis Unit with safing impact sensor (located under the floor console assembly); and SRS warning light to indicate the operational status of the SRS (located on the instrument panel); clock spring (mounted behind the steering wheel); and wiring.

The SRS is designed so that the air bag will deploy when the safing sensor, plus either or both of the left front and right front impact sensors simultaneously activate while the ignition switch is in the ON position. These sensors are designed to activated in frontal or near-frontal impacts of moderate to server force.

Only authorized service personnel should work on or around SRS components. Those personnel should read this manual carefully before starting such work. Extreme care must be used when servicing the SRS to avoid injury to service personnel (by inadvertent deployment of the air bags) or vehicle occupant (by rendering the SRS inoperative).



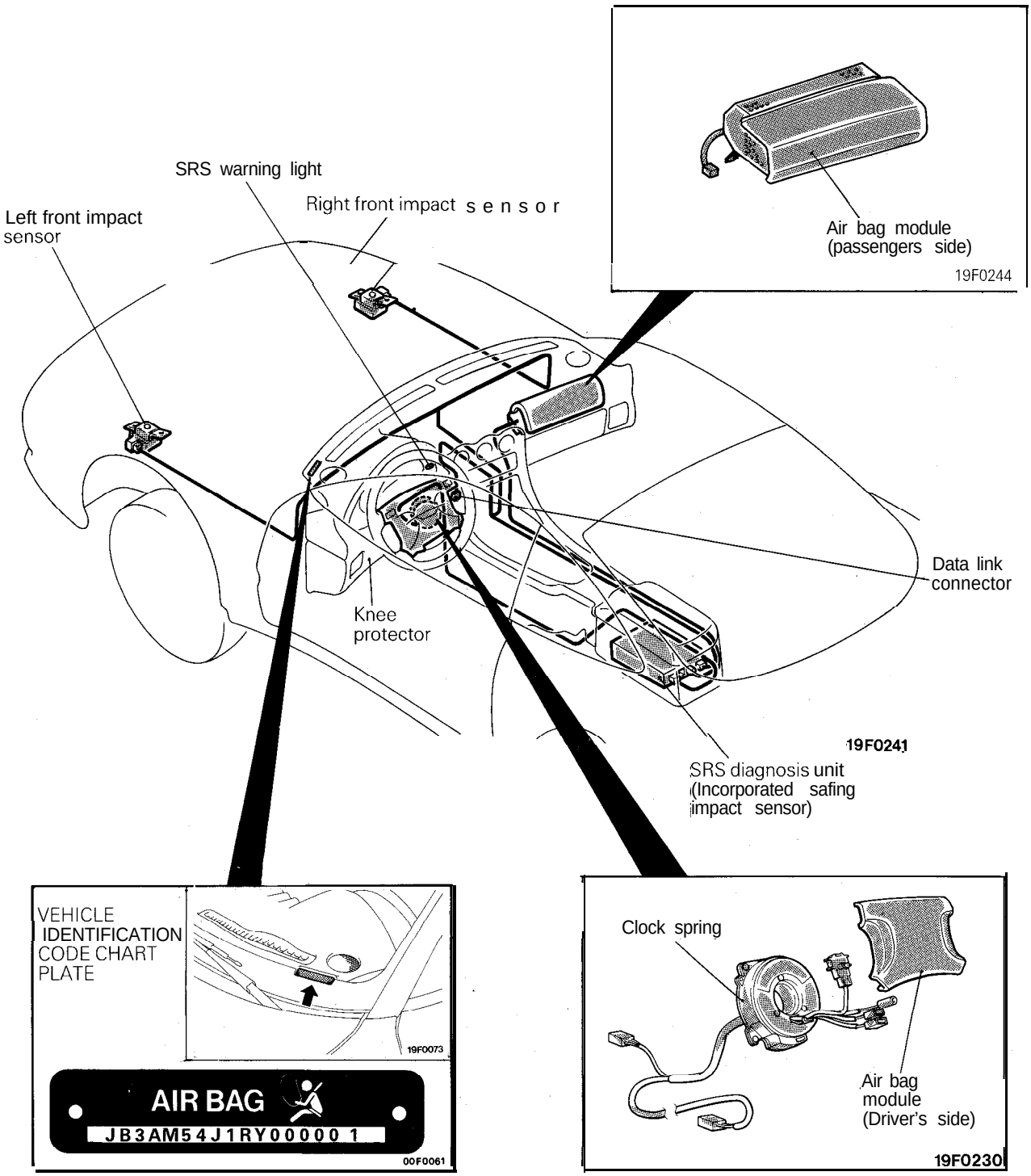
ON-BOARD DIAGNOSTIC/SRS WARNING LIGHT FUNCTION

The diagnosis unit monitors the SRS system and stores data concerning any detected faults in the system. When the ignition key is in “ON” or “START” position, the SRS warning light should illuminate for about 7 seconds and then turn off. That indicates that the SRS system is in operational order. If the SRS warning light does any of the following, immediate inspection by an authorized dealer is needed.

(1) The SRS warning light does not illuminate as described above.
(2) The SRS warning light stays on for more than 7 seconds.
(3) The SRS warning light illuminates while driving.

If a vehicle’s SRS warning light is in any of these three conditions when brought in for inspection, the SRS system must be inspected, diagnosed and serviced in accordance with this manual.

CONSTRUCTION DIAGRAM

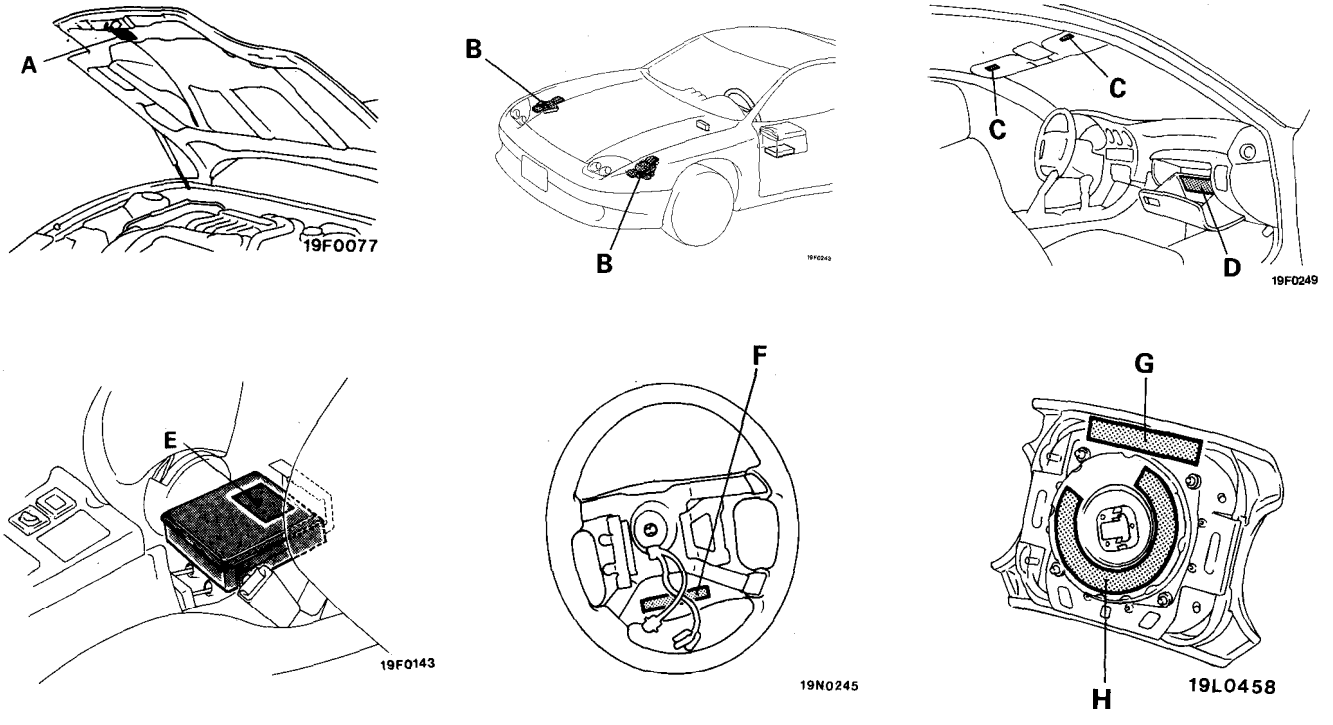


NOTE
This construction diagram displays the general view of the SRS components.
For details, refer to "SRS Schematic" (P.23B-6), "Configuration Diagrams" (P.23B-7) and "SRS Circuit Diagram" (P.23B-11)

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 air bag system.
Refer to service manual before servicing or disassembling underhood components. Read "SRS" section of manual for important instructions.
Improper service procedures can result in the air bag firing or becoming inoperative, leading to injury.

B.

CAUTION: SRS
Read service manual.
Do not drop.
Do not tamper or disassemble.

C

This vehicle has air bags for front occupants as a supplemental restraint system (SRS).
You must always wear your seatbelt, even with an air bag:

- Air bags are not designed to inflate in rollovers or in rear, side or low-speed frontal crashes.
- Air bags inflate powerfully and in moment, If you're too close to an inflating air bag. It could seriously injure you. Seatbelts help keep you in position for air bag inflation in a crash.
- An inflating air bag can seriously injure small children. A child in a rear-facing child restraint can be badly injured by an inflating air bag so never usre a rear-facing child restraint in the front seat of this vehicle; a rear-facing child restraint should be used only in the rear seat. Use a forward-facing child restraint with the front passenger seat as far back as possible, or

- Before driving read label inside the glove box; if the "SRS" light comes on while you are driving or does not come on when you first start the vehicle, see your dealer for service.
  See your owner's manual for more information.

D

Air bag system information
This vehicle has an air bag which will supplement the seatbelt in certain frontal collisions. The air bag is not a substitute for the seatbelt in any type of collision. The driver and all other occupants should wear seatbelts at all times.

WARNING!
If the "SRS" warning light does not illuminate for several seconds when the ignition key is turned to "ON" or engine is started, or if the warning light stays on while driving, take the vehicle to your nearest authorized dealer immediately. Also, if the vehicle's front end is damaged or if the air bvag has deployed, take the vehicle for service immediately. The air bag system must be inspected by an authorized dealer ten years after the vehicle manufacture date shown on certification label located on left front door-latch post or door frame.

Read "SRS" section of your owner's manual before driving, for important information, about operation, and service of the air bag system.
When you are going to discard your gas generator or vehicle, please see your MITSUBISHI dealer.

E

CAUTION: SRS diagnosis unit
This unit cannot be repaired.
If defective, remove and replace entire unit per service manual instructions.
Do not disassemble or tamper.
See service manual for handling and storage instructions.
Do no drop: keep dry.
Failure to follow instructions could render air bag inoperative and result in driver injury.

F.

CAUTION: SRS
Before replacing steering wheel, read service manual, center front wheels and align SRS clock spring neutral marks.
Failure to do so may render SRS system inoperative, risking serious driver injury.

G

WARNING: SRS
This air bag module cannot be repaired. Do not disassemble 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.

H

Danger Poison. Keep out of the reach of children.
Contains sodium azide and potassium nitrate contents are poisonous and extremely flammable. Contact with acid, water, or heavy metals may produce harmful and irritating gases or explosive compounds. Do not dismantle, incinerate, bring into contact with electricity or store at temperatures exceeding (93.3°C) 200°F.
First aid: If contents are swallowed induce vomiting. For eye contact flush eye with water for 15 minutes. If gases from acid or water contact are inhaled, seek fresh air. In every case, get prompt medical attention.
For additional information, see material safety data sheet (MSDS) for this product.

I.

CAUTION: SRS clock spring
This is not a repairable part. Do not disassemble 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.

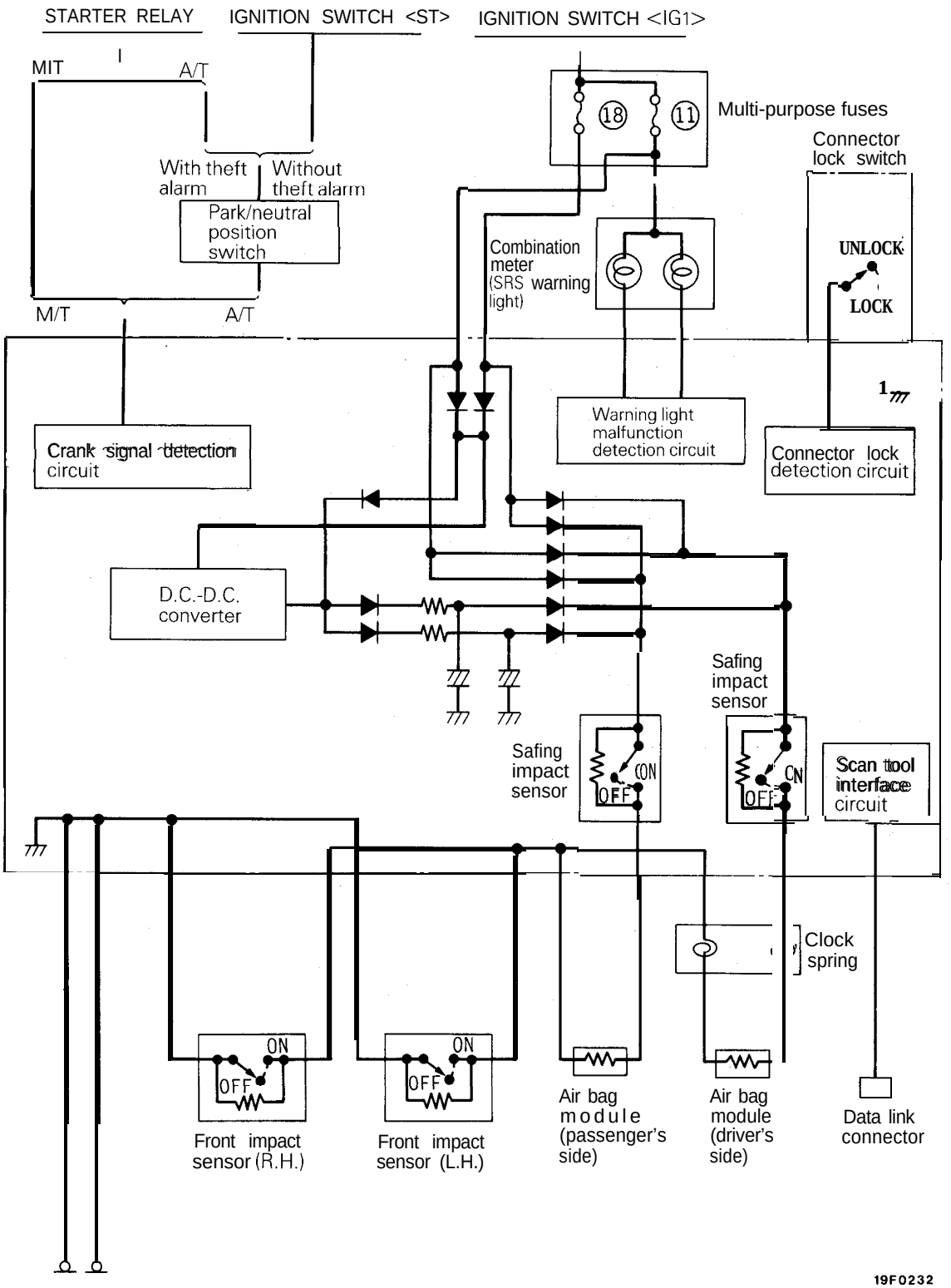
J.

CAUTION: SRS
Before removal of steering gearbox, read service manual, center front wheels and remove ignition key.
Failure to do so may damage SRS clock spring and render SRS system inoperative, risking serious driver injury.

K.

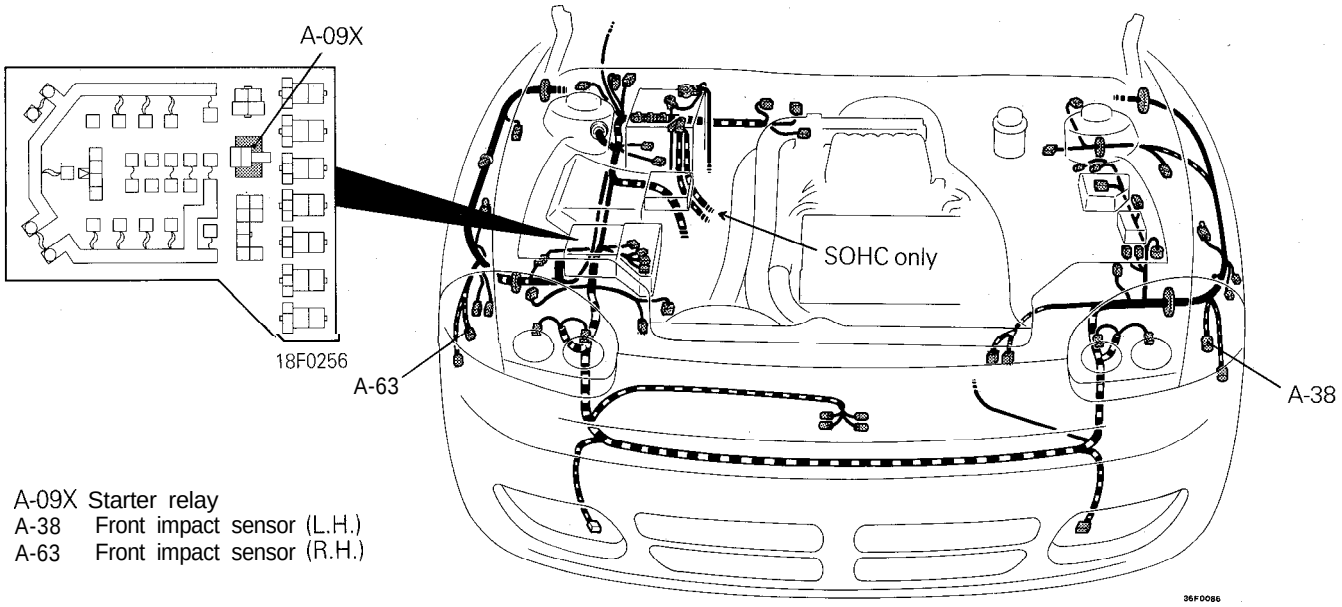
WARNING: SRS
This air bag module cannot be repaired. Do not disassemble or tamper.
Do not perform diagnosis. Do not touch with electrical test equipment or probes.
Refer to service manual for further instructions, and for special handling.
Storage and disposal procedures. Tampering or mishandling can result in injury.
DANGER POISON
Keep out of the reach of children.
Contains sodium azide and potassium nitrate contents are poisonous and extremely flammable. Contact with acid, water, or heavy metals may produce harmful and irritating gases or explosive compounds. Do not dismantle. Incinerate, bring into contact with electricity or store at temperatures exceeding 93°C (200°F).
FIRST AID:
If contents are swallowed induce vomiting. For eye contact flush eye with water for 15 minutes.
If gases from acid or water contact are inhaled, fresh air. In every case, get prompt medical attention.

SCHEMATIC


STARTER RELAY
IGNITION SWITCH <ST>
IGNITION SWITCH <IG1>
MIT
A/T
With theft alarm
Without theft alarm
Park/neutral position switch
M/T
A/T
18
11
Multi-purpose fuses
Connector lock switch
UNLOCK
LOCK
Combination meter (SRS warning light)
Crank signal detection circuit
Warning light malfunction detection circuit
Connector lock detection circuit
D.C.-D.C. converter
Safing impact sensor
Safing impact sensor
ON
OFF
Scan tool interface circuit
Clock spring
ON
OFF
Front impact sensor (R.H.)
Front impact sensor (L.H.)
Air bag module (passenger's side)
Air bag module (driver's side)
Data link connector
19F0232

CONFIGURATION DIAGRAMS

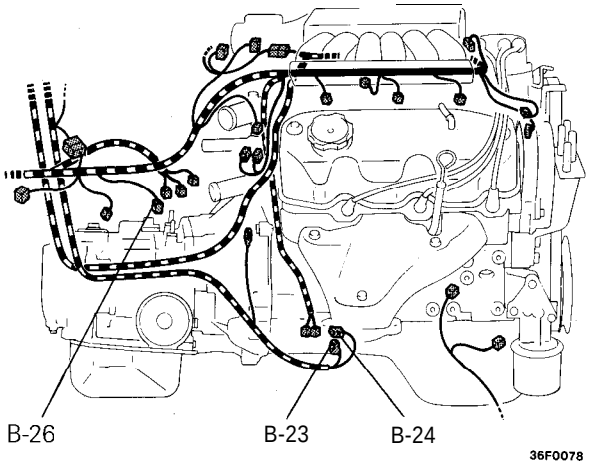
A Engine compartment



A-09X Starter relay
A-38 Front impact sensor (L.H.)
A-63 Front impact sensor (R.H.)

B Engine and transaxle (Front view)

<SOHC>



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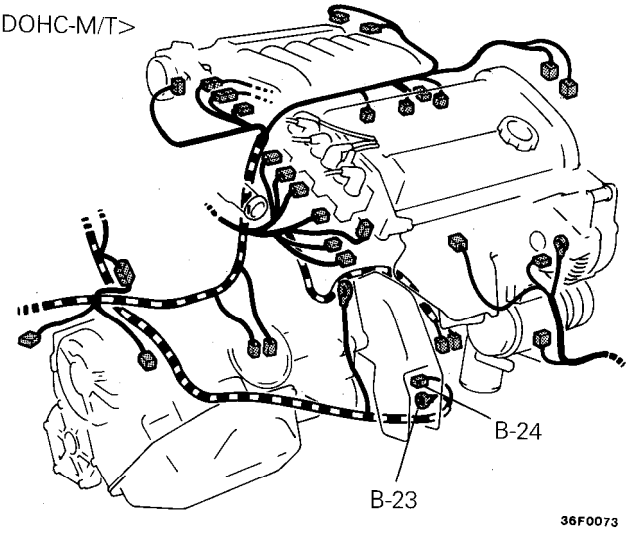

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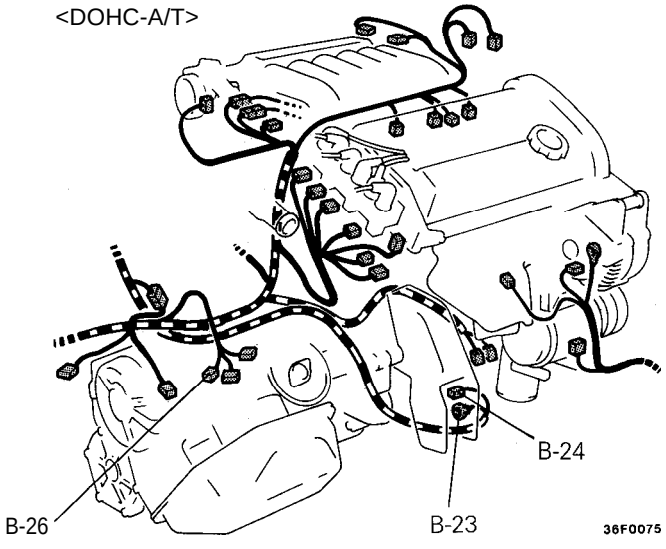
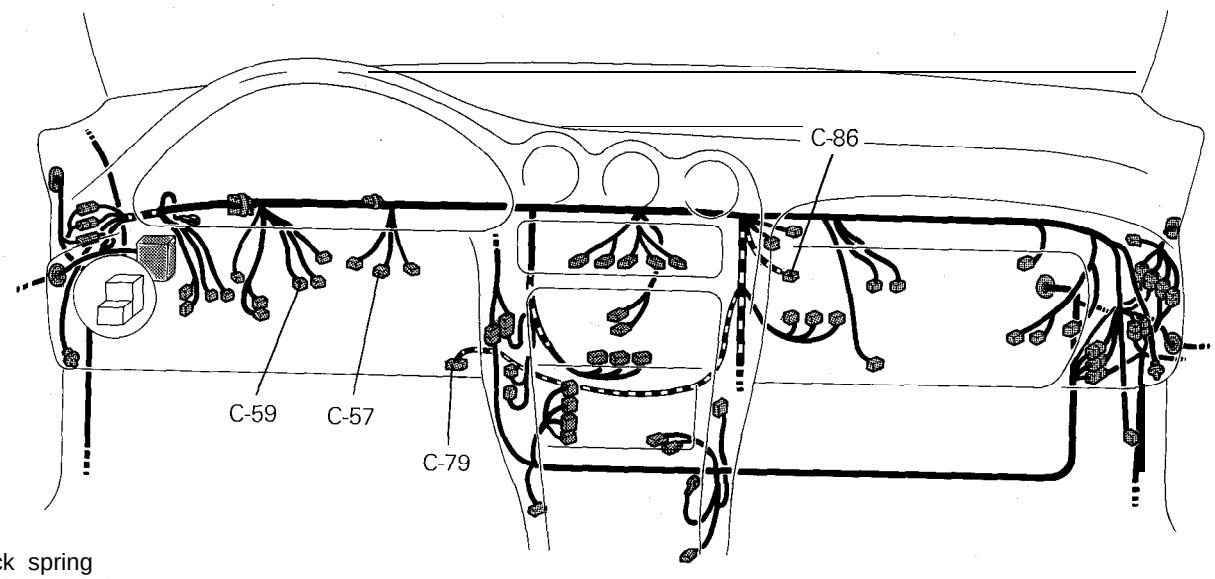


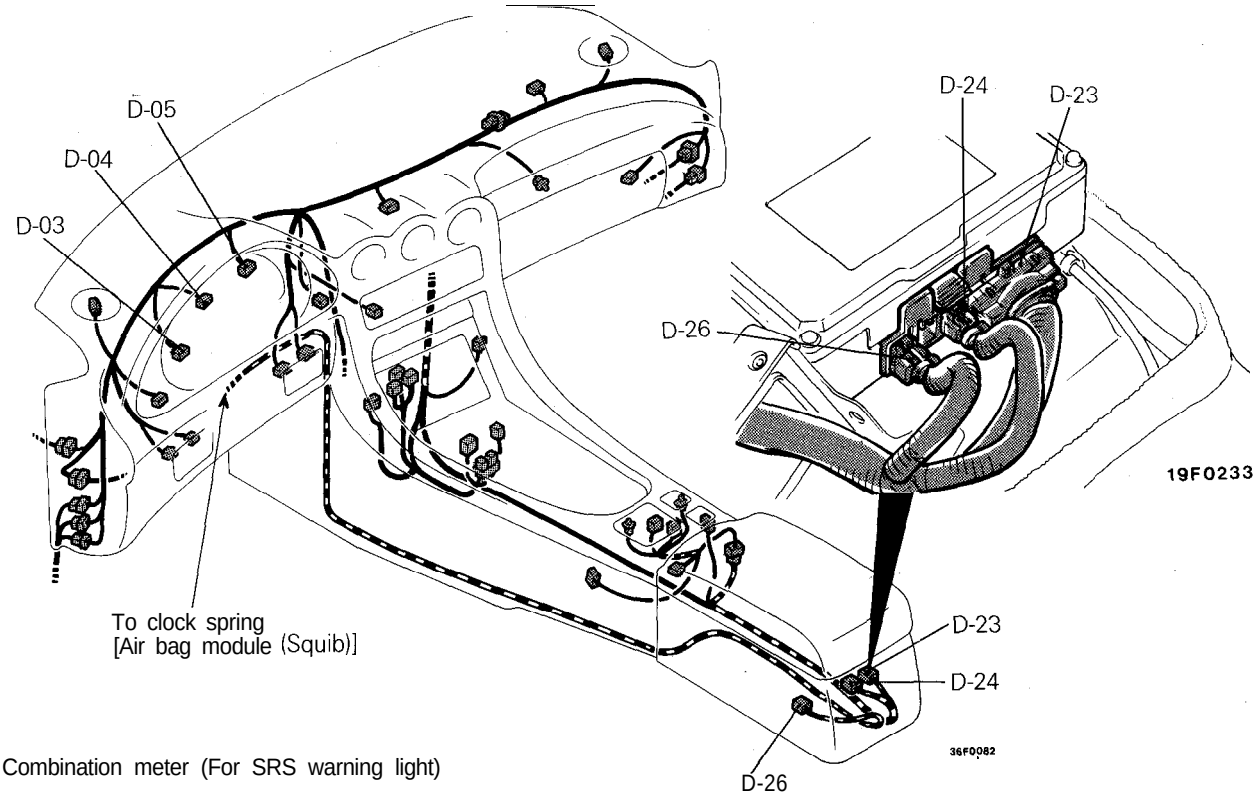
B-23, B-24 } Starter motor
B-26 Park/neutral position switch

❑ **Dash panel**



C-57 Clock spring
C-59 Ignition switch
C-79 Data link connector
C-86 Passenger's air bag module

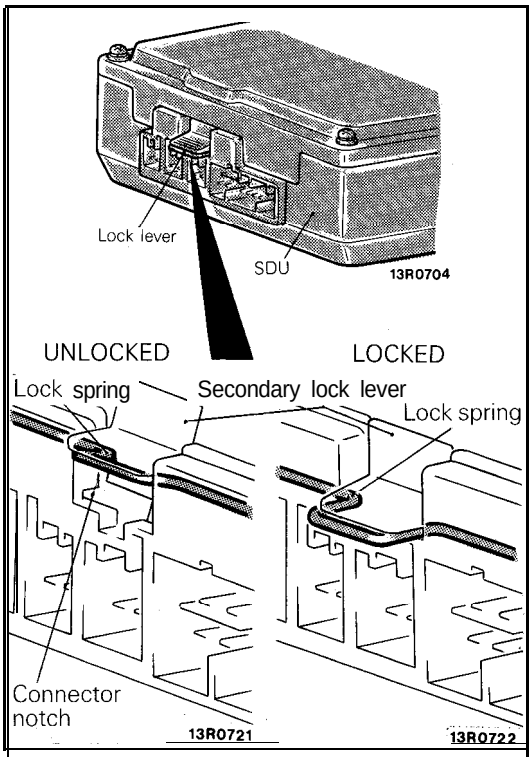
❑ **Instrument panel and floor console**

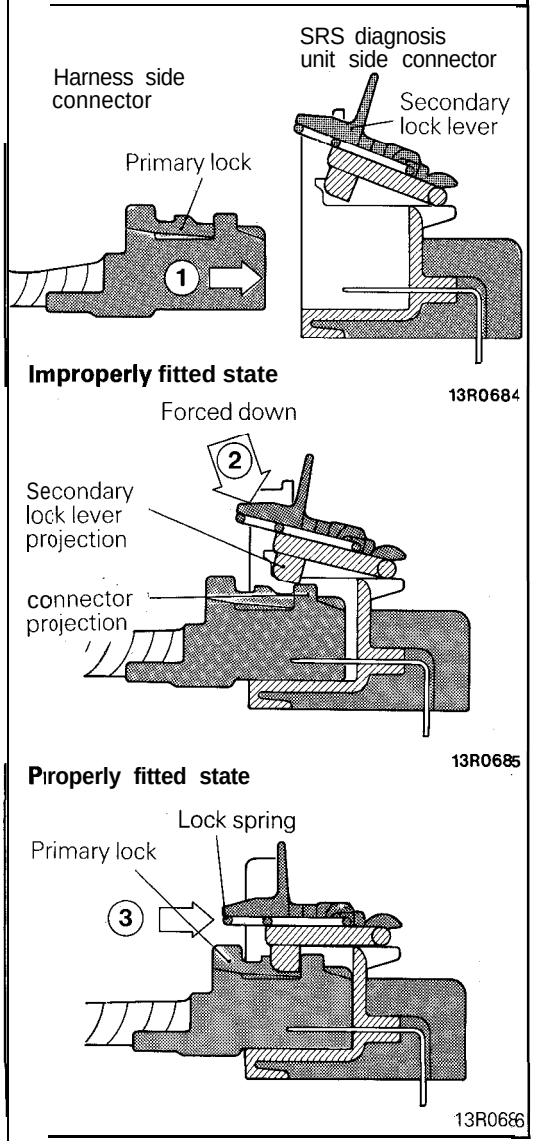


D-03, D-04, D-05: Combination meter (For SRS warning light)

D-23: 14-pin red connector to body wiring harness
D-24: Z-pin green connector to passenger's air bag module (squib)
D-26: 2-pin red connector to clock spring

Connector to SRS Diagnosis Unit





CONNECTOR CONSTRUCTION

The connector of the SRS diagnosis unit has a double lock mechanism, fit verification mechanism and connector shorting mechanism.

DOUBLE LOCK MECHANISM

The mechanism is composed of two mechanisms: each connector of the SRS diagnosis unit is locked to the connector of the harness, then these connectors (of the four harnesses) are locked with the secondary lock lever mounted on the connector of the SRS diagnosis unit side.
The secondary lock lever locking is done as the lock spring fits in the notch of the connector.
The operating principle is described below.

When Connectors Are To Be Fitted

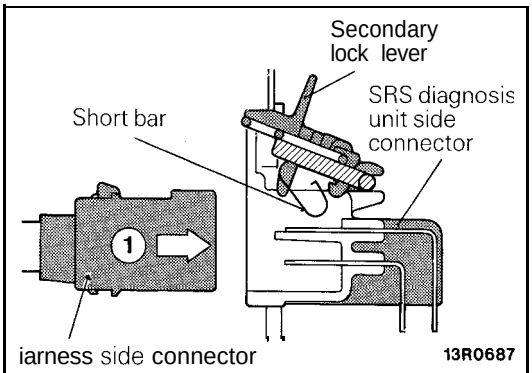
(1) The SRS diagnosis unit and harness side connectors are connected. (Primary lock)
(2) The secondary lock lever mounted to the SRS diagnosis unit side connector is pressed down until a click is heard indicating that the connectors have been locked. (Secondary lock)
If the harness and SRS diagnosis unit connectors do not properly fit, the secondary lock lever side projection and the harness side connector projection interfere with each other, making it impossible to lock the connectors.

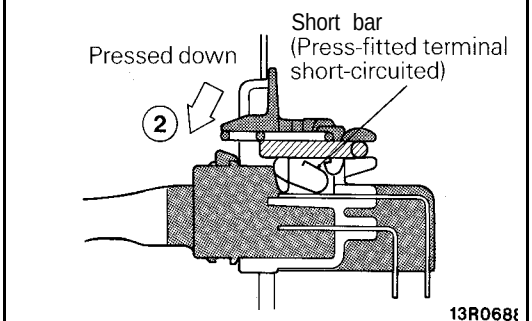
When Connectors Are Unlocked

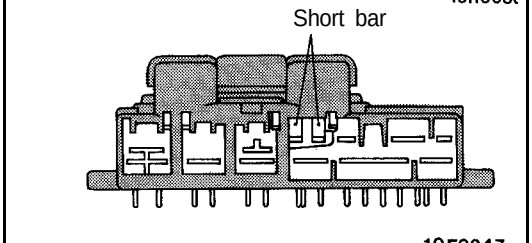
(1) Press in the lock spring with a flat tip (–) screwdriver to disengage the lock spring from the notch area of the connector, and release the lock (secondary lock) of the secondary lock lever.

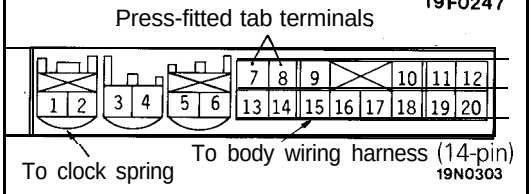
Caution
Forced removal of the connector without releasing the secondary lock lever will result in a damaged lock lever.

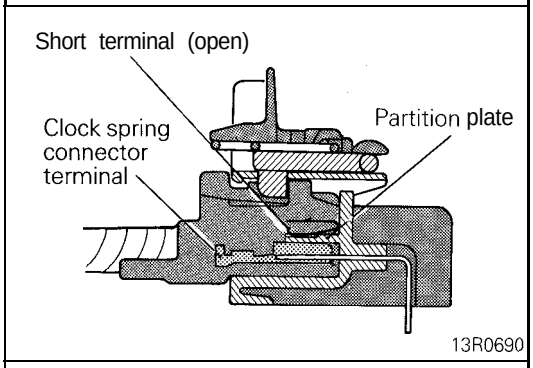
(2) Press the primary lock of each of the harness side connectors and remove the harness side connector.

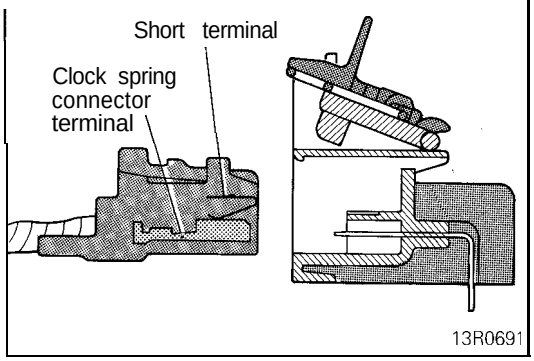












FIT VERIFICATION MECHANISM

The mechanism is used to electrically check the engagement of the connector between the SRS diagnosis unit and body wiring harness. The operating principle is described below.

(1) Securely connect the SRS diagnosis unit and harness side connectors and press the secondary lock lever down to lock the connectors.
(2) At this time, the short bar provided on the rear surface of the secondary lock lever produces a short circuit across terminals No. ⑦ and ⑧ of the SRS diagnosis unit. The SRS diagnosis unit supplies monitoring current to the circuit to electrically verify that the connectors have been locked.

CONNECTOR SHORTING MECHANISM

The mechanism is designed for prevention of accidental ignition of the inflator when the clock spring connector (for the squib circuit) is removed from the SRS diagnosis unit. The operating principle is described below.

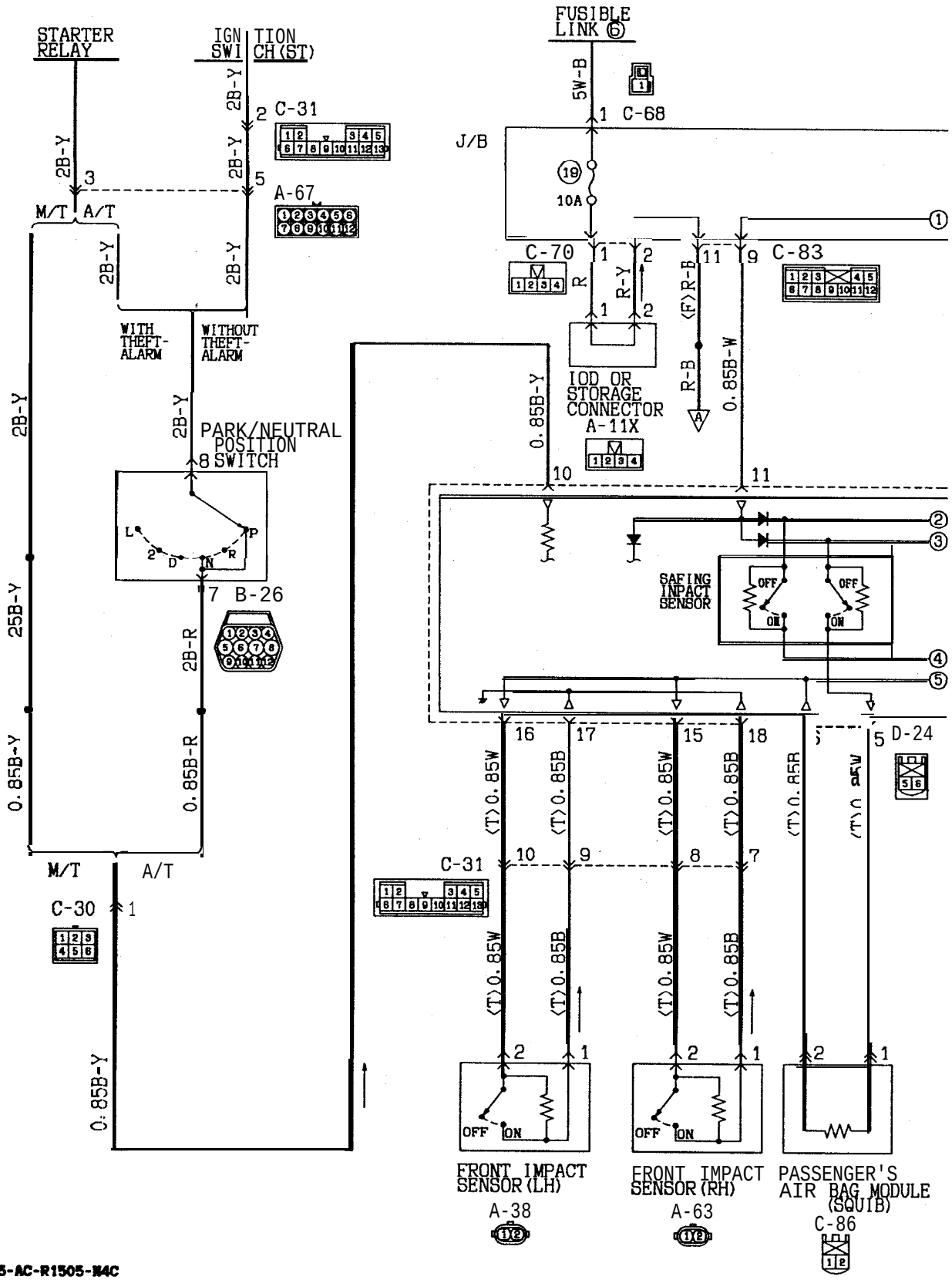
When Connectors Are Fitted

When the SRS diagnosis unit and clock spring connector are coupled, the circuit between the short terminals and clock spring connector terminals is kept in the OFF state by the partition plate provided in the connector of the SRS diagnosis unit.

When Connectors Are Disconnected

When the clock spring connectors are disconnected from the SRS diagnosis unit, the partition plate between the short terminals and clock spring connector terminals is removed. As a result, a short circuit is formed between the two poles of the clock spring connector terminals to prevent generation of a potential difference (current) between the squib terminals.

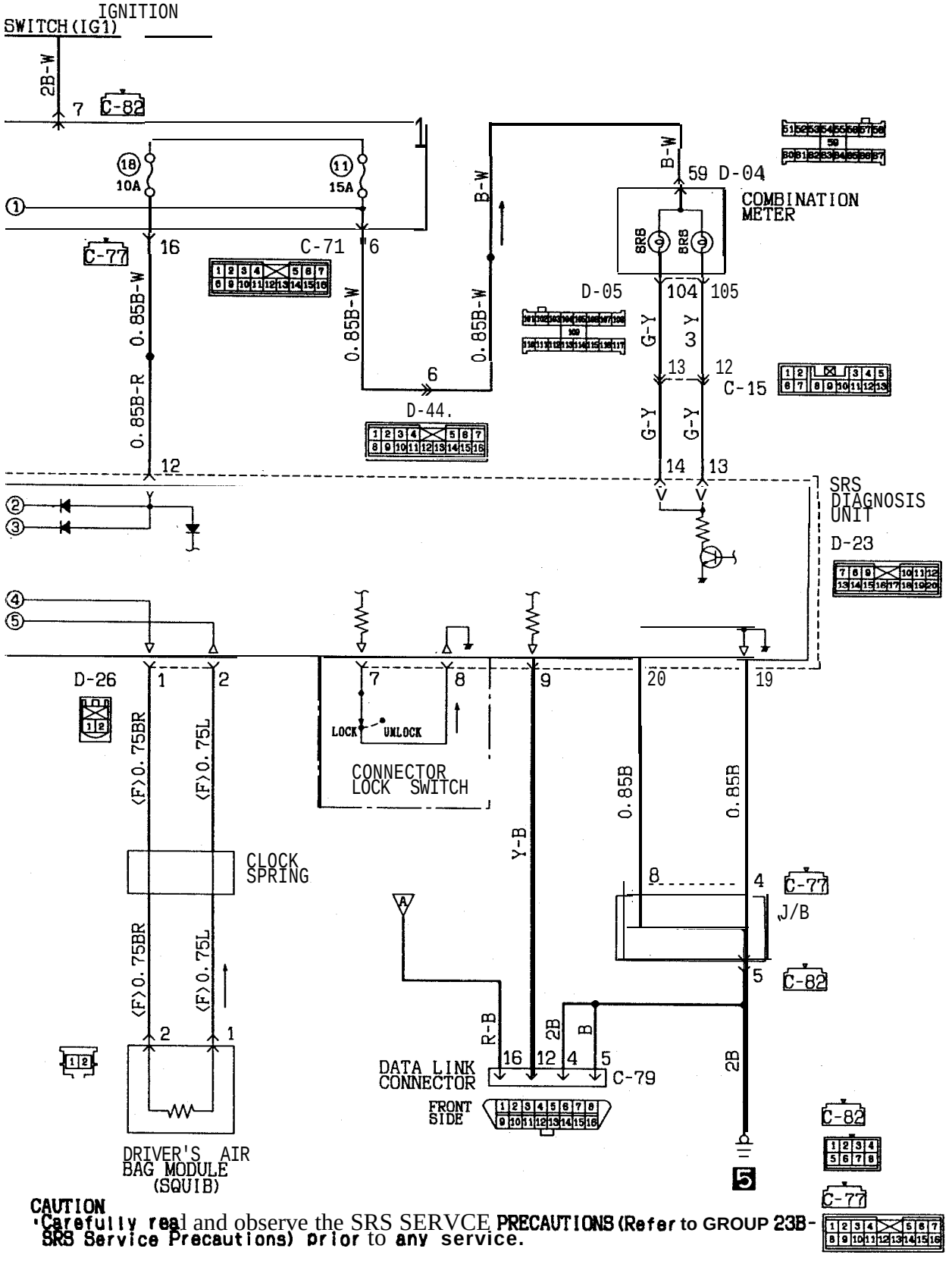
CIRCUIT DIAGRAM



SRS (CONTINUED)

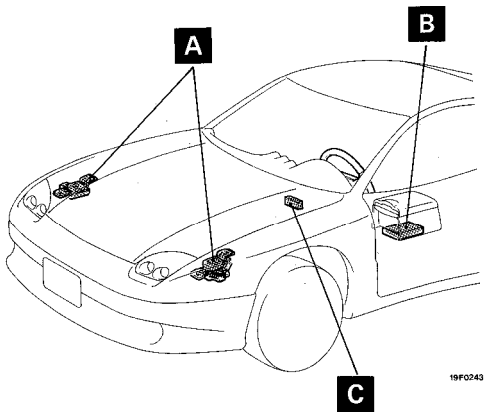
CAUTION

1. **Do not repair, splice or modify SRS wiring (except for specific repairs to the body wiring harness shown on page 23B-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 23B-16.**

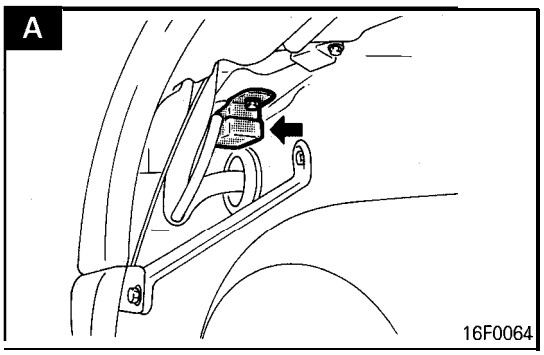


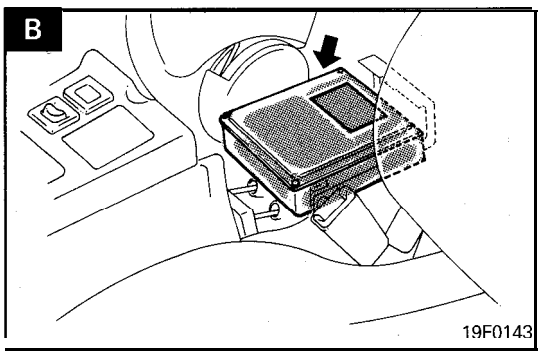
CAUTION
•Carefully read and observe the SRS SERVCE PRECAUTIONS (Refer to GROUP 23B-SRS Service Precautions) prior to any service.

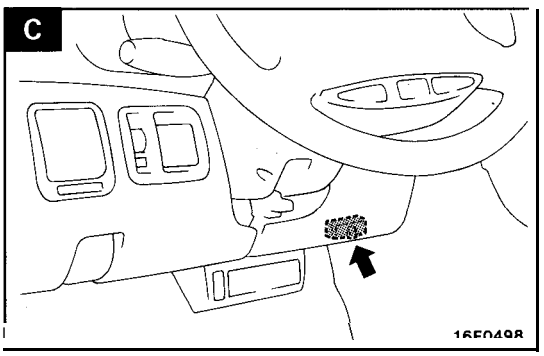
COMPONENT LOCATION



Name	Symbol
Data link connector	C
Front impact sensor	A
SRS diagnosis unit	B







SERVICE PRECAUTIONS

1 In order to avoid injury to yourself or others from accidental deployment of the air bag during SRS servicing, read and carefully follow all the precautions and procedures described in this manual.

2. Do not use any electrical test equipment on or near SRS components, except those specified on next page.
Never use an analog ohmmeter.

3. **Never Attempt to Repair the Following Components:**

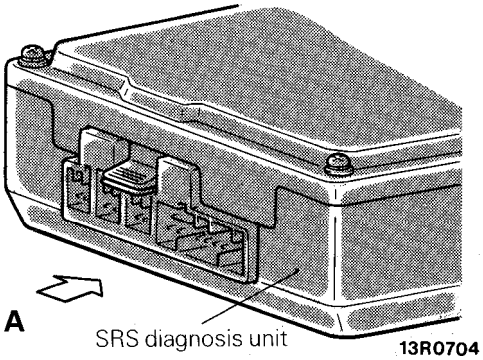
- Front Impact Sensors
- SRS Diagnosis Unit (SDU)
- Clock Spring
- Air Bag Module

If any of those components are diagnosed as faulty, they should only be replaced, in accordance with the COMPONENT SERVICE procedures in this manual, starting at page [23B-48].

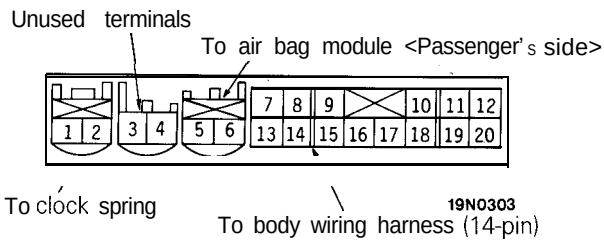
4. Do not attempt to repair the wiring harness connectors of the SRS. If any of the connectors is diagnosed as fault, replace the wiring harness. If the wires are diagnosed as faulty, replace or repair the wiring harness according to the following table.

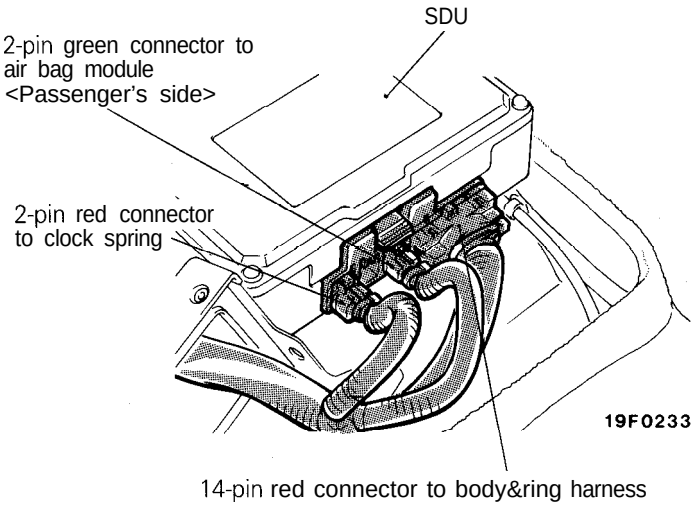
SDU Terminal No.	Harness Connector (No. of Terminals, Color)	Destination of Harness			Corrective Action
1	2 pins, red	Clock spring			Replace clock spring.
2					
3	No connection				–
4					
5	2 pins, green	Body wiring harness	→ Air bag module (passenger's side)		Correct or replace body wiring harness
6					
7	14 pins, red		–		
8					
9			→ Diagnosis check pin		Correct or replace control wiring, instrument panel wiring harness or body wiring harness.
10			→ Control wiring harness → Ignition switch (ST)		
11			→ General purpose fuse No. 11		
12			→ General purpose fuse No. 18		
13			→ Instrument panel wiring harness → SRS warning light		
14					
15			→ Front wiring Harness	→ Front impact sensor (R.H.) – positive (+) terminal	Replace the sensor cable*
16				→ Front impact sensor (L.H.) – positive (+) terminal	
17				→ Front impact sensor (L.H.) – negative (–) terminal	
18				→ Front impact sensor (R.H.) – negative (–) terminal	
19			→ Junction block → Body wiring harness → Ground		Correct or replace body wiring harness.
20					

NOTE
(1) The sensor cable marked with * is available as service part,
(2) The sensor cable used as a replacement part is routed along the body wiring harness



View A





5. After disconnecting the battery cable, wait 60 seconds or more before proceeding with the following work. The SRS system is designed to retain enough voltage to deploy the air bag for a short time even after the battery has been disconnected, so serious injury may result from unintended air bag deployment if work is done on the SRS system immediately after the battery cables are disconnected.
6. SRS components should not be subjected to heat over 93°C (200°F), so remove the front impact sensors, SRS diagnosis unit and air bag module and clock spring before drying or baking the vehicle after painting.
7. Whenever you finish servicing the SRS, check the SRS warning light operation to make sure that the system functions properly. (Refer to P.23B-2).
8. Make certain that the ignition switch is at OFF when the scan tool is connected or disconnected.

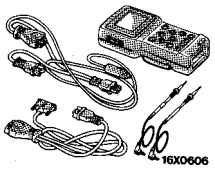
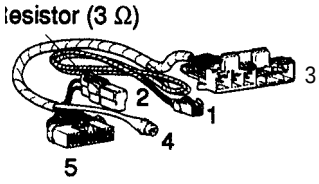
NOTE
SERIOUS INJURY CAN RESULT FROM UNINTENDED AIR BAG DEPLOYMENT, SO USE ONLY THE PROCEDURES AND EQUIPMENT SPECIFIED IN THIS MANUAL.

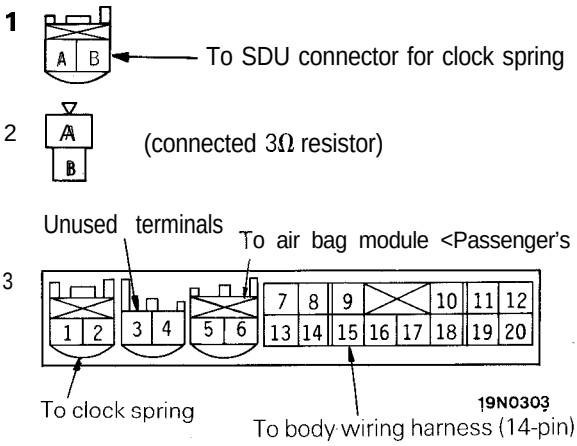
SPECIFICATIONS

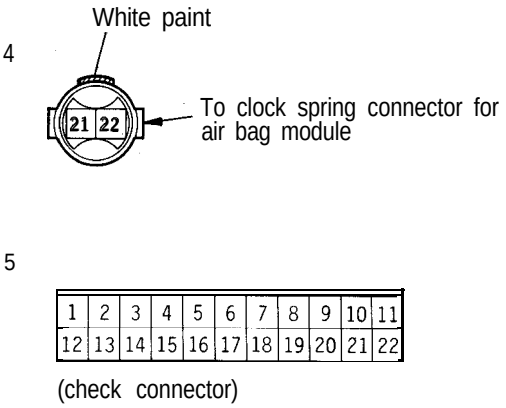
SERVICE SPECIFICATIONS

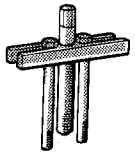
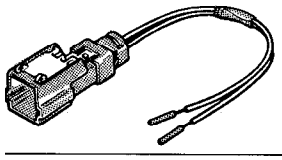
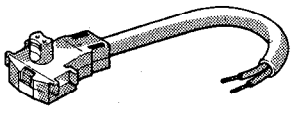
Items	Specifications
Standard value	
Front impact sensor resistance Ω	2,000 ± 40
Clock spring resistance Ω	less than 0.4

SPECIAL TOOLS

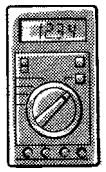
Tool number and tool name	Replaced by Miller tool number	Application
 MB991 502 Scan Tool (MUT-II)	DRB-II Scan tool	• Reading diagnosis codes • Erasing diagnosis code • Reading trouble period • Reading erase times
 MB991 530 SRS Check Harness	MB991 530	• Checking the SRS electrical circuitry with a digital multi-meter NOTE SRS check harness is used on various Diagnostic Tests. For details, refer to DIAGNOSTIC SEQUENCE (P.23B-18 – P.23B-44)

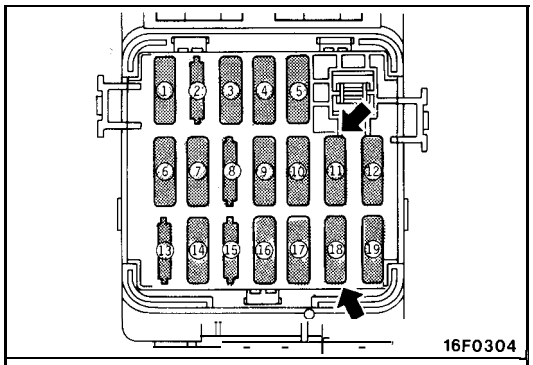




	MB990803 Steering wheel puller	General service tool	Removal of steering wheel
	MB686560 SRS air bag adapter harness A	MB686560	Deployment of air bag module inside the vehicle
	MB628919 SRS air bag adapter harness B	MB628919	Deployment of air bag module outside the vehicle

TEST EQUIPMENT

Tool	Name	Use
 13R0746	Digital multi-meter [Use a multi-meter for which the Maximum test current is 2 mA or less at the minimum range of resistance measurement]	Checking the SRS electrical circuitry with SRS Check Harness



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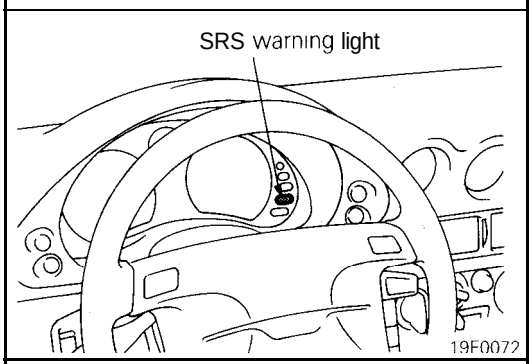

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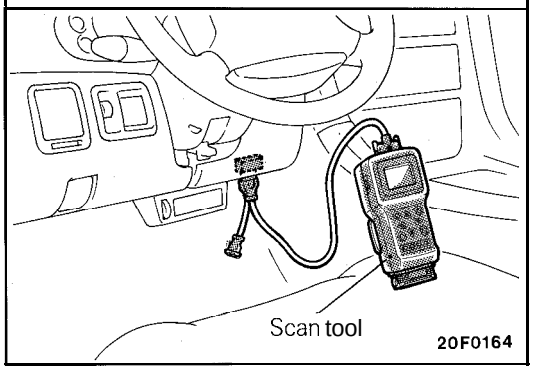

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TROUBLESHOOTING

SRS DIAGNOSTIC PROCEDURES – INITIAL STEPS

FOLLOW THESE STEPS WHEN BEGINNING ANY SRS SERVICE:

1. Check the SRS fuses (multi-purpose fuses No. 11 and No. 18).
   If either is loose, tighten it; if damaged or blown, replace it.
2. After performing step 1, turn the ignition key to the “ON” position. Does “SRS” warning light illuminate for about 7 seconds and then turn OFF? If yes, SRS system is functioning properly.
   If no, continue with following steps.

   NOTE
   The SRS warning light illuminates also when the battery voltage drops. In that case, the SRS warning light goes out if the battery voltage returns to the normal level.
3. Turn the ignition key to the “LOCK” position.
4. Connect the scan tool to the data link connector.

   Caution
   Make certain that the ignition switch is at OFF when the scan tool is connected or disconnected.
5. Start the SRS diagnosis, by conducting TEST 1 (SRS warning light does not extinguish) or TEST 2 (SRS warning light does not illuminate.) which begins on next page.

DIAGNOSTIC SEQUENCE

TEST 1	SRS WARNING LIGHT DOES NOT EXTINGUISH

(1) Read (and write down) all of the displayed diagnostic trouble codes and service data (fault duration and how many time memories are erased) using the scan tool.

NOTE
(1) Maximum stored period: 9999 minutes (approximately 7 days)
(2) Maximum number of times to be stored: 250
(3) If the scan tool displays "CAN'T COMM.", check the scan tool and vehicle side self-check data link connector for poor connections (Refer to P.23B-17.) and perform TEST 3.

(2) Erase the diagnostic trouble codes following the scan tool messages.
(3) Start engine.
Does "SRS" warning light illuminate for about 7 seconds, turn OFF and then remain extinguished for at least 45 seconds?
If yes, SRS system is functioning properly now.
If no, check the diagnostic trouble codes written down at step (4) above, refer to ON-BOARD DIAGNOSTIC QUICK REFERENCE CHART (P.23B-19) and perform service indicated there.

TEST 2	SRS WARNING LIGHT DOES NOT ILLUMINATE

(1) Read (and write down) all of the displayed diagnostic trouble codes and service data (fault duration and how many time memories are erased) using the scan tool.

NOTE
(1) Maximum stored period: 9999 minutes (approximately 7 days)
(2) Maximum number of times to be stored: 250
(3) If the scan tool displays "CAN'T COMM.", check the scan tool and vehicle side self-check data link connector for poor connections (Refer to P.52B-17.) and perform TEST 4.

(2) Check diagnostic trouble codes against ON-BOARD DIAGNOSTIC QUICK REFERENCE CHART and perform service indicated there.

ON-BOARD DIAGNOSTIC QUICK REFERENCE CHART

Fault No.	Explanation	Service
–	Normal. The SRS is in good order.	
11	The circuits for the front impact sensor are shorted to each other. Or the negative harness between the air bag module and the SDU is shorted to ground or the positive harness between the front impact sensor and the SDU is shorted to ground.	Perform TEST 5
12	Right or left impact sensor cirucit is open or the wire from the sensor to the SDU is open-circuit.	
13	Right and left impact sensor circuits are open or the wires from the sensors to the SDU are open-circuit.	
21	The circuits for the driver's air bag module (squib) are shorted to each other or the circuit is grounded.	Perform TEST 6
22	The driver's air bag module (squib) circuit is open or the wire from the driver's air bag module to the SDU (clock spring) is open-circuit. Or the harness connector make a poor contact or the positive harness between the driver's air bag module and the SDU is shorted to ground.	
24	The circuits for the passenger's air bag module (squib) are shorted to each other or the circuit is grounded.	Perform TEST 7
25	The passenger's air bag module (squib) circuit is open or the wire from the passenger's air bag module to the SDU (clock spring) is open-ciucuit. Or the harness connector make a poor contact or the positive harness between the passenger's air bag module and the SDU is shorted to ground.	
31	The capacitor (integrated in the SDU) terminal voltage is higher than the specified value for 5 seconds.	Replace the SDU (Refer to P.23B-51)
32"'	The capacitor (integrated in the SDU) terminal voltage is lower than the specified value for 5 seconds.	If the battery voltage is normal, replace SDU. (Refer to P.23B-51.) If the battery is run down, turn the ignition key to the "LOCK" position, disconnect the negative battery cable and wrap the terminal with tape for insulation. Then, charge the battery.

NOTE – IMPORTANT

(1) After repairing the SRS, reconnect the battery cable, and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)

(2) SDU = SRS Diagnosis Unit

(3) *1: If the vehicle has a discharged battery it will store the fault code 41 or 42. When this diagnostic trouble code is displayed, check the battery.

(4) Upon recovery from the fault identified with the code No. marked with *2, the SRS warning light goes out and the function returns to the normal condition.

Fault No.	Explanation	Service
33*2	The circuit for the cranking signal is shorted to some power supply circuits. It takes at least 45 seconds that the SDU detects this fault.	Perform TEST 8
34*2	The lock switch (short bar) of the SDU double lock connector is open.	Perform TEST 9
41*1 *2	The multi-purpose fuse (No. 18) is blown or the wire from the fuse to the SDU is open-circuit or its resistance value is increased. It takes at least 5 seconds that the SDU detects this fault.	If the battery is run down, turn the ignition key to the "LOCK" position, disconnect the negative battery cable and wrap the terminal with tape for insulation. Then, charg the battery.
42*1, *2	The multi-purpose fuse (No. 11) is blown or the wire from the fuse to the SDU is open-circuit or its resistance value is increased. It takes at least 5 seconds that the SDU detects this fault.	If the battery is run down, turn the ignition key to the "LOCK" position, disconnect the negative battery cable and wrap the terminal with tape for insulation. Then, charg the battery.
43*2	The SRS warning light circuits are open. It takes at least 5 seconds with the light OFF that the SDU detects this fault.	When SRS warning light does not extinguish: Perform TEST 12 When SRS warning light does not illuminate: Perform TEST 13
44	The SRS warning light drive transistor (integrated in the SDU) is open-circuit.	Replace the SDU (Refer to P.23B-51)
45	The EEP ROM or A/D converter (integrated in the SDU) is defective.	

NOTE – IMPORTANT

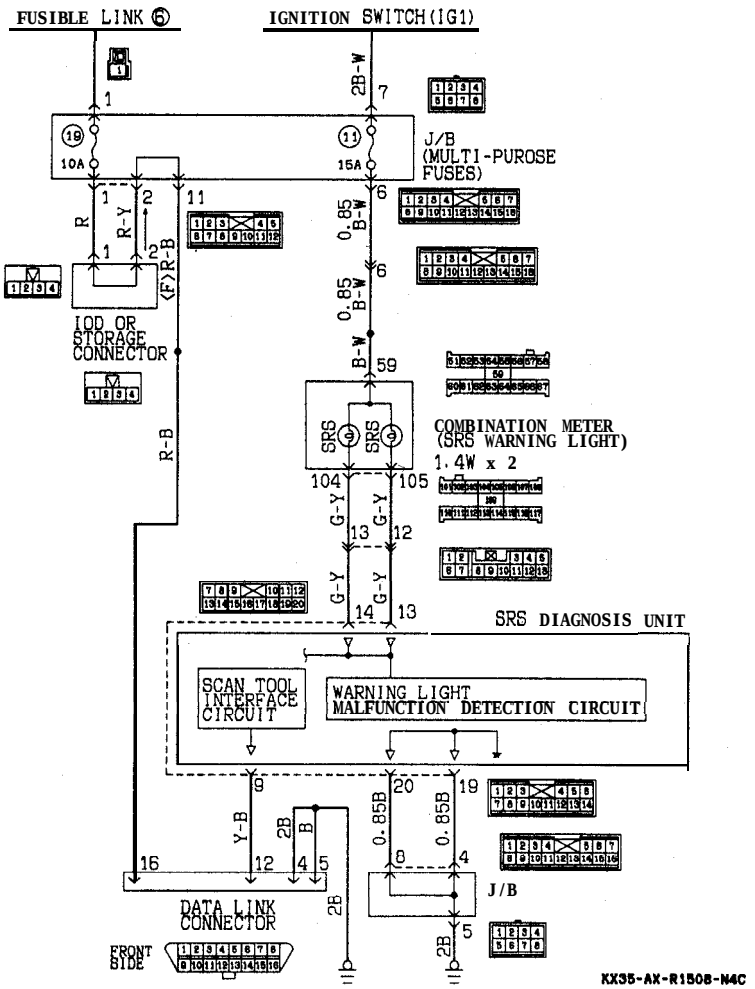
(1) After repairing the SRS, reconnect the battery cable, and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)

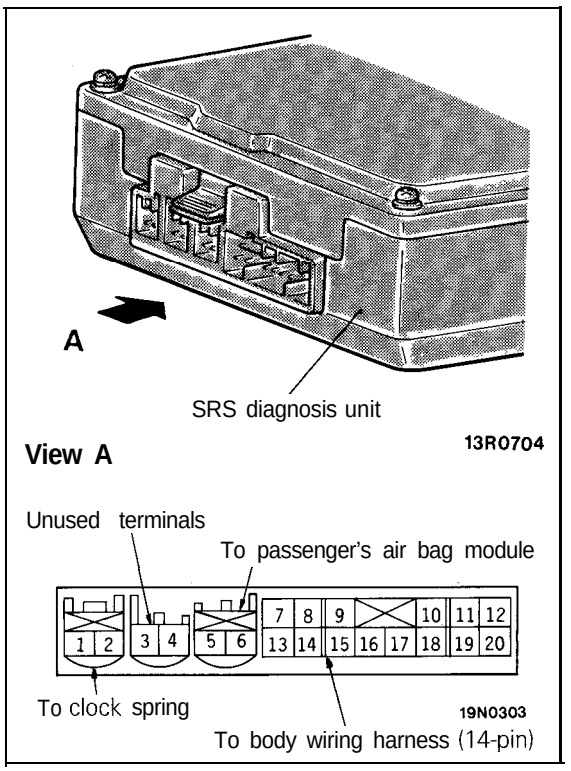
(2) SDU = SRS Diagnosis Unit

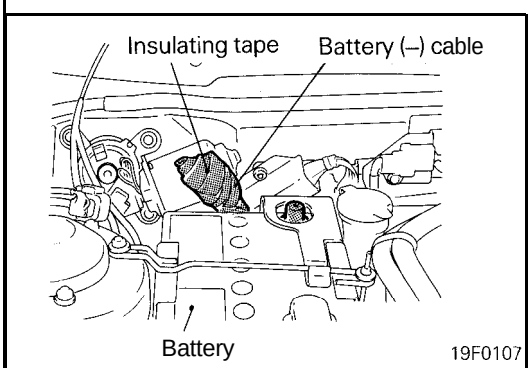
(3) *1: If the vehicle has a discharged battery it will store the fault code 41 or 42. When this diagnostic trouble code is displayed, check the battery.

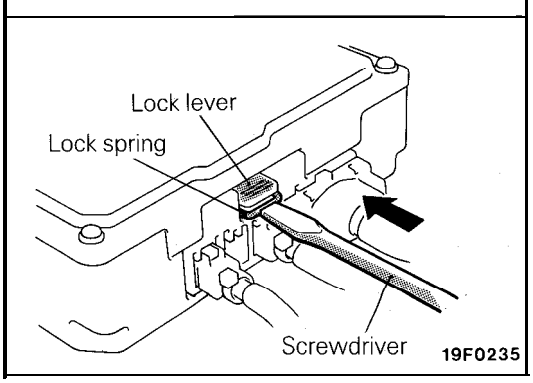
(4) Upon recovery from the fault identified with the code No. marked with *2, the SRS warning light goes out and the function returns to the normal condition.

TEST 3	NO COMMUNICATION BETWEEN SCAN TOOL AND SDU (SRS warning light does not extinguish)









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

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

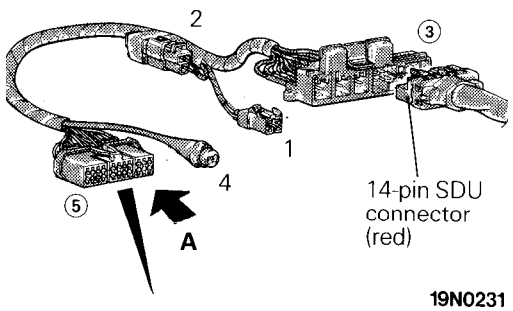
(2) Remove the rear console assembly. (Refer to GROUP 23A Floor Console.)

(3) Apply a flat tip screwdriver to the lock spring (metallic portion) of the SDU connector lock lever as illustrated and push it horizontally toward the back of the unit.

Caution
1. Do not push up the lock lever (green) by force.
2. Never insert a screwdriver between the lock lever (green) and the lock spring (metallic portion).

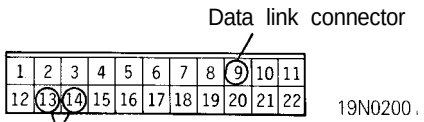
(4) Disconnect the red 14-pin connector from the SDU.

MB991530
SRS Check Harness



19N0231

View A
SRS Check Harness connector (5)

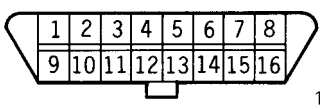


19N0200

(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 @and the No. 12 terminal of the data link connector?

Data link connector



19N0199

No → Body wiring harness damaged or disconnected between the SDU and the data link connector → Repair or replace the body wiring harness. (Refer to P.23B-14.)

Yes ↓

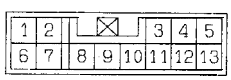
Is there continuity between the No. 13 or No. 14 terminal of SRC Check Harness connector (5) and ground?

No → Malfunction of the SDU. → Replace the SDU. (Refer to P.23B-51.)

Yes ↓

Disconnect the connector between the body wiring harness and instrument panel wiring harness.

Check for continuity between the earth and terminal No. 12 or No. 13 of the body wiring harness's connector which is connected to the instrument panel wiring harness.

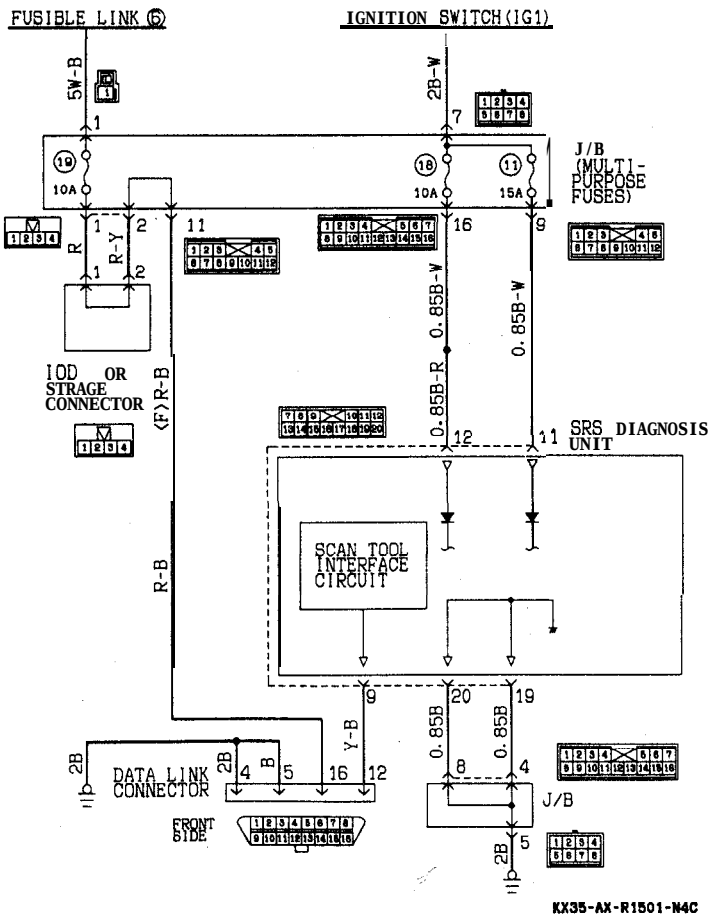


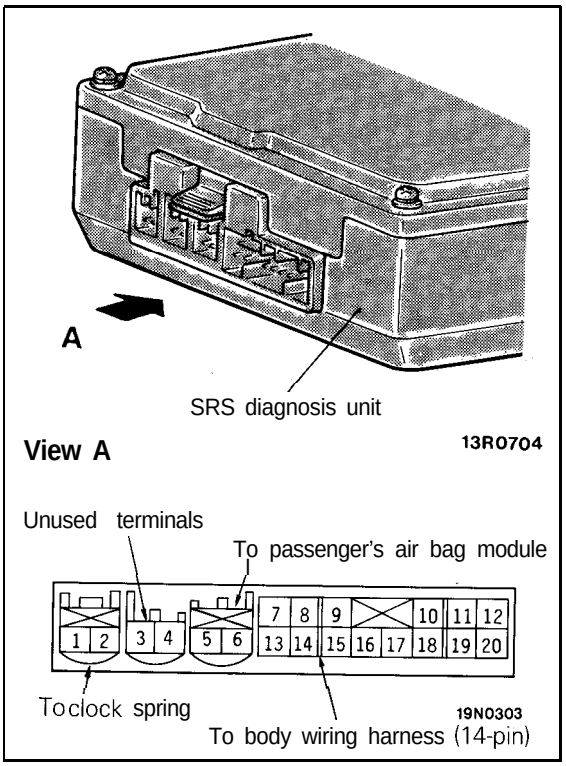
No → The harness between SDU and instrument panel wiring harness is short-circuited. → Repair or replace the body wiring harness at the location of the short circuit.(Refer to P.23B-14.)

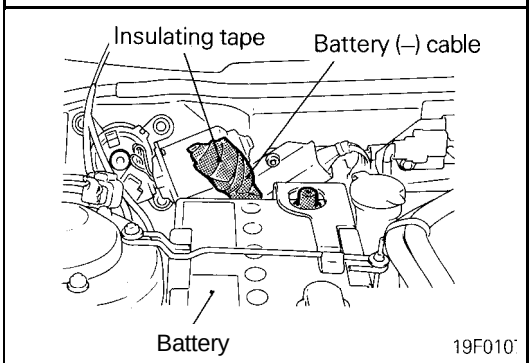
Yes → The instrument panel wiring harness between SRS warning light and body wiring harness is short-circuited. → Repair or replace the instrument panel wiring harness at the location of the short circuit.

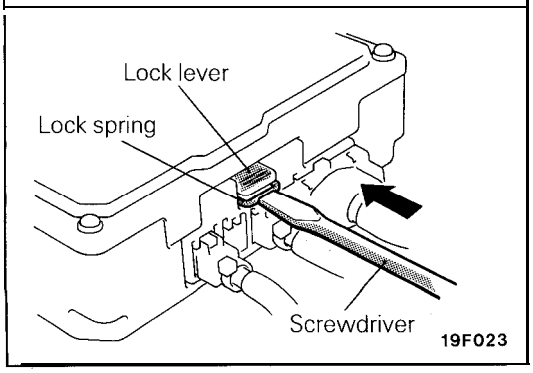
NOTE – IMPORTANT
(1) After repairing the SRS, reconnect the battery cable, erase the diagnostic trouble code memory from the scan tool and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)
(2) SDU = SRS Diagnosis Unit

TEST 4	NO COMMUNICATION BETWEEN SCAN TOOL AND SDU (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 60 seconds after disconnecting the battery cable before doing any further work. The SRS system is designed to retain enough voltage to deploy the air bag even after the battery has been disconnected. Serious injury may result from unintended air bag deployment if work is done on the SRS system immediately after the battery cable is disconnected.

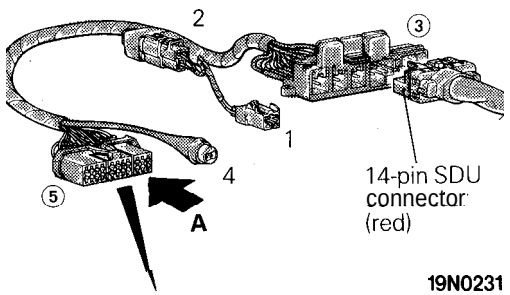
(2) Remove the rear console assembly. (Refer to GROUP 23A Floor Console.)

(3) Apply a flat tip screwdriver to the lock spring (metallic portion) of the SDU connector lock lever as illustrated and push it horizontally toward the back of the unit.

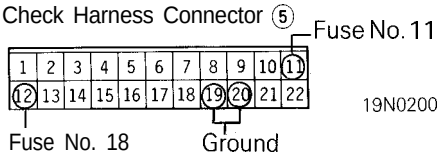
Caution
1. Do not push up the lock lever (green) by force.
2. Never insert a screwdriver between the lock lever (green) and the lock spring (metallic portion).

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

MB991 530
SRS Check Harness



View A
SRS Check Harness Connector ⑤



(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.

Is there continuity between the No. 19 or No. 20 terminal of SRS Check Harness connectorr ⑤ and ground?
→ No → Ground circuit open → Repair or replace harness. (Refer to P.23B-14.)

↓ Yes

Reconnect negative terminal of battery, and turn the ignition key to the "ON" position.

↓

Does the voltage between the No. 11 terminal (of SRS Check Harness connector ⑤) and the No. 19 or 20 terminal (ground) indicate system voltage?
→ No → Damaged or disconnected wiring of the ignition (fuse No. 11) power-supply circuit.

↓ Yes

Does the voltage between the No. 12 terminal (of SRS Check Harness connector ⑤) and the No. 19 or 20 terminal (ground) indicate system voltage?
→ No → Damaged or disconnected wiring of the ignition (fuse No. 18) power-supply circuit.

↓ Yes

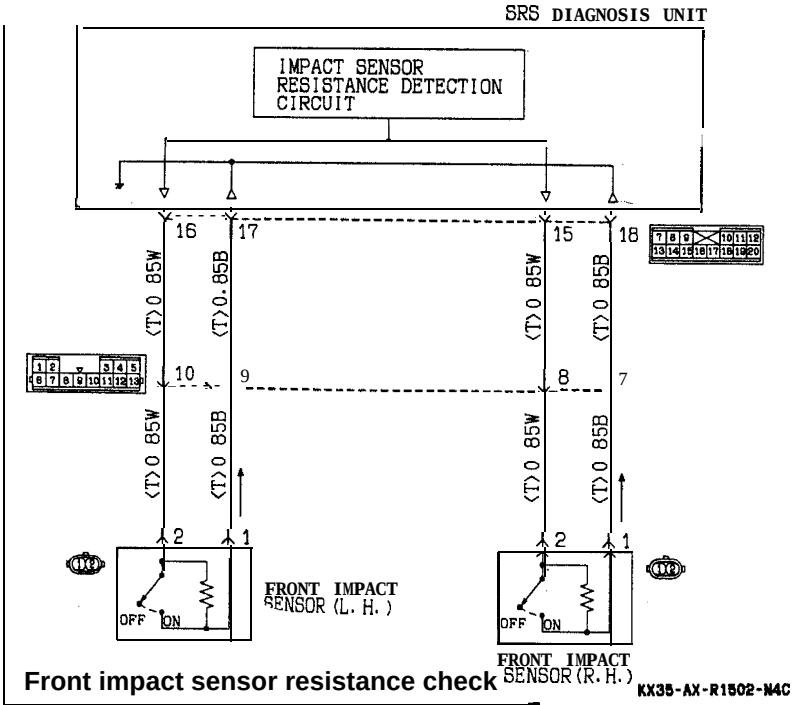
→ Malfunction of the SDU

(1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.
(2) After waiting at least 60 seconds, repair or replace the body wiring harness. (Refer to P.23B-14.)

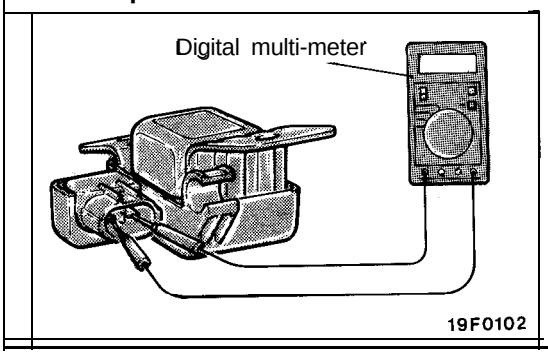
(1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.
(2) After waiting at least 60 seconds, replace the SDU. (Refer to P.23B-51.)

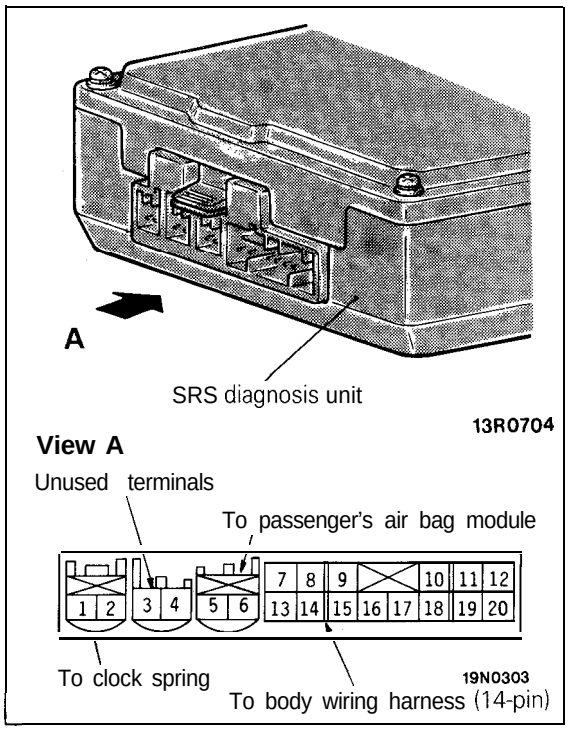
NOTE – IMPORTANT
(1) After repairing the SRS, reconnect the battery cable, erase the diagnostic trouble code memory from the scan tool and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)
(2) SDU = SRS Diagnosis Unit

TEST 5 | WHEN DIAGNOSTIC TROUBLE CODE No. 11, No. 12 OR No. 13 IS DISPLAYED1



Front impact sensor resistance check

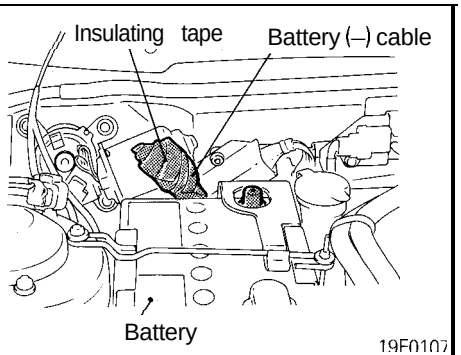


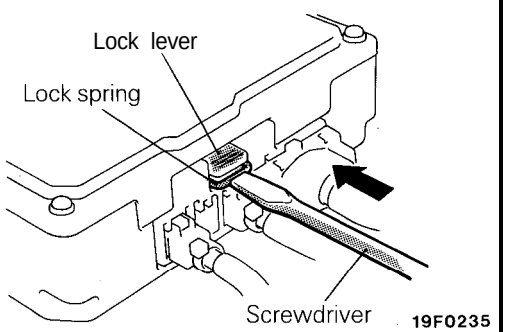


NOTE
If combined front impact sensor and air bag module (squib) failure modes simultaneously occur in two places, the preconditions for the respective detection circuits will go out of order. For this reason, both diagnostic trouble codes may not be stored but only one of them may be indicated.
Their relationships are shown in the following table.

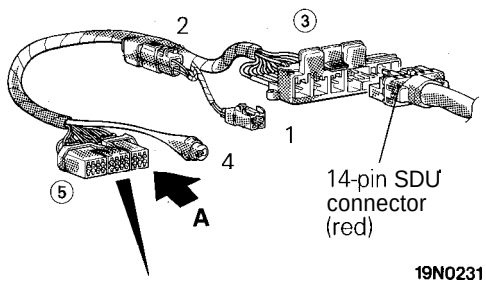
		Front impact sensors		
		Short-circuited	One open-circuited	Two open-circuited
Driver's air bag module (Squib)	Short-circuited	11 or 21	12 or 21	13 or 21
	Open-circuited	11 or 22	12 or 22	13 or 22
Passenger's air bag module (Squib)	Short-circuited	11 or 24	12 or 24	13 or 24
	Open-circuited	11 or 25	12 or 25	13 or 25

The numbers in the boxes are diagnostic trouble codes numbers. (Refer to P.23B-19.)

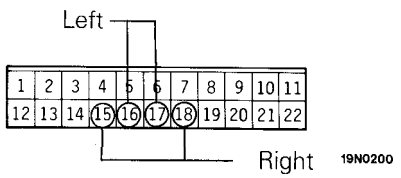




MB991 530
SRS Check Harness



View A
SRS Check Harness connector ⑤



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

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

(2) Remove the rear console assembly. (Refer to GROUP 23A – Floor Console.)

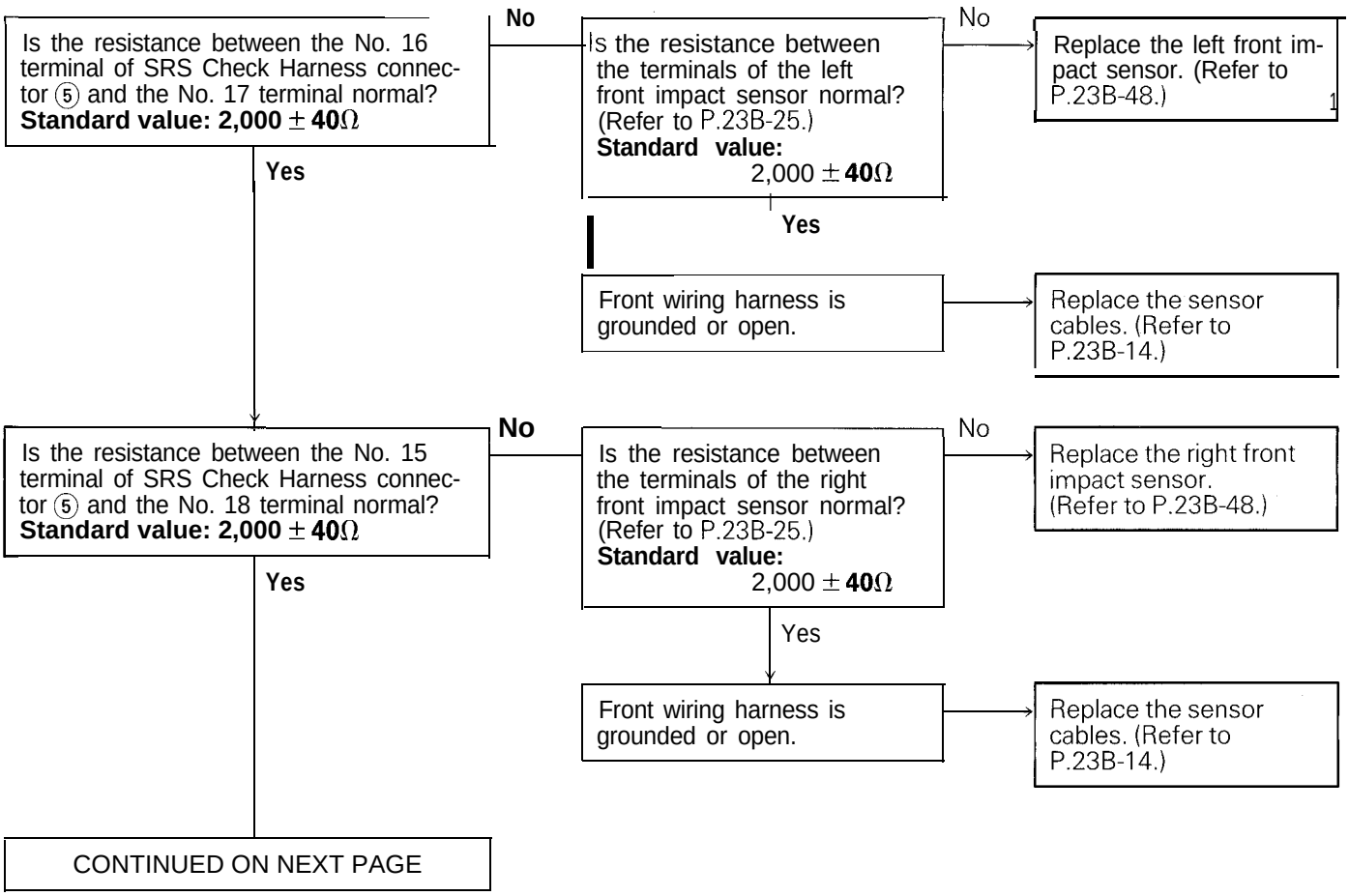
(3) Apply a flat tip screwdriver to the lock spring (metallic portion) of the SDU connector lock lever as illustrated and push it horizontally toward the back of the unit.

Caution
1. Do not push up the lock lever (green) by force.
2. Never insert a screwdriver between the lock lever (green) and the lock spring (metallic portion).

(4) Disconnect red 14-pin connector from the SRS diagnosis unit.

(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.



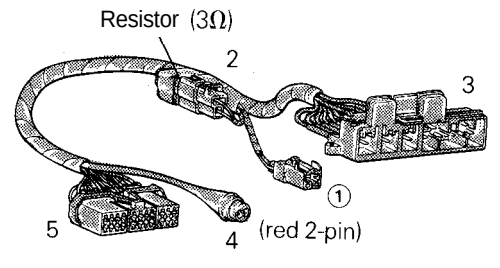
NOTE – IMPORTANT

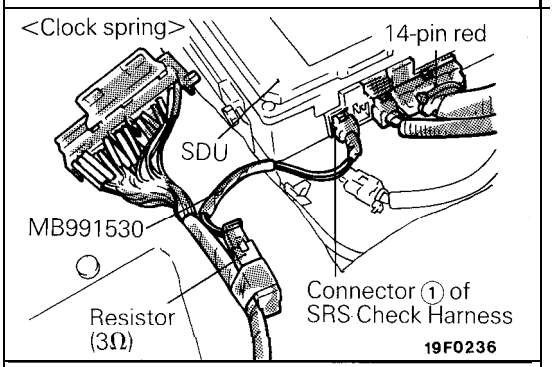
(1) After repairing the SRS, reconnect the battery cable, erase the diagnostic trouble code memory from the scan tool and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)

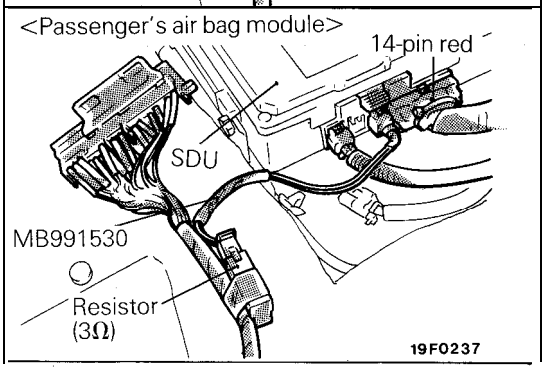
(2) SDU = SRS Diagnosis Unit

CONTINUED FROM PREVIOUS PAGE

MB991 530
SRS Check Harness







(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 and passenger's air bag modole-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.

(2) Reconnect 14-pin red connectors, for the wiring leading to the front impact sensors, to the SDU and double lock them. (Refer to P.23B-9.)

NOTE
If double locking cannot be made, the connector is incorrectly or incompletely inserted; re-check to insert the connector correctly and securely.

Clock spring

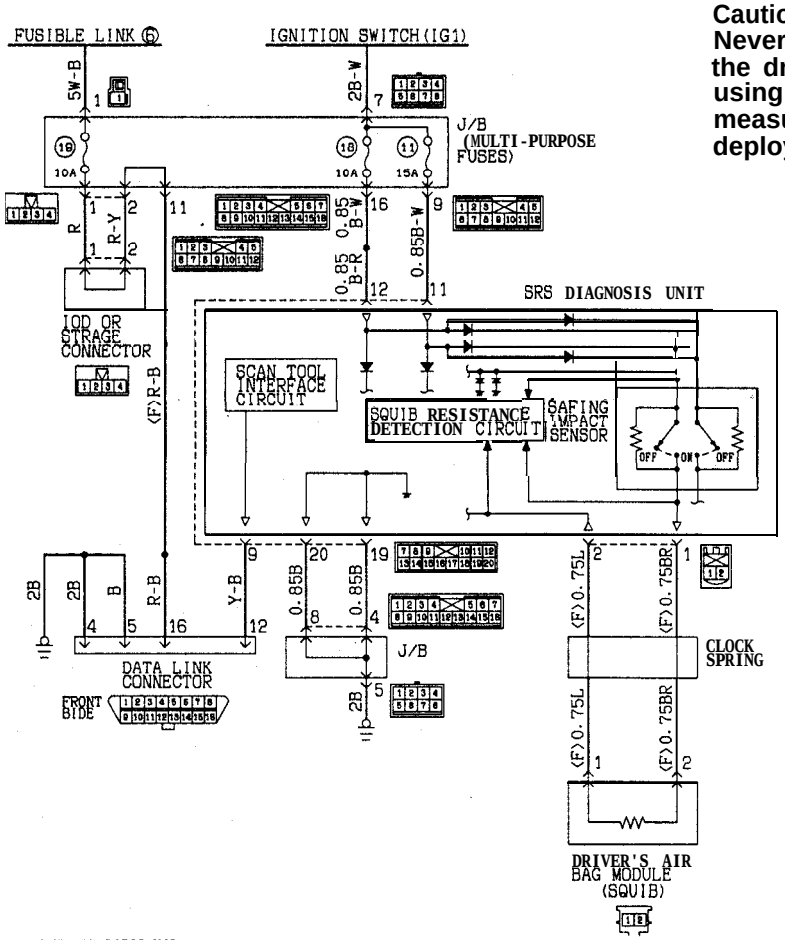
CONTINUED ON 23B-31* (TEST 6)

Passenger's air bag module

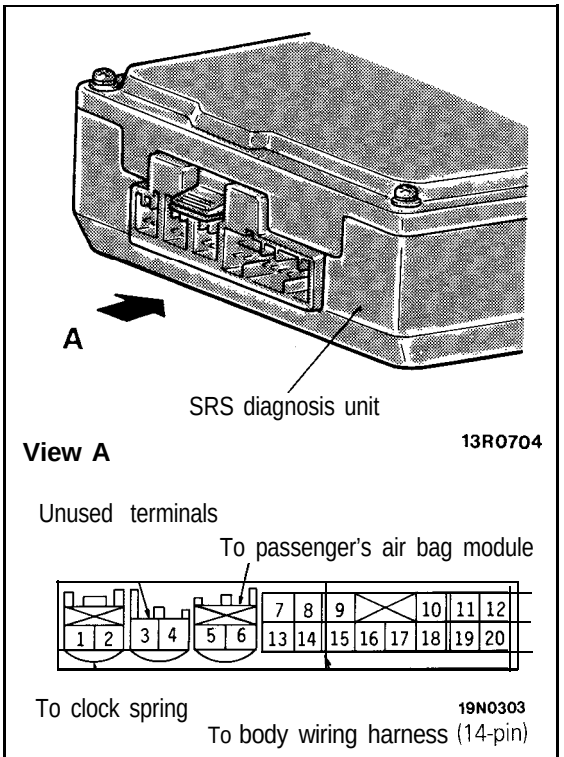
CONTINUED ON 23B-35* (TEST 7)

NOTE – IMPORTANT
(1) After repairing the SRS, reconnect the battery cable, erase the diagnostic trouble code memory from the scan tool and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)
(2) SDU = SRS Diagnosis Unit

TEST 6 | WHEN DIAGNOSTIC TROUBLE CODE No. 21 OR No. 22 IS DISPLAYED



Caution
Never attempt to measure the circuit resistance of the driver's air bag module (squib) even if you are using the specified tester. If the circuit resistance is measured with a tester, accidental driver's air bag deployment will result in serious personal injury.



Have the other diagnostic trouble code test(s) been finished?

No → Perform the other diagnostic trouble code test(s) prior to this test.

Yes

NOTE
If combined front impact sensor and driver's air bag module (squib) failure modes simultaneously occur in two places, the preconditions for the respective detection circuits will go out of order. For this reason, both diagnostic trouble codes may not be stored but only-one of them may be indicated.
Their relationships are shown in the following table.
Perform TEST 5 if it does not become proper even through TEST 6 is executed.

		Front impact sensors		
		Short-circuited	One open-circuited	Two open-circuited
Driver's air bag module (Squib)	Short-circuited	11 or 21	12 or 21	13 or 21
	Open-circuited	11 or 22	12 or 22	13 or 22

The numbers in the boxes are diagnostic trouble codes numbers. (Refer to P.23B-19.)

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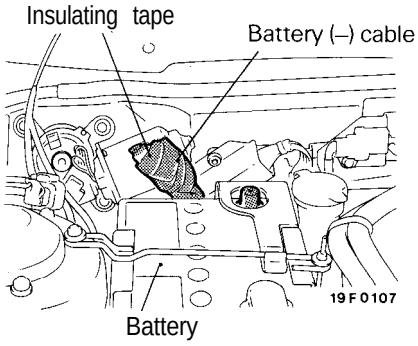
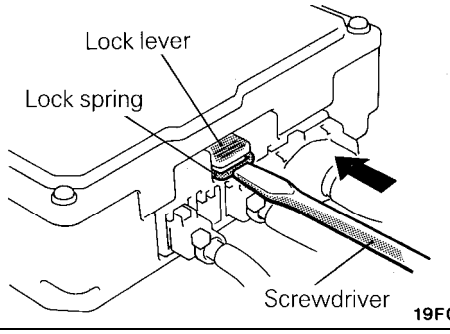
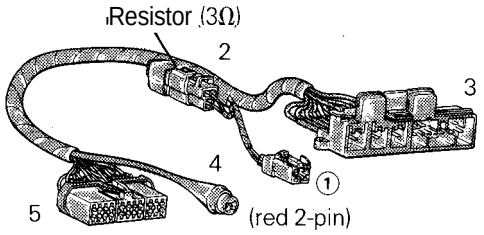
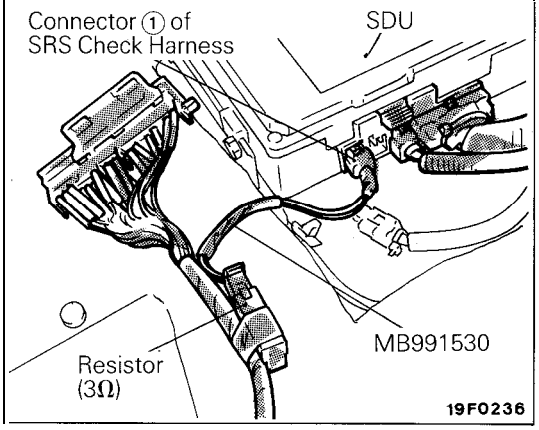




MB991530
SRS Check Harness





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

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

(2) Remove the rear console assembly.
(Refer to GROUP 23A – Floor Console.)

(3) Apply a flat tip screwdriver to the lock spring (metallic portion) of the SDU connector lock lever as illustrated and push it horizontally toward the back of the unit.

Caution
1. Do not push up the lock lever (green) by force.
2. Never insert a screwdriver between the lock lever (green) and the lock spring (metallic portion).

(4) Disconnect the red 2-pin connector from the SDU while pressing down the lock of the connector.
(Refer to P.23B-9.)

(5) Connect the red connector 1 of the SRS Check Harness to the SDU instead of the now-disconnected harness-side connector of the SDU, which were connected to the driver's air bag module (squib) through the clock spring.

NOTE
A 3-ohm resistor that corresponds to the resistance of the driver's air bag module (squib) and the wiring resistance is connected between the terminals of the connector 1 of the SRS Check Harness.

(6) Make the double locking.

NOTE
If double locking cannot be made, the connector is incorrectly or incompletely inserted; recheck to insert the connector correctly and securely.

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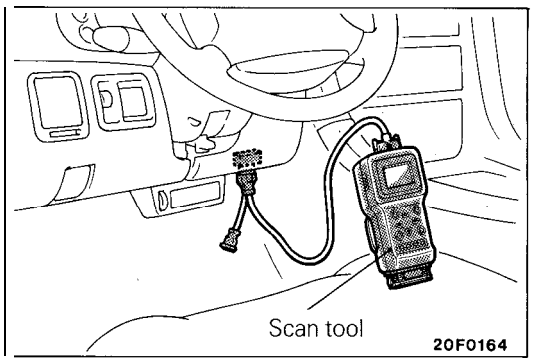
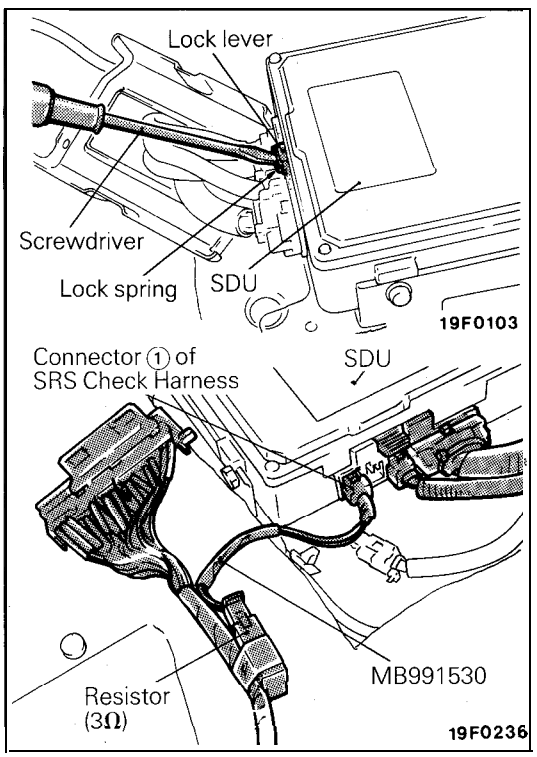


(1) Reconnect negative terminal of battery, and turn the ignition key to the "ON" position.
(2) Using the scan tool, erase the diagnostic trouble code memory. (Refer to TEST 1.)
(3) Return the ignition key from the "ON" to the "LOCK" position and then back to the "ON" position.

Is the SRS warning light operation normal?

No → Malfunction of the SDU. → Replace the SDU. (Refer to P.23B-51.)

Yes



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

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

(2) Apply a flat tip screwdriver to the lock spring (metallic portion) of the SDU connector lock lever as illustrated and push it horizontally toward the back of the unit.

Caution
1. **Do not push up the lock lever (green) by force.**
2. **Never insert a screwdriver between the lock lever (green) and the lock spring (metallic portion).**

(3) Disconnect the red 2-pin connector of the SRS Check Harness from the SDU.

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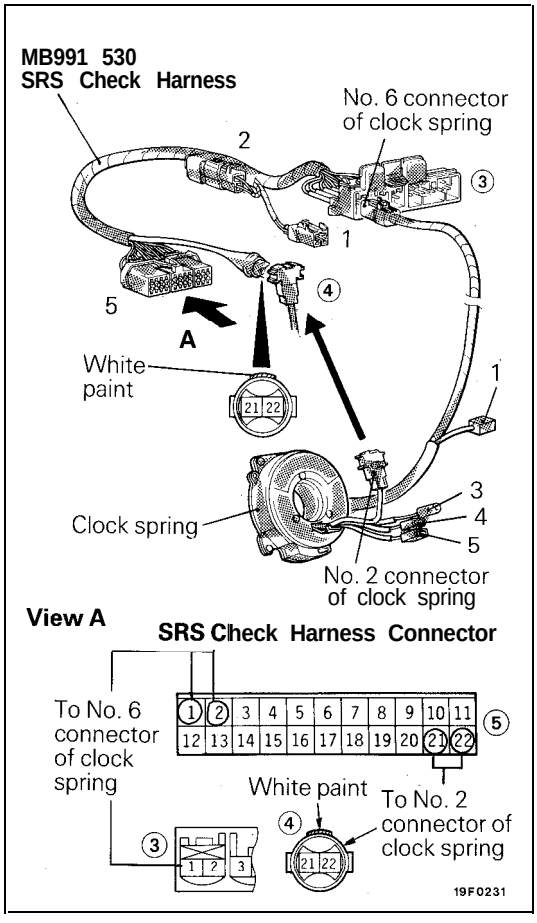


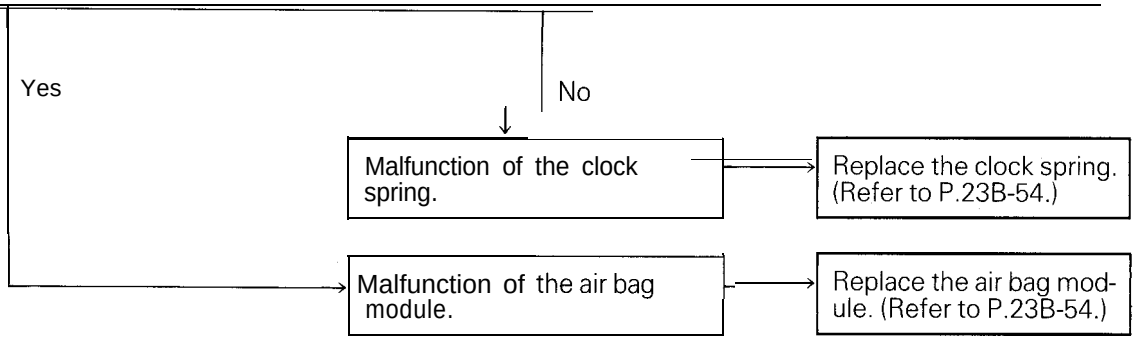
(1) Remove the driver's air bag module. (Refer to P.23B-54.)

(2) Join the No. 2 and No. 6 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.

(3) Is the resistance between terminal 1 and terminal 21 of SRS Check Harness connector ⑤, and between terminal 2 and terminal 22 of SRS Check Harness connector ⑤ normal?

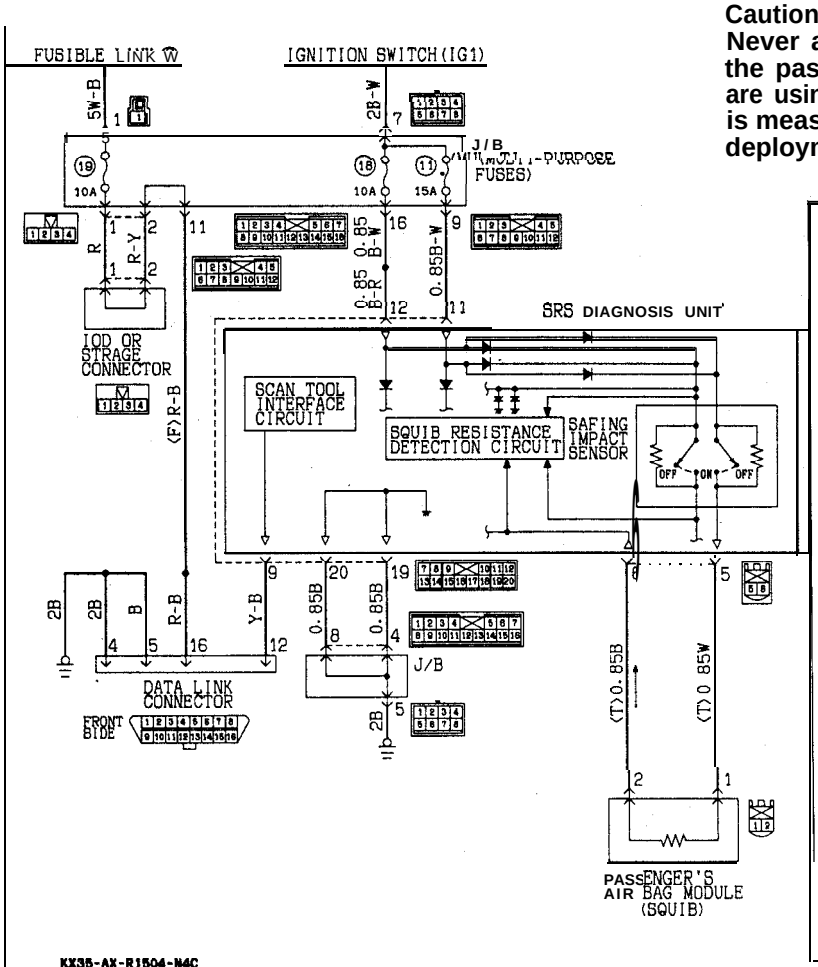
Standard value: less than 0.4 Ω



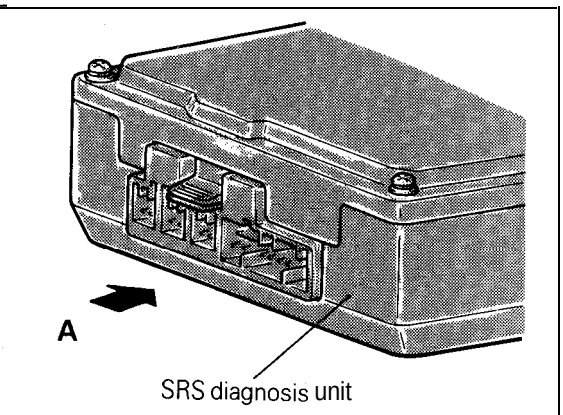
Caution
Never attempt to measure the circuit resistance of the air bag module (squib) even if you are using the specified tester. If the circuit resistance is measured with a tester, accidental air bag deployment will result in serious personal injury.

NOTE – IMPORTANT
(1) After repairing the SRS, reconnect the battery cable, erase the diagnostic trouble code memory from the scan tool and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)
(2) SDU = SRS Diagnosis Unit

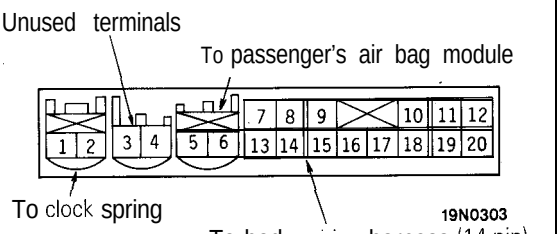
TEST 7 WHEN DIAGNOSTIC TROUBLE CODE No. 24 OR No. 25 IS DISPLAYED



Caution
Never attempt to measure the circuit resistance of the passenger's air bag module (squib) even if you are using the specified tester. If the circuit resistance is measured with a tester, accidental driver's air bag deployment will result in serious personal injury.



View A



Have the other diagnostic trouble code test(s) been finished?

No → Perform the other diagnostic trouble code test(s) prior to this test.

Yes

NOTE
If combined front impact sensor and passenger's air bag module (squib) failure modes simultaneously occur in two places, the preconditions for the respective detection circuits will go out of order. For this reason, both diagnostic trouble codes may not be stored but only one of them may be indicated.
Their relationships are shown in the following table.
Perform TEST 5 if it does not become proper even through TEST 7 is executed.

		Front impact sensors		
		Short-circuited	One open-circuited	Two open-circuited
Passenger's air bag module (Squib)	Short-circuited	11 or 24	12 or 24	13 or 24
	Open-circuited	11 or 25	12 or 25	13 or 25

The numbers in the boxes are diagnostic trouble codes numbers. (Refer to P.23B-19.)

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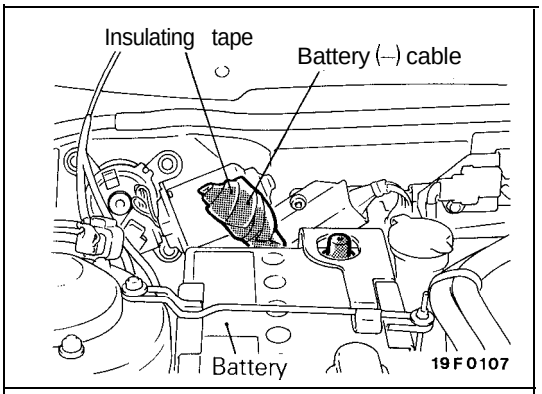

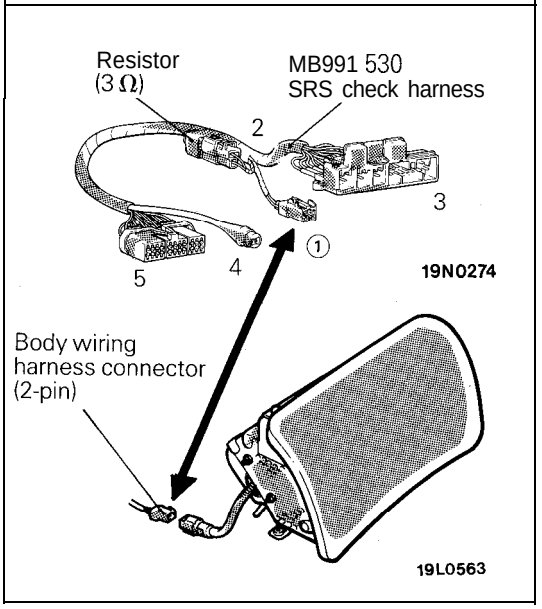

(1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal.

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

(2) Disconnect the passenger's air bag module connector from the body wiring harness connector.

(3) Connect the SRS check harness connector ① to the body wiring harness connector.

NOTE
A 3-ohm resistor that corresponds to the resistance of the passenger's air bag module (squib) and the wiring resistance is connected between the terminals of the connector ① of the SRS Check Harness.

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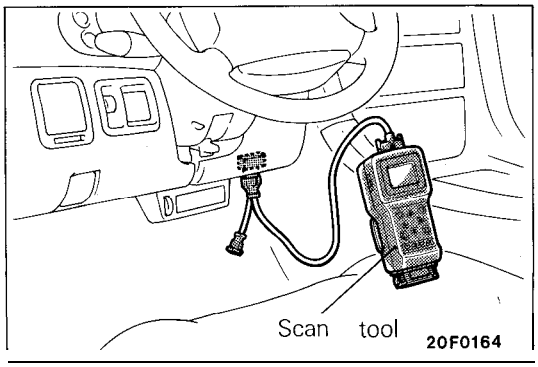


(1) Reconnect negative terminal of battery, and turn the ignition key to the "ON" position.
(2) Using the scan tool, erase the diagnostic trouble code memory. (Refer to TEST 1.)
(3) Return the ignition key from the "ON" to the "LOCK" position and then back to the "ON" position.

Is the SRS warning light operation normal?

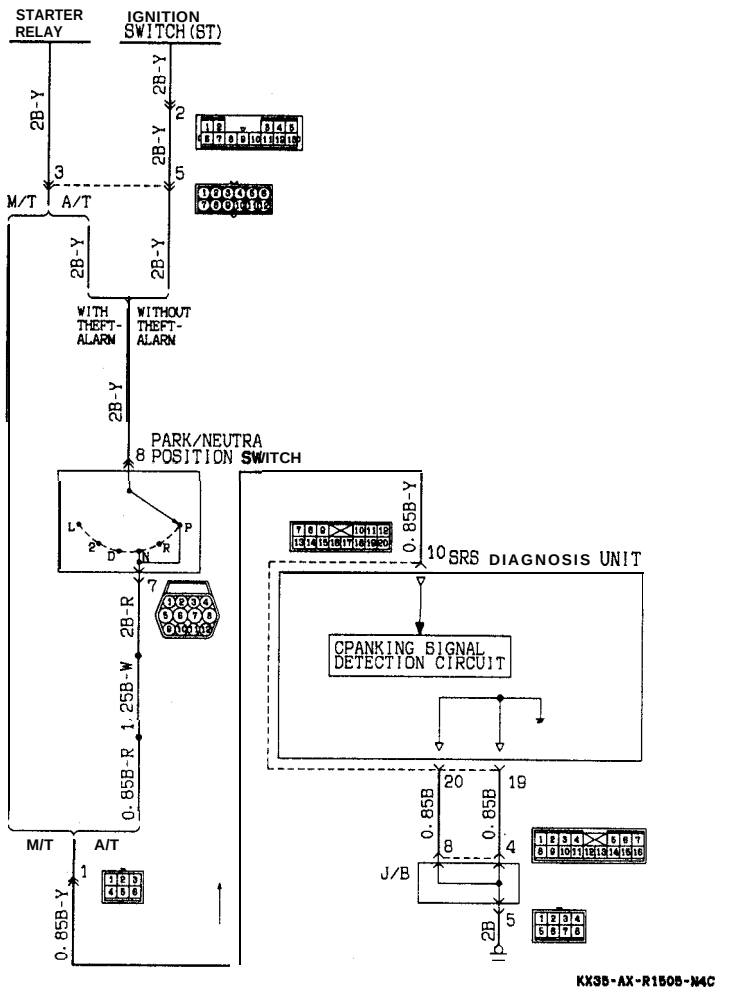
No → Defective SDU or harness between SDU and passenger's air bag module → ● Repair or replace harness (Refer to P.23B-51) ● Replace SDU

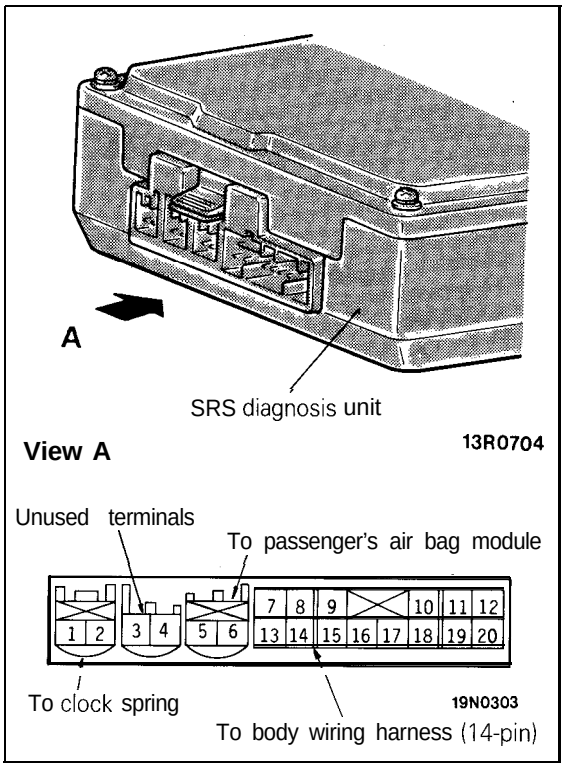
Yes → Defective passenger's air bag module → Replace passenger's air bag module (Refer to P.23B-54)

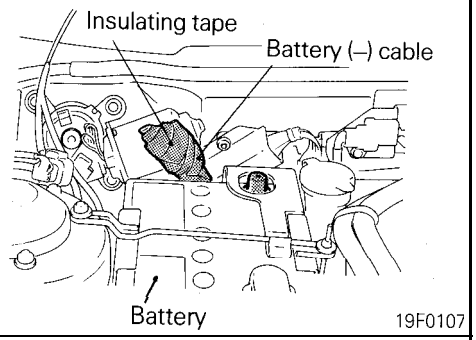
Caution
Never attempt to measure the circuit resistance of the air bag module (squib) even if you are using the specified tester. If the circuit resistance is measured with a tester, accidental air bag deployment will result in serious personal injury.

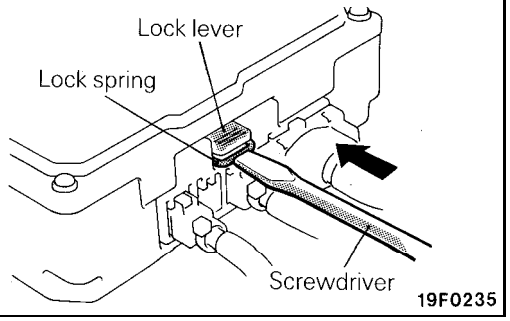
NOTE – IMPORTANT
(1) After repairing the SRS, reconnect the battery cable, erase the diagnostic trouble code memory from the scan tool and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)
(2) SDU = **SRS** Diagnosis Unit

TEST 8	WHEN DIAGNOSTIC TROUBLE CODE No. 33 IS DISPLAYED









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

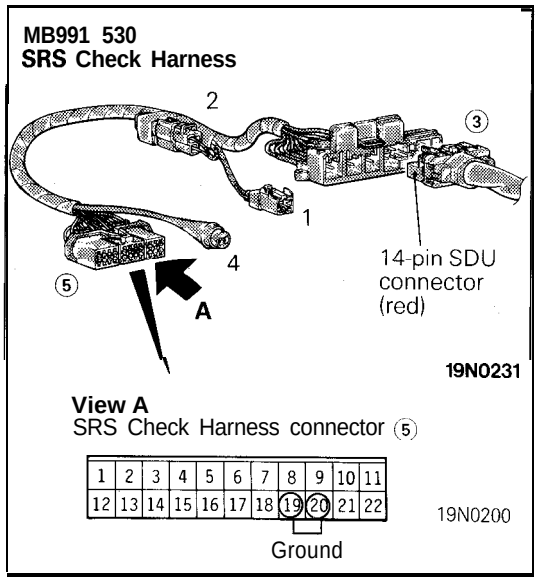
Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. The SRS system is designed to retain enough voltage to deploy the air bag even after the battery has been disconnected. Serious injury may result from unintended air bag deployment if work is done on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

(2) Remove the rear console assembly. (Refer to GROUP 23A – Floor Console.)

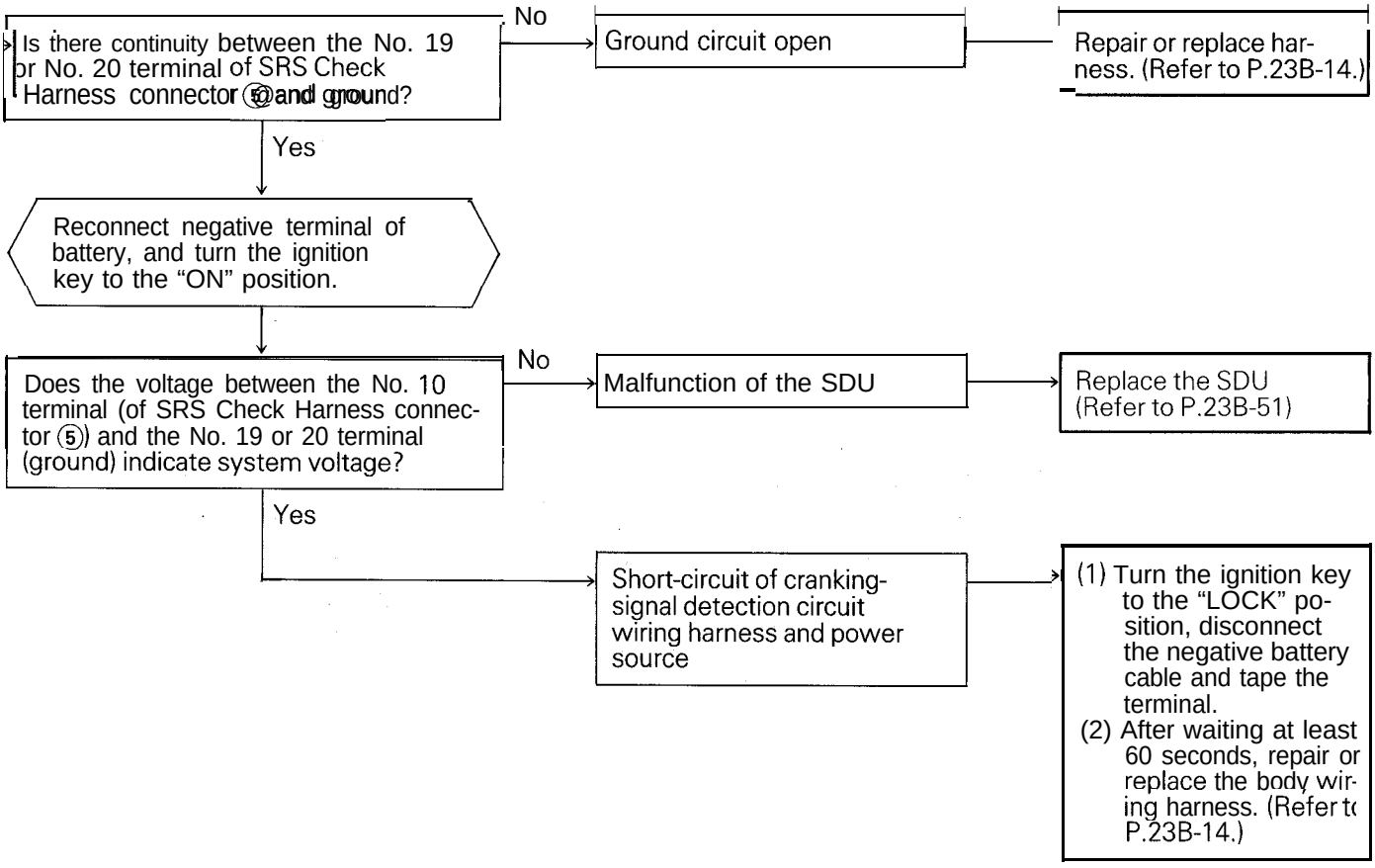
(3) Apply a flat tip screwdriver to the lock spring (metallic portion) of the SDU connector lock lever as illustrated and push it horizontally toward the back of the unit.

Caution
1. Do not push up the lock lever (green) by force.
2. Never insert a screwdriver between the lock lever (green) and the lock spring (metallic portion).

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



(5) Connect the now disconnected red harness-side SDU connector (14-pin) to the connector (3) of the SRS Check Harness.
(6) Check according to the flow chart below, using the digital multi-meter.



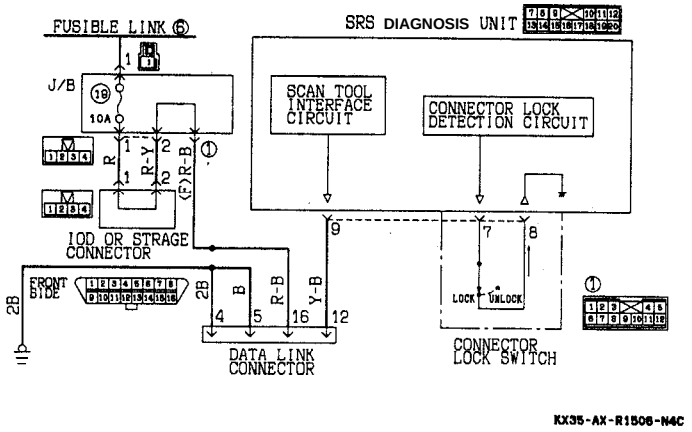
NOTE – IMPORTANT

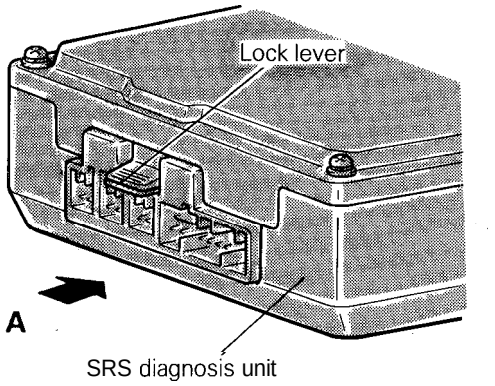
(1) If more than 45 seconds of cranking is required to start up the engine, the diagnostic trouble code will be stored in memory, but if there is no problem, the diagnostic trouble code will be cleared and the SRS will return to normal.

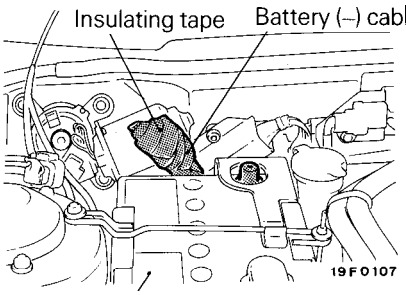
(2) After repairing the SRS, reconnect the battery cable, and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)

(3) SDU = SRS Diagnosis Unit

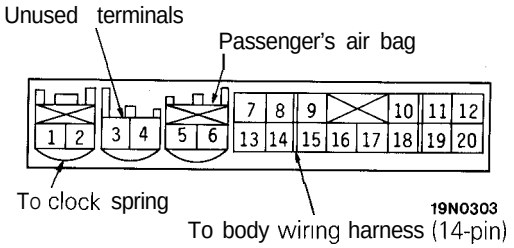
TEST 9	WHEN DIAGNOSTIC TROUBLE CODE No. 34 IS DISPLAYED







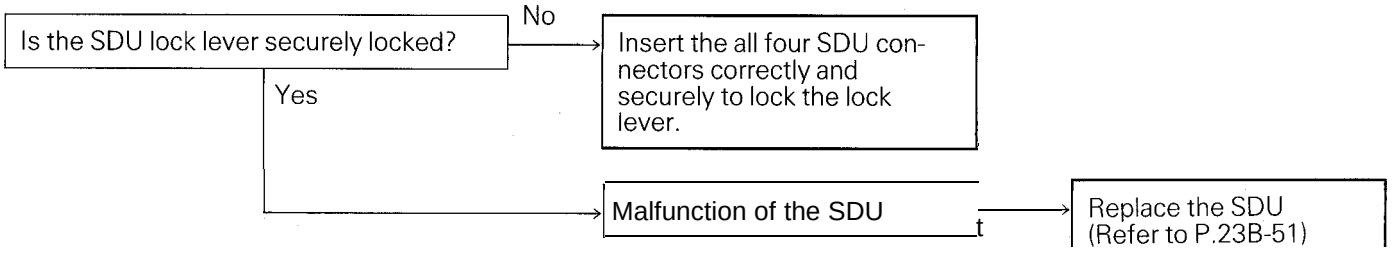
View A



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

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

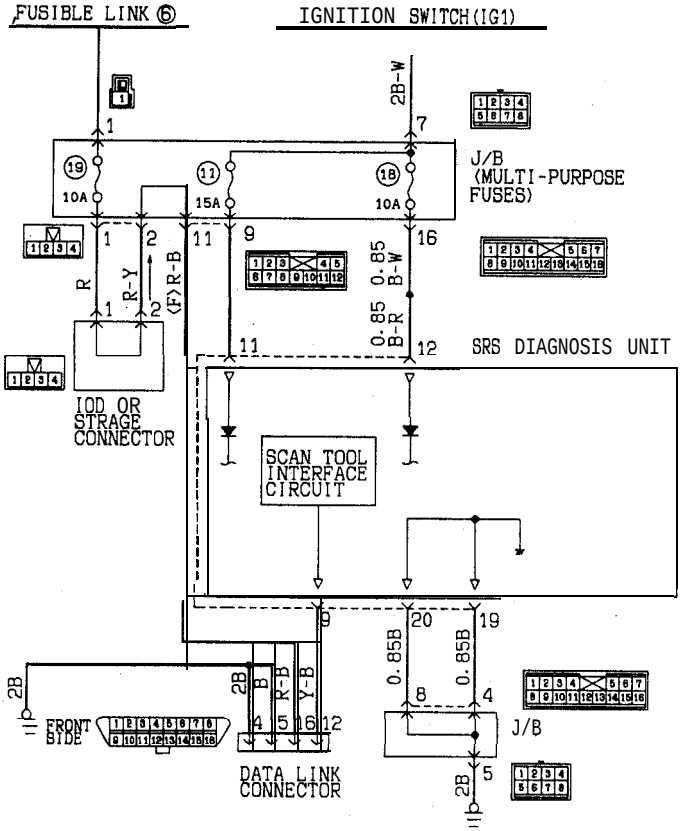
(2) Remove the floor console. (Refer to GROUP 23A – Floor Console.)



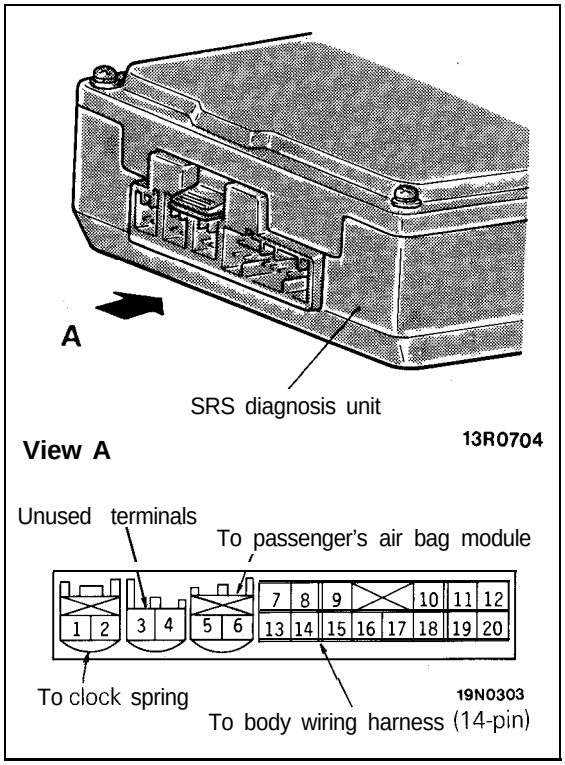
NOTE – IMPORTANT
(1) After repairing the SRS, reconnect the battery cable, and check the SRS warning light operation to verify the system functions properly. (Refer to Test 1.)
(2) SDU = SRS Diagnosis Unit

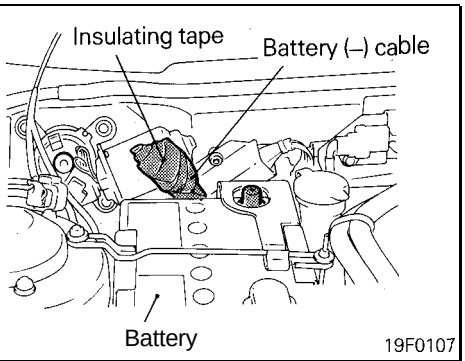
TEST 10 WHEN DIAGNOSTIC TROUBLE CODE No. 41 IS DISPLAYED

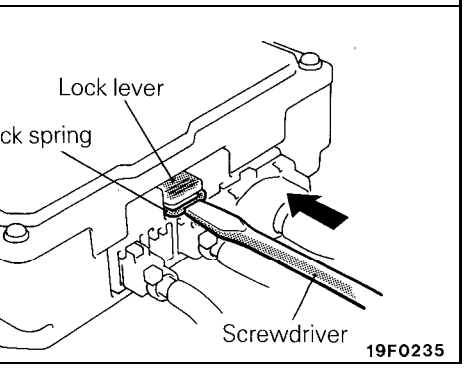
TEST 11 WHEN DIAGNOSTIC TROUBLE CODE No. 42 IS DISPLAYED



KX35-AX-R1507-N4C







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

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

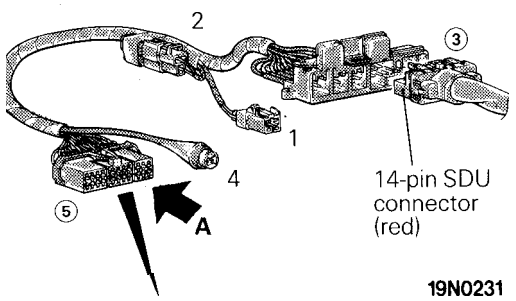
(2) Remove the rear console assembly. (Refer to GROUP 23A – Floor Console.)

(3) Apply a flat tip screwdriver to the lock spring (metallic portion) of the SDU connector lock lever as illustrated and push it horizontally toward the back of the unit.

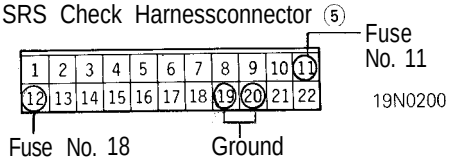
Caution
1. Do not push up the lock lever (green) by force.
2. Never insert a screwdriver between the lock lever (green) and the lock spring (metallic portion).

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

MB991 530
SRS Check Harness



View A
SRS Check Harnessconnector ⑤



(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.

Is there continuity between the No. 19 or No. 20 terminal of SRS Check Harness connector ⑤ and ground?
No → Ground circuit open → Repair or replace harness. (Refer to P.23B-14.)

Yes ↓

Reconnect negative terminal of battery, and turn the ignition key to the "ON" position.

TEST 10 TEST 9

Is there a voltage of 9V or more between the No. 19 or 20 terminal (ground) and the No. 12 terminal of the SRS Check Harness connector ⑤?
No → Damaged or disconnected wiring of fuse No. 18, or damaged or disconnected body wiring harness. → (1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal. (2) After waiting at least 60 seconds, repair or replace the body wiring harness. (Refer to P.23B-14.)

Yes

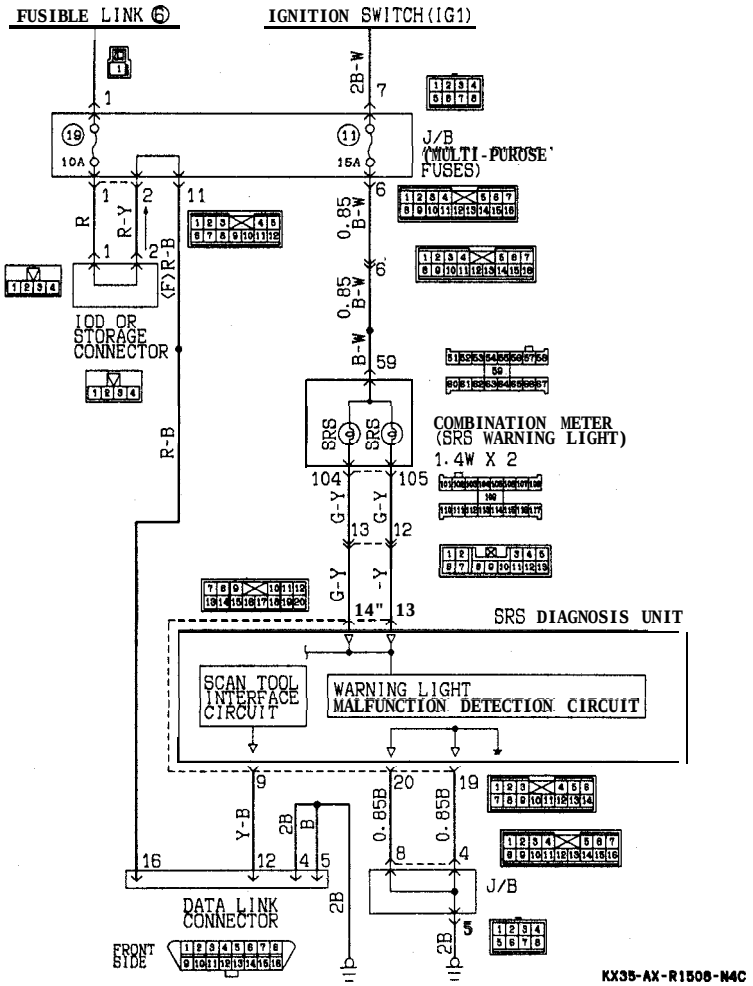
Malfunction of the SDU → Replace the SDU. (Refer to P.23B-51)

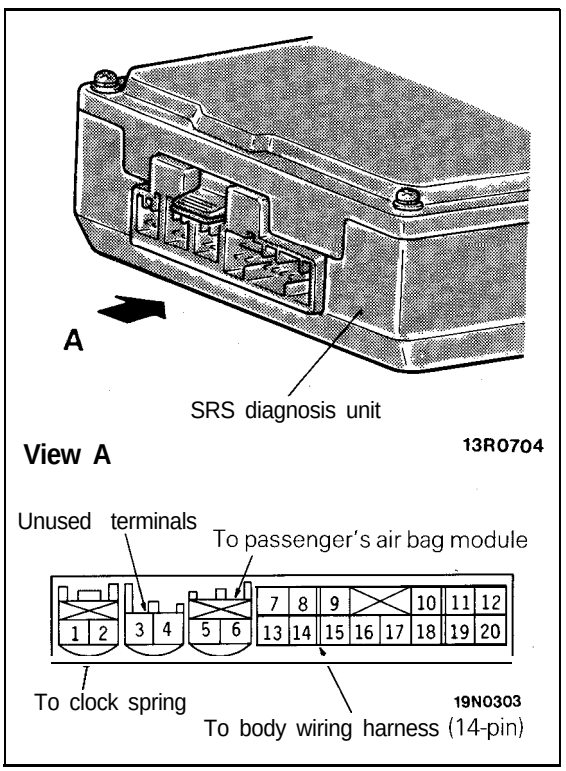
Yes ↓

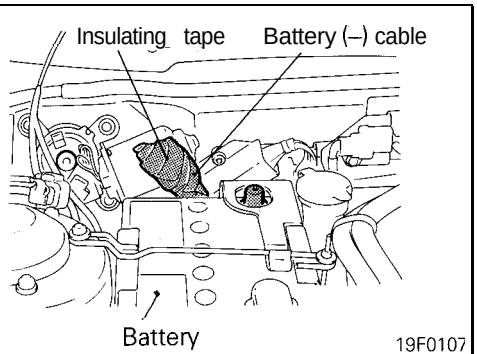
Is there a voltage of 9 V or more between the No. 19 or 20 terminal (ground) and the No. 11 terminal of the SRS Check Harness connector ⑤?
No → Damaged or disconnected wiring of fuse No. 11, or damaged or disconnected body wiring harness. → (1) Turn the ignition key to the "LOCK" position, disconnect the negative battery cable and tape the terminal. (2) After waiting at least 60 seconds, replace the SDU. (Refer to P.23B-51.)

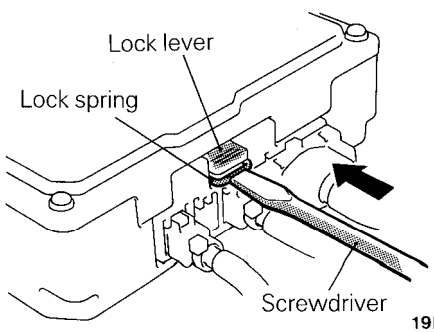
NOTE – IMPORTANT
(1) After repairing the SRS, reconnect the battery cable, and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)
(2) SDU = SRS Diagnosis Unit

TEST 12	WHEN DIAGNOSTIC TROUBLE CODE No. 43 IS DISPLAYED









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

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

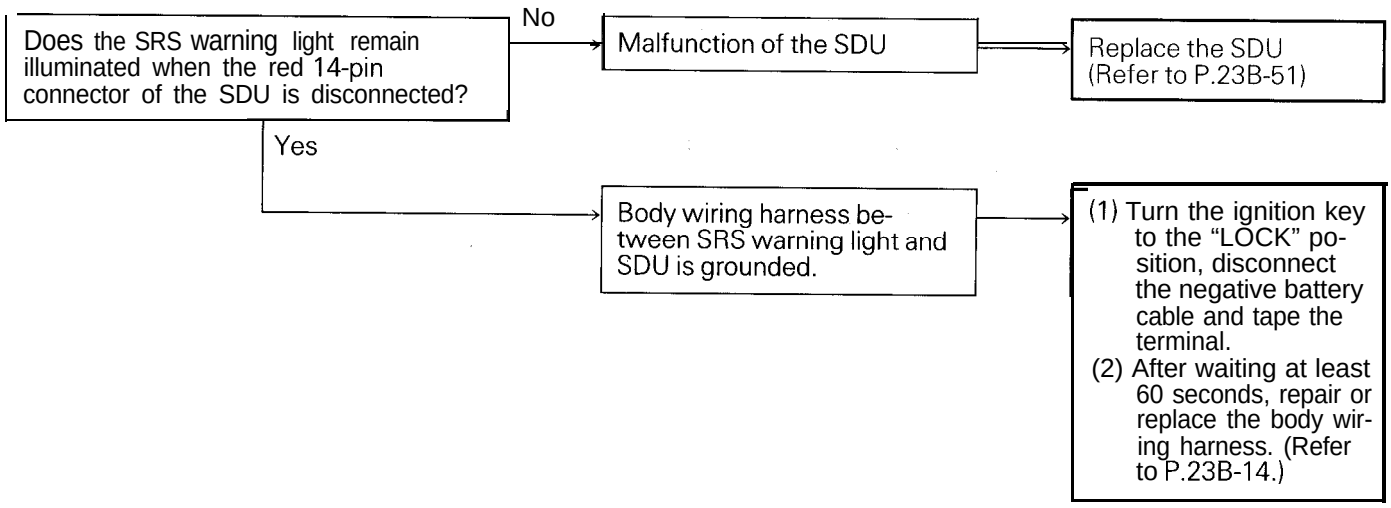
(2) Remove the rear console assembly. (Refer to GROUP 23A Floor Console.)

(3) Apply a flat tip screwdriver to the lock spring (metallic portion) of the SDU connector lock lever as illustrated and push it horizontally toward the back of the unit.

Caution
1. Do not push up the lock lever (green) by force.
2. Never insert a screwdriver between the lock lever (green) and the lock spring (metallic portion).

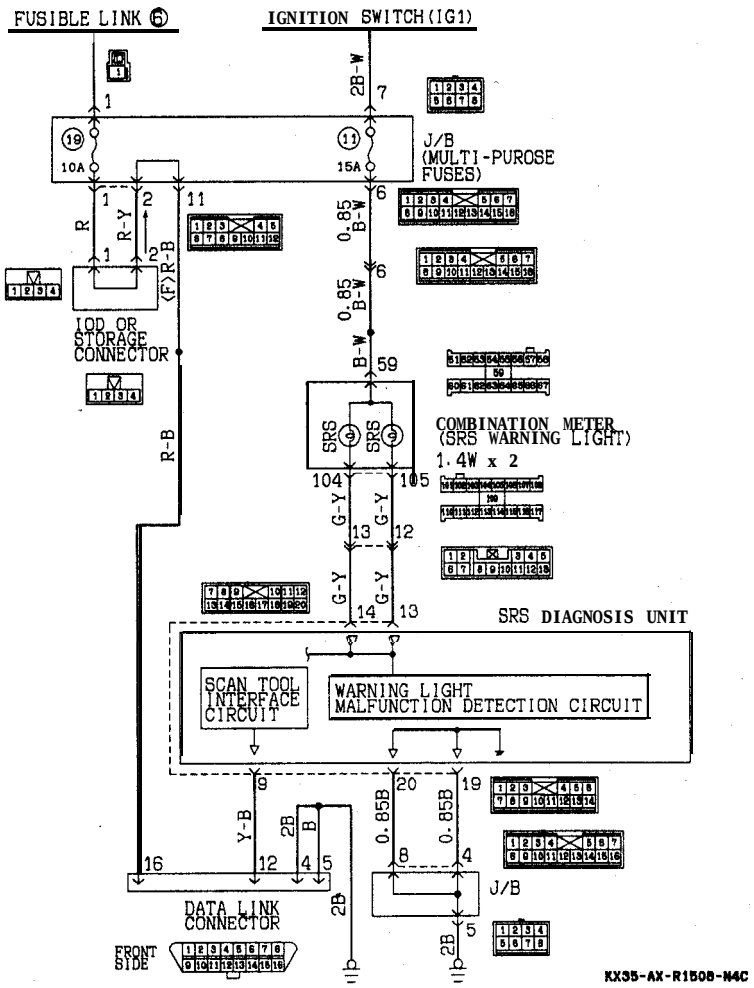
(4) Disconnect the red 14-pin connector from the SDU.

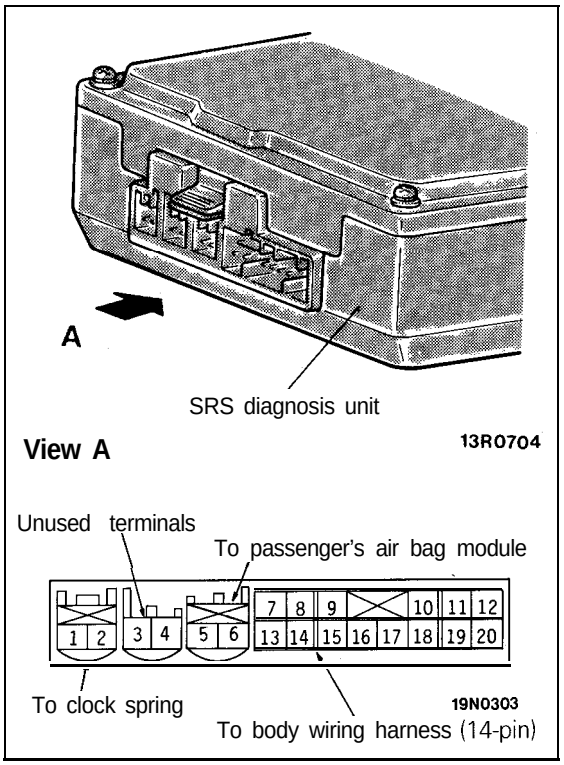
(5) Reconnect negative terminal of battery, and turn the ignition key to the "ON" position.
(6) Check according to the flow chart below.

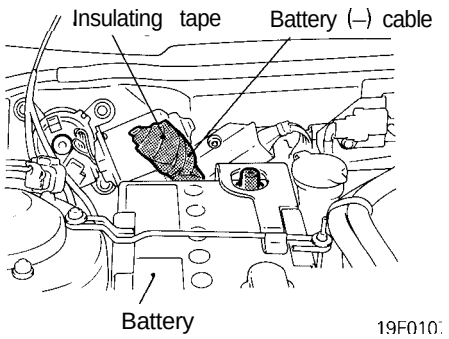


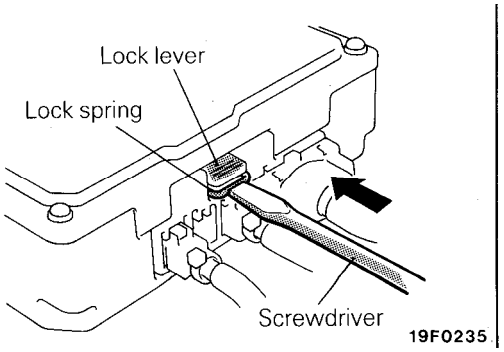
NOTE – IMPORTANT
(1) After repairing the SRS, reconnect the battery cable, and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)
(2) SDU = SRS Diagnosis Unit

TEST 13	WHEN DIAGNOSTIC TROUBLE CODE No. 43 IS DISPLAYED (SRS warning light does not illuminate)









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

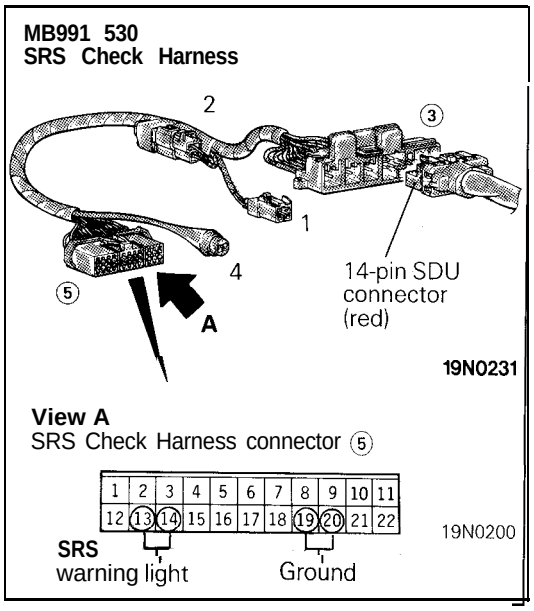
Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. The SRS system is designed to retain enough voltage to deploy the air bag even after the battery has been disconnected. Serious injury may result from unintended air bag deployment if work is done on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

(2) Remove the rear console assembly. (Refer to GROUP 23A Floor Console.)

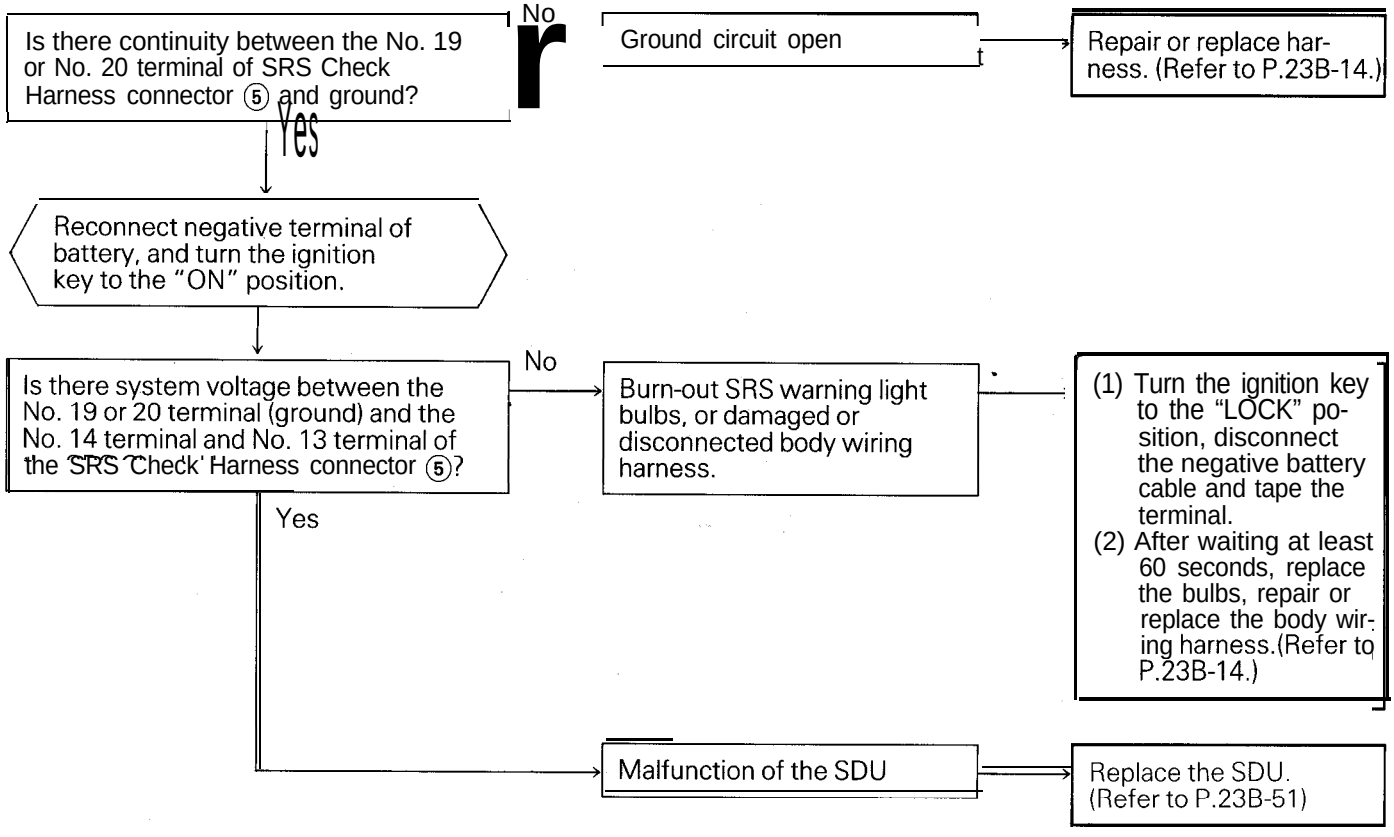
(3) Apply a flat tip screwdriver to the lock spring (metallic portion) of the SDU connector lock lever as illustrated and push it horizontally toward the back of the unit.

Caution
1. Do not push up the lock lever (green) by force.
2. Never insert a screwdriver between the lock lever (green) and the lock spring (metallic portion).

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



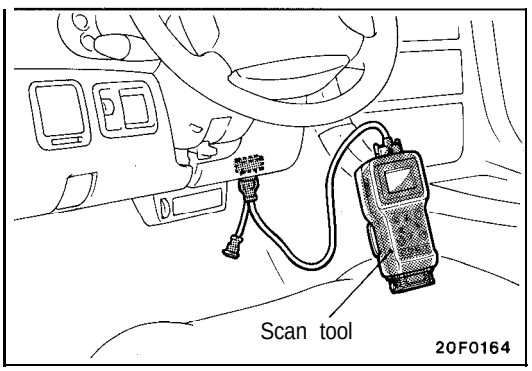
(5) Connect the now disconnected red harness-side SDU connector (14-pin) to the connector ③ of the SRS Check Harness.
(6) Check according to the flow chart below, using the digital multi-meter.



NOTE – IMPORTANT
(1) After repairing the SRS, reconnect the battery cable, and check the SRS warning light operation to verify the system functions properly. (Refer to TEST 1.)
(2) SDU = SRS Diagnosis Unit

MAINTENANCE

The SRS must be inspected by an authorized dealer 10 years after the car manufacture date. (Refer to GROUP 0 – Maintenance Service.)



POST-COLLISION DIAGNOSIS

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) Connect the scan tool to the data link connector.

Caution
Make certain that the ignition switch is at OFF when the scan tool is connected or disconnected.

(2) Read (and write down) all displayed diagnostic trouble codes. (Refer to P.23B-19.)

NOTE
If the battery-power supply has been disconnected or disrupted by the collision, the scan tool cannot communicate with the SRS diagnosis unit. Inspect and, if necessary, repair the body wiring harness before proceeding further.

(3) Read the service data (fault duration and how many times memories are erased) using the scan tool.

NOTE
- Maximum stored period: 9999 minutes (approximately 7 days)
- Maximum number of times to be stored: 250

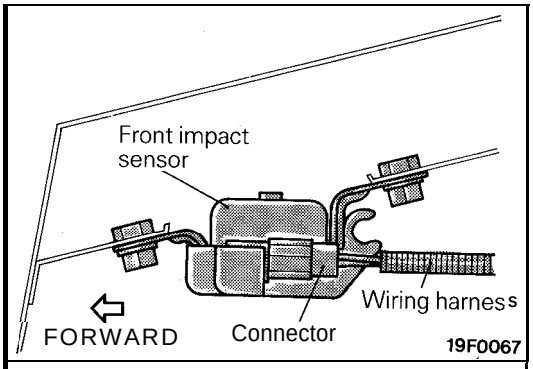
(4) Erase the diagnostic trouble codes and after waiting 45 seconds or more read (and write down) all displayed diagnostic trouble codes. (Refer to P.23B-19.)

REPAIR PROCEDURE

WHEN AIR BAG DEPLOYS FROM COLLISION

(1) Replace the following parts with new ones.
- Front impact sensors (Refer to P.23B-48.)
- SRS diagnosis unit (SDU) (Refer to P.23B-51.)
- Air bag module (Refer to P.23B-54.)
- Clock spring (Refer to P.23B-54.)
- Steering wheel, steering column and intermediate joint (Refer to GROUP 19A – Steering Wheel and Shaft.)

(2) Check harnesses for binding, connectors for damage, poor connections, and terminals for deformities. (Refer to P.23B-19.)

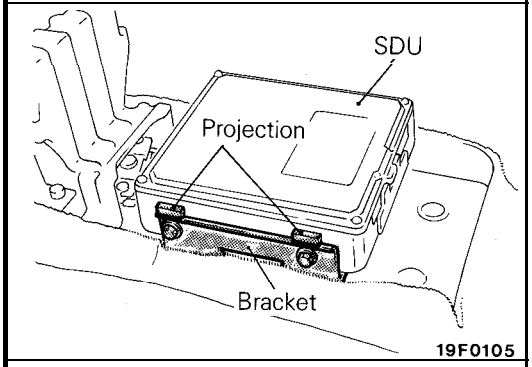


WHEN AIR BAG DOES NOT DEPLOY IN LOW-SPEED COLLISION

Check the SRS components.
If the SRS components are showing any visible damage such as dents, cracks, or deformation, replace them with new ones. Concerning parts removed for inspection, replacement with new parts and cautionary points for working, refer to appropriate COMPONENT SERVICE, P.23B-48.

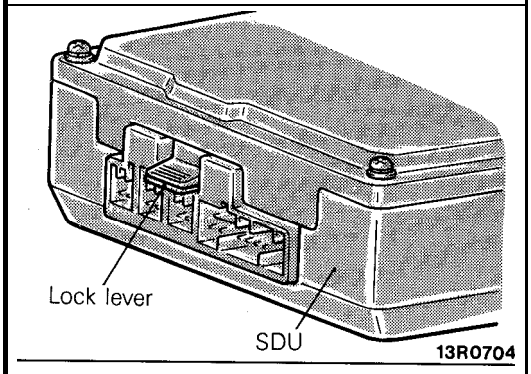
Front Impact Sensors

(1) Check front upper frame lower for deformities or rust.
(2) Check front impact sensor for dents, cracks, deformities or rust.
(3) Check sensor harnesses for binds, connectors for damage, and terminals for deformities.

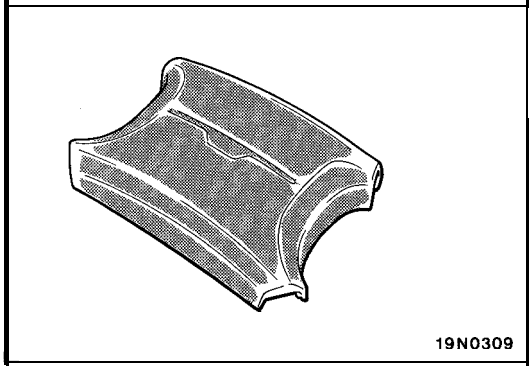


SRS Diagnosis Unit (SDU)

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



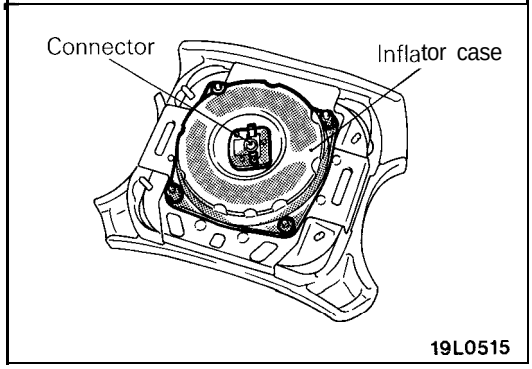
(2) Check connectors and lock lever for damage, and terminals for deformities.



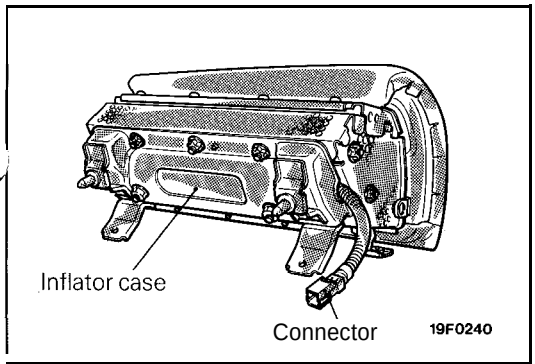
Air Bag Module

<Driver's seat>

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

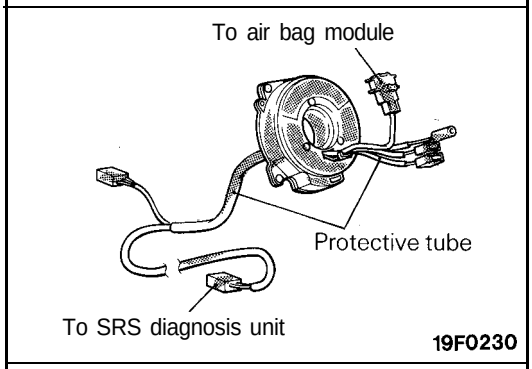


(2) Check for connectors damage, deformed terminal, and binding harness.
(3) Check air bag inflator case for dents, cracks or deformities.
(4) Install air bag module to steering wheel to check fit or alignment with the wheel.



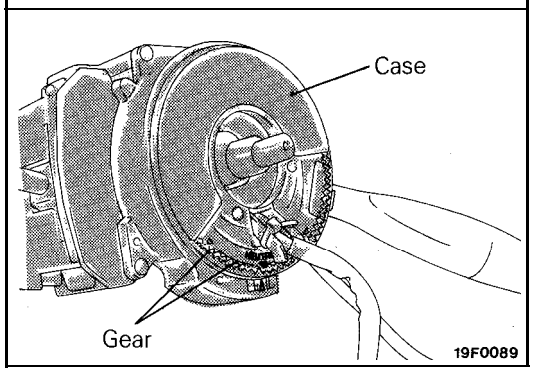
<Passenger's seat>

(1) Check module cover for dents, cracks or deformities.
(2) Check connectors for damage, terminals deformities and for binds.
(3) Check air bag inflator case for dents, cracks or deformities.



Clock Spring

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



(2) Visually check the case and the gears for damage.

Steering Wheel, Steering Column and Intermediate Joint

(1) Check wiring harness (built into steering wheel) and connectors for damage, and terminals for deformities.
(2) Install air bag module to check fit or alignment with steering wheel.
(3) Check steering wheel for noise, binding or difficult operation, or excessive free play.

Harness Connector (Body and Front wiring harness)

Check for binding harnesses, connectors for damage, poor connections, and deformed terminals.
(Refer to P.23B-14.)

COMPONENT SERVICE

If the SRS components are to be removed or replaced as a result of maintenance, troubleshooting, etc., follow each procedure (P.23B-48 – P.23B-60).

Caution

1. **SRS components should not be subjected to heat over 93°C (200°F), so remove the front impact sensors, SRS diagnosis unit, air bag modules and clock spring before drying or baking the vehicle after painting. Recheck SRS system operability after re-installing them.**
2. **If the SRS components are removed for the purpose of inspection, sheet metal repair, painting, etc., they should be stored in a clean, dry place until they are reinstalled.**

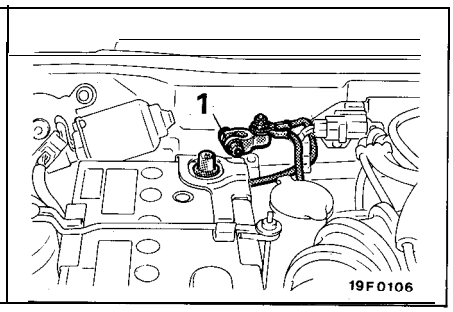
FRONT IMPACT SENSORS

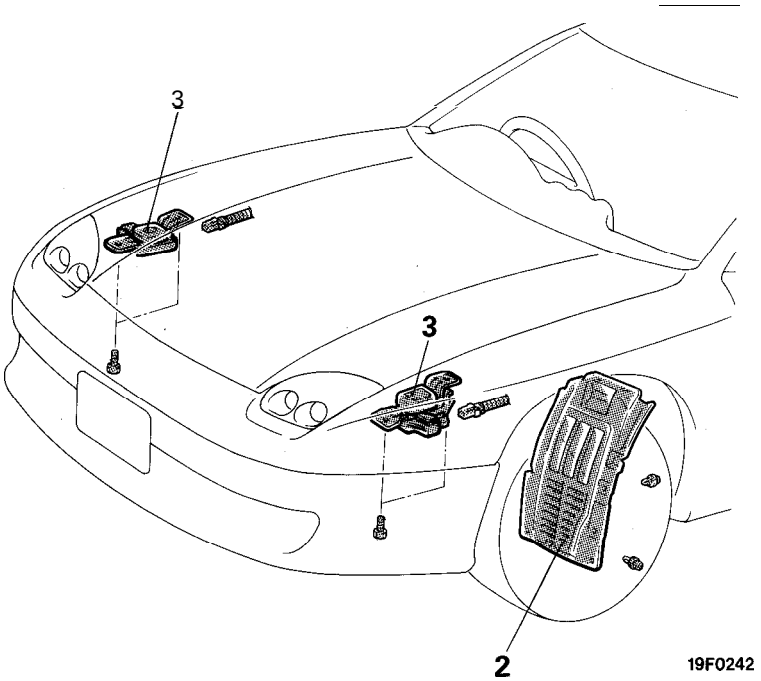
Caution

1. **Never repair or disassemble a front impact sensor. If faulty, replace it.**
2. **Handle the front impact sensors very careful-**

subject them to impact. If a sensor is seen to

REMOVAL AND INSTALLATION

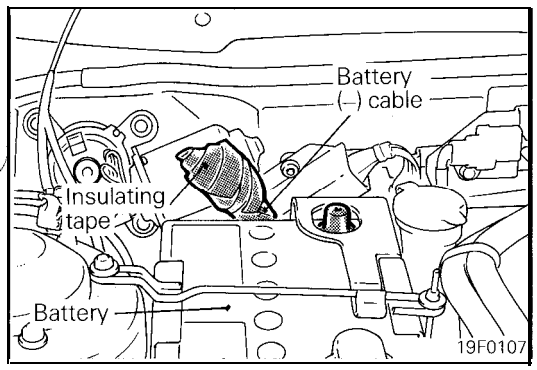




Pre-removal Operation
- Turn the ignition key to the "LOCK" position

Removal steps

- ▯ Post-installation inspection
- ◆◆ 1. Connection for the negative (–) battery cable
- 2. Front splash shield extension
- C 3. Front impact sensor
- ▯ Pre-installation inspection

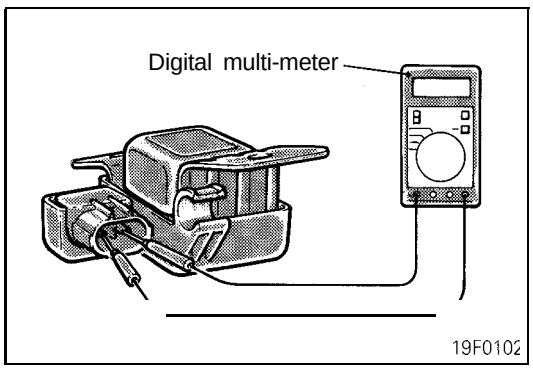


SERVICE POINTS OF REMOVAL

1. DISCONNECTION OF THE NEGATIVE (–) BATTERY CABLE FROM THE BATTERY

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

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



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.

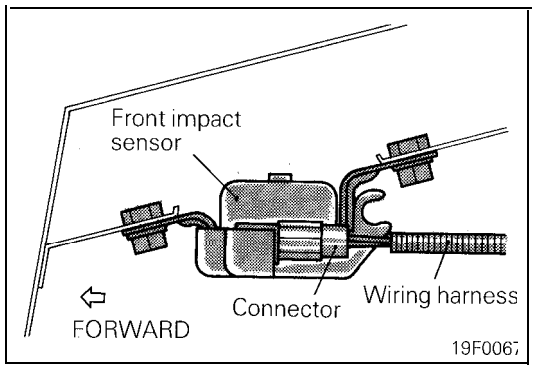
SERVICE POINT OF INSTALLATION

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 ± 40Ω

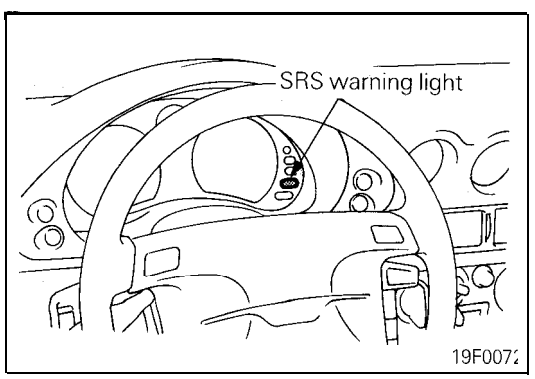
Use the digital multi meter. If the resistance is not within that standard value range, discard it and replace it with a new one that has the standard value.



3. 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 the SRS system not operating properly during a collision.



POST-INSTALLATION INSPECTION

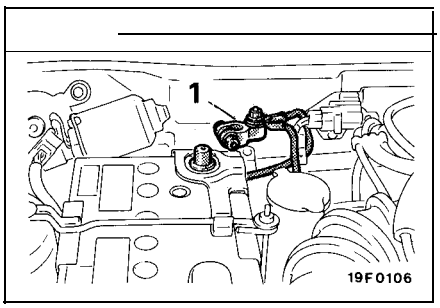
Reconnect the negative battery terminal. Turn the ignition switch to "ON". Check if the SRS warning light illuminates for about 7 seconds and then remain OFF for at least 45 seconds. If yes, SRS system is functioning properly. If no, cunsult page 23B-18.

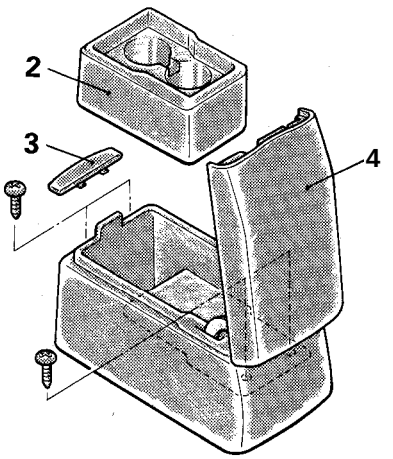
SRS DIAGNOSIS UNIT (SDU)

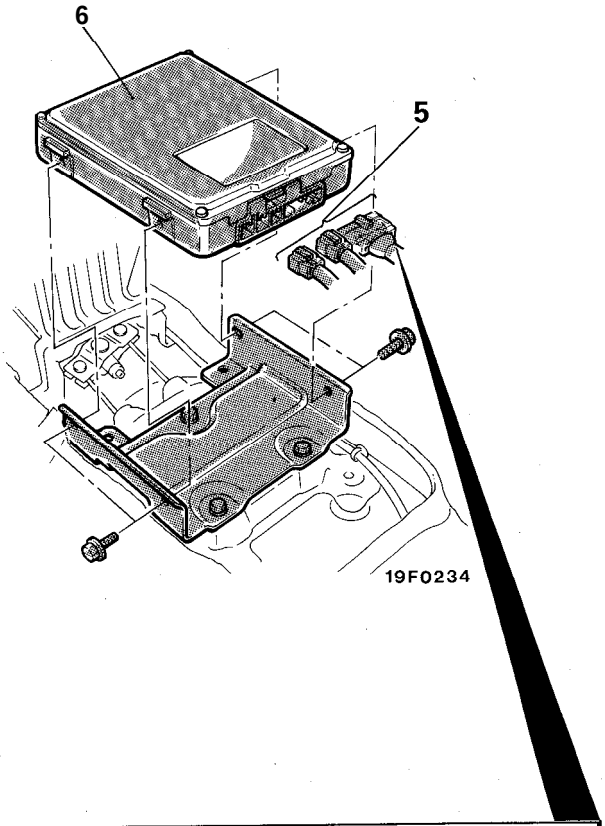
Caution

1. **Never attempt to disassemble or repair the SRS diagnosis unit. If faulty, replace it.**
2. **Do not drop or subject the SRS diagnosis unit to impact or vibration.**
   If dents, cracking, deformation, or rust are discovered on the SRS diagnosis unit, replace it with a new SRS diagnosis unit. Discard the old one.
3. **After deployment of the air bags, replace the SRS diagnosis unit with a new one.**
4. **Never use an ohmmeter on or near the SRS diagnosis unit, and use only the special test equipment described on P.23B-16.**

REMOVAL AND INSTALLATION



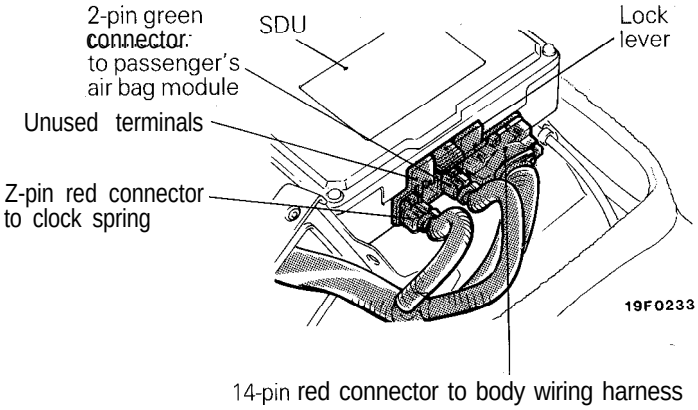


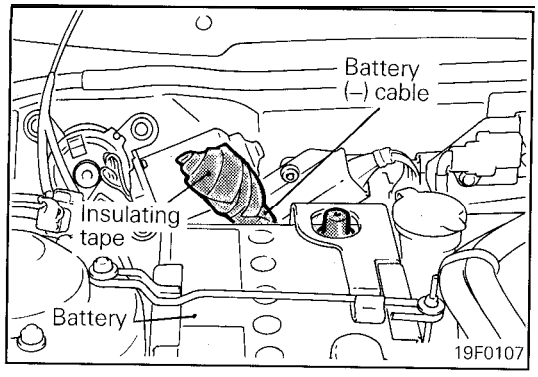


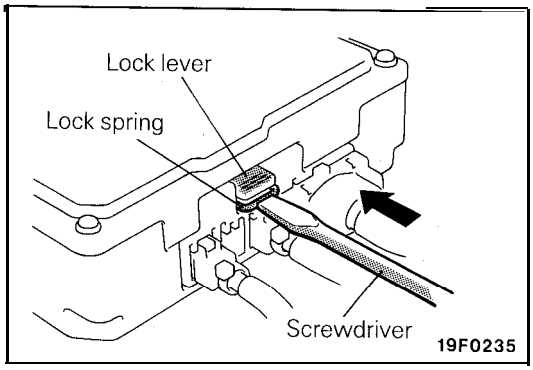
Pre-removal Operation
- Turn the ignition key to the "LOCK" position

Removal steps

- ⧫ ☒ Post-installation inspection
- ◆◆ 1. Connection for the negative (–) battery cable.
  2. Cup holder
  3. Console plug
  4. Rear console assembly
- ◆◆ ⧫ +5. SRS diagnosis unit and each harness connector connection
- ◆◆ 6. SRS diagnosis unit (SDU)
- ⧫ Preinstallation inspection







SERVICE POINTS OF REMOVAL

1. DISCONNECTION OF THE NEGATIVE (–) BATTERY CABLE

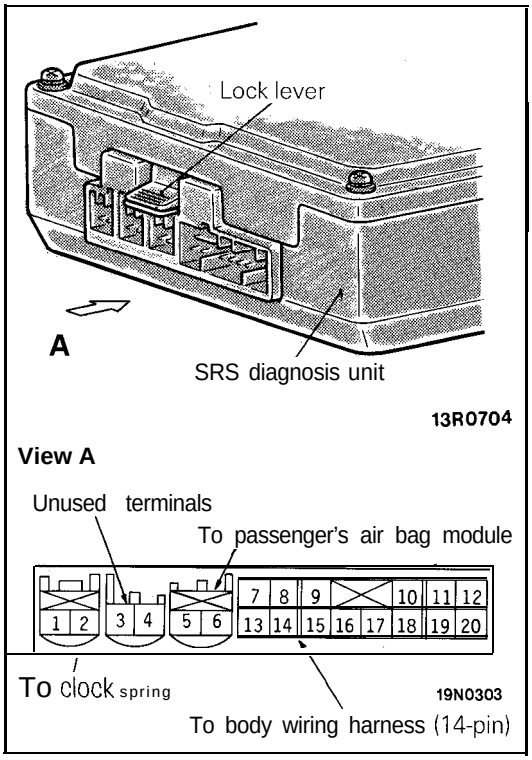
Turn the ignition key to the "LOCK" position, disconnect the negative battery cable from the battery and tape the terminal.

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

5. DISCONNECTION OF THE SRS DIAGNOSIS UNIT AND HARNESS CONNECTOR CONNECTION

(1) Apply a flat tip screwdriver to the lock spring (metallic portion) of the SDU connector lock lever as illustrated and push it horizontally toward the back of the unit.

Caution
1. Do not push up the lock lever (green) by force.
2. Never insert a screwdriver between the lock lever (green) and the lock spring (metallic portion).



INSPECTION

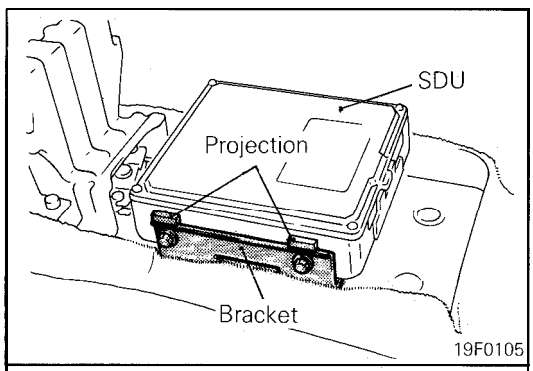
- Check the SRS diagnosis unit case and brackets for dents, cracks or deformities.
- Check connectors and lock lever for damage, and terminals for deformities.

Caution
If a dent, cracks, deformation or rust is discovered, replace the SRS diagnosis unit with a new one.

SERVICE POINTS OF INSTALLATION

PRE-INSTALLATION INSPECTION

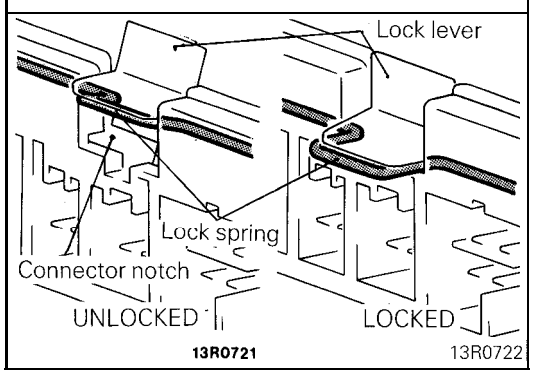
Before SRS diagnosis unit is installed in the vehicle, it must be visually inspected. If a dent, crack or other deformation is detected, discard the SRS diagnosis unit and replace it with a new one that passes the visual inspection.



6. INSTALLATION OF SRS DIAGNOSIS UNIT (SDU)

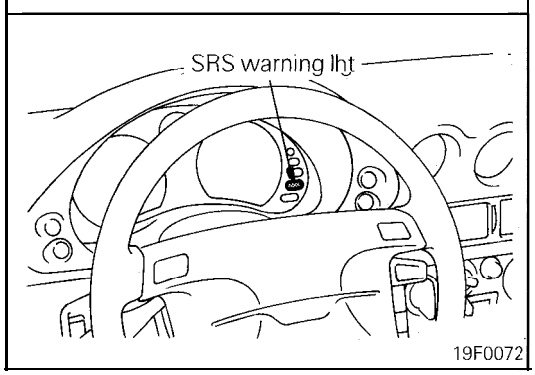
With the projection part of the SRS diagnosis unit placed against the bracket as shown in the figure, securely install the SRS diagnosis unit.

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 CONNECTION

After connecting each harness connector securely and correctly to the SRS diagnosis unit, be sure to press down the lock lever of the SRS diagnosis unit.



POST INSTALLATION INSPECTION

Reconnect the negative battery terminal. Turn the ignition switch to "ON". Check if the SRS warning light illuminates for about 7 seconds and then remain OFF for at least 45 seconds. If yes, SRS system is functioning properly. If no, consult page 23B-17.

AIR BAG MODULE AND CLOCK SPRING

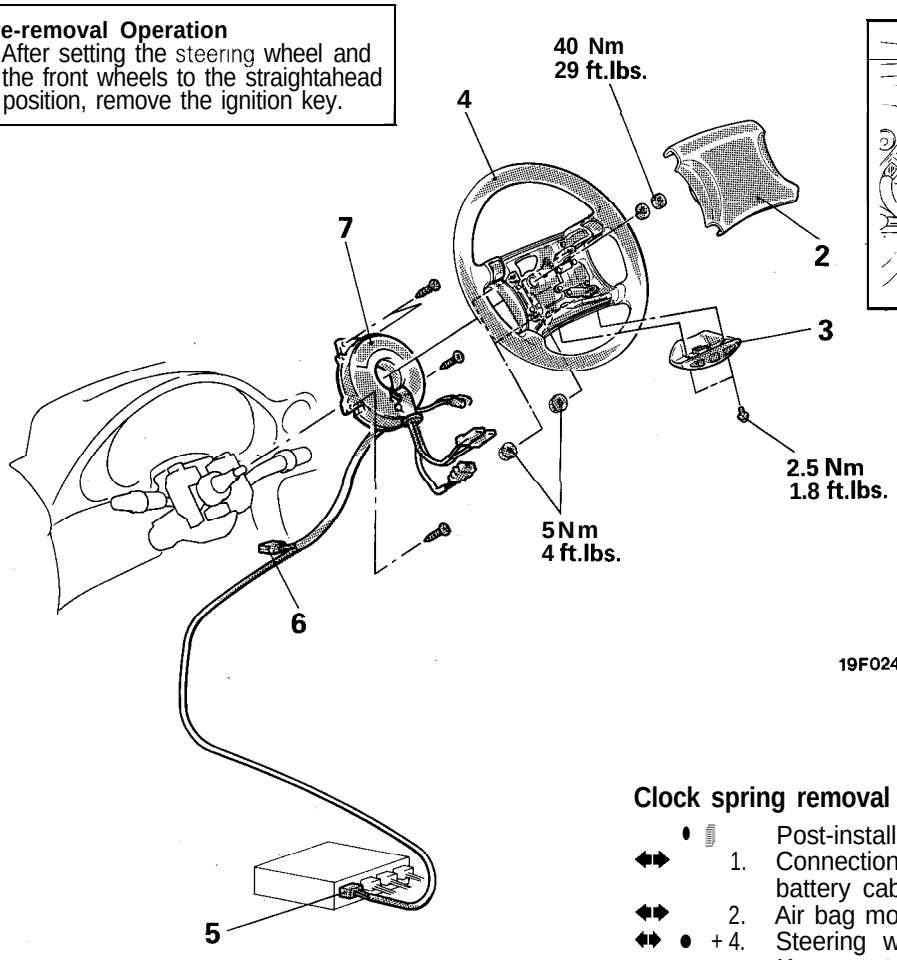
Caution

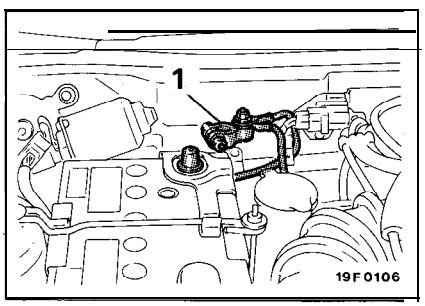
1. **Never attempt to disassemble or repair the air bag module or clock spring. If faulty, replace it.**
2. **Do not drop the air bag module or clock spring or allow contact with water, grease or oil. Replace it if a dent, crack, deformation or rust are detected.**
3. **The air bag module should be stored on a flat surface and placed so that the pad surface is facing upward. Do not place anything on top of the air bag module.**
4. **Do not expose the air bag module to temperature over 93°C (200°F).**
5. **After an air bag has deployed, replace the clock spring with a new one.**
6. **Wear gloves and safety glasses when handling an air bag that has already deployed.**
7. **An undeployed air bag module should only be disposed of in accordance with the procedures P.23B-61 – P.23B-66.**

REMOVAL AND INSTALLATION

<Air bag module (Driver's side), clock spring>

Pre-removal Operation
- After setting the steering wheel and the front wheels to the straightahead position, remove the ignition key.





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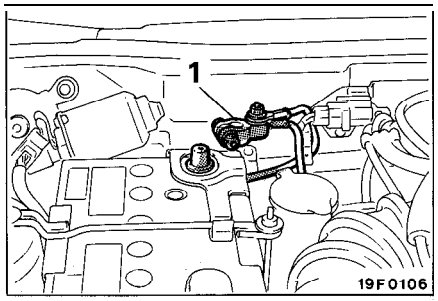
Air bag module removal steps (Driver's side)

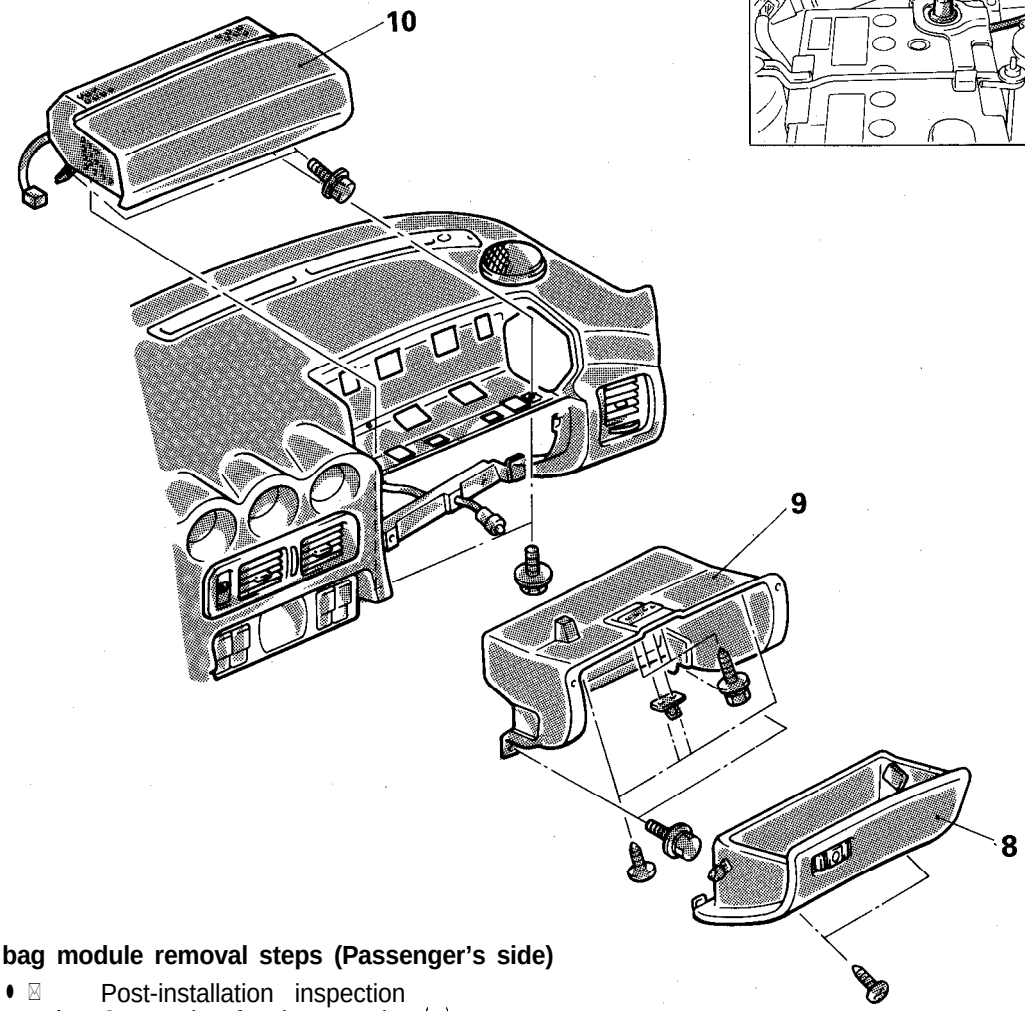
- Post-installation inspection
- 1. Connection for the negative (–) battery cable
- 2. Air bag module (Driver's side)
- 3. Radio remote control assembly
- Pre-installation inspection

Clock spring removal steps

- Post-installation inspection
- 1. Connection of the negative (–) battery cable
- 2. Air bag module (Driver's side)
- + 4. Steering wheel
  Knee protector, Column cover } (Refer to GROUP 23A – Instrument Panel.)
  Floor console (Refer to GROUP 23A – Floor Console.)
- + 5. Clock spring and SRS diagnosis unit connection
- 6. Clock spring and body wiring harness connection
- 7. Clockspring
- Pre-installation inspection

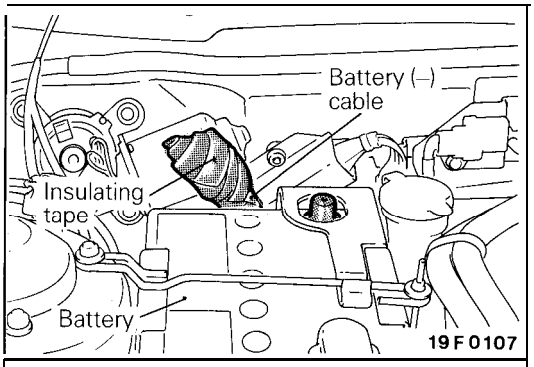
<Air bag module (Passenger's side)>

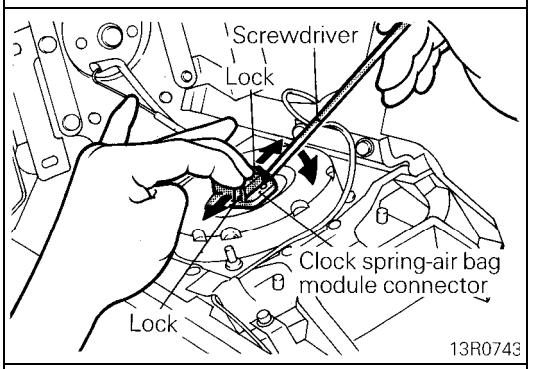


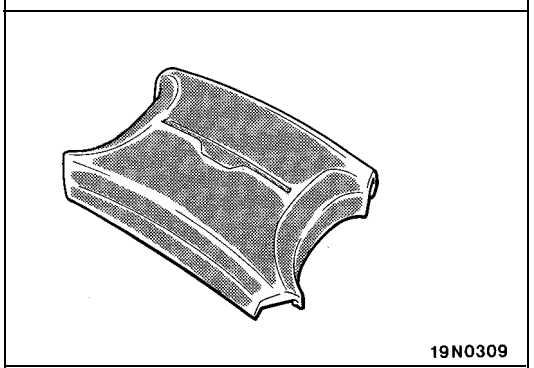


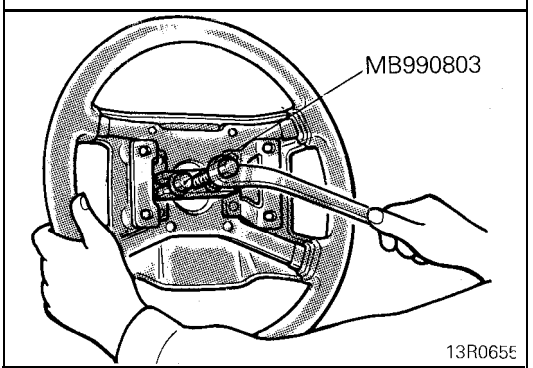
Air bag module removal steps (Passenger's side)

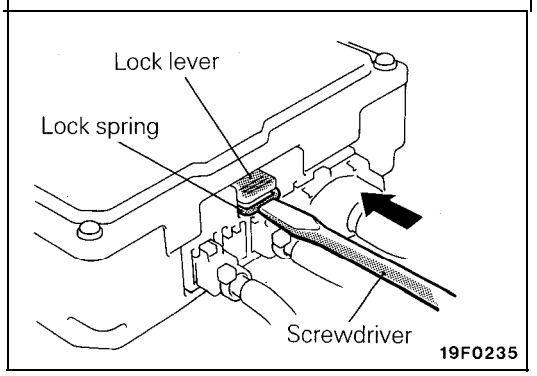
- ◆ ☒ Post-installation inspection
- ◆ ☒ 1. Connection for the negative (–) battery cable
- 8. Glove box assembly
- 9. Cross pipe cover
- 10. Air bag module (Passenger's side)
- ◆ ☒ Pre-installation inspection











SERVICE POINTS OF REMOVAL

1. DISCONNECTION OF THE NEGATIVE (–) BATTERY CABLE

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

Caution

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

2. REMOVAL OF AIR BAG MODULE (DRIVER'S SIDE)

(1) Remove the air bag module mounting nut using a socket wrench from the back side.

(2) When disconnecting the connector of the clock spring from the air bag module, press the air bag's lock toward the outer side to spread it open. Use a screwdriver, as shown in the figure at the left, to pry so as to remove the connector gently.

Caution

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

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

4. REMOVAL OF STEERING WHEEL

Remove the steering wheel by using a special tool.

Caution

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

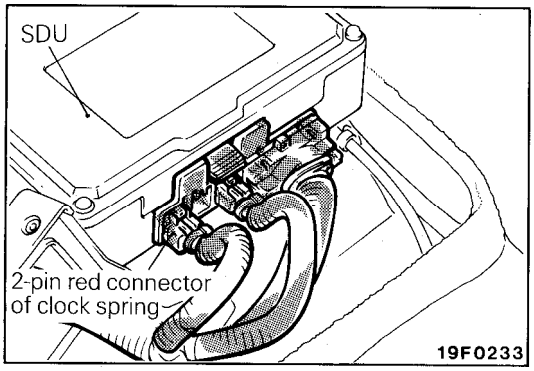
5. DISCONNECTION OF THE SRS DIAGNOSIS UNIT AND CLOCK SPRING CONNECTION

(1) Apply a flat tip screwdriver to the lock spring (metallic portion) of the SDU connector lock lever as illustrated and push it horizontally toward the back of the unit.

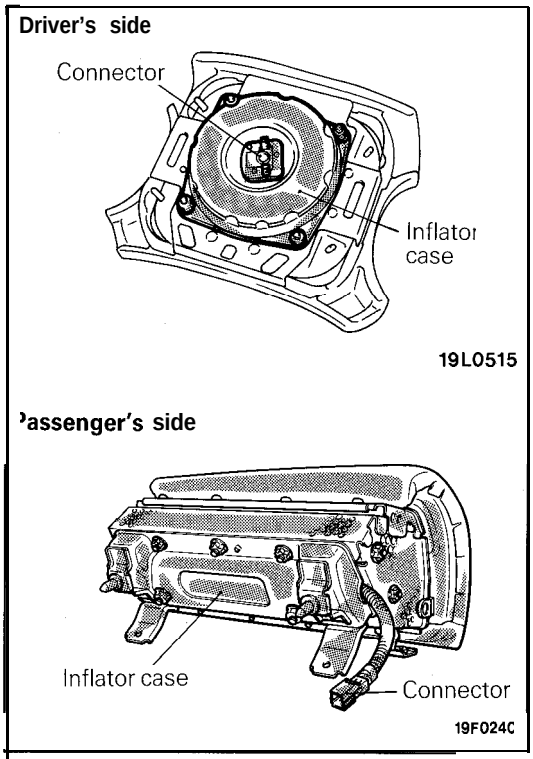
Caution

1. Do not push up the lock lever (green) by force.

2. Never insert a screwdriver between the lock lever (green) and the lock spring (metallic portion).



(2) Remove the 2-pin red connector of the clock spring from the SRS diagnosis unit while pressing down the lock of the clock spring's connector. (Refer to P.23B-9.)



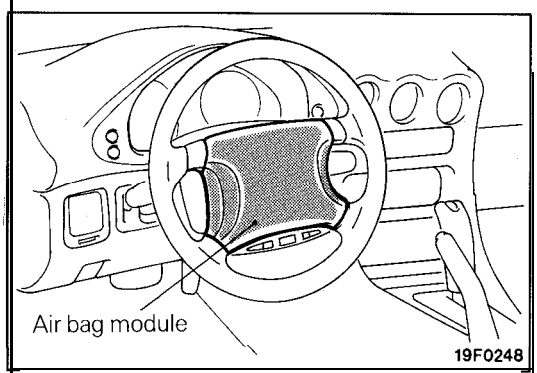
INSPECTION

AIR BAG MODULE

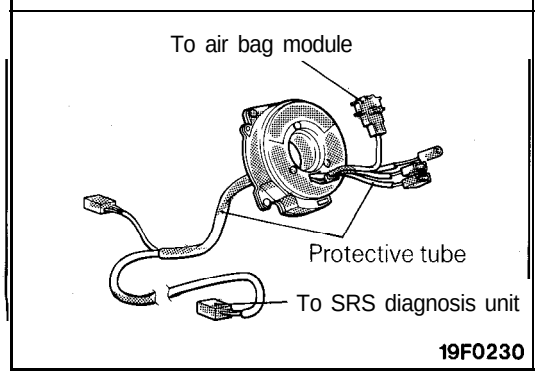
If any improper part is found during the following inspection, replace the air bag module with a new one.
Dispose of the old one according to the specified procedure. (Refer to P.23B-61 to P.23B-66.)

Caution
Never attempt to measure the circuit resistance of the air bag module (squib) even if you are using the specified tester. If the circuit resistance is measured with a tester, accidental air bag deployment will result in serious personal injury.

(1) Check pad cover for dents, cracks or deformities.
(2) Check the air bag module for dents, cracking or deformation.
(3) Check connectors for damage, terminals for deformities, and harness for binds.
(4) Check air bag inflator case for dents, cracks or deformities.



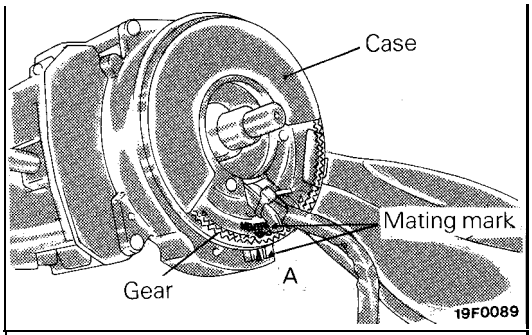
(5) Install the air bag module on the steering wheel to check alignment with the wheel.



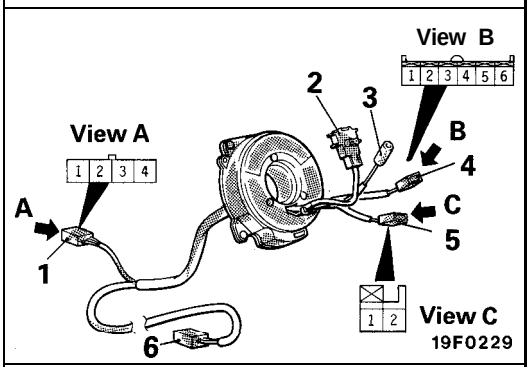
CLOCK SPRING

If, as result of the following checks, even one abnormal point is discovered, replace the clock spring with a new one.

(1) Check connectors and protective tube for damage, and terminals for deformities.



(2) Visually check the case and the gears for damage.

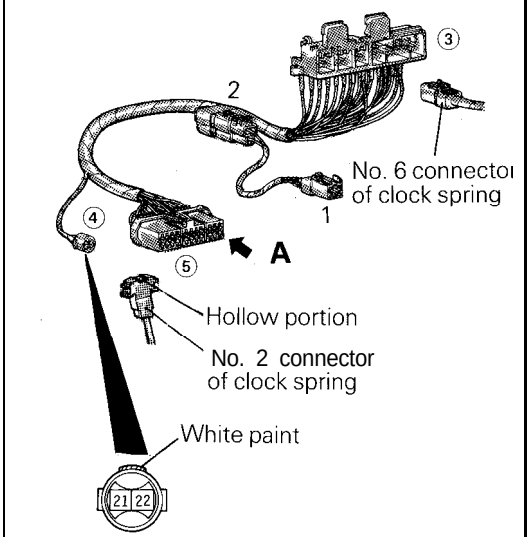


(3) Check for continuity between the No. 1 connector of the clock spring and connectors No. 3, 4 and 5.

Connector No.	1				3	4		5	
Terminal No.	1	2	3	4		4	6	1	2
Continuity	○	○	○	○	○	○	○	○	○
Designation	To cruise control unit	To ACC power	To horn relay	To radio	To horn switch	To steering remote control switch		To cruise control switch	

NOTE
O-O indicates that there is continuity between the terminals.

MB991 530
SRS Check Harness



(4) Check of resistance between the terminals.

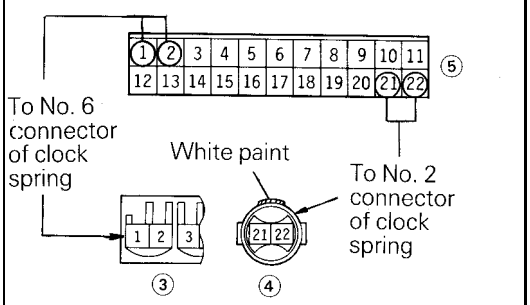
a. Join the No. 2 connector (air bag module side) and No. 6 connector of clock spring to connector ④ and connector ③,

NOTE
When joining SRS Check Harness connector ④, align its white paint with the hollow portion of the No. 2 connector of the clock spring.

b. Check for continuity between terminal 1 and terminal 21, and terminal 2 and terminal 22, of SRS Check ⑤

Standard value: less than 0.4Ω

View A SRS Check Harness connector



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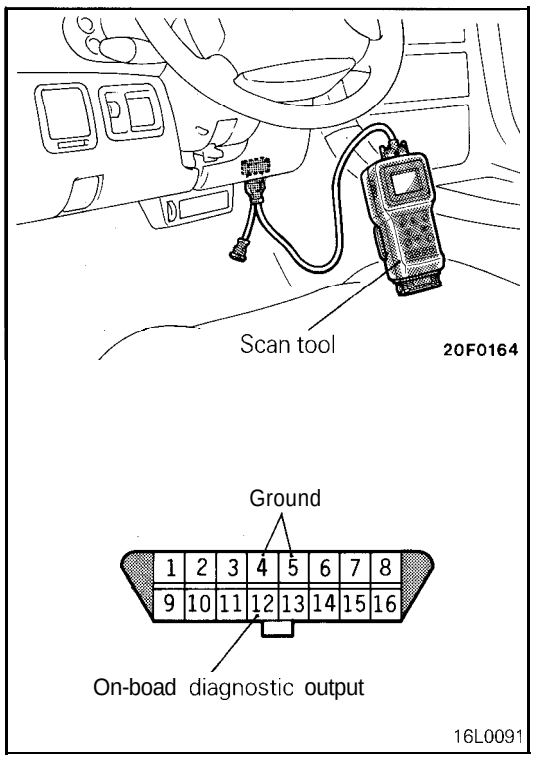
PRE-INSTALLATION INSPECTION

(1) When installing the new air bag module and clock spring, refer to "INSPECTION".

Caution
Dispose of an air bag module only according to the specified procedure. (Refer to P.23B-61 to P.23B-66.)



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

Caution
Make certain that the ignition switch is at OFF when the scan tool is connected or disconnected.

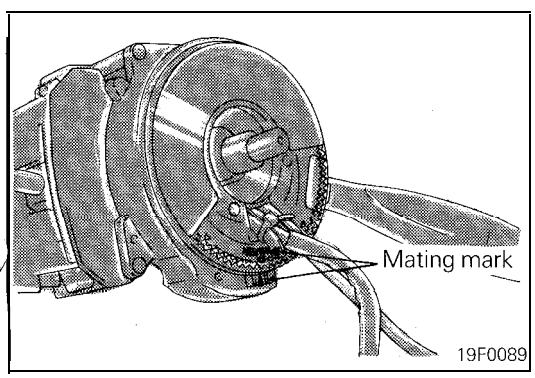
(3) Reconnect negative terminal of battery, and turn the ignition key to the "ON" position.

(4) In case the driver's air bag module has been removed, conduct on-board diagnostic using scan tool to ensure entire SRS operates properly, except open circuit of driver's side air bag module (diagnostic trouble code No. 22). (Refer to P.23B-19.)
In case the passenger's air bag module has been removed,

P.23B-19)

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

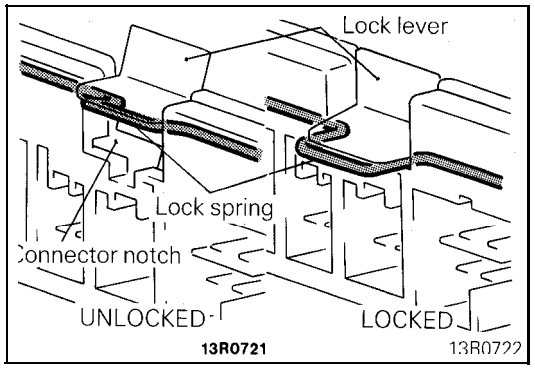
Caution
Wait at least 60 seconds after disconnecting the battery cable before doing any further work. The SRS system is designed to retain enough voltage to deploy the air bag even after the battery has been disconnected. Serious injury may result from unintended air bag deployment if work is done on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



7. 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.



5. CLOCK SPRING AND SRS DIAGNOSIS UNIT CONNECTION

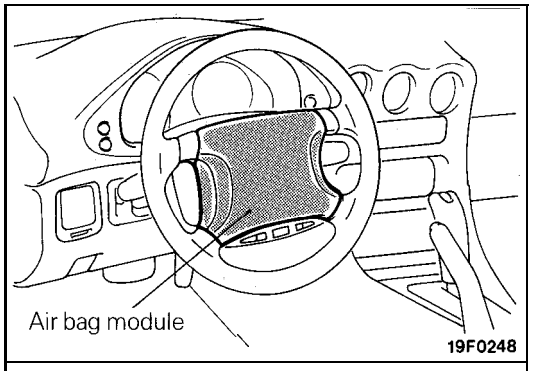
After securely and correctly installing the clock spring's connector to the SRS diagnosis unit, be absolutely sure to press down the lock lever of the SRS diagnosis unit.

4. 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.

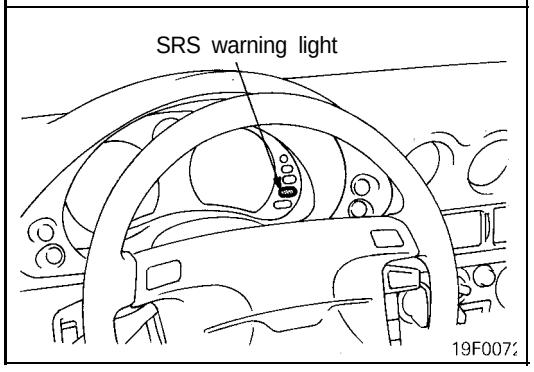
Caution
Be sure when installing the steering wheel, that the harness of the clock spring does not become caught or tangled.

(2) After clamping, turn the steering wheel all the way in both directions to confirm that steering is normal.



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". Check if the SRS warning light illuminates for about 7 seconds and then remain OFF for at least 45 seconds.
If yes, SRS system is functioning properly, if no, consult page 23B-17.

AIR BAG MODULE DISPOSAL PROCEDURES

Before either disposing of a vehicle equipped with an air bag, or prior to disposing of the air bag module, be sure to first follow the procedures described below to and deploy the air bag.

UNDEPLOYED AIR BAG MODULE DISPOSAL

Caution

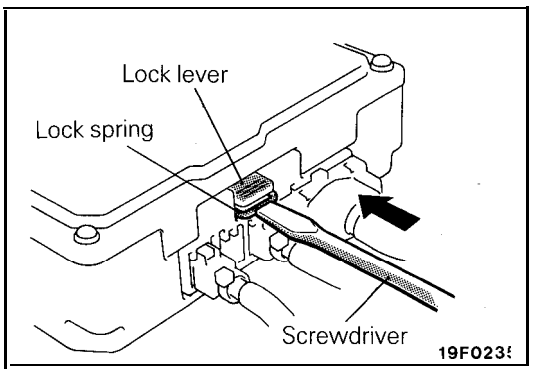
1. If the vehicle is to be scrapped, junked, or otherwise disposed of, deploy the air bag inside the vehicle. If the vehicle will continue to be operated and only the air bag module is to be disposed of, deploy the air bag outside the vehicle.
2. Since a large amount of smoke is produced when the air bag is deployed, select a well-ventilated site. Moreover, never attempt the test near a smoke sensor.
3. Since there is a loud noise when the air bag is deployed, avoid residental areas whenever possible. If anyone is nearby, give warning of the impending noise.
4. Suitable ear protection should be worn by personnel performing these procedures or by people in the immediate area.

DEPLOYMENT INSIDE THE VEHICLE (when disposing a vehicle)

(1) Open all windows and doors of the vehicle. Move the vehicle to an isolated spot.
(2) Disconnect the negative (–) and positive (+) battery cables from the battery terminals, and then remove the battery from the vehicle.

Caution

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

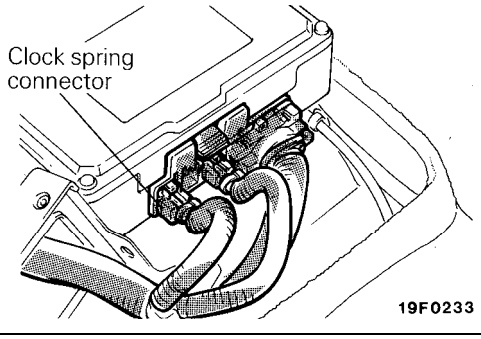


<Driver's side>

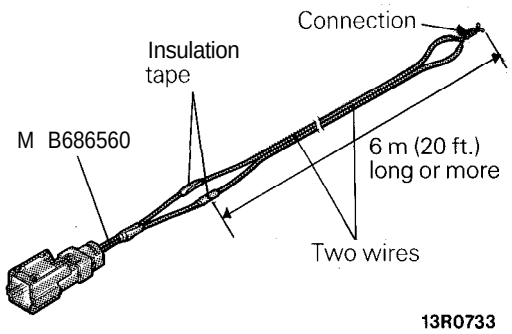
1. Remove the rear console assembly. (Refer to GROUP 23A – Floor Console.)
2. Apply a flat tip screwdriver to the lock spring (metallic portion) of the SDU connector lock lever as illustrated and push it horizontally toward the back of the unit.

Caution

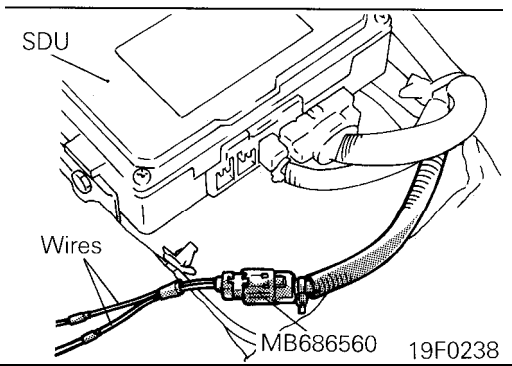
1. Do not push up the lock lever (green) by force.
2. Never insert a screwdriver between the lock lever (green) and the lock spring (metallic portion).



3. Disconnect the clock spring connector from the SRS diagnosis unit while pressing down the lock of the connector. (Refer to P.23B-9.)



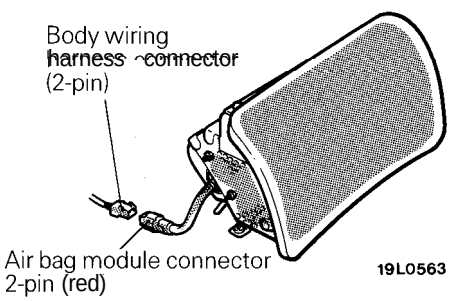
4. Connect two wires each six meters (20 feet) long or more, to the two leads of SRS AIR BAG ADAPTER HARNESS A and cover the connections with insulation tape. The other ends of the two wires should be connected to each other (short-circuited), to prevent sudden unexpected deployment of the air bag.



5. Connect the SRS AIR BAG ADAPTER HARNESS A to the clock spring connector (which has been disconnected from the SRS diagnosis unit), and then lead the two connected wires outside the vehicle.

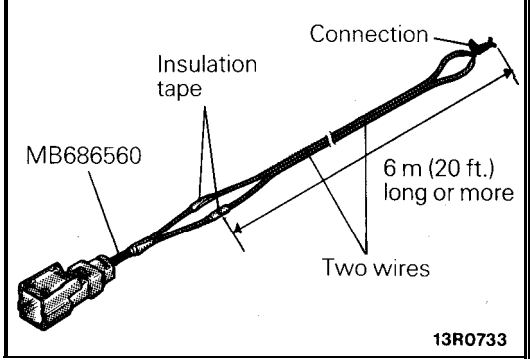
<Passenger's side>

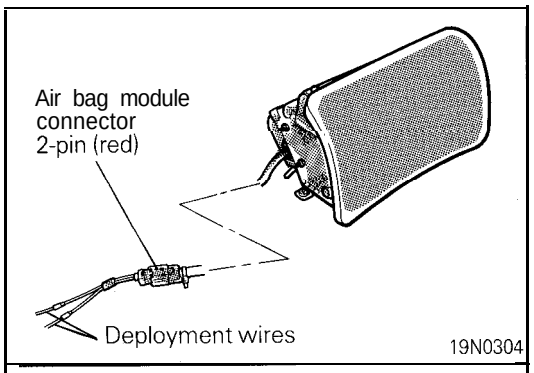
1. Remove the grove box and glove box outer case.
2. Disconnect the passenger's air bag module 2 pin connector (red) from the body wiring harness connector.



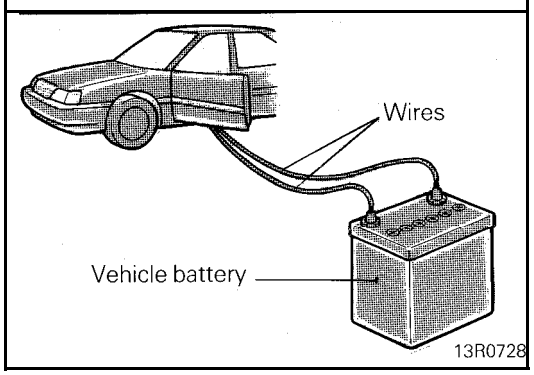
NOTE
If the passenger's air bag module connector is disconnected from the body wiring harness, both electrodes of the passenger's air bag module connector will be automatically shorted to prevent unintended deployment of the air bag due to static electricity,etc.

3. Connect two wires each six meters (20 feet) long or more, to the two leads of SRS AIR BAG ADAPTER HARNESS A and cover the connections with insulation tape. The other ends of the two wires should be connected to each other (short-circuited), to prevent sudden unexpected deployment of the air bag.





4. Connect the passenger's air bag module 2 pin connector (red) to the SRS air bag adapter harness A and take the deployment harness out of the vehicle.



(3) At a location as far away from the vehicle as possible, disconnect the two connected wires from each other, and connect them to the two terminals of the battery (removed from the vehicle) to deploy the air bag.

Caution

1. Before deploying the air bag in this manner, first check to be sure that there is no one in or near the vehicle. Wear safety glasses, suitable ear protection.

2. The inflator will be quite hot immediately following the deployment, so wait at least 30 minutes to allow it to cool before attempting to handle it. Although not poisonous, do not inhale gas from air bag deployment.
See Deployed Air Bag Module-Disposal Procedure (P.23B-61) for post-deployment handling instructions.

3. If the air bag module fails to deploy when the procedures above are followed, do not go near the module.

DEPLOYMENT OUTSIDE THE VEHICLE

Caution

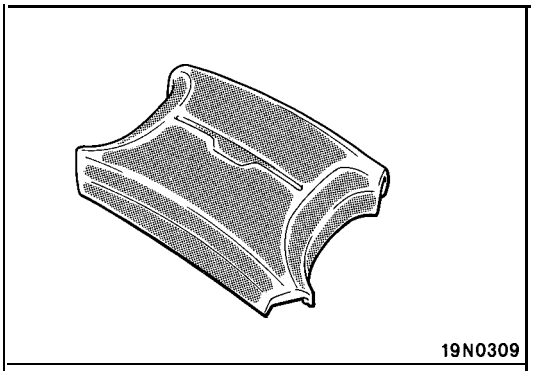
1. Make deployment on a wide, level ground with no person or obstacle around within a radius of 6 m (20 ft.).

2. Do not perform deployment outside, if a strong wind is blowing, and if there is even a slight breeze, the air bag module should be placed and deployed downwind from the battery.

(1) Disconnect the negative (–) 'and positive (+) battery cables from the battery terminals, and then remove the battery from the vehicle.

Caution

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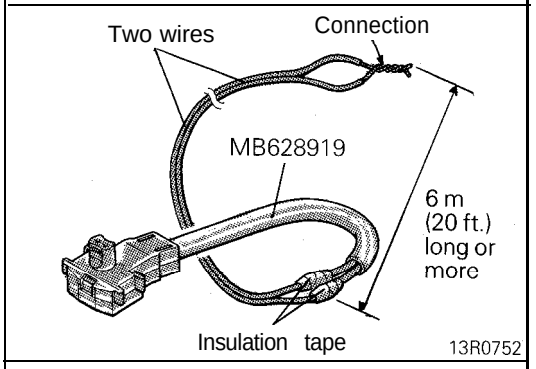
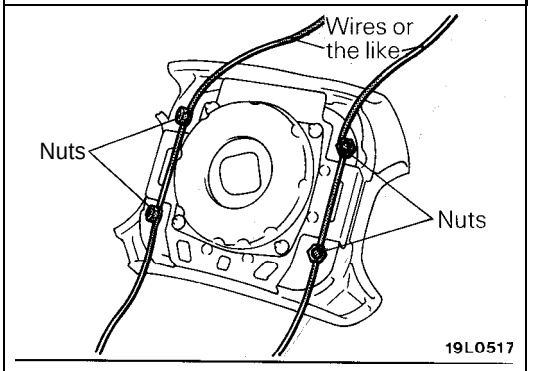
<Driver's side>

1. Remove the air bag module from the vehicle. (Refer to P.23B-54.)

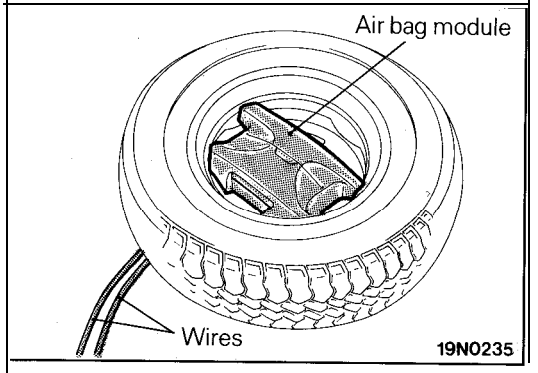
Caution
The air bag module should be stored on a flat surface and placed so that the pad cover face up. Do not place anything on top of it.



2. Connect two wires each six meters (20 feet) long or more, to the two leads of SRS AIR BAG ADAPTER HARNESS B, and cover the connections with insulation tape. The other ends of the two wires should be connected to each other (short-circuited), to prevent sudden unexpected deployment of the air bag.

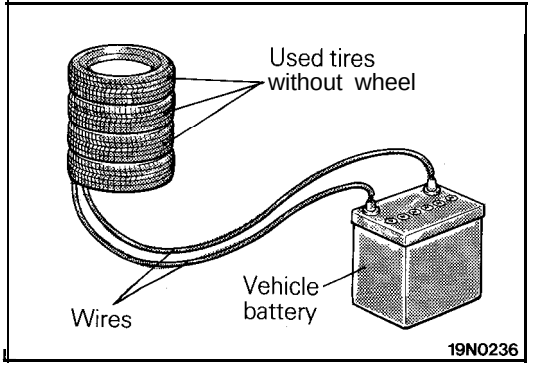


3. Install a disused nut to each of the four bolts on the front of air bag module and connect thick wires to these bolts to secure the module to the wheel.
4. Pass SRS air bag adapter harness B, connected with wires, under the used tire wheel assembly and connect the harness to the air bag module.



5. Put the air bag module in the wheel fitted with a used tire. Using the wires or the like connected to the module's bolts, secure the air bag module. Then turn the module upward.

Caution
Slacken the adapter harness under the wheel to allow for the reaction produced in deployment of the module. If not, the adapter harness may be damaged by the reaction created in deployment.

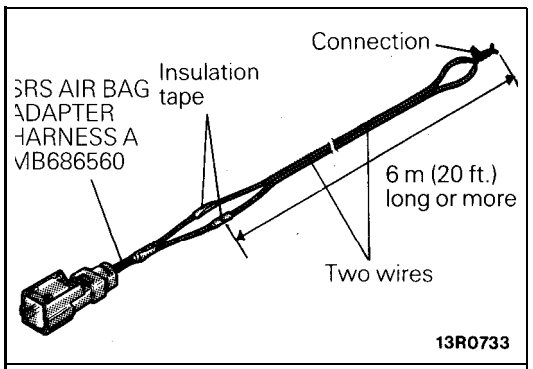


6. Stuck three used tires without wheel on the tire to which the air bag module has been secured.

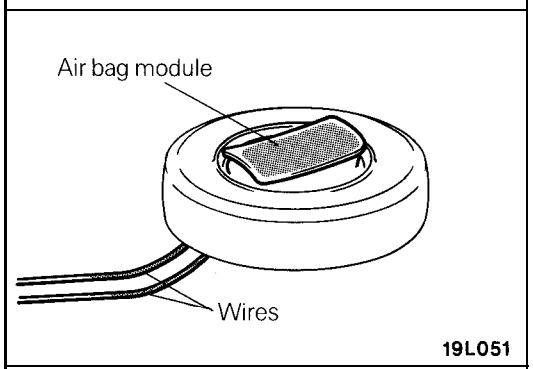
<Passenger's side>

1. Remove the passenger's air bag module. (Refer to P.23B-55.)

Caution
The air bag module should be stored on a flat surface and placed so that the pad cover face up. Do not place anything on top of it.

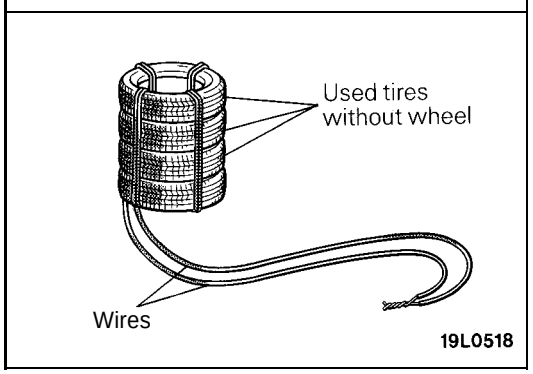


2. Connect two wires each six meters (20 feet) long or more, to the two leads of SRS AIR BAG ADAPTER HARNESS A and cover the connections with insulation tape. The other ends of the two wires should be connected to each other (short-circuited), to prevent sudden unexpected deployment of the air bag.



3. Connect the deployment wires to the SRS air bag adapter harness A, pass it beneath the tire and wheel assembly and connect it to the air bag module.
4. Pass the thick wires into the hole of the air bag module bracket, and secure it to the wheel of the old tire with wheel (4 locations), with the air bag facing upwards.

Caution
1. Leave some space below the wheel for the deployment wires.
If there is no space, the reaction of the air bag deployment could result in damage of the adapter harness.
2. While deployment takes place, do not have the connector of the SRS air bag adapter harness A inserted between the tires.



5. Place three old tires without wheels on top of the tire secured to the air bag module, and secure all tires with ropes (4 locations).

(2) At a location as far away from the air bag module as possible, and from a shielded position, if possible, disconnect the two connected wires from each other and connect them to the two terminals of the battery (removed from the vehicle) to deploy the air bag.

Caution

1. Before deploying the air bag in this manner, first check to be sure that there is no one in or near the vehicle. Wear safety glasses, suitable ear protection.

2. The inflator will be quite hot immediately following deployment, so wait at least 30 minutes to allow it to cool before attempting to handle it.
Although not poisonous, do not inhale gas from air bag deployment. See Deployed Air Bag Module Disposal Procedures (as shown below) for post-deployment handling instructions.

3. If the air bag module fails to deploy when the procedures above are followed, do not near the module.

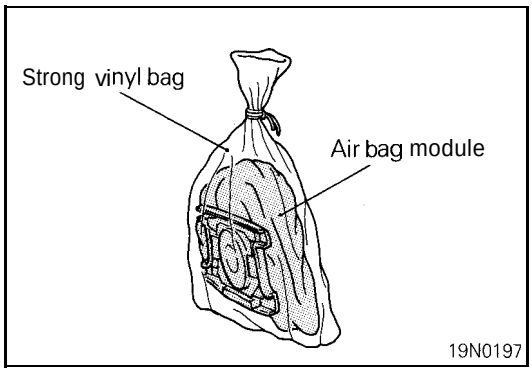
DEPLOYED AIR BAG MODULE DISPOSAL

After deployment, the air bag module should be disposed of in the same manner as any other scrap parts, except that the following points should be carefully noted during disposal.

(1) The inflator will be quite hot immediately following deployment, so wait at least 30 minutes to allow it to cool before attempting to handle it.

(2) Do not put water or oil on the air bag after deployment.

(3) There may be, adhered to the deployed air bag module, material that could irritate the eyes and/or skin, so wear gloves and safety glasses when handling a deployed air bag module. IF DESPITE THESE PRECAUTIONS, THE MATERIAL DOES, GET INTO THE EYES OR ON THE SKIN, IMMEDIATELY RINSE THE AFFECTED AREA WITH A LARGE AMOUNT OF CLEAN WATER.
IF ANY IRRITATION DEVELOPS, SEEK MEDICAL ATTENTION.



(4) Tightly seal the air bag module in a strong vinyl bag for disposal.

(5) After deployment, be sure to wash hands in water.

HEATERS AND AIR CONDITIONING

CONTENTS

CONTINUED ON NEXT PAGE

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

WARNING!

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

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

(3) CHRYSLER dealer personnel must thoroughly review this manual, and especially its GROUP 23B – Supplemental Restraint System (SRS) and GROUP 0 – Maintenance Service, before beginning any service or maintenance of any component of the SRS or any SRS-related component.

NOTE

The SRS includes the following components: impact sensors, SRS diagnosis unit, SRS warning light, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

HEATERS AND AIR CONDITIONING

SPECIFICATIONS

GENERAL SPECIFICATIONS

Items	Specifications
Heater unit	
Type	Three-way-flow full-air-mix system
Heater control assembly	Dial type
Compressor	
Model	MSC 105
Refrigerant unit lubricant cc (cu.in.)	SUN PAG 56 160 ± 20 (9.8 ± 1.2)
Drive belt size mm (in.)	<DOHC>: 1150 (45.3). <SOHC>: 940 (37.0)
Dual pressure switch	
High pressure switch kPa (psi)	OFF: 3,200 (455) ON: 2,600 (370)
Low pressure switch kPa (psi)	OFF: 200 (28) ON: 225 (32)
Freezer prevention °C (°F)	Air temperature thermostat OFF: – 2 (28.4) ON: 2 (35.6)
Refrigerant and quantity g (oz.)	R-l 34a 740 – 790 (26 – 28)

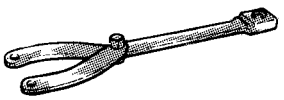
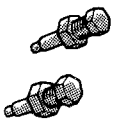
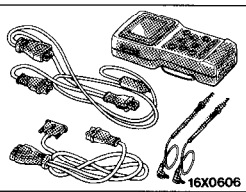
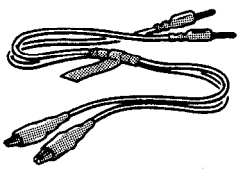
SERVICE SPECIFICATIONS

Items	Specifications
Standard value	
Idle speed when air conditioning on rpm	900 ±100 <A/T at P range>
Resister resistance value Ω	1.76 – 2.06 (Across terminals ② and ①)
	1.10 – 1.26 (Across terminals ② and ③)
	0.38 – 0.44 (Across terminals @and ④)
Thermostat	
ON temperature °C (°F)	Approx. 110 (230) or less
OFF temperature °C (°F)	Approx. 155 (311) or more
Revolution pick up sensor standard resistance Ω	405 ± 35 when ambient temperature is 20°C (68°F)
Clutch clearance mm (in.)	0.4 – 0.6 (.01– .02)
<Fully automatic air conditioning>	
Blend air damper potentiometer motor assembly resistance	
MAX. HOT kΩ	0.2
MAX. COOL kΩ	4.8
Mode selection damper potentiometer assembly resistance	
DEF. position kΩ	0.2
FACE position kΩ	4.8
Engine coolant temperature sensor	
Sensor-ON temperature °C (°F)	26.5 ± 4 (79.7 ± 7)

LUBRICANTS

Items	Specified lubricants	Quantity
Each connection of refrigerant line	SUN PAG 56	As required

SPECIAL TOOLS

Tool number and tool name	Replaced by Miller tool number	Application
 MB991367 Special spanner	6568	Removal and installation of armature mounting nut of compressor
 MB991386 Pin	6568	
 MB991502 Scan tool (MUT-II)	DRB II Scan tool	Inspection of full auto air conditioning
 MB991529 Diagnostic trouble code check harness		Inspection of full auto air conditioning by using a voltmeter

HEATERS AND MANUAL AIR CONDITIONING

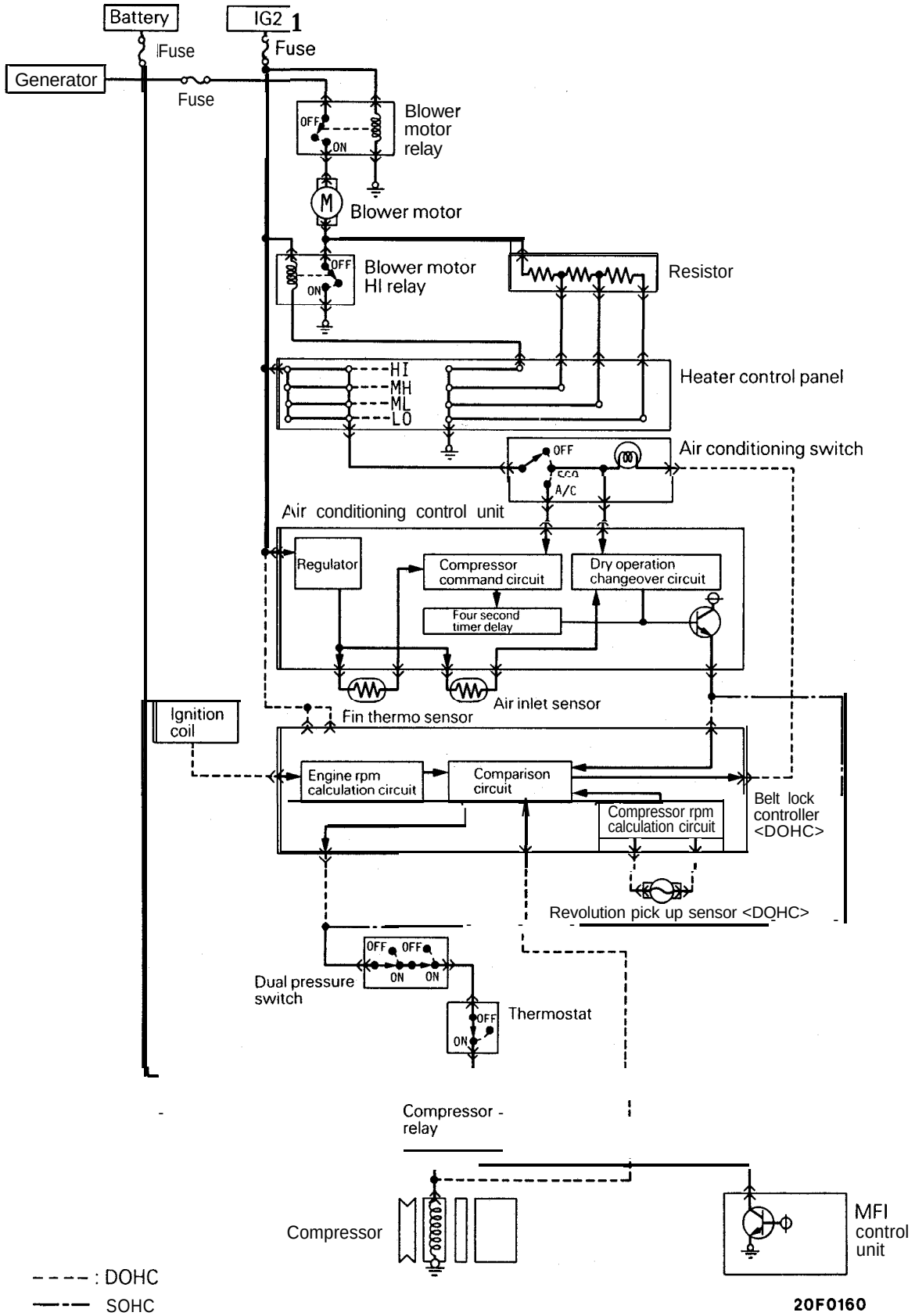
TROUBLESHOOTING

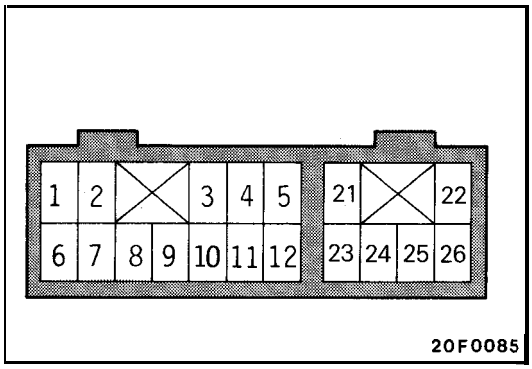
Symptom	Probable cause	Remedy	Ref. page
Heater insufficient heat	Obstructed heater outlets	Correct	–
	Blend air dampers improperly adjusted or binding	Correct	–
	Thermostat malfunction	Replace	Group 7
	Obstructed heater hoses	Replace	–
	Improperly adjusted control cables	Adjust	–
	Plugged or partially plugged heater core	Clean or replace	
	Incorrect adjustment of mode selection dampers	Adjust	–
No ventilation even when mode selection knob is operated	Incorrect installation of mode selection control wire	Adjust	–
	Ducts are incorrectly/incompletely connected, crushed, bent or clogged	Repair or replace	–
Blower motor inoperative	Burnt-out fuse	Correct	–
	Poor grounding	Replace	–
	Malfunction blower switch	Replace	24-20
	Malfunction resistor	Replace	24-22
	Malfunction blower motor	Replace	24-25
	Malfunction heater relay	Replace	24-19
	Malfunction blower motor relay	Replace	24-19
Air conditioning does not operate when the ignition switch in the ON position	Open-circuited power circuit harness	Correct harness	–
	Defective compressor relay in relay box	Replace	24-19
	Defective magnet clutch	Replace	24-32
	Defective thermostat	Replace	24-32
	Defective dual pressure switch	Replace	24-38
	Refrigerant leak	Charge refrigerant, correct leak	24-13
	Excessive refrigerant	Discharge refrigerant	24-16
	Defective air conditioing switch	Replace air conditioning switch	24-23
	Defective belt lock controller <DOHC>	Replace belt lock controller	24-22

Symptom	Probable cause	Remedy	Ref. page
Air conditioning does not operate when the ignition switch in the ON position	Defective air conditioning control unit	Replace air conditioning control unit	24-27
Condenser fan does not operate when the air conditioning is activated	Defective condenser fan motor relay	Replace power relay	24-l 9
	Defective condenser fan motor	Replace condenser fan motor	24-36
Air conditioning switch indicator blinks <DOHC>	Wet compressor drive belt	Dry	–
	Insufficient compressor drive belt tension	Check and adjust	GROUP9
	Defective compressor drive belt	Replace	–
	Defective compressor	Check and replace	24-l 2, 29
	Defective revolution pick-up sensor	Check and replace	24-34, 32
	Defective air conditioning switch	Replace air conditioning switch	24-23
	Defective belt lock controller	Replace	24-22
	Defective air conditioning control unit	Replace	24-27
	Defective MFI control unit	Replace	–

CIRCUIT DIAGRAM

AIR CONDITIONING CONTROL UNIT CIRCUIT





TROUBLESHOOTING HINTS

Inspection of Air Conditioning 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 conditioning switch: ON
(3) Temperature control lever: MAX. COOL
(4) Blower switch: HI

Terminal No.	Signal	Conditions	Terminal voltage
8. 9	Auto compressor control unit ground	At all times	ov
1	Auto compressor control unit power supply	When ignition switch is ON	Battery positive voltage
6	Air conditioning compressor relay	When all conditions for switch-ON of the compressor are satisfied	Battery positive voltage
7	Air conditioning switch: A/C	When air conditioning switch pressed in to second step	Battery positive voltage
2	Air conditioning switch: ECONO	When air conditioning switch pressed in to first step	Battery positive voltage
21	Fin-thermo sensor ⊕	Ignition switch, blower switch and air conditioning switch: ON	Approx. 2.5V
22	Air-inlet sensor ⊕	Ignition switch, blower switch and air conditioning switch: ON	Approx. IV
23	Fin-thermo sensor ⊖	Ignition switch, blower switch and air conditioning switch: ON Ambient temperature: 4°C (39°F)	ov
26	Air-inlet sensor ⊖	Ignition switch, blower switch and air conditioning switch: ON Ambient temperature: 4°C (39°F)	0V

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.24-21.)	Continuity	No continuity	Faulty blower switch	Replace blower switch.
3	Air conditioning switch	Check for continuity between switch terminals, (Refer to P.24-23.)	Continuity	No continuity	Faulty air conditioning switch	Replace air conditioning switch.
4	Magnetic clutch relay	Check for continuity between terminals @and ④	Continuity	No continuity	Faulty air magnetic clutch relay	Replace magnetic clutch relay.
		With battery voltage applied betweem terminals @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.24-33.)	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 1.1kΩ	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 coducted in the sequence shown in this quick-reference table, it is suspected that the compressor is inoperative because of faulty air conditioning control unit. Therefore, replace the air conditioning control unit,

Interior temperature does not lower (No cold air coming out)

Probable cause	Remedy	Ref. page
Excessive refrigerant	Discharge refrigerant	–
Clogged receiver	Replace receiver	24-38
Clogged expansion valve	Replace expansion valve	24-28
Defective compressor	Replace compressor	24-29

SAFETY PRECAUTIONS

Because R-l 34a refrigerant is a hydrofluorocarbon (HFC) which contains hydrogen atoms in place of chlorine atoms, it will not cause damage to the ozone layer.

Ozone filters out harmful radiation from the sun. To assist in protecting the ozone layer, Chrysler Corporation recommends an R-l 34a refrigerant recycling device.

Refrigerant R-134a 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, nonflammable, and nonexplosive. The following precautions must be observed when handling R-134a.

Caution
Wear safety goggles when servicing the refrigeration system.

R-l 34a evaporates so rapidly at normal atmospheric pressures and temperatures that it tends to freeze anything it contacts. For this reason, extreme care must be taken to prevent any liquid refrigerant from contacting the skin and especially the eyes. Always wear safety goggles when servicing the refrigeration part of the air conditioning system. Keep a bottle of sterile mineral oil handy when working on the refrigeration system. Should any liquid refrigerant get into the eyes, use a few drops of mineral oil to wash them out. R-134a is rapidly absorbed by the oil. Next splash the eyes with plenty of cool water. Call your doctor immediately even though irritation has ceased after treatment.

Caution
Do not heat R-134a above 40°C (104°F).

In most instances, moderate heat is required to bring the pressure of the refrigerant in its container above the pressure of the system when charging or adding refrigerant. A bucket or large pan of hot water not over 40°C (104°F) is all the heat required for this purpose. Do not heat the refrigerant container with a blow torch or any other means that would raise temperature and pressure above this temperature. Do not weld or steam clean on or near the system components or refrigerant lines.

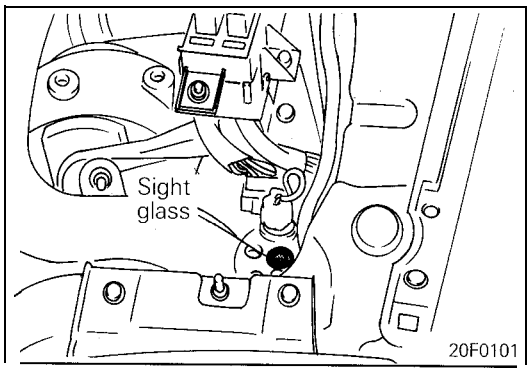
Caution
Keep R-134a containers upright when charging the system.

When adding R-134a into the refrigeration system, keep the supply tank or cans in an upright position. If the refrigerant container is on its side or upside down, liquid refrigerant will enter the system and damage the compressor.

Caution
A leak detector designed for R-134a should be used to check for refrigerant gas leaks.

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.



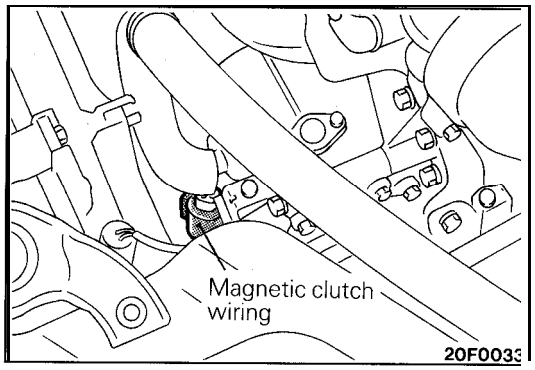
SERVICE ADJUSTMENT PROCEDURES

TEST PROCEDURES

SIGHT GLASS REFRIGERANT LEVEL TEST

The sight glass is a refrigerant level indicator. To check the refrigerant level, clean the sight glass and start the vehicle engine. Push the air conditioning button to operate the compressor, place the blower switch to high and move the temperature control lever to MAX. COOL. After operating for a few minutes in this manner, check the sight glass.

(1) If the sight glass is clear, the magnetic clutch is engaged, the compressor discharge line is warm and the compressor inlet line is cool; the system has a full charge.
(2) If the sight glass is clear, the magnetic clutch is engaged and there is no significant temperature difference between compressor inlet and discharge lines; the system has lost most of its refrigerant charge.
(3) If the sight glass shows foam or bubbles, the system could be low on refrigerant or the receiver drier is restricted. The system has to be tested, leak checked then recharged with refrigerant.



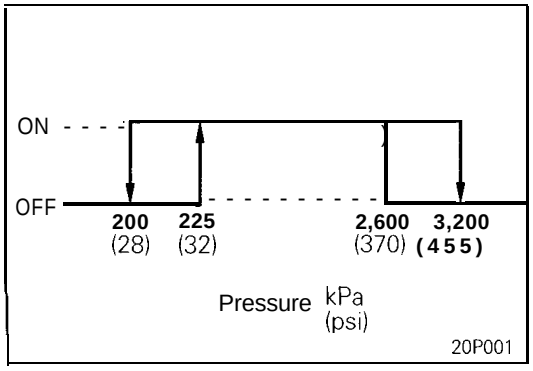
MAGNETIC CLUTCH

(1) Disconnect the wiring to the magnetic clutch.
(2) Connect battery (–) to compressor body.
(3) Connect battery (+) voltage directly to the wiring for the magnetic clutch.
(4) If the magnetic clutch is normal, there will be a “click”. If the pulley and armature do not make contact (“click”), there is a malfunction.

RECEIVER DRIER

To Test the Receiver Drier

(1) Operate the unit and check the piping temperature by touching the receiver drier outlet and inlet.
(2) If there is a difference in the temperatures, the receiver drier is restricted.
Replace the receiver drier.



DUAL PRESSURE SWITCH (LOW PRESSURE SWITCH)

(1) Turn back the adaptor valve handle all the way and install it to the low pressure side service valve.
(2) With the gauge manifold low pressure service valves closed, connect the gauge manifold high pressure side charging hose to the adaptor valve.
(3) Tighten the adaptor valve handle and open the service valve.
(4) If there is continuity between the dual pressure switch terminals when the low pressure side pressure is at the level of dual pressure switch ON condition shown to the left, the switch is functioning normally. If not, replace the switch.

COMPRESSOR CHECK

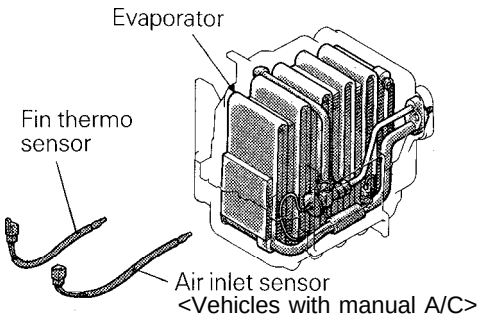
After running the compressor for five minutes, check whether the following items are proper or not.

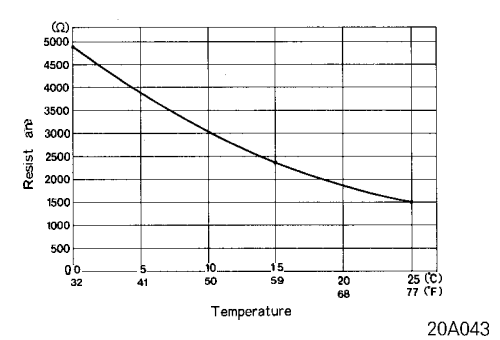
	Inspection content			Criteria	Probable cause	Remedy
	Pressure on the high-pressure side	Pressure on the low-pressure side	Performance test			
Case 1	Saturated pressure of open air + 200 – 500 kPa 28.4 – 71.1 psi	150 – 200 kPa 21.3 – 28.4 psi	Acceptable	Proper		–
Case 2		100 kPa or less 14.2 psi or less	Acceptable	Abnormal The magnet clutch is frequently turned on and off.	Faulty compressor*'	Replace compressor.
Case 3	Nearly saturated pressure of open air		Rejected	The difference between the high and low pressures is not observed.	Faulty compressor*'	
Case 4	Lower than in case 1	150 – 200 kPa 21.3 – 28.4 psi	Rejected	Abnormal Blow-out temperature is high.	Clogged expansion valve	Replace expansion valve

NOTE
(1) Saturated pressure of open air

Temperature °C (°F)		15 (59)	20 (68)	25 (77)	30 (86)	35 (95)	40 (104)
Saturated pressure of open air	kPa (psi)	400 (56.9)	470 (66.8)	560 (79.7)	650 (92.5)	760 (108.1)	870 (123.7)

(2) For the performance testing procedure, refer to P.24-17.
(3) *1 means that the compressor is locked in the full load state (100% delivery).
(4) *2 means that the compressor is locked in the full capacity control (delivery rate: 0) state.



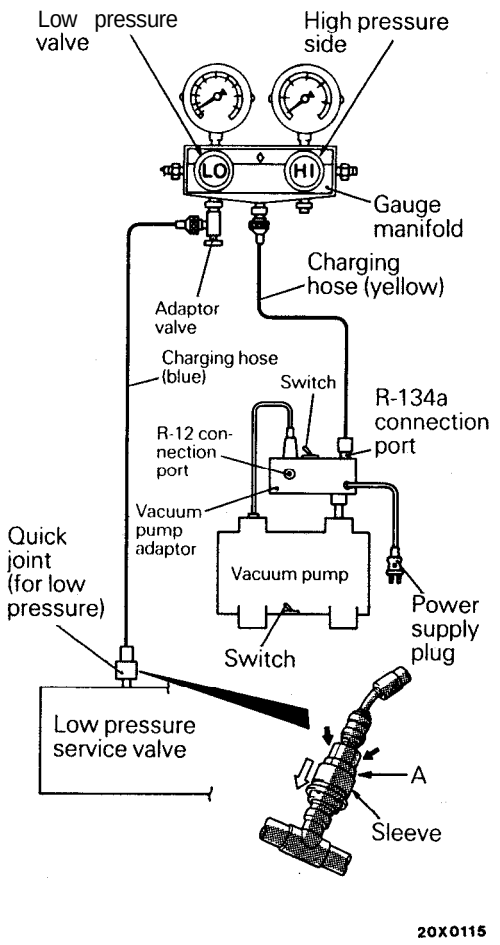


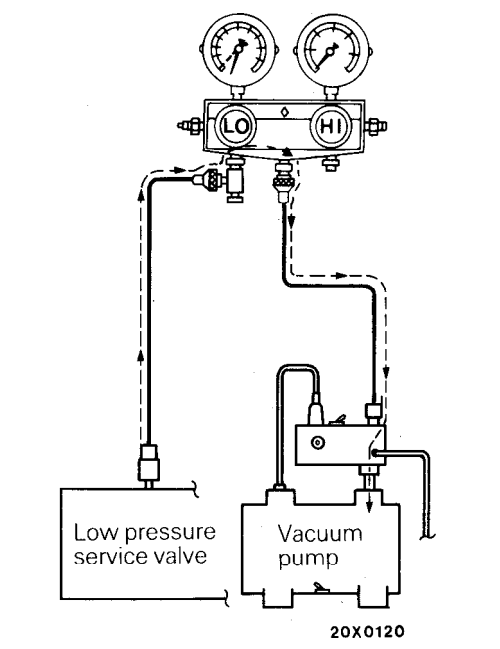
FIN-THERM0 SENSOR AND AIR-INLET SENSOR

(1) Disconnect the sensor's connector at the evaporator case, and by using an ohmmeter, measure the resistance. If the resistance is within ± 10% of value of the characteristic curve, the sensor is functioning normally.
(2) If the sensor is normal, there is a malfunction of the air conditioning control unit, and it should be replaced.

COMPRESSOR DRIVE BELT ADJUSTMENT

Refer to GROUP 9 – Service Adjustment Procedures.





CHARGING

(1) With the handles turned back all the way (valve closed), install the adaptor valve to the low-pressure side of the gauge manifold.
(2) Connect the charging hose (blue) to the adaptor valve.
(3) Connect the quick joint (for low pressure) to the charging hose (blue).
(4) Connect the quick joint (for low pressure) to the low pressure service valve.

NOTE
The low-pressure service valve should be connected to the low pressure hose.

Caution
1. Use tools that are designed for R-134a.
2. To install the quick joint, press section A firmly against the service valve until a click is heard. When connecting, run your hand along the hose while pressing to ensure that there are no bends in the hose.

(5) Close the high and low pressure valves of the gauge manifold.
(6) Install the vacuum pump adaptor to the 'vacuum pump.
(7) Connect the vacuum pump plug to the vacuum pump adaptor.
(8) Connect the charging hose (yellow) to the R-134a connection port of the vacuum pump adaptor.
(9) Tighten the adaptor valve handle (valve open).
(10) Open the low pressure valve of the gauge manifold.
(11) Turn the power switch of the vacuum pump to the ON position.

NOTE
Even if the vacuum pump power switch is turned ON, the vacuum pump will not operate because of the power supply connection in step (7).

(12) Turn the vacuum pump adaptor switch to the R-I 34a side to start the vacuum pump.

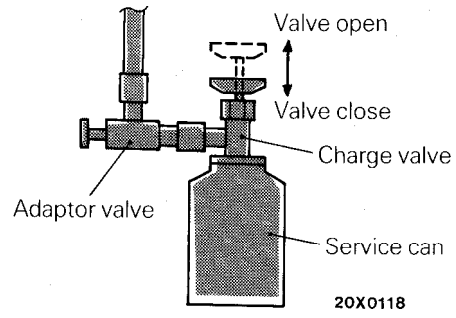
Caution
Do not operate the compressor during evacuation.

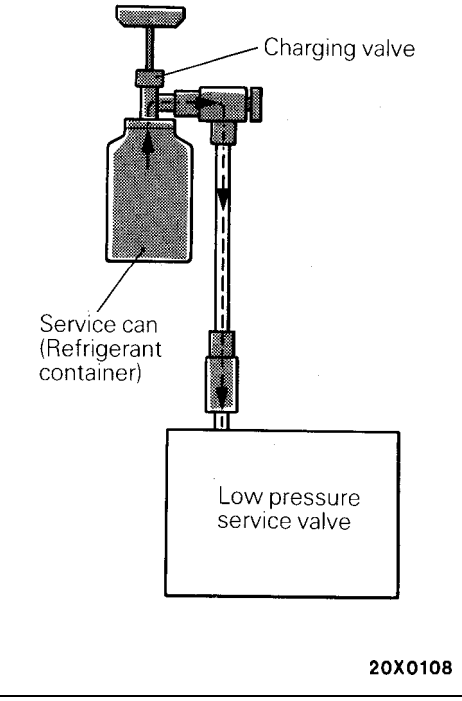
(13) Evacuate to a vacuum reading of 100 kPa (29.5 inHg) or higher (takes approx. 10 minutes).
(14) Turn the vacuum pump adaptor switch OFF and allow to stand it for 5 minutes.

Caution
Do not operate the compressor in the vacuum condition; damage may occur.

(15) Carry out a leak test. (Good if the negative pressure does not drop.)

Caution
If the negative pressure (vacuum) is lost, check for loose connections. Then, repeat the evacuation procedure from step (12). If negative pressure (vacuum) is still lost, add 1 lb of refrigerant and check system using an R-134a compatible leak detector.





(16)With the handle turned out all the way (valve open), install the charging valve to the service can.

(17)Turn the handle of the adaptor valve back all the way (valve closed), remove it from the gauge manifold and install the service can.

(18)Tighten the handle of the charging valve (valve closed) to puncture the service can.

(19)Turn the handle of the charging valve back (valve open) and tighten the handle of the adaptor valve (valve open) to charge the system with refrigerant.

Caution
If the service can is inverted, liquid refrigerant may be drawn into the compressor damaging it by liquid compression. Keep the service can upright to ensure that refrigerant is charged in gas state.

(20)If the refrigerant is not drawn in, turn the handle of the adaptor valve back all the way (valve closed).

(21)Check for gas leaks using a leak detector.
If a gas leak is detected, re-tighten the connections, and then repeat the charging procedure from evacuation in step (12).

Caution
A leak detector designed for R-134a should be used.

(22)Start the engine.

(23)Operate the A/C and set to the lowest temperature (MAX. COOL).

(24)Fix the engine speed at 1,500 rpm.

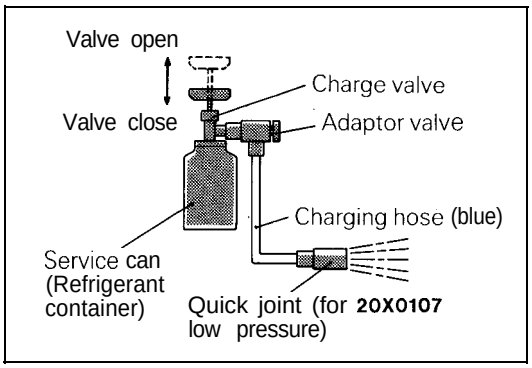
(25)Tighten the handle of the adaptor valve (valve open) to charge the required volume of refrigerant.

Caution
If the service can is inverted, liquid refrigerant may be drawn into the compressor damaging it by liquid compression. Keep the service can upright to ensure that refrigerant is charged in gas state.

(26)After charging with refrigerant, turn the handle of the adaptor valve back all the way (valve closed).

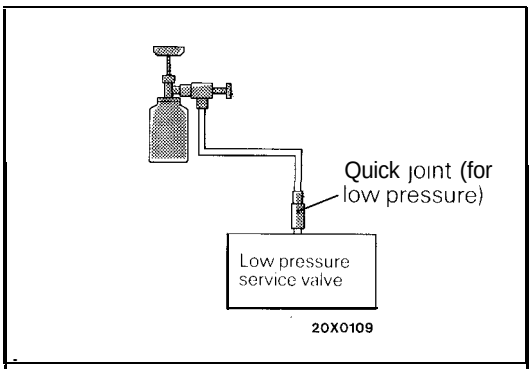
(27)Tighten the charging valve handle (valve closed).
Remove the quick joint (for low pressure) from the low-pressure service valve.

NOTE
If the service can is not emptied, completely, keep the handles of the charging valve and adaptor valve closed for the next charging.



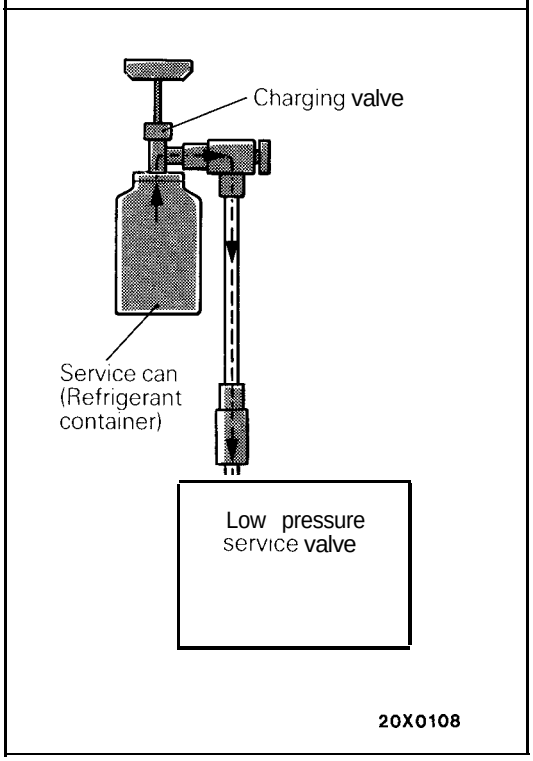
CORRECTING LOW REFRIGERANT LEVEL IN CASE THE SERVICE CAN IS USED

(1) Install the charge valve with the handle turned all the way out (valve open) of the service can.
(2) Install the adaptor valve with the handle turned all the way back (valve close) to the charging valve.
(3) Connect the charging hose (blue) to the adaptor valve.
(4) Connect the charging hose (blue) to the quick joint (for low pressure).
(5) Tighten the handle of the charge valve (valve close), and pierce the service can.
(6) Turn the handle of the adaptor valve to bleed the air.



(7) Install the quick joint (for low pressure) to the low pressure service valve.

NOTE
The low-pressure service valve should be connected to the low-pressure hose.



(8) Start the engine.
(9) Operate the air conditioner and set at the lowest temperature (MAX. COOL).
(10) Fix the engine speed at 1,500 rpm.
(11) Tighten the handle of the adaptor valve (valve open), and replenish refrigerant checking the quantity through the sight glass.

Caution
If the service can is inverted, liquid refrigerant may be draw into the compressor damaging it by liquid compression. Keep the service can upright to ensure that refrigerant is charged in gas state.

(12) After replenishing is completed, turn the handle of the adaptor valve all the way back (valve close), and remove the quick joint.

NOTE
If any refrigerant is remaining in the service can, close the adaptor valve and save the refrigerant for another vehicle. Do not release into the atmosphere.

METHOD BY USING REFRIGERANT RECOVERY AND RECYCLING UNIT

Using the refrigerant recovery and recycling unit, refill the refrigerant.

NOTE
Refer to the Refrigerant Recovery and Recycling Unit Instruction Manual for operation of the unit.

DISCHARGING SYSTEM

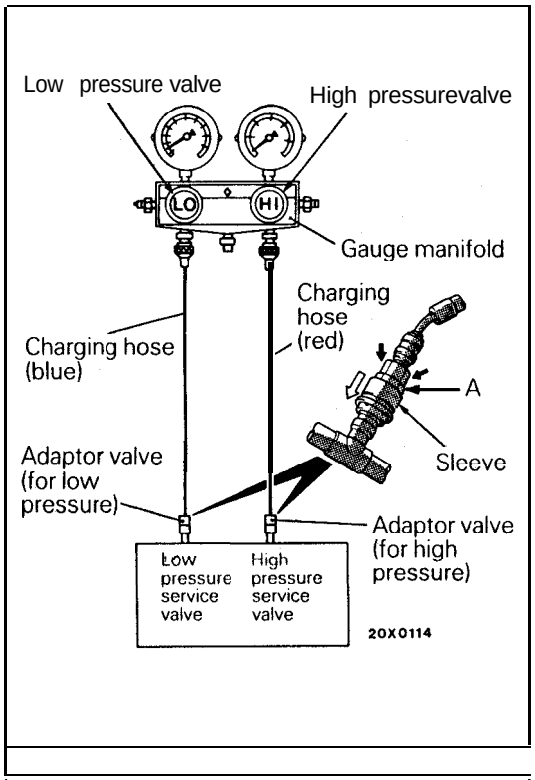
Use the refrigerant recovery unit to discharge refrigerant gas from the system.

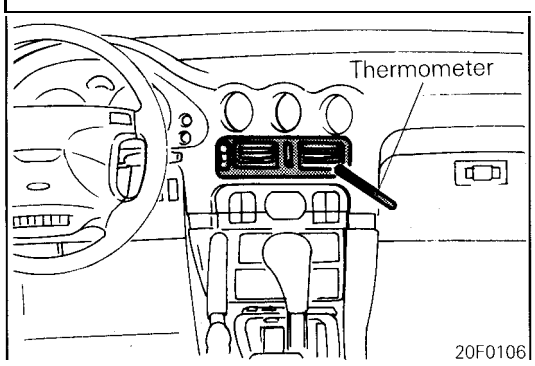
NOTE
Refer to the Refrigerant Recovery and Recycling Unit Instruction Manual for operation of the unit.

REFILLING OF OIL IN THE AIR CONDITIONING SYSTEM

Too little oil will provide inadequate compressor lubrication and cause a compressor failure. Too much oil will increase discharge air temperature.
When a compressor is installed at the factory, it contains 160 cm^3 (5.4 fl.oz.) of refrigerant oil. While the air conditioning system is in operation, the oil is carried through the entire system by the refrigerant.
Some of this oil will be trapped and retained in various parts of the system.
When the following system components are charged, it is necessary to add oil to the system to replace the oil being removed with the component.

Compressor oil: SUN PAG 56
Quantity:
- **Evaporator: 60 cm^3 (2.0 fl.oz.)**
- **Condenser: 15 cm^3 (.5 fl.oz.)**
- **Low-pressure hose: 10 cm^3 (.3 fl.oz.)**
- **Receiver: 10 cm^3 (.3 fl.oz.)**





PERFORMANCE TEST

(1) The vehicles to be tested should be in a place that is not in direct sunlight.
(2) Close the high and low pressure valve of the gauge manifold.
(3) Connect the charging hose (blue) to the low pressure valve and connect the charging hose (red) to the high pressure valve of the gauge manifold.
(4) Install the quick joint (for low pressure) to the charging hose (blue), and connect the quick joint (for high pressure) to the charging hose (red).
(5) Connect the quick joint (for low pressure) to the low-pressure service valve and connect the quick joint (for high pressure) to the high-pressure service valve.

NOTE
The high-pressure service valve is on high-pressure pipe B, and the low-pressure service valve is on the low-pressure hose.

Caution
To connect the quick joint, press section A firmly against the service valve until a click is heard.
When connecting, run your hand along the hose while pressing to ensure that there are no bends in the hose.

(6) Start the engine.
(7) Set the A/C controls as follows:
A/C switch: A/C – ON position
Mode selection: Face position
Temperature control: Max. cooling position
Air selection: Recirculation position
Blower switch: HI (Fast) position
(8) Adjust engine speed to 1,000 rpm with A/C clutch engaged.
(9) Engine should be warmed up with doors and windows closed.
(lO)Insert a thermometer in the left center A/C outlet and operate the engine for 20 minutes.
(11)Note the discharge air temperature.

NOTE
If the clutch cycles, take the reading before the clutch disengages.

Performance Temperature Chart

Garage ambient temperature °C (°F)	21 (70)	26.7 (80)	32.2 (90)	37.8 (100)	43.3 (110)
Discharge air temperature °C (°F)	0.0 – 3.0 (32.0 – 37.4)	1.0 – 4.0 (33.8 – 39.2)	1.0 – 4.0 (33.8 – 39.2)	1.0 – 4.0 (33.8 – 39.2)	2.0 – 5.0 (35.6 – 41.0)
Compressordischarge pressure kPa (psi)	690 – 740 (98.1 – 105.3)	780 – 830 (110.9 – 118.1)	870 – 920 (123.7 – 130.9)	1,080 – 1,130 (153.6 – 160.7)	1,210 – 1,260 (172.1 – 179.2)
Compressor suction pressure kPa (psi)	130 – 190 (18.5 – 27.5)	130 – 190 (18.5 – 27.5)	130 – 190 (18.5 – 27.5)	130 – 190 (18.5 – 27.5)	130 – 190 (18.5 – 27.5)

REFRIGERANT LEAK REPAIR PROCEDURE

LOST CHARGE

If the system has lost all charge due to a leak:
(1) Evacuate the system. (See procedure.)
(2) Charge the system with approximately one pound of refrigerant.
(3) Check for leaks.
(4) Discharge the system.
(5) Repair leaks.
(6) Replace receiver drier.

Caution
Replacement filter-drier units must be sealed while in storage. The drier used in these units will absorb water/water vapor quickly upon exposure to the atmosphere. When installing a drier, have all tools and supplies ready for quick reassembly to avoid keeping the system open any longer than necessary.

(7) Evacuate and charge the system.

LOW CHARGE

If the system has not lost all of its refrigerant charge, locate and repair all leaks. If it is necessary to increase the system pressure to find the leak (because of an especially low charge) add refrigerant. If it is possible to repair the leak without discharging the refrigerant system, use the procedure for correcting low refrigerant level.

HANDLING TUBING AND FITTINGS

Kinks in the refrigerant tubing or sharp bends in the refrigerant hose lines will greatly reduce the capacity of the entire system. High pressures are produced in the system when it is operating. Extreme care must be exercised to make sure that all connections are pressure tight. Dirt and moisture can enter the system when it is opened for repair or replacement of lines or components. The following precautions must be observed.
The system must be completely discharged before opening any fitting of connection in the refrigeration system. Open fittings with caution even after the system has been discharged. If any pressure is noticed as a fitting is loosened, allow trapped pressure to bleed off very slowly.
Never attempt to rebend formed lines to fit. Use the correct line for the installation you are servicing.
A good rule for the flexible hose lines is keep the radius of all bends at least 10 times the diameter of the hose.
Sharper bends will reduce the flow of refrigerant. The flexible hose lines should be routed so that they are at least 80 mm (3 in.) from the exhaust manifold.
It is good practice to inspect all flexible hose lines at least once a year to make sure they are in good condition and properly routed.
O-ring used on connections are not reusable.

COMPRESSOR NOISE

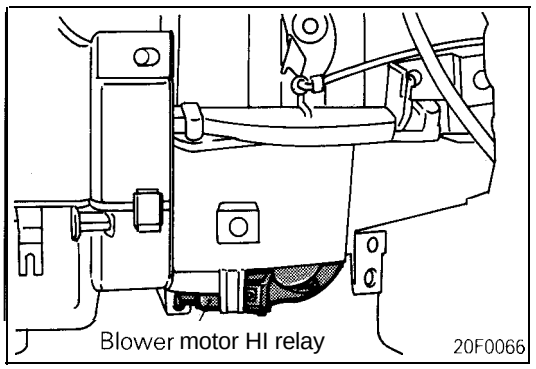
When investigating an air conditioning related noise, you must first know the conditions when the noise occurs. These conditions are: weather, vehicle speed, gear in neutral, engine temperature or any other special conditions.
Noises that develop during air conditioning operation can often be misleading. For example: what sounds like a failed front bearing or connecting rod, may be caused by loose bolts, nuts, mounting brackets, or a loose clutch assembly. Verify accessory drive belt tension (power steering or generator).
Improper accessory drive belt tension can cause a misleading noise when the compressor is engaged and little or no noise when the compressor is disengaged.
Drive belts are speed sensitive. That is, at different engine speeds, and depending upon belt tension, belts can develop unusual noises that are often mistaken for mechanical problems within the compressor.

ADJUSTMENT PROCEDURES

(1) Select a quiet area for testing. Duplicate conditions as much as possible. Switch compressor on and off several times to clearly identify compressor noise.
To duplicate high ambient conditions (high head pressure), restrict air flow through condenser. Install manifold gauge set to make sure discharge pressure doesn't exceed 2,070 kPa (300 psi).
(2) Tighten all compressor mounting bolts, clutch mounting bolt, and compressor drive belt. Check to assure clutch coil is tight (no rotation or wobble).
(3) Check refrigerant hoses for rubbing or interference that can cause unusual noises.
(4) Check refrigerant charge. (See "Charging System".)
(5) Recheck compressor noise as in Step 1.
(6) If noise still exists, loosen compressor mounting bolts and retorque. Repeat Step 1.
(7) If noise continues, replace compressor and repeat Step 1.

POWER RELAY CHECK

(1) Remove the radiator fan motor relays (HI) and (LO) from the relay box on the right of the engine compartment.
(2) Remove the condenser fan motor relays (HI) and (LO), and air-conditioning compressor relay from the relay box on the left of the engine compartment.
(3) Remove the blower motor relay from the junction box.
(4) Remove the blower motor HI relay from the blower case assembly.
(5) Check the continuity between terminals using a circuit tester.



IDLE-UP OPERATION CHECK

(1) Before inspection and adjustment set vehicle in the following condition:
- Engine coolant temperature: 80 – 95°C (176 – 203°F)
- Lights, electric cooling fan and accessories: Set to OFF
- Transaxle: Neutral (N or P for vehicles with A/T)
- Steering wheel: Straightforward

(2) Check to be sure that the idling speed becomes the standard value when the air conditioning switch is switched ON and the air conditioning is activated.

Standard value: 900 ±100 rpm

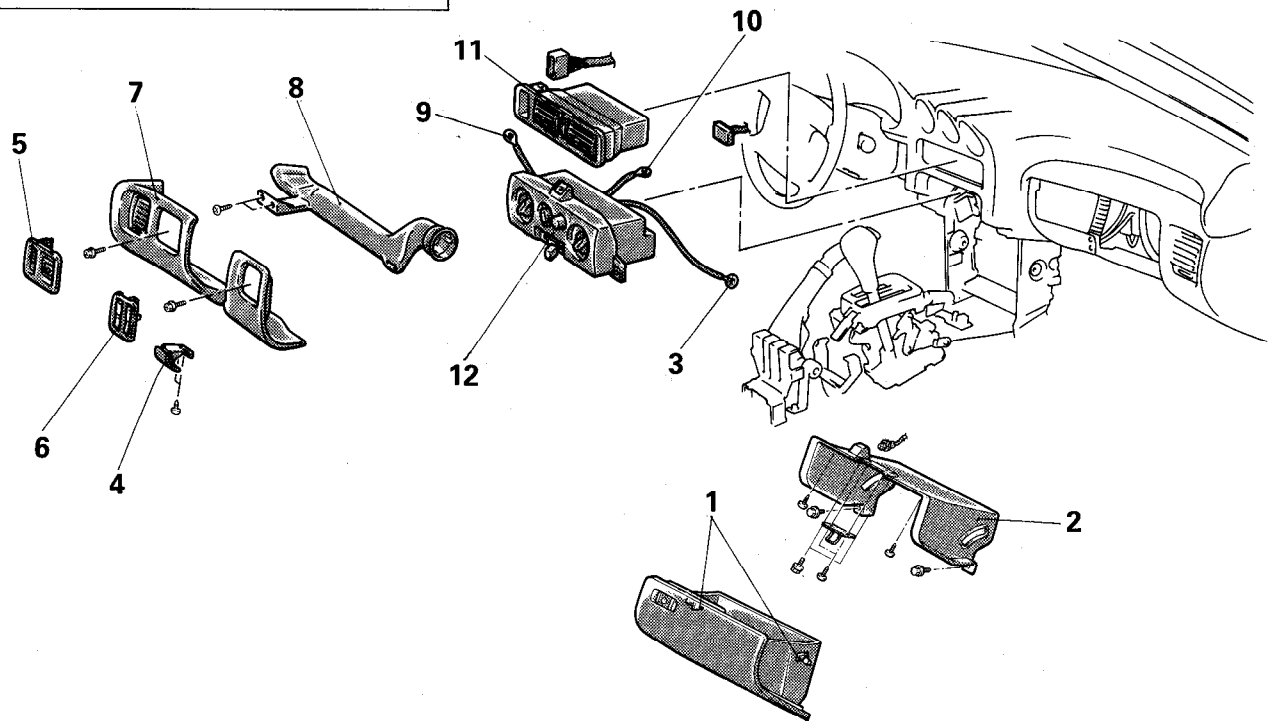
NOTE
Idle speed is controlled by the ISC system and is not adjustable. If, idle speed is not within specifications, check the ISC system.
(Refer to GROUP 14A – Service Adjustment Procedures.)

HEATER CONTROL ASSEMBLY

REMOVAL AND INSTALLATION

're-removal and Post-installation Operation
- Removal and installation of Floor Console (Refer to GROUP 23A — Floor Console.)

CAUTION: SRS
When installing or removing the floor console, don't allow any impact or shock to the SRS diagnosis unit



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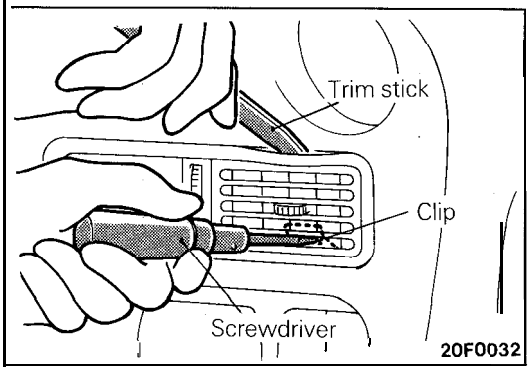
Removal steps

1. Stopper
2. Glove box outer case assembly
- + 3. Connection of the air-selection control wire
4. Hool lock release handle
5. Rheostat assembly
6. Rear wiper&washer switch
7. Knee protector
8. Shower duct
- C 9. Connection of the mode control wire
- +10. Connection of the temperature control wire
- 11. Center air outlet assembly
12. Heater control assembly



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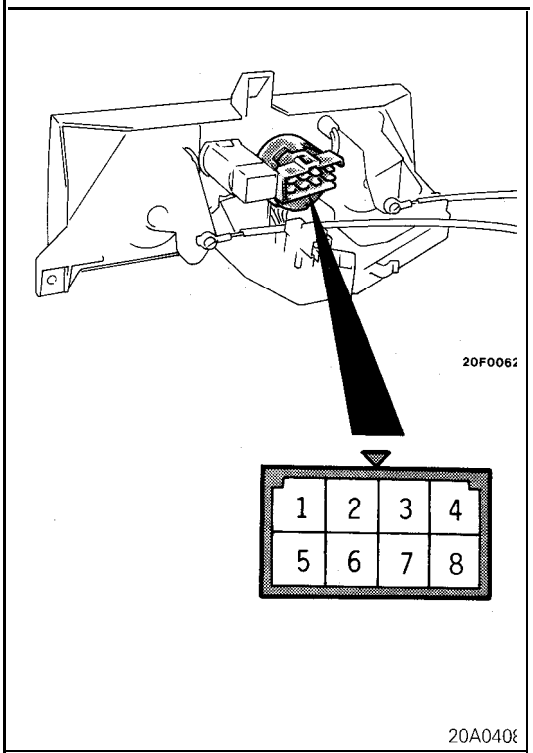
SERVICE POINT OF REMOVAL

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.



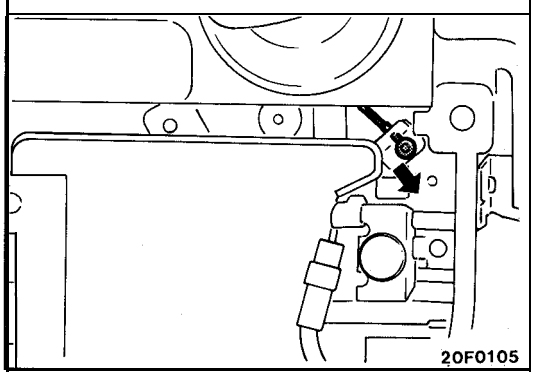
INSPECTION

BLOWER SWITCH

Operate the switch, and check the continuity between the terminals.

Switch position \ Terminal	5	3	2	3	7	8	1	4
OFF								
• (Low)	O—O					O—O		
• (Medium first step)	O—	—O				O—O		
● (Medium second step)	O—	—	—O			O—O	—O	
● (High)	O—	—	—	—O		O—O	—O	

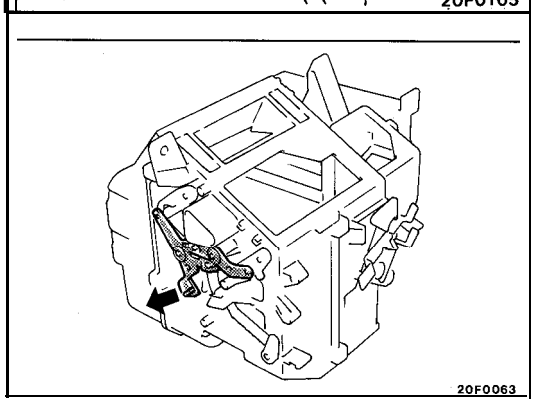
NOTE
O-O indicates that there is continuity between the terminals.



SERVICE POINTS OF INSTALLATION

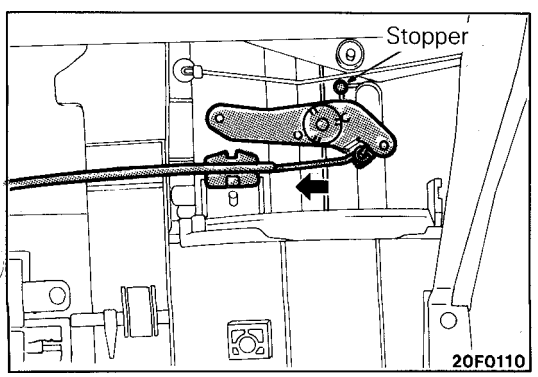
10. INSTALLATION OF TEMPERATURE CONTROL WIRE

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.

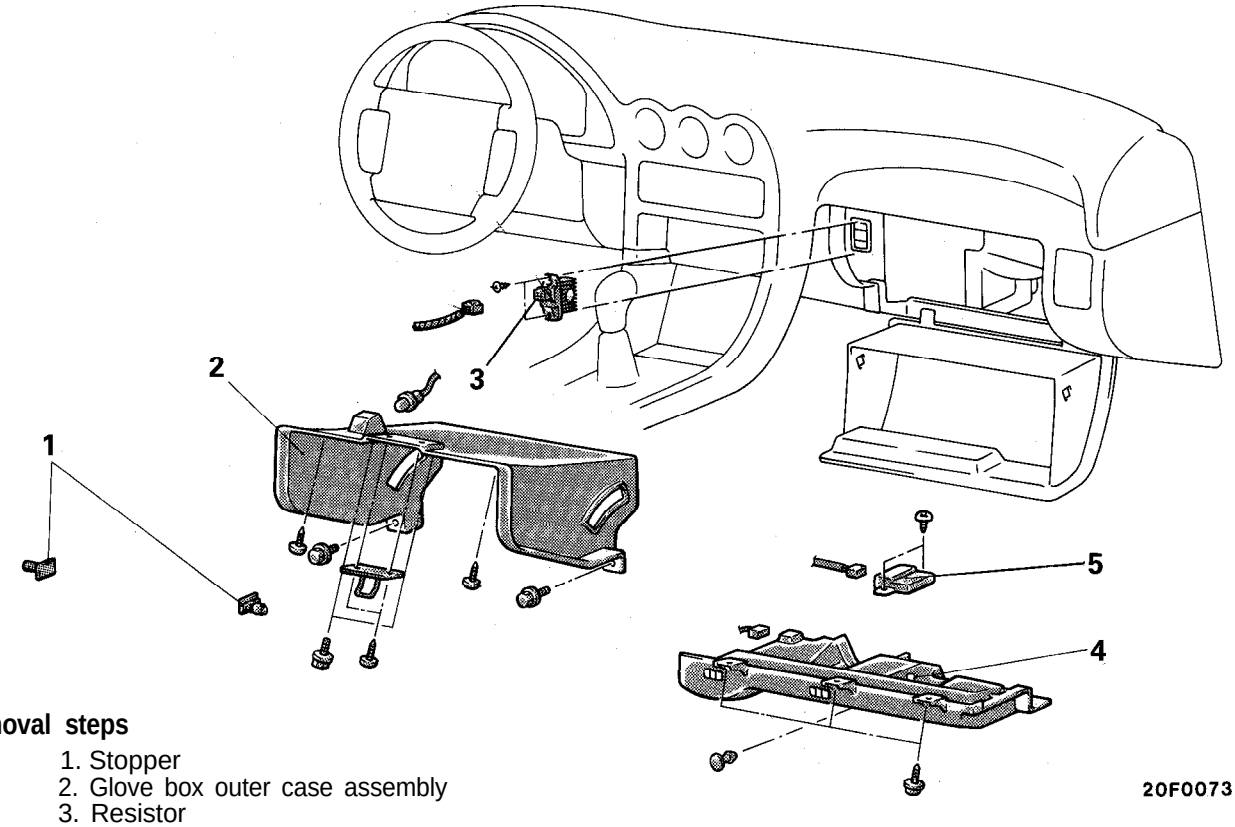


3. INSTALLATION OF AIR SELECTION CONTROL WIRE

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) Set the air selection damper lever as it contacts stopper.
(3) Connect the inner cable of the air selection control wire to the end of the air selection lever, and then secure the outer cable by using a clip.

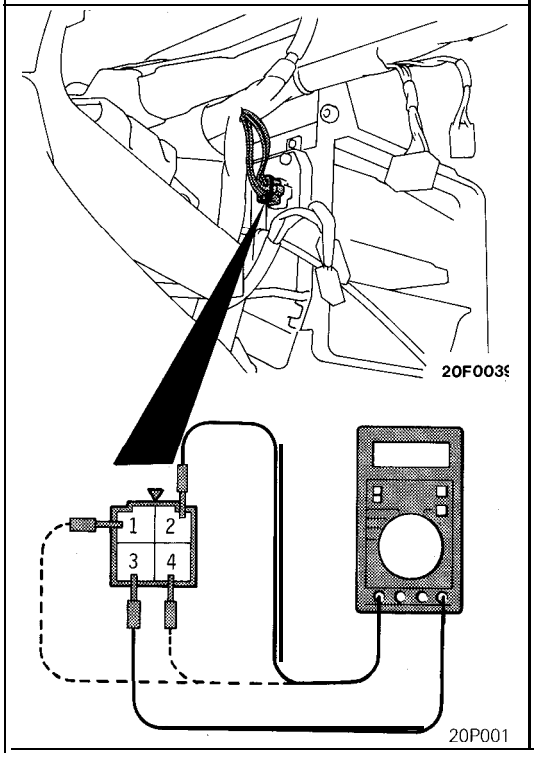
RESISTOR, BELT LOCK CONTROLLER

REMOVAL AND INSTALLATION



Removal steps

1. Stopper
2. Glove box outer case assembly
3. Resistor
4. Under cover
5. Belt lock controller <DOHC>



INSPECTION

RESISTOR CHECK

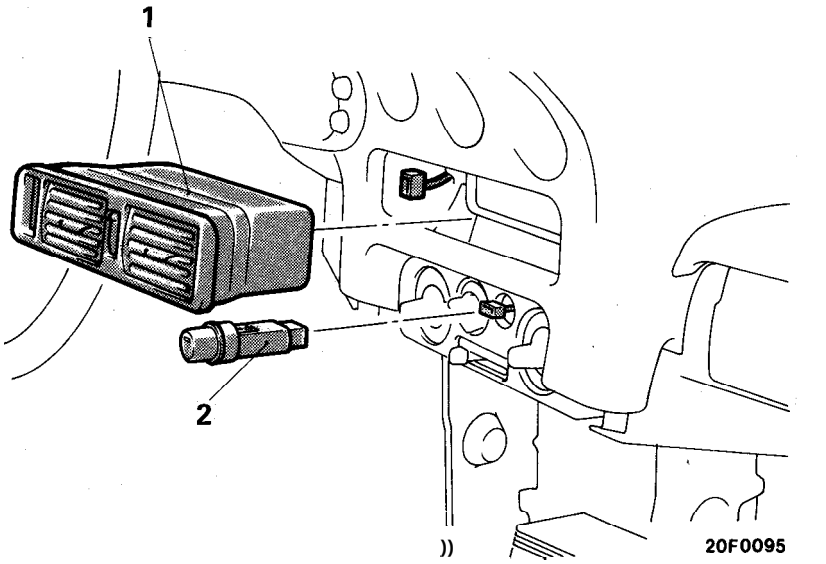
Using a circuit tester, measure the resistance between the terminals indicated below.
The condition can be considered satisfactory if the value measured at this time is equivalent to the standard value.

Standard value

Terminals measured	Standard value Ω
Between terminals ②–①	Approx. 1.79 – 2.06
Between terminals ②–④	Approx. 1.10 – 1.26
Between terminals ②–③	Approx. 0.38 – 0.44

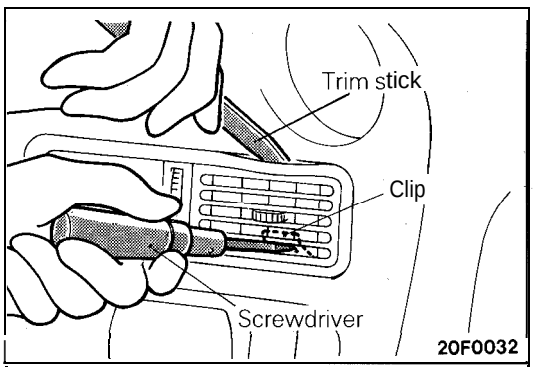
AIR CONDITIONING SWITCH

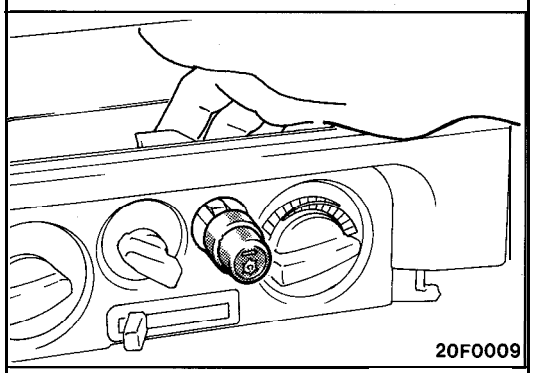
REMOVAL AND INSTALLATION

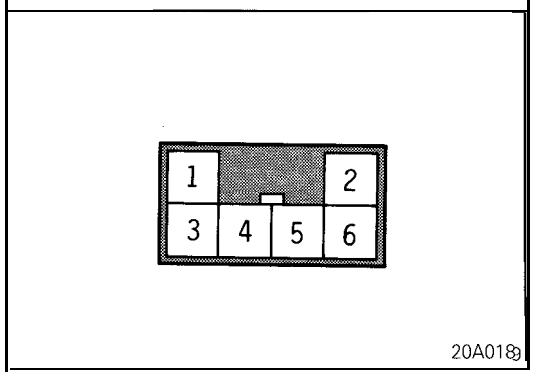


Removal steps

1. Center air outlet assembly
2. Air conditioning switch







SERVICE POINTS OF REMOVAL

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 CONDITIONING 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

AIR CONDITIONING SWITCH CHECK

Switch position \ Terminal	1	2	4	5	3	6
OFF					Illumination light	
If pressed 1 step (ECONOMY)	○		○			
If pressed 2 steps (Air conditioning)	○	○	○	⏭ *		

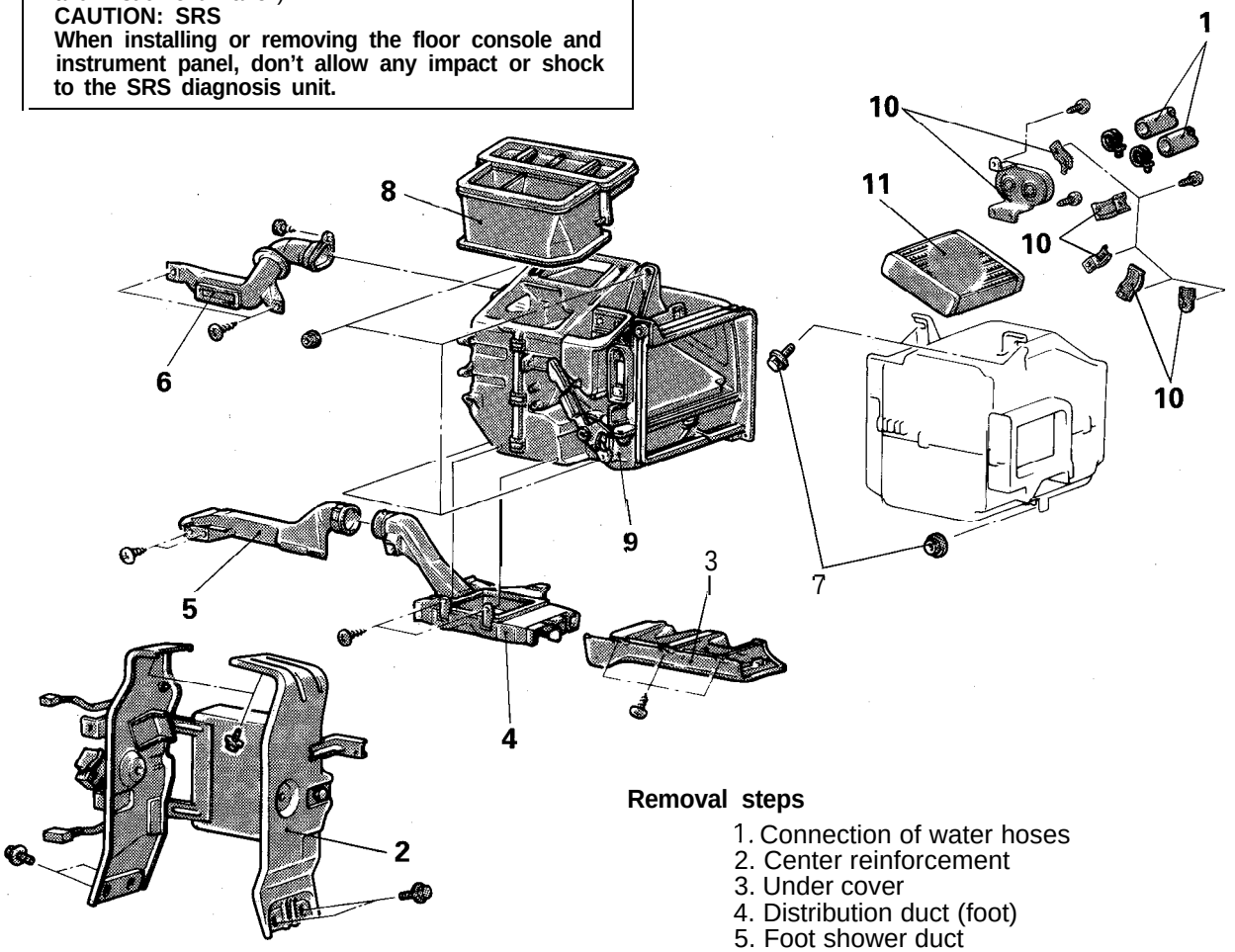
NOTE
(1) The O-O symbol indicates continuity.
(2) *: <Indication light>

HEATER UNIT

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Draining and Supplying of the Coolant (Refer to GROUP 9 -Service Adjustment Procedures.)
- Removal and Installation of the Floor Console and Instrument Panel (Refer to GROUP 23A – Floor Console and Instrument Panel.)

CAUTION: SRS
When installing or removing the floor console and instrument panel, don't allow any impact or shock to the SRS diagnosis unit.



Removal steps

1. Connection of water hoses
2. Center reinforcement
3. Under cover
4. Distribution duct (foot)
5. Foot shower duct
6. Lap cooler duct
7. ◆◆ Evaporator mounting bolt and nut <Vehicles with air conditioning>
8. Center duct
9. Heater unit
10. Plate
11. Heater core

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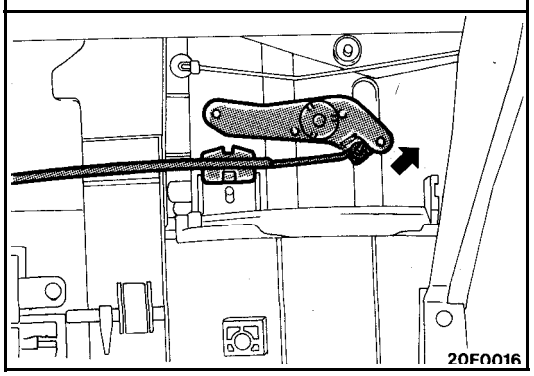


SERVICE POINT OF REMOVAL

7. REMOVAL OF EVAPORATOR MOUNTING BOLT <Vehicles with manual air conditioning>

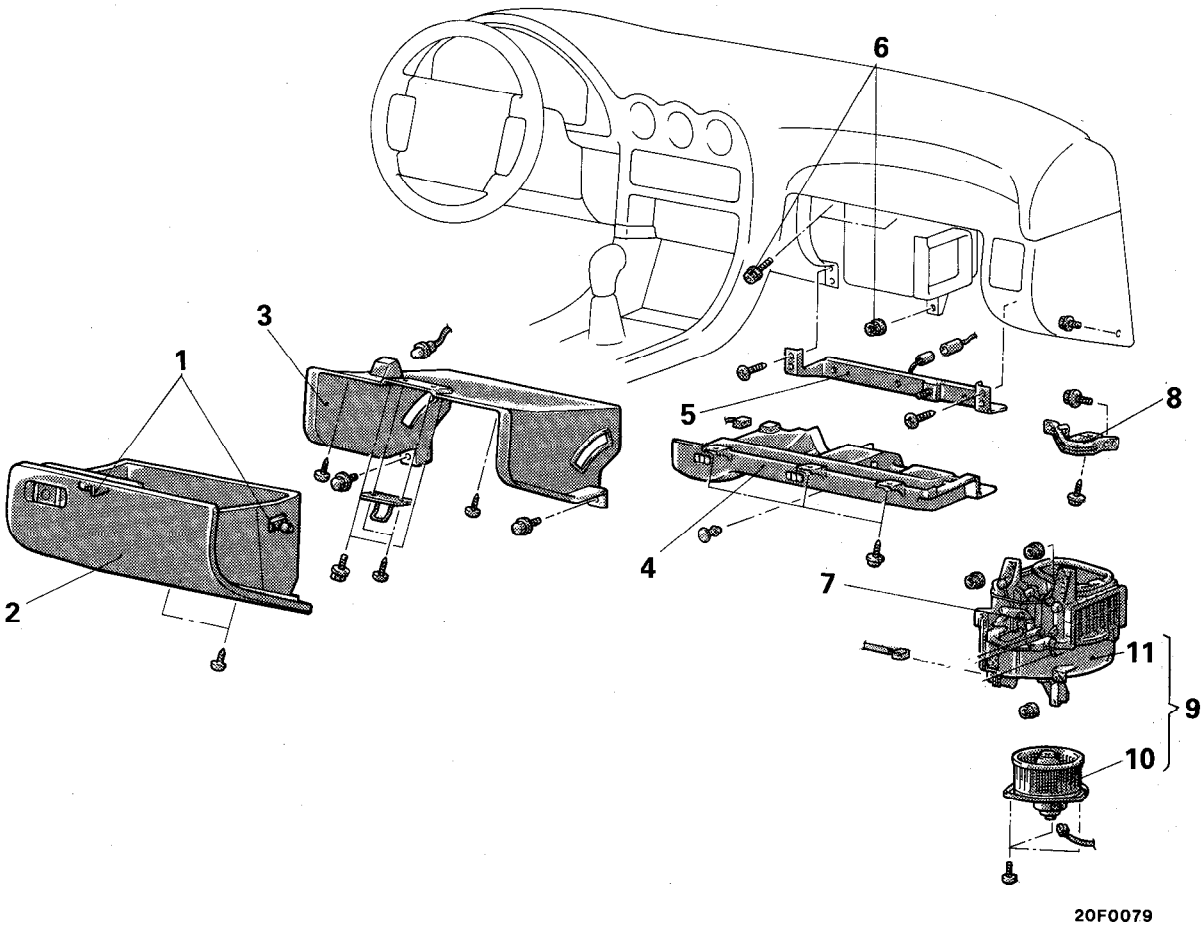
NOTE
In order to prevent bolts from falling into the blower assembly, set the air selection damper to the position that permits outside air introduction.

INSPECTION

- Check the operation of dampers and link mechanism.
- Check the heater core for clogging and water leakage.

BLOWER ASSEMBLY

REMOVAL AND INSTALLATION



Removal steps of blower case assembly

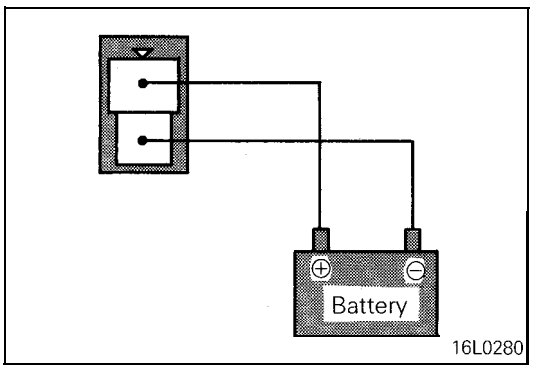
1. Stopper
2. Glove box
3. Glove box outer case assembly
4. Under cover
5. Lower frame
6. Evaporator mounting bolt and nut
   <Vehicles with air conditioning>
7. Connection of the air-selection wire
8. Side frame
9. Blower assembly
10. Blower motor assembly
11. Blower case assembly

Removal steps of blower motor assembly

4. Under cover
10. Blower motor assembly

INSPECTION

- Check for bending or abnormal deflection of the rotating shaft of the blower motor assembly.
- Check for cracking or deterioration of the packing.
- Check for damage to the fan.
- Check for damage to the blower case.
- Check the operation of the inside/outside air selection damper, and for damage.



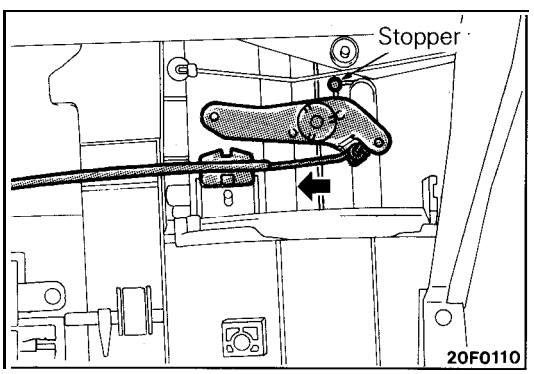
BLOWER MOTOR ASSEMBLY CHECK

When battery voltage is applied between the terminals, check to be sure that the motor operates. Also, check to be sure that there is no abnormal noise.

SERVICE POINTS OF INSTALLATION

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.



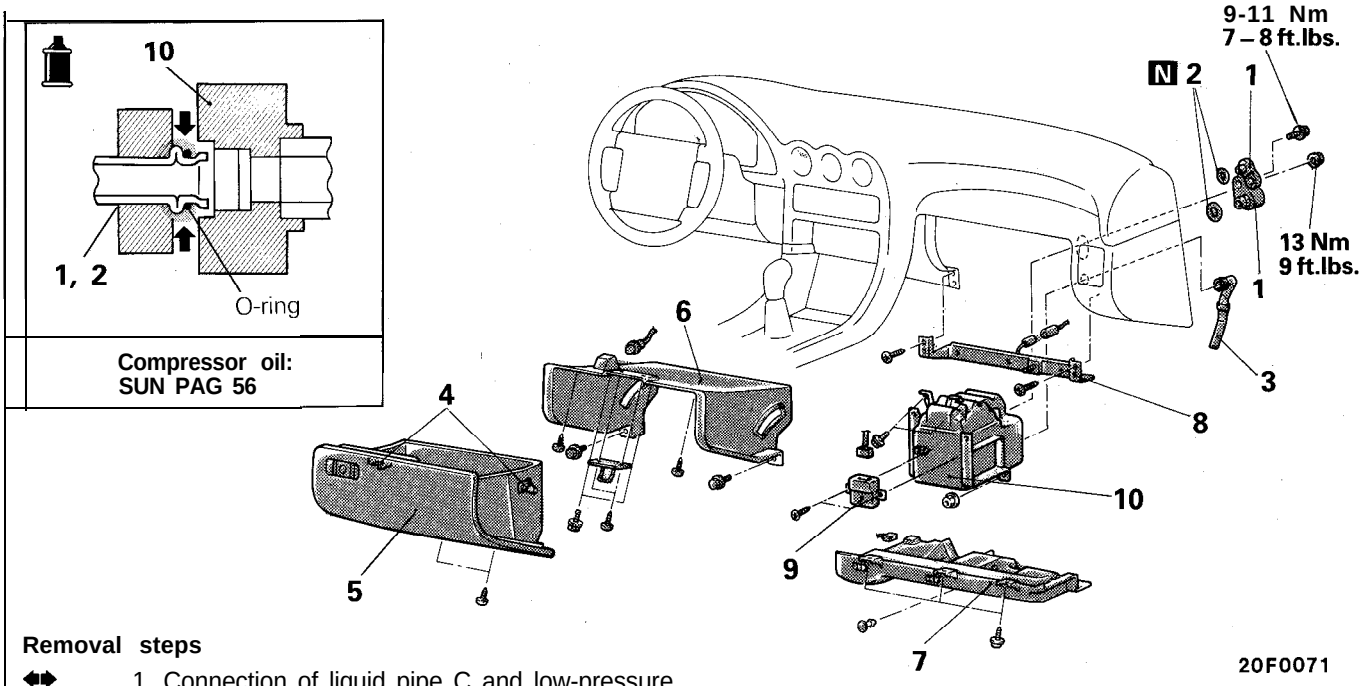
7. INSTALLATION OF AIR SELECTION CONTROL WIRE

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) Set the air selection damper lever as it contacts stopper.
(3) Connect the inner cable of the air selection control wire to the end of the air selection lever, and then secure the outer cable by using a clip.

EVAPORATOR

REMOVAL AND INSTALLATION



Removal steps

- ◆◆ 1. Connection of liquid pipe C and low-pressure hose B
- 2. O-ring
- 3. Drain hose
- 4. Stopper
- 5. Glove box
- 6. Glove box outer case assembly
- 7. Under cover
- 8. Lower frame
- 9. A/C control unit
- ● +10. Evaporator

Pre-removal and Post-installation Operation
- Discharge and Charging of Refrigerant (Refer to P.24-16-13).
- Removal and Installation of Battery

SERVICE POINTS OF REMOVAL

1. DISCONNECTION OF LIQUID PIPE C AND LOW-PRESSURE HOSE B

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

- 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-THERM0 SENSOR AND AIR-INLET SENSOR CHECK

For information concerning the checking procedures, refer to P.24-12.

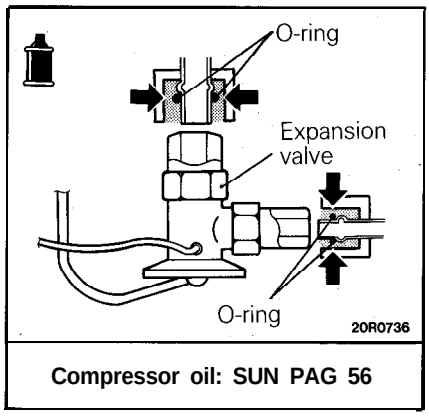
SERVICE POINT OF INSTALLATION

10. INSTALLATION OF EVAPORATOR

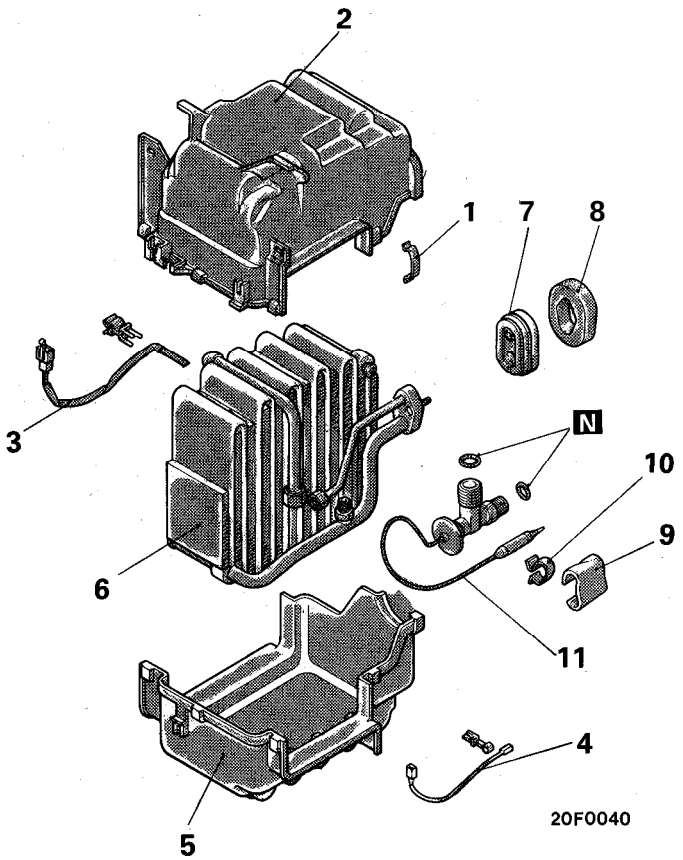
If a new evaporator is used, fill it with the specified amount of compressor oil before installing on the vehicle.

Compressor oil: SUN PAG 56
Quantity: 60 cm³ (2.0 fl.oz.)

DISASSEMBLY AND REASSEMBLY

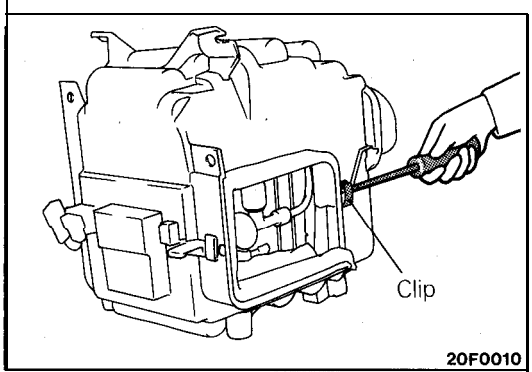


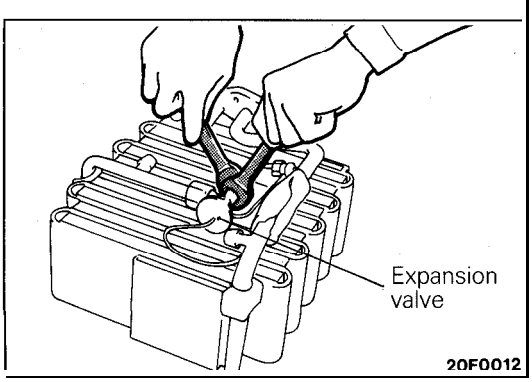
Compressor oil: SUN PAG 56



Disassembly steps

- ◆◆ 1. Clips
- 2. Evaporater case (upper)
- 3. Fin thermo sensor
- 4. Air inlet sensor <Vehicles with manual air conditioning>
- 5. Evaporator case (lower)
- 6. Evaporator assembly
- 7. Grommet
- 8. Insulator
- 9. Rubber insulator
- 10. Clip
- ◆◆ 11. Expansion valve





SERVICE POINTS OF DISASSEMBLY

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).

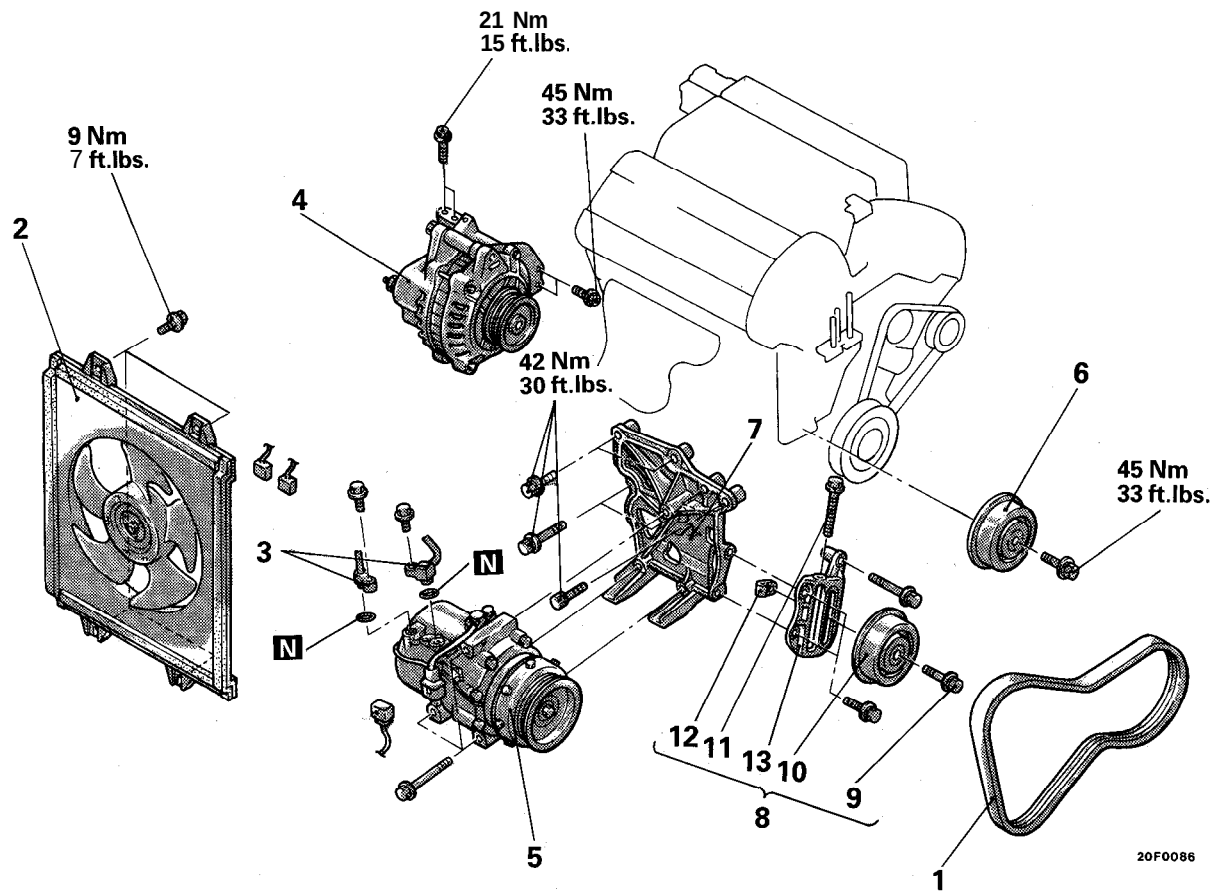
COMPRESSOR

REMOVAL AND INSTALLATION

<DOHC>

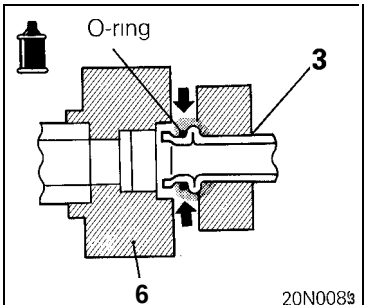
Pre-removal Operation
- Discharge of the Refrigerant (Refer to P.24-16.)

Post-installation Operation
- Adjustment of the Compressor Drive Belt (Refer to GROUP 9 – Service Adjustment Procedures.)
- Charging of Refrigerant (Refer to P.24-13.)



Removal steps

- ◆◆ 1. Compressor drive belt
- 2. Condenser fan motor assembly
- ◆◆ 3. Connection of high-pressure hose and low-pressure hose A
- ● *● a 4. Generator (Refer to GROUP 8 – Generator.)
- ● *● * 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

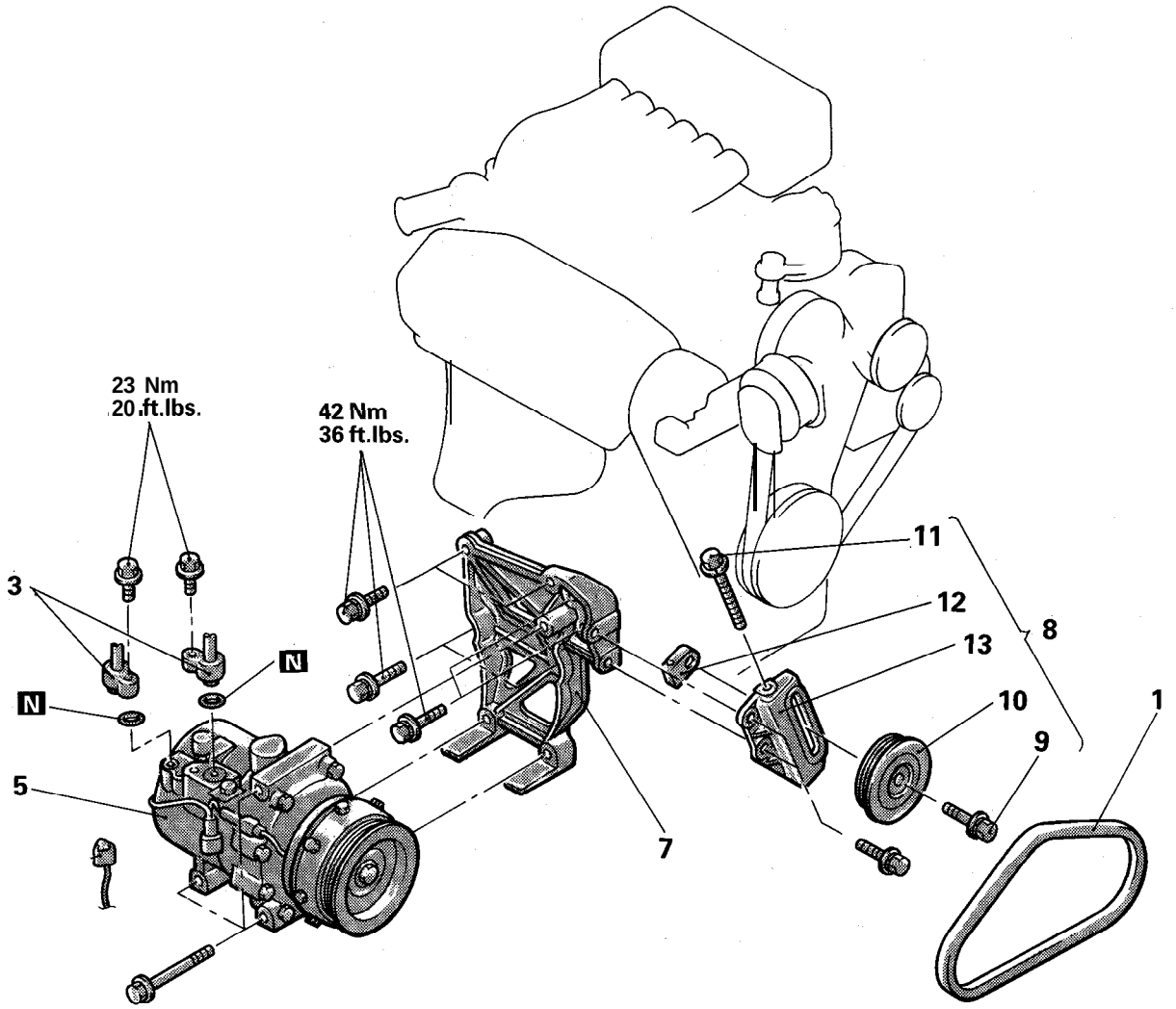


Compressor oil: SUN PAG 56

<SOHC>

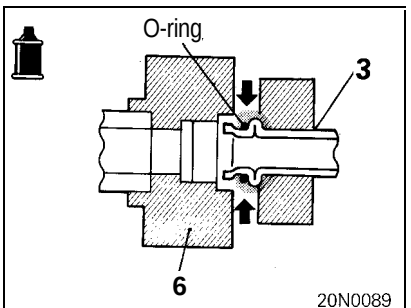
Pre-removal Operation
- Discharge of the Refrigerant (Refer to P.24-16.)

Post-installation Operation
- Adjustment of the Compressor Drive Belt (Refer to GROUP 9 – Service Adjustment Procedures.)
- Charging of Refrigerant (Refer to P.24-13.)

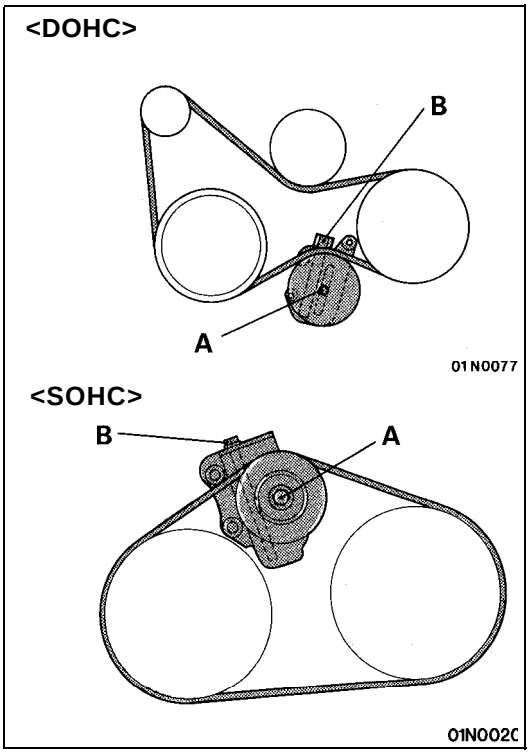


Removal steps

- ◆◆ 1. Compressor drive belt
- ◆◆ 3. Connection of high-pressure hose and low-pressure hose A
- ◆◆ ● a 5. Compressor
  7. Compressor bracket
  8. Tension pulley assembly
  9. Bolt
  10. Tension pulley
  11. Bolt
  12. Adjustment plate
  13. Tension pulley bracket



Compressor oil: SUN PAG 56



SERVICE POINTS OF REMOVAL

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 HIGH-PRESSURE HOSE AND LOW-PRESSURE HOSE A

If the hoses are disconnected, cap the hoses with a blank plug to prevent entry of dust, dirt, and water.

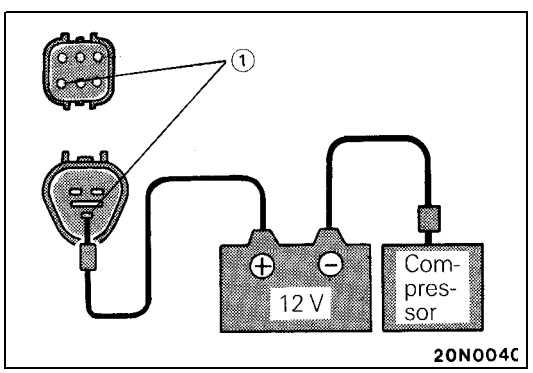
5. REMOVAL OF COMPRESSOR

Caution
Lay the towel on the brake tube to protect them. When installing the compressor, do not damage the brake tubes. This work must be done carefully so as not to spill the compressor oil.

INSPECTION

- Checking for heat damage of the tension pulley.
- Check for excessive play or deflection of the tension pulley.
- Check for unusual wear of the tension pulley.
- Check for hardening of the air conditioning belt.
- Check for unusual wear or abrasion of the air conditioning belt.

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

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 cm^3 (X fl.oz.)] of oil within the removed compressor.
(2) Wipe away (from the new compressor) the amount of oil calculated according to the following formula, and then install the new compressor.

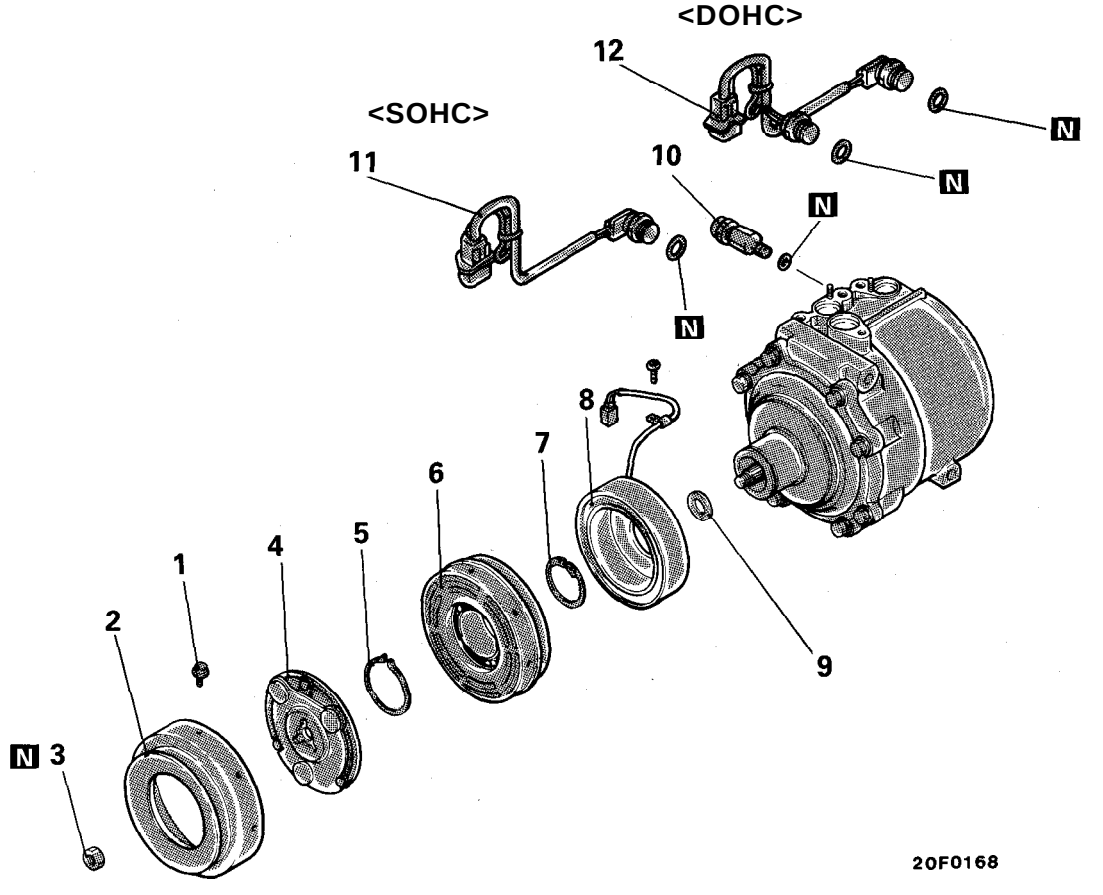
New compressor oil amount 160 cm^3 – X cm^3 = Y cm^3
(5.4 fl.oz. – x fl.oz. = Y fl.oz.)

NOTE
(1) Y cm^3 (Y fl.oz.) indicates the amount of oil in the refrigerant line, the condenser, the cooling unit, etc.

(2) If any other air conditioning part is replaced simultaneously with the compressor, remove the oil from the new compressor, taking the specified amount of oil for the part into consideration.

Quantity
Evaporator: 60 cm³ (2.0 fl.oz.)
Condenser: 15 cm³ (.5 fl.oz.)
Low-pressure hose: 10 cm³ (.3 fl.oz.)
Receiver: 10 cm³ (.3 fl.oz.)

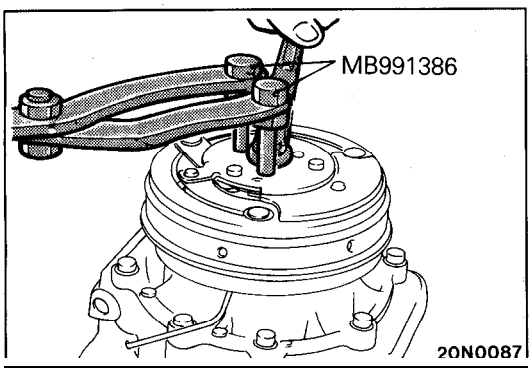
DISASSEMBLY AND REASSEMBLY



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

High pressure relief valve disassembly
10. High pressure relief valve

Thermostat and revolution pick up sensor disassembly
11. Thermostat <SOHC>
12. Thermostat and revolution pick up sensor <DOHC>



SERVICE POINTS OF DISASSEMBLY

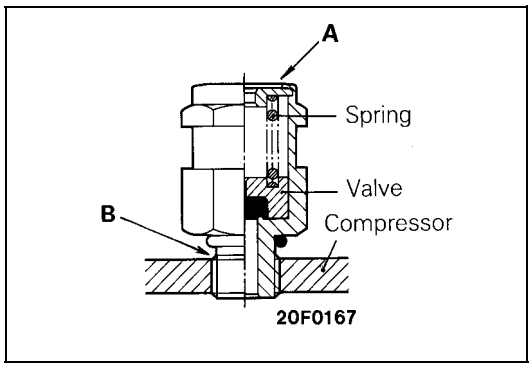
3. REMOVAL OF NUT

Use the special tool to tighten the nut.

INSPECTION

Check the surface of the armature for scoring or bluing.

-
- Check the sealing surfaces for cracks, scratches and deformation.
- Check the front housing for cracks or scoring on the sealing surfaces,
-



HIGH PRESSURE RELIEF VALVE CHECK

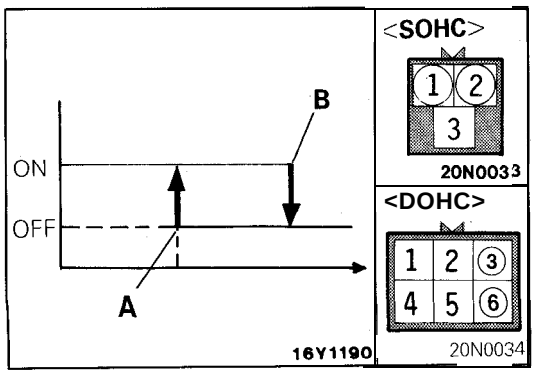
The high pressure relief valve is a safety feature which releases part of the refrigerant inside the system into the atmosphere when the high pressure level exceeds 3,740 kPa (532 psi) during air conditioning operation.

2,940 kPa (418 psi) or lower, the high pressure relief valve closes, thus allowing continued operation.

(1)

relief valve. The valve can be used unless there is a leak from that section.

leak still persists after retightening the valve, replace the packing.



THERMOSTAT CHECK

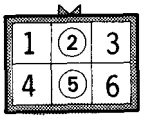
(1)

(2) Check for continuity across terminals ① and ② (SOHC) or ③ and ⑥ (DOHC) when the engine oil is heated.

Standard value:

Continuity at approx. 110°C (230°F) or less

No continuity at approx. 155°C (311°F) or more at B point



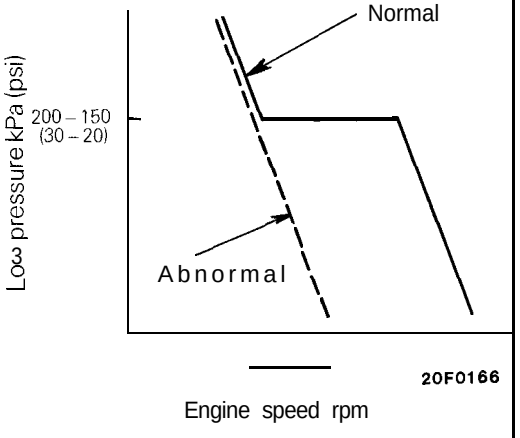
20N0034

REVOLUTION PICK UP SENSOR CHECK

Measure the resistance between terminals ② and ⑤ of the connector.

Normal resistance: 405 ± 35 Ω when ambient temperature is 20°C (68°F)

If the measurement deviates greatly from the above resistance, replace the revolution pick up sensor assembly.

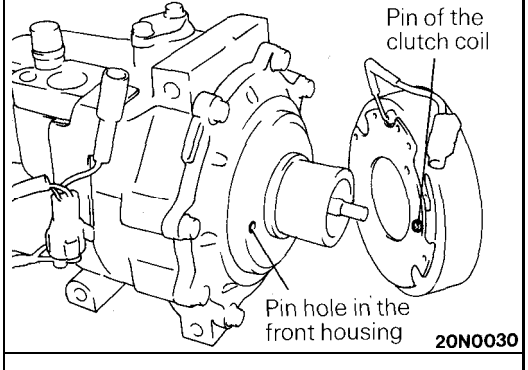


20F0166

CONTROL VALVE CHECK

The control valve detects a low pressure level during the operation of the air conditioning, and adjusts the amount of refrigerant to be bypassed.

(1) Operate the air conditioning under a high temperature load condition (when vehicle interior temperature is high).
(2) Connect a low pressure gauge to the air compressor.
(3) Operate the air conditioning with the engine running at idle.
(4) Gradually increase the engine speed while observing the low pressure gauge.
If the valve is normal, the low pressure drops slowly as the engine speed increases until a pressure of 200 – 150 kPa (30 – 20 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 200 – 150 kPa (30 – 20 psi) pressure level.
If the low pressure drops like this, replace the control valve.

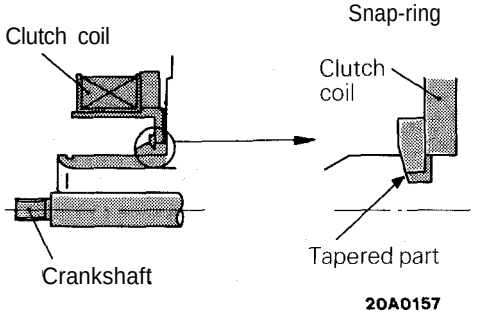


20N0030

SERVICE POINTS OF REASSEMBLY

8. INSTALLATION OF CLUTCH COIL

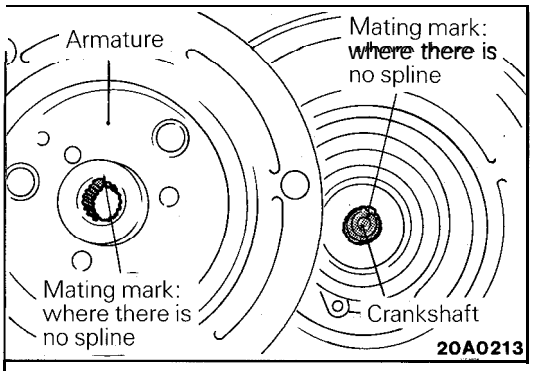
Align the pin of the clutch coil with the pin hole in the front housing, and then fit it into the hole.



20A0157

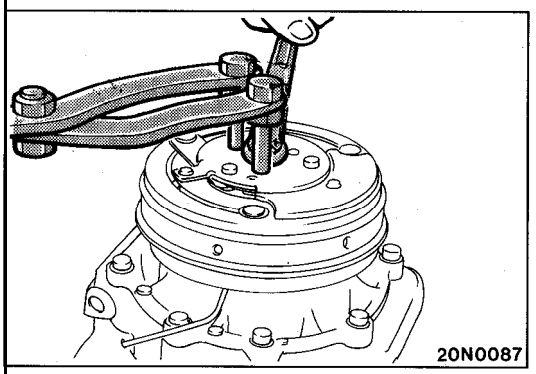
7. INSTALLATION OF SNAP RING

Install the snap ring so that the tapered surface is at the outer side.



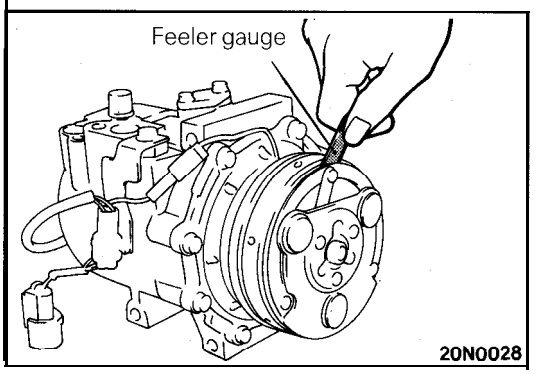
4. INSTALLATION OF ARMATURE PLATE

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 a socket wrench 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

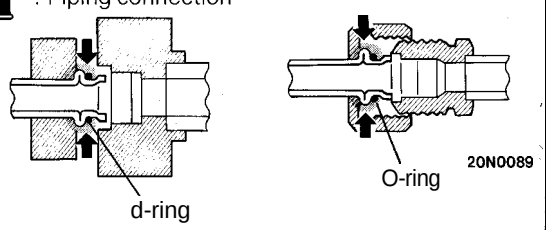
If there is a deviation of the air gap from the standard value, make the necessary adjustment by adjusting the number of shims.

CONDENSER AND CONDENSER FAN MOTOR

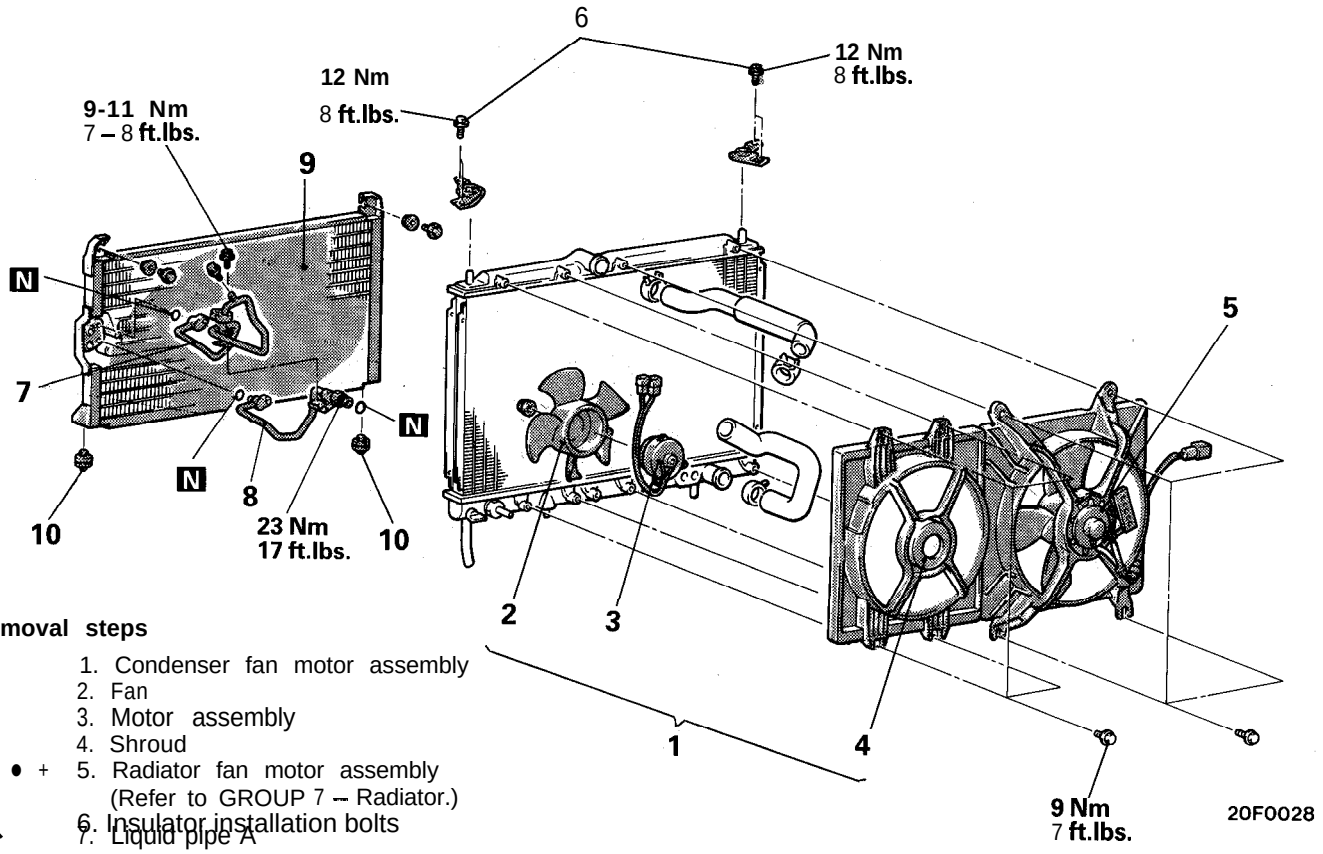
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Discharge and Charging of the Refrigerant (Refer to P.24-16, 13.)
- Removal and Installation of the Generator <DOHC> (Refer to GROUP 8 – Engine Electrical.)

: Piping connection

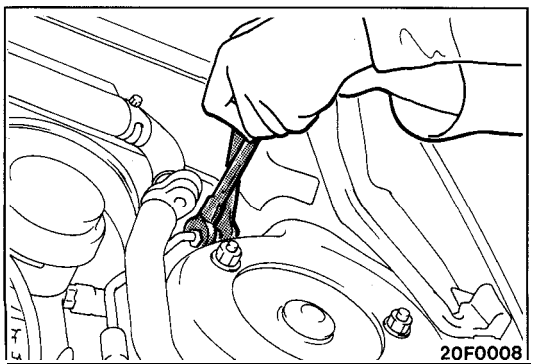


Compressor oil: SUN PAG 56



Removal steps

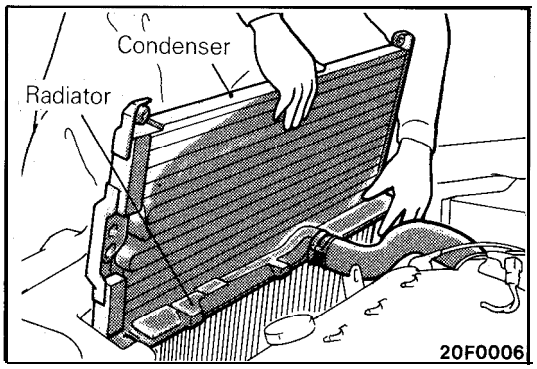
1. Condenser fan motor assembly
2. Fan
3. Motor assembly
4. Shroud
- ◆◆ ● + 5. Radiator fan motor assembly (Refer to GROUP 7 – Radiator.)
- ◆◆ 6. Insulator installation bolts
- ◆◆ 7. Liquid pipe A
- ◆◆ 8. High-pressure pipe
- ◆◆ ● a 9. Condenser
10. Bushings



SERVICE POINTS OF REMOVAL

7. REMOVAL OF LIQUID PIPE A / 8. HIGH-PRESSURE PIPE

(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.

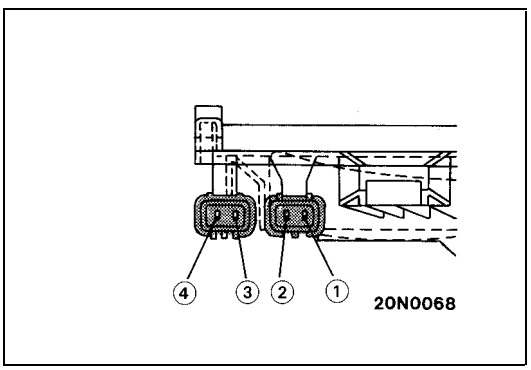


9. REMOVAL OF CONDENSER

Move the radiator toward the engine, and then remove the condenser upward.

INSPECTION

- 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 ③ and ground (–) terminal ④; at this time, check that the condenser fan motor turns.
(2) Apply battery voltage (+) to terminal ① and ground (–) terminal ②; at this time, check that the condenser fan motor turns.

SERVICE POINT OF INSTALLATION

9. INSTALLATION OF CONDENSER

If a new condenser is used, fill it with the specified amount of compressor oil before installing on the vehicle.

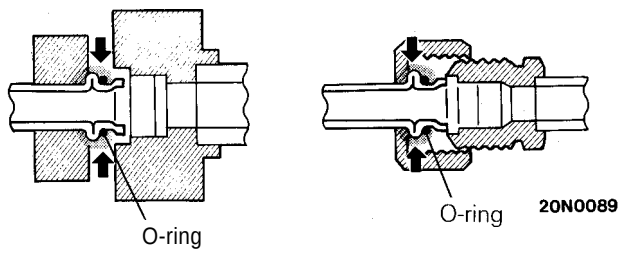
Compressor oil: SUN PAG 56
Quantity: 15 cm³ (.5 fl.oz.)

REFRIGERANT LINE

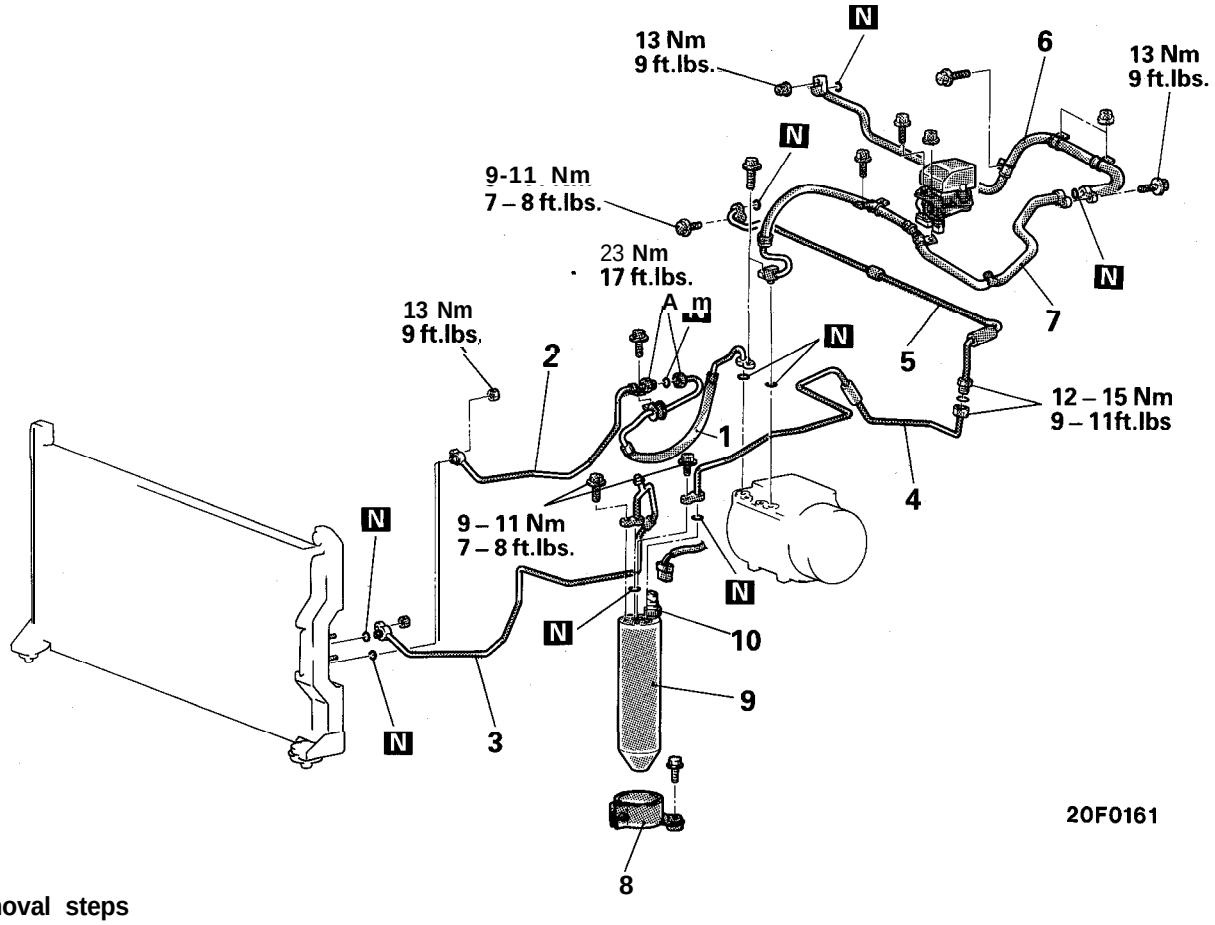
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Discharge and Charging of Refrigerant (Refer to P.24-16, 13.)

: Piping connection

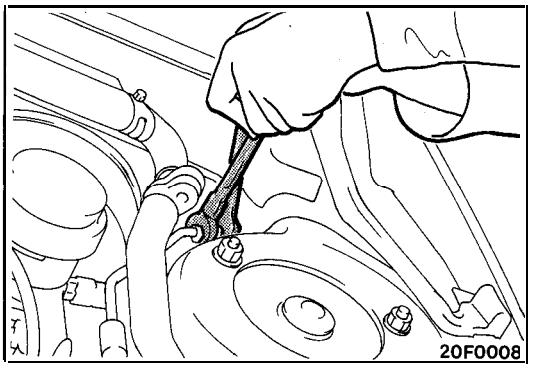


Compressor oil: SUN PAG 56



Removal steps

- ◆◆ 1. High-pressure hose
- ◆◆ 2. High-pressure pipe
- 3. Liquid pipe A
- ◆ C 4. Liquid pipe B
- 5. Liquid pipe C
- ◆ + 6. Low-pressure hose B
- ◆ * 7. Low-pressure hose A
- 8. Receiver bracket
- ◆ 4 9. Receiver
- 10. Dual-pressure switch



SERVICE POINTS OF REMOVAL

1. REMOVAL OF HIGH-PRESSURE HOSE / HIGH-PRESSURE PIPE

Loosen the flare nut by using two wrenches.

INSPECTION

CHECKING DUAL PRESSURE SWITCH

For information concerning the checking procedures of the dual pressure switch, refer to “Service Adjustment Procedures” on P.24-11.

SERVICE POINTS OF INSTALLATION

9. INSTALLATION OF RECEIVER / 7, 6. LOW-PRESSURE HOSE

If the low-pressure hose is replaced with new one, or if a new receiver is installed, pour the specified amount of oil in the compressor before installing these parts in the vehicle.

Compressor oil: SUN PAG 56
Quantity:
Low-pressure hose: 10 cm³ (.3 fl.oz.)
10 cm³ (.3 fl.oz.)

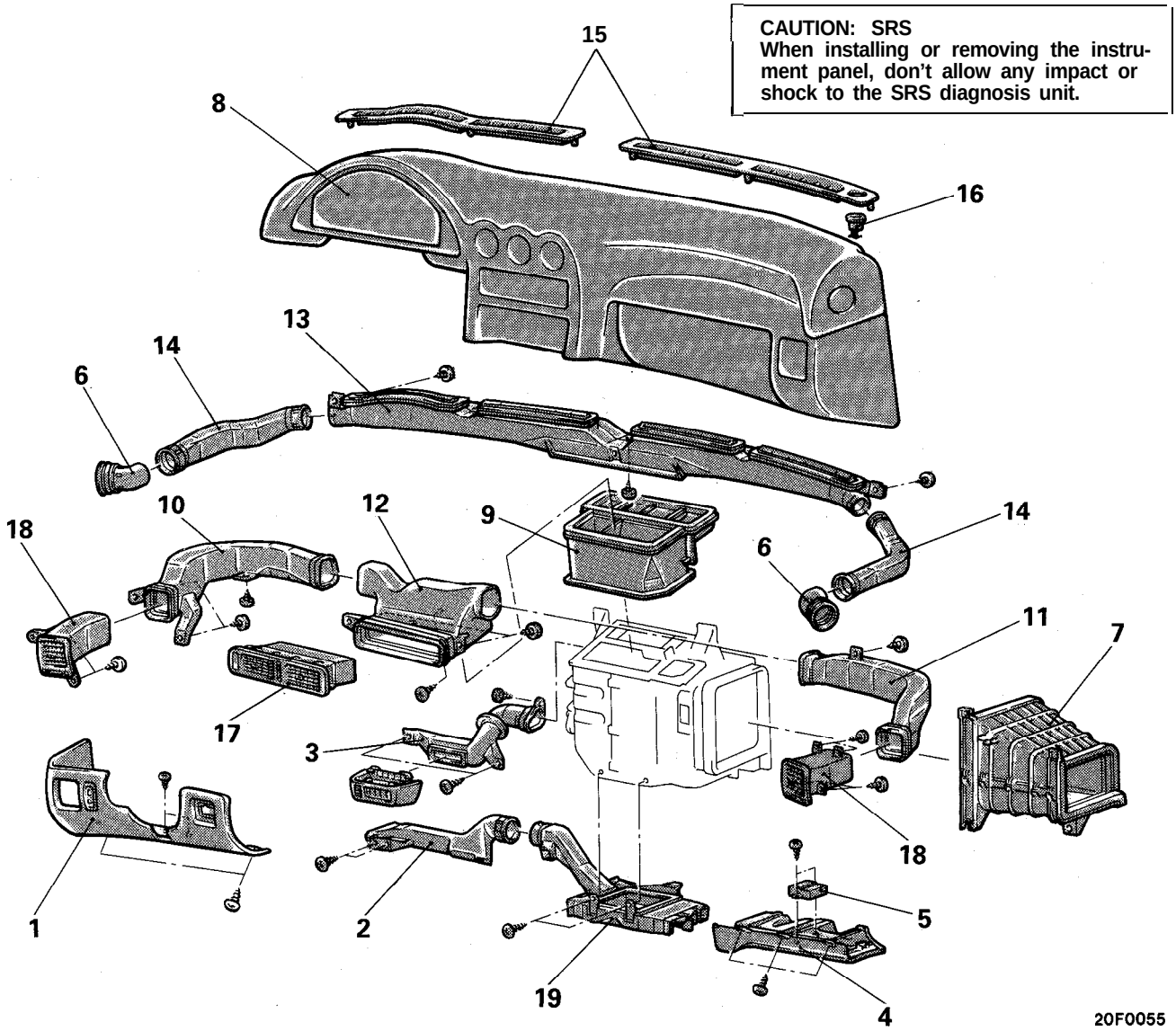
4. INSTALLATION OF LIQUID PIPE B

Connect liquid pipe B first on the receiver side.

VENTILATORS (INSTRUMENT PANEL)

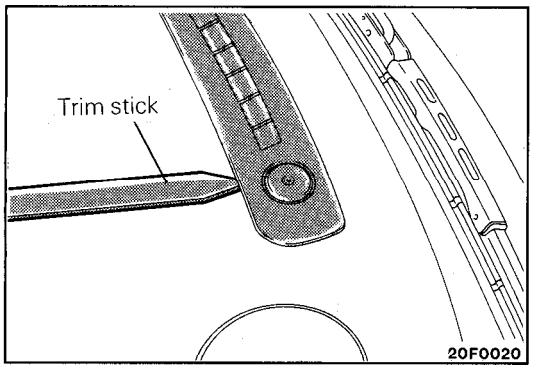
REMOVAL AND INSTALLATION

CAUTION: SRS
When installing or removing the instrument panel, don't allow any impact or shock to the SRS diagnosis unit.



Removal steps

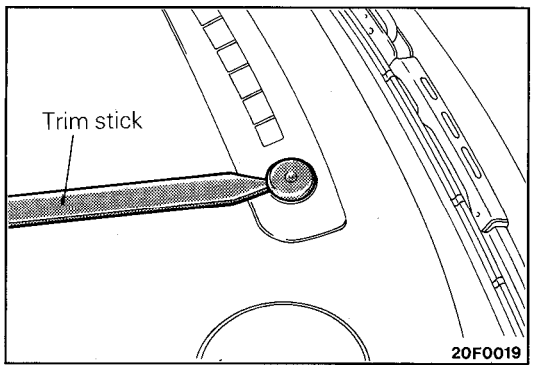
- ◆◆ ● + 1. Knee protector (Refer to GROUP 23A –Instrument Panel.)
- 2. Foot shower duct
- 3. Lap cooler duct
- 4. Under cover
- 5. Belt lock controller <DOHC>
- 6. Side defroster hoses A
- 7. Duct <Vehicles without air conditioning>
- ◆◆ ● + 8. Instrument panel (Refer to GROUP 23A – Instrument Panel.)
- 9. Center duct
- 10. Air duct (LH)
- 11. Air duct (RH)
- 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)



SERVICE POINTS OF REMOVAL

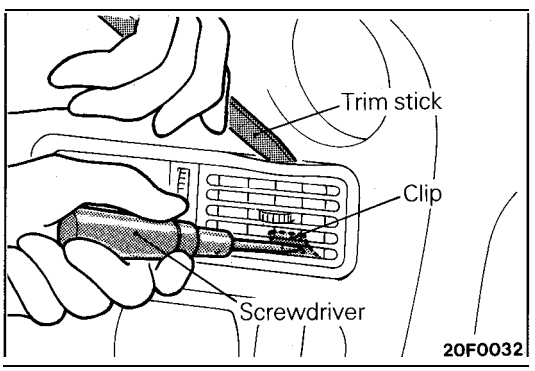
15. REMOVAL OF DEFROSTER GARNISHES

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.

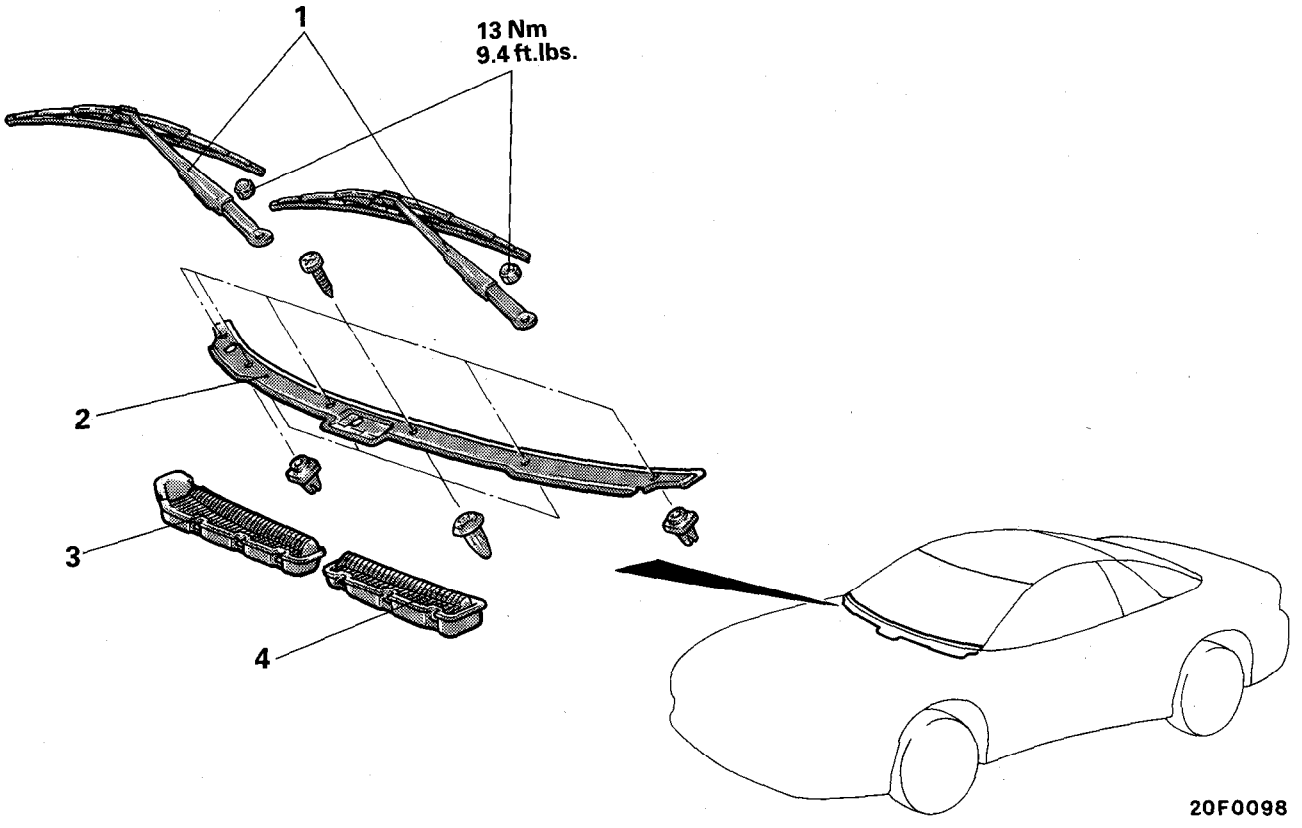


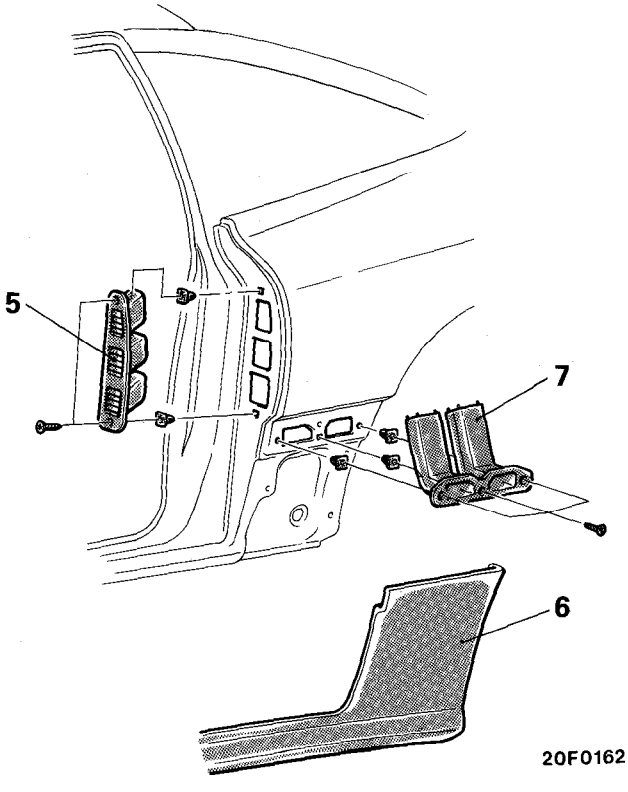
17. REMOVAL OF CENTER AIR OUTLET ASSEMBLY

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)

REMOVAL AND INSTALLATION





Inlet garnishes removal steps

1. Windshield wiper arm
2. Front deck garnish
3. Inlet garnish (RH)
4. Inlet garnish (LH)

Rear ventilation duct removal steps

5. Rear ventilation duct A
6. Side air dam (side sill) (Refer to GROUP 23A – Aero Parts.)
7. Rear ventilation duct B

FULL AUTO AIR CONDITIONING

TROUBLESHOOTING

TROUBLESHOOTING PROCEDURE

(1) Check that the air ducts and rods are not off.
(2) Check that connectors are properly connected and fuses are not blown.
(3) Using an analog voltmeter, check on-board diagnostic outputs. If failure code is being output, check the failing system and repair as necessary. (Refer to Diagnosis Display Patterns and Codes on P.24-60.)
(4) If the on-board diagnostic outputs are normal, check for terminal voltage or continuity with a circuit tester according to the troubleshooting chart by symptom. (Refer to control unit terminal voltages on P.24-49 – 56.)
(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	Harness (incl. connectors)	Compressor relay	Magnetic clutch	Sensors	Pressure switch	Air-conditioning control panel	Refrigerant amount	Receiver	Expansion valve	Compressor	Thermostat	Belt lock controller	Air conditioning control unit	MFI control unit	On-board diagnostic outputs	Blend air damper motor and potentiometer	Heater link	Heater relay	Power transistor	Blower motor	Blower motor relay	Air selection damper motor	Mode selection damper motor/potentiometer	Condenser fan relay	Resistor	Condenser fan motor
1	Air conditioning does not operate when the ignition switch in the ON position.	①	②	③	④		⑥	⑧	⑦				⑤	⑨	⑩	⑪												
2	Interior temperature does not raise even the air conditioning is operating (No warm air coming out).		⑤		②			⑥							⑦		①	③	④									
3	Interior temperature does not lower even the air conditioning is operating (No cold air coming out).	①	④	⑤	⑫	⑪		⑬	⑥	⑦	⑧	⑨	⑩		⑭		②	③										
4	Blower motor does not rotate.	①	④					⑥							⑦					②	③	⑤						
5	Blower motor does not stop rotating.		③					④							⑤						②		①					
6	Air selection damper does not operate.		②					③							④									①				
7	Mode selection damper does not operate.		③					④							⑤		①								②			
8	Condenser fan does not operate when the air conditioning is activated.	①																								②	③	④
9	Air-conditioning graphic display does not function correctly.	①	②					③							④													
10	Air conditioning control panel blinks.					②		③				①		④	⑤	⑥												
11	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 to check the control unit.

No.	Symptom	Probable cause	Remedy	Ref. page
1	Air conditioning does not operate when the ignition switch in the ON position.	Open-circuited power circuit harness	Correct harness.	–
		Defective control panel	Replace control panel.	24-61
		Defective air conditioning control unit	Check on-board diagnostic output.	24-57
		Defective compressor relay in relay box	Replace.	24-19
		Defective magnet clutch	Replace.	24-32
		Defective thermostat	Replace.	24-32
		Defective dual pressure switch	Replace.	24-38
		Refrigerant leak	Charge refrigerant, correct leak.	24-l 3
		Excessive refrigerant	Discharge refrigerant.	24-l 6
		Defective belt lock controller <DOHC>	Replace belt lock controller.	24-62
		Defective MFI control unit	Replace MFI control unit	–
2	Interior temperature does not raise (No warm air coming out).	Defective interior temperature sensor input circuit	Check on-board diagnostic output. Replace defective parts.	24-57
		Defective blend air damper potentiometer input circuit		
		Defective blend air damper drive motor	Replace blend air damper drive motor.	24-63
		Incorrect engagement of blend air damper drive motor lever and blend air damper	Engage correctly.	–
		Sticking blend air damper	Correct blend air damper.	–
		Open-circuited harness between blend air damper drive motor and air conditioning control unit	Correct harness.	–
		Defective control panel	Replace control panel.	24-61
		Defective air conditioning control unit	Replace air conditioning control unit.	24-61
3	Interior temperature does not lower (No cold air coming out).	Defective interior temperature sensor input circuit	Check on-board diagnostic output. Replace defective parts.	24-57
		Defective air inlet sensor input circuit		
		Defective air thermo sensor input circuit		
		Defective blend air damper potentiometer input circuit		

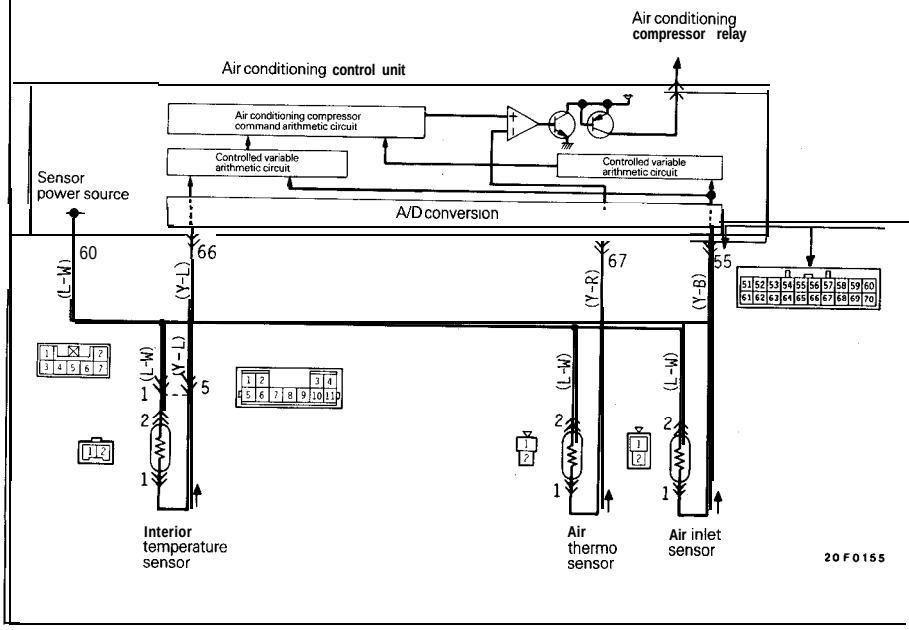
0.	Symptom	Probable cause	Remedy	Ref. page
3	Interior temperature does not lower (No cold air coming out).	Defective blend air damper drive motor	Replace blend air damper drive motor.	24-63
		Incorrect engagement of blend air damper drive motor lever and blend air mix damper	Engage correctly.	–
		Sticking blend air damper	Correct blend air damper.	–
		Open-circuited harness between blend air damper drive motor and air conditioning control unit	Correct harness.	–
		Open-circuited harness between photo sensor and air conditioning control unit	Correct harness.	–
		Defective air-conditioning compressor relay in the relay box	Replace.	24-19
		Defective thermostat	Replace thermostat	24-32
		Defective revolution pick up sensor <DOHC>	Replace revolution pick up sensor	24-32
		Refrigerant leak	Charge refrigerant, correct leak.	24-13, 18
		Excessive refrigerant	Discharge refrigerant.	24-16
		Clogged receiver	Replace receiver.	24-38
		Clogged expansion valve	Replace expansion valve.	24-28
		Defective compressor	Replace compressor.	24-29
		Defective air inlet sensor	Replace air inlet sensor.	24-65
		Defective magnetic clutch	Replace.	24-32
		Defective belt lock controller	Replace belt lock controller.	24-22
		Defective control panel	Replace control panel.	24-6 1
		Defective air conditioning control unit	Replace air conditioning control unit.	24-61
1	Blower motor does not rotate.	Defective blower motor	Replace blower motor.	24-25
		Blown thermal fuse inside air conditioning power transistor	Replace air conditioning power transistor.	24-62
		Defective blower motor relay	Replace blower motor relay.	24-l 9
		Open-circuited harness between fuse and blower motor relay	Correct harness.	–

No	Symptom	Probable cause	Remedy	Ref. page
4	Blower motor does not rotate.	Open-circuited harness between blower motor relay and blower motor	Correct harness.	–
		Open-circuited harness between air conditioning power transistor and air conditioning control unit	Correct harness.	–
		Defective control panel	Replace control panel.	24-61
		Defective air conditioning control unit	Replace air conditioning control unit.	24-61
5	310wer motor does not stop rotating.	Defective blower motor HI relay	Replace power relay.	24-I 9
		Short-circuited harness between blower motor relay and air conditioning power transistor air conditioning control unit	Correct harness.	–
		Defective control panel	Replace control panel.	24-61
		Defective air conditioning control unit	Replace air conditioning control unit.	24-61
		Defective air conditioning control unit	Replace air conditioning control unit	24-61
		Defective air conditioning power transistor	Replace air conditioning power transistor	24-62
6	Air selection damper does not operate.	Defective air selection drive motor	Replace air selection drive motor.	24-63
		Incorrect engagement of air selection drive motor damper	Engage correctly.	–
		Malfunctioning air selection damper	Correct air selection damper.	–
		Open-circuited harness between air selection motor and air conditioning control unit	Correct harness.	–
		Defective control panel	Replace control panel	24-61
		Defective control panel	Replace control panel.	24-61
		Defective air conditioning control unit	Replace air conditioning control unit.	24-61

lo.	Symptom	Probable cause	Remedy	Ref. page
7	Mode selection damper does not operate.	Defective mode selection damper potentiometer input circuit	Check on-board diagnostic output. Replace defective parts.	24-57
		Defective mode selection drive motor	Replace mode selection drive motor.	24-63
		Incorrect engagement of mode selection drive motor and mode selection damper	Engage correctly.	–
		Malfunctioning DEF., FACE, and FOOT damper	Correct DEF., FACE, and FOOT damper.	–
		Open-circuited harness between mode selection motor and control unit	Correct harness.	–
		Defective control panel	Replace control panel.	24-61
		Defective air conditining control unit	Replace air conditioning control unit.	24-61
8	Condenser fan does not operate when the air conditioning is activated.	Defective condenser fan motor relay	Replace power relay.	24-l 9
		Defective condenser fan motor	Replace condenser fan motor.	24-36
9	Air-conditioning graphic display does not function correctly	Open-circuited harness between control panel and air conditioning control unit	Correct harness.	–
		Defective control panel	Replace control panel.	24-61
		Defective air conditioning control unit	Replace air conditioning control unit.	24-61
10	Air conditioning control panel blinks. <DOHC>	Wet compressor drive belt	Dry.	–
		Insufficient compressor drive belt tension	Check and adjust.	GROUP9
		Defective compressor drive belt	Replace.	–
		Defective compressor	Check and replace.	24-l 2, 29
		Defective revolution pick-up sensor	Check and replace.	24-34, 32
		Defective air conditioning switch	Replace air conditioning control panel	24-61
		Defective belt lock controller	Replace belt lock controller	24-62
		Defective air conditioning control unit	Replace air conditioning control unit	24-61
		Defective MFI contorl unit	Replace MFI control unit	–
11	Set temperature returns to 25°C (112°F) when the ignition switch is turned ON and OFF.	Open-circuited power circuit harness	Correct harness.	–
		Defective air conditioning control unit	Replace air conditioning control unit.	24-61

READING THE "CIRCUIT AND UNIT CHECK"

3. Inspection of interior temperature sensor, air inlet sensor, and air tharmo sensor circuits



Connectors are keyed by terminal numbers.

Troubleshooting Hints

- Diagnosis
  - No. 11, 12 [Fix interior temperature sensor input signal at 25°C (77°F).]
  - No. 13, 14 [Fix air inlet sensor input signal at 15°C (59°F).]
  - No. 21, 22 [Fix air thermo sensor input signal at -2°C (−35.6°F).]
- Air conditioning control unit terminal voltages

Indicates the on-board diagnostic output code number and system condition when the code is output.

Terminal No.	Signal name	Condition	Terminal voltage
55	Air inlet sensor	Temperature at sensor 25°C (77°F) (4 kΩ)	2.2 – 2.8 V
60	Sensor power source	Normally	4.8 – 5.2 V
66	Interior temperature sensor	Temperature at sensor 25°C (77°F) (4 kΩ)	2.3 – 2.9 V
67	Air thermo sensor	Temperature at sensor 25°C (77°F) (4 kΩ) when air conditioning is OFF	2.3 – 2.9 V

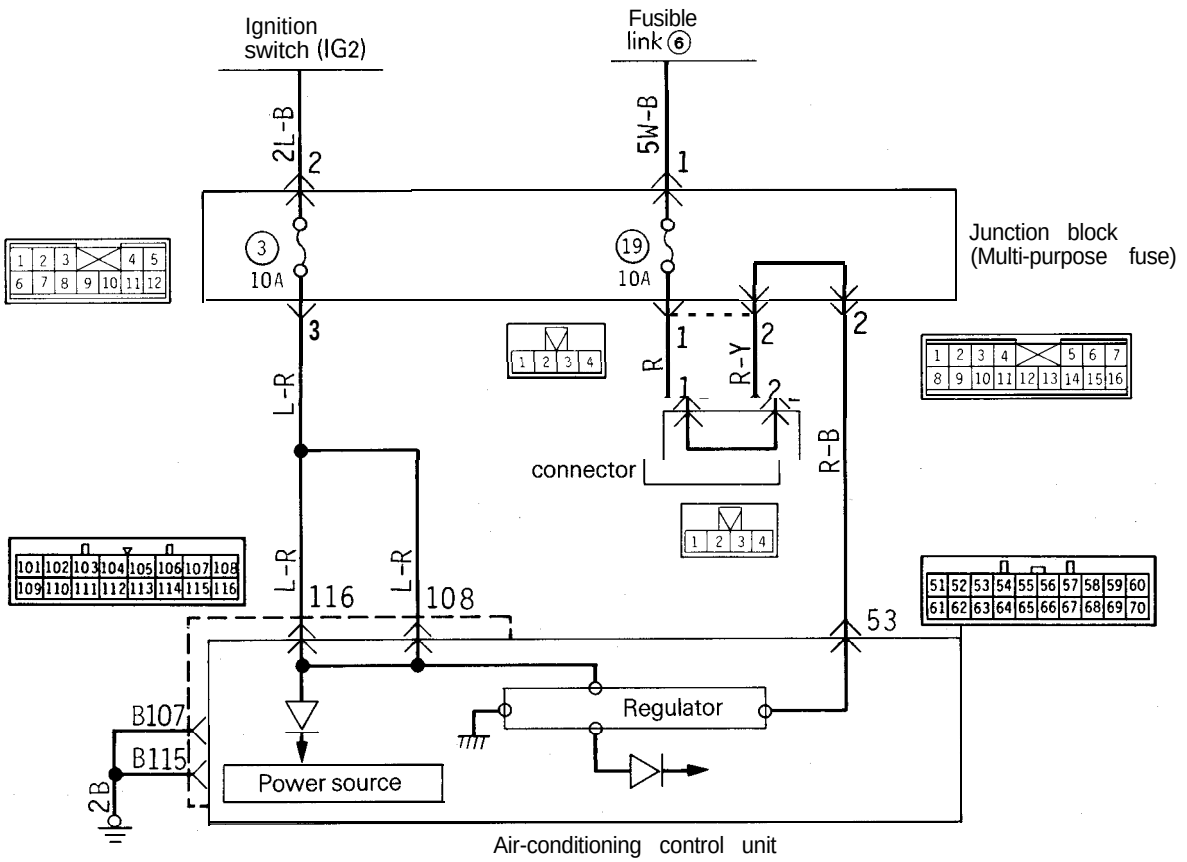
Indicates the terminal number to be checked.

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

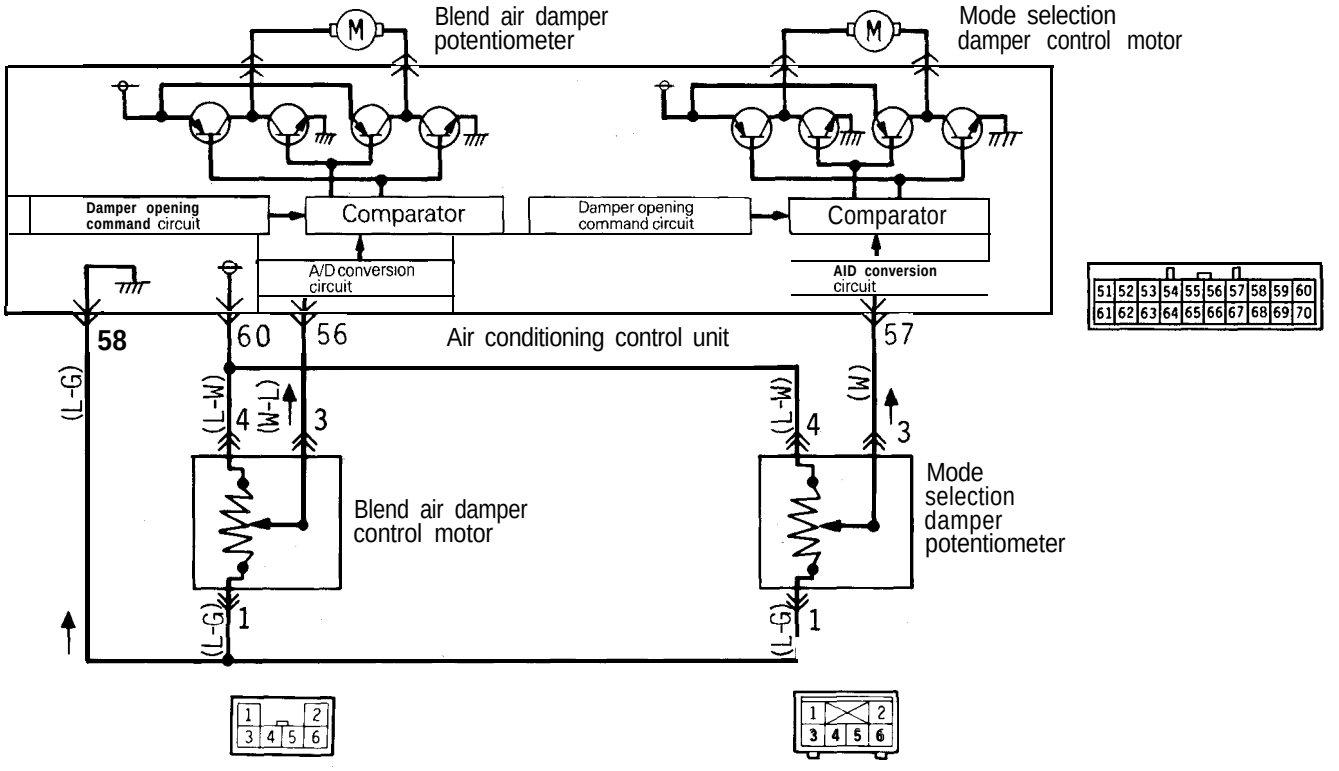
1. Inspection of air conditioning control unit power source circuit



- Air conditioning control unit terminal voltage

Terminal No.	Signal name	Condition	Terminal voltage
53	Backup power source	Normally	Battery positive voltage
108, 116	Air conditioning control unit power source	Ignition switch ON	Battery positive voltage
107, 115	Air conditioning control unit ground	Normally	o v

2. Inspection of potentiometer circuit



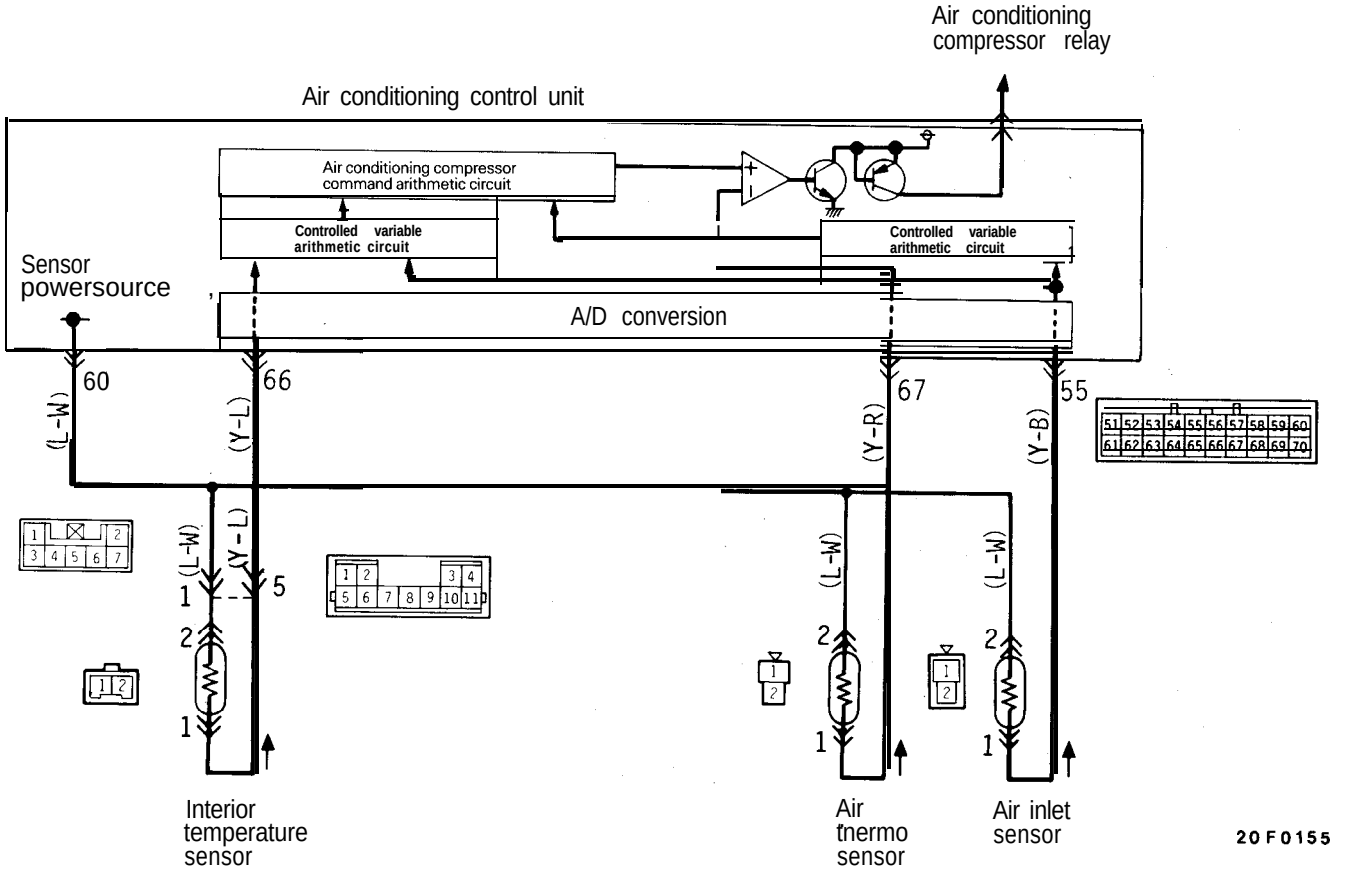
20F0157

Troubleshooting Hints

- Diagnosis
  No. 31 (Fix blend air damper at MAX. HOT position, or at MAX: COOL position when it is at MAX. COOL position.)
  No. 32 (Fix mode selection damper at FACE position, or at FACE position when it is at FACE position.)
- Air conditioning control unit terminal voltages

Terminal No.	Signal name	Condition	Terminal voltage
56	Blend air damper potentiometer (input)	Blend air damper at MAX. COOL position	0.1 – 0.3 V
		Blend air damper at MAX. HOT position	4.7 – 5.0 v
57	Mode selection damper potentiometer (input)	Mode selection damper at FACE position	0.1 – 0.3 V
		Mode selection damper at DEF. position	4.7 – 5.0 v
58	Blend air damper and mode selection damper potentiometer ⊖	Normally	o v
60	Sensor power source	Normally	4.8 – 5.2 V

3. Inspection of interior temperature sensor, air inlet sensor, and air thermo sensor circuits



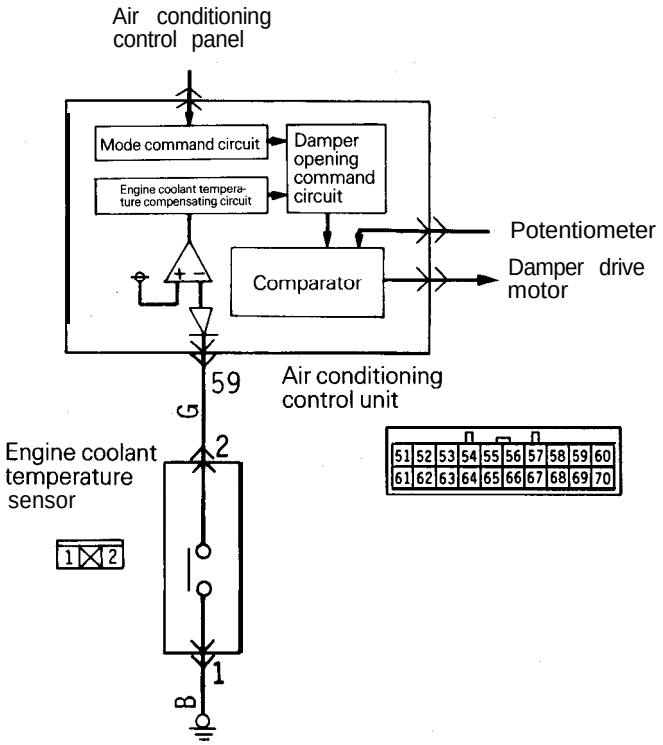
Troubleshooting Hints

- Diagnosis
  - No. 11, 12 [Fix interior temperature sensor input signal at 25°C (77°F)
  - No. 13, 14 [Fix air inlet sensor input signal at 15°C (59°F).]
  - No. 21, 22 [Fix air thermo sensor input signal at -2°C (−35.6°F).]
- Air conditioning control unit terminal voltages

Terminal No.	Signal name	Condition	Terminal voltage
55	Air inlet sensor	Temperature at sensor 25°C (77°F) (4 kΩ)	2.2 – 2.8 V
60	Sensor power source	Normally	4.8 – 5.2 V
66	Interior temperature sensor	Temperature at sensor 25°C (77°F) (4 kΩ)	2.3 – 2.9 V
67	Air thermo sensor	Temperature at sensor 25°C (77°F) (4 kΩ) when air conditioning is OFF	2.3 – 2.9 V

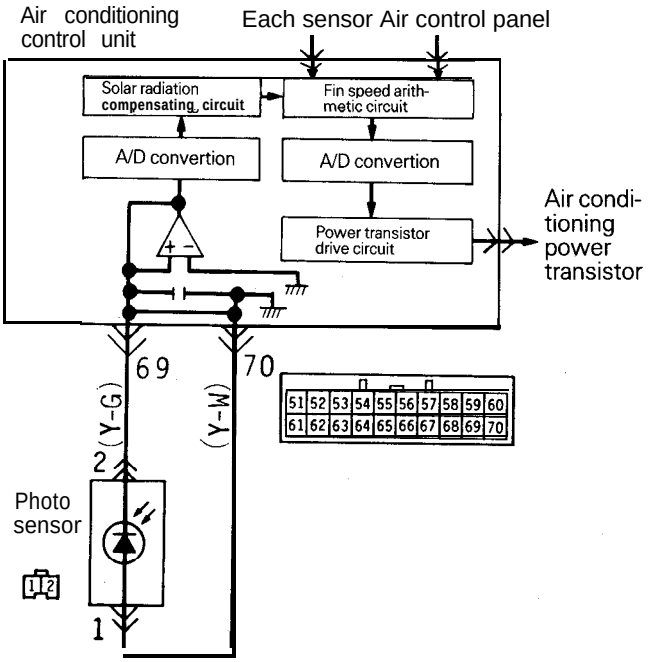
4. Inspection of engine coolant temperature sensor and photo sensor circuits

<Engine coolant temperature sensor>



20F0150

<Photo sensor>



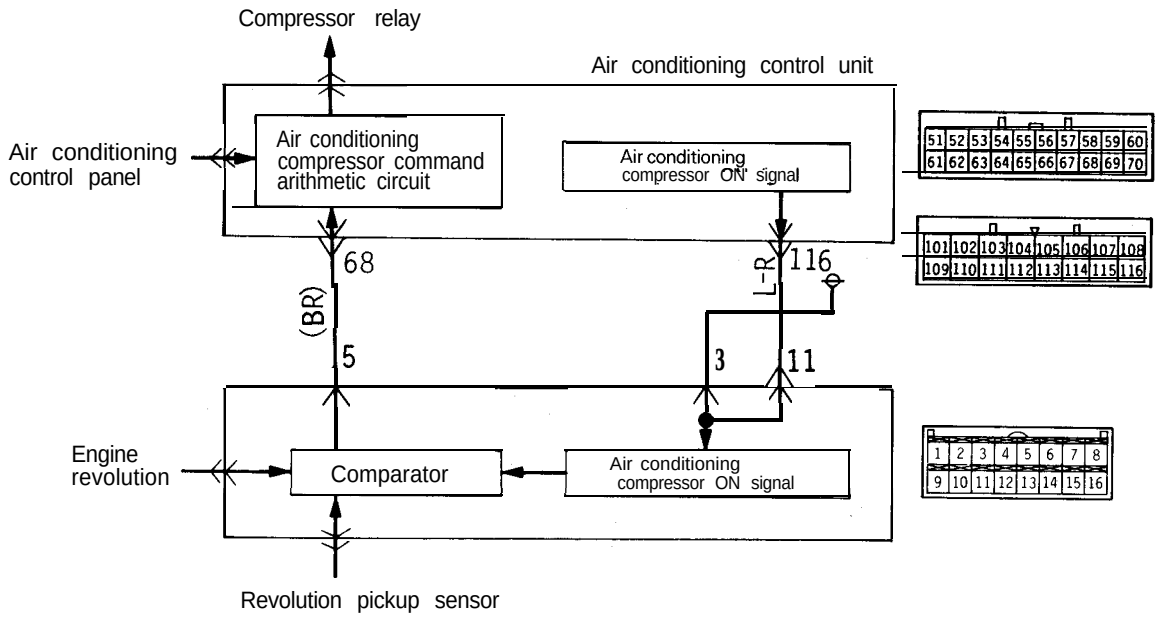
20F0149

Troubleshooting Hints

- Air conditioning control unit terminal voltages

Terminal No.	Signal name	Condition	Terminal voltage
69	Photo sensor ⊖	Illuminance 100,000 lux or more	-0.1 to-o.2 v
		Illuminance less than 0 lux	o v
70	Photo sensor ⊕	Normally	o v
59	Engine coolant temperature sensor ⊕	Switch OFF [Engine coolant temperature less than 50°C (122°F)]	Battery positive voltage
		Switch ON [Engine coolant temperature 50°C (122°F) or higher]	0 V

5. Inspection of belt lock controller circuit



20F0156

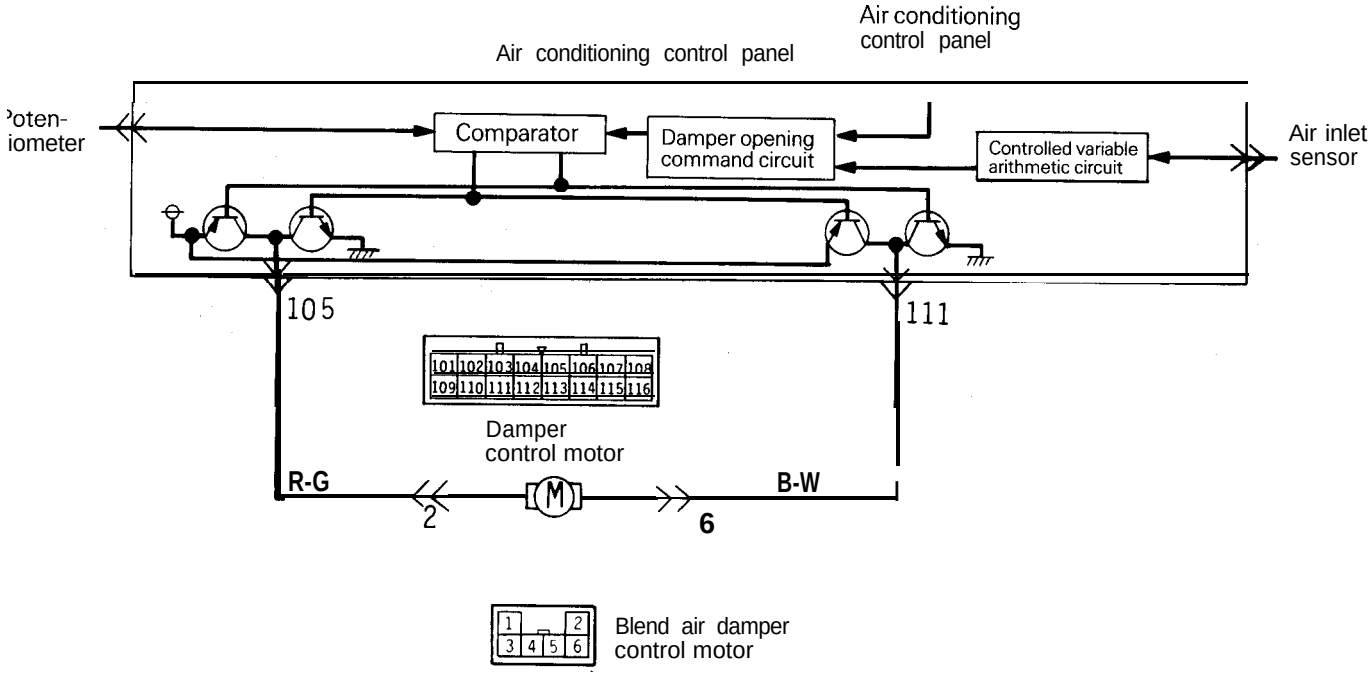
Troubleshooting Hints

- Air conditioning control unit terminal voltages

Terminal No.	Signal name	Condition	Terminal voltage
116	Air conditioning output	Compressor ON	10 V to battery positive voltage

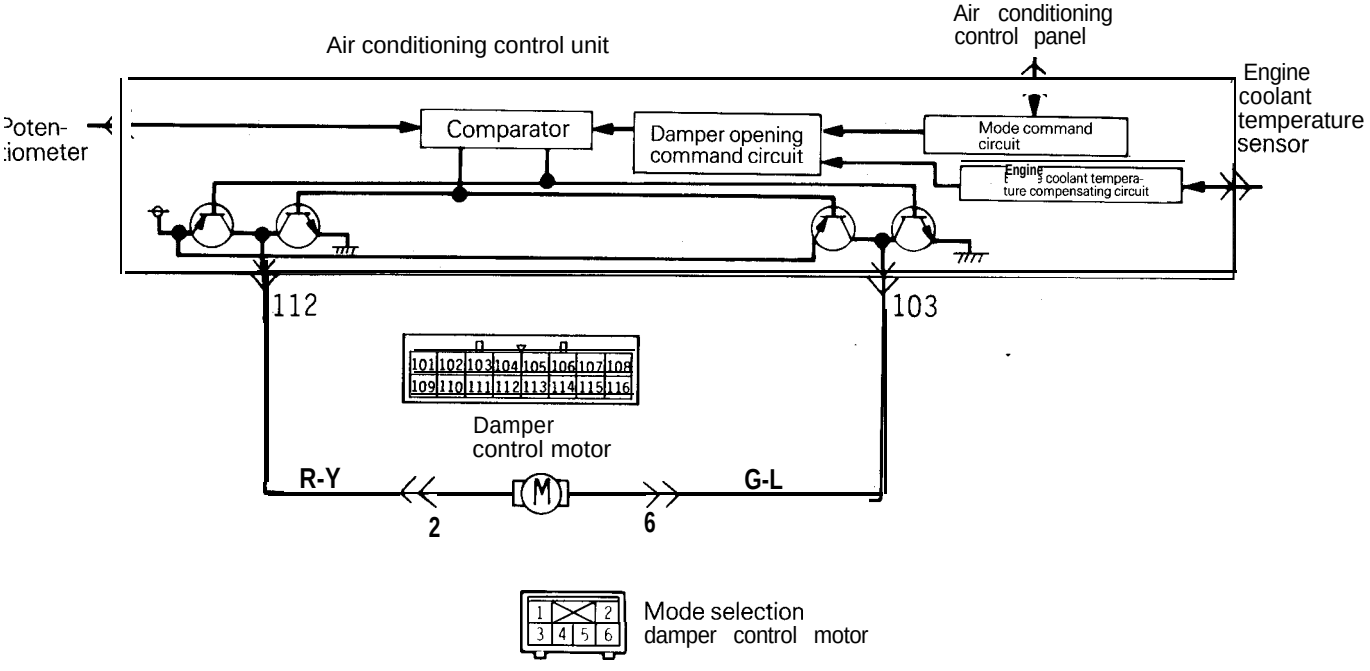
6. Inspection of blend air damper, mode selection damper, air selection damper control motor circuits

<Blend air damper control motor>



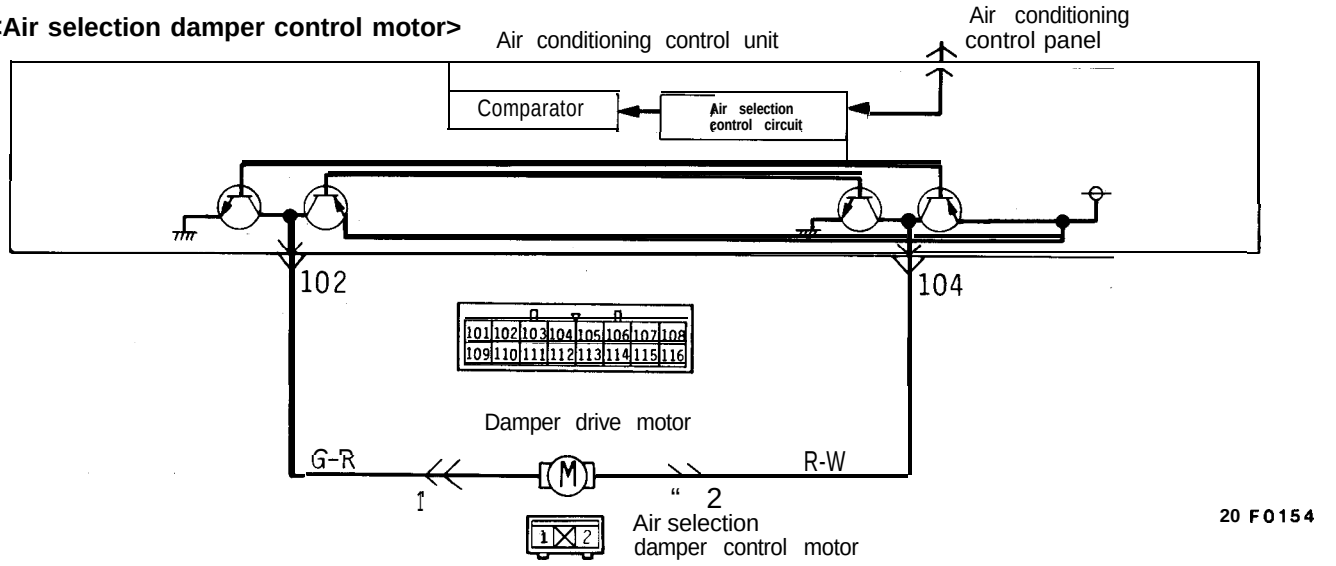
20F 0152

<Mode selection damper control motor>



20F0151

<Air selection damper control motor>

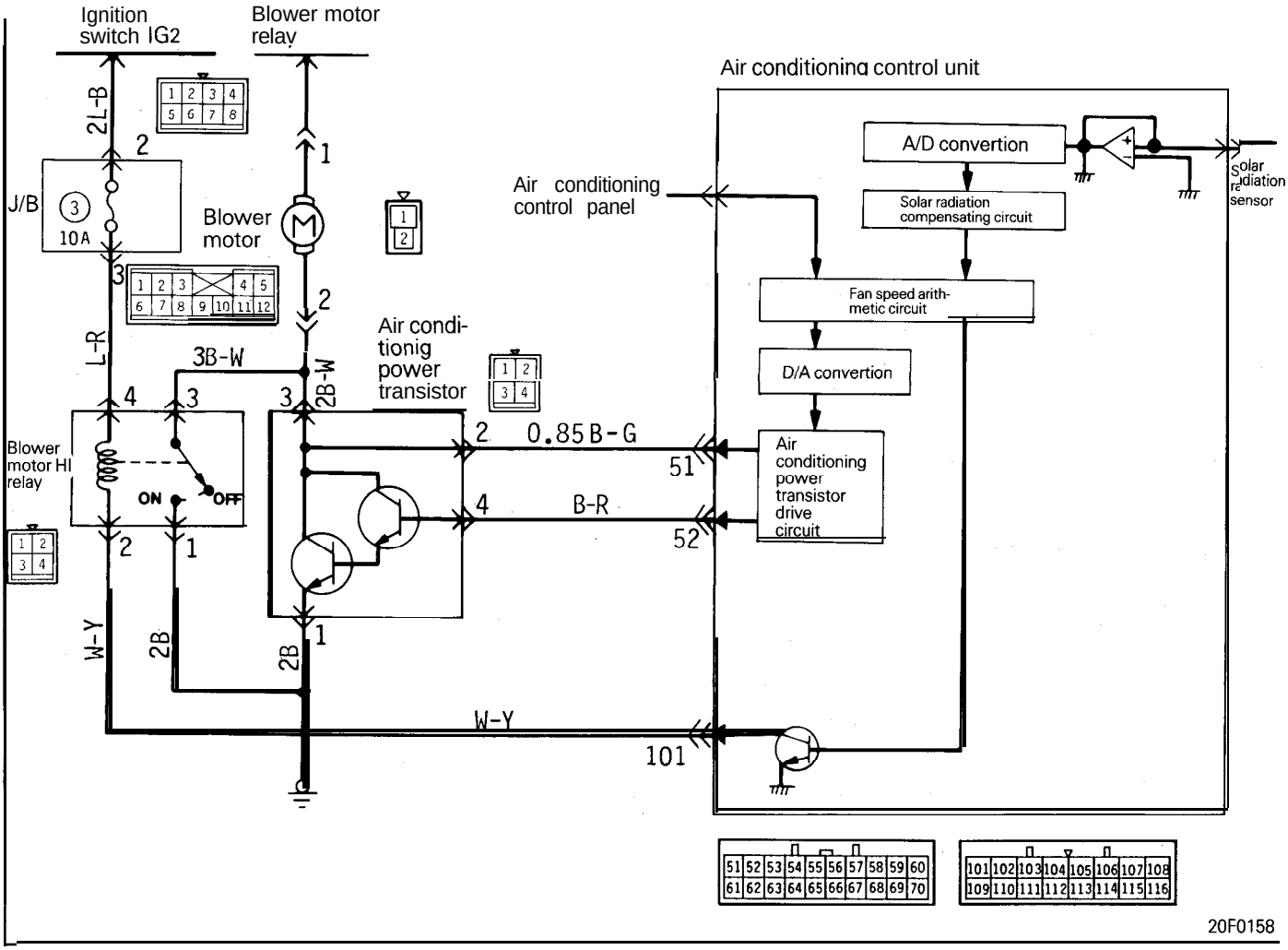


Troubleshooting Hints

- Air conditioning control unit terminal voltages

Terminal No.	Signal name	Condition	Terminal voltage
102	Air selection damper control motor ⊖	Inside-air switch ON (Output turns OFF 40 seconds after the damper moved to inside air position.)	0.5 v
		Outside-air switch ON (Output turns OFF 40 seconds after the damper moved to outside air position.)	10 V
103	Mode selection damper control motor ⊖	FACE switch ON (Output turns OFF 40 seconds after the damper moved to FACE position.)	0.5 v
		DEF. switch ON (Output turns OFF 40 seconds after the damper moved to DEF. position.)	10 V
104	Air selection damper control motor ⊕	Inside-air switch ON (Output turns OFF 40 seconds after inside air has been activated.)	10 V
		Outside-air switch ON (Output turns OFF 40 seconds after outside air has been activated.)	0.5 V
105	Blend air damper control motor ⊕	Temperature is set at 17°C (62.6°F). (Output turns OFF 40 seconds after the damper moved to 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
111	Blend air damper control motor ⊖	Temperature is set at 17°C (62.6°F). (Output turns OFF 40 seconds after the damper moved to MAX. COOL position.)	10 V
		Temperature is set at 32.5°C (90.5°F). (Output turns OFF 40 seconds after the damper moved to MAX. HOT position.)	0.5 v
112	Mode selection damper control motor ⊕	FACE switch ON (Output turns OFF 40 seconds after the damper moved to FACE position.)	10 V
		DEF. switch ON (Output turns OFF 40 seconds after the damper moved to DEF. position.)	0.5 v

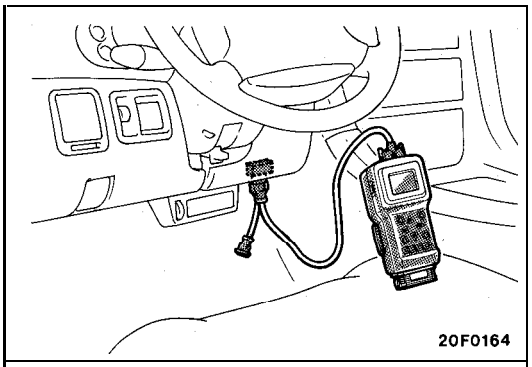
7. Inspection of air conditioning power transistor and blower motor relay circuits



Troubleshooting Hints

- Air conditioning control unit terminal voltages

Terminal No.	Signal name	Condition	Terminal voltage
51	Air conditioning power transistor collector	Switch is turned OFF.	Battery positive voltage
		Switch is placed in LO.	Approx. 7 V
		Switch is placed in HI.	o v
52	Air conditioning power transistor base	Blower switch is turned OFF.	o v
		Blower switch is placed in LO.	Approx. 1.3 V
		Blower switch is placed in HI.	Approx. 1.2 V
101	Blower motor HI relay	Fan switch HI is ON.	1.5 V or less
		Fan switch in ME, LO, or OFF.	Battery positive voltage

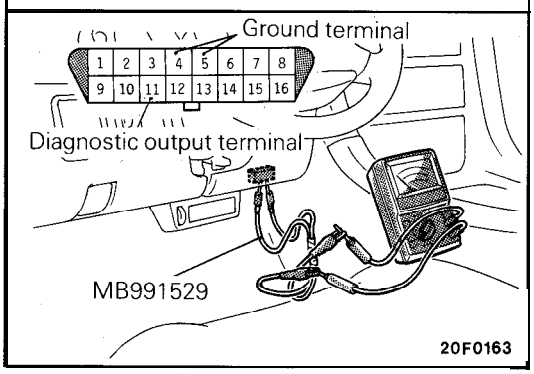

20F0164

ON-BOARD DIAGNOSTIC CHECKING

When using the scan tool

Connect the scan tool to the data link connector to read out the diagnostic trouble codes.

Caution
Turn off the ignition switch beforehand whenever the scan tool is connected or disconnected.



20F0163

When using the voltmeter

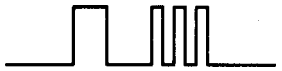
Connect a voltmeter to the diagnostic output terminal and the ground terminal of the data link connector using the special tool. Read out the diagnostic trouble code by observing the voltmeter pointer deflection.

SERVICE DATA

tem no.	Inspection point	Method	Criteria		Probable cause	Remedy
			Normal	Abnormal		
11	Interior temperature sensor	Measure resistance of sensor when room temperature is 25°C (77°F).	Approx. 4 kΩ	Largely deviates from approx. 4 kΩ	Defective interior temperature sensor	Replace interior temperature sensor.
		Measure voltage across terminal ⑯ of air conditioning control unit and ground when interior temperature is 25°C (77°F).	In approx. 2.3 – 2.9 V range	–	Open-circuited harness between interior temperature sensor and air conditioning control unit	Correct harness.
			–	Outside approx. 2.3 – 2.9 V range	Poor connection of air conditioning control unit connector or defective air conditioning control unit	Correct connector connection or replace air conditioning control unit.
13	Air inlet sensor	Measure resistance of sensor when ambient temperature is 25°C (77°F).	Approx. 4 kΩ	Largely deviates from approx. 4 kΩ	Defective air inlet sensor	Replace air inlet sensor.
		Measure voltage across terminal ⑤ of air control conditioning unit and ground when ambient temperature is 25°C (77°F).	In approx. 2.2– 2.8 V range	–	Open-circuited harness between air inlet sensor and air conditioning control unit	Correct harness.
			–	Outside approx. 2.2 – 2.8 V range	Poor connection of air-conditioning control unit connector or defective air conditioning control unit	Correct connector connection or replace air conditioning control unit.
15	Engine coolant temperature sensor	Measure resistance of sensor when engine coolant temperature is 22.5 to 30.5°C (57.6 to 86.9°F).	Conductive	Nonconductive	Defective engine coolant temperature sensor	Replace engine coolant temperature sensor.
		Measure voltage across terminal ⑧ of air conditioning control unit and ground when engine coolant temperature is 22.5 to 30.5°C (57.6 to 86.9°F).	Approx. 12 V	–	Open-circuited harness between engine coolant temperature sensor and air conditioning control unit	Correct harness.
			–	Largely deviates from approx. 12 V	Poor connection of air conditioning control unit connector or defective air conditioning control unit	Correct connector connection or replace air conditioning control unit.
21	Air thermo sensor	Measure resistance of sensor when sensor's sensing 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 conditioning control unit and ground when sensor's sensing temperature is 25°C (77°F).	In approx. 2.3 – 2.9 V range	–	Open-circuited harness between air thermo sensor and air conditioning control unit	Correct harness.
			–	Outside approx. 2.3 – 2.9 V range	Poor connection of air air conditioning control unit	Correct connector connection or replace air conditioning control unit.

tem no.	Inspection point	Method	Criteria		Probable cause	Remedy
			Normal	Abnormal		
31	Blend air damper potentiometer	Refer to p. 24-64.			Defective blend air damper potentiometer	Replace blend air damper potentiometer.
		Measure voltage across terminal ⑧ of air conditioning control unit and ground when potentiometer is in MAX. COOL position.	In approx. 0.1 – 0.3 V range	–	Open-circuited harness between blend air damper potentiometer and air conditioning control unit	Correct harness.
			–	Outside approx. 0.1 – 0.3 V range	Poor connection of air conditioning control unit connector or defective air conditioning control unit	Correct connector connection or replace air conditioning control unit.
33	Mode selection damper potentiometer	Refer to p. 24-64.			Defective mode selection damper potentiometer	Replace mode selection damper potentiometer.
		Measure voltage across terminal ⑧ of air conditioning control unit and ground when potentiometer is in FACE position,	In approx. 0.1 – 0.3 V range	–	Open-circuited harness between mode selection damper potentiometer and air conditioning control	Correct harness.
			–	Outside approx. 0.1 – 0.3 V range	Poor connection of air conditioning control unit connector or defective air conditioning control unit	Correct connector connection or replace air conditioning control unit.

DIAGNOSIS DISPLAY PATTERNS AND CODES

Code	Display pattern (output codes) (use with voltmeter)	Cause	Fail safe
0		Normal	–
11		Open-circuited interior temperature sensor	Condition in which 25°C (77°F) is detected
12		Short-circuited interior temperature sensor	
13		Open-circuited air inlet sensor	Condition in which 20°C (68°F) is detected
14		Short-circuited air inlet sensor	
21		Open-circuited air thermo sensor	Condition in which -2°C (–35.6°F) is detected
22		Short-circuited air thermo sensor	
31		Short-circuited and open-circuited blend air damper potentiometer	MAX. HOT (or MAX. COOL when it is at MAX. COOL)
32		Short-circuited and open-circuited mode selection damper potentiometer	DEF. (or FACE when it is at FACE)
41		Defective blend air damper motor	–
42		Defective mode selection damper motor	–

NOTE: (1) If two or more abnormal conditions occur at the same time, the code numbers are alternately displayed, in order, repeatedly.
(2) The nature of the malfunction is entered and stored in the memory from the time the malfunction occurs until the ignition switch is next turned to OFF.

SAFETY PRECAUTIONS

Same as those given in HEATER AND MANUAL AIR CONDITIONING. (Refer to 24-10.)

SERVICE ADJUSTMENT PROCEDURES

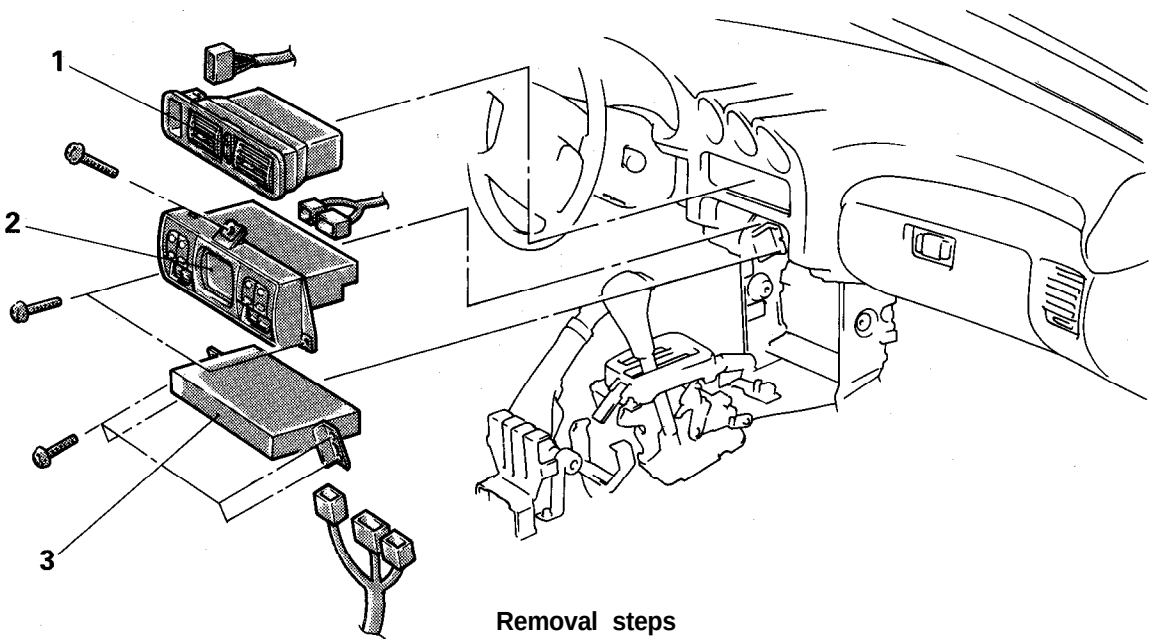
Same as those given in HEATER AND MANUAL AIR CONDITIONING. (Refer to 24-l 1.)

AIR CONDITIONING CONTROL PANEL, AIR CONDITIONING CONTROL UNIT

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Removal and Installation of Floor Console (Refer to GROUP 23A – Floor Console.)

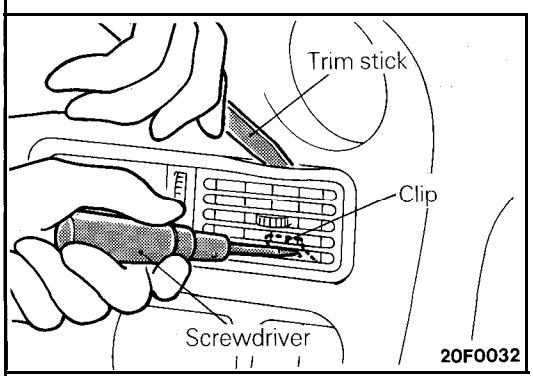
CAUTION: SRS
When installing or removing the floor console, don't allow any impact or shock to the SRS diagnosis unit.



20F0069

Removal steps

◆◆ 1. Center air outlet assembly
2. Air conditioning control panel
3. Air conditioning control unit



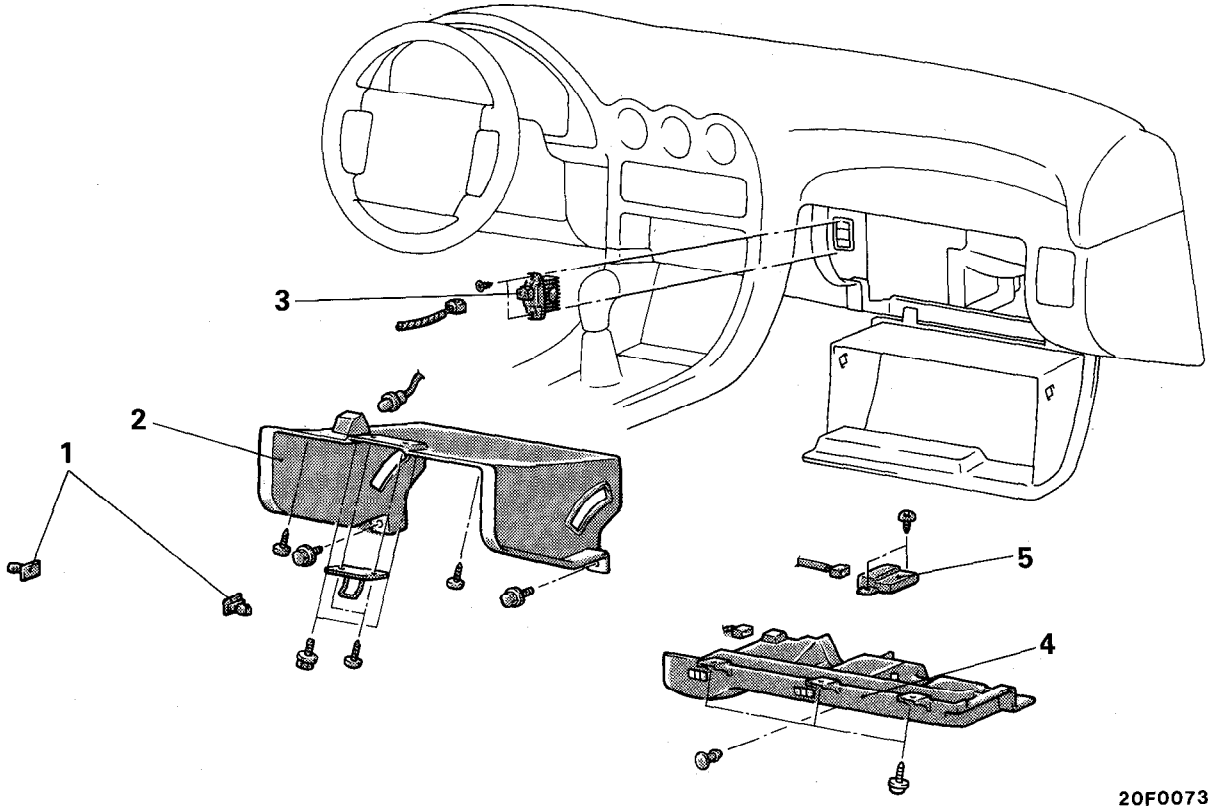
SERVICE POINT OF REMOVAL

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.

POWER TRANSISTOR, BELT LOCK CONTROLLER

REMOVAL AND INSTALLATION



Power transistor removal steps

1. Stopper
2. Glove box outer case assembly
3. Power transistor

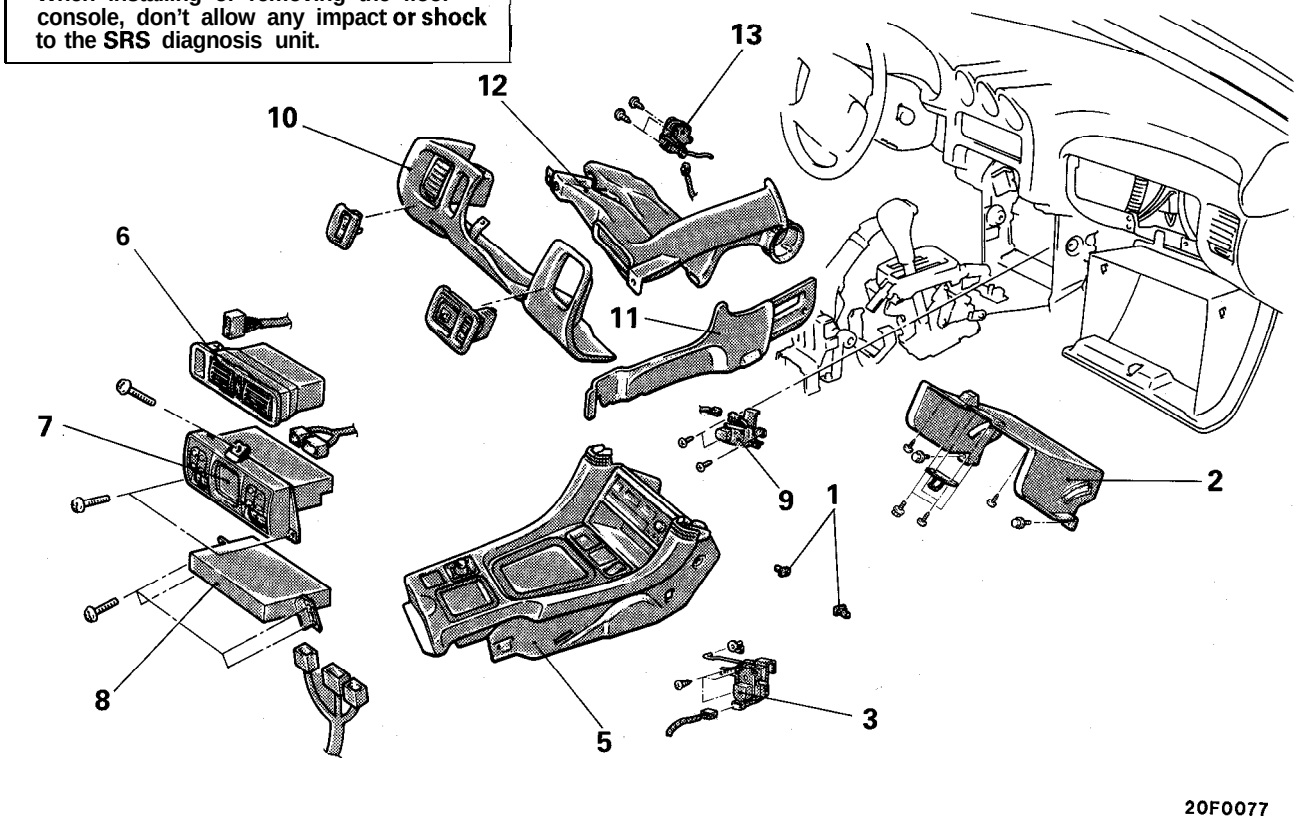
Belt lock controller removal steps

4. Under cover
5. Belt lock controller

DAMPER CONTROL MOTOR ASSEMBLY

REMOVAL AND INSTALLATION

CAUTION: SRS
When installing or removing the floor console, don't allow any impact or shock to the SRS diagnosis unit.



Air selection damper motor assembly removal steps

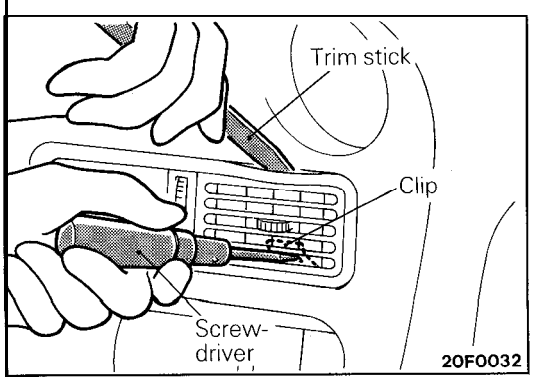
1. Stopper
2. Glove box outer case
3. Air selection damper motor assembly

Blend air damper motor assembly removal steps

- ● *● + 4. Floor console (Refer to GROUP 23A – Floor Console.)
5. Air conditioning control unit
- ◆◆ 6. Center outlet assembly
7. Air conditioning control panel
8. Air conditioning control unit
9. Blend air damper motor assembly

Mode selection damper motor assembly removal steps

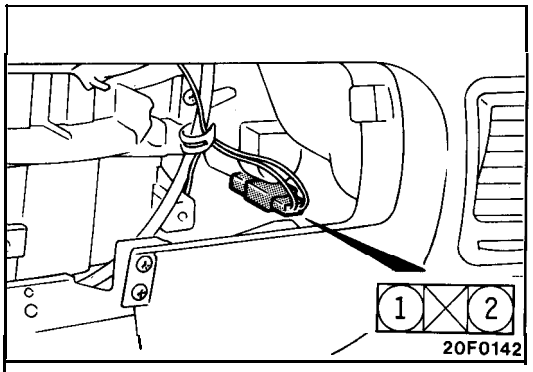
10. Knee protector
11. Side console cover
12. Shower duct and lap cooler duct
13. Mode selection damper motor assembly

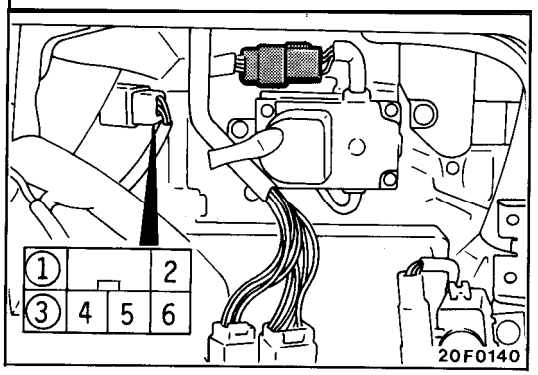


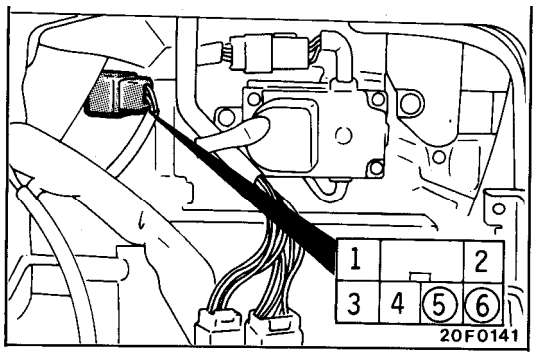
SERVICE POINTS OF REMOVAL

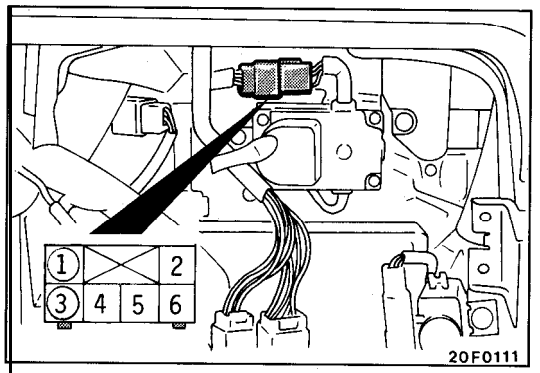
6. REMOVAL OF CENTER AIR OUTLET ASSEMBLY

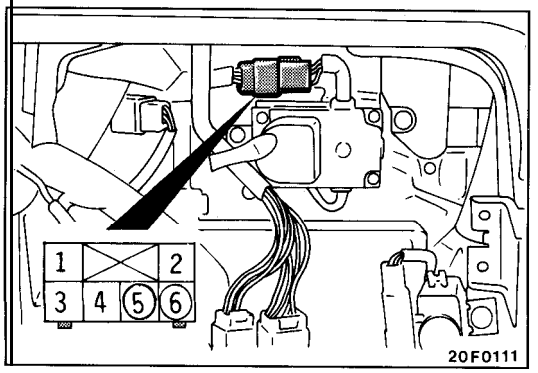
Disengaging the clips (2 positions) of the center air outlet assembly with a flat tip screwdriver, remove the center air outlet assembly with a plastic trim tool.











INSPECTION

INSPECTION OF AIR SELECTION 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 BLEND AIR DAMPER MOTOR

Check that the motor rotates when battery voltage is applied across terminals ① and ③ of motor assembly side connector. Check also that the motor turns in the backward direction when polarity is changed.

Caution
1. **Cut off the voltage when the damper is in the MAX. HOT or MAX. COOL position.**
2. **Cut off the voltage if the motor does not turn when battery voltage is applied.**

INSPECTION OF BLEND AIR DAMPER POTENTIOMETER

Connect a circuit tester across terminals ⑤ and ⑥ of the motor assembly connector and check that resistance gradually changes as the damper is moved from MAX. HOT to MAX. COOL position.

Standard value
MAX. HOT: Approx. 0.2 kΩ
MAX. COOL: Approx. 4.8 kΩ

INSPECTION OF MODE SELECTION DAMPER MOTOR

Check that the motor turns when battery voltage is applied across terminals ① and ③ of the motor assembly connector. Check also that the motor turns in the backward direction when polarity is changed.

Caution
1. **Cut off the voltage when the damper is in the DEF. or FACE position.**
2. **Cut off the voltage if the motor does not turn when battery voltage is applied.**

INSPECTION OF MODE SELECTION DAMPER POTENTIOMETER

Connect a circuit tester across terminals ⑤ and ⑥ of the motor assembly connector and check that resistance gradually changes as the damper is moved from DEF. to FACE position.

Standard value
DEF. position: Approx. 0.2 kΩ
FACE position: Approx. 4.8 kΩ

SENSORS

REMOVAL AND INSTALLATION

◆◆ 1. Interior temperature sensor

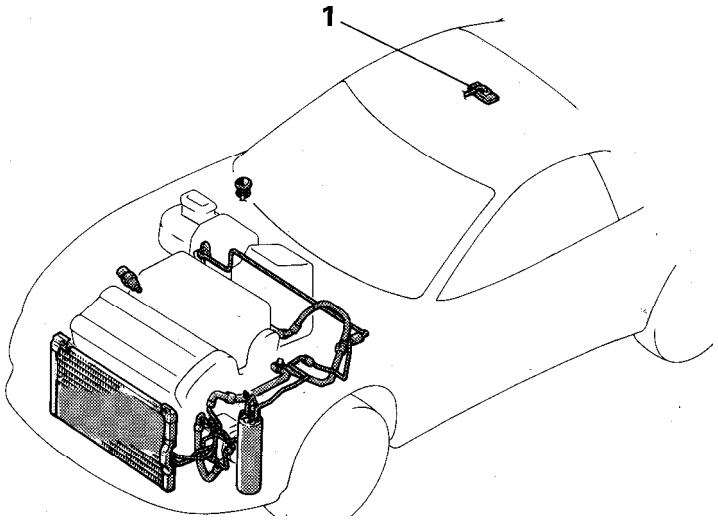


Photo sensor removal steps

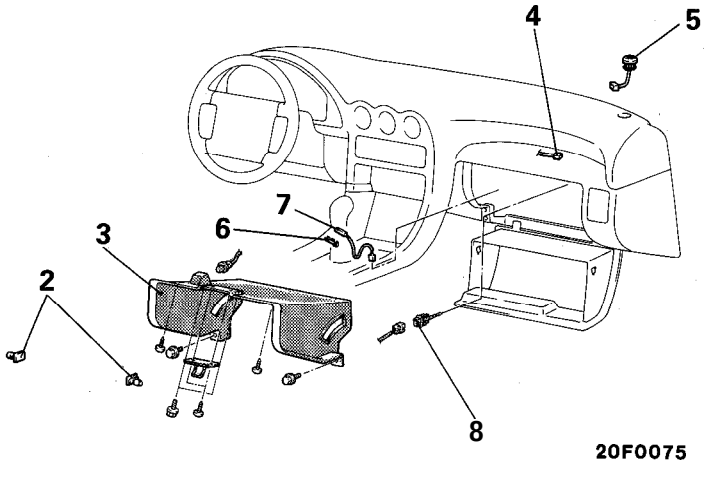
2. Stopper
3. Glove box outer case
4. Photo sensor connector connection
◆◆ 5. Photo sensor

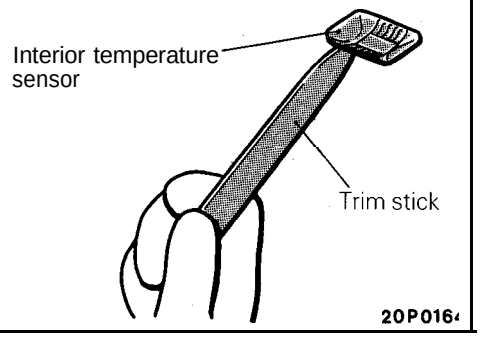
Engine coolant temperature sensor removal steps

2. Stopper
3. Glove box outer case assembly
6. Plate
7. Engine coolant temperature sensor

Air inlet sensor removal steps

2. Stopper
3. Glove box outer case assembly
8. Air inlet sensor

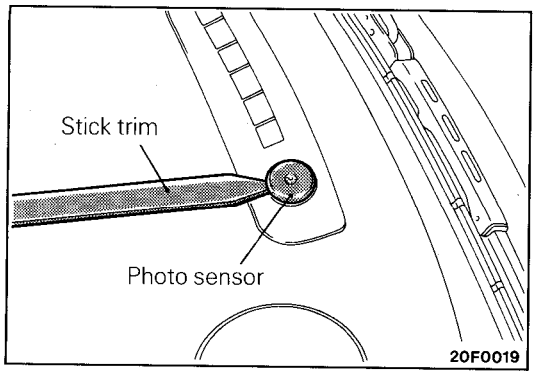




SERVICE POINTS OF REMOVAL

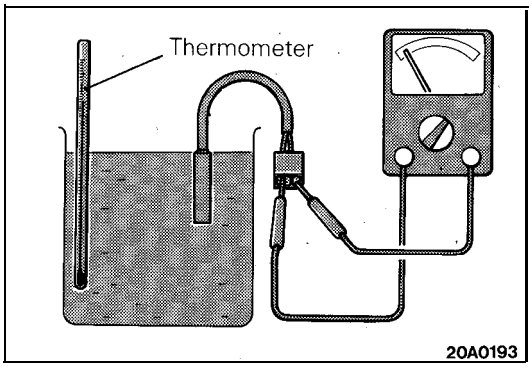
1. REMOVAL OF INTERIOR TEMPERATURE SENSOR

Using the trim stick, remove the interior temperature sensor from the headlining.



5. REMOVAL OF PHOTO SENSOR

Using a trim stick, remove the photo sensor from the defroster garnishes.



INSPECTION

ENGINE COOLANT TEMPERATURE SENSOR

(1) Dip the engine coolant temperature sensor in hot water and, using a stove, etc., raise the engine coolant temperature.
(2) Check that the engine coolant temperature sensor is conductive when the engine coolant temperature reaches the specified temperature.

Standard value: 26.5 ± 4°C (79.7 ± 7.2°F)

AIR INLET SENSOR

The condition can be considered normal if the resistances are measured within the ranges of 3.98 – 4.12 kilohms and 2.21 – 2.35 kilohms, respectively, when the air inlet sensor is submerged in warm water of 25°C (77°F) and 40°C (104°F) for one minute or longer each.

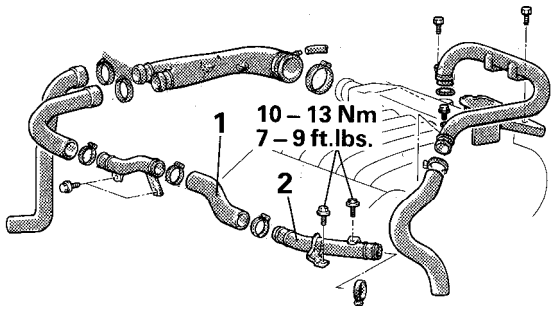
NOTE

The relationship between the air inlet 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

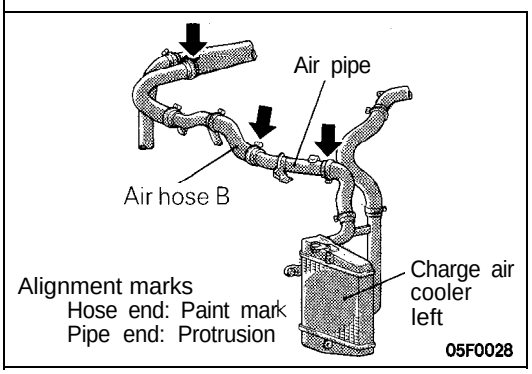
The service procedures are the same as those for manual air conditioning except for those parts described below on turbocharged vehicles.



Compressor, condenser and condenser fan motor, refrigerant line removal steps

- ⧫ + 1. Air hose B
- ⧫ + 2. Air pipe

NOTE
Torque hose clamps to 4 Nm (2.9 ft.lbs.).



SERVICE POINTS OF INSTALLATION

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 charge air cooler itself.

OTHER PARTS

Service procedures for other parts are the same as those in HEATER AND MANUAL AIR CONDITIONING.

Part name	Ref. page	Part name	Ref. page
Heater Unit	P.24-24	Evaporator – Disassembly and Reassembly	P.24-28
Blower Motor Assembly	P.24-25	Compressor – Disassembly and Reassembly	P.24-32
Evaporator – Removal and Installation	P.24-27	Ventilators	P.24-40

EMISSION CONTROL SYSTEMS

CONTENTS

SPECIFICATIONS

GENERAL SPECIFICATIONS

Items	Specifications
Positive crankcase ventilation system	Closed type with positive crankcase ventilation valve
Evaporative emission control system	Canister storage type
Evaporative emission <EVAP> canister	Charcoal type
Evaporative emission <EVAP> purge solenoid	ON/OFF solenoid valve
Exhaust emission control system	
Exhaust gas recirculation system	
EG R valve	Vacuum-activated diaphragm type
EGR temperature sensor <California – Non Turbo, Turbo>	Thermistor type
EGR solenoid <California – Non Turbo, Turbo>	Duty cycle type solenoid valve
Catalytic converter	Monolith type
Location <Federal/Canada – Non Turbo>	Under floor
<California – Non Turbo, Turbo>	Right bank, left bank and under floor

SERVICE SPECIFICATIONS

Items	Specifications
Evaporative emission purge solenoid coil resistance Ω	36 – 44 [at 20°C (68°F)]
EGR temperature sensor resistance kΩ	60 – 83 [at 50°C (122°F)]
	11 – 14 [at 100°C (212°F)]
EGR solenoid coil resistance Ω	36 – 44 [at 20°C (68°F)]

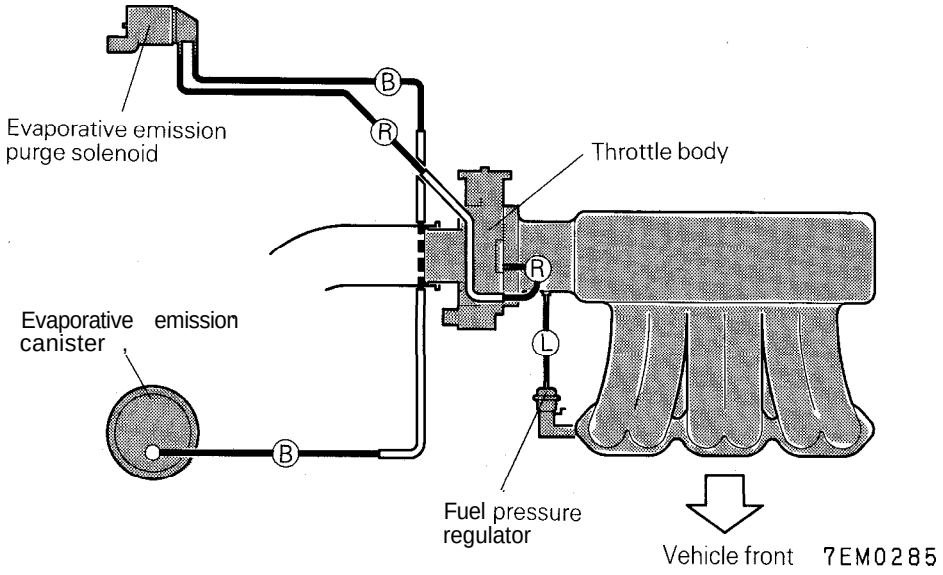
TROUBLESHOOTING

Symptom	Probable cause	Remedy
Engine will not start or hard to start	Vacuum hose disconnected or damaged	Repair or replace
	The EGR valve is not closed	Repair or replace
	Malfunction of the evaporative emission purge solenoid	Repair or replace
Rough idle or engine stalls	The EGR valve is not closed	Repair or replace
	Vacuum hose disconnected or damaged	Repair or replace
	Malfunction of the positive crankcase ventilation valve	Replace
	Malfunction of the purge control system	Check the system; if there is a problem, check its component parts
Engine hesitates or poor acceleration	Malfunction of the exhaust gas recirculation 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

VACUUM HOSES

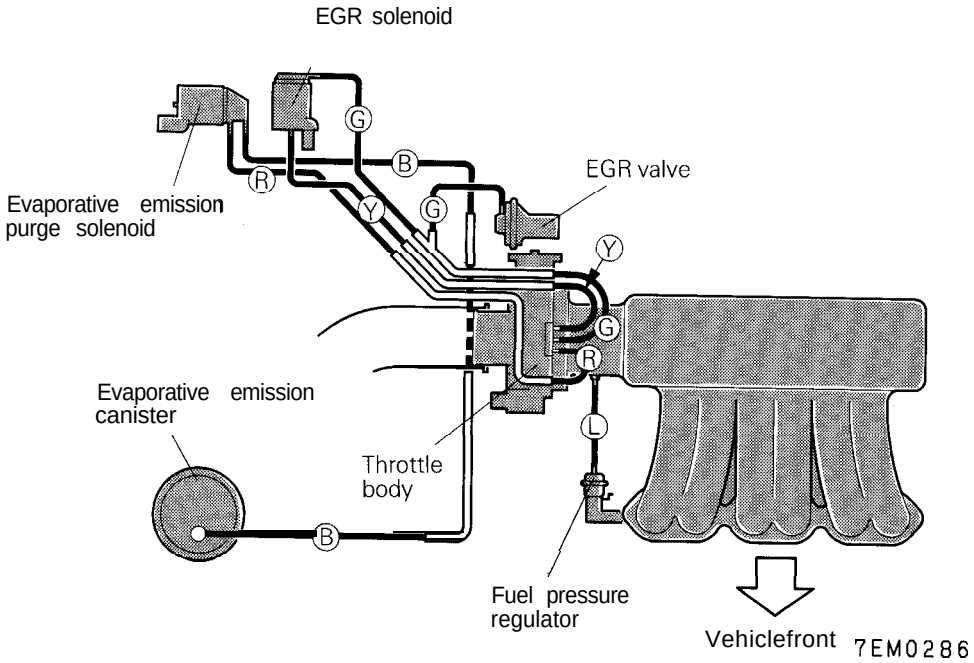
VACUUM HOSES ROUTING

<Federal/Canada – Non Turbo>



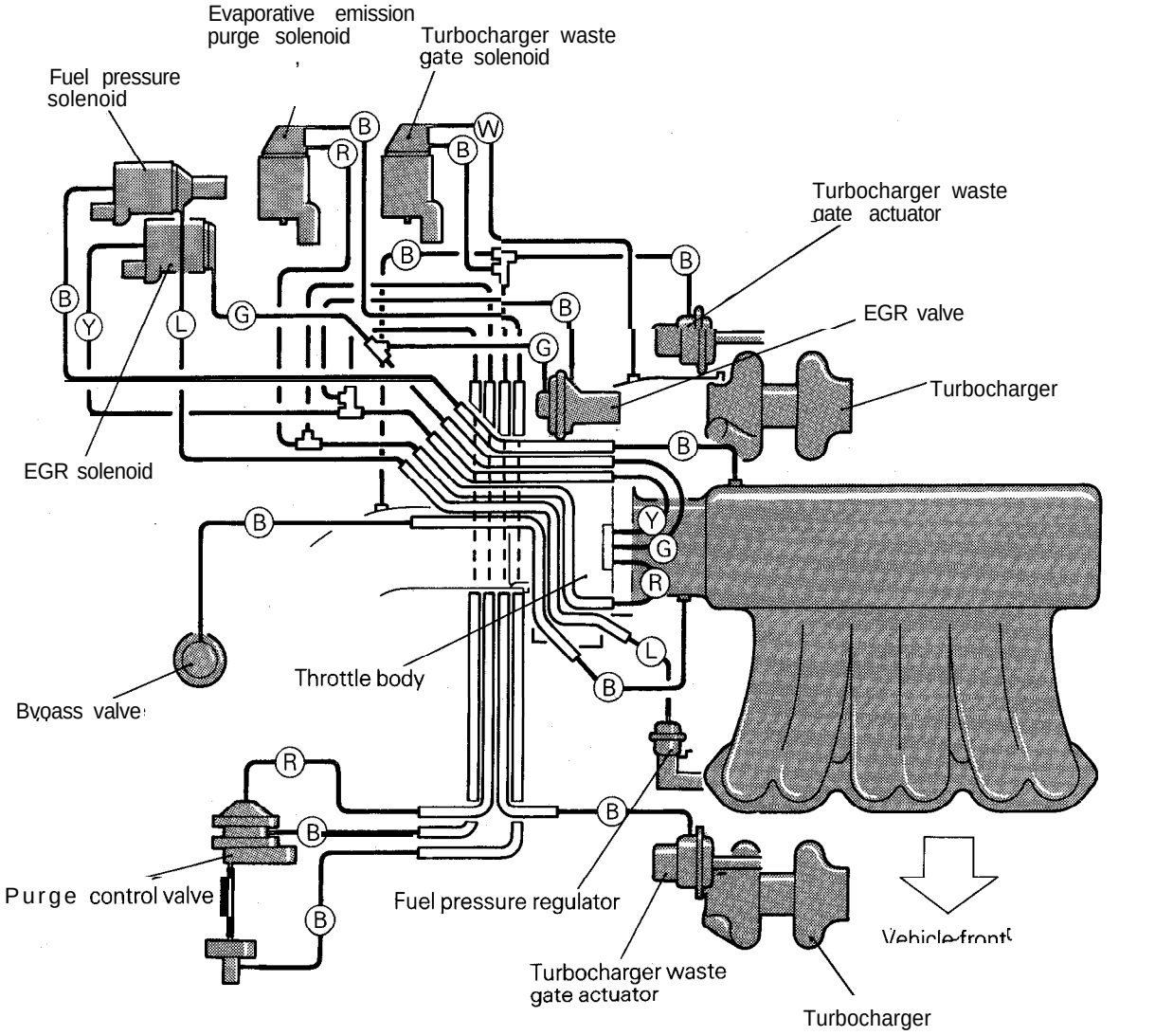
L: Light blue
R: Red
B: Black

<California – Non Turbo>



G: Green
Y: Yellow
L: Light blue
R: Red
B: Black

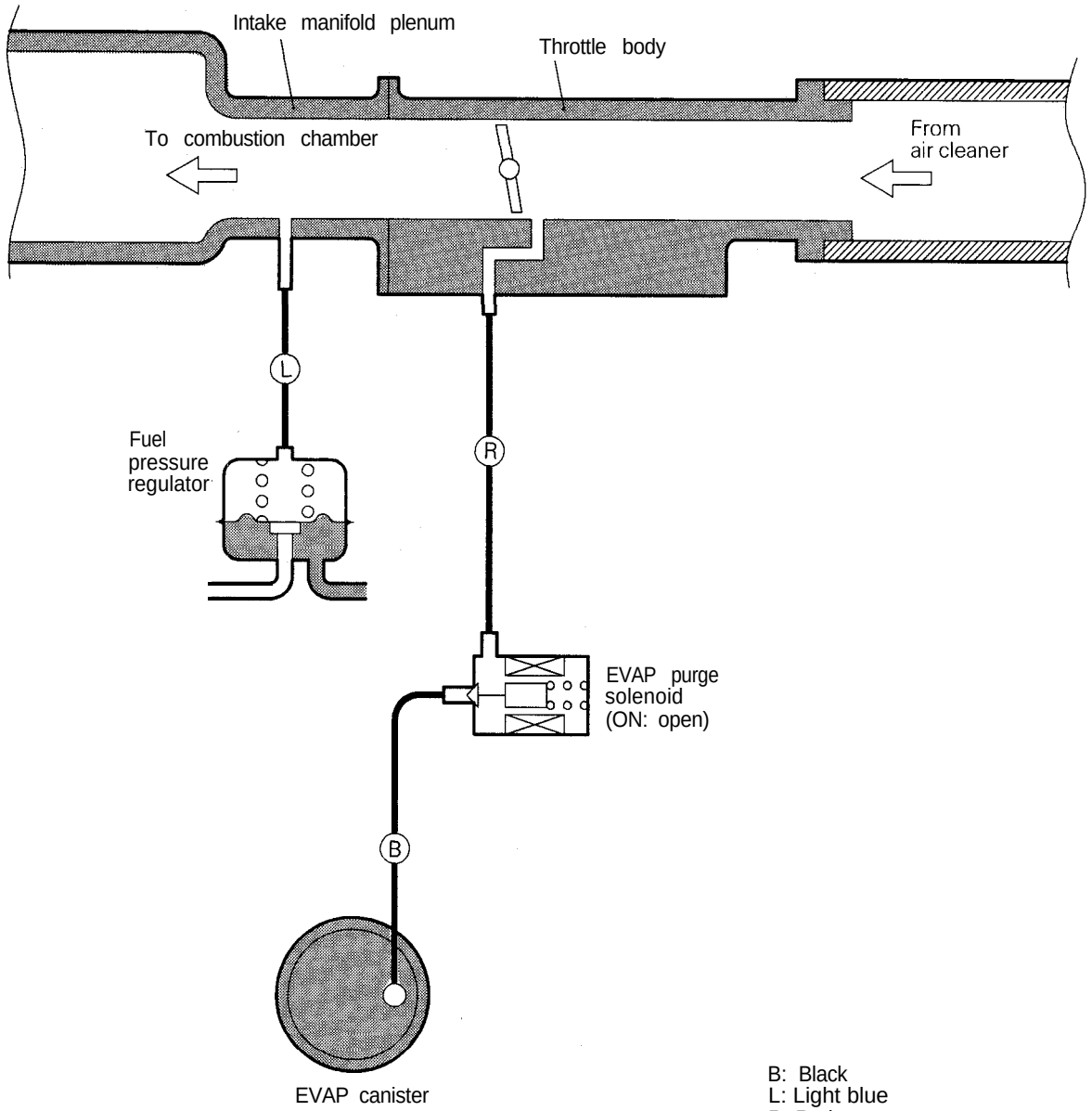
<Turbo>



G: Green
Y: Yellow
L: Light blue
R: Red
B: Black
W: White

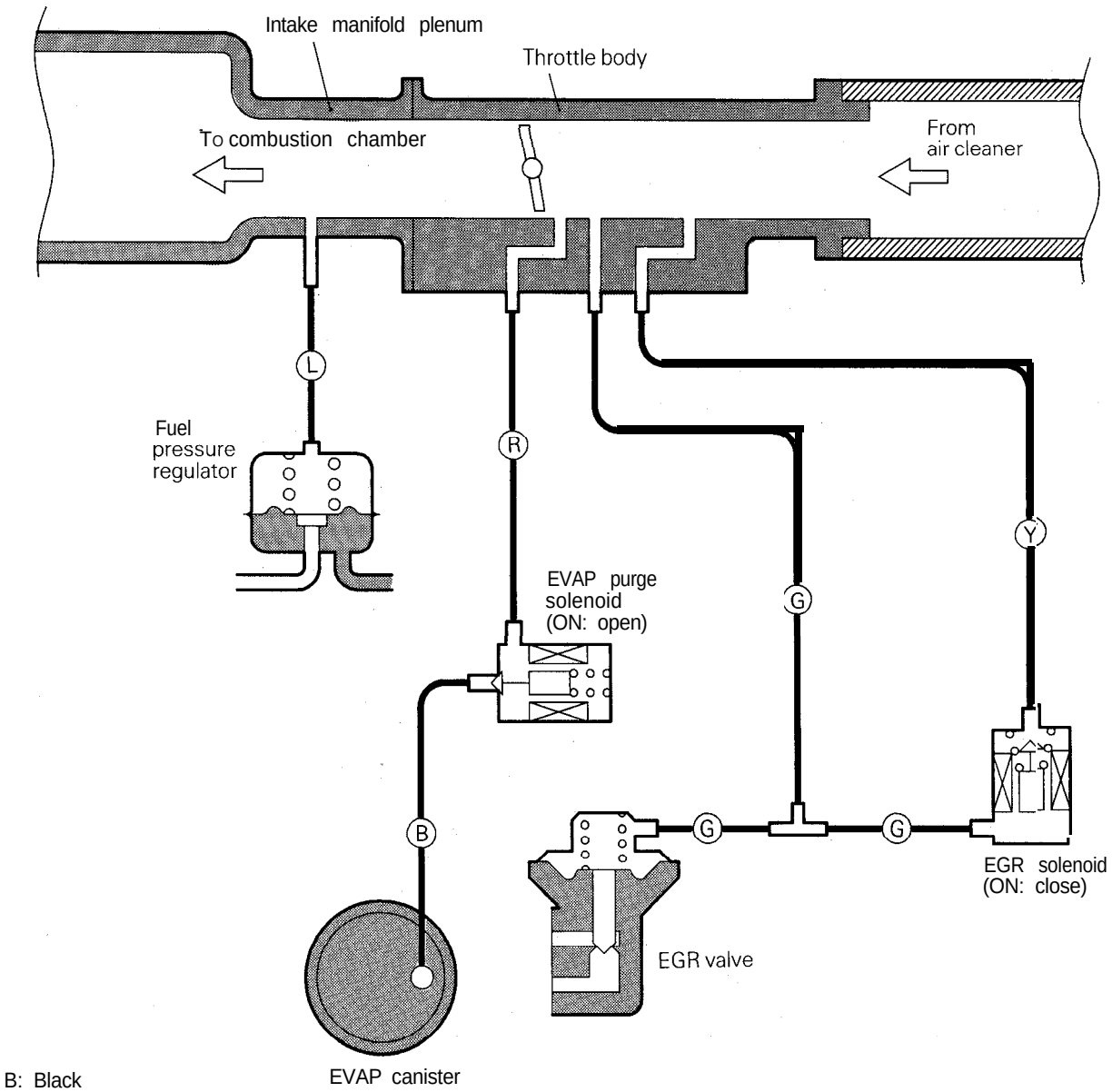
VACUUM CIRCUIT DIAGRAM

<Federal/Canada-Non turbo>



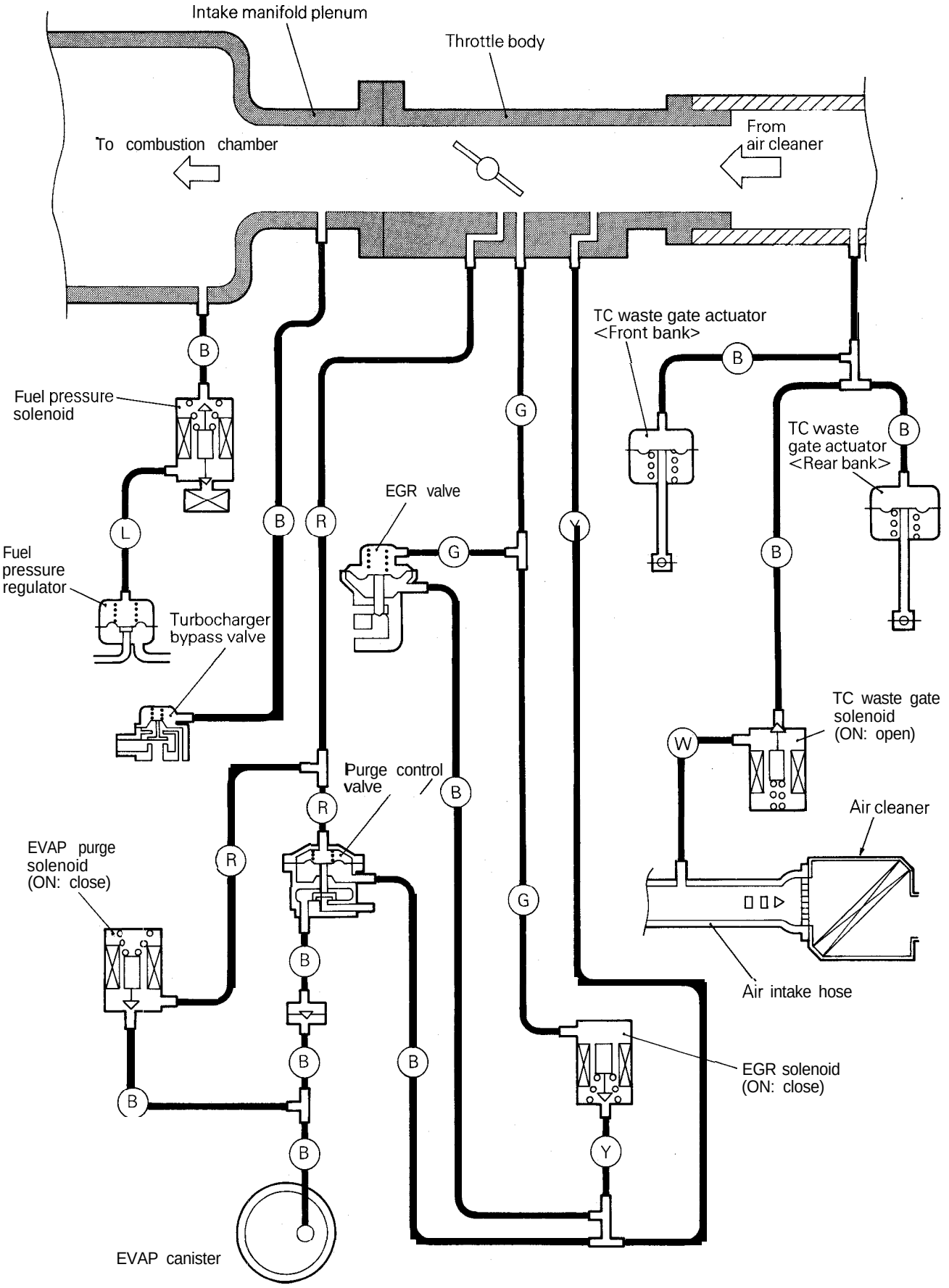
7EM0287

<California – Non turbo>



7EM0288

<Turbo>



7EM0251

INSPECTION

(1) Referring to the VACUUM HOSES ROUTING, confirm that the vacuum hoses are properly connected.
(2) Check the hoses for irregularities (disconnection, looseness, etc.) and confirm that there is no breakage or damage.

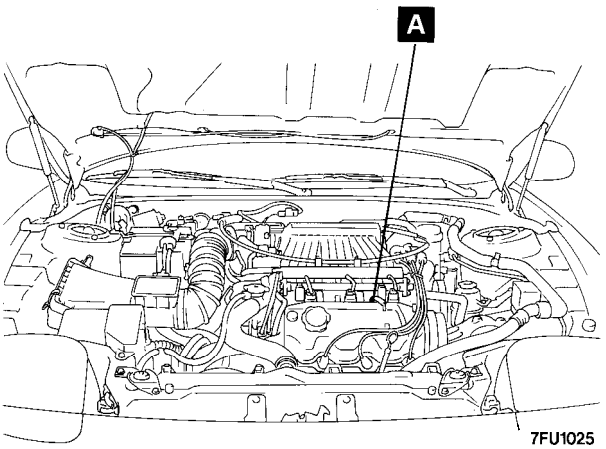
INSTALLATION

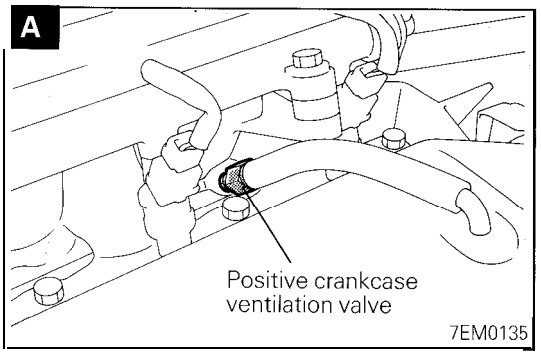
(1) When connecting a hose, firmly press it onto the nipple.
(2) Referring to the VACUUM HOSES ROUTING, connect the hoses correctly.

POSITIVE CRANKCASE VENTILATION SYSTEM

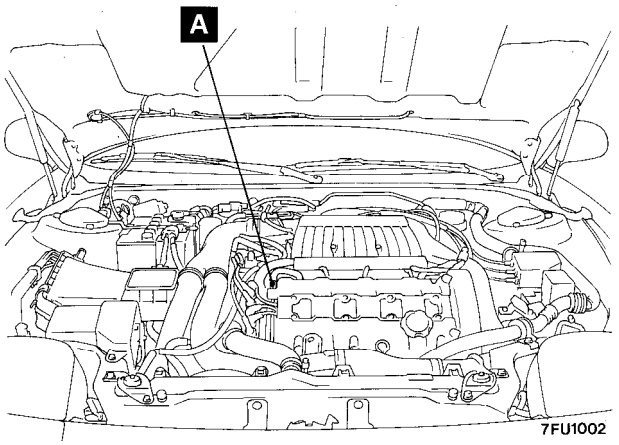
COMPONENT LOCATION

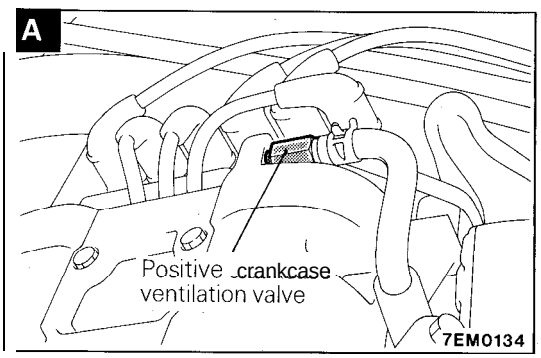
<SOHC>



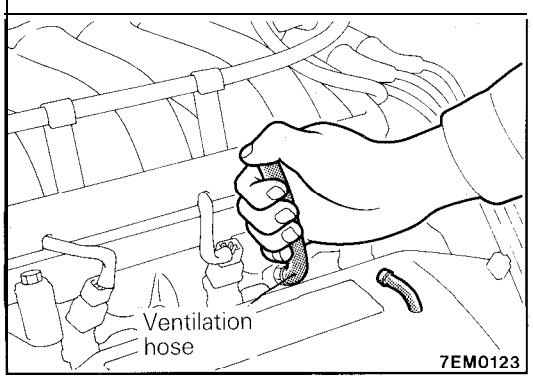


<DOHC>



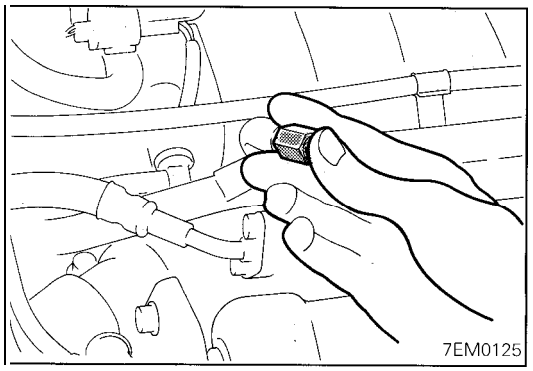


Name	Symbol
Positive crankcase ventilation valve	A



CRANKCASE VENTILATION SYSTEM INSPECTION <SOHC>

(1) Remove the ventilation hose from the rocker cover.
(2) Start the engine and run at idle.
(3) Apply a finger to the end of the ventilation hose and check if the negative pressure of the intake manifold is felt.
NOTE
The plunger in the positive crankcase ventilation valve should move back and forth.
(4) If negative pressure is not felt, clean or replace the positive crankcase ventilation valve.

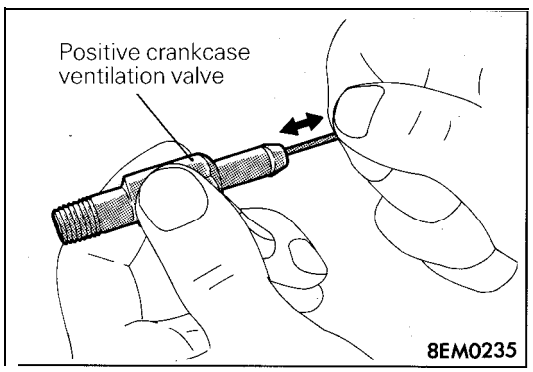


CRANKCASE VENTILATION SYSTEM INSPECTION <DOHC>

(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 <SOHC>

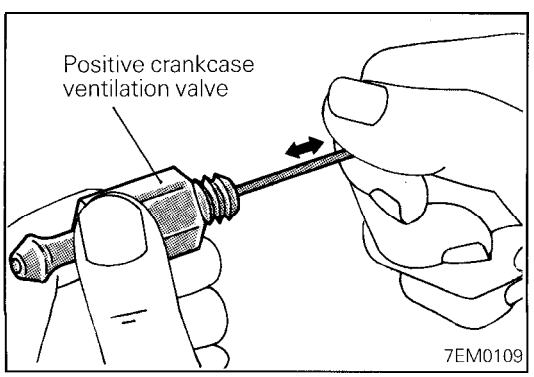
INSPECTION

(1) Insert a thin stick into the positive crankcase ventilation valve from the nipple side and move the stick back and forth to check that the plunger moves.
(2) If the plunger will not move, the positive crankcase ventilation valve is clogged. Clean or replace the valve.

INSTALLATION

Install the positive crankcase ventilation valve and tighten to specified torque.

Specified tightening torque: 10 Nm (7.2 ft.lbs.)



POSITIVE CRANKCASE VENTILATION VALVE <DOHC>

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

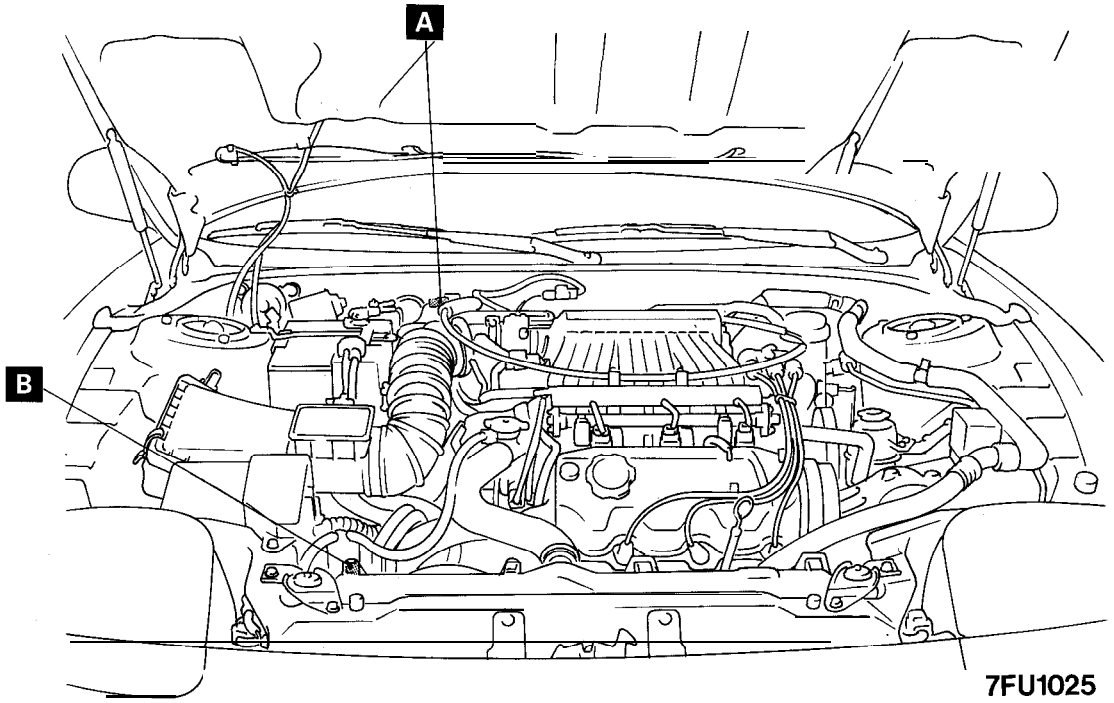
Install the positive crankcase ventilation valve and tighten to specified torque.

Specified tightening torque: 10 Nm (7.2 ft.lbs.)

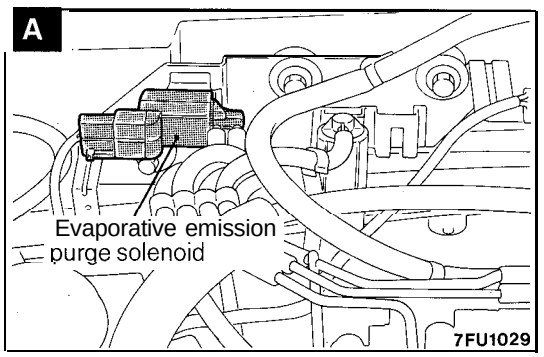
EVAPORATIVE EMISSION CONTROL SYSTEM

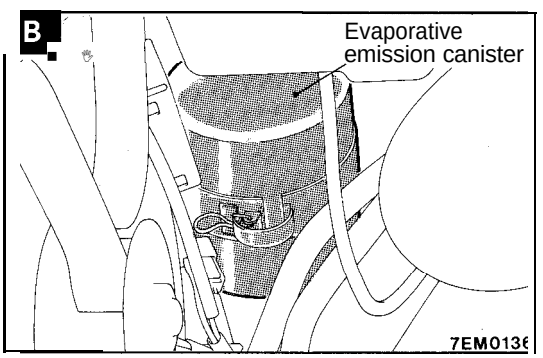
COMPONENT LOCATION

<SOHC>

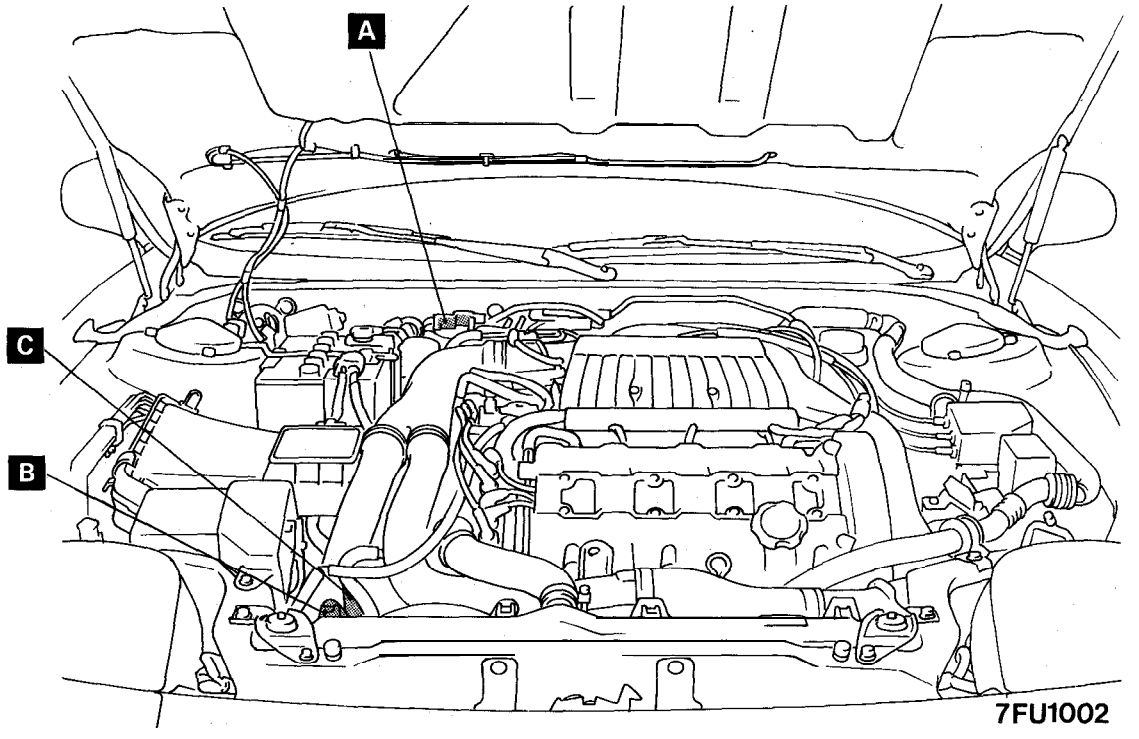


Name	Symbol
Evaporative emission canister	B
Evaporative emission purge solenoid	A

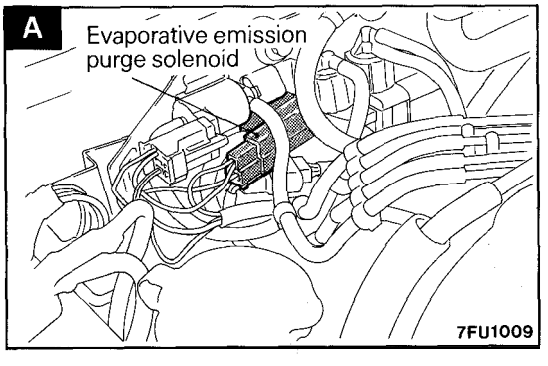


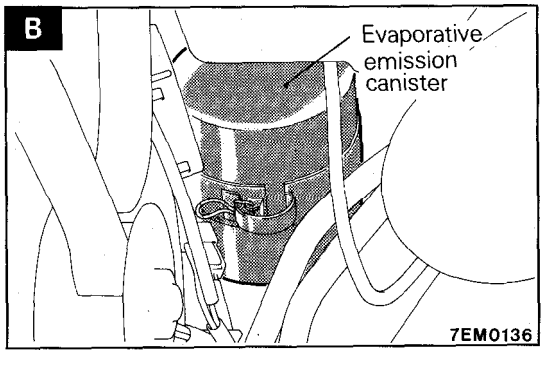


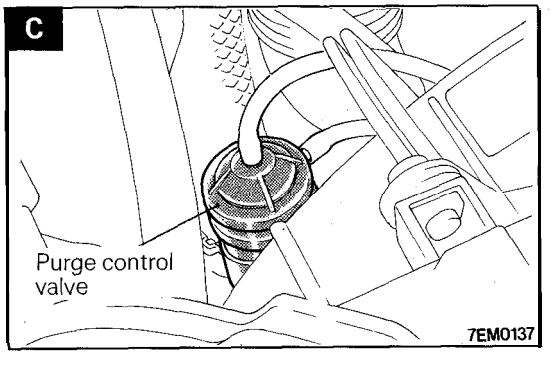
<DOHC>



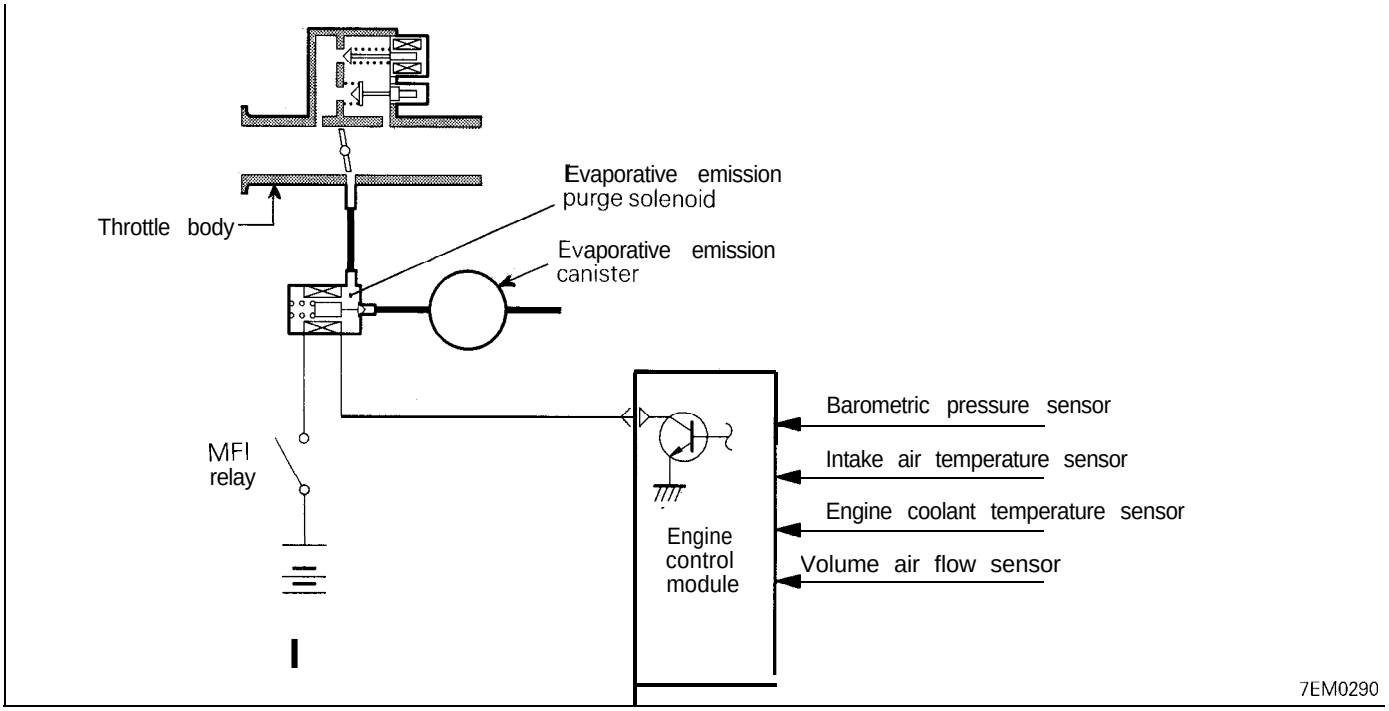
Name	Symbol
Evaporative emission canister	B
Evaporative emission purge solenoid	A
Purge control valve <Turbo>	C

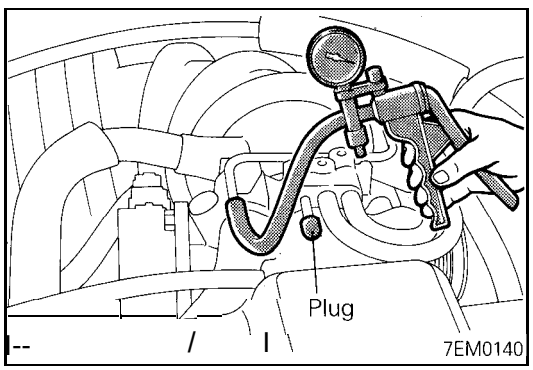






PURGE CONTROL SYSTEM INSPECTION <Non Turbo>





(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.

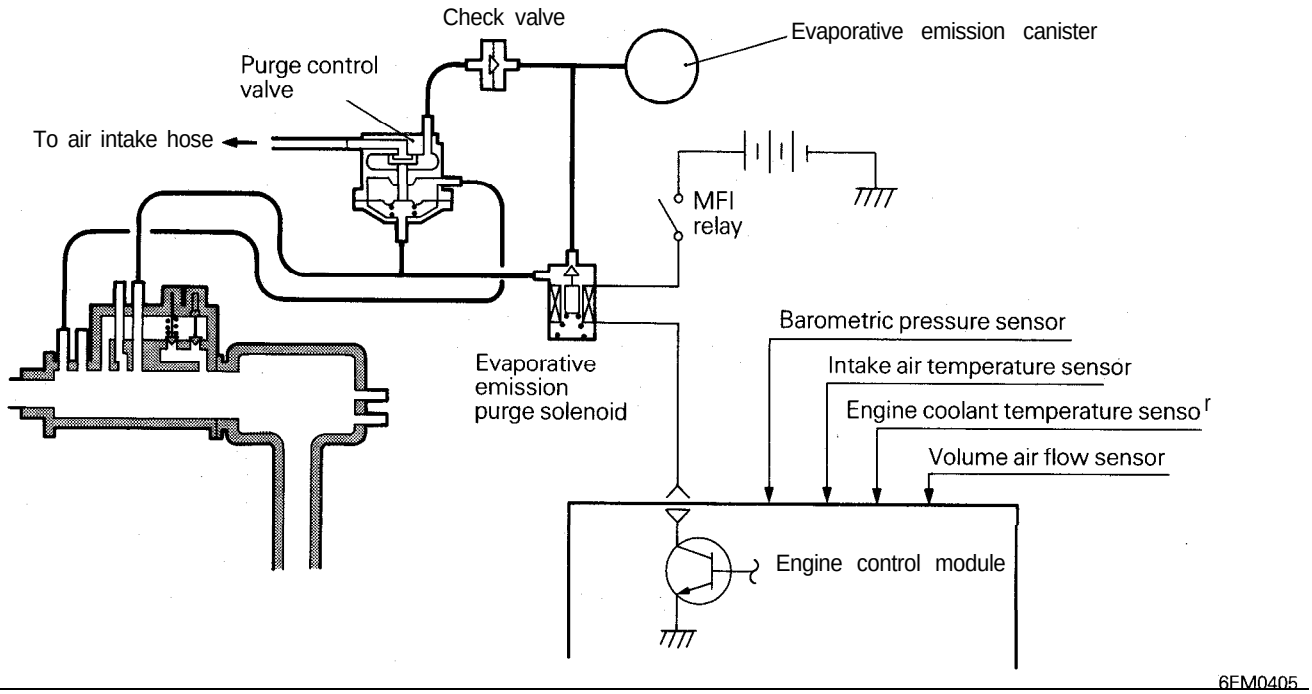
When engine is cold – engine coolant temperature: 60°C (140°F) or less

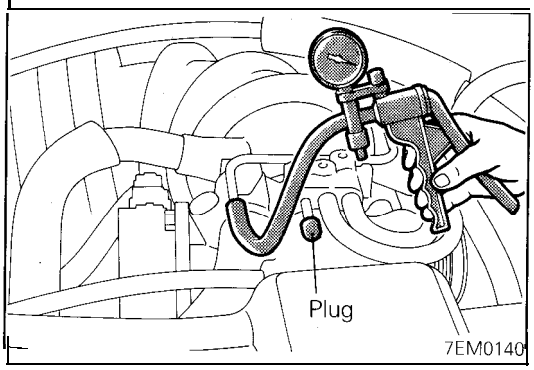
Engine operating condition	Applying vacuum	Result
Idling	375 mmHg (14.8 in.Hg)	Vacuum is maintained
3,000 rpm		

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>





(1) Disconnect the vacuum hose (red stripes) from the throttle body and connect it to a hand vacuum pump.
(2) Plug the nipple from which the vacuum hose is disconnected.
(3) Under the engine conditions shown below, check by applying vacuum from a hand vacuum pump.

When engine is cold – engine coolant temperature: 60°C (140°F) or less

Engine operating condition	Applying vacuum	Result
3,000 rpm	375 mmHg (14.8 in.Hg)	Vacuum is maintained

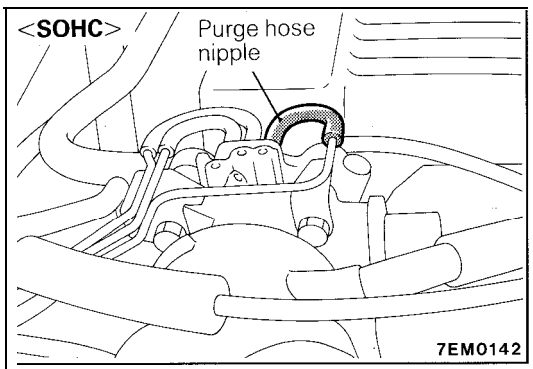
When engine is hot – engine coolant temperature: 70°C (158°F) or higher

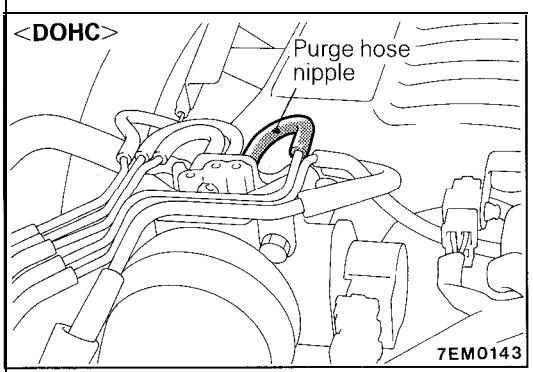
Engine operating condition	Applying vacuum	Result
3,000 rpm within three minutes after starting engine	Try applying vacuum	Vacuum leaks
3,000 rpm after three minutes have elapsed after starting engine	375 mmHg (14.8 in.Hg)	Vacuum will be maintained momentarily, after which it will leak. NOTE The vacuum will 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.

(4) Connect the vacuum hose (red stripes) removed in (1) above to P nipple of the throttle body as before.
(5) Disconnect the purge air hose from the air intake hose, and plug the air intake hose. Then, connect the hand vacuum pump to the purge air hose.
(6) Under the engine conditions shown below, check by applying vacuum from a hand vacuum pump.

When engine is hot – engine coolant temperature: 70°C (158°F) or higher

Applying vacuum	Engine operating condition	Result
375 mmHg (14.8 in.Hg.)	Idling	Vacuum is maintained
	Sudden racing	Vacuum leaks



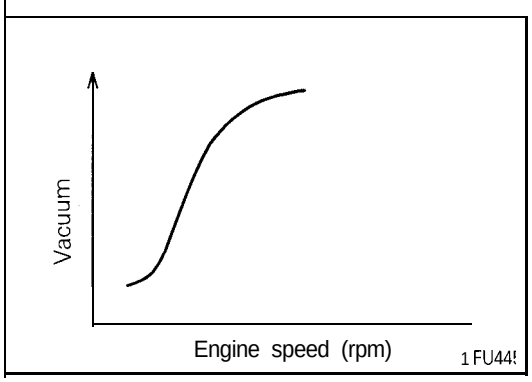


PURGE PORT VACUUM CHECK

Check Condition

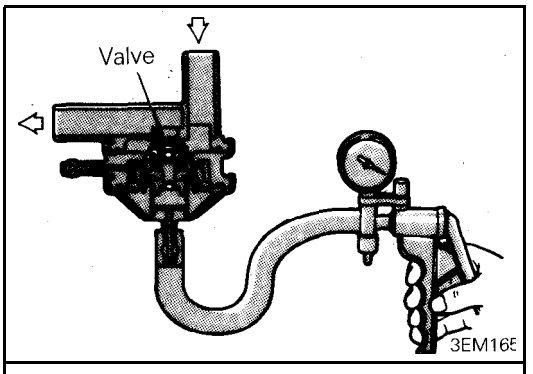
Engine coolant temperature: 80 – 95°C (176 – 205°F)

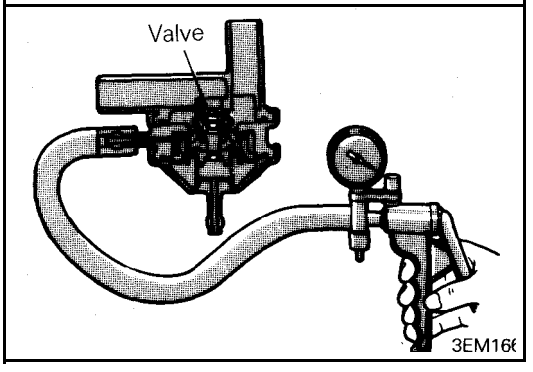
(1) Disconnect the vacuum hose from the throttle body purge hose nipple and connect a hand vacuum pump to the nipple.



(2) Start the engine and check to see that, after raising the engine speed by racing the engine, purge vacuum raises proportionately with the rise in engine speed.

NOTE
If there is a problem with the change in vacuum, it is possible that the throttle body purge port may be clogged and require cleaning.





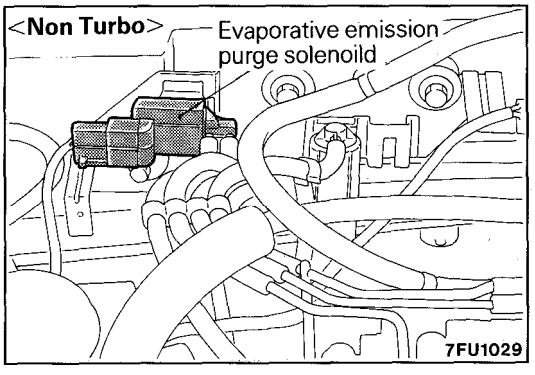
PURGE CONTROL VALVE <Turbo>

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 air-tightness.
(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 air-tightness.

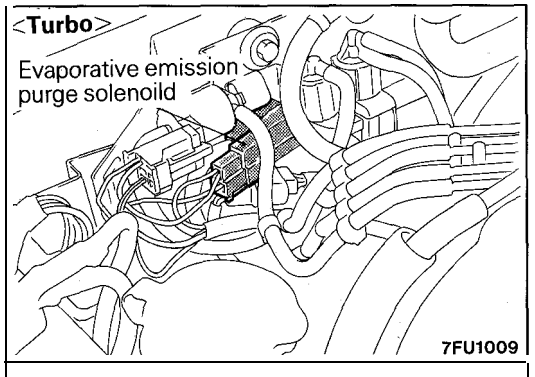


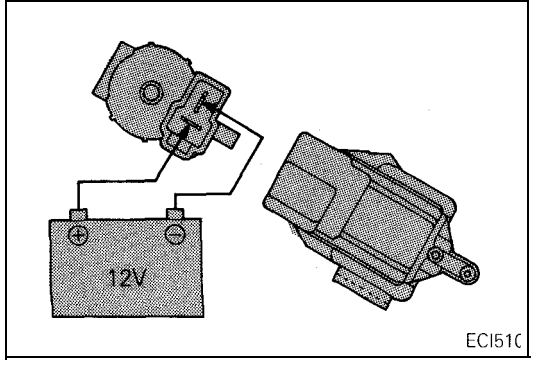
EVAPORATIVE EMISSION PURGE SOLENOID

INSPECTION

NOTE
When disconnecting the vacuum hose, make an identification mark on it so that it can be reconnected to the original position.

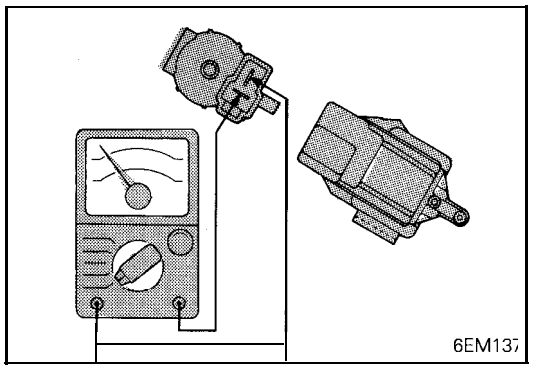
(1) Disconnect the vacuum hoses (non stripe and red stripe hose) from the solenoid.
(2) Disconnect the harness connector from solenoid.
(3) Connect a hand vacuum pump to the nipple to which the red-striped vacuum hose was connected.





(4) Apply a vacuum and check for air-tightness when voltage applied directly to the evaporative emission purge solenoid and when the voltage is discontinued.

Battery voltage	Result
When applied	Vacuum leaks
When discontinued	Vacuum is maintained



(5) Measure the resistance between the terminals of the solenoid.

Standard value: 36 – 44 Ω [at 20°C (68°F)]

VOLUME AIR FLOW SENSOR, ENGINE COOLANT TEMPERATURE SENSOR AND INTAKE AIR TEMPERATURE SENSOR

To inspect these parts, refer to GROUP 14A – MFI System Components.

AIR CONDITIONING SWITCH

To inspect the air conditioning switch, refer to GROUP 24 -Air Conditioning Switch.

FUEL TANK PRESSURE CONTROL VALVE

To inspect the fuel tank pressure control valve, refer to GROUP 14F – Fuel Tank.

EVAPORATIVE EMISSION CANISTER

To inspect the evaporative emission canister, refer to GROUP 14F – Fuel Line and Vapor Line.

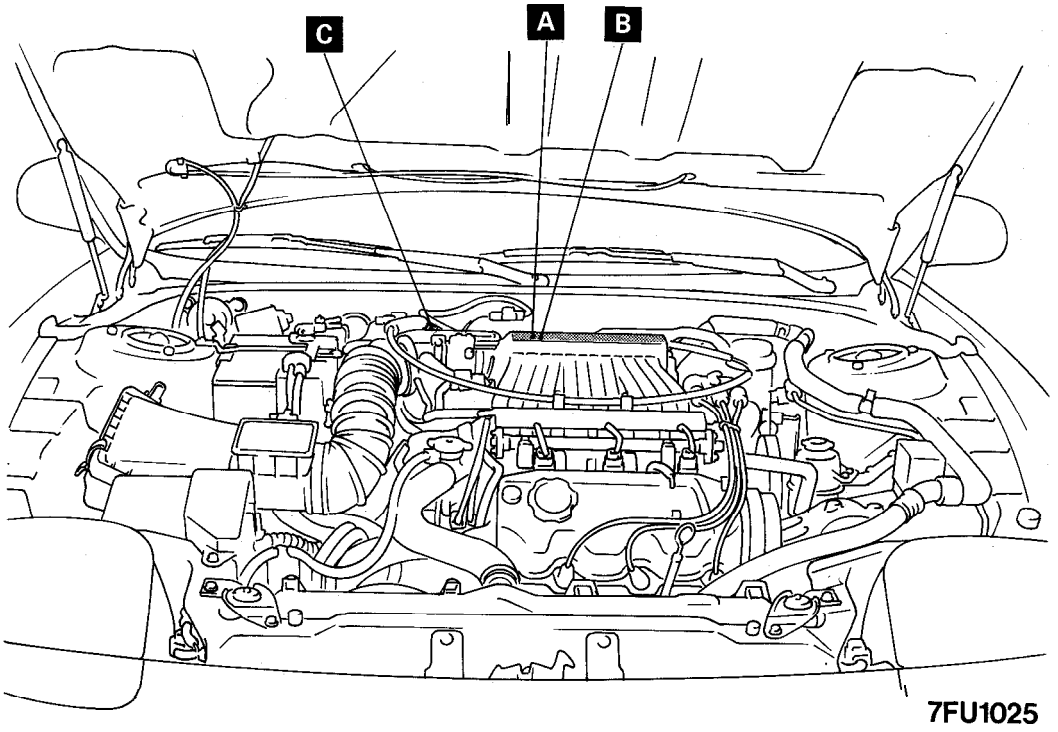
FUEL TANK FILLER CAP TUBE INSPECTION

Check the gasket of the fuel tank filler cap, and the fuel tank filler cap itself, for damage or deformation; replace the cap if necessary.

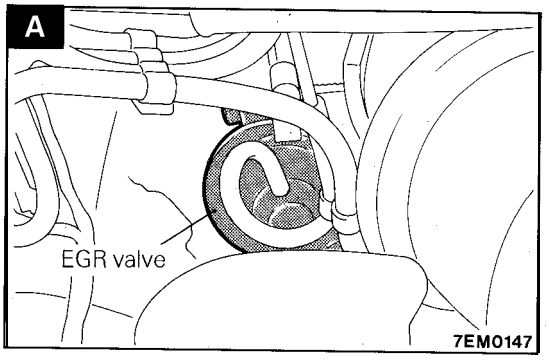
EXHAUST GAS RECIRCULATION (EGR) SYSTEM

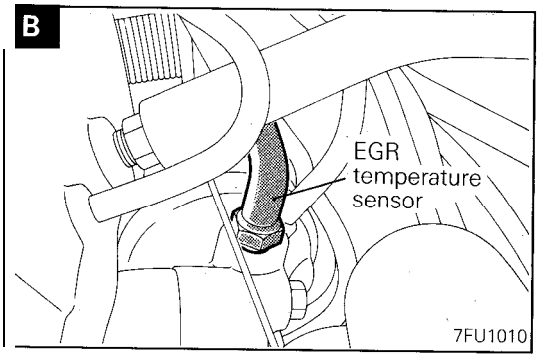
COMPONENTS LOCATION

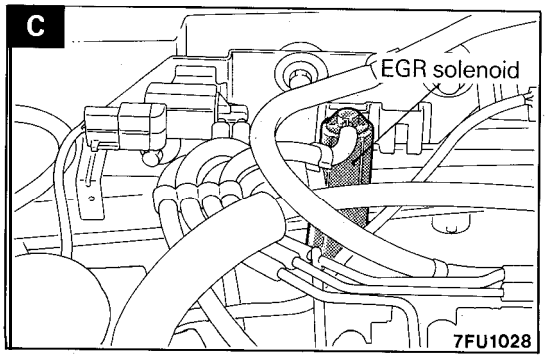
<SOHC>



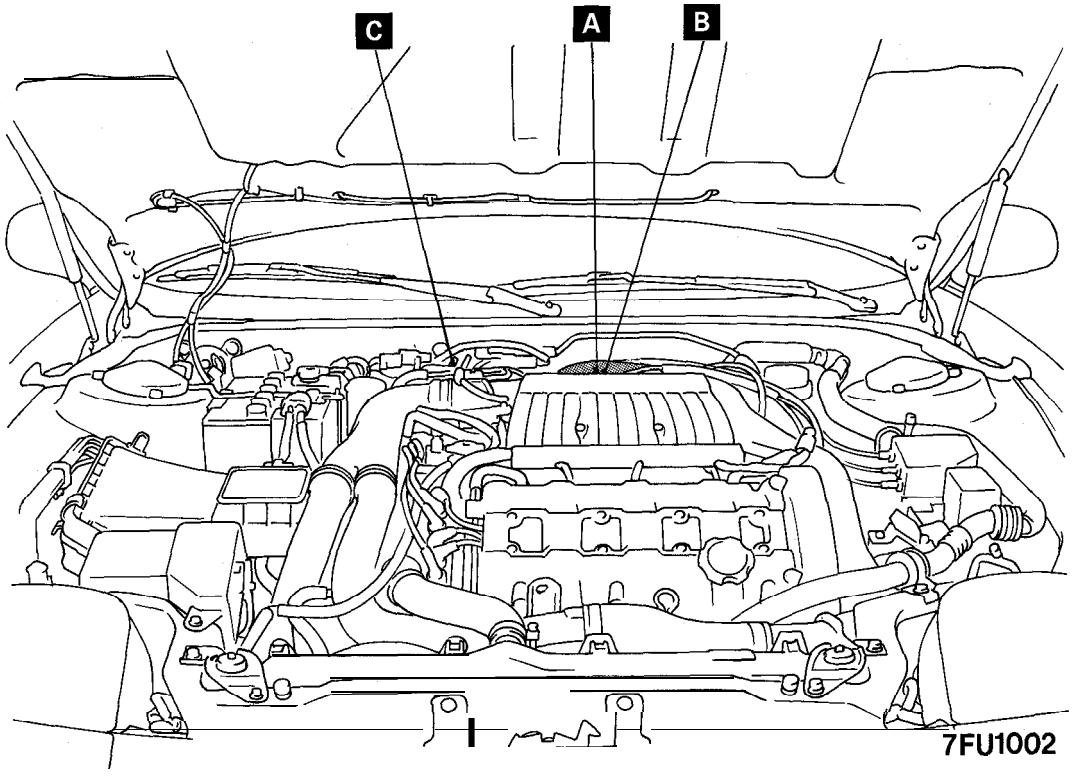
Name	Symbol
EGR solenoid <California>	C
	B
EGR valve <California>	A



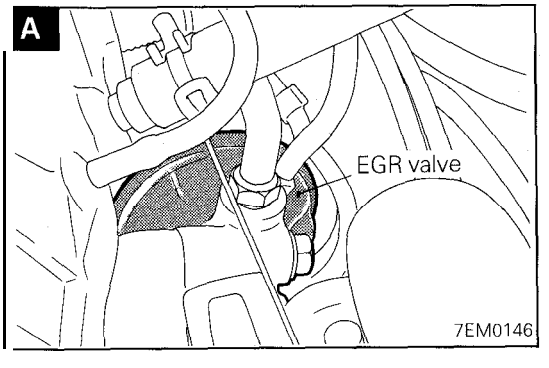


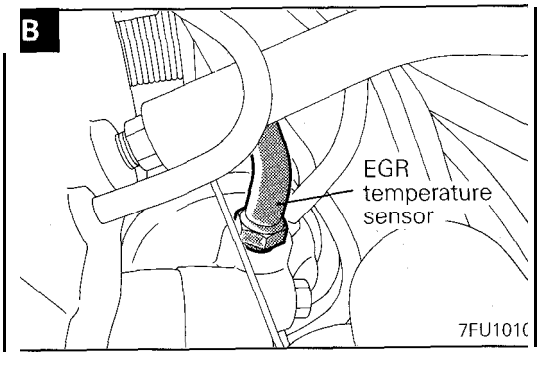


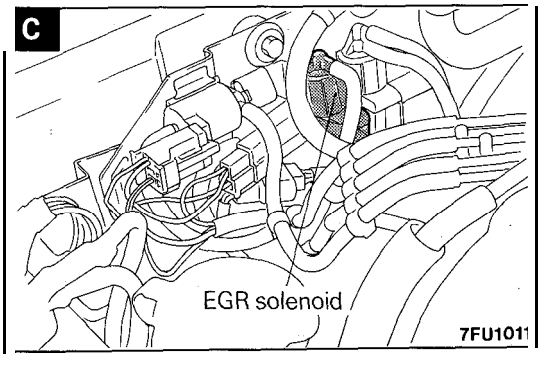
<DOHC>

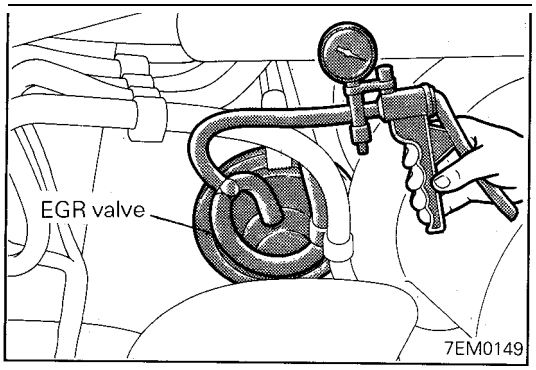


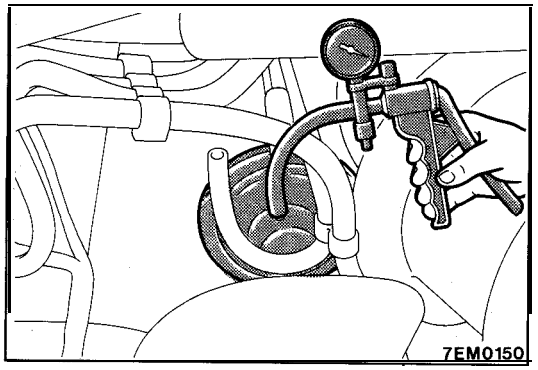
Name	Symbol
EGR solenoid <California – Non Turbo, Turbo>	C
EGR temperature sensor <California – Non Turbo, Turbo>	B
EGR valve <California – Non Turbo, Turbo>	A











EGR SYSTEM INSPECTION <California – Non Turbo, Turbo>

(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:

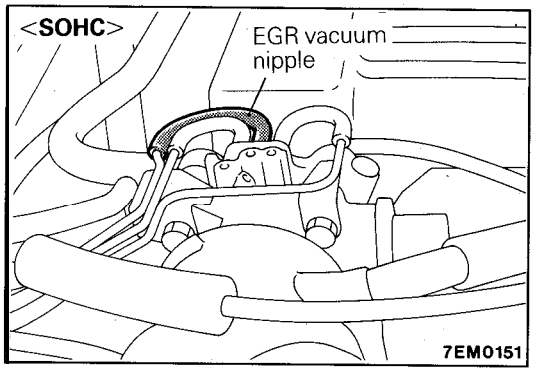
<Cold condition of engine>

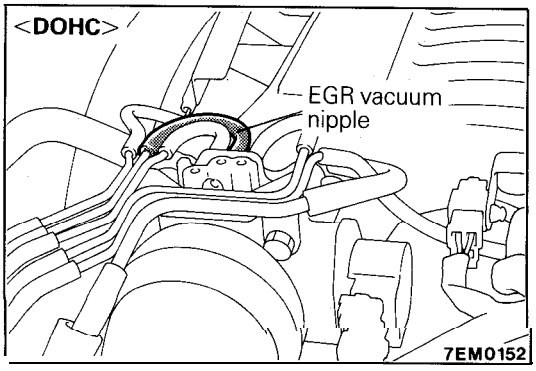
Engine operation	Normal state
Race the engine by rapidly press in the accelerator pedal.	The negative pressure does not vary. (Atmospheric pressure)

<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.



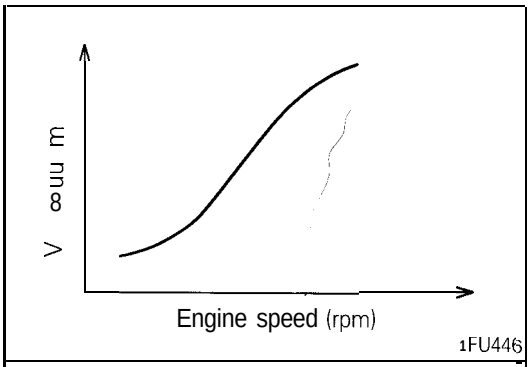


EGR VALVE CONTROL VACUUM CHECK <California – Non Turbo, Turbo>

Check Condition

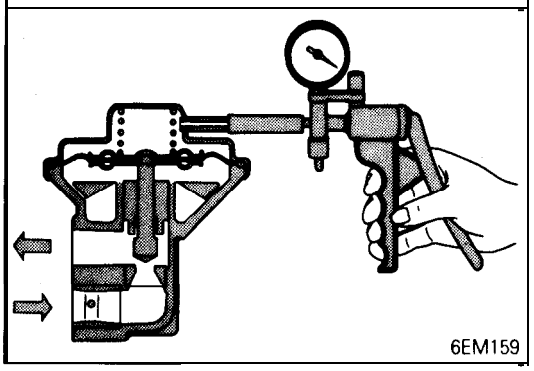
Engine coolant temperature: 80 – 95°C (176 – 205°F)

(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.



EGR VALVE <California – Non Turbo, Turbo>

INSPECTION

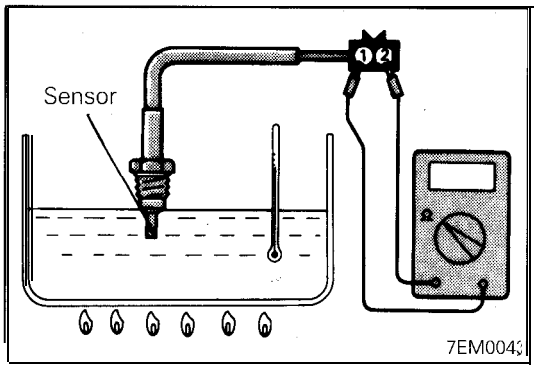
(1) Remove the EGR valve and check it for sticking, deposit of carbon, etc.
If such condition exists, clean with adequate solvent to ensure tight valve seat contact.
(2) Connect a hand vacuum pump to the EGR valve.
(3) Apply a vacuum of 500 mmHg (19.8 in.Hg.) and check airtightness.
(4) Blow in air from 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: 22 Nm (16 ft.lbs.)



EGR TEMPERATURE SENSOR <California – Non Turbo, Turbo>

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.

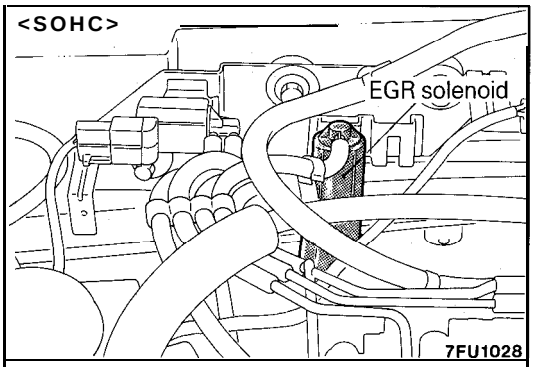
Temperature °C (°F)	Resistance kΩ
50 (122)	60-83
100 (212)	11 – 14

INSTALLATION

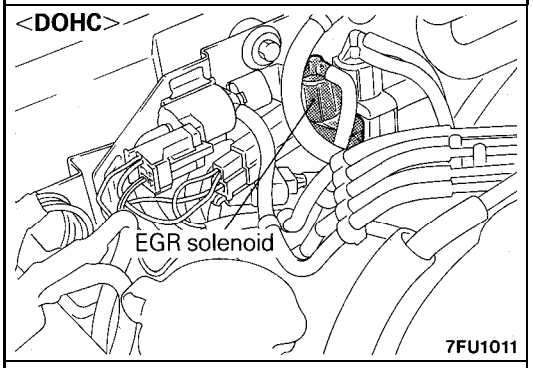
Install the EGR temperature sensor tighten to specified torque.

Specified tightening torque: 11 Nm (8 ft.lbs.)

<SOHC>



<DOHC>

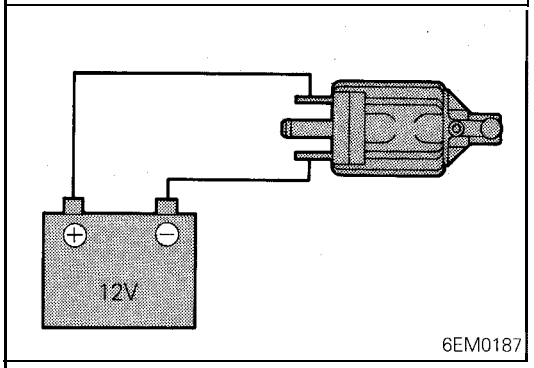


EGR SOLENOID <California – Non Turbo, Turbo>

INSPECTION

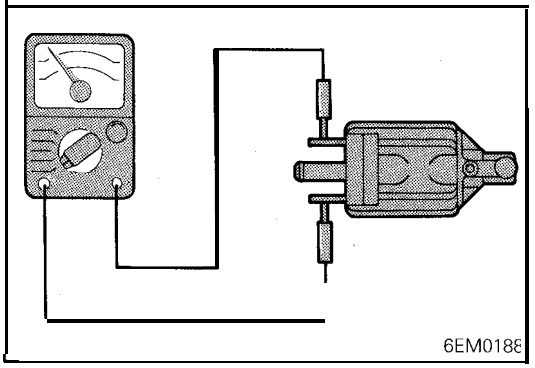
NOTE
When disconnecting the vacuum hose, make an identification mark on it so that it can be reconnected to the original position.

(1) Disconnect the vacuum hose (yellow and green stripe) from the solenoid.
(2) Disconnect the harness connector.
(3) Connect a hand vacuum pump to the nipple to which the green-striped vacuum hose was connected.



(4) Apply a vacuum and check for air-tightness when voltage applied directly to the EGR solenoid and when the voltage is discontinued.

Battery voltage	Result
When applied	Vacuum is maintained
When discontinued	Vacuum leaks



(5) Measure the resistance between the terminals of the solenoid.

Standard value: 36 – 44 Ω [at 20°C (68°F)]

MIXTURE CONTROL (MFI) SYSTEM

- To inspect the mixture control (MFI) system, refer to GROUP 14A – Service Adjustment Procedures.
- For detailed information concerning the illumination pattern of the check engine/malfunction indicator lamp and other aspects of the on-board diagnostic, refer to GROUP 14A – On-board Diagnostic.

CATALYTIC CONVERTER

REMOVAL AND INSTALLATION

Refer to GROUP 11 – Exhaust Pipe, Main Muffler and Catalytic Converter.

INSPECTION

Inspect for damage, cracking or deterioration. Replace if faulty.

Caution

1. **Operation of any type, including idling, should be avoided if engine misfiring occurs. Under this condition the exhaust system will operate at abnormally high temperature, which may cause damage to the catalyst or underbody parts of the vehicle.**
2. **Alteration or deterioration of ignition or fuel system, or any type of operating condition which results in engine misfiring must be corrected to avoid overheating the catalytic converters.**
3. **Proper maintenance and tune up according to manufacturer's specifications should be made to correct the conditions as soon as possible.**

UNITED STATES

CHRYSLER CORPORATION

The special service tools referred to herein are required for certain service operations. These special service tools or their equivalent, if not obtainable through a local source are available through the following outlet.

12842 Farmington Road, Livonia, Michigan 48150, U.S.A.

MILLER SPECIAL TOOLS
SPX Corporation

Telephone (313) 522-6717 FAX (313) 522-6505

CANADA

CHRYSLER CANADA

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Telephone (519) 736-4600 FAX (519) 736-8433

INTERNATIONAL

CHRYSLER INTERNATIONAL

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