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.

SERVICE AND OWNER MANUALS

A vailable for Chrysler, Plymouth, Dodge, Dodge Truck, Jeep, and Eagle vehicles.

Telephone orders may be placed at the number below. Credit cards are accepted (no CODS). Please have your order information available at time of call.

CALL: (218) 572-7240 OR FAX: (218) 572-0815 FOR A FREE CATALOG OR TO PLACE AN ORDER.
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.
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 contents in each group indicate operations requiring warnings.
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.

MIT: 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

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.

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
INTRODUCTION AND MASTER TROUBLESHOOTING

19A-28
STEERING — Power Steering Gear Box

POWER STEERING GEAR BOX
REMOVAL AND INSTALLATION

Pre-removal Operation
1. Drain off the Power Steering fluid.

Removal steps
1. Joint assembly and gear box connecting bolt.
2. Connection for return line.
3. Connection for pressure hose.
4. Center pin
5. Tapped end and knurled connecting.

10. Center member rear mounting box
11. Front interference plug
12. Gear box assembly
13. Mounting rubber

SERVICE POINTS OF REMOVAL
6. DISCONNECTION OF TIE-ROD END
Using the special tool, disconnect the tie rod from the knuckle.

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

12. REMOVAL OF GEAR BOX ASSEMBLY

19A-24
STEERING — Manual Steering Gear Box

LUBRICATION AND SEALING POINTS

Sealant: 3M ART. Part No. 8563 or equivalent

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

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

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

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

Indicates the page number.
Indicates the group title.
Indicates the section title.
Denotes tightening torque.
Denotes non-reusable part.
EXPLANATION OF THE TROUBLESHOOTING GUIDE

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

- Operation description
  A negative-characteristic temperature sensor is employed for each sensor in order to convert the ambient temperature of the sensor part to resistance.
  The sensors' power supply (2 terminals of the air-conditioning control unit) is supplied to each sensor, and the voltages of terminals (16), (17), (18), and (19) 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 20°C (70°F).
  No. 12: The outside-air temperature sensor input signal is held to 0°C (32°F).
  No. 13: The refrigerant sensor input signal is held to 4°C (39°F).

- Air conditioner control unit terminal voltage

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Signal</th>
<th>Condition</th>
<th>Terminal voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Air grading sensor</td>
<td>Sensor part temperature 55°C (131°F)</td>
<td>150.1 kΩ</td>
</tr>
<tr>
<td>10</td>
<td>Sensor power supply</td>
<td>At all times</td>
<td>2.4 V, 2 mA</td>
</tr>
<tr>
<td>15</td>
<td>Refrigerant-temperature sensor</td>
<td>Sensor part temperature 25°C (77°F)</td>
<td>10-120 kΩ</td>
</tr>
<tr>
<td>16</td>
<td>Passenger compartment-temperature sensor</td>
<td>Sensor part temperature 25°C (77°F)</td>
<td>10-120 kΩ</td>
</tr>
<tr>
<td>17</td>
<td>Air-temperature sensor</td>
<td>Sensor part temperature 25°C (77°F)</td>
<td>10-120 kΩ</td>
</tr>
</tbody>
</table>

- Indicates the check to be made.
- Indicates the connector's terminal number.
- Provides hints (including standards for judgement) when troubleshooting procedures are followed.
- Indicates the circuit diagram for checking (including the interface of the air conditioning control unit).
- Indicates the connector number. Numbers are used in the operation descriptions only as necessary, and these numbers correspond to the numbers used in harness and component layout diagrams.
- Indicates the on-board diagnostic output code No. and the system conditions during output.
- 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.

The input/output (direction of current flow) relative to the electronic control unit is indicated by symbols (∆, ▽). The (A) symbol indicates that current flows in the upward direction.

The connector symbol indicates the device side connector (for an intermediate connector, the male side connector) as seen from the terminal front (the connector's connection face).

Indicates the terminal No.

The direction of current flow is indicated by the arrow. In this instance, the current flow is in both directions, up or down.

Indicates that the device side connector includes the harness.

Indicates that the connector is the direct-insertion type.

Indicates the branch point of a harness of a different line diameter or line color.
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.

---

<table>
<thead>
<tr>
<th>1st Digit</th>
<th>2nd Digit</th>
<th>3rd Digit</th>
<th>4th Digit</th>
<th>5th Digit</th>
<th>6th Digit</th>
<th>7th Digit</th>
<th>8th Digit</th>
<th>9th Digit</th>
<th>10th Digit</th>
<th>11th Digit</th>
<th>12th to 17th Digits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country</td>
<td>Make</td>
<td>Vehicle</td>
<td>Others</td>
<td>Line</td>
<td>Price</td>
<td>Body</td>
<td>Engine</td>
<td>Check</td>
<td>Model year</td>
<td>Plant</td>
<td>Serial number</td>
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<tr>
<td>J-</td>
<td>B-</td>
<td>Dodge</td>
<td>2-</td>
<td>Driver</td>
<td>Stealth</td>
<td>A-WD</td>
<td>4-</td>
<td>High</td>
<td>1994</td>
<td>Nagoya</td>
<td>000001 to 999999</td>
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<td></td>
<td></td>
<td>Passenger</td>
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<td>and</td>
<td>FWD</td>
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<td>5-</td>
<td>sports</td>
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<td>Car</td>
<td></td>
<td>Passenger</td>
<td>Stealth</td>
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<td>6-</td>
<td>Premium</td>
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<td></td>
<td>Air Bag</td>
<td></td>
<td></td>
<td>7-</td>
<td>Ultimate</td>
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<td>4-</td>
<td>3-door</td>
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<td>Hatchback</td>
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</tr>
</tbody>
</table>

* "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

<table>
<thead>
<tr>
<th>V.I.N. (except sequence number)</th>
<th>Brand</th>
<th>Engine displacement</th>
<th>Models code</th>
</tr>
</thead>
<tbody>
<tr>
<td>JB3AM44H□RY</td>
<td>Dodge Stealth</td>
<td>3.0 dm³ (181.4 cu.in.) [SOHC-MFI]</td>
<td>Z11AMNHEL2D Z11AMRHEL2D</td>
</tr>
<tr>
<td>JB3AM54J□RY</td>
<td></td>
<td>3.0 dm³ (181.4 cu.in.) [DOHC-MFI]</td>
<td>Z11AMNXML2D Z11AMRXML2D</td>
</tr>
<tr>
<td>JB3AM64J□RY</td>
<td></td>
<td></td>
<td>Z11AMNPML2D Z11AMRPML2D</td>
</tr>
<tr>
<td>JB3AN74K□RY</td>
<td>Dodge Stealth</td>
<td>3.0 dm³ (181.4 cu.in.) [DOHC-MFI-Turbo]</td>
<td>Z16AMJGFL2D</td>
</tr>
</tbody>
</table>

## VEHICLES FOR CALIFORNIA

<table>
<thead>
<tr>
<th>V.I.N. (except sequence number)</th>
<th>Brand</th>
<th>Engine displacement</th>
<th>Models code</th>
</tr>
</thead>
<tbody>
<tr>
<td>JB3AM44H□RY</td>
<td>Dodge Stealth</td>
<td>3.0 dm³ (181.4 cu.in.) [SOHC-MFI]</td>
<td>Z11AMNHEL7D Z11AMRHEL7D</td>
</tr>
<tr>
<td>JB3AM54J□RY</td>
<td></td>
<td>3.0 dm³ (181.4 cu.in.) [DOHC-MFI]</td>
<td>Z11AMNXML7D Z11AMRXML7D</td>
</tr>
<tr>
<td>JB3AM64J□RY</td>
<td></td>
<td></td>
<td>Z11AMNPML7D Z11AMRPML7D</td>
</tr>
<tr>
<td>JB3AN74K□RY</td>
<td>Dodge Stealth</td>
<td>3.0 dm³ (181.4 cu.in.) [DOHC-MFI-Turbo]</td>
<td>Z16AMJGFL7D</td>
</tr>
</tbody>
</table>

## VEHICLES FOR CANADA

<table>
<thead>
<tr>
<th>V.I.N. (except sequence number)</th>
<th>Brand</th>
<th>Engine displacement</th>
<th>Models code</th>
</tr>
</thead>
<tbody>
<tr>
<td>JB3AM44H□RY</td>
<td>Dodge Stealth</td>
<td>3.0 dm³ (181.4 cu.in.) [SOHC-MFI]</td>
<td>Z11AMNHEL3D Z11AMRHEL3D</td>
</tr>
<tr>
<td>JB3AM54J□RY</td>
<td></td>
<td>3.0 dm³ (181.4 cu.in.) [DOHC-MFI]</td>
<td>Z11AMNXML3D Z11AMRXML3D</td>
</tr>
<tr>
<td>JB3AM64J□RY</td>
<td></td>
<td></td>
<td>Z11AMNPML3D Z11AMRPML3D</td>
</tr>
<tr>
<td>JB3AN74K□RY</td>
<td>Dodge Stealth</td>
<td>3.0 dm³ (181.4 cu.in.) [DOHC-MFI-Turbo]</td>
<td>Z16AMJGFL3D</td>
</tr>
</tbody>
</table>
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  
   - Z11AMNH12D  
     - Model series
     - Vehicle model

2. ENGINE  
   - 6G72  
     - Engine model

3. EXT  
   - C6A  
     - Exterior code

4. TRANSAXLE  
   - F5M33  
     - Transaxle model

5. COLOR, INT  
   - R2587V03V  
     - Equipment code
     - Interior code
     - Body color 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

- Z1A  
- RY  
- Refer to 10th thru 17th digits of V.I.N.  
- Indicates STEALTH-series.

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:

<table>
<thead>
<tr>
<th>Engine model</th>
<th>Engine displacement</th>
</tr>
</thead>
<tbody>
<tr>
<td>6G72</td>
<td>3.0 dm³ (181.4 cu.in.)</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Engine serial number</th>
<th>Number cycling</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA0201 to YY9999</td>
<td>AA0201 → AA9999</td>
</tr>
<tr>
<td></td>
<td>AB0001 → AY9999</td>
</tr>
<tr>
<td></td>
<td>BA0001 → YY9999</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Part</th>
<th>Target area</th>
<th>Original Equipment</th>
<th>Replacement Parts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine</td>
<td>SUHC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DOHC</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Engine

![Engine images]

### Transaxle

- Manual transaxle
  - `<F5M33>`
  - `OOF0017`
- Automatic transaxle
  - `<W6MG1>`
  - `OOF0016`
- `<F4A33>`
  - `OOF0018`

### Fender

![Fender image]

The illustration indicates left hand side, outer. Right hand side is symmetrically opposite.
### INTRODUCTION AND MASTER TROUBLESHOOTING – Vehicle Identification

<table>
<thead>
<tr>
<th>Part</th>
<th>Target area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duui</td>
<td>The illustration indicates right hand side, outer. Left hand side is symmetrically opposite.</td>
</tr>
<tr>
<td>Quarter panel</td>
<td>The replacement part label is attached to the inner side of the part shown in the illustration.</td>
</tr>
<tr>
<td>Hood</td>
<td>The illustration indicates left hand side, outer. Right hand side is symmetrically opposite.</td>
</tr>
</tbody>
</table>

- : for original equipment parts
- : for replacement parts
<table>
<thead>
<tr>
<th>Part</th>
<th>Target area</th>
<th>![Image of Liftgate] (31F0074)</th>
<th>![Image of Front Bumper] (00F0013)</th>
<th>![Image of Rear Bumper] (00F0047)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liftgate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Front bumper</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rear bumper</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
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
      • Clock spring
      • Steering gear and linkage clamp
   (6) Store components removed from the SRS in a clean and dry place.
      The air bag module should be stored on a flat surface and placed so that the pad surface is facing upward. Do not place anything on top of it.
   (7) Be sure to deploy the air bag before disposing of the air bag module or disposing of a vehicle equipped with an air bag. (Refer to GROUP 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

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) <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.
INTRODUCTION AND MASTER TROUBLESHOOTING

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.

<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.
INTRODUCTION AND MASTER TROUBLESHOOTING – Towing and Hoisting

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>**

![FWD Diagram](00F0020)

**<AWD>**

![AWD Diagram](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

### GENERAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Items</th>
<th>Models</th>
<th>STEALTH &lt;SOHC&gt;</th>
<th>STEALTH ES &lt;DOHC&gt; (Non-Turbo)</th>
<th>STEALTH R/T &lt;DOHC&gt; (Non-Turbo)</th>
<th>STEALTH R/T &lt;DOHC&gt; (Turbo)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle dimensions mm (in.)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Overall length</td>
<td>1</td>
<td>4,560 (179.5)</td>
<td>4,565 (179.7)</td>
<td>4,565 (179.7)</td>
<td>4,565 (179.7)</td>
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<tr>
<td>Overall width</td>
<td>2</td>
<td>1,840 (72.4)</td>
<td>1,840 (72.4)</td>
<td>1,840 (72.4)</td>
<td>1,840 (72.4)</td>
</tr>
<tr>
<td>Overall height</td>
<td>3</td>
<td>1,285 (50.6)</td>
<td>1,285 (50.6)</td>
<td>1,285 (50.6)</td>
<td>1,285 (50.6)*&quot;</td>
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<tr>
<td>Wheelbase</td>
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<td>2,470 (97.2)</td>
<td>2,470 (97.2)</td>
<td>2,470 (97.2)</td>
<td>2,470 (97.2)</td>
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<tr>
<td>Tread Front</td>
<td>5</td>
<td>1,560 (61.4)</td>
<td>1,560 (61.4)</td>
<td>1,560 (61.4)</td>
<td>1,560 (61.4)</td>
</tr>
<tr>
<td>Tread Rear</td>
<td>6</td>
<td>1,580 (62.2)</td>
<td>1,580 (62.2)</td>
<td>1,580 (62.2)</td>
<td>1,580 (62.2)</td>
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<tr>
<td>Overhang Front</td>
<td>7</td>
<td>1,025 (40.4)</td>
<td>1,025 (40.4)</td>
<td>1,060 (41.7)</td>
<td>1,060 (41.7)</td>
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<tr>
<td>Overhang Rear</td>
<td>8</td>
<td>1,050 (41.3)</td>
<td>1,050 (41.3)</td>
<td>1,050 (41.3)</td>
<td>1,050 (41.3)</td>
</tr>
<tr>
<td>Minimum running ground clearance</td>
<td>9</td>
<td>145 (5.7)</td>
<td>145 (5.7)</td>
<td>145 (5.7)</td>
<td>145 (5.7)</td>
</tr>
<tr>
<td>Angle of approach degrees</td>
<td>10</td>
<td>12.2&quot;</td>
<td>12.2&quot;</td>
<td>12.2&quot;</td>
<td>12.2&quot;</td>
</tr>
<tr>
<td>Angle of departure degrees</td>
<td>11</td>
<td>16.9&quot;</td>
<td>16.9&quot;</td>
<td>16.5&quot;</td>
<td>16.5&quot;</td>
</tr>
<tr>
<td>Vehicle weight kg (lbs.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Curb weights</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MIT</td>
<td></td>
<td>1,390 (3,064)</td>
<td>1,435 (3,164)</td>
<td>1,520 (3,351)</td>
<td>1,720 (3,792)*&quot;</td>
</tr>
<tr>
<td>AA</td>
<td></td>
<td>1,430 (3,153)</td>
<td>1,475 (3,252)</td>
<td>1,560 (3,439)</td>
<td>-</td>
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<tr>
<td>Gross vehicle weight rating</td>
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<td>1,840 (4,057)</td>
<td>1,925 (4,244)</td>
<td>1,925 (4,244)</td>
<td>2,055 (4,530)</td>
</tr>
<tr>
<td>Gross axle weight rating</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Front</td>
<td></td>
<td>1,100 (2,425)</td>
<td>1,100 (2,425)</td>
<td>1,100 (2,425)</td>
<td>1,120 (2,469)</td>
</tr>
<tr>
<td>Rear</td>
<td></td>
<td>850 (1,874)</td>
<td>850 (1,874)</td>
<td>850 (1,874)</td>
<td>935 (2,061)</td>
</tr>
<tr>
<td>Seating capacity</td>
<td></td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Engine</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model No.</td>
<td></td>
<td>6G72-(SOHC)</td>
<td>6G72-(DOHC)</td>
<td>6G72-(DOHC)</td>
<td>6G72-(DOHC)</td>
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<tr>
<td>Piston displacement cm³ (cu.in.)</td>
<td></td>
<td>2,972 (181.4)</td>
<td>2,972 (181.4)</td>
<td>2,972 (181.4)</td>
<td>2,972 (181.4)</td>
</tr>
</tbody>
</table>

NOTE

*1: <4WS>
## INTRODUCTION AND MASTER TROUBLESHOOTING

### General Data and Specifications

<table>
<thead>
<tr>
<th>Models</th>
<th>STEALTH &lt;SOHC&gt;</th>
<th>STEALTH ES &lt;DOHC&gt; (Non-Turbo)</th>
<th>STEALTH R/T &lt;DOHC&gt; (Non-Turbo)</th>
<th>STEALTH R/T &lt;DOHC&gt; (Turbo)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transaxle</td>
<td>F5M33 - 5-speed manual</td>
<td>F5M33 - 5-speed manual</td>
<td>F5M33 - 5-speed manual</td>
<td>W6MG1 - 6-speed manual</td>
</tr>
<tr>
<td>Manual transaxle</td>
<td>F4A33 - 4-speed automatic</td>
<td>F4A33 - 4-speed automatic</td>
<td>F4A33 - 4-speed automatic</td>
<td>-</td>
</tr>
<tr>
<td>Automatic transaxle</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Fuel system</td>
<td>Multiport fuel injection system &lt;MFI system&gt;</td>
<td>Multiport fuel injection system &lt;MFI system&gt;</td>
<td>Multiport fuel injection system &lt;MFI system&gt;</td>
<td>Multiport fuel injection system &lt;MFI system&gt;</td>
</tr>
<tr>
<td>Fuel supply system</td>
<td>-</td>
<td>-</td>
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## ENGINE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Items</th>
<th>6G72</th>
<th>6G72 Non-Turbo</th>
<th>6G72 Turbo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>V60° SOHC</td>
<td>V60° DOHC</td>
<td>V60° DOHC</td>
</tr>
<tr>
<td>Number of cylinders</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Bore mm (in.)</td>
<td>91.1 (3.59)</td>
<td>91.1 (3.59)</td>
<td>91.1 (3.59)</td>
</tr>
<tr>
<td>Stroke mm (in.)</td>
<td>76.0 (2.99)</td>
<td>76.0 (2.99)</td>
<td>76.0 (2.99)</td>
</tr>
<tr>
<td>Piston displacement cm³ (cu.in.)</td>
<td>2,972 (181.4)</td>
<td>2,972 (181.4)</td>
<td>2,972 (181.4)</td>
</tr>
<tr>
<td>Compression ratio</td>
<td>8.9</td>
<td>10</td>
<td>8.0</td>
</tr>
<tr>
<td>Firing order</td>
<td>1-2-3-4-5-6</td>
<td>1-2-3-4-5-6</td>
<td>1-2-3-4-5-6</td>
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</table>

## TRANSAXLE SPECIFICATIONS

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

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

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

The values in the table are not applicable:

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

### Standard bolt and nut tightening torque

<table>
<thead>
<tr>
<th>Bolt nominal diameter (mm)</th>
<th>Pitch (mm)</th>
<th>Torque Nm (ft.lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Head mark 4</td>
</tr>
<tr>
<td>M5</td>
<td>0.8</td>
<td>2.5 (1.8)</td>
</tr>
<tr>
<td>M6</td>
<td>1.0</td>
<td>5.0 (3.6)</td>
</tr>
<tr>
<td>M8</td>
<td>1.25</td>
<td>12 (8.7)</td>
</tr>
<tr>
<td>M10</td>
<td>1.25</td>
<td>24 (17)</td>
</tr>
<tr>
<td>M12</td>
<td>1.25</td>
<td>42 (30)</td>
</tr>
<tr>
<td>M14</td>
<td>1.5</td>
<td>73 (53)</td>
</tr>
<tr>
<td>M16</td>
<td>1.5</td>
<td>113 (82)</td>
</tr>
<tr>
<td>M18</td>
<td>1.5</td>
<td>170 (123)</td>
</tr>
<tr>
<td>M20</td>
<td>1.5</td>
<td>230 (166)</td>
</tr>
<tr>
<td>M22</td>
<td>1.5</td>
<td>310 (224)</td>
</tr>
<tr>
<td>M24</td>
<td>1.5</td>
<td>400 (289)</td>
</tr>
</tbody>
</table>

### Flange bolt and nut tightening torque

<table>
<thead>
<tr>
<th>Bolt nominal diameter (mm)</th>
<th>Pitch (mm)</th>
<th>Torque Nm (ft.lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Head mark 4</td>
</tr>
<tr>
<td>M6</td>
<td>1.0</td>
<td>5.0 (3.6)</td>
</tr>
<tr>
<td>M8</td>
<td>1.25</td>
<td>13 (9.4)</td>
</tr>
<tr>
<td>M10</td>
<td>1.25</td>
<td>26 (19)</td>
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<tr>
<td>M10</td>
<td>1.5</td>
<td>24 (17)</td>
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<tr>
<td>M12</td>
<td>1.25</td>
<td>47 (34)</td>
</tr>
<tr>
<td>M12</td>
<td>1.75</td>
<td>43 (31)</td>
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### Taper thread tightening torque

<table>
<thead>
<tr>
<th>Thread size</th>
<th>Torque Nm (ft.lbs.)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Female thread material: Light alloy</td>
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<tr>
<td>NPTF 1/6</td>
<td>7.0 (5.1)</td>
</tr>
<tr>
<td>PT 1/8</td>
<td>10 (7.2)</td>
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<tr>
<td>PT 1/4, NPTF 1/4</td>
<td>25 (18)</td>
</tr>
<tr>
<td>PT 3/8</td>
<td>48 (35)</td>
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NOTE: NPTF is dry seat pipe thread, while PT is pipe thread.
# Master Troubleshooting

## Engine Overheats

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable cause</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine overheats</td>
<td>Cooling system faulty</td>
<td>7-3</td>
</tr>
<tr>
<td></td>
<td>Incorrect ignition timing</td>
<td>9-1 8</td>
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</tbody>
</table>

## Engine Will Not Crank or Cranks Slowly

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable cause</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine will not crank or cranks slowly</td>
<td>Starting system faulty</td>
<td>8-1 87</td>
</tr>
</tbody>
</table>

## Engine Will Not Start or Hard to Start (Cranks OK)

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable cause</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine will not start or hard to start (Cranks OK)</td>
<td>No fuel supply to injector</td>
<td>14-25</td>
</tr>
<tr>
<td></td>
<td>Injection system problems</td>
<td>14-25</td>
</tr>
<tr>
<td></td>
<td>Ignition system problems</td>
<td>8-199</td>
</tr>
<tr>
<td></td>
<td>Vacuum leaks</td>
<td>25-3</td>
</tr>
<tr>
<td></td>
<td>- Purge control valve hose</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Vacuum hoses</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Intake manifold</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Intake manifold plenum</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Throttle body</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- EGR valve</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Compression too low</td>
<td>9-23</td>
</tr>
</tbody>
</table>
### ROUGH IDLE OR ENGINE STALLS

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

### ENGINE HESITATES OR POOR ACCELERATION

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable cause</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine hesitates or poor acceleration</td>
<td>Ignition system problem</td>
<td>8-199</td>
</tr>
<tr>
<td></td>
<td>Vacuum leaks&lt;br&gt;• Purge control valve hose&lt;br&gt;• Vacuum hoses&lt;br&gt;• Intake manifold&lt;br&gt;• Intake manifold plenum&lt;br&gt;• Throttle body&lt;br&gt;• EGR valve</td>
<td>25-3</td>
</tr>
<tr>
<td></td>
<td>Air cleaner clogged</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fuel line clogged</td>
<td>14-25</td>
</tr>
<tr>
<td></td>
<td>Fuel injection system problem</td>
<td>14-25</td>
</tr>
<tr>
<td></td>
<td>Emission control system problem</td>
<td>25-18</td>
</tr>
<tr>
<td></td>
<td>Engine overheats</td>
<td>7-3</td>
</tr>
<tr>
<td></td>
<td>Compression too low</td>
<td>9-23</td>
</tr>
</tbody>
</table>
## ENGINE DIESELING

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable cause</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine dieseling (runs after ignition switch is turned off)</td>
<td>Incorrect ignition timing</td>
<td>9-18</td>
</tr>
</tbody>
</table>

## EXCESSIVE OIL CONSUMPTION

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable cause</th>
<th>Reference page or remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excessive oil consumption</td>
<td>Oil leak</td>
<td>Repair as necessary</td>
</tr>
<tr>
<td></td>
<td>Positive crankcase ventilation line clogged</td>
<td>25-9</td>
</tr>
<tr>
<td></td>
<td>Valve stem seal worn or damaged</td>
<td>9-7 1</td>
</tr>
<tr>
<td></td>
<td>Valve stem worn</td>
<td>9-7 1</td>
</tr>
<tr>
<td></td>
<td>Piston ring worn or damaged</td>
<td>9-83</td>
</tr>
</tbody>
</table>

## POOR FUEL MILEAGE

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable cause</th>
<th>Reference page or remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor fuel mileage</td>
<td>Fuel leak</td>
<td>Repair as necessary</td>
</tr>
<tr>
<td></td>
<td>Air cleaner clogged</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Ignition system problems</td>
<td>8-1 99</td>
</tr>
<tr>
<td></td>
<td>Fuel injection system problems</td>
<td>14–25</td>
</tr>
<tr>
<td></td>
<td>Compression too low</td>
<td>9-23</td>
</tr>
<tr>
<td></td>
<td>Tires improperly inflated</td>
<td>22-3</td>
</tr>
<tr>
<td></td>
<td>Clutch slips</td>
<td>6-3</td>
</tr>
<tr>
<td></td>
<td>Brakes drag</td>
<td>5-5</td>
</tr>
</tbody>
</table>

## NOISE

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable cause</th>
<th>Reference page or remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise</td>
<td>Loose bolts and nuts</td>
<td>Retighten as necessary</td>
</tr>
<tr>
<td></td>
<td>Engine noise</td>
<td>9-15</td>
</tr>
</tbody>
</table>
### HARD STEERING

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable cause</th>
<th>Reference page or remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard steering</td>
<td>Loose power steering oil pump belt</td>
<td>19A-9</td>
</tr>
<tr>
<td></td>
<td>Low fluid level</td>
<td>Replenish</td>
</tr>
<tr>
<td></td>
<td>Air in power steering system</td>
<td>19A-11</td>
</tr>
<tr>
<td></td>
<td>Low tire pressure</td>
<td>22-3</td>
</tr>
<tr>
<td></td>
<td>Excessive turning resistance of lower arm ball joint</td>
<td>2A-31</td>
</tr>
<tr>
<td></td>
<td>Excessively tightened steering gear box rack support cover</td>
<td>19A-20</td>
</tr>
<tr>
<td></td>
<td>Improper front wheel alignment</td>
<td>2A-9</td>
</tr>
<tr>
<td></td>
<td>Excessive turning resistance of tie-rod ball joint</td>
<td>19A-7</td>
</tr>
<tr>
<td></td>
<td>Sticky flow control valve</td>
<td>19A-32</td>
</tr>
<tr>
<td></td>
<td>Bent rack in steering gear box</td>
<td>19A-20</td>
</tr>
</tbody>
</table>

### POOR RETURN OF STEERING WHEEL TO CENTER

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable cause</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor return of steering wheel to center</td>
<td>Improper front wheel alignment</td>
<td>2A-9</td>
</tr>
<tr>
<td></td>
<td>Improper tire pressure</td>
<td>22-3</td>
</tr>
<tr>
<td></td>
<td>Excessive tightened rack support cover</td>
<td>19A-20</td>
</tr>
<tr>
<td></td>
<td>Damaged front wheel bearing</td>
<td>2A-16</td>
</tr>
</tbody>
</table>
### POOR RIDING

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

### ABNORMAL TIRE WEAR

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable cause</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abnormal tire wear</td>
<td>Improper front or rear wheel alignment</td>
<td>2A–9, 17–5, 22</td>
</tr>
<tr>
<td></td>
<td>Improper tire pressure</td>
<td>22-3</td>
</tr>
<tr>
<td></td>
<td>Imbalanced wheels</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Loose wheel bearings</td>
<td>17–6</td>
</tr>
<tr>
<td></td>
<td>Malfunctioning shock absorber</td>
<td>2A–27, 17–13, 30</td>
</tr>
</tbody>
</table>

### ROAD WANDER

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable cause</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road wander</td>
<td>Improper front or rear wheel alignment</td>
<td>2A–9, 17–5, 22</td>
</tr>
<tr>
<td></td>
<td>Excessive play of steering wheel</td>
<td>19A–6</td>
</tr>
<tr>
<td></td>
<td>Poor turning resistance of lower arm ball joint</td>
<td>2A–31</td>
</tr>
<tr>
<td></td>
<td>Improper tire pressure</td>
<td>22-3</td>
</tr>
<tr>
<td></td>
<td>Loose or worn lower arm bushing</td>
<td>2A–16, 30</td>
</tr>
<tr>
<td></td>
<td>Loose or worn wheel bearings</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Loose rack support cover in steering gear box</td>
<td>19A–20</td>
</tr>
</tbody>
</table>
### VEHICLE PULLS TO ONE SIDE

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

### STEERING WHEEL SHIMMY

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable cause</th>
<th>Reference page or remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steering wheel shimmy</td>
<td>Improper front or rear wheel alignment</td>
<td>2A–9, 17-5.22</td>
</tr>
<tr>
<td></td>
<td>Improper tire pressure</td>
<td>22-3</td>
</tr>
<tr>
<td></td>
<td>Imbalanced wheels</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Poor turning resistance of lower arm ball joint</td>
<td>2A–31</td>
</tr>
<tr>
<td></td>
<td>Excessive play of steering wheel</td>
<td>19A–6</td>
</tr>
<tr>
<td></td>
<td>Broken or weak front stabilizer</td>
<td>2A–32</td>
</tr>
<tr>
<td></td>
<td>Worn lower arm bushing</td>
<td>2A–30</td>
</tr>
<tr>
<td></td>
<td>Malfunctioning shock absorber</td>
<td>2A–27, 17-13, 30</td>
</tr>
<tr>
<td></td>
<td>Broken or weak coil spring</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wear, play, or seizure of wheel bearing</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Wear, play, or seizure of drive shaft ball joint</td>
<td>2A–18, 3–14</td>
</tr>
</tbody>
</table>

### BOTTOMING

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable cause</th>
<th>Reference page or remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottoming</td>
<td>Overloaded vehicle</td>
<td>Correct</td>
</tr>
<tr>
<td></td>
<td>Broken or weak coil spring</td>
<td>2A–27, 17-13, 30</td>
</tr>
<tr>
<td></td>
<td>Malfunctioning shock absorber</td>
<td></td>
</tr>
<tr>
<td>Trouble</td>
<td>Symptom</td>
<td>Probable cause</td>
</tr>
<tr>
<td>----------------</td>
<td>-------------------------------------------------------------------------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td>Pitting</td>
<td>Pitting occurs because of uneven rotation of race and bearing surfaces</td>
<td>Excessive bearing preload</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Excessive load</td>
</tr>
<tr>
<td>Flaking</td>
<td>The surface peels because of uneven rotation of the race and bearing surfaces</td>
<td>End of bearing life</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Improper bearing assembly</td>
</tr>
<tr>
<td>Cracking</td>
<td>Chipping or cracking of cage or roller edges</td>
<td>Impact when bearing was installed (such as being hit with a hammer)</td>
</tr>
<tr>
<td>Flat spotting</td>
<td>When large load is applied, race and roller contact surfaces compress, forming indentations</td>
<td>Excessive bearing preload</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Excessive load</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vibration when bearings are not used, such as during shipment on freight cars, transport trucks, etc.</td>
</tr>
<tr>
<td>Nicks</td>
<td>Instead of rolling along race surface, rollers slide, thus damaging surface</td>
<td>Insufficient grease</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Excessive bearing preload</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Excessive load</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Faulty oil seal</td>
</tr>
<tr>
<td>Smearing</td>
<td>Damage or wear caused by minute particles adhering to surfaces results in rough movement and such high temperatures that parts of surface melt</td>
<td>Excessive variation of loads on bearings</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Use of grease other than that specified</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Insufficient grease</td>
</tr>
<tr>
<td>Rust, corrosion</td>
<td>Appears on various areas of the bearing</td>
<td>Use of grease other than that specified</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Faulty oil seal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Presence of water or moisture</td>
</tr>
<tr>
<td>Wear</td>
<td>Wear of surface areas caused by friction</td>
<td>Insufficient grease</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Foreign matter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rust or corrosion due to moisture</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Use of grease other than that specified</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Faulty oil seal</td>
</tr>
<tr>
<td>Discoloration</td>
<td>Grease discoloration results from grease deterioration which causes particles of pigment contained in grease to adhere to surfaces</td>
<td>Use of grease other than that specified</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Faulty oil seal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Excessive bearing preload</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Excessive load</td>
</tr>
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LUBRICATION AND MAINTENANCE

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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.

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 an 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 alcohol is not recommended unless the nature of the blend can be determined as being satisfactory.

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

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.

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

**NOTE**

*: Except for Federal

### GENERAL MAINTENANCE SERVICE FOR PROPER VEHICLE PERFORMANCE

<table>
<thead>
<tr>
<th>No</th>
<th>General maintenance</th>
<th>Service to be performed</th>
<th>Kilometers in thousands</th>
<th>Mileage in thousands</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Timing belt</td>
<td>Replace</td>
<td></td>
<td>15 30 45 60 75 90 105</td>
</tr>
<tr>
<td>9</td>
<td>Drive belt (for generator)</td>
<td>Check condition</td>
<td></td>
<td>X X X X X X X</td>
</tr>
<tr>
<td>10</td>
<td>Engine oil Non-Turbo</td>
<td>Change Every year</td>
<td>or Every 12,000 km (7,500 miles)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Turbo</td>
<td>Change Every 6 months</td>
<td>or Every 8,000 km (5,000 miles)</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Engine oil filter Non-Turbo</td>
<td>Replace Every year</td>
<td>or Every 16,000 km (10,000 miles)</td>
<td>X X X X X X X X</td>
</tr>
<tr>
<td></td>
<td>Turbo</td>
<td>Replace Every year</td>
<td>or</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Manual transmission (incl. transfer) oil</td>
<td>Inspect oil level</td>
<td>at X X X</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Automatic transmission fluid</td>
<td>Inspect fluid level Every year</td>
<td>or X X X X X X X</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Engine coolant</td>
<td>Change fluid</td>
<td>at X X X</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Disc brake pads</td>
<td>Inspect for wear Every year</td>
<td>or X X X X X X X</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE**

*: For California, this maintenance is recommended but not required
## LUBRICATION AND MAINTENANCE

### Scheduled Maintenance Table

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

**NOTE**  
SRS: Supplemental Restraint System

### SCHEDULED MAINTENANCE UNDER SEVERE USAGE CONDITIONS

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

<table>
<thead>
<tr>
<th>No.</th>
<th>Maintenance Item</th>
<th>Service to be Performed</th>
<th>Mileage intervals in thousands (Miles in thousands)</th>
<th>Severe usage conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Engine oil</td>
<td>Change every 3 months or</td>
<td>Every 4,800 km (3,000 miles)</td>
<td>A X B X X X X</td>
</tr>
<tr>
<td>11</td>
<td>Engine oil filter</td>
<td>Replace every 6 months or</td>
<td>Every 9,600 km (6,000 miles)</td>
<td>A X X X X X</td>
</tr>
<tr>
<td>3</td>
<td>Air cleaner element</td>
<td>Replace</td>
<td>More frequently</td>
<td>X X X X X</td>
</tr>
<tr>
<td>5</td>
<td>Spark plugs</td>
<td>Replace</td>
<td>More frequently</td>
<td>X X X X</td>
</tr>
<tr>
<td>15</td>
<td>Disc brake pads</td>
<td>Inspect for wear</td>
<td>More frequently</td>
<td>X X X X X</td>
</tr>
</tbody>
</table>

#### 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

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

<table>
<thead>
<tr>
<th>Description</th>
<th>Metric measure</th>
<th>U.S. measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine oil</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crankcase</td>
<td>4.0 dm³</td>
<td>4.2 qts.</td>
</tr>
<tr>
<td>Oil filter</td>
<td>0.3 dm³</td>
<td>1/2 qt.</td>
</tr>
<tr>
<td>Oil cooler (Turbo)</td>
<td>0.3 dm³</td>
<td>1/2 qt.</td>
</tr>
<tr>
<td>Total</td>
<td>4.3 dm³</td>
<td>4.5 qts.</td>
</tr>
<tr>
<td>&lt;Non-Turbo&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;Turbo&gt;</td>
<td>4.6 dm³</td>
<td>4.9 qts.</td>
</tr>
<tr>
<td>Cooling system (including heater and coolant reserve system)</td>
<td>8.0 dm³</td>
<td>8.5 qts.</td>
</tr>
<tr>
<td>Manual transaxle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;FWD&gt;</td>
<td>2.3 dm³</td>
<td>2.4 qts.</td>
</tr>
<tr>
<td>&lt;AWD&gt;</td>
<td>2.4 dm³</td>
<td>2.5 qts.</td>
</tr>
<tr>
<td>Transfer &lt;5M/T&gt;</td>
<td>0.27 dm³</td>
<td>29 qt.</td>
</tr>
<tr>
<td>&lt;6M/T&gt;</td>
<td>0.30 dm³</td>
<td>32 qt.</td>
</tr>
<tr>
<td>Automatic transaxle</td>
<td>7.5 dm³</td>
<td>7.9 qts.</td>
</tr>
<tr>
<td>Rear axle &lt;AWD&gt;</td>
<td>1.1 dm³</td>
<td>1.16 qts.</td>
</tr>
<tr>
<td>Power steering</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;2WS&gt;</td>
<td>0.9 dm³</td>
<td>.95 qt.</td>
</tr>
<tr>
<td>&lt;4WS&gt;</td>
<td>1.45 dm³</td>
<td>1.59 qts.</td>
</tr>
<tr>
<td>Fuel tank</td>
<td>75 dm³</td>
<td>19.8 gals.</td>
</tr>
</tbody>
</table>

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/CDECIII”, 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.

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

<table>
<thead>
<tr>
<th>Lubricant</th>
<th>API classification GL-5 or higher</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anticipated temperature range</td>
<td>Viscosity range</td>
</tr>
<tr>
<td>Above -23°C (-10°F)</td>
<td>SAE 90</td>
</tr>
<tr>
<td>-23°C to -34°C (-10°F to -30°F)</td>
<td>SAE 85W-90</td>
</tr>
<tr>
<td>Below -34°C (-30°F)</td>
<td>SAE 80W-90, SAE 80W-90</td>
</tr>
<tr>
<td></td>
<td>SAE 75W</td>
</tr>
</tbody>
</table>

SELECTION OF COOLANT

COOLANT

Relation between Antifreeze Concentration and Specific Gravity

<table>
<thead>
<tr>
<th>Engine coolant temperature °C (°F) and specific gravity</th>
<th>Freezing temperature °C (°F)</th>
<th>Safe operating temperature °C (°F)</th>
<th>Engine coolant concentration (Specific volume)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 (50)</td>
<td>20 (68)</td>
<td>30 (86)</td>
<td>40 (104)</td>
</tr>
<tr>
<td>1.054</td>
<td>1.050</td>
<td>1.046</td>
<td>1.042</td>
</tr>
<tr>
<td>1.063</td>
<td>1.068</td>
<td>1.054</td>
<td>1.049</td>
</tr>
<tr>
<td>1.071</td>
<td>1.067</td>
<td>1.062</td>
<td>1.057</td>
</tr>
<tr>
<td>1.079</td>
<td>1.074</td>
<td>1.069</td>
<td>1.064</td>
</tr>
<tr>
<td>1.087</td>
<td>1.082</td>
<td>1.076</td>
<td>1.070</td>
</tr>
<tr>
<td>1.095</td>
<td>1.090</td>
<td>1.084</td>
<td>1.077</td>
</tr>
<tr>
<td>1.103</td>
<td>1.098</td>
<td>1.092</td>
<td>1.084</td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>SOHC</th>
<th>DOHC</th>
</tr>
</thead>
<tbody>
<tr>
<td>NGK BPR5ES-11</td>
<td>PER6J-11</td>
</tr>
<tr>
<td>NIPPON DENSO</td>
<td>W16EPR11</td>
</tr>
<tr>
<td></td>
<td>PK20PR-P11</td>
</tr>
</tbody>
</table>

(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.

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.

<table>
<thead>
<tr>
<th></th>
<th>Standard value:</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;SOHC&gt;</td>
<td>6.0 – 9.0 mm (.24 – .35 in.)</td>
</tr>
<tr>
<td>&lt;DOHC&gt;</td>
<td>4.0 – 5.5 mm (.16 – .22 in.)</td>
</tr>
</tbody>
</table>

(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.)

- A: Crankshaft pulley
- B: Power steering pump pulley
- C: Tension pulley
- D: Generator pulley
- E: Idler pulley
- F: Air conditioning compressor pulley
10. ENGINE OIL (Change)
Always use lubricants which conform to the requirements of
the API classification “For Service SG ECII” or “For Service
SG/CDCII” 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
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 removing the filler plug. If the oil is contaminated, it is necessary to replace it with new oil.

1. With the vehicle parked at a level place, remove the filler plug.

2. Check that the transaxle oil level is at the lower portion of the filler plug hole. For AWD-vehicles, check that the transfer oil level is at the portion shown in the illustration.
3. Check to be sure that the transmission oil is not noticeably dirty, and that it has a suitable viscosity.
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 dm³ (4.8 qts.) of specified ATF into case through dipstick hole. [Total quantity of ATF required is approx. 7.5 dm³ (7.9 qts.). Actually however, approx. 4.5 dm³ (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 the heat protectors (front and rear) from the exhaust manifold.
2. Loosen the radiator drain plug, remove two drain plugs from the engine block (one for each bank) and remove the radiator cap to discharge coolant.
3. Remove the reservoir tank and discharge coolant.
4. When coolant has been discharged, pour water through the filler port to flush coolant passage.
5. Coat the threads of the engine drain plugs with the specified sealant and tighten the plugs to specification.

**Specified sealant:** 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 vehicle’s driver and passenger.

(3) Check wiring harness (for front impact sensor) for binds, connector for damage, and terminals for deformities.
Replace sensor and/or wiring harness if it fails visual check. (Refer to GROUP 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

<Driver's side>

- Air bag module
- Clock spring
- Steering wheel
- Remote control switch (radio)
- Steering shaft
- SRS diagnosis unit

<Passenger's side>

- Air bag module
- Cross pipe cover
- Glove box assembly
(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.

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

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

(3) Check 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

FRONT SUSPENSION ................................................................. 2A

ELECTRONIC CONTROL SUSPENSION (ECS) ............................ 2B

ELECTRONIC CONTROL SUSPENSION (ACTIVE PREVIEW ECS) .... 2C

NOTE
Shaded groups in the above list are not included in this manual.
WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!
(1) Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver (from rendering the SRS inoperative).
(2) 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

<table>
<thead>
<tr>
<th>Items</th>
<th>FWD</th>
<th>DOHC</th>
<th>AWD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wheel bearing</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O.D. x I.D. mm (in.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drive shaft</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Joint type</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outer</td>
<td>B.J.</td>
<td>B.J.</td>
<td>B.J.</td>
</tr>
<tr>
<td>Inner</td>
<td>T.J.</td>
<td>T.J.</td>
<td>T.J.</td>
</tr>
<tr>
<td>Length mm (in.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L.H. shaft</td>
<td>419 (16.5)</td>
<td>417 (16.4)</td>
<td>419 (16.5)</td>
</tr>
<tr>
<td>R.H. shaft</td>
<td>407 (16.0) or 394 (15.5)</td>
<td>405 (15.9) or 393 (15.5)</td>
<td>391 (15.4)</td>
</tr>
<tr>
<td>Suspension system</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>McPherson strut with coil spring and compression rod type</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Coil spring                    |     |      |     |
| Wire dia. x O.D. x free length mm (in.) | SOHC- M/T | 14.2 x 170 x 316 | 15.2 x 170 x 301.6 |
|                                | SOHC-A/T, DOHC - M/T | 14.4 x 170 x 322.7 | (.56 x 1.70 x 12.4) | (.60 x 1.69 x 11.87) |
|                                | DOHC- A/T | 14.5 x 170 x 329.3 | (.57 x 1.69 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                           |     |      |     |
| 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) | | |
| Contraction N (lbs.)           | 540 (119) | | |

**NOTE**

*: <A/T>
### SERVICE SPECIFICATIONS

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

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

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

1. **MB991045**: Bushing remover and installer
2. **MB990635**: Steering linkage puller
3. **M B990767**: End yoke holder
4. **MB991354**: Pulser body
5. **MB990241**: Axle shaft puller
6. **CT-1003**: Puller shaft
7. **MB990998**: Front hub remover and installer
8. **M B990326**: Preload socket
9. **MB991004**: Wheel alignment gauge attachment
<table>
<thead>
<tr>
<th>Tool number and tool name</th>
<th>Replaced by Miller tool number</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>MB991056 or MB991355</td>
<td>MB991056A (Modification as shown below is required)</td>
<td>Removal of the hub &lt;FWD&gt;</td>
</tr>
<tr>
<td>Knuckle arm bridge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MB990810</td>
<td>P-334</td>
<td>Removal of the wheel bearing inner race &lt;FWD&gt;</td>
</tr>
<tr>
<td>Side bearing puller</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MB990925</td>
<td>General service tool (use universal driver set)</td>
<td>Removal of wheel bearing &lt;FWD&gt;</td>
</tr>
<tr>
<td>Bearing and oil seal installer set</td>
<td></td>
<td>MB990932</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MB990938</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Use in conjunction with MB991366 or MB991056)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Press-out of the center bearing</td>
</tr>
<tr>
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<td>Press-fitting of the center bearing</td>
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<td>Press-fitting of the dust seal outer</td>
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<td>MB990965</td>
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<td>Rear suspension bushing base</td>
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<td>Press-fitting of the wheel bearing</td>
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<td>Press-fitting of the oil-seal (drive shaft side)</td>
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<td>MB990883</td>
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<td>Rear suspension arbor</td>
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<td>Press-fitting of the oil-seal (drive shaft side)</td>
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<td>Tool number and tool name</td>
<td>Replaced by Miller tool number</td>
<td>Application</td>
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<td>MB990947</td>
<td>C-4171</td>
<td>Press-fitting of the oil seal (hub side)</td>
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<td>Lower arm bushing arbor</td>
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<td>MB990955</td>
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<td>Oil seal installer</td>
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<td>MB991248 or MB9988801</td>
<td>P-334</td>
<td>Press-out of the inner shaft and press-fitting seal plate</td>
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<td>Inner shaft remover</td>
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<td>MB991172</td>
<td>General service tool</td>
<td>Press-fitting of the inner shaft</td>
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<td>Adapter</td>
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<td>MB991176</td>
<td>CT-1112</td>
<td>Disassembly/assembly of the strut assembly</td>
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<td>Spring seat holder</td>
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<td>MB991237 MB991238</td>
<td>C-4838</td>
<td>Compression of the front coil spring</td>
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<td>Spring compressor body Arm set</td>
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<td>MB990799</td>
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<td>Installation of ball joint dust cover</td>
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<tr>
<td>Ball joint remover &amp; installer</td>
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## TROUBLESHOOTING

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable cause</th>
<th>Remedy</th>
</tr>
</thead>
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<tr>
<td>Steering wheel is heavy</td>
<td>Suspension malfunction</td>
<td>Adjust or replace</td>
</tr>
<tr>
<td>Excessive vehicle rolling</td>
<td>Unbalanced or worn tires</td>
<td>Adjust or replace</td>
</tr>
<tr>
<td>Poor riding</td>
<td>Improper tire inflation pressure</td>
<td>Adjust</td>
</tr>
<tr>
<td>Inclination of vehicle</td>
<td>Broken or deteriorated coil spring</td>
<td>Replace</td>
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<tr>
<td>Noise</td>
<td>Lack of lubrication</td>
<td>Lubricate</td>
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<tr>
<td>Excessive engine wobble or vibration</td>
<td>Cracked rubber parts of insulator</td>
<td>Replace</td>
</tr>
<tr>
<td>Abnormal noise</td>
<td>Insufficiently tightened parts</td>
<td>Retighten</td>
</tr>
<tr>
<td>Vehicle pulls to one side</td>
<td>Seizure of drive shaft ball joint</td>
<td>Replace</td>
</tr>
<tr>
<td>Vibration</td>
<td>Bend, damage or abnormal wear of drive</td>
<td>Replace</td>
</tr>
<tr>
<td>Shimmy</td>
<td>Improper wheel alignment</td>
<td>Adjust or replace</td>
</tr>
<tr>
<td>Excessive noise</td>
<td>Broken boot, grease leakage</td>
<td>Replace, repack grease</td>
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<td></td>
<td>Bend, damage or abnormal wear of drive</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Play of drive shaft and hub serration</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Abnormal wear, play or seizure of center</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Abnormal wear, play or seizure of wheel</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Loose wheel nut</td>
<td>Retighten</td>
</tr>
<tr>
<td></td>
<td>Malfunction of front suspension and</td>
<td>Adjust or replace</td>
</tr>
</tbody>
</table>
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.

No. 1 cross member, Left member, Right member

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.)

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.
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.
FRONT SUSPENSION – Hub and Knuckle

HUB AND KNUCKLE
REMOVAL AND INSTALLATION

<FWD>

Removal steps

1. Front speed sensor connection
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

<AWD>

Removal steps

60 - 72 Nm
43 - 52 ft.lbs.
9 Nm
7 ft.lbs.
60 - 72 Nm
43 - 52 ft.lbs.
230 Nm
166 ft.lbs.
10
9 N
12 Nm
9 ft.lbs.
50 Nm
36 ft.lbs.
10
9 N
12 Nm
9 ft.lbs.
11 NO029
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 loosening 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.

11. 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
- 3. Adjustment of wheel bearing starting torque
- 4. Hub
- 5. Rotor <Vehicles with A.B.S.>
- 6. Dust shield
- 7. Oil seal (hub side)
- 8. Snap ring
- 9. Wheel bearing
- 10. 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
REMOVAL AND INSTALLATION

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

Disassembly steps

- 1. T.J. boot band (large)
- 2. T.J. boot band (small)
- 3. T.J. case and inner shaft assembly
- 4. T.J. case
- 5. Seal plate
- 6. Innershaft
- 7. Dust shield
- 8. Bracket assembly
- 9. Dust seal outer
- 10. Dust seal inner
- 11. Center bearing
- 12. Center bearing bracket
- 13. Circlip
- 14. Dust shield
- 15. Snap ring
- 16. Spider assembly
- 17. T.J. boot
- 18. B.J. 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.
**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-SOH> 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 of different types of 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.

<table>
<thead>
<tr>
<th>Models</th>
<th>FWD</th>
<th>AWD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boot band</td>
<td>SOHC</td>
<td>DOHC</td>
</tr>
<tr>
<td>T.J. boot band</td>
<td>Large</td>
<td>20–75#BJ95</td>
</tr>
<tr>
<td></td>
<td>Small</td>
<td>20–76#BJ95</td>
</tr>
</tbody>
</table>

**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.
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

(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.)

(2) Press the oil seal into the center bearing bracket using the special tool.

Caution
Take care not to damage the rubber part on the periphery of the dust seal.

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

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.
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

\[
\begin{align*}
\text{<FWD-SOHC>} & : 150 \text{ g (5.29 oz.)} \\
\text{<FWD-DOHC>} & : 160 \text{ g (5.64 oz.)} \\
\text{<AWD>} & : 160 \text{ g (5.64 oz.)}
\end{align*}
\]

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: \(85 \pm 3 \text{ mm (3.35 } \pm \text{ .12 in.)} \)
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**

**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 removed.

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

**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.
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

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

Post-installation Operation

- Adjustment of Wheel Alignment

(Refer to P.2A-9.)

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

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

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.
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

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<thead>
<tr>
<th>Items</th>
<th>FWD</th>
<th>AWD</th>
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<tbody>
<tr>
<td>Suspension system</td>
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<td>29 (162)</td>
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<tr>
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<td>Hydraulic, cylindrical double-acting type</td>
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<td>Mounting method</td>
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<tr>
<td>Outside dia. mm (in.)</td>
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## REAR SUSPENSION

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<th>Items</th>
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<td>Double-wishbone type</td>
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<td>Type</td>
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## SERVICE SPECIFICATIONS

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<tr>
<td>Standard value</td>
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<tr>
<td>Camber</td>
<td>0° ± 30°</td>
<td>0° ± 30°</td>
</tr>
<tr>
<td>Caster</td>
<td>3°55' ± 3 0'</td>
<td>-0° 10' ± 3 0'</td>
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<tr>
<td>Toe-in mm (in.)</td>
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<td>5 ± 2.5 (.02 ± .1)</td>
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## SPECIAL TOOLS

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<tbody>
<tr>
<td>MB991502</td>
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<td>Inspection of electronic control suspension system</td>
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<tr>
<td>Scan tool (MUT-II)</td>
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<td>Reading and erasing diagnostic trouble codes</td>
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<td>Reading service data</td>
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### Troubleshooting

#### Quick Reference Chart for Troubleshooting

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<thead>
<tr>
<th>Symptoms</th>
<th>Associated components</th>
<th>Pages to refer to</th>
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<tbody>
<tr>
<td>When diagnostic trouble code No. 11 is output. *1</td>
<td>ECS switch</td>
<td>P.2B-5</td>
</tr>
<tr>
<td>When diagnostic trouble code No. 21 is output. *2</td>
<td>ECS indicator light</td>
<td>P.2B-6</td>
</tr>
<tr>
<td>When diagnostic trouble code No. 24 is output. *3</td>
<td>Steering angular velocity sensor (angular velocity sensor)</td>
<td>P.2B-7</td>
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<tr>
<td>When diagnostic trouble code Nos. 61 through 64 are output.</td>
<td>Stop light switch</td>
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<td>ECS indicator light does not switch when ECS switch operated.</td>
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<td>Anti-roll control only stops. *4</td>
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<td>P.2B-9</td>
</tr>
<tr>
<td>Anti-dive control only stops</td>
<td>0</td>
<td>P.2B-10</td>
</tr>
<tr>
<td>Anti-squat control only stops. *4</td>
<td>0</td>
<td>P.2B-11</td>
</tr>
</tbody>
</table>

#### 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.
When diagnostic trouble code No. 11 is output

Using scan tool, check service data on the G sensor. Good?

Yes

No

Disconnect G sensor connector. With ignition switch at ON, check harness connector.

No. 1 terminal voltage and continuity between No. 3 terminal and ground up to specification? (Sensor power supply and ground)

Standards:
No. 1 terminal  5 V
No. 3 terminal  Continuity provided

Yes

No

Is continuity provided across the following areas?
Between G sensor and ECS control unit
Between No. 1 terminal and No. 54 terminal
Between No. 3 terminal and No. 57 terminal

Yes

No

Replace ECS control unit.

Correct harness.

Continuity provided between No. 2 terminal of G sensor and No. 61 terminal of ECS control unit?

Yes

No

Is trouble cleared by replaced G sensor?

Yes

No

Replace ECS control unit.

Correct harness.

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

Using scan tool, check service data on the steering angular velocity sensor. Good?

Yes

Check by entering simulated vehicle speed to simulate anti-roll controls. (Refer to P.2B-17.)

No

Good

Replace ECS control unit.

Disconnect steering angular velocity sensor connector.
With ignition switch at ON, check harness connector.

No. 2, 3 and 4 terminal voltages up to specification?

Standard: 5 V

Yes

Replace ECS control unit.

No

Is continuity provided across the following areas?
Between steering angular velocity sensor and ECS control unit
Between No. 2 terminal and No. 56 terminal
Between No. 3 terminal and No. 55 terminal
Between No. 4 terminal and No. 54 terminal

Yes

Correct harness.

No

Is continuity provided between No. 1 terminal of steering angular velocity sensor and No. 57 terminal of ECS control unit?

Yes

No

Correct harness.

Is trouble cleared by replacing steering angular velocity sensor?

Yes

Replace ECS control unit.

No

End
When diagnostic trouble code No. 24 is output

**<Turbo>**

Using scan tool, check service data on vehicle speed sensor. Good?

- Yes
  - Check by entering simulated vehicle speed from scan tool to simulate high speed-sensitive control. (Refer to P.2B-17.) Good?
    - Yes
      - Replace ECS control unit.
    - No
      - Good

- No
  - Disconnect vehicle speed sensor connector and check harness connector.

  No. 1 terminal voltage and continuity between No. 2 terminal and ground up to specification? (Sensor power supply and ground)

  **Standards:**
  - No. 1 terminal: Battery voltage
  - No. 2 terminal: Continuity provided

  - Yes
    - Replace ECS control unit.
  - No
    - Correct harness.

  Is continuity provided between No. 3 terminal of vehicle speed sensor and No. 53 terminal of ECS control unit?

  - Yes
    - Check vehicle speed sensor. (Refer to P.2B-19.) Good?
      - Yes
        - Replace ECS control unit.
      - No
        - Replace vehicle speed sensor.
    - No
      - Replace ECS control unit.

- Non-Turbo

Using scan tool, check service data on vehicle speed sensor.

- Yes
  - Check by entering simulated vehicle speed from scan tool to simulate high speed-sensitive control. (Refer to P.2B-17.) Good?
    - Yes
      - Replace ECS control unit.
    - No
      - Good

- No
  - Is continuity provided between No. 109 terminal of combination meter and No. 53 terminal of ECS control unit?

    - Yes
      - Replace ECS control unit.
    - No
      - Correct harness.

  Is continuity provided between No. 64 terminal of combination meter and ground?

    - Yes
      - Replace ECS control unit.
    - No
      - Correct harness.

  Check vehicle speed sensor. (Refer to P.2B-19.) Good?

    - Yes
      - Replace ECS control unit.
    - No
      - Replace vehicle speed sensor.
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

Yes

No

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

<table>
<thead>
<tr>
<th>Shock absorber terminal</th>
<th>ECS control unit terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>FR No. 1</td>
<td>No. 7</td>
</tr>
<tr>
<td>FR No. 3</td>
<td>No. 6</td>
</tr>
<tr>
<td>FL No. 1</td>
<td>No. 10</td>
</tr>
<tr>
<td>FL No. 3</td>
<td>No. 9</td>
</tr>
<tr>
<td>RR No. 1</td>
<td>No. 13</td>
</tr>
<tr>
<td>RR No. 3</td>
<td>No. 12</td>
</tr>
<tr>
<td>RL No. 1</td>
<td>No. 16</td>
</tr>
<tr>
<td>RL No. 3</td>
<td>No. 15</td>
</tr>
</tbody>
</table>

Yes → Replace ECS control unit.

No → Correct harness.

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

Yes

No

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

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

<table>
<thead>
<tr>
<th>Shock absorber terminal</th>
<th>ECS control unit terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>FR No. 5</td>
<td>No. 5</td>
</tr>
<tr>
<td>FL No. 5</td>
<td>No. 8</td>
</tr>
<tr>
<td>RR No. 5</td>
<td>No. 11</td>
</tr>
<tr>
<td>RL No. 5</td>
<td>No. 14</td>
</tr>
</tbody>
</table>

Yes → Replace ECS control unit.

No → Correct harness.

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

Yes → End

No

Replace ECS control unit.

Correct harness.
ECS indicator light does not switch when ECS switch is operated.

1. Does ECS indicator light flash?
   - Yes: Read diagnostic trouble code and check area associated with diagnostic trouble code.
   - No: Disconnect ECS switch connector and check harness connector with ignition switch at ON.

2. No. 10 terminal voltage and continuity between No. 11 terminal and ground up to specification?
   - Standards:
     - No. 10 terminal: 5 V
     - No. 11 terminal: Continuity provided
   - Yes: Check ECS switch. (Refer to P.2B-19.) Good?
     - Yes: Replace ECS switch.
     - No: Remove combination meter and check ECS indicator light for burnt filament. Good?
       - Yes: Correct harness.
       - No: Replace ECS indicator light bulb.

3. Is continuity provided across the following areas?
   - Between combination meter and ECS control unit
   - Between No. 10 and 2 terminals
   - Between No. 11 and 3 terminals
   - Yes: Is continuity provided between No. 2 terminal of combination meter and ground?
     - Yes: Is trouble cleared by replacing combination meter?
       - Yes: End
       - No: Replace ECS control unit.
     - No: Correct harness.
   - No: Is trouble cleared by replacing combination meter?
     - Yes: End
     - No: Replace ECS control unit.
6 Anti-dive control only stops.

Using scan tool, check service data on stop light switch. Good?  
Yes → Check by entering simulated vehicle speed from scan tool to simulate anti-dive control. (Refer to P.2B-16.) Good?  
   Yes → Good  
   No → Replace ECS control unit

No → Does stop light illuminate when brake pedal is depressed?  
   Yes → Is continuity provided between No. 3 terminal of stop light switch and No. 58 terminal of ECS control unit?  
      Yes → Replace ECS control unit  
      No → Correct harness.

No → Disconnect stop light switch connector and check harness connector.  
     Is No. 2 terminal voltage up to specification?  
       Yes → Correct harness. (Between No. 2 terminal of stop light switch and battery)  
       No → Replace stop light switch.

No → Check stop light switch. (Refer to P.2B-19.) Good?  
   Yes → Replace ECS control unit.
Anti-squat control only stops.

Using scan tool, check service data on throttle position sensor. Good?

Yes

Check by entering simulated vehicle speed from scan tool to simulate anti-squat control. (Refer to P.2B-16.) Good?

Yes

Good

Replace ECS control unit.

No

Replace ECS control unit.

No

Does check engine/malfunction indicator lamp illuminate?

Yes

Is continuity provided between No. 2 terminal of throttle position sensor and No. 59 terminal of ECS control unit?

Yes

Correct harness.

No

Check throttle position sensor. (Refer to P.2B-19.) Good?

Yes

Replace ECS control unit.

No

Replace throttle position sensor.

Is continuity provided across the following areas?
Between throttle position sensor and engine control unit
Between No. 1 and 61 terminals
Between No. 4 and 72 terminals

Yes

Defective engine control unit.

No

Correct harness.
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

<table>
<thead>
<tr>
<th>Code No</th>
<th>Indication Pattern</th>
<th>Diagnostic Item</th>
<th>Fail Safe</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>![Good pattern]</td>
<td>[Good]</td>
<td>[Good]</td>
</tr>
<tr>
<td>11</td>
<td>![Pattern]</td>
<td>G sensor defective*</td>
<td>- Ride controls (pinching and bouncing control, bad road detection control) stop.</td>
</tr>
<tr>
<td>21</td>
<td>![Pattern]</td>
<td>Steering angular velocity sensor open-circuited*</td>
<td>- Anti-roll control stops.</td>
</tr>
<tr>
<td>24</td>
<td>![Pattern]</td>
<td>Vehicle speed sensor open-circuited*</td>
<td>- Steering stability controls (anti-roll, high speed sensitive controls) and attitude controls (anti-dive, anti-squat) stop. - Shock absorber damping force fixed at MEDIUM</td>
</tr>
<tr>
<td>61</td>
<td>![Pattern]</td>
<td>F.R. damping force changeover actuator defective</td>
<td>- All ECS controls stop. - Normal shock absorber damping force fixed at HARD.</td>
</tr>
<tr>
<td>62</td>
<td>![Pattern]</td>
<td>F.L. damping force changeover actuator defective</td>
<td></td>
</tr>
<tr>
<td>63</td>
<td>![Pattern]</td>
<td>R.R. damping force changeover actuator defective</td>
<td></td>
</tr>
<tr>
<td>64</td>
<td>![Pattern]</td>
<td>R.L. damping force changeover actuator defective</td>
<td></td>
</tr>
</tbody>
</table>

**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

<table>
<thead>
<tr>
<th>Code No.</th>
<th>What is defective</th>
<th>On-board diagnostic determination conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>G sensor defective</td>
<td>When sensor input of 0.5 or less or 4.5 V or more lasts for more than 10 seconds.</td>
</tr>
<tr>
<td>21</td>
<td>Steering angular velocity sensor open-circuited</td>
<td>Open circuit detected on the basis of difference in voltage level of sensor signal.</td>
</tr>
<tr>
<td>24</td>
<td>Vehicle speed sensor defective</td>
<td>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.</td>
</tr>
<tr>
<td>61 – 64</td>
<td>Damping force changeover actuator defective</td>
<td>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.</td>
</tr>
</tbody>
</table>

SERVICE DATA OUTPUT CHECK
Using the scan tool, check the service data.

Service Data Inspection List

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Check Point</th>
<th>Check Condition</th>
<th>Soundness Determination Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>G sensor</td>
<td>Vehicle in stationary condition</td>
<td>2.0 – 3.0 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Shake vehicle up and down</td>
<td>Indicated value increases or decreases from 2.5 V</td>
</tr>
<tr>
<td>14</td>
<td>Throttle position sensor</td>
<td>Throttle fully closed</td>
<td>300 – 1,000 mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Slowly depress accelerator pedal.)</td>
<td>Smoothly increases.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Throttle fully opened</td>
<td>4,500 – 5,500 mV</td>
</tr>
<tr>
<td>21</td>
<td>Steering angular velocity sensor</td>
<td>Slowly turn steering wheel counterclockwise</td>
<td>ST1 and ST2 indications change in the following combinations.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Slowly turn steering wheel clockwise.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ST1</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ST2</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ST2</td>
<td>ON</td>
</tr>
<tr>
<td>Item No.</td>
<td>Check Point</td>
<td>Check Condition</td>
<td>Soundness Determination Value</td>
</tr>
<tr>
<td>---------</td>
<td>-------------------</td>
<td>----------------------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>24</td>
<td>Vehicle speed sensor</td>
<td>Check by actually operating vehicle.</td>
<td>Speedometer indication and scan tool indication coincide.</td>
</tr>
<tr>
<td>26</td>
<td>stop light switch</td>
<td>Depress brake pedal.</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Do not depress brake pedal.</td>
<td>OFF</td>
</tr>
<tr>
<td>61</td>
<td>F.R. actuator</td>
<td>Tour mode with vehicle stationary</td>
<td>SOFT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sport mode with vehicle stationary</td>
<td>HARD</td>
</tr>
<tr>
<td>62</td>
<td>F.L. actuator</td>
<td>Tour mode with vehicle stationary</td>
<td>SOFT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sport mode with vehicle stationary</td>
<td>HARD</td>
</tr>
<tr>
<td>63</td>
<td>R.R. actuator</td>
<td>Tour mode with vehicle stationary</td>
<td>SOFT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sport mode with vehicle stationary</td>
<td>HARD</td>
</tr>
<tr>
<td>64</td>
<td>R.L. actuator</td>
<td>Tour mode with vehicle stationary</td>
<td>SOFT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sport mode with vehicle stationary</td>
<td>HARD</td>
</tr>
</tbody>
</table>

**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**

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Check Point</th>
<th>Check Condition</th>
<th>Scan Tool Service Data Item No. 61 - 64 Indicated</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Damping force SOFT</td>
<td>Vehicle in stationary condition</td>
<td>SOFT</td>
</tr>
<tr>
<td>03</td>
<td>Damping force MEDIUM</td>
<td></td>
<td>MEDIUM</td>
</tr>
<tr>
<td>04</td>
<td>Damping force HARD</td>
<td></td>
<td>HARD</td>
</tr>
</tbody>
</table>
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

(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.

<table>
<thead>
<tr>
<th>Steering turning speed</th>
<th>Scan tool indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approx. 0.3 seconds for 90° rotation</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Approx. 0.2 seconds for 90° rotation</td>
<td>HARD</td>
</tr>
</tbody>
</table>

(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

(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.

<table>
<thead>
<tr>
<th>Changing entered simulated vehicle speed</th>
<th>Scan tool indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 km/h (62 mph) to 80 km/h (50 mph)</td>
<td>HARD</td>
</tr>
</tbody>
</table>

(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.

<table>
<thead>
<tr>
<th>Entered simulated vehicle speed</th>
<th>Accelerator operating condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 km/h (19 mph)</td>
<td>HARD</td>
</tr>
<tr>
<td>60 km/h (37 mph)</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>90 km/h (56 mph)</td>
<td>SOFT</td>
</tr>
</tbody>
</table>

(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 \( \uparrow \) and \( \downarrow \) keys of the scan tool, however, the indications of service data items No. 61 through 64 do not change during the period the \( \uparrow \) or \( \downarrow \) key is pressed.)

<table>
<thead>
<tr>
<th>Changing entered simulated vehicle speed</th>
<th>Scan tool indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acceleration 129 km/h (80 mph) to 130 km/h (81 mph)</td>
<td>SOFT ( \rightarrow ) MEDIUM</td>
</tr>
<tr>
<td>Deceleration 120 km/h (75 mph) to 119 km/h (74 mph)</td>
<td>MEDIUM ( \rightarrow ) SOFT</td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>G sensor status</th>
<th>Scan tool indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shake up and down at a speed of a round trip in a second.</td>
<td>HARD</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switch position</td>
</tr>
<tr>
<td>ECS switch</td>
</tr>
<tr>
<td>OFF</td>
</tr>
</tbody>
</table>

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

Removal steps
1. Cargo floor box (R.H.)
2. Lid
3. ECS control unit
CIRCUIT DIAGRAM

1. DEDICATED FUSE
2. TAILLIGHT RELAY
3. G-W
4. J/B
5. 1.25R-W
6. 15A
7. ECS SWITCH
8. D-06
9. COMBINATION METER
10. D-03
11. B, Y
12. R-Y
13. B-Y
14. RHOSTAT
15. D-41
16. DATA LINK CONNECTOR
17. C-79
18. NOTE

1. NON-TURBO (Vehicles for Federal and Canada)
2. TURBO, NON-TURBO (Vehicles for California)
REAR AXLE

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    Grease leakage
  Noise while wheels are rotating
  Differential (Limited Slip Differential)
    Abnormal noise during driving or gear changing
    Abnormal noise when cornering
    Break down
    Gear noise
    Gear oil leakage
    Seizure
    The limited slip differential does not function
  Drive Shaft
    Noise
### SPECIFICATIONS

#### GENERAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Items</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Axle shaft</td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>Semi-floating type</td>
</tr>
<tr>
<td>Shaft dimensions mm (in.)</td>
<td></td>
</tr>
<tr>
<td>Outer bearing portion dia.</td>
<td>35 (1.38)</td>
</tr>
<tr>
<td>Inner bearing portion dia.</td>
<td>28 (1.10)</td>
</tr>
<tr>
<td>Center portion dia.</td>
<td>34.5 (1.36)</td>
</tr>
<tr>
<td>Overall length</td>
<td>245.4 (9.7)</td>
</tr>
<tr>
<td>Bearing</td>
<td></td>
</tr>
<tr>
<td>O.D. x I.D. mm (in.)</td>
<td></td>
</tr>
<tr>
<td>Outer</td>
<td>72 x 35 (2.83 x 1.38)</td>
</tr>
<tr>
<td>Inner</td>
<td>58 x 28 (2.28 x 1.10)</td>
</tr>
<tr>
<td>Drive shaft</td>
<td></td>
</tr>
<tr>
<td>Joint type</td>
<td></td>
</tr>
<tr>
<td>Outer</td>
<td>B.J.</td>
</tr>
<tr>
<td>Inner</td>
<td>T.J.</td>
</tr>
<tr>
<td>Length (joint to joint) x diameter mm (in.)</td>
<td>395 x 28 (15.6 x 1.10)</td>
</tr>
<tr>
<td>Differential</td>
<td></td>
</tr>
<tr>
<td>Reduction gear type</td>
<td>Hypoid gear</td>
</tr>
<tr>
<td>Reduction ratio</td>
<td>3.307</td>
</tr>
<tr>
<td>Differential gear type and configuration</td>
<td>Straight bevel gear x 2*</td>
</tr>
<tr>
<td>Straight bevel gear x 4</td>
<td></td>
</tr>
<tr>
<td>Number of teeth</td>
<td></td>
</tr>
<tr>
<td>Drive gear</td>
<td>43</td>
</tr>
<tr>
<td>Drive pinion</td>
<td>13</td>
</tr>
<tr>
<td>Side gear</td>
<td>16</td>
</tr>
<tr>
<td>Pinion gear</td>
<td>10</td>
</tr>
<tr>
<td>Bearing</td>
<td></td>
</tr>
<tr>
<td>O.D. x I.D. mm (in.)</td>
<td></td>
</tr>
<tr>
<td>Side</td>
<td>82.500 x 45.242 (3.25 x 1.78)</td>
</tr>
<tr>
<td>Front</td>
<td>68.263 x 30.163 (2.69 x 1.19)</td>
</tr>
<tr>
<td>Rear</td>
<td>76.200 x 36.513 (3.00 x 1.44)</td>
</tr>
</tbody>
</table>

**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

<table>
<thead>
<tr>
<th>Items</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting of T.J. boot length</td>
<td>mm (in.)</td>
</tr>
<tr>
<td>Final drive gear backlash</td>
<td>mm (in.)</td>
</tr>
<tr>
<td>Differential gear backlash (Limited slip differential)</td>
<td>mm (in.)</td>
</tr>
<tr>
<td>Drive pinion rotation torque</td>
<td>Nm (in.lbs.)</td>
</tr>
<tr>
<td>Drive pinion rotation torque</td>
<td>Nm (in.lbs.)</td>
</tr>
<tr>
<td>New part</td>
<td>0.5 – 0.7 (4–6)</td>
</tr>
<tr>
<td>New part/reusable part (gear oil application)</td>
<td>0.35 – 0.45 (3 – 4)</td>
</tr>
<tr>
<td>Without oil seal</td>
<td>0.15 – 0.25 (1 – 2)</td>
</tr>
<tr>
<td>Rear wheel bearing rotary-sliding resistance</td>
<td>N (lbs.)</td>
</tr>
<tr>
<td>Rear axle total backlash</td>
<td>mm (in.)</td>
</tr>
<tr>
<td>Drive gear runout</td>
<td>mm (in.)</td>
</tr>
<tr>
<td>Rear wheel bearing end play</td>
<td>mm (in.)</td>
</tr>
</tbody>
</table>

### LUBRICANTS

<table>
<thead>
<tr>
<th>Items</th>
<th>Specified lubricants</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rear axle gear oil</td>
<td>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</td>
<td>1.1 dm³ (1.2 qts.)</td>
</tr>
<tr>
<td>B.J. boot grease</td>
<td>Repair kit grease</td>
<td>125 g (4.41 oz.)</td>
</tr>
<tr>
<td>T.J. boot grease</td>
<td></td>
<td>135 g (4.76 oz.)</td>
</tr>
<tr>
<td>Oil seal lip</td>
<td>MOPAR Multi-Mileage Lubricant Part No. 2525035 or equivalent</td>
<td>As required</td>
</tr>
<tr>
<td>Washer of special tool (MB990901)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Companion flange</td>
<td>contacting surface of the washer</td>
<td></td>
</tr>
<tr>
<td>Outer bearing seal lip surface</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### SEALANTS AND ADHESIVES

<table>
<thead>
<tr>
<th>Items</th>
<th>Specified sealants and adhesives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive gear threaded hole</td>
<td>MOPAR Part No. 4318031 or 4318032 or equivalent</td>
</tr>
<tr>
<td>Tool number and tool name</td>
<td>Replaced by Miller tool number</td>
</tr>
<tr>
<td>---------------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>MB990767</td>
<td>C-3281</td>
</tr>
<tr>
<td>End yoke holder</td>
<td></td>
</tr>
<tr>
<td>MB991354</td>
<td>General service tool</td>
</tr>
<tr>
<td>Puller body</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>MB990241 MB990242</td>
<td>CT-1U03</td>
</tr>
<tr>
<td>Rear axle shaft puller</td>
<td></td>
</tr>
<tr>
<td>MB990242</td>
<td></td>
</tr>
<tr>
<td>Puller bar</td>
<td></td>
</tr>
<tr>
<td>MB990211</td>
<td>C-637*1</td>
</tr>
<tr>
<td>Sliding hammer and adapter</td>
<td>7420 and 7420-8*2</td>
</tr>
<tr>
<td>MB990560</td>
<td>P334</td>
</tr>
<tr>
<td>Bearing remover</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>MB990925</td>
<td>General service tool</td>
</tr>
<tr>
<td>Bearing and oil seal installer set</td>
<td>MB990938, MB990928</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Tool number and tool name</td>
<td>Replaced by Miller tool number</td>
</tr>
<tr>
<td>---------------------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>MB990641</td>
<td>MB990641</td>
</tr>
<tr>
<td>Lower arm bushing installer and remover A</td>
<td></td>
</tr>
<tr>
<td>MB990799</td>
<td>MB990799</td>
</tr>
<tr>
<td>Ball joint dust shield installer</td>
<td></td>
</tr>
<tr>
<td>MB990909</td>
<td>General service tool</td>
</tr>
<tr>
<td>Working base</td>
<td></td>
</tr>
<tr>
<td>MB991116</td>
<td>General service tool</td>
</tr>
<tr>
<td>Working base adapter</td>
<td></td>
</tr>
<tr>
<td>MB991367</td>
<td>6568</td>
</tr>
<tr>
<td>Special spanner</td>
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</tr>
<tr>
<td>MB991385</td>
<td>MB991385</td>
</tr>
<tr>
<td>Pin</td>
<td></td>
</tr>
<tr>
<td>MB990810</td>
<td>P-334</td>
</tr>
<tr>
<td>Bearing puller</td>
<td></td>
</tr>
<tr>
<td>MB990850</td>
<td>C-3281</td>
</tr>
<tr>
<td>End yoke holder</td>
<td></td>
</tr>
<tr>
<td>MB990339</td>
<td>C-293PA</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Tool number and tool name</td>
<td>Replaced by Miller tool number</td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>MB990648</td>
<td>C-293-45</td>
</tr>
<tr>
<td>MB990890 Rear suspension bushing base</td>
<td>MB990890</td>
</tr>
<tr>
<td>MB990901 Drive pinion setting gauge set</td>
<td>C-4626</td>
</tr>
<tr>
<td>MB991378 Drive pinion setting gause set</td>
<td>MB991365-A</td>
</tr>
<tr>
<td>MB990326 Preload socket</td>
<td>General service tool</td>
</tr>
<tr>
<td>MB991168 Oil seal installer</td>
<td>MB991168-A</td>
</tr>
<tr>
<td>MB990728 Bearing installer</td>
<td>MD998909</td>
</tr>
<tr>
<td>MB991380 Oil seal installer</td>
<td>MD998911</td>
</tr>
<tr>
<td>MB991380-A</td>
<td></td>
</tr>
<tr>
<td>MB991294 Side gear holding tool</td>
<td>MB991294</td>
</tr>
</tbody>
</table>
# TROUBLESHOOTING

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AXLE SHAFT</strong>&lt;br&gt;Noise while wheels are rotating</td>
<td>Brake drag&lt;br&gt;Bent axle shaft&lt;br&gt;Worn or scarred axle shaft bearing</td>
<td>Replace</td>
</tr>
<tr>
<td>Grease leakage</td>
<td>Worn or damaged oil seal&lt;br&gt;Malfunction of bearing seal</td>
<td>Replace</td>
</tr>
<tr>
<td><strong>DRIVE SHAFT</strong>&lt;br&gt;Noise</td>
<td>Wear, play or seizure of ball joint&lt;br&gt;Excessive drive shaft spline looseness</td>
<td>Replace</td>
</tr>
<tr>
<td><strong>DIFFERENTIAL</strong>&lt;br&gt;(LIMITED SLIP DIFFERENTIAL)&lt;br&gt;Abnormal noise during driving or gear changing</td>
<td>Excessive final drive gear backlash&lt;br&gt;Insufficient drive pinion preload</td>
<td>Adjust</td>
</tr>
<tr>
<td></td>
<td>Excessive differential gear backlash</td>
<td>Adjust or replace</td>
</tr>
<tr>
<td></td>
<td>Worn spline of a side gear</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Loose companion flange self-locking nut</td>
<td>Retighten or replace</td>
</tr>
</tbody>
</table>

**NOTE**<br>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,

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abnormal noise when cornering</td>
<td>Damaged differential gears&lt;br&gt;Damaged pinion shaft</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Insufficient gear oil quantity</td>
<td>Replenish</td>
</tr>
<tr>
<td>Gear noise</td>
<td>Improper final drive gear tooth contact adjustment</td>
<td>Adjust or replace</td>
</tr>
<tr>
<td></td>
<td>Incorrect final drive gear backlash&lt;br&gt;Improper drive pinion preload adjustment</td>
<td>Adjust</td>
</tr>
<tr>
<td></td>
<td>Damaged, broken, and/or seized tooth surfaces of the drive gear and drive pinion&lt;br&gt;Damaged, broken, and/or seized drive pinion bearings&lt;br&gt;Damaged, broken, and/or seized side bearings&lt;br&gt;Damaged differential case&lt;br&gt;Inferior gear oil</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Insufficient gear oil quantity</td>
<td>Replenish</td>
</tr>
</tbody>
</table>

**NOTE**<br>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.<br>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,
<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gear oil leakage</td>
<td>Worn or damaged front oil seal, or an improperly installed oil seal</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Damaged gasket</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Loose companion flange self-locking nut</td>
<td>Retighten or replace</td>
</tr>
<tr>
<td></td>
<td>Loose filler or drain plug</td>
<td>Retighten or apply adhesive</td>
</tr>
<tr>
<td></td>
<td>Clogged or damaged vent plug</td>
<td>Clean or replace</td>
</tr>
<tr>
<td>Seizure</td>
<td>Insufficient final drive gear backlash</td>
<td>Adjust</td>
</tr>
<tr>
<td></td>
<td>Excessive drive pinion preload</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Excessive side bearing preload</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Insufficient differential gear backlash</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Excessive clutch plate preload</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inferior gear oil</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Insufficient gear oil quantity</td>
<td>Replenish</td>
</tr>
</tbody>
</table>

**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                                           | Adjust                  |
|                     | Insufficient drive pinion preload                                             |                         |
|                     | Insufficient side bearing preload                                             |                         |
|                     | Excessive differential gear backlash                                         |                         |
|                     | 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    | The limited slip device is damaged                                            | Disassemble, check the functioning and replace the damaged parts |
| differential does not function (on snow, mud, ice, etc.) | | |
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 [1.1dm³ (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
9. Rear rotor
   <Vehicles with A.B.S.>
10. Outer bearing
11. Dust shield
12. Dust shield
13. Axle shaft
14. Oil seal
15. Inner bearing

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.

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

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).

<table>
<thead>
<tr>
<th>Item</th>
<th>Drive shaft</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LH</td>
</tr>
<tr>
<td>Boot band (B.J. side) identification color</td>
<td>White</td>
</tr>
</tbody>
</table>

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

Disassembly steps:
1. T.J. boot band (large)
2. T.J. boot band (small)
3. T.J. case
4. Snap ring
5. Spider assembly
6. T.J. boot
7. B.J. boot band (large)
8. B.J. boot band (small)
9. B.J. boot
10. B.J. assembly
11. Circlip
Lubrication Points

Grease: Repair kit grease
Quantity to use: 135 g (4.76 oz.)
Caution
Apply all of the grease from the repair kit to the joint and boot, a half to each as a rule.
Special grease is used for the joint. Do not mix old grease with new or mix different types.

Grease: Repair kit grease
Quantity to use: 125 g (4.41 oz.)
Caution
Apply all of the grease from the repair kit to the joint and boot, a half to each as a rule.
Special grease is used for the joint. Do not mix old grease with new or mix different types.
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

   (1) Wrap vinyl tape around the drive shaft spline.
   (2) Insert the drive shaft in B.J. boot, boot bands, T.J. boot in that sequence.
(3) Fill the inside of the B.J. and B.J. boot with the specified grease.

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

Caution
The grease in the repair kit should be divided in half for use, respectively, at the joint and inside the boot.
A special type of grease is used on the joint. Be cautious to ensure that not other grease is allowed to come in contact with the joint.

(4) Secure the boot bands.

Caution
1. The boot bands should be tightened with the drive shaft at a 0° joint angle.
2. The B.J. boot band and T.J. boot band are identified by the identification number stamped on the lever. Install correct ones at correct positions.

5. INSTALLATION OF SPIDER ASSEMBLY

(1) Apply the specified grease furnished in the repair kit to the spider assembly.

Specified grease: Repair kit grease

(2) Install the spider assembly with the chamfered spline end first.

2. 1. INSTALLATION OF T.J. BOOT BANDS

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

Standard value: 85 ± 3 mm (3.35 ± .12 in.)
Differential Carrier
Removal and Installation

Pre-removal and Post-installation Operation
- Draining and Filling of Differential Gear Oil
  (Refer to Group 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)

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tooth contact pattern resulting from excessive pinion height</td>
<td>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.</td>
</tr>
</tbody>
</table>

**Tooth contact pattern resulting from insufficient pinion height**

The drive pinion is positioned too close to the center of the drive gear. Decrease the thickness of the pinion height adjusting shim, and position the drive pinion farther from the center of the drive gear. Also, for backlash adjustment, position the drive gear closer to the drive pinion.

**NOTE**

1. Tooth contact pattern is a method for judging the result of the adjustment of drive pinion height and final drive gear backlash. The adjustment of drive pinion height and final drive gear backlash should be repeated until tooth contact patterns bear a *similarity to the 'standard' tooth contact pattern.*

2. When adjustment is not able to obtain a correct pattern, it may be judged that the drive gear and drive pinion have 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.
REAR AXLE – Differential Carrier

Reassembly steps

- 1. Spring pin
- 2. Drivegear
- 3. Differential carrier
- 4. Drive pinion rear bearing outer race
- 5. Drive pinion front bearing outer race
- Drive pinion height adjustment
- 6. Drive pinion
- 7. Drive pinion rear shim
  (for drive pinion height adjustment)
- 8. Drive pinion rear bearing inner race
- 9. Drive pinion spacer
- Drive pinion preload adjustment
- 10. Drive pinion front shim
- 11. Drive pinion assembly
- 12. Drive pinion front bearing inner race
- 13. Oil seal
- 14. Companion flange
- 15. Washer
- 16. Self-locking nut
- 17. LSD case (Refer to P.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.

3. 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

<table>
<thead>
<tr>
<th>Bearing classification</th>
<th>Bearing lubrication</th>
<th>Rotation torque Nm (in.lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>New</td>
<td>None (with rust-prevention oil)</td>
<td>0.3 – 0.5 (3 – 4)</td>
</tr>
<tr>
<td>New/reused</td>
<td>Gear oil application</td>
<td>0.15 – 0.25 (1 – 2)</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Standard value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bearing classification</td>
</tr>
<tr>
<td>New</td>
</tr>
<tr>
<td>New/reused</td>
</tr>
</tbody>
</table>

(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

<table>
<thead>
<tr>
<th>Bearing classification</th>
<th>Bearing lubrication</th>
<th>Rotation torque Nm (in.lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>New</td>
<td>None (with rust-prevention oil)</td>
<td>0.5 – 0.7 (4 – 6)</td>
</tr>
<tr>
<td>New/reused</td>
<td>Gear oil application</td>
<td>0.35 – 0.45 (3 – 4)</td>
</tr>
</tbody>
</table>

If there is a deviation from the standard value, check whether or not there is incorrect tightening torque of the companion flange tightening self-locking nut, or incorrect fitting of the oil seal.

### 18. INSTALLATION OF DRIVE GEAR

(1) Clean the drive gear attaching bolts.

(2) Use an M10 x 1.25 tap to remove the adhesive adhering to the threaded holes of the drive gear, and then clean the threaded holes by applying compressed air.
(3) Apply multipurpose adhesive to the threaded holes of the drive gear.

**Specified adhesive:** 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 (0.004 — 0.006 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

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 ($0.0012 - 0.0035$ 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**


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).

<table>
<thead>
<tr>
<th>Thrust washer (left)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part No.</td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
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<tr>
<td></td>
</tr>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Thrust washer (right) (reference)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part No.</td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
</tr>
</tbody>
</table>

NOTE
Select one thrust washer (left) from the eleven types in the kit.
BRAKES
SERVICE AND PARKING

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

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

<table>
<thead>
<tr>
<th>Items</th>
<th>FWD</th>
<th>AWD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master cylinder</td>
<td>Tandem type (with level sensor)</td>
<td>Tandem type (with level sensor)</td>
</tr>
<tr>
<td>I.D. mm (in.)</td>
<td>25.4 (1) or 26.9 (1(\frac{1}{16}))*</td>
<td>26.9 (1(\frac{1}{16}))</td>
</tr>
<tr>
<td>Brake booster</td>
<td>Vacuum type, tandem</td>
<td>Vacuum type, tandem</td>
</tr>
<tr>
<td>Effective dia. of power cylinder mm (in.)</td>
<td>180 (7.0) + 205 (8.0) or 203 (8.0) + 230 (9.0)*</td>
<td>203 (8.0) + 230 (9.0)</td>
</tr>
<tr>
<td>Boosting ratio</td>
<td>6.0 [at 247 N (54 lbs.]) or 7.0 [at 261 N (58 lbs.)]*</td>
<td>7.0 [at 261 N (58 lbs.)]</td>
</tr>
<tr>
<td>Proportioning valve</td>
<td>3.75 – 4.25 (533 – 604)</td>
<td>3.75 – 4.25 (533 – 604)</td>
</tr>
<tr>
<td>Front brakes</td>
<td>Floating caliper, 2-piston, ventilated disc (M-R57W)</td>
<td>Rigid caliper, 4-piston, ventilated disc (M-R76Z)</td>
</tr>
<tr>
<td>Type</td>
<td>Rigid caliper, 2-piston, ventilated disc (M-R45V)</td>
<td>Rigid caliper, 2-piston, ventilated disc (M-R68X)</td>
</tr>
<tr>
<td>Rear brakes</td>
<td>Floating caliper, 1-piston, ventilated disc (M-R45V)</td>
<td>Rigid caliper, 2-piston, ventilated disc (M-R68X)</td>
</tr>
<tr>
<td>Type</td>
<td>228 (9.0)</td>
<td>250 (9.8)</td>
</tr>
<tr>
<td>Disc effective dia. mm (in.)</td>
<td>24 (.94)</td>
<td>20 (.79)</td>
</tr>
<tr>
<td>Disc thickness mm (in.)</td>
<td>16 (.63)</td>
<td>15 (.60)</td>
</tr>
<tr>
<td>Pad thickness mm (in.)</td>
<td>42.8 (1(\frac{1}{16})) x 2</td>
<td>40.4 (1(\frac{19}{32})) x 2 + 42.8 (1(\frac{1}{16})) x 2</td>
</tr>
<tr>
<td>Wheel cylinder I.D. mm (in.)</td>
<td>Automatic</td>
<td>Automatic</td>
</tr>
<tr>
<td>Rear brakes</td>
<td>Mechanical brake acting on rear wheels</td>
<td>Mechanical brake acting on rear wheels</td>
</tr>
<tr>
<td>Parking brakes</td>
<td>Leaver type</td>
<td>Leaver type</td>
</tr>
<tr>
<td>Type</td>
<td>V-type</td>
<td>V-type</td>
</tr>
<tr>
<td>Brake lever type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cable arrangement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotor teeth</td>
<td>47</td>
<td>47</td>
</tr>
<tr>
<td>Front wheel side</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speed sensor</td>
<td>Magnet coil type</td>
<td>Magnet coil type</td>
</tr>
<tr>
<td>Rear wheel side</td>
<td></td>
<td></td>
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</table>

**NOTE**

*: ABS
## SERVICE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Items</th>
<th>FWD</th>
<th>AWD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standard value</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brake pedal height mm (in.)</td>
<td>177 – 182 (7.0 – 7.2)</td>
<td>177 – 182 (7.0 – 7.2)</td>
</tr>
<tr>
<td>Brake pedal free play mm (in.)</td>
<td>3 – 8 (.1 – .3)</td>
<td>3 – 8 (.1 – .3)</td>
</tr>
<tr>
<td>Brake pedal to floorboard clearance mm (in.)</td>
<td>80 (3.1) or more</td>
<td>80 (3.1) or more</td>
</tr>
<tr>
<td>Pad thickness mm (in.)</td>
<td>10.0 (.39)</td>
<td>10.0 (.39)</td>
</tr>
<tr>
<td>Front disc thickness mm (in.)</td>
<td>24.0 (.94)</td>
<td>30.0 (.18)</td>
</tr>
<tr>
<td>Rear disc thickness mm (in.)</td>
<td>18.0 (.71)</td>
<td>20.0 (.79)</td>
</tr>
<tr>
<td>Proportioning valve pressure MPa (psi)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Split point</td>
<td>3.75 – 4.25 (533 – 604)</td>
<td>3.75 – 4.25 (533 – 604)</td>
</tr>
<tr>
<td>Output pressure [input pressure]</td>
<td>5.23 – 5.73 (744 – 815)</td>
<td>5.23 – 5.73 (744 – 815)</td>
</tr>
<tr>
<td>Booster push rod to master cylinder piston clearance mm (in.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 + 8 inch brake booster</td>
<td>0.55 – 0.75 (.022 – .030)</td>
<td>–</td>
</tr>
<tr>
<td>8 + 9 inch brake booster</td>
<td>0.65 – 0.85 (.026 – .033)</td>
<td>0.65 – 0.85 (.026 – .033)</td>
</tr>
<tr>
<td>Disc brake drag force (tangential force of wheel mounting bolts) N (lbs.)</td>
<td>70 (15.4) or less</td>
<td>70 (15.4) or less</td>
</tr>
<tr>
<td>Speed sensor's (ABS) internal resistance kΩ</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Front</td>
<td>0.8 – 1.2</td>
<td>0.8 – 1.2</td>
</tr>
<tr>
<td>Rear</td>
<td>0.6 – 0.8</td>
<td>0.8 – 1.2</td>
</tr>
<tr>
<td>Solenoid valve (HU) resistance Ω</td>
<td>1.0 – 1.3</td>
<td>1.0 – 1.3</td>
</tr>
<tr>
<td>Rear speed sensor pole piece-to-rotor tooth surface clearance mm (in.)</td>
<td>–</td>
<td>28.15 – 28.45 (1.11 – 1.12)</td>
</tr>
<tr>
<td>Clearance between the speed pole piece and the toothed rotor mm (in.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Front</td>
<td>0.3 – 0.9 (.012 – .035)</td>
<td>–</td>
</tr>
<tr>
<td>Rear</td>
<td>0.2 – 0.7 (.008 – .028)</td>
<td>–</td>
</tr>
<tr>
<td>Parking brake lever stroke</td>
<td>3 – 5 notches</td>
<td>3 – 5 notches</td>
</tr>
<tr>
<td>Brake lining thickness mm (in.)</td>
<td>2.8 (.11)</td>
<td>2.8 (.11)</td>
</tr>
<tr>
<td>Brake drum I.D. mm (in.)</td>
<td>168.0 (6.6)</td>
<td>168.0 (6.6)</td>
</tr>
<tr>
<td><strong>Limit</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Left/right proportioning valve output pressure difference MPa (psi)</td>
<td>0.4 (57)</td>
<td>0.4 (57)</td>
</tr>
<tr>
<td>Front disc run-out mm (in.)</td>
<td>0.07 (.0028) or less</td>
<td>0.1 (.004) or less</td>
</tr>
<tr>
<td>Pad thickness mm (in.)</td>
<td>2.0 (.08)</td>
<td>2.0 (.08)</td>
</tr>
<tr>
<td>Front disc thickness mm (in.)</td>
<td>22.4 (.88)</td>
<td>28.4 (1.12)</td>
</tr>
<tr>
<td>Front hub end play mm (in.)</td>
<td>0.05 (.002)</td>
<td>0.05 (.002)</td>
</tr>
<tr>
<td>Rear disc thickness mm (in.)</td>
<td>16.4 (.65)</td>
<td>18.4 (.72)</td>
</tr>
<tr>
<td>Rear disc run-out mm (in.)</td>
<td>0.08 (.0031) or less</td>
<td>0.08 (.0031) or less</td>
</tr>
<tr>
<td>Rear hub end play mm (in.)</td>
<td>0.05 (.002)</td>
<td>0.8 (.031)</td>
</tr>
<tr>
<td>Brake lining thickness mm (in.)</td>
<td>1.0 (.04)</td>
<td>1.0 (.04)</td>
</tr>
<tr>
<td>Brake drum I.D. mm (in.)</td>
<td>169.0 (6.7)</td>
<td>169.0 (6.7)</td>
</tr>
</tbody>
</table>
### LUBRICANTS

<table>
<thead>
<tr>
<th>Items</th>
<th>Specified lubricant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brake fluid</td>
<td>MOPAR Brake Fluid/Conforming to DOT3 or DOT4</td>
</tr>
<tr>
<td>Brake pedal bushing inner surface, Clevis pin and washer</td>
<td>MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent</td>
</tr>
<tr>
<td>Inside of shim A and shim B, or inside of inner shim A, inner shim B, and outer shim</td>
<td>MOPAR Multi-Purpose Grease Part No. 2932524 or equivalent</td>
</tr>
<tr>
<td>Guide pin and lock pin pin sliding part, Piston boot inner surface, Pin boot inner surface</td>
<td>Repair kit grease</td>
</tr>
<tr>
<td>Parking brake lever sliding parts, Bush inner surfaces, Rear brake shoe and backing plate contact surfaces, Contact surface between shoe &amp; lining assembly's strut and adjuster, Contact surface between shoe &amp; lining assembly and shoe-adjustment bolt and shoe-support piece</td>
<td>MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent</td>
</tr>
</tbody>
</table>

### SEALANTS AND ADHESIVES

<table>
<thead>
<tr>
<th>Items</th>
<th>Specified sealant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shoe hold-down pin installation surface</td>
<td>MOPAR “STIC” Cement Part No. 2299314</td>
</tr>
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</table>

### SPECIAL TOOLS

<table>
<thead>
<tr>
<th>Tool number and tool name</th>
<th>Replaced by Miller tool number</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>MB990767 End yoke holder</td>
<td>C-3281</td>
<td>Holding of rear axle shaft</td>
</tr>
<tr>
<td>MB991354 Puller body</td>
<td>General service tool</td>
<td>Removal of the axle shaft *1: C-P-D Dealers *2: Eagle Dealers</td>
</tr>
<tr>
<td>MB990241 Rear axle shaft puller</td>
<td>CT-1003</td>
<td></td>
</tr>
<tr>
<td>MB990242 Puller bar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MB990211 Sliding hammer and adapter</td>
<td>C-637<em>1 7420 and 7420-8</em>2</td>
<td></td>
</tr>
</tbody>
</table>
### Tool numbers and tool names

<table>
<thead>
<tr>
<th>Tool number and tool name</th>
<th>Replaced by Miller tool number</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>MB990964 MB990520 Brake tool set</td>
<td>General service tool</td>
<td>Compressing of disc brake piston</td>
</tr>
<tr>
<td>MB991356 ABS check harness</td>
<td></td>
<td>For checking of ABS</td>
</tr>
<tr>
<td>MB991502 Scan tool (MUT-II)</td>
<td>DRB II Scan tool</td>
<td></td>
</tr>
</tbody>
</table>

### TROUBLESHOOTING

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle pulls to one side when brakes are applied</td>
<td>Grease or oil on pad or lining surface</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Inadequate contact of pad</td>
<td>Correct</td>
</tr>
<tr>
<td></td>
<td>Auto adjuster malfunction</td>
<td>Adjust</td>
</tr>
<tr>
<td>Insufficient braking power</td>
<td>Low or deteriorated brake fluid</td>
<td>Add or refill</td>
</tr>
<tr>
<td></td>
<td>Air in brake system</td>
<td>Bleed air from system</td>
</tr>
<tr>
<td></td>
<td>Overheated brake rotor due to dragging of pad</td>
<td>Correct</td>
</tr>
<tr>
<td></td>
<td>Grease or oil on pad surface</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Inadequate contact of pad</td>
<td>Correct</td>
</tr>
<tr>
<td></td>
<td>Brake booster malfunction</td>
<td>Correct</td>
</tr>
<tr>
<td></td>
<td>Auto adjuster malfunction</td>
<td>Adjust</td>
</tr>
<tr>
<td></td>
<td>Clogged brake line</td>
<td>Correct</td>
</tr>
<tr>
<td></td>
<td>Proportioning valve malfunction</td>
<td>Replace</td>
</tr>
<tr>
<td>Increased pedal stroke (Reduced pedal to floorboard clearance)</td>
<td>Air in brake system</td>
<td>Bleed air from system</td>
</tr>
<tr>
<td></td>
<td>Worn pad</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Broken vacuum hose</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Brake fluid leaks</td>
<td>Correct</td>
</tr>
<tr>
<td></td>
<td>Excessive push rod to master cylinder clearance</td>
<td>Adjust</td>
</tr>
<tr>
<td></td>
<td>Faulty master cylinder</td>
<td>Replace</td>
</tr>
<tr>
<td>Symptom</td>
<td>Probable cause</td>
<td>Remedy</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>-----------------------------------------------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td><strong>Brake drag</strong></td>
<td>Incomplete release of parking brake</td>
<td>Correct</td>
</tr>
<tr>
<td></td>
<td>Incorrect parking brake adjustment</td>
<td>Adjust</td>
</tr>
<tr>
<td></td>
<td>Worn brake pedal return spring</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Incorrect push rod to master cylinder clearance</td>
<td>Adjust</td>
</tr>
<tr>
<td></td>
<td>Defective master cylinder piston return spring</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Clogged master cylinder return port</td>
<td>Correct</td>
</tr>
<tr>
<td><strong>Insufficient parking brake function</strong></td>
<td>Worn brake pad</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Excessive parking brake lever stroke</td>
<td>Adjust the parking brake lever stroke or check the parking brake cable routing</td>
</tr>
<tr>
<td></td>
<td>Grease or oil on pad surface</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Parking brake cable sticking</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Stuck caliper piston</td>
<td>Replace</td>
</tr>
<tr>
<td><strong>Scraping or grinding noise when brakes are applied</strong></td>
<td>Worn brake pads</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Caliper to wheel interference</td>
<td>Correct or replace</td>
</tr>
<tr>
<td></td>
<td>Cracked brake disc</td>
<td>Correct or replace</td>
</tr>
<tr>
<td><strong>Squealing, groaning or chattering noise when brakes are applied</strong></td>
<td>Disc brakes – missing or damaged brake pad anti-squeak shim</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Brake discs and pads worn or scored</td>
<td>Correct or replace</td>
</tr>
<tr>
<td></td>
<td>Improper lining parts</td>
<td>Correct or replace</td>
</tr>
<tr>
<td></td>
<td>Disc brakes – burred or rusted calipers</td>
<td>Clean or deburr</td>
</tr>
<tr>
<td></td>
<td>Dirty, greased, contaminated or glazed pad</td>
<td>Clean or replace</td>
</tr>
<tr>
<td></td>
<td>Incorrect adjustment of brake pedal or booster push-rod</td>
<td>Adjust</td>
</tr>
<tr>
<td><strong>Squealing noise when brakes are not applied</strong></td>
<td>Disc brakes – rusted, stuck</td>
<td>Lubricate or replace</td>
</tr>
<tr>
<td></td>
<td>Loose or extra brake parts</td>
<td>Retighten</td>
</tr>
<tr>
<td></td>
<td>Improper positioning of pads in caliper</td>
<td>Correct</td>
</tr>
<tr>
<td></td>
<td>Improper installation of support mounting to caliper body</td>
<td>Correct</td>
</tr>
<tr>
<td></td>
<td>Poor return of brake booster or master cylinder</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Incorrect adjustment of brake pedal or booster push-rod setting</td>
<td>Adjust</td>
</tr>
<tr>
<td><strong>Groaning, clicking or rattling noise when brakes are not applied</strong></td>
<td>Stones or foreign material trapped inside wheel covers</td>
<td>Remove stones, etc.</td>
</tr>
<tr>
<td></td>
<td>Loose wheel nuts</td>
<td>Retighten</td>
</tr>
<tr>
<td></td>
<td>Disc brakes - failure of shim</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Disc brakes – loose installation bolt</td>
<td>Retighten</td>
</tr>
<tr>
<td></td>
<td>Incorrect adjustment of brake pedal or booster push-rod setting</td>
<td>Adjust</td>
</tr>
</tbody>
</table>
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
CONFIRM CONDITION IN THE FOLLOWING WAY AND DIAGNOSE 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.

---

<table>
<thead>
<tr>
<th>No.</th>
<th>Trouble condition</th>
<th>Major causes</th>
<th>Remedy</th>
</tr>
</thead>
</table>
| 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.) |
|     | ABS warning light |              |        |
|     | Ignition key      |              |        |
| 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.) |
|     | ABS warning light |              |        |
|     | Ignition key      |              |        |
| 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.) |
|     | ABS warning light |              |        |
|     | Ignition key      |              |        |
CONTINUED FROM PREVIOUS PAGE

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

Yes \(\rightarrow\) 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?

Yes \(\rightarrow\) Normal

No

<table>
<thead>
<tr>
<th>Trouble condition</th>
<th>Major causes</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>One-sided braking</td>
<td>- Hydraulic line in HU is clogged. &lt;br&gt; - Mechanical lock of HU solenoid valve</td>
<td>Check HU operation and, if necessary, replace HU. If HU is normal, check structural parts for normal braking.</td>
</tr>
<tr>
<td>Insufficient braking force</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decline in ABS function</td>
<td>- Hydraulic line in HU is clogged. &lt;br&gt; - Malfunction in HU solenoid valve operation</td>
<td></td>
</tr>
<tr>
<td>ABS sometimes functions even when there is no sudden braking. (ABS operation vibration is transmitted.)</td>
<td>- Insufficient wheel speed sensor output voltage (sensor malfunction, too large a gap between sensor rotor, missing rotor teeth) &lt;br&gt; - Malfunction of ABS ECU</td>
<td>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.</td>
</tr>
</tbody>
</table>
CONTINUED FROM PREVIOUS PAGE

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

No diagnostic trouble codes output and normal codes are displayed?

Yes

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

No

No on-board diagnostic output

Yes

Diagnostic trouble codes are output

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.

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

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

Caution
1. When carrying out inspection of the ABS-ECU terminal voltage and resistance, the special tool (MB991356) should be used.
2. Because the ABS-ECU connector terminal No. layout for troubleshooting is different from the terminal No. layout shown on the special tool connector, when using the special tool for inspecting, take the readings from the special tool terminal Nos.

Example

<table>
<thead>
<tr>
<th>ABS-ECU connector terminal No. for troubleshooting</th>
<th>Terminal No. shown on the special tool connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>1</td>
</tr>
</tbody>
</table>
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-1-E-6).

---

DIAGNOSTIC TROUBLE CODE CHART

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

<table>
<thead>
<tr>
<th>No.</th>
<th>Scan tool display</th>
<th>Drive solenoid valve and motor</th>
<th>Drive pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>FR VALVE A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>02</td>
<td>FL VALVE A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03</td>
<td>REAR VALVE A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>04</td>
<td>FR VALVE M</td>
<td>Solenoid valve and pump motor for each HU corresponding channel. &lt;Manual pattern&gt;</td>
<td></td>
</tr>
<tr>
<td>05</td>
<td>FL VALVE M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>06</td>
<td>REAR VALVE M</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
A ABS warning light does not light at all.

[Explaination]
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.
With the ignition key in the “ON” position, do other warning lights (except door-ajar warning light, seat belt warning light) illuminate?

Yes → Turn the ignition switch OFF and check.

No → Check fuse No. 11. If it is blown, correct the cause of the blown fuse and then replace the fuse.

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?

Yes → The harness between the combination meter from fuse No. 11 is broken.

Yes → Repair harness.

No → Repair or replace combination meter.

Is the ABS warning light normal? (Check for burned bulb.)

Yes → Faulty combination meter

No → Replace ABS warning light bulb.

Is there continuity between combination meter No. 58 and No. 59 terminals?

Yes → Repair or replace combination meter

No → Are instrument panel wiring harness and body wiring harness connected properly?

Yes → Connect connectors firmly. (Check for pins pulled out or bent, and repair as needed.)

No → 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.5-58.)
    - 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.
[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?

- Yes
  - Is fuse No. 3 normal?
    - Yes
      - Is power relay normal? (Refer to P. 5-69.)
        - Yes
          - Disconnect ECU connector and check harness connector
        - No
          - Power relay malfunction
    - No
      - Correct cause of blown fuse and replace fuse.

- No
  - Scan tool related malfunction. Repair and recheck.

Is there continuity between body harness terminals No. 9 and No. 34, and ground?

- Yes
  - Is there continuity between body harness connector terminals No. 23 and No. 24, and diagnosis inspection terminals No. 4 & No. 10?
    - Yes
      - Malfunction of ABS ECU
    - No
      - Harness wire between diagnosis inspection terminal and ABS ECU is broken

- No
  - ECU ground line broken

Is harness wire between power relay and ECU is broken?

- Yes
  - Repair harness.
- No
  - Repair harness.

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 IG2 power source which is turned off in the “START” position. The ABS warning light uses the IG1 power source which is not turned off even in the “START” position. Consequently, in the “START” position, power is off and the ECU turns the valve relay OFF. If the warning light does not illuminate at this time, there is trouble in the warning light circuit on the valve relay side.

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?

Yes

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

Yes

HU harness malfunction

No

Valve relay malfunction

Replace valve relay.

No

Harness wire between HU and warning light is broken.

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

No

Broken line between HU and body ground

NOTE
When performing the check marked *, note polarity of the diode (refer to the circuit diagram).
ABS warning light blinks once after the ignition key is turned to the “ON” position. It illuminates in the “START” position and blinks once again when turned to the “ON” position.

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

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

In the ignition key “ON” position, does voltage between terminal No. 25 and ground indicate battery positive voltage?

Yes

Malfunction of ABS ECU

Replace ABS ECU.

No

Harness wire between ABS warning light and ECU is broken.

Repair harness.
E-1 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.
Check flow connected with wheel speed sensor

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

- **Yes**
- **No**
  - Malfunction of wheel speed sensor
    - Replace wheel speed sensor

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

- **Yes**
- **No**
  - Harness wire for wheel speed sensor circuit is broken
    - Repair harness.

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.)

- **Yes**
- **No**
  - Adjust the gap between the wheel speed sensor and rotor.

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

- **Yes**
- **No**
  - Replace rotor that has missing or damaged teeth.

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?

- **Yes**
  - Wheel speed sensor related things are normal.
- **No**
  - Recheck if below the standard value or if the sensor has a poor waveform. Replace sensor or rotor.
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.

```
Do the stop lights light up and go out normally?  
Yes   Check the stop light related circuit and repair problem spots.

No

Disconnect the ABS ECU connector and inspect at the harness side connector.

When the brake pedal is pressed forcefully, does the voltage between connector terminal No. 29 and ground indicate battery positive voltage?  
Yes

Repair harness.

Malfunction of ABS ECU

No

Harness wire between stop light switch and ABS ECU is broken.

Replace ABS ECU.
```
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.

1. Remove HU 1 OP connector and check with the HU side connector.
2. Is the resistance value for the solenoid valve within the range of the standard values?
   **Standard value: 1.0–1.3 Ω**
   - **Yes**: Connect HU 1 OP connector, disconnect ECU connector and check.
   - **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.

3. 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**
   - **Yes**: Repair ABS harness.
   - **No**: Malfunction of ABS ECU

4. Remove HU 1 OP connector and check with the HU side connector.
5. Replace HU.
6. Replace ABS ECU.
[Explanations]

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.

Remove and check the valve relay.

When the valve relay is checked, are the following conditions found?

No. 85 – No. 86: Resistance value 60 – 120Ω
No. 30 – No. 87a: Continuity
No. 30 – No. 87: No continuity
When battery positive voltage is applied between terminals No. 86 and No. 85.
No. 30 – No. 87: Continuity
No. 30 – No. 87a: No continuity

Yes

Install the valve relay and remove the HU connector.

With the ignition key "ON", does the voltage between the connector terminal No. 12 and ground indicate battery voltage?

Yes

Is there continuity between HU No. 8 and No. 7 terminals?

Yes

Connect the HU harness and remove the ECU connector.

Does resistance between body connector terminal No. 2 and terminal No. 2/ indicate 6Ω – 120Ω

No

Faulty harness in HU

Repair harness or replace HU

Yes

Repair harness.

Malfunction of harness between HU and ECU

Repair harness.
[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.

---

<table>
<thead>
<tr>
<th>Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image_url" alt="Diagram Image" /></td>
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</tbody>
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<table>
<thead>
<tr>
<th>Flowchart</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image_url" alt="Flowchart Image" /></td>
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</tbody>
</table>

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<table>
<thead>
<tr>
<th>Table</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image_url" alt="Table Image" /></td>
</tr>
</tbody>
</table>
TROUBLESHOOTING (ABS – AWD)

Confirm condition in the following way and diagnosis accordingly.

<table>
<thead>
<tr>
<th>No.</th>
<th>Trouble condition</th>
<th>Major causes</th>
<th>Remedy</th>
</tr>
</thead>
</table>
| 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.) |
|     | ABS warning light | - 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.) |
|     | Ignition key | - 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.) |

Yes 

CONTINUED ON NEXT PAGE

No
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?

Yea → 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

<table>
<thead>
<tr>
<th>Trouble condition</th>
<th>Major causes</th>
<th>Remedy</th>
</tr>
</thead>
</table>
| 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.

There was trouble in the past.

NOTE Store diagnostic trouble codes in the memory.

Referring to the diagnostic trouble code check chart E-1-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.)

Caution

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

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

Example

<table>
<thead>
<tr>
<th>ABS-ECU connector terminal No. for troubleshooting</th>
<th>Terminal No. shown on the special tool connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>1</td>
</tr>
</tbody>
</table>

Connector terminal No. layout for troubleshooting

Terminal No. layout shown on the special tool connector

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

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

   (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

<table>
<thead>
<tr>
<th>No.</th>
<th>Scan tool display</th>
<th>Drive solenoid valve and motor</th>
<th>Drive pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>FR VALVE A</td>
<td></td>
<td>Not used</td>
</tr>
<tr>
<td>02</td>
<td>FL VALVE A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>04</td>
<td>FR VALVE M</td>
<td>Solenoid valve and pump motor for each HU corresponding channel. &lt;Manual pattern&gt;</td>
<td></td>
</tr>
<tr>
<td>05</td>
<td>FL VALVE M</td>
<td>Pump motor</td>
<td></td>
</tr>
</tbody>
</table>
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.
With the ignition key in the “ON” position, do other warning lights (except door-ajar warning light, seat belt warning light) illuminate?

Yes  

No  

Check fuse No. 11. If it is blown, correct the cause of the blown fuse and then replace the fuse.

Remove the combination meter, and check with the ignition key “ON”.

Does voltage between harness connector terminal No. 59 and ground indicate battery voltage?

Yes  

No  

The harness between the combination meter from fuse No. 11 is broken.

Repair harness.

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.)

Yes  

No  

ABS warning light bulb burned.

Replace ABS warning light bulb.

Is there continuity between combination meter No. 58 and No. 59 terminals?

Yes  

No  

Faulty combination meter.

Repair or replace combination meter.

Are instrument panel wiring harness and body wiring harness connected properly?

Yes  

No  

Connect connectors firmly. (Check for pins pulled out or bent, and repair as needed.)

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. 8 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.
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.
CONTINUED FROM PREVIOUS PAGE

Can other electronic control systems communicate with scan tool?

Yes

Is fuse No. 3 normal?

Yes

Is power relay normal? (Refer to P.35-63.)

Yes

Disconnect ECU connector and check harness connector

Yes

With the ignition key in the “ON” position, does voltage between ECU connector terminal No. 18 and ground indicate the battery positive voltage?

Yes

Is there continuity between body harness terminals No. 9 and No. 34, and ground?

Yes

Is there continuity between body harness connector terminals No. 23 and No. 24, and diagnosis inspection terminals No. 4 & No. 10?

Yes

Malfunction of ABS ECU

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

[Explanation]
The ABS ECU uses the IG2 power source which is turned off in the "START" position. The ABS warning light uses the IG1 power source which is not turned off even in the "START" position. Consequently, in the "START" position, power is off and the ECU turns the valve relay OFF. If the warning light does not illuminate at this time, there is trouble in the warning light circuit on the valve relay side.

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?

Yes

No

Harness wire between HU and warning light is broken.

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

Yes

No

Broken line between HU and body ground

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

Yes

No

Valve relay malfunction or break in HU harness wire
ABS warning light blinks once after the ignition key is turned to the “ON” position. It illuminates in the “START” position and blinks once again when turned to the “ON” position.

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

- Disconnect the hydraulic unit connector (A-64) and the ABS-ECU connector (E-12). Inspect the harness side of both connectors for damage to individual terminal pins. Repair terminal pins as needed.
- In the ignition key “ON” position, does voltage between terminal No. 25 and ground indicate battery positive voltage?
  - Yes
    - Malfunction of ABS ECU
  - No
    - Harness wire between ABS warning light and ECU is broken.
      - Repair harness.
      - Replace ABS ECU.
### E-1 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.

**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.)
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

Yes

No

Malfunction of wheel speed sensor
Replace wheel speed sensor

Is the resistance value at the ECU connector normal?
Standard value: 0.8 – 1.2 kΩ

Yes

No

Harness wire for wheel speed sensor circuit is broken
Repair harness.

Is the front wheel speed sensor-to-rotor clearance normal?
Standard value: 0.3-0.9 mm (.012-.035 in.)

Yes

No

Adjust the gap between the wheel speed sensor and rotor.

Are there any abnormalities such as a loose rear speed sensor mounting bolt?

Yes

No

Retighten or correct abnormalities.

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.)

Yes

No

Replace rear axle shaft or rotor (refer to GROUP 3 – Axle Shaft.)

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

Yes

No

Replace rotor that has missing or damaged teeth.

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?

Yes

No

Recheck if below the standard value or if the sensor has a poor waveform. Replace sensor or rotor.

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.

---

Is G sensor normal? (Refer to P.5-33.)

- Yes
  - Remove the ABS ECU connector and check at the harness connector.
    - No
      - The harness between the G sensor and the ABS ECU is broken.
        - Yes
          - Repair harness.
        - No
          - Replace ABS-ECU
    - Yes
      - Malfunction of ABS-ECU
        - Replace ABS-ECU
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.

1. Do the stop lights light up and go out normally?
   - Yes
   - No
     - Check the stop light related circuit and repair problem spots.

2. Disconnect the ABS ECU connector and inspect at the harness side connector.
   - Yes
   - No
     - Harness wire between stop light switch and ABS ECU is broken.
     - Repair harness.

3. When the brake pedal is pressed forcefully, does the voltage between connector terminal No. 29 and ground indicate battery positive voltage?
   - Yes
   - No
     - Repair harness.

4. Connect ABS ECU connector and check with ignition key in the “ON” position.
   - Yes
   - No
     - Open circuit in harness between ABS ECU and resistor
     - Repair harness.
     - Replace resistor.

5. Is the resistance between No. 1 terminal and ground equal to the battery positive voltage when measured with resistor connector disconnected?
   - Yes
   - No

6. Is resistor resistance 780 to 860 Ω?
   - Yes
   - No
     - Open circuit in harness between resistor and ground.

7. Is there continuity between No. 2 terminal and ground?
   - Yes
   - No
     - Repair harness.

8. Malfunction of ABS-ECU
   - Replace ABS-ECU
[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.

[Flowchart]

1. Remove HU 10P connector and check with the HU side connector.
2. In the resistance value for the solenoid valve within the range of the standard values?
   - Standard value: 1.0 – 1.3 Ω
   - Yes
   - Connect HU 1 OP connector, disconnect ECU connector and check.
   - No
3. 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
   - Yes
   - The harness wire for the solenoid valve circuit whose resistance value is outside the range of the standard value is broken or short circuited.
   - No
   - Repair harness.
   - Malfunction of ABS-ECU
4. Replace ABS-ECU

---

When diagnostic trouble codes “41 FL SOL. VALVE”, “42 FR SOL. VALVE” or “43 VALVE DRIFT” are displayed.
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.

Remove and check the valve relay.

When the valve relay is checked, are the following conditions found?
No. 85 – No. 86: Resistance value 60 – 120Ω
No. 30 – No. 87a: Continuity
No. 30 – No. 87: No continuity
When battery voltage is applied between terminals No. 86 and No. 85.
No. 30 – No. 87: Continuity
No. 30 – No. 87a: No continuity

Yes
Install the valve relay and remove the HU connector.

With the ignition key "ON", does the voltage between the connector terminal No. 52 and ground indicate battery positive voltage?

Yes
Is there continuity between HU No. 8 and No. 7 terminals?

Yes
Connect the HU harness and remove the ECU connector.

Does resistance between body connector terminal No. 2 and terminal No. 27 indicate 60 – 120 Ω?

Yes
Is there continuity between connector terminal No. 22 and ground?

Malfunction of harness between HU and ABS ECU

Malfunction of harness between HU and ABS ECU

Yes
Malfunction of harness between HU and ECU

Malfunction of harness between HU and ECU

Repair harness.

Repair harness.

Yes
Malfunction of ABS-ECU

Malfunction of ABS-ECU

Repair harness.

Repair harness.

Yes
Malfunction of ABS-ECU

Malfunction of ABS-ECU

Replace ABS-ECU.

Replace ABS-ECU.
[Explanations]
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.

1. **Does the motor make a noise during scan tool forced drive mode?**
   - **Yes**: Broken wire or short circuit in motor monitor line
   - **No**: Repair the harness between HU and ECU.

2. **Remove the motor relay.**
   - **No**: Motor relay malfunction
   - **Yes**: Replace motor relay.

3. **Remove the motor relay and check resistance values.**
   - No. 85 - No. 86: Resistance value 30 - 60 Ω
   - No. 30 - No. 87: No continuity
   - Battery voltage is applied between terminals No. 85 and No. 86.
   - No. 30 - No. 87: Continuity

4. **Is pump motor ground connected normally?**
   - **Yes**: Connect ground wire.
   - **No**: Broken wire in pump motor power circuit

5. **Install motor relay and remove HU connector.**
   - **No**: Repair harness.
   - **Yes**: Repair harness.

6. **Does voltage between body connector terminal 11 and ground indicate battery positive voltage?**
   - **Yes**: Connect the HU connector and remove the ECU connector.
   - **No**: Malfunction of harness between HU and ECU

7. **Is resistance between body connector terminal No. 2 and No. 26 30 - 60 Ω?**
   - **Yes**: Malfunction of harness between HU and ECU
   - **No**: Repair harness.

8. **Is resistance between body connector terminal No. 5 and ground 0.1 - 0.3 Ω?**
   - **Yes**: Replace ABS-ECU.
   - **No**: Repair harness.
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.

<table>
<thead>
<tr>
<th>Vacuum pump connection</th>
<th>Accept/reject criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection at the brake booster side ①</td>
<td>A negative pressure (vacuum) is created and held.</td>
</tr>
<tr>
<td>Connection at the intake manifold side ②</td>
<td>A negative pressure (vacuum) is not created.</td>
</tr>
</tbody>
</table>

**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.
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.

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

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

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

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

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

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

10. Using a spring scale, measure the rotary sliding resistance of the hub in the forward direction.
11. Obtain the drag force of the disc brake (the difference between the values measured in 10 and 4).
   **Standard value: 70 N (15.4 lbs.) or less**
12. If the drag force of the brake exceeds the standard value, disassemble the piston and check for dirty or corroded piston sliding surface and deteriorated piston seal.

**<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**

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

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

5. With the brake assembly removed, use a spring scale to measure the rotary sliding resistance of the hub in the forward direction. Disengage the drive shaft and companion flange.
   **NOTE**
   Secure the disc to the hub with wheel nuts.

6. Securely attach the pad clip to the caliper support.
   **Caution**
   Do not deposit grease or other dirt on pad or brake disc friction surfaces.

7. Clean the piston and then using the special tool, push the piston into the cylinder (caliper).
8. 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 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.

<table>
<thead>
<tr>
<th></th>
<th>&lt;FWD&gt;</th>
<th>&lt;AWD&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard value:</td>
<td>18.0 mm (.71 in.)</td>
<td>20.0 mm (.79 in.)</td>
</tr>
<tr>
<td>Limit:</td>
<td>16.4 mm (.65 in.)</td>
<td>18.4 mm (.72 in.)</td>
</tr>
</tbody>
</table>

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.)

<table>
<thead>
<tr>
<th></th>
<th>&lt;FWD&gt;</th>
<th>&lt;AWD&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limit:</td>
<td>0.05 mm (.002 in.)</td>
<td>0.8 mm (.031 in.)</td>
</tr>
</tbody>
</table>

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 (0.11 in.)
Limit: 1.0 mm (0.04 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.

<table>
<thead>
<tr>
<th>Terminal No. (same for AWD and FWD)</th>
<th>FL</th>
<th>RR</th>
<th>FR</th>
<th>RL</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>24</td>
<td>21</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>26</td>
<td>23</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable causes</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Too small or zero waveform amplitude</td>
<td>Faulty wheel speed sensor</td>
<td>Replace sensor</td>
</tr>
<tr>
<td></td>
<td>Incorrect pole piece-to-rotor clearance</td>
<td>Adjust clearance</td>
</tr>
<tr>
<td>Waveform amplitude fluctuates excessively</td>
<td>Axle hub eccentric or with large runout</td>
<td>Replace hub</td>
</tr>
<tr>
<td>(this is no problem if the minimum amplitude is</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100 mV or more)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noisy or disturbed waveform</td>
<td>Open circuit in sensor</td>
<td>Replace sensor</td>
</tr>
<tr>
<td></td>
<td>Open circuit in harness</td>
<td>Correct harness</td>
</tr>
<tr>
<td></td>
<td>Incorrectly mounted wheel speed sensor</td>
<td>Mount correctly</td>
</tr>
<tr>
<td></td>
<td>Rotor with missing or damaged teeth</td>
<td>Replace rotor</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>No.</th>
<th>Scan tool display</th>
<th>Operation</th>
<th>Judgement</th>
<th>Probable cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>04</td>
<td>FR VALVE M</td>
<td>(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.</td>
<td>Brake force released for 6 seconds after locking.</td>
<td>Wheel does not lock when brake pedal is depressed.</td>
<td>Clogged brake line other than HU</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Clogged hydraulic circuit in HU</td>
<td>Replace HU assembly</td>
</tr>
<tr>
<td>05</td>
<td>FL VALVE M</td>
<td></td>
<td></td>
<td>Incorrect HU brake tube connection</td>
<td>Connect correctly</td>
</tr>
<tr>
<td>06”</td>
<td>Rear VALVE M*</td>
<td></td>
<td></td>
<td>HU solenoid valve not functioning correctly</td>
<td>Replace HU assembly</td>
</tr>
</tbody>
</table>

**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

<table>
<thead>
<tr>
<th>No.</th>
<th>Scan tool display</th>
<th>Operation</th>
<th>Judgement (reading of brake force tester)</th>
<th>Probable cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>04</td>
<td>FR VALVE M</td>
<td>After brake force tester indication has stabilized, operate scan tool to force the actuator to operate and check the change in brake force.</td>
<td>Normal: 1,000 (220)</td>
<td>Abnormal: Incorrect HU brake tube connection</td>
<td>Connect correctly</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1) When the actuator is driven by scan tool, brake force changes as shown below: Front wheels:</td>
<td></td>
<td>Brake force in Step 1 shows very little or almost no decrease.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>FWD: 250±200 (55±44) AWD: 350±200 (77±44)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1,000 ± 200 (220 ± 44)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Step 2 (In approx. 6 s)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rear wheels:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1,000 (220)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05</td>
<td>FL VALVE M</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>06</td>
<td>REAR VALVE M</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2) Immediately after checking Step 2 value (in approx. 3 s), increasing brake pedal depression force does not increase brake force</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>FWD: 150±150 (33±33) AWD: 300±150 (66±33)</td>
<td></td>
<td>Increasing brake pedal depression force increases brake force.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>650 ± 150 (143 ± 33)</td>
<td></td>
<td>Fluid leaking in HU (poor sealing)</td>
<td>Replace HU assembly</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Step 2 (In approx. 6 s)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>650 ± 150 (143 ± 33)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>When energized</th>
<th>Between terminals 4 and 5</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>When de-energized</td>
<td>Between terminals 4 and 5</td>
<td>No continuity</td>
</tr>
<tr>
<td></td>
<td>Between terminals 1 and 3</td>
<td>Continuity</td>
</tr>
</tbody>
</table>

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.
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**

<table>
<thead>
<tr>
<th>When de-energized</th>
<th>Between terminals 85 and 30</th>
<th>30 – 60 Ω</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Between terminals 30 and 60</td>
<td>No continuity (≈∞Ω)</td>
</tr>
</tbody>
</table>

**Valve Relay**

<table>
<thead>
<tr>
<th>When de-energized</th>
<th>Between terminals 85 and 30</th>
<th>60 – 120 Ω</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Between terminals 85 and 67</td>
<td>Continuity (approx. 0Ω)</td>
</tr>
<tr>
<td></td>
<td>Between terminals 87 and 85</td>
<td>No continuity (≈∞Ω)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>When energized between terminals 87</th>
<th>Between terminals 85 and 67</th>
<th>No continuity (≈∞Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between terminals 85 and 87</td>
<td>Continuity (approx. 0Ω)</td>
<td></td>
</tr>
</tbody>
</table>
BRAKE PEDAL

REMOVAL AND INSTALLATION

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
1. Return spring
2. Cotter pin
3. Washer
4. Clevis pin
5. Cotter pin
6. Shift lock cable connection
7. Brake pedal assembly (parts from step 10 to step 21)
8. Brake pedal shaft bolt
9. Lever assembly installation nut
10. Lever assembly
11. Brake assembly
12. Bushing
13. Spacer
14. Cotter pin
15. Link assembly
16. Lever assembly
17. Bushing
18. Brake pedal support member

Grease: MOPAR Multi-Mileage
Lubricant Part No.
2525035 or equivalent
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
15 Nm
11 ft.lbs.

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

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

15 – 18 Nm
11 – 13 ft.lbs.

10 Nm
7 ft.lbs.
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.

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:

(1) Measure the dimension (B) between the master cylinder end face and piston.

NOTE
To obtain (B), first take measurement with a square placed on the master cylinder end face. Then, subtract the thickness of the square to arrive at (B).

(2) Obtain the dimension (C) between the brake booster mounting surface on the master cylinder and the end face.
(3) Measure the dimension (D) between the master cylinder mounting surface on brake booster and the push rod end.

**NOTE**
To obtain (D), first take measurement with a square placed on the brake booster. Then, subtract the thickness of the square to arrive at (D).

(4) Using the measured values obtained in (1) through (3), obtain the clearance (A) between the brake booster push rod and primary piston.

**Standard value:** \( A = B - C - D \)
- 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**

**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

**Brake fluid:** MOPAR Brake Fluid/Conforming to DOT3 or DOT4

**Brake master cylinder kit**

**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.
<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
15 Nm
11 ft.lbs.

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
15 Nm
11 ft.lbs.

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
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
BRAKES – Front Disc Brake

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

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)
5. Pad & wear indicator
6. Pad assembly
7. Outer shim
8. Clip
Lubrication points

Brake fluid. MOPAR Brake Fluid /
Conforming to DOT3 or DOT4

Grease: Repair kit grease (orange)

Grease: Repair kit grease (orange)
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

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

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)
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.)

**<FWD>**

- 50-60 Nm  
  36 – 43 ft.lbs.

**<AWD>**

- 50 – 60 Nm  
  36 – 43 ft.lbs.

**Removal steps**
- 1. Brake hose
- 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

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

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
7. Lock pin boot
8. Piston boot
9. Piston
10. Piston seal
11. Caliper body

Pad assembly disassembly steps
1. Lock pin
2. Caliper support (pad, clip, shim)
3. Pad and wear indicator assembly
4. Inner shim B
5. Inner shim A
6. Pad assembly
7. Outer shim
8. Clip

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

<table>
<thead>
<tr>
<th>Brake caliper kit</th>
<th>Pad kit</th>
<th>Seal and boot kit</th>
</tr>
</thead>
<tbody>
<tr>
<td>14NO154</td>
<td></td>
<td>14NO155</td>
</tr>
<tr>
<td>14NO156</td>
<td></td>
<td>14NO1</td>
</tr>
</tbody>
</table>
Lubrication Points

**<FWD>**

![Diagram of FWD lubrication points](image1)

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)

**<AWD>**

![Diagram of AWD lubrication points](image2)

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)
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.

<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.

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
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

**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**

1. Brake line connection
2. Harness connector connection
3. Bracket bolt
4. Hydraulic unit (with bracket)
5. Hydraulic unit bolt initial tightening
6. Grounding wire 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

Flared brake line nuts

15 Nm
11 ft.lbs.
14F038
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

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.)
1. Front rotor

Front speed sensor removal steps

2. Clip.
3. Front speed sensor
5. Rear rotor

Rear speed sensor removal steps

6. Clip
7. Cable band
8. Rear speed sensor
9. O-ring

Pre-removal Operation
- Removal of Splash Shield (Front Only)
  (Refer to Group 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:

<table>
<thead>
<tr>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;FWD&gt;</td>
<td>Front</td>
</tr>
<tr>
<td></td>
<td>Rear</td>
</tr>
<tr>
<td>&lt;AWD&gt;</td>
<td></td>
</tr>
</tbody>
</table>

If the internal resistance of the speed sensor is out of specification, replace with a new one.
(3) Check the speed sensor cable for open circuit and replace if faulty.

NOTE
Remove the cable clamp from the body and, while flexing the cable near the clamp, check for temporary open circuit. Also check connector connection and terminal insertion.

INSPECTION OF ROTOR
Check the rotor for missing or worn teeth and replace if faulty.

SERVICE POINTS OF INSTALLATION
8. INSTALLATION OF REAR SPEED SENSOR <FWD>
Insert a feeler gauge between the speed sensor pole piece and the rotor tooth surface and tighten the speed sensor to specified torque where the clearance is as specified all around.

Standard value: 0.2 – 0.7 mm (.008 – .028 in.)

NOTE
The rear speed sensor pole piece-to-rotor tooth surface clearance is not adjustable in the case of AWD vehicles. In this case, measure the sensor mounting surface-to-rotor tooth surface clearance.

Standard value: 28.15 – 28.45 mm (1.11 – 1.12 in.)

4. INSTALLATION OF FRONT SPEED SENSOR BRACKET

NOTE
(1) The right and left speed sensor brackets differ in shape. Install correctly referring to the identification symbols.
FR: For front speed sensor
R: For right wheel
L: For left wheel

(2) After installation of the speed sensor to the bracket, check that the letters “FR” are visible.

3. INSTALLATION OF FRONT SPEED SENSOR

Caution
Handle the speed sensor carefully so as not to strike the tip of the pole piece or the rotor teeth against any metal parts and damage them.

Insert a feeler gauge between the speed sensor pole piece and rotor tooth surface and tighten the speed sensor to specified torque where the clearance is as specified all around.

Standard value: 0.3 – 0.9 mm (.012 – .035 in.)
**G SENSOR (AWD – ABS)**

**REMOVAL AND INSTALLATION**

<table>
<thead>
<tr>
<th>Pre-removal/Post-installation Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removal/Installation of Front and Rear Console Assemblies</td>
</tr>
<tr>
<td>(Refer to Group 23A – Console Box.)</td>
</tr>
</tbody>
</table>

**CAUTION: SRS**
When installing or removing the instrument panel, don’t allow any impact or shock to the SRS diagnosis unit.

**Removal steps**
1. G sensor connector
2. G sensor
3. G sensor bracket

**INSPECTION**

1. **INSPECTION OF G SENSOR**
   1. Lay the G sensor on a level surface and check for continuity between its terminals.
   2. Incline the G sensor toward the vehicle front gradually and check that continuity is lost at an angle of 30° or more.
   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

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

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
2. Cable adjuster
3. Cable adjuster
4. Cable adjuster
5. Cable adjuster
6. Rear speed sensor
7. Rear brake assembly
8. Rear brake disc
9. Adjusting wheel spring
10. Shoe hold-down cup
11. Shoe hold-down pin
12. Adjuster
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

50 – 60 Nm
36 – 43 ft.lbs.
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

Post-installation Operation
- Parking Brake Lever Stroke Adjustment (Refer to P.5-46.)

Removal steps
1. Rear speed sensor
2. Rear brake assembly
3. Rear brake disc
4. Rear brake disc
5. Hubcap
6. Flange nut
7. Washer
8. Rear hub unit bearing
9. Adjusting wheel spring
10. Shoe hold-down cup
11. Shoe hold-down spring
12. Shoe hold-down pin
13. Adjuster
14. Shoe-to-anchor spring
15. Strut
16. Strut return spring
17. Shoe & lining assembly
18. Clip
19. Backing plate

Sealant: MOPAR "STIC" Cement
Part No. 2299314

Grease: Brake grease SAE J310, NLGI No. 1

83 Nm
60 ft.lbs.
50 – 60 Nm
36 – 43 ft.lbs.
<AWD>

Removal steps

1. Rear speed sensor
2. O-ring
3. Rear-brake assembly
4. Rear brake disc
5. Self-locking nut
6. Companion flange
7. Rear axle shaft
8. Adjusting wheel spring
9. Shoe hold-down cup
10. Shoe hold-down spring
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. Brake tube connection
19. Backing plate

Sealant: MOPAR "STIC" Cement  
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 is symmetrical.

16. INSTALLATION OF ADJUSTER
Install the adjuster facing the left adjusting bolt to the vehicle front and right adjusting bolt to the vehicle rear.

9. INSTALLATION OF SELF-LOCKING NUT
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

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# CLUTCH – Specifications

## SPECIFICATIONS

### GENERAL SPECIFICATIONS

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<tbody>
<tr>
<td>FWD</td>
<td>AWD</td>
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<tr>
<td>Clutch operating method</td>
<td>Hydraulic type</td>
</tr>
<tr>
<td>Clutch disc</td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td></td>
</tr>
<tr>
<td>Facing diameter</td>
<td></td>
</tr>
<tr>
<td>O.D. x I.D. mm (in.)</td>
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</tr>
<tr>
<td>225 x 150 (8.9 x 5.9)</td>
<td>250 x 160 (9.8 x 6.3)</td>
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<tr>
<td>Clutch cover assembly</td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td></td>
</tr>
<tr>
<td>Setting load N (lbs.)</td>
<td></td>
</tr>
<tr>
<td>6,300 (1,386)</td>
<td>9,200 (2,024)</td>
</tr>
<tr>
<td>Clutch release cylinder</td>
<td></td>
</tr>
<tr>
<td>I.D. mm (in.)</td>
<td></td>
</tr>
<tr>
<td>19.05 (3/4)</td>
<td>17.46 (1 1/16)</td>
</tr>
<tr>
<td>Clutch master cylinder</td>
<td></td>
</tr>
<tr>
<td>I.D. mm (in.)</td>
<td></td>
</tr>
<tr>
<td>15.87 (5/8)</td>
<td>15.87 (5/8)</td>
</tr>
<tr>
<td>Clutch booster</td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td></td>
</tr>
<tr>
<td>Effective dia. of power cylinder mm (in.)</td>
<td></td>
</tr>
<tr>
<td>–</td>
<td>Vacuum type</td>
</tr>
<tr>
<td>Boosting ratio [Clutch pedal depressing force]</td>
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<tr>
<td>–</td>
<td>1.7 [at 110 N (24 lbs.)]</td>
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## SERVICE SPECIFICATIONS

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<thead>
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<th>Specifications</th>
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<tr>
<td>Standard value</td>
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<tr>
<td>Clutch pedal height mm (in.)</td>
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</tr>
<tr>
<td>&lt;FWD&gt;</td>
<td>177-1 82 (6.97 – 7.17)</td>
</tr>
<tr>
<td>&lt;AWD&gt;</td>
<td>183-1 88 (6.97-7.17)</td>
</tr>
<tr>
<td>Clutch pedal clevis pin play mm (in.)</td>
<td>1-3 (.04-.12)</td>
</tr>
<tr>
<td>Clutch pedal free play mm (in.)</td>
<td></td>
</tr>
<tr>
<td>&lt;FWD&gt;</td>
<td>145-13 (.24-.51)</td>
</tr>
<tr>
<td>&lt;AWD&gt;</td>
<td>12 – 20 (.49-.79)</td>
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<tr>
<td>Distance between the clutch pedal and the firewall when the clutch is disengaged mm (in.)</td>
<td>35 (2.2) or more</td>
</tr>
<tr>
<td>Booster push rod to master cylinder piston clearance mm (in.) &lt;AWD&gt;</td>
<td>0.21 – 0.46 (.0082 – .0181)</td>
</tr>
<tr>
<td>Vacuum hose insertion distance mm (in.) &lt;AWD&gt;</td>
<td>20 – 25 (0.8 – 1.0)</td>
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</tbody>
</table>

Limit

<table>
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<tr>
<th>Facing rivet sink mm (in.)</th>
<th>0.3 (.012)</th>
</tr>
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<tbody>
<tr>
<td>Diaphragm spring end height difference mm (in.)</td>
<td>0.5 (.020)</td>
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</tbody>
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LUBRICANTS

<table>
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<th>Specified lubricants</th>
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<tr>
<td>Contact surface of release bearing and fulcrum of clutch release fork</td>
<td>MOPAR Multi-mileage Lubricant part No.2525035 or equivalent</td>
</tr>
<tr>
<td>Inner surface of clutch release bearing</td>
<td></td>
</tr>
<tr>
<td>Inner surface of clutch disc spline</td>
<td></td>
</tr>
<tr>
<td>Contact portion of release fork to release cylinder push rod</td>
<td></td>
</tr>
<tr>
<td>Clutch pedal bushing</td>
<td></td>
</tr>
<tr>
<td>Brake pedal bushing</td>
<td></td>
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<tr>
<td>Lever assembly bushing</td>
<td></td>
</tr>
<tr>
<td>Bush</td>
<td></td>
</tr>
<tr>
<td>Rod A</td>
<td></td>
</tr>
<tr>
<td>Rod B</td>
<td></td>
</tr>
<tr>
<td>Clevis pin</td>
<td></td>
</tr>
<tr>
<td>Clutch fluid</td>
<td>MOPAR Brake Fluid/Conforming to DOT3 or DOT4</td>
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<tr>
<td>Inner surface of clutch release cylinder and outer circumference of</td>
<td></td>
</tr>
<tr>
<td>piston and cup</td>
<td></td>
</tr>
<tr>
<td>Inner surface of clutch master cylinder and outer circumference of</td>
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</tr>
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<td>piston assembly</td>
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SPECIAL TOOL

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<th>Application</th>
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<td>Universal clutch disc</td>
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<td></td>
</tr>
<tr>
<td>disc aligner</td>
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TROUBLESHOOTING

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<th>Probable cause</th>
<th>Remedy</th>
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<td>Clutch slips</td>
<td>Clutch pedal play too small</td>
<td>Adjust</td>
</tr>
<tr>
<td></td>
<td>Excessive wear of clutch disc</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>facing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hardened clutch disc facing or</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>oil on facing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clutch release fork not</td>
<td>Repair or</td>
</tr>
<tr>
<td></td>
<td>operating smoothly</td>
<td>replace</td>
</tr>
<tr>
<td></td>
<td>Settled or damaged diaphragm</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>spring</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clogged hydraulic system</td>
<td>Repair or</td>
</tr>
<tr>
<td></td>
<td></td>
<td>replace</td>
</tr>
<tr>
<td></td>
<td>Poorly adjusted clutch booster</td>
<td>Adjust</td>
</tr>
<tr>
<td></td>
<td>push rod &lt;AWD&gt;</td>
<td></td>
</tr>
<tr>
<td>Symptom</td>
<td>Probable Cause</td>
<td>Remedy</td>
</tr>
<tr>
<td>-------------------------</td>
<td>------------------------------------------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Gear shifting failure</td>
<td>Clutch pedal play too large</td>
<td>Adjust</td>
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<td></td>
<td>Large clutch disc distortion or runout</td>
<td>Replace</td>
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<tr>
<td></td>
<td>Worn clutch cover assembly</td>
<td>Replace</td>
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<td></td>
<td>Worn or corroded clutch disc splines</td>
<td>Replace</td>
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<td></td>
<td>Separated clutch disc facing</td>
<td>Replace</td>
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<tr>
<td></td>
<td>Worn clutch release bearing</td>
<td>Replace</td>
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<td></td>
<td>Damaged pressure plate or flywheel</td>
<td>Replace</td>
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<tr>
<td></td>
<td>Leaky or clogged hydraulic system or air trapped in hydraulic system</td>
<td>Repair or replace</td>
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<td></td>
<td>Poorly adjusted clutch booster push rod &lt;AWD&gt;</td>
<td>Adjust</td>
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<td>Noisy clutch</td>
<td>Clutch pedal play too small</td>
<td>Adjust</td>
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<td></td>
<td>Incorrectly installed clutch cover assembly</td>
<td>Repair or replace</td>
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<td></td>
<td>Excessive wear of clutch disc facing</td>
<td>Replace</td>
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<td></td>
<td>Clutch release fork not operating smoothly</td>
<td>Repair or replace</td>
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<tr>
<td></td>
<td>Worn clutch release bearing</td>
<td>Replace</td>
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<tr>
<td></td>
<td>Settled or damaged torsion spring</td>
<td>Replace</td>
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<td></td>
<td>Damaged pilot bushing</td>
<td>Replace</td>
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<td></td>
<td>Poorly lubricated bearing sleeve sliding surface</td>
<td>Repair</td>
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<td>Heavy clutch pedal</td>
<td>Poorly lubricated clutch pedal</td>
<td>Repair</td>
</tr>
<tr>
<td></td>
<td>Poorly lubricated clutch disc splines</td>
<td>Repair</td>
</tr>
<tr>
<td></td>
<td>Clutch release fork not operating smoothly</td>
<td>Repair or replace</td>
</tr>
<tr>
<td></td>
<td>Poorly lubricated bearing sleeve sliding surface</td>
<td>Repair</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Leaky or clogged vacuum system &lt;AWD&gt;</td>
<td>Repair</td>
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<tr>
<td>Clutch vibrates</td>
<td>Worn or damaged clutch disc facing</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Oil on clutch disc facing</td>
<td>Replace</td>
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<td></td>
<td>Uneven diaphragm spring height</td>
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<td></td>
<td>Settled or damaged torsion spring</td>
<td>Replace</td>
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<td></td>
<td>Damaged pressure plate or flywheel</td>
<td>Replace</td>
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<td></td>
<td>Loose or damaged mounts</td>
<td>Tighten or replace</td>
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</table>
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.
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 - 20mm (.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.

<table>
<thead>
<tr>
<th>Vacuum pump connection</th>
<th>Accept/reject criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection at the clutch booster side (1)</td>
<td>A negative pressure (vacuum) is created and held.</td>
</tr>
<tr>
<td>Connection at the intake manifold side (2)</td>
<td>A negative pressure (vacuum) is not created.</td>
</tr>
</tbody>
</table>

**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.
6-8 CLUTCH — Clutch Pedal

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.)

MOPAR Multi-mileage Lubricant
Part No. 2525035 or equivalent

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**

---

**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
5. Adjustment of piston to push rod clearance <AWD>
6. Sealer

---

**Clutch tube removal steps**
1. Brake booster
   (Refer to GROUP 5 – Brake Booster.)
2. Air hose A <AWD>
3. Harness connector
4. Air cleaner cover, air intake hose <FWD>
5. Air cleaner cover, air intake hose A <AWD>
6. Vacuum pipe <AWD>
7. Battery
8. Battery seat, washer tank
9. Steering column assembly
   (Refer to GROUP 19 -Steering Wheel and Shaft,)
10. Protector
11. Clamp
12. Hose clip
13. Clutch tube
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. 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 <FWD>
- 25. Clutch tube C <FWD>
- 26. Clutch 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:** \[A = B - C - D\]
   \[0.21 - 0.46 \text{ mm} (0.0082 - 0.0181 \text{ in.})\]

   **[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 (0.0039 to 0.0118 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

6.0 Nm 4.0 ft.lbs.
13 Nm 9.0 ft.lbs.

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

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

- 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
- 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 the air hoses ensuring that alignment marks are aligned with projections.
Insert air hoses B and C into pipe all the way to its step.

Caution
Be careful not to allow any foreign matter to get into the hoses, pipes, or the intercooler itself.
CLUTCH COVER AND DISC
REMOVAL AND INSTALLATION

Pre-removal Operation
• Removal of the Transaxle Assembly
  (Refer to GROUP 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.
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

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

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

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<td></td>
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<td><strong>Radiator fan motor</strong></td>
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</tr>
<tr>
<td><strong>Type</strong></td>
<td></td>
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<td><strong>Water pump</strong></td>
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<td><strong>Type</strong></td>
<td></td>
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<td>Wax type with jiggle valve</td>
</tr>
<tr>
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<td><strong>Identification mark</strong></td>
<td>76.5 (Stamped on flange)</td>
</tr>
<tr>
<td><strong>&lt;SOHC&gt;</strong></td>
<td></td>
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<tr>
<td><strong>&lt;DOHC&gt;</strong></td>
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<td>Thermostat</td>
<td></td>
</tr>
<tr>
<td>Valve opening temperature of thermostat °C (°F)</td>
<td><strong>&lt;SOHC&gt;</strong> 82 (180)</td>
</tr>
<tr>
<td></td>
<td><strong>&lt;DOHC&gt;</strong> 76.5 (170)</td>
</tr>
<tr>
<td>Full-opening temperature of thermostat °C (°F)</td>
<td><strong>&lt;SOHC&gt;</strong> 95 (203) or more</td>
</tr>
<tr>
<td></td>
<td><strong>&lt;DOHC&gt;</strong> 90 (194) or more</td>
</tr>
<tr>
<td>Opening pressure of cap high pressure valve kPa (psi)</td>
<td>75 – 105 (11 – 15)</td>
</tr>
<tr>
<td>Limit</td>
<td></td>
</tr>
<tr>
<td>Opening pressure cap high pressure valve kPa (psi)</td>
<td>65 (9.2)</td>
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#### LUBRICANT

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<th>Quantity</th>
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<td>Engine coolant</td>
<td>High quality ethylene glycol antifreeze coolant</td>
<td>8.0 (8.5)</td>
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### SEALANT AND ADHESIVE

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<td>Too high an anti-freeze concentration</td>
<td>Correct anti-freeze concentration</td>
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<td>Inoperative electric cooling fan</td>
<td>Replace</td>
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<td></td>
<td>Faulty engine coolant temperature sensor</td>
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<td>Faulty radiator fan relay</td>
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<td></td>
<td>Damaged or blocked (insufficiently ventilated) radiator fins</td>
<td>Correct</td>
</tr>
<tr>
<td></td>
<td>Water leaks</td>
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<td></td>
<td>Damaged radiator core joint</td>
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<td></td>
<td>Corroded or cracked hoses (radiator hose, heater hose, etc.)</td>
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<td>Faulty cap valve or setting of spring</td>
<td></td>
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<td>Cracked intake manifold &lt;SOHC&gt;</td>
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<td></td>
<td>Cracked thermostat housing &lt;DOHC&gt;</td>
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<td></td>
<td>Loose water pump mounting bolt or leaking gasket</td>
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<td></td>
<td>Loose bolt or leaking gasket in water outlet fitting</td>
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<tr>
<td></td>
<td>Loose bolt or leaking gasket in water inlet fitting</td>
<td></td>
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<td></td>
<td>Loose intake manifold bolts or leaking from gasket &lt;SOHC&gt;</td>
<td>Retorque bolts or replace gasket</td>
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<td></td>
<td>Loose thermostat housing bolts or leaking from gasket &lt;DOHC&gt;</td>
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<td>Loose hose and pipe connection</td>
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<td>Faulty thermostat operation</td>
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<td>Faulty water pump operation</td>
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<td>Water passage clogged with slime or rust deposit or foreign substance</td>
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<tr>
<td>No rise in temperature</td>
<td>Faulty thermostat</td>
<td>Replace</td>
</tr>
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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.

Fan Operating Mode

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<th>Fan operating condition</th>
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<td>Low speed</td>
<td>High speed</td>
<td>Radiator fan</td>
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<tr>
<td>80 or less [50 or less]</td>
<td></td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Approx. 95 [203] or less</td>
<td></td>
<td>ON</td>
<td>OFF</td>
<td>Low speed</td>
</tr>
<tr>
<td>Approx. 95 [203] or more</td>
<td></td>
<td>ON</td>
<td>ON</td>
<td>High speed</td>
</tr>
<tr>
<td>Approx. 105 [221] or more</td>
<td></td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>80 or more [50 or more]</td>
<td></td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Approx. 105 [221] or less</td>
<td></td>
<td>ON</td>
<td>ON</td>
<td>High speed</td>
</tr>
<tr>
<td>Approx. 105 [221] or more</td>
<td></td>
<td>ON</td>
<td>ON</td>
<td>High speed</td>
</tr>
</tbody>
</table>

| HI (12V)                             |                      | Low speed | High speed | Radiator fan | Condenser fan |
| Approx. 105 [221] or less            |                      | ON | OFF | Low speed | Low speed |
| Approx. 105 [221] or more            |                      | ON | ON | High speed | High speed |

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.
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

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>

Post-installation Operation
- Refilling of the Engine Coolant
  (Refer to GROUP 6 – Maintenance Service.)
- Checking Automatic Transaxle Fluid Level and Refilling If Necessary

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>

- a 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
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.

RADIATOR FAN MOTOR INSPECTION

(1) Check to be sure that the radiator fan rotates when battery voltage is applied between terminals (as shown in the figure).
(2) Check to see that abnormal noises are not produced, while motor is turning.

INSPECTION OF RESISTOR

(1) Measure the resistance between connector terminals \( \overset{1}{\text{①}} \) and \( \overset{3}{\text{③}} \) of the radiator fan motor.
(2) The resistor is normal if the resistance is within the following range.

\[
\text{Resistance: } 0.29 \text{ ~} 0.35 \Omega
\]
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.

<table>
<thead>
<tr>
<th>When current flows</th>
<th>Between terminals 1 – 3</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>When no current flows</td>
<td>Between terminals 1 – 3</td>
<td>No continuity</td>
</tr>
<tr>
<td></td>
<td>Between terminals 2 – 4</td>
<td>Continuity</td>
</tr>
</tbody>
</table>

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>

7-13 Nm
12 - 14 ft.lbs.

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. 1. Thermostat

<DOHC>

17-20 Nm
12 - 14 ft.lbs.

Pre-removal and Post-installation Operation

- Draining and Supplying of the Engine Coolant
(Refer to GROUP 0 - Maintenance Service.)

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 (.31 in.)] 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 Δ marks on the air intake hoses B and C. Insert the hoses into the air intake hose A until they are bottomed.
WATER PUMP, WATER PIPE AND WATER HOSE <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**
1. Gasket
2. Water pump
3. Water hose B
4. Water hose A
5. Water hose A <Vehicles with manual transaxle>
6. Water hose B <Vehicles with manual transaxle>
7. By-pass water hose
8. Connection for 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>
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 A.

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 B
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
4. 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 A.

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.
COOLING – Engine Coolant Temperature Gauge Unit and ETC Sensor

ENGINE COOLANT TEMPERATURE GAUGE UNIT AND ENGINE COOLANT TEMPERATURE SENSOR

REMOVAL AND INSTALLATION

**<SOHC>**

**<DOHC>**

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)

**Pre-removal and Post-installation Operation**

- Draining and supplying of the engine coolant
  (Refer to GROUP 0 - Maintenance Service.)

**Sealant:** MOPAR Part No. 4318034 or equivalent

**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

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LUBRICATION SYSTEM

<SOHC>
- Lash adjuster

<DOHC>
- Lash adjuster

To oil cooler (turbocharged engine)

Oil pump

Oil cooler bypass valve (turbocharged engine)
## SPECIFICATIONS

### GENERAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Items</th>
<th>SOHC</th>
<th>DOHC – Non-Turbo</th>
<th>DOHC - Turbo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>V-type, SOHC</td>
<td>V-type, DOHC</td>
<td>V-type, DOHC</td>
</tr>
<tr>
<td>Number of cylinders</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Bore mm (in.)</td>
<td>91.1 (3.587)</td>
<td>91.1 (3.587)</td>
<td>91.1 (3.587)</td>
</tr>
<tr>
<td>Stroke mm (in.)</td>
<td>76.0 (2.992)</td>
<td>76.0 (2.992)</td>
<td>76.0 (2.992)</td>
</tr>
<tr>
<td>Piston displacement cm³ (cu.in.)</td>
<td>2,972 (181.4)</td>
<td>2,972 (181.4)</td>
<td>2,972 (181.4)</td>
</tr>
<tr>
<td>Compression ratio</td>
<td>8.9</td>
<td>10.0</td>
<td>8.0</td>
</tr>
<tr>
<td>Firing order</td>
<td>1-2-3-4-5-6</td>
<td>1-2-3-4-5-6</td>
<td>1-2-3-4-5-6</td>
</tr>
<tr>
<td>Valve timing Cases</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intake valve</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opens (BTDC)</td>
<td>19”</td>
<td>1 6</td>
<td>16”</td>
</tr>
<tr>
<td>Closes (ABDC)</td>
<td>59”</td>
<td>55”</td>
<td>55”</td>
</tr>
<tr>
<td>Exhaust valve</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opens (BBDC)</td>
<td>59”</td>
<td>48”</td>
<td>50”</td>
</tr>
<tr>
<td>Closes (ATDC)</td>
<td>19”</td>
<td>15”</td>
<td>17”</td>
</tr>
</tbody>
</table>

### SERVICE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Items</th>
<th>Standard value</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compression pressure SOHC</td>
<td>1,200 (171)/250—400</td>
<td>min. 890 (127)/250—400</td>
</tr>
<tr>
<td>DOHC – Non-Turbo</td>
<td>1,300 (185)/250—400</td>
<td>min. 980 (139)/250—400</td>
</tr>
<tr>
<td>DOHC - Turbo</td>
<td>1,100 (156)/250—400</td>
<td>min. 810 (115)/250—400</td>
</tr>
<tr>
<td>Compression pressure difference of all cylinder</td>
<td>min. 450 (18)</td>
<td></td>
</tr>
<tr>
<td>Manifold vacuum</td>
<td>5” ± 2</td>
<td></td>
</tr>
<tr>
<td>Basic ignition timing at curb idle speed</td>
<td>5” ± 3</td>
<td></td>
</tr>
<tr>
<td>BTDC SOHC</td>
<td>Approx. 15”</td>
<td></td>
</tr>
<tr>
<td>DOHC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actual ignition timing at curb idle speed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BTDC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Curb idle speed rpm</td>
<td>700 ±100</td>
<td></td>
</tr>
<tr>
<td>CO concentration %</td>
<td>0.5 or less</td>
<td></td>
</tr>
<tr>
<td>HC concentration ppm</td>
<td>100 or less</td>
<td></td>
</tr>
<tr>
<td>Items</td>
<td>Standard value</td>
<td>Limit</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>--------------------</td>
<td>------------------</td>
</tr>
<tr>
<td><strong>Cylinder head-SOHC</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall height mm (in.)</td>
<td>84 (3.31)</td>
<td>-0.2 (-.008)*</td>
</tr>
<tr>
<td>Flatness of gasket surface mm (in.)</td>
<td>max. 0.05 (.0019)</td>
<td>0.2 (.008)</td>
</tr>
<tr>
<td>Oversize rework dimension of valve seat hole mm (in.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intake 0.3 (.012) O.S.</td>
<td>44.300-44.325 (1.7440-1.7451)</td>
<td></td>
</tr>
<tr>
<td>0.6 (.024) O.S.</td>
<td>44.600-44.625 (1.7559-1.7569)</td>
<td></td>
</tr>
<tr>
<td>Exhaust 0.3 (.012) O.S.</td>
<td>38.300-38.325 (1.5079-1.5089)</td>
<td></td>
</tr>
<tr>
<td>0.6 (.024) O.S.</td>
<td>38.600-38.625 (1.5197-1.5207)</td>
<td></td>
</tr>
<tr>
<td>Oversize rework dimension of valve seat hole depth mm (in.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intake 0.3 (.012) O.S.</td>
<td>7.9-8.1 (.311-.319)</td>
<td></td>
</tr>
<tr>
<td>0.6 (.024) O.S.</td>
<td>8.2 - 8.4 (.323-.331)</td>
<td></td>
</tr>
<tr>
<td>Exhaust 0.3 (.012) O.S.</td>
<td>7.9-8.1 (.311-.319)</td>
<td></td>
</tr>
<tr>
<td>0.6 (.024) O.S.</td>
<td>8.2 - 8.4 (.323-.331)</td>
<td></td>
</tr>
<tr>
<td>Oversize rework of valve guide hole (both intake and exhaust) mm (in.)</td>
<td>0.05 (.002) O.S.</td>
<td>13.050 - 13.068 (5.138 - 5.145)</td>
</tr>
<tr>
<td></td>
<td>0.25 (.010) O.S.</td>
<td>13.250 - 13.268 (5.217 - 5.224)</td>
</tr>
<tr>
<td></td>
<td>0.50 (.020) O.S.</td>
<td>13.500 - 13.518 (5.315 - 5.322)</td>
</tr>
<tr>
<td><strong>Cylinder head - DOHC</strong></td>
<td>132 (5.20)</td>
<td>-0.2 (-.008)*</td>
</tr>
<tr>
<td>Overall height mm (in.)</td>
<td>max. 0.03 (.0012)</td>
<td>0.2 (.008)</td>
</tr>
<tr>
<td>Flatness of gasket surface mm (in.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oversize rework dimension of valve seat hole mm (in.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intake 0.3 (.012) O.S.</td>
<td>36.300-36.325 (1.4291-1.4301)</td>
<td></td>
</tr>
<tr>
<td>0.6 (.024) O.S.</td>
<td>36.600-36.625 (1.4409-1.4419)</td>
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<tr>
<td>Exhaust 0.3 (.012) O.S.</td>
<td>33.300-33.325 (1.3110-1.3120)</td>
<td></td>
</tr>
<tr>
<td>0.6 (.024) O.S.</td>
<td>33.600-33.625 (1.3228-1.3238)</td>
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</tr>
<tr>
<td>Oversize rework dimension of valve seat hole depth mm (in.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intake 0.3 (.012) O.S.</td>
<td>7.5-7.7 (.295-.303)</td>
<td></td>
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<tr>
<td>0.6 (.024) O.S.</td>
<td>7.8 - 8.0 (.307-.315)</td>
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<tr>
<td>Exhaust 0.3 (.012) O.S.</td>
<td>7.9-8.1 (.311-.319)</td>
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<tr>
<td>0.6 (.024) O.S.</td>
<td>8.2 - 8.4 (.323-.331)</td>
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<tr>
<td>Oversize rework of valve guide hole (both intake and exhaust) mm (in.)</td>
<td>0.05 (.002) O.S.</td>
<td>12.050 - 12.068 (5.138 - 5.145)</td>
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<tr>
<td></td>
<td>0.25 (.010) O.S.</td>
<td>12.250 - 12.268 (5.217 - 5.224)</td>
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<tr>
<td></td>
<td>0.50 (.020) O.S.</td>
<td>12.500 - 12.518 (5.315 - 5.322)</td>
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*Limit must be -0.2 mm (-.008 in.) combined with amount of grinding of cylinder block gasket surface.*
## ENGINE – Specifications

<table>
<thead>
<tr>
<th>Items</th>
<th>Standard value</th>
<th>Limit</th>
</tr>
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<tbody>
<tr>
<td><strong>Camshaft — SOHC</strong></td>
<td></td>
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<tr>
<td>Cam height mm (in.)</td>
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<tr>
<td>Intake</td>
<td>41.25 (1.6240)</td>
<td>40.75 (1.6430)</td>
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<tr>
<td>Exhaust</td>
<td>41.25 (1.6240)</td>
<td>40.75 (1.6430)</td>
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<tr>
<td>Journal O.D. mm (in.)</td>
<td>34 (1.34)</td>
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<tr>
<td>Bearing oil clearance mm (in.)</td>
<td>0.05 – 0.09 (.0020–.0035)</td>
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<td><strong>Camshaft — DOHC</strong></td>
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<tr>
<td>Cam height mm (in.)</td>
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<tr>
<td>Intake</td>
<td>34.91 (1.3744)</td>
<td>34.41 (1.3547)</td>
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<td>Exhaust</td>
<td>34.91 (1.3744)</td>
<td>34.41 (1.3547)</td>
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<td>Bearing oil clearance mm (in.)</td>
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<td><strong>Rocker arm -SOHC</strong></td>
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<td>I.D. mm (in.)</td>
<td>18.9 (.744)</td>
<td>0.10 (.0039)</td>
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<td>Clearance (Rocker arm to shaft) mm (in.)</td>
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<td><strong>Valve — SOHC</strong></td>
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<tr>
<td>Exhaust</td>
<td>102.7 (4.043)</td>
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<tr>
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<td>Exhaust</td>
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<tr>
<td>Face angle</td>
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<td>Thickness of valve head (Margin) mm (in.)</td>
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<tr>
<td>Intake</td>
<td>1.2 (.047)</td>
<td>0.7 (.028)</td>
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<td>Exhaust</td>
<td>2.0 (.079)</td>
<td>1.5 (.059)</td>
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<tr>
<td>Clearance (Valve stem to guide) mm (in.)</td>
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<tr>
<td>Intake</td>
<td>0.03 – 0.06 (.0012–.0024)</td>
<td>0.10 (.0039)</td>
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<td>0.15 (.0059)</td>
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<td>Valve — DOHC</td>
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<td>Intake</td>
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<td>Exhaust</td>
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<tr>
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<td>0.5 (.019)</td>
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<tr>
<td>Exhaust</td>
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<td>1.0 (.039)</td>
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<td>Clearance (Valve stem to guide) mm (in.)</td>
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<tr>
<td>Intake</td>
<td>0.02 – 0.05 (.0008 – .0020)</td>
<td>0.10 (.0039)</td>
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<td>0.05 – 0.09 (.0020 – .0035)</td>
<td>0.12 (.0047)</td>
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<td>Valve guide — SOHC</td>
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<td>Length mm (in.)</td>
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<td>Intake</td>
<td>44 (1.73)</td>
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<td>Exhaust</td>
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<td>Service size mm (in.)</td>
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<td>Valve guide — DOHC</td>
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<td>Length mm (in.)</td>
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<td>Intake</td>
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<td>Exhaust</td>
<td>50.5 (1.988)</td>
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<td>Service size mm (in.)</td>
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<td>Valve seat</td>
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<td>Width of seat contact mm (in.)</td>
<td>0.9 – 1.3 (.035 – .051)</td>
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<td>Seat angle</td>
<td>44 – 44.5&quot;</td>
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<td>Valve spring — SOHC</td>
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<td>Free length mm (in.)</td>
<td>49.8 (1.961)</td>
<td>48.8 (1.921)</td>
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<tr>
<td>Load N (lbs.)</td>
<td>329 (74) at installed height</td>
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<td>Installed height mm (in.)</td>
<td>40.4 (1.591)</td>
<td>41.4 (1.630)</td>
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<td>Squareness</td>
<td>Less than 2&quot;</td>
<td>4&quot;</td>
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<td>Valve spring — DOHC</td>
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<td>Free length mm (in.)</td>
<td>46.4 (1.827)</td>
<td>45.4 (1.787)</td>
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<tr>
<td>Load N (lbs.)</td>
<td>240 (53) at installed height</td>
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<td>Installed height mm (in.)</td>
<td>37.9 (1.492)</td>
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<tr>
<td>Squareness</td>
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<td>4&quot;</td>
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<tr>
<td>Cylinder block</td>
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<tr>
<td>Cylinder bore mm (in.)</td>
<td>91.10 (3.5866)</td>
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<tr>
<td>Out-of-roundness and taper of cylinder bore mm (in.)</td>
<td>Less than 0.02 (.0008)</td>
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<tr>
<td>Flatness of gasket surface mm (in.)</td>
<td>Less than 0.05 (.0020)</td>
<td>0.10 (.0039)</td>
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<tr>
<td>Items</td>
<td>Standard value</td>
<td>Limit</td>
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<tr>
<td><strong>Piston</strong></td>
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<tr>
<td>O.D mm (in.)</td>
<td>91.10 (3.5866)</td>
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<td>Clearance (Piston to cylinder) mm (in.)</td>
<td>0.03 — 0.05 (.0012 — .0020)</td>
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<td>Ring groove width mm (in.)</td>
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<td>No. 1</td>
<td>1.2 (.047)</td>
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<tr>
<td>No. 2</td>
<td>1.5 (.059)</td>
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<td>Oil</td>
<td>3.0 (.118)</td>
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<tr>
<td>Service size mm (in.)</td>
<td>0.25 (.010), 0.50 (.020), 0.75 (.030), 1.00 (.039)</td>
<td>Oversize</td>
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<tr>
<td><strong>Piston ring</strong></td>
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<td>Side clearance mm (in.)</td>
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<td>No. 1</td>
<td>0.03 — 0.07 (.0012 — .0028)</td>
<td>0.1 (.004)</td>
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<td>No. 2</td>
<td>0.02 — 0.06 (.0006 — .0024)</td>
<td>0.1 (.004)</td>
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<tr>
<td>End gap mm (in.)</td>
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<tr>
<td>No. 1</td>
<td>0.30 — 0.45 (.0118 — .0177)</td>
<td>0.8 (.031)</td>
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<td>No. 2</td>
<td>0.45 — 0.60 (.0177 — .0236)</td>
<td>0.8 (.031)</td>
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<td>Oil ring side rail mm (in.)</td>
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<tr>
<td>Service size mm (in.)</td>
<td>0.25 (.010), 0.50 (.020), 0.75 (.030), 1.00 (.039)</td>
<td>Oversize</td>
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<tr>
<td><strong>Connecting rod</strong></td>
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<tr>
<td>Bend mm (in.)</td>
<td>0.05 (.0020) or less</td>
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<tr>
<td>Twist mm (in.)</td>
<td>0.1 (.004) or less</td>
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<td>Big end to thrust clearance mm (in.)</td>
<td>0.10 — 0.25 (.0039 — .0098)</td>
<td>0.4 (.016)</td>
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<td>Piston pin press-in load N (lbs.)</td>
<td>7,500 — 17,500 (1,686 — 3,934)</td>
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<tr>
<td><strong>Connecting rod bearing</strong></td>
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<tr>
<td>Oil clearance mm (in.)</td>
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<tr>
<td>SOHC</td>
<td>0.016 — 0.046 (.0006 — .0018)</td>
<td>0.1 (.004)</td>
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<tr>
<td>DOHC</td>
<td>0.022 — 0.048 (.0009 — .0019)</td>
<td>0.1 (.004)</td>
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<tr>
<td><strong>Crankshaft main bearing</strong></td>
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<td>Oil clearance mm (in.)</td>
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<tr>
<td>SOHC</td>
<td>0.020 — 0.048 (.0008 — .0019)</td>
<td>0.1 (.004)</td>
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<tr>
<td>DOHC</td>
<td>0.018 — 0.036 (.0007 — .0014)</td>
<td>0.1 (.004)</td>
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<tr>
<td>Items</td>
<td>Standard value</td>
<td>Limit</td>
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<td>Crankshaft</td>
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<td>Pin O.D. mm (in.)</td>
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<td>Journal O.D. mm (in.)</td>
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<td>Out-of-roundness of journal and pin mm (in.)</td>
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<td>Less than 0.003 (.0012)</td>
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<td>SOHC</td>
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<tr>
<td>DOHC</td>
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<tr>
<td>Taper of journal and pin mm (in.)</td>
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<td>0.3 (.012)</td>
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<tr>
<td>End play mm (in.)</td>
<td>0.05 – 0.25 (.0020 – .0098)</td>
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<tr>
<td>Oil pressure at curb idle speed kPa (psi) [Conditions: oil temperature is 75 to 90°C (167 to 194°F)]</td>
<td>80 (11.4) or more</td>
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<td>Oil pump</td>
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<td>Tip clearance</td>
<td>0.03 – 0.08 (.0012 – .0031)</td>
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<td>Side clearance</td>
<td>0.04 – 0.10 (.0016 – .0039)</td>
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<td>Body clearance</td>
<td>0.10 – 0.18 (.0040 – .0070)</td>
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<td>Relief spring</td>
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<td>Free length mm (in.)</td>
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<td>Non Turbo</td>
<td>46.3 (1.823)</td>
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<td>Load mm (in.)</td>
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<td>Non Turbo [37 N (8.3 lbs.)]</td>
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<td>Turbo [69 N (15.2 lbs.)]</td>
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<td>Drive belt &lt;SOHC&gt;</td>
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<td>For alternator and power steering oil pump</td>
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<tr>
<td>Deflection mm (in.)</td>
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<tr>
<td>Inspection</td>
<td>6.0 – 9.0 (.236 – .354)</td>
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<tr>
<td>New belt</td>
<td>4.0 – 5.0 (.157 – .196)</td>
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<td>6.0 – 8.0 (.236 – .315)</td>
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<td>Tension N (lbs.)</td>
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<td>Inspection</td>
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<tr>
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<tr>
<td>For air conditioning compressor</td>
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<tr>
<td>Deflection mm (in.)</td>
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<tr>
<td>Inspection</td>
<td>7.5 – 9.5 (.295 – .374)</td>
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<td>6.5 – 7.0 (.256 – .275)</td>
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<td>500 – 600 (110 – 132)</td>
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<td>320 – 400 (70 – 88)</td>
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<tr>
<td>Timing belt tension &lt;SOHC&gt; N (lbs.)</td>
<td>210 – 310 (46.3 – 68.3)</td>
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## ENGINE Specifications

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<th>Items</th>
<th>Standard value</th>
<th>Limit</th>
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<td><strong>Drive belt &lt;DOHC&gt;</strong></td>
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<td>For generator (Vehicle without air conditioning)</td>
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<tr>
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<td>4.0 – 5.5 (.157 – .216)</td>
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<tr>
<td>New belt</td>
<td>3.5 – 4.0 (.138 – .157)</td>
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</tr>
<tr>
<td>Used belt</td>
<td>4.0 – 5.0 (.157 – .196)</td>
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<tr>
<td>Tension N (lbs.)</td>
<td>350 – 600 (77 – 132)</td>
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<td>Inspection</td>
<td>350 – 600 (77 – 132)</td>
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<td>For generator and air conditioning compressor</td>
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<tr>
<td>Deflection mm (in.)</td>
<td>4.0 – 5.5 (.157 – .216)</td>
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<td>Inspection</td>
<td>4.0 – 5.5 (.157 – .216)</td>
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<tr>
<td>New belt</td>
<td>3.5 – 4.0 (.138 – .157)</td>
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<tr>
<td>Used belt</td>
<td>4.0 – 5.0 (.157 – .196)</td>
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<td>For power steering pump</td>
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<tr>
<td>Deflection mm (in.)</td>
<td>9.5 – 13.5 (.374 – .531)</td>
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<tr>
<td>Inspection</td>
<td>9.5 – 13.5 (.374 – .531)</td>
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<tr>
<td>New belt</td>
<td>7.5 – 9.0 (.295 – .354)</td>
<td></td>
</tr>
<tr>
<td>Used belt</td>
<td>10.5 – 12.5 (.413 – .492)</td>
<td></td>
</tr>
<tr>
<td>Tension N (lbs.)</td>
<td>250 – 500 (55 – 110)</td>
<td></td>
</tr>
<tr>
<td>Inspection</td>
<td>250 – 500 (55 – 110)</td>
<td></td>
</tr>
<tr>
<td>New belt</td>
<td>500 – 700 (109 – 154)</td>
<td></td>
</tr>
<tr>
<td>Used belt</td>
<td>350 – 400 (77 – 88)</td>
<td></td>
</tr>
<tr>
<td><strong>Timing belt &lt;DOHC&gt;</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amount of projection of auto tensioner rod mm (in.)</td>
<td>3.8 – 4.5 (.149 – .177)</td>
<td></td>
</tr>
</tbody>
</table>

### SEALANTS

<table>
<thead>
<tr>
<th>Items</th>
<th>Recommended sealant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil pan</td>
<td>MITSUBISHI GENUINE Part No. MD9971 10 or equivalent</td>
</tr>
<tr>
<td>Oil seal case</td>
<td></td>
</tr>
<tr>
<td>Oil pressure switch</td>
<td>MOPAR Part No. 4318034 or equivalent</td>
</tr>
<tr>
<td>Oil pressure gauge unit</td>
<td></td>
</tr>
<tr>
<td>Rocker arm shaft assembly</td>
<td>MOPAR Part No. 4318034 or equivalent</td>
</tr>
<tr>
<td>Rocker cover</td>
<td></td>
</tr>
</tbody>
</table>
## SPECIAL TOOLS

<table>
<thead>
<tr>
<th>Tool number and tool name</th>
<th>Replaced by Miller tool number</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>MD998051 Cylinder head bolt wrench</td>
<td>General service tool</td>
<td>Loosening and tightening of cylinder head bolt</td>
</tr>
<tr>
<td>MD998440 Leak-down tester</td>
<td>MD998440</td>
<td>Leak-down test of lash adjuster</td>
</tr>
<tr>
<td>MD998441 Lash adjuster retainer</td>
<td>MD998441</td>
<td>Bleeding of air inside the adjuster For SOHC engine only</td>
</tr>
<tr>
<td>MD998442 Air bleed wire</td>
<td>MD998442</td>
<td>Air bleeding of auto lash adjuster</td>
</tr>
<tr>
<td>MD998443 Lash adjuster holder (8)</td>
<td>MD998443</td>
<td>Supporting of the lash adjuster to prevent it from falling when rocker shaft assembly is removed or installed &lt;SOHC&gt;</td>
</tr>
<tr>
<td>MD998713 Camshaft oil seal installer</td>
<td>MD998713</td>
<td>Installation of camshaft oil seal &lt;SOHC&gt; Installation of circular packing &lt;SOHC&gt;</td>
</tr>
<tr>
<td>MD998717 Crankshaft front oil seal installer</td>
<td>MD998717</td>
<td>Installation of crankshaft front oil seal</td>
</tr>
<tr>
<td>MD998718 Crankshaft rear oil seal installer</td>
<td>MD998718</td>
<td>Installation of crankshaft rear oil seal</td>
</tr>
<tr>
<td>MD998729 Valve stem seal installer</td>
<td>MD998729</td>
<td>Installation of valve stem seal &lt;SOHC&gt;</td>
</tr>
<tr>
<td>Tool number and tool name</td>
<td>Replaced by Miller tool number</td>
<td>Application</td>
</tr>
<tr>
<td>--------------------------</td>
<td>--------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>MD998727 Oil pan remover</td>
<td>General service tool (Use a scraper and exercise care)</td>
<td>Removal of the oil pan</td>
</tr>
<tr>
<td>MD998735 Valve spring compressor</td>
<td>C-3422-B and 6526 or 7068 and 6627</td>
<td>Removal and installation of valve and related parts</td>
</tr>
<tr>
<td>MD998761 Camshaft oil seal installer</td>
<td>MD998761</td>
<td>Installation camshaft oil seal &lt;DOHC&gt;</td>
</tr>
<tr>
<td>MD998762 Circular packing installer</td>
<td>MD998762</td>
<td>Installation of circular packing &lt;DOHC&gt;</td>
</tr>
<tr>
<td>MD998/63 Valve stem seal installer</td>
<td>MD998763</td>
<td>Installation of valve stem seal &lt;DOHC&gt;</td>
</tr>
<tr>
<td>MD998782 Valve lifter set</td>
<td>MD998782</td>
<td>Removal of rash adjuster &lt;DOHC&gt;</td>
</tr>
<tr>
<td>MB990767 End yoke holder</td>
<td>C-3281</td>
<td>Supporting the sprocket and shaft pulley when attaching or detaching them. Supporting the crankshaft pulley when crankshaft bolt and pulley are removed or reinstalled.</td>
</tr>
<tr>
<td>MD998754 Crank pulley holder</td>
<td>MD998754</td>
<td></td>
</tr>
<tr>
<td>MB990998* Crankshaft wrench</td>
<td>MB990998</td>
<td>Used if the crankshaft needs to be rotated to attach the timing belt, etc., when the piston and connecting rod assembly is assembled. &lt;SOHC&gt; *: Use only the large nut included in MB990998, together with the crankshaft pulley bolt.</td>
</tr>
<tr>
<td>Tool number and tool name</td>
<td>Replaced by Miller tool number</td>
<td>Application</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-------------------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>MD998767 Tensioner pulley socket wrench</td>
<td>MD998767</td>
<td>Adjustment of timing belt &lt;DOHC&gt;</td>
</tr>
</tbody>
</table>
## TROUBLESHOOTING

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compression too low</td>
<td>Cylinder head gasket blown</td>
<td>Replace gasket</td>
</tr>
<tr>
<td></td>
<td>Piston ring worn or damaged</td>
<td>Replace rings</td>
</tr>
<tr>
<td></td>
<td>Piston or cylinder worn</td>
<td>Repair or replace piston and/or cylinder block</td>
</tr>
<tr>
<td></td>
<td>Valve seat worn or damaged</td>
<td>Repair or replace valve and/or seat ring</td>
</tr>
<tr>
<td>Oil pressure drop</td>
<td>Engine oil level too low</td>
<td>Check engine oil level</td>
</tr>
<tr>
<td></td>
<td>Oil pressure switch faulty</td>
<td>Replace oil pressure switch</td>
</tr>
<tr>
<td></td>
<td>Oil filter clogged</td>
<td>Install new filter</td>
</tr>
<tr>
<td></td>
<td>Oil pump gears or cover worn</td>
<td>Replace gears and/or cover</td>
</tr>
<tr>
<td></td>
<td>Thin or diluted engine oil</td>
<td>Change engine oil to correct viscosity</td>
</tr>
<tr>
<td></td>
<td>Oil relief valve stuck (opened)</td>
<td>Repair relief valve</td>
</tr>
<tr>
<td></td>
<td>Excessive bearing clearance</td>
<td>Replace bearings</td>
</tr>
<tr>
<td>Oil pressure too high</td>
<td>Oil relief valve stuck (closed)</td>
<td>Repair relief valve</td>
</tr>
<tr>
<td>Noisy valves</td>
<td>Incorrect lash adjuster</td>
<td>Replace lash adjuster</td>
</tr>
<tr>
<td></td>
<td>Thin or diluted engine oil (low oil pressure)</td>
<td>Change engine oil</td>
</tr>
<tr>
<td></td>
<td>Valve stem or valve guide worn or damaged</td>
<td>Replace valve and/or guide</td>
</tr>
<tr>
<td>Connecting rod noise/ main bearing noise</td>
<td>Insufficient oil supply</td>
<td>Check engine oil level</td>
</tr>
<tr>
<td></td>
<td>Thin or diluted engine oil</td>
<td>Change engine oil</td>
</tr>
<tr>
<td></td>
<td>Excessive bearing clearance</td>
<td>Replace bearings</td>
</tr>
<tr>
<td>Timing belt noise</td>
<td>Incorrect belt tension</td>
<td>Adjust belt tension</td>
</tr>
<tr>
<td>Excessive engine wobble or vibration (with engine in normal condition)</td>
<td>Loose engine roll stopper (Front, Rear)</td>
<td>Retighten</td>
</tr>
<tr>
<td></td>
<td>Loose transaxle mount bracket</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Loose engine mount bracket</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Broken transaxle mount insulator</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Broken engine mount insulator</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Broken engine roll stopper insulator</td>
<td></td>
</tr>
</tbody>
</table>
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:

<table>
<thead>
<tr>
<th>Items</th>
<th>Check value</th>
<th>Adjustment value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>New belt</td>
</tr>
<tr>
<td>For generator and P/S pump</td>
<td>Deflection mm (in.)</td>
<td>6.0 – 9.0 (.24 -.35)</td>
</tr>
<tr>
<td></td>
<td>Tension N (lbs.)</td>
<td>350 – 600 (77 – 132)</td>
</tr>
<tr>
<td>For A/C compressor</td>
<td>Deflection mm (in.)</td>
<td>7.5 – 9.5 (.28 -.37)</td>
</tr>
<tr>
<td></td>
<td>Tension N (lbs.)</td>
<td>250 – 500 (55 – 110)</td>
</tr>
</tbody>
</table>

<DOHC>

Standard value: <Vehicle without air conditioning>

<table>
<thead>
<tr>
<th>Items</th>
<th>Check value</th>
<th>Adjustment value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>New belt</td>
</tr>
<tr>
<td>For generator</td>
<td>Deflection mm (in.)</td>
<td>4.0 – 5.5 (.16 -.22)</td>
</tr>
<tr>
<td></td>
<td>Tension N (lbs.)</td>
<td>350 – 600 (77 – 132)</td>
</tr>
<tr>
<td>For P/S pump</td>
<td>Deflection mm (in.)</td>
<td>9.5 – 13.5 (.37 -.53)</td>
</tr>
<tr>
<td></td>
<td>Tension N (lbs.)</td>
<td>250 – 500 (55 – 110)</td>
</tr>
</tbody>
</table>

Standard value: <Vehicle with air conditioning>

<table>
<thead>
<tr>
<th>Items</th>
<th>Check value</th>
<th>Adjustment value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>New belt</td>
</tr>
<tr>
<td>For generator and A/C compressor</td>
<td>Deflection mm (in.)</td>
<td>4.0 – 5.5 (.16 -.22)</td>
</tr>
<tr>
<td></td>
<td>Tension N (lbs.)</td>
<td>250 – 500 (55 – 110)</td>
</tr>
</tbody>
</table>
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.
(10) 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.
- (10) 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.
COMPRESSİON 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 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.

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) <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.

   <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.

(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

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

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.)

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>

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 AND ENGINE CONNECTION BOLT
   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.)

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 distributor
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
26. Engine mount bracket
27. Rear roll stopper bracket mount bolt
28. Front roll stopper bracket mount bolt
29. Engine assembly
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>
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>
34. Engine mounting bracket
35. Rear roll stopper bracket and engine connection bolt
36. Front roll stopper bracket and engine connection bolt
37. Engine assembly
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

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
- Accelerator 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.)

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

Sealant: MITSUBISHI GENUINE Part No. MD9971 10 or equivalent

Hole of bolt
Groove

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
- 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. Crankshaft rear oil seal
- Stop the crankshaft pulley from turning, and remove the oil seal.
- Caution
  Be careful not to damage the crankshaft and the oil seal case.

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
   - Make a notch in the lip section of the oil seal with a knife, etc.
   - 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.)

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
5. Purge pipe assembly
6. Rocker cover
7. Cylinder head assembly
8. Cylinder head gasket

Sealant: MOPAR Part No. 4318034 or equivalent
**Rear bank**

- **13 Nm** 9 ft.lbs.
- **9 Nm** 7 ft.lbs.
- **22 Nm** 16 ft.lbs.
- **19 Nm** 13 ft.lbs.
- **90 Nm** 65 ft.lbs.
- **10 - 12 Nm** 7 - 9 ft.lbs.

**Cold engine**

- **105 - 115 Nm** 76 - 83 ft.lbs.

**Sealant:** MOPAR Part No. 4318034 or equivalent

- 1. Camshaft sprocket
- 2. Timing belt rear cover
- 3. Connection of power steering pump bracket
- 4. Connection of generator brace
- 5. Purge pipe
- 6. Rocker cover gasket
- 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>

REMVAL 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.9-66.)

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
   * Adjustment of Timing belt tension
   * 15. Timing belt

* 150-160 Nm
  108-116 ft.lbs.
* 10-12 Nm
  7-9 ft.lbs.
* 65-75 Nm
  47-54 ft.lbs.
* 106-115 Nm
  76-83 ft.lbs.
* 10-12 Nm
  7-9 ft.lbs.
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

Removal steps
1. Air hose
2. Air pipe
3. Tensioner assembly
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
13. Adjustment of timing belt tension
14. Timing belt
15. C 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 (A) in the rod is aligned with that (B) in the cylinder.

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

③ Insert a wire [\.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.
Using paper clips, install the timing belt in the following order with care not to allow the belt to slack.


**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

20 Nm
15 ft lbs.

14 Nm
11 ft lbs.

Sealant: MOPAR Part No. 4318034 or equivalent

Lubricate all internal parts with engine oil during reassembly.

No. 1 and No. 4 bearing cap mating surface of cylinder head

7EN0300

7EN0178
**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 No. 4
   ● 14. Rocker arm (B)
   ● 15. Spring
   ● 16. Rocker arm (A)
   ● 17. Spring
   ● 18. Bearing No. 3
   ● 19. Rocker arm (B)
   ● 20. Spring
   ● 21. Rocker arm (A)
   ● 22. Spring
   ● 23. Bearing 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:

<table>
<thead>
<tr>
<th>Side</th>
<th>Standard Value</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake side</td>
<td>41.25 mm</td>
<td>40.75 mm</td>
</tr>
<tr>
<td>Exhaust side</td>
<td>41.25 mm</td>
<td>41.25 mm</td>
</tr>
</tbody>
</table>

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.
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
- 8. Camshaft
- + 7. Bearing cap No. 3
- 6. Bearing cap No. 4
- 5. Bearing cap No. 2
- 3. Bearing cap rear
- 1. Bearing cap front
- 4. Circular packing
- + 2. Oil seal

Lubricate all internal parts with engine oil during reassembly.
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. 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
7. 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
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

Lubricate all internal parts with engine oil during reassembly.
REM OVAL AND INSTALLATION - DOHC

Removal steps:

- Cylinder head bolt
- Washer
- Cylinder head assembly
- Cylinder head gasket
- Retainer lock
- Valve spring retainer
- Valve spring
- Intake valve
- Retainer lock
- Valve spring retainer
- Valve spring
- Exhaust valve
- Valve stem seal
- Valve spring sheet
- Valve stem seal
- Valve spring sheet
- Valve spring sheet
- Valve spring sheet
- Cylinder head

<Non-Turbo>

110 Nm
80 ft.lbs.

<Turbo>

125 Nm
125Nm
90 ft.lbs.

Back off
90 ft.lbs.

Lubricate all internal parts with engine oil during reassembly.
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:**

<table>
<thead>
<tr>
<th></th>
<th>&lt;SOHC&gt;</th>
<th>&lt;DOHC&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake side</td>
<td>1.2 mm (.047 in.)</td>
<td>1.0 mm (.039 in.)</td>
</tr>
<tr>
<td>Exhaust side</td>
<td>2.0 mm (.079 in.)</td>
<td>1.5 mm (.059 in.)</td>
</tr>
</tbody>
</table>

**Limit:**

<table>
<thead>
<tr>
<th></th>
<th>&lt;SOHC&gt;</th>
<th>&lt;DOHC&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake side</td>
<td>0.7 mm (.028 in.)</td>
<td>0.5 mm (.019 in.)</td>
</tr>
<tr>
<td>Exhaust side</td>
<td>1.5 mm (.059 in.)</td>
<td>1.0 mm (.039 in.)</td>
</tr>
</tbody>
</table>

VALVE SPRINGS

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

**Standard value:**

<table>
<thead>
<tr>
<th></th>
<th>&lt;SOHC&gt;</th>
<th>&lt;DOHC&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>49.8 mm (1.961 in.)</td>
<td>46.4 mm (1.827 in.)</td>
</tr>
</tbody>
</table>

**Limit:**

<table>
<thead>
<tr>
<th></th>
<th>&lt;SOHC&gt;</th>
<th>&lt;DOHC&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>48.8 mm (1.921 in.)</td>
<td>45.4 mm (1.787 in.)</td>
</tr>
</tbody>
</table>

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:**

<table>
<thead>
<tr>
<th></th>
<th>&lt;SOHC&gt;</th>
<th>&lt;DOHC&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake</td>
<td>0.03 - 0.06 mm (.0012 - .0024 in.)</td>
<td>0.02 - 0.05 mm (.0008 - .0020 in.)</td>
</tr>
<tr>
<td>Exhaust</td>
<td>0.05 - 0.09 mm (.0020 - .0035 in.)</td>
<td>0.05 - 0.09 mm (.0020 - .0035 in.)</td>
</tr>
</tbody>
</table>
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>
- <DOHC - Non-Turbo>
- <DOHC-Turbo>

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.
Lubricate all internal parts with engine oil during reassembly.
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
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
23. Oil pump outer rotor
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

Removal steps

1. Nut

2. Connecting rod cap

3. Connecting rod bearing (lower)

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

SERVICE POINTS OF INSTALLATION
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.

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).
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.

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).

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.

(2) Check the connecting rod big end thrust clearance.

**Standard value:** 0.10 – 0.25 mm (.0039 – .0098 in.)
**Limit:** 0.4 mm (.016 in.)
CRANKSHAFT, FLYWHEEL AND DRIVE PLATE

REMOVAL AND INSTALLATION

Lubricate all internal parts with engine oil during reassembly.

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)

Sealant: MOPAR Part No. 4318034 or equivalent.
**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.
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.

(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
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 (oversize) 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 oversized 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

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<td>Rubber hangers</td>
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<td>Suspension system</td>
<td></td>
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<tr>
<td>Turbocharger</td>
<td>Exhaust gas turbine type</td>
</tr>
<tr>
<td>Type</td>
<td>TD04-09BS-6</td>
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<tr>
<td>Identification No.</td>
<td>Turbocharger waste gate actuator and</td>
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<tr>
<td>Supercharging pressure control</td>
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<tr>
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<td>Distortion of cylinder head contacting</td>
<td>Less than 0.15 (.0059)</td>
<td>0.2 (.008)</td>
</tr>
<tr>
<td>surface mm (in.)</td>
<td>3.6 - 4.4</td>
<td></td>
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<tr>
<td>Turbocharger</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supercharging pressure kPa (psi)</td>
<td>Approx. 20 - 60 (2.9 - 8.7)</td>
<td></td>
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<tr>
<td>Turbocharger waste gate valve opening</td>
<td>Approx. 48 (6.8)</td>
<td></td>
</tr>
<tr>
<td>pressure kPa (psi)</td>
<td></td>
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SPECIAL TOOLS

<table>
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<th>Application</th>
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<td>M D998770 Oxygen sensor wrench or open end wrench</td>
<td>C-4709 or General service tool</td>
<td>Removal and installation of oxygen sensor &lt;Non-Turbo&gt;</td>
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<tr>
<td>General service tool</td>
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<td></td>
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<td>General service tool (Snap-on YA8875)</td>
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<td>MB991348 Test harness set</td>
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TROUBLESHOOTING

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<th>Probable cause</th>
<th>Remedy</th>
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<td>Exhaust gas leakage</td>
<td>Loose joints</td>
<td>Retighten</td>
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<td></td>
<td>Broken pipe or muffler</td>
<td>Repair or replace</td>
</tr>
<tr>
<td>Abnormal noise</td>
<td>Broken separator in muffler</td>
<td>Replace</td>
</tr>
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<td>Interference of pipe body</td>
<td>Broken rubber hangers</td>
<td></td>
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<tr>
<td>Broken pipe or muffler</td>
<td>Interference of pipe or muffler with vehicle</td>
<td>Correct</td>
</tr>
<tr>
<td>f ler</td>
<td>Repair or replace</td>
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</table>
**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.

<table>
<thead>
<tr>
<th>Sequence</th>
<th>Part to be checked</th>
<th>Checking procedure</th>
<th>Judgement</th>
<th>Probable cause</th>
<th>Remedy</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Valve</td>
<td>Operate valve manually.</td>
<td>Operates freely.</td>
<td>Valve sticking</td>
<td>Replace main muffler.</td>
</tr>
<tr>
<td>2</td>
<td>Active exhaust switch</td>
<td>Refer to P. 11-42</td>
<td></td>
<td>Faulty switch</td>
<td>Replace switch.</td>
</tr>
<tr>
<td>3</td>
<td>Power window relay</td>
<td>Check continuity between terminals @and 3 of relay.</td>
<td>Continuity present</td>
<td>No continuity</td>
<td>Replace power window relay.</td>
</tr>
<tr>
<td></td>
<td>With battery voltage applied between terminals (1) and (3) of relay, check continuity between terminals (4) and (6) of relay.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Actuator assembly</td>
<td>Check continuity between terminals in SPORT mode.</td>
<td>No continuity pres.</td>
<td>Continuity present</td>
<td>Replace actuator assembly.</td>
</tr>
<tr>
<td></td>
<td>Check continuity between terminals @and 5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Continuity present between terminals @and 6.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Apply battery voltage between terminals (1) and (3).</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Motor turns in reverse direction when polarity is reversed.</td>
<td></td>
<td>Motor does not turn</td>
<td></td>
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<tr>
<td>5</td>
<td>Cable</td>
<td>Operate active exhaust switch (while idling)</td>
<td>Actuator operates,</td>
<td>Broken or maladjusted cable</td>
<td>Replace or adjust cable.</td>
</tr>
<tr>
<td></td>
<td>Actuator operates, but valve operates as well.</td>
<td></td>
<td>Actuator does not work.</td>
<td></td>
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1. Apply battery voltage between terminals (1) and (3).
ACTIVE EXHAUST SYSTEM CIRCUIT CHECK

TROUBLESHOOTING HINTS
Checking Active Exhaust Control Module

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<th>Signal</th>
<th>Status</th>
<th>Terminal voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SPORT MODE signal</td>
<td>SPORT MODE</td>
<td>Not less than 10V</td>
</tr>
<tr>
<td>2</td>
<td>TOUR MODE signal</td>
<td>TOUR MODE</td>
<td>Not less than 10V</td>
</tr>
<tr>
<td>3 (8)</td>
<td>Full open position detection signal</td>
<td>SPORT MODE</td>
<td>OV (Not less than 5V)</td>
</tr>
<tr>
<td>4</td>
<td>Engine control module output signal</td>
<td>TOUR MODE, engine speed of not less than 3,500 rpm</td>
<td>Battery positive voltage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TOUR MODE, idle</td>
<td>ov</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SPORT MODE</td>
<td>Battery positive voltage</td>
</tr>
<tr>
<td>5</td>
<td>Control unit ground</td>
<td>At all times</td>
<td>ov</td>
</tr>
<tr>
<td>7</td>
<td>Control unit ground</td>
<td>At all times</td>
<td>Battery positive voltage</td>
</tr>
<tr>
<td>8 (3)</td>
<td>Full close position detection signal</td>
<td>TOUR MODE</td>
<td>OV (Not less than 5V)</td>
</tr>
<tr>
<td>9</td>
<td>Intermediate position detection signal</td>
<td>At all times</td>
<td>Not less than 5V</td>
</tr>
</tbody>
</table>
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 addition, measure the voltage between terminal ③ and terminal ④ in the same way.

Standard value

<table>
<thead>
<tr>
<th>Engine condition</th>
<th>Voltage [V]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idle</td>
<td>0.1 or 4.5-5.5</td>
</tr>
<tr>
<td>Engine speed gradually increases to 5,000 rpm</td>
<td>1.5-4.0 (momentarily)</td>
</tr>
<tr>
<td>5,000 rpm</td>
<td>0.1 or 4.5-5.5</td>
</tr>
</tbody>
</table>

(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

<table>
<thead>
<tr>
<th>Measured terminal</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between terminals ① and ②</td>
<td>Present [5 - 35 Ω: 20°C (68°F)]</td>
</tr>
</tbody>
</table>

(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) Connect a hand vacuum pump to the three-way joint.

(4) Disconnect the hose (with its end painted red) from the turbocharger wastegate actuator control boost nipple and plug the nipple.

(5) Applying a negative pressure with the hand vacuum pump, check tightness both when the hose end (with its end painted red) is closed and when it is open.
TURBOCHARGER WASTE GATE SOLENOID INSPECTION (Turbo)

OPERATION INSPECTION

1. Connect a hand vacuum pump to the solenoid valve nipple (A) (see the illustration to the left).
2. Using a jumper wire, connect between the solenoid valve terminal and battery terminal.
3. Connecting and disconnecting the jumper wire at the battery negative terminal to apply a negative pressure, check tightness.

<table>
<thead>
<tr>
<th>Jumper wire</th>
<th>⑧ nipple condition</th>
<th>Normal condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connected</td>
<td>Open</td>
<td>Negative pressure leaks.</td>
</tr>
<tr>
<td></td>
<td>Close</td>
<td>Negative pressure is held.</td>
</tr>
<tr>
<td>Disconnected</td>
<td>Open</td>
<td>Negative pressure is held.</td>
</tr>
</tbody>
</table>

COIL RESISTANCE INSPECTION

Measure resistance between solenoid valve terminals.

Standard value: 36 – 44 Ω [at 20°C (68°F)]
INTAKE AND EXHAUST - Service Adjustment Procedures

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.

<table>
<thead>
<tr>
<th>Negative pressure</th>
<th>Valve operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>About 400 mmHg (16 in.Hg)</td>
<td>It starts opening</td>
</tr>
</tbody>
</table>
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

<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 Δ mark at points indicated by the arrows, insert air intake hoses B and C until seated.
Insert the turbocharger end of air intake hoses B and C completely.
CHARGE AIR COOLER
REMOVAL AND INSTALLATION

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
1. Air hose G
2. Air pipe A
3. Heat protector F
4. Air hose B
5. Air hose E
6. Air hose C
7. Air hose F
8. Engine oil cooler
9. Charge air cooler duct (LH)
10. 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
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 California]
9. EGR valve [Vehicles for California]
10. EGR valve gasket
11. EGR pipe installation bolts [Vehicles for 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

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 connectors
7. Connection of VIC motor
8. EGR pipe
9. EGR valve
10. EGR valve gasket
11. EGR temperature sensor
12. Accelerator cable bracket
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 connector
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

**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

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.11-15, 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

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
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.
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.
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)

**VEHICLE FOR CALIFORNIA**

**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 or 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.)

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

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)
- Removal and Installation of Condenser Fan Motor Assembly (<Vehicles with Air Conditioning>) (Refer to GROUP 7—Radiator.)

Removal steps of exhaust manifold (front)
1. Drive belt (Generator)
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

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 A to 30 Nm (22 ft.lbs.).
(2) Tighten nuts B to 47 – 53 Nm (34 – 38 ft.lbs.).
(3) Back off nuts B until torque value of 10 Nm (7 ft.lbs.) is achieved.
(4) Tighten nuts B to 29 – 31 Nm (21 – 22 ft.lbs.)

NOTE
1. Fit the cone disc spring with the grooved side facing the nut.
2. Install the nut, cone disc spring and washer in the order shown in the illustration.
3. INSTALLATION OF EXHAUST MANIFOLD STAY
With the exhaust manifold stay resting on the exhaust manifold, fit it along with the exhaust manifold over the studs.

2. INSTALLATION OF EXHAUST MANIFOLD (FRONT)
Tighten the nuts in the following order.
(1) Tighten four nuts \( \text{C} \) to 30 Nm (22 ft.lbs.).
(2) Temporarily tighten the turbocharger to the exhaust manifold.
(3) Tighten nut \( \text{D} \) to 30 Nm (22 ft.lbs.).
(4) Tighten nuts \( \text{E} \) and \( \text{F} \) to 47 – 53 Nm (34 – 38 ft.lbs.).
(5) Back off nuts \( \text{E} \) and \( \text{F} \) until torque value of 10 Nm (7 ft.lbs.) is achieved.
(6) Tighten nuts \( \text{E} \) and \( \text{F} \) to 29 – 31 Nm (21 – 22 ft.lbs.).

**NOTE**
1. Fit the cone disc spring with the grooved side facing the nut.
2. Install the nut, cone disc spring and washer in the order shown in the illustration.
EXHAUST PIPE, MAIN MUFLER AND CATALYTIC CONVERTER
<Non Turbo>

REMOVAL AND INSTALLATION

Removal steps
1. Main muffler and center exhaust pipe installation bolts
2. Gasket
3. Rubber hangers
4. Rubber hanger
5. Main muffler
6. 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 hanger
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

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 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. Oxygen sensor protector
22. Heated oxygen sensor connection
23. Self-locking nuts
24. Rubber hanger
25. Front exhaust pipe
26. Gasket
27. Self-locking nuts
28. Catalytic converter (front)
29. Gasket
30. Heated oxygen sensor connection
31. Catalytic converter (rear) and exhaust fitting stay installation nut
32. Exhaust fitting stay
33. Heat protector A
34. 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 MUFLER 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. Hanger bracket
12. Rubber hangers
13. Center exhaust pipe
14. Gasket
15. Rubber hangers
16. Hanger brackets
17. Hanger bracket
18. Rear floor heat protector
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 warmup 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 warmup three-way catalytic converter
37. Heat protector 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

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

Pre-removal and Post-installation Operation
- Removal and Installation of Rear Side Trim (LH)
(Refer to GROUP 23A-TRIMS.)

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.

<table>
<thead>
<tr>
<th>Switch position</th>
<th>Terminal 2</th>
<th>Terminal 3</th>
<th>Terminal 5</th>
<th>Terminal 6</th>
<th>1</th>
<th>4</th>
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<tbody>
<tr>
<td>TOUR</td>
<td>○</td>
<td>○</td>
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<td>ILL</td>
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NOTE
○-○ indicates that there is continuity between the terminals.
FUEL

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MULTIPOINT FUEL INJECTION

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MULTIPOINT FUEL INJECTION (MFI) SYSTEM DIAGRAM

<Federal SOHC>
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<tr>
<td>&lt;SOHC&gt;</td>
<td>14 (2.13)</td>
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<tr>
<td>&lt;DOHC&gt;</td>
<td>10 (2.36)</td>
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<td>Throttle position sensor</td>
<td>variable resistor type</td>
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<td>Idle air control motor</td>
<td>stepper motor type</td>
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<td>Closed throttle position switch</td>
<td>Stepper motor type by-pass air control system with the first idle air valve</td>
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<td>Engine control module</td>
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<tr>
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<td>Engine coolant temperature sensor</td>
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<td>Knock sensor &lt;DOHC&gt;</td>
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<td>thermistor type</td>
</tr>
<tr>
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<td>contact switch type</td>
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<tbody>
<tr>
<td>Actuators</td>
<td><strong>Contact switch type</strong>&lt;br&gt;Electromagnetic, 6&lt;br&gt;S21 OH&lt;br&gt;SDH210&lt;br&gt;BDL360</td>
</tr>
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<td>Injector type and number</td>
<td><strong>Direct current motor type</strong>&lt;br&gt;ON/OFF type solenoid valve&lt;br&gt;Duty cycle type solenoid valve</td>
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<tr>
<td>Injector identification mark &lt;SOHC&gt; &lt;DOHC – Non Turbo&gt; &lt;DOHC - Turbo&gt;</td>
<td><strong>Evaporative emission purge solenoid</strong>&lt;br&gt;EGR solenoid</td>
</tr>
<tr>
<td>Variable induction control motor &lt;DOHC – Non Turbo&gt;</td>
<td><strong>Fuel pressure solenoid</strong>&lt;br&gt;Turbocharger waste gate solenoid &lt;DOHC - Turbo&gt;</td>
</tr>
</tbody>
</table>

| Fuel pressure regulator | Regulated pressure kPa (psi) | **SOHC, DOHC – Non Turbo**<br><DOHC - Turbo> | 335 (47.6)<br>300 (43.5) |

### SERVICE SPECIFICATIONS

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<thead>
<tr>
<th>Items</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic ignition timing</td>
<td>5° ± 2° BTDC at curb idle&lt;br&gt;700 ± 100</td>
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<tr>
<td>Curb idle speed rpm</td>
<td>900 in neutral&lt;br&gt;650 in D range</td>
</tr>
<tr>
<td>Idle speed when air conditioning is on rpm</td>
<td>700 ± 50</td>
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<tr>
<td>&lt;M/T&gt;</td>
<td>0.4 – 1.0</td>
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<tr>
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<td>Throttle position sensor adjusting voltage V</td>
<td>28 – 33 [at 20°C (68°F)]&lt;br&gt;2.7 [at 20°C (68°F)]</td>
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<tr>
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<tr>
<td>Intake air temperature sensor resistance kΩ</td>
<td><strong>20°C (68°F)</strong>&lt;br&gt;28 – 350 (47 – 50) at curb idle&lt;br&gt;295 – 315 (43 – 45) at curb idle&lt;br&gt;330 – 350 (47 – 50) at curb idle&lt;br&gt;Approx. 270 (38) at curb idle&lt;br&gt;Approx. 235 (34) at curb idle&lt;br&gt;13 – 16 [at 20°C (68°F)]&lt;br&gt;13 – 16 [at 20°C (68°F)]&lt;br&gt;13 – 16 [at 20°C (68°F)]&lt;br&gt;</td>
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<td>Engine coolant temperature sensor resistance kΩ</td>
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<td><strong>Vacuum hose disconnection</strong>&lt;br&gt;Vacuum hose connection &lt;SOHC, DOHC – Non Turbo&gt; &lt;DOHC - Turbo&gt;</td>
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<tr>
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<td><strong>SOHC, DOHC – Non Turbo</strong>&lt;br&gt;&lt;DOHC - Turbo&gt;</td>
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### SEALANT

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<tbody>
<tr>
<td>Engine coolant temperature sensor threaded portion</td>
<td>MOPAR Part No. 4318034 or equivalent</td>
</tr>
</tbody>
</table>
## SPECIAL TOOLS

<table>
<thead>
<tr>
<th>Tool number and tool name</th>
<th>Replaced by Miller tool number</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>MB991502 Scan tool (MUI-II)</td>
<td>DRB-II Scan tool</td>
<td>• Reading diagnostic trouble code</td>
</tr>
<tr>
<td>MB991348 Test harness set</td>
<td>DRB-II Scan tool</td>
<td>• Adjustment of closed throttle position switch and throttle position sensor • Inspection by oscilloscope</td>
</tr>
<tr>
<td>MB991529 Diagnostic trouble code check harness</td>
<td>Tool not necessary if scan tool (MUT-II) is available.</td>
<td>• Checking the diagnostic trouble code • Basic idle speed adjustment</td>
</tr>
<tr>
<td>MD998463 Test harness (6 pin, square)</td>
<td>DRB-II Scan tool</td>
<td>• Idle air control motor inspection • Inspection by oscilloscope</td>
</tr>
<tr>
<td>MD998464 Test harness (4 pin, square)</td>
<td>DRB-II Scan tool</td>
<td>• Heated oxygen sensor inspection &lt;California-Non Turbo, Turbo&gt; • Inspection by oscilloscope</td>
</tr>
<tr>
<td>MD998474 Test harness (8 pin, square)</td>
<td>DRB-II Scan tool</td>
<td>• Inspection by oscilloscope</td>
</tr>
<tr>
<td>MD998478 Test harness (3 pin, triangle)</td>
<td>DRB-II Scan tool</td>
<td>• Inspection by oscilloscope</td>
</tr>
<tr>
<td>MD998709 Adapter hose</td>
<td></td>
<td>• Measurement of fuel pressure</td>
</tr>
<tr>
<td>MD998742 Hose adapter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tool number and tool name</td>
<td>Replaced by Miller tool number</td>
<td>Application</td>
</tr>
<tr>
<td>--------------------------</td>
<td>--------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>MD998773 Knock sensor wrench</td>
<td>–</td>
<td>Removal/Installation of knock sensor</td>
</tr>
</tbody>
</table>
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 inputs/outputs 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

<table>
<thead>
<tr>
<th>Engine control module</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heated oxygen sensor</td>
</tr>
<tr>
<td>Volume air flow sensor</td>
</tr>
<tr>
<td>Intake air temperature sensor</td>
</tr>
<tr>
<td>Throttle position sensor</td>
</tr>
<tr>
<td>Engine coolant temperature sensor</td>
</tr>
<tr>
<td>Crankshaft position sensor</td>
</tr>
<tr>
<td>Camshaft position sensor</td>
</tr>
<tr>
<td>Barometric pressure sensor</td>
</tr>
<tr>
<td>Knock sensor &lt;DOHC&gt;</td>
</tr>
<tr>
<td>Ignition timing adjustment signal &lt;DOHC&gt;</td>
</tr>
<tr>
<td>Injector</td>
</tr>
<tr>
<td>EGR system &lt;California—Non Turbo, Turbo&gt;</td>
</tr>
<tr>
<td>Ignition coil, ignition power transistor unit &lt;DOHC&gt;</td>
</tr>
</tbody>
</table>

**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)

<table>
<thead>
<tr>
<th>Diagnostic trouble code</th>
<th>Diagnostic item</th>
<th>Check item (Remedy)</th>
<th>Memory</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Engine control module</td>
<td>Fuse, Harness and connector, Ground (Replace ECM if power + available)</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Heated oxygen sensor&lt;br&gt;(Except California model)&lt;br&gt;Left bank heated oxygen sensor (front)&lt;br&gt;(California)</td>
<td>Harness and connector, Fuel pressure, Injectors (Replace if defective), Intake air leaks</td>
<td>Retained</td>
</tr>
<tr>
<td>12</td>
<td>Volume air flow sensor</td>
<td>Harness and connector (if harness and connector are normal, replace volume air flow sensor assembly)</td>
<td>Retained</td>
</tr>
<tr>
<td>13</td>
<td>Intake air temperature sensor</td>
<td>Harness and connector, Intake air temperature sensor</td>
<td>Retained</td>
</tr>
<tr>
<td>14</td>
<td>Throttle position sensor</td>
<td>Harness and connector, Throttle position sensor, Closed throttle position switch</td>
<td>Retained</td>
</tr>
<tr>
<td>21</td>
<td>Engine coolant temperature sensor</td>
<td>Harness and connector, Engine coolant temperature sensor</td>
<td>Retained</td>
</tr>
<tr>
<td>22</td>
<td>Crankshaft position sensor</td>
<td>Harness and connector (if harness and connector are normal, replace crankshaft position sensor assembly)</td>
<td>Retained</td>
</tr>
<tr>
<td>23</td>
<td>Camshaft position sensor</td>
<td>Harness and connector (if harness and connector are normal, replace camshaft position sensor)</td>
<td>Retained</td>
</tr>
<tr>
<td>24</td>
<td>Vehicle speed sensor</td>
<td>Harness and connector, Vehicle speed sensor</td>
<td>Retained</td>
</tr>
<tr>
<td>25</td>
<td>Barometric pressure sensor</td>
<td>Harness and connector (if harness and connector are normal, replace barometric pressure sensor assembly)</td>
<td>Retained</td>
</tr>
<tr>
<td>31</td>
<td>Knock sensor &lt;DOHC&gt;</td>
<td>Harness and connector (if harness and connector are normal, replace knock sensor)</td>
<td>Retained</td>
</tr>
</tbody>
</table>

**NOTE**
Do not replace the ECM until a thorough terminal check reveals no short/open circuits.
<table>
<thead>
<tr>
<th>No.</th>
<th>Output signal pattern</th>
<th>Diagnostic trouble code</th>
<th>Diagnostic item</th>
<th>Check item (Remedy)</th>
<th>Memory</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
<td><img src="image1.png" alt="Signal Pattern" /></td>
<td>Ignition timing adjustment signal</td>
<td>Harness and connector</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>39</td>
<td><img src="image2.png" alt="Signal Pattern" /></td>
<td>Heated oxygen sensor &lt;Turbo other than California model&gt; Right bank heated oxygen sensor (front) &lt;California&gt;</td>
<td>Harness and connector, Heated oxygen sensor, Fuel pressure, Injectors (Replace if defective), Intake air leaks</td>
<td>Retained</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td><img src="image3.png" alt="Signal Pattern" /></td>
<td>Injector</td>
<td>Harness and connector, Injector coil resistance</td>
<td>Retained</td>
<td></td>
</tr>
<tr>
<td>43</td>
<td><img src="image4.png" alt="Signal Pattern" /></td>
<td>EGR &lt;California – Non Turbo, Turbo&gt;</td>
<td>Harness and connector, EGR thermo-sensor, EGR valve, EGR solenoid, EGR valve control vacuum</td>
<td>Retained</td>
<td></td>
</tr>
<tr>
<td>44</td>
<td><img src="image5.png" alt="Signal Pattern" /></td>
<td>Ignition coil, Ignition power transistor unit (No. 1 – 4 cylinder) &lt;DOHC&gt;</td>
<td>Harness and connector, Ignition coil, Ignition power transistor unit</td>
<td>Retained</td>
<td></td>
</tr>
<tr>
<td>52</td>
<td><img src="image6.png" alt="Signal Pattern" /></td>
<td>Ignition coil, Ignition power transistor unit (No. 2 – 5 cylinder) &lt;DOHC&gt;</td>
<td>Harness and connector, Ignition coil, Ignition power transistor unit</td>
<td>Retained</td>
<td></td>
</tr>
<tr>
<td>53</td>
<td><img src="image7.png" alt="Signal Pattern" /></td>
<td>Ignition coil, Ignition power transistor unit (No. 3 – 6 cylinder) &lt;DOHC&gt;</td>
<td>Harness and connector, Ignition coil, Ignition power transistor unit</td>
<td>Retained</td>
<td></td>
</tr>
<tr>
<td>59</td>
<td><img src="image8.png" alt="Signal Pattern" /></td>
<td>Left bank heated oxygen sensor (Rear) &lt;California&gt;</td>
<td>Harness and connector, Heated oxygen sensor, Fuel pressure, Injectors (Replace if defective), Intake air leaks</td>
<td>Retained</td>
<td></td>
</tr>
<tr>
<td>61</td>
<td><img src="image9.png" alt="Signal Pattern" /></td>
<td>A cable from trans-axle control module, for transmission of torque reduction signal &lt;A/T&gt;</td>
<td>Harness and connector (If harness, connector and induction control valve are normal, replace only transaxle control module.)</td>
<td>Retained</td>
<td></td>
</tr>
<tr>
<td>62</td>
<td><img src="image10.png" alt="Signal Pattern" /></td>
<td>Induction control valve position sensor &lt;Non Turbo&gt; &lt;DOHC&gt;</td>
<td>Harness and connector (If harness, connector and induction control valve are normal, replace air intake plenum assembly.)</td>
<td>Retained</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE**
Do not replace the ECM until a thorough terminal check reveals no short/open circuits.
<table>
<thead>
<tr>
<th>Diagnostic trouble code</th>
<th>Diagnostic item</th>
<th>Check item (Remedy)</th>
<th>Memory</th>
</tr>
</thead>
<tbody>
<tr>
<td>69</td>
<td>Right bank heated oxygen sensor (Rear)</td>
<td>• Harness and connector&lt;br&gt;• Heated oxygen sensor&lt;br&gt;• Fuel pressure&lt;br&gt;• Injectors (Replace if defective)&lt;br&gt;• Intake air leaks</td>
<td>Retained</td>
</tr>
<tr>
<td>12A0105</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-</td>
<td>Normal state</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>12A0104</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE**
Do not replace the ECM until a thorough terminal check reveals no short/open circuits.
# TROUBLE DIAGNOSIS QUICK REFERENCE CHART

<table>
<thead>
<tr>
<th>Diagnostic trouble code No.</th>
<th>Diagnostic item</th>
<th>Description</th>
<th>Major cause</th>
<th>Remarks (Symptoms, etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Engine control module</td>
<td>Trouble in engine control module itself</td>
<td>(1) Defective heated oxygen sensor (2) Open or short circuit in heated oxygen sensor circuit, or connector in loose contact</td>
<td>• Engine stalls. &lt;br&gt;• Engine cannot be started.</td>
</tr>
<tr>
<td></td>
<td>Heated oxygen sensor &lt;Except California model&gt;</td>
<td>Despite air-fuel ratio feedback control (closed loop control), oxygen sensor signal voltage does not change (get lean/rich) for 30 seconds.</td>
<td>(3) Improper fuel pressure (4) Defective injector (5) Air drawn in through gasket clearance, etc. (6) Defective engine control module</td>
<td>• Poor exhaust emission purifying performance &lt;br&gt;• Poor exhaust emission purifying performance &lt;br&gt;• Poor startability &lt;br&gt;• Unstable idling &lt;br&gt;• Poor acceleration</td>
</tr>
<tr>
<td></td>
<td>Left bank heated oxygen sensor (front) &lt;California&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Volume air flow sensor</td>
<td>Engine is running, but air flow sensor signal frequency is below 1.0 Hz for 4 seconds.</td>
<td>(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</td>
<td>• Poor acceleration* &lt;br&gt;• Improper idling speed* &lt;br&gt;• Unstable idling*</td>
</tr>
<tr>
<td>13</td>
<td>Intake air temperature sensor</td>
<td>(1) Intake air temperature sensor signal voltage is above 4.5 V for 4 seconds. (2) Intake air temperature sensor signal voltage is below 0.27 V for 4 seconds.</td>
<td>(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</td>
<td>@ Somewhat poor driveability* &lt;br&gt;• At high temperature: (a) Poor startability* (b) Unstable idling*</td>
</tr>
<tr>
<td>14</td>
<td>Throttle position sensor</td>
<td>(1) Throttle position sensor signal voltage is below 0.2 V for 4 seconds. (2) Idle switch is ON, but throttle position sensor signal voltage is above 2 V.</td>
<td>(1) Throttle position sensor out of order or maladjusted (2) Open or short circuit in throttle position sensor circuit, or connector in poor contact (3) Closed throttle position switch ON failure (4) Short circuit in closed throttle position signal line (5) Defective engine control module</td>
<td>• Somewhat poor acceleration &lt;M/T&gt; &lt;br&gt;• Poor driveability &lt;A/T&gt; &lt;br&gt;• Engine stalls. &lt;br&gt;• Engine stalls. &lt;br&gt;• Engine cannot be raced.</td>
</tr>
<tr>
<td>21</td>
<td>Engine coolant temperature sensor</td>
<td>(1) Engine coolant temperature sensor signal voltage is above 4.6 V for 4 seconds. (2) Engine coolant temperature sensor signal voltage is below 0.1 V for 4 seconds. (3) During engine warm-up, engine coolant temperature sensor signal shows decrease in engine coolant temperature.</td>
<td>(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</td>
<td>With engine cold &lt;br&gt;• Poor startability* &lt;br&gt;• Unstable idling* &lt;br&gt;• Poor acceleration*</td>
</tr>
</tbody>
</table>

**NOTE**<br>*: Failsafe/backup function is in operation
<table>
<thead>
<tr>
<th>Diagnostic trouble code No.</th>
<th>Diagnostic item</th>
<th>Description</th>
<th>Major cause</th>
<th>Remarks (Symptoms, etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>Crankshaft position sensor</td>
<td>(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 &lt;DOHC&gt;</td>
<td>(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</td>
<td>• Engine stalls. @ Engine cannot be started.</td>
</tr>
<tr>
<td>23</td>
<td>Camshaft position sensor</td>
<td>(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. &lt;DOHC&gt;</td>
<td>(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</td>
<td>• Engine stalls.*</td>
</tr>
<tr>
<td>24</td>
<td>Vehicle speed sensor</td>
<td>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).</td>
<td>(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</td>
<td>When the vehicle is stopped with the engine in decelerated operation, the engine might stall.</td>
</tr>
<tr>
<td>25</td>
<td>Barometric pressure sensor</td>
<td>(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.</td>
<td>(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</td>
<td>• Unstable idling*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Poor acceleration*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Poor startability*</td>
</tr>
<tr>
<td>31</td>
<td>Knock sensor &lt;DOHC&gt;</td>
<td>Abnormal knock sensor signal voltage</td>
<td>(1) Defective knock sensor (2) Open or short circuit in knock sensor circuit, or connector in loose contact (3) Defective engine control module</td>
<td>• Poor acceleration*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>Ignition timing adjustment signal &lt;DOHC&gt;</td>
<td>Ignition timing adjustment signal line short-circuited to ground</td>
<td>(1) Ignition timing adjustment signal line short-circuited to ground (2) Defective engine control module</td>
<td>• Poor acceleration</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Overheated engine</td>
</tr>
<tr>
<td>39</td>
<td>Heated oxygen sensor &lt;Turbo other than California model&gt; Right bank heated oxygen sensor (front) &lt;California&gt;</td>
<td>Air-fuel ratio closed loop control is in effect but heated oxygen sensor signal voltage does not change (air-fuel mixture lean/rich).</td>
<td>(1) Defective heated oxygen sensor (2) Open or short circuit in heated oxygen sensor circuit, or connector in loose contact (3) Improper fuel pressure (4) Defective injector (5) Air drawn in through gasket clearance, etc. (6) Defective engine control module</td>
<td>• Poor exhaust emission purifying performance*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Poor exhaust emission purifying performance*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Poor startability</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Unstable idling</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Poor acceleration</td>
</tr>
<tr>
<td>41</td>
<td>Injector</td>
<td>Injector is not driven for more than four consecutive seconds during engine cranking or idling operation.</td>
<td>(1) Defective injector (2) Open or short circuit in injector circuit, or connector in loose contact (3) Defective engine control module</td>
<td>• Poor idling</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Poor acceleration</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Poor startability</td>
</tr>
<tr>
<td>Diagnostic trouble code No.</td>
<td>Diagnostic item</td>
<td>Description</td>
<td>Major cause</td>
<td>Remarks (Symptoms, etc.)</td>
</tr>
<tr>
<td>----------------------------</td>
<td>-----------------</td>
<td>-------------</td>
<td>-------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>43</td>
<td>EGR &lt;California -Non Turbo, Turbo&gt;</td>
<td>With the engine running after warmup, EGR amount too small (EGR temperature sensor signal voltage too high)</td>
<td>(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</td>
<td>• Poor exhaust emission purifying performance*</td>
</tr>
<tr>
<td>44</td>
<td>Ignition coil and ignition power transistor unit for 1-4 cylinders &lt;DOHC&gt;</td>
<td>With the engine running, no ignition signal is input (except in cases where no ignition signal is input to all the cylinders)</td>
<td>(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</td>
<td>• Unstable idling* • Poor acceleration* • Poor startability*</td>
</tr>
<tr>
<td>52</td>
<td>Ignition coil and ignition power transistor unit for 2-5 cylinders &lt;DOHC&gt;</td>
<td>With the engine running, no ignition signal is input (except in cases where no ignition signal is input to all the cylinders)</td>
<td>(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</td>
<td>• Unstable idling* • Poor acceleration* • Poor startability*</td>
</tr>
<tr>
<td>53</td>
<td>Ignition coil and ignition power transistor unit for 3-6 cylinders &lt;DOHC&gt;</td>
<td>With the engine running, no ignition signal is input (except in cases where no ignition signal is input to all the cylinders)</td>
<td>(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</td>
<td>• Unstable idling* • Poor acceleration* • Poor startability*</td>
</tr>
<tr>
<td>59</td>
<td>Left bank heated oxygen sensor (Rear) &lt;California&gt;</td>
<td>Engine warm-up has been completed, but oxygen sensor signal voltage does not rise above 0.1 V.</td>
<td>(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</td>
<td>• Decrease of exhaust gas purification performance*</td>
</tr>
<tr>
<td>61</td>
<td>A cable from transaxle control module, for transmission of torque reduction signal &lt;A/T&gt;</td>
<td>With the engine running, the “reduce torque” request signal voltage from the control module remains low for several seconds.</td>
<td>(1) “Reduce torque” request signal line short-circuited (2) Defective transmission control module (3) Defective engine control module</td>
<td>• Somewhat poor gearshift feeling*</td>
</tr>
<tr>
<td>62</td>
<td>Induction control valve position sensor &lt;DOHC — Non Turbo&gt;</td>
<td>Even if the variable induction control servo motor is driven several times, the induction control valve does not reach the target position (opening).</td>
<td>(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</td>
<td>• Poor acceleration</td>
</tr>
</tbody>
</table>
**MULTIPORT FUEL INJECTION – Troubleshooting**

**Diagnosis**

<table>
<thead>
<tr>
<th>Diagnostic trouble code No.</th>
<th>Diagnostic item</th>
<th>Description</th>
<th>Major cause</th>
<th>Remarks (Symptoms, etc.)</th>
</tr>
</thead>
</table>
| 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.

<table>
<thead>
<tr>
<th>Trouble item</th>
<th>Controls to be provided in the event of trouble</th>
</tr>
</thead>
</table>
| 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

<table>
<thead>
<tr>
<th>Typical blinking, made while diagnostic trouble code is output</th>
<th>Blinking when condition is normal</th>
</tr>
</thead>
<tbody>
<tr>
<td>In case of diagnostic trouble code No. 24</td>
<td></td>
</tr>
<tr>
<td>Light comes on</td>
<td>Light goes out</td>
</tr>
<tr>
<td>Light goes out</td>
<td>Light comes on</td>
</tr>
<tr>
<td>Pause time 3 seconds</td>
<td>The number of tens</td>
</tr>
<tr>
<td>The number of units</td>
<td>The number of tens</td>
</tr>
<tr>
<td>Positional segmentation 2 seconds</td>
<td>0.5 second</td>
</tr>
<tr>
<td>1.5 second</td>
<td>0.5 second</td>
</tr>
</tbody>
</table>

**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

<table>
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<tr>
<th>Problem symptoms</th>
<th>Starting</th>
<th>Idling stability</th>
<th>Driving</th>
<th>Stopping</th>
<th>Reference page</th>
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<td>Check items</td>
<td>Will not start</td>
<td>Fires up - dies / Hard starting</td>
<td>Hunting - rough idle</td>
<td>Incorrect idle speed</td>
<td>Engine stall</td>
</tr>
<tr>
<td>Power supply and ignition switch-KG</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Engine control module power ground</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Fuel pump</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Volume air flow sensor</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Intake air temperature sensor</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Inertial pressure sensor</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Engine coolant temperature sensor</td>
<td>7</td>
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</tr>
<tr>
<td>Throttle position sensor</td>
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<tr>
<td>Closed throttle position switch</td>
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<tr>
<td>Camshaft position sensor</td>
<td>10</td>
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<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Ignition switch-ST &lt;M/T&gt;</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Ignition switch-ST and Park/Neutral position switch &lt;A/T&gt;</td>
<td>13</td>
<td>13</td>
<td>13</td>
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<tr>
<td>Vehicle speed sensor</td>
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<tr>
<td>Power steering pressure switch</td>
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<td>15</td>
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<tr>
<td>Air conditioning switch and compressor clutch relay</td>
<td>16</td>
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<td>16</td>
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<tr>
<td>Knock sensor &lt;DOHC&gt;</td>
<td>17</td>
<td>17</td>
<td>17</td>
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<td>17</td>
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<tr>
<td>Electrical lead switch &lt;DOHC&gt;</td>
<td>18</td>
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<td>18</td>
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<td>18</td>
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<tr>
<td>Fan motor relay</td>
<td>19</td>
<td>19</td>
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<td>19</td>
</tr>
<tr>
<td>Induction control valve position sensor &lt;DOHC – Non Turbo&gt;</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Heated oxygen sensor</td>
<td>21</td>
<td>21</td>
<td>21</td>
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<td>21</td>
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<tr>
<td>Injectors</td>
<td>22</td>
<td>22</td>
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<tr>
<td>Idle air control motor (stepper motor type)</td>
<td>23</td>
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<td>23</td>
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<tr>
<td>Ignition coil and ignition power transistor</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>EGR solenoid &lt;California – Non Turbo, Turbo&gt;</td>
<td>26</td>
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<td>26</td>
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<td>26</td>
</tr>
<tr>
<td>Fuel pressure solenoid &lt;Turbo&gt;</td>
<td>27</td>
<td>27</td>
<td>27</td>
<td>27</td>
<td>27</td>
</tr>
<tr>
<td>Turbocharger waste gate control solenoid &lt;Turbo&gt;</td>
<td>28</td>
<td>28</td>
<td>28</td>
<td>28</td>
<td>28</td>
</tr>
<tr>
<td>Active exhaust control unit &lt;Turbo&gt;</td>
<td>29</td>
<td>29</td>
<td>29</td>
<td>29</td>
<td>29</td>
</tr>
<tr>
<td>Variable induction control motor (DC motor) &lt;DOHC – Non Turbo&gt;</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Anti-lock braking system &lt;Turbo&gt;</td>
<td>31</td>
<td>31</td>
<td>31</td>
<td>31</td>
<td>31</td>
</tr>
<tr>
<td>Engine and transaxle total control signal &lt;A/T&gt;</td>
<td>32</td>
<td>32</td>
<td>32</td>
<td>32</td>
<td>32</td>
</tr>
<tr>
<td>Fuel pressure</td>
<td>33</td>
<td>33</td>
<td>33</td>
<td>33</td>
<td>33</td>
</tr>
</tbody>
</table>

- Warm engine (number inside indicates check order)
- Cold engine (number inside indicates check order)

*1: SOHC, Federal – Non Turbo, California – M/T Turbo
*2: California – DOHC Non Turbo, Turbo
### PROBLEM SYMPTOMS TABLE (FOR YOUR INFORMATION)

<table>
<thead>
<tr>
<th>Items</th>
<th>Symptom</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Starting</strong></td>
<td><strong>Won’t start</strong> (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.</td>
</tr>
<tr>
<td><strong>Fires up and dies</strong></td>
<td>There is combustion within the cylinders, but then the engine soon stalls.</td>
</tr>
<tr>
<td><strong>Hard starting</strong></td>
<td>Engine starts after cranking awhile</td>
</tr>
<tr>
<td><strong>Hunting</strong></td>
<td>Engine speed doesn’t remain constant; changes at idling.</td>
</tr>
<tr>
<td><strong>Rough idle</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Incorrect idle speed</strong></td>
<td>The engine doesn’t idle at the usual correct speed.</td>
</tr>
<tr>
<td><strong>Engine stall</strong></td>
<td><strong>Dieout</strong> 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.</td>
</tr>
<tr>
<td><strong>Hesitation</strong></td>
<td><strong>Sag</strong> “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”.</td>
</tr>
<tr>
<td><strong>Poor acceleration</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Stumble</strong></td>
<td>Engine rpm increase is delayed when the accelerator pedal is initially depressed for acceleration from the stopped condition.</td>
</tr>
<tr>
<td><strong>Shock</strong></td>
<td>The feeling of a comparatively large impact or vibration when the engine is accelerated or decelerated.</td>
</tr>
<tr>
<td><strong>Surge</strong></td>
<td>This is slight acceleration and deceleration feel usually at steady light throttle cruise must not able under high loads.</td>
</tr>
<tr>
<td><strong>Knocking</strong></td>
<td>A sharp sound like a hammer striking the cylinder walls during driving and which adversely affects driving.</td>
</tr>
<tr>
<td><strong>Run-on (Dieseling)</strong></td>
<td>Also called dieseling, this is a continued operation of the engine after the ignition switch is turned off.</td>
</tr>
</tbody>
</table>
CIRCUIT DIAGRAM <SOHC> (CONTINUED)
MULTIPORT FUEL INJECTION - Troubleshooting

CIRCUIT DIAGRAM <Turbo>

FUSIBLE LINK

BATTERY

STARTER RELAY

IOD OR STORAGE CONNECTOR A-11X

VOLUME AIR FLOW SENSOR

MEI RELAY C-M

DC5-AC-R0508-M4C
MULTIPORT FUEL INJECTION – Troubleshooting

14A-59

VOLUME AIR FLOW SENSOR B-40

INTAKE AIR TEMPERATURE SENSOR

VOLUME AIR FLOW SENSOR

CAMSHAFT POSITION SENSOR

CRANKSHAFT POSITION SENSOR

FLOW SENSOR

VOLUMEAIR FLOW SENSOR

ENGINE RIGHT BANK HEATED OXYGEN SENSOR (REAR)

THROTTLE B-05

ENGINE COOLANT TEMPERATURE SENSOR (REAR)

RIGHT BANK HEATED OXYGEN SENSOR

LEFT BANK HEATED OXYGEN SENSOR (FRONT)
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.
(10) 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 terminal 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>

<table>
<thead>
<tr>
<th>Name</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air conditioning relay</td>
<td>0</td>
</tr>
<tr>
<td>Air conditioning switch</td>
<td>G</td>
</tr>
<tr>
<td>Camshaft position sensor and crankshaft position sensor</td>
<td>D</td>
</tr>
<tr>
<td>Check engine/malfunction indicator lamp</td>
<td>P</td>
</tr>
<tr>
<td>EGR solenoid &lt;California&gt;</td>
<td>V</td>
</tr>
<tr>
<td>EGR temperature sensor &lt;California&gt;</td>
<td>T</td>
</tr>
<tr>
<td>Engine control module</td>
<td>S</td>
</tr>
<tr>
<td>Engine coolant temperature sensor</td>
<td>B</td>
</tr>
<tr>
<td>Evaporative emission purge solenoid</td>
<td>U</td>
</tr>
<tr>
<td>Heated oxygen sensor</td>
<td>E</td>
</tr>
<tr>
<td>Idle air control motor (stepper motor)</td>
<td>L</td>
</tr>
<tr>
<td>Ignition coil (ignition power transistor)</td>
<td>M</td>
</tr>
<tr>
<td>Ignition timing adjusting terminal</td>
<td>Q</td>
</tr>
<tr>
<td>Injector</td>
<td>K</td>
</tr>
<tr>
<td>Multiport fuel injection (MFI) relay</td>
<td>N</td>
</tr>
<tr>
<td>Diagnostic output terminal and diagnostic test mode control terminal</td>
<td>R</td>
</tr>
<tr>
<td>Park/Neutral position switch &lt;A/T&gt;</td>
<td>I</td>
</tr>
<tr>
<td>Power steering pressure switch</td>
<td>H</td>
</tr>
<tr>
<td>Throttle position sensor (with built-in closed throttle position switch)</td>
<td>C</td>
</tr>
<tr>
<td>Variable air intake control servo (DC motor) (with built-in air intake control valve position sensor)</td>
<td>J</td>
</tr>
<tr>
<td>Vehicle speed sensor (reed switch)</td>
<td>F</td>
</tr>
<tr>
<td>Volume air flow sensor (with built-in intake air temperature sensor and barometric pressure sensor)</td>
<td>A</td>
</tr>
</tbody>
</table>

### Diagram

The "Name" column is in alphabetical order.

![Diagram of vehicle components](image-url)
MULTIPORT FUEL INJECTION – On-Vehicle Inspection of MFI Components

**A** Volume air flow sensor (with built-in intake air temperature sensor and barometric pressure sensor)

**B** Engine coolant temperature sensor

**C** Throttle position sensor (with built-in closed throttle position switch)

**D** Camshaft position sensor and crankshaft position sensor

**E** **<Federal, Canada>**
- Heated oxygen sensor

**E** **<California>**
- Left bank heated oxygen sensor (front)
- Left bank heated oxygen sensor (rear)
- Right bank heated oxygen sensor (front)
- Right bank heated oxygen sensor (rear)

**F** Vehicle speed sensor (reed switch)

**G** Air conditioning switch

**H** Power steering pressure switch

**I** Park/neutral position switch
### Multiport Fuel Injection - On Vehicle Inspection of MFI Components

<table>
<thead>
<tr>
<th>Name</th>
<th>Symbol</th>
<th>Name</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air-conditioning relay</td>
<td>O</td>
<td>Ignition coil (ignition power transistor)</td>
<td>M</td>
</tr>
<tr>
<td>Air-conditioning switch</td>
<td>G</td>
<td>Ignition timing adjusting terminal</td>
<td>Q</td>
</tr>
<tr>
<td>Camshaft position sensor</td>
<td>V</td>
<td>Injector</td>
<td>K</td>
</tr>
<tr>
<td>Check engine/malfuction indicator lamp</td>
<td>P</td>
<td>Knock sensor</td>
<td>T</td>
</tr>
<tr>
<td>Crankshaft position sensor</td>
<td>D</td>
<td>Multiport fuel injection (MFI) relay</td>
<td>N</td>
</tr>
<tr>
<td>Diagnostic output terminal and diagnostic test mode control terminal</td>
<td>R</td>
<td>Park/Neutral position switch &lt;A/T&gt;</td>
<td>I</td>
</tr>
<tr>
<td>Engine control module</td>
<td>S</td>
<td>Power steering pressure switch</td>
<td>H</td>
</tr>
<tr>
<td>Engine coolant temperature sensor</td>
<td>B</td>
<td>Throttle position sensor (with built-in closed throttle position switch)</td>
<td>C</td>
</tr>
<tr>
<td>Evaporative emission purge solenoid</td>
<td>U</td>
<td>Variable induction control motor (DC motor) (with built-in induction control valve position sensor)</td>
<td>J</td>
</tr>
<tr>
<td>Heated oxygen sensor</td>
<td>E</td>
<td>Vehicle speed sensor</td>
<td>F</td>
</tr>
<tr>
<td>Idle air control motor (stepper motor)</td>
<td>L</td>
<td>Volume air flow sensor (with built-in intake air temperature sensor and barometric pressure sensor)</td>
<td>A</td>
</tr>
</tbody>
</table>

**NOTE**
The "Name" column is in alphabetical order.
A. Volume air flow sensor (with built-in intake air temperature sensor and barometric pressure sensor)

B. Engine coolant temperature sensor

C. Throttle position sensor (with built-in closed throttle position switch)

D. Crankshaft position sensor

E. Heated oxygen sensor

F. Vehicle speed sensor (reed switch)

G. Air conditioning switch

H. Power steering pressure switch

I. Park/neutral position switch

J. Variable air intake control servo (DC motor) (with built-in air intake control valve position sensor)
Evaporative emission purge solenoid

Camshaft position sensor
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

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

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Standard value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data reading</td>
<td>16</td>
<td>Engine control module power voltage</td>
<td>Ignition switch: ON</td>
<td>B+</td>
</tr>
</tbody>
</table>
HARNESS INSPECTION

1. Measure the ignition switch (IG) terminal input voltage.
   - Engine control module connector: Disconnected
   - Ignition switch: OFF
   - Voltage (V)
     | OFF | 0 – 1 |
   - ON  | B+    |

2. Measure the power supply voltage of the MFI relay.
   - Ignition switch: OFF
   - MFI relay connector: Disconnected
   - Voltage (V)
     | B+ |

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

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

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+

6. Replace the MFI relay or defective engine control module.
MFI RELAY INSPECTION

(1) Remove the MFI relay.

(2) Check for continuity between MFI relay terminals.

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 - 7</td>
<td>Conductive (approx. 90 Ω)</td>
</tr>
<tr>
<td>6 - 8</td>
<td>Conductive (only one direction)</td>
</tr>
</tbody>
</table>

(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.

<table>
<thead>
<tr>
<th>Jumper wire</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connected</td>
<td>B+</td>
</tr>
<tr>
<td>Disconnected</td>
<td>0V</td>
</tr>
</tbody>
</table>

(5) Using jumper wires, connect terminal 8 of MFI relay to battery + terminal and terminal 6 of MFI relay to battery - terminal.

(6) Connecting and disconnecting the jumper wire to battery - terminal, check the continuity across terminals 2 and 4 (or 3 and 4) of the MFI relay.

<table>
<thead>
<tr>
<th>Jumper wire</th>
<th>Continuity across terminals 2 and 4</th>
<th>Continuity across terminals 3 and 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connected</td>
<td>Conductive (0 Ω)</td>
<td>Conductive (0 Ω)</td>
</tr>
<tr>
<td>Disconnected</td>
<td>Nonconductive (∞ Ω)</td>
<td>Nonconductive (∞ Ω)</td>
</tr>
</tbody>
</table>

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

Check for continuity of the ground circuit.
- Engine control module connector: Disconnected
  ![OK]  
  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

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Drive</th>
<th>Check condition</th>
<th>Check content</th>
<th>Normal state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuator test 07</td>
<td></td>
<td></td>
<td>Fuel pump is driven to circulate fuel</td>
<td>- Engine cranking&lt;br&gt;- Forced drive of fuel pump&lt;br&gt;Cause is made for above two conditions</td>
<td>Hold return hose with fingers to feel pulsation indicating fuel flow&lt;br&gt;Listen to pump operating sound near fuel tank</td>
</tr>
</tbody>
</table>

HARNESS INSPECTION

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

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

3. Check for continuity between the fuel pump and the checking terminal.
   - Connector: Disconnected

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

5. Repair the harness. (B1-C1)
Measure the power supply voltage of the MFI relay.

- Control relay connector: Disconnected

<table>
<thead>
<tr>
<th>Ignition switch</th>
<th>Voltage (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>0 – 1</td>
</tr>
<tr>
<td>ON</td>
<td>B+</td>
</tr>
</tbody>
</table>

6

Repair the harness. (Ignition switch – A7) or check the ignition switch.

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

7

Repair the harness. (A5 – 8)

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

8

Repair the harness. (A1 – B1)

Measure the power supply voltage of the fuel pump.

- MFI relay connector: Connected
- Engine control unit connector: Connected

<table>
<thead>
<tr>
<th>Engine</th>
<th>Voltage [V]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cranking</td>
<td>8V or more</td>
</tr>
<tr>
<td>Racing</td>
<td>B+</td>
</tr>
</tbody>
</table>

MFI RELAY INSPECTION

Refer to P.14A-79
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>

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Engine state</th>
<th>Standard value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data reading</td>
<td>12</td>
<td>Data display</td>
<td>Engine coolant temperature: 80 to 95°C (176 to 205°F)</td>
<td>700 rpm (Idle)</td>
<td>21-47 Hz &lt;SOHC&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lights and accessories: OFF</td>
<td></td>
<td>22-48 Hz &lt;DOHC&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Transaxle: Neutral</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Steering wheel: Neutral</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Frequency increases with racing</td>
<td>Racing</td>
<td></td>
</tr>
</tbody>
</table>

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>

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check conditions</th>
<th>Engine state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data list</td>
<td>34</td>
<td>Reset signal</td>
<td>Engine warm up</td>
<td>700 rpm (Idle)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>condition</td>
<td>2,000 rpm</td>
<td>OFF</td>
</tr>
</tbody>
</table>

<Volumetric Efficiency>

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Engine state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data list</td>
<td>37</td>
<td>Volumetric</td>
<td>Engine coolant temperature: 80 to 95°C (176 to 205°F)</td>
<td>700 rpm (Idle)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>efficiency</td>
<td>Lights, electric cooling fan and accessory operation: OFF</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Transaxle: Neutral</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Steering wheel: Neutral</td>
<td>Racing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Frequency increases with racing</td>
<td></td>
</tr>
</tbody>
</table>

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. Harness side connector

- Measure the power supply voltage.
  - [OK] 2
  - Repair the harness (A4 - Control relay) or check the control relay.

### 2. Harness side connector

- Measure the terminal voltage.
  - Connector: Disconnected
  - Ignition switch: ON
  - Voltage (V): 4.8 - 5.2
  - [OK] 3
  - Repair the harness (A3 - 70)

### 3. Harness side connector

- Check for continuity of the ground circuit.
  - Connector: Disconnected
  - [OK]
  - Repair the harness (A5 - 72)

### 4. Harness side connector

- 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]
  - Repair the harness (A7 - 19)

---

**Note:**
- Diagrams and measurements are provided for each step to illustrate the inspection process.
- Ensure all necessary equipment and tools are available for each step of the inspection.
- Follow the steps in order to ensure accurate and thorough testing.

---

**References:**
- 7FU0655
- 7FU0656
- 7FU0657
- 7FU0745
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

Using Scan Tool

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Intake air temperature</th>
<th>Standard value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data reading</td>
<td>13</td>
<td>Sensor temperature</td>
<td>Ignition switch: ON or engine running</td>
<td>At -20°C (-4°F)</td>
<td>-20°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>At 0°C (32°F)</td>
<td>0°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>At 20°C (68°F)</td>
<td>20°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(At 40°C (104°F))</td>
<td>40°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>At 80°C (176°F)</td>
<td>80°C</td>
</tr>
</tbody>
</table>

HARNESS INSPECTION

1. [Harness side connector]
   - Check for continuity of the ground circuit.
   - Connector: Disconnected
     - Repair the harness. (A5 - 72)

2. [Harness side connector]
   - Measure the power supply voltage.
   - Connector: Disconnected
   - Ignition switch: ON
     - Voltage (V)
       - 4.5 – 4.9
     - Repair the harness. (A5 - 52)

SENSOR INSPECTION

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

<table>
<thead>
<tr>
<th>Temperature [°C(°F)]</th>
<th>Resistance (kΩ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 (32)</td>
<td>6.0</td>
</tr>
<tr>
<td>20 (68)</td>
<td>2.7</td>
</tr>
<tr>
<td>80 (176)</td>
<td>0.4</td>
</tr>
</tbody>
</table>
(3) Measure resistance while heating the sensor using a hair drier.

<table>
<thead>
<tr>
<th>Temperature [°C(°F)]</th>
<th>Resistance (kΩ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher</td>
<td>Smaller</td>
</tr>
</tbody>
</table>

(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

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Altitude</th>
<th>Standard value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data reading</td>
<td>25</td>
<td>Sensor pressure</td>
<td>Ignition switch: ON</td>
<td>At 0 m (0 ft.)</td>
<td>101 kPa (760 mmHg)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>At 600 m (1,969 ft.)</td>
<td>95 kPa (710 mmHg)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>At 1,200 m (3,937 ft.)</td>
<td>88 kPa (660 mmHg)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>At 1,800 m (5,906 ft.)</td>
<td>81 kPa (610 mmHg)</td>
</tr>
</tbody>
</table>

HARNESS INSPECTION

1. Harness side connector

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

2. Harness side connector

   Measure the power supply voltage of the barometric pressure sensor.
   - Connector: Disconnected
   - Ignition switch: ON
   - Voltage (V): 4.8 – 5.2

3. Harness side connector

   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

STOP

Repair the harness. [A2 – 65]
**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

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

## HARNESS INSPECTION

1. **Equipment side connector**
   - **Check for continuity of the ground circuit.**
   - **Connector:** Disconnected
   - **Result:** OK
   - **Action:** OK → 2
   - **Repair the harness.**

2. **Harness side connector**
   - **Measure the power supply voltage.**
   - **Connector:** Disconnected
   - **Ignition switch:** ON
   - **Voltage (V):**
     - 4.5 – 4.9
   - **Result:** OK
   - **Action:** OK → STOP
   - **Repair the harness.**
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.

<table>
<thead>
<tr>
<th>Temperature °C (°F)</th>
<th>Resistance (kΩ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 (32)</td>
<td>5.8</td>
</tr>
<tr>
<td>20 (68)</td>
<td>2.4</td>
</tr>
<tr>
<td>40 (104)</td>
<td>1.1</td>
</tr>
<tr>
<td>80 (176)</td>
<td>0.3</td>
</tr>
</tbody>
</table>

(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.
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*

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Throttle valve</th>
<th>Standard value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data reading</td>
<td>14</td>
<td>Sensor voltage</td>
<td>Ignition switch: left ON for 15 seconds or more</td>
<td>At idle position</td>
<td>300 – 1,000 mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Open slowly</td>
<td>Increases with valve opening</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Open widely</td>
<td>4,500 – 5,500 mV</td>
</tr>
</tbody>
</table>

**HARNESS INSPECTION**

1. **Measure the power supply voltage of the throttle position sensor.**
   - Connector: Disconnected
   - Ignition switch: ON
   - Voltage (V)
     - 4.8 – 5.2
   - Repair the harness.

2. **Check for continuity of the ground circuit.**
   - Connector: Disconnected
   - Repair the harness.

3. **Check for an open-circuit, or a short-circuit to ground between the engine control module and the throttle position sensor.**
   - Throttle position sensor connector: Disconnected
   - Engine control module connector: Disconnected
   - Connector of any control module which uses TPS output signals like ECM: Disconnected
   - Repair the harness.
**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

Throttle position sensor
(Closed throttle position switch mounted)

Throttle shaft turning angle

Engine control module

Harness side connector

Equipment side connector

Throttle position sensor connector

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

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Throttle valve</th>
<th>Normal indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data reading</td>
<td>26</td>
<td>Switch state</td>
<td>Ignition switch: ON (check by operating accelerator pedal repeatedly)</td>
<td>At idle position</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Open a little</td>
<td>OFF</td>
</tr>
</tbody>
</table>
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
   - Repair the harness.

2. Check for continuity of the ground circuit.
   - Connector: Disconnected
   - OK
   - STOP
   - Repair the harness.

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).

<table>
<thead>
<tr>
<th>Accelerator pedal</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depressed</td>
<td>Non-conductive (∞Ω)</td>
</tr>
<tr>
<td>Released</td>
<td>Conductive (0Ω)</td>
</tr>
</tbody>
</table>

   - 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

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

3. Check the voltage of the output circuit.
   - Connector: Disconnected
   - Ignition switch: ON

Repair the harness.
CAMSHAFT POSITION SENSOR <DOHC>

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. Measure the power supply voltage.
   - Connector: Disconnected
   - Ignition switch: ON
   - Voltage (V)
     - B+
     - OK

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

3. Measure the impressed voltage.
   - Connector: Disconnected
   - Ignition switch: ON
   - Voltage (V)
     - 4.8 - 5.2
     - OK
     - Repair the harness.
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
MULTIPORT FUEL INJECTION – On-Vehicle Inspection of MFI Components

INSPECTION
Using Scan Tool

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Check content</th>
<th>Normal state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data reading</td>
<td>22</td>
<td>Cranking speed</td>
<td>● Engine cranking&lt;br&gt;● Tachometer connected (check on and off of primary current of ignition coil by tachometer)</td>
<td>Compare cranking speed and scan tool reading</td>
<td>Indicated speed to agree</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Coolant temperature</th>
<th>Standard value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data reading</td>
<td>22</td>
<td>Idle speed</td>
<td>● Engine: Running at idle&lt;br&gt;● Closed throttle position switch: ON</td>
<td>At -20°C (-4°F)</td>
<td>1,275 – 1,475 rpm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>At 0°C (32°F)</td>
<td>1,225 – 1,425 rpm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>At 20°C (68°F)</td>
<td>1,100 – 1,300 rpm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>At 40°C (104°F)</td>
<td>950 – 1,150 rpm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>At 80°C (176°F)</td>
<td>600 – 800 rpm</td>
</tr>
</tbody>
</table>

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
   Repair the harness. (A 3 – MFI relay)

2. Check for continuity of the ground circuit.
   - Connector: Disconnected
   OK → 3
   Repair the harness. (A 4 – Ground)

3. Check the voltage of the output circuit.
   - Connector: Disconnected
   - Ignition switch: ON
   | Voltage (V) |
   | 4.8 – 5.2   |
   OK → STOP
   Repair the harness. (A 2 – 65)
CRANKSHAFT POSITION SENSOR <DOHC>

OPERATION
Refer to P.14A-104

TROUBLESHOOTING HINTS
Refer to P.14A-104

INSPECTION
Using Scan Tool

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Check content</th>
<th>Normal state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data reading</td>
<td>22</td>
<td>Cranking speed</td>
<td>• Engine cranking</td>
<td>Compare cranking speed and scan tool reading</td>
<td>Indicated speed to agree</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Tachometer connected</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.
<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Coolant temperature</th>
<th>Standard value</th>
</tr>
</thead>
</table>
| 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**

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

<table>
<thead>
<tr>
<th>Voltage (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B+</td>
</tr>
</tbody>
</table>

   Repair the harness.  
(A3 – MFI relay)

2. **Harness side connector**

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

   Repair the harness.  
(A1 – Ground)

3. **Harness side connector**

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

<table>
<thead>
<tr>
<th>Voltage (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.8 – 5.2</td>
</tr>
</tbody>
</table>

   Repair the harness.  
(A2 – plug A)
**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**

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Engine</th>
<th>indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data reading</td>
<td>18</td>
<td>Switch state</td>
<td>Ignition switch: ON</td>
<td>Stop</td>
<td></td>
</tr>
<tr>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td>Cranking</td>
<td></td>
</tr>
</tbody>
</table>

**HARNESS INSPECTION**

1. **Engine control module harness side connector**
   - Measure the input voltage to the engine control module.
     - Engine control module connector: Disconnected
     - Ignition switch: START
   - **Voltage (V)**
     - 8 or more
   - [OK](#) → **2** → [Repair the harness.](#)

2. **Engine control module harness side connector**
   - Check for continuity of the ground circuit.
     - Engine control module connector: Disconnected
   - [OK](#) → **STOP** → [Repair the harness.](#)
IGNITION SWITCH-ST AND PARK/NEUTRAL POSITION SWITCH (PNP SWITCH)

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

<table>
<thead>
<tr>
<th>Normal state</th>
<th>Item No.</th>
<th>Data display</th>
<th>i</th>
<th>Check condition</th>
<th>a</th>
<th>Engine</th>
<th>i</th>
<th>o</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>18</td>
<td>Switch state</td>
<td></td>
<td>Ignition switch: ON</td>
<td></td>
<td>Stop</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Cranking</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PARK/NEUTRAL POSITION SWITCH

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Select lever position</th>
<th>Normal indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data reading</td>
<td>29</td>
<td>Shift position</td>
<td>Ignition switch: ON</td>
<td>P or N</td>
<td>P or N</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>D,2,L or R</td>
<td>D,2,L or R</td>
</tr>
</tbody>
</table>

HARNESS INSPECTION

1

- Measure the power supply voltage.
  - Engine control module connector: Disconnected
  - PNP switch connector: Disconnected
  - Ignition switch: START

2

- 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.

3

- Measure the impressed voltage to the PNP switch.
  - Engine control module connector: Connected
  - PNP switch connector: Disconnected
  - Ignition switch: ON

- 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.

<table>
<thead>
<tr>
<th>Continuity</th>
<th>OK</th>
<th>STOP</th>
</tr>
</thead>
<tbody>
<tr>
<td>No continuity</td>
<td>One rotation</td>
<td></td>
</tr>
</tbody>
</table>
**MULTIPORT FUEL INJECTION**

**On-Vehicle Inspection of MFI Components**

**2**

![Diagram](image1)

**Harness side connector**

Measure the power supply voltage of the vehicle speed sensor:
- **Ignition switch: ON**

<table>
<thead>
<tr>
<th>Voltage (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.5 - 4.9</td>
</tr>
</tbody>
</table>

**OK** → **3**

Repair the harness.

**STOP**

**3**

![Diagram](image2)

**Harness side connector**

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

**OK** → **STOP**

Repair the harness.

**SENSOR INSPECTION**

Refer to GROUP 8 — Meters and Gauges.
 **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

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Steering wheel</th>
<th>Normal' indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data reading</td>
<td>2 7</td>
<td>Switch state</td>
<td>Engine: Idling</td>
<td>Steering wheel neutral position (wheels straight-ahead direction)</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Steering wheel half turn</td>
<td>ON</td>
</tr>
</tbody>
</table>

Checking Oil Pressure

<table>
<thead>
<tr>
<th>Steering wheel</th>
<th>Oil pump delivery pressure (ref. value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight forward</td>
<td>700 – 1,200 kPa (100 – 171 psi)</td>
</tr>
<tr>
<td>Turned</td>
<td>1,500 – 2,000 kPa (213 – 284 psi)</td>
</tr>
</tbody>
</table>

HARNESS INSPECTION

1

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

Repair the harness.

SENSOR INSPECTION

Refer to GROUP 19 – Service Adjustment Procedures.
AIR CONDITIONING SWITCH AND COMPRESSOR CLUTCH RELAY

OPERATION
- The air conditioning switch applies the battery voltage to the engine control module when the air conditioning is turned on.
- When the air conditioning ON signal is input, the engine control module drives the idle air control motor and turns ON the power transistor. As a result, the air conditioning power relay coil is energized to turn on the relay switch, which activates the air compressor magnetic clutch.

TROUBLESHOOTING HINTS
If the air compressor magnet clutch is not activated when the air conditioning switch is turned on during idling, faulty air conditioning control system is suspected.

INSPECTION
Using Scan Tool
AIR CONDITIONING SWITCH

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Air conditioning switch</th>
<th>Normal indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data reading</td>
<td>28</td>
<td>Switch state</td>
<td>Engine: Idling (air compressor to be running when air conditioning switch is ON)</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ON</td>
<td>ON</td>
</tr>
</tbody>
</table>
AIR CONDITIONING POWER RELAY

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Air conditioning switch</th>
<th>Normal indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data reading</td>
<td>49</td>
<td>Air conditioning relay state</td>
<td>Engine: Idling after warm-up</td>
<td>OFF</td>
<td>OFF (compressor clutch non-activation)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ON</td>
<td>ON (compressor clutch activation)</td>
</tr>
</tbody>
</table>

HARNESS INSPECTION

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+

AIR CONDITIONING INSPECTION

Refer to GROUP 24 – Service Adjustment Procedures.
KNOCK SENSOR <DOHC>

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

   Repair the harness.
   (A1 - 58)

2. Check for continuity of the ground circuit.
   - Connector: Disconnected
   - OK → STOP
   - OK → Repair the harness.
   (A2 - Ground)

   (7FU0906, 6FU1302)
ELECTRICAL LOAD SWITCH <DOHC>

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

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Equipment state</th>
<th>Normal display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data reading</td>
<td>33</td>
<td>Switch state</td>
<td>Operation of equipment: OFF</td>
<td>Lighting switch only: OFF → ON</td>
<td>OFF → ON</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Rear defogger switch only: OFF → ON</td>
<td>OFF → ON</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Brake pedal only: depressed → Released</td>
<td>ON → OFF</td>
</tr>
</tbody>
</table>
**HarNESS InsPECTION**

1. Measure the input voltage of engine control module.
   - Engine control module connector: Disconnected
   - Lighting switch: ON
     (Tail light relay ON)
   - **OK**
   - **2**
     - 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)
   - **OK**
   - **3**
     - 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)
   - **OK**
   - **Stop**
     - Check circuit related to stop light relay

---

*Engine control module harness side connector 7FU0689*
FAN MOTOR RELAY (RADIATOR, AIR CONDITIONING CONDENSER)

- Radiator fan motor relay (Hi)
- Radiator fan motor relay (Lo)
- Condenser fan motor relay (Hi)
- Condenser fan motor relay (Lo)

**NOTE**

*1: SOHC  
*2: DOHC

**Engine control module connector**

- Ignition switch (IG)
- Battery
- Radiator fan motor
- Resistor
- Radiator fan motor relay
- Condenser fan motor relay
- Air conditioner compressor
- Condenser fan motor

- To air conditioner compressor lock controller

Diagram showing the electrical connections and components involved in the fan motor relay system for the radiator and air conditioning condenser.
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

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Drive content</th>
<th>Check condition</th>
<th>Normal state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuator test</td>
<td>20</td>
<td>Radiator fan motor and condenser fan motor are driven at high speeds.</td>
<td>Ignition switch: ON</td>
<td>Radiator fan motor and condenser fan motor rotate at high speeds.</td>
</tr>
<tr>
<td></td>
<td>21</td>
<td>Radiator fan motor and condenser fan motor are driven at low speeds.</td>
<td>Ignition switch: ON</td>
<td>Radiator fan motor and condenser fan motor rotate at low speeds.</td>
</tr>
</tbody>
</table>

HARNESS INSPECTION

Measure input voltage applied to ECM.
- ECM connector: Disconnected
- Ignition switch: ON

<table>
<thead>
<tr>
<th>Voltage (V)</th>
<th>B+</th>
</tr>
</thead>
</table>

Check the fan motor relay circuit

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. Measure the power supply voltage of the air intake control valve position sensor.
   - Connector: Disconnected
   - Ignition switch: ON

<table>
<thead>
<tr>
<th>Voltage (V)</th>
<th>4.8 – 5.2</th>
</tr>
</thead>
</table>

   OK ➞ 2

   Repair the harness.

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

   OK ➞ 3

   Repair the harness.

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

   OK ➞ STOP

   Repair the harness. 
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

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Engine state</th>
<th>Standard value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data reading</td>
<td>43</td>
<td>Sensor temperature</td>
<td>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.</td>
<td>700 rpm (Idle)</td>
<td>100°C (212°F) or less</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3,500 rpm</td>
<td>120°C (248°F) or more</td>
</tr>
</tbody>
</table>

HARNESS INSPECTION

1. Harness side connector

- Measure the power supply voltage.
  - Connector: Disconnected
  - Ignition switch: ON
  
<table>
<thead>
<tr>
<th>Voltage (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.3 – 4.7</td>
</tr>
</tbody>
</table>

   
   - Repair the harness. [A2 - 53]  

2. Harness side connector

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

   
   - Repair the harness. [A1 - 72]  

SENSOR INSPECTION
Refer to GROUP 25 – Exhaust Gas Recirculation (EGR) System.
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

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Engine state</th>
<th>Standard value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data reading</td>
<td>11</td>
<td>Sensor voltage</td>
<td>Engine: Warm-up (make the mixture lean by engine speed reduction, and rich by racing)</td>
<td>When sudden deceleration from 4,000 rpm</td>
<td>200 mV or lower</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>When engine is suddenly raced</td>
<td>600 – 1,000 mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Engine: Warm-up (using the heated oxygen signal, check the air/fuel mixture ratio, and also check the condition of control by the engine control module)</td>
<td>700 rpm (Idle)</td>
<td>400 mV or lower</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2,000 rpm</td>
<td>600 – 1,000 mV</td>
</tr>
</tbody>
</table>
HARNESS INSPECTION

1. Harness side connector

- Measure the power supply voltage of the heated oxygen sensor.
  - Connector: Disconnected
  - Ignition switch: ON

<table>
<thead>
<tr>
<th>Voltage (V)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>B+</td>
<td></td>
</tr>
</tbody>
</table>

- OK → 2

2. Engine control module harness side connector

- 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

3. Harness side connector

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

- OK → STOP

- OK → Repair the harness. (A3 - MFI relay)

- OK → Repair the harness. (A1 - 56

- OK → Repair the harness. (A2 - 72

- OK → Repair the harness. (A4 - Ground)
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 ① and ② 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.

<table>
<thead>
<tr>
<th>Engine</th>
<th>Heated oxygen sensor output voltage</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>When engine is raced</td>
<td>0.6 – 1.0 V</td>
<td>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.</td>
</tr>
</tbody>
</table>

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.
**MULTIPORT FUEL INJECTION – On-Vehicle Inspection of MFI Components**

**INSPECTION**

**Using Scan Tool**

**<Heated oxygen sensor (front)>**

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Engine condition</th>
<th>Standard value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data reading</td>
<td>11 39</td>
<td>Sensor detection / voltage</td>
<td>Engine: Warm-up (Make the mixture lean by engine speed reduction, and rich by racing)</td>
<td>When sudden deceleration from 4,000 rpm</td>
<td>200 mV or lower</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>When engine is suddenly raced</td>
<td>600 – 1,000 mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>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)</td>
<td>700 rpm (Idling)</td>
<td>400 mV or lower (Changes) 600 – 1,000 mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2,000 rpm</td>
<td></td>
</tr>
</tbody>
</table>

**<Heated oxygen sensor (rear)>**

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Engine condition</th>
<th>Standard value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data reading</td>
<td>59 69</td>
<td>Sensor voltage</td>
<td>● Transaxle: 2nd gear 〈M/T〉, L range 〈A/T〉  ● Drive with wide open throttle</td>
<td>3,500 rpm</td>
<td>600 – 1,000 mV</td>
</tr>
</tbody>
</table>

**<Heated oxygen sensor (front, rear)>**

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Engine condition</th>
<th>Normal indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data reading</td>
<td>48</td>
<td>Heater condition</td>
<td>Engine: Warm-up</td>
<td>750 rpm (Idle)</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5,000 rpm</td>
<td>OFF</td>
</tr>
</tbody>
</table>
**HARNESS INSPECTION**

1. **Harness side connector**
   - Measure the power supply voltage of the heated oxygen sensor.
     - Connector: Disconnected
     - Ignition switch: ON
   - **Voltage (V)**
     - B+
   - Repair the harness.
     - A1, B1, C1, D1 - MFI relay

2. **Engine control module harness side connector**
   - 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
   - Repair the harness.
     - A4 - 105
     - B4 - 55
     - C4 - 56
     - D4 - 102

3. **Engine control module harness side connector**
   - 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
   - Repair the harness.
     - A3, B3 - 54
     - C3, D3 - 57

4. **Harness side connector**
   - Check for continuity of the ground circuit.
     - Connector: Disconnected
   - Repair the harness.
     - A2, B2, C2, D2
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 ④ and ② 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.

<table>
<thead>
<tr>
<th>Engine</th>
<th>Heated oxygen sensor output voltage</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>When engine is raced</td>
<td>0.6 – 1.0 V</td>
<td>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.</td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Coolant temperature</th>
<th>Standard value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data reading</td>
<td>41</td>
<td>Drive time**</td>
<td>Engine: Cranking</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0°C (32°F)*2</td>
<td>13.8 – 16.8 ms</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>20°C (68°F)</td>
<td>40 – 48.8 ms</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>80°C (176°F)</td>
<td>8.6 – 10.6 ms</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Engine state</th>
<th>Standard value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data reading</td>
<td>41</td>
<td>Drive time*3</td>
<td></td>
<td>700 rpm (idle)</td>
<td>2.3 – 3.5 ms</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2,000 rpm</td>
<td>2.1 – 3.3 ms &lt;SOHC&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>When sharp</td>
<td>2.0 – 3.2 ms &lt;DOHC&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>racing is made</td>
<td></td>
</tr>
</tbody>
</table>

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: On-Vehicle Inspection of MFI Components

#### Function: Actuator test

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Drive content</th>
<th>Check condition</th>
<th>Normal state</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>No. 1 injector shut off</td>
<td>Engine: Idling after warm-up (Shut off the injectors in sequence during idling after engine warm-up, check the idling condition)</td>
<td>Idle state to change further (becoming less stable or stalling)</td>
</tr>
<tr>
<td>02</td>
<td>No. 2 injector shut off</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03</td>
<td>No. 3 injector shut off</td>
<td></td>
<td></td>
</tr>
<tr>
<td>04</td>
<td>No. 4 injector shut off</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05</td>
<td>No. 5 injector shut off</td>
<td></td>
<td></td>
</tr>
<tr>
<td>06</td>
<td>No. 6 injector shut off</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 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**

- **Harness side connector**
- Measure the power supply voltage of the front bank injector.
  - **Connector:** Disconnected
  - **Ignition switch:** ON
  - **Voltage (V):** B+

**2**

- **Harness side connector**
- Measure the power supply voltage of the rear bank injector.
  - **Connector:** Disconnected
  - **Ignition switch:** ON
  - **Voltage (V):** B+

---

**3**

- **Repair the harness.**
  - [A] - MFI relay (P1 - MFI relay)
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

Repair the harness.

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

Repair the harness.

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

<table>
<thead>
<tr>
<th>Injector No.</th>
<th>Measuring terminals</th>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 2</td>
<td>1 - 2</td>
<td>13 – 16 Ω</td>
</tr>
<tr>
<td>No. 4</td>
<td>1 - 5</td>
<td>[At 20°C (68°F)]</td>
</tr>
<tr>
<td>No. 6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
(3) Connect the injector intermediate connector.

<table>
<thead>
<tr>
<th>Injector No.</th>
<th>Measuring terminals</th>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 2</td>
<td>1 - 2</td>
<td>13 – 16 Ω</td>
</tr>
<tr>
<td>No. 4</td>
<td>1 - 3 [At 20°C (68°F)]</td>
<td>13 – 16 Ω</td>
</tr>
<tr>
<td>No. 6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
IDLE AIR CONTROL MOTOR (STEPPER MOTOR TYPE)

**OPERATION**
- The intake air volume during idling is controlled by opening or closing the servo valve provided in the air path that bypasses the throttle valve.
- The servo valve is opened or closed by operating the stepper motor in the speed control servo in normal or reverse direction.
- The battery power is supplied to the stepper motor through the MFI relay. As the engine control module turns on power transistors in the module one after another, the stepper motor coil is energized and the motor rotates in normal or reverse direction.

**TROUBLESHOOTING HINTS**

**Hint 1:** If the stepper motor step increases to 100 to 120 steps or decreases to 0 step, faulty stepper motor or open circuit in the harness is suspected.

**Hint 2:** If the idle air control motor harness and individual part checked good but the stepper motor steps are out of specification, the following faults are suspected.
(1) Poorly adjusted reference idle speed
(2) Deposit on the throttle valve
(3) Air leaking into the intake manifold through gasket gap
(4) Loose EGR valve seat
(5) Poor combustion in the cylinder (faulty ignition plug, ignition coil, injector, low compression pressure, etc.)
## INSPECTION

### Using Scan Tool

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Load state</th>
<th>Standard value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data reading</td>
<td>45</td>
<td>Stepper motor steps</td>
<td>- Engine coolant temperature: 80 to 95°C (176 to 205°F)</td>
<td>Air conditioning switch: OFF</td>
<td>2 – 25 step</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Lights, electric cooling fan, accessory units: All OFF</td>
<td>Air conditioning switch: ON</td>
<td>Increase by 10–70 step</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Transaxle: Neutral (P range for vehicle with A/T)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Steering wheel: Neutral</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Idle position switch: ON (compressor clutch to be ON if air conditioning switch is ON)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Engine: Idling</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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+

   ![Harness side connector](image1)

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

   ![Engine control module harness side connector](image2)

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. 6V) 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

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Engine state</th>
<th>Standard value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data reading</td>
<td>44</td>
<td>Ignition advance</td>
<td>- Engine: Warm up&lt;br&gt;- Timing light: Set&lt;br&gt;(Use the timing light to check actual ignition timing)</td>
<td>700 rpm (Idling)</td>
<td>7 – 23° BTDC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2,000 rpm</td>
<td>13 – 39° BTDC</td>
</tr>
</tbody>
</table>
<Ignition timing adjustment mode>

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Engine state</th>
<th>Normal display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data list</td>
<td>36</td>
<td>Existence of continuity to ground if ignition timing adjustment terminal</td>
<td>Engine: Idling</td>
<td>Ground ignition timing adjustment terminal.</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Remove ground from ignition timing adjustment terminal.</td>
<td>OFF</td>
</tr>
</tbody>
</table>

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. Harness side connector
   - Measure the power supply voltage of the ignition coil.
     - Connector: Disconnected
     - Ignition switch: ON
     - Voltage (V)
       - B+
     - Repair the harness. (A2 – Ignition switch)

2. Harness side connector
   - Check for continuity between the ignition power transistor unit and ignition coil.
     - Ignition coil connector: Disconnected
     - Ignition power transistor connector: Disconnected
     - Repair the harness. (B3 – A1)
### Harness Side Connector

**Check for continuity of the ground circuit of the ignition power transistor.**
- Ignition power transistor connector: Disconnected
- Engine control module connector: Disconnected

<table>
<thead>
<tr>
<th>Voltage (V)</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0 – 6.0</td>
<td></td>
</tr>
</tbody>
</table>

**Repair the harness.**

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>G2</td>
<td>Ground</td>
</tr>
</tbody>
</table>

### Harness Side Connector

**Measure the control signal voltage of the ignition power transistor.**
- Ignition power transistor connector: Disconnected
- Ignition switch: START

<table>
<thead>
<tr>
<th>Voltage (V)</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0 – 6.0</td>
<td></td>
</tr>
</tbody>
</table>

**Repair the harness.**

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1</td>
<td>10</td>
</tr>
</tbody>
</table>

### Ignition Timing Adjustment Terminal

**Measure the voltage of the ignition timing adjusting terminal.**
- Ignition switch: ON

<table>
<thead>
<tr>
<th>Voltage (V)</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.0 – 5.2</td>
<td></td>
</tr>
</tbody>
</table>

**Repair the harness.**

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>104</td>
</tr>
</tbody>
</table>

### Actuator Inspection

Refer to Group 8 – Ignition System
OPERATION

- When the ignition power transistor unit A is turned on by the signal from the engine control module, primary current flows to the ignition coil A. When the ignition power transistor unit A is turned off, the primary current is shut off and a high voltage is induced in the secondary coil A, causing the ignition plugs of No. 1 and No. 4 cylinders to spark. When the ignition power transistor unit B is turned off, the ignition plugs of No. 2 and No. 5 cylinders spark. In addition, when the ignition power transistor unit C is turned off, the ignition plugs of No. 3 and No. 6 cylinders spark.

- When the engine control module turns off the transistor in the module, the battery voltage in the module is applied to the ignition power transistor unit to turn it on. When the engine control module turns on the transistor in the module, the ignition power transistor unit is turned off.
### Inspecting MFI Components Using Scan Tool

#### <Spark Advance>

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Engine state</th>
<th>Standard value</th>
</tr>
</thead>
</table>
| 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>

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Terminal condition</th>
<th>Standard value</th>
</tr>
</thead>
</table>
| Data list       | 36       | Continuity present or not present between ignition timing adjustment terminal and ground | • Engine: Idling  
• Ignition timing adjustment terminal is grounded  
• Ignition timing adjustment terminal is disconnected from ground | ON                                      | OFF             |

#### <Standard Ignition Timing>

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Drive</th>
<th>Check condition</th>
<th>Normal condition</th>
</tr>
</thead>
</table>
| 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. Harness side connector

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

| Voltage (V) | B+ |

2. Harness side connector

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

| Voltage (V) | B+ |

3. Harness side connector

- 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

4. Harness side connector

- 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

5. Harness side connector

- Repair the harness.
### ACTUATOR INSPECTION

Refer to GROUP 8 — Ignition System.
EVAPORATIVE EMISSION PURGE SOLENOID

**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

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Drive content</th>
<th>Check condition</th>
<th>Normal state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuator test</td>
<td>08</td>
<td>Solenoid valve from OFF to ON</td>
<td>Ignition switch: ON</td>
<td>Operating sound is heard when driven</td>
</tr>
</tbody>
</table>
### HARNESS INSPECTION

1. **Harness side connector**
   - Measure the power supply voltage.
   - **Connector:** Disconnected
   - **Ignition switch:** ON
   - **Voltage (V)**
     - B+
   - **Result:** OK
   - **Action:** Repair the harness.

2. **Harness side connector**
   - 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
   - **Result:** OK
   - **Action:** Repair the harness.

### ACTUATOR INSPECTION

Refer to GROUP 25 – Evaporative Emission Control System.
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

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Drive content</th>
<th>Check condition</th>
<th>Normal state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuator test</td>
<td>10</td>
<td>Change solenoid valve from OFF to ON state</td>
<td>Ignition switch: ON</td>
<td>Operating sound is heard when driven</td>
</tr>
</tbody>
</table>

HARNESS INSPECTION

1. Measure the power supply voltage.
   - Connector: Disconnected
   - Ignition switch: ON
  odel:
   - Voltage (V):
     - B±
   - Repair the harness. (A1 – MFI relay)

2. Check for an open-circuit, or a short-circuit to ground between the EGR solenoid and the engine control module.
   - EGR solenoid connector: Disconnected
   - Engine control module connector: Disconnected
   - Repair the harness. (A2 – 6)

ACTUATOR INSPECTION

Refer to GROUP 25 – Exhaust Gas Recirculation (EGR) System.
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

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Drive content</th>
<th>Check condition</th>
<th>Normal state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuator test</td>
<td>11</td>
<td>Drive the variable induction control (VIC) motor (Open and close the variable induction valve)</td>
<td>Ignition switch: ON</td>
<td>Turn the variable induction valve shaft: FULL CLOSE → FULL OPEN</td>
</tr>
</tbody>
</table>
HARNESS INSPECTION

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

- Variable induction control motor connector: Disconnected
- Engine control module connector: Disconnected

Repair the harness.

ACTUATOR INSPECTION

Refer to GROUP 11.
ENGINE AND TRANSAXLE TOTAL CONTROL SIGNAL <A/T>

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

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Action</th>
</tr>
</thead>
</table>
| 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 |
|      | ![Multimeter](Image1.png) | ![OK](Image2.png) | Repair the harness. (A7 – 116) |
| 2    | Check for an open-circuit, or a short-circuit to ground between the transaxle control module and the engine control module.  
- Transaxle control module connector: Disconnected  
- Engine control module connector: Disconnected |
|      | ![Multimeter](Image3.png) | ![OK](Image4.png) | Repair the harness. (A9 – 59) |
| 3    | Check for an open-circuit, or a short-circuit to ground between the transaxle control module and the engine control module.  
- Transaxle control module connector: Disconnected  
- Engine control module connector: Disconnected |
|      | ![Multimeter](Image5.png) | ![OK](Image6.png) | Repair the harness. (A108 – 7) |

*Images and icons represent the test setup and outcomes.*

**Engine Control Module Harness Side**

- Connect the transaxle control module to the engine control module connector.

**Transaxle Control Module Side**

- Connect the transaxle control module to the engine control module connector.

---

*Note: Images and multimeter screenshots are used for illustrative purposes.*
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 to 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.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Probable cause</th>
<th>Remedy</th>
</tr>
</thead>
</table>
| • Fuel pressure is too low.  
  • Fuel pressure drops during racing.  
  • No fuel pressure in fuel return hose. | Fuel filter is clogged.  
Malfunction of the valve seat within the fuel pressure regulator, or fuel leakage to return side caused by spring deterioration. | Replace the fuel filter.  
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.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Probable cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>After the engine is stopped, the fuel pressure drops gradually.</td>
<td>Injector leakage.</td>
<td>Replace the injector.</td>
</tr>
<tr>
<td></td>
<td>Leakage at the fuel pressure regulator valve seat.</td>
<td>Replace the fuel pressure regulator.</td>
</tr>
<tr>
<td>There is a sudden sharp drop of the fuel pressure immediately after the engine is stopped.</td>
<td>The check valve (within the fuel pump) is not closed.</td>
<td>Replace the fuel pump.</td>
</tr>
</tbody>
</table>

(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

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Check point</th>
<th>Check conditions (Engine conditions)</th>
<th>Standard value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>Back-up power supply</td>
<td>Ignition switch: OFF</td>
<td>B+</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Power supply</td>
<td>Ignition switch: ON</td>
<td>B+</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>62</td>
<td>Ignition switch IG</td>
<td>Ignition switch: ON</td>
<td>B+</td>
<td></td>
</tr>
<tr>
<td>108</td>
<td>MFI relay (power supply)</td>
<td>Ignition switch: OFF, ON</td>
<td>B+</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ignition switch: ON</td>
<td>0 - 3 V</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>MFI relay (fuel pump)</td>
<td>Ignition switch: ON, Engine: Idle</td>
<td>B+</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0 - 3 V</td>
<td></td>
</tr>
<tr>
<td>61</td>
<td>Sensor impressed voltage</td>
<td>Ignition switch: ON</td>
<td>4.5 – 5.5V</td>
<td></td>
</tr>
<tr>
<td>Terminal No.</td>
<td>Check point</td>
<td>Check conditions (Engine conditions)</td>
<td>Standard value</td>
<td>Remarks</td>
</tr>
<tr>
<td>-------------</td>
<td>--------------------------------------------</td>
<td>--------------------------------------</td>
<td>----------------</td>
<td>---------</td>
</tr>
<tr>
<td>70</td>
<td>Volume air flow sensor</td>
<td>Engine: Idle</td>
<td>2.2 – 3.2V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine: 2,000 rpm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Volume air flow sensor reset signal</td>
<td>Engine: idle</td>
<td>0 – 1V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine: 3,000 rpm</td>
<td>6 – 9V</td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>Intake air temperature sensor</td>
<td>Ignition switch: ON</td>
<td>3.2 – 3.8V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>When intake temperature is 0°C (32°F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>When intake temperature is 20°C (68°F)</td>
<td>2.3 – 2.9V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>When intake temperature is 40°C (104°F)</td>
<td>1.5 – 2.1V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>When intake temperature is 80°C (176°F)</td>
<td>0.4 – 1.0V</td>
<td></td>
</tr>
<tr>
<td>65</td>
<td>Barometric pressure sensor</td>
<td>Ignition switch: ON</td>
<td>3.7 – 4.3V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>When altitude is 0 m (0 ft.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>When altitude is 1,200 m (3,937 ft.)</td>
<td>3.2 – 3.8V</td>
<td></td>
</tr>
<tr>
<td>63</td>
<td>Water temperature sensor</td>
<td>Ignition switch: ON</td>
<td>3.2 – 3.8V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>When water temperature is 0°C (32°F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>When water temperature is 20°C (68°F)</td>
<td>2.3 – 2.9V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>When water temperature is 40°C (104°F)</td>
<td>1.3 – 1.9V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>When water temperature is 80°C (176°F)</td>
<td>0.3 – 0.9V</td>
<td></td>
</tr>
<tr>
<td>64</td>
<td>Throttle position sensor</td>
<td>Ignition switch: Idle</td>
<td>0.3 – 1.0V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kept in ON state for more than 15 seconds</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wide open throttle</td>
<td>4.5 – 5.5V</td>
<td></td>
</tr>
<tr>
<td>67</td>
<td>Closed throttle position switch</td>
<td>Ignition switch: ON</td>
<td>0 – 4V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Throttle valve placed in idle position</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Throttle valve placed in slightly opened position</td>
<td>4V or more</td>
<td></td>
</tr>
<tr>
<td>68</td>
<td>Camshaft position sensor</td>
<td>Engine: Cranked</td>
<td>0.2 – 3.0V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine: Idle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>69</td>
<td>Crankshaft position sensor</td>
<td>Engine: Cranked</td>
<td>0.2 – 3.0V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine: Idle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>51</td>
<td>Ignition switch – ST</td>
<td>Engine: Cranked</td>
<td>8V or more M/T</td>
<td></td>
</tr>
<tr>
<td>71</td>
<td>Park/Neutral position switch</td>
<td>Ignition switch: ON</td>
<td>0 – 3 V</td>
<td>A/T</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Selector lever set to P or N</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Selector lever set to D, 2, L or R</td>
<td>8 – 14V</td>
<td></td>
</tr>
<tr>
<td>Terminal No.</td>
<td>Check point</td>
<td>Check conditions (Engine conditions)</td>
<td>Standard value</td>
<td>Remarks</td>
</tr>
<tr>
<td>-------------</td>
<td>------------------------------</td>
<td>------------------------------------------------------------------------------------------------------</td>
<td>----------------</td>
<td>---------</td>
</tr>
</tbody>
</table>
| 66          | Vehicle speed sensor         | ● Ignition switch: ON  
               ● Move the vehicle slowly forward                       | 0 → 5V         |         |
| 107         | Power steering pressure switch | Engine: Idle, warm  
               Steering wheel placed in neutral (straight ahead) position  
               Steering wheel turned half a turn                       | B+             |         |
| 115         | Air conditioning switch 1    | Engine: Idle  
               Air conditioning switch set to OFF  
               Air conditioning switch set to ON (Air conditioning compressor in driven state) | 0 → 3V         | B+      |
| 101 <SOHC>  | Air conditioning switch 2    | Engine: Running at idle  
               Air conditioning switch set to OFF  
               Air conditioning switch set to ON  
               Indoor set temperature brought closer to atmospheric temperature | 0 → 3V         | 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>   | Fan motor relay (Lo)         | Radiator fan not operating  
               [Coolant temperature: below 90°C (194°F)]  
               Radiator fan operating at low speeds  
               [Coolant temperature: 95 → 105°C (203 → 221°F)] | B+            |         |
| 21 <SOHC>   | Fan motor relay (Hi)         | Radiator fan not operating  
               [Coolant temperature: below 90°C (194°F)]  
               Radiator fan operating at high speeds  
               [Coolant temperature: above 105°C (221 °F)]           | B+            |         |
| 24          | Electric load switch         | Engine: Running at idle  
               Lighting switch set to OFF  
               Lighting switch set to ON                                  | 0 → 3V         | DOHC    |
| 55 56       | Heated oxygen sensor (front) | Engine: warm, 2,000 rpm  
               (Check using a digital type voltmeter.)                   | 0 ↔ 0.8V       |         |
| 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 |
<p>|             | No. 1 injector               | Engine: Running at idle after warmup, and accelerated abruptly by depressing accelerator pedal          | Falls temporarily a little from 11 → 14V.                  |         |
|             | No. 2 injector               |                                                                      |                 |         |
|             | No. 3 injector               |                                                                      |                 |         |
|             | No. 4 injector               |                                                                      |                 |         |
|             | No. 5 injector               |                                                                      |                 |         |
|             | No. 6 injector               |                                                                      |                 |         |</p>
<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Check point</th>
<th>Check conditions (Engine conditions)</th>
<th>Standard value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Stepper motor coil &lt;A1&gt;</td>
<td>Engine: warm  Check immediately after hot restart.</td>
<td>B+ ↑ ↓ 0 – 3V (Changed repeated)</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Stepper motor coil &lt;A2&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Stepper motor coil &lt;B1&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Stepper motor coil &lt;B2&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Ignition power transistor unit A</td>
<td>Engine: 3,000 rpm</td>
<td>0.3 – 3v</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Ignition power transistor unit B</td>
<td></td>
<td></td>
<td>DOHC</td>
</tr>
<tr>
<td>11</td>
<td>Ignition power transistor unit C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Evaporative emission purge solenoid</td>
<td>Ignition switch: ON</td>
<td>B+</td>
<td>California</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine: warm, 3,000 rpm</td>
<td>0 – 3 v</td>
<td></td>
</tr>
<tr>
<td>101</td>
<td>Engine ignition signal</td>
<td>Engine: 3,000 rpm</td>
<td>0.3 – 3v</td>
<td>DOHC</td>
</tr>
<tr>
<td>104</td>
<td>Ignition timing adjustment terminal</td>
<td>Ignition switch: ON</td>
<td>Ignition timing adjustment terminal connected to ground</td>
<td>O – 1V</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ignition timing adjustment terminal disconnected from ground</td>
<td>4.0 – 5.5V</td>
</tr>
<tr>
<td>106</td>
<td>Check engine/malfunction indicator lamp</td>
<td>Ignition switch: OFF → ON</td>
<td>0 – 3V ↓ 9 – 13 V (Several seconds later)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>EGR solenoid</td>
<td>Ignition switch: ON</td>
<td>B+</td>
<td>California</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine: Idle  Suddenly depress the acceleration pedal.</td>
<td>Falls temporarily from B+.</td>
<td></td>
</tr>
<tr>
<td>53</td>
<td>EGR temperature sensor</td>
<td>Ignition switch: ON</td>
<td>When sensor temperature is 50°C (122°F)</td>
<td>3.6 – 4.4V</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>When sensor temperature is 100°C (212°F)</td>
<td>2.2 – 3.0V</td>
</tr>
<tr>
<td>54 57</td>
<td>Oxygen sensor heater</td>
<td>Engine: Idle, warm</td>
<td>o – 3 v</td>
<td>California</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine speed: 5,000 rpm</td>
<td>B+</td>
<td></td>
</tr>
<tr>
<td>111</td>
<td>Induction control valve position sensor No. 1</td>
<td>Ignition switch: ON</td>
<td>0 – 1V or 4.5 – 5.5V</td>
<td>DOHC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine: Slowly accelerated from idling speed to 5,000 rpm</td>
<td>0 – 1V or 4.5 – 5.5V ↓ 1.5 – 4V (for a moment)</td>
<td></td>
</tr>
<tr>
<td>Terminal No.</td>
<td>Check point</td>
<td>Check conditions (Engine conditions)</td>
<td>Standard value</td>
<td>Remarks</td>
</tr>
<tr>
<td>-------------</td>
<td>-------------</td>
<td>-------------------------------------</td>
<td>----------------</td>
<td>---------</td>
</tr>
<tr>
<td>103</td>
<td>Induction control valve position sensor No. 2</td>
<td>Ignition switch: ON</td>
<td>0 – 1V or 4.5 – 5.5V</td>
<td>DOHC</td>
</tr>
<tr>
<td></td>
<td>Induction control valve position sensor No. 2</td>
<td>Engine: Slowly accelerated from idling speed to 5,000 rpm</td>
<td>0 - 1V or 4.5 – 5.5V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Induction control valve position sensor No. 2</td>
<td>Engine: Slowly decelerated from 5,000 rpm to idling speed</td>
<td>0 - 1V or 4.5 – 5.5V</td>
<td></td>
</tr>
<tr>
<td>110</td>
<td>Induction control valve (Opened)</td>
<td>Engine: Slowly accelerated from idling speed to 5,000 rpm</td>
<td>0 - 1V</td>
<td></td>
</tr>
<tr>
<td>109</td>
<td>Induction control valve (Closed)</td>
<td>Engine: Slowly decelerated from 5,000 rpm to idling speed</td>
<td>4.5 – 5.5V</td>
<td></td>
</tr>
<tr>
<td>116</td>
<td>Total control &quot;Reduce torque&quot; request signal 1</td>
<td>Engine: Idle</td>
<td>4.5 – 5.5V</td>
<td>A/T</td>
</tr>
<tr>
<td></td>
<td>Total control &quot;Reduce torque&quot; request signal 1</td>
<td>Engine: Running at idle after warmup and changing speeds</td>
<td>0 - 1V</td>
<td></td>
</tr>
<tr>
<td>59</td>
<td>Total control &quot;Reduce torque&quot; request signal 2</td>
<td>Engine: Idle</td>
<td>0 - 1V</td>
<td>A/T</td>
</tr>
<tr>
<td></td>
<td>Total control &quot;Reduce torque&quot; request signal 2</td>
<td>Engine: Running at idle after warmup and changing speeds</td>
<td>1 – 5.5V</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Total control &quot;Reduce torque&quot; execution signal</td>
<td>Engine: Running at idle with coolant temperature at 50°C (122°F) or lower</td>
<td>0 – 4V</td>
<td>A/T</td>
</tr>
<tr>
<td></td>
<td>Total control &quot;Reduce torque&quot; execution signal</td>
<td>Engine: Idle, warm</td>
<td>1 – 4V</td>
<td></td>
</tr>
</tbody>
</table>

Remarks:
- DOHC: Double Overhead Camshaft (DOHC)
# ON-VEHICLE INSPECTION OF MFI COMPONENTS <California – DOHC Non Turbo, Turbo>

## COMPONENT LOCATION

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

**NOTE**
The "Name" column is in alphabetical order.
MULTIPOINT FUEL INJECTION - On-Vehicle Inspection of MFI Components

1. Volume air flow sensor (with built-in intake air temperature sensor and barometric pressure sensor)

2. Engine coolant temperature sensor

3. Throttle position sensor (with built-in closed throttle position switch)

<California - DOHC Non Turbo>

4. Left bank heated oxygen sensor (front)
5. Left bank heated oxygen sensor (rear)

<California - Turbo>

6. Left bank heated oxygen sensor (front)
7. Left bank heated oxygen sensor (rear)

7. Crankshaft position sensor

8. Vehicle speed sensor (reed switch)

9. Air conditioning switch
14A-172 MULTIPORT FUEL INJECTION – On-Vehicle Inspection of MFI Components

H. Power steering pressure switch

I. Park/Neutral position switch

J. Variable air intake control servo (DC motor) (with built-in air intake control valve position sensor)

K. Injector

L. Idle air control motor (stepper motor)

M. Ignition coil (ignition power transistor)

N. MFI relay

O. Air conditioning relay

P. Check engine/malfunction indicator lamp

Q. Ignition timing adjusting terminal
MULTIPORT FUEL INJECTION – On-Vehicle Inspection of MFI Components

/ Diagnostic output terminal and diagnostic test mode control terminal

Engine control module

Knock sensor

Turbocharger waste gate solenoid

Fuel pressure solenoid

Resistor

Evaporative emission purge solenoid

EGR temperature sensor

EGR solenoid

Camshaft position sensor
COMPONENTS INSPECTION PROCEDURE
USING SCAN TOOL
Refer to P.14A-76.

POWER SUPPLY (MFI RELAY) AND IGNITION SWITCH-IG

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+         |
   ![Image of measurement setup]

2. Measure the power supply voltage of the MFI relay.
   - Ignition switch: OFF
   - MFI relay connector: Disconnected
     | Voltage (V)   |
     | B+            |
   ![Image of measurement setup] 1FU0808

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
   ![Image of measurement setup] 1FU0809

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
   ![Image of measurement setup] 6AF0050
MFI RELAY INSPECTION

Refer to P.14A-79

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

<table>
<thead>
<tr>
<th>Engine</th>
<th>Voltage (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cranking</td>
<td>8V or higher</td>
</tr>
<tr>
<td>Racing</td>
<td>B+</td>
</tr>
</tbody>
</table>

Replace the MFI relay or defective engine control module.
ENGINE CONTROL MODULE POWER GROUND

OPERATION
Refer to 14A-80.

TROUBLESHOOTING HINTS
Refer to 14A-80.

HARNESS INSPECTION
Refer to 14A-80.
FUEL PUMP <Non Turbo>

**OPERATION**
Refer to 14A-81.

**INSPECTION**
Refer to 14A-82.

**HARNESS INSPECTION**
Refer to 14A-82.

**MFI RELAY INSPECTION**
Refer to 14A-79.
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. |
| 2 | Check the ground circuit of the fuel pump.  
|   | - Fuel pump connector: Disconnected |
| 3 | Check for continuity between the fuel pump and the checking terminal.  
|   | - Fuel pump connector: Disconnected |
| 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 |

**Notes:**
- Repair the harness. (B1 - C1)
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

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

7

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

<table>
<thead>
<tr>
<th>Ignition switch</th>
<th>Voltage (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>0</td>
</tr>
<tr>
<td>ON</td>
<td>B+</td>
</tr>
</tbody>
</table>

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

9

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

10

Repair the harness.
MFI RELAY INSPECTION
Refer to P.14A-79.

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.

<table>
<thead>
<tr>
<th>Jumper wire</th>
<th>Continuity between terminals 2 and 5</th>
<th>Continuity between terminals 4 and 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connected</td>
<td>No continuity</td>
<td>Continuity present</td>
</tr>
<tr>
<td>Disconnected</td>
<td>Continuity present</td>
<td>No continuity</td>
</tr>
</tbody>
</table>

(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.

**OPERATION**
Refer to P.14A-84.

**TROUBLESHOOTING HINTS**
Refer to P.14A-84.
**INSPECTION**

Using Scan Tool

### <Volume Air Flow Sensor>

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Engine state</th>
<th>Standard value</th>
</tr>
</thead>
</table>
| 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>

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check conditions</th>
<th>Engine conditions</th>
<th>Standard value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data list</td>
<td>34</td>
<td>Reset signal condition</td>
<td>• Engine warm up</td>
<td>700 rpm (Idle)</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2,000 rpm</td>
<td>OFF</td>
</tr>
</tbody>
</table>

### <Volumetric Efficiency>

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Engine state</th>
<th>Standard value</th>
</tr>
</thead>
</table>
| 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 |

**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. **Harness side connector**
   - Measure the power supply voltage.
   - Connector: Disconnected
   - Ignition switch: ON
   - Voltage (V)
   - OK
   - Repair the harness (A) or check the control relay.

2. **Harness side connector**
   - Measure the terminal voltage.
   - Connector: Disconnected
   - Ignition switch: ON
   - Voltage (V)
   - OK
   - Repair the harness (A) .

3. **Harness side connector**
   - Check for continuity of the ground circuit.
   - Connector: Disconnected
   - OK
   - Repair the harness.

4. **Harness side connector**
   - 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
   - Repair the harness.
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

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Action</th>
</tr>
</thead>
</table>
| 1    | Check for continuity of the ground circuit.  
- Connector: Disconnected | OK  
Repair the harness. <sup>(A) 5 - 92</sup> |
| 2    | Measure the power supply voltage.  
- Connector: Disconnected  
- Ignition switch: ON  
Voltage (V): 4.5 - 4.9 | OK  
Repair the harness. <sup>(A) 6 - 72</sup> |

### 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

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Check for continuity of the ground circuit.</td>
<td><img src="image1.png" alt="Diagram 1" /></td>
</tr>
<tr>
<td></td>
<td>- Connector: Disconnected</td>
<td><img src="image2.png" alt="OK" /></td>
</tr>
<tr>
<td></td>
<td>Repair the harness.</td>
<td><img src="image3.png" alt="Checkered" /></td>
</tr>
<tr>
<td>2</td>
<td>Measure the power supply voltage of the barometric pressure sensor.</td>
<td><img src="image4.png" alt="Diagram 2" /></td>
</tr>
<tr>
<td></td>
<td>- Connector: Disconnected</td>
<td><img src="image2.png" alt="OK" /></td>
</tr>
<tr>
<td></td>
<td>- Ignition switch: ON</td>
<td><img src="image5.png" alt="Voltage" /></td>
</tr>
<tr>
<td></td>
<td>Voltage (V)</td>
<td><img src="image2.png" alt="OK" /></td>
</tr>
<tr>
<td></td>
<td>Repair the harness.</td>
<td><img src="image3.png" alt="Checkered" /></td>
</tr>
<tr>
<td>3</td>
<td>Check for an open-circuit, or a short-circuit to ground between the engine control module and the barometric pressure sensor.</td>
<td><img src="image6.png" alt="Diagram 3" /></td>
</tr>
<tr>
<td></td>
<td>- Volume air flow sensor connector: Disconnected</td>
<td><img src="image2.png" alt="OK" /></td>
</tr>
<tr>
<td></td>
<td>- Engine control module connector: Disconnected</td>
<td><img src="image7.png" alt="STOP" /></td>
</tr>
<tr>
<td></td>
<td>Repair the harness.</td>
<td><img src="image3.png" alt="Checkered" /></td>
</tr>
</tbody>
</table>
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. Check for continuity of the ground circuit.
   - Engine coolant temperature sensor connector: Disconnected
     → OK

2. 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

Repair the harness.

SENSOR INSPECTION

Refer to P.14A-94.

INSTALLATION

Refer to P.14A-94.
THROTTLE POSITION SENSOR

OPERATION
Refer to P.14A-95.

TROUBLESHOOTING HINTS
Refer to P.14A-95.

INSPECTION
Refer to P.14A-96.
HARNESS INSPECTION

1. Measure the power supply voltage of the throttle position sensor.
   - Connector: Disconnected
   - Ignition switch: ON
   | Voltage (V) |
   | 4.8 – 5.2 |
   OK → 2
   Repair the harness. (A1 – 81)

2. Check for continuity of the ground circuit.
   - Connector: Disconnected
   OK → 3
   Repair the harness. (A4 – 92)

3. Check for an open-circuit, or a short-circuit to ground between the engine control module and the throttle position sensor.
   - Throttle position sensor connector: Disconnected
   - Engine control module connector: Disconnected
   - Connector of any control module which uses TPS output signals like ECM: Disconnected
   OK → STOP
   Repair the harness. (A2 – 84)

SENSOR INSPECTION
Refer to P.14A-97.
CLOSED THROTTLE POSITION SWITCH

Throttle position sensor
(Closed throttle position switch mounted)

Engine control module

5 V

Harness side connector

Equipment side connector

Throttle position sensor connector

Terminal voltage (V)

ON

OFF

Throttle shaft turning angle

OPERATION
Refer to P.14A-98.

TROUBLESHOOTING HINTS
Refer to P.14A-98.

INSPECTION
Refer to P.14A-98.
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**
     - Repair the harness.

2. Check for continuity of the ground circuit.
   - Connector: Disconnected
   - **OK**
   - Repair the harness.

SENSOR INSPECTION

Refer to P.14A-99.
CAMSHAFT POSITION SENSOR

OPERATION
Refer to P.14A-100.

TROUBLESHOOTING HINTS
Refer to P.14A-100.

INSPECTION
Refer to P.14A-101
### HARNESS INSPECTION

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Outcome</th>
<th>Action</th>
</tr>
</thead>
</table>
| 1    | Measure the power supply voltage.  
- Connector: Disconnected  
- Ignition switch: ON | OK | Repair the harness.  
(A3 - MFI relay) |
|      | Voltage (V) | B+ |        |
| 2    | Check for continuity of the ground circuit.  
- Connector: Disconnected | OK | Repair the harness.  
(A1 - Ground) |
| 3    | Measure the impressed voltage.  
- Connector: Disconnected  
- Ignition switch: ON | OK | Repair the harness.  
(A2 - B) |
|      | Voltage (V) | 4.8 - 5.2 |        |
OPERATION
Refer to P.14A-104.

TROUBLESHOOTING HINTS
Refer to P.14A-104.
## INSPECTION
### Using Scan Tool

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Check content</th>
<th>Normal state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data reading</td>
<td>22</td>
<td>Cranking speed</td>
<td>- Engine cranking&lt;br&gt;- Tachometer connected (check on and off of primary current of ignition coil by tachometer)</td>
<td>Compare cranking speed and scan tool reading</td>
<td>Indicated speed to agree</td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Coolant temperature</th>
<th>Standard value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data reading</td>
<td>22</td>
<td>Idle speed</td>
<td>- Engine: Running at idle&lt;br&gt;- Closed throttle position switch: ON</td>
<td>At -20°C (-4°F)</td>
<td>1,275 – 1,475 rpm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>At 0°C (32°F)</td>
<td>1,225 – 1,425 rpm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>At 20°C (68°F)</td>
<td>1,100 – 1,300 rpm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>At 40°C (104°F)</td>
<td>950 – 1,150 rpm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>At 80°C (176°F)</td>
<td>600 – 800 rpm</td>
</tr>
</tbody>
</table>

### 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. Harness side connector

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

<table>
<thead>
<tr>
<th>Voltage (V)</th>
<th>B+</th>
</tr>
</thead>
</table>

**OK → 2**

- Repair the harness. (A3 - MFI relay)

## 2. Harness side connector

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

<table>
<thead>
<tr>
<th>Ground</th>
</tr>
</thead>
</table>

**OK → 3**

- Repair the harness. (A1 - Ground)

## 3. Harness side connector

**Measure the impressed voltage.**
- **Connector:** Disconnected
- **Ignition switch:** ON

<table>
<thead>
<tr>
<th>Voltage (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.8 – 5.2</td>
</tr>
</tbody>
</table>

**OK**

- Repair the harness. (A2 - 88)

---

STOP

---

STOP
IGNITION SWITCH-ST <M/T>

OPERATION
Refer to P.14A-109.

INSPECTION
Refer to P.14A-109.

HARNESS INSPECTION

<table>
<thead>
<tr>
<th>Step</th>
<th>Diagram</th>
<th>Task</th>
<th>Condition</th>
<th>Action</th>
</tr>
</thead>
</table>
| 1    | ![Diagram](image1.png) | Measure the input voltage to the engine control module. | - Engine control module connector: Disconnected  
- Ignition switch: START | ![OK](image2.png) → ![OK](image3.png) → Stop the harness. (71 – Ignition switch) |
|      |         | Voltage (V) | 8 or more |        |
| 2    | ![Diagram](image4.png) | Check for continuity of the ground circuit. | - Engine control module connector: Disconnected | ![OK](image5.png) → ![OK](image6.png) → Repair the harness. (91 – Ground) |
IGNITION SWITCH-ST AND PARK/NEUTRAL POSITION SWITCH (PNP SWITCH) <A/T>

OPERATION
Refer to P.14A-110.

TROUBLESHOOTING HINTS
Refer to P.14A-110.
**INSPECTION**

Refer to P.14A-111.

### HARNESS INSPECTION

1. Measure the power supply voltage.
   - Engine control module connector: Disconnected
   - PNP switch connector: Disconnected
   - Ignition switch: START

<table>
<thead>
<tr>
<th>Voltage (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B+</td>
</tr>
</tbody>
</table>

2. 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.

3. Measure the impressed voltage to the PNP switch.
   - Engine control module connector: Connected
   - PNP switch connector: Disconnected
   - Ignition switch: ON

<table>
<thead>
<tr>
<th>Voltage (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B+</td>
</tr>
</tbody>
</table>
VEHICLE SPEED SENSOR <Non Turbo>

Terminal voltage (V)

<table>
<thead>
<tr>
<th>Voltage (V)</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Frequency (Hz) vs Vehicle speed [km/h (mph)]

OPERATION
Refer to P.14A-112.

TROUBLESHOOTING HINTS
Refer to P.14A-112.
## HARNESS INSPECTION

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Check</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Measure the power supply voltage of the vehicle speed sensor.</td>
<td>OK</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>• Connector: Disconnected</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Ignition switch: ON</td>
<td>OK</td>
<td>Repair the harness.</td>
</tr>
<tr>
<td></td>
<td>Voltage (V)</td>
<td>4.5 – 4.9</td>
<td>6FU1265</td>
</tr>
<tr>
<td>3</td>
<td>Check for continuity of the ground circuit.</td>
<td>OK</td>
<td>STOP</td>
</tr>
<tr>
<td></td>
<td>• Connector: Disconnected</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>OK</td>
<td>Repair the harness.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(B 64 – Ground)</td>
</tr>
</tbody>
</table>

## 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. **Harness Side Connector**
   - Measure line voltage applied to vehicle speed sensor.
   - Connector: Disconnected
   - Ignition switch: ON
   - **OK**
   - **Voltage (V)**
     - B+  
   - **Repair the harness.**
     - (A1) Ignition switch)

2. **Engine Control Module Harness Side Connector**
   - Check the vehicle speed sensor output circuit for continuity.
   - Engine control module connector: Disconnected
   - Ignition switch: ON
   - Move the vehicle
   - **OK**
   - **STOP**
   - **Continuity**

3. **Harness Side Connector**
   - Measure the power supply voltage of the vehicle speed sensor.
   - Connector: Disconnected
   - Ignition switch: ON
   - **OK**
   - **Voltage (V)**
     - 4.5 – 4.9
   - **Repair the harness.**
     - (A3 86)

4. **Harness Side Connector**
   - Check for continuity of the ground circuit.
   - Connector: Disconnected
   - **OK**
   - **STOP**
   - **Repair the harness.**
     - (A2 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

1. Harness side connector

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

<table>
<thead>
<tr>
<th>Voltage (V)</th>
<th>R+</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
<td>Repair the harness. [A]1 – 37</td>
</tr>
</tbody>
</table>

SENSOR INSPECTION
Refer to GROUP 19 — Service Adjustment Procedures.
AIR CONDITIONING SWITCH AND COMPRESSOR CLUTCH RELAY

OPERATION
Refer to P.14A-116.

TROUBLESHOOTING HINTS
Refer to P.14A-116.

INSPECTION
Refer to P.14A-116.

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

<table>
<thead>
<tr>
<th>Voltage (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B+</td>
</tr>
</tbody>
</table>

Check the air conditioning circuit.

AIR CONDITIONING INSPECTION
Refer to GROUP 24 – Service Adjustment Procedures
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

   ![Diagram of Harness Inspection 1]

   Repair the harness. (A1 - 78)

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

   ![Diagram of Harness Inspection 2]

   Repair the harness. (A2 - Ground)
ELECTRICAL LOAD SWITCH

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)

Ignition switch — IG

Battery

Radiator fan motor

Resistor

ECM

Air conditioner compressor lock controller

To air conditioner compressor

Condenser fan motor

Engine control module connector

7FU1366
OPERATION
Refer to P.14A-123.

INSPECTION
Refer to P.14A-123.

HARNESS INSPECTION

Measure input voltage applied to ECM.
- ECM connector: Disconnected
- Ignition switch: ON

<table>
<thead>
<tr>
<th>Voltage (V)</th>
<th>Battery voltage</th>
</tr>
</thead>
</table>

Check the fan motor relay circuit.

FAN MOTOR RELAY INSPECTION
Refer to Radiator Check in GROUP 7 and Power Relay Check in GROUP 24.

MUFLER 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

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No. Data display</th>
<th>Check condition</th>
<th>Muffler mode changeover switch condition</th>
<th>Normal display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data list</td>
<td>35</td>
<td>Switch condition</td>
<td>Ignition switch: ON</td>
<td>Turn to TOUR mode: ON</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Turn to SPORT mode: OFF</td>
</tr>
</tbody>
</table>

HARNESS INSPECTION

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

   ![Diagram of harness inspection](image)

   **OK**

   Repair the harness.

   ![Diagram of harness](image)

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

   ![Diagram of harness inspection](image)

   **OK**

   Repair the harness.

   ![Diagram of harness](image)
INDUCTION CONTROL VALVE POSITION SENSOR <Non Turbo>

OPERATION
Refer to P.14A-124.
HARNESS INSPECTION

1. Measure the power supply voltage of the air intake control valve position sensor.
   - Connector: Disconnected
   - Ignition switch: ON
   - Voltage (V): 4.8 - 5.2

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

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

   Repair the harness.

   Repair the harness.
EGR TEMPERATURE SENSOR

OPERATION
Refer to P.14A-126.

INSPECTION
Refer to P.14A-127.
### HARNESS INSPECTION

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Option 1</th>
<th>Option 2</th>
</tr>
</thead>
</table>
| 1    | Measure the power supply voltage.  
- Connector: Disconnected  
- Ignition switch: ON |  
**Voltage (V)**  
4.3 – 4.7 | **OK**  
Repair the harness.  
(A2 – 92) |
| 2    | Check for continuity of the ground circuit.  
- Connector: Disconnected | **OK**  
Repair the harness.  
(A1 – 73) |

### SENSOR INSPECTION

Refer to GROUP 25 — Exhaust Gas Recirculation (EGR) System.
HEATED OXYGEN SENSOR <California – Non Turbo>

OPERATION
Refer to P.14A-128.

TROUBLESHOOTING
Refer to P.14A-129.

INSPECTION
Refer to P.14A-129.
HARNESS INSPECTION

Measure the power supply voltage of the heated oxygen sensor.
- Connector: Disconnected
- Ignition switch: ON

<table>
<thead>
<tr>
<th>Voltage (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B+</td>
</tr>
</tbody>
</table>

Repair the harness.

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

Repair the harness.

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

Repair the harness.

SENSOR INSPECTION
Refer to P.14A-135.

INSTALLATION
Refer to P. 14A-135.
HEATED OXYGEN SENSOR <Turbo except for California>

Theoretical A/F

Electromotive force (V)

14 15 16

A/F

Rich Lean

Engine control module connector

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)

   ![Diagram of harness side connector](7FU1333)

   Repair the harness.
   - (A1, B1 - MFI relay)

2. Check for an open-circuit, or a short-circuit to ground, between the engine control module and the heated oxygen sensor.
   - Heated oxygen sensor connector: Disconnected
   - Engine control module connector: Disconnected

   ![Diagram of harness side connector](7FU1334)

   Repair the harness.
   - (A1 - B1 - 75)

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

   ![Diagram of harness side connector](6AF0079)

   Repair the harness.
   - (A2, B2 - 92)
   - (A3, B3 - Ground)

SENSOR INSPECTION
Refer to P.14A-135.

INSTALLATION
Refer to P.14A-135.
**OPERATION**
Refer to P.14A-128.

**TROUBLESHOOTING**
Refer to P.14A-129.

**INSPECTION**
Using Scan Tool

*<Heated Oxygen Sensor (front)>*

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Engine state</th>
<th>Standard value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data reading</td>
<td>11</td>
<td>39</td>
<td>Sensor detection voltage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensor detection voltage</td>
<td></td>
<td></td>
<td>Engine: Warm-up (Make the mixture lean by engine speed reduction, and rich by racing)</td>
<td>When sudden deceleration from 4,000 rpm</td>
<td>200 mV or lower</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>When engine is suddenly raced</td>
<td>600 – 1,000 mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>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)</td>
<td>700 rpm (Idling)</td>
<td>400 mV or lower</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2,000 rpm</td>
<td>600 – 1,000 mV</td>
</tr>
</tbody>
</table>
### Multiport Fuel Injection

**On Vehicle Inspection of MFI Components**

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Engine state</th>
<th>Standard value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data reading</td>
<td>59 69</td>
<td>Sensor</td>
<td>Voltage</td>
<td>3,500 rpm</td>
<td>600 – 1,000 mV</td>
</tr>
</tbody>
</table>

**Heated Oxygen Sensor (rear)**

<table>
<thead>
<tr>
<th>Harness side connector</th>
<th>Voltage (V)</th>
<th>B+</th>
<th>Measure the power supply voltage of the heated oxygen sensor.</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1 ABCD</td>
<td>OK</td>
<td>OK</td>
<td>• Connector: Disconnected</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 ABCD</td>
<td>OK</td>
<td>OK</td>
<td>• Ignition switch: ON</td>
<td>Repair the harness.</td>
<td>(A1 B1 C1 D1 - MFI relay)</td>
</tr>
<tr>
<td>3 ABCD</td>
<td>OK</td>
<td>OK</td>
<td>• Heated oxygen sensor connector: Disconnected</td>
<td>Repair the harness.</td>
<td>(A1 B1 C1 D1 - MFI relay)</td>
</tr>
<tr>
<td>4 ABCD</td>
<td>OK</td>
<td>OK</td>
<td>• Engine control module connector: Disconnected</td>
<td>Repair the harness.</td>
<td>(A1 B1 C1 D1 - MFI relay)</td>
</tr>
</tbody>
</table>

**Check for continuity of the ground circuit.**

- Connector: Disconnected

**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

- **Check for continuity of the ground circuit.**

- Connector: Disconnected

**Harness side connector**

- **Harness side connector**
- **Engine control module harness side connector**
- **Heated oxygen sensor connector**
- **Engine control module harness side connector**
- **Heated oxygen sensor connector**
- **Engine control module harness side connector**
SENSOR INSPECTION
Refer to P.14A-135.

INSTALLATION
Refer to P.14A-135.

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

Repair the harness.
(A 3, B 3, C 3, D 3 - Ground)
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*₂ | Engine: Cranking | 0°C (32°F)*₁ | 13.8 – 16.8 ms |
| | | | | 20°C (68°F) | 40 – 48.8 ms |
| | | | | 80°C (176°F) | 8.6 – 10.6 ms |

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Engine state</th>
<th>Standard value</th>
</tr>
</thead>
</table>
| Data reading | 41 | Drive time*₂ | • Engine coolant temperature: 80 to 95°C (176 to 205°F)  
• Lights, electric cooling fan, accessory units: All OFF  
• Transaxle: Neutral  
• 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.

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Drive content</th>
<th>Check condition</th>
<th>Normal state</th>
</tr>
</thead>
</table>
| 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

Refer to P.14A-139.
INJECTORS <Turbo>

OPERATION
Refer to P.14A-136.

TROUBLESHOOTING HINTS
Refer to P.14A-137.
INSPECTION

Using Scan Tool

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Coolant temperature</th>
<th>Standard value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data reading</td>
<td>41 (Rear bank) 47 (Front bank)</td>
<td>Drive time*</td>
<td>Engine: Cranking</td>
<td>0°C (32°F)* 2</td>
<td>8.8 – 10.8 ms</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>20°C (68°F)</td>
<td>25.6 – 31.2 ms</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>80°C (176°F)</td>
<td>5.5 – 6.7 ms</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Engine state</th>
<th>Standard value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data reading</td>
<td>41 (Rear bank) 47 (Front bank)</td>
<td>Drive time*</td>
<td>Engine coolant temperature: 80 to 95°C (176 to 205°F) - Lamps, electric cooling fan, accessory units: All OFF</td>
<td>Idle state to change further (becoming less stable or stalling)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>700 rpm (Idle)</td>
<td>1.6 – 2.8 ms</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2,000 rpm</td>
<td>1.4 – 2.6 ms</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Drive content</th>
<th>Check condition</th>
<th>Normal state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuator test</td>
<td>01</td>
<td>No. 1 injector shut off</td>
<td>Engine: Idling after warm-up (Shut off the injectors in sequence during idling after engine warm-up, check the idling condition)</td>
<td>Idle state to change further (becoming less stable or stalling)</td>
</tr>
<tr>
<td></td>
<td>02</td>
<td>No. 2 injector shut off</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>03</td>
<td>No. 3 injector shut off</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>04</td>
<td>No. 4 injector shut off</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>05</td>
<td>No. 5 injector shut off</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>06</td>
<td>No. 6 injector shut off</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 $\Omega$ [at $20^\circ$C ($68^\circ$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 $\Omega$ [at $20^\circ$C ($68^\circ$F)]
(3) Reconnect the injector connector.

RESISTOR

Measurement of Resistance between Terminals
(1) Disconnect the resistor connector.

(2) Measure the resistance between terminals.

<table>
<thead>
<tr>
<th>Measuring terminals</th>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-4</td>
<td></td>
</tr>
<tr>
<td>2-4</td>
<td></td>
</tr>
<tr>
<td>3-4</td>
<td></td>
</tr>
<tr>
<td>5-4</td>
<td>5.5 – 6.5 $\Omega$ [at $20^\circ$C ($68^\circ$F)]</td>
</tr>
<tr>
<td>6-4</td>
<td></td>
</tr>
<tr>
<td>7-4</td>
<td></td>
</tr>
<tr>
<td>8-4</td>
<td></td>
</tr>
</tbody>
</table>

(3) If the resistance is out of specification, replace the resistor.
IDLE AIR CONTROL MOTOR (STEPPER MOTOR TYPE)

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.
OPERATION

Refer to P.14A-149.
### Inspection

**Using Scan Tool**

<Spark Advance>

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Engine state</th>
<th>Standard value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data reading</td>
<td>44</td>
<td>Ignition advance</td>
<td>• Engine: Warming up</td>
<td>700 rpm (Idle)</td>
<td>7−23°BTDC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Timing light: Set (set timing light to check actual ignition timing)</td>
<td>2,000 rpm</td>
<td>30−50°BTDC &lt;Non Turbo&gt; 23−43°BTDC &lt;Turbo&gt;</td>
</tr>
</tbody>
</table>

<Ignition Timing Adjustment Mode>

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Data display</th>
<th>Check condition</th>
<th>Terminal condition</th>
<th>Standard value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data list</td>
<td>36</td>
<td>Continuity present or not present between ignition timing adjustment terminal and ground</td>
<td>• Engine: Idling</td>
<td>Ignition timing adjustment terminal is grounded</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Ignition timing adjustment terminal is disconnected from ground</td>
<td>OFF</td>
</tr>
</tbody>
</table>

<Standard Ignition Timing>

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Drive</th>
<th>Check condition</th>
<th>Normal condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuator test</td>
<td>17</td>
<td>Set to ignition timing adjustment mode</td>
<td>• Engine: idling</td>
<td>5°BTDC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Timing light: set</td>
<td></td>
</tr>
</tbody>
</table>

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. **Harness side connector**
   - Measure the power supply voltage of the ignition coil.
   - Connector: Disconnected
   - Ignition switch: ON
   - **Voltage (V)**
     - B+

2. **Harness side connector**
   - Measure the power supply voltage of the ignition coil.
   - Connector: Disconnected
   - Ignition switch: ON
   - **Voltage (V)**
     - B+

3. **Harness side connector**
   - 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

4. **Harness side connector**
   - 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

5. Repair the harness.
   - (A2 - B13)
   - (A1 - B12)
   - (A4 - B11)
**ACTUATOR INSPECTION**

Refer to GROUP 8 – Ignition System
EVAPORATIVE EMISSION PURGE SOLENOID

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

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>

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

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Drive content</th>
<th>Check condition</th>
<th>Normal state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuator test</td>
<td>09</td>
<td>Turn solenoid valve from OFF to ON</td>
<td>Ignition switch. ON</td>
<td>Click heard when driven</td>
</tr>
</tbody>
</table>
HARNESS INSPECTION

1. Harness side connector

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

      | Voltage (V) |
      | B+          |

   OK → 2
   Repair the harness. (A2 - MFI relay)

2. Engine control module harness side connector

   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
   Repair the harness. (A1 - 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.

<table>
<thead>
<tr>
<th>Battery voltage</th>
<th>The other nipple of solenoid valve</th>
<th>Normal state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not applied</td>
<td>Open</td>
<td>Negative pressure leaks</td>
</tr>
<tr>
<td></td>
<td>Close with finger</td>
<td>Negative pressure is held</td>
</tr>
<tr>
<td>Applied</td>
<td>Open</td>
<td>Negative pressure is held</td>
</tr>
</tbody>
</table>
Coil Resistance Check

(1) Measure the coil resistance with a circuit tester

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

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 following 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

<table>
<thead>
<tr>
<th>Function</th>
<th>Item No.</th>
<th>Drive content</th>
<th>Check condition</th>
<th>Normal state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuator test</td>
<td>12</td>
<td>Turn solenoid valve from OFF to ON</td>
<td>Ignition switch: ON</td>
<td>Click heard when driven</td>
</tr>
</tbody>
</table>

HARNESS INSPECTION

1. **Harness side connector**
   - Measure the power supply voltage.
     - Connector: Disconnected
     - Ignition switch: ON
   - **OK**
   - Repair the harness. (A1 - MFI relay)

2. **Harness side connector**
   - 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**
   - Repair the harness. (A2 - )

ACTUATOR INSPECTION
Refer to GROUP 11.
BOOST METER <Turbo>

- Ignition switch (IG₁)
- Equipment side connector
- Boost meter
- Engine control module
- 7FU0985

- Engine control module connector
- 9FU0393
HARNESS INSPECTION

1. Harness side connector

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

<table>
<thead>
<tr>
<th>Voltage (V)</th>
<th>B+</th>
</tr>
</thead>
</table>

2. Engine control module harness side connector

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

ACTUATOR INSPECTION

Refer to GROUP 8.
ACTIVE EXHAUST CONTROL UNIT <Turbo>

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+

ACTUATOR INSPECTION
Refer to GROUP 11.
OPERATION
Refer to P.14A-157.

INSPECTION
Refer to P.14A-157.

HARNESS INSPECTION

<table>
<thead>
<tr>
<th>1</th>
<th>Engine control module harness side connector</th>
<th>Check for an open-circuit or a short-circuit to ground, between the engine control module and the variable induction control motor connector.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A Harness side connector</td>
<td>• Variable induction control motor connector: Disconnected</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Engine control module connector: Disconnected</td>
</tr>
</tbody>
</table>

ACTUATOR INSPECTION
Refer to GROUP 11.
ANTI-LOCK BRAKING SIGNAL <Turbo>

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
- 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

Repair the harness.
ENGINE AND TRANSAXLE TOTAL CONTROL SIGNAL <A/T>

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.

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

<table>
<thead>
<tr>
<th>Transaxle control module harness side connector</th>
<th>Engine control module harness side connector</th>
</tr>
</thead>
</table>

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**
- Repair the harness.

### 2

<table>
<thead>
<tr>
<th>Transaxle control module harness side connector</th>
<th>Engine control module harness side connector</th>
</tr>
</thead>
</table>

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**
- Repair the harness.

### 3

<table>
<thead>
<tr>
<th>Transaxle control module harness side connector</th>
<th>Engine control module harness side connector</th>
</tr>
</thead>
</table>

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**
- Repair the harness.

---

**6FU1543**
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.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Probable cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fuel pressure is too low.</strong></td>
<td>Fuel filter is clogged.</td>
<td>Replace the fuel filter.</td>
</tr>
<tr>
<td><strong>Fuel pressure drops during racing.</strong></td>
<td>Malfunction of the valve seat within the fuel pressure regulator, or fuel leakage to return side caused by spring deterioration.</td>
<td>Replace the fuel pressure regulator.</td>
</tr>
<tr>
<td><strong>No fuel pressure in fuel return hose.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fuel pressure is too high.</strong></td>
<td>The valve within the fuel pressure regulator is sticking.</td>
<td>Replace the fuel pressure regulator.</td>
</tr>
<tr>
<td><strong>Clogging of the fuel return hose and/or the pipe.</strong></td>
<td>Clean or replace the hose and/or pipe.</td>
<td></td>
</tr>
<tr>
<td><strong>No change of the fuel pressure when the vacuum hose is connected and when not connected.</strong></td>
<td>Damaged vacuum hose or nipple clogging.</td>
<td>Replace the vacuum hose, or clean the nipple.</td>
</tr>
<tr>
<td></td>
<td>Malfunction of the fuel pressure control system <strong>&lt;Turbo&gt;</strong></td>
<td>Checking the fuel pressure control system <strong>&lt;Turbo&gt;</strong></td>
</tr>
</tbody>
</table>
(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.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Probable cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>After the engine is stopped, the fuel pressure drops gradually.</td>
<td>Injector leakage.</td>
<td>Replace the injector.</td>
</tr>
<tr>
<td></td>
<td>Leakage at the fuel pressure regulator valve seat.</td>
<td>Replace the fuel pressure regulator.</td>
</tr>
<tr>
<td>There is a sudden sharp drop of the fuel pressure immediately after the engine is stopped.</td>
<td>The check valve (within the fuel pump) is not closed.</td>
<td>Replace the fuel pump.</td>
</tr>
</tbody>
</table>

(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

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Check point</th>
<th>Check conditions (Engine conditions)</th>
<th>Standard value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td>Back-up power supply</td>
<td>Ignition switch: OFF</td>
<td>8V</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Power supply</td>
<td>Ignition switch: ON</td>
<td>B+</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>82</td>
<td>Ignition switch IG</td>
<td>Ignition switch: ON</td>
<td>B+</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>MFI relay (power supply)</td>
<td>Ignition switch: OFF</td>
<td>B+</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ignition switch: ON</td>
<td>0 – 3V</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>MFI relay (fuel pump)</td>
<td>Ignition switch: ON, Engine: Idle</td>
<td>B+</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0 – 3V</td>
<td></td>
</tr>
<tr>
<td>81</td>
<td>Sensor impressed voltage</td>
<td>Ignition switch: ON</td>
<td>4.5 – 5.5V</td>
<td></td>
</tr>
<tr>
<td>Terminal No.</td>
<td>Check point</td>
<td>Check conditions (Engine conditions)</td>
<td>Standard value</td>
<td>Remarks</td>
</tr>
<tr>
<td>-------------</td>
<td>--------------------------------------------</td>
<td>------------------------------------------------------------------</td>
<td>----------------</td>
<td>---------</td>
</tr>
<tr>
<td>90</td>
<td>Volume air flow sensor</td>
<td>Engine: Idle</td>
<td>2.2 – 3.2V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine: 2,000 rpm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Volume air flow sensor reset signal</td>
<td>Engine: Idle</td>
<td>0 – 1V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine: 3,000 rpm</td>
<td>6 – 9V</td>
<td></td>
</tr>
<tr>
<td>72</td>
<td>Intake air temperature sensor</td>
<td>Ignition switch: ON</td>
<td>3.2 – 3.8V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>When intake temperature is 0°C (32°F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>When intake temperature is 20°C (68°F)</td>
<td>2.3 – 2.9V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>When intake temperature is 40°C (104°F)</td>
<td>1.5 – 2.1V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>When intake temperature is 80°C (176°F)</td>
<td>0.4 – 1.0V</td>
<td></td>
</tr>
<tr>
<td>85</td>
<td>Barometric pressure sensor</td>
<td>Ignition switch: ON</td>
<td>3.7 – 4.3V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>When altitude is 0 m (0 ft.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>When altitude is 1,200 m (3,937 ft.)</td>
<td>3.2 – 3.8V</td>
<td></td>
</tr>
<tr>
<td>83</td>
<td>Water temperature sensor</td>
<td>Ignition switch: ON</td>
<td>3.2 – 3.8V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>When water temperature is 0°C (32°F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>When water temperature is 20°C (68°F)</td>
<td>2.3 – 2.9V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>When water temperature is 40°C (104°F)</td>
<td>1.3 – 1.9V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>When water temperature is 80°C (176°F)</td>
<td>0.3 – 0.9V</td>
<td></td>
</tr>
<tr>
<td>84</td>
<td>Throttle position sensor</td>
<td>Ignition switch: Kept in ON state for more than 15 seconds</td>
<td>0.3 – 1.0V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Idle</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wide open throttle</td>
<td>4.5 – 5.5V</td>
<td></td>
</tr>
<tr>
<td>87</td>
<td>Closed throttle position switch</td>
<td>Ignition switch: ON</td>
<td>0 – 1V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Throttle valve placed in idle position</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Throttle valve placed in slightly opened position</td>
<td>4V or more</td>
<td></td>
</tr>
<tr>
<td>88</td>
<td>Camshaft position sensor</td>
<td>Engine: Cranked</td>
<td>0.2 – 3.0V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine: Idle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>89</td>
<td>Crankshaft position sensor</td>
<td>Engine: Cranked</td>
<td>0.2 – 3.0V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine: Idle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>71</td>
<td>Ignition switch-ST</td>
<td>Engine: Cranked</td>
<td>8V or more</td>
<td>M/L</td>
</tr>
<tr>
<td>91</td>
<td>Park/Neutral position switch</td>
<td>Ignition switch: ON</td>
<td>0 – 3 V</td>
<td>A/T</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Selector lever set to P or N</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Selector lever set to D, 2, L or R</td>
<td>8 – 14V</td>
<td></td>
</tr>
<tr>
<td>Terminal No.</td>
<td>Check point</td>
<td>Check conditions (Engine conditions)</td>
<td>Standard value</td>
<td>Remarks</td>
</tr>
<tr>
<td>-------------</td>
<td>-------------</td>
<td>--------------------------------------</td>
<td>----------------</td>
<td>---------</td>
</tr>
</tbody>
</table>
| 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  
Steering wheel turned half a turn | B+  
0 → 3V |         |
| 45          | Air conditioning switch 1 | Engine: Idle  
Air conditioning switch set to OFF  
Air conditioning switch set to ON (Air conditioning compressor in driven state) | B+  
0 → 3V |         |
| 59          | Air conditioning switch 2 | Engine: Idle  
Air conditioning switch set to OFF  
• Air conditioning switch set to ON  
• Indoor set temperature brought closer to atmospheric temperature | B+  
0 → 3V |         |
| 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)]  
Radiator fan operating at low speeds  
[Coolant temperature: 95 → 105°C (203 → 221 °F)] | B+  
0 → 3V |         |
| 20          | Fan motor relay (Hi) | Radiator fan not operating  
[Coolant temperature: below 90°C (194°F)]  
Radiator fan operating at high speeds  
[Coolant temperature: above 105°C (221 °F)] | B+  
0 → 3V |         |
| 24          | Electric load switch | Engine: Running at idle  
Lighting switch set to OFF  
Lighting switch set to ON | B+  
0 → 3V |         |
| 75 76       | Heated oxygen sensor (front) | Engine: Warm, 2,000 rpm  
(Change 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> |         |
<p>| 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 |         |         |         |</p>
<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Check point</th>
<th>Check conditions (Engine conditions)</th>
<th>Standard value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Stepper motor coil (&lt;A1&gt;)</td>
<td>Engine: Warm Check immediately after hot restart.</td>
<td>B+ ↑ ↓ (0 - 3)V (\text{(Changed repeated)})</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Stepper motor coil (&lt;A2&gt;)</td>
<td>Engine: Warm, 3,000 rpm</td>
<td>B+ (0 - 3)V</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Stepper motor coil (&lt;B1&gt;)</td>
<td>Engine speed: 3,000 rpm</td>
<td>0.3 – 3V</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Stepper motor coil (&lt;B2&gt;)</td>
<td>Engine speed: 3,000 rpm</td>
<td>0.3 – 3V</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Ignition power transistor unit A</td>
<td>Ignition switch: ON</td>
<td>B+ (0 - 3)V</td>
<td>Turbo</td>
</tr>
<tr>
<td>23</td>
<td>Ignition power transistor unit B</td>
<td>Ignition switch: ON</td>
<td>B+ (0 - 3)V</td>
<td>Turbo</td>
</tr>
<tr>
<td>11</td>
<td>Ignition power transistor unit C</td>
<td>Ignition switch: ON</td>
<td>B+ (0 - 3)V</td>
<td>Turbo</td>
</tr>
<tr>
<td>9</td>
<td>Evaporative emission purge solenoid</td>
<td>Ignition switch: ON</td>
<td>B+ (0 - 3)V</td>
<td>Turbo</td>
</tr>
<tr>
<td>7</td>
<td>Fuel pressure solenoid</td>
<td>Ignition switch: ON</td>
<td>B+ (0 - 3)V</td>
<td>Turbo</td>
</tr>
<tr>
<td>32</td>
<td>Turbocharger waste gate solenoid</td>
<td>Ignition switch: ON</td>
<td>B+ (0 - 3)V</td>
<td>Turbo</td>
</tr>
<tr>
<td>41</td>
<td>Turbo meter</td>
<td>Ignition switch: ON</td>
<td>4 – 13V</td>
<td>Turbo</td>
</tr>
<tr>
<td>31</td>
<td>Fuel pump relay 2</td>
<td>Engine: Depress the accelerator pedal abruptly while the engine is idling</td>
<td>Falls temporarily from B+</td>
<td>Turbo</td>
</tr>
<tr>
<td>58</td>
<td>Engine ignition signal</td>
<td>Engine: 3,000 rpm</td>
<td>0.3 – 3V</td>
<td>Turbo</td>
</tr>
<tr>
<td>35</td>
<td>Valve opened or closed indication signal</td>
<td>Muffler mode changeover switch: ON</td>
<td>Engine: Idle</td>
<td>0 – 3V</td>
</tr>
<tr>
<td>34</td>
<td>Muffler mode changeover switch</td>
<td>Ignition switch: ON</td>
<td>Changeover switch set to ON (TOUR)</td>
<td>0 – 3V</td>
</tr>
<tr>
<td>52</td>
<td>Ignition timing adjustment terminal</td>
<td>Ignition switch: ON</td>
<td>Ignition timing adjustment terminal connected to ground</td>
<td>0 – 1V</td>
</tr>
<tr>
<td>Terminal No.</td>
<td>Check point</td>
<td>Check conditions (Engine conditions)</td>
<td>Standard value</td>
<td>Remarks</td>
</tr>
<tr>
<td>-------------</td>
<td>-------------</td>
<td>-------------------------------------</td>
<td>----------------</td>
<td>---------</td>
</tr>
<tr>
<td>36</td>
<td>Check engine/malfunction indicator lamp</td>
<td>Ignition switch: OFF → ON</td>
<td>0 - 3 V ↓ 9 - 13 V (Several seconds later)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>EGR solenoid</td>
<td>Ignition switch: ON</td>
<td>B+</td>
<td>Engine: Idle. Suddenly depress the accelerator pedal Falls temporarily from B+.</td>
</tr>
<tr>
<td>73</td>
<td>EGR temperature sensor</td>
<td>When sensor temperature is 50°C (122°F)</td>
<td>3.6 - 4.4V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>When sensor temperature is 100°C (212°F)</td>
<td>2.2 - 3.0V</td>
<td></td>
</tr>
<tr>
<td>74</td>
<td>Oxygen sensor heater</td>
<td>Engine: Idle, warm</td>
<td>0 - 3 V</td>
<td>&lt;California Turbo&gt;</td>
</tr>
<tr>
<td>77</td>
<td></td>
<td>Engine: 5,000 rpm</td>
<td>B+</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>Induction control valve position sensor No. 1</td>
<td>Ignition switch: ON</td>
<td>0 - 1V or 4.5 - 5.5V</td>
<td>Non Turbo</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine: Slowly accelerated from idling speed to 5,000 rpm</td>
<td>0 - 1V or 4.5 - 5.5V ↓ 1.5 - 4V (for a moment)</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>Induction control valve position sensor No. 2</td>
<td>Ignition switch: ON</td>
<td>0 - 1V or 4.5 - 5.5V</td>
<td>Non Turbo</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine: Slowly accelerated from idling speed to 5,000 rpm</td>
<td>0 - 1V or 4.5 - 5.5V ↓ 1.5 - 4V (for a moment)</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>Induction control valve (Opened)</td>
<td>Engine: Slowly accelerated from idling speed to 5,000 rpm</td>
<td>0 - 1V ↓ 4V or more (for a moment)</td>
<td>Non Turbo</td>
</tr>
<tr>
<td>39</td>
<td>Induction control valve (Closed)</td>
<td>Engine: Slowly decelerated from 5,000 rpm to idling speed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>Anti-lock braking signal</td>
<td>Engine: Idle</td>
<td>B+</td>
<td>Turbo</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• When vehicle is put in motion for the first time after the ignition switch was placed in ON position</td>
<td>B+ ↓ 0 - 3V (for a moment)</td>
<td></td>
</tr>
<tr>
<td>46</td>
<td>Total control “Reduce torque” request signal 1</td>
<td>Engine: Running at idle after warmup and changing speeds</td>
<td>4.5 - 5.5V</td>
<td>A/T</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine: Idle</td>
<td>4.5 - 5.5V</td>
<td></td>
</tr>
<tr>
<td>Terminal No.</td>
<td>Check point</td>
<td>Check conditions (Engine conditions)</td>
<td>Standard value</td>
<td>Remarks</td>
</tr>
<tr>
<td>------------</td>
<td>--------------------------------------------------</td>
<td>---------------------------------------------------------------</td>
<td>----------------</td>
<td>---------</td>
</tr>
<tr>
<td>43</td>
<td>Total control &quot;Reduce torque&quot; request signal 2</td>
<td>Engine: Idle</td>
<td>0 - 1V</td>
<td>A/T</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine: Running at idle after warmup and changing speeds</td>
<td>1 - 5.5V</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Total control &quot;Reduce torque&quot; execution signal</td>
<td>Engine: Running at idle with coolant temperature at 50°C (122°F) or lower</td>
<td>0 - 4V</td>
<td>AA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine: Idle, warm</td>
<td>1 - 4V</td>
<td></td>
</tr>
</tbody>
</table>
14A-260 MULTIPOINT FUEL INJECTION – On-Vehicle Inspection of MFI Components

INJECTOR
REMOVAL AND INSTALLATION

<SOHC>

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
13. Grommet
14. O-ring

5 Nm 4 ft.lbs.
9 Nm 7 ft.lbs.
10-13Nm 7 - 9 ft.lbs.

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>

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
13. Grommet

5 Nm 4 ft.lbs.
9 Nm 7 ft.lbs.
10-13Nm 7 - 9 ft.lbs.

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
- 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.

INSTRUCTION

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.)

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>
2. Throttle position sensor (within closed throttle position switch)
3. Idle air control motor assembly
4. Throttle body

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.

<table>
<thead>
<tr>
<th>Throttle valve position</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fully closed</td>
<td>Conductive</td>
</tr>
<tr>
<td>Fully open</td>
<td>Non-conductive</td>
</tr>
</tbody>
</table>

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

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FUEL TANK ...................................................... 4

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  Accelerator Cable Inspection and Adjustment ............. 3

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SPECIFICATIONS

GENERAL SPECIFICATIONS

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<th>Items</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tank capacity</td>
<td>75 (19.8) dm³ (gal.)</td>
</tr>
<tr>
<td>Return system</td>
<td>Equipped</td>
</tr>
<tr>
<td>Filter</td>
<td>High pressure type</td>
</tr>
</tbody>
</table>

SERVICE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Items</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accelerator cable play</td>
<td>mm (in.)</td>
</tr>
<tr>
<td>&lt;M/T&gt;</td>
<td>1 - 2 (.04 - .08)</td>
</tr>
<tr>
<td>&lt;A/T&gt;</td>
<td>3 - 5 (.12 - .20)</td>
</tr>
</tbody>
</table>

SEALANT

<table>
<thead>
<tr>
<th>Items</th>
<th>Specified sealant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accelerator arm and return spring</td>
<td>MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent</td>
</tr>
<tr>
<td>Fuel tank hole cover</td>
<td>MOPAR Rope Caulk Sealer 3/16 x 80” roll Part No. 4026044 or equivalent</td>
</tr>
</tbody>
</table>

TROUBLESHOOTING

ACCELERATOR CABLE AND ACCELERATOR PEDAL

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Throttle valve will not fully open or close</td>
<td>Misadjusted accelerator cable</td>
<td>Adjust</td>
</tr>
<tr>
<td></td>
<td>Misadjusted automatic speed-control cable</td>
<td>Adjust</td>
</tr>
<tr>
<td></td>
<td>Broken return spring</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Throttle lever malfunction</td>
<td>Replace</td>
</tr>
<tr>
<td>Accelerator pedal operation not smooth</td>
<td>Accelerator pedal wrongly tightened</td>
<td>Repair</td>
</tr>
<tr>
<td>(over acceleration)</td>
<td>Misinstalled accelerator cable</td>
<td>Repair</td>
</tr>
<tr>
<td></td>
<td>Accelerator cable requires</td>
<td>Lubricate or replace</td>
</tr>
</tbody>
</table>
FUEL TANK AND FUEL LINE

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine malfunctions due to insufficient fuel supply</td>
<td>Bent or kinked fuel pipe or hose</td>
<td>Repair or replace</td>
</tr>
<tr>
<td></td>
<td>Clogged fuel pipe or hose</td>
<td>Clean or replace</td>
</tr>
<tr>
<td></td>
<td>Clogged fuel filter or in-tank fuel filter</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Water in fuel filter</td>
<td>Replace the fuel filter or clean the fuel tank and fuel line</td>
</tr>
<tr>
<td></td>
<td>Dirty or rusted fuel tank interior</td>
<td>Clean or replace</td>
</tr>
<tr>
<td></td>
<td>Malfunctioning fuel pump (Clogged filter in the pump)</td>
<td>Replace</td>
</tr>
<tr>
<td>Evaporative emission control system malfunctions (When tank cap is removed, pressure releasing noise is heard)</td>
<td>Mispiping of vapor line</td>
<td>Correct</td>
</tr>
<tr>
<td></td>
<td>Disconnected vapor line piping joint</td>
<td>Correct</td>
</tr>
<tr>
<td></td>
<td>Folded, bent, cracked or clogged vapor line</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Faulty fuel tank filler tube cap</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Malfunctioning fuel tank pressure control valve</td>
<td>Replace</td>
</tr>
</tbody>
</table>

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
- 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.

<table>
<thead>
<tr>
<th>Inspection procedure</th>
<th>Normal condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lightly blow from the inlet side</td>
<td>Air passes through after a slight resistance</td>
</tr>
<tr>
<td>Lightly blow from the outlet side</td>
<td>Air passes through</td>
</tr>
</tbody>
</table>

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.)
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.

---

12. CONNECTION OF HIGH PRESSURE FUEL HOSE

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

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

---

11. CONNECTION OF RETURN HOSE

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

---

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 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
4. High pressure fuel hose connection (body side)
5. High pressure fuel hose connection (fuel pump side)
6. Fuel pump and fuel gauge unit assembly

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.

<table>
<thead>
<tr>
<th>Inspection procedure</th>
<th>Normal condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lightly blow from the inlet (fuel tank) side</td>
<td>Air passes through after a slight resistance</td>
</tr>
<tr>
<td>Lightly blow from the outlet (canister) side</td>
<td>Air passes through</td>
</tr>
</tbody>
</table>

**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. 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. Fuel vapor 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**

**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

**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.
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

<table>
<thead>
<tr>
<th>Items</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main switch</td>
<td></td>
</tr>
<tr>
<td>Rated load A</td>
<td>1.2</td>
</tr>
<tr>
<td>Voltage drop V</td>
<td>0.1 or less</td>
</tr>
<tr>
<td>Auto-cruise control switch</td>
<td></td>
</tr>
<tr>
<td>Rated load mA</td>
<td></td>
</tr>
<tr>
<td>SET</td>
<td>3</td>
</tr>
<tr>
<td>RESUME</td>
<td>6</td>
</tr>
<tr>
<td>CANCEL</td>
<td>10</td>
</tr>
<tr>
<td>Stop light switch (for cruise control)</td>
<td></td>
</tr>
<tr>
<td>Rated load A</td>
<td>0.1 -0.9</td>
</tr>
<tr>
<td>Voltage drop (at rated load) V</td>
<td>0.15 or less</td>
</tr>
<tr>
<td>Clutch switch</td>
<td></td>
</tr>
<tr>
<td>Rated load A</td>
<td>0.1 - 1.5</td>
</tr>
<tr>
<td>Voltage drop (at rated load) V</td>
<td>0.15 or less</td>
</tr>
<tr>
<td>Auto-cruise control unit</td>
<td></td>
</tr>
<tr>
<td>Range of speed control km/h (mph)</td>
<td>40 - 200 (25 - 124)</td>
</tr>
<tr>
<td>Vacuum pump assembly</td>
<td></td>
</tr>
<tr>
<td>Vacuum pump</td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>Diaphragm type</td>
</tr>
<tr>
<td>Rated load A</td>
<td>3.0 or less</td>
</tr>
<tr>
<td>Control valve, release valve</td>
<td></td>
</tr>
<tr>
<td>Rated load A</td>
<td>0.4 or less</td>
</tr>
<tr>
<td>Actuator</td>
<td></td>
</tr>
<tr>
<td>Drive system</td>
<td>Vacuum type</td>
</tr>
<tr>
<td>Stroke mm (in.)</td>
<td>38 - 42 (1.5 - 1.7)</td>
</tr>
</tbody>
</table>

### SERVICE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Items</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accelerator cable play mm (in.)</td>
<td></td>
</tr>
<tr>
<td>&lt;M/T&gt;</td>
<td>0 -1(0 - .04)</td>
</tr>
<tr>
<td>&lt;A/T&gt;</td>
<td>2 -3 (.08 - .12)</td>
</tr>
<tr>
<td>Throttle cable mm (in.)</td>
<td>1 - 2 (.04 - .08)</td>
</tr>
<tr>
<td>Cruise control cable mm (in.)</td>
<td>1 - 2 (.04 - .08)</td>
</tr>
<tr>
<td>Resistance between terminals for control</td>
<td></td>
</tr>
<tr>
<td>valve and relief valve in vacuum pump</td>
<td>50 - 60</td>
</tr>
</tbody>
</table>

## LUBRICANTS

<table>
<thead>
<tr>
<th>Items</th>
<th>Specified lubricants</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedal side of accelerator cable</td>
<td>MOPAR Multi-mileage Lubricant</td>
<td>As required</td>
</tr>
<tr>
<td></td>
<td>Part No. 2525035 or equivalent</td>
<td></td>
</tr>
</tbody>
</table>
SPECIAL TOOL

<table>
<thead>
<tr>
<th>Tool number and tool name</th>
<th>Replaced by Miller tool number</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>MB991502</td>
<td>DRB-II</td>
<td>Checking of the diagnostic output</td>
</tr>
<tr>
<td>Scan tool (MUT-II)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MB991 529</td>
<td>MB99 1529</td>
<td>Inspection of cruise control system using a voltmeter</td>
</tr>
<tr>
<td>Diagnostic trouble code</td>
<td></td>
<td></td>
</tr>
<tr>
<td>check harness</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.

- Check the diagnostic output. (Refer to P. 14G-15.)
- Based on the diagnostic trouble code, check the circuit and individual parts. (Refer to P. 14G-15.)
- Refer to section on trouble symptoms, "Cruise control cannot be set." (Refer to P. 14G-4.)
- Set cruise control and perform driving test.
- Check the diagnostic output. (Refer to P. 14G-15.)
- AUTO CANCEL activated during operation on a steep slope, or a temporary loose contact in the connector.
### Cruise Control System - Troubleshooting

**Cruise control system cannot be set.**

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**
This chart contains troubleshooting procedures to perform when a problem cannot be detected by on-board diagnostic.

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.

<table>
<thead>
<tr>
<th>Result of check</th>
<th>Probable cause</th>
<th>Remedy</th>
<th>Reference page</th>
</tr>
</thead>
<tbody>
<tr>
<td>None of the codes appear even if input operations are performed.</td>
<td>Open circuit in control unit power supply circuit.</td>
<td>Replace main switch or repair harness.</td>
<td>P.14G-7</td>
</tr>
<tr>
<td></td>
<td>Open circuit in control switch circuit</td>
<td>Replace control switch or repair harness.</td>
<td>P.14G-8</td>
</tr>
<tr>
<td></td>
<td>Defective control unit</td>
<td>Replace control unit.</td>
<td>-</td>
</tr>
<tr>
<td>Even when SET switch is set to OFF, code No. 21 does not go away.</td>
<td>SET switch ON malfunction</td>
<td>Replace the control switch.</td>
<td>P.14G-8</td>
</tr>
<tr>
<td>Even when RESUME switch is set to OFF, code No. 22 does not go away.</td>
<td>RESUME switch ON malfunction</td>
<td>Replace control switch.</td>
<td>P.14G-8</td>
</tr>
<tr>
<td>Even when CANCEL switch is set to OFF, code No. 27 does not go away.</td>
<td>CANCEL switch ON malfunction</td>
<td>Replace control switch.</td>
<td>P.14G-8</td>
</tr>
<tr>
<td>Even when brake pedal is depressed, code No. 23 is not displayed.</td>
<td>Defective stop light switch circuit</td>
<td>Replace stop light switch or repair harness.</td>
<td>P.14G-12</td>
</tr>
<tr>
<td>Even when brake pedal is released, code No. 23 does not go away.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Even when clutch pedal is released, code No. 26 does not go away.</td>
<td>Defective clutch pedal position switch circuit</td>
<td>Replace clutch pedal position switch or repair harness.</td>
<td>P.14G-12</td>
</tr>
<tr>
<td>Even when select lever is placed in any position other than “N” and “P”, code No. 26 does not go away.</td>
<td>Defective park/neutral position switch circuit</td>
<td>Replace park/neutral position switch or repair harness.</td>
<td>P.14G-13</td>
</tr>
<tr>
<td>Code No. 25 is not displayed even when vehicle speed is less than about 40 km/h (25 mph).</td>
<td>Defective vehicle speed sensor circuit</td>
<td>Check and repair vehicle speed sensor circuit,</td>
<td>P.14G-10</td>
</tr>
<tr>
<td>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.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### CRUISE CONTROL SYSTEM - Troubleshooting

<table>
<thead>
<tr>
<th>Trouble symptom</th>
<th>Probable cause</th>
<th>Check chart No.</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>- The set vehicle speed varies greatly upward or downward.</td>
<td>Malfunction of the vehicle speed sensor circuit</td>
<td>No. 4</td>
<td>Repair the vehicle speed sensor system, or replace</td>
</tr>
<tr>
<td>- &quot;Hunting&quot; (repeated alternating acceleration and deceleration) occurs after setting is made.</td>
<td>Vacuum pump assembly circuit poor contact</td>
<td>No. 5</td>
<td>Repair the actuator system, or replace the part.</td>
</tr>
<tr>
<td></td>
<td>Malfunction of the vacuum pump assembly (including air leaks from negative pressure passage)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Malfunction of the ECU</td>
<td>-</td>
<td>Replace the ECU.</td>
</tr>
</tbody>
</table>

**NOTE**

**The cruise control system is not canceled when the brake pedal is depressed.**
- Brake switch (for cruise control) malfunction (short-circuit) No. 6
- Vacuum pump assembly drive circuit short-circuit No. 5
- Malfunction of the ECU - Replace the ECU.

**The cruise control system is not canceled when the clutch pedal is depressed.**
- Damaged or disconnected wiring of clutch pedal position switch input circuit
- Clutch switch improper installation (won’t switch ON) No. 7
- Malfunction of the ECU - Replace the ECU.

**The cruise control system is not canceled when the shift lever is moved to the "N" position.**
- Damaged or disconnected wiring of park/neutral position switch input circuit
- Improper adjustment of park/neutral position switch No. 8
- 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
- Vacuum pump assembly circuit poor contact No. 5
- Malfunction of the vacuum pump assembly
- Malfunction of the ECU - Replace the ECU.

**NOTE**

ECU: Electronic control unit
<table>
<thead>
<tr>
<th>Trouble symptom</th>
<th>Probable cause</th>
<th>Check chart No.</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannot accelerate or resume speed by using the RESUME switch.</td>
<td>Open or short circuit in RESUME switch circuit in control switch</td>
<td>No. 2</td>
<td>Replace the control switch.</td>
</tr>
<tr>
<td></td>
<td>Vacuum pump assembly circuit poor contact</td>
<td>No. 5</td>
<td>Repair the harness or replace the vacuum pump assembly.</td>
</tr>
<tr>
<td></td>
<td>Malfunction of the vacuum pump assembly (including air leaks from negative pressure passage)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Malfunction of the ECU</td>
<td></td>
<td>Replace the ECU.</td>
</tr>
<tr>
<td>Even when CANCEL switch is set to ON, cruise control is not canceled. (Cruise control, however, is canceled when brake pedal is depressed.)</td>
<td>Open or short circuit in CANCEL switch circuit in control switch</td>
<td>If the input check code No. 27 indicates a malfunction. No. 2</td>
<td>Replace the control switch</td>
</tr>
<tr>
<td></td>
<td>Malfunction of the ECU</td>
<td></td>
<td>Replace the ECU.</td>
</tr>
<tr>
<td>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.</td>
<td>Malfunction of the vehicle-speed sensor circuit</td>
<td>No. 4</td>
<td>Repair the vehicle speed sensor system, or replace the part.</td>
</tr>
<tr>
<td></td>
<td>Malfunction of the ECU</td>
<td></td>
<td>Replace the ECU.</td>
</tr>
<tr>
<td>The cruise control indicator light of the combination meter does not illuminate. (But cruise control system is normal)</td>
<td>Damaged or disconnected bulb of indicator light</td>
<td>No. 3</td>
<td>Repair the harness or replace the light bulb.</td>
</tr>
<tr>
<td></td>
<td>Harness damaged or disconnected</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Malfunction of the ECU</td>
<td></td>
<td>Replace the ECU.</td>
</tr>
<tr>
<td>Cruise control ON indicator light does not come on. (However, cruise control is functional.)</td>
<td>Burned-out indicator light bulb</td>
<td>No. 3</td>
<td>Repair the harness or replace the main switch.</td>
</tr>
<tr>
<td></td>
<td>Open or short circuit in harness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overdrive is not canceled during fixed speed driving &lt;A/T&gt;</td>
<td>Malfunction of circuit related to overdrive cancellation, or malfunction of ECU</td>
<td>No. 10</td>
<td>Repair the harness or replace the part.</td>
</tr>
<tr>
<td>No shift to overdrive during manual driving. &lt;A/T&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CRUISE CONTROL SYSTEM – Troubleshooting

CHECK CHART

|   | Inspection of control unit power supply circuit |

DESCRIPTION OF OPERATION

The power is supplied through the ignition switch (IG1) and cruise control main switch to the control unit.

1. When the cruise control main switch is set to ON with the ignition switch at ON, the current from switch S1 flows through relay Ry1 in the switch. Accordingly, the contact of relay Ry1 is closed and the power is supplied to the control unit.

2. When the main switch is released, it automatically returns to the neutral position. Since the current from switch S2 flows to relay Ry1, the contact of relay Ry1 remains closed.

3. When the main switch is set to OFF, current to relay Ry1 is interrupted. This opens the contact of relay Ry1 to stop the power supply to the control unit. When the switch is released, it automatically returns to the neutral position, but relay Ry1 stays in the OFF state.

4. When the ignition switch is set to OFF while relay Ry1 in the main switch is ON, relay Ry1 is forced to the OFF state just like when the main switch is set to OFF. Even if the ignition switch is set to ON again, relay Ry1 stays in the OFF state until the main switch is set to ON.

NOTE
The numbers beside each connector correspond to those in the section (P.14G-19) “HARNESS AND COMPONENTS LAYOUT”.

TROUBLESHOOTING HINTS

ECU terminal voltage

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Signal name</th>
<th>Condition</th>
<th>Terminal voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Control unit power supply</td>
<td>Main switch ON and neutral position thereafter</td>
<td>Battery positive voltage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Main switch OFF and neutral position thereafter</td>
<td>ov</td>
</tr>
<tr>
<td>8, 14</td>
<td>Control unit ground</td>
<td>At all times</td>
<td>ov</td>
</tr>
<tr>
<td>16</td>
<td>Control unit back up power supply</td>
<td>At all times</td>
<td>Battery positive voltage</td>
</tr>
</tbody>
</table>
2 Inspection of control switch circuit

### DESCRIPTION OF OPERATION

The control switch is a switch in which the SET, RESUME and CANCEL switches are integrated. Therefore, different resistance values are used for the individual switches to change the outputs (voltages) to the control unit. Current flows through fuse No. 4 of J/B and through the control switch to the control unit.

1. **SET switch**

When the cruise control switch is ON, if the SET switch is set to ON while vehicle speed is within a range from about 40 to 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**

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Signal name</th>
<th>Condition</th>
<th>Terminal voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>Control switch</td>
<td>When all switches are OFF</td>
<td>ov</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When SET switch is ON</td>
<td>3V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When RESUME switch is ON</td>
<td>6V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When CANCEL switch is ON</td>
<td>Battery positive voltage</td>
</tr>
</tbody>
</table>
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 $T_r$ in the control unit is kept in the ON state to keep the indicator light on.

TROUBLESHOOTING HINTS
ECU terminal voltage

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Signal name</th>
<th>Condition</th>
<th>Terminal voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>Cruise control (CRUISE) indicator light</td>
<td>When cruise control is active</td>
<td>0v</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When cruise control is inactive</td>
<td>Battery positive voltage</td>
</tr>
</tbody>
</table>
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).

TROUBLESHOOTING HINTS
Diagnosis No. 12 (Automatically canceled)
ECU terminal voltage

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Signal name</th>
<th>Condition</th>
<th>Terminal voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>Vehicle speed sensor</td>
<td>Slowly drive forward with SELECT lever at “D” or “1st Speed”</td>
<td>0 to 0.6V, Flashing 2V or more</td>
</tr>
</tbody>
</table>
DESCRIPTION OF OPERATION

The input signal from the control switch causes transistor $T_1$ 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.

<table>
<thead>
<tr>
<th>Cruise control operation</th>
<th>DC motor (ON: Current flows) (OFF: No current flows)</th>
<th>Solenoid valve (ON: open OFF: closed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acceleration</td>
<td>ON</td>
<td>Control valve: ON; Relief valve: ON</td>
</tr>
<tr>
<td>Hold</td>
<td>OFF</td>
<td>Control valve: ON; Relief valve: ON</td>
</tr>
<tr>
<td>Deceleration</td>
<td>OFF</td>
<td>Control valve: OFF; Relief valve: 'OFF</td>
</tr>
<tr>
<td>Release</td>
<td>OFF</td>
<td>Control valve: OFF; Relief valve: 'OFF</td>
</tr>
</tbody>
</table>

TROUBLESHOOTING HINTS

Diagnosis No. 11 (Automatically canceled)

ECU terminal voltage

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Signal name</th>
<th>Condition</th>
<th>Terminal voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Relief valve drive signal</td>
<td>When relief valve is ON</td>
<td>0V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When relief valve is OFF</td>
<td>Battery positive voltage</td>
</tr>
<tr>
<td>13</td>
<td>Control valve drive signal</td>
<td>When control valve is ON</td>
<td>0V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When control valve is OFF</td>
<td>Battery positive voltage</td>
</tr>
<tr>
<td>26</td>
<td>DC motor drive signal</td>
<td>When DC motor is running</td>
<td>0V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When DC motor is stationary</td>
<td>Battery positive voltage</td>
</tr>
<tr>
<td>25</td>
<td>Surge absorption circuit</td>
<td>When main switch is ON</td>
<td>Battery positive voltage</td>
</tr>
</tbody>
</table>
### Inspection of stop light switch circuit

**DESCRIPTION OF OPERATION**

When the brake pedal is depressed during vehicle speed control, the cruise control (NC) contact of the stop light switch is opened to interrupt the power supply to the vacuum pump assembly for cancellation of vehicle speed control. (Refer to P.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**

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Signal name</th>
<th>Condition</th>
<th>Terminal voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>Stop light switch</td>
<td>When brake pedal is depressed</td>
<td>Battery positive voltage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When brake pedal is not depressed</td>
<td>OV</td>
</tr>
</tbody>
</table>

### Inspection of clutch pedal position switch circuit <M/T>

**DESCRIPTION OF OPERATION**

When the clutch pedal is depressed during vehicle speed control, the contact of the clutch pedal position switch is closed. As a result, a cancel signal is input to the control unit which internally interrupts the power supply to the vacuum pump assembly drive circuit for cancellation of vehicle speed control.

**TROUBLESHOOTING HINTS**

**ECU terminal voltage**

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Signal name</th>
<th>Condition</th>
<th>Terminal voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Clutch pedal position switch</td>
<td>When clutch pedal is depressed</td>
<td>OV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When clutch pedal is not depressed</td>
<td>Battery positive voltage</td>
</tr>
</tbody>
</table>
8  Inspection of park/neutral position switch circuit <A/T>

**DESCRIPTION OF OPERATION**

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

**TROUBLESHOOTING HINTS**

**ECU terminal voltage**

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Signal name</th>
<th>Condition</th>
<th>Terminal voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Park/neutral position switch</td>
<td>Park/neutral position switch in &quot;N&quot; or &quot;P&quot; position</td>
<td>ov</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Park/neutral position switch in &quot;D&quot;, &quot;2&quot;, &quot;L&quot; or &quot;R&quot; position</td>
<td>Battery positive voltage</td>
</tr>
</tbody>
</table>

9  Inspection of throttle position sensor circuit

**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**

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Signal name</th>
<th>Condition</th>
<th>Terminal voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Closed throttle position switch</td>
<td>When accelerator pedal is depressed</td>
<td>0V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When accelerator pedal is not depressed</td>
<td>4.5 – 5.5V</td>
</tr>
<tr>
<td>5</td>
<td>Throttle position sensor</td>
<td>During idle</td>
<td>0.48 – 0.72V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When fully opened</td>
<td>4.0 – 5.5V</td>
</tr>
</tbody>
</table>
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 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

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Signal name</th>
<th>Condition</th>
<th>Terminal voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>OD signal control power supply</td>
<td>When ignition switch is ON</td>
<td>Battery positive voltage</td>
</tr>
<tr>
<td>10</td>
<td>ELC-4A/T control module</td>
<td>When overdrive mode is active</td>
<td>Battery positive voltage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When overdrive mode is inactive</td>
<td>ov</td>
</tr>
<tr>
<td>11</td>
<td>OD switch</td>
<td>When OD switch is ON</td>
<td>Battery positive voltage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When OD switch is OFF</td>
<td>ov</td>
</tr>
</tbody>
</table>
ON-BOARD DIAGNOSTIC CHECKING

On-board diagnostic checking is performed when there has been an automatic cancellation, without cancel switch operation.

**NOTE**

Even when the ignition key is placed in the OFF position, all diagnostic trouble codes are stored and retained, until the battery cable is disconnected, to make sure that the problems encountered in the past can be checked.

WHEN USING THE 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

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Display patterns (output codes) (Use with voltmeter)</th>
<th>Probable cause</th>
<th>Check chart No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td></td>
<td>Vacuum pump assembly drive output system out of order</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>I1</td>
<td>The same pattern repeatedly displayed</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>Vehicle speed signal system out of order</td>
<td>4</td>
</tr>
<tr>
<td>15</td>
<td></td>
<td>Control switch out of order (When SET or RESUME switch is kept in ON state continuously for more than 60 seconds)</td>
<td>2</td>
</tr>
<tr>
<td>16</td>
<td></td>
<td>Control unit out of order</td>
<td></td>
</tr>
<tr>
<td>17*</td>
<td></td>
<td>Throttle position sensor or closed throttle position switch out of order</td>
<td>9</td>
</tr>
</tbody>
</table>

**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

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Display patterns (output codes) (use with voltmeter)</th>
<th>Input operation</th>
<th>Check results</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td></td>
<td>SET switch ON</td>
<td>SET switch circuit normal</td>
</tr>
<tr>
<td>22</td>
<td></td>
<td>RESUME switch ON</td>
<td>RESUME switch normal</td>
</tr>
<tr>
<td>23</td>
<td></td>
<td>Stop light switch ON (brake pedal depressed)</td>
<td>Stop light switch circuit normal</td>
</tr>
<tr>
<td>24</td>
<td></td>
<td>Vehicle speed more than approx. 40 km/h (25 mph)</td>
<td>Vehicle speed sensor circuit normal if code Nos. 24 and 25 are displayed</td>
</tr>
<tr>
<td>25</td>
<td></td>
<td>Vehicle speed less than approx. 40 km/h (25 mph)</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>M/T</td>
<td>Clutch pedal position switch ON (clutch pedal depressed)</td>
<td>Clutch pedal position switch circuit normal</td>
</tr>
<tr>
<td></td>
<td>A/T</td>
<td>Park/neutral position switch ON (SELECT lever placed in “N” position)</td>
<td>Park/neutral position switch circuit normal</td>
</tr>
<tr>
<td>27</td>
<td></td>
<td>CANCEL switch ON</td>
<td>CANCEL switch circuit normal</td>
</tr>
<tr>
<td>28</td>
<td></td>
<td>TPS output voltage 1.5 V or more (Accelerator pedal depressed more than half the way)</td>
<td>Throttle position sensor circuit normal</td>
</tr>
<tr>
<td>29</td>
<td></td>
<td>Closed throttle position switch OFF (Accelerator pedal depressed)</td>
<td>Closed throttle position switch circuit normal</td>
</tr>
</tbody>
</table>

② Set main switch to **OFF**.
CRUISE CONTROL SYSTEM – Troubleshooting

HARNESS AND COMPONENT LAYOUT
ENGINE COMPARTMENT

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

INSTRUMENT PANEL AND FLOOR CONSOLE

06 Combination meter
07 Main switch
08
09 Main switch
DASH PANEL

JUNCTION BLOCK
Front side

10 Clutch pedal position switch <M/T>
11 Stop light switch
12 Clock spring
13 Cruise control relay

Rear side

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

LOCATION OF CONTROL UNIT AND RELAY

GROUND POINT

1

2
(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.
1. Set the ignition switch to ON (do not start the engine).
2. 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 - 0.04 in.)]
   - **A/T**  About two turns [inner cable free travel 2 to 3 mm (.08 to .12 in.)]

3. Secure the accelerator cable with the lock nut.
4. 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.)]

5. Secure the throttle cable with the lock nut.
6. Secure the adjusting bolt of the intake manifold plenum.
7. 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.)]

8. Secure the cruise control cable with the lock nut.
9. 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.

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>6</th>
<th>ILL</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Press OFF.</td>
<td>O</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neutral position</td>
<td>O</td>
<td>O</td>
<td></td>
<td></td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Press ON.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Switch operation</th>
<th>Resistance between terminals</th>
</tr>
</thead>
<tbody>
<tr>
<td>When switch is not operated</td>
<td>No continuity</td>
</tr>
<tr>
<td>When switch is operated toward you</td>
<td>Approx. 0 Ω</td>
</tr>
<tr>
<td>(CANCEL switch: ON)</td>
<td></td>
</tr>
<tr>
<td>When switch is operated upward</td>
<td>Approx. 820 Ω</td>
</tr>
<tr>
<td>(RESUME switch: ON)</td>
<td></td>
</tr>
<tr>
<td>When switch is operated downward</td>
<td>Approx. 2,700 Ω</td>
</tr>
<tr>
<td>(SET switch: ON)</td>
<td></td>
</tr>
</tbody>
</table>
STOP LIGHT SWITCH/BRAKE SWITCH INSPECTION
(1) Disconnect the connector.
(2) Check for continuity between the terminals of the switch.

<table>
<thead>
<tr>
<th>Measurement conditions</th>
<th>Brake switch</th>
<th>Stop light switch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal 1</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>When brake pedal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>depressed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>When brake pedal</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>not depressed.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th></th>
<th>Across terminals 1-3</th>
<th>Continuity provided</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>When power is supplied</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Across terminals 1-3</strong></td>
<td></td>
<td>No continuity provided</td>
</tr>
<tr>
<td><strong>When no power is supplied</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Across terminals 2-4</strong></td>
<td></td>
<td>Continuity provided</td>
</tr>
</tbody>
</table>

Cruise Control System

Removal and Installation

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
CRUISE CONTROL SYSTEM – Cruise Control System

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

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Noise and Vibration at High Speed
Noise at Start
# SPECIFICATIONS

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<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propeller shaft</td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td></td>
</tr>
<tr>
<td>Length x O.D. mm (in.)</td>
<td></td>
</tr>
<tr>
<td>Front</td>
<td>698.5 x 65 (27.50 x 2.56)</td>
</tr>
<tr>
<td>Center</td>
<td>662.5 x 65 (26.08 x 2.56)</td>
</tr>
<tr>
<td>Rear</td>
<td>555.5 x 65 (21.87 x 2.56)</td>
</tr>
<tr>
<td>Universal joint</td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td></td>
</tr>
<tr>
<td>No. 1 (front)</td>
<td>Cross type</td>
</tr>
<tr>
<td>No. 2 (center front)</td>
<td>Cross type</td>
</tr>
<tr>
<td>No. 3 (center rear) [Lobro]</td>
<td>Constant velocity type</td>
</tr>
<tr>
<td>No. 4 (rear)</td>
<td>Cross type</td>
</tr>
<tr>
<td>Lubrication</td>
<td></td>
</tr>
<tr>
<td>Cross type joint journal O.D.</td>
<td>16 (.63)</td>
</tr>
<tr>
<td>Constant velocity joint O.D.</td>
<td>99.73 (3.93)</td>
</tr>
</tbody>
</table>

**NOTE**
Propeller shaft length indicates the length between the center points of each joint.

## SERVICE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Items</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propeller shaft runout (Dial indicator reading)</td>
<td></td>
</tr>
<tr>
<td>Front mm (in.)</td>
<td>0.6 (.024) or less</td>
</tr>
<tr>
<td>Center mm (in.)</td>
<td>0.6 (.024) or less</td>
</tr>
<tr>
<td>Rear mm (in.)</td>
<td>0.6 (.024) or less</td>
</tr>
</tbody>
</table>

## LUBRICANTS

<table>
<thead>
<tr>
<th>Items</th>
<th>Specified lubricant</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sleeve yoke surface</td>
<td>MOPAR Hypoid Gear Oil/API classification GL-4, SAE 75W–90 or 75W–85W</td>
<td>As required</td>
</tr>
<tr>
<td>Lobro joint assembly</td>
<td>Repair kit grease</td>
<td>As required</td>
</tr>
<tr>
<td>Outer and inner races ball grooves</td>
<td>Repair kit grease</td>
<td>45 – 55 g (1.59 – 1.94 oz.)</td>
</tr>
<tr>
<td>Lobro joint assembly inner part</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SPECIAL TOOL

<table>
<thead>
<tr>
<th>Tool number and tool name</th>
<th>Replaced by Miller tool number</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>MB991 193 Plug</td>
<td>General service tool</td>
<td>Prevention of entry of foreign objects into the transaxle and transfer</td>
</tr>
</tbody>
</table>

TROUBLESHOOTING

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise at start</td>
<td>Worn journal bearing</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Worn sleeve yoke spline</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Loose propeller shaft installation</td>
<td>Retighten</td>
</tr>
<tr>
<td>Noise and vibration at high speed</td>
<td>Unbalanced propeller shaft</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Worn journal bearing</td>
<td>Replace</td>
</tr>
</tbody>
</table>
PROPELLER SHAFT
REMOVAL AND INSTALLATION

Removal steps:
1. Self-locking nut
2. Insulator
3. Propeller shaft
4. Spacer

Gear oil:
MOPAR Hypoid Gear Oil/
API classification GL-4
SAE 75W-90 or 75W-85W
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.
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

(1) Caution
Be cautious to avoid damage to the oil seal lip of the transfer.

(2) Install the propeller shaft to the companion flange with the mating marks properly aligned.

Caution
Tighten installation bolts after removing oil and grease from threads to prevent them from loosening due to lubrication.

2. INSTALLATION OF INSULATOR

Install spacers and insulators as indicated in the illustration.

Caution
When installing the center bearing, assemble the same spacers as removed from it (or new spacers of equal thickness).
Disassembly and Reassembly

**PROPELLER SHAFT AND UNIVERSAL JOINTS**

**DISASSEMBLY AND REASSEMBLY**

**Löbro joint assembly**

- front propeller shaft assembly
- companion flange
- 4. center bearing assembly
- 5. center propeller shaft assembly
- snap ring
- boot band
- C 8. Löbro joint assembly

**Grease:** Repair kit grease

[45 - 55 g (1.59 - 1.94 oz.)]

**Adhesive:** Quick fix adhesive

- 9. rubber packing
- 10. Löbro joint boot
- 11. washer
- 12. center propeller shaft
- 13. self-locking nut
- * 14. companion flange
- C 8. 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**

\[45 - 55 \text{ g (1.59 - 0.94 oz.)}\]

(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 Løbro joint boot and the Løbro joint assembly and install the Løbro joint boot to the Løbro joint assembly.

(10) Check that the Løbro 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 Løbro 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 Løbro 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

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#### GENERAL SPECIFICATIONS

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<th>Vehicles without ECS</th>
<th>Vehicles with ECS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suspension system</td>
<td></td>
<td>Multi-link</td>
</tr>
<tr>
<td><strong>Coil spring</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wire dia. x O.D. x free length</td>
<td>11.3 x 95 x 350 (.44 x 3.74 x 13.78)</td>
<td>11.6 x 105 x 350 (.46 x 4.13 x 13.78)</td>
</tr>
<tr>
<td>Identification color</td>
<td>Pink x 2</td>
<td>Green x 1</td>
</tr>
<tr>
<td>Spring constant N/mm (lbs./in.)</td>
<td>34 (190)</td>
<td>34 (190)</td>
</tr>
<tr>
<td><strong>Shock absorber</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>Hydraulic cylindrical double-acting type</td>
<td>Hydraulic cylindrical double-acting type</td>
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<tr>
<td>Max. length mm (in.)</td>
<td>515 (20.2)</td>
<td>515 (20.2)</td>
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<tr>
<td>Min. length mm (in.)</td>
<td>356 (14.0)</td>
<td>356 (14.0)</td>
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<tr>
<td>Stroke mm (in.)</td>
<td>159 (6.3)</td>
<td>159 (6.3)</td>
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<tr>
<td>Damping force [at 0.3 m/sec (.9 ft./sec)]</td>
<td></td>
<td></td>
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<tr>
<td>Expansion N (lbs.)</td>
<td>1,000 (220)</td>
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<tr>
<td>Contraction N (lbs.)</td>
<td>550 (121)</td>
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#### SERVICE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Items</th>
<th>Specifications</th>
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<tbody>
<tr>
<td><strong>Standard value</strong></td>
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<tr>
<td>Toe-in (Left-right difference) mm (in.)</td>
<td>0.5 ± 2.5 (.01 ± .09)</td>
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<tr>
<td>Camber</td>
<td>0° ± 30'</td>
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<tr>
<td>Stabilizer link ball joint breakaway torque Nm (in.lbs.)</td>
<td>1.7 – 3.2 (15 – 28)</td>
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<tr>
<td>Ball joint breakaway torque Nm (in.lbs.)</td>
<td>2 – 9 (17 – 78)</td>
</tr>
<tr>
<td>Stabilizer link protrusion mm (in.)</td>
<td>5 - 7 (.197 – .276)</td>
</tr>
<tr>
<td>Crossmember bushing projection mm (in.)</td>
<td>8.5 – 9.5 (.33 – .37)</td>
</tr>
<tr>
<td><strong>Limit</strong></td>
<td></td>
</tr>
<tr>
<td>Wheel bearing end play mm (in.)</td>
<td>0.05 (.002) or less</td>
</tr>
<tr>
<td>Rear hub rotary-sliding resistance N (lbs.)</td>
<td>31 (7) or less</td>
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</table>

#### LUBRICANT

<table>
<thead>
<tr>
<th>Items</th>
<th>Specified lubricant</th>
</tr>
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<tbody>
<tr>
<td>Lip and inside of the dust cover (upper and lower arm, assist link, stabilizer link)</td>
<td>MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent</td>
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### SPECIAL TOOLS

<table>
<thead>
<tr>
<th>Tool number and tool name</th>
<th>Replaced by Miller tool number</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>MB991113 Steering linkage puller</td>
<td>MB990635</td>
<td>Removal of the ball joint</td>
</tr>
<tr>
<td>MB990326 Preload socket</td>
<td>General service tool</td>
<td>Measurement of the ball joint breakaway torque</td>
</tr>
<tr>
<td>MB990800 Ball joint remover and installer</td>
<td>MB990800</td>
<td>Installation of the dust cover</td>
</tr>
<tr>
<td>MB991071 MB991072 MB991073 Bushing remover and installer Arbor Base</td>
<td>MB991071 MB991072-A MB991073</td>
<td>Removal and installation of bushing from/to upper arm, lower arm, and assist link</td>
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<tr>
<td>MB991237 Spring compressor body</td>
<td>C-4838</td>
<td>Compression of the coil spring</td>
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<tr>
<td>MR991239 Arm set</td>
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<tr>
<td>MB991045 Bushing remover and installer</td>
<td>MB991045</td>
<td>Removal and installation of the crossmember bushing</td>
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## TROUBLESHOOTING

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Squeaks or other abnormal noise</td>
<td>Loose rear suspension installation bolts and nuts</td>
<td>Retighten</td>
</tr>
<tr>
<td></td>
<td>Malfunction of shock absorber</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Worn bushings</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Upper arms and/or lower arms and/or assist link deformed or damaged</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Trailing arms deformed or damaged</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Crossmember deformed or damaged</td>
<td></td>
</tr>
<tr>
<td>Poor ride</td>
<td>Excessive tire inflation pressure</td>
<td>Adjust the pressure</td>
</tr>
<tr>
<td></td>
<td>Malfunction of shock absorber</td>
<td>Replace</td>
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<tr>
<td></td>
<td>Weak or broken springs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stabilizer bar and/or stabilizer link deformed or damaged</td>
<td></td>
</tr>
<tr>
<td>Body tilting</td>
<td>Weak or deteriorated bushings</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Weak or broken springs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Upper arms and/or lower arms and/or assist link deformed or damaged</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Trailing arms deformed or damaged</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Crossmember deformed or damaged</td>
<td></td>
</tr>
</tbody>
</table>
SERVICE ADJUSTMENT PROCEDURES

REAR WHEEL ALIGNMENT INSPECTION

CAMBER

**Standard value:** $0^\circ \pm 30'$

To adjust camber, turn the lower arm mounting bolt (cross-member 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 ($\Theta$ camber)
   Right wheel: Clockwise ($\Theta$ camber)
   One graduation changes camber by about 15'.

TOE-IN

**Standard value:** $0.5 \pm 2.5$ mm ($0.01 \pm 0.09$ 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 (0.12 in.) or less.
2. Left wheel: Clockwise (toe-in)
   Right wheel: Clockwise (toe-out)
   One graduation changes toe by about 4.8 mm (0.19 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
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 Trim (Refer to GROUP 23A – Trims.)

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

Post-installation Operation
- Check of Wheel Alignment
  (Refer to P. 17-5.)
- 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.)

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. Trailning arm mounting bolt and nut
19. Trailning 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

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

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

- 20 - 25 Nm
- 14 – 18 ft.lbs.
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

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

50-60 Nm
36 - 43 ft.lbs.

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.

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

<table>
<thead>
<tr>
<th>Items</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suspension system</td>
<td>Double wishbone suspension type</td>
</tr>
<tr>
<td><strong>Coil spring</strong></td>
<td></td>
</tr>
<tr>
<td>Wire dia. x O.D. x free length mm (in.)</td>
<td>11.5 x 105 x 379.3 (4.52 x 4.13 x 14.93)</td>
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<tr>
<td>Coil spring identification color</td>
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</tr>
<tr>
<td>Spring constant N/mm (lbs./in.)</td>
<td>28.0 (157)</td>
</tr>
<tr>
<td><strong>Shock absorber</strong></td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>Hydraulic, cylindrical, double-acting type</td>
</tr>
<tr>
<td>Max. length mm (in.)</td>
<td>610 (24.0)</td>
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<tr>
<td>Min. length mm (in.)</td>
<td>407 (16.0)</td>
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<tr>
<td>Stroke mm (in.)</td>
<td>203 (8.0)</td>
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<tr>
<td>Damping force [at 0.3 m/sec. (0.9 ft./sec.)]</td>
<td>Hard: 1,710 (377)</td>
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<tr>
<td></td>
<td>Medium: 1,160 (256)</td>
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<tr>
<td>Expansion N (lbs.)</td>
<td>Soft: 560 (123)</td>
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<tr>
<td>Contraction N (lbs.)</td>
<td>Hard: 1,010 (223)</td>
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<tr>
<td></td>
<td>Medium: 880 (194)</td>
</tr>
<tr>
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<td>Soft: 670 (148)</td>
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</table>

### SERVICE SPECIFICATIONS

<table>
<thead>
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<tbody>
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<tr>
<td>Toe-in mm (in.)</td>
<td>0.5 ± 2.5 (.01±.09)</td>
</tr>
<tr>
<td>Camber</td>
<td>−0°10'± 30'</td>
</tr>
<tr>
<td>Protruding length of stabilizer bar mounting bolt mm (in.)</td>
<td>5-7 (.197-.276)</td>
</tr>
<tr>
<td>Lower arm ball joint breakaway torque Nm (in.lbs.)</td>
<td>2.0 – 9.0 (17 – 78)</td>
</tr>
<tr>
<td>Stabilizer link ball joint breakaway torque Nm (in.lbs.)</td>
<td>1.7 – 3.2 (15 – 28)</td>
</tr>
<tr>
<td>Crossmember support bushing projection mm (in.)</td>
<td></td>
</tr>
<tr>
<td>Upper part</td>
<td>15.5 (.59)</td>
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<tr>
<td>Lower part</td>
<td>2.1 – 3.7 (.08 – .15)</td>
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<tr>
<td>Differential support bushing projection mm (in.)</td>
<td>6.7 – 7.3 (.26 – .29)</td>
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### LUBRICANT

<table>
<thead>
<tr>
<th>Items</th>
<th>Specified lubricant</th>
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<td>MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent</td>
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<table>
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<tr>
<th>Tool number and tool name</th>
<th>Replaced by Miller tool number</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>MB990958 Arbor</td>
<td>MB990975 (Part of MB990958)</td>
<td>Removal and installation of the crossmember bushing</td>
</tr>
<tr>
<td>MB991113 Steering linkage puller</td>
<td>MB990635</td>
<td>Removal of the ball joint</td>
</tr>
<tr>
<td>MB990326 Preload socket General service tool</td>
<td>MB990800</td>
<td>Measurement of the ball joint breakaway torque</td>
</tr>
<tr>
<td>MB990800 Ball joint remover and installer</td>
<td>MB990800</td>
<td>Installation of the dust cover</td>
</tr>
<tr>
<td>MB991071, MB991072, MB991073 Bushing remover and installer Arbor Base</td>
<td>MB991071, MB991072-A, MB991073</td>
<td>Removal and installation of bushing from/to upper arm, lower arm, and assist link</td>
</tr>
<tr>
<td>MB990767 End yoke holder</td>
<td>C-3281</td>
<td>To stop axle shaft turning</td>
</tr>
<tr>
<td>MB990241 Axle shaft puller</td>
<td>CT-1 003</td>
<td>For removal of the axle shaft</td>
</tr>
<tr>
<td>MB990244 Puller shaft</td>
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<tr>
<td>MB990244 Puller bar</td>
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<tr>
<td>MB990242 Puller bar</td>
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<tr>
<td>Sliding hammer</td>
<td>C-637</td>
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</table>
### Tool number and tool name

<table>
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<tr>
<th>Tool number and tool name</th>
<th>Replace by Miller tool number</th>
<th>Application</th>
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<tbody>
<tr>
<td>MB991354 Puller body</td>
<td>CT-1 003</td>
<td>For removal of the axle shaft</td>
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<tr>
<td>MB991 237 Spring compressor body</td>
<td>C-4838</td>
<td>Compression of the coil spring</td>
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### TROUBLESHOOTING

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<th>Probable cause</th>
<th>Remedy</th>
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<tr>
<td>Squeaks or other abnormal noise</td>
<td>Loose rear suspension installation bolts and nuts</td>
<td>Retighten</td>
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<tr>
<td></td>
<td>Malfunction of shock absorber</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Worn bushings</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Upper arms and/or lower arms deformed or damaged</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Trailing arms deformed or damaged</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Crossmember deformed or damaged</td>
<td></td>
</tr>
<tr>
<td>Poor ride</td>
<td>Excessive tire inflation pressure</td>
<td>Adjust the pressure</td>
</tr>
<tr>
<td></td>
<td>Malfunction of shock absorber</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Weak or broken springs</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Stabilizer bar and/or stabilizer link deformed or damaged</td>
<td></td>
</tr>
<tr>
<td>Body tilting</td>
<td>Weak or deteriorated bushings</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Weak or broken springs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Upper arms and/or lower arms deformed or damaged</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Trailing arms deformed or damaged</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Crossmember deformed or damaged</td>
<td></td>
</tr>
</tbody>
</table>
SERVICE ADJUSTMENT PROCEDURES

REAR WHEEL ALIGNMENT INSPECTION

CAMBER
Standard value: $-0^\circ 10' \pm 30'$
To adjust camber, turn the lower arm mounting bolt on the crossmember side.

NOTE
Left wheel: Clockwise ($\ominus$ camber)
Right wheel: Clockwise ($\oplus$ 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: $0.5 \pm 2.5$ mm ($0.01 \pm 0.09$ 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.)

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.)

Parts marked with * are symmetrical
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.

CROSSMEMBER BUSHING (REAR) REPLACEMENT

(1) Using the special tool, remove and press-fit the bushing.
UPPER AND LOWER ARM REMOVAL AND INSTALLATION

(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 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 tool 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.
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

NOTE
For tightening points marked with *, first temporarily tighten and then ground the vehicle to torque to specification where the vehicle is empty.

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.)
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

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

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

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

(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 \(90^\circ \pm 20^\circ\) 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.

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

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POWER STEERING HOSES ..................... 34
POWER STEERING OIL PUMP ................. 29
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  Steering Wheel Return to Center Check .......................... 9
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WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

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

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<th>Specifications</th>
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</thead>
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<tr>
<td>Steering wheel</td>
<td></td>
</tr>
<tr>
<td>Steering wheel O.D. mm (in.)</td>
<td>386 (15.2)</td>
</tr>
<tr>
<td>Gear box</td>
<td></td>
</tr>
<tr>
<td>Steering gear type</td>
<td>Rack and pinion</td>
</tr>
<tr>
<td>Power steering oil pump</td>
<td></td>
</tr>
<tr>
<td>Oil pump type</td>
<td>Vane type</td>
</tr>
<tr>
<td>Displacement cm³/rev. (cu.in./rev.)</td>
<td>9.6 (59)</td>
</tr>
<tr>
<td>Relief set pressure MPa (psi)</td>
<td>8 (1,138)</td>
</tr>
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</table>

### SERVICE SPECIFICATIONS

<table>
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<tr>
<th>Items</th>
<th>Specifications</th>
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</thead>
<tbody>
<tr>
<td>Standard value</td>
<td></td>
</tr>
<tr>
<td>Steering wheel free play (with engine stopped) mm (in.)</td>
<td>11 (.43)</td>
</tr>
<tr>
<td>Steering angle</td>
<td></td>
</tr>
<tr>
<td>FWD</td>
<td></td>
</tr>
<tr>
<td>Inner wheel</td>
<td>33°45’ ± 2”</td>
</tr>
<tr>
<td>Outer wheel</td>
<td>28°21’</td>
</tr>
<tr>
<td>AWD</td>
<td></td>
</tr>
<tr>
<td>Inner wheel</td>
<td>31°45’ ± 2”</td>
</tr>
<tr>
<td>Outer wheel</td>
<td>27°10’</td>
</tr>
<tr>
<td>Tie rod end ball joint starting torque Nm (in.lbs.)</td>
<td>0.5 – 3.0 (4 – 26)</td>
</tr>
<tr>
<td>FWD</td>
<td></td>
</tr>
<tr>
<td>AWD</td>
<td>1.0 – 3.0 (9 – 26)</td>
</tr>
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<td>Stationary steering effort N (lbs.)</td>
<td>35 (8) or less</td>
</tr>
<tr>
<td>Drive belt deflection mm (in.)</td>
<td></td>
</tr>
<tr>
<td>SOHC engine</td>
<td></td>
</tr>
<tr>
<td>When belt tension is inspected 6 – 9 (.24 – .35)</td>
<td></td>
</tr>
<tr>
<td>When belt tension is readjusted 7 (.28)</td>
<td></td>
</tr>
<tr>
<td>When new belt is installed 4 – 5 (.16 – .20)</td>
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</tr>
<tr>
<td>DOHC engine</td>
<td></td>
</tr>
<tr>
<td>When belt tension is inspected 9.5 – 13.5 (.37 – .53)</td>
<td></td>
</tr>
<tr>
<td>When belt tension is readjusted 10.5 – 12.5 (.41 – .49)</td>
<td></td>
</tr>
<tr>
<td>When new belt is installed 7.5 – 9.0 (.30 – .35)</td>
<td></td>
</tr>
<tr>
<td>Oil pump pressure M Pa (psi)</td>
<td></td>
</tr>
<tr>
<td>Pressure gauge valve closed 7.5-8.2 (1,067 – 1,166)</td>
<td></td>
</tr>
<tr>
<td>Pressure gauge valve opened 0.8 – 1.0 (114 – 142)</td>
<td></td>
</tr>
<tr>
<td>Oil pressure switch operating pressure M Pa (psi)</td>
<td>1.5 – 2.0 (213 – 284)</td>
</tr>
<tr>
<td>Oil pressure switch contacts closed (continuity)</td>
<td>1.0 – 1.2 (100 – 171)</td>
</tr>
<tr>
<td>Oil pressure switch contacts opened (no continuity)</td>
<td>0.7 – 1.8 (4.0)</td>
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<tr>
<td>Total pinion torque Nm (in.lbs.)</td>
<td>0.6 – 1.3 (5 – 11)</td>
</tr>
<tr>
<td>Tie-rod joint swing resistance N (lbs.)</td>
<td>8 – 18 (1.8 – 4.0)</td>
</tr>
<tr>
<td>Tie-rod joint swing torque Nm (in.lbs.)</td>
<td>2-5 (17-43)</td>
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### STEERING – Specifications

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<th>Limit</th>
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</thead>
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<tr>
<td>Steering wheel free play (when hydraulic operation) mm (in.)</td>
<td>30 (1.2)</td>
</tr>
<tr>
<td>Variation of tie rod end ball joint shaft direction mm (in.)</td>
<td>1.5 (.059)</td>
</tr>
<tr>
<td>Oil pump pressure Pressure gauge valve opened M Pa (psi)</td>
<td>1.5 (213)</td>
</tr>
<tr>
<td>Space between vane and rotor mm (in.)</td>
<td>0.06 (.0024)</td>
</tr>
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### LUBRICANTS

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<th>Specified lubricant</th>
<th>Quantity</th>
</tr>
</thead>
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<tr>
<td>Steering column and shaft</td>
<td>The surfaces of the bearing spacer</td>
<td>MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent</td>
</tr>
<tr>
<td>Gear box</td>
<td>Bearing O-ring</td>
<td>MOPAR ATF PLUS (Automatic transmission fluid type 7176)/Automatic Transmission Fluid “DEXRON” or “DEXRON II”</td>
</tr>
<tr>
<td></td>
<td>Oil seal Special tool (MB991213) Pinion and valve assembly seal ring part</td>
<td>MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent</td>
</tr>
<tr>
<td></td>
<td>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</td>
<td>MOPAR Multi-mileage Lubricant Part No. 2525035 or equivalent</td>
</tr>
<tr>
<td></td>
<td>Bellows Silicone grease</td>
<td>As required</td>
</tr>
<tr>
<td>Oil pump</td>
<td>Power steering fluid</td>
<td>MOPAR ATF PLUS (Automatic transmission fluid type 7176)/Automatic Transmission Fluid “DEXRON” or “DEXRON II”</td>
</tr>
<tr>
<td></td>
<td>Flow control valve Friction surface of rotor vane, cam ring and pump cover O-ring</td>
<td>MOPAR ATF PLUS (Automatic transmission fluid type 7176)/Automatic Transmission Fluid “DEXRON” or “DEXRON II”</td>
</tr>
</tbody>
</table>

### SEALANT AND ADHESIVES

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<th>Items</th>
<th>Specified sealant and adhesive</th>
</tr>
</thead>
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<td>Power steering gear box</td>
<td>3M ART Part No. 8663 or equivalent</td>
</tr>
<tr>
<td>End plug screw</td>
<td>3M ART Part No. 8663 or equivalent</td>
</tr>
<tr>
<td>Power steering rack support cover screw</td>
<td>3M ART Part No. 8663 or equivalent</td>
</tr>
<tr>
<td>Dust cover</td>
<td>3M ART Part No. 8663 or equivalent</td>
</tr>
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<table>
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<tr>
<th>Tool number and tool name</th>
<th>Replaced by Miller tool number</th>
<th>Application</th>
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</thead>
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<tr>
<td>MB990635 Steering linkage puller</td>
<td>MB990635</td>
<td>Disconnection of tie-rod end</td>
</tr>
<tr>
<td>MB990326 Preload socket</td>
<td>General service tool</td>
<td>Measurement of the ball joint starting torque</td>
</tr>
<tr>
<td>MB990662 Power steering oil pressure gauge</td>
<td>C-3309-E, C-4535</td>
<td>Measurement of oil pressure</td>
</tr>
<tr>
<td>MB990993 Power steering oil pressure gauge adapter (pump side)</td>
<td>MB991217-A</td>
<td>Measurement of the pinion shaft preload</td>
</tr>
<tr>
<td>MB990994 Power steering oil pressure gauge adapter (hose side)</td>
<td>MB990994</td>
<td></td>
</tr>
<tr>
<td>MB991006 Preload socket</td>
<td>CT-1108</td>
<td>Measurement of the pinion shaft preload</td>
</tr>
<tr>
<td>MB991204 Torque wrench socket</td>
<td>S6161 (Snap-on tool)</td>
<td>Removal and installation of the rack support cover</td>
</tr>
<tr>
<td>MB990925 Bearing and oil seal installer set</td>
<td>General service tool (Use universal driver set)</td>
<td>Installation of oil seal and bearing</td>
</tr>
<tr>
<td>MB991120 Needle bearing puller</td>
<td>General service tool (Use brass punch or other suitable means)</td>
<td>Removal of rack housing needle bearing</td>
</tr>
<tr>
<td>Tool number and tool name</td>
<td>Replaced by Miller tool number</td>
<td>Application</td>
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<tr>
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<td>-------------</td>
</tr>
<tr>
<td>MB991 199 Oil seal installer</td>
<td>General service tool</td>
<td>To press in the oil seal for the rack</td>
</tr>
<tr>
<td>MB991 197 Bar (long type)</td>
<td>General service tool</td>
<td>To press in the oil seal for the rack</td>
</tr>
<tr>
<td>MB991 202 Oil seal and bearing installer</td>
<td>General service tool</td>
<td>Press-fitting of rack housing bearing</td>
</tr>
<tr>
<td>MB990941 Torque tube bearing installer</td>
<td>General service tool</td>
<td>Installation of valve housing oil seal</td>
</tr>
<tr>
<td>MB991 203 Oil seal and bearing installer</td>
<td>General service tool</td>
<td>Installation of valve housing oil seal and housing</td>
</tr>
<tr>
<td>MB900776 Front axle base</td>
<td>MB990776-A</td>
<td>Installation of the dust cover</td>
</tr>
<tr>
<td>MB990803 Steering wheel puller</td>
<td>DT-1 00 1 -A 7591</td>
<td>Removal of steering wheel</td>
</tr>
<tr>
<td>MB991213 Rack installer</td>
<td>General service tool (Use vinyl tape to protect seal)</td>
<td>Rack installation</td>
</tr>
</tbody>
</table>
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.
**PRECISION STEERING WHEEL CENTERING**

In general, the tie rods are adjusted to steer the front wheels in the same direction that the steering wheel is off center. If the steering wheel is off center to the left, center it by adjusting the tie rods to make the front wheels steer toward the left, and vice versa.

1. Mark the tie rods and tie rod ends with chalk before loosening the lock nuts.
2. Hold the tie rod with a wrench and loosen the lock nut.
3. Hold the tie rod end with a wrench and turn the tie rod the desired number of turns.
   
   **For 2" or 6 mm (.25 in.) at the steering wheel rim 1/5 turn of tie rods**

4. Tighten the lock nut to specified torque, taking care not to turn the tie rod.
STATIONARY STEERING EFFORT CHECK

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

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**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>When belt tension is inspected</td>
<td>6.0 – 9.0 mm (.24 -.35 in.)</td>
</tr>
<tr>
<td>When belt tension is readjusted</td>
<td>7.0 mm (.28 in.)</td>
</tr>
<tr>
<td>When new belt is installed</td>
<td>4.0 – 5.0 mm (.16 -.20 in.)</td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>When belt tension is inspected</td>
<td>9.5 – 13.5 mm (.37 -.53 in.)</td>
</tr>
<tr>
<td>When belt tension is readjusted</td>
<td>10.5 – 12.5 mm (.41 -.49 in.)</td>
</tr>
<tr>
<td>When new belt is installed</td>
<td>17.5 – 9.0 mm (.30 -.35 in.)</td>
</tr>
</tbody>
</table>

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

Post-installation Operation
• Checking of Steering Wheel Position with Wheels
  Straight Ahead

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
11. Steering column assembly
12. Column support assembly

<Automatic transaxle vehicles>

Removal steps (Automatic transaxle vehicles)
1. Air bag module
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
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

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.

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

<Vehicles with 4WS>

1. Tie rod end locking nuts
2. Tie rod ends
3. Dust shield
4. Bellows clips
5. Bellows bands
6. Bellows
7. Tab washers
8. Tie rods
9. Feed tubes
10. O-rings

Adjustment of total pinion torque

11. End plug
12. Self-locking nut
13. Locking nut
14. Rack support cover
15. Rack support spring
16. Rack support
17. Valve housing

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

19 Nm 16 ft.lbs.
22 Nm 16 ft.lbs.
50-55 Nm 36-40 ft.lbs.
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

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: 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

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

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

**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"

**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.

<table>
<thead>
<tr>
<th>No.</th>
<th>I.D. x Width</th>
<th>mm (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11 x 1.9</td>
<td>(.433 x .075)</td>
</tr>
<tr>
<td>2</td>
<td>13 x 1.9</td>
<td>(.512 x .075)</td>
</tr>
<tr>
<td>3</td>
<td>17.8 x 2.4</td>
<td>(.701 x .094)</td>
</tr>
<tr>
<td>4</td>
<td>13.5 x 1.5</td>
<td>(.531 x .059)</td>
</tr>
<tr>
<td>5</td>
<td>3.8 x 1.9</td>
<td>(.150 x .075)</td>
</tr>
<tr>
<td>6</td>
<td>16.8 x 2.4</td>
<td>(.661 x .094)</td>
</tr>
</tbody>
</table>

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>

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
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.
## SPECIFICATIONS

### GENERAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Items</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power steering gear box</td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>Rack and pinion</td>
</tr>
<tr>
<td>Oil pump</td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>Vane type</td>
</tr>
<tr>
<td>Displacement cm³/rev. (cu.in./rev.)</td>
<td></td>
</tr>
<tr>
<td>Relief set pressure MPa (psi)</td>
<td></td>
</tr>
<tr>
<td>Rear oil pump</td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>Vane type</td>
</tr>
<tr>
<td>Displacement cm³/rev. (cu.in./rev.)</td>
<td></td>
</tr>
<tr>
<td>Relief set pressure MPa (psi)</td>
<td></td>
</tr>
<tr>
<td>Power cylinder</td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>Hydraulic double action type</td>
</tr>
<tr>
<td>Stroke mm (in.)</td>
<td>20.2 (.8) [one side 10.1 (.39)]</td>
</tr>
</tbody>
</table>

### SERVICE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Items</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard value</td>
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</tr>
<tr>
<td>Rear oil pump displacement</td>
<td>Approx. 1.0 (1.06)</td>
</tr>
<tr>
<td>at speedometer reading of 31 mph</td>
<td></td>
</tr>
<tr>
<td>(50 km/h) for 30 seconds dm³ (qts.)</td>
<td></td>
</tr>
<tr>
<td>Power cylinder ball joint</td>
<td>0.5 (4) or less</td>
</tr>
<tr>
<td>rotation starting torque Nm (in.lbs.)</td>
<td></td>
</tr>
<tr>
<td>Power cylinder tie rod swing torque</td>
<td>9 – 55 (2 – 12) [0.5 – 3.0 (4 – 26)]</td>
</tr>
<tr>
<td>N (lbs.) [Nm (in.lbs.)]</td>
<td></td>
</tr>
<tr>
<td>Power cylinder slide resistance</td>
<td>67 (15) or less</td>
</tr>
<tr>
<td>N (lbs.)</td>
<td></td>
</tr>
</tbody>
</table>

### LUBRICANTS

<table>
<thead>
<tr>
<th>Items</th>
<th>Specified lubricant</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power steering fluid</td>
<td>MOPAR ATF PLUS (Automatic Transmission Fluid Type 7176)/Automatic transmission fluid “DEXRON” or “DEXRON II”</td>
<td>1.45 dm³ (1.53 qts.)</td>
</tr>
<tr>
<td>Dust cover</td>
<td>Silicone grease</td>
<td>As required</td>
</tr>
</tbody>
</table>

### SPECIAL TOOL

<table>
<thead>
<tr>
<th>Tool number and tool name</th>
<th>Replaced by Miller tool number</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>M B990993 Power steering oil</td>
<td>MB991 217-A</td>
<td>Measurement of fluid flow volume</td>
</tr>
<tr>
<td>pressure gauge adapter</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**TROUBLESHOOTING**

Before inspecting, check the following items:
- Ensure that the suspension has not been modified
- Tire and wheel size, specifications, air pressure, balance and amount of wear
- Steering wheel type
- Wheel alignment
- Oil pump drive belt tension
- Power steering fluid level, and air in the system
- Engine idle speed and even idle
- Oil leakage

<table>
<thead>
<tr>
<th>Malfunction symptom</th>
<th>Malfunctioning system</th>
<th>Inspection item</th>
</tr>
</thead>
<tbody>
<tr>
<td>4WS does not operate</td>
<td>Power cylinder</td>
<td>Tie rod swing torque</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Power cylinder slide resistance</td>
</tr>
<tr>
<td></td>
<td>Rear oil pump</td>
<td>Flow volume check</td>
</tr>
<tr>
<td></td>
<td>Control valve</td>
<td></td>
</tr>
<tr>
<td>Poor steering feeling</td>
<td>Steering gears and linkage</td>
<td>Rack cracks or deformation</td>
</tr>
<tr>
<td>Feeling of friction in steering</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor steering return</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steering wheel efforts excessive</td>
<td>Control valve</td>
<td>Oil leakage from control valve joint</td>
</tr>
<tr>
<td></td>
<td>Power cylinder</td>
<td>Oil leakage from piston rod</td>
</tr>
<tr>
<td></td>
<td>Oil line</td>
<td>Pressure hose breakage</td>
</tr>
<tr>
<td></td>
<td>Oil reservoir</td>
<td>Oil reservoir deformation or oil leakage</td>
</tr>
<tr>
<td>Rear wheels cannot be steered</td>
<td>Control valve</td>
<td>Stuck control valve spool</td>
</tr>
<tr>
<td>Poor rear wheels return</td>
<td>Power cylinder</td>
<td>Stuck power cylinder</td>
</tr>
<tr>
<td>Hydraulic pressure for rear wheel is constantly high</td>
<td>Rear oil pump</td>
<td>Relief valve remains open</td>
</tr>
<tr>
<td>Long rear wheel steering delay</td>
<td>Power cylinder</td>
<td>Excessive power cylinder friction</td>
</tr>
<tr>
<td>Poor steering response</td>
<td></td>
<td>Looseness in power cylinder tie rod ball joint</td>
</tr>
<tr>
<td>Poor steering range</td>
<td></td>
<td>Ball joint dust cover cracks</td>
</tr>
<tr>
<td>Poor rear wheel steering response</td>
<td>Control valve</td>
<td>Oil leakage from control valve spool</td>
</tr>
<tr>
<td>Poor rear wheel steering range</td>
<td>Power cylinder</td>
<td>Oil leakage from power cylinder</td>
</tr>
<tr>
<td>Poor steerability (extreme tire wear)</td>
<td>Rear oil pump</td>
<td>Extreme oil pump internal wear</td>
</tr>
<tr>
<td></td>
<td>Power cylinder</td>
<td>Tie rod length improperly adjusted after toe-in adjustment</td>
</tr>
</tbody>
</table>
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.
(11) Repeat step (10) several times to make sure that there is no more air in the system. Tighten the bleeder screw and remove the 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 dm³ (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
15 Nm
11 ft.lbs.

150 Nm
110 – 130 Nm
56 – 80 ft.lbs.

78 Nm
56 ft.lbs.

110 – 130 Nm
80 – 94 ft.lbs.

42 Nm
30 ft.lbs.

58 Nm
42 ft.lbs.

78 Nm
56 ft.lbs.

110 – 130 Nm
80 – 94 ft.lbs.
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.
DISASSEMBLY AND REASSEMBLY

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.

(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.
CONTROL VALVE
REMOVAL AND INSTALLATION

Pre-removal Operation
- Cleaning of Pippings 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.)

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.)

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.
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 (*).
<table>
<thead>
<tr>
<th>Element in Use at Each Position of Selector Lever</th>
<th>93</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydraulic Pressure Tests</td>
<td>103</td>
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MANUAL TRANSAXLE <FWD> - General Information

GENERAL INFORMATION

F5M33

- Clutch housing
- Bearing retainer
- 2nd speed gear
- 3rd speed gear
- 1st speed gear
- 3rd-4th speed synchronizer assembly
- 1st-2nd speed synchronizer assembly
- 4th speed gear
- Spacer
- 5th speed gear
- 5th speed synchronizer assembly
- Spacer
- Rear cover
- Reverse gear noise-prevention device
- Filter (Vehicles with DOHC-engine)
- 5th speed intermediate gear
- Intermediate gear
- Spacer
- Output shaft
- Transaxle case
- Differential drive gear
- Differential
- Spacer
- Drain plug

TFM0111
# SPECIFICATIONS

## GENERAL SPECIFICATIONS

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## SNAP RING (FOR ADJUSTMENT) AND SPACER

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#### LUBRICANTS

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<thead>
<tr>
<th>Items</th>
<th>Specified lubricant</th>
<th>Quantity dm³ (qts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual transmission oil</td>
<td>MOPAR Hypoid gear oil or equivalent API classification GL-4, SAE 75W-90 or 75W-85W</td>
<td>2.0 (2.1)</td>
</tr>
<tr>
<td>Drive shaft oil seal lip</td>
<td></td>
<td>As required</td>
</tr>
</tbody>
</table>
| Shift lever assembly  
  Shift lever bushing, Return spring | MOPAR Front Wheel Bearing Grease Part No. 3837794 or equivalent | As required |

#### SEALANTS AND ADHESIVES

<table>
<thead>
<tr>
<th>Items</th>
<th>Specified sealants and adhesives</th>
</tr>
</thead>
</table>
| 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

<table>
<thead>
<tr>
<th>Tool number and tool name</th>
<th>Replaced by Miller tool number</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>MB990635 Steering linkage puller</td>
<td>MB990635</td>
<td>- Disconnection of the coupling of the knuckle and lower arm ball joint</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Disconnection of the coupling of the knuckle and tie-rod end ball joint</td>
</tr>
<tr>
<td>MD998245 Lock pin installer</td>
<td>MD990245</td>
<td>Installation of spring pin and lock pin</td>
</tr>
<tr>
<td>MD998321 Oil seal installer</td>
<td>MD998321</td>
<td>Installation of input shaft oil seal</td>
</tr>
<tr>
<td>MD998325 Differential oil seal installer</td>
<td>MD998325</td>
<td>Installation of differential oil seal</td>
</tr>
<tr>
<td>MD998801 Bearing remover</td>
<td>P-334</td>
<td>Removal of gears and bearings of input shaft, intermediate shaft, output shaft and differential assembly</td>
</tr>
<tr>
<td>MD998802 Input shaft holder</td>
<td>MD998802</td>
<td>Installation and removal of input shaft and intermediate shaft lock nut</td>
</tr>
<tr>
<td>MD998808 Snap ring installer</td>
<td>MD998808-1</td>
<td>Installation of input shaft rear snap ring</td>
</tr>
<tr>
<td></td>
<td>MD998323</td>
<td></td>
</tr>
<tr>
<td>MD998812 Installer cap</td>
<td>-</td>
<td>Use with installer and installer adapter</td>
</tr>
<tr>
<td>Tool number and tool name</td>
<td>Replaced by Miller tool number</td>
<td>Application</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>MD998813 Installer-l 00</td>
<td></td>
<td>Use with installer cap and installer adapter</td>
</tr>
<tr>
<td>M D998816 Installer adapter (30)</td>
<td>L-4965</td>
<td>Installation of input shaft front bearing</td>
</tr>
<tr>
<td>MD998817 Installer adapter (34)</td>
<td>L-441 1</td>
<td>Installation of input shaft bearing sleeve</td>
</tr>
<tr>
<td>MD998818 Installer adapter (38)</td>
<td>c-371 7, L-441 1</td>
<td>Installation of gears, bearing and bearing sleeve of input shaft and intermediate shaft</td>
</tr>
<tr>
<td>M D998822 Installer adapter (46)</td>
<td>MD998306</td>
<td>Installation of differential case bearings</td>
</tr>
<tr>
<td>General service tool</td>
<td>General service tool</td>
<td>Removal of spring pin and lock pin</td>
</tr>
<tr>
<td>Universal punch</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## TROUBLESHOOTING

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vibration, noise</td>
<td>a. Loose or damaged transaxle and engine mounts</td>
<td>a. Tighten or replace mounts</td>
</tr>
<tr>
<td></td>
<td>b. Inadequate shaft end play</td>
<td>b. Correct end play</td>
</tr>
<tr>
<td></td>
<td>c. Worn of damaged gears</td>
<td>c. Replace gears</td>
</tr>
<tr>
<td></td>
<td>d. Use of inadequate grade of oil</td>
<td>d. Replace with specified oil</td>
</tr>
<tr>
<td></td>
<td>e. Low oil level</td>
<td>e. Replenish</td>
</tr>
<tr>
<td></td>
<td>f. Inadequate engine idle speed</td>
<td>f. Adjust idle speed</td>
</tr>
<tr>
<td>Oil leakage</td>
<td>a. Broken or damaged, oil seal or O-ring</td>
<td>a. Replace oil seal or O-ring</td>
</tr>
<tr>
<td>Hard shift</td>
<td>a. Faulty control cable</td>
<td>a. Replace control cable</td>
</tr>
<tr>
<td></td>
<td>b. Poor contact or wear of synchronizer ring and gear cone</td>
<td>b. Correct or replace</td>
</tr>
<tr>
<td></td>
<td>c. Weakened synchronizer spring</td>
<td>c. Replace synchronizer spring</td>
</tr>
<tr>
<td></td>
<td>d. Use of inadequate grade of oil</td>
<td>d. Replace with specified oil</td>
</tr>
<tr>
<td>Jumps out of gear</td>
<td>a. Worn gear shift fork or broken poppet spring</td>
<td>a. Replace shift fork or poppet spring</td>
</tr>
<tr>
<td></td>
<td>b. Synchronizer hub to sleeve spline clearance too large</td>
<td>b. Replace synchronizer hub and sleeve</td>
</tr>
</tbody>
</table>
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 TRANSMISSION 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>
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

**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.
TRANSMISSION 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

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
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 [10 mm] into the hole on the periphery of clutch housing and attach a spinner handle to the special tool.

(5) Remove the lock nut, while using the bolt as a spinner handle stopper.

48. 49. REMOVAL OF SPRING PINS

Remove the spring pins for 1st-2nd and 3rd-4th speed shift forks.
50. REMOVAL OF SHIFT RAIL ASSEMBLY

(1) Shift the 1st-2nd speed shift fork to the 2nd speed.
(2) Shift the 3rd-4th speed shift fork to the 4th speed.

(3) Remove the shift rail assembly.

INSPECTION
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. INSTALLATION OF LOCK NUTS

(1) Install the special tool to the splined end of input shaft.
(2) Screw a bolt [10 mm (.40 in.)] into the hole on the periphery of clutch housing and attach a spinner handle to the special tool.

(3) Shift the transaxle in reverse using control lever and select lever.
(4) Tighten the lock nut to specified torque, while using the bolt attached in the above step as a spinner handle stopper.
(5) Loosen the lock nuts.
(6) Retighten the lock nuts to the specified torque.
(7) Stake the lock nut.

14. INSTALLATION OF SPRING PIN

(1) Install the spring pin using the special tool or a pin punch.
   Caution
   Do not reuse the spring pins.

(2) When installing, make sure that the slit of the spring pin is aligned with the shift rail center line.

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
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

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

Lubricate all internal parts with gear oil during reassembly.
INSPECTION

SYNCHRONIZER SLEEVE AND HUB
- Combine the synchronizer sleeve and hub and check that they slide smoothly.
- Check that the sleeve is free from damage at its inside front and rear ends.
- Check for wear of the hub front end (surface in contact with the 5th speed gear).

Caution
When replacing, replace the synchronizer hub and sleeve as a set.

SYNCHRONIZER KEY AND SPRING
- Check for wear of the synchronizer key center protrusion.
- Check the spring for weakness, deformation and breakage.

SERVICE POINTS OF REASSEMBLY

5. INSTALLATION OF SYNCHRONIZER HUB / 4. SYNCHRONIZER KEY / 2. SYNCHRONIZER SPRING

(1) Assemble the synchronizer hub, and key noting their direction.

(2) Assemble the synchronizer spring so that its projection may be engaged in the groove of the synchronizer key.

NOTE
Take care to prevent the projections of the front and rear spring from sitting in the groove of the same key.
INPUT SHAFT ASSEMBLY
DISASSEMBLY AND REASSEMBLY

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

Lubricate all internal parts with gear oil during reassembly.
SERVICE POINTS OF DISASSEMBLY

1. REMOVAL OF TAPER ROLLER BEARING
   Remove the front bearing using the special tool as illustrated.

2. REMOVAL OF BEARING SLEEVE
   Remove the bearing sleeve using the special tool as illustrated.

4. REMOVAL OF TAPER ROLLER BEARING
   Remove the taper roller bearing together using the special tool as illustrated.

18. REMOVAL OF 3RD SPEED GEAR
   Remove the bearing sleeve, 3rd-4th speed synchronizer assembly and 3rd speed gear together using the special tool as illustrated.

INSPECTION

INPUT SHAFT
- Check the outer surface of the input shaft where the needle bearing is mounted for damage, abnormal wear and seizure [portion A].
- Check the splines for damage and wear.
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

Disassembly steps

1. Snap ring
2. Taper roller bearing
3. Bearing sleeve
4. 1st speed gear
5. Needle bearing
6. Synchronizer ring
7. Synchronizer spring
8. 1st-2nd speed synchronizer sleeve
9. Synchronizer key
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

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 1st-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 A].
- 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 1st-2nd speed synchronizer hub and sleeve as illustrated.
   (2) Assemble the synchronizer spring so that its projection may be engaged in the groove of the synchronizer key. 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 1st-2nd speed synchronizer assembly over the intermediate gear using the special tool.
   Caution
   1. When installing the synchronizer assembly, make sure that three synchronizer keys are seated correctly in respective grooves of the synchronizer ring.
   2. After installation of the synchronizer assembly, check that the 3rd speed gear rotates smoothly.
3. INSTALLATION OF BEARING SLEEVE
Install the 1st speed gear and bearing sleeve together over the intermediate gear using the special tool.

2. INSTALLATION OF TAPER ROLLER BEARING
Install the taper roller bearing over the intermediate using the special tool.
Caution
When installing the bearing, push the inner race only.

1. INSTALLATION OF SNAP RING
Select and install a snap ring that will result in an intermediate gear bearing end play that is the standard value.
Standard value: 0.01 – 0.14 mm (.004 – .006 in.)
OUTPUT SHAFT ASSEMBLY
DISASSEMBLY AND REASSEMBLY

Disassembly steps
1. Taper roller bearing
2. Taper roller bearing
3. Output shaft

Lubricate all internal parts with gear oil during reassembly.

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
5. Interlock plunger
6. 3rd-4th speed shift rail
7. Reverse shift lug

Lubricate all internal parts with gear oil during reassembly.

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

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 \(0.036-0.04\) 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 \(0.001 - 0.006\) 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

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.
CLUTCH HOUSING ASSEMBLY

DISASSEMBLY AND REASSEMBLY

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.
# SPECIFICATIONS

## GENERAL SPECIFICATIONS

<table>
<thead>
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<th>Specifications</th>
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## LUBRICANTS

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<td>Transfer oil seal</td>
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# SPECIAL TOOLS

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<tr>
<th>Tool number and tool name</th>
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<th>Application</th>
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<tbody>
<tr>
<td>MB990030 Installer adapter</td>
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<td>Installation of input shaft rear seal cap</td>
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<tr>
<td>MB990938 Installer bar</td>
<td>-</td>
<td>Use with MB990930</td>
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<tr>
<td>MD998304 Oil seal installer</td>
<td>MB990805</td>
<td>Installation of transfer extension housing oil seal</td>
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<tr>
<td>MD998325 Differential oil seal installer</td>
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<td>M D998803 Differential oil seal installer</td>
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<td>MD998812 Installer cap</td>
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<tr>
<td>M D998824 Installer adapter (50)</td>
<td>MD998909</td>
<td>Installation of transfer case oil seal</td>
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</table>
| 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 dm³ (2.5 qts.)
   - Transfer: 0.6 dm³ (.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.
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. Vacuum pipe
5. Clip
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

Hose clamp 4.0Nm 2.9 ft.lbs.

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

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

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
# AUTOMATIC TRANSAXLE – Specifications

## GENERAL SPECIFICATIONS

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## SERVICE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Items</th>
<th>Specifications</th>
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<tr>
<td>Standard value</td>
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<tr>
<td>Sleeve and selector lever assembly</td>
<td>15.2 – 15.9 (.598 – .625)</td>
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<td>end play</td>
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<tr>
<td>Transfer driven gear preload</td>
<td>0.075 – 0.135 (.0030 – .0053)</td>
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<tr>
<td>Low-reverse brake end play</td>
<td>1.0 – 1.2 (.0394 – .0472)</td>
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<tr>
<td>Input shaft end play</td>
<td>0.3 – 1.0 (.0118 – .0394)</td>
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<tr>
<td>Differential case preload</td>
<td>0.075 – 0.135 (.0030 – .0053)</td>
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<tr>
<td>Differential gear and pinion backlash</td>
<td>0.025 – 0.150 (.0010 – .0059)</td>
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<td>Oil pump side clearance</td>
<td>0.03 – 0.05 (.0012 – .0020)</td>
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<td>Output flange bearing end play</td>
<td>0 – 0.09 (0 – .0035)</td>
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<td>Front clutch end play</td>
<td>0.8 – 1.0 (.0315 – .0394)</td>
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<tr>
<td>Rear clutch end play</td>
<td>1.0 – 1.2 (.0394 – .0472)</td>
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<tr>
<td>End clutch end play</td>
<td>0.60 – 0.85 (.0236 – .0335)</td>
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# VALVE BODY SPRING IDENTIFICATION CHART

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<td>Regulator valve spring</td>
<td>1.4 (.055)</td>
<td>15 (.59)</td>
<td>52 (2.05)</td>
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<tr>
<td>1-2 shift valve spring</td>
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<td>7.6 (.299)</td>
<td>26.6 (1.047)</td>
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<tr>
<td>Pressure control valve spring</td>
<td>0.45 (.0177)</td>
<td>7.6 (.299)</td>
<td>21.3 (.839)</td>
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<tr>
<td>Rear clutch exhaust valve spring</td>
<td>0.7 (.028)</td>
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<td>End clutch valve spring</td>
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<td>6.6 (.260)</td>
<td>24.4 (.961)</td>
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<td>2-3 shift valve spring</td>
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<td>7.0 (.276)</td>
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<td>N-R control valve spring</td>
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<td>9.4 (.370)</td>
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<td>Reducing valve spring</td>
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<td>Line relief spring</td>
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<td>Torque converter valve spring</td>
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### SPACER AND SNAP RING

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<td>Spacer</td>
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<td>(for adjustment of transfer driven gear preload)</td>
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### AUTOMATIC TRANSAXLE – Specifications

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<tbody>
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<td><strong>Spacer</strong> (for adjustment of differential gear and pinion backlash)</td>
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<td>0.93 – 1.00 (0.0366–0.0394)</td>
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### LUBRICANTS

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<td>MOPAR ATF PLUS (Automatic transmission fluid type 7176) or Dia ATF SP or equivalent</td>
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<td>Drive shaft oil seal lip</td>
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<td>Transaxle control Slide lever, Cam lever</td>
<td>MOPAR Multi-mileage Lubricant Part No. 2525055 or equivalent</td>
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<tr>
<td>Selector lever assembly Bracket assembly, bushing, lever assembly, sleeve, spring, pushbutton</td>
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# SPECIAL TOOLS

<table>
<thead>
<tr>
<th>Tool number and tool name</th>
<th>Replaced by Miller tool number</th>
<th>Application</th>
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<tbody>
<tr>
<td>MB990635 Steering linkage puller</td>
<td>MB990635</td>
<td>• Disconnection of the coupling of the knuckle and lower arm ball joint &lt;br&gt;• Disconnection of the coupling of the knuckle and tie-rod end ball joint</td>
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<tr>
<td>M 8990934 Installer adapter</td>
<td>–</td>
<td>Installation of transaxle case outer race</td>
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<tr>
<td>MB990938 Installer bar</td>
<td>–</td>
<td>Use with MB990934</td>
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<tr>
<td>M D998266 Guide pin</td>
<td>M D998266</td>
<td>Alignment of intermediate plate and valve body</td>
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<tr>
<td>MD998303 Valve spring compressor</td>
<td>–</td>
<td>Removal of installation of kickdown servo</td>
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<td>MD998325 Differential oil seal installer</td>
<td>M D998325</td>
<td>Installation of differential oil seal</td>
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<tr>
<td>M D998330 Oil pressure gauge 3,000 kPa (400 psi)</td>
<td>E-3293</td>
<td>Measuring oil pressure</td>
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<td>M D998333 Oil pump remover</td>
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<td>Removal and installation of oil pump</td>
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<td>MD998335 Oil pump band</td>
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<td>MD998337 Spring compressor</td>
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<td>Disassembly and reassembly of front clutch and rear clutch</td>
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<td>MD998348 Bearing and gear puller</td>
<td>MD998056-A</td>
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<td>MD998800 Oil seal installer</td>
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<td>MD998801 Bearing remover</td>
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<td>Removal of bearing</td>
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| MD998812 Installer cap     |                                | • Use with installer adapter  
<pre><code>                          |                                | • Removal and installation of kick down servo |
</code></pre>
<p>| MD998822 Installer adapter (46) |                            | Installation of each bearing |</p>
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<th>Application</th>
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<tr>
<td>MD998825 Installer adapter (52)</td>
<td>—</td>
<td>Installation of each bearing</td>
</tr>
<tr>
<td>MD998829 Installer adapter (60)</td>
<td>—</td>
<td>Installation of each bearing</td>
</tr>
</tbody>
</table>
| MD998830 Installer adapter (66) | — | • Installation of each bearing  
• Removal and installation of kick down servo |
<p>| MD998905 Handle | MD998905 | Removal and installation of low/reverse brake piston |
| MD998907 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 |</p>
<table>
<thead>
<tr>
<th>Tool number and tool name</th>
<th>Replaced by Miller tool number</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>MD998919 Snap ring installer</td>
<td>MD998919</td>
<td>Reassembly of end clutch</td>
</tr>
<tr>
<td>MD999563 Oil pressure gauge 1,000 kPa (140 psi)</td>
<td>C-3292</td>
<td>Measuring oil pressure</td>
</tr>
<tr>
<td>MB991502 Scan tool (MUT-II)</td>
<td>DRB-II Scan tool</td>
<td>Checking of the diagnostic trouble code</td>
</tr>
<tr>
<td>MB991529 Diagnostic trouble code check harness</td>
<td>MB991529</td>
<td>Reading out of diagnostic trouble code by using a voltmeter</td>
</tr>
</tbody>
</table>
AUTOMATIC TRANSAXLE – Troubleshootina

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

<table>
<thead>
<tr>
<th>Problem</th>
<th>Driving impossible or abnormal</th>
<th>Possible start-off</th>
<th>Possible start-off</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Abnormal idling rpm</td>
<td>X</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>2 Performance malfunction</td>
<td>X</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>3 Improper adjustment of manual linkage</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>4 Malfunction of torque converter</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>5 Operation malfunction of oil pump</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>6 Malfunction of one-way clutch</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>7 Damaged or worn gear or other rotating part, or improper adjustment of the pump</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>8 Malfunction of parking mechanism</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>9 Cracked drive plate, or loose bolt</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>10 Worn inside diameter of front clutch retainer</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>11 Low fluid level</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>12 Line pressure too low (seal damaged, leakage, looseness, etc.)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>13 Malfunction of valve body (sticking valve, working cavity, adjustment, etc.)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>14 Malfunction of front clutch or piston</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>15 Malfunction of rear clutch or piston</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>16 Malfunction of kickdown band or piston</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>17 Improper adjustment of kickdown servo</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>18 Malfunction of low-reverse brake or piston</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>19 O-ring of low-reverse brake circuit between valve body and case not Installed</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>20 Malfunction of end clutch or piston (check ball hole, etc.)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>21 Malfunction of park/neutral position switch, damaged or disconnected wiring or improper adjustment</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>22 Malfunction of TPS, or improper adjustment</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>23 Pulse generator (A) damaged or disconnected wiring, or short-circuit</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>24 Pulse generator (B) damaged or disconnected wiring, or short-circuit</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>25 Malfunction of kickdown servovalve switch</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>26 SCSV A or B damaged or disconnected wiring, or short-circuit</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>27 Malfunction of ignition signal system</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>28 Incorrectly grounded ground strap</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>29 PCSV damaged or disconnected wiring, or short-circuit</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>30 PCSV damaged or disconnected wiring, or short-circuit</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>31 TCC solenoid damaged or disconnected wiring (valve open)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>32 TCC solenoid short-circuit or sticking (valve open)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>33 Malfunction of overdrive control switch</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>34 Malfunction of oil temperature sensor</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>35 Malfunction of lead switch</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>36 Poor contact of ignition switch</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>37 Malfunction of transaxle control module</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

**NOTE:** Indicates items of priority during inspection, PCSV = Pressure control solenoid valve, TPS = Throttle position sensor, TCC solenoid = Torque converter clutch solenoid, SCSV = Shift control solenoid valve, OD = Overdrive.
<table>
<thead>
<tr>
<th>Condition</th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
<th>4th</th>
<th>5th</th>
<th>6th</th>
</tr>
</thead>
<tbody>
<tr>
<td>Won't shift from 2nd to 3rd</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Won't shift to 4th</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Overdrive control switch doesn't function</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Doesn't shift according to shift pattern (shifting is possible)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Improper start-off (starts off from 2nd, etc.)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Excessive creeping or idling vibration</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Excessive vibration-shock when shift 1-2 or 3-4</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Excessive vibration-shock when shift 2-3 or 4-3</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Excessive vibration-shock during upshift</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Excessive vibration-shock during D-2 downshift</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Sudden engine rpm increase during upshift</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Sudden engine rpm increase during 3-2 shift, excessive vibration</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Excessive vibration-shock only when cold</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Excessive vibration-shock (other than already described)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Torque converter clutch won't function</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Abnormal vibration in high-load region in low gear (approx. 1 Hz)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Abnormal noise from converter housing together with engine rpm</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Mechanical noise (clatter noise) from converter housing</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Abnormal noise inside transaxle case</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>3rd gear is held</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Example of diagnostic trouble code output voltage waveform</th>
<th>Waveform when normal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waveform for diagnostic trouble code No. 24</td>
<td></td>
</tr>
</tbody>
</table>

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.
<table>
<thead>
<tr>
<th>Code No.</th>
<th>Display Pattern</th>
<th>Item</th>
<th>Remedial Action</th>
</tr>
</thead>
</table>
| 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). |
| 32      |                | Open-circuited pulse generator B | |
| 41      |                | Open-circuited shift control solenoid valve A | • Check solenoid valve connector.  
<p>|         |                |      | • Check shift control solenoid valve A on bench. |
| 42      |                | Short-circuited shift control solenoid valve A | |</p>
<table>
<thead>
<tr>
<th>Code No.</th>
<th>Display Pattern</th>
<th>Item</th>
<th>Remedial Action</th>
</tr>
</thead>
</table>
| 43      | UUUWL          | Open-circuited shift control solenoid valve B | ● Check solenoid valve connector.  
● Check shift control solenoid valve B on bench. |
| 44      | UUWL           | Short-circuited shift control solenoid valve B | |
| 45      | UUWL           | Open-circuited pressure control solenoid valve | ● Check solenoid valve connector.  
● Check pressure control solenoid valve on bench. |
| 46      | UUWL           | Short-circuited pressure control solenoid valve | |
| 47      | UUWL           | Open-circuited torque converter clutch solenoid | ● Check solenoid valve connector.  
● Check torque converter clutch solenoid on bench. |
| 48      | UUWL           | Short-circuited torque converter clutch solenoid | |
| 49      | UUWL           | Defective torque converter clutch system | ● Check torque converter clutch hydraulic circuit.  
● Check torque converter clutch solenoid on bench.  
● Replace control unit. |
| 51      | UUWL           | 1st gear incorrect ratio | ● Check connectors of pulse generators A and B.  
● Check pulse generators A and B on bench.  
● Rear clutch slipping |
| 52      | UUWL           | 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      | UUWL           | 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      | UUWL           | 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 |
###fail-safe code description

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Display Pattern</th>
<th>Item</th>
<th>Fail-safe</th>
<th>Related Self-Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>81</td>
<td></td>
<td>Open-circuited pulse generator A</td>
<td>Fixed at 3rd (D) or 2nd (2, L)</td>
<td>31</td>
</tr>
<tr>
<td>82</td>
<td></td>
<td>Open-circuited pulse generator B</td>
<td>Fixed at 3rd (D) or 2nd (2, L)</td>
<td>32</td>
</tr>
<tr>
<td>83</td>
<td></td>
<td>Open- or short-circuited shift control solenoid valve A</td>
<td>Fixed at 3rd</td>
<td>41, 42</td>
</tr>
<tr>
<td>84</td>
<td></td>
<td>Open- or short-circuited shift control solenoid valve B</td>
<td>Fixed at 3rd</td>
<td>43, 44</td>
</tr>
<tr>
<td>85</td>
<td></td>
<td>Open- or short-circuited pressure control solenoid valve</td>
<td>Fixed at 3rd (D) or 2nd (2, L)</td>
<td>45, 46</td>
</tr>
<tr>
<td>86</td>
<td></td>
<td>Incorrect gear ratio</td>
<td>Fixed at 3rd (D) or 2nd (2, L)</td>
<td>51, 52, 53, 54</td>
</tr>
</tbody>
</table>
### INSPECTION OF CONTROL SYSTEM

Check the control system by using the scan tool and following the procedure given below.

#### CONTROL SYSTEM INSPECTION TABLE

<table>
<thead>
<tr>
<th>Check Item</th>
<th>Description</th>
<th>Possible Cause of Trouble (or Remedy)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Throttle position sensor (TPS)</strong>&lt;br&gt;• Data list&lt;br&gt;• Item No. 11</td>
<td>Throttle position sensor (TPS) check&lt;br&gt;Accelerator pedal fully released&lt;br&gt;Accelerator pedal slowly depressed&lt;br&gt;Accelerator pedal fully depressed</td>
<td>• TPS is improperly adjusted if voltage is high when accelerator pedal is fully depressed or released.&lt;br&gt;• TPS or circuit harness is defective if there is no change.&lt;br&gt;• TPS or accelerator pedal cable is defective if change is not smooth.</td>
</tr>
<tr>
<td><strong>Oil temperature sensor</strong>&lt;br&gt;• Data list&lt;br&gt;• Item No. 15</td>
<td>Oil temperature sensor check&lt;br&gt;Cold engine (before start)&lt;br&gt;Engine warming up&lt;br&gt;After engine warming up</td>
<td>• Defective oil temperature sensor or circuit harness</td>
</tr>
<tr>
<td><strong>Kickdown servo switch</strong>&lt;br&gt;• Data list&lt;br&gt;• Item No. 21</td>
<td>Kickdown servo switch check&lt;br&gt;L range, idle&lt;br&gt;D range, 1st or 3rd speed&lt;br&gt;D range, 2nd or 4th speed</td>
<td>• Improperly adjusted kickdown servo&lt;br&gt;• Defective kickdown servo switch or circuit harness&lt;br&gt;• Defective kickdown servo</td>
</tr>
<tr>
<td><strong>Ignition signal line</strong>&lt;br&gt;• Data list&lt;br&gt;• Item No. 23</td>
<td>Ignition signal line check&lt;br&gt;N range, idle&lt;br&gt;N range, 2,500 rpm (tachometer reading)</td>
<td>• Defective ignition system&lt;br&gt;• Defective ignition signal pickup circuit harness</td>
</tr>
<tr>
<td><strong>Closed throttle position switch</strong>&lt;br&gt;• Data list&lt;br&gt;• Item No. 25</td>
<td>Closed throttle position switch check&lt;br&gt;Accelerator pedal fully released&lt;br&gt;Accelerator pedal slightly depressed</td>
<td>• Improperly adjusted TPS&lt;br&gt;• Defective TPS or circuit harness</td>
</tr>
<tr>
<td><strong>Air conditioning compressor clutch relay signal</strong>&lt;br&gt;• Data list&lt;br&gt;• Item No. 26</td>
<td>Air conditioning compressor clutch relay signal check&lt;br&gt;D range, air conditioning idle-up&lt;br&gt;D range, air conditioning idle OFF</td>
<td>• Defective air conditioning compressor clutch power relay ON signal detection circuit harness</td>
</tr>
<tr>
<td><strong>Transaxle gear position</strong>&lt;br&gt;• Data list&lt;br&gt;• Item No. 27</td>
<td>Transaxle gear position check&lt;br&gt;D range, idle&lt;br&gt;L range, idle&lt;br&gt;2 range, 2nd speed&lt;br&gt;D range, O/D OFF, 3rd speed&lt;br&gt;D range, O/D, 4th speed</td>
<td>• Defective TCM&lt;br&gt;• Defective accelerator pedal switch circuit&lt;br&gt;• Defective park/neutral position switch circuit&lt;br&gt;• Defective TPS circuit</td>
</tr>
<tr>
<td><strong>Pulse generator A</strong>&lt;br&gt;• Data list&lt;br&gt;• Item No. 31</td>
<td>Pulse generator A check&lt;br&gt;D range, stop&lt;br&gt;D range, 3rd speed, driven at 50 km/h (31 mph)&lt;br&gt;D range, 4th speed, driven at 50 km/h (31 mph)</td>
<td>• Defective pulse generator A or circuit harness&lt;br&gt;• Defective pulse generator A shielded wire&lt;br&gt;• External noise interference</td>
</tr>
<tr>
<td>Check Item</td>
<td>Description</td>
<td>Criteria</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Pulse generator B</td>
<td>D range, stop</td>
<td>0 rpm</td>
</tr>
<tr>
<td>• Data list</td>
<td>D range, 3rd speed, driven at 50 km/h (31 mph)</td>
<td>1,600 – 2,000 rpm</td>
</tr>
<tr>
<td>• Item No. 32</td>
<td>D range, 4th speed, driven at 50 km/h (31 mph)</td>
<td>1,600 – 2,000 rpm</td>
</tr>
<tr>
<td>Overdrive switch</td>
<td>Overdrive switch in ON position</td>
<td>OD</td>
</tr>
<tr>
<td>• Data list</td>
<td>Overdrive switch in OFF position</td>
<td>OD-OFF</td>
</tr>
<tr>
<td>• Item No. 35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power/economy select switch</td>
<td>Power pattern selected (including economy pattern control with low oil</td>
<td>Power</td>
</tr>
<tr>
<td>• Data list</td>
<td>temperature)</td>
<td></td>
</tr>
<tr>
<td>• Item No. 36</td>
<td>Economy pattern selected</td>
<td>Economy</td>
</tr>
<tr>
<td>Park/neutral position switch</td>
<td>Shifted to P range</td>
<td>P</td>
</tr>
<tr>
<td>• Data list</td>
<td>Shifted to R range</td>
<td>R</td>
</tr>
<tr>
<td>• Item No. 37</td>
<td>Shifted to N range</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>Shifted to D range</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>Shifted to 2 range</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Shifted to L range</td>
<td>L</td>
</tr>
<tr>
<td>Vehicle-speed reed switch</td>
<td>Vehicle stationary</td>
<td>0 km/h (0 mph)</td>
</tr>
<tr>
<td>• Data list</td>
<td>Driven at 30 km/h (19 mph)</td>
<td>30 km/h (19 mph)</td>
</tr>
<tr>
<td>• Item No. 38</td>
<td>Driven at 50 km/h (31 mph)</td>
<td>50 km/h (31 mph)</td>
</tr>
<tr>
<td>PCSV duty</td>
<td>D range, idle</td>
<td>50 – 70%</td>
</tr>
<tr>
<td>• Data list</td>
<td>D range, 1st speed</td>
<td>100%</td>
</tr>
<tr>
<td>• Item No. 45</td>
<td>D range, gear being shifted</td>
<td>Depends on conditions</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Torque converter clutch slip</td>
<td>D range, 3rd speed, 1,500 rpm (tachometer reading)</td>
<td>100 – 300 rpm</td>
</tr>
<tr>
<td>• Data list</td>
<td>D range, 3rd speed, 3,600 rpm (tachometer reading)</td>
<td>0 rpm</td>
</tr>
<tr>
<td>• Item No. 47</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TCC solenoid duty</td>
<td>D range, 3rd speed, 1,500 rpm (tachometer reading)</td>
<td>0%</td>
</tr>
<tr>
<td>• Data list</td>
<td>D range, 3rd speed, 3,500 rpm (tachometer reading)</td>
<td>Depends on loads</td>
</tr>
<tr>
<td>• Item No. 49</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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
27. Park/neutral position switch (P)
28. Park/neutral position switch (R)
29. Park/neutral position switch (N)
30. Park/neutral position switch (D)
31. Park/neutral position switch (2)
32. Park/neutral position switch (L)
33. Overdrive switch
34. Power mode signal
35. Power source (back up)
36. Vehicle-speed reed switch
37. Pulse generator B (PG-B)
38. Pulse generator B (PG-B)
39. Pulse generator A (PG-A)
40. Pulse generator A (PG-A)
41. Ground
42. Ignition pulse
**ELEMENT IN USE AT EACH POSITION OF SELECTOR LEVER**

<table>
<thead>
<tr>
<th>Selector lever position</th>
<th>Overdrive control switch</th>
<th>Shifting gear</th>
<th>Gear ratio</th>
<th>Engine start</th>
<th>Parking mechanism</th>
<th>Clutch</th>
<th>Brake</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>–</td>
<td>Neutral</td>
<td>–</td>
<td>Possible</td>
<td>–</td>
<td>C1</td>
<td>C2</td>
</tr>
<tr>
<td>R</td>
<td>–</td>
<td>Reverse</td>
<td>2.176</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>N</td>
<td>–</td>
<td>Neutral</td>
<td>–</td>
<td>Possible</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>D</td>
<td>ON</td>
<td>1st</td>
<td>2.551</td>
<td>–</td>
<td>–</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2nd</td>
<td>1.488</td>
<td>–</td>
<td>–</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3rd</td>
<td>1.000</td>
<td>–</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OD</td>
<td>0.685</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>•</td>
</tr>
<tr>
<td>D</td>
<td>OFF</td>
<td>1st</td>
<td>2.551</td>
<td>–</td>
<td>–</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2nd</td>
<td>1.488</td>
<td>–</td>
<td>–</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3rd</td>
<td>1.000</td>
<td>–</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>1st</td>
<td>2.551</td>
<td>–</td>
<td>–</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2nd</td>
<td>1.488</td>
<td>–</td>
<td>–</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>L</td>
<td>–</td>
<td>1st</td>
<td>2.551</td>
<td>–</td>
<td>–</td>
<td>•</td>
<td>•</td>
</tr>
</tbody>
</table>

**NOTE**
C1... Front clutch  
C2... Rear clutch  
C3... End clutch  
B1... Low reverse brake  
B2... Kickdown brake  
OWC... One way clutch

**SHIFT PATTERNS**

Two shift patterns are pre-stored in the control unit of this transaxle. One is the power pattern (for more powerful performance), and the other is the economy pattern (for improved fuel consumption and quieter operation). The driver can select and switch to the desired pattern by using the power/economy select switch on the center console. The solid lines shown in these shift patterns indicate up-shifts, and the broken lines indicate down-shifts. The reason why there is a difference between the shift points for 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

E range
<Vehicles with SOHC engine>

P range

![Graph showing throttle opening vs. transfer drive gear speed for the P range.]

E range

![Graph showing throttle opening vs. transfer drive gear speed for the E range.]

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INSPECTION OF ELECTRONIC CONTROL SYSTEM COMPONENTS

**4. Wiring**

- Based on the wiring diagram, check whether the continuity and grounding of each harness is OK.
  - Continuity
    - Normal
  - No continuity
    - Improper connection of connector, damaged or disconnected harness, or incorrect wiring connection.
    - Reconnect the connector; repair or replace the harness.

**2. Oil-temperature sensor**

- Vary the thermo-sensitive part temperature and check the resistance between terminals 1 and 2.
  - No continuity (resistance: \( \infty \))
    - Damaged or disconnected wiring
    - Replace the oil-temperature sensor
  - Changes of the resistance continuous and smooth.
    - Normal

1: Oil temperature sensor
2: Ground

TFA0821

**3. Throttle-position sensor (TPS)**

- 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.

Pulse generator terminals
1-2: pulse generator A
3-4: pulse generator B

215-275 Ω/20°C (68°F)

Normal

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.

Oscilloscope waveform

- Noise

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.

- 1,000 mVp-p or higher
  - 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.

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.

- 500 mVp-p or higher
  - 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.

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
  - 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.
      - Replace the PCSV.

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
  - 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.
  - Replace the SCSV.

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.

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.

Normal
9. Torque converter solenoid (TCC solenoid)

Solenoid valve connector terminals

1: PCSV
2: TCC solenoid
3: SCsu-A
4: SCsu-B

Connect 12 V between the transmission case and terminal 2; switch ON and OFF and check for operation noise.

Standard value: 13 Ω/20°C(68°F)

Resistance: too low or too high

Short-circuit, or damaged or disconnected wiring.

Replace the TCC solenoid.

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.

Noise exists.

Normal

*Sticking is usually at the release side.
10. Park/neutral position switch

- 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 22 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

Check for continuity between the kickdown servo switch terminal and the transaxle case.

- No continuity: Poor contact, or damaged or disconnected wiring.
  - Continuity exists: Replace the K/D servo switch.

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)
  - No continuity: Replace the K/D servo switch.

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
  - Consider the original TCM to be normal, and again check the sensors, wiring, etc.
  - Same problem (as before TCM exchange) occurs: Install a new TCM.
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

<table>
<thead>
<tr>
<th>No.</th>
<th>Select lever position</th>
<th>Engine speed rpm</th>
<th>Gear position</th>
<th>1 Reducing pressure</th>
<th>2 K/D brake pressure (application)</th>
<th>3 K/D brake pressure (release)</th>
<th>4 Front clutch pressure</th>
<th>5 Rear clutch pressure</th>
<th>6 End clutch pressure</th>
<th>7 Low-reverse brake pressure</th>
<th>8 Torque converter pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N</td>
<td>Idling Neutral</td>
<td>360 - 480</td>
<td>100 - 210 (14 - 30)</td>
<td>730 - 830 (104 - 118)</td>
<td>830 - 900 (118 - 128)</td>
<td>450 - 650 (64 - 92)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>D</td>
<td>Idling 2nd</td>
<td>360 - 480</td>
<td>830 - 900 (118 - 128)</td>
<td>450 - 650 (64 - 92)</td>
<td>830 - 900 (118 - 128)</td>
<td>450 - 650 (64 - 92)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>D (SW-ON)</td>
<td>Approx. 2,500</td>
<td>3rd</td>
<td>830 - 900 (118 - 128)</td>
<td>450 - 650 (64 - 92)</td>
<td>830 - 900 (118 - 128)</td>
<td>450 - 650 (64 - 92)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>D (SW-OFF)</td>
<td>Approx. 2,500</td>
<td>2nd</td>
<td>930 - 900 (118 - 128)</td>
<td>450 - 650 (64 - 92)</td>
<td>830 - 900 (118 - 128)</td>
<td>450 - 650 (64 - 92)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>Approx. 2,500</td>
<td>1st</td>
<td>360 - 480 (51 - 68)</td>
<td>830 - 900 (118 - 128)</td>
<td>300 - 450 (43 - 64)</td>
<td>830 - 900 (118 - 128)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>L</td>
<td>Approx. 1,000</td>
<td>Reverse</td>
<td>1,640 - 2,240 (233 - 319)</td>
<td>640 - 2,240 (233 - 319)</td>
<td>1,640 - 2,240 (233 - 319)</td>
<td>450 - 650 (64 - 92)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>R</td>
<td>Approx. 1,000</td>
<td>Reverse</td>
<td>1,000 (142) or more</td>
<td>1,000 (142) or more</td>
<td>1,000 (142) or more</td>
<td>450 - 650 (64 - 92)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE
(1) —: Indicates pressure is below 10 kPa (1.4 psi)
(2) SW-ON: OD switch in ON position.
(3) SW-OFF: OD switch in OFF position.
(4) ★: Pressure is not standard.
## Remedial Action to Take for Inadequate Hydraulic Pressure

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Possible cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>All line pressures are low (or high).</td>
<td>a. Plugged oil filter</td>
<td>a. Visually check oil filter and replace it if plugged.</td>
</tr>
<tr>
<td></td>
<td>b. Improperly adjusted regulator valve line pressure</td>
<td>b. Measure line pressure @ (K/D brake pressure) and readjust line pressure if it is out of specifications. Or, replace valve body assembly.</td>
</tr>
<tr>
<td></td>
<td>c. Defective valve body assembly</td>
<td>c. Replace valve body assembly.</td>
</tr>
<tr>
<td></td>
<td>d. Valve body left loose</td>
<td>d. Torque valve body clamp bolt and mounting bolt to specification.</td>
</tr>
<tr>
<td></td>
<td>e. Improper oil pump delivery pressure</td>
<td>e. Check oil pump gear side clearance and replace oil pump assembly as necessary.</td>
</tr>
<tr>
<td>Remarks: Line pressures are 2, 3, 4, 5, 6 and 7 shown on the Standard Hydraulic Pressure Table on the preceding page.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improper reducing pressure</td>
<td>a. Plugged reducing pressure circuit filter (L-shaped)</td>
<td>a. Disassemble valve body assembly to check filter and replace filter if it is plugged.</td>
</tr>
<tr>
<td></td>
<td>b. Improperly adjusted reducing pressure</td>
<td>b. Measure reducing pressure @ and readjust as necessary.</td>
</tr>
<tr>
<td></td>
<td>c. Defective valve body assembly</td>
<td>c. Replace valve body assembly.</td>
</tr>
<tr>
<td>Improper K/D brake pressure (application)</td>
<td>a. Defective seal ring @ and D-ring @ of K/D servo piston and seal ring @ of sleeve</td>
<td>a. Disassemble K/D servo and check seal ring and D-ring for damage. Replace seal ring or D-ring if damaged or scratched.</td>
</tr>
<tr>
<td></td>
<td>b. Defective valve body assembly</td>
<td>b. Replace valve body assembly.</td>
</tr>
<tr>
<td>Improper K/D brake pressure (release)</td>
<td>a. Defective seal ring @ and D-ring @ of K/D servo piston and seal ring @ of sleeve</td>
<td>a. Disassemble K/D servo and check seal ring and D-ring for damage. Replace seal ring or D-ring if damaged or scratched.</td>
</tr>
<tr>
<td></td>
<td>b. Defective valve body assembly</td>
<td>b. Replace valve body assembly.</td>
</tr>
<tr>
<td>Improper front clutch pressure</td>
<td>a. Defective seal ring @ and D-ring @ of K/D servo piston and seal ring @ of sleeve</td>
<td>a. Disassemble K/D servo and check seal ring and D-ring for damage. Replace seal ring or D-ring if damaged or scratched.</td>
</tr>
<tr>
<td></td>
<td>b. Defective valve body assembly</td>
<td>b. Replace valve body assembly.</td>
</tr>
<tr>
<td></td>
<td>c. Worn front clutch piston and retainer or defective D-ring @ or seal ring @</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>b. Defective valve body assembly</td>
<td></td>
</tr>
<tr>
<td>Improper rear clutch pressure</td>
<td>a. Defective D-ring @ of piston, seal ring @ of retainer, and seal ring @ of D-ring @ of input shaft</td>
<td>a. Disassemble rear clutch and check input shaft D-ring, center support seal ring, and piston D-ring; replace if damaged or scratched.</td>
</tr>
<tr>
<td></td>
<td>b. Defective valve body assembly</td>
<td>b. Replace valve body assembly.</td>
</tr>
<tr>
<td>Improper end clutch pressure</td>
<td>a. Defective seal ring @, D-ring @, and oil seal @ of end clutch</td>
<td>a. Disassemble the end clutch and check piston oil seal, D-ring, and center support seal ring; replace if damage or scratches are evident.</td>
</tr>
<tr>
<td></td>
<td>b. Defective valve body assembly</td>
<td>b. Replace valve body assembly.</td>
</tr>
<tr>
<td>Improper low-reverse brake pressure</td>
<td>a. Damaged O-ring between valve body and transmission</td>
<td>a. Remove valve body assembly and check O-ring on top of upper valve body; replace if damage or scratches are evident.</td>
</tr>
<tr>
<td></td>
<td>b. Defective valve body assembly</td>
<td>b. Replace valve body assembly.</td>
</tr>
<tr>
<td></td>
<td>c. Defective D-ring @ of piston or O-ring @ of center support</td>
<td>c. Disassemble transaxle and check D-ring and O-ring; replace if damage or scratches are evident.</td>
</tr>
<tr>
<td>Improper torque converter pressure</td>
<td>a. Sticking torque converter clutch solenoid (TCC solenoid) or torque converter clutch control valve</td>
<td>a. Check torque converter clutch system and TCC solenoid for operation.</td>
</tr>
<tr>
<td></td>
<td>b. Plugged or leaky oil cooler and pipings</td>
<td>b. Repair or replace cooler or pipings.</td>
</tr>
<tr>
<td></td>
<td>c. Damaged seal ring @ of input shaft</td>
<td>c. Disassemble transaxle and check seal ring; replace if it is damaged.</td>
</tr>
<tr>
<td></td>
<td>d. Defective torque converter</td>
<td>d. Replace torque converter.</td>
</tr>
</tbody>
</table>
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)

TRANSAXLE CONTROL

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selector lever operation is stiff</td>
<td>Incorrect adjustment of sleeve</td>
<td>Adjust</td>
</tr>
<tr>
<td></td>
<td>Incorrect adjustment of control cable</td>
<td>Adjust</td>
</tr>
<tr>
<td></td>
<td>Excessive wear of detent plate</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Worn contact surfaces of pushbutton and</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>sleeve</td>
<td></td>
</tr>
<tr>
<td>Starter motor does not operate with the selector lever in the “N” or “P” position</td>
<td>Malfunction in park/neutral position switch</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Incorrect adjustment of control cable</td>
<td>Adjust</td>
</tr>
<tr>
<td></td>
<td>Malfunction of starter relay</td>
<td>Replace</td>
</tr>
<tr>
<td>Will not shift to 4-speed</td>
<td>Malfunction of OD switch</td>
<td>Replace</td>
</tr>
</tbody>
</table>
## A/T SAFETY-LOCK SYSTEM TROUBLESHOOTING

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable cause</th>
<th>Remedy</th>
<th>Ref. page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selector lever can be selected into R from P without depressing brake pedal with ignition key in a position other than LOCK.</td>
<td>Damaged lock cam B</td>
<td>Check and replace lock cam B.</td>
<td>21-120</td>
</tr>
<tr>
<td></td>
<td>Improperly adjusted shift lock cable, broken inner cable, loose or off connections</td>
<td>Check, adjust or replace the shift lock cable.</td>
<td>21-118</td>
</tr>
<tr>
<td></td>
<td>Broken or sagging outer cable (shift lock cable) return spring</td>
<td>Check and replace shift lock cable.</td>
<td>21-117</td>
</tr>
<tr>
<td>Selector lever cannot be selected into R from P by depressing brake pedal with ignition key in position other than LOCK.</td>
<td>Defective selector lever assembly</td>
<td>Check and replace selector lever assembly.</td>
<td>21-116</td>
</tr>
<tr>
<td></td>
<td>Sticking shift lock cable, key interlock cable, and transaxle control cable</td>
<td>Check and replace shift lock cable, key interlock cable, and transaxle control cable.</td>
<td>21-116</td>
</tr>
<tr>
<td></td>
<td>Foreign matter wedged in lock cams A and B</td>
<td>Check and adjust lock cams A and B.</td>
<td>21-120</td>
</tr>
<tr>
<td></td>
<td>Improperly adjusted shift lock cable, elongated inner cable</td>
<td>Check, adjust, and replace shift lock cable.</td>
<td>21-117</td>
</tr>
<tr>
<td></td>
<td>Sticking slide lever and cam lever inside key cylinder</td>
<td>Check and adjust slide lever and cam lever.</td>
<td>21-117</td>
</tr>
<tr>
<td>Selector lever can be selected into R from P when brake pedal is depressed even though the ignition key is in the LOCK position.</td>
<td>Damaged lock cam A</td>
<td>Check and replace lock cam A.</td>
<td>21-120</td>
</tr>
<tr>
<td></td>
<td>Broken or disconnected key interlock cable</td>
<td>Check and replace key interlock cable.</td>
<td>21-117</td>
</tr>
<tr>
<td></td>
<td>Damaged slide lever and cam lever inside key cylinder</td>
<td>Check and replace slide lever and cam lever.</td>
<td>21-117</td>
</tr>
<tr>
<td>Selector lever operation from P to R is not smooth.</td>
<td>Improperly adjusted key interlock cable</td>
<td>Check and adjust key interlock cable.</td>
<td>21-119</td>
</tr>
<tr>
<td></td>
<td>Improperly adjusted shift lock cable, elongated inner cable</td>
<td>Check, adjust, and replace shift lock cable.</td>
<td>21-117</td>
</tr>
<tr>
<td></td>
<td>Binding lock cams A and B (in rotation)</td>
<td>Check rotating parts of lock cams A and B.</td>
<td>21-120</td>
</tr>
<tr>
<td></td>
<td>Defective selector lever assembly</td>
<td>Check and replace selector lever assembly.</td>
<td>21-116</td>
</tr>
<tr>
<td></td>
<td>Binding slide lever inside key cylinder</td>
<td>Check slide lever and cam lever.</td>
<td>21-117</td>
</tr>
</tbody>
</table>
## AUTOMATIC TRANSAXLE – Troubleshooting

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable cause</th>
<th>Remedy</th>
<th>Ref. page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selector lever cannot be shifted from R to P.</td>
<td>Defective selector lever assembly</td>
<td>Check and replace selector lever assembly.</td>
<td>21-117</td>
</tr>
<tr>
<td>Improperly adjusted transaxle control cable</td>
<td></td>
<td>Adjust transaxle control cable.</td>
<td>21-118</td>
</tr>
<tr>
<td>Ignition key cannot be turned to LOCK position with selector lever in P.</td>
<td>Foreign matter wedged in lock cams A and B</td>
<td>Check and replace lock cams A and B.</td>
<td>21-120</td>
</tr>
<tr>
<td>Improperly adjusted key interlock cable, sticking inner cable</td>
<td></td>
<td>Check, adjust, and replace key interlock cable.</td>
<td>21-117</td>
</tr>
<tr>
<td>Binding slide lever inside key cylinder</td>
<td></td>
<td>Check slide lever.</td>
<td>21-117</td>
</tr>
<tr>
<td>Ignition key can be turned to LOCK position even with selector lever in position other than P.</td>
<td>Damaged lock cam A</td>
<td>Check and replace lock cam A.</td>
<td>21-120</td>
</tr>
<tr>
<td></td>
<td>Loose key cylinder cover</td>
<td>Check and retighten cover.</td>
<td>21-117</td>
</tr>
<tr>
<td></td>
<td>Broken key interlock cable, loose connections, elongated inner cable</td>
<td>Check and replace key interlock cable.</td>
<td>21-117</td>
</tr>
<tr>
<td></td>
<td>Damaged cam lever inside key cylinder</td>
<td>Check and replace cam lever.</td>
<td>21-117</td>
</tr>
<tr>
<td>Buzzer does not sound even when selector lever is placed in R position.</td>
<td>Defective buzzer</td>
<td>Check and replace buzzer.</td>
<td>21-117</td>
</tr>
<tr>
<td></td>
<td>Open-circuited buzzer circuit harness</td>
<td>Check or correct harness.</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>Defective park/neutral position switch</td>
<td>Check and replace park/neutral position switch.</td>
<td>21-101, 21-127</td>
</tr>
<tr>
<td></td>
<td>Improperly adjusted transaxle control cable</td>
<td>Adjust transaxle control cable.</td>
<td>21-114</td>
</tr>
</tbody>
</table>
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, slippery 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 2¾ 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
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)
+ 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
**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)
- 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.

(10) 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

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
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

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

<table>
<thead>
<tr>
<th>Switch position</th>
<th>Terminal</th>
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</thead>
<tbody>
<tr>
<td>ON (PWR)</td>
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<tr>
<td>OFF (ECO)</td>
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</tr>
<tr>
<td>ON (HOLD)</td>
<td></td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Switch position</th>
<th>Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON (Overdrive activation)</td>
<td>6 - 0</td>
</tr>
<tr>
<td>OFF (Overdrive non-activation)</td>
<td>0 - 0</td>
</tr>
</tbody>
</table>

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.)
<Vehicles without oil cooler>

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
10. Transaxle oil cooler

<Vehicles with oil cooler>

12Nm
8 ft.lbs.

5.0 Nm
4.0 ft.lbs.

4.0 Nm
2.9 ft.lbs.

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.)
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

**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.

**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
(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.
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.
(53) Remove the transfer shaft.

(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.
(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.

(5) Install the output bearing retainer and tighten bolts to specification.
(6) Loosen the bolts and remove the output bearing retainer.

(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.

(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.

(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

<table>
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</table>
(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.
(51) Place 10 mm-long (.39 in.), 1.6 mm-dia. (.06 in.) solders at the locations shown of the differential rear bearing retainer and install the outer race.

(52) Install the differential rear bearing retainer and tighten bolts to specification.

(53) Loosen the bolts, remove the differential rear bearing retainer, and remove the solders. If the solders are not crushed, use larger dia. (3 mm or .12 in.) solders to repeat steps (51) to (53).

(54) Measure the thickness of the solders crushed with a micrometer and select a spacer to obtain the specified end play and preload.

**Standard value:**

- Front differential case preload
  - 0.075 – 0.135 mm (.003 – .0053 in.)

(55) Fit a new O-ring to the differential rear bearing retainer, apply ATF, and mount the retainer to the transaxle case before torquing the bolts to specification.

(56) Mount the front bearing cap and tighten bolts to specification. 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.

\[
\begin{align*}
\text{Bolt A} &= 18 \text{ mm (.71 in.)} \\
\text{Bolt B} &= 25 \text{ mm (.98 in.)} \\
\text{Bolt C} &= 40 \text{ mm (1.57 in.)}
\end{align*}
\]

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
1. Bearing
2. Transfer shaft
3. Bearing

Lubricate all internal parts with automatic transmission fluid during reassembly.

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.

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.
Lubricate all internal parts with automatic transmission fluid during reassembly.

Snap ring
2. Clutch reaction plate
3. Clutch plate
4. Clutch disc
5. Clutch pressure plate
6. Snap ring
7. Return spring
8. Front clutch piston
9. D-ring
10. D-ring
11. Front clutch retainer
SERVICE POINT OF DISASSEMBLY

6. REMOVAL OF SNAP RING

(1) Compress the return spring with the special tool.
(2) Remove the snap ring.

SERVICE POINTS OF REASSEMBLY

6. INSTALLATION OF SNAP RING

(1) Compress the return spring with the special tool.
(2) Install the snap ring.

5. INSTALLATION OF CLUTCH PRESSURE PLATE / 3. CLUTCH PLATE / 2. CLUTCH REACTION PLATE

(1) When installing the clutch pressure plate, clutch plate, and clutch reaction plate, align the areas where one tooth is missing [indicated by A].

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 (11 lbs.) force. If clearance is out of standard value, select a snap ring to obtain the standard value.

Standard value: 0.8 – 1.0 mm (.032 – .039 in.)
Disassembly and Reassembly

Disassembly steps:
1. Seal ring
2. Input shaft
3. O-ring
4. Snap ring
5. Thrust race
6. Seal ring
7. Snap ring
8. Clutch reaction plate
9. Clutch disc
10. Clutch plate
11. 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

Lubricate all internal parts with automatic transmission fluid during reassembly.
SERVICE POINT OF DISASSEMBLY

12. REMOVAL OF SNAP RING
   (1) Using the special tool, compress the return spring.
   (2) Using the snap ring pliers, remove the snap ring.

SERVICE POINTS OF REASSEMBLY

12. INSTALLATION OF SNAP RING
   (1) Using the special tool, compress the return spring.
   (2) Using the snap ring pliers, install the snap ring.

10. INSTALLATION OF CLUTCH PLATE / 8. CLUTCH REACTION PLATE
    Install the clutch plate and reaction plate so that the areas where one tooth is missing [indicated by A] are aligned with each other.
    NOTE
    This ensures that the automatic transmission fluid escapes well and the plate and disc are cooled efficiently.

7. SELECTION OF SNAP RING
    Check clearance between the snap ring and clutch reaction plate. To check the clearance, hold entire circumference of the clutch reaction plate down with 50 N (11 lbs.) force. If clearance is out of standard value, select a snap ring to obtain the standard value.
    Standard value: 1.0 – 1.2 mm (.034 – .047 in.)

2. INSTALLATION OF INPUT SHAFT
    Align the oil groove in the input shaft with the alignment mark on the rear clutch retainer.
END CLUTCH ASSEMBLY

DISASSEMBLY AND REASSEMBLY

Disassembly steps
1. Seal ring
2. Snap ring
3. Clutch reaction plate
4. Clutch disc
5. Clutch plate
6. Snap ring
7. Washer
8. Return spring
9. End clutch piston
10. Oil seal
11. D-ring
12. End clutch retainer
13. Oil seal

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.

Disassembly steps

1. Thrust bearing
2. Rivet
3. Waved washer
4. One-way clutch outer race
5. End plate
6. One-way clutch
7. End plate
8. Planet carrier

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. Transfer drive gear
- 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.)
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
- 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

Disassembly steps
1. O-ring
2. Kickdown servo
3. D-ring
4. Seal ring
5. Locknut
6. Kickdown servo rod
7. Kickdown servo piston

Lubricate all internal parts with automatic transmission fluid during reassembly.

LOW-REVERSE BRAKE
DISASSEMBLY AND REASSEMBLY

Disassembly steps
1. Low-reverse brake piston
2. D-ring
3. D-ring
4. Center support

Lubricate all internal parts with automatic transmission fluid during reassembly.
Lubricate all internal parts with automatic transmission fluid during reassembly.

Disassembly steps

1. Manual valve
2. Pressure control solenoid valve
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
16. Oil filter
17. Upper valve body sub-assembly
18. Steel ball
19. Teflon ball
20. N-D plate
21. Block
22. Upper separating plate
23. Intermediate plate
24. Front end cover
25. Pressure control spring
26. Pressure control valve
27. Torque converter control spring
28. Torque converter control valve
29. Adjusting screw
30. Regulator spring
31. Regulator valve
32. Shift control spring
  + 33. Stopper plate
34. Shift control plug
35. Rear clutch exhaust valve A
36. Rear clutch exhaust valve B
37. Rear clutch exhaust spring
38. 2-3/4-3 shift spring
39. 2-3/4-3 shift valve
40. Rear end cover
41. Shift control plug B
  + 42. Stopper plate
43. Shift control valve
44. 1-2 shift spring
45. 1-2 shift valve
46. Upper valve body

Lubricate all internal parts with automatic transmission fluid during reassembly.
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. TEFOLON 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.

<table>
<thead>
<tr>
<th>Solenoid valve</th>
<th>Wire color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shift control solenoid valve A</td>
<td>Orange</td>
</tr>
<tr>
<td>Shift control solenoid valve B</td>
<td>Yellow</td>
</tr>
<tr>
<td>Torque converter clutch solenoid</td>
<td>Red/Black</td>
</tr>
<tr>
<td>Pressure control solenoid valve</td>
<td>Blue</td>
</tr>
</tbody>
</table>
WHEELS AND TIRES

CONTENTS

SERVICE ADJUSTMENT PROCEDURES ........ 4
  Tire Inflation Pressure Check ............. 4
  Tire Wear Check .................................. 4
  Wheel Runout Check .............................. 4

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  General Specifications ......................... 2
  Service Specifications .......................... 2

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  Bald Spots
  Cracked Treads
  Feathered Edge
  Rapid Wear at Center
  Rapid Wear at Shoulders
  Scalloped Wear
  Wear on One Side

WHEEL AND TIRE .................................. 4
## SPECIFICATIONS

### GENERAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Items</th>
<th>SOHC</th>
<th>DOHC &lt;Non-Turbo&gt;</th>
<th>DOHC &lt;Turbo&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tire size</td>
<td>205/65R15 94H</td>
<td>225/55R16 93V</td>
<td>245/45ZR17</td>
</tr>
<tr>
<td>Wheel type</td>
<td>Polycast steel type, Aluminum type*</td>
<td>Aluminum type</td>
<td></td>
</tr>
<tr>
<td>Wheel size</td>
<td>15 x 6JJ, 15 x 6.5JJ*</td>
<td>16 x 8JJ</td>
<td>17 x 8.5J</td>
</tr>
<tr>
<td>Amount of wheel offset</td>
<td>mm (in.) 46 (1.8)</td>
<td>46 (1.8)</td>
<td>46 (1.8)</td>
</tr>
<tr>
<td>Tire inflation pressure</td>
<td>kPa (psi) 200 (29)</td>
<td>220 (32)</td>
<td>220 (32)</td>
</tr>
<tr>
<td>Front</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rear</td>
<td>180 (26)</td>
<td>200 (29)</td>
<td>200 (29)</td>
</tr>
<tr>
<td>Spare wheel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tire size</td>
<td>T125/50D16</td>
<td>T125/90D16</td>
<td>T135/80D17</td>
</tr>
<tr>
<td>Wheel size</td>
<td>16 x 4T</td>
<td>16 x 4T</td>
<td>17 x 4T</td>
</tr>
<tr>
<td>Amount of wheel offset</td>
<td>mm (in.) 46 (1.8)</td>
<td>46 (1.8)</td>
<td>46 (1.8)</td>
</tr>
<tr>
<td>Tire inflation pressure</td>
<td>kPa (psi) 420 (60)</td>
<td>420 (60)</td>
<td>420 (60)</td>
</tr>
</tbody>
</table>

**NOTE:**

*: Option

### SERVICE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Items</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limit</td>
<td></td>
</tr>
<tr>
<td>Wheel runout</td>
<td></td>
</tr>
<tr>
<td>Radial mm (in.)</td>
<td>1.0 or less (.04 or less)</td>
</tr>
<tr>
<td>Lateral mm (in.)</td>
<td>1.0 or less (.04 or less)</td>
</tr>
<tr>
<td>Tread depth of tire mm (in.)</td>
<td>1.6 (.06)</td>
</tr>
</tbody>
</table>
## TROUBLESHOOTING

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rapid wear at shoulders</td>
<td>Under-inflation or lack of rotation</td>
<td>Adjust the tire pressure</td>
</tr>
<tr>
<td>Rapid wear at center</td>
<td>Over-inflation or lack of rotation</td>
<td></td>
</tr>
<tr>
<td>Cracked treads</td>
<td>Under-inflation</td>
<td></td>
</tr>
<tr>
<td>Wear on one side</td>
<td>Excessive camber</td>
<td>Inspect the camber</td>
</tr>
<tr>
<td>Feathered edge</td>
<td>Incorrect toe-in</td>
<td>Adjust the toe-in</td>
</tr>
<tr>
<td>Bald spots</td>
<td>Unbalanced wheel</td>
<td>Adjust the unbalanced wheels</td>
</tr>
</tbody>
</table>
| 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 ........................................................................................................... 23A

SUPPLEMENTAL RESTRAINT SYSTEM (SRS) .............................................. 23B
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 (*).
### GENERAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Items</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hood</strong></td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>Rear hinged, front opening type (with gas damper)</td>
</tr>
<tr>
<td><strong>Door</strong></td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>Front-hinged, sashless</td>
</tr>
<tr>
<td>Regulator system</td>
<td>Wire type</td>
</tr>
<tr>
<td>Locking system</td>
<td>Pin-fork type</td>
</tr>
<tr>
<td><strong>Liftgate</strong></td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>Inner-hinged, with gas damper</td>
</tr>
<tr>
<td><strong>Glass installation method</strong></td>
<td></td>
</tr>
<tr>
<td>Windshield glass</td>
<td>Adhesive type</td>
</tr>
<tr>
<td>Quarter window glass</td>
<td>Adhesive type</td>
</tr>
<tr>
<td>Liftgate window glass</td>
<td>Adhesive type</td>
</tr>
<tr>
<td><strong>Glass thickness mm (in.)</strong></td>
<td></td>
</tr>
<tr>
<td>Windshield glass</td>
<td>5.3 (.21)</td>
</tr>
<tr>
<td>Liftgate window glass</td>
<td>3.5 (.14)</td>
</tr>
<tr>
<td>Door glass</td>
<td>5.0 (.20)</td>
</tr>
<tr>
<td>Quarter window glass</td>
<td>3.5 (.14)</td>
</tr>
<tr>
<td><strong>Power window motor</strong></td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>Permanent magnet type (Built-in circuit breaker)</td>
</tr>
<tr>
<td>Revolutions under no load rpm</td>
<td>75 or more</td>
</tr>
<tr>
<td>Revolutions under load rpm</td>
<td></td>
</tr>
<tr>
<td>At 1 Nm (.72 ft.lbs.)</td>
<td>45 - 75</td>
</tr>
<tr>
<td>At 2 Nm (1.45 ft.lbs.)</td>
<td>50 - 80</td>
</tr>
<tr>
<td>Bound current A</td>
<td>34 or less</td>
</tr>
<tr>
<td>Direction of rotation</td>
<td>Clockwise and counter-clockwise</td>
</tr>
<tr>
<td><strong>Power window main switch</strong></td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>Automatic reset type</td>
</tr>
<tr>
<td>Rated load current A</td>
<td>10</td>
</tr>
<tr>
<td>Lock switch</td>
<td></td>
</tr>
<tr>
<td>Power window switch</td>
<td>10</td>
</tr>
<tr>
<td><strong>Power window sub switch</strong></td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>Automatic reset type</td>
</tr>
<tr>
<td>Rated load current A</td>
<td>10</td>
</tr>
<tr>
<td><strong>Power window relay</strong></td>
<td></td>
</tr>
<tr>
<td>Maximum contact current A</td>
<td>20</td>
</tr>
<tr>
<td>Rated coil current A</td>
<td>Max. 0.2</td>
</tr>
<tr>
<td>Voltage drop between terminals V</td>
<td>0.2 or less</td>
</tr>
<tr>
<td>(At 12 V and the rated load current)</td>
<td></td>
</tr>
</tbody>
</table>
### Item Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Door lock power relay</strong></td>
<td></td>
</tr>
<tr>
<td>Range of voltage used V</td>
<td>8816</td>
</tr>
<tr>
<td>Rated load current (at 13.5 V) A</td>
<td>10</td>
</tr>
<tr>
<td>Rated coil current A</td>
<td>0.2 or less</td>
</tr>
<tr>
<td>Voltage drop between terminals V</td>
<td>0.2 or less</td>
</tr>
<tr>
<td><strong>Door lock actuator</strong></td>
<td></td>
</tr>
<tr>
<td>Bound current (at 12 V) A</td>
<td>2.5 – 4.5</td>
</tr>
<tr>
<td>Operating voltage range V</td>
<td>9 - 15</td>
</tr>
<tr>
<td>*Tripping time (at 12 V) second</td>
<td>5 - 30</td>
</tr>
<tr>
<td><strong>Door mirror</strong></td>
<td></td>
</tr>
<tr>
<td>Printed heater lines</td>
<td></td>
</tr>
<tr>
<td>Working voltage V</td>
<td>10 – 15</td>
</tr>
<tr>
<td>Operating current A</td>
<td>3.5 or less</td>
</tr>
<tr>
<td>Resistance Ω</td>
<td>7.7 – 10.2</td>
</tr>
</tbody>
</table>

**NOTE**

*: Tripping time is the time consumed until current reaches 0.5 A after power connection

### SERVICE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Items</th>
<th>Standard value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Play of door inside handle mm (in.)</td>
<td>A (play)</td>
</tr>
<tr>
<td></td>
<td>7 (.28)</td>
</tr>
<tr>
<td></td>
<td>B (OPEN)</td>
</tr>
<tr>
<td></td>
<td>46 ± 9 (1.81 ± .35)</td>
</tr>
<tr>
<td></td>
<td>C (FULL)</td>
</tr>
<tr>
<td></td>
<td>69 (2.72)</td>
</tr>
<tr>
<td>Clearance of window glass to weatherstrip holder mm (in.)</td>
<td>Adjustment of glass inclination amount</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Adjustment of glass longitudinal inclination</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### LUBRICANTS

<table>
<thead>
<tr>
<th>Items</th>
<th>Specified lubricant</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>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</td>
<td>MOPAR Multipurpose Grease Part No. 2932524 or equivalent</td>
<td>As required</td>
</tr>
</tbody>
</table>
# SEALANTS AND ADHESIVES

<table>
<thead>
<tr>
<th>Items</th>
<th>Specified sealant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front fender panel</td>
<td>MOPAR Silicone Rubber Sealer Part No. 4026070 or equivalent</td>
</tr>
<tr>
<td>Splash shield</td>
<td>MOPAR Silicone Rubber Sealer Part No. 4026070 or Auto Glass Adhesive and sealer Part No. 2298825, or equivalent</td>
</tr>
<tr>
<td>Waterproof film</td>
<td>MOPAR Rope Caulk Sealer 3/16 x 80” roll Part No. 4026044 or equivalent</td>
</tr>
<tr>
<td>Windshield</td>
<td>3M SUPER FAST URETHAN 8609 or equivalent and 3M SUPER FAST URETHAN PRIMER 8608 or equivalent</td>
</tr>
<tr>
<td>Quarter window glass</td>
<td>3M ATD Part No. 8609 SUPER FAST URETHAN or equivalent 3M ATD Part No. 6382 or equivalent</td>
</tr>
<tr>
<td>Liftgate glass</td>
<td>3M ATD Part No. 8609 SUPER FAST URETHAN or equivalent 3M ATD Part No. 6382 or equivalent</td>
</tr>
<tr>
<td>Side protect moulding</td>
<td>3M ATD Part No. 6382 or equivalent</td>
</tr>
<tr>
<td>Side air dam</td>
<td>MOPAR Part No. 431803 or 4318032 or equivalent</td>
</tr>
<tr>
<td>Side garnish</td>
<td></td>
</tr>
<tr>
<td>Power seat adjuster assembly mounting bolt</td>
<td>MOPAR Part No. 431803 or 4318032 or equivalent</td>
</tr>
</tbody>
</table>
### SPECIAL TOOLS

<table>
<thead>
<tr>
<th>Tool number and tool name</th>
<th>Replaced by Miller tool number</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>MB900934 Door adjusting wrench</td>
<td>General service tool</td>
<td>Adjustment of door fit</td>
</tr>
<tr>
<td>MB990449 Window moulding remover</td>
<td>General service tool</td>
<td>Removal of window moulding</td>
</tr>
<tr>
<td>MB990784 Ornament remover</td>
<td>General service tool</td>
<td>Removal of mouldings and switches</td>
</tr>
<tr>
<td>MB990480 Window glass holder</td>
<td>General service tool</td>
<td>Removal and installation of window glass</td>
</tr>
<tr>
<td>MB991502 Scan tool (MUT-II)</td>
<td>DRB-II Scan tool</td>
<td>Checking the power-windows system and the central door-locking system (ETACS input check)</td>
</tr>
<tr>
<td>MB991529 Diagnostic trouble code check harness</td>
<td>MB991529</td>
<td>Checking the power-windows system and the central door-locking system (ETACS input check)</td>
</tr>
<tr>
<td>Symptom</td>
<td>Probable cause</td>
<td>Remedy</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>-----------------------------------------------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td><strong>Hood/Liftgate</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improper closure</td>
<td>Striker and latch not properly aligned</td>
<td>Adjust the alignment</td>
</tr>
<tr>
<td>Difficult locking and unlocking</td>
<td>Striker and latch not properly aligned</td>
<td>Adjust the alignment</td>
</tr>
<tr>
<td>Uneven body clearance</td>
<td>Incorrectly installed hood or liftgate</td>
<td>Adjust the installation of hood, deck lid or liftgate</td>
</tr>
<tr>
<td>Uneven height</td>
<td>Incorrect hood bumper height</td>
<td>Adjust the hood bumper, deck lid bumper or liftgate bumper height</td>
</tr>
<tr>
<td><strong>Window glass</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water leak through windshield</td>
<td>Defective seal</td>
<td>Fill sealant</td>
</tr>
<tr>
<td></td>
<td>Defective body flange</td>
<td>Correct</td>
</tr>
<tr>
<td>Water leak through door window</td>
<td>Incorrect window glass installation</td>
<td>Adjust position</td>
</tr>
<tr>
<td></td>
<td>Gap at upper window glass</td>
<td>Adjust position</td>
</tr>
<tr>
<td>Water leak through liftgate window</td>
<td>Defective seal</td>
<td>Fill sealant</td>
</tr>
<tr>
<td></td>
<td>Defective body flange</td>
<td>Correct</td>
</tr>
<tr>
<td><strong>Doors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Door window malfunction</td>
<td>Incorrect window glass installation</td>
<td>Adjust position</td>
</tr>
<tr>
<td></td>
<td>Damaged or faulty regulator</td>
<td>Correct or replace</td>
</tr>
<tr>
<td>Water leak through door edge</td>
<td>Cracked or faulty weatherstrip</td>
<td>Replace</td>
</tr>
<tr>
<td>Water leak from door center</td>
<td>Drain hole clogged</td>
<td>Remove foreign objects</td>
</tr>
<tr>
<td></td>
<td>Inadequate waterproof film contact or damage</td>
<td>Correct or replace</td>
</tr>
<tr>
<td>Door hard to open</td>
<td>Incorrect latch or striker adjustment</td>
<td>Adjust</td>
</tr>
<tr>
<td>Door does not open or close completely</td>
<td>Incorrect door installation</td>
<td>Adjust position</td>
</tr>
<tr>
<td></td>
<td>Defective door check strap</td>
<td>Correct or replace</td>
</tr>
<tr>
<td></td>
<td>-Door check strap and hinge required grease</td>
<td>Apply grease</td>
</tr>
<tr>
<td>Uneven gap between body</td>
<td>Incorrect door installation</td>
<td>Adjust position</td>
</tr>
<tr>
<td>Wind noise around door</td>
<td>Weatherstrip not holding firmly</td>
<td>Adjust fit of door</td>
</tr>
<tr>
<td></td>
<td>Improperly installed weatherstrip or setting of weatherstrip</td>
<td>Repair or replace</td>
</tr>
<tr>
<td></td>
<td>Improperly closed door</td>
<td>Adjust</td>
</tr>
<tr>
<td></td>
<td>Improperly fit door</td>
<td>Adjust</td>
</tr>
<tr>
<td></td>
<td>Improper clearance between door glass and door weatherstrip holder</td>
<td>Adjust</td>
</tr>
<tr>
<td></td>
<td>Deformed door</td>
<td>Repair or replace</td>
</tr>
</tbody>
</table>
HOW TO LOCATE WIND NOISES

1. Attach cloth tape to every place which might conceivably be the source of wind noise, such as panel seams, projections, moulding seams, glass and body seams, etc.

2. Then make a road test in order to determine that the places not covered by tape are not sources of wind noise.

3. Then remove the strips of tape one by one, making a road test after each is removed, until a wind noise source is discovered.

4. When such a place is found, cover it again and continue with the procedure so as to determine if there are any other noise sources.

5. If no others are found, the last remaining tape is the only source.

6. Cut the remaining piece of tape into smaller pieces, attach it again as it was before, and then remove the pieces one by one in the same way so as to narrow down the source.

7. Check to confirm that wind noise occurs when the last remaining tape is removed, and that noise does not occur when it is re-attached.

8. When the source(s) of the wind noise is finally located, attach butyl tape, body sealer or similar material to obstruct this source as much as possible.
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

<table>
<thead>
<tr>
<th>Phenomenon</th>
<th>Inspection method</th>
</tr>
</thead>
<tbody>
<tr>
<td>All door windows cannot be opened or closed.</td>
<td>* Check fusible link No. 9.</td>
</tr>
<tr>
<td></td>
<td>* Check the power-window relay.</td>
</tr>
<tr>
<td></td>
<td>* Check the power-window main switch.</td>
</tr>
<tr>
<td>One of the door windows cannot be opened or closed.</td>
<td>* Check the power-window main switch.</td>
</tr>
<tr>
<td></td>
<td>* Check the power-window motor for the power window that does not operate.</td>
</tr>
<tr>
<td>Either the power-window main switch or sub switch does not operate.</td>
<td>* Check the power-window switch for the power window that does not operate.</td>
</tr>
<tr>
<td>The one-touch down switch function only does not operate.</td>
<td>* Replace the power-window main switch.</td>
</tr>
<tr>
<td>The power windows do not operate when the ignition switch is at the “ON”</td>
<td>* Check the ignition switch input signal. (Refer to P.23A-11.)</td>
</tr>
<tr>
<td>position.</td>
<td>* Check the ignition switch. (Refer to GROUP 8 — Ignition Switch.)</td>
</tr>
<tr>
<td></td>
<td>* Check the power window relay. (Refer to P.23A-70.)</td>
</tr>
<tr>
<td>The power windows can be opened and closed immediately after the ignition</td>
<td>* Check the front door switch input signal. (Refer to P.23A-11.)</td>
</tr>
<tr>
<td>switch is switched “OFF”, but the power window operation does not stop if</td>
<td>* Check the front door switch. (Refer to P.23A-68.)</td>
</tr>
<tr>
<td>a front door is opened within 30 seconds.</td>
<td></td>
</tr>
<tr>
<td>The opening and closing operations of the power windows are possible after</td>
<td>* Check the power window relay. (Refer to P.23A-70.)</td>
</tr>
<tr>
<td>the timer operation time has elapsed when the ignition switch is set to the</td>
<td></td>
</tr>
<tr>
<td>“OFF” position.</td>
<td></td>
</tr>
</tbody>
</table>
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 connecting or disconnecting the scan tool.

(2) Perform ON/OFF operation of each switch. If the buzzer of the scan tool sounds once, the ECU input signal sent from the corresponding switch circuit system is normal.

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 WITHOUT POWER WINDOW
*2: VEHICLES WITH POWER WINDOW
KEYLESS CONTROL UNIT

E-37

DOOR SWITCH

(RH) (LH)

ETACS UNIT

C-6S

FUSIBLE LINK (6)

IOD OR STORAGE CONNECTOR

DATA LINK CONNECTOR

C-79

VEHICLES WITHOUT THEFT-ALARM SYSTEM

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

<table>
<thead>
<tr>
<th>Phenomenon</th>
<th>Inspection method</th>
</tr>
</thead>
<tbody>
<tr>
<td>One of the door lock actuators fails to operate.</td>
<td>• Check the door actuator which fails to operate.</td>
</tr>
<tr>
<td>No unlock operation can be made by pressing door lock knob after fulfillment of following conditions.</td>
<td>• Check the key reminder switch input signal.</td>
</tr>
<tr>
<td>@ Insertion of key in ignition switch (key reminder switch OFF)</td>
<td>• Check the key reminder switch: (Refer to GROUP 8– Ignition Switch.)</td>
</tr>
<tr>
<td>* Opening of door (door switch ON)</td>
<td>• Check the front door switch input signal.</td>
</tr>
<tr>
<td></td>
<td>• Check the front door switch: (Refer to P.23A-68.)</td>
</tr>
</tbody>
</table>

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

FUSIBLE LINK (6)

C-38 5-W.B.
J/B
C-78 12

0.656
R-B

DOOR LOCK POWER RELAY 2
E-38

DOOR LOCK POWER RELAY 1
C-04X

UNLOCK
OFF
ON
OFF
ON

Y-B
BR-W

L-R
L-B
L-Y

DOOR LOCK SWITCH (LH)
E-34

DOOR LOCK ACTUATOR (LH)
E-11

DOOR LOCK ACTUATOR (RH)
E-12

VEHICLES WITHOUT POWER WINDOW
VEHICLES WITH POWER WINDOW

E-01
CIRCUIT DIAGRAM (CONTINUED)

- Fusible Link (6)
- Ignition Switch (ACC)
- Storage Connector
- Key Reminder Switch (Vehicles with Theft-Alarm)
- Dome Light
- Keyless Entry Control Unit
- Feeder Antenna
- Transmitter

Diagram includes various circuit components and connections.
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 switch 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.

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Signal</th>
<th>Conditions</th>
<th>Terminal voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Key reminder switch (vehicles with theft alarm)</td>
<td>ON (Key removed)</td>
<td>Battery positive voltage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OFF (Key installed)</td>
<td>o v</td>
</tr>
<tr>
<td>2</td>
<td>Door switch</td>
<td>All doors close (Door switch: OFF)</td>
<td>o v</td>
</tr>
<tr>
<td></td>
<td></td>
<td>One of doors open (Door switch: ON)</td>
<td>5 V</td>
</tr>
<tr>
<td>6</td>
<td>Door lock actuator (L.H.)</td>
<td>LOCK</td>
<td>5 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>UNLOCK</td>
<td>o v</td>
</tr>
<tr>
<td>9</td>
<td>Keyless entry control unit power source</td>
<td>Ignition switch (ACC or ON)</td>
<td>Battery positive voltage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ignition switch (OFF)</td>
<td>o v</td>
</tr>
<tr>
<td>10</td>
<td>Keyless entry control unit power source</td>
<td>Always</td>
<td>Battery positive voltage</td>
</tr>
<tr>
<td>11</td>
<td>Dome light</td>
<td>All doors close (Door switch: OFF)</td>
<td>o v</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dome light switch: OFF or ON</td>
<td>Battery positive voltage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dome light switch: DOOR</td>
<td>Battery positive voltage</td>
</tr>
<tr>
<td>12</td>
<td>Door lock output</td>
<td>To operate</td>
<td>o v</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not to operate</td>
<td>Battery positive voltage</td>
</tr>
<tr>
<td>13</td>
<td>Door unlock output</td>
<td>To operate</td>
<td>o v</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not to operate</td>
<td>Battery positive voltage</td>
</tr>
<tr>
<td>14</td>
<td>Drivers door unlock output</td>
<td>To operate</td>
<td>o v</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not to operate</td>
<td>Battery positive voltage</td>
</tr>
<tr>
<td>20</td>
<td>Ground</td>
<td>Always</td>
<td>o v</td>
</tr>
</tbody>
</table>
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 connecting or disconnecting the scan tool.
(2) Perform ON/OFF operation of each switch. If the buzzer of the scan tool sounds once, the ECU input signal sent from the corresponding switch circuit system is normal.

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.
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.
TENSION-REDUCER TYPE SEAT BELT

CIRCUIT DIAGRAM

- Fusible Link
- Ignition Switch (IG1)
- J/B
- 0 10A
- C-80
- FRONT SEAT BELT SWITCH (RH) (LH)
- E-24 E-26
- FRONT SEAT BELT SOLENOID (RH) (LH)
- E-14 E-20
- ETACS UNIT
- C-65
- C-34
- E-15
- FRONT SEAT BELT SOLENOID (RH) (LH)
- C-83

11: Vehicles without theft-alarm system
12: Vehicles with theft-alarm system

DATA LINK CONNECTOR C-79

DOOR SWITCH
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

<table>
<thead>
<tr>
<th>Phenomenon</th>
<th>Inspection method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some of the tension-reducers do not operates.</td>
<td>• Check dedicated fuse No. 1 and 19.</td>
</tr>
<tr>
<td></td>
<td>• Check the inoperative seat belt switch.</td>
</tr>
<tr>
<td></td>
<td>• Check the inoperative seat belt solenoid.</td>
</tr>
<tr>
<td>With the ignition switch in the ON position, the tension-reducer does not operate.</td>
<td>• Check the ignition switch input signal.</td>
</tr>
<tr>
<td></td>
<td>• Check the ignition switch. (Refer to GROUP 8 – Ignition Switch.)</td>
</tr>
<tr>
<td>Immediately after turning off the ignition switch, the tension-reducer is in operation.</td>
<td>• Check the door switch input signal.</td>
</tr>
<tr>
<td></td>
<td>• Check the door switch. (Refer to P.23A-68.)</td>
</tr>
</tbody>
</table>

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 connecting or disconnecting the scan tool.

2. Perform ON/OFF operation of each switch. If the buzzer of the scan tool sounds once, the ECU input signal sent from the corresponding switch circuit system is normal.

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.
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

<table>
<thead>
<tr>
<th>Problem</th>
<th>Check method</th>
</tr>
</thead>
<tbody>
<tr>
<td>The key-reminder warning doesn't sound.</td>
<td>• Check the door switch. (Refer to P.23A-68.)</td>
</tr>
<tr>
<td>The seat belt warning function is OK.</td>
<td></td>
</tr>
<tr>
<td>The seat belt warning also doesn't function.</td>
<td>• Check the buzzer. (Refer to P.23A-104.)</td>
</tr>
<tr>
<td>The seat belt warning doesn't function.</td>
<td>• Check the seat belt switch. (Refer to P.23A-104.)</td>
</tr>
<tr>
<td>The seat belt warning light flashes.</td>
<td></td>
</tr>
<tr>
<td>The seat belt warning light also does not function (and the key-reminder warning also does not function).</td>
<td>• Check the key-reminder switch. (Refer to GROUP 8 – Ignition Switch.)</td>
</tr>
<tr>
<td>The buzzer doesn't stop even though the driver's seat belt has been buckled.</td>
<td>• Check the seat belt switch. (Refer to P.23A-104.)</td>
</tr>
<tr>
<td>The seat belt warning light doesn't flash (the buzzer sounds).</td>
<td>• Check the light bulb.</td>
</tr>
<tr>
<td>The warning light does not flash and the warning buzzer also does not sound.</td>
<td>• Check the ignition switch input signal. (Refer to P.23A-29.)</td>
</tr>
<tr>
<td>The warning light flashes, but the warning buzzer does not sound.</td>
<td>• Check the key-reminder switch. (Refer to GROUP 8 – Ignition Switch.)</td>
</tr>
<tr>
<td></td>
<td>• Check the seat belt switch. (Refer to P.23A-104.)</td>
</tr>
</tbody>
</table>
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 connecting or disconnecting the scan tool.
(2) Perform ON/OFF operation of each switch. If the buzzer of the scan tool sounds once, the ECU input signal sent from the corresponding switch circuit system is normal.

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.
**LIFTGATE ADJUSTMENT**

1. Loosen the liftgate hinges mounting bolts, and then adjust the liftgate by moving it so that the clearance is equal on all sides.

2. Turn the bumper to adjust the liftgate height.

3. Loosen the liftgate latch mounting bolts, and move the liftgate latch to adjust the attachment between the liftgate latch and liftgate striker.

**FUEL FILLER DOOR ADJUSTMENT**

Loosen the fuel filler door mounting screw and adjust the fuel filler door so that the clearance around the fuel filler door is even without any height differences.

**DOOR ADJUSTMENT**

1. Use the special tool to loosen the hinge mounting bolts on the body side, and then adjust the clearance around the door so that it is uniform on all sides.

2. If the door is not flush with the body, remove the spring pin from the door check, use the special tool to loosen the bolts for mounting the door hinges to the door. Move the door to adjust the door position along the body surface.

   **Caution**
   Attach protection tape to the fender edges where the hinge is installed.
3. If the door does not open freely, adjust the engagement of the striker with the door latch by means of the striker mounting shim and move the striker up and down or from side to side.

**DOOR WINDOW GLASS ADJUSTMENT**

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.

<table>
<thead>
<tr>
<th>Adjustment of Inward Tilt of Glass</th>
<th>Adjustment Procedures</th>
<th>Standard Value</th>
<th>mm (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjust by turning the adjusting bolts of the glass guide front track and glass guide rear track.</td>
<td></td>
<td>Section A-A</td>
<td>Section B-B</td>
</tr>
<tr>
<td>Caution</td>
<td>Turn the two adjusting bolts of the glass guide rear track same amount.</td>
<td>11.7 ± 1.0 ( (0.46 ± 0.04) )</td>
<td>11.8 ± 1.0 ( (0.46 ± 0.04) )</td>
</tr>
</tbody>
</table>

| 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. | 7.0 ± 1.0 \( (0.28 ± 0.04) \) | 7.7 ± 1.0 \( (0.30 ± 0.04) \) | 12.0 ± 1.0 \( (0.47 ± 0.04) \) |

**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

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)
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
17. Inspection light wiring harness
18. Hood gas spring
19. Hood
20. Hood hinge

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.
INSPECTION

HOOD SWITCH
Check the continuity between the terminal.

<table>
<thead>
<tr>
<th>Terminal</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lid switch unpressed</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Lid switch depressed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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).

<table>
<thead>
<tr>
<th>Switch position</th>
<th>Terminal</th>
<th>1 (Connector terminal)</th>
<th>2 (Switch body)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td></td>
<td></td>
<td>O</td>
</tr>
<tr>
<td>OFF</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

SERVICE POINTS OF INSTALLATION

8. 7. 6. INSTALLATION OF BUMPER B, A
Install the bumpers as illustrated.
LIFTGATE
REMOVAL AND INSTALLATION

Adjustment
- Liftgate Adjustment
  (Refer to P.23A-31.)

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
- Liftgate gas spring
- 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) (Refer to P.23A-90.)
- Liftgate damper
- Liftgate opening weatherstrip

- Liftgate gas spring
- Connection for liftgate wiring harness
- Liftgate hinge
- Headlining (Refer to P.23A-95.)
- 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.)
14. Liftgate lock cylinder switch
15. Retainer
16. Liftgate lock cylinder

Caution
1. Never try to disassemble the liftgate gas spring or burn it.
2. Always bore a hole in the gas spring to release the interior gas before the spring is discarded.

INSPECTION
LIFTGATE LATCH SWITCH
(1) Unlock the liftgate latch.
(2) Check the continuity between the terminals.

<table>
<thead>
<tr>
<th>Terminal</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liftgate latch locked</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liftgate latch unlocked</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

LIFTGATE LOCK CYLINDER SWITCH
Check the continuity between the terminals.

<table>
<thead>
<tr>
<th>Terminal</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>When switch is pressed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>When switch is not pressed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.)

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

Grease:
MOPAR Multi-purpose Grease Part No. 2932524 or equivalent
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

<Small type>

44Nm
32 ft.lbs.

12
11
9
7
6
5
1

3

4

<Large type>

44 Nm
32 ft.lbs.

12
11
9
7
6
5
1

3

4

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
11. Bumper face assembly
12. Nuts
13. Bumper reinforcement assembly
DISASSEMBLY AND REASSEMBLY

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

Twist (+):
- 9. Pad
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

Removal steps

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

ECS control unit (Refer to GROUP 2B – ECS Control Unit.)

Pre-removal and Post-installation

Operation:
- Removal and Installation of Rear End Trim and Rear Side Trim
  (Refer to P.23A-90.)
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.
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
4. Quarter upper trim (Refer to P.23A-91.)
5. 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-91.)

Rear panel garnish removal steps
- Rear end 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
Garnishes and Mouldings

13Nm 9 ft.lbs.

18F0342

2.5 Nm 1.8 ft.lbs.

18F039

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
3. Drip moulding
4. Drip line weatherstrip (Refer to P.23A-81.)
5. Quarter upper trim (Refer to P.23A-91.)
6. Flow through garnish

Windshield moulding removal steps
3. Drip moulding
4. Windshield moulding (Refer to P.23A-56.)

Liftgate moulding removal
7. Liftgate moulding (Refer to P.23A-64.)

Side garnish removal
8. Side garnish
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

Front deck garnish removal steps
1. Wiper arm assembly
2. Front deck garnish

Drip moulding and flow through garnish removal steps
3. Drip moulding
4. Drip line weatherstrip (Refer to P.23A-81.)
5. Quarter upper trim (Refer to P.23A-91.)
6. Flow through garnish

Windshield moulding removal steps
3. Drip moulding
4. Windshield moulding (Refer to P.23A-56.)

Liftgate moulding removal
7. Liftgate moulding (Refer to P.23A-64.)

Side garnish removal
8. Side garnish
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

Front deck garnish removal steps
1. Wiper arm assembly
2. Front deck garnish

Drip moulding and flow through garnish removal steps
3. Drip moulding
4. Drip line weatherstrip (Refer to P.23A-81.)
5. Quarter upper trim (Refer to P.23A-91.)
6. Flow through garnish

Windshield moulding removal steps
3. Drip moulding
4. Windshield moulding (Refer to P.23A-56.)

Liftgate moulding removal
7. Liftgate moulding (Refer to P.23A-64.)

Side garnish removal
8. Side garnish
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 \[\Phi 0.8 \text{ mm (.03 in.)}\] 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.
(2) Using a resin spatula or gasket scraper, scrape off the pressure sensitive double-sided tape.
(3) If the pressure sensitive double-sided tape remains on the side garnish, repeat steps (1) and (2).

(4) Use cloth moistened with degreaser (MOPAR SUPER KLEEN or equivalent) to wipe the side garnish clean.
(5) Scrape old adhesive slightly.
   **Caution**
   Do not scrape off all old adhesive.

(6) Affix specified pressure sensitive double-sided tape to the side garnish.
   **Specified adhesive tape:** 3M ATD Part No. 6382 or equivalent

**Installation of Side Garnish**
(1) Remove strip paper from the pressure sensitive double-sided tape.
   **NOTE**
   Affix adhesive tape to the end of strip paper for ease of strip paper removal.

(2) With its clips and bolts aligned with the respective holes in the body, install the side garnish to the body.
   **NOTE**
   If it is hard to affix the pressure sensitive double-sided tape in winter, heat the application surface of the body and the adhesive surface of the side garnish before affixing the tape.
   
<table>
<thead>
<tr>
<th>Body</th>
<th>40 – 60°C (104 – 140°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Side</td>
<td>20 – 30°C (68 – 86°F)</td>
</tr>
</tbody>
</table>

(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.

Sealant:
MOPAR Silicon Rubber Sealer Part No. 4026070 or equivalent

Section A – A Fender panel

Sealant:
MOPAR Silicon Rubber Sealer Part No. 4026070 or Auto Glass Adhesive and sealer Part No. 2298825 or equivalent

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

- Battery tray
- Liftgate gas spring bracket
- Hood lock support
- Intercooler duct (RH)
- Intercooler duct (LH)
- Air guide duct
- Deck crossmember stay
- Rear floor side member
- Towing hook
- Rear end crossmember
- 18FO120
- 18FO121
- 18FO122
- 18FO119
- 18FO124
- 18FO125
- 18FO118
- 18FO117
**WINDOW GLASS**

**GENERAL**

For bonding of the windshield and liftgate glass, a single-liquid urethane adhesive is used.

### ADHESIVE AND RESERVE ITEMS

<table>
<thead>
<tr>
<th>Adhesive and Reserve Items</th>
<th>Applications</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Adhesive</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3M SUPER FAST URETHAN 8609</td>
<td></td>
<td>One cartridge</td>
</tr>
<tr>
<td>3M SUPER FAST URETHAN PRIMER 8608</td>
<td></td>
<td>As required</td>
</tr>
<tr>
<td><strong>Reserve items</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wire (dia. x length)</td>
<td>for cutting adhesive</td>
<td>Five pieces of wire</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.6 mm x 1 m</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(.02 in. x 3.3 ft.)</td>
</tr>
<tr>
<td>Adhesive gun</td>
<td>for adhesive application</td>
<td>One</td>
</tr>
<tr>
<td>MOPAR SUPER KLEEN</td>
<td>for cleaning jointing surfaces</td>
<td>As required</td>
</tr>
<tr>
<td>Wiping rags</td>
<td></td>
<td>As required</td>
</tr>
<tr>
<td>Sealer</td>
<td>for prevention of water leaks and gathering after adhesive application</td>
<td>Two</td>
</tr>
<tr>
<td>Glass holder</td>
<td></td>
<td>One</td>
</tr>
<tr>
<td>Windshield moulding</td>
<td></td>
<td>As required</td>
</tr>
<tr>
<td>(Service Part)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Window dam</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Service Part)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>As required</td>
</tr>
</tbody>
</table>
WINDSHIELD AND LIFTGATE GLASS INSTALLATION PROCEDURE

Removal of moulding

Removal of glass from body

(wire)

Body side

Glass side

When glass is reused

When glass is replaced

Cleaning bonding surface
Scoop out existing adhesive to less than 2 mm (.08 in) thick and clean bonding surface. Then dry 3 minutes or more.

Cleaning bonding surface
Scoop out existing adhesive completely and clean bonding surface. Then, dry 3 minutes or more.

Cleaning bonding surface
Clean the bonding surface and dry 3 minutes or more.

Applying primer
Apply primer amply on bonding surface and dry 3 minutes or more.

Bonding window dam
Apply the window dam to the glass along the reference position inside of the glass periphery.

Applying primer
Apply primer amply on bonding surface and dry 3 minutes or more.

Applying adhesive
Applying uniform coat of adhesive to the inside of glass periphery.

Installation of glass to body

Cleaning of attaching surface

Water test
(after about 30 minutes or more following installation)

If water leaks
Application of sealer

Installation of moulding.

Cleaning of glass and painted surface

Finish
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

Adhesive:
3M SUPER FAST URETHAN 8609 or equivalent
Primer:
3M SUPER FAST URETHAN PRIMER 8608 or equivalent
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.

(10) Degrease the body same way.

Caution
After degreasing, allow three minutes or more to dry well before next work. Do not touch the degreased surface.
SERVICE 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.
(6) After application of the adhesive, line up the matchmarks on the glass and body and force the glass lightly and evenly onto the body for complete fitting.

(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
REMVAL 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.)

Removal steps
1. Quarter window moulding and glass <Type 1> or Quarter window glass <Type 2>
2. Packing <Type 1>
3. Window dam

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 too 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 matchmarks on the glass and body and force the glass lightly and evenly onto the body for complete fitting.

(5) Remove adhesive from around and on the glass and body surfaces using a spatula and wipe the surfaces clean.

(6) After the work (installation of the glass), allow to stand until the adhesive hardens.

**Caution**
If an infrared lamp or other means are used for quicker hardening, keep the surface temperature 60°C (140°F) or lower.

(7) After about 30 minutes or more following bonding of the windshield glass to the body, check for water leaks.

**Caution**
1. If the vehicle is to be moved, do so gently.
2. When checking for water leaks, do not squeeze the hose end.
LIFTGATE GLASS

REMOVAL AND INSTALLATION

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
7. Liftgate 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.)

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 matchmarks on the glass and liftgate and force the glass lightly and evenly for complete fitting.
(7) Remove adhesive from around and on the glass and body surfaces using a spatula and wipe the surfaces clean.
(8) After the work (installation of the glass), allow to stand until the adhesive hardens.

Caution
If an infrared lamp or other means are used for quicker hardening, keep the surface temperature 60°C (140°F) or lower.

(9) After about 30 minutes or more following bonding of the liftgate glass to the tail gate, check for water leaks.

Caution
1. If the vehicle is to be moved, do so gently.
2. When checking for water leaks, do not squeeze the hose end.
DOOR ASSEMBLY
REMOVAL AND INSTALLATION

Adjustment
- Door Adjustment
(Refer to P.23A-30.)

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

Grease:
MOPAR Multi-purpose Grease Part No. 2932524 or equivalent
INSPECTION
DOOR SWITCH
Operate the switch, and check the continuity between the terminals.

<table>
<thead>
<tr>
<th>Switch position</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open (ON)</td>
<td>0</td>
<td>A</td>
<td>0</td>
</tr>
<tr>
<td>Depressed (OFF)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Position</th>
<th>Identification mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Door (LH)</td>
<td>WL</td>
</tr>
<tr>
<td>Door (RH)</td>
<td>WR</td>
</tr>
</tbody>
</table>

DOOR TRIM AND WATERPROOF FILM

REMOVAL AND INSTALLATION

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

Sealant:
MOPAR Rope Caulk Sealer 3/16 x 80" roll
Part No. 4026044 or equivalent
DOOR GLASS AND REGULATOR

REMOVAL AND INSTALLATION

SERVICE POINT OF REMOVAL

1. REMOVAL OF CLIP

Use a shop towel to remove the clip; and remove door window regulator handle.

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
  3. Door belt line outer weatherstrip (Refer to P.23A-61.)
  4. up stop
  5. Stabilizer inner front
  6. Stabilizer inner rear
  7. Delta sash
  8. Door window glass
  9. Door glass guide track front
  10. Door glass guide track rear
POWER WINDOW
REMOVAL AND INSTALLATION

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

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.
(3) Apply battery voltage to terminal 1, and check for continuity when terminal 3 is grounded.

<table>
<thead>
<tr>
<th>Terminal</th>
<th>1</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery voltage</td>
<td>O</td>
<td>O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuity no voltage</td>
<td>O</td>
<td>O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuity with voltage</td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Power window switch (normal)</th>
<th>Power window switch (lock)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>UP</td>
<td>OFF</td>
</tr>
<tr>
<td>Driver's side switch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Passenger's side switch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Switch position</th>
<th>Sub switch</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>UP</td>
<td>OFF</td>
</tr>
<tr>
<td>Sub switch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

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>**

<table>
<thead>
<tr>
<th>Switch position</th>
<th>Terminal No. 1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>L.H. side</strong></td>
<td>LOCK</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Neutral</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>UNLOCK</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>R.H. side</strong></td>
<td>LOCK</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Neutral</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>UNLOCK</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **<Vehicles with theft-alarm system only>**

<table>
<thead>
<tr>
<th>Switch position</th>
<th>Terminal No. 1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>L.H. side</strong></td>
<td>LOCK</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Neutral</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>UNLOCK</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>R.H. side</strong></td>
<td>LOCK</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Neutral</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>UNLOCK</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CENTRAL DOOR LOCKING SYSTEM
REMOVAL AND INSTALLATION

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

INSPECTION
DOOR LOCK ACTUATOR

(1) Place the rod in the LOCK position, apply the battery power to the terminal [(3) for driver’s side or (1) for passenger’s side] and check to see that when the terminal [(1) for driver’s side or (3) for passenger’s side] is grounded, the rod moves to the UNLOCK position.

(2) Then place the rod in the UNLOCK position, apply the battery power to the terminal [(1) for driver’s side or (3) for passenger’s side], and check to see that when the terminal [(3) for driver’s side or (1) for passenger’s side] is grounded, the rod moves to the LOCK position.

(3) Check to ensure that when the rod is placed in the UNLOCK position, there is a continuity between the terminals (2) and (4), and that when the rod is placed in the LOCK position, there is no continuity.
**DOOR LOCK SWITCH**

Check for continuity in accordance to the following connection table.

### <Vehicles with power window>

#### Power window main switch side

<table>
<thead>
<tr>
<th>Switch position</th>
<th>Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCK</td>
<td>7</td>
</tr>
<tr>
<td>OFF</td>
<td>6</td>
</tr>
<tr>
<td>UNLOCK</td>
<td>5</td>
</tr>
</tbody>
</table>

NOTE: ○○ indicates that there is continuity between the terminals.

#### Power window sub switch side

<table>
<thead>
<tr>
<th>Switch position</th>
<th>Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCK</td>
<td>4</td>
</tr>
<tr>
<td>OFF</td>
<td>6</td>
</tr>
<tr>
<td>UNLOCK</td>
<td>1</td>
</tr>
</tbody>
</table>

NOTE: ○○ indicates that there is continuity between the terminals.

### <Vehicles without power window>

#### Door lock switch

- **View A**

<table>
<thead>
<tr>
<th>Switch position</th>
<th>Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCK</td>
<td>3</td>
</tr>
<tr>
<td>OFF</td>
<td>2</td>
</tr>
<tr>
<td>UNLOCK</td>
<td>5</td>
</tr>
</tbody>
</table>

NOTE: ○○ 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.

<table>
<thead>
<tr>
<th>Terminal</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery voltage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuity no voltage</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Continuity with voltage</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

NOTE
(1) O---O indicates that there is continuity between the terminals.
(2) O---O indicates terminals to which battery voltage is applied.
KEYLESS ENTRY SYSTEM
REMOVAL AND INSTALLATION

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

INSPECTION
DOOR LOCK POWER RELAY 2 (FOR KEYLESS ENTRY SYSTEM)

(1) Check for continuity between terminals under the conditions described below.

<table>
<thead>
<tr>
<th>Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery voltage</td>
</tr>
<tr>
<td>Continuity no voltage</td>
</tr>
<tr>
<td>Continuity with voltage</td>
</tr>
</tbody>
</table>

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 operates normally. If not, repeat the steps (1) through (3).

**NOTE**

(1) In case there are two transmitters, register the code on the SET II side in the same manner as the SET I side. 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

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.

<table>
<thead>
<tr>
<th>Identification</th>
<th>color</th>
<th>Applicable side</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td></td>
<td>Left door</td>
</tr>
<tr>
<td>Orange</td>
<td></td>
<td>Right door</td>
</tr>
</tbody>
</table>
DOOR MIRROR
REMOVAL AND INSTALLATION

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.

<table>
<thead>
<tr>
<th>Connection</th>
<th>Battery</th>
<th>Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direction</td>
<td>(+)</td>
<td>(-) 2</td>
</tr>
<tr>
<td></td>
<td>(1)*</td>
<td>(2)*</td>
</tr>
<tr>
<td>I UP</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>DOWN</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>RIGHT</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>LEFT</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Left side</th>
<th>Right side</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direction</td>
<td>3 4 6 7 8</td>
<td>2 4 6 7 9</td>
</tr>
<tr>
<td>UP</td>
<td>○○○○○○</td>
<td>○○○○○○</td>
</tr>
<tr>
<td>DOWN</td>
<td>○○○○○○</td>
<td>○○○○○○</td>
</tr>
<tr>
<td>LEFT</td>
<td>0 0 0 0</td>
<td>0 0 0 0</td>
</tr>
<tr>
<td>RIGHT</td>
<td>○○○○○○</td>
<td>○○○○○○</td>
</tr>
</tbody>
</table>
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
3. Interior temperature sensor
4. Regulator cover
5. 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

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

Adhesive tape:
3M ATD Part No. 6382 or equivalent

Adhesive:
3M ATD Part No. 8609 SUPER FAST URETHAN or equivalent
## 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.

<table>
<thead>
<tr>
<th>Name</th>
<th>Symbol</th>
<th>Size mm (in.) (D x L)</th>
<th>Color</th>
<th>Shape</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tapping screw</td>
<td>A</td>
<td>5 x 16 (.20 x .63)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>5 x 30 (.20 x 1.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>4 x 12 (.16 x .47)</td>
<td>Black</td>
<td></td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>5 x 16 (.20 x .63)</td>
<td>Black</td>
<td></td>
</tr>
<tr>
<td></td>
<td>E</td>
<td>4 x 16 (.16 x .63)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nasher assembled screw</td>
<td>F</td>
<td>5 x 16 (.20 x .63)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>G</td>
<td>4 x 12 (.16 x .47)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Washer assembled bolt</td>
<td>H</td>
<td>6 x 16 (.24 x .63)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I</td>
<td>6 x 16 (.24 x .63)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>J</td>
<td>6 x 20 (.24 x .79)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>K</td>
<td>6 x 20 (.24 x .79)</td>
<td>Black</td>
<td></td>
</tr>
<tr>
<td></td>
<td>L</td>
<td>6 x 25 (.24 x .98)</td>
<td>Black</td>
<td></td>
</tr>
</tbody>
</table>

**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. Combination Meter bezel meter
12. Speaker or plug
13. Harness connector
14. Steering shaft mounting bolts
15. Instrument panel assembly

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
   - Combination gauge (Refer to Group 24 – Ventilators.)
8. Instrument panel wiring harness
FLOOR CONSOLE
REMOVAL AND INSTALLATION

I 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<br>
7. Console side cover<br>
8. Front console garnish
9. Manual transaxle shift lever knob
10. Front console assembly

DISASSEMBLY AND REASSEMBLY

Front console disassembly steps
1. A/T garnish <A/T>
2. M/T shift lever cover <M/T>
3. Ashtray
4. Cigarette lighter
5. Power seat switch
6. Front console
7. Front console bracket

Rear console disassembly steps
8. Plug
9. Console lid
10. Lock lever
11. Spring
12. Rear console
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>

Scuff plate
 Clip

Front pillar trim
 Clip

Quarter upper trim
 Headlining
 Rear roof rail trim
 Screw

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.

NOTE
(I) Location of metallic clip
(2) Location of resin clip

Rear side trim, rear end trim removal steps
1. Luggage compartment floor box (R.H.)
2. Luggage compartment floor box (L.H.)
3. Lid (R.H.)
4. Lid (L.H.)
5. Rear end trim
6. Screws
7. Floor mat mounting clip
8. High floor center board
9. Luggage compartment light connector connection
10. Rear side trim
<Liftgate>

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>
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

Removal steps

<Vehicles with sunroof>
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

<Standard type>

1. Head restraint

Front seat removal steps

2. Seat anchor covers
3. Seat mounting nut
4. Seat mounting bolt
5. Harness connector
6. Front seat assembly

Power seat switch removal steps

7. Front console assembly (Refer to P.23A-89.)
8. Power seat switch A

<Sporty type>

1. Head restraint

Front seat removal steps

2. Seat anchor covers
3. Seat mounting nut
4. Seat mounting bolt
5. Harness connector
6. Front seat assembly

Power seat switch removal steps

7. Front console assembly (Refer to P.23A-89.)
8. Power seat switch A

CAUTION: SRS
When removing and installing the floor console assembly, don’t allow any impact or shock to the SRS diagnosis unit.
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.

<table>
<thead>
<tr>
<th>Lumbar support</th>
<th>Side support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal No.</td>
<td>2</td>
</tr>
<tr>
<td>Switch position</td>
<td></td>
</tr>
<tr>
<td>PUSH (△)</td>
<td>○</td>
</tr>
<tr>
<td>OFF</td>
<td>○</td>
</tr>
<tr>
<td>RELEASE(V)</td>
<td>0</td>
</tr>
</tbody>
</table>

**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 forward tab of the front seat anchor cover to the front seat forward mounting bracket positively. Then rotate the cover in the direction of arrow to install the side tabs in the side holes of the bracket.

(2) Insert the rear side seat anchor cover (outer side) to the front seat rearward installation bracket, and then attach each tab of the seat anchor cover to the hole of the bracket.

(3) Insert the rear tab of the rear seat anchor cover in the front seat rear mounting bracket positively. Then rotate the cover in the direction of arrow to install the side tabs in the side holes of the bracket.
DISASSEMBLY AND REASSEMBLY

DRIVER SEAT
<Standard seat>

1. Reclining adjuster knob
2. Plug
3. Cap
4. Height adjuster lever
5. Power seat adjuster lever
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
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
23. Power seat adjuster
   (Sporty driver seat)
24. Walk-in knob
25. Walk-in knob garnish
26. Slide adjuster

<Sporty seat>

1. Reclining adjuster knob
2. Plug
3. Cap
4. Height adjuster lever
5. Power seat adjuster lever
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
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
23. Power seat adjuster
   (Sporty driver seat)
24. Walk-in knob
25. Walk-in knob garnish
26. Slide adjuster
INSPECTION

POWER SEAT SWITCH B INSPECTION

Operate the power seat switch to check for continuity.

<table>
<thead>
<tr>
<th>Switch position</th>
<th>Terminal No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slide switch</td>
<td></td>
</tr>
<tr>
<td>Forward</td>
<td>O - O 0 0</td>
</tr>
<tr>
<td>Backward</td>
<td>0 O 0</td>
</tr>
<tr>
<td>Front height switch</td>
<td></td>
</tr>
<tr>
<td>Up</td>
<td>O - O 0</td>
</tr>
<tr>
<td>Down</td>
<td>O O O O</td>
</tr>
<tr>
<td>Rear height switch</td>
<td></td>
</tr>
<tr>
<td>Up</td>
<td>0 0 0 0</td>
</tr>
<tr>
<td>Down</td>
<td>0 0 0 0</td>
</tr>
<tr>
<td>All switches</td>
<td>OFF</td>
</tr>
</tbody>
</table>

NOTE

ΟΟ 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.

<table>
<thead>
<tr>
<th>Name of motor</th>
<th>Direction of operation</th>
<th>Terminal No.</th>
<th>Stop position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lumbar support</td>
<td>Push</td>
<td>☒ ☒</td>
<td>Stops within the limit of operation range</td>
</tr>
<tr>
<td></td>
<td>Release</td>
<td>☒ ☒</td>
<td></td>
</tr>
<tr>
<td>Side support</td>
<td>Close</td>
<td>☒ ☒</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Spread</td>
<td>☒ ☒</td>
<td></td>
</tr>
<tr>
<td>Front height, Rear height</td>
<td>Up</td>
<td>☒ ☒</td>
<td>Stops when limit switch is turned off</td>
</tr>
<tr>
<td></td>
<td>Down</td>
<td>☒ ☒</td>
<td></td>
</tr>
<tr>
<td>Slide</td>
<td>Forward</td>
<td>☒ ☒</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Backward</td>
<td>☒ ☒</td>
<td></td>
</tr>
</tbody>
</table>
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>

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forward</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Backward</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Middle (ON)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE

is continuity between the terminals.

<Front and rear height limit switch>

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Front height</th>
<th>Rear height</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 2 3 4 5 6</td>
<td></td>
</tr>
<tr>
<td>Switch position</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Down</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Middle (ON)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE

is continuity between the terminals.

SERVICE POINT OF REASSEMBLY

10. 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.
CAUTION: SRS
When removing and installing the floor console assembly, don't allow any impact or shock to the SRS diagnosis unit.

Outer seat belt removal steps
- 1. Quarter trim (Refer to P.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

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.

<table>
<thead>
<tr>
<th>Terminal</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buckle unlock</td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Buckle lock</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE
0-0 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)

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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 front seat occupants by activating and deploying two air bags during certain frontal collisions.
The SRS consists of: left front and right front impact sensors (located on the right and left front upper frame lowers); air bag modules for the driver (located in the center of the steering wheel) and for the front seat passenger (located above the glove box). Each module contains a folded air bag and an inflator unit. The SRS also contains: an SRS Diagnosis Unit with safing impact sensor (located under the floor console assembly); and SRS warning light to indicate the operational status of the SRS (located on the instrument panel); clock spring (mounted behind the steering wheel); and wiring.

The SRS is designed so that the air bag will deploy when the safing sensor, plus either or both of the left front and right front impact sensors simultaneously activate while the ignition switch is in the ON position. These sensors are designed to activated in frontal or near-frontal impacts of moderate to server force.

Only authorized service personnel should work on or around SRS components. Those personnel should read this manual carefully before starting 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.
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.

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.

CAUTION: SRS
Read service manual. Do not drop. Do not tamper or disassemble.
This vehicle has air bags for front occupants as a supplemental restraint system (SRS). You must always wear your seatbelt, even with an air bag:
- Air bags are not designed to inflate in rollovers or in rear, side or low-speed frontal crashes.
- Air bags inflate powerfully and in moment, if you’re too close to an inflating air bag. It could seriously injure you. Seatbelts help keep you in position for air bag inflation in a crash.
- An inflating air bag can seriously injure small children. A child in a rear-facing child restraint can be badly injured by an inflating air bag so never use a rear-facing child restraint in the front seat of this vehicle; a rear-facing child restraint should be used only in the rear seat. Use a forward-facing child restraint with the front passenger seat as far back as possible, or
- 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.

Air bag system information
This vehicle has an air bag which will supplement the seatbelt in certain frontal collisions. The air bag is not a substitute for the seatbelt in any type of collision. The driver and all other occupants should wear seatbelts at all times.

WARNING!
If the “SRS” warning light does not illuminate for several seconds when the ignition key is turned to “ON” or engine is started, or if the warning light stays on while driving, take the vehicle to your nearest authorized dealer immediately. Also, if the vehicle’s front end is damaged or if the air bag has deployed, take the vehicle for service immediately.

The air bag system must be inspected by an authorized dealer ten years after the vehicle manufacture date shown on certification label located on left front door-latch post or door frame.

Read “SRS” section of your owner’s manual before driving, for important information, about operation, and service of the air bag system.

When you are going to discard your gas generator or vehicle, please see your MITSUBISHI dealer.

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.

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.

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 93.3°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.
### 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>**

- B-23
- B-24
- B-26

**<DOHC-M/T>**

- B-23
- B-24

**<DOHC-A/T>**

- B-23
- B-24
- B-26

Starters:
- B-23
- B-24

Neutral Position Switch:
- B-26

- 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 Combination meter (For SRS warning light)
D-04 14-pin red connector to body wiring harness
D-05 Z-pin green connector to passenger's air bag module (squib)
D-23 Z-pin green connector to passenger's air bag module (squib)
D-23 Connector to SRS Diagnosis Unit
D-24 2-pin red connector to clock spring
D-26 To clock spring [Air bag module (Squib)]
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.
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.

IGNITION

SWITCH (IG1)

CAUTION
Carefully read and observe the SRS SERVICE PRECAUTIONS (Refer to GROUP 23B- SRS Service Precautions) prior to any service.
COMPONENT LOCATION

<table>
<thead>
<tr>
<th>Name</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data link connector</td>
<td>C</td>
</tr>
<tr>
<td>Front impact sensor</td>
<td>A</td>
</tr>
<tr>
<td>SRS diagnosis unit</td>
<td>B</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>SDU Terminal No.</th>
<th>Harness Connector (No. of Terminals, Color)</th>
<th>Destination of Harness</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2 pins, red</td>
<td>Clock spring</td>
<td>Replace clock spring.</td>
</tr>
<tr>
<td>2</td>
<td>No connection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>2 pins, green</td>
<td>Air bag module</td>
<td>Correct or replace body wiring harness</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>3 pins, red</td>
<td>Diagnosis check pin</td>
<td>Correct or replace control wiring harness</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Control wiring harness</td>
<td>Ignition switch (ST)</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>General purpose fuse No. 11</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>General purpose fuse No. 18</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>Instrument panel wiring harness</td>
<td>SRS warning light</td>
</tr>
<tr>
<td>10</td>
<td>14 pins, red body wiring harness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>Front impact sensor (R.H.) positive (+) terminal</td>
<td>Replace the sensor cable*</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>Front impact sensor (L.H.) positive (+) terminal</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td></td>
<td>Front impact sensor (L.H.) negative (−) terminal</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
<td>Front impact sensor (R.H.) negative (−) terminal</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td>Junction block body wiring harness Ground</td>
<td>Correct or replace body wiring harness</td>
</tr>
</tbody>
</table>
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**

<table>
<thead>
<tr>
<th>Items</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard value</td>
<td></td>
</tr>
<tr>
<td>Front impact sensor resistance</td>
<td>Ω 2,000 ± 40</td>
</tr>
<tr>
<td>Clock spring resistance</td>
<td>Ω less than 0.4</td>
</tr>
</tbody>
</table>
## SPECIAL TOOLS

<table>
<thead>
<tr>
<th>Tool number and tool name</th>
<th>Replaced by Miller tool number</th>
<th>Application</th>
</tr>
</thead>
</table>
| 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) |

### Diagrams

1. **To SDU connector for clock spring**
2. **To air bag module <Passenger’s side>**
3. **Unused terminals**
4. **White paint**
5. **To clock spring connector for air bag module**

### Additional Tools

- **MB990803 Steering wheel puller**: Removal of steering wheel
- **MB686560 SRS air bag adapter harness A**: Deployment of air bag module inside the vehicle
- **MB628919 SRS air bag adapter harness B**: Deployment of air bag module outside the vehicle
# TEST EQUIPMENT

<table>
<thead>
<tr>
<th>Tool</th>
<th>Name</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Digital multi-meter" /></td>
<td>Digital multi-meter</td>
<td>Checking the SRS electrical circuitry with SRS Check Harness</td>
</tr>
<tr>
<td></td>
<td>[Use a multi-meter for which the Maximum test current is 2 mA or less at the minimum range of resistance measurement]</td>
<td></td>
</tr>
</tbody>
</table>

## 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

<table>
<thead>
<tr>
<th>TEST 1</th>
<th>SRS WARNING LIGHT DOES NOT EXTINQUISH</th>
</tr>
</thead>
</table>
| (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. |

<table>
<thead>
<tr>
<th>TEST 2</th>
<th>SRS WARNING LIGHT DOES NOT ILLUMINATE</th>
</tr>
</thead>
</table>
| (1) Read (and write down) all of the displayed diagnostic trouble codes and service data (fault duration and how many time memories are erased) using the scan tool.  
**NOTE**  
(1) Maximum stored period: 9999 minutes (approximately 7 days)  
(2) Maximum number of times to be stored: 250 |
| (2) Check diagnostic trouble codes against ON-BOARD DIAGNOSTIC QUICK REFERENCE CHART and perform service indicated there.  
(3) If the scan tool displays “CAN'T COMM.”, check the scan tool and vehicle side self-check data link connector for poor connections (Refer to P.52B-17.) and perform TEST 4. |
### ON-BOARD DIAGNOSTIC QUICK REFERENCE CHART

<table>
<thead>
<tr>
<th>Fault No.</th>
<th>Explanation</th>
<th>Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>–</td>
<td>Normal. The SRS is in good order.</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>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.</td>
<td>Perform TEST 5</td>
</tr>
<tr>
<td>12</td>
<td>Right or left impact sensor circuit is open or the wire from the sensor to the SDU is open-circuit.</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Right and left impact sensor circuits are open or the wires from the sensors to the SDU are open-circuit.</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>The circuits for the driver’s air bag module (squib) are shorted to each other or the circuit is grounded.</td>
<td>Perform TEST 6</td>
</tr>
<tr>
<td>22</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>The circuits for the passenger’s air bag module (squib) are shorted to each other or the circuit is grounded.</td>
<td>Perform TEST 7</td>
</tr>
<tr>
<td>25</td>
<td>The passenger’s air bag module (squib) circuit is open or the wire from the passenger’s air bag module to the SDU (clock spring) is open-circuit. Or the harness connector make a poor contact or the positive harness between the passenger’s air bag module and the SDU is shorted to ground.</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>The capacitor (integrated in the SDU) terminal voltage is higher than the specified value for 5 seconds.</td>
<td>Replace the SDU (Refer to P.23B-51)</td>
</tr>
<tr>
<td>32&quot;</td>
<td>The capacitor (integrated in the SDU) terminal voltage is lower than the specified value for 5 seconds.</td>
<td>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 &quot;LOCK&quot; position, disconnect the negative battery cable and wrap the terminal with tape for insulation. Then, charge the battery.</td>
</tr>
</tbody>
</table>

**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 *, the SRS warning light goes out and the function returns to the normal condition.
## Troubleshooting

<table>
<thead>
<tr>
<th>Fault No.</th>
<th>Explanation</th>
<th>Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>33*2</td>
<td>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.</td>
<td>Perform TEST 8</td>
</tr>
<tr>
<td>34*2</td>
<td>The lock switch (short bar) of the SDU double lock connector is open.</td>
<td>Perform TEST 9</td>
</tr>
<tr>
<td>41<em>1</em>2</td>
<td>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.</td>
<td>If the battery is run down, turn the ignition key to the &quot;LOCK&quot; position, disconnect the negative battery cable and wrap the terminal with tape for insulation. Then, charge the battery.</td>
</tr>
<tr>
<td>42<em>1</em>2</td>
<td>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.</td>
<td>If the battery is run down, turn the ignition key to the &quot;LOCK&quot; position, disconnect the negative battery cable and wrap the terminal with tape for insulation. Then, charge the battery.</td>
</tr>
<tr>
<td>43*1</td>
<td>The SRS warning light circuits are open. It takes at least 5 seconds with the light OFF that the SDU detects this fault.</td>
<td>When SRS warning light does not extinguish: Perform TEST 12 When SRS warning light does not illuminate: Perform TEST 13</td>
</tr>
<tr>
<td>44</td>
<td>The SRS warning light drive transistor (integrated in the SDU) is open-circuit.</td>
<td>Replace the SDU (Refer to P.23B-51)</td>
</tr>
<tr>
<td>45</td>
<td>The EEP ROM or A/D converter (integrated in the SDU) is defective.</td>
<td></td>
</tr>
</tbody>
</table>

### 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. **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.
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

Yes

Is there continuity between the No. 13 or No. 14 terminal of SRC Check Harness connector 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 harness between the SDU and instrument panel 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.
(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
TEST 5  WHEN DIAGNOSTIC TROUBLE CODE No. 11, No. 12 OR No. 13 IS DISPLAYED

Front impact sensor resistance check

Digital multi-meter

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.

<table>
<thead>
<tr>
<th>Front impact sensors</th>
<th>Short-circuited</th>
<th>One open-circuited</th>
<th>Two open-circuited</th>
</tr>
</thead>
<tbody>
<tr>
<td>Driver's air bag module (Squib)</td>
<td>Short-circuited</td>
<td>11 or 21</td>
<td>12 or 21</td>
</tr>
<tr>
<td></td>
<td>Open-circuited</td>
<td>11 or 22</td>
<td>12 or 22</td>
</tr>
<tr>
<td>Passenger's air bag module (Squib)</td>
<td>Short-circuited</td>
<td>11 or 24</td>
<td>12 or 24</td>
</tr>
<tr>
<td></td>
<td>Open-circuited</td>
<td>11 or 25</td>
<td>12 or 25</td>
</tr>
</tbody>
</table>

The numbers in the boxes are diagnostic trouble codes numbers. (Refer to P.23B-19.)
(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

(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 module-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.

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
### 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.

#### SRS DIAGNOSIS UNIT
![SRS Diagnosis Unit Diagram](image)

**View A**
- Unused terminals
- To passenger's air bag module
- To clock spring
- To body wiring harness (14-pin)

---

**Have the other diagnostic trouble code test(s) been finished?**

| Have the other diagnostic trouble code test(s) been finished? | No | Perform the other diagnostic trouble code test(s) prior to this test. |

**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 6 if it does not become proper even through TEST 5 is executed.**

<table>
<thead>
<tr>
<th>Front impact sensors</th>
<th>Short-circuited</th>
<th>One open-circuited</th>
<th>Two open-circuited</th>
</tr>
</thead>
<tbody>
<tr>
<td>Driver's air bag module (Squib)</td>
<td>Short-circuited</td>
<td>11 or 21</td>
<td>12 or 21</td>
</tr>
<tr>
<td></td>
<td>Open-circuited</td>
<td>11 or 22</td>
<td>12 or 22</td>
</tr>
</tbody>
</table>

The numbers in the boxes are diagnostic trouble codes numbers. (Refer to P.23B-19.)

CONTINUED ON NEXT PAGE
(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 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 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.
(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?

Yes

No

Malfunction of the SDU.

Replace the SDU. (Refer to P.23B-51.)

(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.

CONTINUED ON NEXT PAGE
(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 (4), and between terminal 2 and terminal 22 of SRS Check Harness connector (5) normal?

Standard value: less than 0.4 Ω

Yes

Malfunction of the clock spring.

No

Replace the clock spring. (Refer to P.23B-54.)

Malfunction of the air bag module.

Replace the 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 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.

Have the other diagnostic trouble code test(s) been finished?

Yes  

No  

Perform the other diagnostic trouble code test(s) prior to this test.

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 8] 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.)
(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.

CONTINUED ON NEXT PAGE
(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?

Yes

Defective passenger’s air bag module

Replace passenger’s air bag module (Refer to P.23B-54)

No

Defective SDU or harness between SDU and passenger’s air bag module

• Repair or replace harness (Refer to P.23B-51)
• Replace SDU

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

(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.)

Is the SDU lock lever securely locked?  

No  Insert the all four SDU connectors correctly and securely to lock the lock lever.

Yes  Malfunction of the SDU  

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 10  WHEN DIAGNOSTIC TROUBLE CODE No. 41 IS DISPLAYED

TEST 11  WHEN DIAGNOSTIC TROUBLE CODE No. 42 IS DISPLAYED

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

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

(2) Remove the rear console assembly. (Refer to GROUP 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
(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 carefully—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
- 1 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:** $2,000 \pm 40 \Omega$

Use the digital multi meter. If the resistance is not within that standard value range, discard it and replace it with a new one that has the standard value.

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, consult 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

Connection for the negative (−) battery cable.

2-pin green connector to passenger’s air bag module

Unused terminals

Z-pin red connector to clock spring

14-pin red connector to body wiring harness
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 straight-ahead position, remove the ignition key.

Clock spring removal steps
- 1. Post-installation inspection
  1. Connection of the negative (–) battery cable
  2. Air bag module (Driver’s side)
  3. Knee protector
  4. STEERING WHEEL K NE
  5. Floor console (Refer to GROUP 23A – Floor Console.)
- 4. Clock spring and SRS diagnosis unit connection
- 6. Clock spring and body wiring harness connection
- 7. Clockspring
- Pre-installation inspection

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
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.

<table>
<thead>
<tr>
<th>Connector No.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal No.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Continuity</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

**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.

(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
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, (Refer to 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 residential 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 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.
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.
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 (*)

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# HEATERS AND AIR CONDITIONING

## GENERAL SPECIFICATIONS

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<thead>
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<th>Items</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heater unit</td>
<td>Three-way-flow full-air-mix system</td>
</tr>
<tr>
<td>Type</td>
<td>Dial type</td>
</tr>
<tr>
<td>Heater control assembly</td>
<td></td>
</tr>
<tr>
<td>Compressor</td>
<td></td>
</tr>
<tr>
<td>Model</td>
<td>MSC105</td>
</tr>
<tr>
<td>Refrigerant unit lubricant (cu.in.)</td>
<td>SUN PAG 56 160±20 (9.8±1.2)</td>
</tr>
<tr>
<td>Refrigerant and quantity (oz.)</td>
<td>R-1 34a 740−790 (26−28)</td>
</tr>
<tr>
<td>Drive belt size (mm (in.))</td>
<td></td>
</tr>
<tr>
<td>High pressure switch (kPa (psi))</td>
<td>OFF: 3,200 (455) ON: 2,600 (370)</td>
</tr>
<tr>
<td>Low pressure switch (kPa (psi))</td>
<td>OFF: 200 (28) ON: 225 (32)</td>
</tr>
<tr>
<td>Freezer prevention (°C (°F))</td>
<td>Air temperature thermostat</td>
</tr>
<tr>
<td>OFF: −2 (28.4)</td>
<td>ON: 2 (35.6)</td>
</tr>
<tr>
<td>R-l 34a</td>
<td></td>
</tr>
</tbody>
</table>

## SERVICE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Items</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard value</td>
<td>900 ±100 &lt;A/T at P range&gt;</td>
</tr>
<tr>
<td>Idle speed when air conditioning on rpm</td>
<td>1.76 − 2.06 (Across terminals 2 and 1)</td>
</tr>
<tr>
<td>Resister resistance value (Ω)</td>
<td>1.10 − 1.26 (Across terminals 2 and 3)</td>
</tr>
<tr>
<td>Thermostat</td>
<td>0.38 − 0.44 (Across terminals @ and 4)</td>
</tr>
<tr>
<td>ON temperature (°C (°F))</td>
<td>Approx. 110 (230) or less</td>
</tr>
<tr>
<td>OFF temperature (°C (°F))</td>
<td>Approx. 155 (311) or more</td>
</tr>
<tr>
<td>Revolution pick up sensor standard resistance (Ω)</td>
<td>405 ± 35 when ambient temperature is 20°C (68°F)</td>
</tr>
<tr>
<td>Clutch clearance (mm (in.))</td>
<td>0.4 − 0.6 (.01 − .02)</td>
</tr>
<tr>
<td>Blend air damper potentiometer motor assembly resistance</td>
<td></td>
</tr>
<tr>
<td>MAX. HOT kΩ</td>
<td>0.2</td>
</tr>
<tr>
<td>MAX. COOL kΩ</td>
<td>4.8</td>
</tr>
<tr>
<td>Mode selection damper potentiometer assembly resistance</td>
<td></td>
</tr>
<tr>
<td>DEF. position (kΩ)</td>
<td>0.2</td>
</tr>
<tr>
<td>FACE position (kΩ)</td>
<td>4.8</td>
</tr>
<tr>
<td>Engine coolant temperature sensor</td>
<td></td>
</tr>
<tr>
<td>Sensor-ON temperature (°C (°F))</td>
<td>26.5 ± 4 (79.7 ± 7)</td>
</tr>
</tbody>
</table>
### LUBRICANTS

<table>
<thead>
<tr>
<th>Items</th>
<th>Specified lubricants</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Each connection of refrigerant line</td>
<td>SUN PAG 56</td>
<td>As required</td>
</tr>
</tbody>
</table>

### SPECIAL TOOLS

<table>
<thead>
<tr>
<th>Tool number and tool name</th>
<th>Replaced by Miller tool number</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>MB991367 Special spanner</td>
<td>6568</td>
<td>Removal and installation of armature mounting nut of compressor</td>
</tr>
<tr>
<td>MB991386 Pin</td>
<td>6568</td>
<td></td>
</tr>
<tr>
<td>MB991502 Scan tool (MUT-II)</td>
<td>DRB II Scan tool</td>
<td>Inspection of full auto air conditioning</td>
</tr>
<tr>
<td>MB991529 Diagnostic trouble code check harness</td>
<td></td>
<td>Inspection of full auto air conditioning by using a voltmeter</td>
</tr>
</tbody>
</table>
# HEATERS AND MANUAL AIR CONDITIONING

## TROUBLESHOOTING

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable cause</th>
<th>Remedy</th>
<th>Ref. page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heater insufficient heat</td>
<td>Obstructed heater outlets</td>
<td>Correct</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Blend air dampers improperly adjusted or binding</td>
<td>Correct</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Thermostat malfunction</td>
<td>Replace</td>
<td>Group 7</td>
</tr>
<tr>
<td></td>
<td>Obstructed heater hoses</td>
<td>Replace</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Improperly adjusted control cables</td>
<td>Adjust</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Plugged or partially plugged heater core</td>
<td>Clean or replace</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Incorrect adjustment of mode selection dampers</td>
<td>Adjust</td>
<td>—</td>
</tr>
<tr>
<td>No ventilation even when mode selection knob is operated</td>
<td>Incorrect installation of mode selection control wire</td>
<td>Adjust</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Ducts are incorrectly/incompletely connected, crushed, bent or clogged</td>
<td>Repair or replace</td>
<td>—</td>
</tr>
<tr>
<td>310wer motor nonoperative</td>
<td>Burnt-out fuse</td>
<td>Correct</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Poor grounding</td>
<td>Replace</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Malfunction blower switch</td>
<td>Replace</td>
<td>24-20</td>
</tr>
<tr>
<td></td>
<td>Malfunction resistor</td>
<td>Replace</td>
<td>24-22</td>
</tr>
<tr>
<td></td>
<td>Malfunction blower motor</td>
<td>Replace</td>
<td>24-25</td>
</tr>
<tr>
<td></td>
<td>Malfunction heater relay</td>
<td>Replace</td>
<td>24-19</td>
</tr>
<tr>
<td></td>
<td>Malfunction blower motor relay</td>
<td>Replace</td>
<td>24-19</td>
</tr>
<tr>
<td>Air conditioning does not operate when the ignition switch in the ON position</td>
<td>Open-circuited power circuit harness</td>
<td>Correct harness</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Defective compressor relay in relay box</td>
<td>Replace</td>
<td>24-1 9</td>
</tr>
<tr>
<td></td>
<td>Defective magnet clutch</td>
<td>Replace</td>
<td>24-32</td>
</tr>
<tr>
<td></td>
<td>Defective thermostat</td>
<td>Replace</td>
<td>24-32</td>
</tr>
<tr>
<td></td>
<td>Defective dual pressure switch</td>
<td>Replace</td>
<td>24-38</td>
</tr>
<tr>
<td></td>
<td>Refrigerant leak</td>
<td>Charge refrigerant, correct leak</td>
<td>24-1 3</td>
</tr>
<tr>
<td></td>
<td>Excessive refrigerant</td>
<td>Discharge refrigerant</td>
<td>24-1 6</td>
</tr>
<tr>
<td></td>
<td>Defective air conditioning switch</td>
<td>Replace air conditioning switch</td>
<td>24-23</td>
</tr>
<tr>
<td></td>
<td>Defective belt lock controller &lt;DOHC&gt;</td>
<td>Replace belt lock controller</td>
<td>24-22</td>
</tr>
<tr>
<td>Symptom</td>
<td>Probable cause</td>
<td>Remedy</td>
<td>Ref. page</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>-------------------------------------</td>
<td>-------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>Air conditioning does not operate when the ignition switch in the ON position</td>
<td>Defective air conditioning control unit</td>
<td>Replace air conditioning control unit</td>
<td>24-27</td>
</tr>
<tr>
<td>Condenser fan does not operate when the air conditioning is activated</td>
<td>Defective condenser fan motor relay</td>
<td>Replace power relay</td>
<td>24-19</td>
</tr>
<tr>
<td></td>
<td>Defective condenser fan motor</td>
<td>Replace condenser fan motor</td>
<td>24-36</td>
</tr>
<tr>
<td>Air conditioning switch indicator blinks &lt;DOHC&gt;</td>
<td>Wet compressor drive belt</td>
<td>Dry</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Insufficient compressor drive belt</td>
<td>Check and adjust</td>
<td>GROUP9</td>
</tr>
<tr>
<td></td>
<td>tension</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Defective compressor drive belt</td>
<td>Replace</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Defective compressor</td>
<td>Check and replace</td>
<td>24-12, 29</td>
</tr>
<tr>
<td></td>
<td>Defective revolution pick-up sensor</td>
<td>Check and replace</td>
<td>24-34, 32</td>
</tr>
<tr>
<td></td>
<td>Defective air conditioning switch</td>
<td>Replace air conditioning switch</td>
<td>24-23</td>
</tr>
<tr>
<td></td>
<td>Defective belt lock controller</td>
<td>Replace</td>
<td>24-22</td>
</tr>
<tr>
<td></td>
<td>Defective air conditioning control unit</td>
<td>Replace</td>
<td>24-27</td>
</tr>
<tr>
<td></td>
<td>Defective MFI control unit</td>
<td>Replace</td>
<td></td>
</tr>
</tbody>
</table>
CIRCUIT DIAGRAM
AIR CONDITIONING CONTROL UNIT CIRCUIT

- Generator
- Fuse
- Blower motor relay
- Blower motor
- Fuse
- Resistor
- Air conditioning control unit
- Air conditioning switch
- Heater control panel
- Blade lock
- Belt lock controller
- Fin thermo sensor
- Engine rpm calculation circuit
- Comparison circuit
- Compression rpm calculation circuit
- Revolution pick up sensor
- Dual pressure switch
- Thermostat
- Compressor relay
- Compressor
- MFI control unit

Symbols:
- ----: DOHC
- -----: SOHC

Diagram reference: 20F0160
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

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Signal</th>
<th>Conditions</th>
<th>Terminal voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>8, 9</td>
<td>Auto compressor control unit ground</td>
<td>At all times</td>
<td>0V</td>
</tr>
<tr>
<td>1</td>
<td>Auto compressor control unit power supply</td>
<td>When ignition switch is ON</td>
<td>Battery positive voltage</td>
</tr>
<tr>
<td>6</td>
<td>Air conditioning compressor relay</td>
<td>When all conditions for switch-ON of the compressor are satisfied</td>
<td>Battery positive voltage</td>
</tr>
<tr>
<td>7</td>
<td>Air conditioning switch: A/C</td>
<td>When air conditioning switch pressed in to second step</td>
<td>Battery positive voltage</td>
</tr>
<tr>
<td>2</td>
<td>Air conditioning switch: ECONO</td>
<td>When air conditioning switch pressed in to first step</td>
<td>Battery positive voltage</td>
</tr>
<tr>
<td>21</td>
<td>Fin-thermo sensor +</td>
<td>Ignition switch, blower switch and air conditioning switch: ON</td>
<td>Approx. 2.5V</td>
</tr>
<tr>
<td>22</td>
<td>Air-inlet sensor +</td>
<td>Ignition switch, blower switch and air conditioning switch: ON</td>
<td>Approx. 1V</td>
</tr>
<tr>
<td>23</td>
<td>Fin-thermo sensor -</td>
<td>Ignition switch, blower switch and air conditioning switch: ON</td>
<td>0V</td>
</tr>
<tr>
<td>26</td>
<td>Air-inlet sensor -</td>
<td>Ignition switch, blower switch and air conditioning switch: ON</td>
<td>0V</td>
</tr>
</tbody>
</table>

*Ambient temperature: 4°C (39°F)*
### Troubleshooting Quick-Reference Table

#### Compressor doesn’t operate.

<table>
<thead>
<tr>
<th>Item no.</th>
<th>Inspection point</th>
<th>Method</th>
<th>Criteria</th>
<th>Probable cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Magnetic clutch</td>
<td>Apply battery voltage to magnetic clutch terminal to check if sound is developed during operation.</td>
<td>Sound is noted</td>
<td>Faulty magnetic clutch</td>
<td>Replace magnetic clutch.</td>
</tr>
<tr>
<td>2</td>
<td>Blower switch</td>
<td>Check for continuity between switch terminals. (Refer to P.24-21.)</td>
<td>Continuity</td>
<td>No continuity</td>
<td>Faulty blower switch</td>
</tr>
<tr>
<td>3</td>
<td>Air conditioning switch</td>
<td>Check for continuity between switch terminals. (Refer to P.24-23.)</td>
<td>Continuity</td>
<td>No continuity</td>
<td>Faulty air conditioning switch</td>
</tr>
<tr>
<td>4</td>
<td>Magnetic clutch relay</td>
<td>Check for continuity between terminals @and @ with battery voltage applied between terminals @and @, check for continuity between terminals @ and @.</td>
<td>Continuity</td>
<td>No continuity</td>
<td>Faulty air magnetic clutch relay</td>
</tr>
<tr>
<td>5</td>
<td>Liquid pipe</td>
<td>Connect adapter valve and gauge manifold to service plug to measure high pressure side refrigerant pressure.</td>
<td>Within range of 2,100 to 2,700 kPa (299 to 384 psi)</td>
<td>Gas leakage</td>
<td>Correct places where gas leaks.</td>
</tr>
<tr>
<td>6</td>
<td>Dual-pressure switch</td>
<td>Check for continuity between switch terminals.</td>
<td>Continuity</td>
<td>No continuity</td>
<td>Faulty dual-pressure switch</td>
</tr>
<tr>
<td>7</td>
<td>Thermostat</td>
<td>Check for continuity between thermostat terminals. (Refer to P.24-33.)</td>
<td>Continuity</td>
<td>No continuity</td>
<td>Faulty thermostat</td>
</tr>
<tr>
<td>8</td>
<td>Fin-thermo sensor</td>
<td>Measure resistance across terminals at a sensing temperature of 25°C (77°F).</td>
<td>Within range of 3.9 to 4.1 kΩ</td>
<td>Faulty fin-thermo sensor</td>
<td>Replace fin-thermo sensor</td>
</tr>
<tr>
<td>9</td>
<td>Air inlet sensor</td>
<td>Measure resistance across terminals at a sensing temperature of 25°C (77°F).</td>
<td>Within range of 0.9 to 1.1 kΩ</td>
<td>Faulty air inlet sensor</td>
<td>Replace air inlet sensor</td>
</tr>
</tbody>
</table>

If no abnormality is noted at each inspection point after inspection conducted in the sequence shown in this quick-reference table, it is suspected that the compressor is inoperative because of faulty air conditioning control unit. Therefore, replace the air conditioning control unit.

### Interior temperature does not lower (No cold air coming out)

<table>
<thead>
<tr>
<th>Probable cause</th>
<th>Remedy</th>
<th>Ref. page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excessive refrigerant</td>
<td>Discharge refrigerant</td>
<td>–</td>
</tr>
<tr>
<td>Clogged receiver</td>
<td>Replace receiver</td>
<td>24-38</td>
</tr>
<tr>
<td>Clogged expansion valve</td>
<td>Replace expansion valve</td>
<td>24-28</td>
</tr>
<tr>
<td>Defective compressor</td>
<td>Replace compressor</td>
<td>24-29</td>
</tr>
</tbody>
</table>
SAFETY PRECAUTIONS

Because R-134a 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-1 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 \(-29.8^\circ\text{C}\) \((-21.7^\circ\text{F})\), at atmospheric pressure, it will be a vapor at all normal temperatures and pressures. The vapor is heavier than air, non-flammable, and non-explosive. The following precautions must be observed when handling R-134a.

**Caution**

*Wear safety goggles when servicing the refrigeration system.*

R-1 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 \(40^\circ\text{C}\) (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 \(40^\circ\text{C}\) (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.

<table>
<thead>
<tr>
<th>Inspection content</th>
<th>Criteria</th>
<th>Probable cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure on the high-pressure side</td>
<td>Pressure on the low-pressure side</td>
<td>Performance test</td>
<td></td>
</tr>
<tr>
<td>Case 1</td>
<td>Saturated pressure of open air</td>
<td>150 – 200 kPa 21.3 – 28.4 psi</td>
<td>Acceptable</td>
</tr>
<tr>
<td>Case 2</td>
<td>200 – 500 kPa or less 28.4 – 71.1 psi</td>
<td>100 kPa or less 14.2 psi or less</td>
<td>Acceptable</td>
</tr>
<tr>
<td>Case 3</td>
<td>Nearly saturated pressure of open air</td>
<td>Rejected</td>
<td>The difference between the high and low pressures is not observed.</td>
</tr>
<tr>
<td>Case 4</td>
<td>Lower than in case 1</td>
<td>150 – 200 kPa 21.3 – 28.4 psi</td>
<td>Rejected</td>
</tr>
</tbody>
</table>

NOTE
(1) Saturated pressure of open air

<table>
<thead>
<tr>
<th>Temperature °C (°F)</th>
<th>15 (59)</th>
<th>20 (68)</th>
<th>25 (77)</th>
<th>30 (86)</th>
<th>35 (95)</th>
<th>40 (104)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saturated pressure of open air kPa (psi)</td>
<td>400 (56.9)</td>
<td>470 (66.8)</td>
<td>560 (79.7)</td>
<td>650 (92.5)</td>
<td>760 (108.1)</td>
<td>870 (123.7)</td>
</tr>
</tbody>
</table>

(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-THERMO SENSOR AND AIR-INLET SENSOR
(1) Disconnect the sensor’s connector at the evaporator case, and by using an ohmmeter, measure the resistance. If the resistance is within ± 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-134a side to start the vacuum pump.

Caution
Do not operate the compressor during evacuation.

(13) Evacuate to a vacuum reading of 100 kPa (29.5 inHg) or higher (takes approx. 10 minutes).

(14) Turn the vacuum pump adaptor switch OFF and allow to stand it for 5 minutes.

Caution
Do not operate the compressor in the vacuum condition; damage may occur.

(15) Carry out a leak test. (Good if the negative pressure does not drop.)

Caution
If the negative pressure (vacuum) is lost, check for loose connections. Then, repeat the evacuation procedure from step (12). If negative pressure (vacuum) is still lost, add 1 lb of refrigerant and check system using an R-134a compatible leak detector.
(16) With the handle turned out all the way (valve open), install the charging valve to the service can.
(17) Turn the handle of the adaptor valve back all the way (valve closed), remove it from the gauge manifold and install the service can.
(18) Tighten the handle of the charging valve (valve closed) to puncture the service can.

(19) Turn the handle of the charging valve back (valve open) and tighten the handle of the adaptor valve (valve open) to charge the system with refrigerant.

**Caution**
If the service can is inverted, liquid refrigerant may be drawn into the compressor damaging it by liquid compression. Keep the service can upright to ensure that refrigerant is charged in gas state.

(20) If the refrigerant is not drawn in, turn the handle of the adaptor valve back all the way (valve closed).

(21) Check for gas leaks using a leak detector.
   If a gas leak is detected, re-tighten the connections, and then repeat the charging procedure from evacuation in step (12).

**Caution**
A leak detector designed for R-134a should be used.

(22) Start the engine.
(23) Operate the A/C and set to the lowest temperature (MAX. COOL).
(24) Fix the engine speed at 1,500 rpm.
(25) Tighten the handle of the adaptor valve (valve open) to charge the required volume of refrigerant.
   **Caution**
   If the service can is inverted, liquid refrigerant may be drawn into the compressor damaging it by liquid compression. Keep the service can upright to ensure that refrigerant is charged in gas state.

(26) After charging with refrigerant, turn the handle of the adaptor valve back all the way (valve closed).
(27) 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 cm³ (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 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.)
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.
10. Insert a thermometer in the left center A/C outlet and operate the engine for 20 minutes.
11. Note the discharge air temperature.

NOTE
If the clutch cycles, take the reading before the clutch disengages.

Performance Temperature Chart

<table>
<thead>
<tr>
<th>Garage ambient temperature °C(°F)</th>
<th>21 (70)</th>
<th>26.7 (80)</th>
<th>32.2 (90)</th>
<th>37.8 (100)</th>
<th>43.3 (110)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discharge air temperature °C(°F)</td>
<td>0.0 – 3.0 (32.0 – 37.4)</td>
<td>1.0 – 4.0 (33.8 – 39.2)</td>
<td>1.0 – 4.0 (33.8 – 39.2)</td>
<td>1.0 – 4.0 (33.8 – 39.2)</td>
<td>2.0 – 5.0 (35.6 – 41.0)</td>
</tr>
<tr>
<td>Compressor discharge pressure kPa (psi)</td>
<td>690 – 740 (98.1 – 105.3)</td>
<td>780 – 830 (110.9 – 118.1)</td>
<td>870 – 920 (123.7 – 130.9)</td>
<td>1,080 – 1,130 (153.6 – 160.7)</td>
<td>1,210 – 1,260 (172.1 – 179.2)</td>
</tr>
<tr>
<td>Compressor suction pressure kPa (psi)</td>
<td>130 – 190 (18.5 – 27.5)</td>
<td>130 – 190 (18.5 – 27.5)</td>
<td>130 – 190 (18.5 – 27.5)</td>
<td>130 – 190 (18.5 – 27.5)</td>
<td>130 – 190 (18.5 – 27.5)</td>
</tr>
</tbody>
</table>
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

Removal steps
1. Stopper
2. Glove box outer case assembly
3. Connection of the air-selection control wire
4. Hood lock release handle
5. Rheostat assembly
6. Rear wiper & washer switch
7. Knee protector
8. Shower duct
9. Connection of the mode control wire
10. Connection of the temperature control wire
11. Center air outlet assembly
12. Heater control assembly

SERVICE POINT OF REMOVAL
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.

<table>
<thead>
<tr>
<th>Terminal</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Low)</td>
<td>O</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Medium first step)</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Medium second step)</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(High)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Terminals measured</th>
<th>Standard value Ω</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between terminals 2−1</td>
<td>Approx. 1.79 – 2.06</td>
</tr>
<tr>
<td>Between terminals 2−4</td>
<td>Approx. 1.10 – 1.26</td>
</tr>
<tr>
<td>Between terminals 2−3</td>
<td>Approx. 0.38 – 0.44</td>
</tr>
</tbody>
</table>
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**

<table>
<thead>
<tr>
<th>Terminal</th>
<th>1</th>
<th>2</th>
<th>4</th>
<th>5</th>
<th>3</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switch position</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OFF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If pressed 1 step (ECONOMY)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>If pressed 2 steps (Air conditioning)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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

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.24-16-17),
- 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-THERMO 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**

**Disassembly steps**

1. Clips
2. Evaporator 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).
COMPRSSOR
REMOVAL AND INSTALLATION

<DOHC>

Pre-removal Operation
• Discharge of the Refrigerant
  (Refer to P.24-16.)

21Nm
15 ft.lbs.

9Nm
7 ft.lbs.

45Nm
33 ft.lbs.

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
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
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
- 5. Compressor bracket
- 7. Compressor bracket
- 8. Tension pulley assembly
- 9. Bolt
- 10. Tension pulley
- 11. Bolt
- 12. Adjustment plate
- 13. Tension pulley bracket

O-ring

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 \[X \text{ cm}^3 (X \text{ fl.oz.})\] 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.
   \[
   \text{New compressor oil amount} = 160 \text{ cm}^3 - X \text{ cm}^3 = Y \text{ cm}^3 \]
   \[
   (5.4 \text{ fl.oz.} - X \text{ fl.oz.}) = Y \text{ fl.oz.}
   \]

   NOTE
   (1) \(Y \text{ cm}^3 (Y \text{ fl.oz.})\) 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. Check for continuity across terminals 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
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.

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.

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.

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.)

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
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.)
PRE-RAM FROM ATION AND INSTALLATION

Pre-removal and Post-installation Operation

- Discharge and Charging of Refrigerant
  (Refer to P. 24-16, 13.)

Compressor oil: SUN PAG 56

Removal steps

1. High-pressure hose
2. High-pressure pipe
3. Liquid pipe A
4. Liquid pipe B
5. Liquid pipe C
6. Low-pressure hose B
7. Low-pressure hose A
8. Receiver bracket
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

<table>
<thead>
<tr>
<th>Inspection item</th>
<th>Symptom</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Air conditioning does not operate when the ignition switch in the ON position.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>6</td>
<td>7</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Interior temperature does not raise even the air conditioning is operating (No warm air coming out).</td>
<td>5</td>
<td>2</td>
<td>6</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td></td>
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</tr>
<tr>
<td>3</td>
<td>Interior temperature does not lower even the air conditioning is operating (No cold air coming out).</td>
<td>1</td>
<td>4</td>
<td>5</td>
<td>12</td>
<td>11</td>
<td>13</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>Blower motor does not rotate.</td>
<td>4</td>
<td>6</td>
<td>7</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td></td>
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</tr>
<tr>
<td>5</td>
<td>Blower motor does not stop rotating.</td>
<td>6</td>
<td>4</td>
<td>8</td>
<td>3</td>
<td>1</td>
<td></td>
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</tr>
<tr>
<td>6</td>
<td>Air selection damper does not operate.</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<tr>
<td>7</td>
<td>Mode selection damper does not operate.</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td></td>
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<tr>
<td>8</td>
<td>Condenser fan does not operate when the air conditioning is activated.</td>
<td>1</td>
<td></td>
<td></td>
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<tr>
<td>9</td>
<td>Air-conditioning graphic display does not function correctly.</td>
<td>3</td>
<td>2</td>
<td></td>
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</tr>
<tr>
<td>10</td>
<td>Air conditioning control panel blinks.</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>11</td>
<td>Set temperature returns to 25°C (122°F) when the ignition switch is turned ON and OFF.</td>
<td>3</td>
<td>2</td>
<td></td>
<td></td>
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</tbody>
</table>

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.
<table>
<thead>
<tr>
<th>No.</th>
<th>Symptom</th>
<th>Probable cause</th>
<th>Remedy</th>
<th>Ref. page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Air conditioning does not operate when the ignition switch in the ON position.</td>
<td>Open-circuited power circuit harness</td>
<td>Correct harness.</td>
<td>24-61</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Defective control panel</td>
<td>Replace control panel.</td>
<td>24-61</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Defective air conditioning control unit</td>
<td>Check on-board diagnostic output.</td>
<td>24-57</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Defective compressor relay in relay box</td>
<td>Replace.</td>
<td>24-19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Defective magnet clutch</td>
<td>Replace.</td>
<td>24-32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Defective thermostat</td>
<td>Replace.</td>
<td>24-32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Defective dual pressure switch</td>
<td>Replace.</td>
<td>24-38</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Refrigerant leak</td>
<td>Charge refrigerant, correct leak.</td>
<td>24-38</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Excessive refrigerant</td>
<td>Discharge refrigerant.</td>
<td>24-38</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Defective belt lock controller &lt;DOHC&gt;</td>
<td>Replace belt lock controller.</td>
<td>24-62</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Defective MFI control unit</td>
<td>Replace MFI control unit</td>
<td>24-57</td>
</tr>
<tr>
<td>2</td>
<td>Interior temperature does not raise (No warm air coming out).</td>
<td>Defective interior temperature sensor input circuit</td>
<td>Check on-board diagnostic output. Replace defective parts.</td>
<td>24-57</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Defective blend air damper potentiometer input circuit</td>
<td>Replace defective parts.</td>
<td>24-57</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Defective blend air damper drive motor</td>
<td>Replace blend air damper drive motor.</td>
<td>24-63</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Incorrect engagement of blend air damper drive motor lever and blend air damper</td>
<td>Engage correctly.</td>
<td>24-63</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sticking blend air damper</td>
<td>Correct blend air damper.</td>
<td>24-63</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Open-circuited harness between blend air damper drive motor and air conditioning control unit</td>
<td>Correct harness.</td>
<td>24-61</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Defective control panel</td>
<td>Replace control panel.</td>
<td>24-61</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Defective air conditioning control unit</td>
<td>Replace air conditioning control unit.</td>
<td>24-61</td>
</tr>
<tr>
<td>3</td>
<td>Interior temperature does not lower (No cold air coming out).</td>
<td>Defective interior temperature sensor input circuit</td>
<td>Check on-board diagnostic output. Replace defective parts.</td>
<td>24-57</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Defective air inlet sensor input circuit</td>
<td>Replace defective parts.</td>
<td>24-57</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Defective air thermo sensor input circuit</td>
<td>Replace defective parts.</td>
<td>24-57</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Defective blend air damper potentiometer input circuit</td>
<td>Replace defective parts.</td>
<td>24-57</td>
</tr>
<tr>
<td>Symptom</td>
<td>Probable cause</td>
<td>Remedy</td>
<td>Ref. page</td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>----------------</td>
<td>--------</td>
<td>-----------</td>
<td></td>
</tr>
<tr>
<td>3 Interior temperature does not lower (No cold air coming out).</td>
<td>Defective blend air damper drive motor</td>
<td>Replace blend air damper drive motor.</td>
<td>24-63</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Incorrect engagement of blend air damper drive motor lever and blend air mix damper</td>
<td>Engage correctly.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sticking blend air damper</td>
<td>Correct blend air damper.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Open-circuited harness between blend air damper drive motor and air conditioning control unit</td>
<td>Correct harness.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Open-circuited harness between photo sensor and air conditioning control unit</td>
<td>Correct harness.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Defective air-conditioning compressor relay in the relay box</td>
<td>Replace.</td>
<td>24-19</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Defective thermostat</td>
<td>Replace thermostat</td>
<td>24-32</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Defective revolution pick up sensor &lt;DOHC&gt;</td>
<td>Replace revolution pick up sensor</td>
<td>24-32</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Refrigerant leak</td>
<td>Charge refrigerant, correct leak.</td>
<td>24-13, 18</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Excessive refrigerant</td>
<td>Discharge refrigerant.</td>
<td>24-16</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clogged receiver</td>
<td>Replace receiver.</td>
<td>24-38</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clogged expansion valve</td>
<td>Replace expansion valve.</td>
<td>24-28</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Defective compressor</td>
<td>Replace compressor.</td>
<td>24-29</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Defective air inlet sensor</td>
<td>Replace air inlet sensor.</td>
<td>24-65</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Defective magnetic clutch</td>
<td>Replace.</td>
<td>24-32</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Defective belt lock controller</td>
<td>Replace belt lock controller.</td>
<td>24-22</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Defective control panel</td>
<td>Replace control panel.</td>
<td>24-61</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Defective air conditioning control unit</td>
<td>Replace air conditioning control unit.</td>
<td>24-61</td>
<td></td>
</tr>
<tr>
<td>‡ Blower motor does not rotate.</td>
<td>Defective blower motor</td>
<td>Replace blower motor.</td>
<td>24-25</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Blown thermal fuse inside air conditioning power transistor</td>
<td>Replace air conditioning power transistor.</td>
<td>24-62</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Defective blower motor relay</td>
<td>Replace blower motor relay.</td>
<td>24-19</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Open-circuited harness between fuse and blower motor relay</td>
<td>Correct harness.</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>Symptom</td>
<td>Probable cause</td>
<td>Remedy</td>
<td>Ref. page</td>
</tr>
<tr>
<td>----</td>
<td>-------------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>---------------------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>4</td>
<td>Blower motor does not rotate.</td>
<td>Open-circuited harness between blower motor relay and blower motor</td>
<td>Correct harness.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Open-circuited harness between air conditioning power transistor and control unit</td>
<td>Correct harness.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Defective control panel</td>
<td>Replace control panel.</td>
<td>24-61</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Defective air conditioning control unit</td>
<td>Replace air conditioning control unit.</td>
<td>24-61</td>
</tr>
<tr>
<td>5</td>
<td>Blower motor does not stop rotating.</td>
<td>Defective blower motor HI relay</td>
<td>Replace power relay.</td>
<td>24-19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Short-circuited harness between blower motor relay and air conditioning control unit</td>
<td>Correct harness.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Defective control panel</td>
<td>Replace control panel.</td>
<td>24-61</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Defective air conditioning control unit</td>
<td>Replace air conditioning control unit.</td>
<td>24-61</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Defective air conditioning control unit</td>
<td>Replace air conditioning control unit.</td>
<td>24-61</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Defective air conditioning power transistor</td>
<td>Replace air conditioning power transistor</td>
<td>24-62</td>
</tr>
<tr>
<td>6</td>
<td>Air selection damper does not operate.</td>
<td>Defective air selection drive motor</td>
<td>Replace air selection drive motor.</td>
<td>24-63</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Incorrect engagement of air selection drive motor dumper</td>
<td>Engage correctly.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Malfunctioning air selection damper</td>
<td>Correct air selection damper.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Open-circuited harness between air selection motor and control unit</td>
<td>Correct harness.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Defective control panel</td>
<td>Replace control panel.</td>
<td>24-61</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Defective control panel</td>
<td>Replace control panel.</td>
<td>24-61</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Defective air conditioning control unit</td>
<td>Replace air conditioning control unit.</td>
<td>24-61</td>
</tr>
<tr>
<td>No.</td>
<td>Symptom</td>
<td>Probable Cause</td>
<td>Remedy</td>
<td>Ref. page</td>
</tr>
<tr>
<td>-----</td>
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<td>--------</td>
<td>----------</td>
</tr>
<tr>
<td>7</td>
<td>Mode selection damper does not operate.</td>
<td>Defective mode selection damper&lt;br&gt;Defective mode selection drive motor&lt;br&gt;Incorrect engagement of mode selection drive motor and mode selection damper&lt;br&gt;Malfunctioning DEF., FACE, and FOOT damper&lt;br&gt;Open-circuited harness between mode selection motor and control unit&lt;br&gt;Defective control panel&lt;br&gt;Defective air conditioning control unit</td>
<td>Check on-board diagnostic output. Replace defective parts.&lt;br&gt;Replace mode selection drive motor.&lt;br&gt;Engage correctly.&lt;br&gt;Correct DEF., FACE, and FOOT damper.&lt;br&gt;Replace control panel.&lt;br&gt;Replace air conditioning control unit.</td>
<td>24-57, 24-63, –, –, 24-61, 24-61</td>
</tr>
<tr>
<td>8</td>
<td>Condenser fan does not operate when the air conditioning is activated.</td>
<td>Defective condenser fan motor relay&lt;br&gt;Defective condenser fan motor</td>
<td>Replace power relay.&lt;br&gt;Replace condenser fan motor.</td>
<td>24-19, 24-36</td>
</tr>
<tr>
<td>9</td>
<td>Air-conditioning graphic display does not function correctly</td>
<td>Open-circuited harness between control panel and air conditioning control unit&lt;br&gt;Defective control panel&lt;br&gt;Defective air conditioning control unit</td>
<td>Correct harness.&lt;br&gt;Replace control panel.&lt;br&gt;Replace air conditioning control unit.</td>
<td>–, 24-61, 24-61</td>
</tr>
<tr>
<td>10</td>
<td>Air conditioning control panel blinks. &lt;DOHC&gt;</td>
<td>Wet compressor drive belt&lt;br&gt;Insufficient compressor drive belt tension&lt;br&gt;Defective compressor drive belt&lt;br&gt;Defective compressor&lt;br&gt;Defective revolution pick-up sensor&lt;br&gt;Defective air conditioning switch&lt;br&gt;Defective belt lock controller&lt;br&gt;Defective air conditioning control unit&lt;br&gt;Defective MFI control unit</td>
<td>Dry.&lt;br&gt;Check and adjust.&lt;br&gt;Replace.&lt;br&gt;Check and replace.&lt;br&gt;Check and replace.&lt;br&gt;Replace air conditioning control panel.&lt;br&gt;Replace belt lock controller.&lt;br&gt;Replace air conditioning control unit.&lt;br&gt;Replace MFI control unit.</td>
<td>–, GROUP9, –, 24-12, 24-34, 24-32, 24-61, 24-62, 24-61, –</td>
</tr>
<tr>
<td>11</td>
<td>Set temperature returns to 25°C (112°F) when the ignition switch is turned ON and OFF.</td>
<td>Open-circuited power circuit harness&lt;br&gt;Defective air conditioning control unit</td>
<td>Correct harness.&lt;br&gt;Replace air conditioning control unit.</td>
<td>–, 24-61</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Signal name</th>
<th>Condition Condition</th>
<th>Terminal voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>55</td>
<td>Air inlet sensor</td>
<td>Temperature at sensor 25°C (77°F) (4 kΩ)</td>
<td>2.2 - 2.8 V</td>
</tr>
<tr>
<td>60</td>
<td>Sensor power source</td>
<td>Temporarily</td>
<td>4.8 - 5.2 V</td>
</tr>
<tr>
<td>66</td>
<td>Interior temperature sensor</td>
<td>Temperature at sensor 25°C (77°F) (4 kΩ)</td>
<td>2.3 - 2.9 V</td>
</tr>
<tr>
<td>67</td>
<td>Air thermo sensor</td>
<td>Temperature at sensor 25°C (77°F) (4 kΩ)</td>
<td>2.3 - 2.9 V</td>
</tr>
</tbody>
</table>

Indicates the on-board diagnostic output code number and system condition when the code is output.

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

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Signal name</th>
<th>Condition</th>
<th>Terminal voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>53</td>
<td>Backup power source</td>
<td>Normally</td>
<td>Battery positive voltage</td>
</tr>
<tr>
<td>108, 116</td>
<td>Air conditioning control unit power source</td>
<td>Ignition switch ON</td>
<td>Battery positive voltage</td>
</tr>
<tr>
<td>107, 115</td>
<td>Air conditioning control unit ground</td>
<td>Normally</td>
<td>0 V</td>
</tr>
</tbody>
</table>
2. Inspection of potentiometer circuit

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

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Signal name</th>
<th>Condition</th>
<th>Terminal voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>56</td>
<td>Blend air damper potentiometer (input)</td>
<td>Blend air damper at MAX. COOL position</td>
<td>0.1 – 0.3 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blend air damper at MAX. HOT position</td>
<td>4.7 – 5.0 V</td>
</tr>
<tr>
<td>57</td>
<td>Mode selection damper potentiometer (input)</td>
<td>Mode selection damper at FACE position</td>
<td>0.1 – 0.3 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mode selection damper at DEF. position</td>
<td>4.7 – 5.0 V</td>
</tr>
<tr>
<td>58</td>
<td>Blend air damper and mode selection damper potentiometer</td>
<td>Normally</td>
<td>0 V</td>
</tr>
<tr>
<td>60</td>
<td>Sensor power source</td>
<td>Normally</td>
<td>4.8 – 5.2 V</td>
</tr>
</tbody>
</table>
3. Inspection of interior temperature sensor, air inlet sensor, and air thermo sensor circuits

Air conditioning control unit

<table>
<thead>
<tr>
<th>Sensor powersource</th>
<th>Air conditioning compressor relay</th>
</tr>
</thead>
</table>

Air conditioning control unit terminal voltages

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Signal name</th>
<th>Condition</th>
<th>Terminal voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>55</td>
<td>Air inlet sensor</td>
<td>Temperature at sensor 25°C (77°F) (4 kΩ)</td>
<td>2.2 – 2.8 V</td>
</tr>
<tr>
<td>60</td>
<td>Sensor power source</td>
<td>Normally</td>
<td>4.8 – 5.2 V</td>
</tr>
<tr>
<td>66</td>
<td>Interior temperature sensor</td>
<td>Temperature at sensor 25°C (77°F) (4 kΩ)</td>
<td>2.3 – 2.9 V</td>
</tr>
<tr>
<td>67</td>
<td>Air thermo sensor</td>
<td>Temperature at sensor 25°C (77°F) (4 kΩ) when air conditioning is OFF</td>
<td>2.3 – 2.9 V</td>
</tr>
</tbody>
</table>

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

Troubleshooting

- Inspection of interior temperature sensor, air inlet sensor, and air thermo sensor circuits

Diagram:

- Air conditioning control unit
- Sensor powersource
- A/D conversion
- Air conditioning compressor relay
- Air conditioning compressor command arithmetic circuit
- Controlled variable arithmetic circuit
- Interior temperature sensor
- Air inlet sensor
- Air thermo sensor
4. Inspection of engine coolant temperature sensor and photo sensor circuits

Troubleshooting Hints

- Air conditioning control unit terminal voltages

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Signal name</th>
<th>Condition</th>
<th>Terminal voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>69</td>
<td>Photo sensor ⊗</td>
<td>Illuminance 100,000 lux or more</td>
<td>-0.1 to -0.2 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Illuminance less than 0 lux</td>
<td>0 V</td>
</tr>
<tr>
<td>70</td>
<td>Photo sensor ⊗</td>
<td>Normally</td>
<td>0 V</td>
</tr>
<tr>
<td>59</td>
<td>Engine coolant temperature sensor ⊗</td>
<td>Switch OFF [Engine coolant temperature less than 50°C (122°F)]</td>
<td>Battery positive voltage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Switch ON [Engine coolant temperature 50°C (122°F) or higher]</td>
<td>0 V</td>
</tr>
</tbody>
</table>
5. Inspection of belt lock controller circuit

Troubleshooting Hints
- Air conditioning control unit terminal voltages

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Signal name</th>
<th>Condition</th>
<th>Terminal voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>116</td>
<td>Air conditioning output</td>
<td>Compressor ON</td>
<td>10 V to battery positive voltage</td>
</tr>
</tbody>
</table>
6. Inspection of blend air damper, mode selection damper, air selection damper control motor circuits

<Blend air damper control motor>

<Mode selection damper control motor>
Troubleshooting Hints

- Air conditioning control unit terminal voltages

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Signal name</th>
<th>Condition</th>
<th>Terminal voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>102</td>
<td>Air selection damper control motor Θ</td>
<td>Inside-air switch ON (Output turns OFF 40 seconds after the damper moved to inside air position.)</td>
<td>0.5 v</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Outside-air switch ON (Output turns OFF 40 seconds after the damper moved to outside air position.)</td>
<td>10 V</td>
</tr>
<tr>
<td>103</td>
<td>Mode selection damper control motor Θ</td>
<td>FACE switch ON (Output turns OFF 40 seconds after the damper moved to FACE position.)</td>
<td>0.5 v</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DEF. switch ON (Output turns OFF 40 seconds after the damper moved to DEF. position.)</td>
<td>10 V</td>
</tr>
<tr>
<td>104</td>
<td>Air selection damper control motor Θ</td>
<td>Inside-air switch ON (Output turns OFF 40 seconds after inside air has been activated.)</td>
<td>10 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Outside-air switch ON (Output turns OFF 40 seconds after outside air has been activated.)</td>
<td>0.5 v</td>
</tr>
<tr>
<td>105</td>
<td>Blend air damper control motor Θ</td>
<td>Temperature is set at 17°C (62.6°F). (Output turns OFF 40 seconds after the damper moved to MAX. COOL position.)</td>
<td>0.5 v</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Temperature is set at 32.5°C(90.5°F). (Output turns OFF 40 seconds after the damper moved to MAX. HOT position.)</td>
<td>10 V</td>
</tr>
<tr>
<td>111</td>
<td>Blend air damper control motor Θ</td>
<td>Temperature is set at 17°C (62.6°F). (Output turns OFF 40 seconds after the damper moved to MAX. COOL position.)</td>
<td>10 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Temperature is set at 32.5°C(90.5°F). (Output turns OFF 40 seconds after the damper moved to MAX. HOT position.)</td>
<td>0.5 v</td>
</tr>
<tr>
<td>112</td>
<td>Mode selection damper control motor Θ</td>
<td>FACE switch ON (Output turns OFF 40 seconds after the damper moved to FACE position.)</td>
<td>10 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DEF. switch ON (Output turns OFF 40 seconds after the damper moved to DEF. position.)</td>
<td>0.5 v</td>
</tr>
</tbody>
</table>
7. Inspection of air conditioning power transistor and blower motor relay circuits

Troubleshooting Hints
- Air conditioning control unit terminal voltages

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Signal name</th>
<th>Condition</th>
<th>Terminal voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>51</td>
<td>Air conditioning power transistor collector</td>
<td>Switch is turned OFF.</td>
<td>Battery positive voltage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Switch is placed in LO.</td>
<td>Approx. 7 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Switch is placed in HI.</td>
<td>0 V</td>
</tr>
<tr>
<td>52</td>
<td>Air conditioning power transistor base</td>
<td>Blower switch is turned OFF.</td>
<td>0 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blower switch is placed in LO.</td>
<td>Approx. 1.3 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blower switch is placed in HI.</td>
<td>Approx. 1.2 V</td>
</tr>
<tr>
<td>101</td>
<td>Blower motor HI relay</td>
<td>Fan switch HI is ON.</td>
<td>1.5 V or less</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fan switch in ME, LO, or OFF.</td>
<td>Battery positive voltage</td>
</tr>
</tbody>
</table>
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.

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.
<table>
<thead>
<tr>
<th>Term No.</th>
<th>Inspection point</th>
<th>Method</th>
<th>Criteria</th>
<th>Probable cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Interior temperature sensor</td>
<td>Measure resistance of sensor when room temperature is 25°C (77°F).</td>
<td>Approx. 4 kΩ</td>
<td>Largely deviates from approx. 4 kΩ</td>
<td>Defective interior temperature sensor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Measure voltage across terminal 6 of air conditioning control unit and ground when interior temperature is 25°C (77°F).</td>
<td>In approx. 2.3 – 2.9 V range</td>
<td>–</td>
<td>Open-circuited harness between interior temperature sensor and air conditioning control unit</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>–</td>
<td>Outside approx. 2.3 – 2.9 V range</td>
<td>Poor connection of air conditioning control unit connector or defective air conditioning control unit</td>
</tr>
<tr>
<td>13</td>
<td>Air inlet sensor</td>
<td>Measure resistance of sensor when ambient temperature is 25°C (77°F).</td>
<td>Approx. 4 kΩ</td>
<td>Largely deviates from approx. 4 kΩ</td>
<td>Defective air inlet sensor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Measure voltage across terminal 6 of air control conditioning unit and ground when ambient temperature is 25°C (77°F).</td>
<td>In approx. 2.2 – 2.8 V range</td>
<td>–</td>
<td>Open-circuited harness between air inlet sensor and air conditioning control unit</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>–</td>
<td>Outside approx. 2.2 – 2.8 V range</td>
<td>Poor connection of air-conditioning control unit connector or defective air conditioning control unit</td>
</tr>
<tr>
<td>15</td>
<td>Engine coolant temperature sensor</td>
<td>Measure resistance of sensor when engine coolant temperature is 22.5 to 30.5°C (57.6 to 86.9°F).</td>
<td>Conductive</td>
<td>Nonconductive</td>
<td>Defective engine coolant temperature sensor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Measure voltage across terminal 6 of air conditioning control unit and ground when engine coolant temperature is 22.5 to 30.5°C (57.6 to 86.9°F).</td>
<td>Approx. 12 V</td>
<td>–</td>
<td>Open-circuited harness between engine coolant temperature sensor and air conditioning control unit</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>–</td>
<td>Largely deviates from approx. 12 V</td>
<td>Poor connection of air conditioning control unit connector or defective air conditioning control unit</td>
</tr>
<tr>
<td>21</td>
<td>Air thermo sensor</td>
<td>Measure resistance of sensor when sensor’s sensing temperature is 25°C (77°F).</td>
<td>Approx. 4 kΩ</td>
<td>Largely deviates from approx. 4 kΩ</td>
<td>Defective air thermo sensor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Measure voltage across terminal 7 of air conditioning control unit and ground when sensor’s sensing temperature is 25°C (77°F).</td>
<td>In approx. 2.3 – 2.9 V range</td>
<td>–</td>
<td>Open-circuited harness between air thermo sensor and air conditioning control unit</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>–</td>
<td>Outside approx. 2.3 – 2.9 V range</td>
<td>Poor connection of air conditioning control unit</td>
</tr>
<tr>
<td>Item no.</td>
<td>Inspection point</td>
<td>Method</td>
<td>Criteria</td>
<td>Probable cause</td>
<td>Remedy</td>
</tr>
<tr>
<td>---------</td>
<td>-----------------</td>
<td>--------</td>
<td>----------</td>
<td>----------------</td>
<td>--------</td>
</tr>
<tr>
<td>31</td>
<td>Blend air damper potentiometer</td>
<td>Refer to p. 24-64.</td>
<td></td>
<td>Defective blend air damper potentiometer</td>
<td>Replace blend air damper potentiometer.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Measure voltage across terminal (A) of air conditioning control unit and ground when potentiometer is in MAX. COOL position.</td>
<td>In approx. 0.1 – 0.3 V range</td>
<td>–</td>
<td>Open-circuited harness between blend air damper potentiometer and air conditioning control unit.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Outside approx. 0.1 – 0.3 V range</td>
<td>–</td>
<td>Poor connection of air conditioning control unit connector or defective air conditioning control unit.</td>
<td>Correct connector connection or replace air conditioning control unit.</td>
</tr>
<tr>
<td>33</td>
<td>Mode selection damper potentiometer</td>
<td>Refer to p. 24-64.</td>
<td></td>
<td>Defective mode selection damper potentiometer</td>
<td>Replace mode selection damper potentiometer.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Measure voltage across terminal (B) of air conditioning control unit and ground when potentiometer is in FACE position.</td>
<td>In approx. 0.1 – 0.3 V range</td>
<td>–</td>
<td>Open-circuited harness between mode selection damper potentiometer and air conditioning control.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Outside approx. 0.1 – 0.3 V range</td>
<td>–</td>
<td>Poor connection of air conditioning control unit connector or defective air conditioning control unit.</td>
<td>Correct connector connection or replace air conditioning control unit.</td>
</tr>
<tr>
<td>Code</td>
<td>Display pattern (output codes) (use with voltmeter)</td>
<td>Cause</td>
<td>Fail safe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>---------------------------------------------</td>
<td>-------</td>
<td>-----------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>ON OFF Continuous</td>
<td>Normal</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>Open-circuited interior temperature sensor</td>
<td>Condition in which 25°C (77°F) is detected</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>Short-circuited interior temperature sensor</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td></td>
<td>Open-circuited air inlet sensor</td>
<td>Condition in which 20°C (68°F) is detected</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
<td>Short-circuited air inlet sensor</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td></td>
<td>Open-circuited air thermo sensor</td>
<td>Condition in which -2°C (−35.6°F) is detected</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td></td>
<td>Short-circuited air thermo sensor</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31</td>
<td></td>
<td>Short-circuited and open-circuited blend air damper potentiometer</td>
<td>MAX. HOT (or MAX. COOL when it is at MAX. COOL)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td></td>
<td>Short-circuited and open-circuited mode selection damper potentiometer</td>
<td>DEF. (or FACE when it is at FACE)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>41</td>
<td></td>
<td>Defective blend air damper motor</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>42</td>
<td></td>
<td>Defective mode selection damper motor</td>
<td>-</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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 24-11.)

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.

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
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
1* 4. Floor console (Refer to GROUP 23A – Floor Console.)
2. Air conditioning control unit
3. Center outlet assembly
4. Air conditioning control panel
5. Air conditioning control unit
6. 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 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.

<table>
<thead>
<tr>
<th>Ambient temperature °C (°F)</th>
<th>-10 (14)</th>
<th>0 (32)</th>
<th>10 (50)</th>
<th>20 (68)</th>
<th>25 (77)</th>
<th>30 (86)</th>
<th>40 (104)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistance value (reference) kΩ</td>
<td>19.06</td>
<td>11.71</td>
<td>7.45</td>
<td>4.89</td>
<td>4.00</td>
<td>3.30</td>
<td>2.28</td>
</tr>
</tbody>
</table>
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.

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.

<table>
<thead>
<tr>
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<th>Ref. page</th>
<th>Part name</th>
<th>Ref. page</th>
</tr>
</thead>
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<td>Evaporator – Disassembly and Reassembly</td>
<td>P.24-28</td>
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<tr>
<td>Blower Motor Assembly</td>
<td>P.24-25</td>
<td>Compressor – Disassembly and Reassembly</td>
<td>P.24-32</td>
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<tr>
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<th>Specifications</th>
</tr>
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<td>Closed type with positive crankcase ventilation valve</td>
</tr>
<tr>
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<td>Canister storage type</td>
</tr>
<tr>
<td>Evaporative emission &lt;EVAP&gt; canister</td>
<td>Charcoal type</td>
</tr>
<tr>
<td>Evaporative emission &lt;EVAP&gt; purge solenoid</td>
<td>ON/OFF solenoid valve</td>
</tr>
<tr>
<td>Exhaust emission control system</td>
<td>Vacuum-activated diaphragm type</td>
</tr>
<tr>
<td>Exhaust gas recirculation system</td>
<td>Thermistor type</td>
</tr>
<tr>
<td>EG R valve</td>
<td>Duty cycle type solenoid valve</td>
</tr>
<tr>
<td>EGR temperature sensor &lt;California – Non Turbo, Turbo&gt;</td>
<td>Monolith type</td>
</tr>
<tr>
<td>EGR solenoid &lt;California – Non Turbo, Turbo&gt;</td>
<td>Under floor</td>
</tr>
<tr>
<td>Catalytic converter</td>
<td>Right bank, left bank and under floor</td>
</tr>
<tr>
<td>Location &lt;Federal/Canada – Non Turbo&gt;</td>
<td></td>
</tr>
<tr>
<td>&lt;California – Non Turbo, Turbo&gt;</td>
<td></td>
</tr>
</tbody>
</table>

SERVICE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Items</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaporative emission purge solenoid coil resistance Ω</td>
<td>36 – 44 [at 20°C (68°F)]</td>
</tr>
<tr>
<td>EGR temperature sensor resistance kΩ</td>
<td>60 – 83 [at 50°C (122°F)]</td>
</tr>
<tr>
<td>EGR solenoid coil resistance Ω</td>
<td>11 – 14 [at 100°C (212°F)]</td>
</tr>
<tr>
<td></td>
<td>36 – 44 [at 20°C (68°F)]</td>
</tr>
</tbody>
</table>

TROUBLESHOOTING

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Probable cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine will not start or hard to start</td>
<td>Vacuum hose disconnected or damaged</td>
<td>Repair or replace</td>
</tr>
<tr>
<td></td>
<td>The EGR valve is not closed</td>
<td>Repair or replace</td>
</tr>
<tr>
<td></td>
<td>Malfunction of the evaporative emission purge solenoid</td>
<td>Repair or replace</td>
</tr>
<tr>
<td>Rough idle or engine stalls</td>
<td>The EGR valve is not closed</td>
<td>Repair or replace</td>
</tr>
<tr>
<td></td>
<td>Vacuum hose disconnected or damaged</td>
<td>Repair or replace</td>
</tr>
<tr>
<td></td>
<td>Malfunction of the positive crankcase ventilation valve</td>
<td>Repair or replace</td>
</tr>
<tr>
<td></td>
<td>Malfunction of the purge control system</td>
<td>Check the system; if there is a problem, check its component parts</td>
</tr>
<tr>
<td>Engine hesitates or poor acceleration</td>
<td>Malfunction of the exhaust gas recirculation system</td>
<td>Check the system; if there is a problem, check its component parts</td>
</tr>
<tr>
<td>Excessive oil consumption</td>
<td>Positive crankcase ventilation line clogged</td>
<td>Check positive crankcase ventilation system</td>
</tr>
<tr>
<td>Poor fuel mileage</td>
<td>Malfunction of the exhaust gas recirculation system</td>
<td>Check the system; if there is a problem, check its component parts</td>
</tr>
</tbody>
</table>
VACUUM HOSES

VACUUM HOSES ROUTING

<Federal/Canada - Non Turbo>

Evaporative emission
purge solenoid

Evaporative emission canister

Throttle body

Fuel pressure regulator

Vehicle front

L: Light blue
R: Red
B: Black

<California - Non Turbo>

EGR solenoid

Evaporative emission purge solenoid

Evaporative emission canister

Throttle body

Fuel pressure regulator

Vehicle front
EMISSION CONTROL SYSTEMS – Vacuum Hoses

Evaporative emission purge solenoid
Turbocharger waste gate solenoid
Fuel pressure solenoid
EGR solenoid
Bypass valve
Purge control valve
Fuel pressure regulator
Turbocharger waste gate actuator
Turbocharger

G: Green
Y: Yellow
L: Light blue
R: Red
B: Black
W: White

Vehicle front

7EM0254
EMISSION CONTROL SYSTEMS

VACUUM CIRCUIT DIAGRAM

<Federal/Canada-Non turbo>

- Intake manifold plenum
- Throttle body
- Fuel pressure regulator
- EVAP canister
- EVAP purge solenoid (ON: open)

Legend:

B: Black
L: Light blue
R: Red
<California - Non turbo>
<Turbo>

Intake manifold plenum

Throttle body

To combustion chamber
From air cleaner

Fuel pressure solenoid

Turbocharger bypass valve

Fuel pressure regulator

EGR valve

Purge control valve

EVAP purge solenoid (ON: close)

EVAP canister

TC waste gate actuator <Front bank>

TC waste gate actuator <Rear bank>

Air cleaner

Air intake hose

EGR solenoid (ON: close)
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

<table>
<thead>
<tr>
<th>Name</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive crankcase ventilation valve</td>
<td>A</td>
</tr>
</tbody>
</table>

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>

<table>
<thead>
<tr>
<th>Name</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaporative emission canister</td>
<td>B</td>
</tr>
<tr>
<td>Evaporative emission purge solenoid</td>
<td>A</td>
</tr>
</tbody>
</table>

---

![Diagram](7FU1025)

![Diagram](7FU1029)

![Diagram](7EM0131)
## EMISSION CONTROL SYSTEMS – Evaporative Emission Control System

### Name Symbol

<table>
<thead>
<tr>
<th>Name</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaporative emission canister</td>
<td>B</td>
</tr>
<tr>
<td>Evaporative emission purge solenoid</td>
<td>A</td>
</tr>
<tr>
<td>Purge control valve &lt;Turbo&gt;</td>
<td>C</td>
</tr>
</tbody>
</table>
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**

<table>
<thead>
<tr>
<th>Engine operating condition</th>
<th>Applying vacuum</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idling</td>
<td>375 mmHg (14.8 in.Hg)</td>
<td>Vacuum is maintained</td>
</tr>
<tr>
<td>3,000 rpm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**When engine is hot — engine coolant temperature: 70°C (158°F) or higher**

<table>
<thead>
<tr>
<th>Engine operating condition</th>
<th>Applying vacuum</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idling</td>
<td>375 mmHg (14.8 in.Hg)</td>
<td>Vacuum is maintained</td>
</tr>
<tr>
<td>3,000 rpm within three minutes after starting engine</td>
<td>Try applying vacuum</td>
<td>Vacuum leaks</td>
</tr>
<tr>
<td>3,000 rpm after three minutes have elapsed after starting engine</td>
<td>375 mmHg (14.8 in.Hg)</td>
<td>Vacuum will be maintained momentarily, after which it will leak.</td>
</tr>
</tbody>
</table>

**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**

<table>
<thead>
<tr>
<th>Engine operating condition</th>
<th>Applying vacuum</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>3,000 rpm</td>
<td>375 mmHg (14.8 in.Hg)</td>
<td>Vacuum is maintained</td>
</tr>
</tbody>
</table>

**When engine is hot — engine coolant temperature: 70°C (158°F) or higher**

<table>
<thead>
<tr>
<th>Engine operating condition</th>
<th>Applying vacuum</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>3,000 rpm within three minutes after starting engine</td>
<td>Try applying vacuum</td>
<td>Vacuum leaks</td>
</tr>
</tbody>
</table>
| 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**

<table>
<thead>
<tr>
<th>Applying vacuum</th>
<th>Engine operating condition</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>375 mmHg (14.8 in.Hg.)</td>
<td>Idling</td>
<td>Vacuum is maintained</td>
</tr>
<tr>
<td></td>
<td>Sudden racing</td>
<td>Vacuum leaks</td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>Hand vacuum pump vacuum</th>
<th>Normal condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 mmHg (0 in.Hg.)</td>
<td>Air does not blow through</td>
</tr>
<tr>
<td>(No vacuum is applied)</td>
<td></td>
</tr>
<tr>
<td>200 mmHg (8.0 in.Hg.) or more</td>
<td>Air blow through</td>
</tr>
</tbody>
</table>

(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.

<table>
<thead>
<tr>
<th>Battery voltage</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>When applied</td>
<td>Vacuum leaks</td>
</tr>
<tr>
<td>When discontinued</td>
<td>Vacuum is maintained</td>
</tr>
</tbody>
</table>
(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

<table>
<thead>
<tr>
<th>Name</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGR solenoid &lt;California&gt;</td>
<td>C</td>
</tr>
<tr>
<td>EGR valve &lt;California&gt;</td>
<td>B</td>
</tr>
<tr>
<td>EGR valve &lt;California&gt;</td>
<td>A</td>
</tr>
</tbody>
</table>

A

EGR valve

B

EGR temperature sensor

C

EGR solenoid
EMISSION CONTROL SYSTEMS

Exhaust Gas Recirculation (EGR) System

**<DOHC>**

**Table: EGR Components**

<table>
<thead>
<tr>
<th>Name</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGR solenoid &lt;California — Non Turbo, Turbo&gt;</td>
<td>C</td>
</tr>
<tr>
<td>EGR temperature sensor &lt;California — Non Turbo, Turbo&gt;</td>
<td>B</td>
</tr>
<tr>
<td>EGR valve &lt;California — Non Turbo, Turbo&gt;</td>
<td>A</td>
</tr>
</tbody>
</table>

**Diagram:**

- **A:** EGR valve
- **B:** EGR temperature sensor
- **C:** EGR solenoid
EMISSION CONTROL SYSTEMS – Exhaust Gas Recirculation (EGR) System

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>**

<table>
<thead>
<tr>
<th>Engine operation</th>
<th>Normal state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Race the engine by rapidly press in the</td>
<td>The negative pressure does not</td>
</tr>
<tr>
<td>accelerator pedal.</td>
<td>vary. (Atmospheric pressure)</td>
</tr>
</tbody>
</table>

**<Warm condition of engine>**

<table>
<thead>
<tr>
<th>Engine operation</th>
<th>Normal state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Race the engine by rapidly press in the</td>
<td>The negative pressure rises</td>
</tr>
<tr>
<td>accelerator pedal.</td>
<td>to 100 mmHg (3.9 in.Hg) or more.</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Applying vacuum</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>45 mmHg (1.8 in.Hg.) or less</td>
<td>Air does not blow through</td>
</tr>
<tr>
<td>230 mmHg (9.1 in.Hg.) or more</td>
<td>Air blows through</td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>Temperature °C(°F)</th>
<th>Resistance kΩ</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 (122)</td>
<td>60-83</td>
</tr>
<tr>
<td>100 (212)</td>
<td>11 – 14</td>
</tr>
</tbody>
</table>

**INSTALLATION**

Install the EGR temperature sensor tighten to specified torque.

*Specified tightening torque: 11 Nm (8 ft.lbs.)*
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.

<table>
<thead>
<tr>
<th>Battery voltage</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>When applied</td>
<td>Vacuum is maintained</td>
</tr>
<tr>
<td>When discontinued</td>
<td>Vacuum leaks</td>
</tr>
</tbody>
</table>

(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

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.

C & D Riley Enterprises Ltd., P.O. Box 243, Amherstburg, Ontario N9V 2Z4

Telephone (519) 736-4600

FAX (519) 736-8433

INTERNATIONAL

CHRYSLER INTERNATIONAL

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 Fannington Road, Livonia, Michigan 48150, U.S.A.

MILLER SPECIAL TOOLS
SPX Corporation

Telephone (313) 522-6717

FAX (313) 522-6505