

# 2007 Mazda CX-7 Workshop Manual

## FOREWORD

This manual contains on-vehicle service and/or diagnosis procedures for the Mazda CX-7.

For proper repair and maintenance, a thorough familiarization with this manual is important, and it should always be kept in a handy place for quick and easy reference.

All the contents of this manual, including drawings and specifications, are the latest available at the time of printing. As modifications affecting repair or maintenance occur, relevant information supplementary to this volume will be made available at Mazda dealers. This manual should be kept up-to-date.

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**Mazda Motor Corporation  
HIROSHIMA, JAPAN**

## APPLICATION:

This manual is applicable to vehicles beginning with the Vehicle Identification Numbers (VIN), and related materials shown on the following page.

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# VEHICLE IDENTIFICATION NUMBERS (VIN)

JM3 ER29L\*7# 100001—  
JM3 ER293\*7# 100001—

## RELATED MATERIALS

| Material Name  | MNAO Part No.   | Mazda Material No. |
|--|-----------------|--------------------|
| Mazda CX-7 2007 Service Highlights                                   | 9999-95-045F-07 | 3416-1U-06B        |
| Engine Workshop Manual L3 WITH TC                                    | 9999-95-0L3T-06 | 1833-1U-05H        |
| Automatic Transaxle and Transfer Workshop Manual<br>AW6A-EL AW6AX-EL | 9999-95-0AW6-07 | 1874-1U-06B        |
| Mazda CX-7 Bodyshop Manual   | 9999-95-093F-07 | 3419-1U-06C        |
| Mazda CX-7 2007 Wiring Diagram                                       | 9999-95-068G-07 | 5666-1U-06B        |

# GENERAL INFORMATION

**00**  
SECTION

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**GENERAL INFORMATION . . . . 00-00**

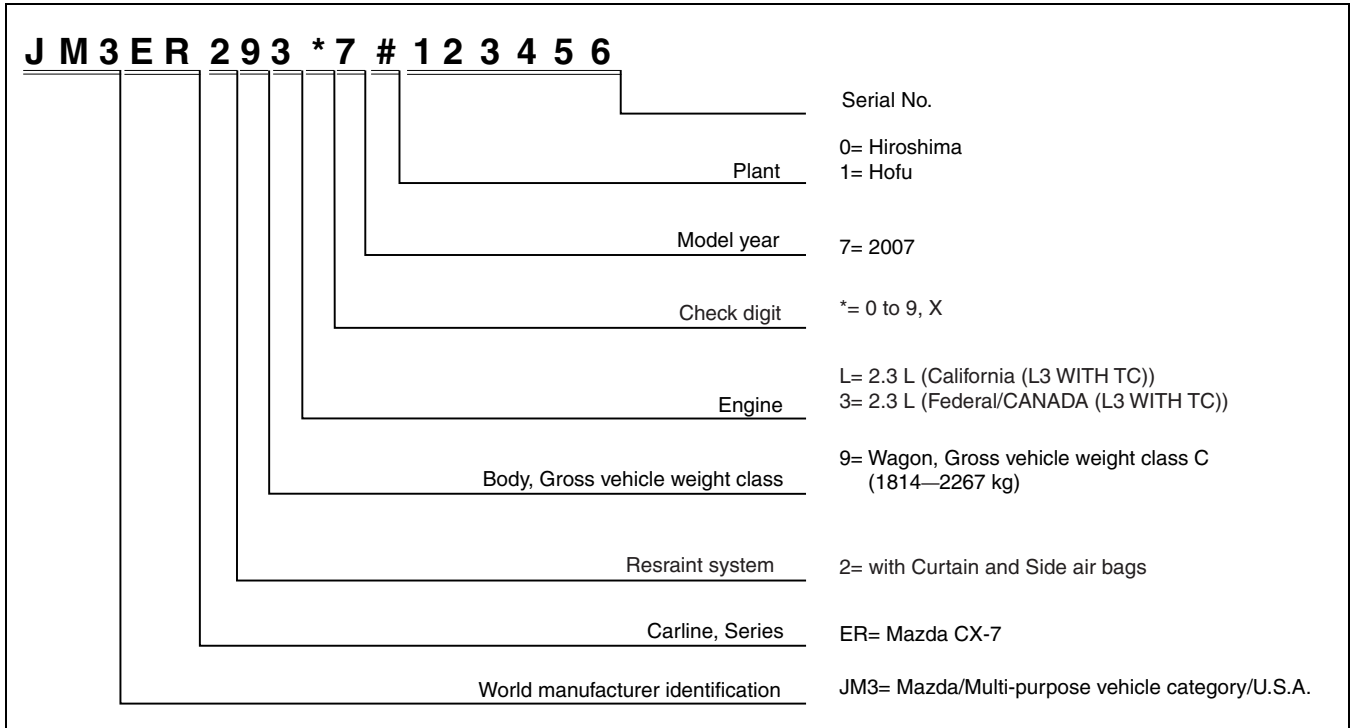
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# GENERAL INFORMATION

## VEHICLE IDENTIFICATION NUMBER (VIN) CODE

id000000100200



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## VEHICLE IDENTIFICATION NUMBER (VIN)

id000000100300

JM3 ER29L\*7# 100001—  
JM3 ER293\*7# 100001—

## HOW TO USE THIS MANUAL

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### Range of Topics

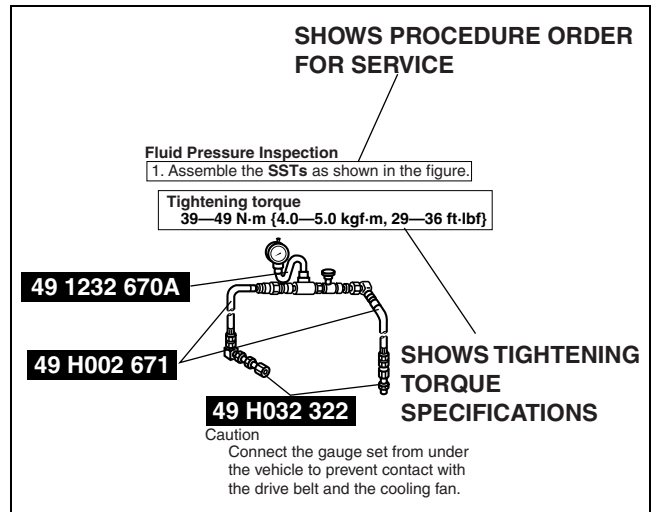
- This manual contains procedures for performing all required service operations. The procedures are divided into the following five basic operations:
  - Removal/Installation
  - Disassembly/Assembly
  - Replacement
  - Inspection
  - Adjustment
- Simple operations which can be performed easily just by looking at the vehicle (i.e., removal/installation of parts, jacking, vehicle lifting, cleaning of parts, and visual inspection) have been omitted.

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### Service Procedure

#### Inspection, adjustment

- Inspection and adjustment procedures are divided into steps. Important points regarding the location and contents of the procedures are explained in detail and shown in the illustrations.



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# GENERAL INFORMATION

## Repair procedure

1. Most repair operations begin with an overview illustration. It identifies the components, shows how the parts fit together, and describes visual part inspection. However, only removal/installation procedures that need to be performed methodically have written instructions.
2. Expendable parts, tightening torques, and symbols for oil, grease, and sealant are shown in the overview illustration. In addition, symbols indicating parts requiring the use of special service tools or equivalent are also shown.
3. Procedure steps are numbered and the part that is the main point of that procedure is shown in the illustration with the corresponding number. Occasionally, there are important points or additional information concerning a procedure. Refer to this information when servicing the related part.

**Procedure**

↓

①

↑

②

↓

"Removal/Installation" Portion

---

"Inspection After Installation" Portion

**SHOWS SERVICE ITEM (S)**

**INDICATES RELEVANT REFERENCES THAT NEED TO BE FOLLOWED DURING INSTALLATION**

**SHOWS SPECIAL SERVICE TOOL (SST) FOR SERVICE OPERATION**

**SHOWS APPLICATION POINTS OF GREASE, ETC.**

**SHOWS EXPENDABLE PARTS**

**SHOWS DETAILS**

**SHOWS TIGHTENING TORQUE UNITS**

**SHOWS REFERRAL NOTES FOR SERVICE**

**LOWER TRAILING LINK, UPPER TRAILING LINK REMOVAL/INSTALLATION**

1. Jack up the rear of the vehicle and support it with safety stands.
2. Remove the undercover. (See 01-10-4 Undercover Removal)
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.
5. Inspect the rear wheel alignment and adjust it if necessary.

**SHOWS PROCEDURE ORDER FOR SERVICE**

**SHOWS TIGHTENING TORQUE SPECIFICATIONS**

44-60 (4.4-8.2, 32-44)

94-116 (9.5-11.9, 69-96)

⑨ SST

⑩ SST R

⑪

⑫

⑬ 43-56 (4.3-5.8, 32-41)

⑭ R

⑮

⑯ SST R

⑰

⑱ 118-156 (12.0-16.0, 87-115)

⑲ R

**SHOWS REFERRAL NOTES FOR SERVICE**

|   |   |    |   |
|---|---|----|---|
| 1 | Split pin   | 7  | Split pin   |
| 2 | Nut   | 8  | Nut   |
| 3 | Lower trailing link ball joint<br>(See 02-14-5 Lower Trailing Link Ball Joint Removal Note) | 9  | Upper trailing link ball joint<br>(See 02-14-5 Upper Trailing Link Ball Joint Removal Note) |
| 4 | Bolt  | 10 | Nut   |
| 5 | Lower trailing link   | 11 | Upper trailing link   |
| 6 | Dust boot (lower trailing link)   | 12 | Dust boot (upper trailing link)   |

**Lower Trailing Link Ball Joint, Upper Trailing Link Ball Joint Removal Note**

- Remove the ball joint using the SSTs.

**SHOWS SPECIAL SERVICE TOOL (SST) NO.**

49 T028 304 UPPER TRAILING LINK

49 T028 305 LOWER TRAILING LINK

49 T028 303

KNUCKLE









**SHOWS REFERRAL NOTES FOR SERVICE**

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## GENERAL INFORMATION

### Symbols

- There are eight symbols indicating oil, grease, fluids, sealant, and the use of **SST or equivalent. use. These symbols show application points or use of these materials during service.**

| Symbol  | Meaning                                       | Kind  |
|---|---|---|
|    | Apply oil                                     | New appropriate engine oil or gear oil                  |
|    | Apply brake fluid                             | New appropriate brake fluid                             |
|    | Apply automatic transaxle/ transmission fluid | New appropriate automatic transaxle/ transmission fluid |
|    | Apply grease                                  | Appropriate grease                                      |
|    | Apply sealant                                 | Appropriate sealant                                     |
|    | Apply petroleum jelly                         | Appropriate petroleum jelly                             |
|  | Replace part                                  | O-ring, gasket, etc.                                    |
|  | Use SST or equivalent                         | Appropriate tools                                       |

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### Advisory Messages

- You will find several **Warnings, Cautions, Notes, Specifications and Upper and Lower Limits in this manual.**

### Warning

- A Warning indicates a situation in which serious injury or death could result if the warning is ignored.

### Caution

- A Caution indicates a situation in which damage to the vehicle or parts could result if the caution is ignored.

### Note

- A Note provides added information that will help you to complete a particular procedure.

### Specification

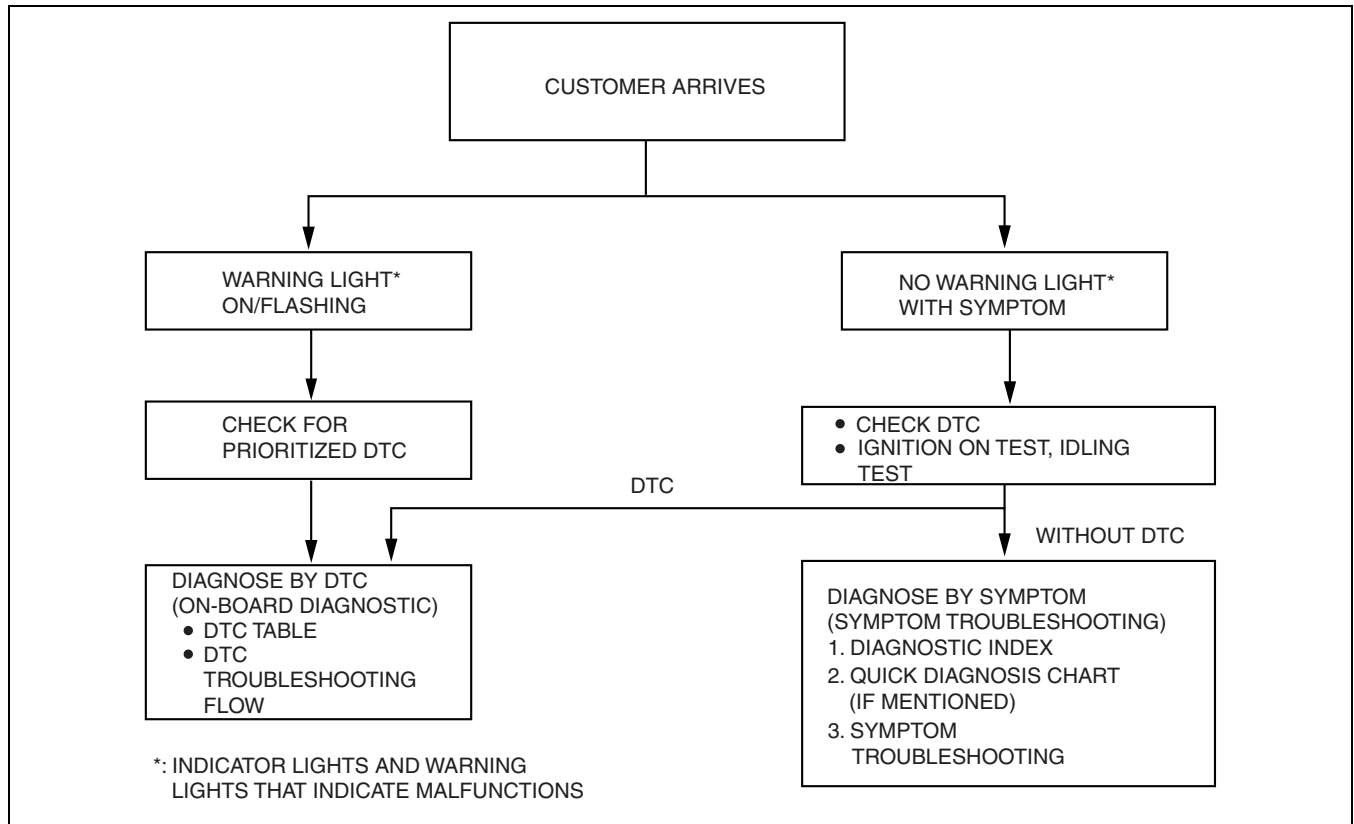
- The values indicate the allowable range when performing inspections or adjustments.

### Upper and lower limits

- The values indicate the upper and lower limits that must not be exceeded when performing inspections or adjustments.

# GENERAL INFORMATION

## Troubleshooting Procedure Basic flow of troubleshooting



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### DTC troubleshooting flow (on-board diagnostic)

- Diagnostic trouble codes (DTCs) are important hints for repairing malfunctions that are difficult to simulate. Perform the specific DTC diagnostic inspection to quickly and accurately diagnose the malfunction.
- The on-board diagnostic function is used during inspection. When a DTC is shown specifying the cause of a malfunction, continue the diagnostic inspection according to the items indicated by the on-board diagnostic function.

### Diagnostic index

- The diagnostic index lists the symptoms of specific malfunctions. Select the symptoms related or most closely relating to the malfunction.

### Quick diagnosis chart (If mentioned)

- The quick diagnosis chart lists diagnosis and inspection procedures to be performed specifically relating to the cause of the malfunction.

### Symptom troubleshooting

- Symptom troubleshooting quickly determines the location of the malfunction according to symptom type.



# GENERAL INFORMATION

## Procedures for Use

### Using the basic inspection (section 05)

- Perform the basic inspection procedure before symptom troubleshooting.
- Perform each step in the order shown.
- The reference column lists the location of the detailed procedure for each basic inspection.
- Although inspections and adjustments are performed according to the reference column procedures, if the cause of the malfunction is discovered during basic inspection, continue the procedures as indicated in the action column.

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| STEP | INSPECTION   | Yes | ACTION   |
|------|--|-----|--|
| 1    | Perform the mechanical system test.<br>(See 05-13-3 MECHANICAL SYSTEM TEST.)<br>Is mechanical system normal?   | Yes | Go to the next step.   |
|      |  | No  | Repair or replace any malfunctioning parts according to the inspection result.   |
| 2    | Turn the ignition switch to the ON position. When the selector lever is moved, does the selector illumination indicate synchronized position to the lever location? Also, when other ranges are selected from N or P during idling, does the vehicle move within 1—2 s?  | Yes | Go to next step.   |
|      |  | No  | Inspect the selector lever and TR switch. Repair or replace malfunctioning parts.<br>(See 05-14-5 SELECTOR LEVER INSPECTION.)<br>(See 05-13-10 TRANSMISSION RANGE (TR) SWITCH INSPECTION.)<br>If the selector lever and TR switch are normal, go to the next step. |
| 3    | Inspect the ATF color condition.<br>(See 05-13-8 AUTOMATIC TRANSMISSION FLUID (ATF) INSPECTION.)<br>Are ATF color and odor normal?   | Yes | Go to the next step.   |
|      |  | No  | Repair or replace any malfunctioning parts according to the inspection result.<br>Flush ATX and cooler line as necessary.  |
| 4    | Perform the line pressure test.<br>(See 05-13-3 Line Pressure Test.)<br>Is the line pressure normal?   | Yes | Go to the next step.   |
|      |  | No  | Repair or replace any malfunctioning parts according to the inspection result.   |
| 5    | Perform the stall test.<br>(See 05-13-4 Stall Speed Test.)<br>Is the stall speed normal?   | Yes | Go to the next step.   |
|      |  | No  | Repair or replace any malfunctioning parts according to the inspection result.   |
|      | Inspect the voltage at the following TCM terminals.<br>(See 05-13-29 TCM INSPECTION.)  | Yes | Go to the next step.   |
|      | <ul style="list-style-type: none"> <li>• Terminal 2J (TFT sensor)</li> <li>• Terminals 1D, 2B, 2C, 2E (TR switch)</li> <li>• Terminal 2G (turbine sensor)</li> <li>• Terminal 2D (down switch)</li> <li>• Terminal 2I (up switch)</li> <li>• Terminal 1E (M range switch)</li> <li>• Terminal 1W (steering shift switch)</li> </ul> Is the voltage normal? | No  | Repair or replace any malfunctioning parts according to the inspection result.   |

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# GENERAL INFORMATION

## Using the DTC troubleshooting flow

- DTC troubleshooting flow shows diagnostic procedures, inspection methods, and proper action to take for each DTC.

**TROUBLE CONDITION**

**DTC P0103**

**DETECTION CONDITION**  
describes the condition under which the DTC is detected.

**POSSIBLE CAUSE**  
describes possible point(s) of malfunction

Indicates the inspection step No. to be performed (01 and 05 section)

STEP shows the order of troubleshooting

INSPECTION describes the method to quickly determine the malfunctioning part(s).

|                            |   |
|----------------------------|---|
| <b>DTC P0103</b>           | <b>MAF circuit high input</b>   |
| <b>DETECTION CONDITION</b> | <p>PCM monitors input voltage from TP sensor after ignition key is turned on. If input voltage at PCM terminal 68 is above 8.25 V, PCM determines that TP circuit has malfunction.</p> <p><b>Diagnostic support note</b></p> <ul style="list-style-type: none"> <li>This is a continuous monitor (CCM).</li> <li>MIL illuminates if PCM detects the above malfunction during first drive cycle. Therefore, PENDING CODE is not available.</li> <li>FREEZE FRAME DATE is available.</li> <li>DTC is stored in the PCM memory.</li> </ul> |
| <b>POSSIBLE CAUSE</b>      | <ul style="list-style-type: none"> <li>MAF sensor malfunction</li> <li>Connector or terminal malfunction</li> <li>Open circuit in wiring between MAF sensor terminal D and PCM terminal 36</li> <li>Open circuit in MAF sensor ground circuit</li> </ul>  |

MAF SENSOR HARNESS SIDE CONNECTOR

PCM HARNESS SIDE CONNECTOR

Indicates the circuit to be inspected (01 and 05 section)

Indicates the connector related to the inspection

**ACTION**  
describes the appropriate action to be taken according to the result (Yes/No) of the INSPECTION.

Reference item(s) to perform ACTION.

| STEP | INSPECTION  |           | ACTION   |
|------|---|-----------|--|
| 1    | <b>VERIFY FREEZE FRAME DATA HAS BEEN RECORDED</b> <ul style="list-style-type: none"> <li>Has FREEZE FRAME DATA been recorded?</li> </ul>  | Yes<br>No | Go to next step.<br>Record FREEZE FRAME DATA on repair order, then go to next step.  |
| 2    | <b>VERIFY RELATED REPAIR INFORMATION AVAILABILITY</b> <ul style="list-style-type: none"> <li>Are related Service Bulletins and/or on-line repair information available?</li> </ul>  | Yes<br>No | Perform repair or diagnosis according to available repair information. If vehicle is not repaired, then go to next step.<br>Go to next step.                     |
| 3    | <b>VERIFY CURRENT INPUT SIGNAL STATUS IS CONCERN INTERMITTENT OR CONSTANT</b> <ul style="list-style-type: none"> <li>Connect diagnostic tool to DLC-2.</li> <li>Start engine.</li> <li>Access MAF V PID using diagnostic tool.</li> <li>Is MAF V PID within 0.2 - 8.3 V?</li> </ul>                   | Yes<br>No | Intermittent concern is existing. Go to INTERMITTENT CONCERNS TROUBLESHOOTING procedure. (See 01-03-33 INTERMITTENT CONCERN TROUBLESHOOTING)<br>Go to next step. |
| 4    | <b>INSPECT POOR CONNECTION OF MAF SENSOR CONNECTOR</b> <ul style="list-style-type: none"> <li>Turn ignition key to OFF.</li> <li>Disconnect MAF sensor connector.</li> <li>Check for poor connection (damaged, pulled-out terminals, corrosion etc.).</li> <li>Are there any malfunctions?</li> </ul> | Yes       | Repair or replace terminals, then go to Step 8.  |

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# GENERAL INFORMATION

## Using the diagnostic index

- Malfunction symptoms are listed in the diagnostic index under symptom troubleshooting.
- The exact malfunction symptoms can be selected by following the index.

| No. | TROUBLESHOOTING ITEM                              | DESCRIPTION  | Page   |
|-----|---|--|--|
| 1   | Melting of main or other fuses                    | —  | (See 01-03-6 MELT NO.1 MAIN OR OTHER FUSE)                 |
| 2   | MIL comes on                                      | MIL is illuminated incorrectly.  | (See 01-03-7 NO.2 MIL COMES ON)                            |
| 3   | Will not crank                                    | Starter does not work.   | (See 01-03-8 NO. 3 WILL NOT CRANK)                         |
| 4   | Hard start/long crank/erratic start/erratic crank | Starter cranks engine at normal speed but engine requires excessive cranking time before starting.     | (See 01-03-9 NO. 4 HARD START/ LONG CRANK/ERRATIC CRANK)   |
| 5   | Engine stalls.      After start/at idle           | Engine stops unexpectedly at idle and/or after start.  | (See 01-03-11 NO. 5 ENGINE-STALLS AFTER START/AT IDLE)     |
| 6   | Cranks normally but will not start                | Starter cranks engine at normal speed but engine will not run.   | (See 01-03-15 NO.6 CRANKS NORMALLY BUT WILL NOT START)     |
| 7   | Slow return to idle                               | Engine takes more time than normal to return to idle speed.  | (See 01-03-19 NO. 7 SLOW RERUN TO IDLE)                    |
| 8   | Engine runs rough/rotling                         | Engine speed fluctuates between specified idle speed and lower speed and engine shakes excessively.    | (See 01-03-20 NO. 8 ENGINE RUNS ROUGH/ROLLING IDLE )       |
| 9   | Fast idle/runs on                                 | Engine speed continues at fast idle after warm-up.<br>Engine runs after ignition key is turned to OFF. | (See 01-03-23 NO. 9 FAST IDLE/RUNS ON)                     |
| 10  | Low idle/stalls during deceleration               | Engine stops unexpectedly at beginning of deceleration or recovery from deceleration.                  | (See 01-03-24 NO. 10 LOW IDLE/ STALLS DURING DECELERATION) |

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# GENERAL INFORMATION

## Using the quick diagnosis chart

- The chart lists the relation between the symptom and the cause of the malfunction.
- The chart is effective in quickly narrowing down the relation between symptom and cause of the malfunction. It also specifies a range of common causes when multiple malfunction symptoms occur.
- The appropriate diagnostic inspection relating to a malfunction cause as specified by the symptoms can be selected by looking down the diagnostic inspection column of the chart.

**① CHOOSE THE ACTUAL SYMPTOM**

**② PARTS WHICH MAY BE THE CAUSE OF PROBLEMS**

SYMPTOM QUICK DIAGNOSTIC CHART

| Troubleshooting item |  | Possible factor                                      |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              |   |
|----------------------|--|--|--|---------------------------|---------------------|-----------------------------|-----------------------------|-----------------------|--------------------|-------------------------------|-------------------|-------------------------|--------------------------------|---|-------------------------------|--|---|--------------------------------|---|--|--|--------------|---|
|                      |  | Starter motor malfunction (Mechanical or electrical) | Starter circuit including ignition switch open | Improper engine oil level | Low or dead battery | Charging system malfunction | Improper engine compression | Improper valve timing | Hydrolocked engine | Improper engine oil viscosity | Improper dipstick | Base engine malfunction | Drive plate or flywheel seized | Improper tension or damaged drive belts | Improper engine coolant level | Water and anti-freeze mixture improperly | Cooling system malfunction (Radiator, hoses, overflow system, thermostat, etc.) | Cooling fan system malfunction | Engine or transaxle mounts improperly installed | Cooling fan or condenser fan seat improperly | Accelerator cable free play mis-adjustment | Fuel quality |   |
| 1                    | Melts of main or other fuse                              |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              |   |
| 2                    | MIL comes on   |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              |   |
| 3                    | Will not crank   | x  | x  |                           | x                   | x                           |                             |                       | x                  |                               |                   |                         | x                              |   |                               |  |   |                                |   |  |  |              |   |
| 4                    | Hard to start/long crank/erratic start/erratic crank     |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
| 5                    | Engine stalls  |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
|                      | After start/at idle                                      |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
| 6                    | Cranks normally but will not start                       |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
| 7                    | Slow return to idle                                      |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
| 8                    | Engine runs rough/rolling idle                           |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
| 9                    | Fast idle/runs on  |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
| 10                   | Low idle/stalls during deceleration                      |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              |   |
|                      | Engine stalls/quits                                      |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
|                      | Acceleration/cruise                                      |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
|                      | Engine runs rough  |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
|                      | Acceleration/cruise                                      |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
|                      | Misses   |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
|                      | Acceleration/cruise                                      |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
|                      | Buck/jerk  |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
|                      | Acceleration/cruise/ deceleration                        |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
|                      | Hesitation/stumble                                       |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
|                      | Acceleration   |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
|                      | Surges   |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
|                      | Acceleration/cruise                                      |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
| 12                   | Lack/loss of power                                       |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
|                      | Acceleration/cruise                                      |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
| 13                   | Knocking/pinging   |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
|                      | Acceleration/cruise                                      |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
| 14                   | Poor fuel economy  |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
| 15                   | Emissions compliance                                     |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
| 16                   | High oil consumption/leakage                             |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
| 17                   | Cooling system concerns                                  |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
|                      | Overheating  |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
| 18                   | Cooling system concerns                                  |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
|                      | Runs cold  |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
| 19                   | Exhaust smoke  |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
| 20                   | Fuel odor (in engine compartment)                        |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
| 21                   | Engine noise   |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
| 22                   | Vibration concerns (engine)                              |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
| 23                   | A/C does not work sufficiently                           |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
| 24                   | A/C always on/ A/C compressor runs continuously          |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
| 25                   | A/C does not cut off under wide open throttle conditions |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
| 26                   | Exhaust sulphur smell                                    |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
| 27                   | Fuel refill concerns                                     |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
| 28                   | Fuel filling shut off issues                             |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
| 29                   | Intermittent concerns                                    |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
| 30                   | Constant voltage   |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
| 31                   | Spark plug condition                                     |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
| 32                   | Automatic transaxle concerns                             |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |
|                      | Upshift/downshift/ engagement                            |  |  |                           |                     |                             |                             |                       |                    |                               |                   |                         |                                |   |                               |  |   |                                |   |  |  |              | x |

(See 05-01 AUTOMATIC TRANSAXLE SYMPTOM TROUBLESHOOTING)

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# GENERAL INFORMATION

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## Using the symptom troubleshooting

- Symptom troubleshooting shows diagnostic procedures, inspection methods, and proper action to be taken for each trouble symptom.

**DESCRIPTION**  
describes what kind of TROUBLE SYMPTOM

**TROUBLE SYMPTOM**

|  |   |  |
|--|---|--|
| <b>14</b>  | <b>Engine flares up or slips when upshifting or down shifting</b>   |  |
| <b>DESCRIPTION</b>   | <ul style="list-style-type: none"> <li>• When accelerator pedal is depressed for driveway, engine speed increase but vehicle speed increase slowly.</li> <li>• When accelerator is depressed while driving, engine speed increases but vehicle not.</li> </ul>  |  |
| <b>POSSIBLE CAUSE</b><br>describes possible point of malfunction | <ul style="list-style-type: none"> <li>• There is clutch slip because clutch is stuck or line pressure is low.                             <ul style="list-style-type: none"> <li>— Clutch stuck, slippage (forward clutch, 3-4 clutch, 2-4 brake band, one-way clutch 1, one-way clutch 2)                                     <ul style="list-style-type: none"> <li>• Line pressure low</li> <li>• Malfunction or mis-adjustment of TP sensor</li> <li>• Malfunction of VSS</li> </ul> </li> <li>• Malfunction of input/turbine speed sensor</li> <li>• Malfunction of sensor ground</li> <li>• Malfunction of shift solenoid A, B or C</li> <li>• Malfunction of TCC solenoid valve</li> <li>• Malfunction of body ground</li> <li>• Malfunction of throttle cable</li> <li>• Malfunction of throttle valve body</li> </ul> </li> <li>— Poor operating of mechanical pressure                                     <ul style="list-style-type: none"> <li>• Selector lever position disparity</li> <li>• TR switch position disparity</li> </ul> </li> </ul> |  |
| <b>STEP</b> shows the order of troubleshooting.                  | <p style="text-align: center;"><b>Note</b></p> <ul style="list-style-type: none"> <li>• Before following troubleshooting steps, make sure that Automatic Transaxle On-board Diagnostic and Automatic Transaxle Basic Inspection are conducted.</li> </ul>   |  |

**Reference item(s) for additional information to perform INSPECTION.**

**INSPECTION** describes the method to quickly determine the malfunctioning part(s).

**Diagnostic procedure**

| STEP | INSPECTION   |     | ACTION   |
|------|--|-----|--|
| 1    | • Is line pressure okay?   | Yes | Go to next step.   |
|      |  | No  | Repair or replace any defective parts according to inspection results.   |
| 2    | • Is shift point okay?<br>(See 05-17-5 ROAD TEST)  | Yes | Go to next step  |
|      |  | No  | Go to symptom troubleshooting No.9 "Abnormal shift".   |
| 3    | <ul style="list-style-type: none"> <li>• Stop engine and turn ignition switch on.</li> <li>• Connect diagnostic tool to DLC-2.</li> <li>• Simulate SHIFT A, SHIFT B and SHIFT C PIDs for ON.</li> <li>• Is operating sound of shift solenoids heard?</li> </ul>  | Yes | <ul style="list-style-type: none"> <li>• Overhaul control valve body and repair or replace any defective parts.<br/>(See ATX Workshop Manual GF4A-EL (1666-1A-99F))</li> <li>• If problem remains, replace or overhaul transaxle and repair or replace defective parts.<br/>(See 05-17-15 AUTOMATIC TRANSAXLE REMOVEVAL/INSTALLATION)</li> </ul>                                 |
|      |  | No  | <ul style="list-style-type: none"> <li>• Inspect for bend, damage, corrosion or loose connection if shift solenoid A, B, or C terminal on ATX.</li> <li>• Inspect for shift solenoid mechanical stuck.<br/>(See 05-17-14 Inspection of Operation)</li> <li>• If shift solenoids are okay, inspect for open or short circuit between PCM connector terminal A, B or C.</li> </ul> |
| 4    | <ul style="list-style-type: none"> <li>• Verify test results.                             <ul style="list-style-type: none"> <li>— If okay, return to diagnostic index to service any additional symptoms.</li> <li>— If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis.</li> <li>— If vehicle is repaired, troubleshooting completed.</li> <li>— If vehicle is not repaired or additional diagnostic information is not available, replace or reprogram PCM.</li> </ul> </li> </ul> |     |  |

**ACTION** describes the appropriate action to be taken according to the result (Yes/No) of the INSPECTION.

**How to perform ACTION is described in the relative material shown.**

**Reference item(s) to perform ACTION.**

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# GENERAL INFORMATION

## UNITS

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|                     |  |
|---------------------|--|
| Electrical current  | A (ampere)   |
| Electric power      | W (watt)   |
| Electric resistance | ohm  |
| Electric voltage    | V (volt)   |
| Length              | mm (millimeter)  |
|                     | in (inch)  |
| Negative pressure   | kPa (kilo pascal)  |
|                     | mmHg (millimeters of mercury)                              |
|                     | inHg (inches of mercury)                                   |
| Positive pressure   | kPa (kilo pascal)  |
|                     | kgf/cm <sup>2</sup> (kilogram force per square centimeter) |
|                     | psi (pounds per square inch)                               |
| Torque              | N·m (Newton meter)   |
|                     | kgf·m (kilogram force meter)                               |
|                     | kgf·cm (kilogram force centimeter)                         |
|                     | ft·lbf (foot pound force)                                  |
|                     | in·lbf (inch pound force)                                  |
| Volume              | L (liter)  |
|                     | US qt (U.S. quart)   |
|                     | Imp qt (Imperial quart)                                    |
|                     | ml (milliliter)  |
|                     | cc (cubic centimeter)                                      |
|                     | cu in (cubic inch)   |
|                     | fl oz (fluid ounce)  |
| Weight              | g (gram)   |
|                     | oz (ounce)   |

### Conversion to SI Units (Système International d'Unités)

- All numerical values in this manual are based on SI units. Numbers shown in conventional units are converted from these values.

### Rounding Off

- Converted values are rounded off to the same number of places as the SI unit value. For example, if the SI unit value is 17.2 and the value after conversion is 37.84, the converted value will be rounded off to 37.8.

### Upper and Lower Limits

- When the data indicates upper and lower limits, the converted values are rounded down if the SI unit value is an upper limit, and rounded up if the SI unit value is a lower limit. Therefore, converted values for the same SI unit value may differ after conversion. For example, consider 2.7 kgf/cm<sup>2</sup> in the following specifications:

**210— 260 kPa {2.1— 2.7 kgf/cm<sup>2</sup>, 30— 38 psi}**

**270— 310 kPa {2.7— 3.2 kgf/cm<sup>2</sup>, 39— 45 psi}**

- The actual converted values for 2.7 kgf/cm<sup>2</sup> are 265 kPa and 38.4 psi. In the first specification, 2.7 is used as an upper limit, so the converted values are rounded down to 260 and 38. In the second specification, 2.7 is used as a lower limit, so the converted values are rounded up to 270 and 39.

**SERVICE CAUTIONS**

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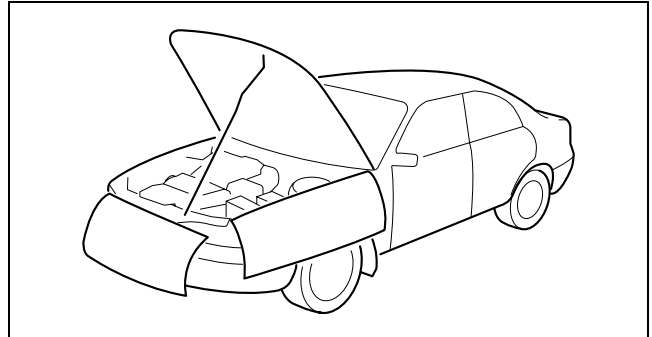
**Injury/damage Prevention Precautions**

- Depending on the vehicle, the cooling fan may operate suddenly even when the ignition switch is turned off. Therefore, keep hands and tools away from the cooling fan even if the cooling fan is not operating to prevent injury to personnel or damage to the cooling fan. Always disconnect the negative battery cable when servicing the cooling fan or parts near the cooling fan.

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**Protection of the Vehicle**

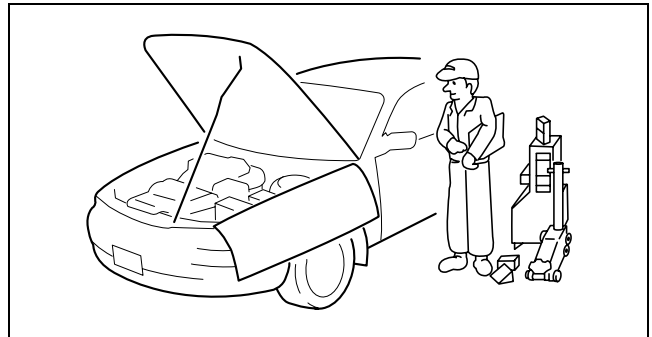
- Always be sure to cover fenders, seats and floor areas before starting work.



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**Preparation of Tools and Measuring Equipment**

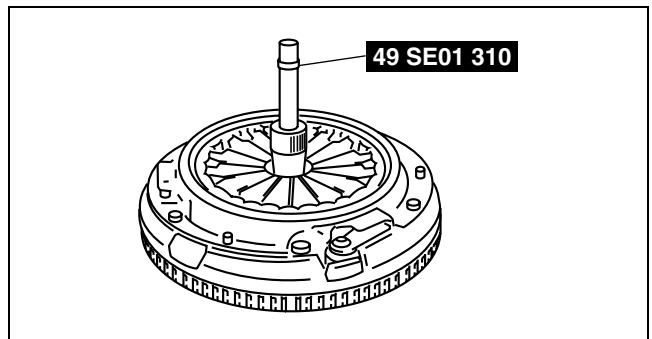
- Be sure that all necessary tools and measuring equipment are available before starting any work.



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**Special Service Tools**

- Use special service tools or the equivalent when they are required.



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**Malfunction Diagnosis System**

- Use the Mazda modular diagnostic system (M-MDS) for malfunction diagnosis.

### Disconnection of the Negative Battery Cable

- When working with the negative battery cable disconnected, wait for 1 min or more to allow the back up power supply of the SAS control module to deplete its stored power after the cable is disconnected.
- Disconnecting the battery cable will delete the memories of the clock, audio, and DTCs, etc. Therefore, it is necessary to note down the information stored in those memories before disconnecting the cable.
- If the battery had been disconnected during vehicle maintenance or for other reasons, the window will not fully close automatically. Initialize the power window system for the power window main switch and the sub switch (FR).  
(See 09-12-13 POWER WINDOW INITIALIZATION PROCEDURE)

#### Warning

- **When the negative battery cable is disconnected, the initialization setting of the steering angle sensor is cleared. Therefore, perform the initialization procedure after connecting the negative battery cable. (See 09-40-8 STEERING ANGLE SENSOR INITIALIZATION PROCEDURE.)**

### Oil Leakage Inspection

- Use either of the following procedures to identify the type of oil that is leaking:

#### Using UV light (black light)

1. Remove any oil on the engine or transaxle/transmission.

#### Note

- Referring to the fluorescent dye instruction manual, mix the specified amount of dye into the engine oil or ATF (or transaxle/transmission oil).

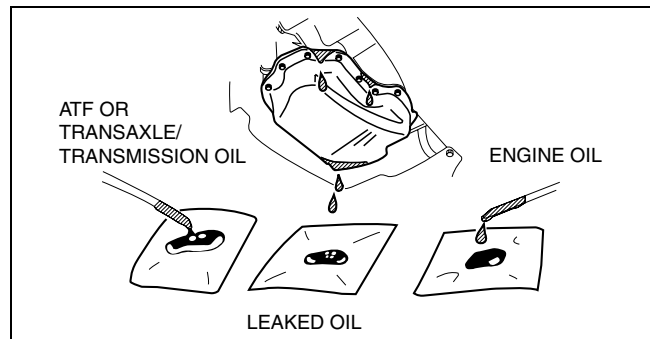
2. Pour the fluorescent dye into the engine oil or ATF (or transaxle/transmission oil).
3. Allow the engine to run for 30 min.
4. Inspect for dye leakage by irradiating with UV light (black light), and identify the type of oil that is leaking.
5. If no dye leakage is found, allow the engine to run for another 30 min. or drive the vehicle then reinspect.
6. Find where the oil is leaking from, then make necessary repairs.

#### Note

- To determine whether it is necessary to replace the oil after adding the fluorescent dye, refer to the fluorescent dye instruction manual.

#### Not using UV light (black light)

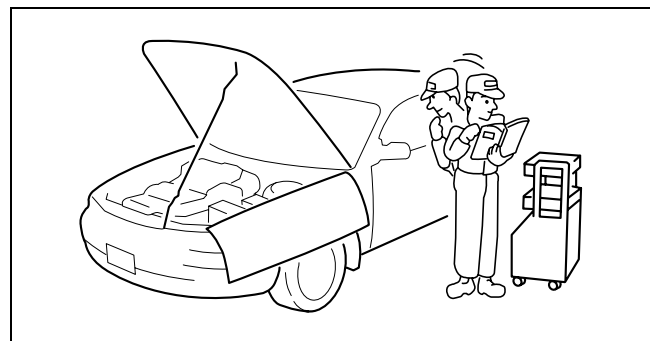
1. Gather some of the leaking oil using an absorbent white tissue.
2. Take samples of engine oil and ATF (or transaxle/transmission oil), both from the dipstick, and place them next to the leaked oil already on the tissue.
3. Compare the appearance and smell, and identify the type of oil that is leaking.
4. Remove any oil on the engine or transaxle/transmission.
5. Allow the engine to run for 30 min.
6. Check the area where the oil is leaking, then make necessary repairs.



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### Removal of Parts

- While correcting a problem, also try to determine its cause. Begin work only after first learning which parts and sub-components must be removed and disassembled for replacement or repair. After removing the part, plug all holes and ports to prevent foreign material from entering.



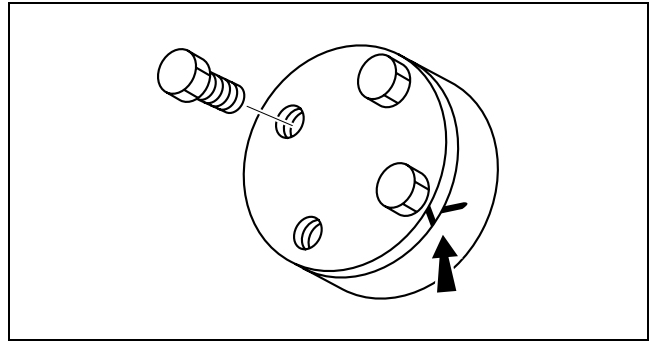
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## GENERAL INFORMATION

### Disassembly

- If the disassembly procedure is complex, requiring many parts to be disassembled, all parts should be marked in a place that will not affect their performance or external appearance, and identified so that reassembly can be performed easily and efficiently.

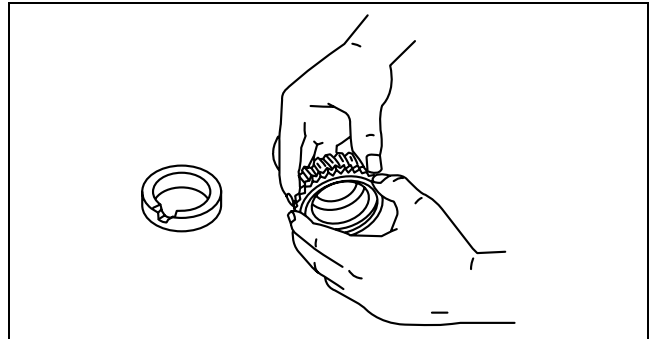


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### Inspection During Removal, Disassembly

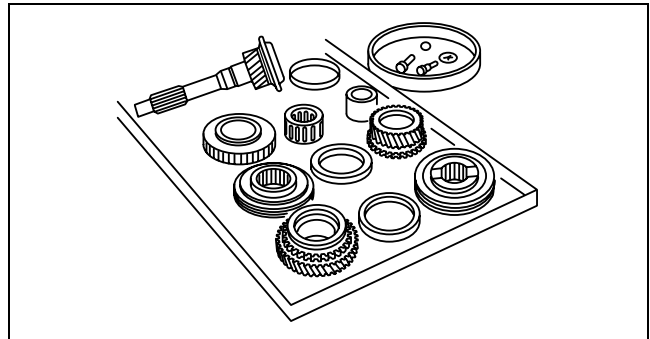
- When removed, each part should be carefully inspected for malfunction, deformation, damage and other problems.



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### Arrangement of Parts

- All disassembled parts should be carefully arranged for reassembly.
- Be sure to separate or otherwise identify the parts to be replaced from those that will be reused.



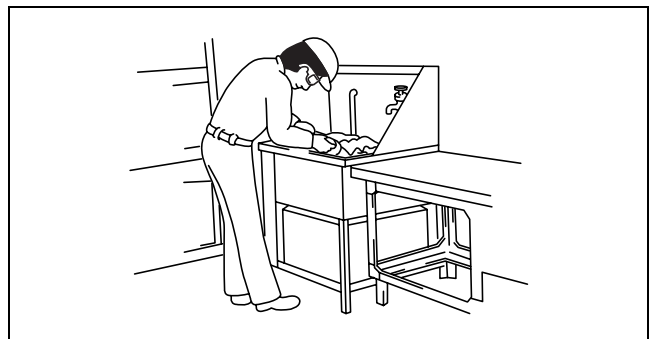
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### Cleaning of Parts

- All parts to be reused should be carefully and thoroughly cleaned in the appropriate method.

#### Warning

- **Using compressed air can cause dirt and other particles to fly out causing injury to the eyes. Wear protective eye wear whenever using compressed air.**

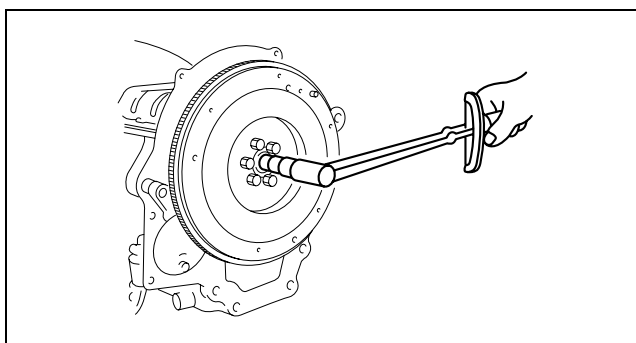


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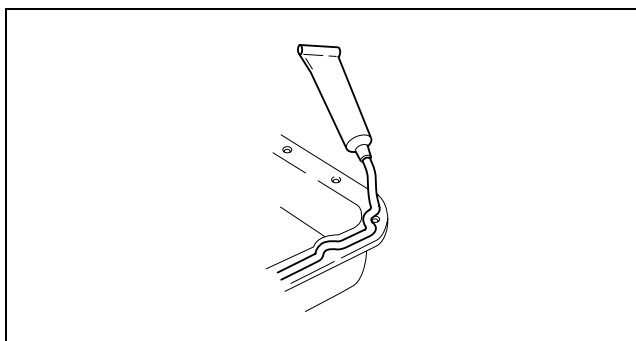
## GENERAL INFORMATION

### Reassembly

- Standard values, such as torques and certain adjustments, must be strictly observed in the reassembly of all parts.
- If removed, these parts should be replaced with new ones:
  - Oil seals
  - Gaskets
  - O-rings
  - Lock washers
  - Cotter pins
  - Nylon nuts
- Depending on location:
  - Sealant and gaskets, or both, should be applied to specified locations. When sealant is applied, parts should be installed before sealant hardens to prevent leakage.
  - Oil should be applied to the moving components of parts.
  - Specified oil or grease should be applied at the prescribed locations (such as oil seals) before reassembly.



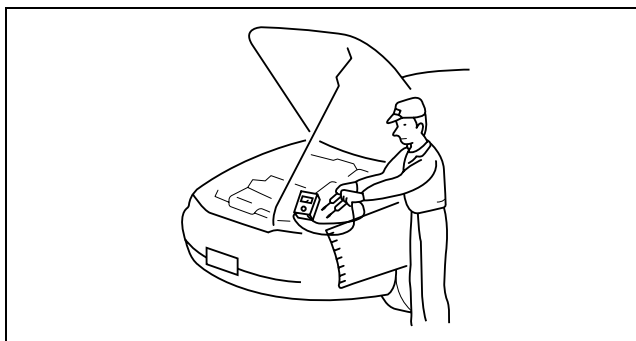
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### Adjustment

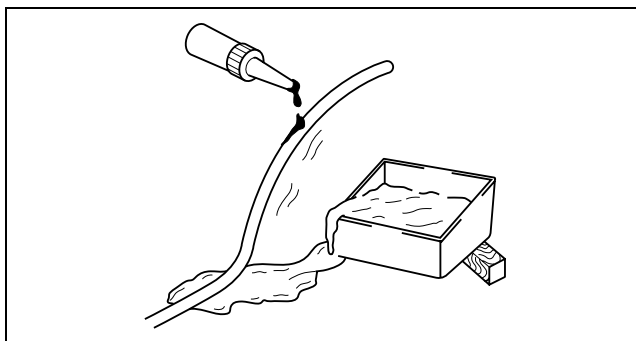
- Use suitable gauges and testers when making adjustments.



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### Rubber Parts and Tubing

- Prevent gasoline or oil from getting on rubber parts or tubing.

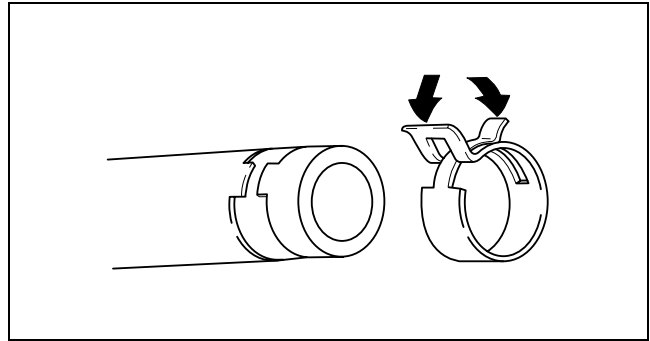


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## GENERAL INFORMATION

### Hose Clamps

- When reinstalling, position the hose clamp in the original location on the hose and squeeze the clamp lightly with large pliers to ensure a good fit.



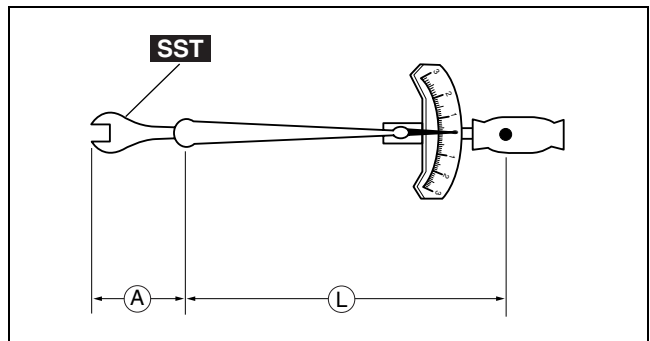
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### Torque Formulas

- When using a torque wrench-**SST** or equivalent combination, the specified torque must be recalculated due to the extra length that the **SST** or equivalent adds to the torque wrench. Recalculate the torque by using the following formulas. Choose the formula that applies to you.

| Torque Unit | Formula                             |
|-------------|-------------------------------------|
| N·m         | $N \cdot m \times [L / (L + A)]$    |
| kgf·m       | $kgf \cdot m \times [L / (L + A)]$  |
| kgf·cm      | $kgf \cdot cm \times [L / (L + A)]$ |
| ft·lbf      | $ft \cdot lbf \times [L / (L + A)]$ |
| in·lbf      | $in \cdot lbf \times [L / (L + A)]$ |



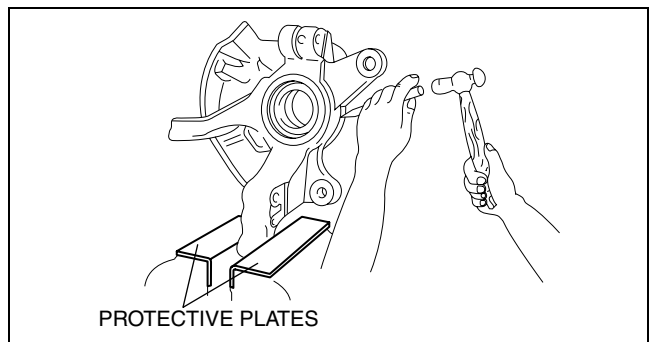
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A : The length of the **SST** past the torque wrench drive.

L : The length of the torque wrench.

### Vise

- When using a vise, put protective plates in the jaws of the vise to prevent damage to parts.



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### Dynamometer

- When inspecting and servicing the power train on the dynamometer or speedometer tester, pay attention to the following:
  - Place a fan, preferably a vehicle-speed proportional type, in front of the vehicle.
  - Make sure the vehicle is in a facility with an exhaust gas ventilation system.
  - Since the rear bumper might deform from the heat, cool the rear with a fan. (Surface of the bumper must be below **70°C {158°F}** degrees.)
  - Keep the area around the vehicle uncluttered so that heat does not build up.
  - Watch the water temperature gauge and do not overheat the engine.
  - Avoid added load to the engine and maintain normal driving conditions as much as possible.

## GENERAL INFORMATION

### Note

- When only the front or rear wheels are rotated on a chassis dynamometer or equivalent, the DSC CM determines that there is a malfunction in the DSC and illuminates the following lights:
  - ABS warning light
  - Brake system warning light
  - DSC indicator light
- If the above lights are illuminated, dismount the vehicle from the chassis dynamometer and turn the ignition switch to the LOCK position. Then, turn the ignition switch back to the ON position, run the vehicle at 10 km/h or more and verify that the warning lights go out. In this case, a DTC will be stored in the memory. Clear the DTC from the memory by following the memory clearing procedure [DSC] in the on-board diagnostic system. (See04-02-3 ON-BOARD DIAGNOSIS.)

### AWD inspection/service

#### Speedometer tester measurement

#### Caution

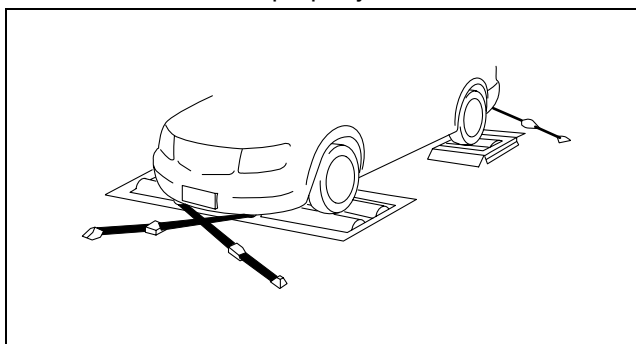
- Install the tension bar (chain wire) to the tie down hook and secure the vehicle to prevent it from rolling and running off.
- Do not accelerate suddenly from a standstill or accelerate/decelerate rapidly.

#### Free roller type

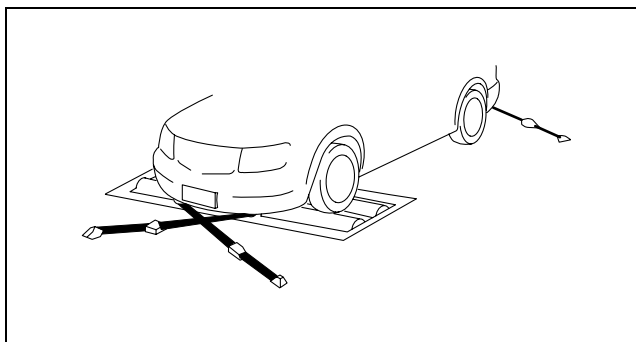
1. Align the free rollers with the wheel base and tread, then set them on the floor properly.
2. Drive the vehicle slowly onto the tester roller and free rollers.
3. Start the engine and accelerate gradually to inspect the speedometer.
4. After inspection, decelerate gradually with gentle braking.

#### Propeller shaft removal type

1. Remove the propeller shaft.  
(See03-15-3 PROPELLER SHAFT REMOVAL/INSTALLATION.)
2. Place the front wheels on the tester roller.
3. Accelerate gradually and inspect the speedometer.
4. After inspection, decelerate gradually with gentle braking.
5. Install the propeller shaft.  
(See03-15-3 PROPELLER SHAFT REMOVAL/INSTALLATION.)



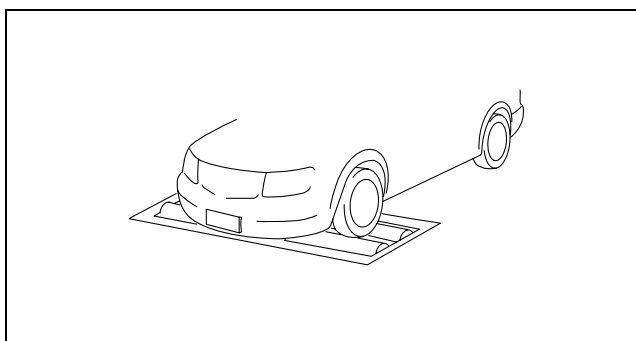
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#### Brake tester measurement

1. Place the wheels (front or rear) to be measured on the tester roller.
2. Shift to the N position/neutral.
3. Activate the tester roller and measure braking force. If there is a large amount of brake drag force, the electronic control system coupling may be affected. Jack up all four wheels to eliminate the effect of the coupling and rotate each wheel by hand to verify the rotation condition.



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