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<td>UNIT DISASSEMBLY AND ASSEMBLY</td>
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<td>Exploded View</td>
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<td>Disassembly</td>
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<td>Inspection</td>
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<td>SERVICE DATA AND SPECIFICATIONS (SDS)</td>
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<td>Companion Flange Runout</td>
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</table>
Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the “SRS AIR BAG” and “SEAT BELT” of this Service Manual.

WARNING:
• To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision that would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.
• Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the “SRS AIR BAG”.
• Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.

PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

WARNING:
• When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.
• When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.

Precaution Necessary for Steering Wheel Rotation after Battery Disconnect

NOTE:
• Before removing and installing any control units, first turn the push-button ignition switch to the LOCK position, then disconnect both battery cables.
• After finishing work, confirm that all control unit connectors are connected properly, then re-connect both battery cables.
• Always use CONSULT-III to perform self-diagnosis as a part of each function inspection after finishing work.
  If a DTC is detected, perform trouble diagnosis according to self-diagnosis results.
  For vehicle with steering lock unit, if the battery is disconnected or discharged, the steering wheel will lock and cannot be turned.
  If turning the steering wheel is required with the battery disconnected or discharged, follow the operation procedure below before starting the repair operation.

OPERATION PROCEDURE
1. Connect both battery cables.
   NOTE:
   Supply power using jumper cables if battery is discharged.
2. Turn the push-button ignition switch to ACC position.
   (At this time, the steering lock will be released.)
3. Disconnect both battery cables. The steering lock will remain released with both battery cables disconnected and the steering wheel can be turned.
4. Perform the necessary repair operation.
5. When the repair work is completed, re-connect both battery cables. With the brake pedal released, turn the push-button ignition switch from ACC position to ON position, then to LOCK position. (The steering wheel will lock when the push-button ignition switch is turned to LOCK position.)

6. Perform self-diagnosis check of all control units using CONSULT-III.

Service Notice or Precautions for Transfer

CAUTION:
- Use Genuine NISSAN Transfer Fluid. Refer to MA-10, "Fluids and Lubricants".
- Never reuse transfer fluid, once it has been drained.
- Check the fluid level or replace the fluid only with the vehicle parked on level ground.
- During removal or installation, keep inside of transfer clear of dust or dirt.
- Replace all tires at the same time. Always use tires of the proper size and the same brand and pattern. Fitting improper size and unusually worn tires applies excessive force to vehicle mechanism and can cause longitudinal vibration.
- Disassembly should be done in a clean work area, it is preferable to work in dustproof area.
- Before proceeding with disassembly, thoroughly clean the transfer. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.
- All parts should be carefully cleaned with a general purpose, non-flammable solvent before inspection or reassembly.
- Check for the correct installation status prior to removal or disassembly. If matching marks are required, be certain they do not interfere with the function of the parts when applied.
- Check appearance of the disassembled parts for damage, deformation, and unusual wear. Replace them with a new ones if necessary.
- Gaskets, seals and O-rings should be replaced any time the transfer is disassembled.
- In principle, tighten bolts or nuts gradually in several steps working diagonally from inside to outside. If tightening sequence is specified, use it.
- Observe the specified torque when assembling.
- Clean and flush the parts sufficiently and blow-dry them.
- Be careful not to damage sliding surfaces and mating surfaces.
- Clean inner parts with lint-free cloth or towels. Do not use cotton work gloves and rags to prevent adhering fibers.
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

<table>
<thead>
<tr>
<th>Tool number</th>
<th>Tool name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ST30701000</td>
<td>Drift</td>
<td>Removing dust shield from companion flange</td>
</tr>
<tr>
<td>(J-25742-2)</td>
<td>a: 61.5 mm (2.421 in) dia.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b: 41 mm (1.61 in) dia.</td>
<td></td>
</tr>
</tbody>
</table>

| KV40104710  | Drift     | Installing rear oil seal, Installing input oil seal |
| (—)        | a: 76.3 mm (3.004 in) dia. |
|            | b: 67.9 mm (2.673 in) dia. |

| KV10119400  | Spline socket | Installing transfer control actuator, Installing transfer rotary position sensor |
| (—)        |              | |

---

**Commercial Service Tools**

<table>
<thead>
<tr>
<th>Tool name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Puller</td>
<td>• Removing dust shield from shaft flange, Removing dust shield from companion flange</td>
</tr>
<tr>
<td>Replacer</td>
<td>• Removing dust shield from shaft flange, Removing dust shield from companion flange</td>
</tr>
</tbody>
</table>
### PREPARATION

<table>
<thead>
<tr>
<th>Tool name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drift</td>
<td>Installing front oil seal</td>
</tr>
<tr>
<td>a: 63 mm (2.48 in) dia.</td>
<td></td>
</tr>
<tr>
<td>b: 59 mm (2.32 in) dia.</td>
<td></td>
</tr>
<tr>
<td>Power tool</td>
<td>Loosening bolts and nuts</td>
</tr>
<tr>
<td>ZZA1003D</td>
<td></td>
</tr>
<tr>
<td>PBIC0190E</td>
<td></td>
</tr>
</tbody>
</table>

**Drift**

- a: 63 mm (2.48 in) dia.
- b: 59 mm (2.32 in) dia.
SYSTEM DESCRIPTION

COMPONENT PARTS

Component Parts Location

1. ECM
   Refer to EC-16, "Component Parts Location".

2. ABS actuator and electric unit (control unit)
   Refer to BRC-10, "Component Parts Location".

3. Steering angle sensor
   Refer to BRC-10, "Component Parts Location".

4. Control valve & TCM
   Refer to TM-10, "A/T CONTROL SYSTEM : Component Parts Location".

5. Transfer control unit

6. 4WD switch assembly

7. Transfer lock position sensor

8. Transfer Hi-Lo position sensor

9. Transfer rotary position sensor

10. Transfer control actuator

11. Transfer fluid temperature sensor

A. Back of glove box assembly

B. 4WD indicator lamp, 4WD warning lamp, ATP warning lamp (in combination meter)

C. Console assembly

D. Transfer assembly upper side

E. Transfer assembly under side
COMPONENT PARTS

< SYSTEM DESCRIPTION >

Component Description

<table>
<thead>
<tr>
<th>Component parts</th>
<th>Reference/Function</th>
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<tr>
<td>Transfer control unit</td>
<td>DLN-11, &quot;Transfer Control Unit&quot;</td>
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<tr>
<td>Transfer motor</td>
<td>DLN-11, &quot;Transfer Control Actuator&quot;</td>
</tr>
<tr>
<td>Transfer internal speed sensor</td>
<td>DLN-11, &quot;Transfer Control Actuator&quot;</td>
</tr>
<tr>
<td>Transfer motor temperature sensor</td>
<td>DLN-11, &quot;Transfer Control Actuator&quot;</td>
</tr>
<tr>
<td>Transfer Hi-Lo position sensor</td>
<td>DLN-12, &quot;Transfer Hi-Lo Position Sensor&quot;</td>
</tr>
<tr>
<td>Transfer rotary position sensor</td>
<td>DLN-12, &quot;Transfer Rotary Position Sensor&quot;</td>
</tr>
<tr>
<td>Transfer lock position sensor</td>
<td>DLN-12, &quot;Transfer Lock Position Sensor&quot;</td>
</tr>
<tr>
<td>Transfer fluid temperature sensor</td>
<td>DLN-12, &quot;Transfer Fluid Temperature Sensor&quot;</td>
</tr>
<tr>
<td>4WD mode switch</td>
<td>DLN-18, &quot;4WD SYSTEM: System Description&quot;</td>
</tr>
<tr>
<td>4WD indicator lamp</td>
<td>DLN-18, &quot;4WD SYSTEM: System Description&quot;</td>
</tr>
<tr>
<td>4WD warning lamp</td>
<td>DLN-18, &quot;4WD SYSTEM: System Description&quot;</td>
</tr>
<tr>
<td>ATP warning lamp</td>
<td>DLN-18, &quot;4WD SYSTEM: System Description&quot;</td>
</tr>
</tbody>
</table>
| ABS actuator and electric unit (control unit) | Transmits the following signals via CAN communication line to transfer control unit.  
  - Vehicle speed signal (ABS)  
  - Stop lamp switch signal (brake signal)  
  - ABS operation signal  
  - VDC operation signal  
  - TCS operation signal |
| Steering angle sensor            | Transmits the following signals via CAN communication line to transfer control unit.  
  - Steering angle signal |
| ECM                              | Transmits the following signals via CAN communication line to transfer control unit.  
  - Accelerator pedal position signal  
  - Engine speed signal  
  - Engine torque signal |
| TCM                              | Transmits the following signals via CAN communication line to transfer control unit.  
  - Shift position signal  
  - Gear position signal  
  - Output shaft revolution signal |

Transfer Control Unit

- Transfer control unit operates transfer control actuator, 4WD warning lamp and 4WD mode indicator lamp according to input signal from 4WD shift switch and each sensor and control unit.
- When 4WD system is malfunctioning, 4WD warning lamp turns ON and fail-safe status activates.
- When protection is necessary, 4WD warning lamp blinks and protection status activates.

Transfer Control Actuator

Transfer control actuator integrates transfer motor, transfer internal position sensor, and transfer motor temperature sensor, and switches 4WD mode (AUTO⇔4H⇔4L).

TRANSFER MOTOR

Transfer motor operates according to signal from transfer control unit and switches 4WD mode (AUTO⇔4H⇔4L). It also performs front and rear distribution of traction force during AUTO mode.

TRANSFER INTERNAL SPEED SENSOR

Transfer internal speed sensor detects rotation status of transfer motor and transmits signal to transfer control unit.

TRANSFER MOTOR TEMPERATURE SENSOR

- Transfer motor temperature sensor measures temperature of transfer motor.
COMPONENT PARTS

< SYSTEM DESCRIPTION > [TRANSFER: ATX90A]

• This sensor uses a thermistor and its electrical resistance varies as the temperature varies. The electrical resistance decreases as the temperature increases.

Transfer Hi-Lo Position Sensor

Transfer Hi-Lo position sensor detects engagement status of Hi-Lo sleeve and transmits signal to transfer control unit.

Transfer Rotary Position Sensor

Transfer rotary position sensor detects rotation status of actuator shaft and transmits signal to transfer control unit.

Transfer Lock Position Sensor

Transfer lock position sensor detects engagement status of lock sleeve and transmits signal to transfer control unit.

Transfer Fluid Temperature Sensor

• Transfer fluid temperature sensor measures temperature of transfer fluid.
• This sensor uses a thermistor and its electrical resistance varies as the temperature varies. The electrical resistance decreases as the temperature increases.
Sectional View

1. Rear companion flange
2. Main shaft
3. Rear case
4. Ball ramp lever
5. Ball lamp lever
6. Piston
7. Clutch
8. Sprocket
9. Lock sleeve
10. Hi-Lo sleeve
11. Sun gear
12. Front case
13. Planetary carrier assembly
14. Internal gear
15. Shift fork
16. Transfer rotary position sensor
17. Front shaft flange
18. Drive chain
19. Actuator shaft
20. Cam
21. Transfer control actuator

Torque Split Mechanism

CONTROL DIAGRAM
DESCRIPTION

- Ball ramp lever operates in the direction of main shaft axis according to rotation of actuator shaft and presses piston. Pressure is applied to each clutch and torque is transmitted.
- Shift fork operates in the direction of main shaft axis according to rotation of actuator shaft and performs engagement and disengagement to Hi-Lo sleeve and lock sleeve of main shaft. Mode is switched between 4H⇔4L.

AUTO MODE

- The optimum torque distribution is electronically performed for front and rear wheels according to road conditions.
- Stable start without wheel spin is possible on slippery road conditions, such as on a snowy road.
- When road condition does not require 4WD driving, the status becomes close to rear wheel drive, which results in better fuel efficiency and provides FR-like steering characteristics.
- The vehicle cornering status is judged according to information from each sensor, and the optimum torque is distributed to front wheels for preventing tight-corner braking symptom.

NOTE:
When there is a difference of revolution speed between the front and rear wheel the shift occasionally changes to direct 4-wheel driving conditions automatically. This is not a malfunction.

4H MODE

- Torque distribution for front and rear wheels is fixed and stable start is achieved while driving on an rough, sandy or snowy road.

4L MODE

- Large traction force is obtained due to low gear. High running ability and escaping ability are achieved.
- Switching from 4H mode to 4L mode is not possible when the vehicle is not stopped and A/T shift selector is not in the neutral position.

TORQUE DISTRIBUTION DIAGRAM
TORQUE DISTRIBUTION FLOW

OPERATION PRINCIPLE
AUTO, 4H MODE
1. Transfer control unit supplies command current to transfer motor.
2. Transfer motor operates and actuator shaft rotates clockwise.
3. Shift fork operates according to rotation of actuator shaft. Sun gear and Hi-Lo sleeve are engaged.
4. Ball ramp lever operates in axial direction via cam fixed on actuator shaft according to traction torque of transfer motor, presses piston, and thrusts multiple plate clutch.
5. Torque is transmitted to front wheels according to thrusting pressure of multiple plate clutch.

**NOTE:**
Torque transmitted to the front wheel is determined according to the command current.

4L MODE
1. Transfer control unit supplies command current to transfer motor.
2. Transfer motor operates and actuator shaft rotates counterclockwise.
3. Shift fork operates according to rotation of actuator shaft. Planetary carrier assembly and Hi-Lo sleeve are engaged.
4WD SYSTEM : System Description

- In AUTO mode, distribution of traction force is controlled from 2WD status (0:100) to 4WD status (50:50) according to signal from each sensor and switch.
- In accordance with fail-safe function, when system is malfunctioning, 4WD warning lamp on combination meter turns ON and 4WD control stops. For fail-safe function, refer to DLN-20, "4WD SYSTEM : Fail-Safe".
- When a high load status continues for transfer assembly (transfer control actuator or transfer fluid), 4WD control temporarily becomes 4H or 2WD status, according to protection function.

**NOTE:**
4WD system is not malfunctioning.

**SYSTEM DIAGRAM**

**INPUT/OUTPUT SIGNAL**
It transmits/receives each signal from the following transfer control unit via CAN communication line.

<table>
<thead>
<tr>
<th>Component parts</th>
<th>Control signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABS actuator and electric unit (control unit)</td>
<td>Transmits the following signals via CAN communication line to transfer control unit.</td>
</tr>
<tr>
<td></td>
<td>• Vehicle speed signal (ABS)</td>
</tr>
<tr>
<td></td>
<td>• Stop lamp switch signal (brake signal)</td>
</tr>
<tr>
<td></td>
<td>• ABS operation signal</td>
</tr>
<tr>
<td></td>
<td>• VDC operation signal</td>
</tr>
<tr>
<td></td>
<td>• TCS operation signal</td>
</tr>
<tr>
<td>ECM</td>
<td>Transmits the following signals via CAN communication line to transfer control unit.</td>
</tr>
<tr>
<td></td>
<td>• Accelerator pedal position signal</td>
</tr>
<tr>
<td></td>
<td>• Engine speed signal</td>
</tr>
<tr>
<td></td>
<td>• Engine torque signal</td>
</tr>
</tbody>
</table>
**SYSTEM**

---

**< SYSTEM DESCRIPTION >**

<table>
<thead>
<tr>
<th>Component parts</th>
<th>Control signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCM</td>
<td>Transmits the following signals via CAN communication line to transfer control unit.</td>
</tr>
<tr>
<td></td>
<td>• Shift position signal</td>
</tr>
<tr>
<td></td>
<td>• Gear position signal</td>
</tr>
<tr>
<td></td>
<td>• Output shaft revolution signal</td>
</tr>
<tr>
<td>Steering angle sensor</td>
<td>Transmits the following signals via CAN communication line to transfer control unit.</td>
</tr>
<tr>
<td></td>
<td>• Steering angle sensor</td>
</tr>
<tr>
<td>Combination meter</td>
<td>Receives the following signals via CAN communication line from transfer control unit.</td>
</tr>
<tr>
<td></td>
<td>• 4WD warning lamp signal</td>
</tr>
<tr>
<td></td>
<td>• ATP warning lamp signal</td>
</tr>
<tr>
<td></td>
<td>• 4WD mode indicator signal</td>
</tr>
</tbody>
</table>

---

**4WD SHIFT SWITCH AND 4WD SHIFT INDICATOR LAMP**

<table>
<thead>
<tr>
<th>4WD shift switch</th>
<th>4WD shift indicator lamp (in Information display)</th>
<th>4WD shift procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUTO</td>
<td><img src="JPDIE0230ZZ" alt="AUTO" /></td>
<td>1. Start the engine.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Turn the 4WD shift switch.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>NOTE:</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mode can be switched between AUTO⇔4H while driving straight.</td>
</tr>
<tr>
<td>4H</td>
<td><img src="JPDIE0231ZZ" alt="4HI" /></td>
<td>1. Start the engine.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Never drive the vehicle.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Press and rotate 4WD shift switch while depressing brake pedal.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>CAUTION:</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4WD mode does not switch when 4WD shift switch is operated while the vehicle is running or A/T shift selector is shifted to any position other than neutral.</td>
</tr>
</tbody>
</table>

---

**CONDITION FOR TURN ON THE WARNING LAMP**

---

Revision: 2010 May 2011 QX56

---

*D1: Blinking 2 times/1 second
*D2: “4HI” and “4LO” blink alternately.*
< SYSTEM DESCRIPTION >

**SYSTEM**

**[TRANSFER: ATX90A]**

**4WD Warning Lamp**
- Turns ON when there is a malfunction in 4WD system. 4WD warning lamp indicates the vehicle is in fail-safe mode.
- Also turns ON when ignition switch is turned ON, for the purpose of lamp check. Turns OFF approximately for 1 second after the engine starts if system is normal.

<table>
<thead>
<tr>
<th>Condition</th>
<th>4WD warning lamp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lamp check</td>
<td>Turns ON when ignition switch is turned ON. Turns OFF approx. 1 second after the engine start.</td>
</tr>
<tr>
<td>4WD system malfunction</td>
<td>ON</td>
</tr>
<tr>
<td>Protection function is activated due to heavy load to transfer assembly. (4WD system is not malfunctioning.)</td>
<td>Quick blinking: 2 times/second (Blinking in approx. 1 minute and then turning OFF)</td>
</tr>
<tr>
<td>Large difference in diameter of front/rear tires</td>
<td>Slow blinking: 1 time/2 seconds (Continuing to blink until turning ignition switch OFF)</td>
</tr>
<tr>
<td>Other than above (system normal)</td>
<td>OFF</td>
</tr>
</tbody>
</table>

**ATP Warning Lamp**
When the A/T shift selector is in P position, the vehicle may move if the transfer case in neutral. ATP warning lamp is turned on to indicate this condition to the driver.

**CONDITION FOR OPERATE WARNING BUZZER**
For preventing an incorrect operation during 4H⇔4L switching, warning buzzer sounds from inside of transfer control unit and warns the driver, when certain conditions are satisfied.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Warning buzzer</th>
</tr>
</thead>
<tbody>
<tr>
<td>4WD shift status</td>
<td>Engine speed</td>
</tr>
<tr>
<td>4H⇔4L</td>
<td>A/T shift selector</td>
</tr>
<tr>
<td>N range</td>
<td>350 – 1.600 rpm</td>
</tr>
<tr>
<td>Under 350 rpm or over 1.600 rpm</td>
<td>On</td>
</tr>
<tr>
<td>Except N range</td>
<td>Always</td>
</tr>
</tbody>
</table>

**4WD SYSTEM : Fail-Safe**
- If any malfunction occurs in 4WD electrical system, and control unit detects the malfunction, 4WD warning lamp on combination meter turns ON to indicate system malfunction.
- When 4WD warning lamp is ON, vehicle changes to rear-wheel drive or shifts to 4-wheel drive (front-wheels still have some driving torque).
CONSULT-III Function

CONSULT-III can display each diagnostic item using the diagnostic test modes as follows.

<table>
<thead>
<tr>
<th>Diagnostic test mode</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECU Identification</td>
<td>Transfer control unit part number can be read.</td>
</tr>
<tr>
<td>Self Diagnostic Result</td>
<td>Self-diagnostic results can be read and erased quickly.*</td>
</tr>
<tr>
<td>Data Monitor</td>
<td>Input/Output data in the transfer control unit can be read.</td>
</tr>
<tr>
<td>Work Support</td>
<td>This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT-III</td>
</tr>
</tbody>
</table>

*: The following diagnosis information is erased by erasing.
  - DTC

ECU IDENTIFICATION
Transfer control unit part number can be read.

SELF DIAGNOSTIC RESULT
Refer to DLN-29, "DTC Index".

When "0" is displayed on self-diagnosis result.
  - The system is presently malfunctioning.

When except "0" is displayed on self-diagnosis result.
  - System malfunction in the past is detected, but the system is presently normal.

NOTE:
Each time when ignition switch is turned OFF to ON, numerical number increases in 1→2→3...110→111. When the operation number of times exceeds 111, the number do not increase and “111” is displayed until self-diagnosis is erased*.
*: For “U1000” and “U1010”, the maximum value is “39”.

DATA MONITOR

<table>
<thead>
<tr>
<th>Monitor item (Unit)</th>
<th>SELECT MONITOR ITEM</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ECU INPUT SIGNALS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MAIN SIGNALS</td>
<td></td>
</tr>
<tr>
<td>4WD MODE [BOTNG/SWTNG/4L/4H/AUTO]</td>
<td>X</td>
<td>Control status of 4WD mode is displayed.</td>
</tr>
<tr>
<td>2WD SW [On/Off]</td>
<td>X</td>
<td>4WD shift switch (2WD) is not equipped, but it is displayed.</td>
</tr>
<tr>
<td>AUTO SW [On/Off]</td>
<td>X</td>
<td>4WD shift switch signal (AUTO) is displayed.</td>
</tr>
<tr>
<td>4H SW [On/Off]</td>
<td>X</td>
<td>4WD shift switch signal (4H) is displayed.</td>
</tr>
<tr>
<td>4L SW [On/Off]</td>
<td>X</td>
<td>4WD shift switch signal (4L) is displayed.</td>
</tr>
<tr>
<td>T/M RANGE [D/N/R/P]</td>
<td>X</td>
<td>A/T shift selector position via CAN communication line is displayed.</td>
</tr>
<tr>
<td>N RANGESW [On/Off]</td>
<td>X</td>
<td>A/T shift selector position (N) via CAN communication line is displayed.</td>
</tr>
<tr>
<td>R RANGE SW [On/Off]</td>
<td>X</td>
<td>A/T shift selector position (R) via CAN communication line is displayed.</td>
</tr>
<tr>
<td>ING SW [On/Off]</td>
<td>X</td>
<td>Ignition switch status is displayed.</td>
</tr>
<tr>
<td>TCS OPER [On/Off]</td>
<td>X</td>
<td>TCS operation status via CAN communication line is displayed.</td>
</tr>
<tr>
<td>VDC OPER [On/Off]</td>
<td>X</td>
<td>VDC operation status via CAN communication line is displayed.</td>
</tr>
</tbody>
</table>
### DIAGNOSIS SYSTEM (TRANSFER CONTROL UNIT)

#### < SYSTEM DESCRIPTION >

<table>
<thead>
<tr>
<th>Monitor item (Unit)</th>
<th>SELECT MONITOR ITEM</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ABS OPER [On/Off]</strong></td>
<td>X</td>
<td>ABS operation status via CAN communication line is displayed.</td>
</tr>
<tr>
<td><strong>SAND MODE IND [On/Off]</strong></td>
<td></td>
<td>This indicator is not equipped, but it is displayed.</td>
</tr>
<tr>
<td><strong>ROCK MODE IND [On/Off]</strong></td>
<td></td>
<td>This indicator is not equipped, but it is displayed.</td>
</tr>
<tr>
<td><strong>SNOW MODE IND [On/Off]</strong></td>
<td></td>
<td>This indicator is not equipped, but it is displayed.</td>
</tr>
<tr>
<td><strong>ONROAD MODE IND [On/Off]</strong></td>
<td></td>
<td>This indicator is not equipped, but it is displayed.</td>
</tr>
<tr>
<td><strong>SAND MODE SW [On/Off]</strong></td>
<td>X</td>
<td>This switch is not equipped, but it is displayed.</td>
</tr>
<tr>
<td><strong>ROCK MODE SW [On/Off]</strong></td>
<td>X</td>
<td>This switch is not equipped, but it is displayed.</td>
</tr>
<tr>
<td><strong>SNOW MODE SW [On/Off]</strong></td>
<td>X</td>
<td>This switch is not equipped, but it is displayed.</td>
</tr>
<tr>
<td><strong>ONROAD MODE SW [On/Off]</strong></td>
<td>X</td>
<td>This switch is not equipped, but it is displayed.</td>
</tr>
<tr>
<td><strong>HI/LO POSI SEN 3 [On/Off]</strong></td>
<td>X</td>
<td>Transfer Hi-Lo position sensor (3) status is displayed.</td>
</tr>
<tr>
<td><strong>HI/LO POSI SEN 1 [On/Off]</strong></td>
<td>X</td>
<td>Transfer Hi-Lo position sensor (1) status is displayed.</td>
</tr>
<tr>
<td><strong>LOCK POSI SEN [OPEN/LOCK/BAT/UNLEAN/HI TEMP/ERROR/GND]</strong></td>
<td>X</td>
<td>Transfer lock position sensor signal is displayed.</td>
</tr>
<tr>
<td><strong>ATP IND [On/Off]</strong></td>
<td></td>
<td>Control status of ATP warning lamp is displayed.</td>
</tr>
<tr>
<td><strong>4WD FAILLAMP [On/Off]</strong></td>
<td>X</td>
<td>Control status of ATP warning lamp is displayed.</td>
</tr>
<tr>
<td><strong>4WD MODE IND [4L/LOCK/AUTO]</strong></td>
<td>X</td>
<td>Control status of 4WD mode indicator lamp is displayed. (LOCK means 4H of 4WD mode)</td>
</tr>
<tr>
<td><strong>MOTOR DRIVE B [HI/LO/PWM]</strong></td>
<td>X</td>
<td>Driving status of transfer motor is displayed. (Reverse side)</td>
</tr>
<tr>
<td><strong>MOTOR DRIVE A [HI/LO/PWM]</strong></td>
<td>X</td>
<td>Driving status of transfer motor is displayed. (Drive side)</td>
</tr>
<tr>
<td><strong>FLUID TEMP SEN [V]</strong></td>
<td>X</td>
<td>Temperature of transfer fluid is displayed.</td>
</tr>
<tr>
<td><strong>MOTOR TEMP [V]</strong></td>
<td>X</td>
<td>Temperature of transfer motor is displayed.</td>
</tr>
<tr>
<td><strong>C/U POWER SUP [V]</strong></td>
<td>X</td>
<td>Power supply voltage value of transfer control unit is displayed.</td>
</tr>
<tr>
<td><strong>MOTOR POWER SUP [V]</strong></td>
<td>X</td>
<td>Power supply voltage value of transfer motor unit is displayed.</td>
</tr>
<tr>
<td><strong>ROTARY POSI SEN [%]</strong></td>
<td>X</td>
<td>Transfer rotary position sensor signal is displayed.</td>
</tr>
<tr>
<td><strong>THRTL POSI SEN [%]</strong></td>
<td>X</td>
<td>Throttle opening status via CAN communication line is displayed.</td>
</tr>
<tr>
<td><strong>AT R SPEED [km/h]</strong></td>
<td>X</td>
<td>Output shaft revolution speed via CAN communication line is displayed.</td>
</tr>
<tr>
<td><strong>T/M GEAR [0 - 7]</strong></td>
<td>X</td>
<td>Current transmission gear via CAN communication line is displayed.</td>
</tr>
<tr>
<td><strong>COMPR VHCL SPEED [km/h]</strong></td>
<td>X</td>
<td>Vehicle speed calculated by transfer control unit is displayed.</td>
</tr>
<tr>
<td><strong>VHCL/S SEN-FR [km/h]</strong></td>
<td>X</td>
<td>Wheel speed (front) average calculated by transfer control.</td>
</tr>
</tbody>
</table>
### SELECT MONITOR ITEM

<table>
<thead>
<tr>
<th>Monitor item (Unit)</th>
<th>ECU INPUT SIGNALS</th>
<th>MAIN SIGNALS</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>VHCL/S SEN-RR [km/h]</td>
<td>x</td>
<td></td>
<td>Wheel speed (rear) average calculated by transfer control.</td>
</tr>
<tr>
<td>ENG SPEED [rpm]</td>
<td>x</td>
<td></td>
<td>Engine status via CAN communication line is displayed.</td>
</tr>
<tr>
<td>INTERNL SPEED SEN [count]</td>
<td>x</td>
<td></td>
<td>Transfer internal speed sensor status is displayed.</td>
</tr>
<tr>
<td>TRANSFER TORQUE [Nm]</td>
<td></td>
<td>x</td>
<td>Commanded transfer communication torque is displayed.</td>
</tr>
<tr>
<td>UNIT PARAMETER [A1 - A9, B1 - B9, C1 - C9, D1 - D9, E1 - E9, F1 - F9, G1 - G9, H1 - H9, J1 - J9]</td>
<td></td>
<td></td>
<td>Unit parameter of transfer recognized by transfer control unit is displayed.</td>
</tr>
</tbody>
</table>

### WORK SUPPORT

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNIT CHARACTERISTIC WRITE</td>
<td>Writes the unit parameter of transfer to transfer control unit.</td>
</tr>
<tr>
<td>START CALIBRATION</td>
<td>Perform initial calibration of transfer control unit.</td>
</tr>
<tr>
<td>LOCK SLEEVE SENSOR* INITIALIZE</td>
<td>Format learning the transfer lock position sensor written to transfer control unit.</td>
</tr>
<tr>
<td>LOCK SLEEVE SENSOR* LEARNING</td>
<td>Perform learning the transfer lock position sensor.</td>
</tr>
<tr>
<td>OIL DETERIORATION INFO RESET</td>
<td>Format the transfer fluid viscosity written to transfer control unit.</td>
</tr>
</tbody>
</table>

*: “LOCK SLEEVE SENSOR” means transfer lock position sensor.
## ECU DIAGNOSIS INFORMATION

### TRANSFER CONTROL UNIT

#### VALUES ON THE DIAGNOSIS TOOL

<table>
<thead>
<tr>
<th>Monitor item</th>
<th>Condition</th>
<th>Value/Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>4WD MODE</td>
<td>IGN ON</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4WD is booting</td>
<td>BOTNG</td>
</tr>
<tr>
<td></td>
<td>4WD mode is switching</td>
<td>SWTNG</td>
</tr>
<tr>
<td></td>
<td>4WD mode: 4L</td>
<td>4L</td>
</tr>
<tr>
<td></td>
<td>4WD mode: 4H</td>
<td>4H</td>
</tr>
<tr>
<td></td>
<td>4WD mode: AUTO</td>
<td>AUTO</td>
</tr>
<tr>
<td>2WD SWITCH (^1)</td>
<td>Always</td>
<td>OFF</td>
</tr>
<tr>
<td>AUTO SWITCH</td>
<td>4WD shift switch: AUTO</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>4WD shift switch: 4H or 4L</td>
<td>OFF</td>
</tr>
<tr>
<td>4H SWITCH</td>
<td>4WD shift switch: 4H</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>4WD shift switch: AUTO or 4L</td>
<td>OFF</td>
</tr>
<tr>
<td>4L SWITCH</td>
<td>4WD shift switch: 4L</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>4WD shift switch: AUTO or 4H</td>
<td>OFF</td>
</tr>
<tr>
<td>T/M RANGE</td>
<td>A/T shift selector: D</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>A/T shift selector: N</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>A/T shift selector: R</td>
<td>R</td>
</tr>
<tr>
<td></td>
<td>A/T shift selector: P</td>
<td>P</td>
</tr>
<tr>
<td>N RANGE SW</td>
<td>A/T shift selector: N</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>A/T shift selector: Except N</td>
<td>OFF</td>
</tr>
<tr>
<td>R RANGE SW</td>
<td>A/T shift selector: R</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>A/T shift selector: Except R</td>
<td>OFF</td>
</tr>
<tr>
<td>IGN SW</td>
<td>IGN SW: ON</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>IGN SW: OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>TCS OPER SW</td>
<td>TCS is operating</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>TCS is not operating</td>
<td>OFF</td>
</tr>
<tr>
<td>VDC OPER SW</td>
<td>VDC is operating</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>VDC is not operating</td>
<td>OFF</td>
</tr>
<tr>
<td>ABS OPER SW</td>
<td>ABS is operating</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>ABS is not operating</td>
<td>OFF</td>
</tr>
<tr>
<td>SAND MODE IND (^2)</td>
<td>Always</td>
<td>OFF</td>
</tr>
<tr>
<td>ROCK MODE IND (^2)</td>
<td>Always</td>
<td>OFF</td>
</tr>
<tr>
<td>SNOW MODE IND (^2)</td>
<td>Always</td>
<td>OFF</td>
</tr>
<tr>
<td>ONROAD MODE IND (^2)</td>
<td>Always</td>
<td>ON</td>
</tr>
<tr>
<td>SAND MODE SW (^3)</td>
<td>Always</td>
<td>OFF</td>
</tr>
<tr>
<td>ROCK MODE SW (^3)</td>
<td>Always</td>
<td>OFF</td>
</tr>
<tr>
<td>SNOW MODE SW (^3)</td>
<td>Always</td>
<td>OFF</td>
</tr>
<tr>
<td>ONROAD MODE SW (^3)</td>
<td>Always</td>
<td>ON</td>
</tr>
</tbody>
</table>

\(^1\) 2WD SWITCH is always OFF when the engine is off.
\(^2\) SAND MODE, ROCK MODE, and SNOW MODE are always OFF when the engine is off.
\(^3\) SAND MODE SW, ROCK MODE SW, and SNOW MODE SW are always OFF when the engine is off.
## Transfer Control Unit

**ECU Diagnosis Information**

### Monitor Item

<table>
<thead>
<tr>
<th>Condition</th>
<th>Value/Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>HI-LO POSI SEN 3</td>
<td><strong>4WD mode: AUTO or 4H</strong></td>
</tr>
<tr>
<td></td>
<td><strong>4WD mode: Shifting</strong></td>
</tr>
<tr>
<td></td>
<td><strong>4WD mode: 4L</strong></td>
</tr>
<tr>
<td>HI-LO POSI SEN 1</td>
<td><strong>4WD mode: AUTO or 4H</strong></td>
</tr>
<tr>
<td></td>
<td><strong>4WD mode: Shifting</strong></td>
</tr>
<tr>
<td></td>
<td><strong>4WD mode: 4L</strong></td>
</tr>
<tr>
<td>LOCK POSI SEN</td>
<td>When lock sleeve is opening</td>
</tr>
<tr>
<td></td>
<td>When lock sleeve locking</td>
</tr>
<tr>
<td></td>
<td>When transfer lock position sensor signal circuit is short. (Battery short)</td>
</tr>
<tr>
<td></td>
<td>When transfer lock position sensor is unlearned.</td>
</tr>
<tr>
<td></td>
<td>When the temperature of transfer lock position sensor is high.</td>
</tr>
<tr>
<td></td>
<td>When transfer lock position sensor is malfunctioning.</td>
</tr>
<tr>
<td></td>
<td>When transfer lock position sensor signal circuit is short. (Ground short)</td>
</tr>
<tr>
<td>ATP IND</td>
<td>ATP lamp: ON</td>
</tr>
<tr>
<td></td>
<td>ATP lamp: OFF</td>
</tr>
<tr>
<td>4WD FAIL LAMP</td>
<td>4WD warning lamp: ON</td>
</tr>
<tr>
<td></td>
<td>4WD warning lamp: OFF</td>
</tr>
<tr>
<td>4WD MODE IND</td>
<td>4WD shift switch: AUTO</td>
</tr>
<tr>
<td></td>
<td>4WD shift switch: 4H</td>
</tr>
<tr>
<td></td>
<td>4WD shift switch: 4L</td>
</tr>
<tr>
<td>MOTOR DRIVE B</td>
<td>When transfer motor is driving in reversal. (100% duty controlled)</td>
</tr>
<tr>
<td></td>
<td>When transfer motor is driving or stopping.</td>
</tr>
<tr>
<td></td>
<td>When transfer motor is driving in reversal. (PWM output)</td>
</tr>
<tr>
<td>MOTOR DRIVE A</td>
<td>When transfer motor is driving. (100% duty controlled)</td>
</tr>
<tr>
<td></td>
<td>When transfer motor is driving in reversal or stopping.</td>
</tr>
<tr>
<td></td>
<td>When transfer motor is driving. (PWM output)</td>
</tr>
<tr>
<td>FLUID TEMP SE</td>
<td>The temperature of transfer fluid is 20 – 80 °C.</td>
</tr>
<tr>
<td>MOTOR TEMP</td>
<td>The temperature of transfer motor is 20 – 80 °C.</td>
</tr>
<tr>
<td>C/U POWER SUP</td>
<td>Always</td>
</tr>
<tr>
<td>MOTOR POWER SUP</td>
<td>Always</td>
</tr>
<tr>
<td>ROTARY POSI SEN</td>
<td>4WD mode: AUTO</td>
</tr>
<tr>
<td></td>
<td>A/T shift selector: D</td>
</tr>
<tr>
<td>THRTL POS SEN</td>
<td>When depressing accelerator pedal (Value rises gradually in response to throttle position)</td>
</tr>
<tr>
<td>AT R SPEED</td>
<td>Vehicle stopped</td>
</tr>
<tr>
<td></td>
<td>Vehicle driving (4WD mode: AUTO)</td>
</tr>
<tr>
<td>T/M GEAR</td>
<td>A/T shift selector: D</td>
</tr>
<tr>
<td></td>
<td>Vehicle driving</td>
</tr>
</tbody>
</table>

**CAUTION:**

Check air pressure of tire under standard condition.
## TRANSFER CONTROL UNIT

### < ECU DIAGNOSIS INFORMATION >

<table>
<thead>
<tr>
<th>Monitor item</th>
<th>Condition</th>
<th>Value/Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMPR VHCL SPEED</td>
<td>Vehicle stopped</td>
<td>0.00 km/h (0.00 mph)</td>
</tr>
<tr>
<td>VHCL/S SEN-FR</td>
<td>Vehicle stopped</td>
<td>0.00 km/h (0.00 mph)</td>
</tr>
<tr>
<td>VHCL/S SEN-RR</td>
<td>Vehicle stopped</td>
<td>0.00 km/h (0.00 mph)</td>
</tr>
<tr>
<td>ENGINE SPEED</td>
<td>Engine running</td>
<td>Approx. equal to the indication on tachometer (inside of ±10 %)</td>
</tr>
<tr>
<td>INTRNL SPEED SEN</td>
<td>4WD mode: AUTO A/T shift selector: D</td>
<td>Depress the accelerator pedal several times. Value is changing</td>
</tr>
<tr>
<td>TRANSFER TORQUE</td>
<td>4WD shift switch: AUTO</td>
<td>0 - 2250 N·m</td>
</tr>
<tr>
<td></td>
<td>4WD shift switch: 4H</td>
<td>0 - 2250 N·m</td>
</tr>
<tr>
<td></td>
<td>4WD shift switch: 4L</td>
<td>0 Nm</td>
</tr>
<tr>
<td>UNIT PARAMETER</td>
<td>Always</td>
<td>A1 - A9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B1 - B9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C1 - C9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>D1 - D9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E1 - E9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>F1 - F9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>G1 - G9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H1 - H9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>J1 - J9</td>
</tr>
</tbody>
</table>

*1: 4WD shift switch (2WD) is not equipped, but it is displayed.

*2: This indicator is not equipped, but it is displayed.

*3: This switch is not equipped, but it is displayed.

### TERMINAL LAYOUT

![Terminal Layout Diagram]

### PHYSICAL VALUES

<table>
<thead>
<tr>
<th>Terminal No. (Wire color)</th>
<th>Description</th>
<th>Condition</th>
<th>Value (Approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>Signal name</td>
<td>Engine running (Never drive the vehicle.)</td>
<td>0 V</td>
</tr>
<tr>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 (BR)</td>
<td>Ground Hi-Lo position sensor 1</td>
<td>4WD mode: AUTO or 4H</td>
<td>0 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4WD mode: Shifting</td>
<td>0 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4WD mode: 4L</td>
<td>5 V</td>
</tr>
</tbody>
</table>

Revision: 2010 May
## TRANSFER CONTROL UNIT

<table>
<thead>
<tr>
<th>Terminal No. (Wire color)</th>
<th>Description</th>
<th>Condition</th>
<th>Value (Approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>-</td>
<td>Input/Output</td>
<td></td>
</tr>
<tr>
<td>7 (Y)</td>
<td>Ground Transfer fluid temperature sensor power supply</td>
<td>Input</td>
<td>Engine running</td>
</tr>
<tr>
<td>9 (G)</td>
<td>Ground Transfer internal speed sensor (GND)</td>
<td>—</td>
<td>Always</td>
</tr>
<tr>
<td>10 (Y/G)</td>
<td>Ground Transfer internal speed sensor (IMP)</td>
<td>Input</td>
<td>IGN ON</td>
</tr>
<tr>
<td>11 (V)</td>
<td>Ground 4WD shift SW (4Lo)</td>
<td>Input</td>
<td>4WD shift switch: 4L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4WD shift switch: Except 4L</td>
</tr>
<tr>
<td>12 (L)</td>
<td>— CAN-H</td>
<td>Input/Output</td>
<td>—</td>
</tr>
<tr>
<td>13 (P)</td>
<td>— CAN-L</td>
<td>Input/Output</td>
<td>—</td>
</tr>
<tr>
<td>14 (W/R)</td>
<td>Ground 4WD shift SW (AUTO)</td>
<td>Input</td>
<td>4WD shift switch: AUTO</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4WD shift switch: Except AUTO</td>
</tr>
<tr>
<td>15 (P/B)</td>
<td>Ground Transfer rotary position sensor (PWM)</td>
<td>Input</td>
<td>IGN ON</td>
</tr>
<tr>
<td>16 (LG)</td>
<td>Ground Transfer rotary position sensor (GND)</td>
<td>—</td>
<td>Always</td>
</tr>
<tr>
<td>17 (W/L)</td>
<td>Ground Transfer lock position sensor power supply</td>
<td>Input</td>
<td>10 seconds or more later after ignition switch turned OFF</td>
</tr>
<tr>
<td>18 (BR/Y)</td>
<td>Ground Transfer rotary position sensor power supply</td>
<td>Input</td>
<td>10 seconds or more later after ignition switch turned OFF</td>
</tr>
<tr>
<td>20 (GR)</td>
<td>Ground Transfer control unit power supply</td>
<td>Input</td>
<td>Always</td>
</tr>
<tr>
<td>25 (P/L)</td>
<td>Ground Hi-Lo position sensor 3</td>
<td>Input/Output</td>
<td>Engine running (Never drive the vehicle.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4WD mode: Shifting</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4WD mode: 4L</td>
</tr>
<tr>
<td>28 (W)</td>
<td>Ground Transfer motor temperature sensor power supply</td>
<td>Input</td>
<td>IGN ON</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>IGN OFF</td>
</tr>
</tbody>
</table>
### Transfer Control Unit

*ECU Diagnosis Information*

#### Transfer Control Unit

<table>
<thead>
<tr>
<th>Terminal No. (Wire color)</th>
<th>Description</th>
<th>Condition</th>
<th>Value (Approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>Signal name</td>
<td>Input/Output</td>
<td></td>
</tr>
<tr>
<td>29 (LG/R)</td>
<td>Hi-Lo position sensor 2</td>
<td>Input/Output, Engine running (Never drive the vehicle.)</td>
<td>Always</td>
</tr>
<tr>
<td>30 (R/B)</td>
<td>Transfer lock position sensor (GND)</td>
<td>—</td>
<td>Always</td>
</tr>
<tr>
<td>31 (L/O)</td>
<td>Transfer internal speed sensor (DIR)</td>
<td>Input, IGN ON, When changing the transfer motor rotation direction.</td>
<td></td>
</tr>
<tr>
<td>32 (BR/R)</td>
<td>IGN SW</td>
<td>Input, IGN ON, IGN OFF, Battery voltage</td>
<td></td>
</tr>
<tr>
<td>35 (R)</td>
<td>4WD shift SW (4H)</td>
<td>Input, IGN ON, 4WD shift switch: 4H, Battery voltage</td>
<td></td>
</tr>
<tr>
<td>36 (L/R)</td>
<td>Transfer fluid temperature sensor (GND)</td>
<td>—</td>
<td>Always</td>
</tr>
<tr>
<td>38 (G/O)</td>
<td>Transfer lock position sensor signal</td>
<td>Input, IGN ON</td>
<td></td>
</tr>
<tr>
<td>39 (R/W)</td>
<td>Transfer internal speed sensor power supply</td>
<td>Input, IGN ON, IGN OFF, Battery voltage</td>
<td>8 V</td>
</tr>
<tr>
<td>41 (W/R)</td>
<td>Transfer control actuator power supply</td>
<td>Input, Always</td>
<td>Battery voltage</td>
</tr>
<tr>
<td>43 (G/R)</td>
<td>Motor drive B</td>
<td>Input/Output, Transfer motor driving, 0V - Battery voltage</td>
<td></td>
</tr>
<tr>
<td>44 (B)</td>
<td>GND</td>
<td>—</td>
<td>Always</td>
</tr>
<tr>
<td>45 (G/Y)</td>
<td>Motor drive A</td>
<td>Input/Output, Transfer motor driving, 0V - Battery voltage</td>
<td></td>
</tr>
<tr>
<td>46 (B)</td>
<td>Transfer control actuator (GND)</td>
<td>—</td>
<td>Always</td>
</tr>
</tbody>
</table>

#### CAUTION:
When using circuit tester to measure voltage for inspection, be sure not to extend forcibly any connector terminals.

#### Fail-Safe

- If any malfunction occurs in 4WD electrical system, and control unit detects the malfunction, 4WD warning lamp on combination meter turns ON to indicate system malfunction.
- When 4WD warning lamp is ON, vehicle changes to rear-wheel drive or shifts to 4-wheel drive (front-wheels still have some driving torque).
## DTC Inspection Priority Chart

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

<table>
<thead>
<tr>
<th>Priority</th>
<th>Detected items (DTC)</th>
</tr>
</thead>
</table>
| 1        | U1000 CAN COMM CIRCUIT  
|          | U1010 CONTROL UNIT (CAN)  |
| 2        | P1802 CONTROL UNIT 1  
|          | P1802 CONTROL UNIT 1  
|          | P1804 CONTROL UNIT 3  
|          | P1809 CONTROL UNIT 4  
|          | P180C SEN POWER SUPPLY (5V)  
|          | P180E SEN POWER SUPPLY (8V)  
|          | P1811 BATTERY VOLTAGE  
|          | P181B INCOMP SELFSHUT  
|          | P181C MOTOR POWER SUPPLY  
|          | P181F INCOMP CALIBRATION  |
| 3        | P1807 VECL SPEED SEN-AT  
|          | P1808 VECL SPEED SEN-ABS  
|          | P1816 PNP SW/CIRC  
|          | P181E ST ANGLE SEN SIG  
|          | P1820 ENGINE SPEED SIG  
|          | P1829 THROTTLE POSI SEN  
|          | P1830 ABS OP SIG  
|          | P1831 VDC OP SIG  
|          | P1832 TCS OP SIG  |
| 4        | P180D ROTARY POSITION SEN  
|          | P1813 4WD MODE SW  
|          | P181A MOTOR TEMP SEN  
|          | P1826 OIL TEMP SEN  
|          | P182A HI-LO POSITION SEN  
|          | P182B LOCK POSITION SEN  |
| 5        | P180F MOTOR SYSTEM  
|          | P1817 SHIFT ACTUATOR  |

### DTC Index

<table>
<thead>
<tr>
<th>DTC</th>
<th>Display Items</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1802</td>
<td>CONTROL UNIT 1</td>
<td>DLN-51, &quot;DTC Logic&quot;</td>
</tr>
<tr>
<td>P1803</td>
<td>CONTROL UNIT 2</td>
<td>DLN-51, &quot;DTC Logic&quot;</td>
</tr>
<tr>
<td>P1804</td>
<td>CONTROL UNIT 3</td>
<td>DLN-51, &quot;DTC Logic&quot;</td>
</tr>
<tr>
<td>P1807</td>
<td>VHCL SPEED SEN-AT</td>
<td>DLN-52, &quot;DTC Logic&quot;</td>
</tr>
<tr>
<td>P1808</td>
<td>VHCL SPEED SEN-ABS</td>
<td>DLN-53, &quot;DTC Logic&quot;</td>
</tr>
<tr>
<td>P1809</td>
<td>CONTROL UNIT 4</td>
<td>DLN-51, &quot;DTC Logic&quot;</td>
</tr>
<tr>
<td>P180C</td>
<td>SEN POWER SUPPLY (5V)</td>
<td>DLN-54, &quot;DTC Logic&quot;</td>
</tr>
<tr>
<td>P180D</td>
<td>ROTARY POSITION SEN</td>
<td>DLN-57, &quot;DTC Logic&quot;</td>
</tr>
<tr>
<td>P180E</td>
<td>SEN POWER SUPPLY (8V)</td>
<td>DLN-59, &quot;DTC Logic&quot;</td>
</tr>
<tr>
<td>P180F</td>
<td>MOTOR SYSTEM</td>
<td>DLN-61, &quot;DTC Logic&quot;</td>
</tr>
<tr>
<td>P1811</td>
<td>BATTERY VOLTAGE</td>
<td>DLN-64, &quot;DTC Logic&quot;</td>
</tr>
<tr>
<td>P1813</td>
<td>4WD MODE SW</td>
<td>DLN-67, &quot;DTC Logic&quot;</td>
</tr>
<tr>
<td>P1816</td>
<td>PNP SW/CIRC</td>
<td>DLN-69, &quot;DTC Logic&quot;</td>
</tr>
<tr>
<td>P1817</td>
<td>SHIFT ACTUATOR</td>
<td>DLN-70, &quot;DTC Logic&quot;</td>
</tr>
<tr>
<td>P181A</td>
<td>MOTOR TEMP SEN</td>
<td>DLN-72, &quot;DTC Logic&quot;</td>
</tr>
<tr>
<td>P181B</td>
<td>IMCOMP SELFSHUT</td>
<td>DLN-74, &quot;DTC Logic&quot;</td>
</tr>
</tbody>
</table>
## ECU Diagnosis Information

### Transfer Control Unit

<table>
<thead>
<tr>
<th>DTC</th>
<th>Display Items</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>P181C</td>
<td>MOTOR POWER SUPPLY</td>
<td>DLN-76, &quot;DTC Logic&quot;</td>
</tr>
<tr>
<td>P181E</td>
<td>ST ANGLE SEN SIG</td>
<td>DLN-77, &quot;DTC Logic&quot;</td>
</tr>
<tr>
<td>P181F</td>
<td>INCOMP CALIBRATION</td>
<td>DLN-78, &quot;DTC Logic&quot;</td>
</tr>
<tr>
<td>P1826</td>
<td>OIL TEMP SEN</td>
<td>DLN-80, &quot;DTC Logic&quot;</td>
</tr>
<tr>
<td>P1820</td>
<td>ENGINE SPEED SIG</td>
<td>DLN-79, &quot;DTC Logic&quot;</td>
</tr>
<tr>
<td>P1829</td>
<td>THROTTLE POSI SEN</td>
<td>DLN-82, &quot;DTC Logic&quot;</td>
</tr>
<tr>
<td>P182A</td>
<td>HI-LO POSITION SEN</td>
<td>DLN-83, &quot;DTC Logic&quot;</td>
</tr>
<tr>
<td>P182B</td>
<td>LOCK POSITION SEN</td>
<td>DLN-85, &quot;DTC Logic&quot;</td>
</tr>
<tr>
<td>P1830</td>
<td>ABS OP SIG</td>
<td>DLN-88, &quot;DTC Logic&quot;</td>
</tr>
<tr>
<td>P1831</td>
<td>VDC OP SIG</td>
<td>DLN-89, &quot;DTC Logic&quot;</td>
</tr>
<tr>
<td>P1832</td>
<td>TCS OP SIG</td>
<td>DLN-90, &quot;DTC Logic&quot;</td>
</tr>
<tr>
<td>U1000</td>
<td>CAN COMM CIRCUIT</td>
<td>DLN-91, &quot;DTC Logic&quot;</td>
</tr>
<tr>
<td>U1010</td>
<td>CONTROL UNIT (CAN)</td>
<td>DLN-92, &quot;DTC Logic&quot;</td>
</tr>
</tbody>
</table>
4WD SYSTEM

WIRING DIAGRAM

INFOID:0000000006222231

Revision: 2010 May 2011 QX56

This connector is not shown in "Harness Layout".

[Diagram of 4WD System with wiring connections and labels]
4WD SYSTEM

< WIRING DIAGRAM >

[TRANSFER: ATX90A]

Revision: 2010 May

JCDWM1074GB
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORK FLOW

Work Flow

DETAILED FLOW

1. INTERVIEW FROM THE CUSTOMER

Clarify customer complaints before inspection. First of all, perform an interview utilizing DLN-39, "Diagnostic Work Sheet" and reproduce symptoms as well as fully understand it. Ask customer about his/her complaints carefully. Check symptoms by driving vehicle with customer, if necessary.

CAUTION:
Customers are not professional. Never guess easily like “maybe the customer means that...,” or “maybe the customer mentions this symptom”.

>> GO TO 2.

2. CHECK SYMPTOM

Reproduce the symptom that is indicated by the customer, based on the information from the customer obtained by interview. Also check that the symptom is not caused by fail-safe function. Refer to DLN-28, "Fail-Safe".

CAUTION:
When the symptom is caused by normal operation, fully inspect each portion and obtain the understanding of customer that the symptom is not caused by a malfunction.

>> GO TO 3.

3. PERFORM SELF-DIAGNOSIS

With CONSULT-III
Perform self-diagnosis for “ALL MODE AWD/4WD”.

Is any DTC detected?
YES >> Record or print self-diagnosis results. GO TO 4.
NO >> GO TO 6.

4. RECHECK SYMPTOM

With CONSULT-III
1. Erase self-diagnostic results for “ALL MODE AWD/4WD”.
2. Perform DTC confirmation procedures for the error detected system.

NOTE:
If some DTCs are detected at the same time, determine the order for performing the diagnosis based on DLN-29, "DTC Inspection Priority Chart".

Is any DTC detected?
YES >> GO TO 5.
NO >> Check harness and connectors based on the information obtained by interview. Refer to GI-40, "Intermittent Incident".

5. REPAIR OR REPLACE ERROR-DETECTED PARTS

- Repair or replace error-detected parts.
- Reconnect part or connector after repairing or replacing.
- When DTC is detected, erase self-diagnostic results for “ALL MODE AWD/4WD”.

>> GO TO 7.

6. IDENTIFY ERROR-DETECTED SYSTEM BY SYMPTOM DIAGNOSIS

Estimate error-detected system based on symptom diagnosis and perform inspection.
Can the error-detected system be identified?
**DIAGNOSIS AND REPAIR WORK FLOW**

< BASIC INSPECTION >

YES  >> GO TO 7.
NO   >> Check harness and connectors based on the information obtained by interview. Refer to GI-40, "Intermittent Incident".

7. FINAL CHECK

With CONSULT-III
1. Check the reference value for “ALL MODE AWD/4WD”.
2. Recheck the symptom and check that symptom is not reproduced on the same conditions.
   Is the symptom reproduced?
   YES  >> GO TO 3.
   NO   >> INSPECTION END

**Diagnostic Work Sheet**

**Description**
- In general, customers have their own criteria for a problem. Therefore, it is important to understand the symptom and status well enough by asking the customer about his/her concerns carefully. To systemize all the information for the diagnosis, prepare the interview sheet referring to the interview points.
- In some cases, multiple conditions that appear simultaneously may cause a DTC to be detected.

**Interview sheet sample**

<table>
<thead>
<tr>
<th>Interview sheet</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Customer name</strong></td>
</tr>
<tr>
<td><strong>Registration number</strong></td>
</tr>
<tr>
<td><strong>Vehicle type</strong></td>
</tr>
<tr>
<td><strong>Storage date</strong></td>
</tr>
</tbody>
</table>

**Symptom**
- Vehicle does not enter 4WD mode.
- 4WD warning lamp turns on.
- Heavy tight-corner braking symptom occurs
- Noise  Vibration
- Others ( )

**First occurrence**
- Recently
- Others ( )

**Frequency of occurrence**
- Always
- Under a certain conditions of
- Sometimes (time(s)/day)

**Climate conditions**
- Weather
  - Fine  Cloud  Rain  Snow  Others ( )
- Temperature
  - Hot  Warm  Cool  Cold  Temperature [Approx. °C ( °F)]
- Relative humidity
  - High  Moderate  Low

**Road conditions**
- Urban area  Suburb area  High way
- Mounting road (uphill or down hill)  Rough road

**Operation conditions, etc.**
- Irrelevant
- When engine starts  During idling
- During driving  During acceleration  At constant speed driving
- During deceleration  During cornering (right curve or left curve)
### Interview sheet

<table>
<thead>
<tr>
<th>Customer name</th>
<th>MR/MS</th>
<th>Registration number</th>
<th>Initial year registration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage date</td>
<td>Engine</td>
<td>Mileage km (Mile)</td>
<td></td>
</tr>
</tbody>
</table>

Other conditions

Memo
ADDITIONAL SERVICE WHEN REPLACING TRANSFER CONTROL UNIT

< BASIC INSPECTION >
[TRANSFER: ATX90A]

ADDITIONAL SERVICE WHEN REPLACING TRANSFER CONTROL UNIT

Description

Perform writing unit parameter and initial calibration after replacing transfer control unit. Refer to DLN-41, "Work Procedure".

Work Procedure

NOTE:
In fail-safe mode, can not perform work support. (Except that DTC P181F is detected.)

1. WRITE UNIT PARAMETER

Perform writing unit parameter to control unit. Refer to DLN-48, "Work Procedure".

   >> GO TO 2.

2. INITIAL CALIBRATION (1)

   ✪ With CONSULT-III
   1. Start the engine.
   CAUTION:
       Never drive the vehicle.
   2. Check "4WD MODE", "T/M RANGE", "COMER VHCL SPEED", "MOTOR POWER SUP" of CONSULT-III "DATA MONITOR" for "ALL MODE AWD/4WD".
   3. Continue the following condition more than 10 seconds.

       | 4WD MODE  | AUTO |
       | T/M RANGE | N    |
       | COMPER VHCL SPEED | 0 km/h (Never drive the vehicle) |
       | MOTOR POWER SUP | More than 11 V |

   Does the transfer motor operate automatically?
   YES >> After the transfer motor operation stop (After approximately 10 seconds) GO TO 4.
   NO  >> GO TO 3.

3. INITIAL CALIBRATION (2)

   ✪ With CONSULT-III
   1. Select "START CALIBRATION" of CONSULT-III "WORK SUPPORT" for "ALL MODE AWD/4WD".
   2. Wait until the motor operation stop. (After approximately 10 seconds)

   >> GO TO 4.

4. PERFORM SELF-DIAGNOSIS

   ✪ With CONSULT-III
   1. Erase self-diagnosis result for "ALL MODE AWD/4WD".
   2. Turn the ignition switch ON to OFF.
   CAUTION:
       Wait for 10 seconds after turning ignition switch OFF.
   3. Start the engine.
   CAUTION:
       Never drive the vehicle.
   4. Perform self-diagnosis for "ALL MODE AWD/4WD".

   Is "DTC P181F" detected?
   YES  >> GO TO 1.
   NO   >> WORK END
Description

Perform writing unit parameter, transfer fluid viscosity learning and initial calibration after replacing transfer assembly. Refer to DLN-42, "Work Procedure".

Work Procedure

NOTE:
In fail-safe mode, can not perform work support. (Except that DTC P181F is detected.)

1. WRITE UNIT PARAMETER

Perform writing unit parameter to control unit. Refer to DLN-48, "Work Procedure".

>> GO TO 2.

2. PREPARATION BEFORE WORK

With CONSULT-III
1. Start the engine.
   CAUTION:
   Never drive the vehicle.
2. Check “4WD MODE”, “T/M RANGE”, “COMER VHCL SPEED”, “MOTOR POWER SUP” of CONSULT-III “DATA MONITOR” for “ALL MODE AWD/4WD”.
3. Continue the following condition more than 10 seconds.

   | 4WD MODE | : AUTO |
   | T/M RANGE | : N |
   | COMPER VHCL SPEED | : 0 km/h (Never drive the vehicle) |
   | MOTOR POWER SUP | : More than 11 V |

>> GO TO 3.

3. PERFORM TRANSFER FLUID VISCOSITY LEARNING

With CONSULT-III
1. Select “OIL DETERIORATION INFO RESET” of CONSULT-III “WORK SUPPORT” for “ALL MODE AWD/4WD”.
2. Select “Start”.

>> GO TO 4.

4. INITIAL CALIBRATION

With CONSULT-III
1. Select “START CALIBRATION” of CONSULT-III “WORK SUPPORT” for “ALL MODE AWD/4WD”.
2. Wait until the motor operation stop. (After approximately 10 seconds)

>> GO TO 5.

5. PERFORM SELF-DIAGNOSIS

With CONSULT-III
1. Erase self-diagnosis result for “ALL MODE AWD/4WD”.
2. Turn the ignition switch ON to OFF.
   CAUTION:
   Wait for 10 seconds after turning ignition switch OFF.
3. Start the engine.
   CAUTION:
   Never drive the vehicle.
4. Perform self-diagnosis for “ALL MODE AWD/4WD”.

Revision: 2010 May

DLN-42

2011 QX56
ADDITIONAL SERVICE WHEN REPLACING TRANSFER ASSEMBLY

< BASIC INSPECTION >

< TRANSFER: ATX90A >

Is "DTC P181F" detected?

YES  >> GO TO 1.

NO   >> WORK END
TRANSFER LOCK POSITION SENSOR LEARNING

< BASIC INSPECTION >

TRANSFER LOCK POSITION SENSOR LEARNING

Description

• Detect a stroke of transfer lock sleeve and learn operating area of transfer lock sleeve (Lock/Unlock).
• Perform the learning of transfer lock position sensor by “CONFIGURATION” of CONSULT-III function. Refer to DLN-44, “Work Procedure”.

CAUTION:
Before performing the learning of lock position sensor, must erase learning of transfer lock position sensor.

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCK SLEEVE SENSOR‘ INITIALIZE</td>
<td>Format learning the transfer lock position sensor written to transfer control unit.</td>
</tr>
<tr>
<td>LOCK SLEEVE SENSOR‘ LEARNING</td>
<td>Perform learning the transfer lock position sensor.</td>
</tr>
</tbody>
</table>

*: “LOCK SLEEVE SENSOR” means transfer lock position sensor.

Work Procedure

NOTE:
In fail-safe mode, can not perform work support. (Except that DTC P181F or P182B is detected.)

1. PREPARATION BEFORE WORK

With CONSULT-III
1. Start the engine.
   CAUTION:
   Never drive the vehicle.
2. Check “4WD MODE”, “T/M RANGE”, “COMER VHCL SPEED”, “MOTOR POWER SUP” of CONSULT-III “DATA MONITOR” for “ALL MODE AWD/4WD”.
3. Continue the following condition.
   - 4WD MODE : 4L
   - T/M RANGE : N
   - COMPER VHCL SPEED : 0 km/h (Never drive the vehicle)
   - MOTOR POWER SUP : More than 11 V

>> GO TO 2.

2. PERFORM ERASE LOCK POSITION SENOER LEARNING

With CONSULT-III
1. Select “LOCK SLEEVE SENSOR INITIALIZE” of CONSULT-III “WORK SUPPORT” for “ALL MODE AWD/4WD”.
2. Select “Start”.
3. Wait until the motor operation stop.

>> GO TO 3.

3. PERFORM LOCK POSITION SENOER LEARNING

With CONSULT-III
1. Select “LOCK SLEEVE SENSOR LEARNING” of CONSULT-III “WORK SUPPORT” for “ALL MODE AWD/4WD”.
2. Select “Start”.
3. Wait until the motor operation stop.

>> GO TO 4.

4. PERFORM SELF-DIAGNOSIS

With CONSULT-III

Revision: 2010 May
TRANSFER LOCK POSITION SENSOR LEARNING

< BASIC INSPECTION >

1. Erase self-diagnosis result for “ALL MODE AWD/4WD”.
2. Turn the ignition switch ON to OFF.
   **CAUTION:**
   Wait for 10 seconds after turning ignition switch OFF.
3. Start the engine.
   **CAUTION:**
   Never drive the vehicle.
4. Perform self-diagnosis for “ALL MODE AWD/4WD”.
   Is “DTC P182B” detected?
   YES >> GO TO 1.
   NO >> WORK END
TRANSFER ROTARY POSITION SENSOR LEARNING

< BASIC INSPECTION >

TRANSFER ROTARY POSITION SENSOR LEARNING

Description

Perform initial calibration after replacing transfer rotary position sensor. Refer to DLN-46, "Work Procedure".

Work Procedure

NOTE:
In fail-safe mode, can not perform work support. (Except that DTC P181F is detected.)

1. INITIAL CALIBRATION

With CONSULT-III
1. Start the engine.
   CAUTION:
   Never drive the vehicle.
2. Check “4WD MODE”, “T/M RANGE”, “COMER VHCL SPEED”, “MOTOR POWER SUP” of CONSULT-III “DATA MONITOR” for “ALL MODE AWD/4WD”.
3. Continue the following condition.
   4WD MODE : AUTO
   T/M RANGE : N
   COMPER VHCL SPEED : 0 km/h (Never drive the vehicle)
   MOTOR POWER SUP : More than 11 V
4. Select “START CALIBRATION” of CONSULT-III “WORK SUPPORT” for “ALL MODE AWD/4WD”.
5. Wait till the motor operates. (Aprrox. 10 seconds)

>> GO TO 2.

2. PERFORM SELF-DIAGNOSIS

With CONSULT-III
1. Erase self-diagnosis result for “ALL MODE AWD/4WD”.
2. Turn the ignition switch ON to OFF.
   CAUTION:
   Wait for 10 seconds after turning ignition switch OFF.
3. Start the engine.
   CAUTION:
   Never drive the vehicle.
4. Perform self-diagnosis for “ALL MODE AWD/4WD”.

Is “DTC P180D” detected?

YES >> GO TO 1.
NO >> WORK END
TRANSFER FLUID VISCOSITY LEARNING

Description

Perform transfer fluid viscosity learning and initial calibration after draining and refilling transfer fluid. Refer to DLN-47, “Work Procedure”.

Work Procedure

NOTE:
In fail-safe mode, can not perform work support. (Except that DTC P181F is detected.)

1. PREPARATION BEFORE WORK

With CONSULT-III
1. Start the engine.

CAUTION:
Never drive the vehicle.

2. Check “4WD MODE”, “T/M RANGE”, “COMER VHCL SPEED”, “MOTOR POWER SUP” of CONSULT-III “DATA MONITOR” for “ALL MODE AWD/4WD”.

3. Continue the following condition more than 10 seconds.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>4WD MODE</td>
<td>AUTO</td>
</tr>
<tr>
<td>T/M RANGE</td>
<td>N</td>
</tr>
<tr>
<td>COMPER VHCL SPEED</td>
<td>0 km/h (Never drive the vehicle)</td>
</tr>
<tr>
<td>MOTOR POWER SUP</td>
<td>More than 11 V</td>
</tr>
</tbody>
</table>

>> GO TO 2.

2. TRANSFER FLUID VISCOSITY LEARNING

With CONSULT-III
1. Select “OIL DETERIORATION INFO RESET” of CONSULT-III “WORK SUPPORT” for “ALL MODE AWD/4WD”.

2. Select “Start”.

>> GO TO 3.

3. INITIAL CALIBRATION

With CONSULT-III
1. Select “START CALIBRATION” of CONSULT-III “WORK SUPPORT” for “ALL MODE AWD/4WD”.

2. Wait until the motor operation stop. (After approximately 10 seconds)

>> GO TO 4.

4. PERFORM SELF-DIAGNOSIS

With CONSULT-III
1. Erase self-diagnosis result for “ALL MODE AWD/4WD”.

2. Turn the ignition switch ON to OFF.

CAUTION:
Wait for 10 seconds after turning ignition switch OFF.

3. Start the engine.

CAUTION:
Never drive the vehicle.

4. Perform self-diagnosis for “ALL MODE AWD/4WD”.

Is “DTC P181F” detected?

YES ➔ GO TO 1.

NO ➔ WORK END
DESCRIPTION

Perform writing unit parameter after replacing transfer control unit, transfer assembly and transfer control actuator. Refer to DLN-48, "Work Procedure".

Work Procedure

NOTE:
In fail-safe mode, can not perform work support. (Except that DTC P181F is detected.)

1. CONFIRM REPLACING PARTS

Confirm the replacing parts.

What is the replacing parts?
- Transfer control unit>>GO TO 2.
- Transfer control actuator>>GO TO 3.
- Transfer assembly>>GO TO 4.

2. WRITE UNIT PARAMETER (1)

With CONSULT-III

1. Make the new unit parameter with the following procedure.
   - Confirm the alphabet of unit parameter (A).

   NOTE:
   • This illustration is sample.
   • For this illustration, the unit parameter is "G3" and the alphabet of unit parameter is "G".

   - Confirm the alphabet of transfer control actuator parameter (B).

   NOTE:
   • Original transfer control actuator does not have marking of alphabet.
   • Just in case that transfer control actuator has been replaced, it has marking of alphabet.
   • This illustration is sample of replaced transfer control actuator.
   • For this illustration, the alphabet of transfer control actuator parameter is "H".

   - Make new alphabet of unit parameter as to the alphabets of unit parameter and the transfer control actuator parameter, using following chart.

   When the alphabet of transfer control actuator parameter is no marking.

<table>
<thead>
<tr>
<th>The alphabet of original unit parameter</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
</tr>
</thead>
<tbody>
<tr>
<td>↓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

   The new alphabet of unit parameter

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
</tr>
</thead>
</table>

Revision: 2010 May

DLN-48

2011 QX56
When the alphabet of transfer control actuator parameter is “C”.

<table>
<thead>
<tr>
<th>The alphabet of original unit parameter</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
</tr>
</thead>
<tbody>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The new alphabet of unit parameter</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>E</td>
<td>F</td>
<td>G</td>
</tr>
</tbody>
</table>

When the alphabet of transfer control actuator parameter is “H”.

<table>
<thead>
<tr>
<th>The alphabet of original unit parameter</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The new alphabet of unit parameter</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>F</td>
<td>F</td>
<td>G</td>
<td>H</td>
<td>J</td>
</tr>
</tbody>
</table>

When the alphabet of transfer control actuator parameter is “N”.

<table>
<thead>
<tr>
<th>The alphabet of original unit parameter</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The new alphabet of unit parameter</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>E</td>
<td>F</td>
<td>G</td>
<td>G</td>
<td>H</td>
<td>J</td>
</tr>
</tbody>
</table>

NOTE:
- For the sample illustrations, the new alphabet of unit parameter is “F”.
- Add the same number of unit parameter behind the new alphabet of unit parameter.

NOTE:
- For the sample illustration, the number of unit parameter is “3” and new unit parameter is “F3”.
2. Turn the ignition switch OFF to ON.
3. Select “UNIT CHARACTERISTICS WRITE” of CONSULT-III “WORK SUPPORT” for “ALL MODE AWD/4WD”.
4. Input new unit parameter.
5. Select “Start”.
6. Check that “UNIT CHARACTERISTICS WRITE COMPLETED” or “UNIT CHARACTERISTICS WRITE ALREADY WRITTEN” is displayed.

WORK END.

3. WRITE UNIT PARAMETER (2)

With CONSULT-III
1. Make the new unit parameter with the following procedure.
   - Confirm the alphabet of unit parameter (A).
   
   NOTE:
   - This illustration is sample.
   - For this illustration, the unit parameter is “G3” and the alphabet of unit parameter is “G”.

- Confirm the alphabet of transfer control actuator parameter (B).

   NOTE:
   - Original transfer control actuator does not have marking of alphabet.
   - Just in case that transfer control actuator has been replaced, it has marking of alphabet.
   - This illustration is sample of replaced transfer control actuator.
   - For this illustration, the alphabet of transfer control actuator parameter is “H”.

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DLN-49

2011 QX56
CONFIGURATION (TRANSFER CONTROL UNIT)

< BASIC INSPECTION >

- Make new alphabet of unit parameter as to the alphabets of unit parameter and the transfer control actuator parameter, using following chart.

When the alphabet of transfer control actuator parameter is “C”.

<table>
<thead>
<tr>
<th>The alphabet of original unit parameter</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
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</thead>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The new alphabet of unit parameter</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>F</td>
<td>G</td>
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</tr>
</tbody>
</table>

When the alphabet of transfer control actuator parameter is “H”.

<table>
<thead>
<tr>
<th>The alphabet of original unit parameter</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The new alphabet of unit parameter</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>F</td>
<td>F</td>
<td>G</td>
<td>H</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

When the alphabet of transfer control actuator parameter is “N”.

<table>
<thead>
<tr>
<th>The alphabet of original unit parameter</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The new alphabet of unit parameter</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>F</td>
<td>F</td>
<td>G</td>
<td>G</td>
<td>H</td>
<td>J</td>
</tr>
</tbody>
</table>

NOTE:
For the sample illustrations, the new alphabet of unit parameter is “F”.

- Add the same number of unit parameter behind the new alphabet of unit parameter.

NOTE:
For the sample illustration, the number of unit parameter is “3” and new unit parameter is “F3”.

2. Turn the ignition switch OFF to ON.
3. Select “UNIT CHARACTERISTICS WRITE” of CONSULT-III “WORK SUPPORT” for “ALL MODE AWD/4WD”.
4. Input new unit parameter.
5. Select “Start”.
6. Check that “UNIT CHARACTERISTICS WRITE COMPLETED” or "UNIT CHARACTERISTICS WRITE ALREADY WRITTEN" is displayed.

>> WORK END.

4. WRITE UNIT PARAMETER (3)

With CONSULT-III
1. Confirm the unit parameter (A).

NOTE:
• This illustration is sample.
• For this illustration, the unit parameter is “G3”.

2. Turn the ignition switch OFF to ON.
3. Select “UNIT CHARACTERISTICS WRITE” of CONSULT-III “WORK SUPPORT” for “ALL MODE AWD/4WD”.
4. Input unit parameter.
5. Select “Start”.
6. Check that "UNIT CHARACTERISTICS WRITE COMPLETED" or "UNIT CHARACTERISTICS WRITE ALREADY WRITTEN" is displayed.

>> WORK END.
DTC/CIRCUIT DIAGNOSIS

DTC Logic

DTC DETECTION LOGIC

<table>
<thead>
<tr>
<th>DTC</th>
<th>Display item</th>
<th>Malfunction detected condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1802</td>
<td>CONTROL UNIT 1</td>
<td>Malfunction is detected in the memory (RAM) system of transfer control unit.</td>
<td>Internal malfunction of transfer control unit.</td>
</tr>
<tr>
<td>P1803</td>
<td>CONTROL UNIT 2</td>
<td>Malfunction is detected in the memory (ROM) system of transfer control unit.</td>
<td></td>
</tr>
<tr>
<td>P1804</td>
<td>CONTROL UNIT 3</td>
<td>Malfunction is detected in the memory (EEOROM) system of transfer control unit.</td>
<td></td>
</tr>
<tr>
<td>P1809</td>
<td>CONTROL UNIT 4</td>
<td>AD converter system of transfer control unit is malfunctioning.</td>
<td></td>
</tr>
</tbody>
</table>

DTC CONFIRMATION PROCEDURE

1. DTC REPRODUCTION PROCEDURE

With CONSULT-III

1. Turn the ignition switch OFF to ON.
2. Perform self-diagnosis for “ALL MODE AWD/4WD”.

Are DTC’s “P1802, P1803, P1804 or P1809” detected?

YES  >> Proceed to diagnosis procedure. Refer to DLN-51, "Diagnosis Procedure".

NO    >> INSPECTION END

Diagnosis Procedure

1. PERFORM SELF-DIAGNOSIS

With CONSULT-III

1. Erase self-diagnostic results for “ALL MODE AWD/4WD”.
2. Turn the ignition switch OFF, and then wait 10 seconds and more.
3. Perform self-diagnosis for “ALL MODE AWD/4WD”.

Are DTC’s “P1802, P1803, P1804 or 1809” detected?

YES  >> Replace transfer control unit. Refer to DLN-107, "Removal and Installation".

NO    >> Check transfer control unit pin terminals for damage or loose connection with harness connector.
        If any items are damaged, repair or replace error-detected parts.
DTC DETECTION LOGIC

DTC CONFIRMATION PROCEDURE

1. DTC REPRODUCTION PROCEDURE

With CONSULT-III
1. Start the engine and drive at 30 km/h (19 MPH) or more for approximately 1 minute.
2. Perform self-diagnosis for “ALL MODE AWD/4WD”.

Is DTC "P1807" detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-52, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. PERFORM TCM SELF-DIAGNOSIS

With CONSULT-III
Perform self-diagnosis for “TRANSMISSION”.

Is any DTCs detected?

YES >> Check the DTC.

NO >> GO TO 2.

2. ERASE SELF-DIAGNOSTIC RESULT

With CONSULT-III
1. Erase self-diagnostic results for “ALL MODE AWD/4WD”.
2. Start the engine and drive vehicle at 30 km/h (19 MPH) or more.
3. Check that A/T CHECK indicator lamp turns OFF.

Does A/T CHECK indicator lamp turn OFF?

YES >> GO TO 3.

NO >> Refer to TM-165, "Symptom Table".

3. CHECK TERMINALS AND HARNESS CONNECTORS

Check transfer control unit pin terminals for damage or loose connection with harness connector.

Is inspection result normal?

YES >> After turning the ignition switch OFF, perform DTC confirmation procedure again. When DTC "P1807" is detected, Replace transfer control unit. Refer to DLN-107, "Removal and Installation".

NO >> Repair or replace error-detected parts.

DTC Display item Malfunction detected condition Possible cause

P1807 VHCL SPEED SEN-AT
- Malfunction is detected in output speed signal that is output from TCM through CAN communication.
- Improper signal is input while driving.
- Harness or connector (CAN communication line)
- TCM
- Internal malfunction of TCM
- Output speed signal error
P1808 WHEEL SPEED SENSOR

DTC Logic

DTC DETECTION LOGIC

<table>
<thead>
<tr>
<th>DTC</th>
<th>Display Item</th>
<th>Malfunction detected condition</th>
<th>Possible cause</th>
</tr>
</thead>
</table>
| P1808| VHCL SPEED SEN-ABS  | • Malfunction is detected in vehicle speed signal that is output from ABS actuator and electric unit (control unit) through CAN communication.  
• Improper signal is input while driving. | • Harness or connector (CAN communication line)  
• Malfunction of ABS actuator and electric unit (control unit)  
• Malfunction of ABS actuator and electric unit (control unit) circuit error  
• Vehicle speed signal error |

DTC CONFIRMATION PROCEDURE

1. DTC REPRODUCTION PROCEDURE

With CONSULT-III
1. Start the engine and drive at 30 km/h (19 MPH) or more for approximately 1 minute.
2. Perform self-diagnosis for "ALL MODE AWD/4WD".

Is DTC “P1808” detected?

YES  >> Proceed to diagnosis procedure. Refer to DLN-53, "DTC Logic".
NO   >> INSPECTION END

Diagnosis Procedure

1. PERFORM ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) SELF-DIAGNOSIS

With CONSULT-III
Perform self-diagnosis for “ABS”.

Is any DTCs detected?

YES  >> Check the DTCs.
NO   >> GO TO 2.

2. ERASE SELF-DIAGNOSTIC RESULT

With CONSULT-III
1. Erase self-diagnostic results for “ALL MODE AWD/4WD”.
2. Start the engine and drive vehicle at 30 km/h (19 MPH) or more.
3. Check that ABS warning lamp turns OFF.

Does ABS warning lamp turn OFF?

YES  >> GO TO 3.
NO   >> Refer to BRC-122, "Diagnosis Procedure".

3. CHECK TERMINALS AND HARNESS CONNECTORS

Check transfer control unit pin terminals for damage or loose connection with harness connector.

Is inspection result normal?

YES  >> After turning the ignition switch OFF, perform DTC confirmation procedure again. When DTC “P1808” is detected, Replace transfer control unit. Refer to DLN-107, "Removal and Installation".
NO   >> Repair or replace error-detected parts.
P180C SENSOR POWER SUPPLY (5V)

Description
Supplies power (5V) to transfer lock position sensor and transfer rotary position sensor.

DTC Logic

DTC DETECTION LOGIC

<table>
<thead>
<tr>
<th>DTC</th>
<th>Display item</th>
<th>Malfunction detected condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P180C</td>
<td>SEN POWER SUPPLY (5V)</td>
<td>When the sensor power supply (5V) voltage is lower or higher than normal.</td>
<td>• Malfunction of transfer lock position sensor power supply circuit (open or short)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Malfunction of transfer rotary position sensor power supply circuit (open or short)</td>
</tr>
</tbody>
</table>

DTC CONFIRMATION PROCEDURE

1. DTC REPRODUCTION PROCEDURE

With CONSULT-III
1. Turn the ignition switch OFF to ON.
2. Perform self-diagnosis for “ALL MODE AWD/4WD”.

Is DTC “P180C” detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-54, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK TRANSFER LOCK POSITION SENSOR POWER SUPPLY (1)

1. Turn the ignition switch OFF.
2. Disconnect transfer lock position sensor harness connector and transfer rotary position sensor harness connector.
3. Turn the ignition switch ON.
   CAUTION: Never start the engine.
4. Check the voltage between transfer lock position sensor harness connector terminals.

<table>
<thead>
<tr>
<th>+</th>
<th>−</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transfer lock position sensor</td>
<td>+</td>
<td>1</td>
</tr>
<tr>
<td>Connector Terminal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F40</td>
<td>Approx. 5 V</td>
<td></td>
</tr>
</tbody>
</table>

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. CHECK TRANSFER LOCK POSITION SENSOR CIRCUIT

1. Turn the ignition switch OFF.
2. Disconnect transfer control unit harness connector.
3. Check the continuity between transfer control unit harness connector and transfer lock position sensor harness connector.
4. Check the continuity between transfer lock position sensor harness connector and ground.

<table>
<thead>
<tr>
<th>Connector</th>
<th>Terminal</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>E59</td>
<td>17</td>
<td>F40</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>1</td>
</tr>
</tbody>
</table>

Is the inspection result normal?
YES  >> GO TO 4.
NO   >> Repair or replace error-detected parts.

3. CHECK TRANSFER LOCK POSITION SENSOR POWER SUPPLY (2)

1. Turn the ignition switch OFF.
2. Connect transfer lock position sensor harness connector.
3. Turn the ignition switch ON.

**CAUTION:**
Never start the engine.

4. Check the voltage between transfer lock position sensor harness connector terminals.

<table>
<thead>
<tr>
<th>+</th>
<th>-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transfer lock position sensor</td>
<td></td>
</tr>
<tr>
<td>Connector</td>
<td>Terminal</td>
</tr>
<tr>
<td>F40</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Approx. 5 V</td>
<td></td>
</tr>
</tbody>
</table>

Is the inspection result normal?
YES  >> GO TO 6.
NO   >> Replace transfer lock position sensor. Refer to DLN-119, "Removal and Installation".

4. CHECK TRANSFER ROTARY POSITION SENSOR POWER SUPPLY (1)

1. Turn the ignition switch OFF.
2. Connect transfer control unit harness connector.
3. Turn the ignition switch ON.

**CAUTION:**
Never start the engine.

4. Check the voltage between transfer rotary position sensor harness connector terminals.

<table>
<thead>
<tr>
<th>+</th>
<th>-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transfer rotary position sensor</td>
<td></td>
</tr>
<tr>
<td>Connector</td>
<td>Terminal</td>
</tr>
<tr>
<td>F41</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Approx. 5 V</td>
<td></td>
</tr>
</tbody>
</table>

Is the inspection result normal?
YES  >> GO TO 6.
NO   >> GO TO 5.

5. CHECK TRANSFER ROTARY POSITION SENSOR CIRCUIT

1. Turn the ignition switch OFF.
2. Disconnect transfer control unit harness connector.
3. Check the continuity between transfer control unit harness connector and transfer rotary position sensor harness connector.
4. Check the continuity between transfer rotary position sensor harness connector and ground.

<table>
<thead>
<tr>
<th>Transfer control unit</th>
<th>Transfer rotary position sensor</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>Terminal</td>
<td>Connector</td>
</tr>
<tr>
<td>E59</td>
<td>18</td>
<td>F41</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td></td>
</tr>
</tbody>
</table>

Is the inspection result normal?
YES >> GO TO 7.
NO >> Replace transfer rotary position sensor.

6. CHECK TRANSFER ROTARY POSITION SENSOR POWER SUPPLY (2)

1. Turn the ignition switch OFF.
2. Connect transfer lock position sensor harness connector.
3. Turn the ignition switch ON.
   **CAUTION:**
   Never start the engine.
4. Check the voltage between transfer rotary position sensor harness connector terminals.

<table>
<thead>
<tr>
<th>+</th>
<th>Transfer rotary position sensor</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>Terminal</td>
<td></td>
</tr>
<tr>
<td>F41</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

Is the inspection result normal?
YES >> GO TO 7.
NO >> Replace transfer rotary position sensor. Refer to DLN-117, "Removal and Installation".

7. CHECK TERMINALS AND HARNESS CONNECTORS

Check the pin terminals for damage or loose connection with each harness connector.

Is the inspection result normal?
YES >> Replace transfer control unit. Refer to DLN-107, "Removal and Installation".
NO >> Repair or replace error-detected parts.
P180D TRANSFER ROTARY POSITION SENSOR

DTC Logic

DTC DETECTION LOGIC

<table>
<thead>
<tr>
<th>DTC</th>
<th>Display item</th>
<th>Malfunction detected condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P180D</td>
<td>ROTARY POSITION SEN</td>
<td>Malfunction is detected in transfer rotary position sensor.</td>
<td>Transfer rotary position sensor error</td>
</tr>
</tbody>
</table>

DTC CONFIRMATION PROCEDURE

1. DTC REPRODUCTION PROCEDURE

With CONSULT-III

1. Turn the ignition switch OFF to ON.
2. Turn the 4WD shift switch AUTO⇒4H⇒4LO⇒4H⇒AUTO.
3. Perform self-diagnosis for "ALL MODE AWD/4WD".

Is DTC "P180D" detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-57, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK TRANSFER ROTARY POSITION SENSOR SIGNAL

1. Turn the ignition switch ON.
2. Check the voltage between transfer control unit harness connector and ground.


<table>
<thead>
<tr>
<th>+</th>
<th>Transfer control unit</th>
<th>−</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>Terminal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E59</td>
<td>15</td>
<td>Ground</td>
<td></td>
</tr>
</tbody>
</table>

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 2.

2. CHECK TRANSFER ROTARY POSITION SENSOR POWER SUPPLY

1. Turn the ignition switch OFF.
2. Disconnect transfer rotary position sensor harness connector.
3. Turn the ignition switch ON.
   CAUTION:
   Never start the engine.
4. Check the voltage between transfer rotary position sensor harness connector terminals.


<table>
<thead>
<tr>
<th>+</th>
<th>Transfer rotary position sensor</th>
<th>−</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>Terminal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F41</td>
<td>1</td>
<td>2</td>
<td>Approx. 5 V</td>
</tr>
</tbody>
</table>
P180D TRANSFER ROTARY POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3. CHECK TRANSFER ROTARY POSITION SENSOR CIRCUIT

1. Turn the ignition switch OFF.
2. Disconnect transfer control unit harness connector.
3. Check the continuity between transfer control unit harness connector and transfer rotary position sensor harness connector.

<table>
<thead>
<tr>
<th>Transfer control unit</th>
<th>Transfer rotary position sensor</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>Terminal</td>
<td>Connector</td>
</tr>
<tr>
<td>E59</td>
<td>18</td>
<td>F41</td>
</tr>
<tr>
<td>16</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Check the continuity between transfer rotary position sensor harness connector and ground.

<table>
<thead>
<tr>
<th>Transfer rotary position sensor</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>Terminal</td>
</tr>
<tr>
<td>F41</td>
<td>1</td>
</tr>
</tbody>
</table>

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

4. CHECK TRANSFER ROTARY POSITION SENSOR SIGNAL CIRCUIT

1. Turn the ignition switch OFF.
2. Disconnect transfer control unit harness connector.
3. Check the continuity between transfer control unit harness connector and transfer rotary position sensor harness connector.

<table>
<thead>
<tr>
<th>Transfer control unit</th>
<th>Transfer rotary position sensor</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>Terminal</td>
<td>Connector</td>
</tr>
<tr>
<td>E59</td>
<td>15</td>
<td>F41</td>
</tr>
</tbody>
</table>

4. Check the continuity between transfer rotary position sensor harness connector and ground.

<table>
<thead>
<tr>
<th>Transfer rotary position sensor</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>Terminal</td>
</tr>
<tr>
<td>F41</td>
<td>3</td>
</tr>
</tbody>
</table>

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5. REPLACE TRANSFER ROTARY POSITION SENSOR

1. Replace transfer rotary position sensor. Refer to DLN-117, "Removal and Installation".
2. Perform confirmation procedure again. Refer to DLN-57, "DTC Logic".

Is DTC "P180D" detected?

YES >> GO TO 6.
NO >> INSPECTION END

6. CHECK TERMINALS AND HARNESS CONNECTORS

Check the pin terminals for damage or loose connection with each harness connector.

Is the inspection result normal?

YES >> Replace transfer control unit. Refer to DLN-107, "Removal and Installation".
NO >> Repair or replace error-detected parts.
P180E SENSOR POWER SUPPLY (8V)

Description
Supplies power (8V) to transfer internal speed sensor.

DTC Logic

DTC DETECTION LOGIC

DTC CONFIRMATION PROCEDURE

1. DTC REPRODUCTION PROCEDURE

With CONSULT-III
1. Turn the ignition switch ON.
2. Perform self-diagnosis for "ALL MODE AWD/4WD".

Is DTC "P180E" detected?
YES >> Proceed to diagnosis procedure. Refer to DLN-59, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

1. CHECK TRANSFER INTERNAL SPEED SENSOR POWER SUPPLY (1)

1. Turn the ignition switch OFF.
2. Disconnect transfer control actuator harness connector.
3. Turn the ignition switch ON.

CAUTION: Never start the engine.
4. Check the voltage between transfer control actuator harness connector terminals.

<table>
<thead>
<tr>
<th>Connector</th>
<th>Terminal</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>F52</td>
<td>3</td>
<td>7</td>
</tr>
</tbody>
</table>

Is the inspection result normal?
YES >> GO TO 3.
NO >> GO TO 2.

2. CHECK TRANSFER INTERNAL SPEED SENSOR CIRCUIT

1. Turn the ignition switch OFF.
2. Disconnect transfer control unit harness connector.
3. Check the continuity between transfer control unit harness connector and transfer control actuator harness connector.

<table>
<thead>
<tr>
<th>Transfer control unit</th>
<th>Transfer control actuator</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>Terminal</td>
<td>Connector</td>
</tr>
<tr>
<td>E59</td>
<td>39</td>
<td>F52</td>
</tr>
<tr>
<td>9</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

4. Check the continuity between transfer control actuator harness connector and ground.
P180E SENSOR POWER SUPPLY (8V)

< DTC/CIRCUIT DIAGNOSIS >

[TRANSFER: ATX90A]

Is the inspection result normal?
YES   >> GO TO 3.
NO    >> Repair or replace error-detected parts.

3. CHECK TRANSFER INTERNAL SPEED SENSOR POWER SUPPLY (2)

1. Turn the ignition switch OFF.
2. Connect transfer control actuator harness connector.
3. Turn the ignition switch ON.
   CAUTION:
   Never start the engine.
4. Check the voltage between transfer control actuator harness connector terminals.

<table>
<thead>
<tr>
<th>Transfer control actuator</th>
<th>—</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>F52</td>
<td>7</td>
<td>Ground</td>
</tr>
</tbody>
</table>

Is the inspection result normal?
YES   >> GO TO 4.
NO    >> Transfer internal speed sensor is malfunctioning. Replace transfer control actuator. Refer to DLN-114, "Removal and Installation".

4. CHECK TERMINALS AND HARNESS CONNECTORS

Check the pin terminals for damage or loose connection with each harness connector.
Is the inspection result normal?
YES   >> Replace transfer control unit. Refer to DLN-107, "Removal and Installation".
NO    >> Repair or replace error-detected parts.
DTC Logic

DTC DETECTION LOGIC

<table>
<thead>
<tr>
<th>DTC</th>
<th>Display item</th>
<th>Malfunction detected condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P180F</td>
<td>MOTOR SYSTEM</td>
<td>• Malfunction is detected in transfer motor.</td>
<td>Transfer control actuator</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Malfunction is detected in transfer internal speed sensor.</td>
<td>Transfer motor error</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Transfer internal speed sensor circuit error</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Transfer assembly internal malfunction.</td>
</tr>
</tbody>
</table>

DTC CONFIRMATION PROCEDURE

1. DTC REPRODUCTION PROCEDURE

2. **With CONSULT-III**
   1. Turn the ignition switch OFF to ON.
   2. Turn the 4WD shift switch AUTO⇒4H⇒4LO⇒4H⇒AUTO.
   3. Perform self-diagnosis for “ALL MODE AWD/4WD”.
   Is DTC “P180F” detected?
   YES >> Proceed to diagnosis procedure. Refer to DLN-61, "Diagnosis Procedure".
   NO >> INSPECTION END

Diagnosis Procedure

1. CHECK TRANSFER INTERNAL SPEED SENSOR SIGNAL

   1. Turn the ignition switch ON.
   2. Check the voltage between transfer control unit harness connector and ground.

<table>
<thead>
<tr>
<th>+</th>
<th>Condition</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transfer control unit</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Connector</td>
<td>Terminal</td>
<td></td>
</tr>
<tr>
<td>E59</td>
<td>10</td>
<td>Ground</td>
</tr>
<tr>
<td>31</td>
<td>Ground</td>
<td>2V/div</td>
</tr>
</tbody>
</table>

   4WD mode: AUTO
   A/T shift selector: N
   Depress accelerator pedal several times

   **NOTE:**
   When changing the transfer motor rotation direction.

   Is the inspection result normal?
   YES >> GO TO 6.
   NO >> GO TO 2.

2. CHECK TRANSFER INTERNAL SPEED SENSOR POWER SUPPLY

Revision: 2010 May
1. Turn the ignition switch OFF.
2. Disconnect transfer control actuator harness connector.
3. Turn the ignition switch ON.
4. Check the voltage between transfer control actuator harness connector terminals.

<table>
<thead>
<tr>
<th>+</th>
<th>-</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3. CHECK TRANSFER INTERNAL SPEED SENSOR POWER SUPPLY CIRCUIT

1. Turn the ignition switch OFF.
2. Disconnect transfer control unit harness connector.
3. Check the continuity between transfer control unit harness connector and transfer control actuator harness connector.

<table>
<thead>
<tr>
<th>Transfer control unit</th>
<th>Transfer control actuator</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>Terminal</td>
<td>Connector</td>
</tr>
<tr>
<td>E59</td>
<td>39</td>
<td>F52</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>7</td>
</tr>
</tbody>
</table>

4. Check the continuity between transfer control actuator harness connector and ground.

<table>
<thead>
<tr>
<th>Transfer control actuator</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>Terminal</td>
</tr>
<tr>
<td>F52</td>
<td>3</td>
</tr>
</tbody>
</table>

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

4. CHECK TRANSFER INTERNAL SPEED SENSOR SIGNAL CIRCUIT

1. Turn the ignition switch OFF.
2. Disconnect transfer control unit harness connector.
3. Check the continuity between transfer control unit harness connector and transfer control actuator harness connector.

<table>
<thead>
<tr>
<th>Transfer control unit</th>
<th>Transfer control actuator</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>Terminal</td>
<td>Connector</td>
</tr>
<tr>
<td>E59</td>
<td>10</td>
<td>F52</td>
</tr>
<tr>
<td>31</td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

4. Check the continuity between transfer control actuator harness connector and ground.

<table>
<thead>
<tr>
<th>Transfer control actuator</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>Terminal</td>
</tr>
<tr>
<td>F52</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.
P180F TRANSFER INTERNAL SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[TRANSFER: ATX90A]

**5. REPLACE TRANSFER CONTROL ACTUATOR**

1. Replace transfer control actuator. Refer to DLN-114, "Removal and Installation".
2. Perform confirmation procedure again. Refer to DLN-57, "DTC Logic".

Is DTC “P180F” detected?
- YES >> GO TO 6.
- NO >> INSPECTION END

**6. CHECK TRANSFER INTERNAL FUNCTION**

With CONSULT-III

1. Remove transfer control actuator. Refer to DLN-114, "Removal and Installation".
2. Turn the actuator shaft. Refer to DLN-114, "Inspection".
3. Check “ROTARY POSI SEN” of CONSULT-III “DATA MONITOR” for “ALL MODE AWD/4WD”.

<table>
<thead>
<tr>
<th>Monitor item</th>
<th>Condition</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROTARY POSI SEN</td>
<td>Turn the actuator shaft.</td>
<td>Value is changing</td>
</tr>
</tbody>
</table>

Is the inspection result normal?
- YES >> GO TO 7.
- NO >> Transfer assembly is mechanical malfunction. Replace transfer assembly. Refer to DLN-121, "Removal and Installation".

**7. CHECK TERMINALS AND HARNESS CONNECTORS**

Check the pin terminals for damage or loose connection with each harness connector.

Is the inspection result normal?
- YES >> Replace transfer control unit. Refer to DLN-107, "Removal and Installation".
- NO >> Repair or replace error-detected parts.
P1811 POWER SUPPLY CIRCUIT FOR TRANSFER CONTROL UNIT

Description

Supplies power to transfer control unit.

DTC Logic

DTC DETECTION LOGIC

DTC CONFIRMATION PROCEDURE

1. DTC REPRODUCTION PROCEDURE

With CONSULT-III

1. Turn the ignition switch OFF to ON.
2. Perform self-diagnosis for “ALL MODE AWD/4WD”.

Is DTC “P1811” detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-64, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK TRANSFER CONTROL UNIT POWER SUPPLY (1)

1. Turn the ignition switch OFF.
2. Disconnect transfer control unit harness connector.
3. Check the voltage between transfer control unit harness connector and ground.

<table>
<thead>
<tr>
<th>Connector</th>
<th>Terminal</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>E59</td>
<td>20</td>
<td>Ground</td>
</tr>
</tbody>
</table>

4. Turn the ignition switch ON.

CAUTION:
Never start the engine.

5. Check the voltage between transfer control unit harness connector and ground.

<table>
<thead>
<tr>
<th>Connector</th>
<th>Terminal</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>E59</td>
<td>20</td>
<td>Ground</td>
</tr>
</tbody>
</table>

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2. CHECK TRANSFER CONTROL UNIT POWER SUPPLY (2)

1. Turn the ignition switch OFF.
2. Check the 10A fuse (#34).
3. Check the harness for open or short between transfer control unit harness connector No.20 terminal and 10A (#34).

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit. Refer to PG-11, "Wiring Diagram - BATTERY POWER SUPPLY -".

NO >> Repair or replace error-detected parts.

Revision: 2010 May
3. CHECK TRANSFER CONTROL UNIT POWER SUPPLY (3)

1. Turn the ignition switch OFF.
2. Check the voltage between transfer control unit harness connector and ground.

<table>
<thead>
<tr>
<th>Connector</th>
<th>Terminal</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>E59</td>
<td>32</td>
<td>Ground</td>
</tr>
</tbody>
</table>

3. Turn the ignition switch ON.

**CAUTION:**
Never start the engine.

4. Check the voltage between transfer control unit harness connector and ground.

<table>
<thead>
<tr>
<th>Connector</th>
<th>Terminal</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>E59</td>
<td>32</td>
<td>Battery voltage</td>
</tr>
</tbody>
</table>

Is the inspection result normal?

YES  >> GO TO 5.
NO   >> GO TO 4.

4. CHECK TRANSFER CONTROL UNIT POWER SUPPLY (4)

1. Turn the ignition switch OFF.
2. Check the 10A fuse (#56).
3. Disconnect IPDM E/R harness connector.
4. Check the continuity between transfer control unit harness connector and IPDM E/R harness connector.

<table>
<thead>
<tr>
<th>IPDM E/R</th>
<th>Transfer control unit</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>E15</td>
<td>58</td>
<td>E59 32</td>
</tr>
</tbody>
</table>

5. Check the continuity between transfer control unit harness connector and the ground.

<table>
<thead>
<tr>
<th>Connector</th>
<th>Terminal</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>E59</td>
<td>32</td>
<td>Ground</td>
</tr>
</tbody>
</table>

Is the inspection result normal?

YES  >> Perform the trouble diagnosis for ignition power supply circuit. Refer to **PG-89, "Wiring Diagram - IGNITION POWER SUPPLY -"**.
NO   >> Repair or replace error-detected parts.

5. CHECK TRANSFER CONTROL UNIT GROUND

1. Turn the ignition switch OFF.
2. Check the continuity between transfer control unit harness connector and ground.

<table>
<thead>
<tr>
<th>Connector</th>
<th>Terminal</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>E60</td>
<td>46</td>
<td>Ground</td>
</tr>
</tbody>
</table>

Is the inspection result normal?

YES  >> GO TO 6.
NO   >> Repair or replace error-detected parts.

6. CHECK TERMINALS AND HARNESS CONNECTORS
P1811 POWER SUPPLY CIRCUIT FOR TRANSFER CONTROL UNIT

< DTC/CIRCUIT DIAGNOSIS >

Check the transfer control unit pin terminals for damage or loose connection with harness connector.

Is the inspection result normal?

YES  >> Replace transfer control unit. Refer to DLN-107, "Removal and Installation".

NO   >> Repair or replace error-detected parts.
P1813 4WD MODE SWITCH

DTC Logic

DTC DETECTION LOGIC

<table>
<thead>
<tr>
<th>DTC</th>
<th>Display item</th>
<th>Malfunction detected condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1813</td>
<td>4WD MODE SW</td>
<td>Multiple signals received from 4WD shift switch are detected.</td>
<td>• 4WD switch assembly &lt;br&gt;• Internal malfunction of 4WD switch assembly &lt;br&gt;• Malfunction of 4WD switch assembly circuit &lt;br&gt;• Transfer control unit</td>
</tr>
</tbody>
</table>

DTC CONFIRMATION PROCEDURE

1. DTC REPRODUCTION PROCEDURE

With CONSULT-III

1. Turn the ignition switch OFF to ON.
2. Turn the 4WD shift switch AUTO ⇒ 4H ⇒ 4LO ⇒ 4H ⇒ AUTO.
3. Perform self-diagnosis for "ALL MODE AWD/4WD".

Is DTC “P1813” detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-67, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

1. CHECK TRANSFER SHIFT SWITCH

Check 4WD switch assembly. Refer to DLN-68, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO  >> 4WD shift switch is malfunctioning. Replace 4WD switch assembly. Refer to DLN-108, "Removal and Installation".

2. CHECK 4WD SHIFT SWITCH CIRCUIT (1)

1. Disconnect transfer control unit harness connector.
2. Check the continuity between transfer control unit harness connector and 4WD switch assembly harness connector.

<table>
<thead>
<tr>
<th>Transfer control unit</th>
<th>4WD switch assembly</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>Terminal</td>
<td>Connector</td>
</tr>
<tr>
<td>E59</td>
<td>11</td>
<td>M54</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>35</td>
<td></td>
</tr>
<tr>
<td></td>
<td>14</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Is the inspection result normal?

YES >> GO TO 3.
NO  >> Repair or replace error-detected parts.
3. CHECK 4WD SHIFT SWITCH CIRCUIT (2)

Check the continuity between 4WD switch assembly harness connector and ground.

<table>
<thead>
<tr>
<th>4WD switch assembly</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector Terminal</td>
<td>Ground</td>
</tr>
<tr>
<td>M54 11</td>
<td>Not existed</td>
</tr>
<tr>
<td>10</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

Is the inspection result normal?
YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4. CHECK TERMINALS AND HARNESS CONNECTORS

- Check transfer control unit pin terminals for damage or loose connection with harness connector.
- Check 4WD switch assembly pin terminals for damage or loose connection with harness connector.

Is the inspection result normal?
YES >> Replace transfer control unit. Refer to DLN-107, "Removal and Installation".
NO >> Repair or replace error-detected parts.

Component Inspection

1. CHECK 4WD SHIFT SWITCH

1. Turn the ignition switch OFF.
2. Remove 4WD switch assembly. Refer to DLN-108, "Removal and Installation".
3. Check the continuity between 4WD switch assembly harness connector terminals.

<table>
<thead>
<tr>
<th>4WD switch assembly</th>
<th>Condition</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>9</td>
<td>4WD shift switch: AUTO</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4WD shift switch: 4H or 4L</td>
</tr>
<tr>
<td>12</td>
<td>10</td>
<td>4WD shift switch: 4H</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4WD shift switch: AUTO or 4L</td>
</tr>
<tr>
<td>12</td>
<td>11</td>
<td>4WD shift switch: 4L</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4WD shift switch: AUTO or 4H</td>
</tr>
</tbody>
</table>

Is the inspection result normal?
YES >> INSPECTION END
NO >> Replace 4WD switch assembly. Refer to DLN-108, "Removal and Installation".
P1816 PARKING/NEUTRAL POSITION SWITCH

DTC Logic

DTC DETECTION LOGIC

<table>
<thead>
<tr>
<th>DTC</th>
<th>Display item</th>
<th>Malfunction detected condition</th>
<th>Possible cause</th>
</tr>
</thead>
</table>
| P1816| PNP SW/CIRC  | Malfunction is detected in PNP switch signal that is output from TCM through CAN communication | - Harness or connector (CAN communication line)  
- TCM  
- Internal malfunction of TCM  
- A/T shift selector error |

DTC CONFIRMATION PROCEDURE

1. DTC REPRODUCTION PROCEDURE

**With CONSULT-III**

1. Turn the ignition switch OFF to ON.
2. Shift the A/T shift selector P position.
3. Perform self-diagnosis for "ALL MODE AWD/4WD".
   
   Is DTC "P1816" detected?
   
   **YES** >> Proceed to diagnosis procedure. Refer to DLN-69, "Diagnosis Procedure".
   
   **NO** >> INSPECTION END

Diagnosis Procedure

1. PERFORM TCM SELF-DIAGNOSIS

**With CONSULT-III**

Perform self-diagnosis for "TRANSMISSION".

Is any DTCs detected?

**YES** >> Check the DTC.

**NO** >> GO TO 2.

2. ERASE SELF-DIAGNOSTIC RESULT

**With CONSULT-III**

1. Erase self-diagnostic results for "ALL MODE AWD/4WD".
2. Start the engine and drive vehicle at 30 km/h (19 MPH) or more.
3. Check that A/T CHECK indicator lamp turns OFF.

   Does A/T CHECK indicator lamp turn OFF?

   **YES** >> GO TO 3.

   **NO** >> Refer to TM-165, "Symptom Table".

3. CHECK TERMINALS AND HARNESS CONNECTORS

Check transfer control unit pin terminals for damage or loose connection with harness connector.

Is inspection result normal?

**YES** >> After turning the ignition switch OFF, perform DTC confirmation procedure again. When DTC "P1816" is detected, Replace transfer control unit. Refer to DLN-107, "Removal and Installation".

**NO** >> Repair or replace error-detected parts.
P1817 TRANSFER MOTOR

DTC Logic

INFOID:0000000006222268

DTC DETECTION LOGIC

<table>
<thead>
<tr>
<th>DTC</th>
<th>Display item</th>
<th>Malfunction detected condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1817</td>
<td>SHIFT ACTUATOR</td>
<td>Malfunction is detected in transfer motor.</td>
<td>Transfer control actuator</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Transfer motor error</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• malfunction of transfer motor circuit</td>
</tr>
</tbody>
</table>

DTC CONFIRMATION PROCEDURE

1. DTC REPRODUCTION PROCEDURE

With CONSULT-III

1. Turn the ignition switch OFF to ON.
2. Turn the 4WD shift switch AUTO⇒4H⇒4LO⇒4H⇒AUTO.
3. Perform self-diagnosis for “ALL MODE AWD/4WD”.

Is DTC “P1817” detected?

YES  >> Proceed to diagnosis procedure. Refer to DLN-70, "Diagnosis Procedure".

NO   >> INSPECTION END

Diagnosis Procedure

1. CHECK TRANSFER MOTOR CIRCUIT (1)

   1. Turn the ignition switch OFF.
   2. Disconnect transfer control unit harness connector.
   3. Check the continuity between transfer control unit harness connector and transfer control actuator harness connector.

<table>
<thead>
<tr>
<th>Transfer control unit</th>
<th>Transfer control actuator</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>Terminal</td>
<td>Connector</td>
</tr>
<tr>
<td>E60</td>
<td>45</td>
<td>F52</td>
</tr>
<tr>
<td>E60</td>
<td>43</td>
<td>43</td>
</tr>
</tbody>
</table>

4. Check the continuity between transfer control unit harness connector and ground.

<table>
<thead>
<tr>
<th>Transfer control unit</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>Terminal</td>
</tr>
<tr>
<td>E60</td>
<td>45</td>
</tr>
<tr>
<td>E60</td>
<td>43</td>
</tr>
</tbody>
</table>

Is the inspection result normal?

YES  >> GO TO 2.

NO   >> Repair or replace error-detected parts.

2. CHECK TRANSFER MOTOR

   Check the transfer control actuator. Refer to DLN-71, "Component Inspection".

   Is the inspection result normal?

   YES  >> GO TO 3.

   NO   >> Transfer motor is malfunctioning. Replace transfer control actuator. Refer to DLN-114, "Removal and Installation".

3. CHECK TRANSFER INTERNAL FUNCTION

   With CONSULT-III

   1. Remove transfer control actuator. Refer to DLN-114, "Removal and Installation".

Revision: 2010 May
2. Turn the actuator shaft. Refer to DLN-114, "Inspection".
3. Check "ROTARY POSI SEN" of CONSULT-III "DATA MONITOR" for "ALL MODE AWD/4WD".

<table>
<thead>
<tr>
<th>Monitor item</th>
<th>Condition</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROTARY POSI SEN</td>
<td>Turn the actuator shaft.</td>
<td>Value is changing</td>
</tr>
</tbody>
</table>

Is the inspection result normal?
- YES >> GO TO 4.
- NO  >> Transfer assembly is mechanical malfunction. Replace transfer assembly. Refer to DLN-121, "Removal and Installation".

4. CHECK TERMINALS AND HARNESS CONNECTORS

Check the pin terminals for damage or loose connection with each harness connector.

Is the inspection result normal?
- YES >> Replace transfer control unit. Refer to DLN-107, "Removal and Installation".
- NO  >> Repair or replace error-detected parts.

Component Inspection

1. CHECK TRANSFER MOTOR

1. Remove transfer control actuator. Refer to DLN-114, "Exploded View".
2. Apply 12 V to transfer control actuator connector No. 1 terminal and No. 8 terminal.
   **CAUTION:**
   - Never make the terminals short.
   - Connect the fuse between the terminals when applying the voltage.
3. Check the operation of transfer control actuator.

<table>
<thead>
<tr>
<th>Transfer control actuator</th>
<th>Condition</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Apply the voltage between No. 1 (+) terminal and No. 8 (−) terminal.</td>
<td>Operate clockwise</td>
</tr>
<tr>
<td>8</td>
<td>Apply the voltage between No. 1 (−) terminal and No. 8 (+) terminal.</td>
<td>Operate counter-clockwise</td>
</tr>
</tbody>
</table>

Is the inspection result normal?
- YES >> INSPECTION END
- NO  >> Replace transfer control actuator. Refer to DLN-114, "Exploded View".
DTC DETECTION LOGIC

<table>
<thead>
<tr>
<th>DTC</th>
<th>Display Item</th>
<th>Malfunction detected condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P181A</td>
<td>MOTOR TEMP SEN</td>
<td>When vehicle speed is 40km/h or more and transfer motor temperature is lower than normal</td>
<td>Transfer control actuator • Malfunction of transfer motor temperature sensor circuit. (open)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When transfer motor temperature is higher than normal</td>
<td>Transfer control actuator • Malfunction of transfer motor temperature sensor circuit. (short)</td>
</tr>
</tbody>
</table>

DTC CONFIRMATION PROCEDURE

1. DTC REPRODUCTION PROCEDURE

With CONSULT-III

1. Start the engine and drive at 40 km/h (25 MPH) or more for approximately 1 minute.
2. Perform self-diagnosis for “ALL MODE AWD/4WD”.

Is DTC “P181A” detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-72, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK TRANSFER MOTOR TEMPERATURE SENSOR POWER SUPPLY

1. Turn the ignition switch OFF.
2. Disconnect transfer control actuator harness connector.
3. Turn the ignition switch ON.
   CAUTION: Never start the engine.
4. Check the voltage between transfer control actuator harness connector terminals.

<table>
<thead>
<tr>
<th>+</th>
<th>Voltage</th>
<th>−</th>
</tr>
</thead>
<tbody>
<tr>
<td>F52</td>
<td>Terminal 4</td>
<td>7</td>
</tr>
</tbody>
</table>

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. CHECK TRANSFER MOTOR TEMPERATURE SENSOR CIRCUIT

1. Turn the ignition switch OFF.
2. Disconnect transfer control unit harness connector.
3. Check the continuity between transfer control unit harness connector and transfer control actuator harness connector.

<table>
<thead>
<tr>
<th>Transfer control unit</th>
<th>Transfer control actuator</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>Terminal</td>
<td>Connector</td>
</tr>
<tr>
<td>E59</td>
<td>28</td>
<td>F52</td>
</tr>
</tbody>
</table>

4. Check the continuity between transfer control actuator harness connector and ground.
P181A TRANSFER MOTOR TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[TRANSFER: ATX90A]

<table>
<thead>
<tr>
<th>Connector</th>
<th>Terminal</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>F52</td>
<td>7</td>
<td>Ground</td>
</tr>
</tbody>
</table>

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

3. CHECK TRANSFER MOTOR TEMPERATURE SENSOR

Check the transfer control actuator. Refer to DLN-73, "Component Inspection".
Is the inspection result normal?

YES >> GO TO 4.
NO >> Transfer motor temperature sensor is malfunctioning. Replace transfer control actuator. Refer to DLN-114, "Exploded View".

4. CHECK TERMINALS AND HARNESS CONNECTORS

Check the pin terminals for damage or loose connection with each harness connector.
Is the inspection result normal?

YES >> Replace transfer control unit. Refer to DLN-107, "Removal and Installation".
NO >> Repair or replace error-detected parts.

Component Inspection

1. CHECK TRANSFER MOTOR TEMPERATURE SENSOR

1. Turn the ignition switch OFF.
2. Disconnect transfer control actuator harness connector.
3. Check the resistance between transfer control actuator harness connector terminals.

<table>
<thead>
<tr>
<th>Transfer control actuator</th>
<th>Condition</th>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F52 7</td>
<td>20 °C (68 °F)</td>
<td>Approx. 12.5 kΩ</td>
</tr>
<tr>
<td></td>
<td>80 °C (176 °F)</td>
<td>Approx. 1.3 kΩ</td>
</tr>
</tbody>
</table>

Is the inspection result normal?

YES >> INSPECTION END
NO >> Transfer motor temperature sensor is malfunctioning. Replace transfer control actuator. Refer to DLN-114, "Exploded View".

Revision: 2010 May

2011 QX56
P181B INCOMPLETE SELFSHUT

DTC Logic

DTC DETECTION LOGIC

<table>
<thead>
<tr>
<th>DTC</th>
<th>Display item</th>
<th>Malfunction detected condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P181B</td>
<td>IMCOMP SELFSHUT</td>
<td>When ignition switch is OFF and transfer control unit power supply is lower or higher than normal</td>
<td>Self-shut is incomplete.</td>
</tr>
</tbody>
</table>

DTC CONFIRMATION PROCEDURE

1. DTC REPRODUCTION PROCEDURE

With CONSULT-III

1. Turn the ignition switch OFF.
2. Perform self-diagnosis for “ALL MODE AWD/4WD”.

Is DTC “P181B” detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-74, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

1. CHECK TRANSFER CONTROL UNIT POWER SUPPLY (1)

1. Turn the ignition switch OFF.
2. Disconnect transfer control unit harness connector.
3. Check the voltage between transfer control unit harness connector and ground.

<table>
<thead>
<tr>
<th>Transfer control unit</th>
<th>—</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>Terminal</td>
<td>—</td>
</tr>
<tr>
<td>E59</td>
<td>20</td>
<td>Ground</td>
</tr>
</tbody>
</table>

4. Turn the ignition switch ON.

CAUTION:
Never start the engine.

5. Check the voltage between transfer control unit harness connector and ground.

<table>
<thead>
<tr>
<th>Transfer control unit</th>
<th>—</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>Terminal</td>
<td>—</td>
</tr>
<tr>
<td>E59</td>
<td>20</td>
<td>Ground</td>
</tr>
</tbody>
</table>

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2. CHECK TRANSFER CONTROL UNIT POWER SUPPLY (2)

1. Turn the ignition switch OFF.
2. Check the 10A fuse (#34).
3. Check the harness for open or short between transfer control unit harness connector No.20 terminal and 10A (#34).

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit. Refer to PG-11, "Wiring Diagram - BATTERY POWER SUPPLY -".
NO >> Repair or replace error-detected parts.

3. CHECK TRANSFER CONTROL UNIT GROUND

1. Turn the ignition switch OFF.
2. Check the continuity between transfer control unit harness connector and ground.

<table>
<thead>
<tr>
<th>Connector</th>
<th>Terminal</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>E60</td>
<td>44</td>
<td>Ground</td>
</tr>
<tr>
<td></td>
<td>46</td>
<td>Existed</td>
</tr>
</tbody>
</table>

Is the inspection result normal?
- YES >> GO TO 4.
- NO >> Repair or replace error-detected parts.

4. CHECK TERMINALS AND HARNESS CONNECTORS

Check transfer control unit pin terminals for damage or loose connection with harness connector.

Is inspection result normal?
- YES >> After turning the ignition switch OFF, perform DTC confirmation procedure again. When DTC "P181B" is detected, Replace transfer control unit. Refer to DLN-107, "Removal and Installation".
- NO >> Repair or replace error-detected parts.
P181C TRANSFER MOTOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS > [TRANSFER: ATX90A]

P181C TRANSFER MOTOR POWER SUPPLY

Description

Supplies power to transfer control actuator (transfer motor).

DTC Logic

DTC DETECTION LOGIC

DTC CONFIRMATION PROCEDURE

1. DTC REPRODUCTION PROCEDURE

With CONSULT-III

1. Turn the ignition switch OFF to ON.
2. Perform self-diagnosis for “ALL MODE AWD/4WD”.

Is DTC “P181C” detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-76, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK TRANSFER MOTOR POWER SUPPLY (2)

Check the voltage between transfer control unit harness connector and ground.

<table>
<thead>
<tr>
<th>E60</th>
<th>41</th>
<th>46</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>−</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. CHECK TRANSFER MOTOR POWER SUPPLY CIRCUIT (2)

1. Turn the ignition switch OFF.
2. Check the 30A fusible link (J).
3. Check the harness for open or short between transfer control unit harness connector No.41 terminal and 30A fusible link (J).

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit. Refer to PG-11, "Wiring Diagram - BATTERY POWER SUPPLY -".

NO >> Repair or replace error-detected parts.

3. CHECK TERMINALS AND HARNESS CONNECTORS

Check the pin terminals for damage or loose connection with each harness connector.

Is the inspection result normal?

YES >> Replace transfer control unit. Refer to DLN-107, "Removal and Installation".

NO >> Repair or replace error-detected parts.
P181E STEERING ANGLE SENSOR

DTC Logic

DTC DETECTION LOGIC

<table>
<thead>
<tr>
<th>DTC</th>
<th>Display item</th>
<th>Malfunction detected condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P181E</td>
<td>ST ANGLE SEN SIG</td>
<td>Malfunction is detected in steering angle sensor signal through CAN communication.</td>
<td>• Harness or connector (CAN communication line)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Steering angle sensor</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Steering angle sensor error</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Malfunction of steering angle sensor circuit error</td>
</tr>
</tbody>
</table>

DTC CONFIRMATION PROCEDURE

1. DTC REPRODUCTION PROCEDURE

With CONSULT-III
1. Turn the ignition switch OFF to ON.
2. Perform self-diagnosis for “ALL MODE AWD/4WD”.

Is DTC “P181E” detected?
YES >> Proceed to diagnosis procedure. Refer to DLN-77, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

1. PERFORM ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) SELF-DIAGNOSIS

With CONSULT-III
Perform self-diagnosis for “ABS”.

Is DTC “C1143” detected?
YES >> Proceed to diagnosis procedure. Refer to BRC-97, "Diagnosis Procedure".
NO >> GO TO 2.

2. CHECK CAN COMMUNICATION LINE

Check communication line. Refer to LAN-69, "Diagnosis Procedure".

Is inspection result normal?
YES >> Replace transfer control unit. Refer to DLN-107, "Removal and Installation".
NO >> Repair or replace error-detected parts.
P181F INCOMPLETE CALIBRATION

DTC Logic

DTC DETECTION LOGIC

<table>
<thead>
<tr>
<th>DTC</th>
<th>Display Item</th>
<th>Malfunction detected condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P181F</td>
<td>INCOMP CALIBRATION</td>
<td>When incomplete calibration of transfer control unit is detected.</td>
<td>Initial calibration of transfer is incomplete</td>
</tr>
</tbody>
</table>

DTC CONFIRMATION PROCEDURE

1. DTC REPRODUCTION PROCEDURE

With CONSULT-III
1. Turn the ignition switch OFF to ON.
2. Perform self-diagnosis for “ALL MODE AWD/4WD”.
   Is DTC “P181F” detected?
   YES >> Proceed to diagnosis procedure. Refer to DLN-78, "Diagnosis Procedure".
   NO >> INSPECTION END

Diagnosis Procedure

1. PERFORM INITIAL CALIBRATION
   1. Erase self-diagnostic result for “ALL MODE AWD/4WD”.
   2. Perform initial calibration. Refer to DLN-41, "Work Procedure".
   3. Perform self-diagnosis for “ALL MODE AWD/4WD”.
   Is any DTC except “P181F” detected?
   YES >> Check DTC.
   NO >> GO TO 2.

2. PERFORM SELF-DIAGNOSIS

With CONSULT-III
1. Erase self-diagnostic result for “ALL MODE AWD/4WD”.
2. Turn the ignition switch OFF, and then wait 10 seconds or more.
3. Perform self-diagnosis for “ALL MODE AWD/4WD”.
   Is DTC “P181F” detected?
   YES >> Replace transfer control unit. Refer to DLN-107, "Removal and Installation".
   NO >> Check transfer control unit pin terminals for damage or loose connection with harness connector. If any items are damaged, repair or replace the error-detected parts.
P1820 ENGINE SPEED SIGNAL

DTC Logic

DTC DETECTION LOGIC

<table>
<thead>
<tr>
<th>DTC</th>
<th>Display Item</th>
<th>Malfunction detected condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1820</td>
<td>ENGINE SPEED SIG</td>
<td>Malfunction is detected in engine speed signal that is output from ECM through CAN communication.</td>
<td>• Harness or connector (CAN communication line)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Internal malfunction of ECM</td>
</tr>
</tbody>
</table>

DTC CONFIRMATION PROCEDURE

1. DTC REPRODUCTION PROCEDURE

With CONSULT-III

1. Start the engine and drive at 20 km/h (12 MPH) or more.
2. Perform self-diagnosis for “ALL MODE AWD/4WD”.

Is DTC “P1820” detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-79, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. PERFORM ECM SELF-DIAGNOSIS

With CONSULT-III

Perform self-diagnosis for “ENGINE”.

Is any DTCs detected?

YES >> Check the DTCs.

NO >> GO TO 2.

2. ERASE SELF-DIAGNOSTIC RESULT

With CONSULT-III

1. Erase self-diagnostic results for “ALL MODE AWD/4WD”.
2. Turn the ignition switch OFF.
3. Start the engine and drive vehicle for a while.
4. Check that malfunction indicator lamp (MIL) turns OFF.

Does malfunction indicator lamp (MIL) turn OFF?

YES >> GO TO 3.

NO >> Refer to EC-515, "Diagnosis Procedure".

3. CHECK TERMINALS AND HARNESS CONNECTORS

Check transfer control unit pin terminals for damage or loose connection with harness connector.

Is inspection result normal?

YES >> After turning the ignition switch OFF, perform DTC confirmation procedure again. When DTC "P1820" is detected, Replace transfer control unit. Refer to DLN-107, "Removal and Installation".

NO >> Repair or replace error-detected parts.

---

**Malfunction detected condition**

**Possible cause**

P1820 ENGINE SPEED SIGNAL

Malfunction is detected in engine speed signal that is output from ECM through CAN communication.

• Harness or connector (CAN communication line)
• Internal malfunction of ECM
P1826 TRANSFER FLUID TEMPERATURE

< DTC/CIRCUIT DIAGNOSIS >

P1826 TRANSFER FLUID TEMPERATURE

DTC Logic

DTC DETECTION LOGIC

<table>
<thead>
<tr>
<th>DTC</th>
<th>Display Item</th>
<th>Malfunction detected condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1826</td>
<td>OIL TEMP SEN</td>
<td>When vehicle speed is 40km/h or more and transfer fluid temperature is lower than normal</td>
<td>Transfer fluid temperature • Malfunction of transfer fluid temperature sensor circuit (open)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When transfer fluid temperature is higher than normal</td>
<td>Transfer fluid temperature • Malfunction of transfer fluid temperature sensor circuit (short)</td>
</tr>
</tbody>
</table>

DTC CONFIRMATION PROCEDURE

1. DTC REPRODUCTION PROCEDURE

With CONSULT-III

1. Start the engine and drive at 40 km/h (25 MPH) or more for approximately 1 minute.
2. Perform self-diagnosis for “ALL MODE AWD/4WD”.
   Is DTC “P1826” detected?
   YES >> Proceed to diagnosis procedure. Refer to DLN-80, "Diagnosis Procedure".
   NO >> INSPECTION END

Diagnosis Procedure

1. CHECK TRANSFER FLUID TEMPERATURE SENSOR POWER SUPPLY

1. Turn the ignition switch OFF.
2. Disconnect transfer fluid temperature sensor harness connector.
3. Turn the ignition switch ON.  
   CAUTION: Never start the engine.
4. Check the voltage between transfer fluid temperature sensor harness connector terminals.

<table>
<thead>
<tr>
<th>+</th>
<th>–</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transfer fluid temperature sensor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connector</td>
<td>Terminal</td>
<td></td>
</tr>
<tr>
<td>F37</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Approx. 5 V</td>
<td></td>
</tr>
</tbody>
</table>

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2. CHECK TRANSFER FLUID TEMPERATURE SENSOR CIRCUIT

1. Turn the ignition switch OFF.
2. Disconnect transfer control unit harness connector.
3. Check the continuity between transfer control unit harness connector and transfer control actuator harness connector.

<table>
<thead>
<tr>
<th>Transfer control unit</th>
<th>Transfer fluid temperature sensor</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>Terminal</td>
<td>Connector</td>
</tr>
<tr>
<td>E59</td>
<td>7</td>
<td>F37</td>
</tr>
<tr>
<td></td>
<td>36</td>
<td></td>
</tr>
</tbody>
</table>

4. Check the continuity between transfer fluid temperature sensor harness connector and ground.
Component Inspection

1. **CHECK TRANSFER FLUID TEMPERATURE SENSOR**

   1. Turn the ignition switch OFF.
   2. Disconnect transfer fluid temperature sensor harness connector.
   3. Check the resistance between transfer control fluid temperature sensor connector terminals.

<table>
<thead>
<tr>
<th>Transfer fluid temperature sensor</th>
<th>Terminal</th>
<th>Condition</th>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
<td>20 °C (68 °F)</td>
<td>Approx. 2.5 kΩ</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>80 °C (176 °F)</td>
<td>Approx. 0.3 kΩ</td>
</tr>
</tbody>
</table>

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace transfer fluid temperature sensor. Refer to DLN-120, "Exploded View".

2. **CHECK TRANSFER FLUID TEMPERATURE SENSOR**

   Check the transfer fluid temperature sensor. Refer to DLN-81, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace transfer fluid temperature sensor. Refer to DLN-120, "Exploded View".

3. **CHECK TERMINALS AND HARNESS CONNECTORS**

   Check the pin terminals for damage or loose connection with each harness connector.

Is the inspection result normal?

YES >> Replace transfer control unit. Refer to DLN-107, "Removal and Installation".

NO >> Repair or replace error-detected parts.

---

Transfer fluid temperature sensor — Continuity

<table>
<thead>
<tr>
<th>Connector</th>
<th>Terminal</th>
<th>Ground</th>
<th>Not existed</th>
</tr>
</thead>
<tbody>
<tr>
<td>DLN</td>
<td>F37</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

Revision: 2010 May

INFOID:0000000006222287

Transfer fluid temperature sensor — Continuity

Connect Terminal

F37 2 Ground Not existed

Condition Resistance

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>20 °C (68 °F)</td>
</tr>
<tr>
<td>2</td>
<td>80 °C (176 °F)</td>
</tr>
</tbody>
</table>

Revision: 2010 May

DLN-81

2011 QX56
P1829 ACCELERATOR PEDAL POSITION SENSOR

DTC Logic

DTC DETECTION LOGIC

<table>
<thead>
<tr>
<th>DTC</th>
<th>Display Item</th>
<th>Malfunction detected condition</th>
<th>Possible cause</th>
</tr>
</thead>
</table>
| P1829| THROTTLE POSI SEN| Malfunction is detected in accelerator pedal position signal that is output from ECM through CAN communication. | • Harness or connector (CAN communication line)  
• Internal malfunction of ECM |

DTC CONFIRMATION PROCEDURE

1. DTC REPRODUCTION PROCEDURE

릭 With CONSULT-III
1. Start the engine and drive at 30 km/h (19 MPH) or more.
2. Perform self-diagnosis for “ALL MODE AWD/4WD”.
   Is DTC “P1829” detected?
   YES  >> Proceed to diagnosis procedure. Refer to DLN-82, "Diagnosis Procedure".
   NO   >> INSPECTION END

Diagnosis Procedure

1. PERFORM ECM SELF-DIAGNOSIS

릭 With CONSULT-III
Perform self-diagnosis for “ENGINE”.
Is any DTCs detected?
YES  >> Check the DTCs.
NO   >> GO TO 2.

2. ERASE SELF-DIAGNOSTIC RESULT

릭 With CONSULT-III
1. Erase self-diagnostic results for “ALL MODE AWD/4WD”.
2. Turn the ignition switch OFF.
3. Start the engine and drive vehicle for a while.
4. Check that malfunction indicator lamp (MIL) turns OFF.
   Does malfunction indicator lamp (MIL) turn OFF?
   YES  >> GO TO 3.
   NO   >> Refer to EC-515, "Diagnosis Procedure".

3. CHECK TERMINALS AND HARNESS CONNECTORS

Check transfer control unit pin terminals for damage or loose connection with harness connector.
Is inspection result normal?
YES  >> After turning the ignition switch OFF, perform DTC confirmation procedure again. When DTC “P1829” is detected, Replace transfer control unit. Refer to DLN-107, "Removal and Installation".
NO   >> Repair or replace error-detected parts.
DTC Logic

DTC DETECTION LOGIC

<table>
<thead>
<tr>
<th>DTC</th>
<th>Display item</th>
<th>Malfunction detected condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P182A</td>
<td>HI-LO POSITION SEN</td>
<td>Malfunction related to transfer Hi-Lo position sensor has been detected.</td>
<td>Internal malfunction of transfer Hi-Lo position sensor</td>
</tr>
</tbody>
</table>

DTC CONFIRMATION PROCEDURE

1. DTC REPRODUCTION PROCEDURE

With CONSULT-III

1. Start the engine.
   
   CAUTION:
   Never drive the vehicle.

2. Turn the 4WD shift switch AUTO ⇒ 4H ⇒ 4LO ⇒ 4H ⇒ AUTO.
3. Drive at 20 km/h (12MPH) or more for 1 minute or more.
4. Perform self-diagnosis for “ALL MODE AWD/4WD”.

Is DTC “P182A” detected?

YES >> Proceed to diagnosis procedure. Refer to DLN-83, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK TRANSFER HI-LO POSITION SENSOR SIGNAL

1. Turn the ignition switch ON.
   
   CAUTION:
   Never start the engine.

2. Check the voltage between transfer control unit harness connector and ground.

<table>
<thead>
<tr>
<th>+</th>
<th>Transfer control unit</th>
<th>Condition</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Connector</td>
<td>Terminal</td>
<td></td>
</tr>
<tr>
<td>E59</td>
<td>6</td>
<td>Ground</td>
<td>4WD mode: AUTO or 4H</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4WD mode: 4L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4WD mode: AUTO or 4H</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4WD mode: 4L</td>
</tr>
</tbody>
</table>

CAUTION:
After operating 4WD shift switch, move the vehicle back and forth to check voltage.

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 2.

2. CHECK TRANSFER HI-LO POSITION SENSOR POWER SUPPLY

1. Turn the ignition switch OFF.
2. Disconnect transfer Hi-Lo position sensor harness connector.
3. Turn the ignition switch ON.
   
   CAUTION:
   Never start the engine.

4. Check the voltage between transfer Hi-Lo position sensor harness connector terminals.
P182A TRANSFER HI-LO POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS > [TRANSFER: ATX90A]

+ Voltage
<table>
<thead>
<tr>
<th>Connector</th>
<th>Terminal</th>
<th>—</th>
</tr>
</thead>
<tbody>
<tr>
<td>F42</td>
<td>1</td>
<td>Ground</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Approx. 5 V</td>
</tr>
</tbody>
</table>

Is the inspection result normal?
YES >> GO TO 4.
NO >> GO TO 3.

3. CHECK TRANSFER HI-LO POSITION SENSOR CIRCUIT

1. Turn the ignition switch OFF.
2. Disconnect transfer control unit harness connector.
3. Check the continuity between transfer control unit harness connector and transfer Hi-Lo position sensor harness connector.

<table>
<thead>
<tr>
<th>Transfer control unit</th>
<th>Transfer Hi-Lo position sensor</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>Terminal</td>
<td>Connector</td>
</tr>
<tr>
<td>E59</td>
<td>6</td>
<td>F42</td>
</tr>
<tr>
<td></td>
<td>25</td>
<td></td>
</tr>
<tr>
<td></td>
<td>29</td>
<td></td>
</tr>
</tbody>
</table>

4. Check the continuity between transfer Hi-Lo position sensor harness connector and ground.

<table>
<thead>
<tr>
<th>Transfer Hi-Lo position sensor</th>
<th>—</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>Terminal</td>
<td></td>
</tr>
<tr>
<td>F42</td>
<td>1</td>
<td>Ground</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Not existed</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

Is the inspection result normal?
YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4. REPLACE TRANSFER HI-LO POSITION SENSOR

1. Replace transfer Hi-Lo position sensor. Refer to DLN-116, "Exploded View".
2. Perform confirmation procedure again. Refer to DLN-83, "DTC Logic".

Is DTC “P182A" detected?
YES >> GO TO 5.
NO >> INSPECTION END

5. CHECK TERMINALS AND HARNESS CONNECTORS

Check the pin terminals for damage or loose connection with each harness connector.

Is the inspection result normal?
YES >> Replace transfer control unit. Refer to DLN-107, "Removal and Installation".
NO >> Repair or replace error-detected parts.
P182B TRANSFER LOCK POSITION SENSOR

DTC DETECTION LOGIC

<table>
<thead>
<tr>
<th>DTC</th>
<th>Display item</th>
<th>Malfunction detected condition</th>
<th>Possible cause</th>
</tr>
</thead>
</table>
| P182B | Lock POSITION SEN | Malfunction related to transfer lock position sensor has been detected. | • Transfer lock position sensor  
• Transfer lock position sensor error  
• Malfunction of transfer lock position sensor circuit |

DTC CONFIRMATION PROCEDURE

1. DTC REPRODUCTION PROCEDURE

With CONSULT-III
1. Turn the ignition switch OFF to ON.
2. Turn the 4WD shift switch AUTO⇒4H⇒4LO⇒4H⇒AUTO.
3. Perform self-diagnosis for “ALL MODE AWD/4WD”.

Is DTC “P182B” detected?
YES >> Proceed to diagnosis procedure. Refer to DLN-85, "Diagnosis Procedure”.
NO >> INSPECTION END

Diagnosis Procedure

1. CHECK TRANSFER LOCK POSITION SENSOR

With CONSULT-III
1. Start the engine.
2. Turn the 4WD shift switch AUTO⇒4H⇒4LO⇒4H⇒AUTO.
3. Check “LOCK POSI SEN” of CONSULT-III “DATA MONITOR” for “ALL MODE AWD/4WD”.

<table>
<thead>
<tr>
<th>Monitor item</th>
<th>Condition</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCK POSI SEN</td>
<td>4WD shift switch: AUTO or 4H</td>
<td>OPEN</td>
</tr>
<tr>
<td></td>
<td>4WD shift switch: 4L</td>
<td>LOCK</td>
</tr>
<tr>
<td></td>
<td>When transfer lock position sensor is unlearned.</td>
<td>UNLEAN</td>
</tr>
<tr>
<td></td>
<td>When the temperature of transfer lock position sensor is high.</td>
<td>HI TEMP</td>
</tr>
<tr>
<td></td>
<td>When transfer lock position sensor is malfunctioning.</td>
<td>ERROR</td>
</tr>
<tr>
<td></td>
<td>When transfer lock position sensor signal circuit is short. (Battery short)</td>
<td>BAT</td>
</tr>
<tr>
<td></td>
<td>When transfer lock position sensor signal circuit is short. (Ground short)</td>
<td>GND</td>
</tr>
</tbody>
</table>

What is the item on “DATA MONITOR”?  
OPEN >> GO TO 7.  
LOCK >> GO TO 7.  
UNLEAN >> GO TO 6.  
HI TEMP >> GO TO 5.  
ERROR >> GO TO 5.  
BAT >> GO TO 2.  
GND >> GO TO 2.

2. CHECK TRANSFER LOCK POSITION POWER SUPPLY

1. Turn the ignition switch OFF.
2. Disconnect transfer position sensor harness connector.
3. Turn the ignition switch ON.

CAUTION:
Never start the engine.

4. Check the voltage between transfer position sensor harness connector terminals.

<table>
<thead>
<tr>
<th>+</th>
<th>-</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>F40</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3. CHECK TRANSFER LOCK POSITION SENSOR POWER SUPPLY CIRCUIT

1. Turn the ignition switch OFF.
2. Disconnect transfer control unit harness connector.
3. Check the continuity between transfer control unit harness connector and transfer lock position sensor harness connector.

<table>
<thead>
<tr>
<th>Transfer control unit</th>
<th>Transfer lock position sensor</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>Terminal</td>
<td>Connector</td>
</tr>
<tr>
<td>E59</td>
<td>17</td>
<td>F40</td>
</tr>
<tr>
<td>30</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Check the continuity between transfer lock position harness connector and ground.

| Transfer lock position sensor | | Continuity |
|-----------------------------|-----------------|
| Connector | Terminal | - |
| F40 | 1 | Ground | Not existed |

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

4. CHECK TRANSFER LOCK POSITION SENSOR SIGNAL CIRCUIT

1. Turn the ignition switch OFF.
2. Disconnect transfer control unit harness connector.
3. Check the continuity between transfer control unit harness connector and transfer lock position sensor harness connector.

<table>
<thead>
<tr>
<th>Transfer control unit</th>
<th>Transfer lock position sensor</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>Terminal</td>
<td>Connector</td>
</tr>
<tr>
<td>E59</td>
<td>38</td>
<td>F40</td>
</tr>
</tbody>
</table>

4. Check the continuity between transfer lock position harness connector and ground.

| Transfer lock position sensor | | Continuity |
|-----------------------------|-----------------|
| Connector | Terminal | - |
| F40 | 3 | Ground | Not existed |

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5. REPLACE TRANSFER LOCK POSITION SENSOR

1. Replace transfer lock position sensor. Refer to DLN-119, "Removal and Installation".
2. Perform confirmation procedure again. Refer to DLN-85, "DTC Logic".

Is the inspection result normal?
6. PERFORM LEARNING OF TRANSFER LOCK POSITION SENSOR

Transfer lock position sensor. Refer to DLN-44, "Work Procedure".

>> GO TO 7.

7. CHECK TERMINALS AND HARNESS CONNECTORS

Check the pin terminals for damage or loose connection with each harness connector.

Is the inspection result normal?

YES >> Replace transfer control unit. Refer to DLN-107, "Removal and Installation".

NO >> Repair or replace error-detected parts.
DTC Logic

DTC DETECTION LOGIC

<table>
<thead>
<tr>
<th>DTC</th>
<th>Display Item</th>
<th>Malfunction Detected Condition</th>
<th>Possible Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1830</td>
<td>ABS OP SIG</td>
<td>Malfunction is detected in ABS operation signal that is output from ABS actuator and electric unit (control unit) through CAN communication.</td>
<td>Malfunction of ABS system</td>
</tr>
</tbody>
</table>

DTC CONFIRMATION PROCEDURE

1. DTC REPRODUCTION PROCEDURE

- **With CONSULT-III**
  1. Start the engine and drive at 30 km/h (19 MPH) or more.
  2. Perform self-diagnosis for “ALL MODE AWD/4WD”.

  Is DTC “P1830” detected?
  - YES >> Proceed to diagnosis procedure. Refer to DLN-88, "Diagnosis Procedure".
  - NO >> INSPECTION END

Diagnosis Procedure

1. PERFORM ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) SELF-DIAGNOSIS

- **With CONSULT-III**
  Perform self-diagnosis for “ABS”.

  Is any DTCs detected?
  - YES >> Check the DTCs.
  - NO >> GO TO 2.

2. ERASE SELF-DIAGNOSTIC RESULT

- **With CONSULT-III**
  1. Erase self-diagnostic results for “ALL MODE AWD/4WD”.
  2. Start the engine and drive vehicle at 30 km/h (19 MPH) or more.
  3. Check that ABS warning lamp turns OFF.

  Does ABS warning lamp turn OFF?
  - YES >> GO TO 3.
  - NO >> Refer to BRC-123, "Diagnosis Procedure".

3. CHECK TERMINALS AND HARNESS CONNECTORS

  Check transfer control unit pin terminals for damage or loose connection with harness connector.

  Is inspection result normal?
  - YES >> After turning the ignition switch OFF, perform DTC confirmation procedure again. When DTC “P1830” is detected, Replace transfer control unit. Refer to DLN-107, "Removal and Installation".
  - NO >> Repair or replace error-detected parts.
P1831 VDC OPERATION SIGNAL

DTC Logic

DTC DETECTION LOGIC

<table>
<thead>
<tr>
<th>DTC</th>
<th>Display item</th>
<th>Malfunction detected condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1831</td>
<td>VDC OP SIG</td>
<td>Malfunction is detected in VDC operation signal that is output from ABS actuator and electric unit (control unit) through CAN communication.</td>
<td>Malfunction of ABS system</td>
</tr>
</tbody>
</table>

DTC CONFIRMATION PROCEDURE

1. DTC REPRODUCTION PROCEDURE

With CONSULT-III

1. Start the engine and drive at 30 km/h (19 MPH) or more.
2. Perform self-diagnosis for "ALL MODE AWD/4WD".
   Is DTC "P1831" detected?
   YES >> Proceed to diagnosis procedure. Refer to DLN-89, "Diagnosis Procedure".
   NO >> INSPECTION END

Diagnosis Procedure

1. PERFORM ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) SELF-DIAGNOSIS

With CONSULT-III

Perform self-diagnosis for "ABS".
   Is any DTCs detected?
   YES >> Check the DTCs.
   NO >> GO TO 2.

2. ERASE SELF-DIAGNOSTIC RESULT

With CONSULT-III

1. Erase self-diagnostic results for "ALL MODE AWD/4WD".
2. Start the engine and drive vehicle at 30 km/h (19 MPH) or more.
3. Check that ABS warning lamp turns OFF.
   Does ABS warning lamp turn OFF?
   YES >> GO TO 3.
   NO >> Refer to BRC-122, "Diagnosis Procedure".

3. CHECK TERMINALS AND HARNESS CONNECTORS

Check transfer control unit pin terminals for damage or loose connection with harness connector.
   Is inspection result normal?
   YES >> After turning the ignition switch OFF, perform DTC confirmation procedure again. When DTC "P1831" is detected, Replace transfer control unit. Refer to DLN-107, "Removal and Installation".
   NO >> Repair or replace error-detected parts.
P1832 TCS OPERATION SIGNAL

< DTC/CIRCUIT DIAGNOSIS >
[TRANSFER: ATX90A]

P1832 TCS OPERATION SIGNAL

DTC Logic

DTC DETECTION LOGIC

<table>
<thead>
<tr>
<th>DTC</th>
<th>Display Item</th>
<th>Malfunction detected condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1832</td>
<td>TCS OP SIG</td>
<td>Malfunction is detected in TCS operation signal that is output from ABS actuator and electric unit (control unit) through CAN communication.</td>
<td>Malfunction of TCS system</td>
</tr>
</tbody>
</table>

DTC CONFIRMATION PROCEDURE

1. DTC REPRODUCTION PROCEDURE

With CONSULT-III
1. Start the engine and drive at 30 km/h (19 MPH) or more.
2. Perform self-diagnosis for “ALL MODE AWD/4WD”.

Is DTC “P1832” detected?

YES  >> Proceed to diagnosis procedure. Refer to DLN-90, "Diagnosis Procedure".

NO   >> INSPECTION END

Diagnosis Procedure

1. PERFORM ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT) SELF-DIAGNOSIS

With CONSULT-III
Perform self-diagnosis for “ABS”.

Is any DTCs detected?

YES  >> Check the DTCs.

NO   >> GO TO 2.

2. ERASE SELF-DIAGNOSTIC RESULT

With CONSULT-III
1. Erase self-diagnostic results for “ALL MODE AWD/4WD”.
2. Start the engine and drive vehicle at 30 km/h (19 MPH) or more.
3. Check that ABS warning lamp turns OFF.

Does ABS warning lamp turn OFF?

YES  >> GO TO 3.

NO   >> Refer to BRC-122, "Diagnosis Procedure".

3. CHECK TERMINALS AND HARNESS CONNECTORS

Check transfer control unit pin terminals for damage or loose connection with harness connector.

Is inspection result normal?

YES  >> After turning the ignition switch OFF, perform DTC confirmation procedure again. When DTC “P1832” is detected, Replace transfer control unit. Refer to DLN-107, "Removal and Installation".

NO   >> Repair or replace error-detected parts.
U1000 CAN COMM CIRCUIT

Description

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN-H line, CAN-L line) allowing a high rate of information transmission with less wiring. Each control unit communicate data but selectively reads required data only.

DTC Logic

DTC DETECTION LOGIC

DTC CONFIRMATION PROCEDURE

1. DTC REPRODUCTION PROCEDURE

With CONSULT-III
1. Turn the ignition switch OFF to ON.
2. Perform self-diagnosis for “ALL MODE AWD/4WD”.
   Is DTC “U1000” detected?
   YES  >> Proceed to diagnosis procedure. Refer to DLN-91, "Diagnosis Procedure".
   NO   >> INSPECTION END

Diagnosis Procedure

1. PERFORM SELF-DIAGNOSIS

With CONSULT-III
Perform self-diagnosis for “ALL MODE AWD/4WD”.
Is DTC “U1000” detected?
   YES  >> Proceed to LAN-18, "Trouble Diagnosis Flow Chart".
   NO   >> INSPECTION END
CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN-H line, CAN-L line) allowing a high rate of information transmission with less wiring. Each control unit communicate data but selectively reads required data only.

DTC Logic

DTC DETECTION LOGIC

<table>
<thead>
<tr>
<th>DTC</th>
<th>Display Item</th>
<th>Malfunction detected condition</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>U1010</td>
<td>CONTROL UNIT (CAN)</td>
<td>Detecting error during the initial diagnosis of CAN controller of transfer control unit.</td>
<td>Malfunction of transfer control unit</td>
</tr>
</tbody>
</table>

DTC CONFIRMATION PROCEDURE

1. DTC REPRODUCTION PROCEDURE

With CONSULT-III
1. Turn the ignition switch OFF to ON.
2. Perform self-diagnosis for “ALL MODE AWD/4WD”.

Is DTC “U1010” detected?

YES  >> Proceed to diagnosis procedure. Refer to DLN-92, "Diagnosis Procedure".

NO  >> INSPECTION END

Diagnosis Procedure

1. CHECK TRANSFER CONTROL UNIT

Check transfer control unit harness connector for disconnection and deformation.

Is the inspection result normal?

YES  >> Replace transfer control unit. Refer to DLN-107, "Removal and Installation".

NO  >> Repair or replace error-detected parts.
< DTC/CIRCUIT DIAGNOSIS >

POWER SUPPLY AND GROUND CIRCUIT

Description

Supplies power to 4WD system.

Diagnosis Procedure

1. CHECK TRANSFER CONTROL UNIT POWER SUPPLY (1)

1. Turn the ignition switch OFF.
2. Disconnect transfer control unit harness connector.
3. Check the voltage between transfer control unit harness connector and ground.

| Connector | Terminal | Voltage
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>E59</td>
<td>20</td>
<td>Ground Battery voltage</td>
</tr>
</tbody>
</table>

4. Turn the ignition switch ON.

**CAUTION:**
Never start the engine.

5. Check the voltage between transfer control unit harness connector and ground.

| Connector | Terminal | Voltage
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>E59</td>
<td>20</td>
<td>Ground Battery voltage</td>
</tr>
</tbody>
</table>

*Is the inspection result normal?*

- YES >> GO TO 3.
- NO >> GO TO 2.

2. CHECK TRANSFER CONTROL UNIT POWER SUPPLY (2)

1. Turn the ignition switch OFF.
2. Check the 10A fuse (#34).
3. Check the harness for open or short between transfer control unit harness connector No.20 terminal and 10A (#34).

*Is the inspection result normal?*

- YES >> Perform the trouble diagnosis for power supply circuit. Refer to **PG-11, "Wiring Diagram - BATTERY POWER SUPPLY -"**.
- NO >> Repair or replace error-detected parts.

3. CHECK TRANSFER CONTROL UNIT POWER SUPPLY (3)

1. Turn the ignition switch OFF.
2. Check the voltage between transfer control unit harness connector and ground.

| Connector | Terminal | Voltage
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>E59</td>
<td>32</td>
<td>Ground Approx. 0 V</td>
</tr>
</tbody>
</table>

3. Turn the ignition switch ON.

**CAUTION:**
Never start the engine.

4. Check the voltage between transfer control unit harness connector and ground.

| Connector | Terminal | Voltage
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>E59</td>
<td>32</td>
<td>Ground Battery voltage</td>
</tr>
</tbody>
</table>
POWER Supply AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.CHECK TRANSFER CONTROL UNIT POWER SUPPLY (4)

1. Turn the ignition switch OFF.
2. Check the 10A fuse (#56).
3. Disconnect IPDM E/R harness connector.
4. Check the continuity between transfer control unit harness connector and IPDM E/R harness connector.

<table>
<thead>
<tr>
<th>IPDM E/R</th>
<th>Transfer control unit</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>E15</td>
<td>58</td>
<td>E59 32</td>
</tr>
</tbody>
</table>

5. Check the continuity between transfer control unit harness connector and the ground.

<table>
<thead>
<tr>
<th>Transfer control unit</th>
<th>—</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>E59 32</td>
<td>Ground</td>
<td>Not existed</td>
</tr>
</tbody>
</table>

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ignition power supply circuit. Refer to PG-89, "Wiring Diagram - IGNITION POWER SUPPLY -".
NO >> Repair or replace error-detected parts.

5.CHECK TRANSFER MOTOR POWER SUPPLY

1. Turn the ignition switch OFF.
2. Check the voltage between transfer control unit harness connector and ground.

<table>
<thead>
<tr>
<th>Transfer control unit</th>
<th>—</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>E60 41</td>
<td>Ground</td>
<td>Battery voltage</td>
</tr>
</tbody>
</table>

3. Turn the ignition switch ON.
   CAUTION:
   Never start the engine.
4. Check the voltage between transfer control unit harness connector and ground.

<table>
<thead>
<tr>
<th>Transfer control unit</th>
<th>—</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>E60 41</td>
<td>Ground</td>
<td>Battery voltage</td>
</tr>
</tbody>
</table>

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.CHECK TRANSFER MOTOR POWER SUPPLY CIRCUIT

1. Turn the ignition switch OFF.
2. Check the 30A fusible link (J).
3. Check the harness for open or short between transfer control unit harness connector No.41 terminal and 30A fusible link (J).

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit. Refer to PG-11, "Wiring Diagram - BATTERY POWER SUPPLY -".
NO >> Repair or replace error-detected parts.

7.CHECK 4WD SWITCH ASSEMBLY POWER SUPPLY (1)

1. Turn the ignition switch OFF.
2. Disconnect 4WD switch assembly harness connector.
3. Check the voltage between 4WD switch assembly harness connector and ground.

<table>
<thead>
<tr>
<th>4WD switch assembly</th>
<th>—</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>Terminal</td>
<td>M54 12</td>
</tr>
</tbody>
</table>

4. Turn the ignition switch ON.

**CAUTION:**
Never start the engine.

5. Check the voltage between 4WD switch assembly harness connector and ground.

<table>
<thead>
<tr>
<th>4WD switch assembly</th>
<th>—</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>Terminal</td>
<td>M54 12</td>
</tr>
</tbody>
</table>

Is the inspection result normal?

YES  >> GO TO 9.
NO   >> GO TO 8.

8. CHECK 4WD SWITCH ASSEMBLY POWER SUPPLY (2)

1. Turn the ignition switch OFF.
2. Check the 10A fuse (#13).
3. Disconnect fuse block (J/B) harness connector.
4. Check the continuity between transfer control unit harness connector and IPDM E/R harness connector.

<table>
<thead>
<tr>
<th>Fuse block (J/B)</th>
<th>4WD switch assembly</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>Terminal</td>
<td>Connector</td>
</tr>
<tr>
<td>M3</td>
<td>10C</td>
<td>M54</td>
</tr>
</tbody>
</table>

5. Check the continuity between transfer control unit harness connector and the ground.

<table>
<thead>
<tr>
<th>4WD switch assembly</th>
<th>—</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>Terminal</td>
<td>M54</td>
</tr>
</tbody>
</table>

Is the inspection result normal?

YES  >> Perform the trouble diagnosis for ignition power supply circuit. Refer to [PG-89, "Wiring Diagram - IGNITION POWER SUPPLY"].
NO   >> Repair or replace error-detected parts.

9. CHECK TRANSFER CONTROL UNIT GROUND

1. Turn the ignition switch OFF.
2. Check the voltage between transfer control unit harness connector and ground.

<table>
<thead>
<tr>
<th>Transfer control unit</th>
<th>—</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>Terminal</td>
<td>E60 44</td>
</tr>
<tr>
<td>E60 44</td>
<td>46</td>
<td></td>
</tr>
</tbody>
</table>

3. Check the continuity between transfer control unit harness connector and ground.

<table>
<thead>
<tr>
<th>Transfer control unit</th>
<th>—</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>Terminal</td>
<td>E60 44</td>
</tr>
<tr>
<td>E60 44</td>
<td>46</td>
<td></td>
</tr>
</tbody>
</table>
POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[TRANSFER: ATX90A]

Is the inspection result normal?

YES  >> GO TO 10.

NO    >> Repair or replace error-detected parts.

10. CHECK 4WD SWITCH ASSEMBLY GROUND

1. Turn the ignition switch OFF.
2. Check the voltage between transfer control unit harness connector and ground.

<table>
<thead>
<tr>
<th>4WD switch assembly</th>
<th>—</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>Terminal</td>
<td>Ground</td>
</tr>
<tr>
<td>M54</td>
<td>20</td>
<td>Ground</td>
</tr>
</tbody>
</table>

Is the inspection result normal?

YES  >> INSPECTION END

NO    >> Repair or replace error-detected parts.
4WD WARNING LAMP

Component Function Check

1. CHECK 4WD WARNING LAMP FUNCTION

1. Turn the ignition switch OFF to ON.
2. Check that 4WD warning lamp light up.

Is the inspection result normal?

YES ➤ INSPECTION END
NO ➤ Proceed diagnosis procedure. Refer to DLN-97, "Diagnosis Procedure".

Diagnosis Procedure

1. CHECK POWER SUPPLY AND GROUND CIRCUIT

Perform the trouble diagnosis for power supply and ground circuit. Refer to DLN-64, "Diagnosis Procedure".

Is the inspection result normal?

YES ➤ GO TO 2.
NO ➤ Repair or replace the error-detected parts.

2. PERFORM SELF-DIAGNOSIS

With CONSULT-III
Perform self-diagnosis for “ALL MODE AWD/4WD”.

Is any DTC detected?

YES ➤ Check the DTC.
NO ➤ GO TO 3.

3. CHECK 4WD WARNING LAMP SIGNAL

With CONSULT-III
1. Turn the ignition switch ON.
   **CAUTION:**
   Never start the engine.
2. Check “4WD FAIL LAMP” of CONSULT-III “DATA MONITOR” for “ALL MODE AWD/4WD”.

Does the item on “DATA MONITOR” indicate “On”?

YES ➤ Check combination meter. Refer to MWI-64, "COMBINATION METER : Diagnosis Procedure".
NO ➤ Replace transfer control unit. Refer to DLN-107, "Removal and Installation".
Component Function Check

1. CHECK 4WD MODE INDICATOR LAMP FUNCTION

1. Start the engine
   **CAUTION:** 
   Never drive the vehicle.
2. Turn the 4WD shift switch AUTO⇒4H⇒4LO⇒4H⇒AUTO.
3. Check the 4WD shift switch position (“AUTO”, “4H” and “4L”) and the indication of the 4WD mode indicator lamp mutually coincide.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to diagnosis procedure. Refer to DLN-98, "Diagnosis Procedure".

Diagnosis Procedure

1. CHECK POWER SUPPLY AND GROUND CIRCUIT

Perform the trouble diagnosis for power supply and ground circuit. Refer to DLN-64, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace the error-detected parts.

2. CHECK 4WD WARNING LAMP SIGNAL

With CONSULT-III

1. Start the engine.
   **CAUTION:** 
   Never drive the vehicle.
2. Turn the 4WD shift switch AUTO⇒4H⇒4LO⇒4H⇒AUTO.
3. Check “4WD MODE IND” of CONSULT-III “DATA MONITOR” for “ALL MODE AWD/4WD”.

<table>
<thead>
<tr>
<th>Monitor item</th>
<th>Condition</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>4WD MODE IND</td>
<td>4WD shift switch: AUTO</td>
<td>AUTO</td>
</tr>
<tr>
<td></td>
<td>4WD shift switch: 4H</td>
<td>4H</td>
</tr>
<tr>
<td></td>
<td>4WD shift switch: 4L</td>
<td>4L</td>
</tr>
</tbody>
</table>

Is the inspection result normal?

YES >> Check combination meter. Refer to MWI-64, "COMBINATION METER : Diagnosis Procedure".
NO >> Replace transfer control unit. Refer to DLN-107, "Removal and Installation".
HEAVY TIGHT-CORNER BRAKING SYMPTOM OCCURS

< SYMPTOM DIAGNOSIS >

SYMPTOM DIAGNOSIS

HEAVY TIGHT-CORNER BRAKING SYMPTOM OCCURS

Description

Heavy tight-corner braking symptom occurs when the vehicle is driven and the steering wheel is turned fully to either side after the engine is started.

NOTE:
Light tight-corner braking symptom may occur depending on driving conditions. This is not malfunction.

Diagnosis Procedure

1. PERFORM ECM SELF-DIAGNOSIS

   With CONSULT-III
   Perform self-diagnosis for “ECM”.
   Is any DTC detected?
   YES >> Check the DTC. Refer to EC-98, “DTC Index”.
   NO >> GO TO 2.

2. PERFORM SELF-DIAGNOSIS

   With CONSULT-III
   Perform self-diagnosis for “ALL MODE AWD/4WD”.
   Is any DTC detected?
   YES >> Check the DTC. Refer to DLN-29, “DTC Index”.
   NO >> GO TO 3.

3. CHECK TRANSFER INTERNAL FUNCTION

   With CONSULT-III
   1. Remove transfer control actuator. Refer to DLN-114, “Removal and Installation”.
   2. Turn the actuator shaft. Refer to DLN-114, “Inspection”.
   3. Check “ROTARY POSI SEN” of CONSULT-III “DATA MONITOR” for “ALL MODE AWD/4WD”.

<table>
<thead>
<tr>
<th>Monitor item</th>
<th>Condition</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROTARY POSI SEN</td>
<td>Turn the actuator shaft.</td>
<td>Value is changing</td>
</tr>
</tbody>
</table>

   Is the inspection result normal?
   YES >> INSPECTION END
   NO >> Transfer assembly is mechanical malfunction. Replace transfer assembly. Refer to DLN-121, “Removal and Installation”.
4WD MODE DOES NOT CHANGE

< SYMPTOM DIAGNOSIS >

4WD MODE DOES NOT CHANGE

Description

Vehicle does not enter 4-wheel drive mode even though 4WD warning lamp turned to OFF.

Diagnosis Procedure

1. PERFORM SELF-DIAGNOSIS

   With CONSULT-III
   Perform self-diagnosis for “ALL MODE AWD/4WD”.
   Is any DTC detected?
     YES >> Check DTC. Refer to DLN-29, "DTC Index".
     NO >> GO TO 2.

2. CHECK 4WD MODE INDICATOR LAMP

   Check 4WD mode indicator lamp function. Refer to DLN-98, "Component Function Check”.
   Is the inspection result normal?
     YES >> GO TO 3.
     NO >> Proceed to diagnosis procedure. Refer to DLN-98, "Diagnosis Procedure”.

3. CHECK 4WD SHIFT SWITCH

   Perform trouble diagnosis of the 4WD shift switch. Refer to DLN-67, "Diagnosis Procedure".
   Is the inspection result normal?
     YES >> Transfer assembly is mechanical malfunction. Replace transfer assembly. Refer to DLN-121, "Removal and Installation”.
     NO >> Replace 4WD switch assembly. Refer to DLN-108, "Removal and Installation”.

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4WD MODE INDICATOR LAMP CONTINUES BLINKING

< SYMPTOM DIAGNOSIS >

Description

After shift the 4WD mode 4H to 4L, 4WD mode indicator lamp continues to blink.

Diagnosis Procedure

1. MOVE THE VEHICLE

Move the vehicle back and forth.

Does the 4WD indicator lamp stop to blink?

YES  >> INSPECTION END  
NO   >> GO TO 2.

2. CHECK 4WD MODE INDICATOR LAMP

Check 4WD mode indicator lamp function. Refer to DLN-98, "Component Function Check".

Is the inspection result normal?

YES  >> GO TO 3.  
NO   >> Proceed to diagnosis procedure. Refer to DLN-98, "Diagnosis Procedure".

3. PERFORM SELF-DIAGNOSIS

With CONSULT-III

Perform self-diagnosis for “ALL MODE AWD/4WD”.

Is any DTC detected?

YES  >> Check DTC. Refer to DLN-29, "DTC Index".  
NO   >> Transfer assembly is mechanical malfunction. Replace transfer assembly. Refer to DLN-121, "Removal and Installation".
Description

While driving, 4WD warning lamp blinks 2 times in 1 second and it turns OFF after 1 minute.
• This symptom protects drivetrain parts when a heavy load is applied to the electric controlled coupling and multiple disc clutch temperature increases. Also, optional distribution of torque sometimes becomes rigid before lamp blinks quickly. Both cases are not malfunction.
• When this symptom occurs, stop vehicle and allow it to idle for some times. Blinking will stop and system will be restored.
4WD WARNING LAMP BLINKS SLOWLY

**Description**

4WD warning lamp blinks at approximately 2 seconds intervals while driving.

**Diagnosis Procedure**

1. **CHECK TIRE**

   Check the following.
   - Tire pressure
   - Wear condition
   - Front and rear tire size (There is no difference between front and rear tires.)

   **Is the inspection result normal?**
   
   YES >> GO TO 2.
   NO >> Repair or replace error-detected parts. And then, drive the vehicle at speed of 20 km/h (12 MPH) or more for 5 seconds or more. Improper size information is initialized accordingly.

2. **TERMINAL INSPECTION**

   Check 4WD control unit harness connector for disconnection.

   **Is the inspection result normal?**
   
   YES >> Replace transfer control unit. Refer to DLN-107, "Removal and Installation".
   NO >> Repair or replace the error-detected parts.
INFORMATION DISPLAY IS NOT DISPLAYED

Description

Information display is not displayed.

NOTE:
When the combination meter receives 4WD shift switch signal, it displays a message on the information display and inform the driver of 4WD mode status. About indication contents, refer to DLN-18, "4WD SYSTEM : System Description" (4WD mode).

Diagnosis Procedure

1. CHECK 4WD SHIFT SWITCH

Perform trouble diagnosis for 4WD shift switch. Refer to DLN-67, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace error-detected parts.

2. CHECK 4WD MODE INDICATOR LAMP

Perform trouble diagnosis for 4WD mode indicator. Refer to DLN-98, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace error-detected parts.

3. CHECK THE INFORMATION DISPLAY

Check that information except 4WD mode is displayed on information display.

Is the inspection result normal?

YES >> Replace transfer control unit. Refer to DLN-107, "Removal and Installation".

NO >> Check information display. Refer to MWI-29, "On Board Diagnosis Function".
Use the chart below to find the cause of the symptom. The numbers indicate the order of the inspection. If necessary, repair or replace these parts.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Transfer Fluid (Level low)</th>
<th>Transfer Fluid (Wrong)</th>
<th>Transfer Fluid (Level too high)</th>
<th>Liquid Gasket (Damaged)</th>
<th>Oil Seal (Worn or damaged)</th>
<th>Gear (Worn or damaged)</th>
<th>Bearing (Worn or damaged)</th>
<th>Transfer Case (Damaged)</th>
</tr>
</thead>
</table>

**Suspected Parts**

(Possible cause)

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Noise 1 2 3 3 3</th>
<th>Transfer fluid leakage 4 1 2 2</th>
<th>3 3 3 3</th>
</tr>
</thead>
</table>

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Transfer Fluid

< PERIODIC MAINTENANCE >

TRANSFER FLUID

Inspection

FLUID LEAKAGE
Check transfer surrounding area (oil seal, drain plug, and filler plug etc.) for fluid leakage.

FLUID LEVEL

1. Remove filler plug (1) and gasket. Then check that fluid is filled up from mounting hole for the filler plug.

   **CAUTION:**
   Never start engine while checking fluid level.

2. Set a new gasket onto filler plug (1), and install it on transfer and then tighten to the specified torque.

   Specified torque: 33 N-m (3.4 kg-m, 24 ft-lb)

   **CAUTION:**
   Never reuse gasket.

Draining

1. Run the vehicle to warm up the transfer unit sufficiently.
2. Stop the engine.
3. Remove the drain plug (1) and drain transfer fluid.
4. Set a new gasket onto drain plug (1), and install it to transfer and tighten to the specified torque.

   Specified torque: 33 N-m (3.4 kg-m, 24 ft-lb)

   **CAUTION:**
   Never reuse gasket.

Refilling

1. Remove filler plug (1). Fill up with new transfer fluid up to mounting hole for the filler plug.

   Fluid grade and Viscosity: Refer to MA-10, "Fluids and Lubricants".

   Fluid capacity: Refer to DLN-124, "General Specifications".

   **CAUTION:**
   Carefully fill the fluid. (Fill up for approximately 3 minutes.)

2. Leave the vehicle for 3 minutes, and check the fluid level again.
3. Set a new gasket onto filler plug, and install it on transfer and tighten to the specified torque.

   Specified torque: 33 N-m (3.4 kg-m, 24 ft-lb)

   **CAUTION:**
   Never reuse gasket.

4. Perform learning of transfer fluid viscosity. Refer to DLN-47, "Work Procedure".
TRANSFER CONTROL UNIT

REMOVAL AND INSTALLATION

REMOVAL

1. Turn the ignition switch OFF.
2. Disconnect negative battery terminal.
   **CAUTION:**
   Wait for 5 seconds after turning ignition switch OFF.
3. Remove the glove box assembly. Refer to IP-14, "Removal and Installation".
4. Disconnect the transfer control unit connector.
5. Move instrument lower cover to backward. Refer to IP-14, "Removal and Installation".
6. Remove the transfer control unit.

INSTALLATION

Note the following, and install in the reverse order of removal.

• When replacing transfer control unit, perform writing unit parameter and initial calibration. Refer to DLN-41, "Work Procedure".
4WD MODE SWITCH

Removal and Installation

REMOVAL

NOTE:
4WD shift switch is integrated in 4WD switch assembly.

1. Remove console finisher assembly from center console assembly. Refer to IP-25, "Removal and Installation".
2. Disconnect 4WD switch assembly harness connector.
3. Press 4WD switch assembly fixing pawls, and remove 4WD switch assembly from console finisher assembly.

INSTALLATION

Install in the reverse order of removal.
Removal and Installation

REMOVAL
1. Remove the drain plug to drain the transfer fluid. Refer to DLN-106, "Draining".
2. Remove the front propeller shaft. Refer to DLN-129, "Removal and Installation".
3. Remove the plug.
4. Remove the O-ring from the plug.
5. Remove the snap ring.
6. Remove the front shaft flange, using a plastic hammer.
7. Remove front oil seal from front case.
   CAUTION:
   Never damage the front case.

INSTALLATION
1. Install front oil seal with a drift (A) (commercial service tool) within the dimension (L) shown as follows.

   L : 5.3 – 5.7 mm

   **CAUTION:**
   - Never reuse front oil seal.
   - Apply transfer fluid onto circumference of oil seal.

2. Install the dust shield to the front shaft flange.

3. Install the front shaft flange.

4. Install the snap ring.

   **CAUTION:**
   - Never reuse the snap ring.

5. Install the O-ring to plug.

   **CAUTION:**
   - Never reuse the O-ring.
   - Never damage the O-ring.

6. Tighten the plug to specified torque.

7. Install front propeller shaft. Refer to [DLN-129, "Removal and Installation".](DLN-129)

8. Fill with new transfer fluid, check fluid level and for fluid leakage. Refer to [DLN-106, "Inspection".](DLN-106)
Removal and Installation

REMOVAL
1. Remove the rear propeller shaft. Refer to DLN-144, "Removal and Installation".
2. Put matching marks (A) on the end of the main shaft and the rear companion flange.
   **CAUTION:**
   For matching mark, using paint. Never damage main shaft.
3. Remove the snap ring.
4. Remove the adjusting shim.
5. Remove the rear companion flange, using a plastic hammer.
6. Remove the dust shield from rear companion flange, using the drift, puller and replacer.
   
   **A** : Drift [SST: ST30701000 (J-25742-2)]
   **B** : Puller (commercial service tool)
   **C** : Replacer (commercial service tool)
7. Remove the o-ring from rear companion flange.
8. Remove the rear oil seal from rear case.
   **CAUTION:**
   Never damage rear case and main shaft.

INSTALLATION
REAR OIL SEAL

< REMOVAL AND INSTALLATION >

1. Install rear oil seal, with a drift (A) [SST: KV40104710 ( — — )] within the dimension (L) show as follows.

   L : 2.8 – 3.2

   CAUTION:
   • Never reuse front oil seal.
   • Apply transfer fluid onto circumference of oil seal.

2. Install the dust shield to the rear companion flange.

3. Install the rear companion flange to main shaft.
   CAUTION:
   • Align the matching marks (A) of main shaft and rear companion flange.

   • Install bolt (A) (M12×1.75 mm) to main shaft, then install the rear companion flange by hammering while pulling the bolt.

4. Install the O-ring (3) to gap between rear companion flange (1) and main shaft (2).
   CAUTION:
   • Never reuse the O-ring.
   • Never damage the O-ring.

5. Select adjusting shim. Refer to DLN-112, "Adjustment".

6. Install adjusting shim.

7. Install the snap ring.

8. Install the rear propeller shaft. Refer to DLN-144, "Removal and Installation".

9. Check fluid level and for fluid leakage. Refer to DLN-106, "Inspection".

Adjustment

ADJUSTING SHIM

1. Remove the snap ring.

2. Remove the adjusting shim.

3. Remove the O-ring.
4. Install the thinnest adjusting shim.
5. Install the snap ring to main shaft.
6. Install the bolt (A) (M12×1.75 mm) to main shaft, then hummer the rear companion flange while pulling the bolt.

7. Fit a dial indicator onto the end of main shaft.
8. Check the clearance between rear companion flange and main shaft during pushing the bolt (A) at direction.
9. Use the formula below to calculate adjusting shim thickness.

Shim selection equation:

\[ T = T_0 + (C - 0.1) \]

- **T**: Correct shim thickness
- **T₀**: The thinnest shim thickness
- **C**: Measured clearance between rear companion flange and main shaft

**CAUTION:**
Adjusting shim thickness is in step of 0.1 mm. When a calculation result includes the second decimal place, it must be rounded down.

**Example:**

\[ T = 2.1 + (0.34 - 0.1) = 2.34 \]

- **T₀**: 2.1
- **C**: 0.34

Calculated value... \( T = 2.34 \) mm

Used shim... \( T = 2.3 \) mm

10. Select the proper adjusting shim. For selecting adjusting shim, refer to the latest parts information.
Removal and Installation

REMOVAL

CAUTION:
If DTC about transfer control actuator is detected, perform inspection after removal.
1. Turn the ignition switch OFF.
2. Disconnect negative battery terminal.
   CAUTION:
   Wait for 5 seconds after turning ignition switch OFF.
3. Disconnect the transfer control actuator connector.
4. Remove the bolts and detach the transfer control actuator.
5. Perform inspection after removal. Refer to DLN-114, "Inspection".

INSTALLATION

Note the following, and installing the reverse order of removal.
• Never damage oil seal of transfer motor.
• If transfer control actuator has been replaced, perform writing the unit parameter. Refer to DLN-48, "Work Procedure"
• Perform inspection after installation. Refer to DLN-114, "Inspection"

Inspection

INSPECTION AFTER REMOVAL
1. Check the oil seal assembled transfer control actuator for wear, crack and damage. Replace if there is malfunction.
2. Check the transfer assembly as follows.
TRANSFER CONTROL ACTUATOR

< REMOVAL AND INSTALLATION >

[TRANSFER: ATX90A]

a. Install the spline socket (A) [SST: KV10119400] to transfer assembly in the figure.
b. When turn the shaft in (B) direction, check returning to (C) direction by spring power.
   CAUTION: The maximum turning force shall be 30 N·m (3.1 kg-m, 22 ft-lb).
c. When turn the shaft in (C) direction, check locking the shaft.

INSPECTION AFTER INSTALLATION

After driving, check the surface fitting transfer control actuator to transfer assembly for fluid leakage.
Removal and Installation

REMOVAL

1. Turn the ignition switch OFF.
2. Disconnect negative battery terminal.
   CAUTION: Wait for 5 seconds after turning ignition switch OFF.
3. Remove exhaust front tube (LH). Refer to EX-5, "Removal and Installation".
4. Support transfer assembly and transmission assembly with a jack.
5. Remove front suspension rear cross member with a power tool. Refer to TM-208, "4WD : Removal and Installation".
6. Remove rear engine mounting cross member with a power tool. Refer to TM-208, "4WD : Removal and Installation".
7. Remove heat insulator of exhaust front tube (LH).
8. Lower jack to the position where the transfer Hi-Lo position sensor can be removed.
9. Disconnect the transfer Hi-Lo position sensor connector.
10. Remove the transfer Hi-Lo position sensor.
11. Perform inspection after removal. Refer to DLN-116, "Inspection".

INSTALLATION

Note the following, and install in the reverse order of removal.
- Never damage O-ring of transfer Hi-Lo position sensor.
- Perform inspection after installation. Refer to DLN-116, "Inspection".

Inspection

INSPECTION AFTER REMOVAL

Check the O-ring assembled transfer Hi-Lo position sensor for wear, crack and damage. Replace the transfer Hi-Lo position sensor if there is malfunction.

INSPECTION AFTER INSTALLATION

After driving, check the surface fitting transfer Hi-Lo position sensor to transfer assembly for fluid leakage.
Removal and Installation

REMOVAL
1. Turn the ignition switch OFF.
2. Disconnect negative battery terminal.
   **CAUTION:**
   *Wait for 5 seconds after turning ignition switch OFF.*
3. Support transfer assembly and transmission assembly with a jack.
4. Remove front suspension rear cross member with a power tool. Refer to TM-208, "4WD : Removal and Installation".
5. Remove rear engine mounting cross member with a power tool. Refer to TM-208, "4WD : Removal and Installation".
6. Disconnect the transfer rotary position sensor connector.
7. Remove the transfer rotary position sensor.
8. Perform inspection after removal. Refer to DLN-118, "Inspection".

INSTALLATION
1. Remove the transfer control actuator. Refer to DLN-114, "Exploded View"
2. Shift transfer assembly into AUTO as follows.
   a. Install the spline socket (A) [SST: KV10119400 ( — )] to transfer assembly in the figure.
   b. Turn the shaft (B) direction and remove the spline socket at a position returning to (C) direction by spring power.
      **CAUTION:**
      *The maximum turning force shall be 30 N·m (3.1 kg-m, 22 ft-lb).*
c. Check that the surface fitting transfer rotary position sensor to transfer assembly is in the figure.

3. Install the transfer rotary position sensor.
   **CAUTION:**
   - Check that part (A) of transfer rotary position sensor is in the position (B).
   - Never damage O-ring of transfer rotary position sensor.

4. Connect transfer rotary position sensor connector.

5. Install the transfer control actuator. Refer to DLN-114, "Exploded View".

6. Perform inspection after installation. Refer to DLN-118, "Inspection".

7. When replacing the transfer rotary position sensor, perform learning of transfer rotary position sensor. Refer to DLN-46, "Work Procedure".

**Inspection**

**INSPECTION AFTER REMOVAL**
Check the O-ring assembled transfer rotary position sensor for wear, crack and damage. Replace the transfer rotary position sensor if there is malfunction.

**INSPECTION AFTER INSTALLATION**
After driving, check the surface fitting transfer rotary position sensor to transfer assembly for fluid leakage.
Removal and Installation

REMOVAL
1. Turn the ignition switch OFF.
2. Disconnect negative battery terminal.
   **CAUTION:**
   Wait for 5 seconds after turning ignition OFF.
3. Support transfer assembly and transmission assembly with a jack.
4. Remove rear engine mounting cross member with a power tool. Refer to TM-208, "4WD : Removal and Installation".
5. Lower jack to the position where the transfer lock position sensor can be removed.
6. Disconnect the transfer lock position sensor connector.
7. Remove the transfer lock position sensor.
8. Perform inspection after removal. Refer to DLN-119, "Inspection".

INSTALLATION
Note the following, and install in the reverse order of removal.
• Never damage O-ring of transfer lock position sensor.
• Perform inspection after installation. Refer to DLN-119, "Inspection".
• When replacing the transfer lock position sensor, perform learning of transfer lock position sensor. Refer to DLN-44, "Work Procedure".

Inspection

INSPECTION AFTER REMOVAL
Check the O-ring assembled transfer lock position sensor for wear, crack and damage. Replace the transfer lock position sensor if there is malfunction.

INSPECTION AFTER INSTALLATION
After driving, check the surface fitting transfer lock position sensor to transfer assembly for fluid leakage.
Removal and Installation

REMOVAL
1. Drain transfer fluid. Refer to DLN-106, "Draining".
2. Disconnect the transfer fluid temperature sensor connector.
3. Remove the transfer fluid temperature sensor.
4. Perform inspection after removal. Refer to DLN-120, "Inspection".

INSTALLATION
Note the following, and install in the reverse order of removal.
• Perform inspection after installation. Refer to DLN-120, "Inspection".
• After refilling new transfer fluid, perform learning of transfer fluid viscosity. Refer to DLN-47, "Work Procedure".

Inspection

INSPECTION AFTER REMOVAL
Check the washer assembled transfer fluid temperature sensor for wear, crack and damage. Replace the transfer fluid temperature sensor if there is malfunction.

INSPECTION AFTER INSTALLATION
After driving, check the surface fitting transfer fluid temperature sensor to transfer assembly for fluid leakage.
UNIT REMOVAL AND INSTALLATION
TRANSFER ASSEMBLY

Exploded View

Removal and Installation

REMOVAL
1. Remove rear propeller shaft. Refer to DLN-144, "Removal and Installation".
2. Remove front propeller shaft. Refer to DLN-129, "Removal and Installation".
3. Disconnect transfer control actuator, transfer rotary position sensor, transfer lock position sensor, transfer Hi-Lo position sensor and transfer fluid temperature sensor harness connectors and separate harnesses from transfer assembly.
4. Remove transfer breather hose.
5. Remove exhaust front tube (LH) with a power tool. Refer to EX-5, "Removal and Installation".
6. Remove exhaust front tube (RH) with a power tool. Refer to EX-5, "Removal and Installation".
7. Remove main muffler with a power tool. Refer to EX-5, "Removal and Installation".
8. Support transfer assembly and transmission assembly with a jack. **CAUTION:**
   Secure transfer assembly and transmission assembly to a jack.
9. Remove rear engine mounting member and engine mounting insulator with a power tool. Refer to EM-99, "Removal and Installation".
10. Lower jack to the position where the top transfer mounting bolts can be removed.
11. Remove transfer mounting bolts and separate transfer from transmission. **CAUTION:**
   Secure transfer assembly and transmission assembly to a jack.

INSTALLATION
Note the following, and install in the reverse order of removal.
When installing the transfer to the transmission, install the mounting bolts following the standard below, tighten bolts to the specified torque.

<table>
<thead>
<tr>
<th>Bolt symbol</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insertion direction</td>
<td>Transfer to transmission</td>
<td>Transmission to transfer</td>
</tr>
</tbody>
</table>

- Tightening the bolt with bracket

When installing transfer breather hose, make sure there are no pinched or restricted areas on the transfer breather hose caused by bending or winding.
- Install the transfer breather hose (1) of transmission side with the paint mark (A) facing upward and the mark (B) (serir) facing right side.
- Install the transfer breather hose (1) of transfer side with the paint mark (A) facing upward, and insert breather hose to breather tube (2) until dimension (B) shown as follows.

B: 20 mm (0.79 in)

- Be sure to fix breather hose in (A) and (B) positions. Fix with the paint mark facing upward in the (A) position.
- Check oil level and check for oil leakage after installation. Refer to DLN-106, "Inspection".
- If replacing transfer assembly, perform writing unit parameter, learning of fluid viscosity and initial calibration. Refer to DLN-42, "Work Procedure".
1. Transfer assembly
2. Input oil seal

Apply transfer fluid. Refer to MA-10, “Fluids and Lubricants”.

Vehicle front

Refer to GI-4, “Components” for symbols not described above.

Removal and Installation

REMOVAL
1. Remove transfer assembly from vehicle. Refer to DLN-121, “Exploded View”.
2. Remove input oil seal from front case, using a suitable tool.
   CAUTION:
   Never damage the front case and input.

INSTALLATION
Note the following, and install in the reverse order of removal.
• Install input oil seal, with a drift (A) [SST: KV40104710 ( — )] until it is flush with the end face of front case with the drift
   CAUTION:
   • Never reuse input oil seal.
   • Apply transfer fluid onto circumference of oil seal.
### General Specifications

<table>
<thead>
<tr>
<th>Applied model</th>
<th>4WD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>V56VD</td>
</tr>
<tr>
<td></td>
<td>A/T</td>
</tr>
<tr>
<td>Transfer model</td>
<td>ATX90A</td>
</tr>
<tr>
<td>Fluid capacity (Approx.)</td>
<td>$\ell$ (US pt, Imp pt)</td>
</tr>
</tbody>
</table>
## Commercial Service Tools

<table>
<thead>
<tr>
<th>Tool name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power tool</td>
<td>Loosening bolts and nuts</td>
</tr>
</tbody>
</table>

*Tool name PBIC0190E*
## NVH Troubleshooting Chart

Use the chart below to help you find the cause of the symptom. If necessary, repair or replace these parts.

### Possible cause and SUSPECTED PARTS

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Uneven rotating torque</th>
<th>Center bearing improper installation</th>
<th>Excessive center bearing axial end play</th>
<th>Excessive joint angle</th>
<th>Excessive runout</th>
<th>Rotation imbalance</th>
<th>DIFFERENTIAL</th>
<th>AXLE AND SUSPENSION</th>
<th>TIRE</th>
<th>ROAD WHEEL</th>
<th>DRIVE SHAFT</th>
<th>BRAKE</th>
<th>STEERING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Shake</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibration</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

×: Applicable

Revision: 2010 May

2011 QX56
PERIODIC MAINTENANCE
FRONT PROPELLER SHAFT

Inspection

NOISE
Check the propeller shaft tube surface for dents or cracks. If damaged, replace propeller shaft assembly.

VIBRATION
If vibration is present at high speed, inspect propeller shaft runout first.
1. With a dial indicator, measure propeller shaft runout at runout measuring points by rotating final drive companion flange with hands.
   
   Propeller shaft runout : Refer to DLN-133, “Propeller Shaft Runout”.

2. If runout still exceeds specifications, separate propeller shaft at final drive companion flange; then rotate companion flange 90, 180, 270 degrees and install propeller shaft.
3. Check runout again. If runout still exceeds specifications, replace propeller shaft assembly.
4. Check the vibration by driving vehicle.

RUNOUT MEASURING POINT
Propeller shaft runout measuring point (Point “△”).

   Propeller shaft runout measuring point (Point “△”).
FRONT PROPELLER SHAFT

REMOVAL AND INSTALLATION

FRONT PROPELLER SHAFT

Exploded View

REMOVAL

![Propeller shaft assembly diagram]

1. Propeller shaft assembly

\[\rightarrow\]: Vehicle front

Refer to GI-4, "Components" for symbols not described above.

DISASSEMBLY

![Propeller shaft assembly diagram]

1. Flange yoke
2. Snap ring
3. Bearing
4. Journal
5. Propeller shaft

\[\rightarrow\]: Vehicle front

*: Replace “2”, “3” and “4” as a set.

Refer to GI-4, "Components" for symbols not described above.
REMOVAL
1. Shift the transmission to the neutral position, and then release the parking brake.
2. Remove protector A and B with power tool. Refer to SCS-39, "PPMU, MIDDLE TUBE ASSEMBLY, PPMU PIPE : Removal and Installation".
3. Remove rear engine mount cross member with a power tool. Refer to TM-208, "4WD : Removal and Installation".
4. Put matching mark (A) on front propeller shaft flange yoke and final drive companion flange.
   **CAUTION:**
   For matching mark, use paint. Never damage propeller shaft flange and final drive companion flange.
5. Put matching mark (A) on front propeller shaft flange yoke and transfer companion flange.
   **CAUTION:**
   For matching mark, use paint. Never damage propeller shaft flange and transfer companion flange.
6. Remove the propeller shaft assembly fixing bolts.
7. Remove propeller shaft assembly from the front final drive and transfer.
8. Perform inspection after removal. Refer to DLN-131, "Inspection".

INSTALLATION
Note the following, and install in the reverse order of removal.
- Align matching mark (A) to install propeller shaft flange yoke and transfer companion flange.
- Align matching mark (A) to install propeller shaft flange yoke and front final drive companion flange.
- After assembly, perform a driving test to check propeller shaft vibration. If vibration occurred, separate propeller shaft from final drive. Reinstall companion flange after rotating it by 90, 180, 270 degrees. Then perform driving test and check propeller shaft vibration again at each point.

- If propeller shaft or final drive has been replaced, connect them as follows:
  - Install the propeller shaft while aligning its matching mark (A) with the matching mark (B) on the joint as close as possible.

Disassembly and Assembly

DISASSEMBLY
FRONT PROPELLER SHAFT

< REMOVAL AND INSTALLATION >

[FRONT PROPELLER SHAFT: 2F P15]

1. Put a matching mark (A) between propeller shaft and flange yoke and remove snap rings (1).
   **CAUTION:**
   For matching mark, use paint. Never damage the surface.

   ![Image of propeller shaft and flange yoke](JP0100980ZZ)

2. Lightly tap bottom of yoke using a copper hammer and remove journal bearing.
   **CAUTION:**
   Never damage the yoke.

   ![Image of journal bearing removal](JA0900940ZZ)

ASSEMBLY

1. Install journal bearing to journal.
   **CAUTION:**
   - Never reuse journal or journal bearing.
   - Always replace journal, journal bearing, and snap rings as a set.
   - Apply multi-purpose grease to journal bearing.

2. Install bearing (1) using a vise.
   **CAUTION:**
   Never damage bearing or flange yoke.

   ![Image of journal bearing installation](JA0900940ZZ)

3. Install journal to propeller shaft so that grease nipple (1) on journal portion is in the same direction.
   **CAUTION:**
   Never reuse journal.

   ![Image of journal installation](JA0900940ZZ)

4. Measure journal axial play. If necessary, select the appropriate snap ring.

   ![Image of journal axial play measurement](JA0900940ZZ)
a. While pushing to 98 N·m (10 kg-m, 72 ft-lb), check the clearance between snap ring (1) and flange yoke (2).

   Journal axial play : Refer to DLN-133, "Journal Axial Play"

b. If journal axial play is outside the specification, use a thicker/thinner snap ring to adjust.

   CAUTION:
   • Never reuse snap ring.
   • Select snap rings so that thickness difference between LH and RH is within 0.06 mm.

5. Install selected snap ring as shown in the figure.

6. Check that joint moves smoothly.

   Reference value (After adaptation)
   Bending resistance : 1.96 N·m (0.20 kg-m, 17 in-lb) or less

   NOTE:
   The bending resistance [1.96 N·m (0.20 kg-m, 17 in-lb) or less] may not be satisfied soon after the installation.

7. Check the journal axial play. Refer to DLN-131, "Inspection".

Inspection

INSPECTION AFTER REMOVAL

Appearance
Check the propeller shaft for dents or cracks. If damage is detected, replace the propeller shaft assembly.

Propeller Shaft Runout
Check propeller shaft runout at measuring point with a dial indicator. If runout exceeds specifications, replace propeller shaft assembly. For measuring point, refer to DLN-127, "Inspection".

   Propeller shaft runout : Refer to DLN-133, "Propeller Shaft Runout"

Journal Axial Play
FRONT PROPELLER SHAFT
As shown in the figure, while fixing yoke on one side, check axial play of joint. If axial play exceeds specifications, replace propeller shaft assembly.

Journal axial play : Refer to DLN-133, "Journal Axial Play"
## General Specification

<table>
<thead>
<tr>
<th>Item</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propeller shaft runout</td>
<td>1.0 (0.04)</td>
</tr>
</tbody>
</table>

## Propeller Shaft Runout

<table>
<thead>
<tr>
<th>Item</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propeller shaft runout</td>
<td>1.0 (0.04)</td>
</tr>
</tbody>
</table>

## Journal Axial Play

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Journal axial play</td>
<td>0.06 (0.0024)</td>
</tr>
</tbody>
</table>
## NVH Troubleshooting Chart

Use the chart below to help you find the cause of the symptom. If necessary, repair or replace these parts.

### Possible cause and SUSPECTED PARTS

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Noise</th>
<th>Shake</th>
<th>Vibration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uneven rotating torque</td>
<td>×</td>
<td>x</td>
<td>×</td>
</tr>
<tr>
<td>Center bearing improper installation</td>
<td>×</td>
<td>x</td>
<td>×</td>
</tr>
<tr>
<td>Excessive center bearing axial end play</td>
<td>×</td>
<td>x</td>
<td>×</td>
</tr>
<tr>
<td>Center bearing mounting (insulator) cracks, damage or deterioration</td>
<td>×</td>
<td>x</td>
<td>×</td>
</tr>
<tr>
<td>Excessive joint angle</td>
<td>×</td>
<td>x</td>
<td>×</td>
</tr>
<tr>
<td>Excessive runout</td>
<td>×</td>
<td>x</td>
<td>×</td>
</tr>
<tr>
<td>Rotation imbalance</td>
<td>×</td>
<td>x</td>
<td>×</td>
</tr>
<tr>
<td>Differential</td>
<td>×</td>
<td>x</td>
<td>×</td>
</tr>
<tr>
<td>Axle and suspension</td>
<td>×</td>
<td>x</td>
<td>×</td>
</tr>
<tr>
<td>Tire</td>
<td>×</td>
<td>x</td>
<td>×</td>
</tr>
<tr>
<td>Road wheel</td>
<td>×</td>
<td>x</td>
<td>×</td>
</tr>
<tr>
<td>Drive shaft</td>
<td>×</td>
<td>x</td>
<td>×</td>
</tr>
<tr>
<td>Brake</td>
<td>×</td>
<td>x</td>
<td>×</td>
</tr>
<tr>
<td>Steering</td>
<td>×</td>
<td>x</td>
<td>×</td>
</tr>
</tbody>
</table>

×: Applicable
PERIODIC MAINTENANCE

REAR PROPELLER SHAFT

Inspection

NOISE
Check the propeller shaft tube surface for dents or cracks. If damaged, replace propeller shaft assembly.

VIBRATION
If vibration is present at high speed, inspect propeller shaft runout first.
1. With a dial indicator, measure propeller shaft runout at runout measuring points by rotating final drive companion flange with hands.
   ↫: Vehicle front
   
   Propeller shaft runout : Refer to DLN-147, “Propeller Shaft Runout”.

2. If runout still exceeds specifications, separate propeller shaft at final drive companion flange; then rotate companion flange 90, 180, 270 degrees and install propeller shaft.
3. Check runout again. If runout still exceeds specifications, replace propeller shaft assembly.
4. Check the vibration by driving vehicle.

RUNOUT MEASURING POINT
Propeller shaft runout measuring point (Point “△”).
   ↫: Vehicle front

<table>
<thead>
<tr>
<th>Dimension</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>120 – 150 mm (4.72 – 5.91 in)</td>
</tr>
<tr>
<td>B</td>
<td>150 – 180 mm (5.91 – 7.09 in)</td>
</tr>
<tr>
<td>C</td>
<td>703.5 mm (27.70 in)</td>
</tr>
</tbody>
</table>
REAR PROPELLER SHAFT

REMOVAL AND INSTALLATION

REAR PROPELLER SHAFT

Exploded View

REMOVAL

1. Propeller shaft assembly

*: Vehicle front
Refer to Gl-4, “Components” for symbols not described above.

DISASSEMBLY

1. Flange yoke
2. Snap ring
3. Bearing
4. Journal
5. Propeller shaft

*: Replace “2”, “3” and “4” as a set.

*: Vehicle front
Refer to Gl-4, “Components” for symbols not described above.
REMOVAL
1. Shift the transmission to the neutral position, and then release the parking brake.
2. Put matching mark (A) on rear propeller shaft flange yoke and rear drive companion flange.
   CAUTION:
   For matching mark, use paint. Never damage propeller shaft flange and final drive companion flange.
3. Put matching mark (A) on rear propeller shaft flange yoke and transfer companion flange.
   CAUTION:
   For matching mark, use paint. Never damage propeller shaft flange and transfer companion flange.
4. Remove the propeller shaft assembly fixing bolts.
5. Remove propeller shaft assembly from the rear final drive and transfer.
6. Perform inspection after removal. Refer to DLN-146, "Inspection”.

INSTALLATION
Note the following, and install in the reverse order of removal.
• Align matching mark (A) to install propeller shaft flange yoke and transfer companion flange.
• Align matching mark (A) to install propeller shaft flange yoke and rear final drive companion flange.
• After assembly, perform a driving test to check propeller shaft vibration. If vibration occurred, separate propeller shaft from final drive. Reinstall companion flange after rotating it by 90, 180, 270 degrees. Then perform driving test and check propeller shaft vibration again at each point.

• If propeller shaft or final drive has been replaced, connect them as follows:
  - Install the propeller shaft while aligning its matching mark (A) with the matching mark (B) on the joint as close as possible.

Disassembly and Assembly

DISASSEMBLY
REAR PROPELLER SHAFT

< REMOVAL AND INSTALLATION >

[REAR PROPELLER SHAFT: 2F P26]

1. Put a matching mark between propeller shaft and flange yoke and remove snap rings (1).
   **CAUTION:**
   For matching mark, use paint. Never damage the surface.

2. Lightly tap bottom of yoke using a copper hammer and remove journal bearing.
   **CAUTION:**
   Never damage the yoke.

3. Remove grease nipple.

ASSEMBLY

1. Install journal bearing to journal.
   **CAUTION:**
   • Never reuse journal or journal bearing.
   • Always replace journal, journal bearing, and snap rings as a set.
   • Apply multi-purpose grease to journal bearing.

2. Install bearing (1) using a vise.
   **CAUTION:**
   Never damage bearing or flange yoke.

3. Install journal to propeller shaft so that grease nipple (1) on journal portion is in the same direction.
   **CAUTION:**
   Never reuse journal.
4. Install snap ring (1).

5. Check that joint moves smoothly.

Reference value (After adaptation)
Bending resistance : 2.26 N·m (0.23 kg-m, 20 in-lb) or less

NOTE:
The bending resistance [2.26 N·m (0.23 kg-m, 20 in-lb) or less] may not be satisfied soon after the installation.

6. Check the journal axial play. Refer to DLN-146, "Inspection".

**Inspection**

**INSPECTION AFTER REMOVAL**

**Appearance**
Check the propeller shaft for dents or cracks. If damage is detected, replace the propeller shaft assembly.

**Propeller Shaft Runout**
Check propeller shaft runout at measuring point with a dial indicator. If runout exceeds specifications, replace propeller shaft assembly. For measuring point, refer to DLN-142, "Inspection".

**Propeller shaft runout** : Refer to DLN-147, "Propeller Shaft Runout"

**Journal Axial Play**
As shown in the figure, while fixing yoke on one side, check axial play of joint. If axial play exceeds specifications, replace propeller shaft assembly.

**Journal axial play** : Refer to DLN-147, "Journal Axial Play"
### General Specification

<table>
<thead>
<tr>
<th>Item</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applied model</td>
<td>4WD</td>
</tr>
<tr>
<td></td>
<td>VK56VD</td>
</tr>
<tr>
<td></td>
<td>A/T</td>
</tr>
<tr>
<td>Propeller shaft model</td>
<td>2F P26</td>
</tr>
<tr>
<td>Number of joints</td>
<td>2</td>
</tr>
<tr>
<td>Type of journal bearings</td>
<td>Shell type</td>
</tr>
<tr>
<td>1st joint</td>
<td>Shell type</td>
</tr>
<tr>
<td>2nd joint</td>
<td>Shell type</td>
</tr>
<tr>
<td>Coupling method with transfer</td>
<td>Flange type</td>
</tr>
<tr>
<td>Coupling method with rear final drive</td>
<td>Flange type</td>
</tr>
<tr>
<td>Shaft length (Spider to spider)</td>
<td>1168mm (45.98 in)</td>
</tr>
<tr>
<td>Shaft outer diameter</td>
<td>101.6 mm (4.00 in)</td>
</tr>
</tbody>
</table>

### Propeller Shaft Runout

<table>
<thead>
<tr>
<th>Item</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propeller shaft runout</td>
<td>1.0 (0.04)</td>
</tr>
</tbody>
</table>

### Journal Axial Play

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Journal axial play</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>
## SYMPTOM DIAGNOSIS

### NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

**[REAR PROPELLER SHAFT: 2S1410]**

### NVH Troubleshooting Chart

Use the chart below to help you find the cause of the symptom. If necessary, repair or replace these parts.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Uneven rotating torque</th>
<th>Center bearing improper installation</th>
<th>Excessive center bearing axial end play</th>
<th>Excessive joint angle</th>
<th>Rotation imbalance</th>
<th>Excessive runout</th>
<th>DIFFERENTIAL</th>
<th>AXLE AND SUSPENSION</th>
<th>TIRE</th>
<th>ROAD WHEEL</th>
<th>DRIVE SHAFT</th>
<th>BRAKE</th>
<th>STEERING</th>
</tr>
</thead>
</table>

### Possible cause and SUSPECTED PARTS

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Noise</th>
<th>Shake</th>
<th>Vibration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>××××××</td>
<td>×</td>
<td>×××××</td>
</tr>
</tbody>
</table>

×: Applicable
REAR PROPELLER SHAFT

PERIODIC MAINTENANCE

REAR PROPELLER SHAFT

Inspection

NOISE
Check the propeller shaft tube surface for dents or cracks. If damaged, replace propeller shaft assembly.

VIBRATION
If vibration is present at high speed, inspect propeller shaft runout first.
1. With a dial indicator, measure propeller shaft runout at runout measuring points by rotating final drive companion flange with hands.

   Propeller shaft runout: Refer to DLN-147, "Propeller Shaft Runout".

2. If runout still exceeds specifications, separate propeller shaft at final drive companion flange; then rotate companion flange 90, 180, 270 degrees and install propeller shaft.
3. Check runout again. If runout still exceeds specifications, replace propeller shaft assembly.
4. Check the vibration by driving vehicle.

RUNOUT MEASURING POINT
Propeller shaft runout measuring range.

Vehicle front
REAR PROPELLER SHAFT

< REMOVAL AND INSTALLATION >

REMOVAL AND INSTALLATION
REAR PROPELLER SHAFT

Exploded View

REMOVAL

1. Propeller shaft assembly

Vehicle front

Refer to GI-4, "Components" for symbols not described above.

DISASSEMBLY

1. Flange yoke
2. Snap ring
3. Bearing
4. Journal
5. Propeller shaft
6. Sleeve yoke

Vehicle front

Refer to GI-4, "Components" for symbols not described above.
REAR PROPELLER SHAFT

REMOVAL

1. Shift the transmission to the neutral position, and then release the parking brake.
2. Put matching mark (A) on rear propeller shaft flange yoke and rear drive companion flange.
   **CAUTION:**
   For matching mark, use paint. Never damage propeller shaft flange and final drive companion flange.
3. Remove the propeller shaft assembly fixing bolts.
4. Remove propeller shaft assembly from the rear final drive and transfer.
5. Perform inspection after removal. Refer to DLN-146, "Inspection".

INSTALLATION

Note the following, and install in the reverse order of removal.
- Align matching mark (A) to install propeller shaft flange yoke and transfer companion flange.
- Align matching mark (A) to install propeller shaft flange yoke and rear final drive companion flange.
- After assembly, perform a driving test to check propeller shaft vibration. If vibration occurred, separate propeller shaft from final drive. Reinstall companion flange after rotating it by 90, 180, 270 degrees. Then perform driving test and check propeller shaft vibration again at each point.

- If propeller shaft or final drive has been replaced, connect them as follows:
  - Install the propeller shaft while aligning its matching mark (A) with the matching mark (B) on the joint as close as possible.

Disassembly and Assembly

DISASSEMBLY

1. Put a matching mark between propeller shaft and flange yoke as shown.
   **CAUTION:**
   For matching mark, use paint. Never damage the surface.
2. Remove snap ring.

3. Lightly tap bottom of yoke using a copper hammer and remove journal bearing.  
   **CAUTION:**  
   Never damage the yoke.

**ASSEMBLY**

1. Install journal bearing to journal.  
   **CAUTION:**  
   • Never reuse journal or journal bearing.  
   • Always replace journal, journal bearing, and snap rings as a set.  
   • Apply multi-purpose grease to journal bearing.

2. Install bearing (1) using a vise.  
   **CAUTION:**  
   Never damage bearing or flange yoke.

3. Measure journal axial play. If necessary, select the appropriate snap ring.  
   a. While pushing to 98 N-m (10 kg-m, 72 ft-lb), check the clearance between snap ring (1) and needle bearing (2).

   **Journal axial play : Refer to DLN-147, "Journal Axial Play"**

   b. If journal axial play is outside the specification, use a thicker/thinner snap ring to adjust.  
   **CAUTION:**  
   • Never reuse snap ring.  
   • Select snap rings so that thickness difference between LH and RH is within 0.02 mm (0.0008 in).
4. Install snap ring (1).

5. Check that joint moves smoothly.

   **Reference value (After adaptation)**
   - **Bending resistance**: 2.26 N·m (0.23 kg-m, 20 in-lb) or less

   **NOTE:**
   The bending resistance [2.26 N.m (0.23 kg-m, 20 in-lb) or less] may not be satisfied soon after the installation.

6. Check the journal axial play. Refer to DLN-146, "Inspection".

**Inspection**

**INSPECTION AFTER REMOVAL**

**Appearance**
Check the propeller shaft for dents or cracks. If damage is detected, replace the propeller shaft assembly.

**Propeller Shaft Runout**
Check propeller shaft runout at measuring point with a dial indicator. If runout exceeds specifications, replace propeller shaft assembly. For measuring point, refer to DLN-142, "Inspection".

   **Propeller shaft runout**: Refer to DLN-147, "Propeller Shaft Runout"

**Journal Axial Play**
As shown in the figure, while fixing yoke on one side, check axial play of joint. If axial play exceeds specifications, replace propeller shaft assembly.

   **Journal axial play**: Refer to DLN-147, "Journal Axial Play"
## General Specification

<table>
<thead>
<tr>
<th>Applied model</th>
<th>2WD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>VK56VD</td>
</tr>
<tr>
<td></td>
<td>A/T</td>
</tr>
<tr>
<td>Propeller shaft model</td>
<td>2S1410</td>
</tr>
<tr>
<td>Number of joints</td>
<td>2</td>
</tr>
<tr>
<td>Type of journal bearings</td>
<td></td>
</tr>
<tr>
<td>1st joint</td>
<td>Shell type</td>
</tr>
<tr>
<td>2nd joint</td>
<td>Shell type</td>
</tr>
<tr>
<td>Coupling method with transfer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sleeve type</td>
</tr>
<tr>
<td>Coupling method with rear final drive</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flange type</td>
</tr>
<tr>
<td>Shaft length (Spider to spider)</td>
<td>1590.4 mm (62.61 in)</td>
</tr>
<tr>
<td>Shaft outer diameter</td>
<td>127.6 mm (5.02 in)</td>
</tr>
</tbody>
</table>

### Propeller Shaft Runout

<table>
<thead>
<tr>
<th>Item</th>
<th>Limit</th>
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</thead>
<tbody>
<tr>
<td>Propeller shaft runout</td>
<td>1.02 (0.0402)</td>
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</table>

### Journal Axial Play

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard</th>
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</thead>
<tbody>
<tr>
<td>Journal axial play</td>
<td>0.02 (0.0008)</td>
</tr>
</tbody>
</table>
PRECAUTION

Precaution Necessary for Steering Wheel Rotation after Battery Disconnect

NOTE:
- Before removing and installing any control units, first turn the push-button ignition switch to the LOCK position, then disconnect both battery cables.
- After finishing work, confirm that all control unit connectors are connected properly, then re-connect both battery cables.
- Always use CONSULT-III to perform self-diagnosis as a part of each function inspection after finishing work.
  - If a DTC is detected, perform trouble diagnosis according to self-diagnosis results.
  - For vehicle with steering lock unit, if the battery is disconnected or discharged, the steering wheel will lock and cannot be turned.
  - If turning the steering wheel is required with the battery disconnected or discharged, follow the operation procedure below before starting the repair operation.

OPERATION PROCEDURE
1. Connect both battery cables.
   NOTE: Supply power using jumper cables if battery is discharged.
2. Turn the push-button ignition switch to ACC position.
   (At this time, the steering lock will be released.)
3. Disconnect both battery cables. The steering lock will remain released with both battery cables disconnected and the steering wheel can be turned.
4. Perform the necessary repair operation.
5. When the repair work is completed, re-connect both battery cables. With the brake pedal released, turn the push-button ignition switch from ACC position to ON position, then to LOCK position. (The steering wheel will lock when the push-button ignition switch is turned to LOCK position.)
6. Perform self-diagnosis check of all control units using CONSULT-III.

Precaution for Servicing Front Final Drive

- Before starting diagnosis of the vehicle, understand the symptoms well. Perform correct and systematic operations.
- Check for the correct installation status prior to removal or disassembly. When matching marks are required, be certain they do not interfere with the function of the parts they are applied to.
- Overhaul should be done in a clean work area, a dust proof area is recommended.
- Before disassembly, completely remove sand and mud from the exterior of the unit, preventing them from entering into the unit during disassembly or assembly.
- Always use shop paper for cleaning the inside of components.
- Avoid using cotton gloves or a shop cloth to prevent the entering of lint.
- Check appearance of the disassembled parts for damage, deformation, and abnormal wear. Replace them with new ones if necessary.
- Gaskets, seals and O-rings should be replaced any time the unit is disassembled.
- Clean and flush the parts sufficiently and blow them dry.
- Be careful not to damage sliding surfaces and mating surfaces.
- When applying sealant, remove the old sealant from the mating surface; then remove any moisture, oil, and foreign materials from the application and mating surfaces.
- In principle, tighten nuts or bolts gradually in several steps working diagonally from inside to outside. If a tightening sequence is specified, observe it.
- During assembly, observe the specified tightening torque.
- Add new differential gear oil, petroleum jelly, or multi-purpose grease, as specified.
## Special Service Tool

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

<table>
<thead>
<tr>
<th>Tool number</th>
<th>Tool name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ST3127S000</td>
<td>Preload gauge</td>
<td>Measuring pinion bearing preload and total preload</td>
</tr>
<tr>
<td>KV381054S0</td>
<td>Puller</td>
<td>Removing front oil seal</td>
</tr>
</tbody>
</table>
| ST30720000  | Drift | • Installing front oil seal  
• Installing side oil seal  
• Installing pinion front bearing outer race |
| ST27863000  | Drift | • Installing front oil seal  
• Installing side oil seal |
<p>| KV10111100  | Seal cutter | Removing carrier cover |</p>
<table>
<thead>
<tr>
<th>Tool number (Kent-Moore No.)</th>
<th>Tool name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ST3306S001 (J-22888-D)</td>
<td>Differential side bearing puller set</td>
<td>Removing and installing side bearing inner race</td>
</tr>
<tr>
<td>1: ST33051001 (J-22888-20)</td>
<td>Puller</td>
<td></td>
</tr>
</tbody>
</table>
| 2: ST33061000 (J-8107-2)     | Base | a: 28.5 mm (1.122 in) dia.  
b: 38 mm (1.50 in) dia. |
| KV10112100 (BT-8653-A)      | Angle wrench | Tightening the drive gear mounting bolts |
| ST33230000 (J-35867)        | Drift | Installing side bearing inner race |
| a: 51 mm (2.01 in) dia.     |  |
| b: 41 mm (1.61 in) dia.     |  |
| c: 28 mm (1.10 in) dia.     |  |
| ST30611000 (J-25742-1)      | Drift bar | Installing pinion rear bearing outer race  
(Use with ST30613000) |
| ST30613000 (J-25742-3)      | Drift | Installing pinion rear bearing outer race |
| a: 72 mm (2.83 in) dia.     |  |
| b: 48 mm (1.89 in) dia.     |  |
| KV38100200 (J-26293)        | Drift | Installing pinion front bearing outer race |
| a: 65 mm (2.56 in) dia.     |  |
| b: 49 mm (1.93 in) dia.     |  |
## Commercial Service Tool

<table>
<thead>
<tr>
<th>Tool name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power tool</td>
<td>Loosening bolts and nuts</td>
</tr>
<tr>
<td>Flange wrench</td>
<td>Removing and installing drive pinion lock nut</td>
</tr>
</tbody>
</table>

---

### Tool number (Kent-Moore No.)

<table>
<thead>
<tr>
<th>Tool name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ST30901000 (J-26010-01)</td>
<td>Installing drive pinion rear bearing inner race</td>
</tr>
<tr>
<td>Drift</td>
<td></td>
</tr>
<tr>
<td>a: 79 mm (3.11 in) dia.</td>
<td></td>
</tr>
<tr>
<td>b: 45 mm (1.77 in) dia.</td>
<td></td>
</tr>
<tr>
<td>c: 35.2 mm (1.386 in) dia.</td>
<td></td>
</tr>
<tr>
<td>ST33200000 (J-26082)</td>
<td>Installing drive pinion front bearing inner race</td>
</tr>
<tr>
<td>Drift</td>
<td></td>
</tr>
<tr>
<td>a: 60 mm (2.36 in) dia.</td>
<td></td>
</tr>
<tr>
<td>b: 44.5 mm (1.752 in) dia.</td>
<td></td>
</tr>
<tr>
<td>(J-34309)</td>
<td>Adjusting bearing preload and pinion gear height</td>
</tr>
<tr>
<td>Differential shim selector tool</td>
<td></td>
</tr>
<tr>
<td>(J-25269-18)</td>
<td>Selecting pinion height adjusting washer</td>
</tr>
<tr>
<td>Side bearing disc (2 Req’d)</td>
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</tbody>
</table>

---

### Tool name Description

<table>
<thead>
<tr>
<th>Tool name</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>ZZAO979D</td>
<td>Installing drive pinion rear bearing inner race</td>
</tr>
<tr>
<td>ZZAO979D</td>
<td>Installing drive pinion front bearing inner race</td>
</tr>
<tr>
<td>NT134</td>
<td>Adjusting bearing preload and pinion gear height</td>
</tr>
<tr>
<td>NT135</td>
<td>Selecting pinion height adjusting washer</td>
</tr>
</tbody>
</table>

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Revision: 2010 May
<table>
<thead>
<tr>
<th>Tool name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Puller</td>
<td>Removing companion flange</td>
</tr>
<tr>
<td>Drift</td>
<td>Removing and Installing bushing</td>
</tr>
</tbody>
</table>
| a: 63 mm (2.48 in) dia. or less  
b: 49 mm (1.93 in) dia. or more |
| Sliding hammer  | Removing differential case assembly              |
| Replacer        | Removing pinion rear bearing inner race          |

Revision: 2010 May 2011 QX56
STRUCTURE AND OPERATION

SYNEM DESCRIPTION

Sectional View

1. Side shaft
2. Side shaft bearing
3. Side gear
4. Drive gear
5. Pinion mate shaft
6. Differential case
7. Side bearing
8. Pinion mate gear
9. Drive pinion
10. Collapsible spacer
11. Companion flange
12. Pinion front bearing
13. Pinion rear bearing
14. Housing spacer
## NVH Troubleshooting Chart

Use the chart below to help you find the cause of the symptom. If necessary, repair or replace these parts.

### Reference

|-----------|------------------------|------------------------|------------------------|------------------------|------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|

### Possible cause and SUSPECTED PARTS

<table>
<thead>
<tr>
<th>Gear tooth rough</th>
<th>Gear contact improper</th>
<th>Tooth surfaces worn</th>
<th>Backlash incorrect</th>
<th>Companion flange excessive runout</th>
<th>Gear oil improper</th>
<th>PROPELLER SHAFT</th>
<th>AXLE AND SUSPENSION</th>
<th>TIRE</th>
<th>ROAD WHEEL</th>
<th>DRIVE SHAFT</th>
<th>BRAKE</th>
<th>STEERING</th>
</tr>
</thead>
</table>

### Symptom

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Noise</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>

*: Applicable
FRONT DIFFERENTIAL GEAR OIL

< PERIODIC MAINTENANCE >

PERIODIC MAINTENANCE
FRONT DIFFERENTIAL GEAR OIL

Inspection

OIL LEAKAGE
Check that oil is not leaking from the front final drive assembly or around it.

OIL LEVEL
- Remove filler plug (1) and check oil level from filler plug mounting hole as shown in the figure.
  
  CAUTION:
  Never start engine while checking oil level.
- Set a gasket on filler plug (1) and install it on final drive assembly. Refer to DLN-167, "Exploded View".
  
  CAUTION:
  Never reuse gasket.

Draining

1. Stop engine.
2. Remove drain plug (1) and drain gear oil.
3. Set a gasket on drain plug (1) and install it to final drive assembly and tighten to the specified torque. Refer to DLN-167, "Exploded View".
  
  CAUTION:
  Never reuse gasket.

Refilling

1. Remove filler plug (1). Fill with new gear oil until oil level reaches the specified level near filler plug mounting hole.

   Oil grade and Viscosity : Refer to MA-10, "Fluids and Lubricants".

   Oil capacity : Refer to DLN-185, "General Specifications".

2. After refilling oil, check oil level. Set a gasket to filler plug (1), then install it to final drive assembly. Refer to DLN-167, "Exploded View".
  
  CAUTION:
  Never reuse gasket.
CAUTION:
Verify identification stamp of replacement frequency put in the lower part of gear carrier to determine replacement for collapsible spacer when replacing front oil seal. Refer to “Identification stamp of replacement frequency of front oil seal”. If collapsible spacer replacement is necessary, remove final drive assembly and disassemble it to replace front oil seal and collapsible spacer. Refer to DLN-162, "Removal and Installation" and DLN-168, "Disassembly".

NOTE:
The reuse of collapsible spacer is prohibited in principle. However, it is reusable on a one-time basis only in cases when replacing front oil seal.

Identification Stamp of Replacement Frequency of Front Oil Seal
- The diagonally shaded area in the figure shows stamping point for replacement frequency of front oil seal.
- The following table shows if collapsible spacer replacement is needed before replacing front oil seal.

<table>
<thead>
<tr>
<th>Stamp</th>
<th>collapsible spacer replacement</th>
</tr>
</thead>
<tbody>
<tr>
<td>No stamp</td>
<td>Not required</td>
</tr>
<tr>
<td>“0” or “0” on the far right of stamp</td>
<td>Required</td>
</tr>
<tr>
<td>“01” or “1” on the far right of stamp</td>
<td>Not required</td>
</tr>
</tbody>
</table>
CAUTION:
Make a stamping after replacing front oil seal.
- After replacing front oil seal, make a stamping on the stamping point in accordance with the table below in order to identify replacement frequency.
CAUTION:
Make a stamping from left to right.

<table>
<thead>
<tr>
<th>Stamp before stamping</th>
<th>Stamping on the far right</th>
<th>Stamping</th>
</tr>
</thead>
<tbody>
<tr>
<td>No stamp</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>“0”</td>
<td>1</td>
<td>01</td>
</tr>
<tr>
<td>(Front oil seal was replaced once.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>“01”</td>
<td>0</td>
<td>010</td>
</tr>
<tr>
<td>(Collapsible spacer and front oil seal were replaced last time.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>“0” is on the far right.</td>
<td>1</td>
<td>...01</td>
</tr>
<tr>
<td>(Only front oil seal was replaced last time.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>“1” is on the far right.</td>
<td>0</td>
<td>...010</td>
</tr>
<tr>
<td>(Collapsible spacer and front oil seal were replaced last time.)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Make a judgement if a collapsible spacer replace is required.
2. Drain gear oil. Refer to DLN-155, "Draining".
3. Remove the drive shafts from the front final drive assembly. Refer to FAX-22, "Removal and Installation".
4. Remove the front propeller shaft from the front final drive assembly. Refer to DLN-129, "Removal and Installation".
5. Measure the total preload torque using preload gauge (A) [SST: ST3127S000 (J-25765-A)].
   NOTE: Record the total preload torque measurement.

6. Put matching mark (B) on the end of drive pinion. The matching mark should be in line with the matching mark (A) on companion flange (1).
   CAUTION: For matching, marks use paint. Never damage companion flange and drive pinion.

7. Remove the drive pinion lock nut using flange wrench (commercial service tool).
8. Remove the companion flange using puller (commercial service tool).

9. Remove front oil seal using the puller [SST: KV381054S0 (J-34286)].

INSTALLATION

1. Drive the front oil seal in evenly until it becomes flush with the gear carrier using drifts (A and B).

   A: Drift [SST: ST30720000 (J-25405)]
   B: Drift [SST: ST27863000 (—)]

   **CAUTION:**
   • Never reuse oil seal.
   • Never incline oil seal when installing.
   • Apply multi-purpose grease to the lips and differential gear oil to the circumference of oil seal.

2. Install companion flange (1).

   **NOTE:**
   When reusing drive pinion, align the matching mark (B) of drive pinion with the matching mark (A) of companion flange, and then install companion flange (1).
3. Apply anti-corrosion oil to the thread and seat of new drive pinion lock nut, and temporarily tighten drive pinion lock nut to drive pinion, using flange wrench (commercial service tool).

**CAUTION:**
Never reuse drive pinion lock nut.

4. Tighten drive pinion lock nut within the limits of specified torque so as to keep the pinion bearing preload within a standard values, using preload gauge (A) [SST: ST3127S000 (J-25765-A)].

   **Total preload torque:** A value that add 0.1 – 0.4 N·m (0.01 – 0.04 kg·m, 1 – 3 in·lb) to the measured value when removing.

   **CAUTION:**
   • Adjust to the lower limit of the drive pinion lock nut tightening torque first.
   • If the preload torque exceeds the specified value, replace collapsible spacer and tighten it again to adjust. Never loosen drive pinion lock nut to adjust the preload torque.

5. Fit a dial indicator onto the companion flange face (inner side of the propeller shaft mounting bolt holes).

6. Rotate the companion flange to check for runout.

   **Companion flange runout** : Refer to DLN-185, "Companion Flange Runout".

7. Fit a test indicator to the inner side of the companion flange (socket diameter).

8. Rotate the companion flange to check for runout.

   **Companion flange runout** : Refer to DLN-185, "Companion Flange Runout".

9. If the runout value is outside the repair limit, follow the procedure below to adjust.
   a. Check for runout while changing the phase between companion flange and drive pinion gear by 90° step, and search for the position where the runout is the minimum.
   b. If the runout value is still outside of the limit after the phase has been changed, possible causes are be an assembly malfunction of drive pinion and pinion bearing and malfunction of pinion bearing. Check for these items and repair if necessary.
   c. If the runout value is still outside of the limit after the check and repair, replace companion flange.

10. Install front propeller shaft. Refer to DLN-129, "Removal and Installation".

11. Install drive shaft. Refer to FAX-22, "Removal and Installation".

12. Refill gear oil to the final drive and check oil level. Refer to DLN-155, “Refilling”.

13. Check the final drive for oil leakage. Refer to DLN-155, "Inspection".
Removal and Installation

REMOVAL
1. Drain gear oil. Refer to DLN-155, "Draining".
2. Remove the drive shafts from the front final drive assembly. Refer to FAX-22, "Removal and Installation".
3. Remove the side oil seal using suitable tool.
   CAUTION:
   Never damage gear carrier.

INSTALLATION
1. Drive the new side oil seal in evenly until it becomes flush with the gear carrier using drifts (A and B).
   
   A: Drift [SST: ST30720000 (J-25405)]
   B: Drift [SST: ST27863000 (J-25405)]

   CAUTION:
   • Never reuse side oil seal.
   • Never incline the new side oil seal when installing.
   • Apply multi-purpose grease to the lips and differential gear oil to the circumference of the new side oil seal.
2. Install drive shaft. Refer to FAX-22, "Removal and Installation".
3. Refill gear oil to the final drive and check oil level. Refer to DLN-155, "Refilling".
4. Check the final drive for oil leakage. Refer to DLN-155, "Inspection".
1. Drain the differential gear oil. Refer to DLN-155, "Draining".
2. Remove the drive shafts. Refer to FAX-22, "Removal and Installation".
3. Remove the front propeller shaft from the front final drive assembly. Refer to DLN-129, "Removal and Installation".
4. Disconnect the breather hose from the front final drive assembly.
5. Support the front final drive assembly using a suitable jack.
6. Remove the front final drive assembly bolts, then remove the front final drive assembly with a power tool.

CAUTION:
Secure the front final drive assembly to a suitable jack while removing it.

INSTALLATION
Note the following, and installation is in the reverse order of removal.

CAUTION:
Check that there are no pinched or restricted areas on the breather hose caused by bending or winding when installing it.
Install the breather hose (1) as shown in the figure.

- Install the breather hose (1) of final side with the paint mark (A) facing vehicle front, and insert the breather hose until dimension (B) shown as follows.

  **B: 20 mm (0.79 in)**

**CAUTION:**
- Never reuse hose clamp.
- Install the hose clamp with the tab facing vehicle front.
- Be sure to fix the breather hose in (C) position.
- If remove the bracket (2), align stopper part (D) to part (E) of suspension mounting bracket (3), and tighten the mounting bolt (4) to specified torque.

  **Specified torque: 8.3 N•m (0.85 kg-m, 73 in-lb)**

- When oil leaks while removing final drive assembly, check oil level after the installation. Refer to DLN-142, "Inspection".
UNIT DISASSEMBLY AND ASSEMBLY
SIDE SHAFT
Exploded View

1. Bushing
4. Side bearing adjusting washer
7. Pinion rear bearing
10. Drain plug
13. Front oil seal
16. Gear carrier
19. Snap ring
22. Drive gear
25. Filler plug
A: Oil seal lip

2. Bearing cap
5. Drive pinion
8. Collapsible spacer
11. Side oil seal (left side)
14. Companion flange
17. Side shaft
20. Snap ring
23. Differential case assembly
26. Carrier cover
B: Screw hole

3. Side bearing
6. Pinion height adjusting washer
9. Gasket
12. Pinion front bearing
15. Drive pinion lock nut
18. Side shaft bearing
21. Side oil seal (right side)
24. Housing spacer

C: Comply with the assembly procedure when tightening. Refer to DLN-169, "Assembly".

Apply gear oil.
Apply anti-corrosion oil.
Disassembly

1. Drain the differential gear oil if necessary.
2. Remove the carrier cover bolts
3. Remove carrier cover to insert the seal cutter (A) [SST: KV10111100 (J-37228)] between gear carrier and carrier cover. **CAUTION:**
   - Never damage the mating surface.
   - Never insert flat-bladed screwdriver, this will damage the mating surface.

4. Remove side oil seal (right side) with a suitable tool. **CAUTION:**
   Never damage gear carrier.

5. Remove snap ring (hole side) with a suitable tool.

6. Remove differential side shaft assembly out of gear carrier with a suitable tool. **NOTE:**
   Tap on differential side shaft assembly from side gear side.
7. Remove snap ring (differential side shaft side).

   CAUTION:
   Never drop differential side shaft.

9. Perform inspection after disassembly. Refer to DLN-166, "Inspection".

Assembly

1. Press differential side shaft bearing to differential side shaft.

   CAUTION:
   Never reuse differential side shaft bearing.

2. Install snap ring (differential side shaft side).

3. Install differential side shaft assembly into gear carrier.

4. Install snap ring (hole side).

5. Install side oil seal (right side) until it becomes flush with the gear carrier, with the drifts (A and B).

   A: Drift [SST: ST30720000 (J-25405)]
   B: Drift [SST: ST27863000 ( — )]

   CAUTION:
   • Never reuse side oil seal.
   • When installing, never incline oil seal.
   • Apply multi-purpose grease onto oil seal lips and gear oil onto the circumference of oil seal.

Inspection

INSPECTION AFTER DISASSEMBLY

Side Shaft
• If it is chipped (by friction), cracked, damaged, or unusually worn, replace.

Bearing
• Clean up the disassembled parts.
• If any chipped (by friction), pitted, worn, rusted or scratched marks, or unusual noise from the bearing is observed, replace as a bearing assembly (as a new set).

Oil Seal
• Whenever disassembled, replace.
• If wear, deterioration of adherence (sealing force lips), or damage is detected on the lips, replace them.
1. Bushing
4. Side bearing adjusting washer
7. Pinion rear bearing
10. Drain plug
13. Front oil seal
16. Gear carrier
19. Snap ring
22. Drive gear
25. Filler plug
A: Oil seal lip

2. Bearing cap
5. Drive pinion
8. Collapsible spacer
11. Side oil seal (left side)
14. Companion flange
17. Side shaft
20. Snap ring
23. Differential case assembly
26. Carrier cover
B: Screw hole

3. Side bearing
6. Pinion height adjusting washer
9. Gasket
12. Pinion front bearing
15. Drive pinion lock nut
18. Side shaft bearing
21. Side oil seal (right side)
24. Housing spacer

C: Comply with the assembly procedure when tightening. Refer to DLN-169, "Assembly".

Apply gear oil.
Apply anti-corrosion oil.
Apply multi-purpose grease.
Disassembly

1. Remove bushing with drift (commercial service tool).
2. Remove differential side shaft assembly. Refer to DLN-165, "Disassembly".
3. Remove side oil seal (left side) from gear carrier with a suitable tool.
4. For proper reinstallation, paint matching marks on one side of the side bearing cap and gear carrier.
   **CAUTION:**
   • For matching marks, use paint. Never damage side bearing cap and gear carrier.
   • Bearing caps are manufactured as integral molding. Use the matching marks to them in their original positions.

5. Remove the side bearing caps.

6. Lift the differential case assembly out of the gear carrier with sliding hammer (commercial service tool).

7. Remove the differential case assembly with the side bearing outer race and side bearing adjusting washer.
   **CAUTION:**
   • Keep side bearing outer races together with side bearing inner races. Do not mix them up.
   • Keep side bearing adjusting washers together with side bearings.
8. Remove housing spacer.

9. Remove side bearing inner race with the puller (A) and base (B).

   A: Puller [SST: ST33051001 (J-22888-20)]
   B: Base [SST: ST33061000 (J-8107-2)]

   **CAUTION:**
   • To prevent damage to the side bearing and drive gear, place copper plates between these parts and vise.
   • It is necessary to remove side bearing inner race except when it is replaced.

10. For proper reinstallation, paint matching marks on the differential case and drive gear.

    **CAUTION:**
    For matching marks, use paint. Never damage differential case and drive gear.

11. Remove the drive mounting gear bolts.

12. Tap the drive gear off the differential case using suitable tool.

    **CAUTION:**
    Tap evenly all around to keep drive gear from bending.

13. Perform inspection after disassembly. Refer to DLN-174, "Inspection".

### Assembly

1. Apply thread locking sealant into the threaded holes of the drive gear and install the new drive gear bolts.

   • Use Genuine High Strength Thread Locking Sealant or equivalent. Refer to GI-22, "Recommended Chemical Products and Sealants".

   **CAUTION:**
   Clean degrees drive gear back and threaded holes sufficiently.

2. Install the drive gear to differential case assembly.

   **CAUTION:**
   Align the matching marks of differential case assembly and drive gear

3. Tighten the drive gear mounting bolts with the following procedure.

   **CAUTION:**
   Apply anti-corrosion oil to the thread and seat of mounting bolts.

   a. Tighten the bolts in a crisscross fashion to the specified torque.

      **Drive gear mounting bolts tightening torque:** 58.8 N·m (6.0 kg-m, 43 ft-lb)

   b. Tighten the bolts additionally at the specified angle.

      **Drive gear mounting bolts tightening angle:** 34 to 39 degree

      **CAUTION:**
      Check the tightening angle using the angle wrench (A) [SST: KV10112100 (BT-8653-A)]. Never make judgment by visual inspection.
4. Press side bearing inner races to the differential case with the drift (A) and the base (B).

   A: Drift [SST: ST33230000 (J-35867)]
   B: Base [SST: ST33061000 (J-8107-2)]

   **CAUTION:**
   Never reuse side bearing inner races.

5. Install housing spacer.

6. Install the differential case assembly with the side bearing outer races into the gear carrier.

   **CAUTION:**
   • Never reuse side bearing outer race when replacing side bearing inner race (replace as a set).
   • Apply differential gear oil to the side bearings.

7. Insert left and right original side bearing adjusting washers in place between side bearings and gear carrier.

8. Install the side bearing caps with the matching marks aligned and tighten the side bearing cap bolts to the specified torque.

   **CAUTION:**
   Align matching marks on bearing cap with that on gear carrier.

9. Install side oil seal (left side) until it becomes flush with the gear carrier with the drift (A and B).

   A: Drift [SST: ST30720000 (J-25405)]
   B: Drift [SST: ST27863000 ( — )]

   **CAUTION:**
   • Never reuse side oil seal.
   • When installing, never incline oil seal.
   • Apply multi-purpose grease onto oil seal lips, and gear oil onto the circumference of oil seal.
10. Check and adjust drive gear runout, tooth contact, backlash, and total preload torque. Refer to DLN-171, "Adjustment". Recheck above items. Readjust the above description, if necessary.

11. Apply sealant to match surface of carrier cover.
   • Use Genuine Silicone RTV or equivalent. Refer to GI-22, "Recommended Chemical Products and Sealants".
   CAUTION:
   Remove any old sealant adhering to the mating surfaces. Also remove any moisture, oil, or foreign material adhering to the application and mating surfaces.

12. Install the carrier cover to the gear carrier. Tighten the bolts to the specified torque.

13. Install side shaft. Refer to DLN-166, "Assembly".


Adjustment

TOTAL PRELOAD TORQUE
1. Install the differential side shaft. Refer to DLN-166, "Assembly".
2. Rotate the drive pinion back and forth 2 to 3 times to check for unusual noise and rotation malfunction.
3. Rotate the drive pinion at least 20 times to check for smooth operation of the bearings.
4. Measure total preload torque with the preload gauge [SST: ST3127S000 (J-25765-A)].

Total preload torque : Refer to DLN-185, "Preload Torque".

NOTE:
Total preload torque = Drive pinion bearing preload torque + Side bearing preload torque

• If the measured value is out of the specification, check and adjust each part. Adjust the drive pinion bearing preload torque first, then adjust the side bearing preload torque.

When the preload torque is large
On drive pinion bearings: Decrease the drive pinion bearing adjusting washer and drive pinion adjusting washer thickness. For selecting adjusting washer, refer to the latest parts information.

On side bearings: Increase the side bearing adjusting washer thickness. For selecting adjusting washer, refer to the latest parts information.

When the preload torque is small
On drive pinion bearings: Increase the drive pinion bearing adjusting washer and drive pinion adjusting washer thickness. For selecting adjusting washer, refer to the latest parts information.

On side bearings: Decrease the side bearing adjusting washer thickness. For selecting adjusting washer, refer to the latest parts information.

DRIVE GEAR RUNOUT
1. Remove carrier cover. Refer to DLN-168, "Disassembly".
2. Fit a dial indicator to the drive gear back face.
3. Rotate the drive gear to measure runout.

   **Drive gear runout**: Refer to DLN-185, "Drive Gear Runout".

   - If the runout is outside of the repair limit, check drive gear assembly condition; foreign material may be caught between the drive gear and differential case, or differential case or drive gear may be deformed.
   **CAUTION:**
   Replace drive gear and drive pinion as a set.

**TOOTH CONTACT**

1. Remove carrier cover. Refer to DLN-168, "Disassembly".
2. Apply red lead to the drive gear.
   **CAUTION:**
   Apply red lead to both the faces of 3 to 4 gears at 4 locations evenly spaced on the drive gear.

3. Rotate the drive gear back and forth several times. Then check for correct drive pinion to drive gear tooth contact as shown.
   **CAUTION:**
   Check tooth contact on drive side and reverse side.
4. If the tooth contact is improperly adjusted, adjust the drive pinion height (dimension X).

- If the tooth contact is near the face (face contact), or near the heel (heel contact), use a thicker drive pinion height adjusting washer to move drive pinion closer to the drive gear.

For selecting adjusting washer, refer to the latest parts information.

<table>
<thead>
<tr>
<th>Tooth contact condition</th>
<th>Drive pinion adjusting shim selection value (mm/in)</th>
<th>Adjustment (Yes/No)</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heel side Toe side Toe side Heel side</td>
<td>+0.09 (+0.0035)</td>
<td>Yes</td>
<td>Occurrence of noise and scoring sound in all speed ranges.</td>
</tr>
<tr>
<td></td>
<td>+0.06 (+0.0024)</td>
<td>Yes</td>
<td>Occurrence of noise when accelerating.</td>
</tr>
<tr>
<td></td>
<td>+0.03 (+0.0012)</td>
<td>No</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>No</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>-0.03 (-0.0012)</td>
<td>Yes</td>
<td>Occurrence of noise at constant speed and decreasing speed.</td>
</tr>
<tr>
<td></td>
<td>-0.06 (-0.0024)</td>
<td>Yes</td>
<td>Occurrence of noise and scoring sound in all speed ranges.</td>
</tr>
<tr>
<td></td>
<td>-0.09 (-0.0035)</td>
<td>Yes</td>
<td>Occurrence of noise and scoring sound in all speed ranges.</td>
</tr>
</tbody>
</table>
DIFFERENTIAL ASSEMBLY

< UNIT DISASSEMBLY AND ASSEMBLY >

- If the tooth contact is near the flank (flank contact), or near the toe (toe contact), use a thinner drive pinion height adjusting washer to move the drive pinion farther from the drive gear. For selecting adjusting washer, refer to the latest parts information.

BACKLASH

1. Remove carrier cover. Refer to DLN-168, "Disassembly".
2. Fit a dial indicator to the drive gear face to measure the backlash.

   Backlash : Refer to DLN-185, "Backlash".

- If the backlash is outside of the specification, change the thickness of the side bearing adjusting washers.

   When the backlash is large:
   Make drive gear back side adjusting washer thicker, and drive tooth side adjusting washer thinner by the same amount. For selecting adjusting washer, refer to the latest parts information.

   If the backlash is less than specification:
   Make drive gear back side adjusting washer thinner, and drive tooth side adjusting washer thicker by the same amount. For selecting adjusting washer, refer to the latest parts information.

   CAUTION:
   Never change the total amount of washers as it changes the preload torque.

Inspection

INSPECTION AFTER DISASSEMBLY

Drive Gear and Drive Pinion
- Clean up the disassembled parts.
- If the gear teeth never mesh or line-up correctly, determine the cause and adjust or replace as necessary.
- If the gears are worn, cracked, damaged, pitted or chipped (by friction) noticeably, replace with new drive gear and drive pinion as a set.

Bearing
- Clean up the disassembled parts.
- If any chipped (by friction), pitted, worn, rusted or scratched marks, or unusual noise from the bearing is observed, replace as a bearing assembly (as a new set).

Side Gear and Pinion Mate Gear
- Clean up the disassembled parts.
- If any cracks or damage on the surface of the tooth is found, replace.
- If any worn or chipped mark on the contact sides of the thrust washer is found, replace.

Side Gear Thrust Washer and Pinion Mate Thrust Washer
- Clean up the disassembled parts.
- If it is chipped (by friction), damaged, or unusually worn, replace.

Oil Seal
DIFFERENTIAL ASSEMBLY

< UNIT DISASSEMBLY AND ASSEMBLY >

[FROMNT FINAL DRIVE: R180A]

- Whenever disassembled, replace.
- If wear, deterioration of adherence (sealing force lips), or damage is detected on the lips, replace them.

Differential Case
- Clean up the disassembled parts.
- If any wear or crack on the contact sides of the differential case is found, replace.
1. Bushing
2. Bearing cap
3. Side bearing
4. Side bearing adjusting washer
5. Drive pinion
6. Pinion height adjusting washer
7. Pinion rear bearing
8. Collapsible spacer
9. Gasket
10. Drain plug
11. Side oil seal (left side)
12. Pinion front bearing
13. Front oil seal
14. Companion flange
15. Drive pinion lock nut
16. Gear carrier
17. Side shaft
18. Side shaft bearing
19. Snap ring
20. Snap ring
21. Side oil seal (right side)
22. Drive gear
23. Differential case assembly
24. Housing spacer
25. Filler plug
26. Carrier cover
A: Oil seal lip
B: Screw hole

Apply gear oil.
Apply anti-corrosion oil.
Apply multi-purpose grease.

C: Comply with the assembly procedure when tightening. Refer to DLN-169, "Assembly".

Revision: 2010 May
DLN-176
2011 QX56
Disassembly

1. Remove the side shaft. Refer to DLN-165, "Disassembly".
2. Remove the differential assembly. Refer to DLN-168, "Disassembly".
3. Remove the drive pinion lock nut with a flange wrench (commercial service tool).

4. Put matching mark (B) on the end of drive pinion. The matching mark should be in line with the matching mark (A) on companion flange (1).

   **CAUTION:**
   For matching, marks use paint. Never damage companion flange and drive pinion.

5. Remove the companion flange with the puller (commercial service tool).

6. Press the drive pinion assembly.

   **CAUTION:**
   Never drop drive pinion assembly.
7. Remove the front oil seal with a suitable tool.
   **CAUTION:**
   *Never damage gear carrier.*

8. Remove the drive pinion front bearing inner race.

9. Remove the collapsible spacer.

10. Remove the drive pinion rear bearing inner race and drive pinion height adjusting washer with the replacer (commercial service tool).

11. Remove the drive pinion front and rear bearing outer races by tapping them uniformly with a suitable tool.
    **CAUTION:**
    *Never damage gear carrier.*

12. Perform inspection after disassembly. Refer to **DLN-184, "Inspection".**
1. Install drive pinion rear bearing outer race and drive pinion front bearing outer race using Tools.

   A: Drift bar [SST: ST30611000 (J-25742-1)]
   B: Drift [SST: ST30313000 (J-25742-3)]
   C: Drift [SST: KV38100200 (J-26233)]

   **CAUTION:**
   - First tap the drive pinion bearing outer race until it becomes flush with the gear carrier.
   - Never reuse drive pinion front and rear bearing outer race.

2. Select pinion height adjusting washer. Refer to DLN-181, "Adjustment".

3. Install selected drive pinion height adjusting washer (2) to drive pinion. Press pinion rear bearing inner race (1) to it, using drift (A) [SST: ST30901000 (J-26010-01)].

   **CAUTION:**
   - Be careful of the direction of pinion height adjusting washer. (Assemble as shown in the figure.)
   - Never reuse pinion rear bearing inner race.

4. Assemble collapsible spacer.

   **CAUTION:**
   - Never reuse collapsible spacer.

5. Assemble drive pinion into gear carrier.

   **CAUTION:**
   - Apply gear oil to pinion rear bearing.

6. Assemble pinion front bearing inner race to drive pinion assembly.

   **CAUTION:**
   - Never reuse pinion front bearing inner race.
   - Apply gear oil to pinion front bearing.
7. Using drift [SST: ST33200000 (J-26082)], press the pinion front
bearing inner race to drive pinion as far as drive pinion nut can
be tightened.

8. Install front oil seal as shown in figure with the drifts (A and B).

   A: Drift [SST: ST30720000 (J-25405)]
   B: Drift [SST: ST27863000 ( — )]

   **CAUTION:**
   - Never reuse oil seal.
   - When installing, never incline oil seal.
   - Apply multi-purpose grease onto oil seal lips, and gear oil
     onto the circumference of oil seal.

9. Install companion flange (1).

   **NOTE:**
   When reusing drive pinion, align the matching mark (B) of drive
   pinion with the matching mark (A) of companion flange, and then
   install companion flange (1).

10. Temporarily tighten drive pinion lock nut to drive pinion.

    **CAUTION:**
    - Apply anti-corrosion oil to the thread and seat of the drive
      pinion lock nut
    - Never reuse drive pinion lock nut.

11. Tighten to drive pinion lock nut using flange wrench (A), while

    adjusting pinion bearing preload torque using preload gauge (B).

    A: Flange wrench (commercial service tool)
    B: Preload gauge [SST: ST3127S000 (J-25765-A)]

    **Pinion bearing preload** : Refer to DLN-185, "Pre-

    load Torque".

    **CAUTION:**
    - Adjust to the lower limit of the drive pinion lock nut tight-
      ening torque first.
    - After adjustment, rotate drive pinion back and forth 2 to 3
      times to check for unusual noise, rotation malfunction,
      and other malfunctions.

12. Install differential case assembly. Refer to DLN-169, "Assem-

    bly".

    **CAUTION:**
Never install carrier cover yet.

13. Check and adjust drive gear runout, tooth contact, drive gear to drive pinion backlash. Refer to DLN-171, "Adjustment".
14. Install side shaft. Refer to DLN-166, "Assembly".
15. Check and adjust companion flange runout. Refer to DLN-181, "Adjustment".
16. Check total preload torque. Refer to DLN-171, "Adjustment".
17. Install carrier cover. Refer to DLN-169, "Assembly".

### Adjustment

#### PINION GEAR HEIGHT

1. Make sure all parts are clean and that the bearings are well lubricated.
2. Assemble the pinion gear bearings into the differential shim selector tool [SST: J-34309].

- **Pinion front bearing:** make sure the J-34309-3 pinion front bearing seat is secured tightly against the J-34309-2 gauge anvil. Then turn the pinion front bearing pilot, J-34309-7, to secure the bearing in its proper position.
- **Pinion rear bearing:** the pinion rear bearing pilot, J-34309-8, is used to center the pinion rear bearing only. The pinion rear bearing locking seat, J-34309-4, is used to lock the bearing to the assembly.
- **Installation of J-34309-9 and J-34309-16:** place a suitable 2.5 mm (0.098 in) thick plain washer between J-34309-9 and J-34309-16. Both surfaces of J-34309-9 and J-34309-16 must be parallel with a clearance of 2.5 mm (0.098 in).
3. Install the pinion rear bearing inner race into gear carrier. Then place the pinion preload shim selector tool, J-34309-1, gauge screw assembly.
4. Assemble the pinion front bearing inner race and the J-34309-2 gauge anvil. Assemble them together with the J-34309-1 gauge screw in gear carrier. Make sure that the pinion height gauge plate, J-34309-16, turns a full 360 degrees. Tighten the two sections together by hand.
5. Turn the assembly several times to seat the bearings.

6. Measure the turning torque at the end of the J-34309-2 gauge anvil using preload gauge [SST: ST3127S000 (J-25765-A)].

   **Turning torque specification**: 1.08 – 1.66 N·m (0.11 – 0.16 kg·m, 10 – 14 in-lb)

7. Place the J-34309-10 “R180A” pinion height adapter onto the gauge plate and tighten it by hand.
   **CAUTION:**
   Make sure all machined surfaces are clean.

8. Position the side bearing discs, J-25269-18, and arbor firmly into the side bearing bores. Install the bearing caps and tighten bearing cap mounting bolts to the specified torque. Refer to **DLN-176, “Exploded View”**.

9. Select the correct standard pinion height adjusting washer thickness. Select by using a standard gauge of 3 mm (0.12 in) and J-34309-101 feeler gauge. Measure the distance between the J-34309-11 pinion height adapter including the standard gauge and the arbor.
10. Write down exact measurement (the value of feeler gauge).

11. Correct the pinion height washer size by referring to the “pinion head number”.
There are two numbers painted on the drive pinion. The first one refers to the drive pinion and drive gear as a matched set. This number should be the same as the number on the drive gear. The second number is the “pinion head height number”. It refers to the ideal pinion height from standard for quietest operation. Use the following chart to determine the correct pinion height washer.

<table>
<thead>
<tr>
<th>Pinion head height number</th>
<th>Add or remove from the standard pinion height adjusting washer thickness measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>−6</td>
<td>Add 0.06 mm (0.0024 in)</td>
</tr>
<tr>
<td>−5</td>
<td>Add 0.05 mm (0.0020 in)</td>
</tr>
<tr>
<td>−4</td>
<td>Add 0.04 mm (0.0016 in)</td>
</tr>
<tr>
<td>−3</td>
<td>Add 0.03 mm (0.0012 in)</td>
</tr>
<tr>
<td>−2</td>
<td>Add 0.02 mm (0.0008 in)</td>
</tr>
<tr>
<td>−1</td>
<td>Add 0.01 mm (0.0004 in)</td>
</tr>
<tr>
<td>0</td>
<td>Use the selected washer thickness</td>
</tr>
<tr>
<td>+1</td>
<td>Subtract 0.01 mm (0.0004 in)</td>
</tr>
<tr>
<td>+2</td>
<td>Subtract 0.02 mm (0.0008 in)</td>
</tr>
<tr>
<td>+3</td>
<td>Subtract 0.03 mm (0.0012 in)</td>
</tr>
<tr>
<td>+4</td>
<td>Subtract 0.04 mm (0.0016 in)</td>
</tr>
<tr>
<td>+5</td>
<td>Subtract 0.05 mm (0.0020 in)</td>
</tr>
<tr>
<td>+6</td>
<td>Subtract 0.06 mm (0.0024 in)</td>
</tr>
</tbody>
</table>

12. Select the correct pinion height adjusting washer. For selecting adjusting washer, refer to the latest parts information.

13. Remove the J-34309 differential shim selector tool from the final drive housing. Then disassemble to retrieve the pinion bearings.

COMPANION FLANGE RUNOUT
DRIVE PINION

< UNIT DISASSEMBLY AND ASSEMBLY >

1. Fit a dial indicator onto the companion flange face (inner side of the propeller shaft mounting bolt holes).
2. Rotate companion flange to check for runout.

   Companion flange runout : Refer to DLN-185, “Companion Flange Runout”.

3. Fit a test indicator to the inner side of companion flange (socket diameter).
4. Rotate companion flange to check for runout.

   Companion flange runout : Refer to DLN-185, “Companion Flange Runout”.

5. If the runout value is outside the runout limit, follow the procedure below to adjust.
   a. Check for runout while changing the phase between companion flange and drive pinion by 90° step, and search for the position where the runout is the minimum.
   b. If the runout value is still outside of the limit after the phase has been changed, possible cause will be an assembly malfunction of drive pinion and pinion bearing and malfunction of pinion bearing. Check for these items and repair if necessary.
   c. If the runout value is still outside of the limit after the check and repair, replace companion flange.

Inspection

INSPECTION AFTER DISASSEMBLY

Drive Gear and Drive Pinion
• Clean up the disassembled parts.
• If the gear teeth never mesh or line-up correctly, determine the cause and adjust or replace as necessary.
• If the gears are worn, cracked, damaged, pitted or chipped (by friction) noticeably, replace with new drive gear and drive pinion as a set.

Bearing
• Clean up the disassembled parts.
• If any chipped (by friction), pitted, worn, rusted or scratched marks, or unusual noise from the bearing is observed, replace as a bearing assembly (as a new set).

Oil Seal
• Whenever disassembled, replace.
• If wear, deterioration of adherence (sealing force lips), or damage is detected on the lips, replace them.

Companion Flange
• Clean up the disassembled parts.
• If any chipped mark [about 0.1 mm, (0.004 in)] or other damage on the contact sides of the lips of the companion flange is found, replace.
# General Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive gear back face runout</td>
<td>0.05 (0.0020)</td>
</tr>
</tbody>
</table>

## Preload Torque

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pinion bearing (P₁)</td>
<td>1.08 – 1.66 (0.11 – 0.16, 10 – 14)</td>
</tr>
<tr>
<td>Side bearing (P₂)</td>
<td>0.59 – 1.08 (0.06 – 0.11, 6 – 9)</td>
</tr>
<tr>
<td>Side bearing to pinion bearing (Total preload) (Total preload = P₁ + P₂)</td>
<td>1.67 – 2.74 (0.17 – 0.27, 15 – 24)</td>
</tr>
</tbody>
</table>

## Backlash

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive gear to drive pinion gear</td>
<td>0.10 – 0.15 (0.0039 – 0.0059)</td>
</tr>
</tbody>
</table>

## Companion Flange Runout

<table>
<thead>
<tr>
<th>Item</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Companion flange face</td>
<td>0.10 (0.004)</td>
</tr>
<tr>
<td>Inner side of the companion flange</td>
<td>0.10 (0.004)</td>
</tr>
</tbody>
</table>
Service Notice or Precautions for Rear Final Drive

- Check for the correct installation status prior to removal or disassembly. If matching marks are required, be certain they never interfere with the function of the parts when applied.
- Overhaul should be done in a clean work area, it is preferable to work in dustproof area.
- Before disassembly, using steam or white gasoline, completely remove sand and mud from the exterior of the unit, preventing them from entering into the unit during disassembly or assembly.
- Check appearance of the disassembled parts for damage, deformation, and unusual wear. Replace them with new ones, if necessary.
- Gaskets, seals and O-rings should be replaced any time when the unit is disassembled.
- In principle, tighten bolts or nuts gradually in several steps working diagonally from inside to outside. If tightening sequence is specified, observe it.
- Clean and flush the parts sufficiently and blow-dry them.
- Be careful not to damage sliding surfaces and mating surfaces.
- When applying sealant, remove the old sealant from the mounting surface; then remove any moisture, oil, and foreign materials from the application and mounting surfaces.
- Always use shop paper for cleaning the inside of components.
- Never use cotton gloves or shop rags to prevent entering of lint.
- During assembly, observe the specified tightening torque, and apply new gear oil, petroleum jelly, or multi-purpose grease as specified for each vehicle, if necessary.
### Special Service Tool

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

<table>
<thead>
<tr>
<th>Tool number (Kent-Moore No.)</th>
<th>Tool name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>KV40104100 (—)</td>
<td>Attachment</td>
<td>Removing side flange</td>
</tr>
<tr>
<td>ST36230000 (J-25840-A)</td>
<td>Sliding hammer</td>
<td>Removing side flange</td>
</tr>
<tr>
<td>ST3127S000 (J-25765-A)</td>
<td>Preload gauge</td>
<td>Measuring pinion bearing preload and total preload</td>
</tr>
<tr>
<td>KV381054S0 (J-34286)</td>
<td>Puller</td>
<td>Removing front oil seal</td>
</tr>
<tr>
<td>ST15310000 (J-25640-B)</td>
<td>Drift</td>
<td>Installing front oil seal</td>
</tr>
<tr>
<td>a: 96 mm (3.78 in) dia. b: 84 mm (3.31 in) dia.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KV38108000 (—)</td>
<td>Protector</td>
<td>Installing side flange</td>
</tr>
<tr>
<td>Tool number</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td>--------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>ST35271000</td>
<td>Installing side oil seal</td>
<td></td>
</tr>
<tr>
<td>KV10111100</td>
<td>Removing carrier cover</td>
<td></td>
</tr>
<tr>
<td>KV38100800</td>
<td>Securing unit assembly</td>
<td></td>
</tr>
<tr>
<td>KV38100800</td>
<td>Removing side bearing inner race</td>
<td></td>
</tr>
<tr>
<td>KV40104730</td>
<td>Removing and installing side bearing inner race</td>
<td></td>
</tr>
<tr>
<td>KV10112100</td>
<td>Tightening the drive gear mounting bolt</td>
<td></td>
</tr>
<tr>
<td>ST01550002</td>
<td>Installing side bearing inner race</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tool number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>KV10111100</td>
<td>Removing carrier cover</td>
</tr>
<tr>
<td>KV38100800</td>
<td>Securing unit assembly</td>
</tr>
<tr>
<td>KV40104730</td>
<td>Removing and installing side bearing inner race</td>
</tr>
<tr>
<td>KV10112100</td>
<td>Tightening the drive gear mounting bolt</td>
</tr>
<tr>
<td>ST01550002</td>
<td>Installing side bearing inner race</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Tool number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NT127</td>
<td>Measuring turning torque</td>
</tr>
<tr>
<td>KV38103300</td>
<td>Installing drive pinion rear bearing outer race</td>
</tr>
<tr>
<td>ST30611000</td>
<td>Installing drive pinion front bearing outer race</td>
</tr>
<tr>
<td>ST30621000</td>
<td>Installing drive pinion front bearing outer race</td>
</tr>
<tr>
<td>ST30022000</td>
<td>Installing pinion rear bearing inner race</td>
</tr>
</tbody>
</table>

### Commercial Service Tool

<table>
<thead>
<tr>
<th>Tool number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NT127</td>
<td>Measuring turning torque</td>
</tr>
<tr>
<td>KV38103300</td>
<td>Installing drive pinion rear bearing outer race</td>
</tr>
<tr>
<td>ST30611000</td>
<td>Installing drive pinion front bearing outer race</td>
</tr>
<tr>
<td>ST30621000</td>
<td>Installing drive pinion front bearing outer race</td>
</tr>
<tr>
<td>ST30022000</td>
<td>Installing pinion rear bearing inner race</td>
</tr>
</tbody>
</table>
### Tool name

<table>
<thead>
<tr>
<th>Tool name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flange wrench</td>
<td>Removing and installing drive pinion lock nut</td>
</tr>
<tr>
<td>Puller</td>
<td>Removing companion flange</td>
</tr>
<tr>
<td>Sliding hammer</td>
<td>Removing differential case assembly</td>
</tr>
<tr>
<td>Puller</td>
<td>Removing drive pinion rear bearing inner race</td>
</tr>
<tr>
<td>Spacer</td>
<td>Installing drive pinion front bearing inner race</td>
</tr>
<tr>
<td>Power tool</td>
<td>Loosing nuts and bolts</td>
</tr>
</tbody>
</table>

#### Dimensions

- a: 60 mm (2.36 in) dia.
- b: 36 mm (1.42 in) dia.
- c: 30 mm (1.18 in)
SYSTEM DESCRIPTION

CROSS-SECTIONAL VIEW

1. Side flange
2. Pinion mate gear
3. Drive gear
4. Pinion mate shaft
5. Differential case
6. Side bearing
7. Drive pinion
8. Pinion front bearing
9. Companion flange
10. Collapsible spacer
11. Pinion rear bearing
12. Side gear
## NVH Troubleshooting Chart

Use the chart below to find the cause of the symptom. If necessary, repair or replace these parts.

### Reference page

- DLN-215, "Inspection"
- DLN-210, "Adjustment"
- DLN-215, "Inspection"
- DLN-210, "Adjustment"
- DLN-193, "Inspection"

### Possible cause and SUSPECTED PARTS

<table>
<thead>
<tr>
<th>Part</th>
<th>Gear tooth rough</th>
<th>Gear contact improper</th>
<th>Tooth surface worn</th>
<th>Backlash incorrect</th>
<th>Companion flange excessive runout</th>
<th>Gear oil improper</th>
<th>PROPELLER SHAFT</th>
<th>AXLE AND SUSPENSION</th>
<th>TIRES</th>
<th>ROAD WHEEL</th>
<th>DRIVE SHAFT</th>
<th>BRAKES</th>
<th>STEERING</th>
</tr>
</thead>
<tbody>
<tr>
<td>NVH in WT section.</td>
<td>NVH of REAR PROPELLER SHAFT</td>
<td>NVH in FAX, RAX, and RSU sections.</td>
<td>NVH in WT section.</td>
<td>NVH in WT section.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NVH in BR section.</td>
<td>NVH in ST section.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Symptom Noise

| x | x | x | x | x | x | x | x | x | x | x | x |

: Applicable
REAR DIFFERENTIAL GEAR OIL

PERIODIC MAINTENANCE

REAR DIFFERENTIAL GEAR OIL

Inspection

OIL LEAKAGE
Check that differential gear oil is not leaking from the rear final drive assembly or around it.

OIL LEVEL
• Remove filler plug (1) and check oil level from filler plug mounting hole as shown in the figure.
  CAUTION:
  Never start engine while checking oil level.
• Set a gasket on filler plug (1) and install it on final drive assembly. Refer to DLN-203, "Exploded View".
  CAUTION:
  Never reuse gasket.

Draining

1. Stop the engine.
2. Remove drain plug (1) and drain gear oil.
3. Set a gasket on drain plug (1) and install it to final drive assembly and tighten to the specified torque. Refer to DLN-203, "Exploded View".
  CAUTION:
  Never reuse gasket.

Refilling

1. Remove filler plug (1). Fill with new gear oil until oil level reaches the specified level near filler plug mounting hole.

   Oil grade and viscosity : Refer to MA-10, "Fluids and Lubricants".
   Oil capacity : Refer to DLN-222, "General Specification".

2. After refilling oil, check oil level. Set a gasket to filler plug (1), then install it to final drive assembly. Refer to DLN-203, "Exploded View".
  CAUTION:
  Never reuse gasket.
FRONT OIL SEAL

< REMOVAL AND INSTALLATION >
[REAR FINAL DRIVE: R230]

REMOVAL AND INSTALLATION
FRONT OIL SEAL

Exploded View

1. Final drive assembly
2. Front oil seal
3. Companion flange
4. Drive pinion lock nut

A. Oil seal lip

- Vehicle front

- Apply gear oil.

- Apply anti-corrosion oil.

Refer to GI-4, "Components" for symbols not described above.

Removal and Installation

REMOVAL

CAUTION:
Verify identification stamp of replacement frequency put in the lower part of gear carrier to determine replacement for collapsible spacer when replacing front oil seal. Refer to “Identification stamp of replacement frequency of front oil seal”. If collapsible spacer replacement is necessary, remove final drive assembly and disassemble it to replace front oil seal and collapsible spacer.

NOTE:
The reuse of collapsible spacer is prohibited in principle. However, it is reusable on a one-time basis only in cases when replacing front oil seal.

Identification Stamp of Replacement Frequency of Front Oil Seal
- The diagonally shaded area in the figure shows stamping point for replacement frequency of front oil seal.
- The following table shows if collapsible spacer replacement is needed before replacing front oil seal.

When collapsible spacer replacement is required, disassemble final drive assembly to replace collapsible spacer and front oil seal.

Refer to DLM-217, "Disassembly".

<table>
<thead>
<tr>
<th>Stamp</th>
<th>collapsible spacer replacement</th>
</tr>
</thead>
<tbody>
<tr>
<td>No stamp</td>
<td>Not required</td>
</tr>
</tbody>
</table>

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DLN-194

2011 QX56
FRONT OIL SEAL

< REMOVAL AND INSTALLATION >

[REAR FINAL DRIVE: R230]

<table>
<thead>
<tr>
<th>Stamp</th>
<th>collapsible spacer replacement</th>
</tr>
</thead>
<tbody>
<tr>
<td>“0” or “0” on the far right of stamp</td>
<td>Required</td>
</tr>
<tr>
<td>“01” or “1” on the far right of stamp</td>
<td>Not required</td>
</tr>
</tbody>
</table>

**CAUTION:**
Make a stamping after replacing front oil seal.
- After replacing front oil seal, make a stamping on the stamping point in accordance with the table below in order to identify replacement frequency.

**CAUTION:**
Make a stamping from left to right.

<table>
<thead>
<tr>
<th>Stamp before stamping</th>
<th>Stamping on the far right</th>
<th>Stamping</th>
</tr>
</thead>
<tbody>
<tr>
<td>No stamp</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>“0”</td>
<td>1</td>
<td>01</td>
</tr>
<tr>
<td>(Front oil seal was replaced once.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>“01”</td>
<td>0</td>
<td>010</td>
</tr>
<tr>
<td>(Collapsible spacer and front oil seal were replaced last time.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>“0” is on the far right. (Only front oil seal was replaced last time.)</td>
<td>1</td>
<td>...01</td>
</tr>
<tr>
<td>“1” is on the far right. (Collapsible spacer and front oil seal were replaced last time.)</td>
<td>0</td>
<td>...010</td>
</tr>
</tbody>
</table>

1. Make a judgment if a collapsible spacer replacement is required.
2. Drain gear oil. Refer to DLN-193, “Draining”.
3. Remove the drive shafts from final drive. Then suspend it by wire, etc. Refer to RAX-11, “Removal and Installation”.
4. Remove the side flange using sliding hammer and attachment.

   A : Attachment [SST: KV40104100 (—)]
   B : Sliding hammer [SST: ST36230000 (J-25840-A)]

**NOTE:**
Circular clip installation position: Side flange
5. Remove the rear propeller shaft. Refer to DLN-144, “Removal and Installation”.

6. Measure the total preload torque with the preload gauge (A) [SST: ST3127S000 (J-25765-A)].
**NOTE:**
Record the total preload torque measurement.
7. Put matching mark (B) on the end of the drive pinion. The matching mark (A) on companion flange (1).

**CAUTION:**
For matching mark, use paint. Never damage companion flange and drive pinion.

8. Remove the drive pinion lock nut using a flange wrench (commercial service tool).

9. Remove the companion flange using a puller (commercial service tool).

10. Remove the front oil seal using the puller (A) [SST: KV381054S0 (J-34286)].

**INSTALLATION**
1. Apply multi-purpose grease to the lips of the new front oil seal. Then drive the new front oil seal in evenly until it becomes flush with the gear carrier using the drift (A) [SST: ST15310000 (J-25640-B)].
**CAUTION:**
- Never reuse front oil seal.
- Never incline the new front oil seal when installing.

2. Align the matching mark (B) of drive pinion with the matching mark (A) of companion flange (1), and then install the companion flange.

3. Apply anti-corrosion oil to the thread and seat of new drive pinion lock nut, and temporarily tighten drive pinion lock nut to drive pinion, using a flange wrench (commercial service tool).
**CAUTION:**
Never reuse drive pinion lock nut.

4. Tighten drive pinion lock nut within the limits of specified torque so as to keep the pinion bearing preload within a standard values, using the preload gauge (A) [SST: ST3127S000 (J-25765-A)].

   **Total preload torque** : A value that add 0.1 – 0.4 N·m (0.01 – 0.04 kg-m, 0.9 – 3.5 in-lb) to the measured value before removing.

   **CAUTION:**
- Adjust to the lower limit of the drive pinion lock nut tightening torque first.
- If the preload torque exceeds the specified value, replace collapsible spacer and tighten it again to adjust. Never loosen drive pinion lock nut to adjust the preload torque.

5. Fit a test indicator to the inner side of companion flange (socket diameter).

6. Rotate companion flange to check for runout.

   **Companion flange runout** : Refer to DLN-222, "Companion Flange Runout".

   - If the runout value is outside the runout limit, follow the procedure below to adjust.
   - Check for runout while changing the phase between companion flange and drive pinion by 90° step, and search for the position where the runout is the minimum.
- If the runout value is still outside of the limit after the phase has been changed, possible cause will be an assembly malfunction of drive pinion and pinion bearing and malfunction of pinion bearing. Check for these items and repair if necessary.

- If the runout value is still outside of the limit after the check and repair, replace companion flange.

7. Make a stamping for identification of front oil seal replacement frequency. Refer to “Identification stamp of replacement frequency of front oil seal”.

CAUTION:
Make a stamping after replacing front oil seal.

8. Install rear propeller shaft. Refer to DLN-144, "Removal and Installation".

9. Install side flange with the following procedure.
   a. Attach the protector [SST: KV38108000 (−−−−)] to side oil seal.
   b. After the side flange is inserted and the serrated part of side gear has engaged the serrated part of flange, remove the protector.
   c. Put a suitable drift on the center of side flange, then drive it until sound changes.
   NOTE:
   When installation is completed, driving sound of the side flange turns into a sound that seems to affect the whole final drive.

   d. Confirm that the dimension of the side flanges (1) installation measurement (A) in the figure comes into the following.

\[ A \quad : \quad 342.2 \text{ mm (13.47 in)} \]

10. Install drive shaft. Refer to RAX-11, "Removal and Installation".

11. Refill gear oil to the final drive and check oil level. Refer to DLN-193, "Refilling".

12. Check the final drive for oil leakage. Refer to DLN-193, "Inspection".
Removal and Installation

REMOVAL

1. Drain gear oil. Refer to DLN-193, "Draining".
2. Remove the drive shaft from the rear final drive assembly. Refer to RAX-11, "Removal and Installation".
3. Remove the side flange using sliding hammer and attachment.

   A. Attachment [SST: KV40104100 (- )]
   B. Sliding hammer [SST: ST36230000 (J-25840-A)]

   NOTE:
   Circular clip installation position: Side flange side
4. Remove the side oil seal using a suitable tool.

   CAUTION:
   Never damage gear carrier.

INSTALLATION
1. Install side oil seal until it becomes flush with the case end, using the drift (A) [SST: ST35271000 (J-26091)].

**CAUTION:**
- Never reuse side oil seal.
- Never incline the new side oil seal when installing.
- Apply multi-purpose grease to the lips of the new side oil seal.

2. Install the side flange with the following procedure.
   a. Install the protector [SST: KV38108000 ] to the side oil seal as shown.
   b. Insert the side flange until the serrated part of the side flange has engaged the serrated part of the side gear and remove the Tool.
   c. Drive in the side flange using suitable tool.

   **NOTE:**
   Installation is completed when the driving sound of the side flange turns into a sound which seems to affect the whole rear final drive assembly.

   d. Confirm that the dimension of the side flanges (1) installation measurement (A) in the figure comes into the following.

   \[ A = 342.2 \text{ mm (13.47 in)} \]

3. Install drive shaft. Refer to RAX-11, "Removal and Installation".
4. Refill gear oil to final drove and check oil level. Refer to DLN-193, "Refilling".
5. When oil leaks while removing, check oil level after the installation. Refer to DLN-193, "Inspection".

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Revision: 2010 May

DLN-200

2011 QX56
UNIT REMOVAL AND INSTALLATION
REAR FINAL DRIVE

Exploded View

Removal and Installation

REMOVAL
1. Remove spare tire.
2. Remove rear propeller shaft from the final drive. Refer to DLN-144, "Removal and Installation".
3. Remove drive shaft from final drive with power tool. Then suspend it by wire, etc. Refer to RAX-11, "Removal and Installation".
4. Remove breather hose from the final drive.

Vehicle front
Refer to GI-4, "Components" for symbols in the figure.
5. Set a suitable jack to rear final drive assembly.
   **CAUTION:**
   Never place a jack under the rear cover (aluminum case).

6. Remove the mounting bolts and nuts connecting to the suspension member with power tool. And then, remove rear final drive assembly.
   **CAUTION:**
   Secure rear final drive assembly to a suitable jack while removing it.

**INSTALLATION**

Note the following, and installation is in the reverse order of removal.

**CAUTION:**
Check that there are no pinched or restricted areas on the breather hose caused by bending or winding when installing it.
- In (A) position, install the breather hose (1) until dimension (D) shown as follows.

\[ D : 20 \text{ mm (0.79 in)} \]

**CAUTION:**
- Never reuse hose clamp.
- Install the hose clamp, with the tab facing downward.
- In (B) position, install the breather hose (2) until hose reaches the plane tube surface connector.

**CAUTION:**
- Never reuse hose clamp.
- Install the hose clamp, with the tab facing rightward and upward direction of the vehicle at 45°.
- In (C) position, install the breather hose (2) until dimension (E) shown as follows.

\[ E : 20 \text{ mm (0.79 in)} \]

- Install breather hose (1) and (2), breather tube (3) and metal connector (4) as shown in the figure.

- Fix breather hose (2) with clip in (A) position
  **CAUTION:**
  Never reuse clip.
- Install metal connector (4) to rear cover with a part to insert breather hose with facing vehicle left.
  **CAUTION:**
  Never reuse metal connector.
- Fix a point with paint mark (B) of breather tube (3) in (C) position.
- Fix breather tube (3) in (D) position.
- When oil leaks while removing final drive assembly, check oil level after the installation. Refer to DLN-193, "Inspection".
UNIT DISASSEMBLY AND ASSEMBLY
DIFFERENTIAL ASSEMBLY
Exploded View

1. Rear cover
2. Bearing cap
3. Side gear thrust washer
4. Side gear
5. Pinion mate thrust washer
6. Pinion mate gear
7. Pinion mate shaft
8. Lock pin
9. Side bearing
10. Side bearing adjusting washer
11. Drive pinion
12. Pinion height adjusting washer
13. Pinion rear bearing
14. Collapsible spacer
15. Side flange
16. Circlip
17. Side oil seal
18. Gear carrier
19. Pinion front bearing
20. Front oil seal
21. Companion flange
22. Drive pinion lock nut
23. Drive gear
24. Differential case
25. Gasket
26. Drain plug
27. Filler plug
A. Oil seal lip
B. Screw hole
C. Comply with the assembly procedure when tightening. Refer to DLN-206, "Assembly".

Apply gear oil.
*: Apply anti-corrosion oil.
Disassembly

1. Drain gear oil, if necessary.
2. Remove side flanges.
3. Remove rear cover mounting bolts.
4. Remove rear cover to insert the seal cutter [SST: KV10111100 (J-37228)] between gear carrier and rear cover.
   **CAUTION:**
   - Never damage the mating surface.
   - Never insert flat-bladed screwdriver, this may damage the mating surface.

5. Using spacers, mount carrier on the attachment (A) [SST: KV38100800 (J-25604-01)].

6. For proper reinstallation, paint matching marks on one side of the bearing cap.
   **CAUTION:**
   - For matching marks, use paint. Never damage bearing caps and gear carrier.
   - Bearing caps are manufactured as integral molding. Use the matching marks to them in their original positions.

7. Remove bearing caps.
8. Lift differential case assembly out with a suitable tool.

- Keep side bearing outer races together with inner race. Never mix them up. 
  Also, keep side bearing adjusting washers together with bearings.

9. Remove side bearing inner race. 
   To prevent damage to bearing, engage puller jaws in groove ( ).
   
   A : Puller [SST: ST33051001 (J-22888-20)]
   B : Base [SST: KV40104730 ( — )]
   
   CAUTION:
   - To prevent damage to the side bearing and drive gear, place copper plates between these parts and vise. 
   - It is not necessary to remove side bearing inner race except when it is replaced.

10. For proper reinstallation, paint matching marks on one differential case assembly. 
    CAUTION: 
    For matching marks, use paint. Never damage differential case and drive gear. 

11. Remove drive gear mounting bolts. 

12. Tap drive gear off differential case assembly with a soft hammer. 
    CAUTION: 
    Tap evenly all around to keep drive gear from bending.
13. Remove lock pin of pinion mate shaft with a punch from drive gear side.


15. Turn pinion mate gear, then remove pinion mate gear, pinion mate thrust washer, side gear and side gear thrust washer from differential case.

16. Perform inspection after disassembly. Refer to DLN-215, "Inspection".

Assembly

1. Install side gear thrust washers with the same thickness as the ones installed prior to disassembly or reinstall the old ones on the side gears.
2. Install side gears and thrust washers into differential case. **CAUTION:**
   Make sure that the circular clip is installed to side gears.

3. Align 2 pinion mate gears in diagonally opposite positions, then rotate and install them into differential case after installing thrust washer to pinion mate gear.

4. Align the lock pin holes on differential case with shaft, and install pinion mate shaft.

5. Measure side gear end play. If necessary, select the appropriate side gear thrust washers.
   a. Place differential case straight up so that side gear to be measured comes upward.
b. Using feeler gauge, measure the clearance between side gear back and differential case at 3 different points, while rotating side gear. Average the 3 readings, and then measure the clearance of the other side as well.

Standard
Side gear back clearance : Refer to DLN-222, "Side Gear Clearance".

CAUTION:
To prevent side gear from tilting, insert feeler gauges with the same thickness from both sides.

c. If the back clearance is outside the specification, use a thicker/thinner side gear thrust washer to adjust. For selecting thrust washer, refer to the latest parts information.

When the back clearance is large: Use a thicker thrust washer.
When the back clearance is small: Use a thinner thrust washer.

CAUTION:
Select a side gear thrust washer for right and left individually.

6. Drive a lock pin into pinion mate shaft, using a punch. Make sure lock pin is flush with differential case.

CAUTION:
Never reuse lock pin.

7. Apply thread locking sealant into the thread hole of drive gear.
   - Use Genuine High Strength Thread Locking Sealant or equivalent. Refer to GI-22, "Recommended Chemical Products and Sealants".
   CAUTION:
Clean and degrease drive gear back and threaded holes sufficiently.

8. Install drive gear to differential case.

CAUTION:
Align the matching marks of differential case and drive gear.

9. Tighten the mounting bolts with the following procedure.
CAUTION:
Apply anti-corrosion oil to the thread and seat of mounting bolts.

a. Tighten the bolts in a crisscross fashion to the specified torque.

   Drive gear mounting bolts tightening torque : 78.5 N-m (8.0 kg-m, 58 ft-lb)

b. Tighten the bolts additionally to the specified angle.
CAUTION:
Check the tightening angle using the angle wrench [SST: KV10112100 (BT-8653-A)]. Never make judgment by visual inspection.

10. Press side bearing inner races to differential case, using the drift (A) and the base (B).

   A : Drift [SST: ST01550002 ( — )]
   B : Drift [SST: KV40104730 ( — )]

CAUTION:
Never reuse side bearing inner race.

11. Install differential case assembly with side bearing outer races into gear carrier.

12. Measure side bearing preload. If necessary, select the appropriate side bearing adjusting washers. Refer to DLN-210, “Adjustment”.

13. Insert selected left and right side bearing adjusting washers in place between side bearings and gear carrier. Refer to DLN-210, “Adjustment”.

14. Align matching marks on bearing cap with that on gear carrier.

15. Install bearing caps and tighten bearing cap mounting bolts.
16. Using the drift [SST: ST35271000 (J-26091)], drive side oil seals until it becomes flush with the case end.

**CAUTION:**
- Never reuse oil seal.
- When installing, never incline oil seal.
- Apply multi-purpose grease onto oil seal lips, and gear oil onto the circumference of oil seal.

17. Check and adjust drive gear runout, tooth contact, drive gear to drive pinion backlash, and total preload torque. Refer to DLN-210, "Adjustment". Recheck above items. Readjust the above description, if necessary.

18. Apply sealant to mating surface of rear cover.
   - Use Genuine Silicone RTV or equivalent. Refer to GI-22, "Recommended Chemical Products and Sealants".

**CAUTION:**
Remove old sealant adhering to mounting surfaces. Also remove any moisture, oil, or foreign material adhering to application and mounting surfaces.

19. Install rear cover on gear carrier and tighten mounting bolts.

20. Install side flange with the following procedure.
   a. Attach the protector [SST: KV38108000 ( )] to side oil seal.
   b. After the side flange is inserted and the serrated part of side gear has engaged the serrated part of flange, remove the protector.
   c. Insert the side flange until the serrated part of the side flange has engaged the serrated part of the side gear and remove the protector.
   **NOTE:**
   When installation is completed, driving sound of the side flange turns into a sound that seems to affect the whole final drive.
   d. Confirm that the dimension of the side flanges (1) installation measurement (A) in the figure comes into the following.

   \[ A : 342.2 \text{ mm (13.47 in)} \]

Adjustment

**TOTAL PRELOAD TORQUE**
Before inspection and adjustment, drain gear oil.
1. Secure final drive assembly onto an attachment [SST: KV38100800 ( )].
2. Remove side flanges.
3. Rotate drive pinion back and forth 2 to 3 times to check for unusual noise and rotation malfunction.
4. Rotate drive pinion at least 20 times to check for smooth operation of the bearing.

5. Measure total preload with the preload gauge (A) [SST: ST3127S000 (J-25765-A)].

**Total preload torque**: Refer to DLN-222, "Preload Torque".

**NOTE:**
Total preload torque = Pinion bearing preload torque + Side bearing preload torque

- If measured value is out of the specification, disassemble it to check and adjust each part. Adjust the pinion bearing preload and side bearing preload. Adjust the pinion bearing preload first, then adjust the side bearing preload.

**When the preload torque is large**
- **On pinion bearings**: Replace the collapsible spacer.
- **On side bearings**: Use thinner side bearing adjusting washers by the same amount to each side. For selecting adjusting washer, refer to the latest parts information.

**When the preload is small**
- **On pinion bearings**: Tighten the drive pinion lock nut.
- **On side bearings**: Use thicker side bearing adjusting washers by the same amount to each side. For selecting adjusting washer, refer to the latest parts information.

**SIDE BEARING PRELOAD**
Before inspection and adjustment, drain gear oil.

1. Remove rear cover. Refer to DLN-204, "Disassembly".

2. Make sure all parts are clean. Also, make sure the bearings are well lubricated with gear oil.

3. Place the differential case, with side bearings and bearing races installed, into gear carrier.

4. Insert left and right original side bearing adjusting washers in place between side bearings and gear carrier.
5. Install bearing caps in their correct locations and tighten bearing cap mounting bolts.

6. Turn the carrier several times to seat the bearings.

7. Measure the turning torque of the carrier at the drive gear mounting bolts with a spring gauge [SST: — (J-8129)].

   **Specification**: 34.2 – 39.2N (3.5 – 4.0 kg, 7.7 – 8.8 lb) of pulling force at the drive gear bolt

8. If the turning torque is outside the specification, use a thicker/thinner side bearing adjusting washer to adjust. For selecting adjusting washer, refer to the latest parts information.

   - **If the turning torque is less than the specified range**: Use a thicker thrust washer.
   - **If the turning torque is greater than the specification**: Use a thinner thrust washer.

   **CAUTION**: Select a side bearing adjusting washer for right and left individually.

9. Record the total amount of washer thickness required for the correct carrier side bearing preload.

**DRIVE GEAR RUNOUT**

1. Remove rear cover. Refer to DLN-204, "Disassembly".

2. Fit a dial indicator to the drive gear back face.

3. Rotate the drive gear to measure runout.

   - **Drive gear runout**: Refer to DLN-222, "Drive Gear Runout".

   - If the runout is outside of the repair limit, check drive gear assembly condition; foreign material may be caught between drive gear and differential case, or differential case or drive gear may be deformed, etc.

   **CAUTION**: Replace drive gear and drive pinion gear as a set.

**TOOTH CONTACT**

Before inspection and adjustment, drain gear oil.

1. Remove rear cover. Refer to DLN-204, "Disassembly".
2. Apply red lead to drive gear.
   **CAUTION:**
   Apply red lead to both the faces of 3 to 4 gears at 4 locations evenly spaced on drive gear.

3. Rotate drive gear back and forth several times, check drive pinion gear to drive gear tooth contact.
   **CAUTION:**
   Check tooth contact on drive side and reverse side.

<table>
<thead>
<tr>
<th>Tooth contact condition</th>
<th>Pinion height adjusting washer selection value [mm (in)]</th>
<th>Adjustment (Yes/No)</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive side</td>
<td>Back side</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heel side</td>
<td>Toe side</td>
<td>+0.06 (+0.0024)</td>
<td>Yes</td>
</tr>
<tr>
<td>Thicker</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heel side</td>
<td>Toe side</td>
<td>+0.04 (+0.0016)</td>
<td>Yes</td>
</tr>
<tr>
<td>Heel side</td>
<td>Toe side</td>
<td>+0.02 (+0.0008)</td>
<td>No</td>
</tr>
<tr>
<td>Heel side</td>
<td>Toe side</td>
<td>0</td>
<td>No</td>
</tr>
<tr>
<td>Heel side</td>
<td>Toe side</td>
<td>-0.02 (-0.0008)</td>
<td>No</td>
</tr>
<tr>
<td>Thinner</td>
<td></td>
<td>-0.04 (-0.0016)</td>
<td>Yes</td>
</tr>
<tr>
<td>Heel side</td>
<td>Toe side</td>
<td>-0.06 (-0.0024)</td>
<td>Yes</td>
</tr>
</tbody>
</table>
4. If tooth contact is improperly adjusted, follow the procedure below to adjust the pinion height [dimension (X)].

- If the tooth contact is near the face (face contact), or near the heel (heel contact), thicken pinion height adjusting washers to move drive pinion closer to drive gear. For selecting adjusting washer, refer to the latest parts information.

- If the tooth contact is near the flank (flank contact), or near the toe (toe contact), thin pinion height adjusting washers to move drive pinion farther from drive gear. For selecting adjusting washer, refer to the latest parts information.

BACKLASH
Before inspection and adjustment, drain gear oil.
1. Remove rear cover. Refer to DLN-204, “Disassembly”.
2. Fit a dial indicator to the drive gear face to measure the backlash.

  Backlash : Refer to DLN-222, “Backlash”.

  • If the backlash is outside of the specified value, change the thickness of side bearing adjusting washer.

  When the backlash is large:
  Make drive gear back side adjusting washer thicker, and drive gear tooth side adjusting washer thinner by the same amount. For selecting adjusting washer, refer to the latest parts information.
When the backlash is small:

Make drive gear back side adjusting washer thinner,
and drive gear tooth side adjusting washer thicker by
the same amount. For selecting adjusting washer, re-
fer to the latest parts information.

CAUTION:
Never change the total amount of washers as it changes the bearing preload.

Inspection

INSPECTION AFTER DISASSEMBLY

Drive Gear and Drive Pinion
• Clean up the disassembled parts.
• If the gear teeth never mesh or line-up correctly, determine the cause and adjust or replace as necessary.
• If the gears are worn, cracked, damaged, pitted or chipped (by friction) noticeably, replace with new drive
gear and drive pinion as a set.

Bearing
• Clean up the disassembled parts.
• If any chipped (by friction), pitted, worn, rusted or scratched marks, or unusual noise from the bearing is
observed, replace as a bearing assembly (as a new set).

Side Gear and Pinion Mate Gear
• Clean up the disassembled parts.
• If any cracks or damage on the surface of the tooth is found, replace.
• If any worn or chipped mark on the contact sides of the thrust washer is found, replace.

Side Gear Thrust Washer and Pinion Mate Thrust Washer
• Clean up the disassembled parts.
• If it is chipped (by friction), damaged, or unusually worn, replace.

Oil Seal
• Whenever disassembled, replace.
• If wear, deterioration of adherence (sealing force lips), or damage is detected on the lips, replace them.

Differential case
• Clean up the disassembled parts.
• If any wear or crack on the contact sides of the differential case is found, replace.
Exploded View

1. Rear cover  
2. Bearing cap  
3. Pinion mate thrust washer  
4. Pinion mate shaft  
5. Side gear thrust washer  
6. Pinion mate gear  
7. Lock pin  
8. Side bearing  
9. Pinion height adjusting washer  
10. Side bearing adjusting washer  
11. Drive pinion  
12. Pinion rear bearing  
13. Collapsible spacer  
14. Side oil seal  
15. Side flange  
16. Pinion rear bearing  
17. Front oil seal  
18. Gear carrier  
19. Pinion front bearing  
20. Drive pinion lock nut  
21. Companion flange  
22. Drive gear  
23. Differential case  
24. Gasket  
25. Filler plug  
26. Oil seal lip  
A. Screw hole  
B. Screw hole

Apply gear oil.

Apply anti-corrosion oil.

Apply Genuine Silicone RTV or equivalent. Refer to GI-22, "Recommended Chemical Products and Sealants".

Comply with the assembly procedure when tightening. Refer to DLN-206, "Assembly".
Disassembly

1. Remove differential case assembly. Refer to DLN-204, "Disassembly".
2. Remove drive pinion lock nut with the flange wrench (commercial service tool).
3. Put matching mark (B) on the end of drive pinion. The matching mark should be in line with the matching mark (A) on companion flange (1).
   **CAUTION:**
   For matching mark, use paint. Never damage companion flange and drive pinion.
   **NOTE:**
   The matching mark on the final drive companion flange indicates the maximum vertical runout position.
   When replacing companion flange, matching mark is not necessary.
4. Remove companion flange using the suitable puller (commercial service tool).
5. Press drive pinion assembly out of gear carrier.
   **CAUTION:**
   Never drop drive pinion assembly.
6. Remove front oil seal.
7. Remove side oil seal.
8. Remove pinion front bearing inner race.
9. Remove collapsible spacer.
10. Remove pinion rear bearing inner race and pinion height adjusting washer with the replacer (A) (commercial service tool).

11. Tap pinion front/rear bearing outer races uniformly using a brass rod or equivalent to remove them.

**CAUTION:**
Never damage gear carrier.

12. Perform inspection after disassembly. Refer to DLN-220, "Inspection".

---

**Assembly**

1. Install front bearing outer race and rear bearing outer race using drifts.

   A : Drift [SST: KV38103300 ( — )]
   B : Drift [SST: ST30611000 (J-25742-1)]
   C : Drift bar [SST: ST30621000 (J-25742-5)]

**CAUTION:**
- At first, using a hammer, tap bearing outer race until it becomes flat to gear carrier.
- Never reuse pinion front and rear bearing outer race.

2. Select drive pinion height adjusting washer. For selecting adjusting washer, refer to the latest parts information.
3. Install selected drive pinion height adjusting washer (2) to drive pinion. Press pinion rear bearing inner race (1) to it, using drift (A) [SST: ST30022000 ( — )].
   **CAUTION:**
   - Be careful of the direction of pinion height adjusting washer. (Assemble as shown in the figure.)
   - Never reuse pinion rear bearing inner race.

4. Assemble collapsible spacer to drive pinion.
   **CAUTION:**
   Never reuse collapsible spacer.

5. Apply gear oil to pinion rear bearing, and assemble drive pinion into gear carrier.

6. Apply gear oil to pinion front bearing, and assemble pinion front bearing inner race to drive pinion assembly.
   **CAUTION:**
   Never reuse pinion front bearing inner race.

7. Using suitable spacer (A), press the pinion front bearing inner race to drive pinion as far as drive pinion nut can be tightened.

8. Using the drift (A) [SST: ST15310000 (J-25640-B)], install front oil seal in evenly until it becomes flush with the gear carrier.
   **CAUTION:**
   - Never reuse oil seal.
   - When installing, never incline oil seal.
   - Apply multi-purpose grease onto oil seal lips, and gear oil onto the circumference of oil seal.

9. Install companion flange (1).
   **NOTE:**
   When reusing drive pinion, align the matching mark (B) of drive pinion with the matching mark (A) of companion flange, and then install companion flange.
10. Apply anti-corrosion oil to the thread and seat of drive pinion lock nut, and temporarily tighten drive pinion lock nut to drive pinion, using flange wrench (commercial service tool).

**CAUTION:**
Never reuse drive pinion lock nut.

11. Adjust to the drive pinion lock nut tightening torque and pinion bearing preload torque, using preload gauge [SST: ST3127S000 (J-25765-A)].

\[
\text{Pinion bearing preload} \quad \text{: Refer to DLN-222, "Preload Torque".}
\]

**CAUTION:**
- Adjust to the lower limit of the drive pinion lock nut tightening torque first.
- If the preload torque exceeds the specified value, replace collapsible spacer and tighten it again to adjust. Never loosen drive pinion lock nut to adjust the preload torque.
- After adjustment, rotate drive pinion back and forth 2 to 3 times to check for unusual noise, rotation malfunction, and other malfunctions.

12. Install differential case assembly. Refer to DLN-206, "Assembly".

**CAUTION:**
Never install rear cover at this timing.

13. Check and adjust drive gear runout, tooth contact, drive gear to drive pinion backlash, and companion flange runout. Refer to DLN-210, "Adjustment" and DLN-220, "Adjustment". Recheck above items. Readjust the above description, if necessary.

14. Check total preload torque. Refer to DLN-210, "Adjustment".

15. Install rear cover. Refer to DLN-206, "Assembly".

### Adjustment

#### COMPANION FLANGE RUNOUT

1. Fit a test indicator to the inner side of the companion flange (socket diameter).
2. Rotate companion flange to check for runout.

\[
\text{Inner side of companion flange runout} \quad \text{: Refer to DLN-222, "Companion Flange Runout".}
\]

3. If the runout value is outside the runout limit, follow the procedure below to adjust.
   a. Check for runout while changing the phase between companion flange and drive pinion by 90° step, and search for the position where the runout is the minimum.
   b. If the runout value is still outside of the limit after the phase has been changed, possible cause will be an assembly malfunction of drive pinion and pinion bearing and malfunction of pinion bearing. Check for these items and repair if necessary.
   c. If the runout value is still outside of the limit after the check and repair, replace companion flange.

### Inspection

#### INSPECTION AFTER DISASSEMBLY

Drive Gear and Drive Pinion
- Clean up the disassembled parts.
- If the gear teeth never mesh or line-up correctly, determine the cause and adjust or replace as necessary.
DRIVE PINION

< UNIT DISASSEMBLY AND ASSEMBLY >

[REAR FINAL DRIVE: R230]

- If the gears are worn, cracked, damaged, pitted or chipped (by friction) noticeably, replace with new drive gear and drive pinion as a set.

Bearing
- Clean up the disassembled parts.
- If any chipped (by friction), pitted, worn, rusted or scratched marks, or unusual noise from the bearing is observed, replace as a bearing assembly (as a new set).

Oil Seal
- Whenever disassembled, replace.
- If wear, deterioration of adherence (sealing force lips), or damage is detected on the lips, replace them.

Companion Flange
- Clean up the disassembled parts.
- If any chipped mark [about 0.1 mm, (0.004 in)] or other damage on the contact sides of the lips of the companion flange is found, replace.
### General Specification

<table>
<thead>
<tr>
<th>Applied model</th>
<th>2WD</th>
<th>4WD</th>
</tr>
</thead>
<tbody>
<tr>
<td>VK56VD</td>
<td></td>
<td>A/T</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Final drive model</th>
<th>R230</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gear ratio</td>
<td>2.937</td>
</tr>
<tr>
<td>Number of teeth (Drive gear/Drive pinion)</td>
<td>47/16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Oil capacity (Approx.)</th>
<th>1.75 (3-3/4, 3-1/8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of pinion gears</td>
<td>2</td>
</tr>
<tr>
<td>Drive pinion adjustment spacer type</td>
<td>Collapsible</td>
</tr>
</tbody>
</table>

### Drive Gear Runout

<table>
<thead>
<tr>
<th>Item</th>
<th>Runout limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive gear back face</td>
<td>0.05 (0.0020) or less</td>
</tr>
</tbody>
</table>

### Side Gear Clearance

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Side gear back clearance (Clearance limit between side gear and differential case for adjusting side gear backlash)</td>
<td>0.20 (0.0079) or less</td>
</tr>
<tr>
<td></td>
<td>(Each gear should rotate smoothly without excessive resistance during differential motion.)</td>
</tr>
</tbody>
</table>

### Preload Torque

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive pinion bearing preload torque</td>
<td>1.76 – 2.65 N·m (0.18 – 0.27 kg·m, 16 – 23 in-lb)</td>
</tr>
<tr>
<td>Side bearing preload torque (reference value determined by drive gear bolt pulling force)</td>
<td>0.29 – 1.47 N·m (0.03 – 0.14 kg·m, 3 – 13 in-lb)</td>
</tr>
<tr>
<td>Total preload torque (Total preload torque = drive pinion bearing preload torque + Side bearing preload torque)</td>
<td>2.06 – 4.12 N·m (0.21 – 0.42 kg·m, 19 – 36 in-lb)</td>
</tr>
</tbody>
</table>

### Backlash

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive gear to drive pinion gear</td>
<td>0.13 – 0.18 (0.0051 – 0.0070)</td>
</tr>
</tbody>
</table>

### Companion Flange Runout

<table>
<thead>
<tr>
<th>Item</th>
<th>Runout limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inner side of the companion flange</td>
<td>0.08 (0.0031) or less</td>
</tr>
</tbody>
</table>