AUTOMATIC TRANSMISSION

ELECTRONICALLY CONTROLLED AUTOMATIC TRANSMISSION (ECT)

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TRANSMISSION WIRE
COMPONENTS
REMOVAL
INSTALLATION
INSPECTION

TRANSMISSION VALVE BODY ASSEMBLY
COMPONENTS
REMOVAL
INSTALLATION

AUTOMATIC TRANSMISSION THREE-WAY SOLENOID ASSEMBLY
INSPECTION

CLUTCH CONTROL SOLENOID NO. 1
INSPECTION

LOCK-UP CONTROL SOLENOID
INSPECTION

EXTENSION HOUSING OIL SEAL
COMPONENTS
REMOVAL
INSTALLATION

SHIFT LOCK DEVICE
ON-VEHICLE INSPECTION

CLUTCH CONTROL SOLENOID NO. 2
INSPECTION

TRANSMISSION CONTROL COMPUTER ASSEMBLY
COMPONENTS
REMOVAL
INSTALLATION

SHIFT LOCK RELEASE CABLE ASSEMBLY
COMPONENTS
REMOVAL
INSTALLATION
ELECTRONICALLY CONTROLLED AUTOMATIC TRANSMISSION (ECT)

OPERATION CHECK

1. INSPECT SHIFT LOCK OPERATION
   (a) Move the shift lever to the P position.
   (b) When operating the shift lever, check that the shift lever cannot be moved to any position other than the P position.
   (c) Check that the shift lever can be moved out of the P position when the ignition switch is turned to the ON position and the brake pedal is depressed.

2. CHECK KEY INTERLOCK OPERATION
   (a) Turn the ignition switch to the ON position.
   (b) While depressing the brake pedal, check that the shift lever can be moved out of the P position.
   (c) Check that the ignition key cannot be turned to the LOCK position.
   (d) Move the shift lever to the P position and turn the ignition key to the LOCK position, and check that the ignition key can be removed.

3. CHECK TIME LAG
   NOTICE:
   • Be sure to check for time lag after checking and adjusting the engine.
   • Be sure to perform this check when the fluid is at its normal driving temperature (70-90°C).
   • Perform this check when the air conditioning is turned OFF.
   (a) Apply the parking brake and use chocks.
   (b) Start the engine.
   (c) While depressing the brake pedal, shift from the N position to the D or R position with the engine idling, and measure the time until the shock can be felt.
   Standard:
   \[
   \begin{align*}
   N \rightarrow D & \text{ position: } 1.0 \text{ second or less} \\
   N \rightarrow R & \text{ position: } 1.0 \text{ second or less}
   \end{align*}
   \]
   NOTICE:
   • Take several measurements and use the average.
   • Allow an interval of 1 minute between measurements.

4. CHECK STALL SPEED
   NOTICE:
   • Be sure to perform this check after checking and adjusting the engine.
   • Be sure to perform this check when the fluid is at its normal driving temperature (70-90°C).
   • Perform this check when the air conditioning is turned OFF.
   • Do not perform this check continuously for more than 5 seconds.
   • Perform this inspection where the \( \mu \) (friction coefficient) is high, such as on the asphalt, to prevent the wheels from spinning.
   (a) Apply the parking brake and use chocks.
(b) Using the DS-II, following the prompts on the screen, select ECU DATA LIST and ENGINE SPEED.

(c) Start the engine.

(d) Fully depress the accelerator pedal with the left foot, shift to the D position, then quickly read the maximum engine speed when fully depressing the accelerator pedal with the right foot.

**Standard:**

2200 to 2700 r/min

5. CHECK FLUID PRESSURE

(a) Pressure gauge installation procedure

![Diagram of automatic transmission fluid pressure points]

**NOTICE:**

- Clean the measurement gauges and hoses using a solvent before and after the measurements.
- Use a new gasket for the SST and measurement gauges.
- The test plugs are not reusable.

(1) Remove the test plug, then install an automatic transmission oil pressure gauge and adapter.

SST 09325-87201

**NOTICE:**

Ensure that the gauge and adapter do not interfere with the front propeller shaft assembly.

(2) Start the engine and warm-up the transmission (between 70 and 90°C), and check the volume and leaks of the fluid.

(3) After the test is completed, install a new test plug.

**Torque:** 9.8 N·m (100 kgf·cm)

(b) C2 pressure test

(1) Apply the parking brake and use chocks.

(2) Start the engine.
(3) Firmly depress the brake pedal with the left foot and shift to the D position. Operate the accelerator pedal with the right foot and measure the fluid pressure.

**Standard:**

930 to 1130 kPa [9.4 to 11.4 kgf/cm²]

(c) C1 pressure test

(1) Apply the parking brake and use chocks.

(2) Start the engine.

(3) Firmly depress the brake pedal with the left foot and shift to the R position. Operate the accelerator pedal with the right foot and measure the fluid pressure.

**Standard:**

1520 to 2110 kPa [15.5 to 21.5 kgf/cm²]

(d) B1 pressure test

(1) Lift up the vehicle.

(2) Start the engine.

(3) Shift to the D position, gradually depress the accelerator pedal to shift to the 2nd gear, then measure the fluid pressure at engine speed of 2,000 r/min.

**Standard:**

930 to 1130 kPa [9.4 to 11.4 kgf/cm²]

(e) C3 pressure test

(1) Lift up the vehicle.

(2) Start the engine.

(3) Shift to the D position, gradually depress the accelerator pedal to shift to the 3rd gear, then measure the fluid pressure when releasing the accelerator pedal.

**Standard:**

440 to 640 kPa [4.5 to 6.5 kgf/cm²]

(f) LUC OFF pressure test

(1) Lift up the vehicle.

(2) Start the engine.

(3) Shift to the D position and measure the fluid pressure. (Fluid pressure when the lock-up is OFF)

**Standard:**

590 to 750 kPa [6.0 to 7.6 kgf/cm²]

(4) Gradually depress the accelerator pedal to shift to the 4th gear, and keep accelerating. Measure the fluid pressure when the lock-up occurs. (Fluid pressure when the lock-up is ON)

**Standard:**

20 kPa [0.2 kgf/cm² or less]

6. **SHIFT TABLE**

**NOTICE:**
- Be sure to perform this check after checking and adjusting the engine.
- Be sure to perform this check when the fluid is at its normal driving temperature (50-80°C).
- Perform this test with no electrical load, air conditioning OFF, and the brake not applied.

**Standard:**
7. ROAD TEST

CAUTION:
Ensure the safety of the road before performing this test.

NOTICE:
• Be sure to perform this test after checking and adjusting the engine.
• Be sure to perform this test when the fluid is at its normal driving temperature (70-80°C).
• Perform this test when the air conditioning and cruise control are turned OFF.

HINT:

ROAD TEST CHART

<table>
<thead>
<tr>
<th>Inspection Item</th>
<th>Inspection and Check Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>D position shift function</td>
<td>Check that the transmission shifts from/to 1st ←→ 2nd ←→ 3rd ←→ 4th under normal driving conditions (city driving).</td>
</tr>
<tr>
<td>Shift shock level when driving in D position</td>
<td>During normal driving, check the shock level at each up-shift.</td>
</tr>
<tr>
<td>Kick-down function</td>
<td>• Perform the kick-down operation at each gear, and check that the transmission downshifts normally.</td>
</tr>
<tr>
<td></td>
<td>• Check the shock level at kick-down.</td>
</tr>
<tr>
<td>Engine brake operation</td>
<td>• While driving in the 3 position and 3rd gear (at a vehicle speed of approximately 40 to 50 km/h), shift into the 2 position and check the 2nd gear engine brake operation.</td>
</tr>
<tr>
<td></td>
<td>• While driving in the 2 position and 2nd gear (at a vehicle speed of approximately 20 to 30 km/h), shift into the L position and check the operation of the 1st gear engine brake.</td>
</tr>
<tr>
<td>Shift point when the accelerator pedal is fully depressed</td>
<td>Fully depress the accelerator pedal in the D position to start off, then check that the 1st to 2nd up-shift speed meets the shift point.</td>
</tr>
<tr>
<td>Lockup function</td>
<td>Lightly depress the accelerator pedal when driving at a constant speed within the lock-up speed range on a level road. Check that the engine speed does not change abruptly.</td>
</tr>
<tr>
<td>P position operation</td>
<td>Park the vehicle on a slope with a grade of approximately 5 degree or more, shift to the P position, and release the parking brake. Check that the vehicle does not move.</td>
</tr>
</tbody>
</table>
8. MANUAL ROAD TEST

(a) Disconnect the transmission wire connector.
(b) Check that the gear shifts to the appropriate position while driving.
   
   Standard:

(c) Clear DTCs after the manual road test.

<table>
<thead>
<tr>
<th>Inspection Item</th>
<th>Inspection and Check Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abnormal noise, vibration</td>
<td>Check for abnormal noise and vibration when driving and shifting.</td>
</tr>
</tbody>
</table>
| Hill control function    | • When driving on an uphill, check that the up-shift to 4th gear is prohibited.  
                           | • When applying the brake while driving downhill in 4th gear with the accelerator pedal fully depressed, check that the transmission downshifts to the 3rd gear. |
| Fluid leaks              | Check each unit for fluid leaks after the road test. |

<table>
<thead>
<tr>
<th>Shift Lever Position</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>D position</td>
<td>3rd</td>
</tr>
</tbody>
</table>
### DIAGNOSTIC TROUBLE CODE CHART

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Diagnostic Item</th>
<th>Lamp</th>
<th>Code Memory</th>
<th>See Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0705/55</td>
<td>No input from the neutral start switch</td>
<td>×</td>
<td>×</td>
<td>AT-24</td>
</tr>
<tr>
<td>P0705/56</td>
<td>Multiple input from the neutral start switch</td>
<td>O</td>
<td>O</td>
<td>AT-24</td>
</tr>
<tr>
<td>P0710/38</td>
<td>Open or short in the fluid temperature sensor circuit</td>
<td>O</td>
<td>O</td>
<td>AT-27</td>
</tr>
<tr>
<td>P0711/38</td>
<td>Fluid temperature sensor performance problem</td>
<td>O</td>
<td>O</td>
<td>AT-27</td>
</tr>
<tr>
<td>P0715/37</td>
<td>No input for turbine speed</td>
<td>O</td>
<td>O</td>
<td>AT-29</td>
</tr>
<tr>
<td>P0720/42</td>
<td>No input for output speed</td>
<td>O</td>
<td>O</td>
<td>AT-31</td>
</tr>
<tr>
<td>P0725/86</td>
<td>No input for engine speed</td>
<td>O</td>
<td>O</td>
<td>AT-33</td>
</tr>
<tr>
<td>P0753/61</td>
<td>Open or short in the solenoid No. 1 circuit</td>
<td>O</td>
<td>O</td>
<td>AT-35</td>
</tr>
<tr>
<td>P0758/62</td>
<td>Open or short in the solenoid No. 2 circuit</td>
<td>O</td>
<td>O</td>
<td>AT-35</td>
</tr>
<tr>
<td>P0763/63</td>
<td>Open or short in the solenoid No. 3 circuit</td>
<td>O</td>
<td>O</td>
<td>AT-35</td>
</tr>
<tr>
<td>P0768/64</td>
<td>Open or short in the duty solenoid circuit</td>
<td>O</td>
<td>O</td>
<td>AT-39</td>
</tr>
<tr>
<td>P0773/65</td>
<td>Open or short in the LUC solenoid circuit</td>
<td>O</td>
<td>O</td>
<td>AT-41</td>
</tr>
<tr>
<td>P1703/72</td>
<td>Lock-up speed does not match</td>
<td>O</td>
<td>O</td>
<td>AT-44</td>
</tr>
<tr>
<td>P1706/31</td>
<td>Engine torque error</td>
<td>O</td>
<td>×</td>
<td>AT-45</td>
</tr>
<tr>
<td>P1711/41</td>
<td>Throttle sensor signal error</td>
<td>O</td>
<td>×</td>
<td>AT-46</td>
</tr>
<tr>
<td>P1730/21</td>
<td>Battery system power source error</td>
<td>O</td>
<td>O</td>
<td>AT-47</td>
</tr>
<tr>
<td>P1731/22</td>
<td>Sensor system power source error</td>
<td>O</td>
<td>O</td>
<td>AT-50</td>
</tr>
<tr>
<td>P1780/66</td>
<td>Open or short in the switch solenoid circuit</td>
<td>O</td>
<td>O</td>
<td>AT-41</td>
</tr>
<tr>
<td>U0100/82</td>
<td>EFI communication receiving error</td>
<td>O</td>
<td>O</td>
<td>AT-53</td>
</tr>
<tr>
<td>U0101/85</td>
<td>EFI communication sending error</td>
<td>O</td>
<td>O</td>
<td>AT-53</td>
</tr>
</tbody>
</table>

### PROBLEM SYMPTOMS TABLE

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Suspected Area</th>
<th>See Page</th>
</tr>
</thead>
</table>
| Does not upshift (any of the gears from 1st to 3rd gear do not upshift) | 1. Solenoid (No. 1)  
2. Solenoid (No. 3)  
3. Transmission control computer assembly | -  
-  
AT-17 |
| Does not upshift (3rd to 4th)                | 1. Solenoid (No. 1)  
2. Solenoid (No. 2)  
3. Solenoid (No. 3)  
4. Switch solenoid  
5. Transmission control computer assembly | -  
-  
-  
-  
AT-17 |
### AT–8 AUTOMATIC TRANSMISSION

#### ELECTRONICALLY CONTROLLED AUTOMATIC TRANSMISSION (ECT)

### AT

#### DESCRIPTION

1. **DIAGNOSIS FUNCTION**
   
   (a) The O/D light blinks when a malfunction occurs in the AT system.

   **NOTICE:**
   
   If the system returns to normal, the O/D light does not come on.

### Table: Symptom Suspected Area

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Suspected Area</th>
<th>See Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does not downshift (4th to 3rd)</td>
<td>1. Solenoid (No. 1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Solenoid (No. 2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Transmission control computer assembly</td>
<td>AT-17</td>
</tr>
<tr>
<td>Does not upshift (any of the gears from 1st to 3rd gear do not downshift)</td>
<td>1. Solenoid (No. 1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Solenoid (No. 3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Switch solenoid</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Transmission control computer assembly</td>
<td>AT-17</td>
</tr>
<tr>
<td>Lock-up does not occur or does not turn off</td>
<td>1. Duty solenoid</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. LUC solenoid</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Turbine speed sensor system</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Engine coolant temperature sensor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Fluid temperature sensor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6. Transmission control computer assembly</td>
<td>AT-17</td>
</tr>
<tr>
<td>Shift point too high or too low</td>
<td>1. Throttle sensor system</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Output speed sensor system</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Neutral start switch assembly system</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Transmission control computer assembly</td>
<td>AT-17</td>
</tr>
<tr>
<td>Up-shift to 4th gear when transmission is cold</td>
<td>1. Fluid temperature sensor system</td>
<td>AT-27</td>
</tr>
<tr>
<td></td>
<td>2. Transmission control computer assembly</td>
<td>AT-17</td>
</tr>
<tr>
<td>Harsh engagement (N → D)</td>
<td>1. Solenoid (No. 2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Transmission control computer assembly</td>
<td>AT-17</td>
</tr>
<tr>
<td>Harsh engagement (when shifting to any gear)</td>
<td>1. Throttle sensor system</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Solenoid (No. 1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Solenoid (No. 2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Solenoid (No. 3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Turbine speed sensor system</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6. Transmission control computer assembly</td>
<td>AT-17</td>
</tr>
<tr>
<td>Harsh engagement (Lock-up)</td>
<td>1. Duty solenoid</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. LUC solenoid</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Engine speed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Turbine speed sensor system</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Transmission control computer assembly</td>
<td>AT-17</td>
</tr>
<tr>
<td>Poor acceleration</td>
<td>1. Solenoid (No. 3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Switch solenoid</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Transmission control computer assembly</td>
<td>AT-17</td>
</tr>
<tr>
<td>The engine stalls when the vehicle is stopped or when the shift lever is moved to the D or R position after the engine is started.</td>
<td>1. Switch solenoid</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Transmission control computer assembly</td>
<td>AT-17</td>
</tr>
</tbody>
</table>
b) The result of diagnosis regarding the time the malfunction occurred is stored in the transmission control computer.

**NOTICE:**
Do not remove the ECUB fuse and battery terminals until the inspection is completed as the memory of the computer will be erased.

2. **FAIL-SAFE FUNCTION**
   (a) If an open or short circuit occurs in any of the solenoid valve circuits, the transmission control computer turns the other solenoid valves ON or OFF. In addition, if all of the solenoid valves are disabled, only the mechanical hydraulic circuit is available, enabling manual shifting. (If an open or short circuit occurs, the transmission control computer stops sending current to the failed solenoid valve.

**HOW TO PROCEED WITH TROUBLE-SHOOTING**

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VEHICLE BROUGHT TO WORKSHOP</td>
</tr>
<tr>
<td>2</td>
<td>CONDUCT CUSTOMER PROBLEM ANALYSIS AND CHECK SYMPTOMS</td>
</tr>
<tr>
<td></td>
<td><strong>HINT:</strong> See page AT-12.</td>
</tr>
<tr>
<td>3</td>
<td>CHECK COMMUNICATION FUNCTION OF CAN COMMUNICATION SYSTEM FOR CONTROL</td>
</tr>
<tr>
<td></td>
<td>(a) Using the DS-II, check for DTCs by selecting DIAGNOSIS → VEHICLE DIAGNOSIS/CAN BUS DIAGNOSIS → DIAGNOSIS FUNCTION/COMMUNICATION ERROR DTC CHECK. <strong>HINT:</strong> See page CA-9 for the CAN COMMUNICATION section.</td>
</tr>
<tr>
<td></td>
<td><strong>DTC DETECTED (GO TO CAN COMMUNICATION SECTION)</strong></td>
</tr>
<tr>
<td></td>
<td><strong>NO DTC (GO TO STEP 5)</strong></td>
</tr>
<tr>
<td>4</td>
<td>CHECK FOR DTCS</td>
</tr>
<tr>
<td></td>
<td><strong>HINT:</strong> See page AT-13.</td>
</tr>
<tr>
<td></td>
<td>(a) CHECK DTC AND FREEZE FRAME DATA</td>
</tr>
</tbody>
</table>
(1) Record the DTCs and the freeze frame data.
(b) CLEAR DTCs AND FREEZE FRAME DATA
(c) RE-CHECK FOR DTCs
(1) Based on the DTCs and freeze frame data recorded, reproduce the symptoms that caused the problem and re-check for the DTCs.
HINT:
• If DTCs are output, see Diagnostic Trouble Code Chart (See page AT-7).
• See page IN-30 for MALFUNCTION REPRODUCTION.

DTC DETECTED (GO TO STEP 8)

DTC NOT DETECTED, SYMPTOMS CANNOT BE CONFIRMED AND REPRODUCED (GO TO MALFUNCTION REPRODUCTION)

DTC NOT DETECTED, BUT SYMPTOMS CAN BE CONFIRMED AND REPRODUCED (GO TO STEP 6)

5 PROBLEM SYMPTOMS TABLE

HINT:
See page AT-7.

RELATED TO PROBLEM SYMPTOM (GO TO STEP 8)

NOT RELATED TO PROBLEM SYMPTOM (GO TO STEP 7)

6 PERFORM TROUBLESHOOTING BASED ON PROBLEM SYMPTOM

(a) DS-II ECU DATA LIST (See page AT-20).
(b) DS-II ACTIVE TEST (See page AT-20).
(c) MANUAL ROAD TEST (See AT-5).
(d) ECU TERMINALS (See page AT-17).

7 ADJUST, REPAIR OR REPLACE
8 CONFIRMATION TEST

END
CUSTOMER PROBLEM ANALYSIS CHECK

<table>
<thead>
<tr>
<th>Customer's Name</th>
<th>First Registration Year Year Month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>VIN</td>
</tr>
<tr>
<td>Date Vehicle Brought In</td>
<td>Odometer Reading km</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weather</th>
<th>Clear</th>
<th>Cloudy</th>
<th>Rainy</th>
<th>Snowy</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>Approximately</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Road Conditions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date Problem First Occurred</th>
<th>Month _____ Day _______ (Engine: ___Cold ___Warm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency Problem Occurs</td>
<td>Continuous          Intermittent ( _____times a day)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>__Vehicle unable to move ( ___All shift positions ___A specific shift position [ ___Position])</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>__Does not shift up ( ___1st → 2nd ___2nd → 3rd ___3rd → 4th )</td>
</tr>
<tr>
<td></td>
<td>__Does not shift down ( ___4th → 3rd ___3rd → 2nd ___2nd → 1st )</td>
</tr>
<tr>
<td></td>
<td>__Poor lock up</td>
</tr>
<tr>
<td></td>
<td>__Poor gear change</td>
</tr>
<tr>
<td></td>
<td>__Large gear change shock ( N → D or R ___ Lock up ___During gear change(s)</td>
</tr>
<tr>
<td></td>
<td>__Poor acceleration (Slipping etc.)</td>
</tr>
<tr>
<td></td>
<td>__Abnormal sound or vibration</td>
</tr>
<tr>
<td></td>
<td>__Others ( )</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MIL Condition</th>
<th>___On ( ) ___Off</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>DTC Inspection</th>
<th>First time ___ Normal Code Malfunction Code</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Second time ___ Normal Code Malfunction Code</td>
</tr>
</tbody>
</table>

The first time a malfunction code is output, freeze frame data is also output.

Freeze Frame Data
CHECK / CLEAR DTCs

1. CHECK DTCs (using DS-II)
   (a) Using the DS-II, follow the prompts and display the DIAGNOSIS - A/T screen, then select DTC FREEZE DATA.
   (b) Check for DTCs.
   HINT:
   If the freeze frame data is recorded, "I" will be displayed on the left side and the color of that column will be changed.

2. DS-II FREEZE FRAME DATA
   (a) Using the DS-II, following the prompts on the screen, select CHECK DTC and select the DTCs that have the records of the freeze frame data (indicated by a "I" mark).
   HINT:
   • Check the consistency between the problem symptoms from inquiry and the diagnostic trouble code chart.
   • After completing repairs, conduct the confirmation test based upon the driving conditions confirmed above.

3. CLEAR DTCs (using DS-II)
   (a) Using the DS-II, follow the prompts and display the DIAGNOSIS - A/T screen, then select DTC FREEZE DATA.
   (b) Select CLEAR from the screen to clear the data.
   NOTICE:
   DTCs and freeze frame data will be cleared at the same time.

4. CHECK DTCs (using check engine warning light)
   (a) Short terminals 13 (ECUT) and 4 (E) of the DLC.
   NOTICE:
   Be sure to short the specified terminals correctly, or a malfunction may occur.
   (b) Turn the ignition switch to the ON position.
   (c) Read the DTCs (count the number of times that the check engine warning light blinks).

NOTICE:
When a letter is used such as [C1] of the DS-II code, it indicates a hexadecimal value. These hexadecimal values use two characters. When they are displayed, they blink 12 times, then once.(at even intervals)

Hexadecimal Conversion Table

<table>
<thead>
<tr>
<th>Hexadecimal</th>
<th>Number of Blinks</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>10</td>
</tr>
</tbody>
</table>
HINT:
• If the system is normal, the warning light will blink repeatedly at an interval of 0.25 seconds on and 0.25 off.
• When only one code is present, the same code will be output again at 4-second intervals.
• When 2 or more DTCs are present, the different codes will be output in series at 2.5-second intervals. When all the codes have been output, the series will return to the beginning and, after a 4.5 second pause, the codes will be output again.
• When 2 or more codes are output, the code with the lower number is indicated first.

(d) Turn the ignition switch off.
(e) Open the circuit between terminals 13 (ECUT) and 4 (E) of the DLC.

5. DELETE DTCs FROM MEMORY (by removing a fuse)
(a) After repairing the trouble area, disconnect the ECUB fuse in the engine compartment for more than 60 seconds, then reconnect it.
(b) Short terminals 13 (ECUT) and 4 (E) of the DLC.
NOTICE:
Be sure to short the specified terminals correctly, or a malfunction may occur.
(c) Turn the ignition switch to the ON position.
(d) Check that the normal code is output.
NOTICE:
If any trouble codes are output, perform troubleshooting again in accordance with the output codes.
(e) Turn the ignition switch off.
(f) Open the circuit between terminals 13 (ECUT) and 4 (E) of the DLC.

FREEZE FRAME DATA / DTC
DETAILED INFORMATION

1. DS-II FREEZE DATA
(a) Using the DS-II, following the prompts on the screen, select CHECK DTC and select the DTCs that have the records of the freeze frame data (indicated by a "I" mark).
HINT:
• Check the consistency between the problem symptoms from inquiry and the diagnostic trouble code chart.
FREEZE FRAME DATA LIST

<table>
<thead>
<tr>
<th>Item</th>
<th>Abbreviation</th>
<th>Item</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine Speed</td>
<td>ESPD</td>
<td>LUC Solenoid</td>
<td>LUC</td>
</tr>
<tr>
<td>Turbine Speed</td>
<td>RTBN</td>
<td>Switch Solenoid</td>
<td>SW</td>
</tr>
<tr>
<td>Output Speed</td>
<td>ROPT</td>
<td>Battery Voltage</td>
<td>VOLT</td>
</tr>
<tr>
<td>Vehicle Speed</td>
<td>SPD</td>
<td>O/D OFF Switch</td>
<td>O/D</td>
</tr>
<tr>
<td>Shift Position</td>
<td>SHFT</td>
<td>Throttle Opening Angle</td>
<td>TANG</td>
</tr>
<tr>
<td>Solenoid No. 1 Current</td>
<td>SOL1</td>
<td>Oil Temperature</td>
<td>OTMP</td>
</tr>
<tr>
<td>Solenoid No. 2 Current</td>
<td>SOL2</td>
<td>Gear Position</td>
<td>GEAR</td>
</tr>
<tr>
<td>Solenoid No. 3 Current</td>
<td>SOL3</td>
<td>Gear Ratio</td>
<td>RATO</td>
</tr>
<tr>
<td>Duty Solenoid</td>
<td>DUTY</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

OPERATION SUPPORT

1. INITIALIZATION OF DS-II AT LEANED VALUE

NOTICE:
- When replacing any of the transmission assembly, valve body assembly, transmission wire, and transmission control computer, perform the AT LEARNED VALUE INITIALIZATION.
- Wait at least 1 minute after connecting the battery terminal before performing the initialization of the automatic transmission learned values.

HINT:
Learned values will not be initialized (erased) by simply disconnecting the negative (-) terminal of the battery.

(a) After confirming that the shift position is in the P position, connect the DS-II to the DLC and turn the ignition switch ON and the DS-II power ON.

NOTICE:
Do not start the engine.

(b) Conduct AT learned value initialization

(1) To initialize learned values, follow the DS-II screen display, select MAIN MENU [OPERATION SUPPORT] → OPERATION SUPPORT CLASSIFICATION [A/T] → [AT LEARNED VALUE INITIALIZATION] and run [AT LEARNED VALUE INITIALIZATION].

HINT:
Initialization will complete in about 1 minute.
## ECU TERMINALS

### 1. TRANSMISSION CONTROL COMPUTER ASSEMBLY

![Diagram of Transmission Control Computer with terminals](C135997.J01)

#### TERMINAL LAYOUT

<table>
<thead>
<tr>
<th>Terminal Symbol (Terminal No.)</th>
<th>Input / Output</th>
<th>Item</th>
<th>Measurement Condition</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTBN ↔ E1 [C10 ↔ B24]</td>
<td>Input</td>
<td>Waveform</td>
<td>Engine idle speed</td>
<td>Waveform 1</td>
</tr>
<tr>
<td>ROPT ↔ E1 [C8 ↔ B24]</td>
<td>Input</td>
<td>Waveform</td>
<td>When driving at 20 km/h</td>
<td>Waveform 2</td>
</tr>
<tr>
<td>VBTB ↔ E1 [C9 ↔ B24]</td>
<td>Output</td>
<td>Voltage</td>
<td>Engine is stopped, ignition switch ON</td>
<td>10 to 14 V</td>
</tr>
<tr>
<td>VBOF ↔ E1 [C7 ↔ B24]</td>
<td>Output</td>
<td>Voltage</td>
<td>Engine is stopped, ignition switch ON</td>
<td>10 to 14 V</td>
</tr>
<tr>
<td>REG1 ↔ E1 [B8 ↔ B24]</td>
<td>Output</td>
<td>Waveform</td>
<td>Engine idle speed</td>
<td>Waveform 3</td>
</tr>
<tr>
<td>P ↔ E1 [C15 ↔ B24]</td>
<td>Input</td>
<td>Voltage</td>
<td>Shift lever in P position</td>
<td>7.5 to 14 V</td>
</tr>
<tr>
<td>P ↔ E1 [C15 ↔ B24]</td>
<td>Input</td>
<td>Voltage</td>
<td>Shift lever in any position other than P</td>
<td>0 to 1.5 V</td>
</tr>
<tr>
<td>R ↔ E1 [B7 ↔ B24]</td>
<td>Input</td>
<td>Voltage</td>
<td>Shift lever in R position</td>
<td>7.5 to 14 V</td>
</tr>
<tr>
<td>R ↔ E1 [B7 ↔ B24]</td>
<td>Input</td>
<td>Voltage</td>
<td>Shift lever in any position other than R</td>
<td>0 to 1.5 V</td>
</tr>
<tr>
<td>N ↔ E1 [C24 ↔ B24]</td>
<td>Input</td>
<td>Voltage</td>
<td>Shift lever in N position</td>
<td>7.5 to 14 V</td>
</tr>
<tr>
<td>N ↔ E1 [C24 ↔ B24]</td>
<td>Input</td>
<td>Voltage</td>
<td>Shift lever in any position other than N</td>
<td>0 to 1.5 V</td>
</tr>
<tr>
<td>D ↔ E1 [C17 ↔ B24]</td>
<td>Input</td>
<td>Voltage</td>
<td>Shift lever in D position</td>
<td>7.5 to 14 V</td>
</tr>
<tr>
<td>D ↔ E1 [C17 ↔ B24]</td>
<td>Input</td>
<td>Voltage</td>
<td>Shift lever in any position other than D</td>
<td>0 to 1.5 V</td>
</tr>
<tr>
<td>2 ↔ E1 [C16 ↔ B24]</td>
<td>Input</td>
<td>Waveform</td>
<td>Shift lever in 2nd position</td>
<td>7.5 to 14 V</td>
</tr>
<tr>
<td>2 ↔ E1 [C16 ↔ B24]</td>
<td>Input</td>
<td>Waveform</td>
<td>Shift lever in any position other than 2nd position</td>
<td>0 to 1.5 V</td>
</tr>
<tr>
<td>L ↔ E1 [C25 ↔ B24]</td>
<td>Input</td>
<td>Voltage</td>
<td>Shift lever in L position</td>
<td>7.5 to 14 V</td>
</tr>
<tr>
<td>L ↔ E1 [C25 ↔ B24]</td>
<td>Input</td>
<td>Voltage</td>
<td>Shift lever in any position other than L</td>
<td>0 to 1.5 V</td>
</tr>
</tbody>
</table>

**HINT:**
Using SST, check the voltage, pulse, and conductivity between the terminals of the connector.

**SST** 09842-97215
## Terminal Symbol (Terminal No.)

<table>
<thead>
<tr>
<th>Terminal Symbol</th>
<th>Input / Output</th>
<th>Item</th>
<th>Measurement Condition</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTMP ←→ ETMP</td>
<td>Input</td>
<td>Voltage</td>
<td>Transmission fluid temperature 20°C</td>
<td>3.4 V</td>
</tr>
<tr>
<td>[C14 ←→ C13]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OTMP ←→ ETMP</td>
<td>Input</td>
<td>Voltage</td>
<td>Transmission fluid temperature 80°C</td>
<td>1.1 V</td>
</tr>
<tr>
<td>[C14 ←→ C13]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B1+ ←→ B1-</td>
<td>Output</td>
<td>Waveform</td>
<td>Without electricity</td>
<td>0 to 1.5 V</td>
</tr>
<tr>
<td>[C6 ←→ C5]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B1+ ←→ B1-</td>
<td>Output</td>
<td>Waveform</td>
<td>With electricity</td>
<td>Waveform 4</td>
</tr>
<tr>
<td>[C6 ←→ C5]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C2+ ←→ C2-</td>
<td>Output</td>
<td>Waveform</td>
<td>Without electricity</td>
<td>0 to 1.5 V</td>
</tr>
<tr>
<td>[C4 ←→ C3]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C2+ ←→ C2-</td>
<td>Output</td>
<td>Waveform</td>
<td>With electricity</td>
<td>Waveform 5</td>
</tr>
<tr>
<td>[C4 ←→ C3]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C3B2+ ←→ C3B2-</td>
<td>Output</td>
<td>Waveform</td>
<td>Without electricity</td>
<td>0 to 1.5 V</td>
</tr>
<tr>
<td>[C2 ←→ C1]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C3B2+ ←→ C3B2-</td>
<td>Output</td>
<td>Waveform</td>
<td>With electricity</td>
<td>Waveform 6</td>
</tr>
<tr>
<td>[C2 ←→ C1]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LUCC ←→ E01</td>
<td>Output</td>
<td>Waveform</td>
<td>Lock-up is OFF</td>
<td>0 to 1.5 V</td>
</tr>
<tr>
<td>C23 ←→ B6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LUCC ←→ E01</td>
<td>Output</td>
<td>Waveform</td>
<td>When slip lock-up occurs</td>
<td>Waveform 7</td>
</tr>
<tr>
<td>C23 ←→ B6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LUCR ←→ E01</td>
<td>Output</td>
<td>Voltage</td>
<td>Without electricity</td>
<td>0 to 1.5 V</td>
</tr>
<tr>
<td>C11 ←→ B6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LUCR ←→ E01</td>
<td>Output</td>
<td>Voltage</td>
<td>With electricity</td>
<td>10 to 14 V</td>
</tr>
<tr>
<td>C11 ←→ B6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOLR ←→ E01</td>
<td>Output</td>
<td>Voltage</td>
<td>Without electricity</td>
<td>0 to 1.5 V</td>
</tr>
<tr>
<td>C12 ←→ B6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOLR ←→ E01</td>
<td>Output</td>
<td>Voltage</td>
<td>With electricity</td>
<td>10 to 14 V</td>
</tr>
<tr>
<td>C12 ←→ B6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>+B1 ←→ E01</td>
<td>Output</td>
<td>Voltage</td>
<td>Engine is stopped, ignition switch ON</td>
<td>10 to 14 V</td>
</tr>
<tr>
<td>B3 ←→ B6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BAT1 ←→ E01</td>
<td>Output</td>
<td>Voltage</td>
<td>Always</td>
<td>10 to 14 V</td>
</tr>
<tr>
<td>B2 ←→ B6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BAT2 ←→ E01</td>
<td>Output</td>
<td>Voltage</td>
<td>Always</td>
<td>10 to 14 V</td>
</tr>
<tr>
<td>B1 ←→ B6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E1 ←→ Body Ground</td>
<td>-  Continuity</td>
<td>Always</td>
<td>Continuity</td>
<td></td>
</tr>
<tr>
<td>[B24 ←→ Body Ground]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E01 ←→ Body Ground</td>
<td>-  Continuity</td>
<td>Always</td>
<td>Continuity</td>
<td></td>
</tr>
<tr>
<td>[B6 ←→ Body Ground]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E02 ←→ Body Ground</td>
<td>-  Continuity</td>
<td>Always</td>
<td>Continuity</td>
<td></td>
</tr>
<tr>
<td>[B5 ←→ Body Ground]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### (a) Waveform 1 (turbine speed sensor)

<table>
<thead>
<tr>
<th>Item</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tester Connection</td>
<td>RTBN ←→ E1</td>
</tr>
<tr>
<td>Tool Setting</td>
<td>5 V/DIV 1 ms/DIV</td>
</tr>
<tr>
<td>Measurement Condition</td>
<td>Engine idle speed</td>
</tr>
</tbody>
</table>

**HINT:**

As turbine speed increases, the cycle becomes shorter.
(b) Waveform 2 (output speed sensor)

<table>
<thead>
<tr>
<th>Item</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tester Connection</td>
<td>ROPT ←→ E1</td>
</tr>
<tr>
<td>Tool Setting</td>
<td>5 V/DIV 1 ms/DIV</td>
</tr>
<tr>
<td>Measurement Condition</td>
<td>Driving at approx. 20 km/h</td>
</tr>
</tbody>
</table>

HINT:
As output speed (vehicle speed) increases, the cycle becomes shorter.

(c) Waveform 3 (engine speed signal)

<table>
<thead>
<tr>
<th>Item</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tester Connection</td>
<td>REG1 ←→ E1</td>
</tr>
<tr>
<td>Tool Setting</td>
<td>5 V/DIV 5 ms/DIV</td>
</tr>
<tr>
<td>Measurement Condition</td>
<td>Engine idle speed</td>
</tr>
</tbody>
</table>

HINT:
As engine speed increases, the cycle becomes shorter.

(d) Waveform 4 (solenoid No. 1)

<table>
<thead>
<tr>
<th>Item</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tester Connection</td>
<td>B1+ ←→ B1-</td>
</tr>
<tr>
<td>Tool Setting</td>
<td>5 V/DIV 1 ms/DIV</td>
</tr>
<tr>
<td>Measurement Condition</td>
<td>With electricity</td>
</tr>
</tbody>
</table>

HINT:
During the shift transition, the duty ratio decreases.

(e) Waveform 5 (solenoid No. 2)

<table>
<thead>
<tr>
<th>Item</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tester Connection</td>
<td>C2+ ←→ C2-</td>
</tr>
<tr>
<td>Tool Setting</td>
<td>5 V/DIV 1 ms/DIV</td>
</tr>
<tr>
<td>Measurement Condition</td>
<td>With electricity</td>
</tr>
</tbody>
</table>

HINT:
During the shift transition, the duty ratio decreases.

(f) Waveform 6 (solenoid No. 3)

<table>
<thead>
<tr>
<th>Item</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tester Connection</td>
<td>C3B2+ ←→ C3B2-</td>
</tr>
<tr>
<td>Tool Setting</td>
<td>5 V/DIV 1 ms/DIV</td>
</tr>
<tr>
<td>Measurement Condition</td>
<td>With electricity</td>
</tr>
</tbody>
</table>

HINT:
During the shift transition and line pressure regulation, the duty ratio decreases.
ECU DATA LIST / ACTIVE TEST

1. DS-II - DATA LIST

NOTICE:
In the event of a problem with intricate symptoms such as surge or rough idling, collect sample data from another vehicle of the same model operating under identical conditions in order to reach an overall judgment by comparing all the items in the data list.

(a) Using the DS-II, following the prompts on the screen, select ECU DATA LIST and read the data.

**[ANALYSIS MENU:A/T → ECU DATA LIST]**

<table>
<thead>
<tr>
<th>Item [Symbol]</th>
<th>Item Description</th>
<th>Inspection Condition</th>
<th>Reference Value</th>
<th>Problem Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine Speed [RENG]</td>
<td>Indicates the engine speed</td>
<td>Engine is stopped, ignition switch ON</td>
<td>0 r/min</td>
<td>REG1 signal</td>
</tr>
<tr>
<td>Engine Speed [RENG]</td>
<td>Indicates the engine speed</td>
<td>Constant engine speed</td>
<td>No significant fluctuation</td>
<td>REG1 signal</td>
</tr>
<tr>
<td>Turbine Speed [RTBN]</td>
<td>Indicates the transmission input speed Display: r/min</td>
<td>Vehicle stopped with shift lever in P or N position (when engine idling)</td>
<td>Almost the same as engine idle speed</td>
<td>RTBN signal</td>
</tr>
<tr>
<td>Turbine Speed [RTBN]</td>
<td>Indicates the transmission input speed Display: r/min</td>
<td>Vehicle stopped with shift lever in D position</td>
<td>0 r/min</td>
<td>RTBN signal</td>
</tr>
<tr>
<td>Turbine Speed [RTBN]</td>
<td>Indicates the transmission input speed Display: r/min</td>
<td>When driving at a constant speed</td>
<td>No significant fluctuation</td>
<td>RTBN signal</td>
</tr>
<tr>
<td>Output Speed [ROPT]</td>
<td>Indicates the transmission output shaft speed Display: r/min</td>
<td>When the vehicle is stopped</td>
<td>0 km/h</td>
<td>ROPT signal</td>
</tr>
<tr>
<td>Output Speed [ROPT]</td>
<td>Indicates the transmission output shaft speed Display: r/min</td>
<td>When driving at a constant speed</td>
<td>No significant fluctuation</td>
<td>ROPT signal</td>
</tr>
<tr>
<td>Vehicle Speed [SPD]</td>
<td>Indicates the vehicle speed calculated from the output speed by the A/T ECU Display range: 0 to 255 km/h</td>
<td>When the vehicle is stopped</td>
<td>0 km/h</td>
<td>CAN signal</td>
</tr>
<tr>
<td>Vehicle Speed [SPD]</td>
<td>Indicates the vehicle speed calculated from the output speed by the A/T ECU Display range: 0 to 255 km/h</td>
<td>When driving at a constant speed</td>
<td>No significant fluctuation</td>
<td>CAN signal</td>
</tr>
</tbody>
</table>

**HINT:**
During the direct lock-up, the duty ratio becomes 100 %.

(g) Waveform 7 (duty solenoid)
<table>
<thead>
<tr>
<th>Item [Symbol]</th>
<th>Item Description</th>
<th>Inspection Condition</th>
<th>Reference Value</th>
<th>Problem Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solenoid No. 1 Current [SOL1]</td>
<td>Indicates the electrical current to the B1 solenoid (No. 1)</td>
<td>B1 solenoid (No. 1) ON → OFF</td>
<td>1,000 → 0 mA</td>
<td>B1 solenoid (No. 1)</td>
</tr>
<tr>
<td>Solenoid No. 2 Current [SOL2]</td>
<td>Indicates the electrical current to the C2 solenoid (No. 2)</td>
<td>C2 solenoid (No. 2) ON → OFF</td>
<td>1,000 → 0 mA</td>
<td>C2 solenoid (No. 2)</td>
</tr>
<tr>
<td>Solenoid No. 3 Current [SOL3]</td>
<td>Indicates the electrical current to the C3 solenoid (No. 3)</td>
<td>C3 solenoid (No. 3) ON → OFF</td>
<td>1,000 → 0 mA</td>
<td>C3 solenoid (No. 3)</td>
</tr>
<tr>
<td>Duty Solenoid [DUTY]</td>
<td>Indicates the ON duty ratio of the LUC solenoid</td>
<td>LUC solenoid ON → OFF</td>
<td>100 → 0%</td>
<td>Duty solenoid</td>
</tr>
<tr>
<td>LUC Solenoid [LUC]</td>
<td>Indicates the operating status (ON/OFF) of the LUC solenoid</td>
<td>LUC solenoid ON → OFF</td>
<td>ON → OFF</td>
<td>Switch solenoid</td>
</tr>
<tr>
<td>Switch Solenoid [SW]</td>
<td>Indicates the operating status (ON/OFF) of the switch solenoid</td>
<td>Switch solenoid ON → OFF</td>
<td>ON → OFF</td>
<td>LUC solenoid</td>
</tr>
<tr>
<td>Battery Voltage [VOLT]</td>
<td>Indicates the battery voltage</td>
<td>Engine idling 9 to 14 V</td>
<td>BAT1 voltage, BAT2 voltage</td>
<td></td>
</tr>
<tr>
<td>O/D OFF Switch [O/D]</td>
<td>Indicates the operating status (ON/OFF) of the O/D OFF switch</td>
<td>O/D OFF switch ON → OFF</td>
<td>ON → OFF</td>
<td>O/D1 voltage</td>
</tr>
<tr>
<td>Brake Switch [BRK]</td>
<td>Indicates the operating status (ON/OFF) of the brake switch</td>
<td>Stop light switch ON → OFF</td>
<td>ON → OFF</td>
<td>ABS ECU signal</td>
</tr>
<tr>
<td>Throttle Opening Angle [TANG]</td>
<td>Indicates the throttle opening angle</td>
<td>Accelerator pedal fully released → fully depressed</td>
<td>Continuously changes</td>
<td>EFI ECU signal</td>
</tr>
<tr>
<td>Oil Temperature [OTMP]</td>
<td>Indicates the ATF temperature</td>
<td>When cold (IG ON) Equal to outside air temperature</td>
<td>OTMP voltage</td>
<td></td>
</tr>
<tr>
<td>Oil Temperature [OTMP]</td>
<td>Indicates the ATF temperature</td>
<td>Sensor circuit is open (IG ON) -50°C</td>
<td>OTMP voltage</td>
<td></td>
</tr>
<tr>
<td>Oil Temperature [OTMP]</td>
<td>Indicates the ATF temperature</td>
<td>Sensor circuit is shorted (IG ON) 205°C</td>
<td>OTMP voltage</td>
<td></td>
</tr>
<tr>
<td>Gear Position [GEAR]</td>
<td>Indicates the current gear position</td>
<td>When driving Shift to each gear position</td>
<td>Neutral start switch signal</td>
<td></td>
</tr>
<tr>
<td>Gear Ratio [RATO]</td>
<td>Indicates the gear ratio</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Torque Converter Slip Volume [SLIP]</td>
<td>Indicates the torque converter slip volume calculated from the engine speed - turbine speed (During IG ON → OFF)</td>
<td>- D120 to 5,080 r/min</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>
AT–22
AUTOMATIC TRANSMISSION □ ELECTRONICALLY CONTROLLED AUTOMATIC TRANSMISSION (ECT)

HINT:
*1: The value may exceed 1,000 mA due to the current feedback.

2. DS-II-ACTIVE TEST
(a) Using the DS-II, following the prompts on the screen, select ACTIVE TEST to perform the active test.

[DIAGNOSIS MENU SCREEN: A/T → ACTIVE TEST]

<table>
<thead>
<tr>
<th>Item</th>
<th>Test Contents</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solenoid No.1</td>
<td>Turns the B1 solenoid (No. 1) ON (electrical current 1 A)/OFF (electrical current 0 A) and cancels drive signals from the DS-II.</td>
<td>IG ON P position Vehicle speed 0 km/h Throttle opening angle 2 % or less</td>
</tr>
<tr>
<td>Solenoid No.2</td>
<td>Turns the C2 solenoid (No. 2) ON (electrical current 1 A)/OFF (electrical current 0 A) and cancels drive signals from the DS-II.</td>
<td></td>
</tr>
<tr>
<td>Solenoid No.3</td>
<td>Turns the C3 and B2 solenoids (No. 3) ON (electricity current 1 A)/OFF (electricity current 0 A) and cancels drive signals from the DS-II.</td>
<td></td>
</tr>
<tr>
<td>Duty Solenoid</td>
<td>Turns the LUC control (duty) solenoid ON (duty ratio 100%)/OFF (duty ratio 0%) and cancels drive signals from the DS-II.</td>
<td></td>
</tr>
<tr>
<td>LUC Solenoid</td>
<td>Turns the LUC shift solenoid ON/OFF (without electricity) and cancels drive signals from the DS-II.</td>
<td></td>
</tr>
<tr>
<td>Switch Solenoid</td>
<td>Turns the switch solenoid ON/OFF (without electricity) and cancels drive signals from the DS-II.</td>
<td></td>
</tr>
</tbody>
</table>

FAIL-SAFE CHART

If any of the codes below are stored in the ECU, the ECU enters fail-safe mode.

<table>
<thead>
<tr>
<th>DTC SAE/ECTS</th>
<th>Fail-safe Operation</th>
<th>Fail-safe Mode Cancel Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0705/55</td>
<td>Performs the normal shifting control with the shift lever in the D position</td>
<td>Canceled after normal conditions are restored</td>
</tr>
<tr>
<td>P0710/38</td>
<td>Shifts to the 3rd gear when the error is detected, then shifts between the 1st and 3rd gears according to the vehicle speed and throttle opening angle</td>
<td>Canceled when the shift lever is moved to the P or N position with the vehicle speed at 0 km/h after normal conditions are restored</td>
</tr>
<tr>
<td>P0711/38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P0715/37</td>
<td>Shifts to the 3rd gear when the error is detected, then shifts between the 1st and 3rd gears according to the vehicle speed and throttle opening angle</td>
<td>Canceled when the shift lever is moved to the P or N position with the vehicle speed at 0 km/h after normal conditions are restored</td>
</tr>
<tr>
<td>P0720/42</td>
<td>• If the sensor system has some errors, the gear position that was selected at the time of the detection of the error is retained, and the transmission will be fixed at the 1st gear after the vehicle is stopped. • If the transmission assembly body has some errors, the transmission will be fixed at the 1st gear.</td>
<td>• For sensor system errors, fail-safe operation will be canceled when the shift lever is moved to the P or N position with the vehicle speed at 0 km/h after normal conditions are restored. • For transmission assembly body errors, the fail-safe operation will be canceled when the ignition switch is turned off after normal conditions are restored.</td>
</tr>
<tr>
<td>P0725/86</td>
<td>Shifts to the 3rd gear when the error is detected, then shifts between the 1st and 3rd gears according to the vehicle speed and throttle opening angle</td>
<td>Canceled when the shift lever is moved to the P or N position with the vehicle speed at 0 km/h after normal conditions are restored</td>
</tr>
<tr>
<td>P0753/61</td>
<td>• Prohibits sending current to the solenoid that is determined to be defective</td>
<td></td>
</tr>
<tr>
<td>P0758/62</td>
<td>• If a short circuit occurs, normal solenoids are used to shift between the 1st and 3rd gears. However, if solenoid No. 3 and the switch solenoid are shorted, the transmission will be fixed at 3rd gear.</td>
<td></td>
</tr>
<tr>
<td>P0763/63</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P0768/64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P0773/65</td>
<td>• If an open circuit occurs or more than 1 solenoid has faults, the transmission will be fixed at 3rd gear.</td>
<td></td>
</tr>
<tr>
<td>P1780/66</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DTC SAE/ECTS</td>
<td>Fail-safe Operation</td>
<td>Fail-safe Mode Cancel Condition</td>
</tr>
<tr>
<td>--------------</td>
<td>---------------------</td>
<td>-------------------------------</td>
</tr>
</tbody>
</table>
| P1706/31     | • Controls the engine torque at a constant value  
               • Shifts to the 3rd gear when the error is detected, then shifts between the 1st and 3rd gears according to the vehicle speed and throttle opening angle | Canceled when the shift lever is moved to the P or N position with the vehicle speed at 0 km/h after normal conditions are restored |
| P1711/41     | • Controls the throttle opening angle at a constant value  
               • Shifts to the 3rd gear when the error is detected, then shifts between the 1st and 3rd gears according to the vehicle speed and throttle opening angle | Canceled when the shift lever is moved to the P or N position with the vehicle speed at 0 km/h after normal conditions are restored |
| P1730/21     | Shifts to the 3rd gear after the error is detected | Canceled when the ignition switch is turned off after normal conditions are restored |
| P1731/22     | Shifts to the 3rd gear after the error is detected | Canceled when the ignition switch is turned off after normal conditions are restored |
| U0100/82     | • Controls the throttle opening angle and engine torque at a constant value  
               • Shifts to the 3rd gear when the error is detected, then shifts between the 1st and 3rd gears according to the vehicle speed and throttle opening angle | Canceled when the shift lever is moved to the P or N position with the vehicle speed at 0 km/h after normal conditions are restored |
| U0101/85     | • Controls the throttle opening angle and engine torque at a constant value  
               • Shifts to the 3rd gear when the error is detected, then shifts between the 1st and 3rd gears according to the vehicle speed and throttle opening angle | Canceled when the shift lever is moved to the P or N position with the vehicle speed at 0 km/h after normal conditions are restored |
**DESCRIPTION**

The shift positions are detected based on the signals input from the neutral start switch assembly to the transmission control computer assembly.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Detection Item</th>
<th>Trouble Area</th>
</tr>
</thead>
</table>
| P0705/55 | No shift position signal is input. | - Wire harness and connector (transmission control computer assembly - neutral start switch assembly)  
- Neutral start switch assembly  
- Transmission control computer assembly |
| P0705/56 | Multiple shift position signals are input. | - Wire harness and connector (transmission control computer assembly - neutral start switch assembly)  
- Neutral start switch assembly  
- Transmission control computer assembly |

**CIRCUIT DESCRIPTION**

![Circuit Diagram](image)

**INSPECTION PROCEDURE**

1. **INSPECT WIRE HARNESS AND CONNECTOR (POWER SOURCE SYSTEM)**

   **HINT:**
   See page IN-38 for the inspection procedure and precautions for the wire harness and connector.
(a) Disconnect the neutral start switch assembly connector.
(b) Turn the ignition switch to the ON position, and using the tester, measure the terminal voltage of the wire harness side connector.

**Standard:**

<table>
<thead>
<tr>
<th>Terminal No. (Terminal Symbols)</th>
<th>Voltage [V]</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 (RB) ←→ Body Ground</td>
<td>9-14</td>
</tr>
</tbody>
</table>

**OK ➤ INSPECT POWER SOURCE SYSTEM**

### 2 INSPECT NEUTRAL START SWITCH ASSEMBLY

(a) Using the tester, check the continuity between the terminals of the neutral start switch assembly.

**Standard:**

<table>
<thead>
<tr>
<th>Shift Position</th>
<th>Terminal No. (Terminal Name)</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>P position</td>
<td>4 (P) ←→ 6 (E)</td>
<td>Continuity</td>
</tr>
<tr>
<td>R position</td>
<td>1 (R) ←→ 7 (RB)</td>
<td>Continuity</td>
</tr>
<tr>
<td>N position</td>
<td>5 (N) ←→ 6 (E)</td>
<td>Continuity</td>
</tr>
<tr>
<td>D position</td>
<td>3 (D) ←→ 6 (E)</td>
<td>Continuity</td>
</tr>
<tr>
<td>2 position</td>
<td>2 (2) ←→ 6 (E)</td>
<td>Continuity</td>
</tr>
<tr>
<td>L position</td>
<td>6 (E) ←→ 8 (L)</td>
<td>Continuity</td>
</tr>
</tbody>
</table>

**NG ➤ REPLACE NEUTRAL START SWITCH ASSEMBLY**

### 3 INSPECT WIRE HARNESS AND CONNECTOR (NEUTRAL START SWITCH ASSEMBLY - TRANSMISSION CONTROL COMPUTER ASSEMBLY)

**HINT:**
See page IN-34 for the inspection procedure and precautions for the wire harness and connector.

(a) Connect the neutral start switch assembly connector.
(b) Disconnect connectors B and C of the transmission control computer assembly.
(c) Turn the ignition switch to the ON position.
(d) Using a tester, check the voltage between the terminals from the wire harness side. (For terminal layout, see page AT-17.)

**Standard:**

<table>
<thead>
<tr>
<th>Shift Position</th>
<th>Terminal No. (Terminal Symbols)</th>
<th>Voltage [V]</th>
</tr>
</thead>
<tbody>
<tr>
<td>P position</td>
<td>C15 (P) ←→ B24 (E1)</td>
<td>9-14</td>
</tr>
<tr>
<td>Other than P position</td>
<td>C15 (P) ←→ B24 (E1)</td>
<td>0-1.5</td>
</tr>
<tr>
<td>R position</td>
<td>B7 (R) ←→ B24 (E1)</td>
<td>9-14</td>
</tr>
<tr>
<td>Other than R position</td>
<td>B7 (R) ←→ B24 (E1)</td>
<td>0-1.5</td>
</tr>
<tr>
<td>N position</td>
<td>C24 (N) ←→ B24 (E1)</td>
<td>9-14</td>
</tr>
</tbody>
</table>
## AUTOMATIC TRANSMISSION

### ELECTRONICALLY CONTROLLED AUTOMATIC TRANSMISSION (ECT)

### Shift Position

<table>
<thead>
<tr>
<th>Shift Position</th>
<th>Terminal No. (Terminal Symbols)</th>
<th>Voltage [V]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other than N position</td>
<td>C24 (N) ←→ B24 (E1)</td>
<td>0-1.5</td>
</tr>
<tr>
<td>D position</td>
<td>C17 (D) ←→ B24 (E1)</td>
<td>9-14</td>
</tr>
<tr>
<td>D position</td>
<td>C17 (D) ←→ B24 (E1)</td>
<td>0-1.5</td>
</tr>
<tr>
<td>2 position</td>
<td>C16 (2) ←→ B24 (E1)</td>
<td>9-14</td>
</tr>
<tr>
<td>2 position</td>
<td>C16 (2) ←→ B24 (E1)</td>
<td>0-1.5</td>
</tr>
<tr>
<td>L position</td>
<td>C25 (L) ←→ B24 (E1)</td>
<td>9-14</td>
</tr>
<tr>
<td>L position</td>
<td>C25 (L) ←→ B24 (E1)</td>
<td>0-1.5</td>
</tr>
</tbody>
</table>

### INSPECT AND REPLACE TRANSMISSION CONTROL COMPUTER ASSEMBLY

**OK**

**NG**

**REPAIR OR REPLACE WIRE HARNESS OR CONNECTOR**
AUTOMATIC TRANSMISSION - ELECTRONICALLY CONTROLLED AUTOMATIC TRANSMISSION (ECT)

**DESCRIPTION**

The fluid temperature sensor attached inside the valve body detects the fluid temperature in the transmission fluid pressure control system circuit, and inputs the signal to the transmission control computer assembly according to the fluid temperature.

**CIRCUIT DIAGRAM**

**INSPECTION PROCEDURE**

HINT:
Read the freeze frame data using the DS-II. Freeze frame data records aspects of the engine's condition when malfunctions occur. This information is helpful when troubleshooting.

1. **INSPECT TRANSMISSION WIRE (FLUID TEMPERATURE SENSOR)**

   SST 09990-97201
(a) Disconnect the transmission wire connector.
(b) Connect SST (A/T solenoid wire check sub-harness).
(c) Using the tester, inspect the resistance between the terminals.
   **Standard:**
   
<table>
<thead>
<tr>
<th>Terminal No. (Terminal Symbols)</th>
<th>Fluid temperature [°C]</th>
<th>Resistance [Ω]</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 (OTMP) ←→ 9 (E)</td>
<td>10</td>
<td>5.63</td>
</tr>
<tr>
<td>5 (OTMP) ←→ 9 (E)</td>
<td>140</td>
<td>0.072</td>
</tr>
</tbody>
</table>

(d) Using the tester, check the insulation between the terminal and body ground.
   **Standard:**

<table>
<thead>
<tr>
<th>Terminal No. (Terminal Symbols)</th>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 (OTMP) ←→ Body Ground</td>
<td>1 MΩ or higher</td>
</tr>
</tbody>
</table>

NG  REPAIR OR REPLACE TRANSMISSION WIRE

OK

2 INSPECT WIRE HARNESS AND CONNECTOR (TRANSMISSION WIRE - TRANSMISSION CONTROL COMPUTER ASSEMBLY)

HINT:
See page IN-34 for the inspection procedure and precautions for the wire harness and connector.

(a) Disconnect the transmission wire connector.
(b) Disconnect connector C of the transmission control computer assembly, and using the tester, inspect the resistance between the terminals. (For terminal layout, see page AT-17.)
   **Standard:**

<table>
<thead>
<tr>
<th>Terminal No. (Terminal Symbols)</th>
<th>Fluid temperature [°C]</th>
<th>Resistance [Ω]</th>
</tr>
</thead>
<tbody>
<tr>
<td>C14 (OTMP) ←→ C13 (ETMP)</td>
<td>10</td>
<td>5.63</td>
</tr>
<tr>
<td>C14 (OTMP) ←→ C13 (ETMP)</td>
<td>140</td>
<td>0.072</td>
</tr>
</tbody>
</table>

OK  REPAIR OR REPLACE WIRE HARNESS OR CONNECTOR

NG

INSPECT AND REPLACE TRANSMISSION CONTROL COMPUTER ASSEMBLY
### DTC P0715/37 No Input for Turbine Speed

#### DESCRIPTION
The transmission revolution sensor (turbine speed sensor) inputs input axis speed signals to the transmission control computer assembly.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>1. Diagnosis Condition</th>
<th>2. Error Status</th>
<th>3. Error Period</th>
<th>Suspected Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0715/37</td>
<td>1. Idling with shift lever in P or N position, or driving in D position</td>
<td>2. Turbine speed signals are not input.</td>
<td>3. 2 seconds</td>
<td>• Wire harness and connector (transmission revolution sensor (turbine speed sensor) system) • Transmission revolution sensor (turbine speed sensor) • Transmission control computer assembly</td>
</tr>
</tbody>
</table>

**HINT:**
If P0715/37 is output, inspect the neutral start switch assembly first. (See page AT-59)

#### CIRCUIT DIAGRAM

![Circuit Diagram](image)

#### INSPECTION PROCEDURE

1. **INSPECT TRANSMISSION REVOLUTION SENSOR (TURBINE SPEED SENSOR)**
   - (a) Inspect the output waveform.
   - (b) Connect the DS-II between the C10 (RTBN) and B24 (E1) terminals of the transmission control computer assembly connector.
   - (c) Set the DS-II to the oscilloscope function.
HINT:
As turbine speed increases, the cycle becomes shorter.

**NG**
REPLACE TRANSMISSION REVOLUTION SENSOR (TURBINE SPEED SENSOR)

**OK**

## 2 INSPECT WIRE HARNESS AND CONNECTOR (TRANSMISSION REVOLUTION SENSOR (TURBINE SPEED SENSOR) - TRANSMISSION CONTROL COMPUTER ASSEMBLY)

HINT:
See page IN-34 for the inspection procedure and precautions for the wire harness and connector.

(a) Disconnect the transmission revolution sensor (turbine speed sensor) connector.

(b) Disconnect connector C of the transmission control computer assembly, and using the tester, inspect the continuity between the terminals.(For terminal layout, see page AT-17.)

**Standard:**

<table>
<thead>
<tr>
<th>Terminal No. (Terminal Symbols)</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>C20 (ETBN) ←→ 3 (E2)</td>
<td>Continuity</td>
</tr>
<tr>
<td>C10 (RTBN) ←→ 2 (RTBN)</td>
<td>Continuity</td>
</tr>
<tr>
<td>C9 (VBTB) ←→ 1 (V12)</td>
<td>Continuity</td>
</tr>
</tbody>
</table>

**NG**
REPAIR OR REPLACE WIRE HARNESS OR CONNECTOR

**OK**

INSPECT AND REPLACE TRANSMISSION CONTROL COMPUTER ASSEMBLY
**DTC** P0720/42 **No Input for Output Speed**

**DESCRIPTION**
The transmission revolution sensor (output speed sensor) inputs output axis speed signals to the transmission control computer assembly.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Diagnosis Condition</th>
<th>Error Status</th>
<th>Error Period</th>
<th>Suspected Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0720/42</td>
<td>1. When driving</td>
<td>2. Output speed signals are not input. Or the ratio to the turbine speed is abnormal.</td>
<td>3. 1 second</td>
<td>• Wire harness and connector (output speed system) • Transmission revolution sensor (output speed sensor) • Transmission control computer assembly</td>
</tr>
</tbody>
</table>

**HINT:**
If Ço0720/42 is output, inspect the neutral start switch assembly first. (See page AT-59)

**CIRCUIT DIAGRAM**

**INSPECTION PROCEDURE**

1. **INSPECT TRANSMISSION REVOLUTION SENSOR (OUTPUT SPEED SENSOR)**
   (a) Inspect the output waveform.
   (b) Connect the DS-II between C8 (ROPT) and B24 (E1) terminals of the transmission control computer assembly connector.
   (c) Set the DS-II to the oscilloscope function.
## AT–32 AUTOMATIC TRANSMISSION

### ELECTRONICALLY CONTROLLED AUTOMATIC TRANSMISSION (ECT)

#### HINT:
As output speed increases, the cycle becomes shorter.

**OK**

**NG**

**REPLACE TRANSMISSION REVOLUTION SENSOR (OUTPUT SPEED SENSOR)**

### 2 INSPECT WIRE HARNESS AND CONNECTOR (TRANSMISSION REVOLUTION SENSOR (OUTPUT SPEED SENSOR) - TRANSMISSION CONTROL COMPUTER ASSEMBLY)

#### HINT:
See page IN-34 for the inspection procedure and precautions for the wire harness and connector.

(a) Disconnect the turbine speed sensor connector.

(b) Disconnect connector C of the transmission control computer assembly, and using the tester, inspect the continuity between the terminals.(For terminal layout, see page AT-17.)

#### Standard:

<table>
<thead>
<tr>
<th>Terminal No. (Terminal Symbols)</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>C18 (EOPT) ←→ 3 (E2)</td>
<td>Continuity</td>
</tr>
<tr>
<td>C8 (ROPT) ←→ 2 (ROPT)</td>
<td>Continuity</td>
</tr>
<tr>
<td>C7 (VBOP) ←→ 1 (V12)</td>
<td>Continuity</td>
</tr>
</tbody>
</table>

**OK**

**NG**

**REPAIR OR REPLACE WIRE HARNESS OR CONNECTOR**

**INSPECT AND REPLACE TRANSMISSION CONTROL COMPUTER ASSEMBLY**
**DESCRIPTION**

This DTC is output when engine speed signals are not input from the engine control computer to the transmission control computer assembly.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>1. Diagnosis Condition</th>
<th>2. Error Status</th>
<th>3. Error Period</th>
<th>Suspected Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0725/86</td>
<td>1. Engine is running</td>
<td>2. Error Status</td>
<td>3. Error Period</td>
<td>Wire harness and connector (engine control computer - transmission control computer assembly)</td>
</tr>
<tr>
<td></td>
<td>2. Engine speed signals from the engine control computer are not input to the transmission control computer assembly.</td>
<td></td>
<td></td>
<td>Engine control computer</td>
</tr>
<tr>
<td></td>
<td>3. 0.5 seconds</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CIRCUIT DIAGRAM**

```
Transmission Control Computer Assembly

REG B8

Engine Control Computer

D4 ATNE
```

**INSPECTION PROCEDURE**

**HINT:**
Read the freeze frame data using the DS-II. Freeze frame data records aspects of the engine's condition when malfunctions occur. This information is helpful when troubleshooting.

1. **INSPECT WIRE HARNESS AND CONNECTOR (TRANSMISSION CONTROL COMPUTER ASSEMBLY - ENGINE CONTROL COMPUTER)**

**HINT:**
See page IN-34 for the inspection procedure and precautions for the wire harness and connector.

(a) Disconnect connector B8 (REG1) of the transmission control computer assembly and connector D4 (ATNE) of the engine control computer.

(b) Using a tester, check the continuity between the terminals. (See AT-17 for the transmission control computer assembly terminal layouts, and see page ES-16 for the engine control computer terminal layouts.)

**Standard:**
Continuity
AT–34

AUTOMATIC TRANSMISSION  ELECTRONICALLY CONTROLLED AUTOMATIC TRANSMISSION (ECT)

NG

REPAIR OR REPLACE WIRE HARNESS OR CONNECTOR

OK

INSPECT OR REPLACE ENGINE CONTROL COMPUTER
DESCRIPTION

The transmission control computer assembly combines the ON-OFF states of solenoids No. 1, No. 2, and No. 3 to change the drive position from the 1st to 4th. If an open or short circuit occurs in any of the solenoid valve circuits, the transmission control computer assembly turns the other normal solenoid valves ON or OFF as a fail-safe function. In addition, if all of the solenoid valves are disabled, only the mechanical hydraulic circuit is available, enabling manual shifting. (If an open or short circuit occurs, the transmission control computer assembly stops sending current to the failed solenoid valve.)

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>1. Diagnosis Condition</th>
<th>2. Error Status</th>
<th>3. Error Period</th>
<th>Suspected Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0753/61</td>
<td>1. When sending current to solenoid No. 1</td>
<td>Open or short in solenoid No. 1 circuit</td>
<td>Continues for 0.03 sec. or more</td>
<td>Wire harness and connector (solenoid No. 1 signal system)</td>
</tr>
<tr>
<td></td>
<td>2. Open or short in solenoid No. 1 circuit</td>
<td>Open or short in solenoid No. 1 circuit</td>
<td>Continues for 0.03 sec. or more</td>
<td>Transmission wire</td>
</tr>
<tr>
<td></td>
<td>3. Continues for 0.03 sec. or more</td>
<td>Continues for 0.03 sec. or more</td>
<td>Continues for 0.03 sec. or more</td>
<td>Solenoid No. 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Transmission control computer assembly</td>
</tr>
<tr>
<td>P0758/62</td>
<td>1. When sending current to solenoid No. 2</td>
<td>Open or short in solenoid No. 2 circuit</td>
<td>Continues for 0.03 sec. or more</td>
<td>Wire harness and connector (solenoid No. 2 signal system)</td>
</tr>
<tr>
<td></td>
<td>2. Open or short in solenoid No. 2 circuit</td>
<td>Open or short in solenoid No. 2 circuit</td>
<td>Continues for 0.03 sec. or more</td>
<td>Transmission wire</td>
</tr>
<tr>
<td></td>
<td>3. Continues for 0.03 sec. or more</td>
<td>Continues for 0.03 sec. or more</td>
<td>Continues for 0.03 sec. or more</td>
<td>Solenoid No. 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Transmission control computer assembly</td>
</tr>
<tr>
<td>Čo0763/63</td>
<td>1. When sending current to solenoid No. 3</td>
<td>Open or short in solenoid No. 3 circuit</td>
<td>Continues for 0.03 sec. or more</td>
<td>Wire harness and connector (solenoid No. 3 signal system)</td>
</tr>
<tr>
<td></td>
<td>2. Open or short in solenoid No. 3 circuit</td>
<td>Open or short in solenoid No. 3 circuit</td>
<td>Continues for 0.03 sec. or more</td>
<td>Transmission wire</td>
</tr>
<tr>
<td></td>
<td>3. Continues for 0.03 sec. or more</td>
<td>Continues for 0.03 sec. or more</td>
<td>Continues for 0.03 sec. or more</td>
<td>Solenoid No. 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Transmission control computer assembly</td>
</tr>
</tbody>
</table>

CIRCUIT DIAGRAM

[Diagram of Automatic Transmission Assembly and Transmission Control Computer Assembly showing connections and wiring]
INSPECTION PROCEDURE

1. INSPECT TRANSMISSION WIRE (No. 1/No. 2/No. 3)

   SST 09990-97201
   (a) Disconnect the transmission wire connector.
   (b) Connect the SST (A/T solenoid wire check sub-harness).
   (c) Using the tester, inspect the resistance between the terminals.

   Standard:

   (d) Using the tester, inspect the insulation between each terminal and the body ground.

   Standard:

   Result:

   Status       Proceed to
   Solenoid No. 1 error Go to step A
   Solenoid No. 2 error Go to step B
   Solenoid No. 3 error Go to step C
   DTC is not output Go to OK

   NG (A)       GO TO STEP 3
   NG (B)       GO TO STEP 4
   NG (C)       GO TO STEP 5

   OK

2. INSPECT WIRE HARNESS AND CONNECTOR (TRANSMISSION WIRE - TRANSMISSION CONTROL COMPUTER ASSEMBLY)

   HINT:
   See page IN-34 for the inspection procedure and precautions for the wire harness and connector.
(a) Connect the transmission wire connector, and disconnect connector C of the transmission control computer assembly.
(b) Using the tester, inspect the resistance between the terminals. (For terminal layout, see page AT-17.)

Standard:

<table>
<thead>
<tr>
<th>Terminal No. (Terminal Symbols)</th>
<th>Resistance [Ω]</th>
</tr>
</thead>
<tbody>
<tr>
<td>C6 (B1+ ) ←→ C5 (B1- )</td>
<td>5.1 to 5.5 (20°C)</td>
</tr>
<tr>
<td>C4 (C2+ ) ←→ C3 (C2- )</td>
<td>5.1 to 5.5 (20°C)</td>
</tr>
<tr>
<td>C2 (C3B2+ ) ←→ C1 (C3B2- )</td>
<td>5.1 to 5.5 (20°C)</td>
</tr>
</tbody>
</table>

NG ➔ REPAIR OR REPLACE WIRE HARNESS OR CONNECTOR

INSPECT AND REPLACE TRANSMISSION CONTROL COMPUTER ASSEMBLY

3 INSPECT SOLENOID NO. 1

(a) Disconnect the clutch control solenoid No. 2 (solenoid No. 1) connector.
(b) Using the tester, inspect the resistance between the terminals.

Standard:

5.1 to 5.5 Ω (20°C)

NG ➔ REPLACE SOLENOID NO. 1

OK

REPAIR OR REPLACE TRANSMISSION WIRE

4 INSPECT SOLENOID NO. 2

(a) Disconnect the clutch control solenoid No. 1 (solenoid No. 2) connector.
(b) Using the tester, inspect the resistance between the terminals.

Standard:

5.1 to 5.5 Ω (20°C)

NG ➔ REPLACE SOLENOID NO. 2

OK

REPAIR OR REPLACE TRANSMISSION WIRE
(a) Disconnect the clutch control solenoid No. 1 (solenoid No. 3) connector.
(b) Using the tester, inspect the resistance between the terminals.

Standard:
5.1 to 5.5 Ω (20°C)

NG  REPLACE SOLENOID NO. 3

OK

REPAIR OR REPLACE TRANSMISSION WIRE
**DESCRIPTION**

The transmission control computer assembly controls the duty solenoid at the predetermined duty ratio.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Diagnosis Condition</th>
<th>Error Status</th>
<th>Error Period</th>
<th>Suspected Area</th>
</tr>
</thead>
</table>
| P0768/64 | 1. When sending current to the duty solenoid | 2. Open or short in solenoid LUCC circuit | 3. 0.33 seconds | • Wire harness and connector (LUCC signal system)  
• Transmission wire (LUCC signal system)  
• Duty solenoid  
• Transmission control computer assembly |

**CIRCUIT DIAGRAM**

**INSPECTION PROCEDURE**

1. **INSPECT TRANSMISSION WIRE (LUCC)**

   SST 09990-97201
   (a) Disconnect the transmission wire connector.
   (b) Connect the SST (A/T solenoid wire check sub-harness).
   (c) Using the tester, inspect the resistance between the terminals.

   **Standard:**

<table>
<thead>
<tr>
<th>Terminal No. (Terminal Symbols)</th>
<th>Resistance (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 (LUCC) ←→ Body ground</td>
<td>11 to 13 (20°C)</td>
</tr>
</tbody>
</table>

   **GO TO STEP 3**
2 INSPECT WIRE HARNESS OR CONNECTOR (TRANSMISSION WIRE - TRANSMISSION CONTROL COMPUTER ASSEMBLY)

HINT:
For inspection procedures and precautions, see page IN-34
(a) Connect the transmission wire connector, and disconnect connectors B and C of the transmission control computer assembly.
(b) Using the tester, inspect the resistance between the terminals. (For terminal layout, see page AT-17.)
Standard:

<table>
<thead>
<tr>
<th>Terminal No. (Terminal Symbols)</th>
<th>Resistance [Ω]</th>
</tr>
</thead>
<tbody>
<tr>
<td>C23 (LUCC) ←→ B24 (E1)</td>
<td>11 to 13 (20°C)</td>
</tr>
</tbody>
</table>

NG  REPAIR OR REPLACE WIRE HARNESS OR CONNECTOR

OK

INSPECT AND REPLACE TRANSMISSION CONTROL COMPUTER ASSEMBLY

3 INSPECT DUTY SOLENOID

(a) Disconnect the duty solenoid connector.
(b) Using the tester, inspect the resistance between the solenoid terminal and body.
Standard:
11 to 13 Ω (20°C)

NG  REPLACE DUTY SOLENOID

OK

REPAIR OR REPLACE TRANSMISSION WIRE
DESCRIPTION
The transmission control computer assembly controls the LUC solenoid at the predetermined duty ratio and performs lock-up.

<table>
<thead>
<tr>
<th>DTC</th>
<th>P0773/65</th>
<th>Open or Short in the LUC Solenoid Circuit</th>
</tr>
</thead>
<tbody>
<tr>
<td>DTC</td>
<td>P1780/66</td>
<td>Switching solenoid circuit disconnection, short circuit</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>1. Diagnosis Condition</th>
<th>2. Error Status</th>
<th>3. Error Period</th>
<th>Suspected Area</th>
</tr>
</thead>
</table>
| P0773/65| 1. When sending current to the LUC solenoid | 2. Open or short in solenoid LUC circuit | 3. 0.04 seconds | • Wire harness and connector (LUCR signal system)  
• Transmission wire (LUCR signal system)  
• LUC solenoid  
• Transmission control computer assembly |
| P1780/66| 1. When sending current to the switch solenoid | 2. Open or short in solenoid SOLR circuit | 3. 0.04 seconds | • Wire harness and connector (SOLR signal system)  
• Transmission wire (SOLR signal system)  
• Switch solenoid  
• Transmission control computer assembly |

CIRCUIT DIAGRAM

INSPECTION PROCEDURE

1 INSPECT TRANSMISSION WIRE (LUCR, SOLR)

SST 09990-97201
(a) Disconnect the transmission wire connector.  
(b) Connect the SST (A/T solenoid wire check sub-harness).  
(c) Using the tester, inspect the resistance between the terminals.

Standard:

<table>
<thead>
<tr>
<th>Terminal No. (Terminal Symbols)</th>
<th>Resistance [Ω]</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 (LUCR) ←→ Body ground</td>
<td>14 to 18 (20°C)</td>
</tr>
<tr>
<td>1 (SOLR) ←→ Body ground</td>
<td>14 to 18 (20°C)</td>
</tr>
</tbody>
</table>
AT–42 AUTOMATIC TRANSMISSION □ ELECTRONICALLY CONTROLLED AUTOMATIC TRANSMISSION (ECT)

**Result**

<table>
<thead>
<tr>
<th>Status</th>
<th>Proceed to</th>
</tr>
</thead>
<tbody>
<tr>
<td>LUC solenoid</td>
<td>Go to step A</td>
</tr>
<tr>
<td>Switch solenoid</td>
<td>Go to step B</td>
</tr>
<tr>
<td>DTC is not output</td>
<td>Go to OK</td>
</tr>
</tbody>
</table>

**NG (A)**

GO TO STEP 3

**NG (B)**

GO TO STEP 4

### 2 INSPECT WIRE HARNESS OR CONNECTOR (TRANSMISSION WIRE - TRANSMISSION CONTROL COMPUTER ASSEMBLY)

**HINT:**
For inspection procedures and precautions, see page IN-34
(a) Connect the transmission wire connector, and disconnect connectors B and C of the transmission control computer assembly.
(b) Using the tester, inspect the resistance between the terminals. (For terminal layout, see page AT-17.)

**Standard:**

<table>
<thead>
<tr>
<th>Terminal No. (Terminal Symbols)</th>
<th>Resistance [Ω]</th>
</tr>
</thead>
<tbody>
<tr>
<td>C11 (LUCR) ↔ B24 (E1)</td>
<td>14 to 18 (20°C)</td>
</tr>
<tr>
<td>C12 (SOLR) ↔ B24 (E1)</td>
<td>14 to 18 (20°C)</td>
</tr>
</tbody>
</table>

**NG**

REPAIR OR REPLACE WIRE HARNESS OR CONNECTOR

### 3 INSPECT LUC SOLENOID

(a) Disconnect the LUC solenoid connector.
(b) Using the tester, inspect the resistance between the solenoid terminal and body.

**Standard:**

14 to 18 Ω (20°C)

**NG**

REPLACE LUC SOLENOID

### 4 INSPECT SWITCH SOLENOID

(a) Disconnect the switch solenoid connector.
(b) Using the tester, inspect the resistance between the solenoid terminal and body.

**Standard:**

14 to 18 Ω (20°C)

<table>
<thead>
<tr>
<th>NG</th>
<th>REPLACE SWITCH SOLENOID</th>
</tr>
</thead>
</table>

**REPAIR OR REPLACE TRANSMISSION WIRE**
DTC P1703/72 Lock-up Speed does not Match

DESCRIPTION
This DTC is output when the engine speed and lock-up speed differ significantly during the direct lock-up.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>DTC Detection Condition</th>
<th>Suspected Area</th>
</tr>
</thead>
</table>
| P1703/72 | 1. During the direct lock-up  
           2. The engine speed and lock-up speed differ significantly.  
           3. 2 seconds | • Valve body assembly  
                      • Torque converter assembly  
                      • Transmission assembly |

INSPECTION PROCEDURE

1 | CHECK FLUID PRESSURE

(a) Lift up the vehicle.
(b) Start the engine.
(c) Gradually depress the accelerator pedal to shift to the 3rd gear, and keep accelerating. Measure the LUC ON pressure and LUC OFF pressure during the direct lock-up.

Standard:
617 - 715 kPa (6.5 - 7.3 kgf/cm) (LUC ON pressure - LUC OFF pressure)

HINT:
To measure the fluid temperature again after the warning is displayed, stop the vehicle, shift to the N position (release the fail), and shift to the D position again. Then start the measurements.

NG [REPLACE VALVE BODY ASSEMBLY]

OK

2 | INSPECT TORQUE CONVERTER

HINT:
See page IN-34 for the inspection procedure of the torque converter assembly.

NG [REPLACE TORQUE CONVERTER]

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY
### DTC P1706/31 Engine Torque Error

**DESCRIPTION**

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Detection Item</th>
<th>Trouble Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1706/31</td>
<td>Engine system error</td>
<td>Engine system</td>
</tr>
</tbody>
</table>

**INSPECTION PROCEDURE**

1. **INSPECT ENGINE CONTROL SYSTEM**
   
   (a) Check for DTCs of the engine system using the DS-II. (See page ES-8 for procedures) (See page ES-3 for the DTC chart)

GO TO DIAGNOSTIC TROUBLE CODE CHART
DTC P1711/41 Throttle sensor signal error

DESCRIPTION

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Detection Item</th>
<th>Trouble Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1711/41</td>
<td>Throttle sensor system errors</td>
<td>Throttle sensor system</td>
</tr>
</tbody>
</table>

INSPECTION PROCEDURE

1. INSPECT ENGINE CONTROL SYSTEM

   (a) Inspect the throttle sensor system. (See page ES-39)

GO TO THROTTLE SENSOR SYSTEM
**DESCRIPTION**

This DTC is output when the battery system power source (BAT1, BAT2) is abnormally cut off for a certain period of time.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>DTC Detection Condition</th>
<th>Suspected Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1730/21</td>
<td>1. Always 2. Battery system power source (BAT1, BAT2) is cut off. 3. 0.1 seconds</td>
<td>Wire harness or connector (battery power source system)</td>
</tr>
</tbody>
</table>

**CIRCUIT DIAGRAM**

![Circuit Diagram]

**INSPECTION PROCEDURE**

1. **INSPECT TRANSMISSION CONTROL COMPUTER ASSEMBLY (VOLTAGE INSPECTION)**

   (a) Measure the voltage between the terminals of the transmission control computer connector using the tester.

<table>
<thead>
<tr>
<th>Terminal (Terminal Name)</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>B2 (BAT1) - B6 (E01)</td>
<td>10 to 14 V</td>
</tr>
<tr>
<td>B1 (BAT2) - B6 (E01)</td>
<td>10 to 14 V</td>
</tr>
</tbody>
</table>

   **OK**

   **HOW TO TROUBLESHOOT ECU CONTROLLED SYSTEMS**
2 INSPECT FUSE (ECUB)

(a) Remove the ECUB fuse from the engine room R/B.
(b) Using a tester, check for continuity.

**Standard:**
- Continuity

**HINT:**
See page IN-34 for the inspection procedure and precautions for the wire harness and connector.

3 INSPECT WIRE HARNESS OR CONNECTOR (TRANSMISSION CONTROL COMPUTER ASSEMBLY - ECUB FUSE)

**HINT:**
See page IN-34 for the inspection procedure and precautions for the wire harness and connector.

(a) Disconnect connector B of the transmission control computer assembly.
(b) Remove the ECUB fuse from the engine room R/B.
(c) Using the tester, check for continuity and short between the vehicle side connector of the transmission control computer assembly and the ECUB fuse holder. (For terminal layout, see page AT-17.)

**Standard:**

<table>
<thead>
<tr>
<th>Terminal (Terminal Name)</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission control computer assembly ↔ ECUB fuse holder</td>
<td></td>
</tr>
<tr>
<td>B2 (BAT1) ↔ 2</td>
<td>There is continuity and no short between the other terminals or body ground.</td>
</tr>
<tr>
<td>B1 (BAT2) ↔ 2</td>
<td>There is continuity and no short between the other terminals or body ground.</td>
</tr>
</tbody>
</table>

**NOTICE:**
When taking the measurement using the tester probe, do not press the tester probes too hard as it may cause damage to the holder part.
NG  REPAIR OR REPLACE WIRE HARNESS OR CONNECTOR

OK

CHECK FOR INTERMITTENT PROBLEMS
**DTC P1731/22 Sensor System Power Source Error**

**DESCRIPTION**

This DTC is output when there is no input from the speed sensor systems for a certain period of time.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>1. Diagnosis Condition</th>
<th>2. Error Status</th>
<th>3. Error Period</th>
<th>Suspected Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1731/22</td>
<td>1. Always</td>
<td></td>
<td></td>
<td>• CHECK WIRE HARNESS OR CONNECTOR (SPEED SENSOR POWER SOURCE SYSTEM)</td>
</tr>
<tr>
<td></td>
<td>2. No input from the turbine speed sensor and output speed sensor</td>
<td></td>
<td></td>
<td>• Transmission revolution sensor (turbine speed sensor)</td>
</tr>
<tr>
<td></td>
<td>3. 0.1 seconds</td>
<td></td>
<td></td>
<td>• Transmission revolution sensor (output speed sensor)</td>
</tr>
</tbody>
</table>

**CIRCUIT DIAGRAM**

Transmission Revolution Sensor (Turbine Speed Sensor)

Transmission Revolution Sensor (Output Revolution Sensor)

Transmission Control Computer Assembly

Diagram showing the connections between the sensors and the computer assembly.
INSPECTION PROCEDURE

1 INSPECT WIRE HARNESS OR CONNECTOR (TRANSMISSION CONTROL COMPUTER ASSEMBLY - BODY GROUND)

HINT:
See page IN-34 for the inspection procedure and precautions for the wire harness and connector.
(a) Disconnect connector C of the transmission control computer assembly.
(b) Using the tester, check the continuity between the terminals. (For terminal layout, see page AT-17.)

Standard:

<table>
<thead>
<tr>
<th>Terminal No. (measurement terminal)</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>C9 (VBTB) ←→ Body ground</td>
<td>Continuity</td>
</tr>
<tr>
<td>C7 (VBOP) ←→ Body ground</td>
<td>Continuity</td>
</tr>
</tbody>
</table>

NG → REPAIR OR REPLACE WIRE HARNESS OR CONNECTOR

OK

2 INSPECT TRANSMISSION REVOLUTION SENSOR (TURBINE SPEED SENSOR)

(a) Connect the DS-II to the DLC.
(b) Turn the ignition switch to the ON position, and follow the prompts on the DS-II screen to check for DTCs. (See page AT-13)
(c) When disconnecting the vehicle side connector of the transmission revolution sensor (turbine speed sensor), check that P1731/22 will be cleared.

Standard:
DTC P1731/22 is cleared.

HINT:
When disconnecting the vehicle side connector of the transmission revolution sensor (turbine speed sensor), take notice that P0715/37 will be displayed.

OK → REPLACE TRANSMISSION REVOLUTION SENSOR (TURBINE SPEED SENSOR)

NG

3 INSPECT TRANSMISSION REVOLUTION SENSOR (OUTPUT SPEED SENSOR)

(a) Connect the DS-II to the DLC.
(b) Turn the ignition switch to the ON position, and follow the prompts on the DS-II screen to check for DTCs. (See page AT-13)
(c) When disconnecting the vehicle side connector of the transmission revolution sensor (output speed sensor), check that P1731/22 will be cleared.

Standard:
DTC P1731/22 is cleared.
HINT:
When disconnecting the vehicle side connector of the transmission revolution sensor (output speed sensor), take notice that P0720/42 will be displayed.

NG

HOW TO TROUBLESHOOT ECU CONTROLLED SYSTEMS

OK

REPLACE TRANSMISSION REVOLUTION SENSOR (OUTPUT SPEED SENSOR)
DESCRIPTION

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Detection Item</th>
<th>Trouble Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>U0100/82</td>
<td>Cannot receive communication signals from the engine control computer.</td>
<td>CAN communication</td>
</tr>
<tr>
<td>U0101/85</td>
<td>Cannot send communication signals from the engine control computer.</td>
<td>CAN communication</td>
</tr>
</tbody>
</table>

INSPECTION PROCEDURE

1. **READ DTCs**

(a) Record the DTCs.

**HINT:**

If a CAN communication error DTC and corresponding sensor error DTC are output at the same time, troubleshoot the sensor error codes after the communication returns to normal.

---

**GO TO TROUBLESHOOTING FOR CAN COMMUNICATION SYSTEM**
AUTOMATIC TRANSMISSION ASSEMBLY

PRECAUTIONS

1. Before disassembly, clean any sand or mud attached to the outside of the transmission to prevent it from entering the inside of the transmission.

2. As any foreign matter remaining in the oil pan may enter the valve body, do not place the oil pan side upward until the oil pan is removed.

3. When removing and installing the transmission parts, perform the operation wearing vinyl gloves or with bare hands. Do not use cotton work gloves or waste clothes to avoid getting cotton threads or particles in the parts.

4. Always organize and arrange the dismounted parts properly to protect them from dust or other foreign matter.

5. Coat the sliding and rotating surfaces with ATF before installation.

6. As it will cause fluid leakage, be extremely careful not to damage the fitting surfaces of the case.

7. Use ATF as the fluid to be added.

8. The fluid level check is not needed for the periodic maintenance. However, if the bleeding or leakage can be found, check the fluid level.
AUTOMATIC TRANSMISSION FLUID

INSPECTION

1. TRANSMISSION FLUID

NOTICE:
- If the fluid level is too high or too low, it may cause trouble.
- Check the idle speed before this inspection.
- Stop the vehicle on a level road.
- Perform this inspection with the transmission fully warmed-up (ATF temperature 70 to 90°C).
- Use ATF as the fluid to be added.

(a) Apply the parking brake.
(b) Start the engine with the brake pedal depressed.
(c) With the engine idling, slowly move the shift lever from the P to the L position, then return it to the P position.
(d) With the engine idling, pull out the level gauge and wipe off the fluid on the gauge with a waste cloth. Re-insert the level gauge and confirm that the fluid level is within the HOT range of the level gauge.

NOTICE:
- When the fluid temperature is low (20 to 30 °C), such as when changing the fluid, adjust the fluid level to the COOL range of the level gauge, then re-check the fluid level with the transmission fully warmed-up.
- If the fluid levels differ between the front and back sides of the gauge, check with the lower level.

(e) If the fluid level is low, check for fluid leaks.
NEUTRAL START SWITCH ASSEMBLY

COMPONENTS

REMOVAL

1. DISCONNECT NEGATIVE BATTERY TERMINAL
2. REMOVE ENGINE UNDER COVER RR RH
3. DISCONNECT TRANSMISSION CONTROL CABLE ASSEMBLY (See page AT-70)
4. REMOVE TRANSMISSION CONTROL SHAFT LEVER
   (a) Move the shift lever to the neutral position.
5. REMOVE NEUTRAL START SWITCH ASSEMBLY
   (a) Disconnect the connector.
   (b) Disconnect the wire harness clamp.
   (c) Remove the bolt and neutral start switch assembly.

INSTALLATION

1. INSTALL NEUTRAL START SWITCH ASSEMBLY
   (a) Temporarily install the neutral start switch assembly with the bolt
   (b) Temporarily install the transmission control shaft lever.
   (c) Turn the transmission control shaft lever counterclockwise until it stops (P position), and turn it clockwise 2 notches to set it to the N position.
(d) Install the SST and turn the switch part so that the gauge part of the SST and the standard line of the neutral start switch assembly match. Tighten the bolt to the specified torque.  
SST  09302-87201  
Torque: 18.2 N\(\cdot\)m (185 kgf\(\cdot\)cm)

(e) Connect the connector to the neutral start switch assembly.

2. FULLY TIGHTEN TRANSMISSION CONTROL SHAFT LEVER  
(a) Tighten the transmission control shaft lever with the nut.  
Torque: 12.8 N\(\cdot\)m (130 kgf\(\cdot\)cm)

3. INSTALL TRANSMISSION CONTROL CABLE ASSEMBLY (See page AT-75)

4. CONNECT NEGATIVE BATTERY TERMINAL

5. INSPECT NEUTRAL START SWITCH ASSEMBLY  
(a) Depress the parking brake pedal and turn the ignition switch to the ON position.  
(b) Depress the brake pedal and check that the engine starts when the shift lever is set in the N or P position, but does not start in other positions.  
(c) Check that the back-up light comes on and the reverse position warning buzzer sounds when the shift lever is set in the R position, but do not function in other positions.

6. INSTALL ENGINE UNDER COVER RR RH

ADJUSTMENT

1. ADJUST NEUTRAL START SWITCH ASSEMBLY  
(a) Move the shift lever to the neutral position.  
(b) Remove the bolt and transmission control cable.  
NOTICE:  
Do not move the control cable end for more than 8 degrees and do not apply load to the control cable end.  
(c) Remove the nut and transmission control shaft lever.  
(d) Loosen the mounting bolt of the neutral start switch assembly.
(e) Install the SST and turn the switch part so that the gauge part of the SST and the standard line of the neutral start switch assembly match.

SST 09302-87201

(f) Tighten the mounting bolt of the neutral start switch assembly.

Torque: 18.2 N*m (185 kgf*cm)

(g) Install the transmission control shaft lever with the nut.

(h) Install the transmission control cable with the bolt.

Torque: 9.2 N*m (94 kgf*cm)

(i) After adjustment, inspect the neutral start switch assembly.

**INSPECTION**

1. **CHECK CONTINUITY**

(a) Using the tester, check the continuity between the terminals of the connector.

**Standard:**

<table>
<thead>
<tr>
<th>Shift Position</th>
<th>Terminal No. (Terminal Symbols)</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>P position</td>
<td>6 (E) ←→ 4 (P)</td>
<td>Continuity</td>
</tr>
<tr>
<td>R position</td>
<td>1 (R) ←→ 7 (RB)</td>
<td>Continuity</td>
</tr>
<tr>
<td>N position</td>
<td>6 (E) ←→ 5 (N)</td>
<td>Continuity</td>
</tr>
<tr>
<td>D position</td>
<td>6 (E) ←→ 3 (D)</td>
<td>Continuity</td>
</tr>
<tr>
<td>2 position</td>
<td>6 (E) ←→ 2 (2)</td>
<td>Continuity</td>
</tr>
<tr>
<td>L position</td>
<td>6 (E) ←→ 8 (L)</td>
<td>Continuity</td>
</tr>
</tbody>
</table>
AT–60

AUTOMATIC TRANSMISSION - TORQUE CONVERTER AND DRIVE PLATE

TORQUE CONVERTER AND DRIVE PLATE

INSPECTION

1. INSPECT TORQUE CONVERTER ASSEMBLY
   (a) Determine the condition of the torque converter assembly.
      (1) If the inspection result of the torque converter meets the
          replacement standards, replace the torque converter.
          Standard:
          Some metallic sounds are heard from the torque
          converter unit during the stall test or when the shift
          lever is in the N position.
          The one-way clutch is free or locked in both direc-
          tions.
          Fine powder exceeding the sample limit is identified
          in the ATF (see the sample).
          HINT:
          The ATF powder sample shows approximately 25 ml of
          ATF (one bottle of 35 mm film case) taken from the
          removed converter.
      (b) Replace the ATF in the torque converter.
         (1) If the ATF is discolored and/or has a foul odor, completely
             stir the ATF in the torque converter and drain it with the
             installation face up.
   (c) Clean and inspect the oil cooler and oil pipe line.
      (1) If the torque converter inspection and the ATF replace-
          ment are performed, clean the oil cooler and pipe line.
          HINT:
          • Spray compressed air of 196 kPa (2kgf/cm²) from the
            inlet hose.
          • If a lot of fire powder is found in the ATF, add new ATF
            using a bucket pump and clean it again.
      (2) If the ATF is cloudy, inspect the oil cooler (radiator).
   (d) Prevent deformation of the torque converter and damage to the
       oil pump gear.
      (1) If there is any damage to the end of the torque converter
          mounting bolt and the bottom of the torque converter
          mounting hole, replace the bolt and torque converter.
      (2) All of the mounting bolts should be the same length (0.5
          mm or shorter).
2. **INSPECT DRIVE PLATE AND RING GEAR**

(a) **INSPECT DRIVE PLATE**
   
   (1) Using a dial indicator, check the runout of the drive plate.
   
   **Standard:**
   
   0.25 mm
   
   **HINT:**
   
   If the value is not as specified, replace the drive plate and ring gear.

(b) **INSPECT RING GEAR**

   (1) Check the ring gear for damage.
   
   **HINT:**
   
   If the ring gear is damaged, replace the drive plate and ring gear.
TRANSMISSION REVOLUTION SENSOR

COMPONENTS

- ENGINE UNDER COVER RR RH
  - O-RING
  - Transmission Revolution Sensor (Output Speed Sensor)
- Engine Under Cover RR LH
  - O-RING
- Transmission Revolution Sensor (Turbine Speed Sensor)
- Front Propeller Shaft Assembly
  - T=5.4(55)
- Front Suspension Cross Member LWR
  - T=5.4(55)
  - T=8.4(85)
  - T=8.4(85)
  - T=60.3(815)
  - T=68(693)
  - T=68(693)

- 4WD
- Apply ATF
- Tightening Torque [Nm(kgf·cm)]
- Non-reuseable part

C140801J02
REMOVAL
1. DISCONNECT NEGATIVE BATTERY TERMINAL
2. REMOVE ENGINE UNDER COVER RR RH
3. REMOVE ENGINE UNDER COVER RR LH
4. DRAIN TRANSFER FLUID (FOR 4WD)(See page TF-7)
5. REMOVE FRONT SUSPENSION CROSS MEMBER LWR (FOR 4WD)(See page PR-3)
6. REMOVE FRONT PROPELLER SHAFT ASSEMBLY (FOR 4WD)(See page PR-3)
7. REMOVE TRANSMISSION REVOLUTION SENSOR
   (a) Disconnect the connector.
   (b) Remove the bolt, each transmission revolution sensor, and O-ring.

INSTALLATION
1. INSTALL TRANSMISSION REVOLUTION SENSOR
   (a) Coat a new O-ring with ATF and install it to the transmission revolution sensor.
   (b) Install each transmission revolution sensor with the bolt.
       Torque: 8.4 N'm (85 kgf*cm)
   (c) Connect the connector.
2. INSTALL FRONT PROPELLER SHAFT ASSEMBLY (FOR 4WD)(See page PR-4)
3. INSTALL FRONT SUSPENSION CROSS MEMBER LWR (FOR 4WD)(See page PR-4)
4. ADD TRANSFER FLUID (FOR 4WD)(See page TF-6)
5. REMOVE ENGINE UNDER COVER RR RH
6. INSTALL ENGINE UNDER COVER RR LH
7. CONNECT NEGATIVE BATTERY TERMINAL
8. CHECK DS-II - ECU DATA LIST

INSPECTION
1. TRANSMISSION REVOLUTION SENSOR (TURBINE SPEED SENSOR)
   (a) Inspect the output waveform.
   (b) Connect the DS-II between the C10 (RTBN) and B24 (E1) terminals of the transmission control computer assembly connector.
(c) Set the DS-II to the oscilloscope function.

HINT:
As turbine speed increases, the cycle becomes shorter.

2. TRANSMISSION REVOLUTION SENSOR (OUTPUT SPEED SENSOR)
(a) Inspect the output waveform.
(b) Connect the DS-II between C8 (ROPT) and B24 (E1) terminals of the transmission control computer assembly connector.
(c) Set the DS-II to the oscilloscope function.

HINT:
As output speed increases, the cycle becomes shorter.
AUTOMATIC TRANSMISSION ASSEMBLY

COMPONENTS

- AIR CLEANER ASSEMBLY
- AIR CLEANER HOSE NO. 1
- ACCELERATOR CONTROL CABLE ASSEMBLY
- BATTERY
- ENGINE UNDER COVER

TIGHTENING TORQUE [N*m(kgf*cm)]
EXHAUST PIPE GASKET

EXHAUST PIPE ASSEMBLY FR

T=19(194)

PROPELLER SHAFT ASSEMBLY

T=60(612)

PROPELLER WITH CENTER BEARING SHAFT ASSEMBLY

T=37(377)

NON-REUSEABLE PART

TIGHTENING TORQUE [N*m(kgf*cm)]
REMOVAL

1. DISCHARGE FUEL SYSTEM PRESSURE (See page EM-146)
2. REMOVE ENGINE UNDER COVER
3. REMOVE ENGINE UNDER COVER RR RH
4. REMOVE ENGINE UNDER COVER RR LH
5. DRAIN AUTOMATIC TRANSMISSION FLUID
   (a) Remove the drain plug and gasket, and drain the fluid.
      Torque: 24.5 N*m (250 kgf*cm)
6. DRAIN TRANSFER FLUID (FOR 4WD) (See page TF-7)
7. DRAIN ENGINE COOLANT (See page CO-9)
8. REMOVE AIR CLEANER HOSE NO. 1 (See page CO-15)
9. REMOVE AIR CLEANER ASSEMBLY (See page EM-146)
10. REMOVE VENTILATION HOSE (See page EM-147)
11. REMOVE VENTILATION HOSE NO. 2 (See page EM-147)
12. DISCONNECT ACCELERATOR CONTROL CABLE ASSEMBLY (See page EM-147)
13. REMOVE FUEL HOSE NO. 2 (See page EM-148)
14. DISCONNECT VACUUM HOSE ASSEMBLY (See page EM-148)
15. REMOVE FUEL DELIVERY PIPE (See page EM-149)
16. REMOVE THROTTLE BODY ASSEMBLY (See page EM-148)
17. REMOVE THROTTLE BODY BRACKET (See page EM-149)
18. REMOVE FUEL INJECTOR ASSEMBLY (See page EM-149)
19. REMOVE INTAKE MANIFOLD (See page EM-149)
20. DISCONNECT EXHAUST PIPE ASSEMBLY FR (See page MT-10)
21. REMOVE FRONT SUSPENSION CROSS MEMBER LWR (FOR 4WD) (See page PR-3)
22. REMOVE PROPELLER WITH CENTER BEARING SHAFT ASSEMBLY (See page PR-6)
23. REMOVE FRONT PROPELLER SHAFT ASSEMBLY (FOR 4WD) (See page PR-3)
24. REMOVE STARTER ASSEMBLY (See page MT-10)
25. REMOVE TORQUE CONVERTER SET BOLT
   (a) Remove the 6 torque converter set bolts.
26. SUSPEND ENGINE ASSEMBLY (See page MT-12)
27. SUPPORT TRANSMISSION ASSEMBLY (AUTOMATIC TRANS-
    MISSION) (See page MT-12)
28. **DISCONNECT TRANSMISSION CONTROL CABLE ASSEMBLY**
   (a) Remove clip and bolt, and disconnect the transmission control cable assembly from the neutral start switch.
   **NOTICE:**
   Do not move the control cable end for more than 8 degrees and do not apply load to the control cable end.

29. **DISCONNECT CONNECTOR**
   (a) Disconnect the neutral start switch connector.
   (b) Disconnect the transmission solenoid connector and the 2 transmission revolution sensor connectors.
   (c) Remove the bolt and earth wire.

30. **REMOVE OIL COOLER TUBE**
   (a) Remove the 2 union bolts, then disconnect the oil cooler tube from the transmission assembly.
(b) Remove the bolt, then disconnect the oil cooler tube clamp from the transmission assembly.

31. REMOVE ENGINE REAR SUPPORT MEMBER (See page MT-12)

32. REMOVE TRANSMISSION ASSEMBLY (AUTOMATIC TRANSMISSION)
   (a) Remove the 6 bolts and automatic transmission assembly.
   HINT:
   When removing bolts A, use an extension bar (600 mm).
   NOTICE:
   • Using a belt, secure the automatic transmission assembly to the high mission jack to prevent the automatic transmission assembly from falling.
   • To avoid damage to the knock pin, do not pry the connecting portion of the automatic transmission assembly and the engine.

33. REMOVE TORQUE CONVERTER ASSEMBLY
   (a) Put matchmarks on the converter and case.
   (b) Remove the torque converter assembly from the automatic transmission assembly.

34. REMOVE ENGINE MOUNTING BRACKET RR (FOR 2WD) (See page MT-13)

35. REMOVE TRANSFER ASSEMBLY (FOR 4WD) (See page TF-9)

INSTALLATION

1. INSTALL TRANSFER ASSEMBLY (FOR 4WD) (See page TF-10)

2. INSTALL ENGINE MOUNTING BRACKET RR NO. 1
   (a) Install the engine mounting bracket RR No. 1 to the transmission assembly with the 3 bolts.
   Torque: 37 N·m (375 kgf·cm)

3. INSTALL TORQUE CONVERTER ASSEMBLY
   (a) Clean the mounting hole of the converter set bolt on the drive plate.
   (b) Apply MP grease to the edge of the torque converter assembly.
   (c) Aligning the matchmarks on the case and converter, engage the spline of the input shaft with the spline of the turbine liner.
   NOTICE:
   Perform this operation while keeping the converter level.
(d) After installing the torque converter, measure dimension A from the edge surface of the housing to the converter set block.

**Standard:**
16.5 mm or more from the T/M fitting surface

4. **TEMPORARILY TIGHTEN TRANSMISSION ASSEMBLY (AUTOMATIC TRANSMISSION)**
   (a) Check that 2 knock pins are attached to the engine side.
   (b) Using a high-mission jack, level the engine and automatic transmission assembly, and engage the knock pin with the knock pin hole.

**NOTICE:**
- To protect the oil pan, place the high-mission jack attachment on the receiving stand of the high-mission jack and perform the tasks.
- Check that the high-mission jack attachment and oil pan are on the center of the receiving stand of the high-mission jack.
- Do not forcibly twist the transmission assembly.

(c) Temporarily install the transmission assembly with the 3 bolts.

**NOTICE:**
- Do not shake the transmission unit assembly violently as doing so may cause damage to the input shaft.
- Tighten the bracket of the rear O2 sensor together.

5. **INSTALL ENGINE REAR SUPPORT MEMBER (See page MT-14)**

6. **FULLY TIGHTEN TRANSMISSION ASSEMBLY (AUTOMATIC TRANSMISSION)**
   (a) Lower the vehicle.

   (b) Using a preset torque wrench, tighten new mounting bolt A of the transmission assembly.

   **Torque:** 59 N·m (602 kgf·cm)

   **HINT:**
   Bolt A part number 91619-61250 (Length under bolt head 50 mm)
7. INSTALL TORQUE CONVERTER SET BOLT
   (a) Install the 6 torque converter set bolts.
   Torque: 27.5 N*m (280 kgf*cm)
   NOTICE:
   • First, tighten the standard bolt (blue silver white color plating).
   • Tighten the remaining 5 bolts uniformly.

8. INSTALL STARTER ASSEMBLY
   (a) Temporarily install the starter assembly with the 2 bolts.
   (b) Connect the starter assembly connector with the nut.
   Torque: 8.8 N*m (90 kgf*cm)
   (c) Lift up the vehicle.
   (d) Using a high-mission jack, support the engine rear support member.
   (e) Remove the 4 bolts and disconnect the engine rear support member.
   (f) Using an extension bar (600 mm), tighten the 2 starter assembly mounting bolts.
   Torque: 37 N*m (377 kgf*cm)
   HINT:
   Adjust the height of the transmission assembly using a high-mission jack, and tighten the 2 starter assembly mounting bolts.

9. FULLY TIGHTEN TRANSMISSION ASSEMBLY (AUTOMATIC TRANSMISSION)
   (a) Tighten the transmission assembly mounting bolts in the order of A, B, C.
   Torque: 59 N*m (602 kgf*cm) Bolt A
   37 N*m (375 kgf*cm) Bolt B
   HINT:
   • Bolt A, B product number 90041-19968 (Length under bolt head 57 mm)
   • Bolt C product number 91612-61040 (Length under bolt head 40 mm)
(1) Using an extension bar (600 mm), tighten the 2 new bolts A.
   **Torque:** 59 N*m (602 kgf*cm)
   **NOTICE:**
   When tightening bolts A, tighten the clamp of water bypass pipe No. 2 together.
   **HINT:**
   Bolt A product number 90041-19968 (Length under bolt head 57 mm)

(2) Using an extension bar (600 mm), tighten 2 bolts B.
   **NOTICE:**
   Tighten the C2 sensor bracket together.
   **Torque:** 59 N*m (602 kgf*cm)
   **HINT:**
   Bolt B product number 90041-19968 (Length under bolt head 57 mm)

(3) Tighten 4 bolts C.
   **Torque:** 37 N*m (375 kgf*cm)
   **HINT:**
   Bolt C product number 90119-10260 (Length under bolt head 40 mm)
10. CONNECT TRANSMISSION CONTROL CABLE ASSEMBLY
   (a) Install the transmission control cable assembly to the neutral start switch with the bolt.

   NOTICE:
   Do not move the control cable end for more than 8 degrees, and do not apply load to the control cable end.
   Torque: 9.2 N*m (94 kgf*cm)

11. INSTALL OIL COOLER TUBE
   (a) Temporarily install the oil cooler tube to the transmission assembly with the 2 union bolts.

   (b) Temporarily install the oil cooler tube clamp with the bolt.
   (c) Tighten the 2 union bolts.
   Torque: 34.3 N*m (349 kgf*cm)
   (d) Tighten the mounting bolt of the clamp.
   Torque: 7.9 N*m (80 kgf*cm)

12. CONNECT CONNECTOR
   (a) Connect the neutral start switch connector.
   (b) Connect the trans solenoid connector and the 2 transmission revolution sensor connectors.

   (c) Install the earth wire to the transmission body with the bolt.
(d) Install the wire harness clamp of the oxygen sensor assembly.

(e) Install the engine rear support member with the 4 bolts.
   Torque: 48 N·m (489 kgf·cm)

13. INSTALL FRONT PROPELLER SHAFT ASSEMBLY (FOR 4WD)(See page PR-4)
14. INSTALL PROPELLER WITH CENTER BEARING SHAFT ASSEMBLY(See page PR-7)
15. INSTALL FRONT SUSPENSION CROSS MEMBER LWR(See page PR-4)
16. INSTALL EXHAUST PIPE ASSEMBLY FR(See page EX-2)
17. INSTALL INTAKE MANIFOLD(See page EM-164)
18. INSTALL THROTTLE BODY ASSEMBLY(See page EM-164)
19. INSTALL FUEL INJECTOR ASSEMBLY(See page EM-164)
20. INSTALL FUEL DELIVERY PIPE(See page EM-165)
21. CONNECT VACUUM HOSE ASSEMBLY(See page EM-165)
22. CONNECT ACCELERATOR CONTROL CABLE ASSEMBLY(See page EM-165)
23. INSTALL VENTILATION HOSE(See page EM-166)
24. INSTALL VENTILATION HOSE NO. 2 (See page EM-166)
25. INSTALL AIR CLEANER ASSEMBLY(See page EM-167)
26. INSTALL AIR CLEANER HOSE NO. 1(See page CO-18)
27. INSTALL BATTERY
28. CONNECT NEGATIVE BATTERY TERMINAL (See page EM-167)
29. ADD AUTOMATIC TRANSMISSION FLUID(See page AT-55)
30. ADD TRANSFER FLUID (FOR 4WD)(See page TF-6)
31. ADD ENGINE COOLANT(See page CO-9)
32. CHECK FOR ENGINE COOLANT LEAKS (See page CO-10)
33. CHECK COOLANT LEVEL(See page CO-10)
34. CHECK FOR FUEL LEAKS(See page EM-167)
35. CHECK FOR EXHAUST GAS LEAKS
36. INSTALL ENGINE UNDER COVER RR RH
37. INSTALL ENGINE UNDER COVER RR LH
38. INSTALL ENGINE UNDER COVER
39. INSPECT ENGINE IDLE SPEED (See page EM-2)

40. INITIALIZE DS-II AT LEARNED VALUE
    (See page AT-15)
TRANSMISSION FLOOR SHIFT ASSEMBLY

COMPONENTS

- CONSOLE BOX ASSEMBLY RR
- CONSOLE BOX REAR COVER
- CONSOLE BOX CARPET
- TRANSMISSION FLOOR SHIFT ASSEMBLY
- TRANSMISSION CONTROL CABLE ASSEMBLY
- CLIP

T=18.1(185)  ×4

• NON-REUSEABLE PART

[ N*m (kgf*cm) ]

C143655J01
REMOVAL

1. DISCONNECT TRANSMISSION CONTROL CABLE ASSEMBLY
   (a) Lift up the vehicle.
   (b) Remove the 2 clips, and disconnect the transmission control cable end from the transmission floor shift assembly.
   NOTICE: Do not move the control cable end for more than 8 degrees, or do not apply load to the control cable end.

2. REMOVE CONSOLE BOX ASSEMBLY RR (See page IP-9)

3. DISCONNECT SHIFT LOCK RELEASE CABLE ASSEMBLY
   (a) Disconnect the shift lock release cable end from the transmission floor shift assembly.

4. REMOVE TRANSMISSION FLOOR SHIFT ASSEMBLY
   (a) Disconnect the wire harness clamp.
   (b) Remove the 4 bolts and transmission floor shift assembly.

INSTALLATION

1. INSTALL TRANSMISSION FLOOR SHIFT ASSEMBLY
   (a) Install the transmission floor shift assembly with the 4 bolts.
   Torque: 18.1 N·m (185 kgf·cm)
   (b) Install the wire harness clamp.

2. CONNECT SHIFT LOCK RELEASE CABLE ASSEMBLY
   (a) Install the shift lock release cable end to the transmission floor shift assembly.

3. CONNECT TRANSMISSION CONTROL CABLE ASSEMBLY
   (a) Install the transmission control cable assembly to the transmission floor shift assembly with 2 new clips.
   NOTICE: Install the eye-end first.
   :Do not move the control cable end for more than 8 degrees, and do not apply load to the control cable end.
   (b) Connect the end of the control cable to the transmission floor shift assembly.

4. INSTALL CONSOLE BOX ASSEMBLY RR (See page IP-20)

5. CHECK FUNCTION OF TRANSMISSION FLOOR SHIFT ASSEMBLY
6. ADJUST TRANSMISSION CONTROL CABLE ASSEMBLY

(a) Check the operation of the shift lock.

(b) While putting the shift lever into each shift range, make sure that the shift lever operates as shown in the illustration. Make sure that the shift lever moves properly and can be operated smoothly. Also check that the correct shift position indicator is indicated when the shift lever is in each position. Make sure that the position indicator does not flicker when the shift lever is moved slightly within each shift position.

(c) Start the engine and check that the vehicle moves forward when the shift lever is in the D, 2, and L positions. Also check that the vehicle reverses when the shift lever is in the R position.

(d) Turn the ignition switch to the ON position. Check that the backup light turns on and the warning buzzer operates when the shift lever is in the R position.

Mark:

- Put the ignition switch into the ACC or ON position. Move the shift while pressing the shift lever button and keeping the brake pedal depressed.
- It should be possible to move the shift lever without pressing the shift lever button.
- The pressing the shift lever button must be pressed in order to move the shift lever.

(b) Place identification marks on the parts to indicate up and down. Remove the installation bolt of the control cable and control shaft lever assembly.

(c) Rotate the control shaft lever in the counterclockwise direction until it stops. (This is the P position.) Then rotate the control shaft lever two turns in the opposite direction. (This is the N position.)

(d) Put the shift lever in the N position.

(e) With no slackness in the control cable, install the transmission control shaft lever assembly.

**Standard:**

\[ T = 9.2 \text{ N} \cdot \text{m} \] (94kgf\(^*\)cm)

(f) After marking the adjustments, check the operation of shift lever.
TRANSMISSION WIRE

COMPONENTS

- APPLY ATF
- TIGHTENING TORQUE [N·m(kgf·cm)]
- NON-REUSEABLE PART

- O-RING
- TRANSMISSION WIRE
- OIL STRAINER
- TRANSMISSION MAGNET
- TRANSAXLE OIL PAN (ATM)
- GASKET
- DRAIN PLUG

- TIGHTENING TORQUE [N·m(kgf·cm)]
- NON-REUSEABLE PART
REMOVAL
1. DISCONNECT NEGATIVE BATTERY TERMINAL
2. REMOVE ENGINE UNDER COVER RR RH
3. REMOVE ENGINE UNDER COVER RR LH
4. DRAIN AUTOMATIC TRANSMISSION FLUID (See page AT-85)
5. REMOVE TRANSAXLE OIL PAN (ATM) (See page AT-85)
6. REMOVE OIL STRAINER (See page AT-85)
7. REMOVE TRANSMISSION WIRE
   (a) Disconnect the solenoid connector and solenoid wire connector.
   (b) Disconnect the wire harness from the clamp.
   (c) Disconnect the 6 connectors of each solenoid valve, and disconnect the transmission wire from the valve body.

INSTALLATION
1. INSTALL TRANSMISSION WIRE
   (a) Install the transmission wire connector with the bolt.
   Torque: 5.9 N*m (60 kgf*cm)
   (b) Connect the transmission wire connector.
(c) Connect the solenoid connector and the solenoid wire connector.

2. INSTALL OIL STRAINER (See page AT-90)

3. INSTALL TRANSAXLE OIL PAN (ATM) (See page AT-90)

4. CONNECT NEGATIVE BATTERY TERMINAL

5. ADD AUTOMATIC TRANSMISSION FLUID

6. INSTALL ENGINE UNDER COVER RR RH

7. REMOVE ENGINE UNDER COVER RR LH

8. INITIALIZE AUTOMATIC TRANSMISSION LEARNED VALUE
   (See page AT-15)

INSPECTION

1. CHECK RESISTANCE
   (a) Using the tester, inspect the resistance between the terminals.

   Standard:

<table>
<thead>
<tr>
<th>Terminal No. (Terminal Symbols)</th>
<th>Fluid temperature [°C]</th>
<th>Resistance [Ω]</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 (OTMP) ←→ 1 (E)</td>
<td>0</td>
<td>5.63 ± 0.56</td>
</tr>
<tr>
<td>5 (OTMP) ←→ 1 (E)</td>
<td>140</td>
<td>0.072 ± 0.0022</td>
</tr>
</tbody>
</table>
TRANSMISSION VALVE BODY ASSEMBLY

COMPONENTS

- CLUTCH CONTROL SOLENOID NO. 1
- SOLENOID LOCK PLATE
- T=5.9(60)

- LOCK UP CONTROL SOLENOID
- T=5.9(60)

- AUTOMATIC TRANSMISSION 3-WAY SOLENOID ASSEMBLY
- T=5.9(60)

- O-RING

- BRAKE CYLINDER SEAL
- T=5.9(60)

- CLUTCH CONTROL SOLENOID NO. 2
- SOLENOID LOCK PLATE
- T=5.9(60)

- AUTOMATIC TRANSMISSION 3-WAY SOLENOID ASSEMBLY
- T=5.9(60)

- O-RING

- TRANSMISSION VALVE BODY ASSEMBLY
- T=8.4(85)

- LOCK UP CONTROL SOLENOID
- T=5.9(60)

- SOLENOID LOCK PLATE
- T=5.9(60)

- CLUTCH CONTROL SOLENOID NO. 1

- MANUAL DETENT SPRING
REMOVAL

1. DISCONNECT NEGATIVE BATTERY TERMINAL

2. REMOVE ENGINE UNDER COVER RR RH

3. REMOVE ENGINE UNDER COVER RR LH

4. DRAIN AUTOMATIC TRANSMISSION FLUID
   (a) Remove the drain plug and gasket, and drain the automatic transmission fluid.
   (b) Install the drain plug using a new gasket.
   Torque: 24.5 N*m (250 kgf*cm)

5. REMOVE TRANSAXLE OIL PAN (ATM)
   (a) Remove the 14 bolts, and remove the oil pan.
   HINT: After removing the bolts, hold the oil pan by hand, and lightly tap the flange of the oil pan to remove the oil pan.

6. REMOVE OIL STRAINER
   (a) Disengage the 3 claws and remove the oil strainer.
   NOTICE: As the transmission fluid will be discharged, place the tray under it.

7. REMOVE TRANSMISSION VALVE BODY ASSEMBLY
   (a) Remove the manual detent with the 2 bolts.

   (b) Disconnect the solenoid connector and transmission wire.

   (c) Using the SST, hold the manual valve idler shaft.

SST 09350-97201
(d) Evenly loosen the 6 bolts to remove, then remove the transmission valve body assembly.  
**NOTICE:**  
When removing the transmission valve body assembly, pay attention not to drop the manual valve.

8. **REMOVE BRAKE CYLINDER SEAL**  
   (a) Remove the brake cylinder seal.  
   **NOTICE:**  
   When removing the valve body, pay attention to the 2nd and 4th brake cylinder seal as they may drop.

9. **REMOVE CLUTCH CONTROL SOLENOID NO. 1**  
   (a) Gently remove the manual valve from the body assembly.  
   (b) Remove the 2 bolts and the 2 clutch control solenoids No. 1.
10. REMOVE CLUTCH CONTROL SOLENOID NO. 2
   (a) Remove the bolt and clutch control solenoid No. 2.

11. REMOVE LOCK-UP CONTROL SOLENOID
   (a) Remove the 2 bolts and the lock-up control solenoid.

12. REMOVE AUTOMATIC TRANSMISSION THREE-WAY SOLENOID ASSEMBLY
    (a) Remove the 4 bolts and the 2 automatic transmission three-way solenoid assemblies.
INSTALLATION

1. INSTALL AUTOMATIC TRANSMISSION THREE-WAY SOLENOID ASSEMBLY
   (a) Install the automatic transmission three-way solenoid assembly with the 4 bolts.
   Torque: 5.9 N·m (60.2 kgf·cm)

2. INSTALL LOCK-UP CONTROL SOLENOID
   (a) Install the lock-up control solenoid with the 2 bolts.
   Torque: 5.9 N·m (60.2 kgf·cm)

3. INSTALL CLUTCH CONTROL SOLENOID NO. 2
   (a) Install the clutch control solenoid No. 2 with the bolt and solenoid lock plate.
   Torque: 5.9 N·m (60.2 kgf·cm)
4. **INSTALL CLUTCH CONTROL SOLENOID NO. 1**
   (a) Install the clutch control solenoid No. 1 with the 2 bolts and the solenoid lock plate.
   **Torque:** 5.9 N·m (60.2 kgf·cm)
   (b) Coat the manual valve with ATF, then install it to the valve body assembly.
   **HINT:**
   After assembling the manual valve, lightly move the manual valve back and forth and check that the valve moves smoothly.

5. **INSTALL BRAKE CYLINDER SEAL**
   (a) Install a new brake cylinder seal.

6. **TEMPORARILY TIGHTEN TRANSMISSION VALVE BODY ASSEMBLY**
   (a) Check that the brake cylinder seal is installed on the transmission case.

   (b) By aligning the protrusion of the manual valve lever with the groove of the manual valve, install them to the transmission case.
   (c) Temporarily install the valve body assembly with the 6 bolts.
   **NOTICE:**
   Clean the bolts with air before installation.

7. **FULLY TIGHTEN TRANSMISSION VALVE BODY ASSEMBLY**
   (a) Tighten the 2 standard bolts (labeled A) to the specified torque.
   (b) Tighten the remaining bolts to the specified torque.
   **NOTICE:**
   • Be sure to install the solenoid wire connector.
   • Be sure to install the solenoid wire to the clamp.
(c) Using SST, align the groove of the manual valve with the hole of the valve body (N position) and install the manual detent spring.

**SST 09351-87211**

**HINT:**
First tighten bolt A then bolt B to install the manual detent spring.

---

8. **INSTALL OIL STRAINER**

(a) Coat a new O-ring with ATF, and install it to the oil strainer.

(b) Install the oil strainer.

---

9. **INSTALL TRANSAXLE OIL PAN (ATM)**

(a) Clean and degrease the fitting surface, then coat the fitting surface with liquid gasket.

**NOTICE:**
Do not apply too much liquid gasket. (If a large amount of liquid gasket dissolves in the ATF, the ATF will deteriorate.)

(b) Install the oil pan to the transmission case with the 14 bolts.

**Torque:** 8.4 N·m (85 kgf·cm)

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10. **CONNECT NEGATIVE BATTERY TERMINAL**

11. **ADD AUTOMATIC TRANSMISSION FLUID**

12. **INSTALL ENGINE UNDER COVER RR RH**

13. **INSTALL ENGINE UNDER COVER RR LH**

14. **INITIALIZE AUTOMATIC TRANSMISSION LEARNED VALUE**
(See page AT-15)

15. **PERFORM INITIALIZATION**
(See page SS-10)
AUTOMATIC TRANSMISSION THREE-WAY SOLENOID ASSEMBLY

INSPECTION

1. AUTOMATIC TRANSMISSION THREE-WAY SOLENOID ASSEMBLY
   (a) Check the operation (LUC solenoid).
      (1) When connecting the battery positive lead to the automatic transmission three-way solenoid assembly (LUC solenoid) terminal and the negative lead to the body, check if the valve in the solenoid operates.
         Standard:
         The valve operates. (Operating sounds can be heard.)
         NOTICE:
         The LUC solenoid valve does not have a spring. If it is necessary to operate the valve again, shake the solenoid or ball to return the valve to its original position. (To return the valve to its original position with the valve installed on the vehicle, start the engine with the shift lever in the P position.)
   (b) Check the resistance (LUC solenoid).
      (1) Using the tester, inspect the resistance between the solenoid terminal and body.
         Standard:
         14 to 18 Ω (20°C)
   (c) Check the operation (switch solenoid).
      (1) When connecting the battery positive lead to the automatic transmission three-way solenoid assembly (switch solenoid) terminal and the negative lead to the body, check if the valve in the solenoid operates.
         Standard:
         The valve operates. (Operating sounds can be heard.)
         NOTICE:
         The switch solenoid valve does not have a spring. If it is necessary to operate the valve again, shake the solenoid or ball to return the valve to its original position. (To return the valve to its original position with the valve installed on the vehicle, start the engine with the shift lever in the P position.)
   (d) Check the resistance (LUC solenoid).
      (1) Using the tester, inspect the resistance between the solenoid terminal and body.
         Standard:
         14 to 18 Ω (20°C)
CLUTCH CONTROL SOLENOID NO. 1

INSPECTION

1. CLUTCH CONTROL SOLENOID NO. 1
   (a) Check the operation (solenoid No. 2).
      (1) Using a 12 V-21 W bulb, connect the battery positive lead to terminal 2 of the clutch control solenoid No. 1 (solenoid No. 2) and the negative lead to terminal 1. Check that the valve in the solenoid operates.
         Standard:
         The valve operates. (Operating sounds can be heard.)
         NOTICE:
         Do not apply battery voltage directly. Be sure to use the specified bulb (resistance) to check the operation.
   (b) Check the resistance (solenoid No. 2).
      (1) Using the tester, inspect the resistance between the terminals.
         Standard:
         5.0 to 5.6 Ω (20°C)
   (c) Check the operation (solenoid No. 3).
      (1) Using a 12 V-21 W bulb, connect the battery positive lead to terminal 2 of the clutch control solenoid No. 1 (solenoid No. 3) and the negative lead to terminal 1. Check that the valve in the solenoid operates.
         Standard:
         The valve operates. (Operating sounds can be heard.)
         NOTICE:
         Do not apply battery voltage directly. Be sure to use the specified bulb (resistance) to check the operation.
   (d) Check the resistance (solenoid No. 3).
      (1) Using the tester, inspect the resistance between the terminals.
         Standard:
         5.0 to 5.6 Ω (20°C)
LOCK-UP CONTROL SOLENOID

INSPECTION

1. LOCK-UP CONTROL SOLENOID
   (a) Check the operation.
      (1) When connecting the battery positive lead to the lock-up control solenoid terminal and the negative lead to the body, check if the valve in the solenoid operates.
         Standard: The valve operates. (Operating sounds can be heard.)
   (b) Check the resistance.
      (1) Using the tester, inspect the resistance between the solenoid terminal and body.
         Standard: 11 to 13 Ω (20°C)
EXTENSION HOUSING OIL SEAL

COMPONENTS

- EXTENSION HOUSING OIL SEAL
- AUTOMATIC TRANSMISSION ASSEMBLY
- REAR DIFFERENTIAL CARRIER ASSEMBLY
- PROPELLER WITH CENTER BEARING SHAFT ASSEMBLY
- ENGINE UNDER COVER RH
- ENGINE UNDER COVER LH

TIGHTENING TORQUE [N·m(kgf·cm)]

- ENGINE UNDER COVER RH: T=5.4(55)
- ENGINE UNDER COVER LH: T=5.4(55)
- AUTOMATIC TRANSMISSION ASSEMBLY: T=60(612)
- EXTENSION HOUSING OIL SEAL: T=37(377)

APPLY MP GREASE
REMOVAL
1. REMOVE ENGINE UNDER COVER RR RH
2. REMOVE ENGINE UNDER COVER RR LH
3. DRAIN AUTOMATIC TRANSMISSION FLUID (See page AT-85)
4. REMOVE PROPELLER WITH CENTER BEARING SHAFT ASSEMBLY (See page PR-6)
5. REMOVE EXTENSION HOUSING OIL SEAL
   SST  09308-00010
   (a) Using the SST, remove the oil seal.

INSTALLATION
1. INSTALL EXTENSION HOUSING OIL SEAL
   SST  09309-87201
   (a) Apply a small amount of MP grease to the lip of a new oil seal.
   (b) Using the SST and a hammer, drive in the oil seal into the extension housing.
   Standard:
   1.5 ± 0.5 mm (press in)
   NOTICE:
   • Do not tap the oil seal in too much.
   • Be careful not to deform the oil seal.
   • Make sure the oil seal is installed in the correct direction.
2. INSTALL PROPELLER WITH CENTER BEARING SHAFT ASSEMBLY (See page PR-7)
3. ADD AUTOMATIC TRANSMISSION FLUID
4. INSPECT AUTOMATIC TRANSMISSION FLUID (See page AT-55)
5. REMOVE ENGINE UNDER COVER RR RH
6. REMOVE ENGINE UNDER COVER RR LH
SHIFT LOCK DEVICE

ON-VEHICLE INSPECTION

1. INSPECT SHIFT LOCK OPERATION
   (a) Turn the ignition switch to the ACC or ON position.
   (b) Move the shift lever to the P position and release the shift lever button.
   (c) With the brake pedal not depressed, make sure that the shift lever button cannot be depressed and the shift lever cannot be moved to any position other than the P position.
   (d) With the brake pedal depressed, make sure that the shift lever button can be depressed and the shift lever can be moved out of the P position.
   (e) Move the shift lever to the P position and release the shift lever button.
   (f) Turn the ignition key to the LOCK position.
   (g) Regardless of the condition of the brake pedal, make sure that the shift lever button cannot be depressed and the shift lever cannot be shifted to any position other than the P position.
CLUTCH CONTROL SOLENOID NO. 2

INSPECTION

1. CLUTCH CONTROL SOLENOID NO. 2
   (a) Check the operation (solenoid No. 1).
      (1) Using a 12 V-21 W bulb, connect the battery positive lead to terminal 2 of the clutch control solenoid No. 2 (solenoid No. 1) and the negative lead to terminal 1. Check that the valve in the solenoid operates.
      **Standard:**
      The valve operates. (Operating sounds can be heard.)
   (b) Check the resistance (solenoid No. 1).
      (1) Using the tester, inspect the resistance between the terminals.
      **Standard:**
      5.0 to 5.6 Ω (20°C)
TRANSMISSION CONTROL COMPUTER ASSEMBLY

COMPONENTS

REMOVAL
1. DISCONNECT NEGATIVE BATTERY TERMINAL
2. REMOVE GLOVE COMPARTMENT DOOR ASSEMBLY (See page IP-11)
3. REMOVE TRANSMISSION CONTROL COMPUTER ASSEMBLY
   (a) Remove the 2 bolts and steering shaft universal joint assembly.
(b) Disconnect the connector from the transmission control computer assembly.

INSTALLATION

1. INSTALL TRANSMISSION CONTROL COMPUTER ASSEMBLY
   (a) Connect the connector to the transmission control computer assembly.

   (b) Install the transmission control computer assembly with the 2 bolts.

2. INSTALL GLOVE COMPARTMENT DOOR ASSEMBLY (See page IP-18)

3. CONNECT NEGATIVE BATTERY TERMINAL
SHIFT LOCK RELEASE CABLE ASSEMBLY

COMPONENTS

- STEERING COLUMN COVER
- INSTRUMENT PANEL UNDER COVER NO. 1
- INSTRUMENT PANEL FINISH PANEL LWR
CONSOLE BOX ASSEMBLY RR

CONSOLE BOX ASSEMBLY RR

CONSOLE BOX CARPET

SHIFT LOCK RELEASE CABLE ASSEMBLY

TIGHTENING TORQUE [N·m (kgf·cm)]

C143660J01
REMOVAL

1. HANDLING AND WORK PRECAUTIONS

2. CHECK FRONT TIRES FACING STRAIGHT AHEAD

3. DISCONNECT BATTERY NEGATIVE TERMINAL

4. REMOVE CONSOLE BOX ASSEMBLY RR (See page IP-9)

5. DISCONNECT SHIFT LOCK RELEASE CABLE ASSEMBLY
   (a) Disconnect the shift lock release cable assembly from the shift control unit assembly.

6. REMOVE STEERING COLUMN LOWER COVER (See page WW-21)

7. REMOVE INSTRUMENT PANEL FINISH PANEL LWR (See page IP-11)

8. REMOVE INSTRUMENT PANEL UNDER COVER NO. 1 (See page IP-11)

9. REMOVE SHIFT LOCK RELEASE CABLE ASSEMBLY
   (a) Remove the 2 bolts, and disengage the 2 clamps of the shift lock release cable assembly.

   (b) Disengage the 2 claws and disconnect the shift lock release cable assembly from the key cylinder assembly.

   (c) Remove the bolt and shift lock release cable assembly.
INSTALLATION

1. INSTALL SHIFT LOCK RELEASE CABLE ASSEMBLY
   (a) Install the shift lock release cable assembly with the bolt.
       Torque: 9.2 N'm (94 kgf*cm)
   (b) Turn the ignition key to the ACC position, and fully slide the key lock pin toward the front of the vehicle.
   (c) Install the shift lock release cable end to the key cylinder assembly.
   (d) Install the 2 clamps of the shift lock release cable assembly with the 2 bolts.
       Torque: 12 N'm (122 kgf*cm)
   (e) Move the shift lever to the park position.
   (f) Install the shift lock release cable end to the shift control unit assembly.

2. ADJUST SHIFT LOCK RELEASE CABLE ASSEMBLY
   (a) Loosen the nut, and without depressing the brake pedal, adjust the lock mechanism unit so that the protrusion becomes 0.5 to 4 mm and secure it with the nut.
       Standard:
       0.5 to 4 mm (protrusion of lock mechanism)
       NOTICE:
       Do not overtighten the adjust nut, or it may change the height of the brake pedal.

3. INSTALL INSTRUMENT PANEL UNDER COVER NO. 1 (See page IP-18)
4. INSTALL INSTRUMENT PANEL FINISH PANEL LWR (See page IP-18)
5. INSTALL STEERING COLUMN LOWER COVER (See page WW-23)
6. INSTALL CONSOLE BOX ASSEMBLY RR(See page IP-20)
7. CONNECT NEGATIVE BATTERY TERMINAL