# AUTOMATIC TRANSMISSION

## CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>GENERAL INFORMATION</td>
<td>2</td>
</tr>
<tr>
<td>SERVICE SPECIFICATIONS</td>
<td>2</td>
</tr>
<tr>
<td>LUBRICANTS</td>
<td>3</td>
</tr>
<tr>
<td>SEALANTS</td>
<td>3</td>
</tr>
<tr>
<td>SPECIAL TOOLS</td>
<td>3</td>
</tr>
<tr>
<td>TROUBLESHOOTING</td>
<td>4</td>
</tr>
<tr>
<td>ON-VEHICLE SERVICE</td>
<td>10</td>
</tr>
<tr>
<td>Automatic Transmission Fluid Check</td>
<td>10</td>
</tr>
<tr>
<td>Automatic Transmission Fluid Change</td>
<td>11</td>
</tr>
<tr>
<td>Transfer Oil Level Check</td>
<td>11</td>
</tr>
<tr>
<td>Transfer Oil Replacement</td>
<td>12</td>
</tr>
<tr>
<td>4WD Detection Switch Continuity Check &lt;4WD&gt;</td>
<td>12</td>
</tr>
<tr>
<td>High/Low Detection Switch Continuity Check &lt;4WD&gt;</td>
<td>12</td>
</tr>
<tr>
<td>Throttle Cable Check and Adjustment</td>
<td>13</td>
</tr>
<tr>
<td>Selector Lever Operation Check</td>
<td>14</td>
</tr>
<tr>
<td>Inhibitor Switch Continuity Check</td>
<td>14</td>
</tr>
<tr>
<td>Inhibitor Switch and Control Cable Adjustment</td>
<td>14</td>
</tr>
<tr>
<td>Automatic Transmission Fluid Temperature</td>
<td>15</td>
</tr>
<tr>
<td>Switch Check</td>
<td></td>
</tr>
<tr>
<td>A/T Control Component Location</td>
<td>16</td>
</tr>
<tr>
<td>A/T Control Component Check</td>
<td>17</td>
</tr>
<tr>
<td>Converter Stall Test</td>
<td>19</td>
</tr>
<tr>
<td>Hydraulic Pressure Test</td>
<td>20</td>
</tr>
<tr>
<td>Hydraulic Circuit</td>
<td>22</td>
</tr>
<tr>
<td>TRANSMISSION CONTROL*</td>
<td>23</td>
</tr>
<tr>
<td>SELECTOR LEVER ASSEMBLY</td>
<td>25</td>
</tr>
<tr>
<td>TRANSMISSION ASSEMBLY &lt;2WD&gt;</td>
<td>27</td>
</tr>
<tr>
<td>TRANSMISSION ASSEMBLY &lt;4WD&gt;</td>
<td>30</td>
</tr>
<tr>
<td>4WD INDICATOR-ECU</td>
<td>33</td>
</tr>
<tr>
<td>TRANSMISSION OIL COOLER</td>
<td>34</td>
</tr>
</tbody>
</table>

## WARNING REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

**WARNING!**

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

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

3. MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B – Supplemental Restraint System (SRS) before beginning any service or maintenance of any component of the SRS or any SRS-related component.

**NOTE**

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

<table>
<thead>
<tr>
<th>Items</th>
<th>Vehicles with 4G63 engine</th>
<th>Vehicles with 4D56 engine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission model</td>
<td>R4AW2-6</td>
<td>V4AW2-6</td>
</tr>
<tr>
<td>Type</td>
<td>4-speed full automatic</td>
<td>4-speed full automatic</td>
</tr>
<tr>
<td>Gear ratio</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st</td>
<td>2.826</td>
<td>2.826</td>
</tr>
<tr>
<td>2nd</td>
<td>1.493</td>
<td>1.493</td>
</tr>
<tr>
<td>3rd</td>
<td>1.000</td>
<td>1.000</td>
</tr>
<tr>
<td>4th</td>
<td>0.730</td>
<td>0.688</td>
</tr>
<tr>
<td>Reverse</td>
<td>2.703</td>
<td>2.703</td>
</tr>
<tr>
<td>Transfer type</td>
<td>–</td>
<td>2-speed</td>
</tr>
<tr>
<td>Gear ratio</td>
<td>High</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>1.000</td>
</tr>
<tr>
<td>Speedometer gear ratio (driven/drive)</td>
<td>22/6</td>
<td>25/8</td>
</tr>
</tbody>
</table>

### SERVICE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Items</th>
<th>Standard value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance between inner cable stopper and end of outer cable &lt;4G63&gt; mm</td>
<td>0 – 1</td>
</tr>
<tr>
<td>Distance between inner cable stopper and end of outer cable &lt;4D56&gt; mm</td>
<td>34 – 35</td>
</tr>
<tr>
<td>Lock-up solenoid valve coil resistance (at 20°C) Ω</td>
<td>Approx. 13</td>
</tr>
<tr>
<td>Stall speed r/min</td>
<td></td>
</tr>
<tr>
<td>4G63</td>
<td>2,100 – 2,400</td>
</tr>
<tr>
<td>4D56</td>
<td>2,300 – 2,600</td>
</tr>
<tr>
<td>Governor pressure kPa</td>
<td></td>
</tr>
<tr>
<td>1,000 r/min</td>
<td>137 – 166</td>
</tr>
<tr>
<td>2,000 r/min</td>
<td>245 – 284</td>
</tr>
<tr>
<td>3,200 r/min</td>
<td>402 – 460</td>
</tr>
<tr>
<td>Line pressure kPa</td>
<td></td>
</tr>
<tr>
<td>At idle speed D range</td>
<td>480 – 558</td>
</tr>
<tr>
<td>R range</td>
<td>735 – 852</td>
</tr>
<tr>
<td>At stall speed D range</td>
<td>1,019 – 1,195</td>
</tr>
<tr>
<td>R range</td>
<td>1,519 – 1,911</td>
</tr>
<tr>
<td>Operation temperature of engine coolant temperature switch °C</td>
<td></td>
</tr>
<tr>
<td>On (continuity)</td>
<td>50 ± 3</td>
</tr>
<tr>
<td>Off (no continuity)</td>
<td>43</td>
</tr>
<tr>
<td>Clearance between shift lever guide and steering column mm</td>
<td>2.4 – 3.6</td>
</tr>
</tbody>
</table>
## LUBRICANTS

<table>
<thead>
<tr>
<th>Items</th>
<th>Specified lubricants</th>
<th>Quantity</th>
</tr>
</thead>
</table>
| Transmission fluid           | DEXRON-II or equivalent                                 | R4AW2: Approx. 6.8  
                              |                                          | V4AW2: Approx. 7.2                  |
| Transfer oil                 | Hypoid gear oil SAE 75W-90, 75W-85W or 80W confirming to API GL-4 | 2.3      |
| O-ring for oil filler pipe   | DEXRON-II or equivalent                                 | As required |

## SEALANTS

<table>
<thead>
<tr>
<th>Items</th>
<th>Specified sealant</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automatic transmission fluid temperature switch</td>
<td>3M ATD Part No.8660 or equivalent</td>
<td>Semi-drying sealant</td>
</tr>
<tr>
<td>Transfer control lever gasket and spring cover support</td>
<td>3M ATD Part No.8661 or equivalent</td>
<td>Semi-drying sealant</td>
</tr>
<tr>
<td>Engine coolant temperature switch</td>
<td>3M Nut Locking Part No.4171 or equivalent</td>
<td>Drying sealant</td>
</tr>
</tbody>
</table>

## SPECIAL TOOLS

<table>
<thead>
<tr>
<th>Tool</th>
<th>Number</th>
<th>Name</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Oil pressure gauge" /></td>
<td>MD998330 (includes MD998331)</td>
<td>Oil pressure gauge (2,942 kPa)</td>
<td>Measurement of oil pressure</td>
</tr>
<tr>
<td><img src="image" alt="Adapter" /></td>
<td>MD998920</td>
<td>Adapter</td>
<td>Connection of oil pressure gauge</td>
</tr>
<tr>
<td><img src="image" alt="Oil pressure gauge" /></td>
<td>MD999563 (includes MD998331)</td>
<td>Oil pressure gauge (980 kPa)</td>
<td>Measurement of oil pressure</td>
</tr>
</tbody>
</table>
TROUBLESHOOTING

STANDARD FLOW OF DIAGNOSIS TROUBLESHOOTING

Automatic transmission malfunctions may be caused by the following conditions. 
(1) Improper maintenance and adjustment  
(2) Shift control system malfunction  
(3) Mechanical malfunctions  
(4) Hydraulic malfunctions  
(5) Poor engine performance

Troubleshooting in the event of any such malfunctions should begin by checking fluid level, ATF condition, manual linkage adjustment, throttle control cable adjustment and other conditions whose deviation from standards can be readily known. Then, road test shall be performed to determine whether or not the problem has been corrected or more diagnosis is necessary. If the problem still persists after these tests and corrections, hydraulic tests should be performed for further troubleshooting.

ROAD TEST

Prior to performing road test, be sure to make basic checks including check and adjustment of fluid level and condition and adjustment of the throttle cable. For road test, the transfer must be placed in the 2H (2WD-high) position. In road test, various changes such as slips in transmission and shifting conditions are checked and the transmission operation at each shift position must have been checked.
D RANGE TEST

TEST 1
Start with throttle valve opened (50 % and full), and check upshift from 1-speed → 2-speed, 2-speed → 3-speed and 3-speed → 4-speed. Check that shifting points match shift pattern.

Does the upshift from 1-speed to 2-speed occur?
Yes → TEST 2
No → OK

Does the upshift from 2-speed to 3-speed occur?
Yes → Correct
No → NG

Does the upshift from 3-speed to 4-speed occur? (with throttle valve opening under 85%)
Yes → OK
No → TEST 2

Check the shifting points.
Correct → Correct
Incorrect → Incorrect

Carry out the TEST 1 again.

TEST 2
Kickdown traveling at 2-speed, 3-speed and 4-speed. Check that possible kickdown vehicle speed limit at 2-speed → 1-speed, 3-speed → 1-speed, 3-speed → 2-speed, or 4-speed → 1-speed, 4-speed → 2-speed, 4-speed → 3-speed conforms with the shift pattern.

Does the downshift occur?
Yes → Correct
No → NG

Check the shifting point.
Correct → Correct
Incorrect → Incorrect

Carry out TEST 2 again.

TEST 3
When traveling in 3-speed or 4-speed, release accelerator pedal and shift to L. Check that 3-speed → 2-speed or 4-speed → 3-speed takes place immediately and 2-speed → 1-speed downshift conforms with shift pattern.

Does the downshift from 2-speed to 1-speed occur?
Yes → Correct
No → NG

Check the Shifting point.
Correct → Correct
Incorrect → Incorrect

Carry out TEST 3 again.
### TEST 4
When traveling in 3-speed or 4-speed, shift to 2 and L. Does the engine brake function in each range?

- Yes → TEST 5

- No → Does the engine brake function in 2 range?

  - Yes → Brake No. 1 malfunction

  - No → Does the engine brake function in L range?

    - Yes → Carry out TEST 4 again.

    - No → Brake No. 3 malfunction

### TEST 5
Is there abnormal noise(s) during acceleration and deceleration?

- Yes → Carry out TEST 5 again.

- No → Is there shocks when slipping and changing speed?

  - Yes → High line pressure

  - No → Accumulator malfunction

  - No → Check ball malfunction

### TEST 6
Is there abnormal noise(s) or vibration when traveling in 3-speed or 4-speed?

- Yes → Incorrect torque converter installation

- No → Oil pump malfunction

- No → Shifting gear not meshing correctly

- No → Incorrect drive plate installation

### TEST 7
Check that lock up ON, OFF. Does the shifting points conform with shift pattern?

- Yes → Carry out the road test in 2 range.

- No → Does the moment when lock up turns ON or OFF conform with the shift pattern?

  - Yes → Governor malfunction

  - No → Line pressure malfunction

### NOTE
Abnormal noises and vibrations are often caused by an unbalanced propeller shaft, differential, tyre, torque converter, engine, etc. Extremely thorough inspection is therefore required.

(1) Determine the moment when lock up turns ON by decreased engine r/min or by a slight shock back and forth.

(2) Determine the moment when lock up turns OFF by increased engine r/min.

(3) Check lock up condition by pumping the accelerator slightly. If engine r/min rises in accordance with throttle valve opening size, determine that the lock up is OFF, if not, determine it ON.

(When lock up is OFF, drive power is transferred through the fluid in the torque converter and therefore, when the accelerator pedal is depressed, slipping occurs inside the torque converter with a resulting large increase in engine r/min.)
2 RANGE TEST

TEST 1
Start with throttle valve opening at 50% and full. Does the shifting points conform with the shift pattern when upshifting from 1-speed → 2-speed?

Yes → TEST 2

No

Does the upshift from 1-speed to 2-speed occur?

Yes

Correct → Carry out TEST 1 again.

No

Incorrect

Check the shifting point.

Correct

Yes → TEST 2

Incorrect

Misadjusted throttle cable
Governor malfunction
Line pressure malfunction

TEST 2
Kickdown and check that possible kickdown vehicle speed limit at 2-speed → 1-speed conforms with shift pattern.

OK → Carry out road test in L range.

NG

Does the downshift occur and is the shifting point correct?

Yes → Carry out TEST 2 again.

No

Detent regulator valve malfunction
Governor malfunction
Misadjusted throttle cable
1 – 2 shift valve malfunction
Line pressure malfunction

L RANGE TEST

TEST 1
Does the transmission upshift to 2-speed?

Yes

Low coast modulator valve malfunction
Governor malfunction
Low line pressure

No → Carry out road test in R range.

R RANGE TEST

TEST 1
Is the engine r/min by stall test correct?

Yes

Brake No. 3 malfunction
Overdrive clutch or direct clutch malfunction
Overdrive one-way clutch malfunction
Low line pressure

No → Carry out road test in P range.

P RANGE TEST

TEST 1
Park vehicle on an incline (more than 5°) and release parking and service brakes. Does the vehicle move?

Yes

End

No

Park mechanism malfunction
Misadjusted shift lever
SHIFT PATTERN

<4G63 engine>

Throttle opening

(%)

Output shaft speed r/min

Vehicle speed km/h

<4D56 engine>

Throttle opening

(%)

Output shaft speed r/min

Vehicle speed km/h

TRA0943

TRA0944
## Overdrive Control Relay Connector

<table>
<thead>
<tr>
<th>Inspection terminal</th>
<th>Inspection item</th>
<th>Check requirement</th>
<th>Standard value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Overdrive switch</td>
<td>Ignition switch: ON</td>
<td>System voltage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Overdrive switch: OFF</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Overdrive switch: ON</td>
<td>0 V</td>
</tr>
<tr>
<td>3</td>
<td>Ignition switch</td>
<td>Ignition switch: OFF</td>
<td>0 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ignition switch: ON</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Detection switch</td>
<td>Run the vehicle</td>
<td>System voltage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Throttle valve: constant opening (under 85 %)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Throttle valve: Full opening</td>
<td>0 V</td>
</tr>
<tr>
<td>5</td>
<td>Overdrive solenoid valve</td>
<td>Run the vehicle at 50 km/h</td>
<td>0 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Overdrive switch: ON</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Throttle valve: constant opening (under 85 %)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Throttle valve: Full opening</td>
<td>11 V or more</td>
</tr>
<tr>
<td>6</td>
<td>Earth</td>
<td>Always</td>
<td>0 V</td>
</tr>
<tr>
<td>7</td>
<td>Engine coolant temperature switch</td>
<td>Ignition switch: ON</td>
<td>System voltage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30°C or lower</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>60°C or higher</td>
<td>0 V</td>
</tr>
<tr>
<td>8</td>
<td>Vehicle speed sensor</td>
<td>Ignition switch: ON</td>
<td>0 V ↔ 5 V (Changes repeatedly)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Move the vehicle slowly forward</td>
<td></td>
</tr>
</tbody>
</table>
ON-VEHICLE SERVICE

ON-VEHICLE SERVICE 23100090121

AUTOMATIC TRANSMISSION FLUID CHECK

1. Place the vehicle on a level surface.
2. Before removing the dipstick, wipe all dirt from area around the dipstick.
3. With the selector lever in the “P” position and the parking brake applied, start the engine.
4. The engine should be running at idle and the transmission should be warmed up sufficiently. (fluid temperature 70 – 80°C)
5. Move the selector lever through all positions to fill the torque converter and hydraulic circuit with fluid. Then place the lever in the “N” position.
6. Check that fluid level is at oil level gauge “HOT”. If fluid level is low, add fluid to “HOT” level.

Transmission fluid: DEXRON-II or equivalent

NOTE
Low fluid level can allow the oil pump to take in air together with fluid, leading to various troubles. Air trapped in hydraulic circuit forms bubbles which make the fluid spongy. This lowers pressure and shows down pressure buildup. If the transmission has too much fluid, gears churn up foam and cause same conditions as when the fluid level is low, resulting in premature deterioration of ATF. In either case, air bubbles can cause overheating and fluid oxidation and varnishing, which can interfere with normal valve, clutch and servo operation. Foaming can also result in fluid escaping from the transmission vent where it may be mistaken for a fluid leak.

7. Check fluid condition.

NOTE
When fluid smells burned, it is contaminated with metal bushing or friction material particles and hence a complete overhaul of the transmission is needed. Be sure to examine fluid on the dipstick closely.
8. After fluid has been checked, insert the dipstick until it is seated fully to seal out water and dirt.
AUTOMATIC TRANSMISSION FLUID CHANGE

Caution
If ATF change is required due to damage to the transmission, be sure to clean the cooler system.

1. Raise the vehicle on hoist. Place a drain container with large opening under the drain plug (located in bottom of the oil pan).
2. Remove the drain plug to let ATF drain.
3. Install the drain plug and new gasket and tighten to 20 Nm.
4. Refill ATF through the oil level gauge hole until its level reached at COLD lower limit of the level gauge.
5. Start the engine and allow to idle for at least two minutes. Then, with the parking brake and service brake applied, move the selector lever through all positions and finally place in the “N” or “P” position.
6. After the transmission is warmed up to the normal operating temperature, recheck the fluid level, which must be between the HOT upper limit and HOT lower limit marks.
7. Insert the dipstick fully to prevent dirt from entering the transmission.

TRANSFER OIL LEVEL CHECK

Inspect each component for evidence of leakage, and check the oil level by removing the filler plug. If the oil is contaminated, it is necessary to replace it with new oil.

1. Oil level should be at the lower portion of the filler plug hole.
2. Check that the transmission oil is not noticeably dirty, and that it has a suitable viscosity.
TRANSFER OIL REPLACEMENT

1. Remove the oil filler plug and oil drain plug.
2. Drain oil.
3. Tighten the oil drain plug to the specified torque.
   **Specified torque: 33 Nm**
4. Fill with specified oil till the level comes to the lower portion of the oil filler plug hole.
   **Specified transmission oil:**
   Hypoid gear oil SAE 75W-90, 75W-85W or 80W conforming to API GL-4
   **Quantity:** 2.3 \( \ell \)
5. Tighten the oil filler plug to the specified torque.
   **Specified torque: 33 Nm**

---

4WD DETECTION SWITCH CONTINUITY CHECK <4WD>

Check the continuity between terminals of the black connector indicated in the illustration.

<table>
<thead>
<tr>
<th>Transfer lever position</th>
<th>Terminal No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>2H</td>
<td></td>
</tr>
<tr>
<td>4H</td>
<td></td>
</tr>
</tbody>
</table>

HIGH/LOW DETECTION SWITCH CONTINUITY CHECK <4WD>

Check the continuity between terminals of the gray connector indicated in the illustration.

<table>
<thead>
<tr>
<th>Transfer lever position</th>
<th>Terminal No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>4H</td>
<td></td>
</tr>
<tr>
<td>4L</td>
<td></td>
</tr>
<tr>
<td>4H – 4L</td>
<td></td>
</tr>
</tbody>
</table>
THROTTLE CABLE CHECK AND ADJUSTMENT

<4G63>
(1) Check the throttle lever and the bracket for deformation.
(2) Measure the distance between the inner cable stopper and the end of the dust cover when the throttle lever is fully opened.

**Standard value: 0 – 1 mm**

(3) If the distance is not within the standard value, turn the adjusting nut.

<4D56>
(1) Check throttle lever for defective or bent and the throttle cable bracket for deformation.
(2) Remove the outer cable side of the boot to expose the inner cable stopper.
(3) Pull the throttle lever fully open and measure the distance between the inner cable stopper and the end of the outer cable.

**Standard value: 34 – 35 mm**

(4) If the distance is not within the standard value, turn the adjusting nut.
SELECTOR LEVER OPERATION CHECK

1. Shift selector lever to each range and check that lever moves smoothly and is controlled. Check the position indicator is correct.
2. Check the selector lever can be moved to each position (by button operation as shown in the illustration).
3. Start the engine and check if the vehicle moves forward when the selector lever is moved from N or D, and moves backward when moved to R.
4. When the shift lever malfunctions, adjust control cable and selector lever sleeve. Check the shift lever assembly sliding parts for worn.

INHIBITOR SWITCH CONTINUITY CHECK

<table>
<thead>
<tr>
<th>Position</th>
<th>Terminal No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>L</td>
<td></td>
</tr>
</tbody>
</table>

INHIBITOR SWITCH AND CONTROL CABLE ADJUSTMENT

1. Shift the manual control lever to the N position.
2. Loosen the inhibitor switch mounting bolt.
3. Turn the inhibitor switch to align the N position reference line on the inhibitor switch with the groove.
4. Tighten the mounting bolt to the specified torque.
AUTOMATIC TRANSMISSION FLUID TEMPERATURE SWITCH CHECK

1. Remove the automatic transmission fluid temperature switch from the transmission.

   Caution
   Use care to prevent foreign materials from entering the automatic transmission fluid temperature switch mounting hole.

2. Immerse the automatic transmission fluid temperature switch in fluid up to the threaded portion as shown in the illustration.

3. Use a circuit tester or similar tool to check the continuity. The switch can be judged to be good if the conditions are within the following ranges:

<table>
<thead>
<tr>
<th>Item</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuity</td>
<td>143 – 151 °C</td>
</tr>
<tr>
<td>(temperature at point A)</td>
<td></td>
</tr>
<tr>
<td>No continuity</td>
<td>125 °C or less</td>
</tr>
<tr>
<td>(temperature at point B)</td>
<td></td>
</tr>
</tbody>
</table>

4. Apply a small amount of specified sealant to thread of the automatic transmission fluid temperature switch.

   Specified sealant:
   3M ATD Part No.8660 or equivalent

5. Install the automatic transmission fluid temperature switch.

   Tightening torque: 30 Nm

6. Check the quantity of the automatic transmission fluid.
## A/T CONTROL COMPONENT LOCATION

<table>
<thead>
<tr>
<th>Name</th>
<th>Symbol</th>
<th>Name</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detection switch</td>
<td>E</td>
<td>Overdrive solenoid valve</td>
<td>F</td>
</tr>
<tr>
<td>Engine coolant temperature switch &lt;4G6&gt;</td>
<td>A</td>
<td>Overdrive switch</td>
<td>C</td>
</tr>
<tr>
<td>Inhibitor switch</td>
<td>E</td>
<td>Vehicle speed sensor</td>
<td>B</td>
</tr>
<tr>
<td>Overdrive control relay</td>
<td>D</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
A/T CONTROL COMPONENT CHECK

INHIBITOR SWITCH CHECK
Refer to P.23-14.

OVERDRIVE SOLENOID VALVE CHECK

1. Disconnect the overdrive solenoid valve connector.

2. Measure the resistance between terminal (2) of the overdrive solenoid valve connector and the body earth.

   Standard value: Approx. 13 Ω

3. If the resistance is not within the standard value, replace the overdrive solenoid valve.

DETECTION SWITCH CHECK

1. Remove the detection switch from the transmission case.

2. While blowing the low-compressed air into the switch, check the continuity between terminal and switch body.

<table>
<thead>
<tr>
<th>Item</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure not applied</td>
<td>No continuity (Infinite resistance)</td>
</tr>
<tr>
<td>Pressure applied</td>
<td>Continuity (0 Ω)</td>
</tr>
</tbody>
</table>
ENGINE COOLANT TEMPERATURE SWITCH  23101020020

1. Disconnect the engine coolant temperature switch connector.

2. Immerse the sensing portion of switch in hot water and check the continuity between the switch connector terminal and the switch body.

   **Standard value:**

<table>
<thead>
<tr>
<th>Item</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>On (continuity)</td>
<td>50 ± 3°C</td>
</tr>
<tr>
<td>Off (no continuity)</td>
<td>43°C</td>
</tr>
</tbody>
</table>

3. Replace the engine coolant temperature switch if necessary.

4. Apply the specified sealant to the threaded portion and tighten to the specified torque.

   **Specified sealant:**
   
   3M Nut Locking Part No. 4171 or equivalent

   **Tightening torque:** 7.4 Nm

VEHICLE SPEED SENSOR CHECK  23100460137

Refer to GROUP 54 – On-vehicle Service.

OVERDRIVE SWITCH CHECK  23100380143

Refer to P.23-26.
CONVERTER STALL TEST

In this test, the engine maximum speed when the torque converter stalls with the shift lever in the “D” or “R” range is measured to check operation of the torque converter, starter and one-way clutch and check holding performance of the transmission clutch (including brake).

Caution
Do not stand in front or at rear of the vehicle during this test.

(1) Check the transmission fluid level. The fluid temperature should be at the level after normal operation (70 – 80°C). The engine coolant temperature should also be at the level after normal operation (80 – 90°C).
(2) Apply chocks to the rear wheels (right and left).
(3) Mount an engine tachometer.
(4) Apply fully the parking and service brakes.
(5) Start the engine.
(6) With the selector lever in the “D” range, fully depress the accelerator pedal and read off the engine maximum speed.

Standard value:
2,100 – 2,400 r/min <4G63>
2,300 – 2,600 r/min <4D56>

NOTE
When doing so, do not keep the engine running with throttle full open for more than 5 seconds. If two or more stall tests are needed, place the selector lever in the “N” position and run the engine at about 1,000 r/min to allow the transmission fluid to cool before another stall test.

(7) Place the selector lever in the “R” range and perform the test as above.

JUDGEMENT OF STALL TEST RESULTS

| Stall speed in “D” and “R” range is equal to each other but lower than the nominal value. | (1) Engine output is low.  
(2) Starter one-way clutch is faulty. (Faulty torque converter is suspected if it is lower than nominal by more than 600 r/min) |
|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| Stall speed in “D” range is higher than nominal. | (1) Overdrive clutch slipping  
(2) Overdrive one-way clutch faulty  
(3) Forward clutch slipping  
(4) One-way clutch No. 2 faulty  
(5) Low line pressure |
| Stall speed in “R” range is higher than nominal. | (1) Overdrive clutch slipping  
(2) Overdrive one-way clutch faulty  
(3) Direct clutch slipping  
(4) Brake No. 3 slipping  
(5) Low line pressure |
The hydraulic pressure tests (governor pressure and line pressure tests) are important in determining the causes of transmission failures. Before conducting these tests, fluid level and condition and throttle cable adjustment, etc. must be checked for defects or abnormalities. When conducting the tests, the engine and transmission should be at correct operating temperatures, (engine coolant 80 – 90°C, transmission fluid 70 – 80°C.)

**GOVERNOR PRESSURE TEST**

1. Place vehicle on a chassis dynamometer.
2. Remove plug from governor pressure take off port.
3. Install special tool as shown in figure and place the meter inside vehicles.
4. Apply parking brake.
5. Start engine.
7. Shift to D and measure governor pressure at each output shaft r/min.

**Standard value:**

<table>
<thead>
<tr>
<th>Output shaft speed r/min</th>
<th>Governor pressure kPa</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,000</td>
<td>137 – 166</td>
</tr>
<tr>
<td>2,000</td>
<td>245 – 284</td>
</tr>
<tr>
<td>3,200</td>
<td>402 – 460</td>
</tr>
</tbody>
</table>

**JUDGEMENT BY GOVERNOR PRESSURE**

| Governor pressure is not within the standard value | ● Line pressure malfunction
|                                                  | ● Oil leak in governor circuit
|                                                  | ● Governor malfunction |
LINE PRESSURE TEST

(1) Place the vehicle on a chassis dynamometer.
(2) Remove the plug from the line pressure take off port.
(3) Install special tool as shown in the figure and place the meter inside vehicle.
(4) Apply the parking brake.
(5) Start the engine.
(6) Place the selector lever in the “D” range.
(7) Depress the brake pedal firmly by the left foot and operate the accelerator pedal by the right foot to measure the line pressure at each engine r/min. If the measured pressure is not nominal, check adjustment of the throttle cable and readjust if necessary before conducting the test again.
(8) Place the selector lever in the “R” range and test as above. When measuring the hydraulic pressure for reverse, change the oil-pressure gauge to 3,000 kPa.

Standard value:

<table>
<thead>
<tr>
<th>Items</th>
<th>Line pressure kPa</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>“D” range</td>
</tr>
<tr>
<td>At idle</td>
<td>4G63</td>
</tr>
<tr>
<td></td>
<td>4D56</td>
</tr>
<tr>
<td>At stall</td>
<td>4G63</td>
</tr>
<tr>
<td></td>
<td>4D56</td>
</tr>
</tbody>
</table>

JUDGEMENT BY LINE PRESSURE

| Hydraulic pressure higher than nominal in all ranges | (1) Regulator valve faulty
| (2) Throttle valve faulty
| (3) Throttle control cable incorrectly adjusted |
| Hydraulic pressure lower than nominal in all ranges | (1) Oil pump faulty
| (2) Regulator valve faulty
| (3) Throttle valve faulty
| (4) Throttle control cable incorrectly adjusted
| (5) Overdrive clutch faulty |
| Hydraulic pressure lower than nominal in “D” range | (1) Large fluid leaks in “D” range hydraulic circuit
| (2) Forward clutch faulty
| (3) Overdrive clutch faulty |
| Hydraulic pressure lower than nominal in “R” range | (1) Large fluid leaks in “R” range hydraulic circuit
| (2) Brake No. 3 faulty
| (3) Direct clutch faulty
| (4) Overdrive clutch faulty |
1. Lock-up clutch
2. Torque converter
3. Overdrive clutch
4. Overdrive brake
5. Forward clutch
6. Direct clutch
7. Brake No. 1
8. Brake No. 2
9. Brake No. 3
10. Governor
11. Lock-up signal valve
12. Accumulator B2
13. Accumulator C2
14. Accumulator C3
15. Lock-up relay valve
16. Secondary regulator valve
17. Cut-back valve
18. Relief valve
19. Throttle valve
20. Check valve
21. Oil cooler
22. Damping check valve
23. Oil pump
24. Strainer
25. Cooler bypass valve
26. Primary regulator valve
27. 1-2 shift valve
28. Low-coast shift valve
29. Manual valve
30. Low coast modulator valve
31. Intermediate shift valve
32. Reverse clutch sequence valve
33. Intermediate modulator valve
34. Detent regulator valve
35. 2-3 shift valve
36. Overdrive solenoid valve
37. Overdrive switch
38. D-2 down timing valve
39. 3rd-coast shift valve
40. 3-4 shift valve
TRANSMISSION CONTROL

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Front Floor Console Removal and Installation (Refer to GROUP 52A.)

Caution: SRS
Be careful not to subject the SRS diagnosis unit to any shocks during removal and installation of the selector lever assembly.

Sealant:
3M ATD Part No.8661 or equivalent

Selector lever assembly removal steps
1. Transmission control cable connection (selector lever side)
2. Selector lever assembly

Transmission control cable assembly removal steps
- Rear console assembly (Refer to GROUP 52A.)
1. Transmission control cable connection (selector lever side)
2. Transmission control upper lever
3. Transmission control cable connection (transmission side)
4. Cable end bracket
5. Retainer
6. Dust cover
7. Transmission control lever assembly removal steps
8. Transfer lever assembly
9. Retainer
10. Cable bracket <4WD>
11. Transmission control lever assembly
12. Gasket
13. Stopper plate
14. Gasket
15. Spring cover support
16. Transfer control lever
INSTALLATION SERVICE POINT
DUST COVER INSTALLATION
Install the dust cover as shown in the illustration.
Removal steps

1. Overdrive switch and indicator lamp connector
2. Overdrive switch
3. Button
4. Spring
5. Shift knob
6. Indicator panel assembly
7. Bulb
8. Position indicator socket assembly

9. Sleeve
10. Lever assembly
11. Shift bushing
12. Collar
13. Pin
14. Spring
15. Ball support
16. Ball
17. Bracket
DISASSEMBLY SERVICE POINT

**A** OVERDRIVE SWITCH AND INDICATOR LAMP CONNECTOR REMOVAL
Disconnect the connector and remove the terminal from the connector.

REASSEMBLY SERVICE POINTS

**A** SLEEVE INSTALLATION
Shift the selector lever to the N position, and then turn the sleeve so that the clearance between the sleeve and lever assembly end is within the standard value.
Standard value (A): 16.0 – 16.8 mm

**B** SHIFT KNOB INSTALLATION
Shift the selector lever to the N position, and then turn the sleeve so that the clearance between the detent plate and pin is within the standard value.
Standard value (A): 0.1 – 0.9 mm

INSPECTION

POSITION INDICATOR LAMP CHECK

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Always</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

OVERDRIVE SWITCH CHECK

<table>
<thead>
<tr>
<th>Switch position</th>
<th>Terminal No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3</td>
</tr>
<tr>
<td>ON (Overdrive activation)</td>
<td></td>
</tr>
<tr>
<td>OFF (Overdrive non-activation)</td>
<td></td>
</tr>
</tbody>
</table>
# Transmission Assembly <2WD>

## Removal and Installation

### Pre-removal Operation
1. Selector Lever Removal (Refer to P.23-23.)
2. Transmission Fluid Draining (Refer to P.23-11.)
3. Propeller Shaft Removal (Refer to GROUP 25.)

### Post-installation Operation
1. Propeller Shaft Installation (Refer to GROUP 25.)
2. Transmission Fluid Filling (Refer to P.23-11.)
3. Selector Lever Installation (Refer to P.23-23.)
4. Selector Lever Operation Check (Refer to P.23-14.)
5. Speedometer Operation Check

### Removal Steps

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Throttle cable connection</td>
</tr>
<tr>
<td>2</td>
<td>Filler tube assembly</td>
</tr>
<tr>
<td>3</td>
<td>O-ring</td>
</tr>
<tr>
<td>4</td>
<td>Transmission control cable connection</td>
</tr>
<tr>
<td>5</td>
<td>Cable end bracket</td>
</tr>
<tr>
<td>6</td>
<td>Speedometer cable connection</td>
</tr>
<tr>
<td>7</td>
<td>Earth cable</td>
</tr>
<tr>
<td>8</td>
<td>Overdrive solenoid valve connector</td>
</tr>
<tr>
<td>9</td>
<td>Inhibitor switch connector</td>
</tr>
<tr>
<td>10</td>
<td>Exhaust pipe clamp mounting bolt</td>
</tr>
<tr>
<td>11</td>
<td>Bell housing cover</td>
</tr>
<tr>
<td>12</td>
<td>Starter motor</td>
</tr>
<tr>
<td>13</td>
<td>Transmission oil cooler tube connection</td>
</tr>
</tbody>
</table>

![Diagram of Transmission Assembly](image)
14. Breather hose
15. Throttle cable clamp
16. Exhaust pipe clamp bracket
17. Torque converter and drive plate connection bolt
18. No.2 crossmember
19. Rear engine support insulator
20. Transmission assembly

- Support the transmission with a transmission jack
REMOVAL SERVICE POINTS

A STARTER MOTOR REMOVAL
Remove the starter motor with the starter motor harnesses still connected, and secure it inside the engine compartment.

B TORQUE CONVERTER AND DRIVE PLATE CONNECTION BOLTS REMOVAL
1. Remove the connection bolts (6 places) while turning the crankshaft.
2. Press in the torque converter to the transmission side so the torque converter does not remain on the engine side.

INSTALLATION SERVICE POINTS

A TRANSMISSION ASSEMBLY INSTALLATION
The sizes of the mounting bolts are different. So be sure not to confuse them.

<table>
<thead>
<tr>
<th>Bolt</th>
<th>Diameter x Length mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>10 x 40</td>
</tr>
<tr>
<td>B</td>
<td>8 x 55</td>
</tr>
<tr>
<td>C</td>
<td>10 x 60</td>
</tr>
<tr>
<td>D</td>
<td>10 x 65</td>
</tr>
</tbody>
</table>

B THROTTLE CABLE INSTALLATION
After installing the throttle cable, adjust it by the following procedure.

1. Open the throttle lever completely and adjust the cable with the adjusting nut so that the distance between the inner cable stopper and the outer cable end is at the standard value.
   
   Standard value (A): 0 – 1 mm

2. Tighten the adjusting nut to the specified torque.
TRANSMISSION ASSEMBLY <4WD>

REMOVAL AND INSTALLATION

Pre-removal Operation
(1) Selector Lever and Transfer Control Lever Removal
(Refer to P.23-23.)
(2) Transfer Case Protector Removal
(3) Transmission Fluid Draining (Refer to P.23-11.)
(4) Transfer Oil Draining (Refer to P.23-12.)
(5) Front and Rear Propeller Shaft Removal
(Refer to GROUP 25.)

Post-installation Operation
(1) Front and Rear Propeller Shaft Installation
(Refer to GROUP 25.)
(2) Transfer Oil Filling (Refer to P.23-12.)
(3) Transmission Fluid Filling (Refer to P.23-11.)
(4) Transfer Case Protector Installation
(5) Selector Lever and Transfer Control Lever Installation (Refer to P.23-23.)
(6) Selector Lever Operation Check (Refer to P.23-14.)
(7) Speedometer Operation Check

--

Removal steps
1. Throttle cable connection
2. Filler tube assembly mounting bolt
3. Oil cooler tube connection
4. Transmission control lever connection
5. Cable end bracket
6. Cable bracket
7. Speedometer cable connection
8. Earth cable
9. 4WD detection switch connector
10. High/Low detection switch connector
11. Overdrive solenoid valve connector
12. Inhibitor switch connector
13. Exhaust pipe clamp mounting bolt
14. Bell housing cover
15. Starter motor
16. Filler tube assembly
17. O-ring
18. Exhaust pipe clamp bracket
19. Torque converter and drive plate connection bolt
   • Support the transmission with a transmission jack
20. Transfer roll stopper
21. Transfer mount bracket
22. Transfer support bracket
23. No.2 crossmember
24. Stopper
25. Rear engine support insulator
26. Transmission assembly
REMOVAL SERVICE POINTS

A STARTER MOTOR REMOVAL
Remove the starter motor with the starter motor harnesses still connected, and secure it inside the engine compartment.

B TORQUE CONVERTER AND DRIVE PLATE CONNECTION BOLTS REMOVAL
1. Remove the connection bolts (6 places) while turning the crankshaft.
2. Press in the torque converter to the transmission side so the torque converter does not remain on the engine side.

INSTALLATION SERVICE POINTS

A TRANSMISSION ASSEMBLY INSTALLATION
The sizes of the mounting bolts are different. So be sure not to confuse them.

<table>
<thead>
<tr>
<th>Bolt</th>
<th>Diameter x Length mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>10 x 40</td>
</tr>
<tr>
<td>B</td>
<td>10 x 55</td>
</tr>
<tr>
<td>C</td>
<td>10 x 65</td>
</tr>
</tbody>
</table>
THROTTLE CABLE INSTALLATION
After installing the throttle cable, adjust it by the following procedure.
(1) Pull out the cable from the boot outer cable side until the inner cable stopper can be seen.
(2) Open the throttle lever completely and adjust the cable with the adjusting nut so that the distance between the inner cable stopper and the outer cable end is at the standard value.
  \( \text{Standard value (A): 34 – 35 mm} \)
(3) Tighten the adjusting nut to the specified torque.

4WD INDICATOR-ECU
REMOVAL AND INSTALLATION
Refer to GROUP 22.
TRANSMISSION OIL COOLER

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
(1) Radiator Grille Removal and Installation
   (Refer to GROUP 51.) <4WD>
(2) Transmission Fluid Draining and Supplying
   (Refer to P.23-11.)
(3) Skid Plate, and Front Under Cover Removal and
    Installation

<2WD>

<4WD>

Removal steps
1. Eye bolt (for engine oil cooler)
2. Gasket (for engine oil cooler)
3. Engine oil cooler tube assembly connection
4. Eye bolt (for transmission oil cooler)
5. Gasket
6. Transmission oil cooler tube assembly connection
7. Oil cooler assembly
8. Return hose (A)
9. Return hose (B)
10. Feed hose
11. Return tube
12. Feed tube