

## TROUBLESHOOTING

### 1. GENERAL INFORMATION

- (a) Troubles occurring with the automatic transmission can be caused by either the engine, electrical control or the transmission itself. These 3 areas should be distinguished before proceeding with troubleshooting.
- (b) Troubleshooting should begin with the simplest operation, working up in order of difficulty, but first determine whether the trouble lies within the engine, electrical control or transmission.
- (c) Proceed with the inspection as follows:

#### PRELIMINARY CHECK

- (a) Check the tire inflation.
- (b) Check the idle speed.
- (c) Check the fluid level and fluid condition.
- (d) Check the throttle cable mark.
- (e) Check the shift linkage.
- (f) Check the park/neutral position switch.



#### STALL TEST

Check the engine and torque converter clutch.



#### TIME LAG TEST

Check the automatic transmission (each clutch, brake and gear) for wear.



#### HYDRAULIC TEST

Measure the line pressure and make a basic check of fluid circuit.



#### ROAD TEST

Check that if trouble lies within the automatic transmission. If noisy or vibrating, the possible cause could be with the engine, drive shaft, tires, etc.



#### SYMPTOM PROBLEM TABLE

## 2. PRELIMINARY CHECK

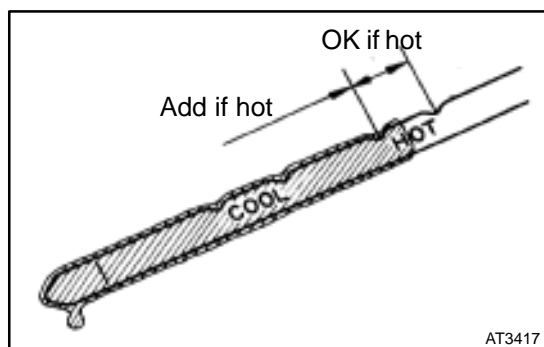
(a) Check the fluid level.

HINT:

- Drive the vehicle so that the engine and transmission are at the normal operating temperature.

**ATF temperature: 70 – 80 °C (158 – 176 °F)**

- Only use the COOL range on the dipstick as a rough reference when the fluid is replaced or the engine does not run.
  - (1) Park the vehicle on a level surface and set the parking brake.
  - (2) With the engine idling and the brake pedal depressed, shift the shift lever into all positions from the P to L position and return to the P position.
  - (3) Pull out the oil level gauge and wipe it clean.
  - (4) Push it back fully into the pipe.



- (5) Pull it out and check that the fluid level is in the HOT range. If the level is not within the HOT range, add new ATF.

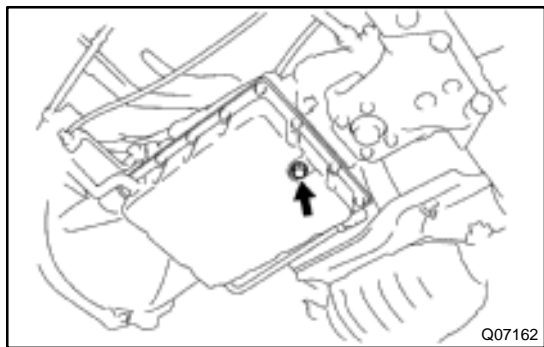
**Fluid type: ATF D-II or DEXRON®III (DEXRON®II)**

**NOTICE:**

**Do not overfill.**

(b) Check the fluid condition.

If the fluid smells burnt or is black, replace it.



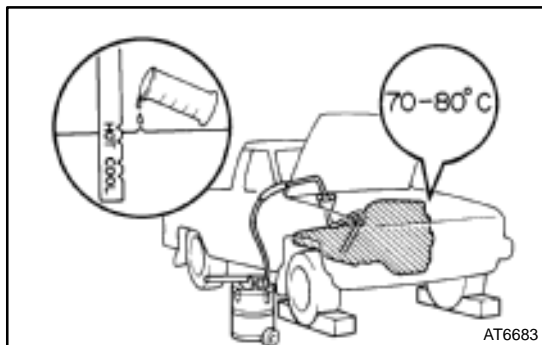
- (c) Replace the ATF.
  - (1) Using a hexagon wrench, remove the drain plug and drain the ATF.
  - (2) Using a hexagon wrench, install the drain plug securely.
  - (3) Add new ATF through the filler pipe.

**Fluid type: ATF D-II or DEXRON®III (DEXRON®II)**

**Capacity:**

**Dry fill: 6.5 liters (6.9 US qts, 5.7 Imp.qts)**

**Drain and refill: 2.4 liters (2.5 US qts, 2.1 Imp.qts)**



- (4) Start the engine and shift the shift lever into all positions from the P position through the L position and then shift it into the P position.
- (5) With the engine idling, check the fluid level. Add fluid up to the COOL level on the dipstick.
- (6) Check the fluid level at the normal operating temperature 70 – 80 °C (158 – 176 °F) and add as necessary.

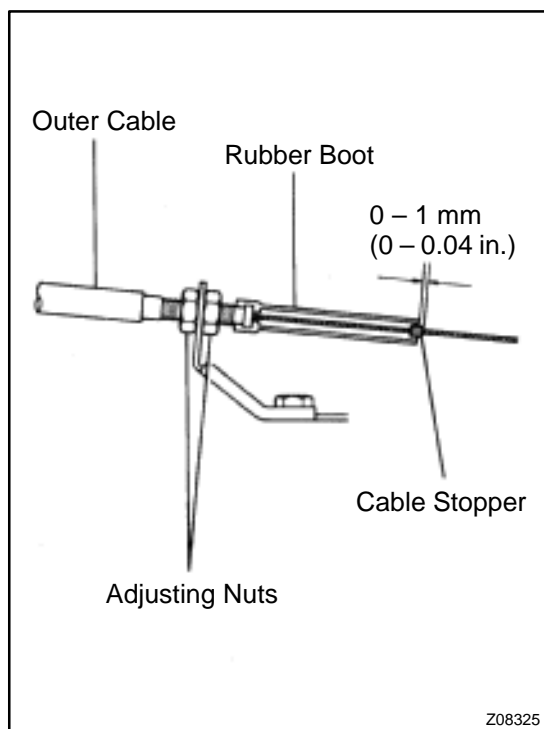
**NOTICE:****Do not overfill.**

- (d) Inspect and adjust the throttle cable.
  - (1) Fully depress the accelerator pedal and check that the throttle valve opens fully.

**HINT:**

If the throttle valve does not open fully, adjust the accelerator cable.

- (2) Fully depress the accelerator.



- (3) Loosen the adjustment nuts.
- (4) Adjust the outer cable so that the distance between the end of the boot and stopper on the cable is the standard.

**Standard boot and cable stopper distance:****0 – 1 mm (0 – 0.04 in.)**

- (5) Tighten the adjusting nuts.
- (6) Recheck the adjustment.
- (e) Inspect the shift control cable.
 

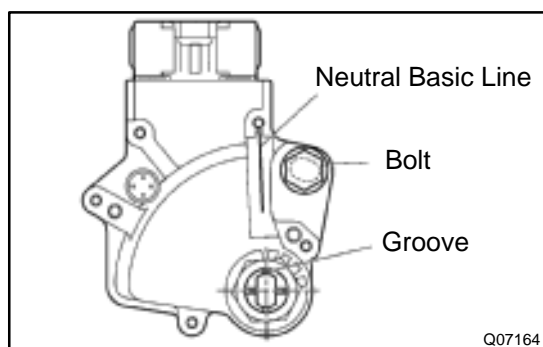
When shifting the shift lever from the N position to other positions, check that the lever can be shifted smoothly and accurately to each position and that the position indicator correctly indicates the position.

If the indicator is not aligned with the correct position, carry out the following adjustment procedures.



- (f) Adjust the shift control cable.
  - (1) Loosen the nut on the control shaft lever. Push the control shaft lever fully rearward.
  - (2) Return the control shaft lever 2 notches to the N position.
  - (3) Set the shift lever to the N position.
  - (4) While holding the shift lever lightly toward the R position side, tighten the nut.

**Torque: 13 N·m (130 kgf-cm, 9 ft-lbf)**



(g) Adjust the park/neutral position switch.

If the engine will start with shift lever in any position other than the N or P position, adjustment is required.

- (1) Loosen the park/neutral position switch bolt and set the shift lever to the N position.
- (2) Align the groove and neutral basic line.
- (3) Hold in position and tighten the bolt.

**Torque: 5.4 N·m (55 kgf·cm, 48 in.-lbf)**

### 3. MEASURE STALL SPEED

The object of this test is to check the overall performance of the transmission and engine by measuring the maximum engine speeds in the D and R positions.

#### NOTICE:

- **Do the test at normal operating ATF temperature 50 – 80 °C (122 – 176 °F).**
- **Do not continuously run this test for longer than 5 seconds.**
- **To ensure safety, conduct this test in a wide, clear, level area which provides good traction.**
  - (1) Chock the 4 wheels.
  - (2) Fully apply the parking brake.
  - (3) Connect OBDII scan tool or TOYOTA hand-held tester to DLC3.
  - (4) Keep your left foot pressing firmly on the brake pedal, and start the engine.
  - (5) Shift into the D position. Fully depress the accelerator pedal with your right foot. Quickly read the stall speed at this time.

**Stall speed: 1,850 ± 150 rpm**

- (6) Do the same test in the R position.

**Stall speed: 1,850 ± 150 rpm**

#### EVALUATION

Problem	Possible cause
(a) Stall speed low in D and R positions.	<ul style="list-style-type: none"> <li>• Engine output may be insufficient</li> <li>• Stator one-way clutch is not operating properly</li> </ul> <p>HINT: If the engine speed is more than 600 rpm below the specified value, the torque converter clutch could be faulty.</p>
(b) Stall speed high in D position.	<ul style="list-style-type: none"> <li>• Line pressure too low</li> <li>• Forward clutch slipping</li> <li>• No.2 one-way clutch is not operating properly</li> <li>• O/D one-way clutch is not operating properly</li> </ul>
(c) Stall speed high in R position.	<ul style="list-style-type: none"> <li>• Line pressure too low</li> <li>• Rear clutch slipping</li> <li>• No.3 brake slipping</li> <li>• O/D one-way clutch is not operating properly</li> </ul>
(d) Stall speed high in D and R positions.	<ul style="list-style-type: none"> <li>• Line pressure too low</li> <li>• Improper fluid level</li> <li>• O/D one-way clutch is not operating properly</li> </ul>

#### 4. MEASURE TIME LAG

When the shift lever is shifted while the engine is idling, there will be a certain time lapse or lag before the shock can be felt. This is used for checking the condition of the O/D direct clutch, front clutch, rear clutch and No.3 brake.

##### NOTICE:

- **Do the test at normal operating ATF temperature 50 – 80 °C (122 – 176 °F).**
- **Make sure to allow 1 minute interval between tests.**
- **Perform measurement 3 times and take the average value.**

(1) Fully apply the parking brake.

(2) Start the engine and check the idle speed. (In N position and A/C OFF)

**Idling speed: 700 ± 50 rpm**

(3) Shift the shift lever from the N to D position. Using a stop watch, measure the time it takes from the shift lever is shifted until the shock is felt.

**Time lag: Less than 1.2 seconds**

(4) In the same way, measure the time lag for N → R.

**Time lag: Less than 1.5 seconds**

##### EVALUATION (If N → D or N → R time lag is longer than the specified):

Problem	Possible cause
N → D time lag is longer	<ul style="list-style-type: none"> <li>• Line pressure too low</li> <li>• Front clutch worn</li> <li>• O/D one-way clutch is not operating properly</li> </ul>
N → R time lag is longer	<ul style="list-style-type: none"> <li>• Line pressure too low</li> <li>• Rear clutch worn</li> <li>• No.3 brake worn</li> <li>• O/D one-way clutch is not operating properly</li> </ul>

#### 5. HYDRAULIC TEST

(a) Measure the line pressure.

(1) Warm up the ATF.

(2) Remove the transmission case test plug and connect SST (See page AT-32).

SST 09992-00095 (09992-00112, 09992-00271)

##### NOTICE:

**Do the test at normal operating ATF temperature 50 – 80 °C (122 – 176 °F).**

(3) Chock the 4 wheels.

(4) Fully apply the parking brake.

(5) Start the engine and check the idle speed.

(6) Shift into the D position, keep your left foot pressing firmly on the brake pedal and while modulating the accelerator pedal with the right foot, measure the line pressure at the engine speeds specified in the table.

(7) In the same way, do the test in the R position.

##### Specified line pressure:

D position	Idling	441 – 500 kPa (4.5 – 5.1 kgf/cm <sup>2</sup> , 64 – 73 psi)
	Stall	990 – 1,167 kPa (10.1 – 11.9 kgf/cm <sup>2</sup> , 144 – 169 psi)
R position	Idling	667 – 745 kPa (6.8 – 7.6 kgf/cm <sup>2</sup> , 97 – 108 psi)
	Stall	1,471 – 1,863 kPa (15.0 – 19.0 kgf/cm <sup>2</sup> , 213 – 270 psi)

(8) If the measured pressures are not up to the specified values, recheck the throttle cable adjustment and retest.

**EVALUATION**

Problem	Possible cause
If the measured values at all positions are higher.	<ul style="list-style-type: none"> <li>• Throttle cable out of adjustment</li> <li>• Throttle valve defect</li> <li>• Regulator valve defect</li> </ul>
If the measured values at all positions are lower.	<ul style="list-style-type: none"> <li>• Throttle cable out of adjustment</li> <li>• Throttle valve defect</li> <li>• Regulator valve defect</li> <li>• Oil pump defect</li> <li>• O/D direct clutch defect</li> </ul>
If pressure is low in the D position only.	<ul style="list-style-type: none"> <li>• D position circuit fluid leakage</li> <li>• Front clutch defect</li> </ul>
If pressure is low in the R position only.	<ul style="list-style-type: none"> <li>• R position circuit fluid leakage</li> <li>• Rear clutch defect</li> <li>• No.3 brake defect</li> </ul>

(b) Measure the governor pressure.

(1) Warm up the ATF.

(2) Remove the transmission case test plug and connect SST (See page [AT-32](#)).

SST 09992-00095 (09992-00112, 09992-00271)

**NOTICE:**

**Do the test at normal operating ATF temperature 50 – 80 °C (122 – 176 °F).**

(3) Check the parking brake to see that it is not applied.

(4) Start the engine.

(5) Shift into the D position and measure the governor pressures at the speeds specified in the table.

**EVALUATION**

Problem	Possible cause
If governor pressure is defective.	<ul style="list-style-type: none"> <li>• Line pressure defect</li> <li>• Fluid leakage in governor pressure circuit</li> <li>• Governor valve operation defect</li> </ul>

**Specified governor pressure:**

**Tire size: P195/75R14**

Output shaft rpm	Vehicle speed (Reference)	Governor pressure
1,000	32 km/h (20 mph)	98 – 157 kPa (1.0 – 1.6 kgf/cm <sup>2</sup> , 14 – 23 psi)
1,800	57 km/h (35 mph)	196 – 255 kPa (2.0 – 2.6 kgf/cm <sup>2</sup> , 28 – 37 psi)
3,500	111 km/h (69 mph)	500 – 618 kPa (5.1 – 6.3 kgf/cm <sup>2</sup> , 73 – 90 psi)

**Tire size: P215/70R14**

Output shaft rpm	Vehicle speed (Reference)	Governor pressure
1,000	32 km/h (20 mph)	98 – 157 kPa (1.0 – 1.6 kgf/cm <sup>2</sup> , 14 – 23 psi)
1,800	58 km/h (36 mph)	196 – 255 kPa (2.0 – 2.6 kgf/cm <sup>2</sup> , 28 – 37 psi)
3,500	113 km/h (70 mph)	500 – 618 kPa (5.1 – 6.3 kgf/cm <sup>2</sup> , 73 – 90 psi)

## 6. ROAD TEST

### NOTICE:

**Do this test at normal operating ATF temperature 50 – 80 °C (122 – 176 °F).**

#### (a) D position test.

Shift into the D position and while driving with the accelerator pedal held constantly with the throttle valve fully open and the O/D main switch ON, check on the following points.

- (1) 1 → 2, 2 → 3 and 3 → O/D up-shifts take place and also that the shift points conform to those shown in the automatic shift schedule (See page [SS-51](#)).

#### HINT:

3 → O/D up-shift does not take place with a throttle valve opening of more than 86% or engine coolant temperature below 55 °C (122 °F).

### EVALUATION

Problem	Possible cause
If there is no 1 – 2 up-shift.	<ul style="list-style-type: none"> <li>• Governor valve is defective</li> <li>• 1 – 2 shift valve is stuck</li> </ul>
If there is no 2 – 3 up-shift.	<ul style="list-style-type: none"> <li>• 2 – 3 shift valve is stuck</li> </ul>
If there is no 3–O/D up-shift (throttle valve opening less than 86%)	<ul style="list-style-type: none"> <li>• 3 – 4 shift valve is stuck</li> <li>• Solenoid valve or circuit defective</li> </ul>
If the shift point is defective.	<ul style="list-style-type: none"> <li>• Throttle cable out of adjustment</li> <li>• Throttle valve, 1 – 2 shift valve, 2 – 3 shift valve, 3 – 4 shift valve etc. are defective</li> </ul>

- (2) In the same way, check the shock and slip at 1 → 2, 2 → 3 and 3 → O/D up-shifts.

### EVALUATION

Problem	Possible cause
If the shock is excessive.	<ul style="list-style-type: none"> <li>• Line pressure is too high</li> <li>• Accumulator is defective</li> </ul>

- (3) Run in the 3rd gear or O/D of the D position and check for abnormal noise and vibration.

#### HINT:

This check must be made with extreme care as noise and vibration could also be due to imbalance in the propeller shaft, differential, tires, and torque converter clutch, etc.

- (4) While running in the 2nd, 3rd and O/D gears of the D position, check that the possible vehicle speed limits for 2 → 1, 3 → 2 and O/D → 3 kick-downs conform to those indicated on the automatic shift schedule (See page [SS-51](#)).

#### HINT:

O/D → 3 kick-down is always possible with a throttle valve opening of more than 86%.

- (5) Check the abnormal shock and slip at kick-down.

#### (b) 2 position test.

Shift into the 2 position and check on the following points while driving with the accelerator pedal held constantly at the fully throttle valve opening position.

- (1) Check to see that the 1→2 up-shift takes place and that the shift point conforms to that shown on the automatic shift schedule (See page [SS-51](#)).
- (2) While running in the 2 nd gear, release the accelerator pedal and check the engine braking effect.

### EVALUATION

Problem	Possible cause
If there is no engine braking effect.	<ul style="list-style-type: none"> <li>• No.1 brake is defective.</li> </ul>

- (3) Check for abnormal noise during acceleration and deceleration.
- (4) Check the shock during up-shift and down-shift.

- (c) L position test.
- (1) While running in the L position, check that there is no up-shift to 2nd gear.
  - (2) While running in the L position, release the accelerator pedal and check the engine braking effect.

**EVALUATION**

Problem	Possible cause
If there is no engine braking effect.	• No.3 brake is defective.

- (3) Check for abnormal noise during acceleration and deceleration.
- (d) R position test.  
Shift into the R position and check for slipping while starting at wide open throttle.

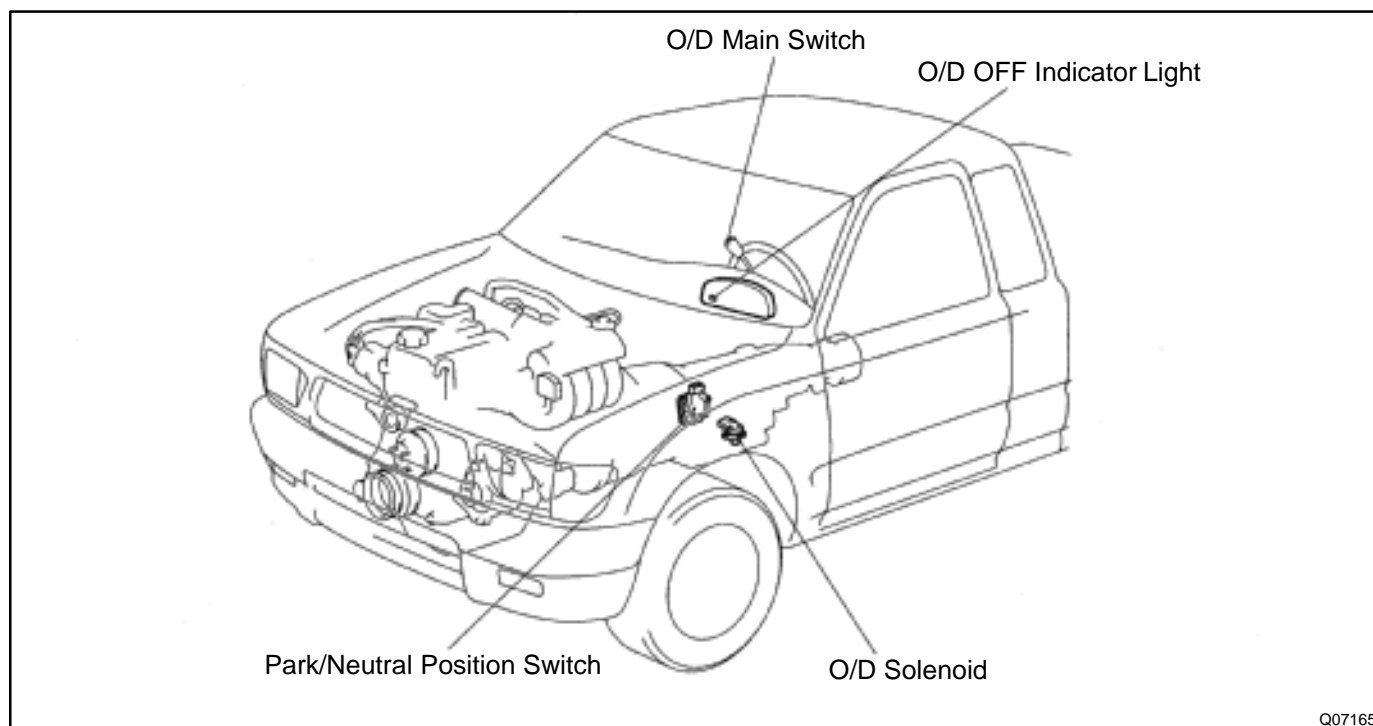
**CAUTION:**

**Before conducting this test, ensure that the test area is free from personnel and obstruction.**

- (e) P position test.  
Stop the vehicle on a gradient (more than 5°) and after shifting into the P position, release the parking brake. Then check that the parking lock pawl holds the vehicle in place.

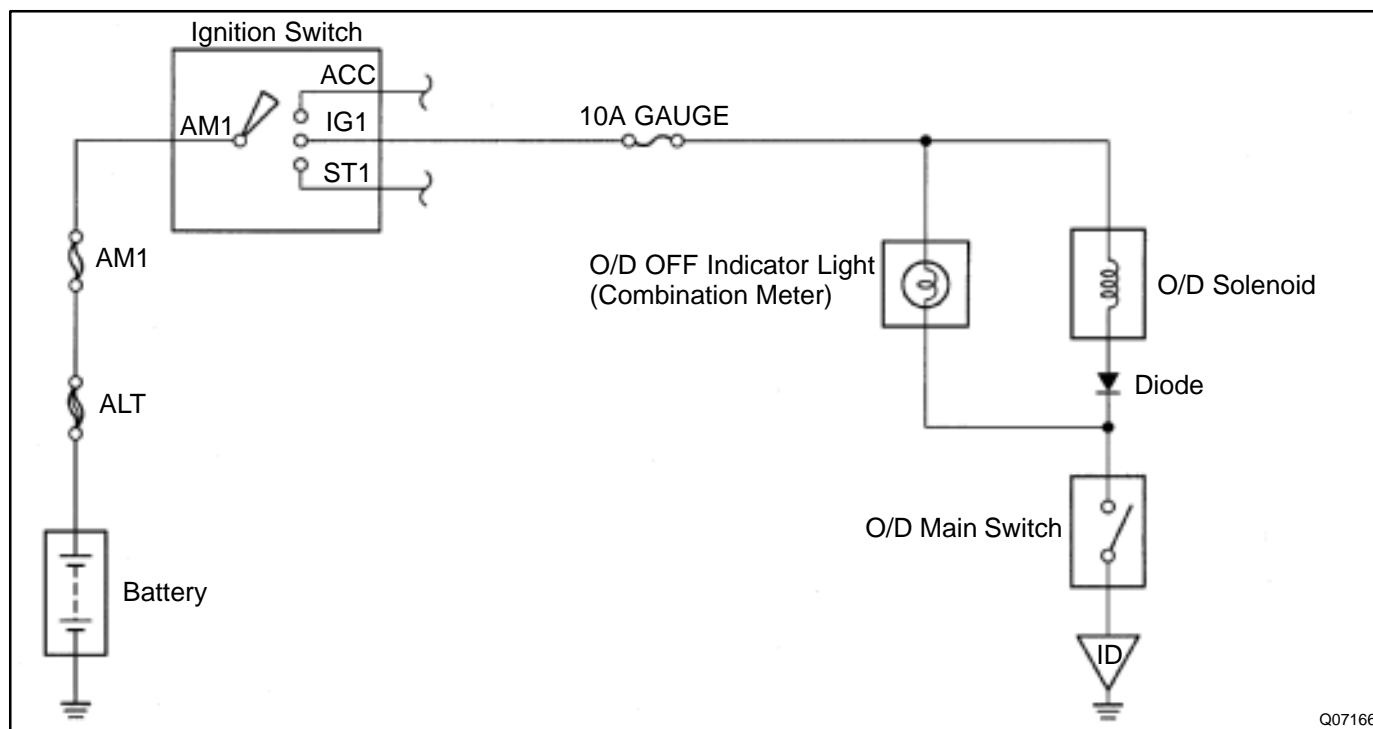


## 7. ELECTRIC CONTROL SYSTEM LOCATION

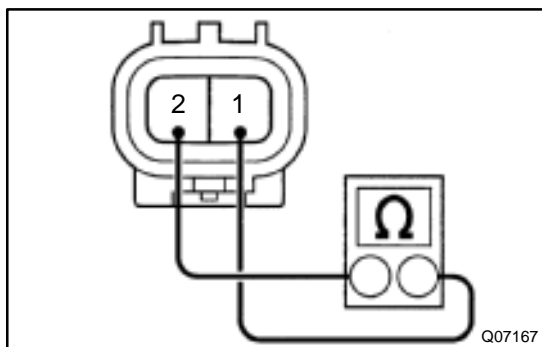


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## CIRCUIT

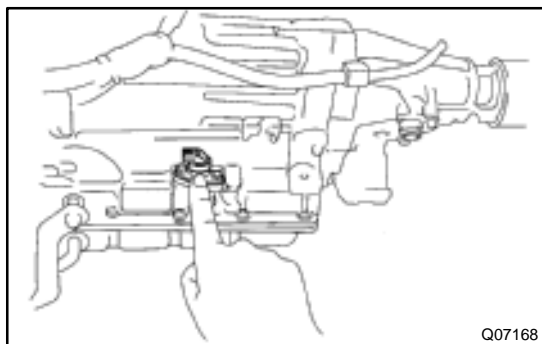


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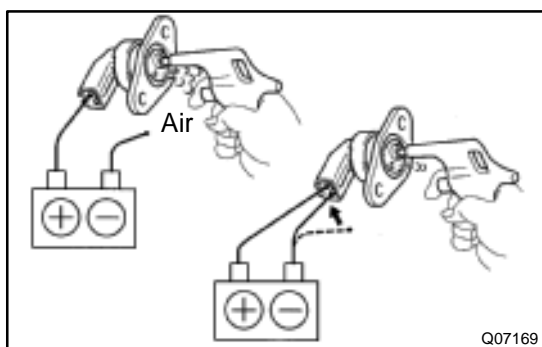


- (a) Inspect the O/D solenoid.
- (1) Using an ohmmeter, measure the resistance between terminals.

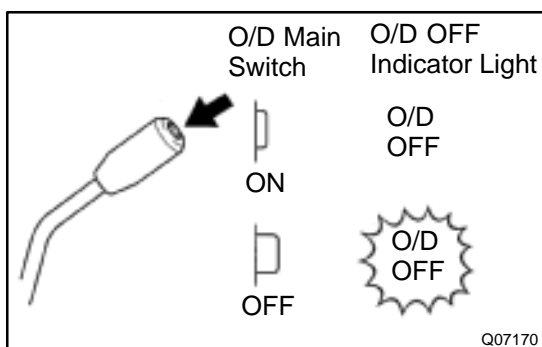
**Resistance: 11 – 15  $\Omega$**



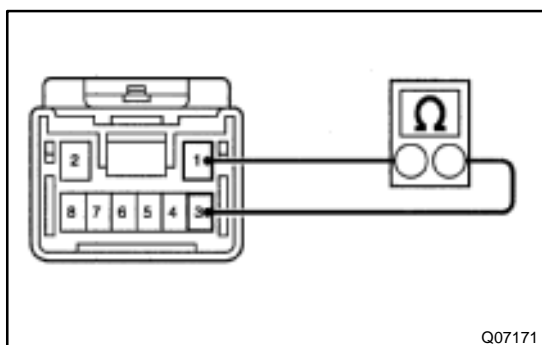
- (2) Apply battery positive voltage to the solenoid. Check that the solenoid operation sound is heard. If operation is not as specified, replace the solenoid.



- (b) Check the solenoid seals.
- If there is foreign material in the solenoid valve, the fluid will not be controlled even with solenoid operation.
- (1) Check that the solenoid valve opens when low-pressure compressed air is applied.
  - (2) When supplying battery positive voltage to the solenoid, check that the solenoid valve does not leak air.
- If there is an air leak, replace the solenoid.



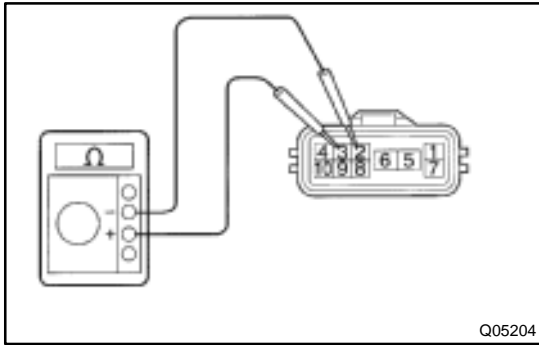
- (c) Inspect the O/D OFF indicator light.
- (1) Turn on the ignition switch.
  - (2) Check that the O/D OFF indicator light does not light, when the O/D main switch is turned ON.
  - (3) Check that the O/D OFF indicator lights, when the O/D main switch is turned OFF.



- (d) Inspect the O/D main switch.
- (1) Remove the lower finish panel.
  - (2) Using an ohmmeter, check the continuity of the terminals for each switch position.

Switch position	Tester connection	Specified value
ON	1 – 3	Continuity
OFF	1 – 3	No continuity

If continuity is not as specified, replace the switch.



- (e) Inspect the park/neutral position switch.  
Inspect that there is continuity between each terminals.

Shift position	Terminal No. continuity	
P	6 – 5	4 – 7
R	4 – 8	–
N	6 – 5	4 – 10
D	4 – 9	–
2	4 – 2	–
L	4 – 3	–

If continuity is not as specified, replace the switch.