

7A2 ON-VEHICLE SERVICE

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DESCRIPTION

Before performing on-vehicle service on the automatic transmission, check that the engine idling speed and general engine condition are normal.

AUTOMATIC TRANSMISSION FLUID (ATF)

Inspect

Remove the transmission dipstick to check the condition of the ATF.

Clean the dipstick and look for gum or varnish. Gum or varnish indicate scorching of the clutch band and other parts.

The transmission control module, the transmission unit, and the vehicle must be carefully checked if gum or varnish is present.

ATF LEVEL

Inspect

Hot Level

1. Warm up the engine and the transmission by driving the vehicle on the road for at least ten minutes.
Do not turn the engine off.
2. Park the vehicle on a level surface.
3. Apply the parking brake firmly.
4. Let the engine run at idle.
Move the gear selector slowly through all the gear ranges (figure 1).

Stop in each gear range just long enough for the transmission to engage.

5. Return the selector to either "P" or "N" (figure 1).
6. Remove the ATF level dipstick.
7. Wipe the dipstick clean with a paper towel.

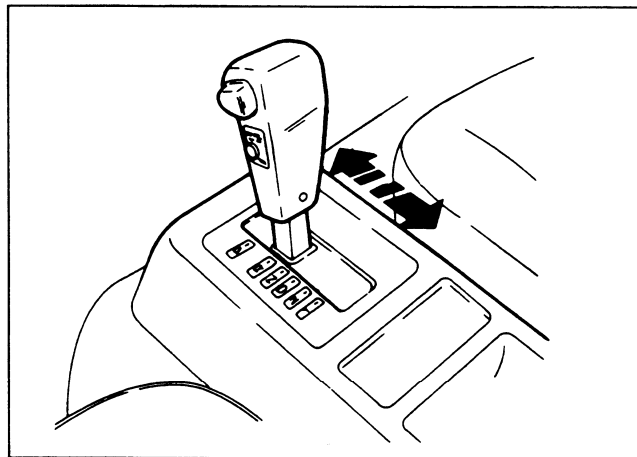


Figure 1. Moving Gear Selector

8. Reinsert the dipstick and wait several seconds.
9. Remove the dipstick.
The ATF level should be inside the "H" range on the dipstick (figure 2).
If the ATF level is below the "H" range, ATF must be added.

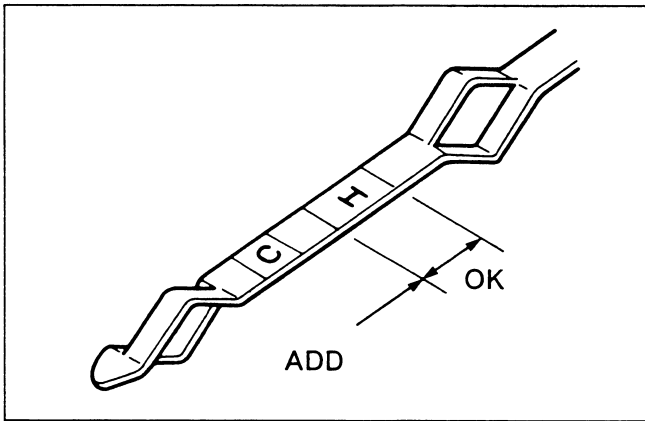


Figure 2. Hot Automatic Transmission Fluid (ATF) Level

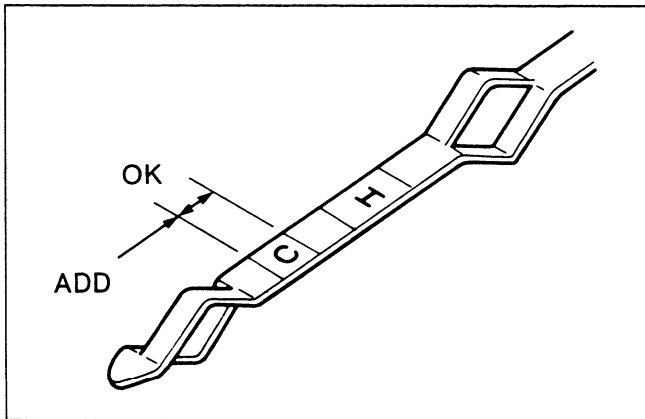


Figure 3. Cold ATF Level

Cold Level

The vehicle must not have been driven for at least three hours before the cold level check is made.

1. Park the vehicle on a level surface.
2. Apply the parking brake firmly.
3. Start the engine and allow it to warm up.
The engine coolant temperature gage needle should be midway between the "C" mark and "H" mark.
4. Let the engine run at idle.
Move the gear selector slowly through all the gear ranges.
Stop in each range just long enough for the transmission to engage.
5. Return the gear selector to either "P" or "N".
6. Remove the ATF level dipstick.
7. Wipe the dipstick clean with a paper towel.
8. Reinsert the dipstick and wait several seconds.
9. Remove the dipstick.
The ATF level should be inside the "C" range on the dipstick (figure 3).
If the ATF level is below the "C" range, ATF must be added.

ATF CHANGE

1. Start the engine and allow it to idle until the ATF reaches a temperature of 40–50°C (104–122°F).
2. Park the vehicle on level ground.
3. Stop the engine.
4. Remove the drain plug from the oil pan and drain the ATF (approximately 7 liters).
5. Remove the oil pan.
6. Inspect the oil pan (details written below).
7. Install the oil pan.

NOTICE: Use new gasket. Clean the oil pan and magnet.

8. Replace the gasket and install the drain plug.

Tighten

- Drain plug 35 N·m (26 lb·ft)

NOTICE: Do not reuse old washer (gasket). Clean the drain plug (especially the threaded section).

9. Pour about 6 liters of new ATF. Then, add more ATF carefully as necessary using the level gage. Refer to the section on "ATF LEVEL" for detail.

CAUTION: Keep the engine idle (do not stop it) during the oil level adjustment.

Inspect

1. Check the drain plug tip for adhesion of foreign substances.
2. Check the drained ATF for color, smell and inclusion of foreign substances.
3. Check the oil pan bottom and magnet for adhesion of foreign substances.
If a problem is discovered during those checks, the Automatic transmission must be overhauled.

**CAUTION: The torque converter and the oil strainer need replaced with new ones if the drained ATF contains large amounts of metallic or facing flakes.
In addition, flush the ATF cooler circuit**

IDLE SWITCH

Idle switch is attached on the injection pump, and has the cover to protect from dust.

This cover is fixed with three bolts as shown in the illustration (figure 4).

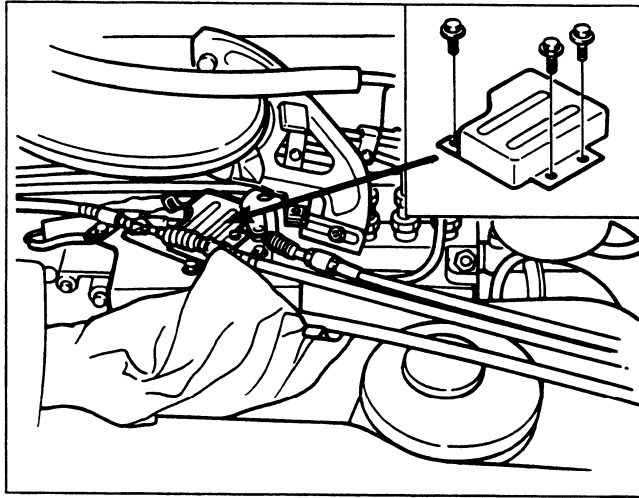


Figure 4. Idle Switch

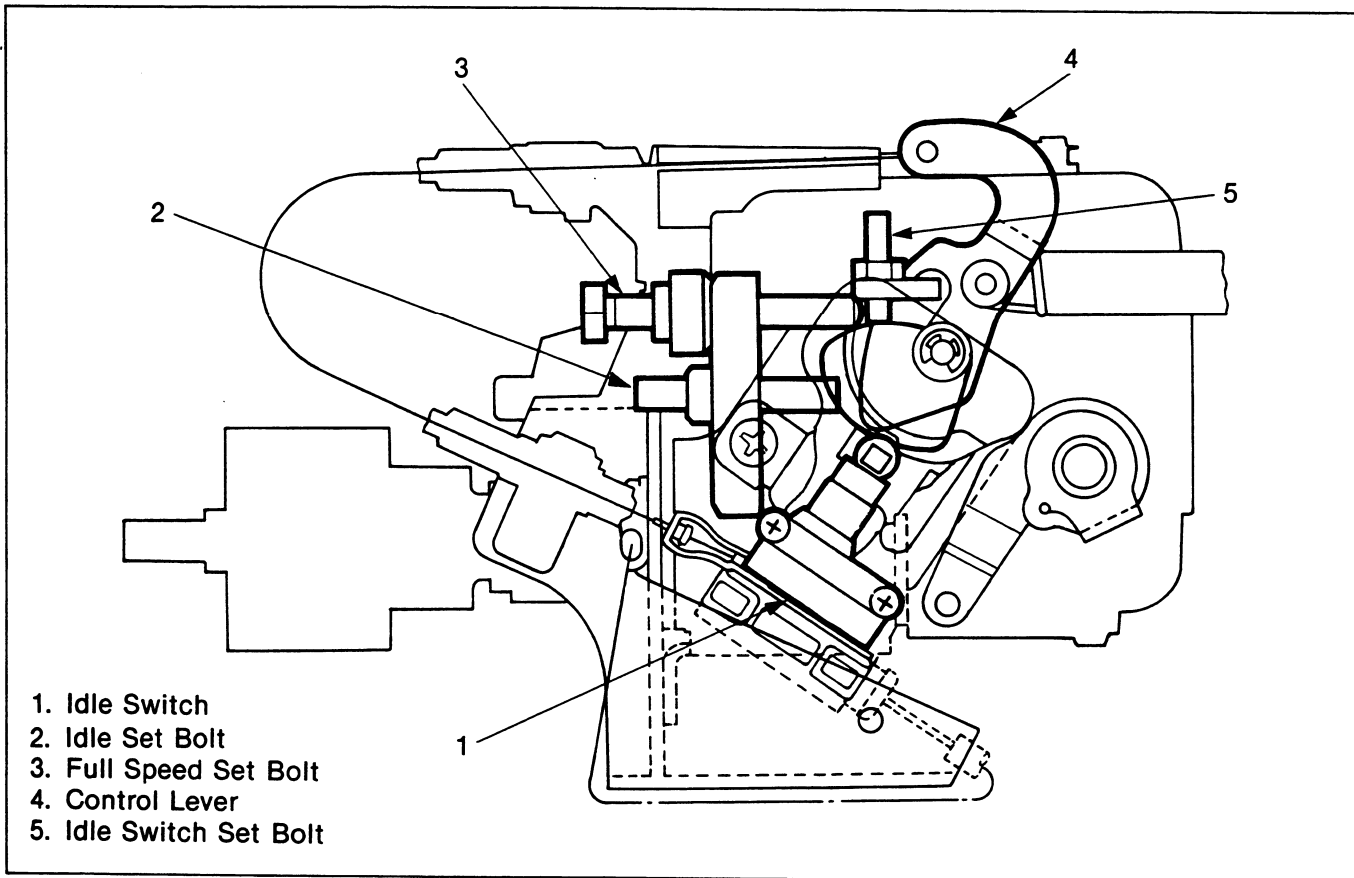


Figure 5. Idle Switch and Related Parts

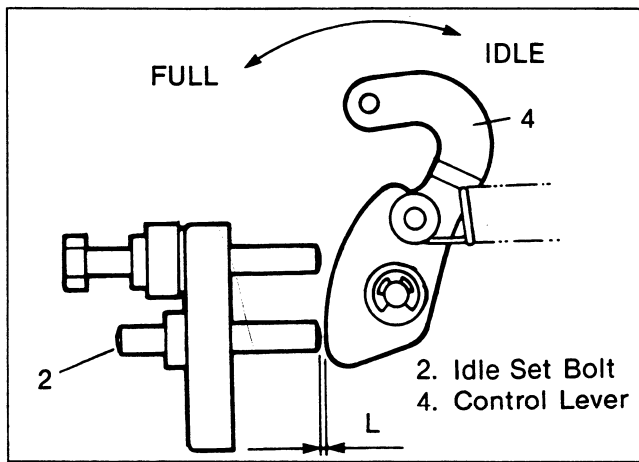


Figure 6. Adjusting Idling Switch

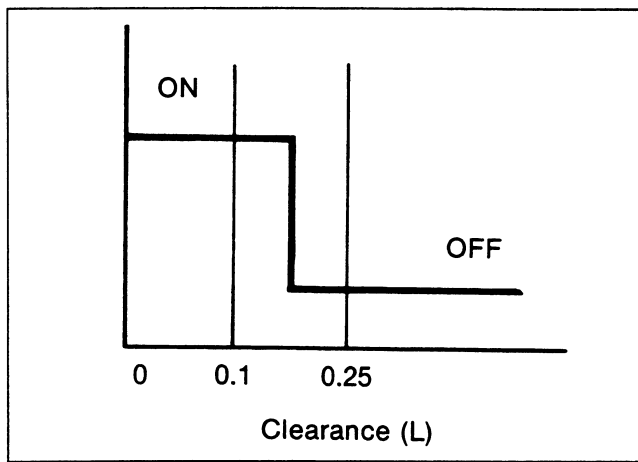


Figure 7. Idle Switch Contact Clearance

Inspect

- A) Check the following two points, to confirm the normal operation of the idle switch.
- 1) When the control lever is returned from "FULL" position to "IDLING" position. The clearance between "Idle set bolt" and "Control Lever"
L=0.1 mm (0.004 in)... Idle switch is "ON"
(figures 5 and 6)
 - 2) Then the control lever is moved from "FULL" to "IDLING" position again. The clearance between "Idle set bolt" and "Control Lever"
L = 0.25 mm (0.01 in)... Idle Switch is "OFF"
- B) In case, the above (A) cannot be obtained, adjust the idle switch set bolt.

Adjust (Figures 5, 6 and 7)

- 1) When the clearance is 0.1 mm (0.004 in), but the idle switch is "OFF". Let the idle switch set bolt screw in.
- 2) When the clearance is 0.25 mm (0.01 in), but the idle switch is "ON". Let the idle switch set bolt screw out.

NOTICE: Make sure the manual idle control disengaged prior to adjustment.

KICK DOWN SWITCH AND THROTTLE POSITION SENSOR

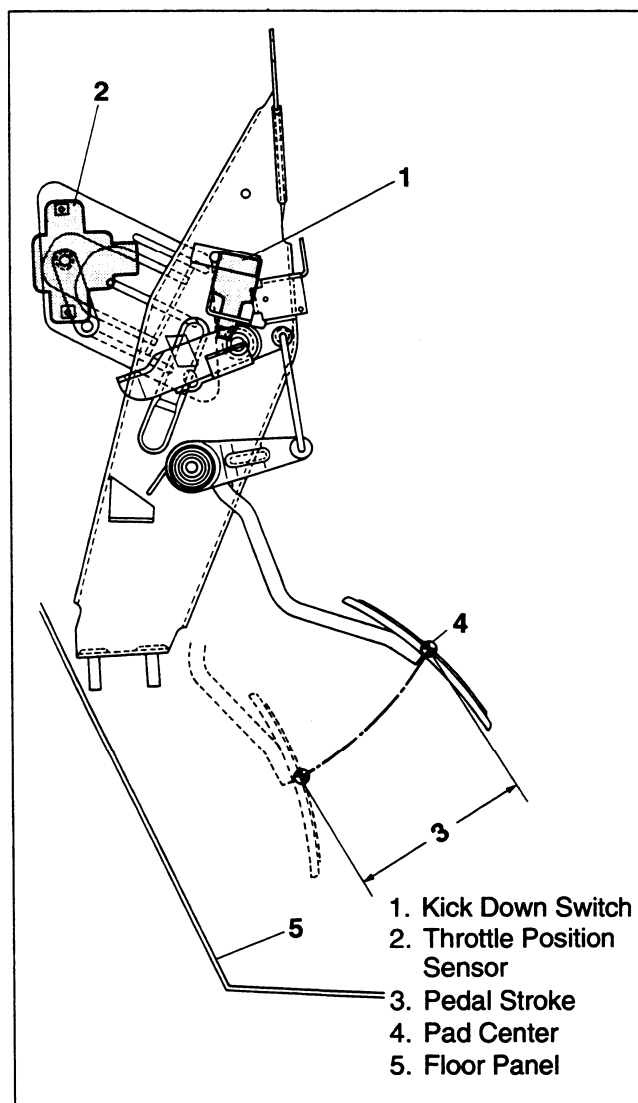


Figure 8. Kick Down Switch, Throttle Position Sensor and Related Part

Kick Down Switch

 **Adjust (Figures 8 and 9)**

1. Depress the accel pedal, at the stroke (3) of 35 ± 1 mm (1.38 ± 0.04 in) on the pad center (4).
2. At the above condition, adjust the projection level of the kick down switch, so that it may become "ON".
3. "Tick, Tick" sound indicates that the kick down switch turns to "ON" condition.

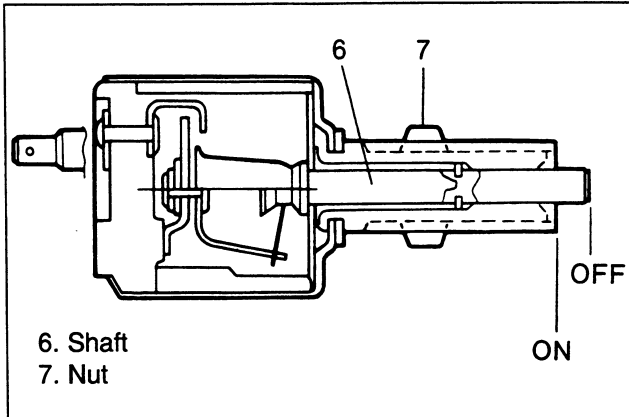


Figure 9. Kick Down Switch

Throttle Position Sensor

 **Adjust (Figures 10 and 11)**

Under the idling condition, set the throttle position sensor according to the following procedure.

1. Remove the throttle position sensor connector and body side connector.
2. Throttle position sensor terminal (10), (11), and (12).
 - a. Apply 5 volts to the terminal (10).
 - b. Measure the output voltage between the terminal(11) and (12) (Terminal (12) is ground).
 - c. If the out-put voltage is 4.0 – 4.9 V, under the above condition, throttle position sensor setting is "OK".
 - d. If the reading is beyond 4.0 – 4.9 V, loosen the throttle position sensor fixing bolts, and turn it right or left, so that the specified output voltage be obtained. After adjusting, tighten the throttle position sensor fixing bolts.

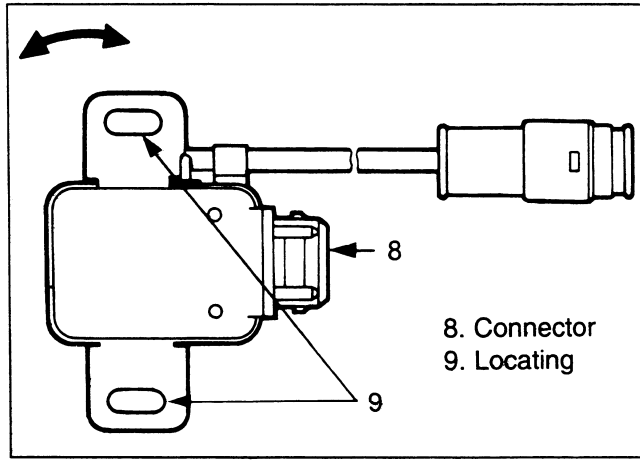


Figure 10. Throttle Position Sensor

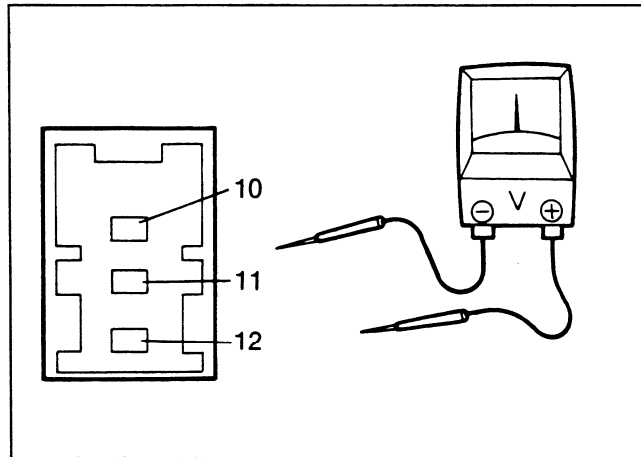



Figure 11. Throttle Position Sensor Connector

CONTROL CABLE

 **Inspect**

Check that the each selector position matches the corresponding position plate ("P", "R", "N", "D", "2" and "1") position.

If the lever and plate positions do not match, the control cable must be adjusted.

 **Adjust (Figure 12)**

- 1) Set the selector to the "N" range.
- 2) Set the selector lever at the right side of the transmission to the "N" range.
- 3) Move the selector towards the "R" position until a slight resistance is felt. Do not move the lever fully into the "R" position.
- 4) Hand-tighten the first adjusting nut (1) until its plane washer (2) makes contact with the transmission side bracket (3).

- 5) Hand-tighten the second adjusting nut (5) until its plane washer (4) makes contact with the transmission side bracket (3).
- 6) Back off the second adjusting nut (4) 1/2 of a turn.
- 7) Tighten the first adjusting nut (1).

Tighten

- First adjusting nut 10 N·m (87 lb·in)

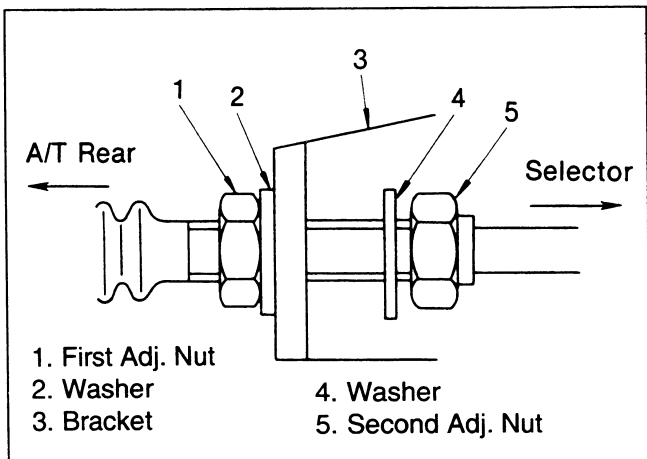


Figure 12. Adjusting Control Cable

	1	2	3	4	5	6	7	9	10
P	○	—	—	—	○			○	○
R	○					○			
N	○						○	○	○
D	○			○					
2	○	○							
1	○	○							

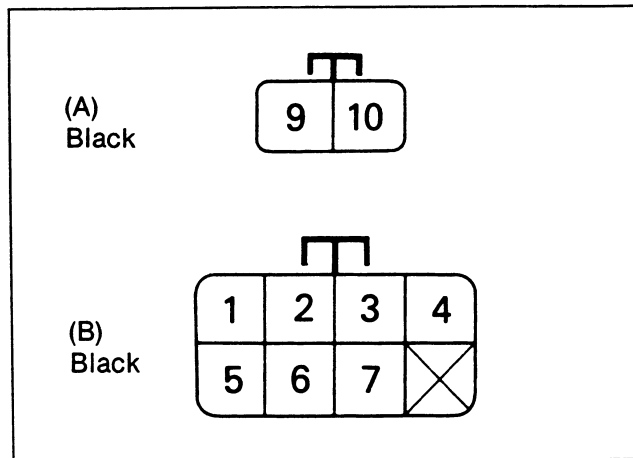


Figure 14. Inhibitor Switch Connector

INHIBITOR SWITCH

Inspect (Figures 13, 14 and 15)

1. Remove the cable bracket (1) from the transmission.
2. Disconnect the control cable (2) from the lever (3).

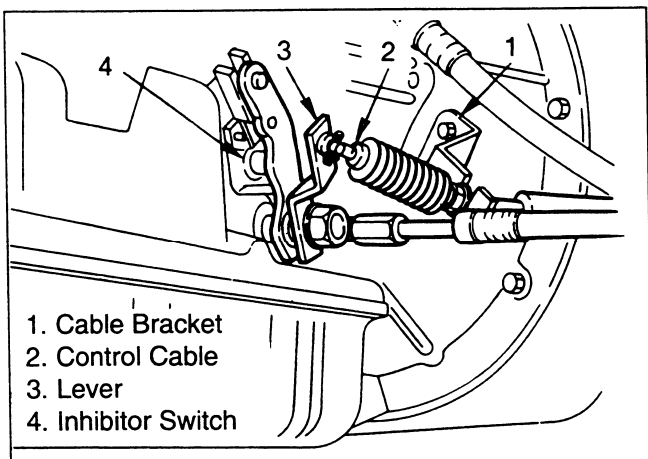


Figure 13. Inhibitor Switch

3. Disconnect the inhibitor switch (4) harness connectors.
4. Use a circuit tester to check the inhibitor switch continuity between the following terminals (figure 14).

5. Place the select range lever (5) in the “N” range (figure 15).

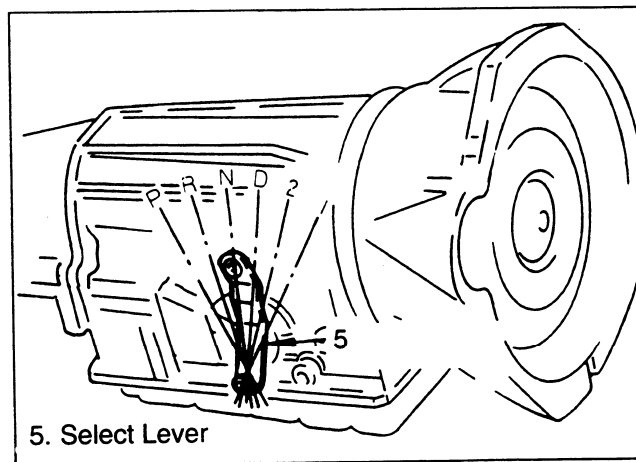


Figure 15. Moving Select Lever

6. Move the select lever to either side. Check the inhibitor switch continuity between the terminals shown in Step 4. The continuity readings should remain fairly steady as the select lever is moved. If there is no continuity or the continuity is intermittent, the inhibitor switch must be adjusted.

 **Adjust (Figure 16)**

- 1) Loosen the inhibitor switch bolts.
- 2) Place the select lever (6) in the "N" range.
- 3) Insert a 4 mm (0.15 in) diameter pin (7) through the select lever and inhibitor switch (4) alignment holes. Be sure that the pin is perpendicular to the holes.
- 4) Tighten the inhibitor switch bolts.

 **Tighten**

- Inhibitor switch bolts 3 N·m (26 lb·in)
- 5) Remove the pin from the holes.
 - 6) Repeat the inhibitor switch inspection procedure. If there is still a problem with the inhibitor switch continuity, the switch must be replaced.

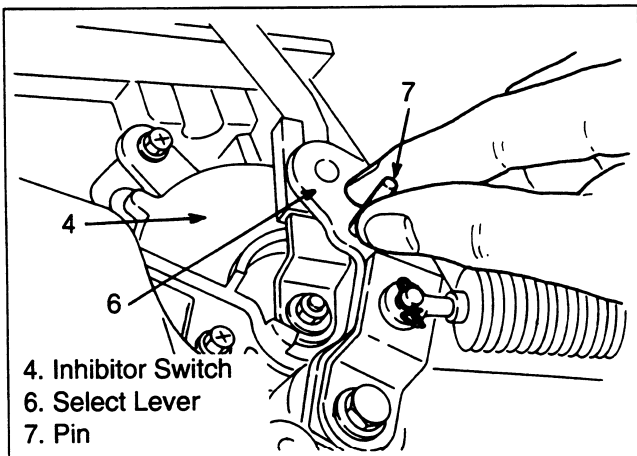


Figure 16. Adjusting Inhibitor Switch

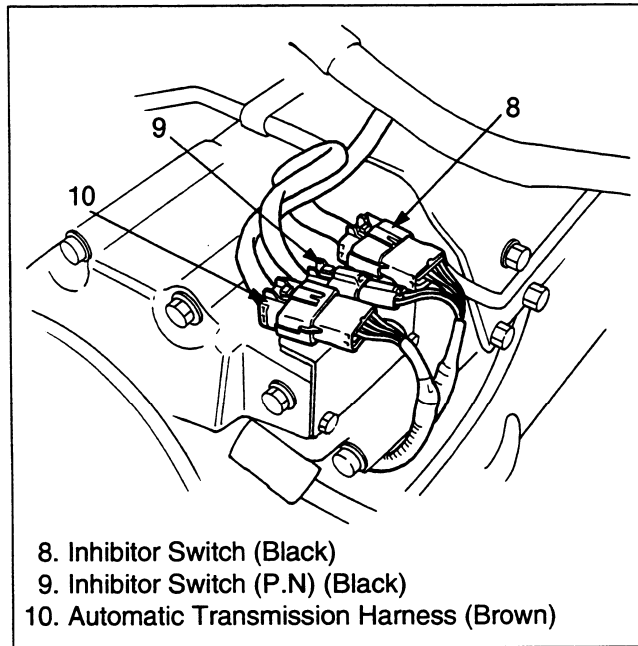


Figure 17. Harness Connector Location

**VEHICLE SPEED SENSOR-1
(INSTALLED ON THE TRANSMISSION)**

 **Inspect (Figure 18)**

Use a circuit tester to measure the resistance between terminals (1) and (2).

 **Measure**

- Resistance 504 – 616 Ω

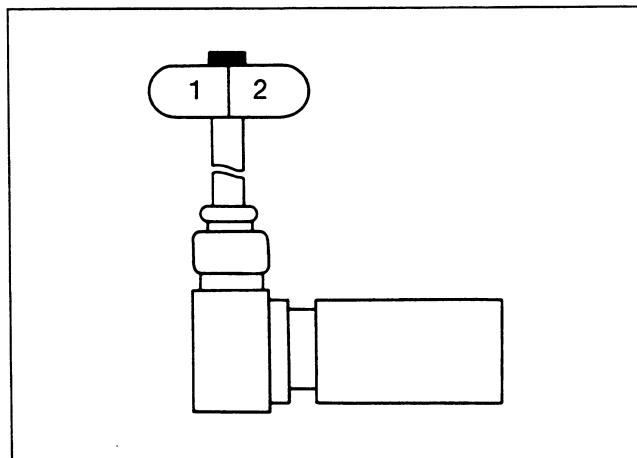


Figure 18. Vehicle Speed Sensor-1

7A2-8 AUTOMATIC TRANSMISSION

If the measured value is outside the specified range, the vehicle speed sensor-1 must be replaced.

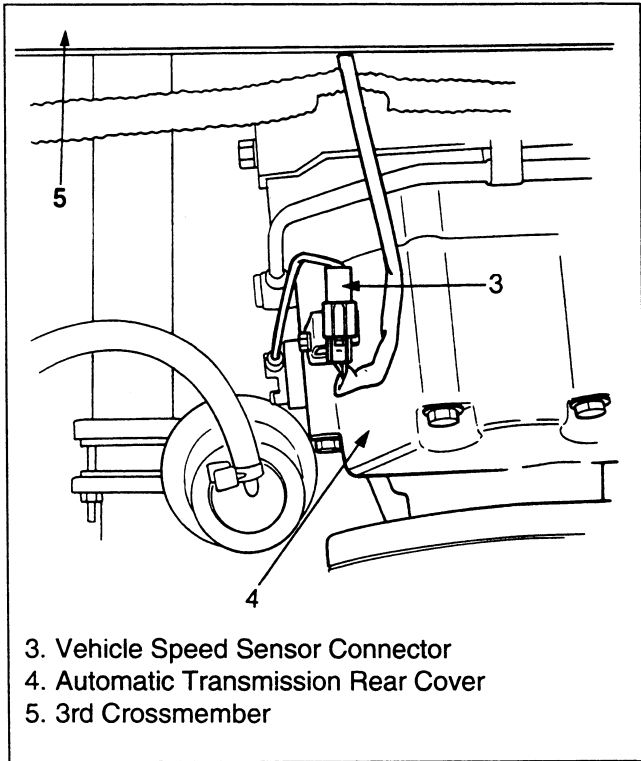


Figure 19. Harness Connector Location

VEHICLE SPEED SENSOR-2 (BUILT IN THE SPEEDOMETER)

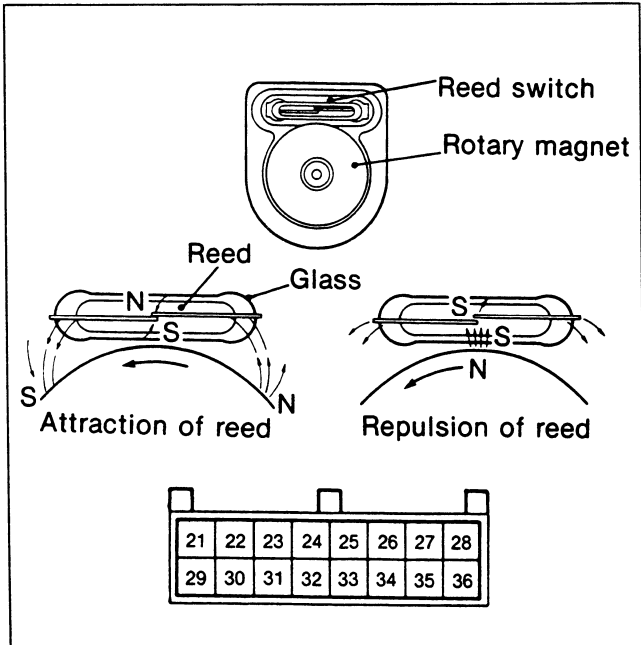


Figure 20. Vehicle Speed Sensor-2

Inspect (Figure 20)

Connect a circuit tester across terminal (24) of the transmission control module connector and ground.

Then disconnect the speedometer cable on the transmission side, turn the inner cable slowly and watch the tester.

When the tester indicates ON and OFF repeatedly, both the vehicle speed sensor-2 and wiring are normal.

ENGINE SPEED SENSOR

Inspect (Figure 21)

Use a circuit tester to measure the resistance between terminal (1) and (2).

Measure

- Resistance 2.1 – 2.5 Ω at 25°C (77°F)

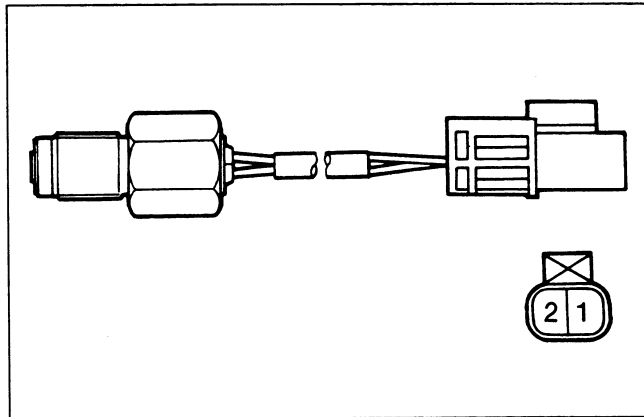


Figure 21. Engine Speed Sensor

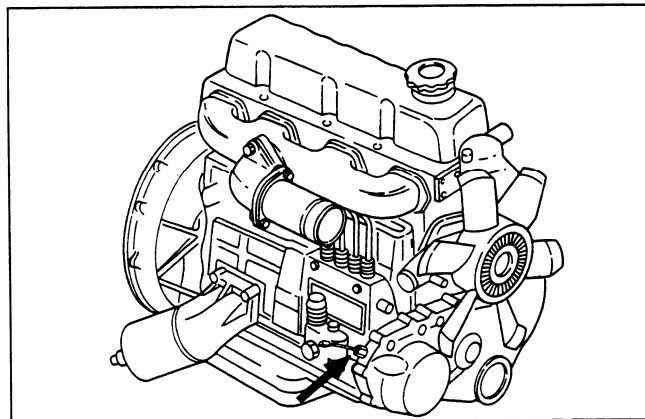


Figure 22. Engine Speed Sensor Location

SOLENOIDS AND AUTOMATIC TRANSMISSION FLUID (ATF) THERMOSENSOR

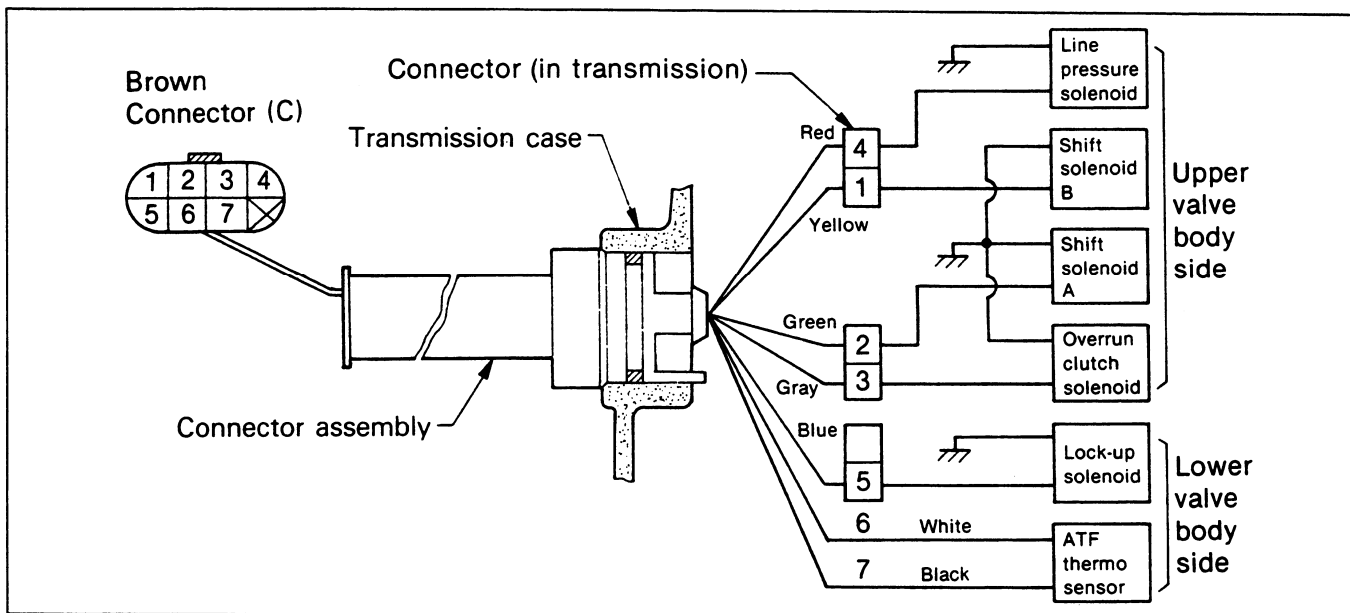


Figure 23. Solenoids

Inspect (Figure 23)

Use a circuit tester to measure the resistance between the following connector terminals and ground.

Measure

Solenoid	Terminal No.	Resistance (Ω)
Shift solenoid B	1	20 – 40
Shift solenoid A	2	
Overrun clutch solenoid	3	
Line pressure solenoid	4	2.5 – 5.0
Lockup solenoid	5	10 – 20
ATF thermosensor	6 – 7	2,500 approx. (at 20°C/ 68°F)
		300 approx. (at 80°C/ 176°F)

If either of the measured values are not in the specified range, the solenoid must be replaced.

FLUSHING THE TRANSMISSION COOLER AND LINE

The oil cooler and lines may be flushed as the following conditions. This will help prevent more trouble after the transmission is repaired.

1. When the abnormal amount of debris are found.
2. When the abnormal wear or chips on gears and shafts are found while overhauling.
3. When the abnormal clutch facing wear and oil contamination are found.

Procedures

1. Disconnect oil cooler lines at transmission case and oil cooler.
2. Flush and back-flush the oil cooler and lines using solvent and compressed air.

Important

DO NOT exceed 197 kPa (29 psi) air pressure or damage may result to oil cooler.

NOTICE: Flushing for the overbridge pipe of upper line can be done from front right hand side only.

3. Remove all remaining solvent from the system with compressed air.
4. Flush the cooling system again with automatic transmission fluid (ATF).
After the final flush, connect all lines and replenish ATF.
5. Start engine to test the system for the free flow of fluid. If the flow is restricted, the cooler assembly or lines must be replaced.
Repeated cleaning and flushing may not remove all debris from the oil cooler circuit. Move the gear selector through the various ranges and return to neutral.
Check for fluid level.
If the fluid level is below the specified range, ATF must be added.

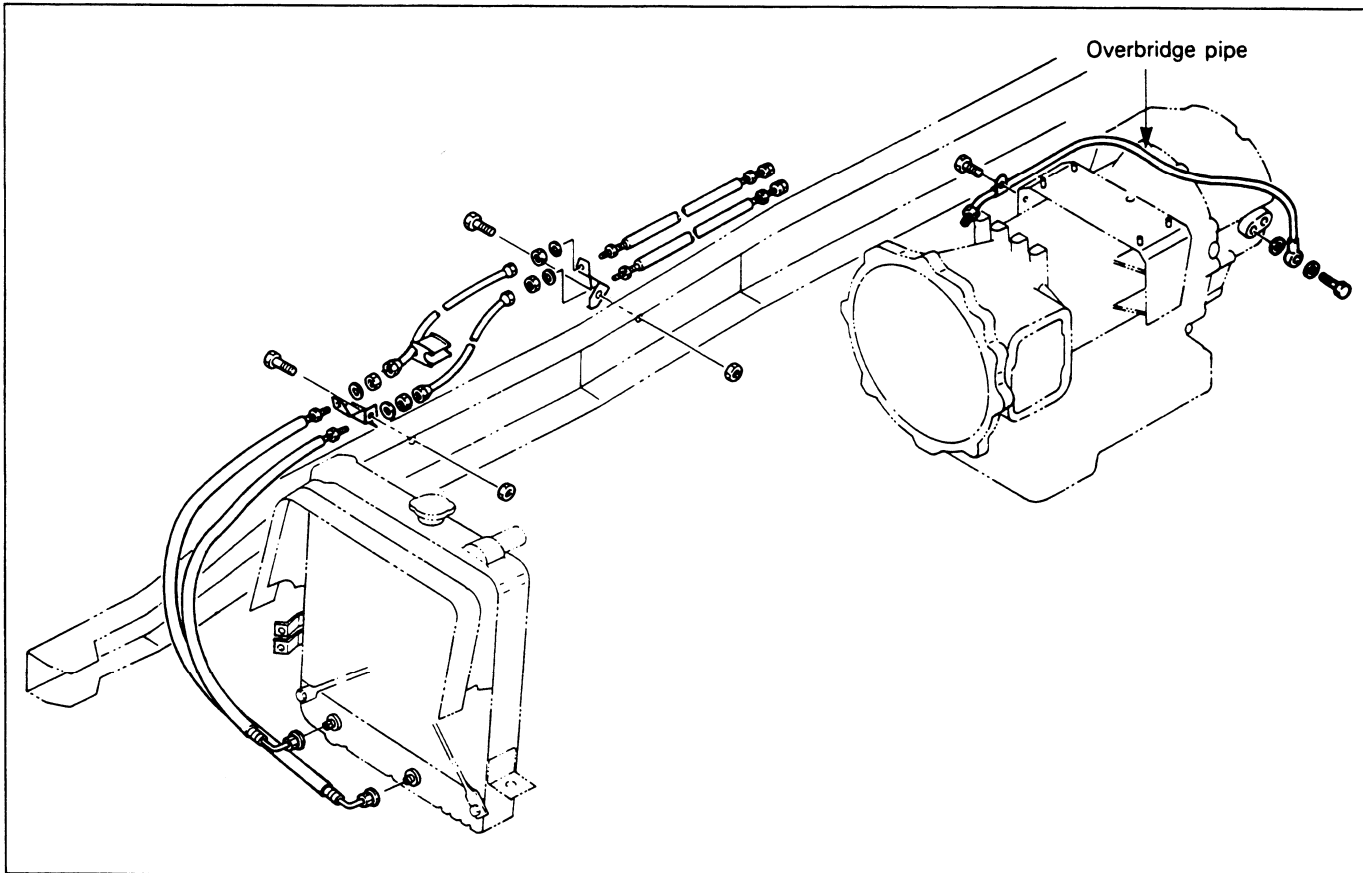


Figure 25. Oil Cooler and Line

CIRCUIT DIAGRAM

