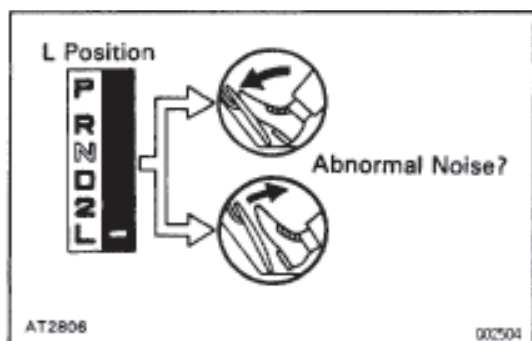
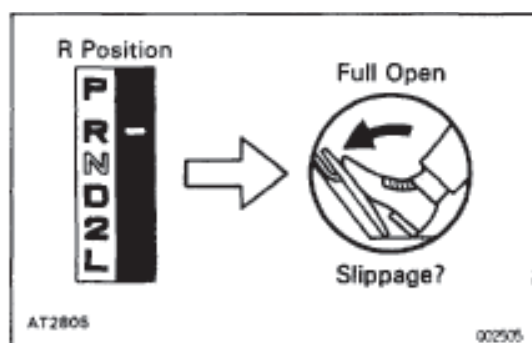


- (b) Check engine braking
While running in the L position, release the accelerator pedal and check the engine braking effect.



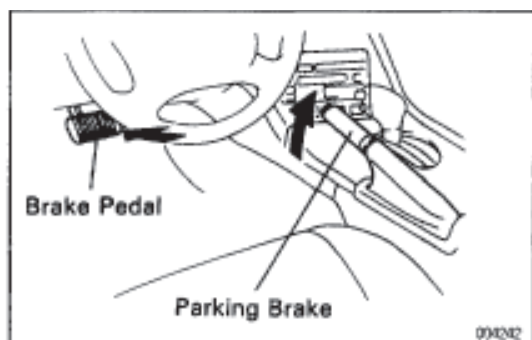
- (c) Check for abnormal noise during acceleration and deceleration.



6. R POSITION TEST

Shift into the R position and while starting at full throttle, check for slipping.

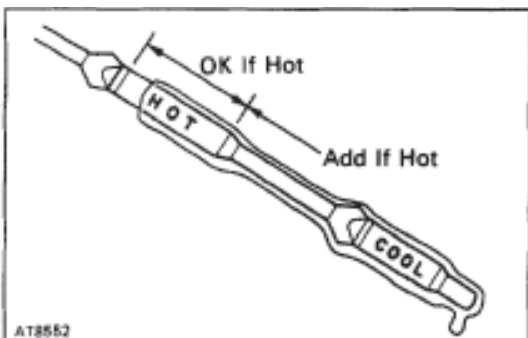
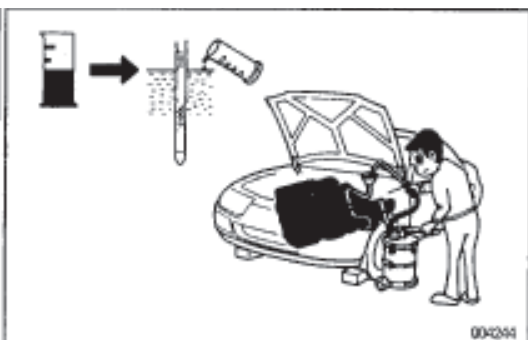
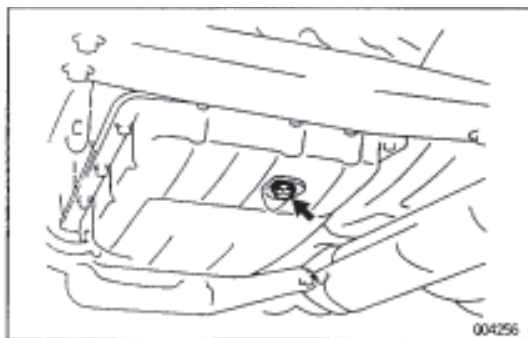
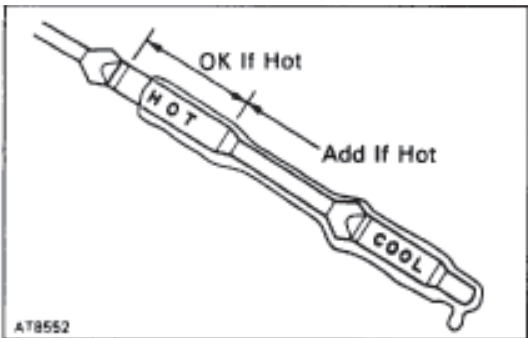
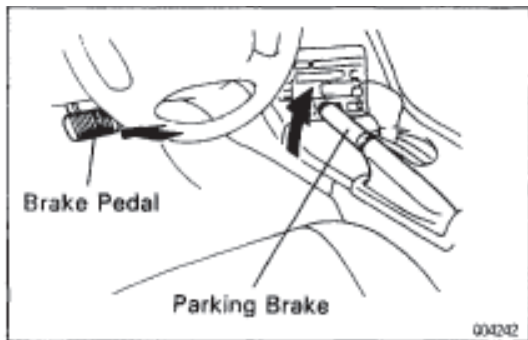
CAUTION: Before conducting this test ensure that the test area is free from personnel and obstruction.



7. 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 to see that the parking lock pawl holds the vehicle in place.



PRELIMINARY CHECK

1. CHECK FLUID LEVEL

HINT:

- Drive the vehicle so that the engine and transmission are at normal operating temperature.
Fluid temp.: 70–80°C (158–176°F)
- Only use the COOL position on the dipstick as a rough reference when the fluid is replaced or the engine does not run.

- Park the vehicle on a level surface and set the parking brake.
- With the engine idling and the brake pedal depressed, shift the shift lever into all positions from P to L position and return to P position.
- Pull out the oil level gauge and wipe it clean.
- Push it back fully into the pipe.
- Pull it out and check that the fluid level is in the HOT position. If the level is at the low side, add fluid.

Fluid type:

ATF TYPE T-II or Equivalent

NOTICE: Do not overfill

2. CHECK FLUID CONDITION

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

3. REPLACE TRANSMISSION FLUID

- Remove the drain plug and drain the fluid.
- Reinstall the drain plug securely.
- With the engine OFF, add new fluid through the oil filler pipe.

Fluid type:

ATF TYPE T-II or Equivalent

Capacity:

Dry fill: 8.2 liters (8.7 US qts, 7.2 Imp. qts)

Drain and refill: 1.9 liters (2.0 US qts, 1.6 Imp. qts)

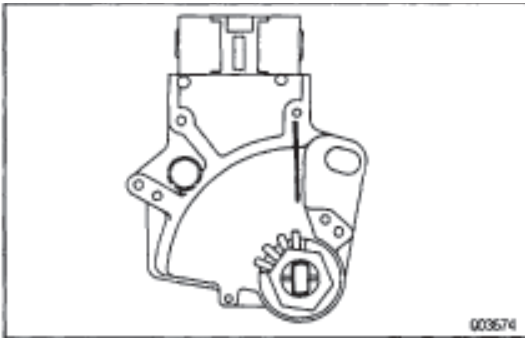
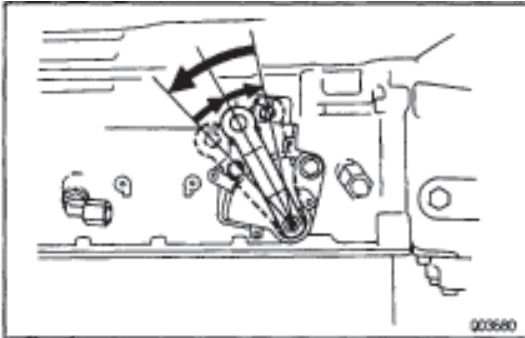
- Start the engine and shift the shift lever into all positions from P to L position and then shift into P position.
- With the engine idling, check the fluid level. Add fluid up to the COOL level on the dipstick.
- Check the fluid level at the normal operating temperature 70–80°C (158–176°F) and add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

NOTICE: Do not overfill.

4. CHECK FLUID LEAKS

Check for leaks in the transmission.

If there are leaks, it is necessary to repair or replace O-rings, seal packings, oil seals, plugs or other parts.



5. INSPECT AND ADJUST SHIFT LEVER POSITION

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:

- Loosen the nut on the control shaft lever.
- Push the control shaft lever fully rearward.
- Return the control shaft lever 2 notches to N position.
- Set the shift lever to N position.
- While holding the shift lever lightly toward the R position side, tighten the shift lever nut.
- Start the engine and make sure that the vehicle moves forward when shifting the lever from the N to D position and reverses when shifting it to the R position.

6. INSPECT AND ADJUST PARK/NEUTRAL POSITION SWITCH

Check that the engine can be started with the shift lever only in the N or P position, but not in other positions.

If not as stated above, carry out these adjustment procedures:

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

Torque: 12 N·m (125 kgf·cm, 9 ft·lbf)

For continuity inspection of the park/neutral position switch, see page [AT2-101](#).

7. INSPECT IDLE SPEED

Idle speed:

650±50 rpm

(In N position and air conditioner OFF)

MECHANICAL SYSTEM TESTS

STALL TEST

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

NOTICE:

- Do the test at normal operating fluid temp. 50–80°C (122–176°F).
- Do not continuously run this test longer than 5 seconds.
- To ensure safety, conduct this test in a wide, clear, level area which provides good traction.
- The stall test should always be carried out in pairs. One technician should observe the conditions of wheels or wheel stoppers outside the vehicle while the other is doing the test.

MEASURE STALL SPEED

- Chock the 4 wheels.
- Fully apply the parking brake.
- Connect a tachometer to the engine.
- Start the engine and check idle.
- Keep your foot pressed firmly on the brake pedal.
- Shift into the D position. Fully depress the accelerator pedal. Quickly read the stall speed.

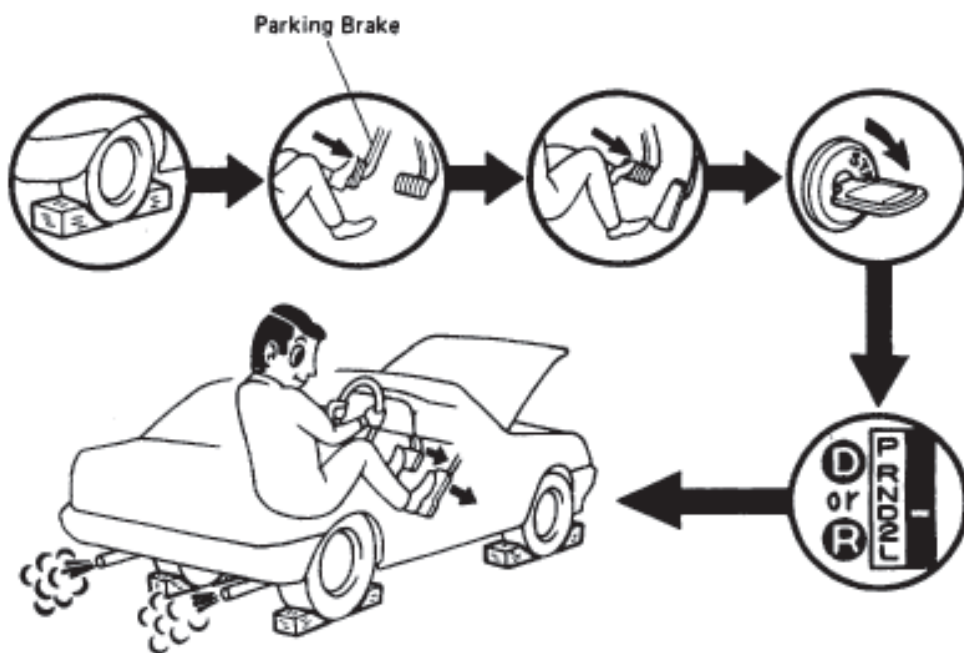
Stall speed:

2,600±150 rpm

- Do the same test in R position. Quickly read the stall speed.

Stall speed:

2,600±150 rpm



EVALUATION

Problem	Possible cause
(a) Stall speed low in D and R positions.	★Engine output may be insufficient. ★Stator one-way clutch is operating properly HINT: If more than 600 rpm below the specified value, the torque converter clutch could be faulty.
(b) Stall speed high in D position	★Line pressure too low. ★Forward clutch slipping ★No.2 one-way clutch not operating properly ★O/D one-way clutch not operating properly
(c) Stall speed high in R position.	★Line pressure too low ★Direct clutch slipping ★First and reverse brake slipping ★O/D clutch slipping
(d) Stall speed high in D and R positions.	★Line pressure too low ★Improper fluid level ★O/D one-way clutch not operating properly

TIME LAG TEST

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, forward clutch, direct clutch, and first and reverse brake.

NOTICE:

- Do the test at normal operating fluid temp. 50–80°C (122–176°F).
- Be sure to allow 1 minute interval between tests.
- Take 3 measurements and take the average value.

MEASURE TIME LAG

- Fully apply the parking brake
- Start the engine and check idle speed.

Idle speed:

650±50 rpm (In N position and air conditioner OFF)

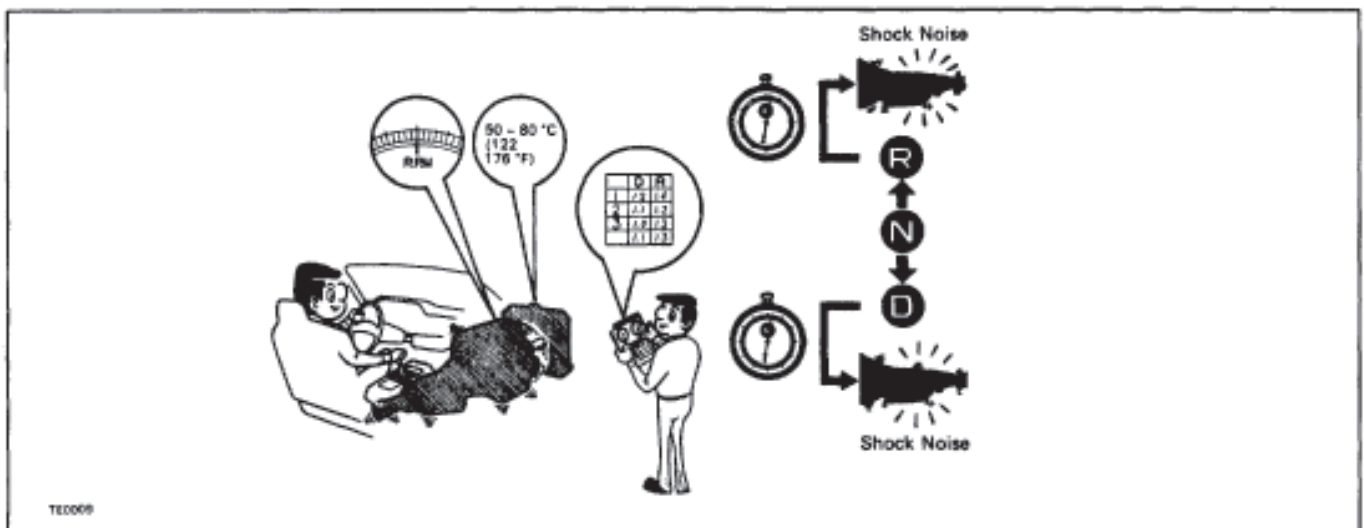
- Shift the shift lever from N to D position. Using a stop watch, measure the time it takes from shifting the lever until the shock is felt.

In same manner, measure the time lag for N → R.

Time lag:

N → D Less than 1.2 seconds

N → R Less than 1.5 seconds



EVALUATION

If N → D or N → R time lag is longer than specified:

Problem	Possible cause
N→D time lag is longer	★Line pressure too low ★Forward clutch worn ★O/D one-way clutch not operating properly
N→R time lag is longer	★Line pressure too low ★Direct clutch worn ★First and reverse brake worn ★O/D clutch worn

HYDRAULIC TEST

MEASURE LINE PRESSURE

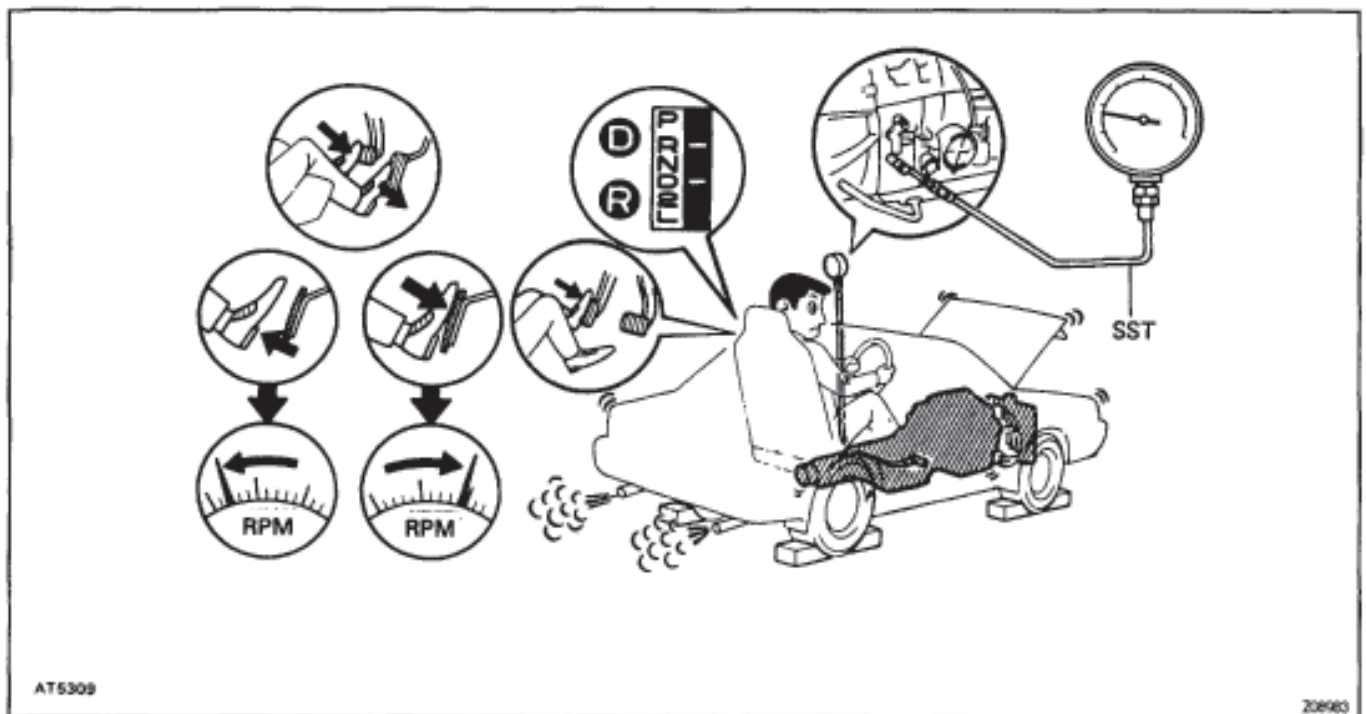
NOTICE:

- Do the test at normal operating fluid temp. 50–80°C (122–176°F)
- The line pressure test should always be carried out in pairs. One technician should observe the conditions of wheels or wheel stoppers outside the vehicle while the other is doing the test.
- Be careful to prevent the oil pressure gauge hose from interfering with the exhaust pipe.

(a) Warm up the transmission fluid.

(b) Remove the test plug on the transmission case left side and connect the oil pressure gauge (SST).
SST 09992-00094 (Oil pressure gauge)

HINT: Connecting the oil pressure gauge will be made easier by moving LH side heat insulator side.



- (c) Chock the 4 wheels.
- (d) Fully apply the parking brake.
- (e) Start the engine and check idling speed.
- (f) Keep your left foot pressed firmly on the brake pedal and shift into D position.
- (g) Measure the line pressure when the engine is idling.
- (h) Fully depress the accelerator. Quickly read the highest line pressure when engine speed reaches stall speed.

NOTICE: Release the accelerator pedal and stop test if the wheels begin to rotate before the engine speed reaches specified stall speed.

- (i) In the same manner, do the test in R position.

SPECIFIED LINE PRESSURE**Line pressure:**

Condition	D position kPa (kgf/cm ² psi)	R position kPa (kgf/cm ² , psi)
Idling	471–530 (4.8–5.4, 68–77)	686–785 (7.0–8.0, 100–114)
Stall	1,334–1,470 (13.6–15.0, 193–213)	1,697–2,030 (17.3–20.7, 246–294)

If the measured pressures are not up to specified values, check the No.5 solenoid valve and retest.

EVALUATION

Problem	Possible cause
If the measured values at all positions are higher.	Throttle cable out of adjustment Throttle valve defective Regulator valve defective
If the measured values at all positions are lower.	Throttle cable out of adjustment Throttle valve defective Regulator valve defective Oil pump defective O/D direct clutch defective
If pressure is low in the D position only.	D position circuit fluid leakage Forward clutch defective
If pressure is low in the R position only.	R position circuit fluid leakage Direct clutch defective First and reverse brake defective

MEASURE ACCUMULATOR BACK PRESSURE

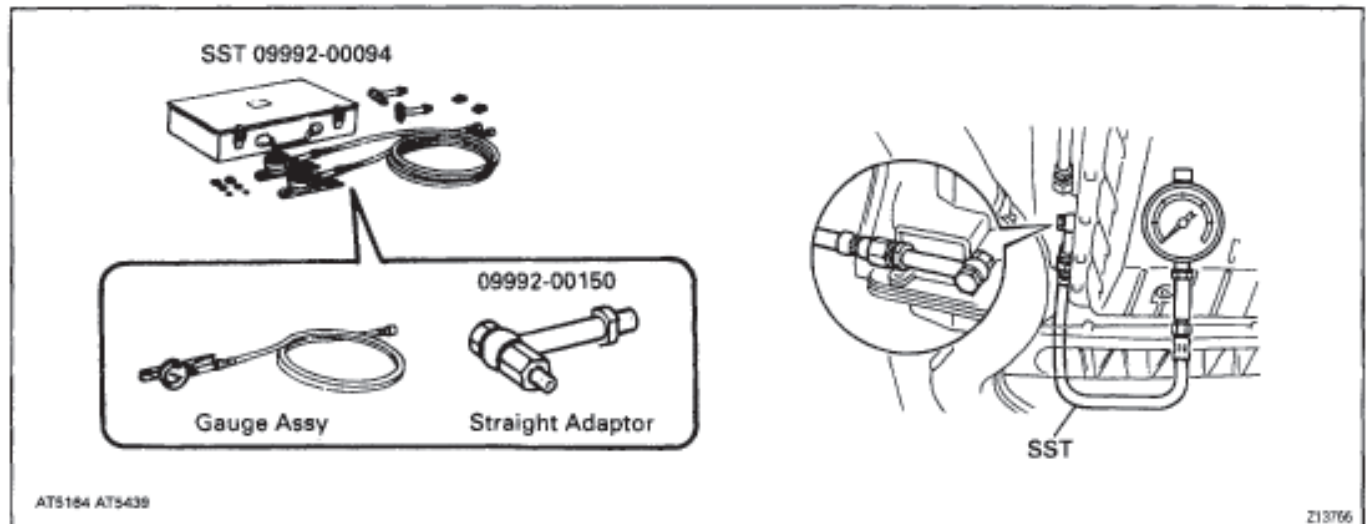
NOTICE:

- Do the test at normal operating fluid temp. 50–80°C (122–176°F).
- Be careful to prevent the oil pressure gauge hose from interfering with the exhaust pipe.

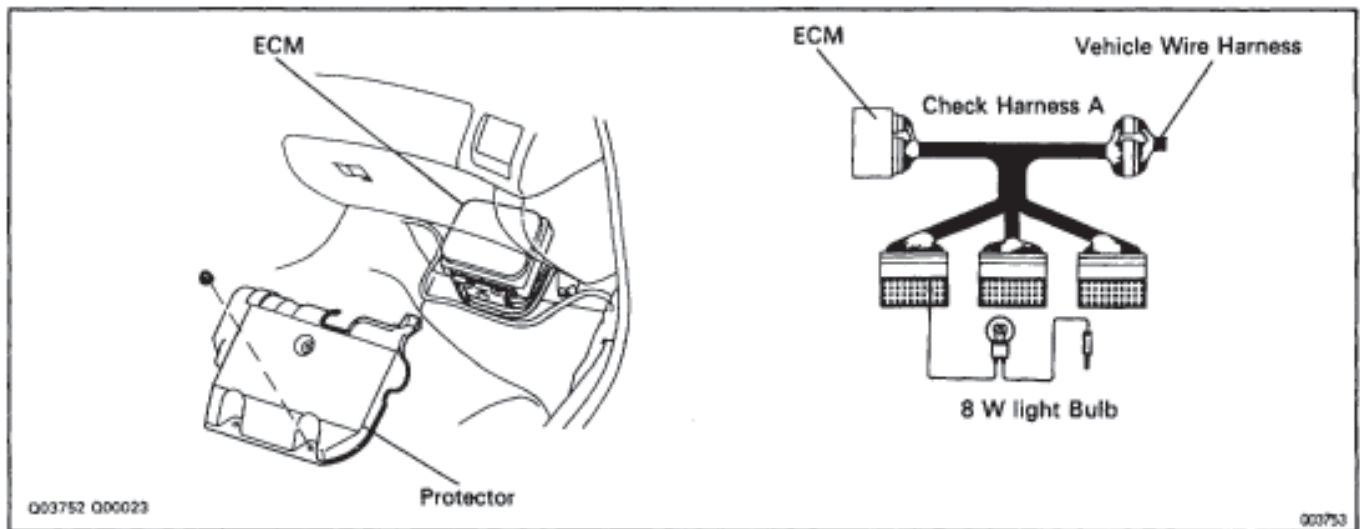
- (a) Warm up the transmission fluid.
- (b) Remove the test plug on the transmission case rear right side and connect the oil pressure gauge (SST)

SST 09992-00094 (Oil pressure gauge)

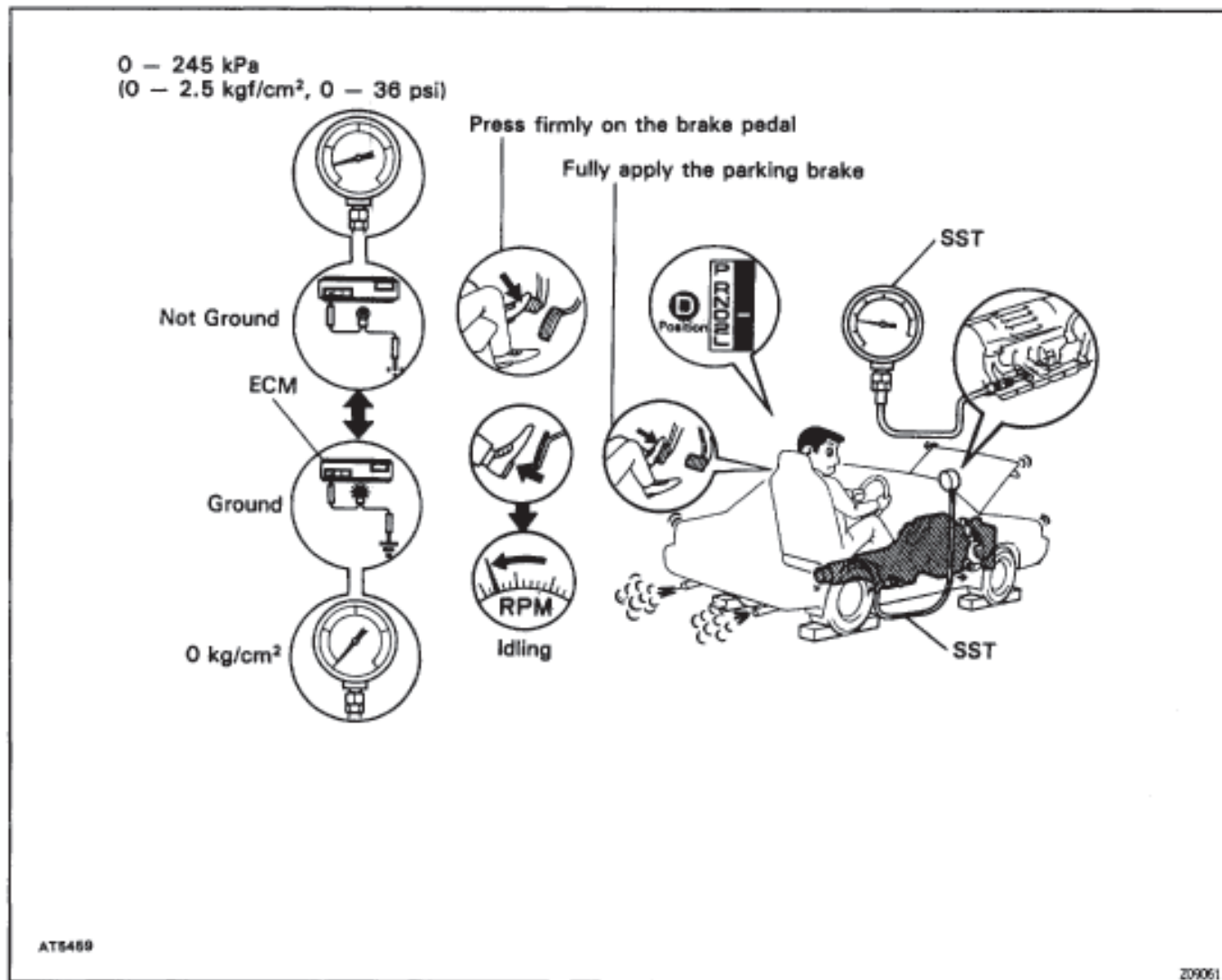
HINT: Connecting the oil pressure gauge will be made easier by moving the RH side head insulator aside.



- (c) Remove the passenger side floor carpet and ECM protector.
- (d) Connect the SST (check harness A) between ECM and connector of vehicle wire harness.
SST: 09990-01000
- (e) Install one test lead probe into the terminal SLN of the ECM wire harness side connector and take care not to ground the other test lead probe.
- HINT: Prepare test leads which are connected with an approximately 8 W light bulb.



- (f) Fully apply the parking brake and chock the 4 wheels.
- (g) Start the engine and check idling speed.
- (h) Keep your left foot pressed firmly on the brake pedal and shift into D position.
- (i) Measure the accumulator back pressure.
- (j) With the conditions the same as in (h), ground the other probe or the test lead which has one end inserted into the terminal SLN of the ECM harness side connector, then measure the accumulator back pressure again.

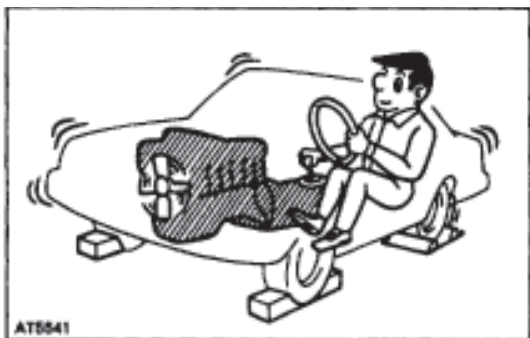
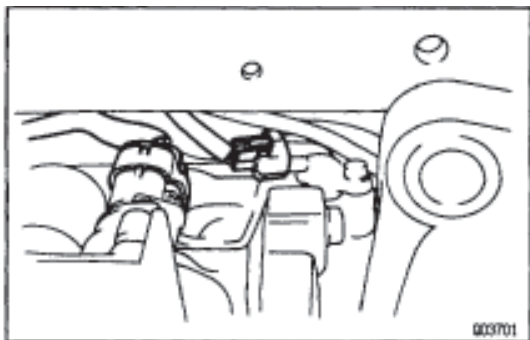


SPECIFIED ACCUMULATOR BACK PRESSURE (D position, Idling)

Condition of ECM terminal SLN	Not ground	Ground
Accumulator back pressure kPa (kgf/cm ² , psi)	177–255 (1.8–2.6, 26–37)	0

EVALUATION

Problem	Possible cause
The accumulator back pressure is not as specified (high or low) when the terminal SLN is not ground.	Throttle cable out of adjustment Throttle valve defective Solenoid modulator valve defective SLN solenoid valve defective Accumulator control valve defective
The accumulator back pressure does not become 0 kgf/cm ² when the terminal SLN is grounded.	SLN solenoid valve defective



MANUAL SHIFTING TEST

HINT: With this test, it can be determined whether the trouble is within the electrical circuit or is a mechanical problem in the transmission.

1. **DISCONNECT SOLENOID WIRE**
2. **INSPECT MANUAL DRIVING OPERATION**

Check that the shift and gear positions correspond with the table below.

Shift Position	Gear Position
D	O/D
2	3rd
L	1st
R	Reverse
P	Pawl Lock

HINT: If the L, 2 and D position gear positions are difficult to distinguish, do the following road test.








- While driving, shift through the L, 2 and D positions. Check that the gear change corresponds to the shift position.

If any abnormality is found in the above test, the problem is in the transmission itself.




3. **CONNECT SOLENOID WIRE**
4. **CANCEL OUT DIAGNOSTIC TROUBLE CODE**
(See page [AT2-35](#))

DIAGNOSTIC TROUBLE CODE CHART

If a diagnostic trouble code is displayed during the diagnostic trouble code check, check the circuit listed for that code in the table below and proceed to the page given.

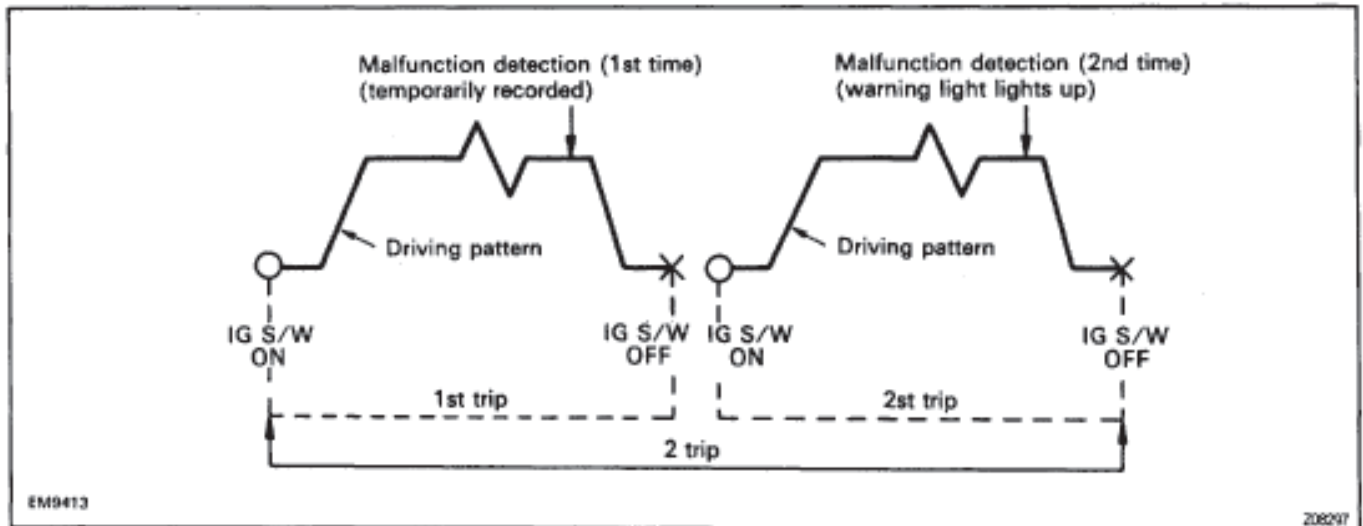
DTC. No.	Blinking Pattern	Circuit	Diagnostic Trouble Code Detection Condition
38	 D02919	A/T fluid temp. sensor	Either (a) or (b) are detected for 0.5 sec. or more: (a) Temp. sensor resistance less than 79 (b) After the engine has been operating for 15 minutes or more, the resistance at the temp. sensor is more than 156 k Ω .
42	 BE3934	No.1 vehicle speed sensor	All conditions below are detected for 4 secs. or more: (2 trip detection logic)*3 (a) No. No.1 vehicle speed sensor signal in 16 pulses of No.2 vehicle speed sensor signal (b) Vehicle speed: 9 km/h (5.6 mph) or more for or more (c) Park/neutral position switch: OFF (Other than P or N position)
46	 BE3934	No.4 solenoid valve	All conditions below are detected for 1 sec. or more: (2 trip detection logic)*3 (a) ECM output duty signal to No.4 solenoid in 90% or higher duty ratio (b) Current to No.4 solenoid: 330 \pm 100 mA or less
61	 BE3936	No.2 vehicle speed sensor	All conditions below are detected: (2 trip detection logic)*3 (a) No. No.2 vehicle speed sensor signal in 4 pulses of No.1 vehicle speed sensor signal (b) Vehicle speed: 9 km/h (5.6 mph) or more for 4 secs. or more (c) Park/neutral position switch: OFF (Other than P or N position)
62	 BE3936	No.1 solenoid valve	(1) Solenoid resistance of 8 Ω or less is detected (*) times or more when NO.1 solenoid is energized. (2) Solenoid resistance of 100 k Ω or more is detected (*) 8 times or more when No.1 solenoid is not energized. (*) If the above failure are detected less than 8 times, the ECM memorizes the malfunction code but the O/D OFF indicator light does not blink.
63	 BE3936	No.2 solenoid valve	(1) Solenoid resistance of 8 Ω or less is detected (*) times or more when NO.2 solenoid is energized. (2) Solenoid resistance of 100 k Ω or more is detected (*) 8 times or more when No.2 solenoid is not energized. (*) If the above failure are detected less than 8 times, the ECM memorizes the malfunction code but the O/D OFF indicator light does not blink.
64	 BE3936	No.3 solenoid circuit	All conditions below are detected for 1 sec. or more: (2 trip detection logic)*3 (a) ECM output duty signal to No.3 solenoid in 90% or higher duty ratio (b) Current to No.3 solenoid: 450 \pm 100 mA or less

Trouble Area	O/D OFF Indicator Light *1 Blinks	Memory *2	See Page
Harness or connector between A/T fluid temp. sensor and ECM A/T fluid temp. sensor ECM	★	★	AT2-70
Harness or connector between No.1 vehicle speed sensor and ECM No.1 vehicle speed sensor Telltale light RH ECM	★	★	AT2-72
Harness or connector between No.4 solenoid valve and ECM No.4 solenoid valve ECM	★	★	AT2-75
Harness or connector between No.2 vehicle speed sensor and ECM No.2 vehicle speed sensor ECM	★	★	AT2-79
Harness or connector between No.1 solenoid valve and ECM No.1 solenoid valve ECM	★	★	AT2-82
Harness or connector between No.2 solenoid valve and ECM No.2 solenoid valve ECM	★	★	AT2-82
Harness or connector between No.3 solenoid valve and ECM No.3 solenoid valve ECM	X	★	AT2-85

DTC. No.	Blinking Pattern	Circuit	Diagnostic Trouble Code Detection Condition
67	 DE3936	O/D direct clutch speed sensor	All conditions below are detected for 4 secs. or more: (2 trip detection logic)*3 (a) Gear change not being performed. (b) Gear position: 1st, 2nd or 3rd (c) T/M input shaft rpm: Less than 300 rpm (d) T/M output shaft rpm: 1000 rpm or more
77	 BE3937	No.5 solenoid circuit	Any of condition below are detected: (2 trip detection logic)*3 (a) SLT- terminal: 0 V or 5 V for 1 sec. or more.
89	 P0505	TRAC ECU circuit	All conditions below are detected for 5 secs. or more: (a) No.1 vehicle speed sensor: 9 km/h (5.6 mph) or more (b) Mirror check of TRAC ECU input signal is abnormal. (c) TRAC ECU input signal does not inform to ECM. (d) TRAC ECU input signal order is abnormal.

Trouble Area	O/D OFF Indicator Light * ¹ Blinks	Memory * ²	See Page
Harness or connector between O/D direct clutch speed sensor and ECM O/D direct clutch speed sensor ECM	★	★	AT2-89
Harness or connector between No.5 solenoid valve and ECM No.5 solenoid valve ECM	★	★	AT2-92
Harness or connector between TRAC ECU and ECM. TRAC ECU	★	★	AT2-95

- *1: "O" mark means "O/D OFF" light blinks once every 2 seconds.
"X" mark means "O/D OFF" light never blinks.
- *2: "O" marks means the ECM memorizes the malfunction code if the ECM detects the diagnostic trouble code detection condition.
- *3: This indicates items for which "2 trip detection logic" is used. With this logic, when a logic malfunction is first detected, the malfunction is temporarily stored in the ECM memory. If the same case is detected again during the second drive test, this second detection causes the O/D OFF indicator light to blink. The 2 trip repeats the same mode twice. (However, the IG switch must be turned OFF between the 1st trip and 2nd trip.)

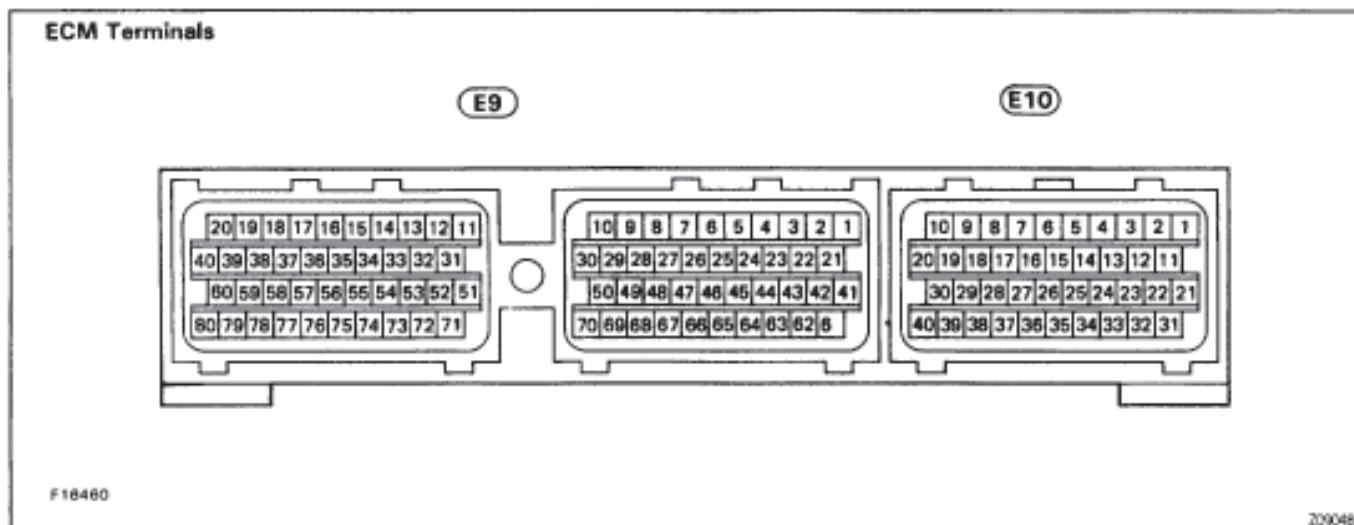


HINT:

- If the malfunction returns to normal while a malfunction warning is being output, the O/D OFF indicator light stops blinking and goes off. However, the diagnostic trouble code is retained in memory until it is cleared from memory.
- If the diagnosis system outputs a diagnostic trouble code even though the O/D OFF indicator was not blinking, there is intermittent trouble. Check all the connections in the circuits corresponding to that code.
- Codes 42, 62, 63 and 64 are limited to short or open circuits in the electrical system comprised of the solenoids, wire harnesses, and connectors. The ECM is unable to detect mechanical trouble (sticking, for example) in the solenoid valves.
- If the speed sensors No.1 and No.2 happen to fail simultaneously, the ECM will neither alert the driver by blinking the O/D OFF indicator nor record any diagnostic trouble code. It will, however, decide that the vehicle can be driven only in 1st and none of the other gears, shifting upward will then be prohibited.

Memo

STANDARD VALUE OF ECM TERMINAL



(*A= (E10), B= (E9))

Terminals	Symbols	Wiring Color	Condition		Standard Value
B13 – B69	SLN \ominus –E1	Y–G \leftrightarrow BR	Ignition switch ON		10 – 14 V
B14 – B69	SLU \ominus –E1	LG–B \leftrightarrow BR	Ignition switch ON		10 – 14 V
B76 – B69	NSW–E1	B–W \leftrightarrow BR	IG ON	Shift Lever: P or N position	Below 1 V
				Shift Lever: Other than P or N position	10 – 14 V
B1 – B21	NCO \ominus –NCO \oplus	L \leftrightarrow Y	IG OFF, Disconnect ECM connector		560 – 680
B3 – B23	SP2 \ominus –SP2 \oplus	G \leftrightarrow R	IG OFF		560 – 680
B10 – B69	S1 – E1	WR \leftrightarrow BR	IG OFF		10 – 16
			Vehicle driving in 2nd gear position		10 – 14 V
			IG ON		10 – 14 V
B9 – B69	S2 – E1	RL \leftrightarrow BR	IG OFF		10 – 16
			Vehicle driving in 2nd or 3rd position		10 – 14 V
			IG ON		Below 0.5 V
B43 – B65	VTA1 – E2	Y \leftrightarrow BR	IG ON	Accel. Pedal is not depressed	Below 1.5 V
				Accel. Pedal is fully depressed	3.0 – 5.5 V
B64 – B65	IDL1 – E2	R \leftrightarrow BR	IG ON	Accel. Pedal is not depressed	Below 1 V
				Accel. Pedal is depressed	10 – 14 V
A2 – B65	SP1 – E2	P \leftrightarrow BR	Ignition switch ON turn one rear wheel slowly		Repeat 0–8 V or above
A3 – B69	KD – E1	Y \leftrightarrow BR	IG ON	Kickdown SW: OFF (Accel. pedal is not depressed)	10 – 14 V
				Kickdown SW: ON (Accel. pedal is fully depressed)	Below 0.5 V
A7 – B69	R – E1	RB \leftrightarrow BR	IG ON	Shift position: R position	10 – 14 V
				Shift position: Other than R position	Below 0.5 V
A9 – B69	2 – E1	LG–R \leftrightarrow BR	IG ON	Shift position: 2 position	10 – 14 V
				Shift position: Other than 2 position	Below 0.5 V
A10 – B69	L – E1	G–B \leftrightarrow BR	IG ON	Shift position: L position	10 – 14 V
				Shift position: Other than L position	Below 0.5 V
A12 – B69	OD1 – E1	BR–B \leftrightarrow BR	Ignition switch ON		4 – 6 V