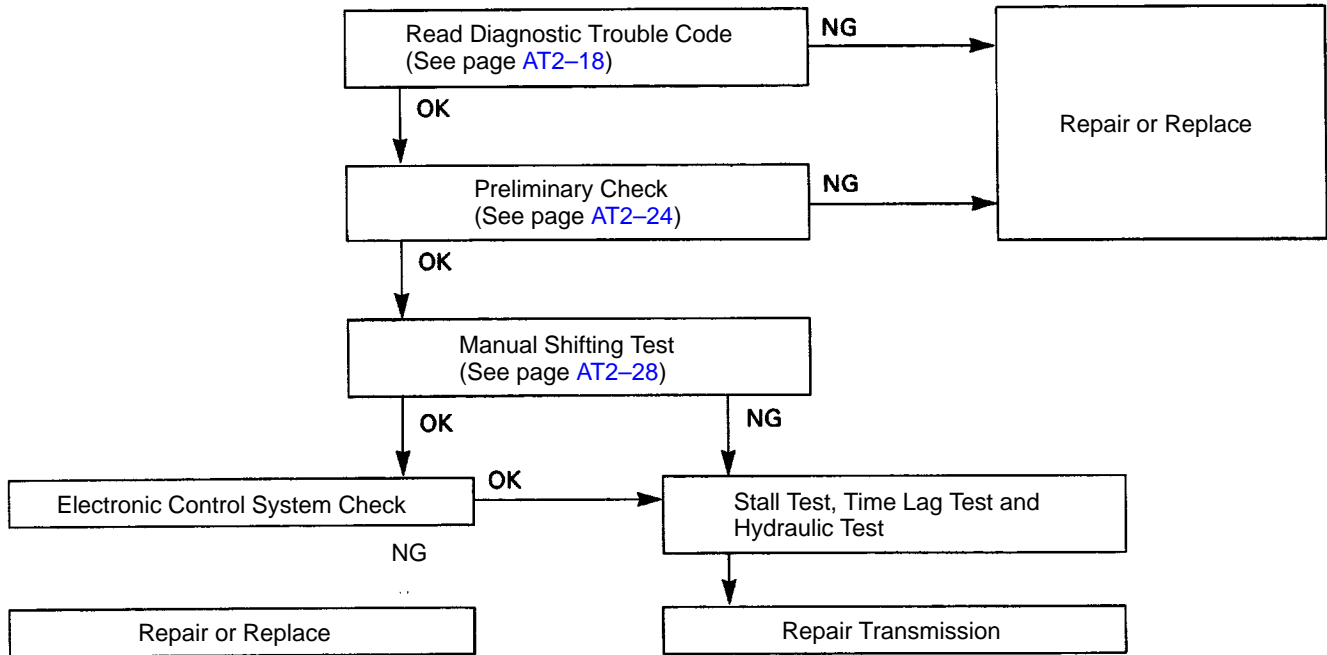


TROUBLESHOOTING

BASIC TROUBLESHOOTING

Before troubleshooting an electronically controlled transmission first determine whether the problem is electrical or mechanical. To do this, just refer to the basic troubleshooting flow-chart provided below. If the cause is already known, using the basic troubleshooting chart below along with the general troubleshooting chart on the following pages should speed the procedure.

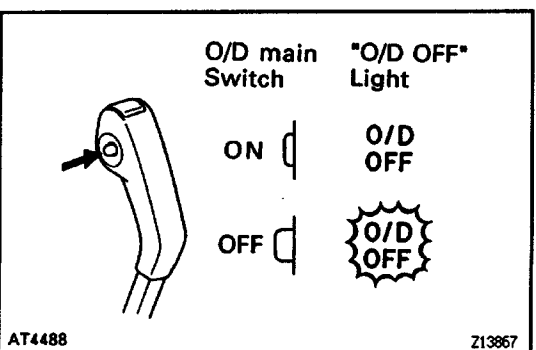
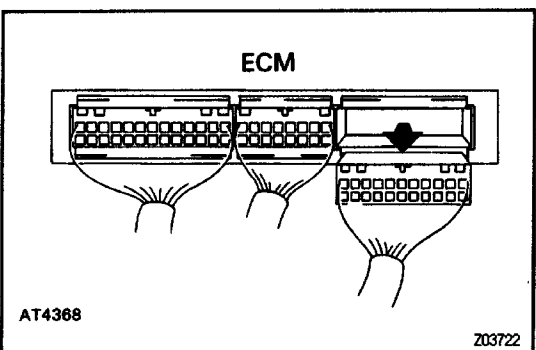
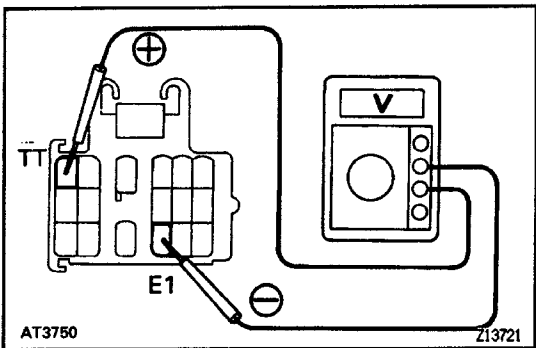
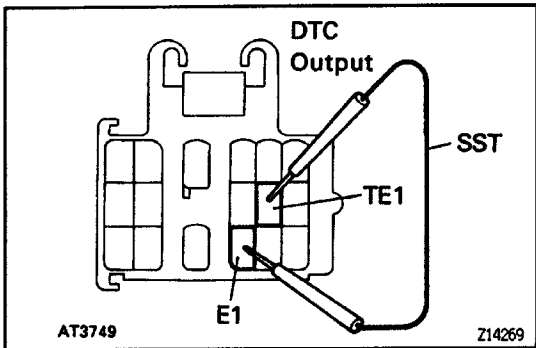
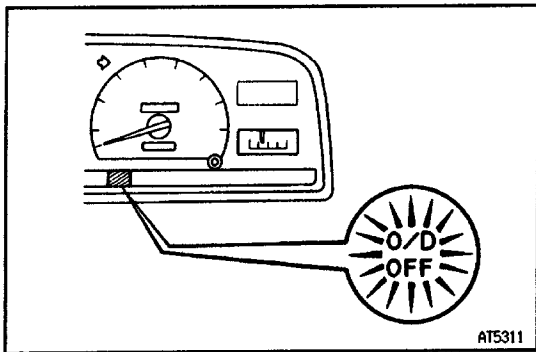


NOTICE: Refer to A340E, A340F, A340H Automatic Transmission Repair Manual (Pub. No. RM391 U) when ★ mark appears in the column for page numbers.

Problem	Possible Cause	Remedy	Page
Fluid discolored or smells burnt	Fluid contaminated Torque converter clutch faulty Transmission faulty	Replace fluid Replace torque converter clutch Disassemble and inspect transmission	AT2-24 AT2-72 ★
Vehicle does not move in any forward position of reverse	Manual linkage out of adjustment Valve body or primary regulator faulty Parking lock pawl faulty Torque converter clutch faulty Converter drive plate broken Oil pump intake screen blocked Transmission faulty	Adjust linkage Inspect valve body Inspect parking lock pawl Replace torque converter clutch Replace drive plate Clean screen Disassemble and inspect transmission	AT2-26 ★ AT2-70 AT2-72 AT2-75 ★ ★
Shift lever position incorrect	Manual linkage out of adjustment Manual valve and lever faulty Transmission faulty	Adjust linkage Inspect valve body Disassemble and inspect transmission	AT2-26 ★ ★
Harsh engagement into any drive position	Throttle cable out of adjustment Valve body or primary regulator faulty . Accumulator piston faulty Transmission faulty	Adjust throttle cable Inspect valve body Inspect accumulator pistons Disassemble and inspect transmission	AT2-26 ★ ★ ★
Delayed 1-2, 2-3 or 3-O/D up-shift, or down-shift, from O/D-3 or 3-2 and shifts back to O/D or 3	Electronic control faulty Valve body faulty Solenoid valve faulty	Inspect electronic control Inspect valve body Inspect solenoid valve	AT2-30 ★ AT2-39
Slips on 1-2, 2-3 or 3-O/D up-shift, or slips or shudders on acceleration	Manual linkage out of adjustment Throttle cable out of adjustment Valve body faulty Solenoid valve faulty Transmission faulty	Adjust linkage Adjust throttle cable Inspect valve body Inspect solenoid valve Disassemble and inspect transmission	AT2-26 AT2-26 ★ AT2-39 ★
Drag, binding or tie-up on 1-2, 2-3 or 3-O/D up-shift	Manual linkage out of adjustment Valve body faulty Transmission faulty	Adjust linkage Inspect valve body Disassemble and inspect transmission	AT2-26 ★ ★

NOTICE: Refer to A340E, A340F, A340H Automatic Transmission Repair Manual (Pub. No. RM391 U) when ★ mark appears in the column for page numbers.

Problem	Possible cause	Remedy	Page
No lock-up in 2nd, 3rd or O/D	Electronic control faulty Valve body faulty Solenoid valve faulty Transmission faulty	Inspect electronic control Inspect valve body Inspect solenoid valve Disassemble and inspect transmission	AT2-30 ★ ★ ★
Harsh down-shift	Throttle cable out of adjustment Throttle cable and cam faulty Accumulator pistons faulty Valve body faulty Transmission faulty	Adjust throttle cable Inspect throttle cable and cam Inspect accumulator pistons Inspect valve body Disassemble and inspect transmission	AT2-26 AT2-67 ★ ★ ★
No down-shift when coasting	Valve body faulty Solenoid valve faulty Electronic control faulty	Inspect valve body Inspect solenoid valve Inspect electronic control	★ ★ AT2-30
Down-shift occurs too quickly or too late while coasting	Throttle cable faulty Valve body faulty Transmission faulty Solenoid valve faulty Electronic control faulty	Inspect throttle cable Inspect valve body Disassemble and inspect transmission Inspect solenoid valve Inspect electronic control	AT2-26 ★ ★ ★ AT2-30
No O/D-3, 3-2 or 2-1 kick-down	Solenoid valve faulty Electronic control faulty Valve body faulty	Inspect solenoid valve Inspect electronic control Inspect valve body	★ AT2-30 ★
No engine braking in 2 or L position	Solenoid valve faulty Electronic control faulty Valve body faulty Transmission faulty	Inspect solenoid valve Inspect electronic control Inspect valve body Disassemble and inspect transmission	★ AT2-30 ★ ★
Vehicle does not hold in P	Manual linkage out of adjustment Parking lock pawl cam and spring faulty	Adjust linkage Inspect cam and spring	AT2-26 AT2-70
No H2-H4, H4-L4, L4-H4 or H4-H2 change gear position of transfer	Transfer linkage out of adjustment Electronic control faulty Transfer valve body faulty Transfer faulty	Adjust linkage Inspect electronic control Inspect valve body Disassemble and inspect transfer	AT2-26 AT2-30 ★ ★



DIAGNOSTIC SYSTEM

DESCRIPTION

1. A self-diagnosis function is built into the electrical control system. Warning is indicated by the O/D OFF indicator light.

HINT: Warning and DTC can be read only when the O/D main switch is ON. If OFF, the O/D OFF light is lit continuously and will not blink.

- (a) If a malfunction occurs within the vehicle speed sensors (No. 1 or 2) or solenoids (No. 1, 2 or 4), the O/D OFF light will blink to warn the driver.

However, there will be no warning of a malfunction with lock-up solenoid.

- (b) The DTC can be read by the number of blinks of the O/D OFF indicator light when terminals TE1 and E1 are connected with SST.

(See page [AT2-18](#))

- (c) The throttle position sensor or brake signal are not indicated, but inspection can be made by checking the voltage at terminal TT of the DLC1.

- (d) The signals to each gear can be checked by measuring the voltage at terminal TT of the DLC1 while driving.

2. The DTC is retained in memory by the ECM and due to back-up voltage, is not canceled out when the engine is turned off. Consequently, after repair, it is necessary to turn the ignition switch off and cancel out the DTC.

(See page [AT2-20](#))

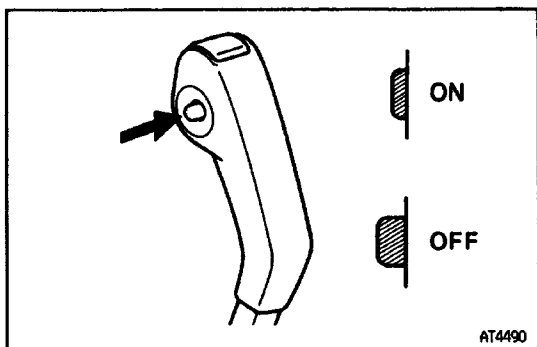
HINT:

- Low battery voltage will cause faulty operation of the diagnosis system. Therefore, always check the battery first.
- Use a voltmeter and ohmmeter that have an impedance of at least 10 k Ω /V.

CHECK "O/D OFF INDICATOR LIGHT

1. Turn the ignition switch ON.
2. The "O/D OFF" light will come on when the O/D is switched OFF.
3. When the O/D main switch is set to ON, the "O/D OFF" light should go out.

If the "O/D OFF" light flashes when the O/D main switch is set to ON, the electronic control system is faulty.

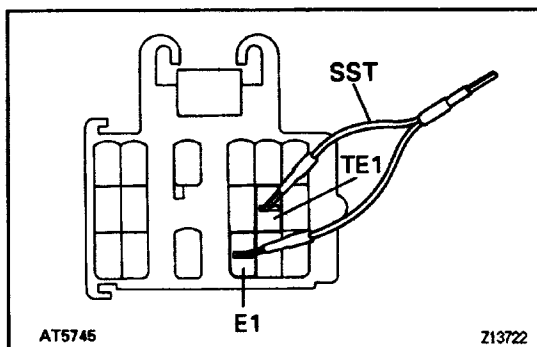


READ DIAGNOSTIC TROUBLE CODE

1. TURN IGNITION SWITCH AND O/D MAIN SWITCH TO ON

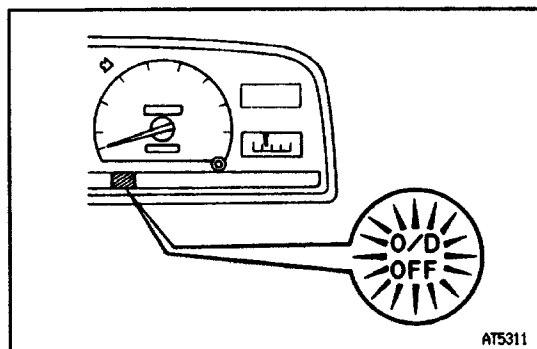
Do not start the engine.

HINT: Warning and DTC can be read only when the O/D main switch is ON. If OFF, the O/D OFF light will light continuously and will not blink.



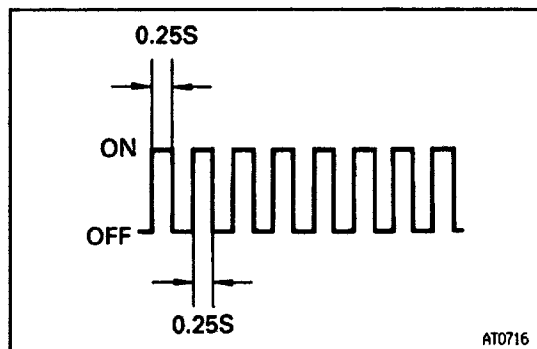
2. CONNECT TE1 TERMINALS OF DLC1

Using SST, connect terminals TE1 and E1.
SST 09843-18020



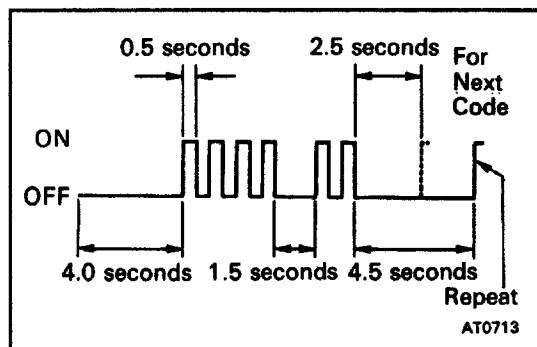
3. READ DIAGNOSTIC TROUBLE CODE

Read the DTC is indicated by the number of times the O/D OFF light flashes.



Diagnostic Trouble Code Indication

- If the system is operating normally, the light will flash 2 times per second.










- In the event of a malfunction, the light will flash 1 time per second. The number of blinks will equal the first number and, after 1.5 seconds pause, the second number of the 2 digit diagnostic trouble code. If there are 2 or more codes, there will be a 2.5 seconds pause between each.

HINT: In the event of several trouble codes occurring simultaneously, indication will begin from the smaller value and continue to the larger.

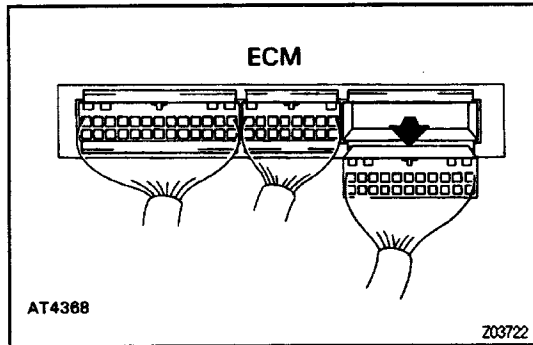
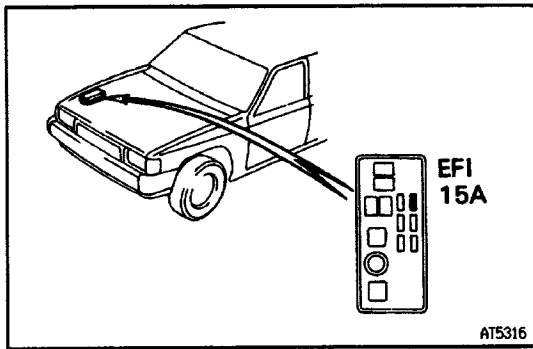
4. REMOVE SST

DIAGNOSTIC TROUBLE CODE

Code No.	Light Pattern	Diagnosis System
—		Normal
42		Defective No. 1 vehicle speed sensor (in combination meter) – severed wire harness or short circuit
61		Defective No. 2 vehicle speed sensor (in ATM)– severed wire harness or short circuit
62		Severed No. 1 solenoid or short circuit – severed wire harness or short circuit
63		Severed No.2 solenoid or short circuit – severed wire harness or short circuit
64		Severed lock-up solenoid or short circuit – severed wire harness or short circuit
65		Severed No.4 solenoid or short circuit – severed wire harness or short circuit

HINT: If codes 62, 63, 64 or 65 appear, there is an electrical malfunction in the solenoid.

Causes due to mechanical failure, such as a stuck valve, will not appear.



CANCEL OUT DIAGNOSTIC TROUBLE CODE

1. After repair of the trouble area, the DTC retained in memory by the ECM must be canceled by removing the EFI fuse (15A) for 10 seconds or more, depending on ambient temperature (the lower the temperature, the longer the fuse must be left out) with the ignition switch OFF.

HINT:

- Cancellation can be also done by removing the negative (-) terminal cable of the battery, but in this case other memory systems will be also canceled out.
- The DTC can be also canceled out by disconnecting the ECM connector.
- If the DTC is not canceled out, it will be retained by the ECM and appear along with a new code in event of future trouble.

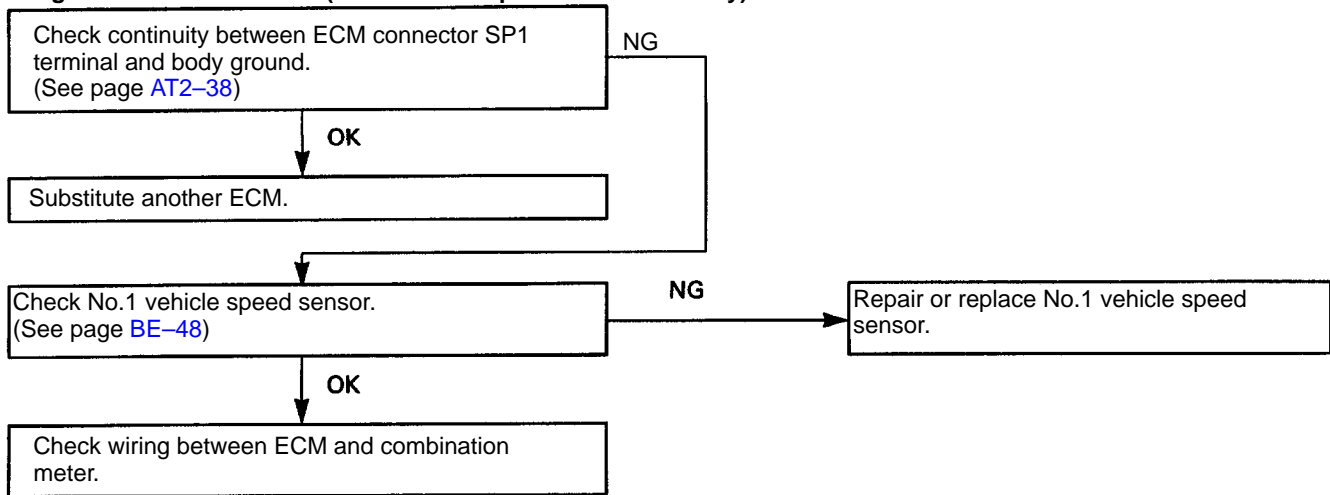
2. After cancellation, perform a road test to confirm that a "normal code" is now read on the O/D OFF indicator light.

TROUBLESHOOTING FLOW-CHART

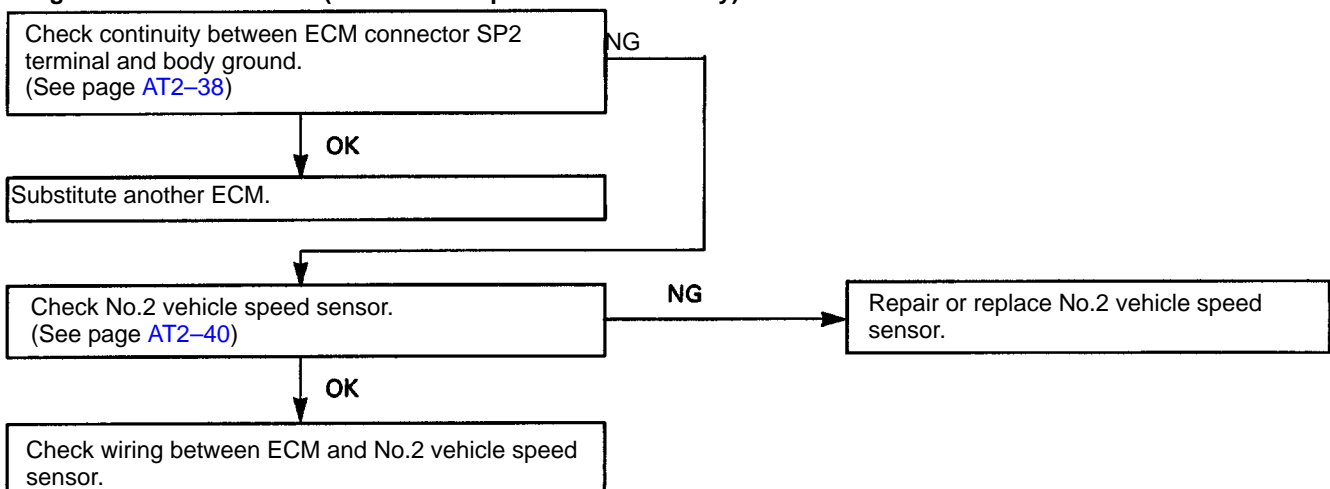
HINT:

- If DTC Nos. 42, 61, 62, 63 or 65 are output, the overdrive OFF indicator light will begin to blink immediately to warn the driver. However, an impact or shock may cause the blinking to stop; but the code will still be retained in the ECM memory unit canceled out.
- There is no warning for DTC No. 64.
- In the event of a simultaneous malfunction of both No.1 and No.2 vehicle speed sensors, no DTC will appear and the fail-safe system will not function. However, when driving in the D position, the transmission will not up-shift from first gear, regardless of the vehicle speed.

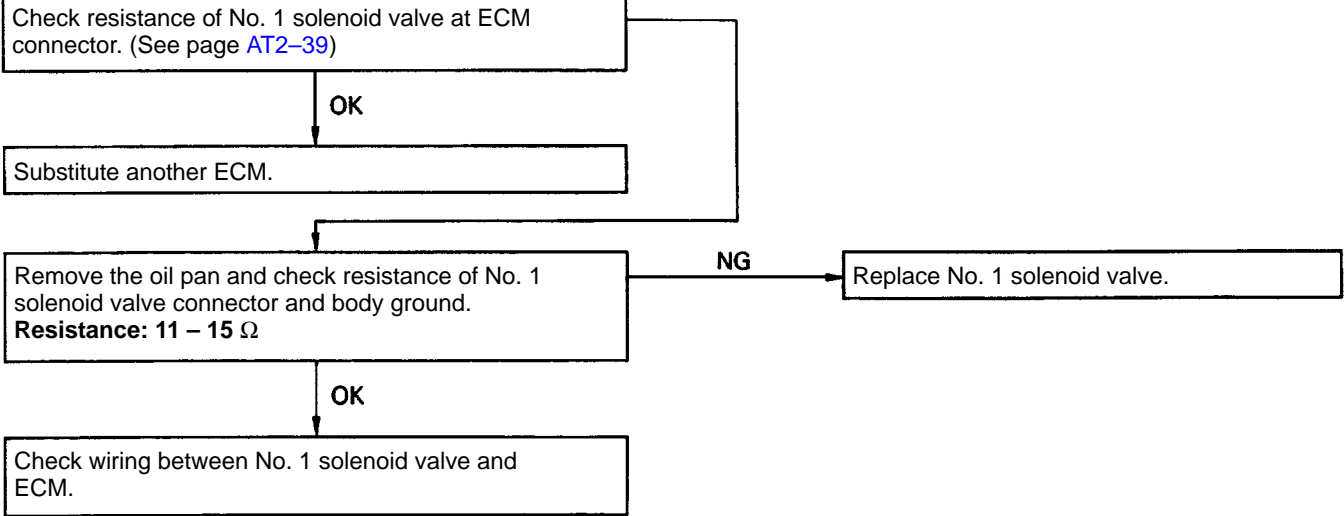
Diagnostic trouble code 42 (No. 1 vehicle speed sensor circuitry)



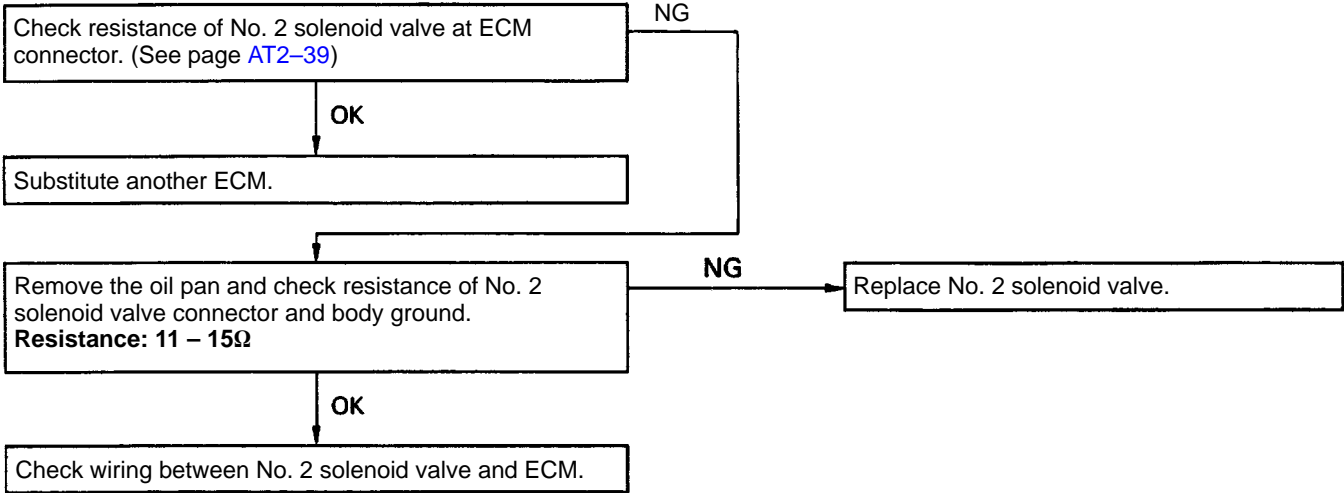
Diagnostic trouble code 61 (No.2 vehicle speed sensor circuitry)



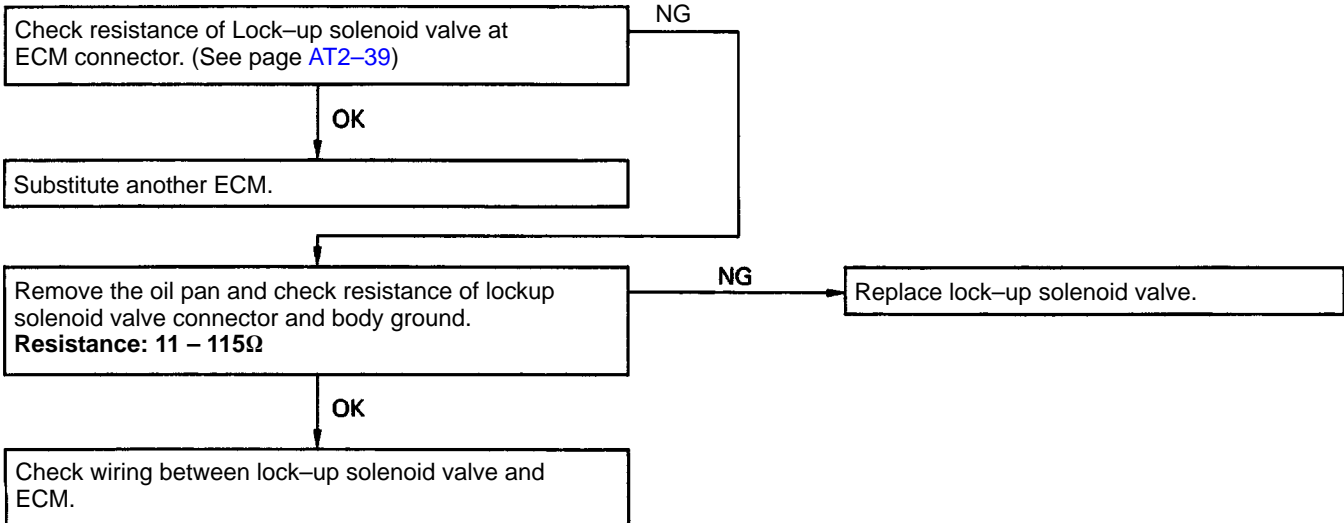
Diagnostic trouble code 62 (No. 1 solenoid valve circuitry)



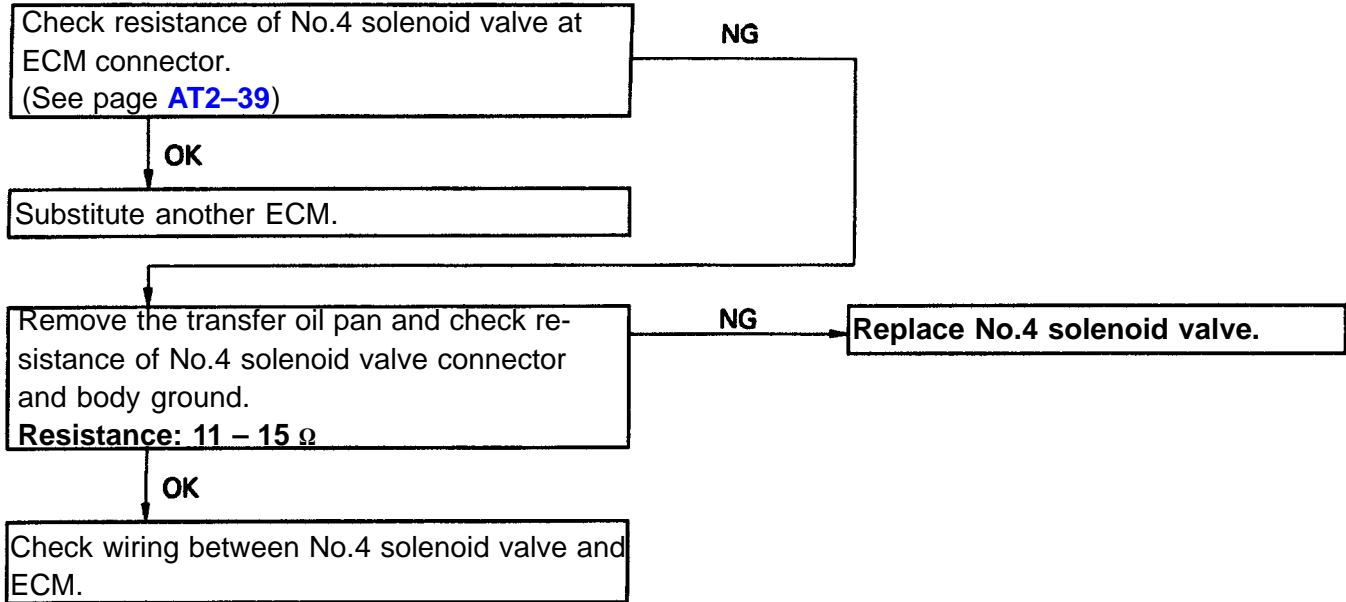
Diagnostic trouble code 63 (No. 2 solenoid valve circuitry)



Diagnostic trouble code 64 (Lock-up solenoid valve circuitry)



Diagnostic trouble code 65 (No.4 solenoid valve circuitry)



PRELIMINARY CHECK

1. CHECK FLUID LEVEL

Transmission and transfer case:

HINT:

- The vehicle must have been driven so that the engine and transmission are at normal operating temperature.

Fluid 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.
- Park the vehicle on a level surface, set the parking brake.
 - With the engine idling, shift the shift lever into all positions from P to L position and return to P position.
 - Pull out the transmission dipstick and wipe it clean.
 - Push it back fully into the pipe.
 - Pull it out and check that the fluid level is in the HOT range.

If the level is at the low side, add fluid.

Fluid type:

ATF DEXRON II

NOTICE: Do not overfill.

Transfer chain case:

Remove the filler plug and feel inside the hole with your finger. Check that the oil comes to within 10 mm (0.39 in.) of the bottom edge of the hole.

If the level is low, add fluid until it begins to run out of the filler hole.

Fluid type:

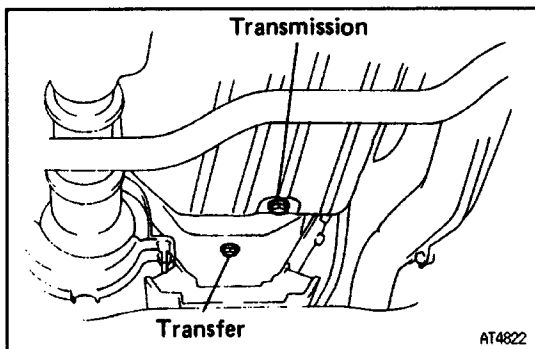
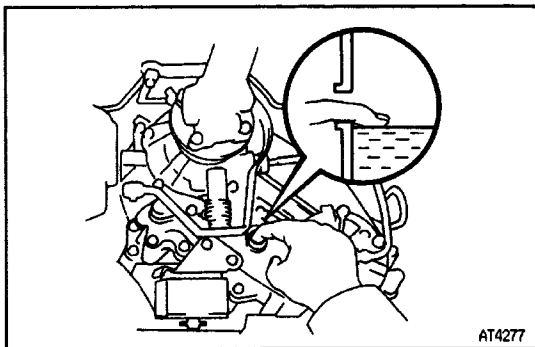
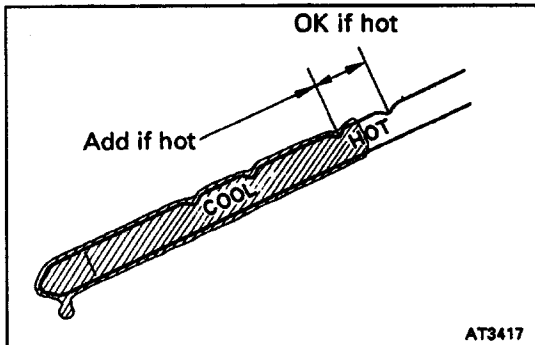
ATF DEXRON II

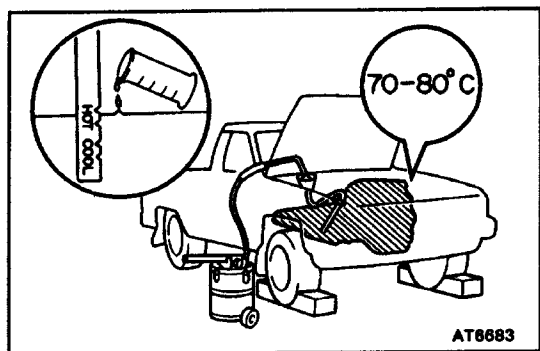
2. CHECK FLUID CONDITION

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

Transmission and transfer case:

- Remove the drain plugs and drain the fluid.
- Reinstall the drain plugs securely.





- (c) With the engine OFF, add new fluid through the oil filler pipe.

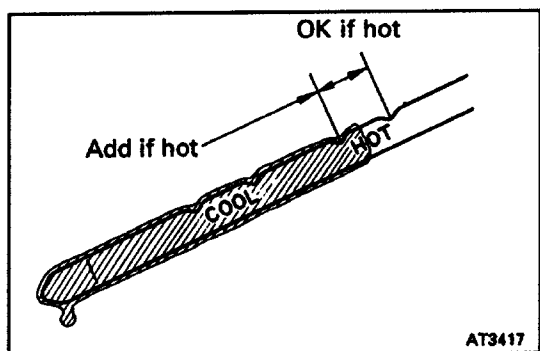
Fluid type:

ATF DEXRON II

Capacity:

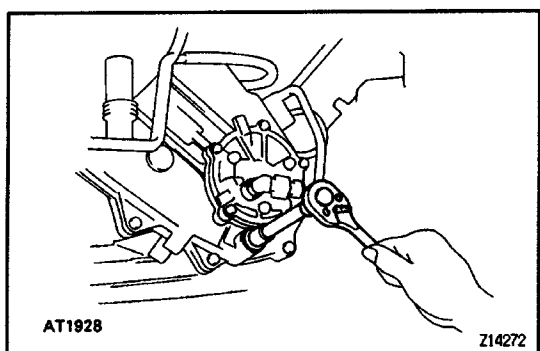
	Transmission liter (US qts, Imp. qts)	Transfer liter (US qts, Imp. qts)
Drain and refill	4.5 (4.8, 4.0)	0.8 (0.8, 0.7)
Dry fill	10.3 (10.9, 9.1)	1.1 (1.2, 1.0)

- (d) Start the engine and shift the shift lever into all positions from P to L position and then shift into P position.
- (e) With the engine idling, check the fluid level. Add fluid up to the COOL level on the dipstick.



- (f) Check the fluid level with the normal operating temperature 70–80°C (158 – 176°F) and add as necessary.

NOTICE: Do not overfill.



Transfer chain case:

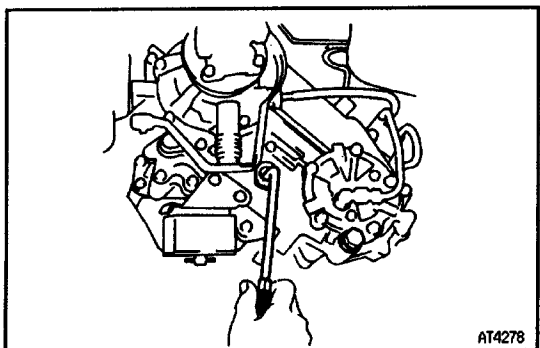
- (a) Remove the transfer under cover.
- (b) Remove the drain plug with a hexagon wrench and drain the fluid.
- (c) Reinstall the drain plug securely with a hexagon wrench.
- (d) With the engine OFF, add new fluid through the filler hole.

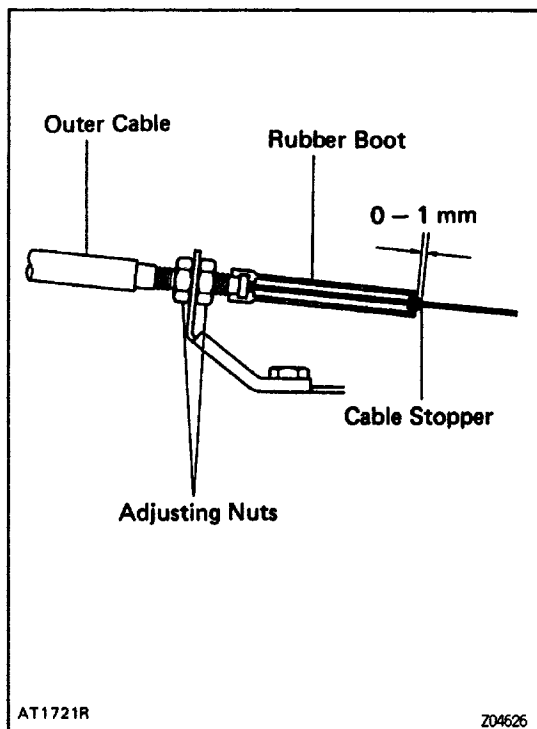
Capacity:

Dry fill – 1.1 liters (1.2 US qts. 1.0 Imp. qts)

Drain and refill – 0.8 liters (0.8 US qts, 0.7 Imp. qts)

- (e) Check the fluid level.
- (f) Install the transfer under cover.





3. INSPECT THROTTLE CABLE

- (a) Depress the accelerator pedal all the way and check that the throttle valve opens fully.

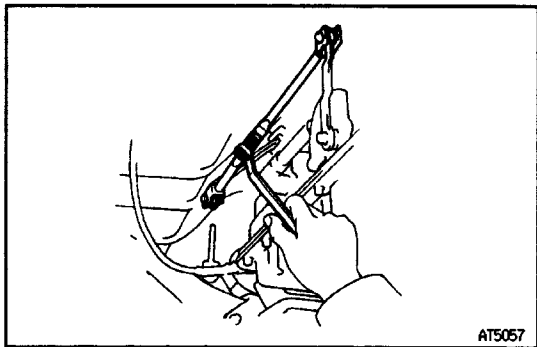
HINT: If the valve does not open fully, adjust the accelerator cable.

- (b) Fully depress the accelerator pedal.
 (c) Measure the distance between the end of the boot and stopper on the cable.

Standard distance:

0 - 1 mm (0 - 0.04 in.)

If the distance is not standard, adjust the cable by the adjusting nuts.

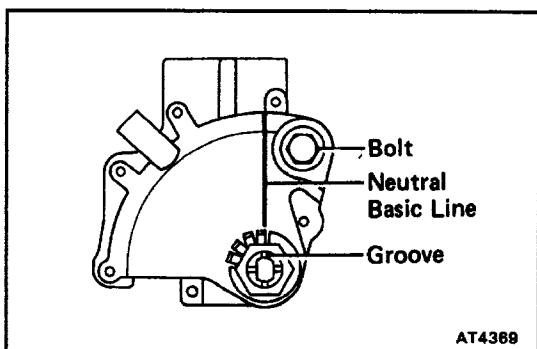


4. INSPECT TRANSMISSION SHIFT LEVER POSITION

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.

- (a) Loosen the nuts on the transmission control rod.
 (b) Push the control shaft lever fully rearward.
 (c) Return the control shaft lever 2 notches to N position.
 (d) Set the shift lever to N position.
 (e) While holding the shift lever lightly toward the R position side, tighten the nuts.
 (f) Start the engine and make sure that the vehicle moves forward when shifting the lever from the N to D position and reverse when shifting it to the R position.



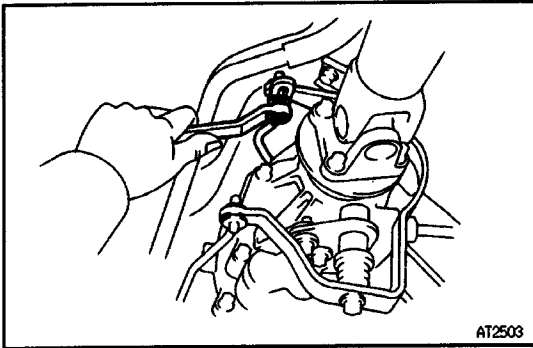
5. INSPECT PARK/NEUTRAL POSITION SWITCH

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 the following adjustment procedures.

- (a) Loosen the park/neutral position switch bolt and set the shift lever to the N position.
 (b) Align the groove and neutral basic line.

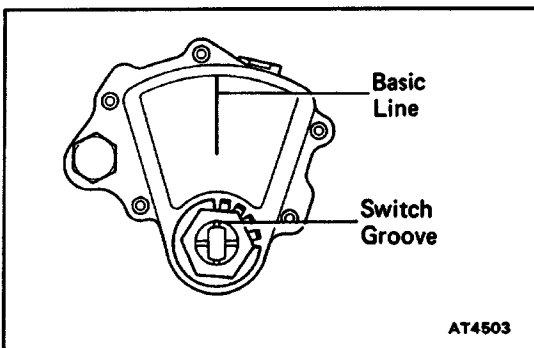
- (c) Hold in position and tighten the bolt.
Torque: 13 N-m (130 kgf-cm, 9 ft-lbf)



6. INSPECT TRANSFER SHIFT LEVER POSITION

When shifting the shift lever from H2 position to H4 and L4 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 cross shaft.
- Push the control shaft lever fully forward.
- Return the control shaft lever 1 notch to H4 position.
- Set the shift lever 4 position.
- While holding the shift lever lightly toward the L4 position side, tighten the nut.

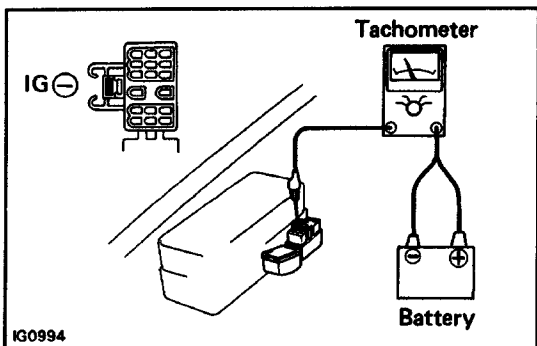


7. INSPECT TRANSFER POSITION SWITCH

If necessary, carry out the following adjustment procedures.

- Loosen the transfer position switch bolt and set the transfer shift lever to the H4 position.
- Align the groove and H4 basic line.
- Hold in position and tighten the bolt.

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

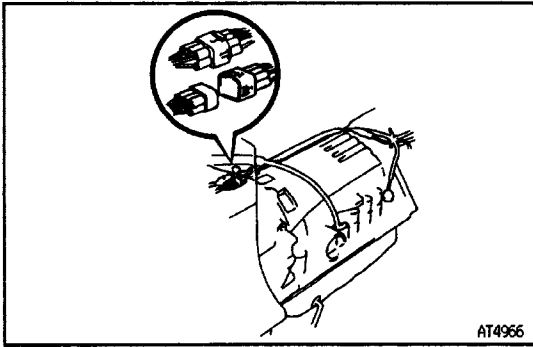


8. INSPECT IDLE SPEED

Connect a tachometer test probe to the data link connector 1 terminal (E), inspect the idle speed.

Idle speed:

800 ± 50 rpm (in N position and air conditioner OFF)



MANUAL SHIFTING TEST

HINT: With this test, it can be determined whether the trouble lies 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.

	Transmission					Transfer (Reference)		
Shift position	D	2	L	R	P	H2	H4	L4
Gear position	O/D	3rd	1st	Reverse	Pawl Lock	High Gear 2WD	High Gear 4WD	High Gear 4WD

HINT: If the L, 2 and D position gear positions are difficult to distinguish, perform 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 lies in transmission itself.

3. **CONNECT SOLENOID WIRE**
4. **CANCEL OUT DIAGNOSTIC TROUBLE CODE**
(See page [AT2-20](#))

REFERENCE: Possible gear positions in accordance with solenoid operating conditions.

Position	NORMAL			NO.1 SOLENOID MALFUNCTIONING			NO.2 SOLENOID MALFUNCTIONING			BOTH SOLENOIDS MALFUNCTIONING		
	Solenoid Valve		Gear Position	Solenoid Valve		Gear Position	Solenoid Valve		Gear Position	Solenoid Valve		Gear Position
	No. 1	No.2		No. 1	No.2		No. 1	No.2		No. 1	No.2	
D position	ON	OFF	1st	X	ON	3rd	ON	X	1st	X	X	O/D
	ON	ON	2nd	X	ON	3rd	OFF	X	O/D	X	X	O/D
	OFF	ON	3rd	X	ON	3rd	OFF	X	O/D	X	X	O/D
	OFF	OFF	O/D	X	OFF	O/D	OFF	X	O/D	X	X	O/D
2 position	ON	OFF	1st	X	ON	3rd	ON	X	1st	X	X	3rd
	ON	ON	2nd	X	ON	3rd	OFF	X	3rd	X	X	3rd
	OFF	ON	3rd	X	ON	3rd	OFF	X	3rd	X	X	3rd
L position	ON	OFF	1st	X	OFF	1st	ON	X	1st	X	X	1st
	ON	ON	2nd	X	ON	2nd	ON	X	1st	X	X	1st

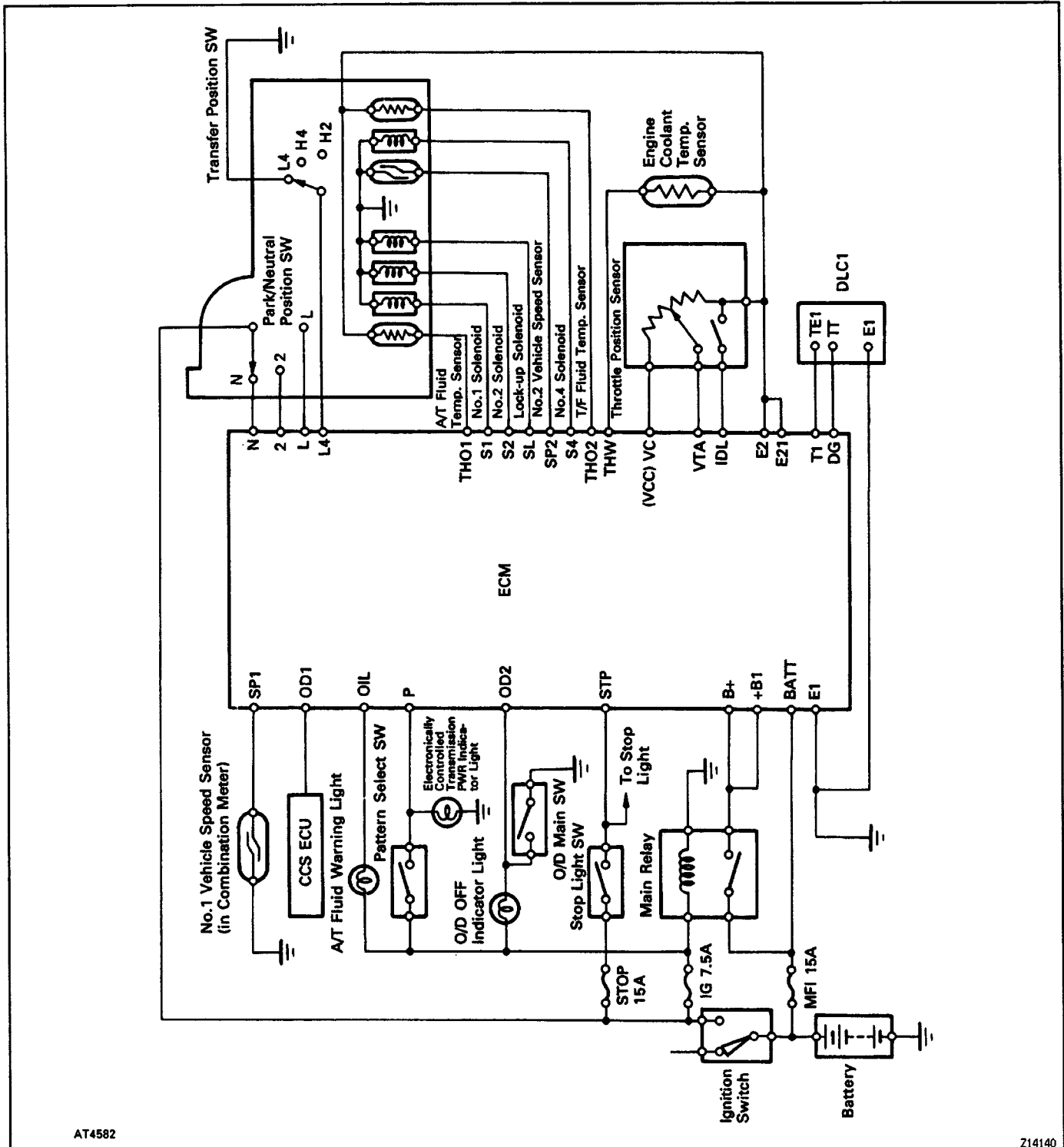
X: Malfunctions

ELECTRONIC CONTROL SYSTEM

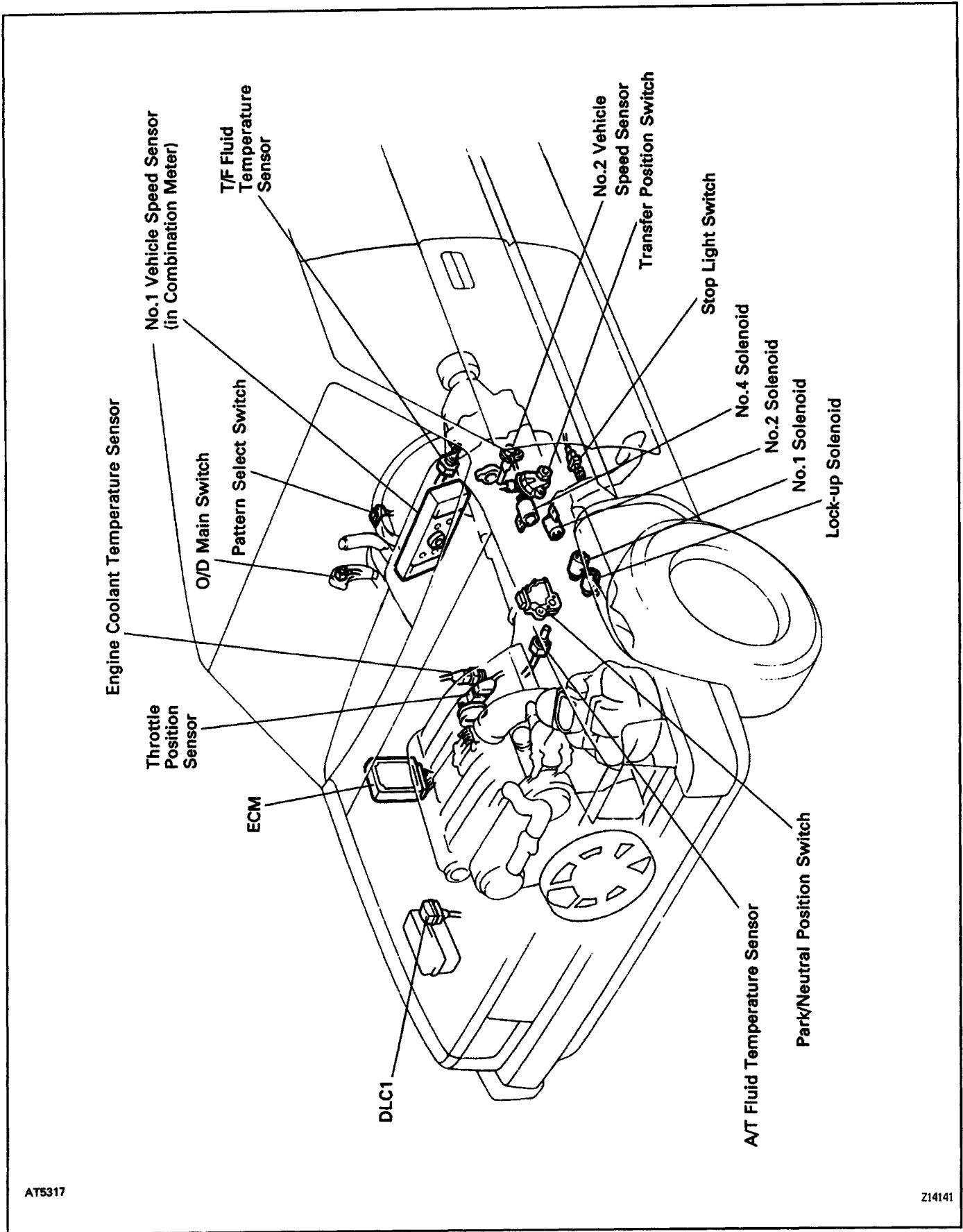
PRECAUTION

Do not open the cover or the case of the ECM and various ECU unless absolutely necessary. (If the IC terminals are touched, the IC may be destroyed by static electricity.)

ELECTRONIC CONTROL CIRCUIT



ELECTRONIC CONTROL COMPONENTS



TROUBLESHOOTING FLOW-CHART

Trouble No. 1 No Shifting

Warm up engine
Coolant temp.: 80°C (176°F)
ATF temp.: 50 – 80°C (122 – 176°F)

Connect a voltmeter to DLC1 terminal TT and E1.
Does TT terminal voltage vary with changes in throttle opening?

Yes

No

Is voltage between ECM terminals STP and E1 as follows?
0 V: Brake pedal released
9 – 14 V: Brake pedal depressed

No

Brake signal faulty

Yes

- Throttle position signal faulty
- TT terminal wire open or short

Disconnect solenoid wire connector and road test.
Does the transmission operate in the respective gear when in the following positions while driving?
D position O/D
2 position 3rd gear
L position 1st gear

No

Transmission faulty

Yes

Connect solenoid wire connector and road test.
Does DLC1 TT terminal voltage rise from 0 V to 7 V in sequence?

0 → 7 V

- Transmission faulty
- Solenoid faulty

0 → 5 V

Proceed to trouble 3 (AT2-34)

0 V

0 → 3 V

Are there 9 – 14 V between ECM terminals 2 – E1 when in the D position?

Yes

No

Are there 9 – 14 V between ECM terminals L – E1 when in the D position?

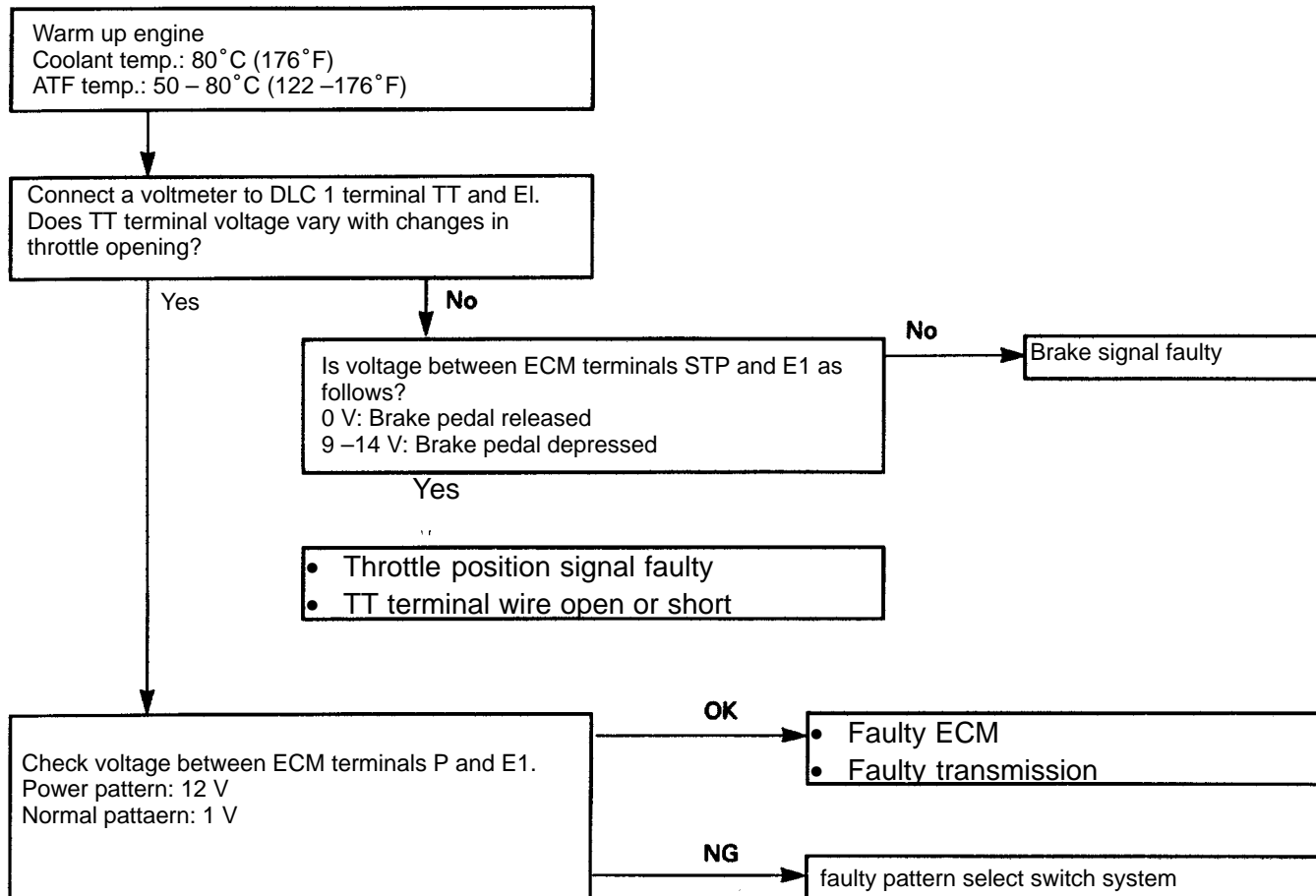
No

Yes

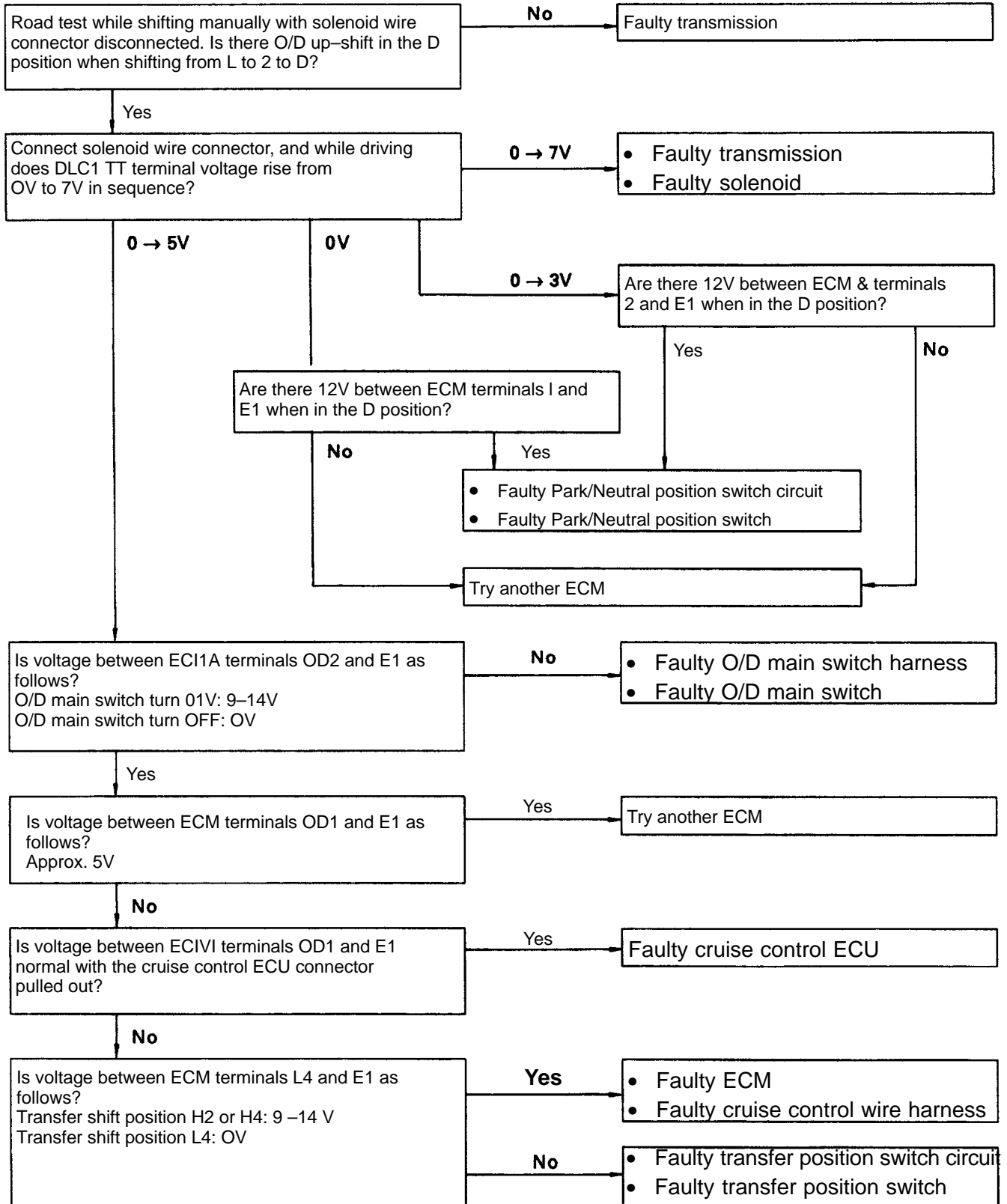
- Park/neutral position switch circuit faulty
- Park/neutral position switch faulty

Try another ECM

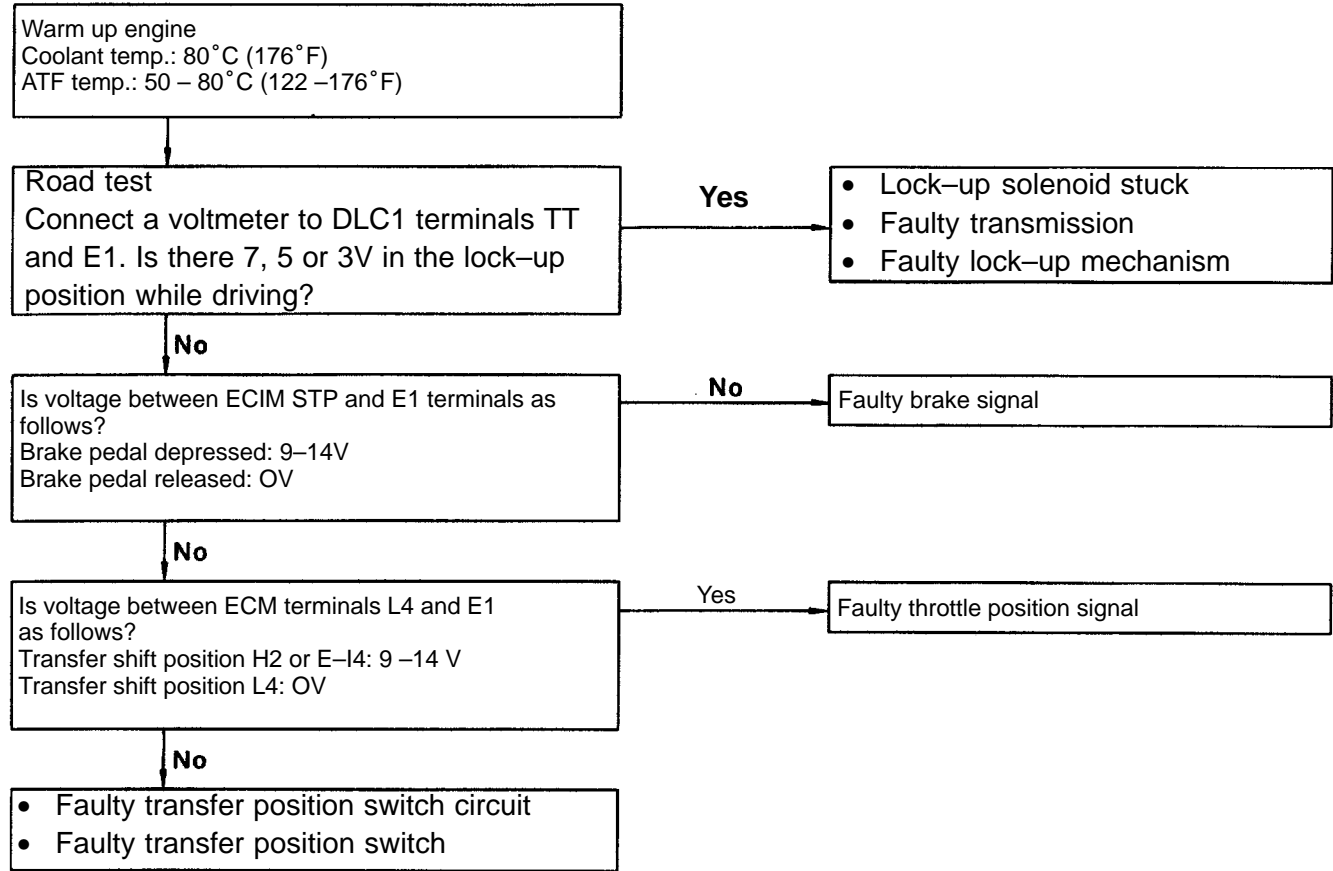
Trouble No.2 Shift point too high or too low



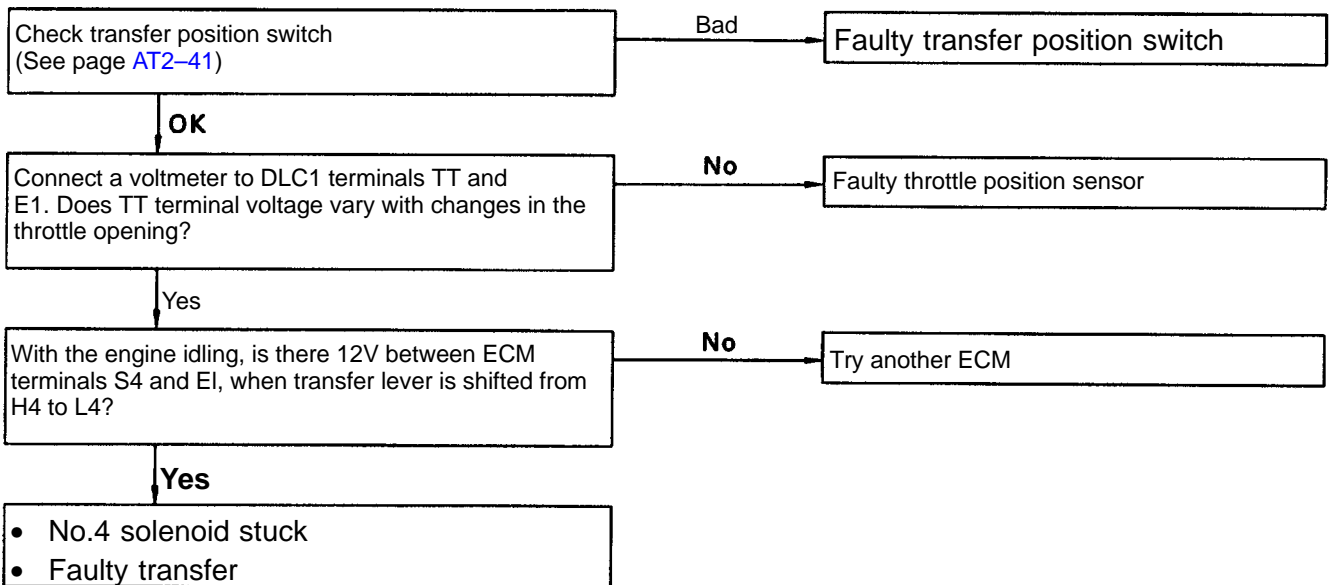
Trouble No.3 No up-shift to overdrive (After warm-up)

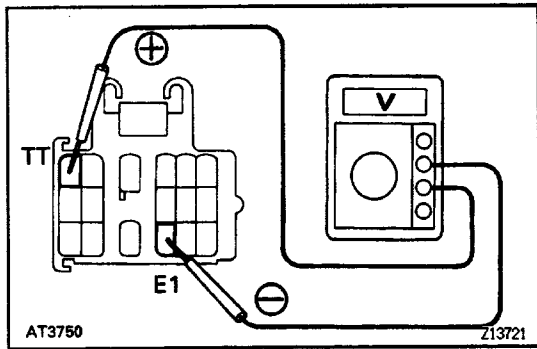


Trouble No.4 No lock-up (After warm-up)



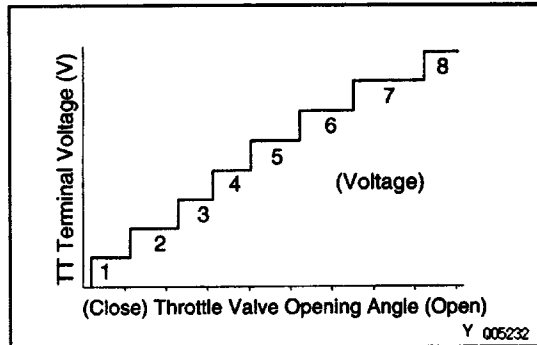
Trouble No.5 Transfer gear no change L4 from H4





TT TERMINAL VOLTAGE INSPECTION

1. **INSPECT THROTTLE POSITION SENSOR SIGNAL**
 - (a) Turn the ignition switch to ON. Do not start the engine.
 - (b) Connect a voltmeter to DLC1 terminals TT and E1.



- (c) While slowly depressing the accelerator pedal, check that TT terminal voltage rises in sequence. If the voltage does not change in proportion to the throttle opening angle, there is a malfunction in the throttle position sensor or circuit.

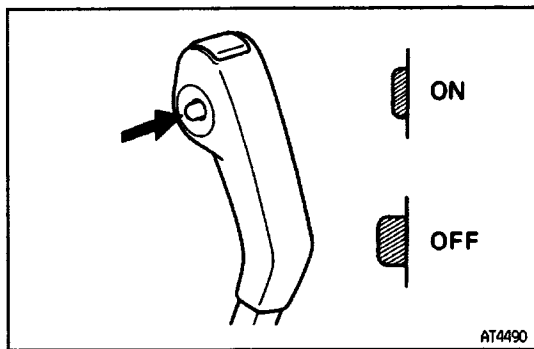
2. INSPECT BRAKE SIGNAL

- (a) Depress the accelerator pedal until the TT terminal indicates 8 V.
- (b) Depress the brake pedal and check the voltage reading from the TT terminal.

Brake pedal depressed 0 V

Brake pedal released 8 V

If not as indicated, there is a malfunction in either the stop light switch or circuit.



3. INSPECT EACH UP-SHIFT POSITION

- (a) Warm up the engine.
Engine coolant temperature:
80° (176°F)
- (b) Turn the O/D main switch to 'ON'.
- (c) Place the pattern select switch in "Normal" and the shift lever into the D position.
- (d) During a road test (above 10 km/h, 6 mph) check that voltage at the TT terminal is as indicated below for each up-shift position.

If the voltage rises from 0 V to 7 V in the sequence shown, the control system is okay.

The chart on the left shows the voltmeter reading and corresponding gears.

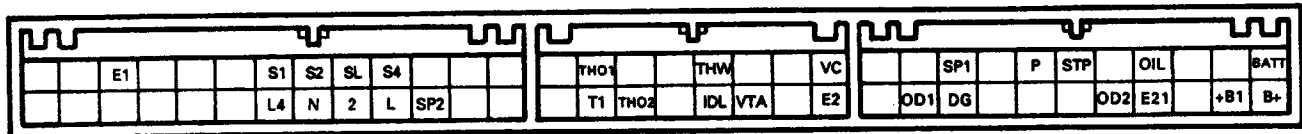
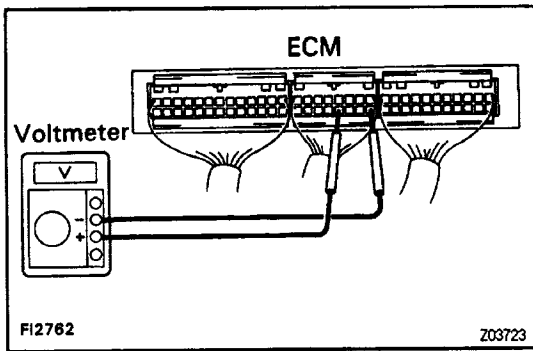
TT Terminal (V)	Gear Position
0	1st
2	2nd
3	2nd Lock-up
4	3rd
5	3rd Lock-up
6	O/D
7	O/D Lock-up

HINT: Determine the gear position by a light shock or change in RPM when shifting. The lock-up clutch will turn ON only infrequently during normal 2nd and 3rd gear operation. To trigger this action, press the accelerator pedal to 50% or more of its stroke. At less than 50%, the voltage may change in the sequence 2 V – 4V–6V–7V.

ELECTRONIC CONTROL COMPONENTS INSPECTION

1. INSPECT VOLTAGE OF ECM CONNECTOR

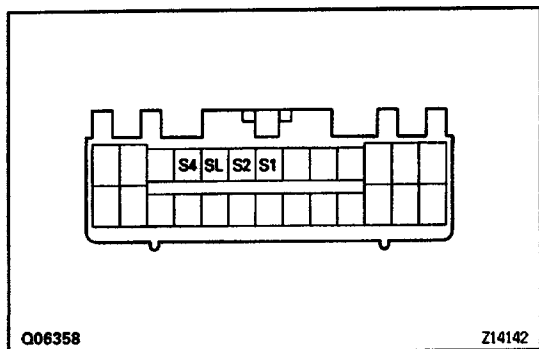
- (a) Remove the cowl side trim of passenger side.
- (b) Turn the ignition switch ON.
- (c) Measure the voltage at each terminal.



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Terminal	Measuring condition	Voltage (V)	
S1 - E1	—	9 - 14	
S2, SL - E1	—	0	
S4 - E1	Transfer shift position H2 or H4	0	
	Transfer shift position L4	9 - 14	
P - E1	PWR pattern	9 - 14	
	NORM pattern	0 - 2	
STP - E1	Brake pedal is depressed	9 - 14	
	Brake pedal is released	0	
THW - E2 (E21)	Engine coolant temp. 80°C (176°F)	0.1 - 1.0	
IDL - E2 (E21)	Throttle valve fully closed	0	
	Throttle valve open	9 - 14	
VTA - E2 (E21)	Throttle valve fully closed	0.1 - 1.0	
	Throttle valve fully open	3 - 5	
VC (VCC) - E2 (E21)	—	4 - 6	
OD1 - E1	—	5	
OD2 - E1	O/D main switch turned ON	9 - 14	
	O/D main switch turned OFF	0	
SP1 - E1	Cruise control main switch OFF	Standing still	0 or 5
		Vehicle moving	2 - 3
SP2 - E1	Standing still	0 or 5	
	Vehicle moving	2 - 3	

Terminal	Measuring condition	voltage (V)
N - E1	N position	9 - 14
	Except N position	0 - 2
2 - E1	2 position	9 - 14
	Except 2 position	0 - 2
L - E1	L position	9 - 14
	Except L position	0 - 2
L4 - E1	Transfer shift position H2 or H4	9 - 14
	Transfer shift position Ld	0
OIL - E1		9 - 14
THO1, THO2 - E2 THO (E21)	Fluid temp. 20°C (68°F)	4 - 5
B + (+B1) - E1		9 - 14
BATT - E1		9 - 14



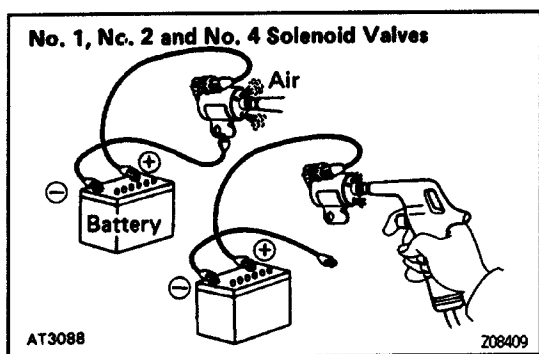
2. INSPECT SOLENOID

- Disconnect the connector from the ECM.
- Measure the resistance between S1, S2, SL, S4 and ground.

Resistance:

11 - 15 Ω

- Apply battery positive voltage to each terminal. Check that an operation noise can be heard from the solenoid.

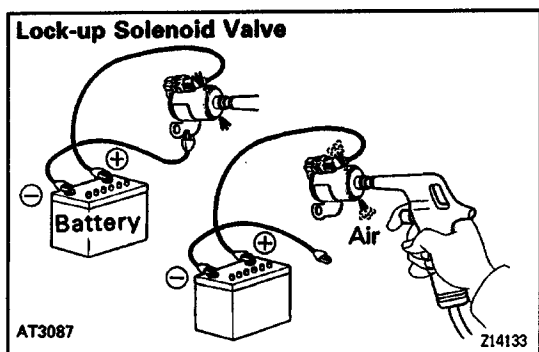


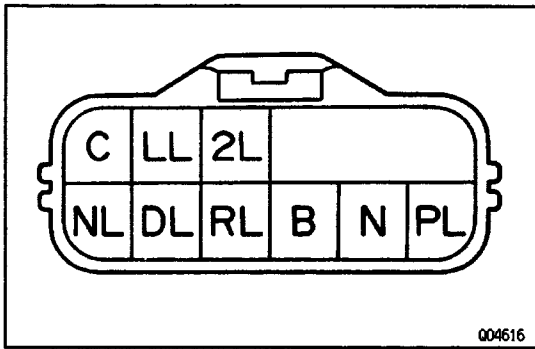
3. CHECK SOLENOID SEALS

If there is foreign material in the solenoid valve, there will be no fluid control even with solenoid operation.

- Check the solenoid valves.
 - Applying 490 kPa (5 kgf/cm², 71 psi) of compressed air, check that the solenoid valves do not leak.
 - When supply battery positive voltage to the solenoids, check that the solenoid valves open.
- Check the lock-up solenoid valve.
 - Applying 490 kPa (5 kgf/cm², 71 psi) of compressed air, check that the solenoid valve opens.
 - When supply battery positive voltage to the solenoid, check that the solenoid valve does not leak the air.

If a malfunction is found during voltage inspection (step 1.), inspect the components listed below.

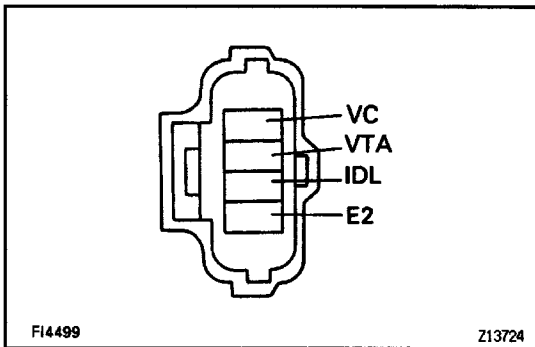




4. INSPECT PARK/NEUTRAL POSITION SWITCH

Inspect that there is continuity between terminals.

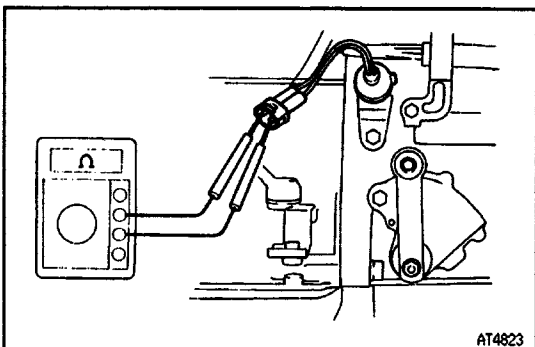
Shift position	Tester condition to terminal	Specified value
P	B - N	Continuity
	PL - C	
R	RL - C	Continuity
N	B - N	Continuity
	NL - C	
D	DL - C	Continuity
2	2L - C	Continuity
L	LL - C	Continuity



5. INSPECT THROTTLE POSITION SENSOR

Using an ohmmeter, check the resistance between each terminal.

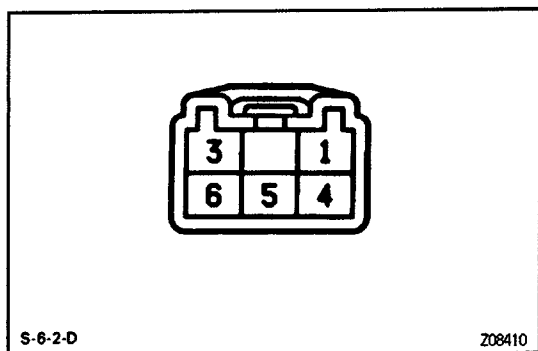
Tester condition to terminal	Throttle valve condition	Resistance (k Ω)
IDL - E2	Fully closed	Less than 2.3
IDL - E2	Open	Infinity
VC - E2	--	3.9 - 9.0
VTA - E2	Fully closed	0.47 - 6.1
VTA - E2	Fully opened	3.1 - 12.1



6. INSPECT NO.2 VEHICLE SPEED SENSOR

- (a) Jack up the rear wheel on one side.
- (b) Connect an ohmmeter between the terminals.
- (c) Spin the wheel and check that the meter needle deflects from 0 Ω to $\infty\Omega$.

7. INSPECT NO.1 VEHICLE SPEED SENSOR
(See page [BE-48](#))



8. INSPECT PATTERN SELECT SWITCH

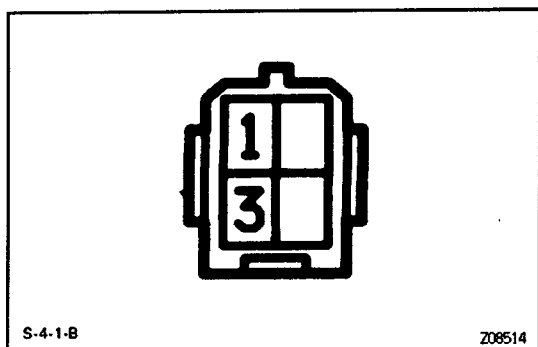
Using an ohmmeter, check the continuity of the terminals for each switch position.

HINT: As there are diodes inside, be careful of the tester probe polarity.

Switch position	Tester condition to terminal number	Specified value
PWR	4 - 6	Continuity
NORM	-	No continuity

9. INSPECT ENGINE COOLANT TEMPERATURE SENSOR

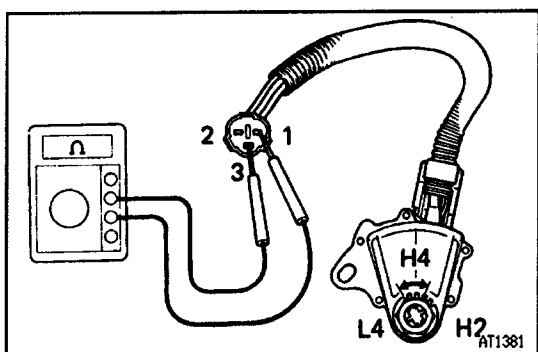
(See page [EG2-246](#))



10. INSPECT O/D MAIN SWITCH

Using an ohmmeter, check the continuity of the terminals for each switch position.

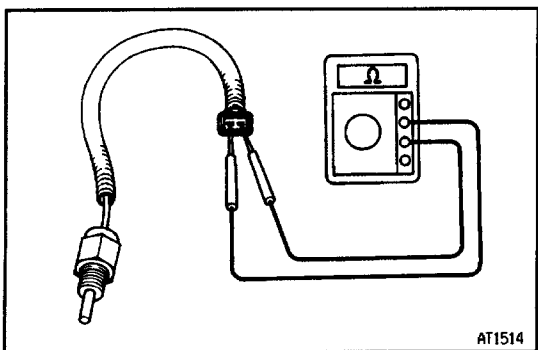
Switch position	Tester condition to terminal number	Specified value
ON	-	No continuity
OFF	1 - 3	Continuity



11. INSPECT TRANSFER POSITION SWITCH

Check that there is continuity between each terminal.

Shift position	Tester condition to terminal number	Specified value
H4	1 - 3	Continuity
L4	1 - 2 - 3	Continuity
H2	-	No continuity



12. INSPECT TRANSMISSION AND TRANSFER FLUID TEMPERATURE SENSOR

Measure the resistance between terminals.

Oil Temperature	Resistance (Ω)
20°C (68°F)	5 k - 20 k
120°C (248°F)	540 - 690
150°C (302°F)	300 - 340

STALL TEST

The objective 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 temperature 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 should observe the conditions of wheels or wheel stoppers outside the vehicle while the other is doing the test.

MEASURE STALL SPEED

- (a) Chock the front and rear wheels.
- (b) Connect a tachometer to the engine.
- (c) Fully apply the parking brake.
- (d) Keep your left foot pressed firmly on the brake pedal.
- (e) Shift the transfer lever to the H2 position.
- (f) Start the engine.
- (g) Shift into the D position. Step all the way down on the accelerator pedal with your right foot. Quickly read the stall speed at this time.

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

Stall speed:

2,850 ± 150 rpm

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

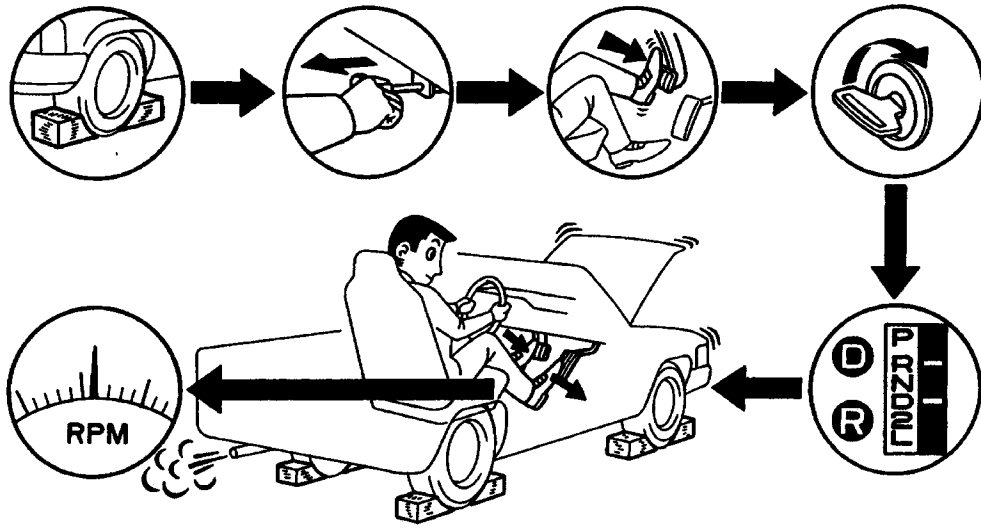
EVALUATION

- (a) If the stall speed is the same for both positions but lower than specified value:
 - Engine output may be insufficient
 - Stator one-way clutch is not operating properly

HINT: If more than 600 rpm below the specified value, the torque converter clutch could be faulty.

- (b) If the stall speed in D position is higher than specified:
 - Line pressure too low
 - Forward clutch slipping
 - No.2 one-way clutch not operating properly
 - O/D one-way clutch not operating properly
 - Transfer direct clutch slipping
- (c) If the stall speed in R position is higher than specified:
 - Line pressure too low
 - Direct clutch slipping
 - First and reverse brake slipping
 - O/D one-way clutch not operating properly
 - Transfer direct clutch slipping
- (d) If the stall speed in both R and D positions are higher than specified:
 - Line pressure too low
 - Improper fluid level
 - O/D one-way clutch not operating properly
 - Transfer direct clutch slipping

STALL TEST



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 temperature 50–80 °C (122–176 °F).**
- **Be sure to allow one minute interval between tests.**
- **Make 3 measurements and take the average value.**

MEASURE TIME LAG

- Fully apply the parking brake.
- Shift the transfer shift lever to the H2 position.
- Start the engine and check the idle speed.

Idle speed (N position and air conditioner OFF):

800 ± 50 rpm

- 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.

Time lag:

Less than 1.2 seconds

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

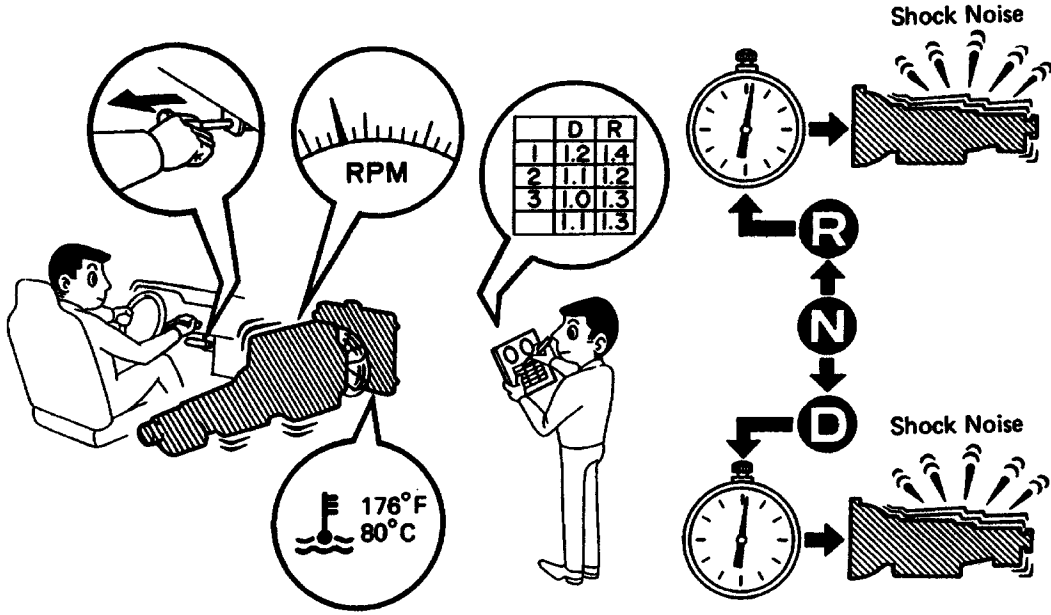
Time lag:

Less than 1.5 seconds

EVALUATION

- If N→D time lag is longer than specified:
 - Line pressure too low
 - Forward clutch worn
 - O/D one-way clutch not operating properly
- If N→R time lag is longer than specified:
 - Line pressure too low
 - Direct clutch worn
 - First and reverse brake worn
 - O/D one-way clutch not operating properly

TIME LAG TEST



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HYDRAULIC TEST

PREPARATION

- (a) Warm up the transmission fluid.
- (b) Remove the transmission case test plug and connect the hydraulic pressure gauge.
SST 09992 – 00094

NOTICE:

- Do the test at normal operating fluid temperature 50–80°C (122–176°F).
- The line pressure test should always be carried out in pairs. One should observe the conditions of wheels or wheel stoppers outside the vehicle while the other is doing the test.

MEASURE LINE PRESSURE

- (a) Fully apply the parking brake and chock the 4 wheels.
- (b) Start the engine and check idling speed.
- (c) Keep your left foot pressed firmly on the brake pedal and shift into D position.
- (d) Measure the line pressure when the engine is idling.
- (e) Press the accelerator pedal all the way down. Quickly read the highest line pressure when engine speed reaches stall speed.

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

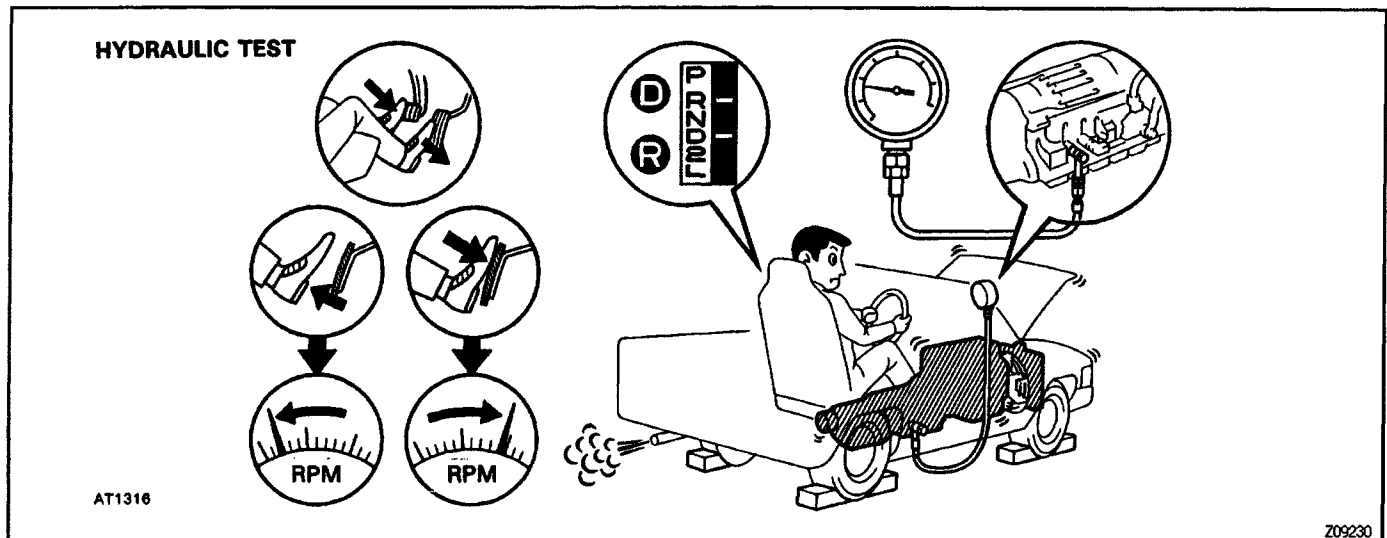
- (f) In the same manner, do the test in R position.

Line pressure	kPa (kgf/cm ² , psi)	D position	R position
Idling		427–481 (4.3–4.9, 61–70)	510–608 (5.2–6.2, 74–88)
Stall		1,118–1,363 (11.4–13.9, 162–198)	1,373–1,716 (14.0–17.5, 199–249)

If the measured pressures are not up to specified values, recheck the throttle cable adjustment and do a retest.

EVALUATION

- (a) If the measured values at all positions are higher than specified:
- Throttle cable out of adjustment
 - Throttle valve defective
 - Regulator valve defective
- (b) If the measured values at all positions are lower than specified:
- Throttle cable out of adjustment
 - Throttle valve defective
 - Regulator valve defective
 - Oil pump defective
 - O/D direct clutch defective
 - Transfer direct clutch defective (H2, H4)
 - Transfer front drive clutch defective (1-14, L4)
 - Transfer low speed brake defective (1-4)
- (c) If pressure is low in the D position only:
- D position circuit fluid leakage
 - Forward clutch defective
- (d) If pressure is low in the R position only:
- R position circuit fluid leakage
 - Direct clutch defective
 - First and reverse brake defective



ROAD TEST

NOTICE: Do this test at normal operating fluid temperature 50 – 80 °C (122 –178 °F).

HINT: The transmission shift points for the H2, H4 and L4 transfer positions are different. Also the O/D gear and lock-up are canceled when L4 is engaged.

1. D POSITION TEST IN NORM AND PWR PATTERN POSITION

Shift into the D position and hold the accelerator pedal constant at the full throttle valve opening position.

Check the following:

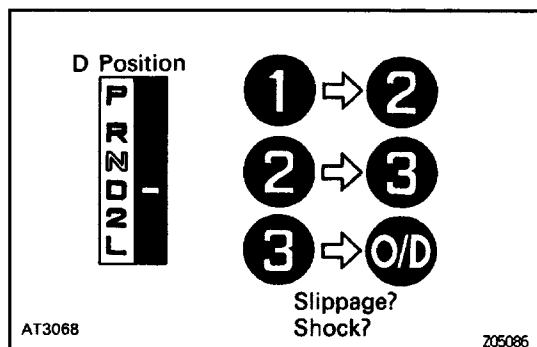
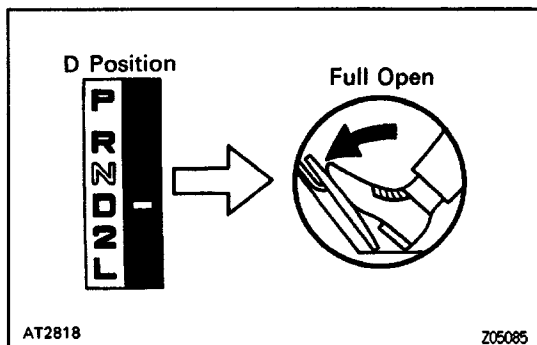
- (a) 1-2, 2-3 and 3-O/D up-shifts should take place, and shift points should conform to those shown in the automatic shift schedule.

Conduct a test under both Normal and Power pattern.

HINT: There is no O/D up – shift or lock – up when the coolant temperature is below 70 °C (158 °F).

EVALUATION

- (1) If there is no 1-i2 up-shift:
 - No.2 solenoid is stuck.
 - 1- 2 shift valve is stuck.
- (2) If there is no 2-3 up-shift:
 - No.1 solenoid is stuck.
 - 2-3 shift valve is stuck.
- (3) If there is no 3-)O/D up-shift:
 - 3-4 shift valve is stuck.
- (4) If the shift point is defective:
 - Throttle valve, 1- 2 shift valve, 2-3 shift valve,
 - 3-4 shift valve etc., are defective.
- (5) If the lock-up is defective:
 - Lock-up solenoid is stuck.
 - Lock-up relay valve is stuck.

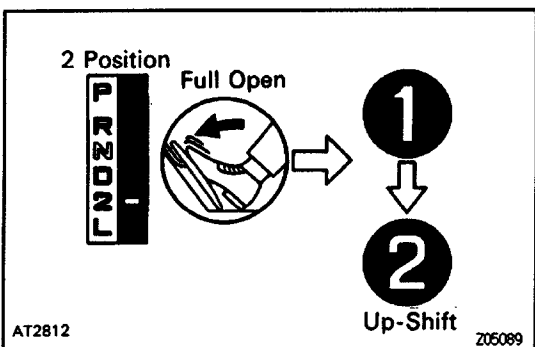
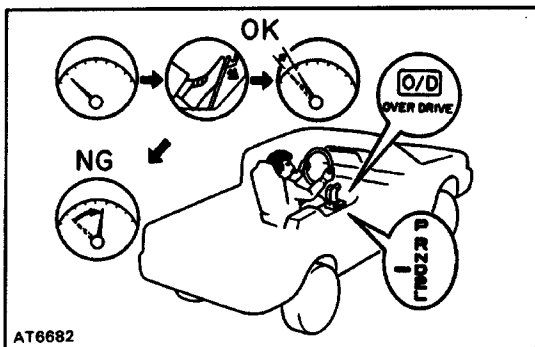
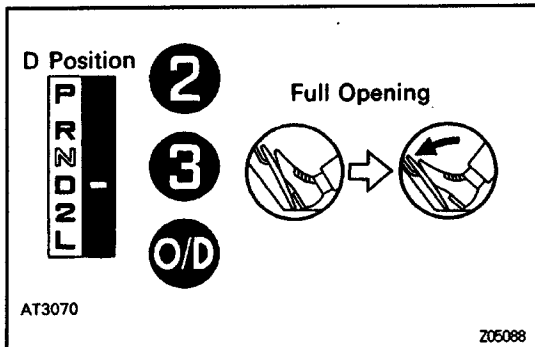
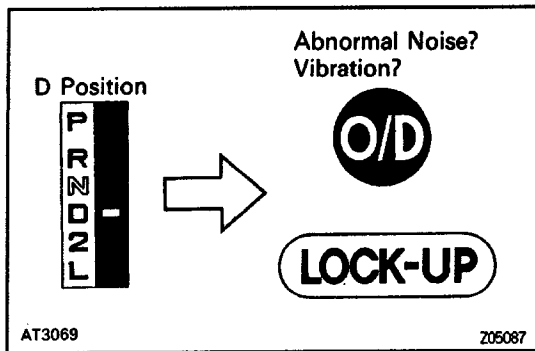


- (b) In the same manner, check the shock and slip at the 1→2 , 2→3, and 3→O/D up-shifts.

EVALUATION

If the shock is excessive:

- Line pressure is too high.
- Accumulator is defective.
- Check ball is defective.



- (c) Run at the D position lock-up or O/D gear and check for abnormal noise and vibration.

HINT: The check for the cause of abnormal noise and vibration must be made with extreme care as it could also be due to loss of balance in the propeller shaft, differential, torque converter clutch, etc.

- (d) While running in the D position, 2nd, 3rd and O/D gears, check to see that the possible kick-down vehicle speed limits for 2→1, 3→2 and O/D→3 kick-downs conform to those indicated on the automatic shift schedule.

- (e) Check for abnormal shock and slip at kick-down.

- (f) Check for the lock-up mechanism.

(1) Drive in D position, O/D gear, at a steady speed (lock-up ON) of about 75 km/h (47 mph).

(2) Lightly depress the accelerator pedal and check that the engine RPM does not change abruptly. If there is a big jump in engine RPM, there is no lock-up.

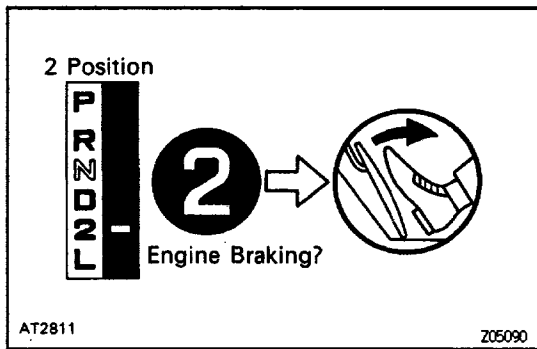
2. 2 POSITION TEST

Shift into the 2 position and, while driving with the accelerator pedal held constantly at the full throttle valve opening position, push in one of the pattern selectors and check on the following points.

- (a) 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.

HINT:

- There is no O/D up-shift and lock-up in the 2 position.
- To prevent overrun, the transmission up-shifts into 3rd gear at around 100 km/h (62 mph) or more.

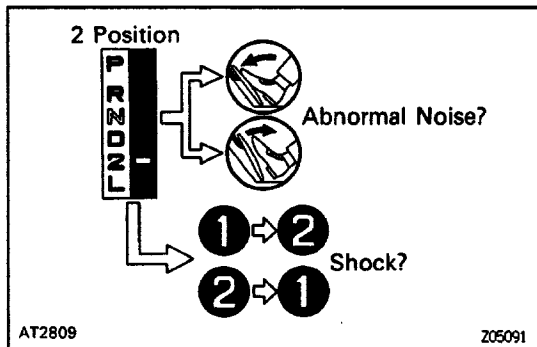


- (b) While running in the 2 position and 2nd gear, release the accelerator pedal and check the engine braking effect.

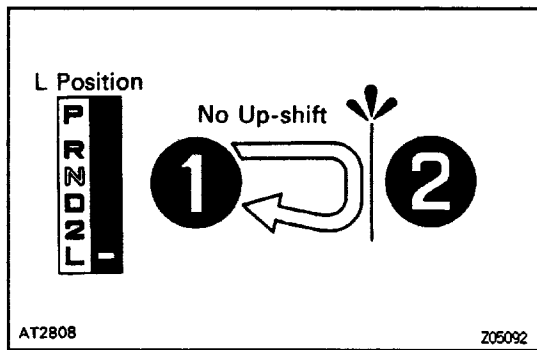
EVALUATION

If there is no engine braking effect:

- Second coast brake is defective.

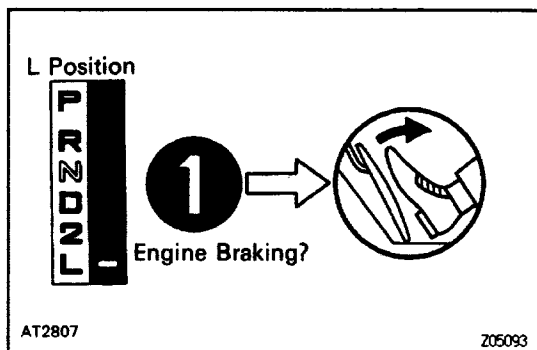


- (c) Check for abnormal noise during acceleration and deceleration, and for shock at up-shift and down-shift.



3. L POSITION TEST

- (a) While running in the L position, check to see that there is no up-shift to 2nd gear.

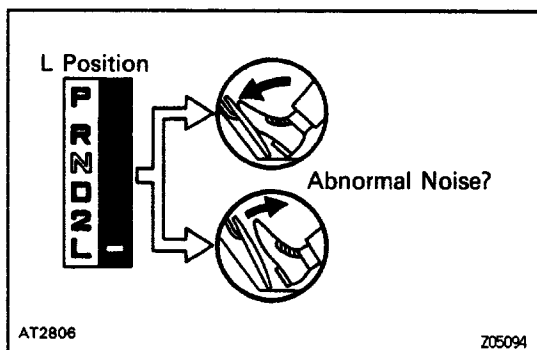


- (b) While running in the L position, release the accelerator pedal and check the engine braking effect.

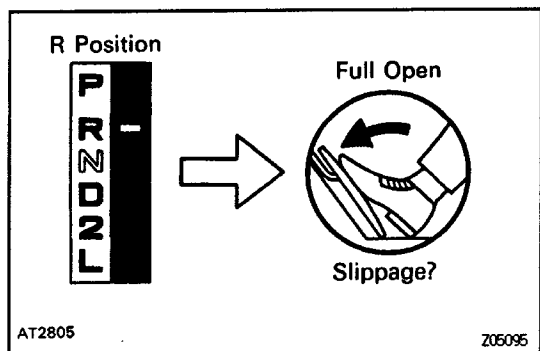
EVALUATION

If there is no engine braking effect:

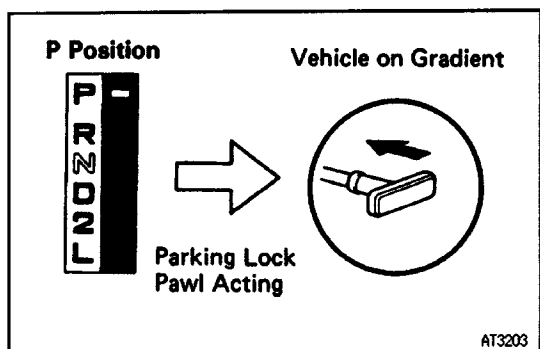
- First and reverse brake is defective.



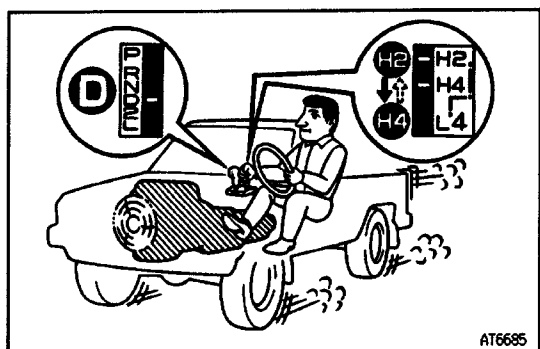
- (c) Check for abnormal noise during acceleration and deceleration.

**4. R POSITION TEST**

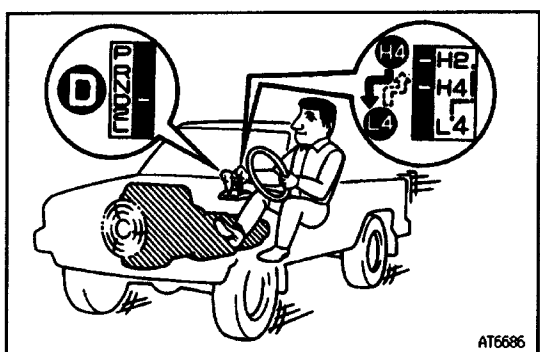
Shift into the R position and, while starting at full throttle, check for slippage.

**5. 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.

**6. TRANSFER TEST**

(a) When the shift lever is shifted from the H2 to H4, confirm that the vehicle changes from 2 to 4 wheel drive. If it does not, the transfer is faulty.



(b) When the transfer lever is shifted from H4 to L4, confirm that the gear changes according to the shift diagram (See page AT2-54). If it does not, the No.4 solenoid, ECM or transfer is faulty.

AUTOMATIC SHIFT SCHEDULE

SHIFT POINT (Transfer shift position "H2" or 'H4')

Shift position	Shifting point		Vehicle speed km/h (mph)
D (NORM)	Throttle valve fully opened	1→2	50-53 (31-33)
		2→3	90-96 (56-60)
		3→O/D	131-138 (81-86)
		O/D→3	125-132 (78-82)
	Throttle valve fully closed	3→2	84-91 (52-57)
		2→1	40-44 (25-27)
		3→O/D	35-39 (22-24)
		O/D→3	21-25 (13-16)
D (PWR)	Throttle valve fully opened	1→2	50-53 (31-33)
		2→3	90-96 (56-60)
		3→O/D	131-138 (81-86)
		O/D→3	125-132 (78-82)
	Throttle valve fully closed	3→2	84-91 (52-57)
		2→1	40-44 (25-27)
		3→O/D	38-42 (24-26)
		O/D→3	21-25 (13-16)
2 (NORM and PWR)	Throttle valve fully opened	1→2	43-46 (27-29)
		2→3	103-109 (64-68)
		3→2	97-103 (60-64)
		2→1	38-42 (24-26)
L (NORM and PWR)	Throttle valve fully opened	3→2	82-89 (51-55)
		2→1	47-51 (29-32)

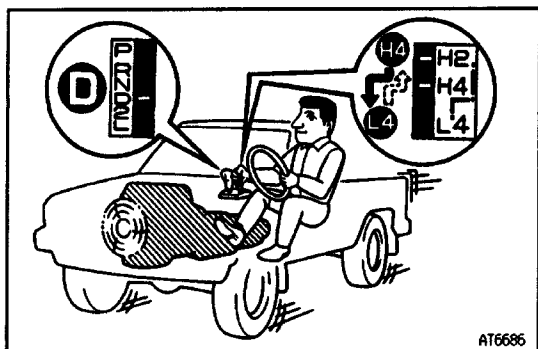
LOCK-UP (Transfer shift position "H2" or 'H4')

D position Throttle valve opening 596	Lock-up ON km/h (mph)	Lock-up OFF km/h (mph)
'3rd Gear	52-56 (32-35)	50-53 (31-33)
O/D Gear (NORM)	64-68 (40-42)	55-59 (34-37)
O/D Gear (PWR)	64-68 (40-42)	58-62 (36-39)

*: O/D main switch OFF

HINT:

- (1) Lock-up will occur in 2nd gear unless the throttle valve opening is greater than 50%.
- (2) There is no lock-up in the 2 and L positions.
- (3) In the following cases, the lock-up will be released regardless of the lock-up pattern.
 - When the throttle is completely closed.
 - When the stop light switch is ON.



AT6686

TRANSFER HIGH-LOW SHIFT POSITION

The A340H transfer differs from previous manual transfer in that high-low shifting is possible while the vehicle is in motion, though it is not possible at all vehicle speeds or throttle opening angles. The shifting possibility positions for high-low shifting have been adopted with the idea of improving shifting performance and transfer conditions, and preventing engine over-run.

The shifting possibility positions are controlled by the ECM and when a high-low shift change is made within these positions, the ECM operates the No.4 solenoid which carries out the high – low transfer shift. However, if a transfer is attempted outside the shifting possibility position, the high-low shift will not take place until the vehicle speed and throttle opening angle come within the appropriate position.

The high-low shifting possibility positions are shown in the diagrams below.

There are 3 shifting possibility positions for when the transmission gear is in 1 st, 2nd or 3rd gear, which combine with the respective transmission shift positions (L, 2, D).

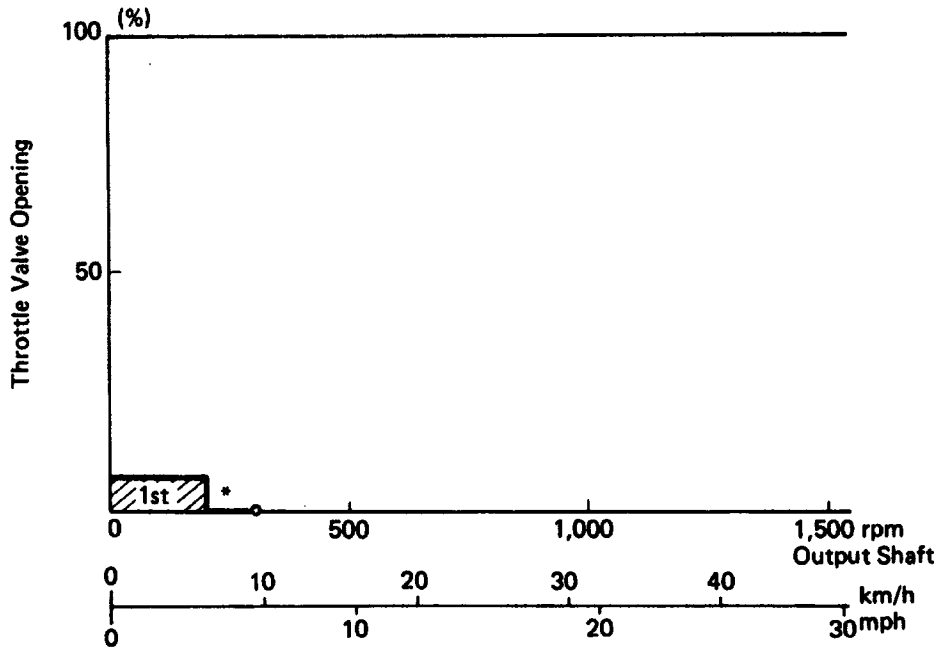
Although the high → low shift takes place in the 1 st gear, 2nd gear and 3rd gear shifting positions with the gears in 1 st gear, 2nd gear and 3rd gear respectively, when a high → low shift change is made in 1 st gear while in the 2nd gear shifting possibility position only

after the transmission has shifted up into 2nd gear does the high → low shift take place.

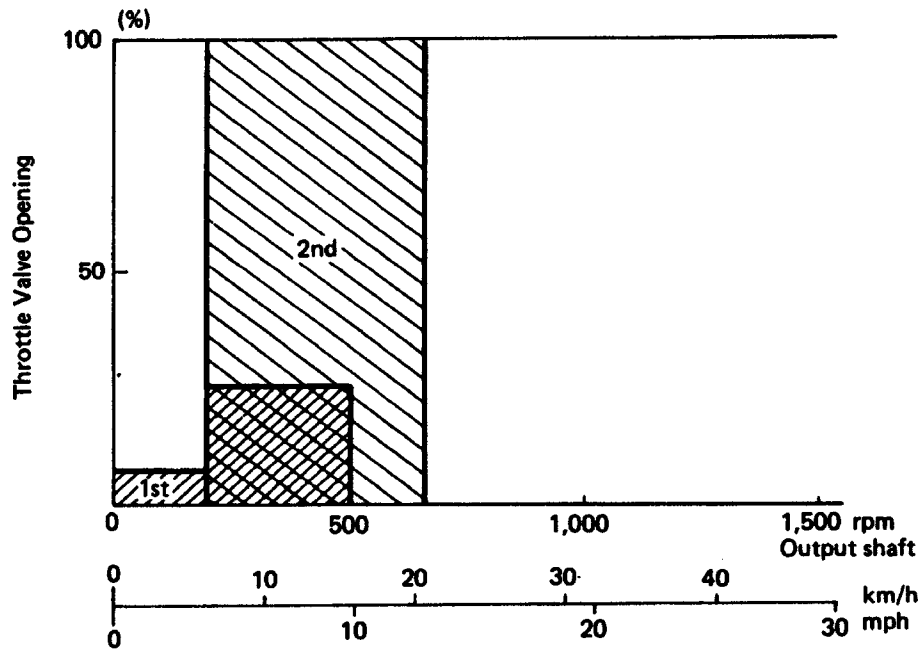
In the 2 position and D position high → low shifting possibility positions where the 1 st and 2nd positions overlap, the high → low shift will take place in 1 st gear if the transmission is in 1 st gear, or in 2nd gear if the transmission is in 2nd gear.

L Position: High - Low Shift Possibility Range

* : This transfer shift is only possible when the IDL contact points of the throttle position sensor are ON.

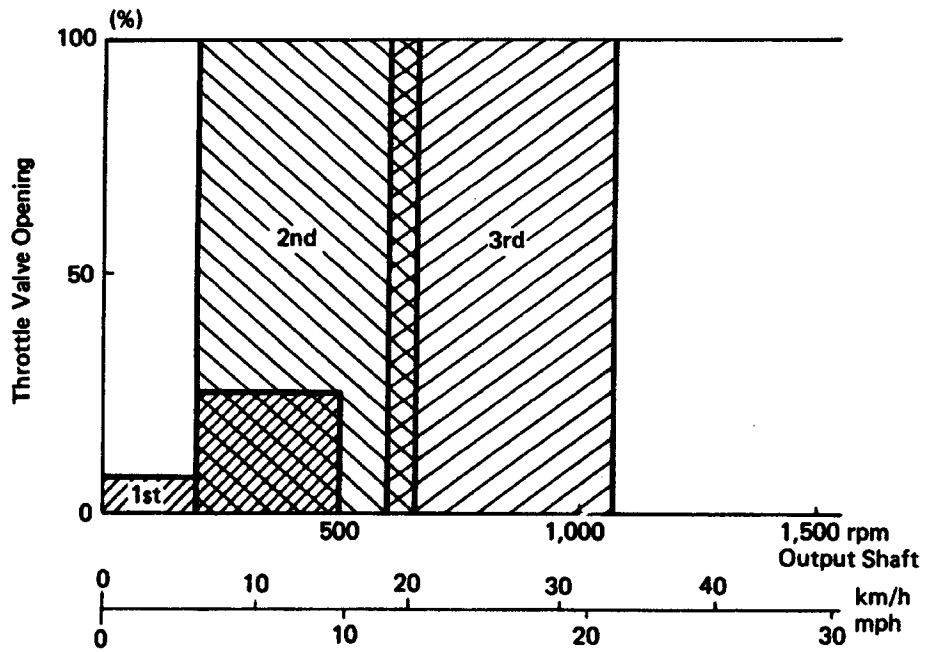


2 Position : High → Low Shift Possibility Range



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D Position : High → Low Shift Possibility Range



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Low → High Shift Possibility Range (L, 2, D Position)

