

# 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:

- Perform the test at normal operating fluid temperature (50–80°C or 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 performing 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) Perform 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

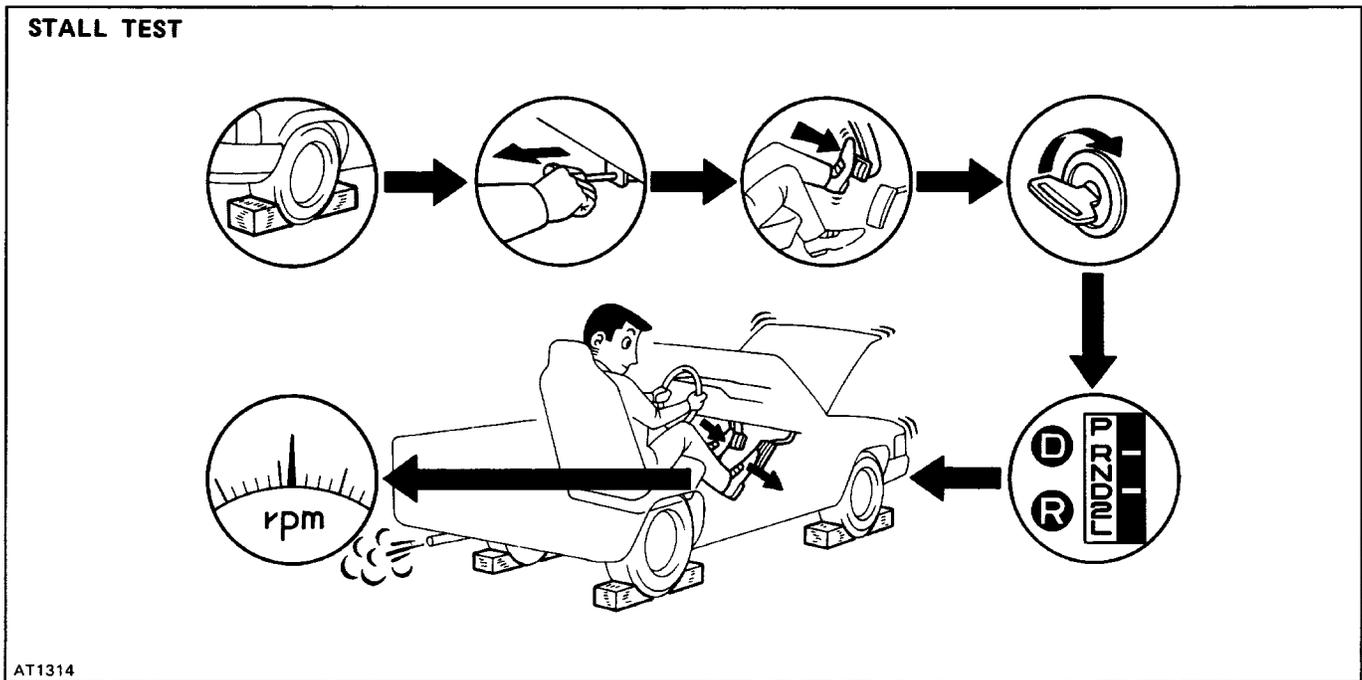
- (d) If the stall speed in both R and D positions are higher than specified:

Line pressure too low

Improper fluid level

O/D one-way clutch not operating properly

Transfer direct clutch slipping



## 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:

Perform the test at normal operating fluid temperature (50–80°C or 122–176°F).

Be sure to allow one minute interval between tests.

Make three measurements and take the average value.

### MEASURE TIME LAG

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

**Idle speed: 850 RPM**

**(N position)**

- (d) 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.

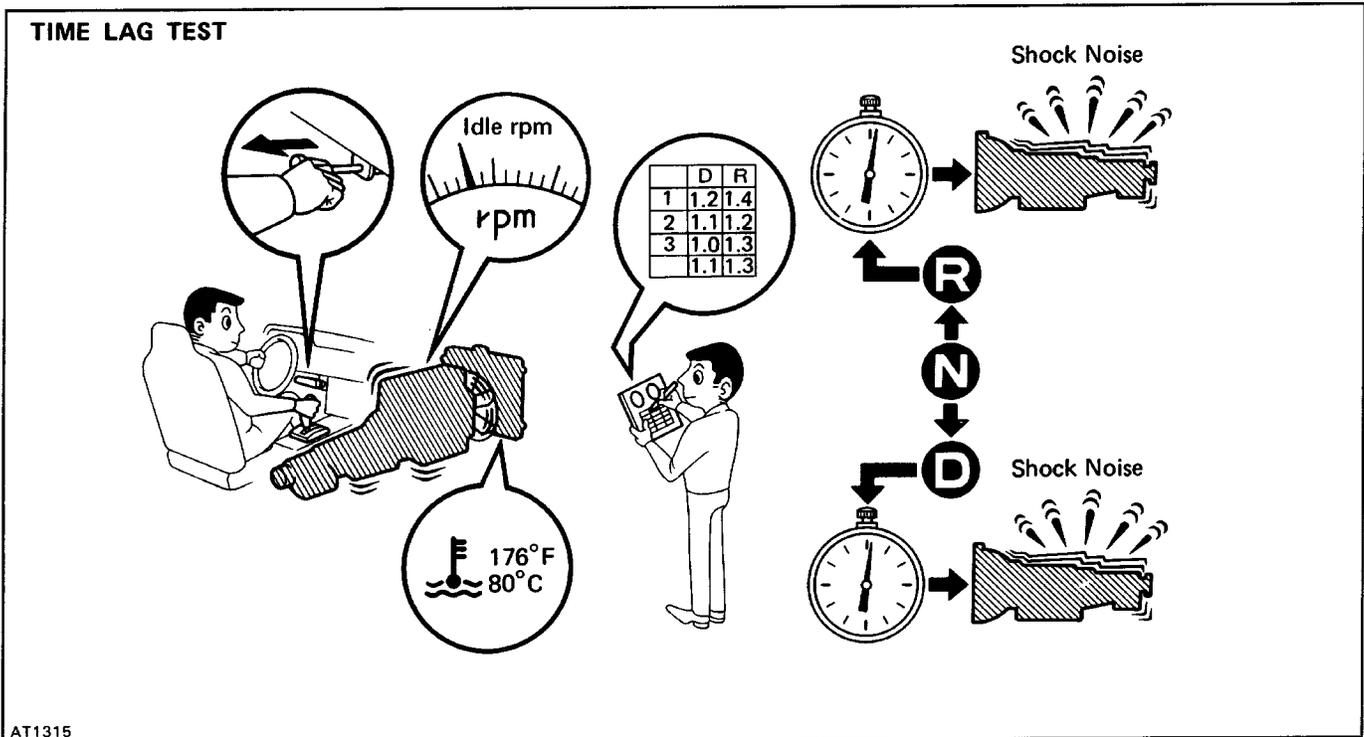
**Time lag: Less than 1.2 seconds**

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

**Time lag: Less than 1.5 seconds**

### EVALUATION

- (a) If N–D time lag is longer than specified:
  - Line pressure too low
  - Forward clutch worn
  - O/D one-way clutch not operating properly
- (b) 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



AT1315

## 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 (Oil pressure gauge)

**NOTICE:**

Perform the test at normal operating fluid temperature (50–80°C or 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 performing the test.

### MEASURE LINE PRESSURE

- (a) Fully apply the parking brake and check the four wheels.
- (b) Start the engine and check idling RPM.
- (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, perform the test in R position. kPa (kgf/cm<sup>2</sup>,psi)

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

If the measured pressures are not up to specified values, recheck the throttle cable adjustment and perform 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 (H4, L4)

Transfer low speed brake defective (L4)

(c) If pressure is low in the D position only:

D position circuit fluid leakage

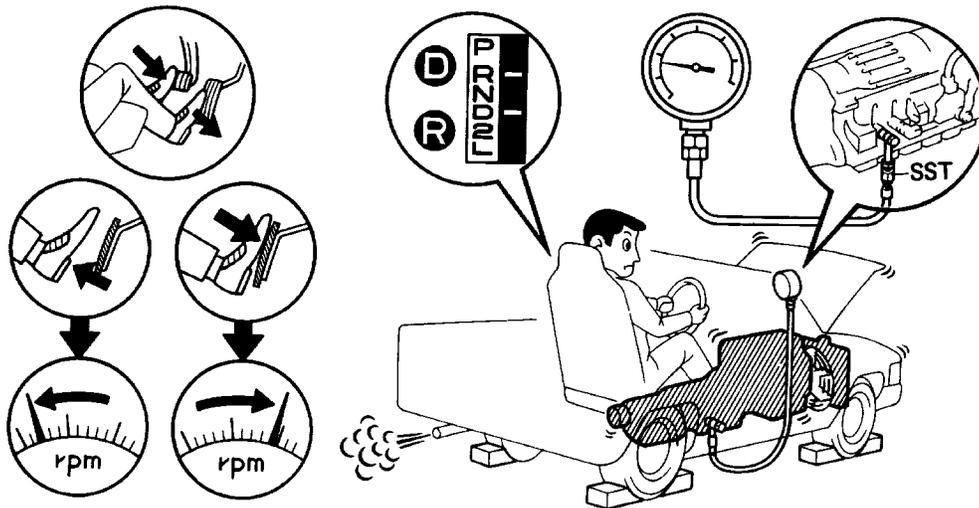
Forward clutch defective

(d) If pressure is low in the R position only:

R position circuit fluid leakage

Direct clutch defective

First and reverse brake defective

**HYDRAULIC TEST**

## ROAD TEST

**NOTICE:** Perform the test at normal operating fluid temperature (50–80°C or 122–176°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 cancelled when L4 is engaged.

### 1. D POSITION TEST IN NORM AND PWR PATTERN POSITIONS

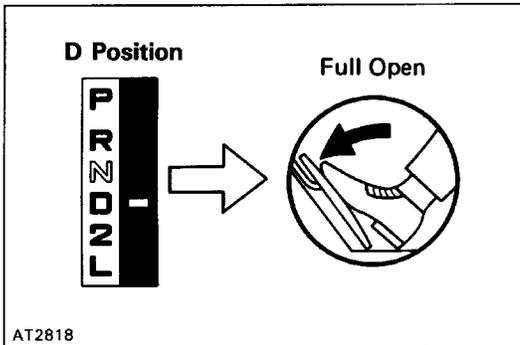
Shift into the D position and hold the accelerator pedal constant at the full throttle valve opening position.

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 patterns.

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



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### EVALUATION

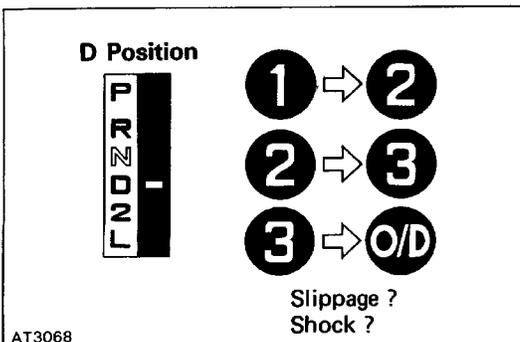
- (1) If there is no 1–2 up-shift:
  - No. 2 solenoid is stuck
  - 1–2 shift valve is stuck
- (2) If there is no 2–3 up-shift:
  - No. 1 solenoid is stuck
  - 2–3 shift valve is stuck
- (3) If there is no 3–i O/D up-shift:
  - 3–4 shift valve is stuck
- (4) If the shift point is defective:
  - Throttle 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

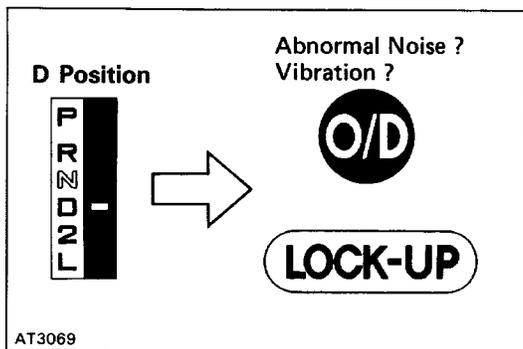
### EVALUATION

If the shock is excessive:

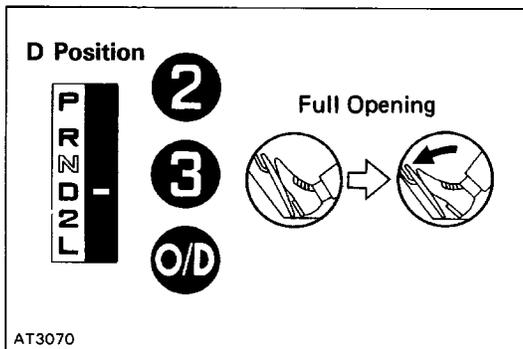
- Line pressure—is too high
- Accumulator is defective
- Check ball is defective



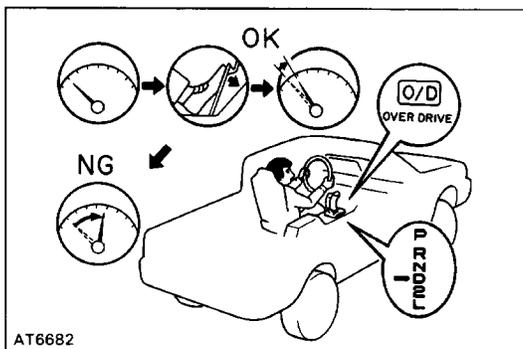
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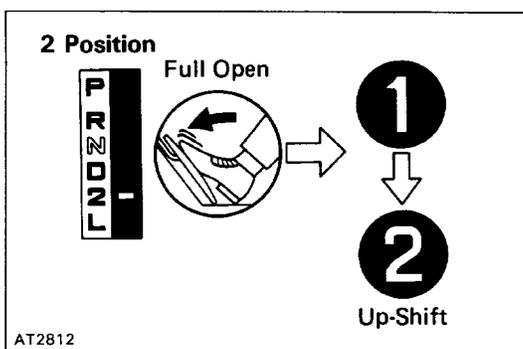
- (c) Run at the D position lock-up or O/D gear and check for abnormal noise and vibration.
- HINT: The check for the cause of abnormal noise and vibration must be made with extreme care as it could also be due to loss of balance in the propeller shaft, differential, torque converter clutch, etc.



- (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 it shown on the automatic shift schedule.

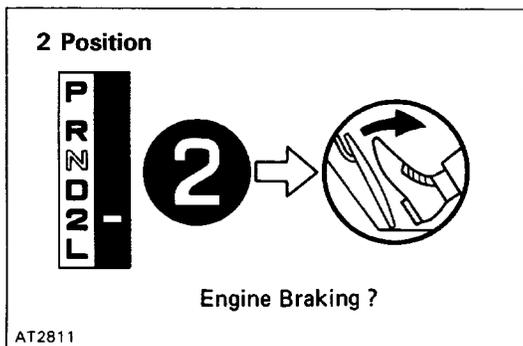
HINT:

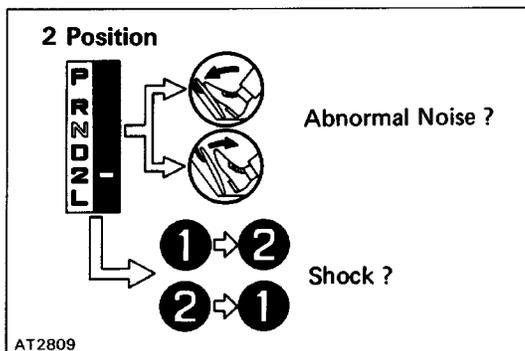
There is no O/D up-shift and lock-up in the 2 position. To prevent overrun, the transmission up-shifts into 3rd gear at around 100 km/h (62 mph) or more.

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

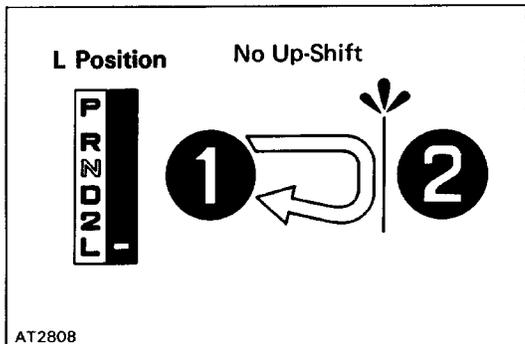
**EVALUATION**

If there is no engine braking effect:  
Second coast brake is defective



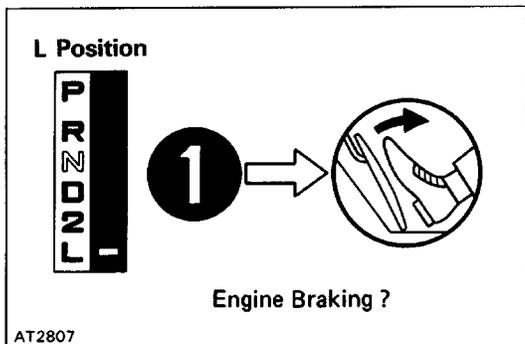


(c) Check for abnormal noise at acceleration and deceleration, and for shock at up-shift and down-shift.



**3. L POSITION TEST**

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

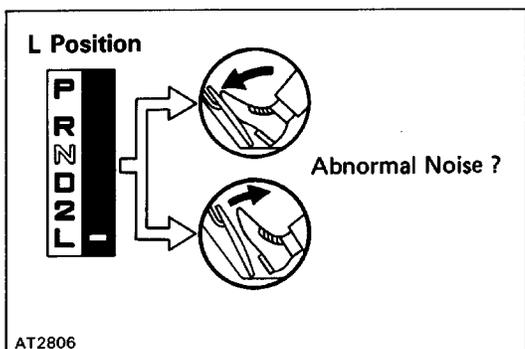


(b) While running in the L position, release the accelerator pedal and check the engine braking effect.

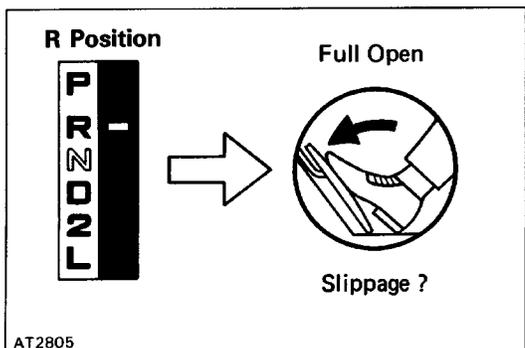
**EVALUATION**

If there is no engine braking effect:

- First and reverse brake is defective

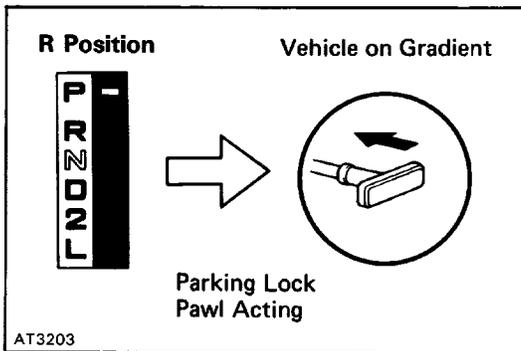


(c) Check for abnormal noise during acceleration and deceleration.



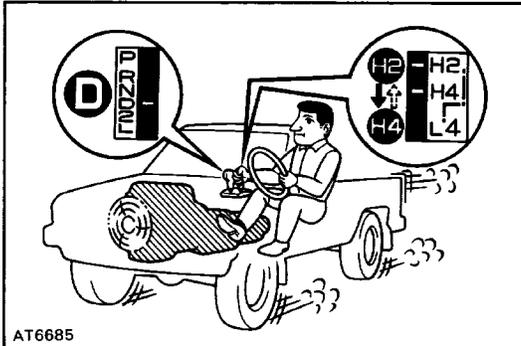
**4. R POSITION TEST**

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



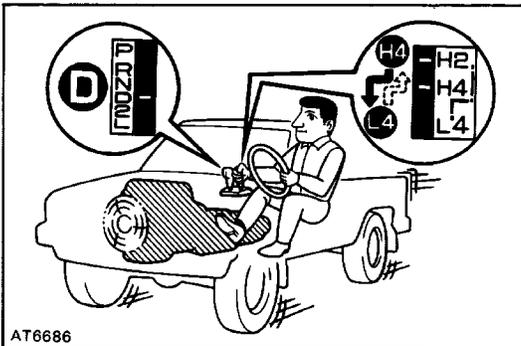
### 5. P POSITION TEST

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 shifted diagram (See page [AT-141](#)). If it does not, the No.4 solenoid, ECM or transfer faulty.