

# 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 ranges.

### 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.

### MEASURE STALL SPEED

- Fully apply the parking brake and chock the four wheels.
- Connect a tachometer to the engine.
- Step down strongly on the brake pedal with your left foot and start the engine.
- Shift into the D range. Step all the way down on the accelerator pedal with your right foot. Quickly read the stall speed at this time.

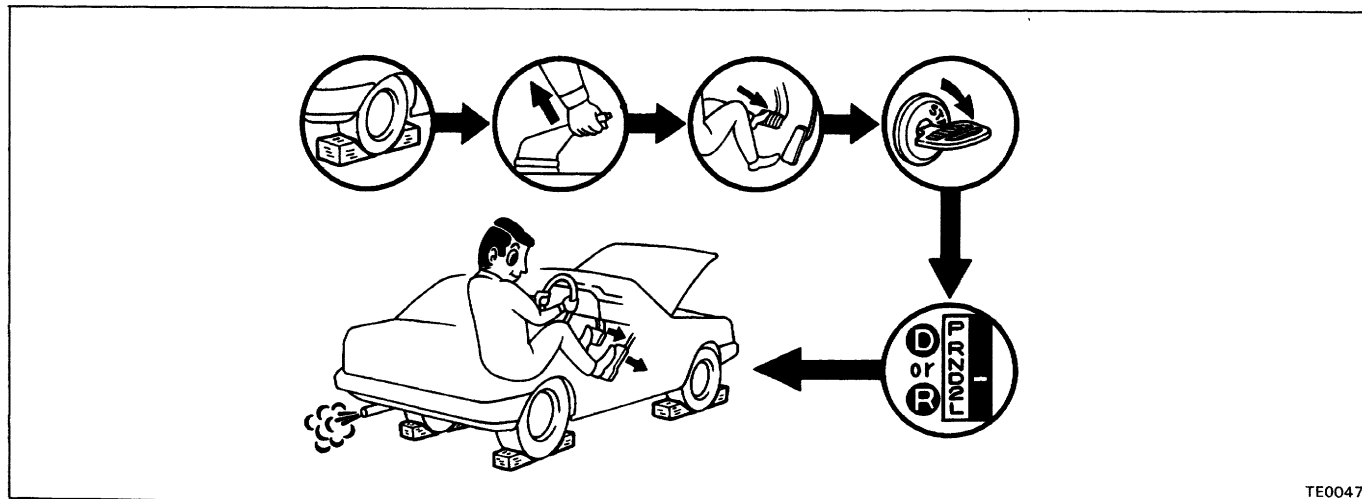
**Stall speed: 2,200 ± 150 rpm**

- Perform the same test in R range.

### EVALUATION

- If the stall speed is the same for both ranges 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 could be faulty.
- If the stall speed in D range 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
- If the stall speed in R range is higher than specified:
  - Line pressure too low
  - Direct clutch slipping
  - First and reverse brake slipping
  - O/D one-way clutch not operating properly
- If the stall speed in both R and D ranges are higher than specified:
  - Line pressure too low
  - Improper fluid level
  - O/D one-way clutch not operating properly



## TIME LAG TEST

If the shift lever is shifted while the engine is idling, there will be a certain time elapse 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

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

**Idle speed: 700 rpm (N range)**

- 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.

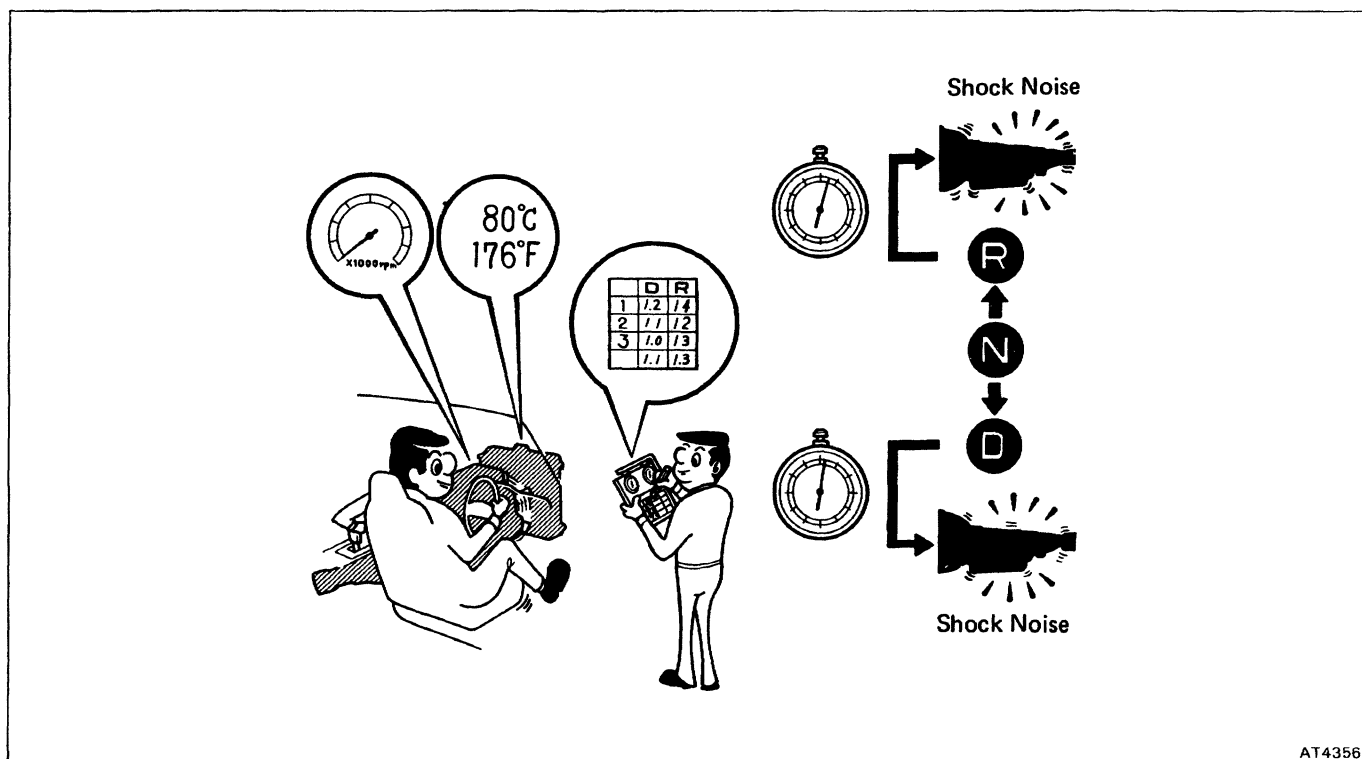
**Time lag: Less than 1.2 seconds**

- 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 operation properly



# HYDRAULIC TEST

## PREPARATION

- Warm up the transmission fluid.
- 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).

## MEASURE LINE PRESSURE

- Fully apply the parking brake and chock the four wheels.
- Start the engine and check idling rpm.
- Step down strongly on the brake pedal with your left foot and shift into D range.
- Measure the line pressure when the engine is idling.
- Press the accelerator pedal all the way down. Quickly read the highest line pressure when engine speed reaches stall speed.
- In the same manner, perform the test in R range.

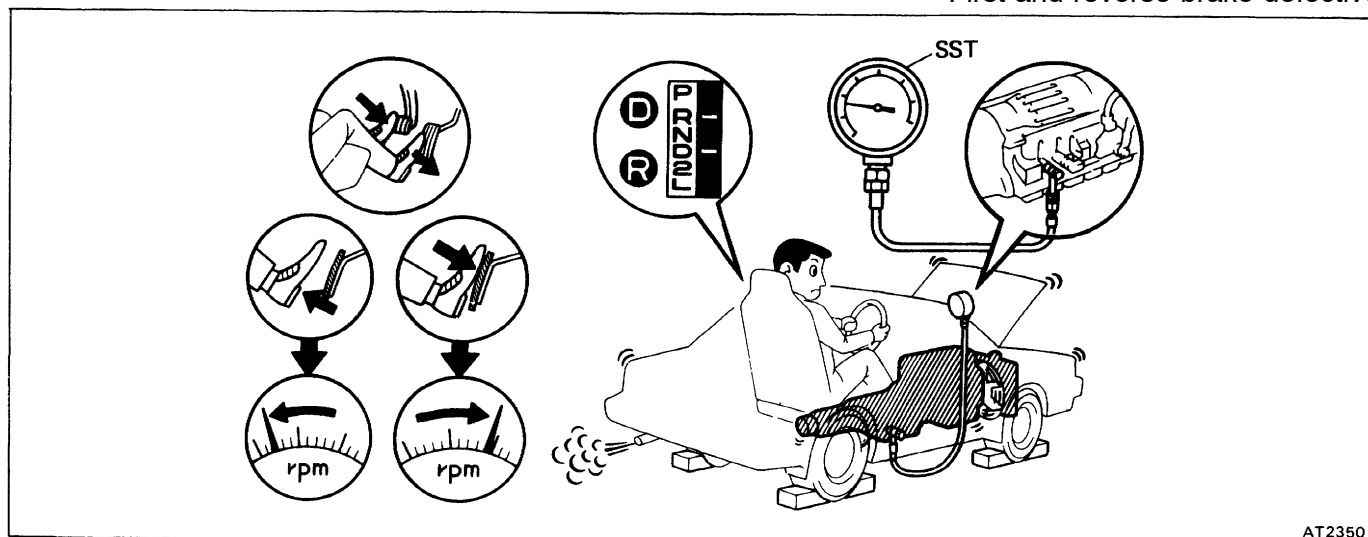
kg/cm<sup>2</sup> (psi, kPa)

D range		R range	
Idling	Stall	Idling	Stall
3.7–4.3 (53–61, 363–422)	9.5–12.0 (135–171, 932–1,177)	5.1–6.1 (73–87, 500–598)	13.2–16.7 (188–238, 1,294–1,638)

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

## EVALUATION

- If the measure values at all ranges are higher than specified:
  - Throttle cable out of adjustment
  - Throttle valve defective
  - Regulator valve defective
- If the measured values at all ranges are lower than specified:
  - 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 range only:
  - D range circuit fluid leakage
  - Forward clutch defective
- If pressure is low in the R range only:
  - R range circuit fluid leakage
  - Direct clutch defective
  - First and reverse brake defective



## ROAD TEST .

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

### 1. D RANGE TEST IN NORM AND PWR PATTERN RANGES

Shift into the D range 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 coolant temp. is below 60°C (140°F) and speed is under 60 km/h (37 mph), or if there is a 4 km/h (2 mph) difference between the set cruise control speed.
- There is no 3rd up–shift or lock–up when coolant temp. is below 35°C (95°F) and speed is under 40 km/h (25 mph).

### 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 → O/D up–shift:

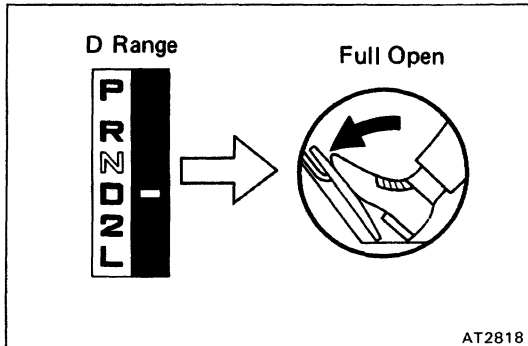
- 3–4 shift valve is stuck

(4) If the shift point is defective:

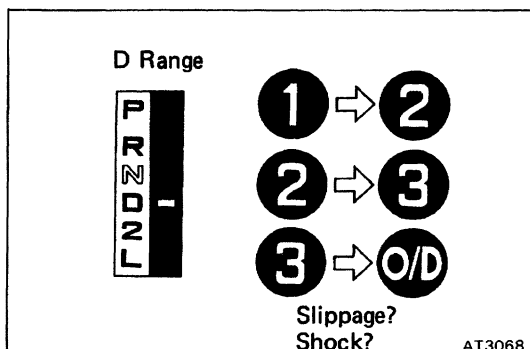
- Throttle valve, 1–2 shift valve, 2–3 shift valve, 3–4 shift valve etc., are defective

(5) If the lock–up is defective:

- Lock–up solenoid is stuck
- Lock–up relay valve is stuck



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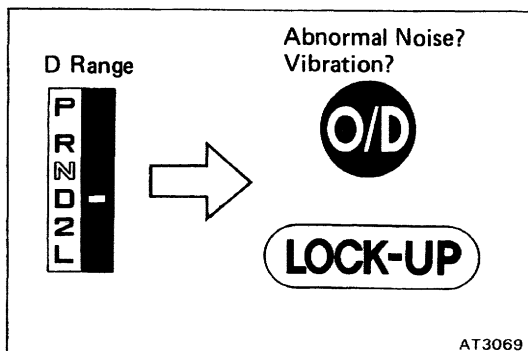
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(b) In the same manner, check the shock and slip at the 1 → 2, 2 → 3, and 3 → O/D up–shifts.

### EVALUATION

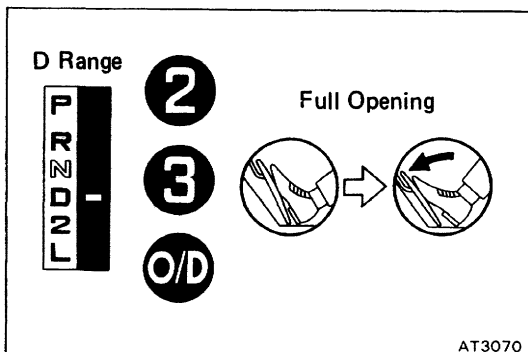
If the shock is excessive:

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



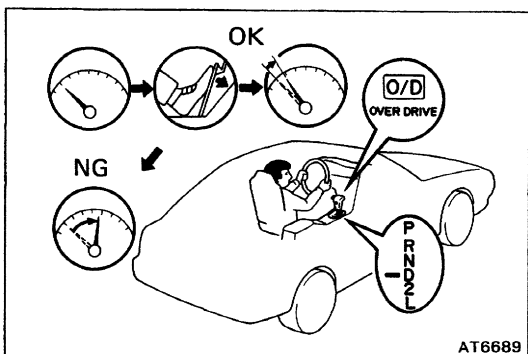
(c) Run at the D range lock-up or O/D gear and check for abnormal noise and vibration.

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, etc.



(d) While running in the D range, 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.

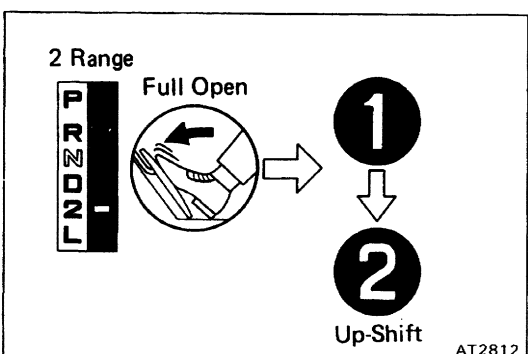


(f) Check for the lock-up mechanism.

(1) Drive in D range, O/D gear, at a steady speed (lock-up ON) of about 70 km/h (44 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 RANGE TEST

Shift into the 2 range 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:

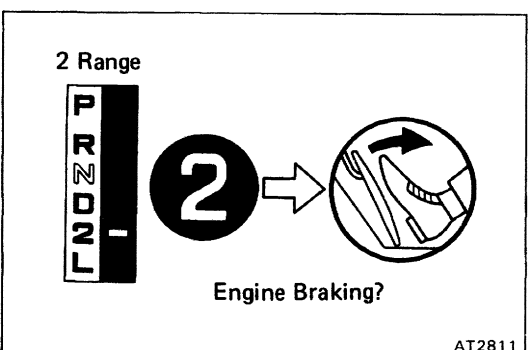
- There is no O/D up-shift and lock-up in the 2 range.
- To prevent overrun, the transmission up-shifts into 3rd gear at around 110 km/h (68 mph).

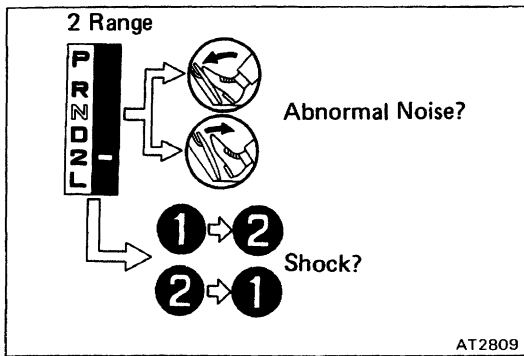
(b) While running in the 2 range and 2nd gear, release the accelerator pedal and check the engine braking effect.

### EVALUATION

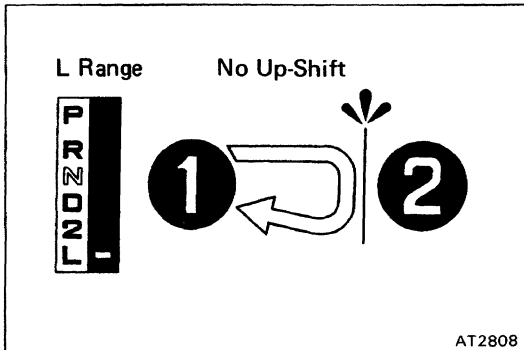
If there is no engine braking effect:

- Second coast brake is defective



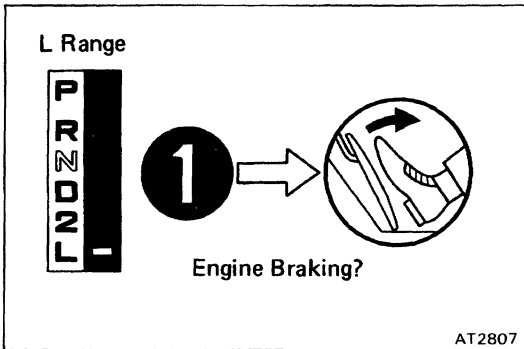


(c) Check for abnormal noise at acceleration and deceleration, and for shock at up-shift and down-shift.



**3. L RANGE TEST**

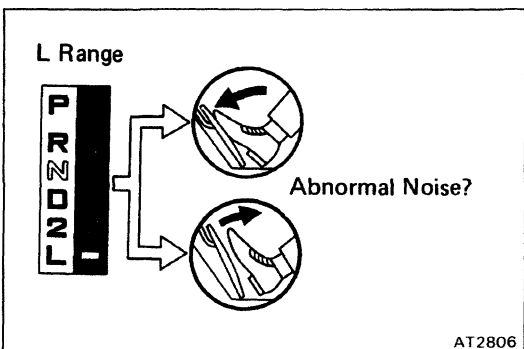
(a) While running in the L range, check to see that there is no up-shift to 2nd gear.



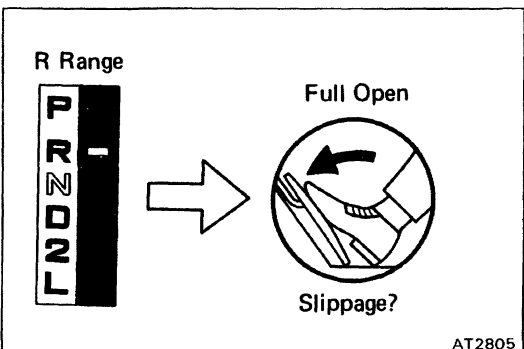
(b) While running in the L range, release the accelerator pedal and check the engine braking effect.

**EVALUATION**

- If there is no engine braking effect:
- First and reverse brake is defective

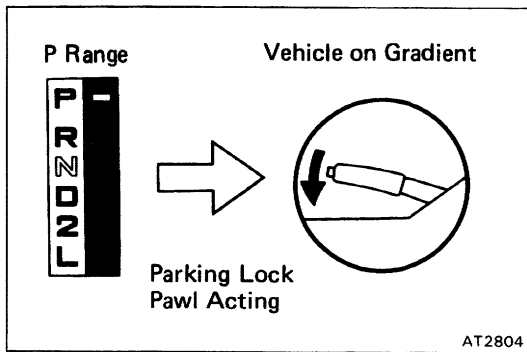


(c) Check for abnormal noise during acceleration and deceleration.



**4. R RANGE TEST**

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



### 5. P RANGE TEST

Stop the vehicle on a gradient (more than 5%) and after shifting into the P range, release the parking brake. Then check to see that the parking lock pawl holds the vehicle in place.