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.**

MEASURE STALL SPEED

(a) Warm up the transmission fluid.

(b) Chock the front and rear wheels.

(c) Connect a tachometer to the engine.

(d) Fully apply the parking brake.

(e) *Step down strongly on the brake pedal with your left foot.*

(f) Start the engine.

(g) 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: 3F Engine 1850 ± 150 rpm
1HZ Engine 1900 ± 150 rpm

(h) *Perform the same test in R range.*

EVALUATION

(a) 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.

(b) If the stall speed in D range is higher than specified:

- Line pressure too low
- Front clutch slipping
- No.2 one-way clutch not operating properly
- O/D one-way clutch not operating properly

(c) *If the stall speed in R range is higher than specified:*

- Line pressure too low
- Rear clutch slipping
- First and reverse brake slipping
- O/D one-way clutch not operating properly

(d) 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 lapse or lag before the shock can be felt. This is used for checking the condition of the O/D direct clutch, front clutch, rear clutch and first and reverse brakes.

NOTICE:

- **Perform the test at normal operating fluid temperature (50 — 80°C or 122 — 176°F)**
- **Be sure to allow one minute intervals between tests.**
- **Make three measurements and take the average value.**

MEASURE TIME LAG

(a) Fully apply the parking brake.

(b) Start the engine and check the idle speed.

Idle speed: 3F Engine 750 rpm
1HZ Engine 710 rpm

(c) 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 0.7 seconds

(d) In same manner, measure the time lag N → R.

Time lag: Less than 1.2 seconds

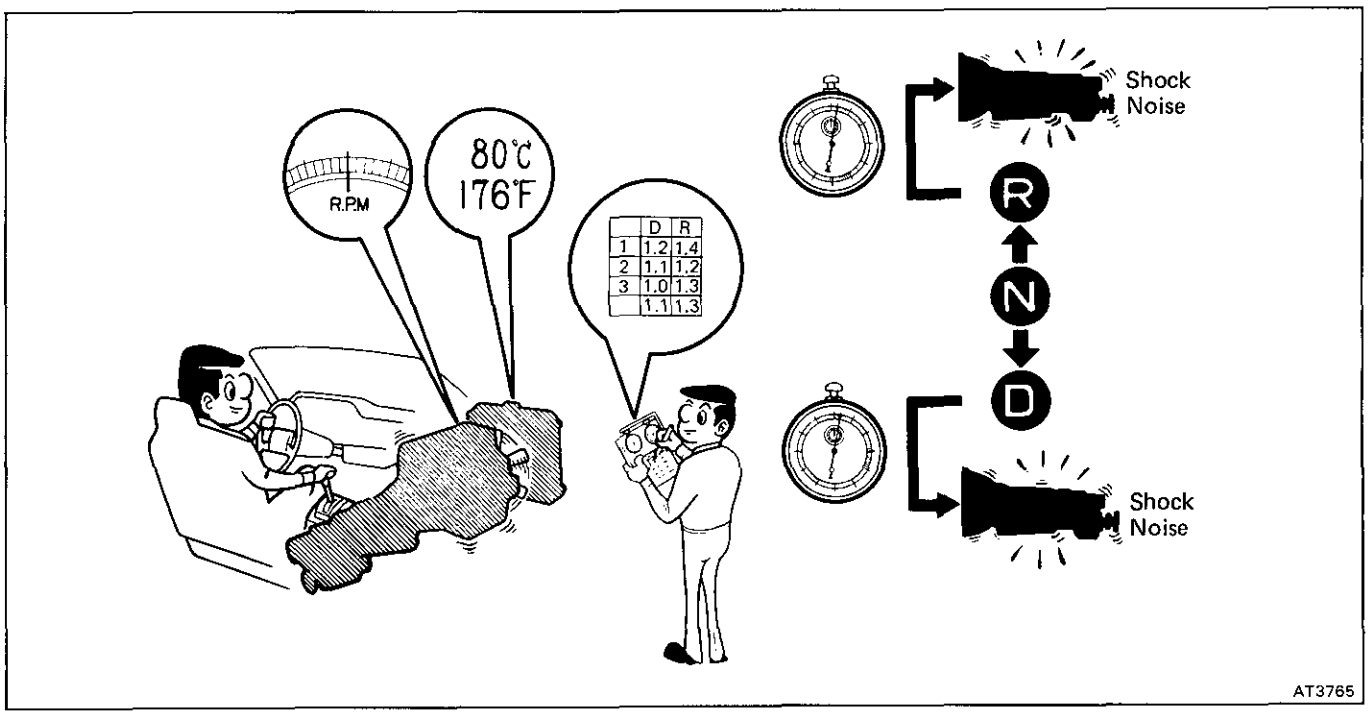
EVALUATION

(a) If N → D time lag is longer than specified:

- Line pressure too low
- Front clutch worn
- O/D one-way clutch not operating properly

(b) If N → R time lag is longer than specified:

- Line pressure too low
- Rear clutch worn
- First and reverse brake worn
- O/D one-way clutch not operating properly



HYDRAULIC TEST

1. MEASURE LINE PRESSURE

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

(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)

(c) Fully apply the parking brake and chock the four wheels.

(d) Start the engine and check idling rpm.

(e) Step down strongly on the brake pedal with your left foot and shift into D range.

(f) Measure the line pressure when the engine is idling.

(g) Press the accelerator pedal all the way down. Quickly read the highest line pressure when engine speed reaches stall speed.

(h) In the same manner, perform the test in R range.

kg/cm^2 (psi, kPa)

D range		R range	
Idling	Stall	Idling	Stall
3.7 — 4.3 (53 — 61, 363 —422)	11.1 — 13.6 (158 — 193, 1,089 — 1,344)	4.5 — 5.5 (64 —78, 441 — 539)	14.0 — 17.0 (199 — 242, 1,373 — 1,667)

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

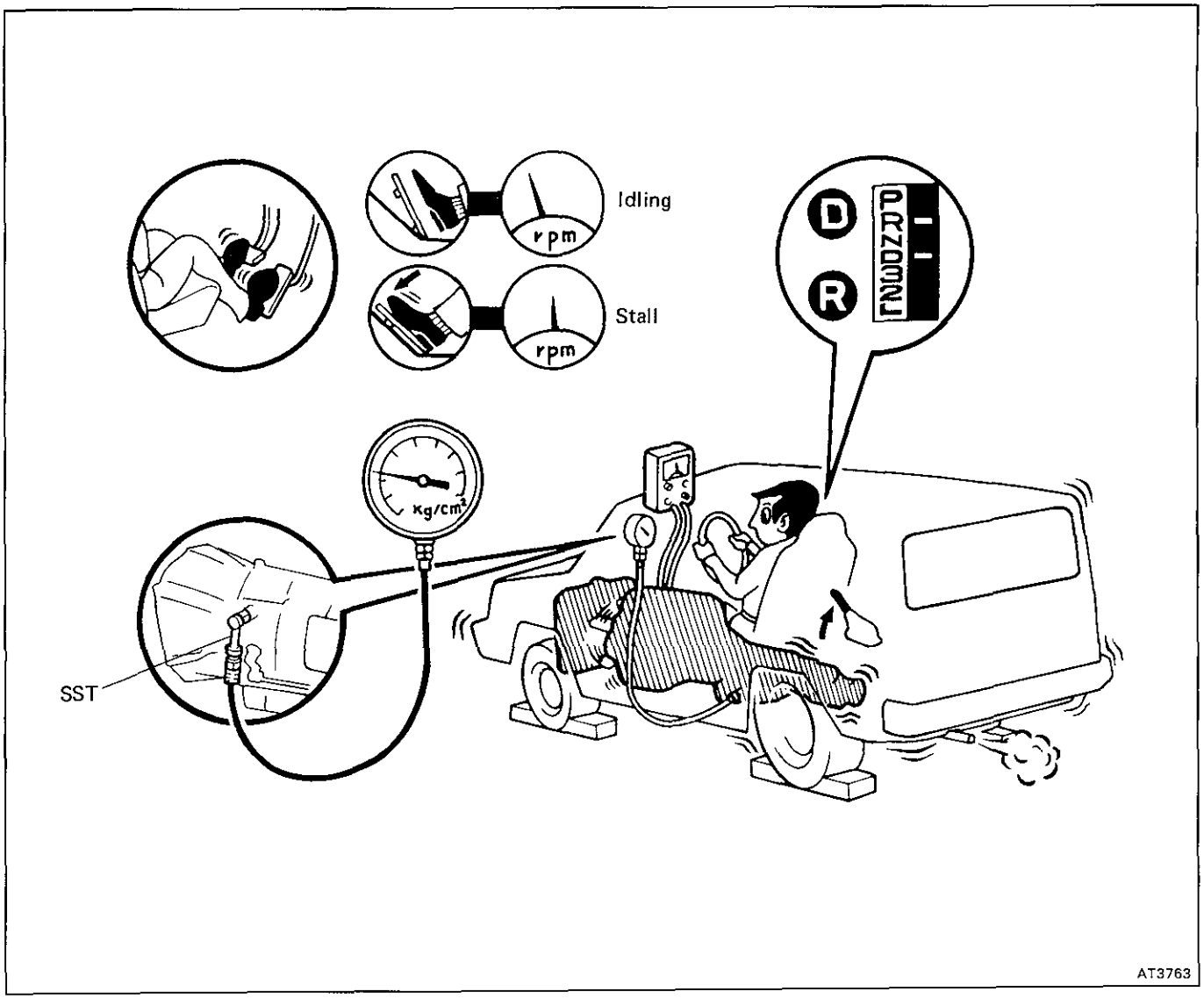
EVALUATION

(a) If the measured values at all ranges are higher than specified:
- Throttle cable out of adjustment
- Throttle valve defective
- Regulator valve defective

(b) 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

(c) If pressure is low in the D range only:
- D range circuit fluid leakage
- Front clutch defective

(d) If pressure is low in the R range only:
- R range circuit fluid leakage
- Rear clutch defective
- First and reverse brake defective


Idling
rpm
Stall
rpm
D
R
P R N D 2 L
kg/cm²
SST
AT3763

2. MEASURE GOVERNOR PRESSURE

NOTICE:

- **Perform the test at normal operating fluid temperature (50 — 80°C or 122 — 176°F).**
- **Measurement can be made with a 1,000 rpm test, but if tests are to be made at 1,800 rpm and 3,500 rpm, it would be safer to do it on road or using a chassis dynamometer because an on-stand test could be hazardous.**

(a) Warm up the transmission fluid.

(b) Shift the transfer shift lever to the "H2" position.

(c) Chock the front wheels.

(d) Jack up rear of the vehicle and support it on stands.

(e) Remove the transmission case test plug and connect the hydraulic pressure gauge.

SST 09992-00094 (Oil pressure gauge)

(f) Check that the parking brake is not applied.

(g) Start the engine.

(h) Shift into the D range and measure the governor pressure at the speeds specified in the table.

3F engine

Differential gear ratio 3.727

Output shaft rpm	Vehicle speed (Reference) km/h (mph) Tire size 7.00 — 15	Governor pressure kg/cm² (psi, kPa)
1,000	35 (22)	0.8 — 1.2 (11 — 17, 78 — 118)
1,800	64 (40)	2.0 — 2.4 (28 — 34, 196 — 235)
3,500	125 (78)	5.7 — 6.3 (81 — 90, 559 — 618)

Differential gear ratio 4.111

	7.50R16-8	7.00-16-6	31 × 10.5R-15	Governor pressure kg/cm² (psi, kPa)
1,000	35 (22)	33 (21)	34 (21)	0.8 — 1.2 (11 — 17, 78 — 118)
1,800	63 (39)	57 (35)	61 (38)	2.0 — 2.4 (28 — 34, 196 — 235)
3,500	123 (76)	110 (68)	119 (74)	5.7 — 6.3 (81 — 90, 559 — 618)
	7.50-16-6	—	—	Governor pressure kg/cm² (psi, kPa)
1,000	35 (22)	—	—	0.8 — 1.2 (11 — 17, 78 — 118)
1,800	64 (40)	—	—	2.0 — 2.4 (28 — 34, 196 — 235)
3,500	124 (77)	—	—	5.7 — 6.3 (81 — 90, 559 — 618)

1HZ engine

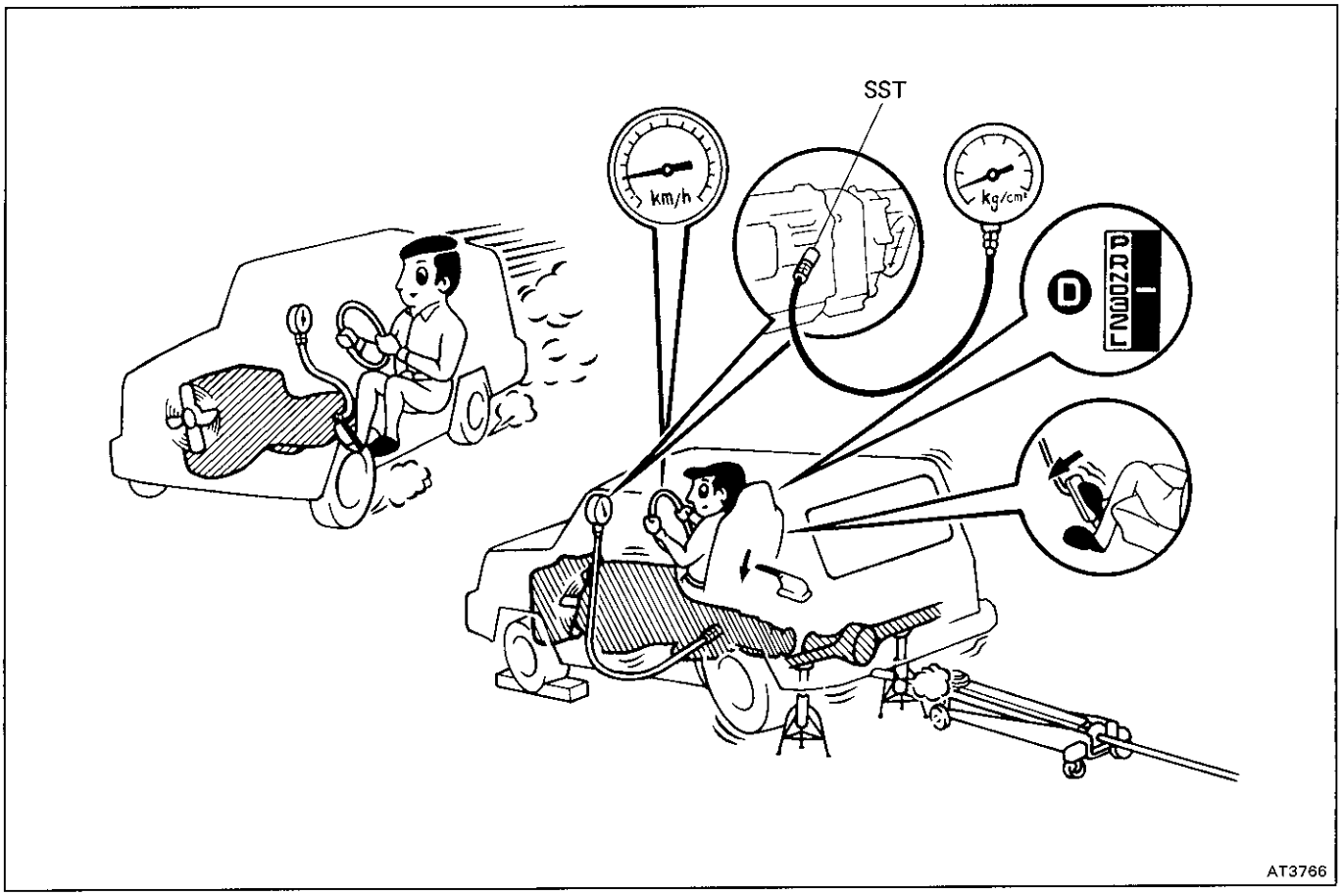
Differential gear ratio 4.111

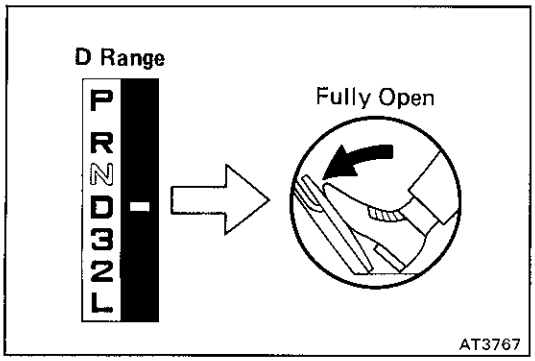
Output shaft rpm	Vehicle speed (Reference) km/h (mph) Tire size 7.50R16-6	265175R-15	Governor pressure kg/cm² (psi, kPa)
1,000	35 (22)	34 (21)	0.8 — 1.2 (11 — 17, 78 — 118)
1,800	64 (40)	61 (38)	2.0 — 2.4 (28 — 34, 196 — 235)
3,500	124 (77)	118 (74)	5.7 — 6.3 (81 — 90, 559 — 618)

EVALUATION

If governor pressure is defective:

- Line pressure defective
- Fluid leakage in governor pressure circuit
- Governor valve operation defective





ROAD TEST

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

1. D RANGE TEST

Shift into the D range and while driving with the accelerator pedal held constant at full throttle valve opening position, check the following points:

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

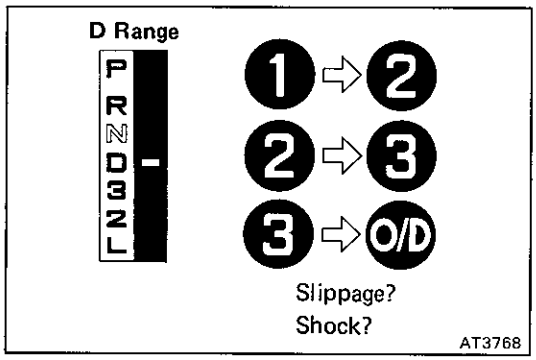
EVALUATION

(1) If there is no 1 → 2 up-shift:
- Governor valve is defective
- 1-2 shift valve is stuck

(2) If there is no 2 → 3 up-shift:
- Governor valve is defective
- 2-3 shift valve is stuck

(3) If there is no 3 → O/D up-shift:
- Governor valve is defective
- 3-4 shift valve is stuck

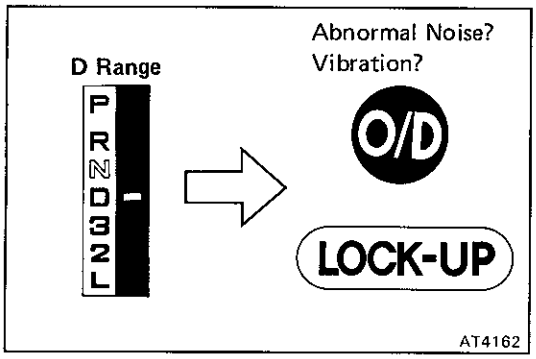
(4) If the shift point is defective:
- Throttle cable is out-of-adjustment
- Throttle valve, 1-2 shift valve, 2-3 shift valve, 3-4 shift valve etc., are defective



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

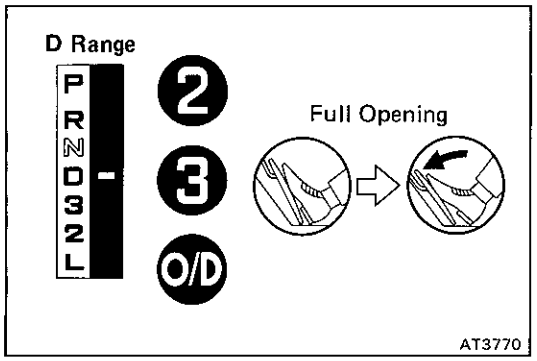
EVALUATION

If the shock is excessive:
- Line pressure is too high
- Accumulator is defective
- Check ball is defective



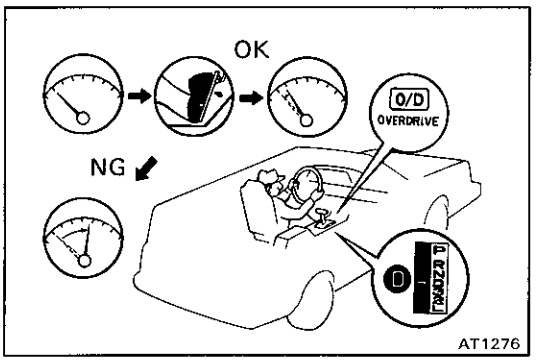
(c) Run in the O/D gear or lock-up of the D range and check for abnormal noise and vibration.

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 shafts, differentials, torque converter, etc.



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

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

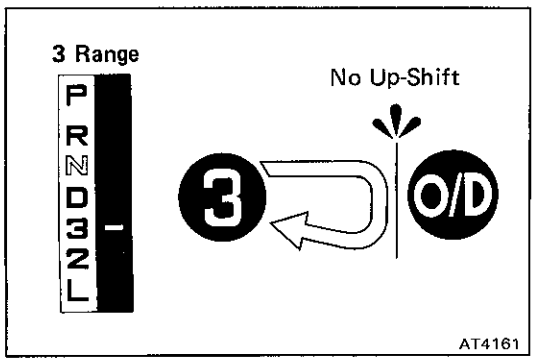


(f) Check for the lock-up mechanism.

(1) Drive in O/D gear of the D range, at a steady speed (lock-up ON) of about 85 km/h (53 mph).

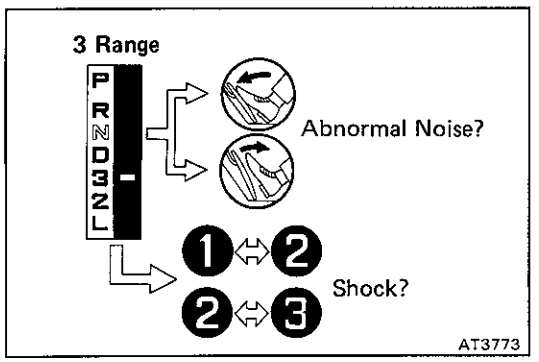
(2) Lightly depress the accelerator pedal and check that the engine rpm does not change abruptly.

If there is a big jump in engine rpm, there is no lock-up.

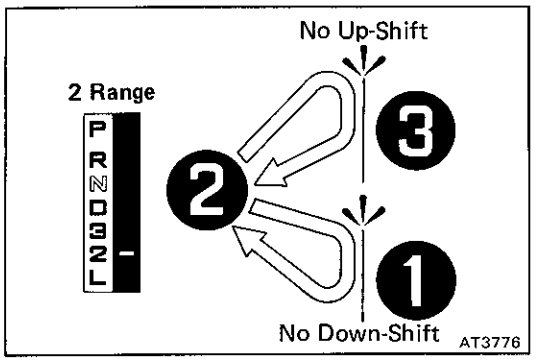


2. 3 RANGE TEST

(a) While running in th 3rd gear of the 3 range, check to see that there is no up-shift to the O/D gear.



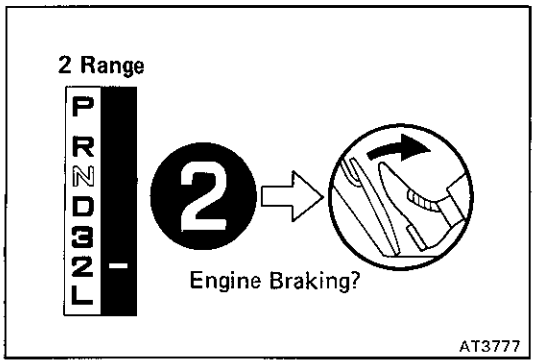
(b) Check for abnormal noise at acceleration and deceleration, and for shock at up-shift and down-shift.



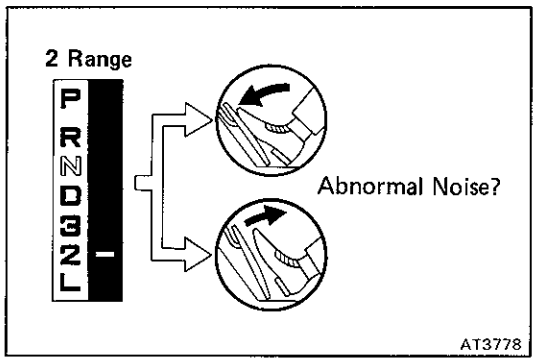
3. 2 RANGE TEST

(a) While running in the 2nd gear of the 2 range, check to see that there is no up-shift to the 3rd gear.

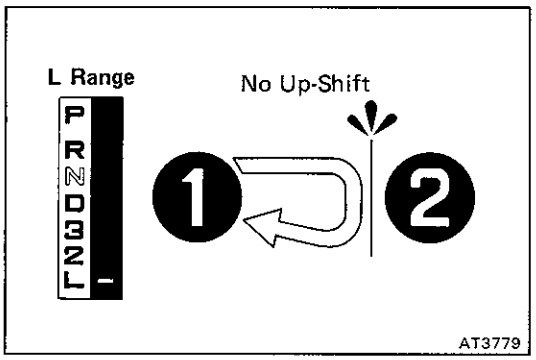
(b) While running in the 2nd gear of the 2 range, check to see that there is no down-shift to the 1st gear.



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

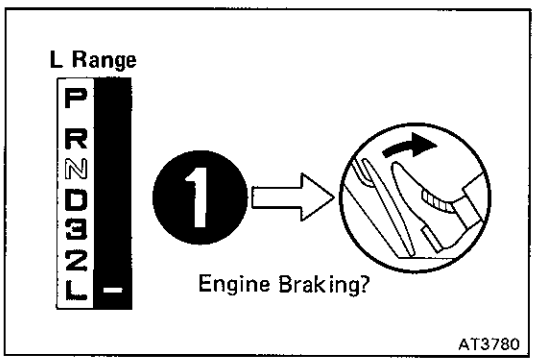


(d) Check for abnormal noise during acceleration and deceleration.



4. L RANGE TEST

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

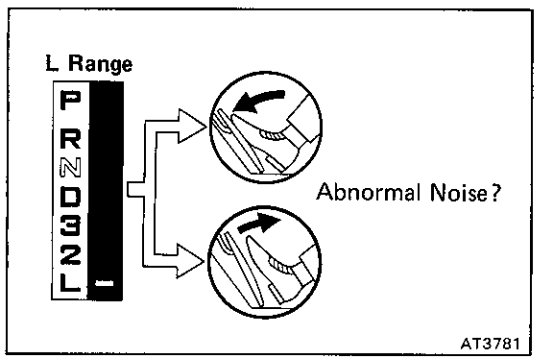


(b) While running in the L range, release the accelerator pedal and check the engine braking effect.

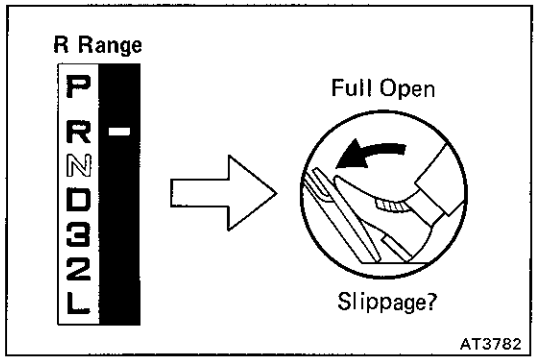
EVALUATION

If there is no engine braking effect:

- First and reverse brake is defective

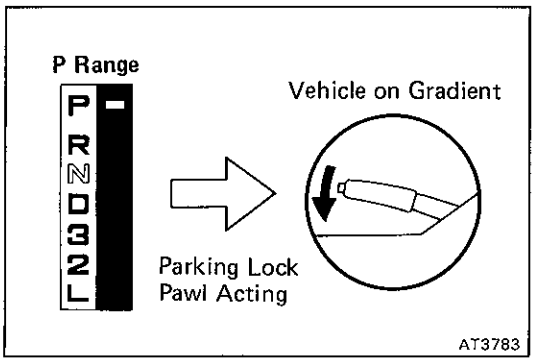


(c) Check for abnormal noise during acceleration and deceleration.



5. R RANGE TEST

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



6. P RANGE TEST

Stop the vehicle on a gradient (more than 9 %) 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.