

3. Performance Test

A: STALL TEST

1. GENERAL

The stall test is of extreme importance in diagnosing the condition of the automatic transmission and the engine. It should be conducted to measure the engine stall speeds in all shift ranges except the P and N ranges.

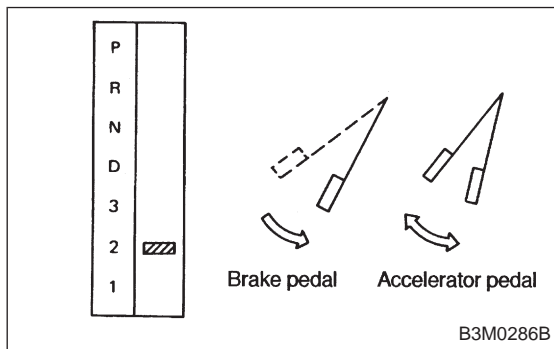
Purposes of the stall test:

- 1) To check the operation of the automatic transmission clutch.
- 2) To check the operation of the torque converter clutch.
- 3) To check engine performance.

2. TEST METHODS

Preparations before test:

- ① Check that throttle valve opens fully.
 - ② Check that engine oil level is correct.
 - ③ Check that coolant level is correct.
 - ④ Check that ATF level is correct.
 - ⑤ Check that differential gear oil level is correct.
 - ⑥ Increase ATF temperature to 60 to 80°C (140 to 176°F) by idling the engine for approximately 30 minutes (with select lever set to "N" or "P").
- 1) Install an engine tachometer at a location visible from the driver's compartment and mark the stall speed range on the tachometer scale.
 - 2) Place the wheel chocks at the front and rear of all wheels and engage the parking brake.
 - 3) Move the manual linkage to ensure it operates properly, and shift the select lever to the 2 range.



- 4) While forcibly depressing the foot brake pedal, gradually depress the accelerator pedal until the engine operates at full throttle.

- 5) When the engine speed is stabilized, read that speed quickly and release the accelerator pedal.
- 6) Shift the select lever to Neutral, and cool down the engine by idling it for more than one minute.
- 7) Record the stall speed.
- 8) If stall speed in 2 range is higher than specifications, forward clutch slipping on brake band slipping may occur. To identify it, conduct the same test as above in D range.
- 9) Perform the stall tests with the select lever in the R range.

CAUTION:

● Do not continue the stall test for **MORE THAN FIVE SECONDS** at a time (from closed throttle, fully open throttle to stall speed reading). Failure to follow this instruction causes the engine oil and ATF to deteriorate and the clutch and brake band to be adversely affected.

Be sure to cool down the engine for at least one minute after each stall test with the select lever set in the P or N range and with the idle speed lower than 1,200 rpm.

● If the stall speed is higher than the specified range, attempt to finish the stall test in as short a time as possible, in order to prevent the automatic transmission from sustaining damage.

Specifications

Stall speed (at sea level):

2200 cc 2,300 — 2,700 rpm

3. EVALUATION

Stall speed (at sea level)	Position	Cause
Less than specifications	2 R	<ul style="list-style-type: none"> ● Throttle valve not fully open ● Erroneous engine operation ● Torque converter clutch's one-way clutch slipping
Greater than specifications	D	<ul style="list-style-type: none"> ● Forward clutch slipping ● One-way clutch (1-2) malfunctioning
	R	<ul style="list-style-type: none"> ● Line pressure too low ● Reverse clutch slipping ● Low & reverse brake slipping
	2	<ul style="list-style-type: none"> ● Line pressure too low ● Forward clutch slipping ● Brake band slipping ● One-way clutch (3-4) malfunctioning

B: TIME LAG TEST

1. GENERAL

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 forward clutch, reverse clutch, low & reverse brake, forward one-way clutch and low one-way clutch.

CAUTION:

- Perform the test at normal operation fluid temperature 60 to 80°C (140 to 176°F).
- Be sure to allow a one minute interval between tests.
- Make three measurements and take the average value.

2. TEST METHODS

- 1) Fully apply the parking brake.
- 2) Start the engine.

Check idling speed (A/C OFF).

“N” range: 800±100 rpm

- 3) Shift the shift lever from “N” to “D” range.

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

- 4) In same manner, measure the time lag for “N” → “R”.

Time lag: Less than 1.5 seconds

3. EVALUATION

- 1) If “N” → “D” time lag is longer than specified:

- Line pressure too low
- Forward clutch worn
- Low one-way clutch not operating properly

- 2) If “N” → “R” time lag is longer than specified:

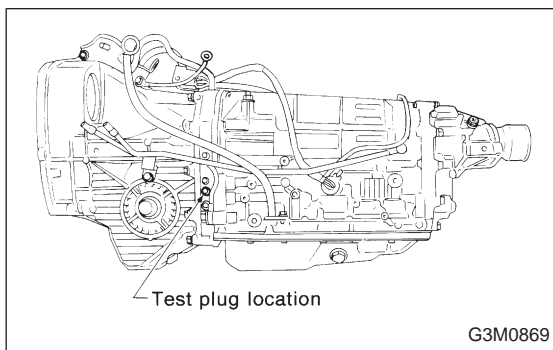
- Line pressure too low
- Reverse clutch worn
- Low & reverse brake worn
- Forward one-way clutch not operating properly

C: LINE PRESSURE TEST

1. GENERAL

If the clutch or the brake band shows a sign of slippage or shifting sensation is not correct, the line pressure should be checked.

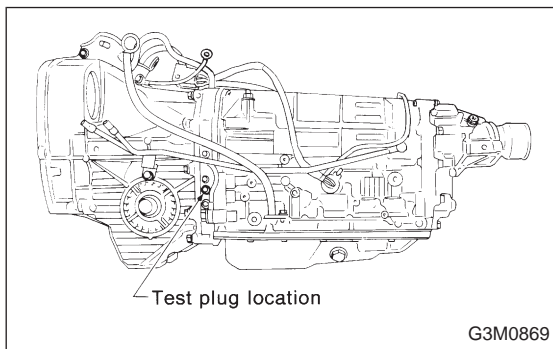
- Excessive shocks during upshifting or shifting takes place at a higher point than under normal circumstances, may be due to the line pressure being too high.
- Slippage or inability to operate the vehicle may, in most cases, be due to loss of oil pressure for the operation of the clutch, brake band or control valve.



1) Line pressure measurement (under no load)

CAUTION:

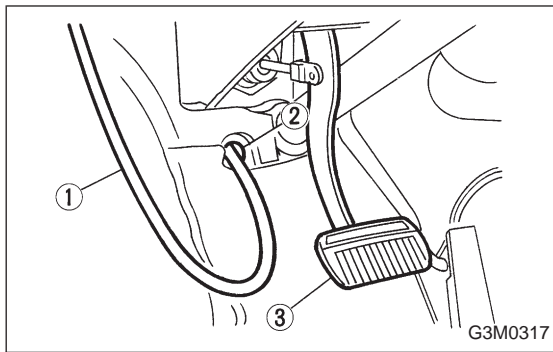
- Before measuring line pressure, jack-up front wheels (front-wheel-drive model) or all wheels (4-wheel drive model).
- Maintain temperature of ATF at approximately 50°C (122°F) during measurement. (ATF will reach the above temperature after idling the engine for approximately 30 minutes with select lever in “N” or “P”.)



2) Line pressure measurement (under heavy load)

CAUTION:

- Before measuring line pressure, apply both foot and parking brakes with all wheels chocked (Same as for “stall” test conditions).
- Measure line pressure when select lever is in “R”, “2” with engine under stall conditions.
- Measure line pressure within 5 seconds after shifting the select lever to each position. (If line pressure needs to be measured again, allow the engine to idle and then stop. Wait for at least one minute before measurement.)
- Maintain the temperature of ATF at approximately 50°C (122°F) during measurement. (ATF will reach the above temperature after idling the engine for approximately 30 minutes with the select lever in “N” or “P”.)

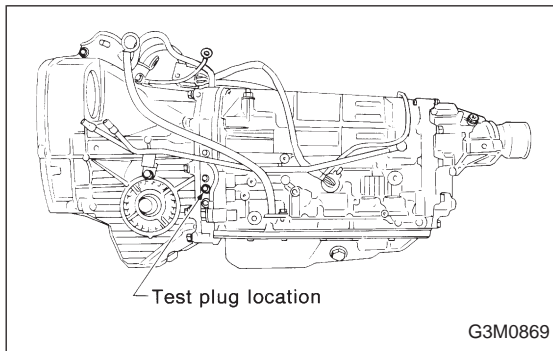


2. TEST METHODS

1) Temporarily attach the ST to a suitable place in the driver's compartment, remove the blind plug located in front of the toe board and pass the hose of the ST to the engine compartment.

ST 498575400 OIL PRESSURE GAUGE ASSY

- ① Pressure gauge hose
- ② Hole in toe board (blank cap hole)
- ③ Brake pedal



2) Remove the test plug and install ST1 instead.

3) Connect ST1 with ST2.

ST1 498897200 OIL PRESSURE GAUGE ADAPTER

ST2 498575400 OIL PRESSURE GAUGE ASSY

4) Check for duty ratio changes by opening and closing throttle valve using select monitor. <Ref. to 3-2 [T8K0].>

5) Check line pressure in accordance with the following chart.

3. EVALUATION

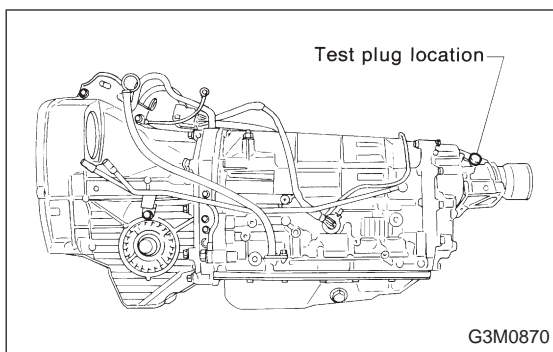
NOTE:

- Under no load: "D"
 - Under full load: "R", "2"
- (With engine running at stall speed)

<Standard line pressure>

Unit: kPa (kg/cm², psi)

Duty ratio (%)	Line pressure		
	"2" range	"R" range	"D" range
5	1,167 — 1,363 (11.9 — 13.9, 169 — 198)	1,432 — 1,569 (14.6 — 16.0, 208 — 228)	—
22	—	—	765 — 902 (7.8 — 9.2, 111 — 131)
100	—	—	235 — 481 (2.4 — 4.9, 34 — 70)



D: TRANSFER CLUTCH PRESSURE TEST

Check transfer clutch pressure in accordance with the following chart in the same manner as with line pressure.

ST 499897700 OIL PRESSURE ADAPTER SET
 ST 498575400 OIL PRESSURE GAUGE ASSY

AWD mode: "D" range

FWD mode: "P" range, engine speed 2000 rpm

CAUTION:

Before setting in FWD mode, install spare fuse on FWD mode switch.

Unit: kPa (kg/cm², psi)

Duty ratio (%)	AWD mode	FWD mode
5	667 — 804 (6.8 — 8.2, 97 — 117)	667 — 804 (6.8 — 8.2, 97 — 117)
40	137 — 226 (1.4 — 2.3, 20 — 33)	—
95	0 (0, 0)	—

If oil pressure is not produced or if it does not change in the AWD mode, the duty solenoid C or transfer valve assembly may be malfunctioning. If oil pressure is produced in the FWD mode, the problem is similar to that in the AWD mode.

E: ROAD TEST

1. GENERAL

Road tests should be conducted to properly diagnose the condition of the automatic transmission.

CAUTION:

When performing test, do not exceed posted speed limit.

2. CHECKING FOR SHIFT PATTERNS

Check "kick-down".

D range: 1st ↔ 2nd ↔ 3rd ↔ 4th

3 range: 1st ↔ 2nd ↔ 3rd ← 4th

2 range: 2nd ← 3rd ← 4th

1 range: 1st ← 2nd ← 3rd ← 4th

3. CHECK FOR ENGINE BRAKE OPERATION

Engine brake operation:

D range → 4th gear

3 range → 3rd gear

2 range → 2nd gear

1 range → 1st gear

4. CHECK FOR THE AWD FUNCTION

If “tight-corner braking” occurs when the steering wheel is fully turned at low speed:

1) Determine the applicable trouble code and check the corresponding duty solenoid C (transfer) for improper operation.

2) If the solenoid is operating properly, check transfer clutch pressure.

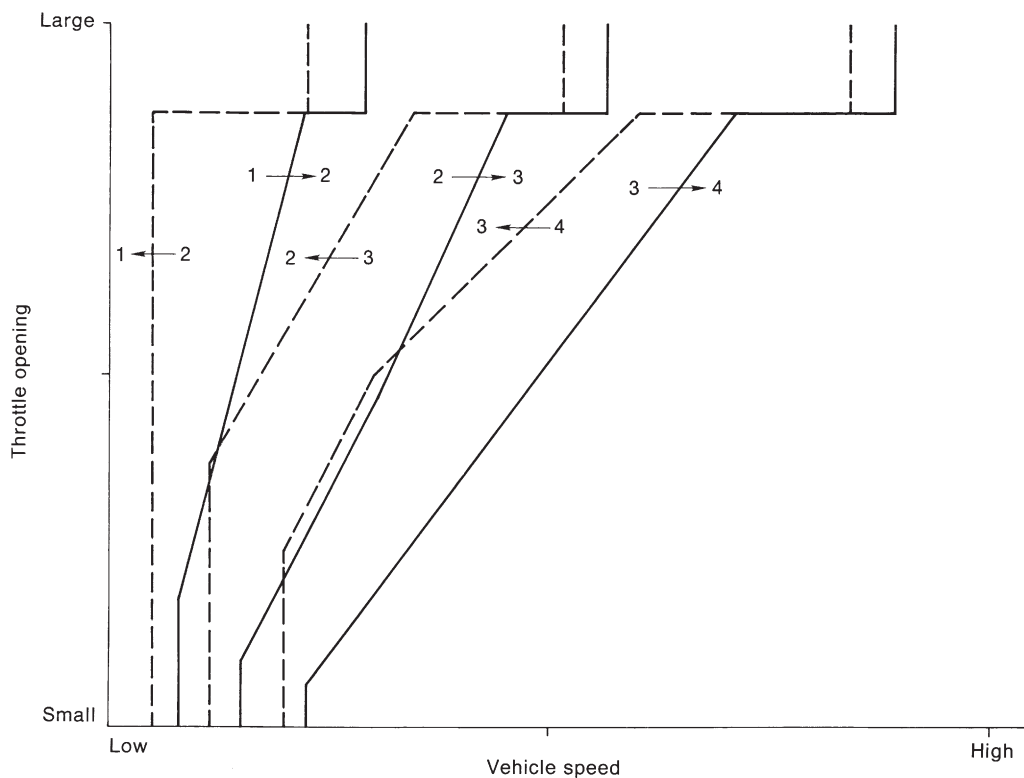
3) If oil pressure is normal but “tight-corner braking” occurs:

Check the transfer control valve for sticking, and the transfer clutch facing for wear.

<Ref. to 3-2 [W15A0].>

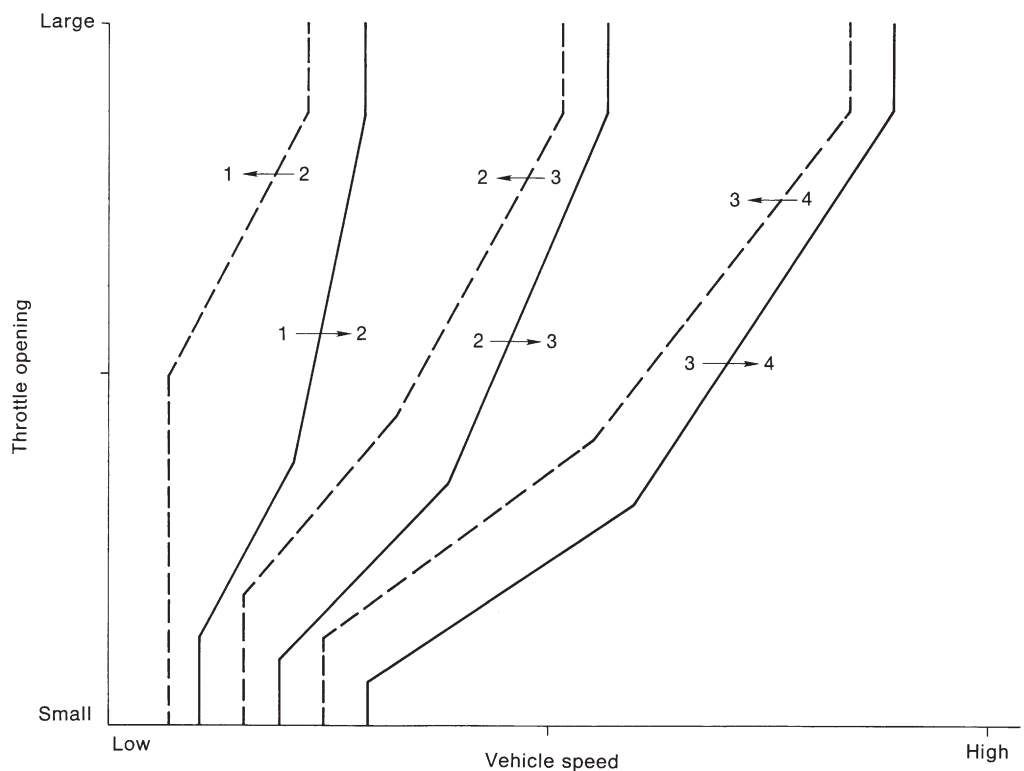
5. AUTOMATIC SHIFT CHARACTERISTICS

FWD model "D" range (Normal pattern)



G3M0319

FWD model "D" range (Power pattern)



G3M0320

