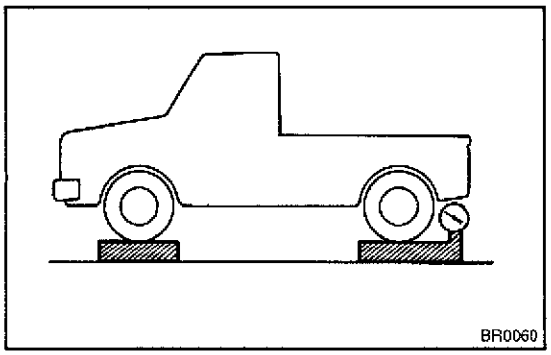
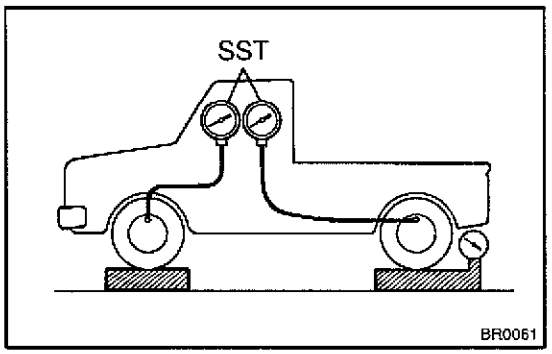


LOAD SENSING PROPORTIONING AND BY–PASS VALVE (LSP & BV)

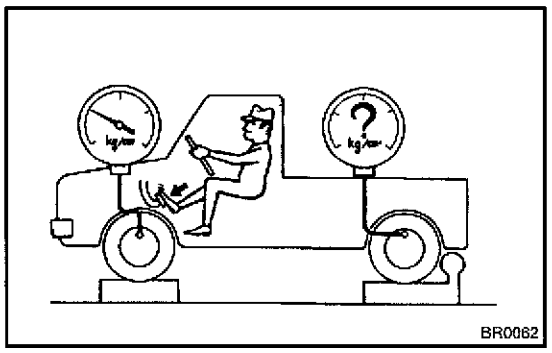
BR0FQ-01

ON–VEHICLE INSPECTION

1. **SET REAR AXLE LOAD**
   Rear axle load (including vehicle weight):
   2WD: 900 kg (1,984 lb)
   4WD: 950 kg (2,094 lb)



2. **INSTALL LSPV GAUGE (SST) AND BLEED AIR**
   SST 09709–29018

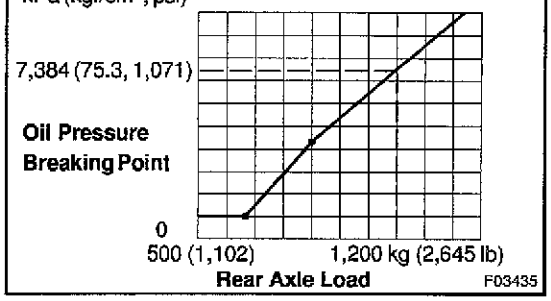


3. **RAISE FRONT BRAKE PRESSURE 7,845 kPa (80 kgf/cm^2, 1,138 psi) AND CHECK REAR BRAKE PRESSURE**
   Rear brake fluid pressure:

2WD	5,227 ± 490 kPa (53.3 ± 5 kgf/cm^2, 758 ± 71 psi)
4WD	4,962 ± 490 kPa (50.6 ± 5 kgf/cm^2, 719 ± 71 psi)

HINT:
The brake pedal should not be depressed twice and/or returned while setting to the specified pressure.
Read the valve of rear brake pressure for 2 seconds after adjusting the specified fluid pressure. If the brake pressure is incorrect, adjust the fluid pressure.

Example (2WD, Australia)



4. IF VEHICLE UNLADEN WEIGHT EXCEEDS SPECIFICATION, SET IT BY FOLLOWING STEPS

(a) Enter the rear axle load on the applicable graph and find out the oil pressure breaking point.

Example: When the rear axle load is 1,200 kg (2,645 lb), the oil pressure breaking point is 7,384 kPa (75.3 kgf/cm², 1,071 psi).

(b) Calculate the rear brake pressure when the front brake pressure is 7,845 kPa (80 kgf/cm², 1,138 psi) in the following formula.

X: Oil Pressure Breaking Point

X + (80 – X) x 0.25

Example:

X: 7,384 kPa (75.3 kgf/cm², 1,071 psi)

75.3 + (80 – 75.3) x 0.25 = 76.5

Rear brake pressure:

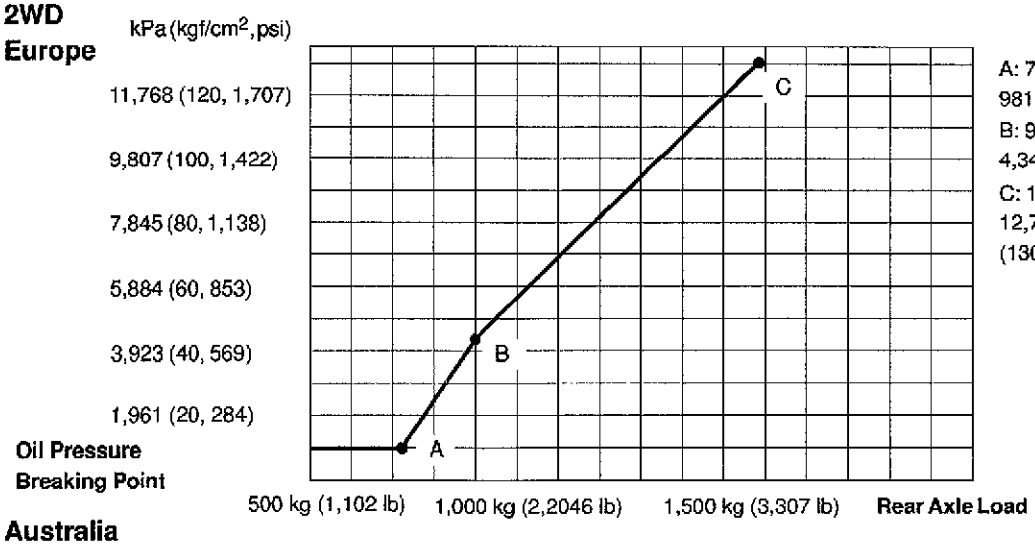
7,502 kPa (76.5 kgf/cm², 1,088 psi)

Service limit:

± 490 kPa (5 kgf/cm², 71 psi)

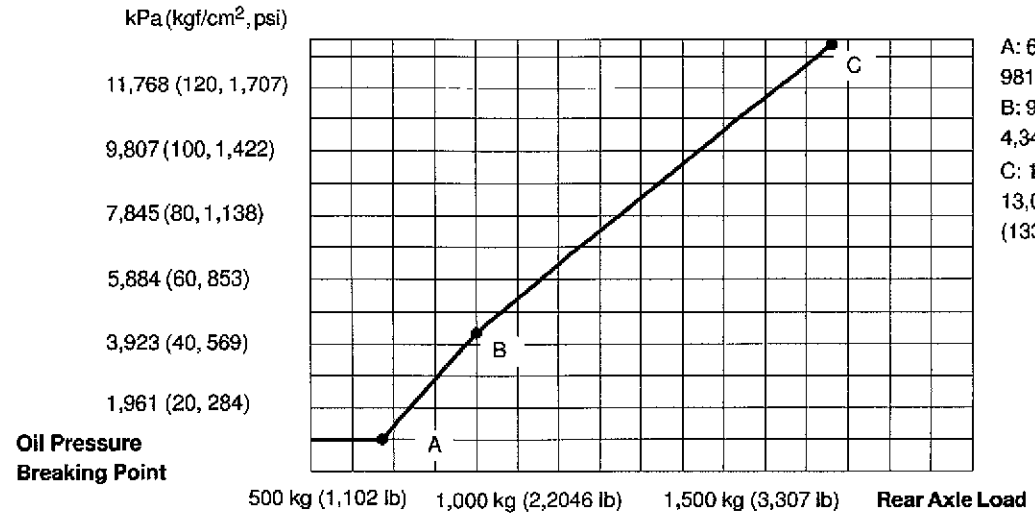
2WD

Europe



A: 724 kg (1,596lb), 981 kPa (10 kgf/cm², 142 psi)
B: 900 kg (1,984 lb), 4,344 kPa (44.3 kgf/cm², 630 psi)
C: 1,585 kg (3,494 lb), 12,768 kPa (130.2 kgf/cm², 1,852 psi)

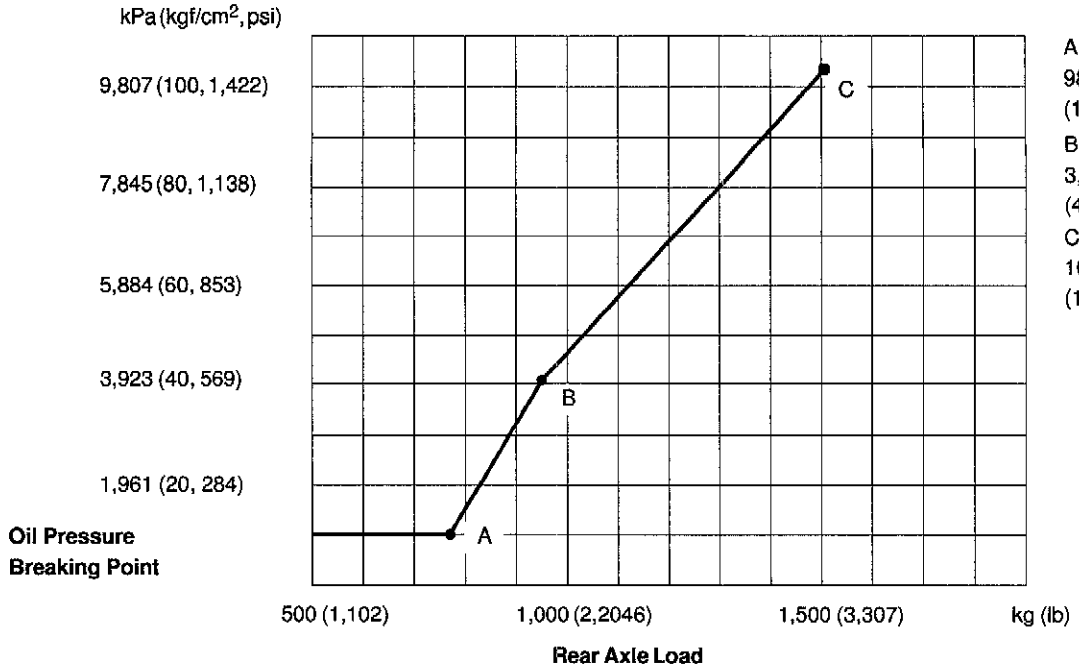
Australia



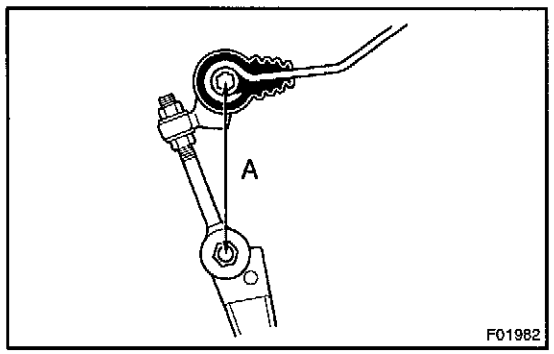
A: 670.4 kg (1,478 lb), 981 kPa (10 kgf/cm², 142 psi)
B: 900 kg (1,984 lb), 4,344 kPa (44.3 kgf/cm², 630 psi)
C: 1,760 kg (3,880 lb), 13,062 kPa (133.2 kgf/cm², 1,895 psi)

F03433

4WD



F03434



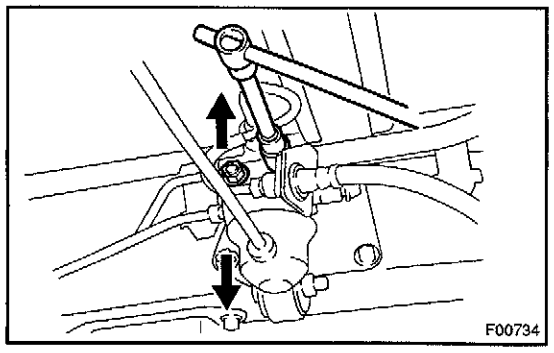
F01982

5. IF NECESSARY, ADJUST FLUID PRESSURE

(a) Adjust the length of the No.2 shackle.
Lower pressure – Lengthen A
High pressure – Shorten A
Initial set: 120 mm (4.72 in.)
Adjustment range:
114 – 126 mm (4.49 – 4.96 in.)

HINT:
One turn of the nut changes the fluid pressure as shown in the following table.

Model	Rear brake pressure kPa (kgf/cm², psi)
2WD	149 (1.52, 21.6)
4WD	114 (1.17, 16.6)



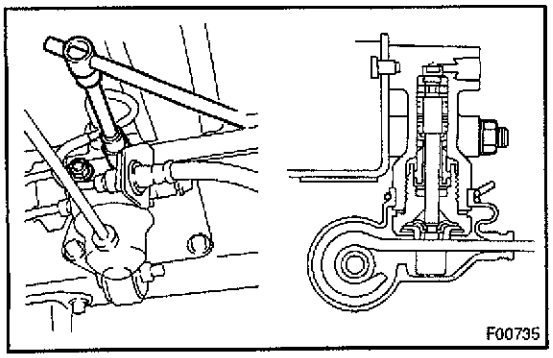
F00734

(b) If the pressure cannot be adjusted by the No.2 shackle, raise or lower the valve body.
Lower pressure – Lower body
High pressure – Raise body

(c) Torque the nuts.
Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

(d) Adjust the length of the No.2 shackle again.

If it cannot be adjusted, inspect the valve position pin and load sensing contact surface (See page BR–68).

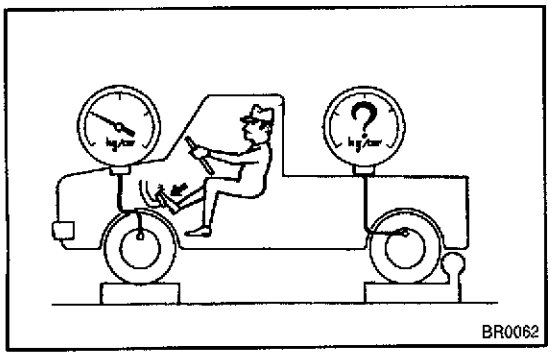


6. IF NECESSARY, CHECK VALVE BODY

(a) Assemble the valve body in the uppermost position.

HINT:

When the brakes are applied, the piston will move down about 0.8 mm (0.03 in.). Even at this time, the piston should not make contact with or move the load sensing spring.



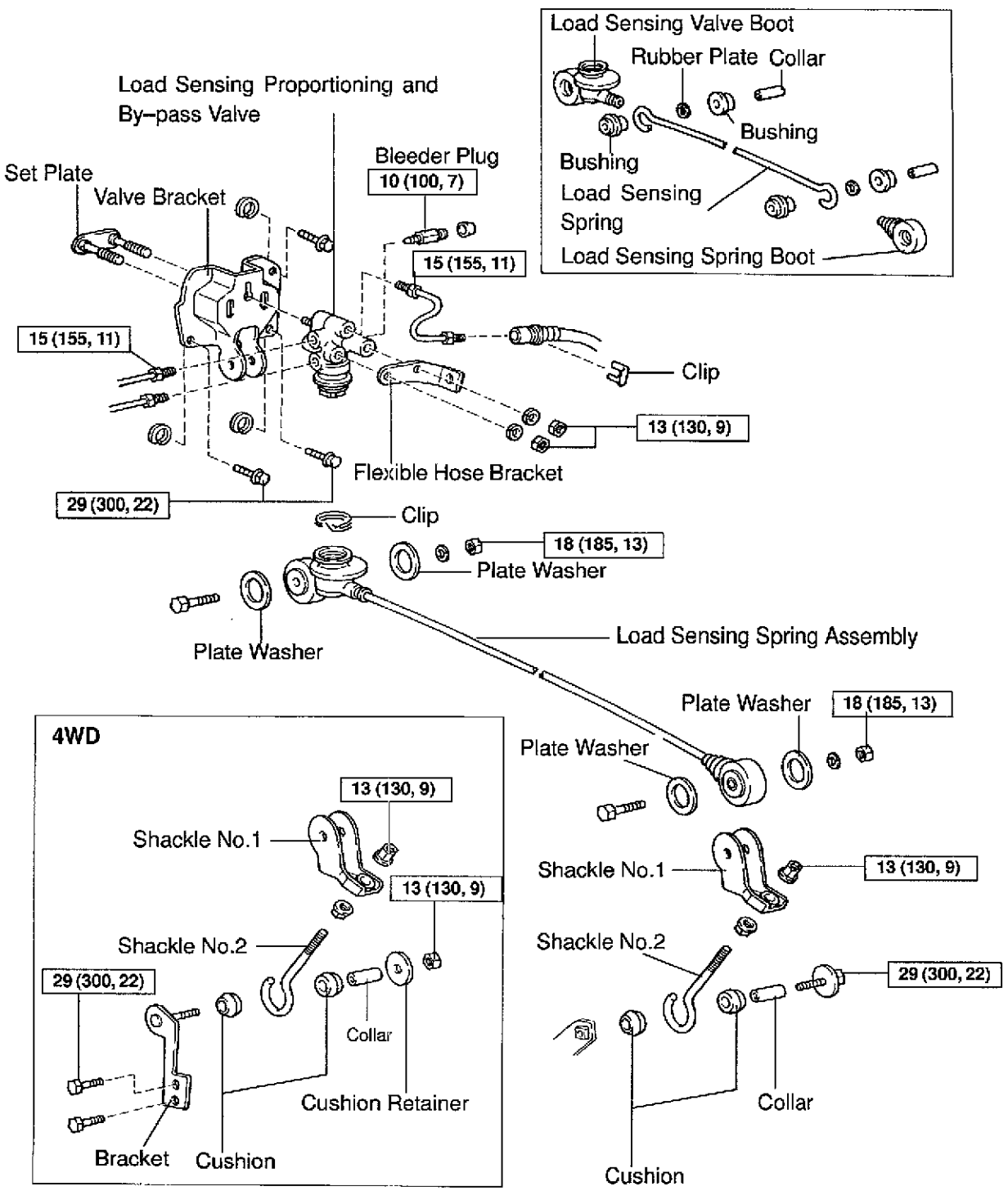
(b) In this position, check the rear brake pressure.

Front brake pressure kPa (kgf/cm^2, psi)	Rear brake pressure kPa (kgf/cm^2, psi)
980 (10, 142)	980 (10, 142)
3,920 (40, 569)	1,716 (17.5, 249)
6,860 (70, 996)	2,451 (25, 356)

If the measured value is not within the standard, replace the valve body.

BR0FR–01

COMPONENTS

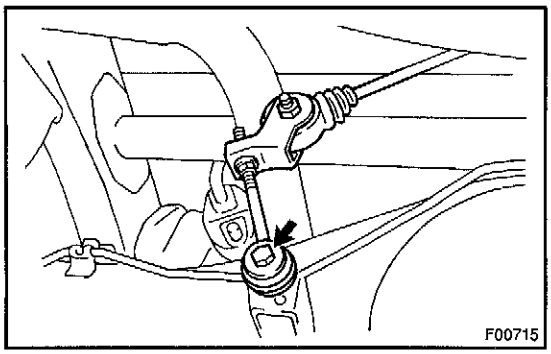


N·m (kgf·cm, ft·lbf) : Specified torque

F00736

BR0FS-01

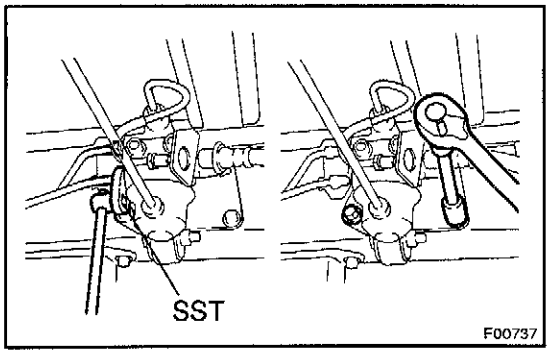
REMOVAL



1. DISCONNECT SHACKLE NO.2 FROM AXLE HOUSING

(a) Remove the nut and disconnect the shackle No.2.

(b) Remove the cushion retainer, 2 cushions and collar.



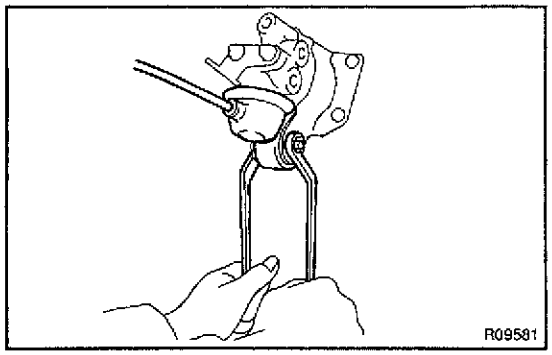
2. REMOVE LSP & BV (LSPV) ASSEMBLY

(a) Using SST, disconnect the brake lines from the valve body.

SST 09023–00100

(b) Remove the clip from the flexible hose bracket.

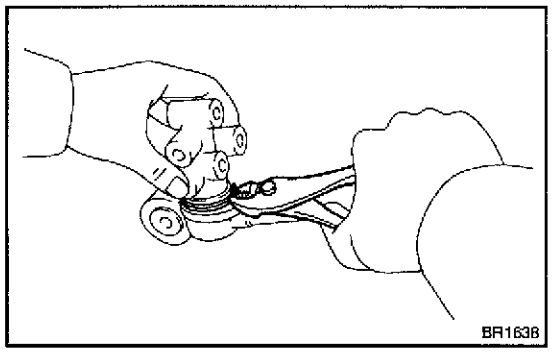
(c) Remove the 3 mounting bolts and the LSP & BV (LSPV) assembly.



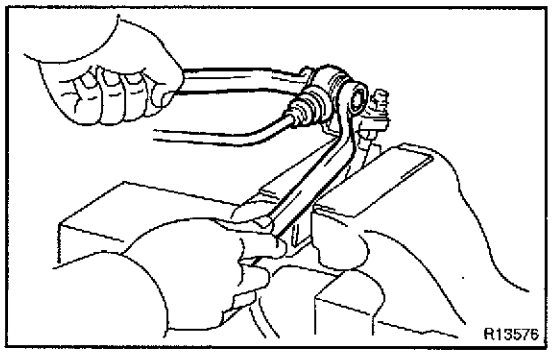
DISASSEMBLY

1. DISCONNECT SPRING FROM VALVE BODY

(a) Remove the nut, bolt and 2 washers.



(b) Using pliers, remove the clip and the spring from the valve body.



2. REMOVE SHACKLE NO.1 AND NO.2

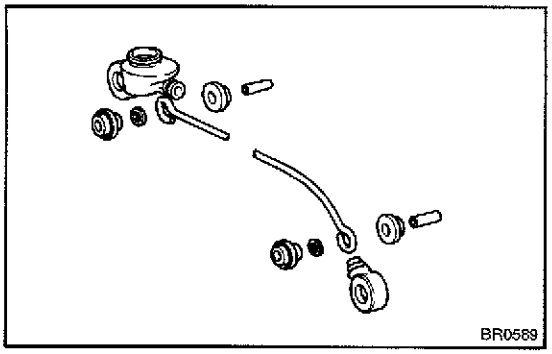
(a) Remove the nut, bolt, the No.1 and No.2 shackles and 2 plate washers from the load sensing spring assembly.

(b) Loosen the lock nut.

(c) Remove the nut, shackle No.1 and lock nut from the shackle No.2.

3. REMOVE VALVE BRACKET

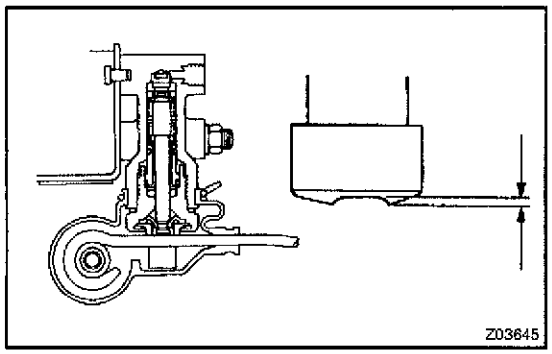
Remove the 2 nuts and flexible hose bracket, and remove the valve bracket and set plate from the valve body.



4. DISASSEMBLE LOAD SENSING SPRING

Disassemble these parts:

- 4 bushings
- 2 collars
- 2 rubber plates
- Load sensing valve boot
- Load sensing spring boot



BR0FU-01

INSPECTION

INSPECT VALVE PISTON PIN AND LOAD SENSING CONTACT SURFACE FOR WEAR

Wear limit: 0.7 mm (0.028 in.)

BR0FV-01

REASSEMBLY

1. ASSEMBLE LOAD SENSING SPRING

Assemble these parts:

- Load sensing spring boot
- Load sensing valve boot
- 2 rubber plates
- 2 collars
- 4 bushings

HINT:

- Apply lithium soap–base glycol grease to all rubbing areas.



Valve Side Shackle Side

BR0070

- Do not mistake the valve side for the shackle side of the load sensing spring.

2. INSTALL VALVE BRACKET

Install the set plate to the valve body through the valve bracket and tighten the 2 valve body mounting nuts with flexible hose bracket.

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

3. INSTALL SHACKLES NO.1 AND NO.2

(a) Install the lock nut and shackle No.1 to No.2 shackles.

(b) Tighten the nut.

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

(c) Install the No.1, No.2 shackles and 2 plate washers, and install the bolt and nut to the load sensing spring assembly.

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

4. CONNECT SPRING TO VALVE BODY

(a) Using pliers, install the clip and the spring to the valve body.

(b) Install the 2 washers, bolt and nut.

NOTICE:

When connecting the shackle to the load sensing spring with a bolt and nut, insert the bolt from the front side of vehicle.

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

BRDFW–01

INSTALLATION

1. INSTALL LSP & BV (LSPV) ASSEMBLY TO FRAME

Install the LSP & BV (LSPV) assembly and 3 mounting bolts.

Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)

2. CONNECT BRAKE LINE

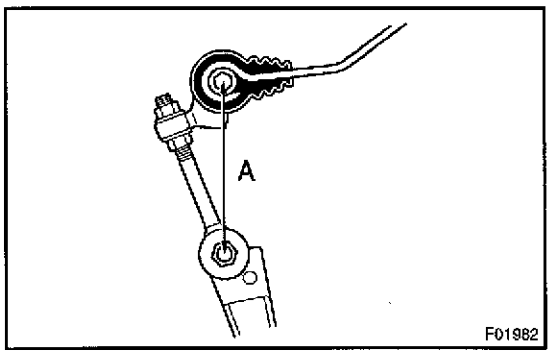
Using SST, connect the brake lines.

Torque: 15 N·m (155 kgf·cm, 11 ft·lbf)

SST 09023–00100

3. CONNECT SHACKLE NO.2 TO AXLE HOUSING

(a) Install the collar, 2 bushings and plate washer.



(b) Set dimension A.

Initial set: 120 mm (4.72 in.)

(c) Tighten the nut.

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

(d) Install the shackle No.2 with the 2 cushions and collar to the axle housing.

(e) 2WD:

Install and torque the nut.

Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)

(f) 4WD:

Install and torque the nut.

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

4. SET REAR AXLE LOAD (See page BR–61)

5. SET VALVE BODY

(a) Loosen the 2 mounting nuts.

(b) When pulling down the load sensing spring, check that the valve piston moves down smoothly.

(c) Position the valve body so that the piston lightly contacts the load sensing spring.

(d) Tighten the 2 mounting nuts.

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

6. BLEED BRAKE LINE (See page BR–4)

7. CHECK AND ADJUST LSP & BV (LSPV) FLUID PRESSURE (See page BR–61)