

## 12.Brake Booster

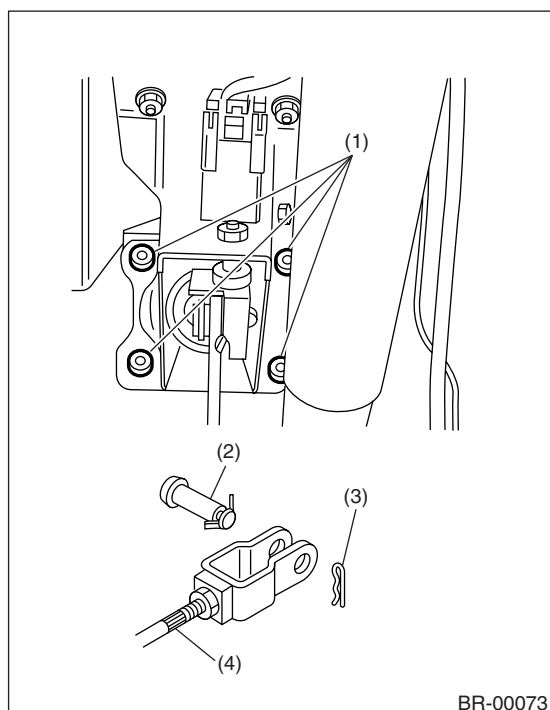
### A: REMOVAL

1) Remove or disconnect the following parts of engine compartment.

- (1) Disconnect the connector of brake fluid level gauge.
- (2) Remove the brake pipes from master cylinder.
- (3) Remove the master cylinder installation nut.
- (4) Disconnect the vacuum hose from brake booster.

2) Remove the following parts from the pedal bracket.

- (1) Snap pin and clevis pin
- (2) Four brake booster installation nuts



- (1) Nut
- (2) Clevis pin
- (3) Snap pin
- (4) Operating rod

3) Remove the brake booster while avoiding the brake pipe.

#### NOTE:

- Be careful not to drop the brake booster. If the booster is dropped, replace it.
- Use special care when handling the operating rod.
- If excessive force is applied to operating rod, angle may cause change in excess of  $\pm 3^\circ$ , and it may result in damage to the master cylinder.
- Be careful when placing the brake booster on floor.
- Do not change the push rod length. If it has been changed, reset the projected length "L" to the standard length.

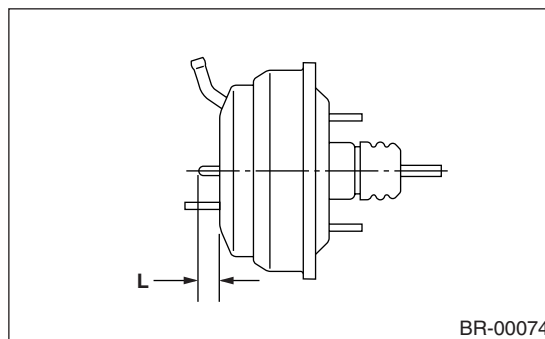
#### Standard:

**Model with ABS**

**L = 10.05 mm (0.396 in)**

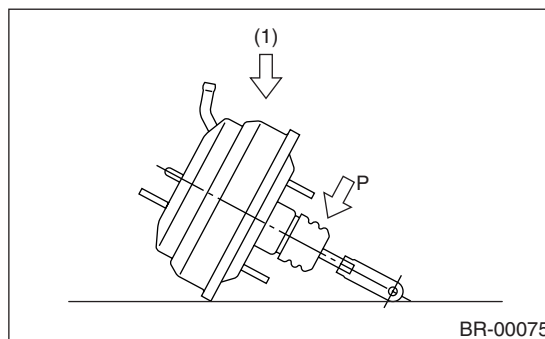
**Model with VDC**

**L = 1.45 mm (0.0571 in)**



#### CAUTION:

If external force is applied from above when brake booster is placed in this position, the resin portion as indicated by "P" may be damaged, so be careful how it is placed.



(1) Force

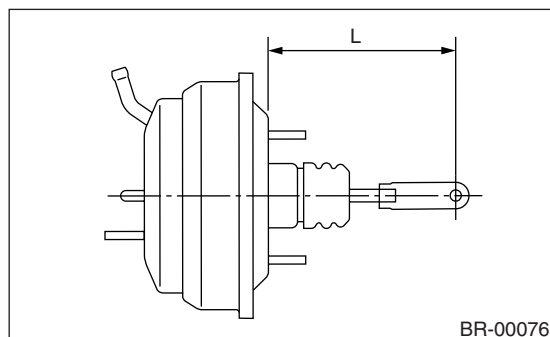
### B: INSTALLATION

1) Check and adjust the operating rod of the brake booster.

**Standard: L**

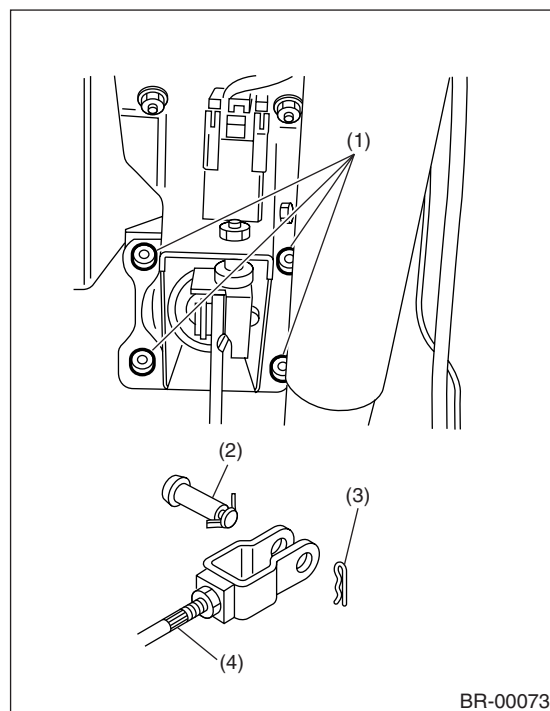
**144.6 mm (5.69 in)**

If it is out of specification, adjust it with the brake booster operating rod.



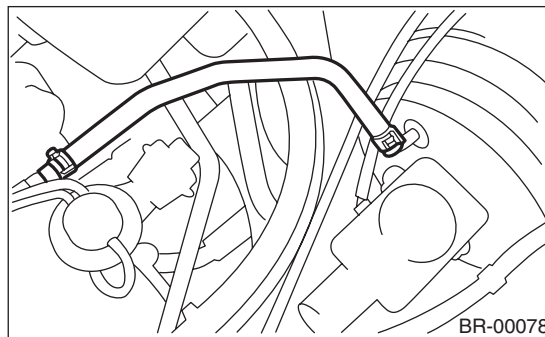
2) Mount the brake booster in position.

3) Connect the operating rod to brake pedal with a clevis pin and snap pin.



- (1) Nut
- (2) Clevis pin
- (3) Snap pin
- (4) Operating rod

4) Connect the vacuum hose to brake booster.



5) Mount the master cylinder onto the brake booster.

6) Connect the brake pipes to the master cylinder.

7) Connect the connector of the brake fluid level gauge.

8) Measure the clearance between the threaded end of stop light switch and the stopper.

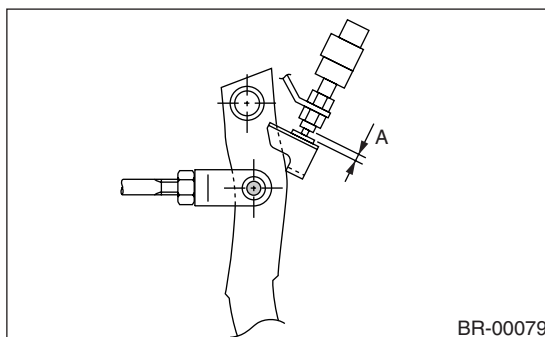
If it is not within the specification, adjust it by adjusting the position of the stop light switch. <Ref. to BR-51, ADJUSTMENT, Stop Light Switch.>

**CAUTION:**

**Do not rotate the stop light switch.**

**Stop light switch clearance: A**

**0.3 mm (0.012 in)**



9) Apply grease to the operating rod connecting pin to prevent it from wear.

10) Bleed air from brake system. <Ref. to BR-43, Air Bleeding.>

**Tightening torque (air bleeder screw):**

**8 N·m (0.8 kgf-m, 5.8 ft-lb)**

11) Perform a road test to make sure the brakes do not drag.

## C: INSPECTION

### 1. OPERATION CHECK (WITHOUT GAUGES)

#### CAUTION:

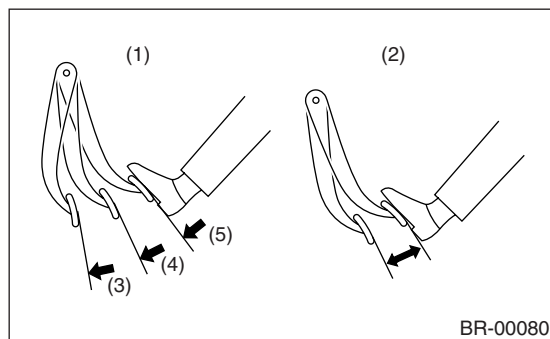
When checking operation, be sure to apply the parking brake securely.

#### CHECK WITHOUT GAUGES

This method can not determine which portion is defective exactly. But it is possible to identify the outline of the defect by performing the check according to the following procedures.

#### AIR TIGHTNESS CHECK

Start the engine, and idle it for 1 to 2 minutes, then turn it OFF. Depress the brake pedal several times applying the normal pedal force. The pedal stroke should be the longest at the 1st depression, and it should become shorter at each successive depression. If the depressed pedal height is not changed, the brake booster is faulty.



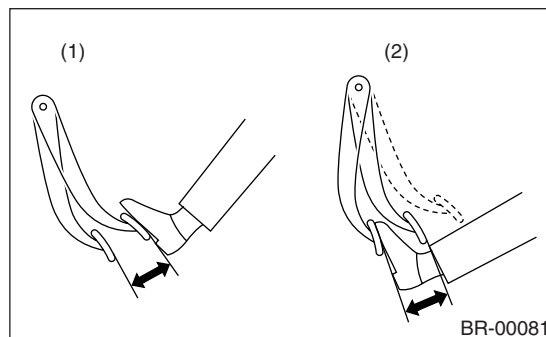
- (1) Normal
- (2) Not OK
- (3) 1st
- (4) 2nd
- (5) 3rd

#### NOTE:

- In case of defective operation, inspect the condition of the check valve and vacuum hose as well.
- Replace them if faulty, and perform the test again.
- If a defect is not improved, check correctly using a gauge.

### OPERATION CHECK

1) While the engine is OFF, depress the brake pedal several times applying the same pedal force, to check for a change in pedal height.



- (1) When engine is stopped
- (2) When engine is started

2) With brake pedal depressed, start the engine.

3) As the engine starts, the brake pedal should move slowly toward floor. If the pedal height is not changed, the brake booster is faulty.

#### NOTE:

If faulty, check correctly with gauge.

#### LOADED AIR TIGHTNESS CHECK

Depress the brake pedal while the engine is running, and turn the engine OFF with the pedal depressed. Keep the pedal depressed for 30 seconds. If the pedal height does not change, the function of brake booster is normal. If the pedal height increases, it is faulty.

#### NOTE:

If faulty, check correctly with gauge.

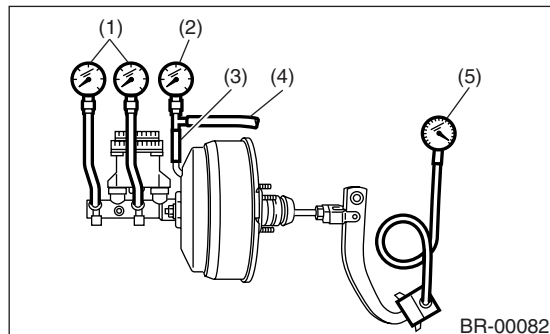
### 2. OPERATION CHECK (WITH GAUGE)

#### CAUTION:

When checking operation, be sure to apply the parking brake securely.

#### Check with gauge

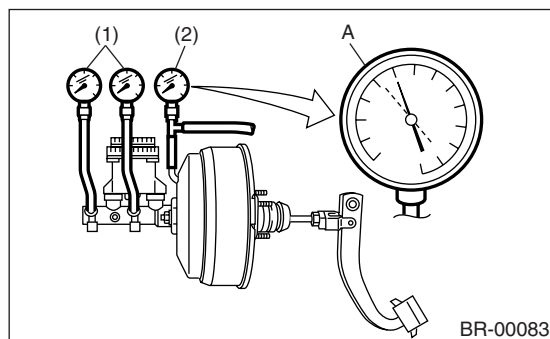
Connect the gauge as shown in the figure. After bleeding air from pressure gauge, perform each check.



- (1) Pressure gauge
- (2) Vacuum gauge
- (3) Adapter hose
- (4) Vacuum hose
- (5) Pedal force gauge

#### AIR TIGHTNESS CHECK

1) Start the engine and keep it running until vacuum pressure indicates A point of vacuum gauge = 66.7 kPa (500 mmHg, 19.69 inHg). Do not depress the brake pedal at this time.



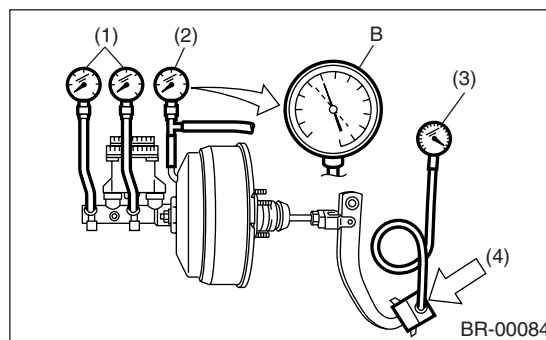
- (1) Pressure gauge
- (2) Vacuum gauge

2) Stop the engine and check the gauge. If the vacuum pressure drop within 15 seconds after stopping the engine is less than 3.3 kPa (25 mmHg, 0.98 inHg), the function of brake booster is normal. If faulty, the cause may be one of the following.

- Check valve malfunction
- Leak from vacuum hose
- Leak from shell joint section or stud bolt welded section
- Damaged diaphragm plate
- Leak from valve body seal and bearing section
- Leak from plate and seal assembly section
- Leak from poppet valve assembly section

#### LOADED AIR TIGHTNESS CHECK

1) Start the engine and depress the brake pedal with a pedal force of 196 N (20 kgf, 44 lb). Keep the engine idling until vacuum pressure indicates B point of gauge = 66.7 kPa (500 mmHg, 19.69 inHg) with the pedal depressed.



- (1) Pressure gauge
- (2) Vacuum gauge
- (3) Pedal force gauge
- (4) Depressed

2) Stop the engine and check the vacuum gauge. If the vacuum pressure drop within 15 seconds after stopping the engine is less than 3.3 kPa (25 mmHg, 0.98 inHg), the function of brake booster is normal.

If defective, refer to "AIR TIGHTNESS CHECK".

<Ref. to BR-37, INSPECTION, Brake Booster.>

3) If the brake booster is faulty, replace it with a new part.

## LACK OF BOOSTING ACTION CHECK

Turn the engine OFF, and set the value of the vacuum gauge to "0". Then, check the fluid pressure when the brake pedal is depressed. The pressure must be greater than the specification listed.

|                             |                                             |                                                |
|-----------------------------|---------------------------------------------|------------------------------------------------|
| Brake pedal operation force | 147 N (15 kgf, 33 lb)                       | 294 N (30 kgf, 66 lb)                          |
| Fluid pressure              | 686 kPa<br>(7 kg/cm <sup>2</sup> , 100 psi) | 17.65 kPa<br>(18 kg/cm <sup>2</sup> , 256 psi) |

## BOOSTING ACTION CHECK

Set the vacuum gauge reading to 66.7 kPa (500 mmHg, 19.69 inHg) with the engine running. Then, check the fluid pressure when the brake pedal is depressed. The pressure must be greater than the specification listed.

|                             |                                                |                                                    |
|-----------------------------|------------------------------------------------|----------------------------------------------------|
| Brake pedal operation force | 147 N (15 kgf, 33 lb)                          | 294 N (30 kgf, 66 lb)                              |
| Fluid pressure              | 6,468 kPa<br>(66 kg/cm <sup>2</sup> , 938 psi) | 10,297 kPa<br>(105 kg/cm <sup>2</sup> , 1,493 psi) |