

Brought to you by Eris Studios  
NOT FOR RESALE

**BRAKE**

# General Description

## BRAKE

### 1. General Description

#### A: SPECIFICATION

Model		Other models	WRX MT	WRX AT	STi
Front disc brake	Size	15 inch type	16 inch type		17 inch type
	Type	Disc (Floating type, ventilated)			Disc (Fixed type, ventilated)
	Effective disc diameter	228 mm (8.98 in)	255 mm (10.04 in)		268 mm (10.55 in)
	Disc thickness × Outer diameter	24 × 277 mm (0.94 × 10.91 in)	24 × 294 mm (0.94 × 11.57 in)		30 × 326 mm (1.18 × 12.83 in)
	Effective cylinder diameter	42.8 mm (1.685 in) × 2			40.0 mm × 2, 46.0 mm × 2 (1.575 in × 2, 1.811 in × 2)
	Pad dimensions (length × width × thickness)	117.8 × 50.5 × 11.0 mm (4.638 × 1.988 × 0.433 in)			129.8 × 60.5 × 9.2 mm (5.110 × 2.382 × 0.362 in)
	Clearance adjustment	Automatic adjustment			
Rear disc brake	Size	14 inch type			17 inch type
	Type	Disc (Floating type)			Disc (Fixed type, ventilated)
	Effective disc diameter	230 mm (9.06 in)			268 mm (10.55 in)
	Disc thickness × Outer diameter	10 × 266 mm (0.39 × 10.47 in)			20 × 316 mm (0.79 × 12.44 in)
	Effective cylinder diameter	38.1 mm (1.500 in)			36.0 mm (1.417 in)
	Pad dimensions (length × width × thickness)	89.4 × 33.7 × 9.0 mm (3.520 × 1.327 × 0.354 in)			74.8 × 45.0 × 9.0 mm (2.945 × 1.772 × 0.354 in)
	Clearance adjustment	Automatic adjustment			
Master cylinder	Type	Tandem			
	Effective diameter	26.99 mm (1-1/16 in)		25.4 mm (1 in)	26.99 mm (1-1/16 in)
	Reservoir type	Sealed type			
	Brake fluid reservoir capacity	205 cm <sup>3</sup> (12.51 cu in)			
Brake booster	Type	Vacuum suspended			
	Effective diameter	205 + 230 mm (8.07 + 9.06 in)			
Brake line		Dual circuit system			
Brake fluid <b>CAUTION:</b> • <b>Avoid mixing brake fluid of different brands to prevent the fluid performance from degrading.</b> • <b>When brake fluid is supplemented, be careful not to allow any dust into the reservoir.</b> • <b>Use fresh DOT3 brake fluid when replacing or refilling the fluid.</b>		FMVSS No. 116, DOT3 or DOT4			

#### NOTE:

Refer to "PB section" for parking brake specifications. <Ref. to PB-2, SPECIFICATION, General Description.>

# General Description

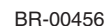
BRAKE

ITEM			STANDARD	SERVICE LIMIT
Front brake	Pad thickness	15"	11 mm (0.43 in)	1.5 mm (0.059 in)
		16"	11 mm (0.43 in)	1.5 mm (0.059 in)
		17"	9.2 mm (0.362 in)	1.2 mm (0.047 in)
	Disc thickness	Except 17"	24 mm (0.94 in)	22 mm (0.87 in)
		17"	30 mm (1.18 in)	28 mm (1.10 in)
	Disc runout		—	0.075 mm (0.0030 in)
Rear brake (Disc type)	Pad thickness	14"	9.0 mm (0.354 in)	1.5 mm (0.059 in)
		17"	9.0 mm (0.354 in)	1.2 mm (0.047 in)
	Disc thickness	14"	10 mm (0.39 in)	8.5 mm (0.335 in)
		17"	20 mm (0.79 in)	18 mm (0.71 in)
	Disc runout		—	0.07 mm (0.0028 in)
Rear brake (Disc type parking)	Inside diameter		170 mm (6.69 in)	171 mm (6.73 in)
	Lining thickness		3.2 mm (0.126 in)	1.5 mm (0.059 in)
Parking brake	Lever stroke		7 to 8 notches/196 N (20 kgf, 44 lb)	

		Brake pedal force	Fluid pressure			
			Other models	WRX MT	WRX AT	STi
Brake booster	Brake fluid pressure without engine running	147 N (15 kgf, 33 lb)	588 kPa (6 kg/cm <sup>2</sup> , 85 psi)			
		294 N (30 kgf, 66 lb)	1,471 kPa (15 kg/cm <sup>2</sup> , 213 psi)		1,667 kPa (17 kg/cm <sup>2</sup> , 242 psi)	1,471 kPa (15 kg/cm <sup>2</sup> , 213 psi)
	Brake fluid pressure with engine running and vacuum at 66.7 kPa (500 mmHg, 19.69 inHg)	147 N (15 kgf, 33 lb)	5,296 kPa (54 kg/cm <sup>2</sup> , 768 psi)	5,688 kPa (58 kg/cm <sup>2</sup> , 825 psi)	6,276 kPa (64 kg/cm <sup>2</sup> , 910 psi)	4,021 kPa (41 kg/cm <sup>2</sup> , 583 psi)
		294 N (30 kgf, 66 lb)	9,120 kPa (93 kg/cm <sup>2</sup> , 1,323 psi)		10,000 kPa (102 kg/cm <sup>2</sup> , 1,450 psi)	8,336 kPa (85 kg/cm <sup>2</sup> , 1,209 psi)

Brake pedal	Free play	0.5 — 2 mm (0.02 — 0.08 in) [Depress brake pedal pad with a force of less than 10 N (1 kgf, 2 lb).]
-------------	-----------	--

• 15 INCH TYPE & 16 INCH TYPE



- |                       |                    |                                      |
|-----------------------|--------------------|--------------------------------------|
| (1) Caliper body      | (9) Support        | (17) Bushing                         |
| (2) Air bleeder screw | (10) Pad clip      | (18) Housing                         |
| (3) Guide pin (Green) | (11) Outer shim    |                                      |
| (4) Pin boot          | (12) Inner shim    | <b><i>Tightening torque: N·m</i></b> |
| (5) Piston seal       | (13) Pad (Outside) | <b><i>T1: 8 (0.8, 5.8)</i></b>       |
| (6) Piston            | (14) Pad (Inside)  | <b><i>T2: 18 (1.8, 13.3)</i></b>     |
| (7) Piston boot       | (15) Disc rotor    | <b><i>T3: 26.5 (2.7, 19.5)</i></b>   |
| (8) Lock pin (Yellow) | (16) Disc cover    | <b><i>T4: 80 (8.2, 59)</i></b>       |

**Tightening torque: N·m (kgf-m, ft-lb)**

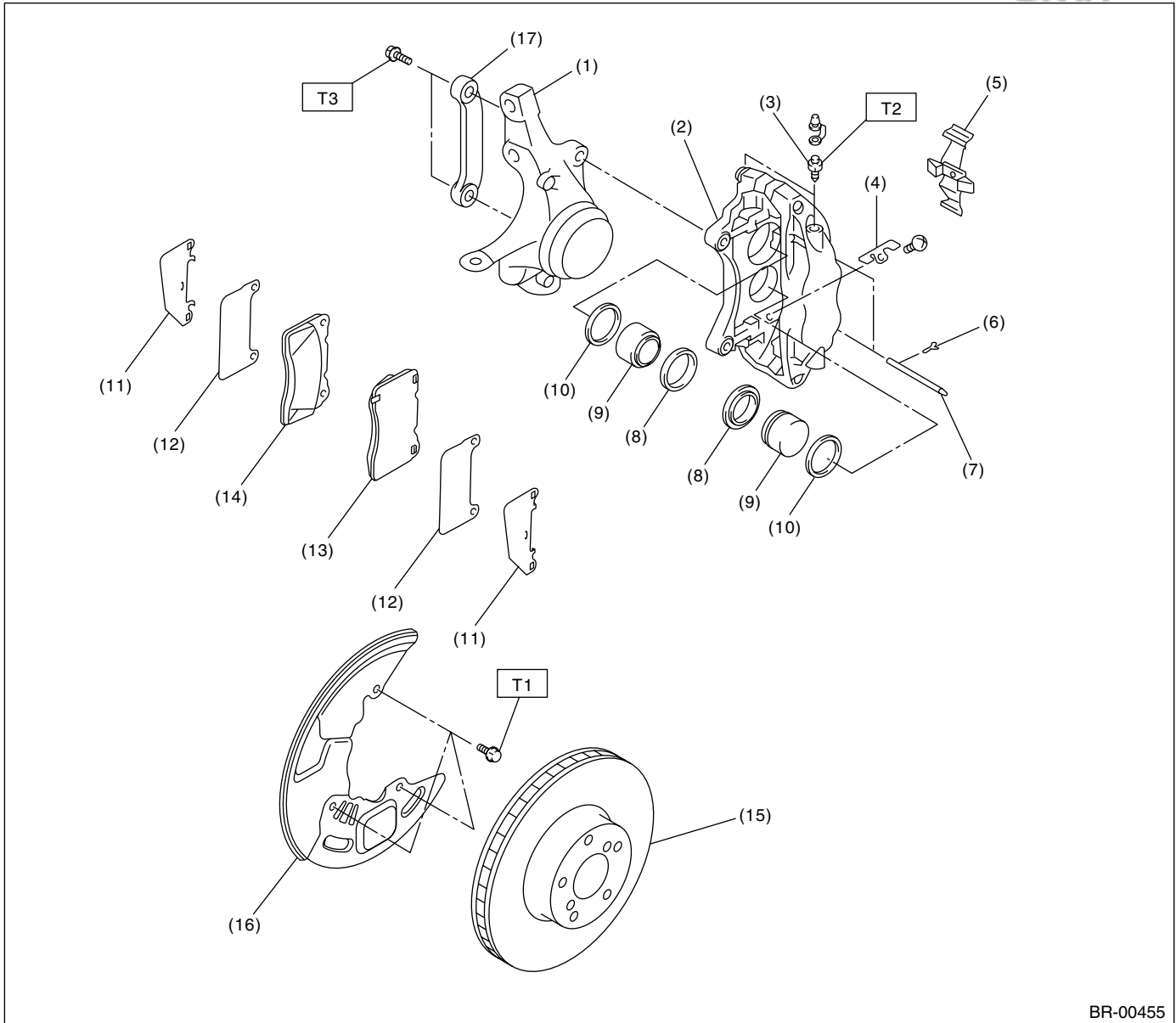
***T1: 8 (0.8, 5.8)***

**T2: 18 (1.8, 13.3)**

***T3: 26.5 (2.7, 19.5)***

***T4: 80 (8.2, 59)***

## • 17 INCH TYPE



BR-00455

- |                       |                         |
|-----------------------|-------------------------|
| (1) Housing           | (9) Piston              |
| (2) Caliper body      | (10) Piston seal        |
| (3) Air bleeder screw | (11) Pad shim (Outside) |
| (4) Guide plate       | (12) Pad shim (Inside)  |
| (5) Cross spring      | (13) Pad (Outside)      |
| (6) Clip              | (14) Pad (Inside)       |
| (7) Pad pin           | (15) Disc rotor         |
| (8) Piston boot       | (16) Disc cover         |

- (17) Tie bar

**Tightening torque: N·m (kgf-m, ft-lb)**

**T1: 18 (1.8, 13.0)**

**T2: 20 (2.0, 14.5)**

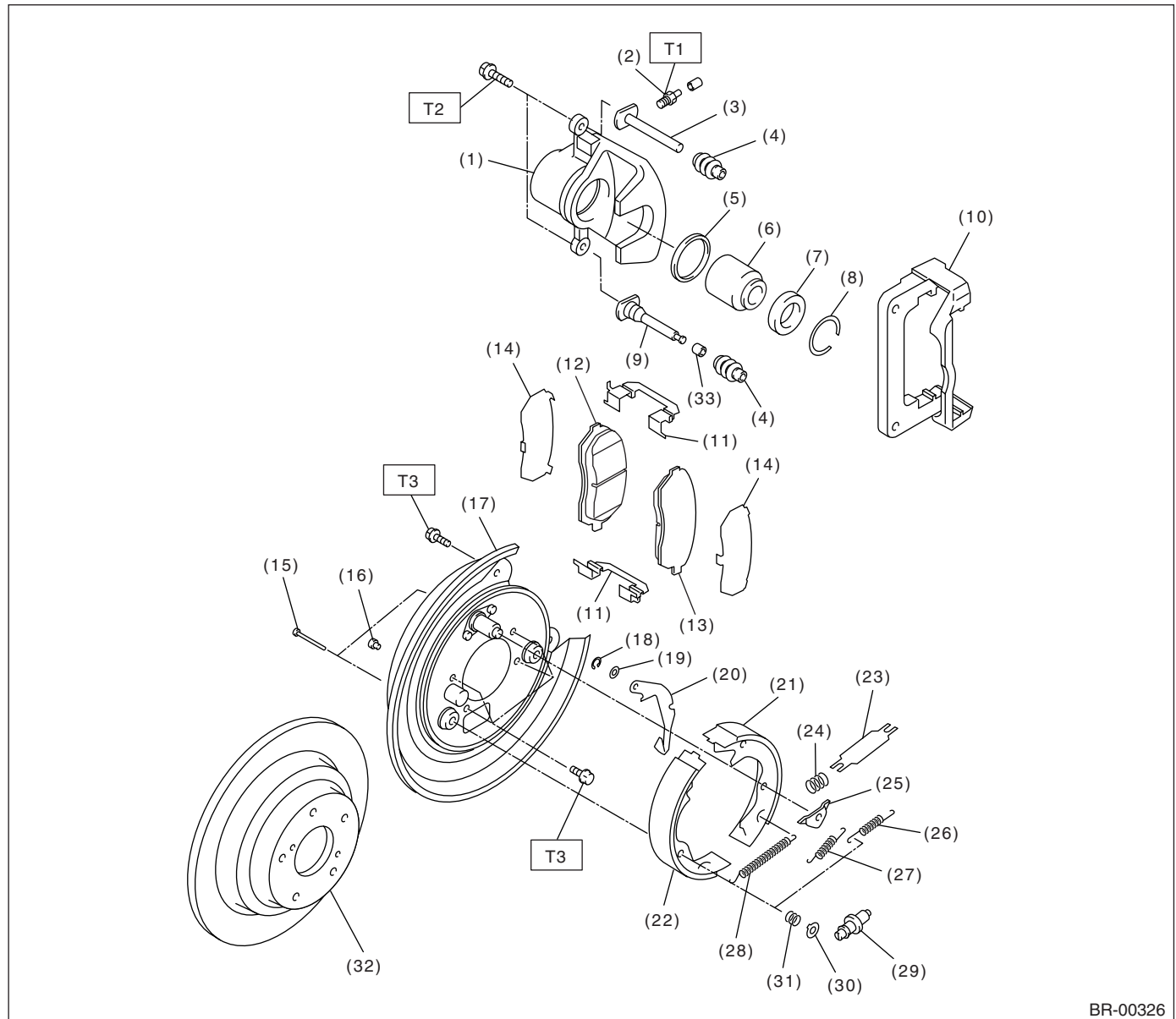
**T3: 155 (15.8, 114.3)**

# General Description

## BRAKE

### 2. REAR DISC BRAKE

#### • 14 INCH TYPE



BR-00326

- |                       |                                     |                                 |
|-----------------------|-------------------------------------|---------------------------------|
| (1) Caliper body      | (14) Shim                           | (27) Primary shoe return spring |
| (2) Air bleeder screw | (15) Shoe hold-down pin             | (28) Adjusting spring           |
| (3) Guide pin (Green) | (16) Cover                          | (29) Adjuster                   |
| (4) Pin boot          | (17) Back plate                     | (30) Shoe hold-down cup         |
| (5) Piston seal       | (18) Retainer                       | (31) Shoe hold-down spring      |
| (6) Piston            | (19) Spring washer                  | (32) Disc rotor                 |
| (7) Piston boot       | (20) Parking brake lever            | (33) Bushing                    |
| (8) Boot ring         | (21) Parking brake shoe (Secondary) |                                 |
| (9) Lock pin (Yellow) | (22) Parking brake shoe (Primary)   |                                 |
| (10) Support          | (23) Strut                          |                                 |
| (11) Pad clip         | (24) Strut shoe spring              |                                 |
| (12) Inner pad        | (25) Shoe guide plate               |                                 |
| (13) Outer pad        | (26) Secondary shoe return spring   |                                 |

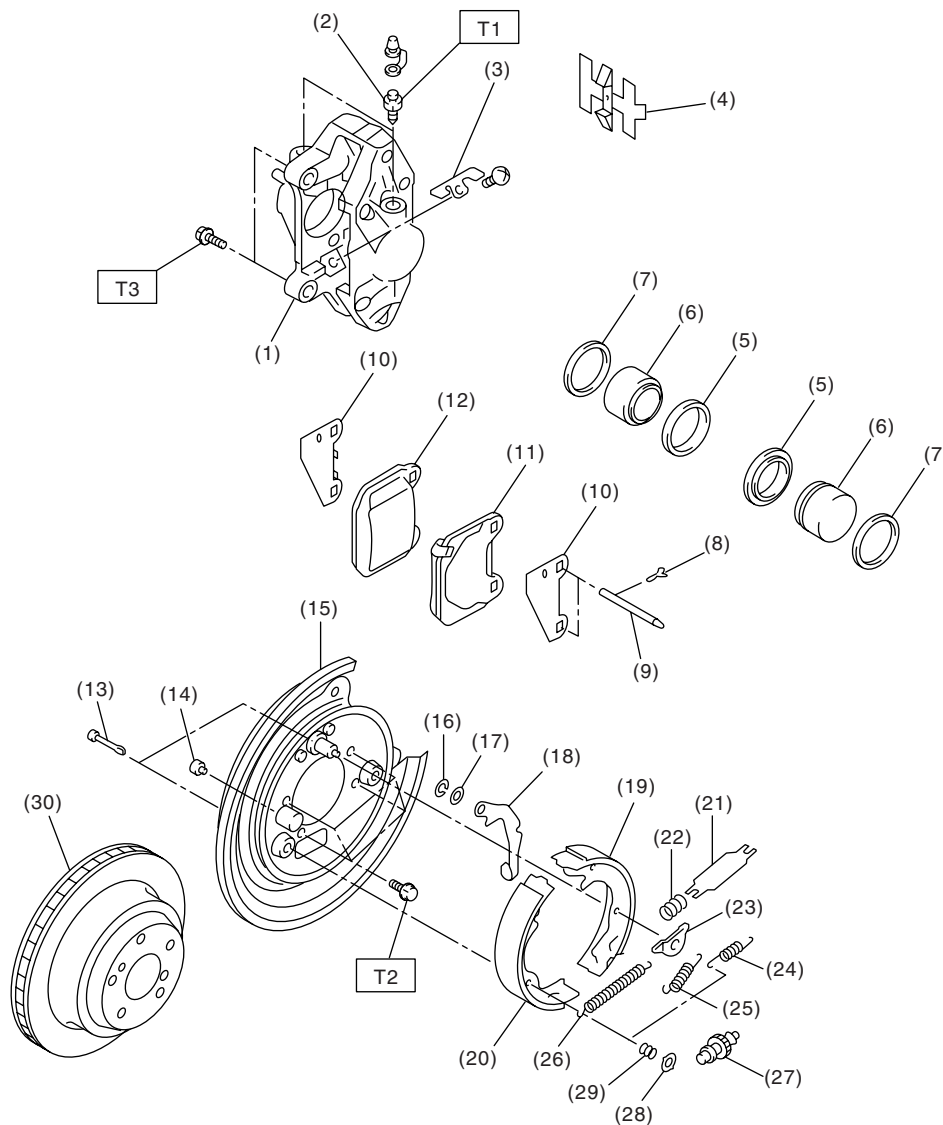
**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 8 (0.8, 5.8)**

**T2: 37 (3.8, 27.5)**

**T3: 53 (5.4, 39.1)**

## • 17 INCH TYPE



BR-00281

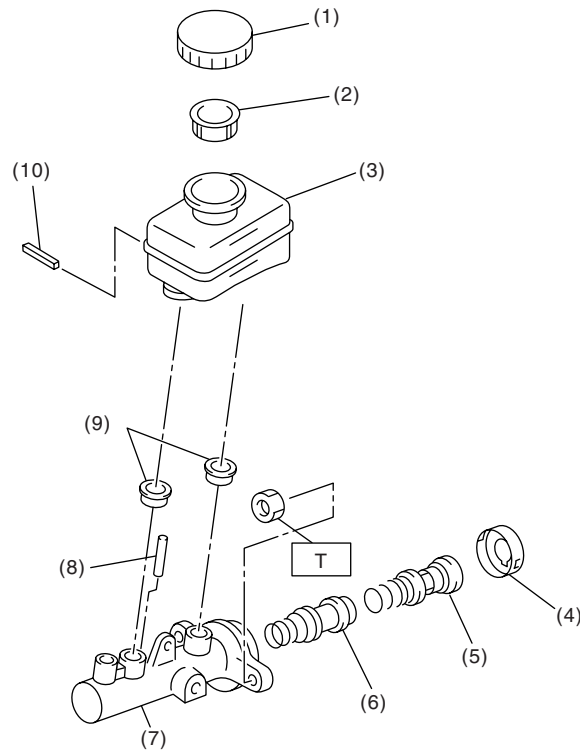
- |                       |                                     |                                 |
|-----------------------|-------------------------------------|---------------------------------|
| (1) Caliper body      | (13) Shoe hold-down pin             | (25) Primary shoe return spring |
| (2) Air bleeder screw | (14) Cover                          | (26) Adjusting spring           |
| (3) Guide plate       | (15) Back plate                     | (27) Adjuster                   |
| (4) Cross spring      | (16) Retainer                       | (28) Shoe hold-down cup         |
| (5) Piston boot       | (17) Spring washer                  | (29) Shoe hold-down spring      |
| (6) Piston            | (18) Parking brake lever            | (30) Disc rotor                 |
| (7) Piston seal       | (19) Parking brake shoe (Secondary) |                                 |
| (8) Clip              | (20) Parking brake shoe (Primary)   |                                 |
| (9) Pad pin           | (21) Strut                          |                                 |
| (10) Pad shim         | (22) Strut shoe spring              |                                 |
| (11) Pad (Outside)    | (23) Shoe guide plate               |                                 |
| (12) Pad (Inside)     | (24) Secondary shoe return spring   |                                 |

---

**Tightening torque: N·m (kgf-m, ft-lb)**
**T1: 20 (2.0, 14.5)****T2: 53 (5.4, 39.1)****T3: 65 (6.6, 47.9)**


---

### 3. MASTER CYLINDER



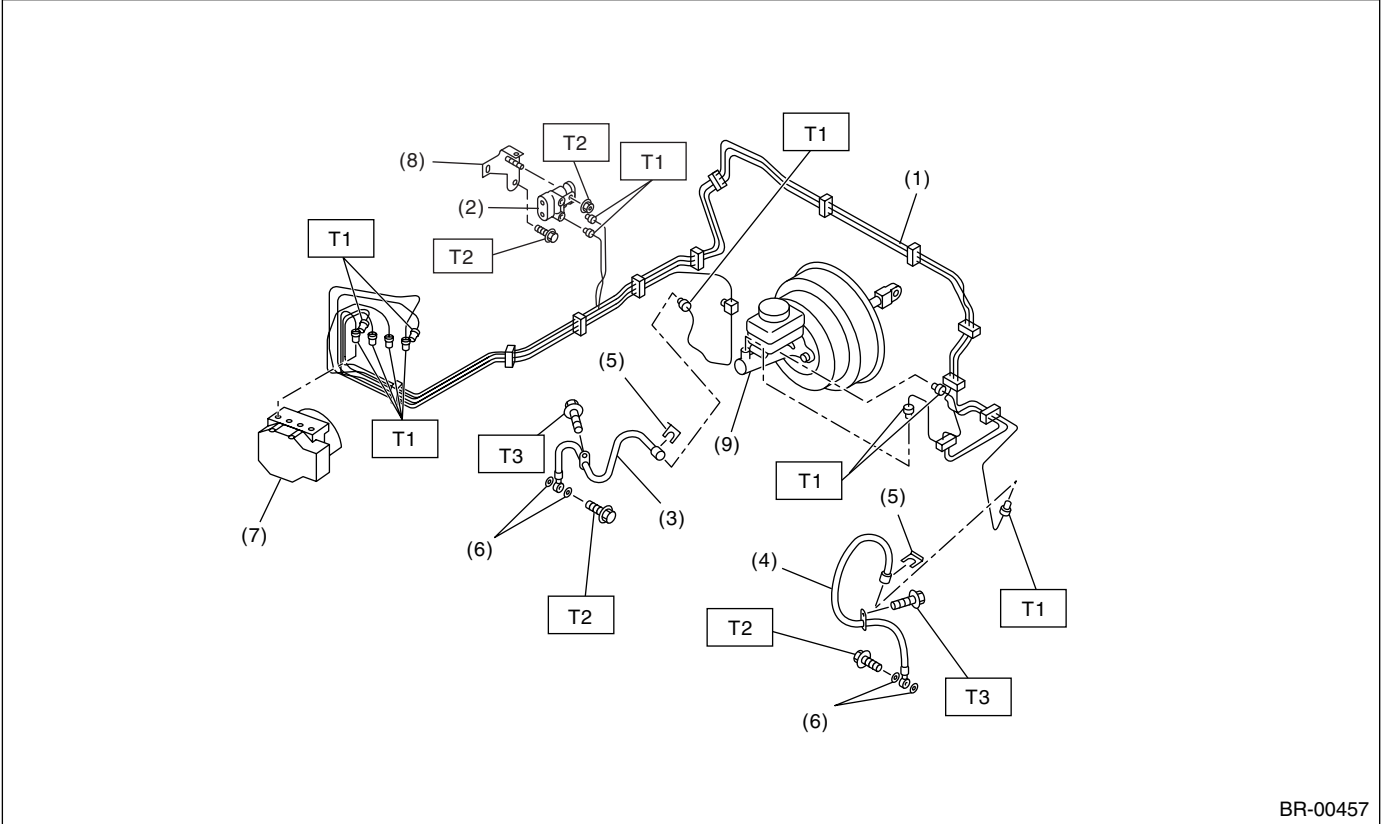
BR-00153

- |                     |                      |
|---------------------|----------------------|
| (1) Cap             | (6) Secondary piston |
| (2) Filter          | (7) Cylinder body    |
| (3) Reservoir tank  | (8) Cylinder pin     |
| (4) Piston retainer | (9) Seal             |
| (5) Primary piston  | (10) Pin             |

**Tightening torque: N·m (kgf-m, ft-lb)****T: 15 (1.5, 10.8)**



4. FRONT BRAKE PIPES AND HOSE

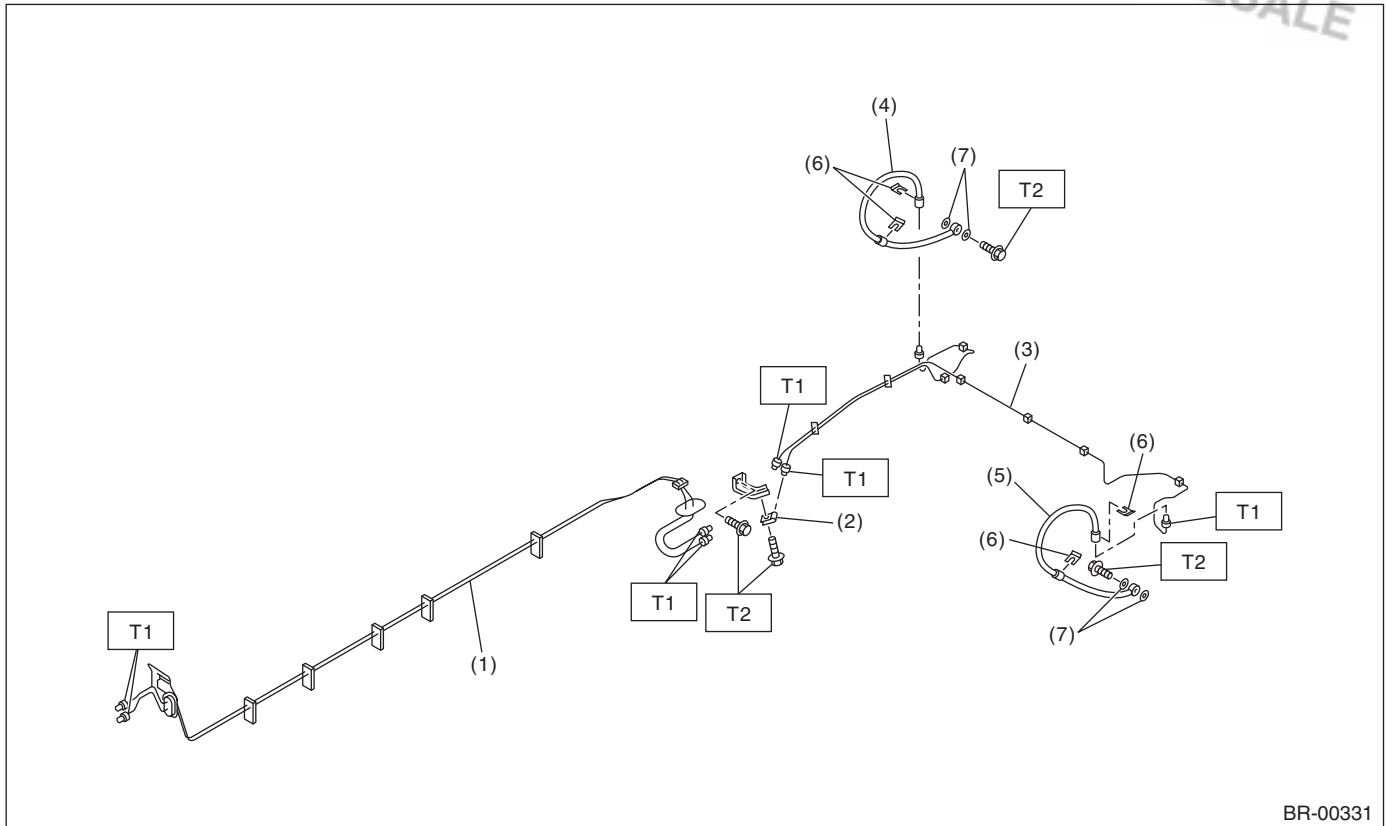


BR-00457

- |                           |   |
|---------------------------|---|
| (1) Front brake pipe ASSY | (6) Gasket  |
| (2) Two-way connector     | (7) ABS control module and hydraulic control unit (ABSCM&H/U) |
| (3) Front brake hose RH   | (8) Bracket   |
| (4) Front brake hose LH   | (9) Master cylinder   |
| (5) Clamp                 |   |

Tightening torque: N·m (kgf·m, ft·lb)	
T1:	15 (1.5, 10.8)
T2:	18 (1.8, 13.0)
T3:	32 (3.3, 23.6)

### 5. CENTER AND REAR BRAKE PIPES AND HOSES



BR-00331

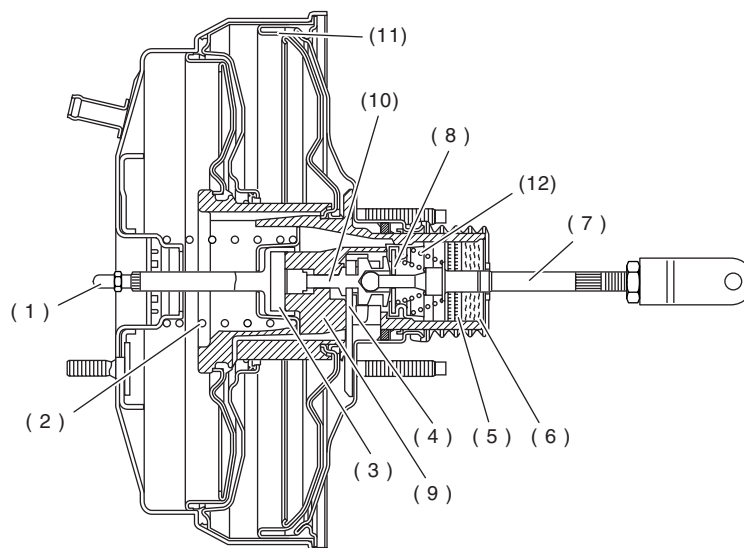
- |                            |                        |
|----------------------------|------------------------|
| (1) Center brake pipe ASSY | (5) Rear brake hose LH |
| (2) Two-way connector      | (6) Clamp              |
| (3) Rear brake pipe ASSY   | (7) Gasket             |
| (4) Rear brake hose RH     |                        |

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 15 (1.5, 10.8)**

**T2: 18 (1.8, 13.0)**

## 6. BRAKE BOOSTER



BR-00008

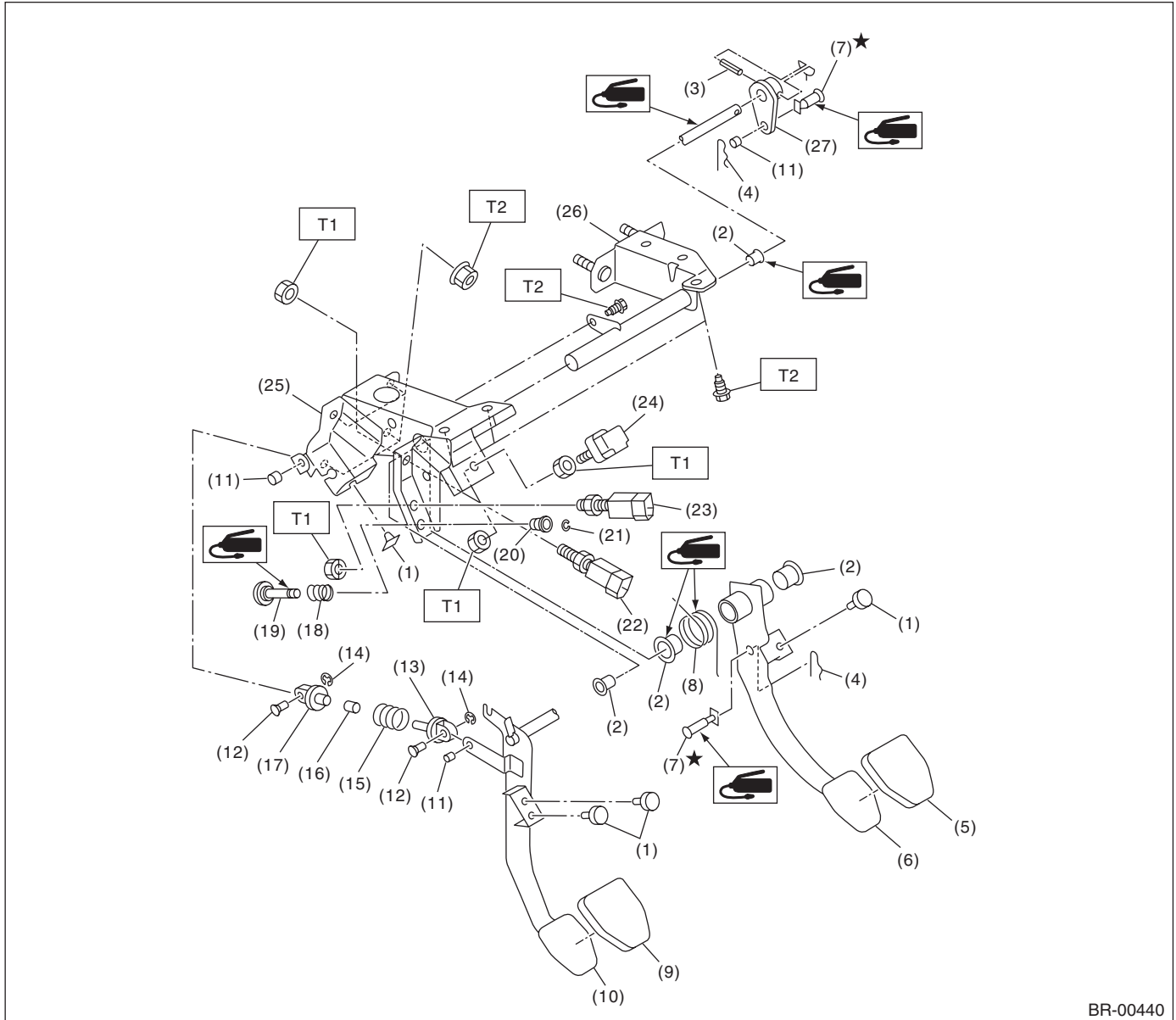
- |                   |                   |                          |
|-------------------|-------------------|--------------------------|
| (1) Push rod      | (5) Filter        | (9) Valve body           |
| (2) Return spring | (6) Silencer      | (10) Plunger valve       |
| (3) Reaction disc | (7) Operating rod | (11) Diaphragm plate     |
| (4) Key           | (8) Poppet valve  | (12) Valve return spring |

# General Description

## BRAKE

### 7. BRAKE PEDAL

#### • MT MODEL



BR-00440

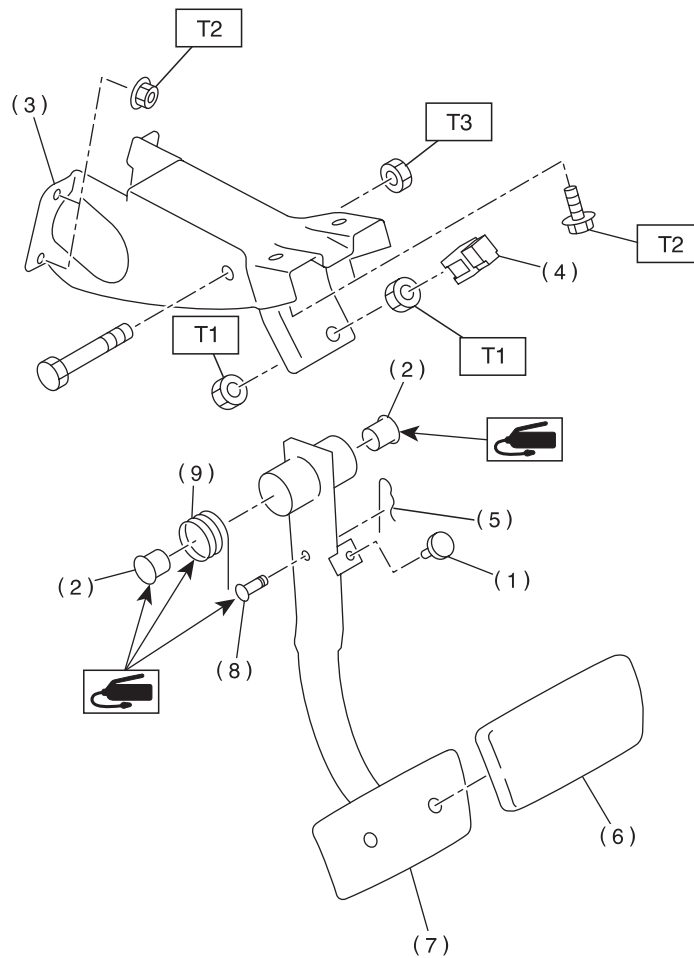
(1) Stopper	(12) Clutch clevis pin	(22) Clutch switch (Starter interlock)
(2) Bushing	(13) Assist rod A	(23) Clutch switch (With cruise control)
(3) Spring pin	(14) Clip	(24) Stop light switch
(4) Snap pin	(15) Assist spring	(25) Pedal bracket
(5) Brake pedal pad	(16) Assist bushing	(26) Clutch master cylinder bracket
(6) Brake pedal	(17) Assist rod B	(27) Lever
(7) Clevis pin	(18) Spring S	
(8) Brake pedal spring	(19) Rod S	
(9) Clutch pedal pad	(20) Bushing S	
(10) Clutch pedal	(21) Clip	
(11) Bushing C		

**Tightening torque: N·m (kgf-m, ft-lb)**

**T1: 8 (0.8, 5.8)**

**T2: 18 (1.8, 13.0)**

## • AT MODEL



BR-00139

- |                       |                        |
|-----------------------|------------------------|
| (1) Stopper           | (6) Brake pedal pad    |
| (2) Bushing           | (7) Brake pedal        |
| (3) Pedal bracket     | (8) Clevis pin         |
| (4) Stop light switch | (9) Brake pedal spring |
| (5) Snap pin          |                        |

---

**Tightening torque: N·m (kgf-m, ft-lb)**
**T1: 8 (0.8, 5.8)****T2: 18 (1.8, 13.0)****T3: 30 (3.1, 22.1)**


---

**C: CAUTION**

- Wear work clothing, including a cap, protective goggles, and protective shoes during operation.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Use SUBARU genuine grease etc. or the equivalent. Do not mix grease etc. with that of another grade or from other manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.

**D: PREPARATION TOOL****1. GENERAL TOOL**

TOOL NAME	REMARKS
Snap ring pliers	Used for removing and installing snap ring.

## 2. Front Brake Pad

### A: REMOVAL

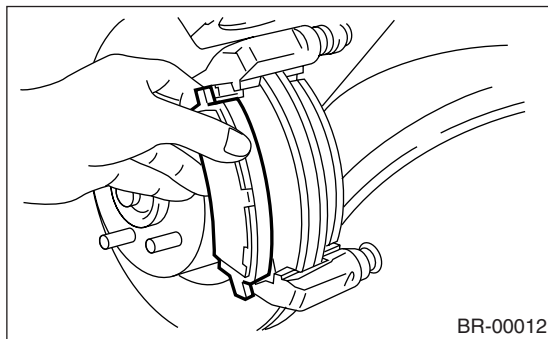
#### 1. 15 INCH TYPE & 16 INCH TYPE

- 1) Set the vehicle on a lift.
- 2) Loosen the wheel nuts.
- 3) Lift-up the vehicle, and then remove the front wheel.
- 4) Remove the lower caliper bolt.
- 5) Raise the caliper body upward and support it.

#### NOTE:

Do not disconnect the brake hose from caliper body.

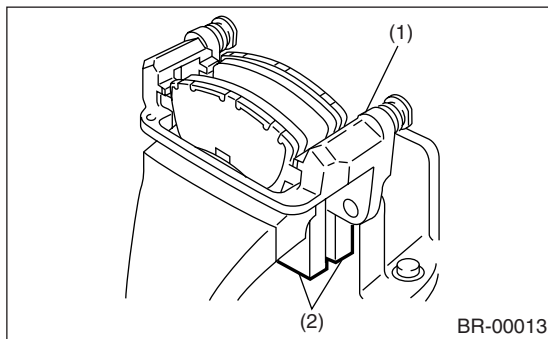
- 6) Remove the pad.



#### NOTE:

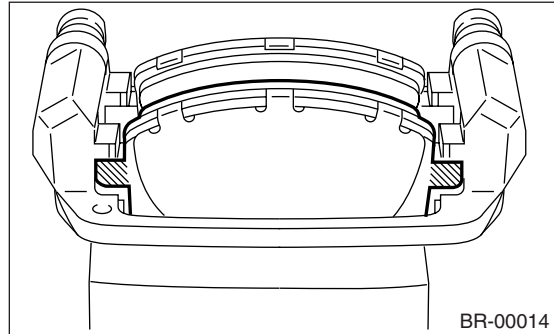
If the brake pad is difficult to remove, proceed as follows:

- (1) Remove the caliper body from support.
- (2) Remove the support.
- (3) Place a support in a vise between wooden blocks.



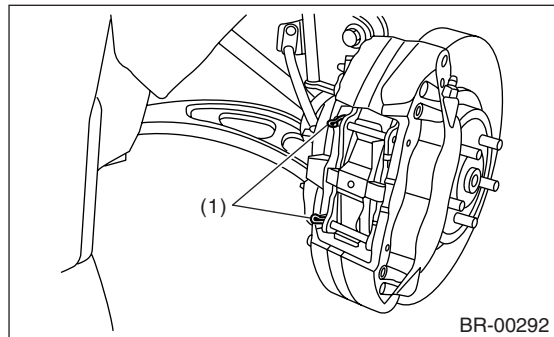
- (1) Support
- (2) Wooden blocks

- (4) Attach a rod of less than 12 mm (0.47 in) dia. to the shaded area of brake pad, and strike the rod with a hammer to drive brake pad out of place.



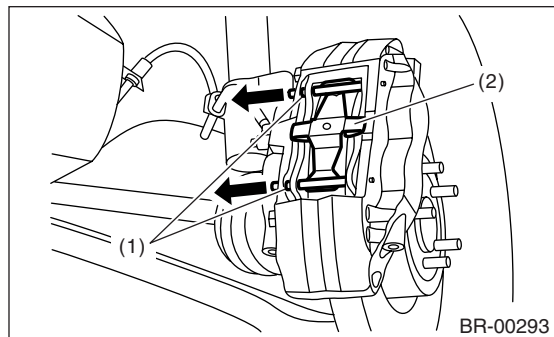
#### 2. 17 INCH TYPE

- 1) Set the vehicle on a lift.
- 2) Loosen the wheel nuts.
- 3) Lift-up the vehicle, and then remove the front wheel.
- 4) Remove the clip.



- (1) Clip

- 5) Remove the pad pins and cross spring.

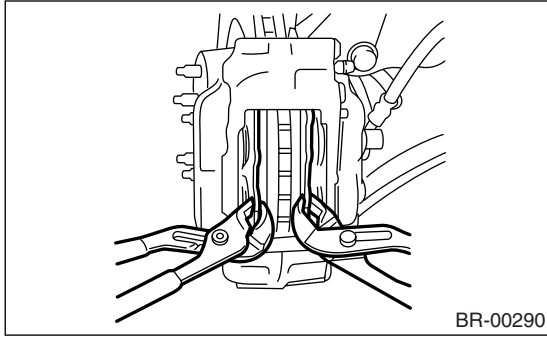


- (1) Pad pin
- (2) Cross spring

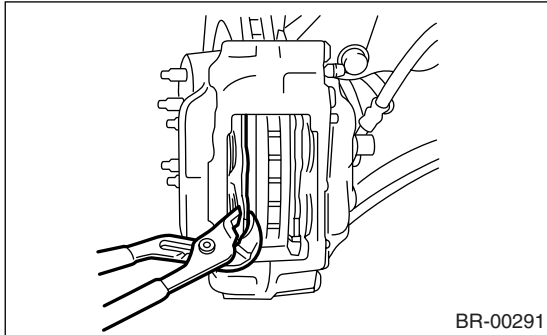
## Front Brake Pad

### BRAKE

6) Use a wrench to expand the pads, and then push the piston back.



7) Remove the pad.

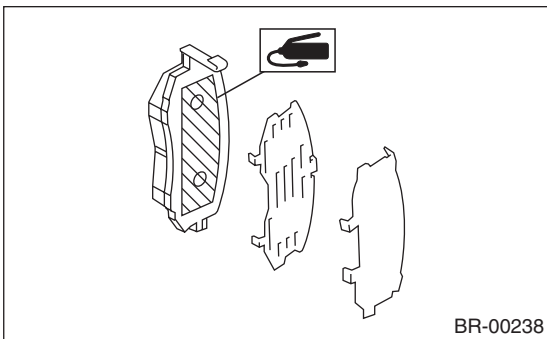


### B: INSTALLATION

#### 1. 15 INCH TYPE & 16 INCH TYPE

1) Apply thin coat of Molykote AS880N (Part No. K0779YA010) to the frictional portion between pad and pad clip.

2) Apply thin coat of Molykote AS880N (Part No. K0779YA010) to the frictional portion between pad and pad inner shim.



3) Install the pads on support.

4) Install the caliper body on support.

#### **Tightening torque:**

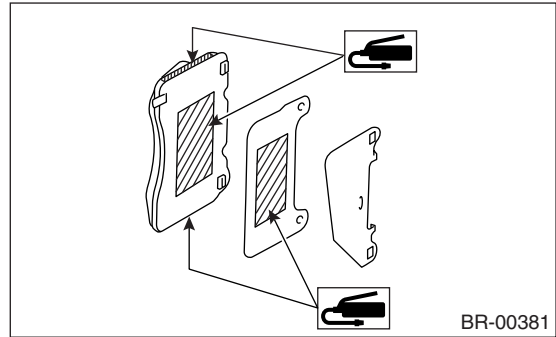
**37 N·m (3.8 kgf-m, 27.5 ft-lb)**

#### **NOTE:**

If it is difficult to push the piston during pad replacement, loosen the air bleeder to facilitate work.

#### 2. 17 INCH TYPE

1) Apply thin coat of Molykote AS880N (Part No. K0779YA010) to the frictional portion between pad and pad shim.



2) Install the pads on caliper body.

3) Install the cross spring.

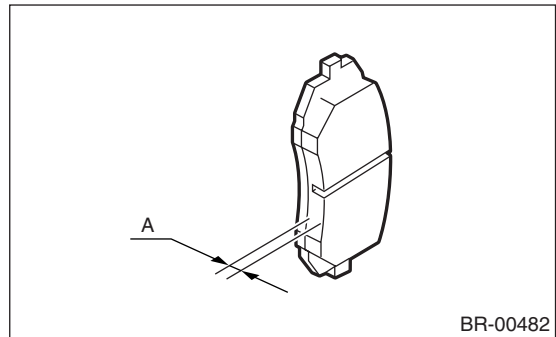
4) Install the pad pins.

5) Install the clip.

### C: INSPECTION

#### 1. 15 INCH TYPE & 16 INCH TYPE

Check the pad thickness A.



Pad thickness	Standard value	11 mm (0.43 in)
	Wear limit	1.5 mm (0.059 in)

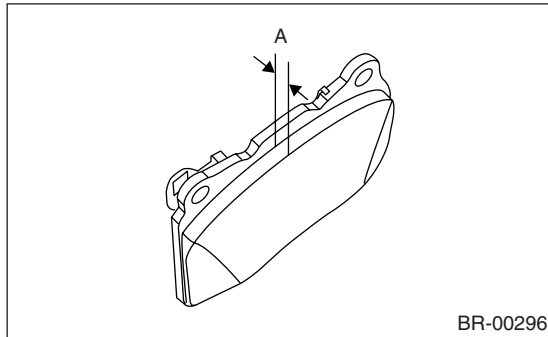
#### **NOTE:**

- Always replace the pads for both right and left wheels at the same time.
- Also replace the pad clips if they are twisted or worn.
- A wear indicator is provided on the inner disc brake pad. If the pad wears down to such an extent that the end of wear indicator contacts disc rotor, a squeaking sound is produced as the wheel rotates. If this sound is heard, replace the pad.
- Replace the pad if there is oil or grease on it.



## 2. 17 INCH TYPE

Check the pad thickness A.



Pad thickness	Standard value	9.2 mm (0.362 in)
	Wear limit	1.2 mm (0.047 in)

### NOTE:

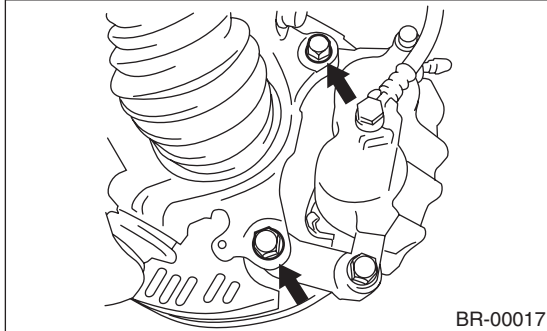
- Always replace the pads for both right and left wheels at the same time.
- Also replace the pad clips if they are twisted or worn.
- A wear indicator is provided on the inner disc brake pad. If the pad wears down to such an extent that the end of wear indicator contacts disc rotor, a squeaking sound is produced as the wheel rotates. If this sound is heard, replace the pad.
- Replace the pad if there is oil or grease on it.

### 3. Front Disc Rotor

#### A: REMOVAL

##### 1. 15 INCH TYPE & 16 INCH TYPE

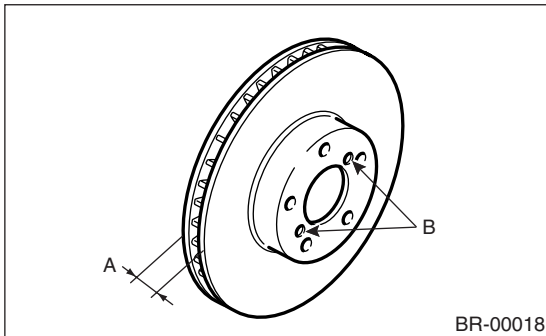
- 1) Set the vehicle on a lift.
- 2) Loosen the wheel nuts.
- 3) Lift-up the vehicle, and then remove the front wheel.
- 4) Remove the caliper body and support from housing, and suspend it from strut using a wire.



- 5) Remove the disc rotor.

#### NOTE:

If the disc rotor seizes up within the hub, drive the disc rotor out by installing an 8-mm bolt in holes (B) on rotor.

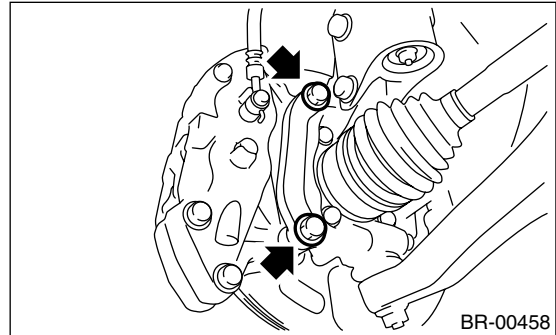


- 6) Clean mud and foreign particles from the caliper body assembly and support.

##### 2. 17 INCH TYPE

- 1) Set the vehicle on a lift.
- 2) Loosen the wheel nut.
- 3) Lift-up the vehicle, and then remove the front wheel.

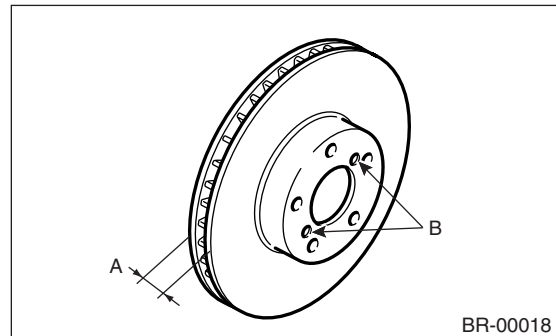
- 4) Remove the caliper body and tie bar from housing, and suspend the caliper body from strut using a wire.



- 5) Remove the disc rotor from hub.

#### NOTE:

If the disc rotor seizes up within the hub, drive the disc rotor out by installing an 8-mm bolt in holes (B) on rotor.



- 6) Clean mud and foreign particles from the caliper body assembly and support.

#### B: INSTALLATION

- 1) Install the disc rotor.
- 2) Install the caliper body and support to housing.

#### Tightening torque:

**Except 17 inch type:**

**80 N·m (8.2 kgf-m, 59 ft-lb)**

**17 inch type:**

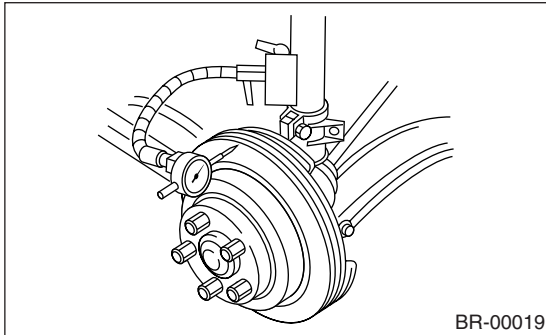
**155 N·m (15.8 kgf-m, 114.3 ft-lb)**

- 3) Install the wheel.

#### C: INSPECTION

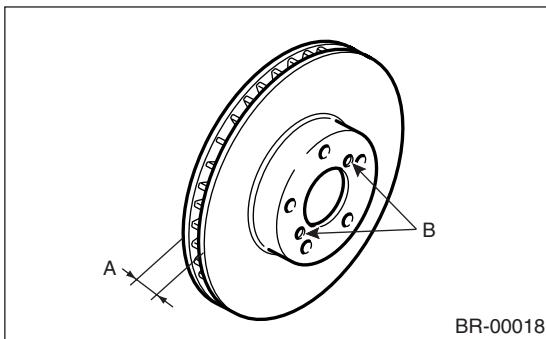
- 1) Check bearing axial end play and hub runout before disc rotor runout limit inspection. <Ref. to DS-24, INSPECTION, Front Axle.>
- 2) Secure the disc rotor by tightening five wheel nuts.

3) Set a dial gauge 10 mm (0.39 in) inward of rotor outer perimeter. Turn the disc rotor to check runout. If the disc rotor runout exceeds the service limit, resurface the disc rotor. After resurfacing, check disc rotor thickness as in step 4.



**Disc rotor runout limit:  
0.075 mm (0.0030 in)**

4) Set a micrometer 10 mm (0.39 in) inward of the rotor outer perimeter, and then measure the disc rotor thickness. If the thickness of disc rotor exceeds the service limit, replace with a new disc rotor.



		Standard value	Service limit	Disc outer dia.
Disc rotor thickness A	15"	24 mm (0.94 in)	22 mm (0.87 in)	277 mm (10.91 in)
	16"	24 mm (0.94 in)	22 mm (0.87 in)	294 mm (11.57 in)
	17"	30 mm (1.18 in)	28 mm (1.10 in)	326 mm (12.83 in)

## 4. Front Disc Brake Assembly

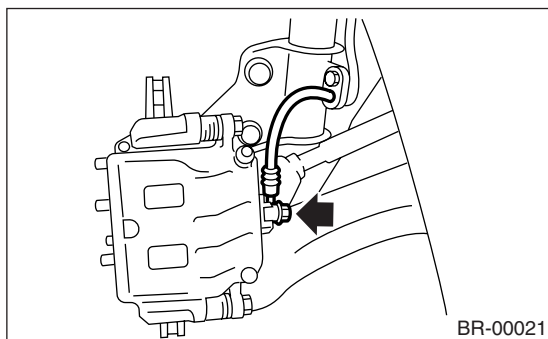
### A: REMOVAL

#### 1. 15 INCH TYPE & 16 INCH TYPE

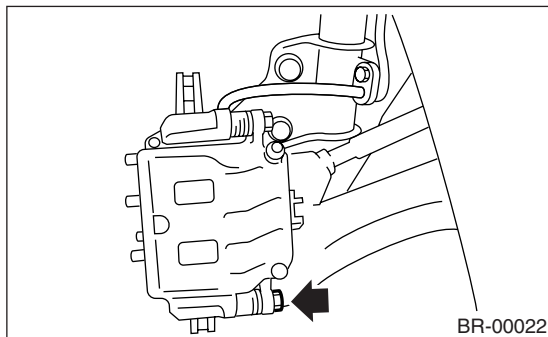
##### CAUTION:

**Do not allow brake fluid to come in contact with vehicle body; wash away with water and wipe off completely if spilled.**

- 1) Set the vehicle on a lift.
- 2) Loosen the wheel nuts.
- 3) Lift-up the vehicle, and then remove the front wheel.
- 4) Remove the union bolt, and then disconnect the brake hose from caliper body assembly.



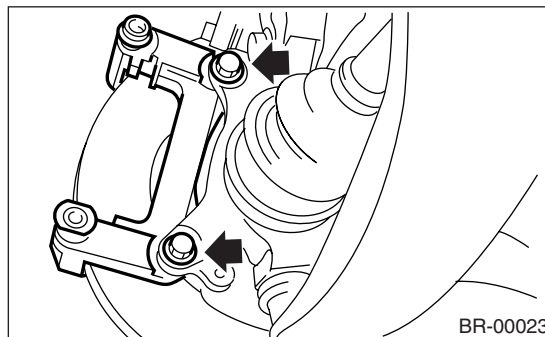
- 5) Remove the bolt securing lock pin to caliper body.



- 6) Raise the caliper body, and then move it toward vehicle center to separate it from support.
- 7) Remove the support from housing.

##### NOTE:

Remove the support only when replacing it or the rotor. It need not be removed when servicing the caliper body assembly.



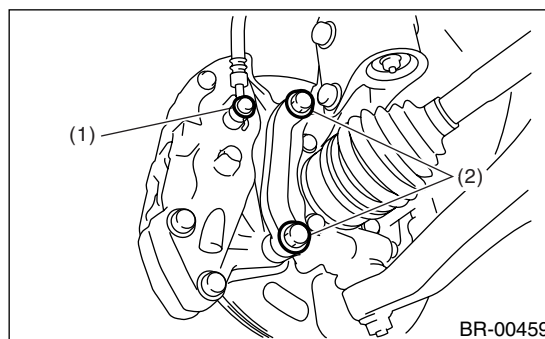
- 8) Clean mud and foreign particles from the caliper body assembly and support.

#### 2. 17 INCH TYPE

##### CAUTION:

**Do not allow brake fluid to come in contact with vehicle body; wash away with water and wipe off completely if spilled.**

- 1) Set the vehicle on a lift.
- 2) Loosen the wheel nuts.
- 3) Lift-up the vehicle, and then remove the front wheel.
- 4) Remove the brake pads from caliper body. <Ref. to BR-15, 17 INCH TYPE, REMOVAL, Front Brake Pad.>.
- 5) Remove the union bolt and brake hose from caliper body assembly.
- 6) Remove two installation bolts and tie bar from housing.



- (1) Union bolt
- (2) Installation bolt

- 7) Clean mud and foreign particles from the caliper body assembly.

## B: INSTALLATION

### 1. 15 INCH TYPE & 16 INCH TYPE

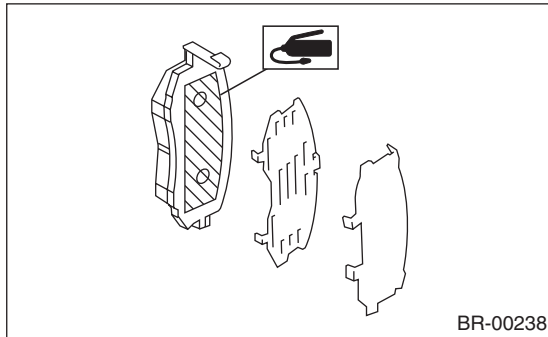
- 1) Install the support on housing.

#### **Tightening torque:**

**80 N·m (8.2 kgf-m, 59 ft-lb)**

- 2) Apply thin coat of Molykote AS880N (Part No. K0777YA010) to the frictional portion between pad and pad clip.

- 3) Apply thin coat of Molykote AS880N (Part No. K0777YA010) to the frictional portion between pad and inner shim.



- 4) Install the pads on support.
- 5) Install the caliper body on support.

#### **Tightening torque:**

**26.5 N·m (2.7 kgf-m, 20.0 ft-lb)**

- 6) Replace the brake hose gaskets with new ones, and then connect the brake hose.

#### **Tightening torque:**

**18 N·m (1.8 kgf-m, 13.0 ft-lb)**

- 7) Bleed air from the brake system.

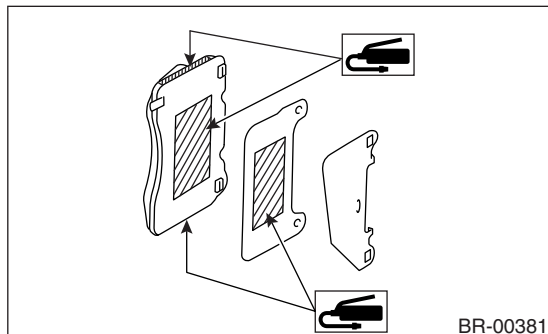
### 2. 17 INCH TYPE

- 1) Install the caliper body assembly and tie bar on housing.

#### **Tightening torque:**

**155 N·m (15.8 kgf-m, 114.3 ft-lb)**

- 2) Apply thin coat of Molykote AS880N (Part No. K0777YA010) to the frictional portion between pad and pad shim.



- 3) Install the pads on caliper body.

- 4) Install the cross spring.
- 5) Install the pad pins.
- 6) Install the clip.
- 7) Replace the brake hose gaskets with new ones, and then connect the brake hose.

#### **Tightening torque:**

**18 N·m (1.8 kgf-m, 13.0 ft-lb)**

- 8) Bleed air from the brake system.

## C: DISASSEMBLY

### 1. 15 INCH TYPE & 16 INCH TYPE

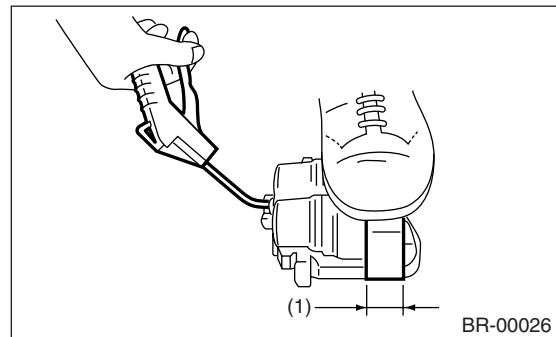
- 1) Clean mud and foreign particles from the caliper body assembly and support.

#### **CAUTION:**

**Be careful not to allow foreign particles to enter the brake hose connector.**

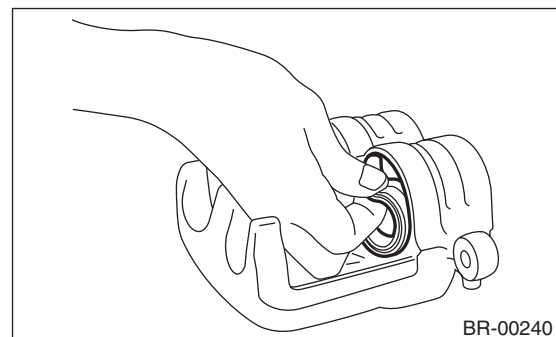
- 2) Place a wooden block in caliper body as shown in the figure to prevent the piston from jumping out and avoid being damaged.

- 3) Gradually supply compressed air via the installation hole of brake hose to force the piston out.



- (1) Place a 30 mm (1.18 in) wide wooden block here.

- 4) Remove the piston boot.



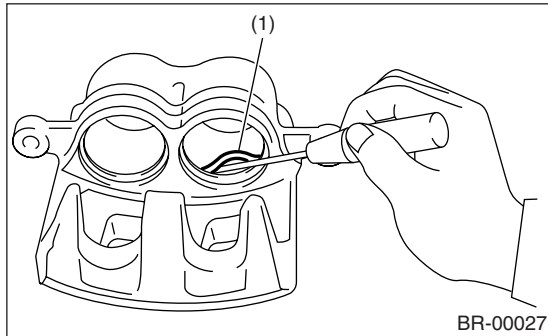
- 5) Remove the piston seal from caliper body cylinder.

# Front Disc Brake Assembly

## BRAKE

### CAUTION:

Do not damage the cylinder and piston seal groove.



(1) Piston seal

6) Remove the guide pin and boot from caliper body.

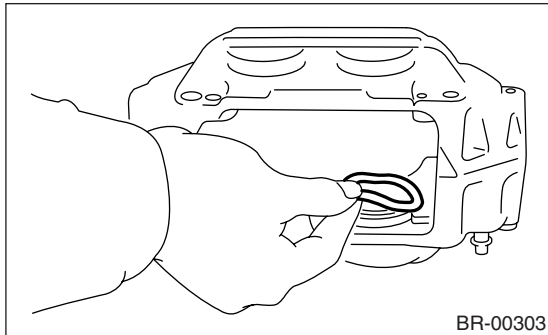
## 2. 17 INCH TYPE

1) Clean mud and foreign particles from the caliper body assembly.

### CAUTION:

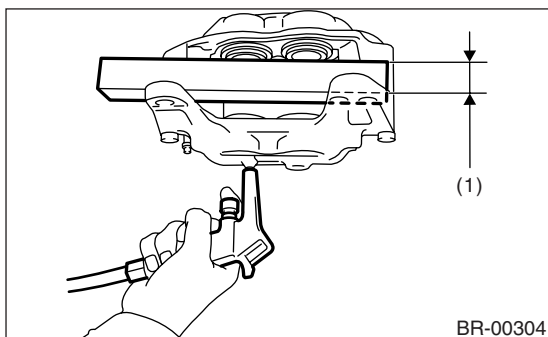
Be careful not to allow foreign particles to enter the brake hose connector.

2) Remove the piston boots from each piston end.



3) Place a wooden block in caliper body as shown in the figure to prevent the piston from jumping out and avoid being damaged.

4) Gradually supply compressed air via the installation hole of brake hose to force the piston out.

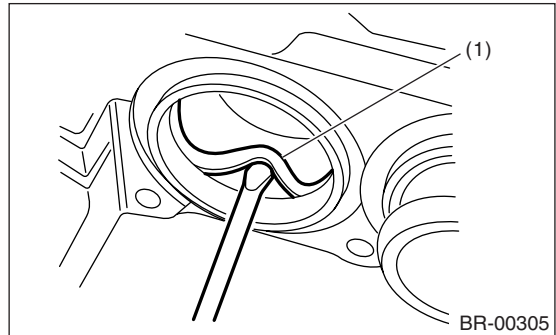


(1) Place a 30 mm (1.18 in) wide wooden block here.

5) Remove the piston seal from caliper body cylinder.

### CAUTION:

Do not damage the cylinder and piston seal groove.



(1) Piston seal

## D: ASSEMBLY

### 1. 15 INCH TYPE & 16 INCH TYPE

- 1) Clean the caliper body interior using brake fluid.
- 2) Apply a coat of brake fluid to the piston seal and fit piston seal in groove on caliper body.
- 3) Apply a coat of brake fluid to the entire inner surface of cylinder and outer surface of piston.
- 4) Apply a coat of specified grease to the boot and install the piston boot to the groove on ends of cylinder.

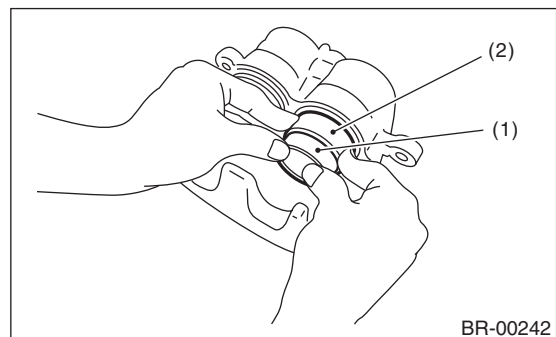
### Grease:

**NIGLUBE RX-2 (Part No. K0779GA102)**

5) Insert the piston into cylinder.

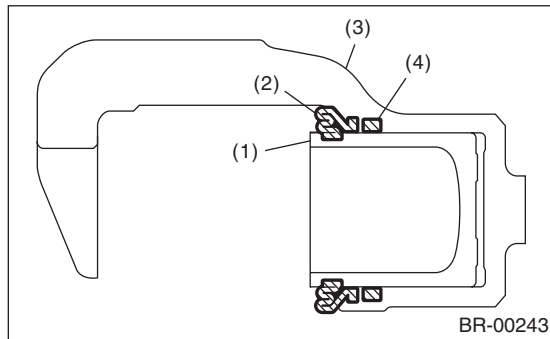
### CAUTION:

Do not force the piston into cylinder.



(1) Piston  
(2) Piston boot

6) Position the boot in grooves on cylinder and piston.



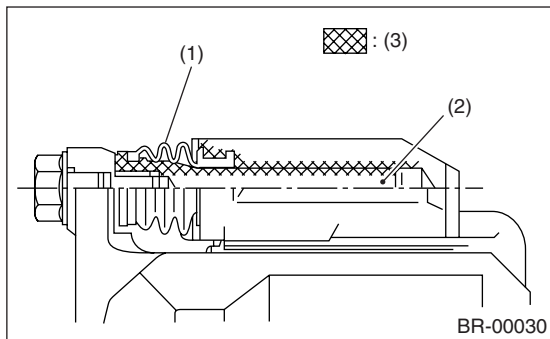
- (1) Piston
- (2) Piston boot
- (3) Caliper body
- (4) Piston seal

7) Apply a coat of specified grease to the lock pin and guide pin outer surface, cylinder inner surface, and boot grooves.

## Grease:

**NIGLUBE RX-2 (Part No. K0779GA102)**

8) Install the lock and guide pin boot on support.



- (1) Pin boot
- (2) Lock pin or guide pin
- (3) Apply grease.

## 2. 17 INCH TYPE

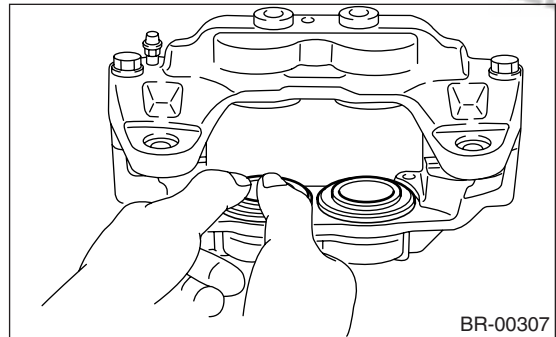
- 1) Clean the caliper body interior using brake fluid.
- 2) Apply a coat of brake fluid to the piston seal, and then install the piston seal in groove on caliper body.
- 3) Apply a coat of brake fluid to the entire inner surface of cylinder and outer surface of piston.
- 4) Apply a coat of specified grease to the boot and install it in the groove on piston.

## Grease:

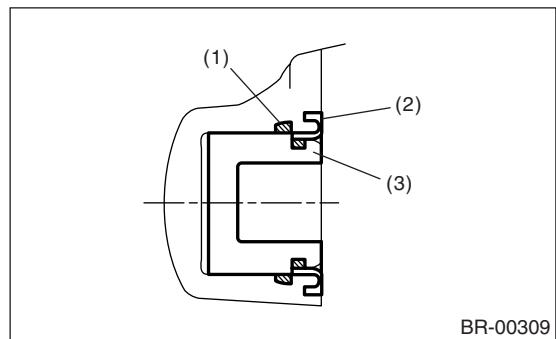
**NIGLUBE RX-2 (Part No. K0779GA102)**

5) Insert the piston into cylinder.

**CAUTION:**  
Do not force the piston into cylinder.



6) Position the boot in grooves on cylinder and piston.



- (1) Piston seal
- (2) Piston boot
- (3) Piston

## E: INSPECTION

- 1) Repair or replace the faulty parts.
- 2) Check the caliper body and piston for uneven wear, damage or rust.
- 3) Check the rubber parts for damage or deterioration.

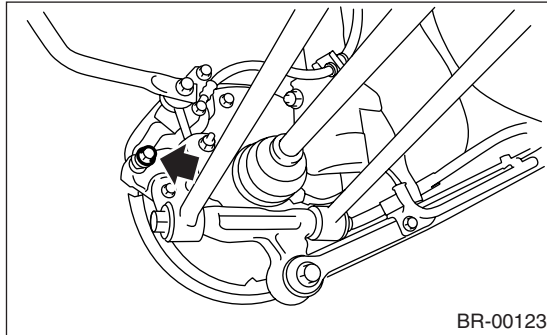


## 5. Rear Brake Pad

### A: REMOVAL

#### 1. 14 INCH TYPE

- 1) Set the vehicle on a lift.
- 2) Loosen the wheel nuts.
- 3) Lift-up the vehicle, and then remove the rear wheel.
- 4) Remove the lower caliper bolt.



- 5) Raise the caliper body upward and support it.

#### NOTE:

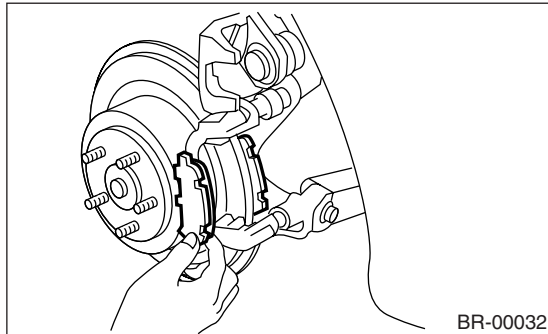
Do not disconnect the brake hose from caliper body.

- 6) Remove the pad.

#### NOTE:

If the brake pad is difficult to remove, use the same procedure as for front disc brake pad.

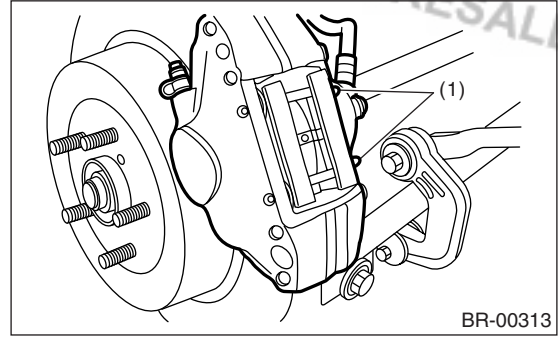
<Ref. to BR-15, REMOVAL, Front Brake Pad.>



#### 2. 17 INCH TYPE

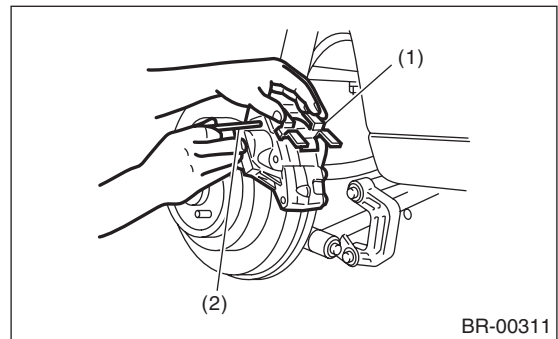
- 1) Set the vehicle on a lift.
- 2) Loosen the wheel nuts.
- 3) Lift-up the vehicle, and then remove the rear wheel.

- 4) Remove the clip.



- (1) Clip

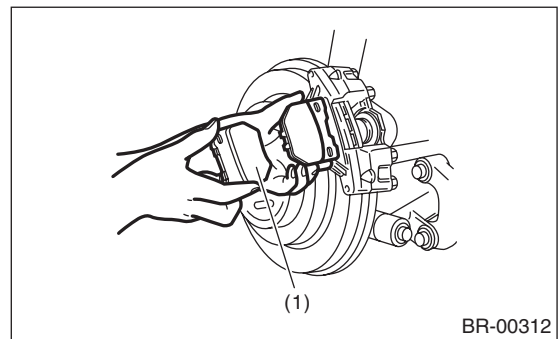
- 5) Remove the pad pins and cross spring.



- (1) Cross spring
- (2) Pad pin

- 6) Expand the pads and push piston back.

- 7) Remove the pad.



- (1) Rear brake pad

### B: INSTALLATION

#### 1. 14 INCH TYPE

- 1) Apply a thin coat of Molykote AS880N (Part No. K0777YA010) to the frictional portion between pad and pad clip.
- 2) Install the pad on support.
- 3) Install the caliper body on support.

#### Tightening torque:

37 N·m (3.8 kgf·m, 27.5 ft·lb)



## NOTE:

If it is difficult to push the piston during pad replacement, loosen air bleeder to facilitate work.

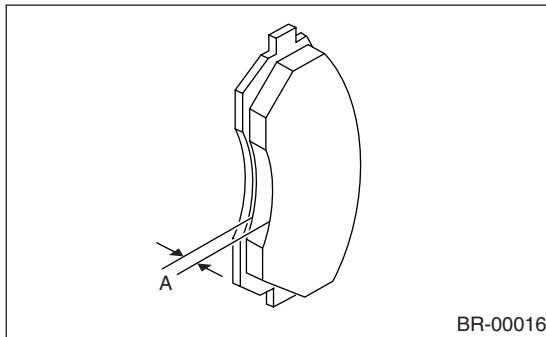
## 2. 17 INCH TYPE

- 1) Apply a thin coat of Molykote AS880N (Part No. K0777YA010) to frictional portion between pad and pad inner shim.
- 2) Install the pads on caliper body.
- 3) Install the cross spring and pad pins.
- 4) Install the clip.

## C: INSPECTION

### 1. 14 INCH TYPE

Check pad thickness A.



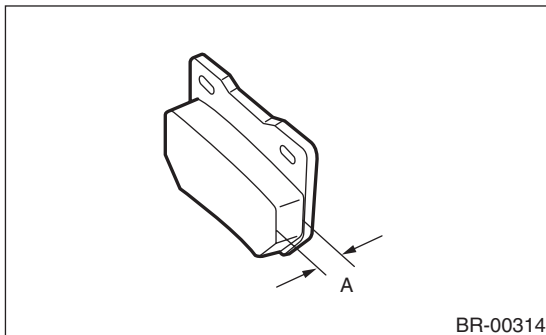
Pad thickness	Standard value	9.0 mm (0.354 in)
	Wear limit	1.5 mm (0.059 in)

## NOTE:

- Always replace the pads for both right and left wheels at the same time.
- Also replace the pad clips if they are twisted or worn.
- A wear indicator is provided on the inner disc brake pad. If the pad wears down to such an extent that the end of wear indicator contacts disc rotor, a squeaking sound is produced as the wheel rotates. If this sound is heard, replace the pad.
- Replace the pad if there is oil or grease on it.

## 2. 17 INCH TYPE

Check the pad thickness A.



Pad thickness	Standard value	9.0 mm (0.354 in)
	Wear limit	1.2 mm (0.047 in)

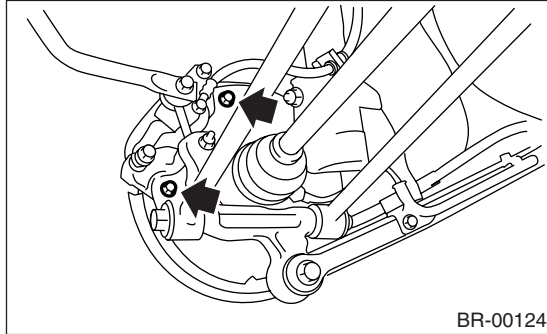
## NOTE:

- Always replace the pads for both right and left wheels at the same time.
- Also replace the pad clips if they are twisted or worn.
- A wear indicator is provided on the inner disc brake pad. If the pad wears down to such an extent that the end of wear indicator contacts disc rotor, a squeaking sound is produced as the wheel rotates. If this sound is heard, replace the pad.
- Replace the pad if there is oil or grease on it.

## 6. Rear Disc Rotor

### A: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Loosen the wheel nuts.
- 3) Lift-up the vehicle, and then remove the wheels.
- 4) Pull down and release the parking brake.
- 5) Remove the two mounting bolts, and then remove the disc brake assembly.

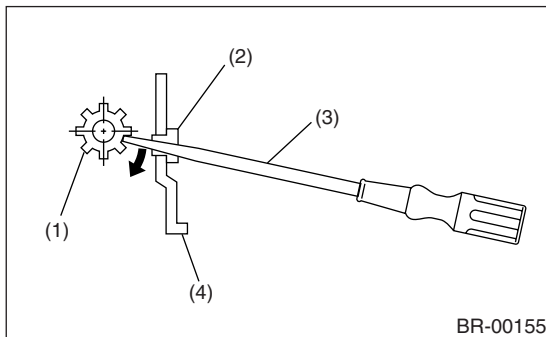


- 6) Suspend the disc brake assembly so that hose is not stretched.
- 7) Remove the disc rotor.

#### NOTE:

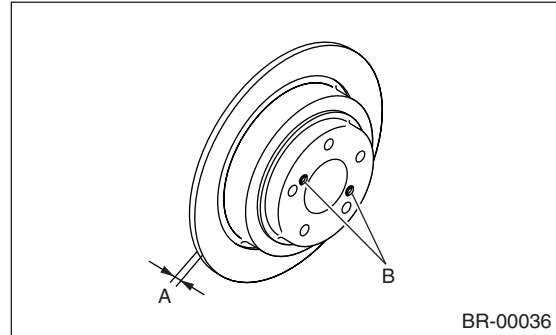
If the disc rotor is difficult to remove try following two methods in order.

- (1) Turn the adjusting screw using a flat tip screwdriver until brake shoe gets away enough from the disc rotor.



- (1) Adjusting screw
- (2) Cover
- (3) Flat tip screwdriver
- (4) Back plate

- (2) If the disc rotor seizes up within hub, drive the disc rotor out by installing an 8-mm bolt in holes B on rotor.

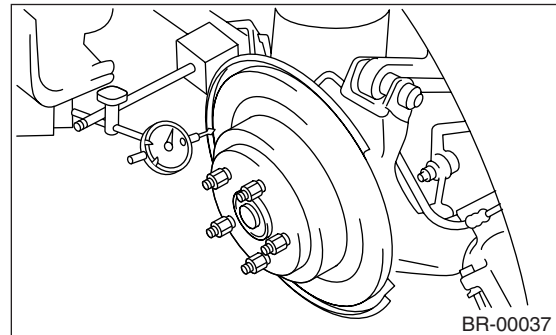


### B: INSTALLATION

- 1) Install in the reverse order of removal.
- 2) Adjust the parking brake. <Ref. to PB-8, ADJUSTMENT, Parking Brake Assembly (Rear Disc Brake).>

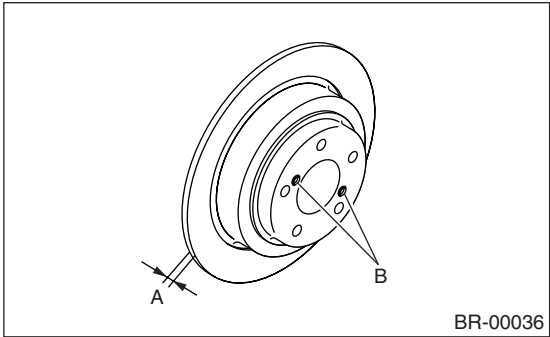
### C: INSPECTION

- 1) Check bearing axial end play and hub runout before disc rotor runout limit inspection. <Ref. to DS-32, INSPECTION, Rear Axle.>
- 2) Secure the disc rotor by tightening five wheel nuts.
- 3) Set a dial gauge 10 mm (0.39 in) inward of rotor outer perimeter. Turn the disc rotor to check runout. If the disc rotor runout exceeds the service limit, resurface the disc rotor. After resurfacing, check disc rotor thickness as in step 4.



**Disc rotor runout limit:**  
**0.070 mm (0.0027 in)**

4) Set a micrometer 10 mm (0.39 in) inward of the rotor outer perimeter, and then measure the disc rotor thickness. If the thickness of disc rotor exceeds the service limit, replace with a new disc rotor.



		Standard value	Service limit	Disc outer dia.
Disc rotor thickness A	14"	10 mm (0.39 in)	8.5 mm (0.335 in)	266 mm (10.47 in)
	17"	20 mm (0.79 in)	18 mm (0.71 in)	316 mm (12.44 in)

## 7. Rear Disc Brake Assembly

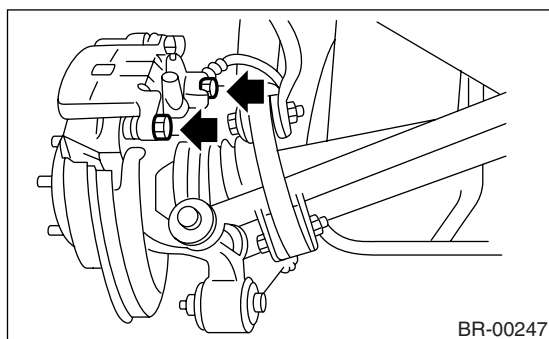
### A: REMOVAL

#### 1. 14 INCH TYPE

##### CAUTION:

**Do not allow brake fluid to come in contact with vehicle body; wash away with water and wipe off completely if spilled.**

- 1) Set the vehicle on a lift.
- 2) Loosen the wheel nuts.
- 3) Lift-up the vehicle, and then remove the wheels.
- 4) Disconnect the brake hose from caliper body assembly.
- 5) Remove the bolt securing lock pin to caliper body.



- 6) Raise the caliper body and move it toward vehicle center to separate it from support.
- 7) Remove the support from housing.

##### NOTE:

Remove the support only when replacing it or the rotor. It need not be removed when servicing the caliper body assembly.

- 8) Clean mud and foreign particles from the caliper body assembly and support.

##### CAUTION:

**Be careful not to allow foreign particles to enter brake hose connector.**

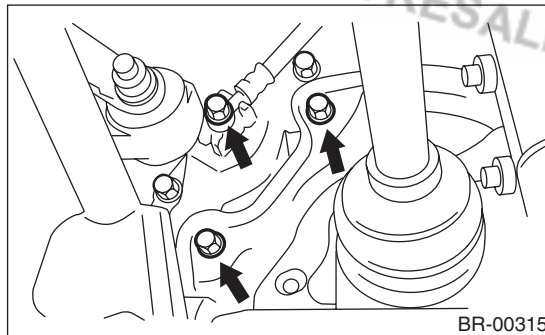
#### 2. 17 INCH TYPE

##### CAUTION:

**Do not allow brake fluid to come in contact with vehicle body; wash away with water and wipe off completely if spilled.**

- 1) Set the vehicle on a lift.
- 2) Loosen the wheel nuts.
- 3) Lift-up the vehicle, and then remove the wheels.
- 4) Remove the brake pads from caliper body. <Ref. to BR-24, 17 INCH TYPE, REMOVAL, Rear Brake Pad.>
- 5) Disconnect the brake hose from caliper body.

- 6) Remove the caliper body from housing.



- 7) Clean mud and foreign particles from the caliper body.

##### CAUTION:

**Be careful not to allow foreign particles to enter brake hose connector.**

### B: INSTALLATION

#### 1. 14 INCH TYPE

- 1) Install the support on housing.

##### Tightening torque:

**53 N·m (5.4 kgf-m, 39.1 ft-lb)**

- 2) Apply thin coat of Molykote AS880N (Part No. K0777YA010) to the frictional portion between pad and pad clip.
- 3) Install the pads on support.
- 4) Install the caliper body on support.

##### Tightening torque:

**37 N·m (3.8 kgf-m, 27.5 ft-lb)**

- 5) Replace the brake hose gaskets with new ones, and then connect the brake hose.

##### Tightening torque:

**18 N·m (1.8 kgf-m, 13.0 ft-lb)**

- 6) Bleed air from the brake system.

#### 2. 17 INCH TYPE

- 1) Install the caliper body on housing.

##### Tightening torque:

**65 N·m (6.6 kgf-m, 47.9 ft-lb)**

- 2) Install the pads on caliper body.
- 3) Replace the brake hose gaskets with new ones, and then connect the brake hose.

##### Tightening torque:

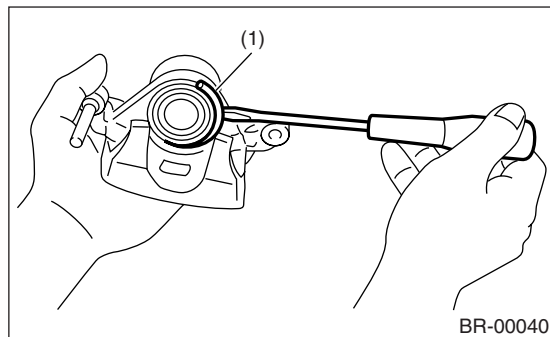
**18 N·m (1.8 kgf-m, 13.0 ft-lb)**

- 4) Bleed air from the brake system.

## C: DISASSEMBLY

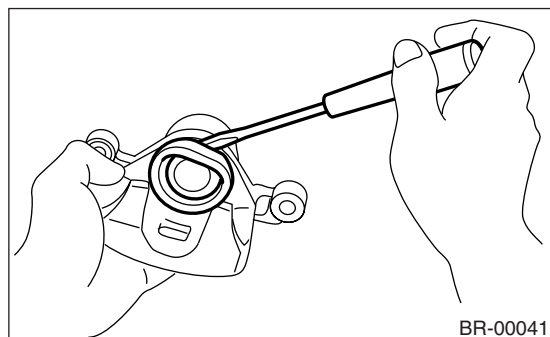
### 1. 14 INCH TYPE

- 1) Remove the boot ring.



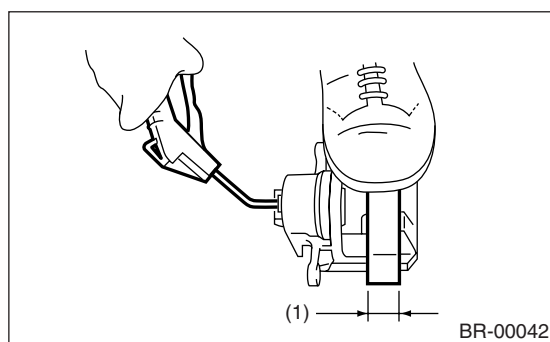
(1) Boot ring

- 2) Remove the piston boot.



- 3) Place a wooden block in caliper body as shown in the figure to prevent the piston from jumping out and avoid being damaged.

- 4) Gradually supply compressed air via the installation hole of brake hose to force the piston out.

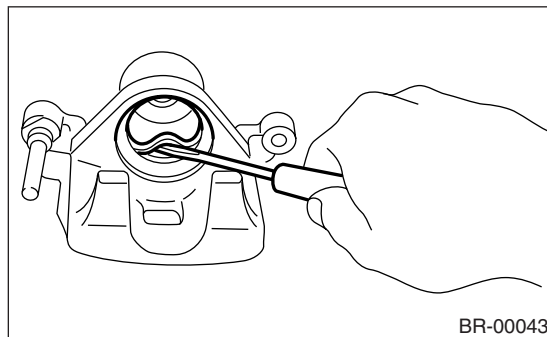


(1) Place a 30 mm (1.18 in) wide wooden block here.

- 5) Remove the piston seal from caliper body cylinder.

### CAUTION:

Do not damage the cylinder and piston seal groove.

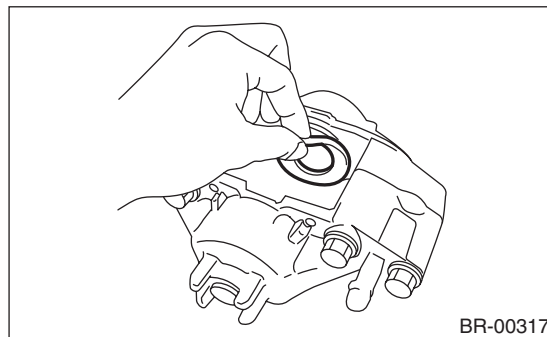


- 6) Remove the lock pin sleeve and boot from caliper body.

- 7) Remove the guide pin boot.

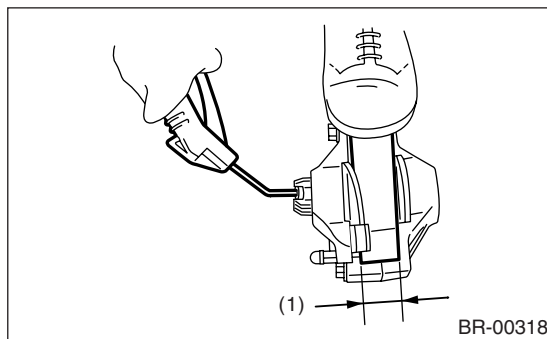
### 2. 17 INCH TYPE

- 1) Remove the piston boot from piston end.



- 2) Place a wooden block in caliper body as shown in the figure to prevent the piston from jumping out and avoid being damaged.

- 3) Gradually supply compressed air via the installation hole of brake hose to force the piston out.



(1) Place a 20 mm (0.79 in) wide wooden block here.

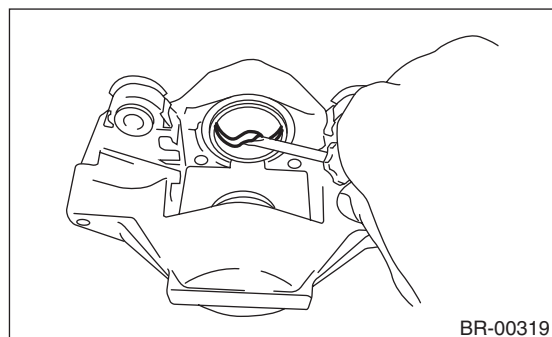
- 4) Remove the piston seal from caliper body cylinder.

# Rear Disc Brake Assembly

## BRAKE

### CAUTION:

Do not damage the cylinder and piston seal groove.



## D: ASSEMBLY

### 1. 14 INCH TYPE

- 1) Clean the caliper body interior using brake fluid.
- 2) Apply a coat of brake fluid to the piston seal and fit piston seal in groove on caliper body.
- 3) Apply a coat of brake fluid to the entire inner surface of cylinder and outer surface of piston.
- 4) Insert the piston into cylinder.

### CAUTION:

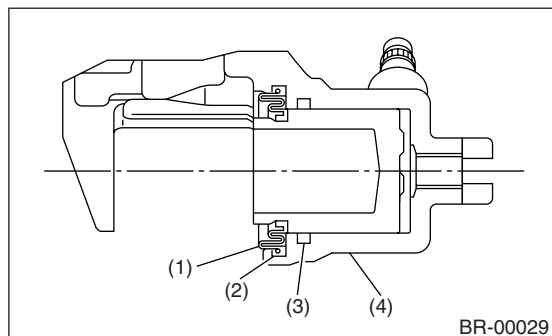
Do not force piston into cylinder.

- 5) Apply a coat of specified grease to the boot and fit in groove on ends of cylinder and piston.

### Grease:

**NIGLUBE RX-2 (Part No. K0779GA102)**

- 6) Install the piston boot to caliper body, and then attach boot ring.

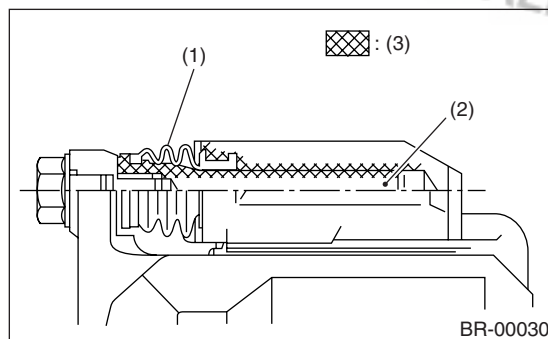


- (1) Piston boot
- (2) Boot ring
- (3) Piston seal
- (4) Caliper body

- 7) Apply a coat of specified grease to the guide pin, outer surface, sleeve outer surface, cylinder inner surface, and boot grooves.

### Grease:

**NIGLUBE RX-2 (Part No. K0779GA102)**



- (1) Pin boot
- (2) Lock pin or guide pin
- (3) Apply grease.

- 8) Install the guide pin boot on support.

- 9) Install the lock pin boot on support, and then insert the lock pin sleeve into place.

### 2. 17 INCH TYPE

- 1) Clean the caliper body interior using brake fluid.
- 2) Apply a coat of brake fluid to the piston seal and install the piston seal in groove on caliper body.
- 3) Apply a coat of brake fluid to the entire inner surface of cylinder and outer surface of piston.
- 4) Apply a coat of specified grease to the boot and install it in the groove on piston.

### Grease:

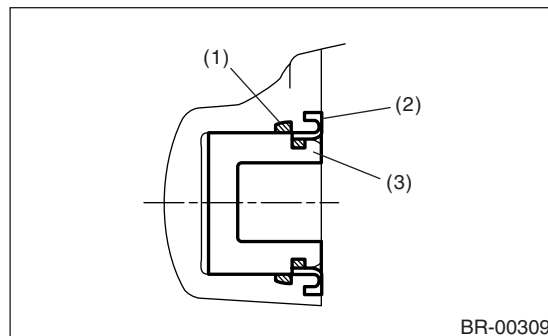
**NIGLUBE RX-2 (Part No. K0779GA102)**

- 5) Insert the piston into cylinder.

### CAUTION:

Do not force the piston into cylinder.

- 6) Position the boot in grooves on cylinder and piston.



- (1) Piston seal
- (2) Piston boot
- (3) Piston

### **E: INSPECTION**

- 1) Repair or replace the faulty parts.
- 2) Check the caliper body and piston for uneven wear, damage or rust.
- 3) Check the rubber parts for damage or deterioration.

## 8. Master Cylinder

### A: REMOVAL

#### CAUTION:

**Do not allow brake fluid to come in contact with vehicle body; wash away with water and wipe off completely if spilled.**

- 1) Thoroughly drain brake fluid from reservoir tank.
- 2) Disconnect the fluid level indicator harness connector.
- 3) Remove the brake pipes from master cylinder.
- 4) Remove the master cylinder mounting nuts, and take out master cylinder from brake booster.

### B: INSTALLATION

- 1) To install the master cylinder to body, reverse the sequence of removal procedure.

#### Tightening torque:

**Master cylinder mounting nut**

**14 N·m (1.4 kgf-m, 10.1 ft-lb)**

**Piping flare nut**

**15 N·m (1.5 kgf-m, 10.8 ft-lb)**

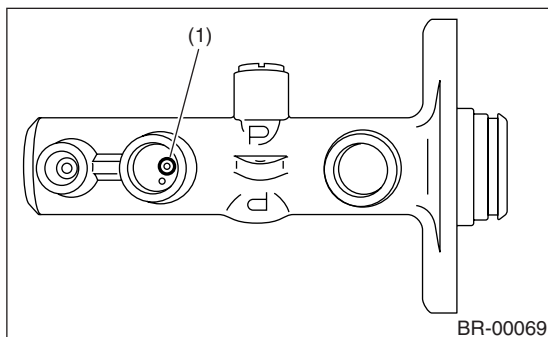
#### CAUTION:

**Be sure to use recommended brake fluid.**

- 2) Bleed air from the brake system. <Ref. to BR-40, PROCEDURE, Air Bleeding.>

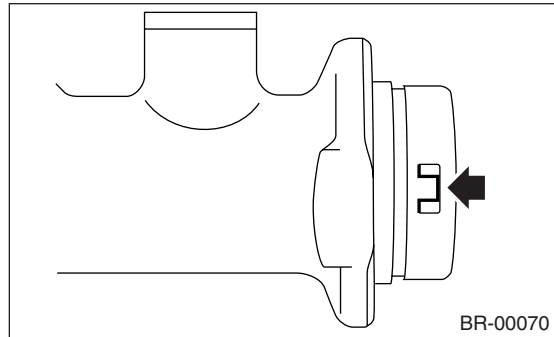
### C: DISASSEMBLY

- 1) Remove mud and dirt from the surface of brake master cylinder.
- 2) Secure the master cylinder on a vise.
- 3) Remove the pin which secures reservoir tank to master cylinder, and then remove the reservoir tank and grommet.
- 4) Remove the cylinder pin with magnetic pick-up tool while pushing in primary piston by screwdriver which wrapped with tape.



(1) Cylinder pin (straight pin)

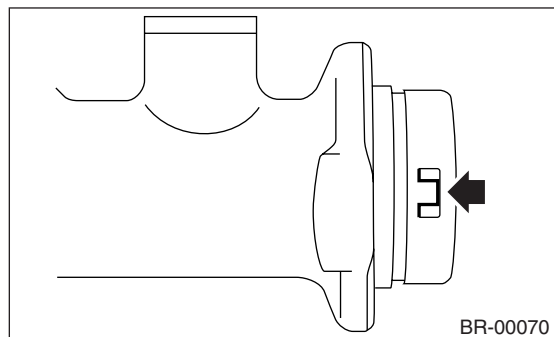
- 5) Pry up the pawl, and then remove the piston retainer. Hold piston retainer tight, because the piston may jump out from master cylinder.



- 6) Extract the primary piston assembly and secondary piston assembly straight out, while taking care not to scratch the inner surface of cylinder.
- 7) Use brake fluid to wash the inside wall of cylinder, and piston assembly. If any damage, deformation, wear, rust, and other faults are found, replace the faulty part.

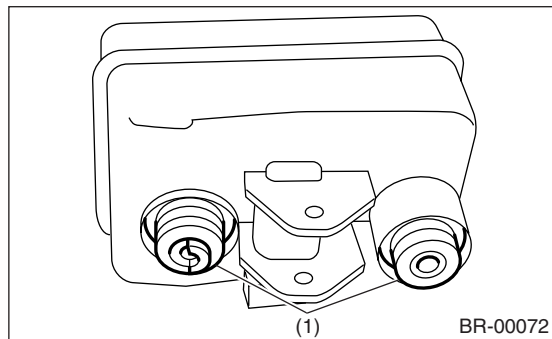
### D: ASSEMBLY

- 1) Apply recommended brake fluid to the inside wall of cylinder, and to outer surface of the piston assembly.
- 2) Ensure that the inside wall of cylinder, and piston assembly are free from dirt when assembling. Install the primary piston assembly and secondary piston assembly, while taking care not to damage, scratch, or dent the cylinder inside wall, and piston assembly.
- 3) Install the cylinder pin while pushing in primary piston by screwdriver which wrapped with tape.
- 4) Install the piston retainer, and then secure it by pressing the pawl.





5) Install the seal to reservoir tank.



(1) Seal

6) Install the reservoir tank to master cylinder and secure with pin.

### E: INSPECTION

If any damage, deformation, wear, swelling, rust, and other faults are found on the primary piston assembly or secondary piston assembly, replace the faulty part.

#### NOTE:

- The primary and secondary pistons must be replaced as complete assemblies.
- The service limit of clearance between each piston and the master cylinder inner dia. is 0.11 mm (0.0043 in).

## 9. Brake Booster

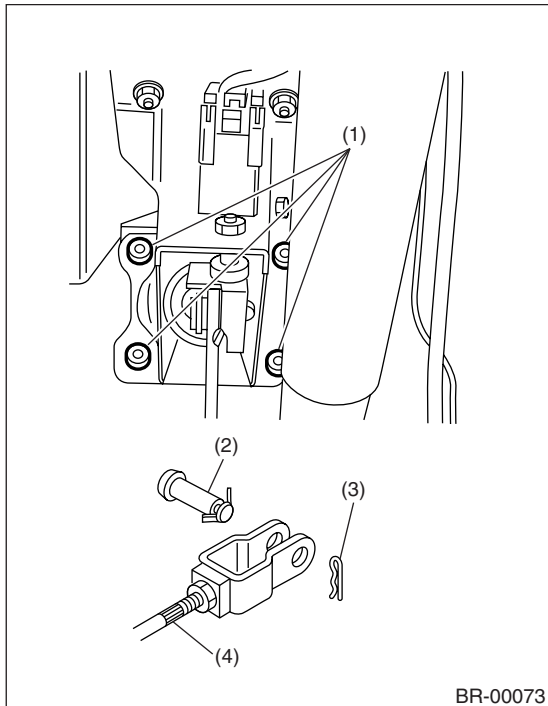
### A: REMOVAL

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

- (1) Disconnect the connector for brake fluid level indicator.
- (2) Remove the brake pipes from master cylinder.
- (3) Remove the master cylinder installing nuts.
- (4) Disconnect the vacuum hose from brake booster.

2) Remove the following parts from pedal bracket.

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



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

3) Remove the brake booster while shunning brake pipes.

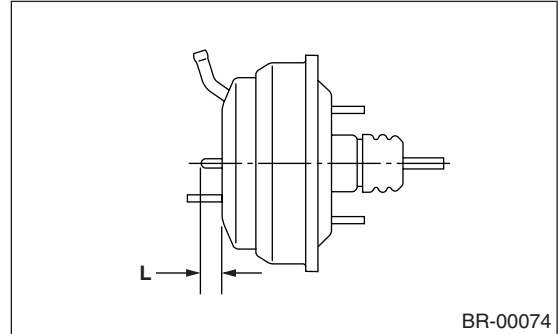
#### NOTE:

- Be careful not to drop the brake booster. The brake booster should be discarded if it has been dropped.
- Use special care when handling the operating rod. If excessive force is applied to the operating rod, sufficient to cause a change in the angle in excess of  $\pm 3^\circ$ , it may result in damage to the power piston cylinder.
- Use care 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 standard length.

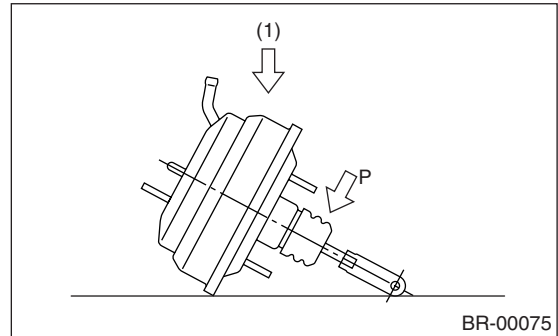
#### Standard L:

**10.05 mm (0.40 in)**



#### CAUTION:

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



(1) Force

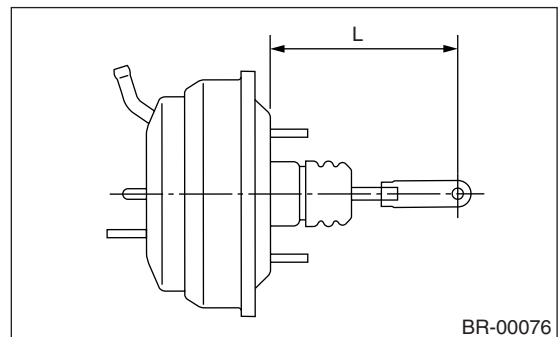
### B: INSTALLATION

1) Adjust the operating rod of brake booster.

#### Standard L:

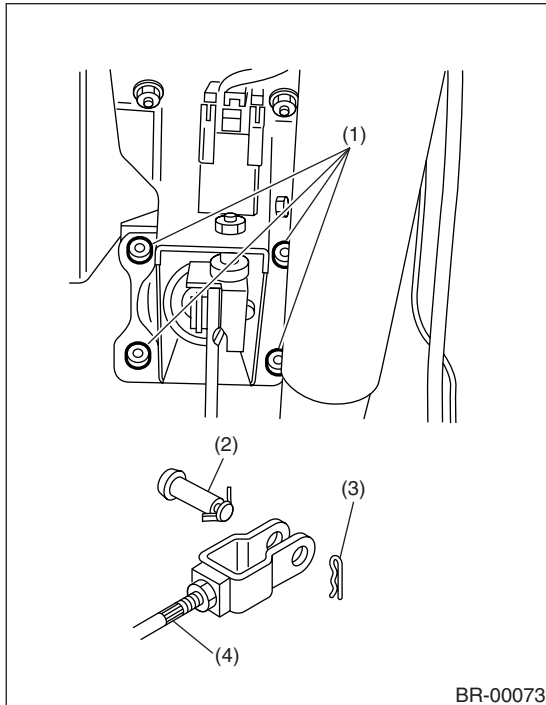
**144.6 mm (5.69 in)**

If it is not within specified value, adjust it by adjusting the brake booster operating rod.



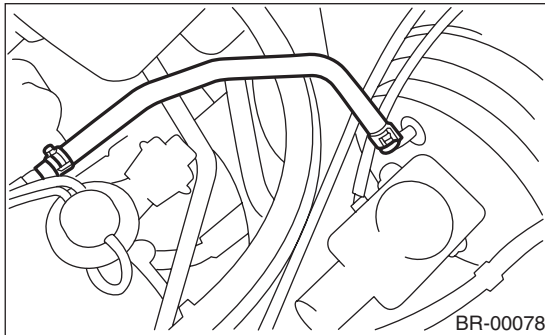
2) Mount the brake booster in position.

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



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

4) Connect the vacuum hose to brake booster.

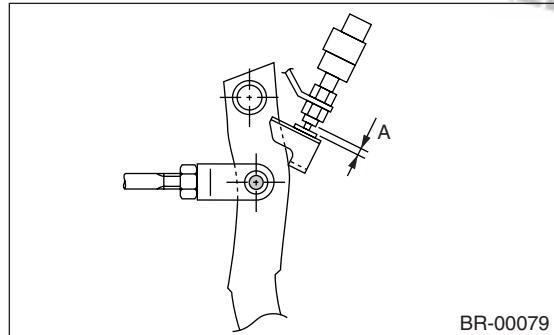


- 5) Mount the master cylinder onto brake booster.
- 6) Connect the brake pipes to master cylinder.
- 7) Connect the electric connector for brake fluid level indicator.
- 8) Measure the clearance between threaded end of stop light switch and stopper. If it is not within specified value, adjust it by adjusting the position of stop light switch. <Ref. to BR-48, ADJUSTMENT, Stop Light Switch.>
- If it is not within specified value, adjust it by adjusting the position of stop light switch.

## CAUTION:

Be careful not to rotate the stop light switch.

**Stop light switch clearance A:**  
0.3 mm (0.012 in)



- 9) Apply grease to operating rod connecting pin to prevent it from wearing.
- 10) Bleed air from the brake system.

## Tightening torque (Air bleeder screw):

**Except 17 inch type:**

8 N·m (0.8 kgf-m, 5.8 ft-lb)

**17 inch type:**

20 N·m (2.0 kgf-m, 14.5 ft-lb)

- 11) Conduct road tests to ensure brakes do not drag.

## C: INSPECTION

### 1. OPERATION CHECK (WITHOUT GAUGES)

#### CAUTION:

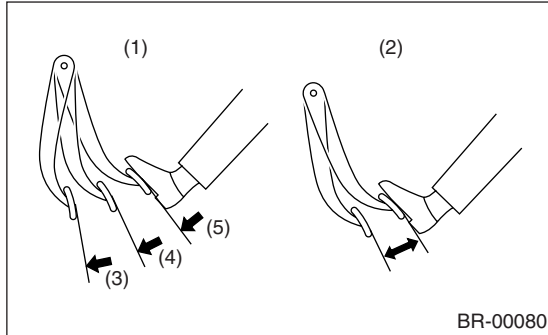
When checking operation, be sure to securely apply the parking brake.

#### • Checking without gauges

This method cannot determine the exact portion which has failed, but it can provide a rough understanding of the nature of failure if checking is conducted in accordance with the following procedures.

### • Air tightness check

Start the engine, and run it for 1 to 2 minutes, then turn it off. Depress the brake pedal several times applying same pedal force as that used in ordinary braking operations. The pedal stroke should be greatest on 1st depression, and it should become smaller with each successive depression. If no change occurs in the pedal height while in a depressed state, the brake booster is faulty.



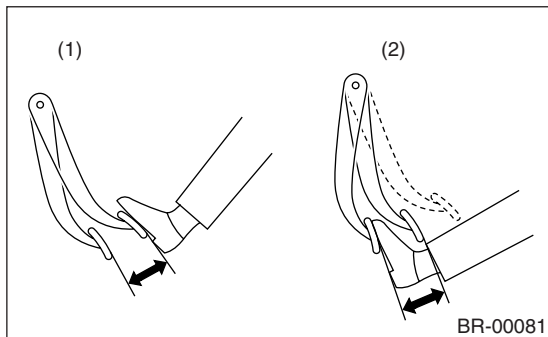
- (1) OK
- (2) NG
- (3) 1st
- (4) 2nd
- (5) 3rd

#### NOTE:

- In the event of defective operation, inspect the condition of check valve and vacuum hose.
- Replace them if faulty and conduct the test again.
- If no improvement is observed, check precisely with gauges.

### • Operation check

1) With the engine off, depress the brake pedal several times applying same pedal force and make sure that pedal height does not vary with each depression of pedal.



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

2) With the brake pedal depressed, start the engine.

3) As the engine starts, the brake pedal should move slightly toward the floor. If no change occurs in the pedal height, the brake booster is faulty.

#### NOTE:

If faulty, check precisely with gauges.

### • Loaded air tightness check

Depress the brake pedal while engine is running, and turn off the engine while pedal is still depressed. Keep the pedal depressed for 30 seconds; if no change occurs in the pedal height, the brake booster is functioning normally; if the pedal height increases, it is faulty.

#### NOTE:

If faulty, check precisely with gauges.

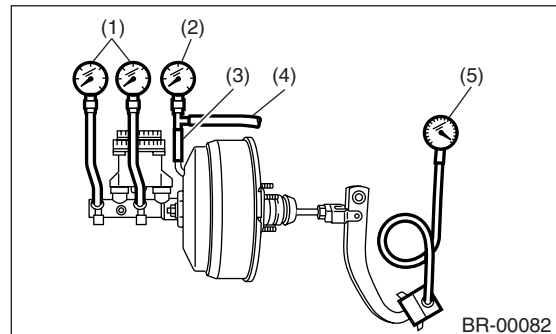
## 2. OPERATION CHECK (WITH GAUGES)

#### CAUTION:

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

### • Checking with gauges

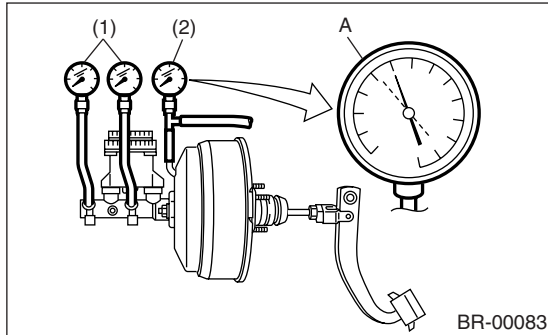
Connect gauges as shown in the figure. After bleeding air from pressure gauges, proceed to each check.



- (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 a vacuum of 66.7 kPa (500 mmHg, 19.69 inHg) = point A is indicated on vacuum gauge. Do not depress the brake pedal.



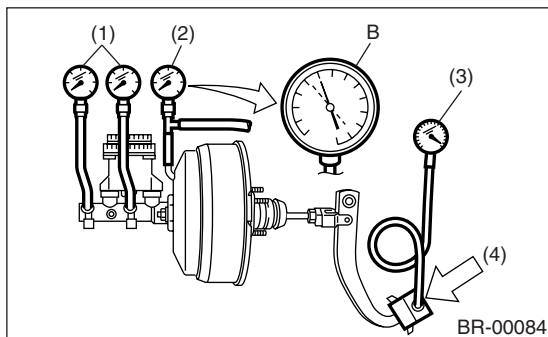
- (1) Pressure gauge
- (2) Vacuum gauge

2) Stop the engine and watch the gauge. If the vacuum drop range is less than 3.3 kPa (25 mmHg, 0.98 inHg) within 15 seconds after stopping engine, the brake booster is functioning properly. If defective, the cause may be one of those listed below.

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

## • Loaded air tightness check

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



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

2) Stop the engine and watch vacuum gauge.

If the vacuum drop range is less than 3.3 kPa (25 mmHg, 0.98 inHg) within 15 seconds after stopping engine, the brake booster is functioning properly. If defective, refer to "AIR TIGHTNESS CHECK".

<Ref. to BR-35, INSPECTION, Brake Booster.>

3) If any fault is found on brake booster, replace the brake booster with a new one.

## • Lack of boosting action check

Turn off the engine, and set the vacuum gauge reading at "0". Then, check the fluid pressure when brake pedal is depressed. The pressure must be greater than the standard value listed.

Brake pedal force		147 N (15 kgf, 33 lb)	294 N (30 kgf, 66 lb)
Fluid pressure	15"	588 kPa (6 kg/cm <sup>2</sup> , 85 psi)	1,471 kPa (15 kg/cm <sup>2</sup> , 213 psi)
	16" (MT)		
	16" (AT)		1,667 kPa (17 kg/cm <sup>2</sup> , 242 psi)
	17"		1,471 kPa (15 kg/cm <sup>2</sup> , 213 psi)

## • Boosting action check

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

Brake pedal force		147 N (15 kgf, 33 lb)	294 N (30 kgf, 66 lb)
Fluid pressure	15"	5,296 kPa (54 kg/cm <sup>2</sup> , 768 psi)	9,120 kPa (93 kg/cm <sup>2</sup> , 1,323 psi)
	16" (MT)	5,688 kPa (58 kg/cm <sup>2</sup> , 825 psi)	
	16" (AT)	6,276 kPa (64 kg/cm <sup>2</sup> , 910 psi)	10,000 kPa (102 kg/cm <sup>2</sup> , 1,450 psi)
	17"	4,021 kPa (41 kg/cm <sup>2</sup> , 583 psi)	8,336 kPa (85 kg/cm <sup>2</sup> , 1,209 psi)

## 10.Brake Fluid

### A: INSPECTION

- 1) Check that the brake fluid level remains between "MIN" and "MAX". If out of the specified range, refill or drain fluid. If the fluid level becomes close to "MIN", refill the fluid.
- 2) Check the fluid for discoloration. If the fluid color has excessively changed, drain the fluid and refill with new fluid.

### B: REPLACEMENT

#### CAUTION:

- To always maintain the brake fluid characteristics, replace the brake fluid according to maintenance schedule or earlier than that when used in severe condition.
- The FMVSS No. 116, fresh DOT3 or DOT4 brake fluid must be used.
- Cover the bleeder with waste cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.
- Do not allow brake fluid to come in contact with vehicle body; wash away with water and wipe off completely if spilled.
- Avoid mixing different brands of brake fluid to prevent degrading the quality of fluid.
- Be careful not to allow dirt or dust to get into the reservoir tank.

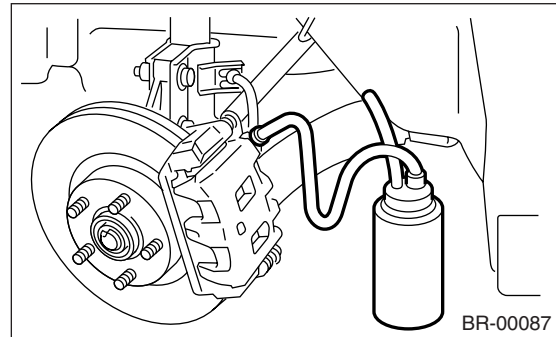
#### NOTE:

- During replacement, keep the brake reservoir tank filled with brake fluid to eliminate entry of air.
  - The brake pedal operating must be very slow.
  - For convenience and safety, two people should do the work.
  - The amount of brake fluid required is approx. 500 ml (16.9 US fl oz, 17.6 Imp fl oz) for total brake system.
- 1) Either lift-up the vehicle and place a rigid racks under it, or lift-up vehicle.
  - 2) Remove both front and rear wheels.
  - 3) Draw out the brake fluid from master cylinder with syringe.
  - 4) Refill the reservoir tank with recommended brake fluid.

#### **Recommended brake fluid:**

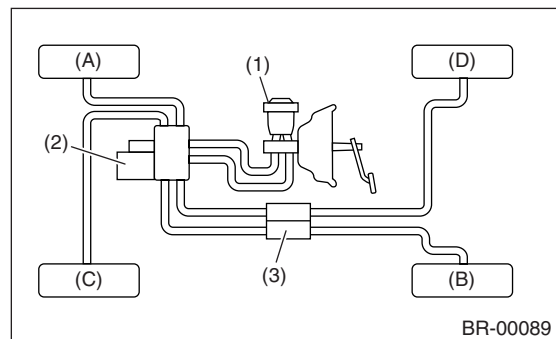
**FMVSS No. 116, fresh DOT3 or DOT4 brake fluid**

- 5) Install one end of a vinyl tube onto the air bleeder and insert the other end of the tube into a container to collect the brake fluid.



#### CAUTION:

**Brake fluid replacement sequence; (A) Front right → (B) Rear left → (C) Front left → (D) Rear right**



- (1) Master cylinder
- (2) Hydraulic unit
- (3) Two-way connector

- 6) Instruct your co-worker to depress the brake pedal slowly two or three times and then hold it depressed.
- 7) Loosen the bleeder screw approx. 1/4 turn until a small amount of brake fluid drains into container, and then quickly tighten the screw.
- 8) Release the brake pedal slowly. Repeat steps 6) through 8) until new fluid flows through vinyl tube.

#### NOTE:

Add brake fluid as necessary during replacement, in order to prevent the tank from running short of brake fluid.

- 9) After completing the replacement, hold brake pedal depressed and tighten screw and install bleeder cap.

#### **Tightening torque (Bleeder screw):**

**Except 17 inch type:**

**8 N·m (0.8 kgf-m, 5.8 ft-lb)**

**17 inch type:**

**20 N·m (2.0 kgf-m, 14.5 ft-lb)**

10) Replace brake fluid of each wheel cylinder using the same procedures as described in steps 6) through 8) above.

11) Depress the brake pedal with a force of approx. 294 N (30 kg, 66 lb) and hold it there for approx. 20 seconds. At this time check for mix in air and pedal height change. Visually inspect the bleeder screws and brake pipe joints to make sure that there is no fluid leakage.

12) Install the wheels, and drive the vehicle for a short distance between 2 to 3 km (1 to 2 miles) to make sure that brakes are operating properly.



# 11. Air Bleeding

## A: PROCEDURE

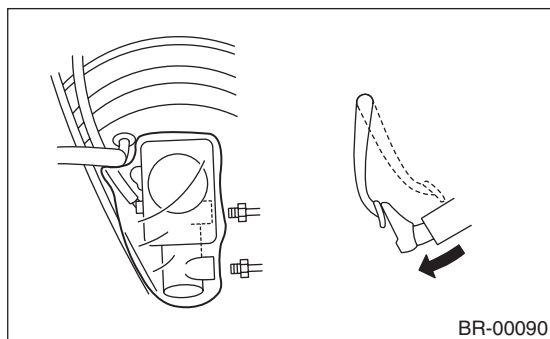
### CAUTION:

- The FMVSS No. 116, fresh DOT3 or DOT4 brake fluid must be used.
- Cover the bleeder with waste cloth when loosening it to prevent brake fluid from being splashed over surrounding parts.
- Do not allow brake fluid to come in contact with vehicle body; wash away with water and wipe off completely if spilled.
- Avoid mixing different brands of brake fluid to prevent degrading the quality of the fluid.
- Be careful not to allow dirt or dust to get into the reservoir tank.

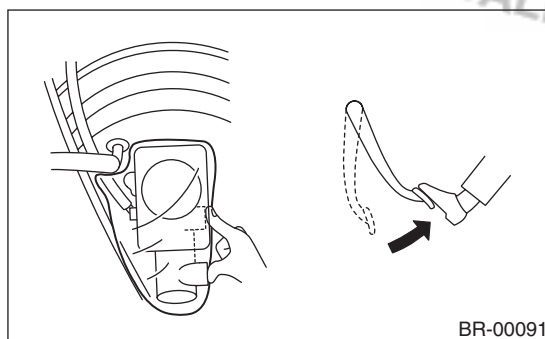
## 1. MASTER CYLINDER

### NOTE:

- If the master cylinder is disassembled or reservoir tank is empty, bleed the master cylinder.
  - During the bleeding operation, keep the brake reservoir tank filled with brake fluid to eliminate entry of air.
  - The brake pedal operating must be very slow.
  - For convenience and safety, two people should do the work.
- 1) Loosen the wheel nuts, jack-up the vehicle, support it with rigid racks, and remove the wheel.
  - 2) Disconnect the brake line at primary and secondary sides.
  - 3) Put a plastic bag cover on master cylinder.
  - 4) Carefully depress and hold the brake pedal.



- 5) Close the outlet plug with your finger, and then release the brake pedal.



- 6) Repeat step 4) and 5) until the brake fluid is completely bled from outlet plug.
- 7) Remove the plastic bag.
- 8) Install the brake pipes to master cylinder.

### Tightening torque:

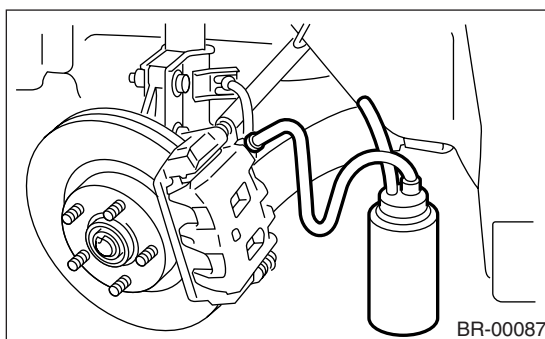
**15 N·m (1.5 kgf-m, 10.8 ft-lb)**

- 9) Bleed air from the brake line. <Ref. to BR-40, BRAKE LINE, PROCEDURE, Air Bleeding.>

## 2. BRAKE LINE

### NOTE:

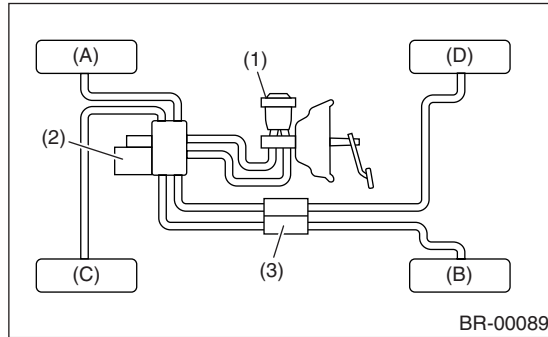
- During the bleeding operation, keep the brake reservoir tank filled with brake fluid to eliminate entry of air.
  - The brake pedal operating must be very slow.
  - For convenience and safety, two people should do the work.
- 1) Make sure that there is no leak from the joints and connections of brake system.
  - 2) Fit one end of vinyl tube into the air bleeder and put the other end into a brake fluid container.





## CAUTION:

**Brake fluid replacement sequence; (A) Front right → (B) Rear left → (C) Front left → (D) Rear right**



- (1) Master cylinder
- (2) Hydraulic unit
- (3) Proportioning valve

3) Slowly depress the brake pedal and keep it depressed. Then, open the air bleeder to discharge air together with the fluid.

Release the air bleeder for 1 to 2 seconds.

Next, with the bleeder closed, slowly release the brake pedal.

Repeat these steps until there are no more air bubbles in the vinyl tube.

Allow 3 to 4 seconds between two brake pedal operations.

## CAUTION:

**Cover the bleeder with waste cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.**

## NOTE:

The brake pedal operating must be very slow.

4) Tighten the air bleeder securely when no air bubbles are visible.

## Air bleeder tightening torque:

**Except 17 inch type:**

**8 N·m (0.8 kgf-m, 5.8 ft-lb)**

**17 inch type:**

**20 N·m (2.0 kgf-m, 14.5 ft-lb)**

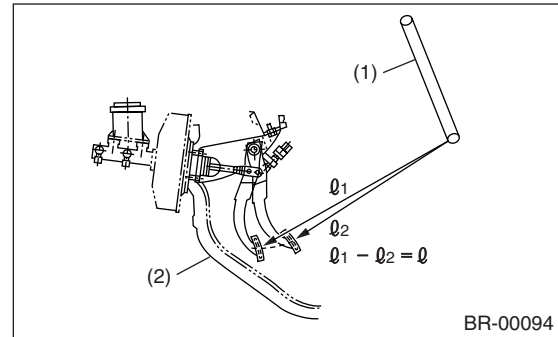
## NOTE:

For 17 inch type, do not allow brake fluid come in contact with caliper body; wash away with water. (Especially for air bleeder screw.)

5) Perform these steps for the brakes connecting to secondary chamber of master cylinder, first, and then for the ones connecting to primary chamber. With all procedures completed, fully depress the brake pedal and keep it in that position for approx. 20 seconds to make sure that there is no leak evident in the entire system.

6) Check the pedal stroke.

While the engine is idling, depress the brake pedal with a 490 N (50 kgf, 110 lb) load and measure the distance between brake pedal and steering wheel. With the brake pedal released, measure the distance between pedal and steering wheel again. The difference between the two measurements must not be more than specified.



- (1) Steering wheel
- (2) Toe board

## Specified pedal stroke

**WRX AT model**

**105 mm (4.13 in)**

**Except WRX AT model**

**90 mm (3.54 in)**

**When depressing brake pedal with a 490 N (50 kgf, 110 lbf) load.**

7) If the distance is more than the specifications, there is a possibility that air is in the brake line. Bleed the brake line until pedal stroke meets the specification.

8) Operate the hydraulic control unit in the sequence control mode. <Ref. to ABS-10, ABS Sequence Control.>

9) Recheck the pedal stroke.

10) If the distance is more than specifications, there is a possibility air is in the inside of hydraulic unit. Repeat above steps 2) to 9) above until pedal stroke meets the specification.

11) Add brake fluid to the required level (MAX. level) of reservoir tank.

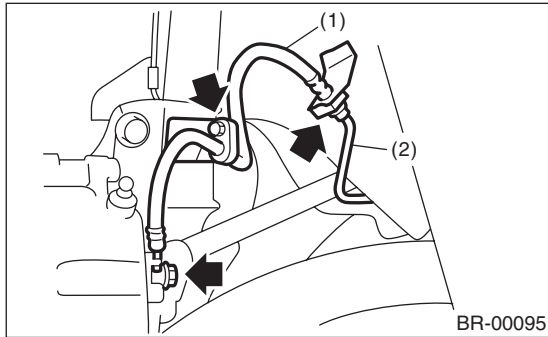
12) As a final step, test run the vehicle at low speed and apply brakes to ensure that brakes provide normal braking action.

## 12.Brake Hose

### A: REMOVAL

#### 1. FRONT BRAKE HOSE

- 1) Separate the brake pipe from brake hose.  
(Always use the flare nut wrench and be careful not to deform the flare nut.)
- 2) Pull out the clamp to remove brake hose.
- 3) Remove the bolt at strut and union bolt.



- (1) Brake hose
- (2) Brake pipe

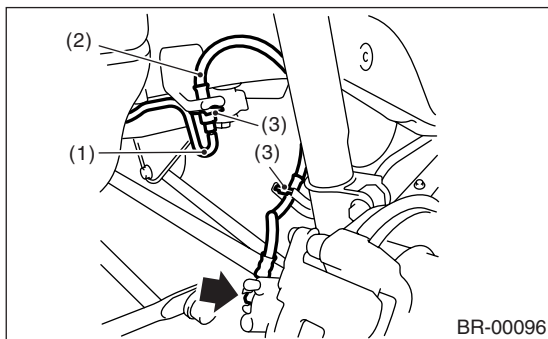
#### 2. REAR BRAKE HOSE

- 1) Separate the brake pipe from brake hose.

#### NOTE:

Always use the flare nut wrench and be careful not to deform the flare nut.

- 2) Remove the clamp and union bolt.



- (1) Brake pipe
- (2) Brake hose
- (3) Brake hose clamp

### B: INSTALLATION

#### 1. FRONT BRAKE HOSE

- 1) Secure the brake hose to strut mount.

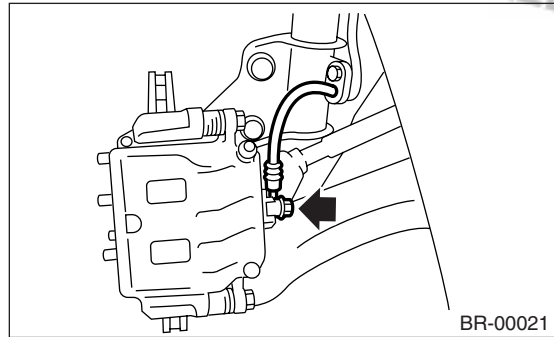
#### Tightening torque:

**32 N·m (3.3 kgf-m, 23.6 ft-lb)**

- 2) Install the brake hose to caliper using a new gas-ket.

#### Tightening torque (Union bolt):

**18 N·m (1.8 kgf-m, 13.0 ft-lb)**



- 3) Position the disc in straight-forward direction and route brake hose through hole in bracket on wheel apron side.

#### CAUTION:

**Be sure brake hose is not twisted.**

- 4) Temporarily tighten the flare nut to connect brake pipe and hose.
- 5) Fix the brake hose with clamp at wheel apron bracket.
- 6) While holding the hexagonal part of brake hose fitting with a wrench, tighten the flare nut to the specified torque.

#### Tightening torque (Brake pipe flare nut):

**15 N·m (1.5 kgf-m, 10.8 ft-lb)**

- 7) Bleed air from the brake system.

#### 2. REAR BRAKE HOSE

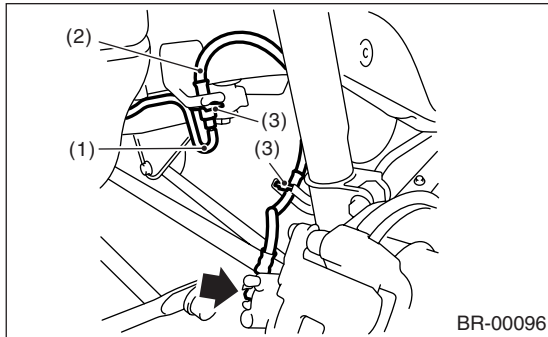
- 1) Pass the brake hose through hole of bracket, and then lightly tighten the flare nut to connect brake pipe.
- 2) Insert the clamp upward to fix brake hose.
- 3) Install the brake hose to caliper using a new gas-ket.

#### Tightening torque (Union bolt):

**18 N·m (1.8 kgf-m, 13.0 ft-lb)**

- 4) While holding the hexagonal part of brake hose fitting with a wrench, tighten the flare nut to the specified torque.

**Tightening torque (Brake pipe flare nut):**  
**15 N·m (1.5 kgf-m, 10.8 ft-lb)**



- (1) Brake pipe
- (2) Brake hose
- (3) Brake hose clamp

5) Bleed air from the brake system.

## C: INSPECTION

Ensure there are no cracks, breakage, or damage on the hoses. Check the joints for fluid leakage. If any cracks, breakage, damage or leakage is found, repair or replace the hose.

## 13.Brake Pipe

### A: REMOVAL

**NOTE:**

Airbag system wiring harness is routed near the center brake pipe.

**CAUTION:**

- All airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuits.
- Be careful not to damage the airbag system wiring harness when servicing the center brake pipe.
- When removing the brake pipe, make sure that it is not bent.

### B: INSTALLATION

**NOTE:**

Airbag system wiring harness is routed near the center brake pipe.

**CAUTION:**

- All airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuits.
- Be careful not to damage the airbag system wiring harness when servicing the center brake pipe.
- When installing the brake pipe, make sure that it is not bent.
- After installing the brake pipe and hose, bleed the air.
- After installing the brake hose, make sure that it does not touch the tire or suspension assembly, etc.

***Brake pipe tightening torque:***

***15 N·m (1.5 kgf-m, 10.8 ft-lb)***

### C: INSPECTION

Ensure there are no cracks, breakage, or damage on pipes. Check the joints for fluid leakage. If any cracks, breakage, damage or leakage is found, repair or replace the pipe.

**NOTE:**

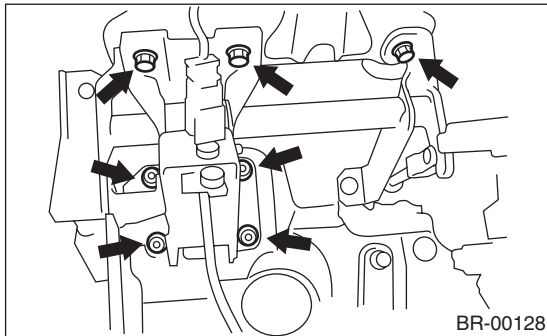
Use a mirror when inspecting low-visible part or back side.

## 14.Brake Pedal

### A: REMOVAL

#### 1. MT MODEL

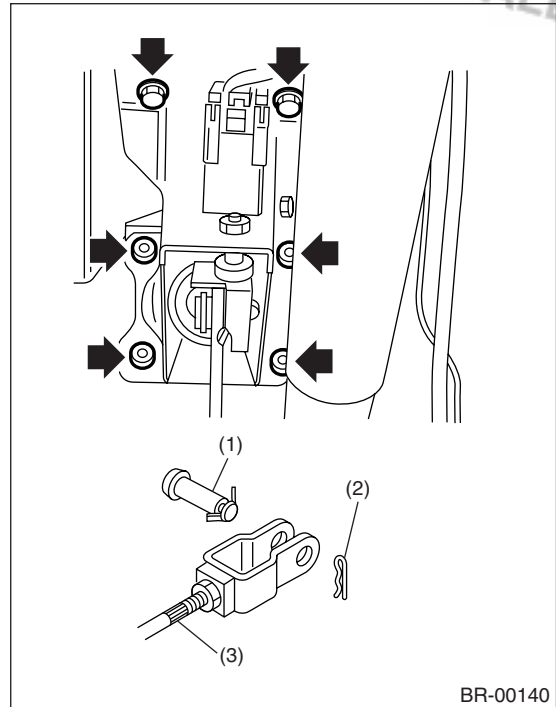
- 1) Remove the steering shaft.
- 2) Disconnect the connectors (for stop light switch, etc.) from pedal bracket.
- 3) Remove the clevis pin which secures the lever to push rod.
- 4) Remove the nut which secures the clutch master cylinder.
- 5) Remove the accelerator pedal.
- 6) Remove the bolts and nuts which the secure pedal bracket.



#### 2. AT MODEL

- 1) Disconnect the ground cable from battery.
- 2) Remove the instrument panel lower cover from instrument panel.
- 3) Remove the clevis pin which secures the brake pedal to brake booster operating rod. Also disconnect the stop light switch connector.

- 4) Remove the four bolts and four nuts which secure the brake pedal to pedal.



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

### B: INSTALLATION

- 1) Install in the reverse order of removal.

#### CAUTION:

- If the cable clamp is damaged, replace it with a new one.
- Never fail to cover the outer cable end with boot.
- Be careful not to kink the accelerator cable.
- Always use new clevis pins.

- 2) Adjust the clutch pedal <Ref. to CL-27, ADJUSTMENT, Clutch Pedal.>
- 3) Inspect the brake pedal after installation <Ref. to BR-46, INSPECTION, Brake Pedal.>

### C: DISASSEMBLY

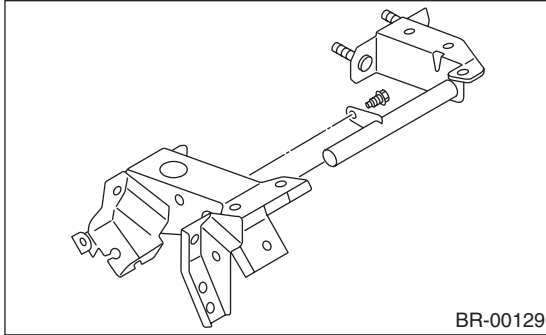
#### 1. MT MODEL

- 1) Remove the brake switch.  
<Ref. to BR-48, REMOVAL, Stop Light Switch.>
- 2) Remove the clutch pedal.  
<Ref. to CL-26, DISASSEMBLY, Clutch Pedal.>

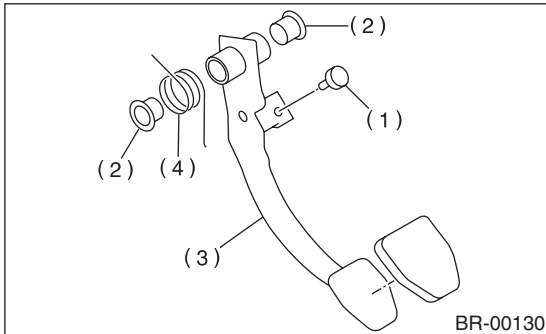
## Brake Pedal

### BRAKE

3) Remove the clutch master cylinder bracket.



4) Remove the bushing, spring and stopper.

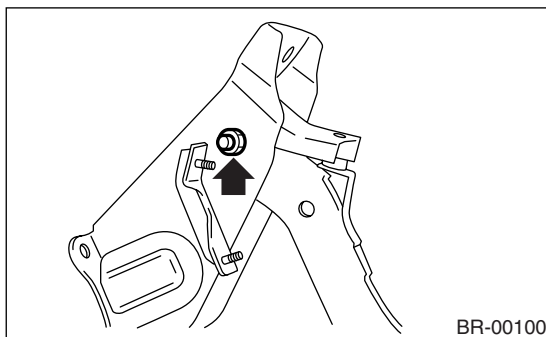


- (1) Stopper
- (2) Bushing
- (3) Brake pedal
- (4) Brake pedal spring

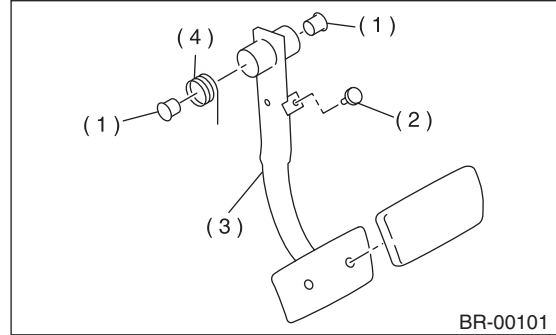
5) Remove the brake pedal pad.

## 2. AT MODEL

- 1) Remove the brake switch.
- 2) Unbolt, and then remove the brake pedal.



3) Remove the bushing, spacer and spring.



- (1) Plug
- (2) Stopper
- (3) Brake pedal
- (4) Brake pedal spring

4) Remove the brake pedal pad.

## D: ASSEMBLY

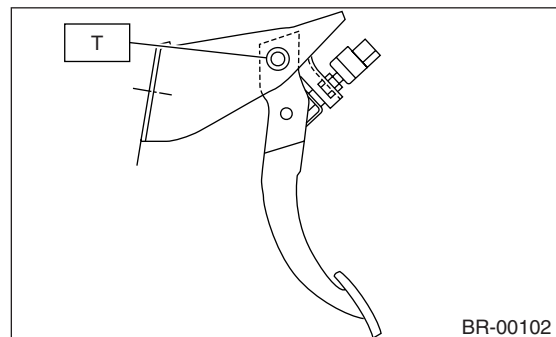
- 1) Attach the stop light switch, etc. to pedal bracket temporarily.
- 2) Clean the inside of bores of clutch pedal and brake pedal, apply grease, and set the bushings into bores.
- 3) Align bores of the pedal bracket, clutch pedal and brake pedal, attach the brake pedal return spring and clutch pedal effort reducing spring (model with hill holder), and then install the pedal bolt.

### NOTE:

Clean up the inside of bushings and apply grease before installing spacer.

### Tightening torque:

**T: 30 N·m (3.1 kgf-m, 22.1 ft-lb)**



4) Adjust the stop light switch position after installing the brake pedal to vehicle.

## E: INSPECTION

- 1) Move the brake and clutch pedal pads in the lateral direction with a force of approx. 10 N (1 kgf, 2 lb) to ensure pedal deflection is in specified range.

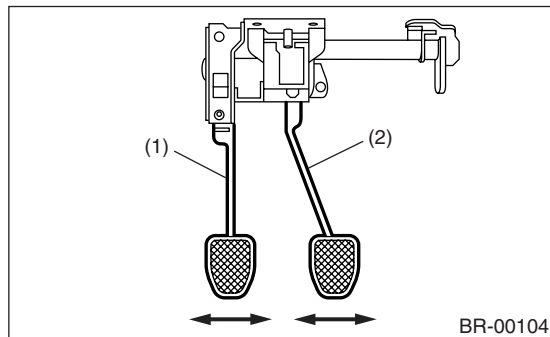
## CAUTION:

If excessive deflection is noted, replace the bushings with new ones.

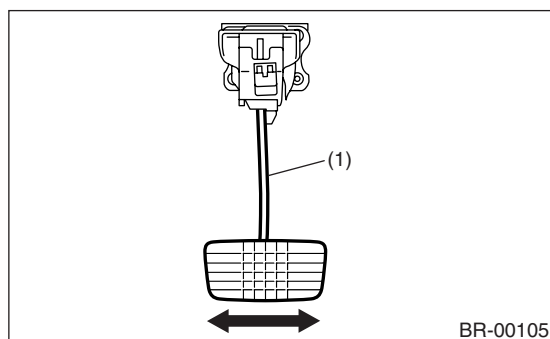
## Deflection of brake and clutch pedal:

### Service limit

**5.0 mm (0.197 in) or less**



- (1) Clutch pedal
- (2) Brake pedal



- (1) Brake pedal

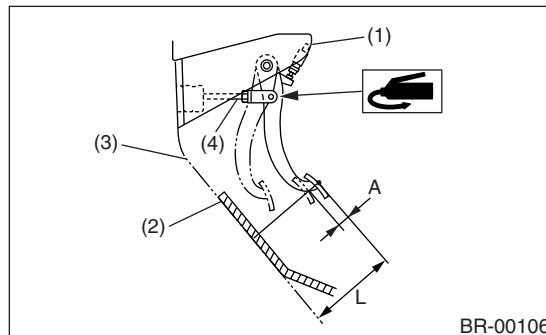
2) Check the position of pedal pad.

## Pedal height L:

**148 mm (5.83 in)**

## Brake pedal free play A:

**0.5 — 2.0 mm (0.02 — 0.08 in) [Depress brake pedal pad with a force of less than 10 N (1 kgf, 2 lb).]**



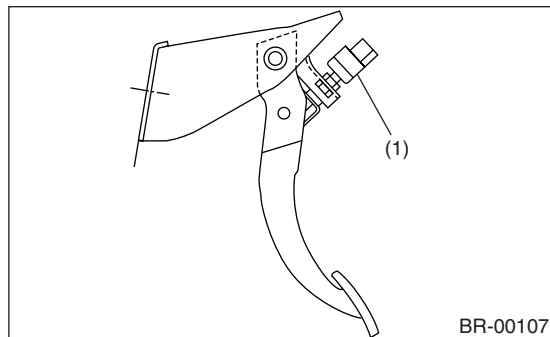
- (1) Stop light switch
- (2) Mat
- (3) Toe board
- (4) Brake booster operating rod

3) If it is not within specified value, adjust it by adjusting the brake booster operating rod length.

## 15. Stop Light Switch

### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Disconnect the stop light switch connector.
- 3) Loosen nuts, and unscrew stop light switch to remove.



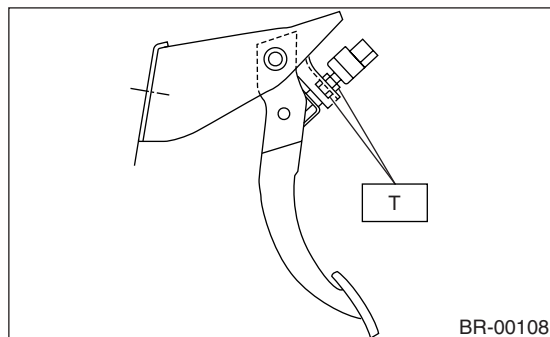
(1) Stop light switch

### B: INSTALLATION

- 1) Screw the stop light switch onto a bracket and secure it temporarily with a nut.
  - 2) Adjust the stop light switch position, and then tighten the nut.
- <Ref. to BR-48, ADJUSTMENT, Stop Light Switch.>

#### Tightening torque:

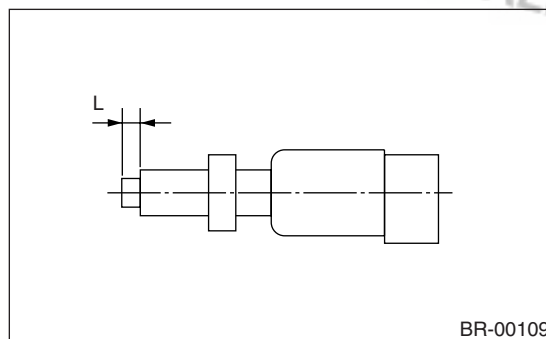
**8 N·m (0.8 kgf·m, 5.8 ft-lb)**



### C: INSPECTION

- 1) If the stop light switch does not operate properly (or if it does not stop at the specified position), replace with a new one.

**Specified position L:**  
**2 mm (0.079 in)**

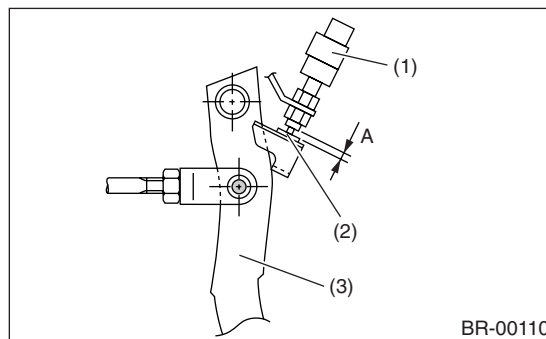


- 2) Measure the clearance between threaded end of stop light switch and stopper.

#### CAUTION:

**Be careful not to rotate stop light switch.**

**Stop light switch clearance A:**  
**0.3 mm (0.012 in)**



- (1) Stop light switch
- (2) Stopper
- (3) Brake pedal

- 3) If it is not within specified value, adjust it by adjusting position of stop light switch.

#### CAUTION:

**Be careful not to rotate the stop light switch.**

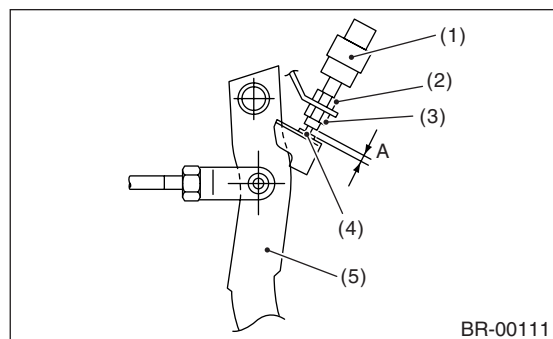
### D: ADJUSTMENT

Loosen the lock nut, and adjust the stop light switch position until the clearance between threaded end of stop light switch and stopper (A) becomes 0.3 mm (0.012 in). Then, tighten the lock nut.



## Tightening torque:

**8 N·m (0.8 kgf-m, 5.8 ft-lb)**



- (1) Stop light switch
- (2) Lock nut A
- (3) Lock nut B
- (4) Stopper
- (5) Brake pedal

## NOTE:

Tighten the lock nut B until the clearance between threaded end of stop light switch and stopper becomes 0 mm (0 in). Hold the stop light switch to prevent turning, and then loosen the lock nut B approx. 60°. The clearance (A) will become 0.3 mm (0.012 in).

## 16. General Diagnostic Table

### A: INSPECTION

	Trouble and possible cause	Corrective action
<b>1. Insufficient braking</b>	(1) Fluid leakage from the hydraulic mechanism	Repair or replace (cup, piston seal, piston boot, master cylinder piston kit, pipe or hose).
	(2) Entry of air into the hydraulic mechanism	Bleed the air.
	(3) Excessively wide shoe clearance	Adjust the clearance.
	(4) Wear, deteriorated surface material, adhering water or fluid on the lining	Replace, grind or clean.
	(5) Improper operation of master cylinder, disc caliper, brake booster or check valve	Correct or replace.
<b>2. Unstable or uneven braking</b>	(1) Fluid on the lining, drum or rotor	Eliminate cause of fluid leakage, clean, or replace.
	(2) Drum or rotor eccentricity	Correct or replace the drum or rotor.
	(3) Worn brake drum, or damage to the drum caused by sand	Correct by grinding, or replace.
	(4) Improper lining contact, deteriorated surface material, improper inferior material, or wear	Correct by grinding, or replace.
	(5) Deformed back plate	Correct or replace.
	(6) Improper tire inflation	Inflate to correct pressure.
	(7) Disordered wheel alignment	Adjust alignment.
	(8) Loosened back plate or the support installing bolts	Retighten.
	(9) Loosened wheel bearing	Retighten to normal tightening torque or replace.
	(10) Trouble in the hydraulic system	Replace the cylinder, brake pipe or hose.
	(11) Uneven effect of the parking brake	Check, adjust, or replace the rear brake and cable system.
<b>3. Excessive pedal stroke</b>	(1) Entry of air into the hydraulic mechanism	Bleed the air.
	(2) Excessive play in the master cylinder push rod	Adjust.
	(3) Fluid leakage from the hydraulic mechanism	Repair or replace (cup, piston seal, piston boot, master cylinder piston kit, pipe or hose).
	(4) Improperly adjusted shoe clearance	Adjust.
	(5) Improper lining contact or worn lining	Correct or replace.
<b>4. Brake dragging or improper brake return</b>	(1) Insufficient pedal play	Adjust play.
	(2) Improper master cylinder return	Clean or replace the cylinder.
	(3) Clogged hydraulic system	Replace.
	(4) Improper return or adjustment of parking brake	Correct or adjust.
	(5) Weakened spring tension or breakage of shoe return spring	Replace the spring.
	(6) Excessively narrow shoe clearance	Adjust the clearance.
	(7) Improper disc caliper operation	Correct or replace.
	(8) Wheel bearing faulty	Replace the wheel bearing.
<b>5. Brake noise (1) (creak sound)</b>	(1) Hardened or deteriorated lining	Replace the shoe assembly or pad.
	(2) Worn lining	Replace the shoe assembly or pad.
	(3) Loosened back plate or the support installing bolts	Retighten.
	(4) Loose wheel bearing	Retighten to normal tightening torque.
	(5) Dirty drum or rotor	Clean the drum or rotor, or clean and replace the brake assembly.
<b>6. Brake noise (2) (hissing sound)</b>	(1) Worn lining	Replace the shoe assembly or pad.
	(2) Improper installed shoe or pad	Correct or replace the shoe assembly or pad.
	(3) Loose or bent drum or rotor	Retighten or replace.

# General Diagnostic Table

BRAKE

	Trouble and possible cause	Corrective action
<b>7. Brake noise (3) (click sound)</b>	In the case of the disc brake:	
	(1) Excessively worn pad or the support	Replace the pad or the support.
	In the case of the drum brake:	
	(1) Excessively worn shoe ridge	Replace the back plate.
	(2) Lack of oil on the shoe ridge surface and anchor	Add more grease.

**General Diagnostic Table**

BRAKE

---

Brought to you by Eris Studios  
NOT FOR RESALE