

Brought to you by Eris Studios
NOT FOR RESALE

BRAKE

General Description

BRAKE

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1. General Description

A: SPECIFICATION

Model		STI
Front disc brake	Size	17-inch type
	Type	Disc (Fixed type, ventilated)
	Effective disc diameter	268 (10.55)
	Disc thickness × Diameter	30 × 326 (1.18 × 12.83)
	Effective cylinder diameter	40.0 × 2, 46.0 × 2 (1.575 × 2, 1.811 × 2)
	Pad dimensions (Length × Width × Thickness)	131.8 × 60.5 × 8.9 (5.189 × 2.382 × 0.35)
	Clearance adjustment	Automatic adjustment
Rear disc brake	Size	17-inch type
	Type	Disc (Fixed type, ventilated)
	Effective disc diameter	268 (10.55)
	Disc thickness × Diameter	20 × 316 (0.79 × 12.44)
	Effective cylinder diameter	40.0 (1.575) × 2
	Pad dimensions (Length × Width × Thickness)	76.8 × 45.0 × 9.0 (3.024 × 1.772 × 0.354)
	Clearance adjustment	Automatic adjustment
Master cylinder	Type	Tandem
	Effective diameter	23.8 (15/16)
	Reservoir type	Sealed type
	Brake fluid reservoir capacity	205 (12.51)
Brake booster	Type	Vacuum suspended
	Effective diameter	208 + 229 (8.19 + 9.02)
Brake line		Dual circuit system
Brake fluid CAUTION: <ul style="list-style-type: none"> • Avoid mixing brake fluid of different brands to prevent fluid performance from degrading. • When filling with brake fluid, be careful not to allow any dust to enter the reservoir. • Use new SUBARU genuine brake fluid when replacing or refilling the fluid. 		FMVSS No. 116, DOT3, or DOT4

General Description

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NOTE:

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

Item		Standard	Limit
Front brake	Pad thickness mm (in)	8.9 (0.35)	1.2 (0.047)
	Disc thickness mm (in)	30 (1.18)	28 (1.10)
	Disc runout mm (in)	—	0.075 (0.0030)
Rear brake	Pad thickness mm (in)	9.0 (0.354)	1.2 (0.047)
	Disc thickness mm (in)	20 (0.79)	18 (0.71)
	Disc runout mm (in)	—	0.07 (0.0028)
Parking brake	Inside diameter mm (in)	190 (7.48)	191 (7.52)
	Lining thickness mm (in)	2.8 (0.11)	1.5 (0.059)
	Lever stroke	7 — 8 notches/200 N (20 kgf, 45 lbf)	

		Brake pedal force N (kgf, lbf)	Fluid pressure kPa (kgf/cm ² , psi)
Brake booster	Brake fluid pressure with engine stopped	147 (15, 33)	545 (6, 79)
		294 (30, 66)	1,564 (16, 227)
	Brake fluid pressure with engine running and vacuum pressure at 66.7 kPa (500 mmHg, 19.69 inHg)	147 (15, 33)	4,984 (51, 723)
		294 (30, 66)	10,249 (105, 1,486)

Brake pedal	Free play mm (in)	0.5 — 2 (0.020 — 0.079) [When pulling the brake pedal upward with a force of less than 10 N (1 kgf, 2 lbf).]
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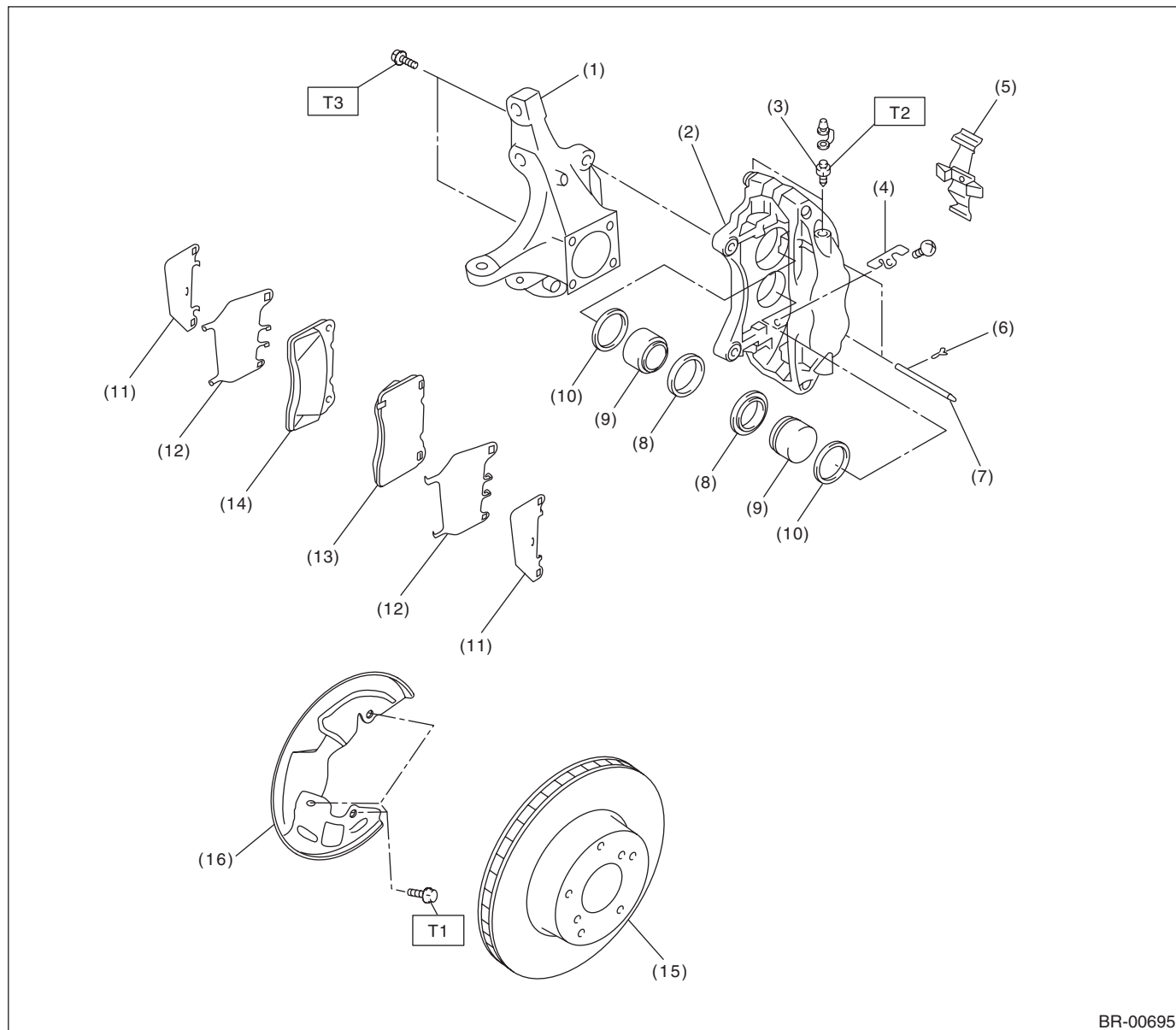
General Description

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B: COMPONENT

1. FRONT DISC BRAKE



BR-00695

- (1) Housing
- (2) Caliper body
- (3) Air bleeder screw
- (4) Guide plate
- (5) Cross spring
- (6) Clip
- (7) Pad pin

- (8) Piston boot
- (9) Piston
- (10) Piston seal
- (11) Pad shim (Outer)
- (12) Pad shim (Inner)
- (13) Pad (Outer)
- (14) Pad (Inner)

- (15) Disc rotor
- (16) Disc cover

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

T1: 18 (1.8, 13.0)

T2: 20 (2.0, 14.5)

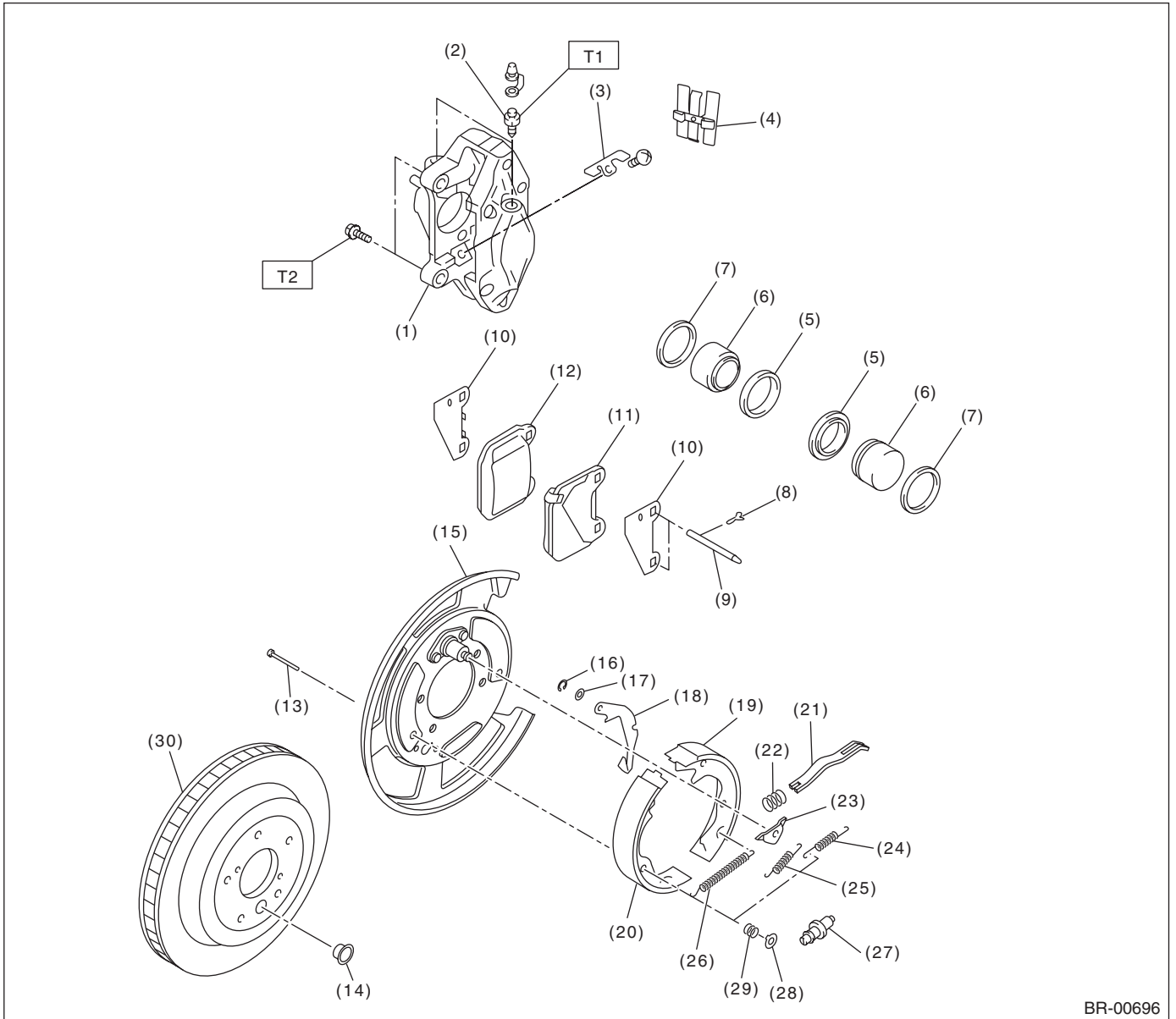
T3: 155 (15.8, 114.3)

General Description

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2. REAR DISC BRAKE



BR-00696

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

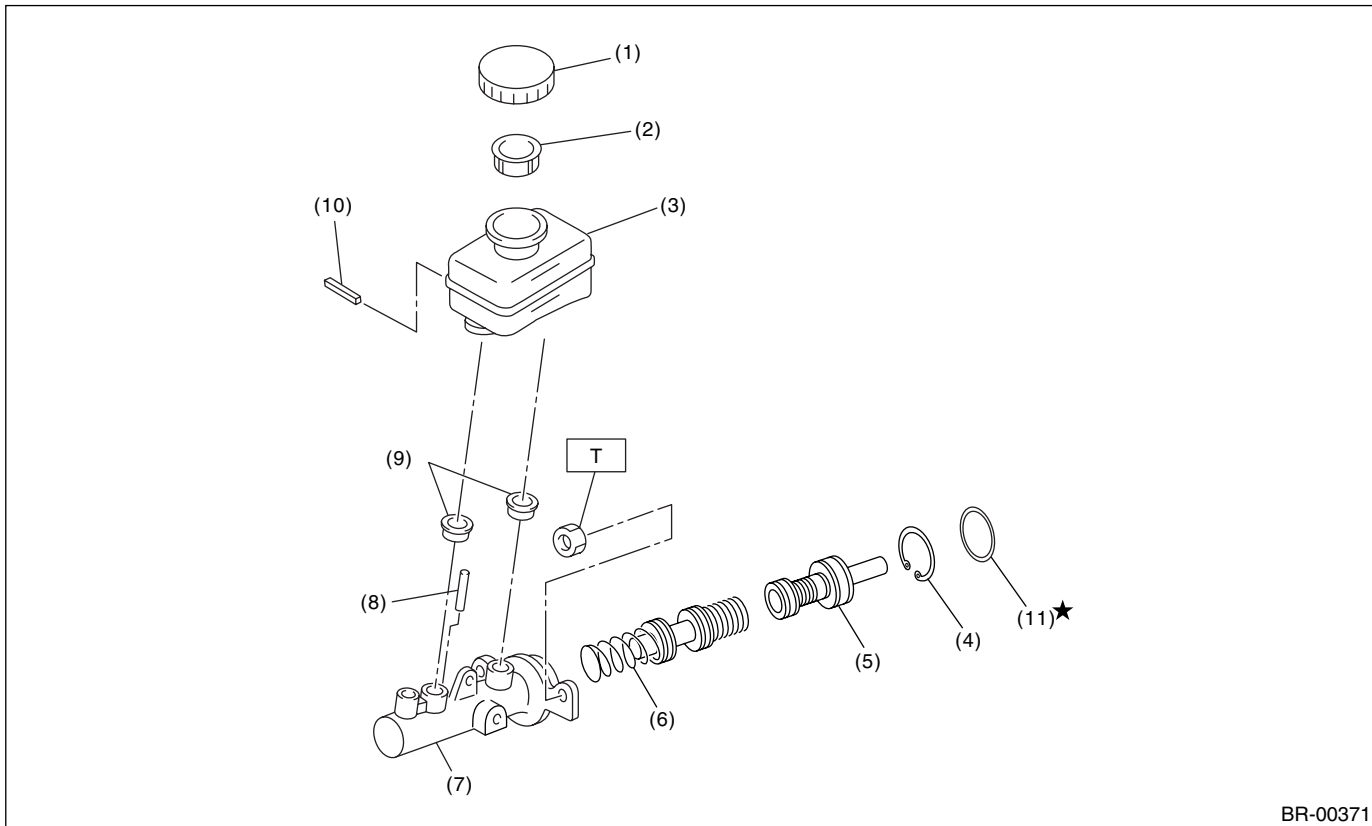
Tightening torque: N·m (kgf·m, ft·lb)
T1: 20 (2.0, 14.5)
T2: 65 (6.6, 47.9)

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3. MASTER CYLINDER



BR-00371

- (1) Cap
- (2) Filter
- (3) Reservoir tank
- (4) C-ring
- (5) Primary piston

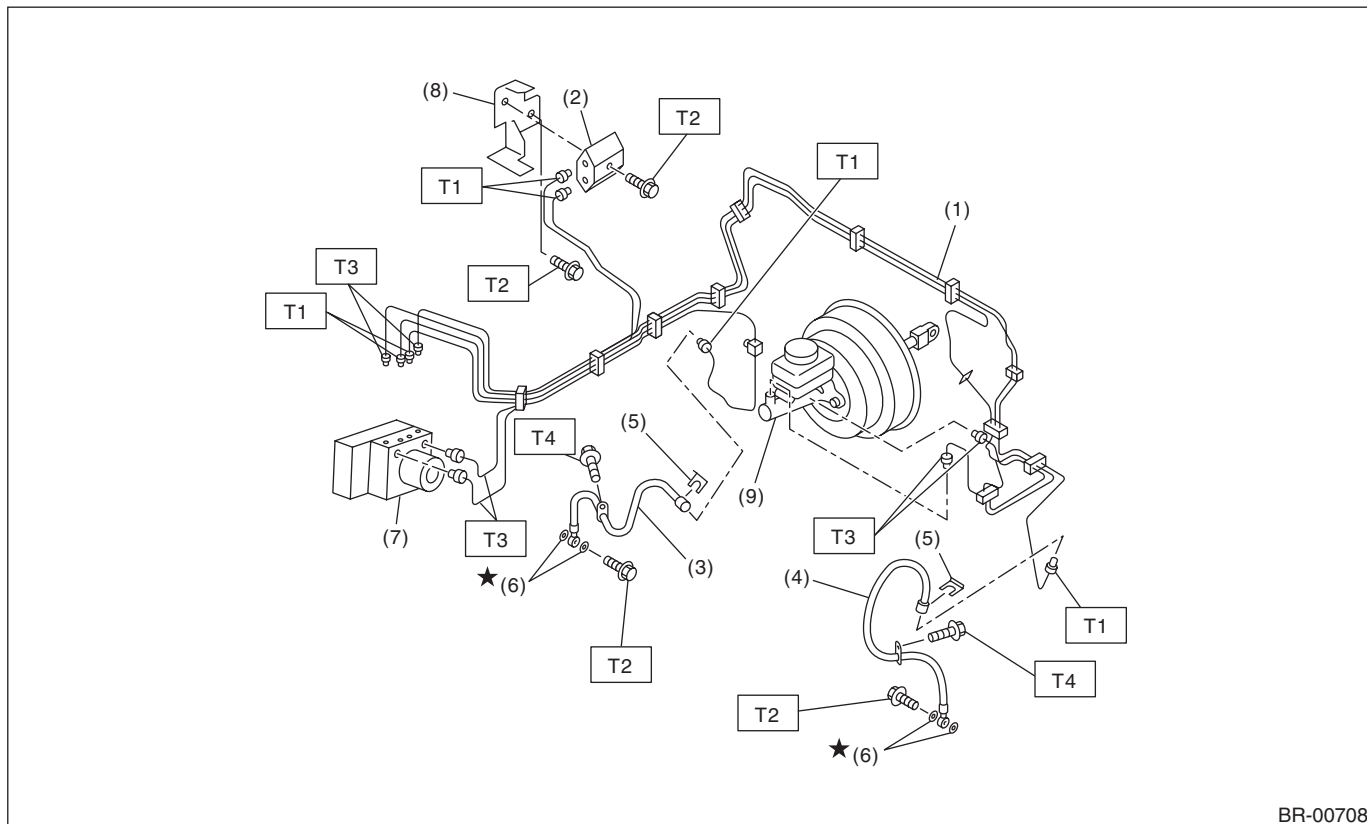
- (6) Secondary piston
- (7) Cylinder body
- (8) Cylinder pin
- (9) Seal
- (10) Pin

- (11) O-ring

Tightening torque: N·m (kgf·m, ft·lb)

T: 13 (1.3, 9.6)

4. FRONT BRAKE PIPES AND HOSES



- | | |
|---------------------------|---|
| (1) Front brake pipe ASSY | (6) Gasket |
| (2) Two-way connector | (7) VDC control module & hydraulic control unit (VDCCM&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)

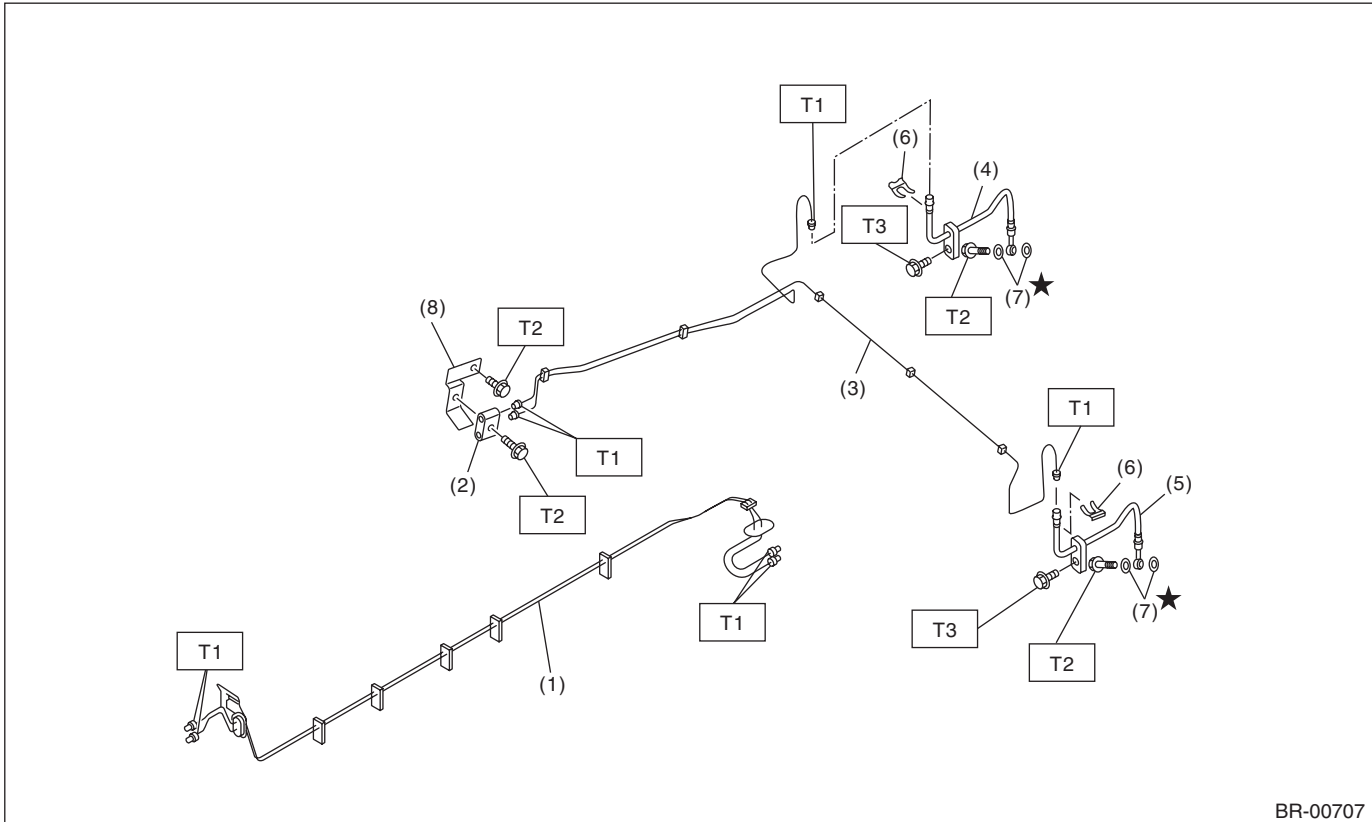
- T1: 15 (1.5, 10.8)**
T2: 18 (1.8, 13.0)
T3: 19 (1.9, 14.0)
T4: 33 (3.4, 24.3)

General Description

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5. CENTER AND REAR BRAKE PIPES AND HOSES

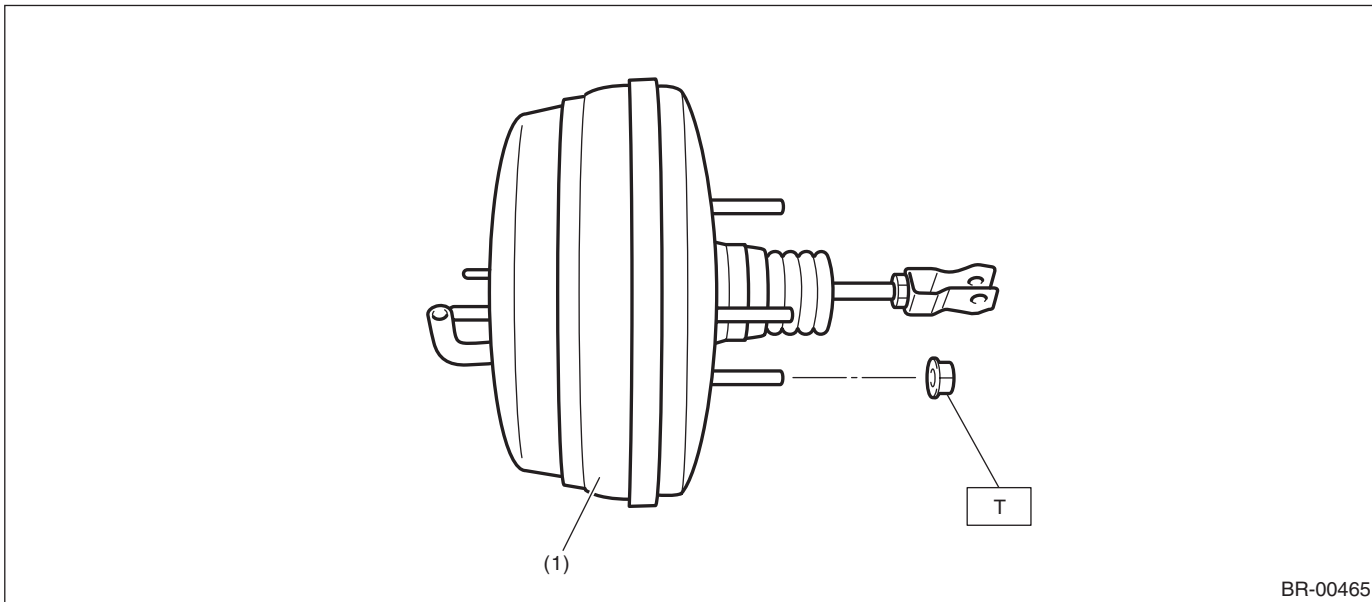


- (1) Center brake pipe ASSY
- (2) Two-way connector
- (3) Rear brake pipe ASSY
- (4) Rear brake hose RH
- (5) Rear brake hose LH
- (6) Clamp
- (7) Gasket
- (8) Bracket

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

T1:	15 (1.5, 10.8)
T2:	18 (1.8, 13.0)
T3:	33 (3.4, 24.3)

6. BRAKE BOOSTER

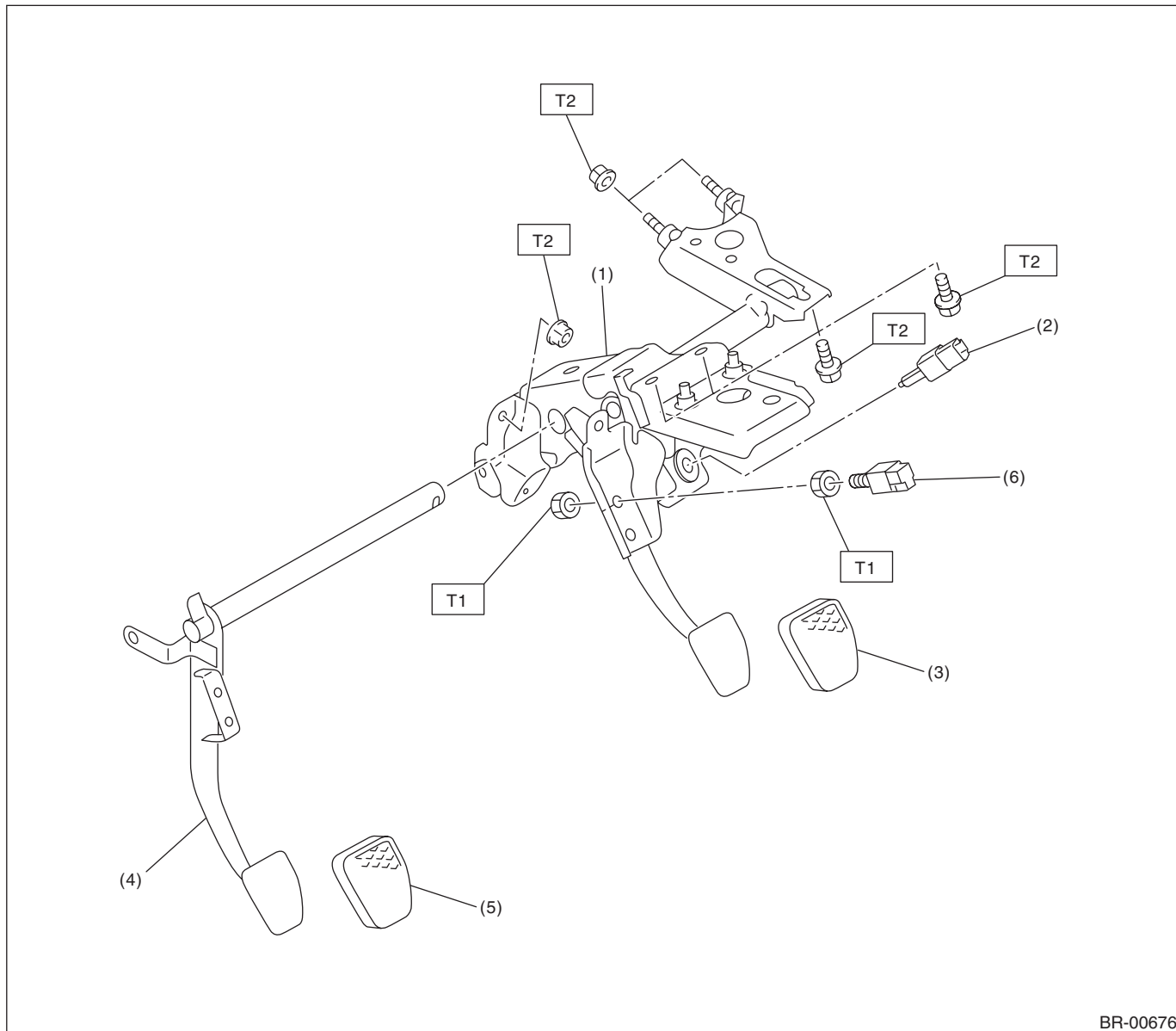


- (1) Brake booster

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

T:	18 (1.8, 13.0)
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7. BRAKE PEDAL



BR-00676

- | | |
|-----------------------|----------------------|
| (1) Brake pedal ASSY | (4) Clutch pedal |
| (2) Stop light switch | (5) Clutch pedal pad |
| (3) Brake pedal pad | (6) Clutch switch |

Tightening torque: N·m (kgf·m, ft·lb)

T1: 8 (0.8, 5.8)

T2: 18 (1.8, 13.0)

General Description

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C: CAUTION

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

D: PREPARATION TOOL

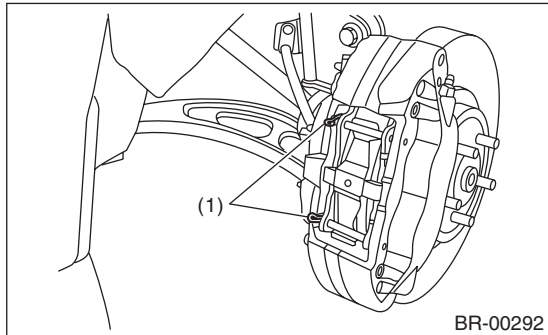
1. GENERAL TOOL

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

2. Front Brake Pad

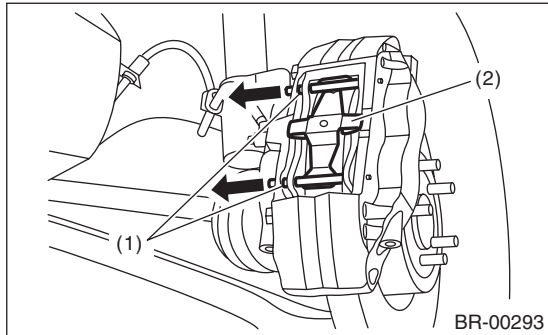
A: REMOVAL

- 1) Lift up the vehicle, and remove the front wheels.
- 2) Remove the clips.



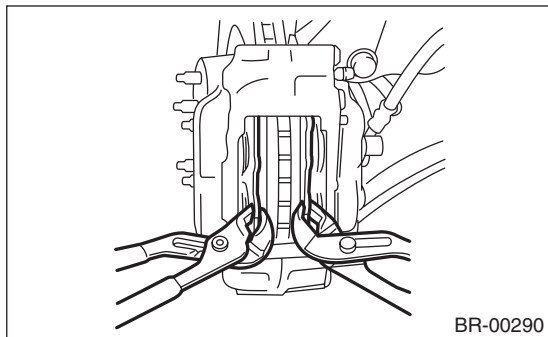
(1) Clip

- 3) Remove the pad pins and cross spring.

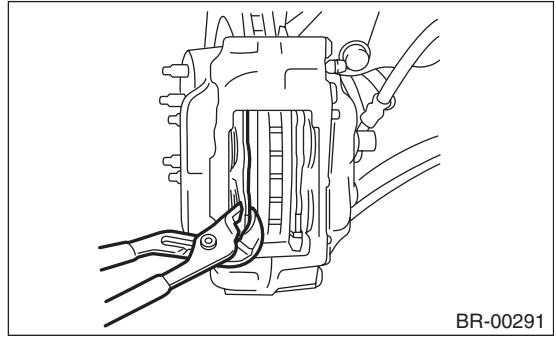


(1) Pad pin
(2) Cross spring

- 4) Spread apart the pads using a pair of wrenches and push back the piston.



- 5) Remove the pads.



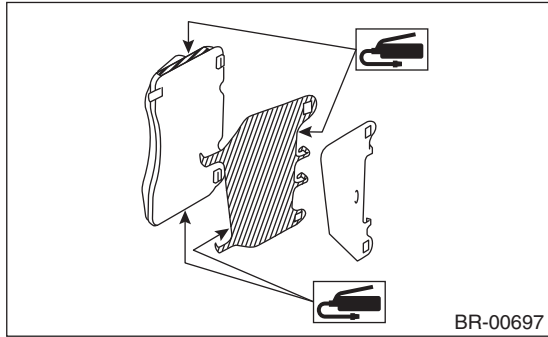
Front Brake Pad

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B: INSTALLATION

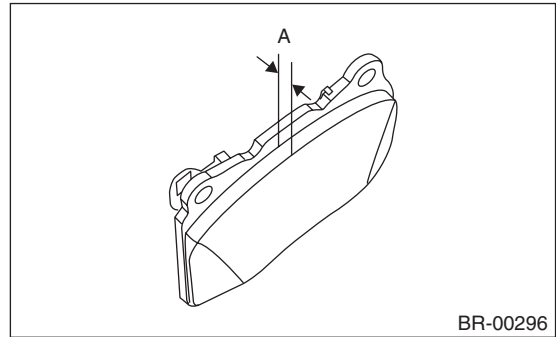
1) Apply a thin coat of Molykote AS880N (Part No. K0777YA010) or the pad kit grease to both surfaces of the pad side and pad shim.



- 2) Install the pads to the caliper body.
- 3) Install the cross spring.
- 4) Install the pad pins.
- 5) Install the clips.

C: INSPECTION

Check the pad thickness A.



Pad thickness mm (in)	Standard	8.9 (0.35)
	Wear limit	1.2 (0.047)

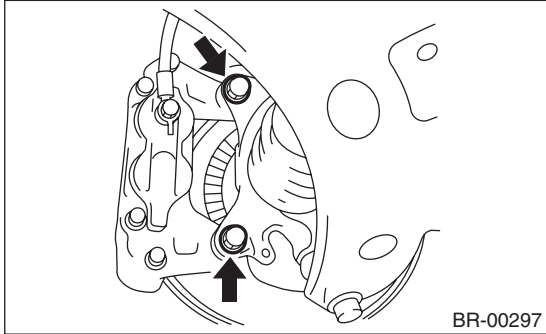
NOTE:

- Always replace the pads of both sides as a set on both wheels.
- Replace the cross spring and pad pins if they are twisted or worn.
- A wear indicator is installed on the outer disc brake pad. If the pad is worn to the limit, the end of wear indicator contacts disc rotor, and a squeaking sound is heard as the wheel rotates. If the sound is heard, replace the pad.
- Replace the pad if there is oil or grease on it.

3. Front Disc Rotor

A: REMOVAL

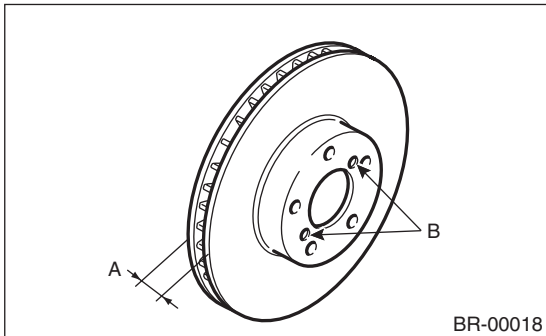
- 1) Lift up the vehicle, and remove the front wheels.
- 2) Remove the caliper body and the support from housing, and suspend it from the strut using a wire.



- 3) Remove the disc rotor.

NOTE:

If it is difficult to remove the disc rotor from the hub, drive an 8 mm bolt into the threaded section (B) of the rotor, then remove the rotor.



- 4) Remove mud and foreign matter from the caliper body.

B: INSTALLATION

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

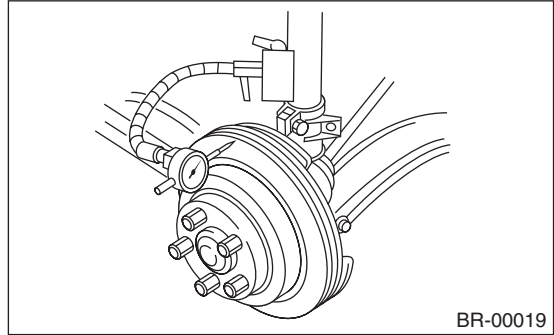
Tightening torque:

155 N·m (15.8 kgf-m, 114.3 ft-lb)

- 3) Install the front wheels.

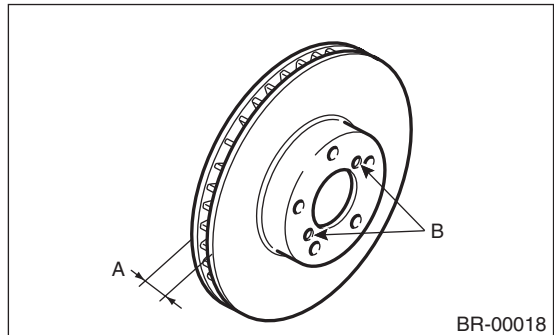
C: INSPECTION

- 1) Check the front wheel bearing play and axle hub runout before the inspection of disc rotor runout limit. <Ref. to DS-16, INSPECTION, Front Axle.>
- 2) Secure the disc rotor by tightening the five wheel nuts.
- 3) Set a dial gauge 10 mm (0.39 in) inward from the disc rotor outer circumference. Rotate the disc rotor to check runout. If the runout of disc rotor exceeds the service limit, grind the disc rotor. After grinding, check the thickness of the disc rotor according to the procedure in step 4).



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

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



	Standard	Limit	Disc rotor outer diameter
Disc rotor thickness A mm (in)	30 (1.18)	28 (1.10)	326 (12.83)

Front Disc Brake Assembly

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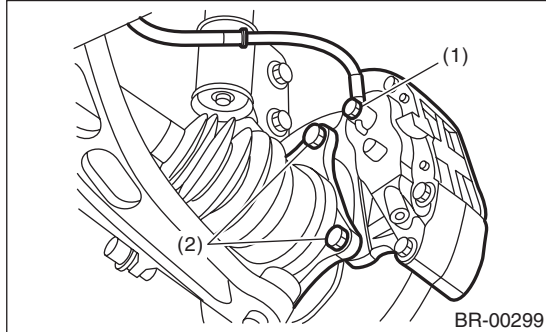
4. Front Disc Brake Assembly

A: REMOVAL

CAUTION:

Do not allow brake fluid to come in contact with vehicle body. If it does, wash off with water immediately and wipe away completely.

- 1) Lift up the vehicle, and remove the front wheels.
- 2) Remove the union bolt and brake hose from the caliper body.
- 3) Remove the mounting bolts from the housing.



- (1) Union bolt
- (2) Mounting bolt

- 4) Remove mud and foreign matter from the caliper body.

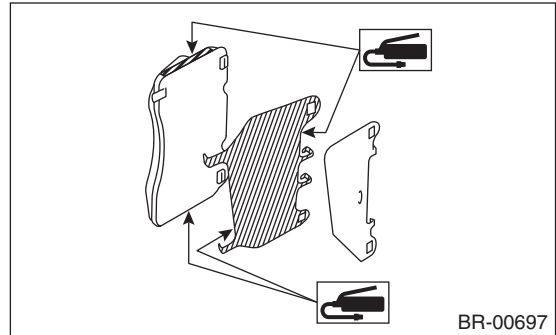
B: INSTALLATION

- 1) Install the caliper body to the housing.

Tightening torque:

155 N·m (15.8 kgf-m, 114.3 ft-lb)

- 2) Apply a thin coat of Molykote AS880N (Part No. K0777YA010) or the pad kit grease to both surfaces of the pad side and pad shim.



- 3) Install the pads to the caliper body.
- 4) Install the cross spring.
- 5) Install the pad pins.
- 6) Install the clips.
- 7) Connect the brake hose using a new brake hose gasket.

Tightening torque:

18 N·m (1.8 kgf-m, 13.0 ft-lb)

- 8) Bleed air from the brake system.

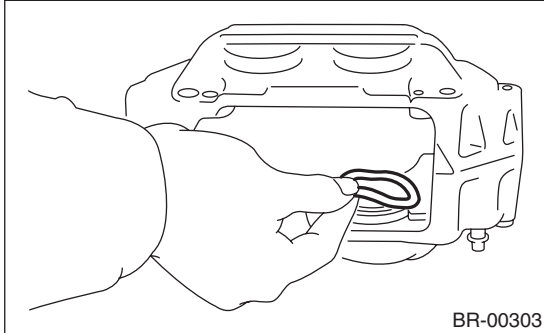
C: DISASSEMBLY

1) Remove mud and foreign matter from the caliper body.

CAUTION:

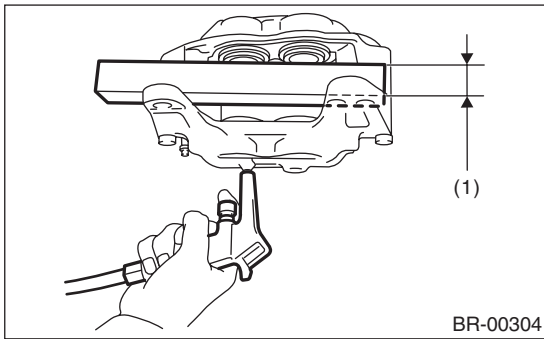
Be careful not to allow foreign matter to enter the brake hose connector.

2) Remove the piston boots from each piston end.



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

4) Gradually apply compressed air via the brake hose installation hole to push the piston out.

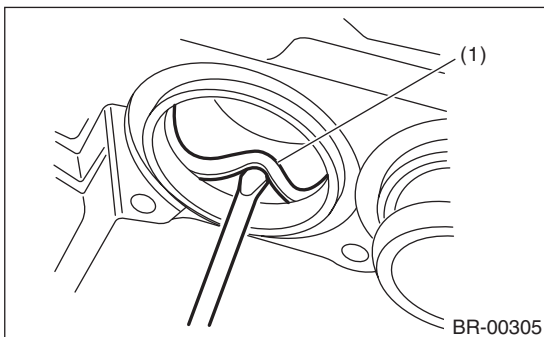


(1) Place a wooden block of 30 mm (1.18 in) width.

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

CAUTION:

Do not damage the cylinder and piston seal groove.



(1) Piston seal

D: ASSEMBLY

1) Clean the inside of the caliper body using brake fluid.

2) Apply a coat of brake fluid to piston seal and install the piston seal to the caliper body groove.

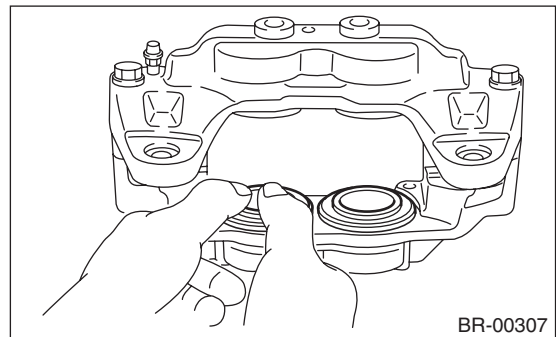
3) Apply a coat of brake fluid to the inner surface of cylinder and the entire outer surface of the piston.

4) Apply NIGLUBE RX-2 (Part No. 000041000) or the piston kit grease to the boot, and install to the piston groove.

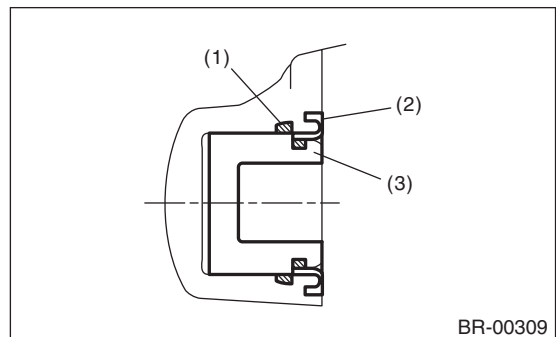
5) Insert the piston into the cylinder.

CAUTION:

Do not force the piston into cylinder.



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



(1) Piston seal

(2) Piston boot

(3) Piston

E: INSPECTION

1) Repair or replace the faulty parts.

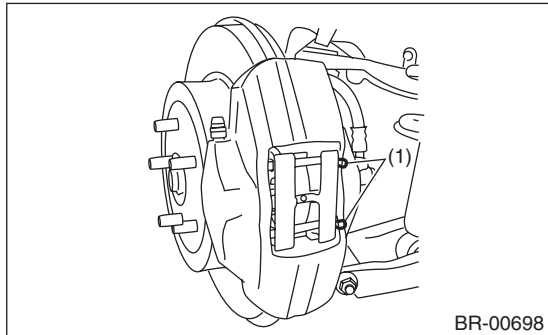
2) Check the caliper body and piston for uneven wear, damage or rust.

3) Check the rubber parts for damage or deterioration.

5. Rear Brake Pad

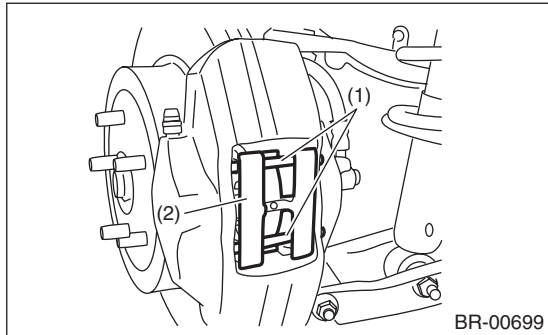
A: REMOVAL

- 1) Lift up the vehicle, then remove the rear wheels.
- 2) Remove the clips.



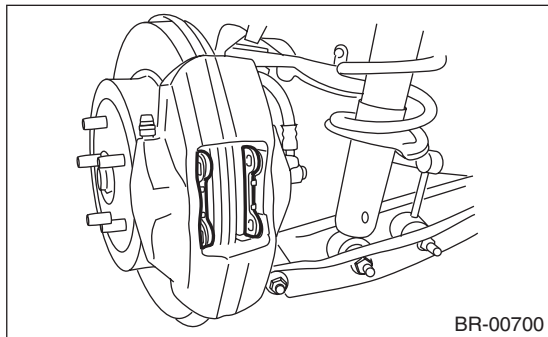
(1) Clip

- 3) Remove the pad pins and cross spring.



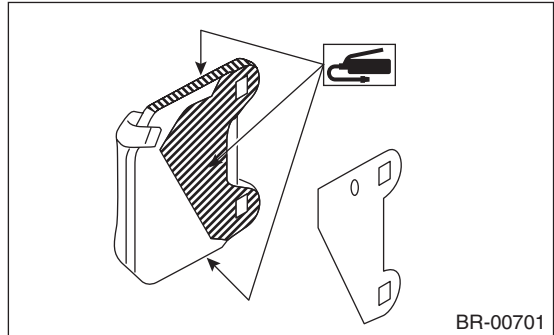
(1) Pad pin
(2) Cross spring

- 4) Spread apart the pads and push back the piston.
- 5) Remove the pads.



B: INSTALLATION

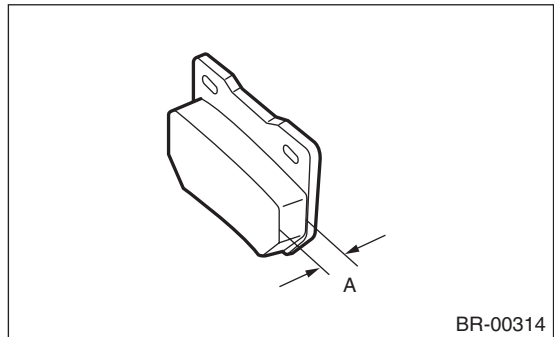
- 1) Apply a thin coat of Molykote AS880N (Part No. K0777YA010) or the pad kit grease to both surfaces of the pad side and pad shim.



- 2) Install the pads to the caliper body.
- 3) Install the cross spring and pad pins.
- 4) Install the clips.

C: INSPECTION

Check the pad thickness A.



Pad thickness	Standard	9.0 (0.354)
	mm (in)	Wear limit

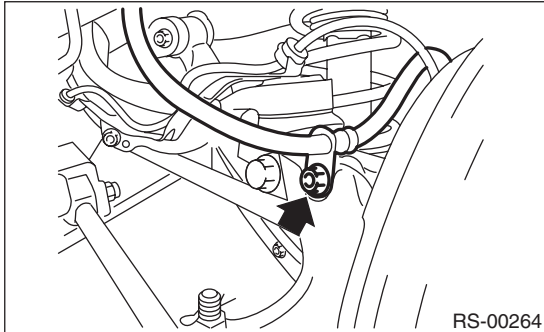
NOTE:

- Always replace the pads of both sides as a set on both wheels.
- Replace the cross spring and pad pins if they are twisted or worn.
- A wear indicator is installed on the outer disc brake pad. If the pad is worn to the limit, the end of wear indicator contacts disc rotor, and a squeaking sound is heard as the wheel rotates. If the sound is heard, replace the pad.
- Replace the pad if there is oil or grease on it.

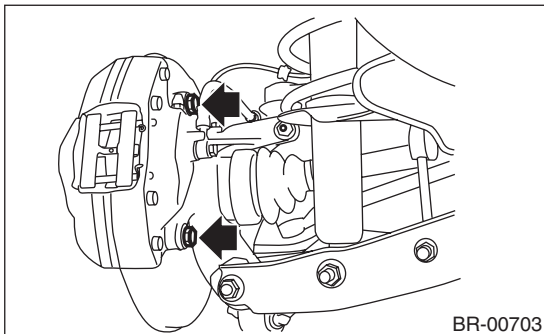
6. Rear Disc Rotor

A: REMOVAL

- 1) Lift up the vehicle, then remove the rear wheels.
- 2) Release the parking brake.
- 3) Remove the brake hose bracket.



- 4) Remove the two mounting bolts and disc brake assembly.

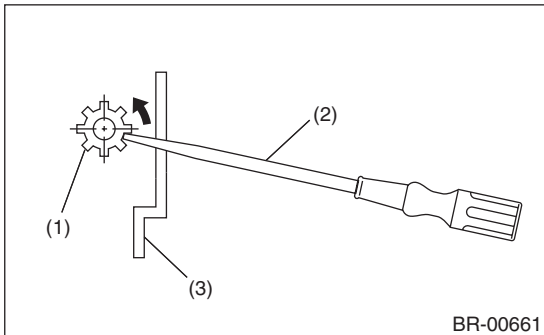


- 5) Suspend the disc brake assembly so that the hose is not stretched.
- 6) Remove the disc rotor.

NOTE:

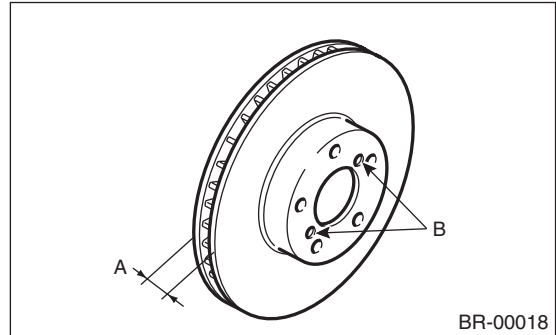
If it is difficult to remove the disc rotor, perform the following two methods in order.

- (1) Turn the adjuster using a flat tip screwdriver until the brake shoe is far enough away to allow removal of the disc rotor.



- (1) Adjuster
- (2) Flat tip screwdriver
- (3) Disc rotor

- (2) If it is difficult to remove the disc rotor from the hub, drive an 8 mm bolt into the threads B of the rotor, then remove the rotor.



B: INSTALLATION

- 1) Install in the reverse order of removal.

Tightening torque:

Brake hose bracket

33 N·m (3.4 kgf-m, 24.3 ft-lb)

Caliper body

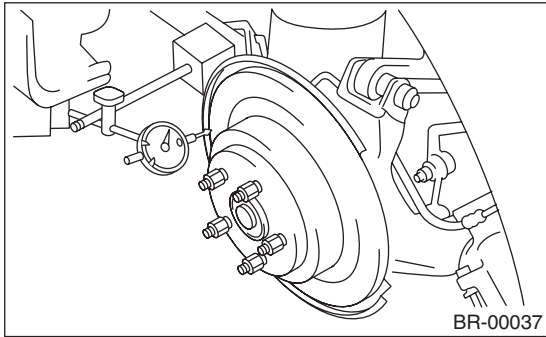
65 N·m (6.6 kgf-m, 47.9 ft-lb)

- 2) Adjust the parking brake. <Ref. to PB-8, ADJUSTMENT, Parking Brake Assembly (Rear Disc Brake).>

BRAKE

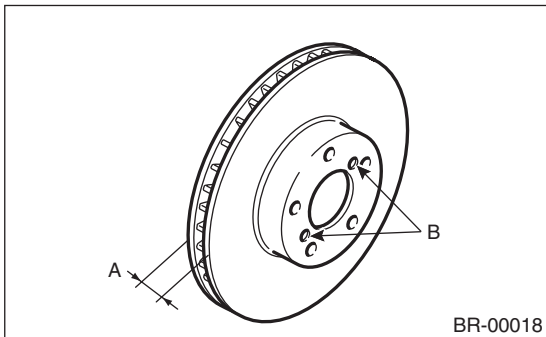
C: INSPECTION

- 1) Check the rear wheel bearing play and axle hub runout before inspecting the disc rotor runout. <Ref. to DS-24, INSPECTION, Rear Hub Unit Bearing.>
- 2) Secure the disc rotor by tightening the five wheel nuts.
- 3) Set a dial gauge 10 mm (0.39 in) inward from the disc rotor outer circumference. Rotate the disc rotor to check runout. If the runout of disc rotor exceeds the service limit, grind the disc rotor. After grinding, check the thickness of the disc rotor according to the procedure in step 4).



**Disc rotor runout limit:
0.07 mm (0.0028 in)**

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



	Standard	Limit	Disc outer dia.
Disc rotor thickness A	20 (0.79)	18 (0.71)	316 (12.44)
	mm (in)		

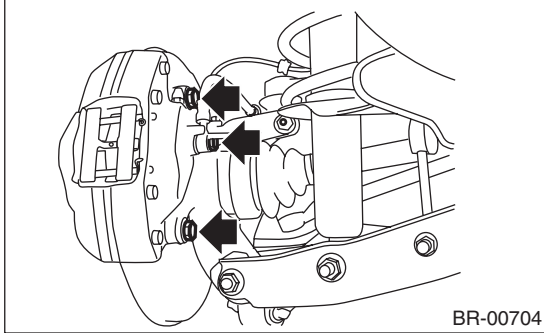
7. Rear Disc Brake Assembly

A: REMOVAL

CAUTION:

Do not allow brake fluid to come in contact with vehicle body. If it does, wash off with water and wipe away completely.

- 1) Lift up the vehicle, then remove the rear wheels.
- 2) Remove the caliper body.



- 3) Remove mud and foreign matter from the caliper body assembly.

CAUTION:

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

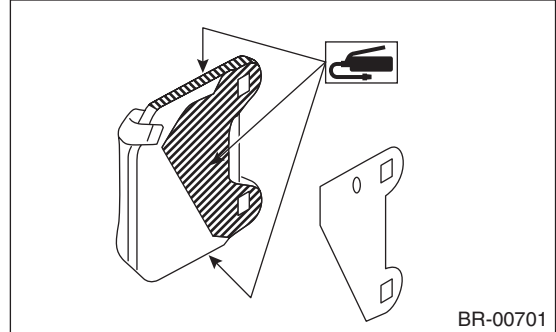
B: INSTALLATION

- 1) Install the caliper body to the housing.

Tightening torque:

65 N·m (6.6 kgf-m, 47.9 ft-lb)

- 2) Apply a thin coat of Molykote AS880N (Part No. K0777YA010) or the pad kit grease to both surfaces of the pad side and pad inner shim.



- 3) Install the pads to the caliper body.
- 4) Install the cross spring and pad pins.
- 5) Install the clips.
- 6) Connect the brake hose using a new brake hose gasket.

Tightening torque:

18 N·m (1.8 kgf-m, 13.0 ft-lb)

- 7) Bleed air from the brake system.

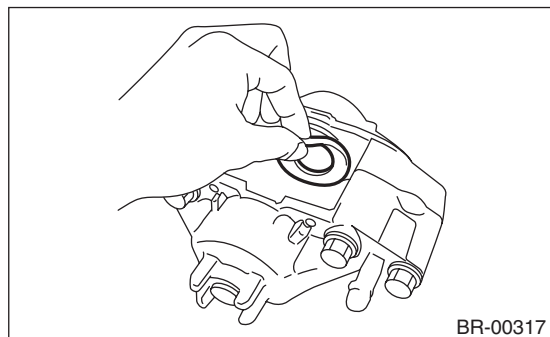
Rear Disc Brake Assembly

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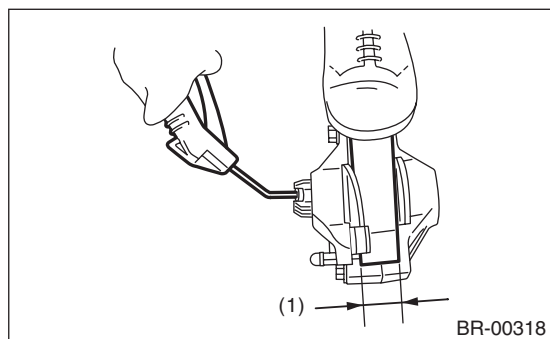
BRAKE

C: DISASSEMBLY

- 1) Remove the piston boots from each piston end.



- 2) Place a wooden block in the caliper body as shown in the figure to prevent the piston from jumping out and being damaged.
- 3) Gradually apply compressed air via the brake hose installation hole to push the piston out.

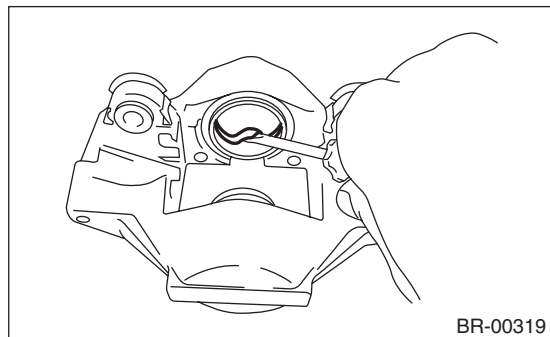


- (1) Place a wooden block of 20 mm (0.79 in) width.

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

CAUTION:

Do not damage the cylinder and piston seal groove.



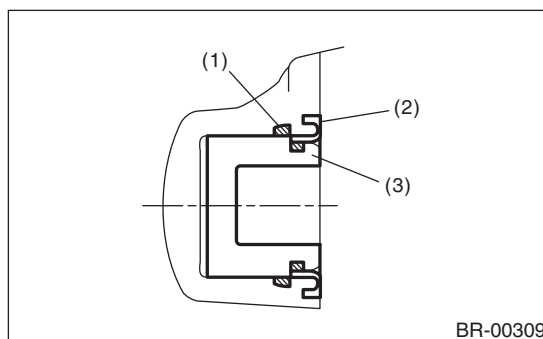
D: ASSEMBLY

- 1) Clean the inside of the caliper body using brake fluid.
- 2) Apply a coat of brake fluid to the piston seal and install in the caliper body groove.
- 3) Apply a coat of brake fluid to the inner surface and the entire outer surface of the cylinder.
- 4) Apply NIGLUBE RX-2 (Part No. 000041000) or the pad kit grease to the boot, and install to the piston groove.
- 5) Insert the piston into the cylinder.

CAUTION:

Do not force the piston into cylinder.

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



- (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. If it does, wash off with water and wipe away completely.

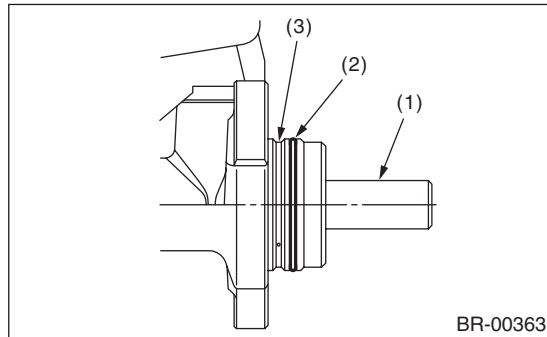
- 1) Drain brake fluid from the reservoir tank completely.
- 2) Disconnect the harness connector of the fluid level gauge.
- 3) Remove the brake pipe from the master cylinder.
- 4) Remove the master cylinder mounting nuts, and carefully remove the master cylinder from the brake booster.

B: INSTALLATION

- 1) Replace the O-ring for the master cylinder with a new part.

CAUTION:

Be careful not to install the O-ring in the wrong location.



- (1) Primary piston
- (2) O-ring
- (3) Do not install the O-ring on this groove.

- 2) Install in the reverse order of removal.

Tightening torque:

Master cylinder mounting nut

13 N·m (1.3 kgf-m, 9.6 ft-lb)

Piping flare nut

15 N·m (1.5 kgf-m, 10.8 ft-lb)

CAUTION:

Be sure to use recommended brake fluid.

- 3) Bleed air from brake system. <Ref. to BR-29, PROCEDURE, Air Bleeding.>

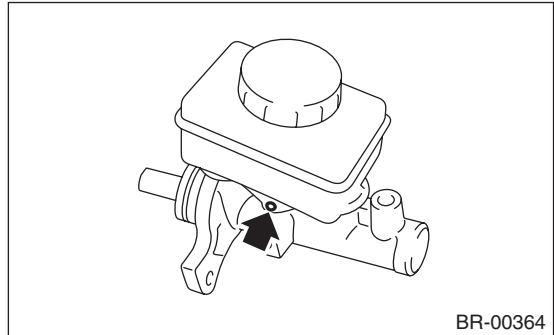
C: REPLACEMENT

- 1) Remove mud and dirt from the surface of brake master cylinder.
- 2) Secure the master cylinder in a vise.

NOTE:

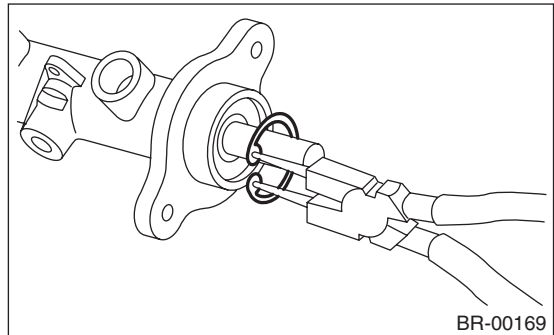
To avoid damaging the master cylinder, place between aluminum plates or other material when holding with a vise.

- 3) Remove the pin which secures the master cylinder and reservoir tank, then remove the reservoir tank and seal.



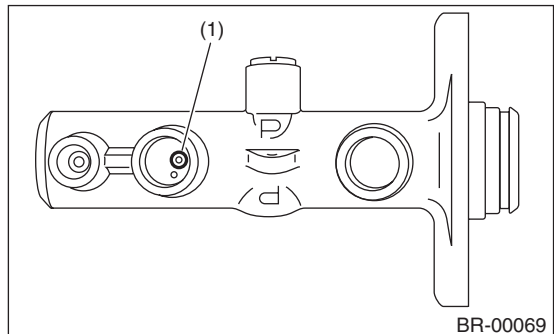
BR-00364

- 4) While pushing in the primary piston, remove the C-ring using pliers.



BR-00169

- 5) While pushing in the primary piston, remove the cylinder pin from the port on the reservoir tank attachment location using a magnet pick-up tool.



BR-00069

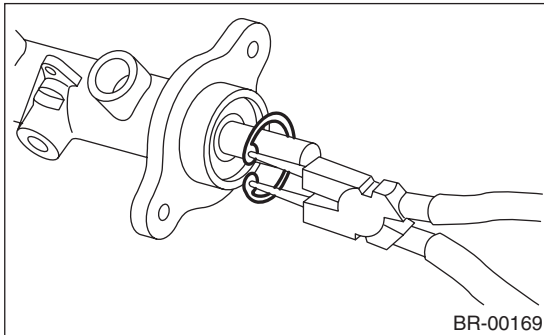
- (1) Cylinder pin

Master Cylinder

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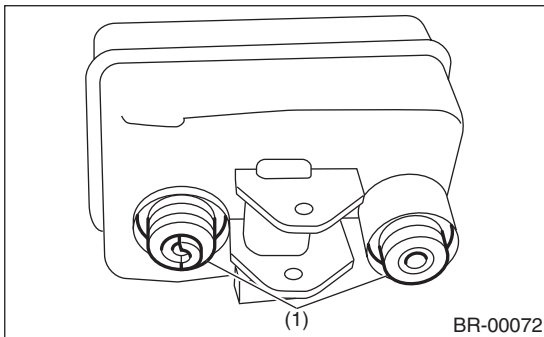
BRAKE

- 6) Extract the primary piston assembly and secondary piston assembly straight out while taking care not to scratch the inner surface of the cylinder.
- 7) Clean the inside of master cylinder with brake fluid. Check the inside of the cylinder for damage, deformation and wear. Replace the master cylinder as an assembly if faulty.
- 8) Apply brake fluid to the inner surface of master cylinder and piston assembly.
- 9) Make sure that the inner surface of master cylinder and the piston assembly are free of foreign matter. Install the primary piston assembly and the secondary piston assembly to master cylinder, while taking care not to scratch the master cylinder inner surface.
- 10) While pushing-in the primary piston, install the cylinder pin.
- 11) While pushing-in the primary piston, install the C-ring to the groove using pliers.



CAUTION:
Make sure the C-ring is installed to the groove securely.

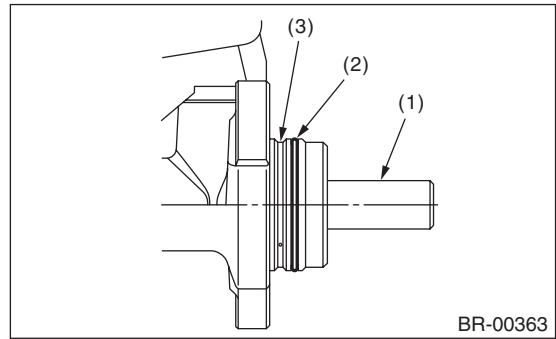
- 12) Install the seal to reservoir tank.



(1) Seal

- 13) Install the reservoir tank to the master cylinder, and secure with pin.

- 14) Replace the O-ring for the master cylinder with a new part.



- (1) Primary piston
- (2) O-ring
- (3) Do not install the O-ring on this groove.

D: INSPECTION

Inspect for brake fluid leakage from the master cylinder.

NOTE:

After replacing the piston kit, if a brake fluid leakage is found even though there is no damage or scratches on the inside of the cylinder, the master cylinder inner wall may be worn. In this case, replace the master cylinder as an assembly.

9. Brake Booster

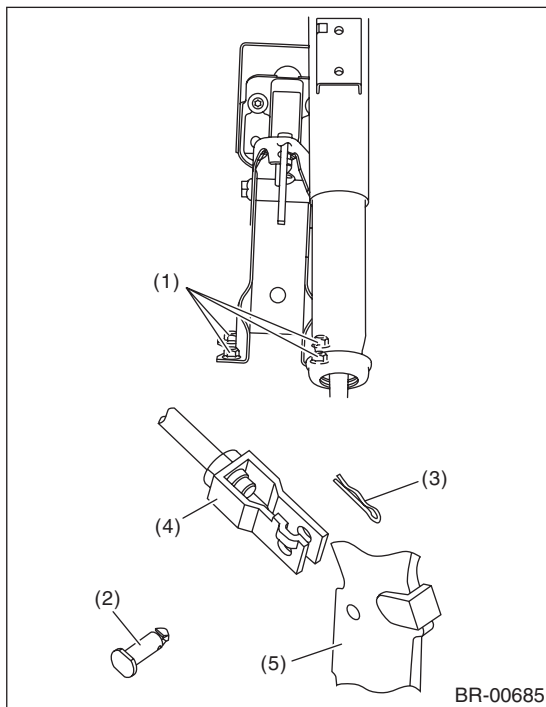
A: REMOVAL

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

- (1) Disconnect the connector of brake fluid level gauge.
- (2) Remove the brake pipe from the 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
- (5) Brake pedal

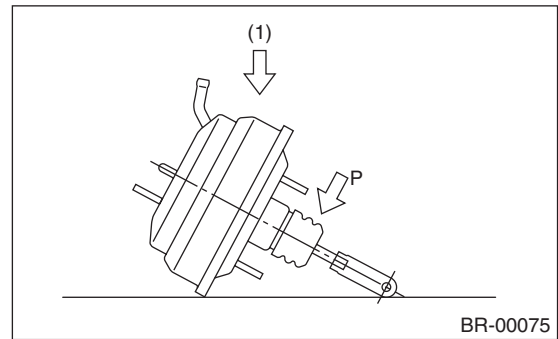
3) Remove the brake booster while avoiding the brake pipe.

NOTE:

- Make sure that the booster shell and vacuum pipe are not subject to strong impacts.
- 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 the operating rod, the angle may change by $\pm 3^\circ$, and it may result in damage to power piston cylinder.
- Be careful when placing the brake booster on floor.
- Do not change the push rod length.

CAUTION:

- **Do not disassemble the brake booster.**
- **If external force is applied from above when brake booster is placed in this position, the resin portion as indicated by "P" may become damaged.**



(1) Force

Brake Booster

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BRAKE

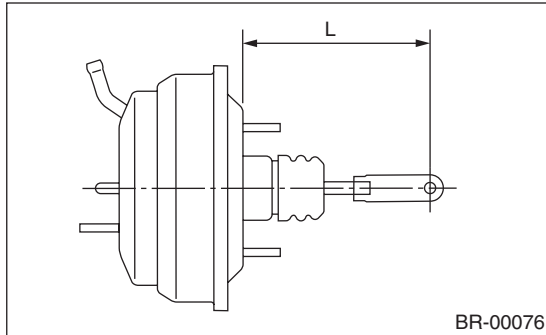
B: INSTALLATION

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

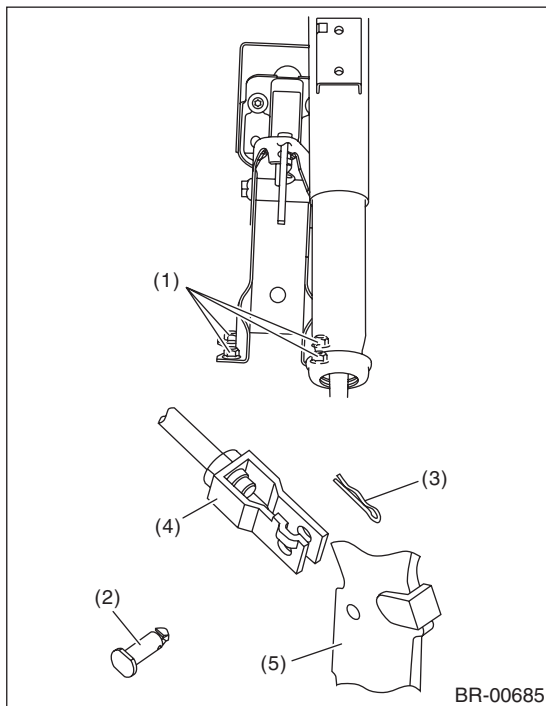
Specification L:

136.3 mm (5.37 in)

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



- 2) Mount the brake booster in position.
- 3) Install clevis pin and snap pin which secure the operating rod to the brake pedal.



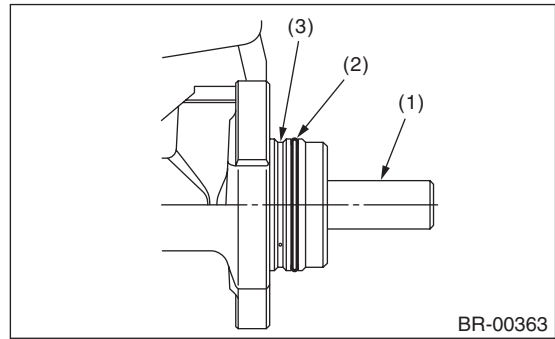
- (1) Nut
- (2) Clevis pin
- (3) Snap pin
- (4) Operating rod
- (5) Brake pedal

NOTE:

Apply a thin coat of KOPR-KOTE (Part No. 003603001) to the clevis pin.

4) Connect the vacuum hose to the brake booster.

5) After replacing the O-ring, install the master cylinder to brake booster.



- (1) Primary piston
- (2) O-ring
- (3) Do not install the O-ring on this groove.

- 6) Connect the brake pipes to the master cylinder.
- 7) Connect the connector of the brake fluid level gauge.
- 8) Apply grease to the operating rod connecting pin to prevent it from wear.
- 9) Bleed air from brake system.

Tightening torque (air bleeder screw):

20 N·m (2.0 kgf-m, 14.5 ft-lb)

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

C: INSPECTION

NOTE:

If the vehicle is equipped with a brake assist mechanism, the following may result when the brake pedal is depressed. They are normal conditions that occur when the mechanism is performing properly.

- Brake feel is soft when brake pedal is depressed hard or quicker than usual.
- A light crack is heard when brake pedal is depressed hard or quicker than usual.

1. OPERATION CHECK (WITHOUT GAUGES)

CAUTION:

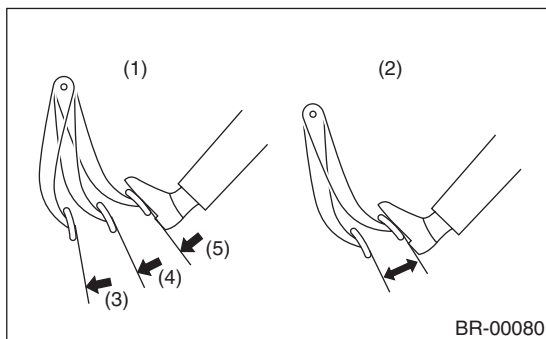
When checking operation, be sure to apply the parking brake securely.

• CHECK WITHOUT GAUGES

This method can not determine exactly what part is defective. 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 no change occurs in the pedal height when pressed, the brake booster is faulty.



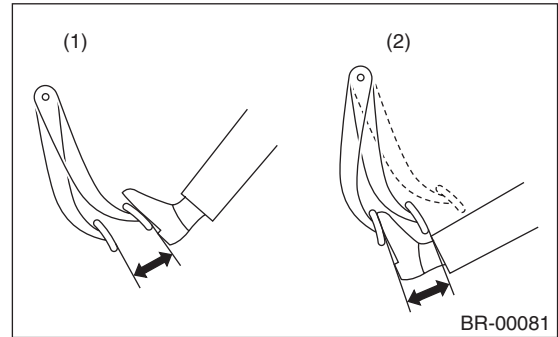
- (1) Normal operation
- (2) Not OK
- (3) 1st
- (4) 2nd
- (5) 3rd

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 no improvement is observed, check precisely with gauges.

• 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 the brake pedal depressed, start the engine.

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

NOTE:

If faulty, check precisely with gauges.

• LOADED AIR TIGHTNESS CHECK

Depress the brake pedal while the engine is running, and turn the engine to OFF while the pedal is 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 precisely with gauges.

BRAKE

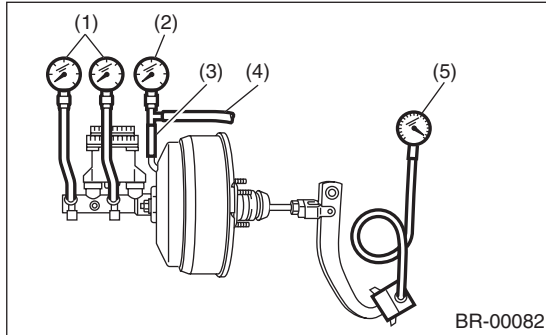
2. OPERATION CHECK (WITH GAUGE)

CAUTION:

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

• CHECK WITH GAUGE

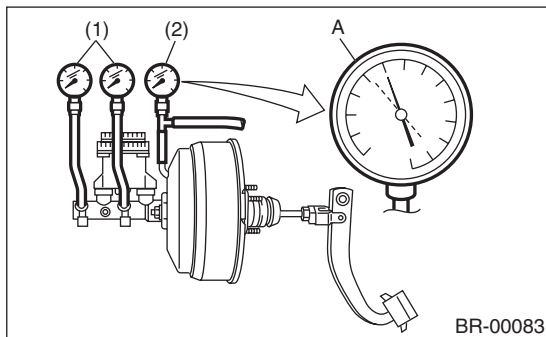
Connect the gauge as shown in the figure. After bleeding air from the pressure gauge, perform each check.



- (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 point A of the 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

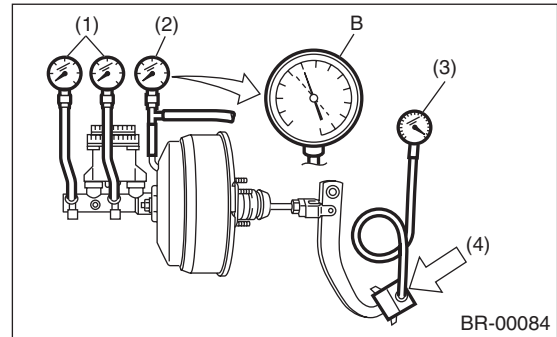
2) Stop the engine and check the gauge. If the vacuum pressure drop within 15 seconds after stopping the engine is 3.3 kPa (25 mmHg, 0.98 inHg) or less, the function of brake booster is normal.

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
- 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 lbf). Keep the engine running and keep the pedal pressed until a vacuum of point B = 66.7 kPa (500 mmHg, 19.69 inHg) is indicated on the vacuum gauge.



- (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 3.3 kPa (25 mmHg, 0.98 inHg) or less, the function of brake booster is normal. If defective, refer to "AIR TIGHTNESS CHECK".
<Ref. to BR-25, INSPECTION, Brake Booster.>

Brake Booster

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BRAKE

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

• LACK OF BOOST 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 N (kgf, lbf)	147 (15, 33)	294 (30, 66)
Fluid pressure kPa (kgf/cm ² , psi)	545 (6, 79)	1,564 (16, 227)

• 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 N (kgf, lbf)	147 (15, 33)	294 (30, 66)
Fluid pressure kPa (kgf/cm ² , psi)	4,984 (51, 723)	10,249 (105, 1,486)

10.Brake Fluid

A: INSPECTION

- 1) Check that the brake fluid level is between “MIN” and “MAX”. If out of the specified range, refill or drain fluid. If the fluid level is close to “MIN”, check the brake pad for wear and refill the fluid.
- 2) Check the fluid for discoloration. If the fluid color has changed excessively, drain the fluid and refill with new fluid.

B: REPLACEMENT

CAUTION:

- Do not let brake fluid come into contact with the painted surface of the vehicle body. Wash away with water immediately and wipe off if it is spilled by accident.
- Avoid mixing brake fluid of different brands to prevent fluid performance from degrading.
- Be careful not to allow dirt or dust to enter the reservoir tank.

NOTE:

- During the operation, keep the reservoir tank filled with brake fluid to eliminate entry of air.
 - Operate the brake pedal slowly.
 - For convenience and safety, two people should work together.
 - The required amount of brake fluid is approximately 500 mℓ (16.9 US fl oz, 17.6 Imp fl oz) for the entire brake system.
- 1) Lift up the vehicle and set rigid racks at the specified locations, or keep the vehicle lifted.
 - 2) Remove both the front and rear wheels.
 - 3) Drain brake fluid from the reservoir tank.
 - 4) Refill the reservoir tank with the recommended brake fluid.

Recommended brake fluid:

Refer to “General Description”. <Ref. to BR-2, SPECIFICATION, General Description.>

Perform the same procedure as for bleeding the brake line, until new brake fluid comes out from vinyl tube. <Ref. to BR-29, PROCEDURE, Air Bleeding.>

11. Air Bleeding

A: PROCEDURE

CAUTION:

- Do not let brake fluid come into contact with the painted surface of the vehicle body. Wash away with water immediately and wipe off if it is spilled by accident.
- Avoid mixing brake fluid of different brands to prevent fluid performance from degrading.
- Be careful not to allow dirt or dust to enter the reservoir tank.

1. MASTER CYLINDER

NOTE:

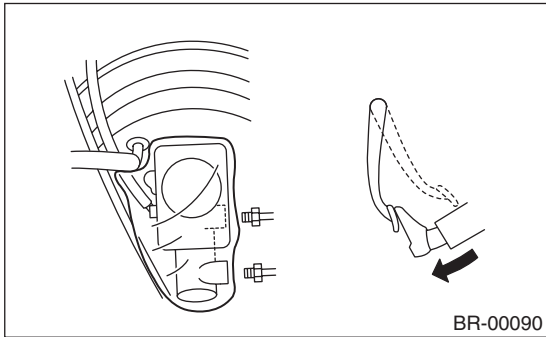
- When the master cylinder is disassembled or the reservoir tank is empty, bleed the master cylinder.
- If bleeding of the master cylinder is not necessary, omit the following procedures, and perform bleeding of the brake line. <Ref. to BR-30, BRAKE LINE, PROCEDURE, Air Bleeding.>

1) Fill the reservoir tank of the master cylinder with brake fluid.

NOTE:

While bleeding air, keep the reservoir tank filled with brake fluid to prevent entry of air.

- 2) Disconnect the brake line at primary and secondary sides.
- 3) Wrap the master cylinder with a plastic bag.
- 4) Depress the brake pedal slowly and hold it.

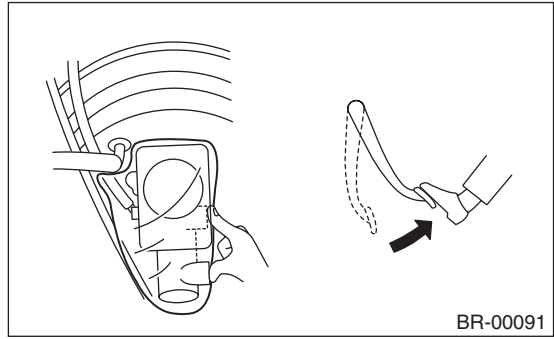


NOTE:

If the vehicle is equipped with a brake assist mechanism, the following may result when the brake pedal is depressed. They are normal conditions that occur when the mechanism is performing properly.

- Brake feel is soft when brake pedal is depressed hard or quicker than usual.
- A light crack is heard when brake pedal is depressed hard or quicker than usual.

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



- 6) Repeat the step 4) and 5) several times.
- 7) Remove the plastic bag.
- 8) Install the brake pipe to the master cylinder.

Tightening torque:

19 N·m (1.9 kgf-m, 14.0 ft-lb)

9) Bleed air from the brake line. <Ref. to BR-30, BRAKE LINE, PROCEDURE, Air Bleeding.>

BRAKE

2. BRAKE LINE

1) When the master cylinder is disassembled or the reservoir tank is empty, bleed the master cylinder before bleeding the brake line. <Ref. to BR-29, MASTER CYLINDER, PROCEDURE, Air Bleeding.>

2) Fill the reservoir tank of the master cylinder with brake fluid.

NOTE:

While bleeding air, keep the reservoir tank filled with brake fluid to prevent entry of air.

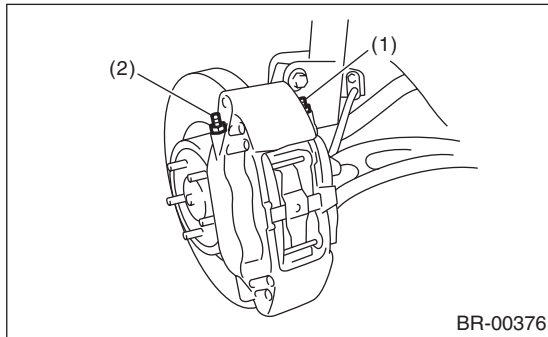
3) Attach one end of the vinyl tube to the air bleeder and the other end to the brake fluid container.

4) Depress the brake pedal several times, and hold it.

5) Loosen the air bleeder screw to drain brake fluid. Tighten the air bleeder quickly, and release the brake pedal.

NOTE:

- Bleed air in order starting from the wheel cylinder farthest from the master cylinder.
- For calipers with two air bleeder screws, bleed air from the inner side first and then the outer side. Repeat this operation at least twice.



- (1) Inner side air bleeder screw
- (2) Outer side air bleeder screw

6) Repeat the steps 4) to 5) until there are no more air bubbles in the vinyl tube.

7) Repeat the steps from 2) to 6) above to bleed air from each wheel.

8) Securely tighten the air bleeder screws.

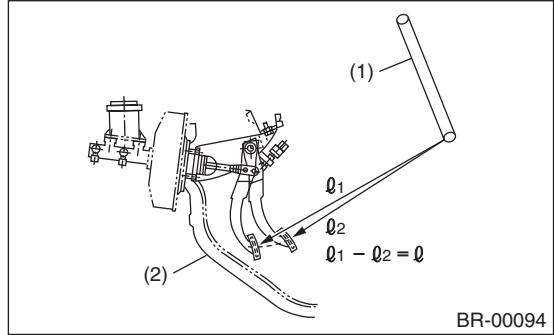
Tightening torque:

20 N·m (2.0 kgf·m, 14.5 ft·lb)

9) Check that there are no brake fluid leaks in the entire system.

10) Check the pedal stroke.

Run the engine at idle after warming up the engine, and depress the brake pedal with a force of 500 N (51 kgf, 112 lbf). Measure the distance between the brake pedal and steering wheel. Release the pedal, and measure the distance between pedal and steering wheel again.



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

Specification of pedal stroke:

When depressing the pedal with a force of 500 N (51 kgf, 112 lbf).

95 mm (3.74 in) or less

11) If the distance is more than specification, there is a possibility of air being caught in the brake line. Bleed the brake line of all air until the pedal stroke meets the specification.

12) Operate the hydraulic control unit in the sequence control mode. <Ref. to VDC-14, ABS Sequence Control.>

13) Check the pedal stroke again.

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

15) Fill the reservoir tank with brake fluid up to the "MAX" level.

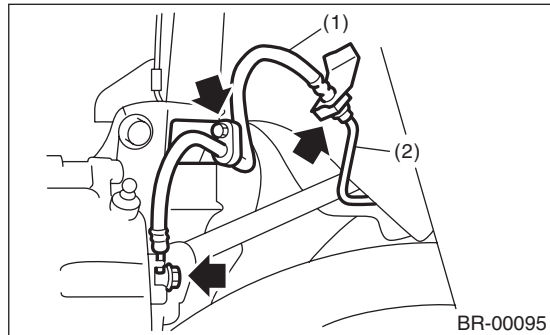
16) Test run the vehicle and ensure that the brakes operate normally.

12.Brake Hose

A: REMOVAL

1. FRONT BRAKE HOSE

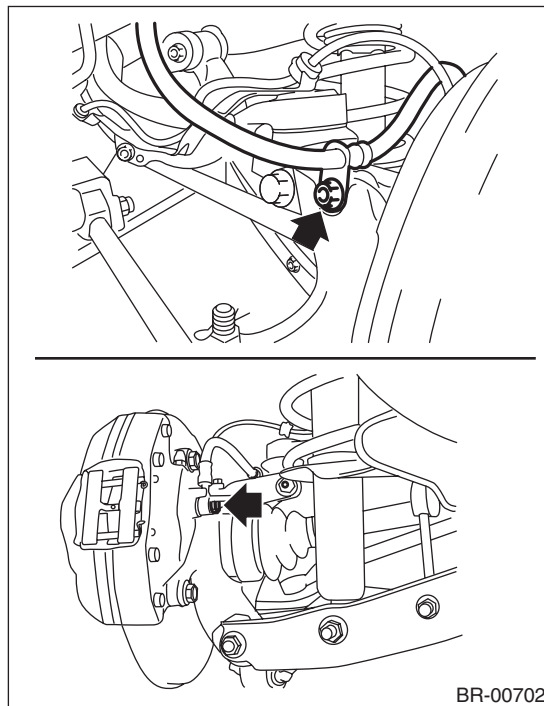
- 1) Separate the brake pipe from brake hose using a flare nut wrench.
- 2) Remove the clamp, the strut mount bolts, and union bolt.



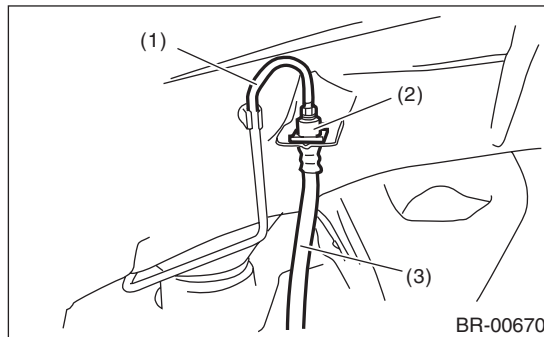
- (1) Brake hose
- (2) Brake pipe

2. REAR BRAKE HOSE

- 1) Remove union bolt and brake hose bracket bolt.



- 2) Separate the brake pipe from brake hose using a flare nut wrench.
- 3) Remove the clamp, and then remove the brake hose.



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

BRAKE

B: INSTALLATION

1. FRONT BRAKE HOSE

- 1) Secure the brake hose to strut mount.

Tightening torque:

33 N·m (3.4 kgf·m, 24.3 ft·lb)

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

Tightening torque (union bolt):

18 N·m (1.8 kgf·m, 13.0 ft·lb)

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

CAUTION:

Do not twist the brake hose.

- 4) Temporarily tighten the flare nut which connects brake pipe and hose.
- 5) Secure the brake hose to wheel apron bracket with clamp.
- 6) Tighten the flare nut to the specified torque.

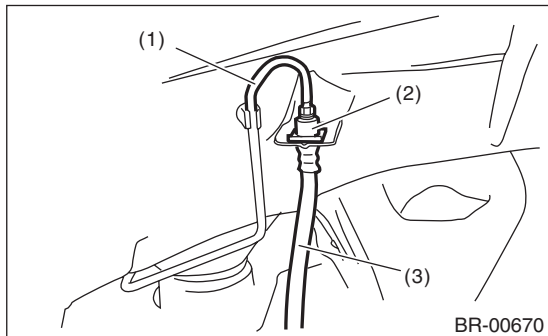
Tightening torque (brake pipe flare nut):

15 N·m (1.5 kgf·m, 10.8 ft·lb)

- 7) Bleed air from the brake system.

2. REAR BRAKE HOSE

- 1) Route the brake hose through the hole of bracket, and lightly tighten the flare nut to connect brake pipe.
- 2) Insert the clamp to secure brake hose.



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

- 3) Install the brake hose bracket.

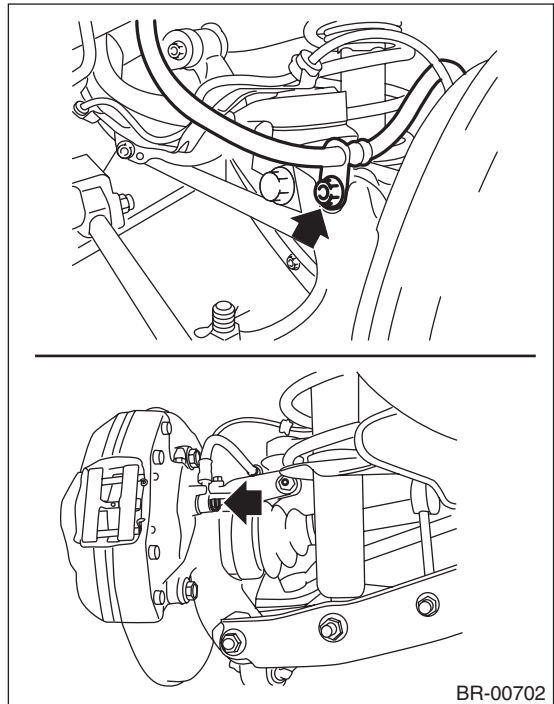
Tightening torque:

33 N·m (3.4 kgf·m, 24.3 ft·lb)

- 4) Install the brake hose to rear brake caliper using a new gasket.

Tightening torque (union bolt):

18 N·m (1.8 kgf·m, 13.0 ft·lb)



- 5) 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)

- 6) Bleed air from the brake system.

C: INSPECTION

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

13.Brake Pipe

A: REMOVAL

NOTE:

The airbag system wiring harness is routed near the center brake pipe.

CAUTION:

- Airbag system wiring harness and connectors are colored yellow. Do not use the 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, do not bend.

B: INSTALLATION

NOTE:

The airbag system wiring harness is routed near the center brake pipe.

CAUTION:

- Airbag system wiring harness and connectors are colored yellow. Do not use the 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, do not bend.
- After installing the brake pipe and hose, perform air bleed.
- After installing the brake hoses, make sure that they do not contact the tires or suspension assembly, etc.

Brake pipe tightening torque:

Refer to "COMPONENT" of "General Description". <Ref. to BR-7, FRONT BRAKE PIPES AND HOSES, COMPONENT, General Description.> <Ref. to BR-8, CENTER AND REAR BRAKE PIPES AND HOSES, COMPONENT, General Description.>

C: INSPECTION

Make sure there are no cracks, breakage or damage on hoses. Check the joint for fluid leakage. If any cracks, breakage, damage or fluid leakage is found, repair or replace the pipes.

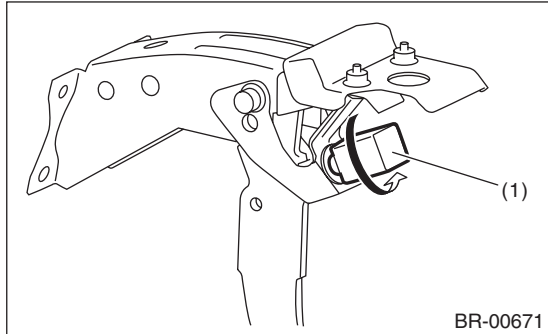
NOTE:

Use a mirror when inspecting back sides and other locations which are hard to see.

14. Brake Pedal

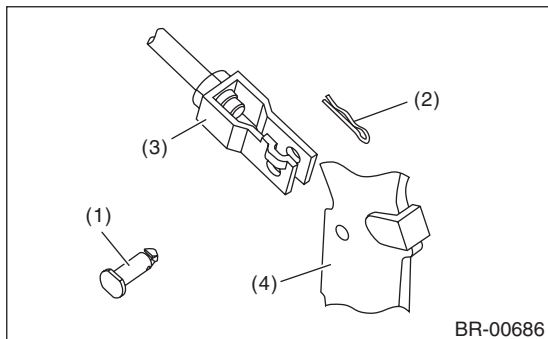
A: REMOVAL

- 1) Remove the steering column. <Ref. to PS-15, REMOVAL, Steering Column.>
- 2) Disconnect the connector from clutch switch.
- 3) Disconnect the connector from stop light switch.
- 4) Turn the stop light switch counterclockwise and remove the switch.



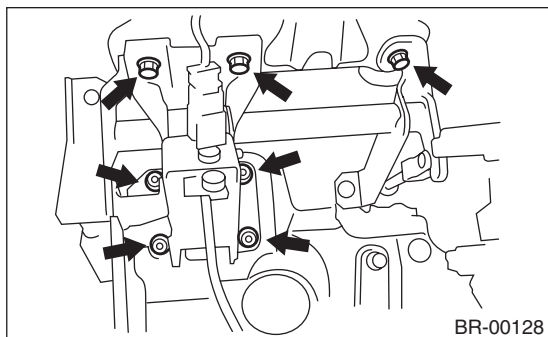
(1) Stop light switch

- 5) Remove the clevis pin which secures the pedal and operating rod.



(1) Clevis pin
(2) Snap pin
(3) Operating rod
(4) Pedal

- 6) Remove the nut which secures the clutch master cylinder.
- 7) Remove the bolt and nut which secures the pedal bracket.



B: INSTALLATION

CAUTION:

- Perform the following steps for the stop light switch.
- Do not install the stop light switch before performing step 2). Otherwise the switch may fall or a condition such as the light being always lit or not lighting properly may occur.

- 1) Install the bolt and nut which secure the brake pedal bracket.

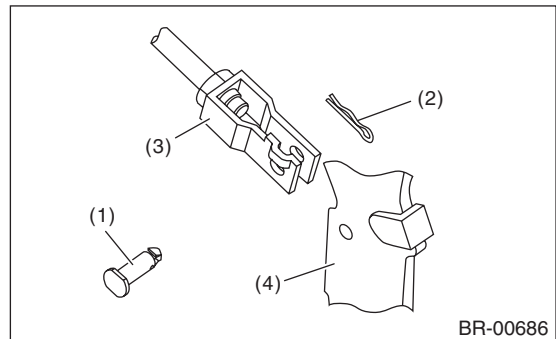
Tightening torque:

18 N·m (1.8 kgf·m, 13.0 ft·lb)

- 2) Install clevis pin and snap pin which secure the operating rod to the brake pedal.

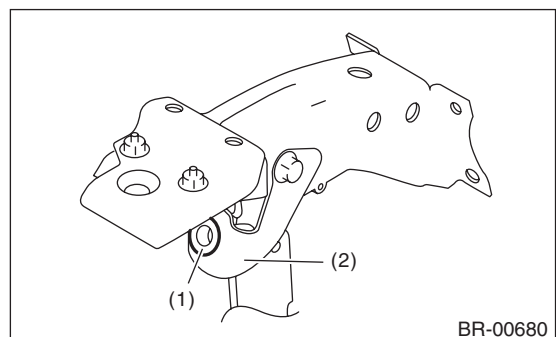
NOTE:

- Replace with a new clevis pin.
- Apply a thin coat of KOPR-KOTE (Part No. 003603001) to the clevis pin.



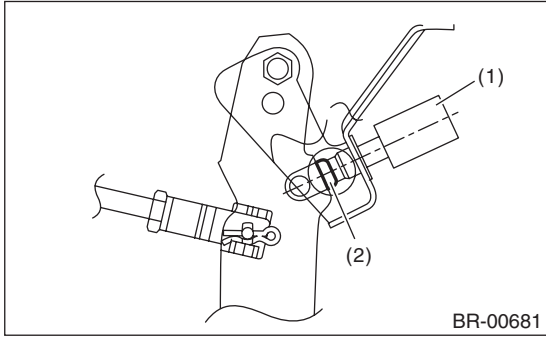
(1) Clevis pin
(2) Snap pin
(3) Operating rod
(4) Brake pedal

- 3) Make sure that the switch clip (gray) is securely installed to the brake pedal bracket.

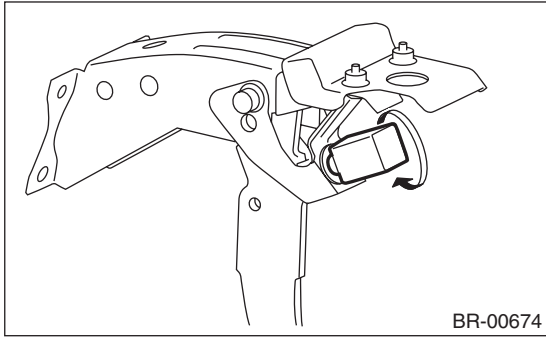


(1) Switch clip
(2) Brake pedal bracket

4) While pulling up the brake pedal, insert the stop light switch to the stopper (brown) at the brake pedal side until it stops. Turn the stop light switch clockwise and install the switch.



- (1) Stop light switch
- (2) Stopper



5) Connect the stop light switch connector.
 6) Check that the brake light operate properly.
 7) Check the brake pedal after installation. <Ref. to BR-35, INSPECTION, Brake Pedal.>

C: INSPECTION

1) Move the brake pedal pads in a horizontal direction with a force of approx. 10 N (1 kgf, 2 lbf), and check that the pedal deflection is in the range of specifications.

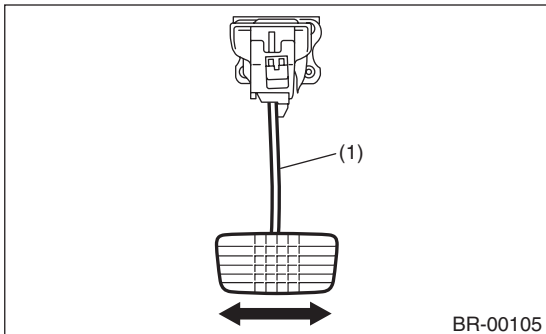
CAUTION:

If excessive deflection is noted, replace with a new bushing.

Deflection of brake pedal:

Service limit

5.0 mm (0.197 in) or less



- (1) Brake pedal

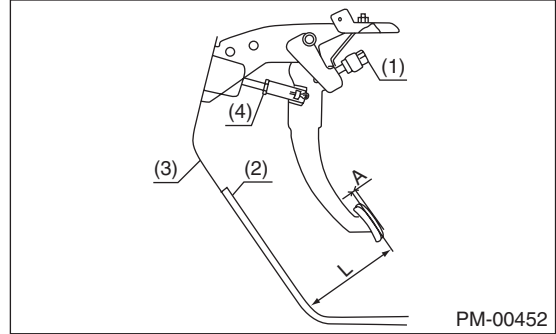
2) Check the position of the pedal pad.

Pedal height L:

150 — 160 mm (5.91 — 6.29 in)

Brake pedal free play A:

0.5 — 2 mm (0.020 — 0.079 in) [When pulling the brake pedal upward with a force of less than 10 N (1 kgf, 2 lbf).]



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

3) If out of specification, perform the procedures below to adjust.

4) Remove the stop light switch. <Ref. to BR-36, REMOVAL, Stop Light Switch.>

5) Loosen the lock nut of the brake booster operating rod, and rotate the rod to adjust the pedal height L to be within the standard value.

6) Tighten the lock nut.

Tightening torque:

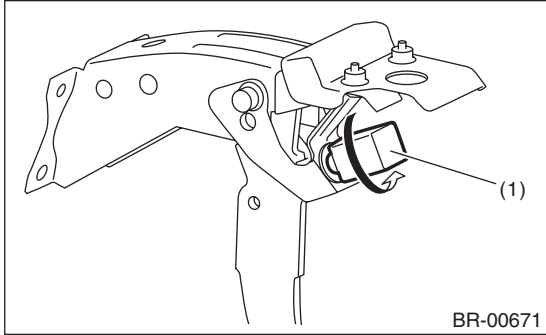
22 N·m (2.2 kgf·m, 16.2 ft·lb)

7) Install the stop light switch. <Ref. to BR-36, INSTALLATION, Stop Light Switch.>

15. Stop Light Switch

A: REMOVAL

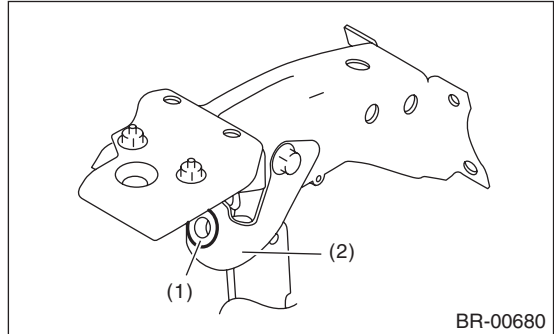
- 1) Disconnect the battery ground cable from the battery.
- 2) Disconnect the stop light switch connector.
- 3) Turn the stop light switch counterclockwise and remove the switch.



(1) Stop light switch

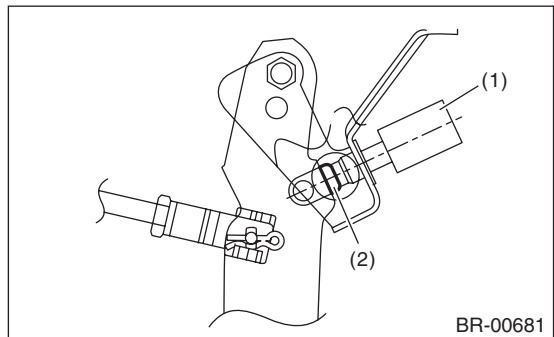
B: INSTALLATION

- 1) Make sure that the switch clip (gray) is securely installed to the brake pedal bracket.

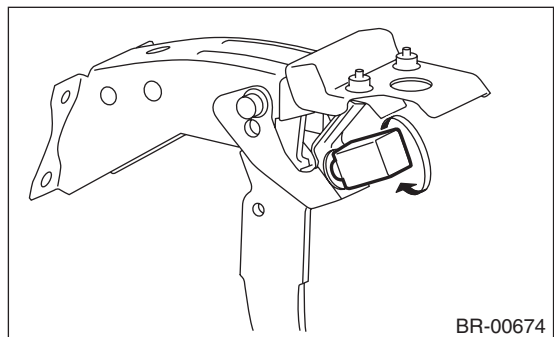


- (1) Switch clip
- (2) Brake pedal bracket

- 2) While pulling up the brake pedal, insert the stop light switch to the stopper (brown) at the brake pedal side until it stops. Turn the stop light switch clockwise and install the switch.



- (1) Stop light switch
- (2) Stopper



- 3) Pull up the brake pedal and make sure that play is 0.5 — 2 mm (0.020 — 0.079 in).
- 4) Connect the stop light switch connector.
- 5) Check that the brake light operate properly.

NOTE:

It is not necessary to check or adjust the clearance to the stop light switch because it is automatically adjusted at installation.

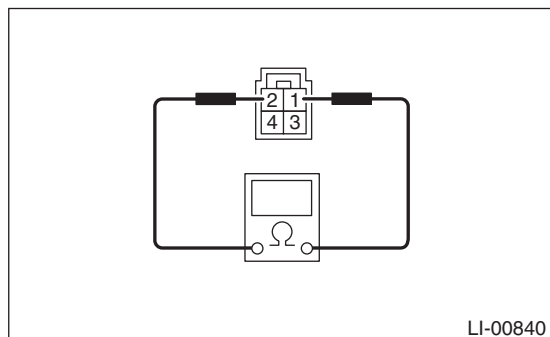
Stop Light Switch

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BRAKE

C: INSPECTION

1) Measure the resistance between stop light switch terminals.



Switch	Pedal	Terminal No.	Standard
Stop light	Released	1 and 2	1 M Ω or more
	Depressed		Less than 1 Ω

2) If the stop light switch does not operate properly, replace with a new part.

General Diagnostic Table

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BRAKE

16. General Diagnostic Table

A: INSPECTION

	Trouble and possible cause	Corrective action
1. Insufficient braking	(1) Fluid leakage from the hydraulic mechanism	Correct or replace. (cup, piston seal, piston boot, master cylinder piston kit, pipe or hose)
	(2) Entry of air into the hydraulic mechanism	Bleed air.
	(3) Wear, deteriorated surface material, water or fluid on lining	Replace, grind or clean.
	(4) Improper operation of master cylinder, disc caliper, brake booster or check valve	Correct or replace.
2. Unstable or uneven braking	(1) Fluid on lining or rotor	Correct the cause of fluid leakage, and clean or replace.
	(2) Rotor defective	Repair or replace the rotor.
	(3) Improper lining contact, deteriorated surface, deteriorated or worn lining material	Repair by grinding, or replace.
	(4) Deformed back plate	Correct or replace.
	(5) Overinflation of tires	Adjust the air pressure.
	(6) Defective wheel alignment	Adjust alignment.
	(7) Loose back plate or support installation bolt	Tighten to the specified torque.
	(8) Faulty wheel bearing	Replace.
	(9) Defective hydraulic system	Replace the cylinder, brake pipe or hose.
	(10) Unstable performance of the parking brake	Check, adjust or replace the rear brake and cable system.
3. Excessive pedal stroke	(1) Entry of air into the hydraulic mechanism	Bleed air.
	(2) Excessive play in the master cylinder push rod	Adjust.
	(3) Fluid leakage from the hydraulic mechanism	Correct or replace. (cup, piston seal, piston boot, master cylinder piston kit, pipe or hose)
	(4) Improper lining contact or worn lining	Correct or replace.
4. Brake dragging or improper brake return	(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	Repair or adjust.
	(5) Weakened spring tension or breakage of shoe return spring	Replace the spring.
	(6) Improper disc caliper operation	Correct or replace.
	(7) Faulty wheel bearing	Replace.
5. Brake noise (1) (creaking sound)	(1) Hardened or deteriorated brake pad	Replace the pad.
	(2) Worn brake pad	Replace the pad.
	(3) Loose back plate or support installation bolt	Tighten to the specified torque.
	(4) Loose wheel bearing	Tighten to the specified torque.
	(5) Dirty rotor	Clean the rotor, or clean and replace brake assembly.
6. Brake noise (2) (hissing sound)	(1) Worn brake pad	Replace the pad.
	(2) Improperly installed pad	Correct or replace the pad.
	(3) Loose or bent rotor	Retighten or replace.
7. Brake noise (3) (click sound)	Excessively worn pad or support	Replace the pad or the support.