CHASSIS SECTION

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

BRAKE

BR

1. General Description

A: SPECIFICATION

Model			2.0 i, 2.5 i	OUTBACK 2.5 i, OUTBACK 3.0 R	2.0 GT, 3.0 R
Front disc brake	Size		15-inch type	16-inch type	17-inch type
	Type		Disc (Floating type, ventilated)		
	Effective disc diameter	mm (in)	228 (8.98)	244 (4.61)	261 (10.28)
	Disc thickness × Outer diameter	mm (in)	24 × 277 (0.94 × 10.91)	24 × 294 (0.94 × 11.57)	30 × 316 (1.18 × 12.44)
	Effective cylinder diameter		42.8 (1.685) × 2		
	Pad dimensions (length × width × thickness)	mm (in)	117.8 × 50.5 × 11.0 (4.638 × 1.988 × 0.433)		130.0 × 53.5 × 11.0 (5.118 × 2.106 × 0.433)
	Clearance adjustment		Automatic adjustment		
Rear disc brake	Size		15-inch type		
	Type		Disc (Floating type, solid)		Disc (Floating type, ventilated)
	Effective disc diameter	mm (in)	238 (9.37)		254 (10.0)
	Disc thickness × Outer diameter	mm (in)	10 × 274 (0.39 × 10.79)		18 × 290 (0.71 × 11.42)
	Effective cylinder diameter	mm (in)	38.1 (1.500)		
	Pad dimensions (length × width × thickness)	mm (in)	92.0 × 33.0 × 9.0 (3.622 × 1.299 × 0.354)		82.4 × 33.7 × 9.0 (3.244 × 1.327 × 0.354)
	Clearance adjustment		Automatic adjustment		
Master cylinder	Type		Tandem		
	Effective diameter	mm (in)	23.8 (15/16)		
	Reservoir type		Sealed type		
	Brake fluid reservoir capacity	cm^3 (cu in)	205 (12.51)		
Brake booster	Type		Vacuum suspended		
	Effective diameter	mm (in)	208 + 229 (8.19 + 9.02)		
Brake line			Dual circuit system		
Brake fluid **CAUTION:** **• Avoid mixing brake fluid of different brands to prevent fluid performance from degrading.** **• When brake fluid is supplemented, be careful not to allow any dust into the reservoir.** **• Use fresh SUBARU genuine brake fluid when replacing or refilling the fluid.**			FMVSS No. 116, DOT3		

NOTE:
Refer to “PB” section for parking brake specifications. <Ref. to PB-2, SPECIFICATION, General Description.>

Item			Standard value	Limit
Front brake	Pad thickness mm (in)	Except 17-inch type	11 (0.43)	1.5 (0.059)
		17-inch type	11 (0.43)	1.5 (0.059)
	Disc thickness mm (in)	Except 17-inch type	24 (0.94)	22 (0.87)
		17-inch type	30 (1.18)	28 (1.10)
	Disc runout mm (in)		—	0.05 (0.0020)
Rear brake (Disc type)	Pad thickness mm (in)	Solid disc	9.0 (0.354)	1.5 (0.059)
		Ventilated disc	9.0 (0.354)	1.5 (0.059)
	Disc thickness mm (in)	Solid disc	10 (0.39)	8.5 (0.335)
		Ventilated disc	18 (0.71)	16 (0.63)
	Disc runout mm (in)		—	0.05 (0.0020)
Parking brake	Inside diameter mm (in)		170 (6.69)	171 (6.73)
	Lining thickness mm (in)		3.2 (0.126)	1.5 (0.059)
	Lever stroke		5 — 6 notches/200 N (20 kgf, 45 lb)	

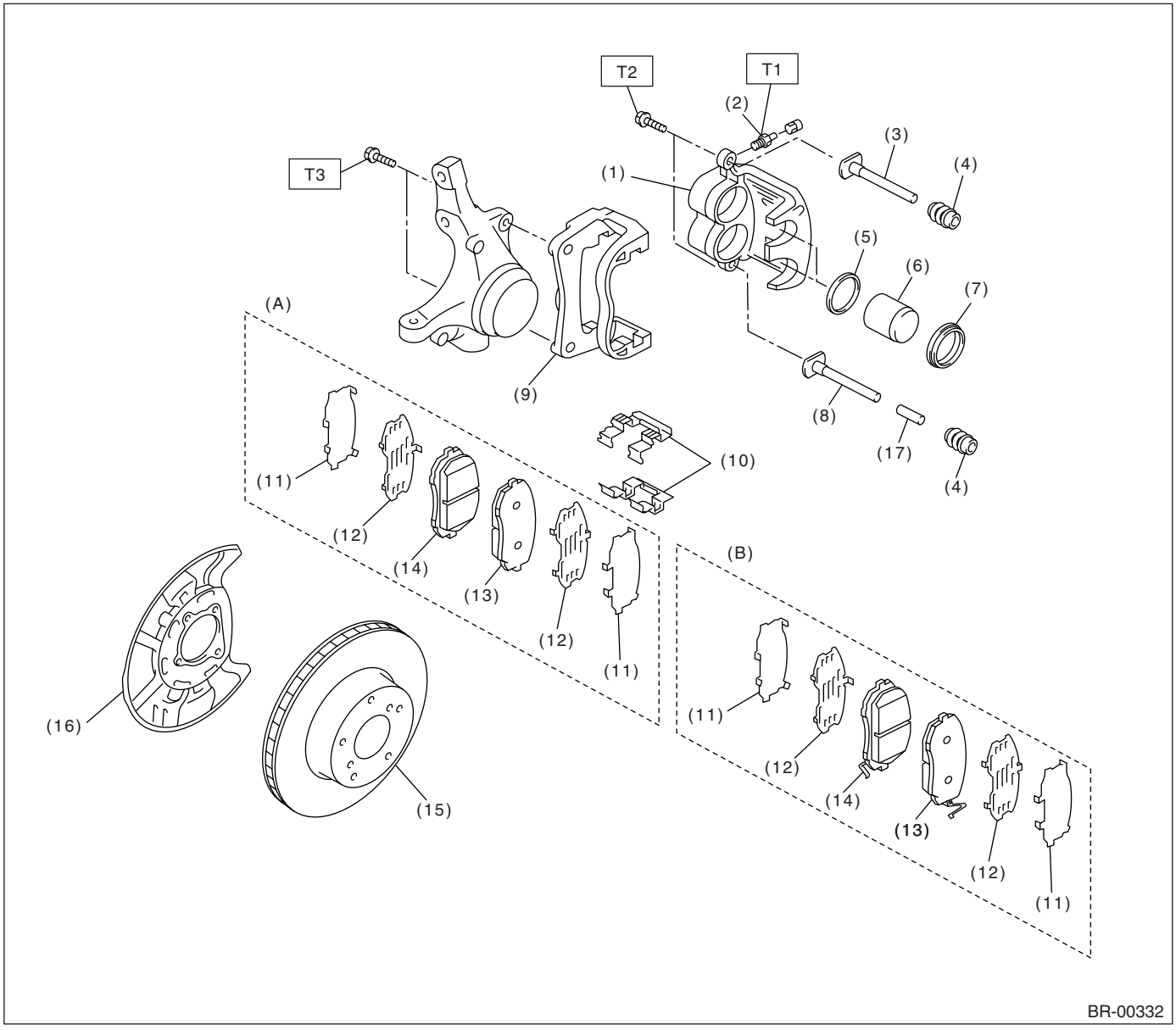
		Brake pedal force N (kgf, lb)	Fluid pressure kPa (kg/cm^2, psi)		
			15-inch type	16-inch type	17-inch type
Brake Booster	Brake fluid pressure without engine running	147 (15, 33)	545 (6, 79)		
		294 (30, 66)	1,564 (16, 227)		
	Brake fluid pressure with engine running and vacuum at 66.7 kPa (500 mmHg, 19.69 inHg)	147 (15, 33)	6,003 (61, 871)	5,381 (55, 780)	4,963 (51, 720)
		294 (30, 66)	11,273 (115, 1,635)	10,982 (112, 1,593)	10,055 (103, 1,458)

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

B: COMPONENT

1. FRONT DISK BRAKE

- Except for EC, EK, OUTBACK model

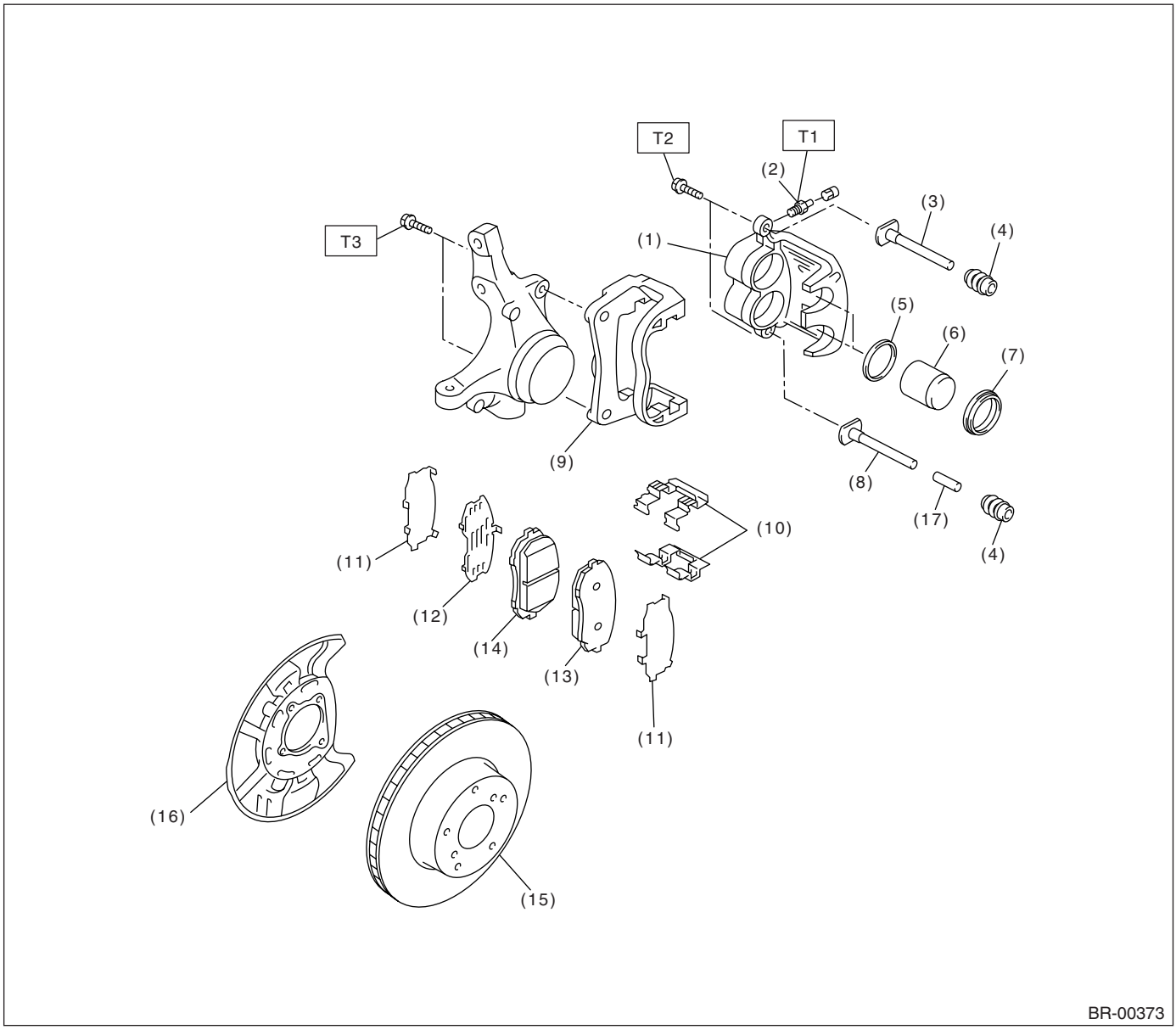


(A) 15, 16-inch type
(B) 17-inch type

(1) Caliper body
(2) Air bleeder screw
(3) Guide pin (Green)
(4) Pin boot
(5) Piston seal
(6) Piston
(7) Piston boot
(8) Lock pin (Yellow)
(9) Support
(10) Pad clip
(11) Outer shim
(12) Inner shim
(13) Pad (Outside)
(14) Pad (Inside)
(15) Disc rotor
(16) Disc cover
(17) Bushing

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 27 (2.8, 19.9)
T3: 80 (8.2, 59)

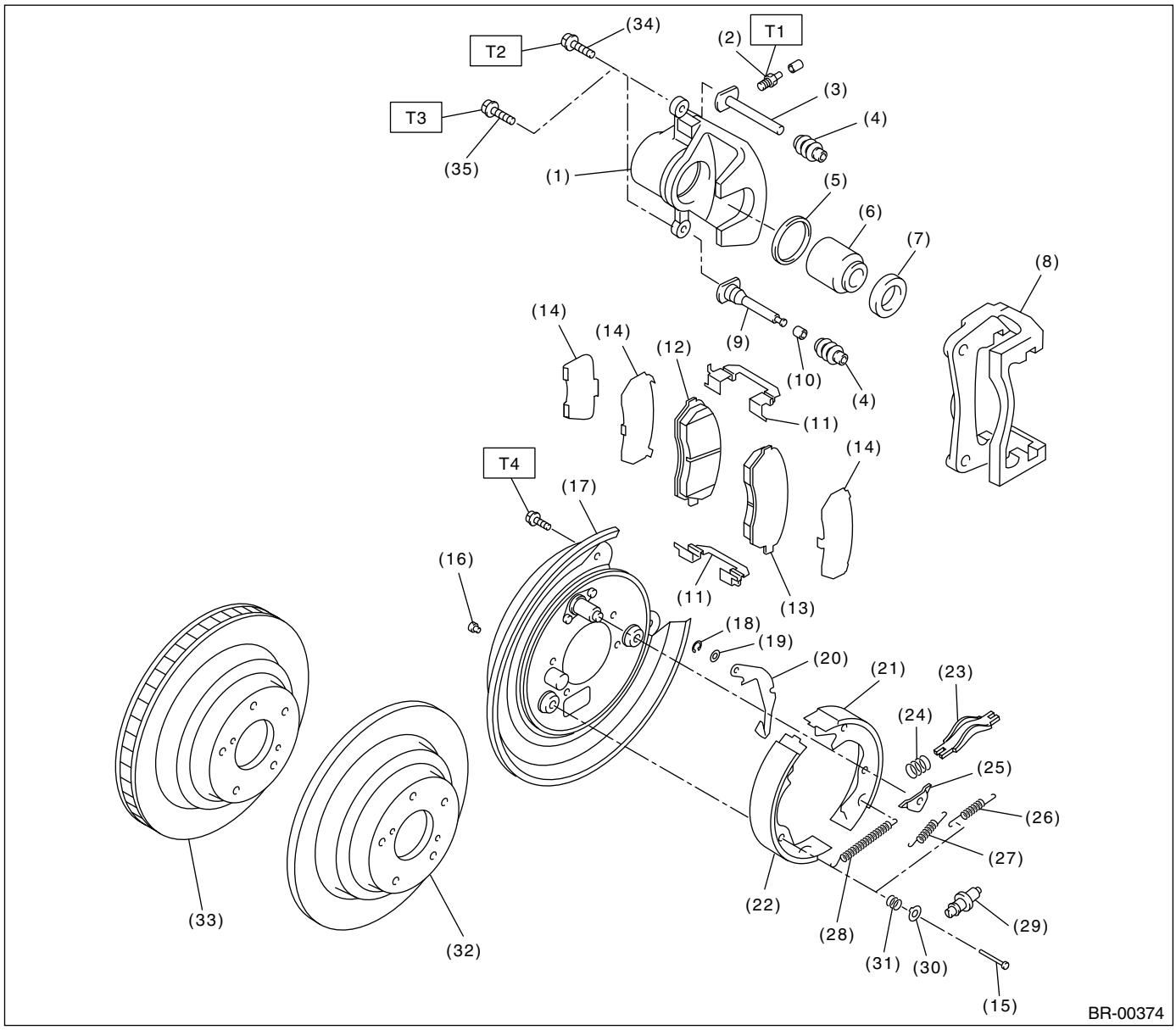
- EC, EK, OUTBACK model



(1) Caliper body
(2) Air bleeder screw
(3) Guide pin (Green)
(4) Pin boot
(5) Piston seal
(6) Piston
(7) Piston boot
(8) Lock pin (Yellow)
(9) Support
(10) Pad clip
(11) Outer shim
(12) Inner shim
(13) Pad (Outside)
(14) Pad (Inside)
(15) Disc rotor
(16) Disc cover
(17) Bushing

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 27 (2.8, 19.9)
T3: 80 (8.2, 59)

2. REAR DISC BRAKE

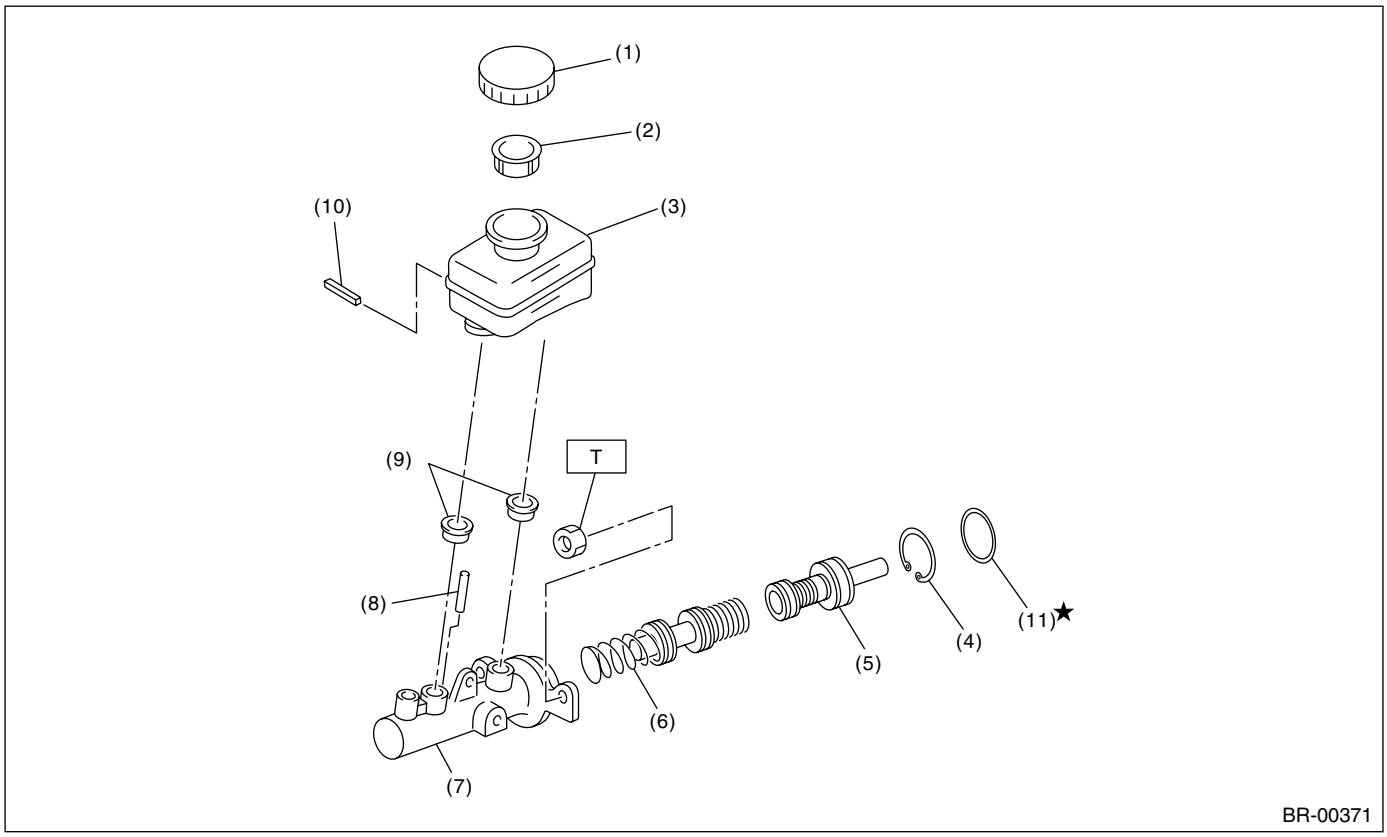


(1) Caliper body
(2) Air bleeder screw
(3) Guide pin (Green)
(4) Pin boot
(5) Piston seal
(6) Piston
(7) Piston boot
(8) Support
(9) Lock pin (Yellow)
(10) Bushing
(11) Pad clip
(12) Inner pad
(13) Outer pad
(14) Shim
(15) Shoe hold-down pin
(16) Cover
(17) Back plate
(18) Retainer
(19) Spring washer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

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 27 (2.8, 19.9)
T3: 37 (3.8, 27.5)
T4: 53 (5.4, 39.1)

3. MASTER CYLINDER

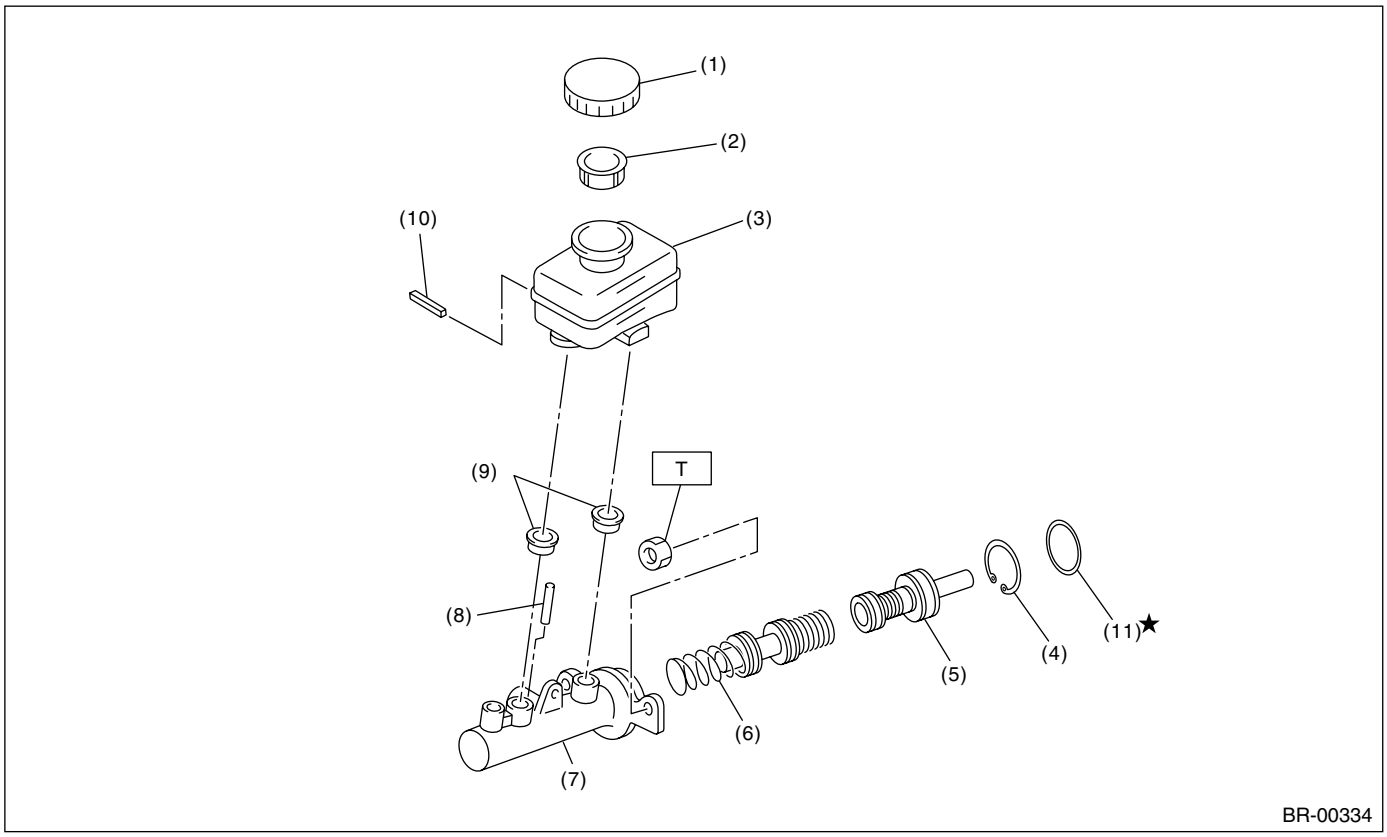
- LHD model



(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)

- RHD model

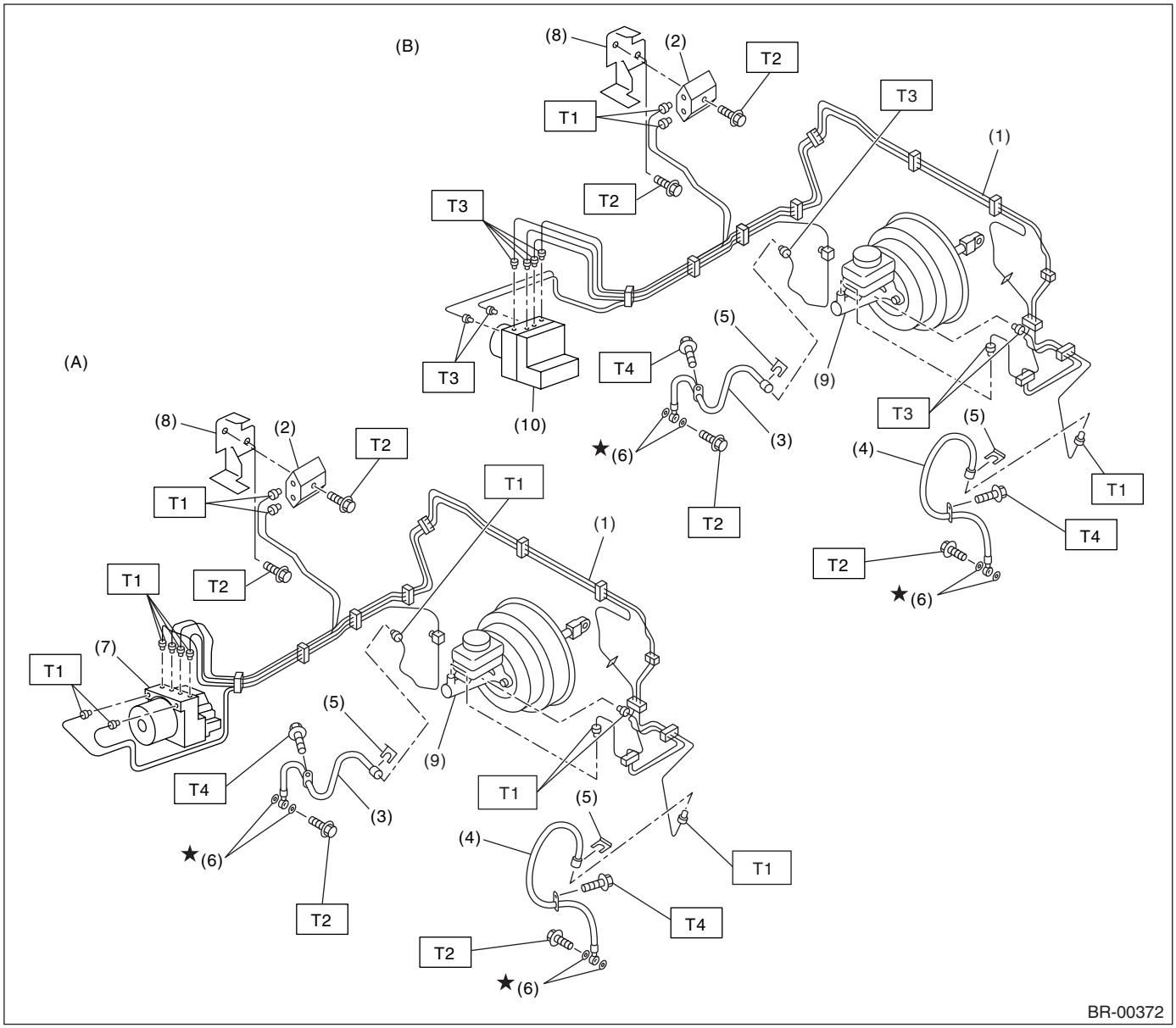


(1) Cap
(2) Filter
(3) Reservoir tank
(4) C-ring
(5) Primary piston
(6) Secondary piston
(7) Cylinder body
(8) Cylinder pin
(9) Seal
(10) Pin
(11) O-ring

Tightening torque: N·m (kgf-m, ft-lb)
T: 13 (1.3, 9.6)

4. FRONT BRAKE PIPES AND HOSE

- LHD model

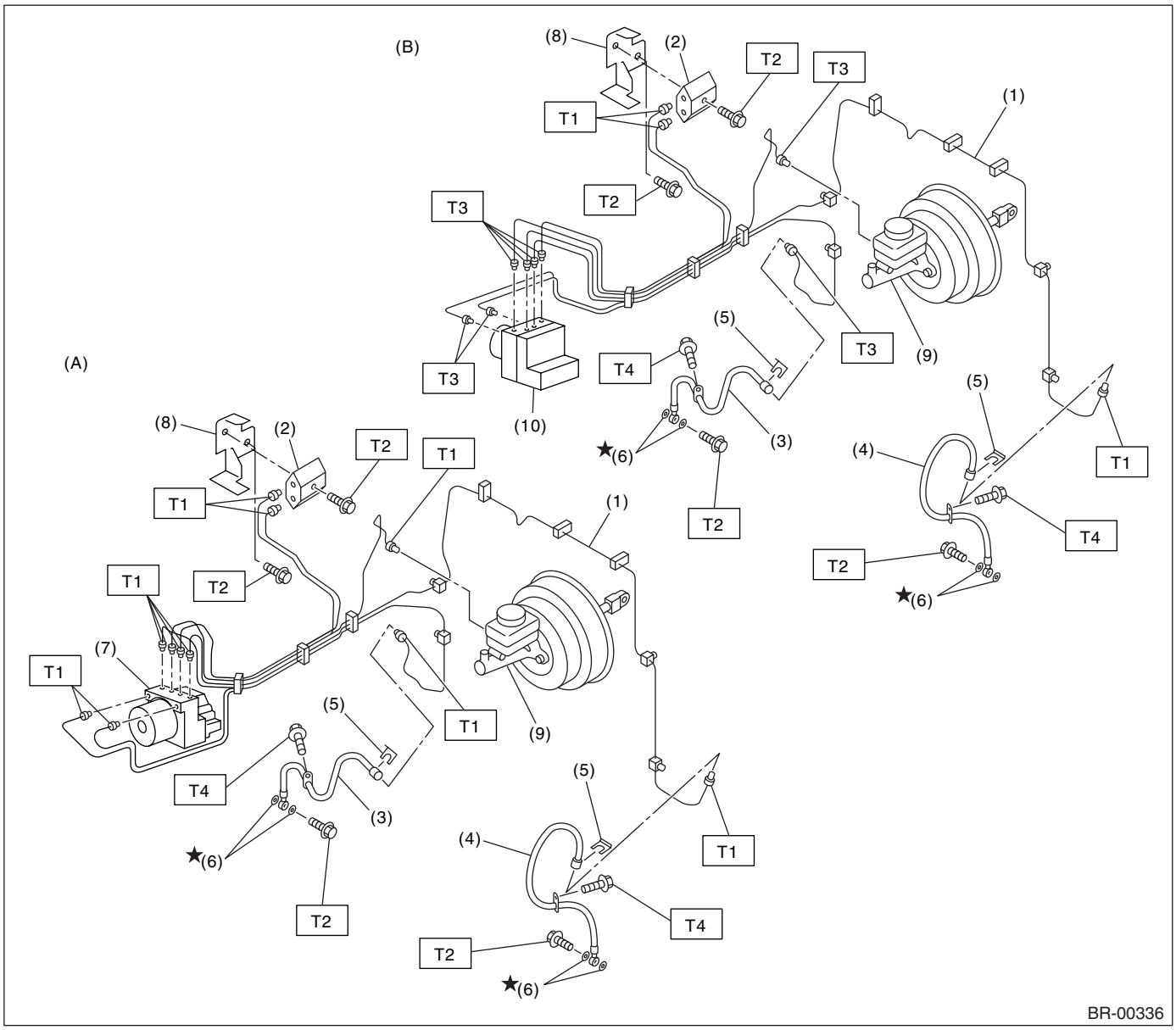


(A)	Model with ABS	(5)	Clamp
(B)	Model with Vehicle dynamics control (VDC)	(6)	Gasket
		(7)	ABS control module and hydraulic control unit (ABSCM&H/U)
(1)	Front brake pipe ASSY	(8)	Bracket
(2)	Two-way connector	(9)	Master cylinder
(3)	Front brake hose RH	(10)	VDC control module & hydraulic control unit (VDCCM&H/U)
(4)	Front brake hose LH		

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)

- RHD model

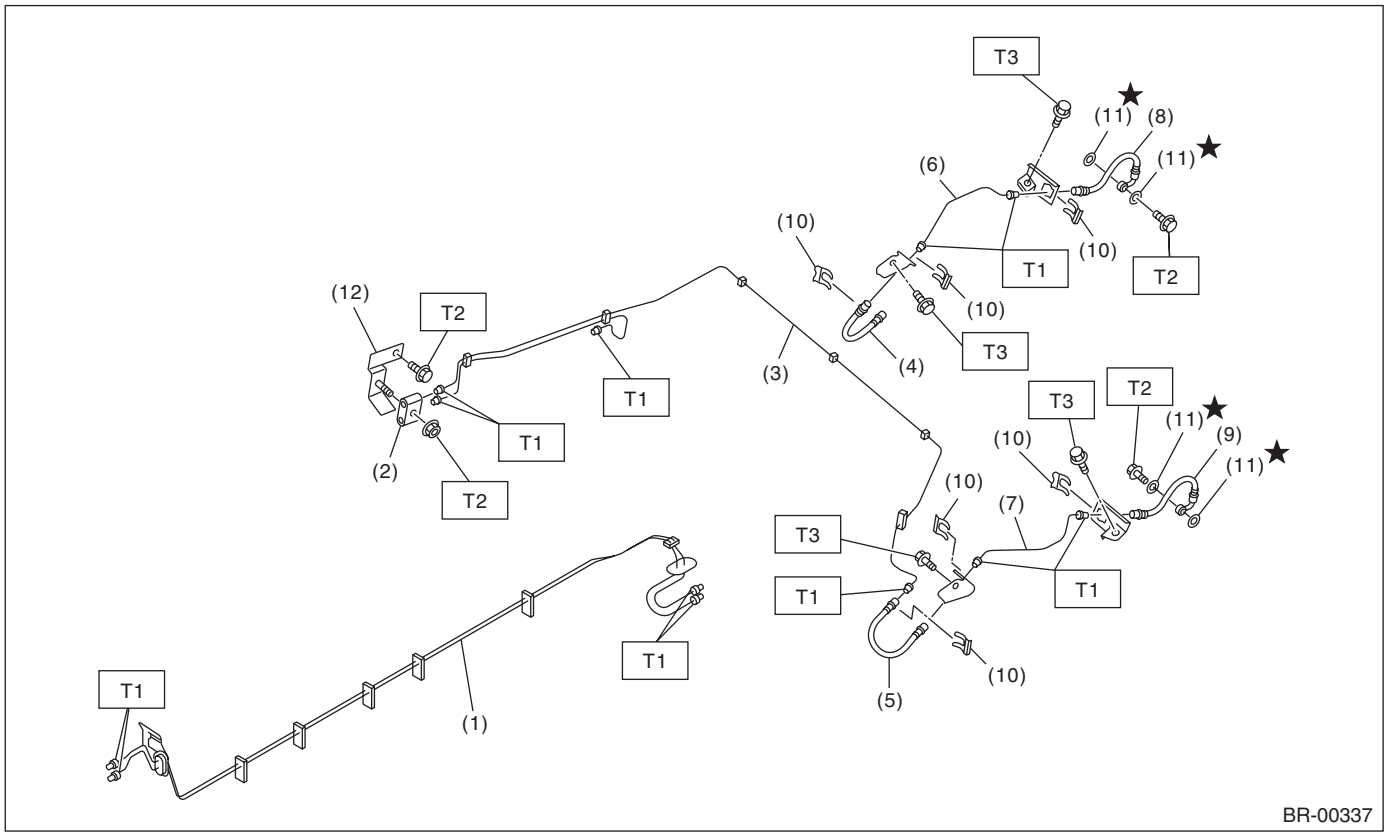


(A) Model with ABS
(B) Model with VDC

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

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)

5. CENTER AND REAR BRAKE PIPES AND HOSE

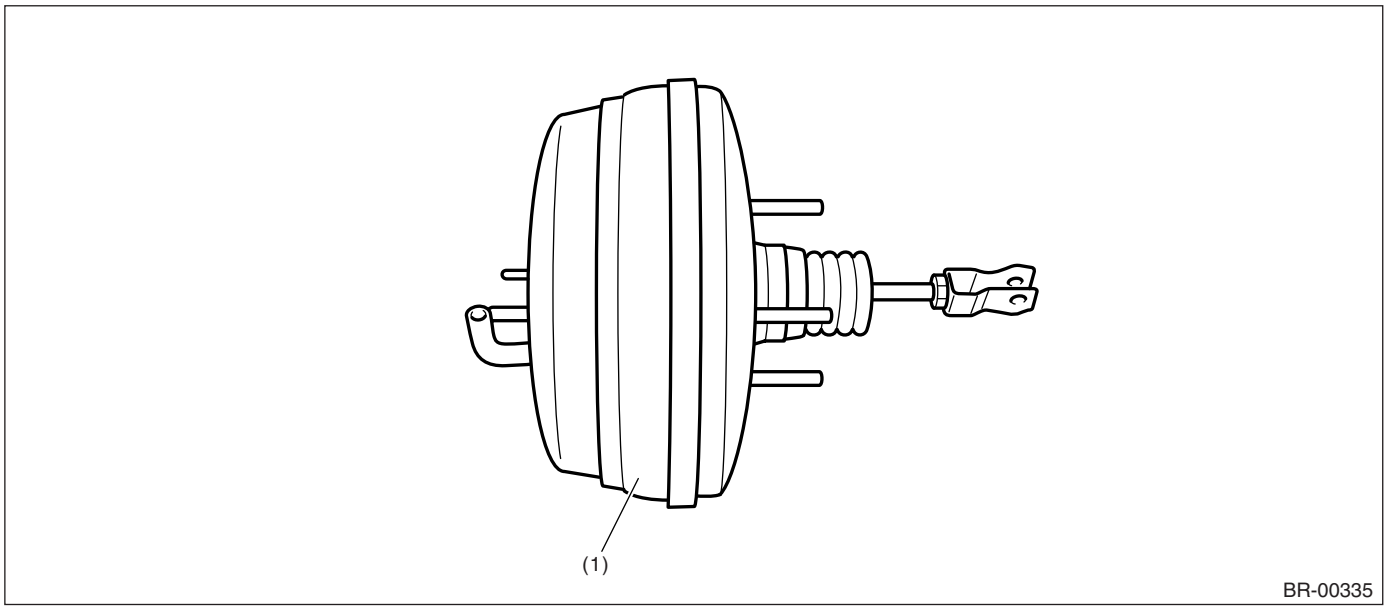


(1)	Center brake pipe ASSY	(7)	Rear brake pipe LH
(2)	Two-way connector	(8)	Rear brake hose rear RH
(3)	Rear brake pipe ASSY	(9)	Rear brake hose rear LH
(4)	Rear brake hose RH	(10)	Clamp
(5)	Rear brake hose LH	(11)	Gasket
(6)	Rear brake pipe RH	(12)	Bracket

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)

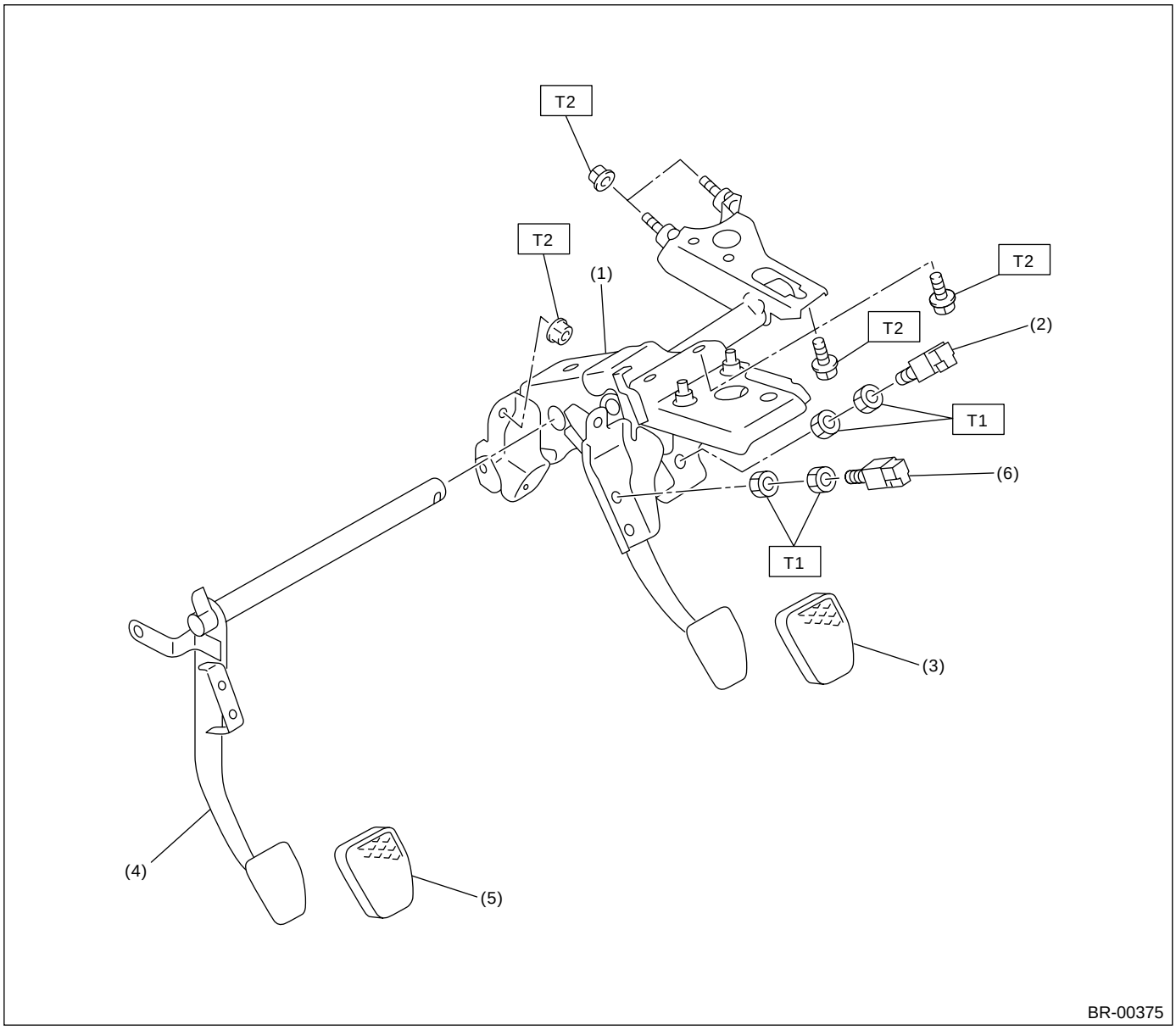
6. BRAKE BOOSTER



(1) Brake booster

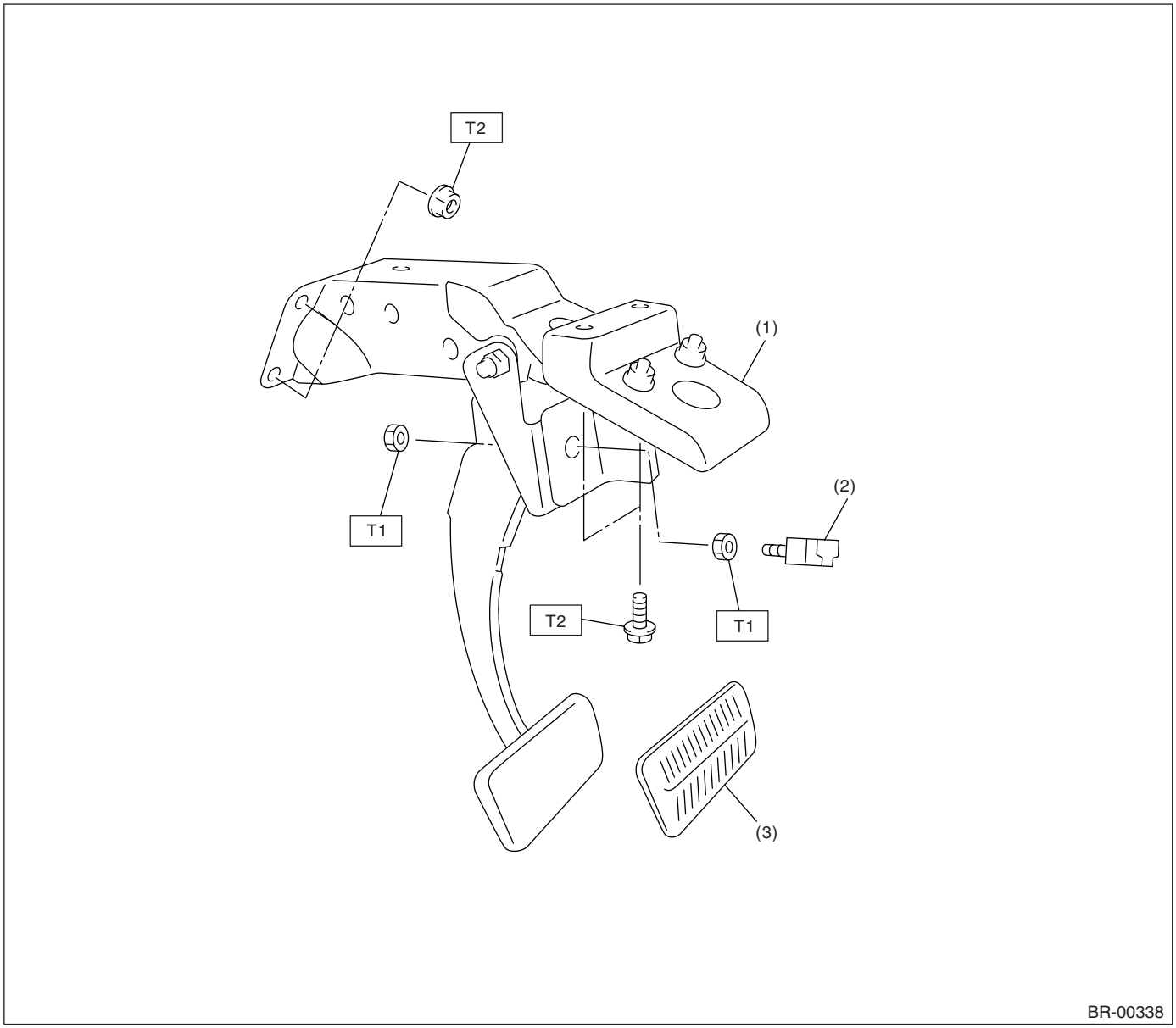
7. BRAKE PEDAL

- LHD MT model



(1)	Brake pedal ASSY	(4)	Clutch pedal	***Tightening torque: N·m (kgf-m, ft-lb)***
(2)	Stop light switch	(5)	Clutch pedal pad	***T1: 8 (0.8, 5.8)***
(3)	Brake pedal pad	(6)	Clutch switch	***T2: 18 (1.8, 13.0)***

- LHD AT model, RHD model



(1) Brake pedal ASSY
(2) Stop light switch
(3) Brake pedal pad

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

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 equivalent. Do not mix grease, etc. with that of another grade or from other manufacturers.
• Before securing a part on a vice, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vice.
• 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

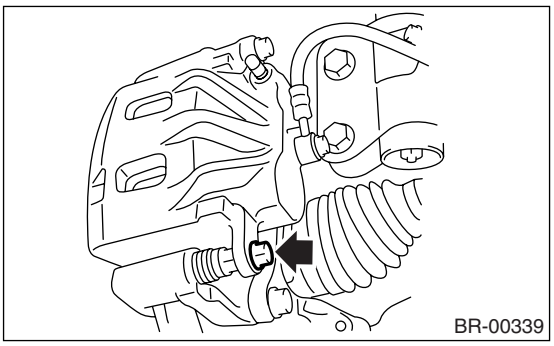
TOOL NAME	REMARKS
Snap ring pliers	Used for removing and installing snap ring.

2. Front Brake Pad

A: REMOVAL

1. 15-INCH TYPE

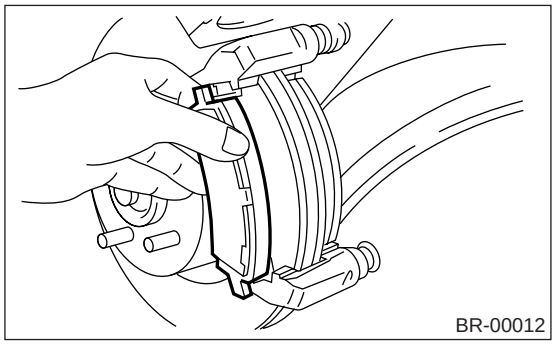
1) Lift-up the vehicle and remove the front wheels.
2) Remove the caliper bolt.



3) Raise the caliper body and support it.

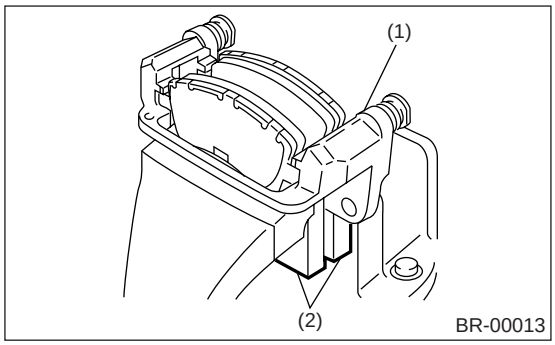
NOTE:
Do not disconnect the brake hose from caliper body.

4) Remove the pad.



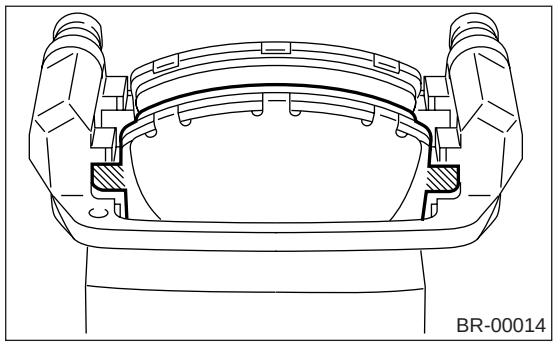
NOTE:
If the brake pad is difficult to remove, proceed as follows:

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



(1) Support
(2) Wooden block

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



2. 16-INCH TYPE

Refer to 15-inch type. <Ref. to BR-16, 15-INCH TYPE, REMOVAL, Front Brake Pad.>

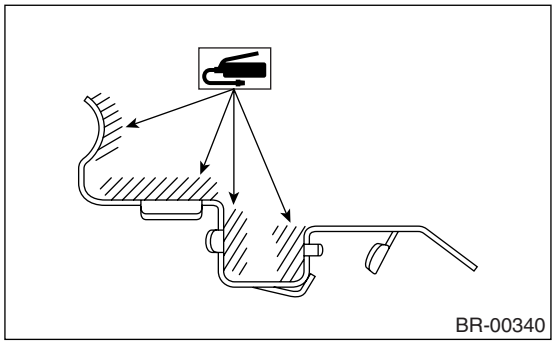
3. 17-INCH TYPE

Refer to 15-inch type. <Ref. to BR-16, 15-INCH TYPE, REMOVAL, Front Brake Pad.>

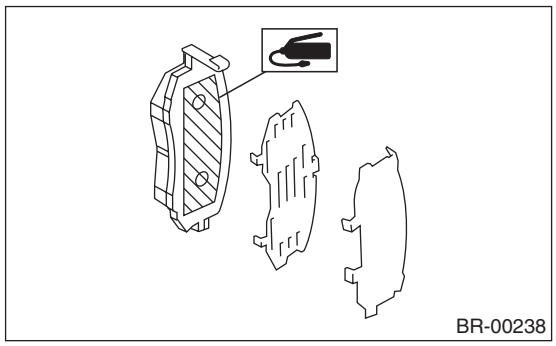
B: INSTALLATION

1. 15-INCH TYPE

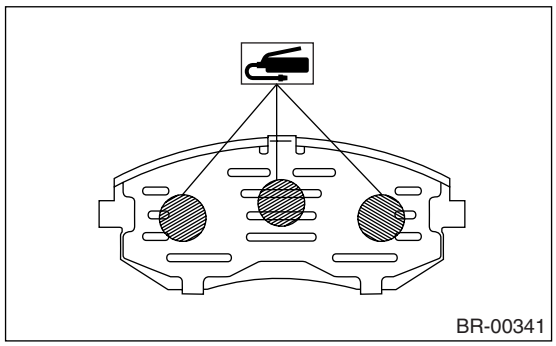
1) Apply a thin coat of Molykote M7439 to the pad clip.



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



3) Apply a thin coat of Molykote AS880N (Part No. K0779YA010) to the three frictional portions between inner shim and outer shim of outer pads.



4) Install the pad on support.
5) Install the caliper body on support.

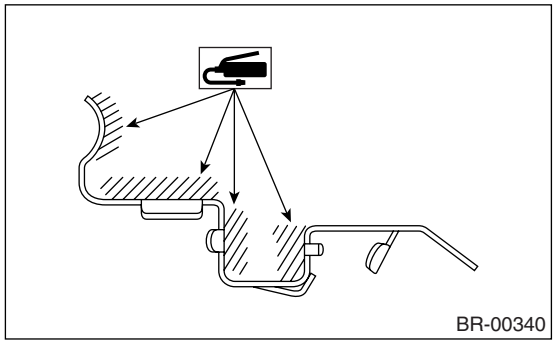
Tightening torque:
27 N·m (2.8 kgf-m, 19.9 ft-lb)

2. 16-INCH TYPE

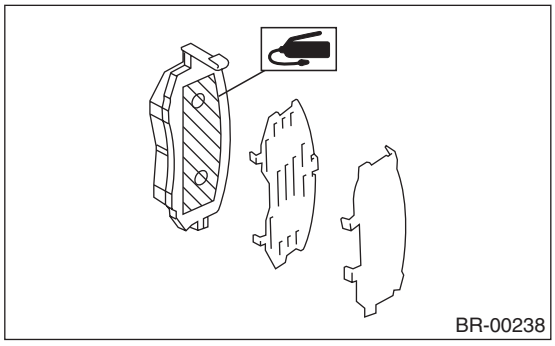
Refer to 15-inch type. <Ref. to BR-16, 15-INCH TYPE, INSTALLATION, Front Brake Pad.>

3. 17-INCH TYPE

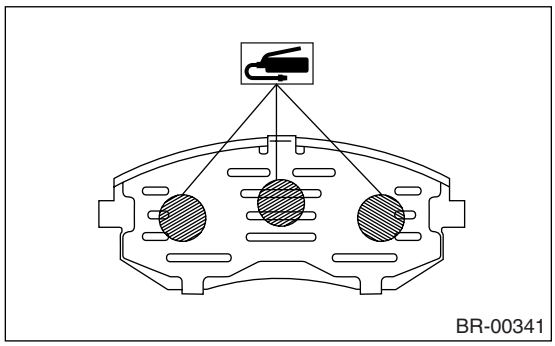
1) Apply a thin coat of Molykote M7439 to the pad clip.



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

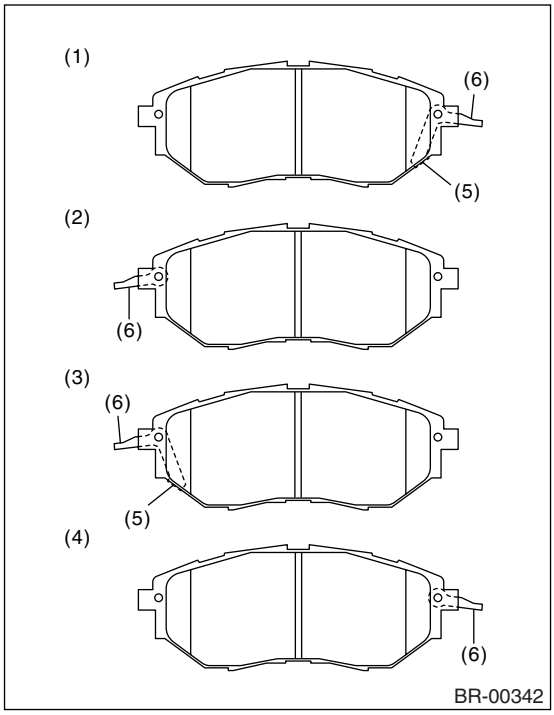


3) Apply a thin coat of Molykote AS880N (Part No. K0779YA010) to the three frictional portions between inner shim and outer shim of outer pads.



4) Install the pad on support.

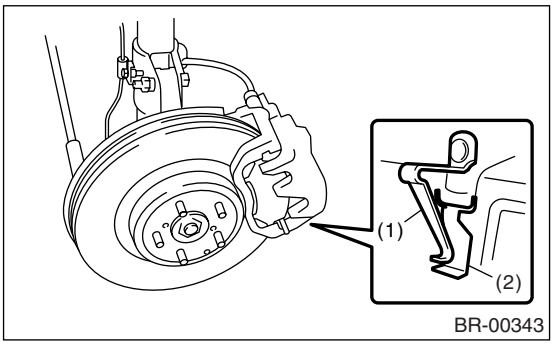
NOTE:
Install the pad indicator in proper direction.



(1) LH – IN
(2) LH – OUT
(3) RH – IN
(4) RH – OUT
(5) Pad indicator
(6) Pad return spring

CAUTION:
• Correctly install the pad return spring to supporting surface of pad clip as shown in the figure.

• When the pad return spring is deformed or damaged, replace the brake pad with new one.



(1) Pad return spring
(2) Supporting surface of pad clip

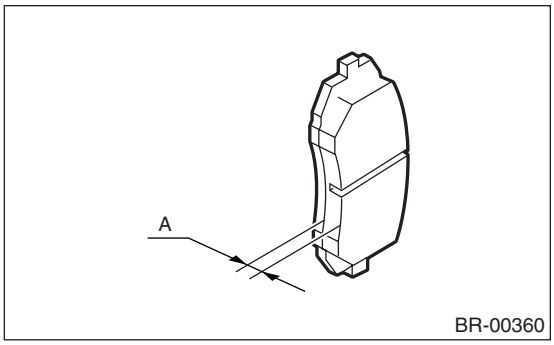
5) Install the caliper body on support.

Tightening torque:
27 N·m (2.8 kgf-m, 19.9 ft-lb)

C: INSPECTION

1. 15-INCH AND 16-INCH TYPE

Check the pad thickness A.



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

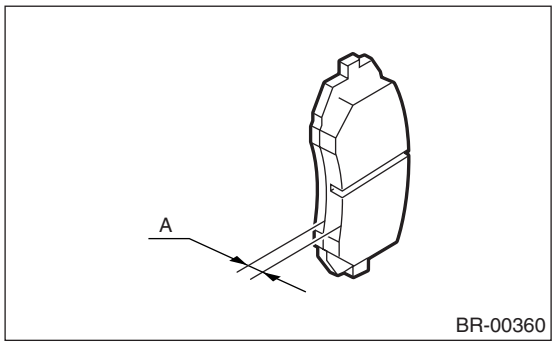
NOTE:
• Always replace the pads for both right and left wheels at the same time.
• Also replace the pad clips if they are twisted or worn.
• Replace the pad if there is oil or grease on it.

2. 16-INCH TYPE

Refer to 15-inch type. <Ref. to BR-18, 15-INCH AND 16-INCH TYPE, INSPECTION, Front Brake Pad.>

3. 17-INCH TYPE

Check the pad thickness A.



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

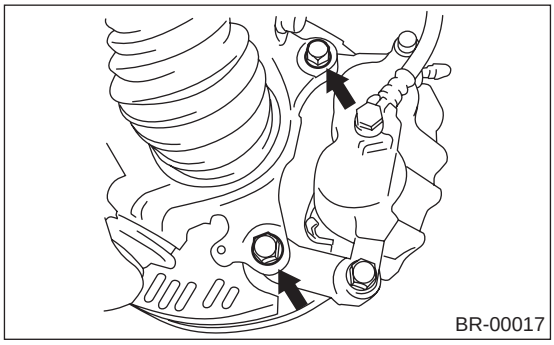
NOTE:
• Always replace the pads for both right and left wheels at the same time.
• Replace the pad if there is oil or grease on it.

3. Front Disc Rotor

A: REMOVAL

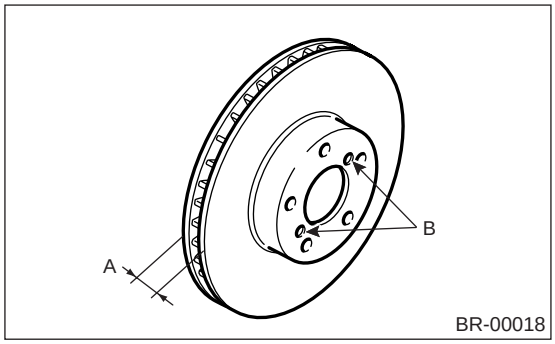
1. 15-INCH TYPE

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



3) Remove the disc rotor.

NOTE:
If the disc rotor seizes up within hub, drive the disc rotor out by pushing with an 8 mm bolt in holes B on the rotor.



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

2. 16-INCH TYPE

Refer to 15-inch type. <Ref. to BR-19, 15-INCH TYPE, REMOVAL, Front Disc Rotor.>

3. 17-INCH TYPE

Refer to 15-inch type. <Ref. to BR-19, 15-INCH TYPE, REMOVAL, Front Disc Rotor.>

B: INSTALLATION

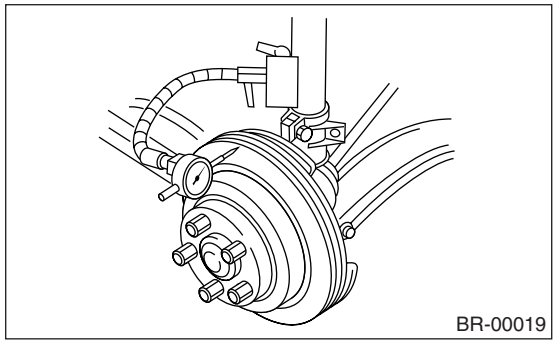
1) Install the disc rotor.
2) Install the caliper body and the support to housing.

Tightening torque:
80 N·m (8.2 kgf-m, 59 ft-lb)

3) Install the front wheels.

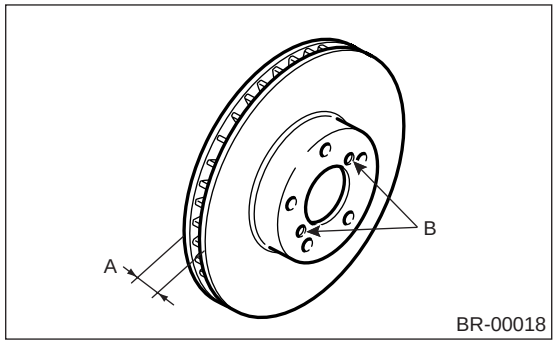
C: INSPECTION

1) Check front wheel bearing play and axial hub runout before disc rotor runout limit inspection. <Ref. to DS-15, 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 specified value, replace with a new disc rotor.



Disc rotor runout limit:
0.05 mm (0.0020 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 is outside the service limit, replace with a new disc rotor.



		Standard value	Limit	Disc rotor outer diameter
Disc rotor thickness A mm (in)	15″	24 (0.94)	22 (0.87)	277 (10.91)
	16″	24 (0.94)	22 (0.87)	294 (11.57)
	17″	30 (1.18)	28 (1.10)	316 (12.44)

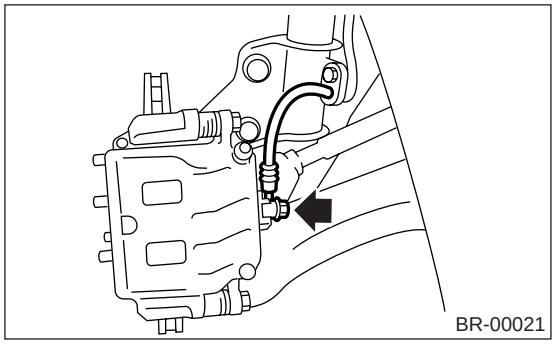
4. Front Disc Brake Assembly

A: REMOVAL

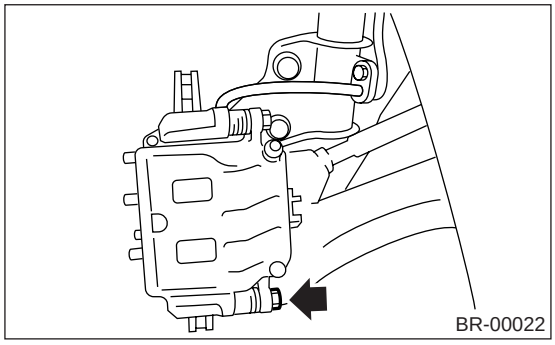
1. 15-INCH TYPE

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

1) Lift-up the vehicle, and remove the front wheels.
2) Remove the union bolt, and disconnect the brake hose from caliper body assembly.

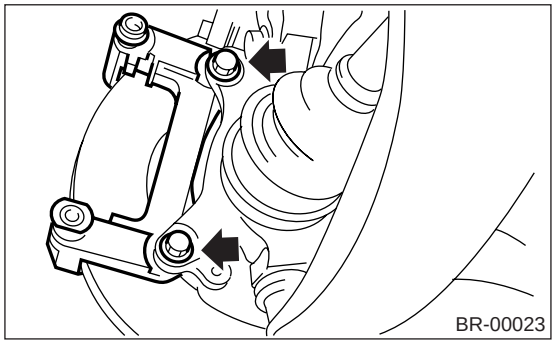


3) Remove the bolt securing lock pin to caliper body.



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

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



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

2. 16-INCH TYPE

Refer to 15-inch type. <Ref. to BR-20, 15-INCH TYPE, REMOVAL, Front Disc Brake Assembly.>

3. 17-INCH TYPE

Refer to 15-inch type. <Ref. to BR-20, 15-INCH TYPE, REMOVAL, Front Disc Brake Assembly.>

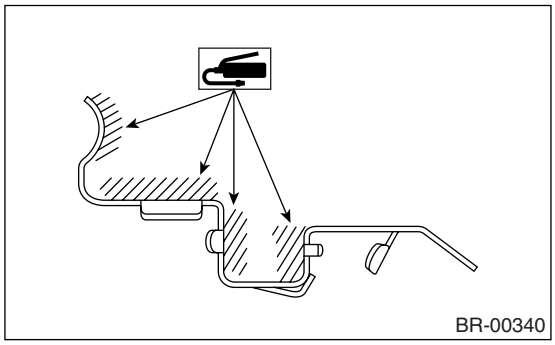
B: INSTALLATION

1. 15-INCH TYPE

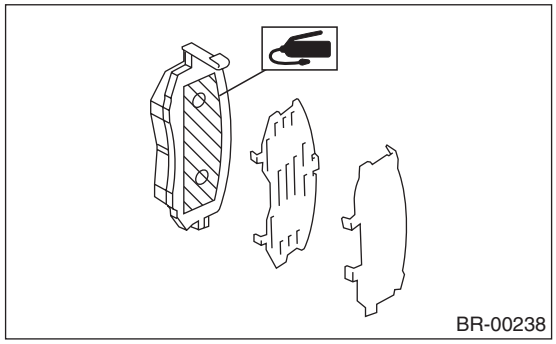
1) Install the support on housing.

Tightening torque:
80 N·m (8.2 kgf-m, 59 ft-lb)

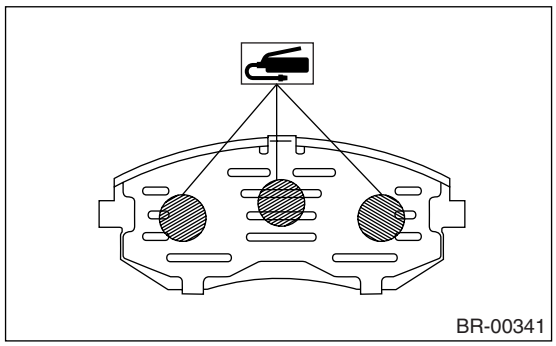
2) Apply a thin coat of Molykote M7439 to the pad clip.



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



4) Apply a thin coat of Molykote AS880N (Part No. K0777YA010) to the three frictional portions between inner shim and outer shim of outer pads.



5) Install the pad on support.
6) Install the caliper body on support.

Tightening torque:
27 N·m (2.8 kgf-m, 19.9 ft-lb)

7) Using new brake hose gaskets, connect the brake hose.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

8) Bleed air from brake system.

2. 16-INCH TYPE

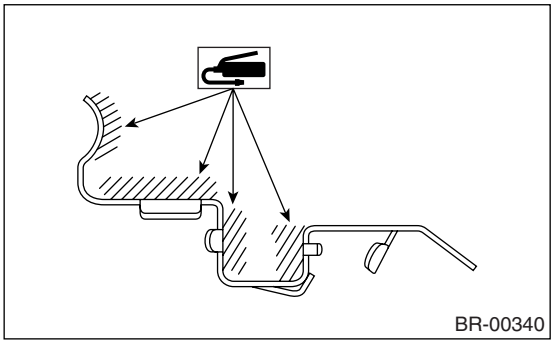
Refer to 15-inch type. <Ref. to BR-20, 15-INCH TYPE, INSTALLATION, Front Disc Brake Assembly.>

3. 17-INCH TYPE

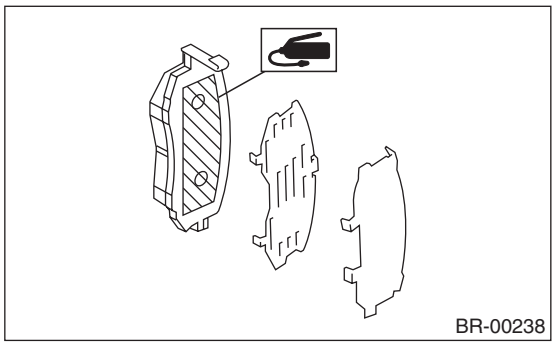
1) Install the support on housing.

Tightening torque:
80 N·m (8.2 kgf-m, 59 ft-lb)

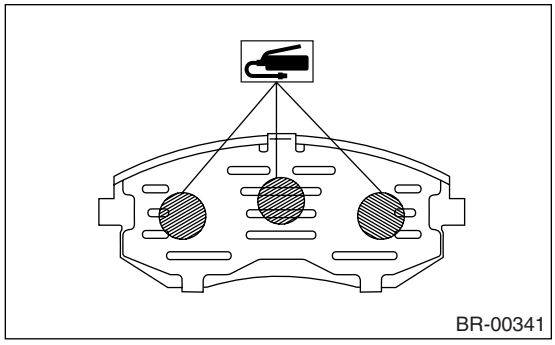
2) Apply a thin coat of Molykote M7439 to the pad clip.



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

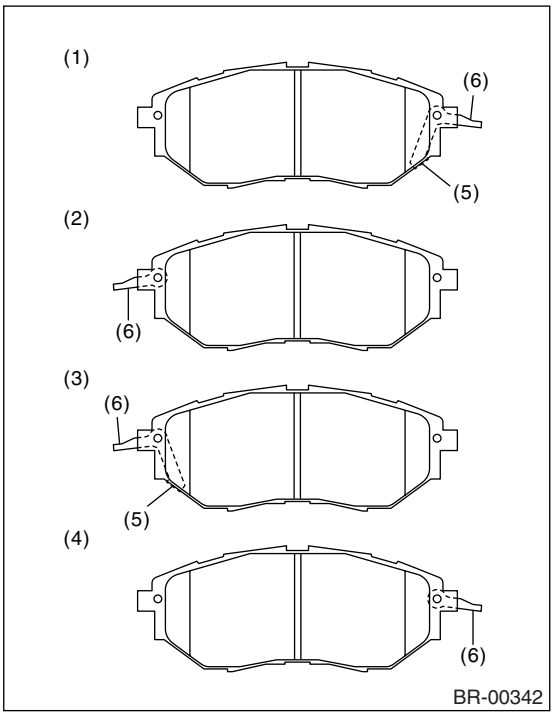


4) Apply a thin coat of Molykote AS880N (Part No. K0779YA010) to the three frictional portions between inner shim and outer shim of outer pads.



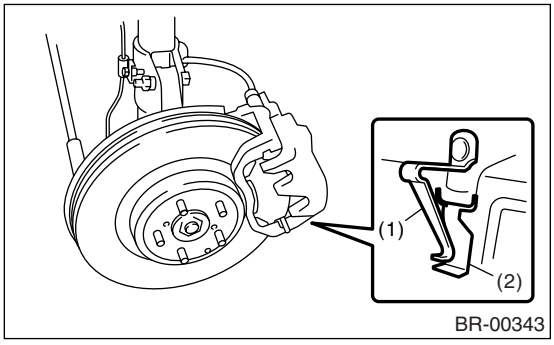
5) Install the pad on support.

NOTE:
Install the pad indicator in proper direction.



(1) LH – IN
(2) LH – OUT
(3) RH – IN
(4) RH – OUT
(5) Pad indicator
(6) Pad return spring

CAUTION:
• Correctly install the pad return spring to supporting surface of pad clip as shown in the figure.
• When the pad return spring is deformed or damaged, replace the brake pad with new one.



(1) Pad return spring
(2) Supporting surface of pad clip

6) Install the caliper body on support.

7) Using new brake hose gaskets, connect the brake hose.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

8) Bleed air from brake system.

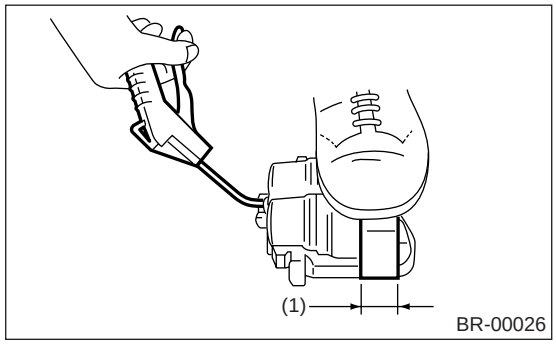
C: DISASSEMBLY

1. 15-INCH TYPE

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

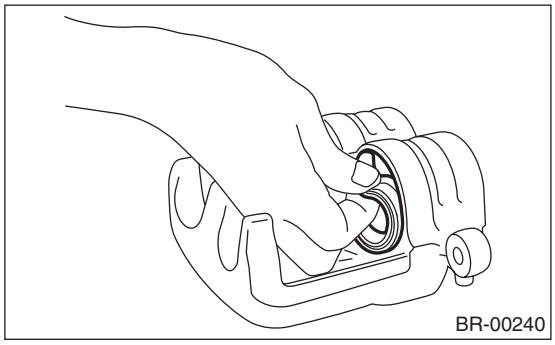
CAUTION:
Be careful not to allow foreign particles to enter inlet (at brake hose connector).

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



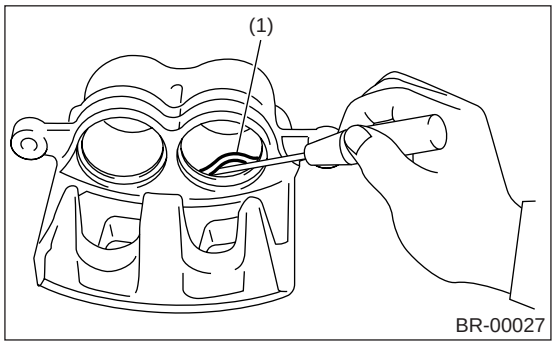
(1) Place a 30 mm (1.18 in) wide wood block here.

4) Remove the piston boot.



5) Remove the piston seal from caliper body cylinder.

CAUTION:
Do not damage the cylinder and piston seal groove.



(1) Piston seal

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

2. 16-INCH TYPE

Refer to 15-inch type. <Ref. to BR-22, 15-INCH TYPE, DISASSEMBLY, Front Disc Brake Assembly.>

3. 17-INCH TYPE

Refer to 15-inch type. <Ref. to BR-22, 15-INCH TYPE, DISASSEMBLY, Front Disc Brake Assembly.>

D: ASSEMBLY

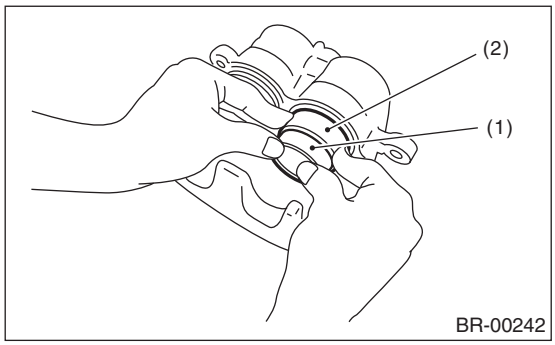
1. 15-INCH TYPE

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 fit in to the groove on ends of cylinder.

Grease:
NIGLUBE RX-2 (Part No. K0779GA102)

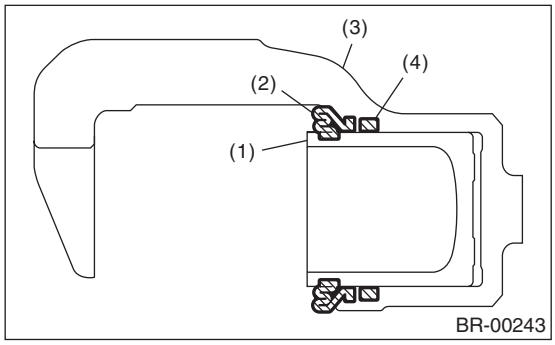
5) Insert the piston into cylinder.

CAUTION:
Do not force the piston into cylinder.



(1) Piston
(2) Piston boot

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

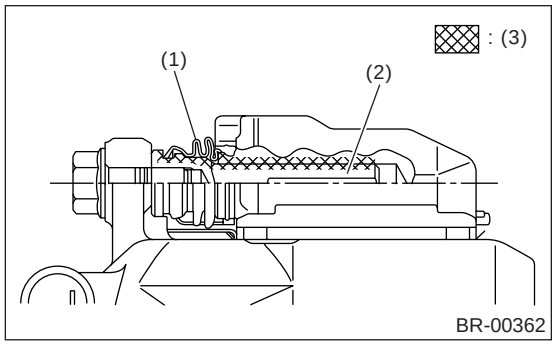


(1) Piston
(2) Piston boot
(3) Caliper body
(4) Piston seal

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 pin and guide pin boot on support.



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

2. 16-INCH TYPE

Refer to 15-inch type. <Ref. to BR-23, 15-INCH TYPE, ASSEMBLY, Front Disc Brake Assembly.>

3. 17-INCH TYPE

Refer to 15-inch type. <Ref. to BR-23, 15-INCH TYPE, ASSEMBLY, Front Disc Brake Assembly.>

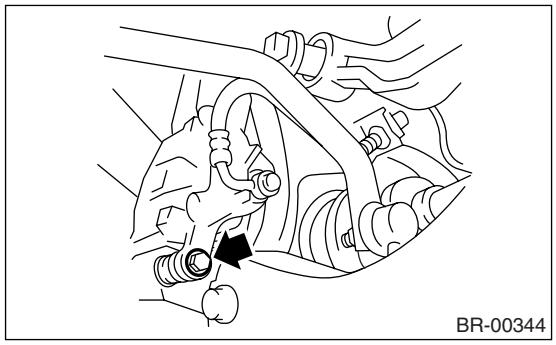
E: INSPECTION

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 and deterioration.

5. Rear Brake Pad

A: REMOVAL

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

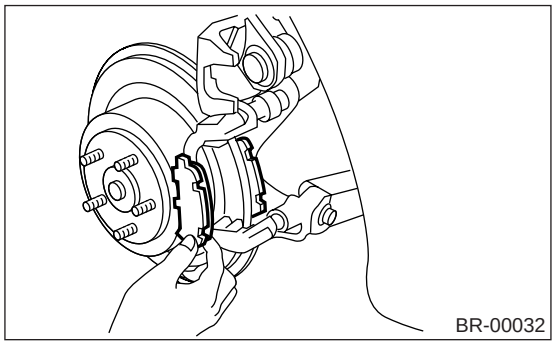


3) Raise the caliper body and support it.

NOTE:
Do not disconnect the brake hose from caliper body.

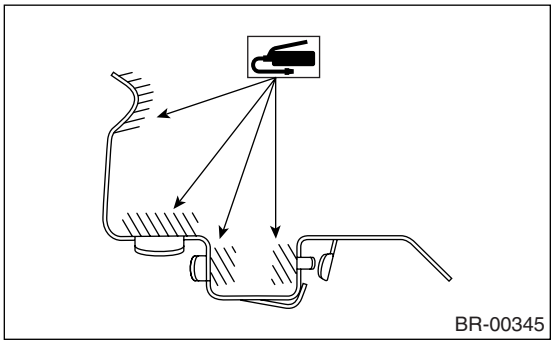
4) Remove the pad.

NOTE:
If the brake pad is difficult to remove, use the same procedure as for front disc brake pad.
<Ref. to BR-16, REMOVAL, Front Brake Pad.>



B: INSTALLATION

1) Apply a thin coat of Molykote M7439 to the pad clip.

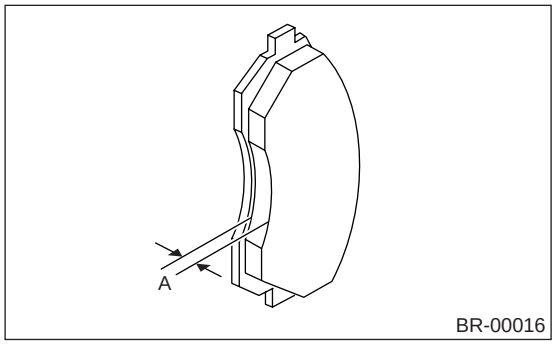


2) Apply a thin coat of Molykote AS880N (Part No. K0777YA010) to the frictional portion between pad and shim.
3) Install the pad on support.
4) Install the caliper body on support.

Tightening torque:
Solid disc brake model
27 N·m (2.8 kgf-m, 19.9 ft-lb)
Ventilated disc brake model
37 N·m (3.7 kgf-m, 27.2 ft-lb)

C: INSPECTION

Check the pad thickness A.



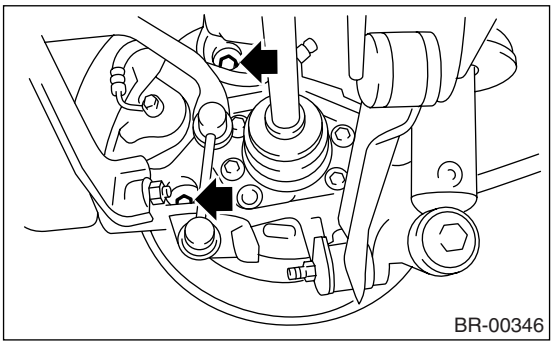
Type of disc rotor		Solid	Ventilated
Pad thickness mm (in)	Standard value	9.0 (0.35)	9.0 (0.35)
	Wear limit	1.5 (0.059)	1.5 (0.059)

NOTE:
• Always replace the pads for both right and left wheels at the same time.
• Also replace 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

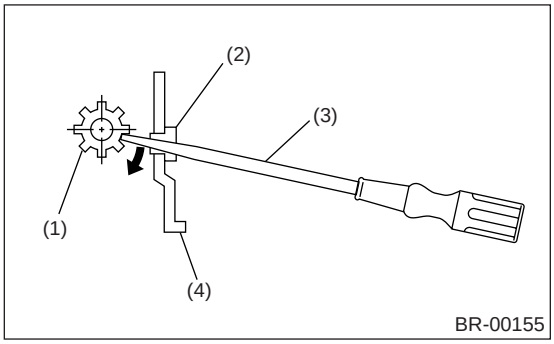
1) Lift-up the vehicle, and then remove the rear wheels.
2) Release the parking brake.
3) Remove the two mounting bolts, and remove the disc brake assembly.



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

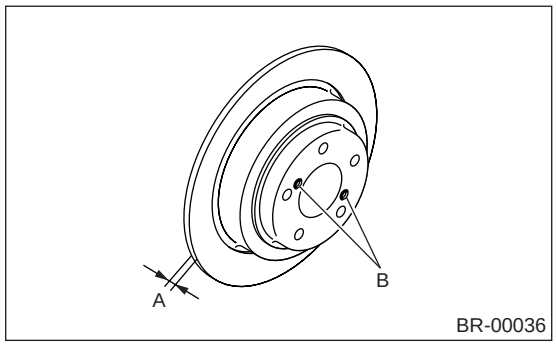
NOTE:
If the disc rotor is difficult to remove, try following two methods in order.

(1) Turn the adjusting screw using a flat tip screwdriver until the 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 pushing with an 8 mm bolt in holes B on the rotor.

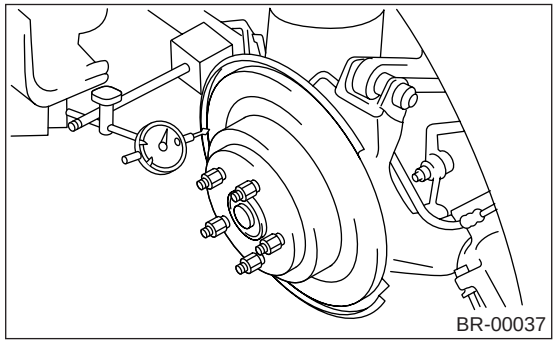


B: INSTALLATION

1) Install in the reverse order of removal.
2) Adjust the parking brake. <Ref. to PB-9, ADJUSTMENT, Parking Brake Assembly (Rear Disc Brake).>

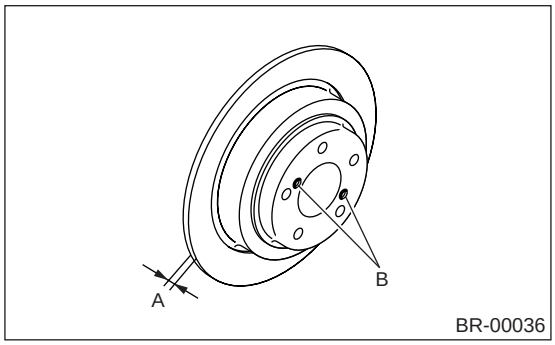
C: INSPECTION

1) Check rear wheel bearing play and axial hub runout before disc rotor runout limit inspection. <Ref. to DS-21, INSPECTION, Rear Hub Unit Bearing.>
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 specified value, replace with a new disc rotor.



Disc rotor runout limit:
0.05 mm (0.0020 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 is outside the service limit, replace with a new disc rotor.



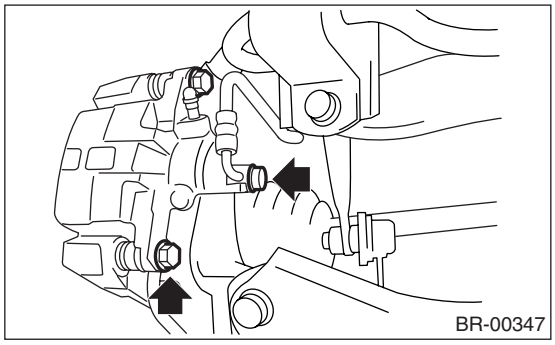
		Standard value	Limit	Disc outer dia.
Disc rotor thickness A mm (in)	Solid disc	10 (0.39)	8.5 (0.335)	274 (10.79)
	Ventilated disc	18 (0.71)	16 (0.63)	290 (11.42)

7. Rear Disc Brake Assembly

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) Lift-up the vehicle, and then remove the rear wheels.
2) Disconnect the brake hose from caliper body assembly.
3) Remove the caliper lower bolts.



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

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

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

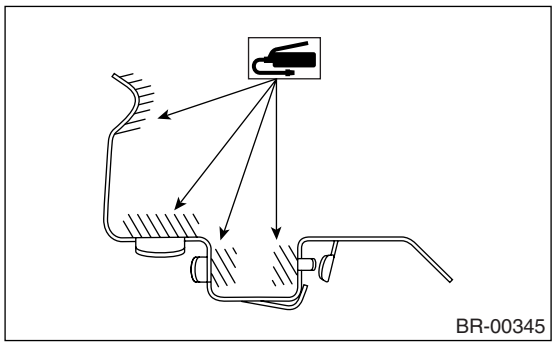
CAUTION:
Be careful not to allow foreign particles to enter inlet (at brake hose connector).

B: INSTALLATION

1) Install the support on housing.

Tightening torque:
53 N·m (5.4 kgf-m, 39.1 ft-lb)

2) Apply a thin coat of Molykote M7439 to the pad clip.



3) Apply a thin coat of Molykote AS880N (Part No. K0777YA010) to the frictional portion between pad and shim.
4) Install the pad on support.
5) Install the caliper body on support.

Tightening torque:
Solid disc brake model
27 N·m (2.8 kgf-m, 19.9 ft-lb)
Ventilated disc brake model
37 N·m (3.7 kgf-m, 27.2 ft-lb)

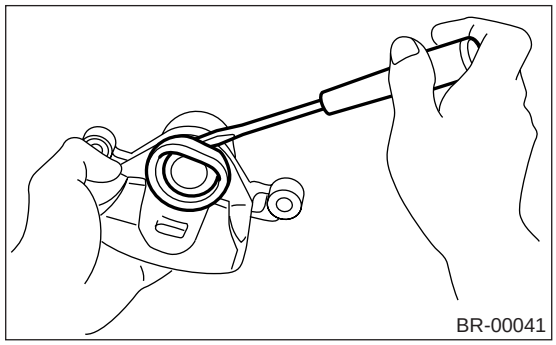
6) Replace the brake hose gaskets with new ones, and then connect the brake hose.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

7) Bleed air from brake system.

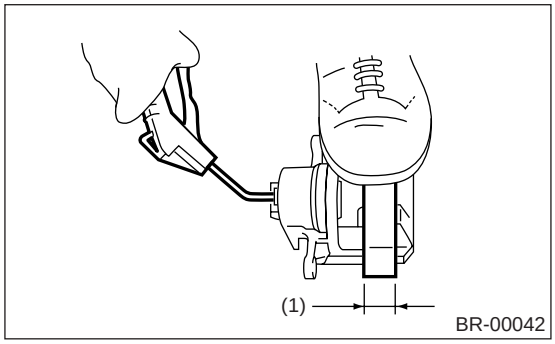
C: DISASSEMBLY

1) Remove the piston boot.



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

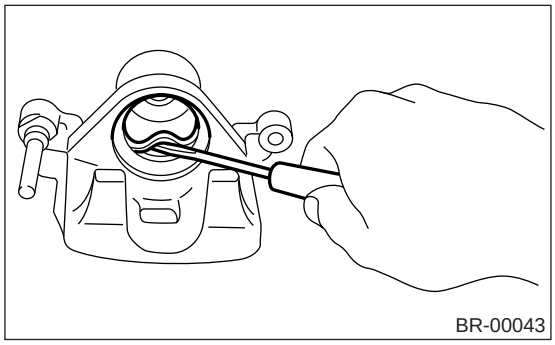
3) Gradually supply compressed air via installation hole of brake hose to force the piston out.



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

4) Remove the piston seal from caliper body cylinder.

CAUTION:
Do not damage the cylinder and piston seal groove.



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

D: ASSEMBLY

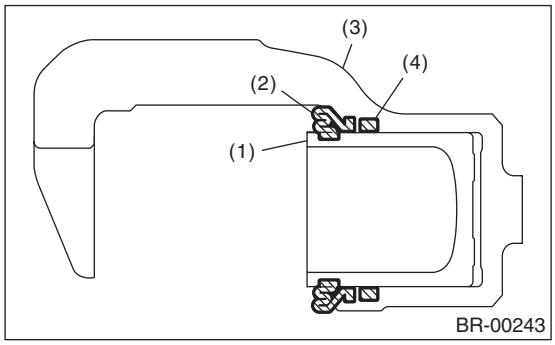
1) Clean the caliper body interior using brake fluid.
2) Apply a coat of brake fluid to the piston seal and fit piston seal in groove on caliper body.
3) Apply a coat of brake fluid to the entire inner surface of cylinder and outer surface of piston.
4) Apply a coat of specified grease to the boot and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

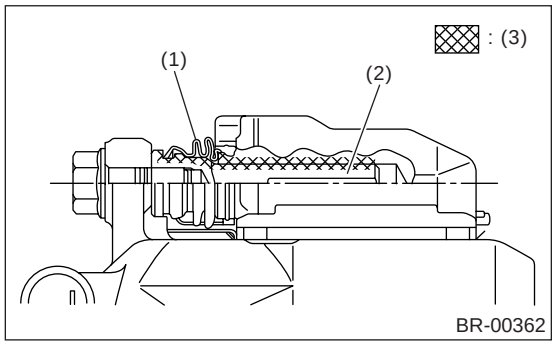
6) Position the boot in grooves on cylinder and piston.



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

7) Apply a coat of specified grease to the 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 specified point.

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

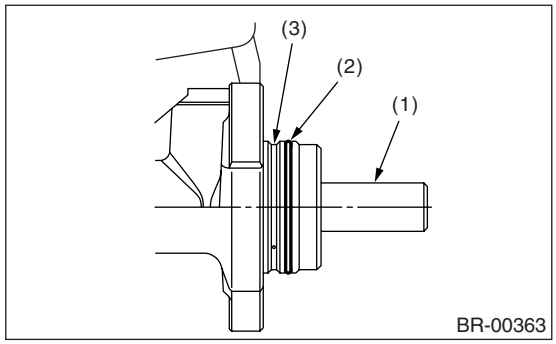
CAUTION:
Do not allow brake fluid to come in contact with vehicle body; wash away with water and wipe off completely if spilled.

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

B: INSTALLATION

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

CAUTION:
Do not install the O-ring in wrong place.



(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
Model with ABS
15 N·m (1.5 kgf-m, 10.8 ft-lb)
Model with VDC
19 N·m (1.9 kgf-m, 14.0 ft-lb)

CAUTION:
Be sure to use recommended brake fluid.

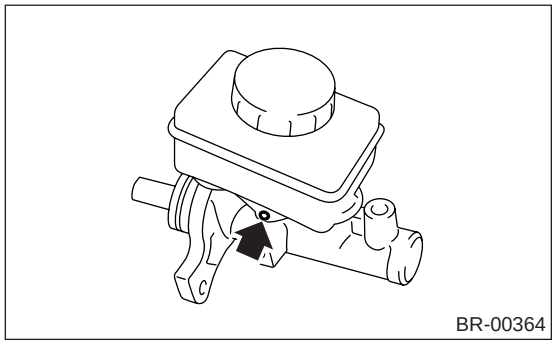
3) Bleed air from brake system. <Ref. to BR-38, PROCEDURE, Air Bleeding.>

C: REPLACEMENT

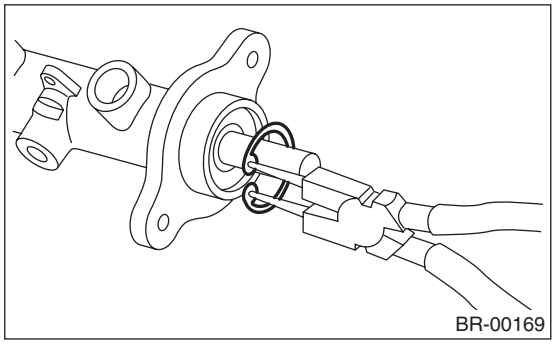
1) Remove mud and dirt from the surface of brake master cylinder.
2) Secure the master cylinder on a vise.

NOTE:
To avoid damaging master cylinder, use aluminum plate while holding with vise.

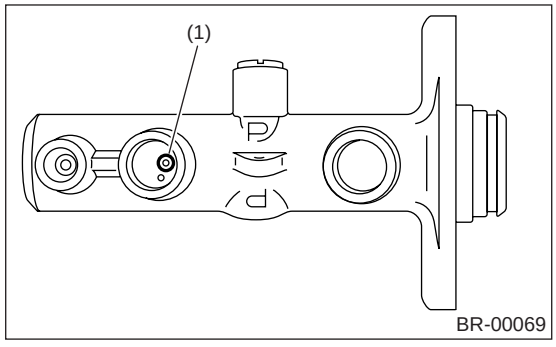
3) Remove the pin which secures the reservoir tank to master cylinder, and then remove the reservoir tank and seal.



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



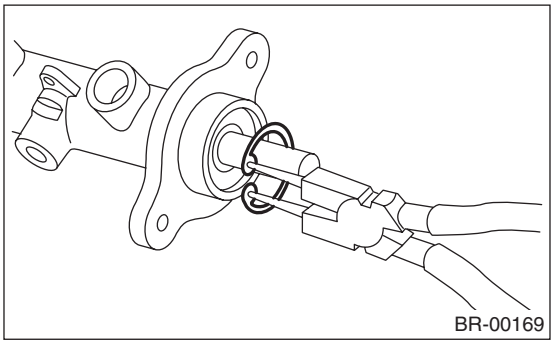
5) With pushing-in the primary piston, remove the straight pin from the port on installation part of reservoir tank using magnet pick-up tool.



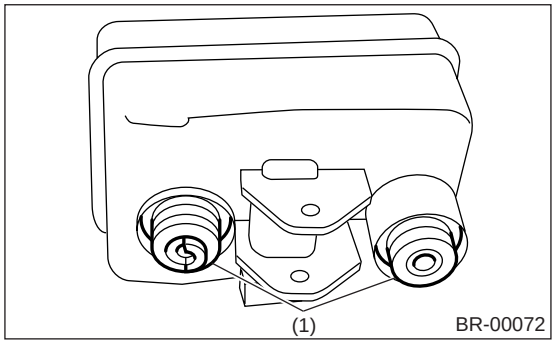
(1) Straight pin

6) Extract the primary piston assembly and secondary piston assembly straight out, while taking care not to scratch the inner surface of cylinder.
7) Clean the inside of master cylinder with brake fluid. Check the inside of cylinder for damage, deform and wear. Replace the master cylinder as assembly if faulty.
8) Apply recommended brake fluid to the inner wall of master cylinder, and outer surface of piston assembly.

9) Ensure that the inner wall of master cylinder, and piston assembly are free of dirt when assembling. Install the primary piston assembly and secondary piston assembly, while taking care not to damage the master cylinder inner wall.
10) With pushing-in the primary piston, install the cylinder pin.
11) With pushing-in the primary piston, install the C-ring to groove using pliers.

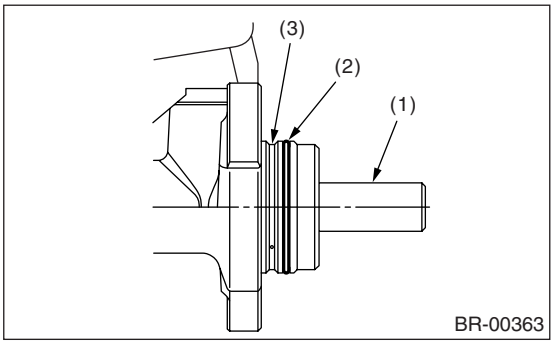


CAUTION:
Ensure the secure installation.
12) Install the seal to reservoir tank.



(1) Seal

13) Install the reservoir tank to master cylinder, and secure with pin.
14) Replace the O-ring for the master cylinder with a new one.



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

D: INSPECTION

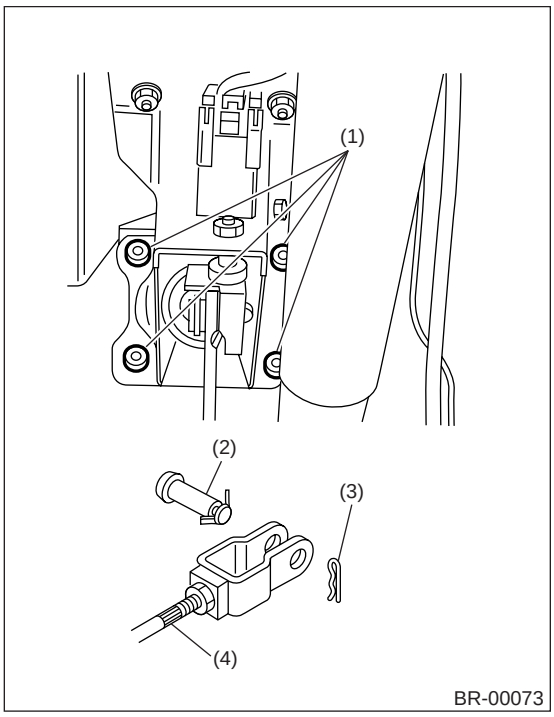
Inspect for oil leakage from the master cylinder.

NOTE:
After replacing piston kit; when the oil leakage is found without damaging or scratching the inside of cylinder, wear of master cylinder inner wall may be the cause. In this case, replace the master cylinder as assembly.

9. Brake Booster

A: REMOVAL

1) Remove or disconnect the following parts at engine compartment.
   (1) Disconnect the connector for brake fluid level gauge.
   (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

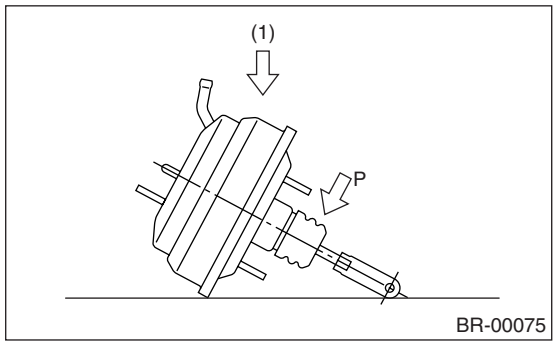


(1) Nut
(2) Clevis pin
(3) Snap pin
(4) Operating rod

3) Remove the brake booster while shunning brake pipes.

NOTE:
• Do not apply strong impact to booster shell and vacuum pipe.
• Be careful not to drop the brake booster. The brake booster should be replaced if it has been dropped.
• Use special care when handling the operating rod. If excessive force is applied to operating rod, sufficient to cause a change in the angle in excess of ±3°, it may result in damage to the power piston cylinder.
• Use care when placing the brake booster on the 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 be damaged.



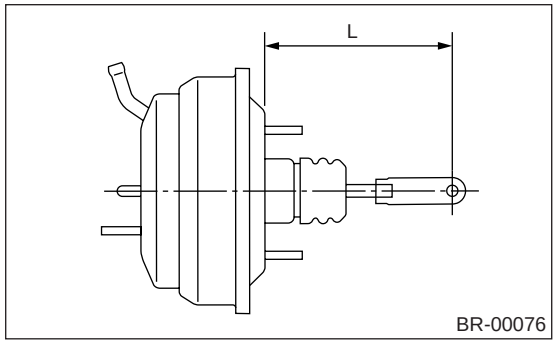
(1) Force

B: INSTALLATION

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

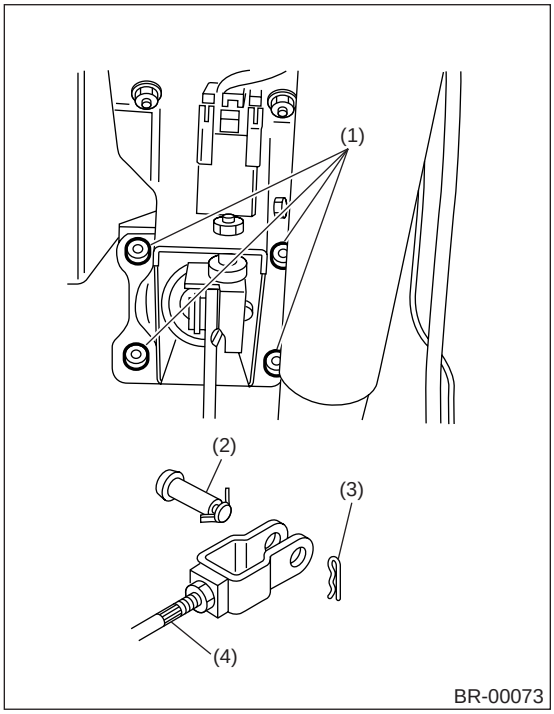
Standard L:
LHD: 136.3 mm (5.38 in)
RHD: 155.2 mm (6.11 in)

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



2) Mount the brake booster in position.

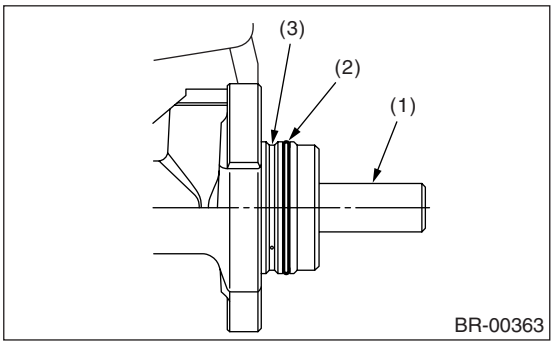
3) Connect the operating rod to brake pedal with clevis pin and snap pin.



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

NOTE:
Apply a thin coat of grease [SUNLIGHT 2 (Part No. 003602010) or equivalent] to clevis pin.

4) Connect the vacuum hose to brake booster.
5) After replacing the O-ring with a new one, install the master cylinder to brake booster.

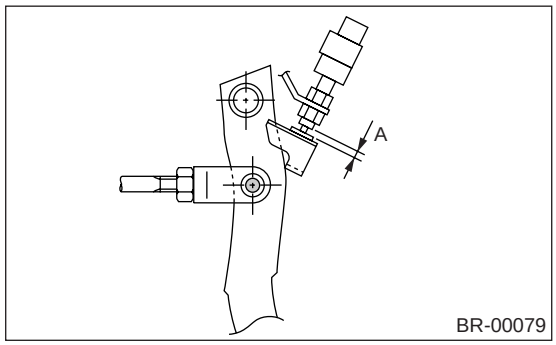


(1) Primary piston
(2) O-ring
(3) Do not install the O-ring on this groove.

6) Connect the brake pipes to master cylinder.
7) Connect the connector for brake fluid level gauge.
8) Measure the clearance between the 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-45, ADJUSTMENT, 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 brake system.

Tightening torque (Air bleeder screw):
8 N·m (0.8 kgf-m, 5.8 ft-lb)

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

C: INSPECTION

1. OPERATION CHECK (WITHOUT GAUGES)

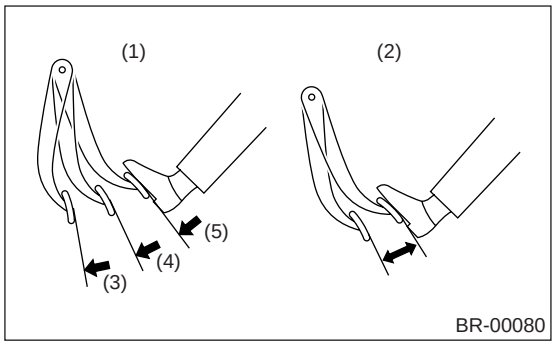
CAUTION:
When checking operation, be sure to securely apply the parking brake.

• 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 idle it for 1 to 2 minutes, then turn it OFF. Depress the brake pedal several times applying the same pedal force as that used in ordinary braking operations. The pedal stroke should be greatest on the 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.

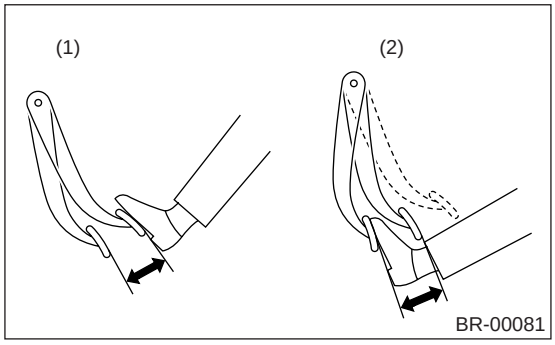


(1) Normal Operation
(2) Not OK
(3) 1st
(4) 2nd
(5) 3rd

NOTE:
• In the event of defective operation, also inspect the condition of the 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 the same pedal force and make sure that the pedal height does not vary with each depression of the pedal.



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

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

3) As engine starts, the brake pedal should move slowly 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 the 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.

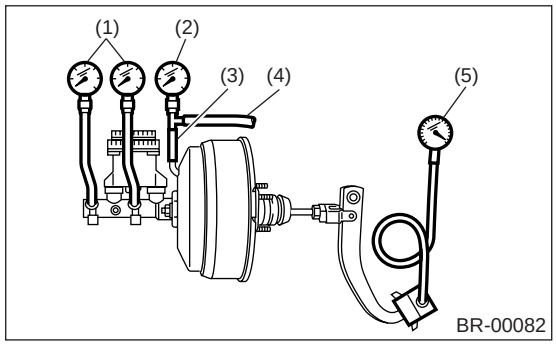
NOTE:
If faulty, check precisely with gauges.

2. OPERATION CHECK (WITH GAUGES)

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

• CHECKING WITH GAUGES

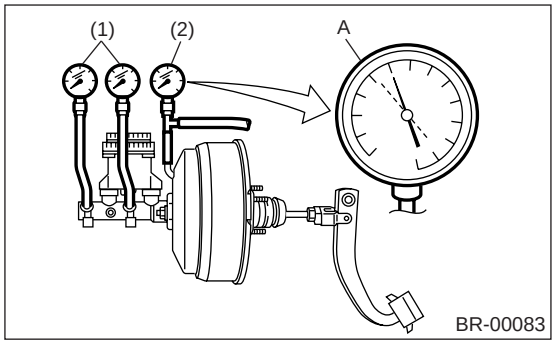
Connect gauges as shown in the figure. After bleeding air from pressure gauges, proceed to each check.



(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 at this moment.

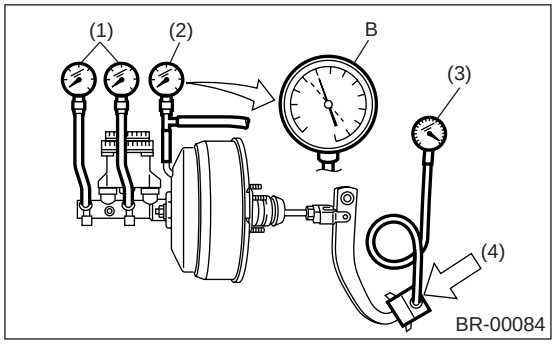


(1) Pressure gauge
(2) Vacuum gauge

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 the engine, 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 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 the 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) Depressed

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 the engine, brake booster is functioning properly.
If defective, refer to “AIR TIGHTNESS CHECK”.
<Ref. to BR-33, 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 N (kgf, lb)	147 (15, 33)	294 (30, 66)
Fluid pressure kPa (kg/cm^2, psi)	545 (6, 79)	1,564 (16, 227)

• 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 N (kgf, lb)		147 (15, 33)	294 (30, 66)
Fluid pressure kPa (kg/cm^2, psi)	15″ 16″ OUTBACK	6,003 (61, 871)	11,273 (115, 1,635)
	16″ (Except for OUTBACK)	5,381 (55, 780)	10,982 (112, 1,593)
	17″	4,963 (51, 720)	10,055 (103, 1,458)

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 fluid.
2) Check the fluid for discoloration. If the fluid color has excessively changed, drain the fluid and refill with new fluid.

B: REPLACEMENT

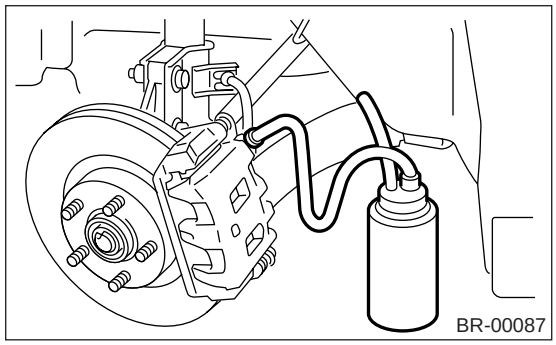
CAUTION:
• To always maintain the brake fluid characteristics, replace the brake fluid according to maintenance schedule or earlier than that when used in severe condition.
• Fresh Subaru genuine fluid must be used.
• Cover the bleeder with cloth, when loosening it, to prevent brake fluid from being 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 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.
• The amount of brake fluid required is approximately 500 mℓ (16.9 US fl oz, 17.6 Imp fl oz) for total brake system.

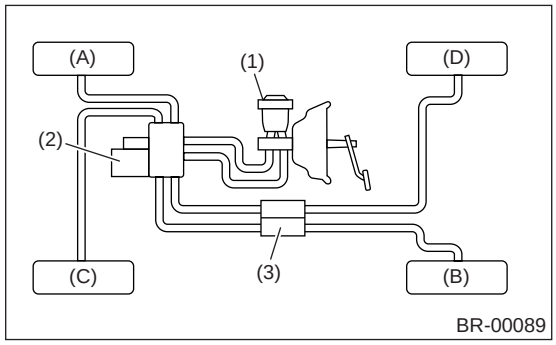
1) Either lift-up the vehicle to place a rigid rack under it, or lift-up the vehicle.
2) Remove both the front and rear wheels.
3) Draw out the brake fluid from master cylinder.
4) Refill the reservoir tank with recommended brake fluid.

Recommended brake fluid:
Refer to the specification. <Ref. to BR-2, SPECIFICATION, General Description.>

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



CAUTION:
Brake fluid replacement sequence; (A) Front RH → (B) Rear LH → (C) Front LH → (D) Rear RH



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

6) Instruct your co-worker to depress the brake pedal slowly two or three times and then hold it depressed.
7) Loosen the bleeder screws to drain brake fluid. And then quickly tighten the screw.
8) Release the brake pedal slowly. Repeat steps 6) through 8) until there are no more air bubbles in the drained brake fluid.

NOTE:
Add brake fluid as necessary while performing air bleed operation, in order to prevent the tank from running short of brake fluid.

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

Tightening torque (Bleeder screw):
8 N·m (0.8 kgf-m, 5.8 ft-lb)

10) Bleed air from each wheel cylinder using the same procedures as described in steps 6) through 8) above.

11) Depress the brake pedal with a force of approximately 294 N (30 kgf, 66 lb) and hold it there for approximately 20 seconds to check for no entry of air and if pedal height remain same.
Visually inspect the bleeder screws and brake pipe joints to make sure that there is no fluid leakage.
12) Install the wheels, and drive 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

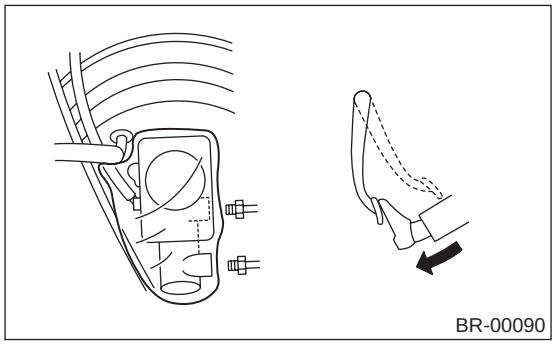
A: PROCEDURE

CAUTION:
• Fresh Subaru genuine fluid must be used.
• Cover the bleeder with 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.

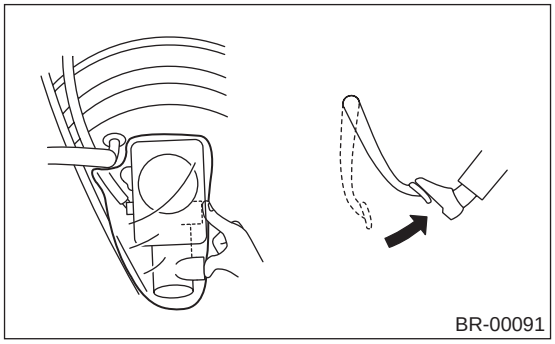
1. MASTER CYLINDER

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 wheels.
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.


BR-00090

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


BR-00091

6) Repeat the step4) and 5) until brake fluid is completely drained from outlet plug.
7) Remove the plastic bag.
8) Install the brake pipes to master cylinder.

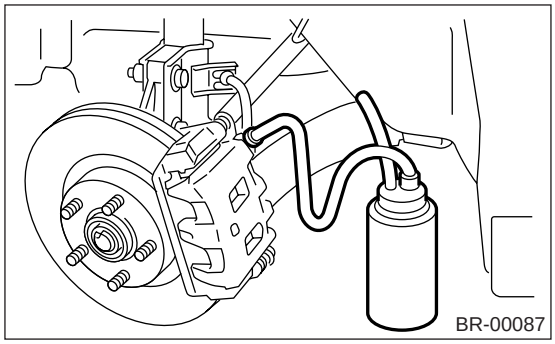
Tightening torque:
15 N·m (1.5 kgf-m, 10.8 ft-lb)

9) Bleed air from the brake line. <Ref. to BR-38, BRAKE LINE, PROCEDURE, Air Bleeding.>

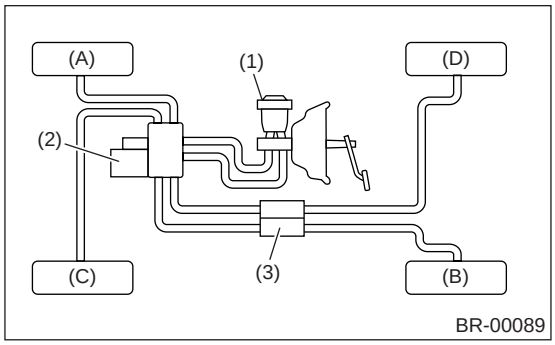
2. BRAKE LINE

NOTE:
• During the bleeding operation, keep the 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 joints and connections of the brake system.
2) Fit one end of vinyl tube into the air bleeder and put the other end into a brake fluid container.


BR-00087

CAUTION:
Brake fluid replacement sequence; (A) Front RH → (B) Rear LH → (C) Front LH → (D) Rear RH



BR-00089

(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.

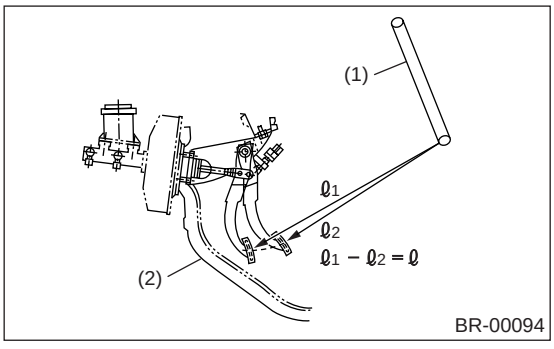
CAUTION:
Cover the bleeder with cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.

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:
8 N·m (0.8 kgf-m, 5.8 ft-lb)

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 approximately 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 after warming up, depress the brake pedal with a 500 N (51 kgf, 112 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 value.



(1) Steering wheel
(2) Toe board

Specified pedal stroke:
95 mm (3.74 in) or less
When depressing brake pedal with a 500 N (51 kgf, 112 lb) load.

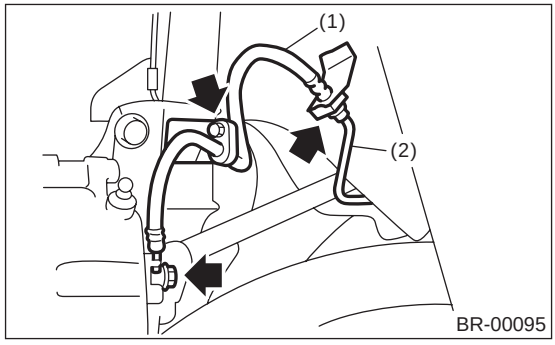
7) If the distance is more than specified, there is a possibility that air is in the brake line. Bleed the brake line until pedal stroke meets the specification.
8) Operate the hydraulic control unit in the sequence control mode. <Ref. to ABS-10, ABS Sequence Control.>
9) Recheck the pedal stroke.
10) If the distance is more than specified, there is a possibility that air is in the inside of the hydraulic unit. Repeat above steps 2) to 9) 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 ensure that brakes provide normal braking action.

12.Brake Hose

A: REMOVAL

1. FRONT BRAKE HOSE

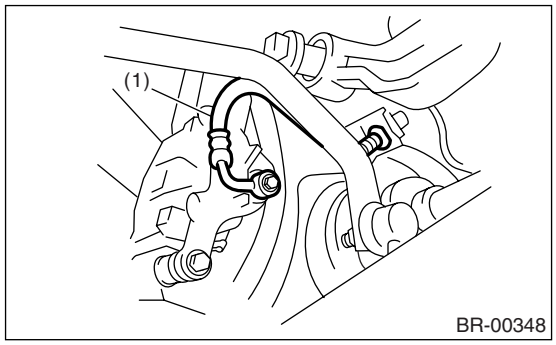
1) Separate the brake pipe from brake hose using a flare nut wrench.
2) Remove the clamp, bolt at strut mount, and union bolt.



(1) Brake hose
(2) Brake pipe

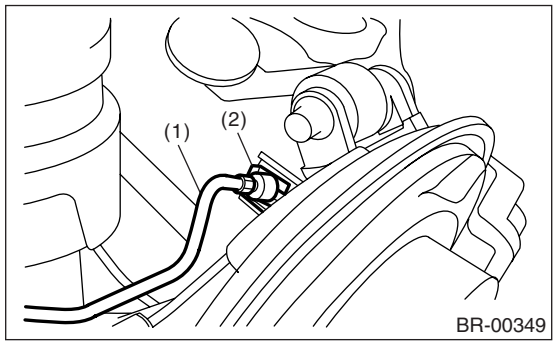
2. REAR BRAKE HOSE

1) Remove the union bolt from rear brake caliper.

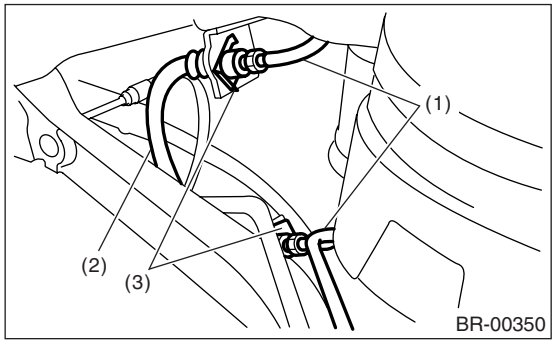


(1) Brake hose

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



(1) Brake pipe
(2) Brake hose clamp



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

B: INSTALLATION

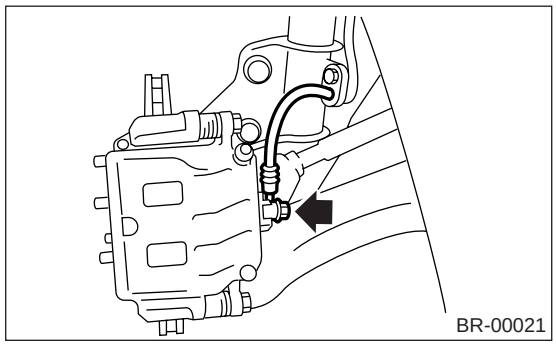
1. FRONT BRAKE HOSE

1) Secure the brake hose to strut mount.

Tightening torque:
33 N·m (3.4 kgf-m, 24.3 ft-lb)

2) Install the brake hose to 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-forward direction and route the brake hose through the hole in bracket on wheel apron side.

CAUTION:
Be sure the brake hose is not twisted.

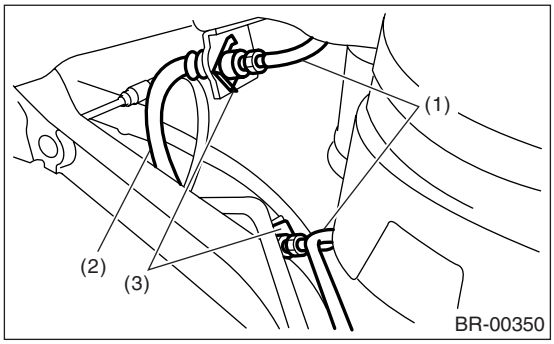
4) Temporarily tighten the flare nut to connect the brake pipe and hose.
5) Fix the brake hose with clamp at wheel apron bracket.
6) Tighten the flare nut to specified torque.

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

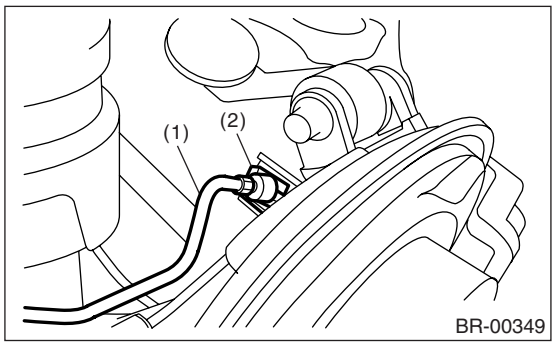
7) Bleed air from brake system.

2. REAR BRAKE HOSE

1) Pass the brake hose through the hole of bracket, and lightly tighten the flare nut to connect brake pipe.
2) Insert the clamp upward to fix brake hose.



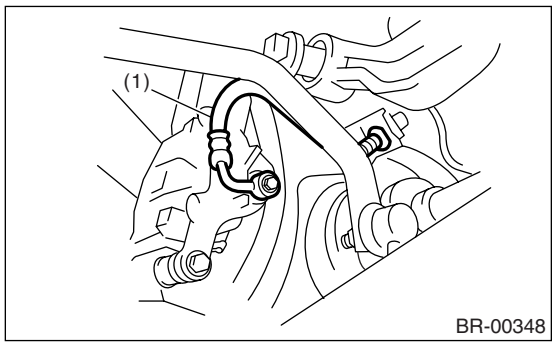
(1) Brake pipe
(2) Brake hose
(3) Brake hose clamp



(1) Brake pipe
(2) Brake hose clamp

3) 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)



(1) Brake hose

4) Tighten the flare nut to specified torque.

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

5) Bleed air from the brake system.

C: INSPECTION

Ensure there are no cracks, breakage or damage on hoses. Check joints for fluid leakage. If any cracks, breakage, damage or fluid 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 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, 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 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, make sure that it is not bent.
• After installing the brake pipe and hose, bleed 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 joints for fluid leakage. If any cracks, breakage, damage or fluid leakage is found, repair or replace the pipes.

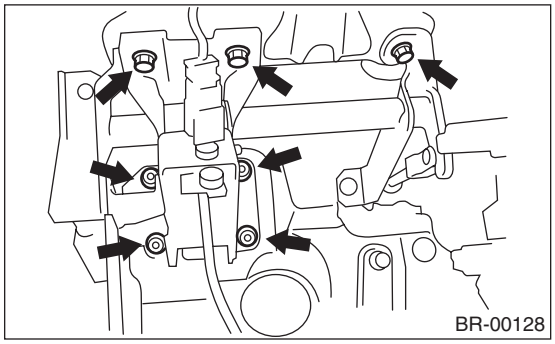
NOTE:
Use a mirror when inspecting the low-visible part or backside.

14.Brake Pedal

A: REMOVAL

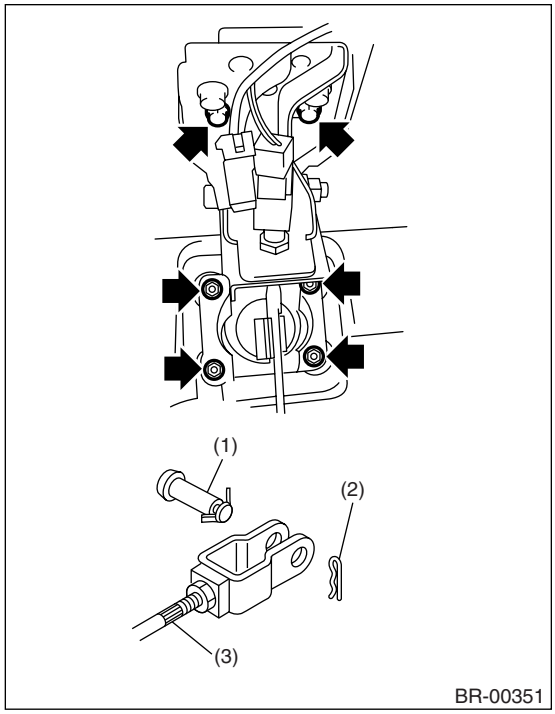
1. LHD MT MODEL

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



2. LHD AT MODEL

1) Remove the steering shaft.
2) Disconnect the connectors (stop light switch) from pedal bracket.
3) Remove the clevis pin which secures lever to push rod.
4) Remove the bolts and nuts which secure pedal bracket.



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

3. RHD MODEL

Refer to LHD AT model. <Ref. to BR-43, LHD AT MODEL, REMOVAL, Brake Pedal.>

B: INSTALLATION

1) Install in the reverse order of removal.

CAUTION:
Always use new clevis pins.

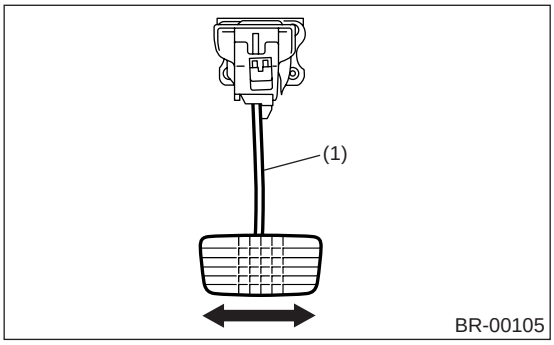
2) Inspect the brake pedal after installation. <Ref. to BR-43, INSPECTION, Brake Pedal.>

C: INSPECTION

1) Move the brake 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 bushing with a new one.

Deflection of brake pedal:
Limit
5.0 mm (0.197 in) or less

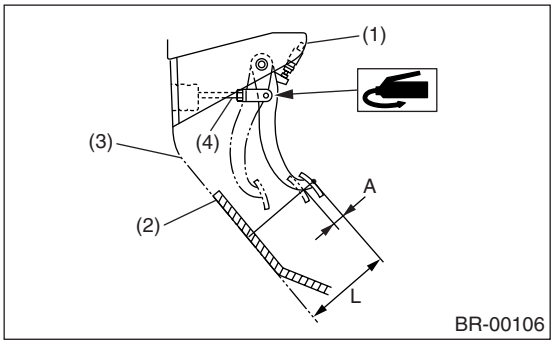


(1) Brake pedal

2) Check the position of pedal pad.

Pedal height L:
LHD: 150 — 160 mm (5.91 — 6.30 in)
RHD: 162 — 172 mm (6.38 — 6.77 in)

Brake pedal free play A:
0.5 — 2 mm (0.02 — 0.08 in) [When the brake pedal is pulled upward with force of less than 10 N (1 kgf, 2 lb).]



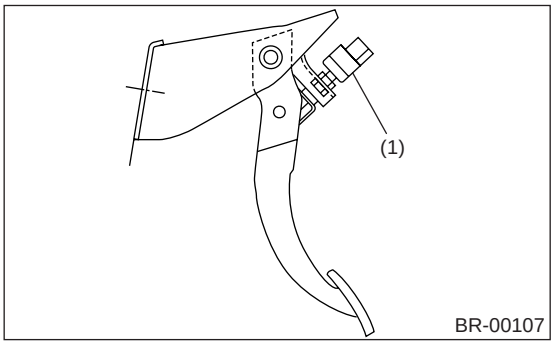
(1) Stop light switch
(2) Mat
(3) Toe board
(4) Brake booster operating rod

3) If it is not within the 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 the nuts, and unscrew the stop light switch to remove.

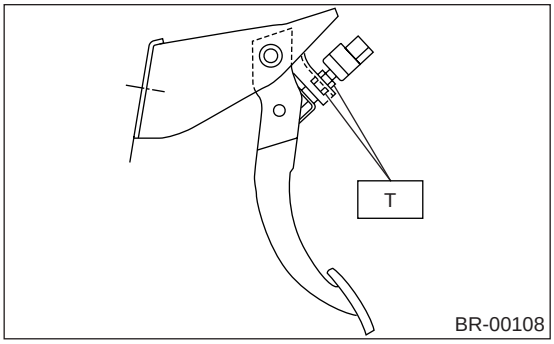


(1) Stop light switch

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-45, ADJUSTMENT, Stop Light Switch.>

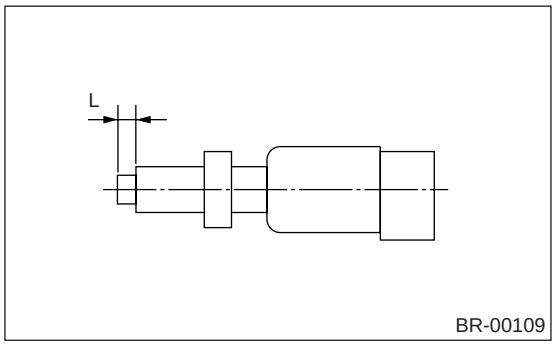
Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)



C: INSPECTION

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

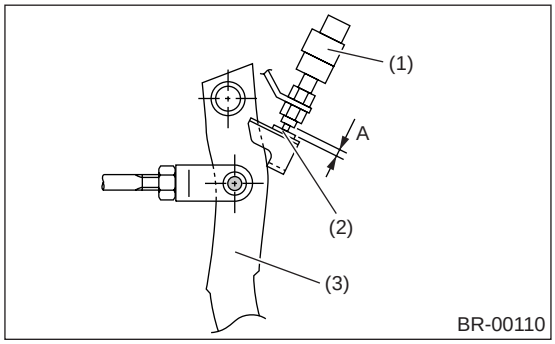
Specified position L:
2 mm (0.079 in)



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

CAUTION:
Be careful not to rotate the stop light switch.

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



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

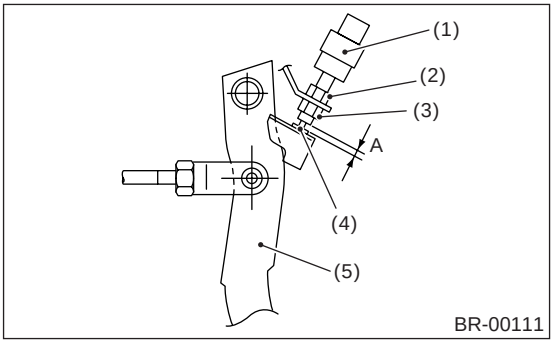
3) If it is not within the specified value, adjust it by adjusting the position of stop light switch.

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

16.Diagnosis

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, adhering water or fluid on the 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 the lining or rotor	Eliminate cause of fluid leakage, and clean or replace.
	(2) Rotor eccentricity	Correct or replace the rotor.
	(3) Improper lining contact, deteriorated surface material, improper inferior material, or wear	Correct by grinding, or replace.
	(4) Deformed back plate	Rectify or replace.
	(5) Improper tire inflation	Adjust to correct pressure.
	(6) Disordered wheel alignment	Adjust alignment.
	(7) Loosened back plate or the support installing bolts	Retighten to specified torque.
	(8) Faulty wheel bearing	Replace.
	(9) Trouble in hydraulic system	Replace the cylinder, brake pipe or hose.
	(10) Uneven effect 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	Correct 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) (creak sound)	(1) Hardened or deteriorated brake pad	Replace the pad.
	(2) Worn brake pad	Replace the pad.
	(3) Loosened back plate or the support installing bolts	Retighten to specified torque.
	(4) Loose wheel bearing	Retighten to 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) Improper 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 the support	Replace the pad or the support.