SECTION BR
BRAKE SYSTEM

CONTENTS

PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

BFS0003P

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

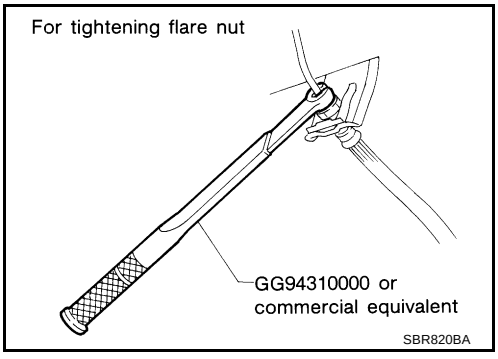
WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

Precautions for Brake System

BFS0003Q

- Clean dust on brake pads, shoes, drums, and back plates with a vacuum dust collector. Do not blow with compressed air.
- Recommended fluid is brake fluid “DOT 3” or “DOT 4”.Refer to MA-17, "Fluids and Lubricants" .
- Never reuse drained brake fluid.
- Be careful not to splash brake fluid on painted areas such as the body. If brake fluid is splashed or spilled on painted areas, wipe it off and flush the area with water immediately.
- Use only clean brake fluid when cleaning master cylinder and disc brake components.
- Never use mineral oils such as gasoline or kerosene to clean. They will ruin the rubber parts and cause improper operation.
- Always use a flare nut torque wrench to securely tighten brake tube flare nuts.
- Brake system is an important safety part. If a brake fluid leak is detected, always disassemble the related parts. If damage, deformation or excessive wear is detected, replace affected parts with new ones.
- Before starting operation, be sure to turn the ignition switch OFF and disconnect the ABS actuator and control module connector or battery cables.
- When installing brake piping, be sure to check torque.



WARNING:

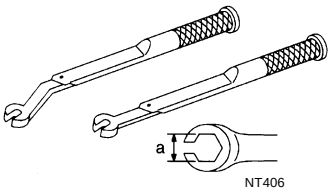
Clean brake pads and shoes with a waste cloth, then wipe with a dust collector.

PREPARATION

PFP:00002

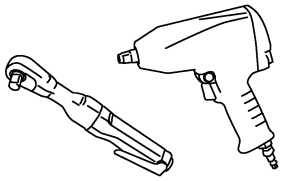
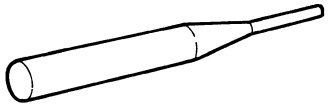
Special Service Tools

BFS0003R

Tool number Tool name	Description
GG94310000 Flare nut torque wench a: 10 mm (0.39 in)/12 mm (0.47 in)  NT406	Removing and installing brake piping

Commercial Service Tools

BFS0003S

Tool name	Description
Power tool  PBIC0190E	Removing front and rear caliper assembly, tyres
Pin punch Tip diameter: 4 mm (0.16 in) dia  ZZA0515D	Removing and installing reservoir tank pin

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

PFP:00003

NVH Troubleshooting Chart

BFS0003T

Use the chart below to help you find the cause of the symptom. If necessary, repair or replace these parts.

			Reference page	BR-25, BR-30	BR-25, BR-30	BR-25, BR-30	—	—	BR-29, BR-35	—	—	—	BR-29, BR-35	—	NVH in PR section	NVH in RFD section	NVH in FAX, RAX and FSU, RSU section	NVH in WT section	NVH in WT section	NVH in RAX section	NVH in PS section
			Possible cause and SUSPECTED PARTS	Pads - damaged	Pads - uneven wear	Shims damaged	Rotor imbalance	Rotor damage	Rotor runout	Rotor deformation	Rotor deflection	Rotor rust	Rotor thickness variation	Drum out of round	PROPELLER SHAFT	DIFFERENTIAL	AXLE AND SUSPENSION	TYRES	ROAD WHEEL	DRIVE SHAFT	STEERING
Symptom	BRAKE	Noise		×	×	×									×	×	×	×	×	×	×
		Shake					×								×		×	×	×	×	×
		Shimmy, Judder					×	×	×	×	×	×	×				×	×	×		×

X: Applicable

BRAKE PEDAL

PFP:46501

On-Vehicle Inspection and Adjustment

BFS0003U

Adjust clearance between dash panel and brake pedal upper surface to the following dimensions.

Brake pedal height "H_1 "
(from dash lower panel top surface)

M/T models: 156 – 166 mm (6.14 – 6.54 in)

A/T models: 164 – 174 mm (6.46 – 6.85 in)

Pedal height "H_2 " when depressed [With engine running and at a depression force of 490 N (50 kg, 110.6 lb)]

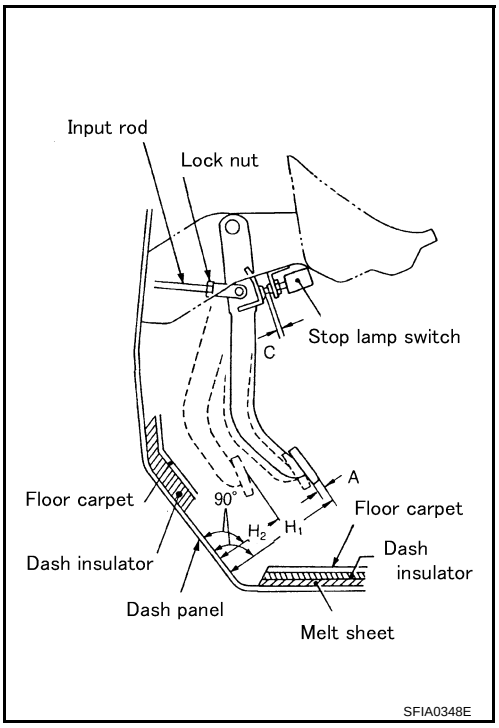
M/T models: 80 mm (3.15 in) or more

A/T models: 85 mm (3.35 in) or more

Clearance "C" between stopper rubber and threaded end of stop lamp switch:

0.74 – 1.96 mm (0.0291 – 0.0772 in)

Pedal play "A": 3 – 11 mm (0.12 – 0.43 in)

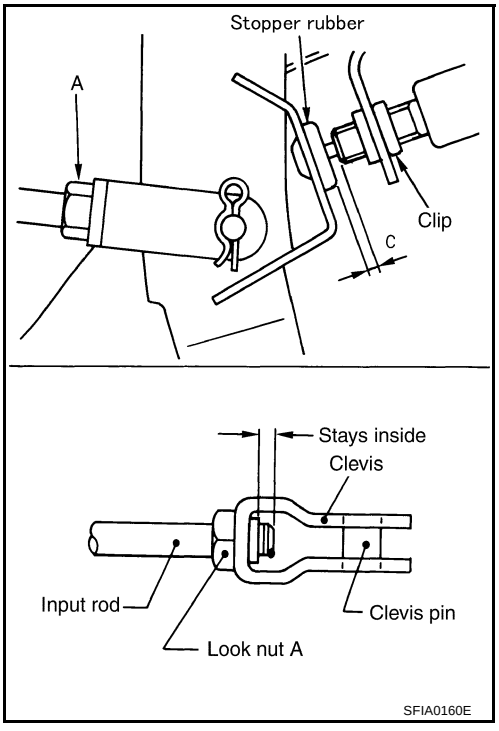


1. Loosen stop lamp switch by rotating it counter-clockwise by 45°.
2. Loosen input rod lock nut (A), then rotate input rod, set pedal to the specified height, and tighten lock nut (A). Refer to BR-21, "Components" .

   CAUTION:
   Confirm threaded end of input rod remains inside the clevis.
3. Pull pedal by hand and hold it. Press stop lamp switch until its threaded end contacts the stopper rubber.
4. While holding it against the stopper rubber, turn the switch clockwise by 45° and secure it.

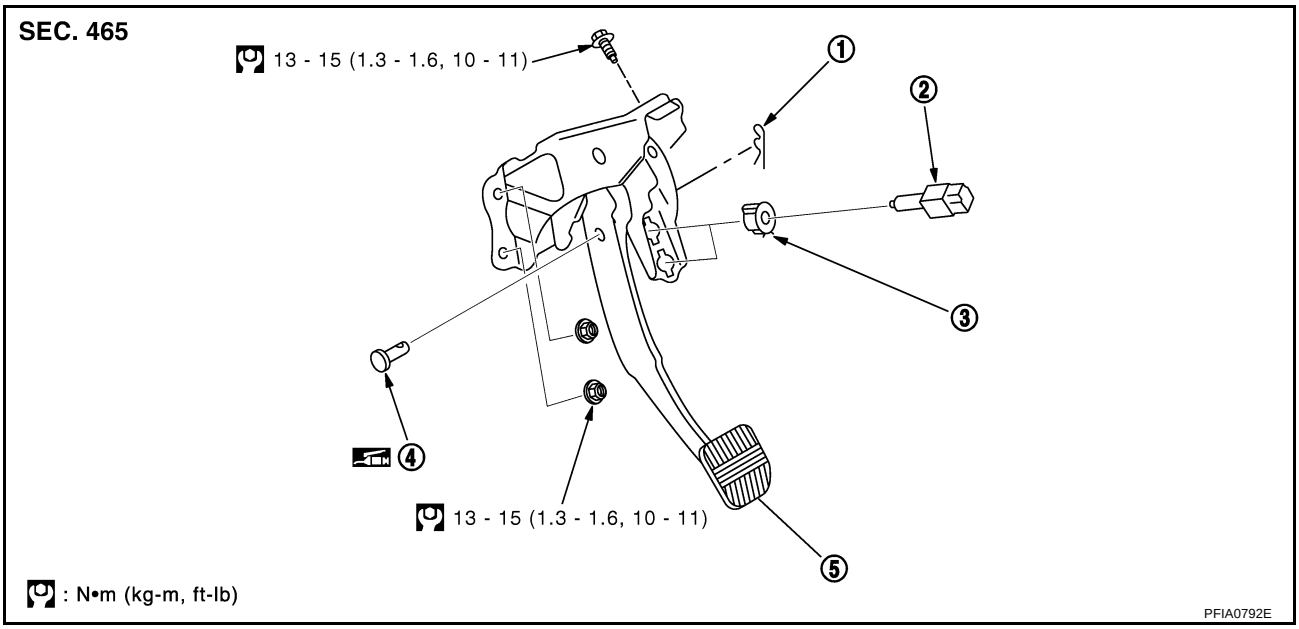
   CAUTION:
   Be sure stopper rubber to stop lamp switch screw threaded end gap (C) is within the specifications.
5. Check pedal free play.

   CAUTION:
   Be sure stop lamps go off when pedal is released.
6. Start engine and check brake pedal depressed height.



Components

BFS0003V



1. Snap pin
2. Stop lamp switch
3. Clip
4. Clevis pin
5. Brake pedal assembly

Removal and Installation

BFS0003W

REMOVAL

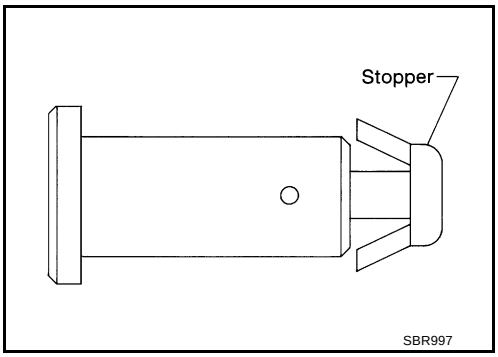
Be careful not to deform brake tube.

1. Remove instrument lower driver panel. Refer to IP-10, "INSTRUMENT PANEL ASSEMBLY" .
2. Remove steering column assembly from steering member. Refer to PS-11, "STEERING COLUMN" .
3. Remove stop lamp switch from brake pedal assembly.
4. Remove snap pin and clevis pin from brake booster clevis.
5. Remove brake pedal assembly mounting nuts. Pull brake booster toward engine compartment to the extent that does not deform brake tube.
6. Remove brake booster clevis from input rod.
7. Remove the mounting bolts from the bracket, and remove the pedal assembly from the vehicle.

INSPECTION AFTER REMOVAL

Check brake pedal for the following.

- Bent brake pedal
- Deformed clevis pin
- Cracks in welded area
- Cracked or deformed clevis pin stopper



INSTALLATION

Install in reverse order of removal. Be careful of the following:

- Adjust brake pedal assembly after installing it.

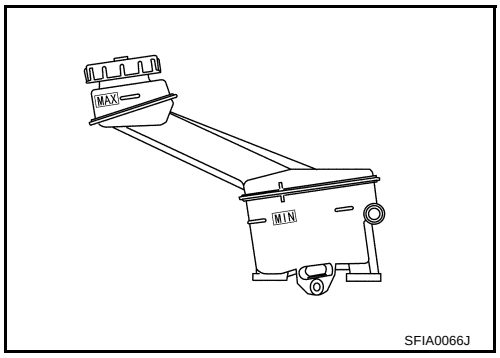
BRAKE FLUID

PFP:KN100

Checking Brake Fluid Level

BFS0003X

- Confirm reservoir tank fluid level is within the specifications (between MAX and MIN lines).
- Visually check around reservoir tank for fluid leaks.
- If fluid level is excessively low, check brake system for leaks.
- If warning lamp remains illuminated after parking brake lever is released, check brake system for fluid leakage.



SFIA0066J

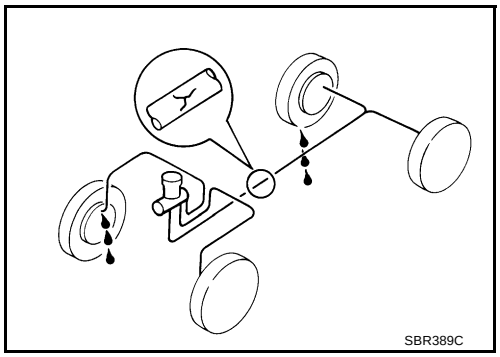
Checking Brake Line

BFS0003Y

CAUTION:

If leakage occurs around joints, retighten or, if necessary, replace damaged parts.

1. Check brake line (tube and hoses) for cracks, deterioration or other damage. Replace and damaged parts.
2. Check for oil leakage by fully depressing brake pedal while engine is running.


SBR389C

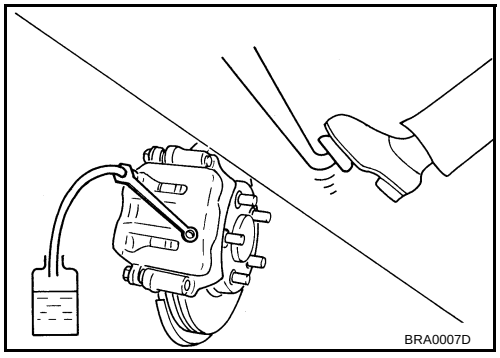
Changing Brake Fluid

BFS0003Z

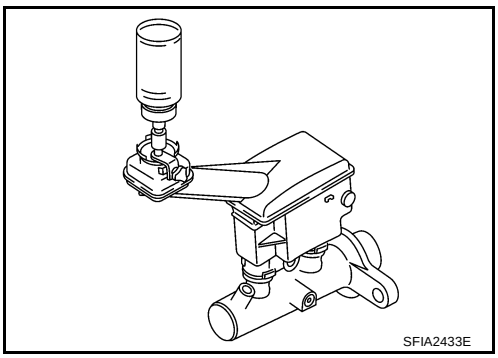
CAUTION:

- **Refill with new brake fluid “DOT 3 or DOT 4”.**
- **Always keep fluid level higher than minimum line on reservoir tank.**
- **Never reuse drained brake fluid.**
- **Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away water immediately.**

1. Connect a vinyl tube to bleed valve.
2. Drain brake fluid gradually from bleed valve of each wheel while depressing brake pedal.
3. Turn OFF ignition switch. Remove ABS actuator connector.


BRA0007D

4. Be sure there is no foreign material in reservoir tank. Refill with new brake fluid.
5. Connect a vinyl tube to bleed valve.
6. Rest foot on brake pedal. Loosen bleed valve. Slowly depress pedal until it stops. Tighten bleed valve. Release brake pedal. Repeat this process a few times at 2-3 second intervals until new brake fluid flows out.
   For bleeding procedure. Refer to BR-9, "Bleeding Brake System" .


SFIA2433E

Bleeding Brake System

BFS00040

CAUTION:

- **Carefully monitor brake fluid level at master cylinder during bleeding operation.**
- **Fill reservoir with new brake fluid “DOT 3” or “DOT 4”. Make sure it is full at all times while bleeding air out of system.**
- **Place a container under master cylinder to avoid spillage of brake fluid.**
- **While bleeding, pay attention to master cylinder fluid level.**
- **For models with ABS, turn ignition switch OFF and disconnect ABS actuator connectors or battery cables.**
- **Bleed air in the following order.**
  Right rear brake, left front brake, left rear brake, right front brake

1. Turn OFF ignition switch. Remove ABS actuator connector.
2. Connect a vinyl tube to bleed valve.
3. Fully depress the brake pedal 4 to 5 times.
4. With brake pedal depressed, loosen air bleeder and bleed air.
5. Close bleed valve.
6. Slowly release brake pedal.
7. Tighten bleed valve to the specified torque. Refer to BR-25, "Components" (Front) and BR-30, "Components" (Rear).
8. Repeat steps 2 – 7. Occasionally refill master cylinder reservoir tank. Be sure to keep it at least half-full.

BRAKE TUBE AND HOSE

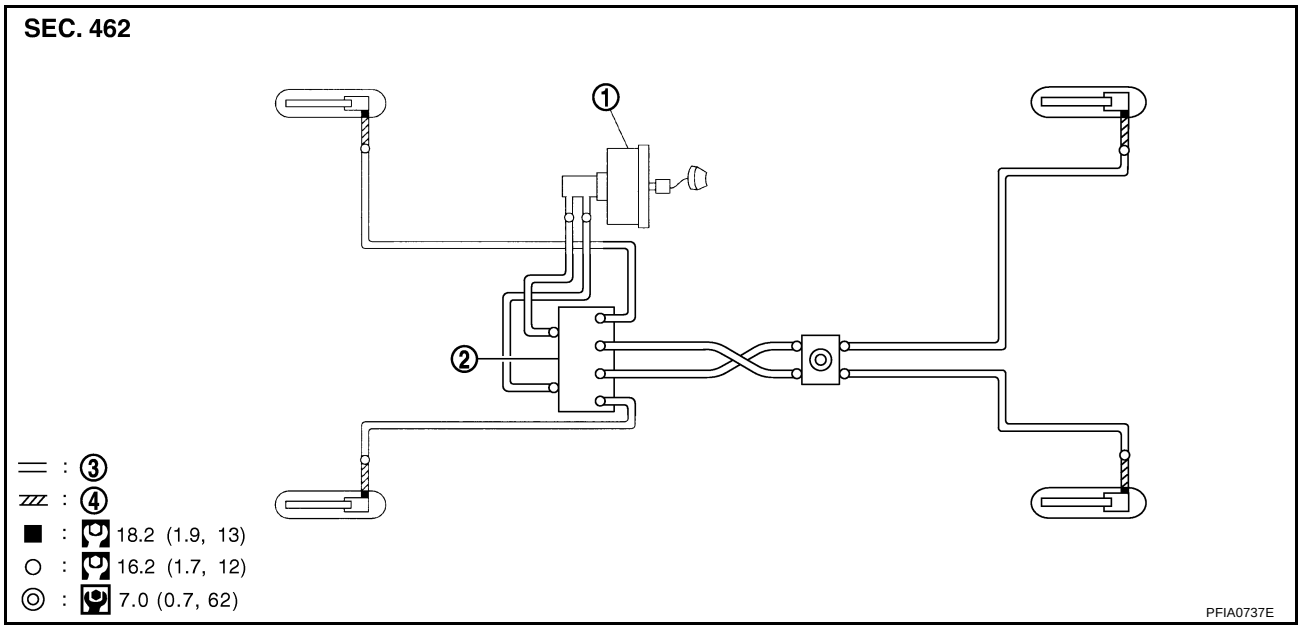
PFP:46300

Hydraulic Circuit

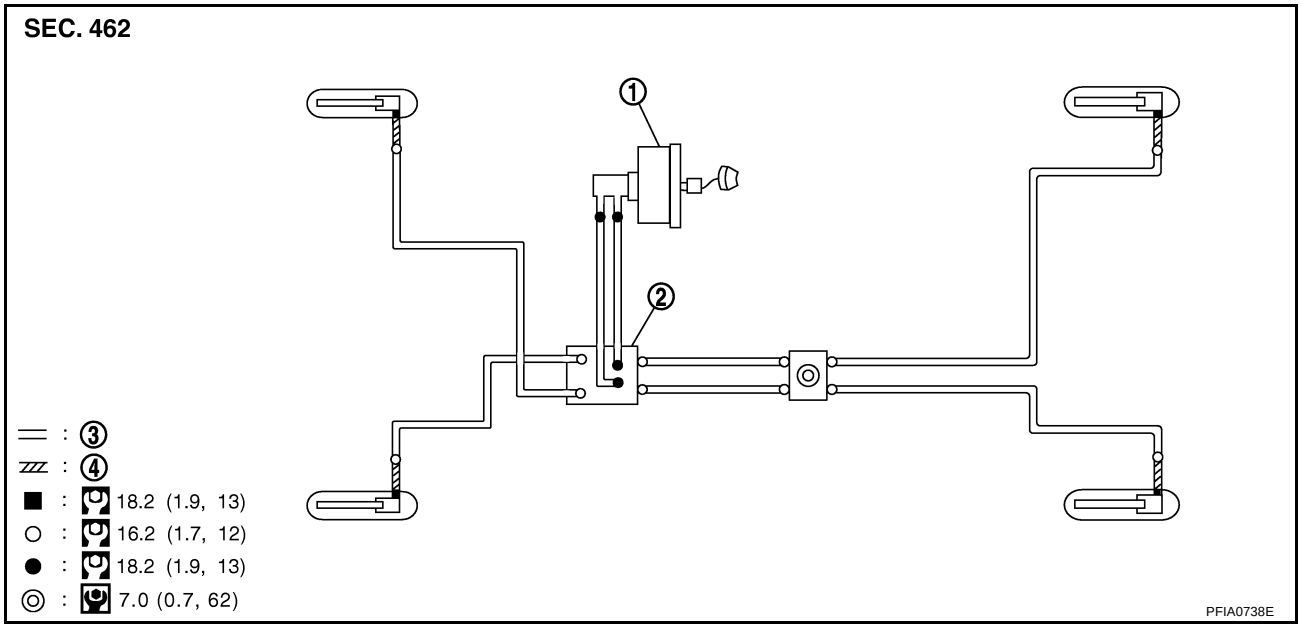
BFS00041

RHD MODELS

WITHOUT ESP



WITH ESP



1. Brake booster
2. Actuator
3. Brake tube
4. Brake hose

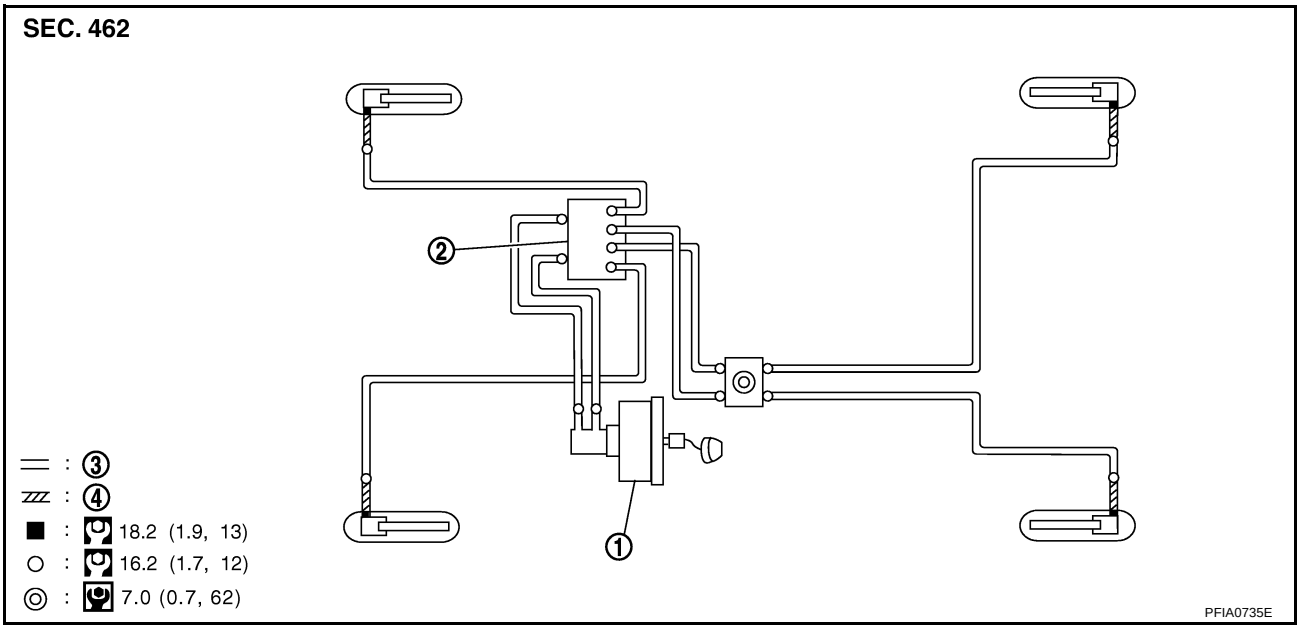
■ : Union bolt
○ : Flare nut
● : Flare nut
◎ : Connector mounting bolt

Refer to GI-9, "Components" , for the symbols in the figure.

LHD MODELS

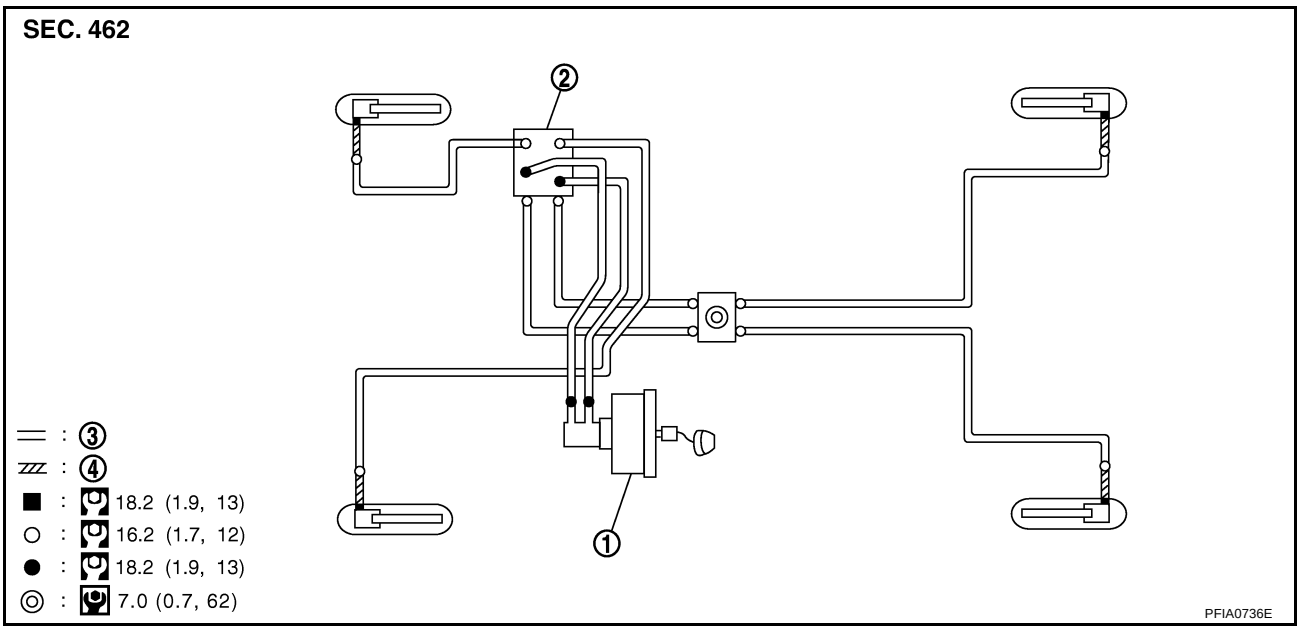
WITHOUT ESP

SEC. 462



WITH ESP

SEC. 462



1. Brake booster
2. Actuator
3. Brake tube
4. Brake hose

■ : Union bolt
○ : Flare nut
● : Flare nut
◎ : Connector mounting bolt

Refer to GI-9, "Components" , for the symbols in the figure.

Removal and Installation of Front Brake Tube and Brake Hose

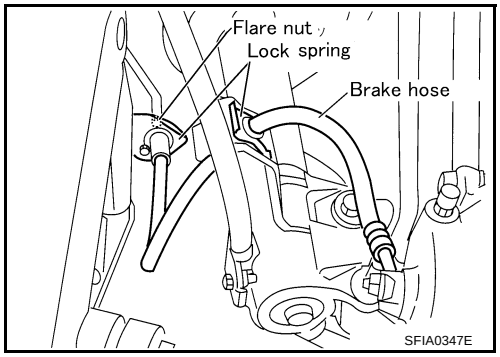
BFS00042

REMOVAL

CAUTION:

- **Do not allow brake fluid to spill or splash on painted surfaces. Brake fluid can seriously damage paint. If it gets on a painted surface, wipe it off immediately and wash it away with water.**
- **Do not bend or twist brake hose sharply, or strongly pull it.**
- **Cover brake fluid line joints to prevent dust and other foreign material.**

1. Connect a vinyl tube to bleed valve.
2. Drain brake fluid gradually from bleed valve of each wheel while depressing brake pedal.
3. Using a flare nut wrench, loosen brake tube flare nuts and disconnect brake tube from brake hose.
4. Remove union bolts and disconnect caliper assembly from brake hose.
5. First remove lock spring from brake tube and strut mounting positions. Then remove brake hose.



INSTALLATION

CAUTION:

- **Refill with new brake fluid “DOT 3” or “DOT4”.**
- **Never reuse drained brake fluid.**

1. Connect brake hose to caliper assembly and tighten union bolt to the specified torque.

   CAUTION:

   - **Securely connect brake hose to the protrusion on the cylinder body.**
   - **Do not reuse the copper washer for union bolt.**
2. Connect brake hose to strut and fix with lock spring.
3. Connect brake hose to brake tube. Temporarily tighten flare nuts by hand as far as they will go. Secure them with the lock spring.
4. Using a flare nut torque wrench, tighten to the specified torque. Refer to BR-10, "Hydraulic Circuit" .
5. Refill brake fluid until new brake fluid comes out of each bleed valve.
6. Afterwards, bleed air. Refer to BR-9, "Bleeding Brake System" .

Removal and Installation of Rear Brake Tube and Brake Hose

BFS00043

REMOVAL

CAUTION:

- **Do not allow brake fluid to spill or splash on painted surfaces. Brake fluid can seriously damage paint. If it gets on a painted surface, wipe it off immediately and wash it away with water.**
- **Do not bend or twist brake hose sharply, or strongly pull it.**
- **Cover brake fluid line joints to prevent dust and other foreign material.**

1. Connect a vinyl tube to bleed valve.
2. Drain brake fluid gradually from bleed valve of each wheel while depressing brake pedal.
3. Using a flare nut wrench, remove brake tube flare nuts and disconnect brake tube from brake hose.
4. Remove lock spring.

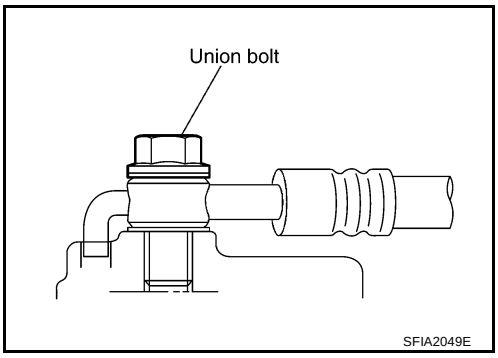
INSTALLATION

CAUTION:

- **Refill with new brake fluid “DOT 3” or “DOT 4”.**
- **Never reuse drained brake fluid.**

1. Attach L-shape metal fitting of the brake hose to brake caliper assembly positioning hole, and then tighten union bolt to the specified torque. Refer to BR-10, "Hydraulic Circuit" .

   CAUTION:
   Do not reuse the copper washer.
2. Fix brake hose by lock spring.
3. Tighten flare nut by using a flare nut wrench with the specified torque. Refer to BR-10, "Hydraulic Circuit" .
4. Refill brake fluid until new brake fluid comes out of each bleed valve.
5. Afterwards, bleed air. Refer to BR-9, "Bleeding Brake System" .
6. Check it after the installation. Refer to BR-13, "Inspection after Installation" .



Inspection after Installation

BFS00044

CAUTION:
If any leaks on joints, retighten it. Replace any damaged parts.

1. Check hose, tube, and joints for fluid leaks, damage, twist, deformation, contact with other parts, and loose connections.
2. Run engine. Depress brake pedal and hold it for approximately 5 seconds while checking each part for leaks.

BRAKE MASTER CYLINDER

PFP:46010

On-Vehicle Inspection

BFS0007L

LEAK INSPECTION

- Check for leaking in a master cylinder installation surface, a reservoir tank installation surface, and brake tube connections.

Removal and Installation

BFS0007M

CAUTION:

Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.

REMOVAL

1. Drain brake fluid. Refer to BR-8, "Changing Brake Fluid" .
2. Disconnect brake fluid level switch harness connector.
3. Using a flare nut wrench, disconnect master cylinder brake tubes.
4. Remove master cylinder mounting nuts and remove master cylinder assembly from vehicle.

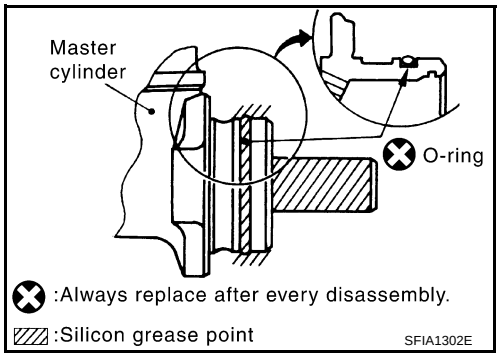
INSTALLATION

CAUTION:

- **Refill with new brake fluid “DOT 3” or “DOT 4”.**
- **Do not reuse drained brake fluid.**

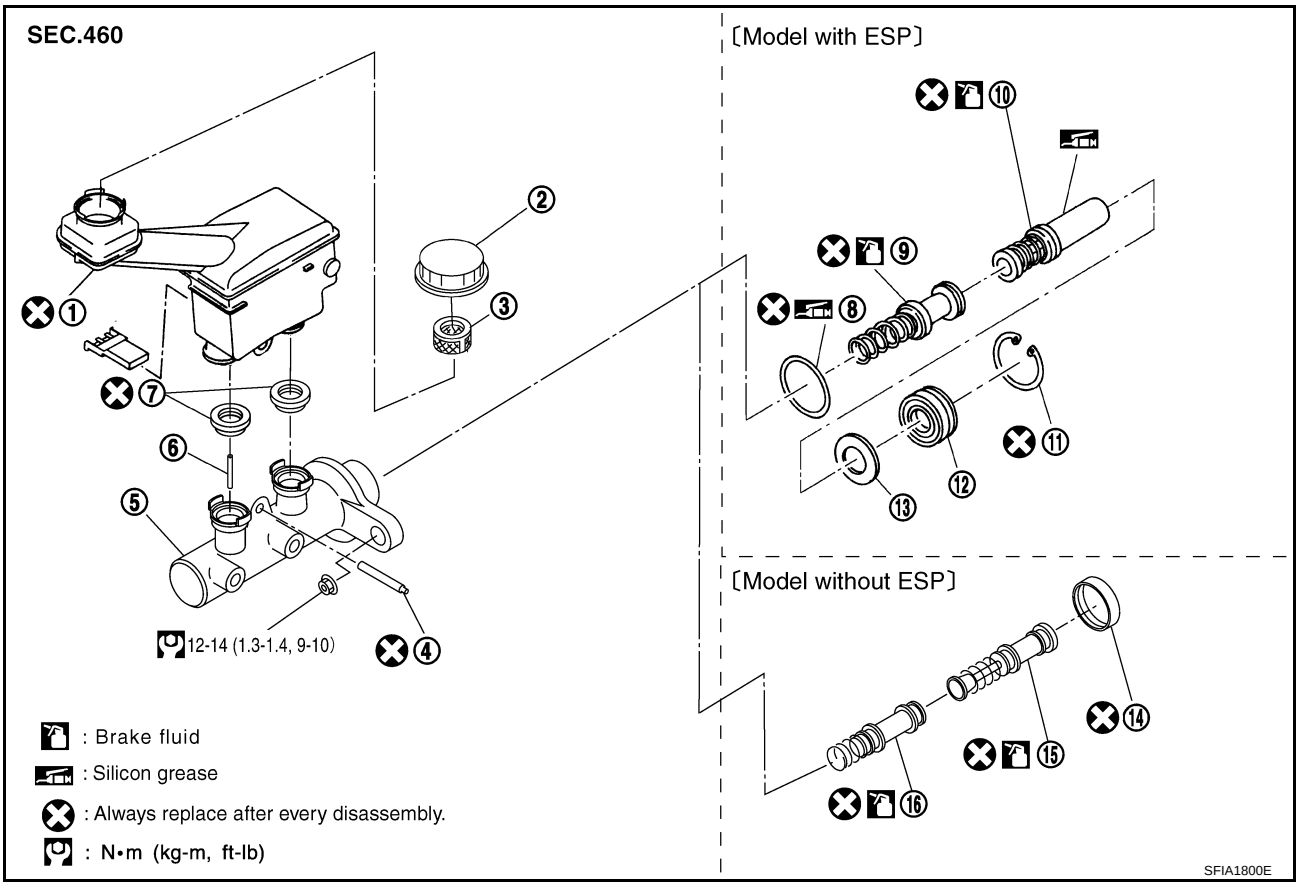
1. Perform the following procedure for ESP models, install master cylinder assembly to brake booster assembly and tighten the nuts to the specified torque. Refer to BR-21, "Components" .
   - Apply silicon grease in inner kit to O-ring and it's surrounding areas and to the booster side inner wall.

   CAUTION:
   - **Do not damage the sliding surface of the primary piston rod and do not allow foreign materials on it's surface.**
   - **Do not reuse O-ring.**
2. Install brake tube to master cylinder assembly and temporarily tighten flare nut by hand.
3. Tighten brake tube flare nut to the specified torque using a flare nut torque wrench. Refer to BR-10, "Hydraulic Circuit" .
4. Connect brake fluid level switch harness connector.
5. Refill with new brake fluid and bleed air. Refer to BR-9, "Bleeding Brake System" .



Components

BFS00045



1. Reservoir tank
2. Reservoir cap
3. Oil strainer
4. Pin
5. Cylinder body
6. Piston stopper (models with ESP)
7. Grommet
8. O-ring
9. Secondary piston assembly
10. Primary piston assembly
11. Snap ring
12. Guide assembly
13. Plate
14. Stopper cap
15. Primary piston assembly
16. Secondary piston assembly

Disassembly and Assembly

BFS00047

MODELS WITHOUT ESP

CAUTION:

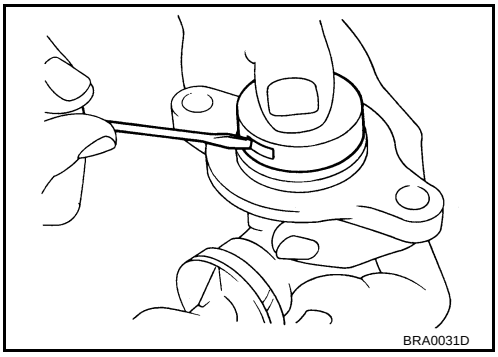
Remove reservoir tank only when absolutely necessary.

Disassembly (Piston Assembly)

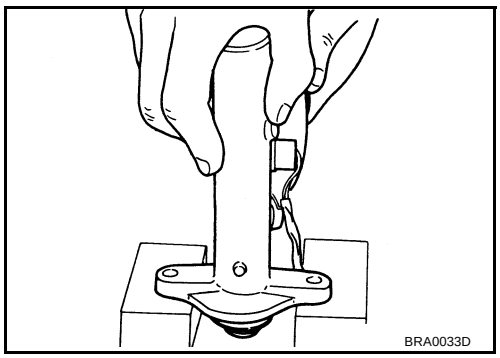
1. Using a flat-bladed screwdriver as shown in the figure, lift up the tabs on the stopper cap and remove it from the master cylinder.

   NOTE:

   Remove stopper cap while holding it because the piston in master cylinder may pop out.
2. Carefully pull primary piston assembly straight out to prevent the cylinder inner wall from being damaged.



3. Tap flange using a soft block, such as wood, and carefully pull secondary piston assembly straight out to prevent cylinder body inner wall from being damaged.



Inspection after Disassembly (Piston Assembly)

Cylinder body

- Check inner wall of cylinder for damage, abrasion, corrosion, and pinholes. Replace the cylinder body if detected.

Assembly (Piston Assembly)

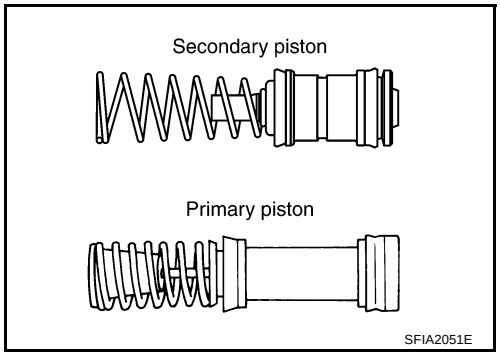
CAUTION:

- **Do not use mineral oils such as kerosene, gasoline during the cleaning and assembly process.**
- **Make sure there is no foreign matter such as dirt or dust attached to the inner cylinder walls, the piston, or the cap seal, and use care to avoid damaging parts with the assembly tools.**
- **Do not drop parts. If a part is dropped, do not use it.**

1. Apply fluid to cylinder inner wall body and contact surface of the piston assembly. Then insert secondary piston assembly and primary piston assembly into cylinder body in this order.

   CAUTION:

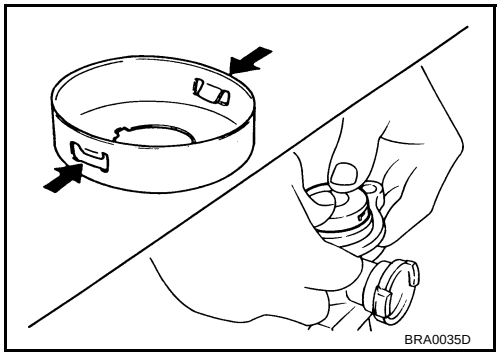
   - **Pay attention to the orientation of the piston cup, and insert straight to prevent the cup from being caught by cylinder inner wall.**
   - **Be sure to replace the assembly without disassembling the new inner kit.**
   - **Do not reuse the primary and secondary piston assemblies.**



2. Holding down the piston with the stopper cap, push the stopper cap tabs so they are firmly into the cylinder grooves, then attach the stopper cap.

   CAUTION:

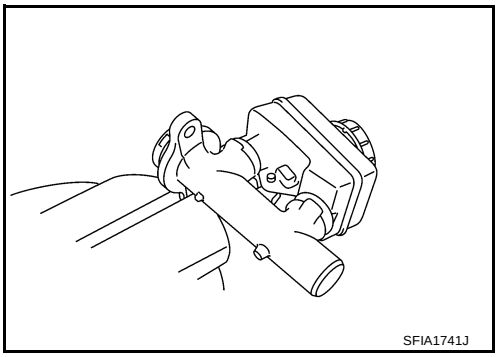
   Do not reuse the stopper cap.



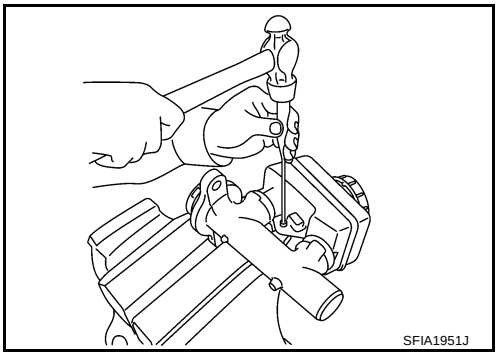
Disassembly (Reservoir Tank)

1. Secure master cylinder assembly into a vise with the chamfered pin insert hole on cylinder body facing upward.

   CAUTION:
   - **When setting the master cylinder assembly in a vise, be sure not to over-tighten.**
   - **When securing in a vise use copper plates or cloth to protect the flange.**



2. Using a pin punch [commercial service tool: diameter approximately 4 mm (0.16 in)], remove mounting pins on the reservoir tank.
3. Remove master cylinder assembly from the vise.
4. Remove reservoir tank and grommet from cylinder body.



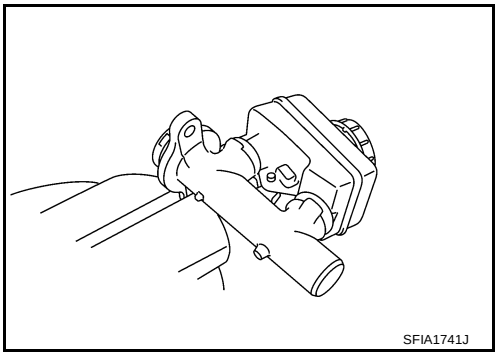
Assembly (Reservoir Tank)

1. Apply brake fluid or rubber lubricant to a grommet, and then install it into cylinder body after installing grommet to reservoir tank.

   CAUTION:
   Do not reuse the reservoir tank and grommet.

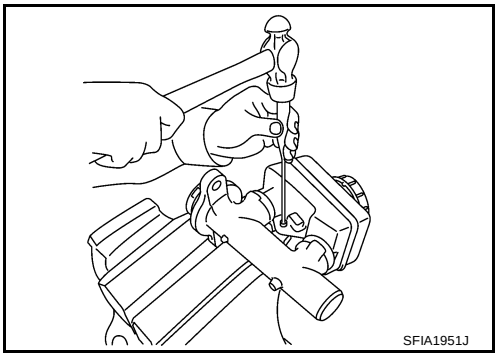
2. Secure master cylinder assembly into a vise with the chamfered pin insert hole on cylinder body facing upward.

   CAUTION:
   - **When setting the master cylinder assembly in a vise, be sure not to over-tighten.**
   - **When securing in a vise use copper plates or cloth to protect the flange.**



3. Tilt reservoir tank as shown in the figure for the mounting pin to be inserted. Return the reservoir tank to the upright position when mounting pin passes through pinhole in the cylinder body. Push mounting pin to the opposite pinhole of the reservoir tank, so that it is the same condition as the insertion side.

   CAUTION:
   - **Be sure to insert pin from the chamfered pinhole of cylinder body.**
   - **Do not reuse the mounting pin.**



MODELS WITH ESP

Disassembly

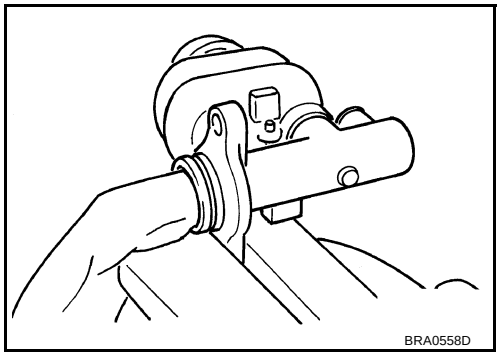
CAUTION:

Cover primary piston rod with cloths during disassembly to prevent damage to it.

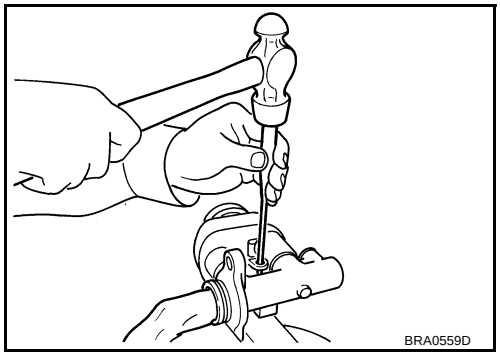
1. Place the side of cylinder body with chamfering around the pin insertion hole up, and secure the cylinder body flange section with a vise as shown in the figure.

   CAUTION:

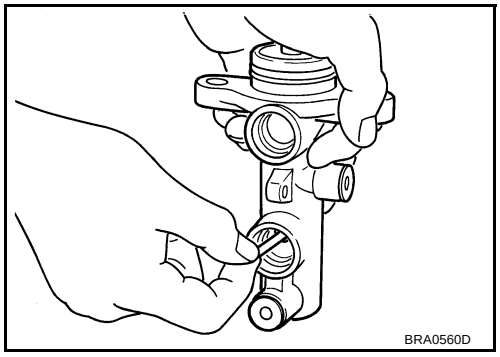
   When securing in a vise, use copper plates or cloth to protect flange.



2. Using a pin punch [commercial service tool: approximately 4 mm (0.16 in) dia.], remove reservoir tank mounting pin.
3. Remove master cylinder assembly from the vise.
4. Remove reservoir tank and grommet from cylinder body.



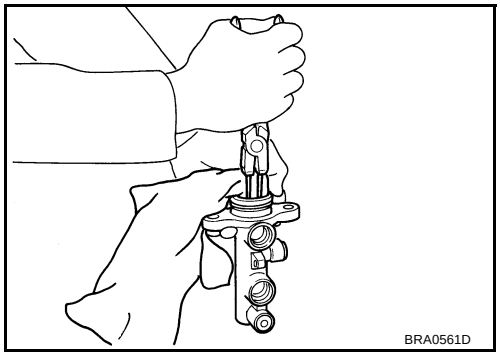
5. Push in the primary piston and remove stopper pin from the cylinder body secondary-side tank boss hole.



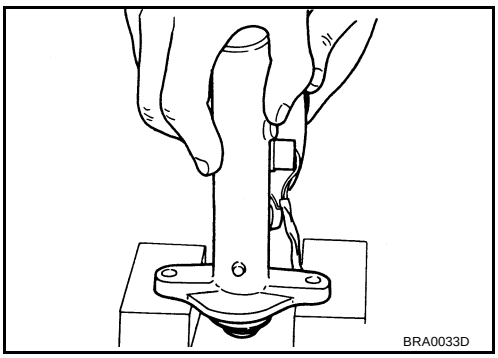
6. Remove the snap ring while pushing primary piston in to prevent piston from popping out.
7. Holding primary piston rod, pull primary piston assembly, plate, and guide straight out.
8. Remove plate and guide from primary piston.

   CAUTION:

   When removing plate from primary piston rod, make sure the inside of plate does not damage rod.



9. Tap flange using a soft block such as wood, and carefully pull the secondary piston assembly straight out to prevent cylinder inner wall from being damaged.



Inspection after Disassembly

Cylinder body

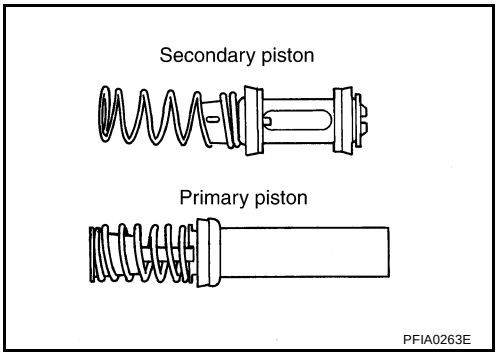
- Make sure there is no damage, friction, rusting, or pinholes on the cylinder inner wall, and replace if there are any non-standard conditions.

Assembly

CAUTION:

- **Never use mineral oils such as kerosene, gasoline during the cleaning and assembly process.**
- **Make sure there is no foreign matter such as dirt or dust attached to the inner cylinder walls, piston, or cap seal, and use care to avoid damaging parts with the assembly tools.**
- **Do not drop parts. If a part is dropped, do not use it.**

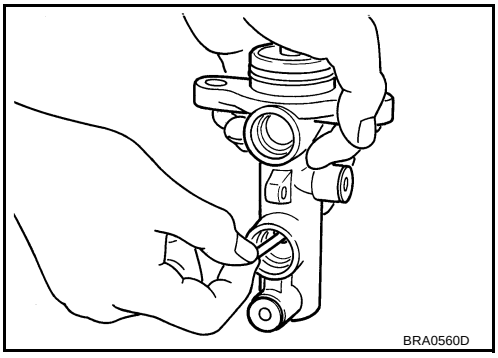
1. Apply brake fluid to the inside surface of cylinder body and the contact surface of piston assembly, and apply the silicon grease in the inner kit to primary piston rod.
2. Insert secondary piston and primary piston into cylinder body.



CAUTION:

- **Do not reuse the primary and secondary piston assemblies.**
- **Be sure to replace the assembly without disassembling new inner kit.**
- **Pay attention to the orientation of piston cup, and insert straight to prevent cup from being caught by cylinder inner wall.**

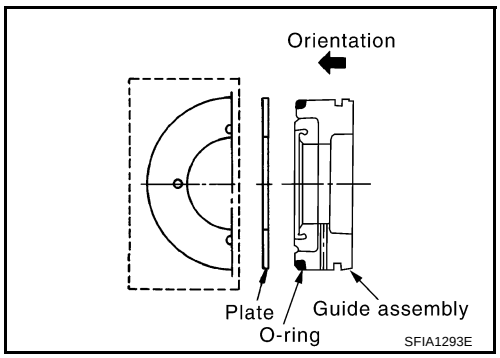
3. Visually inspect the secondary piston slit through the piston stopper mounting hole and then install the piston stopper while pushing in the primary piston.



4. Insert plate and guide into cylinder body.

CAUTION:

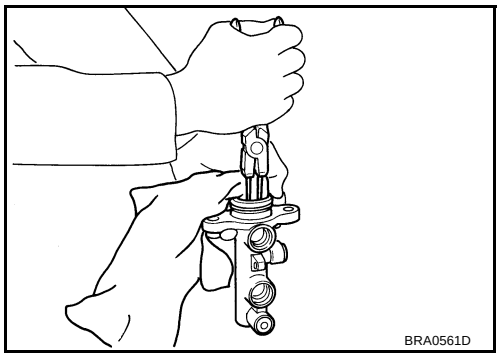
- **Make sure not to damage primary piston rod.**
- **Pay attention to the orientation of guide assembly.**
- **Do not drop O-ring.**
- **Make sure guide and/or plate are not inserted at an angle.**



5. Cover primary piston rod with cloth to prevent it getting damaged, and attach snap ring with primary piston pushed in.

CAUTION:

- **Make sure the area around snap ring is snug in the cylinder body bore groove.**
- **Do not reuse snap ring.**



6. Apply brake fluid to grommet and attach reservoir tank to master cylinder.

CAUTION:

Do not reuse grommet.

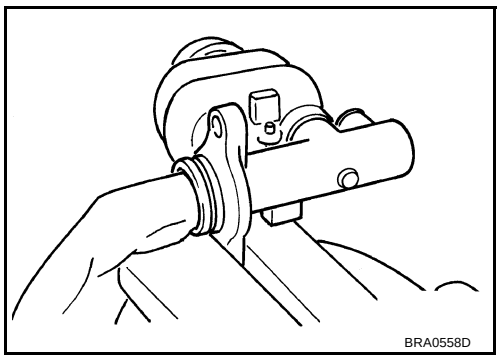
NOTE:

Attach reservoir tank in the orientation shown in the figure.

7. Place the side of cylinder body with chamfering around the pin insertion hole up, and secure the cylinder body flange section with a vise.

CAUTION:

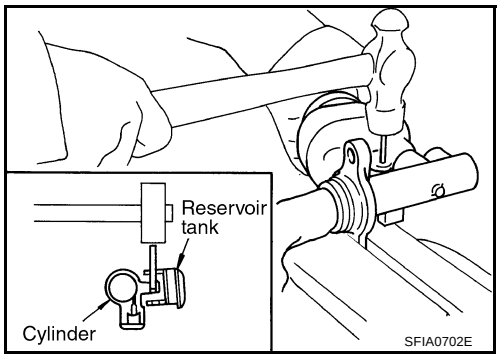
When securing in a vise, use copper plates or cloth to protect flange.



8. Tilt reservoir tank so that mounting pin can be inserted as shown in the figure, and insert mounting pin. When mounting pin has passed the master cylinder pinhole, return reservoir tank to a level position. Attach mounting pin to the opposite mounting pin hole of reservoir tank so that it is the same as the insertion side.

CAUTION:

- **Be sure to insert pin from the chamfered pinhole of cylinder body.**
- **Do not reuse reservoir tank and mounting pin.**



BRAKE BOOSTER

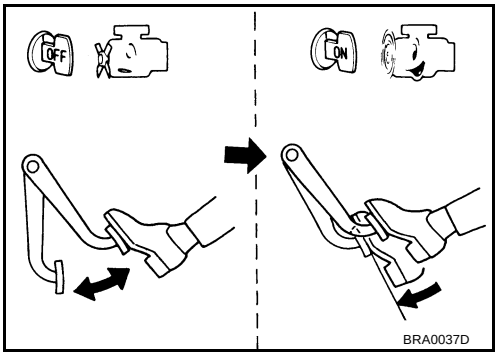
PFP:47200

On-Vehicle Inspection

BFS00048

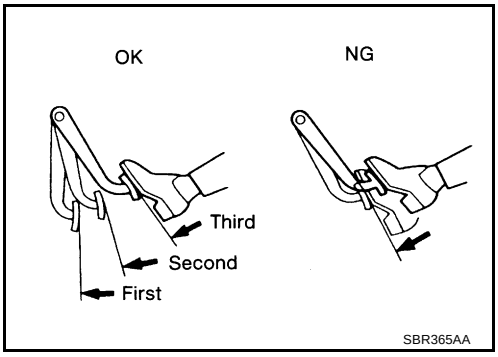
FUNCTION INSPECTION

With engine stopped, discharge stored vacuum by depressing brake pedal several times at 5 second intervals. With brake pedal fully depressed, start the engine. Confirm that clearance between brake pedal and floor panel decreases when engine vacuum stabilizes.



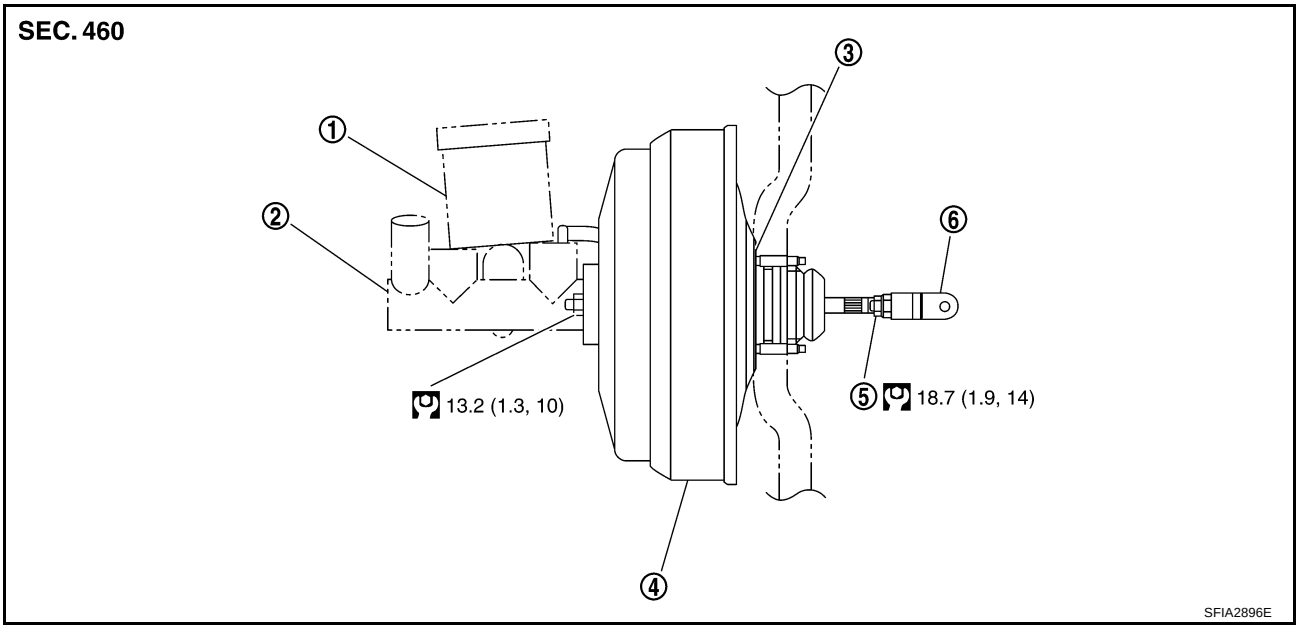
AIRTIGHTNESS INSPECTION

- Run engine at idle for approximately 1 minute. Stop it after applying vacuum to the booster. Depress brake pedal several times with normal force to discharge the stored vacuum. Confirm that clearance between brake pedal and floor panel gradually increases as the brake pedal is depressed.
- Run engine. Depress and hold brake pedal then stop engine. Keep brake pedal depressed for 30 seconds or more and make sure the pedal stroke does not change.



Components

BFS0007O



1.	Reservoir tank	2.	Master cylinder	3.	Gasket
4.	Brake booster	5.	Lock nut	6.	Clevis

Refer to GI-9, "Components" , for the symbols in the figure.

Removal and Installation

BFS00049

REMOVAL

CAUTION:

- **Do not deform or bend brake piping while removing and installing brake booster.**
- **Replace clevis pin if it is damaged.**
- **Do not damage brake booster stud bolt threads. If brake booster is tilted or inclined during installation, the dash panel may damage the threads.**
- **Be sure to install check valve in the correct orientation.**

1. Remove vacuum hose from the brake booster. Refer to BR-23, "Components" .
2. Remove master cylinder. Refer to BR-14, "Removal and Installation" .
3. Remove snap pin and clevis pin from inside vehicle.
4. Remove brake booster and brake pedal assembly.
5. Remove brake booster from dash panel in engine room side.

INSPECTION AFTER REMOVAL

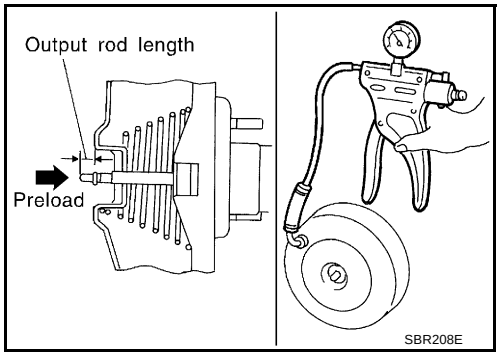
Output rod length inspection

1. Using a handy vacuum pump, apply a vacuum of –66.7 kPa (–500 mmHg, –19.69 inHg) to the brake booster.
2. Check output rod length.

Reference value at vacuum of –66.7 kPa (–500 mmHg, –19.69 inHg)

Without ESP models : 10.4 mm (0.409 in)

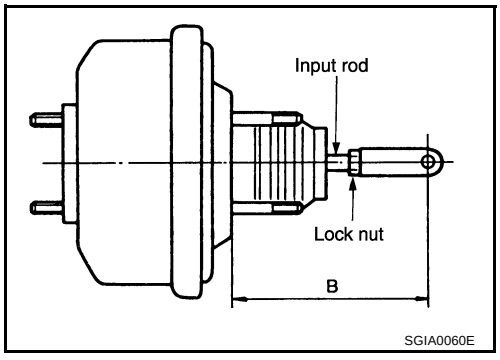
With ESP models : –6.2 mm (–0.244 in)



INSTALLATION

1. Loosen lock nut to adjust input rod length so that length “B” (in the figure) satisfies the specified value.

Length “B” standard : 125 mm (4.92 in)



2. After adjusting “B”, temporarily tighten lock nut to install booster assembly to vehicle.
3. Connect brake pedal to input rod clevis.
4. Connect brake pedal assembly mounting nuts and tighten to the specified torque. Refer to BR-7, "Components" .
5. Connect master cylinder to booster assembly. Refer to BR-14, "Removal and Installation" .
6. Adjust brake pedal height and play. Refer to BR-6, "On-Vehicle Inspection and Adjustment" .
7. Tighten input rod lock nut to the specified torque. Refer to BR-21, "Components" .
8. Bleed air. Refer to BR-9, "Bleeding Brake System" .

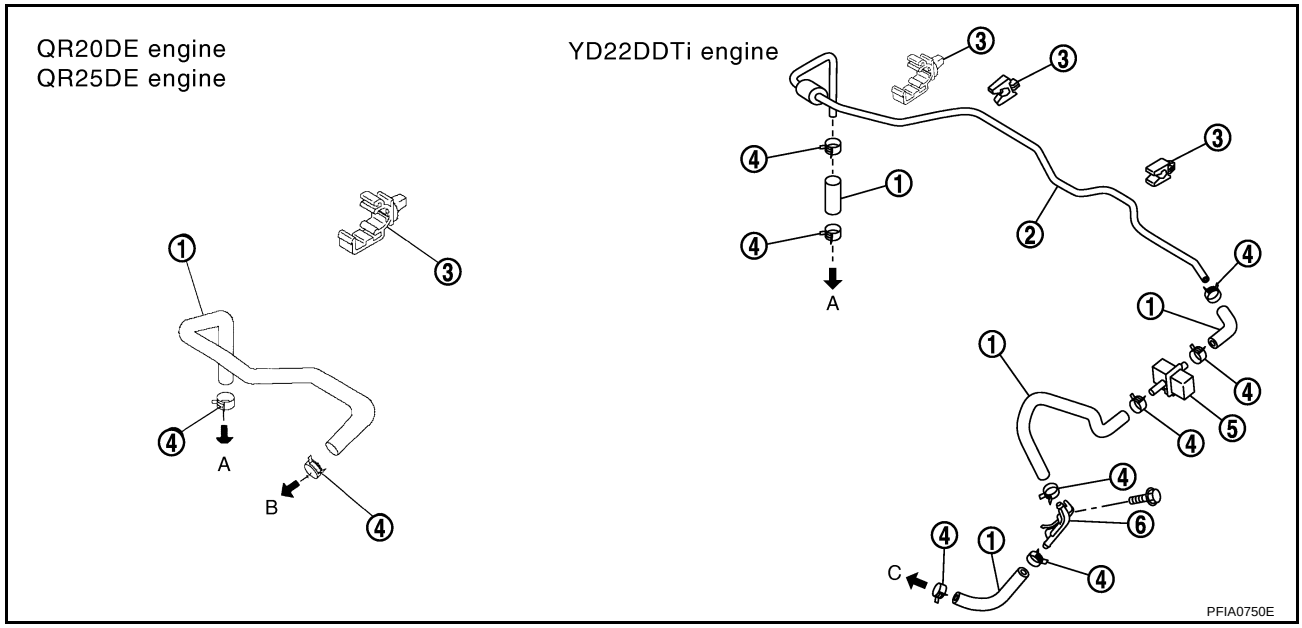
VACUUM LINES

PFP:41920

Components

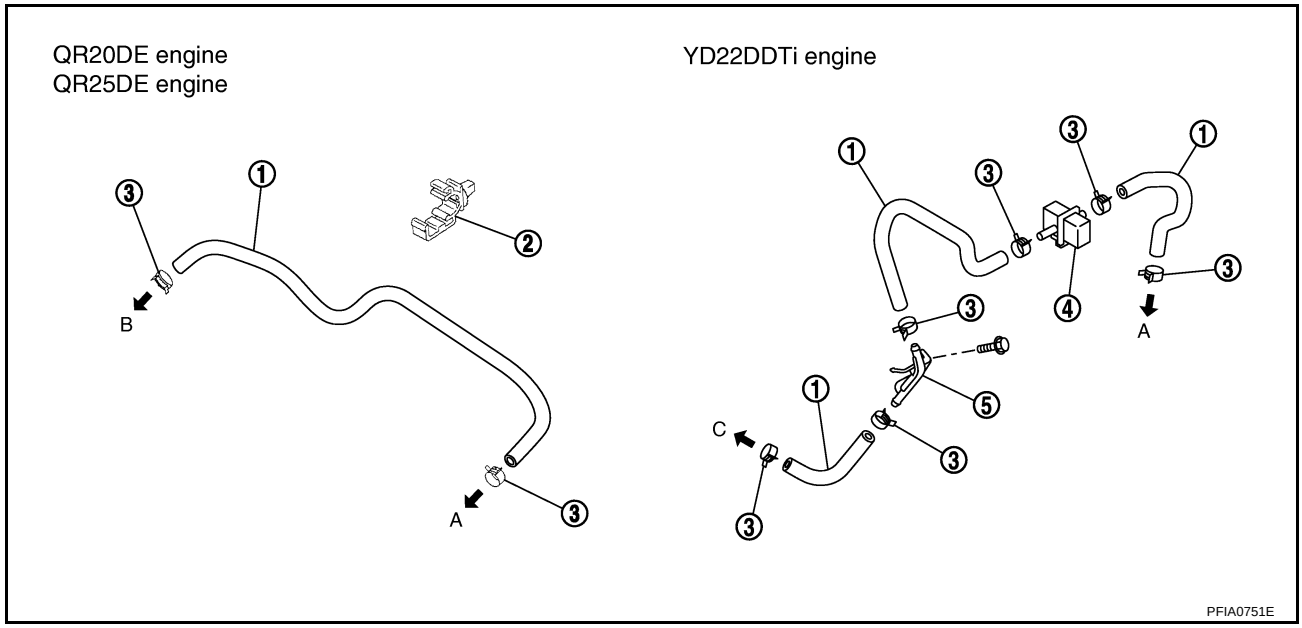
BFS0007P

RHD MODELS



1. Vacuum hose
2. Vacuum tube
3. Clip
4. Clamp
5. Vacuum reservoir assembly
6. Vacuum tube bracket
A: To brake booster
B: To intake manifold
C: To vacuum pump

LHD MODELS



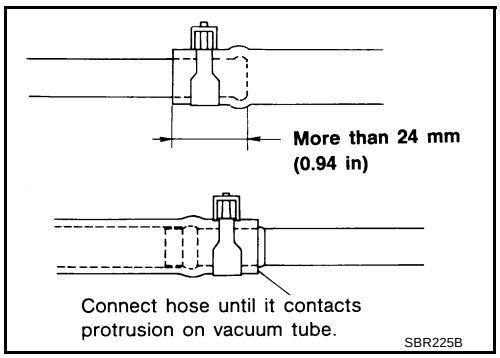
1. Vacuum hose
2. Clip
3. Clamp
4. Vacuum reservoir assembly
5. Vacuum tube bracket
A: To brake booster
B: To intake manifold
C: To vacuum pump

Removal and Installation

BFS0004A

CAUTION:

- **Because vacuum hose contains a check valve, it must be installed in the correct orientation. Refer to the stamp or label to confirm correct installation. Brake booster will not operate normally if hose is installed in the wrong direction.**
- **Insert the vacuum hose at least 24 mm (0.94 in).**
- **Never use lubricating oil during assembly.**



Inspection

BFS0004B

VISUAL INSPECTION

Check for improper assembly, damage and aging.

CHECK VALVE INSPECTION

Airtightness Inspection

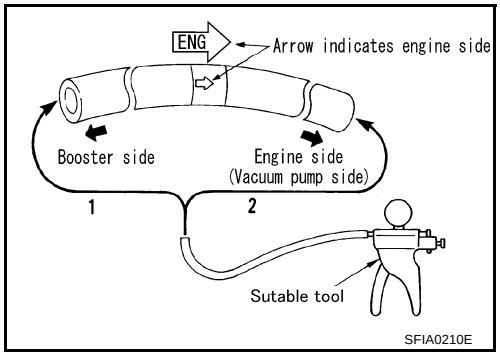
Use a hand-held vacuum pump to check.

When connected to booster side (1):

Vacuum decrease should be within 1.3 kPa (10 mmHg, 0.39 inHg) for 15 seconds under a vacuum of –66.7 kPa (–500 mmHg, –19.69 inHg)

When connected to engine side (2):

No vacuum will be applied



FRONT DISC BRAKE

PFP:41000

On-Vehicle Inspection

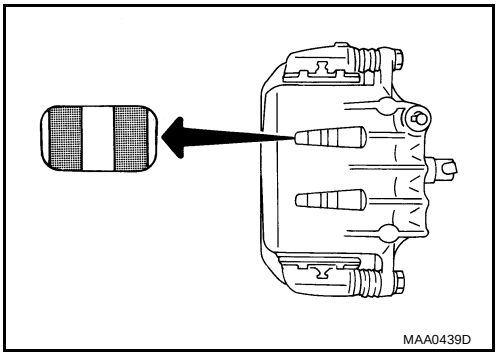
BFS0004D

PAD WEAR INSPECTION

Check pad thickness by lifting vehicle, removing the wheel, and looking through check hole on cylinder body. If necessary, use a scale.

Standard pad thickness : 11 mm (0.43 in)

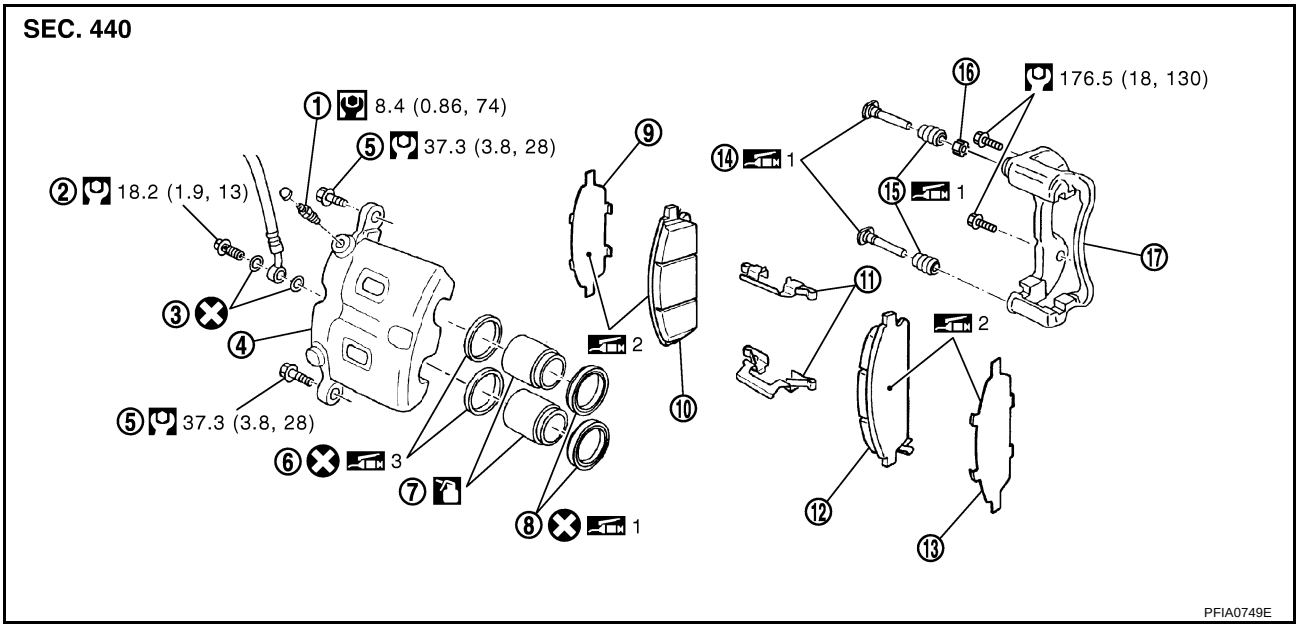
Repair limit thickness : 2.0 mm (0.079 in)



Components

BFS0004C

SEC. 440



1. Bleed valve
2. Union bolt
3. Copper washer
4. Cylinder body
5. Sliding pin bolt
6. Piston seal
7. Piston
8. Piston boot
9. Inner shim
10. Inner pad
11. Pad retainer
12. Outer pad
13. Outer shim
14. Sliding pin
15. Sliding pin boot
16. Bushing
17. Torque member

Refer to GI-9, "Components" and the followings for the symbols in the figure.

1: Apply rubber grease.

2: Apply PBC (Poly Butyl Cuprysil) grease or silicone-based grease.

3: Apply polyglycol ether based lubricant.

: Apply brake fluid.

WARNING:

Clean dust on caliper and brake pad with a vacuum dust collector to minimize the hazard of airborne particles or other materials.

CAUTION:

- **While removing cylinder body, do not depress brake pedal because piston will pop out.**
- **It is not necessary to remove bolts on torque member and brake hose except for disassembly or replacement of caliper assembly. In this case, hang cylinder body with a wire so as not to stretch brake hose.**

- **Do not damage piston boot.**
- **If any shim is subject to serious corrosion, replace it with a new one.**
- **Always replace shim as a set when replacing brake pads.**
- **Keep rotor clean of brake fluid.**
- **Burnish the brake pad contact surfaces after refinishing or replacing rotors, after replacing pads, or if a soft pedal occurs at very low mileage. Refer to BR-29, "BRAKE BURNISHING PROCEDURE" .**

Removal and Installation of Brake Pad

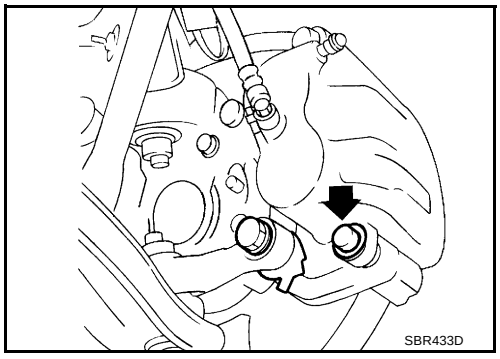
BFS0004E

REMOVAL

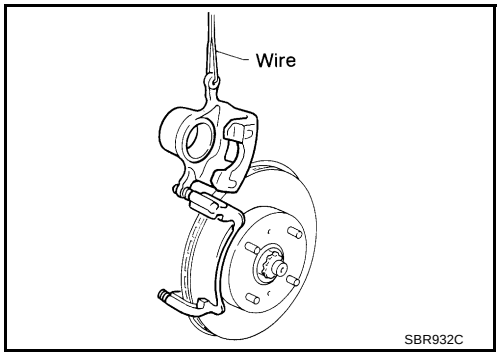
CAUTION:

When replacing brake pads, always replace inner shims, outer shims as a set.

1. Remove master cylinder reservoir tank cap.
2. Remove lower sliding pin bolt.



3. Hang cylinder body with a wire, and remove pads, pad retainers, shims and pad return springs.



INSTALLATION

1. Apply PBC (Poly Butyl Cuprysil) grease or silicone-based grease to the back pads and pad sides of the shim. Install inner shim to inner pad, outer shim to outer pad.
2. Install pad retainers to torque member and install pads.
3. Connect cylinder body to torque member.

   CAUTION:

   When replacing pads with new ones, press piston in until the pads can be installed. Carefully monitor brake master cylinder reservoir fluid level. Brake fluid will return, raising master cylinder reservoir tank fluid level.
4. Install lower sliding pin bolt and tighten to the specified torque. Refer to BR-25, "Components" .
5. Check brakes for drag.
6. Install tyres to vehicle.

Removal and Installation of Brake Caliper Assembly

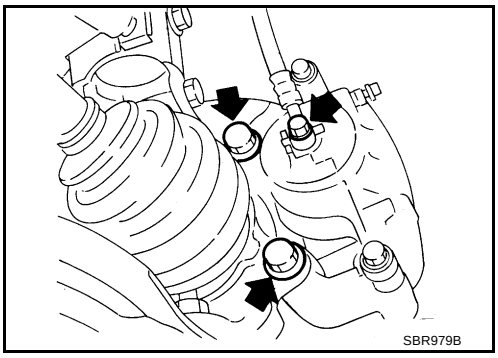
BFS0004F

REMOVAL

1. Connect a vinyl tube to bleed valve.
2. Drain brake fluid gradually from bleed valve while depressing brake pedal.
3. Remove union bolts and torque member mounting bolts, and remove caliper assembly.

   CAUTION:
   Do not drop brake pad.
4. Remove disc rotor.

   CAUTION:
   Put alignment marks on wheel hub assembly and disc rotor, if it necessary to remove disc rotor.


SBR979B

INSTALLATION

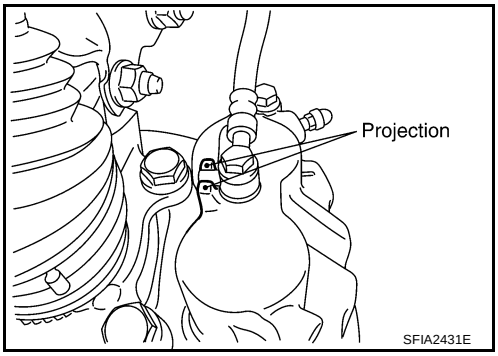
CAUTION:
- **Refill with new brake fluid “DOT 3” or “DOT 4”.**
- **Never reuse drained brake fluid.**

1. Install disc rotor.

   CAUTION:
   Align the marks of disc rotor and wheel hub put at the time of removal when reusing disc rotor.
2. Install caliper assembly. Tighten mounting bolts to the specified torque. Refer to BR-25, "Components" .

   CAUTION:
   Before installing caliper assembly, wipe brake fluid and grease on steering knuckle washer seats and caliper assembly mounting surface.
3. Connect brake hose to caliper assembly and tighten union bolts to the specified torque. Refer to BR-25, "Components" .

   CAUTION:
   - **Do not reuse copper washer for union bolts.**
   - **Securely assemble brake hose to protrusions on cylinder body.**
4. Bleed air. Refer to BR-9, "Bleeding Brake System" .
5. Check front disc brake for drag.
6. Install tyres to vehicle.



SFIA2431E

Disassembly and Assembly of Brake Caliper Assembly

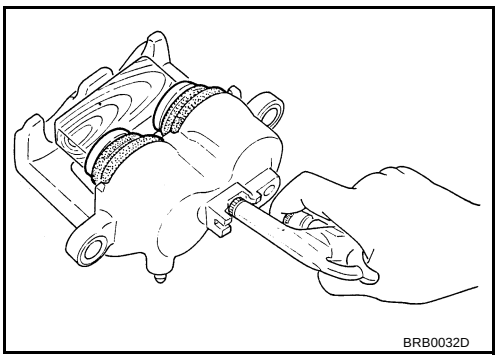
BFS0004G

DISASSEMBLY

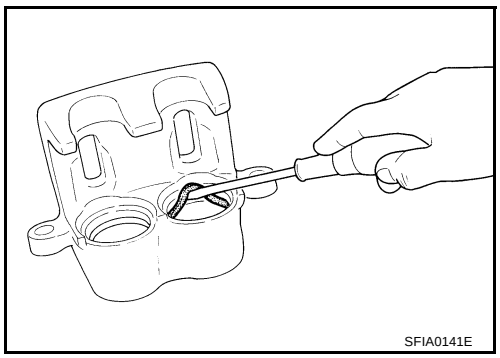
WARNING:
Be careful not to pinch your fingers in the piston.

CAUTION:
Be careful not to damage the cylinder inner wall.

1. Place a wooden block as shown in the figure. Blow air into union bolt mounting hole to remove pistons and piston boots.


BRB0032D

2. Using flat-bladed screwdriver, remove piston seals.


SFIA0141E

INSPECTION AFTER DISASSEMBLY

Cylinder Body

CAUTION:

Use new brake fluid to clean. Never use mineral oils such as gasoline or kerosene.

- Check cylinder inner wall for corrosion, wear and damage. If corrosion, wear or damage is detected, replace the cylinder body.
- Minor flaws caused by corrosion or foreign material can be removed by polishing the surface with fine sandpaper. Replace the cylinder body, if necessary.

Torque Member

Check for wear, cracks and damage. If wear, cracks or damage is detected, replace the applicable part.

Piston

CAUTION:

The piston sliding surface is plated. Do not polish with sandpaper.

Check piston surface for corrosion, wear and damage. If corrosion, wear or damage is detected, replace the applicable part.

Sliding Pin, Pin Bolt, and Pin Boot

Check sliding pin and sliding pin boot for wear, damage and cracks. If corrosion, wear or damage is detected, replace the applicable part.

ASSEMBLY

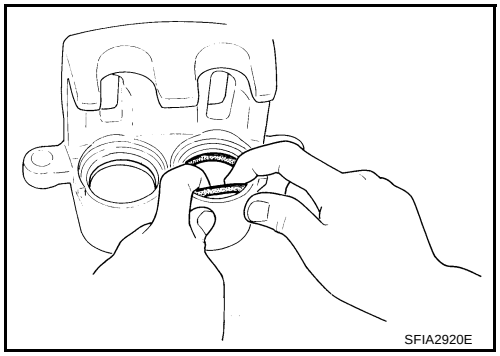
CAUTION:

When assembling, use only rubber lubricant specified below.

1. Apply polyglycol ether based lubricant to the piston seal, and install them to the cylinder body.

   CAUTION:

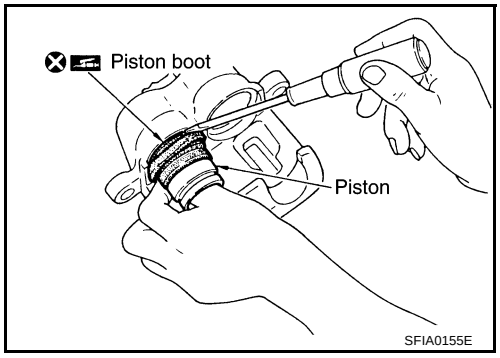
   Do not reuse piston seals.


SFIA2920E

2. Apply brake fluid or rubber lubricant to piston boots. Cover piston end with piston boot. Install cylinder side boot lip properly into groove on cylinder body.

   CAUTION:

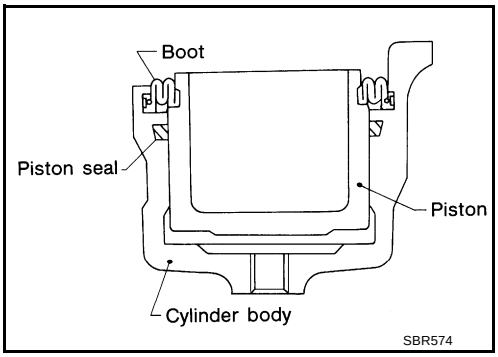
   Do not reuse piston boot.



SFIA0155E

3. Apply brake fluid to piston. Press piston into cylinder body by hand. Assemble piston side boot lip properly into groove on piston.

CAUTION:
Press piston evenly and change pressing point to prevent cylinder inner wall from being rubbed.



DISC ROTOR INSPECTION

Visual Inspection

Check surface of disc rotor for uneven wear, cracks and serious damage. If uneven wear, cracks or serious damage is detected, replace it.

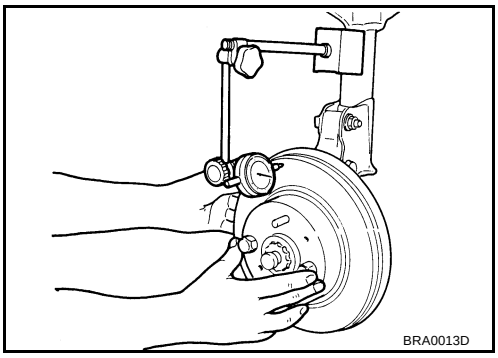
Runout Inspection

1. Using wheel nuts, fix disc rotor to wheels hub. (2 or more positions)
2. Using a dial indicator, check run out.

Measurement point:

At a point of 10 mm (0.39 in) from the outer edge of the disc

Runout limit : 0.04 mm (0.0016 in) or less



NOTE:
Make sure that wheel bearing axial endplay is with in the specifications before measuring runout. Refer to FAX-7, "On-Vehicle Inspection" .

3. If the run out is outside the limit, find the minimum run out point by shifting the mounting positions of disc rotor and wheel hub by one hole.

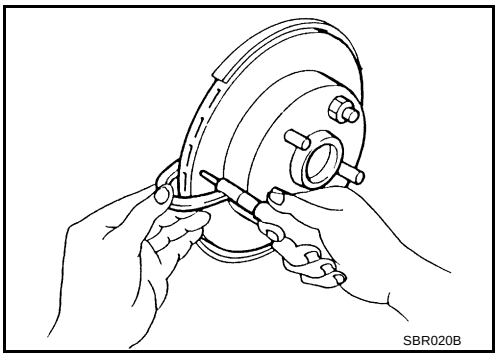
Thickness Inspection

Using a micrometer, check thickness of disc rotor. If the thickness is outside the standard, replace the disc rotor.

Standard thickness : 28.0 mm (1.102 in)

Repair limit thickness : 26.0 mm (1.024 in)

Maximum uneven wear (measured at 8 positions):
0.02 mm (0.0008 in) or less



BRAKE BURNISHING PROCEDURE

Burnish the brake pad contact surfaces according to the following procedure after refinishing or replacing drums or rotors, after replacing pads or linings, or if a soft pedal occurs at very low mileage.

CAUTION:
Only perform this procedure under safe road and traffic conditions. Use extreme caution.

1. **Drive vehicle on a straight smooth road at 50 km/h (31 MPH).**
2. **Use medium brake pedal/foot effort to bring vehicle to a complete stop from 50 km/h (31 MPH). Adjust brake pedal/foot pressure such that vehicle stopping time equals 3 to 5 seconds.**
3. **To cool the brake system, drive vehicle at 50 km/h (31 MPH) for 1 minute without stopping.**
4. **Repeat steps 1 to 3, 10 times or more to complete the burnishing procedure.**

REAR DISC BRAKE

PFP:44000

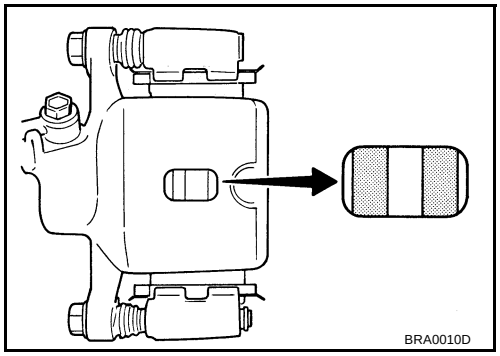
On-Vehicle Inspection

BFS0004I

PAD WEAR INSPECTION

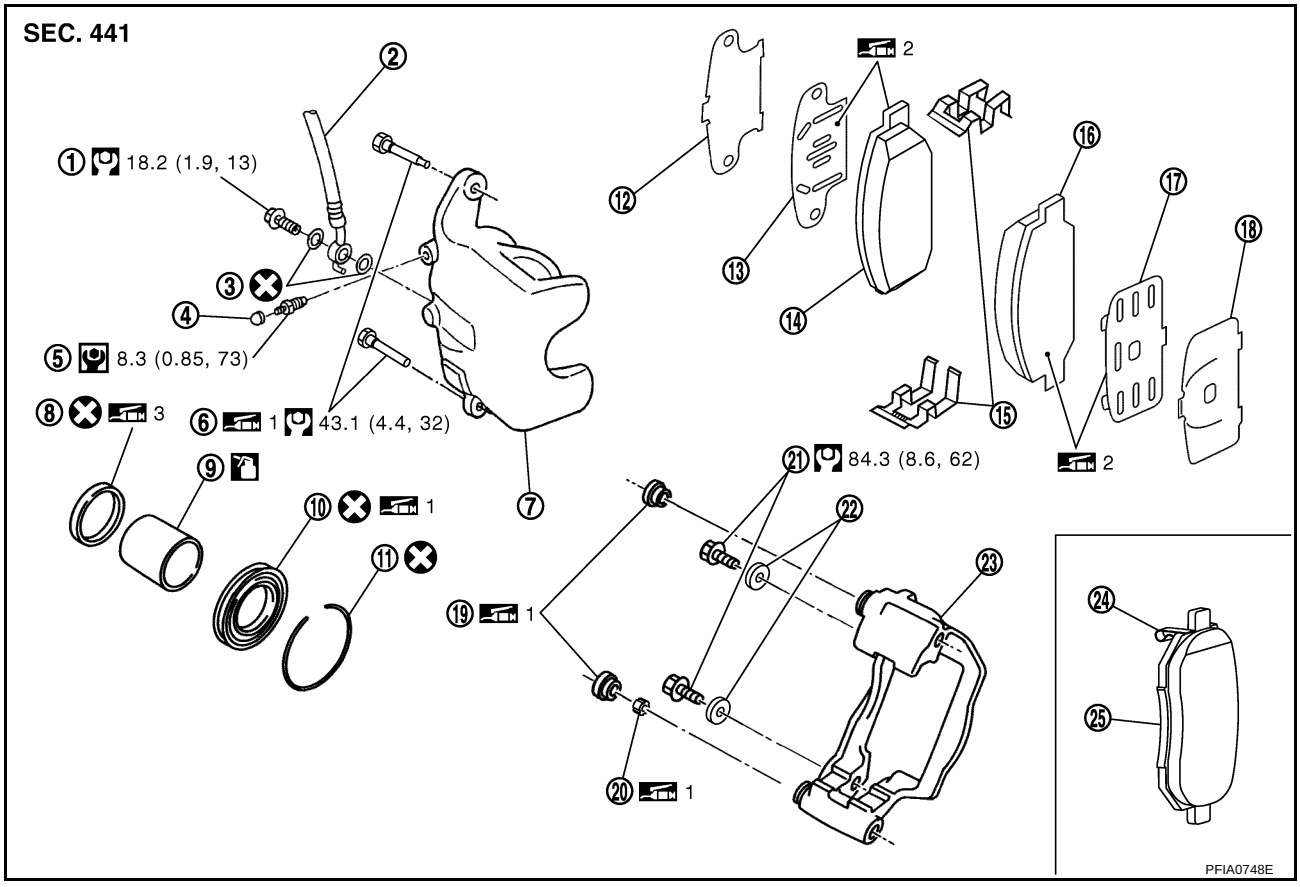
Check pad thickness by lifting vehicle, removing tyre and wheel, and looking through check hole on cylinder body. If necessary, use a scale.

standard thickness : 8.5 mm (0.335 in)
pad wear limit : 2.0 mm (0.079 in)



Components

BFS0004H



1. Union bolt
2. Brake hose
3. Copper washer
4. Cap
5. Bleed valve
6. Sliding pin bolt
7. Cylinder body
8. Piston seal
9. Piston
10. Piston boot
11. Retaining ring
12. Inner shim cover
13. Inner shim
14. Inner pad
15. Pad retainer
16. Outer pad
17. Outer shim
18. Outer shim cover
19. Sliding pin boot
20. Bushing
21. Torque member mounting bolt
22. Washer
23. Torque member
24. Pad wear sensor
25. Inner pad (RH)

Refer to GI-9, "Components" and the followings for the symbols in the figure.

1: Apply rubber grease.

2: Apply PBC (Poly Butyl Cuprysil) grease or silicone-based grease.

3: Apply polyglycol ether based lubricant.

: Apply brake fluid.

WARNING:

Clean dust on caliper and brake pad with a vacuum dust collector to minimize the hazard of airborne particles or other materials.

CAUTION:

- **While removing cylinder body, do not depress brake pedal because piston will pop out.**
- **It is not necessary to remove bolts on torque member and brake hose except for disassembly or replacement of caliper assembly. In this case, hang cylinder body with a wire so as not to stretch brake hose.**
- **Do not damage piston boot.**
- **If any shim is subject to serious corrosion, replace it with a new one.**
- **Always replace shim and shim cover as a set when replacing brake pads.**
- **Keep rotor clean of brake fluid.**
- **Burnish the brake pad contact surfaces after refinishing or replacing drums or rotor, after replacing pads or linings, or if a soft pedal occurs at very low mileage. Refer to BR-29, "BRAKE BURNISHING PROCEDURE" .**

Removal and Installation of Brake Pad

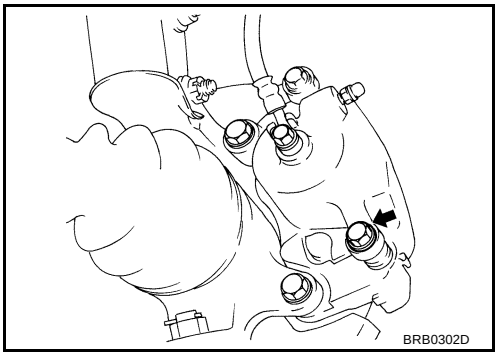
BFS0004J

REMOVAL

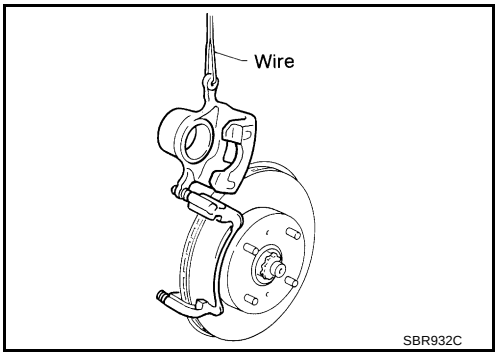
CAUTION:

When replacing brake pads, always replace inner shims, outer shims, and shim covers as a set.

1. Remove master cylinder reservoir tank cap.
2. Remove lower sliding pin bolt.



3. Hang cylinder body with a wire, and remove pads, pad retainers, and shims.



INSTALLATION

1. Apply PBC (Poly Butyl Cuprysil) grease or silicone-based grease to the back of pads and pad sides of the shim. Install inner shim and inner shim cover to inner pad, outer shim and outer shim cover to outer pad.
2. Install pad retainers to torque member and install pads.
3. Connect cylinder body to torque member.

   CAUTION:
   When replacing pads with new ones, press piston in until the pads can be installed. Carefully monitor brake master cylinder reservoir fluid level. Brake fluid will return, raising master cylinder reservoir tank fluid level.
4. Install lower sliding pin bolt and tighten to the specified torque. Refer to BR-30, "Components" .
5. Check brakes for drag.
6. Install tyres to vehicle.

Removal and Installation of Brake Caliper Assembly

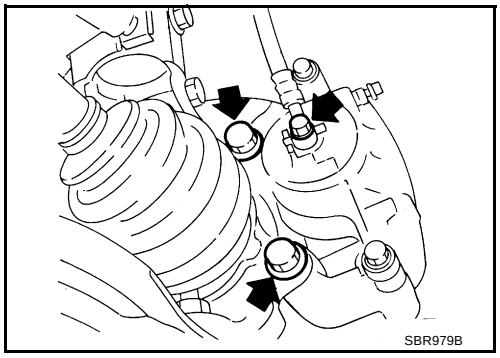
BFS0004K

REMOVAL

1. Connect a vinyl tube to bleed valve.
2. Drain brake fluid gradually from bleed valve while depressing brake pedal.
3. Remove union bolt and remove brake hose from caliper assembly.
4. Remove union bolts and torque member mounting bolts, and remove caliper assembly.

   CAUTION:
   Do not drop brake pad.
5. Remove disc rotor.

   CAUTION:
   Put alignment marks on wheel hub assembly and disc rotor, if it necessary to remove disc rotor.



INSTALLATION

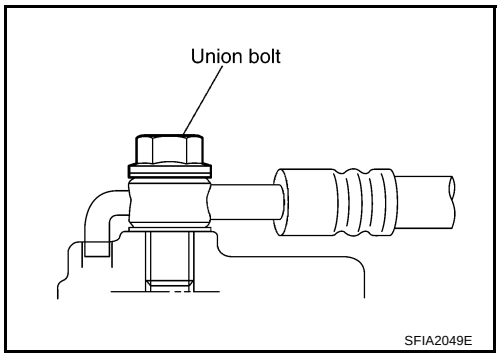
CAUTION:

- **Refill with new brake fluid “DOT 3 or DOT 4”.**
- **Never reuse drained brake fluid.**

1. Install disc rotor.
2. Install caliper assembly. Tighten mounting bolts to the specified torque. Refer to BR-30, "Components" .

   CAUTION:
   Wipe brake fluid and grease on axle assembly washer seats and caliper assembly mounting surface. Install caliper assembly.
3. Connect brake hose to caliper assembly and tighten union bolts to the specified torque. Refer to BR-30, "Components" .

   CAUTION:
   - **Do not reuse the copper washer for union bolts.**
   - **Install L-shape pin of brake hose and then tighten union bolt to the specified torque. Refer to BR-30, "Components" .**
4. Bleed air. Refer to BR-9, "Bleeding Brake System" .
5. Check rear disc brake for drag.
6. Install tyres to vehicle.



Disassembly and Assembly of Brake Caliper Assembly

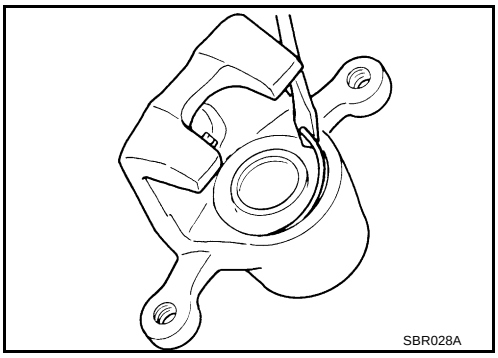
BFS0004L

DISASSEMBLY

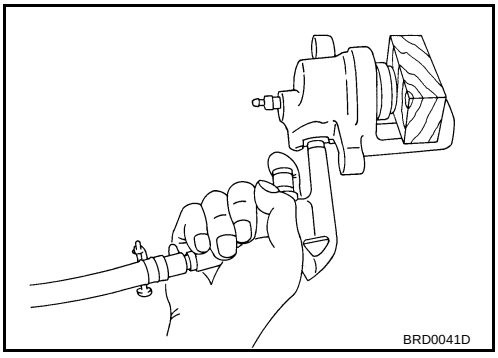
CAUTION:

- **Do not get fingers caught in the piston.**
- **Be careful not to damage the cylinder inner wall.**

1. Remove caliper assembly from vehicle.
2. Remove sliding pin from cylinder body. Then remove pads, shims, shim covers, and pad retainers from caliper assembly.
3. Remove sliding pin boots from torque member.
4. Using flat-bladed screwdriver (as shown in the figure), remove retaining ring.


SBR028A

5. Place a wooden block as shown in the figure. Blow air into union bolt mounting hole to remove pistons and piston boots.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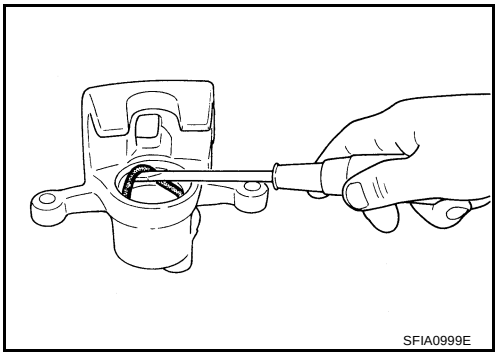
6. Using flat-bladed screwdriver, remove piston seals.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INSPECTION AFTER DISASSEMBLY

Cylinder Body

CAUTION:

Use new brake fluid to clean. Never use mineral oils such as gasoline or kerosene.

- Check cylinder inner wall for corrosion, wear and damage. If corrosion, wear or damage is detected, replace the cylinder body.
- Minor flaws caused by corrosion or foreign material can be removed by polishing the surface with fine sandpaper. Replace the cylinder body, if necessary.

Torque Member

Check for wear, cracks and damage. If wear, cracks or damage is detected, replace the applicable part.

Piston

CAUTION:

The piston sliding surface is plated. Do not polish with sandpaper.

Check piston surface for corrosion, wear and damage. If corrosion, wear or damage is detected, replace the applicable part.

Sliding Pin Bolt and Pin Boot

Check sliding pin boot for wear, damage and cracks. If corrosion, wear or damage is detected, replace the applicable part.

ASSEMBLY

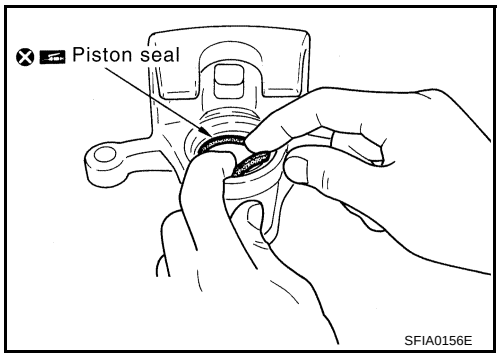
CAUTION:

When assembling, use only rubber lubricant specified below.

1. Apply polyglycol ether based lubricant to the piston seal, and install them to the cylinder body.

   CAUTION:

   Do not reuse piston seals.



2. Apply brake fluid to piston boots. Cover piston end with piston boot. Install cylinder side boot lip properly into groove on cylinder body.

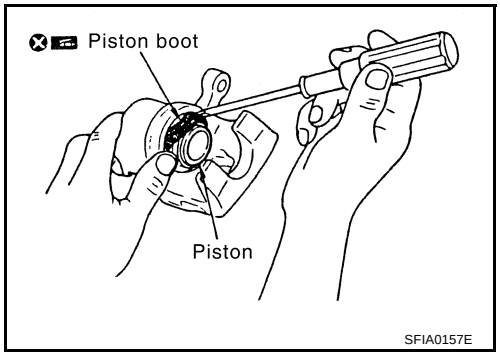
   CAUTION:

   Do not reuse piston boot.

3. Press piston into cylinder body by hand. Assemble piston side boot lip properly into groove on the piston.

   CAUTION:

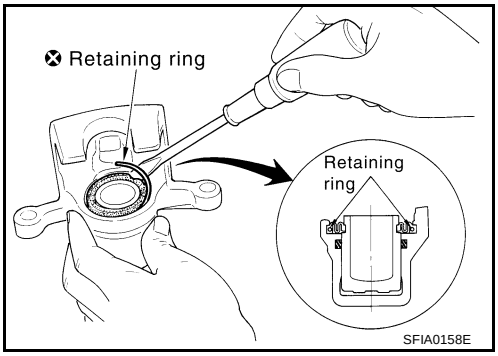
   Press piston evenly and change pressing point to prevent the cylinder inner wall from being rubbed.



4. Fix piston boot with retaining ring.

CAUTION:

- **Be sure boot is securely engaged in groove on cylinder body.**
- **Do not reuse retaining ring.**



5. Install sliding pin boots to torque member.
6. Install torque member to axle assembly and tighten mounting bolts to the specified torque.

CAUTION:

Wipe brake fluid and grease on axle assembly washer seats and torque member mounting surface. Install torque member to axle assembly.

7. Install pads, pad retainers, shims, and shim covers to torque member and assemble cylinder body.
8. Tighten sliding pin bolts to the specified torque.
9. Connect brake hose to caliper assembly and tighten union bolts to the specified torque.

CAUTION:

Do not reuse union bolt copper washer.

10. After installing caliper assembly, refill with new brake fluid and bleed air. Refer to BR-9, "Bleeding Brake System"

DISC ROTOR INSPECTION

Visual Inspection

Check surface of the disc rotor for uneven wear, cracks and serious damage. If uneven wear, cracks or serious damage is detected, replace it.

Runout Inspection

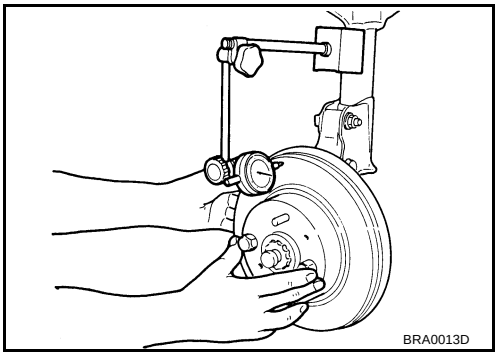
1. Using wheel nuts, fix the disc rotor to wheels hub. (2 or more positions)
2. Using a dial indicator, check run out.

Measurement point:

At a point of 10 mm (0.39 in) from the outer edge of the disc

Runout limit:

0.07 mm (0.0028 in) or less



NOTE:

Make sure that wheel bearing axial endplay is with in the specification before measuring runout. Refer to RAX-6, "On-Vehicle Inspection and Service" (2WD), RAX-10, "On-Vehicle Inspection" (4WD).

3. If the run out is outside the limit, find the minimum run out point by shifting the mounting positions of disc rotor and wheel hub by one hole.

Thickness Inspection

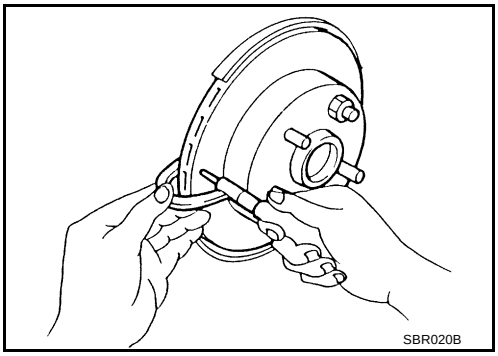
Using a micrometer, check thickness of disc rotor. If the thickness is outside the standard, replace disc rotor.

Standard thickness : 16.0 mm (0.630 in)

Repair limit thickness : 14.0 mm (0.551 in)

Maximum uneven wear (measured at 8 positions):

0.02 mm (0.0008 in) or less



SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

General Specifications

BFS0004M

Unit: mm (in)

Front brake	Cylinder bore diameter		44.2 (1.748) × 2
	Pad length x width x thickness		132.0 × 52.5 × 11.0 (5.20 × 2.067 × 0.433)
	Rotor outer diameter x thickness		280 × 28 (11.02 × 1.10)
Rear brake	Cylinder bore diameter		34.9 (1.374)
	Pad length x width x thickness		83.0 × 33.0 × 8.5 (3.268 × 1.299 × 0.335)
	Rotor outer diameter x thickness		292 × 16 (11.50 × 0.63)
Master cylinder	Cylinder bore diameter		25.4 (1)
Control valve	Valve model		Electronic control type
Brake booster	Diaphragm diameter	Primary	230 (9.06)
		Secondary	205 (8.07)
Recommended brake fluid			DOT 3 or DOT 4

Brake Pedal

BFS0004N

Pedal play		3 – 11 mm (0.12 – 0.43 in)
Brake pedal height (from dash panel top surface)	M/T models	156 – 166 mm (6.14 – 6.54 in)
	A/T models	164 – 174 mm (6.46 – 6.85 in)
Depressed pedal height under a force of 490 N (50 kg,110.6 lb) (from dash panel top surface)	M/T models	80 mm (3.15 in) or more
	A/T models	85 mm (3.35 in) or more
Clearance between stopper rubber threaded end of stop lamp switch		0.74 – 1.96 mm (0.0291 – 0.0772 in)

Check Valve

BFS0004O

Vacuum leakage [at vacuum of– 66.7 kPa (–500 mmHg, –19.69 inHg)]	Within 1.3 kPa (10 mmHg, 0.39 inHg) of vacuum for 15 seconds

Brake Booster

BFS0004P

Vacuum leakage [at vacuum of –66.7 kPa (–500 mmHg, –19.69 inHg)]	Within 3.3 kPa (25 mmHg, 0.98 inHg) of vacuum for 15 seconds
Input rod installation standard dimension	125 mm (4.92 in)

Front Disc Brake

BFS0004Q

Brake pad	Standard thickness	11.0 mm (0.43 in)
	Repair limit thickness	2.0 mm (0.079 in)
Disc rotor	Standard thickness	28.0 mm (1.102 in)
	Repair limit thickness	26.0 mm (1.024 in)
	Runout limit	0.04 mm (0.0016 in)

Rear Disc Brake

BFS0004R

Brake pad	Standard thickness	8.5 mm (0.335 in)
	Repair limit thickness	2.0 mm (0.079 in)
Disc rotor	Standard thickness	16.0 mm (0.63 in)
	Repair limit thickness	14.0 mm (0.55 in)
	Runout limit	0.07 mm (0.0028 in)