SECTION BR
BRAKE SYSTEM

CONTENTS

PRECAUTION

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:0000000003710174

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. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the SR and SB section of this Service Manual.

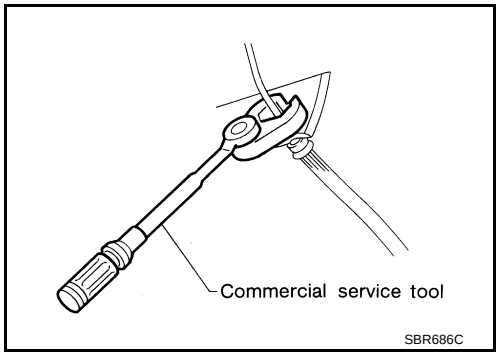
WARNING:

- **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 SR 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.**

Precaution for Brake System

INFOID:0000000003710175

- Always use recommended brake fluid. Refer to MA-10, "Fluids and Lubricants".
- Do not reuse drained brake fluid.
- Be careful not to splash brake fluid on painted areas.
- To clean or wash all parts of master cylinder, disc brake caliper and wheel cylinder, use clean brake fluid.
- Do not use mineral oils such as gasoline or kerosene. They will ruin rubber parts of the hydraulic system.
- Use flare nut wrench when removing and installing brake tube.
- Always check tightening torque when installing brake lines.
- Before working, turn ignition switch to OFF and disconnect connectors for ABS actuator and electric unit (control unit) or battery terminals.
- Burnish the brake contact surfaces after refinishing or replacing drums or rotors, after replacing pads or linings, or if a soft pedal occurs at very low mileage. Refer to BR-29, "Brake Burnishing Procedure".



WARNING:

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

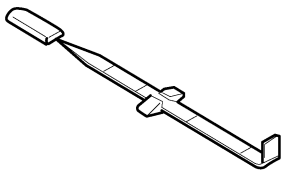
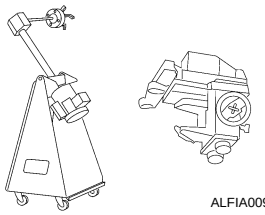
PREPARATION

PREPARATION

Special Service Tool

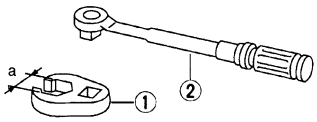
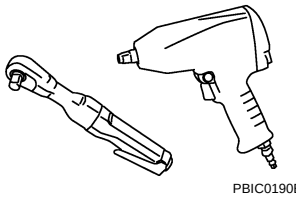
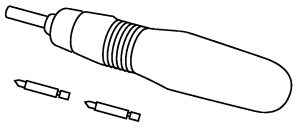
INFOID:0000000003710176

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
— (J-46532) Brake and clutch pedal height measurement tool  LFIA0227E	Measuring brake pedal height
38-PFM90.5 (—) Pro-Cut PFM90 On-Car Brake Lathe  ALFIA0092ZZ	Turning rotors

Commercial Service Tool

INFOID:0000000003710177

Tool name	Description
1. Flare nut crowfoot 2. Torque wrench  S-NT360	Removing and installing each brake piping. **a: 10 mm (0.39 in) / 12 mm (0.47 in)**
Power tool  PBIC0190E  PBIC0191E	Removing nuts, bolts and screws.

FUNCTION DIAGNOSIS

NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

NVH Troubleshooting Chart

INFOID:0000000003710178

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

Reference page		BR-6, BR-8	BR-6, BR-8	BR-6, BR-8	BR-6, BR-8	BR-6, BR-8	BR-6, BR-8	BR-6, BR-8	BR-6, BR-8	BR-6, BR-8	BR-6, BR-8	DLN-180, "NVH Troubleshooting Chart" (2F1310), DLN-188, "NVH Troubleshooting Chart" (2S1410)	DLN-201, "NVH Troubleshooting Chart" (FFD), DLN-233, "NVH Troubleshooting Chart" (RFD)	FAX-4, "NVH Troubleshooting Chart" (FAX), RAX-4, "NVH Troubleshooting Chart" (RAX)	FSU-4, "NVH Troubleshooting Chart" (FSU), RSU-4, "NVH Troubleshooting Chart" (RSU)	WT-43, "NVH Troubleshooting Chart"	ST-11, "NVH Troubleshooting Chart"
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	PROPELLER SHAFT	DIFFERENTIAL	DRIVESHAFT	SUSPENSION	TIRES AND ROAD WHEEL	STEERING
Symptom	Noise	×	×	×								×	×	×	×	×	×
	Shake				×							×		×	×	×	×
	Shimmy, Shudder				×	×	×	×	×	×	×			×	×	×	×

×: Applicable

BASIC INSPECTION

FRONT DISC BRAKE

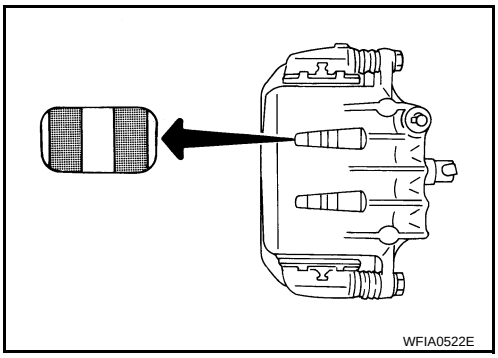
BRAKE PAD

BRAKE PAD : Inspection

INFOID:0000000003710180

PAD WEAR

Check pad thickness from an inspection hole on cylinder body. Check using a scale if necessary.



Standard thickness : Refer to BR-45, "Front Disc Brake".

Repair limit thickness : Refer to BR-45, "Front Disc Brake".

DISC ROTOR

DISC ROTOR : Inspection

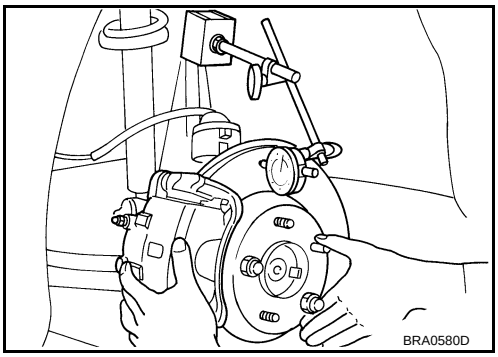
INFOID:0000000003710181

VISUAL

Check surface of disc rotor for uneven wear, cracks, and serious damage. Replace as necessary.

RUNOUT

1. Attach disc rotor to wheel hub using wheel nuts at two or more positions.
2. Inspect runout using a dial gauge placed at 10 mm (0.39 in) inside the disc edge.



Runout limit : Refer to BR-45, "Front Disc Brake".

(with it attached to the vehicle)

NOTE:
Before measuring, make sure that wheel bearing axial end play is within the specification. Refer to FAX-5, "On-Vehicle Inspection and Service".

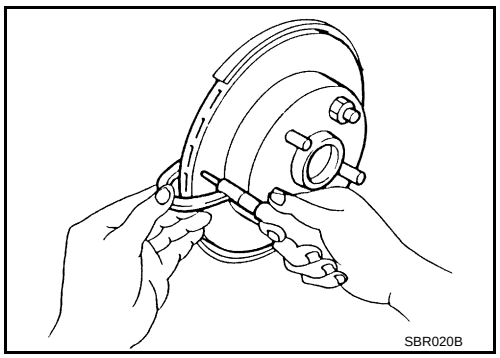
3. When runout exceeds limit value, displace mounting positions of disc rotor by one hole. And then find a position of the minimum value for runout.
4. If runout is outside the specified value after performing the above operation, turn disc rotor using Tool.

Tool number : 38-PFM90.5 (—)

THICKNESS

Check thickness of the disc rotor using a micrometer. Replace disc rotor if thickness is less then the wear limit.

Standard thickness	**: Refer to BR-45, "Front Disc Brake".**
Repair limit thickness	**: Refer to BR-45, "Front Disc Brake".**
Thickness variation (Measured at 8 positions)	**: Refer to BR-45, "Front Disc Brake".**



REAR DISC BRAKE

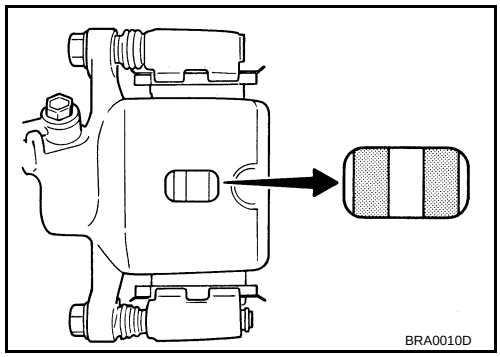
BRAKE PAD

BRAKE PAD : Inspection

INFOID:0000000003710183

PAD WEAR

Check pad thickness from an inspection hole on cylinder body. Check using a scale if necessary.



Standard thickness : Refer to BR-45, "Rear Disc Brake".

Repair limit thickness : Refer to BR-45, "Rear Disc Brake".

DISC ROTOR

DISC ROTOR : Inspection

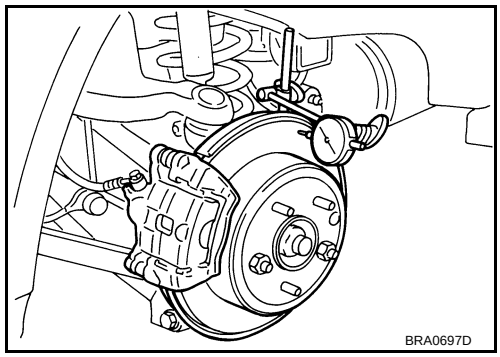
INFOID:0000000003710184

VISUAL

Check surface of disc rotor for uneven wear, cracks, and serious damage. Replace as necessary.

RUNOUT

1. Attach disc rotor to wheel hub using wheel nuts at two or more positions.
2. Inspect runout using dial gauge placed at 10 mm (0.39 in) inside disc edge.



Runout limit : Refer to BR-45, "Rear Disc Brake".
(With it attached to the vehicle)

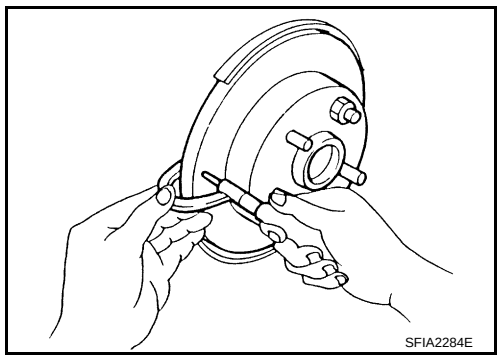
NOTE:
Before measuring, make sure that wheel bearing axial end play is within the specification. Refer to RAX-5, "On-Vehicle Inspection and Service".

3. When runout exceeds limit value, displace mounting positions of disc rotor by one hole. And then find a position of the minimum value for runout.
4. If runout is outside the specified value after performing the above operation, turn disc rotor using Tool.

Tool number : 38-PFM90.5 (—)

THICKNESS

Check the thickness of the disc rotor using a micrometer. Replace disc rotor if the thickness is less then the wear limit.



Standard thickness : Refer to BR-45, "Rear Disc Brake".

Repair limit thickness : Refer to BR-45, "Rear Disc Brake".

Thickness variation (Measured at 8 positions) : Refer to BR-45, "Rear Disc Brake".

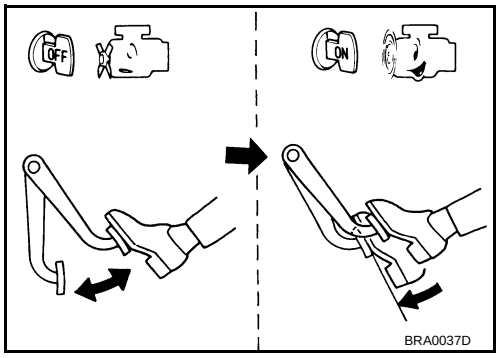
BRAKE BOOSTER

Inspection

INFOID:0000000003710185

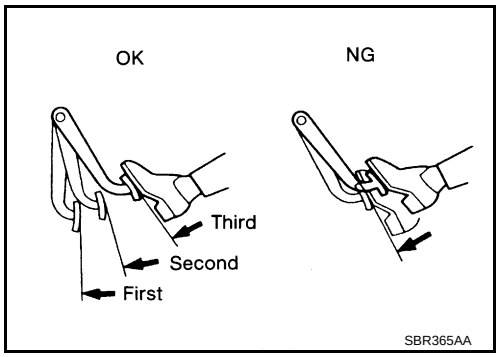
OPERATION

With engine stopped, change vacuum to atmospheric pressure by depressing brake pedal several times. Then with brake pedal fully depressed, start engine and when vacuum pressure reaches the standard, make sure that clearance between brake pedal and floor panel decreases.



AIR TIGHT

- Run engine at idle for approximately 1 minute, and stop it after applying vacuum to booster. Depress brake pedal normally to change vacuum to atmospheric pressure. Make sure that distance at intervals of 5 seconds between brake pedal and floor panel gradually increases.



- Depress brake pedal while engine is running, and stop engine with pedal depressed. The pedal stroke should not change after holding pedal down for 30 seconds.

VACUUM LINES

Inspection

INFOID:0000000004020182

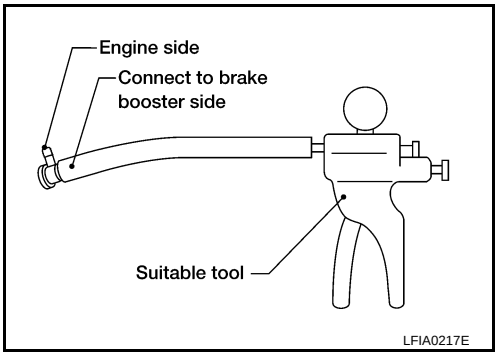
VISUAL INSPECTION

Check for improper assembly, damage and deterioration. Replace as necessary.

CHECK VALVE INSPECTION

Airtightness Inspection

Use a suitable vacuum pump to check. Connect to brake booster side of check valve.



Check valve specification **: 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)**

BRAKE MASTER CYLINDER

On Board Inspection

INFOID:0000000003710186

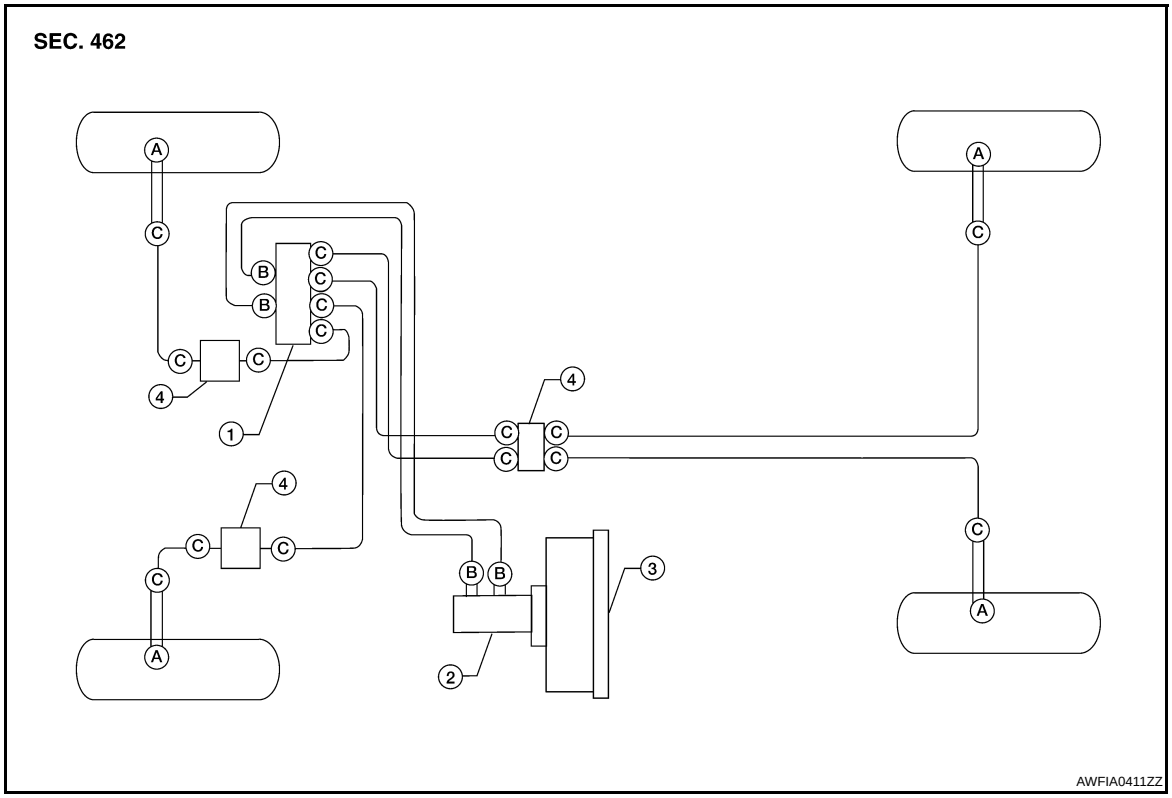
LEAK INSPECTION

Check for leaks at master cylinder to brake booster attachment point, reservoir tank, and brake tube connections.

BRAKE TUBE AND HOSE

Hydraulic Circuit

INFOID:0000000004020183



1. Actuator
2. Master cylinder
3. Brake booster
4. Connector
A. Union bolt
   18.2 N·m (1.9 kg-m, 13 ft-lb)
B. Flare nut M12
   18.2 N·m (1.9 kg-m, 13 ft-lb)
C. Flare nut M10
   13.0 N·m (1.3 kg-m, 10 ft-lb)

CAUTION:

- **All hoses and piping (tubes) must be free from excessive bending, twisting and pulling.**
- **Make sure there is no interference with other parts when turning the steering wheel both clockwise and counterclockwise.**
- **The brake piping is an important safety part. If a brake fluid leak is detected, always disassemble the parts. Replace applicable part with a new one, if necessary.**
- **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.**
- **Do not bend or twist brake hose sharply, or strongly pull it.**
- **When removing components, cover connections so that no dirt, dust, or other foreign matter gets in.**
- **Refill with new specified brake fluid. Refer to MA-10, "Fluids and Lubricants".**
- **Do not reuse drained brake fluid.**

FRONT BRAKE

FRONT BRAKE : Inspection

INFOID:0000000003710188

INSPECTION AFTER REMOVAL

CAUTION:

Brake tubes and hoses are important safety parts. Always disassemble the parts and retighten their fittings, if a brake fluid leak is detected. Replace applicable part with a new one, if damaged part is detected.

1. Check brake lines (tubes and hoses) and connections for fluid leaks, damage, twists, deformation, contacts with other parts, and loose connections. Replace any parts as necessary. Refer to BR-20, "Removal and Installation of Front Brake Piping and Brake Hose".
2. While depressing brake pedal under a force of 785 N (80 kg-f, 177 lb-f) with engine running for approximately 5 seconds, check each part for fluid leaks.

REAR BRAKE

REAR BRAKE : Inspection

INFOID:0000000003710189

INSPECTION AFTER REMOVAL

CAUTION:

Brake tubes and hoses are important safety parts. Always disassemble the parts and retighten their fittings, if a brake fluid leak is detected. Replace applicable part with a new one, if damaged part is detected.

1. Check brake lines (tubes and hoses) and connections for fluid leaks, damage, twists, deformation, contacts with other parts, and loose connections. Replace any parts as necessary. Refer to BR-21, "Removal and Installation of Rear Brake Piping and Brake Hose".
2. While depressing brake pedal under a force of 785 N (80 kg-f, 177 lb-f) with engine running for approximately 5 seconds, check each part for fluid leaks.

ON-VEHICLE MAINTENANCE

BRAKE PEDAL

Inspection and Adjustment

INFOID:0000000004068341

INSPECTION

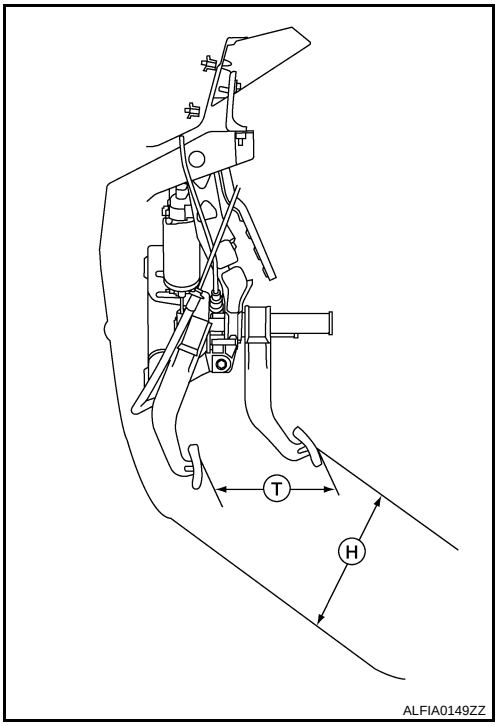
1. Inspect the brake pedal free height (H) from the floor using Tool at a 90° angle to the floor as shown.

Tool number : — (J-46532)

2. Adjust the brake pedal height to specifications.

CAUTION:

When equipped with adjustable pedal, the pedal must be in the forward most (closest to the floor) position for pedal height measurement.



Brake Pedal Specifications

Unit: mm (in)

Pedal free height (H) with pedal in forward most position	182.3 - 192.3 (7.18 - 7.57)
Pedal travel (T)	153.3 (6.04)
Clearance between brake pedal bracket and threaded end of stop lamp switch and ASCD cancel switch	0.74 - 1.96 (0.029 - 0.077)

ADJUSTMENT

1. Loosen the stop lamp switch and ASCD cancel switch by turning them 45° counterclockwise.

2. Loosen lock nut (A) on the input rod, then turn input rod to adjust the brake pedal to the specified height. When finished adjusting, tighten the lock nut (A) to specification.

Lock nut (A) : 18.7 N·m (1.9 kg-m, 14 ft-lb)

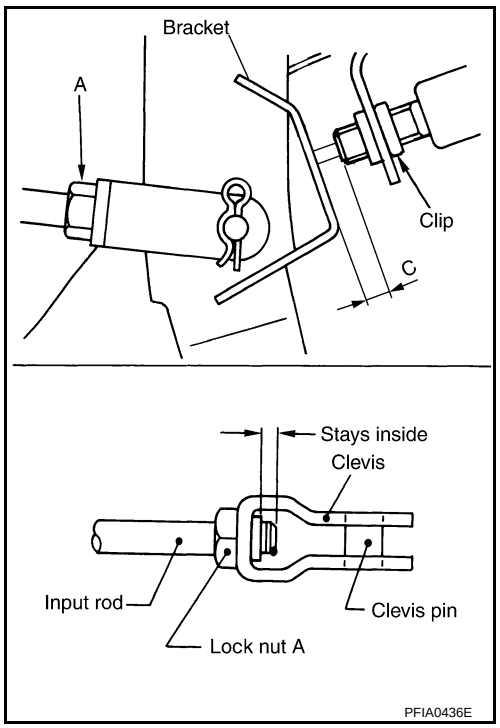
CAUTION:
Make sure that the screw portion of the end of input rod is located inside the clevis.

3. With the brake pedal pulled up and held by hand, press the stop lamp switch and the ASCD cancel switch in until the threaded ends contact the brake pedal bracket.
4. With the threaded ends of the stop lamp switch and ASCD switch contacting the pedal bracket, turn the switches 45° clockwise to lock in place. Check that the stop lamp switch and ASCD cancel switch threaded end to brake pedal bracket gap (C) is within specifications.

CAUTION:
Make sure that the gap (C) between the brake pedal bracket and stop lamp switch and ASCD cancel switch threaded ends are within specification.

5. Check the brake pedal for smooth operation.

CAUTION:
Make sure that the stop lamp goes off when the brake pedal is released.



6. Start the engine and check the height of the brake pedal when depressing it.

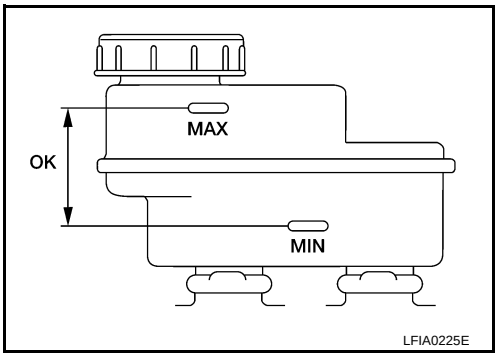
BRAKE FLUID

On Board Inspection

INFOID:0000000004020185

LEVEL CHECK

- Make sure the fluid level in reservoir tank is between MAX and MIN lines as shown.
- Visually check around reservoir tank for fluid leaks.
- If fluid level is excessively low, check brake system for leaks.
- If brake warning lamp remains illuminated after parking brake pedal is released, check brake system for fluid leaks.



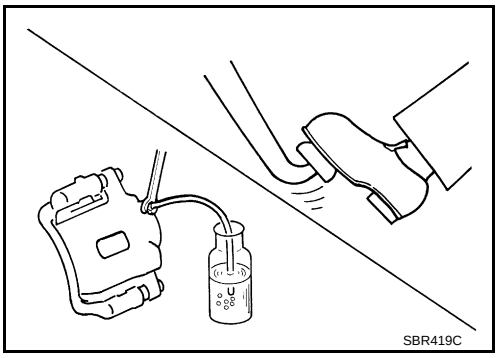
Drain and Refill

INFOID:0000000004020186

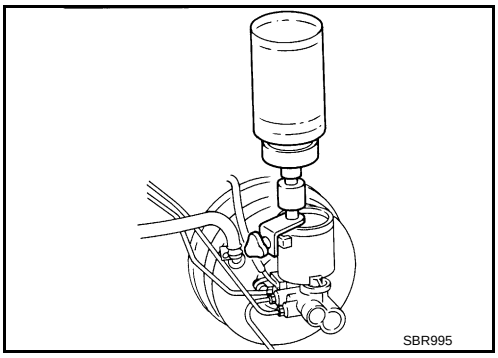
CAUTION:

- **Refill with new brake fluid. Refer to MA-10, "Fluids and Lubricants".**
- **Do not reuse drained brake fluid.**
- **Do not let brake fluid splash on the painted surfaces of the body. This might damage the paint, so if splashing it, immediately wipe off the area and wash away with water.**
- **Before servicing, disconnect ABS actuator and electric unit (control unit) connector or battery negative terminal.**

1. Connect a vinyl tube to each bleed valve.
2. Depress brake pedal, loosen each bleed valve, and gradually remove brake fluid.



3. Make sure there is no foreign material in reservoir tank, and refill with new brake fluid.
4. 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, then pause to add new brake fluid to master cylinder. Continue until new brake fluid flows out of the bleed valve.
   Bleed the air out of the brake hydraulic system. Refer to BR-16, "Bleeding Brake System".



Bleeding Brake System

INFOID:0000000004020187

CAUTION:

While bleeding the brake hydraulic system, pay attention to the master cylinder reservoir tank fluid level.

1. Turn ignition switch OFF and disconnect ABS actuator and electric unit (control unit) connector or battery negative terminal.
2. Connect a vinyl tube to the rear right bleed valve.

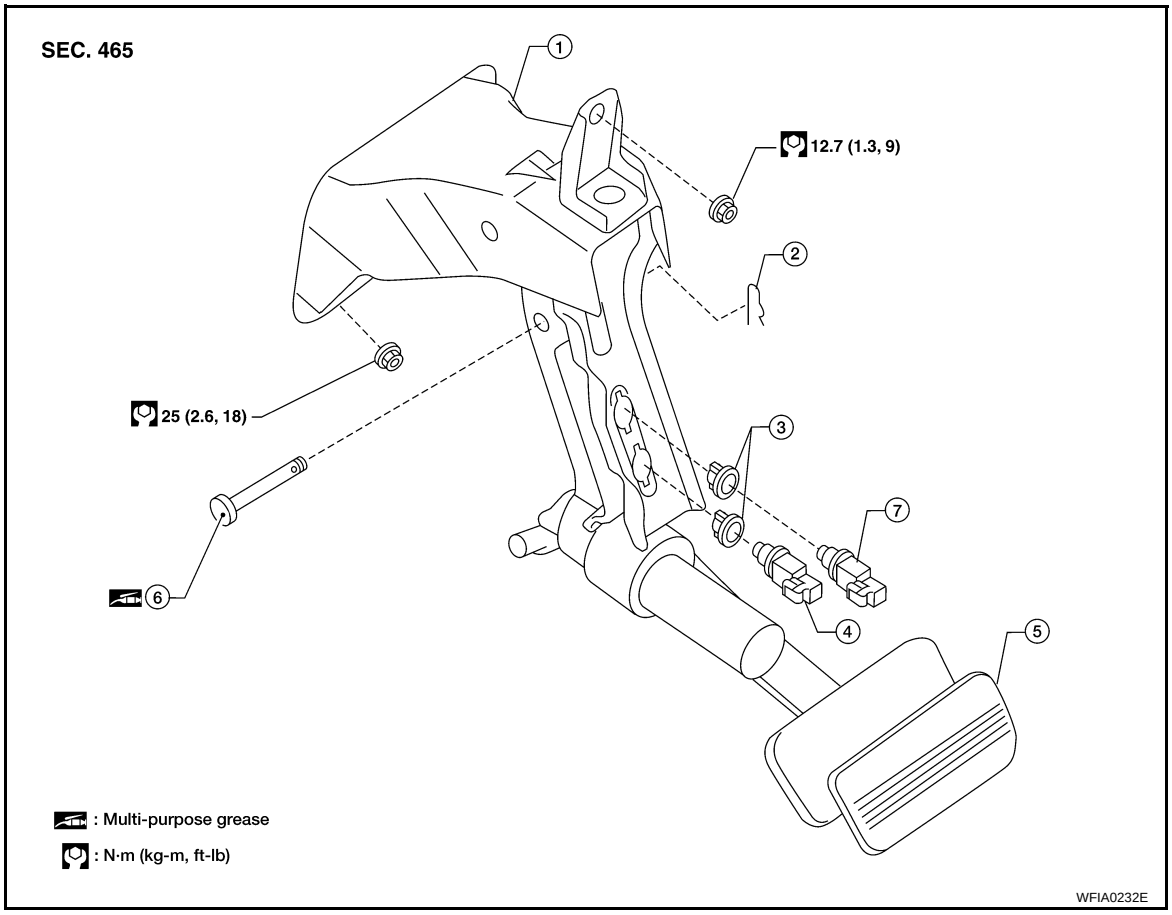
3. Fully depress brake pedal 4 to 5 times.
4. With brake pedal depressed, loosen bleed valve to let the air out, and then tighten it immediately.
5. Repeat steps 3 and 4 until no more air comes out.
6. Tighten bleed valve to the specified torque. Refer to BR-30, "Exploded View of Brake Caliper" (front disc brake), BR-34, "Exploded View of Brake Caliper" (rear disc brake).
7. Repeat steps 2 through 6 at each wheel, with master cylinder reservoir tank filled at least half way, bleeding air in order from the front left, rear left, and front right bleed valves.

ON-VEHICLE REPAIR

BRAKE PEDAL

Removal and Installation

INFOID:0000000004020194



1. Brake pedal assembly
2. Snap pin
3. Clip
4. Stop lamp switch
5. Pedal pad
6. Clevis pin
7. ASCD cancel switch

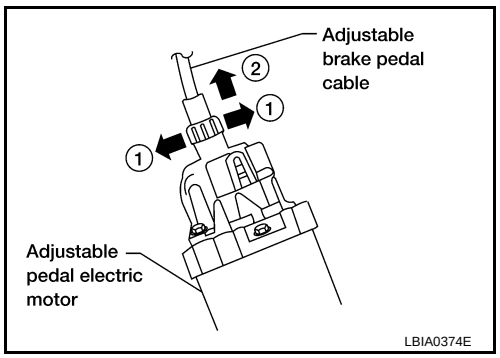
REMOVAL

CAUTION:

- **Before removal and installation, the accelerator and brake pedals must be in the forward most position (closest to the floor). This is to align the base position of the accelerator and brake pedals.**
- **Do not disassemble the brake pedal adjusting mechanism.**
- **Avoid damage from dropping the brake pedal assembly during handling.**
- **Keep the brake pedal assembly away from water.**

1. Remove the lower instrument panel LH. Refer to IP-10, "Exploded View".
2. Remove the stop lamp switch and ASCD cancel switch from the pedal assembly.

3. Disconnect the adjustable brake pedal cable from the adjustable pedal electric motor.
   - Unlock (1) then pull (2) the adjustable brake pedal cable to disconnect it from the adjustable pedal electric motor as shown.

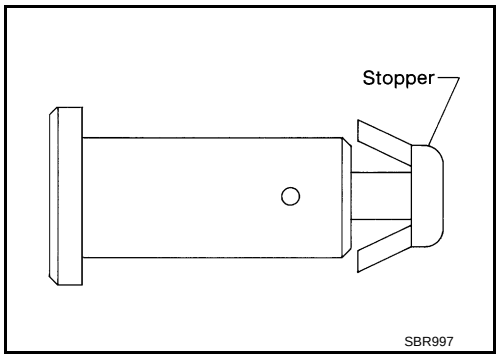


4. Remove snap pin and clevis pin from the clevis of brake booster.
5. Remove brake pedal assembly nuts and remove the brake pedal assembly.
   - Temporarily install the brake pedal assembly nuts by hand to support the brake booster.

WARNING:
Do not bend the brake tubing.
CAUTION:
- **Before removal and installation, the accelerator and brake pedals must be in the forward most position (closest to the floor). This is to align the base position of the accelerator and brake pedals.**
- **Do not disassemble the brake pedal adjusting mechanism.**
- **Avoid damage from dropping the brake pedal assembly during handling.**
- **Keep the brake pedal assembly away from water.**

INSPECTION AFTER REMOVAL

Check the brake pedal assembly for the following items:
- Crack or deformation of clevis pin stopper
- Clevis pin deformation
- Crack of any welded portion of the brake pedal assembly
- Brake pedal bend or deformation



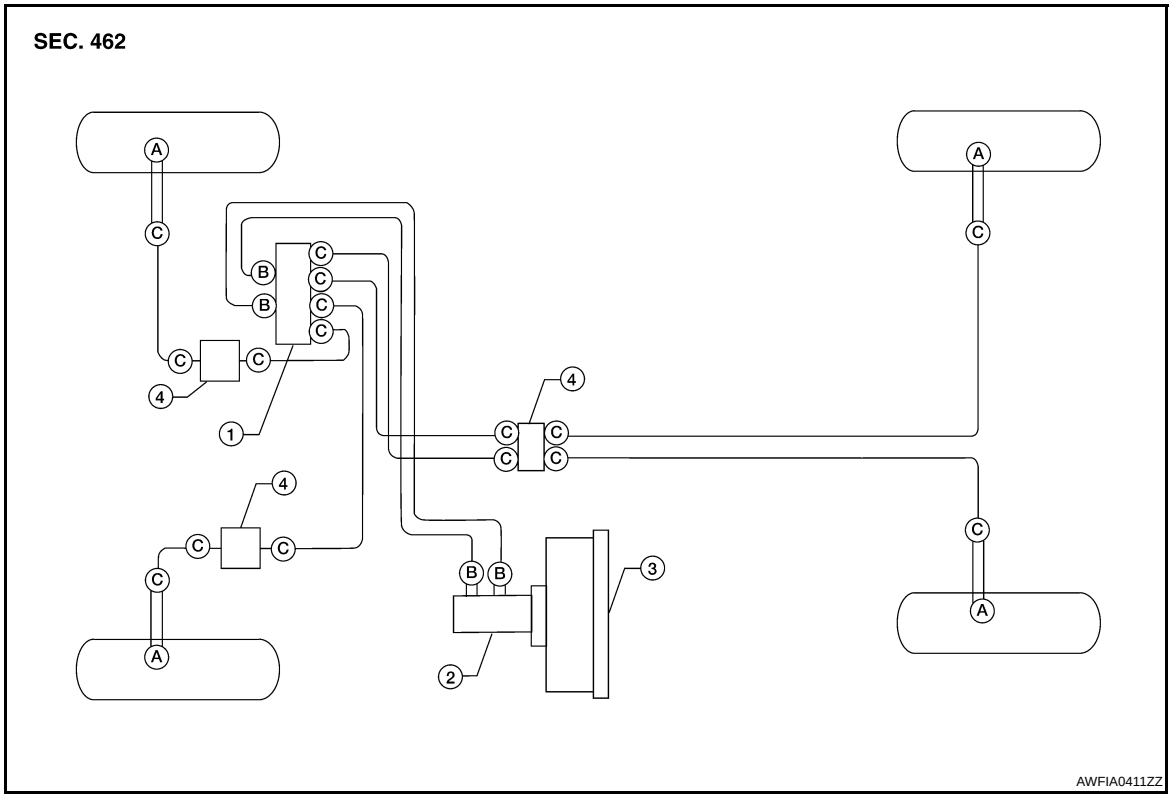
INSTALLATION

Installation is in the reverse order of removal.
- Check the brake pedal for smooth operation. There should be no binding or sticking when applying or releasing the brake pedal.
- Check the brake pedal adjustable feature for smooth operation. There should be no binding or sticking when adjusting the brake pedal forward or backward.
- After installing the brake pedal assembly, be sure to adjust it. Refer to BR-14, "Inspection and Adjustment".

BRAKE TUBE AND HOSE

Hydraulic Circuit

INFOID:0000000004020203



1. Actuator
2. Master cylinder
3. Brake booster
4. Connector
A. Union bolt
18.2 N·m (1.9 kg-m, 13 ft-lb)
B. Flare nut M12
18.2 N·m (1.9 kg-m, 13 ft-lb)
C. Flare nut M10
13.0 N·m (1.3 kg-m, 10 ft-lb)

CAUTION:

- **All hoses and piping (tubes) must be free from excessive bending, twisting and pulling.**
- **Make sure there is no interference with other parts when turning the steering wheel both clockwise and counterclockwise.**
- **The brake piping is an important safety part. If a brake fluid leak is detected, always disassemble the parts. Replace applicable part with a new one, if necessary.**
- **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.**
- **Do not bend or twist brake hose sharply, or strongly pull it.**
- **When removing components, cover connections so that no dirt, dust, or other foreign matter gets in.**
- **Refill with new specified brake fluid. Refer to MA-10, "Fluids and Lubricants".**
- **Do not reuse drained brake fluid.**

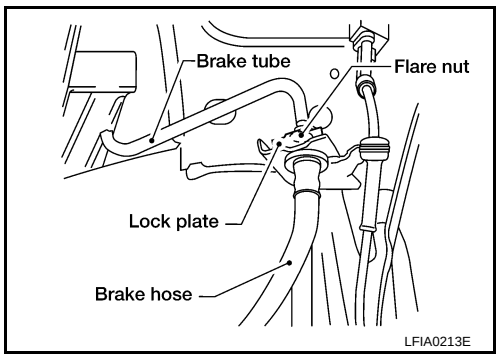
Removal and Installation of Front Brake Piping and Brake Hose

INFOID:0000000004020195

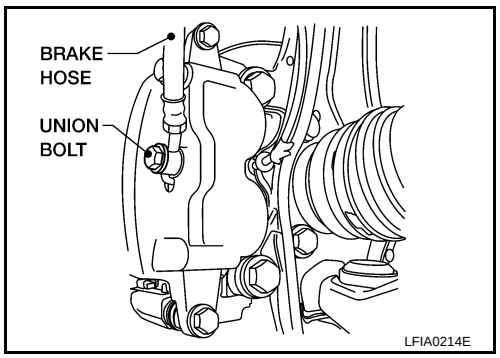
REMOVAL

1. Drain brake fluid. Refer to BR-16, "Drain and Refill".

2. Remove brake tube from brake hose, using a suitable tool.
3. Remove lock plate and brake hose from bracket.

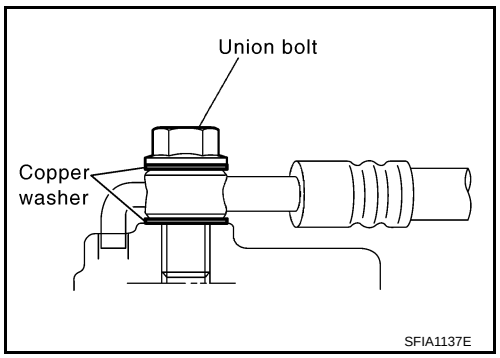


4. Remove union bolt and then remove brake hose from cylinder body.

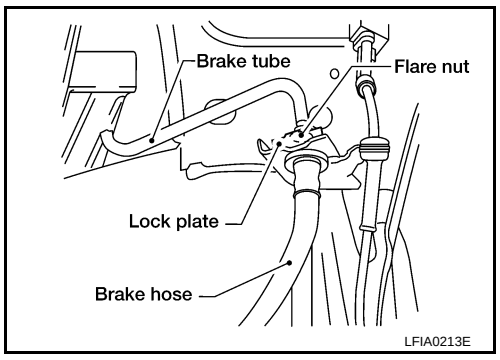


INSTALLATION

1. Install brake hose by aligning with the protrusion on cylinder body, then install the union bolt and new copper washers and tighten to specification. Refer to BR-12, "Hydraulic Circuit".
   CAUTION:
   Do not reuse copper washer.



2. Insert brake hose end through bracket, then secure it to bracket with lock plate.
3. Install brake tube to brake hose, then tighten the flare nut using a suitable tool. Refer to BR-12, "Hydraulic Circuit".



4. Refill brake fluid and bleed air. Refer to BR-16, "Bleeding Brake System".

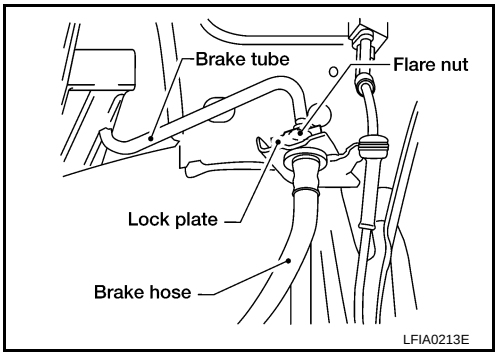
Removal and Installation of Rear Brake Piping and Brake Hose

INFOID:0000000004020196

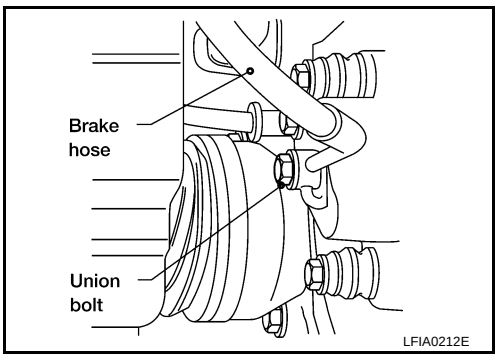
REMOVAL

1. Drain brake fluid. Refer to BR-16, "Drain and Refill".

2. Remove brake tube from brake hose, using a suitable tool.
3. Remove lock plate and brake hose from bracket.

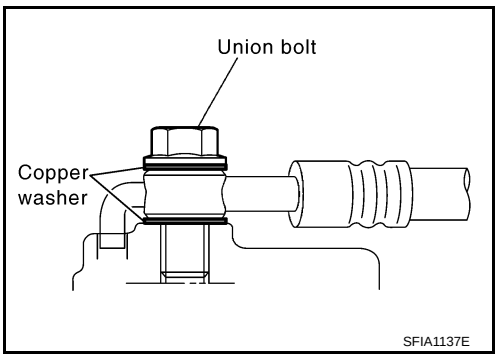


4. Remove union bolt and then remove brake hose from cylinder body.

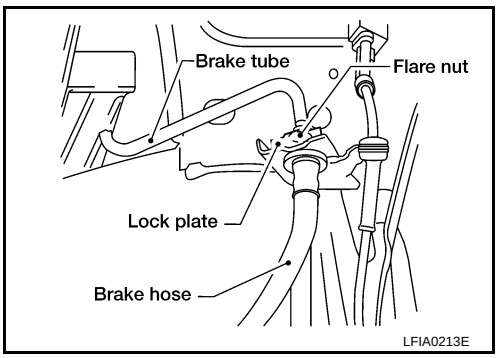


INSTALLATION

1. Install brake hose by aligning with the protrusion on cylinder body, then install the union bolt and new copper washers and tighten to specification. Refer to BR-12, "Hydraulic Circuit".
   CAUTION:
   Do not reuse copper washer.



2. Insert brake hose end through bracket, then secure it to bracket with lock plate.
3. Install brake tube to brake hose, then tighten the flare nut using a suitable tool. Refer to BR-12, "Hydraulic Circuit".



4. Refill brake fluid and bleed air. Refer to BR-16, "Bleeding Brake System".

Inspection After Installation

INFOID:0000000004020197

CAUTION:
Brake tubes and hoses are important safety parts. Always disassemble the parts and retighten their fittings, if a brake fluid leak is detected. Replace applicable part with a new one, if a damaged part is detected.

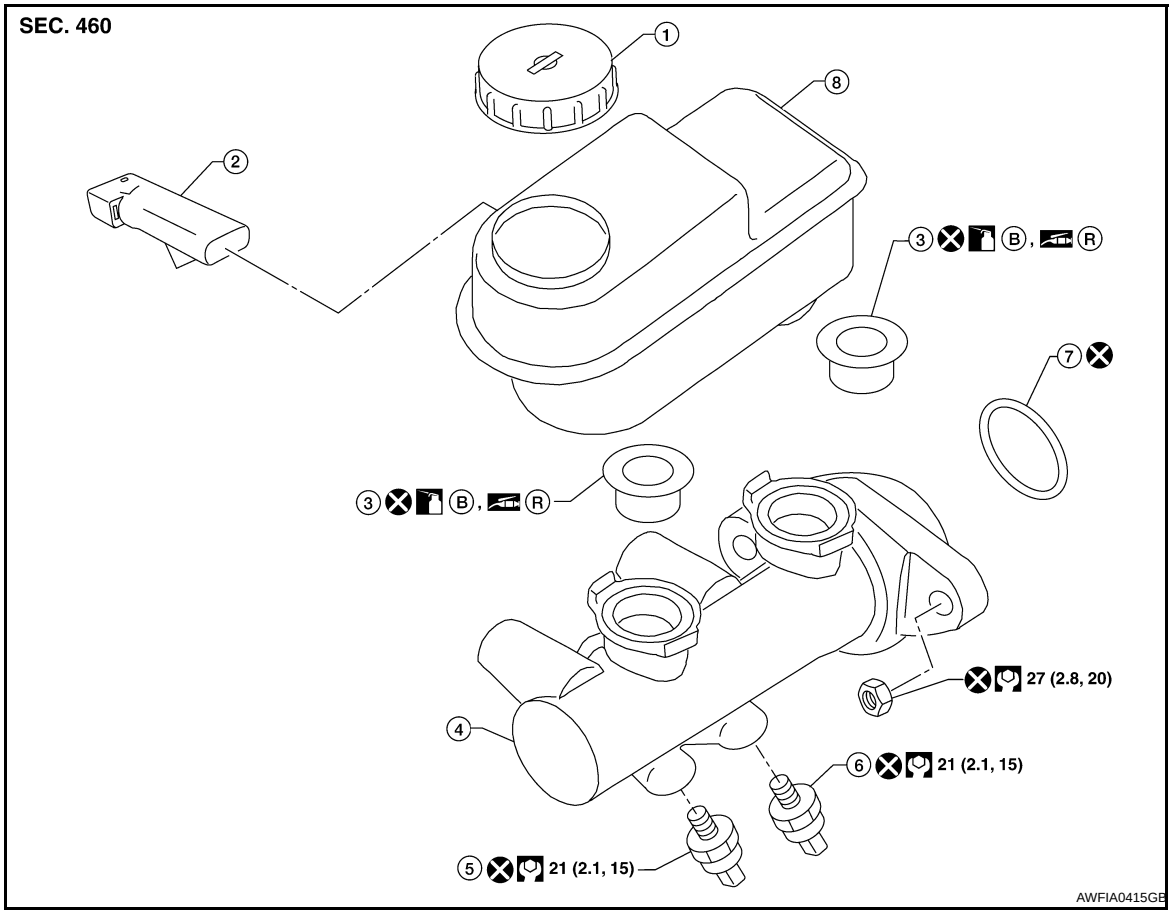
1. Check brake lines (tubes and hoses), and connections for fluid leaks, damage, twist, deformation, contact with other parts, and loose connections. Replace any parts as necessary. Refer to BR-12, "Hydraulic Circuit".

2. While depressing brake pedal under a force of 785 N (80 kg-f, 177 lb-f) with engine running for approximately 5 seconds, check each part for fluid leaks.

BRAKE MASTER CYLINDER

Removal and Installation

INFOID:0000000004020204



1. Reservoir cap
2. Fluid level sensor
3. Grommet
4. Master cylinder assembly
5. Front pressure sensor
6. Rear pressure sensor
7. Seal
8. Reservoir tank
B. Brake fluid
R. Rubber grease

REMOVAL

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.**
- **Before removing brake master cylinder, depress the brake pedal 5-6 times with the key OFF to deplete vacuum in the booster.**

1. Drain brake fluid. Refer to BR-16, "Drain and Refill".
2. Disconnect harness connectors for fluid level sensor, front and rear pressure sensors.
3. Using suitable tool, disconnect brake tube from master cylinder assembly.
4. Remove master cylinder assembly nuts, and remove master cylinder assembly.

INSTALLATION

Installation is in the reverse order of removal.

- Refill brake fluid and bleed air. Refer to BR-16, "Bleeding Brake System".

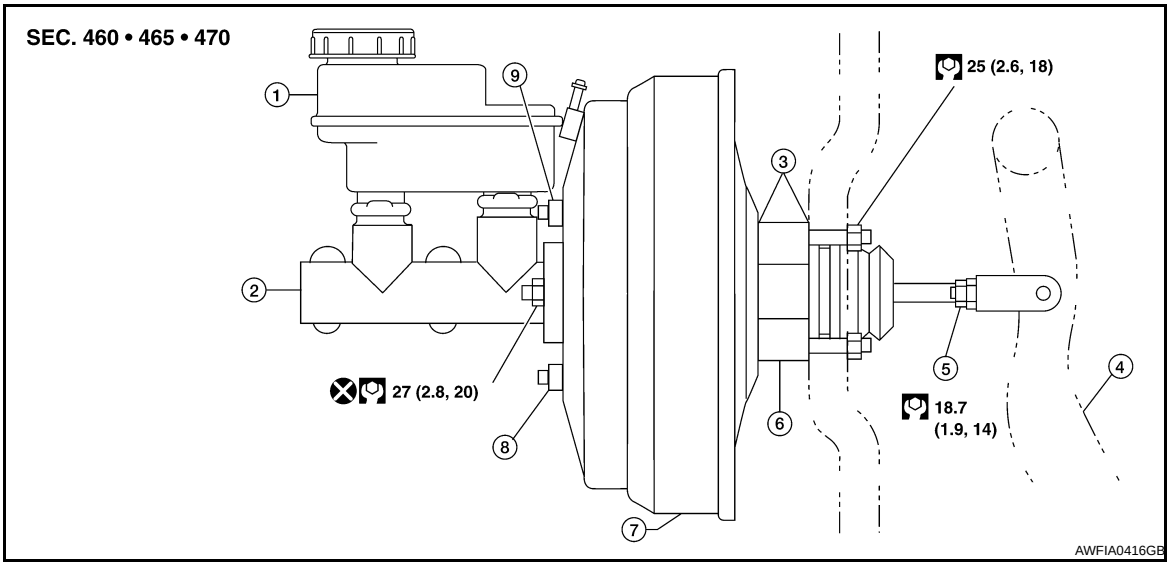
  CAUTION:

  - **Refill with new brake fluid. Refer to MA-10, "Fluids and Lubricants".**
  - **Do not reuse drained brake fluid.**
- Adjust brake pedal. Refer to BR-14, "Inspection and Adjustment".

BRAKE BOOSTER

Removal and Installation

INFOID:0000000004020208



1. Reservoir tank
2. Master cylinder assembly
3. Gasket
4. Brake pedal
5. Lock nut
6. Spacer block
7. Brake booster
8. Active booster
9. Delta stroke sensor

CAUTION:

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

REMOVAL

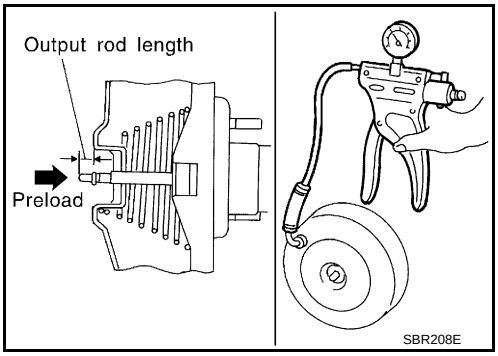
1. Remove engine room cover with power tool. Refer to EM-24, "Removal and Installation".
2. Remove engine air duct assembly. Refer to EM-25, "Removal and Installation".
3. Remove brake piping from master cylinder assembly.
4. Remove master cylinder assembly from brake booster. Refer to BR-24, "Removal and Installation".
5. Remove vacuum hose from brake booster. Refer to BR-27, "Removal and Installation".
6. Disconnect active boost and delta stroke sensor harness connectors from brake booster.
7. Remove brake pedal to clevis attachment snap pin and clevis pin from inside the vehicle.
8. Remove brake booster to brake pedal assembly nuts.
9. Remove brake booster from dash panel.

INSPECTION AFTER REMOVAL

Output Rod Length Inspection

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

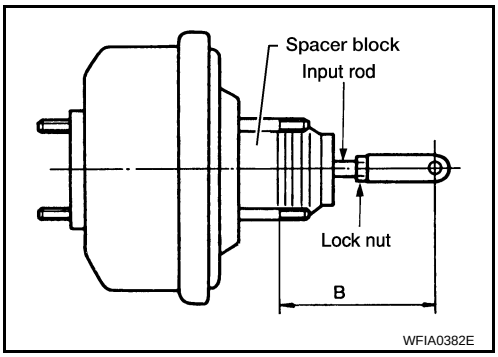
Output rod length **: Refer to BR-45, "Brake Booster".**



INSTALLATION

1. Loosen lock nut to adjust input rod length so that the length (B) is set at the specified value.

Input rod length (B) **: Refer to BR-45, "Brake Booster".**

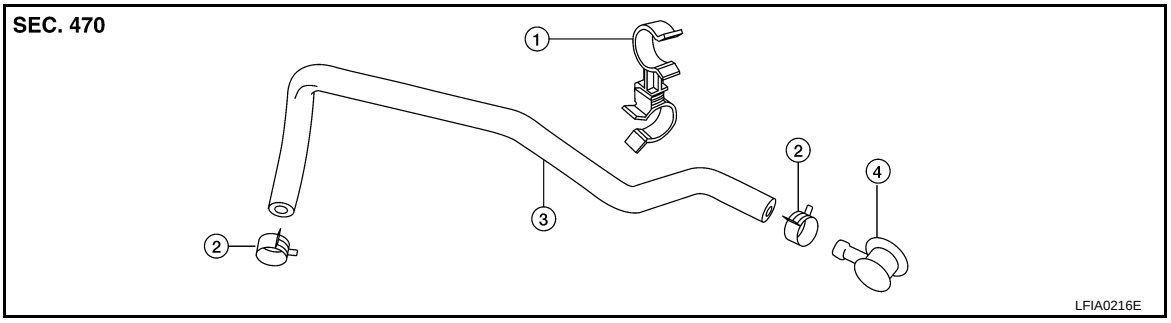


2. After adjusting length (B), temporarily tighten lock nut and install brake booster.
   - Install the gaskets and spacer block between brake booster and dash panel.
3. Connect brake pedal to clevis on the input rod.
4. Install brake booster to brake pedal assembly nuts and tighten to the specified torque.
5. Install brake piping to the master cylinder assembly. Refer to BR-12, "Hydraulic Circuit".
6. Connect active boost and delta stroke sensor harness connectors to brake booster.
7. Connect vacuum hose to brake booster.
8. Install master cylinder assembly to brake booster. Refer to BR-24, "Removal and Installation".
9. Adjust the height and play of brake pedal. Refer to BR-14, "Inspection and Adjustment".
10. Tighten lock nut of input rod to specification.
11. Install engine air duct assembly. Refer to EM-25, "Removal and Installation".
12. Install engine room cover. Refer to EM-24, "Removal and Installation".
13. Refill with new brake fluid and bleed air. Refer to BR-16, "Bleeding Brake System".

VACUUM LINES

Removal and Installation

INFOID:0000000003710207



1. Hose clip
2. Clamp
3. Vacuum hose
4. Check valve

REMOVAL

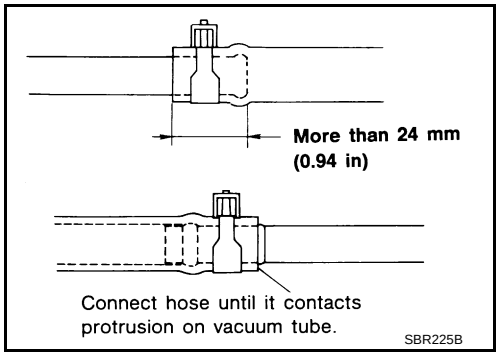
1. Disconnect vacuum hose from hose clip.
2. Release clamps and disconnect vacuum hose.
3. Remove check valve from brake booster.

INSTALLATION

Installation is in the reverse order of removal.

CAUTION:

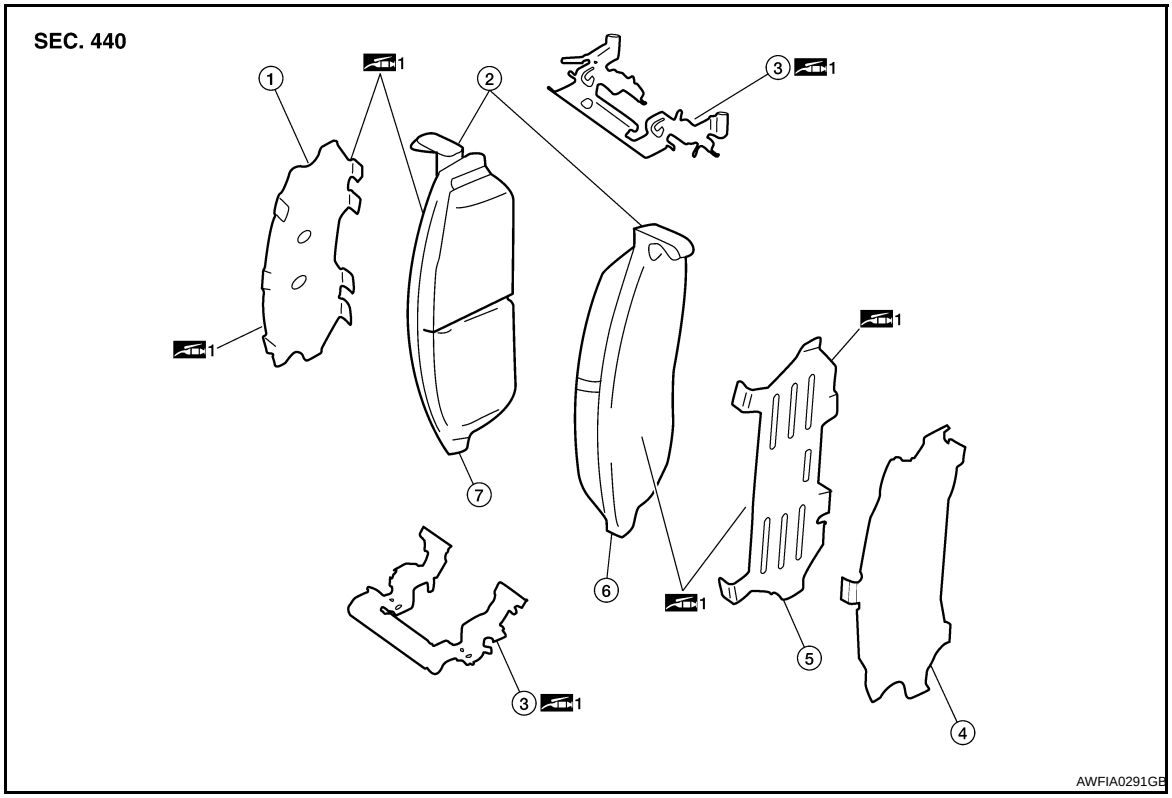
- **Insert vacuum hose over the tube for 24 mm (0.94 in) or more.**
- **Do not use lubricating oil during assembly.**



FRONT DISC BRAKE

Exploded View of Brake Pads

INFOID:0000000004057202



1. Inner multi-layered shim	2. Pad wear sensor	3. Pad retainer
4. Outer shim cover	5. Outer shim	6. Outer pad
7. Inner pad	1: Molykote M-77 grease	

Removal and Installation of Brake Pads

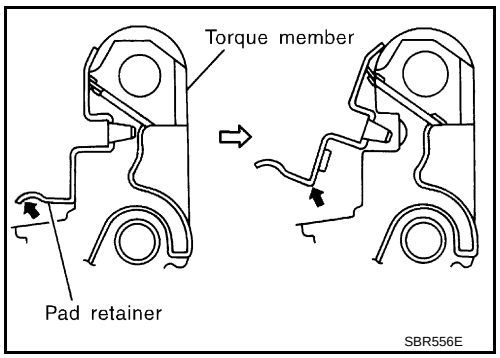
INFOID:0000000004057203

WARNING:
Clean dust on caliper and brake pad with a vacuum dust collector to minimize the hazard of air borne 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 free from brake fluid.**
- **Burnish the brake pads and disc rotor mutually contacting surfaces, after refinishing or replacing rotors, after replacing pads, or if a soft pedal occurs at very low mileage.**

REMOVAL

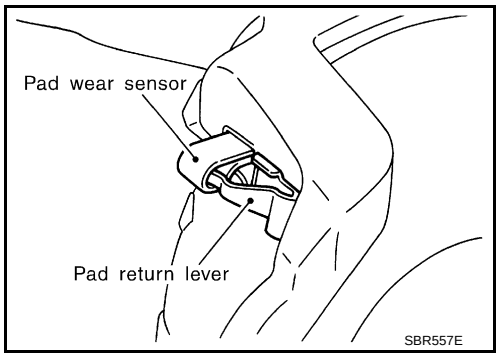
1. Remove front wheel and tires using power tool.
2. Remove lower sliding pin bolt.

3. Hang cylinder body with a wire, and remove pads, pad retainers, shims, and shim cover from torque member.
CAUTION:
When removing the pad retainer from the torque member, lift it in the direction indicated by the arrow as shown so that it does not deform.



INSTALLATION

1. Push pistons in using suitable tool.
CAUTION:
By pushing in pistons, brake fluid returns to master cylinder reservoir tank. Watch the brake fluid level in the reservoir tank.
NOTE:
Using a suitable tool, makes it easier to push in the pistons.
2. Apply Molykote M-77 grease or equivalent to between shim cover and shim. Install outer shim, outer shim cover to inner pad, and inner multi-layered shim to outer pad.
3. Apply Molykote M-77 grease or equivalent to between pad retainer and pad. Install pad retainers and pads to torque member.
4. Apply Molykote M-77 grease or equivalent to the piston face. Install pad return lever securely to pad wear sensor as shown.
CAUTION:
- **Securely assemble pad retainers so that they are not being lifted up from torque member.**
- **Both inner and outer pads have a pad return system on the pad retainer. Install pad return lever securely to pad wear sensor.**



5. Install pads to cylinder body.
6. Install cylinder body to torque member.
CAUTION:
In the case of replacing a pad with new one, check the brake fluid level in the reservoir tank because brake fluid returns to reservoir tank when pressing piston in.
NOTE:
Use a suitable tool to easily press piston.
7. Install lower sliding pin bolt, and tighten it to the specified torque. Refer to BR-28, "Exploded View of Brake Pads".
8. Check front disc brake for drag.
9. Install front wheel and tires.

Brake Burnishing Procedure

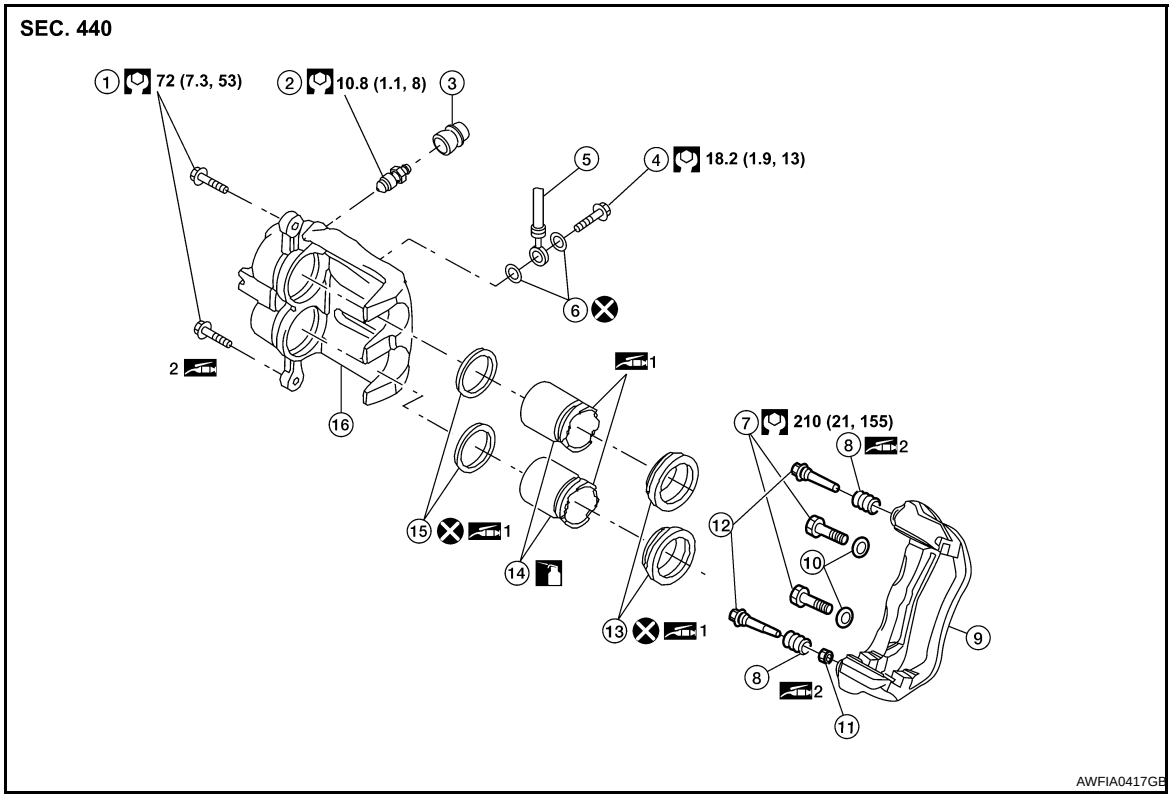
INFOID:0000000004057204

Burnish contact surfaces between disc rotors and pads according to following procedure after refinishing or replacing rotors, after replacing pads, or if a soft pedal occurs at very low mileage.
CAUTION:
- **Be careful of vehicle speed because the brake does not operate easily until pad and disc rotor are securely seated.**
- **Only perform this procedure under safe road and traffic conditions. Use extreme caution.**

1. Drive vehicle on straight, flat road.
2. Depress brake pedal with the power to stop vehicle within 3 to 5 seconds until the vehicle stops.
3. Drive without depressing brake for a few minutes to cool the brake.
4. Repeat steps 1 through 3 until pad and disc rotor are securely seated.

Exploded View of Brake Caliper

INFOID:0000000004057205



1.	Sliding pin bolt	2.	Bleed valve	3.	Cap
4.	Union bolt	5.	Brake hose	6.	Copper washer
7.	Torque member bolt	8.	Sliding pin boot	9.	Torque member
10.	Washers	11.	Bushing	12.	Sliding pin
13.	Piston boot	14.	Piston	15.	Piston seal
16.	Cylinder body		Brake fluid		1: Molykote M-77 grease

2: Rubber grease

Removal and Installation of Brake Caliper and Rotor

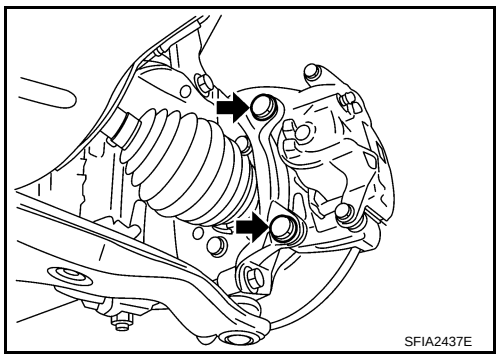
INFOID:0000000004057206

WARNING:
Clean dust on caliper and brake pad with a vacuum dust collector to minimize the hazard of air borne particles or other materials.
CAUTION:
- **While removing cylinder body, do not depress brake pedal because piston will pop out.**
- **Do not damage piston boot.**
- **Keep rotor free from brake fluid.**
- **Refill with new specified brake fluid.**
- **Burnish brake contact surface after refinishing or replacing rotors, after replacing pads, or it a soft pedal occurs at very low mileage. Refer to BR-29, "Brake Burnishing Procedure".**

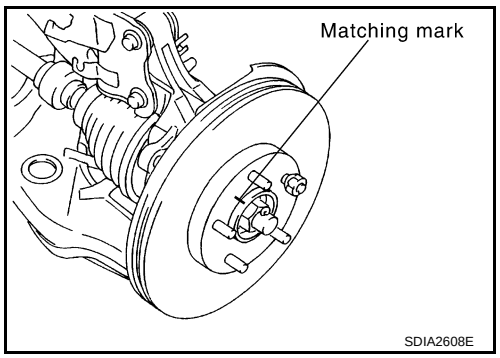
REMOVAL

1. Remove front wheel and tires using power tool.
2. Fasten disc rotor using wheel nut.
3. Drain brake fluid. Refer to BR-16, "Drain and Refill".
4. Remove union bolt, and then disconnect brake hose from caliper assembly.
   NOTE:
   Discard the copper washers, do not reuse.

5. Remove torque member bolts, and remove brake caliper assembly.
CAUTION:
Do not drop brake pad.

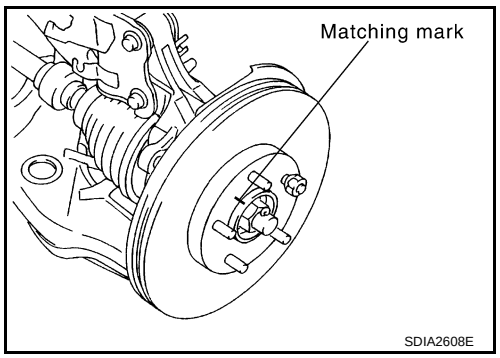


6. Apply matching marks to disc rotor and wheel hub assembly as shown if the disc rotor is to be reused, then remove disc rotor.
CAUTION:
Put matching marks on wheel hub assembly and disc rotor if the disc rotor is to be reused.

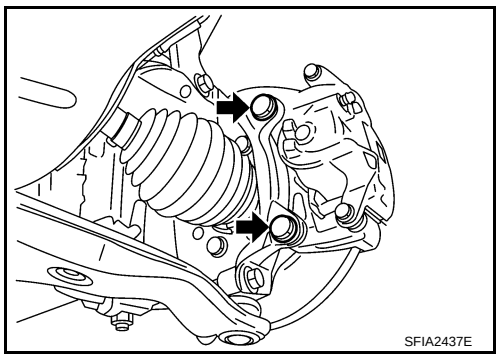


INSTALLATION

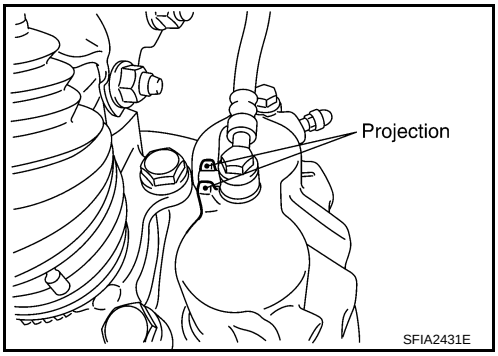
1. If reusing the disc rotor, use the matching marks to align disc rotor on the wheel hub assembly as shown, then install disc rotor using a wheel nut to hold it in place.
CAUTION:
Use matching marks on wheel hub assembly and disc rotor if the disc rotor is to be reused.



2. Install brake caliper assembly to vehicle, and tighten torque member bolts to the specified torque.
CAUTION:
Do not allow oil or any moisture on all contact surfaces between steering knuckle and caliper assembly, bolts, and washer.



3. Install brake hose to brake caliper assembly using new copper washers. Align the brake hose to the projection as shown and tighten union bolts to the specified torque.
   CAUTION:
   - **Do not reuse copper washers.**
   - **Securely attach brake hose to projection on cylinder body.**

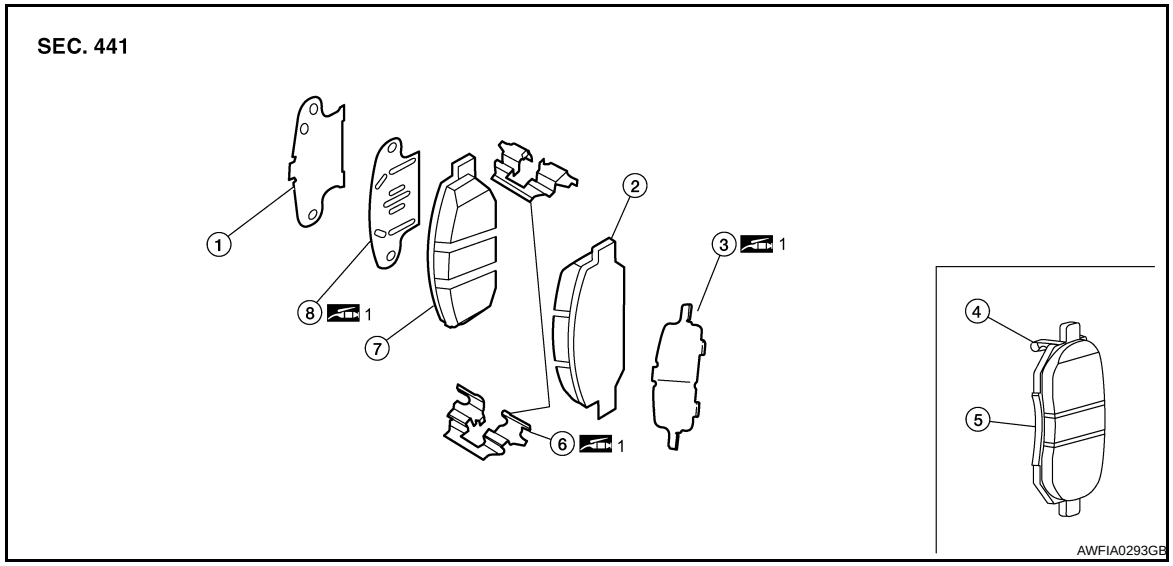


4. Refill with new brake fluid and bleed air. Refer to BR-16, "Bleeding Brake System".
5. Check front disc brake for drag and correct as necessary.
6. Install front wheel and tires.

REAR DISC BRAKE

Exploded View of Brake Pads

INFOID:0000000004057207



1. Inner shim cover
2. Outer pad
3. Outer multi-layered shim
4. Pad wear sensor
5. Inner pad (RH)
6. Pad retainer
7. Inner pad
8. Inner shim

1: Molykote M-77 grease

Removal and Installation of Brake Pad

INFOID:0000000004057208

WARNING:
Clean dust on caliper and brake pad with a vacuum dust collector to minimize the hazard of air borne particles or other materials.
CAUTION:
- **While removing cylinder body, do not depress brake pedal because piston will pop out.**
- **It is not necessary to disconnect brake hose connection 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 free from brake fluid.**
- **Burnish the brake pads and disc rotor mutually contacting surfaces, after refinishing or replacing rotors, after replacing pads, or if a soft pedal occurs at very low mileage.**

REMOVAL

1. Remove rear wheel and tires using power tool.
2. Remove the top sliding pin bolt from the cylinder body.
3. Swing cylinder body open and secure with wire, remove pads, shims, cover and retainers.

INSTALLATION

1. Push piston in using suitable tool.
   CAUTION:
   By pushing in piston, brake fluid returns to master cylinder reservoir tank. Watch the brake fluid level in the reservoir tank.
   NOTE:
   Using a suitable tool, makes it easier to push in the piston.
2. Apply Molykote M-77 grease to knuckle slide where brake pad contacts and to the outer multi-layered shim, pad retainers and inner shim.

CAUTION:
Do not get grease on the brake pads or brake rotor friction surfaces.

3. Install pads, shims, cover and retainers to cylinder body.
4. Install cylinder body top sliding pin bolt and tighten to specification.
5. Check rear disc brake for drag.
6. Install rear wheel and tires.

Brake Burnishing Procedure

INFOID:0000000004057209

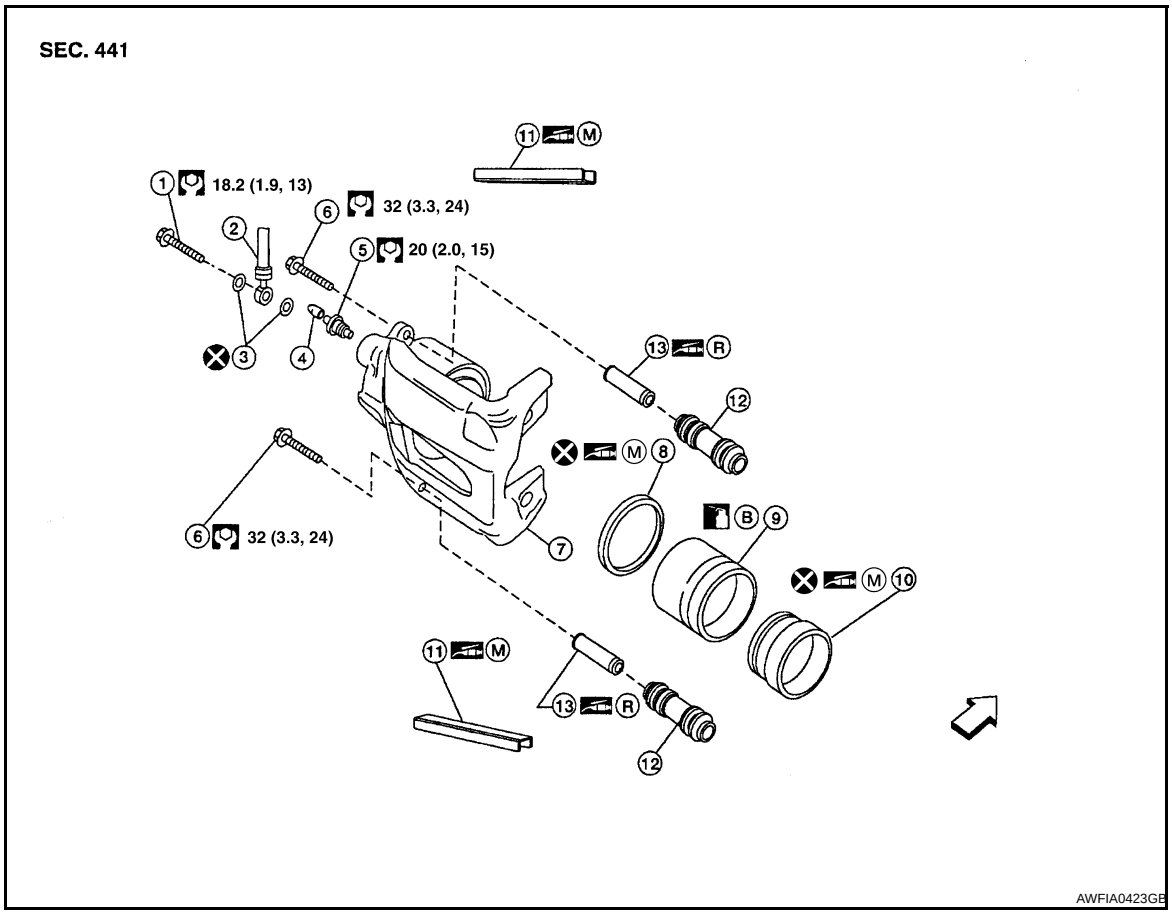
Burnish contact surfaces between disc rotors and pads according to following procedure after refinishing or replacing rotors, after replacing pads, or if a soft pedal occurs at very low mileage.

CAUTION:
- **Be careful of vehicle speed because the brake does not operate easily until pad and disc rotor are securely seated.**
- **Only perform this procedure under safe road and traffic conditions. Use extreme caution.**

1. Drive vehicle on straight, flat road.
2. Depress brake pedal with the power to stop vehicle within 3 to 5 seconds until the vehicle stops.
3. Drive without depressing brake for a few minutes to cool the brake.
4. Repeat steps 1 through 3 until pad and disc rotor are securely seated.

Exploded View of Brake Caliper

INFOID:0000000004057210



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. Knuckle slide
12. Sliding sleeve boot
13. Sliding sleeve
B. Brake fluid
R. Rubber grease
M. Molykote M-77
⇦ Front

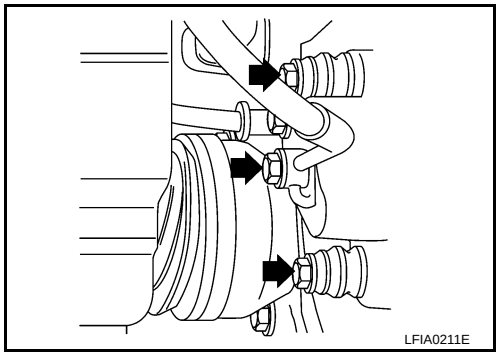
Removal and Installation of Brake Caliper and Disc Rotor

INFOID:0000000004057211

WARNING:
Clean dust on caliper and brake pad with a vacuum dust collector to minimize the hazard of air borne particles or other materials.
CAUTION:
- **While removing cylinder body, do not depress brake pedal because piston will pop out.**
- **Do not damage piston boot.**
- **Keep rotor free from brake fluid.**
- **Refill with new specified brake fluid.**
- **Burnish brake contact surface after refinishing or replacing rotors, after replacing pads, or it a soft pedal occurs at very low mileage. Refer to BR-34, "Brake Burnishing Procedure".**

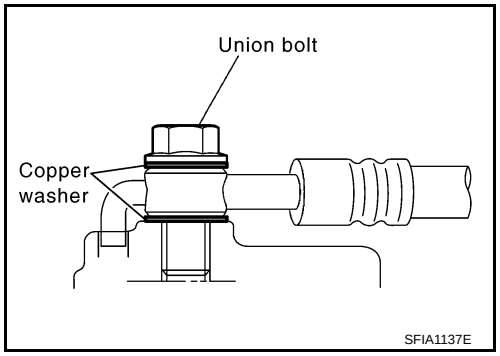
REMOVAL

1. Remove rear wheel and tires using power tool.
2. Fasten disc rotor using wheel nut.
3. Drain brake fluid as necessary. Refer to BR-16, "Drain and Refill".
4. Remove union bolt and cylinder body bolts, then remove cylinder body.
   NOTE:
   Discard the copper washers, do not reuse.
5. Apply matching marks to disc rotor and wheel hub assembly if the disc rotor is to be reused, then remove disc rotor.
   CAUTION:
   Put matching marks on wheel hub assembly and disc rotor if the disc rotor is to be reused.



INSTALLATION

1. If reusing the disc rotor, use the matching marks to align disc rotor on the wheel hub assembly, then install disc rotor using a wheel nut to hold it in place.
   CAUTION:
   Use matching marks on wheel hub assembly and disc rotor if the disc rotor is to be reused.
2. Install cylinder body and tighten cylinder body bolts to specification.
   CAUTION:
   Before installing cylinder body to the vehicle, wipe off mating surface of cylinder body.
3. Install brake hose to cylinder body with new copper washers and tighten union bolt to specification.
   CAUTION:
   - **Do not reuse copper washers.**
   - **Securely attach brake hose to projection on cylinder body.**
4. Refill with new brake fluid and bleed. Refer to BR-16, "Bleeding Brake System".
5. Check rear disc brake for drag and correct as necessary.
6. Install rear wheel and tires.

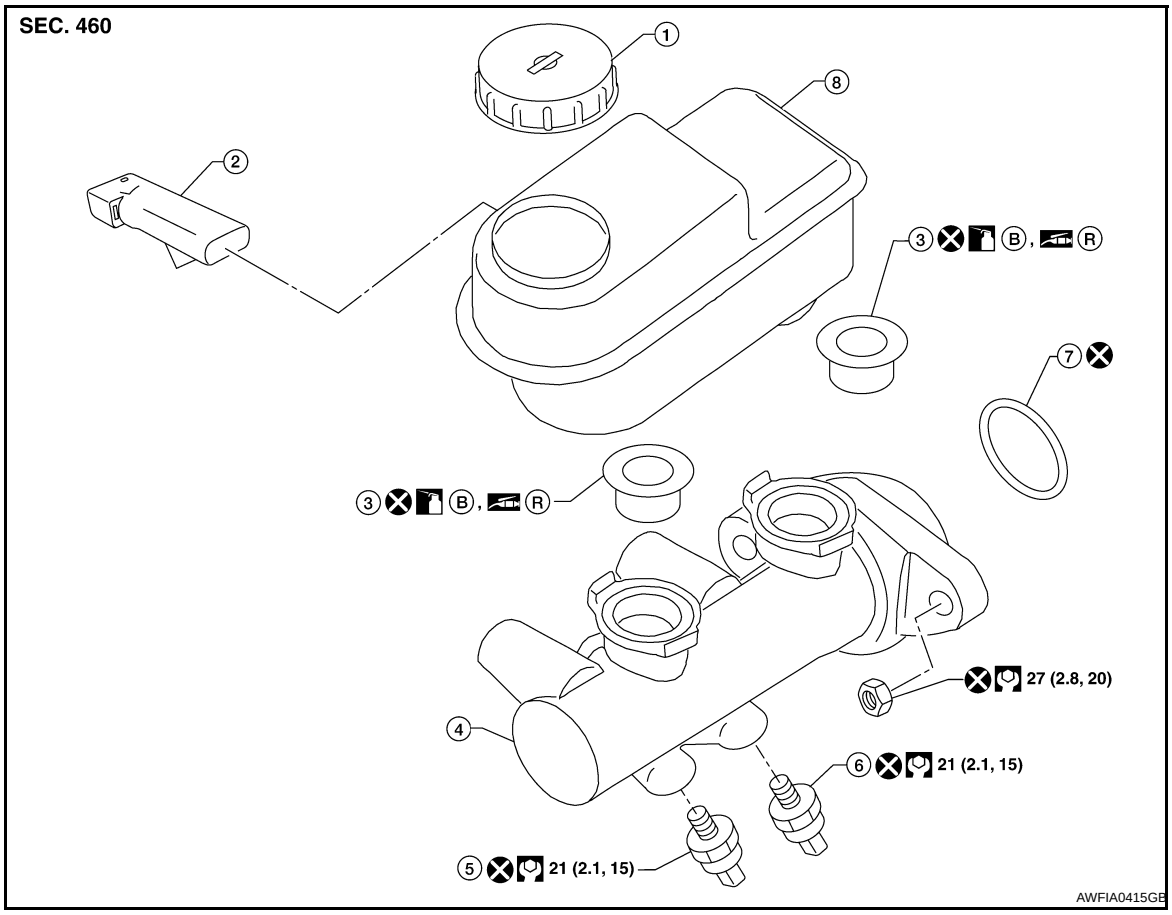


DISASSEMBLY AND ASSEMBLY

BRAKE MASTER CYLINDER

Disassembly and Assembly

INFOID:0000000004024113



1. Reservoir cap
2. Fluid level sensor
3. Grommet
4. Master cylinder assembly
5. Front pressure sensor
6. Rear pressure sensor
7. Seal
8. Reservoir tank
B. Brake fluid
R. Rubber grease

DISASSEMBLY

CAUTION:

- **Master cylinder assembly cannot be disassembled.**
- **Do not drop parts. If a part is dropped, do not use it.**

1. Pull the reservoir tank off the master cylinder assembly.
2. Remove the grommets from master cylinder assembly and discard the grommets.
   CAUTION:
   Discard the grommets, do not reuse.
3. Remove the fluid level sensor from the reservoir tank.
4. Remove the front and rear pressure sensors and discard.
   CAUTION:
   Discard the front and rear pressure sensors, do not reuse.

ASSEMBLY

CAUTION:

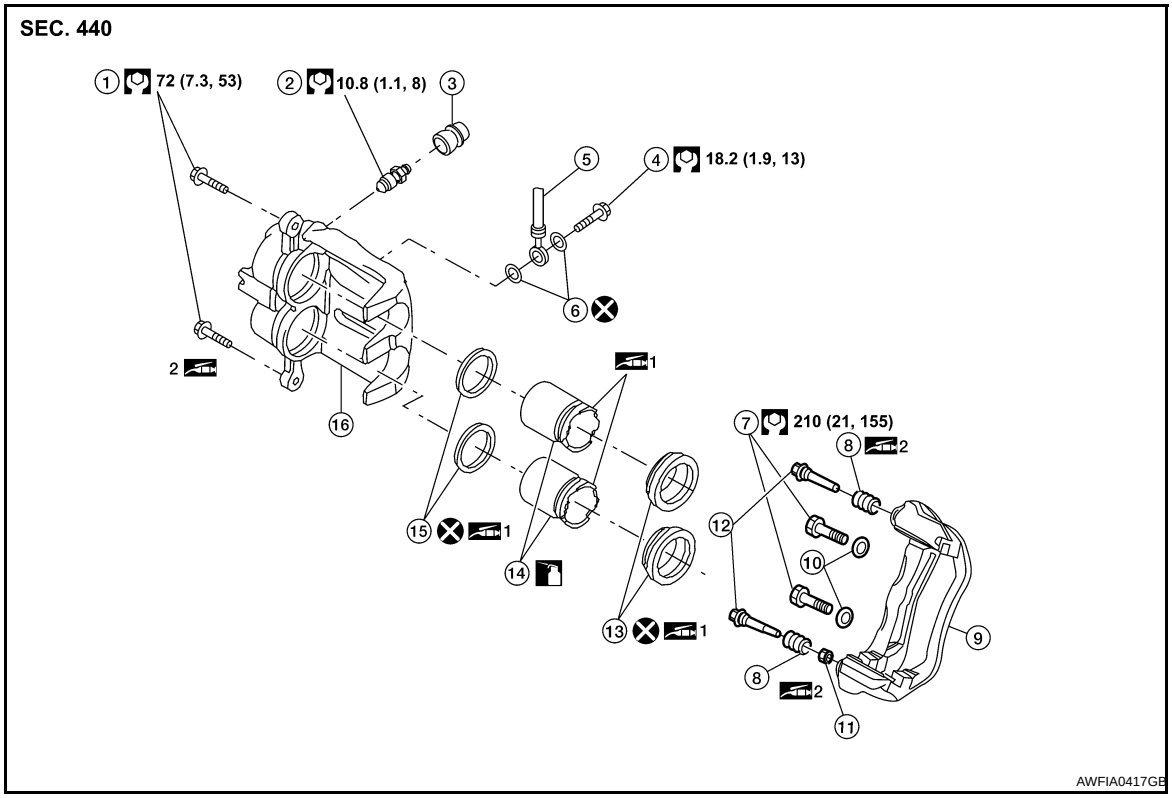
- **Never use mineral oil such as kerosene, gasoline during the cleaning and assembly process.**
- **Do not drop parts. If a part is dropped, do not use it.**

1. Apply brake fluid or rubber grease to the new grommets, then insert the new grommets into the master cylinder assembly.
   CAUTION:
   Do not reuse the grommets.
2. Install the reservoir tank onto the master cylinder assembly.
3. Install the fluid level sensor on the reservoir tank.
4. Install the new front and rear pressure sensors.
   CAUTION:
   Do not reuse the front and rear pressure sensors.

FRONT DISC BRAKE

Disassembly and Assembly

INFOID:0000000004024114

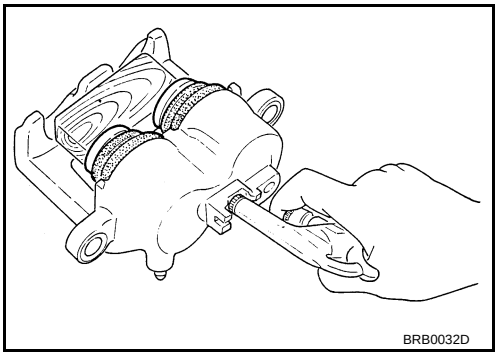


1. Sliding pin bolt	2. Bleed valve	3. Cap
4. Union bolt	5. Brake hose	6. Copper washer
7. Torque member bolt	8. Sliding pin boot	9. Torque member
10. Washers	11. Bushing	12. Sliding pin
13. Piston boot	14. Piston	15. Piston seal
16. Cylinder body	Brake fluid	1: Molykote M-77 grease
2: Rubber grease		

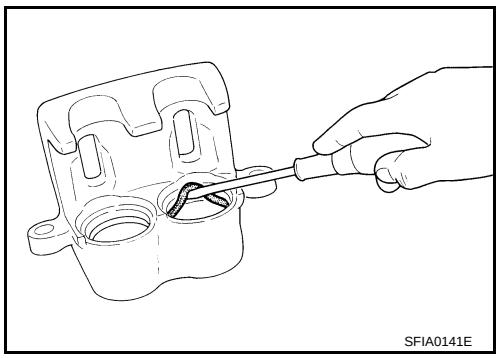
DISASSEMBLY

1. Remove sliding pin bolt, and then remove the pad, shim, shim cover, and pad retainer from the torque member.

2. Remove sliding pins and sliding pin boots from torque member.
3. Place a wooden block as shown, and blow air from union bolt hole to remove pistons and piston boots.
   CAUTION:
   Do not get your fingers caught in piston.



4. Remove piston seals from cylinder body, using a suitable tool.
   CAUTION:
   - **Be careful not to damage cylinder inner wall.**
   - **Do not reuse piston seals.**


SFIA0141E

CALIPER INSPECTION

Cylinder Body

Check inside surface of cylinder for score, rust, wear, damage or foreign materials. If any of the above conditions are observed, replace cylinder body.
Minor damage from rust or foreign materials may be eliminated by polishing surface with a fine emery paper. Replace cylinder body if necessary.
CAUTION:
Use new brake fluid for cleaning. Do not use mineral oils such as gasoline or kerosene.

Torque Member

Check for wear, cracks, and damage. If damage or deformation is present, replace the affected part.

Piston

Check piston for score, rust, wear, damage or presence of foreign materials. Replace if any of the above conditions are observed.
CAUTION:
Piston sliding surface is plated, do not polish with emery paper even if rust or foreign materials are stuck to sliding surface.

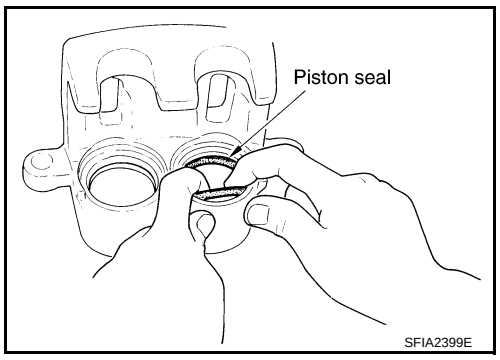
Sliding Pins, and Sliding Pin Boots

Check sliding pin and sliding pin boot for wear, damage, and cracks. If damage or deformation is present, replace the affected part.
CAUTION:
Trailing/upper sliding pin must be replaced at each service.

ASSEMBLY

CAUTION:
Do not use NISSAN Rubber Grease (KRE00 00010, KRE00 00010 01) when assembling.

1. Apply Molykote M-77 grease to new piston seals and insert seals into grooves on cylinder body.
   CAUTION:
   Do not reuse piston seals.



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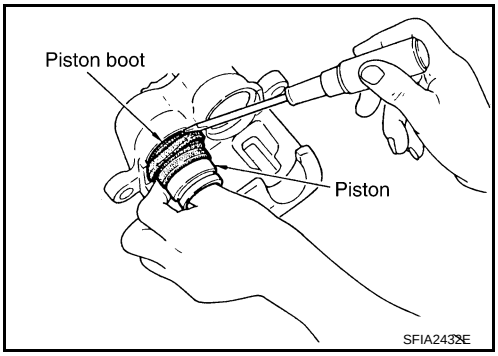
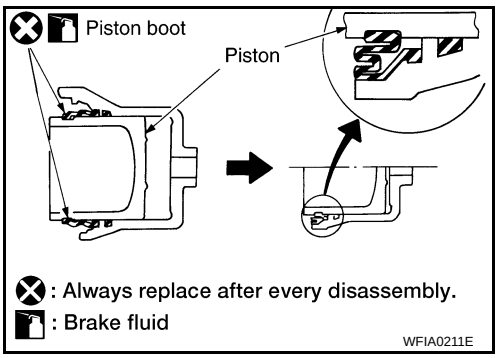
2. Apply Molykote M-77 grease to piston boots. Cover the piston ends with piston boots, and then install cylinder side lip on piston boots securely into the grooves on cylinder body.
CAUTION:
Do not reuse piston boots.



3. Apply clean brake fluid to pistons, then install pistons into cylinder body and insert piston boot side lip into groove of pistons as shown.
CAUTION:
Press the pistons evenly to prevent damage to cylinder wall.

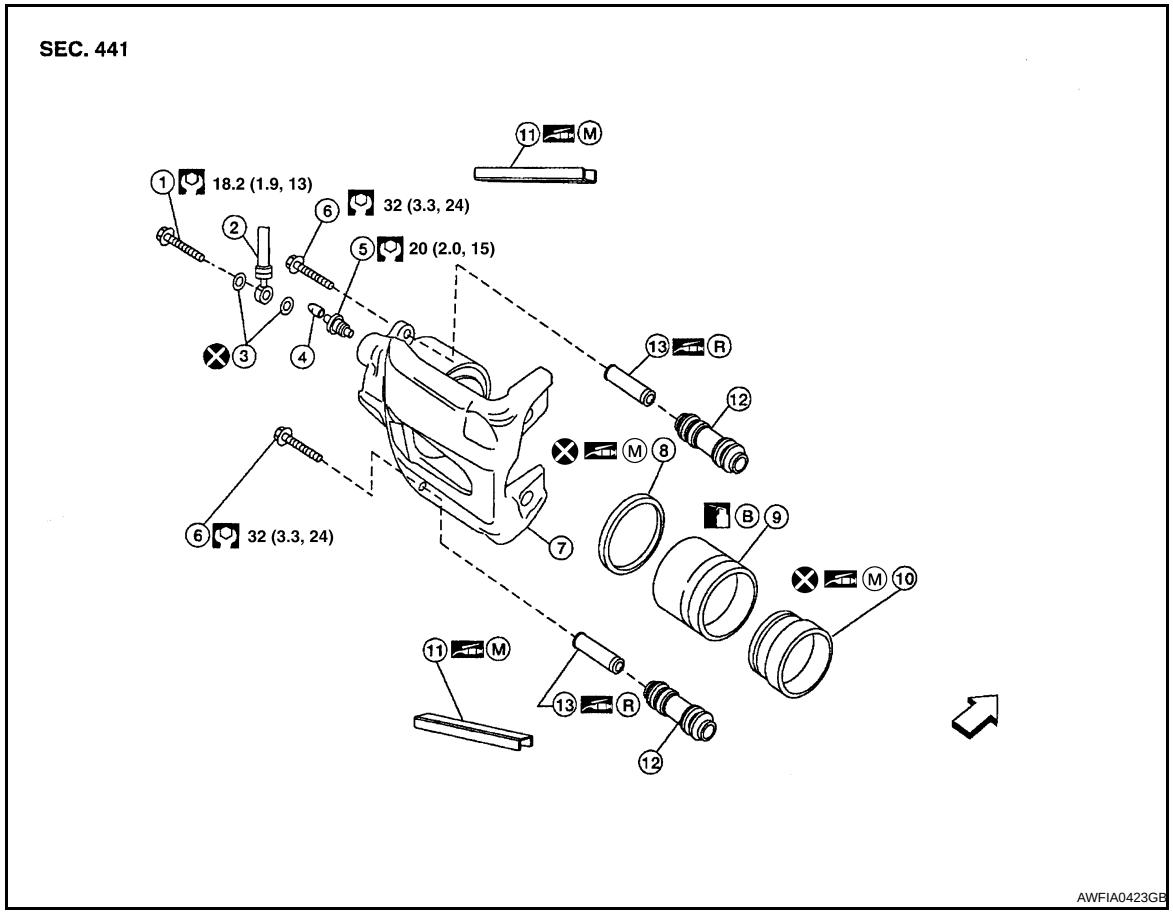


4. Insert into cylinder body by hand and insert piston boot piston-side lip into piston groove.
CAUTION:
Press pistons evenly and vary the pressing point to prevent cylinder inner wall from being rubbed.
5. Install new sliding pins, bushing and sliding pin boots to torque member.
6. Install cylinder body. Tighten sliding pin bolts to the specified torque.

REAR DISC BRAKE

Disassembly and Assembly

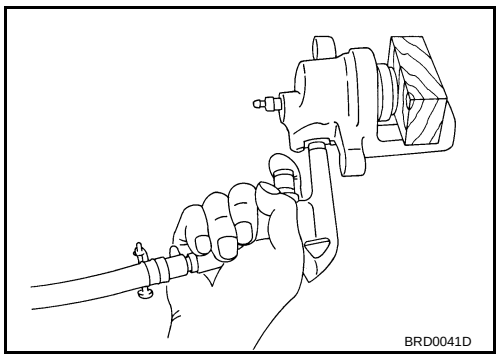
INFOID:0000000004024133



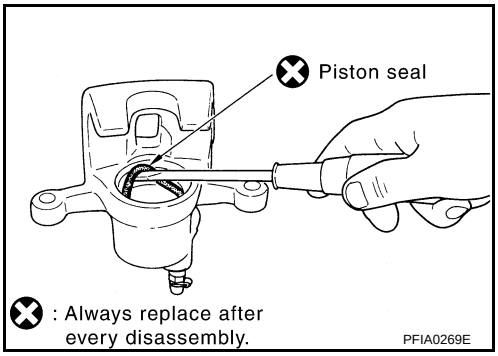
1. Union bolt
2. Brake hose
3. Copper washer
4. Cap
5. Bleed valve
6. Sliding pin bolt
7. Cylinder body
8. Piston seal
9. Piston
10. Piston boot
11. Knuckle slide
12. Sliding sleeve boot
13. Sliding sleeve
B. Brake fluid
R. Rubber grease
M. Molykote M-77
⇦ Front

DISASSEMBLY

1. Remove pads from cylinder body.
2. Remove sliding sleeve and boot from cylinder body.
3. Place a wooden block as shown, and blow air into union bolt hole to remove piston and piston boot.
   CAUTION:
   Do not get your fingers caught in piston.



4. Using a suitable tool, remove piston seal from cylinder body as shown.
   CAUTION:
   Be careful not to damage cylinder body inner wall.



CALIPER INSPECTION

Cylinder Body

Check inside surface of cylinder body for score, rust wear, damage or foreign materials. If any of the above conditions are observed, replace cylinder body.
Minor damage from rust or foreign materials may be eliminated by polishing surface with a fine emery paper. Replace cylinder body if necessary.

CAUTION:

- **Use new brake fluid to clean. Do not use mineral oils such as gasoline or kerosene.**

Torque Member

Check for wear, cracks, and damage. If damage or deformation is present, replace the affected part.

Piston

Check piston for score, rust, wear, damage or presence of foreign materials. Replace if any of the above conditions are observed.

CAUTION:

- **Piston sliding surface is plated, do not polish with emery paper even if rust of foreign materials are stuck to sliding surface.**

Sliding Pin Bolts and Sliding Pin Boots

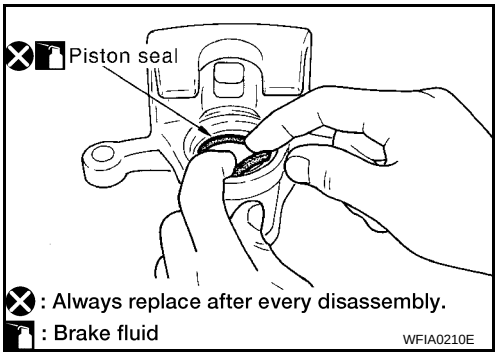
Make sure there is no wear, damage, or cracks in sliding sleeve and sliding sleeve boots, and if there are, replace them.

ASSEMBLY

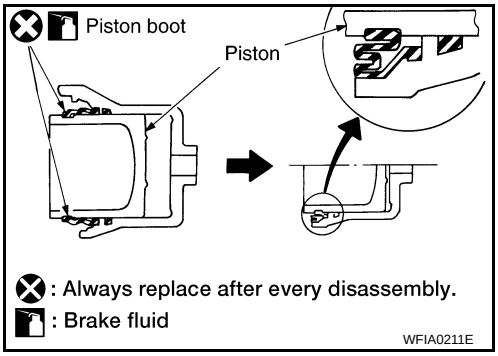
CAUTION:

Do not use NISSAN Rubber Grease (KRE00 00010, KRE00 00010 01) when assembling.

1. Apply clean brake fluid to new piston seal and insert in to groove on cylinder body.
   CAUTION:
   Do not reuse piston seal.



2. Apply clean brake fluid to piston and to piston boot, then install piston boot in to piston groove.
   CAUTION:
   Do not reuse piston boot.



3. Insert into cylinder body by hand and insert piston boot piston-side lip into piston groove.
   CAUTION:
   Press piston evenly and vary the pressing point to prevent cylinder body inner wall from being rubbed.
4. Apply rubber grease to sliding sleeves, then install sliding boots and sleeves to cylinder body.

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

General Specification

INFOID:0000000004181518

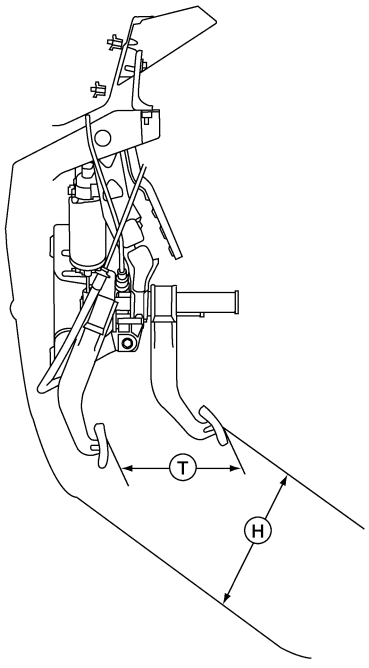
Unit: mm (in)

Front brake	Brake model	AD41VA
	Rotor outer diameter × thickness	350 x 30 (13.78 x 1.181)
	Pad Length × width × thickness	151.6 x 56.5 x 12.0 (5.97 x 2.22 x 0.476)
	Cylinder bore diameter	50.8 (2.00)
Rear brake	Brake model	AD14VE
	Rotor outer diameter × thickness	320 x 14 (12.60 x 0.551)
	Pad Length × width × thickness	83.0 x 33.0 x 12.0 (3.268 x 1.299 x 0.472)
	Cylinder bore diameter	48 (1.89)
Control valve	Valve model	Electric brake force distribution
Brake booster	Booster model	C215T
	Diaphragm diameter	215 (8.46)
Recommended brake fluid		Refer to MA-10, "Fluids and Lubricants"

Brake Pedal

INFOID:0000000004181519

Unit: mm (in)



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Pedal free height (H) with pedal in forward most position	182.3 - 192.3 (7.18 - 7.57)
Pedal travel (T)	153.3 (6.04)
Stop lamp switch and ASCD cancel switch threaded end to brake pedal bracket gap	0.74 - 1.96 (0.029 - 0.077)

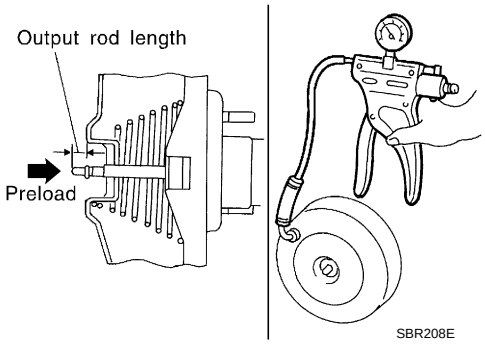
CAUTION:

When equipped with adjustable pedal, the pedal must be in the forward most position (closest to the floor) for pedal height adjustment.

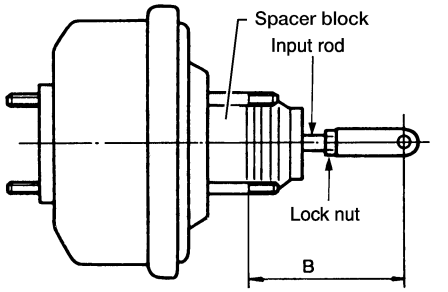
Brake Booster

INFOID:0000000004181520

Unit: mm (in)



Output rod length [at -66.7 kPa (-500 mmHg, -19.69 inHg) vacuum]	15.6 - 15.9 (0.614 - 0.626)



Input rod installation length (B)	151 (5.94)

Check Valve

INFOID:0000000004181521

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

Front Disc Brake

INFOID:0000000004181522

Unit: mm (in)

Brake model		AD41VA
Brake pad	Standard thickness (new)	12.0 (0.476)
	Repair limit thickness	1.0 (0.039)
Disc rotor	Standard thickness (new)	30 (1.181)
	Repair limit thickness	28 (1.102)
	Maximum uneven wear (measured at 8 positions)	0.015 (0.0006)
	Runout limit (with it attached to the vehicle)	0.03 (0.001)

Rear Disc Brake

INFOID:0000000004181523

Unit: mm (in)

Brake model		AD14VE
Brake pad	Standard thickness (new)	12.0 (0.472)
	Repair limit thickness	1.0 (0.039)

Brake model		AD14VE
Disc rotor	Standard thickness (new)	14.0 (0.551)
	Repair limit thickness	12.5 (0.492)
	Maximum uneven wear (measured at 8 positions)	0.015 (0.0006)
	Runout limit (with it attached to the vehicle)	0.05 (0.002)