SECTION BR

BRAKE SYSTEM

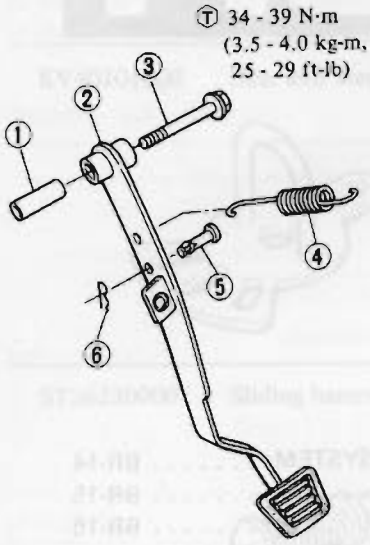
CONTENTS

Refer to Section MA (Brake System) for:

- CHECKING FOOT BRAKE
- CHECKING PARKING BRAKE

SERVICE BRAKE

BRAKE PEDAL



1 Collar
2 Brake pedal
3 Fulcrum bolt
4 Return spring
5 Clevis pin
6 Snap pin

SBR242

REMOVAL

1. Remove instrument lower cover and floor assist nozzle.
2. Remove snap pin and clevis pin and then separate Brake Booster operating rod from pedal.
3. Remove fulcrum bolt.

INSPECTION

Check brake pedal for the following items, servicing as necessary.

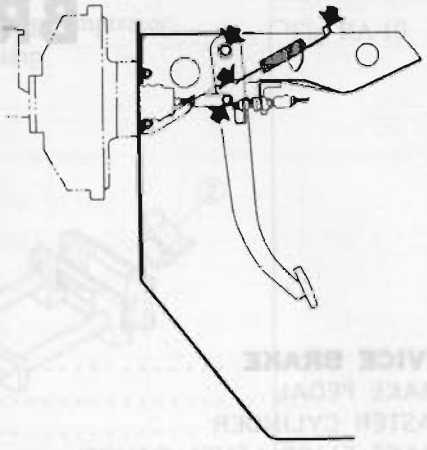
1. Check pedal bushing for wear, deformation or damage.
2. Check for bent brake pedal.
3. Check for fatigued return spring.

INSTALLATION

Install brake pedal in reverse order of removal, paying attention to the following:

Ⓣ : **Fulcrum bolt**
34 - 39 N·m
(3.5 - 4.0 kg-m,
25 - 29 ft-lb)

1. Apply sufficient amount of recommended multi-purpose grease to sliding contact surface and hook of return spring.

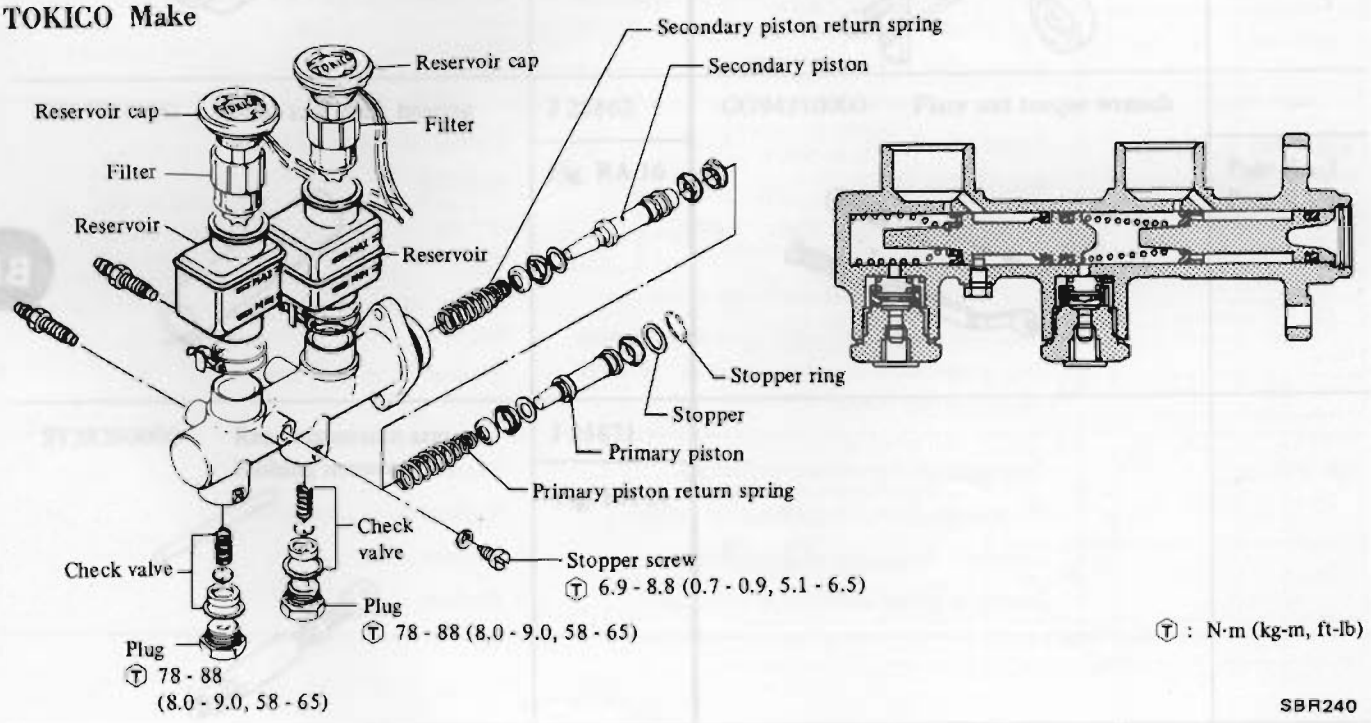


BR730

2. Adjust brake pedal, referring to Section MA.

MASTER CYLINDER

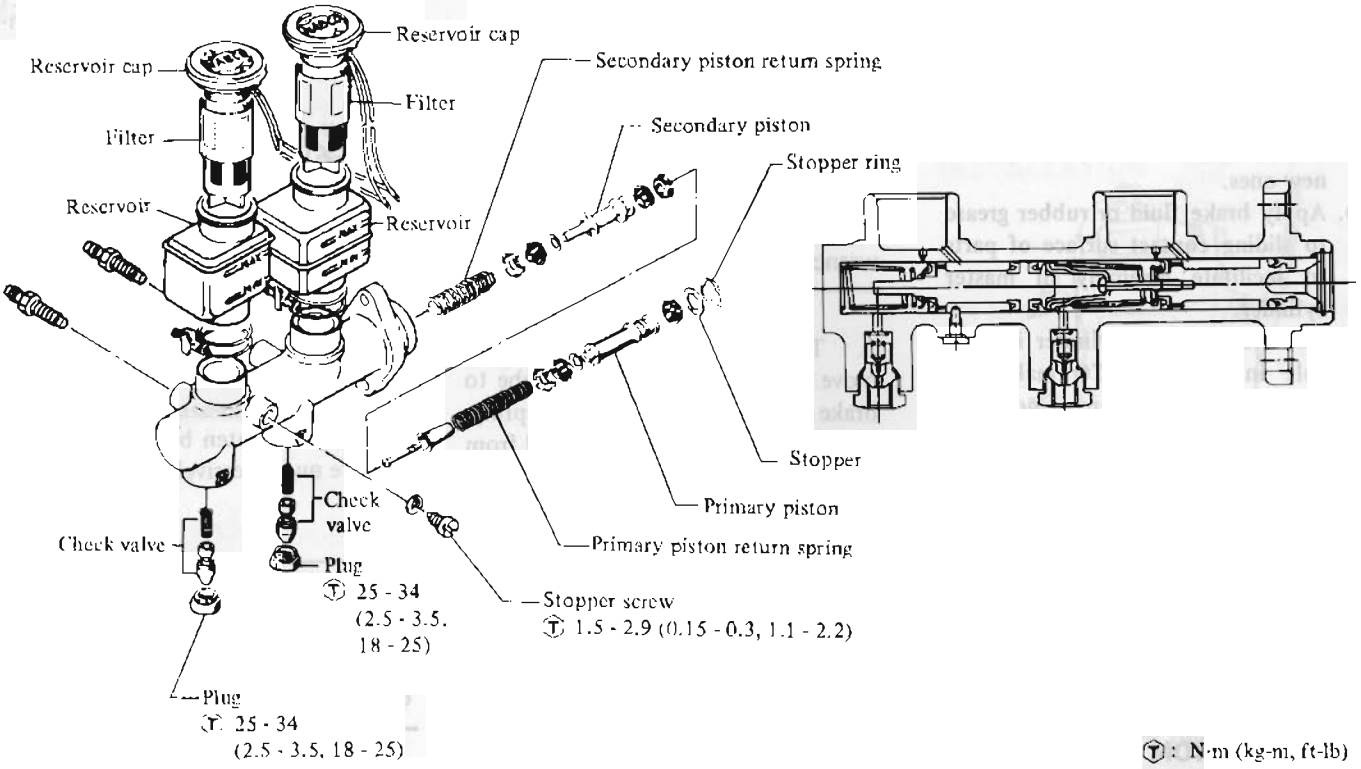
TOKICO Make



Ⓣ : N·m (kg-m, ft-lb)

SBR240

NABCO Make



: N·m (kg-m, ft-lb)

SBR241

REMOVAL

1. Remove heat shield plate.
2. Disconnect wiring to brake fluid level gauge.
3. Disconnect front and rear brake tubes from master cylinder.

CAUTION:
When removing brake tubes, use suitable tube wrench.
Never use open end or adjustable wrench.

Note: When disconnecting brake tubes, be sure to use a container to receive draining brake fluid. Use of rags is also suggested to keep adjacent parts and area clean.

4. Remove master cylinder securing nut. Master cylinder can then be taken out.

DISASSEMBLY

1. Remove reservoir caps and filters and drain out brake fluid.
2. Pry off stopper ring, using a screwdriver.
3. Remove stopper screw and take out stopper, primary piston assembly, spring, and secondary piston assembly, in the order shown.

Note: Discard caps if they are removed from piston assemblies and use new ones.

4. Unscrew plugs to gain access to check valve for disassembling.

Note: Do not remove or disassemble brake fluid level gauge.

INSPECTION

Thoroughly clean all parts in a suitable solvent and check them for wear or damage. Replace any part that is faulty.

CAUTION:
Use brake fluid to clean. Never use mineral oil.

1. Check cylinder and pistons for evidence of abnormal wear or damage. Replace if found faulty.
2. Check piston-to-cylinder clearance. If it exceeds the specified value, replace either piston or cylinder.

Piston-to-cylinder clearance:
Less than 0.15 mm (0.0059 in)

3. Check springs for weakness, fatigue or damage. Replace if necessary.
4. When master cylinder is disassembled, be sure to discard caps and valves. Replace any other parts which show evidence of deformation, wear or other damage.
5. Replace damaged oil reservoirs and caps.

ASSEMBLY

Assemble master cylinder following the reverse procedure of disassembly, paying particular attention to the following note:

Note:

a. Replace gaskets and packing with new ones.
b. Apply brake fluid or rubber grease to sliding contact surface of parts to facilitate assembly of master cylinder.
c. The brake master cylinder is available in both NABCO make and TOKICO make. There is no interchangeability of repair kits or component parts between NABCO and TOKICO makes.
   When replacing the repair kit or component parts, ascertain the brand of the brake master cylinder body. Be sure to use parts of the same make as the former ones.

INSTALLATION

Install master cylinder following the reverse procedure of removal.

After installation, bleed brake system.

CAUTION:
When installing brake tubes, use Flare Nut Torque Wrench GG94310000.

Ⓣ : **Brake master cylinder securing nut**
7.8 - 10.8 N·m
(0.8 - 1.1 kg-m,
5.8 - 8.0 ft-lb)
Brake tube flare nut
15 - 18 N·m
(1.5 - 1.8 kg-m,
11 - 13 ft-lb)

BRAKE FLUID LEVEL GAUGE

INSPECTION

1. Disengage hand brake control lever.
2. Raise cap and make sure that brake warning lamp goes on when float comes into contact with stopper.

BRAKE LINE

REMOVAL

1. Remove flare nuts on both ends, and remove retainers and clips.

CAUTION:
When removing brake tubes and hoses, use suitable tube wrench. Never use open end or adjustable wrench.

2. To remove brake hose, first remove flare nut securing brake tube to brake hose and withdraw lock spring. End of hose can then be removed from bracket. Next remove brake hose. Do not twist brake hose.

INSPECTION

Check brake lines (tubes and hoses) for evidence of cracks, deterioration or other damage. Replace any faulty parts.

If leakage occurs at end around joints, re-tighten or, if necessary, replace faulty parts.

INSTALLATION

Pay particular attention to following instructions when installing brake lines.

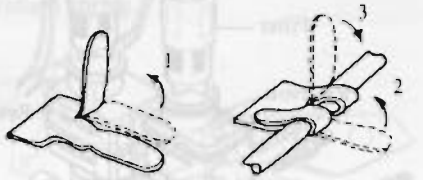
1. Leave a sufficient space between brake lines and adjacent parts so that brake lines are completely free from vibration during driving.
2. Be careful not to warp or twist.
3. When installing brake tube, keep a certain distance between tube and adjacent parts as follows:

- **Tube to rotating parts**
  More than 10 mm (0.39 in)
- **Tube to other parts**
  More than 5 mm (0.20 in)

4. Always fasten brake tubes with mounting clips where necessary.

On rear suspension arm, there are two double clips which should be used to secure brake tubes in manner described below.

Bend short clip straight up. With brake tube on long clip, bend clip up and around tube. Finally, wrap short clip around tube to secure the installation.



BR141

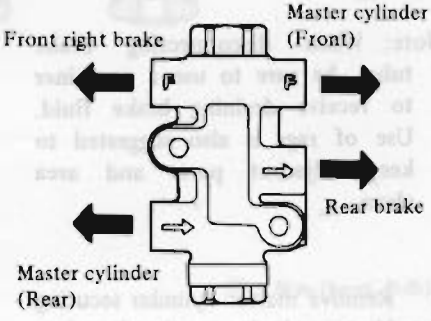
5. Do not tighten brake line mounting flare nut excessively.

CAUTION:
When installing brake tubes, use Flare Nut Torque Wrench GG94310000.

Ⓣ : **Brake tube flare nut**
15 - 18 N·m
(1.5 - 1.8 kg-m,
11 - 13 ft-lb)
Brake hose connector
17 - 20 N·m
(1.7 - 2.0 kg-m,
12 - 14 ft-lb)

6. Upon completion of installation of brake lines, bleed air out of brake lines.

NP-VALVE



BR163A

REMOVAL AND INSTALLATION

1. Remove flare nuts.

CAUTION:
When removing brake tube, use suitable tube wrench. Never use open end or adjustable wrench.

2. Remove NP-valve retaining bolts, and remove NP-valve.

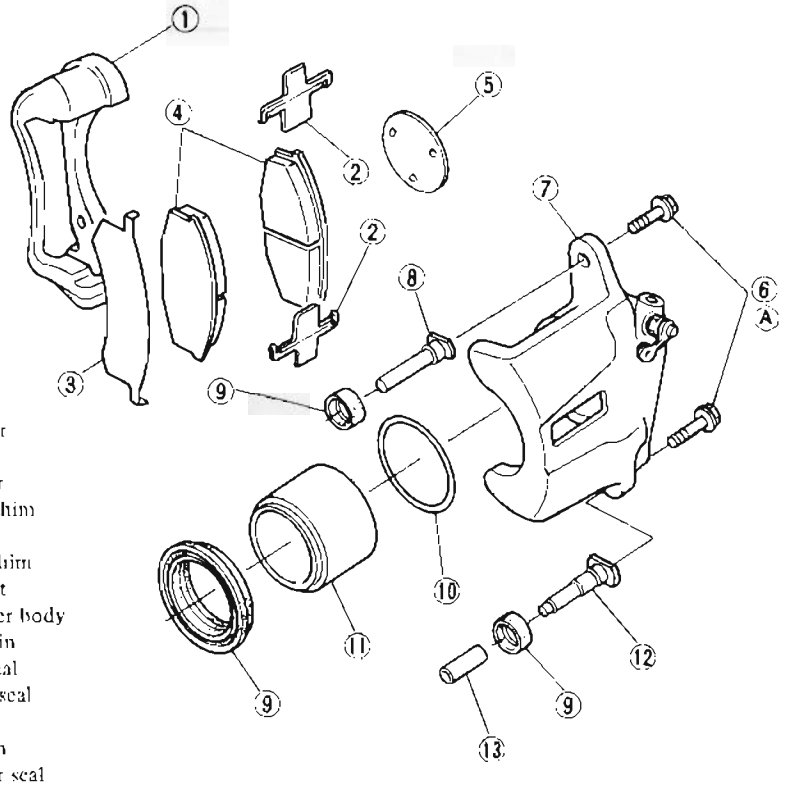
Note: Do not disassemble NP-valve.

3. Installation is in the reverse order of removal.

CAUTION:
When installing brake tube, use Flare Nut Torque Wrench GG94310000.

Ⓣ : Flared nut
15 - 18 N·m
(1.5 - 1.8 kg-m,
11 - 13 ft-lb)
NP-valve attaching bolt
5.9 - 6.9 N·m
(0.6 - 0.7 kg-m,
4.3 - 5.1 ft-lb)

FRONT DISC BRAKE



1 Torque member
2 Pad retainer
3 Outer shim
4 Pad
5 Inner shim
6 Pin bolt
7 Cylinder body
8 Main pin
9 Dust seal
10 Piston seal
11 Piston
12 Sub pin
13 Rubber seal

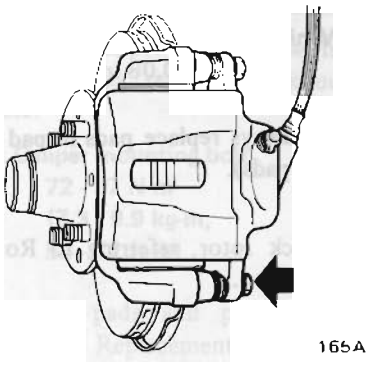
Tightening torque N·m (kg-m, ft-lb)
Ⓐ : 22 - 31 (2.2 - 3.2, 16 - 23)

BR164A

PAD REPLACEMENT

Removal

1. Jack up front of car, and support it on safety stands. Remove wheel.
2. Remove lower pin bolt.

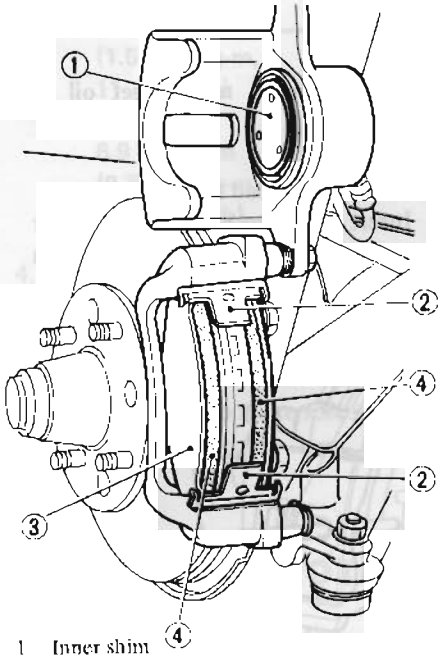


165A

3. Open cylinder body upward and remove pad retainer ②, and inner and outer shims ① & ③.

Note: **Do not pull out cylinder body in axial direction (direction of pin guide).**

4. Detach pads.



1 Inner shim
2 Pad retainer
3 Outer shim
4 Pads

BR166A

CAUTION:
After removing pads, do not depress brake pedal, or pistons will jump out.

Inspection

1. When pads are heavily fouled with oil or grease or when pad is deteriorated or deformed, replace it.
2. If pad is worn to less than the specified value, replace.

Pad wear limit
(Minimum thickness):
2 mm (0.08 in)

Note: Always replace pads in pad kit (four pads).

3. Check rotor, referring to Rotor for inspection.

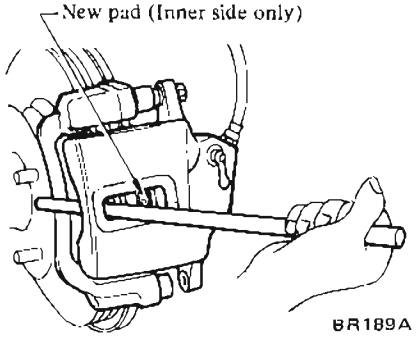
Installation

1. Clean piston end and surroundings of pin bolts.

CAUTION:
Use brake fluid to clean. Never use mineral oil.

Note: Be careful not to get oil on rotor.

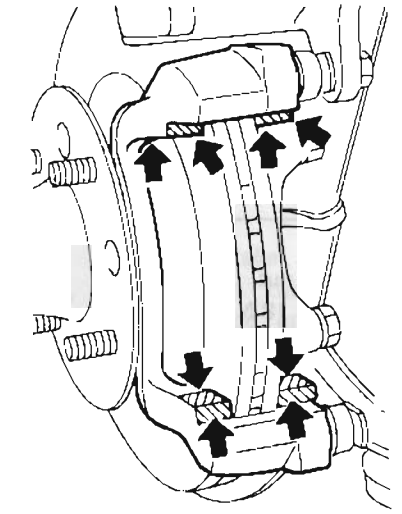
2. Install new pad (inner side).
Insert lever into opening in cylinder body as shown below and push piston by catching torque member.



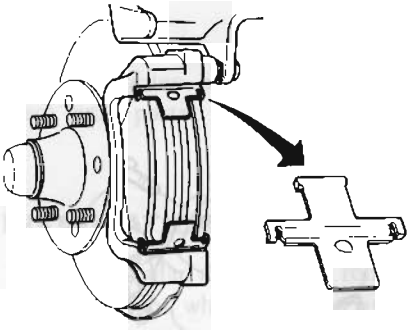
BR189A

3. Coat the following point with recommended brake grease.
- Torque member-to-pad clearance

Note: Do not grease friction face of pad.


: Greasing point
BR167A

4. Install new pad (outer side), and inner and outer shims.
5. After installing pads, install pad retainer, being careful not to fit it upside down.


BR168A

6. Install cylinder body and then tighten lower pin bolt.

Ⓣ: Pin bolt
22 - 31 N·m
(2.2 - 3.2 kg-m,
16 - 23 ft-lb)

7. Depress brake pedal several times, and pads will settle into proper position.
8. Install wheels and lower car to ground.

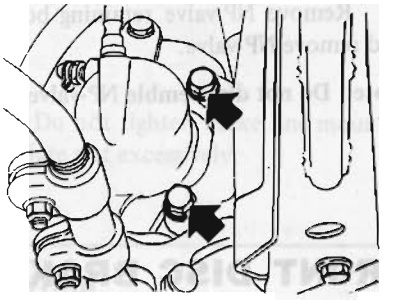
REMOVAL

1. Jack up front of car, and support it on safety stands. Remove wheel.
2. Remove front brake hose.

CAUTION:
When removing brake tube, use suitable tube wrench. Never use open-end or adjustable wrench.

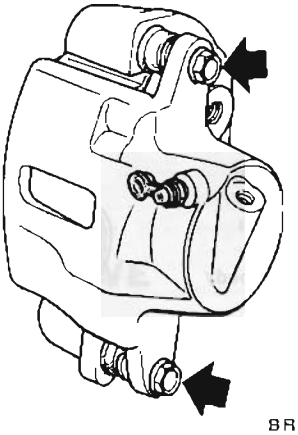
Note: Plug up hole in caliper and brake tube so that brake fluid does not flow out.

3. Remove caliper assembly from knuckle spindle.


BR169A

DISASSEMBLY

1. Drain brake fluid from cylinder body.
2. Wipe off dust and mud from caliper assembly.
3. Remove pin bolts.


BR170A

4. Separate cylinder body and torque member.
5. Remove pad retainers and pads.
6. Force out pistons with dust seal from cylinder by feeding compressed air gradually.

WARNING:
Gradually increase air pressure so that piston does not pop out.

7. Remove piston seals.

CAUTION:
Be careful not to damage seals and cylinder body.

8. If necessary, remove sub pin, main pin and dust seals.

INSPECTION

Clean all parts and check as follows:

CAUTION:
Use brake fluid to clean. Never use mineral oil.

Cylinder body

1. Check inside surface of cylinder for score, rust, wear, damage or presence of foreign substances. If any surface fault is detected, replace cylinder body.
2. Minor damage from rust of foreign substances may be eliminated by polishing surface with a fine emery cloth. If damage is major, cylinder assembly must be replaced.

Torque member

Check for wear, cracks or other damage. Replace if any fault is detected.

Piston

Check piston for score, rust, wear, damage or presence of foreign substances. Replace if any fault is detected.

CAUTION:
Piston sliding surface is plated. Do not polish with emery paper even if rust or foreign matter is sticked on sliding surface.

Piston seal and dust seal

Replace piston seal and dust seal at each disassembly.

Main pin, sub pin and rubber bushing

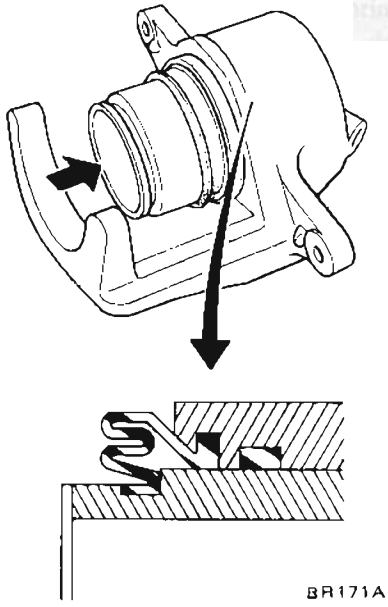
Check for wear, cracks or other damage. Replace if any fault is detected.

ASSEMBLY

Assemble front brake in reverse order of disassembly, closely observing the following:

1. Install piston seals, taking care not to damage them.
2. Apply brake fluid to sliding portions of piston, inside of cylinder body.
3. With dust seal fitted to piston, insert dust seal into groove in cylinder body and install piston. Then securely fit dust seal.

Note: Apply rubber grease to inside of dust seal.



4. Coat the following part with recommended brake grease.
- Torque member-to-pad clearance.

5. Apply a coat of recommended multi-purpose grease to main pin rubber bushing and to sub pin.
6. Tighten pin bolts.

Ⓣ : **Pin bolts**
22 - 31 N·m
(2.2 - 3.2 kg-m,
16 - 23 ft-lb)

INSTALLATION

1. Install caliper assembly without pads and pad retainer to knuckle spindle.

Ⓣ : **Caliper mounting bolt**
72 - 97 N·m
(7.3 - 9.9 kg-m,
53 - 72 ft-lb)

2. Install pads and pad retainer. Refer to Pad Replacement.
3. Install front brake hose and bleed brake system.

CAUTION:
When installing brake tubes, use Flare Nut Torque Wrench GG94310000.

Ⓣ : **Brake tube flare nut**
15 - 18 N·m
(1.5 - 1.8 kg-m,
11 - 13 ft-lb)
Air bleeder
6.9 - 8.8 N·m
(0.7 - 0.9 kg-m,
5.1 - 6.5 ft-lb)

4. After installing, see if there is no leak by depressing brake pedal several times.

Note: **Turn rotor to make sure it does not drag excessively.**

FRONT DISC ROTOR

REMOVAL

Refer to Removal (Section FA).

INSPECTION

Check the following items and, if necessary, replace. Checks can be made by removing only wheel.

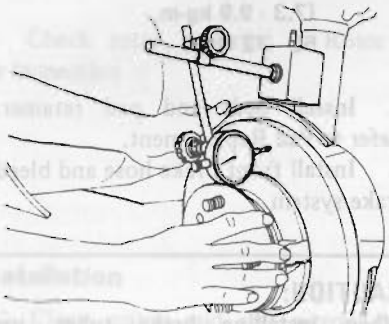
1. Sliding surface

If there are cracks or considerable chips, replace.

2. Runout

Adjust wheel bearing correctly. Using a dial gauge, measure runout.

Runout limit:
Total indicator reading
Less than 0.10 mm (0.0039 in)
at center of rotor pad contact surface

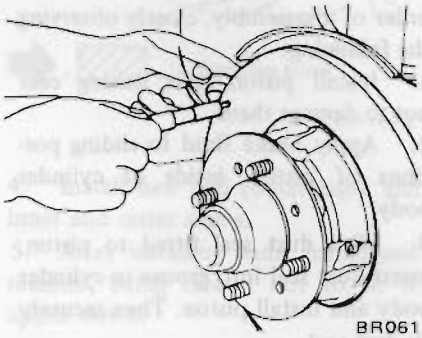

BR025A

3. Parallelism

Measure thickness of rotor in circumferential direction, using a micrometer.

Parallelism:
Circumferential direction
Less than
0.03 mm (0.0012 in)

Note: As this value increases (wear occurs progressively), vibration corresponding to revolution of tire may often be transmitted to interior of car.


BR061

4. Thickness

If rotor thickness is beyond wear limit, replace rotor. When correcting thickness, be sure that the thickness after correction does not exceed the limit.

Standard thickness:
20.0 mm (0.787 in)
Wear limit (Minimum thickness):
18.0 mm (0.709 in)

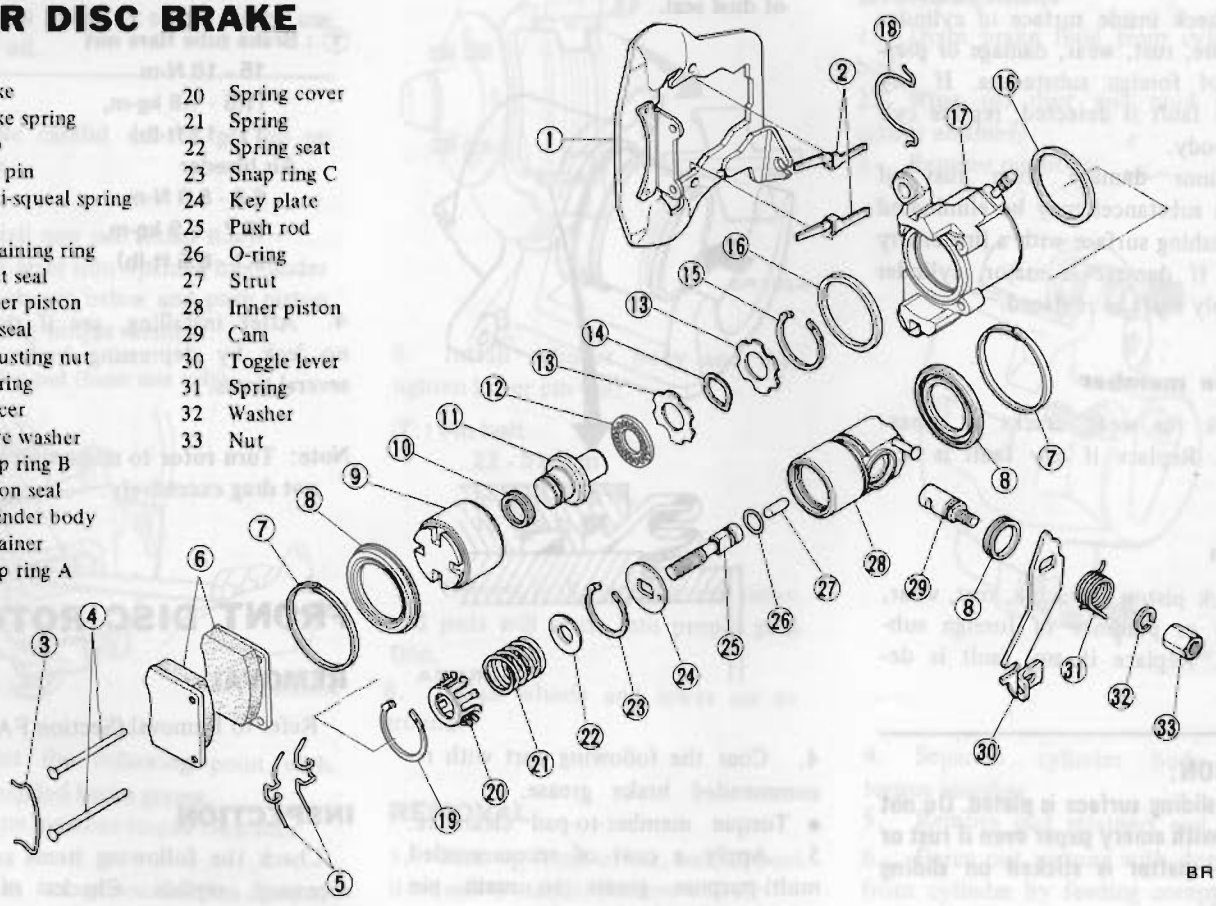
INSTALLATION

Install rotor in reverse order of removal. Adjust wheel bearing preload correctly. Refer to Adjustment (Section MA).

(T) : Rotor to wheel hub
54 - 74 N·m
(5.5 - 7.5 kg-m,
40 - 54 ft-lb)

REAR DISC BRAKE

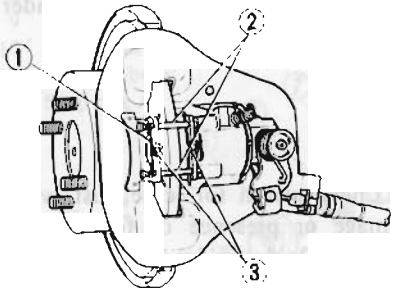
1 Yoke
2 Yoke spring
3 Clip
4 Pad pin
5 Anti-squeal spring
6 Pad
7 Retaining ring
8 Dust seal
9 Outer piston
10 Oil seal
11 Adjusting nut
12 Bearing
13 Spacer
14 Wave washer
15 Snap ring B
16 Piston seal
17 Cylinder body
18 Retainer
19 Snap ring A
20 Spring cover
21 Spring
22 Spring seat
23 Snap ring C
24 Key plate
25 Push rod
26 O-ring
27 Strut
28 Inner piston
29 Cam
30 Toggle lever
31 Spring
32 Washer
33 Nut


BR172A

PAD REPLACEMENT

Removal

1. Jack up rear of car, and support it on safety stands. Remove wheel.
2. Remove clip ①.
3. Remove pad pins ② holding anti-squeal springs ③ with finger.
4. Detach pads.



BR094A

CAUTION:
After removing pads, do not depress brake pedal, or pistons will jump out.

Inspection

1. Clean pads with cleaning solvent.
2. When pads are heavily fouled with oil or grease or when pad is deteriorated or deformed, replace it.
3. If pad is worn to less than the specified value, replace.

Pad wear limit
(Minimum thickness):
2 mm (0.08 in)

Note: Always replace pads in pad kit (four pads).

4. Check rotor, referring to Rotor for inspection.

Installation

1. Clean piston end.

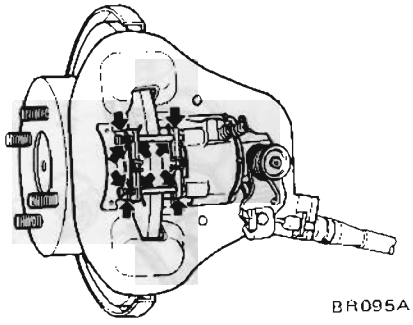
CAUTION:
Use brake fluid to clean. Never use mineral oil.

Note: Be careful not to get oil on rotor.

2.
(1) Coat the following points with recommended brake grease.

- Cylinder body-to-pad clearance
- Yoke-to-pad clearance
- Pad pin-to-pad clearance
- Pad pin-to-bracket clearance

Note: Do not grease friction face of pad.



BR095A

Greasing Points

(2) Check that the following points are coated with silicone based grease. Nissan silicone based grease or equivalent.

Silicone based greasing points:

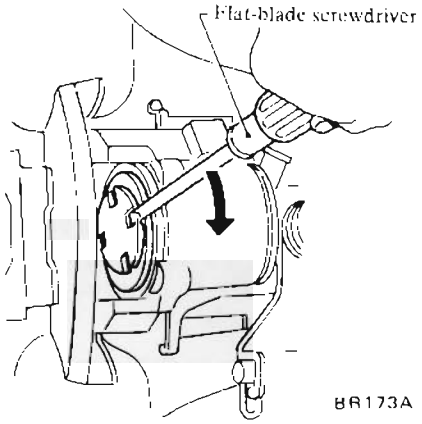
- Friction surface of yoke and cylinder body.
- Cylinder body pad pin hole.

3. When installing new pad, bring piston and yoke into position determined by wear on old pad as follows:

- Turn outer piston clockwise with a suitable driver until it retracts into cylinder body.

CAUTION:
Turn outer piston, being careful not to damage dust seal.

Note: While pushing outer piston, turn it clockwise.

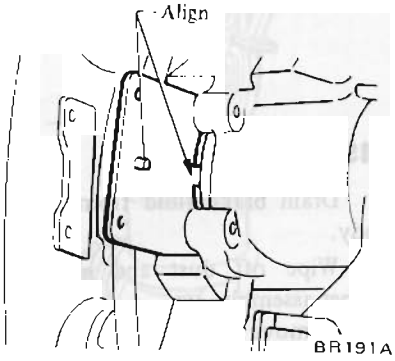


BR173A

- With a lever placed between rotor and yoke, move yoke until clearances to install brake pads are equal.

4. After installing pads, install anti-squeal spring and pad pin, and fix with clip.

Note: Position outer piston so that portion of cutout is level and install pad by aligning this portion with protrusion at back of pad.



BR191A

5. Depress brake pedal few times to adjust brake pad-to-rotor clearance. Clearance is correct if brake pedal stroke is constant.

Add brake fluid to reservoir tank of master cylinder.

6. Install wheels and lower car to ground.

REMOVAL

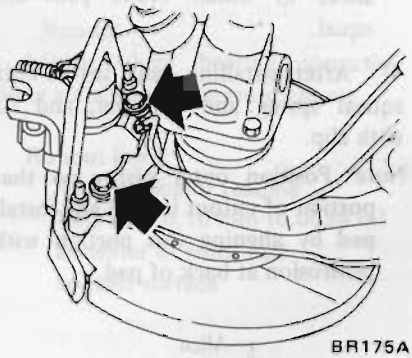
1. Disconnect brake tube from caliper assembly.

CAUTION:
When removing brake tube, use suitable tube wrench. Never use open-end or adjustable wrench.

Note: Plug up hole in caliper and brake tube so that brake fluid does not flow out.

2. Disconnect hand brake cable.

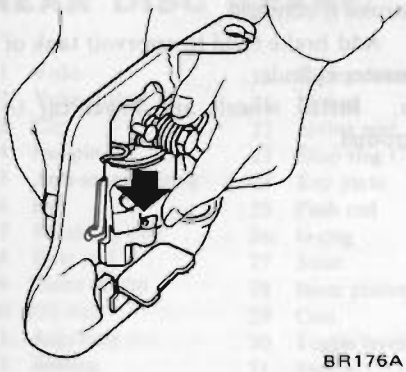
3. Remove caliper mounting bolts and caliper assembly.



BR175A

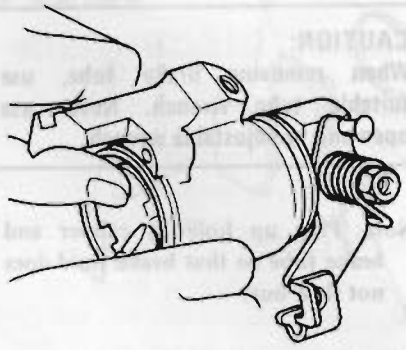
DISASSEMBLY

1. Drain brake fluid from cylinder body.
2. Wipe off dust and mud from caliper assembly.
3. Remove pads. Refer to Pad Replacement.
4. Stand yoke on a work bench. Push in cylinder body to separate it and yoke.



BR176A

5. Remove retaining rings and dust seals from end of both pistons.
6. Push in outer piston to drive out piston assembly.

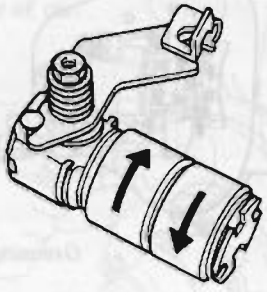


BR177A

7. Remove piston seals.

CAUTION:
Be careful not to damage cylinder body.

8. Remove yoke spring from yoke.
9. Disengage piston assembly by turning inner and outer pistons counterclockwise.



BR178A

10. Disassemble outer piston.
(1) Remove snap ring B.
(2) Disassemble adjusting nut, ball bearing, spacers and wave washer.
11. Disassemble inner piston.
(1) Remove snap ring A and then disassemble spring cover, spring and spring seat.
(2) Remove snap ring C and then disassemble key plate, push rod and strut.
(3) While holding hand brake toggle lever in a vise, remove return spring and nut, and then remove lever.
(4) Remove dust seal and cam.

INSPECTION

Clean all parts and check as follows:

CAUTION:
Use brake fluid to clean. Never use mineral oil.

Cylinder body

1. Check inside surface of cylinder for score, rust, wear, damage or presence of foreign substances. If any surface fault is detected, replace cylinder body.
2. Minor damage from rust of foreign substances may be eliminated by polishing surface with a fine emery cloth. If damage is major, cylinder assembly must be replaced.

Piston

Check piston for score, rust, wear, damage or presence of foreign substances. Replace if any fault is detected.

CAUTION:
Piston sliding surface is plated. Do not polish with emery paper even if rust or foreign matter is sticked on sliding surface.

Yoke

Check for wear, cracks or other damage. Replace if any fault is detected.

Piston seal and dust seal

Replace piston seal and dust seal at each disassembly.

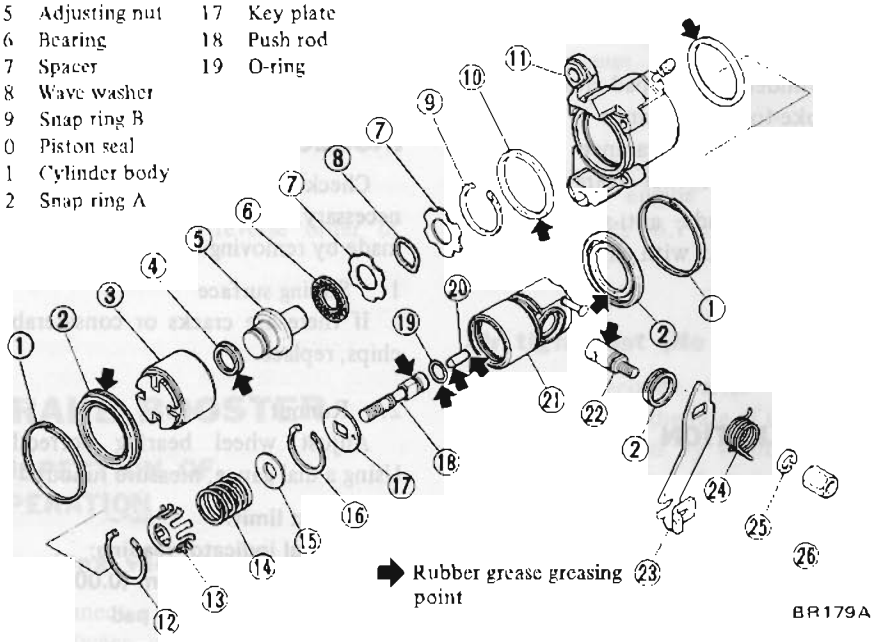
Adjusting nut oil seal and push rod O-ring

Replace at each disassembly.

ASSEMBLY

Piston assembly

1 Retaining ring
2 Dust seal
3 Outer piston
4 Oil seal
5 Adjusting nut
6 Bearing
7 Spacer
8 Wave washer
9 Snap ring B
10 Piston seal
11 Cylinder body
12 Snap ring A
13 Spring cover
14 Spring
15 Spring seat
16 Snap ring C
17 Key plate
18 Push rod
19 O-ring
20 Strut
21 Inner piston
22 Cam
23 Toggle lever
24 Spring
25 Washer
26 Nut



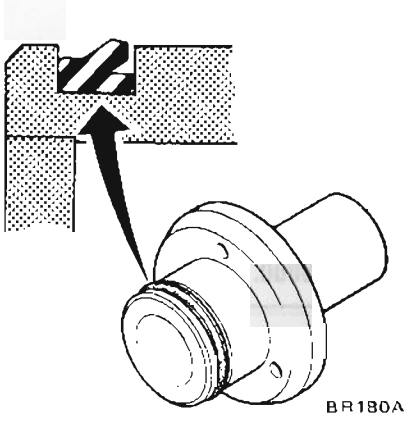
BR179A

Assemble piston assembly in the reverse procedure of disassembly, paying particular attention to the following:

1. Before assembling, apply thin coat of rubber grease to the following:
- Groove in push rod and new O-ring
- Strut ends
- Oil seal
- Piston seal
- Inside of dust seal
- Cam

CAUTION:
a. Securely install oil seal in specified direction.
b. Be careful not to excessively open or twist O-ring.

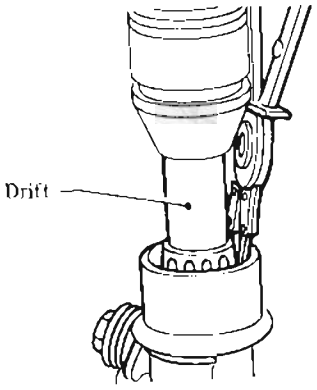
Note: Replace oil seals and dust seal with new ones.



BR180A

2. Securely fit strut in hole in cam.
3. Engage square hole in key plate with push rod. Also engage convex in key plate in concave in piston.
4. Fit snap ring in groove securely.
5. Install spring seat, spring, spring cover and snap ring A with suitable press and drift.

CAUTION:
a. Be careful not to deform spring cover.
b. Take care not to push spring cover excessively.

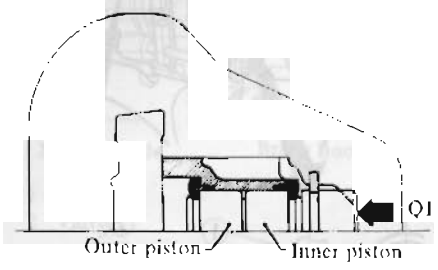


BR190A

6. When installing hand brake toggle lever after assembling piston, turn cam in direction hand brake operates.

T : Toggle lever nut
25 - 29 N·m
(2.5 - 3.0 kg-m,
18 - 22 ft-lb)

Caliper assembly



BR191A

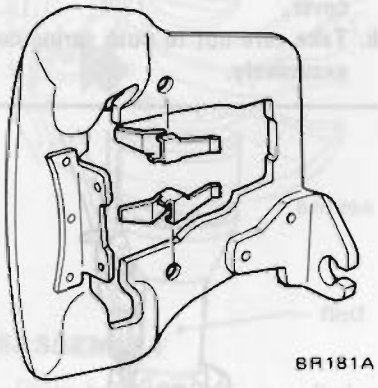
1. Install piston seals, taking care not to damage them.
2. Apply rubber grease or brake fluid to sliding portions of piston, and inside of cylinder.
3. Insert outer and inner pistons into cylinder body.

Note: Insert inner piston and outer piston assembly in direction shown by arrow Q1.

4. Clamp dust seals with retainer rings.

Note: Replace dust seals with new ones.

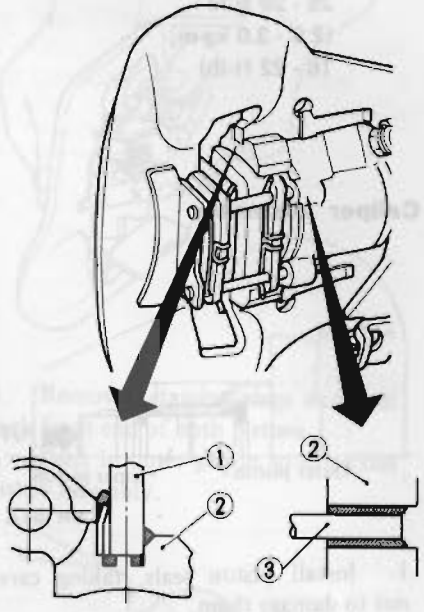
5. Install yoke spring on yoke.



6. Coat the following points with silicone based grease.

- Frictional surfaces of yoke and cylinder body
- Cylinder body pad pin hole

Note: Silicone based grease is contained in seal kit of disc brake.



: Silicone based greasing point

1 Yoke
2 Cylinder body
3 Pad pin

BR182A

Silicone Based Greasing Points

7. Assemble yoke and cylinder with retainer.

Note:

a. Engage cutout portion of inner piston with yoke.

b. Securely fit retainer into groove in piston.

8. Coat the following points with recommended brake grease.

- Cylinder body-to-pad clearance
- Yoke-to-pad clearance
- Pad pin-to-pad clearance
- Pad pin-to-bracket clearance

9. Install pads, anti-squeal springs, pad pins and fix with clip.

INSTALLATION

1. Install caliper assembly to rear suspension arm.

Ⓣ : Caliper mounting bolt
38 - 52 N·m
(3.9 - 5.3 kg-m,
28 - 38 ft-lb)

2. Connect hand brake cable.
3. Connect brake tube and bleed brake system.

CAUTION:
When installing brake tubes, use Flare Nut Torque Wrench GG94310000.

Ⓣ : Brake tube flare nut
15 - 18 N·m
(1.5 - 1.8 kg-m,
11 - 13 ft-lb)
Air bleeder
6.9 - 8.8 N·m
(0.7 - 0.9 kg-m,
5.1 - 6.5 ft-lb)

4. After installation, depress brake pedal few times to properly adjust brake pad-to-rotor clearance, and check for oil leakage. When brake pedal stroke is constant, brake pad-to-rotor clearance is properly adjusted. It will automatically be adjusted by depressing brake pedal.

Note: Turn rotor to make sure it does not excessively drag.

REAR DISC ROTOR

REMOVAL

Remove caliper and rotor can be taken out.

Refer to Rear Disc Brake for removal.

INSPECTION

Check the following items and, if necessary, replace. Checks can be made by removing only wheel.

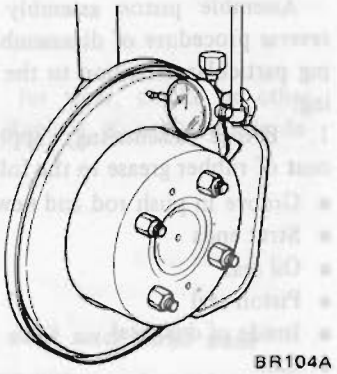
1. Sliding surface

If there are cracks or considerable chips, replace.

2. Runout

Adjust wheel bearing correctly. Using a dial gauge, measure runout.

Runout limit:
Total indicator reading;
Less than 0.15 mm (0.0059 in)
at center of rotor pad
contact surface



3. Parallelism

Measure thickness of rotor in circumferential direction, using a micrometer.

Parallelism:
Circumferential direction;
Less than 0.03 mm (0.0012 in)

Note: As this value increases (wear occurs progressively), vibration corresponding to revolution of tire may often be transmitted to interior of car.

4. Thickness

If rotor thickness is beyond wear limit, replace rotor. When correcting thickness, be sure that the thickness after correction does not exceed the limit.

Standard thickness:
9.6 mm (0.378 in)
Wear limit (Minimum thickness):
8.6 mm (0.339 in)

INSTALLATION

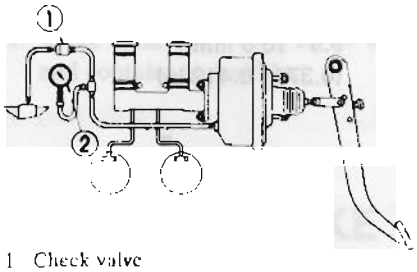
Install rotor in reverse order of removal.

BRAKE BOOSTER

INSPECTION OF OPERATION

Checking vacuum pressure

1. Connect a vacuum gauge, in the line, between check valve and Brake Booster.



1 Check valve
2 Vacuum gauge

BR942

2. Start engine and increase engine speed. Stop engine when vacuum gauge indicates 66.7 kPa (500 mmHg, 19.69 inHg).

Air tight test (No load)

Fifteen seconds after engine is stopped, observe the rate of drop in air pressure registered by vacuum gauge. If vacuum pressure drops more than the specified value, refer to the following chart to determine the cause of failure.

Maximum vacuum leakage:
3.3 kPa
(25 mmHg, 0.98 inHg)

Probable cause	Corrective action
1. Air leakage at check valve.	Replace check valve.
2. Air leakage at push rod seal.	Replace Brake Booster as an assembly.
3. Air leakage between valve body and seal.	
4. Air leakage at valve plunger seat.	
5. Damaged piping or joints.	Repair or replace.

Air tight test (Under load)

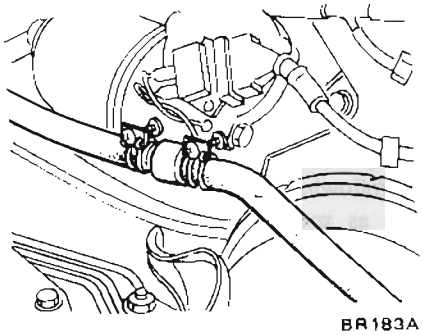
Fifteen seconds after engine is stopped and brake fully applied, observe the rate of drop in air pressure registered by vacuum gauge. If vacuum pressure drops more than the specified value, refer to the following chart to determine the cause of failure.

Maximum vacuum leakage:
3.3 kPa
(25 mmHg, 0.98 inHg)

Probable cause	Corrective action
1. Air leakage at check valve.	Replace check valve.
2. Damaged diaphragm.	Replace Brake Booster as an assembly.
3. Reaction disc dropped off. (Brake Booster)	
4. Air leakage at poppet assembly seat and valve body.	

Inspecting check valve

1. Remove clip and disconnect hoses at connections. The check valve can now be removed.



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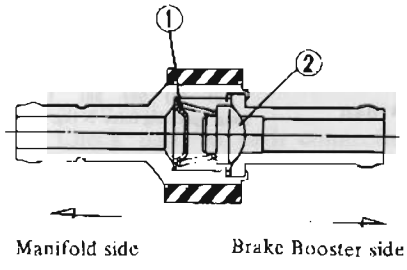
2. Using a Brake Booster tester, apply a vacuum pressure of 26.7 kPa (200 mmHg, 7.87 inHg) to the port of check valve on the Brake Booster side. If vacuum pressure drops more than the specified value in 15 seconds, replace check valve with a new one.

Maximum vacuum leakage of check valve:
1.3 kPa
(10 mmHg, 0.39 inHg)

3. When vacuum pressure is applied to the Brake Booster side of check valve and valve does not open, replace check valve with a new one.



1 Spring
2 Valve

BR953

4. When installing check valve, be careful to avoid incorrect connections.

Operating test

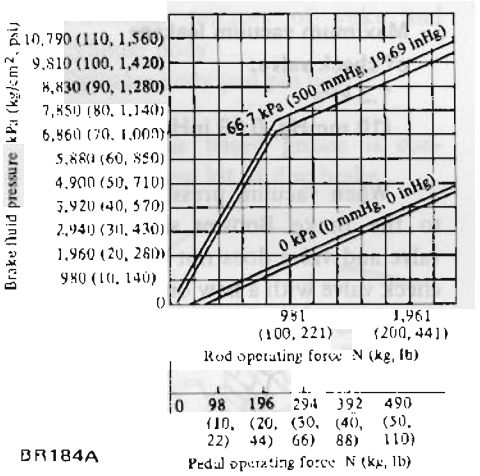
1. Connect an oil pressure gauge to brake line, at connection on master cylinder.
2. Install a pedal force gauge on brake pedal.

3. Start engine, and increase engine speed until a vacuum pressure of 66.7 kPa (500 mmHg, 19.69 inHg) is registered on vacuum pressure gauge. With a steady vacuum pressure of 66.7 kPa (500 mmHg, 19.69 inHg), measure oil pressure with respect to each pedal operating force.

Relationship between oil pressure and pedal operating force is illustrated in following chart. If test results are not as specified in following chart, check Brake Booster for condition in manner described under "Inspection" before removal of this unit.

Also check brake line for evidence of fluid leakage.

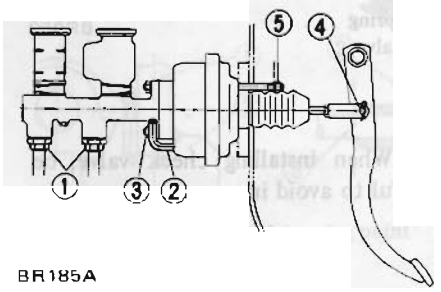
Note: Determine whether source of problem is in Brake Booster or check valve. Before you reach a final conclusion, always inspect check valve first.



BR184A

REMOVAL

Remove parts in numerical order enumerated.

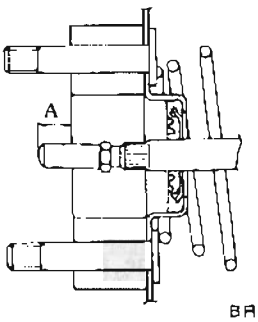


BR185A

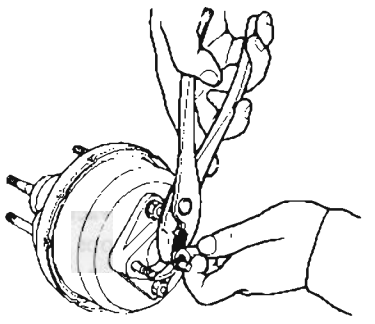
ADJUSTMENT

1. Adjust the length of push rod to the value indicated below. Length adjustment of push rod is made at the tip of push rod.

Length "A":
9.5 - 10.5 mm
(0.374 - 0.413 in)



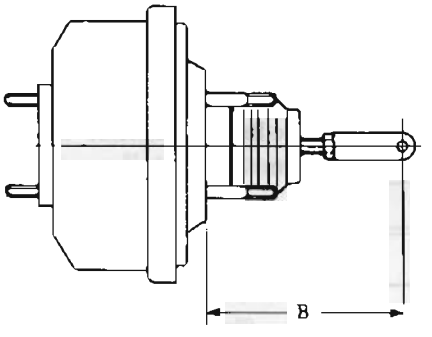
BR109A



BR288

2. Install clevis. Adjust length of operating rod to specified value.

Length "B":
143 mm (5.63 in)



BR110A

INSTALLATION

Install in the reverse sequence of removal.

Ⓣ : Master cylinder to Brake Booster
7.8 - 10.8 N·m
(0.8 - 1.1 kg-m,
5.8 - 8.0 ft-lb)
Brake Booster to body
7.8 - 10.8 N·m
(0.8 - 1.1 kg-m,
5.8 - 8.0 ft-lb)

Note: After Brake Booster is properly installed in car, conduct an air-tight and operational tests as previously described.

BLEEDING HYDRAULIC SYSTEM

Hydraulic brake system must be bled whenever any line has been disconnected or air has in some way entered system.

"Spongy" pedal action is an indication that air has entered brake system.

Bleeding hydraulic system deserves much attention as it is an essential element in regular brake servicing.

1. Clean all dirt around master cylinder reservoir, remove cylinder cover and top up reservoir with recommended brake fluid.

Note: Do not mix two different brand oils.

2. Thoroughly clean mud or dust from bleeder valve so that outlet hole is free from foreign material. Install a bleeder hose on bleeder valve.

Dip other end of hose into brake fluid bled in a container.

3. Depress brake pedal two or three times and then keep pedal fully depressed.

4. With brake pedal fully depressed, open bleeder valve to exhaust air.

Note:

a. **Carefully monitor brake fluid level at master cylinder during bleeding operation.**
b. **Do not re-use brake fluid drained during bleeding operation.**
c. **Bleed air in the following sequence.**

Master cylinder → Rear wheel → Front wheel

d. **Be careful not to splash brake fluid on painted areas.**

5. Close bleeder valve quickly as brake pedal is on down stroke.

6. Allow brake pedal to return slowly with bleeder screw closed.

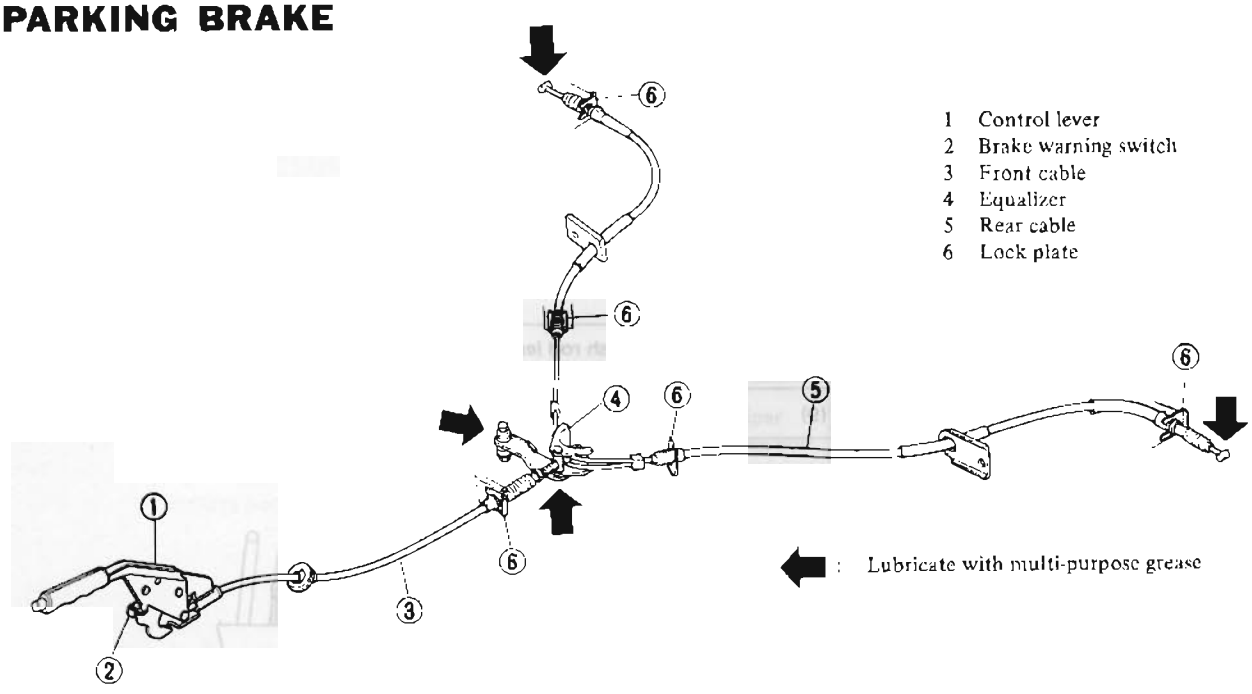
7. Repeat bleeding operations until no air bubbles show in hose.

Note:
a. Brake fluid containing air is white and contains air bubbles.
b. Brake fluid containing no air runs out of bleeder valve in a solid stream free of air bubbles.

8. Repeat steps above on remaining brake line to expel air.

PARKING BRAKE

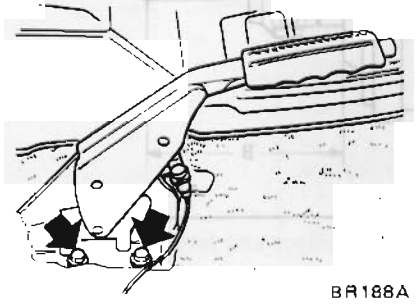
PARKING BRAKE



REMOVAL

Control lever and front cable

1. Remove front assistant's seat.
2. Disconnect terminal from parking brake warning switch.
3. Remove bolts securing parking brake control lever to floor.


BR188A

4. Remove lock plate, adjusting nut and lock nut.
5. Pull front cable out into driver's compartment and remove it together with control assembly.

CAUTION:
Be careful not to deform or damage control lever.

Note: Front cable, clevis pin and cotter pin are available as service parts.

Rear cable

1. Disconnect rear cable at equalizer.
2. Remove cable lock plate from rear suspension and rear disc brake.
3. Remove clevis pin and clevis from rear disc brake.
4. Disconnect rear cable from suspension arm and then remove rear cable.

INSPECTION

1. Check control lever for wear or other damage. Replace if necessary.
2. Check wires for discontinuity or deterioration. Replace if necessary.
3. Replace malfunctioning warning light or switch.
4. Check parts at each connection and, if found deformed or damaged, replace.

INSTALLATION

Install parking brake assembly following the reverse procedure of removal. Closely observing the following items:

1. When installing, apply a coating of grease to sliding contact surfaces.
2. Upon completion of installation of parking brake assembly, adjust the entire system as described in Section MA.
3. Make sure that adjacent parts do not interfere with cable.

Do not apply an undue stress to cable.

SERVICE DATA AND SPECIFICATIONS

GENERAL SPECIFICATIONS

SERVICE BRAKE

Unit: mm (in)

	Front	Rear
Type	Disc-CL28V	Disc-AN14H
Pad dimension Width x thickness x length	49 x 11 x 118 (1.93 x 0.43 x 4.65)	42 x 10.3 x 56.8 (1.65 x 0.406 x 2.236)
Rotor outer diameter	252 (9.92)	269 (10.59)
Caliper inner diameter	60.6 (2.386)	42.8 (1.685)

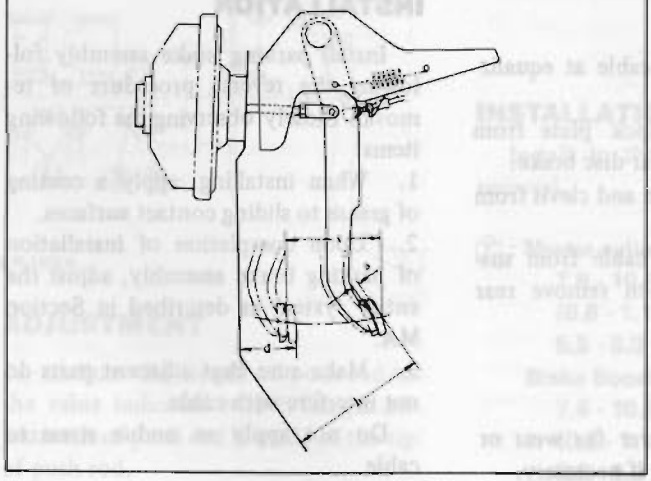
Master cylinder inner diameter mm (in)	23.81 (15/16)
Brake Booster Type	M90
Diaphragm diameter mm (in)	228.6 (9)
NP-valve Split point kPa (kg/cm^2, psi)	3.923 (40, 569)
Reducing ratio	0.4

INSPECTION AND ADJUSTMENT

BRAKE PEDAL

Unit: mm (in)

	M/T	A/T
Pedal play "a"	1 - 5 (0.04 - 0.20)	
Depressed height "d"	More than 80 (3.15)	More than 90 (3.54)
Pedal height "h"	181 - 187 (7.13 - 7.36)	190 - 196 (7.48 - 7.72)
Full stroke "s"	125 (4.92)	134 (5.28)



PARKING BRAKE

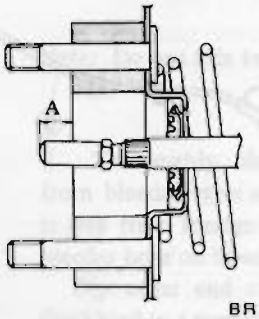
Pulling force	N (kg, lb)	265 (27, 60)
Stroke	mm (in)	86 - 109 (3.39 - 4.29)
Number of notches		4 - 6

MASTER CYLINDER

Allowable clearance between cylinder and piston mm (in)	Less than 0.15 (0.0059)

BRAKE BOOSTER

Maximum vacuum leakage (15 seconds after engine is stopped) kPa (mmHg, inHg)	3.3 (25, 0.98)
Push rod length "A" mm (in)	9.5 - 10.5 (0.374 - 0.413)
Operating rod length "B" mm (in)	143 (5.63)



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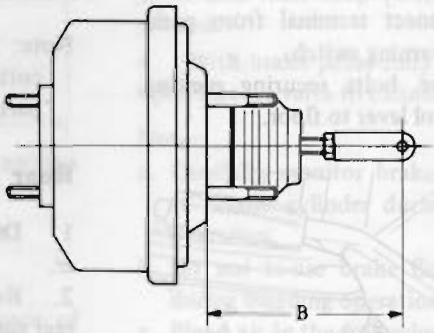


BR947

CHECK VALVE

Maximum vacuum leakage [15 seconds after 26.7 kPa (200 mmHg, 7.87 inHg) pressure is applied] kPa (mmHg, inHg)	1.3 (10, 0.39)

DISC BRAKE

Unit: mm (in)

Item	Front	Rear
	CL28V	AN14H
Pad wear limit (Minimum thickness)	2 (0.08)	
Rotor repair limit Maximum runout	0.10 (0.0039)	0.15 (0.0059)
Maximum parallelism circumferential direction	0.03 (0.0012)	
Minimum thickness	18.0 (0.709)	8.6 (0.339)

TIGHTENING TORQUE

Unit		N-m	kg-m	ft-lb
Master cylinder to Brake Booster		7.8 - 10.8	0.8 - 1.1	5.8 - 8.0
Brake tube flare nut		15 - 18	1.5 - 1.8	11 - 13
Brake hose connector		17 - 20	1.7 - 2.0	12 - 14
Air bleeder valve		6.9 - 8.8	0.7 - 0.9	5.1 - 6.5
Connector mounting bolt	6 mm dia. bolt	4.9 - 6.9	0.5 - 0.7	3.6 - 5.1
	8 mm dia. bolt	7.8 - 10.8	0.8 - 1.1	5.8 - 8.0
NP-valve		5.9 - 6.9	0.6 - 0.7	4.3 - 5.1
Fulcrum bolt of brake pedal		34 - 39	3.5 - 4.0	25 - 29
Brake warning lamp switch lock nut		12 - 15	1.2 - 1.5	9 - 11
Caliper fixing bolt	Front	72 - 97	7.3 - 9.9	53 - 72
	Rear	38 - 52	3.9 - 5.3	28 - 38
Rotor fixing bolt		54 - 74	5.5 - 7.5	40 - 54
Front brake baffle plate fixing bolts		3.1 - 4.3	0.32 - 0.44	2.3 - 3.2
Rear brake baffle plate fixing bolts		3.1 - 4.3	0.32 - 0.44	2.3 - 3.2
Brake booster				
Brake booster to body		7.8 - 10.8	0.8 - 1.1	5.8 - 8.0
Operating rod lock nut		16 - 22	1.6 - 2.2	12 - 16
Flange to shell cover		7.8 - 10.8	0.8 - 1.1	5.8 - 8.0
Push rod adjusting nut		16 - 22	1.6 - 2.2	12 - 16

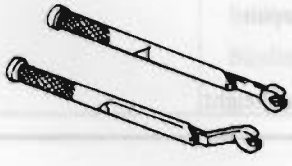
TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause	Corrective action
Excessive pedal travel	Low brake fluid level or empty master cylinder reservoir.	Fill and bleed as necessary. Test for source of leakage by examining all lines, connections and wheel cylinder.
	Leakage in master cylinder.	Overhaul master cylinder.
	Deteriorated check valve.	Replace check valve and bleed system.
	Air in system.	Bleed system.
	Faulty brake adjustment.	Adjust pad-to-rotor clearance. Inspect auto-adjuster operation.
	Excessive lateral play on disc caused by loose or worn wheel bearings or steering parts.	Replace or adjust faulty parts.
Spongy pedal	Low fluid level in master cylinder.	Top with fluid and inspect for leakage.
	Air in system.	Correct as necessary.
	Faulty brake adjustment.	Adjust pad-to-rotor clearance. Inspect auto-adjuster operation.
	Reservoir filler cap vent hole clogged.	Clean and bleed system.
	Swollen hose due to deterioration or use of poor quality hose.	Replace hose and bleed system.
	Distorted brake shoes, or excessively worn or cracked brake drum.	Replace faulty parts.
	Soft or swollen caliper seals.	Drain hydraulic system, flush with alcohol and replace all seals.
	Use of a brake fluid with too low boiling point.	Replace with specified brake fluid and bleed system.
Poor braking effect	Fluid leakage in brake lines.	Check master cylinder, piping and caliper for leaks, and repair.
	Low brake fluid level or empty master cylinder reservoir.	Fill and bleed as necessary.
	Air in brake lines.	Bleed system.
	Grease, oil, mud or water on pads.	Clean brake mechanism and check for cause of problem. Replace pads.
	Deterioration of pads.	Replace.
	Local fit of pads.	Shave or replace.
	Pads excessively worn.	Replace.
	Master cylinder or caliper assembly in poor condition.	Repair or replace.
	Frozen or seized caliper pistons on disc brakes.	Disassemble caliper and free up as required.
	Binding mechanical linkage at brake pedal.	Free up as required.

Condition	Probable cause	Corrective action
Unbalanced brakes	Improper tire inflation.	Inflate to correct pressure.
	Improper auto adjustment of pad-to-rotor clearance.	Readjust.
	Grease, oil, mud or water on pads.	Clean brake mechanism and check for cause of problem. Replace pads.
	Mud in rotor.	Clean.
	Deterioration of pads.	Replace.
	Excessive wear of pads.	Replace.
	Caliper cylinder in poor condition.	Repair or replace.
	Looseness of caliper assembly securing bolts.	Fasten or replace.
	Scored or out-of-round rotor.	Recondition or replace rotor as required. Check for improper pad contact with rotor and grind pad if necessary.
	Incorrect adjustment of wheel bearings.	Adjust or replace.
	Incorrect adjustment of wheel alignment.	Adjust.
Brakes fade	Brake fluid has too low boiling point.	Drain and fill system with approved fluid.
	Use of improper pads.	Replace.
	Brake rotor is out-of-round.	Repair or replace as necessary.
	Hydraulic connections, master cylinder and caliper cylinders are corroded or damaged.	Repair as necessary.
	Bleed screw is open.	Close screw and bleed system.
Brakes drag	Pedal linkage is binding or push rod adjustment is too long.	Lubricate linkage, check pedal return spring for condition and adjust push rod as necessary.
	Master cylinder compensator port is obstructed.	Blow out foreign matter with compressed air.
	Seized master cylinder piston.	Disassemble master cylinder and replace piston. Bleed system.
	Poor pad condition.	Clean and repair.
	Poor caliper cylinder condition.	Repair or replace.
	Deformation of piston cups.	Replace.
	Poor condition of caliper because of faulty piston seals.	Replace piston seals.
	Excessive runout of rotor.	Turn rotor on lathe or replace.
	Hand brake will not return.	Check and repair.
	Clogged master cylinder return port.	Clean.
	Clogged brake lines.	Check and clean.
	Incorrect adjustment of wheel bearings.	Adjust or repair.
	Improper pad-to-rotor clearance.	Adjust.
	No free travel in brake pedal return.	Adjust pedal height.

Condition	Probable cause	Corrective action
Brake chatters	Groove or out-of round rotor.	Grind or replace as required.
	Loose or bent support plate.	Tighten support plate bolts to specified torque, or replace plate.
	Distorted pads.	Replace as necessary.
	Grease or brake fluid on pads.	Replace pads.
Brake squeals	Dirty or scored rotor.	Blow out assembly with compressed air or refinish rotor.
	Bent support plate.	Replace faulty unit.
	Glazed or contaminated pads.	Grind pad to eliminate glaze. If it doesn't, replace pad.
Pedal pulsates	Lateral runout of brake rotor is excessive.	Check with dial indicator, turning disc by hand. If runout exceeds specifications, replace disc.
	Excessive variation in thickness of brake rotor surfaces.	Measure around disc face with micrometer. Replace disc as required.
Rear lock (under light brake pedal force)	Improper tire pressures.	Check and adjust.
	Excessive wear of tires.	Check and replace.
	Faulty NP-valve.	Replace.
Rear lock (under heavy brake pedal force)	Improper tire pressures.	Check and adjust.
	Excessive wear of tires.	Check and replace.
	Poor front braking effect.	
	• Grease oil, mud or water on pads.	Clean or replace.
	• Excessive wear pads.	Replace.
	• Local fit pads.	Shave or replace.
	• Master cylinder or caliper cylinder in poor condition.	Repair or replace.

SPECIAL SERVICE TOOL

Tool number & tool name	Kent-Moore No. / Reference page	Tool number & tool name	Kent-Moore No. / Reference page
GG94310000 Flare nut torque wrench	—		
	Page BR-4 Page BR-5 Page BR-7 Page BR-12		