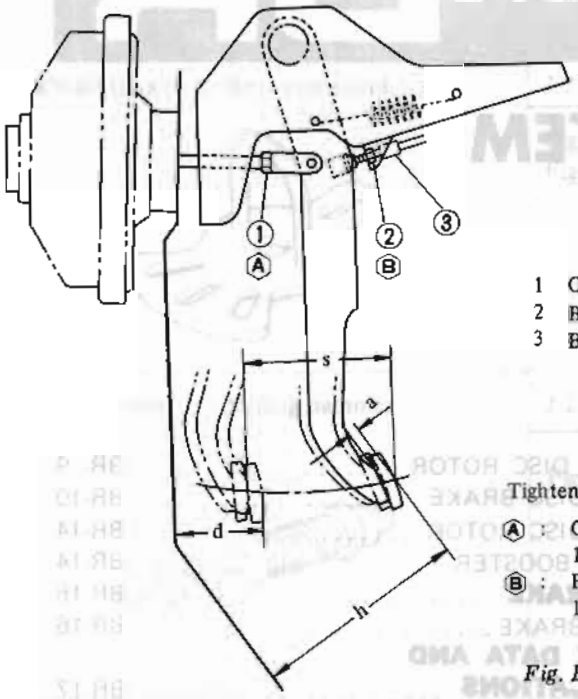
SECTION BR

BRAKE SYSTEM

CONTENTS

ADJUSTMENT

BRAKE PEDAL



1 Operating rod lock nut
2 Brake lamp switch lock nut
3 Brake lamp switch

Tightening torque: kg-m (ft-lb)
Ⓐ : Operating rod lock nut
1.6 to 2.2 (12 to 16)
Ⓑ : Brake lamp switch lock nut
1.2 to 1.5 (9 to 11)

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Fig. BR-1 Adjusting Brake Pedal

1. Adjust pedal height "h" to the specifications by moving brake lamp switch, and operating rod.

Pedal height "h":
M/T model
181 to 187 mm
(7.13 to 7.36 in)
A/T model
190 to 196 mm
(7.48 to 7.72 in)

Then secure brake lamp switch and operating rod.

Ⓣ Tightening torque:
Brake lamp switch lock nut
1.2 to 1.5 kg-m
(9 to 11 ft-lb)
Operating rod lock nut
1.6 to 2.2 kg-m
(12 to 16 ft-lb)

2. Pedal free play adjustment is not necessary under normal conditions. Check pedal free play. If it exceeds the specification, adjust push rod length (refer to Brake Booster for adjustment) by removing master cylinder (refer to Master Cylinder for removal).

Free play "a":
1 to 5 mm
(0.04 to 0.20 in)

3. After adjustment is completed, depress brake pedal several times to insure that it travels over its entire stroke smoothly without squeaking noise, twisting or interference.

Pedal depressed height "d":
M/T model
more than 80 mm (3.15 in)
A/T model
more than 90 mm (3.54 in)

FRONT DISC BRAKE

Front disc brake does not require adjustment under normal conditions since pad to rotor clearance is automatically compensated for by elasticity of piston seal.

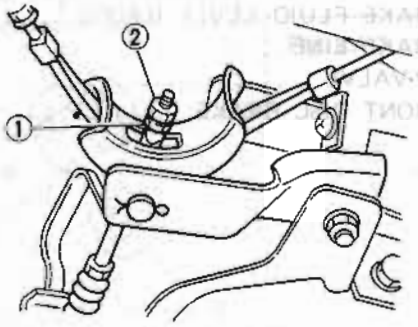
REAR DISC BRAKE

Rear disc brake does not require adjustment under normal conditions since pad-to-rotor clearance is automatically adjusted by depressing foot brake pedal. Brake pad-to-rotor clearance is properly adjusted if brake pedal stroke is constant.

HAND BRAKE

1. Adjust front cable adjusting nut so that when hand brake control lever is pulled by a specified force; lever stroke or number of notches is as indicated in table below.

Pulling force kg (lb)		27 (60)
Control lever stroke	mm (in)	86 to 109 (3.39 to 4.29)
Number of notches		4 to 6



1 Front cable adjusting nut
2 Lock nut

BR160A

Fig. BR-2 Adjusting Front Cable

2. After returning hand brake control lever to its position, ensure that:
- All rear brake toggle levers return to their original positions.
- Rear cables are not slack.

HAND BRAKE WARNING LAMP SWITCH

Bend hand brake warning lamp switch plate down so that brake warning light comes on when ratchet at hand brake lever is moved back one notch and goes out when returned to its original position.

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:

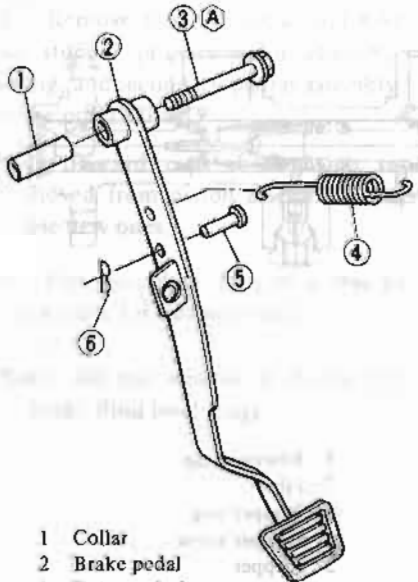
a. Brake fluid containing air is white and contains air bubbles.

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.

SERVICE BRAKE

BRAKE PEDAL



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

Tightening torque kg-m (ft-lb)
Ⓐ : 3.5 to 4.0 (25 to 29)

BR161A

Fig. BR-3 Brake Pedal

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.

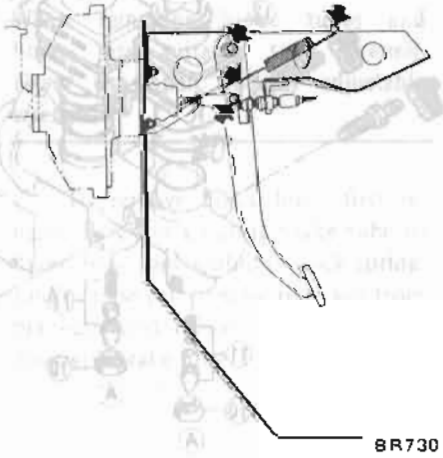
1. Check pedal bushing for wear, deformation or damage.
2. Check for bent brake pedal.
3. Check for fatigued return spring.

INSTALLATION

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

Ⓣ Tightening torque:
Fulcrum bolt
3.5 to 4.0 kg-m
(25 to 29 ft-lb)

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



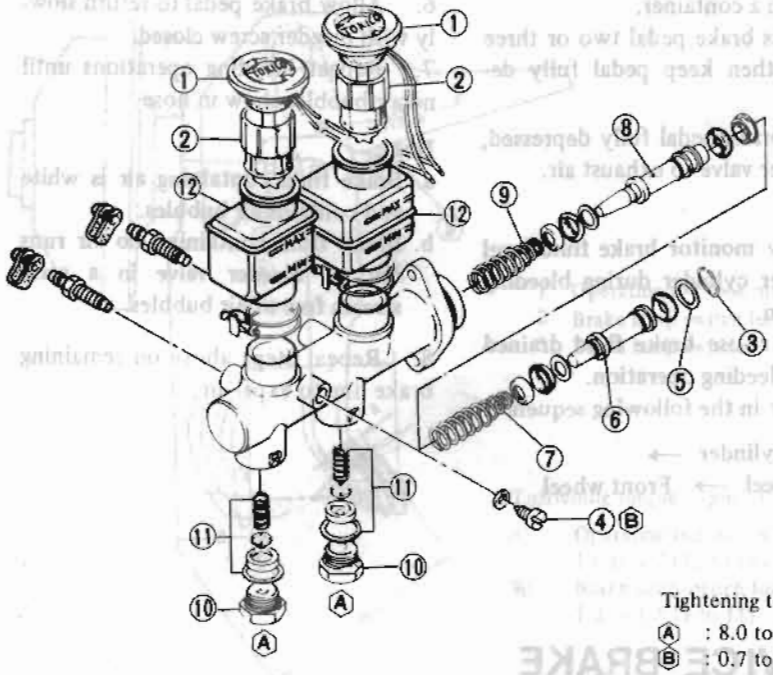
BR730

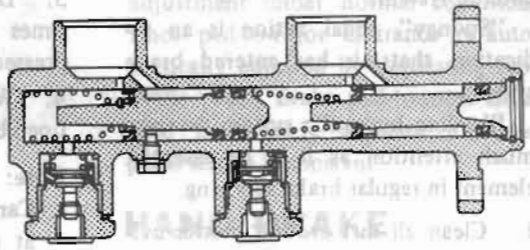
Fig. BR-4 Lubricating Points

2. Adjust brake pedal, referring to "Brake Pedal Adjustment".

MASTER CYLINDER

TOKICO Make

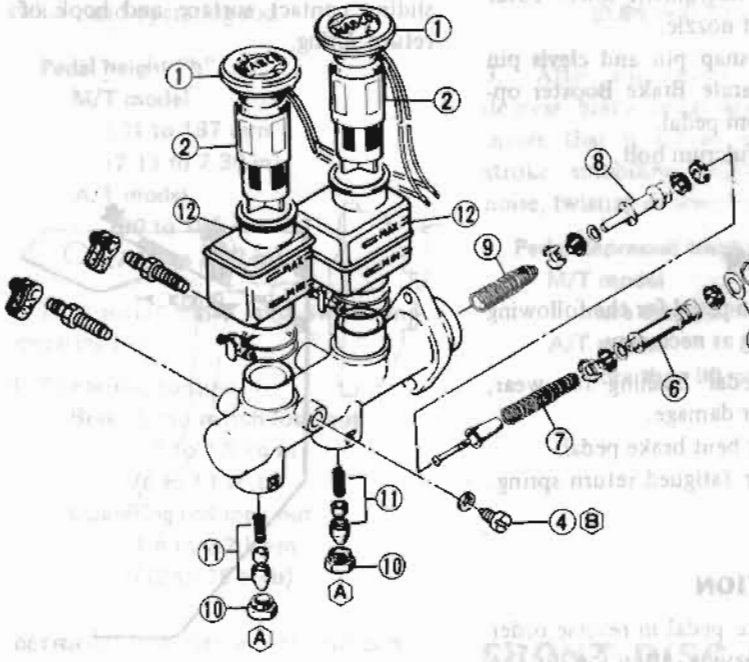


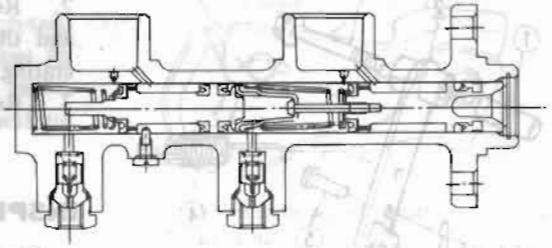


Tightening torque: kg-m (ft-lb)
Ⓐ : 8.0 to 9.0 (58 to 65)
Ⓑ : 0.7 to 0.9 (5.1 to 6.5)

1 Reservoir cap
2 Filter
3 Stopper ring
4 Stopper screw
5 Stopper
6 Primary piston
7 Primary piston return spring
8 Secondary piston
9 Secondary piston return spring
10 Plug
11 Check valve
12 Reservoir

NABCO Make





Tightening torque: kg-m (ft-lb)
Ⓐ : 2.5 to 3.5 (18 to 25)
Ⓑ : 0.15 to 0.3 (1.1 to 2.2)

1 Reservoir cap
2 Filter
3 Stopper ring
4 Stopper screw
5 Stopper
6 Primary piston
7 Primary piston return spring
8 Secondary piston
9 Secondary piston return spring
10 Plug
11 Check valve
12 Reservoir

BR162A

Fig. BR-5 Master Cylinder

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.

Ⓣ Tightening torque:
Brake master cylinder securing nut
0.8 to 1.1 kg-m
(5.8 to 8.0 ft-lb)
Brake tube flare nut
1.5 to 1.8 kg-m
(11 to 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.

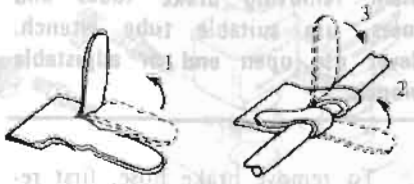
1. Leave a sufficient space between brake lines and adjacent parts so that brake lines are completely free from vibration during driving.
2. Be careful not to warp or twist.
3. When installing brake tube, keep a certain distance between tube and adjacent parts as follows:

- 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

Fig. BR-6 Fastening Brake Tube

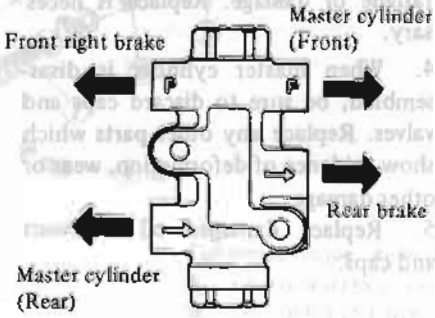
5. Do not tighten brake line mounting flare nut excessively.

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

Ⓣ Tightening torque:
Brake tube flare nut
1.5 to 1.8 kg-m
(11 to 13 ft-lb)
Brake hose connector
1.7 to 2.0 kg-m
(12 to 14 ft-lb)

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

NP-VALVE



BR163A

Fig. BR-7 NP-Valve

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.

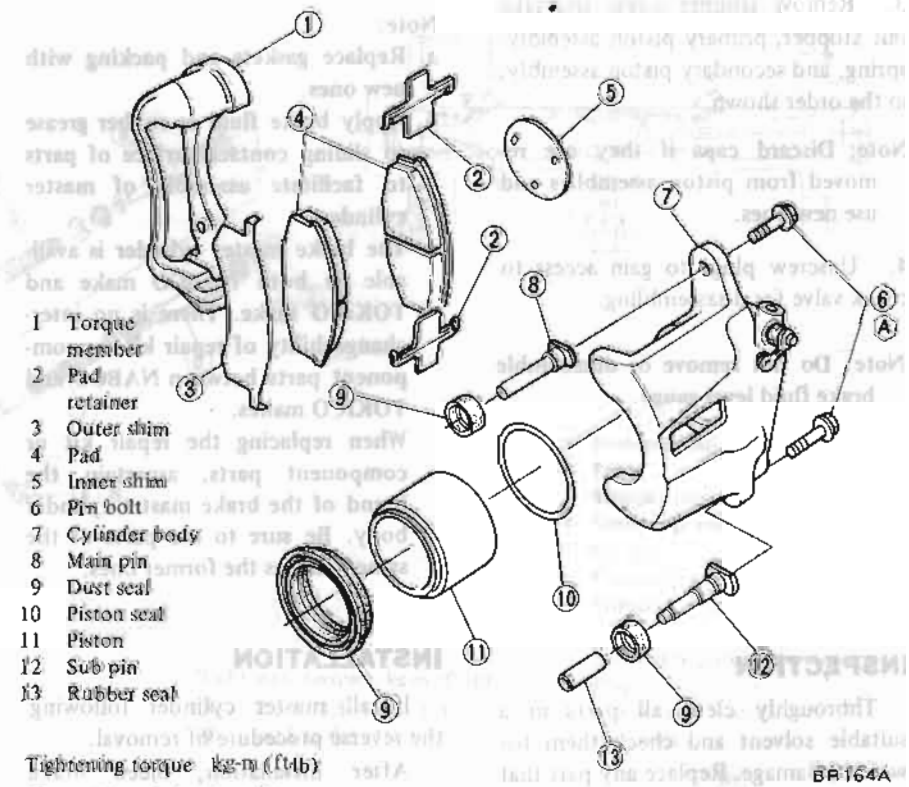
Note: Do not disassemble NP-valve.

3. Installation is in the reverse order of removal.

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

Ⓣ Tightening torque:
Flared nut
1.5 to 1.8 kg-m
(11 to 13 ft-lb)
NP-valve attaching bolt
0.6 to 0.7 kg-m
(4.3 to 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 kg-m (ft-lb)
Ⓐ : 2.2 to 3.2 (16 to 23)

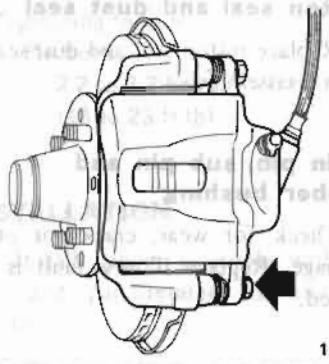
BR164A

Fig. BR-8 Disc Brake

PAD REPLACEMENT

Removal

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



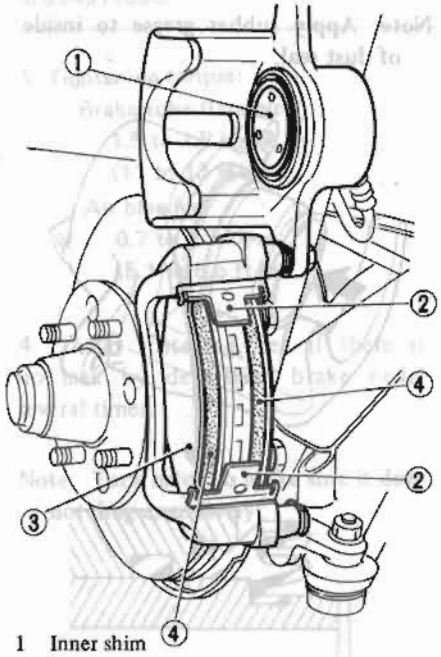
165A

Fig. BR-9 Removing Lower Pin Bolt

3. Open cylinder body upward and remove pad retainer ②, and inner and outer shims ① & ③.
   See Fig. BR-10.

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

Fig. BR-10 Removing Pads

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.

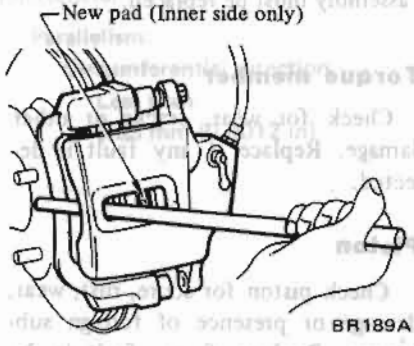
Installation

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.

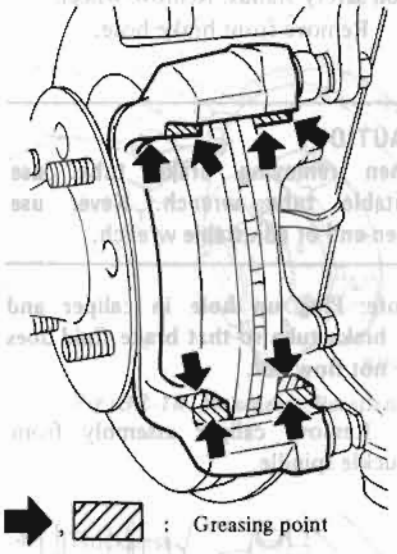


BR189A

Fig. BR-11 Pushing Piston

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

Note: Do not grease friction face of pad.

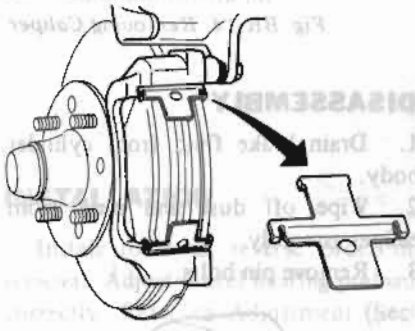


: Greasing point

BR167A

Fig. BR-12 Greasing Point

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

Fig. BR-13 Installing Pad Retainer

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

Ⓣ Tightening torque:
Pin bolt
2.2 to 3.2 kg-m
(16 to 23 ft-lb)

7. Depress brake pedal several times, and pads will settle into proper position.

8. Install wheels and lower car to ground.

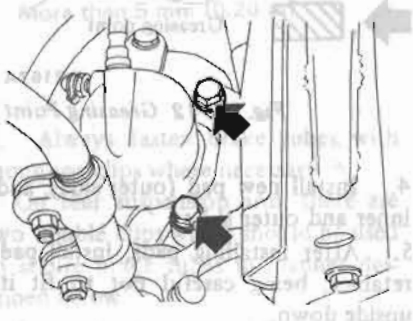
REMOVAL

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.

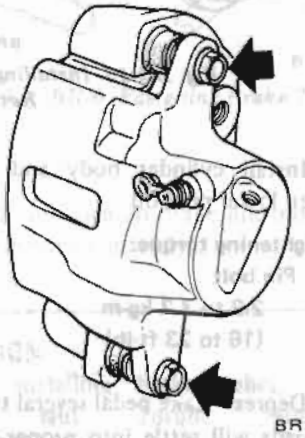


BR169A

Fig. BR-14 Removing Caliper

DISASSEMBLY

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



BR170A

Fig. BR-15 Removing Pin Bolts

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

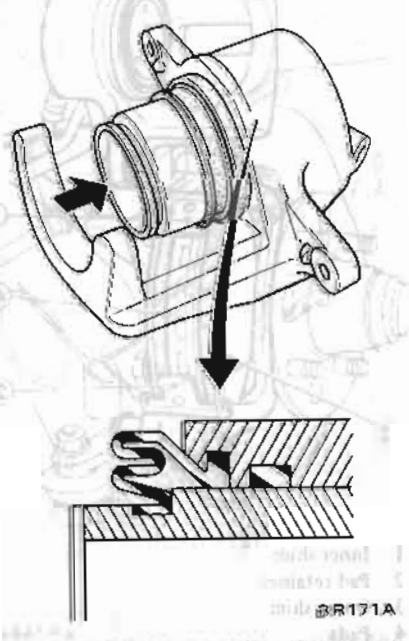
Check for wear, cracks or other damage. Replace if any fault is detected.

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. See Fig. BR-16.

Note: Apply rubber grease to inside of dust seal.



BR171A

Fig. BR-16 Installing Piston and Dust Seal

4. Coat the following part with recommended brake grease. See Fig. BR-12.
• 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.

Ⓣ **Tightening torque:**
Pin bolts
2.2 to 3.2 kg-m
(16 to 23 ft-lb)

INSTALLATION

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

Ⓣ **Tightening torque:**
Caliper mounting bolt
7.3 to 9.9 kg-m
(53 to 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.

Ⓣ **Tightening torque:**
Brake tube flare nut
1.5 to 1.8 kg-m
(11 to 13 ft-lb)
Air bleeder
0.7 to 0.9 kg-m
(5.1 to 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

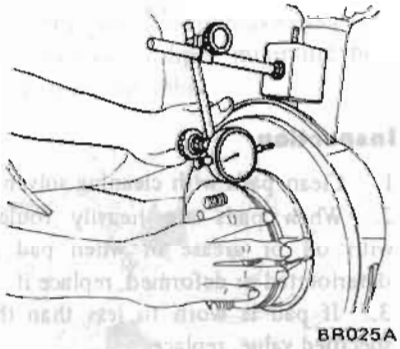


Fig. BR-17 Measuring Runout

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.**

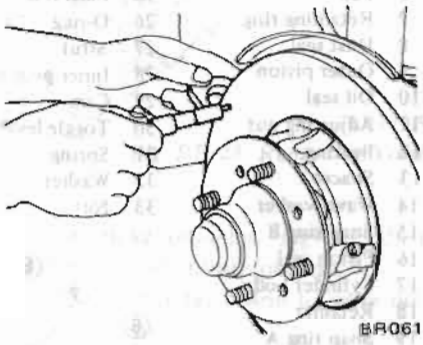


Fig. BR-18 Measuring Parallelism

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)

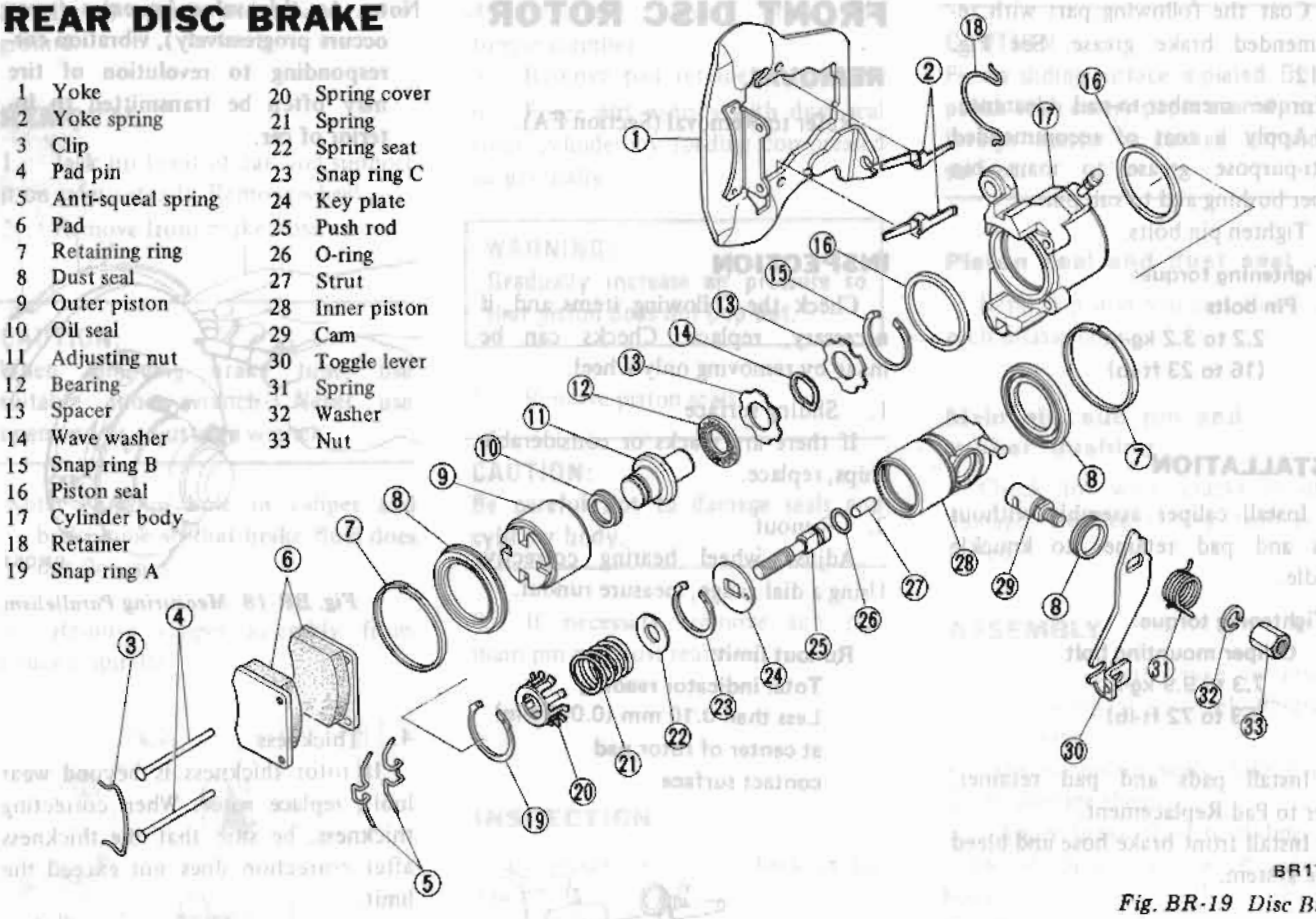
INSTALLATION

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

Ⓣ **Tightening torque:**
Rotor to wheel hub
3.9 to 5.3 kg-m
(28 to 38 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



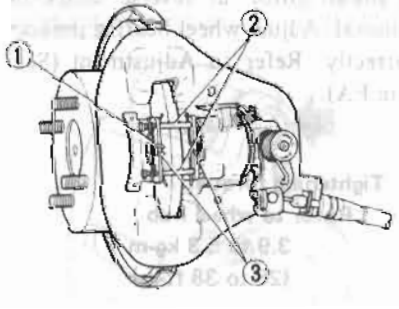
BR172A

Fig. BR-19 Disc Brake

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.



8R094A

Fig. BR-20 Removing Pads

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.

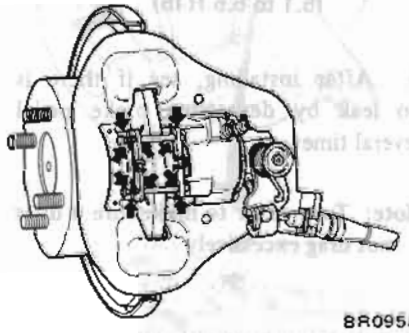
CAUTION:
Use brake fluid to clean. Never use mineral oil.

Note: Be careful not to get oil on rotor.

2. 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.



8R095A

Fig. BR-21 Greasing Points

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.

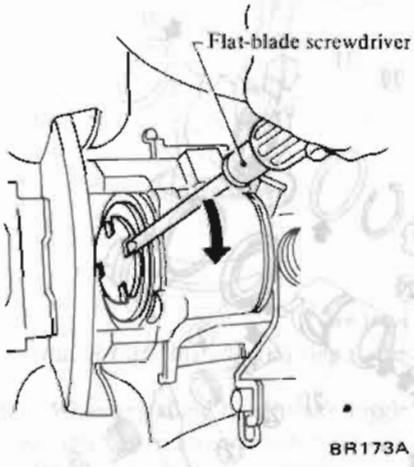


Fig. BR-22 Moving Piston

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

4. After installing shims and pads, install antisqueal 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.

Fig. BR-23 Installing Pads

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.

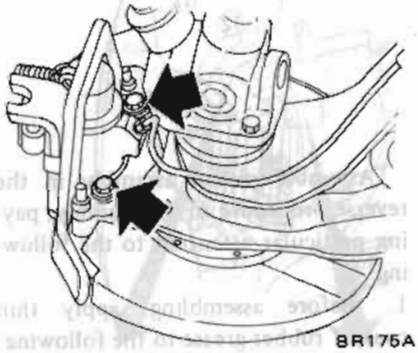


Fig. BR-24 Removing Caliper

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.

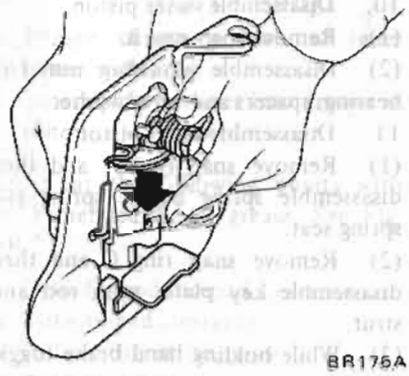


Fig. BR-25 Removing Yoke

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

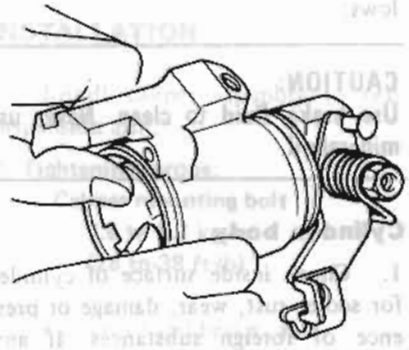


Fig. BR-26 Removing Piston

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.

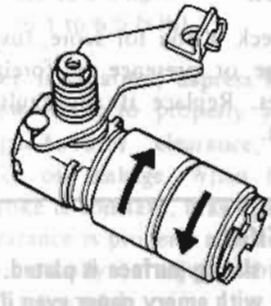


Fig. BR-27 Disconnecting Inner and Outer Piston

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.

Yoke

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.

Adjusting nut oil seal and push rod O-ring

Replace at each disassembly.

ASSEMBLY

Piston assembly

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

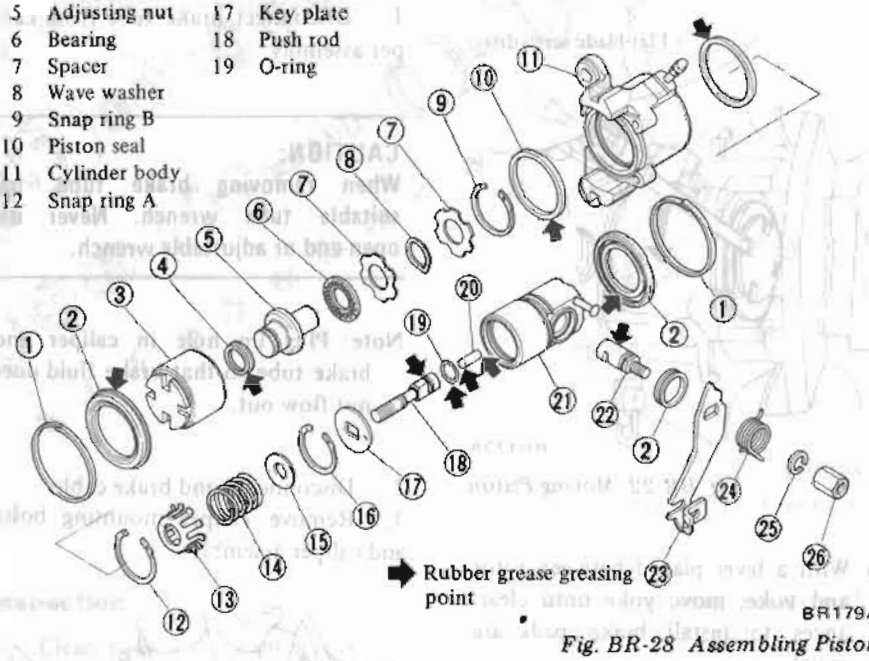


Fig. BR-28 Assembling Piston

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

CAUTION:
a. Securely install oil seal in specified direction. See Fig. BR-29.
b. Be careful not to excessively open or twist O-ring.

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

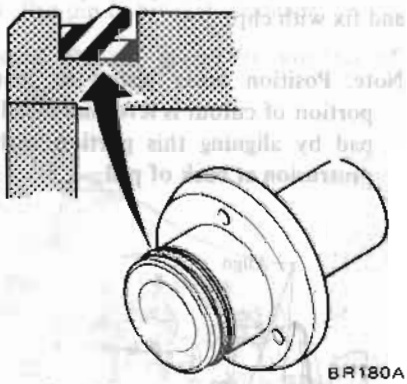


Fig. BR-29 Mounting Direction of Oil Seal

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. See Fig. BR-30.

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

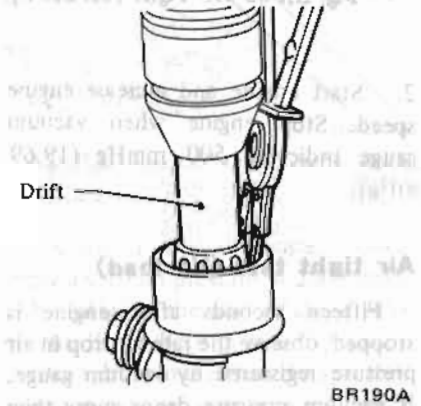


Fig. BR-30 Installing Spring Cover

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

Ⓣ **Tightening torque:**
Toggle lever nut
2.5 to 3.0 kg-m
(18 to 22 ft-lb)

Caliper assembly

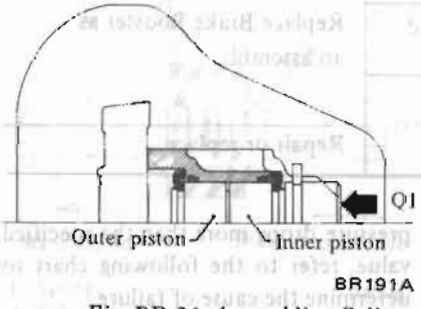


Fig. BR-31 Assembling Caliper

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. See Fig. BR-31.

4. Clamp dust seals with retainer rings.

Note: Replace dust seals with new ones.

5. Install yoke spring on yoke.

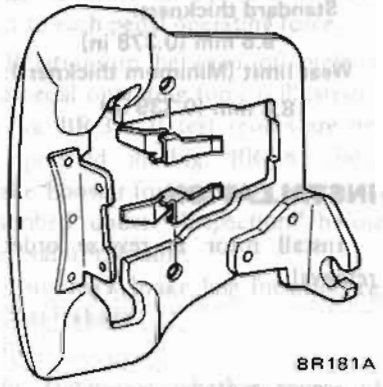
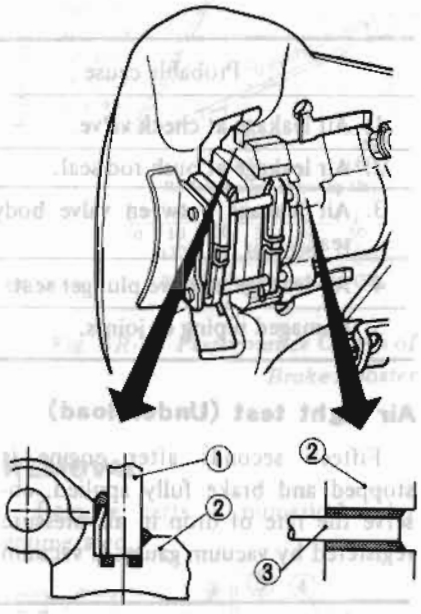


Fig. BR-32 Yoke with Yoke Spring

6. Coat the following points with silicone based grease.
- Frictional surfaces of yoke and cylinder body
- Cylinder body pad pin hole



: Silicone based greasing point
1 Yoke
2 Cylinder body
3 Pad pin

Fig. BR-33 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. See Fig. BR-21.
- 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.

Ⓣ **Tightening torque:**
Caliper mounting bolt
3.9 to 5.3 kg-m
(28 to 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.

Ⓣ **Tightening torque:**
Brake tube flare nut
1.5 to 1.8 kg-m
(11 to 13 ft-lb)
Air bleeder
0.7 to 0.9 kg-m
(5.1 to 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.

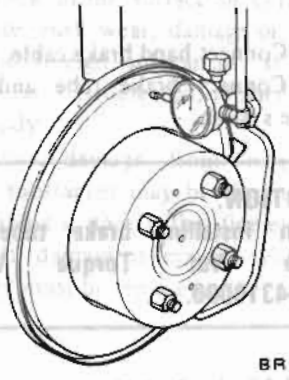
1. Sliding surface

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



BR104A

Fig. BR-34 Measuring Runout

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

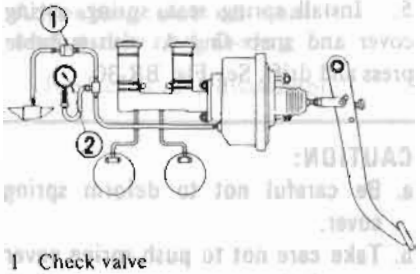
Install rotor in reverse order of removal.

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

Fig. BR-35 Air-Tight Test Set-Up

2. Start engine and increase engine speed. Stop engine when vacuum gauge indicates 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:
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)

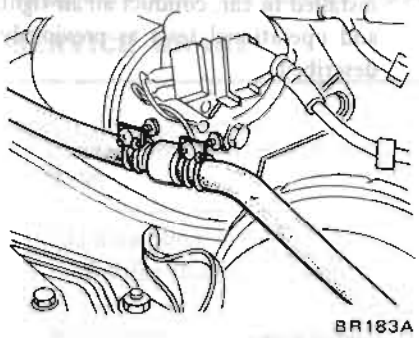
Fifteen seconds after engine is stopped and brake fully applied, observe the rate of drop in air pressure registered by vacuum gauge. If vacuum pressure drops more than the specified value, refer to the following chart to determine the cause of failure.

Maximum vacuum leakage:
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.



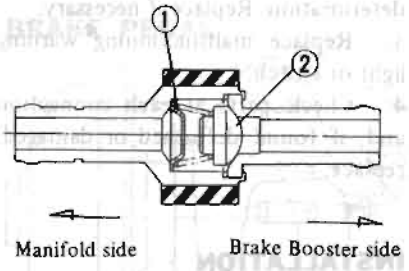
BR183A

Fig. BR-36 Location of Check Valve

2. Using a Brake Booster tester, apply a vacuum pressure of 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:
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

Fig. BR-37 Check Valve

4. When installing check valve, be careful to avoid incorrect connections. See Fig. BR-37.

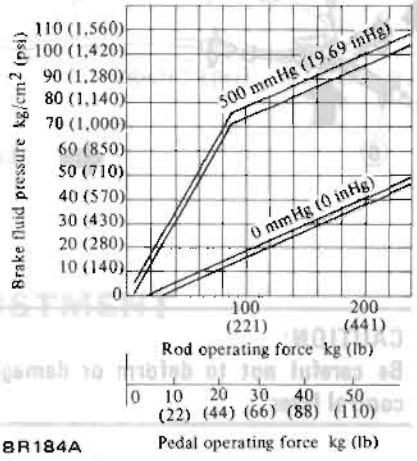
Operating test

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 500 mmHg (19.69 inHg) is registered on vacuum pressure gauge. With a steady vacuum pressure of 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 Fig. BR-38. If test results are not as specified in Fig. BR-38, 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.

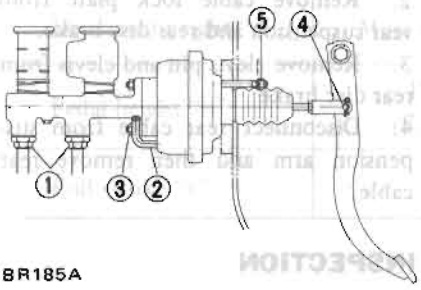


BR184A

Fig. BR-38 Performance Curves of Brake Booster

REMOVAL

Remove parts in numerical order enumerated.



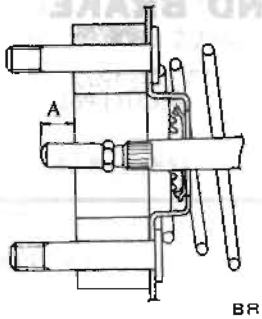
BR185A

Fig. BR-39 Procedures for Removing Brake Booster

ADJUSTMENT

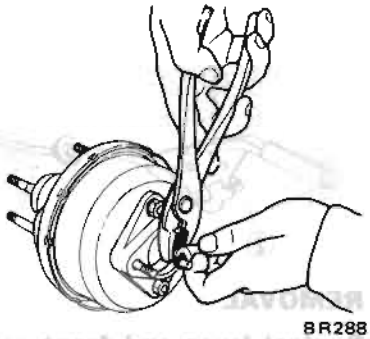
1. Adjust the length of push rod to the value indicated below. Length adjustment of push rod is made at the tip of push rod.

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



BR109A

Fig. BR-40 Length "A"

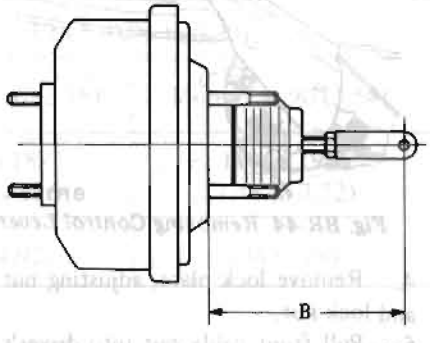


BR288

Fig. BR-41 Adjusting Push Rod Length

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

Length "B":
143 mm (5.63 in)



BR110A

Fig. BR-42 Length "B"

INSTALLATION

Install in the reverse sequence of removal.

Ⓣ Tightening torque:
Master cylinder to Brake Booster
0.8 to 1.1 kg-m
(5.8 to 8.0 ft-lb)

Brake Booster to body
0.8 to 1.1 kg-m
(5.8 to 8.0 ft-lb)

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

HAND BRAKE

HAND BRAKE

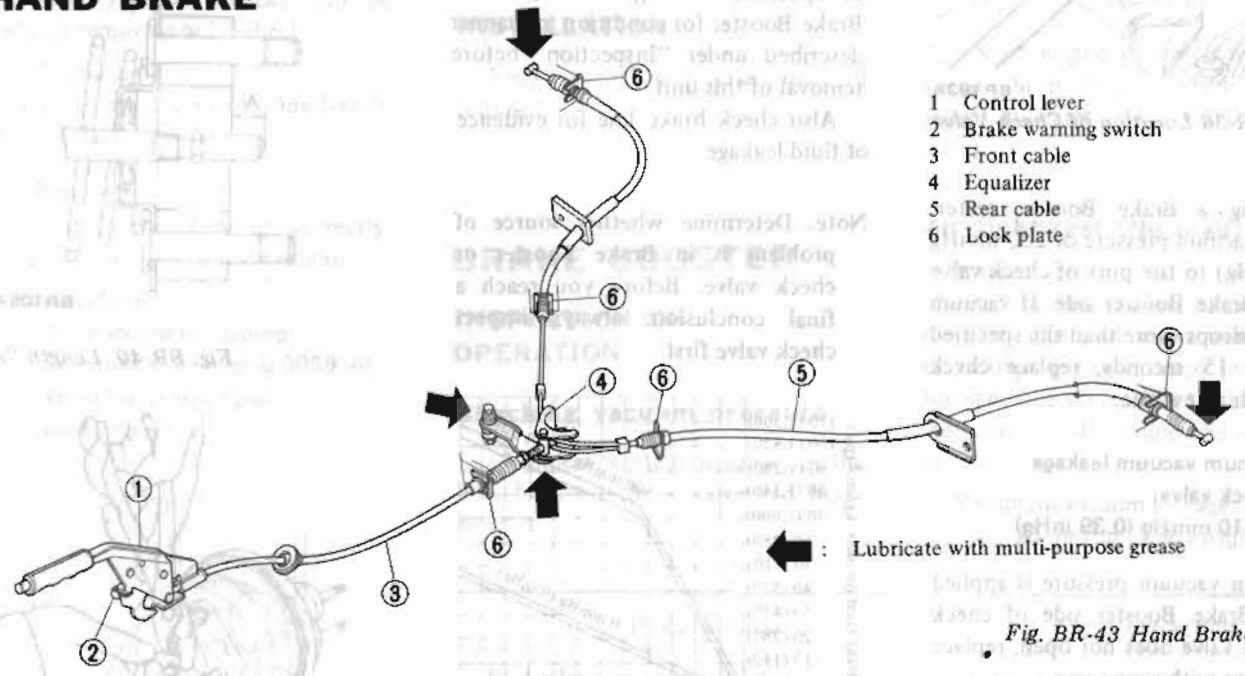


Fig. BR-43 Hand Brake Linkage

REMOVAL

Control lever and front cable

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

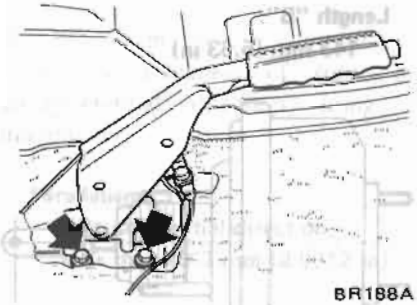


Fig. BR-44 Removing Control Lever

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 hand 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. See Fig. BR-43.
2. Upon completion of installation of hand brake assembly, adjust the entire system as described on page BR-3 for Adjustment of Hand Brake.
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

		Front	Rear
Type		Disc-CL28V	Disc-AN14H
Pad dimension Width x thickness x length	mm (in)	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	mm (in)	252 (9.92)	269 (10.59)
Caliper inner diameter	mm (in)	60.6 (2.386)	42.8 (1.685)

Master cylinder inner diameter mm (in) 23.81 (15/16)

Brake Booster

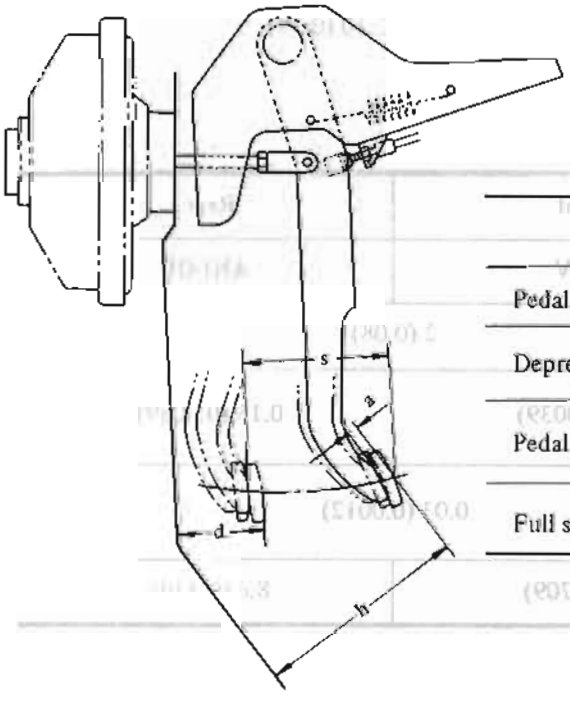
- Type M90
- Diaphragm diameter mm (in) 228.6 (9)

NP-valve

- Split point kg/cm^2 (psi) 40 (569)
- Reducing ratio 0.4

INSPECTION AND ADJUSTMENT

BRAKE PEDAL



Unit: mm (in)

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

HAND BRAKE

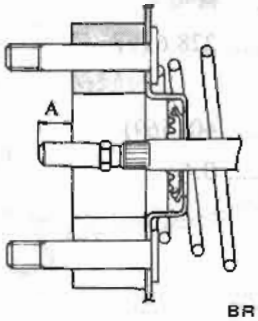
Pulling force	kg (lb)	27 (60)
Stroke	mm (in)	86 to 109 (3.39 to 4.29)
Number of notches		4 to 6

MASTER CYLINDER

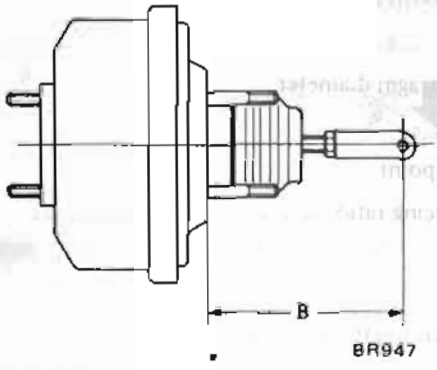
Allowable clearance between cylinder and piston	mm (in)	less than 0.15 (0.0059)

BRAKE BOOSTER

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



BR109A



BR947

CHECK VALVE

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

DISC BRAKE

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

TIGHTENING TORQUE

Master cylinder to Brake Booster	kg-m (ft-lb)	0.8 to 1.1 (5.8 to 8.0)
Brake tube flare nut	kg-m (ft-lb)	1.5 to 1.8 (11 to 13)
Brake hose connector	kg-m (ft-lb)	1.7 to 2.0 (12 to 14)
Air bleeder valve	kg-m (ft-lb)	0.7 to 0.9 (5.1 to 6.5)
Connector mounting bolt		
6 mm dia. bolt	kg-m (ft-lb)	0.5 to 0.7 (3.6 to 5.1)
8 mm dia. bolt	kg-m (ft-lb)	0.8 to 1.1 (5.8 to 8.0)
NP-valve	kg-m (ft-lb)	0.6 to 0.7 (4.3 to 5.1)
Fulcrum bolt of brake pedal	kg-m (ft-lb)	3.5 to 4.0 (25 to 29)
Brake warning lamp switch lock nut	kg-m (ft-lb)	1.2 to 1.5 (9 to 11)
Caliper fixing bolt		
Front	kg-m (ft-lb)	7.3 to 9.9 (53 to 72)
Rear	kg-m (ft-lb)	3.9 to 5.3 (28 to 38)
Rotor fixing bolt	kg-m (ft-lb)	3.9 to 5.3 (28 to 38)
Front brake baffle plate fixing bolts	kg-m (ft-lb)	0.32 to 0.44 (2.3 to 3.2)
Rear brake baffle plate fixing bolts	kg-m (ft-lb)	0.32 to 0.44 (2.3 to 3.2)

BRAKE BOOSTER

Brake Booster to body	kg-m (ft-lb)	0.8 to 1.1 (5.8 to 8.0)
Operating rod lock nut	kg-m (ft-lb)	1.6 to 2.2 (12 to 16)
Flange to shell cover	kg-m (ft-lb)	0.8 to 1.1 (5.8 to 8.0)
Push rod adjusting nut	kg-m (ft-lb)	1.6 to 2.2 (12 to 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 part 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 pad 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 or Fig. No.	Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.
GG94310000 Flare nut torque wrench	—		
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